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TDSB - TO P3 OR NOT?

Exploring Alternatives in Public-Private Partnerships for including public schools in mixed-use vertical developments in Toronto

Supervised Research Project Report

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Disclaimer

This study was not paid for or commissioned by Toronto District School Board (TDSB). Thus, its findings and conclusions are for academic purposes only, and are not an indication of any future policies that TDSB may undertake.

Abstract

In Toronto, the Toronto District School Board is facing overenrollment and school infrastructure shortage in areas of rapid growth. In these neighbourhoods, TDSB faces challenges of limited land availability and inadequate financial capability, and it is looking at mixed-use developments and public-private partnerships to address these issues respectively. This research project assesses the viability of these strategies through a series of case studies. While constructing new schools through p3 is not new to Canada, the construction of public schools in mixed-use vertical developments through p3 is relatively new and this research project explores this emerging concept.

P3s for building public school infrastructure in mixed-use developments have been applied with varying degrees of success. Such projects present opportunities for the TDSB to address enrollment issues in overcrowded areas, achieve its infrastructure goals, provide quality public facilities, support after-school-hour usage of these facilities, lighten financial burdens, reduce backlogs on maintenance and repairs, and continue ownership of public school lands in the coming years. Not all schools can be built using p3s, and not all schools can be built in mixed-use developments. School boards should approach partnerships with thoughtfulness, carefully weigh the benefits and challenges, and adopt a model that is suited to the local context.

Résumé

Le Toronto District School Board (TDSB) fait présentement face à certaines problématiques dans les zones de croissance rapide, notamment en ce qui a trait à la sur-inscription d'élèves ainsi qu'à une pénurie d'infrastructures scolaires. Les principaux défis que se doit de surmonter le TDSB dans ces quartiers consistent en une disponibilité limitée de terrains vacants ainsi qu'un manque de financement adéquat. Pour faire face à ces enjeux, le TDSB explore diverses possibilités dont notamment le développement de zones à usage-mixte et les partenariats public privé (PPP). Alors que la construction de nouvelles écoles préconisant selon le modèle PPP n'est pas nouvelle au Canada, ce projet examine plus précisément la viabilité de la pratique émergente relative à la construction des écoles publiques avec en hauteur et à usage mixte utilisant l'approche PPP en évaluant un ensemble d'études de cas.

La construction d'écoles publiques selon le modèle PPP au sein de zone à usage-mixte a déjà été mis à l'épreuve avec des degrés de succès variables. Ces types de projets offre au TDSB l'opportunité d'adresser les problèmes de sur-inscription, accomplir ses objectifs infrastructurels, fournir des installations publiques de qualité et soutenir leur usage en dehors des heures d'école, alléger ses fardeaux financiers, réduire les retards sur l'entretien et les réparations de leurs infrastructures et rester propriétaire des terrains sur lesquels sont bâtis les écoles publiques. Bien évidemment, les écoles ne peuvent tous être construites sous le modèle PPP et ne peuvent également tous être des développements à usage-mixte. Les commissions scolaires devraient tout de même aborder ce type de partenariat de façon réfléchie en considérant les divers enjeux et bénéfices qui y sont liés afin d'adopter un modèle adéquatement adapté au contexte local.

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Preface

In recent years, the demand for new infrastructure and repair needs for existing infrastructure have both been on the rise in Canada. With greater fiscal restraints at all levels of government, public-private partnerships (P3) have been proposed as an alternative financing model and as a solution for the successful delivery of infrastructure projects across the country.

More specifically, the shortage of school infrastructure in innercity areas of rapid development has been gaining attention. With limited land availability in dense urban areas and inadequate financial capability of the school boards to raise capital to build new schools, the willingness to explore public-private partnerships to address these issues has gained momentum in the past two decades. As inner city development goes vertically up, the tendency to include schools as part of these vertical developments is emerging as a response to address lack of school infrastructure. This is realized as a partnership effort between the public and private sectors. While constructing new schools through P3 is not new to Canada, the construction of public schools in mixed-use vertical developments through a P3 is relatively new.

As cities continue to grow, it is important to meet the needs of young families and children who rely on the infrastructure and community amenities that the city provides. Planning for schools to accommodate the growing population in the downtown cores, as well as address repair and maintenance in existing schools, requires timely delivery and cost effectiveness. Cities, school boards, real estate developers and the community at large need to recognize the necessity of public schools whenever a residential project is planned and not as an afterthought. Busing children to distant schools or increasing the number of portables in an already crowded public school are both unappealing solutions that discourage young families with children from moving into downtown cores. It is important to take preventative actions by collaborating, building partnerships, relying on the strengths and expertise of both the public and private sector, in order to create public schools within mixed-use developments.

This research project aims to better understand how publicprivate partnerships have been successful in building new public schools—especially in mixed-use vertical developments. It recognizes that a major concern for school boards is the limited availability of land and funding and, therefore, seeks to answer questions about how these concerns have been achieved across the globe, as well as about willingness of different stakeholders. Still the question recurs, "Can we do better?" The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty and we must rise with the occasion. As our case is new, so we must think anew and act anew.

-Abraham Lincoln

CHAPTER 1: INTRODUCTION

Overcrowding affects infrastructure. As the condo boom continues across Canada, the need for more community assets, facilities, and infrastructure increases, and schools face increasing enrolment pressures. The task is to ensure that school infrastructure responds to increasing community needs. While this is a phenomenon observed in dense downtown cores of several cities across the globe, this research project focuses on Toronto and its School Board needs.

1.1 **Problem Definition**

The increase in population in the inner-city areas of Toronto has led to increasingly dense neighbourhoods that have added to enrollment pressure on existing schools. The Toronto District School Board (TDSB) is exploring different options of addressing school infrastructure need (Latto & Kisko, 2015). But, why is it difficult to build new schools?

In Canada, education falls under provincial jurisdiction. The Ontario Ministry of Education oversees publicly funded elementary and secondary schools through school boards. Until 1997, school boards had access to local property tax and provincial funding to support k-12 public education. This meant that school boards with a higher tax base had more money to spend on education. In 1997, in order to bring about an equitable funding scenario for education and to provide equal opportunity for students across the province, the provincial government developed a formula¹ for funding education in Ontario (Ministry of Education, 2011). The funding is provided through a series of grants to school boards depending on several factors such as number

¹ <u>http://edu.gov.on.ca/eng/funding/1112/technical11.pdf</u> - This paper contains an overview of the grant formulas and other criteria for education funding that are used to calculate school boards' allocations for budgeting.

of schools, enrolment, geographical needs, and special needs (Ontario Ministry of Education, 2015, People for Education, 2016).

The TDSB is one of the largest school boards in the province, serving 588 schools throughout Toronto (TDSB, 2014a), and, with over 50% of its properties built in the 1950s and 1960s, it is facing growing repair and maintenance needs (TDSB 2014b). The board thus has to balance funding between construction of new schools and renovation of existing schools. Even though education is the second largest budget item in the provincial budget after health care (TDSB 2014c), existing funding commitments aren't sufficient to address infrastructure maintenance needs and new school construction requirements. Figure 1 shows the capital renewal backlog of \$3 billion, which is the amount of funding necessary for the upkeep and maintenance of school infrastructure. The majority of the TDSB schools were built in the 1950s and 1960s and the aging facilities are in need of capital funding to support renovation and to replace portables. Moreover, the average design life cycle of a school is 35 years (TDSB Capital Facts, 2014).



Figure 1 Capital Renewal Backlog - gap between funding grants and exponentially rising backlog Source: TDSB Capital Facts, 2014 p.4

The funding formula set by the provincial government provides capital funding based on average enrollment across the entire city. But this is difficult for Toronto and the TDSB, because closing schools in areas where there is a decline in enrollment and building new schools in areas of greater enrollment is time intensive and politically controversial as it affects the communities involved (Refer to Figure 2).



Figure 2 Representation of TDSB secondary and elementary schools under review for closure, 2015 Source: Marshall, 2015

The Ministry of Education insists that the TDSB meet its infrastructure needs by raising its own capital. This is to be achieved in part through the sale of either whole or partial school board sites, despite the fact that such sales might reduce the Board's ability to respond to future student needs arising from demographic changes. Does the Board truly need to sell its land to raise capital for construction of new schools? How difficult would it be to include a school when a high-density development is proposed in a rapidly growing neighbourhood whose schools already faces increased enrollment? Can the private sector accommodate a public school as part of its development, without the Board having to fund the construction? What will it take to make that happen? While the TDSB is investigating the option of integrating school space into mixed-use projects, this research investigates other options of including public schools in a mixed-use development when there is shortage of land availability and funding by looking at domestic and international case studies. According to this research, TDSB has not completely explored the potential of its existing school land in areas of rapid development. Why should school boards sell public lands to raise capital if there are other options available?

1.2 Purpose of the Research

Traditional school sites are slowly becoming impractical to identify and impossible to acquire in areas of Toronto with high intensification and rising property values (Refer to Figure 3).



Planned Future Residential Development

Figure 3 As of 2014, there are applications for an additional 277,000 new residential units across the City of Toronto. | Source: TDSB Capital Facts, 2014 p.5

The TDSB does not have taxation powers and relies on the Ministry of Education for funding new construction and major renovations. The TDSB has been facing pressure from the Ministry to sell properties—in particular those that are currently being leased out to other organizations—to pay for the maintenance backlog. Moreover, the TDSB is also unable to collect Education Development Charges from new condominium projects—charges that other school boards such as the Toronto Catholic District School Board (TCDSB) rely on for up to \$841 per unit. These charges can only be used to purchase and upgrade land, and since TDSB already owns land it is not allowed to collect them (Refer to Figure 4).

Even though procuring a traditional school site in the downtown core turns out to be very expensive for TDSB, it still has to take care of its student needs by appropriately addressing resource and infrastructure issues. Given this task, the planning profession needs to continue to innovate ways to infiltrate the dense urban fabric and redevelop from the inside out.

Funding Capital Requirements

Region	School Board	Residential Charge Per Unit	Non-Residential Charge/Sq Ft
Durham Region	Durham Catholic District School Board	\$541.00	\$0.00
	Durham District School Board	\$1,423.00	\$0.00
Halton Region	Halton Catholic District School Board	\$1,484.00	\$0.38
	Halton District School Board	\$2,691.00	\$0.69
Hamilton	Hamilton-Wentworth Catholic District School Board	\$739.00	\$0.22
Peel	Dufferin-Peel Catholic District School Board	\$551.00	\$0.33
	Peel District School Board	\$1,595.00	\$0.32
Simcoe County	Simcoe County District School Board	\$1,364.00	\$0.36
	Simcoe Muskoka Catholic District School Board	\$463.00	\$0.12
Toronto	Toronto Catholic District School Board	\$1,303.00	\$0.94
	Toronto District School Board	\$0.00	\$0.00
York Region	York Catholic District School Board	\$650.00	\$0.17
	York District School Board	\$1,370.00	\$0.35

Education Development Charges in the GTA

Figure 4 Education development charges in the GTA | Source: TDSB Capital Facts, 2014 p.6

This research project explores the emerging concept of developing schools in a mixed-use project through public-private partnerships, and looks at different options of including public schools in a mixed-use development to address the current need of TDSB. Two separate themes guide this project: land availability and fiscal capacity. On the one hand, the development of schools in a mixeduse project can address the limited availability of land. On the other hand, the development of schools through a public-private partnership can address the school board's limited fiscal capability.

1.3 Structure of the Report

There are two major components of this research report. The first component is a literature review (Chapter 2), which provides a broad understanding of the elements of public-private partnership models for school infrastructure development, mixed-use development, and multi-stakeholder dynamics in Canada. A significant portion of the literature review is focused on gray literature, such as the websites and reports produced by various organizations, networks, and partnerships. From the literature review, the interests, roles and expectations of both the public and private partners are described. Overall benefits and opportunities of public private partnerships are discussed separately for mixed-use developments and public schools.

The second major component is the case studies (Chapter 4). This chapter begins with an introduction to mixed-use school infrastructure development in Toronto through public private partnerships. Each case study provides an overview, a project description, discussion of the public-private partnership approach, the motivations and multi-stakeholder dynamics in the project, the challenges and successes of the project, and finally the lessons for Toronto. This chapter concludes with the rationale for choosing to study Toronto District School Board and the reasons for selecting the six case studies.

The subsequent chapter presents analysis and discussion of findings from the literature review and case studies. The synthesis involves different options of partnerships that surfaced in the case studies and discussion on the benefits and issues of public private partnerships in school infrastructure development. The issues distinct to mixed-use and public schools and public private partnerships and public schools are dealt with separately. Chapters 5 and 6 provide conclusions from the research. Chapter 5 summarizes the success of achieving school infrastructure in mixed-use development through public-private partnerships, and outlines a way forward for TDSB to address enrollment pressures. Chapter 6 provides specific recommendations to the stakeholders involved in mixed-use school infrastructure development and concludes with a discussion on future research.

While the report is written with a focus on the TDSB in the City of Toronto, it makes an effort to understand similar approaches to school infrastructure through partnerships in other school boards across Canada. The report presents policy lessons for engaging the key drivers of action, and assembling collaborative stakeholder networks to meet the education needs of upcoming dense urban neighbourhoods in the City of Toronto.

It is anticipated that this research will be valuable to different stakeholders such as school board planners, municipalities and real estate development firms. For municipalities, the study should allow them to better understand the emerging need and accommodate zoning and by-law changes. For school board planners and trustees, the study should provide insight into the current trends in using publicprivate partnerships as an innovative way to deliver school infrastructure as well as how to integrate the school function into a mixed-use development. Furthermore, it also brings to the attention of real estate development firms the enrollment pressures that increased new residential development puts on the school boards, and opens room for discussion on creating opportunities for public schools as part of their site development.

CHAPTER 2: LITERATURE REVIEW

Existing scholarship on unconventional school development has tended to focus on either P3s or mixed-use; and this research is an attempt to bring the pieces together. Clearly, school closures and selling of school lands to raise capital have become more and more prominent to address the need for school infrastructure. Consequently, the public sector and private sector needs to react to this situation and implement change when necessary. Therefore, it is critical to look at how P3s and mixed-use developments can come together to facilitate public school construction.

This chapter will examine the literature on P3s, public schools and mixed-use developments. At the present time, a gap exists in connecting all these individual components. Specifically, there has been no examination on the relationship between the public schools in a mixed-use vertical development that has been developed through a public-private partnership. Hence the literature review is split into three sections based on preceding research. Section 2.1 discusses mixed-use developments and public-private partnerships. The first part sets the overall context of public-private partnerships in mixed-use developments and identifies the partners. The second part identifies the role, interests and expectations of the public and private partners in mixed-use developments. The third part briefly reviews the benefits and challenges of P3 to each of the partners, and the final part summarizes the literature for this section.

Section 2.2 reviews public-private partnerships and schools, analyzing the reports of several foundations and policy institutes who have summarized expert and practitioner experiences with P3s and school infrastructure. The first part traces the evolution of P3 approach in Canadian public schools and the different P3 models currently in use. The second part discusses the benefits and challenges in this approach, and the third part focuses on few cases that have benefited from this process.

Section 2.3 is a review of vertical mixed-use developments that have an institutional use, focusing especially development of public schools in mixed-use projects in the North American context. It highlights the benefits and challenges associated with developing public schools in this manner.

2.1 Mixed-use developments and public private partnerships

North America has seen a rise of mixed-use developments over the past two decades. Even though the concept of mixing uses is not new to planning, the need for separating uses through land use regulations, zoning and increased automobile usage had masked the benefits of mixed-use development until recently (Rabianski, et al., 2009, Schwanke, et al., 2003). Revitalizing city centres through mixeduse developments—and thereby bringing in intensification—has become an important strategy in urban development to control urban sprawl and to create vibrant, walkable and sustainable neighbourhoods.

While there are different definitions for the term 'mixed use', the underlying principle is similar. Mixed use is characterized by three or more significant revenue-producing uses, which are functionally integrated and developed in conformance with a coherent plan. Mixed-use developments have both horizontal and vertical configurations and the uses can be residential, retail, entertainment, office, institutional, hotel, civic, cultural or recreation (Urban Land Institute, 2003). Horizontal mixed use refers to the mix of land uses spread across a site or different plots of land separated by internal roads or a district. Vertical mixed use refers to the mix of uses accommodated in one vertical structure which means that the uses vary from one floor to another in a building (Mateo-Babiano et al., 2013). Since the 1980s governments around the world have used private sector participation to develop and finance infrastructure projects through public-private partnerships (or P3) (Roehrich et al., 2014, Stainback 2000). But what relevance do P3s have for mixed-use projects that are primarily developed by a private developer? Who participates and why do they contribute? How effective are P3s in delivering value to mixed-use developments? What are the different issues of mixed-use developments that arise in the context of publicprivate partnerships?

2.1.1 Context

A public-private partnership is an arrangement between a public agency, which could be a local municipality or a provincial, state or federal government, and a private sector entity, which is usually a real estate developer or a construction company. The process brings together the expertise and assets of both the public and private sector to deliver a service or facility for the benefit of the community (Siemiatycki, 2012, Vrooman, 2012, Stainback, 2000). "A P3 is a long-term contractual arrangement between the public and private sectors where mutual benefits are sought and where ultimately (a) the private sector provides management and operating services and/or (b) puts private finance at risk" (Garvin & Bosso, 2008, p.). While the concept of P3s has been around since the 1980s, the definition stated above captures an emerging consensus about the term's meaning.

Public-private partnerships can be initiated by the public sector or the private sector (Vrooman, 2012). Public-private partnerships were originally conceived to join the investment capabilities of the private sector and the political strength of the public sector in order to construct large-scale public projects. For instance, the public sector such as the local government would approach a private entity to work on an improving infrastructure or constructing new facilities such as schools, roads, parking garages, libraries, etc.

In the past decade, P3s have become an innovative tool for urban revitalization and a preferred strategy to build mixed-use projects (Boulais, 2013, Siemiatycki, 2012, Garvin, 2008). This is attributed to the scale of mixed-use developments, complexity of site selection and land acquisition process, conflicting uses, increased density, financing and ownership models, leasing and continued operation and maintenance of buildings that require meticulous legal work, increasing expenditures involved in renovation, constant risk management and community acceptance (Roehrich, 2013, Long & Lock, 2010, Lobash, 2003, Bennett, 1999). Mixed-use developments help real estate developers diversify their investments, increase the density of the property and local governments to increase property tax bases, create more jobs and enhance the surrounding community (Vrooman, 2012, Lobash, 2003). Also, the Great Recession of 2008-2009 has brought real estate developers and construction companies who have the limited liquidity to enter into cooperative agreements. These cooperative agreements made with the government allow for mixeduse projects that revitalize urban and suburban areas. Such projects wouldn't have happened otherwise because post-recession private developers haven't had the capital to carry out these kinds of projects on their own.

Public sector projects bring new opportunities for profit making to the private sector, and the private sector brings expertise and capital to the public sector. PPP projects are typically conducted "offbook" for the public partner because they don't involve any borrowing. PPPs also allow the public sector to share risks with the private sector. But why do private developers get into partnerships for mixed-use developments? In addition to privatizing profits, there are several other reasons why a developer builds mixed-use projects. Sometimes it is the choice of the government or landowners who want to see a specific mix of activities. Other times it is the only viable option because of planning requirements, development site restrictions or zoning regulations (Schwanke, 2003). Market analysis supply-demand projections are an increasingly common reason. For example, a real estate developer recognizes a development opportunity, approaches the public landowner with an idea to develop the property and proposes to create a mixed-use development. In such circumstances, P3 arrangements enable the public sector and the private sector to work in a collaborative fashion, banking on each other's competencies and resources to deal with issues. Also by aligning the interests of each sector, the partnership is strengthened and can hopefully produce better outcomes than any one sector trying to deliver the project on its own (Siemiatycki, 2012, McQuaid, 2000).

At the same time, studies have raised red flags on publicprivate partnerships regarding public accountability, effectiveness, validity, benefit and risk allocation. Siemiatycki and Farooqi (2012) have found, for example, that public-private partnerships cost an average of 16 per cent more than conventional tendered contracts in a study of 28 Ontario P3 projects worth more than \$7-billion. The increase in cost was attributed to higher interest rates, because it's the private partner who is doing the borrowing instead of the public partner, and higher transaction costs for lawyers and consultants (The Globe and Mail, 2012). While this cannot be ignored, the assumption of this research project is that public sector actors decide to enter into a partnership with the private sector when the project is actually in the public interest, driven by the involvement of public schools.

2.1.2 Partners

Partnerships exist between a variety of public and private organizations. Academic literature identifies three main categories of partners - the public partner; private partner and third-party partner

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(Burr and Shaw, 2012, Vrooman, 2012, Schwanke, 2003, Stainback, 2000) The public partner in a P3 can include more than one government entity. This includes federal, state/provincial and local governments. It also refers to business improvement districts, universities and public school districts. For instance, if a local municipality intends to develop a mixed-use project to revitalize a specific area, the partnership likely will include the private sector, the local planning authority, the local governing body and the state government, because of the legislation and tax revenues involved in the project (Stainback, 2000).

The private partner in mixed-use developments is usually the primary owner. This could be the landowner, corporate investor, private developer, bank, or business group which incurs most of the risk, responsibility and costs required to implement the project (Vrooman, 2012, Burr and Shaw, 2012, Stainback, 2000).

The third-party partner encompasses the non-profit organizations, citizens, interest groups, and community groups who offer community support and maintain community vision. In a mixeduse development, these actors are of contextual importance and, when the third partner is involved, the P3 provides a mechanism for engaging local communities (Burr and Shaw, 2012, Bult-Spiering & Dewulf, 2008).

2.1.3 Interests, Roles and Expectations of the Partners

Public and private sector actors have different motivations to engage in P3s. Government involvement offers major advantages for private developers, including political support for the project and possibly lower costs of development through financial incentives. For example, tax abatement programs, development bonds, and bonds from tax increment financing (TIF) are available for the construction of mixed-use development projects when an affordable housing component is involved in the project (Herndon, 2011, DVRPC, 2008). But what is the interest of the public sector in the P3 model for mixeduse development? The next section briefly reviews the role, interests and expectations of the two major partners.

Public Sector's Interest

The most obvious reason for local governments or municipalities to join in the partnership of a real estate development such as a mixed-use project is to increase the local tax base (Schwanke, 2003, Knaap, 2007). A successful development can drive up land values in adjacent neighbourhoods and can spur additional development, further augmenting the city's tax base and revenues. And compared to a single-use project, mixed-use development can generate additional revenues such as city sales tax and business revenues if commerce is part of the mix.

Mixed-use development can offer non-financial benefits as well. It can contribute to a better downtown urban environment by offering attractive public open spaces and amenities with more pleasant places to work, shop or visit. If the mixed-use development is proposed in a suburban area, the project acts as an anchor and promotes growth around it. Mixed-use developments are also used as an urban development strategy to revitalize declining areas and to induce adjacent development. Furthermore, the scale, character, a mix of uses and vibrancy such developments bring relieve the monotony of single use. Also, mixed-use developments can create new housing, expand the community's commercial base, integrate civic uses such as city halls and courthouses, create jobs, and improve mass transit usage (Rabianski, 2007, DVRPC, 2008).

Public Sector's Role

"The public sector's interest and participation in mixed-use developments have taken a variety of forms from non-interest and conflict to active encouragement and involvement with the development" (Urban Land Institute, 1989, p. 127). Real estate practice and academic literature mention that the public sector has a significant role in mixed-use development P3s. The public sector is capable of enabling legislation for local planning that encourages a mix of uses through zoning, sometimes by creating a mixed-use classification, by revising building codes and fire standards, or by allowing as-of-right projects especially in New York, USA that do not require public consultation to intensification and mixing of uses. While these are general land-use regulatory powers, they also apply to projects that are developed under a public-private partnership. Many times, regulations on mixed-use development in terms of density, height, type of uses may be prescribed to local planning authorities through a centralized government body that is very similar to the creation of regional cities (Schwanke, 2003, Knaap, 2007). An example of this is the metropolitan land use development plan, which guides the development of towns and cities within a metropolitan community. This could reduce segregation of use and support public transportation. The public sector is also capable of providing public infrastructure—for example, public transit planning on the large scale, or street improvements on the small scale.

Also, the public sector is capable of providing financial assistance. This can range anywhere from allowing tax abatements, encouraging financing through grants, bonds and also lending funds to developers at attractive interest rates. At times the interest is charged only after completion of construction (Schwanke, 2003, Knaap, 2007).

Lately, the increase in the number of mixed-use projects in North America reveals the increasing support of city planning officials towards planning mixed-use development (Skartvedt, 2009). This implies that the use of P3s is providing the insulation against risks for mixed-use developments, which are generally perceived as complex projects.

Expectations of the Public Sector by the Private Sector

According to real estate literature, different real estate developers have expectations of the public sector to mobilize mixeduse developments. Academic literature has not documented these expectations but different real estate consulting groups and law firms mention that a strong political will, stable planning commission with the support of the City council, community and media support, options to seek public financing, and land control are some of the public-sector functions which developers expect, among other needed incentives and mechanisms.

Urban strategists at Leland Consulting Group believe that the public sector's role also includes expedited permitting, land assembly, investment in infrastructure surrounding the mixed-use development such as the creation of parking, parks and sidewalks, joint marketing and also fostering community relations to ensure local support.

Private Sector's Interest

There are many reasons why developers are interested in mixed-use projects. Because of their sheer scale, mixed-use developments often require a long period for development and have multiple phasing. The ability for an investor or multiple investors to stay through the duration of the project is limited. Moreover, the private developer must have a solid reputation and experience in completing long-term projects to attract potential lenders. In this scenario, a partnership with the public sector with increased access to marketbased information, financial resources, incentives and social capital in the sense of trust and good will is attractive. Also, the credibility that comes by partnering with the public sector lowers the risk component and supportive infrastructure motivates private developers to seek out P3 interests in mixed-use developments (Burr & Shaw, 2012, Schwanke, 2003). In addition to economic and political feasibility, intangible benefits such as free marketing, visibility, security for the project, background research on potential tenant mix, and community support are frequently expected to come out of the partnership with government agencies and organizations (Schwanke, 2003).

Private Sector's Role

The private sector brings together different parties through a legal structure usually termed a special purpose vehicle (SPV). The SPV is the new project company that is formed for each P3 project by a group of investors, contractors and legal advisors. This is to ensure that the firms that make up the SPV are insulated from being financially responsible for covering project losses or bankruptcy (Siemiatycki, 2012). It is through the SPV that the project is developed, built, maintained and operated for the specified time period. The private sector will bear the project delivery, financial and operational risks in the case of mixed-use developments. The SPV is funded by the parent companies that put together an initial equity investment amount. This is to ensure that the firms "are strongly incentivized to develop innovative project designs, construction strategies, and operational plans that minimize costs over the entire lifecycle of the project, since their initial investment is repaid in installments over the long-term operating period" (Siemiatycki, 2012, p. 16).

Expectations of the Private Sector by the Public Sector

Even though collaboration is increasingly important to support development, local governments tend to proceed with caution especially when they use public money to support mixed-use projects (Burr & Shaw, 2012). Hence, public-sector expectations of their privatesector partners focus on the reliability, financial capability, experience and strength of the private developer. The developer is expected to understand the public process, have a successful track record and previous experience in the type of proposed project, be financially strong, and have equity and debt sources in place (Leland, 2009).

2.1.4 Benefits and Challenges

Apart from combining strengths and resources, sharing risks and rewards, all partners are concerned about the benefits and challenges in mixed-use P3s. For instance, public funding and public sector contributions can transform an idea into an iconic mixed-use development on a significantly large scale, but these projects are perceived as riskier mainly because of the private equity required to fund them. So it is important to understand the benefits and challenges that both public and private partners face.

2.1.4.1 Benefits

Public Partner

There is a multitude of motivations for public sectors to partner with the private sector to finance, design, develop, construct, operate and maintain mixed-use development projects. These do not need voter approval and construction will begin without obtaining funding or tying the capital of the public partner to the project. Fixed lease payments that are created during the formation of a contract remove uncertainty and allow room for long-term construction and multiple phasing (Stainback, 2000, Brookhurst Development Corp, 2013, Boulais 2013).

While there are studies that claim that P3s initially cost an average of 16% more than conventional tendered contracts (Siemiatycki & Farooqi 2012), urban development studies by the Urban Land Institute in Canadian cities have demonstrated life-cycle cost savings in mixed-use developments built using a P3 model. Also, financing and market risks are passed on to the private partner who takes responsibility in not only optimizing private equity and debt financing but also bringing experienced professionals and specialists and legal counsel into a complex project. As mentioned earlier, the added benefits of job creation, area revitalization, economic growth, and revenue generation can make P3 beneficial for public partners (Brookhurst Development Corp, 2013).

Private Partner

The benefits to the private partner are obvious. Apart from the key benefit that it opens up new areas of profit making, the very partnership with a public entity on a mixed-use project gives the private developer public recognition, while, on the regulatory side, expedited approval processes are very valuable. From the financial side, when the government shares the cost, even though this is not a common occurrence, there is reduced financial burden on the private investor. In addition to that, sharing of risks and responsibilities are also to the advantage of the private partner.

2.1.4.2 Challenges

Public Partner

A key challenge is accountability to the public. Technological and business secrecy is part of the culture of the private sector and this rubs against the normal accountability processes that the public expects in major public works projects. Another major trade-off for the public partner is the "reduction of control" when entering into a P3. Depending on the contract that was laid out at the start of the project, control may shift more towards the private sector, over issues such as the plan of the facility, architecture, choice of materials, and management. It is possible for the public sector to develop standards for these issues, but the real estate industry argues that such standards would result in project delays owing to internal negotiations and contract changes (Stainback, 2000).

Another common challenge is the possibility of arriving at a partnership, which does not have a fair distribution of costs, risks,

responsibilities and economic returns. The real estate industry claims that this arises either from the public partner not understanding the riskreward tradeoff or from a public partner's vision which is not financially feasible (Brookhurst Development Corp, 2013, Leland, 2009). Also many jurisdictions won't have the resources to adequately understand the full implications of the deals they are undertaking, particularly when complex financing arrangements are brought to bear. Transparency is also highlighted as yet another important challenge in the partnership process. Private partners have the right to protest the developer selection process but at the same time also have the right to sell the project to a third party without the knowledge of the public partner (Pierce, Berg & Alaimo, 2003).

Private Partner

One of the main challenges is the availability of time. Academic research claims that public entities' lack of expertise in mixed-use real estate causes delays in decision-making, costing time and money to the private partner. Furthermore, delays in arriving at a consensus on an issue by the public partner force the risk to slide on the side of the private partner. Political stability and unreasonable publicpartner expectations add on to the challenges that private developers face. The private partner is denied the opportunity to share creative solutions and is forced to stick to the negotiation and contract process. And lastly, the reluctance shown by many public agencies to rework planning and zoning legislation adds to the complexity of the development (Stainback, 2000, Halstead, 2014).

2.1.5 Summary

A P3 is demanding for all partners involved. While it is not an easy task to summarize the lessons and experience of the scholars and practitioners, this section broadly looked at themes that have surfaced in the literature. The public entity must have the financial resources and the capability to steer that matches with that of the private developer, and the private developer has to hold through the budgeting, approval and legislative process of the public sector. A transparent contract detailing the terms and condition of risks and responsibilities must be devised after several negotiations. This transparent contract will lay the steps for a development plan that will help in taking the partners through the project. It is easy to underestimate the impact of a mixed-use development. It has to be understood by all the partners that risk is inherent in all issues including design, construction, financing, operation and management.

There are situations where both the partners receive the benefits of P3 in mixed-use developments and others where it is onesided. Apart from the enhanced feasibility a mixed-use project receives, the private partner benefits from a fast-paced investment timeline, achievement of significant policy goals, and the ability to overcome financial, political, physical, market and regulatory barriers. The public partner benefits in terms of initiatives that creates additional private investment. Benefits also include strengthening of the tax base, and provision of greater community-wide benefits such as creation of another amenity with a sense of place. But the reason for the challenges to outweigh the benefits is more theoretical. In theory the distinction of roles and expectations are more idealistic and favors privatization (Bult-Spiering & Dewulf, 2008). The lack of transparency, hiding of true costs, lack of accountability and the right of private developers to do things without the knowledge of the public partner are identified as major pitfalls by many academic scholars (Stainback, 2000, Bult-Spiering & Dewulf, 2008, Romero, 2015).

While it is not easy to list out the roles and responsibilities of each of the partners involved in a partnership, a highly integrated process is required for the partnerships to be successful. Each project is unique and so is every partnership. The model that works for one P3 project may not necessarily work in the same way for the other. The project team, the budget, the schedule, legislations, the legal contract, the development plan, community support, consensus among the partners, expectations and the strength of the partners are all crucial elements that have to come together for any development project to be successful.

P3s in mixed-use developments generally reflect the motivations, roles and responsibilities shared between public and private partners. But there are certain qualities, which change when this development involves school boards. The next section highlights the literature review on public-private partnerships and public schools.

2.2 Public-private partnerships and public schools

Traditionally new schools have been built using a design-bidbuild contract where the public sector designs or hires an engineering firm to design a project, then bids are invited from construction firms, and the winning bid gets to build the project. So how does a publicprivate partnership work in building schools? What are the different partnership approaches? There has been considerable professional literature and some academic literature in the area of partnerships and public school infrastructure development. Academic research reveals that there is a long history to non-government (and particularly religious) delivery of school infrastructure and education (Dresscher & Harris 2005, Utt, 1999). This means that non-governmental bodies such as religious organizations carry out funding of new schools. But under contemporary conditions of under-funding of school facilities, increasing enrollment pressures, requirement for new schools, renovation of existing schools, and depleted school budgets, many school systems have been forced to look for new sources of funding to facilitate school infrastructure projects, and are coming to recognize P3s as a viable tool to finance school infrastructure projects (TDSB, 2015). While the responsibility of delivering education and education

facilities rests with governments, P3s have become increasingly popular in delivering school facilities.

2.2.1 Definition, evolution and methods of delivery

Many studies explore different definitions of P3 but the widely accepted definition in the school infrastructure segment is as follows: "close collaboration of a public entity(s) and a private entity, or team, to structure, negotiate and implement the finance, design, development, construction and operation of building(s)" (Stainback, 2000, p. 1). Apart from the key differences as listed in Table 1 between conventional and P3 procurement approaches ownership of the property varies in both the approaches. In a traditional Design-Bid-Build model, the public partner retains ownership of the project and control of its financing, operations, and maintenance. In the case of a P3 which is a Design-Build-Finance-Operate-Maintain, also called Build– Own–Operate–Transfer, the private partner owns the project during the term of the agreement but then transfers ownership to the public partner at the end of the term.

Conventional Projects (design-bid-build)	P3 Projects (design–build, design–build–finance, & design–build–finance–operate–maintain)
• Public sector burdened with all risks.	 Risks shared between public and private partners.
 Succession of separate (and multiple) contracts. 	 Integration of two or more project phases.
• Public financing.	• Private financing (except design-build).
• Lowest bidder.	• Best-suited bidder.

Table 1 Key differences between conventional and P3 projects Source: Canadian Council for Public-Private Partnerships and USDOT

When a school is involved, the ownership of the property rests with the school board if the school board owns the land. If the school is part of the development proposed by the developer on the developer's land, then the ownership is retained until the contract term ends. In some cases it is then transferred to the school board, and in other cases the school boards buys the development rights of the school from the developer and pays the capital required to construct the school as part of the mixed-use development project. This is dependent on the negotiations between the public and private sector. If the private company owns the school in a P3 mixed-use project, it is effectively a leasing model, and thus will not fall into a P3 approach.



Figure 5 P3 approach began in Nova Scotia schools in 1997 to finance school infrastructure projects. Source: The Canadian Council for Public-Private Partnerships, 2008

In Canada, it was not until the mid-1990s that public schools took the P3 approach to address financing of infrastructure issues (Refer to Figure 5). The first wave of exploratory projects that happened between 1980s and 1990s saw the construction of 39 Nova Scotia schools through a public-private partnership. The second wave happened between 2000 and 2005, and the third wave was between 2006 and 2010, when a number of Alberta schools were built through a different model of partnership.

With a series of investments in Canadian infrastructure projects through P3s, the concept is well recognized at both the federal and provincial levels of governance (Pierce, et. al., 2003). The Canadian Council for Public-Private Partnerships identifies education as one of the sectors that require active investment and lists the different P3 models in Canada (Refer to Figure 6). An investigation to understand P3s done by the Association of Consulting Engineering Companies Canada lists five forms of P3 in Canada, while another report identifies three methods as the latest delivery methods in Canada (Refer to Figure 7).



Degree of Private Sector Involvement

Figure 6 P3 models in Canada as identified by the Canadian Council for Public Private Partnerships Source: The Canadian Council for Public-Private Partnerships, 2008

As mentioned earlier, many studies are focused on P3s delivering other infrastructure projects and very few directly address P3s as an alternative procurement method, or as a creative form of project delivery and an innovative financing opportunity for new school construction. However, one of the reports on P3s refers to the Design-Build-Finance-Own-Maintain-Operate-Transfer delivery method as a model not widely-used in Canada by the public sector, owing to
the fact that facilities such as hospitals, schools and courtrooms must always be publicly owned (ACEC Canada, 2010).

Association of Consulting Engineering Companies Canada	Goodmans LLP
Design Build Finance and Maintain (DBFM)	Design Build Operate Finance
Design Build Finance (DBF)	Design Build
Build Finance Maintain (BFM)	Design Build Operate
Build Finance (BF)	
Design Build Finance Maintain Operate (DBFMO)	
Design Build Finance Own Maintain Operate Transfer (DBFOMOT)	

Figure 7 P3 delivery methods in Canada as identified by professional literature Source: Association of Consulting Engineering Companies Canada and Goodmans LLP

But three studies in the United States have been directed toward understanding how partnerships can work between school boards and developers. The studies mention that a P3 approach enables public school systems to investigate multiple options with a developer. These options include: negotiation with the developer who is willing to build a school and enter into a long term predetermined rent-lease agreement with the school board; leasing a school building that was built by developers on the land sold by the school board (The Board of Public Works, 2009, Pierce, et. al., 2003, Utt, 1999); and a concession agreement where the management of schools is left to private management companies (Pierce, et. al., 2003, Utt, 1999). In all these options, the studies state that the developer is responsible only for the physical structure and, at the end of the lease term; the physical structure automatically becomes the property of the public school system (Pierce, et. al., 2003, Utt, 1999). Also, a report by the Appleseed Foundation (2004) lists four options of funding school projects using a P3 approach (Refer to Figure 8). In general across the globe, national governments' ministries of education are looking at P3s more (Ministry of Education, 2015) and as an alternate financing

strategy to tackle immediate school infrastructure requirements (The Board of Public Works, 2009) by bringing the public and private sector together.

2.2.2 Benefits and Challenges of Public-Private Partnerships to School Construction

Even though there is increased acceptance of P3s as an alternate form of school infrastructure delivery, there is also increased criticism and hesitation to build education facilities using public-private partnerships ((Shaoul, 2005, Kaganova & Polen, 2006, Flinder, 2005, Blondal, 2005). But the studies that directly address the topic of P3 for school construction are pre-disposed to P3s and therefore focus on discussing the benefits compared to the challenges. Both academic and professional literatures strongly argue that there are tangible and intangible benefits for the government, the public sector and the private sector (The Board of Public Works 2009, Utt, 1999) and that the implementation of public-private partnerships for schools has already demonstrated important advantages compared to the traditional public-sector construction approach in several countries across the globe.

P3 option	Description
Sale of Assets	The school district sells extra school property and uses the funds to finance construction of new school buildings.
Sale/leaseback or Lease/ leaseback	The school district sells land holdings to a developer to construct a new school building on the land. The developer then leases the building back to the school district. The school district pays rent to the developer. Also, the developer has the option to use the facility when school is not in session/after school hours.
Nonprofit Participation	The school district leases the property to the developer. The developer absorbs the cost of constructing a new school. The school pays a predetermined rent for its usage during school working hours. It is a long term lease and the developer never owns the property or the building. The developer has the option to lease the facility to other organizations after school hours (for example, night classes, trade schools, colleges and universities). This supplemental income allows the developer to charge the schools less rent.
Real Estate Investment Trust (REIT)	Non-profit organizations eligible for tax- exempt bonds use these bonds to finance new facilities. To lease existing facilities, the school districts make long-term rent payments to the nonprofit organization. To build new facilities, the nonprofit purchases the site with agreements to build or renovate the facility and (similarly) leases the building to the school district.

Figure 8 P3 delivery methods as identified by the Appleseed Foundation report Source The Appleseed Foundation, 2004 Alan Mallach identifies three distinct measurable benefits: time savings, risk mitigation and fiscal benefits for both the developer and the school board (Mallach, 2009). Another researcher also remarks that if school buildings adopt a leasing arrangement, the facilities are put to maximum use around the clock and the facilities themselves can be built in a more modern and innovative way (Utt, 1999). Although many school boards and school districts are facing pressure to build new schools and renovate existing schools, the inherent risk of alternate financing, lack of documented evidence on cost savings, transparency of financial structures and limited supply of contractors, subcontractors and prospective bidders restricts school boards from entering into public-private partnerships (The Board of Public Works, 2009).

2.3 Public schools and mixed-use developments

Until recently, including public schools in the mixed-use equation was not an immediate consideration in mixed-use developments. But the increase in population in the downtown core, overcrowding of schools, enrollment pressures, failing infrastructure, and lack of funding to renovate schools is steering mixed-use developments to opt for public schools while mixing the uses. Even though integrated learning is not new and was seen in ancient cities such as Isfahan, Iran, where the Art University is next to the great market place buzzing with activity, mixed-use education is today considered a recent innovation.

Prevalence of P3s in mixed-use projects involving schools

Leveraging private real estate to build public school as part of a mixed-use development is a new phenomenon in Canada. While the province of Nova Scotia, the states of Texas and Florida in the USA, and the United Kingdom all have had P3s fund school construction; there are not many examples of public schools built as parts of mixed-use developments. In the North American context, notable examples include: Bishop O'Byrne School project in Calgary; Callingwood School project in Edmonton; Evergreen Park school in New Brunswick; O'Connell Drive Elementary School in Nova Scotia; Inderkum High School in Sacramento, California; and Oyster School/Henry Adams House in Washington, DC. However, it is New York City that has the largest number (17 projects) of public schools built in mixed-use through P3s, and most importantly, is the only city in North America to have public schools incorporated into high-rise developments. It is only in recent years that many proposals for mixed-use public schools are on the table for discussion. Refer to Appendix A for the list of known mixed-use education projects globally.

Mallach (2009) defines mixed-use school developments as projects where a school is combined with compatible non-school facilities within the same building or on the same site. The uses could include public facilities, such as libraries or health care facilities or the arts, leisure facilities, schools and other civic and cultural uses; or private uses, such as housing, office or retail space (Rabianski, et. al., 2009a, Schwanke, et al., 2003).

2.3.1 Benefits of Mixed-use school developments

Maximum and efficient space usage

The development of public schools in a mixed-use setting has the potential to create more sustainable facilities by maximizing space usage and by allowing efficient use of available space. Especially in an environment where sites for building new schools are scarce, mixing institutional uses with other uses can be an attractive planning and development strategy. The advantages of mixed-use development as a response to limited land availability for development will generally depend on the ability to intensify the use of the site (Mallach, 2009). For instance, if a school is located in a mixed-use development, comprising a community auditorium, a few floors of commerce and retail establishments and a few floors of residential units managed by a property management firm, the school can save by sharing space such as auditorium, cafeterias and bathrooms. Utilities and administrative services can also be shared with the overall property management firm.

Cost savings

When a development company works with the city and the school board in a public-private partnership, there are potential fiscal advantages. Public-private mixed-use developments bring funding options in the form of grants, provide the benefit of fiscal mechanisms including lease options and tax credits, and also lower the management and operating costs in the long run. These cost savings include savings in infrastructure construction and maintenance costs that are to the benefit of both the developer and the school board. Furthermore, planning professionals have frequently noted that bringing amenities in close proximity also reduces transportation costs for families (Rabianski, et. al., 2009, DVRPC, 2008, Schwanke, et al., 2003). For instance, a mixed-use high-rise project that comprises ground floor retail, condominiums and schools would dramatically reduce the cost of transportation for the children in the building compared to their being bused to outside their neighbourhood due to lack of space and over-enrollment in the schools within their neighbourhood.

Strong interactions and enhanced learning experience

In addition to efficient use of space and reduced costs, adding education to a mixed-use development can bring benefits to the community and vice versa, through school-community partnerships and enriched learning environments. The benefits of mixing uses extend beyond the students and residents who study and live in such a mixeduse development community. Parents, teachers and residents enjoy the vibrancy a mixed-use setting offers while urban planning professionals and school authorities appreciate the benefits that this type of development offers to its stakeholders and to the community as a whole.

School boards

In areas with high intensification and growing property values, acquiring large plots of land to build traditional schools is becoming increasingly impractical for school boards. Introducing public schools in mixed-use developments can help to offset the huge cost of new construction, and help ensure adequate availability of space for students. This would mean less overcrowding, and potentially a domino effect of effective teaching, receptive students and better performance in their learning environments. Furthermore, funds received from the Ministry can be used for procuring teaching aids and other state of the art facilities and equipment for the schools (Mirvish, 2015).

The shortage of buildable sites, shortage of public schools, and demand for housing close to downtown of these large cities should make mixed-use development a desirable proposition for the developers, the school boards, the municipalities as well as the community at large.

Teachers

Mixed-use developments embed schools in environments, which also provide the opportunity for teachers to enjoy their work environment, thereby, potentially reducing teacher attrition (Meacock, 2010). Billions of dollars invested in training and retaining teachers goes to waste and affects school board budgets when teachers take a transfer or leave the job. Lower levels of productivity and ineffective teaching happen in a non-stimulating, uninspiring work environment. Research in the social sciences and educational psychology has shown that teachers who are provided a social atmosphere with adequate mentoring, training, professional development and regular interaction with members of the education community are more effective and engaging in class. Increased access to restaurants, fitness centres, retail and entertainment through a mixed-use development increases teachers' retention in schools (Meacock, 2010, Rogic, 2013).

Students

Sharing of physical space has advantages beyond convenience and financial advantages. A notable example is the Grace Living Center in Jenks, Oklahoma where the uses have been mixed in a minimal way. Two kindergarten classrooms were constructed inside the nursing room and the spaces were rented out to the local district for a \$1 annual fee. A drop in medication levels were observed in seniors and an improvement in reading skills were noticed among children. While the school benefitted from more space, lower cost and greater academic success, the nursing home owners have happier seniors and lower staff turnover (Rogic, 2013).

Urban Planners

A mixed-use neighbourhood is compact, vibrant, and walkable. Increased traffic throughout the day brings more users who use the infrastructure. Jennifer Keesmaat, Chief Planner of the City of Toronto, in an interview to a prominent news channel has mentioned that renting out school facilities after school hours enables more intensive usage of the infrastructure (Yonge street media, 2014); since infrastructure ages irrespective of its usage, putting it to different uses maximizes the value of municipal investments.

Developers

Mixed-use facilities are usually site-specific. When a school is added to the mix, there is the potential to attract greater political support, and hence increased funding and subsidies for the development. Also it is one of the approaches that developers use to purchase desired property (LIIF, 2006). Apart from the effective use of land and financial gains upon completion of the project, the developers also benefit from reduced long-term maintenance cost (Mirvish, 2015, Meacock, 2010). Ron Beit, president of RBH Group a development company in Newark stated in an interview that, in a connected world, the addition of schools is a win-win situation for all parties involved (School Construction News, 2010).

2.3.2 Challenges of Mixed-use school developments

While the benefits of mixed-use school developments are many, such developments are not without significant challenges. Indeed, the low number of mixed-use schools can be attributed in part to the fact that the challenges may outweigh the benefits (Mallach, 2009). Apart from generic issues that apply to any real-estate project such as lack of common vision, agreement terms, financing, phasing and timing, there are some challenges specific to mixed-use school developments.

Diversity

The diversity of uses, stakeholders and ownership make mixeduse school projects complex. Working and collaborating with multiple partners, determining responsibilities of the stakeholders, and finding synergy among the uses all make the project challenging and time consuming (TDSB, 2015, Rabianski et. al., 2009a, WCPS, 2007, Edelsberg, 1999). The very diversity that brings the school component in to the mixed-use becomes a daunting factor.

Design, Space and Curriculum Requirements

Design and spatial issues are another major concern in school design. The building codes on soundproofing, firewalls, access and ventilation in schools are different from those in residential, commercial and retail design. There are also potential spatial issues that can arise on access, egress, privacy, student drop off and parking that happen because of the combination of different uses (TDSB, 2015, Kim Hyeong III, nd, Rabianski, et al., 2009a, Edelsberg, 1999). Also, schools built on a smaller site as part of a mixed-use vertical development may not be able to support a full-fledged physical education program due to the lack of sports facilities such as a playing field and direct access to open space (TDSB, 2015, The Board of Public Works, 2009)—a problem which would affect curriculum requirements.

Cost

With a limited number of mixed-use school projects in North America, developers often see such projects as a risk rather than a profitable investment. It is widely acknowledged that the greater the complexity of mixed-use projects, the greater is the risk (Kats, 2010). The unavailability of financial tools increases development costs or necessitates complex financing arrangements, thereby limiting the private sector ability to carry out such projects (WCPS, 2007). Additionally, the intricacy of diversity and design make securing project capital all the more difficult for developers (Rabianski et. al., 2009b), adding time delay in execution of the project.

In addition to the above mentioned issues, mixed-use school projects face challenges in terms of existing city zoning regulations (TDSB, 2015, Hilt & Cranford, nd, Rabianski et. al., 2009b), lack of expertise in financial and project management of such projects (TDSB, 2015), and political will (Rabianski et. al., 2009b).

To summarize, prior studies have predominantly analyzed the theory and practice of mixed-use developments (Wardner, 2014, Grant & Perrott, 2010, Herndon, 2011, Rabianski et. al., 2009, Hirt, 2007, Niemira, 2007, Hoppenbrouwer & Louw, 2005, Schwanke, 2003, Grant, 2002, Rowley, 1996), financing feasibility (Allston, 2014, Lemont, 2012, Bayster, 2005), efficacy of mixed-use development (DeLisle et. al., 2013), concept and drivers of mixed-use (Niemira, 2007, Schwanke, 2003), ownership issues (Van Atta et. al., 2011), and comparisons with single use projects (Cheah et. al., 2011). There has, however, been minimal research on mixed-use public schools, which is assumed to be because of the limited number of mixed-use school projects that have been conceived and executed around the globe. Moreover, it is a recent approach spearheaded by global cities like New York, Los Angeles, Singapore, Glasgow and others to address school infrastructure needs as cities get denser and build vertically with an effort to control sprawl.

Many studies have looked into the combination of publicprivate partnerships and public schools or public-private partnerships and mixed-use developments. No academic attention has been given to the combination of all three. This research brings all these components together—both to address the specific needs of TDSB described in Chapter 1, and to contribute to this growing area of policy research. Although there are several P3 approaches to achieve school construction, each approach has its own character, inherent risks, advantages and disadvantages. This study specifically contributes to the literature by providing a set of case studies and analyzing, which approaches worked, and under which circumstances.

CHAPTER 3: METHODOLOGY

This research contributes to the literature on P3 for public schools in mixed-use development planning by exploring the mutual benefits for school boards and developers in locating a school in a new mixeduse development, especially in inner-city areas where there is limited land availability and fiscal challenges. This is done by examining the roles and responsibilities of the public and private sector partners, the benefits received and the challenges faced in the partnership approach, the financing model, and the types of uses mixed in the development.

The literature review examined two separate themes that guide this research: land availability and fiscal capacity. The literature on schools and P3s explored approaches to school development. This provides a fair understanding of the fiscal capability issue that could be addressed. The review of literature on the development of schools in a mixed-use project explored the option of mixing uses. The remainder of the report now seeks to answer whether a mixed-use P3 is the direction to address limited availability of land and fiscal capability.

With two dozen mixed-use vertical developments with a public school in the North American context since 1967, this concept of including public schools in a mixed-use development is still at a nascent stage. There were four main selection criteria for the case studies. First, the site had to be located in a dense urban neighbourhood with a combination of different uses. Second, the inner city population must be increasing owing to rapid development and growth. Third, the increase in population has resulted in enrollment pressures in existing schools resulting in the need for more schools. Fourth, the project had to be developed using a public-private partnership between the school boards, the developer and the city. Case studies are used for a qualitative comparison of the different P3 approaches used in building school infrastructure in a mixed-use

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development. As can be seen in Table 2, two cases were selected in New York because of the increasing inner city population, enrollment pressures and need for schools that were similar to the situation in Toronto with the TDSB. The final case in this group of case studies is NTCI in Toronto, which is a public high school, constructed using a publicprivate partnership by selling portion of excess land. These case studies look at how the different cities namely New York and Toronto addressed the issue of land availability. Two cameo studies that are a brief study of the provincial programs in Alberta and Nova Scotia were selected based on their success in building schools using a P3 approach and the governance and funding issues that were handled. These provincial programs addressed funding issues and construction of new schools. As mentioned in Figure 7, Design-Build-Finance-Own-Maintain-Operate-Transfer is the only P3 method so far used in Canada and it was essential to explore the provincial programs that contributed to building new schools while the cameos look at different provincial programs

In addition to first-hand notes from briefing meetings with the TDSB, the case studies were compiled from official documents, interviews with the representatives of city agencies, private developers, academic researchers who are practicing urban planning professionals and non governmental organizations working on P3s. As can be seen in Table 3, at least one person associated with the case study or cameos were interviewed. The fourteen interviews were conducted over telephone and in person depending on the availability of the person in the months of February and March of 2016. The interviews ranged from 15 minutes to 60 minutes with an average interview lasting up to 30 minutes. The interviews were semi-structured with only the initial introduction questions being similar (Refer to Appendix B); however, follow-up questions, points of clarification and the discussion thereon varied. Interviewees discussed their current position, role played by them in P3s, involvement in projects, which included either a public school development using a P3 approach or a public school development as a part of the mixed-use development.

	PROJECT NAME	LOCATION	CONFIGURATION	MIX OF USES	VISUAL
	New York by	Downtown	Single tower (76	Residential,	
	Gehry		storey)	Elementary	
	(New York,			School K-8,	
	United States of			Medical	
	America)			Center,	
				Retail	
	P.S. 59 and The	Midtown	One residential	Residential,	
IES	High School of		tower (65 storeys)	Elementary	
TUD	Art and Design		+ 1 school	School K-5,	
SE S	(New York,		building both on	High School,	
CA	United States of		top of retail	Retail	
	America)				
	North Toronto	Midtown	Two residential	Residential,	
	Collegiate		towers (24 storeys,	High School	
	Institute		27 storeys) + 1		
	(Toronto,		freestanding		
	Canada)		school building		
	Alberta Schools	Urban and	Freestanding	Not mixed-	
	Alternative	suburban	school building	use but P3	
	Procurement				
	(Alberta,				
	Canada)				
EOS	Nova Scotia	Urban and	Freestanding	Not mixed-	
AM:	schools (Nova	suburban	school building	use but P3	
0	Scotia, Canada)				

Table 2 List of Case studies and cameos chosen for this study

Table 3 Number of people interviewed in public and private sectors for each case study

CASE STUDIES	NUMBER OF PEOPLE INTERVIEWED			
	Public Sector	Dic Sector Private Sector		
	(School Board/	(Developer/	Researcher/	
	Education Planning	Contractor/	NGO / Private	
	Authority / Trustee/ Development		Organization	
	School Construction	Authority)		
	Authority)			
New York by Gehry	1	1		
NYC, USA	I	I		
P.S. 59 and The			2	
High School of Art	1	1	۲.	
and Design, NY,	I	I		
USA				
North Toronto				
Collegiate Institute,	2	2	1	
Toronto, Canada				
Alberta	1	1		
Nova Scotia			1	

The notes taken during the interviews were then documented using Microsoft Word. The text was read through in detail and each comment's context was analyzed. An open coding was followed while reading through the text. Codes were created and texts were highlighted based on the codes. From a long list of codes, similar codes and redundant codes were marked and the list was reduced to a smaller and more manageable number. The interview notes were constantly compared with during this process. This was further analyzed to find the commonalities and patterns and five to seven overarching themes covering the codes emerged during this process. This was used to categorize the case studies.

Documents produced by organizations such as the Canadian Council for Public-Private Partnerships also contributed to the case studies, as did value-for-money reports produced by the Government of Alberta assessing the Alberta Schools Alternative Procurement projects. While the method is interpretive, case studies are used for a qualitative comparison of the different P3 approaches used in building school infrastructure in a mixed-use development. The research attempts to highlight the trend towards the transformation of public school construction in terms of partnership, financing and approach taken in the inner-city areas that were primarily built in a traditional plot using the traditional method of design-bid-build. This is important in understanding how school boards can approach school infrastructure needs when land and funds are limited.

This approach to studying mixed-use public schools and P3s was modeled after research done for the United States Department of Transportation - Office of Policy and Governmental Affairs, Federal Highway Administration to study cases of public-private partnerships for transportation projects in the United States (Office of Policy and Governmental Affairs, 2007). The study identified the different P3 approaches, implications and applicability of partnerships in transportation projects by studying the experience of the early users through the discussion of case studies and cameos. In the present research, each case study explores the motivations of the partnership, the partnership model, division of roles and responsibilities, the issues and challenges that were encountered by different stakeholders and the lessons learnt.

CHAPTER 4: CASE STUDIES

In Canada, several large-scale infrastructure responsibilities fall under provincial jurisdiction. These include the building of new schools in conjunction with the school boards, which are vital public assets. In Toronto, the Toronto District School Board (TDSB) has a new challenge to face. The increase in population in the city of Toronto has led to increasingly dense neighborhoods and growing enrollment pressures on existing schools. Some schools have 270% enrollment and classrooms are accommodated in portables. The traditional procurement model for social infrastructure has been the design-bid-build model, where, on a project-by-project basis, the province solicits bids to build a school, hospital, or courthouse. Construction costs are borne by the province, and the long-term maintenance costs are borne by the associated government agency (e.g., school board or health authority).

In the case of Toronto schools, TDSB bears the cost of school infrastructure. But as the TDSB can no longer raise taxes to generate or receive sufficient funding to address all its new construction, renovation and maintenance needs, it becomes important to look at alternate funding and revenue sources. While the Ontario Ministry of Education urges TDSB to raise its own revenue by closing schools and selling either whole of partial school board sites, it is not easy to close schools and lose a valuable community asset that may be required eventually when demographic changes in the coming decades limit the school board's ability to use the school owned lands (Ministry of Education, 2013) Leaving that aside, the emerging problem is the lack of schools in areas where there is considerable residential development. TDSB is forced to erect signs stating that living within the school board boundary doesn't guarantee admission into the board's schools (Refer to Figure 9). Another way this over enrollment can be addressed is by changing the boundary of a school, which defines the attendance areas (TDSB, 2014). Areas with high growth can have a larger attendance area to include more schools. But this is not a sustainable solution, since it would only prevent residents from moving into midtown and downtown areas. Also there are parent groups and community organizations that urge the provincial government to increase funding for repairing and rebuilding schools in the TDSB. Nevertheless, it is important to consider the children's immediate needs and look at strategies that will help create more schools. Children living in downtown should not be bused to distant schools, and development should not be stalled in areas of growth. There has to be a sustainable alternative that encourages families to move downtown and to let children walk to school.



Figure 9 TDSB also erects signs in front of new construction so that condo buyers are not in the impression that their wards can go to the closest school | Source: Post City Magazine, 2013

Including institutional uses in mixed-use projects is not a new phenomenon², but the accommodation of public schools within private developments is not widespread. Globally and nationally, there

² This kind of planning has been seen in the ancient cities. For example, in Isfahan, Iran, Art University is next to the great Bazaar, which was a market place that bustled with activity.

are some examples of mixed-use real estate projects including schools are helping to address the lack of schools in inner-city areas. The Canadian American School is situated in the central business district of Makati, Manila, Philippines. This includes a condominium complex with top-flight sports facilities and a school. Since 1967, 17 projects have been built in New York, USA using a P3 approach to include public schools in a mixed-use development (Smarr, personal communication, March 04, 2016). Hamilton Park Montessori and Middle School at the Hamilton Square in Jersey City is an example of mixing residential uses with schools. DSD Project at 60 Water Street, right next to the Brooklyn Bridge in New York is another example of mixed-use school development. The massive rental complex features a 17-story tower, a nine-story section, and a 300-seat middle school that runs along Front and Dock streets. Pomona School District in California USA, an urban area facing a shortage of available real estate, purchased and renovated part of a retail complex to create an elementary school.

In Toronto, TDSB has undertaken two projects to address the redevelopment of deteriorating schools: the North Toronto Collegiate Institute (or NTCI) and the Downtown Alternative School. The NTCI project is a public high school integrated in a residential development. It includes a 4-storey, 156,000 sq. ft. school, two condominium towers with approximately 500,000 sq. ft. of residential development, a full-sized, artificial turf athletic field, and a tree-lined walkway with public art. Another educational mixed-use project in Toronto is the Downtown Alternative School. The primary school is located in a mixed-use development with cooperative housing above and shops below. This school shares the Toronto Catholic School Board's St. Michael's School.

While it is important to look at the approach taken by the NTCI project, it is equally critical to understand the issues and challenges faced by other cities that are going through similar growth pressures and school needs. What have other cities with similarly accelerated development in downtown and midtown areas done? How have they addressed issues of over crowding in schools and lack of funding for constructing school infrastructure? Why was a specific approach chosen?

Zoning regulations, mixing of appropriate uses, and legal restrictions limit the number of mixed-use public school developments. But, a gradual increase in such projects is evident by the number of proposals that have been sprouting especially in the North American context. Georgetown Day School in Davenport Street, Washington is planning to build a mixed-use school project as part of its expansion plan with 30,000 sq. ft. of retail on the ground and 340 residential units above. Another public middle school will be part of a development in Brooklyn, NY. The proposal is to develop an approximately 323-unit mixed-income residential building with ground-floor retail, a 300-seat public middle school on a single story and a three-story, partially below-grade, 465-space public parking garage (NYC, 2009). This chapter provides an overview of three public school projects built as part of a mixed-use development using a P3 approach and two cameo cases where a partnership model was used to construct public school infrastructure.

4.1 Case 1 - New York by Gehry at 8 Spruce Street | NYC, US Context

The project began when a parking lot owned by the New York Downtown Hospital became available for redevelopment in 2003. The hospital was in financial distress and decided to sell the site to monetize its assets. A request for proposals that solicited bids for the parking lot site was issued. The developer who won the project saw it as an opportunity to acquire a site that would otherwise not be available. While the developer intended to build an iconic building so as to maximize the potential of the site, the hospital wanted a development that would accommodate floor space for its use so as to complement the hospital next door. The sale included agreements regarding provision of medical centers to serve the hospital, and the site was purchased in December of 2004. The project site also fell within the area of lower Manhattan that was zoned to allow a maximum floor/area ratio with no height restrictions. Moreover, the project did not require rezoning and did not include any formal public consultation, as it was an as-of right project.

Initial renderings of the project brought objections from neighbours, who tried to stop the project through litigation. Public meetings and negotiations were held to understand neighbourhood concerns and public spaces such as a park and plaza were added to the design. The shortage of schools in the area brought the New York City Department of Education into the picture. The developers also needed the mayor's approval. By introducing the school, the developer gained advantages in terms of increased height (addition of four floors for the school meant the residential units had to be raised higher), marketing and possible additional funding.

Site

This project is located in the centre of lower Manhattan, specifically in the Financial District surrounded by high-rise office buildings. The site is adjacent to New York Downstate Hospital, south of City Hall Park and Brooklyn Bridge. This project is easily accessed by public transportation including two nearby multimodal stations and has transit stations in close proximity. This project site was originally a parking lot owned by the adjacent New York Downtown Hospital. The Hospital sold the site to the developer. The entire project is built on a site area of 0.95 acres.

Project description

The mixed-use residential tower on 8 Spruce Street is a 76-story residential skyscraper mixed with other uses. Architect Frank Gehry designed it. The project began in 2004 and the construction was completed in 2011. The building totals 1.1 million sq. ft. The lower five storeys have a brick façade while the storeys above are cladded with stainless steel and glass. This was intentionally done by the architects to respect the nature of the neighbouring buildings. The residential portion of the building has a concierge and valet services. It also has indoor and outdoor social and entertainment amenities such as a swimming pool, fitness centre, library, lounges and game rooms.

Mix of Uses

The project includes a K-8 public elementary school with a capacity of 600 students, 898 luxury condos, a medical centre for the New York Downtown Hospital, retail, and two outdoor plazas that serve as public spaces. The school covers 100,000 sq. ft. of the first five floors of the building with 5000 sq. ft. of outdoor play space on the roof deck of the fourth floor. Just above the school, the residential tower rises consisting of luxury condos ranging from studios to 3 bedroom apartments, which can only be rented. The building also includes space for New York Downtown Hospital, which takes up 25,000 sq. ft. (Refer to Figure 10). There are about 175 parking spots provided below ground for hospital use. Also there are public plazas on the east and west sides of the building with 1,238 sq. ft. of street level retail facing the plazas, which is the only commercial retail in the condominium (The Skyscraper Center, 2016). The residence and the school share none of the services except egress on the site.



Figure 10 Section of 8 Spruce Street, NYC Source: Gehry Partners, LLP 2011

The P3 approach

The project developed through a public-private partnership. Forest City Ratner (FCR), the real estate firm that took on the project, had built several mixed-use projects in the past and was well versed in the concept of public-private partnerships. According to FCR, the site's location had a huge development potential in terms of greater density and revenue generating capacity, which made the project extremely desirable. As the site was not "subjected to any design ordinances or neighbourhood development jurisdictions" (Rowe & Kan, 2014, p. 90), the hospital issued a request for proposal. The proposal by FCR highlighted maximizing the potential of the site by increasing the density and thereby increasing the residential population and building a landmark structure by the renowned architect Frank Gehry that would contribute to Manhattan's skyline. Concurrently, the New York Downtown Hospital also saw the advantage of having a signature building adjacent to its property in terms of attracting high-profiled doctors and thus chose the real estate firm.

Meanwhile, the New York City Department of Education (NYCDOE) approached the developer with the idea of putting a pre-K to grade 8 public school in the building. Even though the developer was aware that the addition of a school could cause delays to the project, the marketing, the additional floor height and the city's offer of Liberty Bond³ financing were sufficient incentives for FCR to agree to the proposal.

An agreement was entered into with the New York education officials. Even though the real estate firm was responsible for the construction of the school, the school was to be built with a negotiated fixed price and the City paid for the construction as the project advanced. Upon completion of the project, the Department of Education bought the school from the developer. Thus the approach chosen here seemed to fit in the Design - Build - Maintain - Transfer. The project site is completely owned by the private developer. The building is legally owned and operated as a commercial condominium consisting of four ownership units: the residential tower, the school, the ambulatory care facility for the hospital, and the hospital parking as the mechanical system is shared by the project components. The developer owns the residential tower, the school is owned by the DOE and the medical centre is owned by the hospital. The maintenance is through this condominium agreement.

Zoning

The high-density zoned site initially allowed for 66 storeys. The inclusion of a public school and addition of public squares on the east and west side earned additional height, making the project one of the

³ Liberty Bonds were issued in the aftermath of the September 11, 2001 happenings in the US to finance rebuilding of the areas affected (David nd.)

tallest residential projects in that area. The zoning did not require any parking in the building - a requirement not unusual for a project in downtown Manhattan.

Financing

The developer was able to fund the project partly through the tax-free financing of US\$203.9 million from the Liberty Bond program that was being given to newly developing properties to incentivize redevelopment in lower Manhattan after the 9/11 tragedy and by taking a taxable debt of US\$476 million from a group of six banks. NYC paid the construction costs for the school incrementally as the costs were incurred, and upon completion the school was legally acquired by the New York City Department of Education. The total construction costs on the project ended up being approximately \$902 million (\$800 per sq. ft.), which included a land acquisition cost of \$87.75 million. The land was financed with equity, debt, and a 65 percent loan-to-cost land loan.

Debt capital sources for 2011 refinancing		Initial equity capital sources	
Munich RE	\$158,544,544	Forest City Ratner	\$183,500,000
Fifth Third Bank of Northwestern Ohio N.S. Toledo	\$86,727,303	National Electric Benefit Fund	\$147,100,000
ING Real Estate Finance (USA) LLC	\$86,727,303	Total	\$330,600,000
Norddeutsche Landesbank Girozentrale (NordLB)	\$86,727,303	Ownership as of 2012	
Wells Fargo Bank, N.A.	\$86,727,303	TIAA-CREF	49%
RBS Citizens, N.A.	\$39,623,253	Forest City Ratner	26%
Total credit facility	\$545,077,011	National Electric Benefit Fund	25%
Tax-exempt and taxable bond breakdown			
NYC HDC tax-exempt Liberty Bonds	\$203,900,000		
NYC HDC taxable bonds	\$335,100,000		
Total	\$539.000.000		

Figure 11Sources of funds

Source: Urban Land Institute 2014

In order to qualify for the tax abatement program that was soon to expire, the developer had to lay the building's foundation sooner than the scheduled date using the firm's own equity, as the construction financing was not in place. The tax-free Liberty Bonds greatly contributed to the reduction of borrowing costs for the developer. Out of six banks involved in the financing of the project, four lead banks provided credit enhancements for the bonds. "By providing the credit enhancements the banks essentially took on the construction risk involved, as bond buyers don't take real estate construction risks" (Urban Land Institute, 2014, p. 4).

Success and Benefits

The creation of a landmark luxury residential tower by a renowned architect with 350 unique residential plan configurations, medical centre, public school and amenities all located in the Financial District with access to nine different subway lines made the project a very desirable property for tenants who desired accessibility to different activities in the downtown. The project was financed before the financial crisis of 2008 and became operational when the market started to recover. Also, the NYC housing market changed from a condo owners' market to a renters' market in 2011 - 2012 as the project was in construction (Urban Land Institute, 2014). The developer, who had originally envisioned that the inclusion of the school would attract more young families, decided to change the strategy and developed one-bedroom and studio units that could be leased instead of building saleable two bedroom and three bedroom units. This change in strategy was attributed to the economic recession and change in demand structure (from an owner's market to a renter's market) during the time when the project was built. Furthermore, adding more families would have only created additional enrollment pressures in a neighbourhood with a need for schools. The developer had less competition, as the market had just recovered from the recession, and was able to lease the residential tower successfully. The need for school space in that neighbourhood was also addressed by bringing the school into the mix. The high-end luxury apartments with panoramic views have attracted young working professionals and

empty nesters capable of paying premium rental rates.⁴ Rent stabilization that applies to all units, which came into effect because of the Liberty Bonds funding, benefits tenants by limiting rent increases to not more than 2-3 percent per year.

Moreover, as per the City's request, the developer included a school, gained additional height and tax-free funding through Liberty Bonds. According to the interview with a representative at the FCR group, addition of the school added to the marketability of the project.

Challenges and Issues

Soon after FCR acquired the rights to develop the site, neighbourhood opposition began to mount. While there were no zoning restrictions, project resistance came from neighbours who tried to stop the project through litigation. The litigation emphasized the massing of the building that restricted views. The developer set up a negotiation process. During this process it was decided to build a park and plaza between the new building and the existing buildings adjacent to the site to accommodate the interests of the neighbouring residents. Thus, the litigation was dropped. The developer's decision to resolve the issue through negotiation instead of going through the lawsuit was timely, since the litigation could have delayed the project and financing would have become difficult during the recession (Urban Land Institute 2014).

Another major challenge was the façade. The curvature of the façade was challenging in terms of structure and floor unit design. More than 300 different residential configurations and different floor plates evolved from the undulating folds of the curvature of the façade. The building height that creates shadow on adjacent properties, its curvilinear façade and the 900 units that adds to the density of the Financial District brought some discussions. While the height brought litigation, the façade brought engineering challenges

⁴ Studios start at \$2,630-per-month, one-bedrooms are \$3,580 and two-bedrooms \$5,945.

in terms of assembling the structure. In spite of the façade being an engineering feat, there were criticisms that the south-facing façade was neglected. Although the architect had mentioned that the difference in façade was to give variety, there were criticisms from the public and architectural critics that it was neglected because of a constraint in the budget. The façade of the school had to be designed based on the budget of the school and façade of the residential towers had to carry an image of luxury residential development. Added to these issues, the pre-K program, which was part of the original school proposal, was cancelled at the time of school opening. This caused some disappointment and uproar among the parents who were looking forward to enrolling their children into the program. The cancellation happened due to lack of space and improper planning in the design of the elementary school spaces in the school.

Lessons

There are some important lessons that can be learned from this project. Firstly, the partnership must come together to realize a vision and has to work towards achieving it. Irrespective of market changes, the partners must stay patient, be aware of the risks and resolve to work their way through negotiation. Secondly, as-of-right developments could be beneficial to the developer as they don't require public input and don't need approval from the City Planning Commission or Board of Standards and Appeals in NYC, but they could cause issues from adjacent properties on height and density. And lastly, during negotiations with the community, resolving conflicts instead of litigating them is a time saver in a complex mixed-use project.

4.2 Case 2 - P.S. 59 and the High School of Art and Design | Manhattan East side, NYC, US

Context

The Educational Construction Fund (ECF) is a New York City Department of Education (DOE) agency that uses public-private partnerships to develop schools in mixed-use sites. The agency redevelops schools that are deteriorating. The ECF leases parcels of land owned by the DOE to real estate developers. The developers in turn redevelop the sites and include new schools.

250 East 57th Street at 2nd Avenue in NYC was a site, which had two schools P.S. 59 a K-5 elementary school and the High School of Art and Design in Manhattan. Both school facilities were deteriorating and the condition of the schools were brought to the DOE's attention in 2005. In 2005, the City along with the support of the schools, decided to rebuild the schools and to lease the air rights above the schools to a private developer. Proposals were sought and the World-Wide Group acquired the project. The City permitted a private developer to build a residential tower on the City-owned property, which was originally occupied by the schools and under utilized. The developer demolished the old schools and constructed two new schools on the site in exchange for leasing the air rights and the ability to use the rest of the site. The development includes the two schools, a grocery store and luxury condos. The city retained the ownership of the site, and DOE leased it to the developer. Since the planned development was an asof-right site, it did not require approval by the Planning Commission or the City Council (Smarr, personal communication, March 04, 2016).

Site

The school site is an L-shaped 1.5 acre parcel located between 2nd and 3rd Avenues in Midtown Manhattan. The interim spaces for the schools were built on an adjacent site until the new buildings were constructed. There are three entrances to the mixed-use project. Whole Foods, a prominent grocery store, is accessed from 57th street. The entry to the luxury condo building is on 2nd Avenue and the entry to high school is on 56th Street.

Project Description

The mixed-use project is a 65-storey tower. SOM architects designed the hourglass shaped building. The construction was split into two phases. Phase 1 began in 2009 and was completed in 2012. This phase included the construction of two new schools and a retail space. It also included the renovation of a building few blocks from the site into an interim school to temporarily accommodate the students during construction of the main project. Phase II began in 2012. This phase in which the residential tower is being built is still in progress. The project has three floors below ground that consists of the parking, auditorium and gymnasium, ground level of retail; twelve storeys of school facilities and the remaining levels make up the residential tower.



Figure 12 Rendering of mixed-use tower proposed at 57 East, NYC Source: City Realty 2006

Mix of Uses

The mixed-use project consists of a Whole Foods market, one K-5 public school, one high school and residences. It is a 65-storey residential tower with a 12-storey building shared by both schools. There are 350 residential units comprised of both rentals and condos. The residential tower is separated from the schools by a courtyard. The new school building for PS 59 and the High School of Art and Design, occupies 385,000 sq. ft. of space. They share amenities such as an auditorium, a library and science labs. These facilities are also shared by another public school PS 169 which is located off site. There are outdoor and indoor spaces for students to interact, entertain and play. The two schools are separated at the fifth floor, and the sidewalk level is raised up by a 38,000 sq. ft. Whole Foods grocery store. The apartments on the lower floors are for rent and the apartments above are for sale. The city's only use requirement was the school; it was the developer who decided the mix of the other uses.

Financing

Financing a complex project was possible because of multiple funding options. ECF - who owns the land - and the World-Wide Group entered into an agreement, under which, apart from leasing the property from the Department of Education for 75 years, the developer agreed to pay for construction of two new schools and for temporary space for the two schools at an alternate site. The developer will also be making annual payments in lieu of taxes on the 75-year lease to ECF. The first phase of the project, not including the 38,000 sq. ft. Whole Foods, was entirely financed by the City of New York through bonds. In 2010, the ECF issued \$53.8 million to finance phase one of the construction of the elementary school and in 2011 issued \$137 million to finance the construction of the high school. "The developer is paying off those bonds using lease proceeds as well as the federal Payments in Lieu of Taxes program" (Commercial Observer, 2014, para 4). The second phase of the project, which includes the retail space and the luxury residential, is being financed by a four-year construction loan with extension options. The developer has obtained a \$450-million construction loan for the construction of the condo units. The same financing company provided phase-one financing towards construction of the interim facility.

Success and Benefits

PS 59 is the seventeenth mixed-use public school P3 project in New York. It is also the largest mixed-use vertical development project that was done using a P3 in the city. The profit from selling the development rights paid not only for the construction of two new schools within the city, but also contributed towards capital improvements of few other city schools to the DOE. The partnership also ensured timely construction of the schools, benefitting the students and the community at large. The Educational Construction Fund, which is an agency of the New York City Department of Education agency, uses P3s to develop mixed-use sites that include schools (Smarr, personal communication, March 04, 2016).

The developer's strategy to rent out the units on the lower levels and sell the units on the upper levels is an effort to realize maximum profits from the units. The tower is another iconic building with its hourglass shape, added to the city's skyline. Furthermore, the developer also ensured that about 20% of the rental units would belong to the affordable housing category in response to statutory requirements. This means that, as per the funding requirements and in exchange for more density, an additional 30 units are allocated for the Inclusionary Housing Program⁵. Also, the building management control

⁵ "The Inclusionary Housing Program (IHP) is designed to preserve and promote affordable housing within neighbourhoods where zoning has been modified to encourage new development in NYC. A development may receive a density bonus in return for the new construction, substantial rehabilitation, or preservation of permanently affordable housing." (NYC 2016)

system employed in the school allows the DOE to monitor mechanical systems off-site, which is new for the DOE.

Challenges and Issues

The challenge emanated from the oddly shaped site and the deep excavation that had to be carried out below the structure to accommodate parking. The greatest challenge was the location of the gymnasium, which doubles as the auditorium. Robust structural and acoustical treatments were required as this facility was located above the classrooms. Another challenge was the façade. Metal panel systems were used for the entire building, including the schools. Since the material is not conventionally used in schools, special approvals were required.

Lessons

There are some major lessons to learn from this case study. Firstly, a development model from the 1970s was revived wherein the city retained the ownership of the land and permitted the private developer to build on the underutilized land. Secondly the air rights above the existing schools were exchanged for the construction of two schools - a public k -5 school and a high school. Thirdly, a single point of contact at the City for the project, strong support from the mayor and a significant non-school portion of the project to maximize development motivated major development companies to enter into the bidding process. Lastly the usage of contemporary building materials like pre-fab metal panels and innovative sustainable technologies show that the way school construction occurs is changing.

4.3 Case 3 - The North Toronto Collegiate Institute (or NTCI) | Toronto, Canada

Context

The Toronto District School Board (TDSB) has both shortage of funds and limited land availability in the downtown and midtown areas to construct new schools or repair existing schools that require maintenance. The redevelopment of NTCI is one of the initial projects in Toronto where an aging facility was replaced by a new facility.

The NTCI is a public high school that was founded in 1912 in Toronto, Canada. The project is located in the heart of the city's Yonge-Eglinton urban node, which has direct access to public transit, a main street with vibrant retail and a strong residential market. This school went through six additions in the course of 90 years and a new location was finally sought in the early 2000s. During a building evaluation in 2005, the building was assessed to be in extremely poor condition owing to the lack of maintenance and deferral of code compliance over the years. This situation was attributed to the lack of funding. Before any kind of renovations could even be considered, the building had to be brought up to current safety standards – a process with an estimated cost of \$18 million. Faced with a badly deteriorating structure, the TDSB made the decision to rebuild NTCI rather than renovate or close for two primary reasons – cost and location (Refer to Figure 14). With TDSB being cash strapped and lacking in funding for new construction or procurement of new school sites, TDSB decided to sever the land on which the school building existed to raise capital. NTCI's reputation, accessibility, its attractiveness to out-of-district students, and its prime location gained the support of the community for the redevelopment project.

This NTCI as mentioned earlier is located in midtown Toronto, very close to the Yonge-Eglinton Urban node, which has direct access to public transit and a vibrant retail main street. A strong residential neighbourhood supports the site. The 5.3-acre parcel was NTCI's property with no structures other than the school building.



Figure 13 Aerial view of the North Toronto Collegiate Institute | The towers are on either side of the school. The school is 3 storeys. All buildings face the playing field. | Source: NTCI 2012

Project description

Site

The project, known as the Republic Towers and NTCI, involved the redevelopment of an aging high school into a newly constructed secondary school building which is a four-storey structure with a built up area of 156,000 sq. ft.; two residential buildings of 24 and 27 storeys; a playfield; and a public pedestrian walkway connection between two city streets (Refer to Figure 13). The design for the school is conceived around a major courtyard space. This courtyard brings in daylight, provides ample views and access to the outdoor space. Even though the residential buildings were constructed as part of the overall school complex and share a common underground parking garage, they are separate buildings with separate entrances with designated parking. Only the roof of the school is shared between the residential buildings and the school. Massing and building materials are also distinct between the school building and the residential buildings. The residential building elevation is glass-clad while the secondary school is solid-masonry.

	IDSB Lanas Only						
	CRITERIA	Status Quo	Renovation	Renov. Plus Addition	Renov. & Addition	New Construction	
				Option A	Option B		
Quantitative	Cost	5 mil over 5 yrs	\$18.4 mil	\$32.6 mil	\$31.6mil	\$28.6 mil	
	Residential Development Funding Possible	No	No	No	\$7.4 mil	\$14.6 mil	
	TDSB Funding Available	Maintenance Fund.	Req. Board Approval	Req. Board Approval	Req. Board Approval	YES, \$14.0	
	Net Other Funding Required	N/A	\$18.4 million	\$32.6 million	\$24.2 million	0	
	Total Building Area to Maintain	174,200 s.f.	174,200 s.f.	200,000 s.f.	180,000 s.f.	153,000 s.f.	
	Future Operating Costs	14% more +	14% more	30% more	18% more	typical	
Qualitative	Students Remain During Construction	Yes.w. disruption	No	No	No	Yes	
	Retains Historic Façade	Yes	Yes	Yes	Yes	Yes, Relocated	
	Retains Historic Classrooms	Yes	Yes	Yes	Yes	No	
	Barrier Free Access	No	Yes, 80%	Yes, 80%	Yes	Yes, 100 %	
	New Programme Accomodated	No	No	Yes	Yes, gym too narrow	Yes	
	Full Track and Field	No	No	Yes	Yes	Yes	
	N/S Orientation to Field	No	No	No	No	Yes	
	Access to Swimming Pool	Yes	Yes	Yes	Yes	Yes	
	Parking Available (NIC TPA)	65 surface	65 surface	370 per floor	220 per floor	440 per floor	

QUALITATIVE & QUANTITATIVE ANALYSIS

Figure 14 Architect analyses on the NTCI Redevelopment project to arrive at best possible scenario Source: TDSB - NTCI Redevelopment Study 2004

Mix of Uses

The rebuilding process as a part of a mixed-use project with the school and the residential buildings began in 2005 and the new school was occupied in 2010. Tridel, a private development company, built the project. The school facility has about 156,000 sq. ft. of floor space and the two residential towers have 500,000 sq. ft.. The fourstorey secondary school building is designed to accommodate 1,200 students and includes science, art, music and drama classrooms, a 600-seat theatre, library, and a triple gymnasium. There is also an outdoor playing field on the site, which is used by the school and made accessible to the residents and to the public. Moreover, the school amenities are accessible to the public after school hours. The mix of uses has attracted a diverse set of residents, from working young professionals to empty nesters.

The P3 approach

The redevelopment of the school was made possible through a unique public-private partnership between the Toronto District School Board and the private developer Tridel. The school board chose Tridel as the development partner after issuing a request for proposals. As part of the deal, the TDSB sold two surplus parcels of land to the developer. The board then used the money from the land sale to finance a major portion of the school construction. From the early stages of conception, this project started with a participatory design approach that involved several stakeholders. The stakeholders included councilors, representatives of the local community, NTCI alumni, students, parents, the school board, the developer and architects. The TDSB and the resident ratepayers' association signed a MOU, which stated the height and density limits and indicated that the community's needs to use the facilities, the requirement of public space and a playfield were understood and will be taken care of in the redevelopment. This MOU was required to get support redevelopment of site and the basic requirements were listed. Educators, alumni, and the ratepayers' association also communicated their requirements. Conceptual plans and site plans were then developed. A feedback mechanism was part of the process.

Moreover, a Heritage Working Group comprising principal, teachers, architects, a school archivist, and a heritage preservation
consultant worked together to arrive at a strategy to preserve the school's history. In order to gain alumni and community acceptance for demolishing the original structure, which was built in 1912, significant heritage components such as entranceways, date stones, decorative stone panels and original brick elements were integrated into the new school's internal courtyard. The collaborative approach solicited stakeholders' input and decision-making was done based on maximum value generating propositions for the school, the developer and the community at large. The decision to make it an energy efficient and sustainable redevelopment also helped in bringing additional funding. At the time of sending out bids for construction, the school board sent out contracts for their portion of the building and Tridel took care of theirs. Only the slab on the 5th floor was shared between the two parties.

The risks were greater for the developer because of the level of involvement in the partnership. According to Bruno Giancola, vicepresident, project management at Deltera, the other stakeholders had a different understanding of land development. This means that building a school is different from building a residential condominium or a commercial development. Developing a mixed-use facility that involves two different uses with different ownership introduces multiple zoning requirements, building material usages, and marketing operations.

The school board's only financial risk was to ensure that the construction happened within the stipulated budget. The school is completely freehold, while the school and residential towers share ownership in the parking garage. Operational and maintenance activities are carried out separately on the site. For example, the school board has easement rights on maintenance of the cooling towers and HVAC system even though the cooling towers are not located on top

of the school. Another example is maintenance of the walkways; the school board maintains walkways around the school only.

Financing

The developer was able to fund this project by obtaining school construction funding leveraging from residential development. As the building was designed to LEED standards, innovative green loan financing was also obtained based on utility payback and life cycle costing for the project. The total cost of constructing the school was \$52 million. A portion (0.7 acre) of the school grounds was sold for \$23 million to fund the construction of the school building. The School Board provided additional funds for the completion of construction of the school, and alumni also contributed funds required for the school courtyard.



Figure 15 View of NTCI in relationship to neighbourhood scale | Source: TDSB - NTCI 2010

Success and Benefits

The project's success is its central location and collegiate reputation. It is located in a high-density residential zone, with access to public transit and vibrant retail activity. Not surprisingly, the units in the residential tower sold out. A broad mix of units made it affordable to a range of users. The residential towers and the school building are to scale with the neighboring buildings (Refer to Figure 15). The project also does not have excess amenities that remain unused or units that are still vacant. Sustainable design features integrated into the building such as the green roof also contribute towards energy savings by providing insulation, absorbing heat and collecting rainwater and by purifying the air. The project was carried out in two phases. While the construction occurred, the school was still in session and remained open to students because the new building was built on the location of the old sports field. The old building was demolished upon completion of the new building in September 2010 and was converted into a new field in October 2011. Students of NTCI benefitted from upgraded infrastructure and state of the art facilities. This project also helped in clearing \$52 million capital deficit from the Board's financials.

Challenges and Issues

The most immediate challenge according to Tridel was designing and fitting a school building in the designated land. By repositioning the location of the school on the grounds and by relocating parking underground, the project planners were able to sufficiently accommodate the school. There was initial resistance from community regarding selling of public school land to a private developer. But the initial criticism lessened after community members saw the results. The money received from selling the severed parcels of land was put to use in achieving some significant updates for the school, such as state of the art facilities, a football field, auditorium, and theatre which were initially not available. According to the interview with Shelley Laskin, Trustee TDSB Ward 11, the project also cost less than what it would have taken to renovate the school building or build it the traditional way.

The developer's concerns revolved around the building. NTCI was built in 1912. In an effort to carry the history into the future, the Heritage Working Group identified historic elements from the old building that had to be incorporated in the new building. The challenge of incorporating facades of the original school into the project became the developer's responsibility. Another issue was that of sound isolation between the school and the residential towers. The new school's auditorium was also constructed as a musical and theatrical venue. Acoustical provisions were made to mitigate sound transfer specifically from the auditorium to the residential property. Other issues involved the difference in operation styles between the public and private partners, levels of transparency, pricing difference in contracts and tenders. For example, some contracts for formwork and exterior skin came out cheaper for schools. The absence of retail in this project, though, likely spared the project additional issues or challenges.

Lessons

In a situation where the TDSB no longer receives provincial funding for new schools or to replace existing schools or site purchases, the severing of land and selling it to the private developer to raise capital for the redevelopment of the school was indeed beneficial. But the long-term impacts such as the need for land as demographics change are unknown. A main lesson in this project is the importance of community participation. Collaboratively working with the community and the various stakeholders involved in the project is vital when public land is involved. According to the school board, yet another lesson was the importance of design guidelines. With most of the public schools aging in Toronto, new design guidelines have to be drafted to guide construction of new schools and to renovate existing schools.

4.4 Cameo Case 1 - Nova Scotia, Canada

Nova Scotia implemented a P3 model to build 41 new schools in 1997. The government pursued this P3 model as a method of government procurement and the main objective was to enable Nova Scotia taxpayers to get better value for their tax money by shifting financing and operation responsibility to the private sector. This P3 model followed a Design-Build-Finance-Operate structure, all by the private sector. Even the interiors, furniture and technology aids were included in the contract. The school system provided only the students and the teaching professionals.

Under this P3 model, the developer purchases the land from the province, and leases it to a construction management company (CMC) for 20 - 30 years. The CMC constructs the building and purchases the technology such as the equipment and computers required for the school. The province/school board and the development company enter into the same lease term. The province/school board pays monthly payments and an annual administration fee to the CMC. The costs that arise from operations, repairs and capital improvements are the responsibility of the province/ school board. At the end of the contract term, the developer will retain the land, building, and equipment unless the province/school board either purchases the facility from the developer for a pre-determined price or renews the lease again. The private sector profits not only from the lease arrangement but also from renting the facility after school hours with no or limited access to the community around it.

From the provincial government's point of view, this model came to be seen as a failure owing to minimal risk transfer and unbalanced advantages that it offered to the private sector. Firstly, schools were built on land with lower real estate prices and not in locations where they were needed. Secondly, contractual agreements and financial terms were not set early in the project. Thirdly, entering into an agreement a year into the process gave an upper hand to the private developer to set their terms, conditions and transaction costs. For these reasons, and following a change of government in 1999, the provincial government abandoned the P3 approach to school construction. The operation and maintenance contracts were transferred to the school boards that escalated their costs once again.

4.5 Cameo Case 2 - Alberta, Canada

Alberta brought into effect a P3 model for school construction to address rapid growth. The primary objectives were to reduce the backlog of school requirements and to build schools to accommodate the needs of a new community. In the last decade, several new schools have been constructed and several are under construction. This initiative is known as Alberta Schools Alternate Procurement (ASAP). The P3 model followed is Design - Build - Finance - Maintain structure carried out by the private sector. Like any P3 model, consortiums submit qualifications. After an intrinsic evaluation process, a team is chosen to begin the DBFM work on the new schools. A fixed price is guaranteed to the government and a delivery date is scheduled. Also, the partner gives a 30-year warranty on the schools to the government. The risk is transferred to the private sector by the very nature of contractual agreement. Apart from receipt of payment only after demonstration of substantial completion of the project, construction cost inflation and weather related delays are absorbed the private partner. Furthermore, the private contractor can be penalized if timelines are not adhered to. Interestingly, the uniqueness about Alberta's model is that the province funds the construction of new schools while the lands still belonged to school jurisdiction. Upon successful completion of the project, and once the schools are open, the government makes regular payments to the partner for the 30-year time period. The advantages of grant funding, a long-term revenue

stream, and government support for P3 projects motivated multiple consortiums to compete for bidding.

In the first phase eighteen schools were completed in 2010 by BBPP Alberta Schools Limited. According to the value for money report by the Alberta Schools Alternative Procurement (ASAP), the P3 approach resulted in a cost savings of \$97 million - a 13% saving for the provincial government and a time saving of two years compared to the traditional method. The second and third phase also was successfully implemented and new schools were constructed resulting in a saving of \$90 million. The launch of ASAP Phase 4 brought some surprises. The increasingly competitive nature of the P3 structure, the resource requirements necessary to build large number of schools, the repeated winning of bids by the same consortium, and a shortage of skilled workers all slowly reduced the incentives for bidding. Around the same time, external factors such as declining oil prices, economic recession, change in the local government, and a change in government priorities and focus areas resulted in decreasing support towards P3.

In the three case studies above, different motivations led to the implementation of public schools in mixed-use buildings in dense urban downtown neighbourhoods. The case studies demonstrate that the interest of the developer, the participation of the community, the process of government approvals, zoning and the availability of financial incentives open up the opportunity for newer projects to include schools in the mix, which addresses the need for schools by the school boards. Also, the different stakeholders who have been involved in the projects understand that the process is long, tedious and consumes more effort than a traditional single use project. Moreover, this initiative of introducing a public school in a mixed-use vertical development is in its nascent stage and the hurdles it will face in the course of time are unknown.

CHAPTER 5: DISCUSSION

- How all this comes together

The case studies reveal that P3 partnerships for mixed-use public school development project have the potential to be win-win propositions for the project partners. The developer has its agenda greater density, availability of property at a prime location, access to additional sources of funding, tax benefits in some cases, increased air rights, political support for including the school component, and most importantly rapid absorption of finished sites at the highest price.

MXD & P3	MXD & NOT P3
 multiple P3 approaches urban schools land is owned/ leased air-rights sold to developer alternate financing/mixed financing 	 suburban schools land not owned by school board school rents/leases out space
 school construction packed into a single contract follows a D-B-F-M model several global examples urban and suburban schools cost-effective land owned by school board provincial funding 	 traditional schools Design-bid-build suburban schools land owned by school board school board funding

NOT MXD & P3

NOT MXD & NOT P3

Figure 16 Differences between public schools built using various approaches | Mixed use developments (MXD) | Source: The author.

For the school board and the community at large, a major benefit is the state-of-the-art facilities and upgrades, which would be otherwise difficult to achieve in a cash-strapped situation. The community further benefits from more housing options, access to additional public amenities and growth in that area, and being able to raise capital either by selling a parcel of excess land or by leasing developmental area. The existence of these benefits does not imply an exclusive model to address the school infrastructure need, however, because each project is unique, specific to its location, and constrained by project-specific conditions (Refer to Figure 16).

5.1 Features of P3 mixed-use public school projects

General Characteristics - Location of the school in a dense urban setting, occupying the lower part of the building for the purpose of education, separating entrances based on uses, clearly identified parking, provision of both indoor and outdoor spaces for play, interaction and recreation, public access to amenities after school hours, distinct architecture styles and materials for the school in comparison to the whole project, retention of history by incorporating heritage elements from the demolished building into the new school building in a redevelopment project are some of the notable characteristics of public schools in mixed-use developments.

But there are variations between the New York example and the Toronto example in terms of the density and height of the residential towers. The NTCI project in Toronto has a relationship to its neighbourhood scale in terms of the tower height (Refer to Figure 14). This could be to the fact that the density was arrived by working in collaboration with the ratepayers association in the NTCI project, whereas in the case of New York, both projects were as-of-right projects and public opinion was not sought.

Provision of services - The private partner invests in the school infrastructure. This refers to the core and shell of the building and building systems in the case of Manhattan and Toronto and in the case of Alberta and Nova Scotia it went as far as providing the technologies, furniture and equipment to run the school. The public partner retained the responsibility of providing education. When the private partner is responsible for operating and maintaining a property for a fixed term, like it happens in a partnership as in Nova Scotia or Alberta, the developer makes different decisions regarding the design, construction techniques and materials chosen. Instead of having to deliver a project at the lowest possible capital cost, the lifecycle cost is accounted for.

Lease term - Arrangements between the public partner and private partner are governed by long-term contracts. This is usually 25 to 30 years, as in the case of Nova Scotia and Alberta, and more than 75 years in the case of the PS 59 project where the land was leased by the private developer from the city. The agreement specifies the lease term as 75 years. While what happens after 75 years is still unclear owing to the infancy of such projects, these lease terms specify the services the terms and conditions of use for a specific time period. The case studies and cameo studies demonstrate that public schools could be designed and built using a P3 approach and mixing uses to accommodate institutional use is feasible. An increased willingness on the part of the school construction authority and school board to partner with developers and vice-versa to co-locate a school in a new development was evident both in the literature and case studies. What explains this? What drives this interest? The following analysis answers that question from each partner's perspective

5.2 Why does the school want to partner with a developer?

The major drive for the School Construction Authority in NY and TDSB in Toronto to partner with developers for school construction is the huge backlog of new schools required, pending repair and maintenance of existing schools, and redevelopment of underutilized school sites. Many schools in the cities investigated for case studies have deferred maintenance over the years. In the current context, the cost of rebuilding a new school is often cheaper than the cost of renovation. In Manhattan, real estate values are high and rising, and with little land to build on, the only way to build is up. The NYDOE depends on the expertise of the private sector to accommodate a school in a vertical development that comes up in a location where there is a need. In the case of TDSB, there is a dire need of capital for many of its projects. This situation is due to the funding formula of the province. Funding is based on the average enrollment across the city and this average doesn't properly serve the needs of Toronto, as there are some areas with enrollment pressures while there are other areas with significant decline in student enrollment. TDSB is now looking at options such as selling surplus school land and collecting Education Development Charges (EDC) to address the capital need for new schools.

Another major reason is that the cost of school construction using unionized labour in NY is \$1500 - \$2000 per sq. ft.. The school board compares this cost to the cost of construction of luxury residential condominiums, which is \$800 per sq. ft.. According to the School Construction Authority (SCA), which is in charge of school construction in NY, it is significantly cheaper to buy the school from a private development than to build them the traditional way. That is why the school was bought at the end of construction in the New York by Gehry project.

Apart from the main objectives there are other tangible and intangible benefits for wanting to partner with a private developer. As in the case of Alberta, school boards no longer have to hire the architect and prepare the designs. That responsibility is transferred to the private developer. In some cases, even the cost of information technology and equipment are transferred to the private partner. Likewise, construction costs, mechanical equipment costs are shared between the private developer and public partner if facilities such as parking are shared. Additionally, when a private partner takes responsibility for operating and maintaining a property for a certain time period (the DBOM P3 approach), the private partner makes different decisions on how to build and what kind of materials to be used, since the liability falls on the private partner. "Instead of delivering a project at the lowest possible capital cost, it delivers a project at the lowest possible lifecycle cost" (PC34FCPS, 2012, p. 3).

5.3 Why does the developer want to partner with a school board?

As illustrated in the case studies, the developer is interested in the availability of property at a coveted location. Development companies in New York are on the constant look out for opportunities where an existing school gets listed for redevelopment in the real estate market. Private developers want air rights over the schools because of the location and the ability of such developments to bring in funding in the form of tax-exempt bonds from the ECF and other grants and incentives that may be available at that time for mixed-use P3s that include schools in their mix.

Height, density, and transferable air space are other keywords that appeal to the private partner. In the New York by Gehry case study, the developer received additional height for including a school in the residential tower development. The case studies from Manhattan were as-of-right projects. This means that the developers don't have to go through a public review process which is time consuming and arduous. This public review process take anywhere from 9 -18 months and is usually used as a platform for the public and various city agencies and elected officials to deliberate on large-scale development proposals.

When a public school is incorporated into a mixed-use project, the private partner usually receives extra development density, as with the inclusion of the school in the Spruce Street tower project by Gehry. Availability of space in the central business district is critical for the developer to build more residential and to add an iconic structure to the city's skyline. This translates into brand image, identity and marketability for the private developer. These in turn are most important for rapid absorption of units at the highest price. Interviewees who worked on these projects confirmed that they had no trouble renting the units. Finally, having a public partner makes the process of securing construction loans easier for the private partner.

5.4 What's in school P3s for city governance?

There are several reasons for governments to support P3s – above all for addressing social infrastructure such as education and health. In the case of Toronto and Manhattan, school construction through partnerships has helped address the infrastructure backlog. According to one of the spokesperson for the New York's PS 59 project, the project generated a "financial return for the city that could be used to support school construction and renovation elsewhere" (New York Sun, 2006, para 22).

Schools are extremely important for communities, and addressing the need for schools in inner cities can help prevent families from moving out of the urban core. By retaining young families with children, inner cities can maintain their vibrancy and not transform into ghost towns outside of business hours. The school becomes an anchor and the area becomes desirable. The partnership provides communities with state-of-the-art facilities and maximum development of the space that otherwise are beyond a typical school system's budget. This is evident from the three case studies.

Even though there are enough reasons to pursue a publicprivate partnership, this research has also identified hesitation to pursue it. In order to better align the interests of the public and private sectors, it is important to examine the major reasons for this hesitation, which this research has identified as lack of land, funding problems, culture issues, and lack of political will.

Land use

The biggest barrier is availability of land in the inner cities to realize a mixed-use public school. While in most cases the city develops schools on land it already owns, this increasingly may not be the case. With ever increasing real estate values and availability of funds limiting the purchase of newer land by school boards, it is important to look at the current utilization rate of the land in which a school is located. It is observed that any site that a school owns uses only 10-15% (i.e. the floor are ratio). As technology changes lifestyles, it is important to continue to assess the relevance of the traditional way of building schools. High school students need more interaction with professionals in the field. Research centres and technology incubators offer new academic learning experiences while sport specific facilities offer stateof-the-art facilities to develop a particular sport. Inter-generational learning happens in a mixed-use environment. Schools have to start thinking about potential synergies, and by opening up the school land for development, interactions, collaborations and experiential learning can happen.

It is also important to note that not all places can support such a development. A certain density is needed to support a mixed-use development. What works on 2nd Avenue in Manhattan may not be applicable to Bayview Avenue in Toronto. Land development decisions have to keep in mind the current scenario, projections of demographic growth, and change in needs. This can happen only when the City planning and design department and the school board work in conjunction with each other.

Land development has a lot of constraints in the form of zoning and bylaws. There are no clear laws and regulations for mixeduse school development, so special accommodation in zoning has to be made each time there is a proposition. Whether it is necessary to have clearer regulations in place is another discussion. Many times a permit is issued for residential development of certain density in an area that is already undergoing severe enrollment pressures in its existing schools, which suggests that development approvals without accounting for pressure on area services needs attention. Concurrently, zoning regulations also need a closer look in a rapidly changing urban environment. The impact on neighbourhood resources like open air, sunlight and park space must also be assessed. Innovative and intelligent forms of land use have to start now so as to address issues of social infrastructure, especially in inner cities where land is scarce.

Finance

Finding the appropriate funds for large-scale projects is not an easy task. As the cost of construction slowly increases, it takes a team of financial experts to work out the finances. School boards generally don't have this expertise. Private partners hire a wide array of experts to handle the financing issues. This reliance of the public sector on the private partner becomes essential on two occasions: 1. when the project is large, and 2. when one of the partners lack adequate funding capabilities. Traditionally, the private sector financed a project without any external funding source, so-called equity financing⁶. Equity financing is costly, doesn't allow the developer to diversify his investment and high risk, as the equity is locked into a single project. This is still possible for small scale, single use project but is usually not lucrative for developers. As the project size and scale increases, developers prefer debt to equity. It is not feasible for developers to raise enough equity to cover all the costs involved in larger projects.

⁶ Equity: Ownership interest in a firm. Also, the residual dollar value of a futures trading account, assuming its liquidation is at the going trade price. In real estate, dollar difference between what a property could be sold for and debts claimed against it. In a brokerage account, equity equals the value of the account's securities minus any debit balance in a margin account. Equity is also shorthand for stock market investments. (Harvey 2012)

Investment is sought from banks, investment entities, and private investors. Debt financing gives the flexibility of investing in different projects thereby diversifying the risk for a developer. Other advantages to debt financing include greater returns and limited liability. For instance, if the developer opts for debt financing, a construction loan is acquired for the entire project and then each particular product type is financed with separate permanent lenders who are comfortable with that specific type of project, such as commercial, residential, office. Owing to the mixed-use nature of the project, the developer may have to accept higher interest loans (Bayster, 2005, Edelsberg, 1999). These initial costs are borne by the developer through his equity. This is a high-risk scenario for the developer.

Different kinds of private investments depend on the priorities and financing approaches of the private investors. It is important to understand the pros and cons of these financing approaches to find the one suitable for mixed-use school projects. Moreover, many of the public financing tools that exist in the market today, require that the project be located in special planning districts or created by the local municipality, such as improvement districts or reinvestment zones, and usually require certain criteria to be met (Rabianski, 2009). Furthermore, tax abatement programs, development bonds, and bonds from tax increment financing (TIF), are also available for the construction of certain types of facilities and infrastructure (Herndon, 2011, DVRPC, 2008).

Design and construction of a school is different from construction of a residential or commercial or office building. Developers who are not familiar with integrating the different uses in a single development face increased cost in this process. This can be attributed to the need for separate entrances and egress, different exterior facades, different building materials, column-free space for auditoriums and gymnasiums, and separate elevator shafts and stairwells. At times, the partners are willing to compromise on the aesthetic of the development because of the difference in budgets between the partners.

Despite these challenges, there are some opportunities that arise as well. Project bidding attracts competitive construction costs. Private developers may look at innovative technologies and sustainable design practices focusing on long-term efficiencies and cost savings. Many times, the operational cost is also transferred to the private partner, making it their responsibility to build it right the first time. Savings in cost are attempted by maximizing the use of facilities. Use of explicit contracts and improved costing mechanisms makes the cost of services more transparent.

Culture

There is always resistance to anything new. Schools have always been imagined as stand-alone one- or two-storey buildings with their own parking lot and play field. The school board has always owned the land. Construction, renovation, and maintenance, along with the service of providing education, have always been the school board's responsibility. A slight alteration to this structure causes resistance. There is resistance from the communities to let private partners develop on public land. P3s in education have also been criticized on the grounds that they represent a first step toward full privatization. There are concerns of delay in delivery of services, new forms of risk, corruption, loss of ownerships and control, loss of accountability, lack of transparency and cost effectiveness, lack of security and safety in a mixed-use and possibilities of inequalities and unfair distribution of risks, responsibilities and profits.

Political Will

Another source of resistance to P3 mixed-use school development can come from private investors who believe that the process of negotiating with the city is more time consuming. According to private investors, public officials are not motivated by profit and are not sensitive to time and approval delays. On one hand there is willingness from private partners to work with the government but on the other hand there is reluctance from the government to move ahead on such projects. Many P3s are either driven or stopped by politics. Moreover, as schools are directly involved with communities, it is impossible to execute such projects without political will. Whether it is possible to reduce the politicization of social infrastructure is a completely different issue to debate. This explains the reluctance of partners to work with the system. The absence of stability in policies, the fear of changes to a program or change in priorities, the necessity for voter approval, and the overall lack of support from the governments all limit innovation from happening in P3s in building schools.

A mixed-use project that involves a school needs significant planning, appropriate expertise, adequate financing and collaboration with different stakeholders. Timing of construction, marketing, external market factors and global economy are also factors that contribute to the success of the project. The problems that we have today cannot be solved with the same thinking that we used when we once created them.

Mixed-use school development can thus maximize land use efficiency where there is limited land availability, offset development cost of new construction and renovation of schools when there is restrained fiscal capability, create benefits for the community, and create an anchor to regenerate the area. But all this will require strong political will and the willingness from different stakeholders to accept a new form of school infrastructure. At the same time, it is also not possible to develop mixed-use schools everywhere. Land size, city requirements, school board requirements for smaller schools and schools without direct access to open space, mix of uses, unforeseen risk of incompatible uses, condominium agreements, ownership and financial restraints have to be looked into before determining the feasibility of developing a mixed-use school.

Strong arguments can be made to support the proposition that every public school in the midtown and downtown area should be designed in a mixed-use setting, and the school space must be shared after school hours, to maximize benefits for the school boards, the students, teachers and the community but that does not have to be the norm. Along with its benefits, mixed-use school development raises many difficulties with respect to using, multiple financing sources, coordinating multiple users, and facility management and operation. "To be justified, the benefits of mixed-use development must outweigh the potential difficulties" (Mallach, 2009, p. 14).

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

The way in which a school is built, how it should look, and how it interacts with other users of the community are all slowly changing. With the reputation of schools influencing the real estate prices in many neighbourhoods, public schools act as anchors and economic boosters in the City of Toronto. And the City is rapidly approaching a crossroad - whether to sell surplus public school lands to cover capital costs of school infrastructure or to further delay construction of new schools and defer maintenance of aging schools.

This report shows that public-private partnership is a viable way to address over enrollment and to expedite school construction, especially under two circumstances: 1. when a school board is cashstrapped, and 2. when there is lack of land to build schools. School boards, developers, businesses and communities have also started realizing the benefits of working together to enable school infrastructure as a part of mixed-use developments. This is apparent from a lot more willingness to discuss public-private partnerships from the literature review and case studies. Despite the growing prevalence of infrastructure P3s, there remains little rigorous research on their impacts. Studies have found that P3s have been successful in delivering school infrastructure in a timely and cost-effective manner. The success of these projects on operational performance is difficult to assess because these public schools in mixed-use developments are still in their early stages. Nonetheless some initial evidence shows that P3 projects appear to be meeting expectations. Different stakeholders are able to see the benefits that such projects will bring despite the challenges they might have to tackle. The criticisms that arise against P3s are unavoidable as the social and environmental impacts of such project are still unknown. Moreover, the fear of increased privatization

of public assets is of grave concern. Like any topic, there will be more questions than answers and there is always more scope for investigation. The study has attempted to answer some questions and the following recommendations synthesize key issues.

6.1 Recommendations

1. The Ministry of Education funding formula should be revised for innercity school boards such as the TDSB

Funding needs are different for inner-city schools and suburban schools. The larger the school board, the larger its expenses to renovate and maintain existing schools and construct new schools to meet the demands of increased residential intensification. But the funding formula leaves larger school boards such as TDSB with less funds to balance the expenses of maintaining their aging inner-city education infrastructure with the demands for new school construction (Chowaniec, Gordezky & Grieve, 2015). The province should provide increased provincial funding to TDSB and allow TDSB to access Education Development Charges (EDC) irrespective of enrollment capacity. The regulations regarding EDC should be reconsidered in light of increased vertical development and enrollment pressures on neighbourhood schools in inner city areas.

2. TDSB should pursue alternate revenue generating measures than selling surplus public school land

Selling school land is not a sustainable revenue source to fund new school construction. According to Siemiatycki and Roberts (2014), selling land could bring in funds to improve school infrastructure and provide maximum utilization of school spaces to the neighbouring community, but three key questions must first be answered: "1. How is the proposed property currently being used by the school and surrounding community? 2. What is going to be developed on the site and what are the proceeds from the sale going to be used for?

3. How are stakeholders in the affected community meaningfully engaged in decisions around the public land sale and how the money is used?" (Toronto Star, November 24, 2012, para 6).

Moreover, selling of surplus land is not a long-term solution as land is a finite resource. Once sold, school boards lose a valuable community asset. Also it is not possible to increase the supply of school lands by buying more land with TDSB being cash strapped. Considering alternative use of surplus land to generate revenue has to be investigated in collaboration with the stakeholders.

3. The Ministry of Education and TDSB should establish selection criteria for private partners

Private partners should have prior experience in more complex mixed-use projects or large public-private partnerships. They should have sufficient equity in case of a delay in release of construction funds from an external source. The Ministry of Education along with TDSB should list out the selection criteria of a private developer to ensure that the developer has the right set of expertise, financial, contract management and project planning capabilities, as this is a complex process. Governments are exposed to significant financial and performance risks mainly because of poorly designed contractual agreements on complex projects. A careful understanding of risk assessment and value for money assessment should be performed.

4. TDSB should work closely with the City of Toronto land use planners

Schools are irreplaceable community assets for municipalities (Seasons, 2013). Municipalities in turn take the responsibility for planning sustainable communities (Sauve, 2011). Even though there is an understanding of this connection between schools, municipalities and communities an absence of a formal role by the city planners in school infrastructure planning is noticeable (Irwin & Seasons, 2012). The TDSB must work in collaboration with city planners not only in reviewing the option of selling the school lands but largely in the decision-making process of building school infrastructure. This will not only help in understanding areas that are undergoing rapid development and that will experience school shortages but also bring together concerned parties on the same table ahead of time to discuss potential solutions.

5. TDSB should establish minimal sustainable design standards for new construction and major renovations of school facilities

A reconceptualization of the school as part of the urban community, as opposed to the vision of traditional suburban school designs, is required. This involves a change in culture to be more forward thinking. Modern sustainable architectural approaches offer resource-efficient designs that optimize natural light minimize operational costs on water and energy and contribute to better learning environments. TDSB should adopt innovative, sustainable design principles and energy efficient school building technologies in building school facilities, should promote biodiversity in school sites, and should create facilities that will last longer.

6. Private developers should adhere to an inclusionary design process

Inclusion of public opinion from early stages of design to accommodate community needs helps prevent unnecessary litigation. Engaging the community in a more participatory process gains their approval and support. It is important that the local community supports a complex mixed-use project that benefits their neighbourhood.

7. Public schools incorporated into mixed-use developments need the flexibility to adapt to changing needs

Student population and enrolment projections are always just educated guesses. Schools under the TDSB need to be given the flexibility to expand or limit their spatial occupancy in a building according to their need. Moreover, schools are strong community assets. Inter-generational learning, maximizing the usage of space by sharing spaces, and collaborating to address changing curriculum needs can only be tested in an environment where there is a interplay of different uses and users.

P3s present opportunities for the TDSB to address enrollment issues in overcrowded areas, achieve its infrastructure goals, provide quality public facilities, support after school hour usage of these facilities, lighten financial burdens, reduce backlogs on maintenance and repairs and continue ownership of public school lands in the coming years. P3s for building public school infrastructure in mixed-use developments have been applied with varying degrees of success. TDSB has to be aware of the shortcomings and weakness and has to detail out strategies to work the P3 approach to meet its needs. Not all schools can be built using P3s, and not all schools can be part of a mixed-use development. School boards should approach partnerships with thoughtfulness, carefully weigh the benefits and challenges, and avoid adopting a cookie cutter approach. Each school board must adopt a model that is suited for its own local context. As times change, unconventional ideas for creating modern sustainable schools that can house children for the next 50 to 60 years need to be brought to the table. TDSB along with the City of Toronto can change the urban pressures affecting them by acting proactively. It is absolutely necessary to explore every option to build new schools and give students a better quality of life.

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Appendix A

Structured Introduction Questions:

 What is the name of your position and how long have you held it?
 Are you directly involved in creating a public-private partnership?
 Can you tell me about the role of your position in P3s and development of school infrastructure/ mixed-use developments or combination of both?

4. Can you tell me about a recent mixed-use public school project which you have worked on?

Other structured questions depending on the involvement of the interviewee in a project are as follows:

1. In what way does the partnership for school infrastructure development differ from other type of development projects? Are there specific advantages and disadvantages?

2. What is the biggest barrier to locating schools in mixed-use vertical developments?

3. What is the biggest barrier to creating public-private partnerships when a school component is involved?

Appendix B

List of known mixed-use projects with a public school included in the North American context

City	Name of School	Mix of Uses	Stage of school completion
New York, USA (Manhattan)	Public School 59, High School of Art and Design	2 schools, residential, commercial	Completed (2012)
New York, USA (Manhattan)	Spruce Street School / (P.S. 397)	1 school, offices, residential	Completed (2009)
New York, USA (Manhattan)	Junior High School 47	1 school, residential	Completed
New York, USA (Manhattan)	Park West High School	1 school, residential	Completed (1979)
New York, USA (Manhattan)	Public School 89	1 school, residential	Completed (1998)
New York, USA (Manhattan)	Yung Wing School	1 school, residential	Completed (1976)
New York, USA (Manhattan)	Murray Bergtraum High School	1 school, office, recreational	Completed (1976)
New York, USA (Manhattan)	Norman Thomas High School	1 school, office	Completed (1975)
New York, USA (Manhattan)	Robert F. Kennedy School	1 school, residential	Completed (1973)
New York, USA (Manhattan)	Roberto Clemente School	1 school, residential	Completed (1976)
New York, USA (Manhattan)	East Side Middle School	1 school, residential	Completed (2010)
New York, USA (Bronx)	Fiorello LaGuardia School	1 school, residential	Completed (1975)
New York, USA (Bronx)	Dr. Marjorie H. Dunbar School	1 school, residential	Completed (1967)
New York, USA (Queens)	Public School 99	1 school, residential	Completed (1974)
New York, USA	Riverside Center School	1 school, residential, retail, office, recreational, commercial	Under construction
New York, USA	77 Greenwich street	1 school, residential	Proposed (2016)
New York, USA (Dock Street)	Middle School @ 60 Water Street	1 school, residential	Completed
Boston, USA	Swampscott High School	1 school, senior residence	Completed (2007)
Philadelphia, USA (South Kensington)	The Center for Educational Excellence	1 school, residential, office, commercial	Under construction
California, USA (Pomona)	Pomona School District	1 school, retail	Proposed
Hawaii, USA (Kakaako)	690 Pohukaina elementary school	1 school, residential	Proposed (2016)

Ontario, Canada (Toronto)	Downtown Alternative School	2 schools, institutional, recreational, residential commercial,	Completed (2012)
Ontario, Canada (Toronto)	North Toronto Collegiate Institute	1 school, residential	Completed (2010)
British Columbia, Canada (Invermere)	Eileen Madson Primary School	1 school, senior residence	Completed
British Columbia, Canada (Vancouver)	Elsie Roy elementary school	1 school, residential	Completed