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WALKABLE LIVE/WORK
NEIGHBOURHOODS IN BIG BOX GREYFIELDS

by

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B.A., University of Waterloo, Waterloo, Ontario, 1971

A design thesis|project

presented to Ryerson University

in partial fulfillment of the

requirements for the degree of

Master of Architecture

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Master of Architecture
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ABSTRACT

The research focussed on how urban greyfields, especially abandoned big box retail, can be redeveloped into mixed-use walkable live/work neighbourhoods for an energy-efficient future. The history of shopping centre and big box retail and the mixed-use residential redevelopment of such sites using the new LEED Neighbourhood Development rating system were studied. Four principle concepts were found and used to guide the design project. They were sustainable urbanism planning versus Modernist auto-dependency; mixed-use planning; walkable neighbourhood concepts; and live/work units. These help create local employment in transit-based neighbourhoods having nearby services and amenities to reduce commuting and auto-dependency. The design project on a 25-acre Toronto greyfield includes Continuous Productive Urban Landscapes for food production and a trail system promoting walking, cycling and greater contact with nature. Greyfield sites used for sustainable communities help offset valuable farmland losses and offer useful urban intensification possibilities for a looming energy crisis.

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DEDICATION

This thesis is respectfully dedicated to Andrew Christopher Stanton Jr., writer and director of Pixar Animation Studio's film, 'WALL·E'. This film was a stunning achievement on many levels. Stanton created one of the most realistic and plausible dystopias ever seen and a frightening possibility for Mankind's future. Though intended chiefly to display the breakdown in human relationships and not for any specific environmental message, it was that latter theme that inspired me as I started this thesis. Stanton also created the Buy'NLarge mega-corporation that became the world's largest and only business and, ultimately, its government. It transformed humanity into unthinking consuming machines, used up the world's resources and rendered it unfit for habitation. Buy'NLarge can be read as Wal-Mart, as a metaphor for the king of big box stores, the subject of this thesis.

The character WALL·E compacted the huge piles of accumulated waste into structures to create more usable space on Earth. This thesis shows how we can take the waste of failed big box store sites to transform them into walkable live/work neighbourhoods to help reduce the destruction caused by an auto-dependent society that thrives on Wal-Mart stores and its brethren. In the process we could build communities that enhance relationships, both amongst people and between humans and Nature.

Figure 1.1 WALL·E. Credit: Disney·PIXAR.

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CHAPTER 1 – INTRODUCTION

For most of human history, the two birds More and Better roosted on the same branch. You could toss one stone and hope to hit them both. That's why the centuries since Adam Smith have been devoted to the dogged pursuit of maximum economic production. (McKibben, 2007, p. 1)

Introduction/Study Context

The vast loss of farmland to North American urban sprawl since the Second World War is a well understood issue (Kunstler, 1994; Farr, 2008). Recent concerns of food security and greenhouse gas production from automotive commuting have added more urgency to address this problem. With the record July 2008 spike in oil prices came realization that the grim predictions of Peak Oil writers were not only feasible but some were already underway (Heinberg, 2003; Kunstler, 2005). There quickly followed announcements of major losses and plant closures by Ontario's fuel-inefficient vehicle manufacturers and a flurry of house listings in Toronto's commuter cities such as Barrie and Newmarket.

This thesis was initially to focus on the aftermath of a collapse of the 'Wal-Mart' model of goods distribution from a breakdown in trans-continental trucking during a Peak Oil Crisis (Heinberg, 2003; Kunstler, 2005). The abandonment of arterial roadside big box stores and their giant parking lots offers the possibility for constructing walkable neighbourhoods and use of the salvaged stores for a new, non-commuting post-carbon economy. More housing would be required if commuter suburbs of 'McMansions' were abandoned owing to unaffordable heating and commuting costs. The use of big box sites for urban intensification could preclude further loss of farmland made more valuable after the end of the so-called '3,000 mile Caesar salad' economy of imported food (Kunstler; Smith & MacKinnon, 2007). Preliminary research lead to the realization that the use of these retail 'greyfield' sites has started in both Canada and the US and is offsetting some urban sprawl. Even if the predicted energy crisis is less severe than forecast, a need will still exist for more compact communities that reduce the sprawl, energy waste and carbon emissions of conventional auto-dependent urban planning that dominated North American cities during most of the 20th Century.

Various strategies have been developed and are being implemented to address the problems of sprawl and energy conservation. Eco-village and intentional communities were mentioned by Pulver (2007) and investigated by Jackson and Svensson (2002) and Van der Ryn and Cowan (1996). Regional Smart Growth strategies are mentioned by Farr (2008) and Pulver. Both also cite the Congress of New Urbanism and the US Green Building Council's LEED program for providing initiatives on these issues. As well, cooperative, communal and co-

housing strategies offer ways to create more compact residential developments (Scotthanson & Scotthanson, 2005).

New sustainable designs are often at the expense of greenfields, a criticism made of new urbanism practitioners. These communities often lack live/work or mixed-use residential areas or commercial and light industrial facilities that could create non-commuting employment in walkable neighbourhoods. There was, however little advocacy for a more sustainable and less auto-dependent urban design before new urbanism concepts were developed in North America. Such planning has a long tradition in Europe.

Toronto has recognized the merits of, and is implementing, urban intensification along transit routes, a concept advocated there by architect, Barton Myers in the late 1970s (Myers, 1978). Again, this was not a new discovery but a reworking of earlier American and European concepts he had witnessed during Philadelphia's early 1960s urban rebuilding renaissance while a student at the University of Pennsylvania. His ideas prevailed during the early 1970s Reform Council period in Toronto under Mayor David Crombie but were abandoned as pro-development interests came to dominate City Hall later in that decade. The design principles for compact and healthier walkable neighbourhoods exist. These communities are compact with a wide range of employment, services, shopping, recreation, institutional facilities and places of worship within a close walk of residences. They provide an enjoyable and safe environment in which to bike or walk at any time of the day. Such neighbourhoods have an identifiable centre such as a village square, shopping area or a dense main street that gives a sense of place to its residences. These mixed-use areas, often on transit routes, are increasingly providing live/work and work/live accommodation to further reduce auto-dependency. Such communities have a range of incomes and housing types that create off-hour diversity that increase safety especially at evening and night time.

Present now and to be more common in the near future are urban sites that could contain such communities (Merritt, 2006). These are the locations of earlier big box stores that are approaching their end life spans. They are likely not to be replaced as such retail has been concentrating at so-called 'power centres' and 'power nodes' at the intersections of major highways. The need to conserve farmland by using existing fully serviced urban sites for compact live/work neighbourhoods for an alternate carbon-neutral urban future lead to the formulation of this research statement.

Research Statement

Can urban greyfields, specifically abandoned big box retail sites, be used to develop walkable neighbourhoods for sustainable live/work communities for a carbon-neutral future?

Research Objectives

Within this research question are six primary research objectives:

- 1) to evaluate the development of big box retailing and its role in the creation of greyfields;
- 2) to evaluate the problems and opportunities in greyfield redevelopment to meet future needs;
- 3) to evaluate the adaptive reuse of box stores and their potential for reusing or recycling their building components;
- 4) to evaluate several case studies on the redevelopment of southern Ontario greyfield sites;
- 5) to evaluate design methods and case studies that could be used as examples for the design of carbon neutral walkable live/work neighbourhoods; and
- 6) to provide recommendations for such greyfield redevelopments and for further research.

Thesis Structure

Chapter Two, 'Literature Review' gives the background and context for this research. It begins by defining greyfields and traces the development of shopping centres and big box stores and their role in the greyfield phenomenon especially in the Greater Toronto Area. The emerging trend of lifestyle centres is discussed in some detail as they are changing the face of retail and have important issues of public versus private space. The chapter then discusses the problems and possibilities of greyfield redevelopment. Chapter Three reviews five Southern Ontario greyfield redevelopment case studies and concludes with an analysis.

Chapter Four discusses the potential for adaptive reuse of big box stores and the reuse and recycling of their building components. Chapter Five reviews the development of walkable neighbourhood design for use in greyfields and critiques new urbanism and sustainable urbanism design. It examines Dockside Green in Victoria B.C. and BedZED in London, England as exemplars of carbon neutral sustainable live/work neighbourhoods. Both these developments contain live/work residences, car sharing and local transit to reduce auto-dependency. Chapter Six describes the design project in detail with plans and renderings to illustrate the research findings on walkable neighbourhoods. The Conclusion in Chapter Seven summarizes the

findings on greyfield redevelopment and their possibilities for new sustainable neighbourhoods. Included there are recommendations for further research to promote energy conservation and to conserve farmland.

CHAPTER 2 - LITERATURE REVIEW

Introduction

Greyfields are an intermediate land development category between untouched greenfields, either rural or suburban, and brownfields, former industrial sites that are often contaminated. The term evolved after 2000 and is used primarily to describe the shopping malls, big box stores and strip centres surrounded by large areas of grey asphalt parking lots that are either abandoned or in economic decline. The term is attributed to Pricewaterhouse Coopers (PWC) and the Congress for the New Urbanism (<http://www.deadmalls.com>) following publication of their study by Sobel, Greenberg and Bodzin (2002). Urban infill or non-retail properties may also be classified as greyfields. Chilton (2004) states that the definition of size varies amongst experts. Some limit greyfields to enclosed shopping malls with a minimum retail space of 400,000 square feet. Others consider that power centres, ones with multiple major anchor stores, or even neighbourhood strip malls with a grocery store anchor qualify (see Figure 2.1). Greyfield reuse is often associated with new urbanism redevelopment in the US. A related planners' acronym is 'TOAD'- temporary, obsolete, abandoned or derelict properties that includes empty shopping centres, warehouses or shuttered industrial plants (Knechtel, 2007).

Figure 2.1 The former K-Mart greyfield site in Kingston, Ontario. Credit: CMHC.

Greyfield Definitions

Sobel, Greenberg and Bodzin (2002) define failed retail centre greyfields as being between about 10 to over 100 acres and averaging about 45 acres. Merritt (2006) makes a persuasive argument for a broader definition of greyfields by including the 'suburban retrofitting' projects of some new urbanist architects. These are the rehabilitation of worn out or failing suburban sites that could include garden apartment sites or business parks. Like greyfield shopping centres, most sites are found in established inner ring suburbs and have similar profiles. They are a minimum of 10 acres and are usually single-use sites exclusively for offices, commerce or housing. They are of post-Second World War construction with larger parking lots than their building footprints near major or arterial roads with nearly all in single ownership. Greyfields can be found in cities and suburbs and range from an acre or less to over 300 acres, including closed military bases or airports. This new definition therefore applies to an uncontaminated site, previously built with more parking area than building footprint and that are underperforming. "A greyfield is a place in which people were accustomed to working, shopping or living at one point in relatively recent history (within the last 40 years) yet has ceased to perform successfully as its originally intended use" (Merritt, p.16). Thus, suburban retrofits and greyfields share the same characteristics: multiple tenancies under single ownership located near major arterial roads and intersections dependent upon automotive travel. Merritt listed these new definitions:

- More land occupied by parking lots than building footprints.
- Property is underperforming the market.
- Suburban or urban.
- Any size.
- Single use, multi-use or mixed-use.
- Single or multi-storey building.
- Located at key intersections or along major thoroughfares.
- Encumbered by one or more leases with various lengths and structures.
- Typically at least 10-15% vacant.
- Often owned by single entity (p. 16).

Greyfields versus Brownfields

De Sousa (2000) estimated there were 20,000 to 30,000 suspected or known brownfield sites in Canada compared with 400,000 to 600,000 in the US. This is a far higher than the number of American greyfield sites identified by Sobel, Greenberg and Bodzin (2002); Merritt (2006); or the unknown but likely not high, Canadian numbers. The perception of higher risk with uncertain remediation expenses was cited as a major factor for Canadian developers preferring projects on greenfield sites. Merritt states a different case for the US. There, a large brownfield

redevelopment industry exists owing to state and federal funding to remediate contaminated sites for the public good. As they lack a contamination threat or the adverse visuals of an abandoned industrial site, greyfields do not enjoy such public funding support and consequently that redevelopment industry is not as well developed. The externalities of brownfields are scientifically measurable by a large community of mostly publicly funded specialists. Greyfields have no such definable externalities making justification for public support more difficult. Therefore, argues Merritt, with no public state and federal support, individual greyfield projects vary from municipality to municipality depending upon the level of local cooperation and subsidy. Greyfield redevelopments become one-off situations depending on individual incentive programs and planning policies. For a greyfield industry to develop and specialize, it may need programs of state and federal funding. It is fragmented at present to local and one-of-a-kind projects by one-off developers. This thesis will make a different case for greyfield redevelopment in the Greater Toronto Area (GTA).

There have been two recent major brownfield redevelopments in the City of Toronto; both have high tourism potential and neither had major contamination issues. The first was the restoration of the 40-acre Don Valley Brick Works as a conservation area and an industrial heritage park ongoing since 1995 (<http://www.lostrivers.ca/BrickWorksPark.htm>). The second was restoration and development of the historic 13-acre Distillery District, once the biggest distillery in the Commonwealth. This pedestrian-only site with North America's largest collection of Victorian-era industrial buildings is now an arts and culture district that opened in 2003. The site is being further developed with three condominium residences plus offices and retail outlets (<http://www.lostrivers.ca/points/distillerydistrict.htm>).

The Historic Development of Shopping Centres

The shopping for and buying of goods has existed since ancient cultures first produced a surplus of food and artefacts. Purpose-built shopping centres have a long lineage. Iran's Grand Bazaar of Isfahan is likely the world oldest existing market dating from the 10th Century (http://www.absoluteastronomy.com/topics/Bazaar_of_Isfahan). Istanbul's Grand Bazaar, built in 1464, with 60 streets and 5,000 shops is one of the world's largest covered markets (www.mygrandbazaar.net/). The Covered Market opened in 1774 in Oxford, England, a first for that country. Possibly the first department store is Saint Petersburg's Gostiny Dvor which opened in 1789. Arcade malls running between city streets date from 1819 with London's Burlington Arcade and Milan's Galleria Vittorio Emanuele II, built from 1865-77 (Maitland, 1990). The latter site and Paris' 1876 Bon Marché department store, are examples of the large cast-iron

and glass-roofed spaces of the Victorian era. These major structures helped transform the experience of shopping into a form of theatre, spectacle and the consumption of goods as status symbols (Moss, 2007). It became part of a 20th Century economic revolution where consumer spending defined a major component of one's personal identity.

Widespread automobile use, especially in the US, further changed the concept of the shopping centre. There are two claims to be the first automobile-centred mall in the US (Pocock, 2007). Market Square in Lake Forest, Illinois, opened in 1916. The Country Club Plaza in Kansas City claims to be the first designed on a unified plan by a sole developer, opening in 1924. Large scale, post-war suburbanization helped lead further refinement of automobile-based malls. Austrian architect, Victor Gruen's Northland Mall in Southfield, Michigan, was the world's largest when it opened in 1954. It had 110 stores centered on a department store anchor and surrounded by parking lots. It became an early precedent for shopping centres and was widely imitated.

Figure 2.2 Galleria Vittorio Emanuele II. Credit: Suolaleonardo.com

Convincing a developer of the merits of the Galleria Vittorio Emmanuel II (see Figure 2.2) as a precedent, Victor Gruen designed Southdale Center (see Figures 2.3 and 2.4), the world's first fully-enclosed and air-conditioned mall. Gruen disliked American suburbs and designed the Southdale Centre to provide a meeting place for the community. It opened in 1956 at Edina, Minnesota with ten acres of stores including two anchors, double levels of shopping with escalators and two levels of parking. It was the first to be introverted with no exterior windows and had 5,000 parking spaces. A further innovation was the creation of a sky lit central courtyard, large trees, hanging plants, a huge birdcage, fishpond and a café. "A 'pleasure-dome-with-parking', *Time* cheered. One journalist

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announced that Overnight Southdale had become an integral 'part of the American Way' " (Gladwell, 2004, para. 3).

Thus Gruen formed the archetype for regional malls that was copied across North America. Shopping was to be done with automobiles in greenfield consuming suburbs and not in traditional downtown department stores or along retail Main Streets. Big, easily accessible shopping malls made suburban life more attractive and helped expand its appeal to the growing middle class. Eventually, they became an industrial world phenomenon.

Figure 2.3 Aerial view of Southdale Centre. Credit: Minnesota Historical Society.

Figure 2.4 Southdale's interior, 1956. Credit: Malls of America.

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Figure 2.4 Southdale's interior, 1956. Credit: Malls of America.

The Big Box Store

The next major shopping centre innovation was the introduction of the big box store (see Figures 2.5 and 2.6). The concept was started independently by a number of large retailers in the US before the term was first coined. Jones and Doucet (1998) list these pioneers as: Baby Furniture and Toy Supermarket, the predecessor to Toys 'R' Us (1957), Wal-Mart (1962), Price Club (1976), and Home Depot (1978). They cite big box pioneers in Toronto as IKEA (1962), Knob Hill Farms (1971), and Leon's Furniture (1973). They state that the first recognized power centre was the 280 Metro Centre in Colma, California which opened in 1986. Jones and Doucet show Toys 'R' Us as the first American big box in Toronto in 1985. The Crossroads Centre at Weston Road and Highway 401 in North York was Toronto's first power centre in 1987, a year after its first American creation.

Figure 2.5 Big box store. Credit: Flickr.

Figure 2.6 Big box store. Credit: Flickr.

There are a number of definitions associated with big boxes and shopping malls (Blackbird & Florence, n.d.). A 'big box' is a high volume store that is normally a high bay, large stand alone single-storey building between 10,000 and 100,000 square feet. There however, are big box stores located within enclosed malls and many on major downtown streets, usually without parking lots. Killingsworth and Farrow (2007) note, "They have parking lots four to seven times the size of the store footprint with direct access to main arteries. Typically, they are located near large complimentary stores or are attached to strip shopping centers" (p. 2). Related to it are 'category killers,' chain stores often in big box structures that specialize in one product sector to the detriment of smaller firms in the same sector or diversified outlets such as department stores. A 'dead mall' suffers from low vacancy rates, reduced shopper traffic, is outdated or in need of upgrades and revitalization. A 'ghostbox' is an abandoned big box store. The International Council of Shopping Centers defines a 'power centre' as one, "...dominated by several large anchors including discount department stores, off-price stores, warehouse clubs, or category killers... The centre typically consists of several freestanding (unconnected) anchors

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and only a minimum of small specialty tenants" (2001, p. 83). They share common parking lots that enable visitors to park close to their store of choice, to shop quickly and leave. 'De-malling' is the trend of transforming declining malls into pedestrian-oriented, mixed-use developments.

Big box retail accelerated rapidly in Canada in the 1990s. Hernandez, Erguden and Svindal (2008) describe how this occurred:

The reasons for big box and associated power retail development growth can be traced to a number of factors including: the influx of US 'big box' retailers to Canada through the 1990s (e.g., Home Depot entering Canada in 1992, Wal-Mart in 1994); the re-zoning of industrial sites for retail development; the suburbanization of retail functions and availability of large development sites; planning regimes across much of Canada since the 1990s that placed few barriers in the way of major big box retailers / developers; and, a slowdown in mall development (albeit with substantial re-development and a reconfiguration of existing shopping centre space). Stated simply, big box retail stores have been a relatively low-cost form of retail development, meeting the needs of retailers to accrue economies of scale in their operations and Canadian consumers' demands for price, product selection and service (p. 1).

They listed the following definitions of power retailing:

Big Box: big box retailers are retail outlets that are typically at least three or more times larger than other comparable stores. The definition of big box varies by sector and is determined by gross leasable area.

Power Centre: Three or more big box retailers with shared parking lot and typically ancillary commercial services.

Power Node: One power centre with additional big box or other power centres / major malls within a one kilometre radius, typically centred on a major intersection (p. 2).

Big Box Retail Development in the Greater Toronto Area (GTA)

Jones and Doucet (1998) analyzed the rapid development of big box stores in the GTA. By 1990, there were 93 outlets with 4.5 million square feet that averaged 48,430 square feet of space per location. By 1997, they numbered 268 sites with 11.1 million square feet that averaged 41,515 square feet per location. These store numbers had increased over 188 per cent within eight years. By 2007, they numbered 1,315 sites of which 165 were freestanding (Hernandez, Erguden & Svindal, 2008). There were 1,232 big boxes, almost evenly split between power centre and power nodes locations. That year there were a total of 80 power centres and 29 larger, power nodes in the GTA. Nationally, they identified 410 power centres with 9,549 retail outlets that utilised a total retail space of 134.5 million square feet. This represents about 20 per cent of Canada's retail space and accounts for about of 25 per cent of all non-vehicle retail sales.

Figures 2.7, 2.8 and 2.9, illustrate both the huge scale and rapid development of a power node at Highways 400 and 7 in Vaughan, Ontario (Hernandez, Biasiotto & Jones, 2003; Hernandez, Erguden & Svindal, 2008). Shown is the growth between 2002 and 2007 that can occur at major arterial intersections. This node had an estimated total retail space of 3.1 million square feet with 77 big box stores amongst its 327 tenants. Such sites are the primary focus for the further development of big box retailing in major Canadian cities. Figure 2.9 shows the slightly smaller power node at Scarborough's Eglinton and Warden Avenues (Hernandez, Erguden & Svindal, 2007). This power node had an estimated total retail space of 1.5 million square feet with 32 big box stores amongst its 119 tenants.

Hernandez, Erguden and Svindal (2008) summarized the main trends in big box development. From the mid- to late-1990s most Canadian major retail growth has focussed on large format stores, and power centre and node developments. These locations contain sizable mixes of smaller outlets providing such diversified services as fashion, financial, and restaurants along with major multi-screen cinemas. This broadens the appeal of such sites as shopping has now become a major entertainment activity. Big box stores have integrated into malls by moving to out-pads in their parking lots. The development of these new urban consumer destinations is nationwide and is increasing in smaller centres on the outskirts of large metropolitan cities. Newer versions of these centres and nodes are being designed with landscaped parking lots and pedestrian walkways, street façade frontages, bicycle racks and transit stops in an attempt to be more aesthetically pleasing.

One project bucking the trend of centres dominated by large parking lots and over-sized big boxes is the \$100M Sportsworld Crossing being built in greenfields near the GTA in Kitchener, Ontario (Saunders, 2008). The design concept is for smaller stores of less than 20,000 square feet each and smaller segregated parking lots to create a more traditional streetscape. Like Victor Gruen's precedent setting Southdale Centre, this unenclosed centre will have a major green central space and pond with the addition of landscaped walkways and a waterfall. The goal is to be more pedestrian focussed. Higher quality limestone facades with arched windows will add to that desired impression. A major change from other power centres is shielding the loading docks from view by using the site's sloping terrain to advantage. The developer believes Sportsworld Crossing will raise the design bar for Ontario's retail developments. This project illustrates the efforts and investments made to keep power centres and nodes as attractive a shopping destination as possible. But they pave over yet more greenfields with parking spaces and encourage a rapacious consumerism that the world's resources can no longer support.

As described in detail in Chapter Four, most big box structures have an average fifteen year life span. Pending a possible Peak Oil Crisis, these power centres and nodes at dominant arterial intersections will continue to exist with their worn out stores being replaced. There are, however, dozens of other big boxes at less desirable locations that are unlikely to be rebuilt. The 93 outlets existing in 1990 and the 862 big boxes existing as of 1999 are now all at least 19 and 10 years old respectively. There are scores of similar sites at less prosperous cities across Canada. Those locations offer opportunities to intensify residential redevelopments on fully serviced sites along accessible major roads to relieve pressure for comparable greenfield use.

Map 1. Power Node Located at Highway 400 and Highway 7, Vaughan, Ontario

Figure 2.7 Power node at Highways 400 & 7, Vaughan, Ontario (2002). Credit: CSCA.

Hwy 400 & Hwy 7 - Vaughan, Ontario

Legend:

- Power Centre/Node Tenant
- Shopping Centre

Map Labels:

- Renaissance Commercial Centre
- Seven & 400 Power Centre
- Westridge Power Centre
- Highway 400 & Highway 7
- The Interchange
- Colossus Power Entertainment Centre
- Woodbridge Square
- Whitmore Centre
- Kingmoor Place
- Steeles Ave
- Sheppard Ave
- Don Mills Rd
- Bayview Ave
- Finch Ave
- McCowan Ave
- Highway 404
- Highway 401
- Highway 7
- Highway 400
- Highway 10
- Highway 16
- Highway 24
- Highway 32
- Highway 40
- Highway 48
- Highway 56
- Highway 64
- Highway 72
- Highway 80
- Highway 88
- Highway 96
- Highway 104
- Highway 112
- Highway 120
- Highway 128
- Highway 136
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Map Details:

- Power Centres/Node Tenants:** Renaissance Commercial Centre, Seven & 400 Power Centre, Westridge Power Centre, The Interchange, Colossus Power Entertainment Centre, Woodbridge Square, Whitmore Centre, Kingmoor Place, Steeles Ave, Sheppard Ave, Don Mills Rd, Bayview Ave, Finch Ave, McCowan Ave, Highway 404, Highway 401, Highway 7, Highway 400, Highway 10, Highway 16, Highway 24, Highway 32, Highway 40, Highway 48, Highway 56, Highway 64, Highway 72, Highway 80, Highway 88, Highway 96, Highway 104, Highway 112, Highway 120, Highway 128, Highway 136, Highway 144, Highway 152, Highway 160, Highway 168, Highway 176, Highway 184, Highway 192, Highway 200, Highway 208, Highway 216, Highway 224, Highway 232, Highway 240, Highway 248, Highway 256, Highway 264, Highway 272, Highway 280, Highway 288, Highway 296, Highway 304, Highway 312, Highway 320, Highway 328, Highway 336, Highway 344, Highway 352, Highway 360, Highway 368, Highway 376, Highway 384, Highway 392, Highway 400, Highway 408, Highway 416, Highway 424, Highway 432, Highway 440, Highway 448, Highway 456, Highway 464, Highway 472, Highway 480, Highway 488, Highway 496, Highway 504, Highway 512, Highway 520, Highway 528, Highway 536, Highway 544, Highway 552, Highway 560, Highway 568, Highway 576, Highway 584, Highway 592, Highway 600, Highway 608, Highway 616, Highway 624, Highway 632, Highway 640, Highway 648, Highway 656, Highway 664, Highway 672, Highway 680, Highway 688, Highway 696, Highway 704, Highway 712, Highway 720, Highway 728, Highway 736, Highway 744, Highway 752, Highway 760, Highway 768, Highway 776, Highway 784, Highway 792, Highway 800, Highway 808, Highway 816, Highway 824, Highway 832, Highway 840, Highway 848, Highway 856, Highway 864, Highway 872, Highway 880, Highway 888, Highway 896, Highway 904, Highway 912, Highway 920, Highway 928, Highway 936, Highway 944, Highway 952, Highway 960, Highway 968, Highway 976, Highway 984, Highway 992, Highway 1000.
- Shopping Centres:** Woodbridge Square, Whitmore Centre, Kingmoor Place, Steeles Ave, Sheppard Ave, Don Mills Rd, Bayview Ave, Finch Ave, McCowan Ave, Highway 404, Highway 401, Highway 7, Highway 400, Highway 10, Highway 16, Highway 24, Highway 32, Highway 40, Highway 48, Highway 56, Highway 64, Highway 72, Highway 80, Highway 88, Highway 96, Highway 104, Highway 112, Highway 120, Highway 128, Highway 136, Highway 144, Highway 152, Highway 160, Highway 168, Highway 176, Highway 184, Highway 192, Highway 200, Highway 208, Highway 216, Highway 224, Highway 232, Highway 240, Highway 248, Highway 256, Highway 264, Highway 272, Highway 280, Highway 288, Highway 296, Highway 304, Highway 312, Highway 320, Highway 328, Highway 336, Highway 344, Highway 352, Highway 360, Highway 368, Highway 376, Highway 384, Highway 392, Highway 400, Highway 408, Highway 416, Highway 424, Highway 432, Highway 440, Highway 448, Highway 456, Highway 464, Highway 472, Highway 480, Highway 488, Highway 496, Highway 504, Highway 512, Highway 520, Highway 528, Highway 536, Highway 544, Highway 552, Highway 560, Highway 568, Highway 576, Highway 584, Highway 592, Highway 600, Highway 608, Highway 616, Highway 624, Highway 632, Highway 640, Highway 648, Highway 656, Highway 664, Highway 672, Highway 680, Highway 688, Highway 696, Highway 704, Highway 712, Highway 720, Highway 728, Highway 736, Highway 744, Highway 752, Highway 760, Highway 768, Highway 776, Highway 784, Highway 792, Highway 800, Highway 808, Highway 816, Highway 824, Highway 832, Highway 840, Highway 848, Highway 856, Highway 864, Highway 872, Highway 880, Highway 888, Highway 896, Highway 904, Highway 912, Highway 920, Highway 928, Highway 936, Highway 944, Highway 952, Highway 960, Highway 968, Highway 976, Highway 984, Highway 992, Highway 1000.

Data Collected: October 2007
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Lifestyle Centres

Sportsworld Crossing exemplifies an emerging trend in power retailing that should also be discussed as it bears some resemblance to the concept of walkable neighbourhoods: 'lifestyle centres.' As these innovations are the fastest growing trend in the US and involve issues of public versus private space, they will be examined in some detail. Hernandez (2007) analyzed this American marketing evolution that began in the late 1980s. Lifestyle centres have two defining attributes: (1) they are mainly unenclosed or open-air, and (2) they contain a mix of higher-end stores and services. The concept has been evolving and adaptations of it have been applied to enclosed malls but the essential criterion is a heavy mix of national, upscale retail brands in a mostly open-air format and with a leisure component. They are also described as 'boutique malls' (see Figures 2.11 and 2.12).

Hernandez (2007) suggests three reasons for the slower development of this concept in Canada. First, the winter climate could discourage shoppers from walking around open-air districts. But, he points out that is a fact of life here and in northern American states and that technology exists for keeping sidewalks clear. Secondly, Canada lacks the widespread concentration of affluent neighbourhoods that are adjacent to most American lifestyle centres. The few such communities in the GTA such as Forest Hill and Rosedale would lack the available acreage to build such centres. Lastly, he attributes Canadian conservatism for the slower development of this retail concept, a point made elsewhere in this thesis. Canadians are risk-adverse, but that has its upside. Canada did not have the sub-prime mortgage or banking failures witnessed recently in the US.

Hernandez (2007) cites an important definition regarding mixed-use development that will be used in this thesis and makes observations on lifestyle developments:

As the ICSC broadly define: 'mixed-use development is a real estate project with planned integration of some combination of retail, office, residential, hotel, recreation, or other functions. It is pedestrian-oriented and contains elements of a live-work-play environment. It maximizes space usage, has amenities and architectural expression and tends to mitigate traffic and sprawl' (http://icsc.org/srch/lib/Mixed-use_Definitions.pdf). Many of these new urbanist developments (often part of master-planned communities) are being labelled as 'Urban Villages', 'Town Centres', 'Town Squares', and 'Main Streets'. With smart growth the prevailing wisdom in planning circles in Canada, the mixing of uses (including) retail and the remit to intensify land-uses and increase urban density (reducing sprawl) will likely result in more of these types of mixed-use development being proposed and ultimately built-out across urban Canada (p. 5).

He points out that the composition of lifestyle centres is blurred and various components of it are being combined in all forms of retail centres, malls and strip developments. One common element is higher quality architectural finishes and treatments. Importantly, lifestyle centre

typologies give developers new freedom to escape the restraints of older formats and to customize a design to the traditions, vernacular styles and consumer tastes of particular localities. Hernandez observed that this format developed in the US while power centre construction predominated in Canada and that there is growing interest in combining retail with residential components here. The size and extent of Canada's adoption of the American precedents has been slow but several major projects are proposed. Finally, he noted that this format is evolving here with the potential inclusion of components in future upgrades or re-branding of existing power centres and malls or specialized applications for niche markets. Farr (2008) attributes the co-option of new urbanism design principles by the American developers' Urban Land Institute for the innovation of lifestyle centres. These mixed-use developments failed to address the needs of lower-income people that the new urbanists sought to include in their designs.

The lifestyle centre development model changes the potential for future greyfields. It appears that only a few of these sites have conventional big box stores. Lifestyle centres have better quality construction that suggests a longer building life span. Higher funding is required to create an upscale ambience with superior landscaping including trees and water features. With a longer investment cycle, these centres should last for decades vice the 15-year average life span of big box stores. Such is the profile of Ontario's first lifestyle centre, the redevelopment of the Don Mills Centre. It opened in 1955 as a pedestrian-oriented strip mall for industrialist E.P. Taylor's Don Mills, Canada's first planned community. It was designed by Macklin Hancock, Douglas Lee and Henry Fleiss. The site was redeveloped as an enclosed regional shopping centre by 1978 and closed in 2006. This 44-acre site will have 100 stores and services in an open-air format re-open in 2009, as the Shops at Don Mills (see Figure 2.10). To be phased over seven years will be provision of 1,300 residential units in six high-rise 10-15 storey buildings. In *The Cadillac Fairview Story*, Stoffman (2004) quotes their president and CEO, Peter Sharpe, on this project:

It's a niche market," says Sharpe of the demographic group that responds to the so-called "lifestyle mall." They are same people who buy modern cars with 1950s designs and retro-fitted hardware at high prices. "You create this ambience of an old downtown or city centre square. It's an enjoyable environment (p. 112).

Figure 2.10 Rendering of The Shops at Don Mills, Ontario's first lifestyle centre. Credit: Turner and Fleischer Architects.

This development created controversy in Don Mills when first announced in 2005 (<http://www.donmillsfriends.org>). Many seniors did not wish to lose their enclosed mall space as such centres are important, especially during Canadian winters, as public gathering places. Nor did they want to lose the medical facilities at the centre. As well, they argued that the new through roads there would make it less the pedestrian-friendly site as claimed and encourage more traffic congestion. But the metrics of annual sales per square foot trumped the seniors who don't spend much money other than for coffee and meals. Their best arguments are posted on the Don Mills Friends website:

Don Mills was built as a neighbourhood where people could walk and cycle to shopping, work, and entertainment; it featured pedestrian routes, rows of trees, green space, and a unique road community that urban planners, environmentalists, and politicians at all levels today tout as the ideal model community. Don Mills was the perfect example of this ideal community (History, para 10).

The aging demographic of the community is being left to die out. We feel that for Don Mills to continue to prosper as a vibrant community, we must continue to cater to all people-young and old, healthy and disabled-at all income levels (Home, para 5).

Lifestyle centres are billed as being pedestrian-oriented though there is some question whether they are walk-to or drive-to centres. The architect whose firm completed this centre's master plan said it was designed as a walk-to (J. Chow, personal communication, November 12,

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2008). He added that they are a major urban area development typology and are not found in smaller cities such as Barrie and Newmarket that are car-dependent. There is some small environmental gain because not as many shoppers might drive from store to store as happens at power centres. The planned addition of the housing component could reduce the need for its residents to drive there to shop. But the Don Mills proposal appears as yet another 'towers in the park' Modernist scheme that will likely not create much of a sense of community. The observation is made that though the retail development industry is going in the right direction with mixed-use schemes, many of their customers still have to drive to them. Change comes in tiny increments. John Chow's firm designed the lifestyle centre at Bathurst and Centre Streets in Thornhill, Ontario. It is a two-storey retail based on the street plan. It does not have exclusively high-end stores as other such centres but contains many national chain outlets. He stated that planners like such developments as they reduce the visibility of parking lots unlike major malls such as the Yorkdale Shopping Centre in Toronto. As will be shown in Chapter Five, the issue of densification is the key complaint made against walkable neighbourhood designs but traffic congestion is actually reduced there.

Following the planning of The Shops of Don Mills, more proposed lifestyle centers were announced in Canada. These include the GTA's, 120-acre Woodbine Live (see Figure 2.13) and the 18-acre Foundry District. That latter project is proposed to include a large Wal-Mart, is being fought by the local community and is currently under appeal at the Ontario Municipal Board. The 30-acre Morgan Crossing is being built in Surrey British Columbia (see Figure 2.14), the 200-acre Park Place at Barrie, Ontario (see Figure 2.15), and the 150-acre Quartier DIX30 was opened in 2006 on Montreal's South Shore. The recent economic downturn will most likely slow down the build-out of some of these projects. The economics of lifestyle centers are more profitable than shopping malls. Their heating and cooling bills are much lower as they have less enclosed space. Bhatnagar (2005) states that the first lifestyle centre, The Shops of Saddle Creek, at Germantown, Tennessee, opened in 1987 (see Figure 2.12). He describes US sales of \$400-\$500 per square foot at these new centres vice \$330 per square foot at traditional shopping malls. At about 50,000 square feet, lifestyle centres are smaller than a suburban mall that could be about 800,000 square feet in area. The newer centres are faster to build as well. He cites there were only 30 lifestyle centres in the US in 2002 with 120 built by end 2004. About 10-20 were expected to open each year to 2006 compared to only four new regional shopping centres forecast to be built annually.

Andrew Blum (2006) writing in *Slate* makes these astute observations of this trend and the blurring of the perception of public and private space at these centres:

Like insecure teenagers, malls keep changing their style. They are ripping away their roofs and drywalled corridors; adding open-air plazas, sidewalks, and street-side parking; and rechristening themselves "lifestyle centers." This new look may remind you of something: a vibrant urban street. Yet, while these new malls may appear to be public space, they're not public at all - at least if you want to do anything but shop. They represent a bait-and-switch routine on the part of developers, one that exchanges the public realm for the commercial one.

More incredibly, lifestyle centers do all the things that urban planners have promoted for years as ways of counteracting sprawl: squeeze more into less space, combine a mix of activities, and employ a fine-grained street grid to create a public realm—a "sidewalk ballet," in Jane Jacobs' alluring phrase. The irony is almost too perfect: Malls are now being designed to resemble the downtown commercial districts they replaced.

This is our public realm? Lifestyle centers aren't any worse than malls as gathering places; in fact, they're a lot better-designed, successfully capturing most of the pleasures of walking down a city street. And yet, if it's crossed your mind that, as a society, we're getting a little confused about our right to freedom of expression, then lifestyle centers are a fair target. There's something a bit unhealthy about faux public places designed to attract rich people and make them feel comfortable....The lifestyle center is a bizarre outgrowth of the suburban mentality: People want public space, even if making that space private is the only way to get it (para 1,6,8).

Figure 2.11 The Shops at Briargate in Colorado Springs. Credit: CNNMoney.com

Figure 2.12 The Shops of Saddle Creek, Germantown, Tennessee, the first lifestyle centre. Credit: CNNMoney.com

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Figure 2.13 Renderings of the 120-acre Woodbine Live lifestyle centre. Credit: cordish.com

The Woodbine Live lifestyle centre would be the largest in Toronto if it proceeds with its 2011 opening date (<http://www.cordish.com>). This 120-acre site at the Woodbine Racetrack's old parking lot represents a \$750M-\$1B investment. It will contain shops, restaurants, clubs, pubs, a multiplex cinema of 16 screens, a concert hall of 6,000 seats, a conference centre of 100,000 square feet, a 450-room four-star hotel, canals, and a large skating rink (<http://www.ontariotourisminvestment.ca>). A proposed Phase Two would see 2,500 residential units added. This will be another drive-to centre promoting shopping and entertainment. It received a controversial tax break of \$120M from the City of Toronto for the jobs it will create but with no guarantee of any to nearby residents.

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Figure 2.14 The residences at Morgan Crossing lifestyle centre, Surrey, B.C. Credit: morgancrossing.ca

Figure 2.15 The 200-acre Park Place lifestyle centre, Barrie, Ontario. Credit: parkplacebarrie.com

The move towards lifestyle centres is not the latest trend in retailing marketing. The Internet's e-commerce sites are growing in importance and are beginning to reduce sales from malls (Sobel, Greenberg & Bodzin, 2002). They cite inroads in the consumer electronics and book sectors and suggest that, over time, even regional malls would suffer loss of their market share. CBC (2008) reported a 62 per cent increase in Canadian online shopping to \$12.8B from 2005 to 2007. E-commerce offers convenience and some lower prices that will gradually reduce

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bricks-and-mortar's market share and appears to be approaching the exponential growth that was forecast for it in 2000. Competition and innovation in retail sales is relentless. The winners get bigger and the losers become greyfield properties.

Problems and Possibilities for Greyfield Sites

Why Shopping Centres and Big Boxes Decline

Killingsworth and Farrow (2007) list these reasons for the failure of big box stores:

- Poor economic performance of large big box retailers.
- Population shift to other areas of town.
- Failure of store layout and size to meet new tenant demands.
- Previous big box tenant relocates to adjacent, larger location maintaining or increasing market share (p. 2).

The last point raises the issue of the creation of Wal-Mart Super Stores in the US, and the new Supercentres in Canada, and their destructive effect for the greyfielding phenomenon. Wal-Mart's strategy has effectively closed many smaller Main Street retailers in surrounding towns, their strip malls and other big box competitors. They then close their first big box after a larger regional one is built. This forces consumers to drive even farther which has transferred the distribution costs off Wal-Mart's books to their customers. Another abandoned big box is also created in the process which is why Wal-Mart has so many of them.

The following press release of November 2006 describes this process in Ontario (http://www.coldwellbankerpbr.com/commercial/vol9iss11_nov06.pdf):

WAL-MART CANADA CORP. announced plans to have 17 hybrid grocery stores open by the end of next year. This past week, the retail giant unveiled three of the new stores located in the Ontario communities of Stouffville, London and Ancaster. The new stores range in size from 160,000 sq. ft. to 200,000 sq. ft. Each Wal-Mart Supercentre will stock approximately 120,000 products, compared to 80,000 in a traditional store...The new stores will carry discount products at prices below almost all other retailers, but will also stock more upscale products, such as organics and health food. The stores will contain a deli, ready-to-go foods counter and a bakery (para 2).

Their earlier move into the grocery business has attracted a larger market share to Wal-Mart and initiated a destructive trade war with Ontario's traditional grocery chains (see Figure 2.16). This will possibly cause the closure of large format or big box grocery competitors to Wal-Mart. Is this how the Buy'NLarge mega-corporation started its ascendancy?

Sobel, Greenberg and Bodzin (2002) offer other reasons for retail failures, primarily of malls. Poor design or location is a major cause and can often be attributed to inexperienced developers. Changes of the purchasing power in the mall's catchment area and in consumer

taste are other factors. A redesign of the transportation system that diverts traffic away from a centre, blocks its access or makes it too circuitous, can adversely affect malls. Shoppers seek places with the best automotive access. As well, they desire unique features and innovations in their shopping experience. Newer malls with more entertainment amenities such as cinemas, gyms, gardens with fountains or better restaurants attract more shoppers. Therefore, the most important factor for the failure is that larger regional malls with more variety and attractions cause older, smaller centres, often located in inner ring suburbs, to decline. Reinvestment or recapitalization is vital for shopping centres to retain their appeal. 'Freshening up' a store façade, usually on a five year basis, is a common tenant lease requirement to keep a centre looking new. Maintenance of the structural fabric, the common amenity spaces and parking lot landscaping is necessary for owners to stay competitive. Those unwilling or unable to expand or upgrade their malls can see them become greyfield properties. Finally, the arrival of big box stores overcame the aesthetic appeal of indoor malls as a shopping experience. Consumers flocked to these newer stores that did not have to pay the fees associated with enclosed malls, seeking the lowest possible prices.

The Role of Federal Legislation and Tax Policies in Greyfield Development

Gladwell (2004), writing on the career of mall innovator Victor Gruen, offers a more profound reason for the proliferation of retail greyfields. Changes to capital depreciation rates in the 1950s and developer greed produced an over-malling of the US. This resulted from the 1954 Congress's more generous accelerated depreciation rates used to revive the economy following the post-Second World War recession. He notes that in 1953, prior to these changes, there was only one American regional shopping mall. By 1956, there were twenty-five such malls. Developers went into overdrive building large numbers of commercial structures to reap these windfall profits. Eventually, too many malls within urban shopping catchment areas caused the weakest to close. This helps explain Sobel, Greenberg and Bodzin's (2002) findings cited below, regarding the scale of retail greyfields in the US.

Emerson's (2007) legal study validates Gladwell's (2004) findings. Emerson wrote that as well, other American federal laws and policies governing transportation, housing, mortgage deductibility, gasoline taxes and earlier legislation for model zoning codes have also contributed to urban sprawl. Emerson distinguishes two types of sprawl: commercial and residential. Owing to the creation of land separation through zoning codes that were sanctioned in the landmark 1926 Supreme Court opinion, *Village of Euclid v. Ambler Realty Co.*, mixed-land use development was halted. Euclidean zoning then led to the creation of the 'Miracle Mile' commercial development model that was nearly always auto-dependent. Consumers gradually

had reduced options for pedestrian or streetcar-based shopping as malls were zoned to the outer edges of new suburban developments. The secret 1930s pact by the Big Three American vehicle manufacturers to buyout and close many large urban public transit systems helped push the change to a driving culture.

Lorimer's (1978) milestone analysis of the Canadian development industry found these same tax benefits that inadvertently promoted urban sprawl and ultimately, greyfields. He cites the introduction of the 1972 federal capital cost allowance legislation that greatly benefited developers who often paid little or no taxes on their highly profitable operations. He also shows how their five project types: (p. 77) "corporate suburbs, high-rise apartments, suburban industrial parks, office towers, and shopping centres" are all interrelated to maximize profitability. He explained:

Each depends on the others for its success. Shopping centres, to take one example, depend on the suburbs. There have to be thousands of people living in large subdivisions of suburban houses, all with the use of cars, and all of them many miles away from the traditional retail downtown, for the large regional shopping centres to come into existence (p. 77).

Thus it can be seen that urban sprawl is a very profitable business model that favours North America's developers, highway and infrastructure contractors, and the whole automotive and petroleum industry. Attempting to change these policies would be a near impossible undertaking. The role of zoning separations between residential and commercial uses is also critically important in the development of sprawl. This is one key area that can be changed locally and is a tool that has proved essential in the planning of sustainable urbanism neighbourhoods (Farr, 2008).

Figure 2.16 Welland Centre, Welland, Ontario. Credit: Alex Rebanks Associates.

The Scale of Greyfields in North America

Killingsworth and Farrow (2007) commented trenchantly on the widespread problem of the adaptive reuse of abandoned American big box stores:

This is particularly a problem with large, chain retail stores like Wal-Mart, Home-Depot, and others. Wal-Mart alone currently advertises more than 230 “big box” structures containing more than 21,000,000 square feet for sale or lease. These unused facilities constitute eyesores, reduce local property tax revenues, and impede the attraction of new retailers and manufacturers. Limited success has been realized through the adaptive reuse of these structures. However, more must be done as the building industry attempts to positively impact the worldwide effort to use resources efficiently (p. 1).

Sobel, Greenberg and Bodzin (2002) state that seven per cent of American malls are now classified greyfields and 12 per cent of the regional malls are susceptible. Those regional malls could become greyfields in as short as five years without major reinvestment. Mall decay in the US is developing towards a national issue. They used a PricewaterhouseCoopers (PWC) study to determine mall viability based on annual sales per square foot. Those with abnormally low figures slip below rental income viability sufficient to maintain the infrastructure. A well performing mall generates \$300 to over \$450 per square foot whereas sales below \$150 per square foot condemns a mall to becoming a greyfield. Counter-intuitively, occupancy rates are not the best barometer of a mall's wellbeing. By lowering rents, landlords can keep greyfield status malls open, but not as profitably. With lower budgets for upgrading or expansion these malls eventually succumb to relentless competition from newer centres and shutter their doors.

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Merritt (2006) cited the same PWC study noting that most greyfields were built during the 1960s and had gone seven or eight years without renovations. Additionally, most were sited in long established inner city suburbs and failed to compete against larger centres built in outer suburban or exurban areas. Merritt estimated that there are 50 to 200 greyfield shopping centre locations in the US. The PWC study estimated there were 2,200 to 9,000 acres of greyfields there. This figure could be higher if Merritt's greyfield definition was applied. The *Residential Development Handbook* (2004) suggested marginal regional malls numbering up to 140 could be greyfields with an additional 200-250 nearing that status in the US.

Gomez-Insausti, Erguden and Jones (2000) examined the existence of mall greyfield decline in the GTA using vacancy rates versus sales per square foot. Of the 643 malls there, 27 had vacancy rates above 30 per cent and 85 others had rates between 15 and 30 per cent. These malls were assumed to be experiencing the greyfield effect. They believed greyfielding was not widespread in the GTA as owners were being proactive. It cited the Village by the Grange, near the Art Gallery of Ontario, for converting poorly performing commercial areas to condominium use. Other owners had sought planning exemptions to replace vacant small retail areas with larger stores to attract more customers to increase rental income. The study recommended greater latitude by municipalities for owners to redevelop problem malls. This benefited all concerned: mall owners, retailers, municipalities and ultimately, the shoppers.

Canada Mortgage and Housing Corporation (CMHC) (2005) has case studies on five Ontario former retail greyfields sites that will be examined in Chapter Four. These were converted to housing, including for seniors, affordable and live/work spaces; recreation; a farmers' market; or commercial space. One such site was Markham's Thornhill Square Shopping Centre that demonstrated how a poorly planned mall can close, even in an affluent city.

The number of greyfields is more difficult to establish in Canada than in the US owing to it being a smaller and later phenomenon here. There are three possible reasons for this. Firstly, a large number of US greyfields are associated with declining economic areas especially in the Rustbelt states near the Great Lakes where major industries have closed. That decline has not happened in Canada, especially Southern Ontario, on such a scale, but with the recent spate of plant closings, it is possible. Secondly, Canadian banks and institutional lenders are more conservative than their American counterparts and are much less likely to finance speculative real estate projects. This difference was seen in the recent sub-prime mortgage crisis where no Canadian bank failed and three of our banks are now in the North American top ten (Stewart, 2008). Lastly, the big box revolution did not occur in Canada until the 1990s and only a smaller number of these buildings, especially in the GTA, have likely passed their 15-year life

expectancy but many will soon enter that zone (Hernandez, Erguden & Svindal, 2008). Therefore, there is reason to believe that greyfields will become both a bigger issue and an opportunity in Canada in the near term in selective areas. A key realization is that failing retail sites rarely become long visible greyfield ghostboxes as growth demand, especially in the GTA, quickly absorbs them for redevelopment. A Toronto architect familiar with big box development stated that abandoned and declining suburban or neighbourhood strip malls are more problematic than big boxes as most are not old enough to have become obsolete. He cited some areas in Scarborough, Toronto, such as southern Kennedy Road as having the worst retail decline and no interest in redeveloping those malls (J. Chow, personal communication, November 12, 2008).

City of Toronto Planning Response to Greyfields

City of Toronto policy planners do not see greyfield redevelopment as a policy issue at the present time (P. Moore, personal communication, October 29, 2008). They are aware of a number of such sites undergoing redevelopment under the guidance of community planners. The most recent large projects are the afore-mentioned Shops at Don Mills and the 644-acre Downsview Airfield greyfield given a secondary plan to facilitate its redevelopment after that military base closed in 1994. Recognizing the need to address the future intensification of large retail centres, lead to a designation for future mixed-use of such sites in Toronto's new Official Plan, adopted in 2002. It allows housing and mixed-use developments on greyfields without lengthy planning approval delays. By doing so, the City is helping expedite reuse of such sites before they adversely affected neighbouring properties and businesses. But Toronto's position as Canada's wealthiest city and its annual influx of approximately 80,000 immigrants has helped maintain a high demand for housing, retail services and constant development. *Forbes Magazine* recently ranked Toronto as the tenth most economically powerful city in the world (Zumbrun, 2008). Therefore, good greyfield sites are unlikely to remain vacant for long in the GTA. This situation is not, however, shared by many other Canadian cities.

Figure 2.17 Kingston Centre, Kingston, Ontario. Credit: Alex Rebanks Associates.

The Redevelopment Potential of Greyfields

Greyfields offer much potential to municipal planners and developers (see Figure 2.17 and 2.18). Chilton (2004) defines five major attributes: location; urban tract size; developed infrastructure; no contamination; and surrounding population density. 'Location, location, location' is a mantra for both real estate agents and property investors. Though newer development has sprawled away from a shopping centre and made it obsolete, the sites still have good vehicular access. Many are on transit routes making them ideal for redeveloped walkable neighbourhoods. The larger a site, the more potential it offers developers who are not constrained by tight layouts, access, and construction storage areas. Opportunities for a creative mix of affordable housing with mixed-use commercial facilities increase with the available acreage. One of the cost benefits of greyfields is their existing municipal utilities networks. Even though the layout may require much modification for new roads and sidewalks, the presence of water, sewer, stormwater and hydro services saves considerable time and investment, critical for development. Unlike most brownfield sites, greyfields are by definition, uncontaminated. This eliminates the great expense of environmental assessment, bureaucratic negotiations and remediation. And lastly, the higher the population density near, and vehicle access at, a greyfield, the greater is its redevelopment value. Merritt (2006) makes the case that public amenities such as nearby parks, schools or transit lines increase the value of greyfield sites.

Problems in Redeveloping Greyfields

Sobel, Greenberg and Bodzin (2002) identified various problems in redeveloping greyfields. Declining malls are symptoms of a shrinking economy or population base rather than

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a source of stagnation. A strong market demand is therefore needed for every component of a redevelopment proposal before it can proceed economically. Encumbrances by mall store lessees can hold up or veto redevelopment in spite of strong support by the owners and municipal officials. This is owing to leases that give large tenants rights of refusal over changes to the centre's layout. Jointly owned malls can experience similar problems in determining changes to its site. Remotely located malls with a low population base are not suited for a mixed-used redevelopment with housing. These neighbourhoods work best with higher intensity and require pedestrian and shopper traffic and other site visitors. A strong role by the municipality seeking higher density neighbourhoods is often needed to prevent fast moving and well-financed big box chains from taking over a declining site. A local government may be the only one with the financial capacity to act as master developer. Greyfield sites that could be profitably redeveloped sometimes wait years owing to risk-averse owners or those who would rather procrastinate until irreversible decline forces a sale to developers. Abandoned big box stores create problems for municipalities. Ghost boxes, especially when boarded up and with weeds in the parking lot, cast a pall of decline on surrounding sites and lowers their property values.

Overvalued land can lead to unprofitable redevelopments. "And there is some evidence that, in their rush to enter the Canadian market place, they [American big box retailers] have driven up the price of land. For example, Price/Costco paid the unheard of figure of \$635,000 per acre for land in Mississauga in 1993, while Home Depot paid \$525,000 per acre for its site in the same city in 1994" (Jones & Doucet, 1998, p. 1). Without reinvestment, a centre's sales decline and this must be calculated into its future net worth. A municipality or developer that overvalues the site can often compromise its future profitability and also encounter financing difficulties as Canadian institutional lenders perform rigorous appraisals. Finally, a large project is normally completed in phases. Despite having existing utilities, a redeveloped greyfield will require more plus new roads and parks that are usually costlier than the revenues accruing in the initial phases. Unlike a subdivision whose first houses are sold at reduced 'mud money' prices, a mixed-use project has to project a quality image to attract initial tenants and buyers. Careful financing is therefore required to ensure early project profitability.

Figure 2.18 Welland Centre, Welland, Ontario. Credit: Alex Rebanks Associates.

Big Box Retail and the Loss of Farmland

Despite having the second-largest land mass in the world, Canada's useable agricultural land is only 11 per cent. Of this area, Class 1 farmland forms only half of one per cent (Miner, 2007). The loss of farmland to urban sprawl in the GTA since the mid-1970s has been enormous:

In the Greater Toronto Area (GTA) alone, more than 2,000 farms and 150,000 acres of farmland were lost to production in the two decades between 1976 and 1996. This represented approximately 18% of Ontario's Class 1 farmland. Although farmland loss is not tracked as extensively today as it was in previous decades, we know that the amount of farmland in the GTA decreased by at least 50,000 acres between 1996 and 2001 and that Ontario lost at least 600,000 acres of farmland between 1996 and 2006. It can take thousands of years to produce one centimeter of the topsoil needed for agricultural production. For this reason, Ontario's farmland should be seen as a limited natural resource, to be managed and protected (<http://www.ontariofarmlandtrUST.ca/issues-and-programs/saving-farmland>, para 3).

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Figure 2.19 Montage of highway and greenfield use. Credit: Statistics Canada.

Big box stores, shopping malls and power centres alone cannot be blamed for all of this loss of farmland and greenfields (see Figure 2.19). They mainly serve the urban sprawl of the GTA and other Canadian cities. But these are a very visible symbol of that sprawl and are a feature that makes suburban life attractive. They are a component of the drive-in lifestyle that Schlosser (2005) traces to the development of the American inter-state highway system built for military purposes by President Eisenhower in the mid-1950s. It was modelled on the German autobahn network that had impressed him as Supreme Allied Commander during the Second World War. Canada's Trans Continental Highway and Ontario's 400 series of highways that followed helped enable sprawl based on an identical automotive commuter culture. Programs such as Ontario's greenbelt established in 2005 (Mittelstaedt, 2008) gradually succumb to the relentless pressure of developers who have inordinate political influence in Ontario.

Summary

An interview was held with the Director of Ryerson University's Centre for the Study of Commercial Activity (Dr. T. Hernandez, personal communication, November 6, 2008). Much of discussion confirmed the findings cited earlier and helped clarify related issues. The following is a synopsis of that interview and forms a summary of this chapter on greyfields and big box stores.

The last 15 years of Canadian retail development have focused on large format or big box stores. It is very land intensive, mostly single-storey and has huge parking lots. This has been built against the ideals of good planning but has followed the post-war model of an auto-dependent society. In the process, this development has wasted vast tracts of farmland especially in the GTA and the Golden Horseshoe area. Smart Growth strategies have been introduced with recent greenbelt initiatives in Southern Ontario but they do not address issues of making cities more compact. There may be a desire for walkable communities but life in the suburbs remains one of weekday commuting, driving children to hockey practice and weekend

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shopping by car. The new Ontario government Places to Grow initiative recommends retail growth on major arterial roads and delineates transportation, energy and environment policies. It also promotes the adaptive reuse of urban sites to curb sprawl. But that plan gives no direction for live/work, work/live or walk-to community development. The population growth projected to 2030 in the Golden Horseshoe area from 5.5M to 8M people raises concern for the livability and sustainability of this region.

Canadian development has tended to be more conservative and have greater reinvestment than in the US where there has been over-building of malls and a shorter build and demolish cycle. But Americans have shown 'creative destruction' in the process and have continuously attempted new development models such as the lifestyle centre that has seen slower adoption in Canada. However, owing to over-malling, especially in areas now in economic and population decline, the US has experienced more greyfielding. Canada has a greater concentration of powerful developers than does the US. They have maintained large land banks, have often built lower cost structures and waited for population growth to reach them to enable higher value redevelopment. These firms have also often retained ownership of their retail developments in order to have a project in waiting for the next stage of redevelopment. An example cited was Cadillac Fairview's Don Mills Centre now being rebuilt as Ontario's first lifestyle centre, The Shops at Don Mills. In the US, according to Dr. Hernandez, developers will more often sell an aging site than redevelop it themselves.

Canada does not have the scale of greyfield redevelopment problem that exists in the US. This is especially the case in the GTA. Toronto's Official Plan helps expedite this process where its high growth demand quickly absorbs failing retail sites for redevelopment. Few sites rarely turn into prolonged ghostboxes though some areas in Scarborough seem destined to have closed malls that will remain undeveloped. There was, however, an over-building of smaller centres from the mid-1990s to the present and some could become greyfields in the near future. Many 1960s and 1970s malls have had little reinvestment and are nearing their end life. There is a move towards reviving the traditional Main Street ambiance in newer centres but it needs authenticity. They provide suburbanites a sense of urbanity but without the density or perceived disorder of cities. Origins of this new trend can be traced to the Disney Corporation's Celebration new town development in Florida, often criticized for recreating a past that never existed. The model for these developments is often too prescriptive or planned. A Canadian trend is starting for Main Street retail and walkable main squares. But often it is a tweaking of power centres or locating big boxes on the periphery. Large scale lifestyle centres, some over 100 acres in size, are being built and more are proposed. But vehicles are still needed to access these sites. They

also raise issues of public versus private space such as exists at enclosed malls. These developments also show that catering to consumption and entertainment is a growing industry and the scale of investment being made to attract those consumers' dollars. Pending a Peak Oil crisis, there is little likelihood for major big box sites becoming available for live/work walkable neighbourhoods, especially in the GTA (see Figure 2.20).

Figure 2.20 Abandoned Canadian Tire store in Toronto's Junction district. Credit: Flickr.

Alex Rebanks, whose firm designs many large format grocery stores, made an astute comment on the differences in shopping culture between Canada and the US. This helps explain the different scale of shopping centres and of greyfielding between the two countries.

"Americans make a day of shopping, they have a consumer-driven economy and they like to buy

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"Americans make a day of shopping, they have a consumer-driven economy and they like to buy

all the 'goodies'. Canadians go out to purchase, it is a more pared down shopping model" (A. Rebanks, personal communication, November 24, 2008).

Large retail developments locate almost exclusively on major arterial networks that often have transit service and surrounding residential areas. As newer and larger centres with more amenities are built, the earlier ones become greyfields. They are redeveloped and increasingly, in the US, with mixed-use residential components. The design project will seek such a site to demonstrate a mixed-use neighbourhood whose design promotes reduced auto-dependency.

CHAPTER 3 - FIVE SOUTHERN ONTARIO CASE STUDIES

Introduction

Canada Mortgage and Housing Corporation (CMHC) published case studies on seven built greyfield housing redevelopments in Southern Ontario (2005). The following is a brief summary of five of the largest of those projects with a concluding analysis.

1600 Bath Road - Kingston

This 6.9 hectare site contained two major retail stores: a K-Mart and a Loeb's grocery with a drycleaners in a third building (see Figure 3.2). This site is in Kingston's built-out west side commercial area with a railway line adjacent on its northern boundary. A low density residential community lies on the other side of the railway. On the south side of the site is a penitentiary. Along the east and west sides of Bath Road are retail and services strip developments. A major big box shopping centre located within a kilometer of the site caused the decline in revenue of both this site's stores (see Figure 3.1). The K-Mart was offered for sale to North American-wide big box retailers but its sized posed problems. It did not meet current larger retail standards and its interior height restricted the reuse possibilities only for retail. A developer bought the site 'on spec' in 1999, without any planned redevelopment concept. The K-Mart with its large air-conditioning system was converted into a climate-controlled warehouse. The Loeb store was refurbished as a bingo hall after the new owner bought and closed two smaller bingo operations in Kingston. The drycleaners facility was retained in that business. These three buildings are located on 3.1 hectares of the site.

Figure 3.1 Project vicinity for 1600 Bath Road. Credit: CMHC.

The existing large parking lots were not required for these operations and negotiations began with the City of Kingston to intensify the remaining 3.8 hectares of the plaza with

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The existing large parking lots were not required for these operations and negotiations began with the City of Kingston to intensify the remaining 3.8 hectares of the plaza with

apartment buildings. Kingston did not have any policies or incentives regarding greyfield site redevelopment. Their agreement to amend the Official Plan enabled a significant reuse of this location. The developer's original proposal for 420 rental units was reduced to three buildings of 120 units each. The one and two-bedroom units were geared to a general market ranging from university students, younger couples and seniors with rents below Kingston's average. In 2004, the development was awarded \$1.4 million under a federal-provincial program for provision of 85 affordable housing units. The existence of two bus routes to the site was a factor for the viability of the project's affordable housing component. One of the two apartment buildings was completed in 2008. No development application has been made to date for construction of the second building.

Figure 3.2 The former K-Mart store before site redevelopment. Credit: CMHC.

The existing stormwater and sewer system was retained and new water lines were installed. A new green space planned to replace much of the parking lot will enable stormwater infiltration to alleviate dependence on the existing drainage systems. The only new on-site amenities will be a shared gym in the apartment buildings and a quarter hectare of parkland. Other than the existing drycleaners, no new retail or services were provided. Nor were design considerations made to facilitate biking or walking to the nearby commercial and service centres (see Figure 3.3).

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Figure 3.3 1600 Bath Road project site plan. Credit: CMHC.

With its low vacancy rate and lack of smaller apartment units, Kingston gained more affordable housing with this project. It redeveloped a large underused site and added housing in a large commercial area without any municipal incentives. The Bath Road project utilizes public transit services to reduce automotive traffic and existing site utilities. The plan essentially replaces a car filled big box site with a car filled apartment complex. All vehicles are surface parked which greatly reduces the potential for green space. A structured parking garage or underground parking would have made a significant difference to this site but this area of Kingston did not have policies to enforce such development standards. As well, that layout forced the park into the NW corner making it likely too remote to be much used. This project demonstrates a fairly shrewd developer. The charitable view is that he saved three large structures from demolition. The project lacks on-site commercial facilities and did little to create a sense of neighbourhood (see Figure 3.4). The climate-controlled warehouse offers nothing for the nearby residents. A more cynical view is that the developer produced a captive market of lower-income tenants for his large bingo hall.

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Figure 3.4 Perspective drawing of 1600 Bath Road. Credit: CMHC.

The New Kitchener Market - Kitchener

The original market building and old Kitchener City Hall were removed to construct the new Market Square Mall in 1973. A thirty-year lease secured space there for the Kitchener Market until the City decided that a new stand alone market with higher visibility would add needed vitality to the declining downtown Market District core (see Figure 3.5). That area had evolved with specialty food stores and a diverse mix of restaurants, businesses and a significant South-east Asian community. The Market District's focus as a centre for cultural, shopping, retail and tourist activities was to be enhanced. The new one hectare site covered a city block (see Figure 3.6). A City-owned car-park occupied half this greyfield site with ground floor retail and second-storey apartments comprising the balance which were bought or expropriated by the City in 2001 to clear the block. Close by are a fitness gym, theatres and a high-rise office block. Surrounding this site on three sides are detached houses with condominiums and stores with second-floor housing on the fourth side. It is well served by public transit including impaired mobility service.

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Figure 3.5 Project vicinity for the New Kitchener Market. Credit: CMHC.

Five components comprise the project: the New Kitchener Market; Le Marché Residential, a three-storey condominium; and two flanking two-storey office and retail buildings on either side of a public square with a 300-space underground parking structure (see Figure 3.7). Covering one third of the site behind the market is the condominium with 68 units of one to three bedroom suites. The elongated C-shaped structure has a garden courtyard facing a pergola walkway connecting the two side streets along the north side of the market (see Figure 3.8). Figures 3.9 and 3.10 show the entrance facades to both the Market Building and the Le Marché residence which has a public transit stop there.

Figure 3.6 King Street business block before demolition. Credit: CMHC.

Figure 3.5 Project vicinity for the New Kitchener Market. Credit: CMHC.

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Figure 3.6 King Street business block before demolition. Credit: CMHC.

Figure 3.7 Rendering of the New Kitchener Market. Credit: CMHC.

The 5,575-square metre market is masonry clad with large windows and skylights for copious natural light (see Figure 3.8 on p. 41). Its massing harmonizes with that of the block's residential fabric and to prevent blank walls, each side recreates building façades. To reduce disruptive traffic, the market's truck delivery is by an internalized driveway through the structure. A farmer's market operates two-days-a-week on the main floor with full-time shops on the second. The square, centred on the market's south entrance, achieves a sense of enclosure with the two flanking office and retail buildings. Vendor stands operate there during warmer weather to add diversity and street life to the square which is a significant public amenity for the complex.

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Figure 3.8 Garden court of Le Marché Residential. Credit: CMHC.

Figure 3.9 Entrance façade for the New Kitchener Market. Credit: CMHC.

Figure 3.10 Entrance façade of Le Marché Residential. Credit: CMHC.

Kitchener had no greyfield redevelopment policies when this proposal was initiated. However, their Community Improvement Plan had targeted the downtown core for improvements. This project succeeded owing to the City's role as land assembler and its offering of incentives to developers to help achieve revitalization of its urban core. The City owns and manages the Market, its square and the underground parking garage. This project, completed in 2006, was recognized for the enhancement of the 'urbanization potential' of the City's core where other residential and mixed-use initiatives have been constructed. Provision of affordable housing enlivens the Market District, stimulates nearby businesses, reduces growth on the urban fringe and increases the tax base while making effective use of the surrounding infrastructure. A new walkable complex with public open spaces and connecting pathways and links helps create a destination centre that showcases Kitchener's reputation as an innovative city. The provision of underground parking added significantly to the site ambiance through the creation of more public open space that otherwise would have been possible.

Lakeshore Village - Oakville

The Lakeshore Village site of about 2,300 square metres was the site of a former automotive sales dealership. It is located in the west Central Business District (CBD) at the corner of Lakeshore Road West, a major commercial arterial, and Kerr Street, a residential collector (see Figure 3.11). Mixed-use ground floor retail with upper storey apartments at 80

Figure 3.10 Entrance façade of Le Marché Residential. Credit: CMHC.

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units per hectare predominate the northern portion of Lakeshore Road West across from the site. A street frontage townhouse complex at 30 units per hectare is located directly behind the site. Further south is an older community of housing at around 20 units per hectare. Several parks, two recreation centres, a seniors' complex and Sixteen-Mile Creek are all within two blocks. Despite its arterial frontage, public transit is only available two blocks from the site. This West Harbour side location of the CBD of Oakville had been declining in recent years and offered the opportunity to create housing to help reduce employment commuting.

Figure 3.11 Project vicinity for Lakeshore Village. Credit: CMHC.

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Figure 3.11 Project vicinity for Lakeshore Village. Credit: CMHC.

Figure 3.12 Before: the Lakeshore and Kerr Street site. Credit: CMHC

Figure 3.13 Lakeshore Village site plan. Credit: CMHC.

A Dairy Queen drive-in restaurant, whose owner refused to upgrade his building maintenance, dominated this greyfield site (see Figure 3.12). A rundown house, a tombstone

Figure 3.12 Before: the Lakeshore and Kerr Street site. Credit: CMHC

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A Dairy Queen drive-in restaurant, whose owner refused to upgrade his building maintenance, dominated this greyfield site (see Figure 3.12). A rundown house, a tombstone

maker and a gardening centre were the other declining site occupants. Purchased in 2001, a year after the Dairy Queen closed, the developer proposed a two block three-storey residential-commercial townhouse project of 14 units in 2002 (see Figure 3.13). Fronting on Lakeshore Road West is Oakville's first live/work project of ten units (see Figure 3.14). The business owners live above their ground floor commercial spaces designed for professional or service functions. The first occupants included an architect, a dermatologist, chiropractor and a realtor. The project's second component is four townhouse units on Kerr Street around the corner (see Figure 3.15). Approximately 60 units per hectare is the site density. One of Oakville's blocks of heritage masonry façades was the precedent for the Lakeshore Road West frontage. Terracing the rear of these units reduced the building's massing to visually merge it with the lower heights of the housing on the south side. All the residential units were provided outdoor space with either patios or terraces at the building's rear. Since the residents of the live-work spaces would work there, the higher requirements for employee parking was reduced to eliminate five parking spaces.

Figure 3.14 Lakeshore Village façade on Lakeshore Road West. Credit: CMHC.

Oakville's Official Plan (OP) gave no incentives for the residential redevelopment of commercial property. Whereas live-work projects were not addressed in the OP, it did facilitate residential and retail developments in their CBD. Two aims of the OP, the provision of land uses promoting walkable and street-oriented projects, were achieved by Lakeshore Village. This project was widely endorsed. Oakville's planners saw the opportunity to help revitalize the CBD's west side with its first ever live/work development that helped eliminate employment-related

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commuting. The site's neighbours desired its redevelopment. Following minor architectural changes recommended at community consultations, the project was supported to Oakville City Council. The project sold out quickly and encouraged other live/work developments in Oakville.

Figure 3.15 The Kerr Street façades. Credit: CMHC.

Olde Thornhill Village - Markham

The 6.1 hectare defunct Thornhill Square Shopping Centre site was redeveloped as a major in-fill project within a mature community (see Figure 3.16). The site contained a mall of 23,226 square metres, a six-storey office structure and a parking lot with an above ground parking garage. The enclosed mall and a four-storey office building on west side of the site will be expanded, renovated and re-clad. The results are a six-storey office structure of 5,725 square metres and retail space of 11,060 square metres. The east side of the mall will be removed. Replacing it will be eight blocks of low-rise stacked townhouses with 220 units and two linked seven and nine-storey apartment buildings with 224 units (see Figure 3.17).

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Figure 3.16 Project Vicinity for Olde Thornhill Village. Credit: CMHC.

Figure 3.17 Olde Thornhill Village site plan. Credit: CMHC.

Within walking distance of the site are an ice arena, recreation centre, library, and a primary school. Tennis courts and a swimming pool are located slightly farther away. The site

frontage is served with a bus route and within 200 metres, at a single stop are local, regional and GO bus services. The block is surrounded by a 15-storey apartment building, two-storey condominium townhouses, a church and a mature industrial area. Nearby across Bayview Avenue is a seniors' residence and a hospital.

Figure 3.18 Rendering of the townhouse courtyard. Credit: CMHC.

The mall, built in 1980, failed owing to some of the common conditions mentioned earlier in this paper. These include a poor location within its superblock, an ill-suited retail layout and inaccessibility to its closest arterial route, Bayview Avenue. In 2000, the owner applied to the City of Markham for demolition of a major part of the mall and its replacement with a big box home renovation centre. Citing incompatibility with existing neighbouring land uses, Markham denied the application. This was appealed to the Ontario Municipal Board (OMB) by the developer in 2002. The OMB denied the proposal. In 2001, a major segment of the mall was closed and the developer applied to build the townhouse complex in 2003. Construction of the stacked 220 townhouse condominiums started in 2004 and was completed in 2008 and has sold out (see Figure 3.18). The second phase development originally proposed for 224 condominium apartments may start construction in 2009 but with an as yet undetermined number of units (see Figure 3.19).

Jane Jacobs (1961) emphasized the failure of the Modernist superblock concept to provide connections within the block and its adjoining streets. This was the factor that most often lead to deadness within residential complexes and with a lack of pedestrian movement, the crime potential increased. Olde Thornhill Village makes a strong linkage to its residential and commercial facilities with a new grid pattern road connecting John Street, on the south, with

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Green Lane, on the north. Street fronting retail along that new road encourages pedestrian access with the Village residences to the east. Walkability is promoted with both pedestrian and bike paths connecting residences to other site facilities and increased access to off-site locations. The normal municipal parking criteria were applied by Markham. The commercial development on the west will have 592 below grade parking spaces while the residences will have 555 spaces.

Figure 3.19 Condominium apartment building. Credit: CMHC.

This greyfield redevelopment received no municipal financial incentives but Markham supported the Thornhill Village initiative as a much better option than the original big box proposal. Its staff developed a Secondary Plan to establish specific principles to guide the project. These rules applied to site design; requirements for open space; connections between the various components; walkability and street fronting retail. Its policies support a mix of residential densities and variety in the housing being offered. By implementing these measures, Thornhill Village met the Markham Official Plan's goals for mixed-use and higher density development near public transit services. Markham held non-statutory meetings to allow opportunities for neighbours to express their concerns. Though generally supportive of an alternative to the big box option, the public had the usual concerns regarding density and the impact of massing on the surrounding properties. A series of design presentations defused these issues to their satisfaction.

Despite not being a sustainable urbanism design, Olde Thornhill Village achieved a number of desirable greyfield redevelopment goals. It had an excellent mix of generally affordable townhouse units with retail and office employment contained at one walkable site.

Green Lane, on the north. Street fronting retail along that new road encourages pedestrian access with the Village residences to the east. Walkability is promoted with both pedestrian and bike paths connecting residences to other site facilities and increased access to off-site locations. The normal municipal parking criteria were applied by Markham. The commercial development on the west will have 592 below grade parking spaces while the residences will have 555 spaces.

Figure 3.19 Condominium apartment building. Credit: CMHC.

This greyfield redevelopment received no municipal financial incentives but Markham supported the Thornhill Village initiative as a much better option than the original big box proposal. Its staff developed a Secondary Plan to establish specific principles to guide the project. These rules applied to site design; requirements for open space; connections between the various components; walkability and street fronting retail. Its policies support a mix of residential densities and variety in the housing being offered. By implementing these measures, Thornhill Village met the Markham Official Plan's goals for mixed-use and higher density development near public transit services. Markham held non-statutory meetings to allow opportunities for neighbours to express their concerns. Though generally supportive of an alternative to the big box option, the public had the usual concerns regarding density and the impact of massing on the surrounding properties. A series of design presentations defused these issues to their satisfaction.

Despite not being a sustainable urbanism design, Olde Thornhill Village achieved a number of desirable greyfield redevelopment goals. It had an excellent mix of generally affordable townhouse units with retail and office employment contained at one walkable site.

Higher-density was achieved within a mature urban neighbourhood accessible to amenities, services and public transit. Good cooperation between planning staff and City council helped block the unsuitable big box retail proposal which was supported by the OMB. Markham's design guidelines proved invaluable in achieving their redevelopment objectives and established precedents for similar future proposals. The public information sessions helped avoid major design changes when the community's fears regarding density and massing issues were allayed. Finally, this case study shows that a large mall in an established community can fail, even in an affluent city such as Markham.

The Aldershot Plaza - Burlington

The 6.2 hectare site of a former A&P supermarket and a Zellers anchored strip mall has been redeveloped with mixed-uses in two phases (see Figure 3.20). Phase One replaced the supermarket with an 11-storey and a 12-storey rental apartment complex with some condominiums, totaling 226 units. A recreation centre with a swimming was also provided. The Phase Two project on the strip mall site built five apartment buildings, with ground floor commercial space, totaling 640 units. This greyfield site was a rare one with some contamination by toxins from the parking lot paving and gasoline that had leaked from a gas station located off-site (see Figure 3.21).

Figure 3.20 Project vicinity for Aldershot Plaza. Credit: CMHC.

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Figure 3.20 Project vicinity for Aldershot Plaza. Credit: CMHC.

Figure 3.21 Air photo of the former Aldershot Plaza. Credit: CMHC.

Both the former retail facilities date from the late 1980s and declined owing to the nearby construction of a regional shopping centre, an Ikea and supermarket big box stores. The ceiling heights of these Burlington retail structures did not allow for feasible conversions and were demolished. This project has good access to some key amenities. It is in an older residential community with low to medium density dwellings on the south with a higher density development adjacent on the west along with retail usage. Strip development and a used auto lot are located on the east and north sides with a high school adjacent on the site's south east. The Aldershot Plaza abuts the Plains Road West arterial with good public transit. A Go Train stop is a medium walk away for regional commuters to Hamilton or Toronto.

In 2004, the contaminated surface soil was removed prior to construction of Phase One which was completed in 2006 (see Figure 3.22). The first of the five building in Phase Two will start construction in 2009 with one more building being planned a year if demand justifies it (see Figure 3.22). Phase One, at 1.7 hectares with a density of 150 units per hectare, is much higher than the 50 units per hectare low-rise neighbourhood to the south (see Figure 3.22). It is however, similar to the high-density development adjacent on the west side. Phase Two with 4.5 hectares has a density of 142 units per hectare. The normal parking criteria was applied to the project. Of the 502 spaces required, 404 will be located underground. Sidewalks along Plains Road West provide pedestrian site accessibility which link to those on the project's internal streets.

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Figure 3.22 Phase One site plan. Credit: CMHC.

Burlington had neither incentives nor programs to address the redevelopment of greyfields. Their Official Plan (OP) allowed for medium to higher density housing and retail services for this site. Time was saved for the developer as no rezoning or OP amendments were required. However, a ten-month delay was encountered owing to the need for lengthy consultations with the residents of site's south side lower-density neighbourhood and removal of the contaminated soil. The consultations concerned the apartment building's height and that no commercial retail facilities would remain nearby for the residents following the plaza's demolition. The neighbourhoods were not completely mollified when adjustments to the site plan moved the high-rises farther from their location.

Figure 3.23 Phase One on left and proposed Phase Two on the right. Credit: drewloholdings.com

Figure 3.22 Phase One site plan. Credit: CMHC.

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Figure 3.23 Phase One on left and proposed Phase Two on the right. Credit: drewloholdings.com

Based on those consultations, the City Council sought inclusion of some commercial retail in Phase Two of the project to satisfy the neighbourhood need for walkable shopping. Additionally, the developer used models to demonstrate four massing options for that Phase in their subsequent community consultations. The developer is marketing the apartments to seniors from the nearby lower-density community who wish to remain in the neighbourhood. These units would appeal to them as Burlington has a low vacancy rate and a limited supply of smaller apartments. The site also has good services and amenities within easy walking distance for these seniors.

This was a successful project for the City of Burlington which had no prior greyfield redevelopment policies. As more are likely in the future, the Aldershot Plaza project was a good test case. Their officials learned the importance of retaining some commercial retail in a mixed-use proposal to satisfy the needs of both the adjoining community and the new project's residents. This also reduces some car traffic off-site for shopping. That recognition of the need for community shopping will be included in similar future intensification projects. More driving reductions are achieved with the local and regional transit connections close to the site. The apartment size mix met the City's rental needs. It also allowed nearby seniors who sell their houses to continue living in their established community and to use its familiar nearby services.

Summary

All of these five southern Ontario greyfield case studies were failed or failing retail sites. All are in urban areas; none are on the urban or suburban edge. Four are located alongside major roads or arterials while the Markham site was very close to one. Except for the Kingston example, located in a mature commercial area with only lower density housing on one side, all are within established neighbourhoods with a mix of surrounding low to higher density housing. They range in area from a half acre to 6.9 hectares with three of them six hectares in area. All are served with public transit. They meet the greyfield criterion established earlier in this paper (Merritt, 2006). Only the Kingston site retained and reused its existing big box store structures.

Walkable neighbourhoods have a sense of community and reduced auto-dependency (Farr, 2008). These goals are achieved by mixed-use developments with retail, services and amenities on-site or close to it. Of these five locations, Kitchener is closest in the providing the maximum of these qualities. It features a condominium residence with a loggia bordered courtyard garden and is located beside that most fascinating of shopping venues, a large market hall. This contains a twice a week farmer's market and a top floor of diverse market shops. All parking is underground which added significantly to the site ambiance by creating more public

open space that otherwise would have been possible. A public square with a southern exposure with warmer weather vendors completes this picture of a most attractive walkable small neighbourhood. The bonus is that it is centred in the old downtown Market District with an eclectic array of multicultural restaurants, businesses and a large South-east Asian community.

The Markham location provides some measures for the creation of a walkable neighbourhood. It is on a large split residential and commercial site with ample landscaping. The townhouse condominiums surround courtyards linked by bicycle and pedestrian pathways that connect with off-site locations. Street fronting retail is provided along the new road separating the residential component from the renovated office and commercial portion of this redevelopment. Those renovated facilities provide on-site employment which is another desirable walkable neighbourhood feature. That new road also improves the connectivity with the larger community.

The Kingston example had the poorest walkable neighbourhood design. It has no on-site retail or services other than a drycleaners and a bingo hall. Other than the roadway sidewalks, no paths for biking or walking around the site are provided. Nor was there any attempt made for connections to off-site destinations. The developer was not forced to provide for other than surface parking which used up nearly all of the site and forced the location of its park to a remote corner of the property. This design is an example of the failed Modernist Movement towers in the park(ing lot) concept that has produced inferior urban community development for much of the 20th Century in North America (Jacobs, 1961).

Oakville's pioneer live/work residences offer a small precedent there to reduce commuting. This not only prevents pollution, wasted energy and the need for yet more parking spots elsewhere, but eliminates the waste of a worker's valuable travel time. It proved so successful that other local developers have duplicated the concept.

The case studies illustrate the role of planners working with developers to help implement or improve proposals and also in scaling down egregious density requests. These studies also highlight the importance of community information sessions where local residents' criticisms are enunciated and design modifications can be made to address those concerns. Changes to the massing of the Oakville live/work proposal were made following such meetings. Similarly, such changes plus the relocation of the higher density apartments were made by the residents of the low density neighbourhood bordering the second phase of the Burlington redevelopment. As well, they requested inclusion of retail outlets to replace those lost with the demolition of the former mall there. Not only was that recommendation implemented which made the site more of a walkable neighbourhood, but Burlington's planners recognized its

importance and included such provisions for similar future developments. Changes to both density and massing were made following similar concerns raised by nearby residents at the Markham redevelopment of the Thornhill Square Shopping Centre.

There must be a market demand before a developer is willing to incur the risks of investing. Reading that demand is a skill and the history of retail or other uses at sites illustrates that mistakes are often made or conditions change leading to subsequent greyfield situations. A case study not cited involved a small failed strip mall in Oakville for which a developer proposed a townhouse development. At local planning meetings nearby residents voiced demands for some replacement retail outlets. Recognizing that such a use had failed, the developer refused to consider the suggestion. The townhouse proposal was supported by both planners and Council and that development took place without any retail component.

Most of these post-1999 case studies indicate that the municipalities concerned had no policies to address greyfield redevelopment proposals. Once a number of projects are underway the awareness of the issues involved is soon spread to other jurisdictions. Ontario's economy is undergoing major changes as global competition and the soaring Canadian dollar threatens its manufacturing base. In the Fall of 2008, plant closures were announced for long established vehicle and farm implement manufacturers in Goderich, St. Catharines and St. Thomas. Not only could their brownfield plant sites be available for transformation but eventually some retail malls there could also become greyfield redevelopment opportunities.

These case studies are instructive for the direction of the design project as they demonstrate the current lack of emphasis of walkability in Ontario residential developments. With the exception of the Kitchener New Market example, all are based on auto-dependency. However, all of our cities, except at their densest residential centres, share the same dependency.

CHAPTER 4 - BIG BOX BUILDING REUSE, COMPONENT REUSE AND RECYCLING

A major factor contributing to the longevity of buildings that have survived from the past is their fusion of nature and art. They had to be both earth friendly and beautiful to be worthy of preservation in the first place.

Wines (2007, p. 20).

Introduction

There are only three options for the future of a closed big box building: longer term abandonment, adaptive reuse or demolition (Killingsworth & Farrow, 2007). Abandonment means lost owner revenue and all of its former jobs. A pall is cast on surrounding properties that lowers their values and can lead to economic decline. Though demolition is a profitable business there is loss in the construction cost of the building and the embodied energy of all its components. The community's tax base declines unless new and more expensive construction takes place. The preferred solution is the adaptive reuse of the building if it is economically viable.

Figure 4.1 Elevations for a no frills grocery store, Toronto. Credit: Alex Rebanks Associates.

Construction Characteristics of Big Box Stores

The building details and costing of a 'no frills' large format grocery store were discussed as an example of big box construction (A. Rebanks, personal communication, October 23, 2008). These structures usually range from 25,000 to 50,000 square feet in area, are light steel framed on a 25 to 30 foot grid with a 16 to 18 foot ceiling height (see Figure 4.1). Light open web steel joists covered with unpainted metal decking form the ceiling treatment. A roofing membrane over rigid insulation forms the roof. The envelope is basic and consists of interior

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liner panels which are sprayed or pre-finished and fixed to horizontal girts with an air barrier. The metal siding exterior with semi-rigid insulation is held in place with more girts. For a grocery, the most complex and important component is the high quality concrete floor with carefully calculated food cooler drains. The slab is finished and treated without tiles. Central mechanical systems used to be interior mounted, but owing to replacement costs, they are all roof mounted. Those roofs were so minimally constructed that they had no tolerance for extra loads. If extra chiller plant was required, as cooling loads are a bigger factor than heating, extra support had to be installed. The partition between the backrooms and the store is only ten feet high and does not extend to the underside of the deck. There is limited finishing on-site. The building is basically a cheaply built box costing about \$60 a square foot. The roof and the electrical and mechanical system have a 15-year life span. Some similar stores last up to 25 years before being demolished according to this architect.

Life Span of a Big Box Store

Figure 4.2 Rusting big box store. Credit: Flickr.

A senior executive of a major GTA construction company indicated that most big box stores have a 15-year lifespan (A. Merton, personal communication, October 7, 2008). Components with such life spans include roofs, electrical and mechanical systems, poorly insulated walls (see Figure 4.2 and Figure 4.3) and lower-quality windows.

Perhaps the best components are the main entrance doors owing to their heavy use and the need to create a quality appearance. Only in the last few years have big box stores addressed energy conservation issues. As well, big box stores, like personal storage depots, are built by developers in anticipation of the longer term appreciation of the site. Their minimalist structures, even if marginally profitable, cover the carrying costs of the land until it can be redeveloped with more profitable uses such as high-rise housing once the population growth expands to that area. The colloquial developers' term for such land use is 'ground cover.' The architect of many large format stores for Ontario's leading grocery chain confirmed an average 15-year life span for these structures (A. Rebanks, personal communication, October 23, 2008). But he added that the economic redundancy is generally shorter owing to expansion

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requirements, tenant changes, stylistic considerations and the densification owing to increased land values. His most interesting observation was the effect on construction of big box stores by competition in that sector from retail giant, Wal-Mart. So close are cost margins that many big box stores have now slightly reduced construction standards in an attempt to maintain their profitability. This may likely reduce the already short lifespan of many of these structures. Wal-Mart's impact in altering the North American marketing landscape is finding new ground. Another Toronto big box architect stated that some newer big box stores should have a 20-year life span (J. Chow, personal communication, November 12, 2008).

Figure 4.3 Big box wall section showing thermal bridging. Credit: Fire Engineering.

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Building Reuse Potential

Guy and Ciarimboli (n.d.) describe William McDonough Architects' design for a Wal-Mart Eco-Store at Lawrence, Kansas, opened in 1993. This was the retailer's initial store to address the issue of end life reuse. *The Wall Street Journal* described it as the first major American retail outlet to include ecological elements in its design (Panchapakesan, n.d.). More important than the use of green building materials and energy conservation, was the specification of a future use for the store after it ceased its retail function. The decision to reuse the structure as an apartment building determined a two-storey store design to facilitate its future conversion with the insertion of a second floor. Laminated wood trusses of shallower depth than conventional open web steel joists and a ceiling envelope appropriate for the future use will make that renovation to residential use much easier. The exterior concrete block walls were modularly coordinated for the easier cutting of window and door openings for the later reuse function. As well, the energy saving prismatic skylights were designed to provide lighting for the future second floor apartments. The decision to create an end use for this store will save all the embodied energy of the components manufactured, transported and installed to construct this building.

American Wal-Mart stores are now being built to a higher standard and at least one with a geothermal heat pump (G. Sather, personal communication, October 29, 2008). A Toronto architect who designs for this American retailer said Wal-Mart's Canadian stores do not have such high standards but they are now building better quality stores (J. Chow, personal communication, November 12, 2008). He mentioned their use of recycled steel and reflective roofs to lower cooling loads. It appears that Wal-Mart is now so profitable that it can afford to maintain higher environmental standards while its competitors are lowering their construction standards to stay profitable. John Chow's firm has done a number of subdivisions of big boxes into ancillary retail spaces for the chain owner. He suggested that it was not cost effective to reuse an older big box as they were too poorly built and are usually too big for most other uses. In a buoyant economy, firms such as Home Depot wanting a bigger or newer big box would sell theirs back to the owners who would demolish them and redevelop as required.

Examples of Big Box Reuse

There are examples of adaptive reuse of big boxes especially in the US where their abandonment has been a larger scale and longer standing problem than in Canada. Perhaps the most imaginative reuse with the greatest economic impact on a town was the creation of the Spam Museum in Austin, Minnesota (<http://www.bigboxreuse.com>, n.d.). Also known as Spam Town, U.S.A., it was the birthplace of that product in 1937. A 33,000 square foot K-Mart store sat

empty for years which depressed the surrounding area and caused the abandonment of a big box grocery across the street. The Spam Museum now occupies half this building and the Hormel meat packing company offices, the balance (see Figure 4.4). Opening in 2001, this museum draws about 100,000 visitors annually. Cost was cited as a major factor in this project as it was cheaper to renovate the store than to purpose build.

Figure 4.4 The Spam Museum in a reused K-Mart store, Austin, Minnesota.
Credit: Miller Gallery.

The congregation of Calvary Chapel, Pinella Park, near St.Petersburg, Florida first met in a private school followed by the use of a Sons of Italy hall. They then moved to a 10,000 square foot warehouse followed by the use of an abandoned large format grocery that their 700 members occupied for seven years. Wal-Mart left a 120,000 square foot store for a larger, new Superstore nearby (see Figures 4.5 and 4.6). The congregation then moved into that store in stages. A second storey is being added on the purchased building's frontage. The very large parking lot at this former Wal-Mart site was a major factor for the move of the now 2,000 strong congregation. Gazebos and pathways were added to the unused rear of the store for weddings and outdoor functions (<http://www.bigboxreuse.com>, n.d.).

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Figure 4.5 Calvary Chapel before renovations. Credit: bigboxreuse.com

Figure 4.6 Staged renovations of Calvary Chapel. Credit: bigboxreuse.com

Figure 4.7 Old K-Mart. Credit: bigboxreuse.com

A K-Mart store that had been empty for ten years was renovated to house a HeadStart Child and Family Development Program in Hastings, Nebraska (see Figure 4.7). The big box problems of ownership and lease rights, mentioned in Chapter Two, delayed the purchase of this site. The land was owned separately from the building owner and K-Mart held the lease. The reuse provides over 70

rooms, including 13 classrooms, four special purposes areas for infants and toddlers, 19 washrooms and an Hispanic immigrant resource centre with computer workshops, meeting rooms, cafeteria and offices (see Figure 4.8). The renovations took over six months with the opening in 2001. This centre employs more than 100 people and has about 120 students. The exterior renovations involved repainting and a new roof. All of the mechanical and electrical systems, interior walls and ceilings were replaced. Its siting as a big box at a major regional

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intersection made access for its users and employees ideal as did its large size for the purposes required (<http://www.bigboxreuse.com>, n.d.).

Figure 4.8 Classroom, dining area and early childhood room in Hastings, Nebraska.
Credit: bigboxreuse.com

Figure 4.9 Centralia Center, Wisconsin Rapids. Credit: USA Today.

Wal-Mart left a 120,000 square foot store in Wisconsin Rapids, Wisconsin to move to a Supercentre on the edge of town (see Figure 4.9). Being in the centre of town was an incentive to build the Centralia Center, for its seniors. After the demolition of 20,000 square feet of the store for a garden, it was renovated to provide recreational amenities for seniors and to serve for the aging and disabled citizens of two counties. The central location of this store made it ideal for these requirements (El Nasser, 2008).

Material Reuse and Recycling Potential

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indicated that most of the six or so large format grocery stores they take down annually have close to a 15-year life span. They also remove about a dozen malls and plazas annually. Almost invariably, nearly all of the removed building components and material are recycled with little reuse of components. Items such as large tanks, vessels and motors, and some doors and windows are recovered intact for reuse. Butler pre-engineered buildings were disassembled. On occasion, if requested, the firm recovers steel columns and beams. However, nearly all steel products are recycled at smelters. Concrete is crushed primarily for aggregate but is sometimes used as admixtures by cement plants. Asphalt is all recycled. He agreed that the lack of deconstruction design in buildings prevented the recovery of useable components and that high labour costs made it uneconomic to do so (see Figure 4.10). Mr. Swift also knew of smaller salvage firms, especially those of the Mennonite communities, who specialized in the recovery of useable building components from lesser sized buildings. Most demolitions of large format groceries took about three weeks unless contamination issues such as asbestos were discovered which would prolong the job. Architect John Chow, cited above, confirmed that all components of big boxes are recycled at demolition; nothing was wasted.

Figure 4.10 Big box roof section with roof deck spot welded to open web steel joists that prevents the material from being salvaged. Credit: Fire Engineering.

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Figure 4.10 Big box roof section with roof deck spot welded to open web steel joists that prevents the material from being salvaged. Credit: Fire Engineering.

Possible Adaptive Reuses of a Big Box Store

A number of examples of adaptive reuses of big box stores have been cited. The following list those plus other possible uses depending on the size of the structure and other possible co-users.

Institutional/Non-profit

Museum
Church or place of worship
Seniors' centre
Daycare

Theatre
School or training centre
Community centre
Gymnasium, sports club

Commercial

Cold storage facility
Market
Light assembly
Offices or personal services

Bingo hall
Urban agriculture
Cottage industry
Retail

Summary

As stated by Killingsworth and Farrow (2007) and confirmed in interviews with architects, Alex Rebanks and John Chow, big boxes are problematic. They are often too big or too old for adaptive reuse. Much depends on their location. The situation is much better in the GTA for their demolition and site redevelopment than in smaller centres or across much of the US where they are more numerous and definitely much older. Killingsworth and Farrow quoted \$US 25 to \$40 per square foot costs in 2004 for a conversion. Much would depend on the age and fit-up requirements for a renovation budget.

There is very little component reuse in the GTA. One demolition firm mentioned that occasionally they would salvage steel beams and columns for clients besides the usual scavenging of tanks, vessels, motors and some doors and windows. Otherwise, all experts agree, the structural elements are all recycled. Though this is profitable, society loses all of the immense embodied energy expended in the mining, manufacturing, transporting and assembly of these components. Design for disassembly is required to save more of this waste and awareness of that issue is growing. As well, more infrastructure is required by the demolition industry to sort, store and advertise valued items for reuse. A greater understanding of this potential is also required of the design and construction industry. Appendix 'A' lists recommendation for the improved disassembly of building components to promote their reuse and save their considerable embodied energy.

Big box stores exhibit the worst tendency in our society to waste resources by building cheaper and less durable structures. This phenomenon illustrates, in part, the design philosophy of the 1960s, British design group Archigram, who saw an evolution to a more changeable and disposable philosophy of infrastructure.

Though extremely wasteful in their construction and energy operation, there is an upside to the ephemeral nature of big box construction. Most of them were originally sited in inner-city suburbs. When redundant for further retail development their locations make them ideal for more long-lasting residential uses. The design project sought such a site to demonstrate a walkable neighbourhood design. The selected location with excellent features had a large masonry mill suitable for adaptive reuse and was used in lieu of a big box store.

CHAPTER 5 - WALKABLE LIVE/WORK NEIGHBOURHOOD DESIGN

You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.

R. Buckminster Fuller (Farr, 2008, p. 31).

Introduction

The history of the movements that sought to control urban sprawl and evolved to the development of walkable neighbourhood design will be examined. It follows with an analysis of walkable neighbourhood designs at Dockside Green in Victoria, B.C., and BedZED in London, England, that exemplify the best in carbon-neutral building practice.

The 1970s Environmental Movement and the Fight against Urban Sprawl

Douglas Farr (2008) chaired the new LEED standard for Neighbourhood Design. He discusses the history of environmental movements and how their insularity prevented them from merging with other groups to achieve a wider and more effective means of limiting urban sprawl. He states that the environmental movement began with Rachel Carson's (see Figure 5.1) *Silent Spring* (1962). His book, *Sustainable Urbanism*, is subtitled *Urban Design with Nature* in tribute to Ian McHarg's *Design with Nature* (1969). McHarg, who pioneered ecological design and regional planning with natural processes, is criticized by Farr for failing to integrate such awareness into urban design, "This obliviousness to human systems carried over to McHarg's built work - essentially well landscaped, auto-dependent suburbs - which are still mistakenly seen as sustainable development" (p. 28).

Figure 5.1 Rachel Carson, 1940
Credit Wikipedia

Farr (2008) traces the history of three movements that preceded sustainable urbanism as a means to control urban sprawl. These groups are smart growth, new urbanism and the green building movement. Essentially all three trace their beginnings to the 1970s environmental movement. He credits President Richard Nixon with legislation that, "serves as the backbone of US environmental policy to this day. This includes the Clean Water Act, the Clean Air Act, the Endangered Species Act, the National Environmental Protection Act (NEPA), the Coastal Zone Management Act, as (p. 29).

Knaap (2004) believes smart growth originated with state land use plans that began with Maryland's 1933 establishment of America's first State Planning Commission. It became a State Planning Department by 1959. The 1970 National Land use Policy promoted individual state versions to address the need for regional planning as the economy expanded. Increased urbanization from migration from farms, the southern states, and immigration during this period had necessitated such measures. Farr (2008) suggests Smart Growth grew out of the 1970s environmental movement and cites the designation of Urban Growth Boundaries (UGBs) to control land development in Oregon in 1973. These UGBs helped save rural scenery but did little for promoting good urban development within these zones, for what was termed 'smart sprawl.' Farr suggests that 'Smart Growth' was coined in 1995 by Colorado's Governor Roy Romer in his vision to control urbanization. Maryland then introduced its Smart Growth and Neighbourhood Conservation Program in 1997 to earmark approved expansion areas with infrastructure funding. Other states followed this example and it was such criteria for urban growth that Farr says helped influence the LEED standard for Neighbourhood Design. In 1996, the U.S. Environmental Protection Agency strengthened the movement for smart growth with the promotion of the following Ten Principles of Smart Growth (<http://www.smartgrowth.org>):

- Create Range of Housing Opportunities and Choices
- Create Walkable Neighborhoods
- Encourage Community and Stakeholder Collaboration
- Foster Distinctive, Attractive Communities with a Strong Sense of Place
- Make Development Decisions Predictable, Fair and Cost Effective
- Mix Land uses
- Preserve Open Space, Farmland, Natural Beauty and Critical Environmental Areas
- Provide a Variety of Transportation Choices
- Strengthen and Direct Development Towards Existing Communities
- Take Advantage of Compact Building Design (para 1-10)

This statement united the diverse anti-growth environmentalists as a single Smart Growth movement, suggests Farr. However, these principles were vague and the lending of the movement's name to projects of dubious quality decreased the smart growth 'label.' Pulver (2007) noted the limitations on Smart Growth, "In contrast to new urbanism, which is recognizable at the neighbourhood scale, it tends to be most frequently implemented at the regional scale, and recognized in the form of greenbelt and urban growth boundaries" (p. 49). But, argues Farr, this broad national membership of hardcore volunteers for land conservation and sound redevelopment practices are the loyal workers for sustainable urbanism.

Farr (2008) then discussed the history of the Congress of New Urbanism (CNU), and their reaction against the International Congress of Modern Architecture (CIAM). He cited that

group's third congress of 1930 where high-rise towers surrounded by green space were promoted to solve the crowding and lack of 'lungs' for cities; the birth of the destructive 'towers in the park' housing concept. He was critical of their 1943 Athens Charter giving primacy to high-speed automobile use and their recommendation for intersections to be spaced 200-400 yards apart to prevent the wearing out of brake linings. He sources this thinking to the car dependency, segregated zoning, land use, isolated buildings and urban sprawl of post-Second War American suburbanization. The CNU adopted its charter in 1996 and their ideas spread widely after some of its members produced such designs as Disney Corporations's Celebration community in Florida. The U.S. Department of Housing and Urban Development adopted these ideas for the demolition and rebuilding of CIAM designed public housing complexes. The CNU design style was co-opted by the Urban Land Institute members of the American development industry. This resulted in the creation of lifestyle centres and "master planned communities" (p. 32) that did not address the needs of lower-income families, a CNU goal. Farr then discussed the Congress' innovation of form-based land use codes as an alternative to the long entrenched Euclidean zoning that stalled mixed-use planning since the 1920s. With that they restored walkable street patterns, town squares, and a more traditional streetscape. He acknowledges the CNU's failure to achieve more than local successes on a project by project basis that has left in place standards that do not prevent sprawl.

Though it follows with many detailed principles, the central tenet of the Charter of the New Urbanism (<http://www.cnu.org/charter>) is:

We advocate the restructuring of public policy and development practices to support the following principles: neighborhoods should be diverse in use and population; communities should be designed for the pedestrian and transit as well as the car; cities and towns should be shaped by physically defined and universally accessible public spaces and community institutions; urban places should be framed by architecture and landscape design that celebrate local history, climate, ecology, and building practice (para 5).

With the exception of, "Architecture and landscape design should grow from local climate" and, "Natural methods of heating and cooling can be more resource-efficient than mechanical systems." (para 11) none of CNU's detailed principles refer to the environmental sustainability of buildings.

The history of the development of LEED standards is then discussed by Farr (2008) as the third of the movements stemming from late 20th Century environmentalism. He criticized two important unrelated deficiencies with this system. The first is the lack of progress in getting widespread adoption of the rating system by the construction industry. He states that in the six

years following LEED's launch, less than one thousand structures had reached certification when about 150,000 other buildings had been constructed in the US. The other critique is, "LEED's building-centric focus and the low value it places on a project's location and context, particularly concerning auto-dependency. The dominant unit of reform within the LEED system remains the stand-alone building" (p. 36).

These three movements discussed were seen by Farr (2008) as myopic for not seeking common solutions for the long-term urban environmental issues:

Further, there has been an understandable but unfortunate tendency toward self-validation, resulting in an unwillingness to engage a larger, comprehensive agenda. For instance, a certified green building isn't really a positive for the environment when it turns out to be surrounded by a massive paved parking lot; a walkable neighbourhood is hard to sustain when its houses are wastefully constructed and energy inefficient (p. 29).

He makes the case for the evolution of new urbanism into 'sustainable urbanism' which he defined as:

Reduced to its most basic tenets, sustainable urbanism is *walkable and transit-served urbanism integrated with high-performance buildings and high-performance infrastructure*. Compactness (density) and biophilia (human access to nature) are core values of sustainable urbanism (p. 42).

Though not mentioned by Farr, recognition should be made of the outstanding contribution of Jane Jacobs to the preservation of neighbourhoods. Her *Death and Life of Great American Cities* (1961) was instrumental in turning back the Modernism Movement planning that placed such supremacy on designing cities for the automobile.

Mixed-use Planning

The following discusses the history and renewed interest in mixed-use neighbourhoods (Lurz, 2007):

Visit quaint American towns and you'll see downtown streets lined with narrow buildings of three stories that have retail businesses right on the sidewalk and a mix of offices and residential units in the floors above. These mixed-use buildings reached their zenith in the late 19th and early 20th centuries, before the automobile reshaped cities and towns. They are what make "Main Street" an American icon. But after World War II, American urban planners turned away from integrating residential, commercial and retail spaces in one building, or even the same neighborhood. Urban and suburban building and zoning codes routinely outlawed it and separated residences into neighborhoods a car ride away from retail and commercial businesses. In the early 1990s, New Urbanist architects and town planners began calling for a return to mixed-use development and higher residential densities. They integrated retail, commercial and residential spaces in buildings of the classic form that allow people to live in apartments above a workplace on the first floor (para 30-34).

Live/Work and Work/Live Uses

Live/work units are usually residential accommodation over an at-grade place of business and are most often found on commercial streets. Work/live units permit employment in the place of residency often of an artistic or light assembly nature. Recent studies have suggested these permitted uses encourage creativity in cities as well as restoring the advantages of traditional mix-use development (Kelbough, 2002). Statistics Canada (2008) reported that over 2.6 million Canadians, or more than 15 per cent of the workforce, were self-employed in 2007. These numbers have been growing steadily and will likely continue to do so. It is unlikely that the majority of these workers are home-based. Providing an opportunity for such work however, especially with the growth of telecommuting and information technology (IT) employment, would stimulate economic growth. As well, it reduces commuting and its related greenhouse gas production.

Dockside Green

Dockside Green is considered the world's largest sustainable mixed-use development project (see Figures 5.2 and 5.3). It was designed by Peter Busby who is described as:

As a founding father of the Canada Green Building Council and recently as its chair, Peter Busby has been instrumental in stimulating change towards sustainable practices in what is one of the most conservative of industries...His architectural practice, initially Busby Associates Architects, and more recently Busby Perkins + Will, has grown to be arguably Canada's, or even North America's, premier green building practice. His building designs have put many others to shame, by demonstrating how high quality architectural design can embrace the highest sustainable design standards, leading to stimulating architectural solutions that have minimal environmental impact (Dr M. Gorgolewski, personal communication, November 10, 2008).

Dockside Green is not a greyfield redevelopment but the reclamation of 15 acres of industrial brownfield on Victoria, British Columbia's harbour front (P. Busby, lecture, November 13, 2008 and www.busby.ca). With the planned certification of 26 LEED Platinum buildings it represents the world's largest sustainable mixed-use project. When planned there was only one such building in the world. It is also the first North American project to be registered for the new LEED Neighbourhood Development rating certification (www.docksidegreen.com, 2007). The site runs north-south parallel to the harbour and had almost a century of industrial use. Dockside Green will feature a central spine park with a water course terminating at the circular village plaza at the project's southern end (see Figure 5.4). This park is connected at its other end to the Galloping Goose Trail that runs north from Victoria to Soote on a former railway right-of-way. Mixed-use residential towers reaching ten-storeys encircle that plaza with the remaining structures to the north ranging from three to seven storeys. When completed after its ten-year

build-out in about 2016, it will be a house about 2,500 people in a walkable live/work, work/live mixed-use community with offices, retail, hotel, and light industrial facilities. Farr (2008) lists the planning and sustainable design features for Dockside Green (Table 5.1).

Figure 5.2 Perspective and site plan of Dockside Green. Credit: www.docksidegreen.com

Figure 5.3 Rendered photo of the Dockside Green proposal. Credit: www.busby.ca

Farr (2008) described key design factors at Dockside Green as follows:

- 15 acres site.
- Approximately 860 dwelling units.
- Ten-year build-out; first phase completed in late 2007.
- All 26 buildings planned for LEED Platinum certification.
- 45-55 per cent estimated building energy saving.
- 11 per cent affordable housing.
- Biomass co-generation facility.
- Biodiesel facility.
- Reuse or recycle at least 90 per cent of waste on-site.
- Dedicated pedestrian and cyclist routes run through the heart of the development.
- Neighbourhood retail.
- Open space.
- Biodiversity corridors.
- Stormwater systems.
- On-site waste water treatment.
- Walkable streets and networks.
- Car sharing.
- Large district energy systems (p. 258).

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Figure 5.4 Site orientation at Dockside Green. Credit: docksidegreen.com

Phase One of the project, called "Synergy" was completed in 2008 and scored at 63 points Platinum, the highest in the world but not yet certified as such. This grouping, in the upper right corner of the site plan (see Figures 5.2 and 5.4), has four separate structures over an underground parking lot common to all of Synergy. The nine-storey residential and the six-storey towers both have ground floor commercial facilities. A two-storey townhouse and a four-storey residential structure complete this grouping. Synergy (see Figure 5.5) is the residential units closest to the Galloping Goose Trail.

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Figure 5.5 Synergy from the central park. Credit: dockside green.com

Walkable Neighbourhood Design, Smart Growth, New Urbanism, Sustainable Urbanism

The Busby Perkins+Will website cites smart growth and new urbanism design features for their Dockside Green project (<http://www.busby.com>). As previously discussed, the principles of smart growth are not very specific for neighbourhood design but are rather guidelines to controlling urban sprawl at the regional scale. They did help lead the evolution of urban design to new urbanism (Farr, 2008). New urbanism has been widely criticized since its first projects were built in the US in the 1990s. Bressi (2002) discusses a range of these arguments. Criticisms ranged from: despite claiming to be a means to control sprawl, many of their projects were in greenfields; to the many projects geared to higher-income levels and not reflecting the stated aim of promoting mixed-income community design. New urbanists who believe they are reacting to the strictures and prescriptions of CIAM and the Athens Charter are themselves blamed for what Bressi describes as:

...the use of regulatory controls, such as architectural codes and pattern books, and the emphasis on returning to traditional building types, architectural styles, compositional practices, and urban patterns...Yet another dimension of this critique involves the appropriateness, replicability, and adaptability of typologies that New Urbanists use-not only buildings but also streets and open spaces. Again and again, the issue that emerged was how to replicate traditional urban patterns of streets, blocks, building, and open spaces, in settings that must address modern demands for the use and structuring of urban space, and modern conceptions of domestic environments (p. 12-13).

Figure 5.5 Synergy from the central park. Credit: dockside green.com

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When questioned on this issue (P. Busby, personal communication, November 13, 2008) he suggested that many criticisms of new urbanism are now dated. He added that Dockside Green is being built on former brownfields vice greenfields, has an affordable housing component and is not following any prescribed traditional architectural style. The following is a brief analysis of Dockside Green to examine issues of connectivity to its surrounding community, a walkable design integrating built-form with nature, and the reduction of automobile-dependency. The degree of mixed-use land use, the resident's mix of income and age, and carbon-neutral design will then be examined. The argument will be made that Busby's description of smart growth and new urbanism features for this project is outdated. Rather it is suggested that Dockside Green is more accurately sustainable urbanist in nature as the two former features are now included in the latter.

Figure 5.6 Connections to surrounding community. Credit: docksidegreen.com

Site Connectivity and a Walkable Design Integrated with Nature

The primary connections to the surrounding community are shown in Figure 5.6. Dockside Green is based on a Radburn superblock (P. Busby, personal communication, November 13, 2008). They were first introduced in that newly planned New Jersey town in 1929 by Clarence Stein and Henry Wright. They sought to adopt the Garden Cities ideas of Ebenezer Howard and Sir Patrick Geddes. Jane Jacobs (1961) was critical of superblocks as a Modernist Movement idea that severed connections with the surrounding community. Here the original concept has been amended with numerous walkways between the buildings along the two long sides for access to the central park. Several bridges span the water feature to allow east-west transit of the site (see Figure 5.7). As well, much imagination and expense was involved in the creation of this natural feature whose ambiance would be destroyed with bisecting roads. Dockside Green makes excellent connections at its southern circular village plaza with its

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neighbouring streets. At the other end of the site is an important connection to the Galloping Goose Trail along the shoreline that was restored as part of this project (see Figure 5.8). Thus the walking, jogging and biking activities of that trail continue almost uninterrupted into Dockside Green's park. On-site retail encourages further walkability of the site without traffic disruption.

Figure 5.7 View of central park and water course spine. Credit: www.busby.ca

Figure 5.8 Connection to Galloping Goose Trail and the shoreline restoration. Credit: docksidegreen.com

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Figure 5.7 View of central park and water course spine. Credit: www.busby.ca

Figure 5.8 Connection to Galloping Goose Trail and the shoreline restoration. Credit: docksidegreen.com

Figure 5.9 Site walkability. Credit: docksidegreen.com

The aerial photograph (see Figure 5.9) illustrates the walking scale at Dockside Green and the relatively short distances to the two adjacent bridges across Victoria's harbour. The high degree of public transit connections at the site are shown in Figure 5.10. These play a key role in automobile reduction for the development which includes car sharing as part of that strategy (see Figure 5.11 on p. 76). Locating developments on transit routes is a principle of both new urbanism and sustainable urbanism.

Figure 5.10 Transit routes at site.
Credit: docksidegreen.com

Figure 5.11 Smart Car sharing.
Credit: www.docksidedgreen.com

Figure 5.9 Site walkability. Credit: docksidergreen.com

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Mixed-use Planning

Smart Growth principles were cited earlier by Peter Busby for the densification of Dockside Green. Its higher density housing on 15 acres would have required 115 acres if built as conventional single family units (see Figure 5.12). A description of the mixed-use planning and walkability connections in its three neighbourhoods follows (<http://www.docksidegreen.com/images/stories/bottom/itn/Sustainability Report 2007.pdf>).

Figure 5.12 The three neighbourhoods of Dockside Green. Credit: docksidegreen.com

The south end of the site (Dockside Village) [**Brown Area**] will feature homes, offices, shops and services, light industry and live-work studios. In the heart of the village will be a community amphitheatre that will be bordered by cafés, retail, light retail and office space – a true gathering place for visitors and residents.

Dockside Commons, [**Blue Area**] located in the middle of the site, includes Harbour Road industry. It will be characterized by a dense, small-scale light industrial atmosphere with office and residential to the east and west of the greenway. Open bike lanes and walking space will allow for increased connectivity between downtown, the site and the Galloping Goose Trail.

Dockside Wharf [**Green Area**] will include residential condos located along Tyee Road, with beautifully landscaped street-oriented townhouses and high-rise condominiums insulated by garden flats facing an internal greenway. Open space between all buildings will allow for increased pedestrian traffic throughout the site. This design will make the area user friendly and safe while promoting urban ecology. At the north end of Harbour Road, an office building with a neighbourhood pub, organic bakery and coffee shop is being constructed. Blending in with the harbour industry across the street, this area of Dockside Green will mix historical uses with modern flare and design. At the north end of Dockside Wharf, there will be waterside residences with direct access to the water, a public wharf, and the ever-convenient Galloping Goose Trail. Whether you want to hop on a harbour ferry to downtown or ride your bike to the BC Ferries terminal at Swartz Bay along the Galloping Goose, this end of the site allows for connections to both (p. 40).

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Dockside Wharf [**Green Area**] will include residential condos located along Tye Road, with beautifully landscaped street-oriented townhouses and high-rise condominiums insulated by garden flats facing an internal greenway. Open space between all buildings will allow for increased pedestrian traffic throughout the site. This design will make the area user friendly and safe while promoting urban ecology. At the north end of Harbour Road, an office building with a neighbourhood pub, organic bakery and coffee shop is being constructed. Blending in with the harbour industry across the street, this area of Dockside Green will mix historical uses with modern flare and design. At the north end of Dockside Wharf, there will be waterside residences with direct access to the water, a public wharf, and the ever-convenient Galloping Goose Trail. Whether you want to hop on a harbour ferry to downtown or ride your bike to the BC Ferries terminal at Swartz Bay along the Galloping Goose, this end of the site allows for connections to both (p. 40).

Mix of Income and Ages

Victoria has the fifth highest housing costs in Canada (Hawkey, 2008). Dockside Green is located on the harbour which is about the most picturesque and desirable place to live in Victoria. It would be expected

Figure 5.13 Income distribution at Synergy. Credit: docksidegreen.com

that the residences there would be expensive considering the high costs of sustainability features in this project. However, the income mix of the Synergy residents is definitely not upper-income which is a common criticism of new urbanist developments (see Figure 5.13). As well, the developer is providing 11 per cent of the units there as affordable housing as part of their development contributions to the project. This speaks highly of their social commitment of this project. Considering that Victoria is considered the retirement capital of Canada, the age distribution of Synergy's and Balance, Phase Two's, residents is quite young (see Figure 5.14).

The mix of purchaser ages in Synergy:

The mix of purchaser ages in Balance:

Figure 5.14 Synergy/Balance age distribution. Credit: docksidegreen.com

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The mix of purchaser ages in Synergy:

The mix of purchaser ages in Balance:

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Figure 5.15 North-west view along Tyee Road. Credit: www.busby.ca

Figure 5.16 North-west view along Harbour Road. Credit: www.busby.ca

Integrated Environmental Sustainability Designs

Dockside Green is recognized as the world's largest sustainable mixed-use development project. This will be achieved by the integration of a number of leading edge technologies, most of which are of Canadian origin. Part of the design philosophy is the incorporation of the synergistic systems principles to capture and use as many natural processes as possible (P. Busby, personal communication, November 13, 2008). This concept is described in McDonough

Figure 5.15 North-west view along Tyee Road. Credit: www.busby.ca

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and Baungart's *Cradle to Cradle* (2002). The best analogy to explain that process is an early 20th Century Chicago robber baron meatpacker's explanation of how well they exploited their pigs: 'we use everything but their squeal.'

Biomass Heating

One of their goals is to be North America's first major neighbourhood to be neutral for greenhouse gas emissions by producing their own renewable energy (see Figure 5.17). The following states how this will be achieved:

Provide a biomass co-generation facility to be "greenhouse gas neutral" from a building energy perspective, using biomass energy with the purchase of green power certificates. A centralized biomass gasification plant is being designed and built. The site work is underway....The plant will be fully backed up by natural gas boilers for peak loads and maintenance...The technology is that of Nexterra Systems, a BC company. The waste wood gasification process produces a gas that is then burned to produce renewable hot water for buildings and domestic hot water heating. This is a smokeless, odourless and efficient process that requires only 3,000 tonnes of bone dry waste wood per year (SustainabilityReport, 2007, p.14).

Figure 5.17 Schematic of biomass heating system. Credit: docksidgreen.com

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Figure 5.17 Schematic of biomass heating system. Credit: docksidegreen.com

Figure 5.18 On-site biomass heating plant. Credit: docksidegreen.com

Construction has started for the on-site biomass heating plant (see Figure 5.18). Excess heat not required until full build-out of the project will be sold to adjacent properties for credits of greenhouse gas production (GHG). This will offset the GHG created for the project's electrical consumption and delivery to site of the wood waste required to operate the heating plant. As well, research to extract heat from the site's sewer lines and sewage plant with Canadian technology has been conducted.

Water Treatment

Figure 5.19 The water treatment at Docksider Green. Credit: docksidegreen.com

Another goal is to achieve 100 per cent sewage treatment on-site. Victoria does not treat its waste which is dumped into the ocean. To comply with Docksider Green's philosophy of

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Another goal is to achieve 100 per cent sewage treatment on-site. Victoria does not treat its waste which is dumped into the ocean. To comply with Docksider Green's philosophy of

environmental integrity it will process this waste and reuse it. That treated water will be used for toilet flushing, garden and green roof irrigation and maintenance of the pond and creek (see Figure 5.19). The plant is located under the park near the Synergy building (see Figure 5.20). The details of the process, using Canada's Zenon technology, a world leading system, is described by Docksidegreen:

The sewage treatment plant will produce water that is equivalent to the drinking water standards quality in Singapore. In the beginning stages of development at Dockside Green, the plant will process 140 cubic metres per day, or 1 litre per second of treated water. At full build-out, treated flows from the site will equal 380 cubic metres per day (702,240 gallons in a week) – equivalent to the amount of water it takes to fill an Olympic size swimming pool. It is estimated that the use of treated water will save about 30.8 million of water per year at build-out. The remaining treated water will be used to fill the naturalized waterway that will from the south end to the north end of the site (Sustainability Report, 2007, p.17).

Figure 5.20 Plans and elevations of the on-site sewage treatment plant. Credit: docksidegreen.com

BedZED

BedZED is a four-acre ecovillage in South London, England that was likely the first attempt at a larger scale carbon neutral development (Farr, 2008). It was built between 2000-2002 and was a partnership between its architect, Bill Dunster, BioRegional (entrepreneurial charity), Arup (major design/engineering firm), and the Peabody Trust (London's biggest housing association). It has a walkable neighbourhood design with live/work units (see Figures 5.24 and 5.25). It has a number of major sustainability goals. These include being zero energy by using on-site renewable power primarily from photovoltaic panels (PV) and solar gain envelope design. Farr cites a maximum 109 kilowatts PV output. Like Dockside Green it has a wood waste gasification plant. This was for district heating and cogeneration of electricity but that system proved unreliable and a replacement system is being investigated. Also like Dockside Green it had a biogester for treating waste water but that system is now also defunct. BedZED's site plan

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is shown at Figure 5.21 with a panorama photograph at Figure 5.22. Farr's listing of planning and design factors is shown at Table 5.2.

BedZED and Dockside Green share many similarities other than those already discussed. Both are brownfield developments that feature live/work units to reduce daily work commuting. Both have partners with a social conscience. The Peabody Trust is a development partner and funds the affordable housing component at BedZED. Vancity is a partner in Dockside Green and is the largest credit union in British Columbia. The Canadian credit union movement has a long history of social concern and only invest their members' mortgage funds locally. Both projects seek to reduce auto-dependency and share carbon-neutral goals in their designs. Both locations have affordable housing provisions. Eleven per cent of Dockside Green's units are provided from the developer's subsidization to the project. At BedZED, 18 per cent of the units are provided by the Peabody Trust that was established by an American philanthropist in the 19th Century. This creates non-commuting on-site employment and also provides services to other residents to further reduce auto-dependency.

Figure 5.21 BedZED site Plan. Credit: surreycc.gov.uk

Figure 5.22 BedZED, South London. Credit: greenlineblog.com

Farr (2008) described key design factors at Dockside Green as follows:

- 4.08 acre site.
- 82 dwelling units.
- Approximately 30,000 square feet of office space and community facilities.
- Achieve zero net carbon emissions through the use of alternative energies, including CHP system, photovoltaic panels, and wind-driven natural ventilation.
- Reduce potable water consumption by 30 per cent.
- 15 per cent of construction material reused or recycled.
- 50 per cent reduction in fossil-fuel consumption from private car use compared with conventional development in ten years.
- Reduce heat consumption by 90 per cent.
- Within ten years, power 40 electric vehicles using photovoltaic panels.
- Large district energy systems.
- Walkable streets and networks.
- Food production.
- Stormwater systems.
- Car sharing (p. 214).

Figure 5.22 BedZED, South London. Credit: greenlineblog.com

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Figure 5.23 BedZED village square. Credit: BioRegional.

Walkable Design

BedZED's site location helps it maximize reduced auto-dependency a more walkable community (see Figure 5.23). The following details its easy connections to public transit.

BedZED is accessible from the east side of London Road (A237), opposite New Road, approximately 500 metres north of Hackbridge station. Because of BedZED's low-energy-emission concept, cars are discouraged; the project encourages public transport, cycling, and walking, and has limited parking space. The development is within about five minutes walk of Hackbridge station, which services trains from London Victoria and St Pancras International via London Blackfriars. There is a Tramlink service from Croydon or Wimbledon to Mitcham Junction station, which is within 15 minutes walk of BedZED. BedZED is serviced by the 127 bus on the Purley–Tooting route, via Wallington railway station and Hackbridge ([/en.wikipedia.org/wiki/BedZED](http://en.wikipedia.org/wiki/BedZED)).

Farr (2008) describes additional features. There is a car-share program to reduce the need for car ownership. The goal is to produce enough solar power within ten years to recharge 40 electric cars. As well, the live/work space reduce the daily commuting needs of many as Bed ZED is marketed towards urban professionals who can be home-based (see Figure 5.24). The site provide almost 27,000 square feet of such office space for on-site work. The layout design enabled perimeter parking to help create car-free blocks. But he noted, "However, the combination of one parking space per dwelling, perpendicular parking and back-of-curb is far

Figure 5.23 BedZED village square. Credit: BioRegional.

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less pedestrian friendly" (Farr, p. 214). As with all the other projects considered in this paper, municipal parking requirements are fairly rigid in all cities. Until society is forced by energy shortages to reduce auto-dependency, ground consuming parking will always be a necessity. Farr describes other design features that make BedZED pedestrian-friendly:

Community facilities, including playing fields and a village square, are within easy walking distance, Hared building walls and garden spaces promote casual interaction between neighbours and have resulted in such events as a farmers' market, a music festival, and an organic Christmas dinner (p. 214).

Figure 5.24 Live/work space. Credit: Arup Journal.

Carbon Neutral Design

Figure 5.25 Sunspace and kitchen. Credit: Arup Journal.

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Figure 5.24 Live/work space. Credit: Arup Journal.

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Figure 5.25 Sunspace and kitchen. Credit: Arup Journal.

Figure 5.26 Building physics. Credit: greenlineblog.com

Farr (2008) describes the very high level of building envelope design to help achieve maximum energy savings. These include a superinsulated and airtight structure with minimum north facing fenestration. Triple-glazing is used throughout and south facing exposure is maximized for solar gain. Kitchens which are the social heart of any home have enclosed sun spaces (see Figure 5.25). Work spaces are kept to the north elevation and the houses face south to benefit the living spaces that are used for longer on a daily basis. Adjacent buildings are massed to curtail shading on the housing units. Energy saving appliances and fixtures are used to reduce water and electrical demand (see Figure 5.26). Figure 5.27 shows the roof mounted PV panels and the wind cowls which serve for natural ventilation. Fresh air is drawn into the house which is then preheated. Farr cites energy savings of 30 per cent for water use, 90 per cent for home heating and 25 per cent for electrical reduction.

Figure 5.26 Building physics. Credit: greenlineblog.com

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Figure 5.27 Wind cowls and PV panels. Credit: Arup Journal.

Figure 5.28 Mechanical and electrical systems. Credit: Google Images.

Figure 5.28 illustrates more energy saving features | BedZED's design. Rainwater is collected and reused for on-site irrigation and stormwater is diverted to a pond lined with indigenous vegetation. Waste water and refuse is treated with a Living Machine using a reed bed. However, the original system is being replaced. Building material, wherever possible, was obtained within 35 miles of the site and 15 per cent of it was either from reclaimed or recycled sources. Figure 5.29 shows locally sourced exterior cladding material for wall construction. The

Figure 5.27 Wind cowls and PV panels. Credit: Arup Journal.

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building's massing is setback to achieve greater solar gain (see Figure 5.30). Connecting bridges improve the site's walkability to help conserve energy (see Figure 5.30).

Figure 5.29 Locally sourced untreated oak siding, local brick, and triple-glazing. Credit: Arup Journal.

A Code for Sustainable Homes was introduced for voluntary compliance in England for 2007. It is a new rating system to set a higher standard of energy efficiency and sustainability. It compliments the European Energy Performance of Buildings Directive and may become compulsory by 2016. The maximum level is a carbon neutral home. BedZED has shown that such construction standards are possible.

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Figure 5.30 Massing setbacks reduce shading on solar gain windows. Credit: greenlineblog.com

Figure 5.31 Views of the bridges and lanes. Credit: greenlineblog.com

Walkable Neighbourhood Concepts

Four principle concepts of walkable neighbourhood design were identified in this research. They are discussed as follows in order of their priority: sustainable urbanism vice auto-dependency planning; mixed-use planning; walkable neighbourhoods; and live/work units.

Sustainable Urbanism vice Auto-dependency Planning

Energy and environmental concerns have recently highlighted the problems of the urban planning model based on the automobile for most of the late 20th Century. Figure 7.32 discusses this history. Earlier planning concepts predating the widespread adoption of automobile have been rediscovered. Work places, shopping, entertainment, recreation and places of worship are now being built in new communities that are a walking distance from residences. This gives priority to healthier walking, biking and transit use over auto-dependency. With fewer cars it is safer to walk or bike and fewer parking lots allows for larger green amenity spaces such as parks and tree-lined boulevards. This new model is called sustainable urbanism with a new LEED standard, Neighbourhood Design, to guide in its design and environmental evaluation.

Post Second War planning gave primacy to the car and consumed vast areas of farmland at city edges.

It was the product of cheap energy, affordable cars, the post-war baby boom and an expanding economy.

Tax benefits to developers inadvertently gave rise to urban sprawl and ultimately, greyfields.

The lack of major transit expansion for the last three decades in the GTA has offered no alternative to expanded auto-dependency and suburban sprawl.

Can we afford to keep losing valuable farmland as the price of unbounded growth in southern Ontario?

How will a looming energy crisis impact this model of high vehicle dependency?

Figure 7.32 Sustainable urbanism vice auto-dependency planning. Credit: Globe and Mail.

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Figure 7.32 Sustainable urbanism vice auto-dependency planning. Credit: Globe and Mail.

Mixed-use Planning

The rise of automobile ownership and the primacy given it by 1920s Modernist planners helped end mixed-use planning in North American cities as discussed in Figure 7.33 Such neighbourhoods offer local employment, shopping, services and amenities, and a mix of incomes and housing types that provides greater security with off-hour diversity. It has an identifiable centre such a shopping area or a square that helps provide a sense of place to its residents (neighbourhood.org/about). All of these desirable facilities are located within a compact neighbourhood that is not dependent on automobile use for accessibility.

Mixed-use zoning of street level businesses with residential units above flourished in North America in the late 19th and early 20th centuries.

Land separation through zoning codes followed the 1926 U.S. Supreme Court opinion of *Village of Euclid v. Amber Realty Co.*

Modernist planning ideas and the automobile reshaped city planning. After the Second World War the integration of retail, commercial and residential spaces in one building or the same neighbourhood gradually ended.

Urban and suburban zoning separated residences away from retail districts making car ownership a necessity of life.

The early 1990s saw a return to mixed-use development and higher residential densities. They integrated retail, commercial and residential spaces in buildings of the classic form that allow people to live in apartments above a workplace on the first floor.

(photographs of late 19th Century North American main streets)

Figure 7.33 Mixed-use planning. Credit: Design Quarterly.

Site Walkability

A walkable neighbourhood has medium density, unlike more dispersed suburbs. Definitions of such a neighbourhood are shown at Figure 7.34. One new design concept for improved walkability, Woonerf streets, deserves elaboration (Figure 7.35). They originated in Holland during the 1970s and gave precedence to cyclists and pedestrians over motorists. The living street concept evolved from it and made automobiles secondary to all other uses of a street. Thus cyclists, pedestrians, children's play and slow moving cars share the street as an urban space. These concepts have proven more effective than traffic calming measures such as speed bumps, irregularly spaced planter boxes and speed signage. Toronto City Council has approved Canada's first woonerfs for the West Don Lands residential development. Such streets

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normally have granite cobble-stoned surfaces and may have coloured lines demarcating parking spaces and either no curbs or very low ones. Traditionally trafficked streets that often act as barriers to pedestrian movement can now become expanded living zones within neighbourhoods. Besides improving walkability such streets increase the social ambiance with lower noise, more safety and gentility on roads not seen since the early 20th Century.

...a compact place where people live within walking distance to work, school, shopping, entertainment, recreation and places of worship.

...an environment that is pleasant and safe to walk or bike in at all hours of the day.

...a place that has a distinctive identity or character that people want to visit, often referred to as a *sense of place*.

...has mixed incomes and mixed uses that provide off-hour diversity for an increased sense of security.

...is a place where walking, biking, or mass transit are the preferred means of transportation, and vehicles are only used rarely.

...has a discernible centre whether as a shopping district, a main street, or a public space.

...has plenty of parks and public spaces to gather and play.

Jarvis Street, Toronto. 1890s.
Credit: Design Quarterly.

Prince Arthur Avenue, Toronto.
Credit: Author.

Figure 7.34 Walkable neighbourhood definitions. Credit: neighborhoods.org

Figure 7.35 Woonerf living street. Credit:toronto.ca

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Figure 7.35 Woonerf living street. Credit:toronto.ca

Walkable neighbourhoods have criteria for street, building forms and blocks that adds completeness to the design of the street (Farr, 2008). These include:

- Wide sidewalks for ease of movement.
- Trees in boulevards or planter strips to provide a canopy.
- Block lengths are short to enable movement through the blocks.
- Streets are not too wide.
- Street parking is provided 24 hours a day.
- Parks or open spaces located no more than 800 feet from all homes.
- No driveways fronting onto streets.
- A density of 10 to 20 dwelling units per acre or more (p. 152).

Live/work Units

Live/work units are another land use that helps reduce auto-dependency and are defined in Figure 7.36. BedZED, and to a lesser extent, Dockside Green, make these units part of their automobile reduction strategies. These uses were common in late 19th and early 20th Century mixed-use urban plans. The most commonly known are the British concept of 'living over the shop' and are also still found in Paris and most European cities. The Oakville case study in Chapter Three on greyfield redevelopment discusses that city's first live/work project implemented to reduce employment commuting.

Live/work units are usually residential accommodation over an at-grade place of business. Most often found on commercial streets.

Work/live units permit permit employment in the place of residency often of an artistic or light assembly nature.

Theses uses encourage creativity in cities as well as restoring the advantages of traditional mixed-use development.

Statistics Canada (2008) reported over 2.6M Canadians, or more that 15 per cent of the workforce were self-employed. These numbers have been growing steadily and will like continue to do so.

It is unlikely that the majority of these workers are home-based. Increasing opportunites for such work especially with the growth of telecommuting and information technology would stimulate growth. It would also reduce commuting and greenhouse gas production.

Live/work townhouse units Burlington, Ontario
Credit: Joginder Dhanjal

Figure 7.36 Live/work unit definitions. Credit: Joginder Dhanjal.

Walkable neighbourhoods have criteria for street, building forms and blocks that adds completeness to the design of the street (Farr, 2008). These include:

Wide sidewalks for ease of movement.

Trees in boulevards or planter strips to provide a canopy.

Block lengths are short to enable movement through the blocks.

Streets are not too wide.

Street parking is provided 24 hours a day.

Parks or open spaces located no more than 800 feet from all homes.

No driveways fronting onto streets.

A density of 10 to 20 dwelling units per acre or more (p. 152).

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Figure 7.36 Live/work unit definitions. Credit: Joginder Dhanjal.

Summary

Walkable neighbourhood design is not new. It existed earlier in the 20th Century before the ascendancy of the automobile and the Modernist Movement that planned cities for faster vehicle mobility. The environmental movement that started with Rachel Carson's *Silent Spring* (1962) help evolve the smart growth initiative to new urbanism and sustainable urbanism with ideas promoted by Jane Jacobs and Christopher Alexander. Euclidean zoning and mandatory municipal parking requirements still hinder attempts to make less auto-dependent neighbourhoods. Live/work and work/live housing units are making a comeback in innovative cities especially those attempting to become what urban theorist, Richard Florida, describes as 'creative cities'.

BedZED and Dockside Green have shown that not only can more useful walkable neighbourhoods be built but that they can approach carbon neutrality. There is an element of Engels Law in this process. He theorized that most innovations are initiated by the elite which then filter down to the masses. Architectural innovation is usually sought by an upper-middle class clientele who are an intellectual avant-garde. Through dissemination by media, cost-reducing mass production and 'keeping up with the Jones' these innovative ideas then trickle down to larger markets. But a prototype is first required that then fulfills the 'Bannister Effect' demonstrated by the breaking of the four-minute mile in 1954. At the time such a feat was considered impossible. But within a year of that milestone being shattered, college students were breaking it. Change takes time to evolve on a mass scale. But these two projects have demonstrated the art of the possible.

Both these projects and the four planning concepts formed the basis for the design project discussed in Chapter Six. Often new planning innovations such as the Modernist urban model have unintended consequences. There is less likelihood that new communities formulated on these mixed-use walkable concepts will suffer the same fate as they are time tested and proved viable before the universal rise of automobile supremacy in cities. This research has shown why walkable neighbourhoods are returning to popularity especially for couple with children and older citizens. The principles are not new but rather a reworking of earlier planning concepts. The major hurdle is eliminating Euclidean zoning to crate a mix of uses within one neighbourhood. This provides local employment, services and amenities that dramatically reduce the need for cars. These concepts will be incorporated into the design project.

CHAPTER 6 - DESIGN PROJECT REPORT

Introduction

This thesis project demonstrates the design of a walkable mixed-use live/work neighbourhood in a large greyfield site to reduce auto-dependency. The intention was to select a large big box greyfield with the possible reuse of a big box structure. One residential building was to be shown in some detail. The other buildings were to be shown schematically and renderings produced to provide an indication for the character of the neighbourhood.

Site Selection and Analysis

Three City of Toronto sites with a minimum of 40 acres each were identified (see Figures 6.1 to .7). Site Two on Eglinton Avenue East was the most satisfactory (see Figure 6.4 It was subsequently determined to be too large and reduced to 25 acres. This location had significant attributes for redevelopment. It is one block from the planned Eglinton Crosstown Light Rapid Transit (LRT) line to be completed by 2016. Adjacent to the site is Ernest Thompson Seton Park that stretches south to the Don Valley Parkway astride the West Don River and its trail system. Within a 15 minute walk are a primary/ middle school; a church; and three groceries and banks.

Figure 6.1 Site One: Queensway and Highway 427.
Credit: Google Earth.

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Figure 6.1 Site One: Queensway and Highway 427.
Credit: Google Earth.

Site One

102 acres/41 hectares

Advantages:

- Adequate size
- Transit service
- Adjacent creek/greenspace

Disadvantages:

- No adjacent neighbourhoods
- Major arterial boundary

Figure 6.2 Site One analysis. Credit: Google Earth.

Figure 6.3 Site Two: Eglinton Avenue East and Laird Drive.
Credit: Google Earth.

102 acres/41 hectares

Adequate size

Adjacent creek/greenspace

No adjacent neighbourhoods

Major arterial boundary

Figure 6.2 Site One analysis. Credit: Google Earth.

Figure 6.3 Site Two: Eglinton Avenue East and Laird Drive.
Credit: Google Earth.

Site Two

76 acres/30 hectares

Advantages:

- Adequate size
- Transit service with planned LRT upgrade
- Adjacent river/greenspace
- Adjacent neighbourhood with school and services

Disadvantages:

- Need for connection between retail and residential areas

Figure 6.4 Site Two analysis. Credit: Google Earth.

Figure 6.5 Site Three: St. Clair Avenue and Keele Street.
Credit: Google Earth.

Site Two

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Advantages:

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- Transit service with planned LRT upgrade
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Disadvantages:

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Figure 6.4 Site Two analysis. Credit: Google Earth.

Figure 6.5 Site Three: St. Clair Avenue and Keele Street.
Credit: Google Earth.

Site Three

68 acres/27 hectares

Advantages:

- Adequate size
- Transit service
- Adjacent neighbourhood
- School and services

Disadvantages:

- Inadequate greenspace

Figure 6.6 Site Three analysis. Credit: Google Earth.

Selected Site Context

This site is located in the Thorncliffe Park community in Ward 26 (see Figure 6.7). Its boundaries are Eglinton Avenue East on the north; Laird Drive and Millwood Road on the west; the Don River on the south; and the West Don River on the east.

Figure 6.7 Thorncliffe Park boundaries. Credit: Google Earth.

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Figure 6.7 Thorncliffe Park boundaries. Credit: Google Earth.

Thorncliffe Park is surrounded by residential development on all sides but exists as an anomaly in the City's context. It is primarily an industrial area (see Figure 6.8) bisected by a CPR rail line with only two separate and distinct residential locations (see Figure 6.9). The population of 17,945 in 2006 is almost entirely located in high-rises and townhouses south of Overlea Boulevard and in a small cluster of three-storey townhouses on the northern edge of the subject site.

Figure 6.8 Thorncliffe Park industrial areas. Credit: Google Earth.

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Figure 6.8 Thorncliffe Park industrial areas. Credit: Google Earth.

Figure 6.9 Thorncliffe Park residential areas. Credit: Google Earth.

The area around the site, primarily to the south and east are undergoing substantial redevelopment in isolated pockets. At the site's south-west corner on Wicksteed Avenue is a 140,000 square foot Home Depot big box store that opened in August 2001 (see Figure 6.10). Sharing that entire block, west to Laird Drive, is a big box complex that opened shortly thereafter. Fairly recent big box stores are located immediately to the north and north-west of site on Eglinton Avenue East. 'Scenic on Eglinton', a 16 and 12-storey condominium project is currently pre-selling units at its site coterminous with the townhouses north on Eglinton Avenue

Figure 6.10 Aerial view of site area. Credit: Bing Maps.

Figure 6.9 Thorncliffe Park residential areas. Credit: Google Earth.

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Figure 6.10 Aerial view of site area. Credit: Bing Maps.

East with a planned occupancy of early 2012 (see Figure 6.11). This addition of about 365 units so close to the subject site was a factor in the design of the connecting walkways for this project.

Figure 6.11 'Scenic on Eglinton' proposed development. Credit: scenicliving.ca

Telus Corporation has a recent mid-rise office tower at Laird Drive and Esandar Drive. There are several very large cleared sites south of the site and the street just north of the rail line has some of the most dilapidated buildings seen in Toronto. It is only a matter of time before land assemblers start the process of clearing that area for new developments. This area shares many characteristics with similar industrial lands such as along King Street West, Parkside Drive and south Etobicoke that underwent major residential redevelopment in a short timeframe. This future possibility influenced the project design with the suggestion of extending a park trail system into the surrounding area with the continuous productive urban landscape (CPUL) concept of Andre Viljoen. Figure 6.12 shows the existing site massing.

Thorncliffe Park's industrial nature is offset by a rare vast amount of parkland and green space (see Figure 6.13). Its entire eastern and southern boundary is bordered by the ravines of the Don River system. Ernest Thompson Seton Park, on the eastern site boundary, extends from Eglinton Avenue along that river south to the Don Valley Parkway. That river green space widens north of Eglinton Avenue with Sunnybrook and Willet Creek Parks. Running through these parks is a trail connected to the wider Toronto trail network. The Seton Park at the NE site's corner was originally purchased for the proposed Metro Zoo and was later leased by the province of Ontario for the Ontario Science Centre. Thus possible future residential

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Figure 6.12 Existing site massing.

Figure 6.13 Thorncliffe Park parkland and green space. Credit Google Earth.

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ravine system and its trail networks. Such a connection was an important concept for this design project as shown in Figures 6.14 and 6.15.

Figure 6.14 West Don River trail connection to site. Credit: Google Earth.

Figure 6.15 Nature trail system extended from the site. Credit Google Earth.

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Figure 6.15 Nature trail system extended from the site. Credit Google Earth.

Transportation

One of the site's major future development potentials is the funded construction of the Eglinton Crosstown Light Rapid Transit (LRT) route (see Figure 6.16). It has a 2016 proposed completion date. The nearest transit stop will likely be one block west of the site at Laird Drive. Two bus routes directly serve the site.

Figure 6.16 Eglinton Avenue LRT. Credit: Toronto Transit Commission.

Existing Neighbourhoods

One block north along Eglinton Avenue and one block west are large neighbourhoods of single family housing. As well, as previously noted, 15 blocks of three-storey townhouses border Vanderhoof Avenue on the north with a future adjoining 16 and 12-storey condominium project.

Master Plan Design Precedent

Elements from Dockside Green, Victoria, BC, by Busby Perkins + Will, was used as a precedent for this project as detailed in Chapter Five. That design is based on a Radburn superbloc with numerous walkways on its long two sides that make connections with the surrounding community to its central spine park (see Figure 5.6). Also, the absence of roads traversing that block also served as a precedent for this project (see Figure 5.7). Dockside Green connects its central spine walkway with the Galloping Goose Trail, an abandoned rail right-of-way to the town of Soote (see Fig. 5.8). This thesis project also connects its central walkway to the West Don River trail system. This would encourage walking, jogging and biking and greater contact with nature in a highly urbanized setting.

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Site Design

Figure 6-.17 shows the design in its final form. It is called Seton Place in honour of Ernest Thompson Seton, noted naturalist, artist, author and founder of the Boy Scouts of America, whose park is adjacent to the site. The key concept of the plan is to link the West Don River ravine trail through the development to Brentcliffe Road. The entrance to this trail is beneath a bridge that joins two retail blocks on either side of a small courtyard fronting on Brentcliffe Road. The park-like spine is connected with cross paths to the townhouses to the north and south. Based on the Dockside Green precedent, this layout creates a superblock that is not traversed by cars. It encourages exercise and a closer relationship with nature by walking, jogging and biking along the extensive north-south Don River trail network. A parallel trail runs east-west along the southern edge of the new townhouses along Wicksteed Avenue. That pathway is connected at four points to the main trail to the north. that southern trail has double rows of trees along most of its length. This forms a green visual barrier to the bigbox and industrial structures south of Wicksteed Avenue. If and when that area is redeveloped this green path would function like the main trail in the northern superblock. Connecting off this southern trail are three projected continuations of the trail; two to the south and one west. This would carry green space into new residential developments based on the CPULs concept of Andre Viljoen. The eastern-most southern trail would connect with a large green space within the industrial area that is part of the West Don Valley parklands (see Figure 6.15).

Figure 6.17 Seton Place landscaping plan.

The Central Spine Trail

The central spine trail serves as the green community centre for this walkable neighbourhood. It serves many functions and metaphors. It links both ends of the development and connects to the ecological green space of the West Don River ravine that is rare in most parts of Toronto. A geospatial modeling of the ravine and that trail through site is shown at Figure 6.18. It thus provides a pleasant venue for exercise: walking, jogging, cycling and cross-country skiing. It undergoes change along its length. The ravine slope approach to the site is heavily treed. As it enters the space between the residential units it becomes more urbanized and park like with the picnic and recreational area. Near the east end of the trail are the tennis courts and the picnic and recreation area shown in the rendering at Figure 6.19. Nearby is the major north-south cross path that connects both sets of townhouses (see Figure 6.20). The green space also provides an opportunity for the introduction of the CPULs concept with allotment gardens and the possible use of bioswales for grey water treatment (see Figure 6.21).

Figure 6.18 Geospatial modeling of the ravine and trail through the site.

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Figure 6.18 Geospatial modeling of the ravine and trail through the site.

Figure 6.19 Tennis courts at the east end of the main block as seen from the trail.

Figure 6.20 Rendering of the trail and the townhouse cross path.

Figure 6.21 Rendering of the trail near the plaza.

CPULs

CPULs - Continuous Productive Urban Landscapes: Designing Agriculture for Sustainable Cities, edited by architect Andre Viljoen (2006) is of vital concern for urban design. Food security is threatened by the increased energy costs expended for food production and processing; its long distance importation; and the massive disruption of a possible future energy crisis. *CPULs* examines both the Cuban response to their oil crisis by the creation of large scale urban farms (see Figure 6.22) and wartime Britain's allotment gardens to augment their food supply. Under-utilized urban land could produce healthy local food thereby reducing food miles and pollution. Viljoen proposes linear paths across cities for agriculture, biking and walking to alleviate future food scarcity and for a healthier environment. An important quote from the book is: Permaculture has evolved into a system for the conscious design of sustainable productive systems which integrate housing, people, plants, energy and water with sustainable financial and political structures (Robert Hopkins, 2000, p.203). CPULs were added along the site trails and the proposed future trails into the surrounding developable land to promote local food production.

Figure 6.22 Cuban CPULs. Credit: energybulletin.net

Development Initiatives

Figures 6.23 and 6.24 show the project's three phase demolition plan and the road work necessary for the project's completion. The most important is the closure of the eastern end of Vanderhoof Avenue to make the vital connection between the largest site block and the trail through Ernest Thompson Seton Park. It is proposed that site development would occur from

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west to east on the northerly block first. This would be followed by the creation of two new streets and townhouse construction on the southern block.

Figure 6.23 Phased building demolition plan. Credit: Google Earth.

Figure 6.24 Proposed road development. Credit: Google Earth.

Site Zoning

A number of zoning maps highlight various features of the site plan as discussed below.

Site Walkability

Figure 6.25 shows that most of the site is within a two-and-a-half minute of its centre. Figure 6.3 shows the proximity of a junior and middle school; a church; three groceries and banks to the site all of which are within a fifteen-minute walk.

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Figure

6.25 Site walkability.

Residential

Residential occupancy includes most of the site (see Figure 6.26). This is principally in the form of four-storey condominiums on the north and three-storey townhouses on the south. Two C-shaped garden apartment buildings and the top floor of the adjacent commercial block on the west boundary complete the residential component. These three housing types provide for a mix of income, marital status and ages in the population distribution. Ideally they would also create a variety work and lifestyles for off-hour diversity that helps increase security around the neighbourhood.

Figure

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Figure 6.26 Residential zoning.

Live/work Units

A key ingredient for a walkable neighbourhood is the ability to live and work in close proximity. Live/work and work/live units allow residents to operate small businesses primarily in this plan of a consultancy or service basis vice shops. Such units also greatly reduce the need for commuting and even car ownership. Neighbours also benefit as desirable services are closer at hand and a local economy is allowed to flourish. These are shown in Figure 6.27. They comprise the north elevation ground units of the condominiums, the recessed end units of the interior townhouses and the two top floors of the commercial block along Brentcliffe Road. These units represent about 18 per cent of all the residential units and are based on the precedent of BedZED in London, England by architect Bill Dunster.

Figure 6.27 Live/work unit zoning.

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Figure 6.27 Live/work unit zoning.

Commercial

A walkable community needs shops and services and in close proximity to achieve a sense of neighbourhood completeness. Commercial blocks do not work well in the centre of a residential area. Figure 6.28 shows the allocation of proposed commercial facilities. Here a two-block commercial facility linked by a second storey bridge forms the western edge of this development proposal on Brentcliffe Road. It has a rear pedestrian laneway with a sidewalk as stores either extend through the block to the rear or two stores are back to back. Four sets of stairs connect the sidewalk with a second level of shops with live/work units above them. A walkway extends around the second level allowing access to the front and rear shops.

Figure 6.28 Commercial zoning.

A second commercial facility exists in the large Mill Building on the south side of the plaza. About 40 per cent of this former woollen mill is to be retained as part of the site development. It serves as a reminder of the site's industrial heritage and offers valuable space that can be readapted for new uses. These include a hydroponics and aquaponics growing facility on the south and west facing interior; a ground floor market; cooperative enterprise workspaces and a small community theatre. The community plaza abuts directly against its window walls and the adjacent sidewalks are quite close to allow passersby to view the interior activity. This helps create sense of urban theatre to animate the surrounding outdoor space, especially in the plaza area.

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Recreation

Recreational areas and facilities are dispersed throughout the site and shown in Figure 6.29. On the east near the trail is a picnic area with wood-fired pizza ovens and barbecues with nearby shuffleboard courts, horseshoe pitches and two tennis courts (see rendering at Figure 6.19). The central trail is connected to the parallel path or trail on the south that has future projections offsite into the surrounding developable areas. This provides for walking, jogging and biking pursuits. Between the condominium units are terraced areas. These contain a low-walled

Figure 6.29 Recreational zoning.

barbeque area partially covered with grapevine covered pergolas that connect the sidewalks between the buildings. Behind this area are multi-purpose open air shelters that could be used to repair a bicycle or scooter, paint, or work at a picnic table. This provides workspace for the condominium tenants or sheltered amenity areas during rainy weather. Lastly, is the large public plaza adjacent to the Mill Building. It contains a pond that could be drained in the summer months for communal bonfires and winter skating. Benches and an outdoor café area provide opportunities to sit, observe or be with friends. A playground for children up to age 12 is provided at the east end of the site (see Figure 6.30).

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Figure 6.30 Playground design. Credit: outdoorlearningenvironments.com

Parking

This project makes the assumption that future car ownership will be reduced owing to high fuel costs, the site's availability to rapid transit and the provision of live/work units. Figures 6.31 below and 6.32 show provision of both street and underground parking.

Figure 6.31 Street parking.

Figure 6.30 Playground design. Credit: outdoorlearningenvironments.com

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Figure 6.31 Street parking.

Figure 6.32 Underground parking.

Condominium Design

For this project one residential building was to be shown in detail and to be used across the site. The condominium building was designed with a north facade entrance on Vanderhoof Avenue. A variant was also made for a south elevation entrance to be located on Research Road. The enabled the south facing terraced design to be used on both the north and south side of the trail. The key concept for this terraced four-storey condominium was a skip-stop floors design to provide some units with double aspects and natural cross-ventilation (see Figure 6.33). Only the first and third floors have corridors. These provide access to the skip-stop units on one side and single floor units on the other.

Figure 6.32 Underground parking.

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Figure 6.33 Skip-stop design features.

The building length was kept short to avoid long, unfriendly corridors (see Figure 6.34 to 6.39). A two-storey atrium space is provided at the main entrance and between the third and fourth floors (see Figure 6.40). It also provides double aspect lighting into both the second and fourth floor building amenity spaces. The brick-clad building contains 28 units. Ten are one-bedroom single floor units. Nine units, all skip-stop with ground floor access, can be either regular two-bedroom or one-bedroom units with a live/work space on the ground floor. The remaining nine units located on the third and fourth floors are all one-bedroom. All units have one balcony on the north facade including the two-floor skip-stop units. This allows the balconies to be staggered across that facade and thus only one shadow from that projection is cast on one of the two windows of the units below. This is demonstrated in the rendering at Figure (6.42).

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Vanderhoof Avenue

Figure 6.34 Ground floor plan.

Figure 6.35 Second floor plan.

Third
Figure 6.36 Third floor plan.

Fourth

Figure 6.37 Fourth floor plan.

Basement

Figure 6.38 Basement plan.

Figure 6.39 Ground floor, south entrance variant.

Figure 6.40 Building section.

It was important for site walkability to connect the building facade to life on the sidewalk. Small enclosed courtyards on both the front and rear facades serve several functions (see Figure 6.40). There was need to provide privacy to the ground floor units especially those facing the street. The courtyard with a 1.5m lattice fence provides a transition from public and semi-public to private space. The fence, while providing some privacy is not too high and does not restrict daylighting to the north facing the units. It also provides an opportunity for growing espalier fruit trees in a small space for local food production (see Figure 6.42). Planters with shrubbery also help transition the facade to the sidewalk. Trees such as locust, ficus benjamina or ginkgo biloba are planted outside each gateway. All are urban tolerant and are not too tall or dense to limit north unit daylighting.

Figure 6.41 End elevation showing front and rear courtyards.

Figure 6.42 Rendering of amenity space between the condominium buildings.

This building has roof mounted solar water heaters. Grapevines could be grown on unit balconies from planter boxes measuring 1.8m by .9m by .6m according to Ontario's leading viticulture expert (Dr. H. Fisher, personal communication, June 23, 2009). This allows the

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condominium residents to create more shading of their balconies and for food production. To facilitate increased bicycle use, the building has owner and visitor bike racks in the basement along with a shower room as LEED standards. A fairly large athletic centre with change rooms is also located in the basement (see Figure 6.38).

Outdoor amenities include a low-walled barbeque area overlooking the central trail spine park shown in the rendering at Figure 6.42. This area is partially enclosed with a grapevine covered pergola that extends shelter along the rear sidewalks between the condominium buildings. Behind that area is an open-air covered shelter. This could be used for activities ranging from bike or scooter repair, painting, Tai-chi and fitness classes during inclement weather to reading and working at a picnic table. This allows residents to partake of outdoor activities close to their building and during rainy weather. All of the condominium residences are in close proximity and connected to the central trail. Residents thus have two routes to traverse the site: the central trail or the sidewalks in front of their buildings. The front and rear elevations of the condominium units with a north facade entrance on Vanderhoof Avenue are shown in Figures 6.43 and 6.44. Figure 6.45 shows the elevation of the south facade entrance condominiums located along Research Road on the south of that block. Both the rows of condominiums on either side of the spine trail have south facing terraced facades. It was necessary to create a variant design for the Research Road buildings to have a southern entrance versus the northern entrance for the Vanderhoof Avenue units.

Figure 6.43 North elevation with amenity space between buildings.

Figure 6.44 South elevation of the condominium.

Figure 6.45 South elevation of south entry condominium.

Other Site Buildings

Townhouses

The narrower south block was suitable for townhouses especially the much narrower western block. Two new streets were added for site circulation and walkability. The three eastern blocks, being deeper, allowed for collective private gardens between the units. The City of Toronto guidelines were followed for townhouse design especially for street setbacks and main entrance elevations.

A connection from the central spine trail on the north block is carried through at three points to make connections with a secondary trail that runs the length of the townhouse block on its southern side. This trail has a double row of trees on the three eastern blocks. The western block has a single row of trees with allotment gardens bordering the townhouses. This serves to screen the townhouses from the industrial development to the south. When that area undergoes possible residential redevelopment this trail would serve as a green space to that area as does the central spine trail on the northern block. This trail continues off the site as a CPULs near the south-east corner and at its western end at Brentcliffe Road.

There are 171 townhouses of which 32 are live/work units. Those latter models are the ones recessed 4.5m from the blocks of townhouses at either end of their frontages. This creates public space on the sidewalk and delineates their usage. Figure 6.46 shows how such a corner live/work unit could appear. The massing relationship of the north block with its central spine trail and condominium units with the townhouse blocks is shown in Figure 6.47. The townhouses on the south side of the private gardens have flat roofs and the top floor is cut back with a terrace to allow more sunlight into the garden space.

Figure 6.46 Live/work townhouse as corner café on a Woonerf living street. Credit: Author.

Figure 6.47 North-south cross-section of the site.

Garden Apartments

Two garden apartment buildings of 24 units each straddle the site trail between the plaza and Mill Building and the commercial block. They have balconies along their sides to help create a sense of urban theatre by allowing its residents to see and be seen from both the plaza and the passersby on the second floor terraces of the commercial block. An elevation is shown in Figures 6.48.

Figure 6.48 South elevation of the northern garden apartment block.

Mill Building

This former woollen mill with 41,000 square feet of useable space was retained from its previous larger size for its industrial heritage and easily adaptable space. Commercial space for local employment consists of a weekend market, cafe, a hydroponics and aquaponics growing operation, cooperative workspaces for light assembly and a small community theatre. Its large glazing allows passersby on the walkways flanking it to see inside to promote a sense of vitality. The plaza butts up to its north facade which allows the outdoor cafe area there to animate that public space. Figure 6.49 shows its south elevation.

Figure 6.49 South elevation of the Mill Building.

Plaza

The plaza acts as the neighbourhood social focal point. It is on the pedestrian route to the Eglinton LRT stop and abuts the Mill Building containing a cafe, a market and a small theatre. It features a 17m pool with a fountain that can be used for skating to promote year-round activities. It has a small grove of trees to offset the pool and provide some enclosure from Vanderhoof Avenue. The plaza is flanked by two walkways on the east and west sides to promote access and site walkability. Figure 6.50 shows a rendering of this space from the north.

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Figure 6.50 Rendering of the plaza from the north.

Commercial Block

This double block of stores flanking Brentcliffe Road takes as its precedent the 8House project by the Danish architectural firm BIG. It forms an enclosing western edge to the development. Two blocks of five ground floor stores are connected by a bridge over a small courtyard that marks the entrance to the site trail. The second floor with a perimeter walkway allows access to small live/work shops with third floor residences. The block's rear laneway has a sidewalk providing access to the rear shops and services located there. Figures 6.51 show its western elevation and its rendering on Brentcliffe Road is at Figure 6.52.

Figure 6.51 West elevation of the commercial block.

Figure 6.52 Rendering of the commercial block facing Brentcliffe Road.

Summary

This thesis project demonstrates the design of a walkable live/work neighbourhood in a large greyfield to reduce auto-dependency. It took elements of Dockside Green in Victoria, B.C. as its primary precedents. These include its large superblock configuration with connections to the neighbouring context. Its full-length central spine pathway connecting to a major urban feature, the Galloping Goose Trail, was an inspiration for this project. The project also draws from the high live/work residential composition of London's BedZED to provide local non-commuting employment opportunities.

The site is 25 acres on three Toronto blocks with a large greyfield and industrial buildings. Located in a declining industrial zone, the area is currently undergoing major isolated redevelopment primarily with big box stores and a major high-rise condominium project. This location has two outstanding features. The first is the funded construction of the Eglinton Crosstown LRT, located one block north, with a 2016 completion date. The second feature is its

Figure 6.52 Rendering of the commercial block facing Brentcliffe Road.

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immediate proximity to the Ernest Thompson Seton Park on the West Don River and its extensive trail system.

The project, called Seton Place, takes advantage of the river ravine trail by connecting to it with its own full pathway that extends to Brentcliffe Road on the west. Centering on this trail are ten four-storey condominium residences; a picnic/recreation area and playground; two garden apartment buildings; a community plaza; a renovated industrial woollen mill; and a commercial block that straddles the site entrance. On the southern blocks are 171 townhouses, most with shared private gardens. The CPULS concept was included in the design of the central spine trail that extends at three points into the surrounding developable context. These promote local food production and create a green linear urban walking and biking network.

Seton Place combines large green spaces, an incentive to healthy walking along a rare urban ravine park system with a community promoting auto-dependency with mixed-use planning, live/work units and close proximity to a rapid transit system. Of its 497 residences, 92 or 18 per cent are live/work units. Ten stores with ten live/work units located above it are provided on Brentcliffe Road to facilitate site walkability. The density of almost 21 units per acre is in the upper range recommended for a walkable neighbourhood by Farr (2008). Seton Place attempts to create a healthier and more energy-efficient neighbourhood by fostering a closer relationship between nature, people and the built environment.

CHAPTER 7 - CONCLUSIONS

Introduction

Greyfields offer excellent redevelopment opportunities. These fully serviced sites are normally located along major roads and arterials, often at important intersections. Most often they are declining or failed retail centres but can include other non-industrial uses where their parking areas are much larger than the building's footprint.

Kunstler (2005) suggested a collapse of the Wal-Mart distribution model some time after the onset of a Peak Oil Crisis. This paper initially was to research the redevelopment of these big box sites as a way of curbing urban sprawl on ever increasingly important farmland. Those lands would be crucial for local food production during a prolonged energy crisis as imported food became unaffordable. Initial research uncovered the concept of greyfielding and its redevelopment already established in the US where this phenomenon is larger and older than in Canada. This led to an investigation of the problem primarily in the GTA, to understanding retailing trends and the possible reuse of big box stores and their parking lots.

This research was to further an understanding of walkable live/work neighbourhood design. This was seen as a way of reducing urban sprawl with a less auto-dependent land-use model than that promoted by the Modernist Movement and return to neighbourhood designs that encouraged more human interaction and the development of local community.

Findings

Retail Development and Innovation

There has been continuous innovation in North American retail development since the first large shopping malls were built after the Second World War. These became part of the suburban model where low density housing necessitated auto-dependency. In the process there was massive urban sprawl that consumed vast tracts of valuable farmland. Lorimer (1978), Gladwell (2004) and Emerson (2007) described how mortgage amortization, taxation and other legislation and policies favoured developers and inadvertently encouraged this destructive sprawl. Emerson also discussed the impact of a landmark American Supreme Court opinion that promoted Euclidean zoning. This separated residential areas from commercial and industrial uses and furthered the necessity for car ownership. Thoughtless consumerism only added to the problems of wasted resources which became a global problem as 'the American way of life' was promoted by advertising and media. In the process, healthy walking and neighbourly social interaction and community participation has been replaced with wasted commuting time;

increased energy use and greenhouse gas production; unhealthy sedentary lifestyles; and the sterility of both urban built-form and daily life.

Big Box Stores

American big box stores originated in the 1960s and 1970s and arrived in Toronto in 1985. They are high bay industrial buildings normally ranging from 10,000 to 100,000 square feet though newer versions being built by such retailers Wal-Mart are up to 200,000 square feet. Their parking lots are usually four to seven times their store footprint. Their arrival precipitated the decline of many smaller outlets and furthered the decline of traditional downtown and Main Street shopping though big boxes without large parking lots are now located in urban cores. The first big boxes built in the GTA have a 15-year lifespan though newer models will probably last 20 years. The earliest GTA big boxes are now entering their end-life period and are being replaced. Especially important for this research was understanding the growth of power centres and nodes; massive grouping of such stores on regional arterials. These locations, pending a possible energy crisis, will continue to exist and their big boxes will be replaced with newer retail structures at their end lives. However, stand alone big boxes scattered throughout the GTA and suburban strip malls, especially at some Scarborough locations, are in decline and may not be replaced with new retail outlets. Greyfielding is not a problem in most areas of Toronto as it was ranked by *Forbes Magazine* as the tenth most economically powerful city in the world (Zumbrun, 2008). Demand for more housing and retail development quickly overtakes these sites. Big box stores are not designed for disassembly and when demolished nearly all components except such items as vessels, motors and some door and window hardware are recycled versus being reused. This is part of our North American waste mentality and much embodied energy is lost through such demolition.

There are examples, especially in the US, of the adaptive reuse of big boxes but they are problematic as a building typology. Many are too old, too large or too remotely located to be economically reused. Costs for renovations in 2004 were cited in a \$US 25 to \$40 per square foot range but much depends on their age and the fit-up requirements. Many more are abandoned and produce adverse effects on surrounding properties. But all bets are off on their usefulness especially when the Peak Oil Crisis that appears ever more likely, occurs. When all manufactured goods, especially energy-intensive building components become very expensive, these structures would offer cheaply available space. This could occur on a wide scale basis as Kunstler's (2005) predictions of the collapse of the warehouse-on-wheels distribution model would then seem inevitable. At such times their vast parking lots could be as valuable as their enclosed spaces. Surging energy costs would make longer distance commuting from dormitory

communities and heating their larger houses unaffordable. There could then be need for new housing with live/work and work/live spaces and walkable retail and places of employment for a more local economy. The big box stores could be reused for factory farming, light assembly, cottage industries, cooperative enterprises, markets, schools and offices. With the provision of streetcar lines along their arterial routes these locations could provide very useful new mixed-use developments that would save farmland.

Lifestyle Centres

Further urban sprawl saw many shopping centres and suburban strip malls decline, especially in first ring suburbs, as larger regional malls were built farther out in new greenfields. This was the start of the greyfield phenomenon that developed on a larger scale in the US owing to its earlier and larger retail developments than in Canada. The new urbanist movement was an early innovator in redeveloping some of these sites. Their design style was appropriated by the Urban Land Institute development industry (Farr, 2008) who promoted the 'lifestyle centre' mixed-use retail concept (Dr. T. Hernandez, personal communication, November 6, 2008). These open-air centres with upscale outlets and leisure elements were originally designed as walk-to locales near affluent communities. This trend was slow to innovate in Canada owing such factors as financial risk-adversity, colder climate and the lack of concentrated affluent neighbourhoods. It is now being established here with the redevelopment of the Don Mills Centre as Ontario's first example. Now being promoted are such major developments as Toronto's proposed Woodbine Live, the Foundry District, Barrie's Park Place and Surrey, B.C.'s Morgan Crossing. Though they exhibit some features of live/work neighbourhoods such as mixing retail with offices and residential uses, most are drive-to versus walk-to in concept. This does nothing to reduce auto-dependency and creates yet more opportunities for 'shopaholics' to consume global resources.

Southern Ontario Greyfield Redevelopment Case Studies

Five CMHC case studies were examined as Canadian examples of greyfield redevelopment. At only one site were the original big box stores retained for other uses. Most of these developments were rather ordinary apartment projects but two good examples merit mention. A small retail strip in Oakville was redeveloped as their first live/work project. Owners lived over their ground floor stores and professional service offices. This reduced employment commuting and was so successful that other developers duplicated this example. The best case for walkability was the redevelopment of a downtown greyfield block for the New Kitchener Market, a courtyard condominium and a plaza flanked by two office/retail buildings. Several studies showed the influence of community consultation sessions. One project was forced to

provide on-site retail to replace that lost in the redevelopment of a strip mall. This facilitated walkability at the site and that need was written into the requirements for subsequent development proposals.

Walkable Neighbourhood Design

The history of the environmental movements fighting urban sprawl and their coalescing into sustainable urbanism was explored (Farr, 2008). Though this is the latest 'ism' it proved valuable in this research for understanding good walkable community design. As well, Farr's model was the basis for the development of the new LEED for Neighbourhood Design (ND) rating. This combines the concept of a sustainability rating for buildings with that of neighbourhood designs. This lends credibility to sustainable urbanism as a new standard for energy conservation and ecological balance.

Four principle concepts of walkable neighbourhood design were found during the research. All were common in North American cities before the 1930s and have continued in uninterrupted use in Europe. Three of these include mixed-use planning; site walkability and live/work residences that taken together form the argument for the fourth concept: sustainable urbanism vice our current auto-dependency urban planning. Cheap energy, affordable cars, and ample developable land made Euclidean zoning attractive before the Second World War. Separating land uses was a rational and logical idea based on improving the speed and maneuverability of the car and to create quieter residential areas free of other uses. That model worked but it had unintended consequences that took decades to realize its costs. The advent of increased environmental awareness and a sharp rise in oil and resource costs has recently shown this model to be unsustainable. A new model or in this case, a reworking of earlier planning methods, was required.

Two exemplary models of sustainability, Victoria's Dockside Green and London's BedZED, were examined as examples of this new model: mixed-use, live/work neighbourhoods. The larger of these two sites, Dockside Green, though not yet completed, has nearly all of the components suggested by Farr (2008) for a good community. Its siting on a harbour with a central park and water course, a restored shoreline and connections to a long hiking trail provides an excellent model of urban ecology. BedZED was completed six years ago and contains a high proportion of live/work units to provide non-commuting jobs. Significantly, these two projects prove that not only can good walkable live/work neighbourhoods be built but that they can also approach carbon neutrality in their operation.

Design Project

The design project sought to demonstrate a walkable neighbourhood based on the reduced auto-dependency concepts uncovered in the research phase. Essentially all are based on the planning and development principles existing before the North American proliferation of car ownership. Seton Place, the design project, capitalized on a large greyfield close to a transit system undergoing upgrade and a large river ravine park connected to an extensive trail network. It included the primary research findings for walkability. These include a mixed-use of retail, services, a multi-functional mill building, and parks with the residences. Live/work units totaling almost a fifth of the housing create non-commuting employment and provide more on-site services to further reduce auto-dependency. As well, a nearby school and church and three groceries and banks provide walk-to services.

Seton Place makes an easy connection to the river ravine trail system to encourage healthier walking and biking following the Dockside Green precedent. This also extends along its southern boundary as a defining edge and a buffer to the industrial uses further south. The CPULs concept is incorporated in the trail which is proposed to extend at three points into the surrounding industrial context, if and when it is redeveloped. This would help create a linear park system to encourage further local food production, walking and biking.

Whether the energy crisis unfolds as predicted or is less ever than anticipated, there is a need to adapt newer models of urban development. We can no longer afford cheap energy for commuting, the distance food importation, the loss of precious farmland or the unhealthy consequence of large scale auto-dependency.

This paper has reviewed the role of retail centres in urban sprawl. Relentless competition in that sector has produced casualties in the form of retail greyfields. Many of these sites, especially in the GTA, are being redeveloped. But there is a growing trend towards highly profitable lifestyle centre developments that not only promote more auto-dependency but mindless consumerism in the face of climate change, global resource depletion and rising energy costs. The evolution of sustainable urbanism shows the latest ideas to achieve higher density, good urban ecology and mixed-use developments that can promote a less auto-dependent land-use model. Building such walkable live/work neighbourhoods on retail greyfields can help relieve the sprawling of valuable farmland in Canada by increasing urban intensification. In the event of a Peak Oil Crisis that the summer of 2008 foretold, such development may be critically important for Canada's urban future.

Recommendations

The following recommendations are made to further research and policy development.

- 1). Minimize the parking lot requirements for future walkable developments.
- 2). Offer incentives to GTA developers to undertake projects comparable to Dockside Green or BedZED.
- 3). Consider changes to the federal or provincial capital cost allowance rates or other taxation measures to encourage carbon neutral walkable neighbourhoods to help achieve sustainability targets.
- 4). Encourage community or non-profit groups could make adaptive reuse of a smaller big box store to help save these useful buildings from demolition.
- 5). The City of Toronto could consider allowing a big box store owner to partially redevelop its parking lot at higher than permitted densities in return for giving up the structure to community or non-profit organizations. This would be similar to the zoning concessions granted under the Mayor's Tower Renewal program to facilitate the recladding of energy inefficient high-rise apartment buildings.
- 6). Consider the creation of a City of Toronto owned building component reuse compound that would be operated by a demolition companies.

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APPENDIX A

(Guy & Ciarimboli, n.d.).

Ten Key Principles for Design for Disassembly

1. **Document materials and methods for deconstruction.**
As-built drawings, labeling of connections and materials, and a “deconstruction plan” in the specifications all contribute to efficient disassembly and deconstruction.
2. **Select materials using the precautionary principle.**
Materials that are chosen with consideration for future impacts and that have high quality will retain value and/or be more feasible for reuse and recycling.
3. **Design connections that are accessible.** Visually, physically, and ergonomically accessible connections will increase efficiency and avoid requirements for expensive equipment or extensive environmental health and safety protections for workers.
4. **Minimize or eliminate chemical connections.** Binders, separate and recycle, and increase the potential for negative human and ecological health impacts from their use.
5. **Use bolted, screwed and nailed connections.** Using standard and limited palettes of connectors will decrease tool needs, and time and effort to switch between them.
6. **Separate mechanical, electrical and plumbing (MEP) systems.**
Disentangling MEP systems from the assemblies that host them makes it easier to separate components and materials for repair, replacement, reuse and recycling.
7. **Design to the worker and labor of separation.** Human-scale components or conversely attuning to ease of removal by standard mechanical equipment will decrease labor intensity and increase the ability to incorporate a variety of skill levels.
8. **Simplicity of structure and form.** Simple open-span structural systems, simple forms, and standard dimensional grids will allow for ease of construction and deconstruction in increments.
9. **Interchangeability.** Using materials and systems that exhibit principles of modularity, independence, and standardization will facilitate reuse.
10. **Safe deconstruction.** Allowing for movement and safety of workers, equipment and site access, and ease more economical and reduce risk.

Detailed Strategies

1. Use high-quality reused materials that encourage the markets for the reclamation of materials.
2. Minimize the different types of materials which reduces the complexity and number of separation processes.
3. Avoid toxic and hazardous materials that increase potential human and environmental health impacts, and potential future handling costs, liability risk and technical difficulties.
4. Avoid composite materials, and make inseparable products from the same material that are then easier to recycle.
5. Avoid secondary finishes to materials which may cover connections and materials, making it more difficult to find the connection points.
6. Provide standard and permanent identification of material chemistry.
7. Minimize the number of different types of components to increase the quantities of similar recoverable components.
8. Separate the structure from the cladding to allow for increased adaptability and separation of non-structural deconstruction from structural deconstruction.
9. Provide adequate tolerances to allow for disassembly in order to minimize the need for destructive methods that will impact adjacent components.
10. Minimize numbers of fasteners and connectors to increase speed of disassembly.
11. Design joints and connectors to withstand repeated assembly and disassembly to allow for adaptation and for the connectors to be reused.
12. Allow for parallel disassembly to decrease the time on-site in the disassembly process.