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# Underground landscape: The urbanism and infrastructure of Toronto's downtown pedestrian network

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**Abstract**

Beneath the surface of the streets of Toronto lies a sprawling labyrinth that serves over 100,000 people every day and countless tourists and visitors. One of the city's most under-valued urban spaces, Toronto's underground is remarkably the largest underground shopping complex in the world according to the Guinness Book of World Records with more than 30 km of shopping tunnels and retail nodes. Since the 1970s, this underground system has grown and multiplied beneath the surface of the city with relatively little intervention from city planners. This article discusses the development pattern of the underground as a network and the future it holds as an important urban infrastructure.


*Keywords:* Underground; Pedestrian network; Urbanism; Infrastructure; Landscape

## 1. Introduction

> "A real challenge to urban design is to accept that infrastructure is as important to the vitality and the experience of the contemporary metropolis as the town hall and the square once was. As we move into the twenty first century, one of the primary roles of urban design will be the reworking of movement corridors as new vessels of collective life."[1]

The Toronto underground is a vast urban environment that can be considered a city onto itself. As a pedestrian network, the underground is approximately six blocks wide and 10 blocks long, a 3 km walk from one end to the other. The size of the underground rivals that of the West Edmonton Mall in Canada or the Mall of America in the United States.[2] As a retail complex, the underground houses over a half million square meters of retail space filled with 1200 different stores that employs about 2500 people. Like a small city, the underground connects over 50 office towers and buildings, six major hotels, two major department stores, over 20 underground parking garages and several major tourist destinations.[3] As a transportation infrastructure, the underground is surrounded by two subway lines, six stations, a regional transit terminal and a national bus terminal (Fig. 1). In total, the underground services a daytime population of over 100,000 people that come from as far as Oshawa and London, some 150 km away.

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[1] Alex Wall, "Programming the Urban Surface", in James Corner, ed., *Recovering Landscape: Essays in Contemporary Landscape Architecture*" (New York: Princeton Architectural Press, 1999), 246.

[2] The underground is serviced with five independently operated rear-alley docking areas equipped with freight elevators that also provide drop-off points for truck deliveries during off peak hours.

[3] "Toronto's Downtown Walkway: Path Facts", City of Toronto, www.city.toronto.on.ca/path/.

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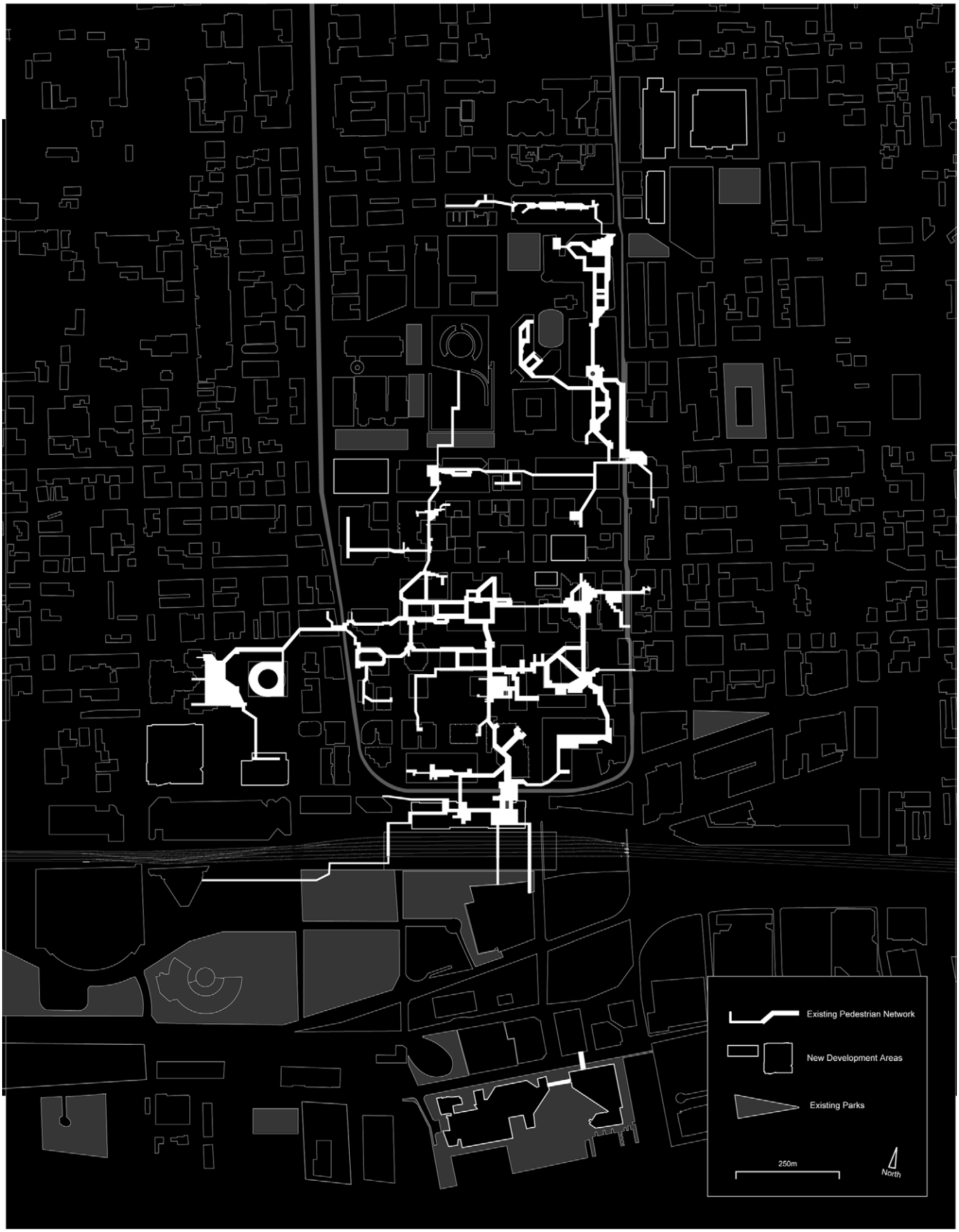


Fig. 1. Underground landscape: extents of the Toronto pedestrian network, 2005.

## 2. Strata and structure

Though its structure appears haphazard, the configuration of the Toronto underground is extremely logical. Comparable to the interior space of a suburban mall, the overall spatial structure of the underground follows a series of *axes* and *nodes*, surrounded by an underground subway loop (Fig. 2). Major pedestrian movements are concentrated along north-south and east-west axes that loosely parallel the streets above. For example, the main directional flow of the underground lies along two main north-south axes that split off from the Union Station transit terminal at the south end, towards the Eaton Centre shopping centre and the City Hall building at the north end. Although they are circuitous, these axes follow the directionality of major streets above ground. Two of the most heavily traveled axes are below Bay Street, the spine of the city's financial district and Yonge Street, the longest street in North America. Lateral axes have also formed in an east-west direction: one following King Street, the main entertainment district, another along Queen Street, the main shopping street, and another along Front Street, the major event street. Axes function as collectors and distributors of pedestrian circulation. Like indoor streets, axes are lined with retail shops where vendors capitalize on the abundance of foot traffic to deliver convenience goods for stop-and-go purchases such as newsstands and variety stores. Axes are not all situated underground, they sometimes re-surface at street grade or even at mezzanine levels to cross over streets to circumvent car traffic altogether. The Toronto Skywalk is a clear example of this variation: a 1.2 km tunnel entirely located above ground that joins Union Station, the main regional transit terminal at the south end to the Rogers Centre (formerly the Skydome), a fifty thousand person stadium at the west end. The walkway passes above York and Simcoe Streets, two of most congested streets in the downtown area.

The structure of the underground is further amplified at specific *nodes* in the network. These areas are created by the intersection of several axes and are most often found in the middle of blocks where office towers and pedestrian corridors meet. Whereby axes function as conduits, nodes function as social condensers. Nowhere is this more evident than in the shopping concourse of Toronto Dominion Centre, one of the busiest nodes in the system. Its volume of activity is primarily a function of its location: bordered


Fig. 2. Underground matrix: the structure of axes and nodes of the underground network.

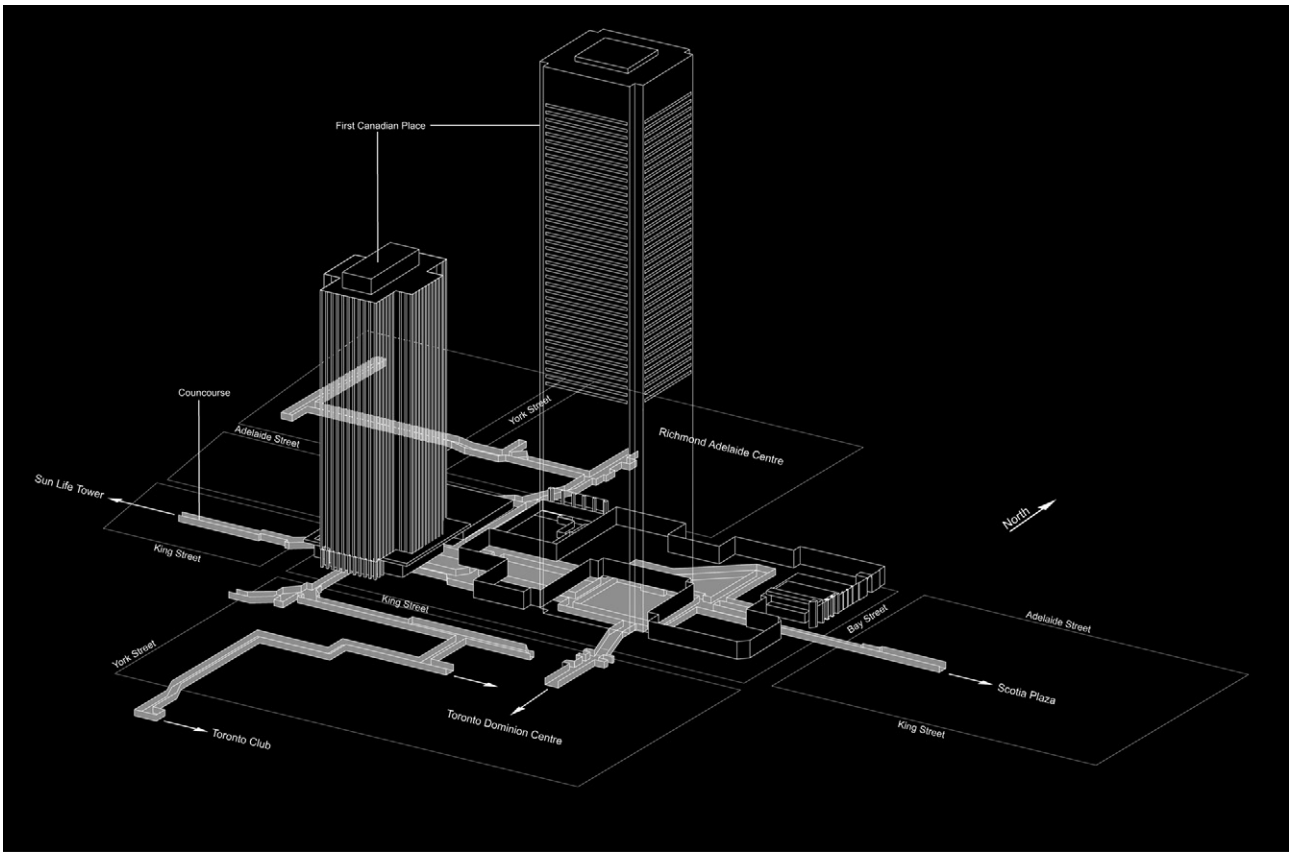


Fig. 3. Underground node: Axonometric view of the First Canadian Place concourse.

by four major nodes (First Canadian Place, Commerce Court, Royal Bank Plaza, Standard Life Centre), its shopping concourse is also located at the junction of two major circulation axes flanked at each end by two subway stations (St. Andrew and King) making a major access point to other areas of the network. The concourse also provides a clear understanding of the differences in physical shape and retail activity between axes and nodes. Whereas the axes are long and linear, nodes are wide and expansive (Fig. 3). In the case of the Toronto Dominion Centre, for example, that configuration enables niche convenience such as fashion shops and business services to line the concourse axes while cafés and restaurants cluster around a central seating area where informal conferences can be held, away from high-traffic tunnels.[4]

Ts or jogs in the network are merely shortcuts between blocks, diagonal passageways created to minimize the amount of tunneling or bypass underground pipes while shortening the distance between nodes. Barely recognizable as a pattern, this network of axes, nodes, and diagonals form a distinct matrix-like structure where the historic street grid above simply dissolves.[5]

## 3. Developments and effects

The historical development of the Toronto underground is both planned and accidental. Though a planned network was officially proposed in the 1950s, several conditions were already in place by the turn of the century. The Eaton Centre was the catalyst: as Canada's largest department store, it had already linked its vast shopping block with underground tunnels. By 1917 for example, five understreet tunnels connected its main store, catalogue store, bargain annex and stable.[6] With the construction of Union

[4] The functional characteristics of the network vary considerably as one moves north to south. In the southern part of the system, convenience goods and personal and business services increase while in the northern part of the underground fashion tends to be more dominant. In the centre of the underground food retailing is more pronounced. It is clear that these variations are a reflection of the types of different users in different parts of the [network]. See Norman Dudley, ''An Overview of the retail Structure of Toronto's Underground Pedestrian System'', *The Operational Geographer* Vol. 7 No. 2 (1989), 22–27.

[5] Fulford, *Accidental City: the transformation of Toronto* (Toronto: MacFarlane Walter and Ross, 1995), 46. Fulford's differentiation of the pattern of the underground network from the aboveground street grid suggests the invalidity of cardinal points of references such as north, south, east and west that are currently used as main wayfinding elements in the network.

[6] As indoor environments, arcades and passages may be considered the typological antecedents to modern underground shopping concourses. For example, where the Eaton Centre is now located, once lay the Toronto Arcade between 1883 and 1955. Indoor streets lined with shops of arcades and passages are not new nor are they particular to city of Toronto. Their roots lie deep in the eighteenth and nineteenth century with models such as Le Passage Feydeau in Paris (1790), the Burlington Arcade in London (1818) and the Galeria Vittorio Emmanuelle II in Milan (1867).

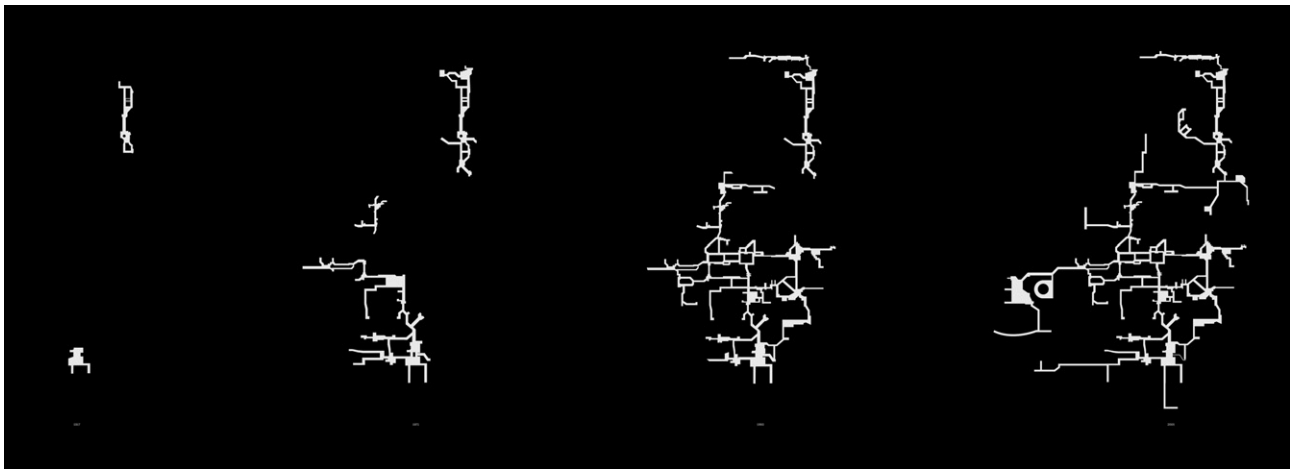

Fig. 4. Chronological development of the Toronto underground network in the past century (1917, 1971, 1993, 2006).

Station in the 1920s – Canada's largest regional rail station modeled on Grand Central Station in New York – another tunnel was built joining the arrivals area with the Royal York Hotel[7] across the street. These two nodes, one at the north of the downtown area and the other at the south end, form the main extremities of the network today.

With the advent World War II, no further development ensued until the construction of Canada's first subway between 1949 and 1954. Connections to the underground now seemed even more logical: subway stations and mezzanine levels could be linked under the streets. The central planning ideology of 'separating people from traffic' during the 1960s laid the groundwork for Matthew Lawson – city planning commissioner between 1954 and 1967 – who imagined that "much of the future of downtown was below grade". Lawson's Plan originally considered the burial of motor cars prior to the development of an underground pedestrian network but the disruption caused by the construction and the colossal financial investment required made it impossible.

Underground development exploded in the 1960s and 70s (Fig. 4). To ensure a minimum quality and connectivity to the space, the city planning department subsequently decided to participate in the construction of additional concourse elements by subsidizing half of its cost. The lobbying and cost-sharing effort was not new, in fact it was initiated approximately a decade after the first successful example in Montreal, the Place Ville Marie (PVM) designed by Ieoh Ming Pei with its central underground shopping complex.[8] More importantly, the initial development of the underground is principally due to a legislative loophole rather than a design guideline: below-grade space was not calculated as part of maximum density allowances. Also known as the FAR for Floor Area Ratio, the loophole freed developers to build additional concourse levels without sacrificing building heights. Following the success of the PVM Formula, underground shopping concourses – merely big basements – became corporate incentives in Toronto, primarily built to attract tenants to the offices above. Transit access was simply an added bonus. A means of relieving surface congestion, Lawson's Plan also had unintended consequences:

> "The growth that was coming presented several problems. The sidewalks were too crowded – by 1960, people were spilling into the gutters at rush hour – and there was no affordable way to widen them. Dry cleaners, restaurants, and other services were vanishing from the streets because they didn't fit into the new corporate aesthetic. Those who were putting up buildings, especially banks, didn't want the logos of hamburger joints and camera shops cluttering their elegant facades and blurring their corporate identities".[9]

In many ways, the Toronto underground was almost too successful. By the mid 1970s, streets and squares were reportedly being drained by the effectiveness of the climate-controlled and super-connected underground.[10] The

[7] The Royal York Hotel is now owned by Fairmont Hotels & Resorts.

[8] Completed by 1962, Place Ville Marie, or "PVM" as it is also called, became a shopping landmark. As author Pierre Berton wrote in the Toronto Star that year: "There is no longer any sense talking about the race between Montréal and Toronto. For the moment the race is over. Montréal has won. Place Ville Marie has put it a decade ahead of us" (Source Unknown). Montreal's quantum leap is also result of several mega projects such as Place Bonaventure, the 6-acre multi-functional commercial complex built by 1966 and the Métro, the first rubber-tire subway system in the world built for Expo '67.

[9] Fulford, *Accidental City: the Transformation of Toronto*, 44.

[10] From a macro-economic perspective, the proliferation of shopping malls and expressways around the city of Toronto in the 1960s and 1970s are two of the most important factors that led the drain of downtown street life and retail activity. In 1964 for example, the Yorkdale Shopping Centre became the largest most popular malls in Canada, attracting developers from Germany, France, Switzerland, Britain and Holland on their North American tours of cutting edge shopping centres. With larger malls, higher ceilings, air-conditioning, large parking lots and extended operating hours, suburban shopping centres eclipsed retail activity on downtown streets. Architect and urbanist, Victor Gruen provided a comprehensive description of this phenomenon in *The Heart of Our Cities* (New York: Simon and Schuster, 1964), a phenomenon that was much more pronounced in the United States.

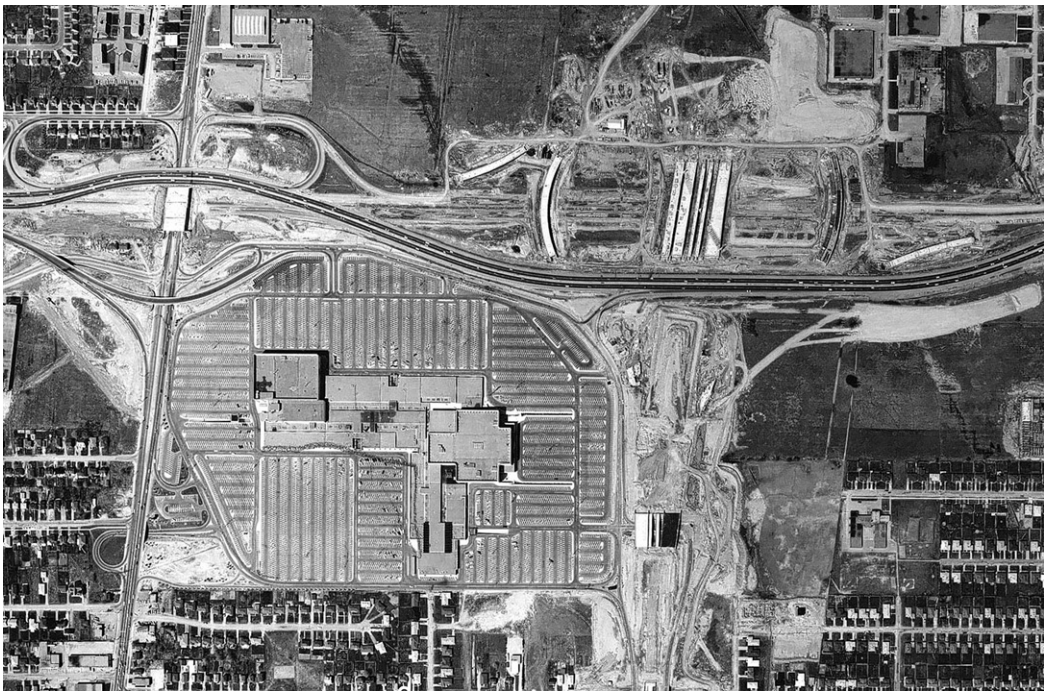

Fig. 5. Construction of the Yorkdale Shopping Mall on the northern periphery of the Greater Toronto Area, 1964. Source: Sanborne Aerial Imagery.

network was only half of its current size when urban designer Edward K. Carpenter, observed in 1977 a reduction in the pedestrian life on the streets and square above. "What began as a system of convenience due to the cold, wet, windy winters has become a system of habit."[11] With the advent of a reformist 'anti-underground' council in the late 1970s, city involvement was overturned and financing for tunnel connections pulled. An entirely new development review process was set in motion with a different emphasis: streets were privileged over underground concourses, and density allowances were leveraged over open space investment.[12] After 1976, the implicit incentive to build underground space disappeared entirely.[13]

Good intentions by city planners succeeded in producing the opposite effect. By the 1970s, as Robert Fulford explains, "the underground system was beyond halting. The owners of each new building wanted to be connected, whether they had the city's blessing or not. Tenants had come to expect it".[14] Increasing competition from regional shopping malls with their abundance of expressway access and free parking placed significant pressure on downtown development to distinguish itself (Fig. 5). The identity and connectivity of the underground as a network was by now an economic imperative. Reaching its zenith in the 1980s, the unprecedented growth of the financial district in Toronto and the construction of skyscrapers in the downtown area now made this possible. In a building frenzy, more than 25 towers went up in the space of a decade: the Richmond-Adelaide Centre in 1966, the Sheraton Centre and the Bank of Montreal in 1972, the Atrium on Bay in 1981, the Commerce Court in 1972, the Marriott Hotel and the First Canadian Place in 1975, the Cadillac Fairview Tower in 1977, the Royal Bank Plaza in 1979, the Exchange Tower in 1981, the Standard Life Centre and Sun Life Centre in 1984, the Scotia Plaza in 1988 and the BCE Place in 1990 (Fig. 6).[15]

Speculation that catalyzed the growth of the financial district in the 1980s came to a grinding halt in the early 90s. When the recession hit, skyscraper projects were shelved or scrapped. Projects already underway were literally grounded, leaving critical voids in the underground

[11] Edward K. Carpenter, *Urban Design: Case Studies* (Washington: RC Publications, 1977), 206.

[12] The view that indoor shopping environments function as pedestrian vacuums is in part attributable to Jane Jacobs, one of the most fervent proponents of street-level urbanism. Renowned urban theorist and critic, Jacobs popularized this view more than forty years ago in *The Death and Life of Great American Cities* (New York: Random House, 1961).

[13] The Central Area Plan of 1976 successfully proposed the acquisition of parkland through development bonuses and the swapping of city-owned land and road allowances. The plan resulted in the creation of countless urban parks and green spaces, signature elements Toronto's urban landscape.

[14] Fulford, *Accidental City: the transformation of Toronto*, 45.

[15] Migration of corporate headquarters from Montreal to Toronto, at the height of the separatist movement in Québec in the 1970s, greatly contributed to the establishment of Toronto as Canada's main financial centre.

Fig. 6. Aerial photograph of the downtown core area. Source: City of Toronto Ortho Photos, 1993.

network. Nowhere is this effect more evident than at the Bay-Adelaide Centre. In 1993, construction of a 50-story tower was halted, with only an underground parking lot built with a half-built concrete elevator shaft left standing. Direct circulation through the site was never fully realized and the vacant site remains one of the most awkward gaps in the network today.[16] Though the city loosely encourages extensions to the network, the underground is now virtually all privately financed. Since the underground network is well established though, developers are more than eager to cooperate with one another. In fact, access to the network is worth about 2$ per square foot in increased retail and office rents, encouraging its inter-connectivity.[17]

Recently, the structure of the underground network has taken on a more hybrid configuration. With new connections to convention amenities to the west (Metro Toronto Convention Centre, Metro Hall, Canadian Broadcasting Centre) and major tourist destinations (CN Tower, Rogers Centre) and surface connections throughout, the pattern of the underground now consists in a combination of below grade and above grade pathways that forms an extensive multi-level pedestrian circuit throughout the downtown area (Fig. 7).

## 4. Forces and dynamics

What is most compelling about the historical development of the underground is its self-replicating behavior. As a network, the retail dynamics and spatial complexities of the underground warrant an examination of the critical forces that shape it. By examining these forces as spatial parameters, a clearer understanding can be reached of the dynamics of the underground and its broader context within the Greater Toronto Area (GTA).

[16] This epileptic urbanism persisted. In March, 1998, a new design for the Bay-Adelaide site was unveiled, and it was announced that the building would be completed for occupancy by 2000. Six months later, the proposal was shelved again.

[17] Ken Jones, Chair of the Centre for the Study of Commercial Activity (Ryerson University), in personal conversation (25 June 2005).

Fig. 7. Hybridized network: low-altitude aerial view of the skywalk passing over the regional train corridor in downtown Toronto, 2004.

### 4.1. Climate

No other condition has contributed more to the invention of indoor environments other than climate. In North America, there are several types of indoor pedestrian networks that demonstrate this condition. They include underground systems (Toronto, Montreal, Chicago), skyways (St.Paul-Minneapolis, Calgary, Halifax) or multilevel pathways (Cleveland, Edmonton) (Fig. 8).[18] Despite their structural variations, climate remains one of the most critical factors encouraging the development of these indoor environments. Hot and humid summers, and long cold winters of northern cities with their often severe conditions, such as windy and wet streets, greatly influence their usefulness and extensiveness.[19] Exacerbated by the frequency of smog alerts that have considerably increased over the past decade in the GTA that usefulness will no doubt persist.[20]

### 4.2. Spatial legibility

One of the most visible aspects of the network is its circuitous, often illegible space. The combination of tunnels, openings, shops, and courts that dot the network of the underground – when considered as a whole – is confusing and disorienting. The hyper-accumulation of signs, media, symbols, lights, materials, displays, and proportions[21] – a natural effect of retail competition between 1200 different tenants – further compounds this condition, masking the more basic or essential components of the network.[22] Transit connections, central nodes, street levels and emergency exits – seemingly banal aspects of any urban space – usually lie outside the physical perimeter of individual properties. The un-coordination between various underground nodes

[18] In contrast to the Toronto underground, Calgary's pedestrian network – named the "Plus 15 Walkway System" is entirely above ground. At an average height of 15 feet, 60 suspended bridges connect 100 buildings, creating a 16 km walking route for circulating the core of the city without having to go outside. Montreal's network, branded as RESO in 2004, is a hybrid of above ground and below ground tunnels. It consists of 30 km of tunnels spread over an area of twelve square kilometres of downtown Montreal.

[19] See Christopher Hutsul, "Another world beneath the city: critics cal it unnatural, but swarms of Torontonians rely on underground pathways daily for convenience and relief from the elements", *Toronto Star* (August 10, 2002), K02.

[20] In 2005, there were 41 smog alert days, up from 1 in 1993. See Ministry of the Environment and City of Toronto Public Health Department, "Smog alert days in Toronto since 1993", http://www.city.toronto.on.ca/health/smog/smog_new.htm.

[21] The mixture of visual media of the underground can be perceived as having its own special identity in many respects; however it is complex and difficult to understand especially for newcomers such as visitors and tourists.

[22] See Bill Taylor, "The PATH from enlightenment: Lost in the world's largest underground shopping complex", *Toronto Star* – Metropolis Section (June 6, 2004), B02.

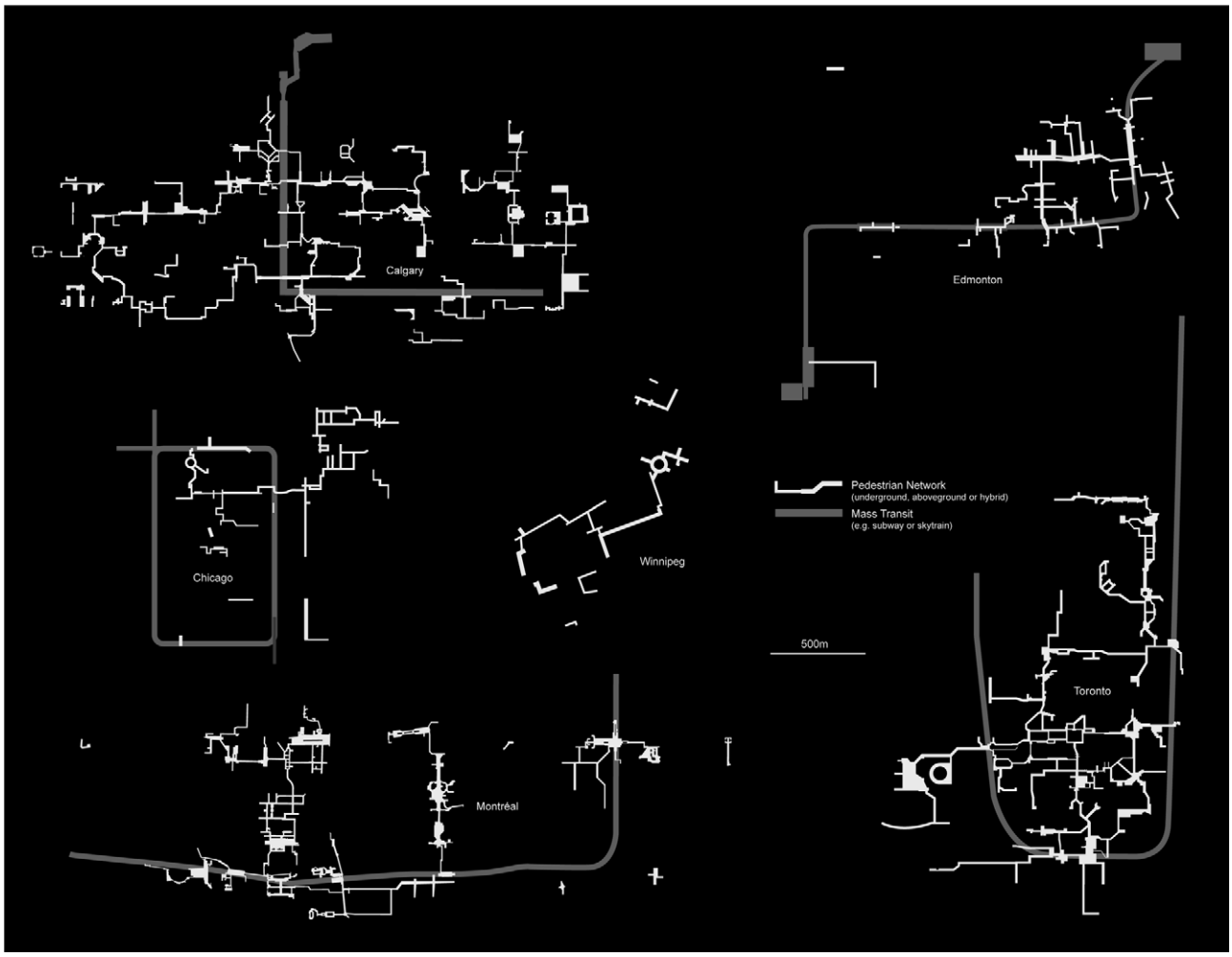


Fig. 8. Comparative structure and size of pedestrian networks in North America (clockwise): Montreal, Chicago, Calgary, Edmonton, Winnipeg, Toronto.

and these basic elements results in a lack of overall spatial legibility (Fig. 9).[23] This compound effect not only renders the underground difficult to navigate, but often leads people to avoid the space altogether.[24] The challenge here lies with a higher definition of the relationships between the various blocks and the critical connections to existing infrastructure for more effective pedestrian mobility.

The city planning department addressed this challenge with a new signage program in the early 1980s. Paul Arthur, the grandfather of wayfinding,[25] was commis-

[23] The proposal for the central organization of the underground, either through a master planning exercise or a central administration, is an oxymoron. To call it a system is therefore misleading. The underground is formed by individual properties with their own set of individual tenants. Below grade connections between properties that often require tunneling under city property (streets for example), have historically been negotiated on a project-per-project basis between the two bordering property owners each one sharing the cost of tunneling with little or no incentive from the City Planning Department since 1976. Property owners within the underground have demonstrated however a strong level of cooperation towards better signage if it yields increased traffic within their block and if its bears no financial responsibility on them.

[24] Kevin Lynch was one of the first urban planners to recognize wayfinding and spatial legibility as underlying aspects of a city's image. Lynch's influential book *The Image of the City* (Cambridge: MIT Press, 1960), establishes that users understand their surroundings in consistent and predictable ways through the relationship between five physical elements: paths, edges, districts, nodes and landmarks.

[25] Wayfinding is the art and design of directional signage and urban navigational systems. There are two counter prevailing tendencies in the field of wayfinding, both of which carry their own attributes. The first, and perhaps more prevalent practice involves maximum signage, often resulting in the erection of a variety of signs, posters and messages to explicitly communicate a store's product or service. Though graphic, this practice often results in a bombardment of mixed media that mutes the original message by numbing visual attention. With their dense façade of electronic billboards, fluorescent signs, sidewalk displays in Toronto's Downtown Chinatown or New York's Times Square are good examples of this. The second less obvious practice involves minimum signage while maximizing spatial relationships. Conceiving space as a whole, this practice involves the establishment of basic principles, or rules, to ensure universal legibility of information. Based on a principle that "less is more", this practice of *relational wayfinding* implies the use of existing visual cues and spatial references for directionality. A good example of this practice is the award-winning color-coded signage program developed by Bureau Mijksenaar for Schipol Airport in Amsterdam, that has become the benchmark for airports worldwide.


Fig. 9. Comparative views of different nodes in the Toronto underground.

sioned to conduct a feasibility study on the underground and to write a report on how it could be made easier to use.[26] Arthur was already aware of the issues after giving countless lectures on the chaos of the underground in the 1980s. "The emergence of wayfinding difficulties...is a recent phenomenon brought on by the complexity of contemporary buildings and cities."[27] In the report, Arthur wrote that the system was such a crucial part of the city that "no one thinks it can continue much longer as an impenetrable maze". Arthur's report led to an elaborate signage program that was implemented in the early 1990s. Designed by Stuart Ash and Keith Muller,[28] the signage program was logistically complex: it involved coordination with the then 1100 store owners and 32 property owners.[29] However, renowned journalist Robert Fulford criticized the program within a short period of its implementation:

> "the individual components of PATH – wall signs, wall maps, compasses on the ceilings, outdoor pylons and paper maps that are handed out in the thousands by office buildings and hotels – are well designed and no doubt deserve the merit award they won from the Society of Environmental Graphic Design in the U.S. But taken together they add up to no more than a tentative first step toward coherence. As systems of communication, PATH fails to speak loudly and clearly. It mutters. It's too reticent to do the job, and its inadequacy

[26] Paul Arthur was a self-taught designer. Often credited with coining the term "signage" in the early 60s, Arthur was responsible for the environmental graphic design of Expo 67 in Montreal. His Toronto firm, VisuCom Limited, specialized in the development of visual and audible wayfinding solutions for complex environments establishing the important role of signs in well-planned environments. He was a founding member of the Society for Environmental Graphic Design and died in 2001. www.paularthur-wayfinding.com/.

[27] See Paul Arthur and Romedo Passini, *Wayfinding: People, Signs & Architecture* (McGraw-Hill, 1992): 4.

[28] See "Path Installation – Downtown Underground Malls Wayfinding Programme", 1993 City of Toronto Executive Committee Report No. 4 (February 22, 1993).

[29] The PATH signage program was coordinated by Don Sinclair at the city planning department who performed a similar project for the overhead walkway system in Calgary, Canada.

illustrates the problems involved in imposing public presence on private property.''[30]

There is a hidden irony in the hyper-accumulation of signs, symbols and wayfinding devices that canvass the underground. With the 125 junction points that dot the underground, there is very little room for any additional signage especially at designated nodes.[31] One of the few exceptions to the rather unsuccessful wayfinding system is the shopping concourse of the Toronto Dominion Centre, a node located below the granite plinth in the near center of the underground network. Built between 1964 and 1971, the project architect Ludwig Mies van der Rohe established a strict yet simple guideline for the concourse: ''signage throughout the controlled traffic areas is to be purely directional and strictly consolidated on ceiling-mounted boards''.[32] Above eye-level, these back lit directory boards are mounted on the ceiling at each intersection at a standard height clearance, limiting the information to the name of the area, to adjacent concourses and transit connections. In step with these standards, the boards have a standard dimension with graphic information reduced to a light-coloured standard serif typeface, on a dark monochromatic background. Promotional or retail-oriented signage is strictly prohibited, placing more emphasis on the quality of storefront displays and vitrines. In part the result of its orthogonal configuration, spatial references play an underlying role in the concourse (Fig. 10). The focal space, for example, is a café located under a pavilion which provides continuous daylight and visual contact with the plaza above. Furthermore, exits and stairways are located at the end of each axis (Fig. 11). Above ground, the entrances to the concourse are located at the edge of the city sidewalk, making them visible to the point of being transparent. Even the name of above ground streets are marked at each intersection below ground, strengthening the relationship between both. The coordinated design of surfaces, materials and proportions further amplifies this navigational transparency: the clear plate glass, sliding screens and black aluminum fascias of shop fronts, the field of acoustic tiles and recessed lighting on the ceiling, and finally, the dark green speckled terrazzo paving on the floor. By minimizing signage and maximizing mobility, the spatial transparency of the underground concourse of the Toronto Dominion Centre renders it one of the most spacious and seamless segments within the entire system.[33] In many ways, the sign *is* the concourse and the concourse *is* the sign.

### 4.3. Access and mobility

In its early beginnings, the underground was originally planned by the city as a component of an overall pedestrian network that included sidewalks, plazas, squares, and parks in the downtown area. In many ways, this early vision precluded the integration of the underground with streets and blocks above through access points and spatial references. Despite opposition to the underground expressed in the 1960s, a 1969 city report acknowledged that:

> ''[The underground] does not imply an underground pedestrian system which is totally excluded from the natural and city environments. By establishing open spaces adjacent to the pedestrian routes...sunlight, sky, snow, tress, city-scape and street activity can and must be made accessible (visually and physically) to pedestrians.''[34]

What ensued however after the adoption of 1976 Official City Plan and the pull-out of city investment was unchecked development in the underground that served only the single-mindedness of individual developers and

[30] Robert Fulford, *Accidental City: the Transformation of Toronto*, 49. There is an obvious contradiction in the implementation of any signage program for underground networks. While most users simply look for a clearly marked way out, most vendors seek the exact opposite. Private business owners instead look to capture users for longer periods of time to reduce threshold resistance and increase consumer behaviour. Viacom, one of the world's largest media companies, has formalized this consumer catchment technique with signage programs called ''Station Domination'' and ''Brand Trains'' for underground environments. The Viacom techniques are part of an overall strategy that aims to establish a powerful (read totalizing) presence in urban locations such as buses, billboards, subways, street furniture, malls, and airports. Source: Viacom Outdoor, *Out-of-Home Advertising Media*, http://www.viacomoutdoor.com/.

[31] Clearly it is the task of network-wide spatial design to provide greater spatial legibility and improved physical accessibility. However, ratifying or updating the underground may not solely lie with the creation of a joint municipal-corporate authority. The research suggests that with the development of a tool for visualizing the underground system as a three-dimensional landscape may also prove to be a valuable and cost-effective solution to the problems of legibility and access of the underground. Two examples are noteworthy: the first known three-dimensional illustration of the underground was rendered by Norm Tufford for the Toronto Star in 1988. See Judy Morgan, ''Toronto's Underground City'', Toronto Office Guide (Spring 1998): 31. The second, more explicit example appeared three years later in 1991 with a stunningly precise three-dimensional map of the entire underground network and the 1000 stores and services that composed it. See Visign, Inc.,''Toronto Down Under: 3D Scale Map of the Underground'' (Toronto: Greg Eby Publisher, 1991).

[32] Interview, Imran Jivraj, Manager, Retail & Tenant Relations, Toronto-Dominion Centre, August 4, 2005. As a design parameter, this restriction placed on signage is echoed by Victor Gruen in *Shopping Towns USA* (New York, NY: Reinhold Publishing Company, 1960) whereby ''tenants'' store signs should not be permitted to be attached or to protrude into controlled areas (145).

[33] With its above-average retail stability, the case of the Toronto Dominion Centre shopping concourse suggests that there may be a correlation between the legibility of the network, the design of the space, the circulation it encourages, and the sales volume it generates. See Ken Jones, ''*Retail Dynamics in the Toronto Underground System: 1993–1997*'', Research Report 1998-11 (Toronto: CSCA, Ryerson Polytechnic University, 1998), 12.

[34] Edward K. Carpenter, *Urban Design: Case Studies*, 206.

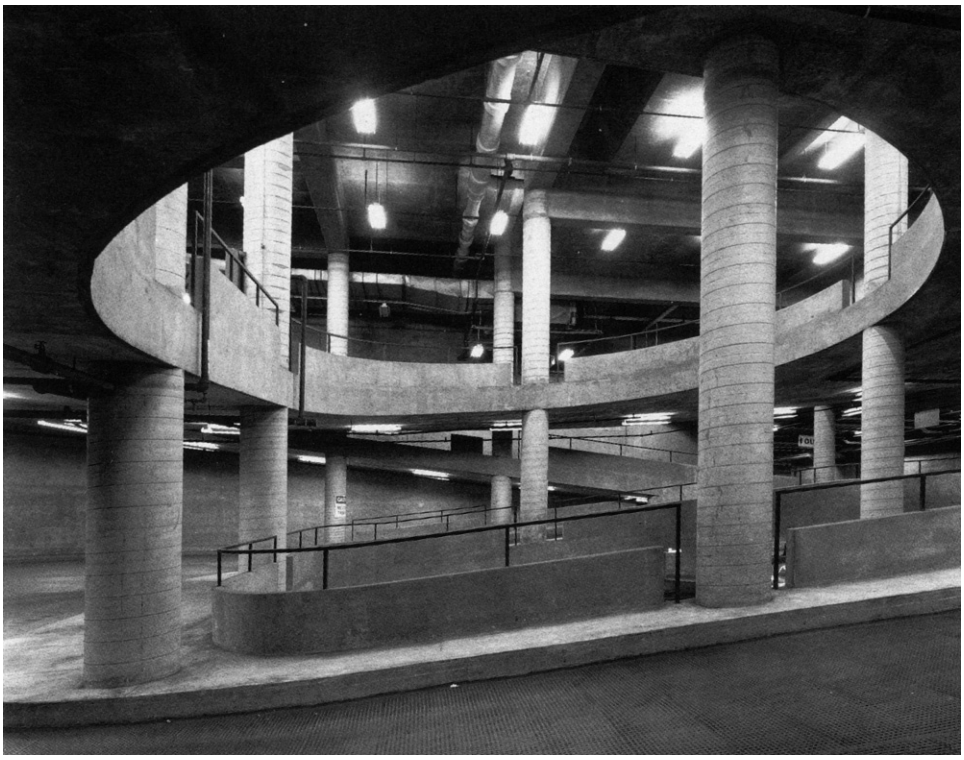

Fig. 10. Toronto Dominion Centre: circular void in the underground parking area, 1968. Photograph by Panda in Detlef Mertins (ed.), *The Presence of Mies* (New York, NY: Princeton Architectural Press, 1994), 258.

property owners. One of the few exceptions to this effect is First Canadian Place. As explained by Edward Carpenter in his 1977 *Urban Design Case Studies* (see Fig. 12):

> "First Canadian Place is notable because of its highly integrated pedestrian system and the quality of its public spaces. The multiple street-level entrances along each street direct access to the commercial areas. The importance of these entrances cannot be overemphasized, for they draw people into the center and develop a high volume of foot traffic. Within, there are several escalator banks that provide convenient connections between the three levels. The connection from the tunnel concourse under King Street is excellent. There, the pedestrian enters directly into the lobby of the First Canadian Place Tower. The three-level focal space behind the elevator banks has a water cascade that provides both spatial and aural orientation. With their white marble walls, gray-marble floors, and white-plaster ceilings the pedestrians areas are light and expansive even under artificial lights. The variety of entrances, connections, paths, and light levels has made this city block a highly successful element in Toronto's underground pedestrian system."[35]

Network discontinuity is also the effect of limited hours of operation. Evident at several junctions in the network (between the Eaton Centre and the Hudson's Bay Company for example) nine to five store hours restrict through traffic affecting the overall connectivity of the network. Greater attention to these strategic connections through a better understanding of times coverage may further increase the accessibility and the use of the underground (Fig. 13). These aspects of connectivity within a larger urban landscape cannot be understated, and as Alex Wall – an influential thinker and urbanist – acknowledges, is vitally important:

> "The design and integration of new transportation infrastructure is central to the functioning of the urban surface. The importance of mobility and access in the contemporary metropolis brings to infrastructure the character of collective space. Transportation infrastructure is less a self-sufficient service element than an extremely visible and effective instrument in creating new networks and relationships."[36]

### 4.4. Flow and usage

Pedestrian circulation operates on a peak-period schedule. Traffic floods the underground at three successive

[35] Edward K. Carpenter, *Urban Design: Case Studies*, 203.

[36] Wall, "Programming the Urban Surface", 238–39.

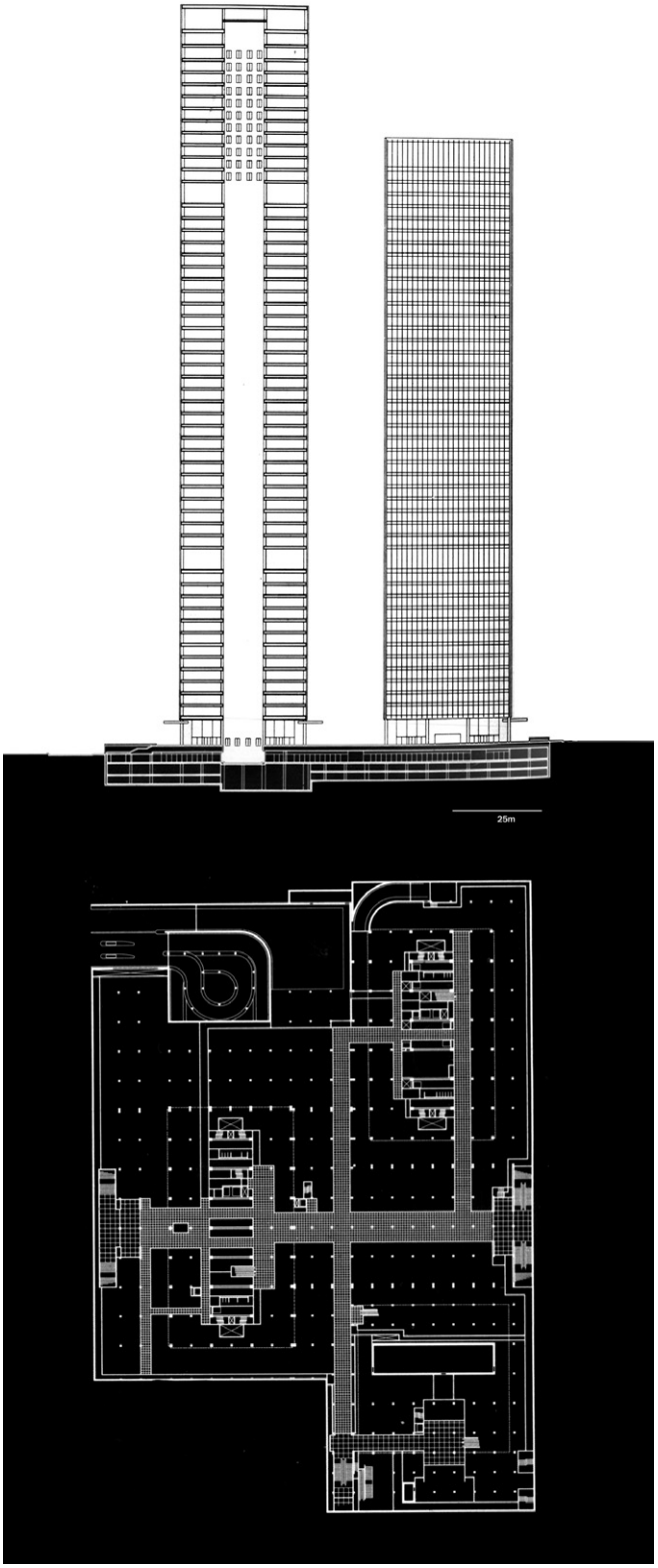


Fig. 11. Plan and cross-section of the Toronto Dominion Centre. Source: Peter Carter, *Mies van der Rohe at Work* (Chicago: Pall Mall Press, 1972), 137.

Fig. 12. Light access: view of the underground in the Richmond-Adelaide concourse.

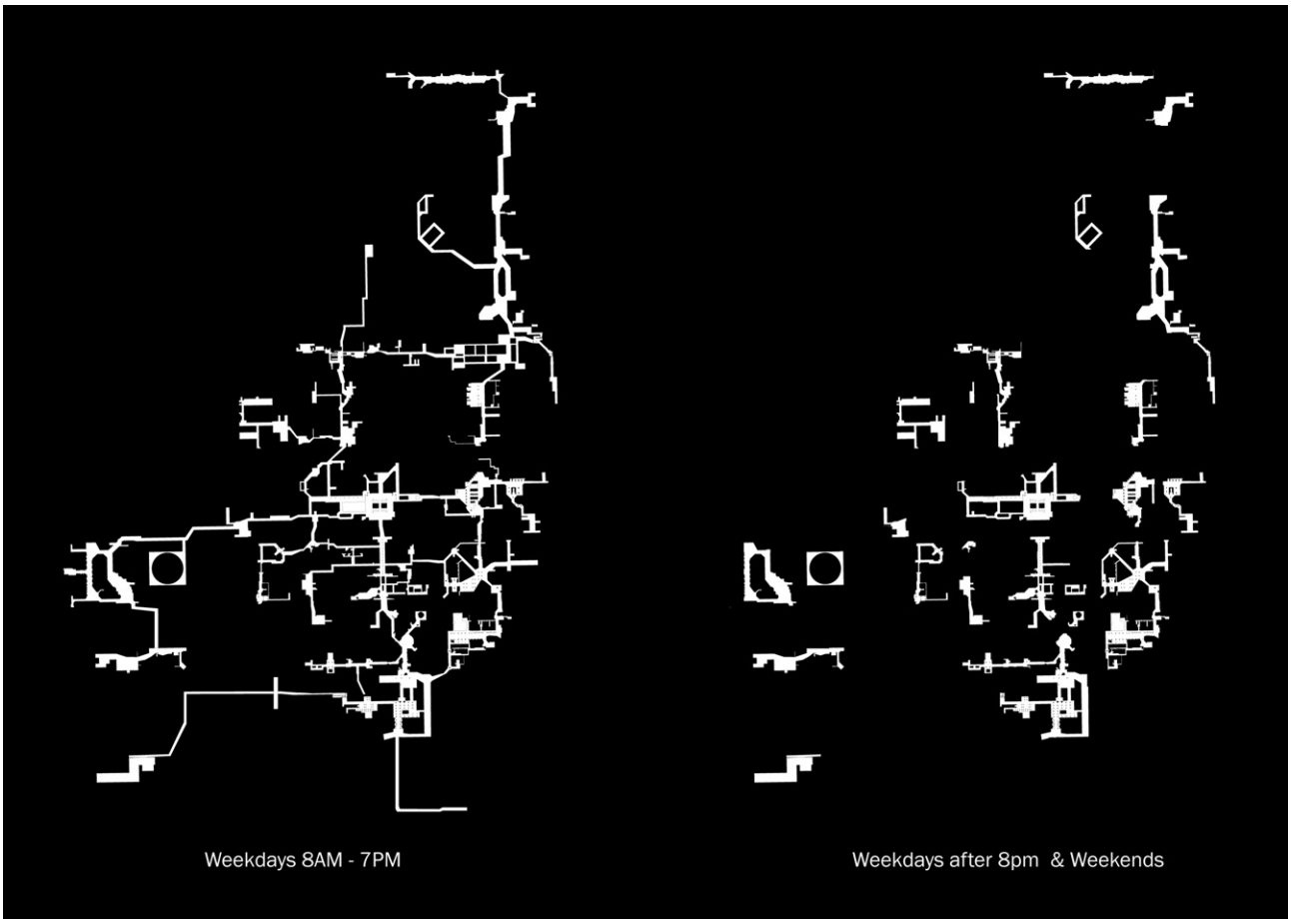


Fig. 13. Times coverage map of the Toronto underground network during weekdays, evenings, and weekends.

periods during business days: south-north traffic in the morning (inbound), lunchtime crowds at midday, and north-south traffic in late afternoon (outbound). During lulls (evenings and weekends) the network is primarily vacant. This peak-flow schedule reflects another paradoxical condition of the underground. It characterizes a system that by and large serves a day time population with little effort to address off-hour usage by downtown residents and out-of-town visitors. Ken Jones, a notable expert on the Toronto underground retail system, summarizes the pitfall and the potential of times coverage:

> "The underground system must be viewed as a specialized market. A place devoid of children and young families, the elderly, the lower income segments of our society and the underclass. In large part, the underground is a retailing subsystem that is directly linked to the corporate city of enterprise. It serves the residents of the white collar city of privilege. It has its own rhythm. It operates best for 5 days week and no more than 8 hours a day [...]. On the other hand, the Eaton Centre (2.6 million square feet in total) provides a seven day per week commercial environment in the downtown core that serves the tourist/convention market and that of the entire metropolitan area."[37]

### 4.5. Spatial control and surveillance

Accessibility problems are solvable but the single most contested issue in the underground is spatial control. The space of the underground is independently monitored by independent security agencies with closed circuit surveillance systems that are employed at the discretion of each independent proprietor that do not communicate with one other. Like shopping centres, spatial control of the underground is not immune to the controversial questions facing proprietors and tenants: who should be kept in or out? In a chapter of *City Lives* & *City Forms,* Jeffrey Hopkins explains the conflict:

> "[P]roprietors must maintain an atmosphere conducive to business, which necessitates prohibiting those members of the public and activities they perceive as detracting from

[37] Ken Jones, *Retail Dynamics in the Toronto Underground System*: 1993–1997, 17.

this objective. Given the high intensity of public use in these corridors, maintaining the desired level of spatial control may be problematic … [and] may be perceived by some members of the public as itself problematic if access is discriminatory and rules of conduct unduly restrictive."[38]

The compound effects of legibility, accessibility, flow and control may also bear significance on the collective safety and security of the thousands of users of the underground in the future. In the event of an emergency, clarity of signage and accessibility to the 125 points of egress may contribute to a comprehensive strategy for the mass exit of large concentrations of people from the underground system.[39] Several examples in other cities, such as the gas attacks in Tokyo in 1995 or the terrorists' bombing in London in 2005 indicate that serious consideration must be given to the design of wider distribution of egress points, larger more accessible open areas and network wide contingency plans, in the event of a natural disaster, transit accident, blackout or terrorist attack (Fig. 14).[40]

### 4.6. Economic volatility

Since the implementation of the wayfinding program in the early 1990s, the growth of the underground has by and large remained in the hands of private developers seeking opportunistic linkages to connect with other underground nodes. Without a strategy to shape its overall growth, let alone an agency to oversee it, the private rules that shape the underground and the private security forces that control it may fall dangerously prey to a larger and more significant force that could radically destabilize its current activity. That force involves the decentralization of retail dynamics brought on by the proliferation of regional shopping malls in the GTA. Over the past twenty five years, during an era of significant growth outside the metropolitan area, new commercial power centres have been emerging in GTA (Fig. 15). Most often found at major roadway junctions and geared towards automobile accessibility,

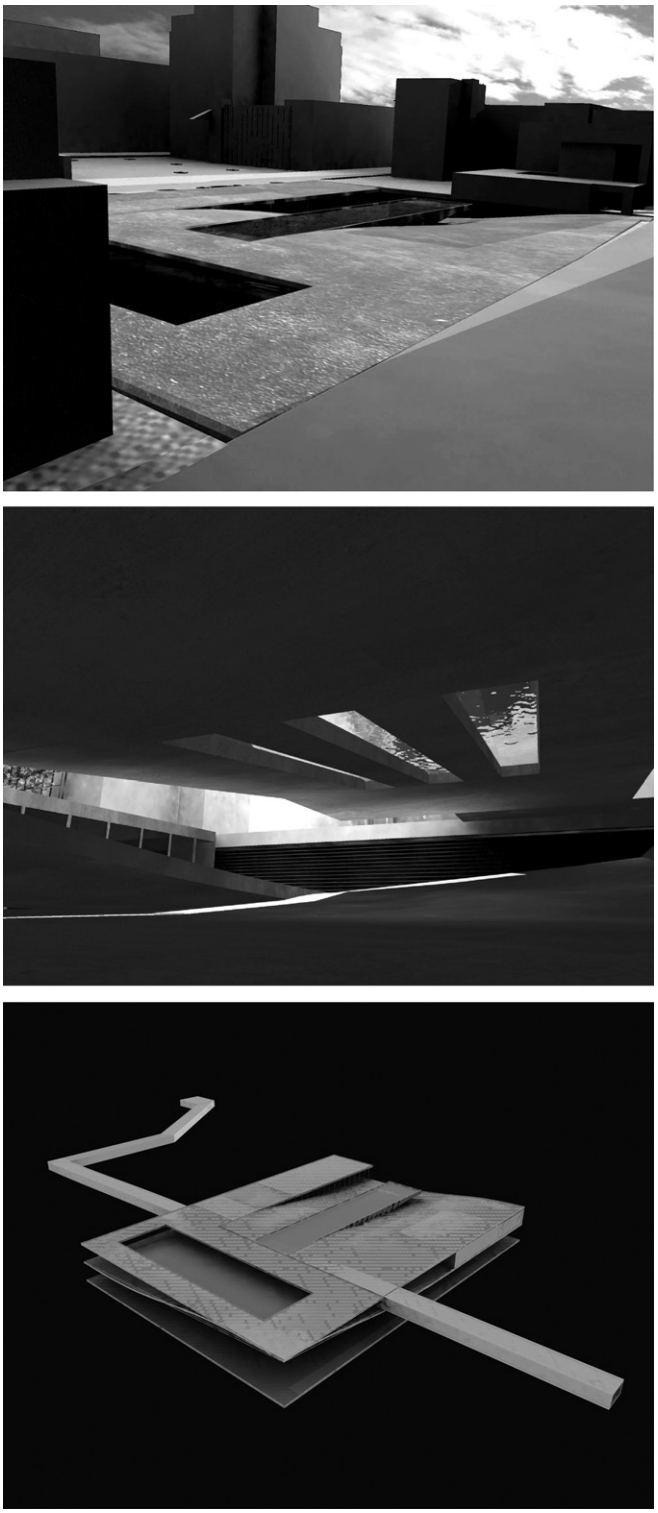

Fig. 14. Prototypical design for an underground node with surface connections and emergency access park at grade.

[38] See John Caulfield and Lesley Peake (eds.), *City Lives and City Forms* (Toronto: University of Toronto Press, 1996): p.xx. As a shopping complex, Ken Jones further observes that the underground is not without problems. "Principal among these is the debate between the ownership of public and private spaces. Enclosed commercial environments are normally private spaces. As such, they normally prohibit some basic freedoms (e.g., the right of free speech, the right to picket, the right to distribute political/religious materials) and typically certain groups are excluded (e.g., teenagers, the old, the poor – the disenfranchised). The control over large parts of the urban fabric and infrastructure by private ownership that operate only during business hours raises some fundamental political questions. Furthermore, the emergence of indoor cities in many urban inner city areas has created two competing and often disparate co-existing urban forms – the dynamic unplanned streetscape, and the controlled homogeneous indoor city environments. The necessity to integrate and to create connections between these two systems remains a major planning challenge." Ken Jones, "*Retail Dynamics in the Toronto Underground System: 1993–1997*", Research Report 1998-11 (Toronto: CSCA, Ryerson Polytechnic University, 1998), 2.

[39] On August 11, 1995, three passengers were killed in a fatal subway crash near Dupont Station on the Spadina-University Subway Line.

[40] A decentralized strategy proves to be the best way to protect public safety networks against failure that can be caused by a terrorist attack. In the 1990s, Chicago amalgamated the radio networks of its police, fire and EMS in a "distributed network" making them more difficult for terrorists to counter.

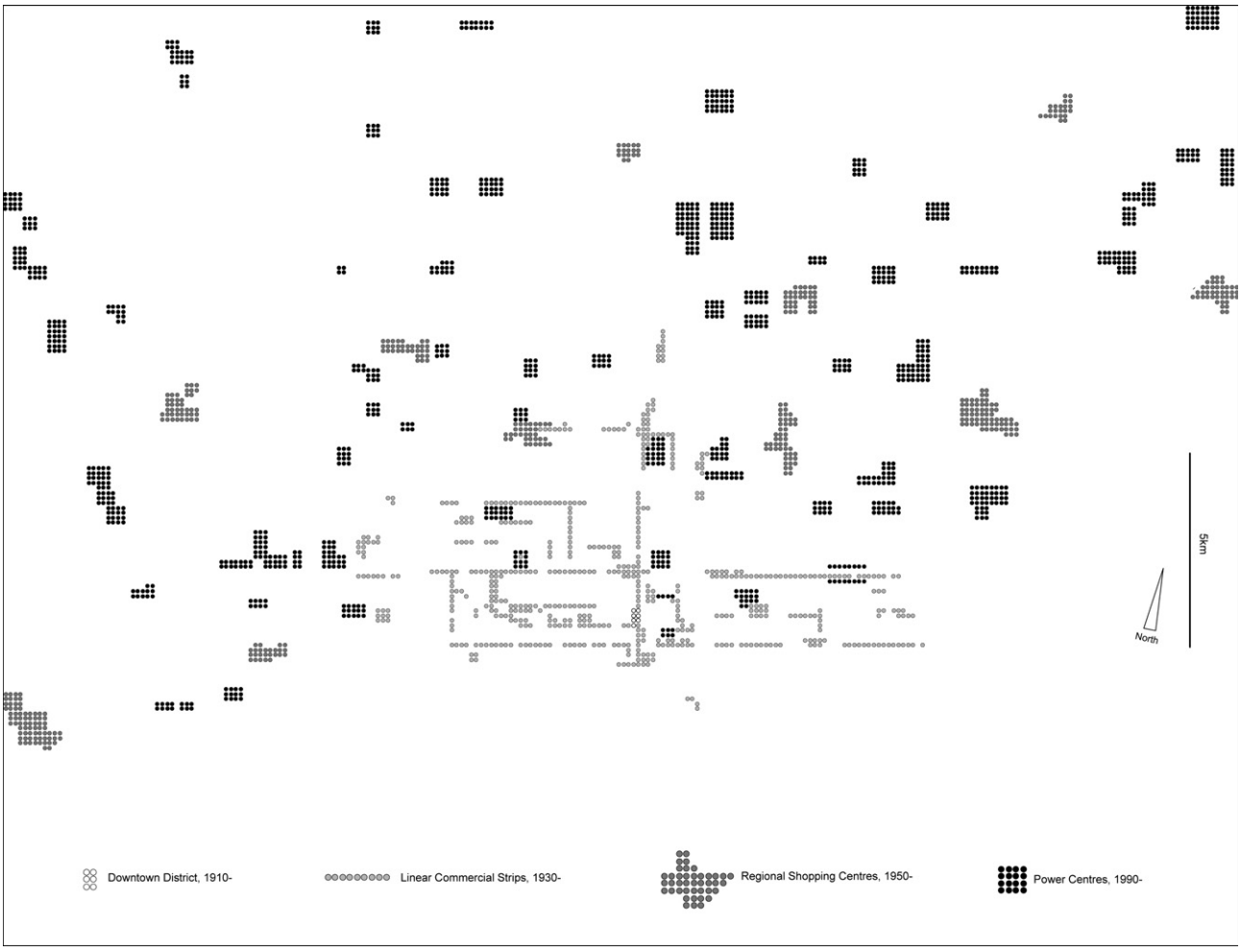


Fig. 15. Regional expansion of retail environments in the Greater Toronto Area.

these power centres represent the largest growth in retail activity in the Greater Toronto Area, and in Canada as a whole. There is mounting fear today that the underground, as part of the downtown area is at risk. In a report titled "The Big Box, The Big Screen, The Flagship and Beyond: Impacts and Trends in the Greater Toronto Area", Ken Jones explains this effect in greater detail:

> "The downtowns in Canada are in trouble. We've seen some relatively dramatic changes in a short period of time.... Some of the statistics are quite remarkable.... In a four-year period, the area flanking the Eaton Centre in downtown Toronto fell from the top spot to eighth in a ranking of 20 top retail destinations. It has been replaced by the fast-growing, highly affluent, suburban town of Markham, home to several major shopping malls, power centres and big box stores.... In an even starker sign of the times, a cluster of big box retailers and power centres around Highways 400 and 7 in Woodbridge has vaulted into third place.... These are things policy makers should be thinking about. If Canada's downtown cores fail to meet the challenge, they run the risk of becoming hollowed out the way many American city centres were destroyed by the rise of the regional shopping mall in the 1960s and 70s."[41]

From a shopping perspective, the reconsideration of the downtown area as an integrated pedestrian mall that includes the network underground and the streets above ground seems crucial if not inevitable.[42] Much lauded for

[41] See Dana Flavelle, "Suburban big boxes hurt downtowns: Ryerson survey sounds warning Eaton Centre is no longer top draw", *Toronto Star* (28 November 2002).

[42] A. Alfred Taubman, Michigan shopping-mall magnate, was a firm proponent that a complete circuit around a mall for example is essential to it success since it takes pedestrians back to the beginning and encourages them to circulate through the whole space. See Malcolm Gladwell, "The Terrazzo Jungle: Fifty years ago, the mall was born. America would never be the same", The New Yorker, Annals of Commerce, 15 March 2004. In 1956, Victor Gruen produced a world-renowned plan for a walkable downtown in Dallas Fort Worth. Gruen's plan incorporated substantial citizen participation over a seven-year period and resulted in specific area plans for sectors and districts. The plan was updated in the early 1980s and a Comprehensive Plan was approved in 2000. In *Delirious LA: Investigations in Landscape & Urbanism* (http://www.deliriousla.net/essays/2000-gruen.htm), Alan A. Loomis' excellent essay "Locating Victor Gruen" convincingly recapitulates the discourse on downtown planning strategies involving pedestrian malls.

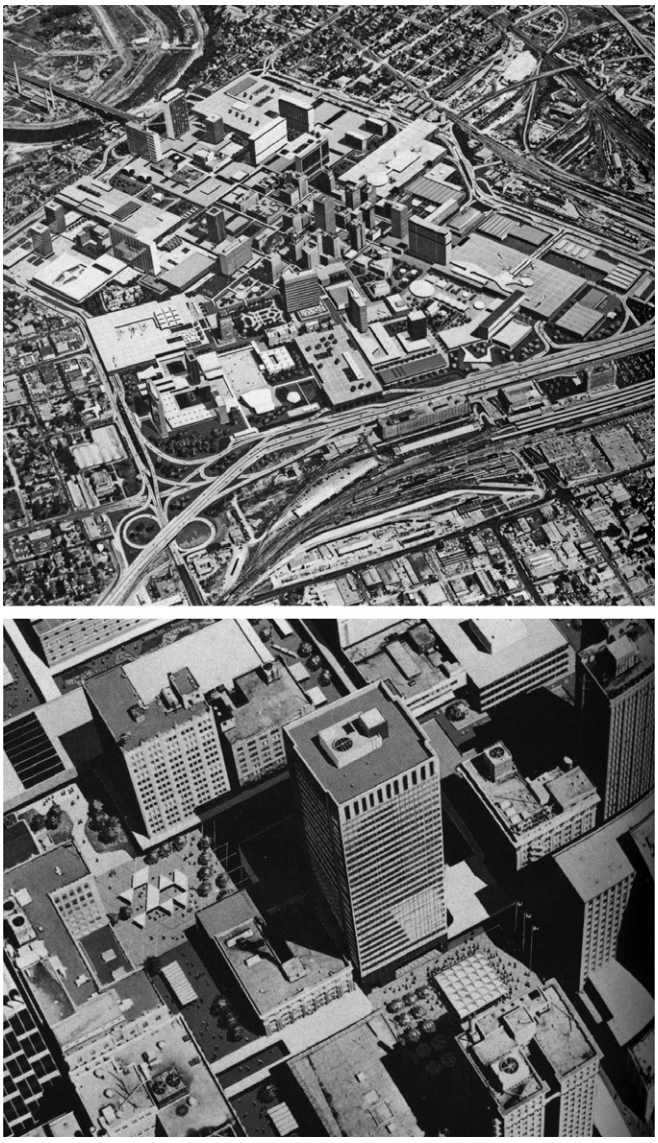

Fig. 16. Pedestrian mall: Victor Gruen's revitalization project for the city core of Fort Worth, Texas. Source: Victor Gruen, *The Heart of Our Cities – The Urban Crisis: Diagnosis and Cure* (New York: Simon and Shuster, 1964), 218.

his invention of the regional shopping mall in the 1950s, Victor Gruen provides a significant vision for the future of inner city areas as total pedestrian environments (see Fig. 16):

> "As people left the cities for the suburbs of postwar America, what they missed was a central place for shopping, walking, meeting neighbors or just spending time. Highway strip malls were uninspired, dangerous and single-use. In designing the automobile-based environment, then, architects should restore some of the satisfactions of the old pedestrian city, with new climate control technologies, within the safe walls of a mall."[43]

[43] See Victor Gruen, "Pedestrianism and Other Futures Modes of Transportation" in *Heart of Our Cities: Diagnosis and Cure* (New York: Simon and Scuster, 1964), 243–265.

What is remarkable today is that the demographic exodus that characterized the 1960s and 1970s is being countered more recently by a rise in residential populations within the Toronto downtown area. Condominium and waterfront developments for example are injecting new densities and new ethnicities in the core are of the GTA, no doubt requiring convenient access to retail goods, services and transit in the immediate future.[44] "Extended operating hours with an improved directional system could promise tremendous potential for the underground. With internet accessible maps, for example, people could plan and organize their trips to the underground ahead of time. The invention of a mapping tool like MapQuest or a MallFinder would radicalize the use of the underground."[45]

### 4.7. Earthworks

As part of the mechanics of city building, there is another less recognized effect of the underground involving the creation of an artificial headland. To accommodate excavated material from the development of downtown sites (and subway tunnels) as well as for dredged material from the expansion of the port from the 1960s to the 80s, the city port authority developed a plan for a shoreline disposal area in proximity to the downtown area that would also function as a coastal barrier.[46] In fact, the silty clay substrate of the city's

[44] See "Toronto: Population and Household Growth", *Urban Development Services – City of Toronto Bulletin* No. 1 (June 1997), 5. "Over the past 10 years, the number of Central Area residents grew by 20% while the number of households increased 28%. These rates of growth are comparable to that across the GTA as a whole, where since1986, the population has risen by 24% and households by 25%. The addition of 8948 occupied dwelling units in the Central Area since1991, or one-fifth of all the units added through-out Metropolitan Toronto, reflects the strength of the downtown in the regional housing market," (5).

[45] Ken Jones, in personal conversation (25 March 2005).

[46] The headland was initially proposed by the port authority in 1959 to provide protection for a new outer harbour and operate as a base for post-industrial land uses. By 1973, trends in water transportation radically changed and port development subsided. A new concept was then developed to promote recreational use of the still expanding land mass. While the sub-base of the headland is primarily composed of large concrete aggregate debris, the opportunity to dramatically increase the land base of the park emerged in 1973 with approximately 6 million cubic metres of sand dredged from the outer harbour. The sand was placed in the lee of the headland resulting in the formation of lagoons and sand spits. The next major expansion of land area began in 1979 with the construction of a headland on the eastern part of the headland. The headland was constructed to provide a protected area in which to confine material dredged from the inner habour and the Keating channel. Construction of the headland was completed in 1985 at which time the filling operation was concentrated on the completion of a more stable land shape on the south east side of the headland. Land filling operations still remain active on the eastern half of the headland while the western section is primarily used for recreational and ecological park use.

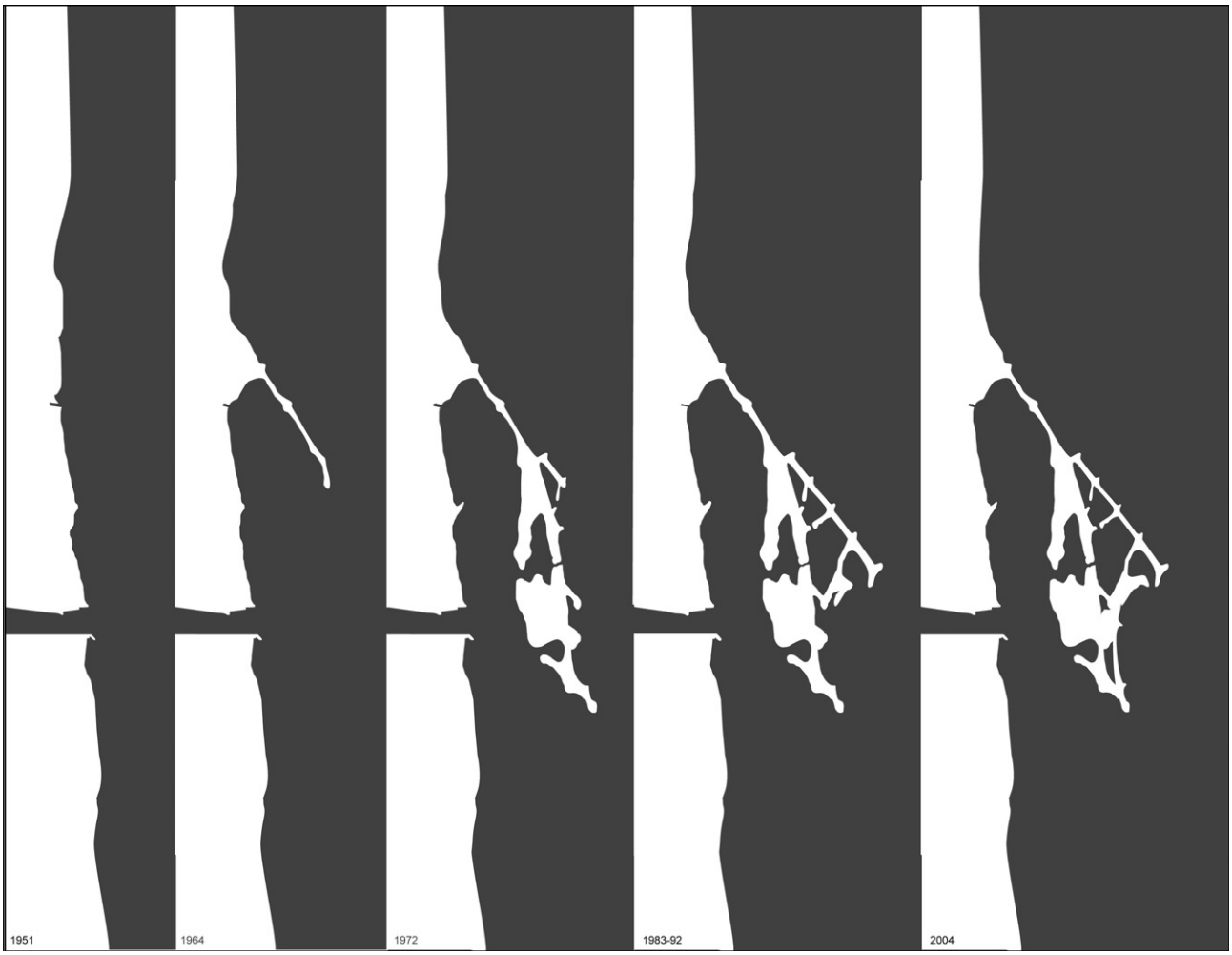


Fig. 17. Chronological development of the 5-km long headland used for waste disposal along the southern shoreline of downtown Toronto.

pre-existing geology proved an ideal base material for the construction of the headland. During the forty year period that spanned the development of the downtown area, the headland slowly grew into what is now a five kilometre long peninsula (Fig. 17). From a regime of mediated neglect and intervention, emergent vegetation colonized the peninsular landmass and with the intervention of the Toronto and Region Conservation Authority, was preserved as one of the most unique urban wilderness parks in North America.[47] As a coastal barrier and a disposal space, the headland model provides evidence of a critical correlation between development logistics and parkland manufacturing; where post-industrial sites can serve as productive landscapes that hold urban areas in a synthetic equilibrium.

## 5. Conclusion: sub-urbanization

The origins and transformations of the Toronto underground illustrate the complexity and multi-dimensionality of its structure. In the beginning, economic growth provided the incentive to catalyze its growth by separating pedestrian circulation from automobile traffic, a transformation that resulted in obvious advantages and disadvantages to both. That structural transformation required a greater level of integration with street, subway and rail infrastructure that in turn led to the creation of a planned network. The increased level of accessibility managed to transfigure what was historically perceived as an isolated urban space, into a network that connects pedestrians below and above ground. Seasonal cycles, real estate markets, trends in retail competition and mass-transit have and will undoubtedly continue to play an important relationship in its use, but considered otherwise, they may also be the binding agents that seal its future.

[47] See Toronto and Region Conservation Authority, *Tommy Thompson Park, Public Urban Wilderness: Habitat Creation & enhancement Projects, 1995–2000* (Toronto: TRCA, 2000).

Recent construction projects provide clear evidence of increasing change and interest in the quality of the downtown urban landscape. The new opera house to the west, the expansion of Ryerson University to the east, the construction of the Trump Tower in the middle and the planned air to rail link to the southwest signal the re-working of a comprehensive pedestrian infrastructure that can re-invigorate the downtown area as a whole with contemporary urban life and new cultural possibilities.[48] From an economic perspective, these contemporary transformations propose three basic principles that underlie the robustness of the network:

> "First, indoor cities should benefit form the existence of a strong and well defined urban tourism component. Ideally, the retail system should be physically linked with the necessary hotel and convention facilities. Second, the retailers must be supported by a strong local residential population base. Typically, this involves the existence of a significant inner city residential component of apartment and condominium units. Finally, the indoor city must be directly or in close to the cultural and artistic elements of the community such as art galleries, museums, theatre districts, sport complexes."

In the continued absence of a mechanism for coordinating the activities of the network, the city's urban design department may have to take a leadership role in addressing several key questions that still linger in the wake of its involvement more than two decades ago. Should the existing wayfinding system be ratified or the accessibility program upgraded? How should the underground be monitored or controlled? If so, who will bear the cost and who will take responsibility for its long term management?

The development of a long term strategy is clearly required for the city urban design department to resolve these questions. This strategy involves a minimum of three priority objectives to establish a direction that is clear yet flexible. First, the mapping of the city's downtown core is urgently needed to provide a simple and precise way of navigating the downtown area with an emphasis on spatial references and street level connections.[49] Second, the synchronization of underground operating hours during the evenings and weekends must be addressed to respond to the needs of a growing downtown resident population. Third, the development of a directive plan that integrates the future growth of retail amenities below ground with public spaces on the street level above ground (Fig. 18).[50]

Acknowledging the underground as an urban landscape is therefore a crucial critical task.[51] From the economic growth that catalyzed its development in the 1970s and 80s to the growing intensification of the downtown core at the turn of this century, the underground has grown from the innocence of a simple tunnel to a sophisticated complex of transportation nodes, shopping concourses and social spaces. It connects and joins shops, food courts, subway stations and regional rail below grade to the sidewalks, plazas, squares, parks, streets and blocks above grade (Fig. 19). As part of a greater urban landscape, its surface is thickening and in turn, the network it binds demands a more synthetic rather than individuated approach. As an exercise of co-operative capitalism and co-operative urbanism that transcends the boundaries of property ownership,[52] its future success uniquely depends on the involvement of planning officials and transit authorities in close coordination with property owners, municipal

[48] Renewed interest in the quality of the downtown Toronto area was also demonstrated 1999 when the Eaton Centre – the underground's biggest and perhaps most important retail node – was saved from bankruptcy, acquired by mall giant, Sears Corporation and financed by the Toronto Dominion Bank and Cadillac Fairview Corporation, one of North America's largest biggest developers.

[49] The accurate mapping of the city's downtown core is equally critical to the safe and expedient flow of residents, workers and tourists in the event of a significant disaster or public emergency.

[50] Urban designer and planner, William H. Whyte has dedicated his entire career to the analysis and design of downtown public spaces. For clear and pragmatic advice, see *The City: Rediscovering the Center*, New York: Doubleday, 1988.

[51] The reluctance of urban designers and academics to engage the dynamics of the underground is stunning. For almost 50 years, urban designers, landscape architects and planners have longed for car-free pedestrian environments that are safe, secure and accessible. From a planning perspective, the Toronto underground may be the ultimate form of attrition of the automobile on the urban landscape: there are no parking lots, no asphalt, and no congestion. With its mass-transit accessibility, it is an ideal pedestrian network. This reluctance may in part be attributable to a prevailing attitude that privately-controlled underground shopping is undesirable, at best dismissible. As self-contained environments, they are perceived as lying outside the so-called public domain and that they kill off street life. As a more legitimate form of collective space, street-level activity located within municipal right-of-ways therefore receives much more advocacy.

[52] In the case of the Toronto underground, for example, while its main structure has been constructed as the bargain basement of skyscrapers, its network may some day fall within the jurisdiction of city authorities as a matter of logistical practicality and collective functionality. The case of the pedestrian walkway system in Calgary, named +15, is informative, since management is coordinated by individual contractual agreements between property owners and the city planning department.

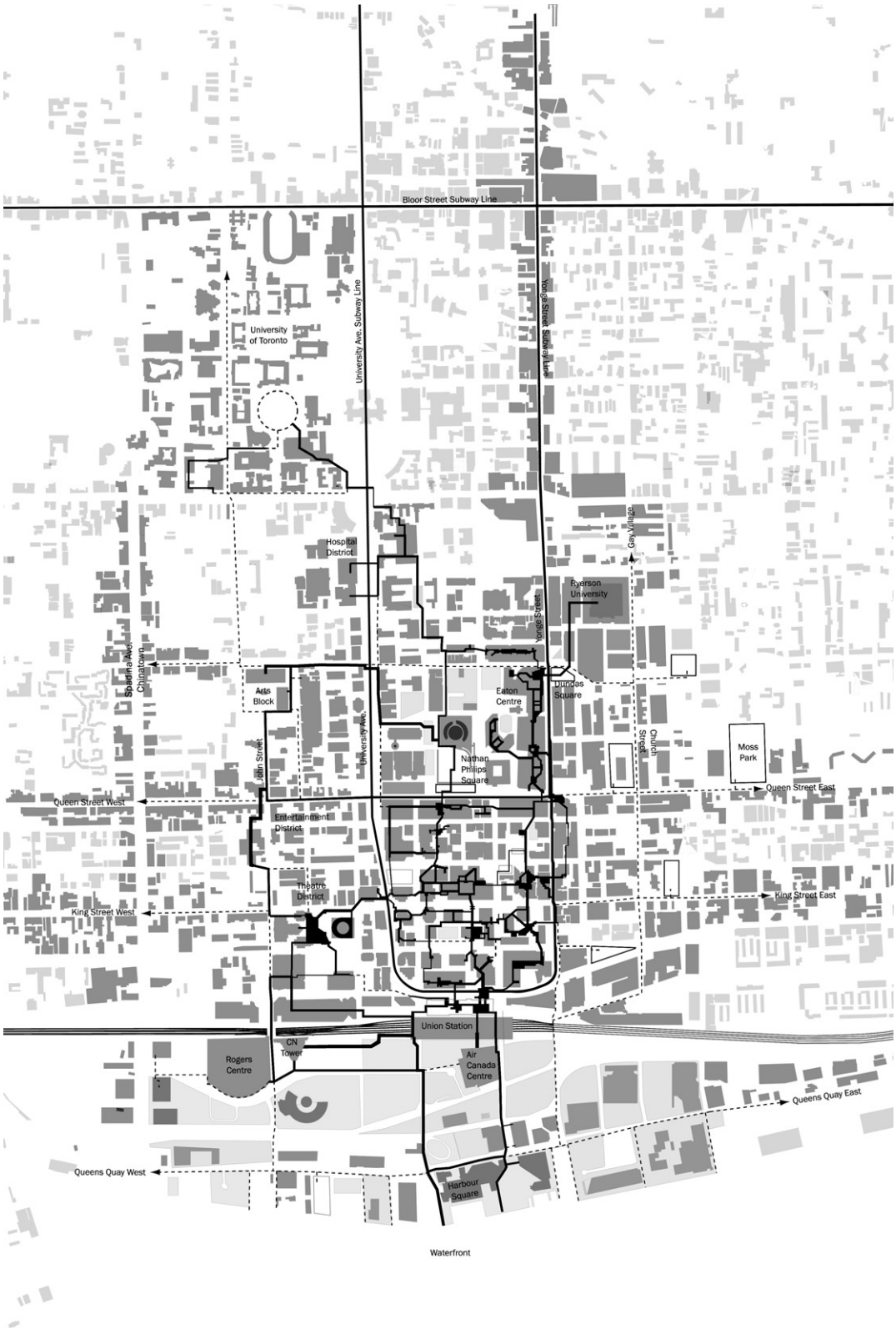


Fig. 18. Envisioned zones (dashed vectors) of growth of the Toronto underground network by 2020: a comprehensive pedestrian infrastructure connecting the existing underground to the major cultural districts in the centre, the universities to the north, the urban markets to the east and west, as well as to the new waterfront parks to the south.

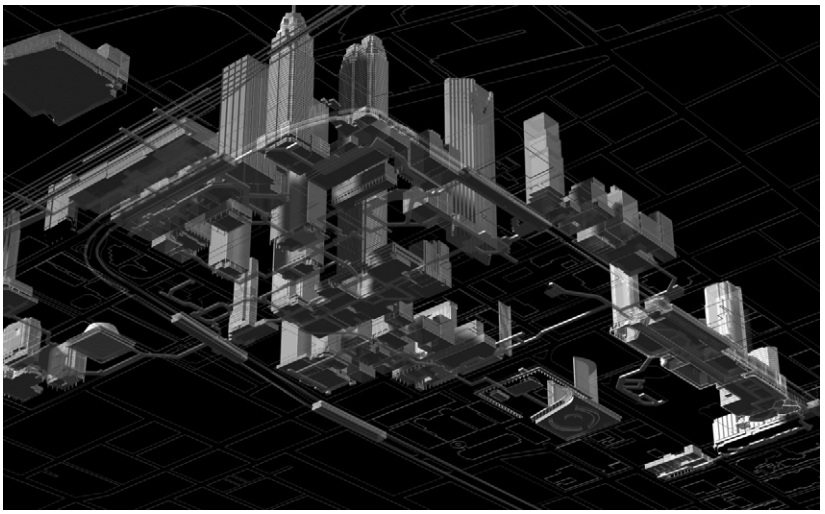

Fig. 19. Perspective view of the Toronto underground network from below.

agencies, service providers and pedestrians that use it every day.[53]

With the growing number of pedestrian walkway systems – below ground, above ground or a combination of both – in major North American cities, the research suggests that the sphere of influence of pedestrian networks offers intrinsic potential to reinvigorate urban areas while countering the effects of traffic congestion. With the emergence of mass transit in the 21st century, downtowns clearly need a lesson from the suburbs. The regional shopping mall was one of the only new building types in the 20th century that represented a response to the emergence of the automobile as a means of transportation. In the 21st century, the downtown pedestrian mall will be another. If city-builders are genuinely interested in avoiding the hollowing out of downtown cores from the spread of low-rise regional development that is so typical of other North American cities today, it is only through the reevaluation of its present urbanism that we may better understand how to strengthen the presence of underground networks as dynamic public landscapes.

[53] The multi-dimensional nature of the underground exposes the limitations of the conventional precepts of *public* and *private* space. These spatial characterizations fail to acknowledge the more tacit economic forces and multiplicity of users that drive the capital infrastructure required for city-building and growth. The emergence of this discourse was in part the subject of an influential conference held in 1989, curated and edited by Detlef Mertins in *Metropolitan Mutations: The Architecture of Emerging Public Spaces*, RAIC Annual I (Boston: Little Brown & Company, 1989). During these proceedings, the idea of 'publicness' was critically re-evaluated by George Baird in his presentation entitled "The Space of Appearance" (135–152). For a greater discussion on the politics of the public realm, see also Jürgen Habermas, *The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society,* translated by Thomas Burger (Cambridge, MA: MIT Press, 1989). As city builders, urban designers and planners must recognize that the Toronto underground is part of a larger economic system that binds the entire surface of the downtown urban landscape. In *The Harvard Design School Guide to Shopping*, Sze Tsung Leong's piercing introduction is particular instructive for urban designers: "Shopping is arguably the last remaining form of public activity. Through a battery of increasing predatory forms, shopping has infiltrated, colonized and even replaced almost every aspect of urban life. Town centers, suburbs, streets, and now airports, train stations, museums, hospitals, schools, the Internet, and the military are shaped by the mechanisms and spaces of shopping. The voracity by which shopping pursues the public has, in effect, made it one of the principal – if only – modes by which we experience the city. . .. Perhaps the beginning of the 21st century will be remembered as the point where the urban could no longer be understood without shopping." Chuihua Judy Chung, Jeffrey Inaba, Rem Koolhaas, Sze Tsung Leong (eds.), *Harvard Design School Guide to Shopping/ Harvard Design School Project on the City 2* (New York: Taschen, 2002), inside cover.

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