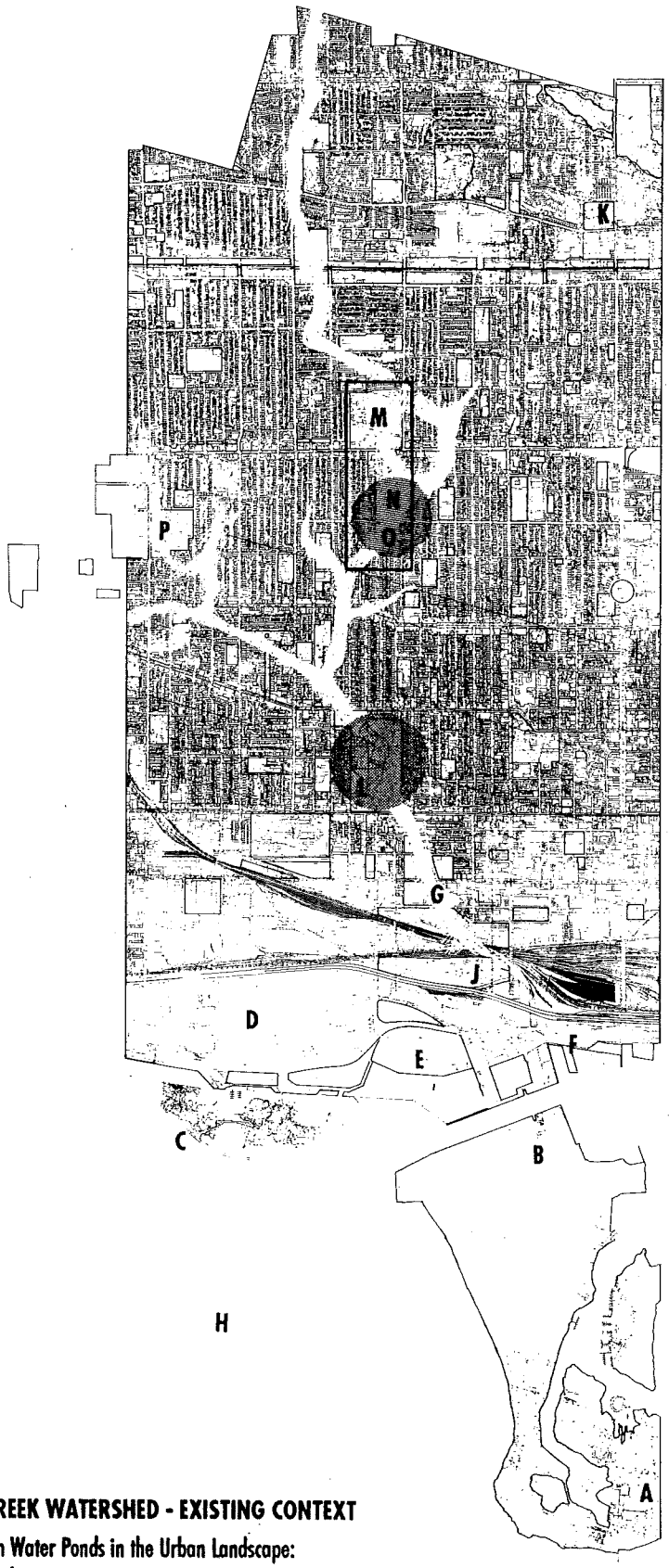
RAIN WATER PONDS IN AN URBAN LANDSCAPE
GARRISON CREEK DEMONSTRATION PROJECT

for the Waterfront Regeneration Trust
The Honourable David Crombie, PC, Commissioner
David Carter, Deputy Commissioner

BROWN AND STOREY ARCHITECTS

March 31 1996



KEY

A	Toronto Island
B	Island Airport
C	Ontario Place
D	CNE Grounds
E	Coronation Park
F	Industrial Wtaerfront
G	Garrison Ravine Profile
H	Lake Ontario
J	Fort York
K	Casa Loma
L	Trinity Bellwoods Park
M	Christie Pits
N	Bickford Vale
O	Montrose School Yard
P	Dufferin Grove
Q	Profile of the buried Garrison Ravine

GARRISON CREEK WATERSHED - EXISTING CONTEXT

Taken from"Rain Water Ponds in the Urban Landscape:
the Garrison Creek Demonstration Project" - Brown and Storey Architects

Rain Water in the Urban Landscape
Garrison Creek Demonstration Project

Preface

Brown and Storey Architects were commissioned by the Waterfront Regeneration Trust to investigate and identify the opportunities for a demonstration project in the Garrison Creek watershed that would address the feasibility of retrofitting stormwater utilization to a built-up urban setting. The progress of the work of this study was marked by several meetings hosted by the Regeneration Trust and attended by representatives from the City of Toronto Parks and Recreation Department, the Planning and Development Department, the Public Works and the Environment Department, the National Water Research Institute, and from the Waterfront Regeneration Trust. Their input has added greatly to the scope of the study and we thank them for their attendance and support of this work.

Much of the base information of the existing storm system has been provided to us by the Public Works and the Environmental Department; we thank the Deputy Commissioner Werner Wichman and the Director of Engineering Wayne Greene for their help in this regard. We would like to thank Jiri Marsalek of the National Water Research Institute in particular for his support and invaluable advice.

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Rain Water Ponds in an Urban Landscape
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Nature, the City and Infrastructure

1
Construction of the Crawford St. Bridge at Trinity Bellwoods Park, 1913

The connection, or the disconnection, between urbanism and environmentalism - city and nature - is made by the human intervention of "infrastructure". How we choose to lay this groundwork for the physical support of our daily lives - water, movement, light, waste removal - can create a disjointed gap in our existence between our city and our natural environment. Or, a considered infrastructure can knit these two seemingly incompatible elements together in meaningful relationships that enrich the lives of the city's inhabitants.

The subject of this study, "retrofitting stormwater management systems to a built-up urban setting" appears to be technical and dry. Yet this consideration of how our city deals with its stormwater collection, storage, and treatment, points to a new opportunity to make those choices that can reverse the trend of the last one hundred years of disconnecting the city from its landscape, and regenerate the open and hidden landscapes of Toronto into a vital and living part of the experience of our communities.

The content of this work proposes conceptual approaches to creating stormwater management pond systems in the Garrison Creek watershed. These pond systems are suggested within a phased implementation that could progressively divert stormwater from the present system for collection, storage, treatment and re-use within the local community. The feasibility of this system is reinforced by maps that describe the present inventory of green spaces that could be sites for ponds.

2
Hemel Hempstead Water Gardens, England, c. 1959, Sir Geoffrey Jellicoe

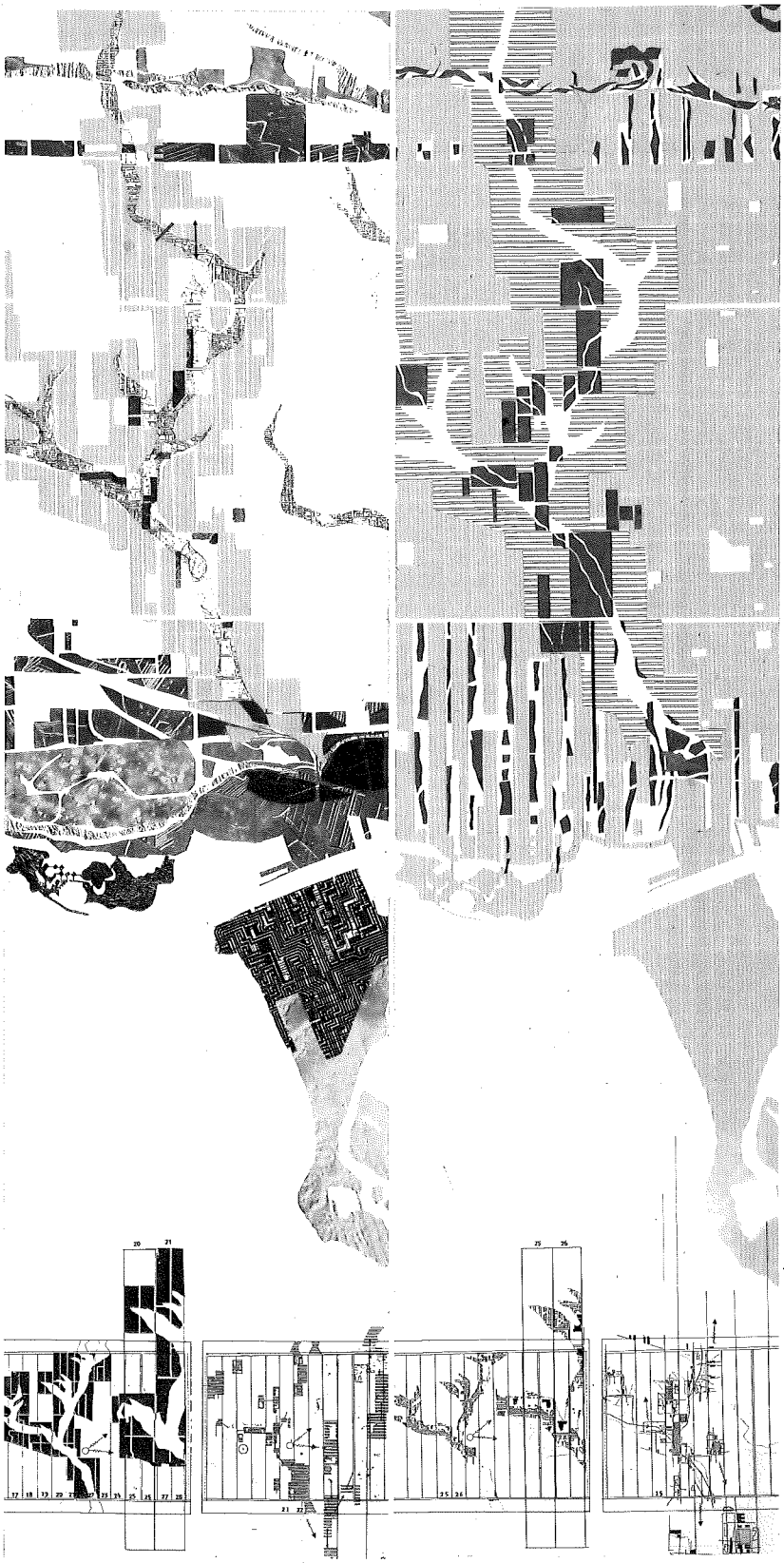
Other maps document areas of fill, existing stormwater lines, and diagrammatic systems of collection through connected ponds. Two events form the foundation of this work:

- the new sewer system master plan in the City of Toronto that currently proposes a structurally intensive engineered system of collecting the city's CSO's (combined sewer overflows) and some stormwater into large storage tunnels buried along the length of the lakeshore and the Don River, and pumping this to an expanded treatment facility in the east end of Toronto for further treatment

- and the potential of the Garrison Creek, buried one hundred years ago, as an original and enduring element of the city's formation and development, and a catalyst in the making of a connected open space sytem in the west end of Toronto.

The thesis of this study suggests that the existing natural watersheds, like that of the Garrison Creek recalling the original landscape of Toronto, can be used as sites for stormwater management pond systems. The site of this study is the Garrison Creek that exists today in an elaborate Victorian brick sewer running under the remaining traces of the original Garrison Ravine. Not only can these connected pond systems serve to collect, treat, and re-use stormwater locally, thereby reducing CSO's, they can also act as a catalyst in the creation of a series of connected open spaces knitting both an urban and green infrastructure back to the waterfront of Lake Ontario.

The Ecosystem Approach



By adopting an ecosystem approach, this study looks at integrated and sustainable infrastructure solutions that respond to more than one focus. For example, an examination of the open spaces that trace the Garrison Ravine should include a broad range of aspects: actual physical data (sizes, characteristics, topography, etc.) built form patterns and the cultural heritage in the watershed area, local economic development, archaeological and "buried" artifacts, how water is collected, how spaces are lit at night, how people, cyclists, and cars move down the system, and so on.

In practical terms, this means that the cost of our basic water infrastructure, seen as one aspect or focus, could be used at the same time to exponentially increase the breadth of public benefit through the regeneration of our parks and the creation of connected systems, by dealing with the other aspects at the same time.

The work of this study is presented in three sections that describe a multi-faceted approach to sustainable urban stormwater management:

1. ***The Ravine, the City, and Water Infrastructure: Co-Evolving Systems***

2. ***A Connected Pond System in the Garrison Creek Watershed***

3. ***Christie Pits / Bickford Demonstration Project: A Detail of the Larger System***

The Ravine, the City, and Water Infrastructure: Co-Evolving Systems

1

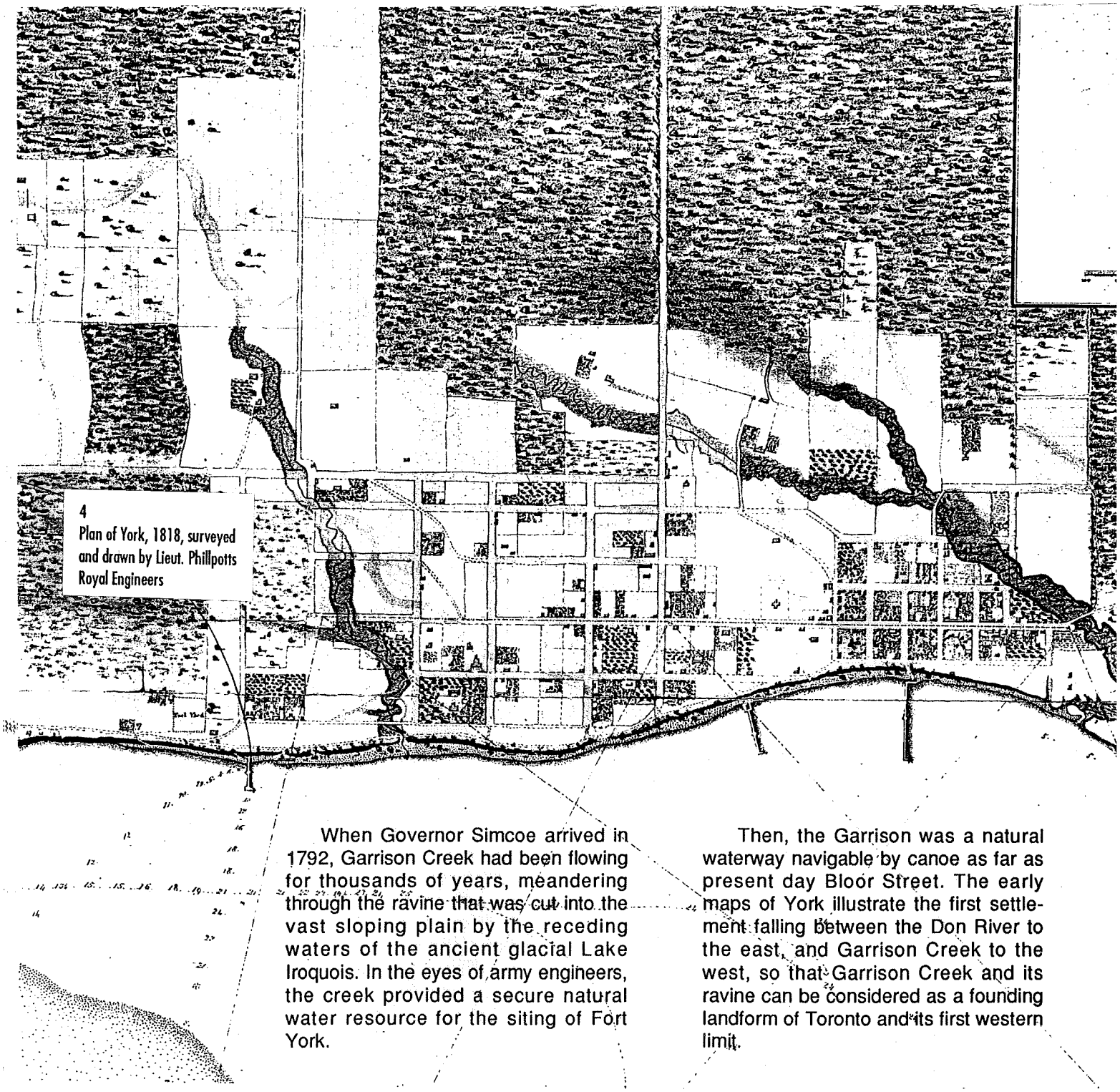
An ecological approach suggests that many realities exist in the study area that should be examined both separately and together. The idea of the co-evolving systems goes further to suggest that the evolution of these different aspects has come about through a series of dynamic balances and imbalances that occur between the natural environment and the growth of the city. How the infrastructure has been built to both collect and treat water and sewage is interesting as a gauge of those imbalances that are a constantly changing and evolving phenomenon of the growth of the city.

The theory of the co-evolving system suggests that systems, ie. of the environment and of urban growth, cannot be looked at independently but in connected pairs. Acts upon one system necessarily affects the other.

The history of Garrison Creek is a story of balances and imbalances that have occurred in urban growth and environmental change during the founding and evolution of Toronto.The natural boundaries of the Garrison watershed have formed over centuries, reflecting meteorological patterns and calamities. The levelling of this landscape and the replacement of the creek with a succession of estate lots, villas, streets and residential areas have correspondingly reflected urban flows of people, traffic, and goods.

3
Wychwood Ravine, 1910, part of the headwaters of Taddle Creek; approximate location at Davenport Road

The Original Condition



4
Plan of York, 1818, surveyed and drawn by Lieut. Phillpotts Royal Engineers

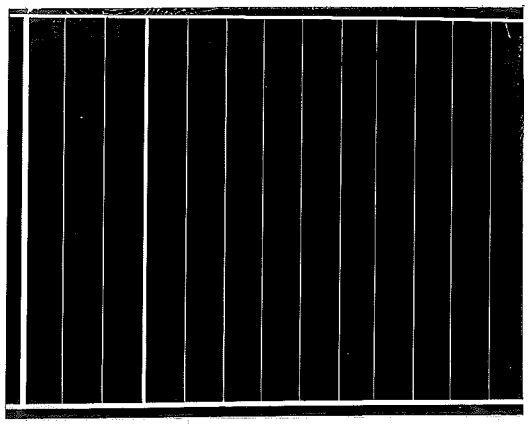
When Governor Simcoe arrived in 1792, Garrison Creek had been flowing for thousands of years, meandering through the ravine that was cut into the vast sloping plain by the receding waters of the ancient glacial Lake Iroquois. In the eyes of army engineers, the creek provided a secure natural water resource for the siting of Fort York.

Then, the Garrison was a natural waterway navigable by canoe as far as present day Bloor Street. The early maps of York illustrate the first settlement falling between the Don River to the east, and Garrison Creek to the west, so that Garrison Creek and its ravine can be considered as a founding landform of Toronto and its first western limit.

The balance between the settlement and the ravine was first tipped with the drafting of "Park Lots". This first system of strictly orthogonal land division was laid out by the engineers of Lord Simcoe to be large estates offered as enticements to prospective gentlemen settlers. The park lots were long and narrow, extending from Bloor Street south to Queen Street (then Lot Street), without regard to the Garrison Ravine. Although the boundaries of these park lots did not recognize the influence of the ravines, the early estates built in the park lot system were sited to take most advantage of their property's natural features. A typical villa would normally be sited on the banks of the ravine, at the highest point, and formally addressing Lake Ontario.

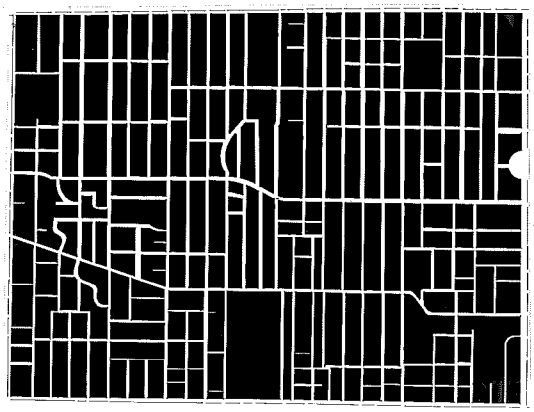
The accompanying illustrations show a portion of the Garrison watershed, comparing three evolving conditions on the same piece of land, extending from Bloor Street (north) to Queen Street to the south, and Dufferin Street (west) to Spadina Avenue to the east. These maps show the original ravine profile, the park lot division that was superimposed on the ravine, and the present day street grid.

Although the present day condition of street grids and the much smaller residential lot division are primarily determined by the orthogonal nature of the park lots, there are still a number of anomalies that reflect the original ravine presence. These deviations include several curving streets, like Crawford Street, Heydon Road, and St. Anne's Road that reflect both the main course of Garrison Creek and some of its tributaries. The larger blocks indicate major open spaces like Trinity Bellwoods Park, Dufferin Grove, Bickford Vale and several school yards that trace the original ravine landscape.

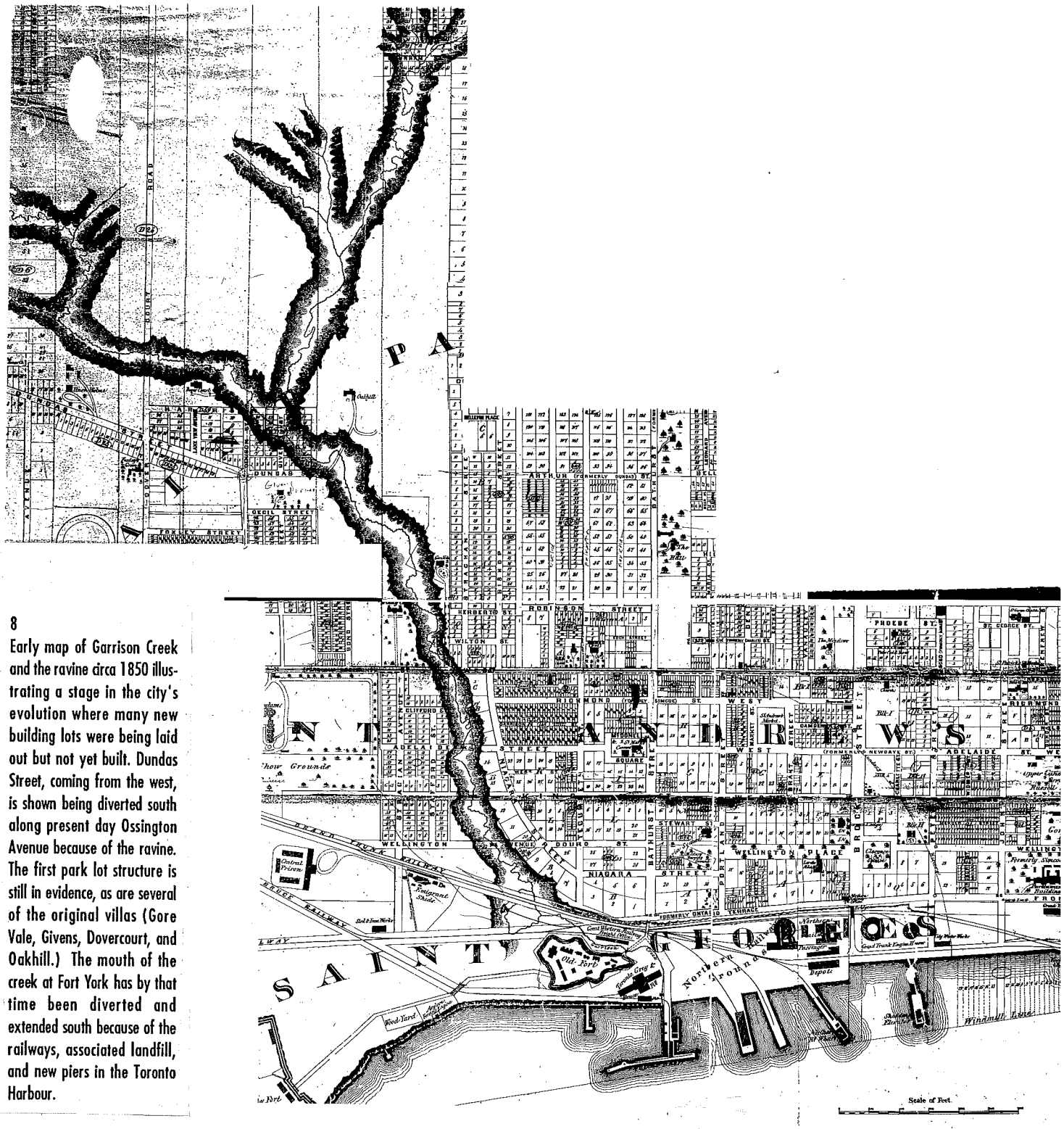


5 The profile of the Garrison Creek Ravine from Bloor Street (north) to Queen Street (south) and from Dufferin St. (west) to Spadina Avenue (east) Russell Creek is also present in the eastern portion.,

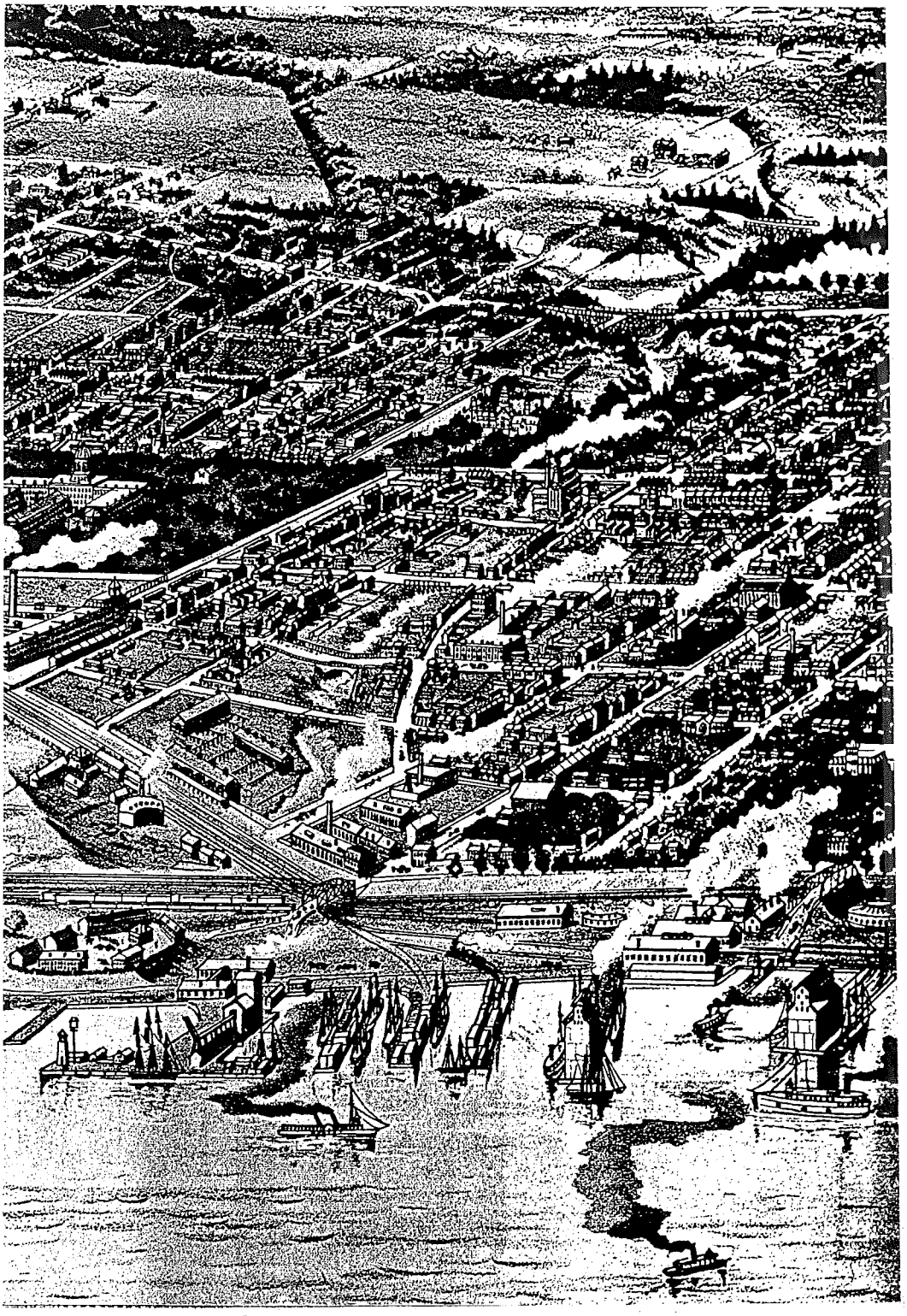
6 The same area of land showing the superimposition of the park lot system drafted by Lord Simcoe's engineers.



7 The existing street grid that has evolved from the influences of both the orthogonal park lot system and the natural landform of the ravine.



8
Early map of Garrison Creek and the ravine circa 1850 illustrating a stage in the city's evolution where many new building lots were being laid out but not yet built. Dundas Street, coming from the west, is shown being diverted south along present day Ossington Avenue because of the ravine. The first park lot structure is still in evidence, as are several of the original villas (Gore Vale, Givens, Dovercourt, and Oakhill.) The mouth of the creek at Fort York has by that time been diverted and extended south because of the railways, associated landfill, and new piers in the Toronto Harbour.



9
A detail taken from *"A Bird's-eye View of Toronto,* c. 1878, prior to the building of the Garrison Sewer. This view illustrates the many industries that were sited along the southern portion of the creek.

The Garrison Sewer

10
Inside the Garrison Sewer during construction circa 1888.

11
Filling in Garrison Creek, circa 1888

It is a testament to the prominence of Garrison Creek in the early formation of Toronto that many early industries, like breweries and brickyard, were sited along its banks from Queen Street (then known as Lot Street) to Fort York at the lakefront. However, as industry and settlement increased, the Garrison was used for discarding waste, and quickly became polluted. It rapidly lost the status of water resource to that of a health hazard due to its "noxious fumes".

In the late 1880's the creek was buried in a ten foot diameter brick sewer, built to provide predictable, safe and serviceable stormwater and waste management. If infrastructure can be considered as the connection between the city and the natural landscape, then the burial of the creek, the ravine and ultimately the bridges, reflects the attitudes of Victorian Toronto - that nature was to be found in the wilderness, and open space within the city limits was better managed as predictable land parcels.

The encasement of Garrison Creek happened at the same time that the city had embarked upon the construction of a full sewer system - one that not only allowed the city to accomplish its subsequent rapid intensification, but that also saw the disappearance of many creeks that once flowed through Toronto's landscape. These include Taddle Creek, Garrison Creek and Russell Creek.

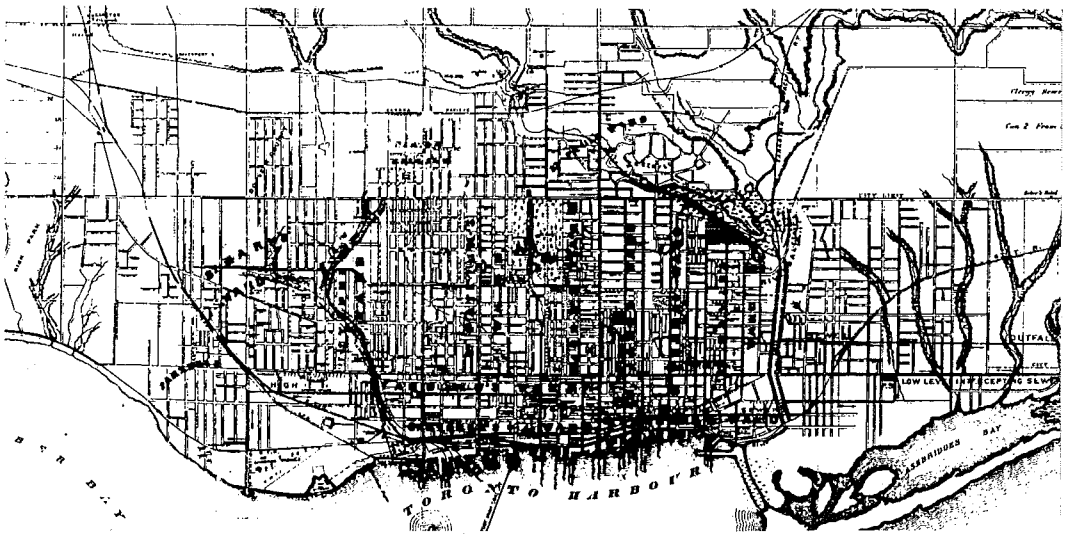
The Combined Sewer System, the Separate System, and CSO's

Combined Sewer System: The system that was built in the Garrison watershed then was a typical combined sewer system, which is still essentially in place today. In this system, both stormwater and sanitary sewage are collected in a single pipe.

Stormwater collected in an urban setting includes rainfall that passes over street pavements, roof surfaces, gardens, yards, and trees, and which brings with it both bacterial and metal contaminants. This combined volume of rainwater run-off and sanitary sewage is carried to a treatment plant, where both the sewage and stormwater are treated as sewage and discharged to the "receiving waters" - Lake Ontario. It has not been possible to specifically treat the contaminants found in stormwater run-off in this process.

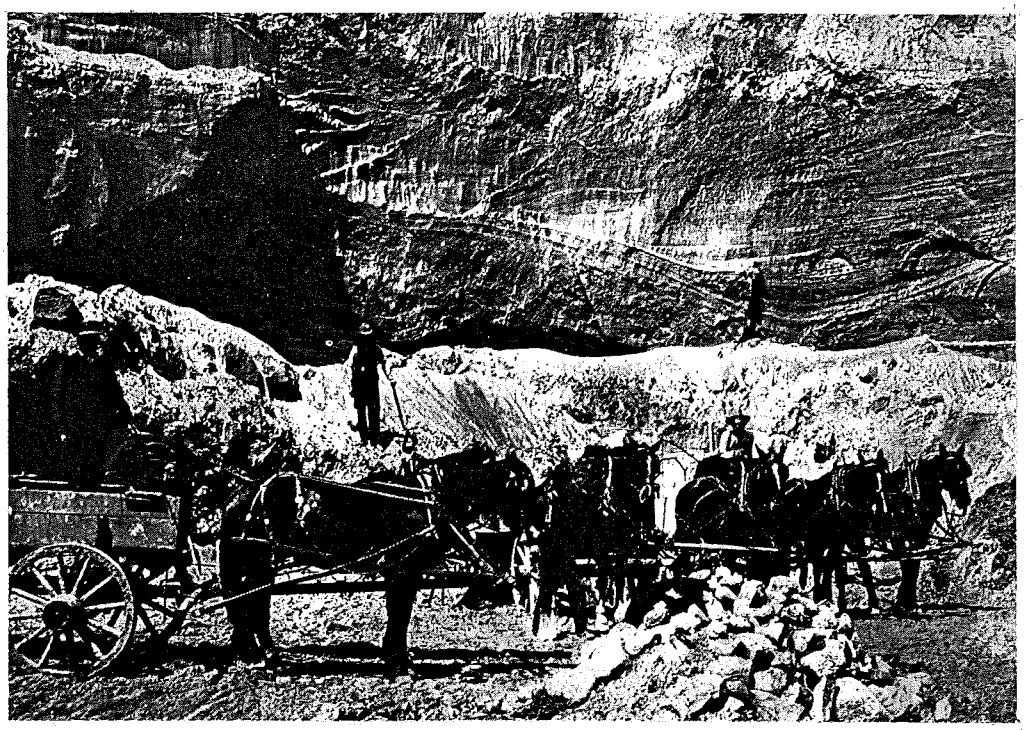
CSO's- Combined Sewer Overflows: In heavy rainfalls, the stormwater collected suddenly increases and exceeds the design capacity of the sewer system's collection network. This excess, combined with the sewage in thesystem, then escapes from the collection system into the lake through what are called "CSO's" - combined sewer overflows. These discharges occur in a number of outfalls along the lakeshore and are considered to be the prime cause of local bacterial pollution, causing beach closures at the Lake Ontario waterfront. Thus the elimination or diminishing the CSO's is a common environmental, political, and community goal.

The Separate Sewer System: In an alternate system, the separate sewer system, stormwater is collected into its own collector pipe and carried to the receiving waters. This system allows interventions to be made in a range of treatment techniques before entering the pipes or anywhere along the treatment route. Municipal sewage is contained in sanitary sewers and taken to the sewage treatment plant and treated before being discharged into the lake. Some separate storm lines have been constructed in the city that collect road run-off, but most run-off from the private yards, gardens, and driveways continue to be collected in the older, main combined sewer system.



12
Proposed Intercepting Sewers and Outfall, February 1889, City Engineer's Office; This map also shows the creek and ravine systems that still existed as functioning watersheds in the city.

Co-existence of the City and the Ravine



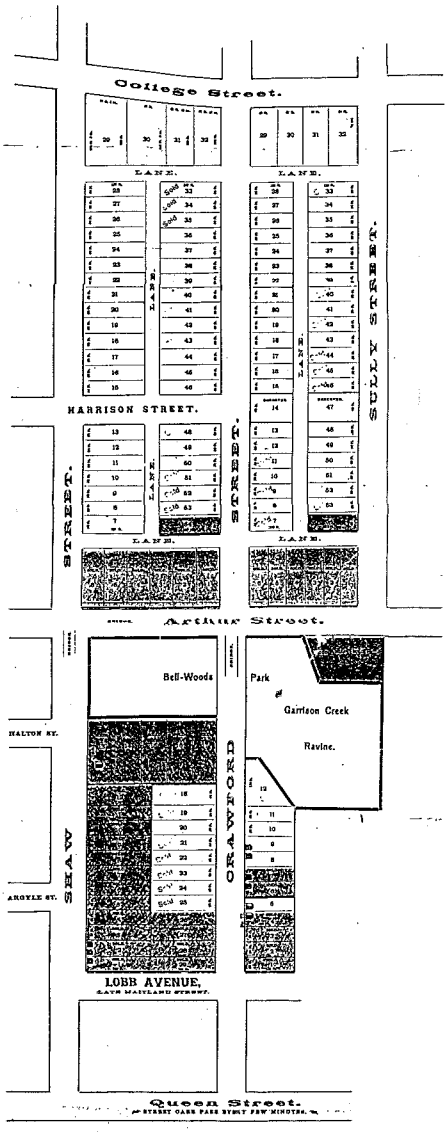
13
Shaw Street Sand Pit: This quarry was located to the north west of Christie Pits, and was about the same size. In the early 1910's, Shaw Pits was filled with garbage, topped up with 10 feet of top soil, and sold off for building lots. The results of building houses on this type of uncompacted, unregulated fill has resulted in many of the houses sinking and twisting to an alarming degree.

During the rapid growth that reached a certain "completion" in the 1920's and 30's, the landform of the Garrison Creek Ravine, though partially filled at the base by the brick sewer, persisted as a continuous open space network in this western watershed area, more or less bounded by Dufferin Avenue to the west, Bathurst Street to the east, and running south from Davenport Road to the lake.

14
Trinity Bellwoods Park, 1913

Certain locations along Garrison Creek, like Christie Pits, and, directly to the north, Shaw Pits, became gravel quarries. Bickford Vale and the present College/Crawford intersection were developed as brick yards. Where city streets intersected with the ravine, wood bridges were built and then replaced with concrete. Its use as a site for local industry established the ravine as a vital part of the city's economy. The elaborate system of a score of bridges, ensured that the city and the ravine could co-exist as continuous systems of movement.

Both the construction of the sewer and the presence of the wooded ravine were used in advertisements to attract prospective new settlement in the west end of Toronto. The Garrison Ravine then existed simultaneously as a continuous open space, an economic boon, and a beautiful natural landscape where people wanted to live.



"The rapid and, in fact, extraordinary growth of Toronto westward, induced the present proprietors a few years ago to acquire and lay before the Public in building lots of suitable size, the fine tract of land shown on this plan. Noticeable as was the growth of the City in this neighbourhood, at that time, what must be said of it now? Whole fields of waste land which not so long ago could be seen between Bathurst Street and Parkdale have given place to well-paved streets and avenues, filled with sightly and substantial buildings.

To the intending investor the question must suggest itself - How long is it safe to postpone making a selection? Everybody must admit that now is the time to invest in West End Real Estate; land which could have been bought three years ago at $12 per foot cannot to-day be had for less than $20 or $25, and everything warrants the anticipation of a like increase in the future. ...

... In the property before you it is claimed that there is every imaginable quality requisite for a desirable dwelling site. ...

Crawford Street, forming the central line, is pleasantly situated, overlooking as it does, the attractive grounds of Trinity College, and running through the picturesque Bellwoods Park. The street having recently been block-paved, citizens will find it a pleasant drive along Crawford Street and over the bridges which span the Garrison Creek ravine. Along this ravine and following the creek has been constructed the famous Garrison Creek sewer, over which it is proposed to form a public drive, in accordance with the scheme for parks and drives formulated by ex-Mayor McMurrich

The work of bridging and grading Shaw Street north to College Street will shortly be commenced; when completed this will make one of the handsomest avenues in the City..."

15
Excerpt from real estate advertisement for The Crawford Estate, the Ontario Industrial Loan and Investment Co., c. 1885

16
Lower left: The second Crawford Street Bridge c. 1915, looking east from Shaw Street and Dundas. This bridge still exists but was buried intact with fill produced through the construction of the Bloor Danforth subway in the early 1960's.

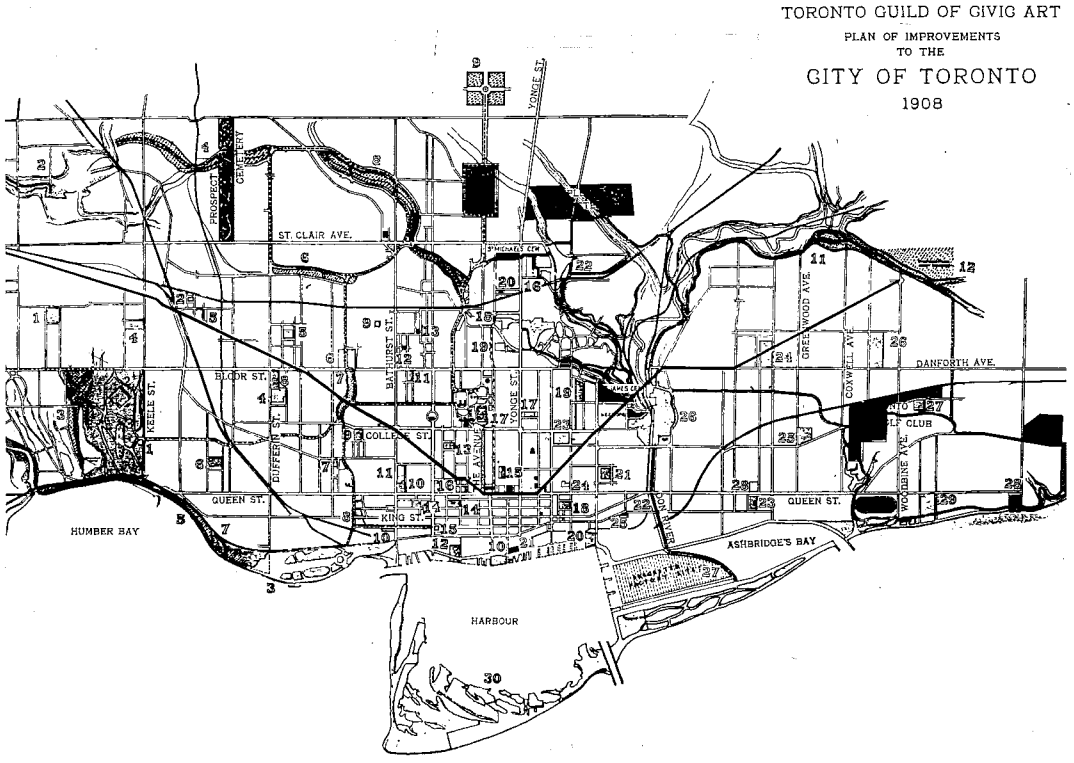
The Garrison Parkway

As the larger estates of the original park lot owners were divided and sold off over the turn of the nineteenth century, most of the ravine lands were marked for filling and new residential development. However, following the construction of the sewer, and up until the 1920's, the City of Toronto carried on a policy of acquiring Garrison ravine lands (including Trinity Bellwoods Park, Christie Pits, Bickford Ravine, and Prittie Ravine) to create and maintain a publicly owned connected open space system.

The Garrison ravine also appeared in real estate advertisements and in the Toronto Civic Guild of Artists' plan for Toronto as a green belt in the city that would eventually connect to the University of Toronto campus to the east and to High Park further west as central elements in a continuous city-wide parkway. The accompanying report stressed that the proposed plan was unique to Toronto and incorporated the characteristic features of the site:

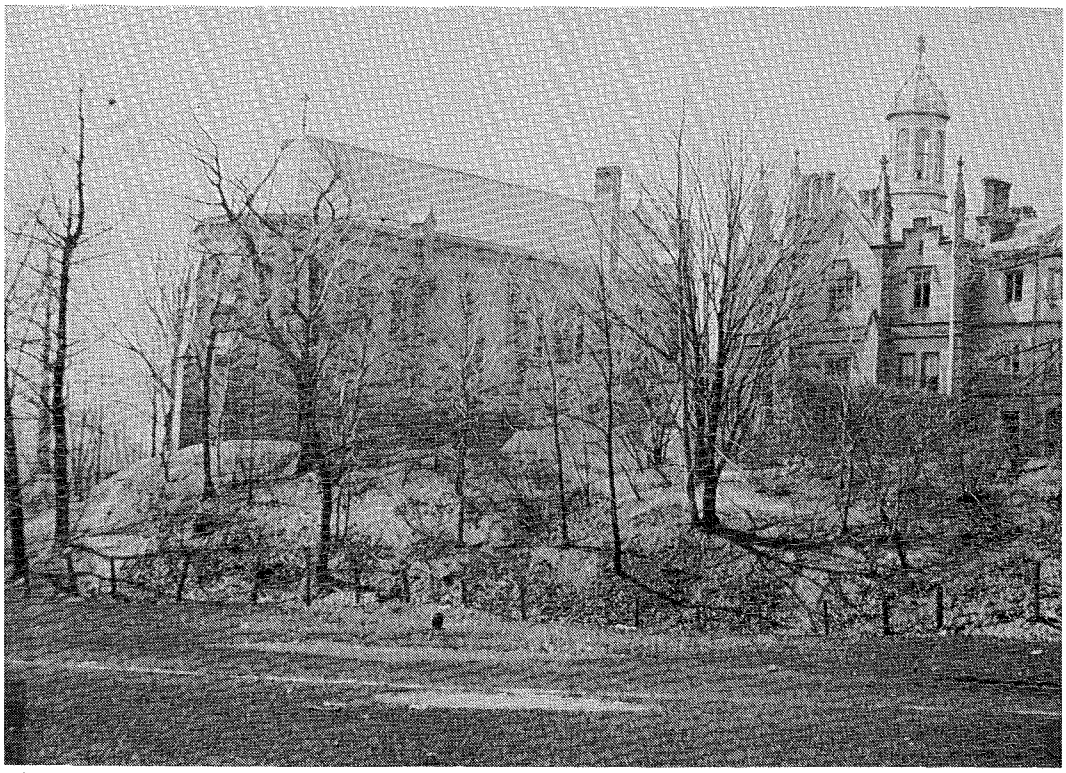
"to preserve and indeed develop them, and thus to develop the natural character we have and make of Toronto not just a beautiful city, beautiful in a conventional way, after the model of some other city, but to bring out its own beauty. It is character in a town that makes the dwellers in it love it." : Toronto Guild of Civic Art Plan of Improvements to the City of Toronto, Report, 1909

The plan also proposed connecting the Garrison ravine lands north to a continuous green belt that ran along the Davenport ridge (the ancient glacial Lake Iroquois shoreline) which then effectively connected an encircling system of parks and green space based completely on the natural landscapes of the city.



17
Toronto Guild of Civic Art: Plan of Improvements to the City of Toronto, 1908

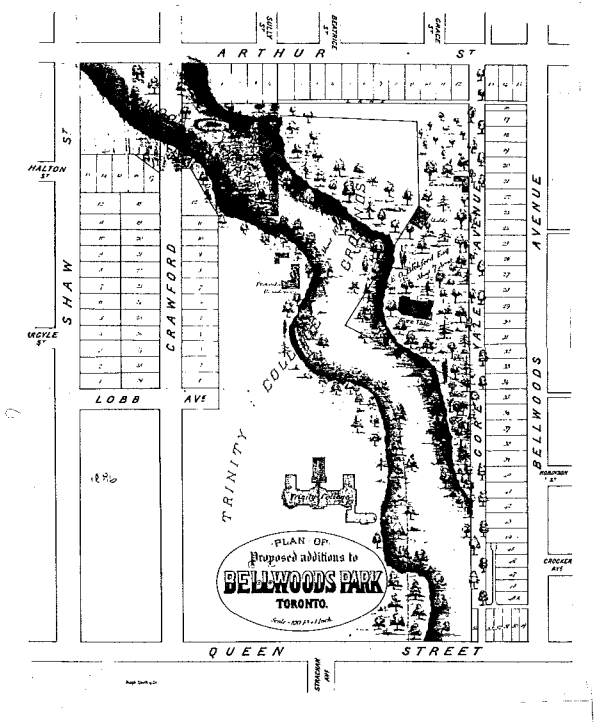
Community Infrastructure



18
The east face of Trinity College viewed from the Garrison ravine. Trinity College, incrementally built between 1851 and 1894, was a major institution in the western part of the city. The College moved to the main University of Toronto campus in 1925; the buildings and land had been bought by the City of Toronto in 1912. The buildings were demolished by the city in 1955 after a long period of neglect.

Just as Garrison Creek sustained the first settlements in Toronto, the Garrison Ravine sustained the second wave of settlement in the late nineteenth century. The neighbourhoods of the watershed were conceived around the continuous open space of the ravine. Major institutions sited along the ravine, like the original Trinity College, brought vitality and prestige as central "monuments". The bridges were also landmarks that made direct connections between the city grid and the natural ravine course.

At this stage, a certain balance was possible, where the city could co-exist with the ravine, its natural host. Had this balance hinted at in the Civic Guild's plan been maintained and pursued, the city today would have had a continuous connected landscape, knitting the west end neighbourhoods directly south to the lake.



19
Plan of proposed additions to Bellwoods Park, Toronto, 1886, showing Trinity College before the construction of its west wing. Gore Vale Villa, the original estate of the park lot, is also shown.

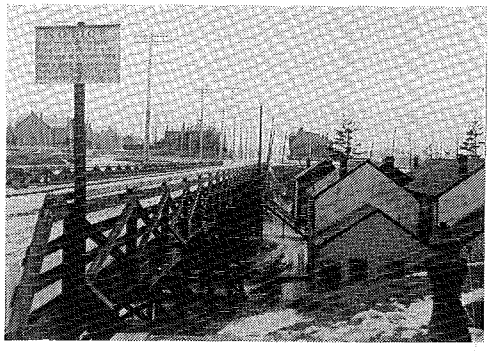
A regeneration of the Garrison Creek could have been imagined and realized in a future where local collection of rain water was considered not as a nuisance to be taken away, but as a resource to be collected in natural urban waterways and treatment ponds, naturally cleaned, recycled and re-used, or sent through its natural course to the lake.

Instead, the balance between the man-made form of the city and its natural landscape tipped against the ravine, and in favour of the further development of the city. The city politicians apparently lost interest in the acquisition of Garrison lands, leaving their holdings including Trinity Bellwoods Park, Stanley Park, Christie Pits, Bickford Ravine, and parts of the Prittie Ravine disconnected.

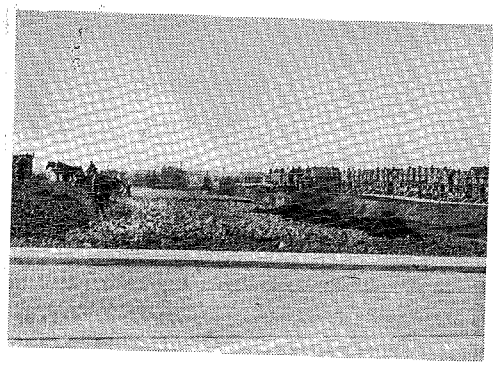
Sometime in the 1930's and 40's, the ravine became an available and inexpensive landfill site for the dumping of garbage and construction debris. Much of the Garrison ravine was filled and settled by housing. Publicly owned land was also used for extensive landfill, with only small areas that still recall the ravine profile. Many of the bridges, such as the Harbord Street Bridge and the Crawford Street Bridge at Trinity Bellwoods Parks, that were instrumental in preserving the continuity of the ravine through the city grid, were buried intact.

The third wave of settlement reflected a break in the way the city and nature were now "zoned", not as integrated, co-existing, harmonious elements, but as very separate and non-compatible uses. The parcelling of the ravine lands into separate parks, divided by city streets, allowed the piecemeal disintegration of the Garrison system, so that as one piece of the ravine was filled in, another maintained a

20 Former Sully Crescent looking west to the Shaw Street Bridge just south of College Street; now filled and the site of Miracle Food Mart parking lot.



21 Shaw Street Bridge (shown above) looking south from College Street; Sully Crescent was actually built in the ravine and connected past the bridge to Prittie Ravine which is also shown on opposite page. Prittie Ravine has also been completely filled and is now known as Fred Hamilton Park.



22 Bickford Ravine, being filled with garbage circa 1915. This part of the ravine, once a brick yard, was not completely filled and bears some resemblance today to its original profile.

ghost of the ravine profile, and another was sold off for new housing, or later as a site for a new school or shopping centre. The central sustaining core of the Garrison community has been lost. The nature of a co-evolving system requires the health of both the city and the natural landform. The loss of the Garrison Ravine has been not only a loss to the natural environment, but also a diminution of the richness of the urban condition as well.

With the aging of the Toronto sewer infrastructure system, plans are now being made by the City of Toronto for the rehabilitation and rebuilding of many of the original lines. An addition to the original system is the Public Works Department's proposal for a large storage tunnel to be located along the waterfront that would provide for the collection and storage of the CSO's that would then be transported for treatment and discharge into Lake Ontario.

This study proposes that the regeneration of Garrison Ravine and the communities along its length can be implemented by the restoration of the natural function of the watershed, that is, in the local collection and treatment of rain water and urban run-off. This has been done as a matter of course in new development in surrounding new towns and suburbs, in accordance with current provincial regulations, and in some existing urban centres in North America and Europe.

The built form of Toronto has previously been thought of as being too dense to allow for the amount of land that would be needed to institute stormwater management techniques such as ground infiltration, tree canopies and stormwater detention ponds.

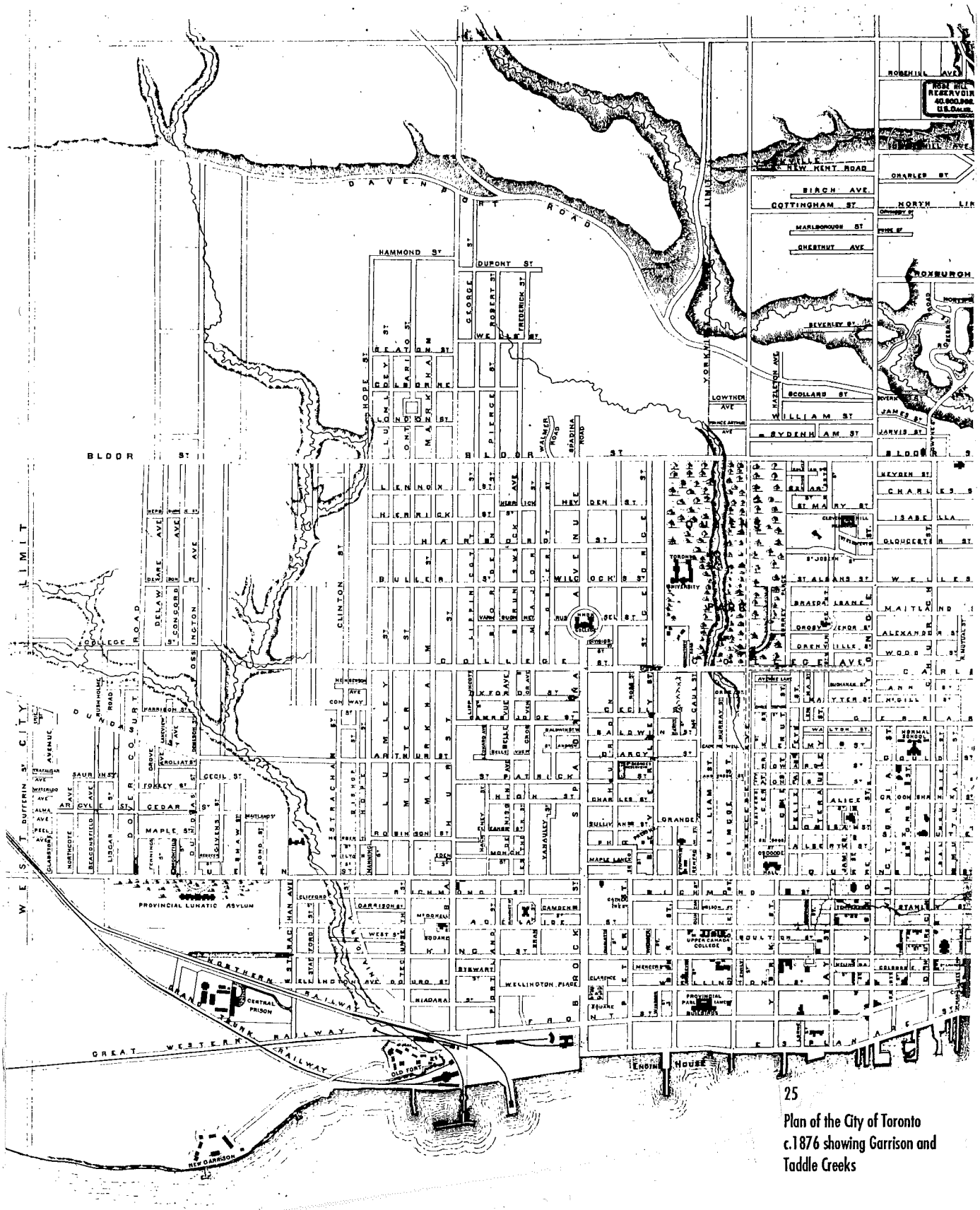
23
Prittie Ravine, looking south towards Dundas Street, 1913; now known as Fred Hamilton Park, it has been completely filled. The southern portion of the ravine was sold for housing development.

However, the ravine has left its trace through the series of unconnected parklands. Research for this study shows a considerable inventory of existing open space in public ownership that is in fact potentially available in the Garrison system. Subject to community consultations, environmental assessments, and the public approval process, this inventory suggests that several of these alternate stormwater management techniques are quite possible and also desirable as improvements to existing parks.

Other buried creek systems across Metropolitan Toronto may also have the potential to put stormwater management techniques into effect because of the open spaces that line those courses.

As the instrument that can connect or disconnect the city from its natural landscape, the stormwater infrastructure is proposed here as the catalyst to restore the balance of the co-evolving systems of the ravine and of the city.

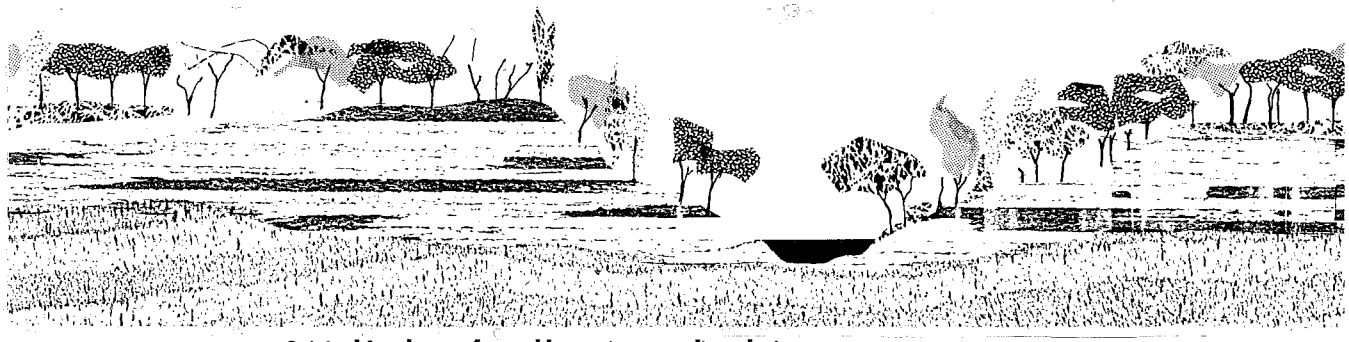
24
Winter tobogganing at Christie Pits, c. 1915



25

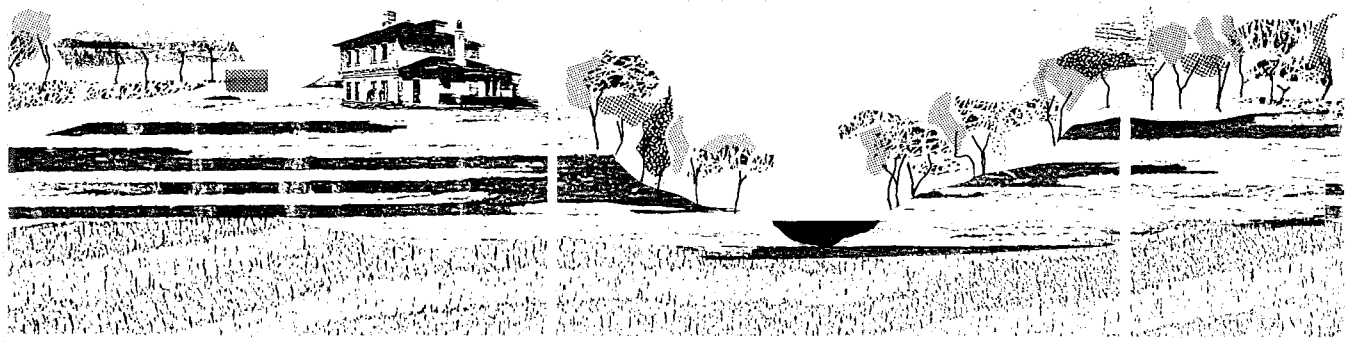
Plan of the City of Toronto c.1876 showing Garrison and Taddle Creeks

A Selected Chronology of the Co-Evolving Systems Landscape and the City



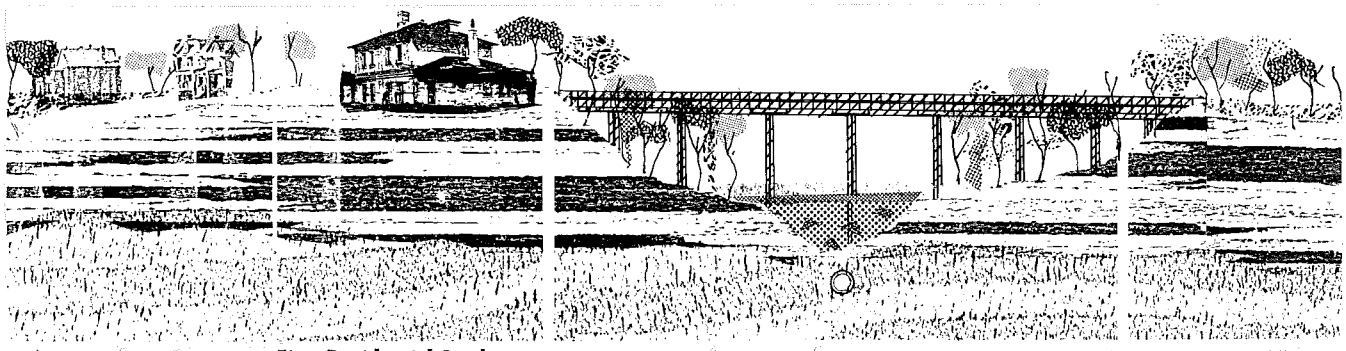
1 **Original Landscape formed by ancient receding glaciers:**

The creek meandered down to the lakeshore, part of a network of creeks and ravines that score the plain running from the Oakridge Moraine to Lake Ontario. Set in the densely forested plain, the length of the ravine, although forested as well, would have been used as a comparative clearing and way through the natural landscape to the lake.



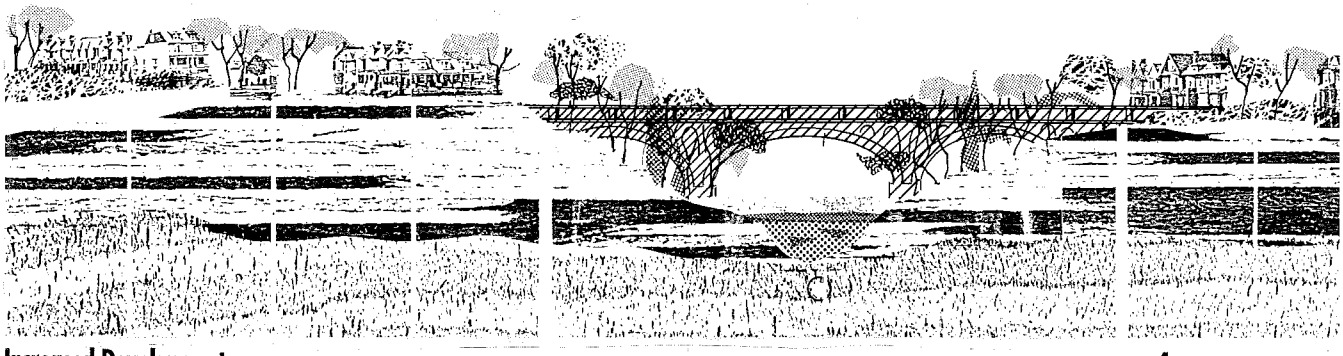
2 **Initial European Settlement:**

The surveyors of Lord Simcoe divided the countryside between Bloor Street and Lot Street (now Queen) into park lots, the forerunners of the Toronto grid, which were given to the new landed aristocracy of Upper Canada. While the park lot divisions did not acknowledge the natural landscape, the villas built by the landowners were often sited on significant bends on the banks of the ravines with axial views to the lake. Closer to the lake, small industries were built to take advantage of the water resource of Garrison Creek. As the forest of the plain was gradually cleared for development, the ravine became the vestigal forest, reversing its original role as the clearing through the plain.



3 **First Residential Settlement**

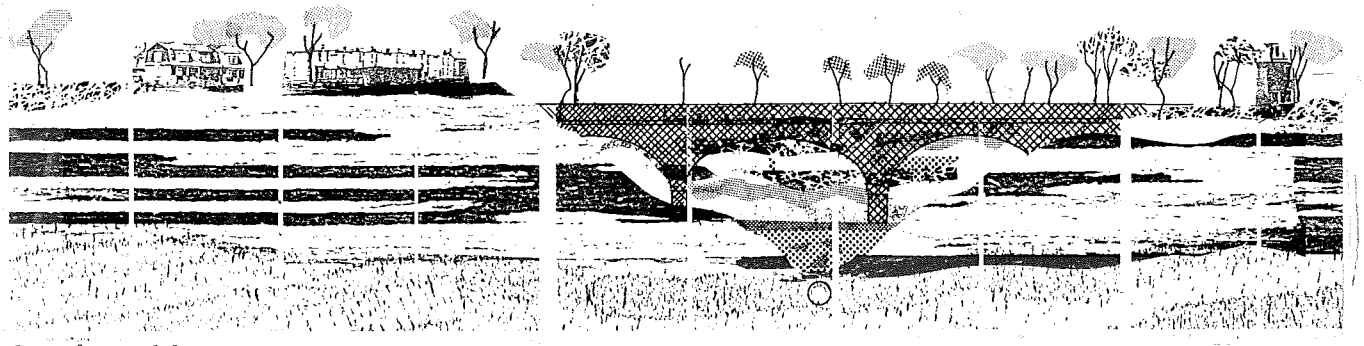
As the city grew, the western edges of the city became desirable locations for suburban settlement, and the beauty of the Garrison Ravine, also called a "parkway", was cited as an encouragement to buy residential lots. By this time, the creek had become polluted by the settlement and by industry, and the burial of the creek into a brick sewer, ten feet in diameter, was seen as a positive step in providing a safe and controlled environment for development. As the creek was buried, the ravine was cleared, and the base of the ravine, where the creek had been, was filled. New streets were made, and wooden and steel bridges were built to allow the streets to pass over, and to allow the ravines to travel undisturbed to the lakeshore.



Increased Development:

4

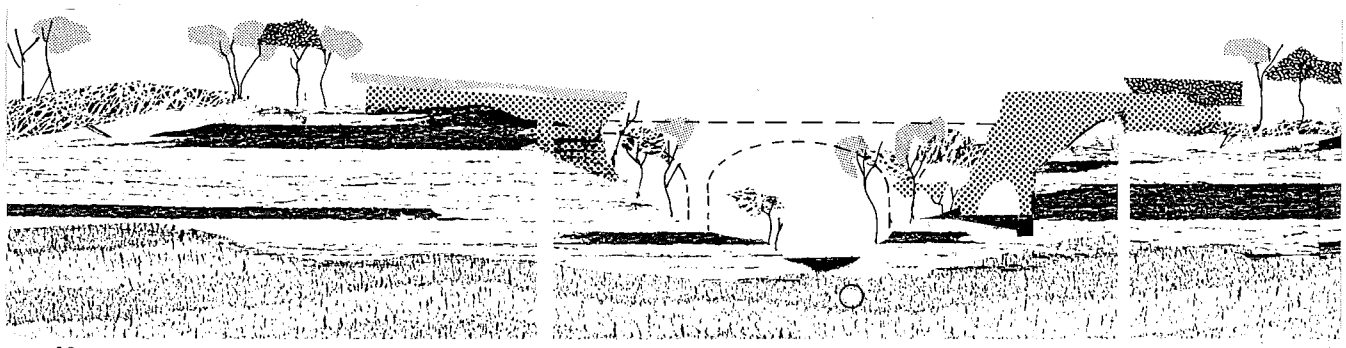
The area of the first park lot division was now completely built with the more dense street grid and dense residential development. The original wood bridges were sometimes replaced by more substantial concrete structures. The ravine, now essentially cleared, partially filled, became once more the dear route, but now it was through a "forest" of development, and pressure to increase available lots for building resulted in some sections being filled in and subdivided for housing.



Degradation of the System:

5

The Garrison Ravine was largely filled in during this period, possibly because of its new attraction to builders as a landfill site. During the construciton of other areas of the city, and new infrastructure networks, such as the subways, the ravine disappeared; whole bridges were buried with the fill. These last sites for "ravine levelling" tended to be used either for the construction of large building types, such as schools and apartment buildings, or remained as open spaces and developed into city parks.



Possible Futures:

6

Growing community awareness of the Garrison Creek Ravine has started a movement towards the excavation of the original landform and revealing of the bridges where they occur on public park land. The considerable inventory of open space on the ravine route suggests the potential of a connected open space system that could knit the Garrison communities to Fort York at the original mouth of the creek and Lake Ontario. Illustrated here is a condition of the ravine and the city in a new balance, with new ponds recalling the original creek, excavation to the original ravine elevation, and the revealing of the connecting infrastructure of the bridge, that allows both the city and the ravine to co-exist.

A Connected Pond System in the Garrison Creek Watershed

2

26
Trevi Fountain, Rome

The Trevi Fountain: Water Infrastructure

The Trevi Fountain, long a famous landmark in Rome, is first known as a work of art, seen in postcards, tourist shots and movies. It is also known on a secondary level of urban design as an integral part of one of Rome's pedestrian piazzas. But the Trevi Fountain is primarily infrastructure, the end of an aqueduct that brings water supplies to the heart of the city. The fountain is an expression of "the necessity of water and its relationship to the health and productivity of the city."1

It is art, urban design, infrastructure, and as a product of all those, a cultural treasure. It is within this expanded context of the "interconnectedness" between urbanism, environmentalism and the culture and servicing of the public realm that the Garrison Creek Connected Urban Pond System can be placed.

This study has been undertaken to evaluate the feasibility of restoring the natural watersheds in an urban context as a viable method of stormwater management, and how the restoration can simultaneously create opportunities for an integrated approach to community infrastructure as a means of enriching the city's natural and urban landscapes.

Historically, the construction of major water infrastructure has been coupled with a complete reconsideration of an entire city - including its streets, boulevards, parks and public spaces In Paris, the famous Baron Haussman transformations that brought Paris out of the medieval city structure were occasioned by the construction of the new Parisian sewers. City dumps and slaughterhouses, once located inside the city proper, were then moved to the periphery.

Their original locations became new community and urban spaces. The water treatment infrastructure was the basis of a new community infrastructure that was considered in concert across the city.

In Toronto, the construction of the present sewer system one hundred years ago heralded the next wave of development in the city, and of its present system of parks and now well-established neighbourhoods.

The impact of the creation of new water infrastructure must be considered in terms of its environmental consequences, but equally as important, in its potential to reveal and present opportunities for the regeneration of the community and open space infrastructure of our city.

Toronto has spent considerable time identifying its "wish lists" in the form of city planning documents; the reconsideration of our water infrastructure now presents a method of implementation. The need for an updated water infrastructure system can be considered in light of our existing urban and natural systems: streets, public spaces, natural features, heritage, design and quality of life.

The new Cityplan By-Law No. 423-93 states under "Quality in the Public Realm", Section 3.1 Maintaining and Improving the Public Realm:

Council regards the public realm as an important asset for the benefit of all people. The public realm comprises public streets and lanes, parks and other open spaces, and the accessible parts of public buildings. Council will seek to extend the public realm, and maintain and enhance its quality by

a. encouraging development that enhances the quality of public streets and other publicly accessible open spaces;

b. ensuring that all new City projects, including streetscapes, parks, public works and public buildings, are of a high standard;

c. expanding initiatives to achieve high quality design for all public works and open spaces through design competitions and selection procedures which encourage participation by a wide spectrum of the City's design community and by initating public projects which exemplify the objectives of this Plan ...

Further in Section 3.2, "Reinforcing the Pattern of Natural Features". Cityplan states:

Council shall encourage appropriate public use and enjoyment of the City's natural features by:

... reconnecting the street grid to the waterfront and other major natural features where appropriate and feasible;

creating, improving or encouraging pedestrain and bicycle connections to natural features, including, where appropriate, special landscape features such as stairways or bridges;

creating, improving or encouraging pedestrian and bicycle routes through or along natural features, and providing appropriate public amenities, provided such routes and amenities are compatible with the character and quality of such features; and

seeking to integrate natural features within a comprehensive and well connected open space system ..."

Table of Maps

To graphically illustrate the different perspectives that make up the Garrison Ravine, the following maps listed below look at a range of existing aspects of the watershed. Beginning with the existing condition, the Garrison Ravine is shown within both the urban and the bioregional contexts. The following maps then demonstrate various aspects of both the urban and natural landscapes, including the constructed stormwater infrastructure, major landform and civic elements, areas of fill and of excavations.

The maps attempt to show engineering works in a more descriptive manner that juxtaposes them directly with parks and other open spaces, streets, historic systems, cultural artifacts, and landforms in a relationship with their geographical origins that do not reduce the potential richness of other inter-related systems.

The open space data inventory map (Map 2.8) then provides a complete summary of types of open spaces in the Garrison watershed, indicating which ones fall directly in the path of the former ravine, and categorizing the open spaces as publicly owned (parks), school yards, and commercial privately owned space. This map provides the basis for the assumption that the Garrison watershed contains sufficient areas of publicly owned open space to feasibly contain a stormwater management system of connected urban ponds while not compromising exisitng recreational resources.

The final map of the Pond System Abstract, (Map 2.9), illustrates the concept of the detention ponds, identifying catchment areas, and showing a full section through the length of the system. This map also locates the proposed demonstration project area of Christie Pits, Bickford Vale, and the Montrose Schoolyard that is explored in the third and final section of this study.

MAP 2.1 The Existing Context

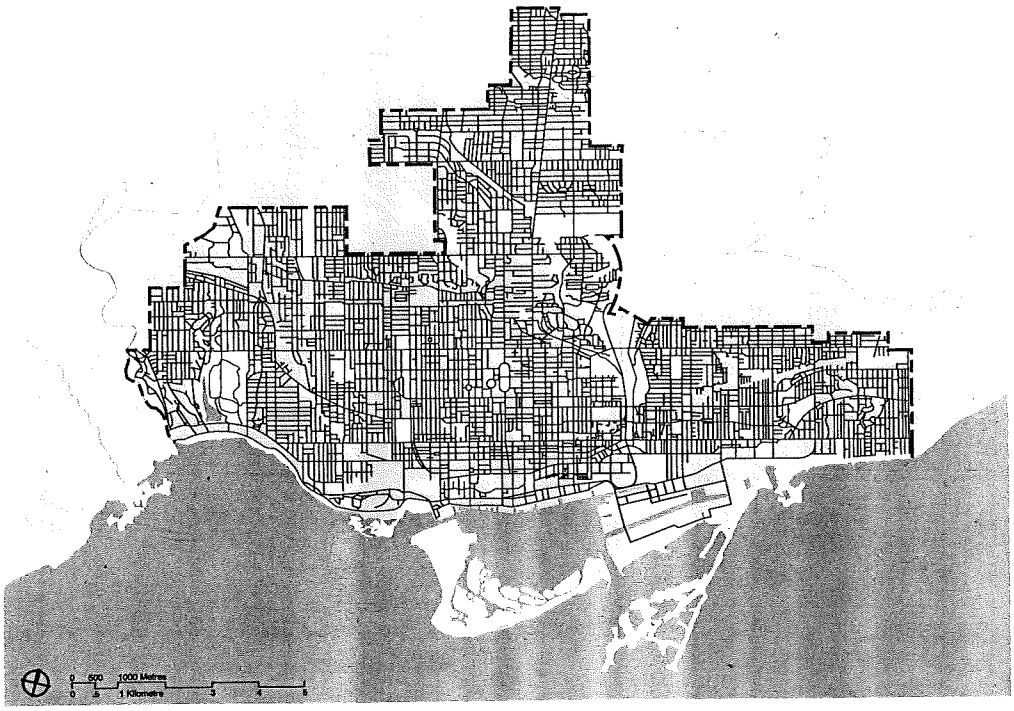
This map introduces the Garrison watershed study area, extending from St. Clair Avenue south to Lake Ontario, and between Dufferin Avenue to the west and Spadina Avenue to the east. A shadow of the presently buried Garrison Ravine profile is superimposed over a composite of City of Toronto "data maps" that indicate streets, buildings and open spaces.

Open spaces, (parks, school yards, abandoned industrial areas) located in the study area and the Christie / Bickford / Montrose demonstration project site are highlighted and significant elements are identified in the key.

The superimposition of the ravine profile demonstrates that a considerable number of public spaces are located along the traces of the historical Garrison Creek route.

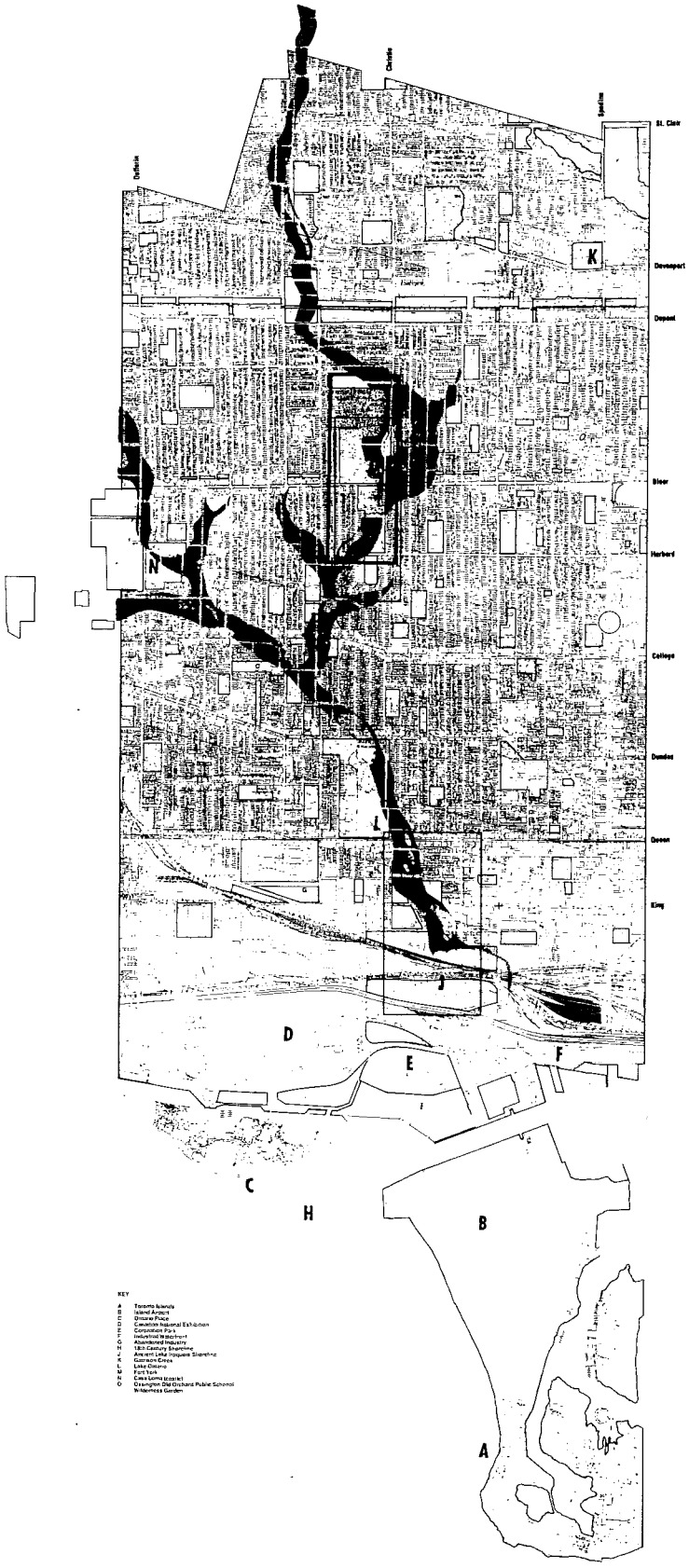
The illustration below keys the Garrison Watershed study area to the larger context of the City of Toronto.

MAP 2.2 The Garrison Watershed in the Urban Context



Taken from "City Patterns: An Analysis of Toronto's Physical Structure and Form" by the City of Toronto Planning and Development Department

MAP 2.1 The Existing Context



KEY

Toronto Island	A
Island Airport	B
Ontario Place	C
CNE Grounds	D
Coronation Park	E
Industrial Waterfront	F
Garrison Ravine Profile	G
Lake Ontario	H
Fort York	J
Casa Loma	K
Trinity Bellwoods Park	L
Christie Pits	M
Dufferin Grove	N

MAP 2.3 Structural and Landform Elements

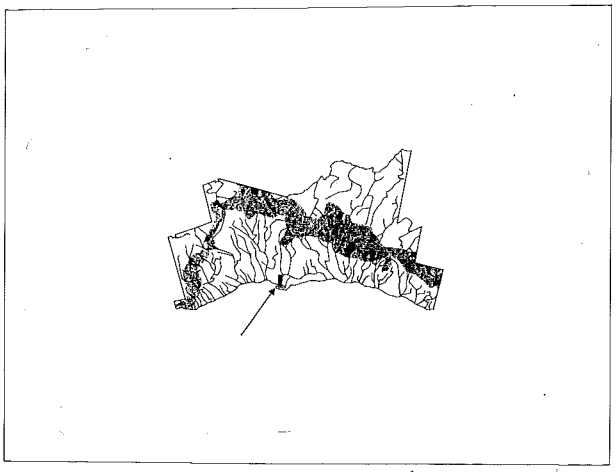
The layers of this map show elemental aspects of the Garrison Creek watershed and their evolution over time. The key original landforms are shown; the ancient glacial shoreline of Lake Iroquois (Davenport Road) runs parallel to the present-day Lake Ontario waterfront. The Garrison Creek and Ravine runs between the two. The original Lake Ontario shoreline and Toronto Islands profile are highlighted to illustrate the large amounts of landfill that extended the city beyond its original natural borders.

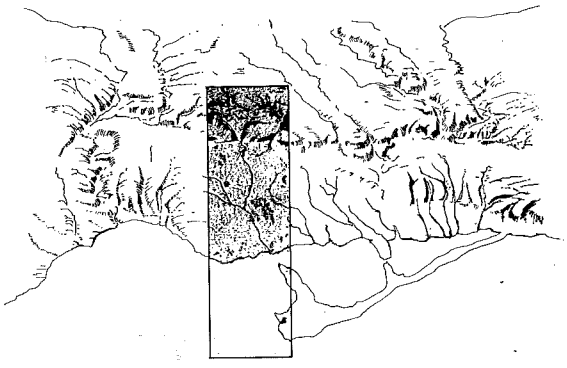
A portion of the city's present-day street grid is placed over the ravine profile to show the number of open spaces, and curving street aberrations that still trace the route of the Garrison.

MAP 2.4 The Garrison Watershed in the Metropolitan Context

In the early maps of Toronto, Garrison Creek and the Don River defined the western and eastern limit of the new city's potential for growth. This map shows that Garrison Creek is in fact one of many creeks that scored the original plain of Toronto sloping to Lake Ontario.

The potential exists for Toronto's original tracery of creeks to become sites for localized stormwater management systems that would act as catalysts in the creation of linear connected open spaces - "public ways" - fusing the neighbourhoods of the city more closely to Lake Ontario.



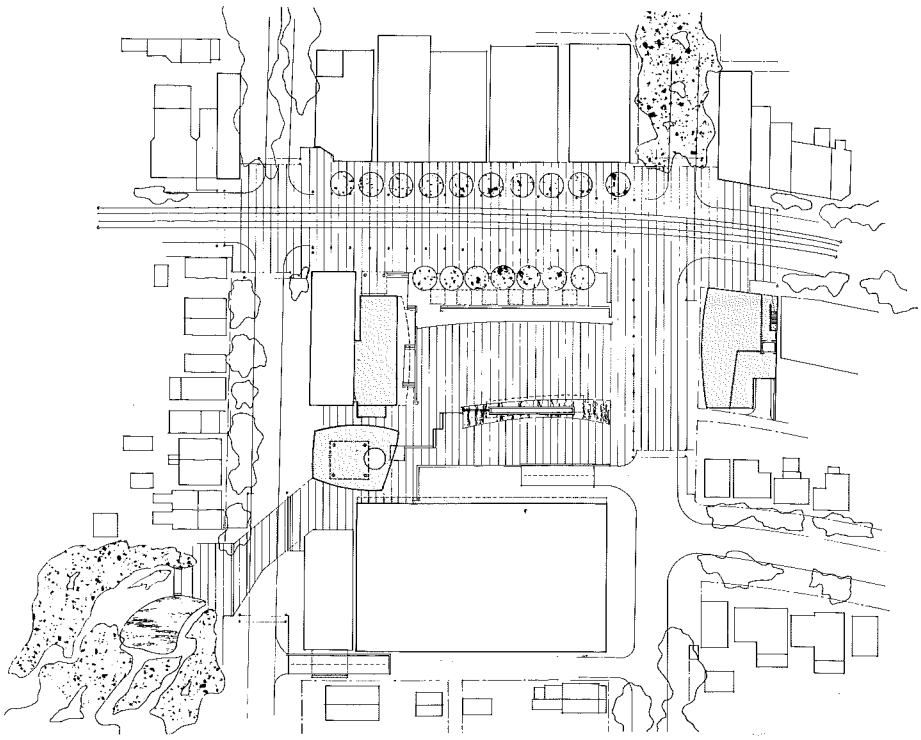


MAP 2.5 Linear Dynamics

In this map, open spaces have been separated from the built form context and highlighted. Those spaces that specifically trace the Garrison Ravine are shaded. Many of the other open spaces of the watershed are schoolyards, which suggests that the "greening the schoolyard" movement (community and PTA initiatives to replace large areas of asphalt schoolyards with gardens contributing to new environmental curricula) can play a large part in the regeneration of the Garrison watershed.

Within this Garrison network, lines and circles have been drawn that illustrate potential "strings" of activity, where potential sites for connection and park renovation can form concentrated patterns of linkages and fully animated public spaces. These symbols suggest a dynamic potential exists for the intensification of a connected open space system following the route of Garrison Creek.

The illustration below shows an example of one of the potential sites in more detail. In the intersection of College Street and Crawford Street, the ravine has played an historical and formative role in creating both the shift in College Street and the curve of Crawford Street. The College "shift" also happens to coincide with an area of great commercial and cultural activity. The intersection of the natural landform and the urban "main street" acts as a catalyst to a neighbourhood focus. In this example, the potential development of sites like this is illustrated by a public square on the parking lot of an existing large supermarket, that while creating a significant open space connection also brings economic stimuli to the main street.



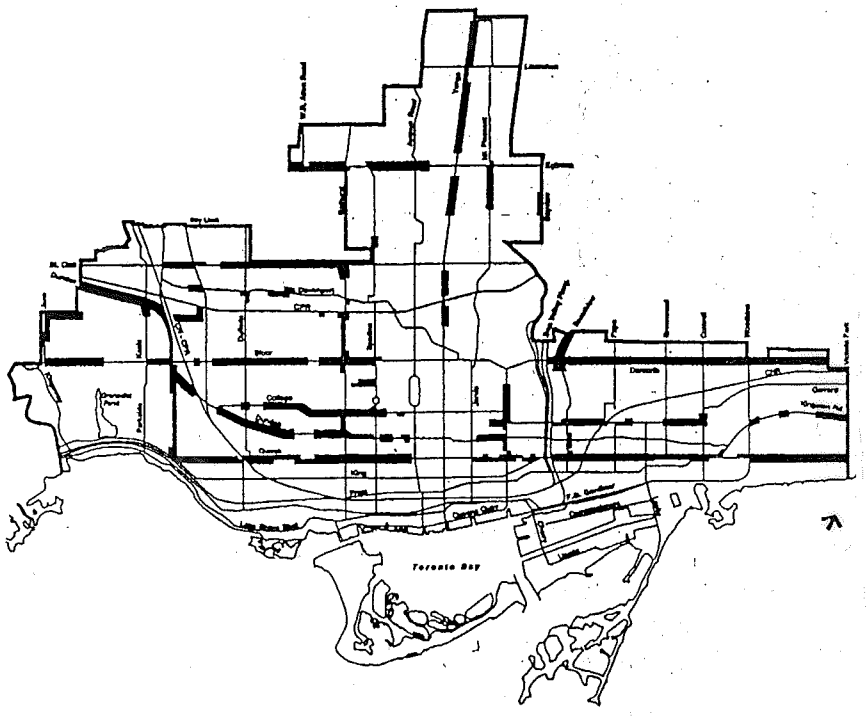
MAP 2.51 Linear Dynamics Detail: New Public Square at College and Crawford

MAP 2.6 Historical and Geographical Stratification

The map on the opposite page illustrates the east west bands of "main streets" that run across the Garrison study area. These streets have been specially designated by the City of Toronto for housing intensification above existing commercial structures, to make use of the existing infrastructure of water supply and treatment, roads, and public transit, and to regenerate the economic vitality of the city's traditional public life that can be found on the main streets.

The Garrison study area contains the highest concentration of main streets targeted for intensification in the city. Shown with this urban infrastructure are types of soil deposits, original landforms, and areas of landfill along the waterfront. These urban and geographical layers of information are shown together on this map to suggest that the strengthening of the Garrison open space network can work with a balance between the two systems.

Map 2.61 Main Streets Intensification Areas



28
Housing on Main Streets Intensification:
This map, taken from the City of Toronto notice of the new Main Streets Zoning By-law, illustrates those areas of the city where this zoning takes effect. The Main Streets initiative promotes the provision of new housing units over commercial streets that will take advantage of existing transit and physical infrastructure, and enhance the urbanity and vitality of Toronto's public streets.

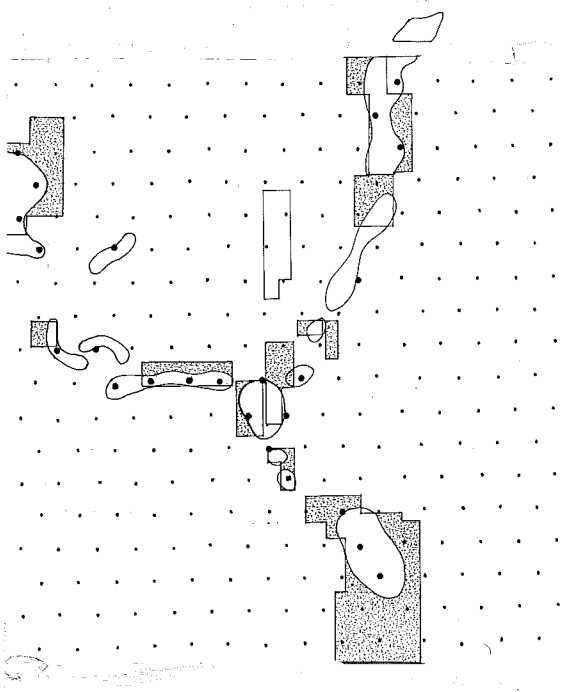
MAP 2.7 Fills / Excavations and Storm / Sanitary Sewer System

In this map, the profile of the Garrison Ravine is highlighted. Within its boundaries, the bands of crossing streets, areas of fill, depressions and existing fragments of the original ravine are indicated. Adjacent buried stream beds are shown along with the original shore line and form of the Toronto Islands.

Contours are illustrated on this map at 5 meter intervals showing a relatively homogeneous slope down from the Davenport Road ridge to Lake Ontario on either side of the depressions that trace the Garrison Ravine. The underground system of existing storm lines are shown branching out from the Garrison sewer, a brick construction 3 meters in diameter, that was built at the end of the nineteenth century, mirroring the original location of the creek.

By superimposing the mapping of fills and excavations over the storm and sanitary sewer system, the potential of interaction of the separate systems of the geographical landform and existing water treatment infrastructure can be identified.

MAP 2.71 Detail of Built Context on Landfill



MAP 2.72 Detail of Areas of Depressions

MAP 2.8 Open Space Data Inventory

All open spaces of the Garrison watershed that fall under the categories of Parks, Schoolyards, and Commercial / Industrial are documented and keyed. Separate areas have been calculated for each category of open space.

There are 39 open spaces in public ownership with a total area of 335.36 acres, or 135.72 hectares. These sites present the greatest potential for creating a comprehensive storm water management pond system, because of their collective size, their essentially even distribution through the Garrison system, and the opportunity for forming partnerships with different city departments and neighbourhoods to make simultaneous improvements to the community infrastructure.

There are 43 schoolyards in the watershed for a total area of 149.08 acres, or 60.33 hectares. The Garrison watershed contains the highest concentration of schoolyards in the city.

The opportunity exists to work with the local communities and school boards in the "greening of the schoolyards" programming to provide on site water collection to form a valuable part of the school's environmental curriculum.

The 19 commercial and other kinds of open space, including abandoned industrial lots, parking lots, etc. make up a total area of 135.55 acres, or 54.86 hectares. These kinds of open spaces present potential for private development or participation in either future development that specifically addresses issues of storm water collection and/or the Garrison open space system, and also identifies areas that represent significant paving areas where specific pollution control techniques could be tested. (ie. parking lot drain skimmers that can remove some of the heavy metal pollutants, etc.) The combined total of all these open spaces is 620 acres, or 250.91 hectares.

29

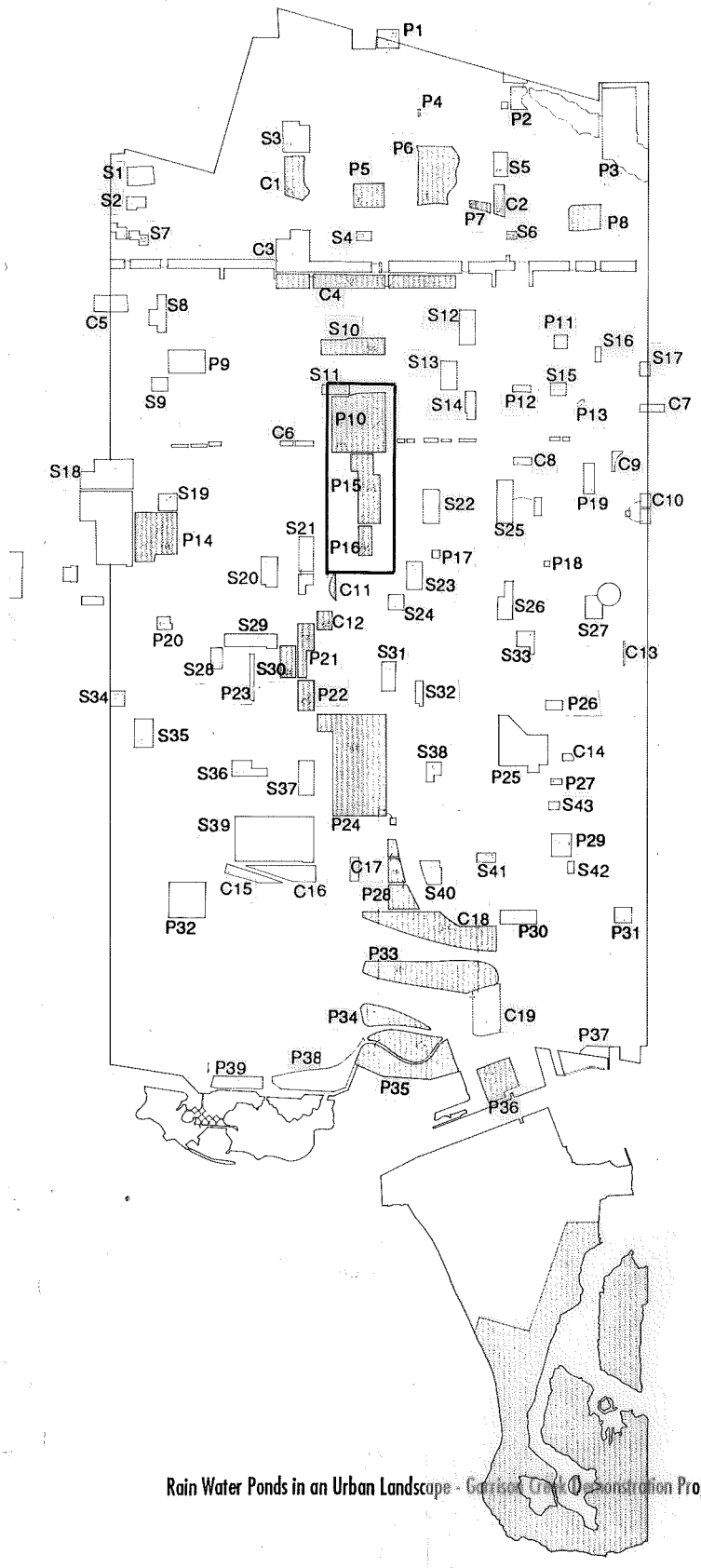
The parent and teacher Wilderness Garden Committee at Ossington Old Orchard Public School have created an extremely popular and successful "wilderness garden" as part of the "greening the schoolyards" initiative that has replaced large areas of asphalt with terraced gardens, tree planting, and hedgerow planting that are extensively used by the children, teachers, and community as part of an integral environmental curriculum.

MAP 2.8 Open Space Data Inventory

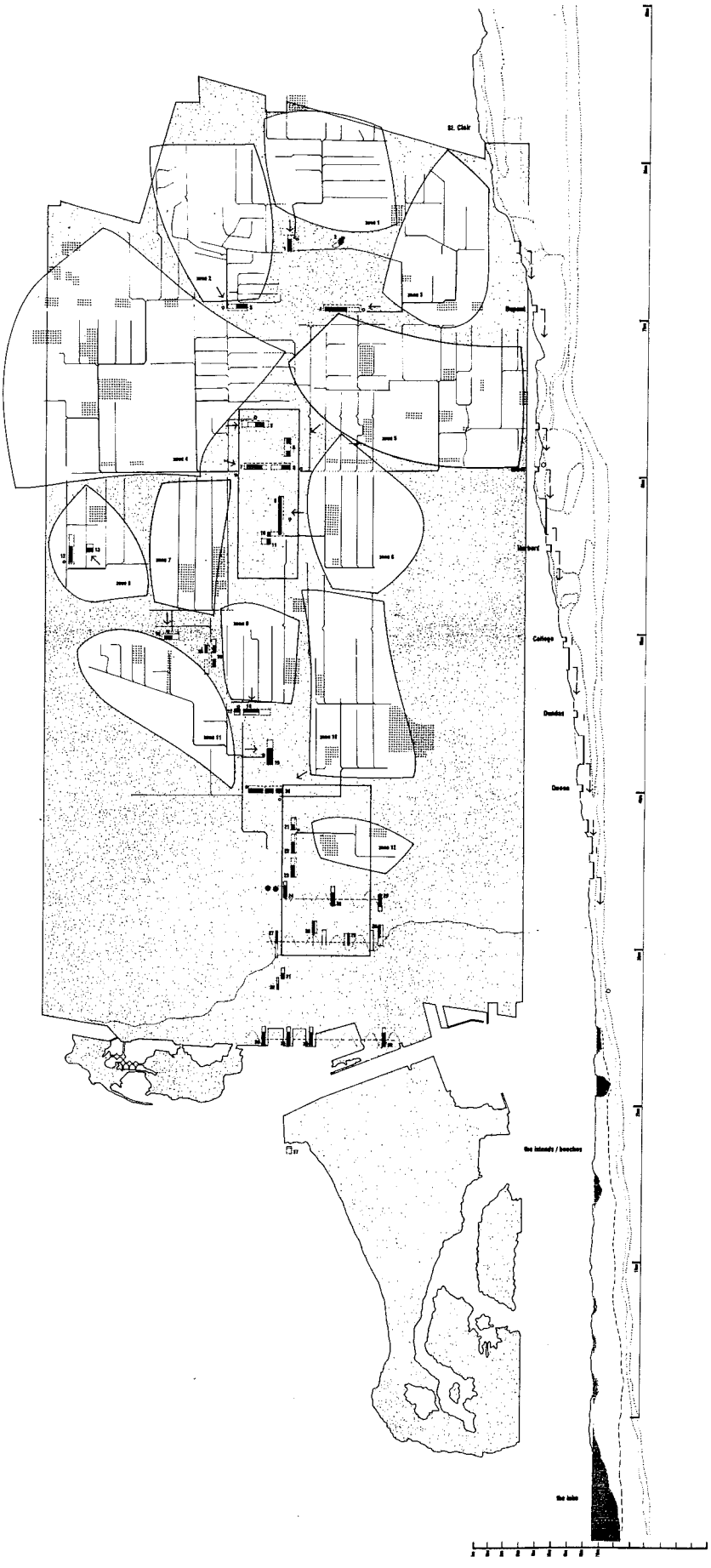
KEY

Read open spaces as P1, [Parks #1, 3,900 m2], S1, [Schools #1, 16,500 m2], and C1, [Commercial #1, 17,250 m2], etc. by referring to table below.

	PARKS m2	SCHOOLS m2	COMMERCIAL m2
1	3,900	16,500	17,250
2	13,350	5,500	9,600
3	137,600	24,000	197,125
4	400	3,850	69,700
5	23,200	10,800	9,000
6	67,200	1,750	22,650
7	4,800	1,195	2,500
8	28,000	12,400	3,150
9	26,000	7,200	4,800
10	92,800	20,400	11,000
11	6,400	7,500	3,850
12	11,550	17,550	9,350
13	800	14,400	1,000
14	52,900	6,000	2,200
15	47,350	6,750	15,000
16	11,500	2,700	25,000
17	1,800	8,750	5,400
18	1,200	20,000	96,000
19	10,400	12,100	44,000
20	4,500	13,600	
21	19,750	28,800	
22	17,000	17,100	
23	4,730	14,400	
24	150,100	11,700	
25	74,300	22,675	
26	5,250	14,400	
27	1,500	8,400	
28	35,100	7,450	
29	14,300	18,000	
30	12,000	16,200	
31	10,000	12,750	
32	40,000	5,600	
33	133,700	9,300	
34	26,000	6,300	
35	135,000	19,800	
36	38,000	12,000	
37	9,600	16,150	
38	56,000	8,550	
39	19,600	110,250	
40		18,800	
41		6,300	
42		2,450	
43		3,000	
TOTAL	135.72 ha	60.33 ha	54.86 ha	250.91 ha
	335.36 acres	149.08 acres	135.55 acres	620.00 acres



MAP 2.9 Pond System Abstract



MAP 2.9 Pond System Abstract

This map illustrates a potential pond system in a diagrammatic format. Conceptual zones for water drainage patterns are suggested, and overlaid on the existing storm line network. Each zone takes in a "branch" of the existing storm water lines that feed into the main combined sewer (the original site of Garrison Creek). A series of thirty ponds are indicated throughout the watershed that would be used to divert the current water drainage to the adjacent city park. A full site section is drawn that shows the current and historic elevations of the ravine and surrounding context, and proposed pond locations.

The next section of this study will highlight the Christie / Bickford / Montrose demonstration project site that is indicated in this Pond Abstract. It is proposed that the demonstration project can act as a microcosm of the larger system shown here. As a pilot, the Christie/ Bickford / Montrose site could act autonomously as a microcosm of the larger storm water network, and eventually as part of the full connected pond series down the length of the Garrison open space system.

30
Hemel Hempstead Water Gardens, England, c. 1959, Sir Geoffrey Jellicoe

Christie / Bickford / Montrose Demonstration Project: A Detail of the Larger System

3

31
Water in the park: a swimming hole made by the quarry excavations in Christie Pits

This study has been founded on the idea that the integration of water treatment infrastructure and Toronto's existing network of open spaces could result in an enriched community infrastructure of renovated parks with a more ecologically based system of rain water collection, treatment and re-use. Like the Trevi Fountain in Rome, water is a resource that can exist and be perceived on several levels - as a natural element, as a source of nourishment, and as a cultural benefit that can enrich both the urbanity and the environment of our parks.

The mapping of the previous section illustrated the potential of the Garrison network of open spaces to be regenerated in its original role of watershed, in terms of historic patterns, natural landforms, zones of landfill, and the supply of publicly owned open space tracing the buried creek and ravine.

This final section looks at the once connected trio of parks - Christie Pits, Bickford Vale, and the Montrose Schoolyard - as a site for a demonstration project that would use stormwater management techniques like ground infiltration and connected stormwater detention ponds. These techniques would be used to not only collect, treat, and re-use rain water, but to also use this infrastructure as a catalyst in the regeneration of the Garrison Ravine system, its parks, and its community.

This case study specifically demonstrates that the use of ponds in the three parks would not interfere with current recreational facilities, like baseball diamonds and playing fields, and could be used in conjunction with urban design considerations of entrances, accessibility, lighting, and pathways to improve upon the current condition of the parks.

The connected pond system is explored as an alternative to the "end of pipe" solution that is typically used in urban settings for the treatment of storm water. Whether in separated or in combined sewers, rain water is drained from the city's surfaces into underground pipes where it is taken directly to a treatment facility. During large storms, the increased volume of rain water combines with the sewage to overflow directly into the lake.

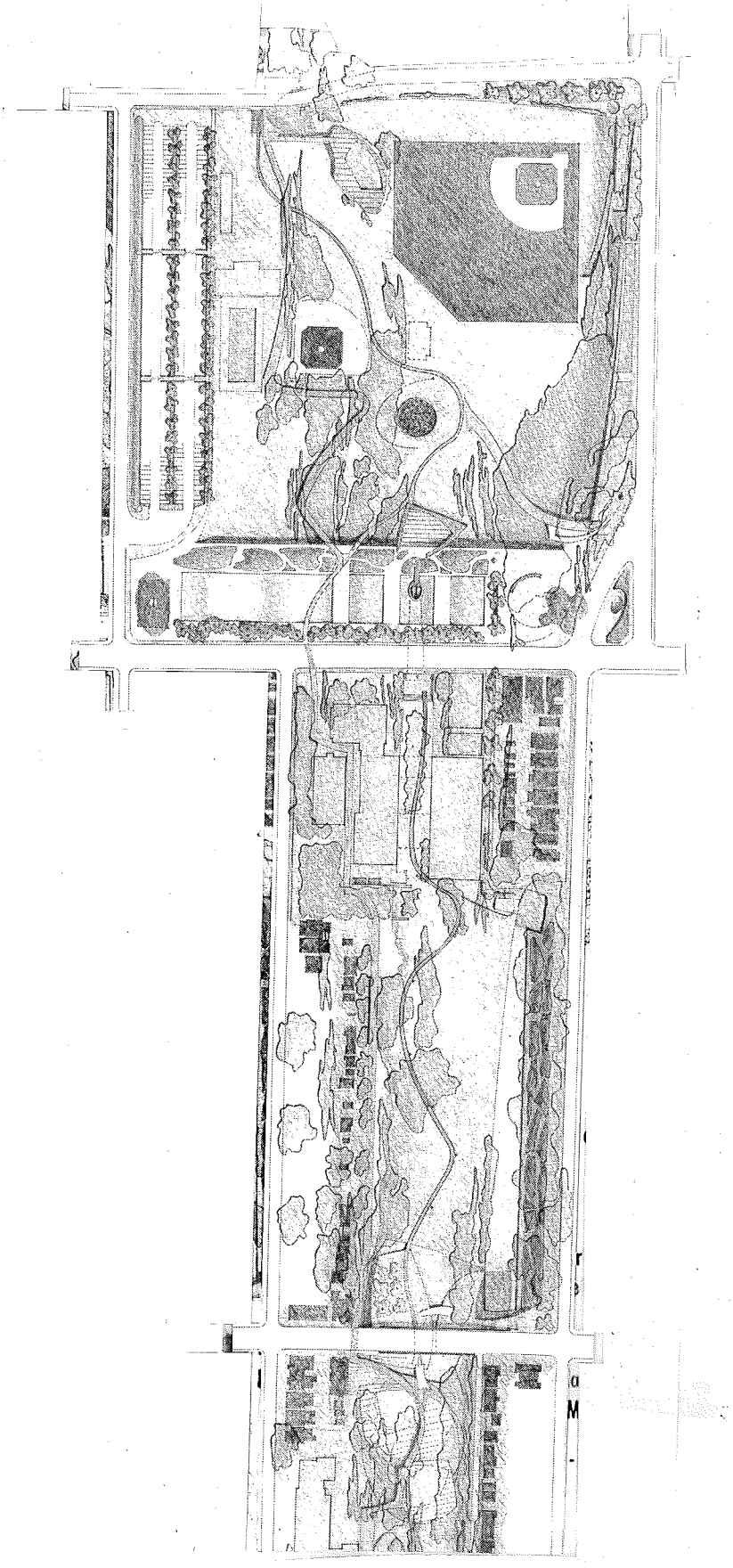
It is proposed that a system that collects, treats and re-uses rain water in a connected series of storm water ponds would reduce the volume and the pollution at the "end of the pipe". The connected pond system is seen as part of a fine grain solution that would then enable the use of more environmentally sensitive treatment methods, like biofiltration systems and smaller local treatment plants. Combined with other programmes like downspout disconnection, rain barrels, French drains, and porous pavements, the pond system enlists the resources of the community landscape - the neighbourhood, the open space, the individual and the collective - to treat rain water as a renewable, reuseable resource instead of a disposable waste that pollutes our beaches and the Great Lakes.

The case study area of the Christie / Bickford / Montrose (CBM) site is seen as a fragment of the larger potential system leading to the receiving waters of Lake Ontario. The use of rain water within this fragment of the larger system is autonomous and, for the short term, seen as discontinuous, much in the same way as the parks are a fragment of a potentially larger connected system of open spaces.

As a connected pond demonstration project, the CBM site would be used as a new receiver of rain water from the existing adjacent zones that are presently drained through underground pipes. The rain water would be collected and treated through a system of filtration and detention ponds in a gravity fed finite system ending in a small wetlands. At the completion of the detached autonomous system, the rain water can travel in many different ways - it can be re-used for irrigation of the parks, it can be stored in an urban canopy of trees, it can infiltrate into the ground water supply, and it can be connected back into the underground pipe system as a smaller and cleaner volume than what was previously collected. Eventually the demonstration project would connect into later phases of the connected pond system that would trace the course of the entire ravine as it travels towards Lake Ontario.

MAP 3.1

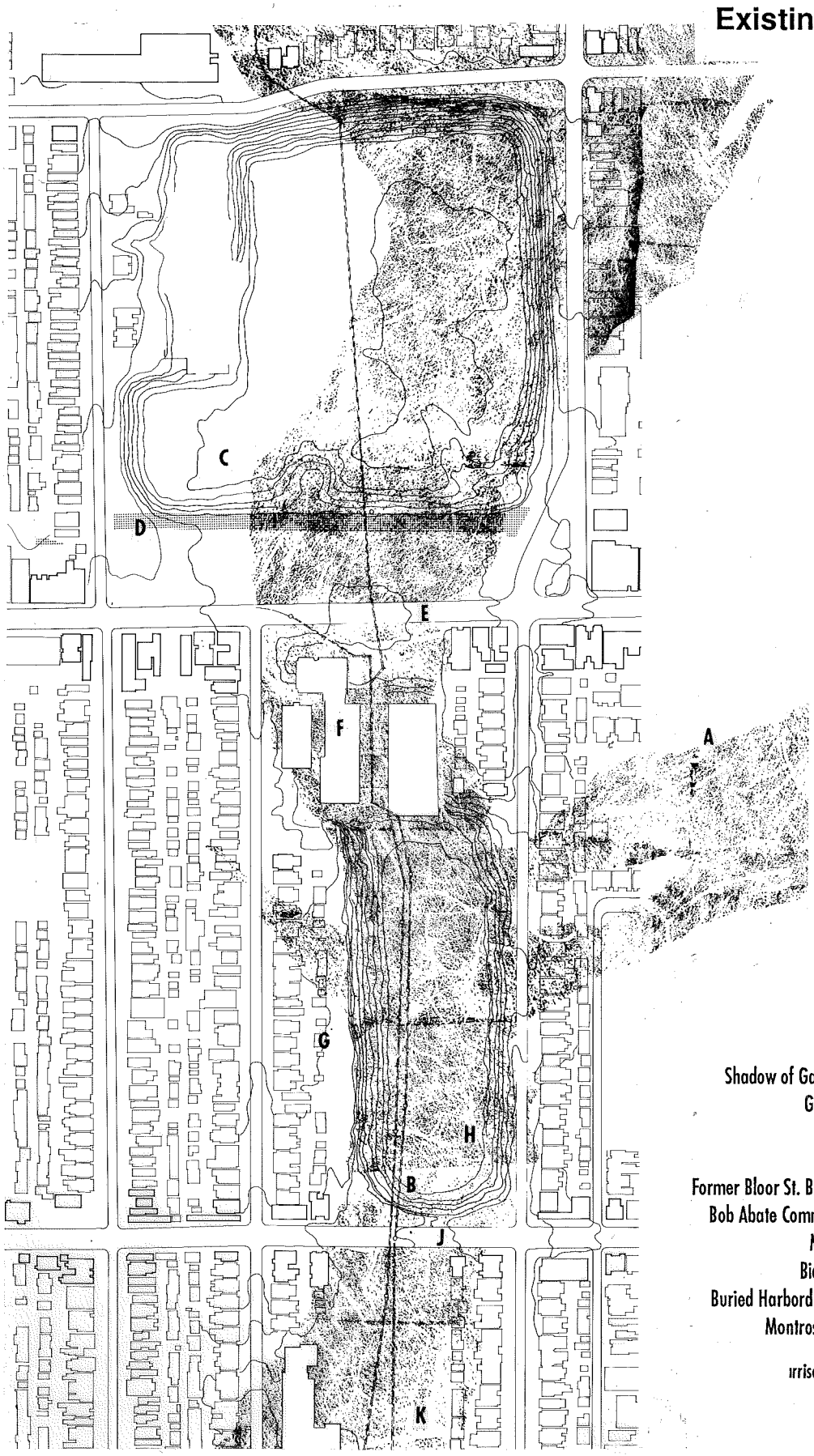
Christie / Bickford / Montrose Demonstration Project
Connected Ponds, Park Improvements and Urban Canopy



KEY

Stepped Parking Terraces / Aquifier	A
Raised Standing Pond / Christie Promontory	B
Urban Canopy and Arboretum	C
Existing Baseball Diamonds	D
Braided Path	E
Barton Bluff	F
Christie Bluff	G
Linear Ponds	H
Christie Terrace	J
Public Balcony	K
Existing Bob Abate Community Centre	L
Cascading Ponds	M
Existing Residential	N
Existing Laneway	O
East Terrace	P
West Terrace	Q
Restored Ravine Edge	R
Linear Vegetal Receiving Ponds	S
Linear Grace Street Pond and Skating Rink	T
Restored Harbord Street Bridge	U
New Transit Stop and Access	V
Wetland Marsh	W
Existing Montrose Public School	X
Montrose Promontory	Y

MAP 3.2 Christie / Bickford / Montrose Demonstration Project
Existing Condition



KEY

Shadow of Garrison Ravine	A
Garrison Sewer	B
Christie Pits	C
Bloor Subway	D
Former Bloor St. Bridge location	E
Bob Abate Community Centre	F
Montrose lane	G
Bickford Ravine	H
Buried Harbord Street Bridge	J
Montrose Schoolyard	K

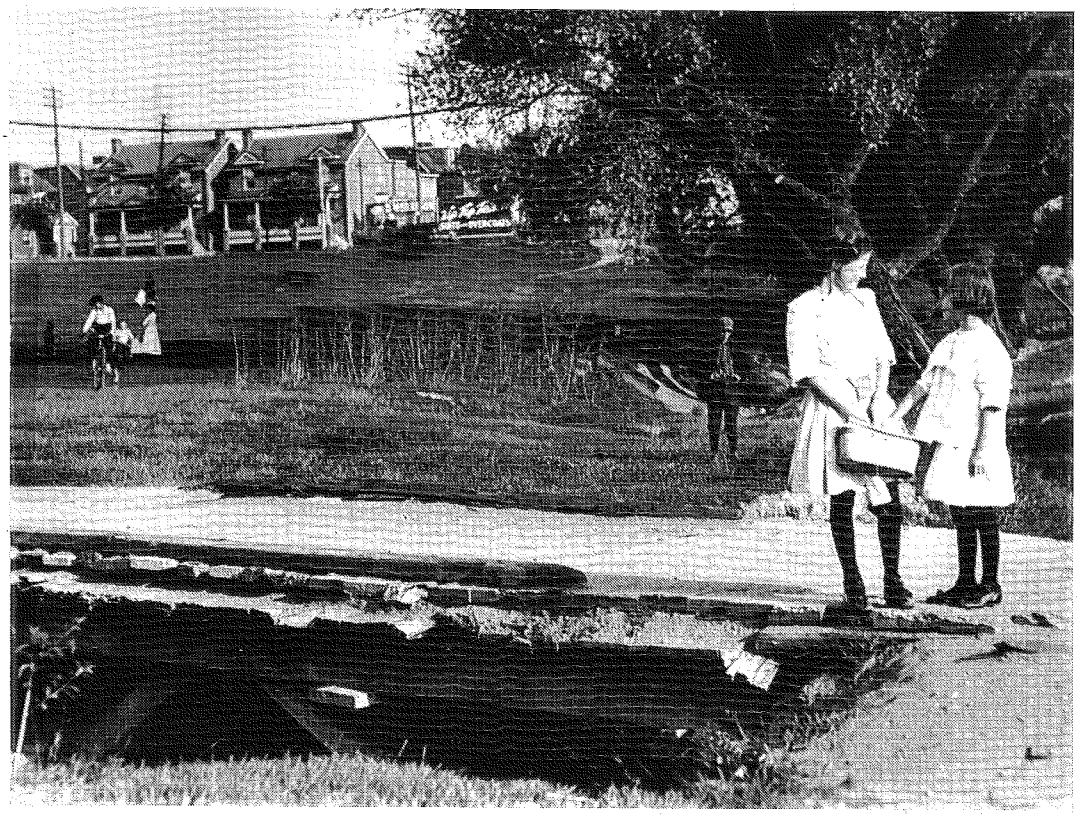
Background

The demonstration project site comprises three separate parks that once formed a continuous ravine open space: Christie Pits, Bickford Vale, and Montrose Park. As mirrored in the "Selected Chronology", these three parks remained as a continuous route because of two bridges, one at Bloor Street, and one at Harbord Street, that allowed the ravine to co-exist with the new streets that were constructed at the turn of the century. The context of these spaces today is largely residential with commercial cross streets occurring at Bloor Street and Harbord Street.

When these ravine spaces were connected, their area was larger than that of Trinity Bellwoods Park, a major public urban space in the southern portion of the Garrison system. When the Bloor and Harbord Bridges were filled in, the connectedness of these open spaces was lost, along with the grand scale of the ravine. By dividing the ravine into small parcels, the act of filling in this major landform became incremental and simpler to accomplish. The evolution and condition of each of the now separate parks encompasses many of the special areas that occur along the length of the entire Garrison Ravine.

32
Christie Pits when it was actively quarried; Ossington Fire Hall is seen in the background (now demolished)

Christie Pits (Willowvale Park)



33
Standing on a small foot bridge over Garrison Creek as it passes through the north east corner of Christie Pits, c. 1905; This area, including the creek, was filled in by 1915.

Above Bloor Street, between Christie Street and Crawford Street, the park officially known as Willowvale Park, but commonly called Christie Pits, was an area of the Garrison system that had operated as a large deep gravel quarry since the 1880's. One of these operaters was Conn Smythe (famous as the builder and founder of Maple Leaf Gardens). The "Pits" refer to the excavated holes that filled with water and became a favourite play area for local children.This quarry was obtained by the city in 1906 and partially filled in the 1910's.

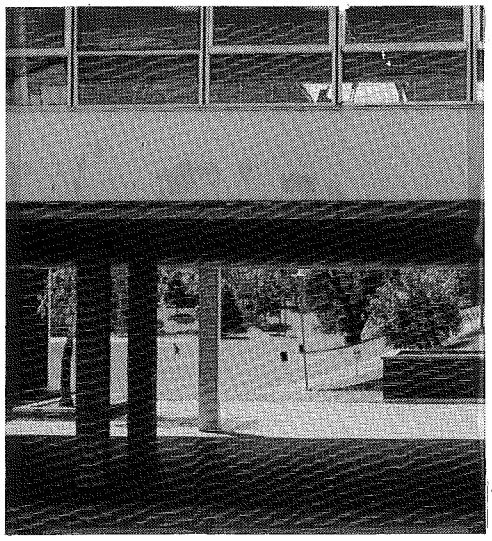
The present day park is set approximately 50 to 60 feet (or 15 to 20 meters) below the level of the surrounding streets, sloping steeply up to the sidewalks on all its edges. Its connection to Bickford Vale to the south was made via a bridge located at Bloor Street, which has since been either buried intact or destroyed. Running in its place at the south edge of Christie Pits is the Bloor Subway. The "cover" of soil and grass over the subway forms a wide terrace at street level along the entire Bloor Street edge, which then falls steeply to the lower elevation of the "Pits".

The grounds of Christie Pits contain essentially recreational facilities, including an outdoor pool and change room building, three baseball diamonds, seasonal washrooms, and children's playground. The western edge of the open space was developed as small housing lots, and a row of garages on a lane now faces the park. The north and east boundaries are made by Barton Avenue and Christie Street. Here, there are steep drops with one sharply descending asphalt path at the northeast corner forming the only "way" into the park from the north.

Bickford Vale

Directly south of Christie Pits, bounded to the north by Bloor Street and Harbord Street to the south, and between Grace and Crawford Streets, lies Bickford Vale, originally known as Bickford Ravine. Early in the city's history, it was used as a brickyard, and like Christie Pits, the original banks of the ravine quickly disappeared through excavations for clay that continuously increased its width. When this site was put on the market for sale in the late 1800's, a plan was made that called for complete landfilling and lot subdivision similar to that found on the neighbouring streets.

Instead, this land was obtained by the City of Toronto for parkland in the early 1910's as part of their general acquisition policy to make the Garrison parkway, a route of green spaces and a boulevard that would run along the length of the Garrison Ravine. This policy was largely responsible for the creation of parklands at Christie Pits, Fred Hamilton Park, Trinity Bellwoods, and Stanley Park.



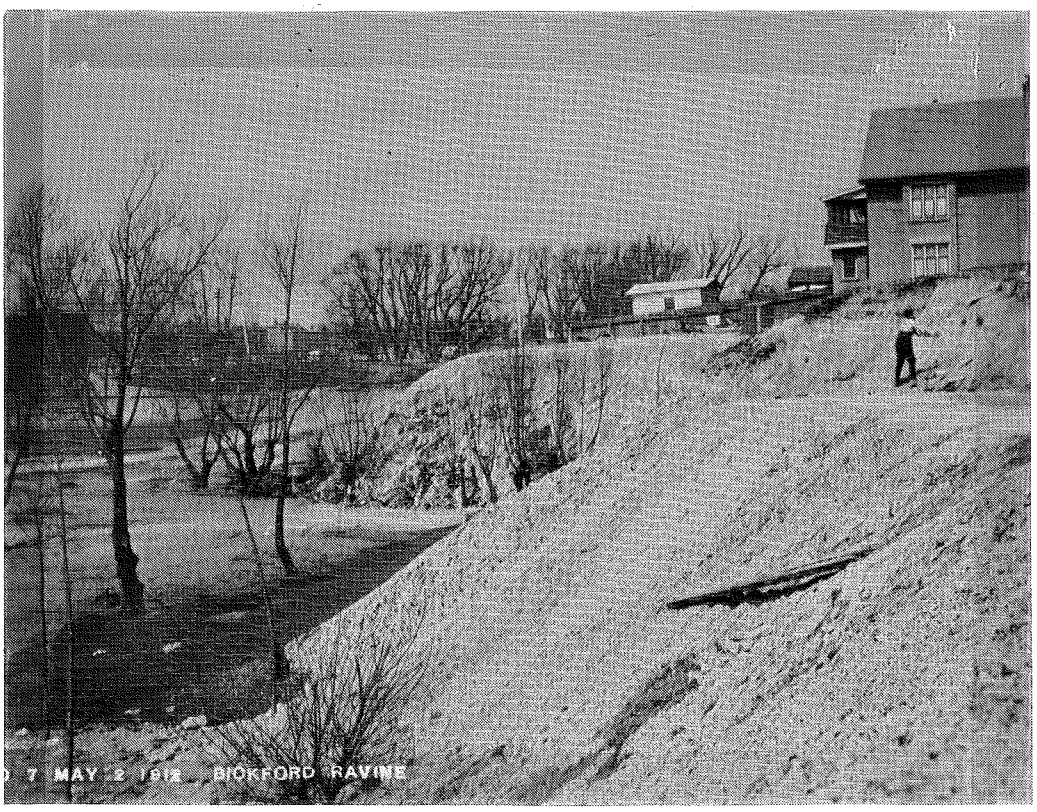
34
Bickford Ravine looking south from Bloor Street through the lower outside passage of the Bob Abate Community Centre
1994

Possibly during this acquisition period, the landform of the Bickford Ravine was substantially filled with garbage to a level of about twenty-five feet (7.5 meters) below the surrounding streets, also with sloping edges. Bickford Park still recalls the ravine depression, although its present depth is only a faint reflection of the original ravine. Although Bickford Park contains one baseball diamond, and one bocci court, its predominant character is of a largely vacant green space. The western edge, similar to Christie Pit's condition, was also developed and is formed by backs of garages. The eastern edge slopes sharply up to Grace Street with no formal access point other than at the corners, made by steep asphalt paths.

The original visual connection to the north between Bickford Park and Christie Pits has been blocked by the construction of the Bickford / Bob Abate Community Centre in the 1960's. This follows the pattern of later development of ravine lands by large institutions. The community centre building does allow an open passage stepping down from Bloor Street connecting to Bickford Park, but this is not immediately apparent as a strong link between the two parks.

At the southern boundary made by Harbord Street, the grade of the park slopes steeply up to meet the street level. This slope also conceals the buried face of the Harbord Street Bridge, although the bridge's abutment is still visible rising above the street to form a low wall. The bridge, built in 1915, allowed a generous passage of 50 feet in length, 35 feet in width, 25 feet in height, between the Bickford Ravine and the space now known as Montrose Park and Schoolyard to the south.

35
Bickford Vale looking north from Harbord Street, 1913. Grace Street is shown on the right.



36
Looking north west from the midpoint of Bickford Ravine, 1912. The Grace Street house on the right can be keyed back to the views above (35) and on the opposite page (34)

Bridging the Ravine

When Christie Pits, Bickford Vale, and Montrose Schoolyard were first acquired by the City of Toronto, they were part of one large open space that travelled uninterrupted under bridges built on Bloor Street and Harbord Street.

At one time there were over twenty bridges spanning the length of the Garrison Ravine. These bridges allowed the urban system to pass over the natural system, while a fully connected open space system passed through at the lower level. The open space connections were not made as "underpasses", but by an impressive and varied display of bridge design that allowed both urban and natural passages to exist equally and autonomously, while the bridge provided the opportunity for symbolic or actual connections.

One of these bridges lies buried under Harbord Street between Grace and Montrose Streets. The Harbord Street Bridge was built in the early 1900's. It allowed Harbord Street to pass over Bickford Ravine. When the bridge was buried in the 1930's, Bickford Ravine then became the two smaller parts of Montrose and Bickford Vale. Efforts are underway by the Garrison Creek Community Group, a non-profit citizen's group, to have the Harbord Street bridge uncovered and to link the two parks together once again.

If the three pieces of open space were able to be re-connected, the total park area would exceed that of Trinity Bellwoods Park and other major urban parks in the City of Toronto. While the presence of the Bloor subway is an obvious discouragement to the reconnection of Christie Pits to Bickford Vale, the pond system proposed for the Bickford / Christie Pit site assumes the "recovery" of the Harbord Street Bridge and the reconnection of Montrose and Bickford ravine sections.

38
Harbord Street Bridge c. 1915 connecting Bickford Vale and Montrose School yard. The Romanesque vault is 35' wide by 23' high. This bridge was buried intact during the 1930's or 40's when the south part of Bickford Ravine (now Montrose schoolyard) was also filled.

The Christie / Bickford / Montrose Connected Pond System

The elements of the CBM demonstration project play many roles as the instruments that integrate the function of the water treatment infrastructure to the role of urban and environmental design. Map 3.3 Storm Water Management and Urban Landscape Elements represents a departure in the traditional separation of public works infrastructure and public space, where water infrastructure is perceived as an underground and invisible, unknowable system by the general public, and the public space as a decorative dispensable divorced "applique".

By tying public works infrastructure and open space together, a new model for a community infrastructure is proposed. By broadening the definition of performance criteria for infrastructure, more broad objectives and solutions can be reached within equal or less expenditures. This new framework requires that multi-disciplinary teams of professionals and of interdepartmental government agencies at all levels need to be recognized and developed.

Finally, this model of integrated infrastructure depends on a shared responsibility with the local community in the full process of defining the objectives and implementation strategies.

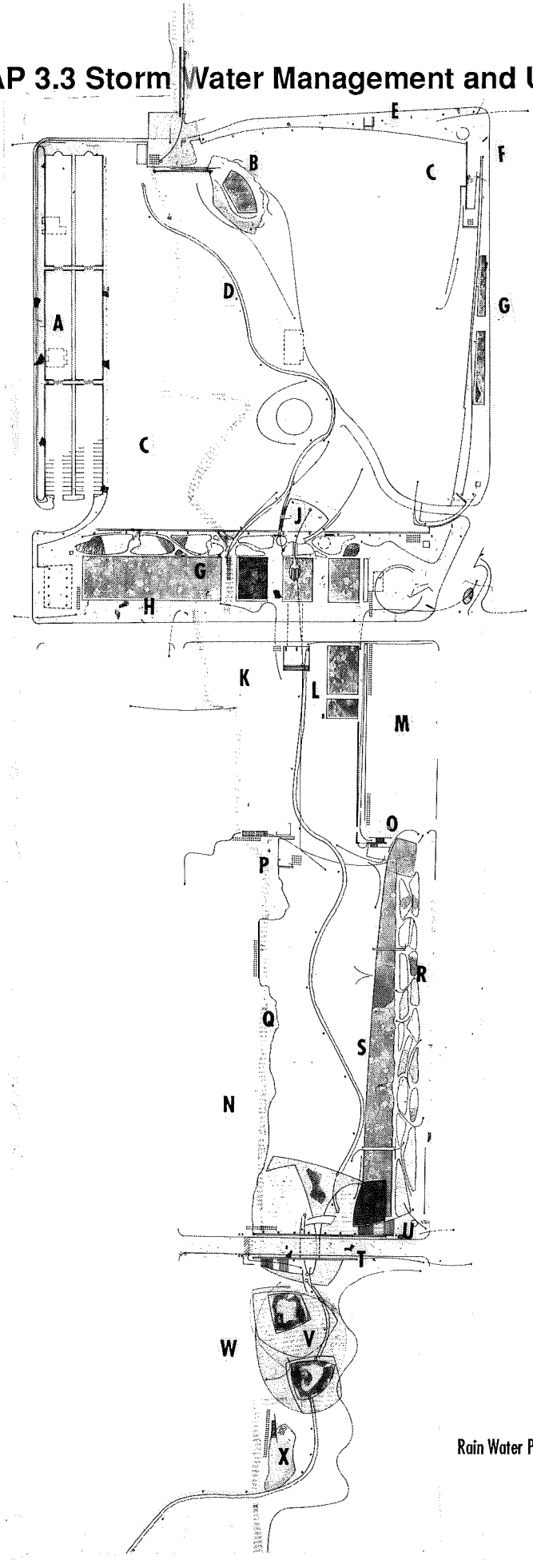
Following the integrated urban and infrastructure elements, the relevant systems are drawn separately to identify their functions. These elements are described through the next three maps:

MAP 3.4 Progressive Water Treatment Conveyance, (see page 52) illustrating the basic role of the water and filtering elements as storm water collection and treatment techniques;

Map 3.5 The Urban and Ecological Elements (see page53) describing the urban and civic natures of the water and landscape elements; and

Map 3.6 The Urban Canopy and **Map 3.7 The Braided Path** (see pages 54 and 55) propose features that can extend beyond the borders of the demonstration project site to form part of the larger Garrison system of open space, while performing important roles within the water treatment infrastructure.

MAP 3.3 Storm Water Management and Urban Landscape Elements



KEY

Stepped Parking Terraces / Aquifier	A
Raised Standing Pond / Christie Promontory	B
Existing Baseball Diamonds	C
Braided Paths	D
Barton Bluff	E
Christie Bluff	F
Linear Ponds	G
Christie Terrace	H
Public Balcony	J
Bob Abate Community Centre	K
Cascading Ponds	L
Existing Residential	M
Existing Laneway	N
East Terrace	O
West Terrace	P
Restored Ravine Edge	Q
Linear Vegetal Receiving Ponds	R
Linear Grace Street Pond and Skating Rink	S
Harbord Street Bridge	T
New Transit Stop and Access	U
Wetland Marsh	V
Montrose Public School	W
Montrose Promontory	X

MAP 3.4 Progressive Water Treatment Conveyance

Bickford to Montrose, corresponds to both a scale of the largest to the smallest, and from higher to lower elevations. This reduction in size and elevation provides a rationale for the pond locations, ie. Chrisite Pits, as the largest park is able to accommodate larger bodies of water, Bickford's length enables a series of thin linear ponds, and the nature and scale of the Montrose school yard provides the best siting for a small and finite wetlands that can become part of an educational curriculum and become the temporary terminus of the demonstration project's conveyance train.

ELEMENTS

Points of Connection

The points of connection between the existing storm water lines and the proposed connected pond conveyance train are indicated on the drawing as arrows that refer back to the "zones" that are drawn in Map 2.9 of the Pond System Abstract. These four zones represent adjacent neighbourhoods that would be disconnected from the main storm water branch and fed into the new pond system, in fact, re-creating the natural and original drainage pattern of the watershed. The volume of the water that is being tapped from each zone would determine the number of ponds required and their capacities. This study assumes a certain number and type of ponds and techniques to demonstrate their potential in an urban park setting.

Porous Surface Aquafier

Along the west side of Christie Pits, a porous pavement is sited that filters surface water and the collected water from the adjacent zone through a number of layers of gravels stepping down the western edge. While the immediate surface water is dispersed through French drains into the ground water system, larger volumes of rain water are allowed to pond and filter gradually through the aquafier where it is collected and gravity fed to an irrigated tree system and to the ponds that face Bloor Street. The porous pavement area could also be equipped with points of access to drain skimmers where heavy pollutants could be screened and periodically cleaned out.

Raised Standing Pool

The Raised Standing Pool is sited on a constructed promontory, making an historical reference to the original bank of the Garrison Ravine. The pool at this raised height collects and measures rain water directly.

Linear Connecting Ponds

The connected ponds are strategically located to refer to the original presence of water in the ravine, and to create both formal settings and to reconfigure natural landscapes in Christie Pits and Bickford Vale.

The ponds located along Christie Street, connected to an adjacent drainage zone, collect water which is then pumped or gravity fed to a larger group of ponds along the public face of Bloor Street. This series of ponds are both shallow and deep and form part of the "Christie Terrace", a raised promontory that looks north across the expanse of Christie Pits. The flow of water from these ponds is pumped below grade, under Bloor Street to cascading courtyard ponds in the Bob Abate Centre.

The gravity fed connection from the stepped Bob Abate ponds to the long Grace Street pond is made by a canal that acts both as a shallow filter and channel during normal periods, and allows water ponding during rain storms.

MAP 3.4 Progressive Water Treatment Conveyance

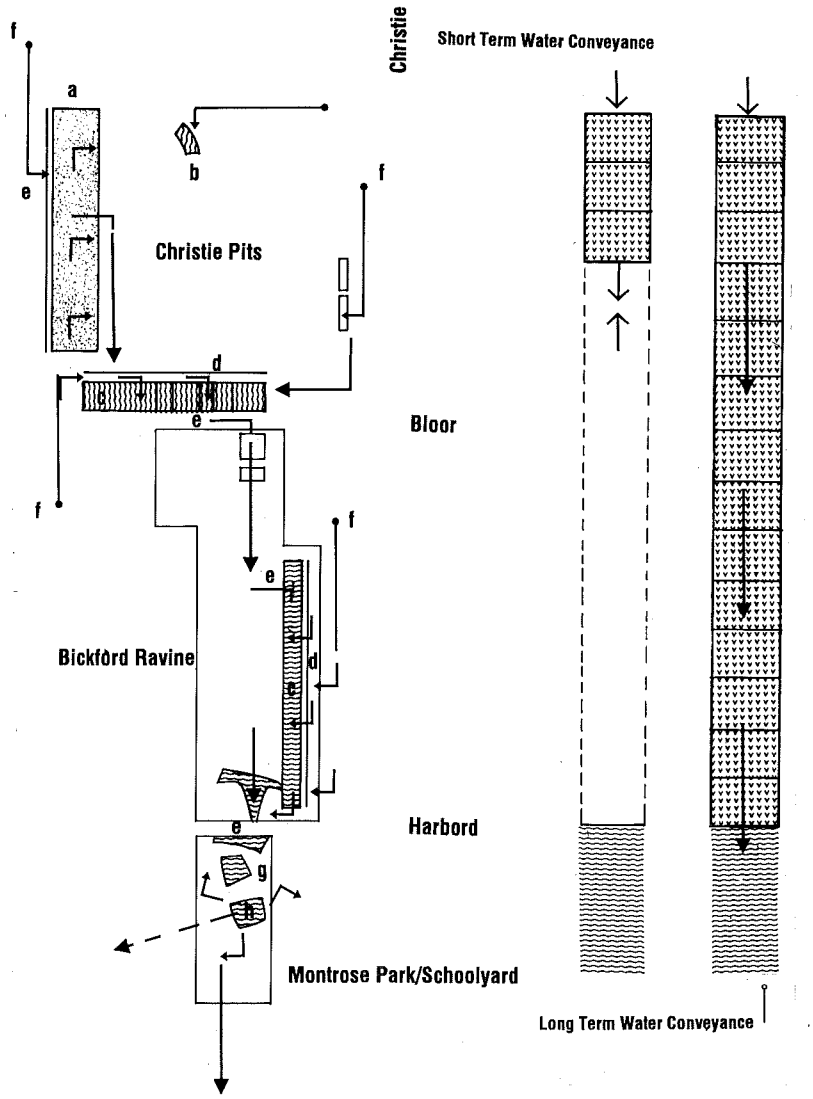
Linear Vegetal Receiving Pond

The long Grace Street pond is bordered along its length by a receiving area of wet grasses, reeds, and other filtering vegetal elements that take both collected water from the adjacent zone and the immediate catchment. Water passes through these natural filters before reaching the long more formally edged Grace pond. This pond eventually passes under the Harbord Street Bridge. It is assumed that the Harbord Bridge would be restored as an invaluable means of reconnecting the parks and of providing a continuous pond system.

Marsh

The Grace pond passes through a shallow area to a small wetland in the Montrose schoolyard, which provides the terminus of the autonomous pond system. The marsh combines a serial connection of shallow to deep water and supports a generous edge of natural vegetal filters. The marsh water level would rise and fall according to the seasonal rainfall.

At the terminus of this conveyance train, the collected rain water will then travel to a number of possibilities: infiltration to the ground water system, being drawn up into the surrounding trees and small orchard that act as water storage tanks, re-use in park irrigation systems, and reconnection into the underground storm water lines eventually reaching Lake Ontario.

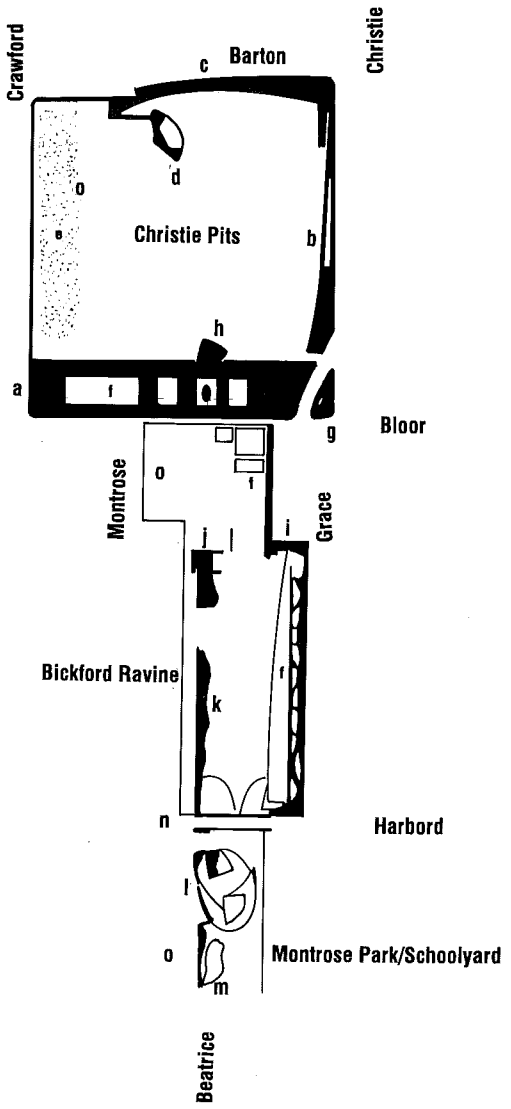


KEY

Porous Surface Aquifier	A
Raised Standing Pond	B
Linear Connecting Ponds	C
Linear Vegetal Receiving Pond	D
Controls	E
Storm Line Connection	F
Marsh	G
Deep and Shallow Water	H

MAP 3.5 Urban and Ecological Elements

water system is integrated with vegetal, urban, and civic spaces that combine to make an enriched community landscape. The following elements are proposed as places and structures that create cultural and recreational benefits from the water while it functions in the collection of rain water.



KEY

Christie Terrace	A
Christie Bluff	B
Barton Bluff	C
Christie Promontory	D
Stepped ParkingTerraces	E
Linear Ponds	F
Christie Islands	G
Public Balcony	H
East Terrace	I
West Terrace	J
Restored Ravine Edge	K
Marsh	L
Montrose Promontory	M
Harbord Street Bridge	N
Existing Facilities	O

The Braided Path is also proposed

The Stepped Parking Terrace

While acting as a porous surface aquifier, the stepped parking terrace also acts as a hard surface shaded area that provides a graduated formal way down to the lower elevation of Christie Pits. The terrace can also be used as a raised viewing platform across the park, and as a place for overflow parking in special events. Its hedgerow planting at Crawford Street creates an edge and buffer to the residential street.

Barton and Christie Bluffs

These two bluffs, located on the north and east edges of Christie Pits, correct an existing condition where the access is difficult and unresolved. The presence of water is combined with unique settings for seating and lighting, making a shared space between the urban and the natural - between the city and Christie Pits. This zone, as the first point of contact between the Christie subway station and the park, sets up conditions for safe access, ramps, stairs, seating areas, drinking fountains, and gardens.

Christie Promontory

The promontory containing the raised standing pool recreates a small piece of the original ravine bank, and provides a high point on the site that allows views down the Garrison system of open spaces.

Christie Terrace

Christie Terrace creates a main public face of the park to Bloor Street, and can also provide a visual connection between the subway that passes below to the park. It contains ornamental gardens and the largest series of shallow and deep ponds, establishing strong pedestrian zones crossing Bloor Street, and becomes a public balcony looking north across Christie Pits.

MAP 3.6 The Urban Canopy and Braided Path

East and West Terraces

The East and West Terraces in Bickford Vale create points of entry from the west lane and at Grace and Montrose Streets. These set up spaces for stairways, public gathering places, drinking fountains, lights and pathways. The west side of Bickford is restored as the ravine edge, pulled out into the space to reveal the original profile. A line of trees act to filter out the views of garages along the bordering lane.

The Harbord Street Bridge

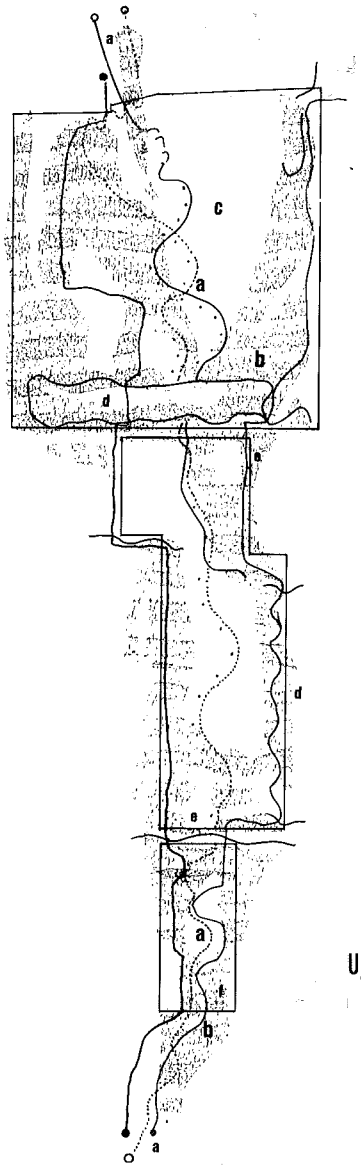
The excavation of the Harbord Street Bridge will reveal a grand passage between Montrose and Bickford parks. It will also become the site for a public art installation, transit stop, lighting, public telephone, and accessible ramps and stairs down from the street to the park level.

MAP 3.6 The Urban Canopy and Braided Path

The urban canopy is proposed as a linear system and arboretum of trees that are both indigenous and refer to historical patterns. This canopy would trace and describe the route of the Garrison Ravine without having to make physical connections between the presently scattered network of open spaces. The trees also play an important role in stormwater management, in their enormous capacity for water storage and their ability to sustain a higher ground water level.

The Braided Path is proposed as a new model for sustaining linear "ways" as public spaces rather than public pathways. A traditional path remains a thin ribbon not necessarily engaging the landscape it passes through, while the braided path contains, defines, and modulates the spaces so that a broad linear park is defined rather than a single.

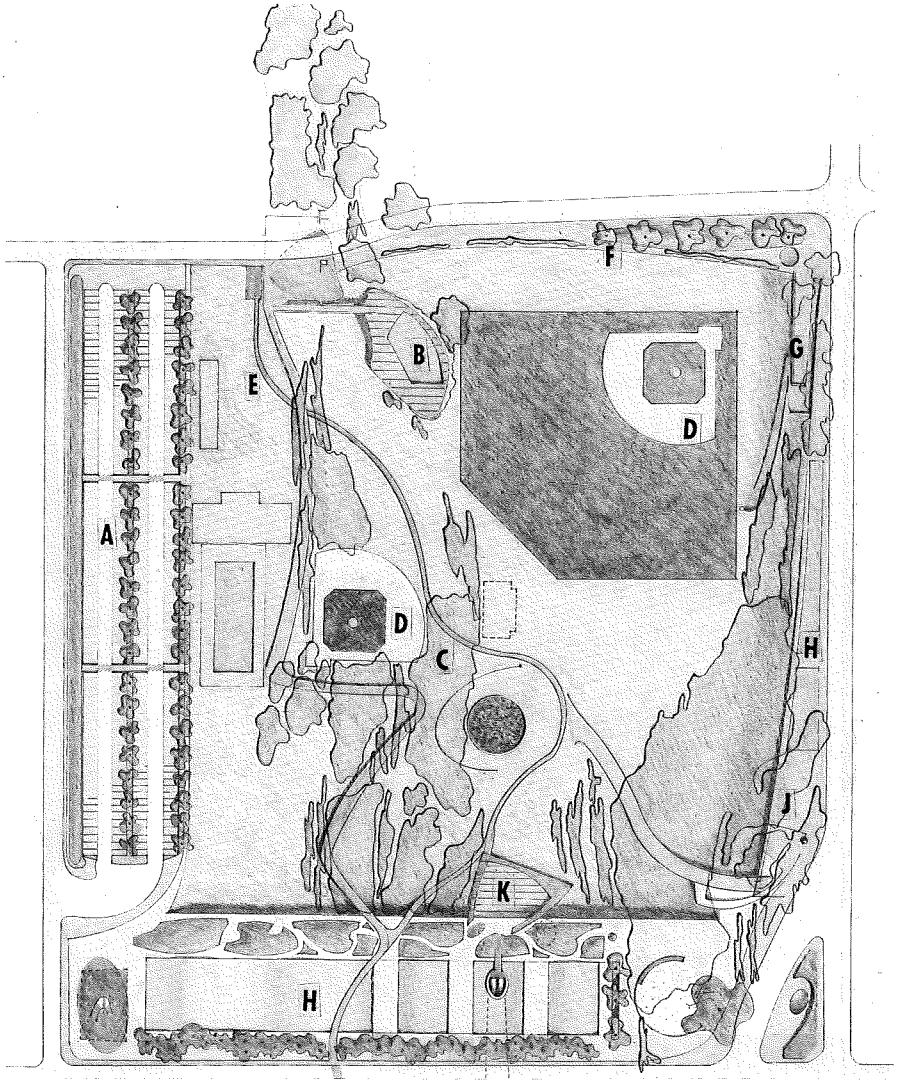
One path is hard surface, well lit and makes the formal and most public "way" through. A secondary "nature" trail is soft surfaced, moving through more sensitively landscaped areas in a more circuitous route. A third trail catering to cyclists, joggers, and skating is located on the upper edges of the parks, where the high speeds do not interfere with the slower movement of the other two trails below.



KEY

Braided Path	A
Hard Surface Public "Way"	A1
Soft Surface Route	A2
Upper Cyclist / Jogger Route	A3
Urban Canopy	B
Open Areas	C
Formal Planting	D
Trellis	E
Garden Sites	F

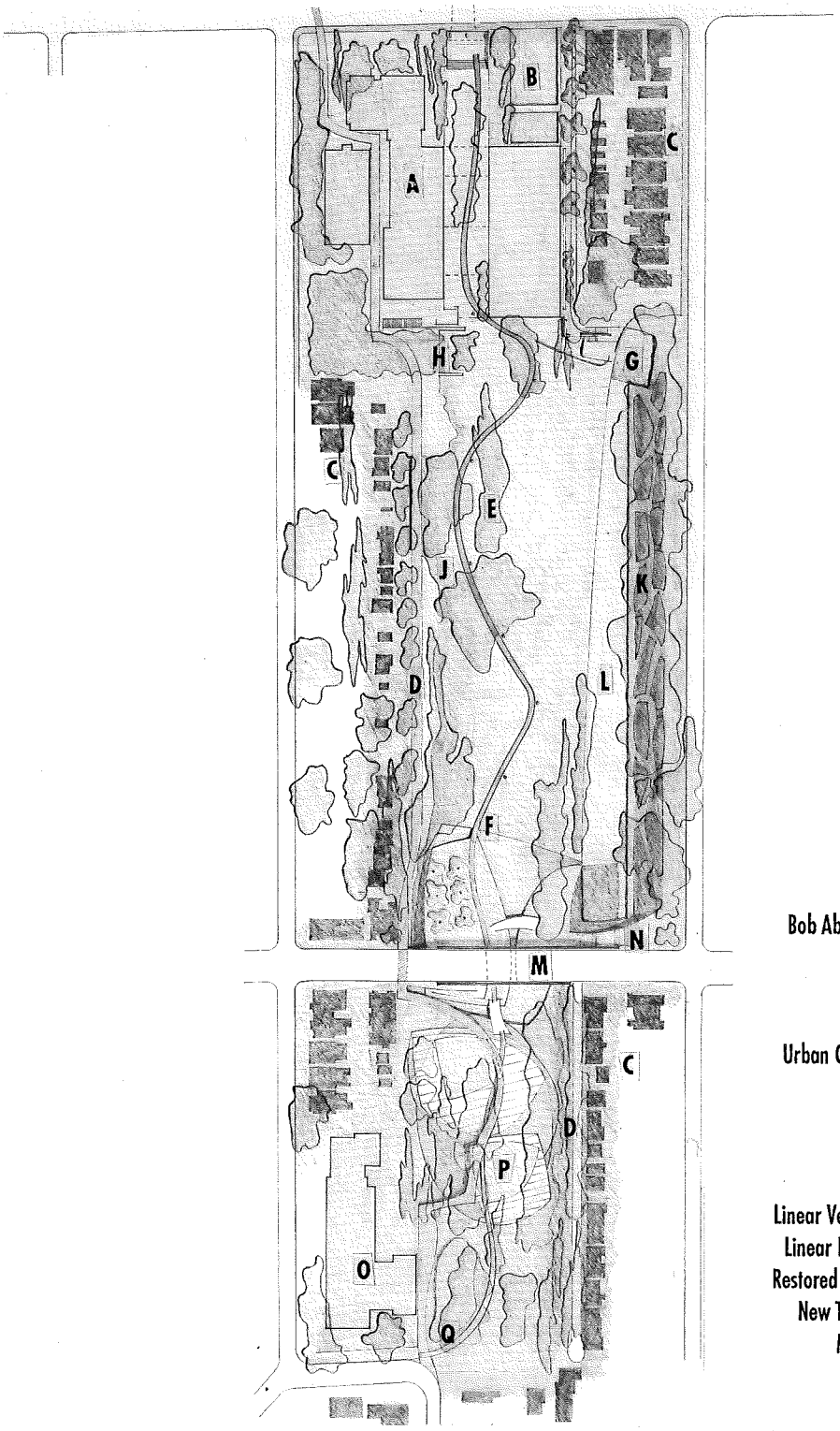
MAP 3.7 Christie Pits Detail Plan
Connected Ponds, Park Improvements and Urban Canopy



KEY

Stepped Parking Terraces / Aquifier	A
Raised Standing Pond / Christie Promontory	B
Urban Canopy and Arboretum	C
Existing Baseball Diamonds	D
Braided Paths	E
Barton Bluff	F
Christie Bluff	G
Linear Ponds	H
Christie Terrace	J
Public Balcony	K

MAP 3.8 Bickford Vale and Montrose Schoolyard Detail Plan
Connected Ponds, Park Improvements and Urban Canopy



KEY

Bob Abate Community Centre	A
Cascading Ponds	B
Existing Residential	C
Existing Laneway	D
Urban Canopy and Arboretum	E
Braided Path	F
East Terrace	G
West Terrace	H
Restored Ravine Edge	J
Linear Vegetal Receiving Ponds	K
Linear Pond and Skating Rink	L
Restored Harbord Street Bridge	M
New Transit Stop and Access	N
Montrose Public School	O
Wetland Marsh	P
Montrose Promontory	Q

Next Steps

The mapping of the connected urban pond system at the conceptual level, at both the scale of the full length of the Garrison Ravine and of the detail demonstration project level at the Christie / Bickford / Montrose site illustrates that it would be feasible and desirable to proceed further into finer grain and more technically focussed investigations.

The work of this study has essentially established that there is a historic precedent for the role of water in the natural function of the Garrison watershed. It also demonstrates that there is a significant amount of open space that traces the ravine route that could provide locations for stormwater ponds. And finally, a system of connected ponds could be located in Toronto parks without compromising existing recreational uses, and more importantly, greatly improve conditions of entrance, movement, shade, and community amenities.

The concept of collecting, treating, and re-using rain water at source and along the watershed's course to the lake is seen as a viable alternative to the "end of pipe" solution. Combined with other techniques such as down spout disconnection, porous pavements, urban forestry and French drains that promote the infiltration of rain water into the ground water supply and into the trees that act as storage tanks, it is proposed that this alternative technology can alleviate the design loads carried by the end of pipe solutions, whether they are underground storage tanks or biofiltration mechanisms.In order to establish strategic framework for the overall Garrison Creek Regeneration Plan, it is proposed that a watershed planning study be undertaken that would provide data and detail design for the Christie/ Bickford / Montrose demonstration project, and engineering and urban design data for the larger Garrison system. This study should look at three aspects of the Garrison Creek watershed:

1. The completion of conceptual plans and implementation strategies for the entire Garrison storm water system, including the identification of discreet development parcels, and corresponding cost estimates, to facilitate phased implementation, as capital funding becomes available;

2. Preparation of detailed conceptual design drawings, complementary capital, and operating and maintenace cost estimates for the Christie / Bickford Vale Monstrose demonstration project, the lessons of which can be applied to the other parcels determined for the larger system;

3. The identification of alternative and preferred institutional structures for the ongoing implementation, management, and maintenace of the watershed; ongoing and extensive community and agencies consultation, in cooperation with existing residential and environmental groups (the Garrison Creek Community Group, local school groups, neighbourhood committees, etc.)

Demonstration Project Sites

Ideally, several more demonstration areas should also be illustrated, in particular, the Fort York area, that would form the southern terminus of the pond system and the connection to the waterfront linear park and Garrison Common. It would also be beneficial to study sites at the northern limit of the watershed that have been highly built up and lack open spaces.

Next Steps: Hydrology / Water Quality Issues Operation and Maintenance

Specifically, the following hydrology and water quality issues should be addressed in a further developed watershed planning study:

Hydrology / Water Quality Issues

1. Establish the boundaries of the Garrison watershed
2. Provide the estimated water balance for the study area (annual, monthly)
3. Delineate, specify, and quantify the sources of surface runoff - roof areas, residential streets, school yards, pervious areas, etc., and their implications for water quality
4. Produce a vertical profile (or profiles) through the area - this will clarify the issues of connectivity among the various storm water management elements
5. Produce water balance for the proposed storm water management elements (pond, infiltration basins, etc.)
6. Address the feasibility of disconnection of runoff inputs to the sewers and their connection to the stormwater management system
7. Detail treatments to be carried out in the demonstration area - techniques,. maintenance, and operation
8. Estimate the composition and volume of surface runoff from various areas and its suitability for infiltration or other processing in the stormwater management systems
9. Identify the volume of stormwater which can be diverted from the City's storm sewer system
10. Assess the estimated water quality in view of the current regulations for surface waters (chemistry, microbiology, etc.)
11. Assess suitable and sustainable water uses for the newly created water bodies

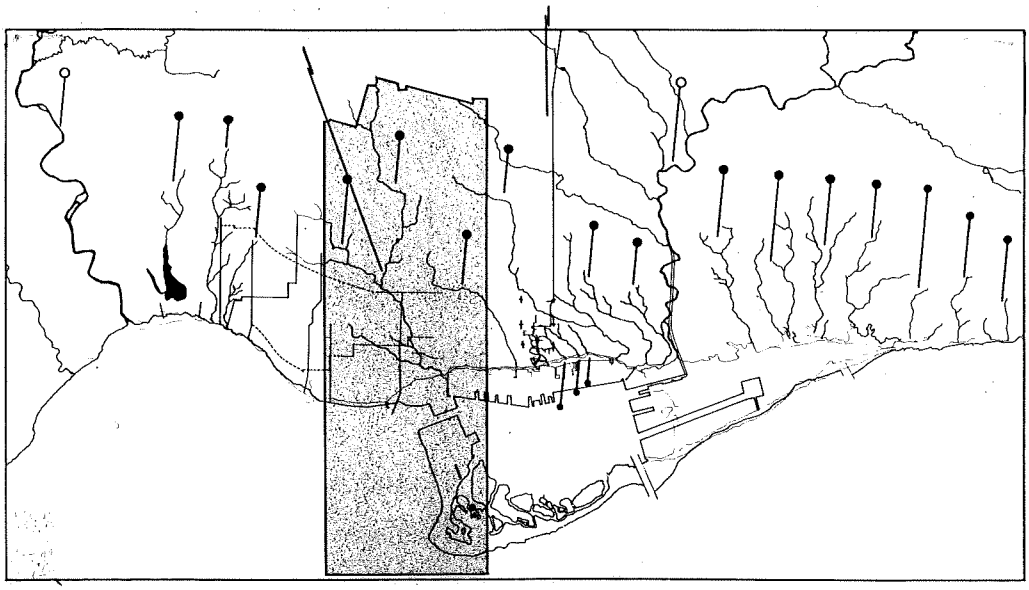
Operation and Maintenance

12. Address the issues of operation and maintenance; costs, operators, equipment, public involvement
13. Estimate preliminary costs for the various components of the demonstration project and full site relating to capital costs, maintenance, and operation

The Metropolitan Context

The Garrison Watershed is one of many creek systems, intact or buried, that run down the gently sloping Toronto plain into Lake Ontario. The study of the Garrison watershed and its potential to regain its original function of collecting rain water, can be seen as a prototypical for the other twenty small creek and streams that run between the Humber and the Rouge Rivers. Many of these systems have a corresponding set of open space similar to that of the Garrison ravine that could conceivably support connected pond networks as well.

The value of the Garrison Creek Connected Pond System should be seen as part of a larger movement towards more ecologically tuned methods of water collection and treatment. If the storm water management ponds can act as catalysts in the overall regeneration of these currently disconnected green spaces, then each creek, whether buried or intact, represents a significant opportunity for the creation of linked open space systems that would knit local neighbourhoods on a north south axis to the Toronto waterfront. Taken as a repeated rhythm of connected linear park systems across the city, the introduction of water collection infrastructure into the existing park / ravine networks could result in an overwhelming improvement to the metropolitan region and its connection to the Toronto waterfront..



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24. Winter tobogganing at Christie Pits c. 1915, source City of Toronto Archives

25. Plan of the City of Toronto c. 1876, source Metro Toronto Reference Library

26. Trevi Fountain, Rome, photograph Brown and Storey Architects

27. Grass Amphitheatre in the Garrison Ravine, Trinity Bellwoods Park; Trinity College students presenting Aristophanes' "The Frog", c. 1910, City of Toronto Archives

28. Housing on Main Streets; Diagram of areas affected by the Main Streets By-law; Source City of Toronto Department of Planning and Development

29. Aerial view of the Wilderness Garden, Ossington Old Orchards Public School; c.1991, photograph by former principal Ted Currie, Source O.O.O.P.S. Wilderness Garden Committee

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31. Christie Pits Swimming Hole; c. 1910, Source City of Toronto Archives

32. Christie Pits Quarry; c. 1900, Source City of Toronto Archives

33. Christie Pits Footbridge over Garrison Creek, c. 1905, Source City of Toronto Archives

34. Bickford Ravine present day condition; looking north towards Bob Abate Community Centre, Source Brown and Storey Architects 1993

35. Bickford Ravine c. 1913, looking north Harbord Street; Source City of Toronto Archives

36. Bickford Ravine c. 1913, looking north from midway between Bloor and Harbord Streets; Source City of Toronto Archives

37. Bickford Ravine south of Harbord Street Bridge, now known as Montrose Schoolyard, c. 1915, Source City of Toronto Archives

38. Harbord Street Bridge, c. 1915, Source City of Toronto Archives

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