A Design Strategy For the Assiniboine Riverfront in Central Winnipeg

by

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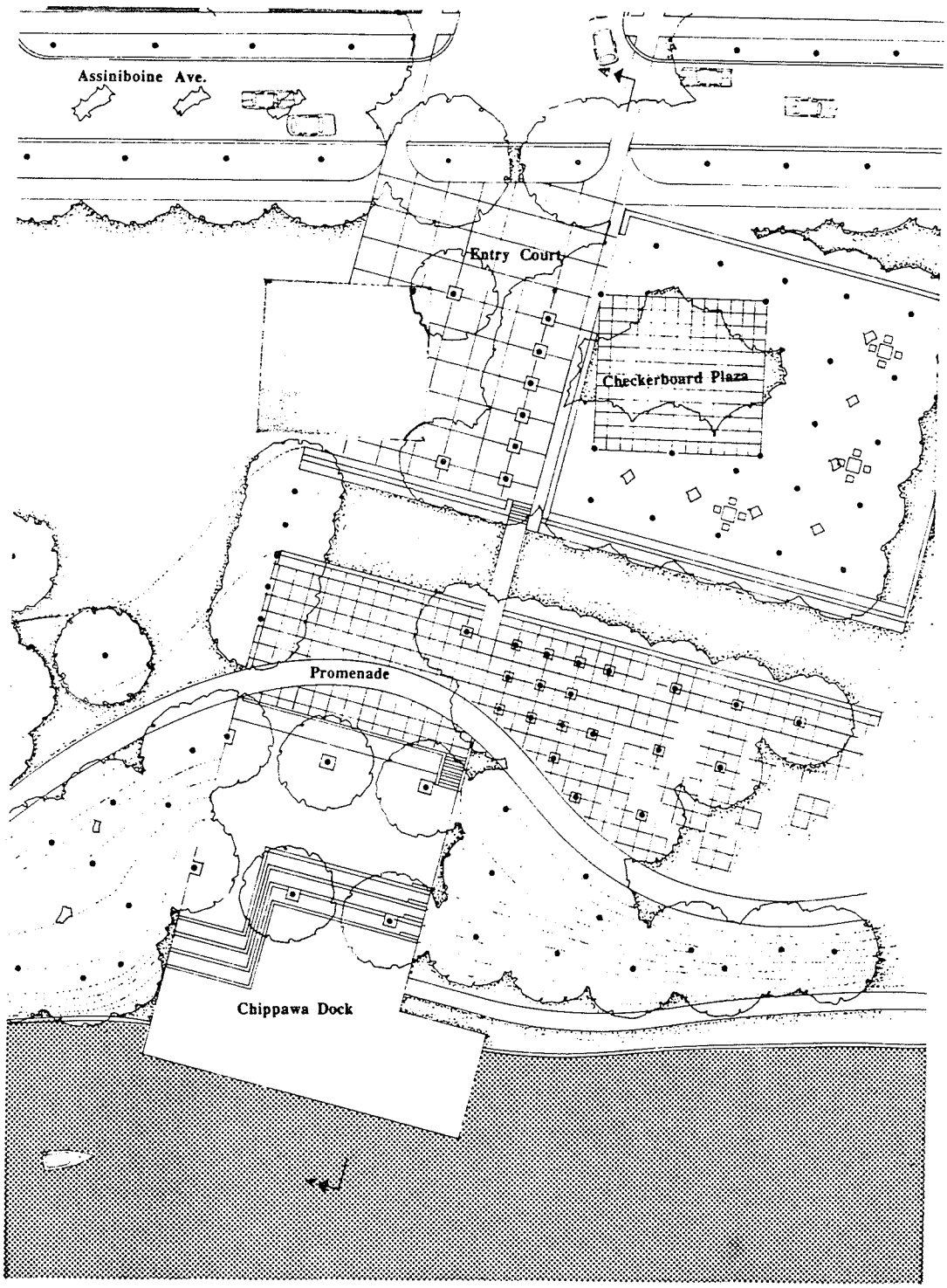

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Abstract

This study develops a strategy for the design of the Assiniboine riverfront, from Main Street to Osborne Street, in Central Winnipeg. Located in a high density residential, commercial and business neighborhood, and in light of the renewed interest in rivers and in riverfront development by governments and community groups, a number of interests must be reconciled in any development plan before it may be successfully implemented.

The design strategy presented in this study is the result of a detailed analysis of the site, its context and resident, bureacratic, environmental and other interest group considerations. The stategy is logically based on the factors that distinguish this area of the city from others. The approach does not reconcile the interests of all those involved, but it reflects the common elements of their concern by providing an approach that is general enough to be workable and specific enough to ensure that development of this property is consistent and coherent in the long term.

The design strategy developed includes rules for design that are applicable in other, similar situations. It provides a method for beginning the process of urbanizing riverfronts located in downtown areas of cities, in light of these areas' special status.

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CHAPTER ONE
Introduction

INTRODUCTION

It is in the most densely populated areas of cities that public open space is most highly valued and is generally most limited. Such areas are characterized by a diversity of land uses and resident groups including singles, young married couples, families, as well as elderly singles and couples. The open space system of such an area should provide for all these residents and respond, as well, to the needs of those who use the commercial, recreational and other facilities which are often associated with such an area.

In the City of Winnipeg, the highest residential densities are often found in close proximity to the Assiniboine and Red rivers,and the tendancy to increase density adjacent rivers is continuing. As the City's population becomes increasingly dense in proximity to these rivers, the need for well designed and accessible open space increases. Within the River-Osborne/downtown area, public open space is limited and there is a pressing need to realize the potential of river front property for development and integration with the surrounding urban fabric and open space network.

The Value of Riverfront Development

Recognition of the public benefits and the value to be gained from the development of riverfront property in Winnipeg as a recreational, educational, scenic and historic resource has been growing rapidly in recent years. This increased recognition has been demonstrated by programs initiated under the Agreement for Recreation and Conservation, the Core Area Initiative, the current development of co-ordinated efforts for the design, conservation and management of the rivers, the commitment of funds by all levels of governments to its development for public use, and by the many commissioned studies that have been completed to date. The underlying assumption and the rationale these studies have used for re-establishing the importance of the riverfront is that the opportunities it offers for recreation, the sustenance of wildlife communities, aesthetic enjoyment, enhanced land values, the modification of micro climates, and its natural character will enrich and have an overall positive affect on the lives of those who make up the community.

Further reasoning that helps to make the case for the value of renewing interest in the riverfront and suggests some of its development potential, includes its inherent varied character, its historic role in the shaping of the city and the identity with history that it offers as a result. This line of reasoning has led most to conclude that the riverfront is important to all residents. It has also resulted in a move towards the public acquisition of riverfront property to facilitate public access and the appropriate development of the riverfront. While it is difficult to assess a dollar figure to the value of riverfront development, its desirability is undisputed.

The rivers of Winnipeg, have been, until recently, the forgotten vestiges of the City's origins and have been virtually inaccessible to the public. The historical importance of these rivers as a transportation network and as the basis for the establishment of the City, have been among the motivating factors for the renewed interest in the development of riverfront properties for public use. At a recent public discussion and debate focusing on the use of river front property[1], a consensus developed that it would be of benefit to all concerned if sensitive and appropriate development of riverfront property took place.

In a city such as Winnipeg, in which neighborhoods are often experienced as distinct communities, the rivers provide a sense of continuity in the landscape while offering visual diversity, impact and excitement. In the downtown area, revitalization projects have targeted many areas considered to have unique features worth preserving. Particularly in this area, where a wide variety of land uses that compete for space and co-exist, the riverfront offers great potential for linking commercial and residential land uses and for adding another level of excitement, interest and variety to the city.

The Assiniboine river, from Osborne St. east to Main St. and along Assiniboine and River avenues (see Plate 1), acts as a border to downtown Winnipeg and separates it from the River-Osborne area to the south. Its banks, while providing a continuous green edge, are characterized by poor links to nearby open spaces and streets, and poor access for the adjacent residents. The use and access to the river's edge is restricted by topography,

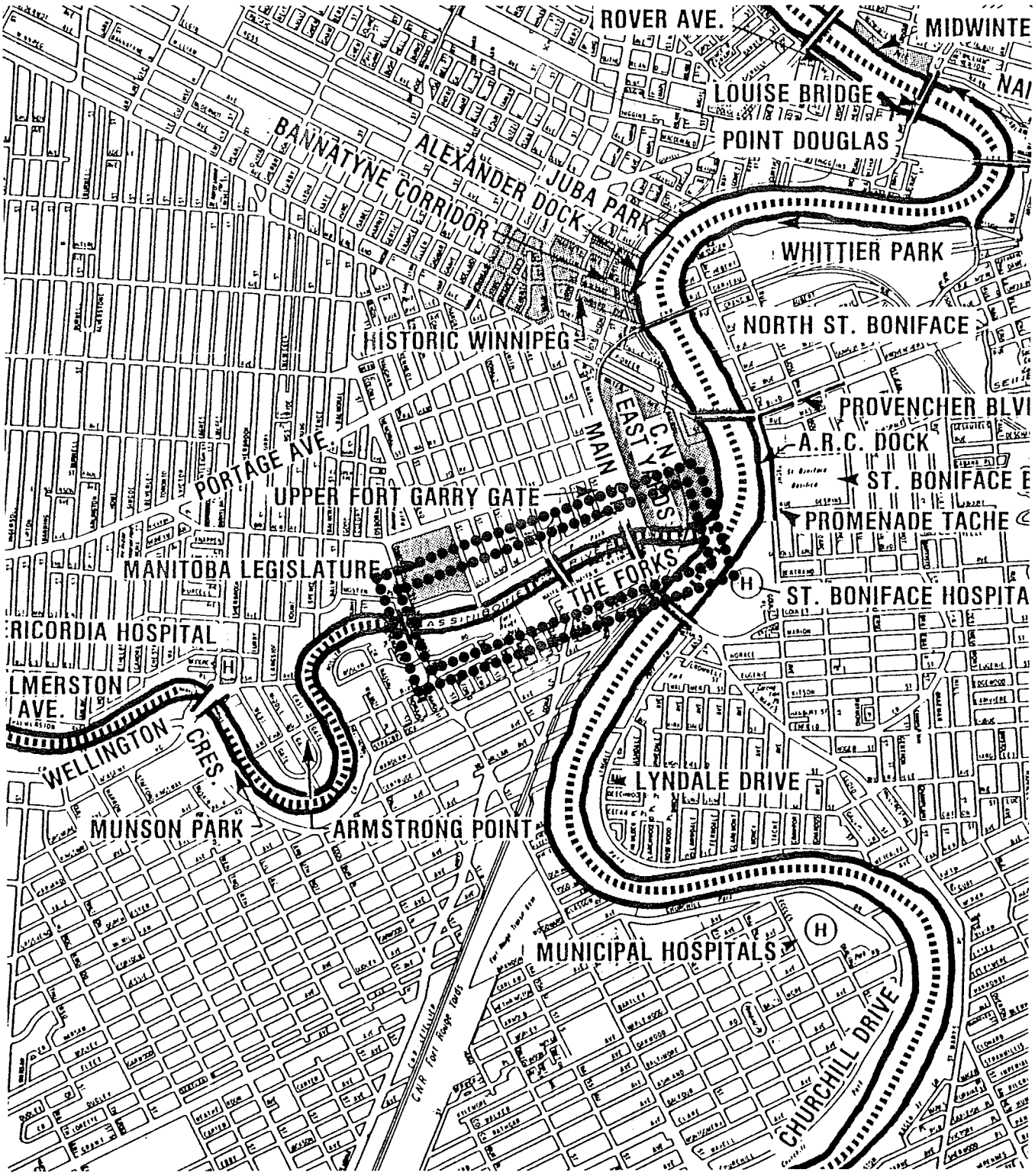

Figure 1

Assiniboine Riverfront **Context**

vegetation, recognizable access points, and the existing pattern of development and land ownership. Although in recent history Winnipeg has turned its back on its rivers for commercial and recreational development,[2] the scale of the Assiniboine River provides an opportunity for riverfront development which could satisfy resident needs and be effectively integrated with the existing patterns of urban fabric and open space.

Study Objectives

The overall objective of this study is to establish a method for achieving appropriate and sensitive open space development for the riverfront in the downton area, and to explore form alternatives that such development might take. It will develop a strategy of reintegrating the river environment into the surrounding existing pattern of commercial and residential fabric and a rational basis for determining the overall structure of its development. It will further examine the potential of the riverfront property along Assiniboine and River avenues for development that will result in its integration with the existing open space system.

This objective is pursued to both meet the identified needs of the residents, and to allow for their participation in the process of defining issues and in making design recommendations. It is pursued with the objectives of reconciling other interests involved, and increasing the appropriate use of, and access to, this riverfront property within the context of a high density residential and commercial area. As well, the site must have a physical organization which will accommodate the activities expected to occur there.[3]

To design the physical environment for this area of the City, it is recognized that the views of land owners and governing bodies as well as the views of residents, the clients, must all be considered. It is the task of the designer to develop open space environmental proposals which not only reconcile these interests but, as well, are representative of broader societal benefits and aspirations, providing richness and diversity and expressing their values and goals.

The two principal objectives of this study are:

1. to develop an understanding of the interests concerned with the development of the Assiniboine riverfront. As a component of this, a telephone survey of residents was undertaken to determine what residents of Winnipeg would like to see happen on the riverfront in the downtown area of the city, what their concerns and priorities for its development are.

2. to devlop an overall strategy and conceptual plan for the length of the Assiniboine river between Osborne street and Main street. More detailed design for specific sections of the riverfront illustrate at greater length, ways of integrating the river and the adjacent urban pattern, reconciling the requirements of all user and interest groups.

STUDY AREA CHARACTER

The River-Osborne/downtown study area is characterized by an increase in population and living units (largely apartments), and a decline in the number of persons per household. While there is no doubt that this is a highly dense community when compared to the city as a whole, the latter decline suggests that overcrowding is not a problem in this area (defined by the City of Winnipeg as more than one person per room). Current statistics for this neighborhood describe a population comprised of 93.28 per cent tenants, suggesting a highly transient community. This suggestion was reaffirmed by a local study which states that:

> the majority of this population have lived in their current home for one year or less.[4]

The area is further characterized by two principal population groups: 1. young singles and married without children and 2. the elderly. While this characterization may suggest particular types of development for the neighborhood based on the needs of these particular user groups, it is recognized that the daily downtown working population, all city residents who may visit the area and other tourists must be considered as part of the potential user group population, as the riverfront is considered the property of all city residents.

That this area is deficient in the amount of public open space it contains has been demonstrated numerous times. One local study concluded that;

> the River-Osborne area is extremely deficient in land provided as public open space. While recommending that eight acres of open space per 1000 population be used as a standard. . . the heavily populated area is extremely lacking in this regard.[5]

A land use survey undertaken in 1971 indicates that according to this standard, this area (deliniated by Cockburn and Donald Streets and Assiniboine and Corydon Avenues) should have 97.59 acres of open space as compared to its 17.74 acres of planned park space. If the above standard may be considered valid, the area under study is deficient by almost 80 acres of open space.

SCOPE, METHODOLOGY and STUDY INTENT

The initial phase of the study was a review of the literature on open space needs in high density areas and riverfront development. This review provided a basis of knowledge concerning user perception and open space needs. As well, a review of the literature on the River-Osborne area, of studies of other communities of similar character and population densities, and other riverfront property was undertaken. This literature review resulted in an annotated bibliography completed under separate cover.

The second phase of the project was a review of the political and interest group positions on what should happen on the riverfront. It identifies key concerns and obstacles to pursuing coordinated development of the riverfront. This was followed by a survey of residents living within the study area. Many of the surveys previously undertaken in the study area, including a small survey of area residents,[6] identified the need for more park space and concluded that development occurring there should reflect the desires of the nearby residents. For the purposes of this study a telephone survey of residents was undertaken to establish:

1. types of open space desired;
2. attitudes to riverfront development an as integral part of the existing open space network;
3. attitudes towards the existing system of open spaces;
4. differences in perceptions by age group and family status;
5. ways of integrating user groups in the design process;
6. concerns regarding safety, security and privacy.

Phase four of the project involved an analysis of the ownership and land use patterns and an inventory of the existing topographical, vegetation and access conditions along the Assiniboine River, in order that existing and potential future sites for riverfront development could be identified. It also included an analysis of the existing open space network within and adjacent to the study area, its current uses, and its potential for linkage to the riverfront.

On the basis of an analysis of the information collected, the study proceeded with the identification of potential sites for both immediate and long-term development according to the factors outlined above. Two demonstration sites were then chosen from those identified as having immediate development potential, and site specific designs were completed to illustrate how development of the riverfront might occur to both satisfy the interests concerned and to be integrated into the existing system of open space.

This document develops a strategy for consistent and coherent riverfront development over the long term that identifies ways of achieving;

1. development of riverfront property that will result in its reintegration with the surrounding urban fabric and open space, while recognizing land use and ownership issues;
2. the development of open space to accommodate a wide diversity of resident and other user groups;

Further, both the overall strategy and the detailed design illustrate ways of opening up linkages to the riverfront such that access to the public sections of the river will be more easily defined and understood. It is the

overall intent of this project to design the riverfront in such a way that activity will begin to focus on it, suggesting more intensive use of this property.

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1 Winnipeg Rivers Conference. (University of Winnipeg: Winnipeg, October, 1985).
2 Artibise, Alan. 1982.
3 Simon, Alfred. Perception of Residential Density. (University of Manitoba Thesis: Winnipeg, 1982).
4 Department of City Planning. River-Osborne Study. (Department of Urban Affairs: Manitoba, 1983).
5 Artibise, Alan. 1982.
6 Department of City Planning. ibid.

CHAPTER TWO

Community Groups and Government Agencies

COMMUNITY GROUPS AND NON-PROFIT ORGANIZATIONS

Riverborne Development Association

As a non-profit organization, the Riverborne Association acts on behalf of the community, lobbying governments to take action regarding riverfront development. They advocate low scale, low impact development that is beneficial to, and meets the needs of the surrounding community, and that would result in more public use. Their position, as expresed in a submission to the Riverbank Task Force, is that the emphasis of riverfront development should be in the most densely populated areas of the city, and should include participation from neighboring residents in any development plan. They supported the general design philosophy of the Agreement for Recreation and Conservation (ARC) program and the inclusion of the Assiniboine river in its larger scale development plans.

In their recently submitted Assiniboine River Accessibility Project (1986), the Riverborne Development Association propose long range development plans for the river involving the community in the design process. They emphasize increasing the use of, and access to the riverfront, providing 'windows' onto the river and providing linkages to other park sites. Their design program emphasizes year-round use and, consistent with this objective, they have been instrumental in providing opportunities for the public to use the river in both summer and winter months.

Riverbankers

The Riverbankers is an informal organization of residents who own property on the riverfront or close to it. The focus of their mandate has been to voice the concerns of area residents and to seek information.

Among their concerns are; water pollution, rapid erosion, the loss of natural habitat and the lack of a co-ordinating legislative body

for the rivers and riverbanks. The focus of their concerns is riverbank erosion caused by waterskiers and motorboats and by the control of the water level by the locks in Lockport which result in a rapid drawdown of the water level once a year. The riverbankers support the idea of a new agency whose mandate would be to provide long term development plans for the rivers in Winnipeg and to exercise authority over the use and development of their banks.

Naturalist Society

This group is active in speaking out on environmental issues. They advocate a natural approach of minimum intervention to the riverfront. The focus of their concerns are the preservation of natural habitats and the rehabilitation of waste lands along riverfronts.

LEVELS OF GOVERNMENT

Government of Canada

The Federal government's current interest in riverfront development is to pursue the completion of the Forks Historic National Park site currently being undertaken by Parks Canada under terms set out by the ARC agreement. The objectives of this development are to create a major historic park commemorating the historic importance of the Forks site, to complement other ARC development projects and to ensure that it is compatible with other development and parks while retaining the integrity of the natural, historic resource.

Aside from its committment to this project, existing tri-partite agreements and the federal regulatory role involving small crafts and the coast guard, it is considered unlikely that the federal government will become inextricably involved in further riverfront development

except on a project by project basis. As stated by the City of Winnipeg Review Act Committee:

> our sense is that Ottawa's long-term interests and concept of its responsibility do not extend to direct involvement in provincial or municipal organizations devoted to waterway and waterfront improvements. . . although special grant funding and other federal incentives, could in the future be channelled directly to a new Winnipeg Development Corporation.[1]

Of the three levels of government, the federal level has the least at stake in riverfront development and is hence, likely to be the smallest of the three players in future development.

Government of Manitoba

The provincial government has committed 100 million dollars to riverfront development to be spent over the next decade. With changes in governments and their priorities, it is not guaranteed that all this money will be allocated. Of five million dollars allocated to date, 1.5 million have been used to acquire property and to develop Omand's Creek Park, and some of the remaining 3.5 million dollars has been used to acquire property along the riverfront within the innner city. For the remaining funds, variations of: the establishment of a Riverbank Authority; the development of an overall concept plan for the Assiniboine Riverfront; and the implementation of one of its component projects as an example of the plan's overall intent, are being considered.

A Riverbank Authority, proposed by the Province as a Civic/Provincial partnership, is currently being considered as a body that would oversee and co-ordinate development plans for the Assiniboine, Red and Seine Rivers within the Winnipeg area. A major shortcoming of this proposal is that it proposes a provincial role in co-ordinating and implementing plans for land already owned by the city. The evolution of such an authority requires that ahost of jurisdictional

and bureaucratic roles and funding committments guaranteed. This initiative, in spite of its shortcomings, reflects the awareness of both levels of government that undertaking development of the rivers as a co-ordinated effort is essential for its success.

City of Winnipeg

The city's priorities with respect to the rivers focus on questions of jurisdiction, management and the protection of these waterways. The question of who should exercise powers over the waterways is still being heavily debated, and is an important one for the city. It appears that as a part of negotiating better ways of 'getting things done' on the rivers, the issue of sorting out and consolidating authority is central.

The view of city council centres on this and related issues. Significant evidence of a move towards a more understandable civic bureaucratic structure is that a legislation mandate to this effect has been adopted. The city has also expressed a willingness to accept responsibility for existing regulations (and their enforcement) regarding the rivers currently under Provincial and Federal jurisdiction.

The city's willingness to take initiative for both long and short term planning of this resource has reinforced their position of putting in place a structure that will facilitate the implemention of development plans for the rivers. Such a structure may facilitate more positive and coherent management of the city's rivers than is currently perceived by the public.

City council's recommendation to consider the long range planning, development and management of water and related open space, a seperate issue from regulation illustrates both a recognition of the importance of this resource and of the need to prepare for the long term. Their consideration of the wide array of proposals aubmitted regarding the development of these rivers to date suggests a

movement towards the consolidation of a long range plan and its implementation.

Specific City Development Plan

The city's current plan for the development of its rivers is the Riverbank Parkway Concept Plan as articulated in Plan Winnipeg. This concept plan incorporates local parks and recreational needs within its overall structure. The Riverbanks Lineal Park System plan reflects the primary concern of connecting existing city parks, most of which are found along the rivers. This system, as a component of the overall open space system plan, provides a focus for linking the other park systems.

Based on a long term plan to acquire riverfront property, this design concept portrays a series of nodal parks connected by a bicycle and walking pathway system along the rivers, or, alternatively, where land ownership precludes this, along residential streets. Where these streets are considered scenic, land acquisition is not a priority. This tactic is motivated by the prohibitive costs of some land acquisition and the unlikelihood of some lands being made available even in the long term. The acquisition of riverfront property (by the city) in the downtown area is expected to continue. The objective for these segments of the rivers is to provide a park framework and to protect the relationship between the river and its surroundings in terms of access and image. It is also considered important to incorporate methods of linking neighborhoods to the rivers in any final development plan. The City has identified the need for a study which identifies methods for achieving this as a part of a program necessary to implement a comprehensive lineal park system. The concept is, hence, both practical and workable and explores the potential of mixed use development appropriate to the city.

As a component of the overall plan, the plan for the Assiniboine river is to connect a series of spaces along it from the legislative building to city hall by means of a park (Stephen Juba) along the Red

River. The development of any future parks or public open spaces along the Assiniboine are expected to be consistent with the plan for the Forks site, by reiterating the concept of a series of spaces connected by pathways and set into loosely defined open space. The plan's intent at a more local level is to increase accessibility to the river and to preserve its natural landscape.[2]

The recognized need for green space as a relief from the urban core is one motivating principle behind the push by some groups for an essentially natural edge along the rivers. The nature of open space along the rivers in Winnipeg to date has been loose in organization, reminiscent of 19th and early 20th century parks. A spokesperson for the city parks department agreed that there is a definate need to explore varying the treatment and scale of open space within the city, particularily within the downtown area. City council has adopted a policy that views this part of the riverfront as a special site, requiring a different, more urban treatment than the riverfront in other areas of the city.

TRI-PARTITE AGREEMENTS

Agreement for Recreation and Conservation (ARC)

In the Federal-Provincial ARC agreement, the federal and provincial governments advocated the protection of land from development and the acquistion of land necessary to provide public access to and/or recreational facilities on waterfronts. Their desirability for transportation for both work related trips and recreation is described as an untapped opportunity. The riverways are considered the rightful property of all residents, and, hence, should be available for use to all. By initiating the use of the rivers it is expected that the "tourism/recreation system will act as a catalyst for creating opportunities for private sector industries." [3]

Under the ARC program, both governments made their commitment to riverfront development and their understanding of its importance

clear through the implementation of several projects along the Red River before the disbanding of the ARC authority in 1987.

Core Area Initiative

This tri-level initiative is a package of programs intended to assist in improving opportunities and standards for residents living within the core area. Each level of government has contributed equally to the initiative and two programs deal specifically with riverfront development.

Riverbank Enhancement

A component program under the CAI, five million dollars have been contributed to improving the visual and physical quality of riverfront property, and their accessibility to the public. Currently, a master concept plan is underway for property within the core area. Remaining funds will be used for purchasing property and cleaning up the riverfronts within this area.

East Yards Development (The Forks)

The current commitment of a total of 20 million dollars (to be spent over the 5 year period 1987-92) was made by all three levels of government for the development of the CNR East Yards site. This initiative, and related property acquisition is considered to have been a federal initiative.

The objective of this program is to develop the site as a multi-purpose public space including a range of residential, commerical and recreational activities. To own, manage and develop the site, a non-profit development corporation representing the three levels of government was established (under the Manitoba Corporation Act). The board is composed of appointed representatives that may change to reflect changes in governments and priorities, however it is intended as a long term body acting as a private company. It is intended to stand alone as a non-profit organization with the mandate to meet the social

and economic objectives of the community at large within the context of the East Yards site.

CONCLUSION

For this city, and typical for most, each level of government has a desire to maintain a level of control over the waterways. As a result, it is unlikely that any one co-ordinating body, jointly administered or otherwise, will easily be given broad powers. The current jumble of bureaucratic and jurisdictional responsibilities and objectives regarding the rivers prohibits a single co-ordinated effort for their development. The paring down the red tape associated with getting things done on the rivers currently underway, is intended to establish a more coherent organization within each administrative structure.While each level of government is attempting to sort out, give up, add and consolodate their jurisdictional and development responsibilities, the situation is a complicated one without simple solutions.

In light of the existing situation, coordinating political efforts between levels of government is a complex and difficult task at best. Attempts to coordinate, develop and manage the riverfronts is not exempt from the inherent difficulties of changes in the priorities of new governments, balancing responsibilities, development undertakings, defining clear roles and sharing credit.

The jurisdictional and bureaucratic difficulities within and between the levels of government mean that it is virtually impossible for the entire realm of issues relating to riverfront development to be brought under one umbrella of authority. Smaller, joint and tri-partite undertakings have been the result of efforts to date and may be the best solution available.

As each level of government pursues their own development projects along the river, the task of ensuring that development is consistent and coherent in the long term becomes more difficult. It is clear that, despite differing views and goals of each level of

government and community organizations concerned with riverfront development, all agree that its pursuit is valuable and worthwhile for the benefits it will bring the public at large.

An alternative to establishing one administrative structure for development is that all parties adopt the same general strategy for development. This would ensure that any development projects completed by public or private agencies, whether singly, jointly or otherwise administered, would be part of an overall coherent plan, and would fit together in the long term.

---

1 City of Winnipeg Review Act Committee. Final Report. (City of Winnipeg, 1986). p. 68.

2 Deparment of Parks and Recreation. Winnipeg Development Plan Review: Parks and Recreation Component. (n.p.: Winnipeg. 1981). p. 3.

2 Arc Management Board. Arc Red River Corridor Master Plan. (Department of Urban Affairs: Winnipeg, 1981).

CHAPTER THREE
Survey of Area Residents

BACKGROUND

As a part of developing an independent understanding of what the various interests think about development along the Assiniboine River, what they would like to see happen there, and in the development of a program for its design, a survey of residents living in close proximity to the Assiniboine was undertaken. For the purposes of this study, the public, as represented by the survey respondents, was considered as one of a group of players with interests in its development.

The available literature provides an overview of public opinion regarding rivers in general and it suggests reasons for approaching survey results and current public opinion expressed through other means, with caution. It has been pointed out by several sources that;

> evidence suggests that metropolitan residents are likely to be unconcerned about the development of their water resources for a variety of reasons, including its typically poor condition, low visibility and unknowns about its value as a resource. An informed public, familiar with, and appreciative of the value of the river as a resource indicates a public more aware of its development potential.[1]

The jurisdictional and bureaucratic muddle associated with the development and management of rivers, while common to most cities, not only has resulted in a lack of comprehensive planning for this resource, but has further exacerbated the issue of low public interest and has complicated issues of access and rights of use.[2]

It is well accepted that to realize the development potential of our rivers, representatives of a community must find ways of making decisions about its use and find means of implementing a course of actions which represents its collective interests. While mechanisms currently being put in place in Winnipeg towards this end are being undertaken by informed individuals who cannot be said to be representative of the public at large, they are acting on behalf of the public to establish broad priorities for the development of the resource. It is widely considered necessary and in the best

interests of the public that the establishment of a framework for action occurs in this way. As stated by the Meewasin Valley Authority;

> people prefer to get involved when specific issues are at issue, rather than in the setting of broad priorities. . . The identification of long range priorities tends to be removed from people's daily lives. . . and is usually a task best left to decision makers.[3]

Public attitude surveys provide one means of gauging public understanding of and interest in the issues at hand.

Earlier Surveys of Winnipeg Residents

Previous surveys of Winnipeg residents that have, to some degree, sought to characterize public opinion with respect to riverfront development, suggest public priorities for its development.
According to a study that included a survey of 338 shopping mall patrons,[4] the majority of Winnipegers feel that the view of (48%), and access to (52%), the rivers of this city is poor. Most of those surveyed described a need for more facilities in current riverbank parks and for more river-oriented recreational opportunities. Associated with these concerns, most wanted better preservation and marking of historic sites along the rivers. Better clean up, water quality, bank stability and policing were also considered necessary.

While the statistical validity of this study and its survey, as representative of the views of city residents as a whole is uncertain, its results nonetheless provide a point of departure for further study. As a result of the survey, the study went on to conclude that

> the greatest impediment to full use of Winnipeg waterways is the lack of any community public concept about what they are and how they should be used . . . [5]

This suggestion, that the public lacks the knowledge and/or the interest necessary to make informed and creative suggestions about what should occur on the riverfront, was reaffirmed by the Ruston/Tomany survey(1979) which pointed out that very few respondents offered suggestions for

improvements to the parks system. To the extent that this survey dealt with attitudes about recreation on riverfronts, its findings reinforced the conclusion of others that the public perceives a need to make more of the riverfront accessible and useable.

With respect to the specific development of riverfront property, Kelnhofer concludes that because people tend to use what is made available to them, the development of riverfronts should incorporate as wide a variety and mix of activities as possible, for as wide a cross-section of the population as possible. This conclusion is based on the contention that the likeliness of people to be attracted to a recreational development is one of two economic measures of its value (the other is the willingness of people to pay for it), and this attraction is related to the variety and availability of experiences a development offers. The provision of a development that a wide range of people are attracted to provides a strong rationale for continuing with such development.

THIS SURVEY

Purpose

In light of the concerns outlined herein, the survey was seen as a way of gauging the level of public understanding of the value of riverfronts, as a step towards public education of their importance and as a way of gauging the community's priorities regarding its development. The need to understand current public interests and perceptions are suggested in the statement made by the Meewasin Valley Authority that;

> for a plan to be truly responsive to the needs and priorities of the community, it must be developed with the involvement of the people it is intended to serve.[6]

Further to these, the purpose of this survey was to gain knowledge about the attitudes, opinions and perceptions of Winnipegers about the shape that specific development of riverfront property along the Assiniboine River from the Forks site to Osborne Street should take, and to assist in determining how important this development is seen to be. The survey was considered a

method for allowing resident participation in the design process such that ideas solicited will be considered in arriving at a final design solution. It is also intended as an addition to the body of knowledge which may assist other interest groups or authorities in making decisions about what should happen on the river. The issue of public access was highlighted in the survey and a range of suggestions for development alternatives was provided.

By gaining further knowledge about the attitudes of Winnipegers, conclusions can be drawn about what the public sees as the most important issues regarding riverfront development and what the priorities for such development should be. The survey was a stage in the development of a design strategy which will illustrate how development of the river can realistically occur in light of the attitudes and opinions of Winnipeg residents and the other interests involved. It is hoped that the results of this survey may assist in the process of further action being taken regarding the riverfront.

Target Population/ Sampling Frame and Methodology

The target for this survey was the adult population of Winnipeg residents living within two blocks of the Assiniboine River. As a result of time constraints and the purposes of the survey, the sample was selected from within two blocks north and south of the Assiniboine River. The sampling frame was chosen based on the generally accepted relationship between proximity to a site and the likelihood of use. It was thought that individuals living near the riverfront would:

1. be more inclined to use the riverfront now and in the future, and,
2. would be more concerned about its development.

The phone numbers for 84 households were chosen from the Henderson's directory and those listed immediately before and after these were recorded for cases in which the original household could not be contacted after three attempts. In cases when none of the three households could be contacted, a 'no response' was to be recorded. This situation did not arise; at least one of the three residences selected was contacted in all cases.

The 'non responses' received occurred as a result of the unwillingness of some residents to answer the questionnaire.

Survey Design

Factors related to sampling and non sampling errors which influence the responses in an opinion survey have been recognized and steps have been taken to address them. In the latter category, the key influence is the design of survey questions; their degree of clarity and ambiguity, and the effect of these problems on the quality of the conclusions drawn. For these reasons, this survey has been evaluated by a survey statistician.

Pre-Test

As well, a pre-test was conducted on a selected sample to determine unforeseen ambiguities and problems with survey questions. The pre-test was conducted using an interview format in which respondents were asked:

1. what questions were understood to mean,
2. if questions were clear or confusing,
3. what they think the intent of the survey was, and
4. if there was enough variety in the question type to allow respondents to express their views, attitudes and feelings.

Corrections and redefinition of questions were then made accordingly before the final survey was administered. An effort was made to ensure an equal number of male and female respondents through the survey administration.

Constraints

The constraints in designing the questionnaire were: manpower and time for its administration and finances which could be spent on its implementation. For these reasons a relatively small sample (84 respondents) was chosen. As well, the telephone sampling method, while allowing for an adequate coverage of the desired population, decreased the time and cost factors in administering the survey.

The decision to analyze the survey results using the Statistical Analysis System (SAS) at the University of Manitoba was made prior to the design of the questionnaire. As a result of difficulties in coding and analyzing free response questions, these were limited in the survey, but were still included to allow for unanticipated issues and concerns.

Questionnaire Format and Question Design

A sincere effort was made to structure the questionnaire such that the way early questions were asked does not adversely affect responses made to later ones. The questions were arranged from the general to the specific in order to encourage respondents to be thinking about the issues of development before they were asked to suggest specific development ideas and priorities. Questions were organized in groups according to specific topics and issues in an attempt to maximize the information gathered, to affect the issue of fatigue in respondents, and to make the questionnaire as understandable and clear as possible. Both open and closed questions were included in each category.

Question Format and Type

The questionnaire included a combination of attitude and factual questions in order that tests on the relationship between attitudes and age, for example, could be carried out. The Likert attitude scale, which allows respondents to indicate how strongly they agree or disagree with the statements provided, has been used for some questions because of its reliability in allowing accurate tests of attitudes to be conducted. A range of choices are provided for some questions based on the principle that people will express the meaning something has to them more fully if appropriate choices are provided.[7]

Data Analysis

This study, although conducted using a statistical analysis system, was not intended to provide detailed statistical analysis. The information sought was how strongly people feel about general and specific issues related to

riverfront development and what they would like to see happen on the riverfront. The analysis of the survey data is intended as a preliminary guide to how Winnipegers think and feel about development of the Assiniboine Riverfront.

General Survey Statistics

The opinions and attitudes of Winnipeg residents expressed here describe a sample of 84 households representing 1.9% of the total number of households in the area surveyed. Of these 63 households (75% of the sample) responded and 21 (25% of the sample) refused or could not be contacted. Most of the non-responses were refusals.

Of the respondents, 30 live south of the river and 33 live north of it. The majority of respondents (66%) have lived in the area fewer than five years. A breakdown of the response rates and percentages is provided in table 1.

TABLE 1: SURVEY RESPONSES

	South of River	North of River	Total
Households Surveyed	2004	2325	4329
Vacancy Rate (%)	8	5.8	6.9
Occupied Households	1840	2190	4030
Sample Size	40	44	84
Responses	30	33	63
Response Rate (%)	75	75	75
Sample as % of Total Households	2	1.9	1.9
Sample as % of Occupied Households	2.2	2.0	2.1
Responses as % of Total	1.5	1.4	1.5
Responses as % of Occupied	1.6	1.5	1.6

General Attitude Towards Development

Most of the respondents felt that a development of the Assiniboine Riverfront would improve its use (92%) and that appropriate development of this property should occur (75%). The majority (59%) felt that its development should be a combination of hard edge (paved areas and docks) and soft edge (park space) while 35% of respondents felt that the emphasis should be on soft edge development. Most (75%) felt that the riverfront should be developed for year round use and 59% thought that development of this riverfront would have a positive economic impact on the downtown economy.

Attitudes Towards Development Options

When asked to agree or disagree that each of a list of elements should be included in a development plan, respondents tended to prefer low impact, recreational elements including canoe and motorboat docks and walking and bicycle paths over retail shops and food related developments. Some of the more creative options on the list including observation decks and fountains, received favorable response. Most felt that more park space should be included in any development plan. A summary of the responses to this list of activities is provided in Table 2.

The responses in this table are categorized into three groups of priorities for development according to the percentage response received over 80, over 60 and under 60 percent respectively. The table illustrates the tendency of respondents to prefer low impact, recreational developments over those that are seen as having a less desirable affect on the landscape and more likely to detract from the natural character of the riverfront. For example, many respondents expressed specific reservations about not choosing third priorities including that they may be loud (motorboats), may result in more littering of the area (food related), or may be unnecessary in the area which is perceived to have enough of an alternative provided (retail shopping). The implication is that respondents prefer development

Table 2: Responses to a Range of Activity Options

Question: Should Each of the Following Activities be Included in a Development Plan?	Percentage Response	
	Yes	No
FIRST PRIORITY ACTIVITIES		
canoe docks	82	11
skating areas	89	8
walking/ bicycle paths	92	3
observation decks	84	8
more park space	84	6
SECOND PRIORITY ACTIVITIES		
boat rentals	60	32
sport spaces	62	32
large gathering spaces	63	27
fountains	68	22
THIRD PRIORITY ACTIVITIES		
motorboat docks	43	33
swimming facilities	46	43
food related	40	46
retail shops	21	65
parking	51	36

alternatives for the riverfront that will take advantage of its natural character, rather than being developed in ways considered typical of urban centres whether or not they are close to waterfront property.

Reasons given for not choosing second place alternatives included that they are considered unnecessary (boat rentals), or that they are seen to already exist in sufficient numbers in the areas (large gathering spaces, sport spaces). When asked to suggest other elements that ought to be included in a development plan, the following suggestions were made; bar-be-que and picnic areas, lighting, playgrounds, beaches and the provision of paddle boats.

While only 3% of respondents suggested lighting as an important element, it is considered to be more important than this may suggest as a result of the large number of respondents indicating that crime and safety issues [8]are deterrents to use of the riverfront. 77% of respondents feel that crime, in general, is an important issue to be dealt with and 54% feel the same about the issue of vagrancy. These responses were often qualified by statements suggesting that these factors made them feel unsafe and even unable to use the riverfront. It appears though, that the largest deterrent to use of the riverfront is the current perception of it as overgrown, littered, and undeveloped for use.

Access

The fact that there is not enough public access to the riverfront, was confirmed by the survey results. 57% of respondents replied 'no' when asked if there is enough access and 16% were unsure. This latter group of responses is explained by a large number of respondents who have not been inclined to use the riverfront and by the large number of elderly respondents (36%) who expressed the feeling that they are unable to use it.

When asked to comment on whether each of a variety of types of access should be provided, most favored the lower impact modes; walking (90%) and bicycle (81%) routes, canoe access (82%) while only 8% felt that more car access should be provided. Of the 44% who feel that motorboat access should be provided, many expressed concern about problems related to motorboats on the river, and agreed to this alternative partly because they felt it unfair to exclude it if canoe access points would be provided.

Survey Limitations

While the survey results provided a clear understanding of the views of the public in general, few respondents offered unprompted suggestions for the development of the riverfront. The more unusual of the list of suggestions provided by the survey (for example, the choice 'fountains' was included because it was thought to be something that most respondents would not think of when asked what they thought should occur on the riverfront), often received responses of "sure, why not?" and "well, that's an interesting idea", confirming the assumption that people are more likely to react favorably to choices presented to them, than they are to think of these without prompting.

The ranking of development options as outlined in Table 2, identifies what should be general priorities (relative to each other), in a development plan for the Assiniboine riverfront. However, the way respondents envision some elements to consider them less desirable than others is unknown, and it is this unknown that may make the setting of priorities from this ranking suspect. For example, if a plan for a type of retail development along the riverfront was presented to a group of respondents that was different from their initial vision of one, their feeling about its desirability or appropriateness may change. In short, it is the task of the designer to demonstrate the realm of possibilities of an idea; how it is appropriate and workable in a particular set of circumstances. The public at large cannot be expected to complete this task with the asking of a question.

Public response to a set of ideas about what may occur on the riverfront is likely a more valid portrayal of their preferences for development than a set of survey questions. It is therefore, with caution that the responses outlined are taken to be descriptive of specific priorities for development.

Conversely, it is argued here that the responses received do assist in the setting of broad priorities for development. The desirability of walking trails and boat docks over retail shops, as expressed through the survey was often accompanied by the rationale that these preferred elements would add more variety to the range of opportunities for activity in the environment while

the latter are considered to exist in sufficient abundance. This rationale helps to confirm that the public desires an increase in the range of recreational opportunities available and that they consider an appropriate development of the riverfront to provide a means of achieving this. This response also reflects the magnitude of the desirability of being able to walk near and enjoy the riverfront, as a first priority over being able to do other things there.

The survey's value is that it has provided a tentative sketch of broad priorities for development and provides a rationale for electing to proceed with particular types of development over others.

Resident and Interest Group Preferences for Development

It is evident from the preceding discussions that many common elements of exist between the priorities, goals and interests of city residents, government agencies and community groups regarding what should happen on the riverfront. Some inferences may be drawn about other areas of implied commonalty between these groups.

Community groups tend to priorize program elements such as walking trails and bicycle paths, the preservation of natural habitats and the promotion of an appreciation of the riverfront for recreation, transportation and the historic features associated with it over built forms and activities that are considered to encourage littering. It is considered important by all groups that development should also result in the rehabilitation of lands used for waste disposal and visually characterized by litter and overgrown vegetation.

The survey respondents support the position of other groups that low impact development (defined as minimized built forms on the riverfront landscape) is considered the most suitable for the Assiniboine riverfront. Survey respondents also priorized trails, docking facilities and increased access as desirable features of riverfront development over retail shops, restaurants and residential dwellings.

The energy government agencies are channelling towards the development of an overall concept plan for the Assiniboine riverfront and

towards the establishment of a co-ordinating body to oversee and manage the development of this resource, is consistent with the objectives of other interest groups. The city's long range development plan for this riverfront is also consistent with these aims. As a linear system of pathways connecting nodal parks, their plan's primary objective is to encourage use of the riverfront and to increase public access to it.

CONCLUSION

The high response rate received (75%) is considered evidence confirming general public interest in the development of the riverfront. The results are considered a gauge of public opinion within the area of study. They establish that area residents wholeheartedly agree that pursuing riverfront development for public use is both desirable and worthwhile. The increased variety this is thought to provide was the primary reason offered by respondents.

The results are also valuable as confirmation of a list of basic program elements for a design strategy by providing an overview of what the community considers of primary importance in a development plan. A word of caution about accepting what all parties feel should occur on the riverfront as definitive of program elements is appropriate at this point. Interest groups tend to have one main objective in mind with respect to the riverfront and hence, they tend to see it in a particular way, often as a separate entity from its surroundings. This view lacks a wholistic perspective of the river in the city and cannot result in optimum solutions for its development.

Therefore, the principal value of the knowledge provided by the survey and the interviews of relevant interest groups is considered to be that they provide a cautionary note to grandiose schemes, confirm key areas of concern (eg. access to the river), and identify a list of the basic, essential program elements for a development plan. They also confirm that the general goals of the public, government agencies and community groups are to increase the public use of and access to the riverfront and to improve its physical and visual quality.

The results from the resident survey and the summary of the positions of interest groups in chapter two, provide few innovative suggestions or ideas about a method or formal structure by which a design program may be implemented. This lack may be a reflection of the survey design but it also suggests that public reaction to specific design solutions may be a better way of gauging its priorities. Such a survey of public opinion, later in the process of design, may add another level of insight to an understanding of their priorities, goals and interest with respect to riverfront development.

The list of program elements confirmed with the survey have implications for design that are general enough to allow much flexibility. It provides initial direction for establishing design programs once that point in the process has been reached.

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1 Kelnhofer, Guy. Metropolitan Planning and River Basin Management. (Water Resources Centre: Georgia, 1960). p. 11.

2 Kelnhofer. ibid.

3 Meewasin Valley Authority. Development Plan 1987-1992. (n.p.: Saskatoon, 1987).

4 Department of City Planning. Winnipeg Waterways.(n.p.: Winnipeg, 1986).. p. v.

5 Department of City Planning. ibid.

6 Meewasin Valley Authority. ibid. p.9.

7 Zeisel. ibid. p. 168.

CHAPTER FOUR
Physical Site Analysis

PHYSICAL SITE ANALYSIS

Along with understanding the desires of political agencies, community groups and society in general, the process of developing an approach to the design of the riverfront requires that the physical character of the site and its context is fully understood. This chapter describes the existing physical site conditions, the site analysis mapping (plates 1 through 8), and the opportunities and constraints each condition presents for devising a design strategy that will provide consistence and coherence in the long term. The site is located within its immediate context in Plate 1.

GENERAL CHARACTER

Topography

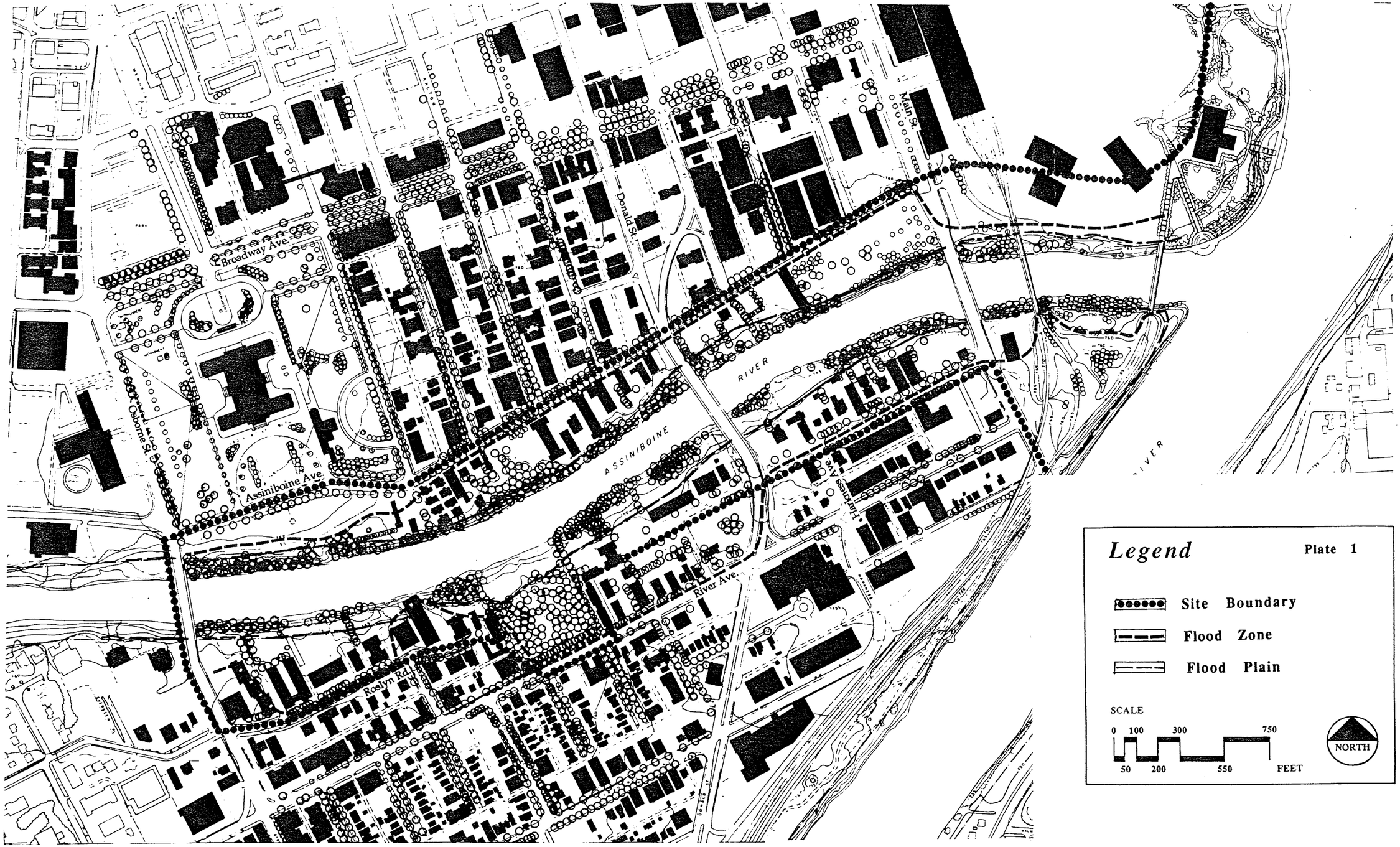
The banks of the Assiniboine are characterized by ruggedly sloped, steep alluvial banks and distinct alluvial terraces partially covered with natural riverbottom vegetation. In some areas, the banks are gently sloped or terraced towards the river, mostly where significant clearing of vegetation has occurred. These terraces have resulted from the slumping and sliding of the silty clay alluvial soils prevalent along the Assinboine River.

Opportunities

The character of the banks provides an opportunity for reflecting the inherent variety of the riverfront in its development; areas of steep slopes suggest overlooks, stairs and narrow pathways following the contours of the river, gently sloped or terraced banks suggest grand entrances to the river, an opening up of the riverfront and the development of spaces for large gatherings. The latter may take the form of theater or sport spaces, plazas or open park space.

Soils

Soils throughout the area are silts and silty clays; the alluvium range in texture from sand to silty clay. Along the outside bend of the river as it enters the Red, large amounts of sand have been deposited, resulting in a bank that is more prone to failure through slumping and sliding than the banks further west. Waste and fill materials added to the CNR East Yards site and to the



Assiniboine Riverfront

Area Context

Figure 1: TYPICAL SOIL PROFILE OF THE ASSINIBOINE RIVERFRONT

Layer	Depth From Surface (metres)	Layer Depth (metres)	Composition
Complex Zone	0-3	3	silty clay and silt organic soils alluvial silts and sands
Silty Clay	3-14.6	11.6	brown/grey brown grey/blue transition: loose/ water bearing
Glacial Tills	14.6-23	4.8-8.5	dense very dense
Carbonate Bedrock	23	variable	uneven surface

source: Baracos, et. al., Map 5: North-South Stratigraphic Cross Section, Geological Engineering Report for Urban Development in Winnipeg, University of Manitoba.

South Point, have created relatively steep slopes and contribute up to 5.5 metres of the elevation in these areas.

Riverdale Silty Clay, defined as alluvial soils developed on river terraces characterized by a weak or undeveloped profile, exists along the north shore of the east end of the river. This soil is considered a juvenile, highly fertile soil typically found on the terraces and floodplains of the Assiniboine River. Fort Garry Silty Clay is found beginning from the middle of the East Yards westward towards Main Street. Figure 1 illustrates the typical depths of soil regimes along the Assiniboine River.

Opportunities

The fertile nature of the upper layer soils allows for the use of a wide variety of plant species and is responsible for the dense, lush growth commonly found along the river's edge.

Vegetation

The study area supports an intermittent band of natural riverbottom forest (broken where vegetation has been cleared), and on the upper slopes, planted ornamental and native species. Formal parkland exists in adjacent city parks and the Legislative grounds. The character of the riverfront as a green, lush environment in contrast to the surrounding urban pattern, is one of its distinguishing features and hence, is one that should be retained in any design strategy.

Opportunities

The existence of significant stands of healthy and visually attractive vegetation suggests areas of priority that should be retained as dense forests for passive recreation and nature study. The retention of as much vegetation as possible is considered desirable as it contributes to site variety, bank stability, and habitat preservation. In its existing state it also supports bird species, contributes to the preservation of a natural habitat for plant and animal species alike and to the stability of the banks. Particularly desirable stands of vegetation have been identified on the basis of a visual assessment discussed later in the text (see Plate 7).

Constraints

Debris and the overgrown nature of vegetation restrict riverfront access, use and hamper its visual quality. Dutch Elm disease plaguing native Elm trees further hampers the visual quality of the riverfront and demands that alternative species be used to ensure a forested river edge condition.

Plant species found along the riverfront include:

Trees	
American Elm	Ulnus americana
Manitoba Maple	Acer negundo
Eastern Cottonwood	Populus deltoides
Green Ash	Fraxinus pennsylvanica
PeachLeafed Willow	Salix amygdaloides
Shrubs	
Alder	Alnus spp.
Red-Osier Dogwood	Cornus stolinifera
Willow	Salix interior
Herbaceous Species	
Sarsaparilla	Aralia medicaulis
Hog Peanut	Amphicarpa bracteata
Thistles	Cirsium spp.
Nettles	Laportea spp., Urtica spp., Stachys spp.
Grasses	Including Bromus spp.
Water's Edge	
Beggar's Tick	Bidens cernua
Cocklebur	Xanthium strumarium
Burdock	Arctium minus
Ragweed	Ambrosia elatior
Wild Cucumber	Micrampetis lobata

Flooding (see Plate 1)

Flooding of the Assiniboine River depends on the level of the Red River and results from its backing up east from the junction of the two. When flooding of the Assiniboine occurs, the water level rises one foot higher than the Red River at the Main St. bridge, two feet higher at the Donald St. Bridge and four feet higher at the Osborne St. bridge. Since 1970, the highest annual water level at these bridges (calculated based on readings

taken at James and Redwood Avenues) was 746.62, 746.72 and 746.92 feet above sea level respectively, although the main "floodway" for the Assiniboine River in the area under study is officially considered to be between 750 and 755 feet above sea level.

The "floodway" defines the key flood area, in which flood waters are swift moving and the most destructive. This line also indicates the width of the river required for floodwaters to pass through. No permanent building is allowed within this zone, by regulation, and any proposal to significantly (by more than one inch according to one provincial employee) narrow the width of the river would not be approved by the Provincial Water Resources Branch.

The floodway fringe (or floodplain) as defined by the province, varies between 755 and 765 feet above sea level, and is located at varying distances from the floodway. This area designates the outer limit of flooding based on the 160 year flood level plus two feet, and defines a zone in which buildings must be elevated above this level.

> The floodplain area, due to a low level alluvial terrace between the C.N.R. tracks, takes up to approximately 50'-100' along the riverfront and to 85' along the south point.[1]

Opportunities

The two flood lines indicate zones or elevations of seasonal use in which different kinds of activities may be expected to occur. For example, activities along the water's edge, within the flood zone, may tend to be informal, such as walking paths, while those on the upper slopes may tend to be more formal in character such as paved plaza areas. These two levels suggests two sets of pathways, one usable during dry parts of the year, bringing users to the water's edge, and one usable year round.

Elements that overlap the floodway line may be designed to be partially useable during high water conditions, and change with a drop in the water level to be fully useable, providing some seasonal variety of form.

Constraints

Development within the floodway must be able to withstand innundation and sediment deposition. Buildings are not not allowed in this zone.

Drainage

As the upper banks of the river are, in general, grassed, surface runoff is largely absorbed and is held as a result of the imperfectly drained nature of the subsurface clay soils; contributing to bank instability. Some runoff drains into the river overland, however, most enters the river through sewer outlets (refer to Plate 2). On the lower banks, natural riverbottom forest contributes to absorption. In some areas without extensive groundcover, as a result of silt deposition during high water in spring, and dense understory vegetation, minimal erosion from overland flows is evident.

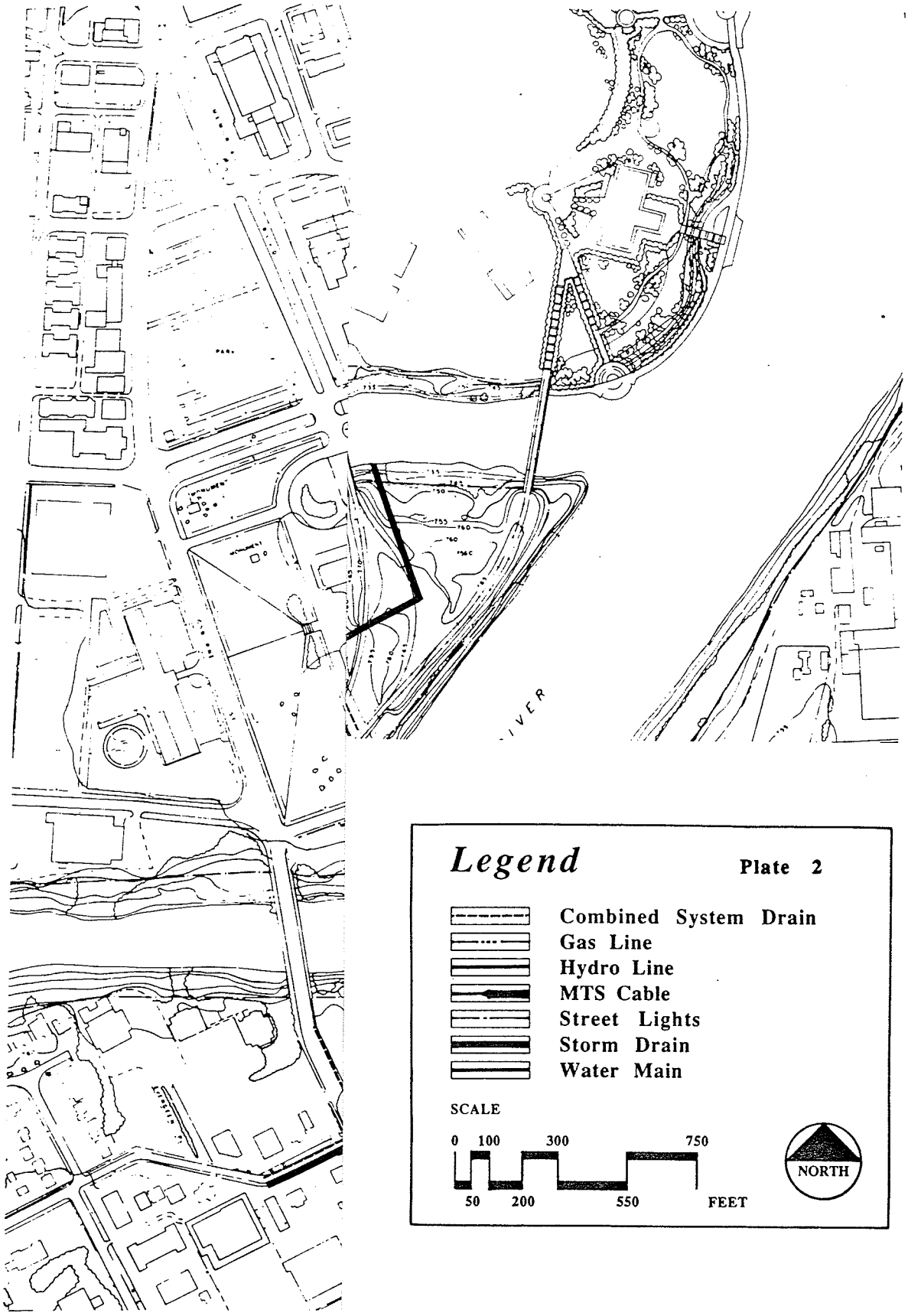
Constraints

The current location of three sewer outlets along the riverfront (see Plate 2) requires a design treatment that will minimize their visibility and human contact with these sites, especially as two of them let raw sewage into the river during wet weather conditions.

Bank Stability

Bank stability is low throughout the area as a result of relatively slow, continuous slumping and sliding of the banks. This condition is caused and perpetuated by the saturation of the soil during high water and wet weather and by the nature of subsurface clay and silty soils. There is also evidence of toe erosion along the banks, caused by wave action, and of wind erosion along the tops of steep banks.

> The stability of the banks is greatly affected by the operation of the St. Andrew's locks at Lockport which causes a rapid dropping of the water level during the first two weeks of November, when the gates are opened to the fullest extent. This opening of the gates causes the water level to drop about 13 feet in Lockport, 5.5 feet at James Avenue in downtown Winnipeg, . . . Careful and precise measurements of the rate of movement of a marginally stable bank opposite Tache Avenue have shown a marked increase in the rate of movement at the time of the



Assiniboine ound Structures

> lowering of the water level. Stability analysis indicate the lowering of the river level causes a reduction in the safety factor of the bank by roughly 1/3. . . scientific observations and analysis support the widely held opinion . . . that drawdown of the Red River does contribute to bank instability. Minor benefits may be obtained by reducing the rate of drawdown. . . however, elimination of the drawdown effect would require costly structural modifications at the St. Andrews Dam.[2]

The most unstable area of the riverfront has been previously identified as the north side of the River, where there is a gently sloping, slumping clay bank between, and to either side of, the two C.N.R. bridges. This area is an active slide erosion zone and is located at the outside meander and point of outflow of the Assiniboine River.[3]

To retain the position of the toes of the banks and to slow further slumping and sliding there are two effective construction methods; the least visually intrusive one is to construct a hard edge on piles to bedrock, or at a minimum, to till, along the toe of the banks. The other is a much less expensive solution and consists of constructing a rip rapped edge along the toe of the banks. The latter method prevents further toe erosion but does little to slow sliding. Each of these methods would result in some measure of greater overall stability of the banks. Other measures of increasing bank stability include reducing weight on the banks, increasing vegetation and by artificially improving soil drainage. Figure 3 illustrates existing typical conditions of the river edge.

A more precise evaluation of the effectiveness of either of these measures can only be done by a qualified engineer after test hole samples have been taken and a thorough analysis of existing slump zones has bneen completed. To date, such an analysis have not been done in this area, except for those done of Bonneycastle Park and the CNR East Yards.

Opportunities

The area noted as an active slump zone, areas where most vegetation has been cleared (suggesting less stable and slump prone areas), and where steep banks exist, suggest sites where significant modification of the bank may

occur without adversely affecting a natural habitat, forest or the stability of the banks.

Constraints

The unstable banks require that any development is able to withstand some amount of further slumping and sliding. In the event of further serious bank disturbance, maintenance and repair costs would be high unless adequate stability measures are taken.

Water Quality

River pollution originates from several sources of which surface and storm sewer discharge, sewage discharge in wet weather conditions, and chemical dumping by farmers upstream are the most critical. The quality of water throughout the downtown section of the city is very poor when compared to further upstream.

To be effective, the correction of this status would require the treatment of storm sewer flow, and according to one civic authority, would be prohibitively expensive and not entirely effective. There is much controversy over the precise state of pollution in this city and about the effectiveness of further regulating measures. As no consensus exists, it is difficult to draw conclusions on this subject except to say that the water in the area under study is considered unsafe for human contact.

Opportunities

The quality of the water is considered acceptable for canoeing and other passive, non-contact uses.

Constraints

Areas for water contact activities should not be provided within the area under study. The water quality of the rivers through Winnipeg and particularly in the downtown area, is considered unsafe for human contact, barring swimming and skiing from any development plan. Odors arising from slow moving waters, and the build up of algae will restrict the desirability of the riverfront for some users during some times of the year.

SITE SPECIFIC ANALYSIS

LAND USE ANALYSIS (see Plate 3)

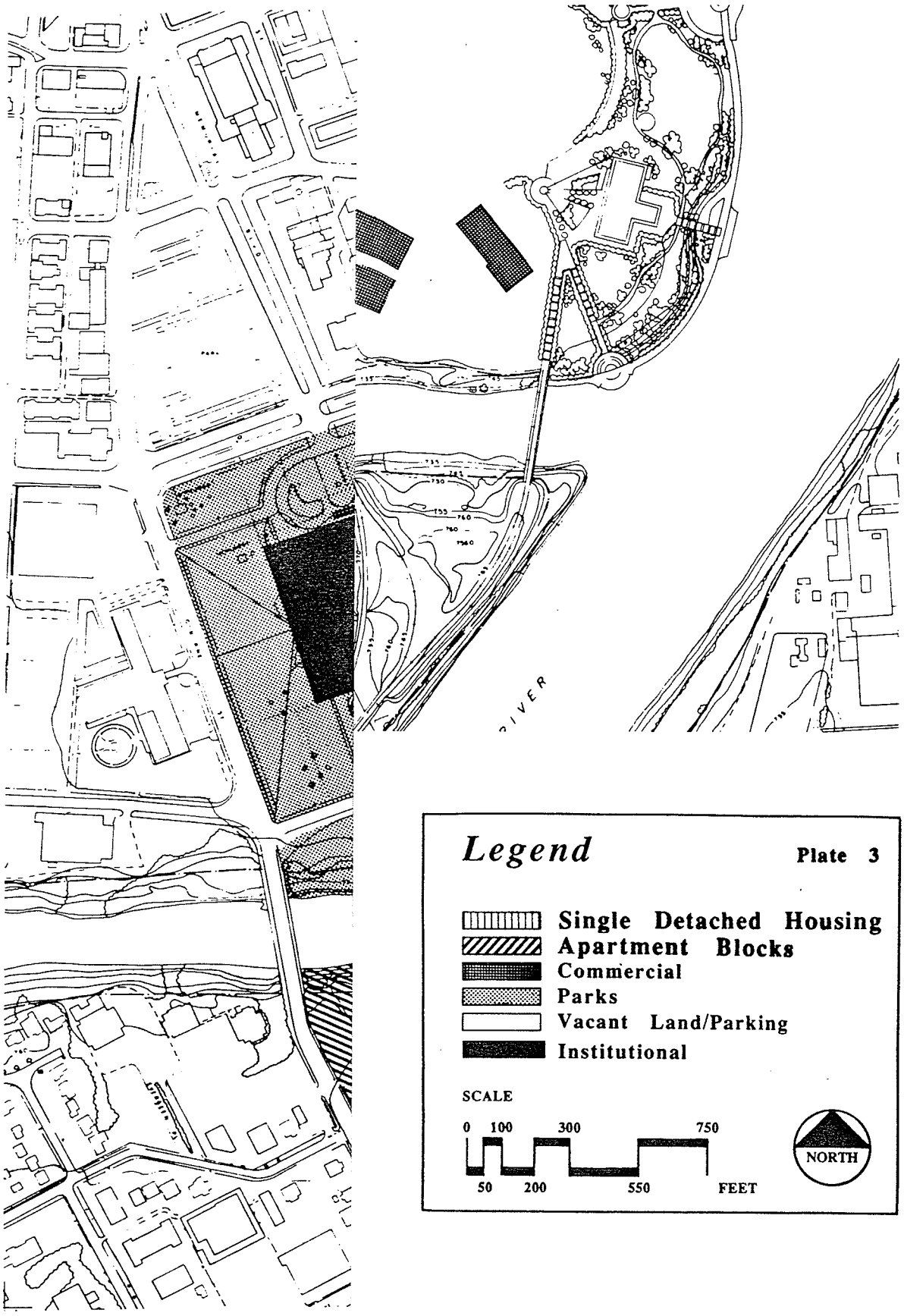
Land use within the study area is mixed and includes commercial, residential and recreational uses. There are more commercial uses of land on the north side of the riverfront; the south side is almost exclusively comprised of residential and park developments. Recreational use of the land is passive in established riverside parks which are enjoyed by local residents and the downtown lunch population alike. More active recreational uses are provided by nearby private recreational clubs and facilities.

Commercial and Services

Downtown Winnipeg borders the north of the site which becomes more residential towards the river and west of Main street. Commercial activities occur along the riverfront in small office buildings, converted houses and are most prevalent along the major transportation routes; Assiniboine Ave., Donald St., Osborne St. and Main St. The latter two streets form the east and west boundaries of the site and Donald St. divides it, particularly on the south side of the river.

Residential

The south side of the riverfront is characterized by all densities of residential development (single and multiple family houses, townhouses, walkups and high rise apartment blocks) and city parks, however, along the riverfront itself, residential development is almost exclusively walkups and high rise apartment blocks. The north side of the river, along Assiniboine Avenue, is characterized by more mixed use development consisting of medium and high density residential uses and parks, as well as small commercial buildings, club headquarters and restaurants.



Assiniboine Land Use

Recreational

Private recreation facilities within the site include the Winter Club, the Winnipeg Squash and Raquet Club and four curling rinks, two of which bound the site. Public facilities include formal city parks, containing tennis courts, a wading pool, play structures and one school yard.

Transportation

The area is characterized and divided by major vehicular routes, along River and Assiniboine Avenues and Donald, Osborne and Main Streets and by excellent bus service. Public transportation is excellent in the study area as a result of all the routes going into the downtown area.

The inclusion of elements that encourage use of the river for transportation for both work and leisure, is considered desirable as it will add variety and is hence, consistent with the goals of all levels of government and resident users.

Historic Sites

The design of the Forks site historic park, currently under development by Parks Canada and the newly established Forks Renewal Corporation, is consistent with the aims of the City's Parks Branch for the development of this property and the Assiniboine riverfront in general. Its design aims to bring users to the riverfront, commemorates the historic significance of this site, the history of the fur trade and of Western Canadian exploration, and it promotes the use of the river for recreation and for transportation; the latter objective achieved by the provision of docking facilities. As a result of its design steps will also be taken to stabilize the riverfront.

The celebration and marking of historic sites is consistent with the objectives of Parks Canada and is generally considered desirable from a public perspective. The obvious benefits of this component are educational, provides variety and contributes to a sense of cultural identity. The sensitive treatment of such sites and linkages to them is considered an important part of the final design solution.

Specific Historic Features

Linkages to the Forks site development and to Upper Fort Garry are therefore important. The Louis Riel monument should to be retained in the area although may be relocated depending on the final design configuration. The other historic monuments and plaques in the area deserving of consideration are: the Pierre Gauthier de la Verendyre monument, a plaque at government house and the commemoration of R. H. G. Bonnycastle (Metro's first chairman) through an interpretive device in Bonnycastle park and the commemoration of other such individuals who have contributed to the city's development and are considered an important part of its history.

The Upper Fort Garry historic site located in close proximity to the riverfront. Earlier proposals for its development have called for the remarking of this site or its use as a transition from the urban character of Main street to the neighborhood character of Assiniboine Avenue and for the articulation of related linkages to the riverfront.

Opportunities

The use of land on the north shore of the river is of three distinct types and defines three zones, each related to the next. Moving north from the river these are; 1. the riverfront itself, 2. a transitional, mixed use, medium density zone that reflects the ongoing competition between residential and commercial uses and the inherent variety of the downtown area, and 3. the commercial centre of the city.

The interrelated, yet distinct character of these zones offers an approach that will assist in deciding how the riverfront should relate to the city and how it should remain unique. The existing character suggests that an approach to the riverfront's design should reflect the surrounding variety in land use as well as its own. This approach provides an opportunity for reflecting the inherent variety of the city centre and the riverfront, and by doing this, create a zone of development that is a mixture of both, dynamic in character and fulfills the program requirements of user and interest groups.

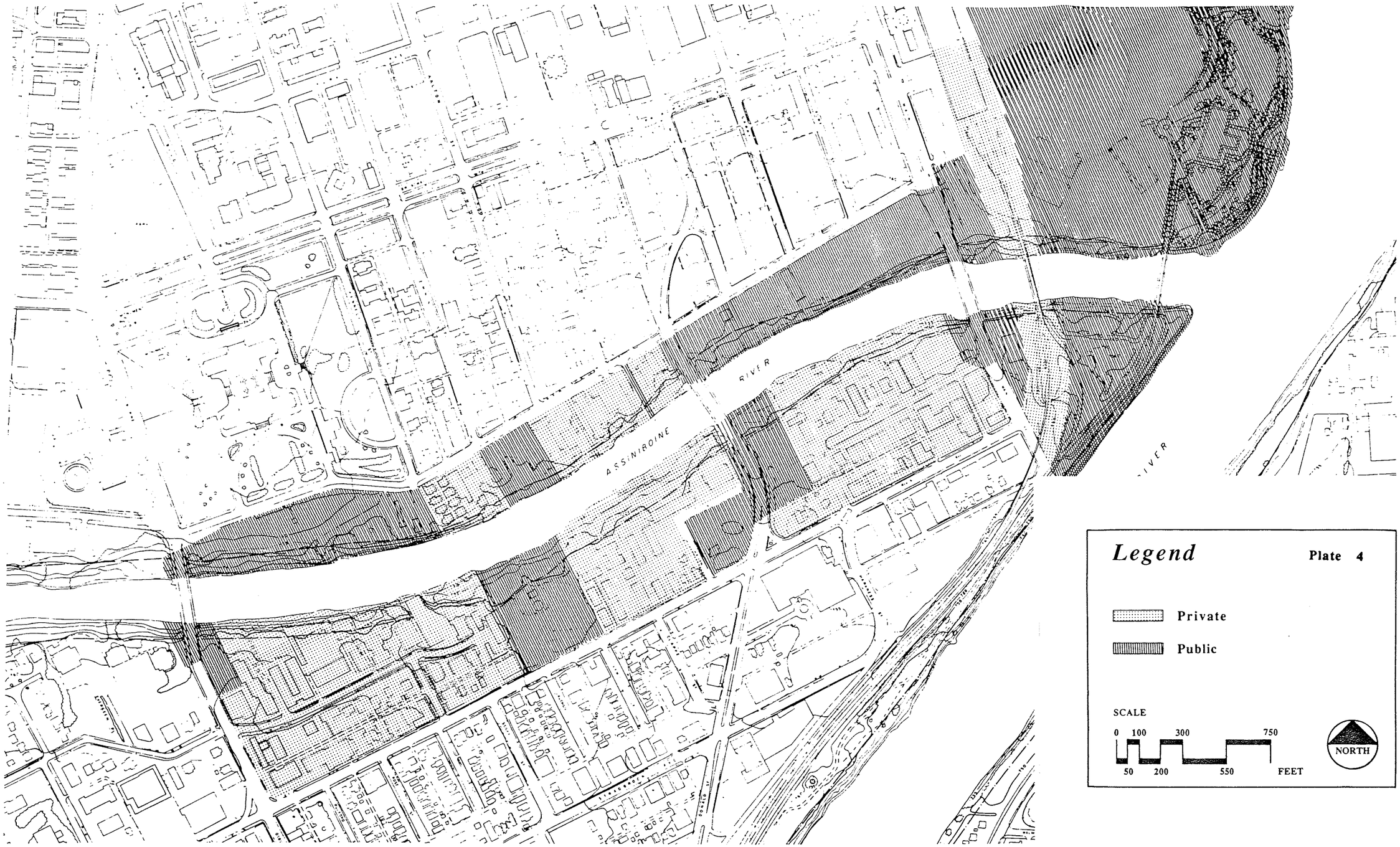
LAND OWNERSHIP ANALYSIS (see Plate 4)

Much of the land along the north shore is in public hands, and each level of government has a one-third share in the East Yards Site. Beyond this share, the federal property holdings are restricted to the Forks site and the Province's holdings are restricted to the Legislative Grounds and associated land on the riverfront. The city is the largest landholder of the three, with four city parks (including the recently acquired Guertin property as a part of Bonneycastle Park), a sewer outlet and bridge rights of ways, a school yard and recently acquired property immediately east of Donald Street to be developed as an extension of Mayfair park. For the purposes of this study, all public lands are considered as having the same development potential.

The willingness of private owners to allow development of the extreme riverfront of their holdings is considered good if it serves to increase their property values (as a result of the development to occur there) and releases them from legal liability resulting from personal injuries or accidents associated with the riverfront. It is thought that owners of the apartment buildings in the area may be less likely to agree if they perceive that tenants will find their suites less private and hence, less desirable. This consideration supports the contention that proposed development on private lands should be intended for use primarily by residents of the immediate vicinity. Nonetheless, for the purposes of this study, it is assumed that all private holdings along the riverfront will be available for public development. For the purposes of this study, it is assumed that a continuous strip of land along the Assinboine riverfront will be made available for public use and development.

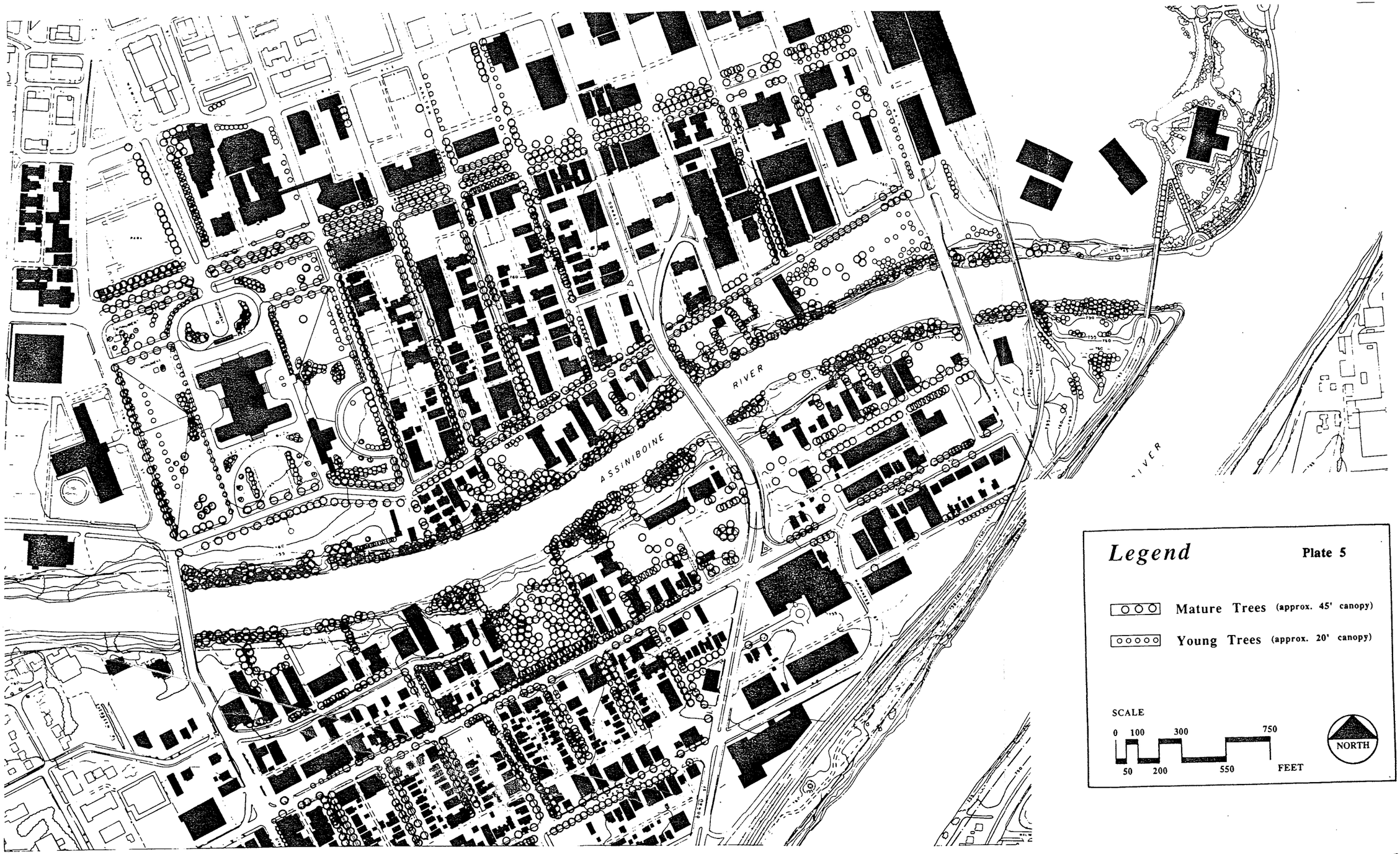
BUILDING VOLUME ANALYSIS (Plates 5 and 6)

An examination of the Figure/Ground Map is useful for determining areas of building concentrations, the ratio of buildings to open space, the configuration of spaces created by building masses, edges and patterns created by buildings and streets and variation throughout the site.



Assiniboine Riverfront Site Analysis

Land Ownership



Legend **Plate 5**

Mature Trees (approx. 45' canopy)

Young Trees (approx. 20' canopy)

SCALE

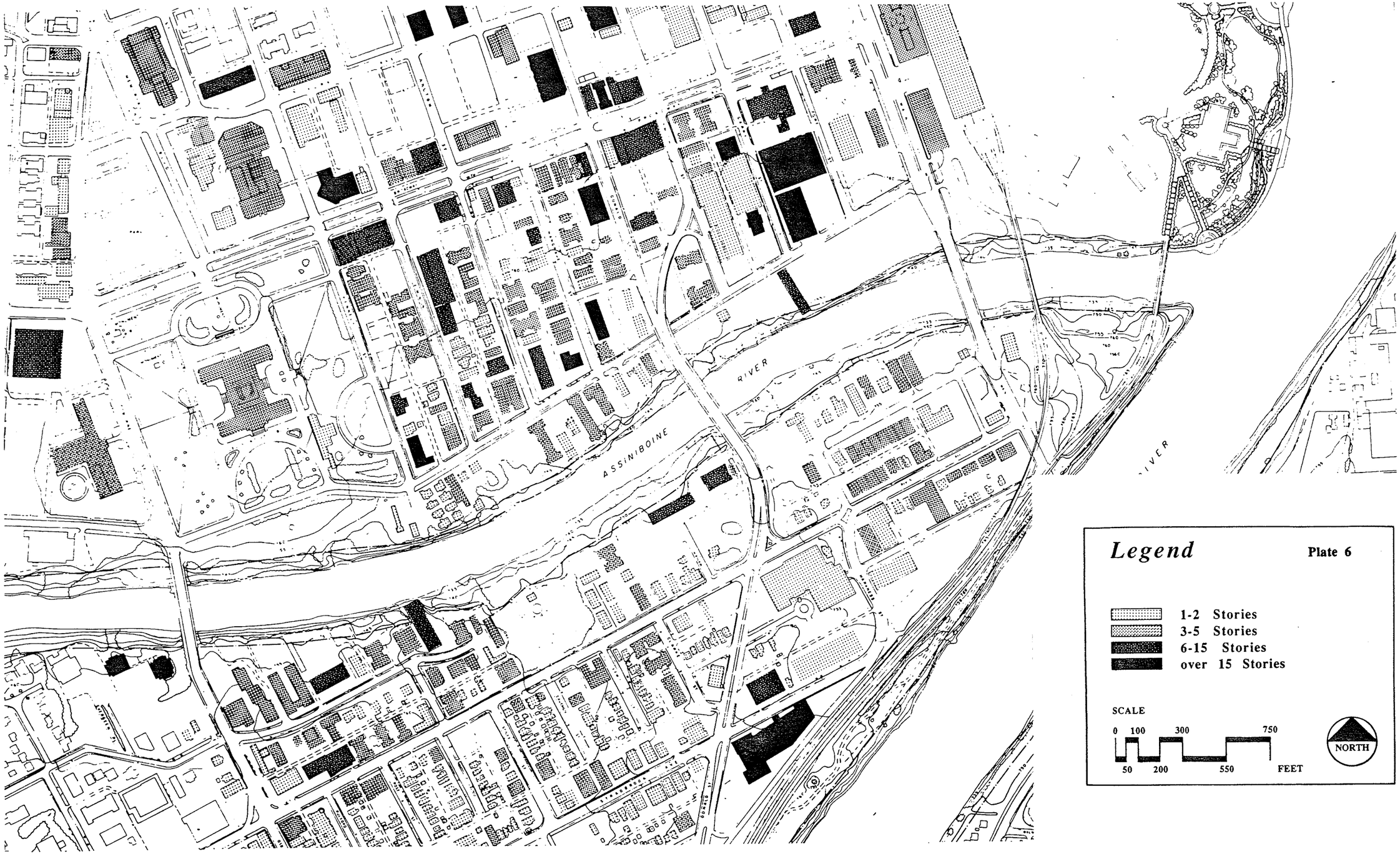
0 100 300 750

50 200 550 FEET

NORTH

Assiniboine Riverfront Site Analysis

Figure Ground



Assiniboine Riverfront Site Analysis Building Elevations

There are two orientations of the urban pattern of streets and buildings evident on the north side of the river and one on the south side. On the north shore the pattern between the river and Assiniboine avenue is evidence of the river lot system of land sub-division, and responds to the pattern of the river. To the north of Assiniboine avenue, the pattern is a continuation of the downtown orientation of streets and buildings. Along the south shore, the orientation of streets and buildings consistently responds to the river, although it is on a different angle than either of those on the north shore. These three orientations of the urban pattern of streets and buildings provide a basis that may be used to organize space and to locate design elements on the riverfront.

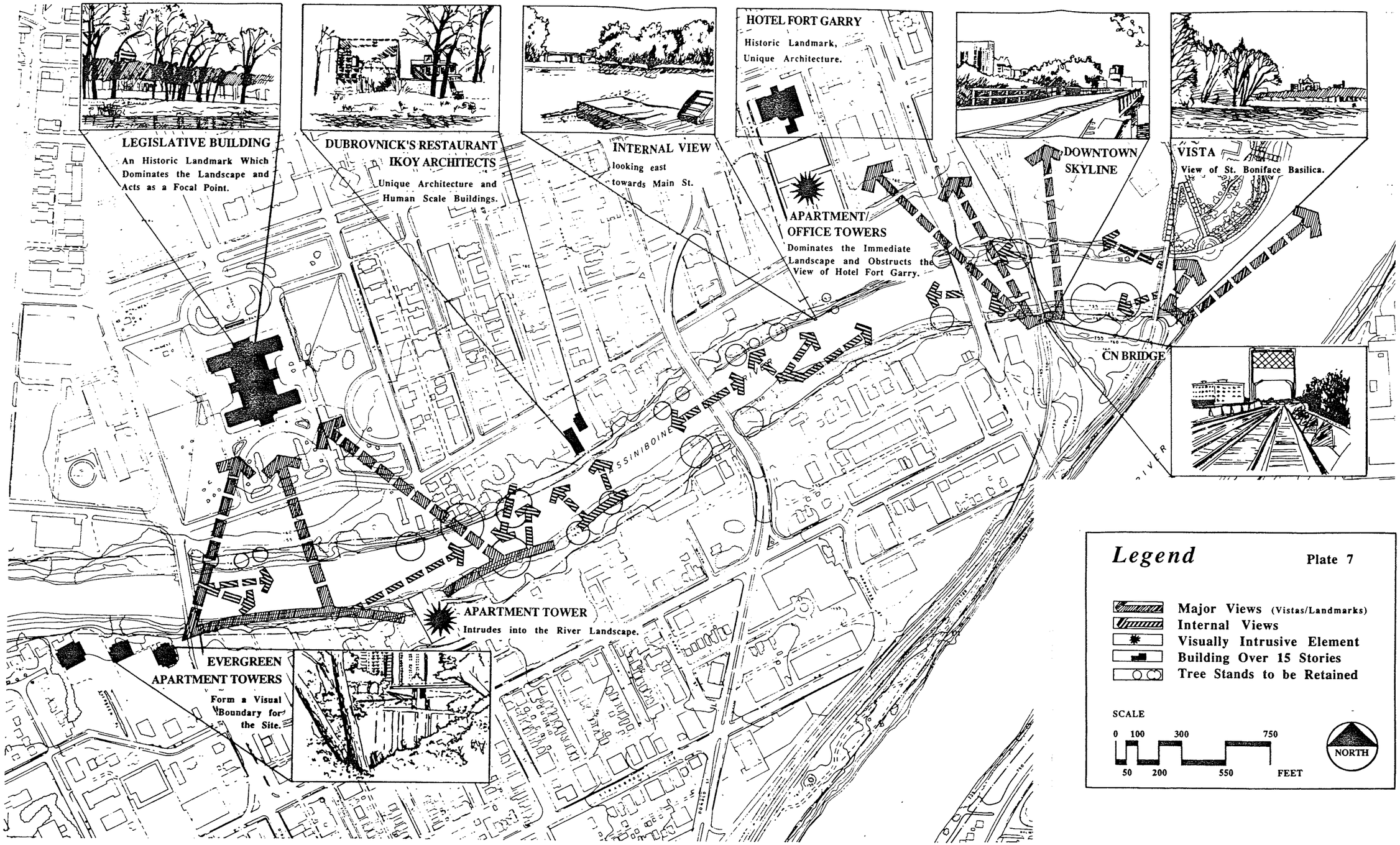
The variety of building patterns along each street fit into these relatively consistent patterns. This variety gives each street a unique pattern of massing, density, height and open space and serves to distinguish each street from the next. The illustration of building elevations (plate 6) provides dimension to the volume analysis and a sense of the texture formed by their masses. This textural quality may also be used or reflected in site specific design by the heights of elements or by the location of built forms. Areas of densely used space defined by building heights can assist in determining areas where linkages to the river are most important.

Locations of tree canopies and masses similarly allow for ready definition of patterns and breaks in patterns along both the river and adjoining streets.

VISUAL ANALYSIS (Plate 7)

Visual features of the site were analyzed to identify elements that may be used to enhance linkages to the river, its inherent varied character, or act as focal points. The visual analysis identifies existing vistas and landmarks, attractive views internal to the site, key viewing points, desirable stands of vegetation and negative, visually intrusive elements.

Views were identified and distinguished by the type of view offered; 1. vistas and views of landmarks (major views) and 2. internal positive views



Assiniboine Riverfront Site Analysis

Visual Analysis

(minor views). Landmarks are defined as focal points in the landscape, including distant features or buildings and/or historically significant elements. Internal viewing areas provide a background and some detail of the riverfront or a view down river. Vistas offer a wider scope of vision looking down the river, or across it, focusing on a distant point. An example of a site offering this type of view is the South Point of the Forks Site. It's relatively high elevation and position at the junction of the rivers, offers views north and south down the Red River as well as West down the Assiniboine, and renders it ideal for the purpose as the key viewing point of the proposed development.

Visually intrusive elements are those which obstruct otherwise attractive views or uncomfortably dominate the landscape by their size, physical appearance or proximity to the river. Positive internal views include those down the river, or visually pleasing spots along its banks.

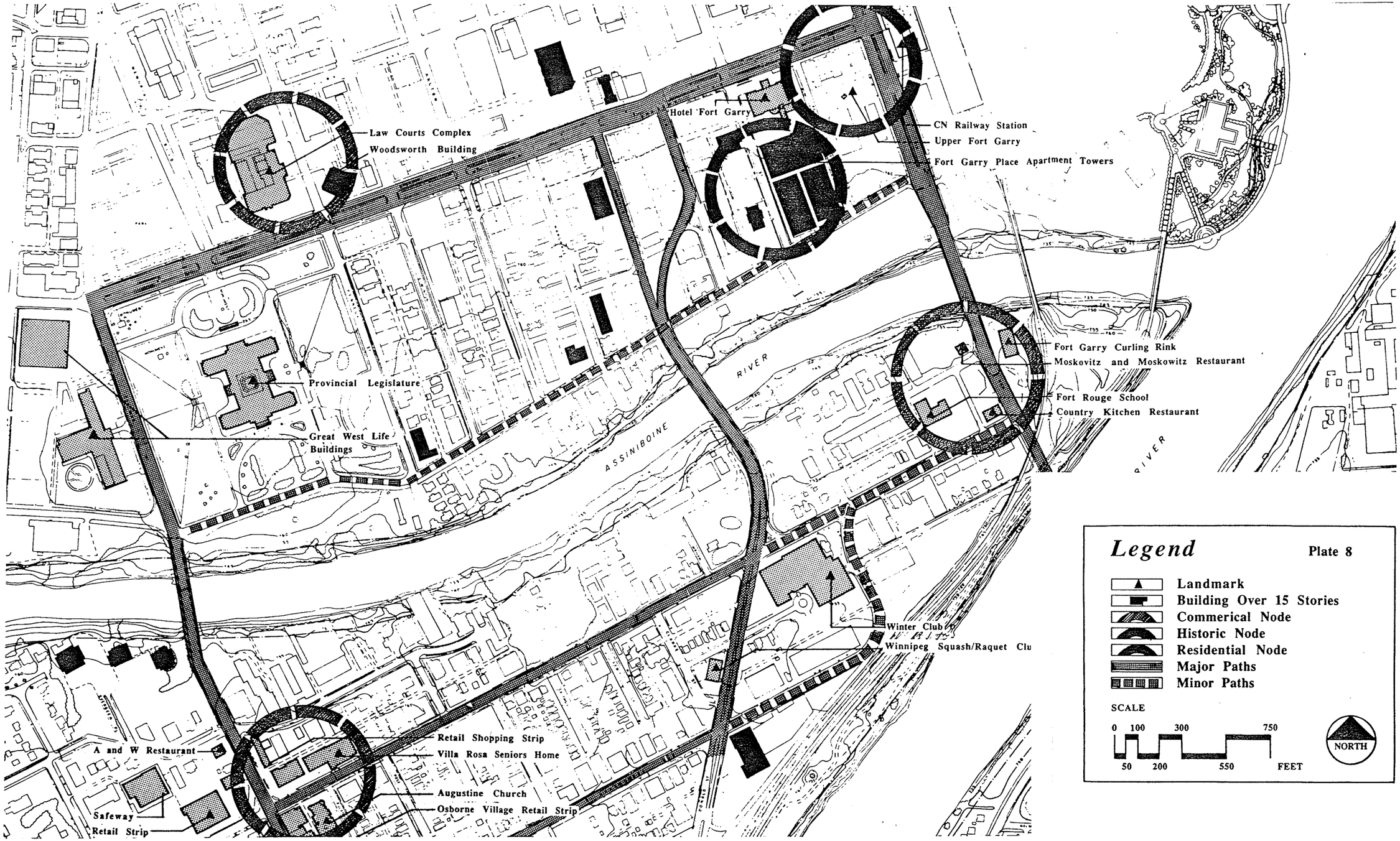
This component of the analysis is subjective and is not intended to be definitive, but is intended as a way of identifying existing positive views and zones which lack focal points or positive views.

PATHS, NODES AND LANDMARKS (see Plate 8)

This analysis identifies the pattern of major streets and building densities that suggest where spaces along the riverfront should be linked.

CONCLUSIONS

This analysis of physical site factors and surrounding land uses provides general site familiarity, a basis for developing a design strategy that will be consistent and coherent in the long term and identifies the major physical issues and factors to be considered in the design strategy. An understanding of pattern of streets, building volumes, densities and the riverfront itself allows these features to emerge as the critical patterns that should be used as the basis for a conceptual approach to design and for the development of a design strategy. The unique features of the riverfront in general and the particular patterns of the surrounding urban fabric are those



Legend

Plate 8

- Landmark
- Building Over 15 Stories
- Commerical Node
- Historic Node
- Residential Node
- Major Paths
- Minor Paths

SCALE

0 100 300 750

50 200 550 FEET

NORTH

Assiniboine Riverfront *Site Analysis* *Paths/ Nodes/ Landmarks*

CHAPTER FIVE
Design Stategy

that distinguish this area of the city from others. Hence, they are the features that should be used to develop a strategy for the development of the riverfront.

In summary, these features are;

Riverfront	:existing visual focal points and edges
	:variations in topography evident in plan, elevation and section
	:the contrasting nature of natural riverfront vegetation and city, planted trees
	:the character of a water environment in contrast to the urban condition
City Pattern	: the pattern and orientation of the city's grid: streets, buildings, and pathways
	:surrounding, varied land use and densities

The foregoing analysis also provides a basis for giving physical form and expression to societal desires and goals.

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1 Hilderman. ibid.
2 Manitoba Water Commission. p. 25.
3 Hilderman and Assoicates. ARC Draft Master Development Plan. (Department of Mines, Natural Resources and Environment: Winnipeg, 1980).

INTRODUCTION

The foregoing analysis provides a data base; the raw materials for establishing a conceptual site planning framework and approach to design, making design decisions for a given set of specific site conditions, the setting broad priorities for development and for developing a strategy for the design of the riverfront.

The concept provides direction regarding the themes of development and the strategy will provide specific guidelines for the site's design. This direction for development that will occur over a long term by different individuals and groups is necessary to ensure consistency and coherence in the site's development. This factor and the scale of the site demand that the overall strategy and conceptual approach established remain intact throughout the development process to provide direction and consistency in the long term.

A strategy for design that will ensure appropriate and sensitive development must be consistent and coherent over a long term, must provide a clear set of rules for design that will guide the shape of development, and must be flexible enough to accommodate unique site-specific situations. It must address the priorities of development which have been identified as:

1. the articulation of access points to and from the river
2. a system of continuous pathways along the riverfront
3. the implementation of a public focal point, or points, on the river as a complement to the Forks and the reintroduction of public uses to the waterfront
4. to develop one or more minor focal point
5. to link the site to historic areas; the Forks, Upper Fort Garry.

The strategy for the design of this site is composed of
1. a concept which defines general themes for development,
2. a design strategy providing a framework for the shape of development, composed of rules to be applied to site specific conditions and intended to guide the progress of development,
3. both 1 and 2 reflect a framework for ensuring that key program elements are appropriately included in the site's plan.

The strategy developed in the following pages assumes that a continuous strip of land along the river will be made available for public use. It also assumes that development of the riverfront in downtown Winnipeg will take on a more urban character than has been typical of development along the riverfront in this city, and aims to illustrate how the process of urbanization may occur while retaining the natural character and integrity of the riverfront.

Conceptual Approach

To be descriptive of the city it serves, a conceptual approach for the development of the Assiniboine riverfront in the downtown/ River-Osborne area must address the three components of the area that characterize it; the universal attraction of the river itself, its terraced banks and the particular pattern of the adjacent streets and buildings. To be effective in the long term, the concept must also reflect the principal objectives of the development project. In brief these are:

1. to bring people to the water's edge; to increase its use and the perception of its usability,
2. to link the downtown part of the city and the river,
3. to take full advantage of the urban and natural unique qualities of the study area.

Consideration of the unique features of the river and its historical relationship with the city provides the basis for an overlying concept. The river's original relationship to the city was as a transportation route and as the focus of commerce. Its use was characterized by arrivals and departures and it was the focus of activity. A reintroduction of foci on the river as

destinations, points to arrive at, and to stroll by, is, hence, an appropriate theme for development on the water and at its edge, and is a reflection of the priorities for this development plan.

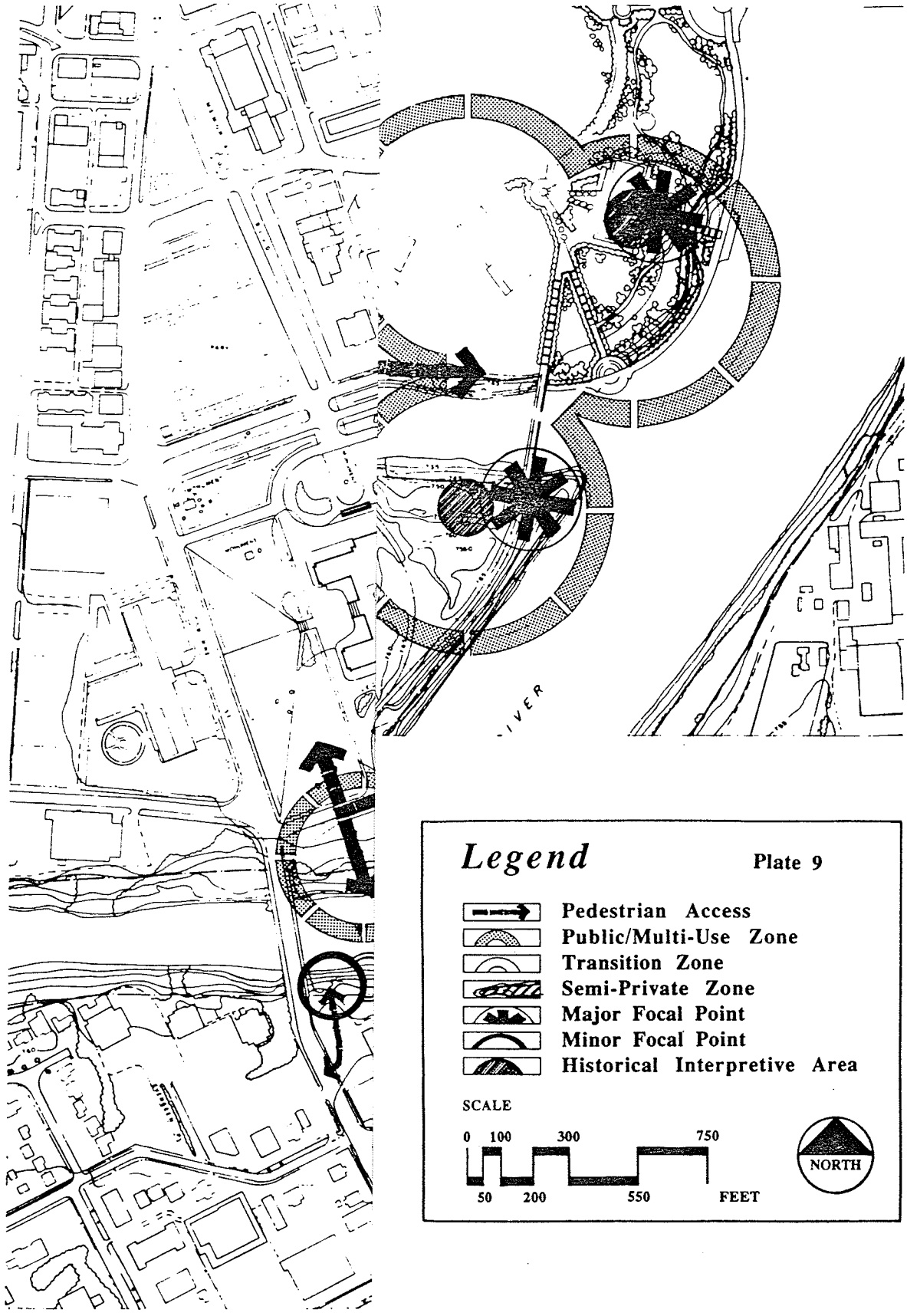
Destination points on the water and their linkage to each other as a theme for development provides an opportunity for taking full advantage of the natural visual and physical quality and potential of the riverfront and for providing variety in the character, quality and scale of the spaces generated. This theme is responsive to the character of the river as a continuous meander through the city, and the recognized desirability of providing a continuous series of spaces for public use along it. Such spaces will enhance both the inherent variety of the riverfront and the city.

Conceptual Framework (see Figure 9)

Central to the key objectives of this project is to increase the public's awareness and appreciation of the river and the perception that it is accessible The degree to which this objective is achieved depends on the treatment of linkages from the city to the riverfront and the reverse linkage, and it is how this occurs that will determine the success of this project.

The existing pattern of streets, building densities and public and private land ownership along the riverfront provide the means for locating key access points to, and focal points on the river. The pattern of public land use define areas with the potential for intensive public use and areas where residential buildings dominate are those for more private, less intense uses. A new pattern of public(major), semi-public(minor), transitional spaces and focal points emerges that reflects existing patterns. The identification of areas where these spaces can be linked to the city fabric are based on the foregoing analysis and are as illustrated in Figure 9.

Areas for major, public focal points have been identified according to existing concentrations of commerical and residential buildings on both shores, public access from the street to the river, and their proximity to major transportation routes (points of high visibility). Areas for minor focal points were also defined according to existing concentrations of buildings and the



Assiniboine Park Framework

lack of general public access from nearby streets. The decision to provide two distinct types of spaces resulted from the existing pattern and character of land use adjacent to the riverfront and is consistent with the wide range of users expected.

Areas designated as public/multi-use spaces are those intended for use by the public at large, local residents and tourists. This spatial type demands that spaces are clearly visible and accessible from places of entry and viewing points, may tend to be more urban in character, and invite use by all. These spaces may function as large gathering spaces, for use during ceremonial occasions and events or as urban focal points on the river. They should provide opportunities for festive gatherings, programmed events, and the celebration of historic sites. As points of orientation, fulcrums of activity and the celebration of historic points or events, these spaces will contribute to a sense of order and continuity along the riverfront. Transitions from these into more intimate, smaller scale spaces are essential for providing a sense of privacy and exclusivity of use for the local residents who will use these more passive spaces.

The less public spaces and trail linkages are intended for less intensive use, with the emphasis for use by local residents. The need to clearly define boundaries between public and private lands dictates that these spaces and their linkages to streets be more private in character, with less obvious entry points and visibility than the other, in order that the integrity of the surrounding residential character is maintained.

The conceptual framework outlined here provides an organizing framework for site specific development. It is flexible enough to accommodate changes in site specific conditions, and suggests the general character of development. However, it does not suggest what will make development descriptive of the city it serves, or a structure for its form that will ensure that development will be coherent in the long term. An additional layer to this framework is necessary to ensure that individual development projects will be coherent and display consistency in the forms used for organizing space and in the way design elements are used. A

conceptual structure that deals with the form of development will provide guidance and will act as a basis for developing site specific design rules.

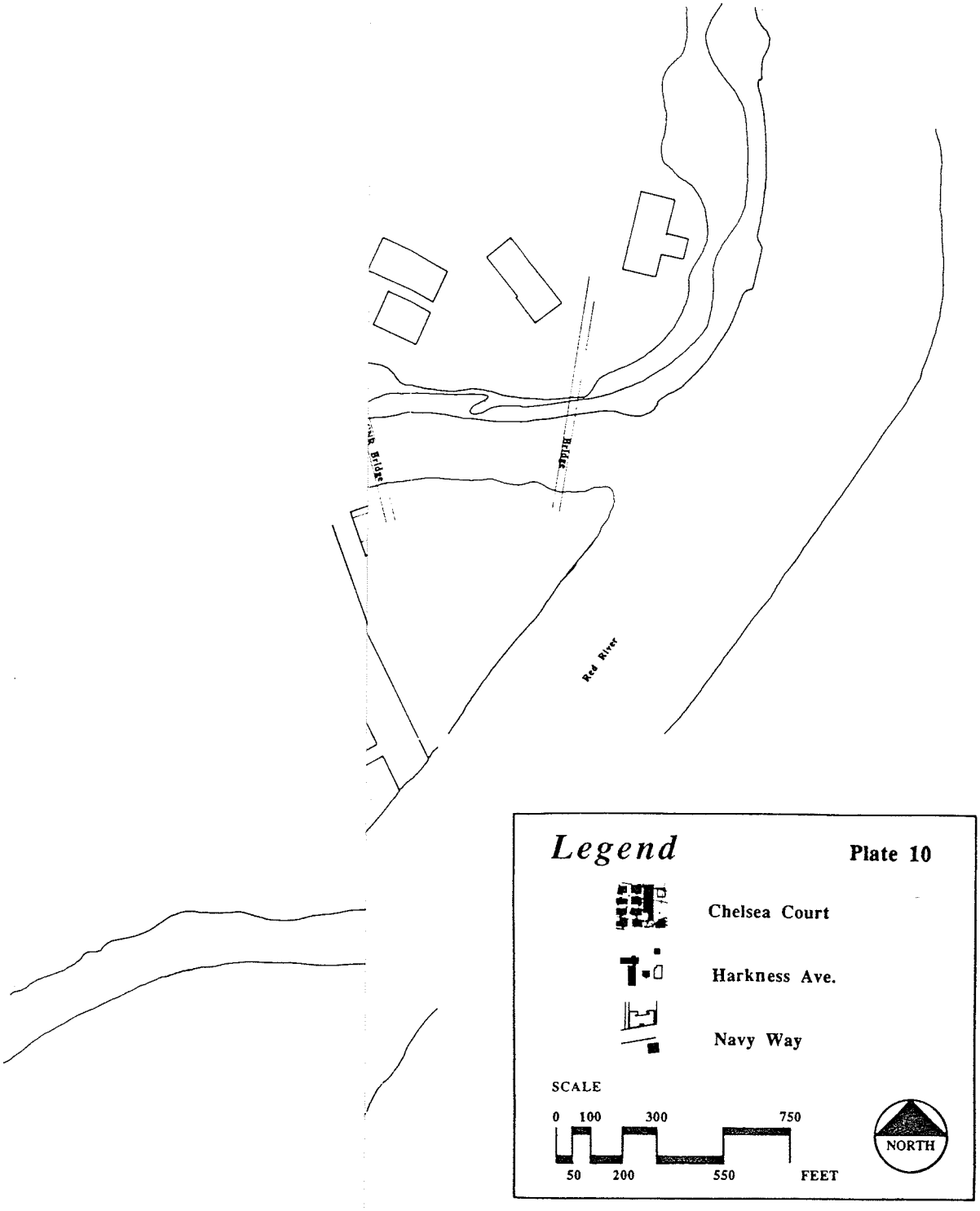
Conceptual Structure

The co-existence of commercial and residential land uses in the study area is characterized by a mixture of the two, provides an interesting mix of both, and helps to distinguish this area from other parts of the city. This suggests that to reflect this integration of land uses in the development of the riverfront can be a way of integrating it with the adjacent patterns. The interaction of this edge between the city and the riverfront provides the widest range of opportunities for adding dynamism and excitement to the city, as a complement and as a contrast to a natural riverfront condition. It is this interaction that, by the contrast it provides, will facilitate a full appreciation of the natural character and quality of the riverfront. The pattern of the city and the riverfront emerge as those having physical form that can be used as the basis for a design strategy.

The City's Pattern (see Plate 10)

The grid and street pattern of the city, two orientations on the north shore (one is evidence of the original river lot system of sub-division) and another, different orientation on the south shore, provides the means for continuing the city to the water's edge, and for contrasting the natural character of the riverfront with the urban character of the city. It provides a modulation for space and material that is flexible and will ensure a level of consistency in design.

A hierarchy for continuing the city street pattern to the water's edge is provided by the existing pattern of land ownership and proposed land use along the riverfront. Areas where public ownership extends to the street, and where the street pattern is continued to the water's edge, more easily and logically allows a higher degree of urbanization than areas where the issue of public/private separation of land is paramount. Areas identified for public, multi-use development provide immediate opportunities for large scale urban treatments of the riverfront and the existing pattern of streets identifies the logical initial places for continuing the urban pattern of the city to the



Assiniboine reet/ River Pattern

water's edge. In some areas it may be considered desirable to extend this pattern over a larger area, for example, where a large public space is planned.

The pattern of streets may be continued as lines of trees, by the use of seating walls to define space and the use of hard surfaces. It may be reflected by the planting of trees in bosques and by the location of ramps and stairs. Adjacent sidewalks help to locate access paths and entry courts.

The continuation of the pattern of city streets to the water's edge define areas where treatment may be entirely urban and forms used may be rigid. The extended lines of adjoining streets are to act as lines where patterns may begin to breakdown and merge with their surroundings, or where the pattern used ends abruptly. The breakdown of this urban treatment should occur in a consistent proportion away from these 'lines of urban extension', perpendicular to the river. The continuation of this pattern within the extended lines, is intended to diminish as it reaches the water's edge.

The specifics of this treatment will depend on the individual site's specific program. The precise breakdown of the city street and grid pattern is left to the designer's discretion. The flexibility of these general guidelines are intended to ensure that the degree of urbanization and the handling of specific design issues will vary according to the particular condition and character of the riverfront segment being designed.

The continuation of adjacent patterns of streets to the water's edge is a way of bringing the city to the water and provides contrast to the natural river edge condition. The breakdown of this pattern away from street lines helps to fit the extended urban pattern into its context and assists in the transition from public to less public spaces. It is intended that the urban pattern also breakdown where it encounters a pathway level or terrace that reflects the river pattern

Riverbank Terraces (see Plate 10)

Historically, land at the water's edge was the most valued for settlement and it was only when all of it was occupied that settlers moved

further up onto the flat prairie. The alluvial terraces which characterize the Assiniboine riverfront provided the means of access to the city and were the focus of all initial commercial activity. The character of the river terraces as steep and overgrown in places describes the current relationship between the city and the river, they are one of the few topographical changes on the prairies and act as the edge that separates the river from the city.

These terraces reflect a pattern of natural processes that should also be reflected and preserved in development if the integrity of the natural system is to be retained. The use of establishment of these terraces as the basis for a design strategy, provides an opportunity for adding variety, and an enhancement of riverbank character which focuses on the interface between the city and the river.

The terrace levels 755, 752, 747 and 737 feet above sea level have been selected as the main ones to be articulated in design. These levels reflect, in descending order, the time processes have been acting upon them and each one defines a logical zone for specific components of a design program and is based on annually expected flood and seasonal water levels.

755 the 160 year flood level defines a line above which permanent structures may be built without the risk of flood damage.

752 the 100 year flood line defines a zone of transition from the street to the permanent pathway system and is a level generally well defined where terraces are evident.

747 this terrace is identified one foot above the annually expected spring flood waters. It is the terrace where the all season pathway system is to be constructed.

736 2-3 feet above the summer water level. The level for docks and summer pathways. This level is flooded each spring, so pathways will require cleaning or reestablishment.

Method of Articulation

The design intent for articulating river terraces is to reflect the meandering character of the river, and the processes that have shaped it over time, both in plan and in elevation. The methods for articulating river terraces involve the use of retaining walls, variations in paving patterns,

railings and the curvilinear line formed by pathways. The inherent variations in terrace widths, heights and contour lines evident in plan, are to be expressed through the use of varying intensities and heights of these tools.

The form and character of the existing terraces evident in plan is extrapolated to a smooth, meandering curve that mimics the original line and the character of the river. The form and shape of the pathway levels (736 and 747), reflects the line and gives it a consistent expression along the riverfront. These lines find expression as paved pathways, retaining walls and handrails. The continuous line formed by a pathway and a continuous or broken line formed by retaining walls are to be visible to those who use the site and by those who approach it from the river.

The articulation and use of river terraces provides an additional means of ensuring design consistency, of entrenching a unique feature of the riverfront, and of adding contrast to the existing urban pattern. They are topographic features with varying degrees of visibility and variability according to the length of time it has taken the river to establish them, the extent of human intervention and the process of sliding and erosion that has acted upon them. The specific terrace levels to be articulated were chosen based on their elevation and relationship to annually expected spring flood and summer water levels.

Riverbank Typification

The processes acting on the riverfront over thousands of years have resulted in a variety of slope and terrace types that suggest, and may require, different design treatments to solve each of the design issues arising from the priorities for development. Towards the end of retaining the inherent variety of the riverfront and of achieving a level of consistency in design, a typification of the riverbank was derived according to slope conditions; the presence and absence of distinct terraces, of private property between the river's edge and the parallel street and the resulting ability or inability to reach the water's edge.

To assist in decisions about the use of design tools in site specific situations and to ensure that existing variations in terraces are expressed, a typification of the riverbank was undertaken. It raises the issue of public/private land separation and the treatment of different slope types.

The typology described serves as a model that defines sets of conditions requiring different design treatments and serves to assist in determining rules for the use of design tools. This outline of the riverbank typification as illustrated in plates 11 and 12, is elaborated upon here and includes the general character of each type and the specifics of each sub-type.

Type 1

The riverbank is steep at the water's edge (over 40% slope, preventing easy access to the water's edge), with no or few terraces evident; none of those evident are 30 feet or greater in width (the minimum necessary to accommodate a trail and seating/viewing space). Removal of some riverbank material is necessary to accommodate a pathway.

1A. Public property between the parallel street and the river allows free pedestrian access from the street.

1B. Private property between the parallel street and the river prevents free pedestrian access from the street. As a result of steep banks, the issue of public/private separation between adjoining residential properties and the public pathway along the river is critical.

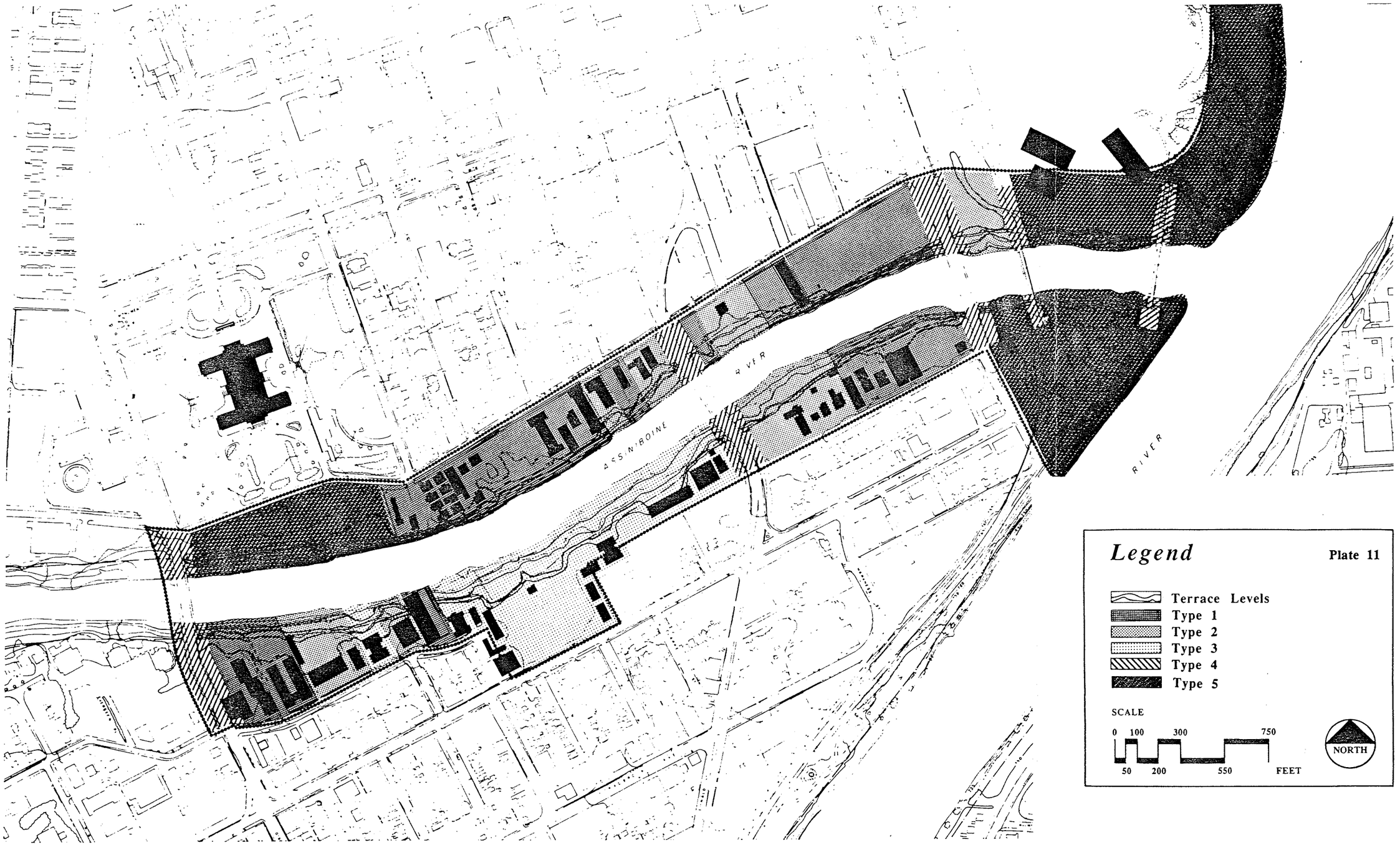
1C. An existing building on the water requires a special treatment to provide a continuous pathway system.

Type 2

The riverbank is steep at the water's edge (over 40% slope) with one or more terraces over 30 feet wide in evidence.

2A. Private property between the parallel street and the river prevents free pedestrian access from the street. In this condition, the issue of public/private separation between adjoining residential properties and the public pathway along the river is also critical.

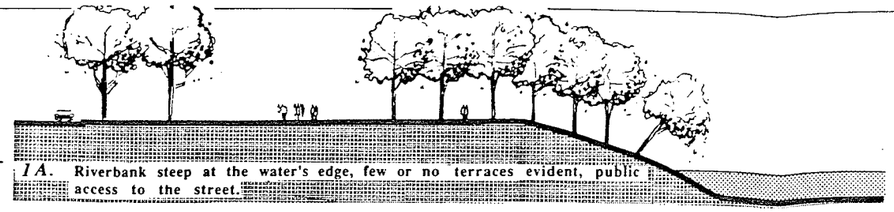
2B. Public property between the parallel street and the river allows free pedestrian access from the street.



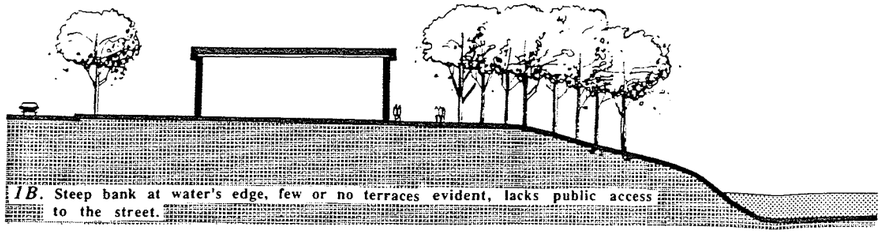
Assiniboine Riverfront Strategy

Riverbank Characterization

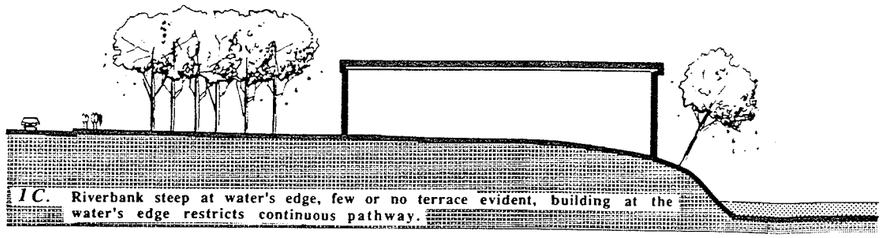
TYPE 1



1A. Riverbank steep at the water's edge, few or no terraces evident, public access to the street.

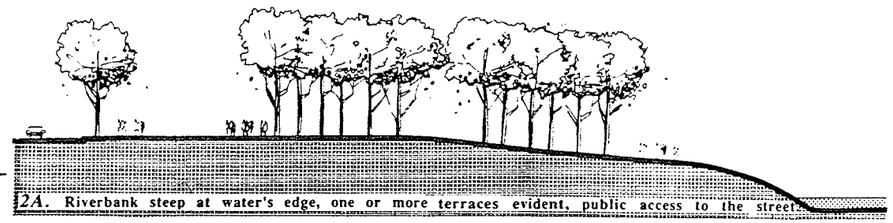


1B. Steep bank at water's edge, few or no terraces evident, lacks public access to the street.

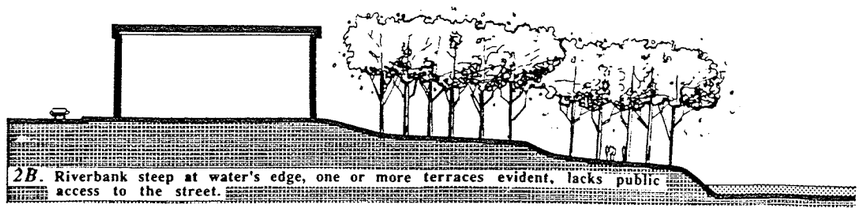


1C. Riverbank steep at water's edge, few or no terrace evident, building at the water's edge restricts continuous pathway.

TYPE 2

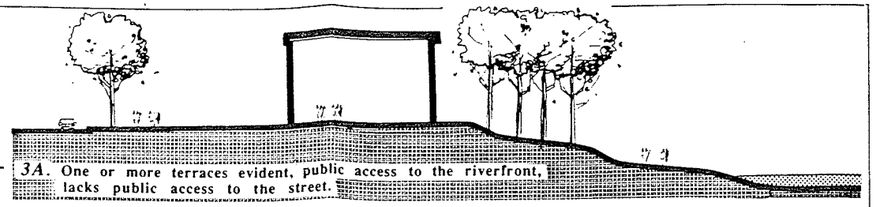


2A. Riverbank steep at water's edge, one or more terraces evident, public access to the street.

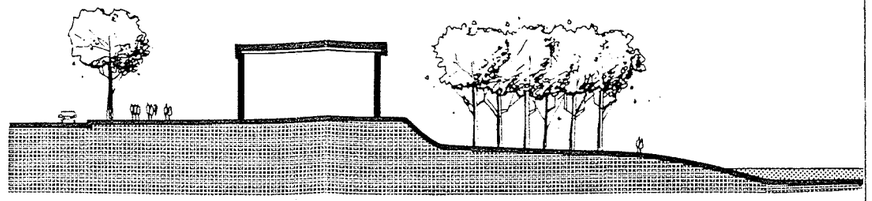


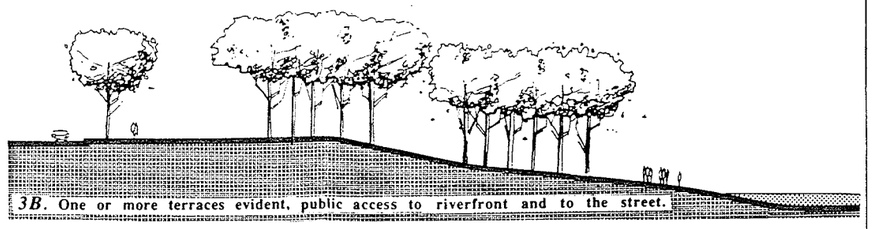
2B. Riverbank steep at water's edge, one or more terraces evident, lacks public access to the street.

TYPE 3



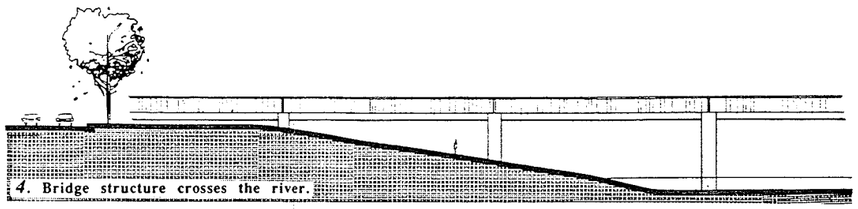
3A. One or more terraces evident, public access to the riverfront, lacks public access to the street.





3B. One or more terraces evident, public access to riverfront and to the street.

TYPE 4



4. Bridge structure crosses the river.

SCALE

0 10 30 75

5 20 55 FEET

Plate 12

Assiniboine Riverfront *Strategy* *Riverbank Types*

This type is distinguished from type 1 by the potential it offers for including seating or viewing spaces along pathways. For both types, defining a water level terrace may or may not occur. Where it is, steep bank edges require steep staircases and ramps for access. In other areas, steep bank conditions provide the opportunity for overlooks and viewing decks.

Type 3

The riverbank is shallow at the water's edge (less than 40% slope), allowing free access to within 5 feet of the water's edge. By definition, one or more terraces are evident, at least one of which is 30 feet or greater in width.

3A. Private property between the parallel street and the river prevents free pedestrian access from the street. In this condition, the issue of public/private separation between adjoining residential properties and the public pathway along the river is also critical.

3B. Public property between the parallel street and the river allows free pedestrian access from the street.

These slope conditions assist in locating docks and pathways, provides opportunities for water based activities generally, and for nature walks through existing stands of riverbottom forest.

Type 4

Areas where a bridge is constructed over the river are often areas where regrading of the riverbank has occurred to accommodate these structures, resulting in a fairly uniform slope condition, often paved.

Type 5

This category includes sets of special conditions which may fit into any of the above slope/property types, but where the uniqueness of the specific site and/or of the adjoining land use suggests more significant modification of the riverfront. The Provincial Legislative Building, the Forks site and the South Point are all examples of such unique sites where more elaborate manipulation or urbanization of the riverfront than dictated by these guidelines may be considered desirable. The design of these sites may or

may not follow the guidelines provided with the exception that the pathway link at the 747 contour level must be included.

Typology Summary

This typology raises the issues of public/private land separation and the treatment of various slope conditions to be dealt with in design. It provides a rational basis for decisions about where and what kinds of terraces should be articulated in design, and for locating particular program elements along the river.

DESIGN GUIDELINES

The strategy for design presented here is based on the use and manipulation/composition of river terraces and the urban grid pattern of the city, both of which provide the basis for a set of design guidelines. These two design features derive from existing urban and natural features of the fabric adjacent the river and will, therefore, assure both consistency in the urban pattern and coherence among nodal and pathway development.

The design guidelines were derived according to the riverbank terraces and typology, in combination with the adjacent urban pattern, and were developed that illustrate how the main design issues are to be resolved for each set of conditions. These issues are:

1. public/private separation of spaces
2. the articulation of river terraces
3. the continuation of the urban street to the water's edge and related access
4. pedestrian movement from the street and from one terrace level to the next
5. the character of nodal development
6. the degree of urban/natural mix in all the conditions outlined, and
7. the method for handling of existing and proposed vegetation.

It is intended that the urban grid pattern and the patterns of the river terraces be used together to provide an overall coherent structure for all types of development. The following discusses the implementation of both patterns through the use of retaining walls, paving, railings and lines and

bosques of trees and how these tools should be used to address the design issues listed above and discussed earlier in the text.

Retaining Walls

The intent for the use of retaining walls is to reflect in elevation a meandering line descriptive of the river terrace form and to distinguish terrace levels. A line, or lines of retaining walls are to be visible to those experiencing the site and from the water. They are to be generally more clearly articulated within the lines of an extended street pattern. Retaining walls may diminish or breakdown away from the edges of these lines by a decrease in their height and the intensity of materials used.

Retaining walls should also be used to define public/private boundaries. Where the issue of public/ private separation is critical, and where the public pathway is close to private property, steep retaining walls (1:1 slope) should be used to define pathway edges and to direct users' view away from residences. Small seating spaces along pathways may be cut into retaining walls and should be located according to the existing pattern of streets.

Retaining walls are also to be used to mask dead space under bridges and to preserve existing stands of vegetation in close proximity to the river. Walls used for these purposes should be connected or linked to other retaining walls that define specific terrace levels. In all their uses, retaining walls are intended to form a system of walls that link elements along the river, mimic the natural terrace form and the meandering character of the river

Railings

The use of railings along steep edges addresses safety concerns but also ensures that terraces used as pathways or overlooks will be visible form the water. The use railings will provide a broken, curved line that also mimics the terrace form.

Paving

A single paving pattern should be chosen for each of the pathway levels to ensure that the lines formed by them will be readily apparent. Where private property prohibits public access from the street, and the issue of public/private land separation is raised by the proximity of residential dwellings to the river and limited space, the major pathway terrace level (747) is to be articulated by cutting into the existing bank. Building this pathway level out away from dwellings may be considered necessary to ensure maximum privacy for residents and a continuous pathway system. To facilitate privacy for adjacent residents, pathways may also be narrowed and sloped down below the 747 terrace level where private buildings are located on elevations closer to the public pathway level.

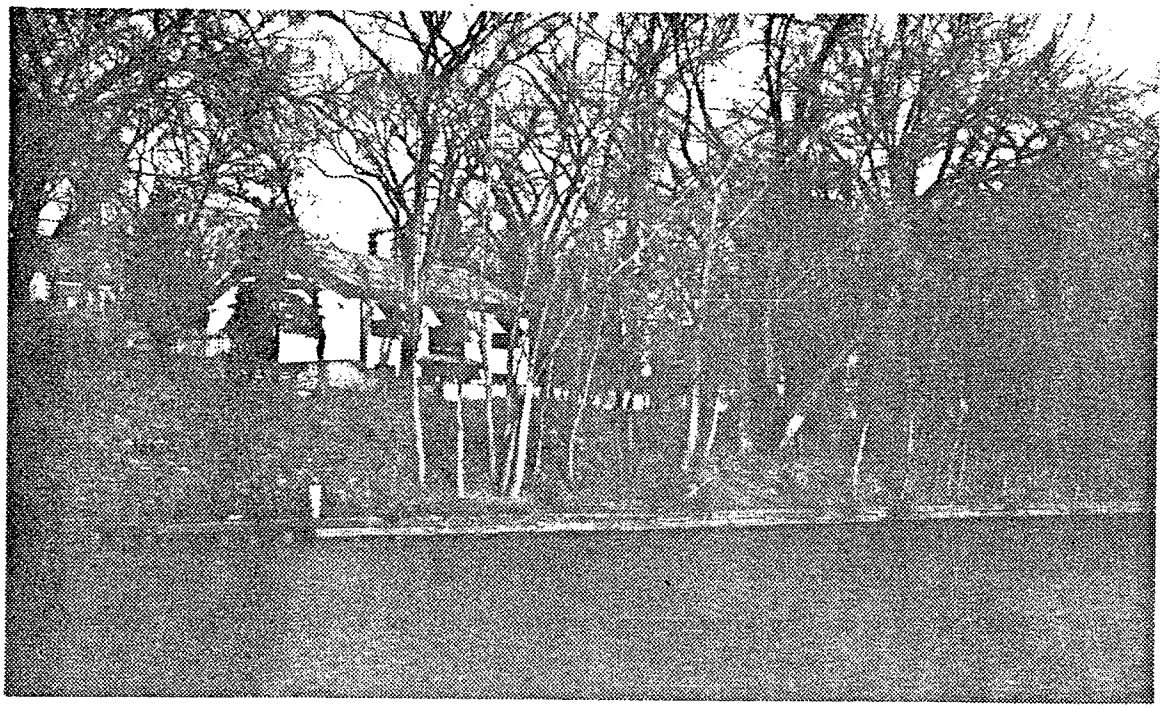
Where pathways are sloped to facilitate privacy, the result is a pathway subject to spring floods, impassable during part of that season. Therefore, this solution should only be used where considered absolutely necessary. This treatment of pathways is illustrated in Plate 13

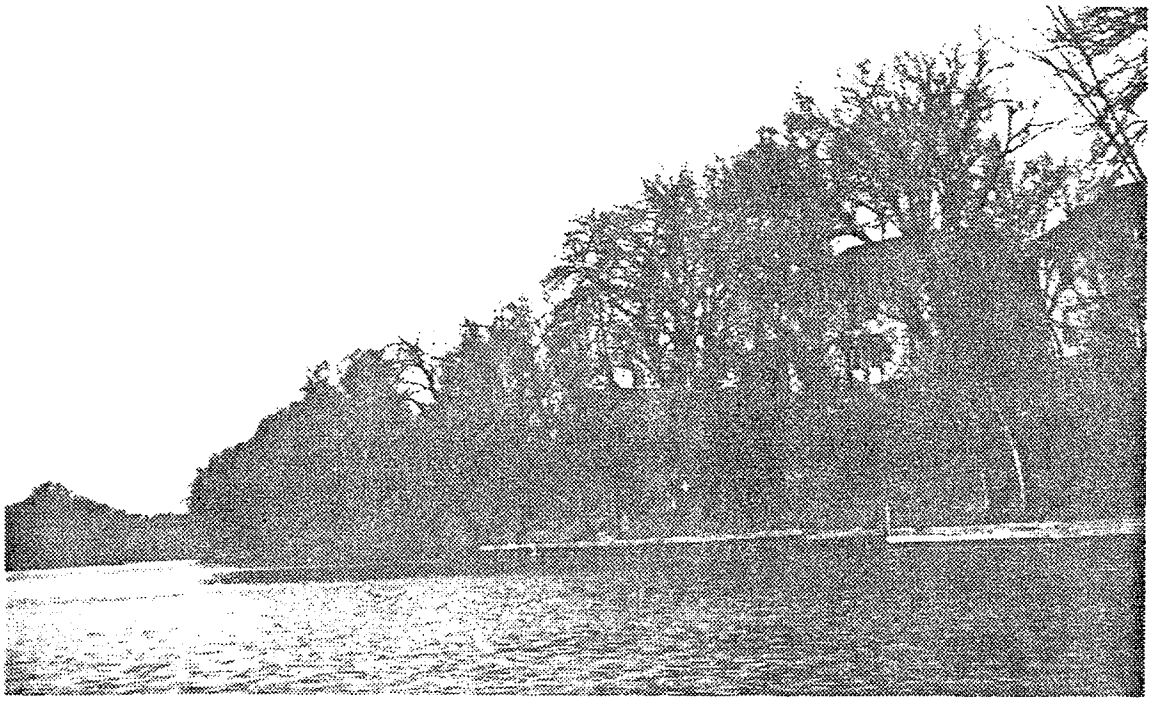
The use of different paving patterns and materials for spaces on each terrace level continued to the river's edge within the lines of streets will help to distinguish both the pattern of the city grid and river terrace form. The edges of street lines are to be used to define the extent of paving materials and surfaces or used as lines where paving materials begin to diminish. Where the pattern of an adjoining street is continued to the water through the use of paving materials, their intensity should also be lessened on each terrace level is reached. For more urban spaces, this may be achieved by using a smaller unit or more natural type of paving (eg. wood, rough stone) on lower terrace levels.

Pathway links, and the continuation of paving materials under bridges help to link the riverbank.

Lines of Trees

Lines of trees are to be used to carry the pattern of streets to the water's edge and for articulating the edge of terraces and spaces that reflect other, existing or historical patterns of streets and buildings.





This site's steep slope condition (1:1) requires that a pathway be cut into the riverbank. Retaining walls should be used to assist bank stability, protect vegetation, and public/ private seperation of property.

Figure 4 ***Chelsea Court Existing Site Conditions***

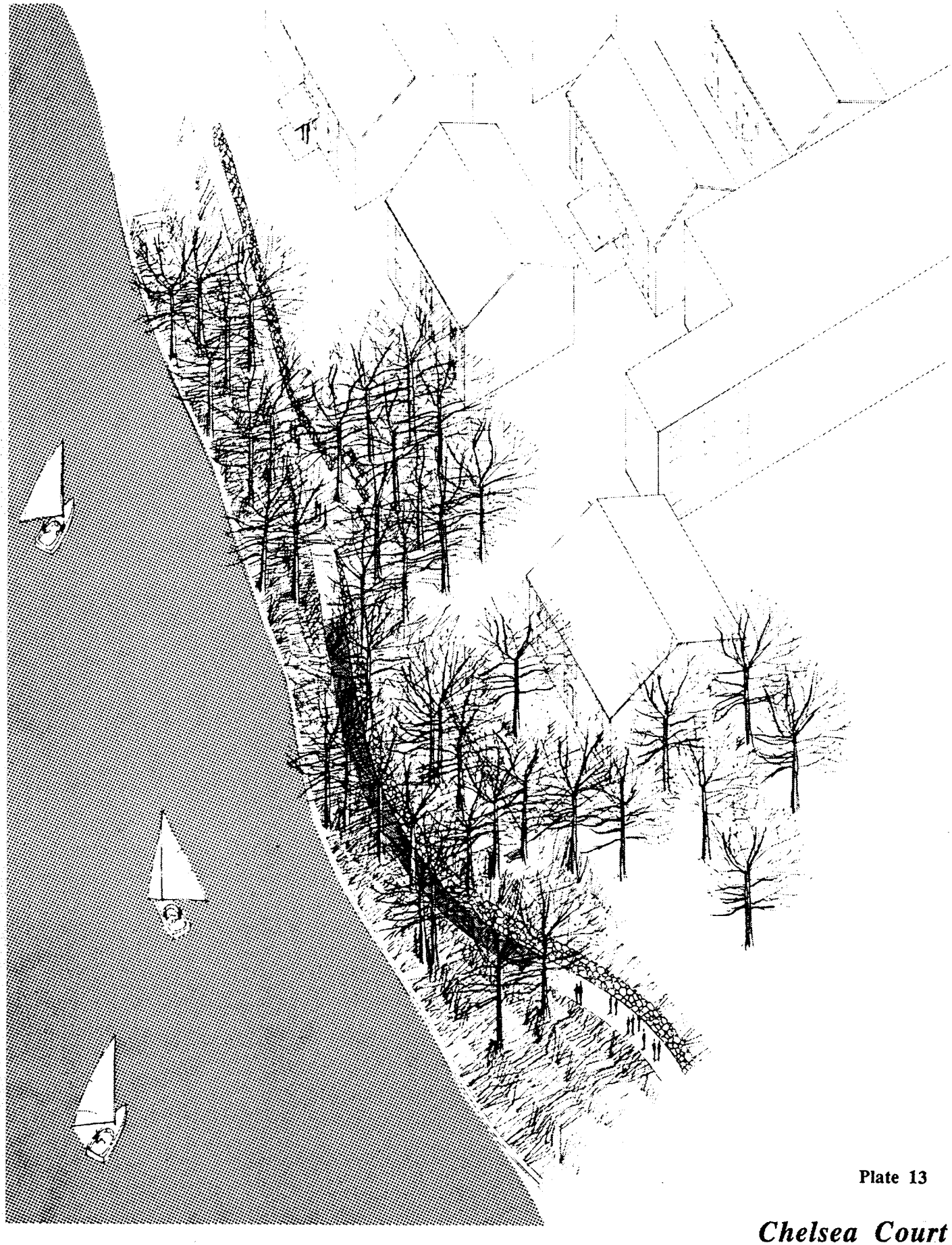


Plate 13

Chelsea Court

Design Strategy — *Axonometric*

Bosques of Trees

The design intent for the use of bosques of trees is that they be used to contrast with existing natural stands and to contribute to an overall forested river edge condition. Bosques of trees should reflect the grid patterns used, lines of streets, and former or existing patterns of buildings. It is intended that, in general, bosques become less dense away from the extended lines of streets towards the river's edge, depending on the design intent.

Nodal Development

The development of 'nodes' on the river, whether docks, boat bus stops or public plazas, are to be located according to the adjacent street pattern and the type of slope conditions present; areas where public access to the river is possible, suggest the best locations for development at the water's edge. Where a major public focal point is planned for a steep riverbank condition, it is likely that a major manipulation of terraces will be necessary to accommodate it. In this case, the terraces to be articulated should be one of, or a combination of those defined earlier in the text.

Vegetation

The design guidelines developed for vegetation are universally applicable to any set of site specific conditions. The overall concept with respect to vegetation is to retain and to enhance the integrity of a treed riverbank condition. This does not imply that the riverbank should be retained as a natural green belt, but that the quality of the treed character should be retained as one of the factors that comprises the unique quality of the riverfront.

Trees - Trees over 2" caliber (considered sufficiently mature to have significant root development which assists in riverbank stabilization) that are considered to be healthy specimens should be retained in all cases except where their retention is considered to have a significant detrimental impact on the design intent. Where trees have been cleared and/or where it is considered desirable to add trees, an adjacent grid pattern is to be reflected through the planting of urban bosques and lines of trees. The use of adjacent street patterns reflects them, contrasts newly planted stands of vegetation with existing ones, and serves to reestablish an overall treed riverfront

condition. The modulation and the grid orientation used for this purpose is left to the discretion of the designer.

Shrubs - Shrub species are considered an integral part of the vegetative cover and should also be retained wherever possible in concert with an overhead tree canopy or on their own. Decisions regarding these are also left to the designer's discretion, however, for each section of the river undertaken as a project, some integral stands of vegetation should be retained.

Other General Design Principles

The general policy of reducing loading on the toe of banks is adopted as a part of the overall strategy. This method is accepted as the most effective way of slowing down the erosion and sliding processes acting on the banks.

Where stands of naturally occurring vegetation are to be retained to the water's edge, stabilization techniques may involve removing excess soil under canopies. Where understory vegetation is poorly developed and/or where bank stability is a major concern, this vegetation may be removed.

Hard Water Edge Treatment

Consistent with the policy adopted by the City of Winnipeg to treat the riverfront in the downtown area as a particularly important one, and as a more urban environment in general, a hard retaining wall treatment for the water's edge is also adopted. This is considered an essential component of ensuring that the riverfront in this area is well protected form further, rapid sliding and erosion processes. The removal of some tree stands and specimens and the replanting of trees may be required to achieve this.

SITE SPECIFIC DESIGN

Navy Way Site Design (see Plates 14 and 15)

The specific program for this site and the forms used to create space are intended to relate the site to its context. The provision of a dock and a seating/teaching space are useable by both the Chippawans who occupy a nearby building and by the Fort Rouge Community Centre that occupies the building on site.

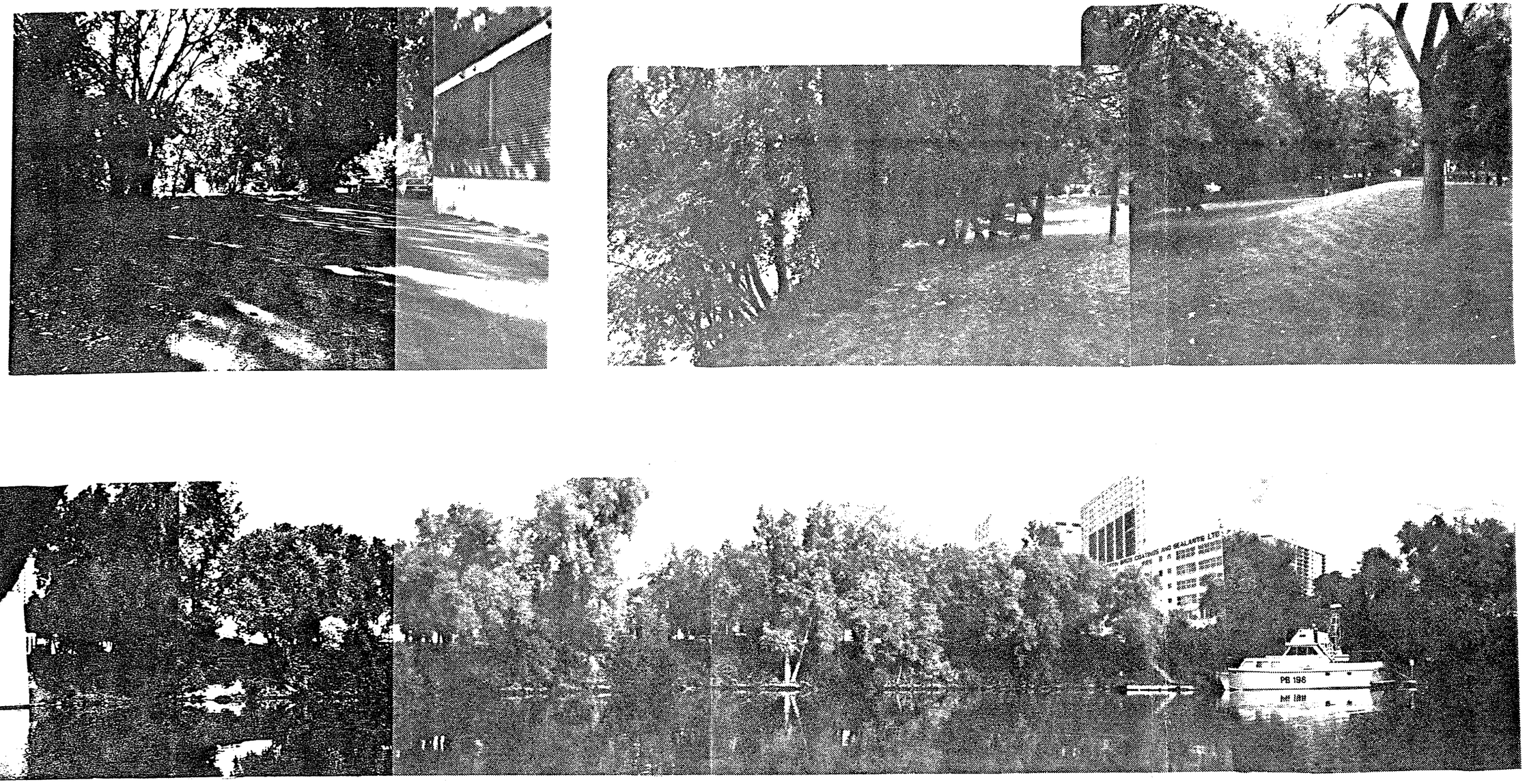
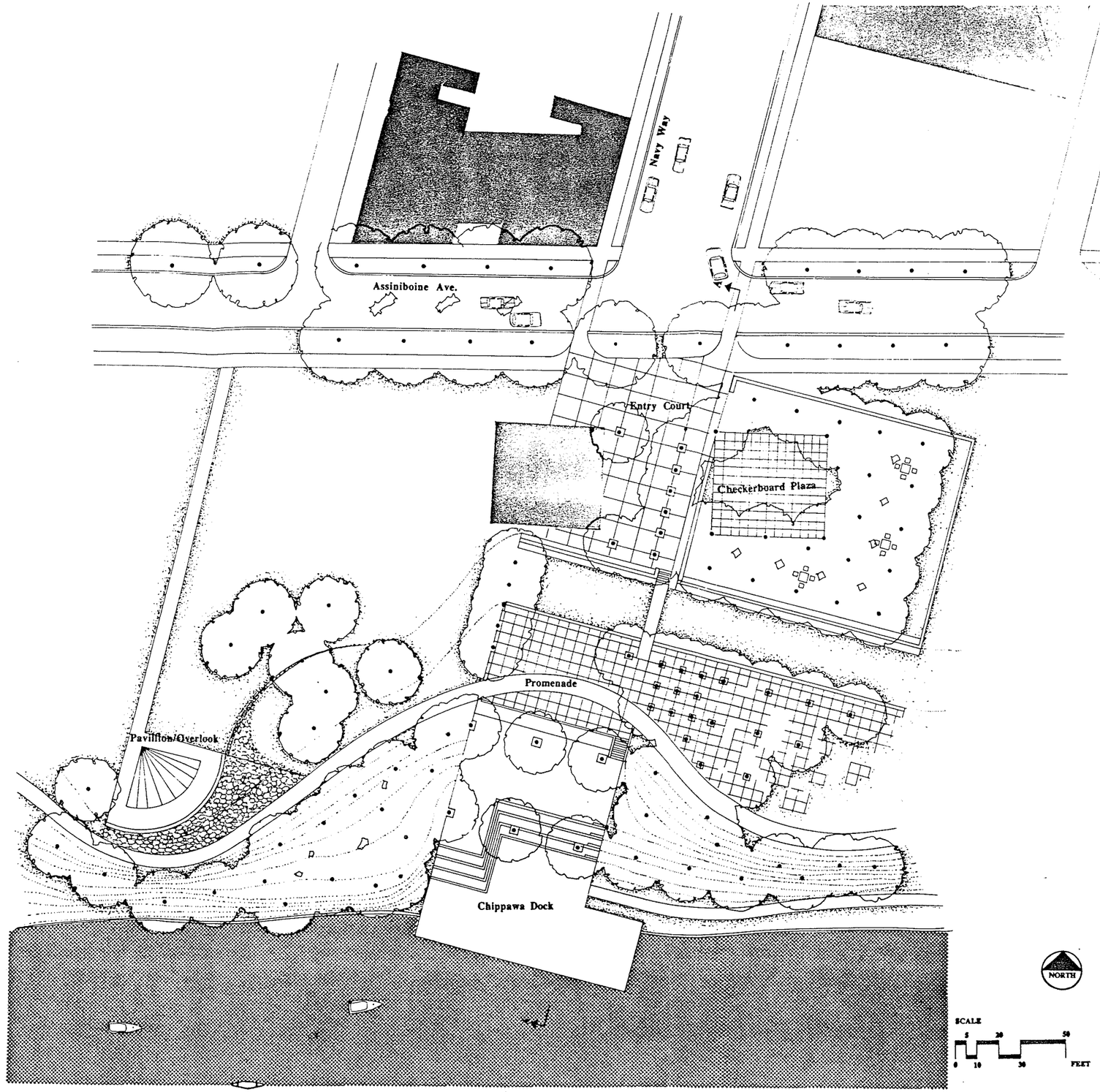


Figure 5 *Navy Way Existing Site Conditions*



Assiniboine Riverfront Design Strategy

Plate 14 *Navy Way* ***Plan***

Assiniboine Riverfront

Plate 15 *Navy Way* ***Axonometric***

This design illustrates the use of both grid orientations on the north side of the river. The river lot orientation is reflected by a plaza in the shape of the building on site. The footprint of the Chippawa building to the north of the site is reflected by a seating wall defining a seating and activity space.

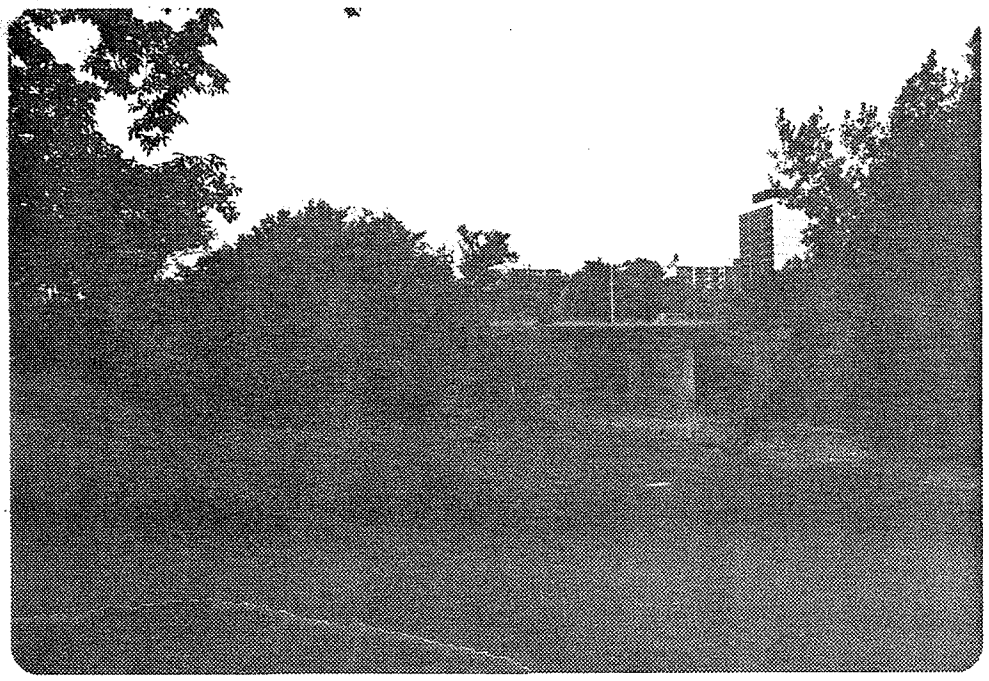
The continuation of the street pattern on this site forms a zone of paved terraces, overlooks, an entry court, seating spaces and walls and a dock. As the grid pattern approaches the water, it is interrupted by, and contrasted with existing stands of vegetation at the dock level. Steep retaining walls are used to reflect the original steeply sloped edge of the site and to define each terrace level. These walls diminish into the adjoining landscape, serving to link this area with its context.

Harkness Avenue Design(see Plates 16 and 17)

This site's character is residential, and hence semi-private. It presents a case in which the street line is broken by buildings along another perpendicular street. The lines of this street appear at the water in the form of a dock, seating and an overlook space. Public access to the dock level is gained by a ramped connection from the upper level pathway, intended to symbolize the realignment of the entry plaza and pathway to the street pattern. The existing character of the site as generally passive, is reflected in the scale of seating, the retention of a casual lawn and by the minimal use of retaining walls. A combination of tree bosques and retaining walls are used to separate public and private land, to define the edge of the street pattern, to screen the adjacent bridge, and to reflect the location of a former building.

Design Summary

Both design examples illustrate how the strategy may be applied to bring the city to the water, to entrench the pattern of the river and to give a consistent structure to a particular site program. In both examples, pathways form a smooth curved line extrapolated from the existing, natural terrace form. The use of retaining walls, railings, stairs and ramps ensure that the terrace levels are visible from the river. Terrace levels are also distinguished by varied paving materials and patterns, and their intensity.



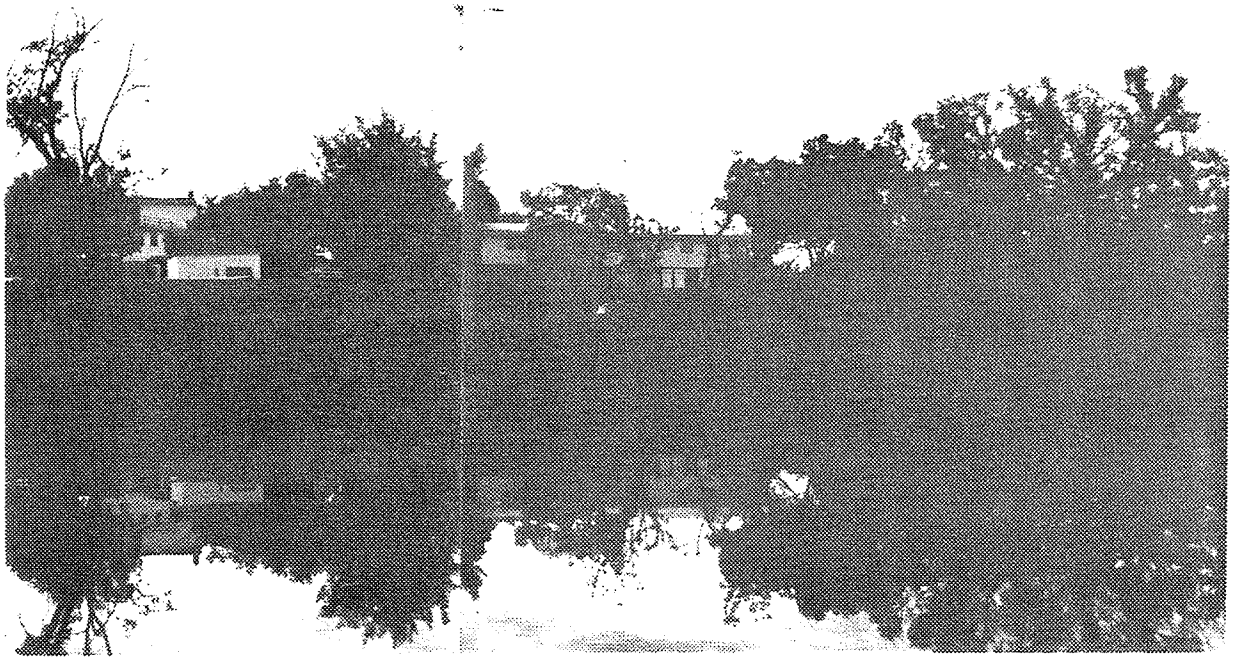
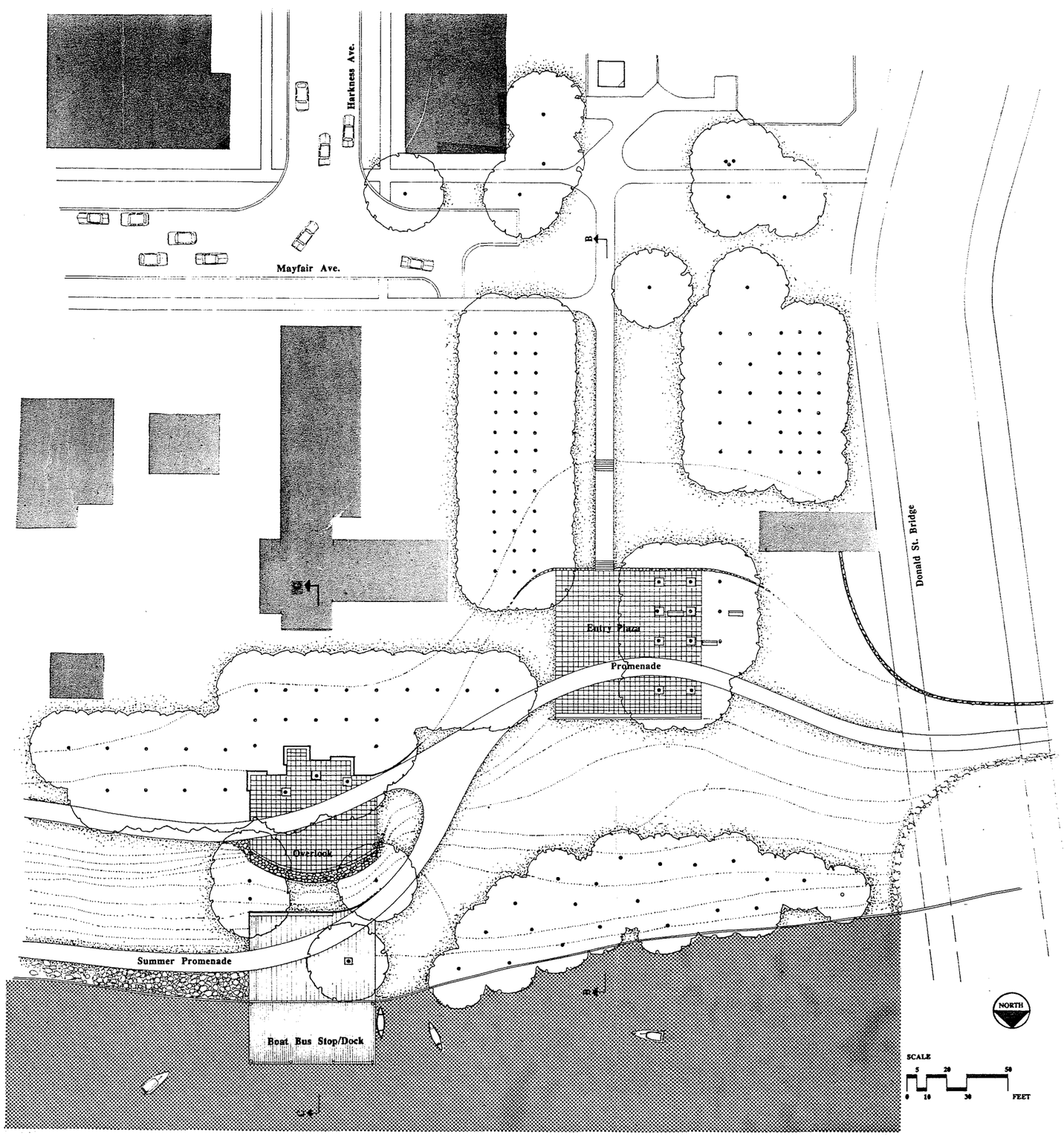
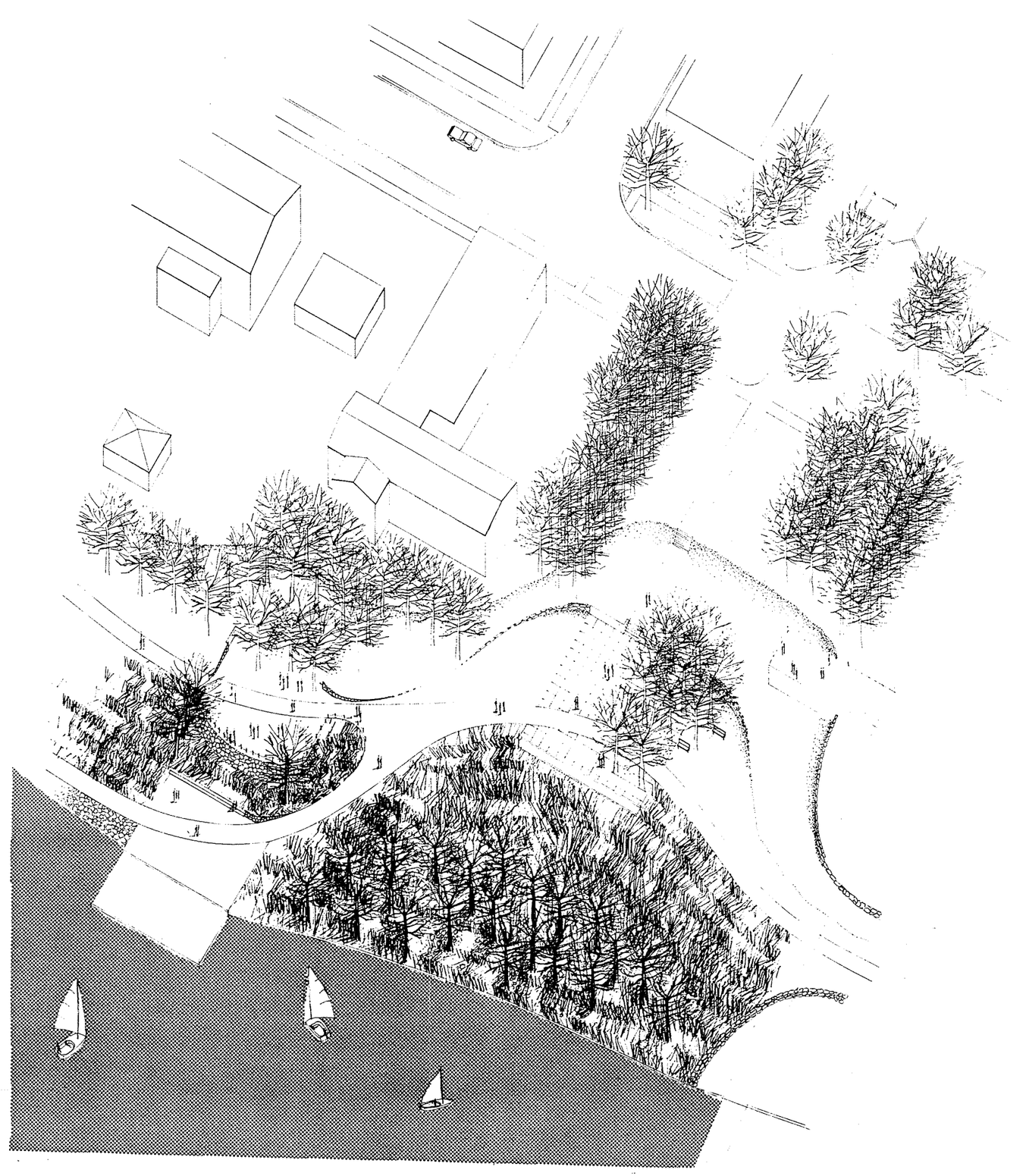


Figure 6 ***Harkness Ave. Existing Site Conditions***

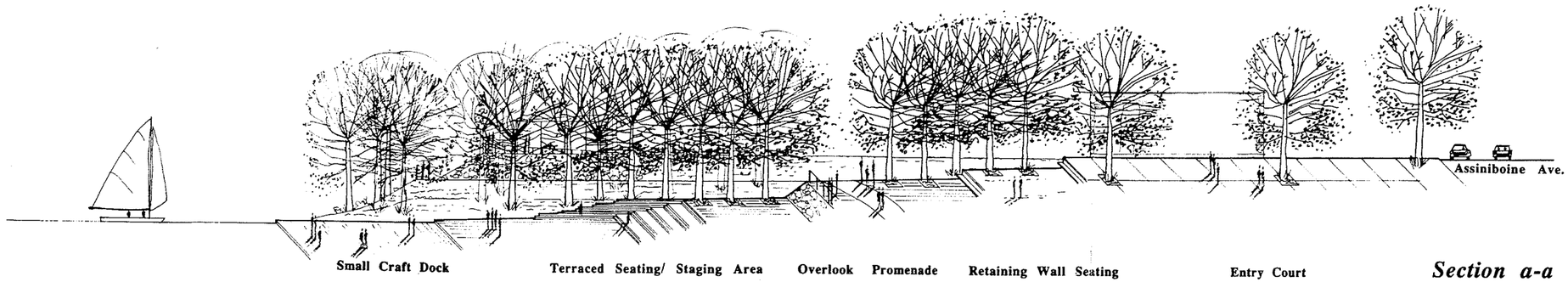


Assiniboine Riverfront Design Strategy **Plate 16** ***Harkness Ave.*** ***Plan***

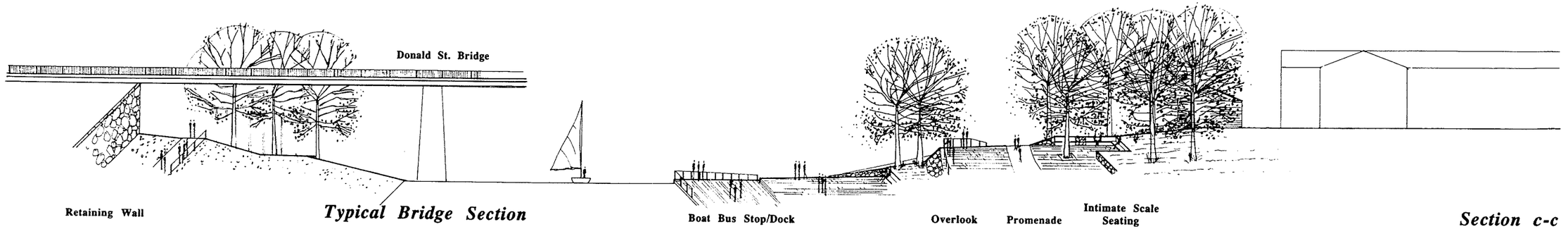


Assiniboine Riverfront

Plate 17 *Harkness Ave.* ***Axonometric***



Section a-a



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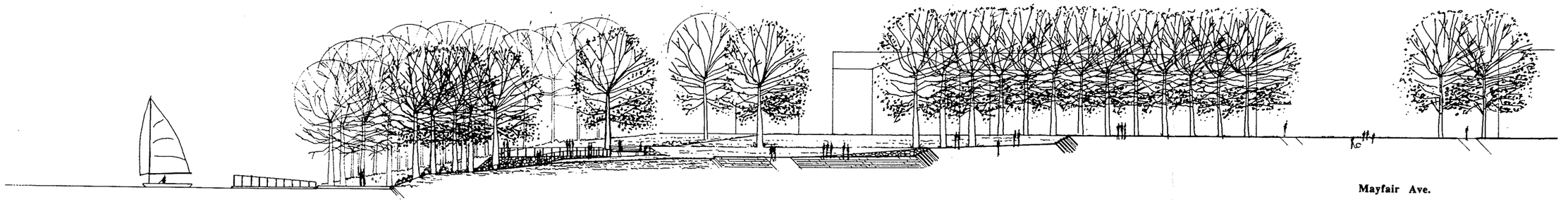

Section b-b

SCALE 5 20 50
0 10 30 FEET

Plate 18

Assiniboine Riverfront Design Strategy

Sections

Adjacent street patterns are continued to the water's edge through the use of trees and paving, and through the location of seating spaces, overlooks and elements at the water. The pattern of streets cuts through existing vegetation and contrasts with the natural river edge condition. The pattern of paving used end abruptly at the edge of extended streets or, as in the Navy Way example, a lane east of the street extended is used to define the limit of space.

Both design examples illustrate how the pattern of the city and the riverfront may be used, reflected and preserved in design to facilitate increased public use of the riverfront. The consistent use of these patterns, articulated through retaining walls, railings, paving and vegetation, will ensure a level of consistency and coherence in the development of the riverfront over the long term.

AREAS FOR FURTHER EXPLORATION

Safety

Issues relating to safety have not be dealt with in this study, except that implicit in the strategy is the use of pedestrian scale lighting along pathways and public focal points, and on the underside of bridges. A strategy for ensuring that pedestrians feel safe when using a site that is open to the public 24 hours a day is a necessary additional layer to this design strategy. It may require, especially at night, policing areas without heavy pedestrian traffic. The concern for safety seems especially important in more remote parts of the site, including the underside of bridges. It is the opinion of the author that designs that bring a high level of pedestrian traffic will, to some extent, make the issue of safety less a concern.

Bridges/ Vegetation

This strategy does not explore the full potential for some features of the riverfront including vegetation and bridges. For example, the use of vegetation as a feature on its own, through the establishment of a historic area reflecting the original settlement vegetation of a part of the site is considered an interesting idea worthy of further exploration. The potential of

bridges for development that contributes dynamism and excitement to the city is great and an area that is beginning to be explored and offers the potential for entirely unique treatments.

CONCLUSIONS

In recent years the desire and recognized need for well designed and sensitive proposals for riverfront development has been made clear. Trends indicate that this need and desire are on the increase. Within the downtown area of the city, a special and unique place, trends are moving towards a more urban, dynamic development for riverfront property.

Many factors influence the specific shape and type of development and many compromise must be made at all levels to juggle the demands and interests of all players. What emerges is that it is of overriding importance that what does occur is consistent, and in the long term, each piece of the puzzle fits within an overall structure that is logical and coherent.

The design strategy developed through this study illustrates an approach by which development of the riverfront in downtown Winnipeg can be consistent and coherent in the long term and descriptive of the city it serves. This strategy is based on a logical analysis of existing conditions and a definition of patterns that are descriptive of the riverfront and its urban context.

It is intended as a starting point for a more urban treatment of the riverfront. As development begins to occur, and the public begins to use this resource, more specific design goals and objectives are sure to be brought to light. Programs may them be enriched and over time, as the values, goals and patterns of society changes other variations of the existing patterns may evolve. The patterns dealt with in this study are those that have and will continue to endure and reflect the passage of time.

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APPENDIX 1
Survey of Area Residents

ASSINIBOINE RIVER DEVELOPMENT SURVEY

Hello! My name is Lori Young and I am a graduate student in the Deparment of Landscape Architecture at the University of Manitoba. As the first part of a design project for the **Assiniboine riverfront in downtown Winnipeg,** I am undertaking a telephone survey to find out what Winnipegers would like to see happen on the riverfront and how they feel about its development. Would you be willing to answer a few questions about the Assiniboine riverfront?

This survey is intended as method of allowing **your feelings and ideas about the development of this riverfront property** to be considered in the design. The survey results will be compiled and used to help decide **what should happen on the riverfront** and what the priorities of Winnipegers are for the development of this property. Your responses are among many and will be kept confidential.

The particular area I am concerned with is the stretch of the Assiniboine river from the Osborne Street bridge to Main Street, along Assiniboine and River avenues. Are you familiar with that area?

ASSINIBOINE RIVERFRONT DEVELOPMENT SURVEY

I would like to begin by asking some questions about where you live and work.

1. How long have you lived in the River-Osborne/downtown neighborhood?
   _____ years

2. How many blocks from the Assiniboine riverfront(Osborne-Main) ?
   _____ blocks

3. Can you comfortably walk to this riverfront?
   a). yes
   b). no

4. Do you work in downtown Winnipeg?
   a). yes
   b). no

5. If yes, how many blocks is your place of work from this section of the Assiniboine river?
   _____ blocks

6. How often do you go downtown?
   _____

7. ISSUES OF THE RIVERFRONT

I would like to ask you some questions about how accessible you think the section of the **Assiniboine riverfront from Osborne-Main** is. Please indicate if you agree or disagree with the following questions.

	AGREE			DISAGREE	DON'T KNOW
	1	2	3	4	5
Is there enough public access to the Assiniboine riverfront?					
Should development of this riverfront occur?					

Should more of the following kinds of access be provided?

foot (walking)
bicycle
car
bus
motorboat
canoe
other_____

8. Do you have any other ideas about how the Assiniboine river in downtown Winnipeg could be made more accessible to the public?_____
_____

9. ISSUES OF RIVERFRONT DEVELOPMENT

I will now read a list of issues related to the river. How important is it that each of the following issues be dealt with in a develoment plan for the **Assiniboine riverfront in downtown Winnipeg(Osborne-Main)?**

	important			not important	d. know
PHYSICAL	1	2	3	4	5
Steps to prevent erosion					
The muddiness of the water					
Preventing littering of the riverbanks					
More public ownership of riverfront property					
Industrial pollution					
Pollution from sewage					
SOCIAL					
Vagrancy on the riverfront					
Crime on the riverfront					
Vandalism					

10. Do you currently use the section of the riverfront from Osborne-Main St.?

How often do you use it?_____

Would you like to use it?_____

How do you use this space?_____

How would you like to be able to use it?_____

11. Would you use activity areas on this section of the riverfront more often:

	yes	no
If there were more variety in the kinds of spaces		
If there were more of them		
If it was more accessible to the public		

12. I will now read a list of types of activities that could be included in a development plan for the Assiniboine riverfront in downtown Winnipeg (Osborne-Main). Please indicate if you think they should be included or don't know.

	1 yes, definately	2	3 maybe	4	5 no	don't know
docking facilities for motor boats						
docks for canoes						
boat rentals						
swimming facilities						
skating areas						
bicycle/walking paths						
food related						
retail shops						
large gathering spaces						
active sport spaces (eg. playing fields)						
parking						
lookouts						
fountains						
park space						
other_____						

13. Do you think the riverfront in downtown Winnipeg should be developed for:

a). year round activities
b). mostly for summer use
c). mostly for winter use

14. Do you feel that the emphasis of development on the Assiniboine riverfront in downtown Winnipeg should be:

Hard edge development eg. docks
shops, asphalt paths

Soft edge development eg. bark
chip paths, park

A combination of both these types

15. GENERAL ATTITUDE ABOUT RIVERFRONT DEVELOPMENT

The following statements deal with general feelings and attitudes towards the development of the riverfront. Please indicate if you agree or disagree with the folowing statements.

	AGREE	DISAGREE	DON'T KNOW
A development plan for the Assiniboine riverfront in downtown Winnipeg would improve its use			
It would have a positive economic impact on the downtown economy			

The last set of questions deal with general demographic information and is intended to help find out if different people have different needs and perceptions regarding the Assiniboine.

16. Are you
    a). single
    b). married
    c). divorced
    d). widowed
    e). seperated
    f). other_____

17. Are you
    a). male
    b). female

18. In what year were you born? 19___

19. This household's annual income is
    a). under $10,000
    b). 10-30,000
    c). 31-50,000
    d). 51-80,000
    e). over $80,000

20. Do you
    a). own
    b). rent
    your home

21. How many adults normally live here?_____

22. How many children normally live here?_____

I appreciate your help and time in completing this survey. If you should have any questions about the survey, please fell free to call me, Lori Young, at

APPENDIX 2
Monthly and Mean Water Levels

RED RIVER AT JAMES AVENUE PUMPING STATION - STATION NO. 05OJO15

MONTHLY AND ANNUAL MEAN WATER LEVELS IN METRES FOR THE PERIOD OF RECORD

AR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
71	---	---	---	225.012	223.822	223.726	223.681	223.657	223.661	223.732	222.878	222.526	---	1971
72	---	---	223.067	225.865	224.548	223.802	223.688	223.688	223.727	223.823	221.861	---	---	1972
73	221.850	221.888	222.746	222.218	223.582	223.664	223.684	223.681	223.734	223.710	222.130	222.139	222.936	1973
74	222.110	222.086	222.040	224.400	227.023	225.192	223.722	223.693	223.680	223.733	222.183	221.880	223.495	1974
75	222.088	---	---	223.536	226.013	224.230	226.031	223.813	223.707	223.700	222.440	222.327	---	1975
76	222.377	222.289	222.269	225.654	224.381	223.857	223.706	223.682	223.695	223.703	221.632	221.423	223.223	1976
77	221.586	221.529	221.347	222.065	223.642	223.670	223.706	223.678	223.736	223.644	221.804	221.927	222.703	1977
78	221.840	221.984	221.820	226.055	224.446	223.678	223.746	223.696	223.737	223.643	221.602	221.610	223.178	1978
79	221.654	221.732	221.679	223.998	227.121	224.525	223.843	223.707	223.678	223.562	221.876	221.695	223.283	1979
80	222.037	222.041	221.981	223.907	223.893	223.711	223.682	223.717	223.713	223.608	221.622	221.441	222.833	1980
81	221.524	221.484	221.806	221.815	223.513	223.677	223.684	223.678	223.732	223.628	221.856	221.683	222.707	1981
82	221.838	221.848	221.814	225.315	224.021	223.721	223.705	223.693	223.704	223.634	222.165	222.226	223.145	1982
83	222.073	222.053	223.747	226.183	223.734	223.745	223.724	223.723	223.712	223.609	222.004	222.015	223.283	1983
84	222.077	221.842	222.124	224.682	223.652	224.240	223.668	223.663	223.700	223.584	221.907	221.959	223.100	1984
85	221.883	221.886	223.060	224.073	223.955	223.759	223.751	223.789	223.699	223.586	222.272	222.353	223.196	1985
AN	221.945	221.906	222.285	224.259	224.483	223.946	223.869	223.711	223.706	223.654	222.026	221.958	223.098	MEAN

WATER LEVELS REFERRED TO GEODETIC SURVEY OF CANADA DATUM

LOCATION - LAT 49 53 45 N DRAINAGE AREA, 287 000 km²
LONG 97 07 50 W REGULATED

add 0.7 to get elevation

RED RIVER AT JAMES AVENUE PUMPING STATION - STATION NO. 05OJO15

ANNUAL EXTREMES OF WATER LEVELS IN METRES FOR THE PERIOD OF RECORD

AR	MAXIMUM INSTANTANEOUS WATER LEVEL	MAXIMUM DAILY WATER LEVEL	MINIMUM DAILY WATER LEVEL	YEAR
71	226.936 AT 1720 CST ON APR 12	226.838 ON APR 12	---	1971
72	226.872 AT 2147 CST ON APR 18	226.811 ON APR 18	221.431 ON NOV 22	1972
73	225.384 AT 1313 CST ON MAR 28	225.305 ON MAR 28	221.657 ON MAR 8	1973
74	227.722 AT 0757 CST ON MAY 21 *	227.612 ON MAY 21 *	221.698 ON NOV 23	1974
75	226.683 AT 0056 CST ON MAY 20	226.588 ON MAY 20	221.827 ON MAR 21	1975
76	226.689 AT 1123 CST ON APR 9	226.576 ON APR 9	221.257 ON NOV 17	1976
77	224.037 AT 2116 CST ON JUL 13	223.900 ON JUL 14	221.227 ON MAR 17	1977
78	227.375 AT 0538 CST ON APR 15	227.046 ON APR 15	221.035A ON NOV 21 *	1978
79	227.606 AT 1322 CST ON MAY 9	227.599 ON MAY 9	221.553 ON NOV 13	1979
80	225.663 AT 0429 CST ON APR 13	225.619 ON APR 13	221.260 ON NOV 27	1980
81	223.984 AT 0821 CST ON MAY 30	223.890 ON MAY 30	221.341 ON FEB 25	1981
82	226.736 AT 1044 CST ON APR 18	226.667 ON APR 18	221.553 ON MAR 23	1982
83	227.138 AT 1657 CST ON APR 7	226.890 ON APR 10	221.520 ON NOV 28	1983
84	226.104 AT 1824 CST ON APR 7	226.018 ON APR 8	221.745 ON NOV 25	1984
85	226.201 AT 1849 CST ON MAR 28	226.190 ON MAR 28	221.764 ON MAR 15	1985

metres above sea level

WATER LEVELS REFERRED TO GEODETIC SURVEY OF CANADA DATUM

A - MANUAL GAUGE
(SEE REFERENCE INDEX)

* - EXTREME RECORDED FOR THE PERIOD OF RECORD

RED RIVER AT SELKIRK - STATION NO. 05OJOO5

MONTHLY AND ANNUAL MEAN WATER LEVELS IN METRES FOR THE PERIOD OF RECORD

AR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
50	---	---	---	---	---	---	---	---	---	---	---	---	---	1950
57	---	---	---	---	---	---	218.204	218.060	217.863	217.770	---	---	---	1957
58	---	---	---	---	217.553	217.526	217.512	---	---	217.053	---	---	---	1958
59	---	---	217.213	217.978	217.562	217.782	217.835	217.807	217.766	217.819	---	---	---	1959
60	---	---	---	---	218.104	217.954	217.906	217.781	217.544	217.421	---	---	---	1960
61	---	---	---	217.572	217.491	217.485	217.416	217.280	217.162	217.034	216.878	---	---	1961
62	---	---	---	217.933	217.705	218.328	218.063	217.832	217.765	217.804	217.558	---	---	1962
63	---	---	217.374	217.835	217.523	---	217.515	217.694	217.464	217.246	217.088	---	---	1963
64	---	---	---	---	217.496	217.784	217.540	217.558	217.543	217.397	---	---	---	1964
65	---	---	---	---	---	---	---	---	---	---	---	---	---	1965
68	---	---	---	---	---	---	---	---	---	---	---	---	---	1968
AN	---	---	217.294	217.830	217.633	217.810	217.774	217.716	217.601	217.443	217.208	---	---	MEAN

WATER LEVELS REFERRED TO GEODETIC SURVEY OF CANADA DATUM

LOCATION - LAT 50 08 30 N
LONG 96 52 05 W REGULATED

max 446.7 — min 727.3

RED WOOD BRIDGE

RED RIVER AT WINNIPEG - STATION NO. 05DJ001

ANNUAL EXTREMES OF WATER LEVELS IN METRES FOR THE PERIOD OF RECORD

YEAR	MAXIMUM INSTANTANEOUS WATER LEVEL	MAXIMUM DAILY WATER LEVEL	MINIMUM DAILY WATER LEVEL	YEAR
1912	---	---	---	1912
1914	---	---	---	1914
1915	---	224.592 ON JUL 10	221.361 ON NOV 8	1915
1916	---	228.951 ON APR 22	221.605 ON FEB 3	1916
1917	---	226.065 ON APR 14	---	1917
1918	---	223.799 ON MAY 31	220.834 ON JAN 2	1918
1920	---	226.788 ON APR 18	---	1920
1921	---	225.628 ON APR 15	---	1921
1922	---	225.625 ON MAY 20	---	1922
1923	---	227.500 ON APR 28	221.280 ON NOV 24	1923
1924	---	224.592 ON APR 29	221.260 ON NOV 21	1924
1925	---	226.244 ON APR 2	221.395 ON JAN 3	1925
1926	---	223.943 ON APR 27	221.516 ON NOV 15	1926
1927	---	226.957 ON MAY 16	221.523 ON JAN 3	1927
1929	---	225 418 ON APR 2	221.120 ON NOV 26	1929
1930	---	225.814 ON APR 11	220.937 ON NOV 18	1930
1931	---	224.717 ON APR 8	220.901 ON NOV 19	1931
1932	---	225.936 ON APR 15	221.004 ON NOV 18	1932
1933	---	225.967 ON APR 10	220.883 ON NOV 15	1933
1934	---	223.757 ON APR 14	220.770 ON NOV 24 *	1934
1935	---	223.909 ON JUL 7	220.892 ON JAN 1	1935
1936	---	225.890 ON APR 22	220.861 ON NOV 11	1936
1937	---	223.787 ON MAY 6	220.892 ON NOV 21	1937
1938	---	223.678 ON MAY 16	220.953 ON JAN 2	1938
1939	---	223.757 ON OCT 4	221.135 ON DEC 29	1939
1940	---	223.985 ON APR 22	220.922 ON NOV 10	1940
1941	---	226.226 ON APR 15	221.166 ON JAN 1	1941
1942	---	226.515 ON APR 15	221.379 ON JAN 22	1942
1943	---	226.256 ON APR 14	221.331 ON NOV 12	1943
1944	---	224.519 ON SEP 7	221.443 ON JAN 14	1944
1945	---	227.039 ON MAR 31	221.486 ON DEC 3	1945
1946	---	225.927 ON MAR 31	221.498 ON NOV 16	1946
1947	---	225.805 ON MAY 2	221.532 ON NOV 16	1947
1948	---	228.234 ON APR 30	221.068 ON NOV 14	1948
1949	---	226.701 ON APR 18	221.331 ON JAN 9	1949
1950	---	230.325 ON MAY 19 *	221.611 ON JAN 7	1950
1951	---	225.884 ON APR 21	221.547 ON NOV 10	1951
1952	---	225.512 ON APR 17	221.068 ON NOV 26	1952
1953	---	224.132 ON JUN 29	221.285 ON JAN 2	1953
1954	---	224.171 ON JUL 15	221.559 ON DEC 3	1954
1955	---	226.847 ON APR 12	221.544 ON NOV 21	1955
1956	---	227.875 ON APR 27	221.376 ON APR 9	1956
1957	---	224.427 ON MAY 1	221.550 ON JAN 5	1957
1958	---	223.927 ON MAY 13	221.123 ON NOV 17	1958
1959	---	225.762E ON APR 12	221.212 ON JAN 1	1959
1960	---	227.862 ON APR 18	221.105 ON NOV 15	1960
1961	---	223.796 ON OCT 20	221.004 ON NOV 20	1961
1962	---	227.314 ON APR 24	220.816 ON MAR 22	1962
1963	---	224.698 ON APR 11	---	1963
1964	---	225.217 ON APR 20	---	1964
1965	---	227.637 ON APR 19	221.602 ON APR 6	1965
1966	---	229.133 ON APR 14	221.574 ON NOV 14	1966
1967	---	227.393 ON APR 25	221.138 ON NOV 24	1967
1968	---	224.226 ON AUG 26	221.382 ON JAN 2	1968
1969	---	226.972 ON APR 30	221.751 ON DEC 4	1969
1970	---	227.030 ON APR 24	221.501 ON NOV 26	1970
1971	---	226.436 ON APR 12	221.830 ON MAR 23	1971
1974	---	227.204 ON MAY 21	---	1974
1975	---	226.198 ON MAY 20	---	1975
1976	---	226.220 ON APR 4	---	1976

WATER LEVELS REFERRED TO GEODETIC SURVEY OF CANADA DATUM

E - ESTIMATED * - EXTREME RECORDED FOR THE PERIOD OF RECORD

RED RIVER BELOW FLOODWAY CONTROL STRUCTURE - STATION NO. 05OC020

MONTHLY AND ANNUAL MEAN WATER LEVELS IN METRES FOR THE PERIOD OF RECORD

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	YEAR
1970	---	---	---	---	227.746	---	---	---	---	---	---	---	---	1970
1971	---	---	---	---	---	---	---	---	---	---	---	---	---	1971
1972	---	---	---	227.830	---	---	223.738	223.750	223.732	223.763	---	---	---	1972
1974	---	---	---	---	228.443	---	---	---	---	---	---	---	---	1974
1975	---	---	---	---	227.327	224.771	227.618	---	---	---	---	---	---	1975
1976	---	---	---	---	---	---	---	---	---	---	---	---	---	1976
1979	---	---	---	---	228.836	---	---	---	---	---	---	---	---	1979
1982	---	---	---	227.030	224.914	224.095	---	---	---	---	---	---	---	1982
1983	---	---	---	226.528	224.116	224.145	---	---	---	---	---	---	---	1983
1984	---	---	---	226.282	224.016	225.193	---	---	---	---	---	---	---	1984
1985	---	---	---	224.871	224.871	224.450	224.400	---	---	---	---	---	---	1985
MEAN	---	---	---	226.508	226.259	224.531	225.251	223.750	223.732	223.763	---	---	---	MEAN

WATER LEVELS REFERRED TO GEODETIC SURVEY OF CANADA DATUM (LOCAL 1929 ADJ.)

LOCATION - LAT 49 45 20 N
LONG 97 08 10 W REGULATED SINCE 1969

REMARKS - THIS GAUGING STATION IS GENERALLY ACTIVATED WHEN THE RED RIVER FLOODWAY IS OPERATING

APPENDIX 3
Water Quality Report

Date sampled:May 13/86

THE CITY OF WINNIPEG
WATERWORKS, WASTE AND DISPOSAL DEPARTMENT
LABORATORY SERVICES DIVISION

RIVER ANALYSIS REPORT

Location:		RED RIVER						Assiniboine River			RED RIVER proposed interim objectives
		Floodway Control	Fort Garry Bridge	Norwood Bridge	Redwood Bridge	North Perimeter Bridge	Lockport Bridge	Headingly	West Perimeter Bridge	Main Street Bridge	
parameter	unit										
TEMPERATURE	C.	14.0	14.0	13.0	13.0	13.0	13.0	14.0	15.0	13.0	
DISSOLVED OXYGEN	mg/l	8.3	8.3	8.4	8.5	8.5	8.6	8.6	8.4	8.6	
	% SATURATION	81	81	80	81	81	82	84	84	82	47
pH	units	7.8	7.9	7.8	7.8	7.8	7.9	7.9	7.6	7.7	6.0-9.0
TOTAL SOLIDS	mg/l	572	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			566	578	654	xxxxxxxxxxxxxx	700	1500
SUSPENDED SOLIDS	mg/l	136	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			114	122	200	xxxxxxxxxxxxxx	274	
TURBIDITY	n.t.u.	75	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx			62	65	115	xxxxxxxxxxxxxx	160	25
TOTAL ORG. CARBON	mg/l	26	18	20	25	20	19	26	18	16	
TOTAL COLIFORM	MF/100 ml	40	800	300	200	2300	6800	250	400	350	1000-MED.
		40	900	300	300	2800	5900	250	400	310	
FECAL COLIFORM	MF/100 ml	20	300	90	100	600	1300	120	100	120	400-MED.
		30	100	80	120	1900	1300	70	140	110	
TOTAL PHOSPHORUS	mg/l P	0.35	0.35	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		0.30	0.30	0.45	xxxxxxxxxxxxxx	0.5	
TOTAL KJELDAHL N	mg/l N	2.5	2.0	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		3.0	2.5	2.5	xxxxxxxxxxxxxx	2.5	
AMMONIA N	mg/l N	<0.20	<0.20	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		0.30	0.20	<0.20	xxxxxxxxxxxxxx	0.30	
un-ionized AMMONIA N (calc.)	mg/l N	<0.003	<0.004	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		0.004	0.004	<0.004	xxxxxxxxxxxxxx	0.003	0.0165
NITRATE NITRITE N	mg/l N	0.40	0.40	xxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		0.44	0.44	0.36	xxxxxxxxxxxxxx	0.4	30

COMMENTS:Weather - Sunny, high temp. 18 C.

Technician:T.Poniatowski

Approved for distribution:

CC: W.J.BORLASE
D.BROWN(Environmental Management Div.-Prov.of Man.)
Mayor-TOWN OF SELKIRK
M.DIDYK(R.M.of WEST ST.PAUL)