

**Thunderbird Boathouse: A Community Development
Fraser River- Middle Arm, City Centre Richmond**

By

Brian I. Beresford

B. Sc. (Psych.) University of Victoria

A thesis submitted in partial fulfillment of the requirements of
the degree of

Master of Landscape Architecture

In

The Faculty of Graduate Studies

Department of Landscape Architecture

University of British Columbia

We accept this thesis as conforming to the required standard

The University of British Columbia

April 2004

© Beresford, Brian I., 2004

Library Authorization

In presenting this thesis in partial fulfillment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the head of my department or by his or her representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Brian Beresford

Name of Author (please print)

23/April/2004

Date (dd/mm/yyyy)

Title of Thesis: Thunderbird Boathouse: A
Community Development - Fraser River-
middle Arm, City Centre Richmond

Degree: MLA - master Landscape Arch. Year: 2004

Department of Landscape Architecture

The University of British Columbia

Vancouver, BC Canada

Abstract

As the City of Richmond grows and continues its transition into a progressively urban landscape, many development opportunities will arrive providing exciting and challenging design interventions, both large and small. Nowhere will this be more apparent than within the City Centre district where the existing strip-mall and industrial land-use will gradually change into higher-density residential and commercial/ retail land-use. This transition will become all the more apparent in the advent of the proposed introduction of the Rapid Transit Line running down the unofficial Main Street in No. 3 Road. Considering the potential redevelopment of this region, the adjacent riverfront will become an important public-space in which the identity and the character of the area may be fostered.

The intention of this thesis is to provide a full-scale examination of the potential of the riverfront redevelopment within this region. Further, this thesis focuses on the development and implementation of the currently proposed Thunderbird Boathouse along the shores of the existing dyke/ riverfront edge and its role and place within a larger riverfront redevelopment design. This facility will provide a central hub within the existing and future riverfront environment, establishing an *axis mundi* from which the community can identify and orientate themselves around.

In order to understand and develop a comprehensive design proposal for the Thunderbird Boathouse and adjacent riverfront, this thesis first examines redevelopment options for the City Centre district and then applies this analysis into the creation of a new City Centre riverfront environment. Within this context the design, layout, and implementation of the Thunderbird Boathouse is explored, focusing on connecting this facility within its existing and future landscape.

Table of Contents

Abstract.....	ii
Table of Contents.....	iii
List of Figures.....	vi
Acknowledgements.....	viii
Chapter One: Overview and Summary.....	1
1.1 Introduction.....	1
1.2 Statement of Intent.....	2
1.3 Thesis Goal.....	3
1.4 Theoretical/ Policy Basis.....	3
1.5 Methodology.....	4
Chapter Two: Theoretical Orientation and Policy.....	6
2.1 Community Development.....	6
2.2 Riverfront Vision.....	8
2.3 Riverfront Development.....	9
2.4 Existing Policy.....	10
2.4.1 <i>Community Development</i>	10
2.4.2 <i>Transportation</i>	12
Chapter Three: Precedent Review.....	13
3.1 Old Mill Boathouse: Port Moody Rowing and Paddling Centre.....	13
3.1.1 <i>Introduction</i>	13
3.1.2 <i>Boathouse Design</i>	14
3.1.3 <i>Conclusion</i>	16

Chapter Four: Site Analysis and Design Framework.....	17
4.1 City Centre Description.....	17
4.2 Riverfront Site Description.....	17
4.3 Current and Proposed Infrastructure.....	19
4.4 Preliminary Site Analysis.....	20
4.4.1 Context.....	20
4.4.2 Existing Zoning.....	21
4.4.3 Circulation.....	22
4.4.4 Airport Noise Implications.....	23
4.4.5 Views.....	24
4.5 Preliminary Design Framework.....	25
Chapter Five: City Centre Development.....	26
5.1 Introduction.....	26
5.2 Existing Conditions.....	26
5.3 Development Option A.....	27
5.4 Development Option B.....	28
5.5 Development Option C.....	28
5.6 Development Option Figures.....	30
5.6.1 Existing Conditions.....	30
5.6.2 Development Option A.....	31
5.6.3 Development Option B.....	32
5.6.4 Development Option C.....	33
5.7 Development Considerations and Recommendations.....	34
Chapter Six: Boathouse Programming and Development..	35
6.1 Introduction.....	35
6.2 Boathouse Programming and Spatial Requirements.....	35
6.2.1 Boathouse Design Requirements.....	35
6.2.2 Additional Recommendations.....	37
6.3 Boathouse Development Implications.....	38
6.3.1 Boathouse Footprint.....	38
6.3.2 Boatbay Height Requirement.....	42
6.4 Development Considerations and Recommendations.....	43

Chapter Seven: Thunderbird Boathouse Riverfront	
Design.....	45
7.1 Introduction.....	45
7.2 Site Design.....	46
7.2.1 <i>Key Design Factors</i>	46
7.2.2 <i>Site Plan</i>	46
7.2.3 <i>Site Elevation</i>	50
7.2.4 <i>Circulation</i>	51
7.2.5 <i>Parking</i>	52
7.3 Site Detail.....	53
7.3.1 <i>Boathouse Plaza</i>	53
7.3.2 <i>Pier 1</i>	53
7.3.3 <i>Pier 2/ Finish Line</i>	54
7.4 Site Character.....	54
7.5 Conclusion.....	55
7.6 Figures and Images.....	55
Literature Reviewed.....	63

List of Figures

Chapter 1: Introduction

Figure 1: Large Context of City Centre.....	1
Figure 2: Map of City Centre.....	2
Figure 3: Site Location and Boundary.....	3
Figure 4: Proposed Boathouse Location.....	4

Chapter Two: Theoretical Orientation and Policy

Figure 5: Steveston Village.....	7
Figure 6: Steveston Residential Development.....	8
Figure 7: City Centre Long-Term Network Plan.....	12

Chapter Three: Precedent Review

Figure 8: Old Mill Boathouse Location.....	13
Figure 9: OMB Building and Park Location.....	14
Figure 10: OMB First Floor Layout.....	15
Figure 11: OMB Second Floor Layout.....	15
Figure 12: Old Mill Boathouse.....	15
Figure 13: OMB Front Entrance.....	16
Figure 14: OMB Front Plaza.....	16

Chapter Four: Site Analysis and Design Framework

Figure 15: Picture Montage of Existing Riverfront Conditions	18
Figure 16: Image Montage of Various Context Scales.....	20
Figure 17: Existing Zoning and Land-Use.....	21
Figure 18: Adjacent Land-Use.....	21
Figure 19: Adjacent Land-Use.....	21
Figure 20: Existing Vehicle Circulation.....	22
Figure 21: Vancouver International Airport Noise Exposure Forecast.....	23
Figure 22: Site Noise Forecast.....	23
Figure 23: Primary Views.....	24
Figure 24: View North: No. 2 Rd. Bridge.....	24
Figure 25: View North from Riverfront.....	24

Chapter Five: City Centre Development

Figure 26: Existing Development Conditions.....	30
Figure 27: Riverfront Section- Existing Conditions.....	30
Figure 28: Development Option A.....	31
Figure 29: Riverfront Section- Option A.....	31
Figure 30: Development Option B.....	32
Figure 31: Riverfront Section- Option B.....	32
Figure 32: Development Option C.....	33
Figure 33: Riverfront Section- Option C.....	33

Chapter Six: Boathouse Programming and Development

Figure 34: Boathouse Footprint Analysis.....	39
Figure 35: Boathouse Projection Analysis.....	41
Figure 36: Two-Floor Boatbay Projection.....	42
Figure 37: Split Building Layout.....	42
Figure 38: Boathouse Sections: Design Proposal.....	44

Chapter Seven: Thunderbird Boathouse Riverfront Design

Figure 39: Conceptual Riverfront Plan.....	45
Figure 40: Site Plan.....	48
Figure 41: Site Plan in Existing Context.....	49
Figure 42: Site Elevation and Grades.....	50
Figure 43: Site Circulation and Public Open-Space.....	51
Figure 44: Site Parking Locations.....	52
Figure 45: Boathouse Plaza Plan.....	56
Figure 46: Boathouse Plaza Details.....	57
Figure 47: Pier 1 Plan.....	58
Figure 48: Pier 1 Details.....	59
Figure 49: Pier 2/ Finish Line Plan.....	60
Figure 50: Pier 2/ Finish Line Details.....	61
Figure 51: Precedent Images and Materials.....	62

Acknowledgements

I would first like to thank my thesis committee Don Luymes, Doug Paterson, and Clarence Sihoe from the City of Richmond. Their help, guidance, and support throughout this design process was invaluable and greatly appreciated. I would also like to thank everyone else who contributed to this project by providing valuable information and guidance. Thanks and appreciation are also owed to the staff at the City of Richmond for all of their help and assistance.

I would like to give a special thanks to Doug Paterson for providing his support and encouragement throughout my three years here in this program.

I would like to thank my family and friends (including the greatest woman in the world) for all of their help and support through this project and the last three years. Thanks guys, I finally did it.

And finally, I would like to say thank you and good luck to all my classmates. Your support and friendship will always be valued.

Chapter One

Overview and Summary

1.1 Introduction

The City of Richmond is a growing community that is experiencing the pressures of urban growth and transformation. It is a region of transition from a historically agricultural environment to a thriving and dynamic urban residential and business landscape. It is this metamorphosis that has established Richmond as a unique area within the Greater Vancouver Regional District.

Today Richmond is also going through another transition in which current business and small industrial districts are being redeveloped into residential communities in response to the strong demand for housing because of the consistent demographic influx within the area. Nowhere is this more apparent than in the City Centre district in which predominantly industrial land-uses surrounding No. 3 Rd. and the Middle Arm of the Fraser River are gradually transitioning into a commercial, retail, and residential hub. This demand will only increase with the proposed introduction of the RAV Line running down the No. 3 Rd. corridor improving the connection between the City of Richmond and the City of Vancouver. A connection that will strengthen the importance of the City

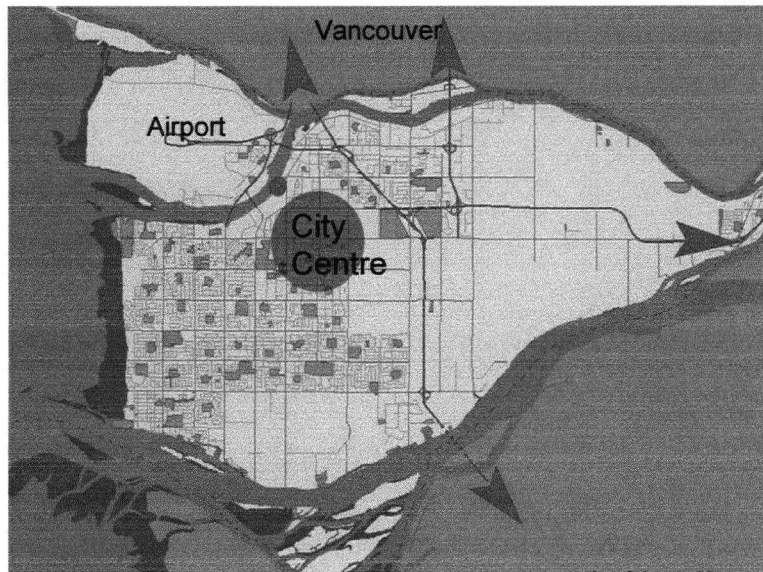


Figure 1: Large Context of Richmond City Centre

Centre district as an important hub for the rest of the Richmond area. Because of this growing potential for redevelopment within this area, Richmond has been and is currently examining large-scale development planning schemes in order to properly predict and then manage transportation and land use demands for today and into the future. (City of Richmond OCP)

The City Centre district is situated in the north-west corner of Richmond, geographically framed to the north by the Middle-Arm of the Fraser River which separates Richmond from the Vancouver International Airport. It is the commercial and retail hub of Richmond, anchored by No. 3 Road, the north-south vehicle corridor and commercial axis for the region. The unofficial “main street” of Richmond, No. 3 Road can be thought of as a significant processional

route for the City of Richmond as it links the North and South Arm of the Fraser River and passes directly through significant nodes such as City Hall, Richmond Centre, and Brentwood Mall (Busch 1).

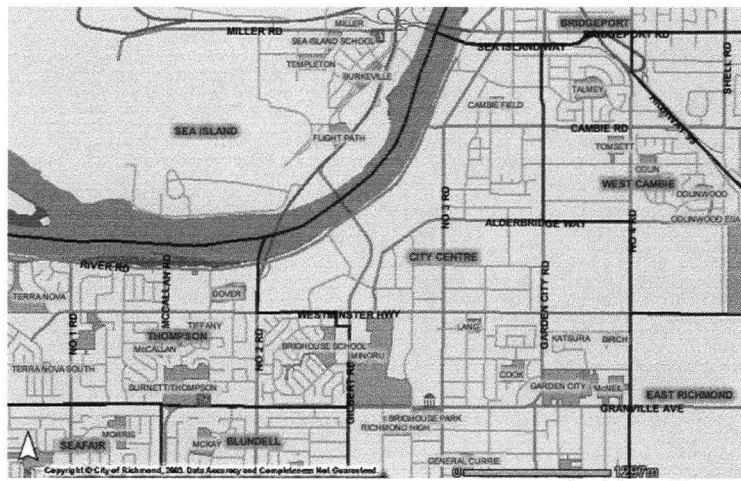


Figure 2: Map of City Centre

Because of its location within Richmond and the Lower Mainland, the City Centre district is also a central transportation hub. This area is consistently dominated by traffic congestion flows with three bridges connecting to the adjacent airport and primary roads and highways into Vancouver. It has been this geographic significance

coupled with the adherent traffic circulation demands that has initiated proposals for implementing the new RAV transportation line along No. 3 Road.

Within this transitional development it is crucial to realize both the importance and potential of the adjacent riverfront. Currently this region has turned its back on the river and essentially blocked off any real connection between the central urban district along No. 3 Road and the riverfront environment. The existing industrial land-use has created an impenetrable barrier in which one may not even be aware of the river when traveling within the urban landscape. This lack of connection between city and riverfront will be the primary focus of the larger design framework of this thesis.

1.2 Statement of Intent

Waterfront edges are important areas of public open space. They are an important link between urban development and the natural environment. Because of this connection, waterfront edges become essential areas of community integration and identity creating important nodes of activity and sustainable social places. This project will evaluate the proposition of implementing the UBC Thunderbird Rowing facility along the Middle Arm of the Fraser River on the existing Richmond river dyke system. Its primary focus will examine how the introduction of this programmed recreational activity can enhance existing public open space environments and promote future sustainable community development.

1.3 Thesis Goal

The goal of this project is to develop an integrated public open-space plan enhancing an existing waterfront edge environment to facilitate the Thunderbird Boathouse and future residential urban development and community growth.

1.4 Thesis Objectives

To generate a riverfront design proposal implementing the UBC Thunderbird Boathouse facility within a larger public open-space development. To complete this exercise, this project will explore the following objectives:

- a) Analyze and understand existing regional opportunities and constraints concerning large-scale development proposals
- b) Propose three different development options for the predicted urban growth of the Richmond City Centre district
- c) Establish a stronger connection between the existing urban axis along No. 3 Road and the Fraser River riverfront environment
- d) Develop a riverfront development that responds to both the predicted urban growth and need for improved public open-space
- e) Analyze exiting Thunderbird Boathouse layout proposals and explore alternative responses
- f) Design the implementation of the Thunderbird Boathouse (with all inherent programmatic requirements) within a larger riverfront park open-space plan
- g) Develop and integrate a new urban dyke trail system character within the Richmond City Centre

1.5 Theoretical/ Policy Basis

In order to understand current issues and future development considerations it is necessary to review existing planning policies within the Official Community Plan of the City of Richmond (City of Richmond OCP). Already established planning and development policies will be essential in guiding design decisions within this project.

It is also necessary to explore theoretical notions of development and design, focusing primarily on issues of riverfront development and community open-space.

Finally, a close examination of an exiting university boathouse facility within a larger public environment will be conducted. The recently constructed Old Mill Boathouse in Rocky Point Park in Port Moody will be used for this precedent study and will be evaluated as a potential framework for both the boathouse facility itself as well as its integration within the larger landscape.

1.6 Methodology

The design process of this project is a continually dynamic investigation of relevant issues and design explorations of various scales both within and outside the immediate site boundaries. The site will be evaluated on four primary scales:

- a) **Richmond City Centre:** Large-scale development options and analysis
- b) **Riverfront Development:** Design proposal for riverfront open-space and adjacent land-use
- c) **Boathouse Layout and Integration:** Investigation of boathouse design and integration with public riverfront environment
- d) **Site Design Details**

The design framework for this thesis will be based primarily on the required and proposed programming elements of the site at all relevant scales. This includes integrating and proposing new and existing land-use policies and introducing riverfront public open-space. Most importantly, the required programming and spatial configurations of the proposed boathouse facility will be used as fundamental guidelines informing all design decisions within and around the boathouse location.

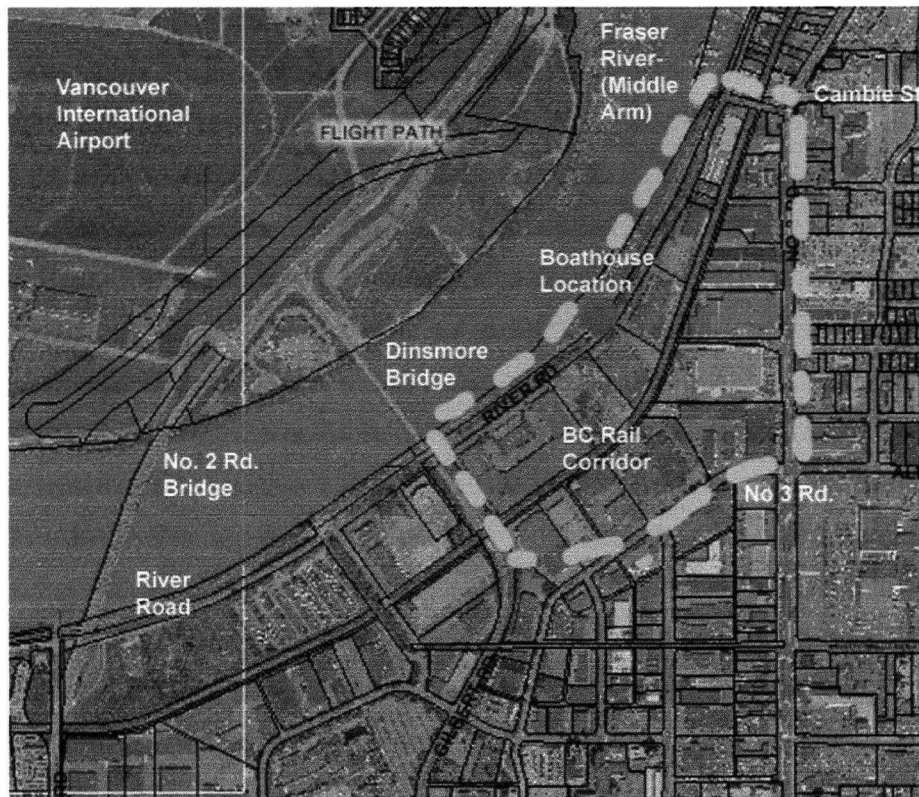


Figure 3: Site location and boundary

Aerial photograph: www.city.richmond.bc.ca

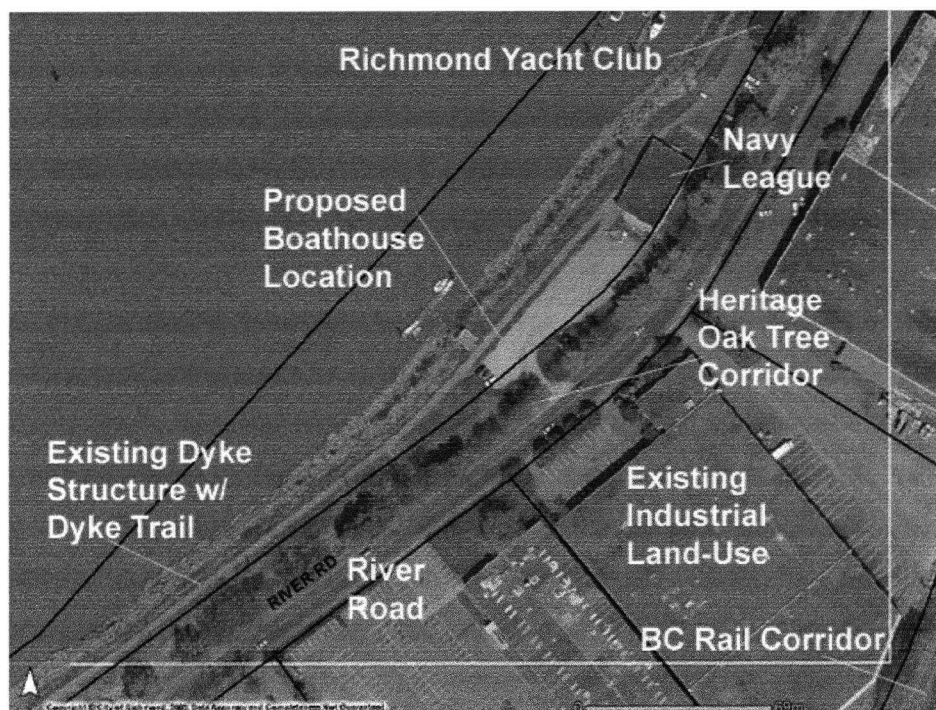


Figure 4: Proposed Boathouse Location

Aerial photograph: www.city.richmond.bc.ca

Chapter Two

Theoretical Orientation and Policy

There's no telling what the power of the people and the river can do (Seeger 1982 in Breen 1994).

2.1 Community Development

The City Centre district of Richmond, like most other areas within the Lower Mainland, is going through a major transitional period of urban growth due to a continually demanding real-estate market and demographic influx. Under these conditions, many areas of current agricultural or small-scale industrial uses are being converted into modern urban residential and commercial/ retail landscapes. Nowhere is this more apparent than in the City Centre district in which current developmental pressures combined with transportation demands are beginning to change the existing industrial and vehicle based strip-malls to a more densified urban framework with new and more efficient road and circulation alignments.

Within such a dynamic development environment it is absolutely essential to establish a strong community vision from which all future decisions can be based. The City of Richmond has begun this procedure by developing their most recent Official Community Plan (OCP) in which specific guidelines are created to inform present and future development proposals. By establishing a vision for the future, a cohesive and connected developmental transition within the area may be accomplished.

More importantly, a well established development plan can help in either maintaining and emphasizing or establishing a new community identity. In fact, it is the creation of community identity that should be the primary guiding principle behind any OCP. According to Douglas Paterson, MLA Director, University of British Columbia (Paterson 16), a development proposal should be a procedure beginning of radical revision by requiring all building activity to be, first and foremost, an act of community building. In starting with community first, informing how the character of how future development may evolve, a sense of identity and thus personal belonging within the current and prospective residents can be fostered, strengthening the overall effectiveness of any landscape changes.

Steveston Village, at the far southern end of No. 3 Road in Richmond is currently an extremely fast growing residential development, which, due to its waterfront nature, is an ideal precedent example of an attempt in new, large-scale community development. Yet unlike the City Centre district, Steveston had an already firmly established community identity of a small, quaint, working fishing village. This identity and character was in fact the primary selling feature

for the immense medium to high-density residential developments currently happening within the area.

What is important to note about the Steveston residential development boom is that although the strong identity was essentially the selling feature bringing people into the community, thus increasing housing and related development



<http://home.earthlink.net/.../Van-Steveston.htm>

Figure 5: Steveston Village



Picture taken February, 2004

Figure 5: Steveston Residential Dev.

demands, it is in fact this identity and character that is now being effectively squashed and feared to be altered for good. Although all the housing developments attempt to emulate the character of the area through the new architecture and landscaping, the influx of developmental demands from an increasing population such as new roads, schools, commercial and retail outlets, have begun to change the community identity. The very identity which drew the people there in the first place.

Despite the growing identity crisis, the Steveston residential development was initially a very positive community building plan in which the village fishing would serve as a place of orientation and belonging for a growing residential environment.

According to Mircea Eliade in his book, *The Sacred and the Profane: The Nature of Religion* (1987), it is this orientation around

a significant and sacred entity within the landscape that informs the creation of community and identity. Eliade suggests "there needs to be a break in the profane continuum of suburbia, for it is a break effected in space that allows the world to be constituted, as it reveals the fixed point, the central axis for all future orientation" (Eliade 21). Eliade goes on to suggest that the notion of sacred place follows four phenomenological conceptions prevalent in traditional societies. The first is the *break in the homogeneity* of the surrounding area which, secondly, is symbolized by *an opening by which passage to another cosmic region* is made possible. Next, the sacred place must become the *axis mundi* or central hub for the expression of the area's social and cultural communications from which, finally, *around this axis lies the world* in the form of the surrounding community (Eliade 37). It is no wonder then that the Steveston community is such a success (in development terms) as future residents identify and thus orientate themselves around the strong community character of the existing fishing village which, as an entity on its own, is a break in the surrounding landscape and axis of communal activity.

But, as previously mentioned, this is quite unlike the City Centre district which currently seems to be a mix of unorganized urban forms oriented around a strip-mall dominated vehicle corridor in No. 3 Road. Although a stronger identity may

be fostered with the advent of the RAV line, the urban core still has little distinctive characteristics for which the community can orientate around. With this in mind, it becomes increasingly important for the riverfront environment adjacent to the urban core to become the central focus and axis of future development within the area. In creating a unique, interesting, and most of all, functioning public open-space along the riverfront edge of the City Centre, the community could then be sustained and oriented around a strong, interactive, and social *axis mundi*. By establishing both physical and psychological connections from the urban core around No. 3 Road to the riverfront, the community heart can be taken away from the commercial and retail corridor and put into the natural river environment. These connections will be of primary importance throughout the design process of this project.

2.2 Riverfront Vision

“At once calm and dynamic, profoundly symbolic in religion and literature, water provokes primeval emotions in all of us. The lure of water is powerful and universal” (Breen 10).

There is ample evidence that the waterfront, broadly defined, is, and has been for years, the most fertile area of planning and development in our communities (Breen 2). It is from the redevelopment of the riverfront area that this region within the City of Richmond can foster a strong identity. Such a unique opportunity of having both a physical and phenomenological connection to the river directly adjacent to a growing urban environment will be fully explored.

It is therefore essential to establish first the nature of what the waterfront environment will be. In many instances the planning process and its potential flexibility depend upon the realization of an appropriate vision for the waterfront: an image of what the development should actually involve (Hoyle 32). This vision is the beginning of establishing the identity for the region, informing the character of all future development. The riverfront park must then have an overall recognized image, a strong phenomenological connection to the region, its people, and the function it serves for the community. To begin to realize that the edge public open-space of the urban core is to become the central social hub or *axis mundi* of a clearly identified community, then this space must be a strong and clearly recognized entity itself.

In creating a recognized social axis on the riverfront within the urban core, it will be important to first create a space in which the community can come together and interact on both large and small scales. The community's overriding goal for the riverfront should be simple and clear-cut: make the riverfront a place in which it is a source of enjoyment and pride for the City Centre and greater Richmond residents (Sedway Cooke Associates 7). Therefore on the one hand, it should be the creation of open-space as a convenient location in which to meet new acquaintances, whether it be boy meet girl or a convergence of people of particular interests (Lynch 397). In contrast, on a larger scale, one of the major attributes for public waterfront projects is that

they become ideal, neutral territory for festivals and other community gatherings (Breen 27). The riverfront must therefore be a dynamic environment which can accommodate various community functions yet at the same time maintain a solid overall image.

2.3 Riverfront Development

For any redevelopment proposal it is essential to first establish a set of guidelines from which design decisions can be made. According to Andy Harney, *Reviving the Urban Waterfront* (Harney 7), there are themes and issues identified as common to most urban waterfronts, all of which are evident within the riverfront of the Middle Arm of the Fraser River:

- 1) Cinderella Syndrome: the existence of many vacant, deteriorated, obsolete, or underutilized structures as well as by the secondary status which the waterfront takes to the downtown or outlying areas
-the existing industrial park on the edge of the urban core, immediately adjacent to the riverfront
- 2) Aesthetic and Cultural Potential: both man-made and natural waterfront areas
-this potential clearly exists in the redevelopment of the riverfront, accentuating both the natural features and flows of the river as well the introduction of the Thunderbird Boathouse
- 3) Environmental Concerns: water and air quality, wetlands protection, shoreline maintenance, erosion control, storm and flood damage control
-the existing dyke structure along the edge of the existing riverfront is clearly an issue in future redevelopment of this area because of both its functional necessity and impact on the natural riverfront edge environment
- 4) Competition of users: land, water-dependent and water; residential, recreational, parks, walks, commercial, tourist, industrial, power generation, marina, ports
-although not a heavily used marine corridor (contributing to its appeal as an ideal rowing location), there will be competition of space between the boathouse and the adjacent Richmond Yacht Club
-there will also be a separation of public open-space users throughout the riverfront from the semi-private/ organized university and community activities in the boathouse location

Although these four themes are somewhat generic in nature, they will serve as an ideal base in identifying the design concerns of the Middle Arm riverfront development. From this base we are also able to establish seven design

principles from Harney (9), that will guide development decisions throughout the riverfront environment:

- 1) Creation of a safe environment
- 2) Multi-use of land and building areas
- 3) Recycling or renewal of deteriorated and abandoned areas
- 4) Methods of overcoming physical barriers: infrastructure and natural conditions
- 5) Visual access
- 6) Creation of parks, open-spaces or plazas
- 7) Shoreline pathway systems

By following these guidelines and the before mentioned key issues and themes of the riverfront environment, the development of the riverfront edge in conjunction with future urban redevelopment of the City Centre district will create a strong social, economic, and environmentally sustainable city core within the City of Richmond.

2.4 Existing Policy

2.4.1 Community Development

The existing Richmond Official Community Plan does a relatively good job in laying out simple and clear development guidelines for the city as a whole and within individual communities. It is a document dedicated to strengthening the overall sustainability (social, economic, ecological) by identifying key issues present today that will effect the city into the future. Throughout the OCP there are many guiding principles that will help govern the future development of the City Centre and hopefully realize the potential in redeveloping the adjacent riverfront environment.

According to the OCP (Neighborhoods and Housing), Richmond is widely acknowledged as a city and not a bedroom suburb. And, as a maturing community, Richmond residents endorse the concentration of growth to create a strong City Centre, a true downtown with a business core, urban neighbourhoods, and arts and culture. This acknowledgement of the City Centre as the social, economic, and cultural core is an essential first step in establishing a strong identity for this area. Although current conditions seem to only express the economic stability of the region, future developmental moves such as riverfront improvements and access could go a long way in building social and cultural sustainability.

The Richmond OCP also establishes a list of key objectives that should be met when building or enhancing new and established communities (Richmond OCP, Neighborhoods and Housing). These objectives are positive and again should be help to create the framework for redeveloping the City Centre riverfront environment:

- 1) Strengthen neighbourhood gathering places to foster a sense of community and identity.
-this objective can clearly be met by establishing a community based riverfront open-space as well as strong connections to the surrounding community
- 2) Promote a sense of cohesion and pride for neighbourhoods by emphasizing unifying characteristics.
-the development of a riverfront in which its residents enjoy and are proud of will help to establish an overall character and identity for the area
- 3) Use green to integrate nature into, and enhance livability of, neighbourhoods.
-by establishing the riverfront environment as the central cultural and social hub of the City Centre then nature instead of the urban core will identify the community
-establishing stronger connections from the city to the riverfront will bring the nature into the city
- 4) Improve physical connections to provide opportunities for safe, convenient, and pleasant access within neighbourhoods
-providing connections from the urban core along No. 3 Road to the riverfront and riverfront walkway will provide greater pedestrian access within and outside the City Centre district
- 5) Use edges and gateways as opportunities to define neighbourhoods and to respect the transition to another area.
-the development of the riverfront environment will be critical in establishing a strong edge for the growing urban core
-by establishing stronger connections to the river and Richmond riverfront walkway system, the riverfront will serve as a strong physical and psychological gateway
- 6) Balance regional uses located in the neighbourhood with local residents' priorities.
-the riverfront development is a priority within the City Centre in establishing a strong character for the region and establishing a strong sense of place

Although the existing OCP is obviously on the right track in terms of creating strong guidelines for community development, it should be noted that greater emphasis towards exposing and enhancing existing locational natural features, such as the City Centre riverfront, should be explored. Taking into consideration the general and overreaching nature of an OCP document, detailed development

plans for this region must take into account the community development potential of the riverfront in this region.

2.4.2 Transportation

The current City Centre Transportation Plan within the existing Richmond OCP makes some positive moves in establishing both a better vehicle circulation pattern as well strengthen physical connections to the riverfront. For this reason, most of the proposed road alignments and transportation improvements will be adopted throughout this project.



www.city.richmond.bc.ca/transportation/tplan.htm

Figure 7: City Centre Long-Term Network Plan

Most importantly, the proposed road extensions running east-west through the City Centre to the riverfront are important in establishing both physical and psychological connections to the river. Secondly, by changing the existing BC Rail corridor running north-south between No. 3 Road and River Road into a four-lane street will be extremely beneficial in alleviating both the existing congestion problems on No. 3 Road and serve to remove River Road as a through-road. In doing so, the potential to alter River Road within a riverfront redevelopment is created allowing for greater design potential in the area.

Chapter Three

Precedent Study

3.1 *Old Mill Boathouse: Port Moody Rowing and Paddling Centre*

In developing the design and implementation of the Thunderbird Boathouse and City Centre riverfront development, it was first important to examine a precedent project. The Old Mill Boathouse (OMB) development was chosen because of both its location within a public park and because it is a facility that is closely related to the Thunderbird Boathouse, both in scale and programming. Although similar within these two points, the two projects differ due to the OMB's placement within an already established waterfront park. This being said, the OMB provides essential information and guidance into many aspects of the future Thunderbird Boathouse.

3.1.1 Introduction

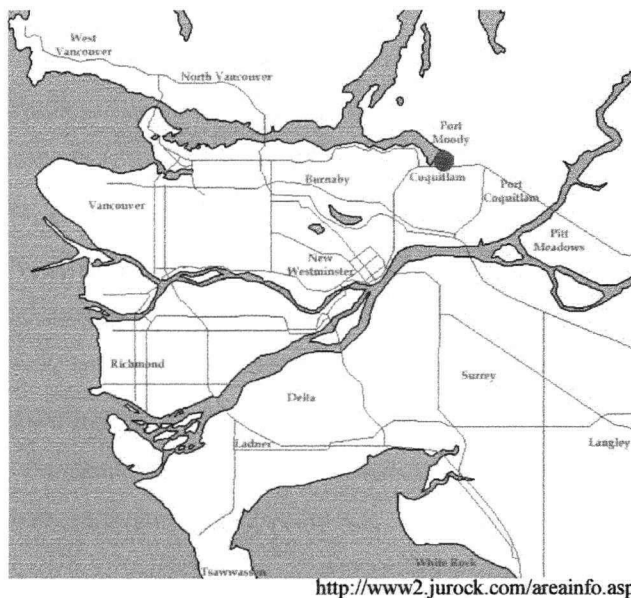


Figure 8: Old Mill Boathouse Location

Rocky Point Park is located at the eastern most tip of Burrard Inlet in Port Moody. It is the largest park of five along the Shoreline Park System connected by over 3km of trails stretching around the edge of Burrard Inlet (Lin). The park itself is primarily a large community open-space providing boat access to the ocean. It contains a public pool as well as a large public pier and dock access. Because of its location, amenities, and substantial open-space, Rocky Point is an essential recreational and cultural hub hosting large community events and celebrations.

The unique characteristics of Burrard Inlet into Port Moody make an ideal maritime educational and training location as the sea conditions are almost always favorable to rowing and paddling activities (Old Mill Boathouse). The combination of the existing infrastructure of Rocky Point and its facilities with ideal maritime conditions provided the ideal location for the boathouse development.

The original project grew out of a need from the City of Port Moody to provide a shelter for water related activities such as kayaking, rowing, and sailing; that at

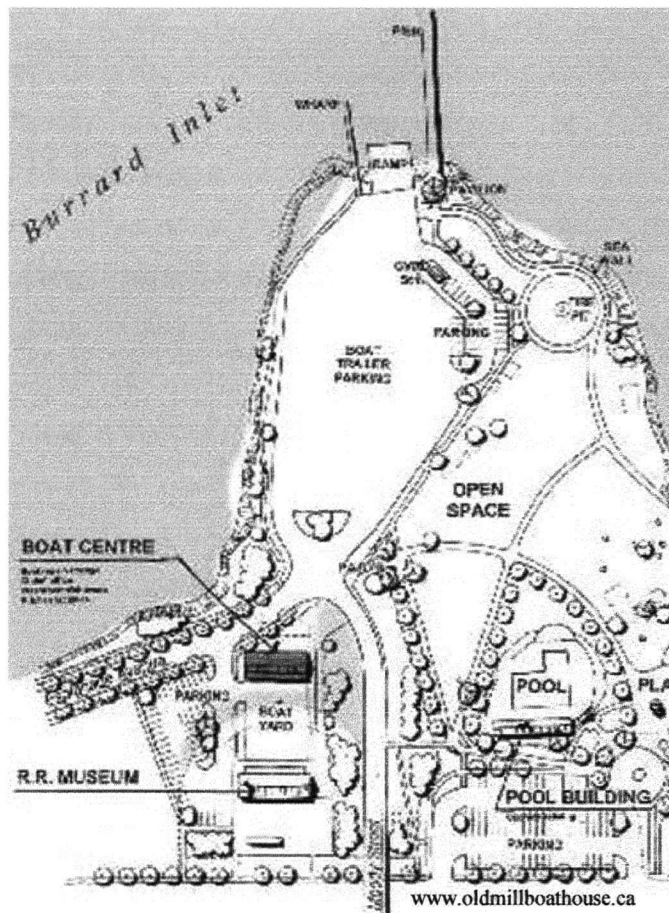


Figure 9: OMB Boathouse and Park Location

the time were spread around the park in makeshift locations (Robert Burgers Architect Inc. 1). The concept then grew into a facility that would provide a home base for the Port Moody Rowing, Sailing, and Paddling Society and many other groups that could gain access to waterborne activities. This base would also be a focal point of rowing and sailing regattas which could bring thousands of tourists into the community (Old Mill Boathouse).

Although the Old Mill Boathouse project was implemented within an existing public park it became the initial center point of the Rocky Point Rejuvenation Project in which 4.5 million dollars would be invested into upgrading the park facilities. 1.3 million dollars went to the development of the OMB with

the difference spent in 2005 on other facilities such as new restaurant (Rhode 1). The City of Port Moody, with help from Provincial and Federal Governments, provided the property as well as 300,000\$ of the estimated 1 million needed to build the facility. BC2000+ Community Spirit Program committed 200,000\$, leaving the newly formed Old Mill Boathouse Society to raise the balance through public and private contributors (Old Mill Boathouse). In following this economic structuring the implementation of the Thunderbird Boathouse could be of little added expense to a greater riverfront project.

3.1.1 Boathouse Design

Programmatically, the Old Mill Boathouse is very similar to the Thunderbird Boathouse in its requirements of fulfilling both the activities of the SFU Rowing Club as well as functioning as a community facility for both marine activities and social events. Functionally, the 4,000 square foot building had to provide for its primary purpose of storage and maintenance of various types of motorized and non-motorized vessels (primarily rowing shells and equipment) while also providing for community and special group activities (Royer 34).

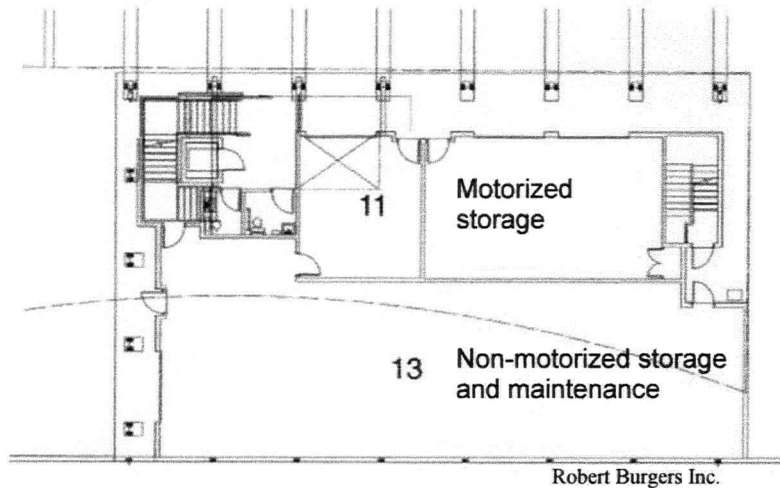


Figure 10: OMB First Floor Layout

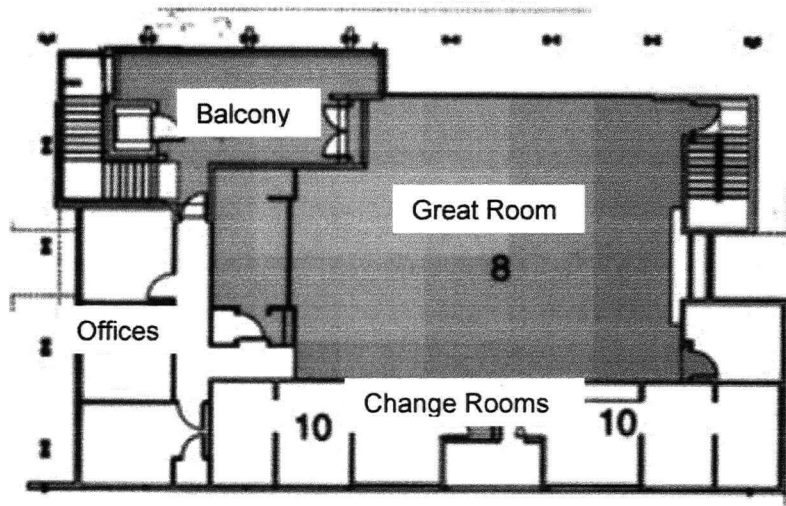


Figure 11: OMB Second Floor Layout



Figure 12: Old Mill Boathouse

The two level facility designed by Robert Burgers Inc. is approximately 88 ft. long and 44 ft. wide. The first level was designed to provide the storage and maintenance area as well as a physical exercise center and public washrooms (Old Mill Boathouse). The second level, created due to the program augmentation from simply a storage building, functions primarily as the social area with a 1,500 square foot 'great room' and fireplace used for public events, rowing regattas, banquets, and privately rented activities such as weddings (Robert Burgers 6). It also contains offices, smaller meeting rooms, a balcony, and full change rooms (Old Mill Boathouse). The

layout, programmatic solutions, and floorplan will be considered when developing both the design and implementation of Thunderbird Boathouse within the riverfront environment.

Unfortunately, the buildings location within the park contributes to its somewhat uninviting open-space and building character. Situated in the far south-western corner of the park, immediately adjacent to commercial and heavy industry, the boathouse seems somewhat unattached to the character of Rocky Point Park. Because



Picture taken Nov. 2003

Figure 13: OMB Front Entrance

of this location, the boathouse also seems separated from the waterfront and the activities for which it serves. Immediately in front of the boathouse, running almost right to the water's edge, is a large car and trailer parking lot. Although convenient for event parking and preparation, this concrete divider further alienates the boathouse from its intended purpose.

3.1.2 Conclusion

Despite the functional successes, the Old Mill Boathouse does not seem to connect well with its immediate environment. The combination of a heavy and vertical industrial building design seems cold and uninviting despite the strong and effective references to the historical and existing industrial activities in the area. This sentiment is continued in the immediate open-space that does little to compensate for the industrial nature of the building or attempt to unify the boathouse with the surrounding park landscape.



Picture taken Nov. 2003

Figure 14: OMB Front Entrance

In terms of reference in considering the future Thunderbird Boathouse, the Old Mill Boathouse is a good precedent in determining both what to do and what not to do. The OMB is good in integrating the two programmatic elements of community and university club activity. The boathouse layout itself is good in providing spaces for storage and maintenance as well space for community events and gathering. Yet despite these positive interventions, the OMB fails to provide a sense community belonging to the building. This is due first

of all to its location in the park, away from the water and central community space. Secondly the strong vertical nature of the building and uninviting industrial facade do not connect well with the surrounding landscape and contribute to the sense of separation between park and boathouse character. All these elements were taken into consideration in developing design options for Thunderbird Boathouse and larger riverfront development.

Chapter Four

Site Analysis and Design Framework

4.1 City Centre Description

As previously mentioned, the City Centre district of Richmond is oriented around No. 3 Road, the primary north-south vehicle corridor in the area. Currently this area is a collection of various vehicle-dominated strip-malls, shopping centres, and light industrial buildings. There seems to be no real sense of connection or unity throughout the area aside from the congested vehicle traffic running down No. 3 Road.

There is also very limited views of natural features such as mountains or water from which one may be able to orientate themselves to. This factor compounded by the undifferentiated urban sprawl creates a sense of placelessness and contributes to this areas lack of true identity.

As this urban core densifies and rapid transit becomes the dominant transportation medium then maybe, eventually, this area will begin to form a strong and distinguished city atmosphere and character.

4.2 Riverfront Site Description

The existing riverfront environment adjacent to the City Centre is currently not recognized as prime community open-space within the City of Richmond. Presently, the only community use this area provides is the dyke walkway which runs along the dyke edge, connecting the area to the greater Richmond waterfront trail system. Although this connection is important, the rest of the riverfront does not provide any reason to really stop along this trail, thus creating a simple circulation corridor along the river.

This condition is the result of two dominant features throughout this portion of the riverfront. First, is the existing dyke, which runs along the edge of the river. Due to the functional requirements of this infrastructure, there are strict limitations as what can happen on or around the dyke. Most importantly, and most obvious, is the required height of the dyke along the river. Currently the dyke stands at approximately 3.5m above the mean tidal level of the river with future plans to raise this to 4.0m due to present and future weather patterns (Gilfillan). This elevation, although a constant reminder of the functional importance of the dyke, immediately removes the community from the river environment and its inherent flows.

The top and river-side edges of the dyke must be free of all trees to prevent the roots from creating soft pockets in the dyke foundation (Gilfillan). This restriction does not allow for the creation of a beautiful natural environment or any type of ecological significant areas along the top of dyke.

The actual dyke edge material and grade again does not allow for any vegetative intervention and restricts the potential riverfront marine ecology. The required concrete or rip-rap edge, steeply sloping into the river, is functional but not necessarily beneficial in attempting to develop a sense of character based around the riverfront environment.

Secondly, the existing riverfront environment is heavily dominated by the adjacent industrial land-use. The combination of a strictly functional river edge with the surrounding industrial character does not facilitate the existence of a true social or cultural landscape. Besides the continual physical reference to the importance of the dyke, this area has limited socially sustainable features and definitely does not speak for the desired identity of the region.



Pictures taken between October 2003 and March 2004

Figure 15: *Picture Montage of Existing Riverfront Conditions*

4.3 *Current and Proposed Infrastructure*

In reviewing the Official Community Plan, the City of Richmond "intends to guide the development of the City Centre so that it can absorb a major portion of Richmond's growth over the next two decades, and support a strong economy, a high degree of social well-being, and a livable environment" (City of Richmond Transportation Plan 2). For this reason, "the OCP encourages more housing in the downtown, attractive to a broad range of ages, incomes, and cultures, promoting pedestrian- and transit-friendly approaches to the design of buildings, streets, and parks; and, it discourages car-dependent lifestyles" (City of Richmond Transportation Plan 2). With current and future urban growth projections within this area there will have to be major development and infrastructure initiatives to accommodate the demographic influx.

Obviously, the one major infrastructure proposition of implementing the Rapid Transit Line down the No. 3 Road corridor will bring large changes to the central core of the City Centre. This new infrastructure will not only alleviate traffic congestion and establish stronger connections with the rest of the Lower Mainland, but will also change the character of the City Centre. With the advent of this initiative, more infrastructure and development will be required in order match the predicted changes throughout the area.

What is of greatest concern to this project is the redevelopment of the adjacent industrial area set between No. 3 Road and the riverfront. Because of the current conditions and apparent lack of importance (seen in OCP Transportation Plan) the existing industrial park will have to be redeveloped in order to accommodate the proposed urban transition and growth.

Regarding the development of such a large and important urban centre, there is bound to be a trickle down effect of redevelopment initiatives in the surrounding regions. Because of the immediate adjacency of the riverfront to the central urban core, this edge environment will most likely receive some of the benefits of the redevelopment wave predicted throughout the region.

4.4 Preliminary Site Analysis

4.4.1 Context

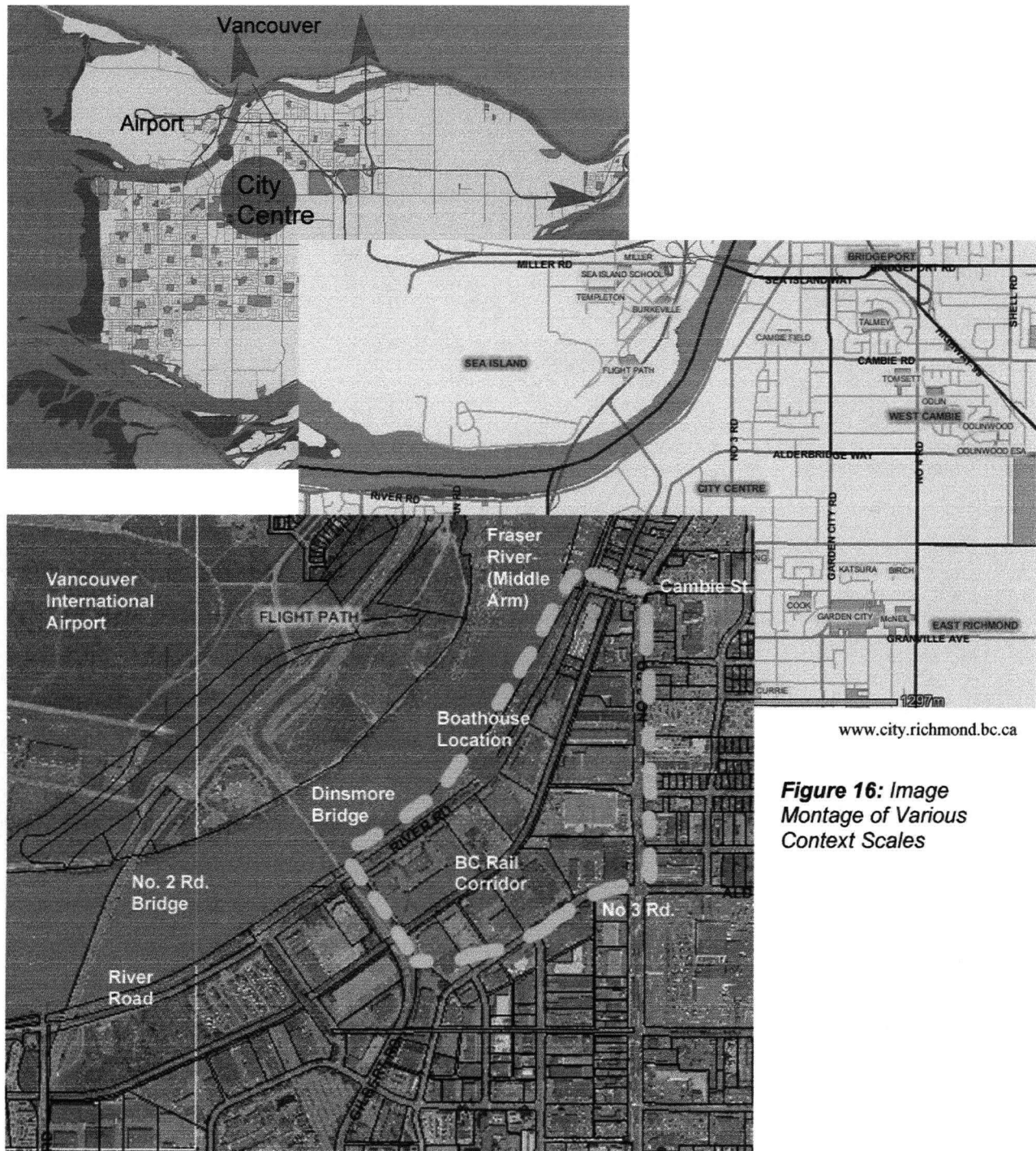
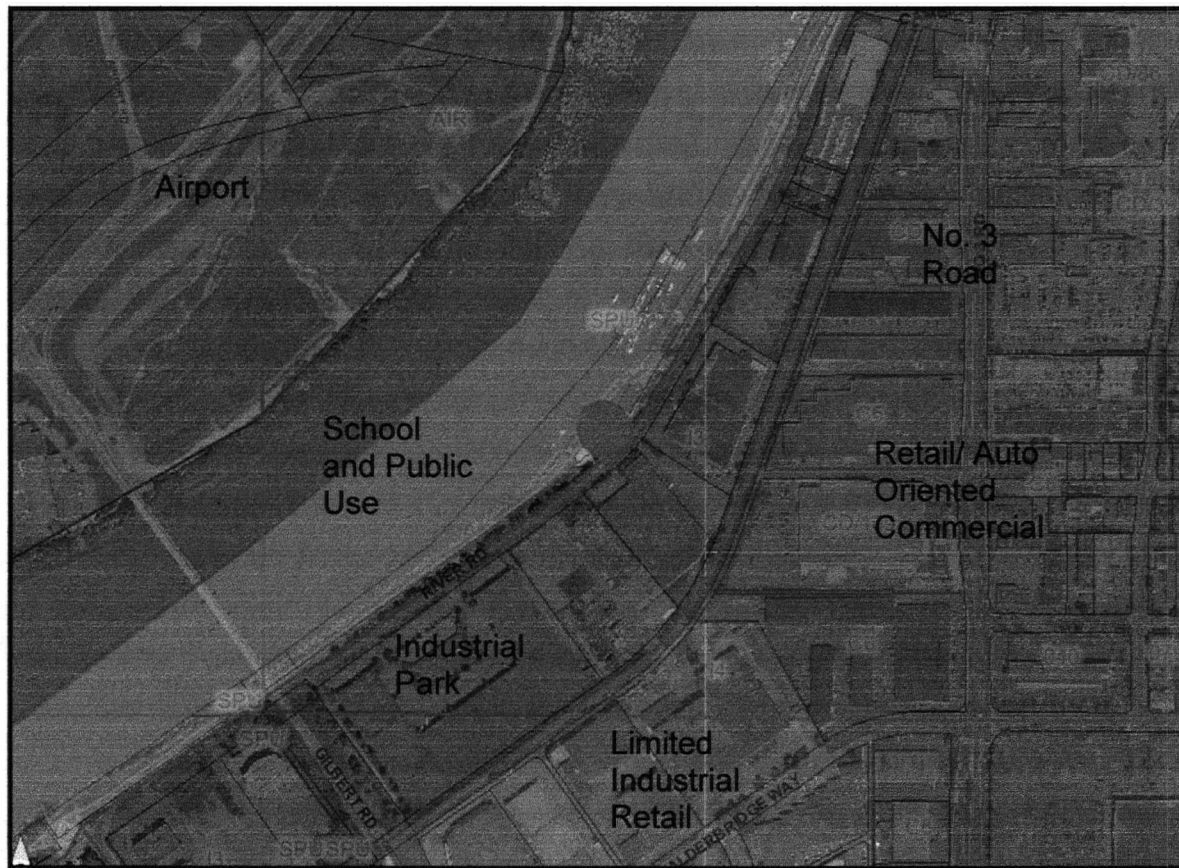


Figure 16: Image Montage of Various Context Scales

The City Centre is centrally located in the north-west corner of Richmond, immediately adjacent to both the Vancouver International Airport and the City of Vancouver. The City Centre is bounded to north by the Middle Arm of the Fraser River providing a riverfront environment immediately adjacent to the urban core.

4.4.2 Existing Zoning



Aerial: www.city.richmond.bc.ca

Figure 17: Existing Zoning and Land-Use

As shown in Figure 17, the urban core of the City Centre is primarily a vehicle oriented commercial and retail corridor. The No. 3 Road is the primary commercial axis throughout this area with all other adjacent land-uses orienting themselves around it. Currently, the existing Industrial Park separates the riverfront environment from the City Centre and provides an effective physical and psychological barrier between the two landscapes. This region will be the focus area of this study, suggesting development proposals directed at both facilitating the predicted urban growth and helping to establish a strong regional character.



Picture taken Nov. 2003

Figure 18: Adjacent Land-Use



Picture taken Nov. 2003

Figure 19: Adjacent Land-Use

4.4.3 Circulation



Figure 20: Existing Vehicle Circulation

Aerial: www.city.richmond.bc.ca

Figure 20 shows the existing major circulation patterns within the riverfront region of the City Centre district. This area is bounded by No. 3 Road to the east, Westminster Hwy to the south, No. 2 Road and Dinsmore Bridge to the north-west, and River Road running along the river edge. Indicated by the red area, is the impenetrable block between No.3 Road and River Road, created by the existing industrial land-use that effectively separates the urban core from the riverfront environment. In following the newly proposed road alignments from the Richmond Official Community Plan, this existing block will be penetrated establishing greater connections to the riverfront. These connections will be a key element in informing design decisions for the riverfront development.

4.4.4 Airport Noise Implications

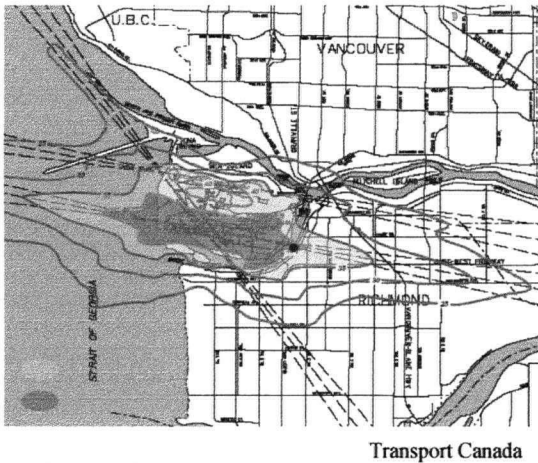


Figure 21: Vancouver International Airport Noise Exposure Forecast



Aerial: www.city.richmond.bc.ca

Figure 22: Site Noise Forecast

The close proximity of the City Centre to the Vancouver International Airport means that noise generated by the continual aircraft traffic is a major consideration in any future development plans. Noise related to aircraft landings and take-offs can be so immense that areas of land directly adjacent to the airport are prohibited from most types of development.

Transport Canada, in conjunction with Vancouver International Airport, conduct intense noise impact surveys and release results to inform appropriate city councils as to what impact the airport noise will have on certain areas. The Noise Contour Forecast (NEF) is produced to encourage compatible land-use planning in the vicinity of airports (Transport Canada).

In conjunction with NEF analysis, Transport Canada releases Land-Use Tables suggesting appropriate development strategies in relation to the existing noise forecast. According to Transport Canada, NEF contours with a 40+ value are not appropriate for any form of residential development but is acceptable for offices and commercial use, suggesting the reason for the existing land-use within the riverfront area (see Figure 21). Although residential development within the NEF values of 35-40 is still unrecommended, certain development strategies such as insulated higher-density buildings (with no private yards) may be acceptable in remediating the effects of aircraft noise (Transport Canada). Although residential development within this region is not the most ideal situation due to the existing noise implications, future residential development should be still be considered. Alternative housing strategies and forms may contribute to unique and interesting community character that could effectively define a new character for the riverfront and City Centre region.

4.4.5 Views



Aerial: www.city.richmond.bc.ca

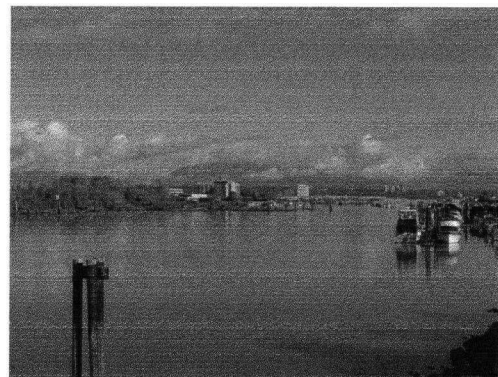
Figure 23: Primary Site Views

The existing views from the riverfront (seen in yellow) are dramatic in both directions. To the north is the North Shore Mountains and to the south, the Fraser River and adjacent bridges. Both bridges provide great views of the river in both directions. Unfortunately, as previously mentioned, the existing road alignments and industrial land-use create a block (seen in red) preventing views from the City Centre towards the riverfront.



Picture taken Oct. 2003

Figure 24: View North-No.2 Rd. Bridge



Picture taken Oct. 2003

Figure 25: View North from Riverfront

4.5 Preliminary Design Framework

The following design interventions for the larger City Centre district, riverfront environment, and Thunderbird Boathouse will be informed by the existing conditions present throughout this region. By building off currently proposed development frameworks laid out within the Richmond Official Community Plan and information provide by the site analysis, the design process for this project will be developed in accordance to key opportunities and constraints inherent to this site.

The design framework will follow six key conceptual objectives:

- 1) City Centre urban development
- 2) Connections between the City Centre and riverfront environment
- 3) Conceptual riverfront open-space plan
- 4) Riverfront Site Design
- 5) Boathouse design and layout
- 6) Detailed site design

By moving site design interventions from a large, all encompassing scale, to a gradually smaller and precise focus, all aspects of development implications from urban development to boathouse location can be explored.

Chapter 5

City Centre Development

5.1 Introduction

This section will explore development potential in the riverfront area adjacent to the City Centre District. Although the whole region will be in developmental transition in the near future, this project will focus on the area west of No. 3 Road, immediately adjacent to the riverfront environment.

The primary objectives of this investigation are to:

- 1) Establish stronger connections between the urban core and No. 3 Road by introducing new roads breaking the physical block formed by the existing Industrial Park
-New road alignments proposed in the Richmond OCP will serve as a developmental framework
- 2) Introduce new land-use throughout the existing Industrial Park area in between No. 3 Road and the Fraser River
-Most of the proposed land-use will be mixed-use (residential and retail/commercial), high-density residential development to accommodate future demographic growth as well improve social and cultural identity within the area
- 3) Introduce strategies focused on relieving developmental constraints on the riverfront because of functional restrictions of the existing dyke
-These strategies will be focused on bringing people closer to the river and its inherent flows, limiting elevation differences between River Road and the riverfront, increasing public open-space along the river, and alleviating developmental restrictions regarding tree planting and river-edge material

5.2 Existing Conditions (Figures on page 30)

Implications

- Existing industrial land-use and surrounding road alignments create an impenetrable physical and psychological block between the urban core (No. 3 Rd.) and the riverfront environment
- The riverfront edge is currently a functional dyke which requires a minimum elevation of 3.5m-4.0m above mean river tidal levels
- Functional restrictions of the dyke require an unerodable edge such as the current rip-rap treatment
- River Road is currently at an average elevation of 1.5m-2.0m, currently

- creating a steep slope up to the riverfront and top of dyke
- Existing Heritage Oak Trees are at an average elevation of 1.5m-2.0m and must be retained

Analysis

- Existing functional dyke edge does not allow any access or connection to the river environment
- Steep rip-rap limits marine vegetation ecosystems
- Existing dyke walkway is a gravel trail which does not match growing urban environment
- Steep slope from River Road and Heritage Oak Trees does not allow for easy access onto riverfront environment

5.3 Development Option A (Figures on page 31)

Implications

- River Road alignment and elevation would remain the same
- New 'urban' walkway character
- Existing slope from dyke elevation to River Road would be modified
- New and existing roads from the urban core will be 'punched' through existing land-use to riverfront
- New mixed-use (commercial/retail/residential) land-use would be developed
- Existing BC Rail corridor would be turned into 4-lane connector road
- Traffic calming measures will be introduced on River Road, forcing through traffic onto new adjacent road

Analysis

Positives:

- Cheapest development option that could be used as a potential 'phase 1' of a long-term development plan
- Dyke would remain in existing position promoting site history and dyke importance

Negatives:

- Elevation difference between River Road and Dyke still an issue
- Future development will have to be at 3.5m-4.0m base elevation creating grade change back to existing River Road
- Functional dyke requirements would still prohibit tree planting and continue to inhibit marine vegetation environments
- Views to river still inhibited by dyke elevation
- Dyke and River Road corridors limit functional community open-space along riverfront

5.4 Development Option B (Figures on page 32)

Implications

- River Road alignment and elevation (up to 4.0m) would be changed
- Functional dyke would be moved back under new River Road corridor
- Riverfront edge would be lowered in certain locations to predicted high-tide levels
- New and existing roads from the urban core will be 'punched' through existing land-use to riverfront
- New mixed-use (commercial/retail/residential) land-use would be developed
- Existing BC Rail corridor would be turned into 4-lane connector road
- Traffic calming measures will be introduced on River Road, forcing through traffic onto new adjacent road

Analysis

Positives

- New River Road alignment creates more community riverfront open-space
- New dyke alignment allows for less developmental restrictions allowing for improved riverfront experience
- Heritage Oak Trees will remain and can become part of ecological corridor
- Raised River Road would match required development elevations
- Views from River Road and future land-use are improved

Negatives

- Would be a costly development option for moving dyke and River Road
- Functional dyke would be hidden from view inhibiting community acknowledgement and education of dyke's role and importance

5.5 Development Option C (Figures on page 33)

Implications

- River Road, along City Centre riverfront, would be detoured into the city centre, creating only pedestrian access along riverfront environment
- Functional dyke would be moved back from riverfront
- Road access would be provided for boathouse and service vehicle use
- Riverfront edge would be lowered in certain locations to predicted high-tide levels
- New and existing roads from the urban core will be 'punched' through existing land-use to riverfront
- New mixed-use (commercial/retail/residential) land-use would be developed
- Existing BC Rail corridor would be turned into 4-lane connector road
- Traffic calming measures will be introduced on River Road, forcing

through traffic onto new adjacent road

Analysis

Positives

- Emphasis on pedestrian environment and circulation
- Maximizing community riverfront open-space
- New dyke alignment allows for less developmental restrictions allowing for improved riverfront experience
- Heritage Oak Trees will remain and can become part of ecological corridor
- Raised River Road would match required development elevations

Negatives

- Riverfront would be less accessible and could become less inviting because of potential spatial dominance by adjacent residential buildings
- River Road provides access, energy, and greater connection between the riverfront and the surrounding community

5.6 Development Option Figures

5.6.1 Existing Conditions



Figure 26: Existing Development Conditions

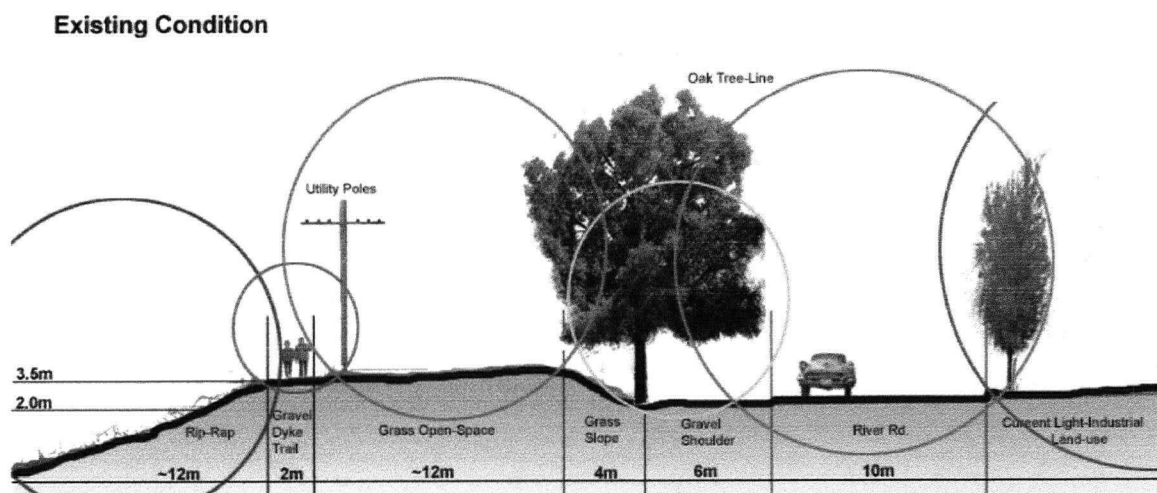


Figure 27: Riverfront Section-Existing Condition

5.6.2 Development Option A



Aerial: www.city.richmond.bc.ca

Figure 28: Development Option A

Development Plan A

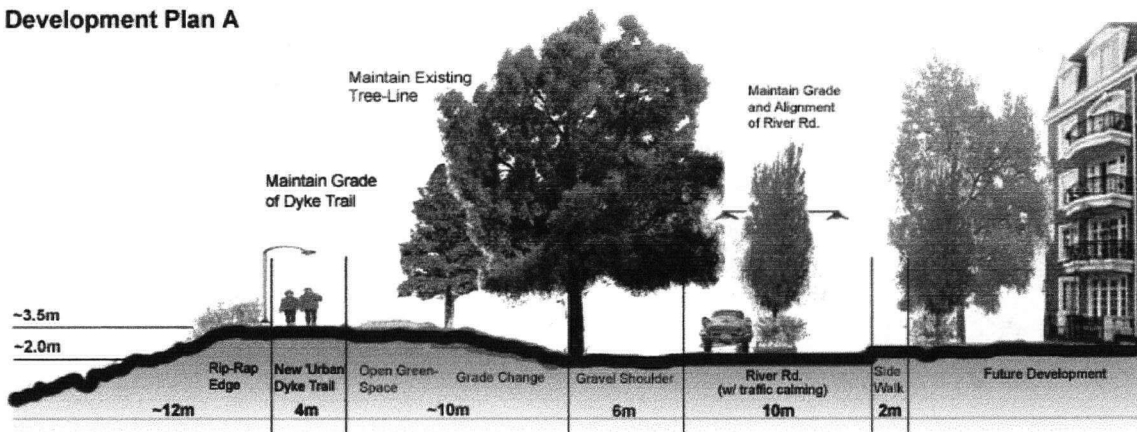


Figure 29: Riverfront Section-Option A

5.6.3 Development Option B



Aerial: www.city.richmond.bc.ca

Figure 30: Development Option B

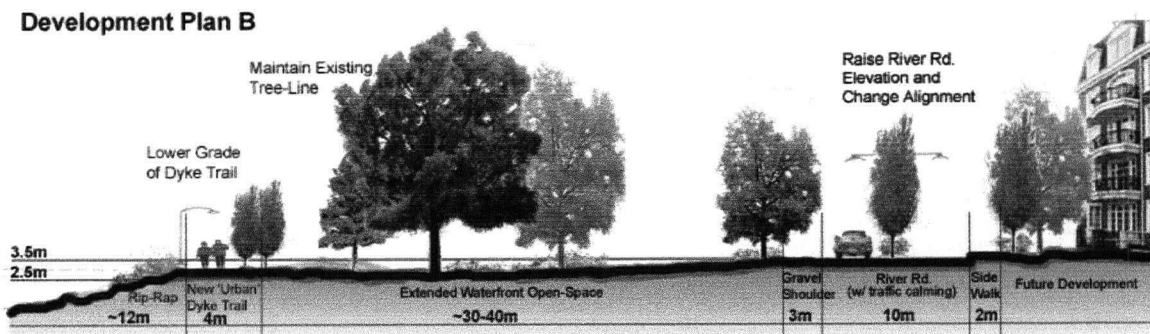


Figure 31: Riverfront Section-Option B

5.6.4 Development Option C



Aerial: www.city.richmond.bc.ca

Figure 32: Development Option C

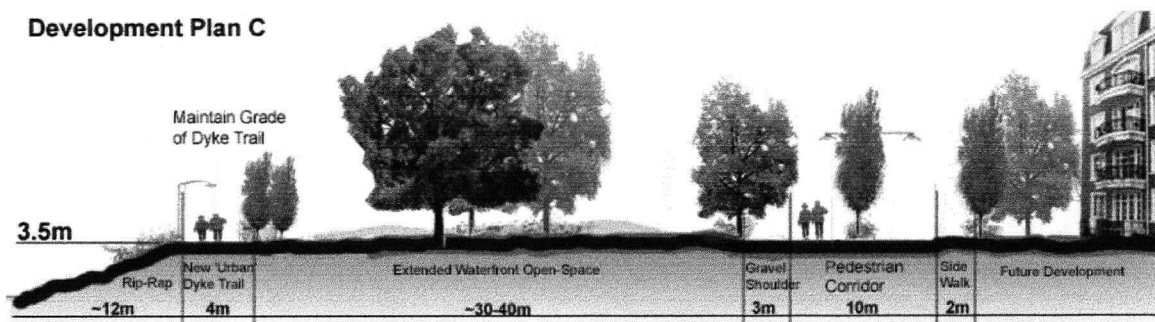


Figure 33: Riverfront Section- Option C

5.7 Development Considerations and Recommendations

Considering all the implications involved in developing the riverfront adjacent to the growing City Centre district, a larger development scheme must be identified and followed throughout the entire design and planning process. In doing so, a strong and sustainable environment can be created in order to meet the growing population and economic demands.

Although all three development options have their inherent strengths and weaknesses, Option B is both the most exciting and beneficial development plan for this region. By realigning and raising River Road, a unique and dynamic riverfront environment can be created, establishing a strong axis from which future development can be oriented. Although moving River Road and changing the existing dyke infrastructure has some financial implications, building a strong and sustainable public riverfront open-space will help foster community identity and potentially raise surrounding land value. It is important when dealing with large-scale development opportunities like the City Centre district, and its adjacent waterfront, to look into the future and establish a strong program and community vision to maintain and foster a continued sustainable urban environment.

Therefore, the following riverfront and Thunderbird Boathouse design interventions will be founded on Development Option B.

Chapter Six

Boathouse Programming and Development

6.1 Introduction

The introduction of the Thunderbird Boathouse facility will be a key feature within the larger riverfront development. Proper implementation into this public open-space environment will be essential in integrating the programming of this facility within the context of a community place and its inherent programming and activities.

The design and layout of the boathouse will be founded by both natural and man-made constraints within the region. It will be essential to develop a design conception for this building that emphasizes the desired character and identity of the future riverfront park environment. In order for this to be accomplished, key site elements and programming elements will be identified.

The development of this facility must be considered in terms of its long-term impact within the community. Although the boathouse will most likely be constructed within the near future, design and layout proposals must consider how this facility will fit within a larger riverfront park redevelopment in relation to a large-scale City Centre redevelopment outlined by Development Option B (page 32). Having said this, the boathouse design and layout must also consider existing conditions along the riverfront dyke environment. It is therefore important to integrate both the long and short-term design implications into the current Thunderbird Boathouse design in order to properly integrate the facility into the both the present and future, potential, riverfront conditions.

6.2 Boathouse Programming and Spatial Requirements

6.2.1 Boathouse Design Requirements

A comprehensive list of Thunderbird Boathouse spatial requirements was established by UBC Properties in conjunction with the UBC Rowing Club (UBC Properties 1-4). Although all requirements will be used to inform all boathouse design considerations, the following list indicates the most important requirements relating to the facilities implementation into the riverfront environment:

1) Boathouse Spatial and Programming Requirements

5 Boatbays

-3 for 8+s	22'x80' each (6.7m x 24.5m)
-2 for smaller boats	18'x80' each (5.5m x 24.5m)
-Repair Workbay	14'x80' each (4.3m x 24.5m)
<u>-Total</u>	<u>94'x80' (35.4m x 24.5m)</u>

Large Change Rooms

-men's

- 3 toilets
- 2 urinals
- 3 sinks
- 6 shower heads
- change space
- 50-60 half size lockers
- Approx. 600sq/ft (55sq/m)

women's

- 4 toilets
- 4 sinks
- 6 shower heads
- change space
- 50-60 half size lockers
- Approx. 600sq/ft (55sq/m)

-Total

1200 sq/ft (110sq/m)

Team Meeting Rooms

-2 Meeting Rooms

300sq/ft each (28sq/m)

-Total

600sq/ft (56sq/m)

Offices

-3 Offices

150 sq/ft each (14sq/m)

-Total

450 sq/ft (42sq/m)

Social Space

- Small apartment for caretaker
- Lounge area- social area for: banquets, weddings, waiting area for parents, (accommodate groups of people up to 120)
- Workout/flex room- this area should be a flexible space that can be opened to accommodate large social functions
- Men's and Women's washrooms
- Bar
- Small Kitchen
- Storage room for training equipment etc.
- Trophy area
- Patio Space

Total

5050 sq/ft (470 sq/m)

2) Adjacent Open-Space Requirements

- Dock: approximately 8700 sq. ft. (800m/sq)
 - Dock length should be approximately 70m long by 6m wide to accommodate rowing events and training
- Access Ramps: At least two access ramps from the boathouse to the dock

3) Parking Requirements

Weekday and Saturday Mornings	50
Weekday/ Mid-day	24
Weekday/ Afternoon	90
Events	320

Boat Trailers- would need to be parked in close proximity to boathouse with space for the trucks that tow them (Approximately the size of 50 Vehicles)

Note: Although most of the everyday parking would ideally be on site, event and excess parking could potentially be accommodated within the immediately surrounding area.

6.2.2 Additional Recommendations

Further programmatic requirements and recommendations were made by Mike Pearce (Pearce), the UBC Men's Rowing Coach. These suggestions are very important in understanding spatial requirements for rowing activities within and surrounding the Thunderbird Boathouse facility:

Building Design

- Large deck to accommodate shell preparation and event gathering
- At least two (preferably three) dock access ramps from the boathouse to accommodate large circulation flows to and away from the dock during events
- Storage of equipment adjacent to facility (dragonboats, coaching boats, equipment storage shed)
- Boathouse orientation on dyke to maximize viewing potential
- Boathouse orientation and design on dyke to minimize dock extension into river

Adjacent Open-Space Requirements

- Day-to-day parking required immediately adjacent to boathouse (with handicapped parking)
- Event parking must be accommodated by surrounding area (existing parking lots at adjacent commercial businesses and along River Rd.)
- Rowing trailer parking and event area requires long linear lane with adjacent informal open-space for event preparation and team 'bases' (i.e tents, bar-b-q's, rest areas etc.)
- Clear path from team 'bases' to deck and dock access
- Clear and designated pedestrian access and entrance from River Rd.

Dyke Landscape

- Informal spectator areas (enhancement of dyke rip-rap, burms or other elevation treatments to accommodate viewers)
- Formal viewing nodes at key locations along dyke trail to strengthen connection of dyke and its users to rowing events

Security

- Restricted dock access at night
- Restriction of public trespassing when facility is closed without large fencing, gates, etc.

6.3 Boathouse Development Implications

The positioning of the Thunderbird Boathouse, in consideration of all its required programmatic elements, will be important in integrating the facility into the surrounding landscape now, and in the future. Some key landscape implications must be considered in finding the appropriate fit within the riverfront environment.

Although current riverfront edge conditions will be eventually altered resulting from the proposed Development Option A, the Thunderbird Boathouse will be developed long before the resulting changes will occur within this area. Because of this, the initial implementation of this facility must first be developed in response to current conditions.

Following is a description of key implications regarding this development.

6.3.1 Boathouse Footprint

According to the boathouse spatial requirements laid out by UBC Properties (UBC Properties 1-4), the minimum boatbay footprint would be 24m x 35m (if boathouse facilities were positioned on top of boatbay). This spatial requirement has important implications into the positioning of the boathouse on the existing dyke edge. As space on the dyke open-space is limited and must therefore be preserved for other programmatic elements, the boathouse structure should project out from the dyke edge as much as possible. This boathouse positioning out into the river then becomes an important consideration as there is only a 50m distance between the dyke edge and the Headwater Line. This projection constraint into the river is important when considering that there must be at least a 16m distance allocated for dock access from the boathouse if the ramps are to maintain a grade less than 30% when the dock is at low tidal levels (5m elevation).

With this in mind, the boathouse can be aligned in one of two possible options. The first would be to line the boathouse lengthwise along the dyke edge thus allowing for the least amount of projection into river (Figure 34: Boathouse 1). This alignment would mean that the boatbay doors would be facing the dyke/ riverfront open-space and skulls/ boats would therefore be brought in an out in that direction.

The second option would suggest aligning the boathouse perpendicular to the dyke edge and projecting the facility lengthwise into the river (Figure 34: Boathouse 2). This alignment would mean that skulls/ and boats would be accessed from the side of the building away from the dyke/ riverfront open-space.

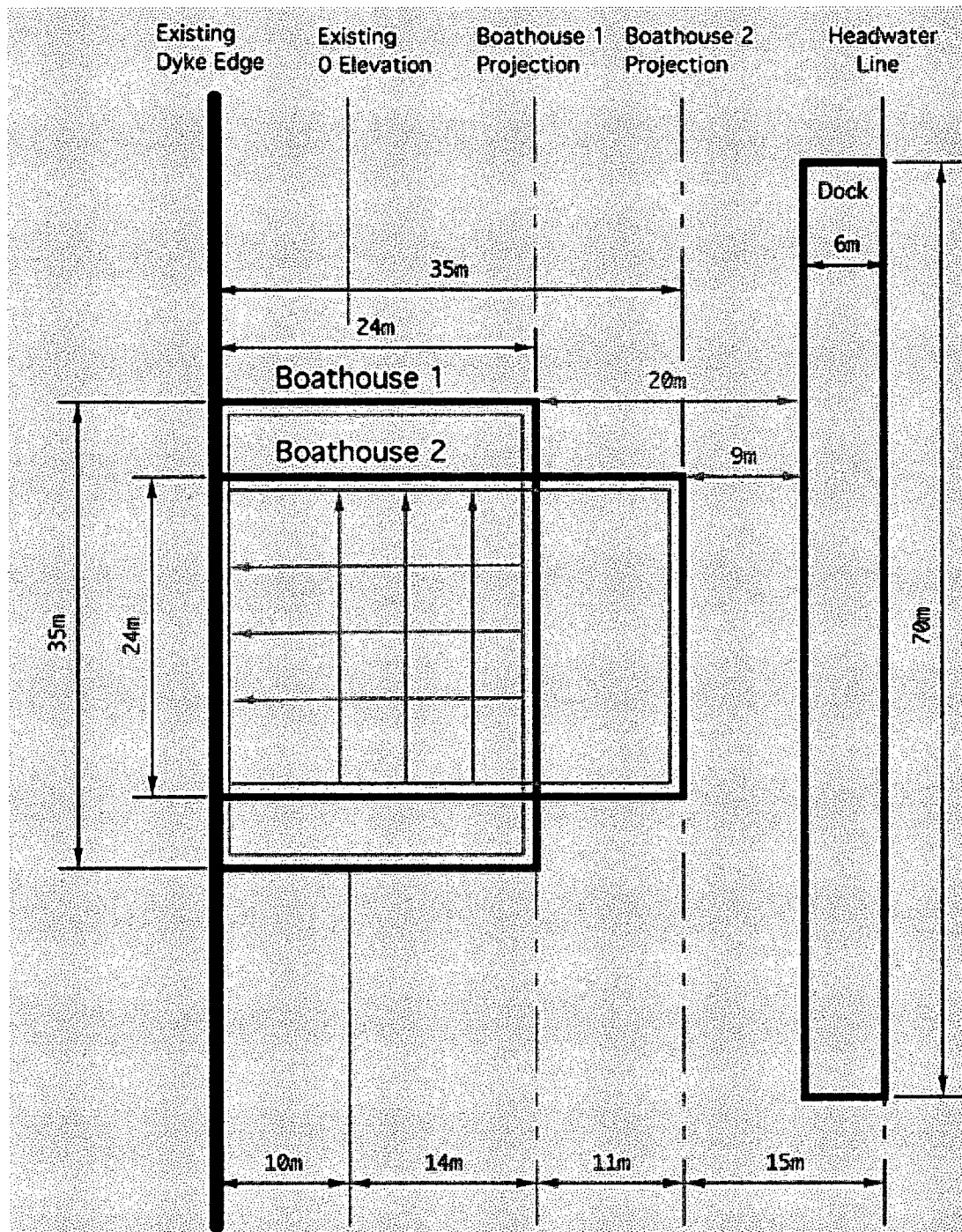


Figure 34: Boathouse Footprint Analysis

Boathouse 1 Layout:**Positives:**

- Projection into river is only 24m allowing for increased space for decks and ramps
- Boatbay facade onto dyke would be more interesting with boatbay doors

Negatives:

- Boatbay footprint is large along dyke edge
- Shells/ boats would have to be accessed via dyke open-space and then carried around building to dock access ramps

Boathouse 2 Layout:**Positives:**

- Boatbay footprint is minimal along dyke edge
- Shells/ boats would be accessed on the side of the building, closer to decks and dock access ramps

Negatives:

- Boatbay projects 35m into river leaving little room for dock access
- Boatbay facade would be less interesting along dyke edge

See *Figure 35: Boathouse Projection Analysis* on page 41.

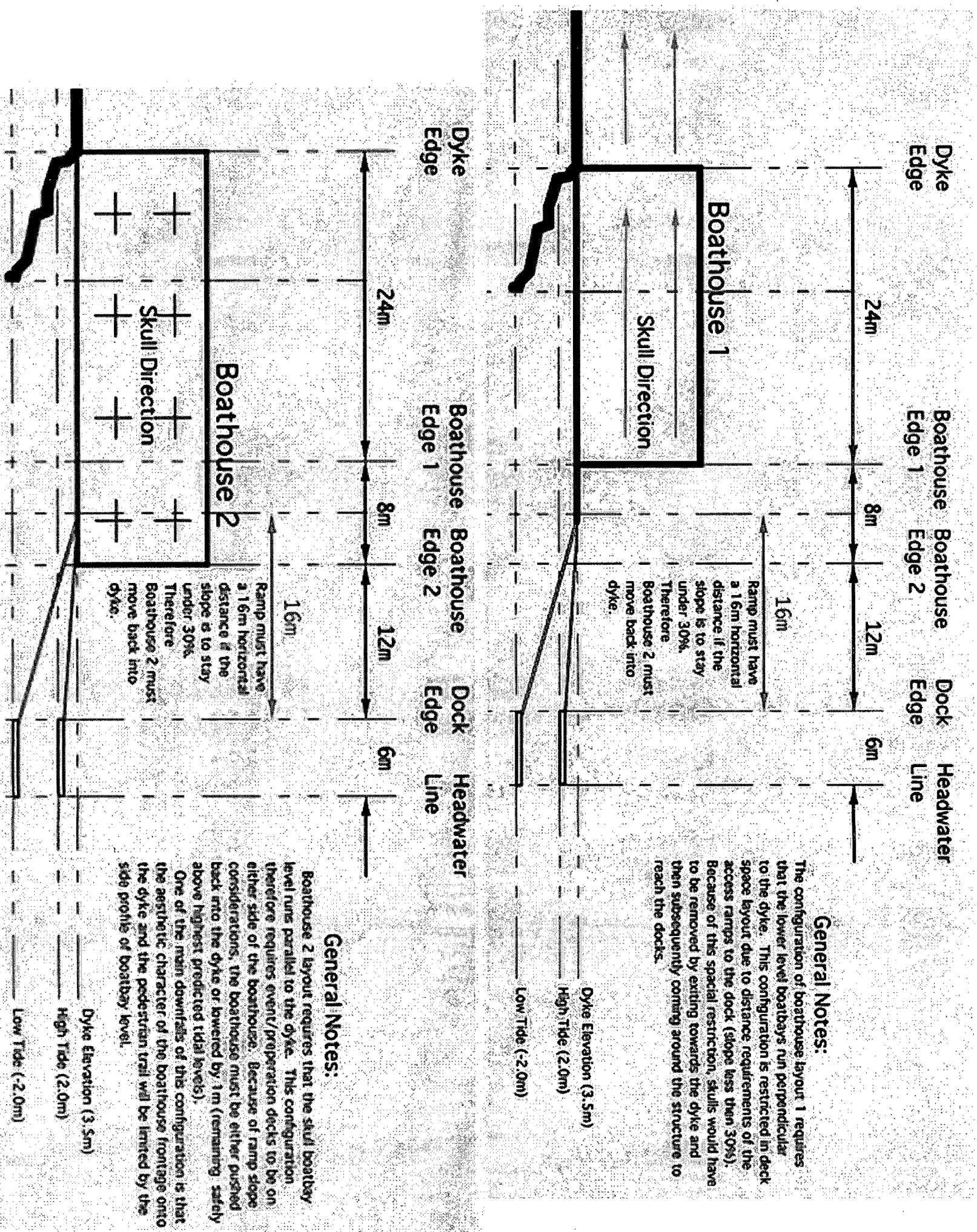


Figure 35: Boathouse Projection Analysis

6.3.2 Boatbay Height Requirement

The boatbay must be a minimum of 4.5m high to properly store all rowing equipment. To minimize the overall boathouse footprint while accommodating required building programming, existing boathouse proposals suggest building a second floor on top of the boatbay structure. Although attempting to minimize the building footprint is favourable in most development conditions, the addition of a second floor on top the 4.5m high required boatbay height immediately suggests that the boathouse would be a relatively high building structure along the riverfront environment. This building model may be problematic in attempting to develop a structure that fits into both existing and future riverfront open-space.



Figure 36: Two-Floor Boatbay Projection

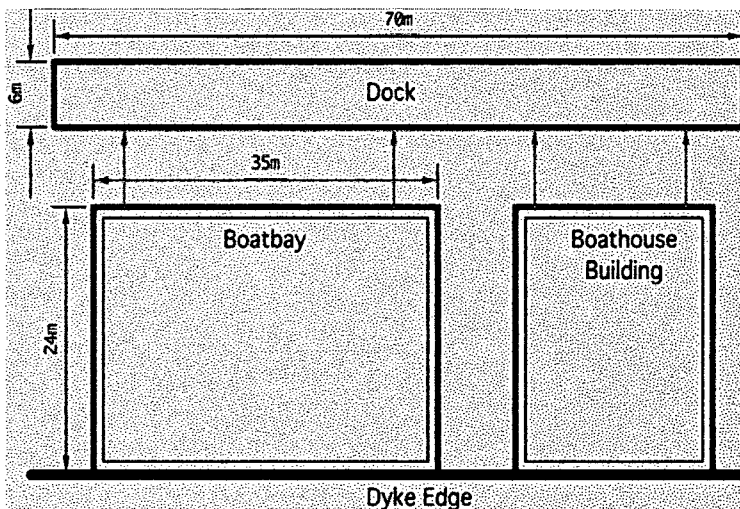


Figure 37: Split Building Layout

Considering that the dock will be around 70m in length along the river-edge, the boathouse footprint along the dyke could also potentially be the same distance. This length would provide enough area for both the buildings as well as ample deck and preparation space. Because this layout stretches the building footprint along the dyke edge, it will be essential to integrate the boathouse decks and access ramps with the dyke or riverfront open-space and pedestrian walkway environment.

To mitigate the potential awkwardness of the currently proposed boathouse height, it may be beneficial to split the proposed building structure into two separate buildings. The separation of the boatbay from the boathouse facility, creating two separate buildings, could then also facilitate many exciting and dynamic building design opportunities.

6.4 Development Considerations and Recommendation

In recognition of all of the spatial and programmatic elements inherent with implementing the Thunderbird Boathouse on the City Centre riverfront, the following boathouse design framework will be used for this project. First, the boathouse will be split into two separate buildings. This layout allows for a more unique and exciting building design opportunity. Although this design requires a larger footprint along the dyke/ riverfront edge, certain design interventions can be made to fully integrate this facility within the riverfront environment. It is felt that this will be a much more exciting and interesting design opportunity than the previously proposed two-storey structure.

Secondly, the boatbay structure (24m x 35m) will follow Boathouse 2 Layout, positioning the boathouse perpendicular to the dyke edge. Although this alignment requires that the boatbay projects further out into the river, the benefits of freeing-up more space for a large deck and viewing are much more essential in integrating the boathouse facility within the riverfront environment.

See *Figure 38: Boathouse Sections: Design Proposal* on page 44. These sections demonstrate a design proposal integrating both the boathouse footprint alignment and layout. The sections also suggest a deck, ramp, and dock design responding to the proposed Thunderbird Boathouse layout.

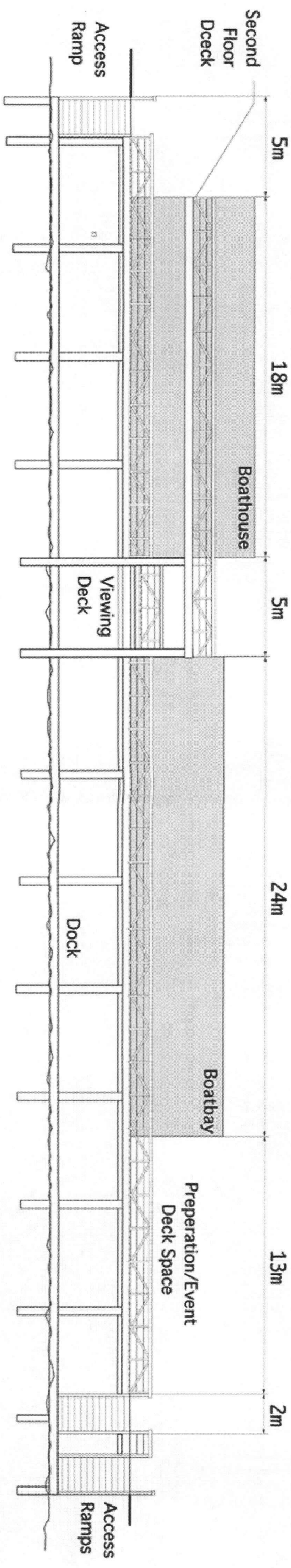
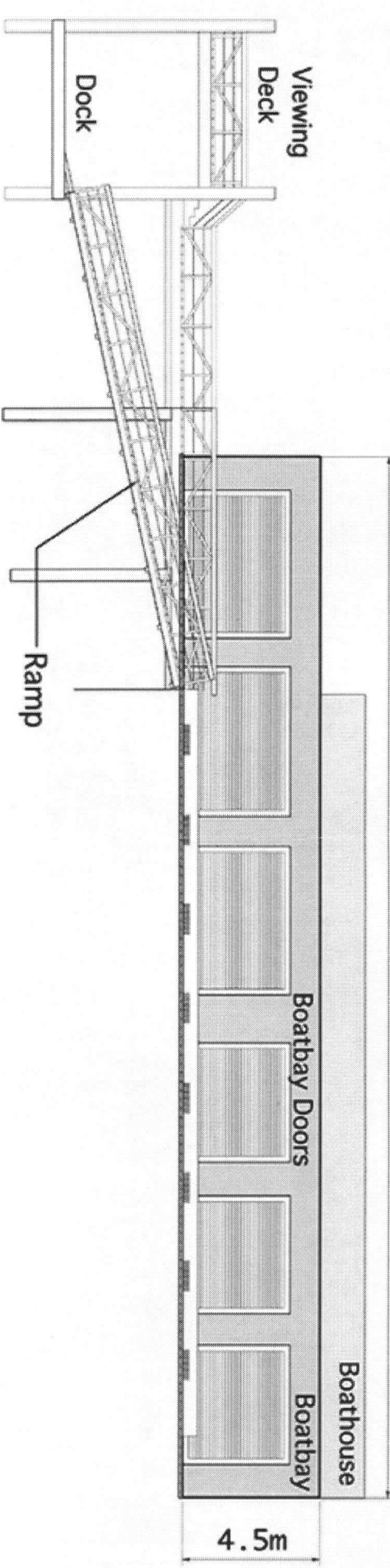
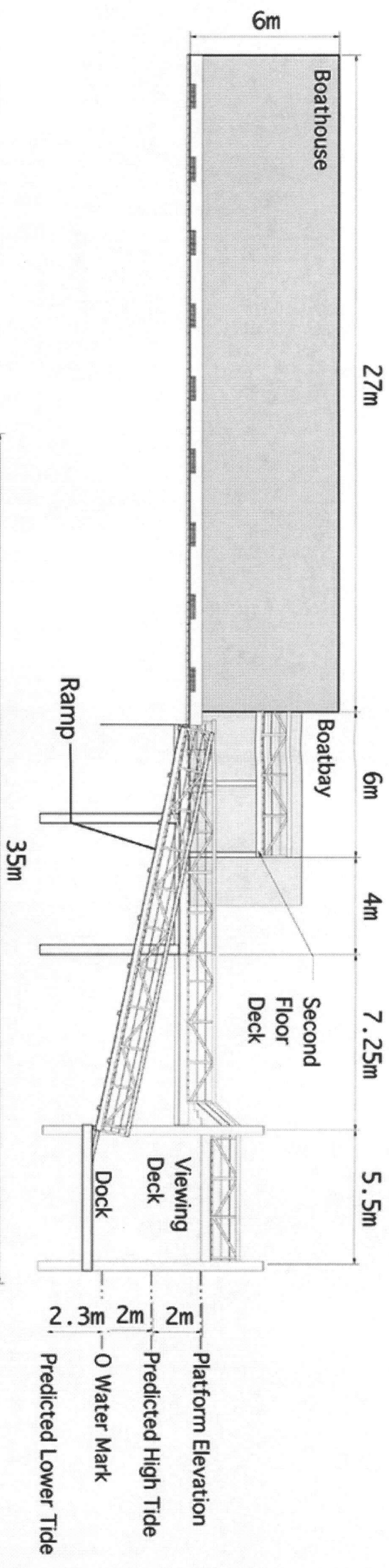


Figure 38: Boathouse Sections- Design Proposal

Chapter Seven

Thunderbird Boathouse Riverfront Design

7.1 Introduction

The design of the City Centre riverfront, in conjunction with the implementation of the Thunderbird Boathouse is informed by both existing and future site conditions. Boathouse layout implications also informed how the space immediately surrounding the boathouse and its connections to the surrounding landscape would be formed (see section 6.4, page 43). It is imperative to integrate the current and predicted/ proposed landscape conditions in order to develop a boathouse facility that complements the City Centre now, and into the future.

This design focused on the riverfront and surrounding land-use immediately adjacent to the City Centre urban core (No. 3 Road). Upon selecting a large-scale developmental plan for the region (Development Option B), the next step is to investigate the riverfront and its connection to the Thunderbird Boathouse.

To create a well recognized and identifiable riverfront park, an overall conceptual image for this public-open space was created. This image was founded on developing stronger connections from the City Centre to the riverfront while bringing people closer to the river environment (see *Figure 39*). This conceptual image was then used to inform a more detailed examination of the area immediately surrounding the boathouse facility (*Figure 39-Detailed Site Design*).

Site Context

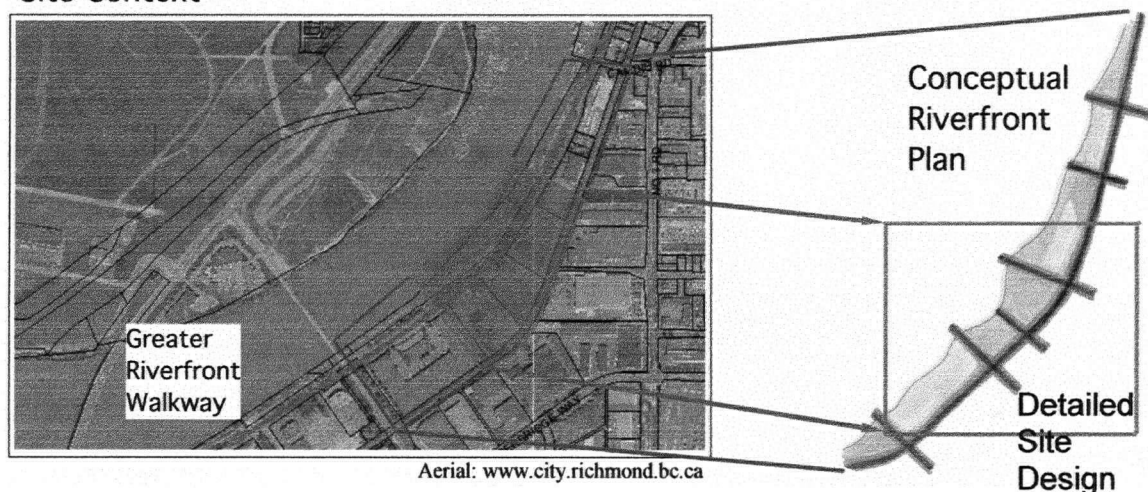


Figure 39: Conceptual Riverfront Plan

The following sections will introduce the development proposal for the City Centre riverfront development immediately surrounding the Thunderbird Boathouse.

7.2 Site Design

7.2.1 Key Design Factors

The riverfront site design was based on previously indicated site conditions and analysis. The most important guiding principles are as follows:

- 1) Realigning River Road and raising its elevation to 4.0m within the City Centre riverfront area while repositioning the functional dyke under this new corridor
- 2) Follow and express proposed road development and circulation options developed in the Richmond Official Community Plan
 - *Change the existing BC Rail Corridor into 4-lane connector street*
 - *'Punch' through new and existing roads from the City Centre to the River Road and the riverfront environment*
- 3) Maintain existing Heritage Oak Tree corridor running adjacent to riverfront
 - *Maintain 1.5m-2.0m elevation of Heritage Oak Trees*
- 4) Introduce an 'urban' character to riverfront walkway along City Centre riverfront
- 5) Increase public-open space and connection to the riverfront environment
- 6) Bring community closer to the riverfront environment by lowering river-edge elevation to predicted high-tide river levels in certain areas allowing for access to the river

The implementation of the Thunderbird Boathouse is also key in developing a well recognized, functional, and connected riverfront environment. The most important guiding principles for the Thunderbird Boathouse are as follows:

- 1) Boathouse development will be built on the existing dyke/ riverfront Environment with all its inherent landscape conditions
 - *Dyke elevation of 3.5m from mean tidal levels*
 - *Limited dyke/ riverfront open-space*
- 2) Boathouse design and implementation must consider future riverfront Redevelopment and character
- 3) Boathouse programming and layout must be well integrated within the Existing and proposed riverfront open-space

7.2.2 Site Plan

The site design of this area was intended to create a new riverfront environment that would help to define the character of the City Centre district in Richmond. This design followed 7 main objectives to serve as a means of guidance in developing an area that properly serves both the community and Thunderbird Boathouse facility.

- 1) Develop the riverfront as a more intensive urban, people-oriented area which complements the predicted urban growth of the adjacent City Centre district
- 2) Provide a public-open space that provides for both large community-cultural gatherings as well as everyday public use
- 3) Develop the riverfront to serve as a magnet drawing people to the heart of the city
- 4) Construct a new walkway with a more 'urban' character strengthening its connection to the adjacent area while still maintaining a strong connection to the greater waterfront walkway system
- 5) Provide a variety of open-spaces ranging from paved areas suitable for large public events, grass open-spaces for play, viewing areas for rowing and scenic observation and sunning
- 6) Provide for handicap access throughout the riverfront environment
- 7) Develop a unique and well-integrated Thunderbird Boathouse that will serve a hub for the riverfront and help define its character
- 8) Finally, design a riverfront that serves as a place of pride and enjoyment for the City Centre community

See *Figure 40: Site Plan* on page 48

See *Figure 41: Site Plan in Existing Context* on page 49

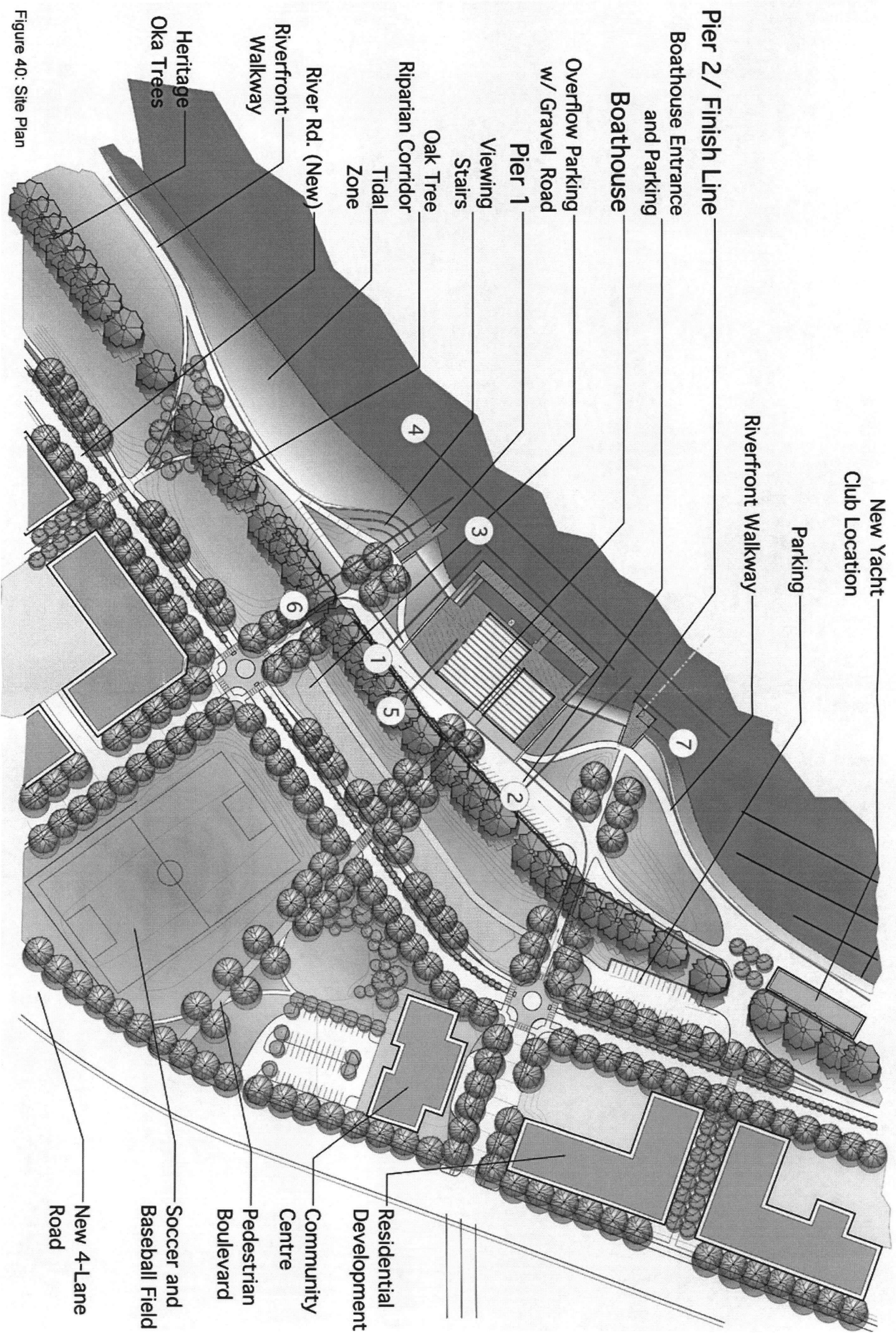




Figure 41: Site Plan in Existing Context

7.2.3 Site Elevation

The elevation throughout this site is an important factor in determining how the riverfront environment will be designed. Obviously the first and most important consideration along this riverfront is maintaining a functional dyke to mitigate flooding and river tidal levels. This elevation of 3.5m-4.0m determines the height of the newly aligned River Road and governs the nature of the elevation difference between this corridor and the riverfront edge.

Secondly, in maintaining the existing Heritage Oak Tree corridor, a 1.5m-2.0m elevation must be maintained along this linear stretch of the riverfront development. This implies that in some areas of the riverfront there will be at least a 1.50m difference in elevation between River Road and the Oak Tree corridor.

The elevation of the existing dyke is important to note when considering the development of the Thunderbird Boathouse into the existing landscape. Because the boathouse facility will be built on the existing dyke (3.5m elevation) then future riverfront design proposals must also inherit this riverfront edge elevation around the boathouse building. This boathouse elevation is also important when considering that the Heritage Oak Tree corridor (just 30m away) will maintain an elevation of 1.5m-2.0m. This change in elevation within a relatively short distance creates an interesting landscape and challenge in facilitating all programmatic elements within the riverfront environment.

General Elevation and Grades

- -3.5m -4.0m
-Limited Slope
- -1.5m-3.5m
-Flat and Sloping Ground

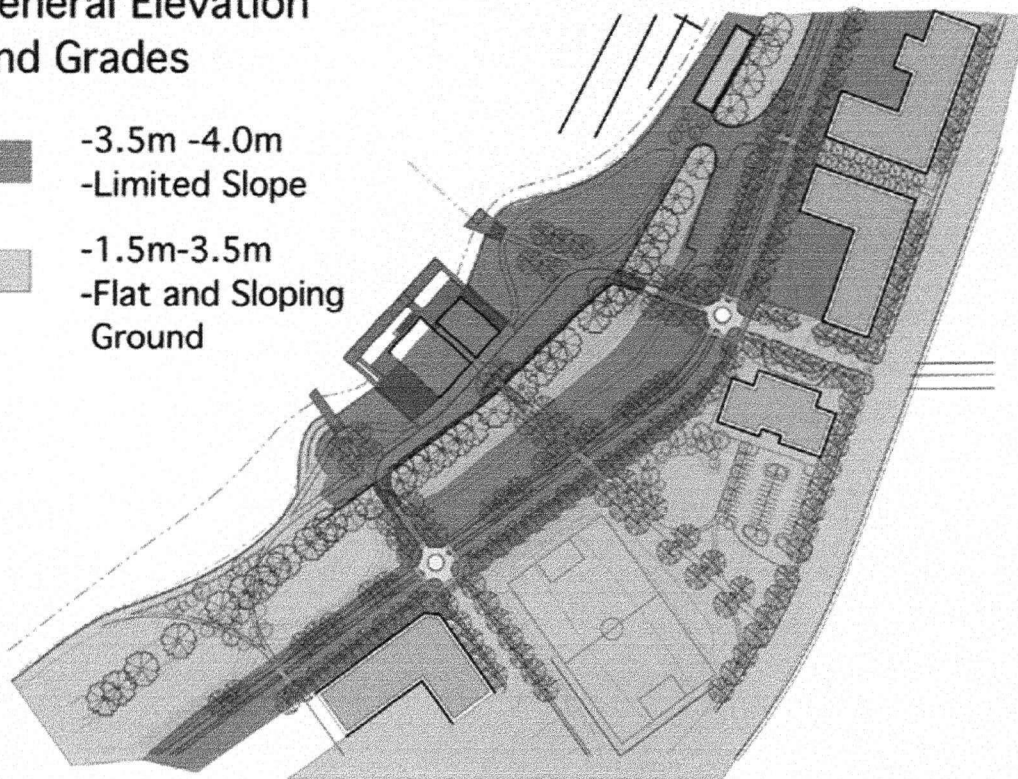


Figure 42: Site Elevation and Grades

7.2.4 Circulation

Site circulation was important in determining the energy flows throughout the site. Both vehicle and pedestrian circulation dominate the site as both River Road and the riverfront walkway govern the creation of space.

The form of the riverfront design was based on the new alignment of River Road and the new connecting streets coming from the City Centre to the riverfront. By accentuating these connecting streets through into the riverfront park, a stronger physical and phenomenological connection between the river and the urban core will be established. Vehicle and pedestrian circulation is also important in integrating the Thunderbird Boathouse within the riverfront open-space.

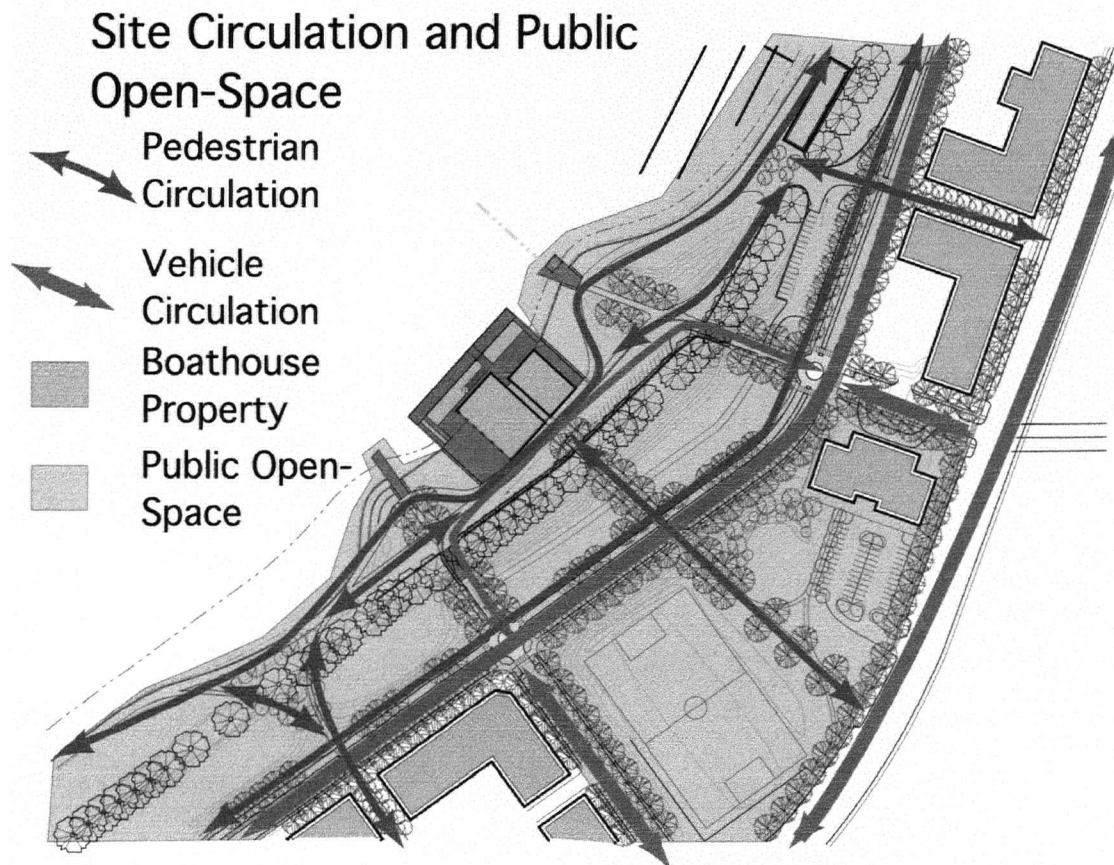


Figure 43: Site Circulation and Public Open-Space

7.2.5 Parking

Parking requirements within and around the Thunderbird Boathouse are important programming and spatial requirements in the site plan. It is important to integrate the parking within the riverfront development and allow for these spaces to complement the surrounding landscape instead detract from the overall character. For this reason parking was spread throughout the site preventing a large awkward parking lot. Everyday boathouse parking will be accommodated in the parking lot immediately adjacent to the boathouse facility and in the overflow-trailer lot located on the other side of the Oak Tree riparian Corridor. Event Parking will be accommodated throughout the site within the designated parking areas, street parking, and potential shuttle service.

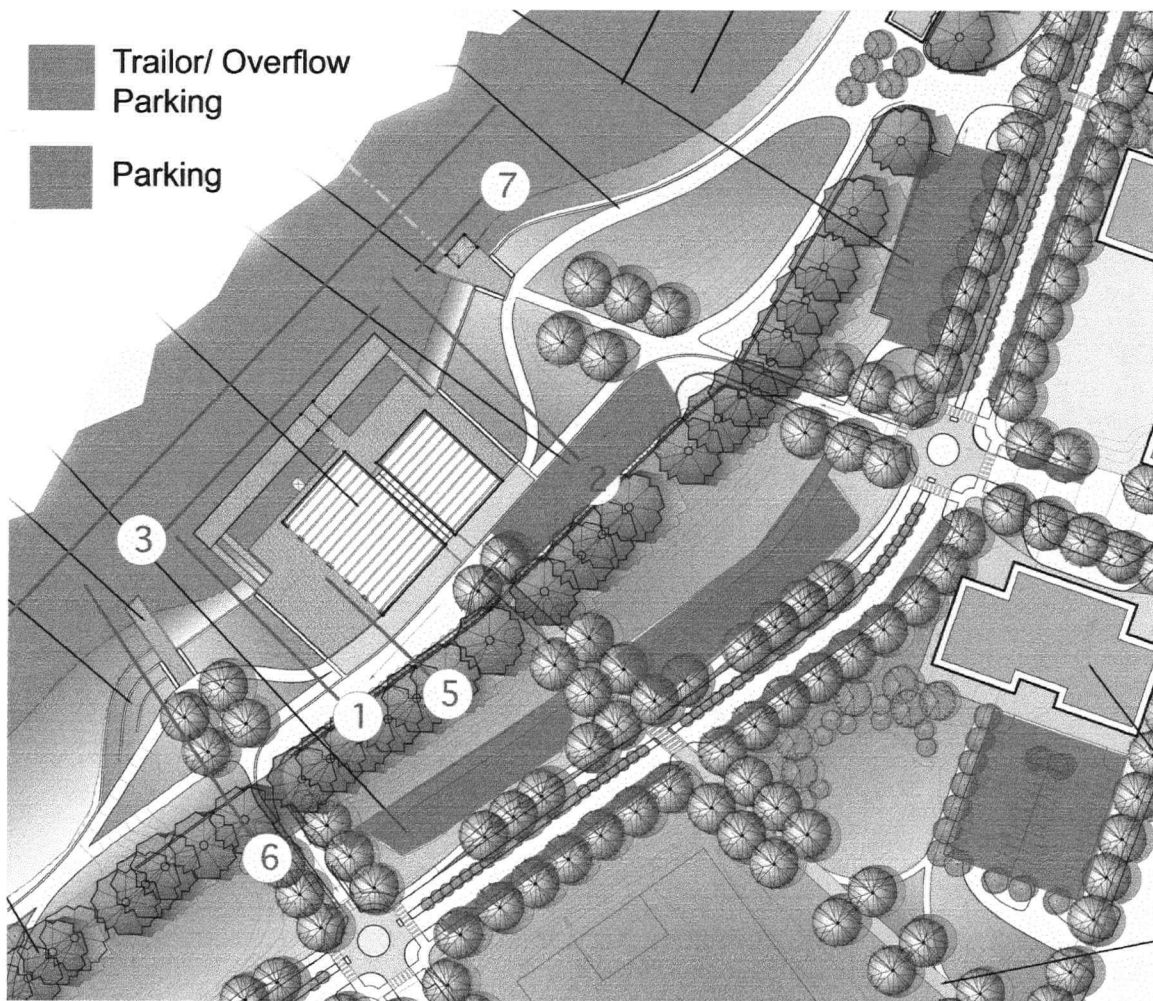


Figure 44: Site Parking Locations

7.3 Site Detail

7.3.1 Boathouse Plaza

See Figures: 45 (page 56) and 46 (page 57)

The Thunderbird Boathouse Plaza is a very important area and hub within the larger riverfront park design. It is an area in which vehicle circulation, the riverfront walkway, and the building entrance all come together.

One of the most important factors in developing this area is integrating the boathouse layout and programming with the pedestrian oriented riverfront walkway. It is essential to delineate the Thunderbird Boathouse plaza along the walkway without creating an environment that is confusing for the walkway users passing through the space. In order to deal with this situation, the plaza is one level, with no curbs and sidewalks to express the pedestrian dominance of the area. A simple change in paving material from the concrete walkway to the plaza paving stones would signify the plaza space, while bollards, signage, and lighting (Oar-lights) would allow the user to see that the riverfront walkway, in fact, is the dominant spatial flow within the area. The walkway priority is also established by designating the walkway path the overriding spatial element by cutting into the boathouse Preparation/ Event Deck on the southern side of the boathouse plaza.

Aside from the pedestrian boulevard trees, this space must remain relatively clear of all vertical obstructions to facilitate the maneuvering of rowing shells from the trailer parking area, over the bridge, through the boathouse plaza, and down the dock access ramps.

The main pedestrian entrance to the plaza from River Road and the overflow-trailer parking area accentuates the continuous linear axis running through the site from the Community Centre and Sports Fields to the Thunderbird Boathouse and out into the boathouse Viewing Deck. A bridge, similar to the two vehicle access bridges on either side, brings people across the Oak Tree Riparian Corridor into the plaza area.

7.3.2 Pier 1

See Figures: 47 (on page 58) and 48 (on page 59)

Pier 1 is formed by the proposed continuation of Minoru Blvd. from the City Centre to River Road. By continuing this axis, a strong physical connection is established between the urban core and the riverfront environment. This connection is accentuated by a pier that brings people out over the water.

This area serves as both an informal resting and sunning area (in the grass open-space and viewing stairs) to a community and rowing event space (spectator viewing on viewing stairs and pier, open-space for events, and large Event/ Preparation Deck). Both the pier and Event/ Preparation deck are formed by large concrete seating blocks. These blocks serve as both a spatial separation and functional element within the landscape.

The Pier 1 area will be the central activity area for all the Thunderbird Boathouse programming requirements. The large deck adjacent to the boatbay doors provide an ideal event and preparation space. This space is also the central circulation hub for rowing events, as shells will be continually moving up and down the dock access ramps. The integration of this area with the adjacent public open-space allows for the boathouse facility to be a connected element within the landscape as well provide a place of interest for people within the park.

Viewing stairs take advantage of the sun exposure, while bringing people down to the water level establishing a stronger connection to the river environment.

7.3.3 Pier 2/ Finish Line

See Figures: 49 (on page 60) and 50 (on page 61)

Pier 2, again, accentuates the physical connection established by the continuation of the proposed connector street (Leslie St.) from the City Centre to River Road. This connection is again accentuated by a pier at the riverfront edge. Although similar to Pier 1, Pier 2 is larger to accommodate larger crowds for viewing rowing events as it will be situated at the primary finish line along the rowing course. For this reason, this space is important in emphasizing the rowing events along the river.

To signify this axis as the all important finish line, a shelter has been implemented to signify its location to both the rowers on the water and people within the riverfront area. This shelter is accentuated by tall poles allowing people to see this place from various locations; most importantly, all the way down the Leslie St. corridor from River Road and beyond into the City Centre urban core.

Pier 2 also provides plenty of open-space for both formal and informal community activities.

7.4 Site Character

It is important to establish a strong continuous site character throughout the riverfront open-space and Thunderbird Boathouse location. Beyond creating an overall site image for the riverfront, detailed elements throughout the site must convey a sense of unity.

One of the most effective ways of establishing a unified character is to maintain an identifiable palette of materials throughout the riverfront environment (see *Figure 51: Precedent Images and Materials*, page 62).

One example of this is the Oar Lighting detail (seen in *Figure 48* page 59, and *Figure 50* page 61), which emphasizes the importance of the Thunderbird Boathouse within the riverfront environment as well provide a continual marker and signal into the overall character of the area.

7.5 Conclusion

As the City of Richmond grows and continues its transition into a progressively urban landscape, many development opportunities will arrive providing exciting and challenging design interventions, both large and small. Nowhere will this be more apparent than within the City Centre district where the existing strip-mall and industrial land-use will gradually change into higher-density residential and commercial/ retail land-use. This transition will become all the more apparent in the advent of the proposed introduction of the Rapid Transit Line running down the unofficial Main Street in No. 3 Road. Considering the potential redevelopment of this region, the adjacent riverfront will become an important public-space in which the identity and the character of the area may be fostered.

The intention of this thesis was to provide a full-scale examination of the potential of the riverfront redevelopment within this region. Further, this thesis focused on the development and implementation of the currently proposed Thunderbird Boathouse along the shores of the existing dyke/ riverfront edge and its role and place within a larger riverfront redevelopment design. This facility will provide a central hub within the existing and future riverfront environment, establishing an *axis mundi* from which the community can identify and orientate themselves around.

In order to understand and develop a comprehensive design proposal for the Thunderbird Boathouse and adjacent riverfront, this thesis first examined redevelopment options for the City Centre district and then applies this analysis into the creation of a new City Centre riverfront environment. Within this context the design, layout, and implementation of the Thunderbird Boathouse is explored, focusing on connecting this facility within its existing and future landscape.

In establishing the riverfront as the central social and cultural axis from which the adjacent urban environment can orientate, the cultural strength, character and sustainability of the region can continue into the future for later generations.

7.6 Figures and Images

The following pages are site design details and images.

Boathouse Entry Plaza and Dyke Walkway

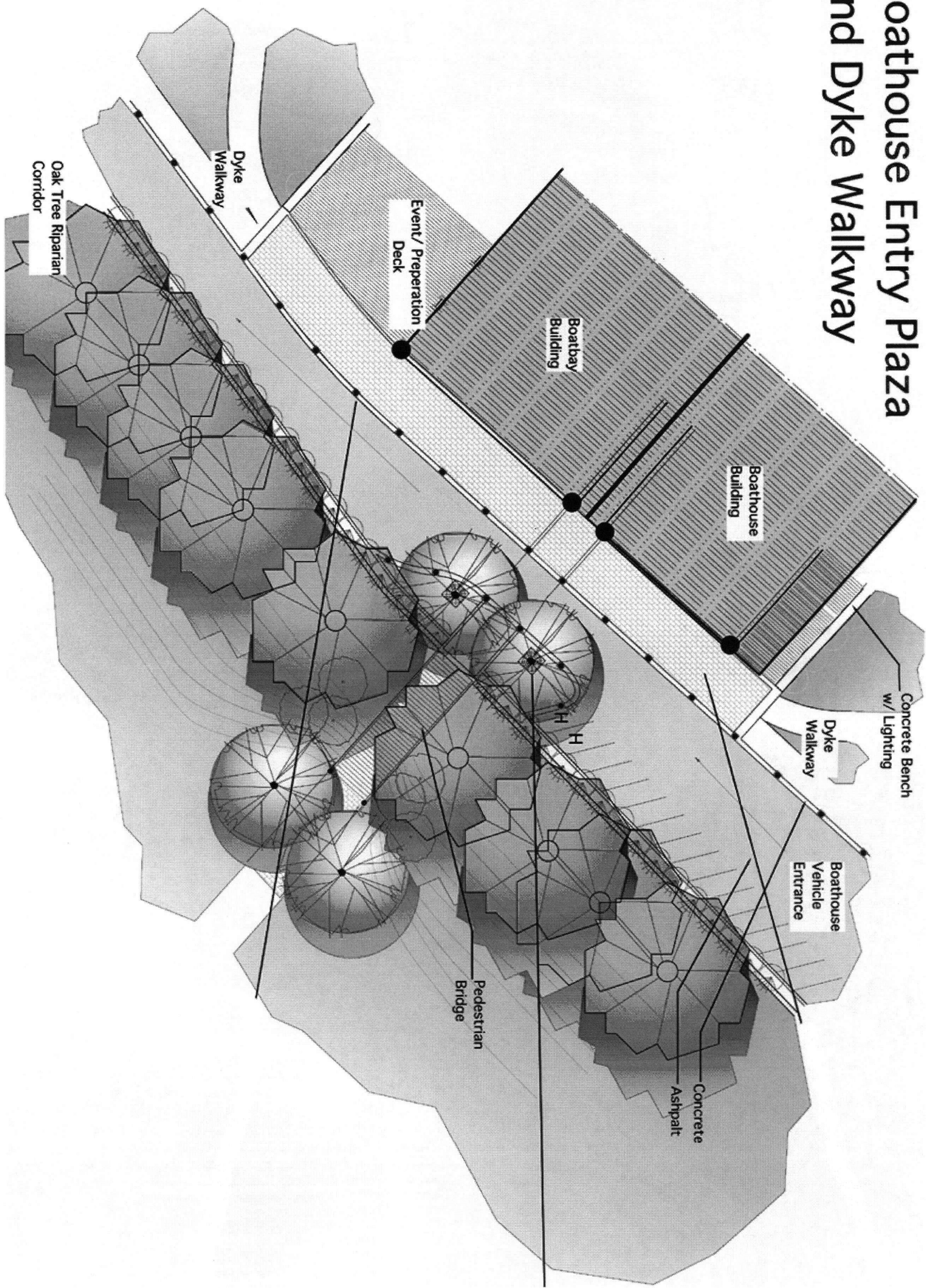


Figure 45: Boathouse Plaza

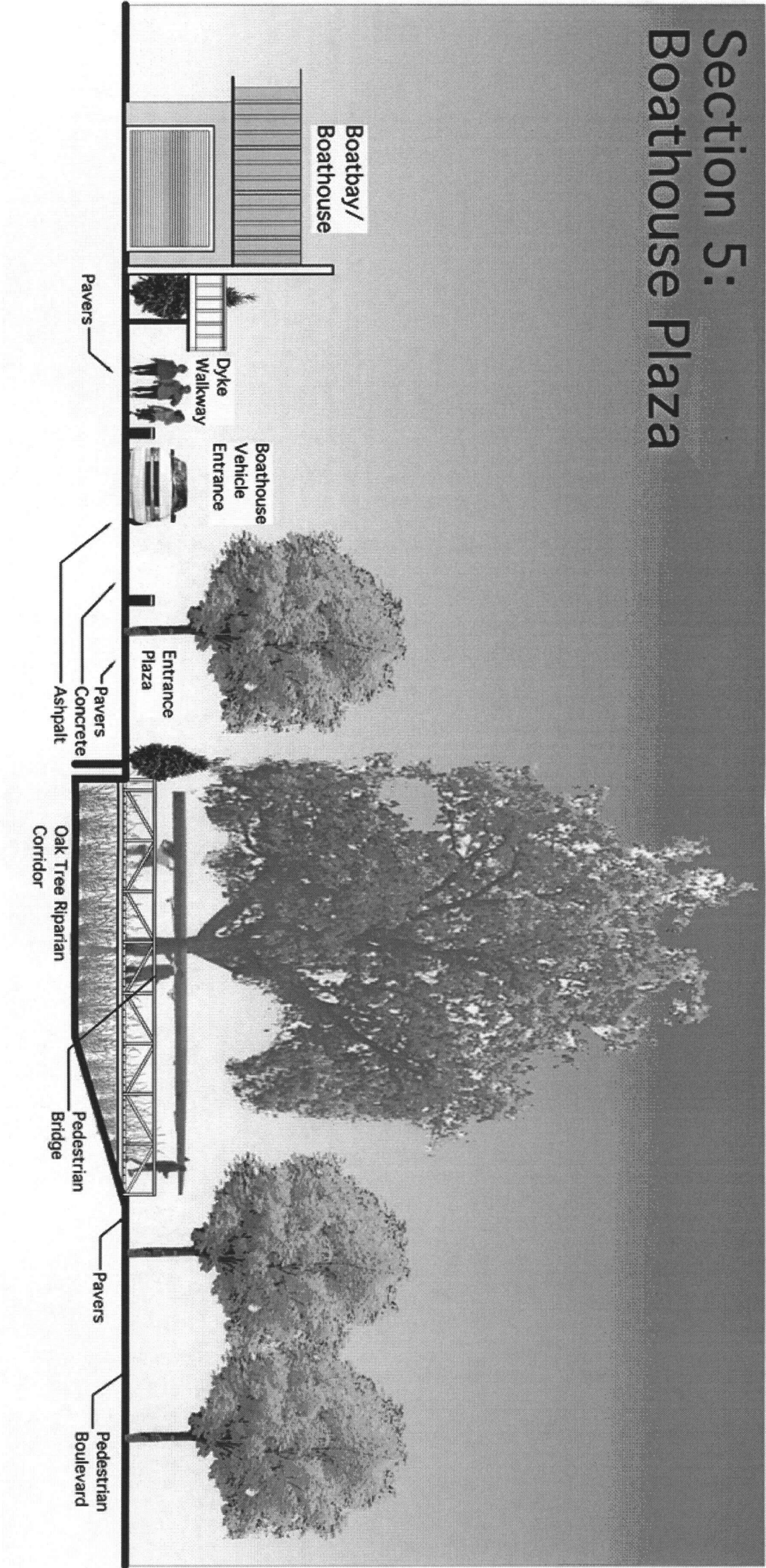


Figure 46: Boathouse Plaza Section

Pier 1 Detail

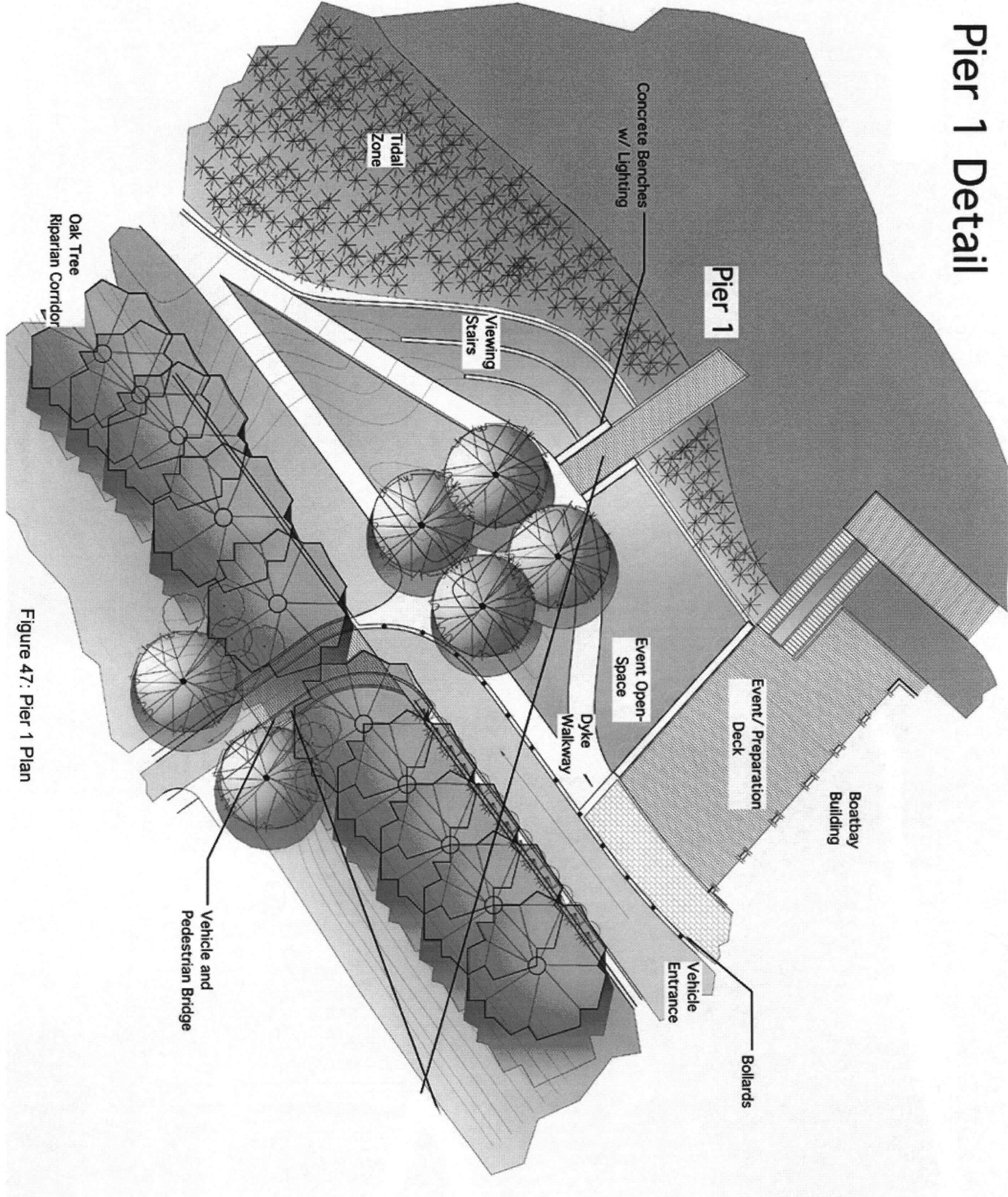
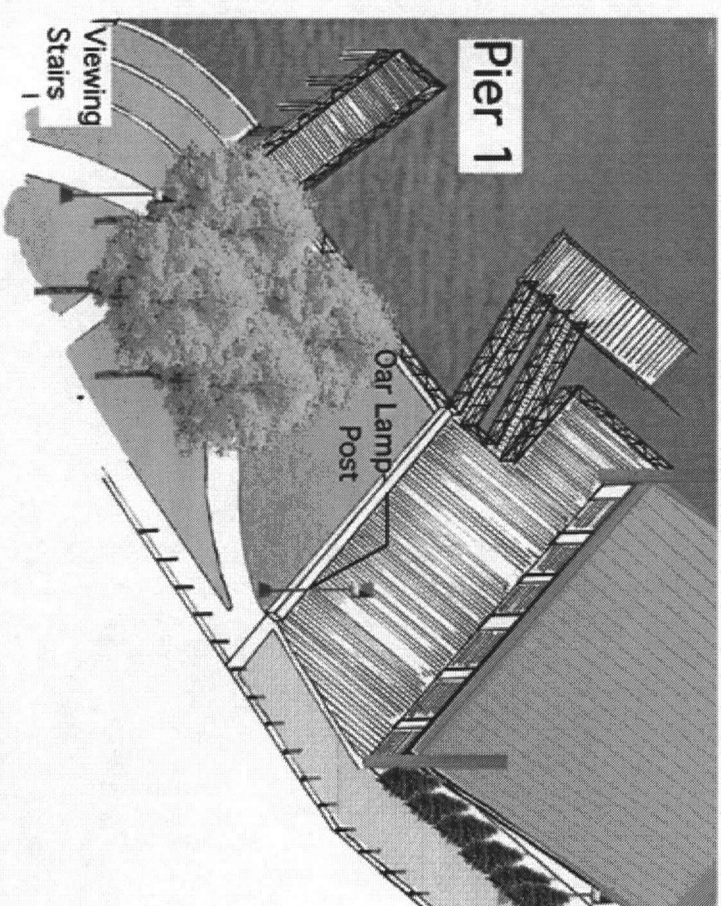
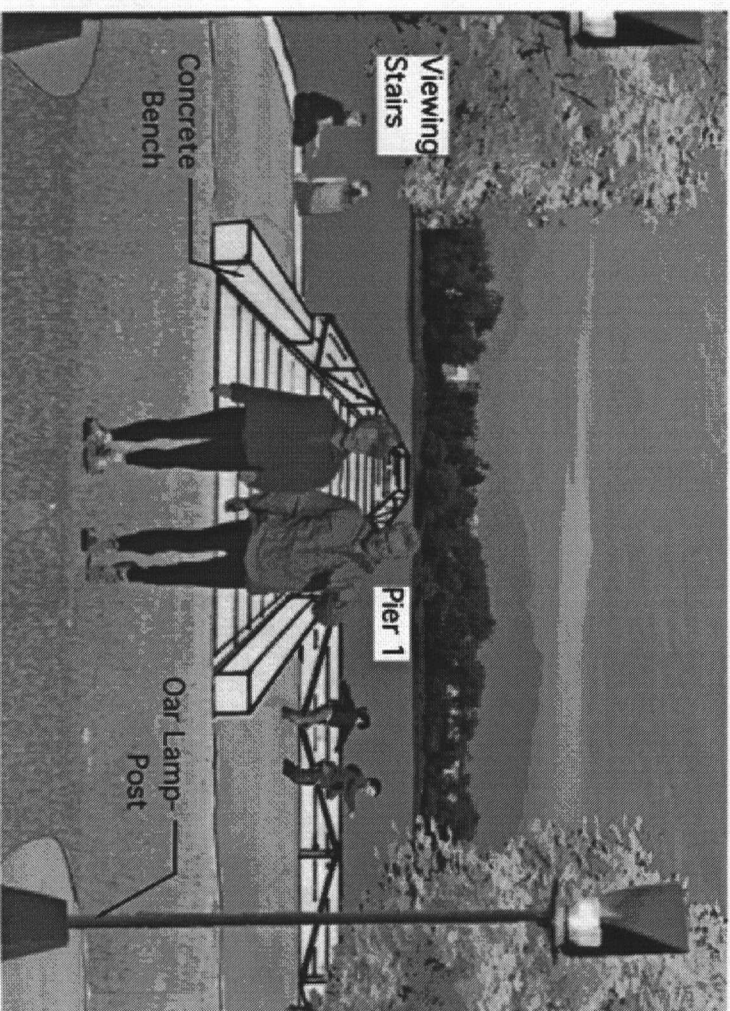
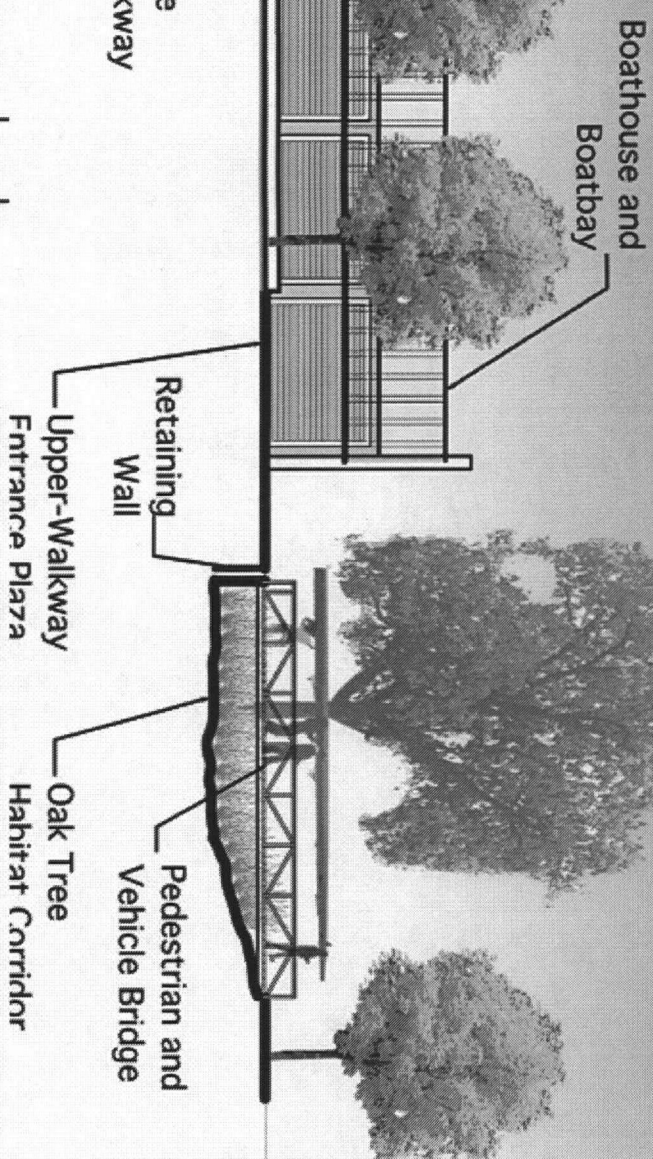
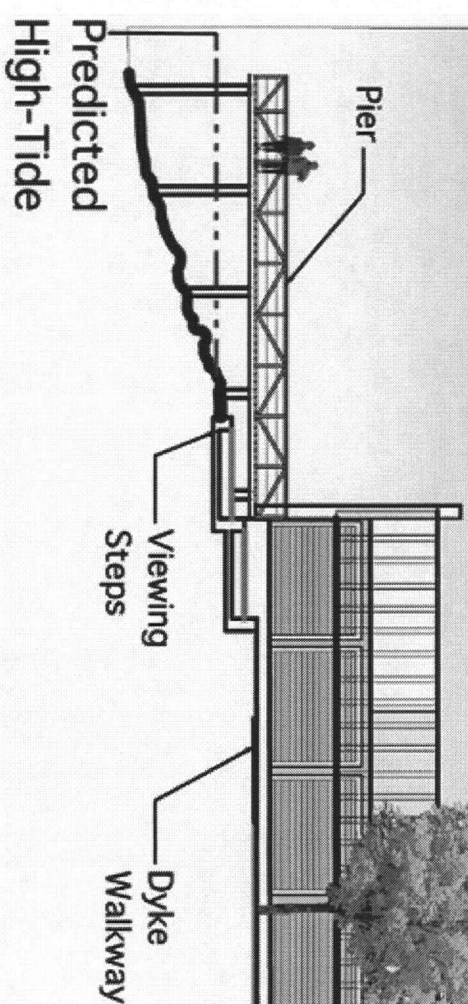
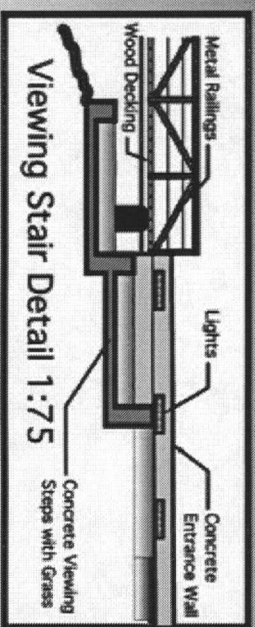


Figure 47: Pier 1 Plan

Section 6: 1: Pier 1



Pier 1 Perspective

Pier 1 Axon Detail

Figure 48: Pier 1 Details

Pier 2/ Finish Line Detail

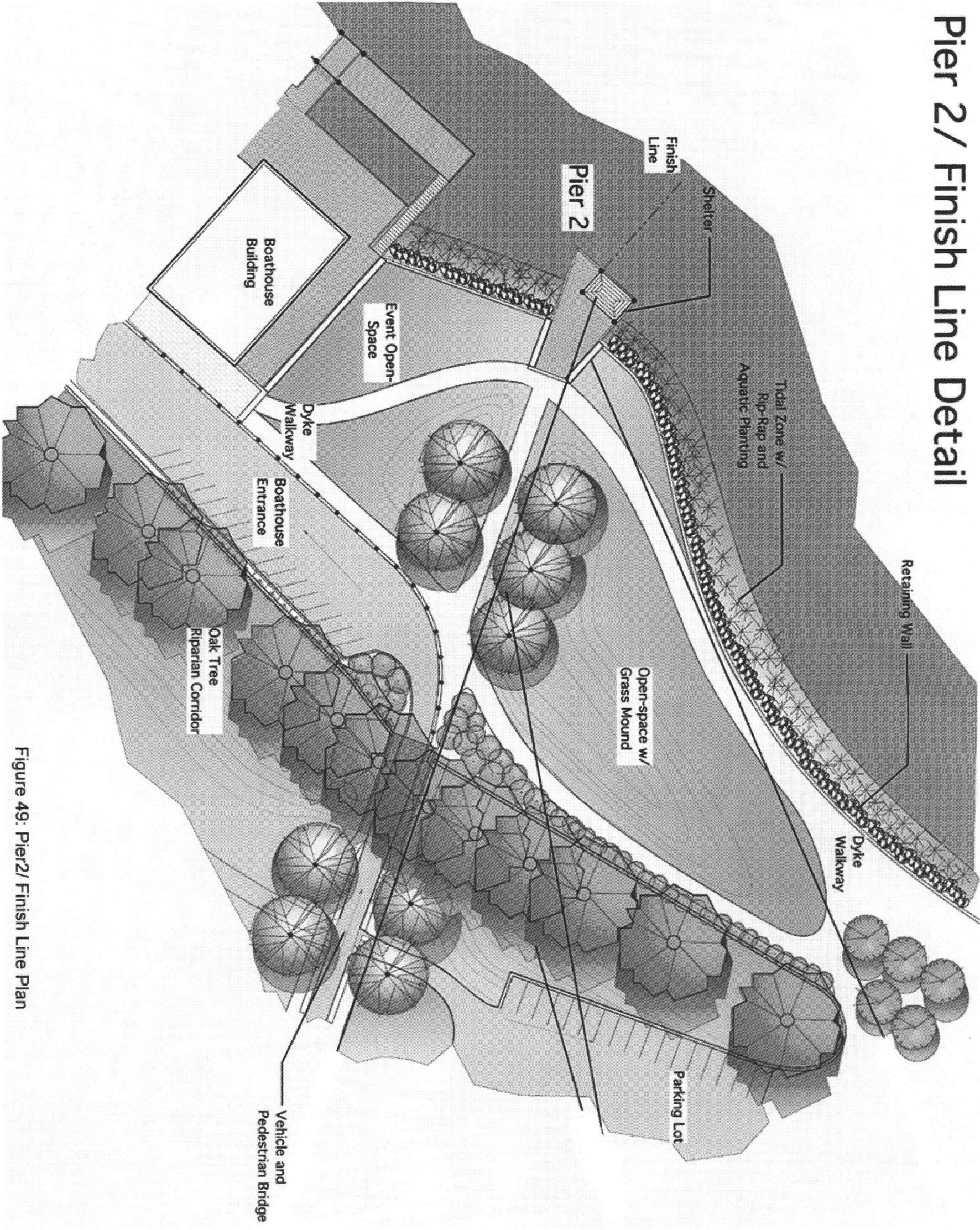
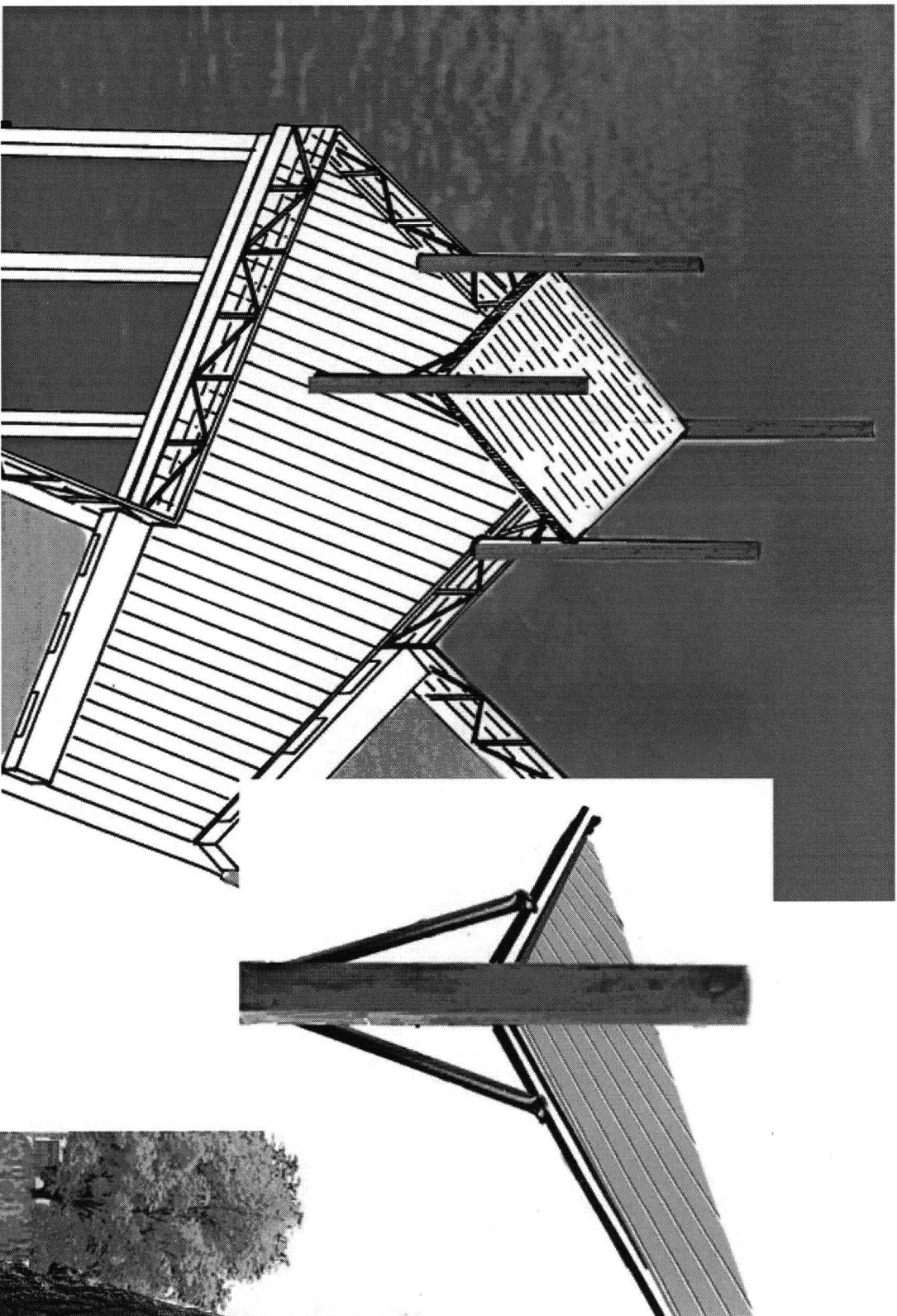


Figure 49: Pier2/ Finish Line Plan



Pier 2/ Finish Line Shelter

Figure 50: Pier 2/ Finish Line Details



Oak Tree Riparian Corridor

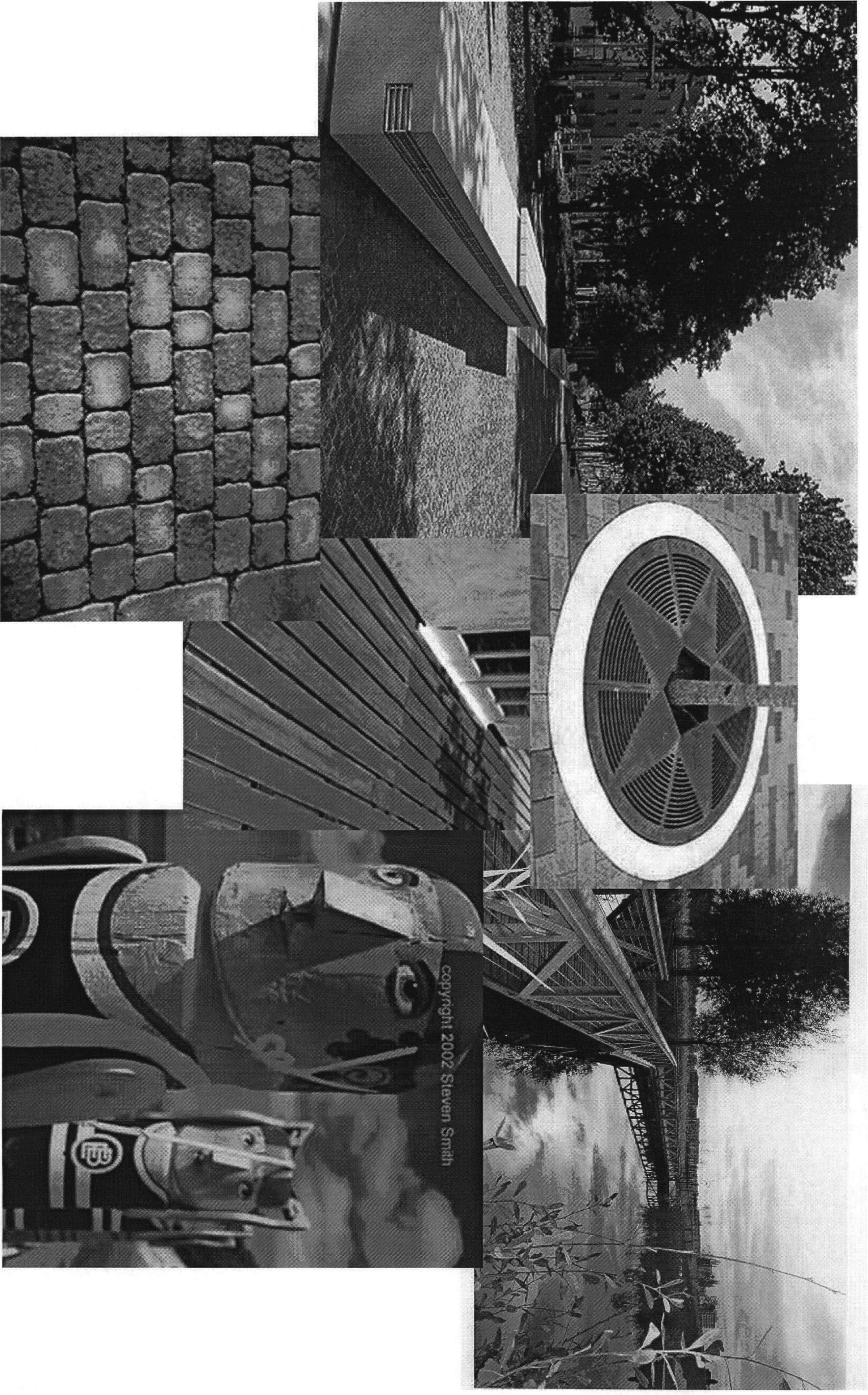


Figure 51: Precedent Images and Materials

Literature Reviewed

Breen, Ann and Dick Rigby, Waterfronts: Cities Reclaim Their Edge. McGraw-Hill, Inc., 1994.

Busch, Carmen P., Design on the edge: an urban industrial waterfront in Richmond-Bridgeport Sub-Area and Van Horne Industrial Park. Master in landscape Architecture Thesis Report, 1998.

City of Richmond. Report to Committee: Parks, Recreation and Cultural Services Committee. Re: University of British Columbia Thunderbird Rowing Club- Memorandum of Understanding. File 7200-01. Dave Semple, Director of Parks Operations. June 4, 2003.

City of Richmond. Report to Committee: Parks, Recreation and Cultural Services Committee. Re: UBC Rowing Club Lease for Site at 7411 River Road. File 1000-14-084. Mike Redpath, Manager, Parks & Programs, February 12, 2002.

Eliade, Mircea, The Sacred and the Profane: The Nature of Religion. Translated by Willard R. Trak. New York: McGraw-Hill Publishing Company, 1987.

Gold for Life: The John M.S. Lecky UBC Boathouse- Building Athletes and Communities (Brochure). Richmond, British Columbia, 2003.

Harney, Andy Leyon (ed.), Reviving the Urban Waterfront. National Endowment of the Arts—Office of Coastal Zone Management. Partners for Livable Places, 1972.

Harris, Charles W., and Nicolas T. Dimes, Time-Saver Standards for Landscape Architecture, 2nd Edition, McGraw-Hill, New York, 1998.

Hoyle, Brian S., Urban Waterfront Redevelopment in Canada: Propositions and Perspectives. Discussion Paper No. 38 Part 2. Department of Geography, University of Southampton, Southampton UK, 1994.

Lynch, Kevin. What Time is this Place? Cambridge, Mass.: The MIT Press, 1972.

Mayberry, Keith, Rowing- The Essential Guide to Equipment and Techniques. New Holland Publishers Ltd., 2002.

McCulskey, Jim, Parking: A Handbook of Environmental Design. E. & F.N. Spon. London, 1987.

Miller, Catherine G., Carscape: A Parking Handbook. Irwin-Sweeney-Miller Foundation. Washington Street Press. Columbus, Indiana, 1988.

Paterson, Douglas D.. "Community Building and the Necessity for radical Revision". LARC 520 Reader for Advanced Theories in the Experience of Landscape. Landscape Architecture Program. University of British Columbia, 2002.

Lin, Joseph. Green Culture Web. Green Club. Vancouver, BC. Copyright 2000-2003.
www.greenclub.bc.ca/regions/burrard_inlet/moody_arm/shoreline_park/Shoreline_Park.html.

PWL Partnership with Don Wuori Design Consultant, Denise Cook Design and Planning, and Pottinger Gaherty Environmental. Middle Arm Open Space Master Plan. Richmond, British Columbia. Sept. 10, 2003.

rba- Robert Burgers Architect Inc., Old Mill Boathouse- Project Description. Old Mill Boathouse, Port Moody, British Columbia, 2003.

rba- Robert Burgers Architect Inc. Thunderbird Rowing Centre: A proposal for the Thunderbird Rowing Centre, Richmond, British Columbia, 2003.

Sedway Cooke Associates, Salem Riverfront Master Plan. Adopted as Development Guide by the City Council of Salem, Oregon, 1986.

University of British Columbia, Boathouse Design Requirements and Rationale. September 2003.

University of British Columbia Properties, Gold For Life-Boathouse Campaign: Building Athletic & Community Potential Through Rowing & Paddling in Richmond. For the City of Richmond: UBC Rowing Case. June 24, 2003.

Internet References:

City Of Richmond: Aerial Photo and GIS Information. 2003.
www.city.ricmond.bc.ca

City of Richmond: Heritage
www.city.richmond.bc.ca/planning/HeritageInventory/HeritageInventory_Details.asp?ID=161

City of Richmond: Transportation Plan-Long Term Road Network Plan Map
www.city.richmond.bc.ca/transportation/trans_index.htm

City of Richmond: Official Community Plan
www.city.richmond.bc.ca/ocp/ocp98/ocp98_index.htm

Old Mill Boathouse, Old Mill Boathouse Rowing, Sailing, and Paddling Center-
Rebuilding History for the Future, 2003
www.oldmillboathouse.ca

Vancouver International Airport Authority. Environmental Noise Management
Annual Report 2002.
http://www.yvr.ca/authority/community/runway/noise_mgmt/contours_08.asp

Health Canada: Environmental Noise
<http://www.hc-sc.gc.ca/english/iyh/environment/noise.html>

Port Moody Rowing Centre
www.f2000p.org/portmoody/

Transport Canada: Environmental Noise
<http://www.tc.gc.ca/CivilAviation/Aerodrome/Environment/TP1247E/Part4/Part4-2.htm#NOTE>

Interview References:

Gilfillan, Eric, (Richmond Parks Director of Operations), personal
interview, February 2004.

Pearce, Mike, (UBC Men's Rowing Coach), personal interview, January
2004.