River Valley Mechanized Access
Site Location Study

Final Report

Prepared for:

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EXECUTIVE SUMMARY

The purpose of the River Valley Mechanized Access (RVMA) Site Location Study is to detail the social, financial, environmental and institutional constraints that make a location within the North Saskatchewan River Area Redevelopment Plan (Bylaw 7188) boundaries essential. This report also provides a detailed examination of project conformance to the goals, objectives and policies of Bylaw 7188.

The proposed project is one of 13 important initiatives within the greater River Valley Alliance's (RVA) Capital Project announced in January 2013 (RVA 2013). The Capital Project will improve overall public access to the North Saskatchewan River and river valley and add new trails and features to existing infrastructure in what is considered North America's longest metropolitan park system (RVA 2013).

DIALOG previously investigated the feasibility of five potential mechanized access alignments in Louise McKinney Riverfront Park in 2009-2010 (Carlyle and Associates et al. 2010). That site was not studied further because of the subsequent development of the Valley Line LRT alignment through Louise McKinney Riverfront Park. The availability of River Valley Alliance Capital Project funding in 2013 for mechanized access in the river valley permitted the City to consider other locations. In 2014, DIALOG subsequently investigated five potential site locations for mechanized access in the North Saskatchewan River Valley, including four on the north side of the river and one on the south side of the river (DIALOG 2014). The City of Edmonton selected two preferred locations that formed the basis of the previous concept engineering study: 100 Street Access on McDougall Hill on the north side of the river and the 105 Street Access within Queen Elizabeth Park on the south side of the river (DIALOG 2015a). In addition, two separate alignment options, West and East, were proposed for the 100 Street RVMA project area, both of which would have connected 100 Street near the Fairmont Hotel Macdonald at the top-of-bank to existing shared use pathways (SUPs) in the river valley and across the Low Level Bridge (Spencer Environmental 2016). Ultimately, the East alignment was determined to be the preferred option, and on 23 June 2015, City Council approved the East Alignment to proceed.

The following provides a brief overview of the social, environmental and institutional constraints that make the project location, within Bylaw 7188 boundaries, essential:

Social: The proposed RVMA project will connect downtown Edmonton to the existing river valley SUP system, improving accessibility of the river valley for all Edmontonians and visitors to Edmonton, regardless of age or ability. Development of the proposed RVMA project will enhance recreational opportunities in the Edmonton River Valley and Ravine system for all users; additionally, the proposed project will directly connect downtown Edmonton to existing recreational amenities at Louise McKinney Riverfront Park as well as to the Low Level Bridge, enhancing non-motorized transportation opportunities for recreationalists and commuters on both sides of the river. Guiding principles of alignment selection included following the intent of the River Valley Alliance's

Capital Project, utilizing existing vegetation clearings where possible to minimize disturbance to the natural setting, and incorporating feedback from stakeholders and the public on an ongoing basis.

Financial: On 23 January 2013, the City of Edmonton received a total of $72.9-million in grants from the River Valley Alliance (RVA) and the provincial and federal governments. That funding is for specific capital projects described in five initiatives to improve public access to the North Saskatchewan River and connectivity within the river valley. The proposed RVMA is one of the projects included in those initiatives with a budget of $24 million, fully-funded by the River Valley Alliance supported by the provincial and federal governments and the City of Edmonton. City Council approved the RVMA project to proceed for the East Alignment, connecting 100 Street near the Fairmont Hotel MacDonald and the river valley SUP system near the Low Level Bridge on 23 June 2015. Project funding requires that the proposed project be totally completed by July 2017.

Environmental: The proposed RVMA project will be largely situated within and immediately adjacent to existing developed areas in downtown Edmonton. Despite those conditions, the proposed project has sought to minimize environmental impacts, and project infrastructure will be designed to ensure protection of slope stability, existing drainage, native vegetation, wildlife movement, nearby aquatic resources as well as river valley visual aesthetics. Specifically, RVMA project alignment selection criteria included potential impacts to natural areas in the North Saskatchewan River Valley, while balancing other concerns such as universal accessibility, constructability, engineering and user safety. Ultimately, the preferred alignment was one that required somewhat more vegetation clearing than the alternatives; however, that alignment also offered improved connectivity to existing SUPs that is expected to enhance user experience and avoids major utilities in the area. The current alignment of the RVMA project was approved by City Council on 23 June 2015.

Institutional: The location of the proposed RVMA project represents a balanced approach to river valley development that provides for improved access to the river valley and expanded recreational opportunities that are compatible with existing local private development and consistent with existing City of Edmonton and River Valley Alliance planning documents. The proposed RVMA project will directly tie Edmonton's downtown into the existing river valley SUP system, thereby maximizing accessibility to the river valley. The proposed RVMA project is consistent with the *Ribbon of Green Master Plan* (City of Edmonton 1992) and the major goals presented in city planning documents including *The Way We Grow: Municipal Development Plan* (Bylaw 15100) (City of Edmonton 2010a), *The Way We Move: Transportation Master Plan* (City of Edmonton

2009), *The Way We Live: Edmonton's People Plan* (City of Edmonton 2010) and *The Way We Green: Environmental Strategic Plan* (City of Edmonton 2011).

This Site Location Study concludes that the location and preliminary design of the RVMA project conform to the goals and applicable objectives and policies of Bylaw 7188.

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1.0 INTRODUCTION

The purpose of the River Valley Mechanized Access (RVMA) Site Location Study (SLS) is to detail the social, financial, environmental and institutional constraints that make locating the project within the *North Saskatchewan River Valley Area Redevelopment Plan* (NSRV ARP) (Bylaw 7188) boundaries essential. It also examines ways in which the proposed project conforms to Bylaw 7188 goals, objectives and policies.

1.1 Project Background/Justification

The City of Edmonton (COE) proposes to improve overall connectivity and access to the North Saskatchewan River and river valley via mechanized means through the proposed River Valley Mechanized Access (RVMA) project. That project will connect the top-of-bank to the existing river valley shared-use path (SUP) system through a transportation system that is accessible for all Edmontonians and visitors to Edmonton. The proposed RVMA project offers the potential for connecting major destinations with one another where there is both potential demand and vertical elevation differences that make other modes less suitable (DIALOG 2014). This characteristic of connection is inherent in the relationships between the North Saskatchewan River, the river valley flats and the tableland destinations of downtown Edmonton.

The proposed RVMA project is one of 13 integral initiatives within the greater River Valley Alliance's (RVA) Capital Project that were announced in January 2013 (RVA 2013). The RVA's vision is: "To create a continuous integrated river valley park system in the Alberta Capital Region, from Devon through Parkland County, Leduc County, Edmonton, Strathcona County and Sturgeon County to Fort Saskatchewan (RVA 2015). The Capital Project will improve overall public access to the North Saskatchewan River and river valley and add new trails and features to existing infrastructure in what is considered North American's longest metropolitan park system (RVA 2013). Funding for the RVA Capital Project is provided in equal parts from the federal Building Canada Fund ($30 million), the Government of Alberta ($30 million) and the seven RVA municipalities, including the City of Edmonton, that benefit from the Capital Project initiatives ($30 million). As part of the Capital Project, the proposed project is fully-funded with a budget of approximately $24 million. The funding rules require that the project must be completed by July 2017.

With respect to the City of Edmonton, specifically, the proposed RVMA project is consistent with the *Ribbon of Green Master Plan* (City of Edmonton 1992) and the major goals of the *North Saskatchewan River Valley Area Redevelopment Plan* (Bylaw 7188) (City of Edmonton 2014). Those goals include: 1) to ensure preservation of the natural character and environment of the North Saskatchewan River Valley and its Ravine System; 2) to establish a public metropolitan recreation area; and 3) to provide the opportunity for recreational, aesthetic and cultural activities in the Plan area for the benefit of Edmontonians and visitors to Edmonton.

1.2 Project Overview

The proposed RVMA project will be located on the north river valley slope of the North Saskatchewan River, adjacent to and below the Fairmont Hotel Macdonald and will extend downslope to the floodplain and lower valley terrace (Plate 1.1). It will comprise an upper platform, a funicular with an adjacent urban stair, a promenade, a pedestrian bridge across Grierson Hill Road, an elevator with accompanying stairs and a cantilevered lookout (Figure 1.1). The funicular will connect the top of the river valley slope to the promenade and pedestrian bridge above Grierson Hill Road. An elevator will connect the pedestrian overpass and lookout to the existing river valley SUPs on the lower valley terrace and floodplain between Grierson Hill Road and the North Saskatchewan River.

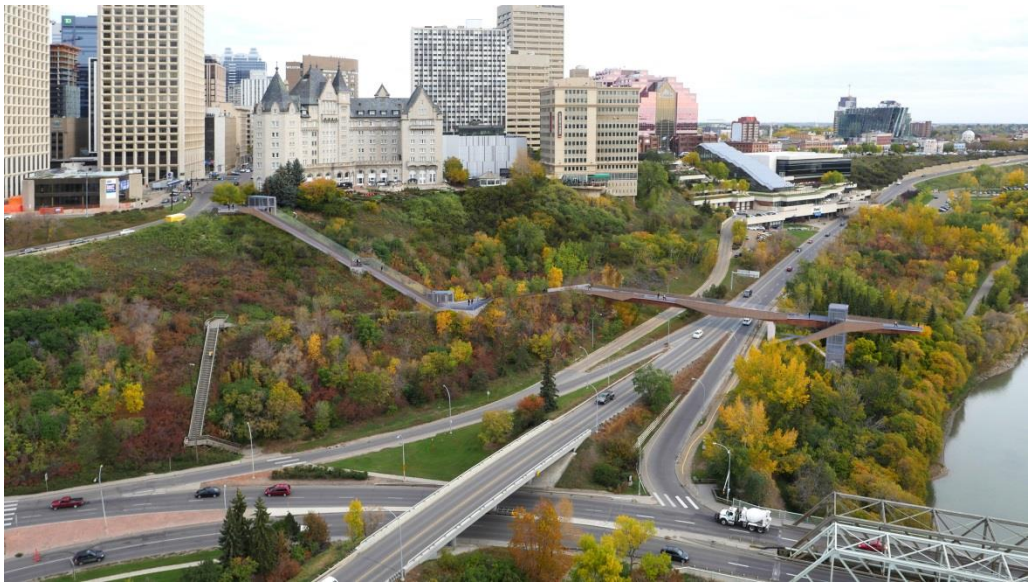


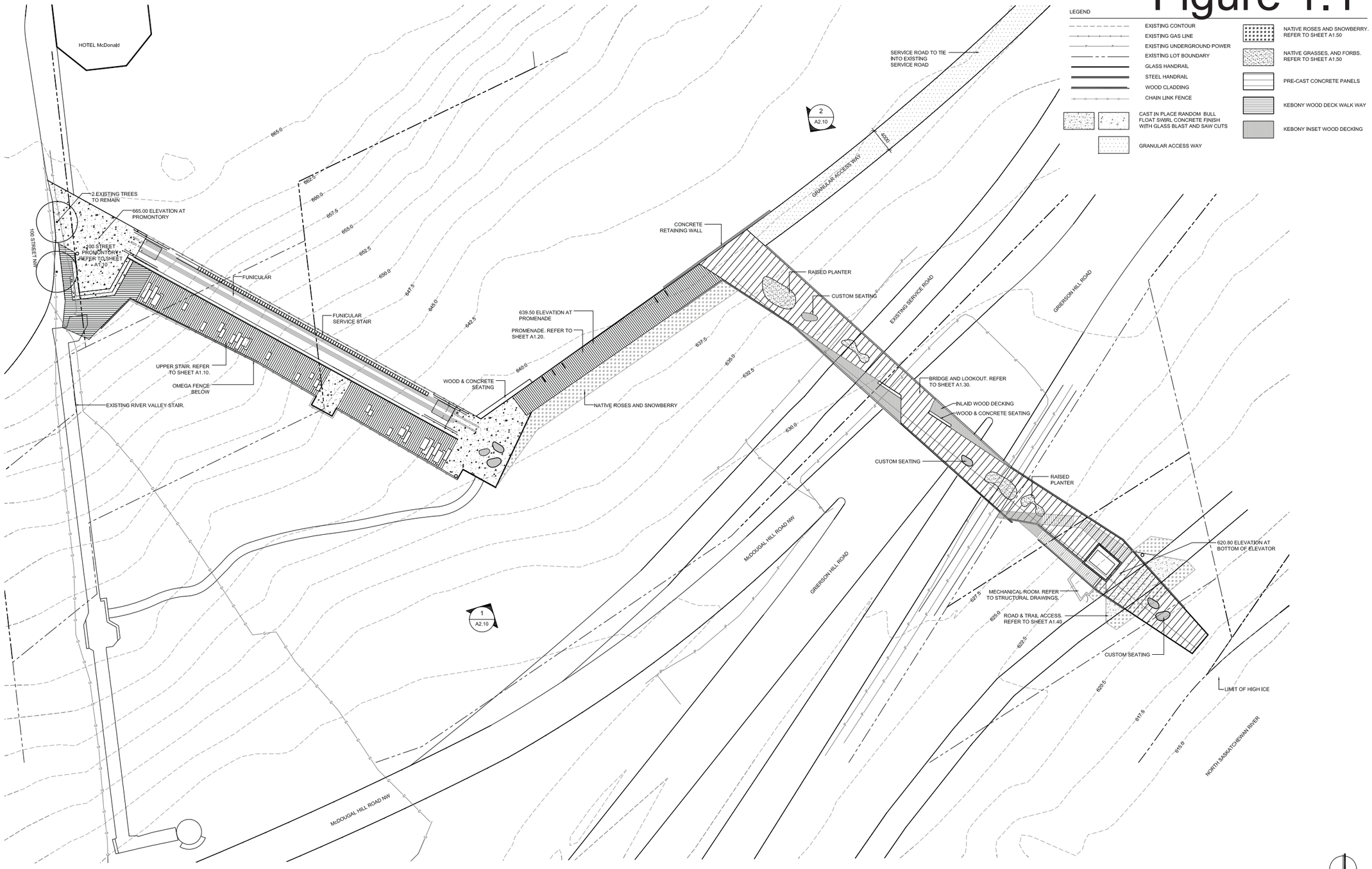
Plate 1.1. Proposed RVMA project locations and components (DIALOG 2015a). Note that the image does not depict the retained lower portion of existing wooden stair and the trail connector between the stair and promenade.

The proposed RVMA project is situated within the "Central Area", as defined by Bylaw 7188. The Central Area includes all Bylaw 7188 boundary lands between the High Level Bridge to the west and Dawson Bridge to the east; these lands also include Mill Creek Ravine. Significant features of the Central Area in the vicinity of the proposed RVMA project area include Louise McKinney Riverfront Park, Henrietta Muir Edwards Park, and Gallagher Park, as well as the Low Level Bridge and local shared-use paths (SUPs) and sidewalks.

1.2.1 Project Components within Bylaw 7188 Boundaries

The *River Valley Mechanized Access Final Environmental Impact Assessment* (Spencer Environmental 2016) outlines a proposed project with mechanized component to improve accessibility to the North Saskatchewan River Valley from downtown Edmonton for all

Figure 1.1



1 A1.00 SITE DEVELOPMENT PLAN
SCALE: 1:300

0 2000 5000 10000 15000

RIVER VALLEY MECHANIZED ACCESS

DIALOG®

NOVEMBER 13, 2015
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ISSUED FOR DEVELOPMENT PERMIT
DRAWN BY: MZ, DH, KG, GB

SITE DEVELOPMENT PLAN
A1.00

Edmontonians and visitors to Edmonton. The scope of this Site Location Study addresses the same project alignment and components. The focus of Site Location Studies should be restricted to developments considered to be "major facilities", including the proposed RVMA project. The key project components required for this major facility include the following:

- 100 Street promontory
- Urban stair and express stair
- Funicular
- Promenade and trail connector
- Pedestrian bridge and lookout
- Elevator, stair and SUP tie-in
- Lighting
- Access way (new service road)
- Surface water management
- Utility service connection and decommissioning
- Traffic accommodation during construction
- Removal of top portion of existing wooden river valley stair

Considering that the whole project footprint is situated within the Bylaw 7188 boundaries, all proposed components are also located within Bylaw 7188 boundaries. Figure 1.2 shows the proposed project location and construction footprint within Bylaw 7188 boundaries. The following sections provide greater detail for each of the aforementioned project components.

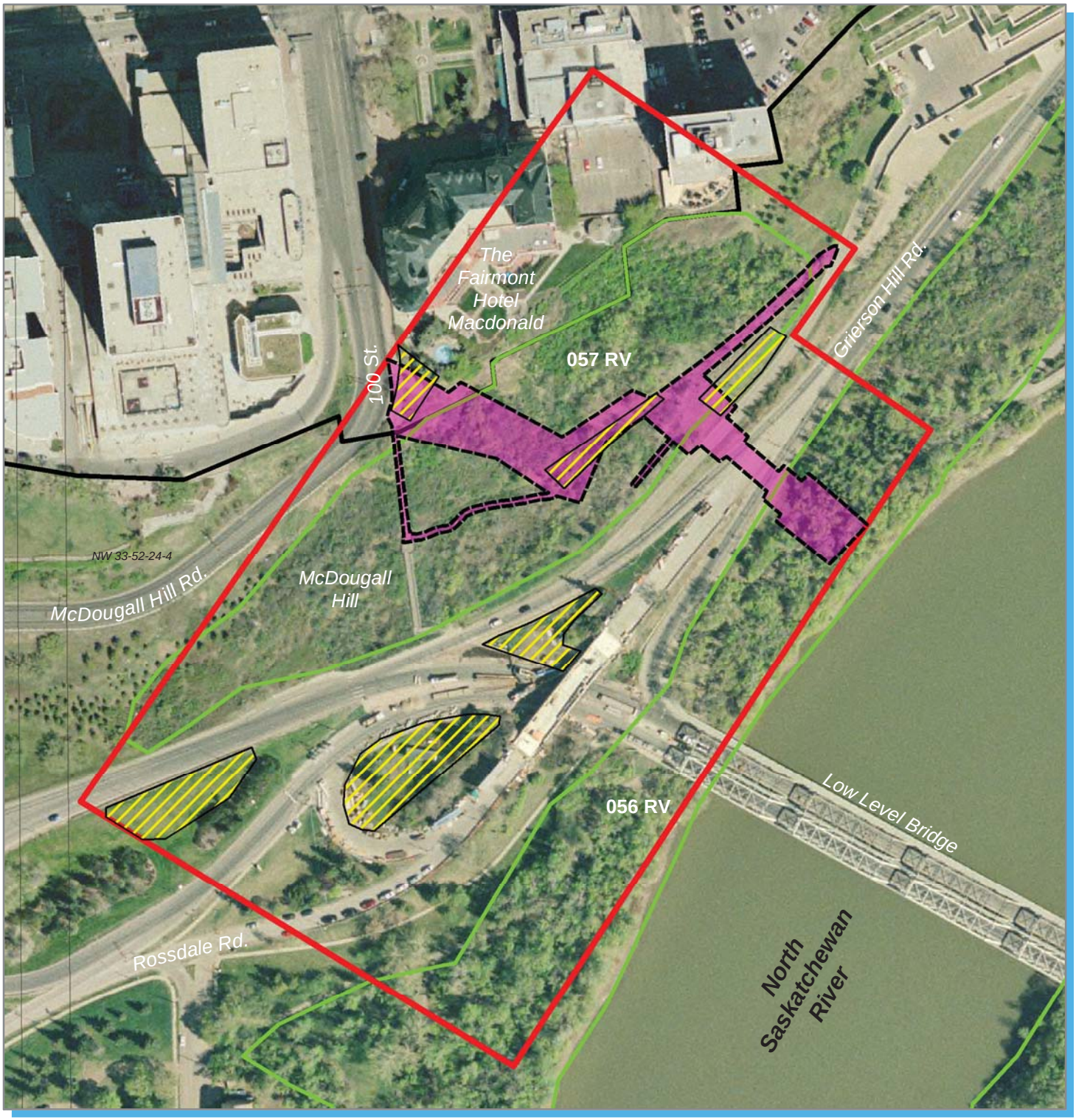
1.2.1.1 RVMA Design

100 Street Promontory

The 100 Street promontory and funicular upper platform will be constructed at the top of the north valley slope adjacent to the west side of the Fairmont Hotel Macdonald. All existing lookout elements at this location will be removed and returned to the City of Edmonton to accommodate construction of the promontory. This promontory will be approximately 160 m^2 and serve as a landing for both stair-based and mechanized transportation modes as well as a gathering area and viewpoint for enjoying river valley vistas (DIALOG 2015a). The plaza will be constructed of cast-in-place concrete.

Urban Stair and Express Stair

An urban stair comprising a combination of a stair with landings and a parallel "express" stair with access to a cross-over landing will be constructed immediately adjacent to the funicular. The urban stair will be a wood stair system, with integrated glass and wood railings; the express stair will be Kebony wood treads with a glass railing. The cross-over landing will be constructed with cast-in-place concrete and finished with a random bull float swirl concrete finish with glass blast and saw cuts. Steel and wooden platforms with glass guardrails will be provided at regular intervals to offer resting places and



Legend

- Disturbance Limits
- Potential Laydown/Staging Locations
- Local Study Area
- City of Edmonton River Valley Natural Areas (2010) (with ID)
- Bylaw 7188 boundary

Figure 1.2 Construction Footprint within Bylaw 7188 Boundaries

River Valley Mechanized Access

N

0 20 40 80 Meters

1:2,300

Aerial Photograph Date: May 2012

Date Map Created: 18 November 2015

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opportunity to enjoy views of the river valley. A bike rail will be provided on the east side of the stairs for people taking bicycles uphill.

Funicular

In principle, funiculars are cable-propelled systems that pull a car over an inclined track. Funiculars (DIALOG 2015a):

- are safe,
- typically have long service lives,
- are not susceptible to strong winds,
- do not require an operator because they are passenger-controlled,
- are a low-energy option because they are only operated when needed.
- provide a closed compartment that will shelter passengers during operation; and
- are expected to perform better than other mechanized access systems in winter conditions.

The proposed funicular system for the RVMA project will be located immediately adjacent to the urban stair and will comprise an upper platform accessible from the 100 Street promontory, a lower platform accessible from the promenade and parallel maintenance/emergency stairs. Protective glass canopies will be constructed at the top and bottom funicular platforms to protect users from the weather when loading and unloading from the funicular car. The funicular will be passenger-controlled and integrated with the City's existing control system. The funicular system will be approximately 64 m in length and will comprise one-cabin, cable-propelled system on an elevated and inclined track. The funicular machine, mechanical and electrical rooms will be located under the 100 Street promontory. The cabin will be approximately 5.19 m^2 (3.0 m x 1.73 m) in size and is expected to provide adequate capacity (20 passengers on foot/10 passengers and two bicycles, etc.) for the proposed system at an operational speed of 2.0 m/s (DIALOG 2015a). Expected system demand (year 2044) is predicted to be 366 users/hour and 183 users/hour/direction during the peak hour service (over the lunch hour) compared to current peak demand of approximately 100 users in each direction during the lunch hour on the existing wooden river valley stairs (DIALOG 2015a). The cabin will have doors at both ends to allow loading and unloading to occur without having to turn bicycles, wheelchairs, strollers, etc. (drive-through approach). It is expected that a one-way trip on the funicular would take approximately 45 seconds to 1 minute, depending on the selected speed of the system (DIALOG 2015a). Funicular hours of operation would coincide with park hours, which are 5:00 a.m. to 11:00 p.m. That could change, however, depending on level of facility use and availability of maintenance staff.

Due to the length of the system (approximately 64 m), it is expected that a winch/drum system will be required to pull the cabin.

The trackway and maintenance/emergency stair will be 3.8 m wide (DIALOG 2015a). The trackway will be elevated 1.2 m above grade for safety and operation reasons, and

will be fenced off to deter tampering. A higher trackway would allow snow to accumulate on the slope below without impeding the funicular car. The trackway will be supported on piers founded on micropiles.

Omega Fence Architectural Fencing will be installed at grade under the outside edge of the maintenance/emergency stairs and the urban stair, on the east and west sides, respectively, to prevent people from climbing on the structure and taking up residence under the structure. The fencing will be 2.4 m high with a 5 cm x 15 cm mesh and a 10 cm gap at the bottom.

Promenade and Trail Connector

A promenade will connect the lower funicular platform and urban stair with the pedestrian bridge. It will be supported by a retaining wall and will be constructed with cast-in-place concrete featuring a random bull float swirl concrete finish with glass blast and saw cuts on the walking surface. A wood bench on a concrete upstand will be located on the north side of the promenade. A 1.5 m wide secondary trail will connect the west side of the promenade below the urban stair and funicular to the existing wooden stair landing to the west. That trail will formalize an existing informal trail that exists across the slope. Providing the trail connection between the existing stairs and the promenade will address concerns raised by internal City stakeholders, allowing a faster pedestrian connection to the Low Level Bridge and the existing bus stops on McDougall Hill and Grierson Hill Roads.

Pedestrian Bridge and Lookout

A 68 m long pedestrian bridge will connect the promenade with the elevator/stair (see below) and a 20 m long cantilevered lookout. The bridge will be supported by an abutment adjacent to the south end of the boardwalk, north of the Shaw Conference Centre exit ramp, and a bridge pier located south of eastbound lane and sidewalk of Grierson Hill Road. The bridge deck will comprise pre-cast concrete panels, steel and wood seating areas and raised and recessed planting areas. Glass guardrails will be located appropriately and Kebony wood cladding is proposed for the outside of the structure.

Elevator, Stair and SUP Tie-in

An elevator, stair and plaza will be constructed at the south end of the project to tie the pedestrian bridge and lookout into the existing river valley SUP system. In addition to the stop at the level of the SUP system, the elevator will also stop at Grierson Hill Road, thereby facilitating access to the Low Level Bridge and nearby residential areas. The elevator will comprise a shaft and machine and maintenance rooms located at the base. A concrete retaining wall and concrete walls for the machine rooms will be constructed at the base of the elevator while the elevator core will be comprised of glazed glass supported on galvanized steel framing. The intent is to use bird-friendly glass to minimize the potential for bird-window collisions. The elevator drive equipment will be located in the 1:100 year floodplain. The intent is to keep the base elevation of the elevator machinery at or above the 1:50 year flood level and the wall-mounted electrical

components at or above the 1:100 year flood level. Normally, the life expectancy of this type of equipment is 20 to 25 years, but there is a chance that the equipment will be damaged or destroyed within that service lifetime by a flood. The elevator shaft itself will be structurally designed to withstand water forces associated with a 1:100 year flood event. A hydraulic elevator lift will not be used so that there is no chance of a hydraulic fluid leak during elevator operation. It is expected that the elevator hours of operation would coincide with park hours, which are 5:00 a.m. to 11:00 p.m. That could change, however, depending on level of facility use and availability of maintenance staff. The urban and express stairs will be available for use at all hours, and a bike rail on the east side of the stair will facilitate cyclist use after park hours.

A Kebony wood walkway will connect the sidewalk on the south side of Grierson Hill Road to concrete stairs leading up to the lookout and pedestrian bridge as well as wood stairs down to a landscaped plaza at the lower elevator access. The existing river valley SUP will tie-in to the new elevator, plaza and stair facilities.

Lighting

Site lighting will be designed to illuminate the paths while eliminating spill-over that would illuminate large parts of the river valley. It will be designed to provide a safe feeling and limit safety concerns. Pathway lighting will be mounted within handrails or barrier cladding joints.

The lighting design will incorporate controlled, dark-sky friendly exterior lighting, utilizing controls to minimize or eliminate electric lighting when there are no people in the space. Low power LED lighting will be used throughout.

Access Way (New Service Road)

An approximately 3.5 m wide new granular service road will be constructed along an existing informal "trail", on the naturally-occurring flat bench located at the approximate midpoint of the river valley slope and connect to the east end of the promenade. That access was previously trimmed and brushed in spring 2015 in support of project geotechnical investigations. Minimal clearing (up to 5 m in width) and upgrading work is required to provide level and direct access during construction and for maintenance access during RVMA operation from the upper section of the Shaw Conference Centre access road. The service road will be constructed with a geogrid type system with surface planting on top (e.g., Neoweb Geocell). It is expected that the finished surface will have a topsoil and grass surface.

1.2.2 Alternatives Considered

1.2.2.1 Site Locations and Alignments

Improvement to river valley access from the Downtown has been a City priority for several years, which has resulted in several mechanized access studies over the past six years. DIALOG previously investigated the feasibility of five potential mechanized access alignments in Louise McKinney Riverfront Park in 2009-2010 (Carlyle and

Associates et al. 2010). That site was not studied further because of the subsequent development of the Valley Line LRT alignment through Louise McKinney Riverfront Park. The availability of River Valley Alliance Capital Project funding in 2013 for mechanized access in the river valley permitted the City to consider other locations.

In 2014, the City of Edmonton requested DIALOG to conduct a "high level" review and assessment of the potential for a mechanized access conveyance for five potential alignments in the central part of the North Saskatchewan River Valley, including four on the north side of the river and one on the south side of the river:

North Side (Downtown)
- 100 Street ("Hotel MacDonald stairs")
- 104 Street
- 106 Street(at Alberta Legislature)
- 110/109 Street (High Level Bridge)

South Side (Strathcona)
- 105 Street

Each of the proposed alignments in the river valley was assessed using a series of criteria identified by City administration as follows (Dialog 2014):

- Connection to active transportation network
- Connection to West Rossdale/Generating Station
- Connect to River
- Connection to Downtown
- Connection to Strathcona
- Connection to Cloverdale
- Year round use potential
- Geotechnical considerations
- Structural considerations
- Modal feasibility

A construction cost estimate (Class D) was also calculated for each site based on various component and construction area combinations. The details of each site evaluation and construction cost estimate are available in Dialog 2014 in Appendix A of this document. Of the five site locations, Dialog, in consultation with the City, determined that the 106 Street site was no longer required and that an inclined elevator was recommended at three sites (100 Street, 104 Street and 105 Street) and an elevator was recommended at the 100 Street site (Dialog 2014).

From those recommendations, City administration selected two preferred locations that formed the basis of the 2015 concept engineering study: 100 Street Access on McDougall Hill on the north side of the river and 105 Street Access within Queen Elizabeth Park on the south side of the river (DIALOG 2015a). In addition, two separate alignment options, West and East were proposed for the 100 Street RVMA project area, both of which would have connected 100 Street near the Fairmont Hotel Macdonald at

the top-of-bank to existing shared-use paths (SUPs) in the river valley and across the Low Level Bridge (Spencer Environmental 2016).

The proposed West option would replace the existing wooden stair on McDougall Hill. Core mechanized access improvements at the proposed west option alignment included (DIALOG 2014):

- Improved plaza at the top-of-bank with lighting, furnishings and plantings.
- Mechanized access with parallel stair (min. 4.2 m width) from top-of-bank to landing 7 m above roadway.
- Pedestrian bridge over Rossdale Road and Grierson Hill to berm at existing overpass.
- SUP extension west to 100 Street along proposed accessible route to connect with North Rossdale and 100 Street.

The proposed East option would begin at the top of the existing wooden stair, but would descend McDougall Hill to the east of the existing stair (Figure 1.2). Core mechanized access improvements proposed for the East option alignment included (DIALOG 2014):

- Improved plaza at the top-of-bank with lighting, furnishings and plantings.
- Mechanized access with parallel stair (min. 4.2 m width) from top-of-bank to landing 7 m above roadway.
- Pedestrian bridge over Grierson Hill to existing SUP along the North Saskatchewan River.
- SUP between mechanized access landing and Grierson Hill pedestrian bridge.

It was felt that the proposed East and West alignments at 100 Street would provide improved access to the north and south sides of the river, the Low Level Bridge, the proposed Muttart LRT Station and Louise McKinney Riverfront Park.

After consideration of concept engineering, environmental, historic resources, sustainability, constructability (including utilities), cost, operations, schedule and risk management, DIALOG recommended constructing only the East Alignment of the 100 Street Access on McDougall Hill (DIALOG 2015a). That alignment offered the best opportunity to create a vibrant connection for the public between downtown Edmonton and the North Saskatchewan River Valley and would deliver the best long-term benefit for the City of Edmonton with the funding available.

1.2.2.2 Mechanized Access

DIALOG considered several types of mechanized access for the river valley, including the following (DIALOG 2015a):

- Rail-based and at-grade systems:
    - Rack/Cog Railways
    - Funiculars/Inclined Elevators

  - Vertical Elevators
  - Outdoor Escalators

- Aerial Systems:
  - Gondolas/Funitels
  - Chairlifts
  - Tramways/Runifors

DIALOG (2015a) found that the large elevation difference and the moderate expected ridership did not validate the use of railways to access the Edmonton river valley. Due to their susceptibility to cold weather and trapping of debris, such as sand in winter, escalators in not fully enclosed buildings do not perform well in Edmonton. Maintenance, especially in the Edmonton outdoor climate, and full accessibility of escalators for such users as cyclists and wheelchairs is challenging and, therefore, escalators were not carried forward as an option. Gondolas/funitels, chairlifts, aerial tramways and funifors require on-site operators, which was not desired by the City. Furthermore, they provide a capacity that is significantly too large for the expected ridership and thus they are not economical. Chairlifts also posed accessibility challenges and patrons would not be adequately protected from the weather. A vertical elevator was not deemed appropriate for the sites from an urban integration point-of-view due to the height of elevator towers that would be required to connect to the top of the valley slope.

Based on these considerations, a funicular was the preferred mechanized system to access the Edmonton river valley at the 100 Street and 105 Street site locations, which was consistent with the site selection study completed in 2014 (DIALOG 2015a).

1.2.2.3 City Council Approval

On 23 June 2015, City Council approved the RVMA project to proceed for the East Alignment, connecting 100 Street near the Fairmont Hotel MacDonald and the river valley SUP near the Low Level Bridge comprising the funicular, stairway (urban stair), promenade, pedestrian bridge, elevator and lookout components.

2.0 CONSTRAINTS ANALYSIS

Considering that the proposed project is intended to facilitate access from downtown Edmonton to the City's existing river valley SUP system for users with varying mobility, the project must be located, at least in part, within the river valley Bylaw 7188 lands. Nevertheless, the following is an analysis of the social, environmental and institutional constraints that make this project essential, have influenced the project location and have minimized disruption to the river valley.

2.1 Overall Constraints Analysis

2.1.1 Social Constraints

The proposed RVMA project is an integral initiative within the greater River Valley Alliance's (RVA) Capital Project (RVA 2013). The RVA's vision is "to create a continuous integrated river valley park system in the Alberta Capital Region, from Devon through Parkland County, Leduc County, Edmonton, Strathcona County and Sturgeon County to Fort Saskatchewan" (RVA 2015). Furthermore, a goal of the RVA's Capital Project is to "improve public access to the North Saskatchewan River and river valley" (RVA 2015). The City of Edmonton is a cooperating member of the RVA and supports the RVA vision as compatible with the City's overarching vision for the river valley. To achieve this vision, new and upgraded river valley amenities are required as the city grows.

Specifically, the RVMA project is consistent with the *Ribbon of Green Master Plan* (City of Edmonton 1992) and the major goals of the *North Saskatchewan River Valley Area Redevelopment Plan* (Bylaw 7188) (City of Edmonton 2014). Those goals include: 1) to ensure preservation of the natural character and environment of the North Saskatchewan River Valley and its Ravine System; 2) to establish a public metropolitan recreation area; and 3) to provide opportunity for recreational, aesthetic and cultural activities in the Plan area for the benefit of Edmontonians and visitors to Edmonton.

The RVMA project would improve connectivity for the public between urban areas and the North Saskatchewan River Valley. The urban stair and funicular components of the RVMA project offer an exciting opportunity to access and experience Edmonton's Ribbon of Green from the City's downtown, incorporating the river valley into people's everyday lives. Tying the RVMA project into the existing SUP system will enhance both recreational opportunities in the river valley as well as non-motorized transportation opportunities between downtown Edmonton and south side communities. In addition, the RVMA project is compatible with several of the City's planning documents including *The Way We Grow: Municipal Development Plan*, *The Way We Move: Transportation Master Plan*, *The Way We Live: Edmonton's People Plan* and *The Way We Green: Environmental Strategic Plan*. The RVMA project offers the potential to be an entrance to the river valley for everyone, regardless of age and ability, and a focal point that will bring people together in the heart of Edmonton.

City lands are not the only lands involved, and a small area near the top-of-bank will be situated on lands included in a land-use agreement with the Fairmont Hotel Macdonald. Guiding principles of alignment selection included integrating input from stakeholder and public consultation sessions.

2.1.2 Financial Constraints

On 23 January 2013, the City of Edmonton received $72.9-million in grants from the River Valley Alliance (RVA) Capital Project funding, comprising equal funding contributions from federal, provincial and municipal governments. As part of the Capital Project, the proposed RVMA project is fully-funded with a budget of approximately $24 million. The funding rules require that the project must be completed by July 2017. If the project is not completed on time, the funding will be lost because it cannot be applied to any other City projects.

2.1.3 Environmental Constraints

This RVA initiative, while acknowledging localized impacts on the natural environment, has been guided by the mandate to ensure that the long-term ecological integrity of the river valley is preserved. Prior to the current RVA Capital Project, and after extensive public and stakeholder consultation, the River Valley Alliance released its Plan of Action 2007 that articulated its vision for a continuous, connected North Saskatchewan River Valley Park (RVA 2015). That plan identified specific planning areas along the North Saskatchewan River as well as proposed developments within each of those planning areas. The Plan of Action also included a detailed report on the history, topography and natural features, plants and wildlife, attractions and development in the river valley.

An Environmental Impact Assessment (EIA), pursuant to Bylaw 7188, is being undertaken as part of project preliminary design, and construction will not commence until the EIA is approved by City Council. Recommended mitigation measures and best management practices outlined in the EIA will be adhered to during detailed design and construction in order to limit the potential adverse impacts of the development of a promontory, funicular, urban stair and express stair, promenade, pedestrian bridge and elevator and associated project components within the river valley. The planned components of the proposed RVMA project represent relatively minimal development and disturbance in a part of the river valley that supports considerable existing infrastructure. Several alternatives and options were considered before selecting the preferred alignment. Ultimately, the preferred alignment provides barrier-free access from downtown Edmonton to the existing SUP on the lower river valley terrace. Project components use wood and glass to integrate with the natural setting, and the stairs and funicular components are set 1.2 m above-grade on McDougall Hill for safety and operational reasons, and will also minimize erosion concerns (DIALOG 2015b). Natural plantings on McDougall Hill will reclaim the area, stabilize the slope and further incorporate project components into the natural landscape (DIALOG 2015b). The proposed alignment utilizes a previously cleared area midslope on McDougall Hill, thereby minimizing the clearing of natural vegetation communities.

2.1.4 Institutional Constraints

The proposed RVMA project location is compatible with existing local development while providing barrier-free access to the river valley for all Edmontonians and visitors to Edmonton, regardless of age or ability. The proposed project represents a balanced approach to river valley development that provides for improved access for all users and offers expanded recreational opportunities that are compatible with existing local private development and consistent with existing City of Edmonton and RVA development in the river valley. At the same time, the proposed project acknowledges the natural value and preserves the integrity of the river valley environment.

3.0 CONFORMANCE WITH NSR VALLEY ARP (BYLAW 7188)

The document *North Saskatchewan River Valley Area Redevelopment Plan*, Bylaw 7188 (City of Edmonton 2014) outlines the history and intent of the Plan as well as its goals, objectives and policies. These goals, objectives and policies (in bold italics below) of the Plan are examined in relation to the placement of the proposed alignment within the North Saskatchewan River Valley. In cases where the stated objectives or policies are not relevant to the project, a brief statement indicating a lack of relevance is provided. Where goals, objectives and policies are relevant, a brief explanation of how the proposed project conforms to such requirements is provided.

For each individual goal, objective and policy of Bylaw 7188, each of the project components detailed in *Section 1.2.1* are taken into consideration individually, where appropriate.

3.1 Major Goals

To ensure preservation of the natural character and environment of the North Saskatchewan River Valley and its Ravine System.

The elements included within the proposed RVMA project represent relatively limited development in the North Saskatchewan River Valley, with construction and operation confined to a relatively small (0.45 ha) footprint, with an additional 0.34 ha impacted temporarily during construction. The surrounding river valley will remain in its current natural or semi-natural condition. Where possible, construction staging areas will be situated in previously disturbed locations, such as manicured road medians or existing roadway surfaces. Of the impact area, only 0.13 ha of native plant communities (i.e., plant communities dominated by native species) will be impacted; the remaining area consists of semi-natural, manicured and otherwise disturbed areas. The design of the proposed RVMA project has been undertaken with the goal of integrating the project as seamlessly as possible into the existing natural character of the river valley.

To establish a public metropolitan recreation area.

The proposed RVMA project will result in construction of a promontory, urban and express stairs and funicular adjacent to downtown Edmonton that will connect to existing SUPs in the North Saskatchewan River Valley via a promenade, pedestrian bridge (over Grierson Hill Road), elevator and stairs that will improve accessibility to the existing SUP system for the benefit of the public. The proposed project will add to available public metropolitan recreation resources and will ensure sustainable use by a range of park users of varying abilities well into the future.

To provide for recreational, aesthetic and cultural activities in the Plan area for the benefit of Edmontonians and visitors of Edmonton.

The North Saskatchewan River Valley in central Edmonton supports a variety of recreational amenities to accommodate public use. Due to the steep slope between the tablelands on which downtown Edmonton is situated and the lower terrace of the river valley, however, access is limited, especially for people with limited mobility. The proposed project will connect downtown Edmonton to the river valley flats via a

mechanized component and will tie into the existing SUP network, providing opportunities for all users to access the SUPs and take advantage of recreational opportunities in the river valley, regardless of ability. The promontory at 100 Street will provide a viewpoint from which users can enjoy unrestricted views of the river valley in all directions. Furthermore, the urban stair and promenade components of the project will have occasional wide landings and seating areas to provide opportunities for additional cultural activities. Project design has endeavored to integrate the proposed project into its natural surroundings while also making it a unique landmark that links downtown Edmonton with the river valley. Architectural design and hard and soft landscaping elements that respect and complement the existing river valley aesthetic will reduce the visual impact of the proposed RVMA structures and soften the transition between the structures and their natural surroundings.

To ensure the retention and enhancement of the Rossdale and Cloverdale communities in the River Valley.

The proposed project is located in the northeast corner of the Rossdale Neighbourhood at McDougall Hill. The proposed RVMA project will improve accessibility between this neighbourhood and downtown Edmonton, as the elevator and stair components at the downslope terminus of the project will have a stop or landing at the Grierson Hill Road level in addition to the lower river valley SUP level, thereby facilitating access to residential areas to the west, and the pedestrian bridge, promenade and funicular provide barrier-free access from nearby residents to downtown Edmonton..

3.2 Parkland Development Objectives

To provide park, open space, and a variety of recreation and cultural uses.

The proposed RVMA project represents an increase in recreational amenities in the North Saskatchewan River Valley in central Edmonton, through the construction of an urban stair in addition to an express stair. Wide landings and occasional benches on the urban stair and promenade will provide opportunities for new recreational and cultural uses. Additionally, the funicular component represents a means of improving accessibility to existing recreational amenities in the river valley. Much of the proposed RVMA project will be located in or adjacent to natural or semi-natural vegetation communities, with an intent to preserve the current natural or semi-natural state of the river valley as much as possible. The proposed RVMA project will focus on increasing access to passive recreational activities in the area (e.g., dog walking, bird watching, nature photography, running, cycling) for recreationalists of varying abilities. Thus, the proposed RVMA project will add to public metropolitan recreation resources and will help sustain use by a range of park users well into the future.

To provide a metropolitan recreation and conservation area.

At present, there are existing river valley SUPs and an existing wooden stair in the vicinity of the proposed project area. The proposed RVMA project will replace the wooden stair and provide new access and viewpoints to support a wide range of uses and accommodate users of varying abilities. In particular, the proposed RVMA project will improve access for passive recreational activities (e.g., dog walking, bird watching, nature photography, running) by directly connecting downtown Edmonton to the existing

river valley SUP system. The proposed alignment will have a relatively small footprint and will minimize clearing of native vegetation as much as possible, thus minimizing adverse environmental impacts to the river valley.

To provide a pedestrian movement network, and other non-motorized vehicular networks including the provision of River and Ravine Crossings, throughout the Plan area.

The proposed RVMA project will enhance pedestrian and cyclist movement in the river valley in central Edmonton, with an emphasis on improving accessibility for a variety of users with limited mobility. The pedestrian bridge and trail connections will improve pedestrian and cyclist movement and connectivity through the area near Grierson Hill Road and McDougall Hill Road by connecting downtown Edmonton at the top-of-bank to the river valley SUP system directly, bypassing the major arterial roadways. The existing river valley SUPs directly connect to the Low Level Bridge, thereby enhancing connectivity between downtown Edmonton and the south side of the river for non-motorized commuters.

To ensure that park and recreation facilities have pedestrian and vehicular access.

The proposed RVMA project will provide pedestrian access between 100 Street/McDougall Hill Road and the existing river valley SUP system, as well as sidewalks along McDougall Hill Road, Grierson Hill Road and the Low Level Bridge. The proposed project is considered a component of the river valley SUP system rather than a destination, therefore, access is expected to be primarily by pedestrians and cyclists accessing the system from existing sidewalks and SUPs. The site is easily accessed by public transit, with Central LRT station located nearby and numerous bus stops along Jasper Avenue, 100 Street and at the top and bottom of McDougall Hill. Public parking is provided throughout downtown Edmonton, with numerous parking meters and four parkades in close proximity to the proposed project area. Some parking for river valley park users is provided in nearby Louise McKinney Riverfront Park and Henrietta Muir Edwards Park.

To encourage water-oriented recreational modes of transportation to link the various activity nodes within the Plan area.

This objective is not relevant to this project.

To promote the conservation and rehabilitation of archaeological, paleontological, architectural and historic resources within the parks and open space system.

A Historical Resources Impact Assessment was completed in summer 2015 for areas of proposed surface disturbance associated with RVMA construction. No historic resources were identified in the course of the HRIA field investigations (Turtle Island 2015). As a result, it was the conclusion of the HRIA that no further concern for historical resources in the area is warranted. A paleontological HRIA will be conducted as part of the construction monitoring program as required by Schedule A (*Historical Resources Act* Requirements), issued by Alberta Culture and Tourism. Regardless of the results of these studies, if archaeological, paleontological or historical resources are encountered during

proposed construction activities, work will cease immediately and Alberta Culture and Tourism and/or the Royal Tyrell Museum will be notified.

To promote an exemplary standard of landscape, urban, and architectural design for all proposed developments, park amenities and the general environment.
Overall design elements, including project component structures and hard landscaping, will enhance aesthetic appeal of all project components within the river valley setting, including the funicular, urban stair, promenade, pedestrian bridge, lookout and elevator. Portions of the promenade may incorporate planters to integrate with surrounding vegetation. Project components have been designed to minimize adverse impacts to visual aesthetics of the river valley. Wayfinding signage has been designed to be consistent with similar features elsewhere in the river valley.

To ensure handicapped people have access to the River Valley and Ravine System.
The funicular and elevator components will provide barrier-free access to the river valley and ravine system for mobility-impaired and otherwise disabled people. The funicular will run parallel to an urban stair and connect users at the 100 Street top-of-bank to a promenade and pedestrian bridge over Grierson Hill Road at the base of the slope. An elevator will take users from the pedestrian bridge to ground level at the river valley flats, including one stop at Grierson Hill Road sidewalk level and a lower stop at the existing river valley SUP system level. Paved trail tie-ins will be constructed to connect the pedestrian bridge and elevator to existing river valley SUPs and the Low Level Bridge, thus providing barrier-free access from downtown Edmonton at 100 Street to the existing river valley SUP network, encompassing SUPs and amenities on both sides of the North Saskatchewan River.

3.2.1 Parkland Development Policies

Natural Conservation Area

It is a policy of this Plan that those areas which have significant vegetation, potential wildlife and waterfowl habitat, or other unique natural physical features shall be managed as nature conservation areas and may be used for outdoor education, interpretation or low intensity recreational activities.
The river valley in central Edmonton includes a variety of land uses, including residential and recreational lands, major roadways, manicured lands and areas of native vegetation. The proposed project area encompasses portions of two natural areas in the North Saskatchewan River Valley (056 RV and 057 RV) as well as manicured areas and otherwise disturbed areas. The designated natural areas comprise communities of natural and semi-natural vegetation. While natural communities provide wildlife habitat, these communities are not unique in the North Saskatchewan River Valley in the City of Edmonton. Regardless, the proposed RVMA project will be situated so as to minimize clearing of native vegetation by taking advantage of pre-existing disturbances as much as possible. In particular, out of a total project impact area of 0.79 ha, 0.13 ha are natural plant communities dominated by native species. The proposed RVMA project plans to accommodate a variety of user groups and will promote primarily passive, low-intensity recreational pursuits (e.g., dog walking, bird watching, nature photography) as well as

contributing to a pedestrian and cyclist commuter route between downtown Edmonton and south side communities.

Intensity Range of Recreational Uses

It is the policy of this plan that a low to high intensity range of recreational activities will be developed and managed within the River Valley.

The proposed RVMA project will provide opportunities for a range of passive, low-intensity recreational uses (e.g., dog walking, bird watching, nature photography, running) as well enhance connectivity for a pedestrian and cyclist commuter route. The proposed project will facilitate access to the river valley for potential users with varying abilities and mobility limitations.

Location of Recreational Facilities

It is the policy of the Plan to locate the higher intensity recreational and cultural facilities in close proximity to major roadways, public transit routes and direct River crossings, except in the Central area.

The proposed RVMA project is located within the Central Area and is intended to provide a direct connection between downtown Edmonton and the river valley for all users, regardless of age or ability. To establish a well-connected system with easy access for non-motorized users, the proposed RVMA project is located in close proximity to major roadways (100 Street, McDougall Hill Road, Grierson Hill Road), public transit (numerous bus routes and Central LRT station), and a river crossing at the Low Level Bridge.

Ravines and River Edges

It is a policy of this Plan that ravines and river edge lands will be used for low intensity outdoor recreational use.

The proposed RVMA project will provide opportunities for a range of passive, low-intensity recreational uses (e.g., dog walking, bird watching, nature photography, running) and facilitate access to the river valley for potential users with varying abilities and mobility limitations.

Viewpoint Parks

It is a policy of this Plan that selected sites with an existing and outstanding view potential will be encouraged to be developed as "viewpoint" parks.

Currently, the top-of-bank at 100 Street and McDougall Hill Road and the existing wooden stair on McDougall Hill Road provide outstanding views of the North Saskatchewan River Valley, while drivers and passengers traveling along many of the roadways in the area, particularly traveling either north or south on McDougall Hill Road, also have partial views of the river valley. The Fairmont Hotel Macdonald provides outstanding views from its grounds and south-facing rooms. The proposed RVMA project design has purposely taken advantage of available views and viewpoint in the project area. The top-of-bank plaza will incorporate a viewpoint element, and the cantilevered lookout at the downslope terminus of the system will provide outstanding views from a lower vantage point. The urban stair will include several landings from

which users can enjoy the view, while the funicular will provide a range of views as it ascends and descends McDougall Hill.

Accessory Land Uses

It is a policy of this Plan that accessory land uses such as cafes, restaurants, bicycle rentals or other commercial establishments which are complementary to recreational and open space opportunities and harmonious to the natural environment will be encouraged where land use districting permits.

This policy is not relevant to this project.

Environmental Reserve Dedication

It is a policy of this Plan that the City may acquire through subdivision all lands lying below the geomorphic limit of the River Valley and Ravine System as Environmental Reserve, in accordance with the provisions of the Planning Act. At the discretion of the Subdivision Officer or the Municipal Planning Commission, the geographic top-of-the-bank may replace the geomorphic limit in this Policy.

This policy is not relevant to this project.

Capital City Recreation Park

It is a policy of this Plan that the City will support the concept of the extension of the Capital City Recreation Park to the City's Northeast and Southwest boundaries.

This policy is not relevant to this project.

Trail System

It is the policy of this Plan to establish pedestrian and other non-motorized vehicular movement systems; which includes bicycles, cross-country ski trail developments and equestrian trails in selected areas; as the primary modes of movement along and through the River Valley.

The proposed RVMA project will facilitate pedestrian and cyclist access and connectivity to the existing river valley SUP system for users of varying abilities and with varying mobility limitations. The local SUP network in the Central Area will be preserved and enhanced for all permitted forms of transportation, including cycling. Pedestrian and cyclist movement across Grierson Hill Road will be improved with the addition of the new pedestrian bridge compared to the existing condition.

River and Ravine Crossings

It is the policy of this Plan to develop and/or improve River and Ravine crossings for pedestrians and other non-motorized movement systems so as to connect recreational activity nodes and other park amenities.

This policy is not relevant to this project.

Roadway Access and Parking

It is the policy of this Plan to develop a vehicular distribution and parking system in the River Valley that permits access to parking areas but restricts vehicular penetration

through recreational and park areas. This policy does not restrict emergency vehicle access required for public safety.

Roadway access to the proposed RVMA project area will comprise existing City of Edmonton roadways including Grierson Hill Road, McDougall Hill Road and 100 Street. Since the proposed project is considered a component of the river valley SUP system rather than a destination, access is expected to be primarily by pedestrians and cyclists accessing the system from existing sidewalks and SUPs. Public parking is provided throughout downtown Edmonton, with numerous parking meters and four parkades in close proximity to the proposed project area. Some parking for river valley park users is provided in nearby Louise McKinney Riverfront Park and Henrietta Muir Edwards Park.

Recreational Water Transportation

It is the policy of this Plan to encourage and support recreational programmes and facilities for water-borne modes of transportation in conjunction with detailed plans for parks and recreation development.

This policy is not relevant to this project.

Historic Resources Inventory

It is the policy of this Plan to continue to develop and maintain an inventory of all historic and archeological resources and recognize those resources in planning or land use decisions.

A Historical Resources Impact Assessment was completed in summer 2015 for areas of proposed surface disturbance associated with proposed RVMA construction. No historic resources were identified in the course of the HRIA field investigations (Turtle Island 2015). As a result, it was the conclusion of the HRIA that further concern for historical resources in the area is not warranted. A paleontological HRIA will be conducted as part of the construction monitoring program as required by Schedule A (*Historical Resources Act* Requirements), issued by Alberta Culture and Tourism. Regardless of these studies, if archaeological, paleontological, or historical resources are encountered during proposed construction activities, work will cease immediately and Alberta Culture and Tourism and/or the Royal Tyrell Museum will be notified.

Designation of Historic Resources

It is the policy of this Plan that under the Historic Resources Act of Alberta, buildings or groups of buildings maybe designated as Municipal Resources or Municipal Historic Areas where appropriate.

This policy is not relevant to this project.

Minimize Land Use Conflicts

It is the policy of this Plan that land use conflicts between parks and nonparks uses will be minimized by appropriate facility siting, quality design, noise and visual buffering.

Consistent with this policy, several steps have been taken during project preliminary design to minimize conflicts with existing uses. The majority of the proposed RVMA

system will be located on City-owned lands, with a small portion situated on an easement on the Fairmont Hotel Macdonald grounds.

As a result of comprehensive consultations with stakeholders, the RVMA project has been designed to aesthetically fit into the river valley setting and have a low profile on the landscape. The pedestrian bridge support piers have been located to minimize interference with sightlines for motorists on Grierson Hill Road. Operation of the funicular is expected to make relatively minimal noise, equivalent to a normal human conversation. The elevator structure and entrance adjacent to the existing river valley SUP will be situated so as to minimize interference between those wishing to access the elevator and those using the SUP. It is intended that the existing wooden stair remain operational for as much of the construction period as possible so that recreationalists and commuters may continue to use it.

Urban Design and Architectural Guidelines

It is the policy of this Plan that all public development will conform to Council approved environmental, urban and architectural design guidelines to be developed in future studies and park development plans.

The proposed RVMA project will conform to all relevant City of Edmonton design guidelines, consistent with all other existing river valley amenities.

Access for the Handicapped

It is the policy of this Plan that recreational facilities will be designed, if feasible, to accommodate access and other requirements of the handicapped.

The funicular and elevator components will provide barrier-free access to the River Valley and Ravine System for mobility-impaired and otherwise disabled people. The funicular will connect users at the 100 Street top-of-bank to the promenade and pedestrian bridge over Grierson Hill Road, and the elevator will take users from the pedestrian bridge to ground level at the river valley flats, with stops at both the Grierson Hill Road sidewalk level and at the existing SUP level. Paved trail tie-ins on relatively flat terrain will be constructed to connect the pedestrian bridge to existing river valley SUPs, promoting accessibility to a variety of users.

3.3 Environmental Protection Objectives

To establish the River Valley and Ravine System as an environmental protection area. To consider environmental factors when planning for use in the River Valley.

Criteria pertaining to alignment selection included impacts to parks and recreation, riparian zones and natural areas. The proposed alignment – within Bylaw 7188 boundaries – was determined to have potentially fewer impacts to such resources in comparison to alternate alignments. The EIA prepared for this project identifies means of mitigating impacts to the natural environment.

3.3.1 Environmental Protection Policies

Preservation of Natural Resource Areas

It is the policy of this Plan to recognize the Plan Area as containing natural resource areas which will be preserved and enhanced for recreational, scenic, and ecological purposes.

The entire proposed RVMA footprint will be located within Bylaw 7188 boundaries, in an area that supports semi-natural and natural areas, as well as manicured spaces. Clearing of natural and semi-natural plant communities will be required; however, clearing requirements will be minimized by the relatively linear (i.e., no meanders) alignment and compact construction footprint. The promenade, trail connector and access road will follow a previously disturbed trail on McDougall Hill. Manicured or previously disturbed areas will be used for construction staging areas to minimize clearing of natural vegetation.

Identification of Sensitive and Hazardous Lands

It is the policy of this Plan to identify environmentally sensitive and hazardous lands through a detailed resource management approach.

An EIA pursuant to Bylaw 7188 has been conducted in support of the proposed project. In addition, a geotechnical evaluation of all sensitive lands has been undertaken in support of preliminary design, and design has been influenced by the need to ensure slope stability throughout construction and operation. The slope at this location is considered currently stable, and design will account for any potential to destabilize. Additional slope stability monitoring may be required on an ongoing basis through construction and early operation to ensure continued stability.

Application of Environmental Impact Assessment

It is the policy of this Plan to ensure the application of an environmental impact screening and assessment to all proposed public development and development on public land.

An EIA pursuant to Bylaw 7188 has been undertaken as part of preliminary design and is submitted for review with this Site Location Study.

Development on Environmentally Sensitive Lands

It is the policy of this Plan that when a development application is received, the Development Officer shall determine if the subject lands are environmentally sensitive to development, and may require additional information be provided. In determining whether a permit shall be issued and what conditions, if any, are required to eliminate or mitigate environmental damage, the Development Officer may consult with other civic departments and environmental agencies.

The proposed project includes development within the central area of the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188). An EIA for the proposed project has been undertaken and will be subject to the standard review process conducted by City of Edmonton Sustainable Development.

Development on Hazardous Lands – Unstable Slopes

It is the policy of this Plan that development will avoid areas with unstable slope conditions. Where development in such locations is deemed to be essential or is permitted by existing regulation, the Development Officer may require, from a registered Professional Engineer, detailed construction techniques to ensure stability of land and buildings.

The proposed project will be situated on McDougall Hill, extending from the top-of-bank to the river valley flats. The slope in this area is considered very steep, and inactive landslides were noted during geotechnical investigations (Thurber Engineering 2015). However, no significant slope movement was noted over the last four years of monitoring and the slope was considered relatively stable. Slope monitoring will continue throughout design, construction and operation to assess both short- and long-term movements. Stormwater will be managed to minimize changes to overland flow downslope, and vegetation clearing on the slope will be minimized, with disturbed areas revegetated as soon as possible following construction. Other recommendations include ensuring stockpiles are not situated on the slope and ensuring the addition of fill for grading improvements is kept to a minimum.

Floodplain Management Guidelines

It is the policy of this Plan that the City will undertake, with other public authorities, the identification and designation of flood risk areas, and adopt floodplain management guidelines.

Out of the whole project footprint, only the downslope terminus of the proposed project will be situated within the 1:100 year floodplain, as noted in the City of Edmonton Flood Protection Overlay. Project components in this area consist of an elevator and wooden stair and plaza that connect to a cantilevered lookout extending over the river valley flats. Flooding potential was considered during preliminary and detailed design.

3.4 Transportation Objectives

To support a transportation system which serves the needs of the City and the Plan area, yet is compatible with the parkland development and the environmental protection of the River Valley and its Ravine System.

This objective is not relevant to this project.

3.4.1 Transportation Policies

Direct River and Direct Ravine Crossings by Major Transportation Corridors

It is the policy of this Plan that new transportation corridors will not be approved except for direct River and direct Ravine crossings which are deemed essential and approved by City Council as in Policy 3.5.3.

This policy is not relevant to this project.

Negative Impacts of Existing and Future Transportation Facilities

It is the policy of this Plan that existing and future transportation facilities will be reviewed with the objective to eliminate, minimize or mitigate the negative effects of the facilities through design and landscaping measures.
This policy is not relevant to this project.

Environmental Impact Assessment for Transportation Facility Proposals

It is the policy of this Plan that proposals for the upgrading of approved transportation corridors and attendant facilities be subject to an environmental impact screening assessment (Schedule D) and that the identified adverse impacts be eliminated, minimized or mitigated through design and landscaping measures.
This policy is not relevant to this project.

3.5 Major Facility and Natural Resource Development Objectives

To control the expansion and construction of major facilities and minimize the adverse impacts of major facilities on the natural environment and park development.
The RVMA EIA documented the proposed alignment and the alternatives. The proposed alignment was selected, as it would result in the fewest potential adverse impacts to existing parks, recreation traffic, and utilities. The proposed alignment has a slightly larger footprint than the alternatives and would require slightly more vegetation clearing; however, this alignment utilizes an existing trail located midslope on McDougall Hill and consequently reduces the amount of clearing in native plant communities. The overall alignment is also relatively linear (i.e., no meanders), which further reduces the amount of clearing required in areas of natural vegetation.

3.5.1 Major Facility and Natural Resource Development Policies

Development of Major Facilities

It is a policy of this Plan that major public facilities shall not be constructed or expanded unless their location within the River Valley is deemed essential and approved by City Council.
This Site Location Study meets the need for a location assessment for proposed major facilities. Further, based on the constraints analysis, this SLS concludes that it is essential that the major facilities proposed as part of the RVMA project be located within the North Saskatchewan River Valley.

Development of Natural Resource Extraction Industries

It is a policy of this Plan that natural resource extraction industries shall not be developed unless their location within the River Valley is deemed essential by Council.
This policy is not relevant to this project.

Site Location Study and Environmental Impact Screening Assessment

It is a policy of this Plan that all proposals for the development of a major facility that is publicly owned or is developed on public lands shall be subject to an environmental impact screening assessment as outlined in Schedule D, and a detailed site location

study detailing costs, and social, environmental and institutional constraints which make a River Valley location essential must be prepared for Council approval. These studies shall be undertaken prior to Council committing funds for capital expenditure for the development of this proposal.

On 23 January 2013, the City of Edmonton received $72.9-million in grants from the River Valley Alliance (RVA) and the provincial and federal governments, for specific capital projects described in five initiatives to improve public access to the North Saskatchewan River and connectivity within the river valley. The proposed RVMA project is one of those five funded initiatives and is fully-funded with a budget of approximately $24 million. The proposed project is considered a major facility pursuant to Bylaw 7188; therefore, an environmental impact assessment (under separate cover) and site location study (this document) have been prepared for City Council approval pursuant to Bylaw 7188. Construction will not commence until the EIA and SLS documents are approved by City Council. All mitigation measures and best management practices set out in the EIA will be adhered to during project detailed design and construction.

Protection of Unique Areas

It is a policy of this Plan that the City will not support applications for facility development to the Energy Resources Conservation Board for resource extraction in those portions of the Plan area which possess unique environmental features (topographical, geological, historical, archaeological).

This policy is not relevant to this project.

Landscaping and Site Design Requirements

It is a policy of this Plan that landscaping and other design considerations for buffering extraction operations be a condition of approval of resource extraction operations.

This policy is not relevant to this project.

Disposal Sites for Clean Fill

It is a policy of this Plan that sites for storage of clean fill for reclamation of extraction operations shall be assigned as a condition of approval.

This policy is not relevant to this project.

Reclamation and Restoration of Natural Resource Extraction Sites

It is a policy of this Plan that a reclamation and restoration programme providing details on grading, landscaping or other treatments necessary to restore extraction sites for park or recreational use shall be condition of approval for resource extraction operations and Civic maintenance activities.

This policy is not relevant to this project.

Conformity to Provincial Land Conservation Guidelines

It is a policy of this Plan that natural resource extraction operators conform to the Land Conservation Guidelines of the Alberta Land Surface Conservation and Reclamation Act.

This policy is not relevant to this project.

Storm Water Management

It is a policy of this Plan to employ the use of storm water management techniques to reduce the adverse impacts of increased volume and rate of stormwater discharges, particularly along the River Valley edge and its tributary ravines.

The establishment of proposed RVMA infrastructure in the proposed project area is expected to result in changes to surface drainage patterns as a result of some vegetation removal, slope regrading and the introduction of new hard-surface infrastructure that will increase impermeable surfaces in the study area. Currently, surface water on McDougall Hill naturally infiltrates into the vegetated slope or flows downslope as runoff towards Grierson Hill Road where it enters the City's storm sewer system. Similarly, surface water flows on the slope south of Grierson Hill Road naturally infiltrate into existing vegetated areas.

During operation, surface drainage patterns will be altered as a result of the construction of project components that will increase impermeable surfaces in the study area. This will result in increased surface runoff, creating the potential to overwhelm existing municipal drainage infrastructure, if not managed adequately, and cause erosion and sedimentation on steep slopes in the area. Drainage systems have, therefore, been designed not to overwhelm existing drainage infrastructure, via the use of LID elements such as a vegetated swale. That swale will contain a buried "French drain" to collect and remove the surface water collected by the swale. The swale and the drain will sit on an impermeable layer to manage the potential for water to migrate through the slope and saturate the ground immediately below the swale. The swale drain will be connected to outfall pipes along its length to allow the collected flow to daylight below the promenade. This will help mitigate the build-up of groundwater behind the promenade north supporting wall as well as allow surface water flows to infiltrate into the vegetated slope, thereby slowing and minimizing runoff into the municipal storm sewer system. A toe drain will also be supplied at the promenade north support wall to manage the natural flow of water that does locally occur.

The pedestrian bridge and lookout will have conventional deck drainage with surface water collected along a curb at the edge of the walking surface. Planted areas and rain gardens will absorb rainfall and not contribute to surface runoff. Surface water flows will be collected at the top of the elevator stairs and fed to the collection drain at the deck gradient break point on the north side of the elevator. The flow intercepted at this location will be fed back to the drainage points alongside the pier adjacent to Grierson Hill Road.

Monitor and Regulation of Water Quality

It is a policy of this Plan to monitor and to regulate water quality and flows where possible within the watershed and to operate with other governmental agencies in the achievement of effective control.

The proposed RVMA project is not anticipated to affect river water quality, and design has included this consideration. Issues pertaining to water quality will be monitored during construction. Low Impact Development and best management practices were considered during project drainage design.

To control the further development of natural resource extraction and to minimize the adverse impacts of natural resource extraction operations on the natural environment and park developments.

This policy is not relevant to this project.

To prohibit the development of utility corridors, including utility right-of-ways, except for direct river crossings.

This policy is not relevant to this project.

To minimize the adverse environmental effects of all existing and future public works, landfill and solid waste disposal facilities.

This policy is not relevant to this project.

To control the design and construction of future public works in a manner which will enhance the natural environment.

This policy is not relevant to this project.

3.6 Agricultural Land Use Objectives

To continue agricultural activities.

This objective is not relevant to this project.

3.6.1 Agricultural Land Use Policy

Agricultural Activities

It is a policy of this Plan that existing agricultural activities may continue subject to Policies 3.2.7 and 3.2.8.

This policy is not relevant to this project.

3.7 Residential Land Use Objectives

To control residential development in the Plan area and to limit its impact and extent on the natural environment and the parks system.

This objective is not relevant to this project.

3.7.1 Residential Land Use Policies

Present Residential Development

It is a policy of this Plan to recognize existing residential development and those lands presently districted for residential development outside the Central Area.
This policy is not relevant to this project.

3.8 Central Area Land Use Objectives

To designate the Central Area as an area where community plans will be prepared.
This objective is not relevant to this project.

To establish general land use guidelines and direction for the future land use of the Central Area of the River Valley.
This objective is not relevant to this project.

3.8.1 Central Area Land Use Policies

It is a policy of this Plan to recognize the existing communities of Rossdale and Cloverdale as illustrated on the Central Area Map (page 17) **(of Bylaw 7188).**
The proposed project area is located adjacent to the northeast edge of the Rossdale community, which encompasses the western portion of McDougall Hill up to the 100 Street intersection. Thus, all project components will be situated outside Rossdale, within downtown Edmonton. Thus, no alterations to the existing community of Rossdale will be required.

It is a policy of this Plan that when the future land use of this area is determined, the detailed development plan and community plan proposals should consider the following guidelines:

1. ***Primarily residential development will be proposed in the designated areas of South Rossdale and South Cloverdale. (See Central Area Map p. 17)*** **(of Bylaw 7188).**

This policy is not relevant to this project.

2. ***New or expanded major facilities which adversely impact the residential communities shall be discouraged.***

This policy is not relevant to this project.

3. ***Proposed new development should be designed to take advantage of the river location and should be integrated with design concepts of the Capital City Recreation Park.***

The proposed RVMA project, situated adjacent to the northeast portion of the Rossdale Neighbourhood, will take advantage of outstanding views of the river valley from McDougall Hill and will be integrated into the existing river valley SUPs via trail tie-ins from the elevator at the downslope terminus. Thus the proposed project links downtown Edmonton with the Capital City Recreation Park. Architectural design and landscaping that respect and complement the existing river valley aesthetic will integrate the proposed

RVMA project with its surroundings. Hard and soft landscaping elements will soften the transition between project structures and their natural parkland surrounding, thereby integrating the structures as visual elements within the landscapes.

4. Additional commercial use may be proposed, and if so, should serve local residential development and existing recreational development, be compatible to parkland development, or be part of a city-wide facility.

This policy is not relevant to this project.

5. Ensure the provision of pedestrian links to all the abutting neighbourhoods, including the Downtown and ensure that the facilities that provide these links are of sufficient capacity to accommodate the proposed development for this area.

The proposed RVMA project will provide direct links for pedestrians and cyclists from Downtown to the Rossdale Neighbourhood and existing river valley SUPs. Through the construction of an urban stair, funicular, promenade, pedestrian bridge and elevator, pedestrians and cyclists of varying abilities will have barrier-free access to Downtown, the sidewalk along Grierson Hill Road and the existing river valley SUP network.

6. A marketing strategy for the disposal of City-owned lands in Rossdale and Cloverdale will be developed in conjunction with the preparation of the community plans. Disposal of lands will occur upon completion of these community plans and in a manner compatible with the community plans.

This policy is not relevant to this project.

7. ***Residential and other suitable uses, including parks and recreational uses, may be considered in the Rossdale and Cloverdale community plan areas.***

The proposed RVMA project facilitates access for all users from Downtown to existing recreational amenities in the river valley.

Prohibit Additional Residential Development

It is a policy of this Plan that additional residential lots will not be created, except in the Central Area.

No additional residential lots will be created as a result of the propose RVMA project.

3.9 Upland Area

In keeping with the Major Goals in Section 2.2* (of Bylaw 7188) *and the Land Use Policies accompanying relevant objectives, Policy C542 Development Setbacks from River Valley/Ravine Crests will require that the design of development in all new or redeveloping areas abutting the River Valley and Ravine System provide for the separation of development from the river valley and ravine as generally illustrated in the accompanying Figure 1* (of Bylaw 7188)*, and as further described in Policy C542 and its accompanying Procedures.

The purpose of the City of Edmonton's Policy C542 is to ensure that urban development is reasonably safe from environmental hazards, such as slope instability, and to protect the river valley and ravine system from urban development that may compromise its long-term stability. The exception to this policy is the downtown and existing river valley communities, where development has already occurred either on the slope or in the floodplain of the River Valley and Ravine System. While the proposed RVMA project may be considered an exception to Policy C542 because of its location downtown, the project does satisfy the policy's requirement to ensure the preservation of the River Valley and Ravine System as a significant visual and natural amenity feature, contribute to the ecological functionality of the City's natural areas system, and provide a recreational opportunity for the citizens of Edmonton. In addition, several geotechnical investigations have been conducted in support of the proposed RVMA project and have informed preliminary design and the Bylaw 7188 Environmental Impact Assessment to ensure slope stability is maintained in the area.

4.0 CONCLUSION

As documented in this Site Location Study, providing mechanized access and improving connectivity in the North Saskatchewan River Valley – within Bylaw 7188 boundaries – is essential to facilitate the expansion and connectivity of Edmonton's SUP system for all users from downtown Edmonton to the river valley. Previous planning studies conducted by the City and previous decisions by City Council have determined that the site specific location of the proposed alignment has the potential for the fewest impacts, including impacts to the natural environment and socio-economic considerations. Based on the information collected and analyzed in this report, we are confident that the proposed alignment and design conforms to the goals, and applicable objectives and policies of the North Saskatchewan River Valley Area Redevelopment Plan (Bylaw 7188).

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Appendix A. North Saskatchewan Central River Valley Mechanized Access (DIALOG 25 June 2014)

25 June 2014

NORTH SASKATCHEWAN CENTRAL RIVER VALLEY MECHANIZED ACCESS

TRANSFORMING | EDMONTON

BRINGING OUR CITY VISION TO LIFE

Prepared by DIALOG

Prepared for The City of Edmonton

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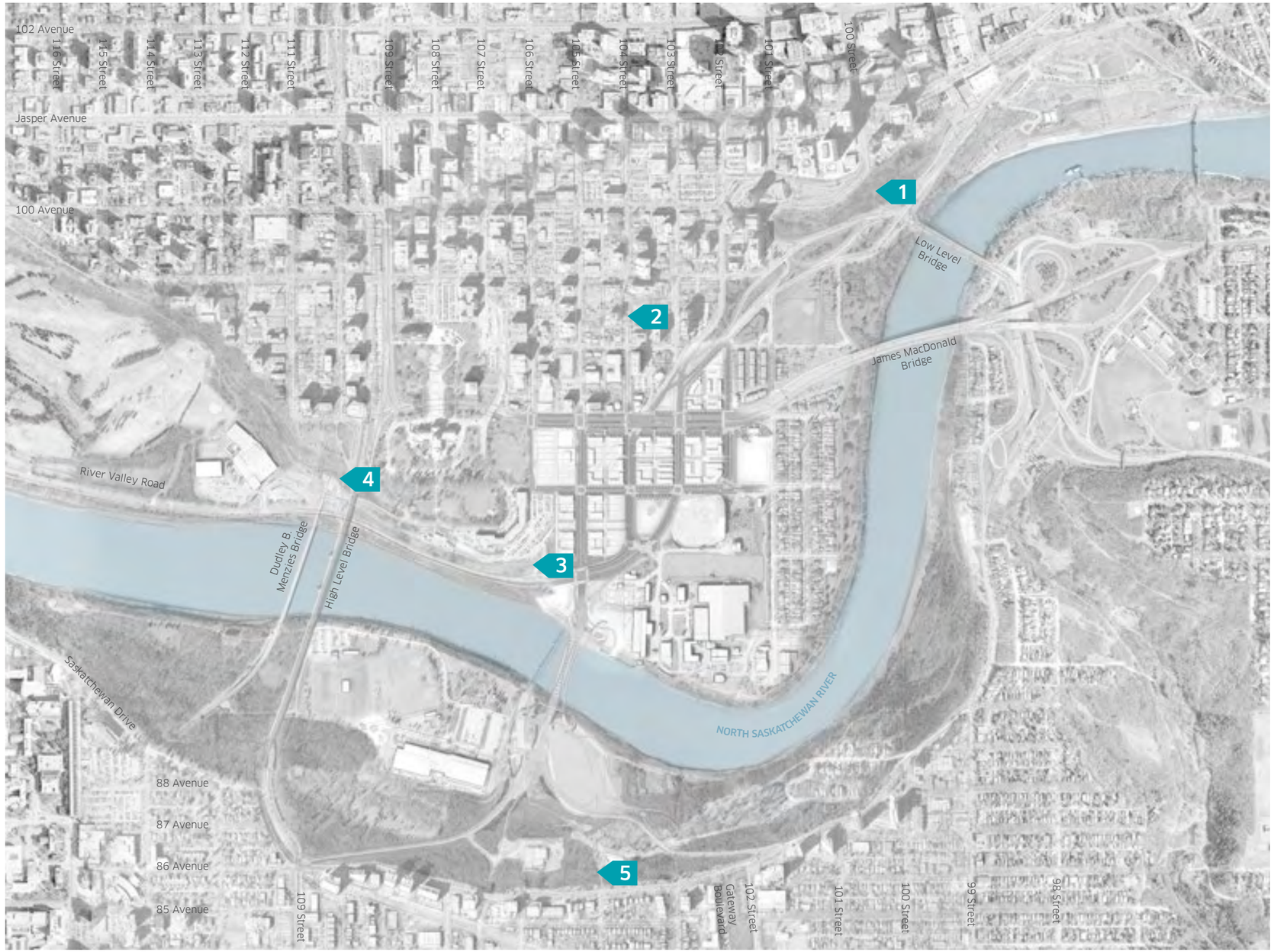
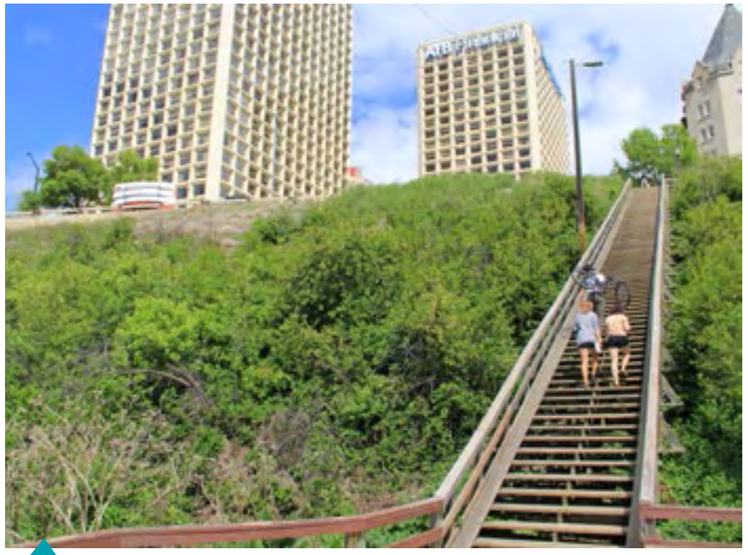


STUDY SITE LOCATIONS



1 100 Street at McDougall Hill

2 104 Street at 99 Avenue

1.0 INTRODUCTION

1.1 Site Identification

This report offers the City of Edmonton a 'high level' review and assessment of the potential for a mechanized access conveyance for a number of alignments in the central part of the North Saskatchewan River Valley:
North Side (Downtown)

- 100 Street ("Hotel MacDonald stairs")
- 104 Street
- 106 Street (at Alberta Legislature)
- 110/109 Street (High Level Bridge)

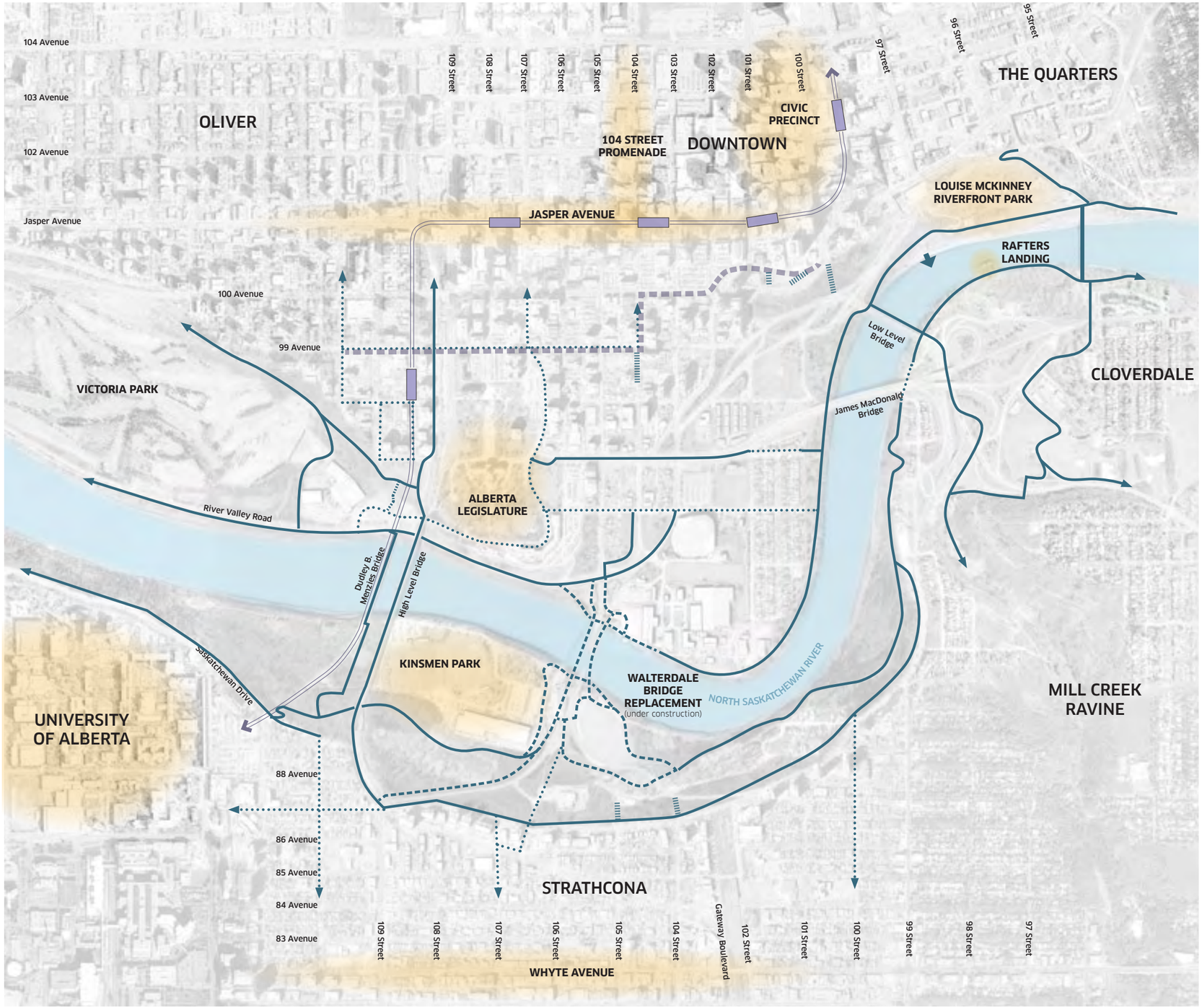
South Side (Strathcona)

- 105 Street

3 106 Street at River Valley Road

5 105 Street at Saskatchewan Drive

4 110 Street at Ezio Faraone Park



EXISTING CONDITIONS
Active Transportation and Destinations

0 100 250 500 1000m

1.2 Prior Mechanized Access Review

Improvements to river valley access from the Downtown are identified in CCDP. Prior reviews of mechanized access have included:

- Louise McKinney Riverfront Park
- RFEOI for Mechanized Access along 104 Street

1.3 Opportunity for Mechanized Access

Mechanized Access offers the potential of connecting major destinations with one another where there is both potential demand and vertical elevation differences that make other modes not as suitable. This characteristic of connection is an inherent in the relation between the river, the river valley flats and the tableland destinations of Downtown and Strathcona.

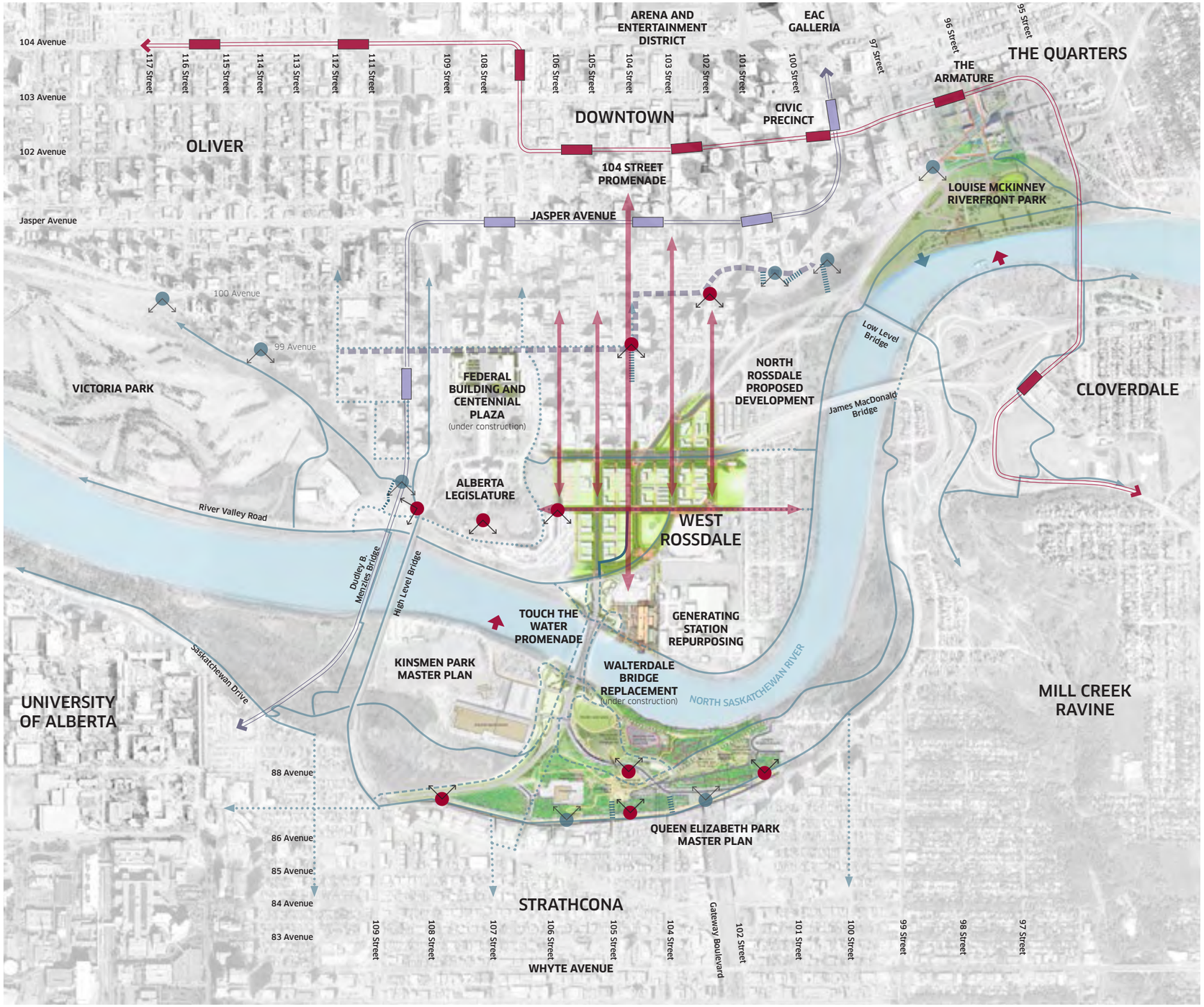
1.4 Relevant Initiatives

Significant initiatives of "city building" are underway in the central river valley focused on the Rossdale Flats:

- West Rossdale
  - Urban Design Plan, ARP Amendment, DC zoning
  - Public Realm and Roadway Improvement project
  - Governance review
  - Rossdale Generating Station Repurposing/ Stabilization
- Walterdale Bridge Replacement, including
  - Provision for "Touch The Water" Promenade along the north bank at the bridge
  - Integration with the bridge of a "passerelle" or Shared Use Path (SUP) along the downstream side to connect improvements in Queen Elizabeth Park with the Generating station and the River

LEGEND

- Existing Destination
- Existing On Road Bike Route
- Existing Shared Use Path
- Shared Use Path (within scope of Walterdale Bridge Replacement project)
- Existing Stair
- Existing Heritage Trail
- Existing LRT Alignment
- Existing LRT Alignment
- Existing Boat Dock



In combination these initiatives are set to create a destination neighbourhood in and surrounding West Rossdale.

There are at the same time other initiatives in the area:
- LRT to the Southeast including a proposed station at the Muttart Conservatory.
- North Rossdale proposed residential development
- Proposed boat dock and launches along the river
- SUP improvements such as the accessible route in the vicinity of 105 Street on the south side.

Each of these initiatives is directly or indirectly improving the 'active transportation' network in the valley. They realize the potential of its character and amenity, including neighbourhoods and destinations that are highly walkable.

LEGEND

Existing Features

- On Road Bike Route
- Shared Use Path
- Shared Use Path (within scope of Walterdale Bridge Replacement project)
- Stair
- Heritage Trail
- LRT Alignment
- LRT Station
- Dock and Boat Launch
- Lookout

Proposed Features

- Linkages (As proposed in CCDP)
- LRT Alignment
- LRT Station
- Dock and Boat Launch
- Lookout (As proposed in Queen Elizabeth Park Master Plan and CCDP)

Plans depicted for illustrative purposes only.
No approved status.

FUTURE CONDITIONS
Active Transportation and Destinations

0 100 250 500 1000m

1.5 Study Objective

The review and assessment offers an information base for furthering the review of improved valley access via mechanized means. Each alignment is reviewed with respect to urban design (planning), structural, modal, geotechnical and cost (Class D). The assessed modes of mechanized access focus on elevator or inclined elevator. They offer a user experience that is unique, can operate without on-site staffing, and are durable within Edmonton's climatic region.

The modal alignment is undertaken in tandem with an improved pedestrian stairway experience. It also identifies the feasibility for accommodating cyclists within the context of alternate routes as part of active transportation.

1.6 Study Assumptions and Limitations

To complete the site analysis, we use existing readily available City information and that from our own offices developed for prior projects:

1. Any previous geotechnical investigation within the vicinity of the site.
2. Topographic slope and existing features information, including plans of existing stairs, above below grade utilities.
3. Property limits and lot patterns.

2.0 Technology Summary

Several mechanized systems have been built in urban environments to transport people from higher to lower laying areas and vice versa. These include:

- Railways
- Funiculars
- Vertical elevators
- Inclined elevators
- Escalators
- Gondolas/funitels
- Chairlifts
- Tramways and funifors

Different types of operations are required for each of these systems. The inclined and vertical elevator systems do not require operators and are manually controlled by the passenger. The escalator system is fully automatic and does not require an operator. This system can be shut off when there is no demand. The funicular and aerial systems (gondolas, funitels, chairlifts, tramways and funifors) require operating personnel, nominally between three and six persons depending on the system and the service level. For systems without operators, special measures regarding CPTED need to be considered. Such measures include security cameras, emergency phones, and system shut-off during night time.

RAIL BASED AND AT-GRADE SYSTEMS
Rack/Cog Railway

Rack/Cog wheel trains are similar to traditional railway systems, but have an additional geared wheel engaged to a continuous linear rack (a third rail) along the track centreline to overcome grades steeper than 6%, which is roughly the limiting grade for adhesion-based railway systems. The engagement between the wheel and the rack is not always permanent; it can be engaged in steep sections of the track and disengaged in flatter areas.

This is a reliable, robust system with high passenger capacity and a straightforward evacuation procedure. However, the size and capacity of a railway system may not be suitable for the ridership and site conditions on the sites around the river valley. Additionally, the requirements for practically level sites for the train stations and the access barriers created by tracks at wildlife/pedestrian/vehicular crossings will complicate the design of the track alignment.

Capacity expansion for railway systems is often challenging, unless the stations are initially built for longer trains.

Funiculars

Funiculars are cable-propelled systems that haul trains over an inclined track. Typically, funiculars operate using two vehicles fixed to opposite ends of a cable with gravity acting on the descending car used to aide in propelling the ascending car uphill. A traction motor provides the additional power to the system needed to overcome friction and the difference in weight between the ascending and descending vehicles. An emergency walkway adjacent to the tracks is used for evacuation.

Funiculars are safe, require less maintenance than aerial systems, typically have long service lives, and are not susceptible to strong winds. The size of cars can vary from as small as 10 passenger cars to cars that can accommodate up to 200 passengers. Cars can operate in pairs with single or double track arrangements. However, they cannot operate in alignments with many grade changes, unless self-leveling cars are used. As the cars are permanently fixed to the propelling cable, funiculars require evenly spaced stations if more than two stations are used for a system, unless stopping a car outside a station is accepted when the other car is in a station. Funiculars create practically insurmountable access barriers when tracks are at-grade, necessitating support structures for elevating the tracks at crossings with roads, shared use paths, and wildlife corridors.

Capacity expansion for funiculars is often challenging, as the carriage generally has to be exchanged and stations expanded.

Inclined Elevators

Inclined elevators operate under the same principles as single-track single-car funiculars. They are generally smaller and slower than funiculars and operate on an on-call basis. This system is appropriate for areas with lower ridership demand and is a low-energy option as it operates only when needed. This system faces the same detriments as Funiculars.

Capacity expansion for inclined elevators is costly, as it requires the addition of another elevator. Furthermore, space constraints might not permit an additional system.

Vertical Elevators

Vertical elevators operate using a similar process to building elevators, moving in the vertical plane to tranport the occupants to different elevations. Vertical elevators have similar ridership capacity to inclined elevators in that they are smaller and slower than funiculars while operating on an on-call basis. The vertical elevator system is also similar to the inclined elevator system in that it is a low-energy option and is appropriate for areas with low ridership.

Montmartre Funicular Upper Station + Funicular, Paris

Inclined elevator – Chattanooga, Tennessee

Monograeme - Portland Oregon

Elevator - Pamplona, Spain

However, the challenges of incorporating the physical extents of the vertical elevator into the surroundings may be less than with the inclined elevator as the structure can be integrated with existing structures.

Capacity expansion for vertical elevators is costly, as it requires the addition of another elevator. Furthermore, space constraints might not permit an additional system.

Outdoor Escalator

Outdoor escalators are mechanically identical to conventional escalators but require additional treatments to enable operation and ensure passenger safety in adverse weather conditions. These measures include a canopy/roof structure, waterproofing components susceptible to moisture, and heating systems. The linked escalator steps remain horizontal, allowing an immobilized escalator to act as a normal staircase. For energy efficiency, the escalator can be stopped or mobilized based on passenger demand. This system does not face the same disembarking challenges as a cable-based mechanized access system in the event of emergency evacuation.

Escalators' fixed inclination will require specific elevation differences between its ends. Escalator manufacturers also specify height and span limitations. In addition, Perhaps the greatest challenge for conventional escalators is barrier-free access.

Capacity expansion for escalators is costly, as it requires the addition of another escalator or the replacement of an existing escalator with a larger one. Furthermore, space constraints might not permit an expansion.

AERIAL SYSTEMS

Aerial systems are generally susceptible to strong winds, particularly single-cable systems supported and propelled along the same line. These systems tend to require more maintenance than rail or at-grade systems necessitating either an auxiliary system in place or accepting a shut-down. Aerial systems also need a minimum length and ridership demand before becoming economically viable. Changes in the horizontal alignment are also challenging.

Aerial systems, however, do not interfere with other transportation corridors and can swiftly accommodate changes in vertical alignment. They are also economically attractive for longer systems, especially when dealing with significant variations in grades along the alignment.

Gondolas/Funitels

For gondola/funitel systems, cabins are supported and propelled by the same aerial cable(s). Cabins can operate one-by-one, or in platoons of 2 to 4 as pulsed gondolas. Cabin capacities range from 5-15 passengers per cabin for gondolas and about 25 for funitels. Gondola cabins are generally supported on one cable, but can be suspended from 2 or 3 closely spaced cables for added stability. Funitels are propelled by at least two cables that are spaced two or more metres apart, providing more stability to the carriages.

For both, gondolas and funitels, cabins loop around the system generally on one continuous cable and at the end stations are detached from the cable and mechanically pulled around a semi-circle without stopping the cable drive or interrupting the operation of other cabins. It is while the cabins are detached that boarding and disembarking takes place. The detachment of the carriages allows for an unevenly spacing of stations if more than two stations are used.

Capacity expansion for gondolas/funitels can generally be achieved by simply adding carriages to the system, provided that the capacity of the propulsion system is designed for expansion. This is one of the big advantages of gondolas/funitels.

Disembarking in emergency situations, as with all other aerial systems, is inherently less safe in comparison to rail based and at-grade systems.

Chairlifts

A more economical variant for gondolas/funitels are aerial chairlifts. These operate under the same principles as pulsed gondolas and share basically all of their opportunities and disadvantages. The cars themselves are, essentially, benches conveyed by overhead cable and typically accommodate 2-4 people per chair. The chairs are either fixed to a point on the cable or detachable for better ease of loading/unloading. The detachable option is more desirable, from the standpoint of accessibility and being able to adjust the number of operating cars depending on demand. Commonly used in ski areas, these systems are demonstrably well-suited for use in lower temperatures. Auxiliary motors power a back-up system in case power is lost to the main engines driving the cable, allowing passengers to disembark. Due to the carriages being open, passengers will be exposed to the elements. Furthermore, the vehicles themselves create accessibility barriers.

Capacity expansion for chairlifts can generally be achieved by simply adding chairs to the system, provided that the capacity of the propulsion system is designed for expansion. This is one of the big advantages of chairlifts.

Aerial Tramways & Funifors

Aerial Tramways use at least two cables, with one or more fixed cables providing support and guidance, while a separate haul rope propels the car. Vehicle capacities range from 30 to 150 passengers per cabin. Tramways have two operating configurations: jig-back and single-loop. In a jig-back configuration, the haul cable pulls the vehicles up and down without any impact to other vehicles, negating the need for evenly spaced stations. For the single-loop configuration, a set of carriers move along a single path of travel, requiring evenly spaced stations if more than two are required.
Funifors are a variation to Aerial Tramways. They are propelled and supported by two cables with the hanger structure as wide as the car which make them more stable in high wind conditions.

CONCLUSION

The rather large elevation difference and the moderate expected ridership do not validate the use of rack/cog railways to access the Edmonton River Valley. Due to their susceptibility to cold weather and trapping of debris, such as sand in winter, escalators outside of fully enclosed buildings do not perform well in Edmonton. Furthermore, full accessibility of escalators is challenging and therefore they are not further carried as an option in the present study. Tramways and funifors typically operate on a scale that is significantly too large for the proposed use and are thus not economical and not further investigated, either. Chairlifts pose accessibility challenges and patrons are not adequately protected from the weather, which makes this mode another option that is not adept for the Edmonton River Valley.

Funiculars, inclined and vertical elevators, and gondolas are all viable and winter-proven technologies to provide access to the North Saskatchewan River Valley. Due to their generally lower life-cycle cost, preference will be given to inclined and vertical elevators over gondolas for each of the River Valley access locations discussed in this report.

3.0 Geotechnical Summary

All modes are considered equal from a geotechnical standpoint, assuming a common need for stable foundation with low tolerance for movement is required. Aerial systems might require less stringent movement control and could therefore be viewed as more favourable from a geotechnical point of view for unstable slope conditions. Where current slope stability appears good and there is no indication of deep seated movements, standard support is expected to consist of deep foundations (piles).

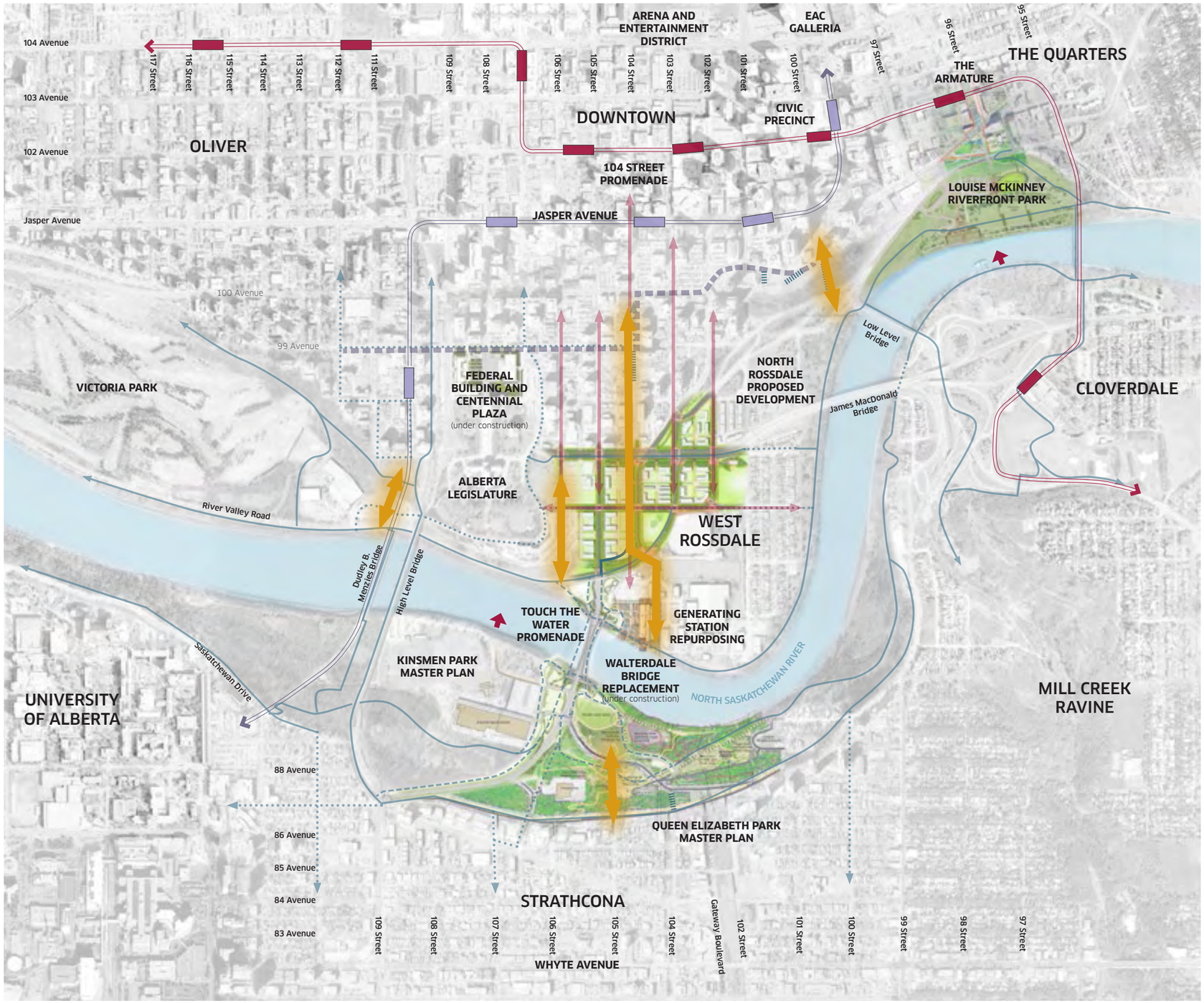
The controlling factor for design of piles is expected to be frost uplift (and/or lateral load), not compression. CIP concrete piles to min. 8 m depth could be assumed for preliminary assessment (subject to results of further assessment), to support “bridge” type structures. The specific diameter of piles will depend on lateral loads.

Access to install foundations is generally poor due to slopes - add a factor for access (related to slope steepness; higher factor for steeper slope and lack of staging area).

It is understood that a uniform grade will be required for these modes. Cuts in the upper portions of the slopes and fills at the bottom of slopes are in general okay, however this should be assessed further for each specific site. If upon further study it is determined that deeper seated movements are occurring, additional mitigative measures such as toe berm and/or retaining wall structures may be required to enhance slope stability. This is more likely required for Queen Elizabeth Park than other sites, as some slope instability has been observed (refer to geotechnical comments in section 5.0, Site Assessments for additional information).

View of the North Bank from Saskatchewan Drive

4.0 Site Alignment Opportunities



LEGEND

Existing Features

- On Road Bike Route
- Shared Use Path
- Shared Use Path (within scope of Walterdale Bridge Replacement project)
- Stair
- Heritage Trail
- LRT Alignment
- LRT Station
- Dock and Boat Launch
- Lookout

Proposed Features

- LRT Alignment
- LRT Station
- Dock and Boat Launch
- Potential alignments and connecting routes for mechanized access
- Linkages (As proposed in CCDP)

Plans depicted for illustrative purposes only.
No approved status.

POTENTIAL MECHANIZED ACCESS ALIGNMENTS

0 100 250 500 1000m

We have met with selected City staff to review and confirm alignments, their site character and conditions, modes and geotechnical considerations.

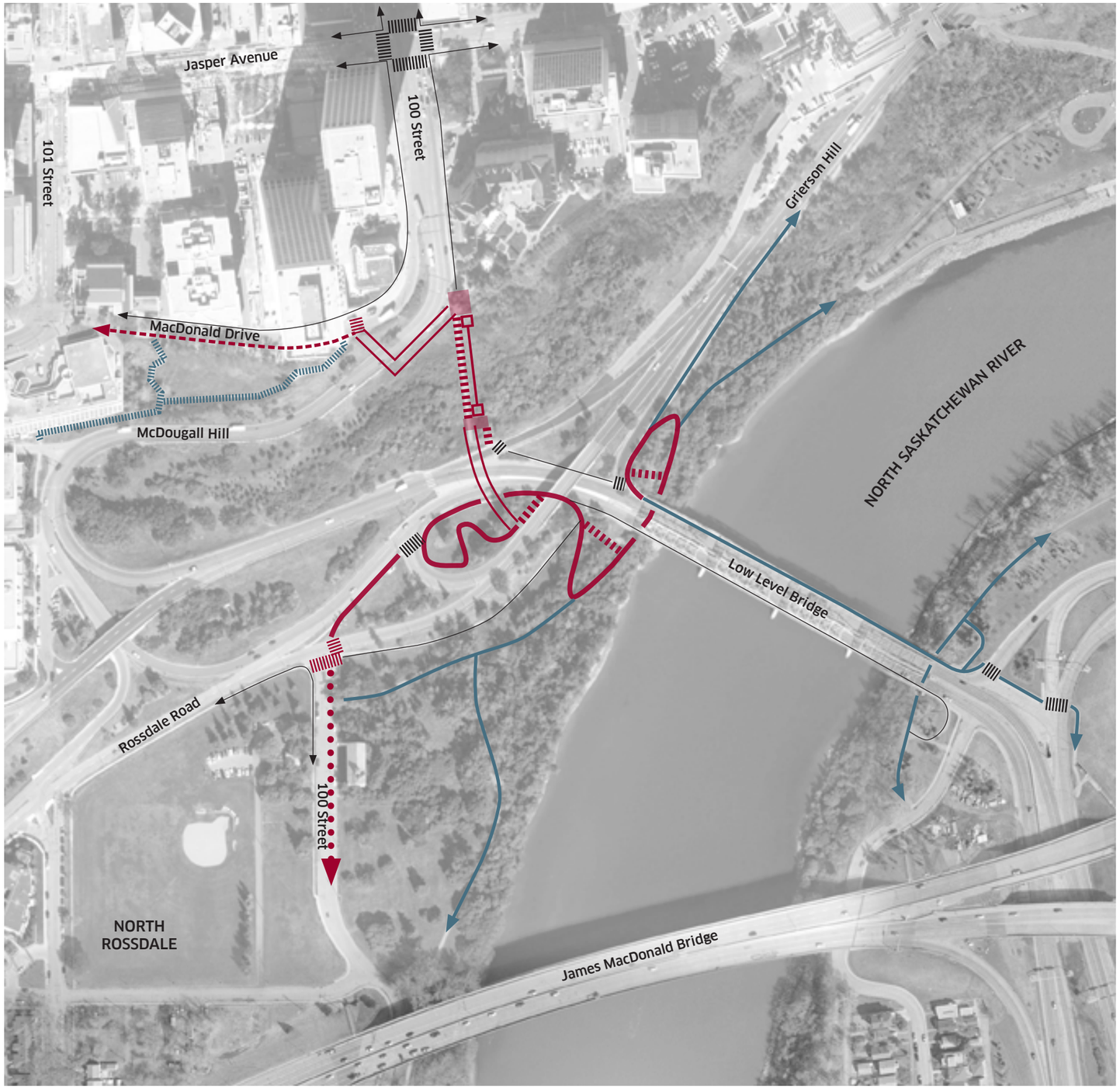
Each of the alignments offers connectivity to destinations in and beyond the valley, both existing and potential. There is an ease of pedestrian access to the alignment from surrounding neighbourhoods and associated destinations. Each alignment examines:

- Views,
- Amenity and lighting given the variation of season
- Lighting to address long winter nights, and
- Terminus integration with their surroundings at both top and bottom of the access, opportunities and constraints.
- Operation and maintenance requirements
- It is given that stairs are to be retained and improved in addition to the mechanized access.

View of the top of the existing stairs at 100 Street and McDougall Hill

4.1 100 Street Alignment

North Bank at McDougall Hill



100 STREET ALIGNMENT

Core Mechanized Access Improvements

- Improved plaza at top of bank with lighting, furnishings and planting.
- Mechanized access with parallel stair (min. 4.2m width) from top of bank to landing 7m above roadway.
- Pedestrian bridge over Rossdale Road and Grierson Hill to berm at existing overpass.
- SUP extends west to 100 Street along proposed accessible route to connect with North Rossdale and 100 Street.

Potential Access Improvements

- SUP loops under pedestrian bridge and existing Grierson Hill overpass then under the upstream side of the Low Level Bridge and up to the existing SUP on the downstream side of the bridge.
- Potential pedestrian bridge over McDougall Hill to top of existing stair near Hotel MacDonald to improve access from proposed Heritage Trail.
- Potential improved connections to Louise McKinney Riverfront Park and proposed Muttart LRT Station.

LEGEND

Existing Features

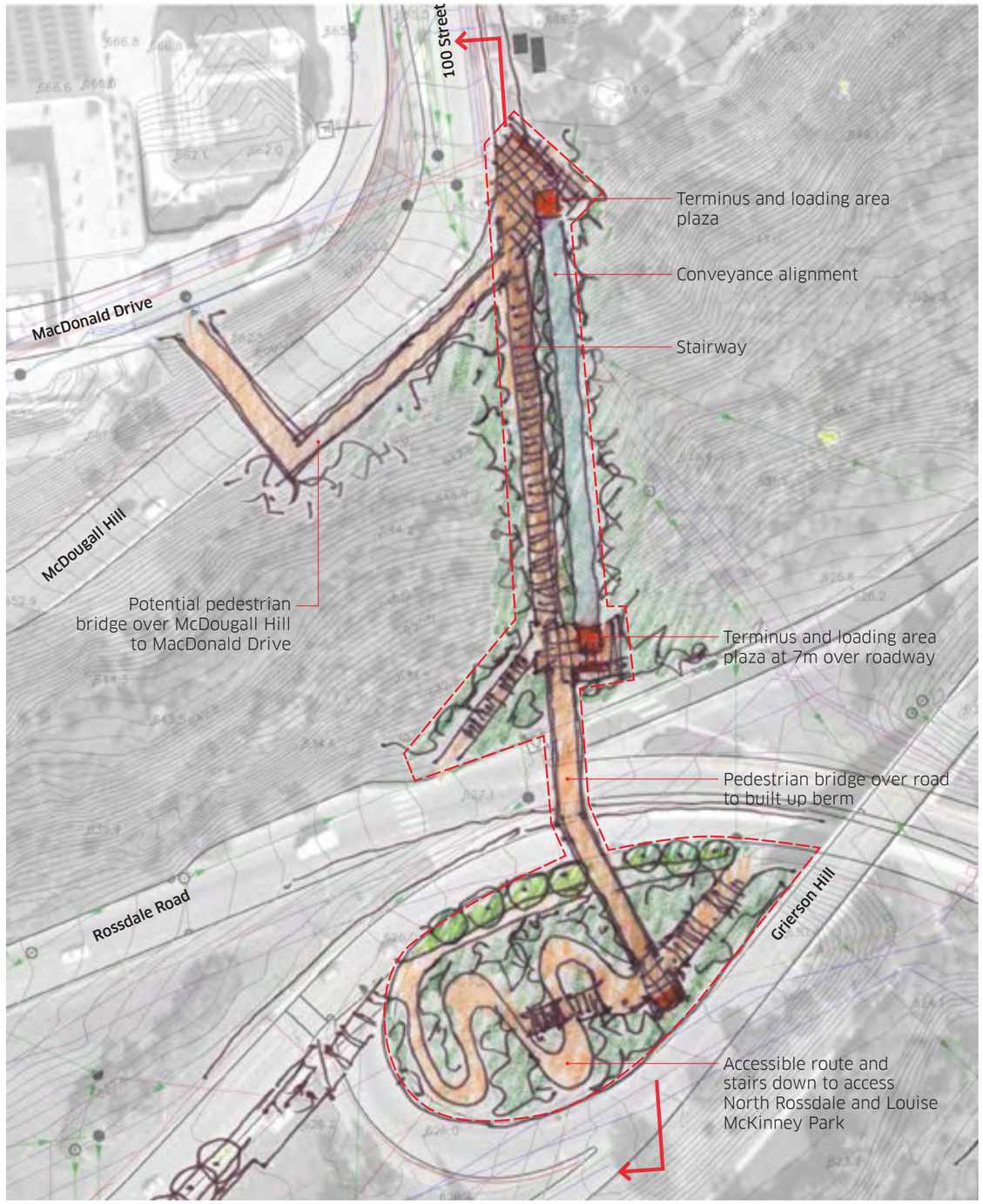
- SUP
- Stair
- Walkway
- Pedestrian Crossing

Proposed Features

- Plaza
- Pedestrian Bridge
- Mechanized Access
- SUP
- Stair
- Pedestrian crossing
- Heritage Trail
- On-Road bike route

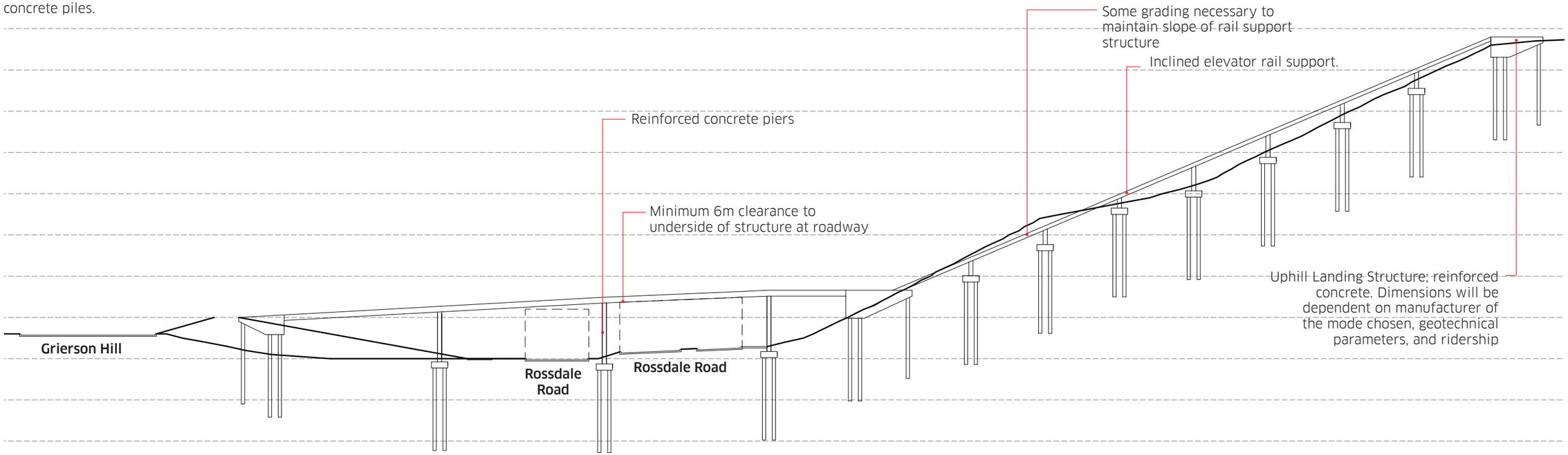
CONCEPT DIAGRAM
100 Street Alignment

0 50 100 200m



Preliminary Plan
100 Street Alignment

NOTE: Unless noted otherwise:
structures are founded on drilled concrete piles.



Section - Conveyance Structure

100 Street Alignment

View up the existing stairs on 104 Street between 98 and 99 Avenue.

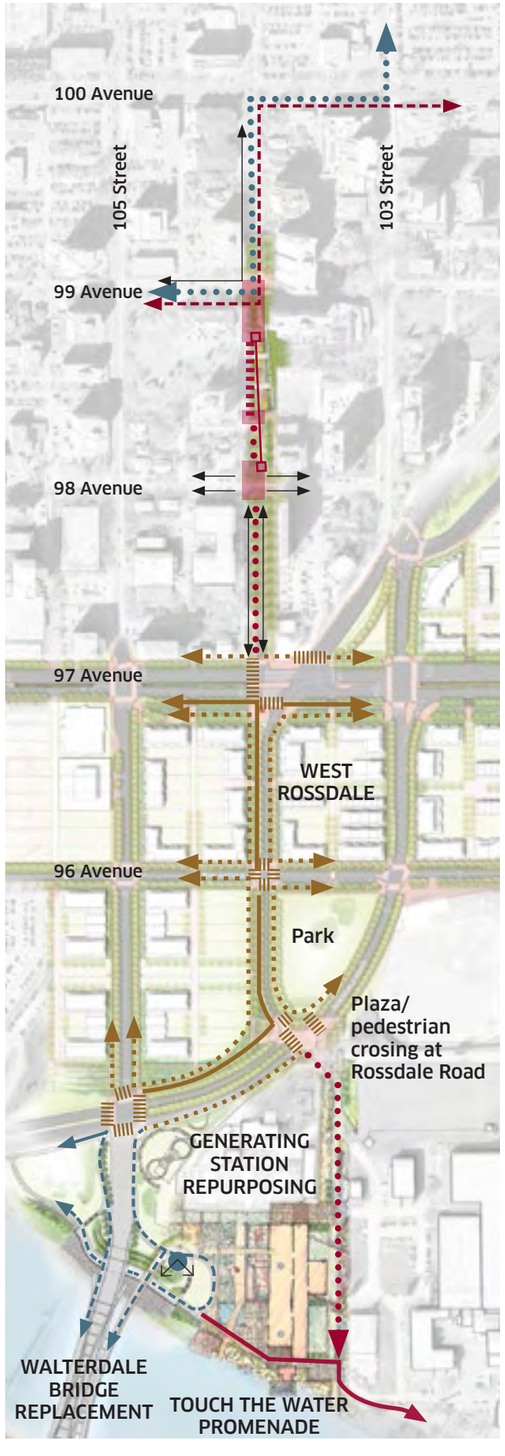
4.2 104 Street Alignment

North Bank from 98 Avenue to 99 Avenue

View of 104 Street looking North from 98 Avenue from August 2013 Pre-design for 104 Street Mechanized Access. *For illustrative purposes only. No approved status.*

View of 104 Street looking North from 96 Avenue with parallel walkway and SUP west of roadway. (West Rossdale Roads and Public Realm Improvement Concept Plan) *For illustrative purposes only. No approved status.*

SUP on the Walterdale Bridge Replacement (Walterdale Bridge Replacement Concept Planning Study)



CONCEPT DIAGRAM
104 Street Alignment

104 STREET ALIGNMENT

Core Mechanized Access Improvements

- Plaza with lighting, furnishings, and planting at top of bank between McKay Avenue School and 104 Street and 99 Avenue.
- Mechanized access extends from top of slope at McKay Avenue School to northeast corner of 104 Street and 98 Avenue intersection.
- Mechanized access occupies existing east parking lane from bottom of existing slope to 98 Avenue.
- Vehicular access to existing apartments on east side of 104 Street accommodated under mechanized access.
- Stair parallel to mechanized access extends south to existing landing at base of slope.
- Create on-road bicycle route from 98 Avenue to 97 Avenue.

Associated Access Improvements - West Rossdale Roads and Public Realm Improvement Concept Plan

- Broad pedestrian crossing across 97 Avenue on west side of 104 Street
- Parallel walk and SUP on west side of 104 Street
- Plaza/pedestrian crossing at 104 Street and Rossdale Road to Generating Station Site

Associated Access Improvements

- Esplanade along east side of Generating Station site to Touch the Water Promenade
- Touch the Water Promenade extends west under Walterdale Bridge Replacement

LEGEND
Existing Features

- On-road bicycle route
- SUP
- SUP (Within scope of Walterdale Bridge Replacement project)
- Walkway
- Lookout with Public Art Integration (Walterdale Bridge)

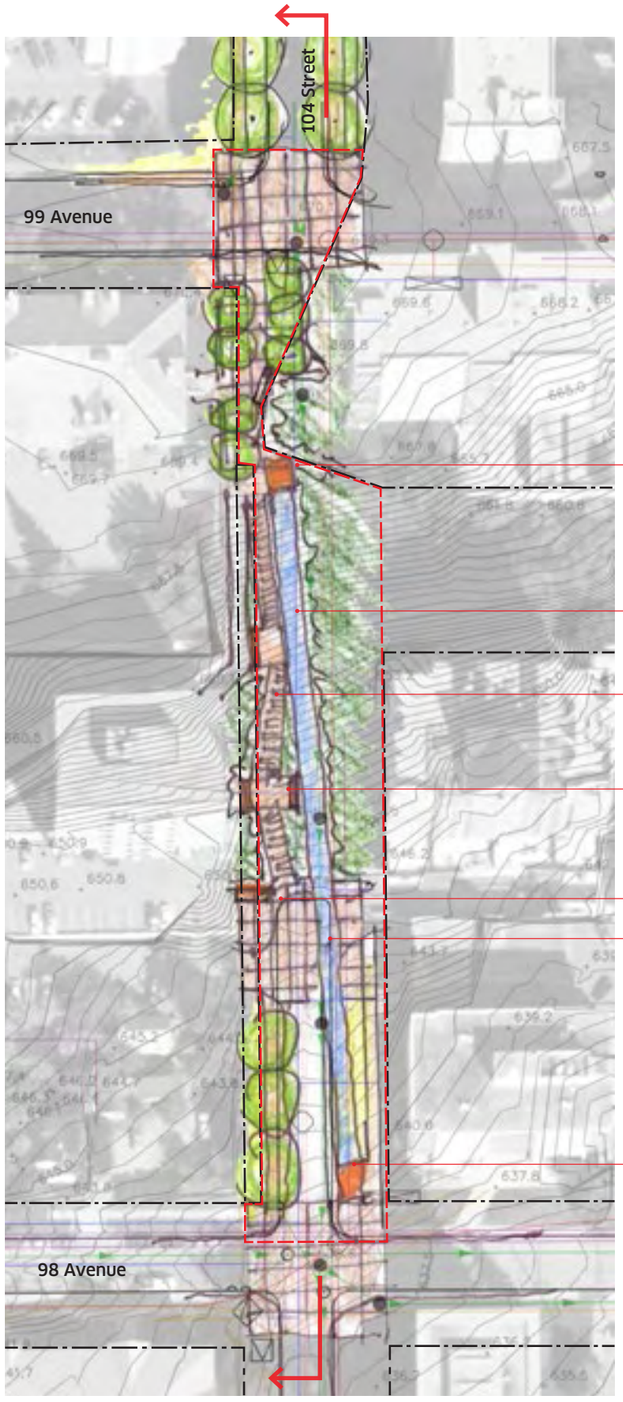
Proposed West Rossdale Roads and Public Realm Improvement Concept Plan

- Walkway
- SUP
- Pedestrian crossing

Proposed Features

- Plaza
- Heritage Trail
- Mechanized Access
- SUP
- Stair
- On-road bicycle route

West Rossdale Roads and Public Realm Improvement plan depicted for illustrative purposes only. No approved status.



NOTE: Full potential extent of mechanized access illustrated. Further study is required to determine appropriate extent.

Terminus and loading area plaza

Conveyance alignment

Stairway

Landing and lookout

Plaza with amenities at landing

Clearance for vehicles to access properties east of 104 Street

Terminus and loading area plaza

Legend

- Scope of construction cost estimate
- Drainage
- Water
- Communications
- Power
- Gas
- Property Line

Preliminary Plan
104 Street Alignment

0 10 25 50m

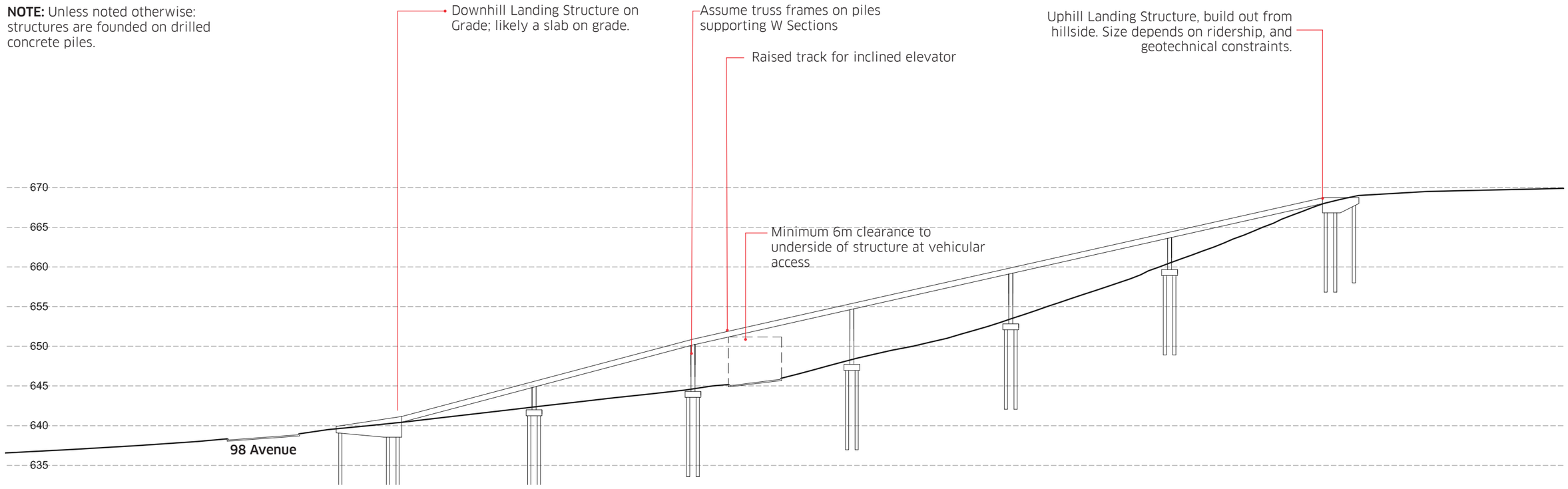
Looking south on the Walterdale Bridge Replacement SUP. *For illustrative purposes only. Enhancements depicted have no approved status.*

Looking east on the SUP below the Walterdale Bridge Replacement. *For illustrative purposes only. Enhancements depicted have no approved status.*

Proposed repurposing of Rossdale Generating Station site and Touch the Water Promenade. *For illustrative purposes only. No approved status.*

Proposed repurposing of Rossdale Generating Station site and Touch the Water Promenade. *For illustrative purposes only. No approved status.*

NOTE: Unless noted otherwise: structures are founded on drilled concrete piles.



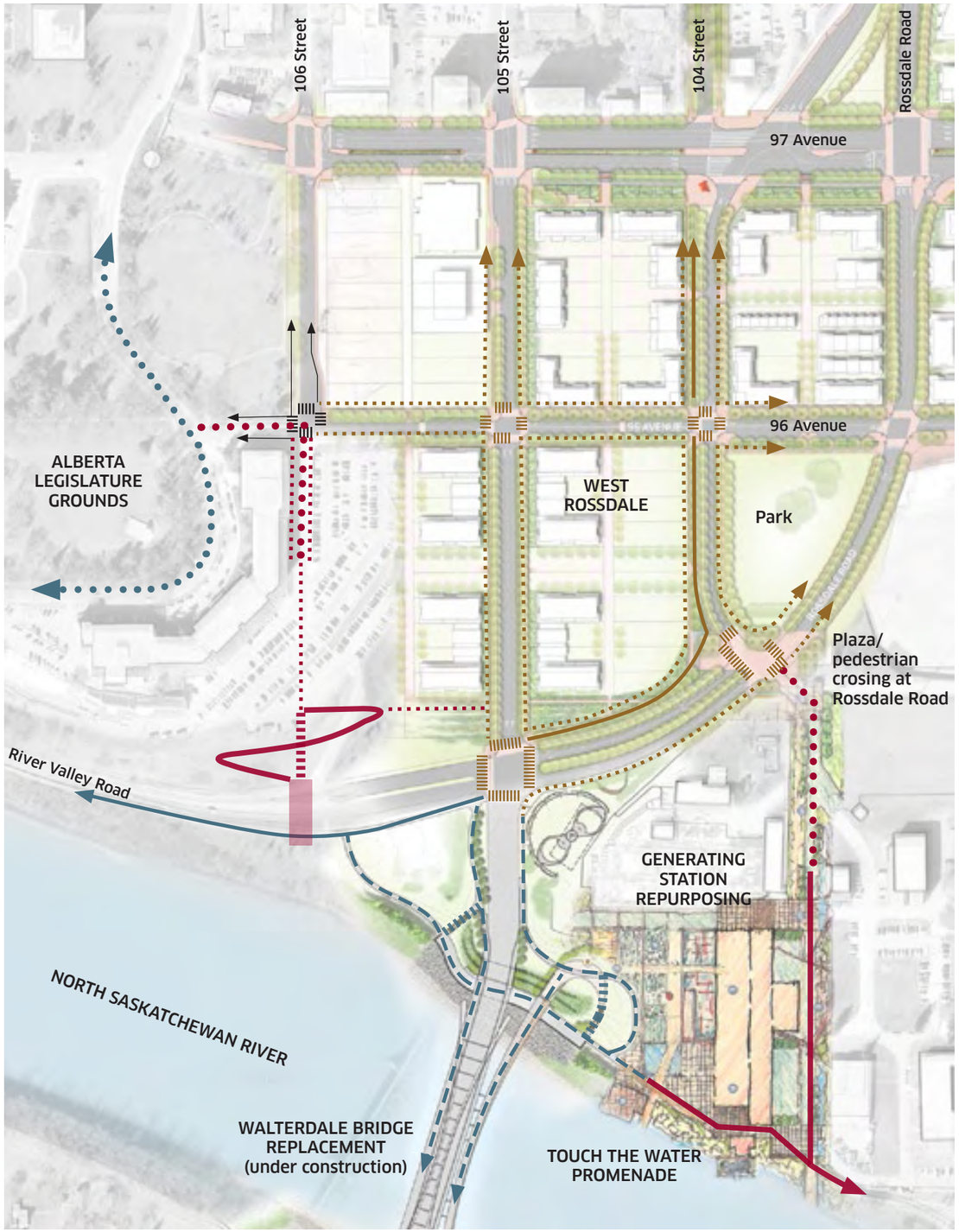
Section - Conveyance Structure
104 Street Alignment

0 10 25 50m

View across River Valley Road to existing slope at 106 Street alignment

4.3 106 Street Alignment

North Bank from River Valley Road to Legislature Grounds



Concept Diagram
106 Street Alignment

0 50 100 200m

106 STREET ALIGNMENT

Core Access Improvements

- No mechanized access required due to minimal elevation change.
- Provide stair access with accessible trail/SUP from top of bank to River Valley Road.
- Create new pedestrian crossing on River Valley Road to plaza at terminus of Touch the Water Promenade

Potential Access Improvements

- Extend on-road bicycle route from Fortway Drive, east on 96 Avenue to 106 Street and south to top of bank.
- Create pedestrian access through existing parking lot to top of bank.
- Proposed pedestrian crossing on River Valley Road ties into proposed Touch the Water Promenade

NOTE: Alignment developed conceptually to link desired destinations. Consultation with the Province of Alberta required.

LEGEND

Existing Features

- On-road bicycle route
- SUP
- SUP (Within scope of Walterdale Bridge Replacement project)
- Walkway
- Pedestrian Crossing

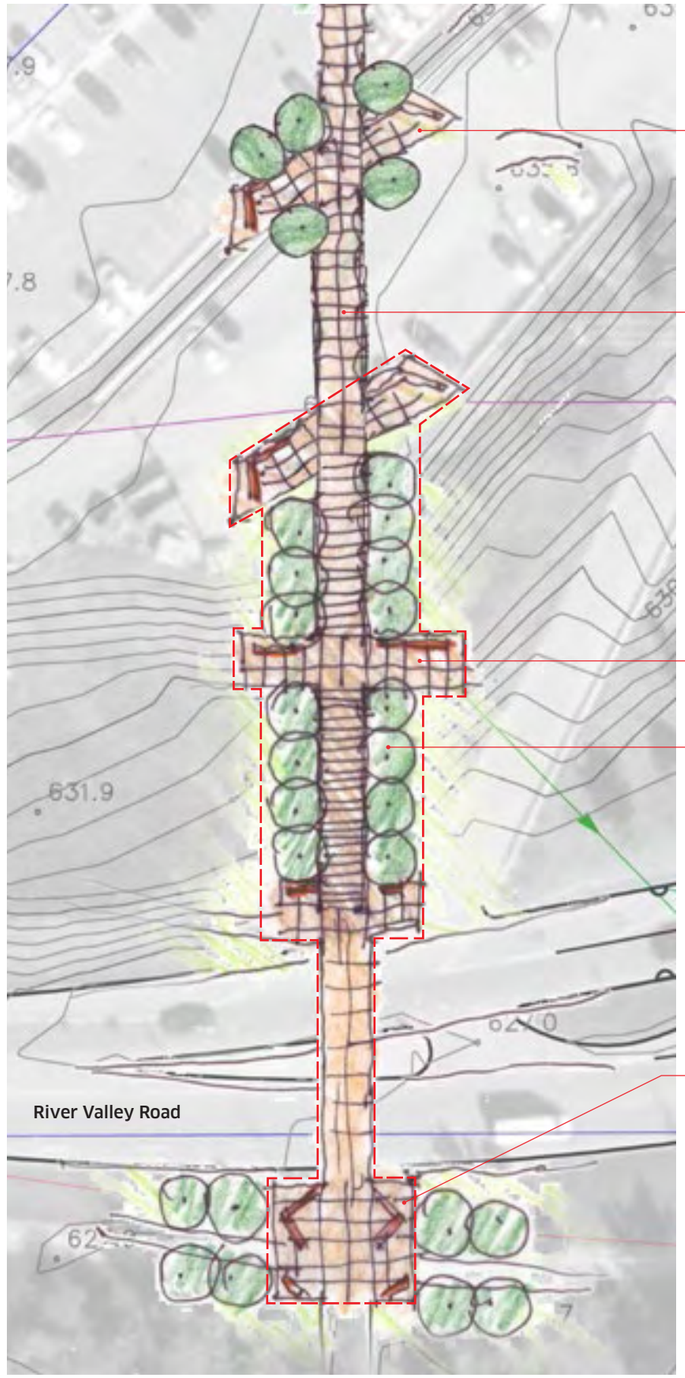
Proposed Features

- Plaza
- SUP
- Stair
- On-road bicycle route

Proposed West Rossdale Roads and Public Realm Improvement Preliminary Design

- Walkway
- SUP
- Pedestrian Crossing

West Rossdale Roads and Public Realm Improvement plan depicted for illustrative purposes only. No approved status.



Preliminary Plan
106 Street Alignment


View south through parking area

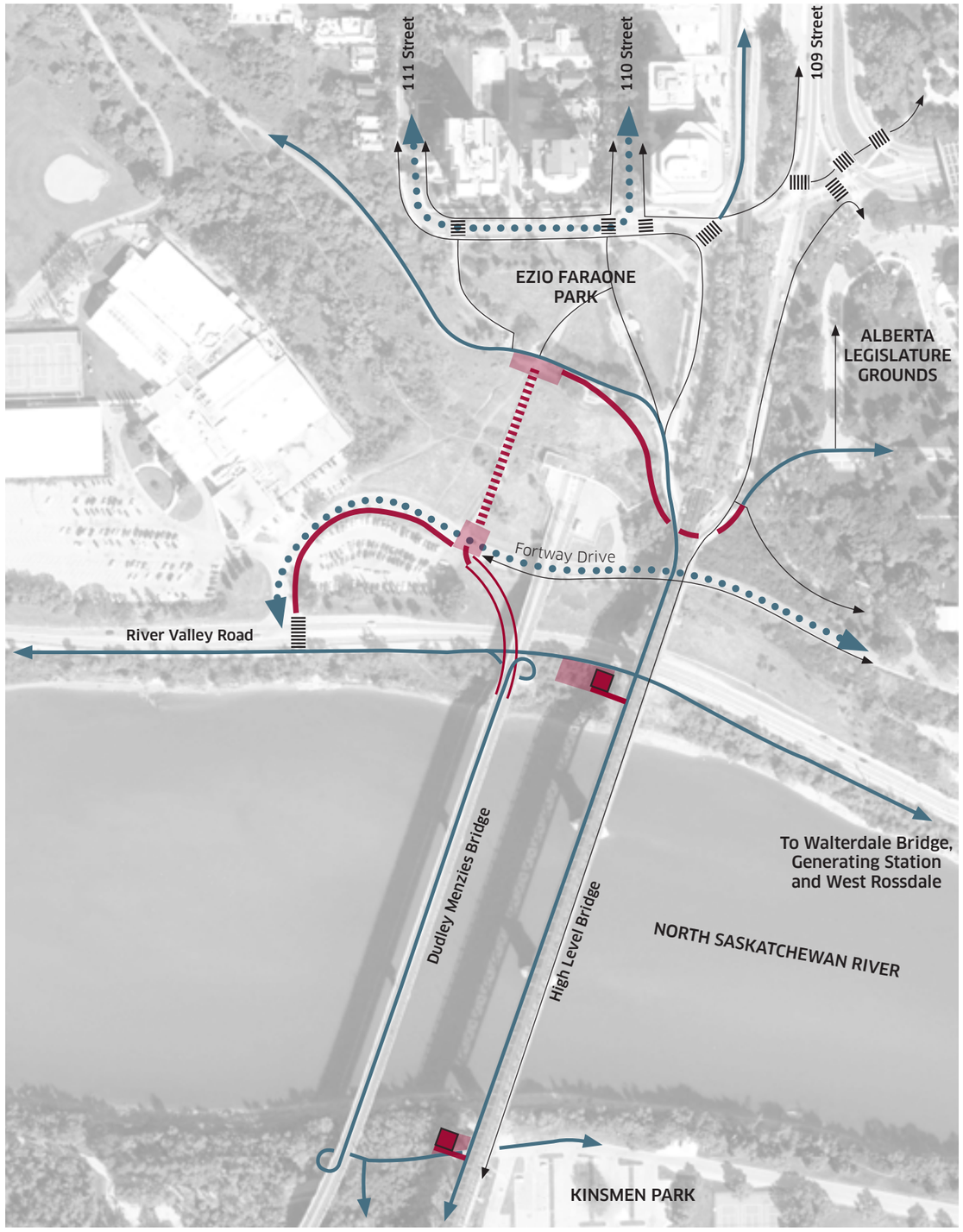

View north through parking area


SUP along River Valley Road

View from Ezio Faraone Park at top of existing stairs to High Level Bridge

4.4 110 Street Alignment

North Bank and South Bank, Ezio Faraone Park



CONCEPT DIAGRAM
110 Street Alignment

0 50 100 200m

HIGH LEVEL BRIDGE

Core Access Improvements

- Improve stairs from Ezio Faraone Park to Fortway drive.
- Create plaza across Fortway Drive from pedestrian bridge to base of stairs.
- Elevator from west side of High Level Bridge down to new plaza/lookout along SUP on River Valley Road.
- Elevator from west side of High Level Bridge down to new plaza along SUP at Kinsmen Park.
- SUP from bottom of stair plaza to existing pedestrian crossing at Fortway Drive and River Valley Road.

Potential Access Improvements

- SUP connection from Alberta Legislature grounds under north abutment of High Level Bridge to Ezio Faraone Park.
- Pedestrian bridge extending from existing Dudley Menzies Bridge over River Valley Road to proposed pedestrian crossing/plaza at Fortway Drive.

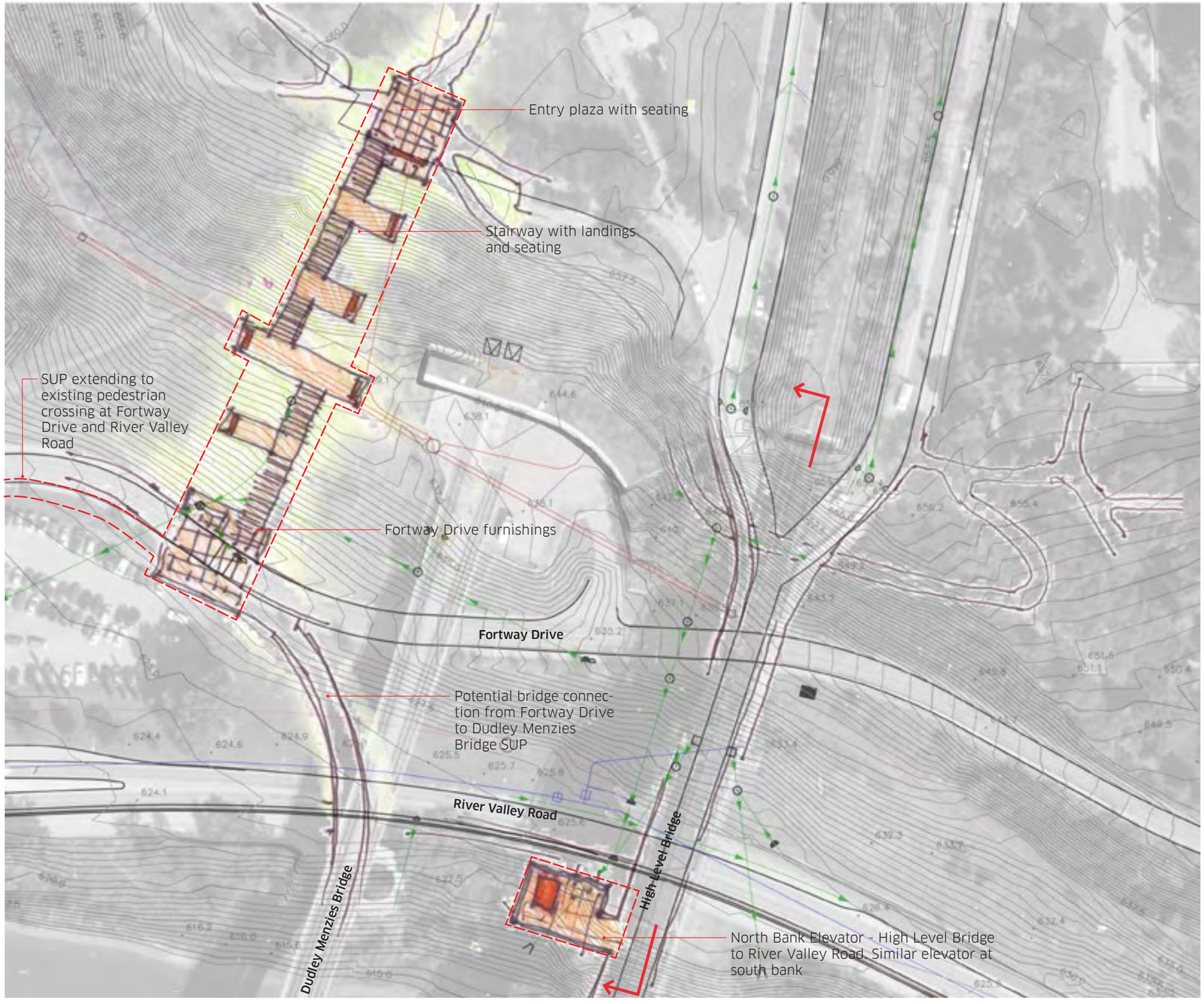
LEGEND

Existing Features

- On-road bicycle route
- SUP
- Walkway
- Pedestrian Crossing

Proposed Features

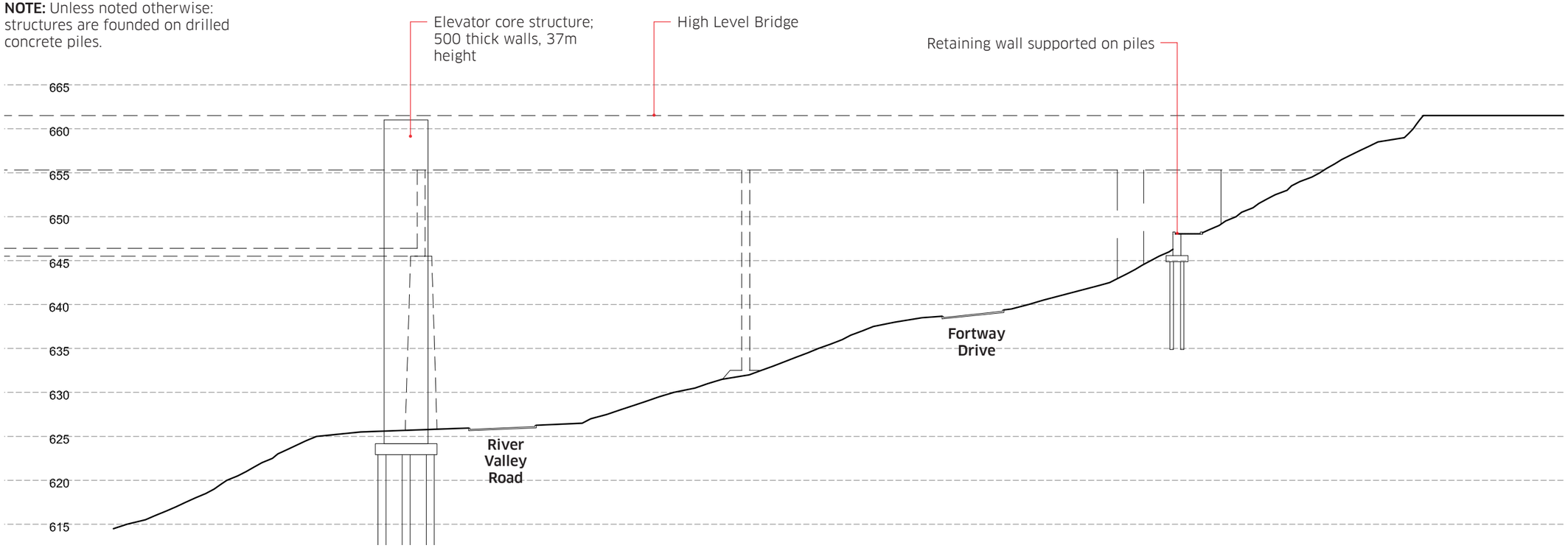
- Plaza
- SUP
- Stair
- On-road bicycle route
- Pedestrian bridge over roadway
- Elevator



Preliminary Plan
110 Street Alignment

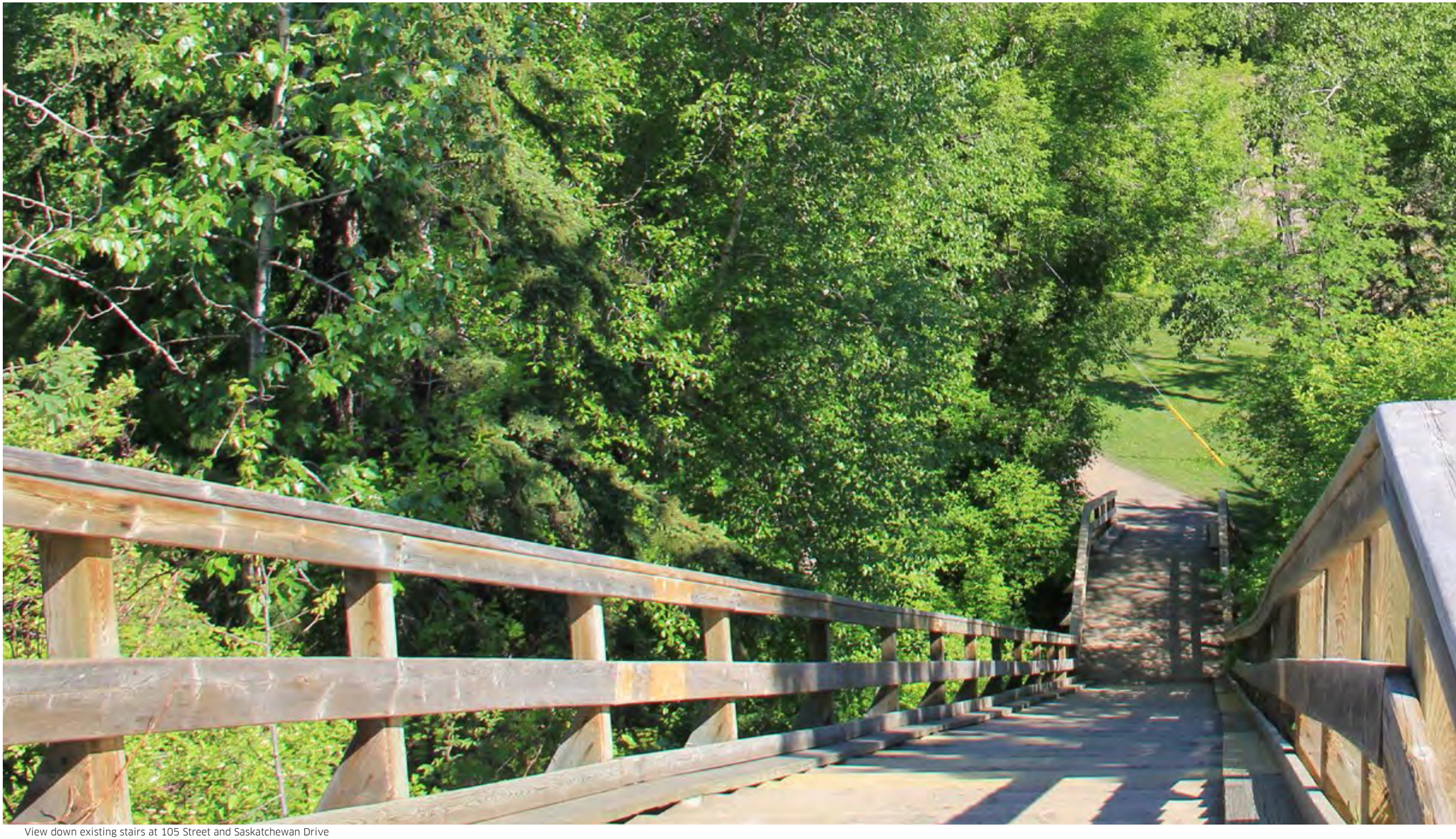
View of proposed elevators to High Level Bridge

NOTE: Unless noted otherwise: structures are founded on drilled concrete piles.



Section - Elevator Structure
110 Street Alignment

0 10 25 50m



View down existing stairs at 105 Street and Saskatchewan Drive

4.5 105 Street Alignment

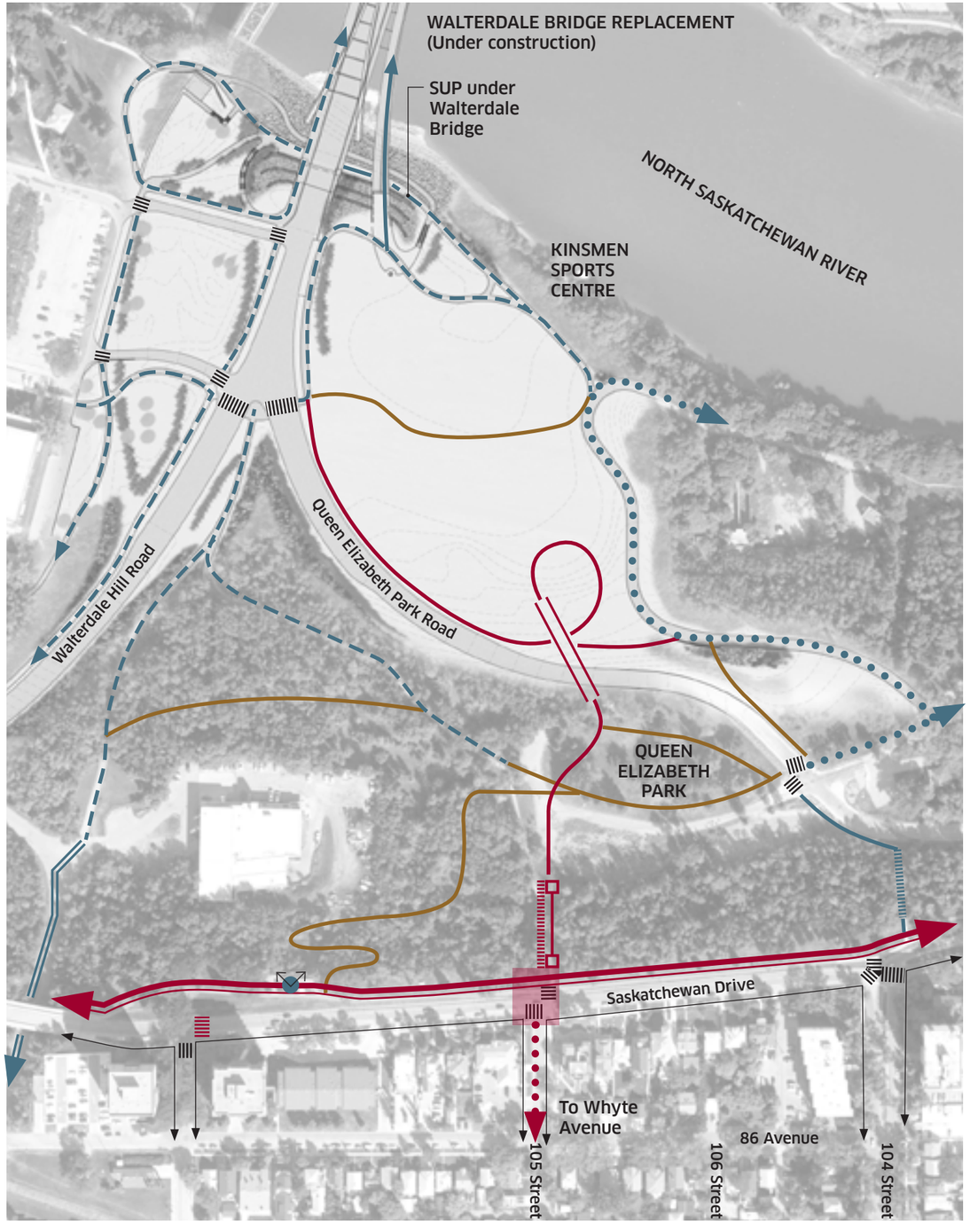
South Bank from Saskatchewan Drive to Queen Elizabeth Park

Image of pedestrian bridge over roadway (Queen Elizabeth Park Master Plan) *For illustrative purposes only.*

Image of pedestrian bridge over roadway (Queen Elizabeth Park Master Plan). *For illustrative purposes only.*

Existing lookout west of 105 Street alignment

View of existing stairs



Concept Diagram
105 Street Alignment

105 STREET ALIGNMENT

Core Access Improvements

- Mechanized access with parallel stair (min. 4.2m width) to Queen Elizabeth Park.
- Improved pedestrian crossing at 105 Street and Saskatchewan Drive with paving materials across roadway and new lookout at top of bank c/w lighting, furnishings, and planting.
- Accessible trail/SUP through Queen Elizabeth Park to pedestrian bridge over Queen Elizabeth Park Road.
- Accessible trail/SUP loops down and under pedestrian bridge and follows Queen Elizabeth Park Road to tie into existing SUP network.

Potential Access Improvements

- Improved SUP with parallel walkway on Saskatchewan Drive.
- Create on-road bicycle route along 105 Street south to Whyte Avenue.

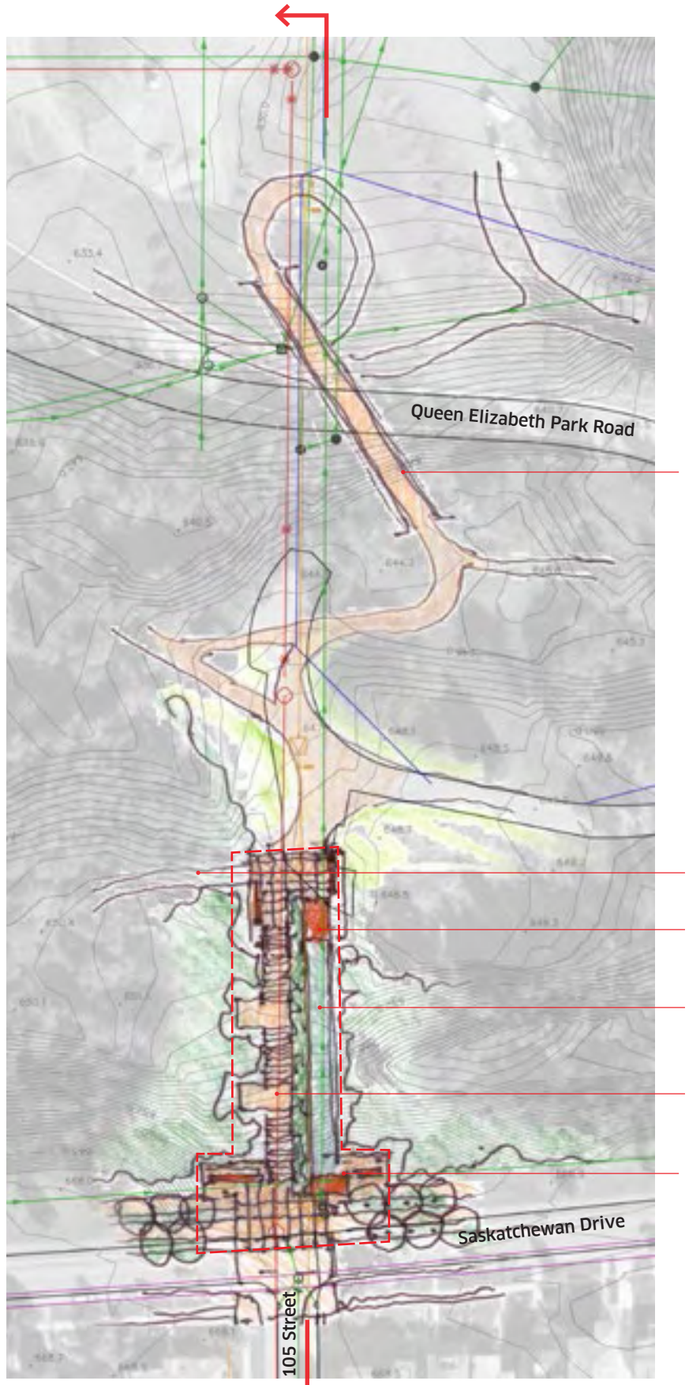
LEGEND

Existing Features

- Existing SUP
- SUP (Within scope of Walterdale Bridge Replacement project)
- Existing stair
- Existing shared vehicle/SUP
- Existing pedestrian route
- Existing pedestrian crossing
- Existing lookout

Proposed Features

- Plaza
- Pedestrian Bridge
- Mechanized Access
- SUP
- Stair (4.2m width)
- Proposed SUP with parallel walkway
- Proposed on-road bicycle route
- Proposed pedestrian crossing
- Trail (Queen Elizabeth Park Master Plan)



Pedestrian bridge over Queen Elizabeth Park Road to connect north and south sides of park with ease of access. This is an approved element of the Queen Elizabeth Park Master Plan.

Accessible path from Saskatchewan Drive

Terminus and loading

Mechanized access alignment

Landing and lookout

Terminus

Legend

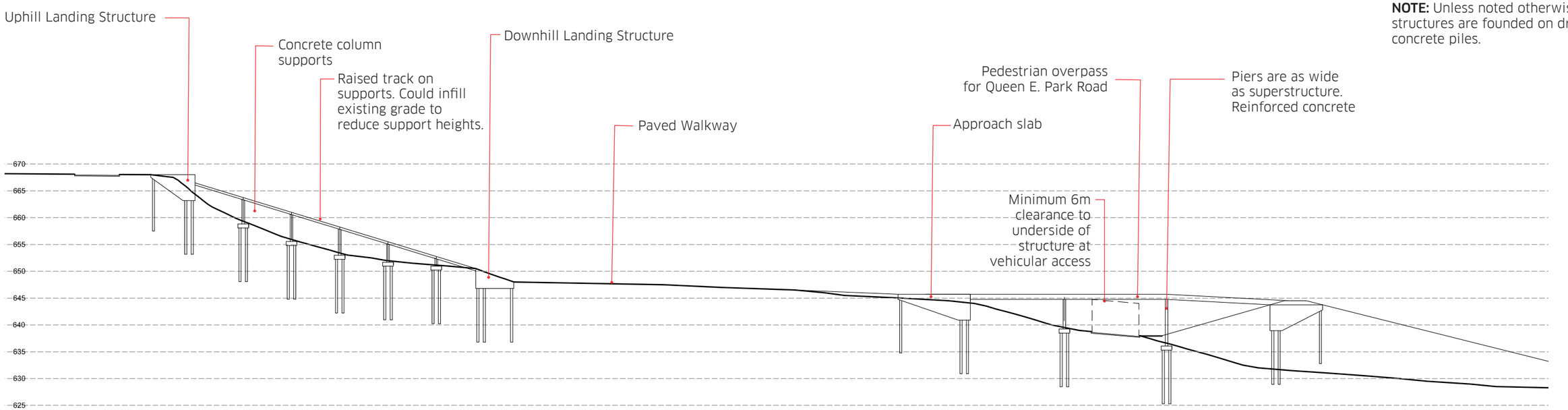
- Scope of construction cost estimate
- Drainage
- Water
- Communications
- Power
- Gas

0 10 25 50m

Preliminary Plan
105 Street Alignment

SUP west of existing stair at 105 Street on Saskatchewan Drive

Existing stair at 105 Street



NOTE: Unless noted otherwise: structures are founded on drilled concrete piles.

Section - Conveyance Structure

105 Street Alignment

5.0 SITE ASSESSMENTS

Each of the alignments is assessed using a series of criteria summarized in the following matrix. Criteria identified with City administration are:

- Connection to active transportation network
- Connection to West Rossdale/Generating Station
- Connection to River
- Connection to Downtown
- Connection to Strathcona
- Connection to Cloverdale
- Year round use potential
- Geotechnical Considerations
- Structural Considerations
- Modal feasibility

The assessment is categorized as either a key opportunity, neutral issue, or a key constraint. The basis for evaluation is summarized below:

Connection to active transportation:
- Is there access to an SUP or bicycle route to connect users to the existing active transportation network?
- Are there challenges for users to accessing an SUP or bicycle route such as heavy vehicular traffic, confusing wayfinding, or other hindrances?

Connection to West Rossdale/Generating Station, River, Dowtown, Strathcona, and Cloverdale:
- Is the destination accessible via the active transportation network?
- What is the proximity to the destination? Less than 1km is considered a key opportunity, 1 - 2km considered neutral, and destinations greater than 2km considered a key constraint.

Year round use potential:
- Does the alignment access the Winter Jogging Loop?
- What is the proximity to active winter destinations such as skating, and cross country skiing?

Key Opportunity

Neutral Issue

Key Constraint

	100 Street	104 Street	106 Street	110 Street	105 Street (South Bank)
Connection to active transportation network	· Poor connection to top of bank active transportation network · Connects to SUP at base · Confusing existing pedestrian crossing, ped bridge recommended	· Access to signed bike routes (104 Street, 99 Avenue) at top of bank · Tie into proposed SUP route on 104 Street to West Rossdale · Broad crosswalk proposed at 97 Avenue for West Rossdale	· Access to signed bike routes (96 Avenue, Fortway Drive) and SUP at 97 Avenue and River Valley	· Access to SUP at top and bottom of bank · Access to existing pedestrian crossing at River Valley Road	· Connection to Saskatchewan Drive SUP at top of bank · Connection to Queen Elizabeth Park accessible trail, SUP mid valley · High volume traffic on Queen Elizabeth Park road, pedestrian bridge over roadway recommended
Connection to West Rossdale/Generating Station	· 1 - 1.5km via SUP	· Walking distance to West Rossdale. <1km to Generating Station Site via 104 Street SUP	· Walking distance to West Rossdale and Generating Station via 96 Avenue, river valley SUP/ river promenade	· 1 - 1.5km to Generating Station, West Rossdale via river valley trails	· <1km to Generating Station, West Rossdale via SUP, Walterdale Bridge.
Connection to River	· Access to both banks via Low Level Bridge · SUP on East side of Low Level Bridge	· Base of alignment is mid-valley	· Direct access to River Promenade and Walterdale Bridge	· Access to River Valley Road SUP, River Promenade at Walterdale Bridge	· Base of alignment is mid-valley

	100 Street	104 Street	106 Street	110 Street	105 Street (South Bank)
Connection to Downtown	· Walking distance to Jasper Avenue, Civic Precinct · Walking distance to existing LRT, transit · Only accessible from East side of 100 Street · Poor access to MacDonald Drive/Heritage Trail	· Walking distance to 104 Street promenade, Downtown Farmers Market, Jasper Avenue · Walking distance to existing LRT, transit · 1 - 1.5km to Civic Precinct	· Walking distance to Alberta Legislature, Federal Building/Centennial Plaza. · <1km to Jasper Avenue via designated bicycle route	· Direct access to Oliver · Walking distance to Alberta Legislature · <1km to Jasper Avenue via SUP	· 1.5 - 2km to Alberta Legislature
Connection to Strathcona	· 3 - 3.5km via SUP, Walterdale bridge	· Via Walterdale Bridge	· Walking distance to South Bank via Walterdale Bridge	· Connection to Strathcona via High Level Bridge at top of bank · Connection to Kinsmen Park at river via Dudley Menzies Bridge	· Direct access to Strathcona · Walking distance to Whyte Avenue
Connection to Cloverdale	· Walking distance to South Bank at Low Level Bridge · 1 - 1.5km to proposed Cloverdale LRT station	· 2km via river valley trails, Low Level Bridge	· 3km via river valley trails, Low Level Bridge	· 3 - 3.5km via river valley trails, Low Level Bridge	· 3km via SUP
Year Round Use Potential	· Integration with winter jogging loop at bottom of bank	· Downtown - West Rossdale connection provides year round user base · Ties into winter jogging loop · Walking distance to skating at Alberta Legislature	· Walking distance to cross country ski trails at Kinsmen Park via Walterdale Bridge	· Ties into winter jogging loop at both top and bottom of valley · Walking distance to cross country ski trails at Victoria Park · <1km to cross country ski trails at Kinsmen Park · Walking distance to skating at Alberta Legislature · < 1km to skating at Victoria Oval	· Ties into winter jogging loop · Walking distance to Kinsmen Park Cross country ski trails
Geotechnical Considerations	Current slope stability appears good [1]; upper and lower slopes about 25 degrees at the stairs and west, 30 degrees further east. Fill at top of slope, potentially aggravated by voids left behind from coal mining activity, thought to be cause of slope instability of adjacent roadway prior to repair [2]. Deep seated movements reported in early (1967) studies likely will not be impacted by low weight of mechanized access or stairs. No visible sign of shallow failures noted in area of stairs in the 1967 studies, however this should be followed up with a more detailed assessment to confirm.	Current slope stability appears good [1]; upper slope about 25 degrees. No indication of deep seated movements [2].	Current slope stability appears good [1]; short slopes 20 to 25 degrees. No indication of deep seated movements [2].	Current slope stability appears good [1], including at the current stair location (27 degree upper slope at the stairs, steeper just to the west), along the top of bank (30 degree upper slope above portal) and below the High Level Bridge (25 to 30 degree upper slope) connecting to the legislature grounds. No indication of deep seated movements [2]. May require retaining wall to create path under bridge, or consider suspending a pathway supported by the bridge. Security concern below the bridge.	Current local shallow slope stability appears marginal due to oversteepened upper slopes (up to 40-45 degrees in upper 10 m; 30-35 degrees overall slope to bench at old pool site). Unknown water source appears to be providing destabilizing action at gabion basket wall located at top of slope immediately west of stairs. No indication of active deep seated movements [2]. Little opportunity to slope flatten on top at current stair location. Does not preclude development of mechanized access on slope, but will likely require additional slope stabilization measures upon further assessment.

[1] Based on results of site reconnaissance and review of LiDAR imagery. No signs of major slope instability including surface cracking, bulging, seepage or tree leaning (where present).

[2] Based on review of available geotechnical information from City of Edmonton and Thurber in-house files.

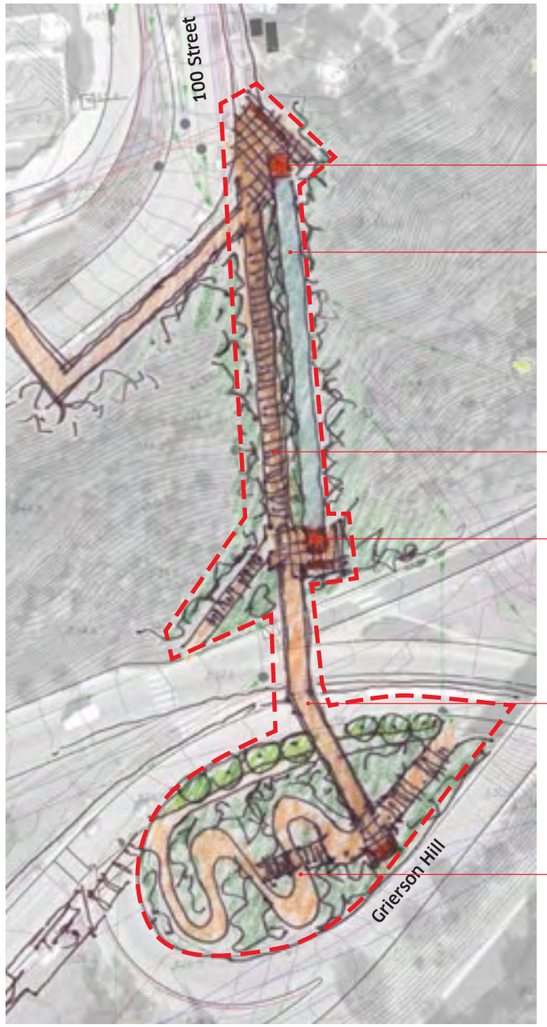
	100 Street	104 Street	106 Street	110 Street	105 Street (South Bank)
Structural Considerations	Either a funicular or inclined elevator will be a suitable barrier-free means of conveying passengers between landings at the top of the existing stair near the Hotel Macdonald and the abutment for a new pedestrian bridge over Grierson Hill and Rossdale Roads. The size of the landings will vary depending on the type of system chosen, ridership, and geotechnical constraints. Girders spanning between the landings at the top and bottom of the river bank and intermediate supports will be necessary to support the rails of the mechanized access mode chosen. Due to the limited number of locations that can accomodate piers, the girders may be rather deep. A 6.0 m vertical clearance is required for the superstructure spanning over the roads. At the bottom of the riverbank either a ramp or elevator should be built to allow access off of the new structure. Alternatively, a gondola system could be used to convey passengers between landings at the top of the existing stair and downhill of Rossdale Road. Structures will be supported on pile foundations.	New 104 Street mechanized access can be either a funicular or an inclined-elevator with landings at the top of the river bank and by 98 ave. The size of the landings will vary, depending on the system chosen, ridership, and geotechnical constraints. Special consideration needs to be given to the locations of structural supports, to avoid conflicts with existing utilities. A minimum of 6.0 m of vertical clearance at the change in slope will be required to accomodate vehicle access to the buildings. Supports should be spaced to allow vehicle access to the east of the existing stairs. Structures will be supported on pile foundations.	N/A	A new retaining wall structure supported on piles will need to be built for the portion of the proposed connecting path travelling near the north abutment of the High Level Bridge. An elevator will connect the High Level Bridge to the Shared Use Path at River Valley Road. A concrete or steel-braced shaft, founded on piles and additionally fixed laterally by the High Level Bridge, will support the elevator cabin.	A funicular or inclined elevator will be required to overcome the steep grade immediately north of Saskatchewan Drive. The landing at the top of the bank will need to be built out from the hill side to accomodate the structure required for the system and for passenger egress. The landing at the bottom will be south of Queen Elizabeth Park Road. The landings will vary in size depending on the system chosen, ridership, and geotechnical constraints. Girders supported on piers will be required to support the mechanized system over the steep grade of the river bank. A pedestrian bridge will be necessary to allow barrier-free access over Queen Elizabeth Park Road. A 6.0 m vertical clearance is required for the superstructure spanning over the road. Alternatively, a gondola system could be used to connect the uphill landing by Saskatchewan drive to the landing downhill of Queen Elizabeth Park Road. Intermediate towers supporting the cables should allow for a minimum 6.0 m clearance over the road. Structures will be supported on pile foundations.
Modal Feasibility					
Elevator	Not Recommended	Not Recommended	Not Required	Recommended	Not Recommended
Inclined Elevator	Recommended	Recommended	Not Required	Not Recommended	Recommended
Funicular	Feasible	Feasible	Not Required	Not Recommended	Feasible
Aerial System	Feasible	Feasible	Not Required	Not Recommended	Feasible

6.0 CONSTRUCTION COST ESTIMATE

Construction cost estimates (Class D) for each alignment are summarized. They address current costing for both the mechanized access product, stairways, on site building components including lighting, and urban design amenities.

Operating costs are generally as follows:

- Staffed Mechanized Access $1 500 000/annum
- Elevators (2 x $300k) $600 000/annum
- Inclined Elevators $390 000/annum



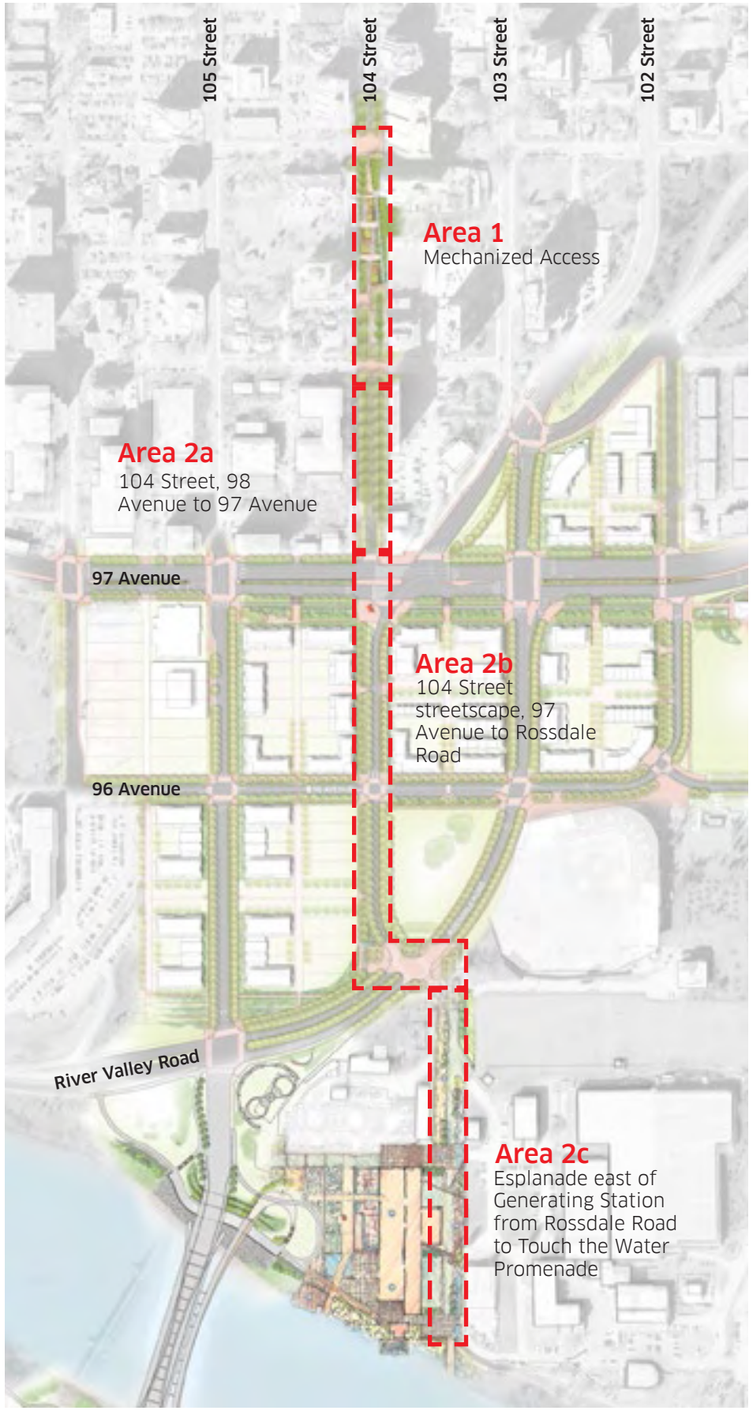
Preliminary Plan
100 Street Alignment

0 10 25 50m

100 Street Alignment

Top Plaza	640 000		640 000
Stair	720 000		720 000
Bottom Plaza	640 000		640 000
Bridge Over Roadway	3 900 000		3 900 000
SUP	360 000		360 000
Bottom Stair	260 000		260 000
Inclined Elevator (1)	2 480 000	Inclined Elevator (2)	4 960 000
Sub-Total	**$9 000 000**		**$11 480 000**
Contingencies (50%)	4 500 000		5 740 000
Sub-Total	**$13 500 000**		**$17 220 000**
Soft Costs (25%)	3 375 000		4 305 000
TOTAL	**$16 875 000**		**$21 525 000**

Scope of construction cost estimate



Preliminary Plan
104 Street Alignment

0 50 100 250m

104 Street Alignment
Area 1

Top Plaza	640 000		640 000
Stair	920 000		920 000
98 Avenue Plaza	300 000		300 000
Bottom Plaza	460 000		460 000
Inclined Elevator (1)	3 480 000	Inclined Elevator (2)	6 960 000
Sub-Total	**$5 800 000**		**$9 280 000**
Contingencies (50%)	2 900 000		4 640 000
Sub-Total	**$8 700 000**		**$13 920 000**
Soft Costs (25%)	2 175 000		3 480 000
TOTAL	**$10 875 000**		**$17 400 000**

Scope of construction cost estimate

104 Street Alignment
Area 2a

Removals and Protection	309 000
Streetscape Hardscaping	2 430 000
Streetscape Planting	42 000
Streetscape Lighting	336 000
Sub-Total	$3 117 000
Contingencies (30%)	935 100
Soft Costs (19%)	592 230
TOTAL	$4 644 330

Source: 104 Street Mechanized Access - Pre-Design, August 2013

104 Street Alignment
Area 2b

Earthworks and Removals	380 500
Roadways	569 200
Miscellaneous Roadways Items	1 522 100
Landscape Improvements	4 526 303
Sub-Total	$6 998 103
Contingencies (30%)	2 099 430
Soft Costs (19%)	1 329 639
TOTAL	$10 472 172

Source: West Rossdale Roads and Public Realm Improvement Concept Planning Report, October 2013

West Rossdale Roads and Public Realm Improvement plan depicted for illustrative purposes only. No approved status.

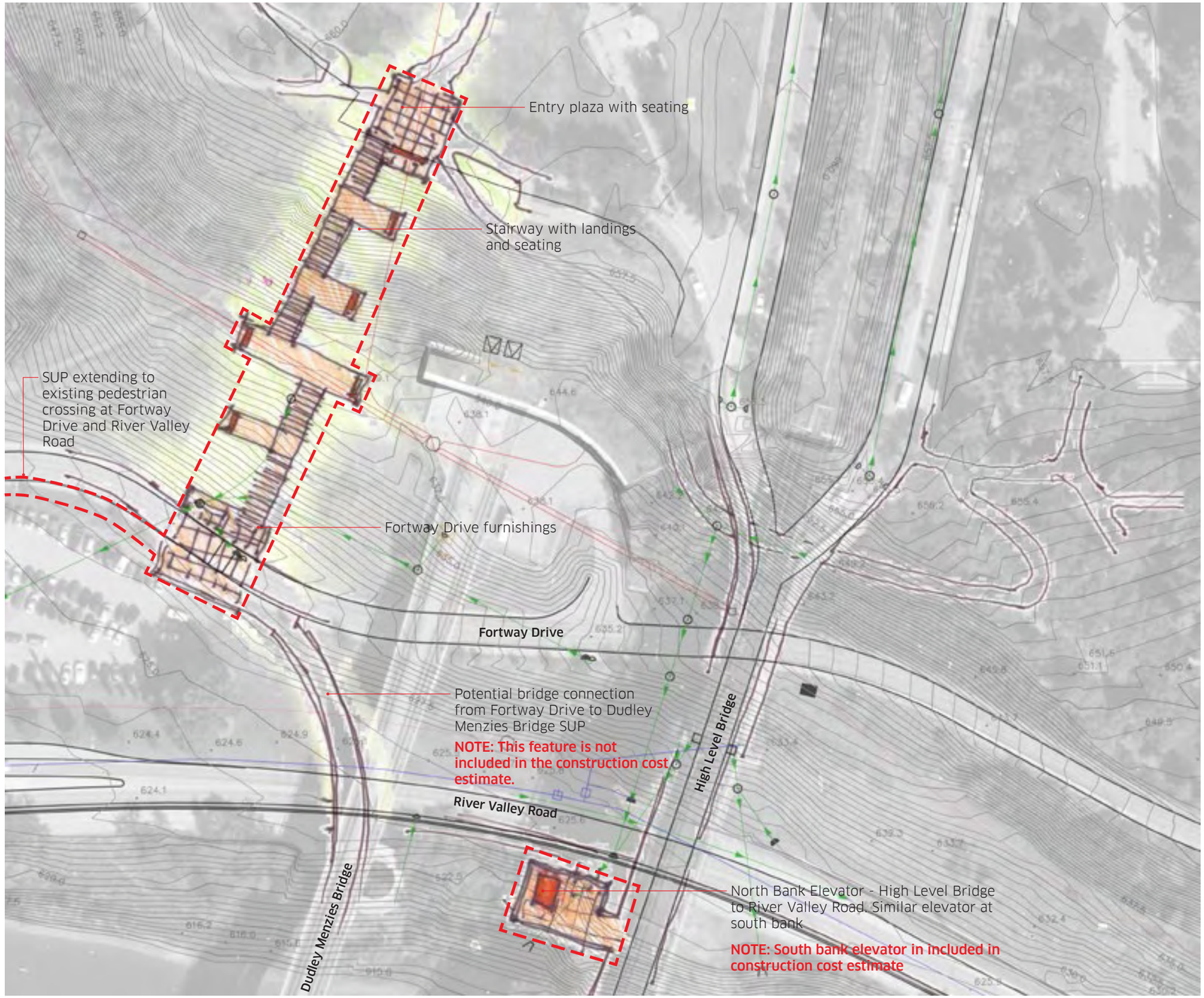
104 Street Alignment
Area 2c

Removals and Protection	474 100
Streetscape Hardscaping	4 378 800
Streetscape Planting	850 090
Streetscape Lighting	1 126 180
Sub-Total	$6 829 170
Contingencies (30%)	2 048 751
Soft Costs (19%)	1 297 542
TOTAL	$10 175 463

Source: 104 Street Mechanized Access - Pre-Design, August 2013

104 Street Alignment
Area 2 Total

Area 2a Total	4 644 330
Area 2b Total	10 472 172
Area 2c Total	10 175 463
TOTAL	$25 246 965



110 Street Alignment

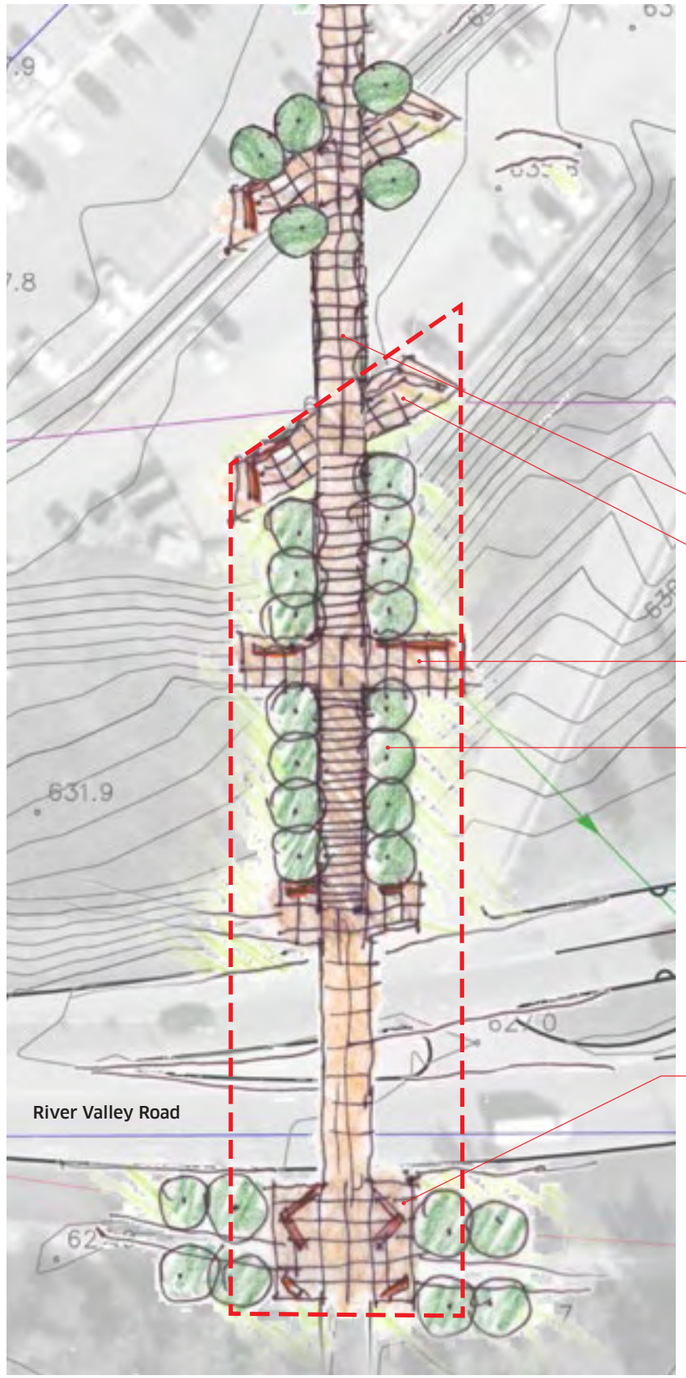
Top Plaza	640 000
Stair	1 020 000
Bottom Plaza	320 000
SUP	320 000
North Elevator	3 340 000
South Elevator	3 340 000
Sub-Total	**$8 980 000**
Contingencies (50%)	4 490 000
Sub-Total	**$13 470 000**
Soft Costs (25%)	3 368 000
TOTAL	**$16 838 000**

NOTE: Elevator costs includes connection to High Level Bridge and plaza at grade.

Scope of construction cost estimate

Preliminary Plan
High Level Bridge Alignment

0 10 25 50m



106 Street Alignment

Stair	740 000
SUP	700 000
Bottom Plaza	600 000
Sub-Total	**$2 040 000**
Contingencies (50%)	1 020 000
Sub-Total	**$3 060 000**
Soft Costs (25%)	765 000
TOTAL	**$3 825 000**

NOTE: Alignment developed conceptually to link desired destinations. Consultation with the Province of Alberta is required and may have a cost implication.

Scope of construction cost estimate

Walkway extends through parking area

Stalls removed for walkway and parking

Landing with amenity

Arcade of tree planting along slope and through parking to mark alignment

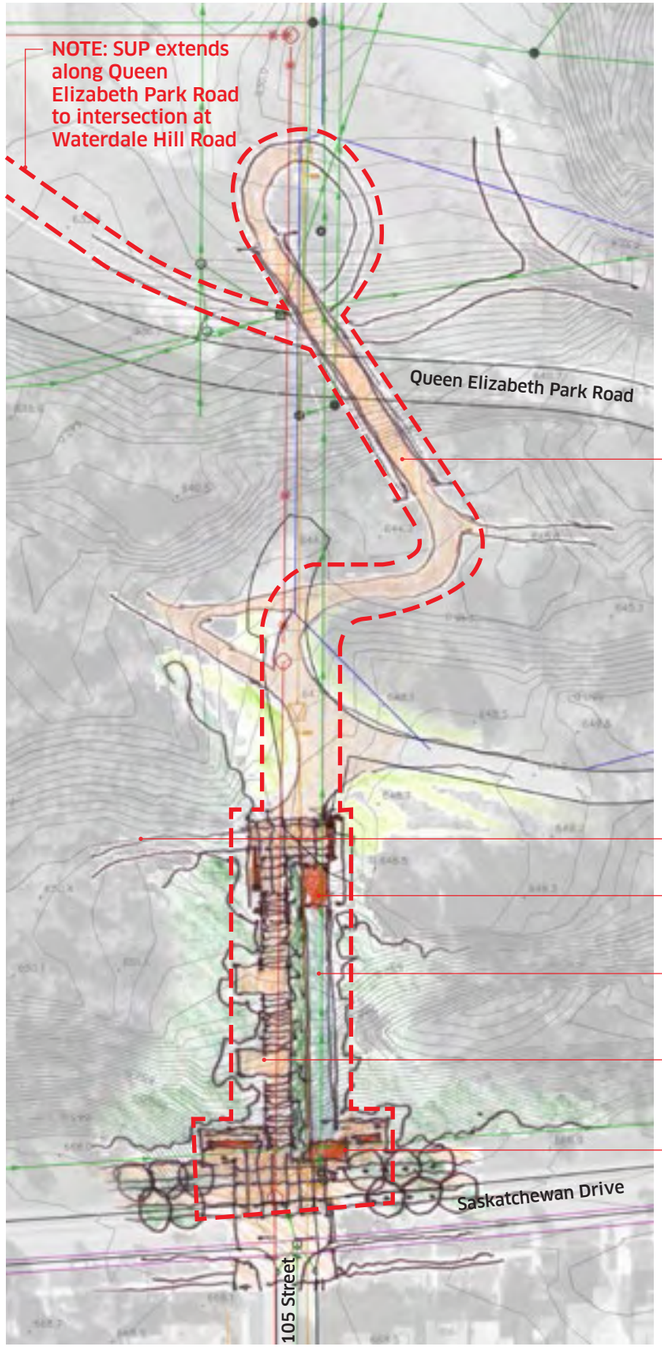
Access to Touch the Water Promenade

LEGEND
Utilities

- Drainage
- Water
- Communications
- Power
- Gas

Preliminary Plan
106 Street Alignment

0 10 25 50m



105 Street Alignment

Top Plaza	1 020 000	
Stair	490 000	
Bottom Plaza	580 000	
Bridge Over QEP Road	3 900 000	
SUP	960 000	
Inclined Elevator (1)	1 880 000	In
Sub-Total	**$8 830 000**	
Contingencies (50%)	4 415 000	
Sub-Total	**$13 245 000**	
Soft Costs (25%)	3 311 000	
TOTAL	**$16 556 000**	

Scope of construction cost estimate

Bridge over Queen Elizabeth Park Road to connect north and south sides of park with ease of access. This is an approved element of the Queen Elizabeth Park Master Plan.

Accessible path from Saskatchewan Drive

Terminus and loading

Mechanized access alignment

Landing and lookout

Terminus

Preliminary Plan
105 Street Alignment

0 10 25 50m