2.0 PROJECT EVALUATION

2.1 PROJECT WORKSHOP (START-UP)

A Project Workshop involving the Project Team and City staff was convened at the initiation of the Study. The intent of the workshop was to introduce the project and work to-date to staff from various City departments and obtain feedback from City Staff regarding other projects and initiatives in the area. The workshop provided the Project Team with additional insight about the area, but also revealed that many initiatives were unfunded and conceptual only, adding uncertainty about how to incorporate them into the project.

2.2 DESIGN CRITERIA

Design criteria developed for the project to guide the development and evaluation of the bridge and road options are summarized in **Table 2.1** and generally comply with Transportation Association of Canada (TAC) and City of Edmonton Standards and Guidelines. These design criteria were approved by the City and would form the basis standard of road and bridge design.

2.3 OPTION DEVELOPMENT AND EVALUATION

Twenty-six (26) road options involving various bridge locations and orientations were developed by the Project Team for further evaluation. Technical evaluation by the Project Team eliminated sixteen (16) Options considered to have “Fatal Flaws”. Evaluation criteria and weighting was then developed, with input from the Project Team and Workshop attendees to develop a comparison matrix to further reduce the number of viable options. Project Team members and Workshop attendees were asked to complete the comparison matrix which was then used by the Project Team to select four (4) options for further evaluation and subsequently for presentation to the public at an Open House.

2.4 BRIDGE OPTION DEVELOPMENT

The Bridge Team members of the Project Team (Dialog and Buckland Taylor) have expended significant effort to develop and evaluate bridge types (styles) considered appropriate signature bridges for this location. A half day Design Charette was held in Dialog’s office which resulted in the following four (4) bridge types being selected for further consideration and evaluation:

- Girder
- Cable Stayed
- Extradosed
- Arch

Walterdale Bridge Replacement **Table 2.1**

Concept Planning Study

DESIGN CRITERIA (Final)

Criteria	One Way Option	Two Way Option	Ramps/Kinsmen Access
Road Classification	UAU	UAD	UAU
Design Speed	60 km/h 50km/h - posted	60 km/h 50 posted	60 km/h, (min 40 km/h)
No. of Lanes	2 lanes 3 lanes at river bridge	3 lanes NB/1 lane SB at river bridge	1 lane
Design Vehicle	Walterdale Hill Road, 105 Street, Rossdale Road - WB 21, City Bus Queen Elizabeth Park Road - City Bus		
Min Radius	130 m	130 m	130 m, (min 55 m)
Min K Factor	Crest 13, Sag 18	Crest 13, Sag 18	Crest 13, Sag 18
Max Grade	Road: Desired Max 5%, Absolute Max. 6% Structure: Desired Max 3%, Absolute Max. 4%	Road: Desired Max 5%, Absolute Max. 6% Structure: Desired Max 3%, Absolute Max. 4%	Road: Desired Max 5%, Absolute Max. 6% Structure: Desired Max 3%, Absolute Max. 4%
Min Grade	Road/Underpass: 0.6 % Overpass – 0.0%	Road/Underpass: 0.6 % Overpass – 0.0%	Road/Underpass: 0.6 % Overpass – 0.0%
Max. Superelevation	6%	6%	6%
Min. S.S.D.	85 m	85 m	85 m
D.S.D.	60 km/h – 175 - 235 m	60 km/h – 175 - 235 m	60 km/h – 175 - 235 m
Lane Width (See notes below)	3.7 m, right lane 4.2 m	NB- 3.7m, right lane 4.2 m SB – 4.3 m	3.7, 4.2m with required offset
Shoulders	n/a, 150x250 mm C/G	n/a, 150x250 mm C/G	n/a, 150x250 mm C/G
Structure/Barrier Off-Set	Overpass: Uniform off-set (right and left side) based on blended value of long and short bridges (TAC Figures 2.2.10.3, 2.2.10.2) as well as suggested shy distance (TAC Table 3.1.6.4) involving rigid barriers – 1.4 m Underpass/Adjacent Retaining Wall: (TAC Figures 2.2.10.1) Right side 2.6 m, Left side 1.4 m – consistent with an overpass or determined by Stopping Sight Distance (SSD).		
Clear Zone Width TAC Figure 3.1.3.1	Varies 6.0 m to 7.5 m based on side slope		5.0 m
Median Width	n/a	1.7 m Lip to Lip	n/a
Vertical clearance	5.5 m includes 0.1 m for future overlays	5.5 m includes 0.1 m for future overlays	5.5 m includes 0.1 m for future overlays
Multi-Use Trails	2.5 m plus 0.6 m offset to rigid barrier	2.5 m plus 0.6 m offset to rigid barrier	

Note:

- *Minimum width of **one lane** roadway determined using TAC Table 2.3.7.1 – Case II, Condition B and C for a tangent.*
- *Lane width would be modified in constrained geometry using Case III, Condition C - TAC Table 2.3.7.1*

Each bridge type was determined to be appropriate for the four (4) road options presented at the Open House, and accordingly all four (4) bridge options were also exhibited as potential bridge options.

2.5 PUBLIC INVOLVEMENT

The first phase of public involvement was comprised of conducting a series of one-on-one interviews with a list of selected stakeholder groups that the Project Team determined would be representative of the many stakeholder groups that are an integral part of the project key stakeholders consulted are included in the Public Involvement report Summary in **Appendix F**. Fifteen (15) interviews were conducted. Common issues that arose from the interviews included:

- The project presents an opportunity to address vehicle traffic issues and to improve pedestrian and cyclist circulation throughout the area.
- The challenge for this project is to achieve a balance between providing improved access for private vehicles to downtown Edmonton and protecting/preserving the character, safety and integrity of the communities that the roadways approaching the bridge replacement will be impacting.
- Better signage and wayfinding should be provided to improve circulation into and out of the river valley.
- The bridge design needs to reflect the history of the area.
- This is a relatively small area and the bridge and roadways must fit in.
- East/west flows (River Valley Road through Rossdale) must be maintained and/or improved.
- Make better use of Gateway Boulevard and Calgary Trail (not 99 Street and 109 Street) to funnel vehicle traffic in and out of downtown.
- Current traffic volumes on Gateway Boulevard, Calgary Trail and 109 Street onto Walterdale Hill and Queen Elizabeth Park Road are tolerable, but these should not increase, and no additional property or parkland should be sacrificed to achieve greater roadway capacity.
- Remove bottleneck created by four (4) lanes (two (2) on Queen Elizabeth Park Road and two (2) on Walterdale Hill Road) merging into two (2) lanes across the bridge and going back to four (4) lanes on the north side of the river.
- Two-way traffic on the bridge is desirable.

The second component of the public involvement plan was a widely promoted and heavily attended (approximately 225 participants) Open House on November 18, 2010. This Open House was undertaken jointly with the West Rossdale Urban Design Planning project through the Planning and Development Department of the City of Edmonton.

Two (2) tools were used to collect input and feedback from participants for the Walterdale Bridge Replacement component of the Open House.

The first tool was a Comment Form handed out at the event, this comment sheet was made available on the project website where interested Edmontonians could download

and complete the form then fax, scan, e-mail or mail to the Project Team. Close to eighty (80) forms were returned using this tool. The second tool was the use by participants of post-it notes that were supplied at tables displaying "roll maps" of each of the four (4) roadway options. Participants were then asked to fill out the post-it notes and attach them directly to the roll maps close to the area on the map pertaining to their comments.

The Project Team received a great deal of detailed and lengthy feedback from the two (2) input tools but there was a diverse range of comments and themes with much contradictory comment. Generally speaking, and at a high level, Option 1, the status quo regarding roadways on the south side of the crossing was most supported. This theme was justified in that the community quality-of-life impacts, neighbourhood access and loss of heritage character were too great.

However, there were enough comments and suggestions indicated that although the status quo was preferable, the possibility of reconfiguration and flow improvement on the roadways at some point in the future to better handle additional traffic must be maintained.

There were also a significant number of comments pertaining to maintaining or improving the east/west traffic flows, especially for pedestrians and cyclists on both sides of the river crossing. Also, there was significant support for two-way traffic on the bridge itself and better access from the north bank of the river to the Kinsmen Sports Center.

There was little or no support for elevating the roadway at the north end of the bridge.

Regarding bridge design, although there was not definitive support for any one option presented, the **extradosed** and **arch** options received more positive comments than the other two. The **cable stay** option also received more favourable comments than the **girder** option, which was considered to be "boring or "staid."

The most significant bridge design criterion seems to be how the bridge design will fit into its surroundings. All four (4) options received both favourable and unfavourable comments about fitting in to the context and the surroundings, but there were more unfavourable comments about the sheer size of the cable stay option. Opinion was split about the concept of a signature bridge design versus fitting into the context and surroundings.

2.6 HISTORICAL RESOURCES

As noted, the area in the vicinity of the Walterdale Bridge has been established as a location of unprecedented cultural resource potential. To identify and mitigate the potential impact of historical resources on this project, Gareth Spicer, MA, with Turtle Island Cultural Resource Management, who has considerable experience in the area, commenced initial work and community engagement prior to preparing and submitting a Statement of Justification for Historical Resources Act Requirements. The Statement of

Justification summarized a review of the Project Area and provided recommendation for a proactive cultural resource management program to facilitate moving forward with the project options. Written response from Alberta Culture and Community Spirit (ACCS) had not been received at the time of writing; however, the report has been referred for possible paleontological concerns, which may further delay a response from ACCS.

A review of the current road and bridge replacement options suggests that the historical resource impacts can be mitigated and/or managed to facilitate construction completion of a replacement bridge by 2014, provided a Historical Resources Impact Assessment is initiated immediately upon the development of the recommended alignment.

A brief summary report and Statement of Justification is included in **Appendix D**.

2.7 ENVIRONMENTAL PROGRAM

2.7.1 Data Gap Analysis

Spencer Environmental conducted a comprehensive desktop inventory of available environmental information sources for the entire Project Area encompassing the initial ten (10) options identified in the evaluation matrix exercise conducted in August 2010. Sources of information included the City of Edmonton's Planning and Development and Transportation Libraries as well as Alberta Environment's Environmental Site Assessment Registry (ESAR). All reports were reviewed for environmental information including: geology and soils, surface and groundwater, vegetation (including rare plants), wildlife (including wildlife movement corridors), fish and recreational land use and access.

Based on the results of that analysis, sufficient baseline environmental information is available for the bridge replacement Project Area in general. Information gaps do exist for site specific information including geotechnical, hydrotechnical, air quality, vegetation (plant communities and rare plants), wildlife (avifauna and amphibians) and noise. Avifauna and vegetation/rare plant surveys will be required in early 2011 once the final bridge alignment and road network option is chosen.

Because of proposed construction timelines, and to facilitate future acquisition of environmental approvals, Pisces Environmental Consulting Services Ltd. conducted a fish and fish habitat assessment in October 2010. Their assessment included the North Saskatchewan River (NSR) Project Area encompassing the previously selected ten (10) bridge crossing options. Spring-spawning fish species (specifically lake sturgeon and walleye) and fall-spawning fish species (specifically mountain whitefish) are present in the North Saskatchewan River in the vicinity of Edmonton, as are a wide variety of other fish species. Based on the results of the habitat assessment, habitat utilization within the area of the Walterdale Bridge is varied, as some species may occupy this part of the river during all life cycle phases on a year-round basis, while others may utilize the habitat on a seasonal basis to meet some immediate life requirements, such as spawning or rearing. As a result, project sequencing and timing of any instream work to

avoid sensitive periods will be of principle importance in reducing impacts to fish and fish habitat.

Specifically, the NSR is a mapped Class C water body under the Code of Practice for Watercourse Crossings with a restricted activity period of September 16 to July 31. During this period, no instream work should be conducted without the permission of Alberta Environment contingent upon the advice of a Qualified Aquatic Environment Specialist (QAES). In particular, construction and removal of isolation works should be scheduled to avoid the period 01 April to 31 July 31, to mitigate potential effects on important spring spawning species including lake sturgeon. Depending upon final bridge design and alignment, determination of construction methodology and scheduling (i.e., if an exemption to the restricted activity period is requested to allow instream construction in the fall), some additional fisheries information may be required. Instream activities (i.e. instream isolation of the construction site) occurring between August 1 and September 15 would not require specific recommendations from a QAES with regard to timing. In addition, construction site isolation and implementation of sediment control will be instrumental in protecting fish and fish habitat.

2.7.2 Environmental Permitting and Approvals

Members of the Project Team and the City of Edmonton met with federal permitting agencies [Department of Fisheries and Oceans Canada (DFO) (*Fisheries Act*), Transport Canada (*Navigable Waters Protection Act*) and Canadian Environmental Assessment Agency (CEAA) (*Canadian Environmental Assessment Act (CEA Act)*)] on December 6, 2010. That meeting was held to confirm environmental permitting and approval requirements and the required project scope for the environmental review.

Considering the conceptual information available to-date, DFO indicated that, if a *Fisheries Act* Authorization is required, they likely will be the lead Responsible Authority for CEAA review of the project and anticipate that it could take up to six (6) months to get authorization for the project once detailed designs are available. Application for approval pursuant to the *Navigable Waters Protection Act* and CEAA review would occur concurrently.

Although the North Saskatchewan River is well-studied in terms of available fish and fish habitat information, DFO indicated there is the possibility that they may ask for additional fisheries fieldwork (i.e. spring 2011 and summer 2011). This will be confirmed once the final alignment and bridge crossing are chosen and the project proceeds to detailed design.

It was determined that one Environmental Impact Assessment (EIA) document that satisfies the requirements of the federal regulatory agencies as well as the City of Edmonton's *Bylaw 7188* (North Saskatchewan River Valley Area Redevelopment Plan) will be required. City of Edmonton *Bylaw 7188* review usually takes approximately three (3) weeks once a draft EIA is submitted to Planning and Development. The timeline for resubmitting a final EIA will depend on the nature and extent of comments received

from the City's review and whether another City review is required prior to Council approval.

2.8 COLLISION STATISTICS

Collision data for the period of 2006 to 2010 for various locations within the Study Area are illustrated on **Exhibit 2.1**. The data suggests that generally, the area would not be considered a high collision area; however, one hundred and fifty (150) collisions were reported on Queen Elizabeth Park Road, of which, seventy-four (74) were recorded at the Queen Elizabeth Park Road/Saskatchewan Drive intersection. Although this number is not particularly high (15 collisions per year), based on the City's annual reporting, high collision locations within the City are those with more than fifty (50) collision per year, and therefore, none of the intersections within the Study Area fall within this range.

2.9 TRAFFIC ANALYSIS

2.9.1 Network Traffic Analysis

2.9.1.1 Background

The Walterdale Bridge replacement project, while focused on the need to replace the existing bridge by 2014, could also involve some significant changes to the adjacent roadway network that could affect the operation of the broader roadway network, or specific elements of that network. As part of the process of arriving at an optimal bridge replacement, a number of bridge and roadway options were generated and analyzed. An initial screening of the alternatives resulted in a shortlist of four (4) options being identified for further consideration. In order to further distinguish between these four (4) options, the City of Edmonton carried out traffic modeling of the four (4) options to identify their relative performances. Using the City's EMME2 based Regional Travel Model (RTM), the four (4) options were modeled and standard output packages produced for the Project Team's use. The standard output package included the following information:

- Roadway link characteristics: location, length, number of lanes, posted speed and capacity.
- Roadway link volumes: AM Peak Hour, PM Peak Hour, daily.
- Roadway link volume to capacity ratios (V/C) by direction.

2.9.1.2 Network Assumptions

Given that the new Walterdale Bridge is needed by 2014, the traffic analysis was carried out for the 2016 planning horizon, which is the closest available set of traffic projections in the RTM. The 2016 planning horizon assumes the following major network changes from the current situation:

- Light Rail Transit: City-wide extensions to west, northwest and southeast.
- Anthony Henday Drive: Completed around entire city.
- Rossdale Road: Converted to 2-way operation.

- Bellamy Hill Southbound: Connected to Rossdale Road, instead of 104 Street.

2.9.1.3 Analysis Options

As noted above, a total of four (4) bridge replacement options were analyzed:

- Option 1: Bridge replaced and tied into existing roadways on either side.
- Option 2 (Model Run Scenario 2):Bridge replaced with Queen Elizabeth Park Road grade separated from Saskatchewan Drive, and 105 Street remaining at-grade at River Valley Road.
- Option 3 (Model Run Scenario 4): Bridge replaced with 105 Street elevated over River Valley Road (no connection) and at-grade intersection on Saskatchewan Drive at Queen Elizabeth Park Road, with hairpin turn removed.
- Option 4 (Model Run Scenario 3): Bridge replaced downstream of crossing and connected to 103 Street instead of 105 Street; Gateway Boulevard passes under Saskatchewan Drive (no connections).

In addition to the bridge replacement options, two additional scenarios were tested. Three (3) of the four (4) bridge replacement options may require the closure to traffic of the existing bridge; it was therefore necessary to test such a closure assuming the following two scenarios:

- Walterdale is closed without any other changes in the roadway network.
- Walterdale is closed and High Level Bridge is converted to two-way operation.

2.9.2 Analysis and Results

2.9.2.1 System-wide Analysis

In order to gain an understanding of the potential impacts of changes to the roadway network around the Walterdale Bridge, the Traffic Modeling Team generated a series of system wide metrics for the central area of the City. For the purpose of this analysis, the central area covered an area bounded by 114 Avenue in the north, 73 Street in the east, 80 Avenue in the south, and 133 Street to the west. This area allowed for observation of changes in the central area traffic performance that might result from changes in the roadway network near Walterdale Bridge.

The following **Table 2.2** illustrates system-wide parameters in the central area associated with the four (4) bridge replacement options:

Table 2.2 – System-Wide Parameters

SCENARIO	2016 AM PK HR PEAK DIRECTION RIVER CROSSING VOLUMES	2016 % OF HIGH OCCUPANCY VEHICLES IN CENTRAL AREA	2016 CENTRAL AREA DAILY VEHICLE-KM	2016 CENTRAL AREA DAILY VEHICLE-HOURS	2016 CENTRAL AREA DAILY AVERAGE SPEEDS (KM/HR)	2016 CENTRAL AREA VEHICLE EMISSIONS (KG)
Option 1; New Bridge only	13,110	21.2	3,284,200	90,000	32.15	420
Option 2; River Valley Road at grade, Saskatchewan Drive grade/ separation	13,120	21.2	3,280,200	89,500	32.35	420
Option 3; flyover at River Valley Road, Saskatchewan Drive at-grade	12,490	21.2	3,291,900	90,200	32.25	420
Option 4; New Bridge at 103 Street	12,860	Not Tabulated	Not Tabulated	Not Tabulated	Not Tabulated	Not Tabulated
Walterdale Closed; no other changes	10,860	17.2	3,262,900	89,700	32.09	Not tabulated
Walterdale Closed; 2-way High Level Bridge	10,470	20.1	3,266,100	90,200	32.01	Not tabulated

Reference to the above Table provides some observations concerning the performance of the bridge replacement options and the two bridge closure options. **Exhibits 2.2, 2.3, and 2.4** illustrate the anticipated daily and peak hour traffic volumes for the 2016 planning horizon for all four options.

At a broad level, there are no material differences between the various bridge replacement options in the overall performance of the central area network. Across almost all metrics, the bridge replacement options provide similar levels of traffic performance. A noteworthy difference between the options, however, is the amount of traffic crossing the central area river bridges in the AM Peak Hour. It is observed that the total amount of traffic crossing into the central area in Options 3 and 4 is noticeably lower than in Options 1 and 2. This observation may at first glance appear to be counter-intuitive since Options 3 and 4 reflect a higher degree of free flow operation at River Valley Road and Saskatchewan Drive, respectively. Additional insights into the performance of the various options will be provided below.

Reference to the network performance of the bridge closure options indicates a dramatic decrease in cross-river traffic on central area bridges, when compared to Option 1. Simple closure of the Walterdale Bridge results in a 17% decline in cross-river traffic. On the other hand, closure of the bridge with conversion of the High Level Bridge to two-way operation results in a 21% decline. The decline in cross-river traffic is

also accompanied by a degradation of average speed in the central area network; this means that there are fewer vehicles in the network, but that each vehicle is encountering more delay.

The decline in cross-river traffic is judged to occur as a result of the removal of significant river crossing capacity and the inability of alternative routes to absorb the displaced traffic. As a consequence, the displaced traffic is either choosing to avoid the congested peak hour, travelling outside the peak hour, or being diverted to public transit, or a combination of both.

2.9.2.2 Comparison of Options

Options 1 and 2

A review of V/C plots for Options 1 and 2 indicates very similar performance levels. In both cases, the approach to River Valley Road operates at a V/C of under 0.9 in the critical AM Peak Hour. In both cases the new, wider bridge, will result in less interference from the River Valley Road intersection on the Walterdale Road/Queen Elizabeth Park Road intersection.

Review of the northbound approaches to the Walterdale Road/Queen Elizabeth Road intersection indicates that all the approaches will operate poorly, as they will be at capacity. The Queen Elizabeth Park Road approach is particularly congested in both options.

The provision of a grade separation on Gateway Boulevard at Saskatchewan Drive relieves the congestion on Gateway Boulevard between Whyte Avenue and Saskatchewan Drive. The improvement on this link appears to draw some additional traffic to this corridor and results in a slightly higher degree of congestion on Queen Elizabeth Park Road.

Option 3

The provision of a flyover from the new Walterdale Bridge across River Valley Road has a significant impact on traffic volumes and network performance on both sides of the new bridge.

The flyover eliminates turns from Walterdale Road onto either River Valley Road or Rossdale Road. As a result, there is a 43% reduction in traffic choosing to use the new Walterdale Bridge; from 3620 veh/hr (Option 1) to 2060 veh/hr (Option 3). The reduction of traffic on the new bridge means that there will also be less traffic on the approach roads, and correspondingly better levels of service.

The removal of turns at River Valley Road will result in all bridge traffic being fed directly north on 105 Street towards 97 Avenue. This will result in 105 Street operating poorly, with extremely long queues. This is likely to result in a significant amount of shortcutting through the West Rossdale Plan area, along 96 Avenue.

Option 4

The provision of a new Walterdale Bridge that feeds directly to Rossdale Road instead of 105 Street also results in a reduction in traffic using this bridge. Traffic on and immediately north of the bridge on Rossdale Road will be highly congested and experience long delays. This option generates significant northbound to westbound left turns from Rossdale Road onto River Valley Road, followed by high right turns from River Valley Road onto 105 Street. These two heavy movements are caused by the desire of traffic to access the west side of downtown via 97 Avenue/109 Street. As with Option 3, the difficulty of executing the left turn from Rossdale Road to River Valley Road is most likely to result in significant shortcutting through West Rossdale via 96 Avenue.

2.9.2.3 Closure of Existing Bridge

Closure of the existing Walterdale Bridge during construction of the new bridge will cause a significant disruption to the central area roadway network. The modeling of two scenarios for such closure indicates that conversion of the High Level Bridge to two-way operation will not provide any relief but will actually result to further degradation, as compared to a simple closure of Walterdale.

There are other possible strategies that could be tested to allow the City to cope with the closure of Walterdale Bridge, but these have not been examined. These options include provision of lane reversals on Groat and James McDonald bridges to provide additional peak direction capacity.

2.9.2.4 Kinsmen Sports Centre Access

Access to the Kinsmen Sports Centre is currently provided at the intersection of Walterdale Hill Road and Queen Elizabeth Park Road. More specifically, the inbound movement is accommodated via a single inbound lane at the signalized intersection while site egress is provided directly by way of a single lane exit slip ramp directly onto Walterdale Hill Road immediately south of the bridge.

With all four proposed roadway alignments, Walterdale Hill Road and Queen Elizabeth Park Road will meet at a signalized intersection with a small approach angle between them, as compared to the right angle which currently exists. Given the significant change in the approach alignment of Queen Elizabeth Park Road, two (2) Kinsmen Centre access configurations were examined as shown conceptually in **Exhibit 2.6.**

Analysis of the two (2) options indicated that a two way access located on the west side of the traffic signal would require a three phase signal at the intersection. While this scheme provides a satisfactory arrangement for traffic accessing and egressing from the Sports Centre, it imposes additional delays and lengthens the traffic queues on both Walterdale Hill and Queen Elizabeth Park Road.

Conversely, an arrangement that replicates the existing one-way in and one-way out configuration provides adequate inbound and outbound access capabilities without

imposing an undue delay burden on either of the major approaches to the signalized intersection.

2.10 GEOTECHNICAL CONSIDERATIONS

2.10.1 Introduction

A preliminary desktop geotechnical assessment was carried out for four (4) potential alignments of the river valley crossing associated with the new Walterdale Bridge project.

The preliminary assessment was based on a review of existing geotechnical information coupled with air photo interpretation and site reconnaissance. No geotechnical investigation was completed for this assessment, and the preliminary evaluations provided herein need to be verified by further investigation and stability analysis. This work is a continuation of the preliminary assessment completed by Thurber in 2008 for selected route options at that time.

The air photo interpretation was carried out using stereo aerial photographs from 1970 at a scale of 1:12,000 and from 2001 at a scale 1:20,000. The interpretations were checked during the field reconnaissance.

2.10.2 South Slope Geology

The main geotechnical feature of the south slope alignments is the presence of deep seated ancient and presently dormant landslides that extend from the north edge of Saskatchewan Drive down to the toe of the slopes at the low level river terrace. These slide features have been superimposed on the mosaic plans for Alignment Options 1 through 4.

While these landslide areas are presently inactive, there is the potential to reactivate these failures by unfavorable construction activities on these slopes that could reduce the overall stability. Activities that could negatively impact the current state of slope stability include; placement of fill on the upper portion of the slopes; cuts into the middle or lower portions of the slopes; and activities that cause a rise in the groundwater table. Positive impact on stability would include placement of fills at the toe of the slope.

2.10.3 Preliminary Assessment of Route Options

The following provides a preliminary assessment of the four alignments based on the above noted studies. Further investigation and stability analyses are required to quantify the south slope stability condition and evaluate the potential impact on stability of the selected options.

2.10.3.1 Alignment Option 1

Alignment Option 1 is similar to the existing south slope alignment and therefore has negligible potential impact on the south slope stability.

2.10.3.2 Alignment Option 4

Alignment Option 4 involves a new bridge alignment downstream of the existing Walterdale Bridge and requires fills throughout the south slope ranging from about 10 m high near to the top of the slope to 3 to 6 m high in the mid section and about 7 to 8 m high at the toe of the slope. Placement of the high fills near the crest of the slope will have a negative impact on the slope stability and will need to be further evaluated.

2.10.3.3 Alignment Option 3

Alignment Option 3 involves an at grade crossing of Saskatchewan Drive and requires extensive filling up to 15 m high at the crest of the slope coupled with cuts up to 6 m deep near to the toe of the slope. This has the greatest negative impact on the slope stability of the options considered and would likely not be feasible from a geotechnical perspective without extensive slope enhancement measures to offset the negative impacts on slope stability.

2.10.3.4 Alignment Option 2

Alignment Option 2 involves a depressed crossing under Saskatchewan Drive and involves fills up to about 5 m high at the crest of the slope, cuts up to 7 m deep in the mid section and fills up to 9 m high at the toe of the slope.

The alignment is considered superior to Options 3 and 4; however, the impact of fill placement at the crest of the slope would need to be assessed and will likely require slope enhancement measures to offset the impact of fill placement.

2.10.4 Geotechnical Ranking of Alternative Alignments

Following is a ranking of the alignments based on geotechnical criteria.

Option 1 has least potential slope disturbance and is therefore considered the most acceptable.

Option 2 is considered the most favorable of the new alignments with respect to potential impact on slope stability.

Option 4 involves greater height of fill placement at the crest of the slope and is therefore less favorable than Alternative Alignment 2.

Option 3 has the greatest potential negative impact on the south slope and hence has the lowest geotechnical ranking. This would have a major impact on the overall slope stability and would likely not be geotechnically feasible without major slope stabilization measures, including use of elevated bridge sections to avoid high fills, slope stabilization with pile walls, etc.

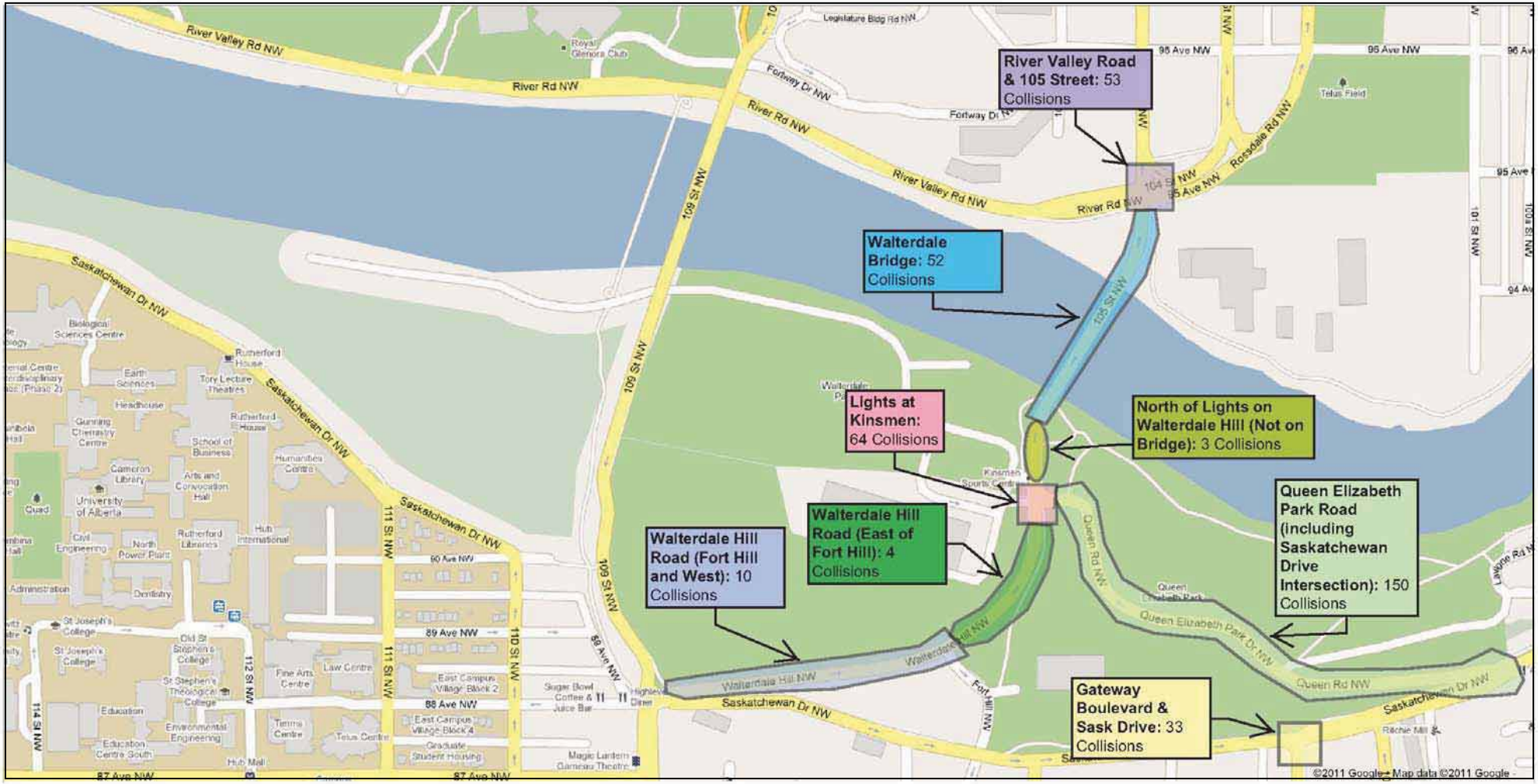
Appendix C contains Geotechnical Memorandum No. 1 regarding the preliminary analysis of options.

2.11 ARTIST SELECTION

The Project Team, in conjunction with the Edmonton Arts Council, completed selection of an Artist through a Request for Proposal selection process. The artist has been assigned to work with the Project Team throughout the Concept Planning Study and will continue through preliminary and detailed design. The intent is that the Artist would work and collaborate with the Project Team to develop Public Art, not a separate commission, but rather as an integral part of the design and implementation process. This is a unique approach to Public Art and is expected to result in enhanced value for the art component of the project.

Collision Data: January 1, 2006 to December 31, 2010

Google maps Canada



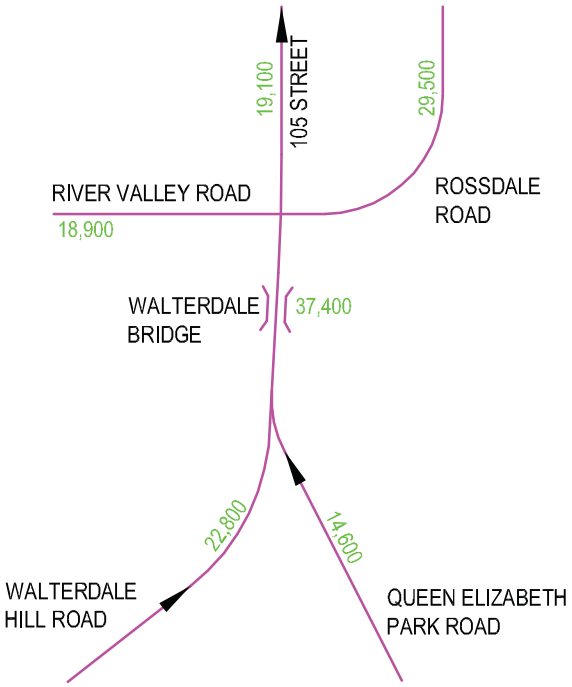
ISL Engineering and Land Services | AL-TERRA ENGINEERING | DIALOG | BUCKLAND & TAYLOR LTD. Bridge Engineering

WALTERDALE BRIDGE REPLACEMENT CONCEPT PLANNING STUDY COLLISION DATA

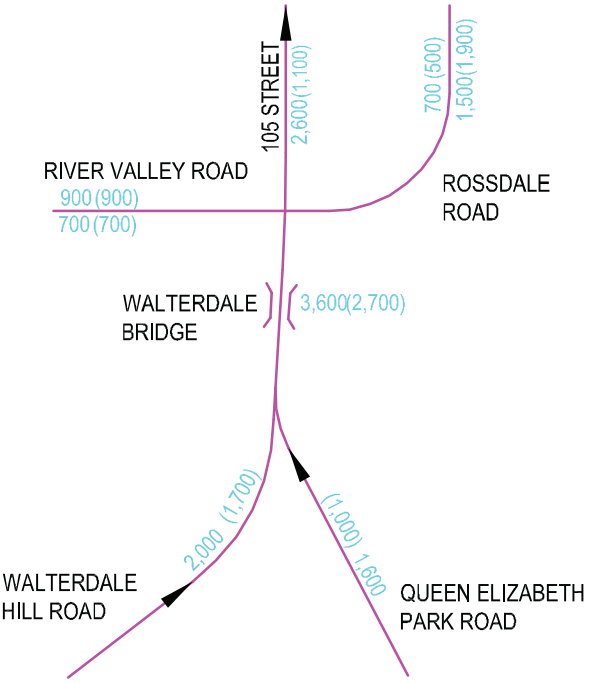
Exhibit 2.1

OPTION 1 - BRIDGE REPLACEMENT ONLY

DAILY TRAFFIC



PEAK HOUR TRAFFIC



LEGEND:

4,100 (3,200) - AM PEAK (PM PEAK)

ISL Engineering and Land Services | DIALOG | BUCKLAND & TAYLOR LTD Bridge Engineering | AL-TERRA ENGINEERING

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

PROJECT: WALTERDALE BRIDGE

PRG. TITEL: ESTIMATED FUTURE TRAFFIC VOLUME
ROAD NETWORK OPTION 1

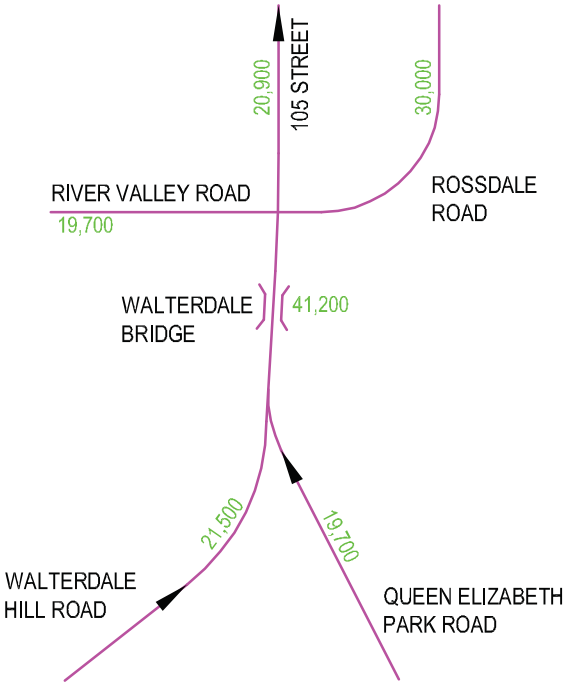
THE CITY OF Edmonton TRANSPORTATION

DRAWN BY: BSTAPOR
CHECKED BY: CBROKS
DATE March 2011

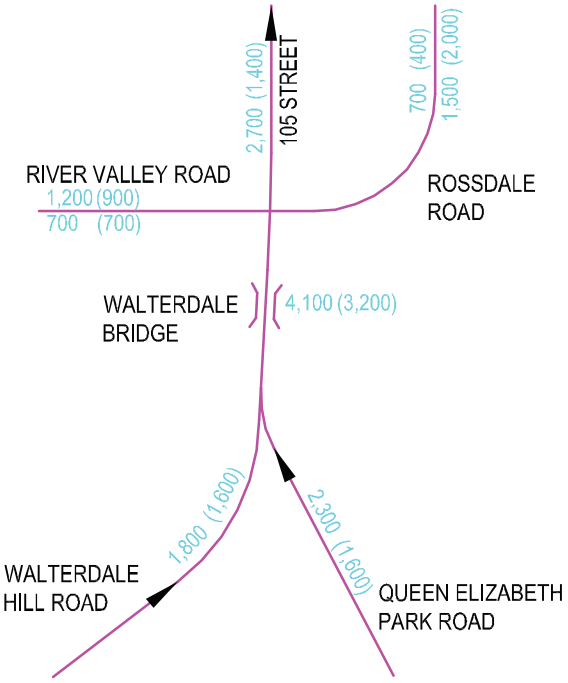
PLAN NO. EXHIBIT 2.2

OPTION 2 - REIVER VALLEY ROAD AT GRADE, SASKATCHEWAN DRIVE GRADE

DAILY TRAFFIC



PEAK HOUR TRAFFIC



LEGEND:

4,100 (3,200) - AM PEAK (PM PEAK)

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Manager, Transportation Planning Branch

Director, Facility and Capital Planning

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

PROJECT: WALTERDALE BRIDGE

PRG. TITEL: ESTIMATED FUTURE TRAFFIC VOLUME ROAD NETWORK OPTION 2

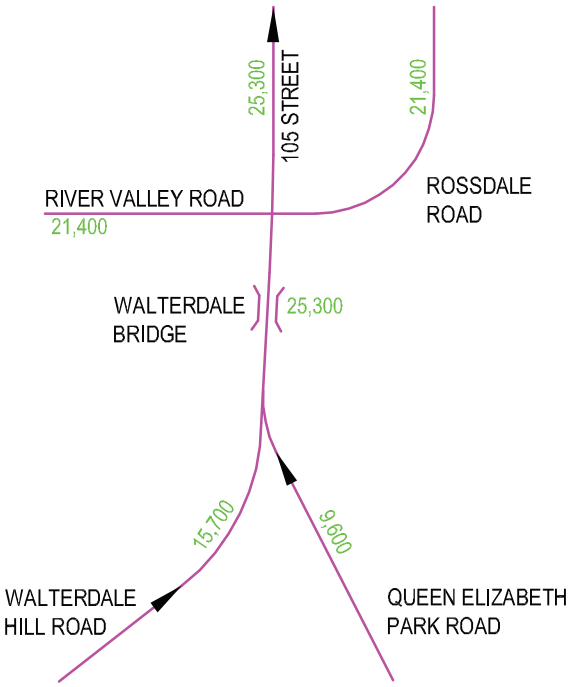
THE CITY OF Edmonton TRANSPORTATION

DRAWN BY: BSTAPOR
CHECKED BY: CBROKS
DATE March 2011

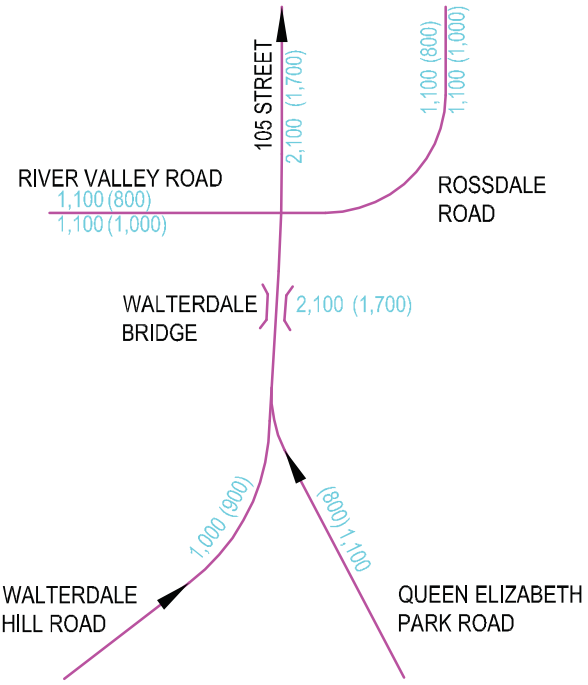
PLAN NO. EXHIBIT 2.3

OPTION 3 - FLYOVER AT RIVER VALLEY ROAD AND SASKATCHEWAN DRIVE AT GRADE

DAILY TRAFFIC



PEAK HOUR TRAFFIC



LEGEND:

4,100 (3,200) - AM PEAK (PM PEAK)

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Manager, Transportation Planning Branch

Director, Facility and Capital Planning

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

PROJECT: WALTERDALE BRIDGE

PRG. TITEL: ESTIMATED FUTURE TRAFFIC VOLUME
ROAD NETWORK OPTION 3

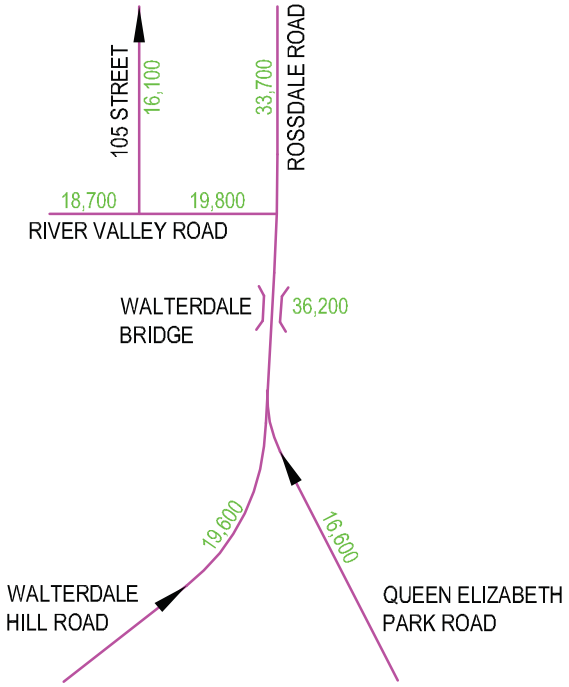
THE CITY OF Edmonton TRANSPORTATION

DRAWN BY: BSTAPOR
CHECKED BY: CBROKS
DATE March 2011

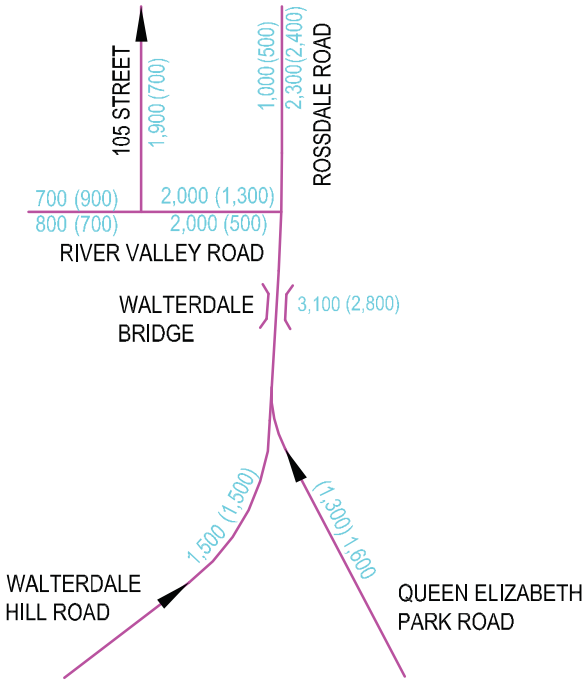
PLAN NO. EXHIBIT 2.4

OPTION 4 - NEW BRIDGE AT 103 STREET

DAILY TRAFFIC



PEAK HOUR TRAFFIC



LEGEND:

4,100 (3,200) - AM PEAK (PM PEAK)

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Manager, Transportation Planning Branch

Director, Facility and Capital Planning

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

PROJECT: WALTERDALE BRIDGE

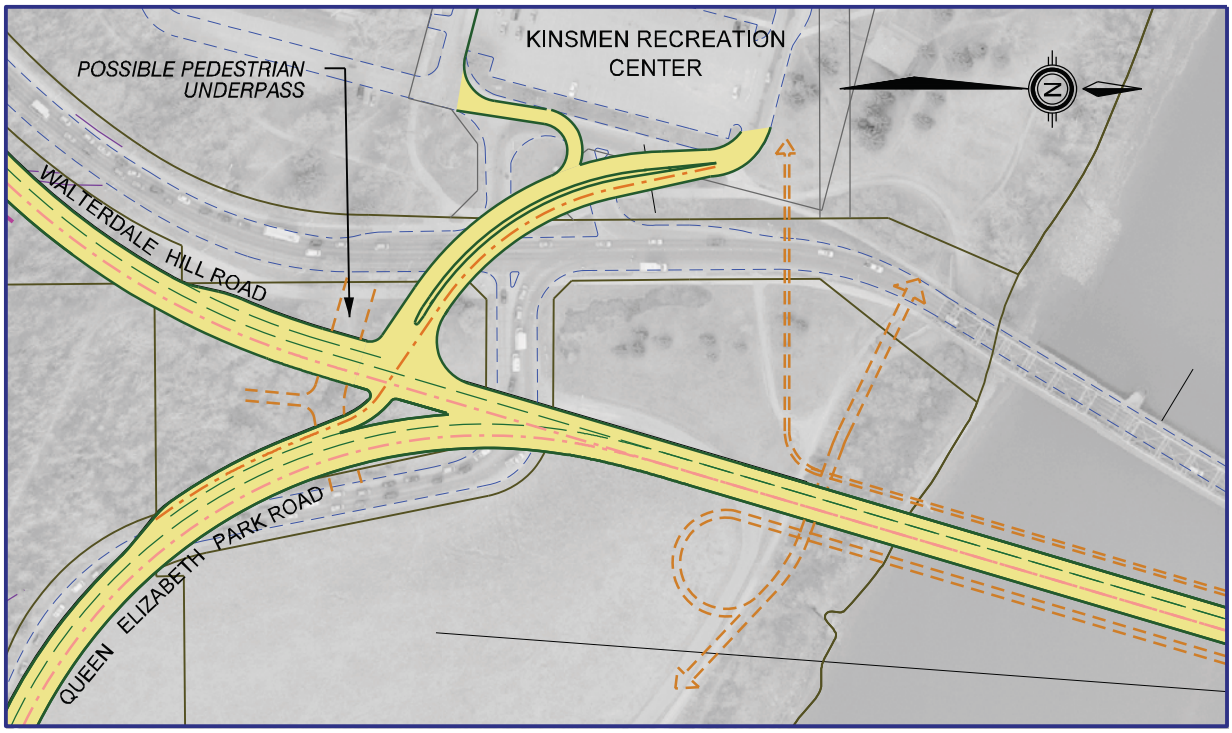
PRG. TITEL: ESTIMATED FUTURE TRAFFIC VOLUME
ROAD NETWORK OPTION 4

THE CITY OF Edmonton TRANSPORTATION

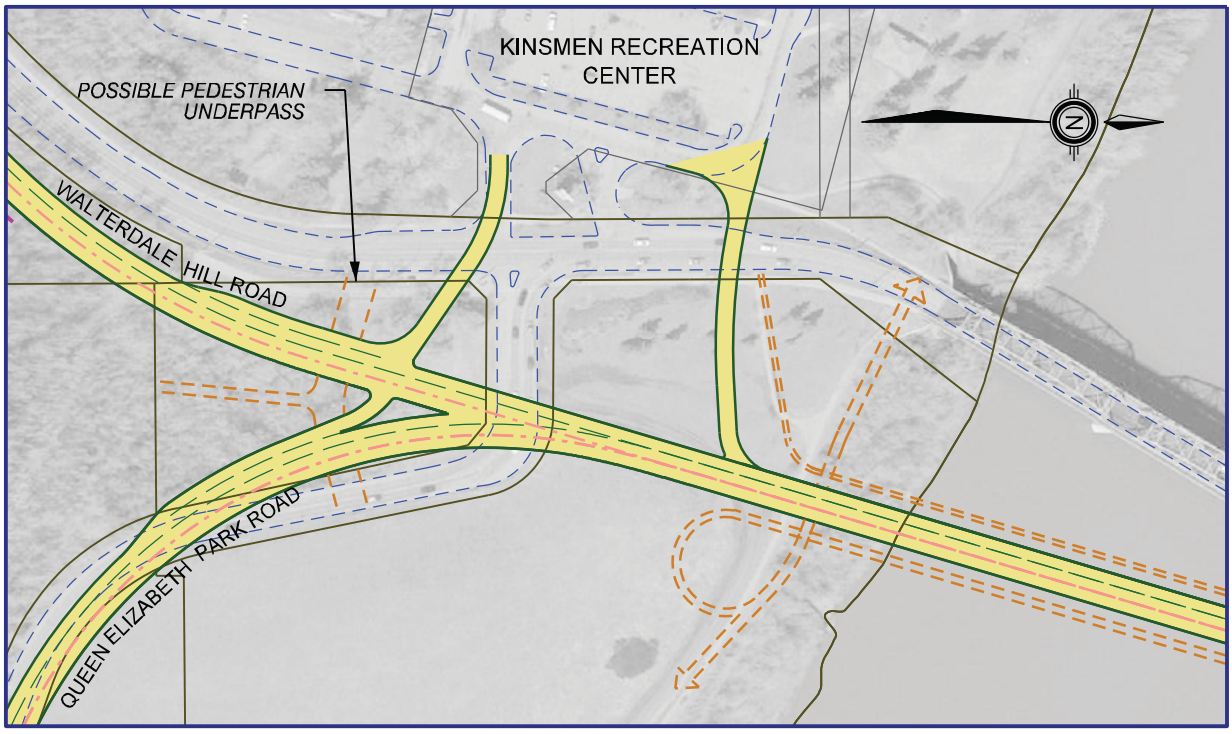
DRAWN BY: BSTAPOR
CHECKED BY: CBROKS
DATE March 2011

PLAN NO. EXHIBIT 2.5

COMBINED ACCESS TO KINSMEN



SEPARATE ACCESS TO KINSMEN



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BUCKLAND & TAYLOR LTD. Bridge Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

PROJECT: WALTERDALE BRIDGE

PRG. TITEL: ACCESS TO KINSMEN

THE CITY OF Edmonton TRANSPORTATION

DRAWN BY: BJSTAPOP
CHECKED BY: CJBROKS
DATE: March 20, 1

PLAN NO. EXHIBIT 2.6