

Appendix A: Alternative Analysis for Construction Access Route



Memorandum

AECOM
ConnectEd Transit Partnership
10235 101 Street, Suite 1200, Edmonton, AB, Canada T5J 3E9

To	Brad Griffith	Page 1
CC	File, Jeff Ward, Gordon Menzies, Lynn Maslen, Josh Jones, Russ Coulombe	
Subject	Valley Line LRT – North Bank Access Route	
From	Mark Perry	
Date	December 19, 2013	Project Number 60222337

This memo summarizes the options regarding the short term construction and long term maintenance and emergency access to the Valley Line tunnel portal and Tawatinâ Bridge on the north bank of the North Saskatchewan River.

Short term construction access could include bringing in material and equipment required to build the tunnel, portal, bridge and any landscaping or pathway reconstruction. There is also the potential the access could be used for removal of excavated material from the tunnel. Long term access would be for regular maintenance of the tunnel and Tawatinâ Bridge and any emergency services required in the tunnel or on the bridge.

The current design shows both the short term and long term access from Cameron Avenue. A potential minor secondary access was identified through Louise McKinney Park in the Environmental Impact Screening Assessment (EISA) in this way:

“Construction access for the portal structure is designated as from the east, via Cameron Avenue but, as planning proceeds, the need for a secondary access from the west, through Louise McKinney Park, may also be identified. For this reason, this environmental assessment assumes an as yet unidentified secondary access from the west but also assumes that this access will be limited and will not require physical modification. Therefore, secondary access is not shown on figures, is considered to be outside of the study area and is only assessed qualitatively.”

For an access through Louise McKinney Park to be used for construction would require some upgrading and therefore further review and approval to be compliant with Bylaw 7188 (North Saskatchewan River Valley Area Redevelopment Plan)

Access from Cameron Avenue, although feasible, has some inherent issues. The primary issue is that the main contractor access, which would include large heavy loads and equipment, would travel down a fairly steep road through a residential neighbourhood. CTP was asked to evaluate other potential access options including through Louise McKinney Park to mitigate some of these concerns.

Potential Access Alignments

In addition to the Cameron Avenue access 3 alternate alignments were identified for access from the west. The alignments are shown on Figure 1.

West Access Alignment 1 is from Grierson Hill past the Riverfront Plaza along the existing SUP to the bridge site on the north bank. Access to the tunnel portal site would follow the same route as the new portion of the Cameron Access route.

West Access Alignment 2 is from Grierson Hill along the existing maintenance road through Louise McKinney Park. At the east end of the existing maintenance road the access route would cross through the World Walk and over a Shared Use Path (SUP) on sufficient fill to meet the elevation of the tunnel portal. Access to the bridge site on the north bank would need to go through the portal site or use the Cameron Avenue access. Figure 2 shows the profile of the Alignment 2.

West Access Alignment 3 is from a SUP connection on Grierson Hill modified to accommodate construction vehicles. The route would follow the existing SUP to a point where a new connection would be provided to the tunnel portal site. To access the bridge site vehicles could either continue along the SUP or cross the tunnel portal site and access along the Cameron Avenue access connection. Figure 3 shows the profile of the Alignment 3.

All of the alternate alignments would require upgrading of the SUPs or maintenance roads to accommodate construction loads. In some cases this will be building up the road structure and widening the existing structure.

Alternative Comparison

The attached summary identifies some of the items of consideration for the alternate alignments.

It should be noted that the existing access shown in the Preliminary Design has been approved via the EISA and any substantial work that is in addition to what is discussed in the EISA may trigger a new EISA.

LRT D&C has agreed that the long term access can be maintained via Cameron Avenue as this would be used only sporadically for regular maintenance and emergencies. The biggest concern and impact on the adjacent residents would be the short term access during the construction phase.

The Cameron Avenue alignment provides the best long term routing for maintenance and emergency access since the anticipated frequency is relatively low, therefore not expecting to impact residents significantly, and sharing less SUPs than the west alignments. The short term construction access will have significant impact on the adjacent residents.

West Access Alignment 1 does not improve on the Cameron Avenue Alignment for maintenance and emergency access since the vehicles would need to be routed along more than 600 metres of SUP before getting to the same new access road that would be needed

for the Cameron route. The main advantage to Alignment 1 is that the route skirts the former dump site and since it runs along the base of the slope, appears to be the most geotechnically stable. This route also does not require any more significant retaining walls or structures than identified in the Cameron Avenue route. Alignment 1 does have a significant impact on the use of the Riverside Plaza and Promenade. A major event planned for the winters of 2015, 2017, and 2019 would require closure of this route for approximately 6 weeks. There is the potential to access the site using Alternative 1 and exit through Cameron Avenue during construction.

West Access Alignment 2 would require significant grading over the existing World Walk in Louise McKinney Park to have vehicles access the tunnel portal site. This additional loading on the sensitive side slope and crossing the former dump site make this route less desirable geotechnically and therefore not recommended for short or long term access. As with Alignment 1 this route will be closed for approximately 6 weeks for the major event planned for the winters of 2015, 2017, and 2019.

West Access Alignment 3 does not provide good maintenance and emergency access for the long term since the connection to Grierson Hill will be restricted to a right turn onto the access road and therefore become a one way road only. For construction access Alignment 3 would require building up the connection of the SUP to Grierson Hill. This could be incorporated into the proposed park viewpoint at this location. However there is concern that this connection would add load to the top of a historic slide area. As well additional work and retaining walls would be required to connect the SUP to the tunnel portal site. Upgrading the SUP to reach the bridge site would be likely, even for a construction access only, since the existing slope does not allow for an access road to be built adjacent to the existing path. Similar to Alignment 1 this alignment would need to be used as a one way in access for construction traffic with Cameron Avenue as the exit from site.

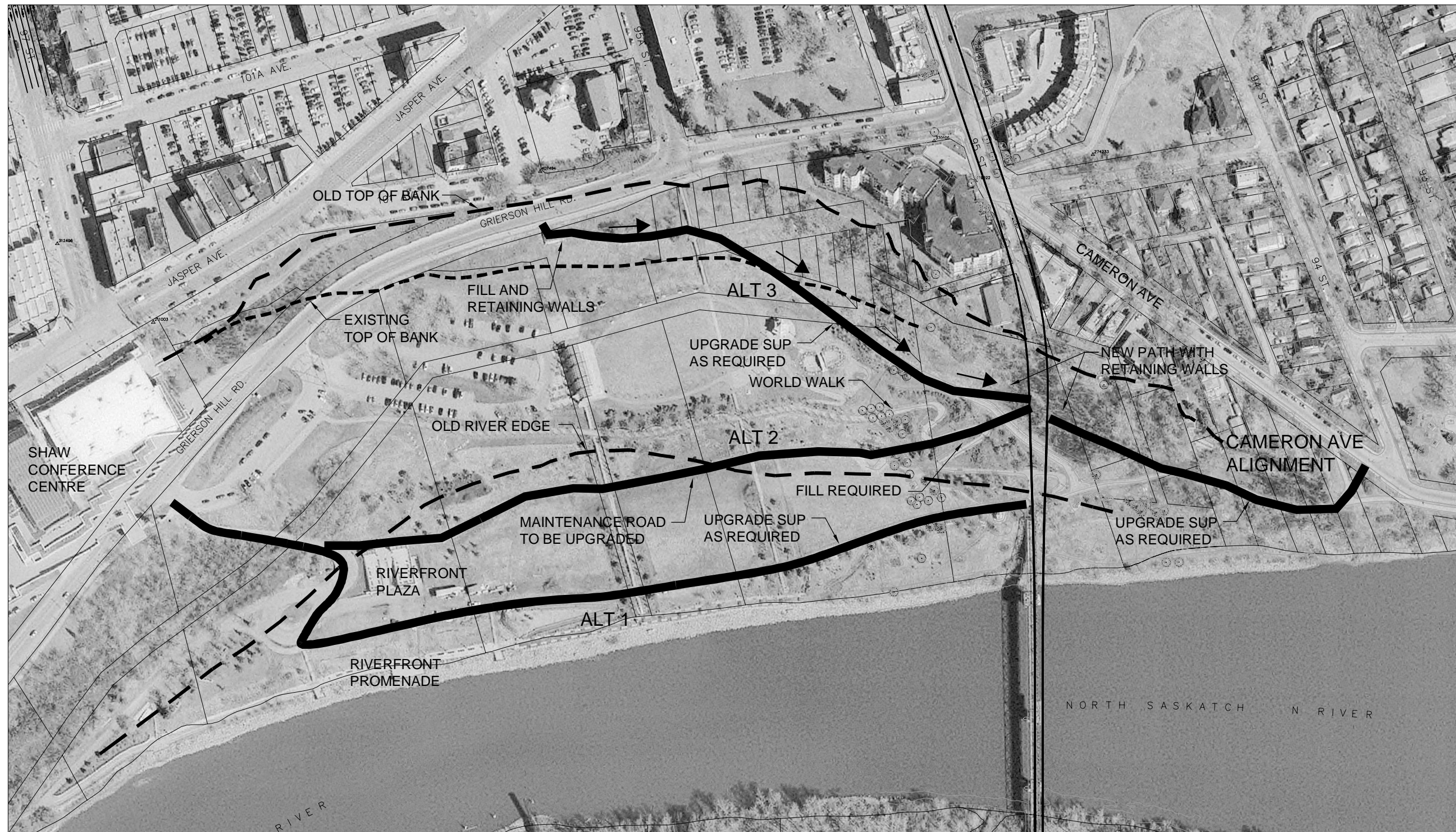
Recommendation

Due to the relatively low frequency of maintenance vehicles and the expectation that the maintenance vehicles will not be large vehicles the permanent maintenance and emergency access should come off of Cameron Avenue. This will minimize the amount of trails and park space that will have the maintenance vehicles cross through for the long term.

For the short term construction access, impact on the residents needs to be weighed against the impact on Louise McKinney Park. To balance the impact consideration can be given to using West Access Alignment 1 as the access to the site and Cameron Avenue as the exit from site. This would mean that the heavier loads of construction materials such as concrete and bridge equipment would access along the SUP that would need structural upgrading instead of along Cameron Avenue. This route will need to be reviewed with Parks and event organizers to determine if it is feasible considering businesses and events planned along this route. Costs should be comparable to using the Cameron Avenue alignment as a 2 way route since there should be no significant additional retaining walls required for the construction access and the use of Cameron as a one way route only would reduce the rehabilitation costs of Cameron Avenue. As with all the alignments, additional geotechnical investigation will be required to confirm the need for structural stability, the ability to build a construction access adjacent to the SUP, or, where needed, the upgrading of the SUP to support construction loads.

If West Access Alignment 1 is determined to be unfeasible due to park and event restrictions than West Access Alignment 3 should be considered as a one way access to the site with the exit to Cameron Avenue. There is a higher geotechnical risk with this option due to placing the route along the top of the slope. The slope stabilizing and additional required retaining walls to access the portal site increase the costs of the option substantially.

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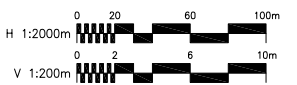
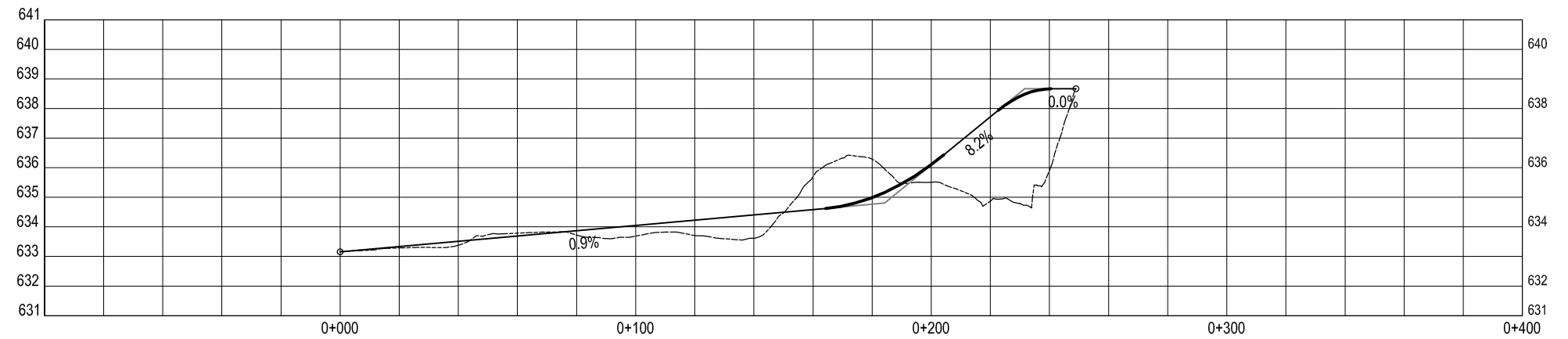
VALLEY LINE LRT



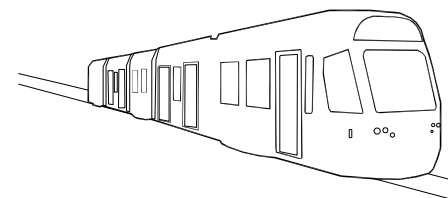
Date Issued: 29-11-2013
 Drawing No: Figure 1

NORTH RIVER BANK ACCESS OPTIONS

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Associate Consultants



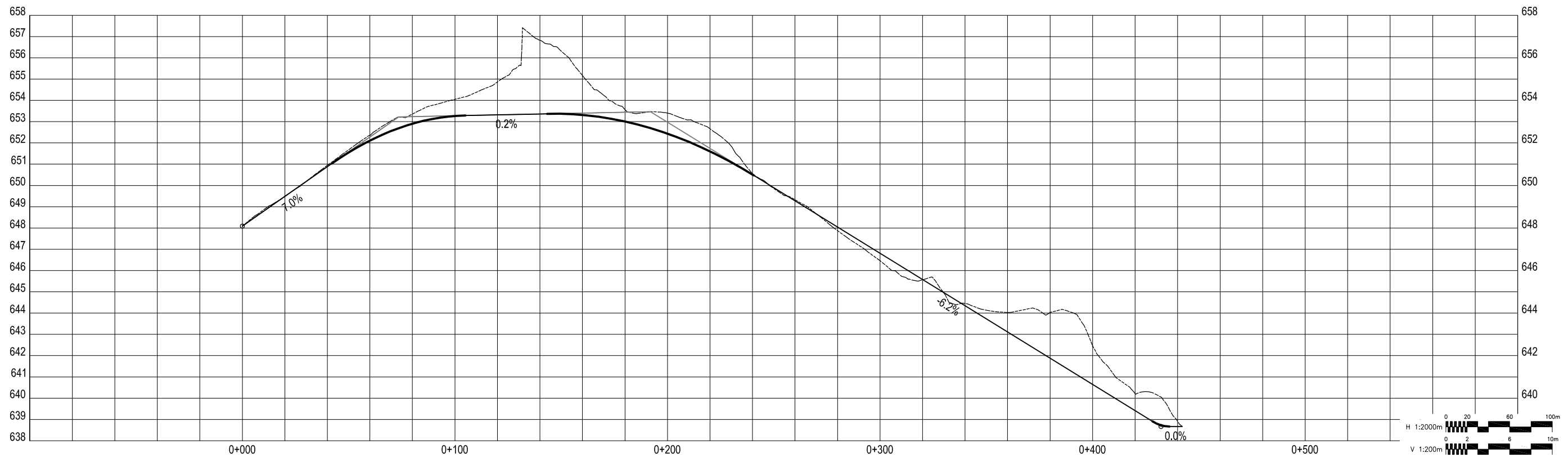
SOUTHEAST TO WEST LRT

Drawn By: B.C.
Designed By: B.C.
Checked By: R.C.
Date Issued: 12-09-2013

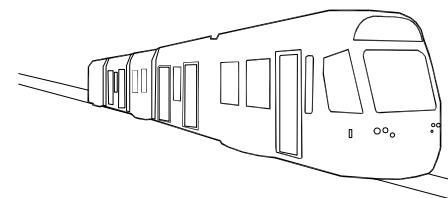
NORTH BANK
WEST ACCESS ROAD
OPTION 2

FIGURE 2

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Associate Consultants



SOUTHEAST TO WEST LRT

Drawn By: B.C.
 Designed By: B.C.
 Checked By: R.C.
 Date Issued: 12-09-2013

NORTH BANK
 WEST ACCESS ROAD
 OPTION 3

FIGURE 3

Summary of Valley Line LRT West River Bank Access Alignments

Criteria	Cameron Avenue Alignment	West Alignment 1	West Alignment 2	West Alignment 3
Geometric Considerations	Steepest Grades approx. 12%	Steepest grades approx. 15%	Steepest grades approx. 15%	Steepest grades approx. 15%
Connecting Road	Cameron Avenue is a local collector road providing access to/from Riverdale community.	Grierson Hill is a arterial road designated as 24 hour truck route	Grierson Hill is a arterial road designated as 24 hour truck route	Grierson Hill is a arterial road designated as 24 hour truck route
Residential Impacts	-Cameron Avenue on street parking would be banned -Private Property access would be impacted -Construction traffic adjacent to curb walks -Noise, vibration, dust, safety concerns for adjacent residents	None if used as 2 way access. Similar, yet less, impacts if to Cameron Avenue Alignment if Cameron Ave is used as as an exit.	None if used as 2 way access. Similar, yet less, impacts if to Cameron Avenue Alignment if Cameron Ave is used as as an exit.	None if used as 2 way access. Similar, yet less, impacts if to Cameron Avenue Alignment if Cameron Ave is used as as an exit.
Access Considerations	Parking ban would be required on Cameron Avenue with a tight corner to make at bottom of Cameron Ave.	Traffic Signal may be needed on Grierson Hill	Traffic Signal may be needed on Grierson Hill	Geometry may only allow right turns off of Grierson Hill. May require additional route to exit site.
Route Upgrade and Restoration	Pavement damage leading to repaving/reconstruction of Cameron Avenue following construction. Approximately 170 m of SUP would then need post-construction restoration. Some tree removal may be required.	Potentially 370 m of SUP along north river bank would require upgrading to accommodate construction vehicles and would then need post-construction restoration. Potential accomodation of a construction access along the SUP would require potential grading, road preparation, and restoration. Some tree removal may be required.	Approximately 310 m of maintenance access road would require upgrading and would then need post-construction restoration. Use as permanent access would mean that World Walk and rose garden would need to be relocated.	SUP would require upgrading for construction access and would then then need post-construction restoration. Constructing adjacent to SUP is unlikely due to steep side slopes. Some temporary retaining structures may be required. Some tree removal may be required.
Tunnel Portal Construction Access	Via new access road	Via same new access road as Cameron Avenue alignment (This option does not provide permanent access to Tunnel)	Via new access connection through World Walk site (This option does not provide permanent access to Tunnel)	Via new connection from SUP
Bridge Site Construction Access	Via existing SUP	Along existing SUP	Via additional access road through World Walk area or along West Alignment 1	Via existing SUP or new access road similar to Cameron Avenue alignment
Retaining Walls	Required for new access road	Required for new access road	Potentially needed through park site to accommodate final access road configuration	Required at access to Grierson Hill and along access to portal site
Known restrictions on route use	None	Would not be able to use route for 6 weeks during winter of 2015, 2017, & 2019 due to major park event.	Would not be able to use for 6 weeks during winter of 2015, 2017, & 2019 due to major park event.	Would be closed for 4 days for major park event during winter of 2015, 2017, & 2019.
Snow Clearing	Coordination with Road Maintenance for Cameron Ave clearing	Contractor Responsibility for snow clearing route through park	Contractor Responsibility for snow clearing route through park	Contractor Responsibility for snow clearing route through park
EISA	Included in EISA. No further approval required.	Identified as potential secondary access in EISA. Would require additional submission and approval.	Identified as potential secondary access in EISA. Would require additional submission and approval.	Identified as potential secondary access in EISA. Would require additional submission and approval.
Louise McKinney Park:				
<i>Impact to Trail Users</i>	Approximately 170 m of SUP, the only existing trail access from the east, would be closed to users during construction	Potentially additional 370m of SUP would be closed to use during construction	Approximately 310 m of maintenance access road would be unavailable to park management but this route is not a designated pathway so there would be no impact to formal trail system	Additional 450m of SUP would be closed to users during construction.
<i>Impact to Programmed and Unprogrammed Park Uses</i>	Does not affect programmed use; adjacent lands do not support unprogrammed use, therefore no impact.	Interrupts access to Riverside Promenade which supports programmed and unprogrammed use; impacts two businesses at the Riverfront Plaza. Indirect impact on quality of unprogrammed use of adjacent lands.	Does not directly impact programmed use but indirectly impacts quality of unprogrammed use of adjacent lands.	No impact on programmed use but indirectly affects quality of unprogrammed use on adjacent lands.

Summary of Valley Line LRT West River Bank Access Alignments

Criteria	Cameron Avenue Alignment	West Alignment 1	West Alignment 2	West Alignment 3
Geotechnical:				
<i>Decommissioned Landfill (limits approximated)</i>	Within the landfill but very near the NE limits.	Eastern half is within the landfill. Test holes indicated the presence of uncontrolled fill soils mixed with waste materials. Depths are not confirmed in this location. The existing fill/waste subgrade could be unsuitable to support construction traffic.	Majority of this route is through the centre of the landfill. Test holes indicated the presence of uncontrolled fill soils mixed with waste materials up to 25 m thick. The existing fill/waste subgrade could be unsuitable to support construction traffic.	Eastern two-thirds descends into the landfill. Test holes indicated the presence of uncontrolled fill soils mixed with waste materials. Depths are not confirmed in this location. The existing fill/waste subgrade could be unsuitable to support construction traffic.
<i>Construction Route Structure</i>	The existing SUP structure is unknown, but unlikely to have been designed to support heavy construction traffic. SUP structure assessment/upgrading will be required.	The existing SUP structure is unknown, but unlikely to have been designed to support heavy construction traffic. SUP structure assessment/upgrading will be required. Access Road adjacent to the SUP would also need confirmation of suitable structure.	The condition of the existing maintenance access road structure is unknown, but unlikely to have been designed to support heavy construction traffic. Road structure assessment/upgrading will be required.	The existing SUP structure is unknown, but unlikely to have been designed to support heavy construction traffic. SUP structure assessment/upgrading will be required.
<i>Slope Stability/Grierson Hill Slide</i>	This option will have the least impact on the stability of the Grierson Hill slide		Fill embankment would be required across the World Walk and SUP to get from maintenance road to tunnel portal site. Embankment fills will exert additional loading on the Grierson Hill and, depending on their height, can trigger slope movement. Will require geotechnical evaluations to determine the impact of the proposed fills on the stability of the valley slope.	This route (particularly the northern section) is close to the scarp/crest of the Grierson Hill slide. Fills, and to a lesser extent cuts, near the scarp of the slide could be detrimental to the stability of the slope (the worst location to add fills is at/near the crest of the slide). This option will require geotechnical evaluations to determine the impact of the proposed earth works on the stability of the valley slope. Fill and retaining wall required to access portal and therefore would be placing loading on the slope.