

Beltline to Inglewood/Ramsay Alignment: Options Summary

TT2017-0236
ATTACHMENT 4

12 Ave S Alignment Options	Construction Cost Estimate	Economic Analysis	LRT Travel Time	Stakeholder Engagement	Victoria Park Transit Centre	Traffic Analysis	Development Integration	LRT Stations	Event Operations	Environment and Floodproofing	Tunnel Portal and Urban Realm
Surface in the Beltline, surface around the north side of Victoria Park Transit Centre	\$470 million - Class 5 estimate which has a range of -50% to +100%. Land costs not included.	The surface alignments provide a slightly better property value uplift in the study area due to their ease of accessibility when compared to underground stations. The overall delay in travel time for motorists and transit customers indicates the tunnel options are preferable due to faster travel times.	Travel time between 7 Ave S Station and Inglewood/Ramsay Station: approximately 13.5 minutes.	Minimal support for the surface options.	Impact to bus and LRT operations as sightlines and access/egress will be restricted. This option will require reconfiguration/partial demolition of the structure, and relocation of the diesel storage tanks and other structures. Some impact to bus operations for buses using 11/12 Ave S to leave/return to the transit centre.	Average delay to traffic travelling through the study area is doubled from 1.6 minutes to 3.1 minutes in the AM peak period. Average delay in travel time for motorists doubles from 1.3 to 2.7 minutes. Cycle track required to be relocated to 11 Ave S east of 5 St SW. Localized site access/circulation would need to be addressed through LRT and site design.	"Property value premiums due to increases in accessibility [to rail transit] range between 3% and 40%. Property value premiums due to increases in the ability to develop or redevelop property depend on the amount of development allowed on the property. Slight negative impacts of rail on property values are generally attributed to noise, visual intrusion, and the association of the rail right-of-way with industrial uses" (from <i>Impact of Rail Transit on Property Values</i> , Diaz, Roderick B., 2015). Discussions within Calgary (development industry, Administration) estimate the uplift between 4-10%. There was no data to support a differential in development potential comparing surface to underground LRT.	Two surface stations. Surface stations can move east-west, but must remain within a block face. This alignment has the additional constraint of track geometry at 6 St SE limiting station placement to west of 6 St SE.	Additional pedestrian flow modelling is required to determine LRT event operations, pedestrian crossings/storage space, be required for pedestrian and transit passenger storage to reduce impact to LRT operations during events.	Most of Victoria Park is within the 100-year flood inundation extent (Government of Alberta). Surface LRT is vulnerable to flooding, but as shown in the flood of 2013 recovery can be quickly where embedded track is inundated (as was the case on 7 Ave S).	Locating the portal on 2 St/10 Ave SW keeps the portal off the main redevelopment/commercial corridor of 12 Ave S.
Surface in the Beltline, surface along Macdonald Ave SE	\$480 million - Class 5 estimate which has a range of -50% to +100%. Land costs not included.	The surface alignments provide a slightly better property value uplift in the study area due to their ease of accessibility when compared to underground stations. The overall delay in travel time for motorists and transit customers indicates the tunnel options are preferable due to faster travel times.	Travel time between 7 Ave S Station and Inglewood/Ramsay Station: approximately 12.0 minutes.	This option is not supported by the Ramsay community. Administration will continue to work closely with all stakeholders in the Beltline and Inglewood/Ramsay to understand the challenges and opportunities associated with this option.	Some impact to bus operations for buses using 11/12 Ave S to leave/return to the transit centre.	This variant was not modelled, however, average delay to traffic travelling through the study area would be similar to that indicated above. There would be localized changes to the road network in Ramsay. Cycle track required to be relocated to 11 Ave S east of 5 St SW. Localized site access/circulation would need to be addressed through LRT and site design.	Calgary (development industry, Administration) estimate the uplift between 4-10%. There was no data to support a differential in development potential comparing surface to underground LRT.	Two surface stations. There is additional flexibility with station placement as it is not constrained by track geometry at 6 St SE and can move further east.	A new bridge across Elbow River at the 12 Ave/Macdonald Ave SE alignment is required. This bridge would carry the Green Line, vehicles, cyclists, and pedestrians.		

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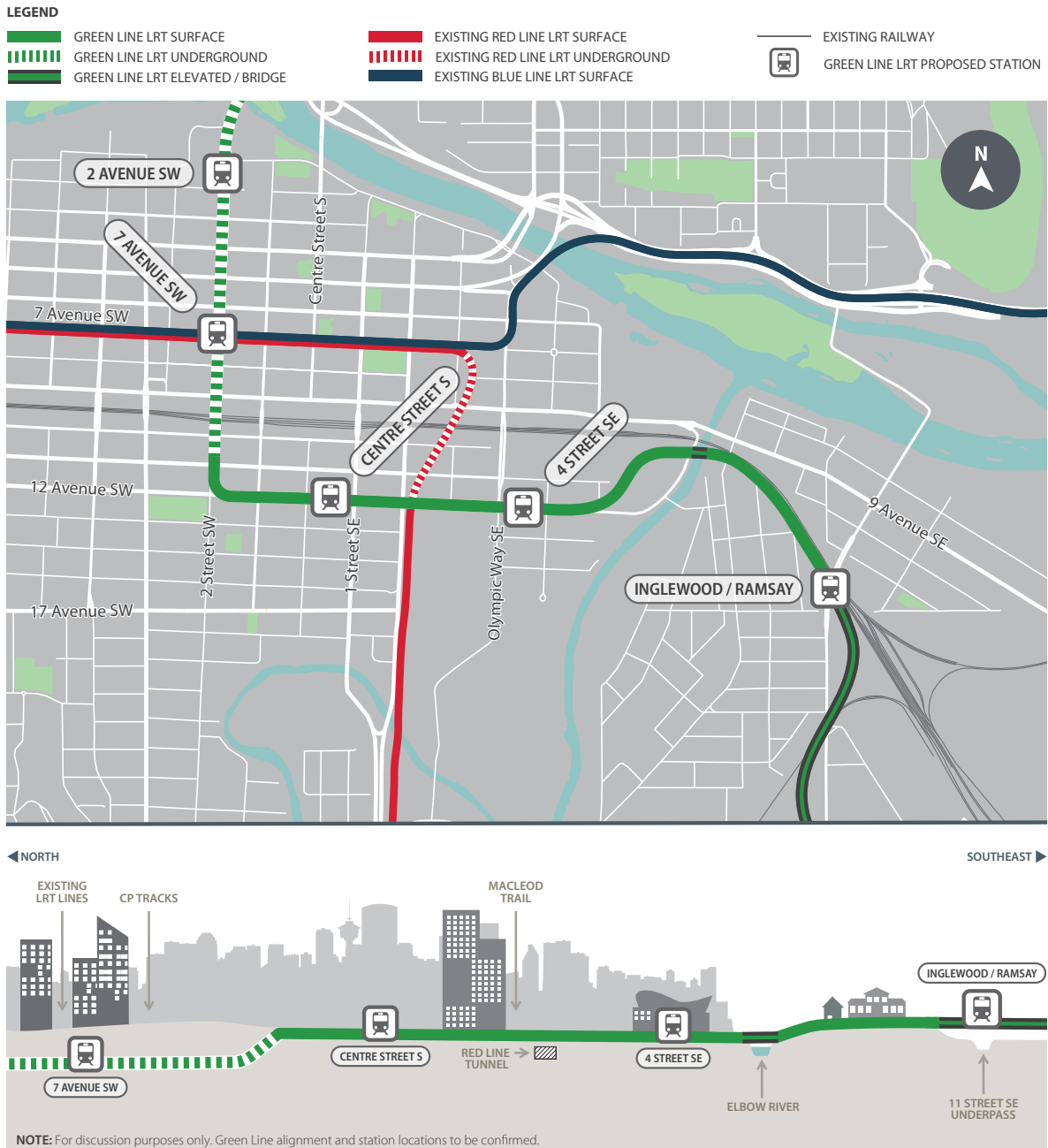
12 Ave S Alignment Options	Construction Cost Estimate	Economic Analysis	LRT Run Time	Stakeholder Engagement	Victoria Park Transit Centre	Traffic Analysis	Development Integration	LRT Stations	Event Operations	Environment and Floodproofing	Tunnel Portal and Urban Realm
Tunnel in the Beltline, surface around the north side of Victoria Park Transit Centre	\$550 million - Class 5 estimate which has a range of -50% to +100%. Land costs not included.	The Beltline Economic Analysis indicates the higher construction cost of the tunnel option is offset by time savings (productivity) within five years of opening day. After 30 years of operation there is an annual savings of approximately \$400 million in time savings, and after 100 years, approximately \$1 billion.	Travel time between 7 Ave S Station and Inglewood/Ramsay Station: approximately 8.5 minutes.	Public, landowner, and development industry stakeholder support for tunnel options.	Impact to bus and LRT operations as sightlines and access/egress will be reduced. This option will require reconfiguration/partial demolition of the structure, and relocation of the diesel storage tanks and other structures. Some impact to bus operations for buses using 11/12 Ave S to leave/return to the transit centre.	This option has minimal impact to traffic network delay in the study area. Localized access/circulation would need to be addressed through LRT and site design east of 4 St SE.	¹ Property value premiums due to increases in accessibility for rail transit range between 3% and 10%. Property value premiums due to increases in the ability to develop or redevelop property depend on the land use and amount of development allowed on the property. Slight negative impacts of rail on property values are generally attributed to noise, visual intrusion, and the association of the rail right-of-way with industrial uses" (from Impact of Rail Transit on Property Values, Diaz, Roderick B., 2015). Discussions within Calgary (development industry, Administration) estimate the uplift between 4-10%. There was no data to support a differential in development potential comparing surface to underground LRT. Development industry partners have indicated they are supportive of integrating underground stations into their future developments (providing a benefit to the developer/landowner, as well as the transit customer).	One underground, one surface station. This alignment has the additional constraint of track geometry at 6 St SE limiting station placement to west of 6 St SE.	Additional pedestrian flow modelling is required to determine LRT event operations, pedestrian crossings/storage space. Public realm space will be required for pedestrian and transit use and to reduce impact to LRT operations during events.	Tunnel portal is located within the 100-year flood inundation extents. Flood mitigation measures required. Alignment ties to previously-approved alignment crossing Elbow River.	Tunnel portal is located on 12 Ave S on the main commercial redevelopment corridor, adjacent to a potential arena, in the cultural entertainment district. Future developments will integrate in urban realm, and remains an issue for stakeholders.
Tunnel in the Beltline, surface on MacDonald Ave SE	\$600 million - Class 5 estimate which has a range of -50% to +100%. Land costs not included.		Travel time between 7 Ave S Station and Inglewood/Ramsay Station: approximately 7.0 minutes.	This option is not supported by the Ramsay community. Administration will continue to work closely with all stakeholders in the Beltline and Inglewood/Ramsay to understand the challenges and opportunities associated with this option.	Some impact to bus operations for buses using 11/12 Ave S to leave/return to the transit centre.	This option has minimal impact to traffic network delay in the study area. Localized access/circulation would need to be addressed through LRT and site design east of 4 St SE.		One underground, one surface station. Additional flexibility with station placement as they are not constrained by road network or track geometry at 6 St SE.		Tunnel portal is located within the 100-year flood inundation extents. Flood mitigation measures required. A new bridge across Elbow River at the 12 Ave/Macdonald Ave SE alignment is required.	

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Green Line LRT Beltline Alignment Options

12 Avenue SW Surface Option 1: Around Victoria Park Transit Centre

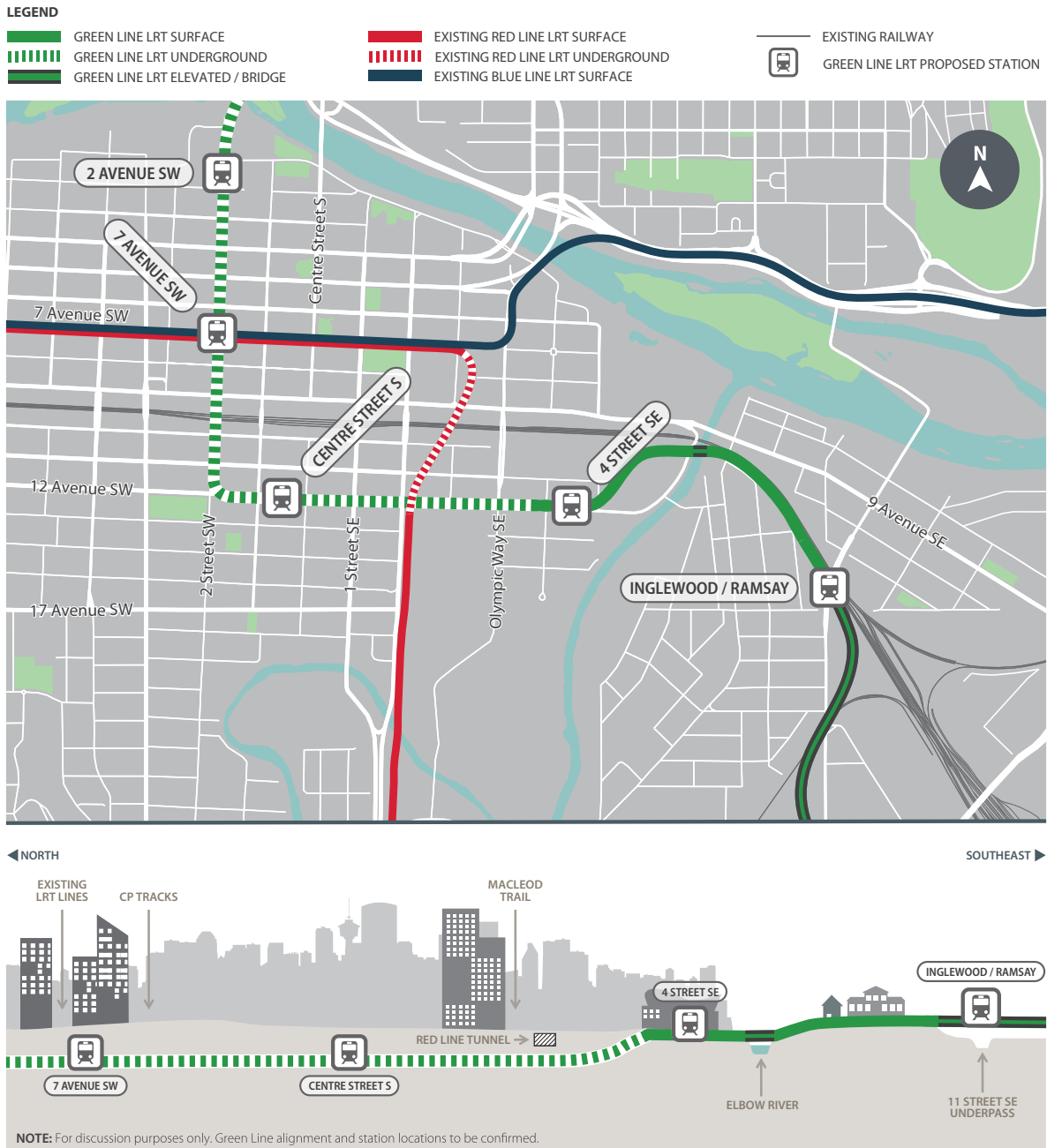


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Green Line LRT Beltline Alignment Options

12 Avenue SW Tunnel Option 1: Around the Victoria Park Transit Centre

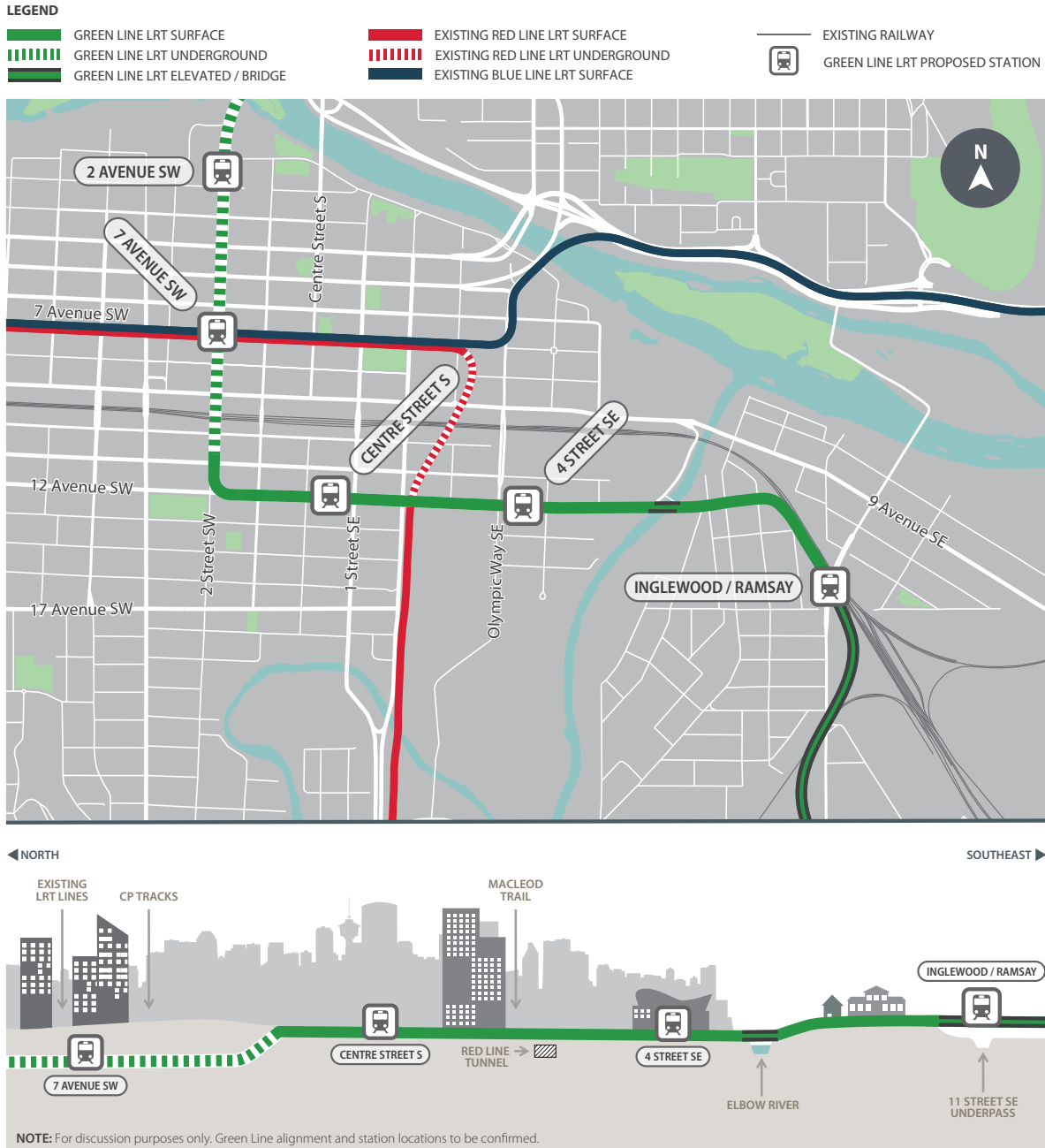


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Green Line LRT Beltline Alignment Options

12 Avenue SW Surface Option 2: Surface to MacDonald Avenue SE



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Green Line LRT Beltline Alignment Options

12 Avenue SW Tunnel Option 2: Surface To MacDonald Avenue SE

LEGEND

	GREEN LINE LRT SURFACE		EXISTING RED LINE LRT SURFACE		EXISTING RAILWAY
	GREEN LINE LRT UNDERGROUND		EXISTING RED LINE LRT UNDERGROUND		GREEN LINE LRT PROPOSED STATION
	GREEN LINE LRT ELEVATED / BRIDGE		EXISTING BLUE LINE LRT SURFACE		

