Calgary

Green Line LRT

Centre City Alignment Option Evaluation Detailed Results

Financial Capacity

Goal

An affordable and cost effective service. Costs are achievable, sustainable in the long term and provide good value for money.

Evaluation Metrics

+ Capital Cost

Consideration of the anticipated costs to construct the LRT infrastructure.

+ Land Impact

The amount of land required to be purchased to accommodate the LRT infrastructure.

+ Operating & Maintenance Cost

High-level consideration of the overall costs to operate and maintain the infrastructure.

Key Outcomes

- Options A and E were ranked the highest overall as they would run primarily at street level, and would therefore be the least expensive. Service would require less infrastructure than the tunneled or elevated options. Maintenance and operational costs would also be lower.
- Option C would be elevated in the Centre City and tunneled north of the river, and would have the least impact on properties in the area. Additional land purchases would not be required to accommodate the LRT.

Results

The chart below summarizes the evaluation results for **Financial Capacity**:

Metric	Option A	Option B	Option C	Option D	Option E
+ Capital Cost	●	◔	◑	◔	●
+ Land Impact	◔	◔	●	◔	◑
+ Operating & Maintenance Cost	●	◑	◔	◔	◕
Overall Score	◕	◑	◑	◔	◕

● Highest Score

◔ Lowest Score

◕ Highest Ranked Option Overall

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Community Well-being

Goal

A safe and socially inclusive service that improves access to key community destinations and provides transportation choices for Calgarians.

Evaluation Metrics

+ Community Cohesion

Consideration of opportunities for integrating stations with existing neighbourhoods while minimizing visual and physical barriers.

+ Impact to Recreational Uses

Consideration of potential construction impacts on community events, festivals and amenities.

+ Safety, Security & Emergency Access

Consideration of perceived safety and security of the LRT service, including how emergency services could access different parts of the system.

+ Accessibility

Consideration of service that would be accessible to all users.

Results

The chart below summarizes the evaluation results for **Community Well-being**:

Metric	Option A	Option B	Option C	Option D	Option E
+ Community Cohesion					
+ Impact to Recreational Uses					
+ Safety, Security & Emergency Access					
+ Accessibility					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall

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Key Outcomes

- Option D was the highest ranked because the underground option had the most potential to preserve community well-being in downtown. It would have minimal disruption to the street and surrounding area, and would not limit future development in the downtown core. It was also seen to have the highest potential for preserving existing recreational uses, particularly around Prince's Island Park.
- Options A and E offered highly visible stations at street-level and would provide best environment for the public to feel safe. Underground or elevated options are not as visible and could be perceived by the public as less secure. Note - all stations will have security features to ensure transit users are safe.
- Option E was considered to be the most accessible because of the potential for a street-level stations at 9 Avenue North and Eau Claire. Option A also shows stations at street level, but there are technical challenges with having a station at Chinatown, making this option less accessible.

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Transportation

Goal

A high priority transit service that attracts transit use, walking & cycling as preferred mobility choices for Calgarians. An integrated service that improves customer experience, meets future demand and strengthens the regional & local transit networks.

Evaluation Metrics

+ Ride Time for LRT

Evaluation of factors that could influence travel times for transit customers.

+ Transportation Network Reliability

Consideration of impacts to businesses and residents, traffic, and demand on the overall transportation network.

+ Integration of Existing & Future Transit Service and Customers

Opportunities to strengthen regional and local transit networks by providing convenient connections to existing and planned routes.

+ LRT Service Reliability

Evaluation of factors that could influence the reliability of the LRT service, such as interaction with vehicle traffic, pedestrian crossings, or incidents that can disrupt transit service.

+ Ridership

Consideration of future growth and projected ridership numbers.

+ Complete Streets: Multi-modes, Connectivity & Accessibility

Opportunities to align with transportation policy documents by supporting active transportation such as cycling or pedestrian facilities along the route.

Results

The chart below summarizes the evaluation results for **Transportation**:

Metric	Option A	Option B	Option C	Option D	Option E
+ Ride Time for LRT					
+ Transportation Network Reliability					
+ Integration of Existing & Future Transit Service and Customers					
+ LRT Service Reliability					
+ Ridership					
+ Complete Streets: Multi-modes, Connectivity & Accessibility					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall

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Key Outcomes

- Option D was the highest ranked option because an underground line would have fewer impacts to the transportation network due to its physical separation. It would not limit future street-level development of the transportation network.
- Option B and C provided unique opportunities with the proposed new bridge over Prince's Island Park. A new cycling bridge could be explored as part of the new bridge over Prince's Island Park.
- Option C and D provided benefits for overall ride time and reliability because the elevated and underground options would be completely separated from other modes of transportation. However, transit users would have to travel further to connect with the elevated service.
- Option A ranked the lowest due to technical challenges with locating a station in Chinatown.

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Urban & Neighbourhood Development

Goal

A service that supports current and future land use, development along the corridor, and integrates with neighbouring communities.

Evaluation Metrics

+ Transit Oriented Development & Development Potential

Consideration of how well stations locations and the route alignment could integrate into existing land uses and provide opportunities for future development.

+ Streetscape & Public Realm

Evaluation of potential ways to improve the street environment and create high quality public spaces.

+ Impact on Parking

Consideration of parking availability and access.

+ Urban Vision

Consideration of opportunities to provide high quality architectural design.

Key Outcomes

- **Options B** and **D** scored the highest as it had the most opportunity to support future development. They also preserved more on-street parking, and had less impact on private parking and building accesses.
- **All options** offered potential for Transit Oriented Development as all would be located in high-density areas in the downtown core.
- **All options** offered opportunities to improve streets and public spaces through station design and integration with surroundings.

Results

The chart below summarizes the evaluation results for **Urban & Neighbourhood Development**:

Metric	Option A	Option B	Option C	Option D	Option E
+ Transit Oriented Development & Development Potential					
+ Streetscape & Public Realm					
+ Impact on Parking					
+ Urban Vision					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall

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Sustainable Development

Goal

A service that promotes sustainable development by reducing greenhouse gases and minimizes impact to the existing natural environment.

Evaluation Metrics

+ Impact on Existing Natural Environment

Consideration of the impact on biodiversity and natural environment, both during and after construction.

+ Environmental Soil Conditions & Contamination

Consideration of the number of contaminated sites that may be disturbed during construction.

+ Flood Risk

Consideration of the impact of extreme weather conditions and climate change on the LRT infrastructure.

+ Noise & Vibration Impacts

Consideration of noise and vibration impacts on residents and businesses in the area during LRT operations.

Key Outcomes

- **Option A** was ranked the highest as the street level option would run within existing roads and would therefore have the lowest impact on the environment. There is also less chance of encountering contaminated soil with this option.
- **Option C** has the highest potential of avoiding flooding as it is located above the flood plain.

Results

The chart below summarizes the evaluation results for **Sustainable Development**:

Metric	Option A	Option B	Option C	Option D	Option E
+ Impact on Existing Natural Environment					
+ Environmental Soil Conditions & Contamination					
+ Flood Risk					
+ Noise & Vibration Impacts					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall

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Feasibility & Deliverability

Goal

A service that can be constructed and operated without significant technical issues or constraints.

Evaluation Metrics

+ Constructability

Consideration of technical constraints such as existing utilities, ground conditions, system wide challenges, and the risk related to each.

+ Construction Impacts

Consideration of traffic impacts and disruption to the surrounding community during construction activities.

+ Impacts to Residences & Businesses

Consideration of impacts to neighbourhoods, business operations, and traffic flow during construction.

+ Archaeological & Heritage Impacts

Consideration of potential impacts on land or buildings with historical or architectural significance.

Key Outcomes

- **Option D** ranked the highest as the underground line would have fewer impacts to existing businesses, residences, and other properties in the area. There would also be fewer impacts to the street during construction
- **Option B** also ranked highest it has a mix of bridge and tunnel sections with fewer impacts to existing businesses, residences, and other properties in the area.
- All options will have some impact to the community during construction. **Option A** would be most likely to disturb communities during construction as the work would be done on existing city streets.

Results

The chart below summarizes the evaluation results for **Feasibility & Deliverability:**

Metric	Option A	Option B	Option C	Option D	Option E
+ Constructability					
+ Construction Impacts					
+ Impacts to Residences & Businesses					
+ Archaeological & Heritage Impacts					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall

Stakeholders

Goal
A service that reflects the values and priorities of communities.

Evaluation Metrics
+ Public Acceptability

Consideration of public input gathered on the Centre City options between December 2015 and February 2016 about community and business priorities and values.

+ Alignment with City of Calgary Plans & Policies

Alignment with existing policy documents intended to shape the future of Calgary including the Municipal Development Plan (MDP), Calgary Transportation Plan (CTP), Complete Streets, and Build Calgary.

Key Outcomes
- **Option D** received the most positive feedback as many people believed the underground option would provide the most opportunity for future development to occur in downtown.
- Many of the values identified in the engagement events indicated that Calgarians felt it was important to maintain traffic, pedestrian and cyclist connections in the downtown core. There was also a strong desire to preserve Prince's Island Park as it is today, without the addition of a new bridge.
- Some people indicated that street-level LRT would provide opportunities to improve sidewalks and pedestrian amenities.
- Concerns regarding the visual impact of an elevated LRT guideway in the Centre City were expressed.

Results
The chart below summarizes the evaluation results for **Stakeholders:**

Metric	Option A	Option B	Option C	Option D	Option E
+ Public Acceptability					
+ Alignment with City of Calgary Plans & Policy					
Overall Score					

Highest Score

Lowest Score

Highest Ranked Option Overall