Calgary Green Line

ALTERNATIVE ALIGNMENTS ASSESSMENT

AECOM

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List of Acronyms

AACE ESTIMATES	Association for the Advancement of Cost Engineering
AVE	Avenue
AVG	Average
BRT	Bus rapid transit
CCTV	Closed-circuit television
CPKC	Canadian Pacific Kansas City Railway
DR	Drive
ECA	Evaluation criteria assessment
EMP	Employment
ENMAX	ENMAX corporation
EX	Existing
GP	General purpose
HSR	High-speed rail
IB	In bound track
KM	Kilometers
LRT	Light rail transit
LRV	Light rail vehicle
M	Meter
MIN(S)	Minute(s)
MM	Millimeters
MSF	Maintenance Storage Facility
NE	Northeast
OB	Outbound Track
PL	Parking Lane
POP	Population
ROM	Rough order of magnitude
ROW	Right-of-way
SE	Southeast
ST	Street
SW	Southwest
SW	Sidewalk
TAZ	Traffic Analysis Zone
TOD	Transit-oriented development
UG	Underground
VCE	Vertical circulation elements
YOE	Year of expenditure

INTRODUCTION

Background

In September 2024 the Government of Alberta initiated an alternative alignments assessment for the Calgary Green Line Light Rail Transit (LRT) project, specifically for the segment that runs through downtown Calgary.

The alignments will consider:

- Construction costs, including, where possible, options to minimize throwaway costs from the current Green Line LRT project alignment.
- Impacts on ridership and operations of the Green Line, Red line, and Blue Line.
- Impacts to pedestrian and vehicular traffic.
- Impacts to existing downtown infrastructure, including the Plus 15 pedway network.
- Potential stakeholder considerations with an at-grade or elevated alignment.
- Interactions with the CPKC rail line.

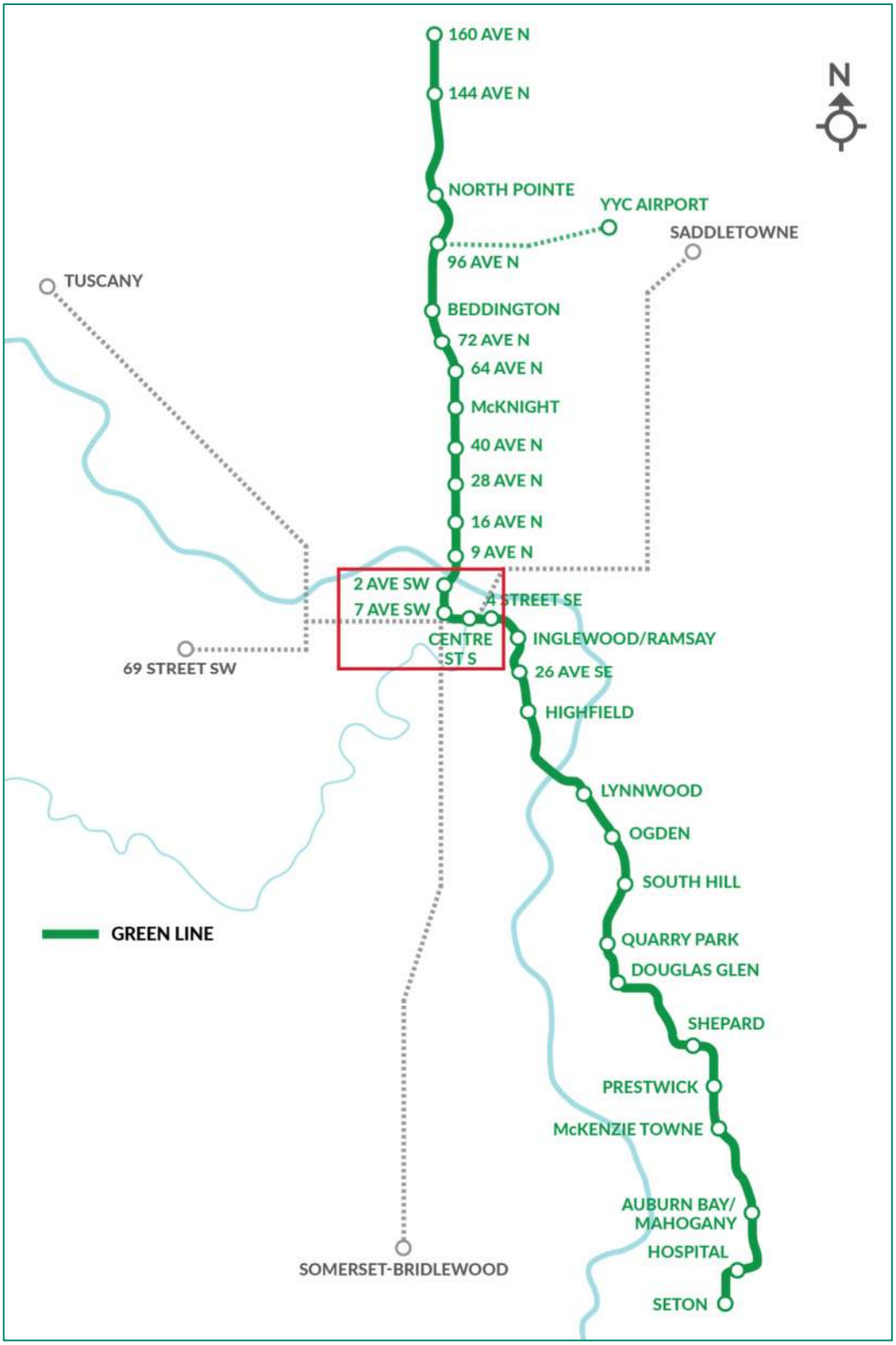
This document provides an alternative alignments assessment to determine feasible downtown at-grade or elevated Green Line connections to the Green Line alignment east of the Elbow River to Shepard.

The alternative alignments assessment includes an initial feasibility analysis for multiple evaluated options, an evaluation criteria assessment and summary for three LRT alignment options downtown, cost estimates for these three options to connect to Shepard and to Seton, ridership analysis of the three downtown options connecting to Shepard, and visualization of the proposed LRT stations.

Project Study Area

The project study area for this alternative alignments assessment focuses on Downtown Calgary bounded by the Elbow River to the east and the Bow River to the north. Outcomes of this study would integrate with work previously completed for the Green Line LRT project east of the Elbow River to Shephard. In developing alignment alternatives for this study, the Project Team conducted a document review of previous studies, plans and drawings for the Green Line LRT Stage 1 Project and assessed the previously preferred alignment tunnel option through downtown Calgary. The Stage 1 Green Line LRT project map is shown in Figure 1.

Figure 1: Project Location Map



Purpose and Need

This Alternative Alignments Assessment sought to identify alternative Green Line LRT project alignments beginning just east of the Elbow River and ending with potential station areas south of the Bow River. The analyzed alternatives were developed in line with the following project goals:

- Ease of passenger transfers to/from Red Line and Blue line
- Pedestrian connectivity to the future Grand Central Station and Calgary's Arena Entertainment District
- Connection to the Phase 1 previously developed Green Line alignment east of the Elbow River to Shepard
- Compatibility with a vision for expansion north of the Bow River
- Reduction of construction costs, where possible, with options to minimize throwaway costs from the Green Line LRT project tunneled alignment
- Technical feasibility

Alternative Alignment Assessment Methodology

The AECOM team started their analysis by completing an extensive data collection of previously completed work for the Green Line LRT project and evaluating possible alignments for the Green Line LRT in Downtown Calgary that would meet the project goals. Engagement with City of Calgary and Green Line LRT project staff was conducted during a development and optioneering period that occurred in the following steps:

1. Previous plans and document review
2. High level option development
3. Evaluation and collaboration with City of Calgary and Green Line LRT project staff
    a. Option elimination via "fatal flaw" screening
4. Retained option refinement and development with stakeholders
    a. Options engineering evaluation
    b. Option evaluation criteria assessment
    c. Options development of costs
5. Final report and engineering drawings

The following sections provide overview and discussion on all options developed, eliminated, and retained to final evaluation and conceptual drawings.

OPTION DEVELOPMENT AND EVALUATION

This section outlines and provides a description of the Alternative Alignments Assessment process. This step utilized "blue sky" thinking and knowledge gained from previously developed plans to develop a universe of options for the downtown study area consistent with the task goals while attempting to capitalize on works already conducted and/or enabling projects soon to be underway.

Options Considered

The conceptual options included a variety of grade-separated and at-grade LRT configurations. Key elements present in all options included an origin point east of the Elbow River, connection to the proposed Grand Central Station, and a station area in proximity to the Red Line and Blue Line downtown stations. The conceptual options were analyzed using a high-level fatal flaw evaluation. Based on the results of the fatal flaw analysis options were either retained or eliminated from further evaluation.

Table 1 includes all options evaluated and a summary for retention or elimination. Additional option details and evaluation can be found in **Appendix 7 Options Eliminated**.

Table 1: Options Considered

Options Reviewed	Description	Criteria for Elimination
Option 1A and 1B	At grade on 11th or 12th Avenue and 2nd or 3rd Street SW – end at Eau Claire	Requires grade separation under CPKC > 1 kilometer (km)
Option 2A	Elevated on 11th or 12th Avenue and 6th Street SW	Required substantial Traffic impacts on 11th Avenue or 12th Avenue – Modified option for 10th Avenue and added 2nd St SW and 1st St SW
Option 2B	At grade/elevated on 11th Avenue or 12th Avenue and 6th Street SW	Impacts to 11th Avenue and 12th Avenue and to north/south traffic caused by Green Line at grade
Option 3	At grade on 9th Avenue and 2nd (or 3rd) Street SW – end at Eau Claire	Running through Inglewood Community and Red/Blue at-grade crossing unfeasible due to impacts to existing operations
Option 4	At grade on 12th Street SE and 9th Avenue- end at 7th Avenue	Running through Inglewood Community and impacts to Red Line and Blue Line by ending east of city hall
Option 5A and 5B	Elevated west of Elbow River – end at 3rd Street SE (City Hall)	Impacts to Red Line and Blue Line by ending east of city hall
Option 6A	Underpass at 6th Street SE and at-grade City Hall station – end at 7th Avenue	Impacts to Red Line and Blue Line by ending east of city hall
Option 6B	Underpass at 6th Street SE and elevated City Hall station – end at 7th Avenue	Impacts to Red Line and Blue Line by ending east of city hall
Option 7	Green Line interline with Red Line using existing tunnel	Red/Blue interconnection unfeasible because of difference voltage with Green Line
Option 8	Plenary/Liricon Proposal	Uncertainty of Green Line Grand Central Station integration with high-speed rail (HSR). Impacts to Canadian Pacific Kansas City (CPKC) railway right-of-way and does not provide connectivity to downtown.

Retained Options

Option 2A was modified to become three different elevated alignments to further evaluation. In order to minimize the traffic impacts along 11th Avenue or 12th Avenue, the Green Line LRT alignment was moved from originating on 11th Avenue to 10th Avenue. Electrical transmission lines along the north side of 10th Avenue were relocated to underground which allowed adequate horizontal clearance for the elevated alignment. The following section provides details on the remaining options, engineering characteristics, conceptual architectural design, and inventory of potential impacts.

RETAINED OPTION REFINEMENT AND EVALUATION

This section provides details on the three options developed from the modified Option 2A.

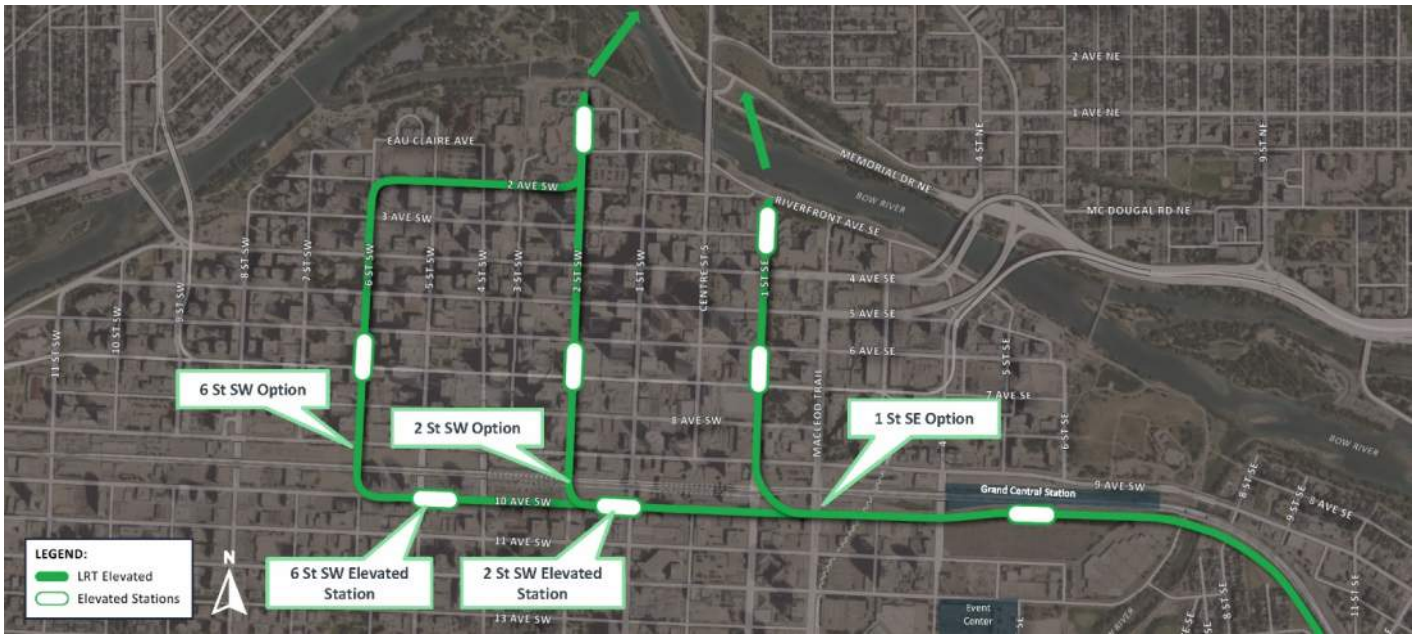
Overview of Retained Options

Originating just east of the Elbow River, each option would serve the proposed Green Line portion of the Grand Central Station just west of the Elbow River and offer future connection to HSR and commuter rail. Traveling east to west, each option would use 10th Avenue before turning north at three distinct locations, 1st Street SE, 2nd Street SW, and 6th Street SW. Table 2 describes these option details.

Table 2: Options Detail

Option Name	Alignment	Length	# of Stations	Guideway
1 Street SE Option	10th Avenue and 1st Street SE	1.8 km	3	Elevated
2 Street SW Option	10th Avenue and 2nd Street SW	2.9km	4	Elevated
6 Street SW Option	10th Avenue and 6th Street SW	4 km	4	Elevated

Figure 2: Remaining Options Map



Potential for Phasing

To further evaluate option feasibility, each of these three options have been divided into three segments for consideration of phased implementation. Future design work could complete a detailed analysis on tail tracks, crossovers, service impacts, etc.

Figure 3: Remaining Options Phasing Map

**Service for 10th Avenue Segment for the 1st St SE Option will terminate at Grand Central Station*

Engineering and Design Characteristics

Conceptual analysis was completed for the three retained options to determine feasibility and understand the high-level impacts of each. Each retained option proposes an elevated guideway with elevated station areas. The proposed typical LRT elevated guideway structure would be 10.15 meters wide except at station areas. The guideway includes an emergency walkway on both sides of the track and direct fixation trackwork for the entire length of the elevated structure. Special trackwork was not included in this analysis, and adjustments to both horizontal and vertical geometry are anticipated in the future to accommodate any special trackwork.

Proposed elevated guideways and station areas are anticipated to cross over or integrate the Calgary Plus-15 network in the downtown area. The Plus-15 pedway network is a series of pedestrian bridges and pathways connecting numerous buildings in downtown Calgary. The network provides climate and access-controlled pedestrian travel.

The proposed conceptual analysis assumes a center-running pier or straddle bents, where needed. No structural analysis was completed at this phase of the project; the locations and sizes of the columns are representative only and subject to change. The columns are assumed to land on a center median for the center piers or on the side of the travel lanes for the straddle bent locations. Straddle bent columns may remove or reduce on-street parking and/or reduce the width of the sidewalks at those locations, as shown in Figure 4 and Figure 5.

The conceptual analysis completed only accounts for existing conditions, future conditions are not analyzed for impact reduction or document impacts t this phase. A detailed constructability review has not been completed for the conceptual analysis. The indirect impacts to adjacent properties have not been examined in detail.

Key assumptions for each engineering discipline are included in the Engineering Report on **Appendix 1 Engineering Report and Roll Plots**. A full discussion of study limitations for the conceptual analysis completed can also be found on **Appendix 1 Engineering Report and Roll Plots**.

Figure 4: Elevated Guideway Typical Section – Center-Running Pier

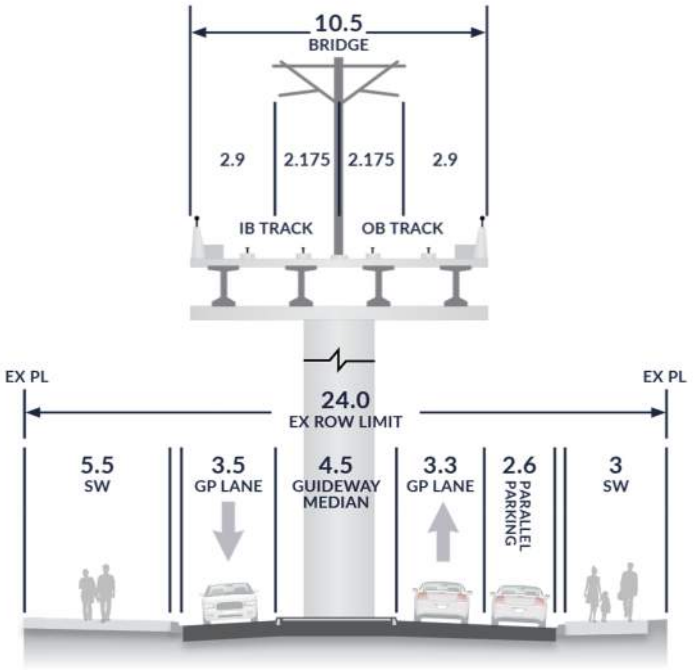
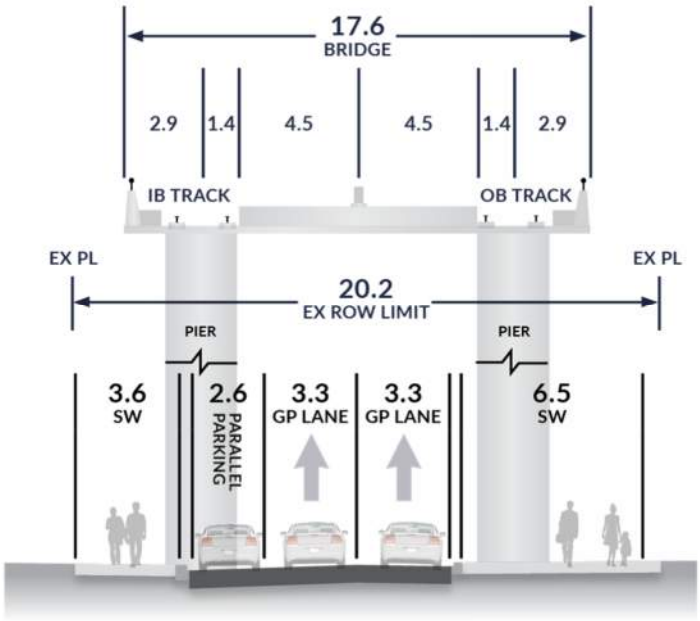


Figure 5: Elevated Guideway Typical Section – Straddle Bent



All station areas are proposed as elevated stations within the existing right-of-way (ROW), with exceptions for some vertical circulation elements (VCE), as shown in **Appendix 8 Vertical Circulation Elements locations**. Future design progression might increase ROW impacts as more details are determined for potentially mechanical, equipment rooms, etc. The locations of the VCE are dependent on available ROW at each location, in some cases VCEs have been placed in private property where an existing

building would not be impacted (open space, parking areas, plazas, etc). In cases where no location exists without existing building impacts, VCE were placed in the public ROW, but may land in parking areas, medians or sidewalks. All critical systems rooms would be located interior to stations. Should a preferred option progress in design, evaluation of VCE location should re-assessed to minimize potential impacts.

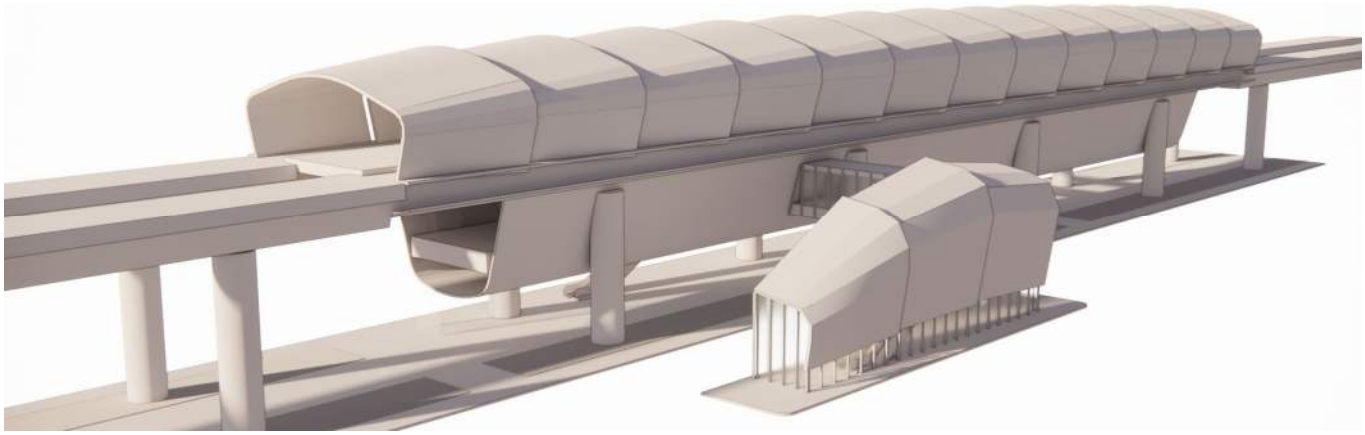
Platforms are assumed to be 135 meters long and 9 meters wide center loading platforms. Side-loading platforms can be evaluated in future detailed design phases. To the extent possible, stations have been designed to minimize the need for allocation of additional ROW and disruption to neighboring buildings. Should a preferred option progress in design, future analysis should explore reduction of station width feasibility.

Stations assume a mezzanine level to facilitate the pedestrian access to the ground level as well as integration with existing Plus-15 structures. Should a preferred option progress in design, studies should be considered to enhance pedestrian connectivity in the Plus 15 network to proposed LRT stations. At station locations straddle bents are assumed, as shown in Figure 6. For more information on the station design and evaluation process, please see **Appendix 3 Stations and Urban Integration Design Options.** All renderings are subject to value engineering.

Elevated LRT stations offer several security benefits. Firstly, their height and visibility can act as a deterrent to criminal activities, as potential offenders are less likely to commit crimes in areas that are easily observable from multiple vantage points. Additionally, elevated stations often have fewer access points, making it easier to monitor and control entry and exit, thus enhancing overall security. The design of these stations can also incorporate advanced surveillance systems, such as CCTV cameras, which can cover a wide area and provide real-time monitoring to security personnel. Furthermore, the elevated nature of these stations can facilitate better lighting, reducing dark spots where criminal activities might occur, thereby increasing the safety of passengers.

However, there are also issues associated with the security of elevated LRT stations. One significant challenge is the potential for increased vulnerability to external threats, such as vandalism, due to their prominent and accessible structure. Elevated stations can also pose evacuation challenges in case of emergencies, as passengers may have limited escape routes, which can lead to congestion and panic. Additionally, maintaining security equipment, such as cameras and lighting, can be more complex and costly due to the station's height and exposure to weather conditions.

Figure 6: Typical section central platform – elevated station with mezzanine, side stairs core, and side piers structure



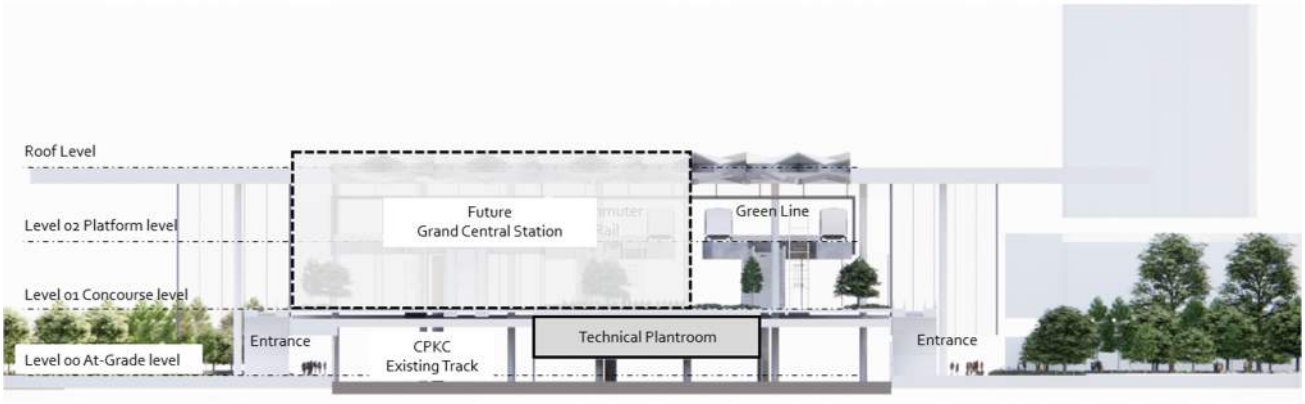
Grand Central Station

The proposed Green Line station at Grand Central Station would be located just west of the Elbow River and would be included in all three retained options. Additional architectural information on the station can be found in **Appendix 3 Stations and Urban Integration Design Options**.

Concepts for the future Grand Central Station will be developed by the Government of Alberta as part of the Passenger Rail Master Plan and will likely include separate dedicated platforms for each of HSR and commuter rail in accordance with the Government's vision for passenger rail. It is assumed that Green Line LRT project will only build the Green Line infrastructure and will not pre-build for integration.

The proposed Grand Central Station design goal would develop a mobility hub providing users multimodal choice with local and regional connections into the Beltline and downtown areas. Potential section views and renderings, shown in Figures 7 and 8 show station configuration and a conceptual perspective view. Please refer to **Appendix 3 Stations and Urban Integration Design Options** for more details.

Figure 7: Grand Central Station and Green Line LRT Integration – Functional Section



Grand Central Station Renders

Figure 8: Grand Central Station and Green Line LRT Integration – North Entrance Exterior View

Figure 9: Grand Central Station and Green Line LRT Integration – South Entrance Exterior View

1st Street SE Option

This option runs along 10th Avenue and continues north on 1st Street SE. No station is proposed along 10th Avenue because of the proximity between Grand Central Station and the elevated guideway curve. This option crosses over the CPKC rail corridor on an elevated guideway and has sufficient vertical clearance to not impact the existing Plus-15 structures. The Plus-15 structure north of 7th Avenue SE is assumed to be integrated with the station mezzanine under the platform.

Pedestrian connection shown from Grand Central Station in Figure 10 is not included in this conceptual design or any of the analysis completed, except for cost, at this phase. This connection is illustrated to show future possible connections.

Figure 10: 1st Street SE Option

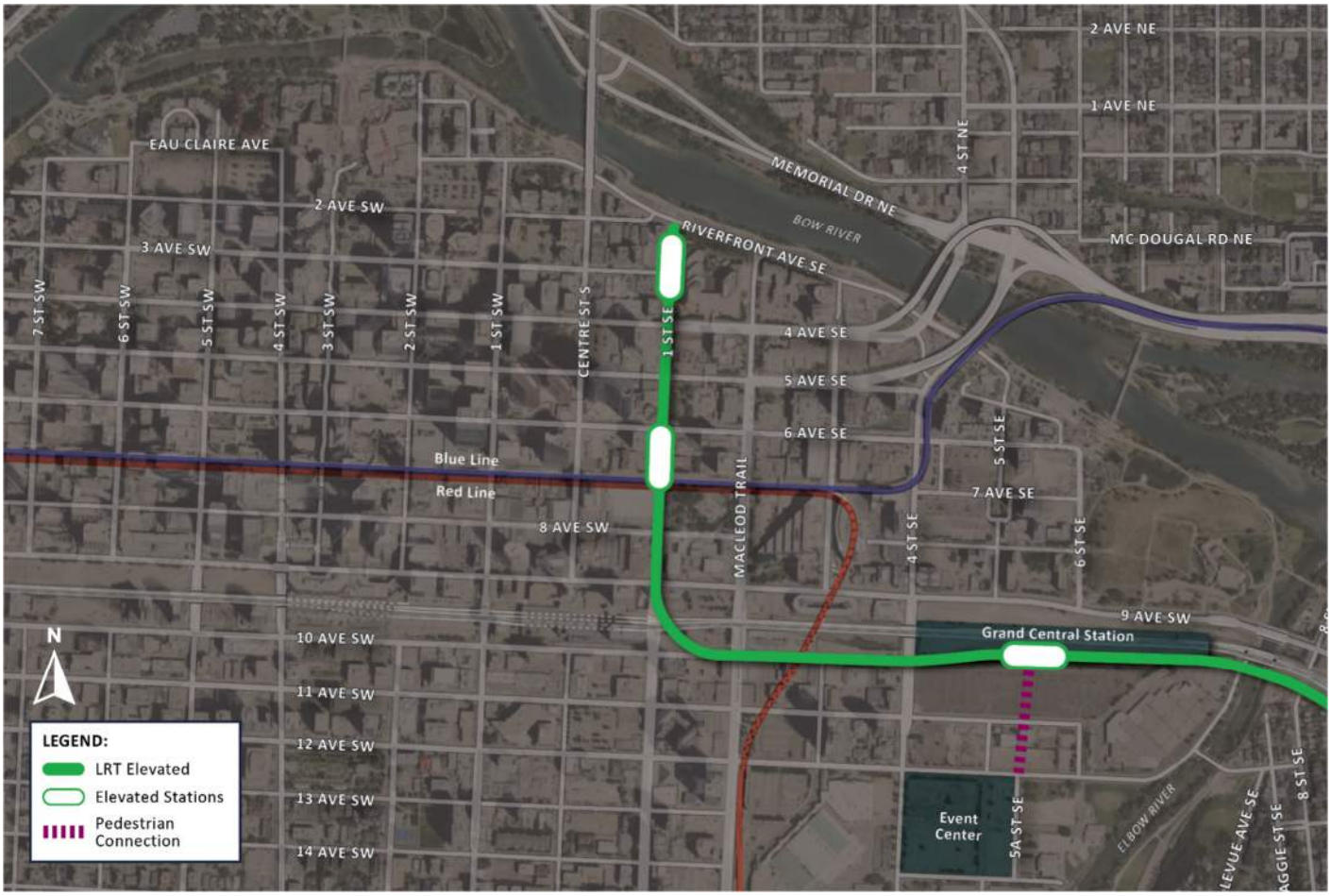


Table 3: Key Considerations

Pros	Cons
• No curve radii of less than 145m • Three travel lanes maintained along 1st Street SE as requested by the City of Calgary to support traffic needs • Vertical Circulation Elements for station located in city-owned land and Olympic Plaza • Utility impacts: existing transmission poles along 10th Avenue have been removed and lines relocated to underground	• Impacts six properties • No station along 10th Avenue • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Avenue • Requires a transfer to Red Line and Blue Line if needing to travel further west to jobs

Stations

1st Street SE Option - 7th Avenue SE Station Site

The proposed 7th Avenue SE station would facilitate passenger transfers between the Green Line and the existing Red Line and Blue Line. The elevated station includes a mezzanine level and two VCEs providing street level access, both VCE's are currently shown on private property and require additional ROW: at the northwest corner of the intersection of 1st Street SE and 7th Avenue SE and at Olympic Plaza Park. Neither location results in a direct impact to buildings and feedback from City Staff noted potential redevelopment at Olympic Plaza Park and both properties are city owned. Modifications to City owned lands, buildings or ongoing projects may be required.

Figure 11: 7th Avenue Station Area

In addition, this station mezzanine would integrate the Plus-15 structure connecting the Andrew Davison Building and Carter Place.

Construction challenges and permanent indirect impacts to the building in this location should be considered, the southwest and southeast corner of 7th Avenue SE would have less than 2-meter horizontal clearance between the building and the structure edge, future analysis is recommended to evaluate reducing the width of the station to increase the horizontal clearance. Indirect impacts could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

1st Street SE Option - 7th Avenue SE Station Renderings

Figure 12: 1st Street SE Option - 7th Avenue SE Station – Aerial View

Figure 13: 1st Street SE Option - 7th Avenue SE Station – Street View (looking north)

2nd Street SW Option

This option runs along 10th Avenue and continues north on 2nd Street SW on an elevated guideway. The 2nd Street SW Option would impact a parkade ramp, as shown on **Appendix 1 Engineering Report and Roll Plots**, just north of the CPKC rail corridor as the Green Line alignment turns from 10th Avenue to 2nd Street SW. The elevation is sufficient to have no impact on the existing Plus-15 structures except for the Plus-30 structure located south of 7th Avenue SW. The proposed station design, at this location, includes the removal of the Plus-30 structure and the integration of the Plus-15 at that same location with a mezzanine under the platform.

The removal of the parkade ramp and the Plus-30 structure would require negotiation and legal agreements with the property owner that would require potential compensation for modifications during and after construction. Please refer to the Costs section for more details about the cost estimate.

Pedestrian connection shown in Figure 14 from Grand Central Station is not included in the conceptual design, except for cost, or any of the analysis completed at this phase. This connection is intended to show future possible connections.

Figure 14: 2nd Street SW Option

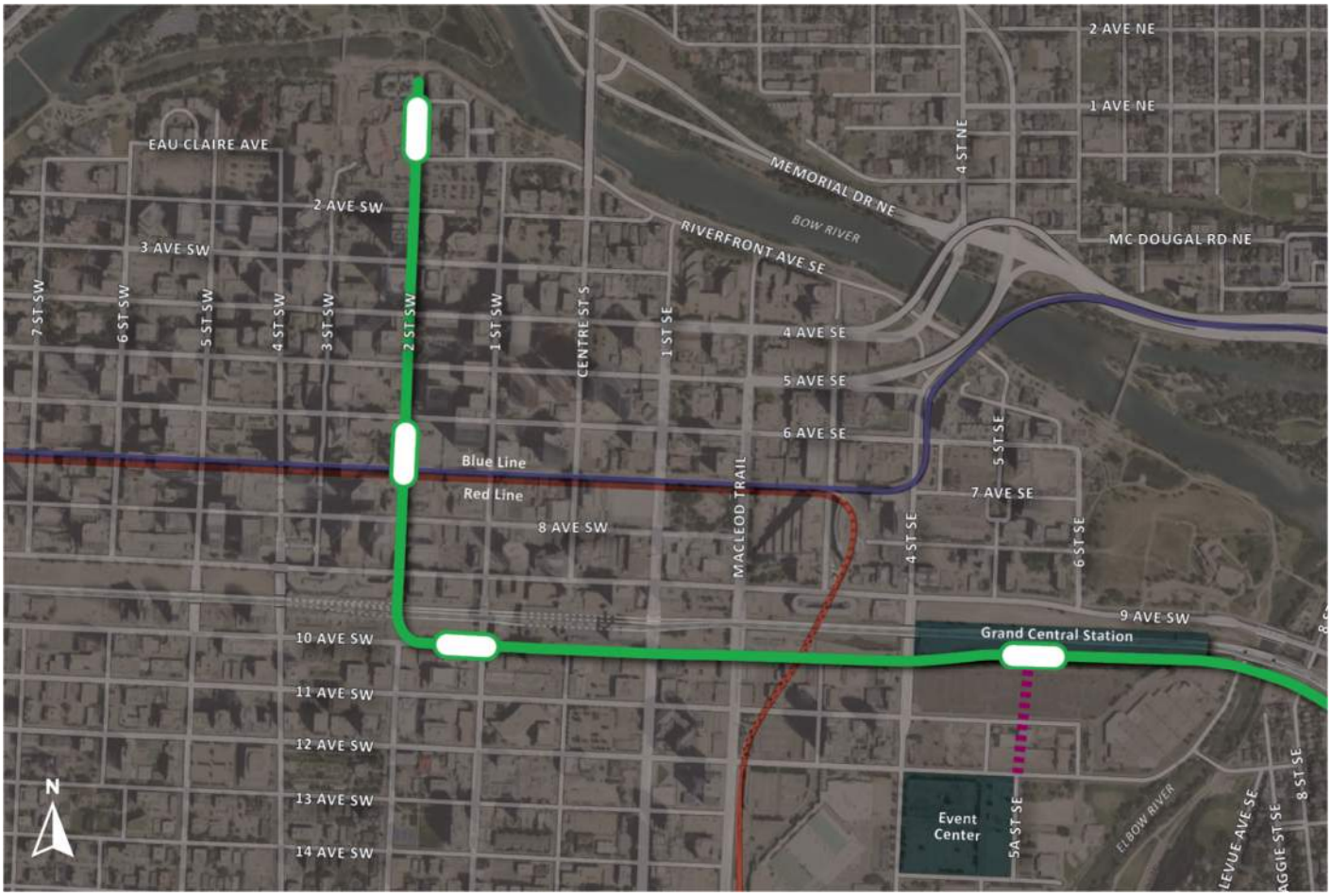


Table 4: Key Considerations

Pros	Cons
• The city already evaluated reducing travel lanes to accommodate head houses on previous Green Line tunneled alignment along 2nd Street • Close to centroid of employment and living of downtown • Potential for redevelopment in areas along 10th Avenue and Eau Claire • No curve radii of less than 60m • Utility impacts: Existing transmission poles along 10th Avenue have been removed and lines relocated to underground	• Partial impacts 10 properties • Requires removal of parkade ramp north of CPKC and rebuilding the pedestrian walkway • Requires removal of Plus-30 at 7th Avenue SW station • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Avenue • Potential impacts to existing underground fiber network at 7th Avenue SW and 2 Street SW

Stations

2nd Street SW Option - 10th Avenue Station Site

The proposed station would be located along 10th Avenue, near the 2nd Street SW intersection. This site was chosen based on direction to push the location as far west as possible. An existing surface parking lot here also provide opportunity for placement of one VCE.

The proposed elevated station includes a mezzanine level providing street-level access via two different VCE locations, one would be at the north surface parking lot. The other one is assumed to be on public ROW. Figure 16 below shows one of the VCE along 2nd Street SW. As shown on **Appendix 8 Vertical Circulation Elements locations**.

Figure 15: 10th Avenue Station Area

2nd Street SW Option - 10th Avenue Station Renderings

Figure 16: 2nd Street SW Option - 10th Avenue Station - Aerial View

Figure 17: 2nd Street SW Option - 7th Avenue SW Station - Street View (looking east)

2nd Street SW Option - 7th Avenue SW Station

The proposed station would be on 2nd Street SW between 6th Avenue SW and 8th Avenue SW, and it offers Green Line riders transfer opportunities to existing Red and Blue lines.

An elevated station at this location poses unique challenges due to existing Plus-15 and Plus-30 structures. The proposed station mezzanine would remove the Plus-30 structure and integrate the Plus-15 structure beneath. The integrated mezzanine and Plus-15 would provide a seamless connection between the Plus-15 skywalk and station vestibule.

Further elevating the Green Line platform over the Plus-30 structure would result in a taller and more costly structure; therefore, further elevating the station was not proposed.

Figure 18: 7th Avenue SW Station Area

The elevated station would be served by two different VCE locations providing street level access, one is placed at the northeast corner of 7th Avenue SW and require additional ROW. The other one is assumed to be on public ROW. As shown in **Appendix 8 Vertical Circulation Elements (VCE) Locations**.

Additional constraints at this location include low horizontal clearance from existing adjacent buildings on the west side of 2nd Avenue SW. Preliminary assessment shows less than 1-meter horizontal clearance between the building and station structure edge and three other locations where the horizontal clearance is less than 2.5 meters. Future analysis is recommended to evaluate reducing station width to increase the horizontal clearance. Engineering drawings in **Appendix 1 Engineering Report and Roll Plots** identify these locations. Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

2nd Street SW Option – 7th Avenue SW Station Renderings

Figure 19: 2nd Street SW Option - 7th Avenue SW Station – Aerial View

Figure 20: 2nd Street SW Option - 7th Avenue SE Station – Street View (looking north)

Eau Claire Station (both 2nd Street SW and 6th Street SW Options)

The proposed station at Eau Claire would be the terminus station for the 2nd Street SW and 6th Street SW options. A station at this location would be compatible with a vision for expansion north of the Bow River.

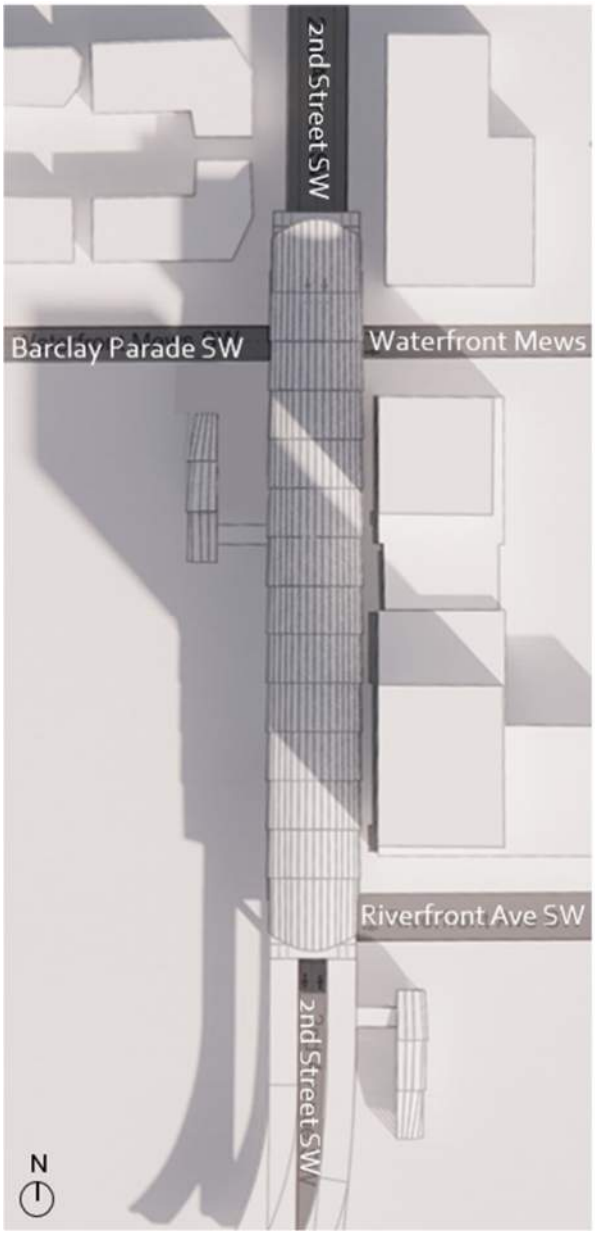
The proposed elevated station would include platforms and a mezzanine with street-level access provided by two VCE locations. Both VCE's require additional ROW from private property at the southeast corner of Riverfront Avenue SW and on the west side of 2nd Street SW, as shown in **Appendix 8 Vertical Circulation Elements (VCE) Locations**.

Figure 21: Eau Claire Station Area

An aerial view of the proposed station is shown in

Figure 22, below.

Figure 22: Eau Claire - General Plan View



6th Street SW Option

This option runs along 10th Avenue and turns north on 6th Street SW. The 6th Street SW option impacts one building structure, as shown on **Appendix 1 Engineering Report and Roll Plots**, just south of the CPKC tracks as the Green Line alignment turns from 10th Avenue to 6th Street SW. This option crosses over the CPKC rail corridor on an elevated guideway. The elevation is sufficient to have no impact on the existing Plus-15 structures.

Pedestrian connection shown in Figure 23 from Grand Central Station is not included in the conceptual design, except for cost, or any of the analysis completed at this phase. This connection intended to show future possible connections.

Figure 23: 6th Street SW Option

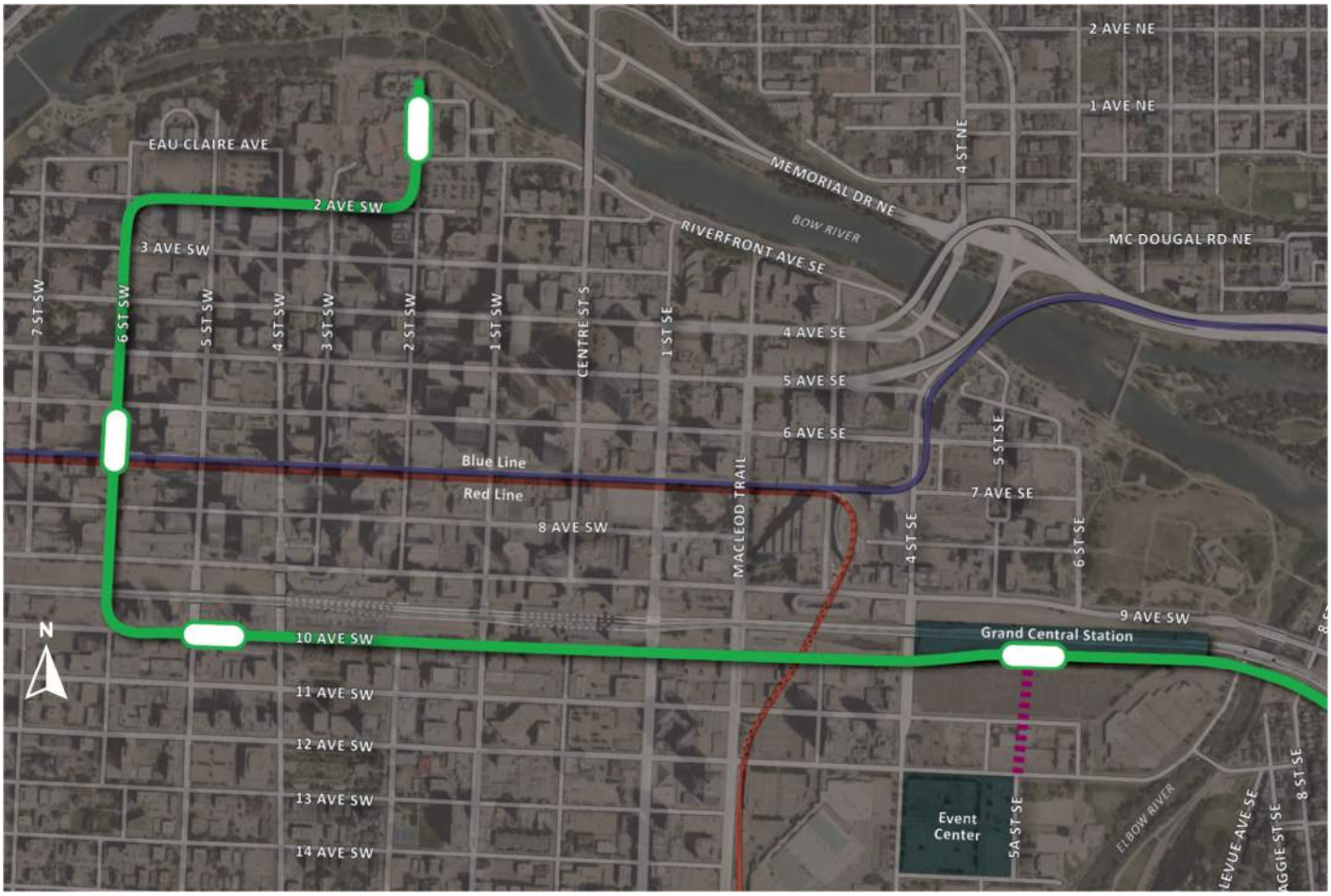


Table 5: Impacts Table

Pros	Cons
• No impacts to existing Plus-15 • Stop along beltline • Potential for redevelopment in areas along 10th Avenue and Eau Claire Street	• Curves radii of 35 meters along 2nd Avenue SW resulting in reduced LRT speeds at curves and potential noise impacts to surrounding residential buildings • Partial impacts to 10 properties • Impacts one building south of the CPKC • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Avenue

Stations

6th Street SW Option - 10th Avenue SW Station

The proposed station would be located along 10th Avenue, near the 6th Street SW intersection. This site was chosen based on the track turn location and the desire to push the location as far west as possible.

Constraints at this location include adjacent buildings on all sides of the station creating challenges for VCE placement The elevated station includes a mezzanine level providing street-level access via the two VCE locations all to be placed in public ROW. As shown on **Appendix 8 Vertical Circulation Elements (VCE) Locations**.

Figure 24: 10th Avenue Station Area

There are three highly constrained places where less than 2-meter horizontal clearance from structure edge to building are identified. Future analysis is recommended to evaluate reducing station width to increase horizontal clearance. Engineering drawings in **Appendix 1 Engineering Report and Roll Plots** identify these locations. Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

6th Street SW Option - 10th Avenue SW Station Renderings

Figure 25: 6th Street SW Option - 10th Avenue Station – Aerial View

Figure 26: 6th Street SW Option - 10th Avenue Station – Street View (looking west)

6th Street SW Station 7th Avenue SW Station Site

The proposed station would be on 6th Street SW between 6th Avenue SW and 8th Avenue SW, and it offers Green Line riders transfer opportunities to existing Red Line and Blue Line.

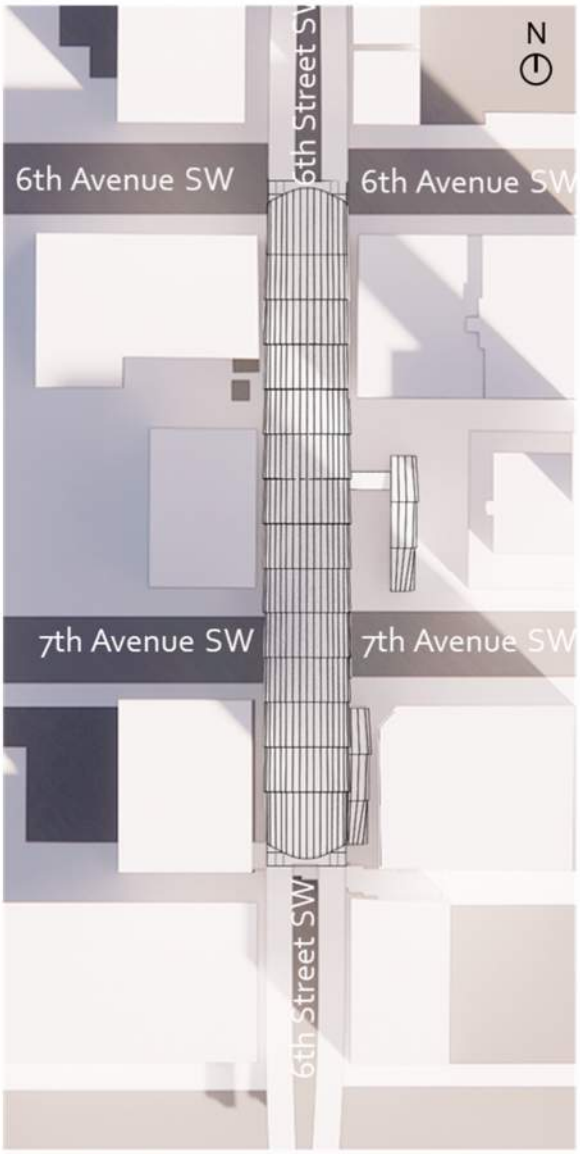
Figure 27: 7th Avenue SW Station Area

The proposed elevated station would include platforms and a mezzanine with street-level access provided by two VCE locations. Both VCE's require additional ROW from adjacent private property located east of the guideway north and south of 7th Avenue SW. As shown in **Appendix 8 Vertical Circulation Elements (VCE) Locations**. One of the properties is owned by the Government of Alberta.

This station has ten highly constrained location where the buildings and structure edge have between 1- and 2-meter horizontal clearance. Future analysis is recommended to evaluate reducing station width to increase horizontal clearance. Engineering drawings in **Appendix 1 Engineering Report and Roll Plots** identify these locations.

Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

Figure 28: 6th Street SW to 7th Avenue SW Station – General Plan View



Eau Claire Station

The Eau Claire station is common to both 6th Street SW and 2nd Street SW alignment options. Details about this station can be found in the 2nd Street SW option station area description above.

Options Summary

This chart provides a summary of each option.

Table 6: Options Summary

	Characteristics	Pros	Cons
1st Street SE Option	• Approximately 1.8 km from Elbow River crossing to station on 7th Street SE • 1 station on Grand Central Station • 1 station on 1st Street SE • 1 possible station south of the Bow River. Not necessarily goes to Eau Claire; there are different alignments that could be phased • 1 Plus-15 integrated with station	• No curve radii of less than 145 m • Three travel lanes maintained along 1st Street SE • Station footprint in city-owned land and Olympic Plaza • Utility impacts: existing transmission poles have been relocated to underground	• Partial impacts to six properties • No station along 10th Avenue • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Ave • Requires a transfer for Red Line and Blue Line if needing to travel further west in downtown
2nd Street SW Option	• Approximately 2.9 km from Elbow River crossing to Eau Claire • 1 station on Grand Central Station • 1 station on 10th Avenue • 1 station on 2nd Street SW • 1 station at Eau Claire • 1 Plus-15 integrated and 1 Plus-30 removed north of 8th Avenue	• The city evaluated reducing travel lanes to accommodate head houses on previous underground Green Line LRT project alignment along 2nd Street • Proximity to centroid of employment and living downtown • Potential for redevelopment in areas along 10th Avenue and Eau Claire • Station footprint in city-owned land and Olympic Plaza (coordination pending) • No curve radii of less than 60 m • Utility impacts: Existing transmission poles have been relocated to underground	• Partial impacts to 10 properties • Requires removal of parkade ramp north of CPKC • Requires removal of Plus-30 at 7th Avenue SW station • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Avenue • Potential impacts to existing underground fiber network at 7th Avenue SW and 2 Street SW
6th Street SW Option	• Approximately 4 km from Elbow River crossing to Eau Claire • 1 station at Grand Central Station • 1 station on 10th Avenue • 1 station on 6th Street SW • 1 station at Eau Claire • 1 Plus-15 integrated with station	• No impacts to existing Plus-15 • Stop along belt line • Potential for redevelopment in areas along 10th Avenue and Eau Claire Street	• Curve radii of 35 meters along 2nd Avenue SW resulting in reduced LRT speeds and potential noise impacts to surrounding buildings • Partial impacts to 10 properties • Impacts one building south of the CPKC • Potential impacts to existing water feeder main, underground electric, storm and sanitary sewer along 10th Avenue

EVALUATION CRITERIA ASSESSMENT

For the 1st Street SE, 2nd Street SW, and 6th Street SW options, an evaluation criteria assessment (ECA) was conducted to identify and inventory potential impacts, both positive and negative.

The evaluation framework was developed for this task in consideration of previous multi-account evaluations completed in support of the Green Line Project Vision and Green Line LRT Alignment Options Review, among others. Categories and criteria developed for investigation and consideration are focused on aspects relevant to the downtown study area, such as potential for noise impacts and potential for impacts to pedestrian areas. A detailed summary of the evaluation criteria assessment can be found in **Appendix 6 Evaluation Criteria Assessment Scoring Results**.

Evaluation Methodology

The evaluation criteria assessment was conducted in the following steps:

1. Determine evaluation categories and criteria in collaboration with the City of Calgary and Green Line Staff.
2. Identify potential impacts (positive and negative) for each option and segment through desktop research and workshops with the City of Calgary and Green Line Staff.
3. All criteria were weighted equally to reduce subjective assessment of potential impacts.
4. Rate and summarize each category and criterion.

Evaluation Categories and Criteria

The following categories and criteria were developed for this assessment.

Table 7: ECA Details

Categories	Criteria	Descriptions	Metric
Transit Considerations	Potential Ridership	Potential ridership at year 2048 from Shepard for each segment.	Quantitative
	Transit Operations	Potential run time from Shepard to station areas on each segment.	Quantitative
Transportation/ Multimodal	Mobility Network Impacts	Potential for removal of traffic lane.	Count
	Strategic Transit Network Connections	Transfer opportunity to Red/Blue lines or MAX/bus rapid transit (BRT) within 1 block of station areas.	Count
	Pedestrian Connectivity	Potential for guideway and structure piers to cause impacts to the pedestrian areas.	Count
	Bicycle Connectivity	Stations integration with existing bicycle facility network.	Qualitative
Population and Employment Access	Population Served	Year 2048 population data by Traffic Analysis Zone (TAZ) intersected by station area 400-meter buffer. Segments are cumulative.	Quantitative
	Access to Employment	Year 2048 employment data by TAZ intersected by station area 400-meter buffer. Segments are cumulative.	Quantitative

Categories	Criteria	Descriptions	Metric
Urban Development/ Urban Realm	Impacts to Parking	Potential for guideway and structure piers to impact parking zones.	Count
	Transit-Oriented Development (TOD) and Development Potential	Desktop review of vacant and/or developing parcels in proximity to station areas; proximity of stations to planned growth districts.	Qualitative
Environmental Impacts	Noise Impacts	Propensity for noise impacts in proximity to guideway turns and station areas.	Count/ Qualitative
	Visual and Aesthetic Change	Perception of change to viewshed based on surrounding land use.	Qualitative
	Historic Resources	Potential for LRT guideway or station areas to intersect or impact historic resources.	Count
	Land Impacts	Potential for property displacement.	Count
Feasibility/ Deliverability	Constructability	Complexity of construction, number of tight curves, and construction in tight quarters.	Qualitative
	Impacts to Utilities	Potential for options/segment to impact utilities based on utilities conflict assessment and utility size/type.	Count
	Existing Building Impacts	Potential for impacts to driveway or service entry access points.	Count
	Indirect Risks	Potential for multi-agency or stakeholder coordination for impact mitigation.	Qualitative

Evaluation Summary

The evaluation summary table shows rating results from each option and segment evaluated from a common origin beginning at Grand Central Station and ending at Eau Claire/Bow River station. The ECA summary is shown in Table 8.

The ECA process identified potential impacts (positive and negative) for each segment in each option. Generally, a filled circle rating means more positive impacts were identified, empty circles mean negative impacts, based on the category and defined criteria, e.g.: Transit considerations show a fuller circle for segments capturing more ridership and performing better in travel time.

Table 8: Evaluation Summary

	6th St SW Option			2nd St SW Option			1st St SE Option		
	10th Ave Segment	7th Ave Segment	Eau Claire Segment	10th Ave Segment	7th Ave Segment	Eau Claire Segment	10th Ave Segment	7th Ave Segment	Bow River Segment
Transit Considerations (Fuller circles = more ridership/faster travel time)									
Transportation / Multimodal (Fuller circles = Lower potential impacts)									
Population / Employment Access (Fuller circles = higher population and employment captured)									
Urban Development/ Urban Realm (Fuller circles = more TOD opportunity / less parking impacts)									
Environmental Impacts (Fuller circles = Lower potential impacts)									
Feasibility / Deliverability (Fuller circles = Less potential challenges)									

Note: Each segment rating should be considered independently rather than cumulative.

Key takeaways for the options evaluation are considered below:

- **Transit Considerations,** with a station in the Beltline and higher ridership (15-20 percent more), the 6th Street SW and 2nd Street SW options outperform the 1st Street SE option.

- **Transportation/Multimodal** considers impacts to traffic lanes, transit user transfer opportunities, bicycle, and pedestrian realm. Potential impacts are noted on 2nd Street SW and 6th Street SW for comparable impacts. A travel lane is reduced on 1st Street SE, and 2nd Street SW.

- **Population/Employment,** generally, 6th Street SW and 2nd Street SW score similarly, however, higher population on the west side of downtown Calgary are observed. 1st Street SE scores lower with fewer noted high population and employment areas on the east side of downtown.

- **Urban Development / Urban Realm,** options score similarly for potential development along the Beltline Area and for 1st St SE, potential for the development in the planned River District. Options differ when approaching downtown, where the 6th Street SW option may have more potential land for redevelopment. However, more potential parking impacts were identified for this option. Also, 2nd Street SW and 6th Street SW options share development potential around Eau Claire.

- **Environmental Impacts**, each option has considerable potential to add noise and change in viewshed to the environment particularly around each guideway turn north into downtown and station area. Sensitive receivers include primarily office buildings and multi-family residential structures. Notably the 1st Street SE option would be located in proximity to the Arts Commons building, Glenbow museum, and open space Olympic Plaza. Property impacts are primarily related to locating space for VCE in proximity to station areas, however the referenced guideway turn would impact properties on both 2nd Street SW and 6th Street SW options, the parkade ramp north of CPKC and a single-story structure, respectively.

- **Feasibility/Deliverability,** each option poses unique challenges in constructability and utilities, coordination, existing building impacts. All options would face similar challenges relating to construction in proximity and over to CPKC lines, in addition, all options would face similar challenges when constructing station areas in the downtown environment.

Evaluation Considerations

A desktop review of potential impacts in support of the ECA identified and inventoried a number of key considerations for each option and segment. While this Evaluation Assessment considered each impact equally, some impacts warrant additional narrative.

Transit Considerations

This category considered ridership and LRT run times. The ECA scores each of these comparably; however, it is important to consider nuance between the three options due to station areas and option length. The discussion below provides context to each criterion. Also, additional information can be found in **Appendix 5 Ridership Report**.

This evaluation only considered criteria related to the retained options. Should a preferred option progress in design, future study should be considered to evaluate impacts to underlying transit LRT and bus service and service integration with the proposed LRT and stations.

Ridership

Ridership estimates are based on data established in 2020 and for the evaluation in this assessment, the methodology is consistent with City of Calgary's previous Green Line LRT project ridership forecasts. Table 9 below shows potential ridership for each option by segment for horizon year 2048.

Table 9: Year 2048 Ridership by Option and Segment

Option	Shepard – 10th Avenue	Shepard – 7th Avenue SW	Shepard – Eau Claire
1st Street SE	23,700*	43,000	47,100**
2nd Street SW	41,100	51,200	55,200
6th Street SW	41,600	50,900	54,700

*1st Street SE option has no proposed station on 10th Avenue; therefore, ridership reflects Shepard to Grand Central Station.
**1st Street SE option terminates at Bow River Segment near 1st Street SE and 3rd Avenue SE.

Consideration should be given to the number of stations for each option, as highlighted in the Option Summary above. 1st Street SE would have no station along 10th Avenue except for Grand Central Station that is common to all options. Similarly, 2nd and 6th Options would have the same terminus station at Eau Claire. Therefore, values in the table above, for each segment, should be considered as potential scenarios.

The 2nd Street SW option captures the most ridership in a scenario with a station at Eau Claire due to factors including potential travel time, population catchment areas, and number of stations. Similarly, should options ending at the 7th Ave segment be considered, ridership between 2nd Street SE and 6th Street SE options are comparable with the slight edge to the former.

Travel Times

Travel times for options and segments were considered from a common origin at Shepard and are described in Table 10. Information on travel time calculation and methodology can be found in **Appendix 5 Ridership Report**.

Table 10: Estimated Travel Times by Option and Segment

Option	Shepard – 10th Avenue	Shepard – 7th Avenue SW	Shepard – Eau Claire
1st Street SE	25.6	28.2	29.9*
2nd Street SW	27.7	29.4	31.6
6th Street SW	28.3	30	35.3

*1st Street SE option terminates at Bow River Segment near 1st Street SE and 3rd Avenue SE.

Notably, the 1st Street SE option would have both shortest run time and lowest potential ridership due to having three stations and traveling only briefly west on 10th Avenue. The 2nd Street SE option and 6th Street SE options are comparable to 7th Avenue segment for travel time and ridership, however, differ significantly in travel time on the segment to Eau Claire.

Additional consideration for each option could be given based on values shown in the population and employment access section below. While 2nd Street SW and 6th Street SW are comparable in travel time and potential ridership, TAZ's showing year 2048 population and employment data report slightly higher TAZ density captured by 400-meter buffer on the 6th Street SW option

Lastly, potential travel time and ridership have cascading impacts for operations, rolling stock fleet, and the maintenance facility. These factors were not incorporated into the evaluation criteria. A discussion on project benefits covering topics of travel time savings can be found in the following sections. Additionally, discussion of rolling stock fleet requirements can be found in **Appendix 5 Ridership Report**.

Transportation

Within the Transportation category, impacts have been identified on topics related to vehicle, bicycle, and pedestrian or transit user movements and further detailed in subsections below.

Mobility Network Impacts

Mobility network impacts due to the proposed options, for this evaluation, have been identified as reduction of the existing number of traffic lanes or dedicated turn-lanes. Only the 1st Street SE option would necessitate a reduction of general-purpose travel lanes from 4 to 3 along portions of 1st Street SE north of the freight track underpass. Through conversations with City of Calgary staff, this reduction of capacity was deemed manageable.

Reductions of dedicated turn-lanes primarily occur on northbound corridors (6th Street SE and 2nd Street SE option), in proximity to the 7th Avenue SW station areas where the guideway would require piers on both sides of the roadway. However, vehicles would not be precluded from a left-turn movement in these locations.

At future stages of design traffic modelling should be conducted for the preferred option to assess mitigation strategies, such as shifting or relocation of piers, structural design alternatives, or removal of parallel parking, impacts to pedestrian realm or changing the number of available lanes.

Strategic Transit Network Connections

Transit network connections identify the potential for transit users to efficiently transfer to LRT and BRT public transit facilities by option and by segment. For this study, a one block (approximately 160 meters) buffer from proposed station areas was used to determine transfer opportunity. Intuitively, all options meet this threshold at the 7th Avenue SW station areas. Notably, 2nd and 6th Street SW options have more opportunities to transfer to MAX and BRT facilities than the 1st Street SE Option. However, the 1st Street SE option does include the only station south of the Bow River with a BRT stop within the same block of the proposed station location. All options via the 7th Avenue station area would provide users opportunity to travel into downtown and quickly transfer to Red Line and Blue line to continue on an east or west journey toward their intended destination.

Pedestrian Connectivity

The proposed options require use of straddle bents for areas near elevated guideway turns and station areas. Straddle bents would require placement of piers that may remove on-street parking and/or reduce the width of the sidewalks. For this evaluation, locations where piers are present within the sidewalk are deemed as potential impacts to pedestrian connectivity. At further stages of design mitigation measures may be identified for impacts to sidewalks. For the proposed options, the minimum sidewalk width is 3 meters in all locations with the exception of 1st Street SE option where sidewalks would be reduced to 1.5 meter behind piers just south of 7th Avenue SE, as shown in **Appendix 1 Engineering Report and Roll Plots**.

6th Street SW Option: This option has piers impacting sidewalks on 10th Avenue between 1st Street SE and 2nd Street SE, 6th Street SW between 2nd Avenue and 3rd Avenue, and on 2nd Street SE between Eau Claire and 2nd Avenue.

2nd Street SW Option: This option has piers impacting sidewalks on 10th Avenue between 1st Street SE and 2nd Street SE, 2nd Street SE between Eau Claire and 2nd Avenue and on 2nd Street SE between 6th Avenue and 8th Avenue.

1st Street SE Option: This option has piers impacting sidewalks on 1st Street SE between 8th Avenue SE to 7th Avenue SE and on 1st Street SE between 7th Avenue SE to 6th Avenue SE. We are also assuming pier impacts north within the Bow River segment.

Bicycle Connectivity

Bicycle connectivity describes the way in which the construction and roadway design changes may impact existing bicycle facilities, and the way in which the rail stations may connect to the overall existing and planned bicycle facility system. This scoring system is qualitative and based on observed positive and negative impacts. There are no anticipated narrowing or removal of bicycle facilities in any of the alignment segments. Stations within the existing bicycle network included the Bow River and Eau Claire stations in the northern phasing segments of each option.

Population/Employment Access

Using Traffic Analysis Zones, two buffer sizes were created around station areas at 800-meters and 400-meters. Year 2048 population and employment forecast data was provided from previous studies and a proximity analysis was completed identifying intersected Traffic Analysis Zones (TAZ) for each option and segment. Findings are shown in Table 11.

Table 11: 2048 Population and Employment Catchment

Option	# of stations	400-Meter Buffer					800-Meter Buffer				
		# of TAZs intersected @ 400m	2048 Pop	Avg. pop / TAZ	2048 Employ	Avg. Emp / TAZ	# of TAZs intersected @ 800m	2048 Pop	Avg. pop / TAZ	2048 Employ	Avg. Emp / TAZ
1st Street SE	3	21	29,394	1,400	80,815	3,848	44	63,453	1,442	160,840	3,655
2nd Street SW	4	33	46,132	1,398	150,631	4,565	54	87,251	1,616	210,845	3,905
6th Street SW	4	36	53,064	1,474	170,012	4,723	59	100,777	1,708	204,955	3,474

Notably, 800-meter buffers in the downtown area have considerable geographic overlap and accounted for at a segment level but shown in aggregate at an option level. Meaning, option level values consider total TAZs intersected and do not double count values.

In general, the 6th Street SW option captures slightly more population and employment at 400-meter level, while the 2nd Street SW option captures slightly lower population but higher employment at an 800-meter buffer.

Urban Development/Urban Realm

Impacts to Parking

The proposed elevated guideway and stations for each option would require placement of piers in parking areas where the elevated guideway curves or in station areas. For this evaluation, two conditions were considered:

- The LRT elevated guideway or stations necessitates removal of on-street parking zones completely through redesign of the ROW.
- The LRT elevated guideway or stations place intermittent piers within parking zones causing potential loss of spaces.

Count of zones removed and count of zones with intermittent piers were inventoried and considered as two separate criteria informing the impacts to parking criteria.

No zones would be anticipated to be removed for the 1st Street SE Option. In the downtown area, the 6th Street SW and 2nd Street SW options score comparably. The 6th Street SW option would necessitate removal of the most parking zones, particularly along the 10th Avenue segment. The 2nd Street SW option scores highest for intermittent impacts to parking zones from piers.

Should a preferred option progress in design, mitigation to parking impacts should be considered through shifting or relocation of piers through collaborative process with future designer and City of Calgary.

Transit-Oriented Development and Development Potential

For this evaluation, TOD and development potential were examined for two conditions:

- Proposed option's stations and alignments adjacency or proximity to planned districts supporting TOD or mixed-use development, and/or
- the number of vacant and/or underutilized parcels along the alignments and near stations.

Two adopted downtown development plans were reviewed, the River District Master Plan and the Beltline Area Redevelopment Plan. For proposed options with stations in proximity to planned districts, development potential is heightened where a mix of land uses, higher densities, active uses, and/or public amenities (parks or open space, trails, etc.) are present, all of which are included in the two downtown development plans.

The 1st Street SE option is nearest to planned districts due to boundary of the River District Master plan. In addition, all options share some proximity to the Beltline Area Redevelopment plan boundaries. However, both 2nd Street SW and 6th Street SW options, as they are longer, are adjacent to more vacant or underutilized parcels. Consideration was also given to stations bordering vacant and developing parcels including Grand Central Station and Eau Claire station.

This assessment did not consider any existing agreements already made or in progress regarding TOD development for the previous Green Line LRT tunnel alignment. Should a preferred option progress in design, consideration and assessment of those agreements and potential future agreements should be evaluated by future designer in collaboration with City of Calgary.

Environmental Impacts

For this evaluation, a high-level, limited, assessment of environmental impacts was conducted.

Historic Resources

Historic resource data from the Government of Alberta and City of Calgary's datasets were reviewed; however, no resources were identified in proximity to the proposed options and therefore no values were assigned.

Should a preferred option progress in design, future studies should consider potential direct and indirect environmental impacts to historic structures that may or may not be registered as historic resources.

Noise

A full and thorough noise and vibration impact assessment was not conducted at this stage of design. For evaluation purposes, a desktop review of land uses in proximity to guideway turns and station areas was completed noting the propensity for increased

noise levels at these locations. Land uses including, office, residential, open space/parks, and civic/cultural centers were identified as potentially sensitive receives that may require future mitigation.

The 6th Street SW and 2nd Street SW options ranked highest for noise impacts due to length and density of potential sensitive receives. However, the 6th Street SW option's two tight curves on the segment traveling toward Eau Claire would likely require a higher level of coordination with more businesses and homeowners.

The 1st Street SE option would have particularly challenging noise impacts related to civic and cultural uses at the Arts Common, Glenbow museum, Telus Convention Centre, Olympic Plaza, and multiple religious buildings. Should a preferred option progress in design, a full noise and vibration study should be conducted to identify impacts and mitigation measures.

Visual Aesthetic

An objective approach was taken to defining potential viewsheds change as a result of the proposed LRT options. A desktop review of urban form and land use was conducted to evaluate potential change at a segment level. Qualitative assessment of urban form, including size and scale of structures and buildings, density, and land use types were evaluated.

The elevated guideway and stations for all options would represent a high level of viewshed change, particularly in 10th Avenue segments and Eau Claire and Bow River segments where urban form and structure density are far less than 7th Avenue station areas. However, as preferred option design progresses, future study should more fully evaluate changes to viewshed along all areas of the alignment due to presence of the elevated guideway and station areas. Assessment should include light and safety impacts in the downtown core, potential changes to property values along the alignment, and considerable collaboration between City, public stakeholders, and future design team.

The City of Calgary defines Landmark View Corridors and Landscape View Corridors in their urban design guidelines. For both 2nd Street SE and 6th Street SE options, further assessment should be conducted to determine potential impacts to landmark view corridors in the 2nd Avenue area near Eau Claire and the Chinese Cultural Center.

Land Impacts

Each option and segment noted potential need for additional ROW primarily for station area vertical circulation and guideway turns from 10th Avenue towards downtown. Key property impacts for each are described below.

1st Street SE Option: Property impacts are primarily related to station area vertical circulation needs.

2nd Street SW Option: Key property impacts occur on the turn from 10th Avenue to 2nd Street SW where a parkade ramp on the north side of the freight railroad tracks would require removal. Additionally, removal of the Plus-30 pedestrian way near the 7th Avenue SW station area would be another significant property impact.

6th Street SW Option: Key property impacts occur on the turn from 10th Avenue to 6th Street SW where acquisition of a structure may be required.

Should a preferred option progress in design, full consideration of the need for additional ROW or acquisition should be evaluated. Future analysis should consider legal implications of property requirements for a preferred option.

Feasibility/Deliverability

Constructability

A qualitative assessment was undertaken related to engineering complexity and construction in space constrained areas. Each option presents unique construction challenges in an urban environment and should a preferred option progress in design, additional analysis should be completed to understand potential constraints and mitigations. For this evaluation, consideration for this criterion included number of curves in the elevated guideway and station area construction in dense urban areas.

The 6th Street SW option presents unique challenges with two tight curves on the segment north toward Eau Claire. Complexity of construction over the CPKC rail corridor and elevated station construction in dense urban downtown at 7th Avenue SW are consideration for all options.

As noted in the station area discussion, should a preferred option progress in design, future evaluation of low horizontal clearance locations near station areas should be conducted to understand potential impacts to adjacent buildings relate to fire and life safety, maintenance and operations, and emergency response.

Impacts to Utilities

Utility impacts including water, sanitary sewer, storm sewer, and electric were evaluated according to a high-low scoring metric according to pipe size. Water pipes greater than 900mm were given a high, 300-535mm given a medium, and less than 300mm given a low. Sanitary sewer pipes greater than 750mm were given a high, and 500mm were given a medium. Storm sewer pipes greater than 525mm were given a high, and less than 525mm were given a medium. Since electric lines were all given a medium, they were not included in the final scoring. The most utility impacts were generally seen in longer segment alignments, with the most seen in the 6th Street SW Option- Eau Claire segment, followed by the 6th Street SW Option- 10th Avenue segment. A complete list of potential utility impacts can be found in **Appendix 2 Utility Conflict Matrix**. Should a preferred option progress in design, additional subsurface utility investigation will be needed to fully evaluate the utility impacts.

Existing Building Impacts

Access entry/egress obstructions due to pier placement were identified throughout each option and segment. In many cases these obstructions could be mitigated at more detailed levels of design through shifting or relocation of piers. Notable pier locations in proximity to entry/egress or driveway locations include:

1st Street SE Option: Pier location in loading dock area near the Convention Center.
2nd Street SW Option: Pier locations in proximity to loading docks and parkade entry/egress near the 7th Avenue station area.
6th Street SW Option: Pier locations in proximity to driveway locations on 9 Avenue SW and just south of 6th Avenue SW.

Should a preferred option progress in design, mitigation to access/egress impacts should be considered through shifting or relocation of piers through collaborative process with future designer, City of Calgary, and/or building owner or stakeholders.

Indirect Risks

For the evaluation, indirect risks are identified as potential coordination efforts caused by the project. Potential coordination is primarily anticipated in relation to construction over CPKC freight tracks, or removal of parkade ramps or entry/egress mitigation. Noise impacts and coordination for mitigation through businesses, homeowners, and/or business district boards.

6th Street SW and 2nd Street SW options score similarly in this category with 1st rating poses potential challenges relating to planned projects in proximity to station areas.

Should a preferred option progress in design, assessment of indirect impacts to existing capital projects around alignment should be considered. Feedback from City of Calgary have noted potential project impacts at Arts Commons, Olympic Plaza, Glenbow, Convention Centre, Stephen Avenue, and 1st Street SE corridor.

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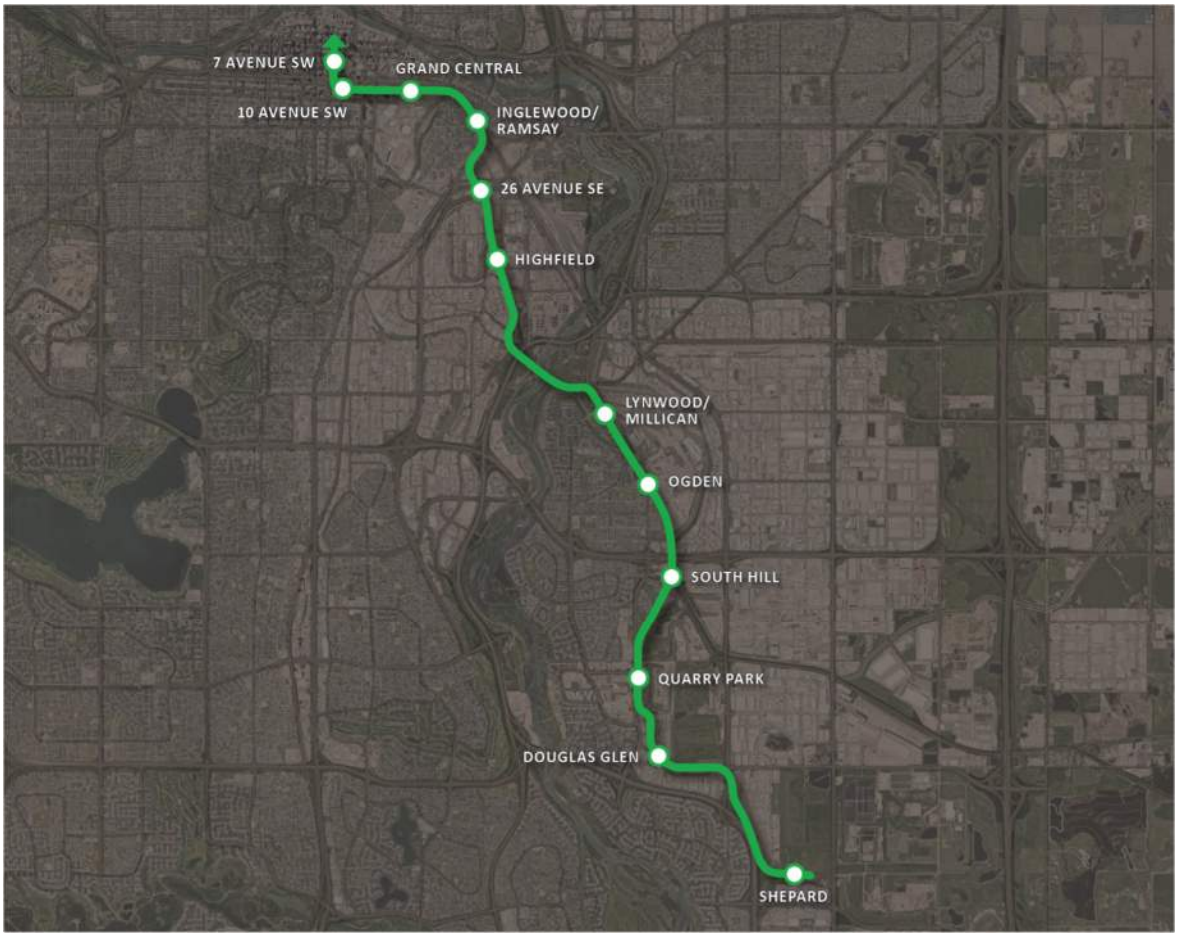
Figure 31: Preferred Alignment from Shepard to Downtown



PROJECT BENEFITS

This section provides discussion on relative benefits by option and segment and is an excerpt from **Appendix 5 Ridership Report**.

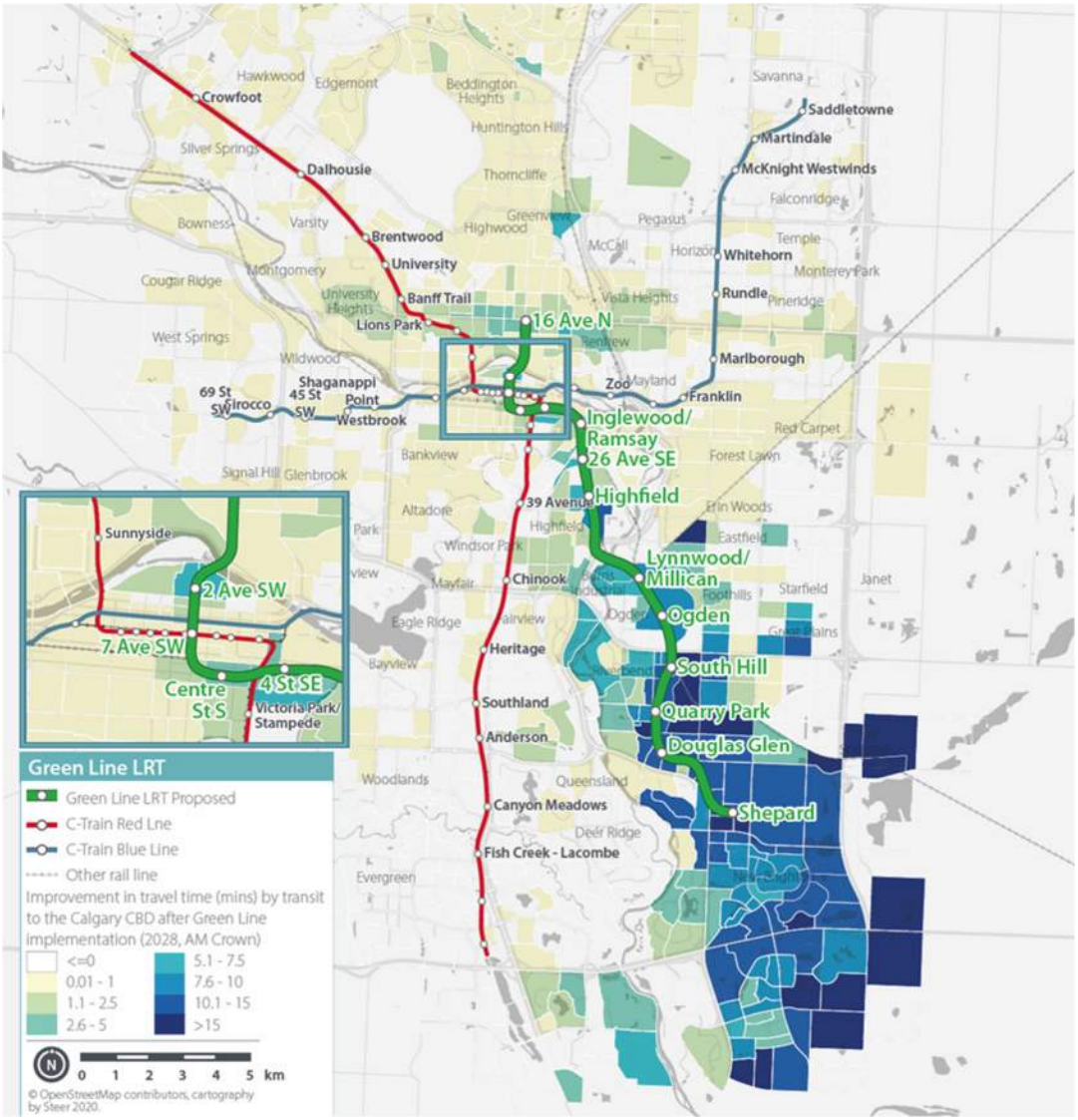
Travel Time Savings

The majority (>75 percent) of the quantified project benefits come from travel time savings. Total project time savings are a function of how close the stops are to final destinations and the number of people using the system – options that have the highest ridership and connect to the centre of downtown generate the most time savings.

The Green Line LRT project would offer travel time savings as:

- Existing services between Shepard and Downtown take almost 60 minutes and provided every 15 minutes
- Green Line will offer a reliable 30 minutes' travel time every 5 to 8 minutes
- Average travel time savings of 10 minutes in opening day increasing to 13 minutes by 2048 which users in the far south/southeast saving up to 25-30 minutes per trip

Figure 32: Travel Time Savings (Opening Day)



Travel time savings (and project benefits) for each option impacted by:

- Length of options (travel time and stations)
- First mile/last mile travel time from station locations
  - Downtown Avenue (east-west) blocks are ~170m = 2.2 min walk
  - Downtown Street (north-south) blocks are ~100m = 1.3 min walk
  - 10th Ave SW – 9th Ave SW (across CPKC) is ~150m = 1.9 min walk

Table 15: Travel Time Benefits

2048 Daily (minutes)	1st Street SE	2nd Street SW Option	6th Street SW Option
Shepard-10th Avenue	5,000*	274,000	253,000
Shepard-7th Avenue	291,000	597,000	564,000
Shepard-Eau Claire (Figure 30)	374,000**	714,000	673,000

* Shepard to Grand Central Station (4th Street SE)
** Terminates at 1st Street SE & 3rd Avenue SE

The option time savings pivot off the Shepard-Eau Clair 2nd Street SW project benefits and are estimated based on the ridership, alignment and station locations of the various options as indicated above. The project benefits gradually reduce as the line is shortened with the highest benefits for the Shepard-Eau Claire route and the lowest when the line is stopped at 10th Avenue SW. The 2nd Street SW and 6th Street SW provide a similar level of benefits as they include the same number of stations serving most of the downtown while the 1st Street SE option shows reduced benefits as there is one station less and the alignment is focused on the east away from the centroid of downtown.

Note the low level of travel time savings for the Shepard to Grand Central station option. The main issue with that option is that passengers can access the edge of the downtown but are then faced with a long walk (1.8km ~ 20 mins) or a transfer to a bus (incurring a transfer penalty and then 5-10 mins on a bus). A test was run previously with the Green Line terminating at the Red Line, Erlton Station (south of the downtown) and the test showed negative benefits/total travel time savings which highlights the impact of not providing a link into the downtown core.

STUDY LIMITATIONS

This section notes limitations, caveats and need for additional study relating to elements of this report.

The Calgary Green Line Alternative Alignments Assessment provides conceptual analysis for feasible LRT options connecting the Beltline and downtown areas to the Green Line LRT Stage 1 Project at the Elbow River.

Additional details regarding limitations specific to engineering, architectural, cost, and other topics have been documented and are available in their respective appendices. These appendices offer a more detailed discussion of constraints and nuances of each area. Readers are encouraged to refer to the appropriate appendix for a deeper understanding of the limitations relevant to each topic.

Potential Need for Additional Study of Impacts

The evaluation criteria assessment conducted in support of the proposed options detailed in the report above have been undertaken at a high-level. Should a preferred Green Line LRT Option be chosen from the retained options, a full environmental impact assessment should be considered with collaboration from stakeholders and community members. As design progresses, additional assessment of potential environmental impacts should include, but are not limited to:

- Flooding and Stormwater impacts
- Noise and Vibration
- Property Impacts, including access/egress
- Socioeconomic impacts, including potential economic impacts to property
- Traffic modeling and traffic impacts
- Transit system underlying service impacts

This list should not be considered exhaustive and additional impacts could be identified as the project progresses.

Calgary Green Line: Appendix 1

Engineering Report and Roll Plots

AECOM

Calgary Green Line: Appendix

ENGINEERING REPORT and Roll Plots

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date 11/27/24
PERMIT NUMBER: P10450
The Association of Professional Engineers, Geologists and Geophysicists of Alberta.

AECOM

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LIST OF ACRONYMS

BRT	Bus Rapid Transit
CDRL	Contract Data Requirements List
CPKC	Canadian Pacific Kansas City Railway
GIS	Geographic Information System
GP	General Purpose
HSR	High-Speed Rail
IB	Inbound
km	Kilometers
LRT	Light Rail Transit
OB	Outbound
OSC	Overhead Catenary System
ROW	Right-Of-Way
SW	Sidewalk
TCRP	Transit Cooperative Research Program
TOD	Transit-Oriented Development
VCE	Vertical Circulation Elements

INTRODUCTION

Background

AECOM was contracted on September 17, 2024, by the government of Alberta Province to develop alternative alignments for the Calgary Green Line LRT project.

The alternative alignments assessment includes an initial feasibility analysis for three light rail transit (LRT) alignments option downtown. The project study area for the alternative alignments assessment focuses on Downtown Calgary bounded by the Elbow River to the east and the Bow River to the north.

This document serves as the basis pf design for this project. It documents the design team's basic design principles, processes and considerations, as well as clarifies any issues that may not be evident in the Green Line LRT Alternative Alignments Assessment roll plots.

The purpose of the Green Line LRT Alternative Alignments Assessment design is to prove the engineering feasibility of the three alignments being evaluated, as well as evaluating impacts. The Green Line LRT Alternative Alignments Assessment roll plots will be used to generate preliminary quantities for cost estimates.

TRACK HORIZONTAL AND VERTICAL ALIGNMENTS

Design Criteria

Design criteria used to develop horizontal and vertical alignments for this Conceptual Alternative Analysis are combined design documentation developed from previous phases of this project and other project precedence. The specific documents used included the following:

- CDRL – IIP 03 – Track and Right of Way Interfaces for Calgary Green Line LRV (Issued 01/23/2024)
- Green Line LRT – Stage 1 Phase 1 Downtown Segment (Issued Sept 2022)
- TCRP – Report 155: Track Design Handbook for LRT, 2nd Edition (Ch3 – Light Rail Transit Track Geometry)

While the alignments developed for this analysis generally follow standard design guidelines and previously established criteria, when there was conflicting information, assumptions were made and therefore the geometry should be considered conceptual in nature. The track criteria document is attached as Appendix 1.1, which details the combination of standards used in development of the alignments.

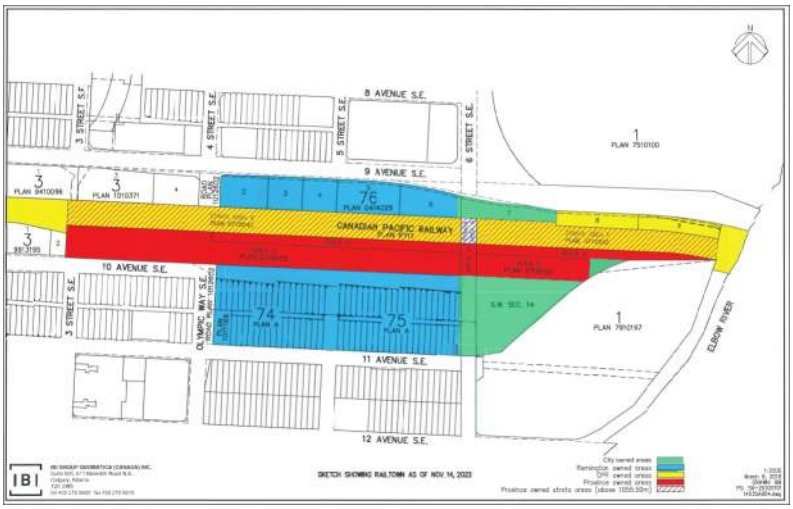
Geometric Design

HORIZONTAL ALIGNMENT

The following considerations and assumptions were used to develop horizontal alignments for the alternatives:

- Elbow River crossing and Grand Central
    - The horizontal alignments match the Elbow River design package received from City on 11/14/2024 (file names GLBTC-AG-ERB) from matchline at Sta. 120+400 to just west of the Elbow River bridge (approximate Sta. 120+700) but then diverges toward the north along the Province-owned parcel adjacent to CPKC for the Grand Central station shown on Figure 1. The horizontal tangent along this parcel provides 3m clearance from LRT deck to the parcel line to avoid impacts to the Remington-owned parcel. The alignment shifts to 10 Avenue SE just to the west of 4 Street SE to avoid impacts to the existing stairs and sidewalks to the east of the 10 Avenue SE cul-de-sac.

Figure 1. Grand Central Station Property Owner Information



- 10 Avenue SE
  - The horizontal tangent along 10 Avenue SE was developed to avoid impacts (full relocation) of an existing 900 mm water feeder main as well as achieve minimum clearance (7m, provided by Enmax) from transmission lines at the electric substation between 7 Street SE and MacLeod Trail SE. The tangent is located to provide 3m clearance from the outside diameter of the water feeder main to the LRT piers, which are assumed at 2.5m for this phase. Clearance from the transmission line is discussed further in the *Future Refinements section* below.
- Crossing over CPKC (1 Street SE Option)
  - Horizontal alignment is designed to accommodate a feasible span length with columns landing outside CPKC right of way as well as to minimize impacts to traffic by allowing for three lanes through the existing roadway underpass along 1 Street SE, while avoiding underpass structural impacts and building impacts on the SE corner of 9 Avenue SE and 1 Street SE.
- Station platforms
  - The location of horizontal tangents at platform locations is dictated by current architectural design assumptions, 135m long by 9m wide center platforms. These tangent locations were intended to maximize horizontal clearance from existing buildings on both sides of the roadway. See *Future Refinements section* below for further details. At the Eau Claire LRT station, the tangent is located to provide 3m horizontal clearance from the existing residential building on the east side, pushing the platform toward the west where the building has been demolished.
  - Locations of platforms along the alignments are placed to accommodate vertical circulation elements at specific locations, for example to avoid building impacts or to allow for convenient transfers with Red/Blue lines.

Vertical Alignment

The following considerations and assumptions were used to develop vertical alignments for the alternatives:

- See the *Future Refinements section* below for information on the existing ground data used in this analysis.
- Outside of the Elbow River crossing, due to being an elevated structure for the entire downtown section, the profile has limited constraints and is designed with the minimum height required to accommodate vertical clearance of existing roadways and existing CPKC and Red/Blue Lines. If desired in future design phases to raise the alignment, this can be achieved without major constrains.
- In general, architectural considerations, specifically mezzanines and resulting structural depth at platform locations, dictate the low point for clearance. Integration of Plus-15s into certain mezzanine levels was also a consideration to determine the elevation of the alignment.

Future Refinements

There are several areas of future refinement that will result in changes to both horizontal and vertical geometry, and at a minimum includes the following:

General

- The existing ground data used for development of the vertical profile opensource GIS data. Once survey is obtained, changes to the profile are anticipated.
- As multi-disciplinary design advances, general horizontal and vertical adjustments are anticipated. Examples include but are not limited to refinements for:
    - Structural design (constructability of spans, vertical clearance, location of piers),
    - Systems elements, including design of OCS,
    - Traffic analysis (lane configuration changes),
    - Architectural and urban design (accommodation of vertical circulation, mezzanines, ties to existing and proposed Plus-15 system, etc.),
    - Special trackwork.
- Horizontal clearance from existing buildings to the Green Line LRT structure (bridge deck) is less than 3m in several locations, especially near platform locations along 6 Street SW, 2 Street SW, 1 Street SE options. Adjustments to horizontal geometry, including analysis of potential side platform type and configurations, can be evaluated in future design phases to increase horizontal clearance.
- Special trackwork was not included in this analysis, and adjustments to both horizontal and vertical geometry are anticipated in the future to accommodate any special trackwork.
- Specific site development plans were generally not considered as part of this analysis, including ROW implications. Changes to geometry are anticipated as a result.

Specific Locations

- Assumptions were made for the location of future conditions HSR and Commuter Rail alignments at Grand Central Station, both horizontally and vertically. This dictated the proposed location for the adjacent Green Line LRT station. As concurrent designs progress, including architectural and structural designs for the Green Line LRT platform as well as private site development, Green Line LRT geometry will need to be developed accordingly, including potential updates to the vertical alignment across the Elbow River bridge.
- Vertical and horizontal clearance for the existing pump station just west of 4 Street SE, including subsurface structural elements, will likely result in updates to geometry.
- The overhead transmission lines along the north side of 10 Avenue SE, 7 Street SE to Macleod Trail were relocated underground after the survey data used for this analysis was collected. Locations of the relocated poles at the Substation with risers to underground were assumed using available data on Google Earth, the proposed alignment assumes a horizontal minimum separation of 7 meters to the proposed LRT structure. Additional survey is needed to confirm the location of lines and ensure horizontal clearance to the LRT structure is met.
- At terminus stations, end of line geometry was conceptual only and did not account for braking distance, operational and storage needs, and systems elements. Both horizontal and vertical adjustments are anticipated as a result.
- For Opt 6 Street SW, the horizontal curve radius (35m) from 6 Street SW to 2 Avenue SW is significantly below the minimum radius used per criteria (60m), this radius was used in order to avoid a building impact. Feasibility of construction, operations and maintenance needs to be confirmed.

PROPOSED RIGHT–OF–WAY (ROW)

Assumptions

The design of all options sought to minimize right of way impacts by utilizing the existing public right of way. In areas where that was not feasible, property acquisition was proposed. Where property was required, the following assumptions were made in an effort to minimize building impacts:

- Proposed ROW (Desirable) – 3m setback from edge of pedestrian clearway or vertical circulation element at stations
- Proposed ROW (Adjacent to building) – No setback from edge of pedestrian clearway
- Proposed aerial easements were provided based off a 3m offset from the LRT structure over the CPKC property.

Temporary Construction Easements (TCE) required to facilitate construction, grading tie ins, driveway tie ins, etc. were not included in this stage of design but should be reviewed in later stages.

Permissions To Enter (PTE) or consent from private property owners to conduct preliminary engineering investigations, including geotechnical investigations, topographic survey, or utility investigations, were not considered at this stage of design but should be reviewed in later stages.

Property Acquisitions and Easements

Property acquisitions were kept to a minimum for each option with exceptions around station areas and curves along the alignments. The exceptions were necessary to provide adequate pedestrian access to the elevated stations and maintain the required turning radii for the LRT. However, in areas where ROW is required, stations and curves were strategically placed to take advantage of city owned property and to avoid building impacts.

An aerial easement over the CPKC railway will be required for all three options as the alignments shift from 10th Avenue to downtown. The proposed easements extend 3 meters from either side of the proposed elevated LRT structure. Coordination with CPKC will be essential to secure the necessary permissions and ensure sufficient safety during construction and operation phases. Aerial easement purchase presents possible schedule delays for acquisition process.

1st Street SW Option is the least impactful with approximately 2240 sq. meters of proposed ROW acquisition and no known building impacts. The largest property acquisition for this option is the surface parking lot located at 204 and 218 10th Avenue SE, equating to nearly half of the total required acquisitions. Additional ROW will be required at Olympic Plaza and 138 7th Avenue SE for pedestrian access to the station.

2nd Street SW Option is the most impactful with approximately 3900 sq. meters of proposed ROW acquisition and major impact to the Parkade ramp structure located at 221 9th Avenue SW. The largest property acquisition for this option is the surface parking lot, including a small security structure, located at 224 and 232 10th Avenue SW, equating to just under half of the total required acquisitions. Additional ROW will be required at 310 7th Avenue SW for pedestrian access at the 7th Avenue Station as well as at 114 2nd Street SW and 200 Barclay Parade SW for pedestrian access at the Eau Claire Station. None of the acquisitions needed for pedestrian access to the stations will result in building impacts.

6th Street SW Option is slightly less impactful with approximately 3600 sq. meters of proposed ROW acquisition and demolition of 640 7th Avenue SW, also known as Castello's. Acquisitions will be required primarily of properties currently used as surface parking lots including 706 10th Avenue SW, 725 9th Avenue SW, and 342 2nd Avenue SW. Additional ROW will be required for pedestrian access at the 7th Avenue Station as well as for pedestrian access at the Eau Claire Station. None of the acquisitions needed for pedestrian access to the stations will result in building impacts.

Structure Impacts

Although the design philosophy was to avoid structures to the extent possible, the nature of the project necessitated some impacts. These impacts have been identified on the conceptual engineering plans. A brief description of the impacted building for each option is described below:

- 1st Street SE Option
  - Olympic Plaza
    - Located at the south east corner of 7 Avenue SE and 1 Street SE, the temporary structures located within Olympic Plaza are assumed to be impacted as part of this option. Feedback from City of Calgary Staff noted potential redevelopment at Olympic Plaza Park

- 2nd Street SW Option
  - 221 9 Avenue SW - CPA Lot 25 City Centre Parkade (9 Avenue)
    - Located south of the intersection of 2 Street SW and 9 Avenue SW, the parkade ramp is assumed to be impacted as part of this option. Engineering design plans relating to the parkade were not known at the time of this design, so the full extent of impact is unknown.
  - Plus 15 / 30 Network – Calgary's Skywalk – located throughout
    - The Plus-30 Network skywalk, located between 7th Avenue SW and 6th Avenue SW, was assumed to be fully impacted and will require removal. Additional engineering investigations should be conducted to confirm impacts to the adjacent structures.
  - 200 Barclay Parade SW – Eau Clair Market
    - This building is assumed to being demolished as part other works and will be removed prior to the LRT construction.
- 6th Street S.W. Option
  - 640 10 Avenue SW – Four20 Cannabis property
    - Located north of the intersection of 10 Avenue SW and 6 Street SW, this building is assumed to be impacted as part of this option.
  - 200 Barclay Parade SW – Eau Clair Market
    - This building is being demolished as part other works and will be removed prior to the LRT construction.

Future Refinements

In some areas, partial property acquisitions have been noted on the drawings. Through design refinements, property negotiations, and review of other ancillary project requirements, a full property acquisition could be considered for the overall project benefit.

Coordinating with engineering team for structurally design piers and pedestrian access.

Additional study and design should be completed to determine refined property impacts due to the structural elements, such as piers and pedestrian access structures, as well as power system requirements, and maintenance access.

Potential impacts to the roadway that should be refined include sight distance / daylight triangles at the intersection corners with potential property acquisition if deemed necessary.

TCE should be reviewed and coordinated with property owners.

Permission to enter (PTE) or consent to conduct preliminary engineering investigations, including geotechnical, topographic survey, or utility investigations, were not considered.

Systems elements have not been designed at this phase; additional ROW will be required for systems elements along the alignments.

ROADWAY

The Roadway design criteria provided in Appendix 2.1 was prepared based on the following key items;

- Summary of existing design standards,
- Justification and rationale along with references and applicable standards for the proposed standard,
- Summarize and propose a design standard to be carried forward for this project.

Assumptions

The following assumptions were made during the development of roadway design for all three options.

- The proposed roadway will match existing roadway profile,
- Private and public driveway accesses will be evaluated in future design,
- Proposed corner radii at intersections were matched to existing conditions,
- Turning movements for proposed conditions with design vehicle will be evaluated in future design iteration,
- 3.5m lane width if one lane with curbs on both sides. 3.3m for two adjacent lanes or one lane with adjacent parallel parking. 3.1m minimum lane width under the CPKC bridge on 1st Street SW,
- Minimum of 1.5m sidewalk was provided due to right-of-way constraints.

Standards, Codes, Regulations, and Guidelines

There were various guidelines, standards, and by-laws used in roadway design. They are as follows:

- Transportation Association of Canada Geometric Design Guide for Canadian Roads
- City of Calgary Design Guidelines for Subdivision Servicing 2020
- City of Calgary Road Construction 2021 Standard Specifications
- City of Calgary Access Design Standards
- City of Calgary Centre City Urban Design Guideline
- City of Calgary Centre City Mobility Plan
- City of Calgary By-Law 1P2007 for Motor Vehicle Parking Stalls

Future Refinements

The vertical roadway profile including minimum and maximum vertical grades will be evaluated as per City's design guidelines in future design updates. For this design, it was assumed that roadway profile will match existing conditions, and it was not evaluated. In addition, the current design, corner radii were matched to existing conditions. However, further refinement will be required once the Traffic Operations team evaluates turning movements using a design vehicle. This will also confirm movements that will need to be restricted for an acceptable level of service. Roadway design will be further refined to accommodate and/or restrict driveway access. For center running median, driveways will need to be restricted to right-in and right-out only.

Future design phases can evaluate redistributing the parking and sidewalk areas. Tree and furniture areas, wider sidewalk, or wider parking lanes can be proposed in these areas without impacting to the traffic operations.

BRIDGE AND STRUCTURAL DESIGN

No structural design was completed at this stage. Column placement, bridge locations, and column sizing are conceptual only for feasibility and cost assessment.

Assumptions

- Columns placed every 30 meters,
- 2.5-meter column width,
- 1 meter buffer between column and edge of travel lane,
- Center piers are located when tracks are spaced at 4.35 meters,
- Straddle bents are assumed in locations when tracks open for center stations,
- 3-meter structural depth for guideway, at station locations 1 meter structural depth under mezzanine.

Future Refinements

- Column spacings for curved guideway will likely need to be a shorter than those that are on straight guideway,
- Columns at intersections should be located in a way to avoid compromising visibilities at the intersections.

STATION DESIGN

Assumptions

Size 9 x 135 metered elevated center station

Future Refinements

Side platforms to be evaluated in the future to increase the distance between the OCS and the building facades at locations where the guideway is transitioning back together.

UTILITIES

Standards, Codes, Regulations, and Guidelines

- The City of Calgary Design Guidelines for Development Site Servicing Plans
- Alberta Electrical Utility Code, Sixth Edition – August 2022

Assumptions

- Minimum horizontal clearance from the proposed columns to the outside diameter of underground pipes to be 3 meters
- Minimum horizontal clearance from the proposed columns to the underground electric lines to be 3 meters
- Minimum horizontal clearance from the LRT structure to the transmission lines to be 7 meters

Future Refinements

Topographic surveys and subsurface utility engineering (SUE) investigations to be performed in the future to confirm utility locations and ensure adequate clearances are met.

APPENDICES

1.1 GL Design Criteria Matrix_TRACK-Alignments

GL DESIGN CRITERIA MATRIX
Note: DRAFT version, in metric as indicated
From TCRP-Report 155: Track Design Handbook for LRT, 2nd Edition, Ch 3 - Light Rail Transit Track Geometry
From Previous Design Documentation: IIP.03 Track and right of way Interfaces
From Orange Line or other project precedence - see notes
OL direct values not converted

SECTION (155)	DESCRIPTION	CRITERIA			CONFLICTING INFORMATION	NOTE	
3	LRT TRACK ALIGNMENT & CLEARANCE					per existing OT traffic speed of 50km/h and footnote 1 below (https://data.calgary.ca/Health-and-Safety/Speed-Limits-Map/rbfp-3tic)	
3.1	General						
	Alignment design speed	50 km/h					
	Stationing	East to west and south to north					
	Control track	Right (when viewing station ahead)					
	Track alignment (mixed traffic)	Geometric design criteria of street dictates track geometry					
3.2	Horizontal Alignment[4]					See P 3-7 of TCRP 155	
	Tangent Alignment	Desired	Minimum	Absolute			
	Minimum tangent length	Greater of: 60 m or 0.5*V	Greater of: $L_{vehicle}$ or 0.5*V	Greater of: 9.5 m or see note	21 m		
	Tangent extension beyond both ends of platform		55	5' beyond boarding doors			
		Desired	Minimum	Absolute			
	Minimum radius, mainline, aerial/tunnel		150 m		60 m minimum for mainline		
	Minimum radius, mainline, at-grade ballasted		150 m	90 m	60 m minimum for mainline		
	Minimum radius, mainline, in-street (embedded)		150 m	25 m	60 m minimum for mainline		
	Minimum radius, yard & service tracks		30 m	25 m	30 m minimum in depot		
	Minimum length of curve (L_c)	0.5*V = 28.5 m		0'			
	Minimum length of curve (L_c), superelevated	3-5m > truck center distance					
	Maximum actual superelevation (Ea)	120 mm		6"		Use 5mm increments	
	Maximum unbalanced superelevation (Eu)	4.5"		6" (> 35mph) / 9" (≤ 35mph)			
	Maximum track design Twist	2.5 mm/m					
	Spiral Transitions	Desired	Minimum	Absolute			
	Spiral transition length (L_s)[2]	AREMA formulas			10 m minimum "curve transition"	Using 20m as minimum and 8m as abs min (converted	
	Virtual Transition Length		1.85m				
3.3	Vertical Alignment[3,4,5,6]	Desired	Max/Min	Absolute			
	Mainline maximum grade[5]		4%/6%		7%	Note in document on the 7% justification is on p9 of	
	Mainline minimum grade		0.5% or 0% with drainage measures				
	At-grade station, maximum grade		1%	1.5%			
	At-grade station, minimum grade		0.5%	0.2%			
	Aerial station, maximum grade		0.5%	1.5%			
	Aerial station, minimum grade		0.2%				
	Minimum tangent length	Greater of: 0.5*V or 30 m		12 m	0 per CAF		
	Minimum tangent length extension from end of platform		40'			Using 12 m conceptually (40' ~12 m)	Using 5m as absolute min
	Length of vertical curve (crest/sag)[4,7]	60A	30A				
	Length of vertical curve (L_{VC}), crest			Greater of: AV²/215 - or- 2.5A		2.5A from TRCP-155 p3-42, R_v of 250m	
	Length of vertical curve (L_{VC}), sag			Greater of: AV²/387 -or- 3.5A		3.5A from TRCP-155 p3-42, R_v of 350m	
	Minimum vertical track radius		500m				
2.3	Vehicle Clearances	Desired	Typical	Absolute			
	Track spacing, with center OCS/support[9]		14'				
	Track spacing, no center OCS/support		12'				
		Desired	Minimum	Absolute			
	Distance from edge of platform to CL of track		55.5" (4.625')				
	Distance from near face of CUT retaining wall to CL of track		8.6" (0.7167')				
	Distance from fence/rail of FILL retaining wall to CL of track		8.6" (0.7167')				
	Height of FILL retaining wall above top of ballast		6'				
	Minimum vertical clearance, at overhead bridges	21.5'	4.6 m	4.5 m		dependent on veh/OCS - used OL mins converted	
	Minimum vertical clearance, LRT over interstate, freeway, arterials	17'	5 m				
	Minimum vertical clearance, LRT over local, collector roads	15.5'	4.5 m				
	Minimum vertical clearance, LRT over railroad		7m (=23' per CPKC standards)				
	Minimum vertical clearance, LRT over existing LRT (Red/Blue line)		4.8 m	potential to reduce		per 2024.10.07 Track Align meeting	
OTHER							
	CAF Clearance Jig	6.6m Height x 3.41m Wide					
Running Parameters	Non-compensated acceleration	0.65 m/s²					
	Maximum lateral jerk	0.49 m/s³					
	Maximum roll	2 deg/s					
	Structural Depth, Roadway		2.5 m			Assumed from precedence	
	Structural Depth, Track/Existing RR		3 m			Assumed from precedence	
	Structural Depth at Inverted T's pier caps		3.35 m			Assumed from precedence (OL Riverside alt)	
	Guideway Width, At-Grade		8 m			per 2024.10.07 Track Align meeting	
	Track 1/2 CL to guideway curb face		1.825 m				
	Track 1/2 CL to exposed wall face (ret fill)		3.25				
	Wall thickness		0.7 m				
	Track 1/2 CL to bridge deck line		2.9 m			per 30% plans	
	FOOTNOTES						
0	4.9.21: Per project convention and AECOM precedent, design speed being used for track matches target speed being used for roadway. Design speed at station location also varies.						
1	For spiraled curves, length of the circular curve plus sum of 1/2 lengths of both spirals shall be acceptable method of compliance with desirable min length criteria (4.3.4.C)						
2	Spirals shall be required on all mainline track h.c. with radius less than 3000m (3.2.5.1)						
3	PGL in tangent track is along centerline b/t 2 running rails and in plane defined by TOR. In curved track, inside rail remains at PGL and superelevation achieved by raising outer rail above inner rail (4.3.6.1.B)						
4	See Table 7 for yard and pocket track PGL limitations						
5	If the length between vertical PIs is less than or equal to 750m, max longitudinal grade of 6% can be usedshort grade (<150m) = des max 7%, abs max 9%						
6	V.C.s should have max possible length, esp if approach/depart tangents are long. (4.3.6.4.A.1.ii)						
7	See 4.3.6.4.A.2 for reverse V.C. lengths						
8	For combined vert/hor curvature, use following absolute min combos: 82' HC/1640' VC -- 89' HC/1148' VC -- 95'HC/820'VC (4.3.6.4.A(4))						
9	Design shall allow for center OCS						

ASSUMPTIONS FROM PREVIOUS DESIGN (PDFs used were 1) 3 Phase 1 - Reference Concept Design - Downtown Segment; 2) GL - Provincial Technical Discussion March 17 2021.pdf; 3) Segment 2 Risk Mitigation Measures for Underground...			
Bored Tunnel	TOR to top outside of tunnel = 4.675m	U-Section	CL to outside wall = 5.425m
	Track 1 CL to Track 2 CL = 5.615M	At-grade	CL to CL = 4.35 m (assumed from cut and cover sections)
	CL to outside of tunnel wall = 8.635m	Platform Length	130m + 30m extensions = 190m total tangent
	Optimized radius (to reduce overcut) = 200m		

1.2 Design Criteria Matrix_TRACK-Work

GL DESIGN CRITERIA MATRIX					
Note: DRAFT version, in metric as indicated					
From TCRP-Report 155: Track Design Handbook for LRT, 2nd Edition, Ch 3 - Light Rail Transit Track Geometry					
From Previous Design Documentation: IIP.03 Track and right of way Interfaces					
From Orange Line or other project precedence - see notes					
OL direct values not converted					
SECTION	DESCRIPTION	CRITERIA			NOTE
	STATION DESIGN				
	Platform Geometry & Dimensions	Desired	Minimum	Absolute	
	Platform length	135 m			per 2024.10.07 Track Align meeting
	Platform height, above top of rail elevation	1'-2"			
	Platform width, center, at-grade	6 m		18'	per 2024.10.07 Track Align meeting
	Platform width, center, elevated/tunnel (vert circ on platform)			30'	
	Platform width, side, at-grade	4 m		12'	per 2024.10.07 Track Align meeting
	Platform width, side, elevated/tunnel (vert circ on platform)	18'		14'	
	Platform cross slope, maximum, toward track	1.5%[4]			
ASSUMED VALUES	Platform height	0.35 m			based on 14" from OL, converted
	Ramp length	9.25 m			based on 30' from OL, converted
	Guideway width at side platform	3.5 m			based on 11.625' from OL, converted rounded down because their standard GW width is narrower
	CL to platform distance	1.4 m			
	Mezzanine height	6.5 m			From screenshot from Isis 10/24
ROADWAY	Lane width (conceptual)	3.65 m (12')	3.35 m (11')	3.05 m (10')	

1.3 GL Design Criteria Matrix_TRACK-**Stations**

GL DESIGN CRITERIA MATRIX				
Note: DRAFT version, in metric as indicated				
From TCRP-Report 155: Track Design Handbook for LRT, 2nd Edition, Ch 3 - Light Rail Transit Track Geometry				
From Previous Design Documentation: IIP.03 Track and right of way Interfaces				
From Orange Line or other project precedence - see notes				
OL direct values not converted				
SECTION	DESCRIPTION	CRITERIA		
	STANDARDS, CODES, REGULATIONS & GUIDELINES			
	Standard rail section	115lb RE, continuous welded		
	Standard rail section, bridges, embedded track	112 TRAM (Block Rail)		
	TRACK CONSTRUCTION TYPES			
	See section for types and uses			
	TRACK GAUGE			
	Standard gauge	4'8-1/2"		
	SPECIAL TRACKWORK			
	Smallest turnout	#10	unless otherwise approved by CMTA	
	Minimum length of tangent b/t pt of switch & end of platform	55'		
		MINIMUM	DESIRABLE	ABSOLUTE MIN
	Tangent distance b/t pt of switch and hor/vert curve	35'	45'	20'

2.1 GL Design Criteria Matrix_Roadway

Item	Existing Condition	Proposed Condition - 1. Option 1st St 2. Option 2nd St 3. Option 6th St	Requirement	Reference
Roadway Classification	Residential/ Urban Boulevard	Urban Boulevard	Residential/Urban Boulevard	Calgary Road and Street Network Plan, Centre City Mobility Plan Centre City Urban Design Guideline (Oct 2015)
Posted Speed (km/hr)	40/50		-	
Design Speed (km/hr)	50/60	50/60	-	Pg 47 - Design Guidelines for Subdivision Servicing 2020
ROW - Roadway	Varies	Minimum 9.65m from edge of travelled lane	Min. 9.65m from edge of travelled lane	Fig 14 - Cross Section, Urban Boulevard - Design Guidelines for Subdivision Servicing 2020
ROADWAY HORIZONTAL GEOMETRY				
Lane Width (m)	Varies	3.3m (when two lanes or adjacent parallel parking) 3.5m (if one lane and curbs on both sides) 3.1m (minimum, constrained)	3.3	Pg 47 - Design Guidelines for Subdivision Servicing 2020
Parking Width (m)	~3m	2.6m	2.1m + 0.8m (door zone buffer for bike lanes) / 2.6m (bylaw)	Pg 47 - Design Guidelines for Subdivision Servicing 2020 / Calgary - Land Use Bylaw1P2007 Division 6: Requirements for Motor Vehicle Parking Stalls, Bicycle Parking Stalls and Loading Stalls
Approach taper ratio	N/A	10:1	8:1 to 30:1	TAC Table 9.17.1
BOULEVARD DESIGN				
Curb Type	Barrier C&G	0.25m Standard C&G	0.25 Rolled C&G Median 0.25m Standard C&G	Pg 47 - Design Guidelines for Subdivision Servicing 2020
Curb width	0.5 / 0.6	0.415	0.415	Fig 14 - Standard Curb with 250mm Gutter - Road Construction 2021 Standard Specification
Corner Radii	Varies	Varies - Match existing	Varies based on sidestreet (Street - Classification - NE/SE/SW/NW 10th St SE - Urban Blvd - 7.5m (all) 9 Ave SE - Urban Blvd (E), Residential (W) - 7.5m (E), 12.5m / 9m (E) 8 Ave SE - Proposed LRT? - No standard 7 Ave SE - Ex LRT - No standard 6 Ave SE - Residential - 12.5m (curb ext. parking) / 9m (no curb ext. parking)	Pg 99 - Design Guidelines for Subdivision Servicing 2020
Sidewalk	Varies	Varies 1.5m (minimum)	3m / 1.5m	Pg 47 - Design Guidelines for Subdivision Servicing 2020 Pg 10 - Calgary's Access Design Standards,
Median	N/A	4.5m		
Clearance from Pier to Face of Curb	N/A	1m		

3.1 GL **Utility Conflict Matrix**

- 1st Street SE Option

Date Prepared: 11/25/2024

General Note: Utility conflicts are identified using city-provided GIS utility information with proposed LRT structures. Utilities conflict matrix will need to be updated as design and survey progresses in the next design phase.

CONFLICT CATEGORY:	
YES	Less than 3m separation with proposed structure and ex water/sewer/storm. Less than 7m separation between Enmax electric line to proposed structure
NO	More than 3m separation with proposed structure and ex water/sewer/storm. More than 7m separation between Enmax electric line to the proposed structure

Calgary LRT Utility Conflicts Matrix

OPTION 1st ST

SN	UTILITY	SIZE (mm)	Size (ince	Size (Ft)	MATERI	CONFLICT LENGTH (I	CONFLICT CATEGORY	CONFLICT WITH	LOCATION
1	Water	400	15.7	1.3	PVC	96	YES	Potential conflict with LRT columns	Along 1st St SW between 6 Ave and 7 Ave SE
2	Water	300	11.8	1.0	YDI	99	YES	Potential conflict with LRT columns	Along 1st St SW between7 Ave & 8 Ave SE
3	Water	400	15.7	1.3	PDI	122	YES	Potential conflict with LRT columns	Along 1st St SW between 8 Ave and 9 Ave SE
4	Water	900	35.4	3.0	ST	20	YES	Potential conflict with LRT columns	Along 10 Ave between 1st ST SE and Macledo TR SE
5	Water	400	15.7	1.3	PDI	122	YES	Potential conflict with LRT columns	Along 10 Ave between 1st ST SE and Macledo TR SE
6	Sanitary Sewer	Minor	Minor	Minor	Minor	289	YES	Potential conflict with LRT columns	Along 1st SW between 6 Ave SE & 9 Ave SE
7	Sanitary Sewer	Minor	Minor	Minor	Minor	47	YES	Potential conflict with LRT columns	Along 10 Ave & West of Macleod Trail SE
8	Storm Sewer	1050	41.3	3.4	CONC	23	YES	Potential conflict with LRT columns	Along 1st St SW between 6 Ave and S of 5 Ave SE
9	Storm Sewer	900	35.4	3.0	CONC	118	YES	Potential conflict with LRT columns	Along 1st St SW between 7 Ave SE and 6 Ave SE
10	Storm Sewer	750	29.5	2.5	CONC	196	YES	Potential conflict with LRT columns	Along 1st St SW between 8 Ave and 9 Ave SE
11	Storm Sewer	Minor	Minor	Minor	Minor	65	YES	Potential conflict with LRT columns	Along 10 Ave SE between 1 St SE & Macleod Trail SE
12	Electric Lines	UG Dist Duct Bank	-	-	-	400	YES	Potential conflict with LRT columns	Along 1st St
13	Electric Lines	UG Transission	-	-	-	90	YES	Potential conflict with LRT columns	Along 10 Ave
14	Electric Lines	UG Dist Duct Bank	-	-	-	80	YES	Potential conflict with LRT columns	Along 10 Ave

- 2nd Street SW Option

Calgary LRT Utility Conflicts Matrix

OPTION 2nd St

SN	UTILITY	SIZE (mm)	Size (inces)	Size (Ft)	MATERIAL	CONFLICT LENGTH (M)	CONFLICT CATEGORY	CONFLICT WITH	LOCATION
1	Water	300	11.8	1.0	YDI/CI	1000	YES	Potential conflict with LRT columns	Along 2nd St SW between Sau Claire AV SW to 9 Ave SW
2	Water	900	35.4	3.0	ST	300	YES	Potential conflict with LRT columns	Along 10 Ave between 2nd St SW & Center St
3	Water	150	5.9	0.5	PVC	300	YES	Potential conflict with LRT columns	Along 10 Ave between 2nd St SW & Center St
4	Sanitary Sewer	Minor	Minor	Minor	PVC/CON C/VCT	1184	YES	Potential conflict with LRT columns	Along 2nd St SW between N of Riverfront Ave SW & 9 Ave SW
5	Sanitary Sewer	Minor	Minor	Minor	VCT	145	YES	Potential conflict with LRT columns	Along 10 Ave SW between 2 St SW of 1 St SW
6	Sanitary Sewer	500	19.7	1.6	VCT	42	YES	Potential conflict with LRT columns	Along 10 Ave between 1 St SW & Center St
7	Sanitary Sewer	500	19.7	1.6	CONC	125	YES	Potential conflict with LRT columns	Along 10 Ave between 1 St SW & Center St
8	Storm Sewer	1350	53.1	4.4	CONC	282	YES	Potential conflict with LRT columns	Along 2nd St SW between 3 Ave SW & N of Riverfront Ave SW
9	Storm Sewer	1500	59.1	4.9	CONC	46	YES	Potential conflict with LRT columns	Along 2nd St SW between 6 Ave SW & 3 Ave SW
10	Storm Sewer	1200	47.2	3.9	CONC	119	YES	Potential conflict with LRT columns	Along 2nd St SW between 7 Ave SW & 6 Ave SW
11	Storm Sewer	900	35.4	3.0	CONC	200	YES	Potential conflict with LRT columns	Along 2nd St SW between 9 Ave SW & 7 Ave SW
12	Electric Lines	UG Dist Duct	-	-	-	583	YES	Potential conflict with LRT columns	Along 2nd St
13	Electric Lines	UG Dist Duct Bank	-	-	-	533	YES	Potential conflict with LRT columns	Along 2nd St
14	Electric Lines	UG Dist Duct	-	-	-	88	YES	Potential conflict with LRT columns	Along 10 Ave
15	Electric Lines	UG Dist Duct Bank	-	-	-	255	YES	Potential conflict with LRT columns	Along 10 Ave
16	Electric Lines	UG Transission	-	-	-	170	YES	Potential conflict with LRT columns	Along 10 Ave

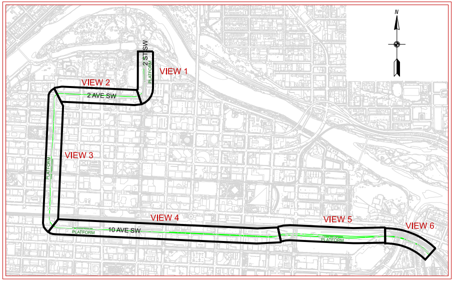
- 6th Street SW Option

Calgary LRT Utility Conflicts Matrix

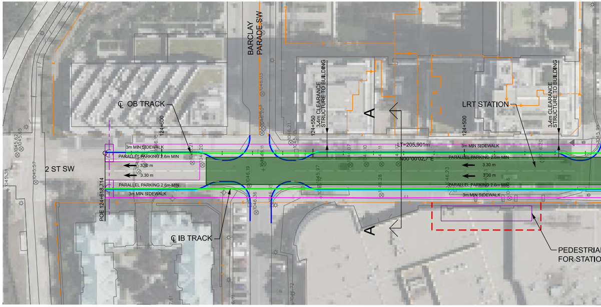
OPTION 6TH ST

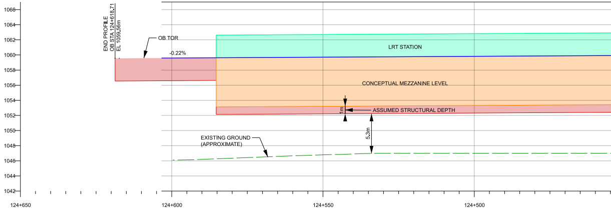
SN	UTILITY	SIZE (mm)	Size (inc	Size (Ft)	MATERI	CONFLICT LENGTH (f	POTENTIAL CONFLICT	CONFLICT WITH	LOCATION
1	Water	300	11.8	1.0	YDI	243	YES	Potential conflict with LRT columns	Along 2 St SW towards N of 2 Ave SW
2	Water	535	21.1	1.8	YDI	589	YES	Potential conflict with LRT columns	Along 2 Ave SW between 6 St SW & 2 St SW
3	Water	200	7.9	0.7	YUDI	87	YES	Potential conflict with LRT columns	Along 6 st SW between 2 and 3 Ave SW
4	Water	200	7.9	0.7	CI	106	NO	More than 3m Away from LRT columns	Along 6 st SW between 4 and 5 Ave SW
5	Water	200	7.9	0.7	CI/DI	422	YES	Potential conflict with LRT columns	Along 6 st SW between 5 and 9 Ave SW
6	Water	900	35.4	3.0	ST	342	YES	Potential conflict with LRT columns	Along 10 Ave SW between 6 St SW and 4 St SW (N side)
7	Water	150	5.9	0.5	CI	332	NO	More than 3m Away from LRT columns	Along 10 Ave SW between 6 St SW and 4 St SW (S side)
8	Water	900	35.4	3.0	ST	721	NO	More than 3m Away from LRT columns	Along 10 Ave SW between 4 St SW & West of 1 ST SE (N side)
9	Water	250	9.8	0.8	CI	420	YES	Potential conflict with LRT columns	Along 10 Ave SW between 4 St SW to 1 St SW (S side)
10	Water	150	5.9	0.5	CI	338	YES	Potential conflict with LRT columns	Along 10 Ave SW between 1 St SW & 1 St SE (S side)
11	Water	900	35.4	3.0	ST	150	YES	Potential conflict with LRT columns	Along 10 Ave SW between1 ST SE & Macleod TR SE (N side)
12	Water	250	9.8	0.8	PVCG	482	YES	Potential conflict with LRT columns	Along 10 Ave SW between 1 St SE & Olympic Way SE (S side)
13	Water	900	35.4	3.0	ST	347	NO	More than 3m Away from LRT columns	Along 10 Ave SW between Macleod TR SE & Olympic Way SE (N side)
14	Sanitary Sewer	750	29.5	2.5	Conc	151	YES	Potential conflict with LRT columns	Along 10 Ave Sw between 6 St SW & 5 St SW
15	Sanitary Sewer	500	19.7	1.6	Conc	340	YES	Potential conflict with LRT columns	Along 10 St SE between 1 St SW & 1 St SE
16	Sanitary Sewer	Minor	Minor	Minor	Conc	242	YES	Potential conflict with LRT columns	Along 2 St SW & N of 2 Ave SW
17	Sanitary Sewer	Minor	Minor	Minor	PVC	578	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 3 and 6 St SW
18	Sanitary Sewer	Minor	Minor	Minor	PVC/Conc	191	YES	Potential conflict with LRT columns	Along 6 st SW between 2 and 6 Ave SW
19	Sanitary Sewer	Minor	Minor	Minor	Conc/VCT	1076	YES	Potential conflict with LRT columns	Along 10 St SE between Macleod Trail SE & 5 St SW
20	Storm Sewer	Minor	Minor	Minor	PVC/Conc	574	YES	Potential conflict with LRT columns	Along 10 Ave SE between 6 St SW & Macleod Trail SE
21	Storm Sewer	1350	53.1	4.4	Conc	244	YES	Potential conflict with LRT columns	Along 2 St SW & N of 2 Ave SW
22	Storm Sewer	1050	41.3	3.4	Conc	157	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 3 St SW & 2 St SW
23	Storm Sewer	600	23.6	2.0	Conc	101	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 3 St SW
24	Storm Sewer	525	20.7	1.7	Conc	134	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 5 St SW
25	Storm Sewer	900	35.4	3.0	Conc	90	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 5 and Eest 6 St SW
26	Storm Sewer	750	29.5	2.5	Conc	70	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 6 and West 5 St SW
27	Storm Sewer	525	20.7	1.7	Conc	125	YES	Potential conflict with LRT columns	Along 10 Ave SE between 3 St SE & 4 St SE
28	Storm Sewer	Minor	Minor	Minor	Conc	130	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 5 St SW
29	Electric Lines	UG Dist Duct	-	-	-	225	YES	Potential conflict with LRT columns	Along 2nd St
30	Electric Lines	UG Dist Duct	-	-	-	345	YES	Potential conflict with LRT columns	Along 2nd Ave
31	Electric Lines	UG Dist DuctBank	-	-	-	290	YES	Potential conflict with LRT columns	Along 2nd Ave
32	Electric Lines	UG Dist Duct	-	-	-	529	YES	Potential conflict with LRT columns	Along 6th St
33	Electric Lines	UG Dist DuctBank	-	-	-	211	YES	Potential conflict with LRT columns	Along 6th St
34	Electric Lines	UG Dist Duct	-	-	-	730	YES	Potential conflict with LRT columns	Along 10 Ave
35	Electric Lines	UG Dist DuctBank	-	-	-	869	YES	Potential conflict with LRT columns	Along 10 Ave
36	Electric Lines	UG Transission	-	-	-	393	YES	Potential conflict with LRT columns	Along 10 Ave

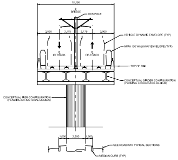
KEYMAP


N
2 ST SW
PLATFORM
VIEW 1
VIEW 2
2 AVE SW
VIEW 3
PLATFORM
VIEW 4
10 AVE SW
PLATFORM
VIEW 5
PLATFORM
VIEW 6

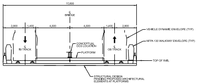
VIEW 1


BARCLAY PARADE SW
2 ST SW
℄ OB TRACK
℄ IB TRACK
LRT STATION
124+600
124+550
124+500
3.4m CLEARANCE STRUCTURE TO BUILDING
3.4m CLEARANCE STRUCTURE TO BUILDING
A
A
LT=205.901m
N00°00'02.7"E
3m MIN SIDEWALK
PARALLEL PARKING 2.6m MIN
3.30 m
3.30 m
PARALLEL PARKING 2.6m MIN
3m MIN SIDEWALK
POE 124+618.714
PEDESTRIA
FOR STATIO


END PROFILE
OB STA 124+618.71
EL 1059.56m
OB TOR
-0.22%
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
1m
ASSUMED STRUCTURAL DEPTH
5.3m
EXISTING GROUND (APPROXIMATE)
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
124+650
124+600
124+550
124+500


10,150
℄ BRIDGE
OCS POLE
2,900
2,175
2,175
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
℄ OB TRACK
TOP OF RAIL
CONCEPTUAL GIRDER CONFIGURATION (PENDING STRUCTURAL DESIGN)
CONCEPTUAL PIER CONFIGURATION (PENDING STRUCTURAL DESIGN)
1,000
2,500
1,000
SEE ROADWAY TYPICAL SECTIONS
MEDIAN CURB (TYP)

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, SINGLE PIER


17,600
℄ BRIDGE
2,900
1,400
4,500
4,500
1,400
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
℄ OB TRACK
CONCEPTUAL OCS LOCATION
PLATFORM
TOP OF RAIL
STRUCTURAL DESIGN PENDING PROPOSED ARCHITECTURAL ELEMENTS AT PLATFORMS

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, CENTER PLATFORM

DATE: 11/21/2024
TIME: 11:02 PM

SHEET # 1 OF 3

NOT FOR CONSTRUCTION

GREEN LINE LRT
ALTERNATIVE ALIGNMENTS ASSESSMENT
6TH ST SW OPTION

REV 0
DWG No. PLOT_Opt-6th
CONTRACT #########

SCALE H1:500 / V1:200
DRAWN CHRISTINA EDGAR
DESIGNED CE/MH/MY
CHECKED PENG ZHAO
IN-CHARGE PAUL BASSI
DATE 11/22/2024
DESIGN SUBMITTAL ALTERNATIVE ANALYSIS

Alberta

AECOM
SUITE 300
48 QUARRY PARK BLVD. S.E.
CALGARY, AB T2C 5P2, CANADA
AECOM.COM

HORIZONTAL
0 5 10 15 20 25
SCALE 1:500m

VERTICAL
0 2 4 6 8 10
SCALE 1:200m

IN PROGRESS REVIEW

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature PB
Date 11/27/24
PERMIT NUMBER: P10450
The Association of Professional Engineers, Geologists and Geophysicists of Alberta.

LEGEND

🟩	PROPOSED GREEN LINE CENTERLINE
🟦	PROPOSED ROADWAY CURB
—	PROPOSED SIDEWALK (SW)
—	PROPOSED BRIDGE DECK
—	*PROPOSED BRIDGE BENT/PIERS* (SEE NOTE 1)
— E —	EXISTING RIGHT OF WAY (ROW)
— — —	PROPOSED RIGHT OF WAY (PROW)
— — —	PROPOSED EASEMENT

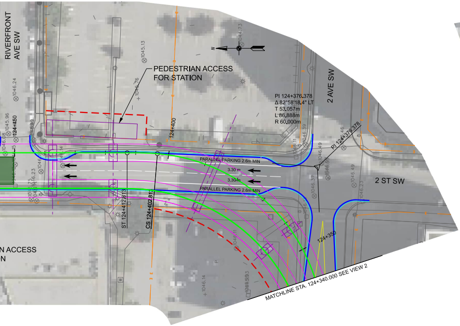
NOTES

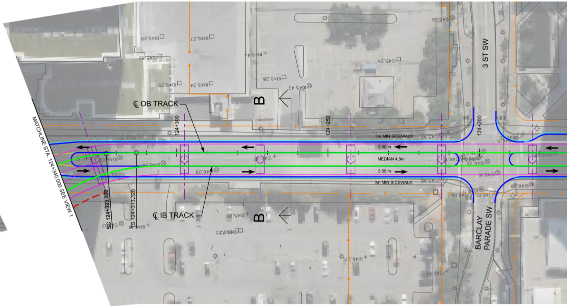
1. ALL UNITS IN METERS (m) UNLESS OTHERWISE SPECIFIED.
2. EXISTING GROUND LINE IN PROFILE IS GIS DATA (NOT SURVEY-BASED). SEE ENGINEERING DESIGN REPORT FOR FURTHER INF
3. PROPOSED BRIDGE BENT AND PIER LOCATIONS ARE CONCEPTUAL AND ARE SHOWN ONLY FOR THE PURPOSE OF ROADWAY T DESIGN. LOCATION AND CONFIGURATION OF BRIDGE STRUCTURES TO BE DETERMINED PENDING STRUCTURAL DESIGN AND A
4. SEE ARCHITECTURAL DRAWINGS FOR CONCEPTUAL COLUMN PLACEMENT AT LRT STATIONS.
5. PEDESTRIAN ACCESS LOCATIONS AT PLATFORMS ARE CONCEPTUAL ONLY AND TO BE REFINED IN FURTHER DESIGN PHASE.
6. BACK OF SIDEWALK LIMITS TO MATCH EXISTING ROW OR BUILDING FACE, DEPENDING ON EXISTING CONDITIONS.
7. PROPOSED DRIVEWAYS NOT SHOWN AND TO BE ANALYZED IN FURTHER DESIGN PHASES.

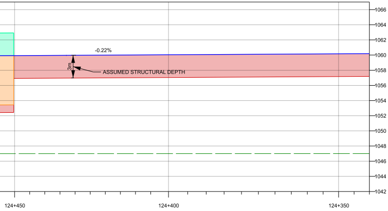
ABBREVIATIONS

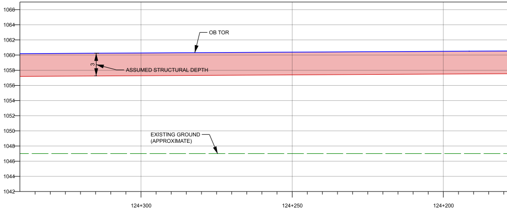
CPKC	CANADIAN PACIFIC KANSAS CITY	OB	OUTBOUND	TOR	TOP OF RAIL
GP	GENERAL PURPOSE	OCS	OVERHEAD CATENARY SYSTEM		
IB	INBOUND	ROW	RIGHT OF WAY		
LRT	LIGHT RAIL TRANSIT	SW	SIDEWALK		

FILE NAME: CalgGL_PLOT_Opt-6th
USER NAME: c.edgar

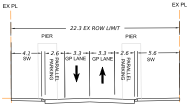

RIVERFRONT AVE SW
PEDESTRIAN ACCESS FOR STATION
PI 124+376.378
Δ 82°58'18.4" LT
T 53.057m
L 86.888m
R 60.000m
2 AVE SW
PI 124+378.378
2 ST SW
PARALLEL PARKING 2.6m MIN
3.30 m
3.30 m
PARALLEL PARKING 2.6m MIN
124+450
124+400
124+350
ST 124+412.813
CS 124+402.813
N ACCESS
N
MATCHLINE STA. 124+340.000 SEE VIEW 2


℄ OB TRACK
B
B
℄ IB TRACK
MATCHLINE STA. 124+340.000 SEE VIEW 1
124+300
124+250
124+200
3m MIN SIDEWALK
3.50 m
MEDIAN 4.5m
3.50 m
3m MIN SIDEWALK
SC 124+323.320
TS 124+313.320
3 ST SW
BARCLAY PARADE SW



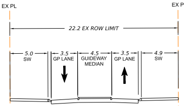


ORMATION.
RANSITION
NALYSIS.


EX PL
EX PL
22.3 EX ROW LIMIT
PIER
PIER
4.1
SW
2.6
PARALLEL PARKING
3.3
GP LANE
3.3
GP LANE
2.6
PARALLEL PARKING
5.6
SW

SECTION A-A

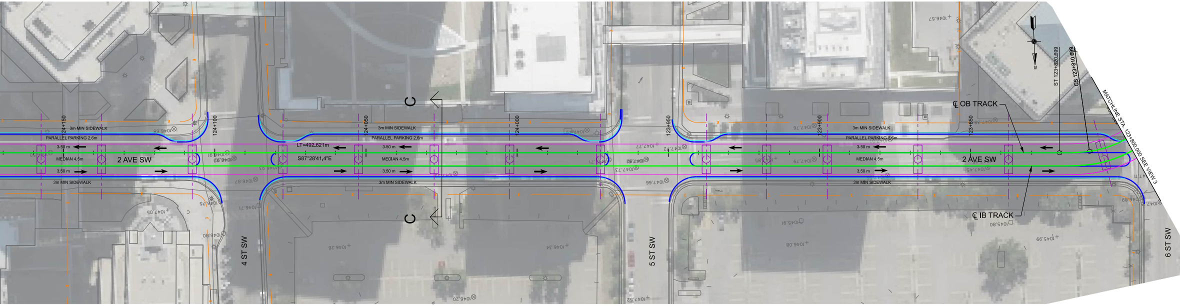
2nd St, Between Eau Clair to 2nd Ave (Station)

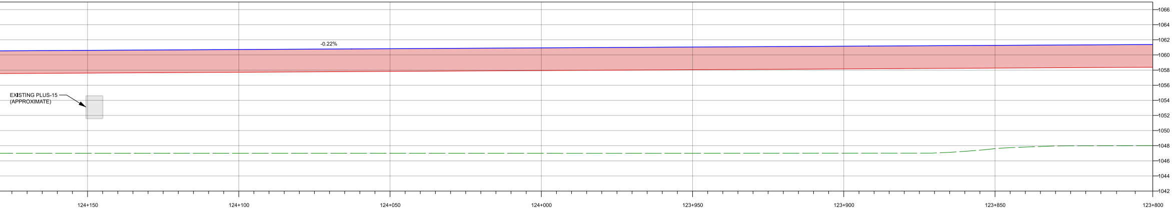

EX PL
EX PL
22.2 EX ROW LIMIT
5.0
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.9
SW

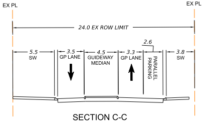
SECTION B-B

2nd Ave, Between 2nd St to 3th St

VIEW 2

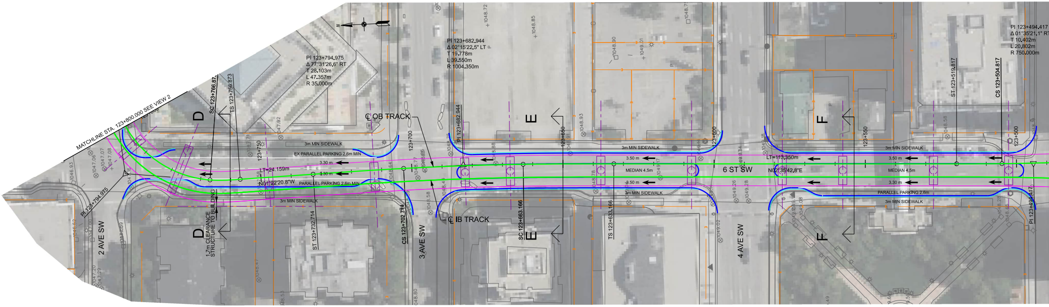

124+150
124+100
124+050
124+000
123+950
123+900
123+850
3m MIN SIDEWALK
PARALLEL PARKING 2.6m
3.50 m
MEDIAN 4.5m
3.50 m
3m MIN SIDEWALK
2 AVE SW
LT=492.621m
S87°28'41.4"E
C
C
4 ST SW
5 ST SW
6 ST SW
℄ OB TRACK
℄ IB TRACK
ST 123+820.699
CS 123+810.699
MATCHLINE STA. 123+800.000 SEE VIEW 3
N



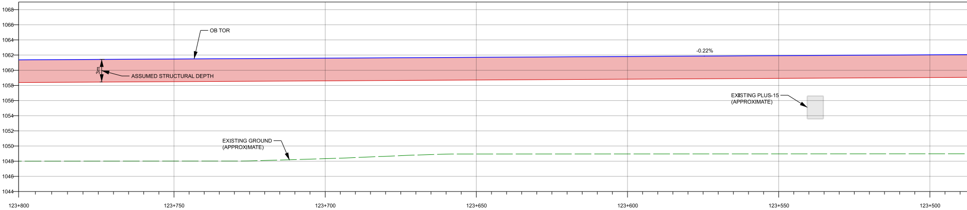

EX PL
EX PL
24.0 EX ROW LIMIT
5.5
SW
3.5
GP LANE
4.5
GUIDEWAY
MEDIAN
3.3
GP LANE
2.6
PARALLEL
PARKING
3.8
SW

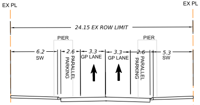
SECTION C-C

2 AVE SW, BETWEEN 3 ST SW and 6 ST SW



MATCHLINE STA. 123+800.000 SEE VIEW 2
PI 123+794.975
Δ 77°31'26.6" RT
T 28.103m
L 47.357m
R 35.000m
PI 123+682.944
Δ 02°15'22.5" LT
T 19.778m
L 39.550m
R 1004.350m
PI 123+494.417
Δ 01°35'21.1" RT
T 10.402m
L 20.802m
R 750.000m
SC 123+766.87
TS 123+756.873
ST 123+732.714
CS 123+702.714
PI 123+682.944
SC 123+663.166
TS 123+633.166
ST 123+519.817
CS 123+504.817
PI 123+494.417
123+750
123+700
123+650
123+600
123+550
123+500
D
D
E
E
F
F
℄ OB TRACK
℄ IB TRACK
3m MIN SIDEWALK
EX PARALLEL PARKING 2.6m MIN
3.30 m
3.30 m
LT=24.159m
N01°22'20.8"W
PARALLEL PARKING 2.6m MIN
3m MIN SIDEWALK
1.7m CLEARANCE STRUCTURE TO BUILDING
3.50 m
MEDIAN 4.5m
3.50 m
LT=113.350m
N02°35'42.8"E
PARALLEL PARKING 2.6m
6 ST SW
2 AVE SW
3 AVE SW
4 AVE SW

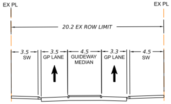




EX PL
EX PL
24.15 EX ROW LIMIT
PIER
PIER
6.2
SW
2.6
PARALLEL PARKING
3.3
GP LANE
3.3
GP LANE
2.6
PARALLEL PARKING
5.3
SW

SECTION D-D

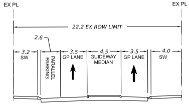
6 St SW, BETWEEN 2 Ave SW and 3 Ave SW



EX PL
EX PL
20.2 EX ROW LIMIT
3.5
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.3
GP LANE
4.5
SW

SECTION E-E

6 St SW, BETWEEN 3 Ave SW and 4 Ave SW

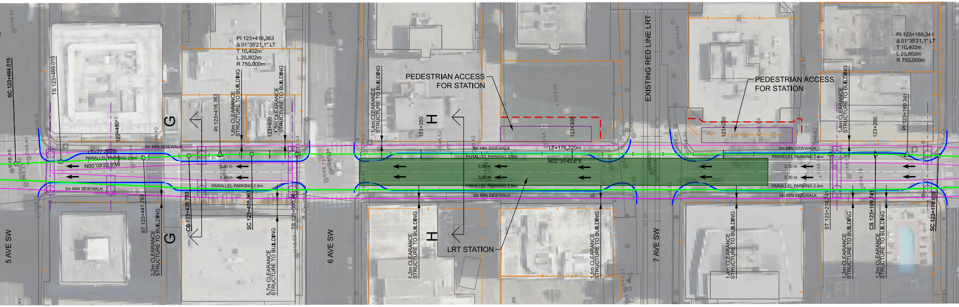


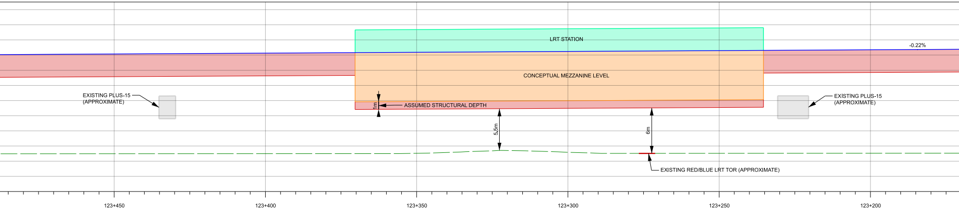
EX PL
EX PL
22.2 EX ROW LIMIT
2.6
3.2
SW
PARALLEL PARKING
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.0
SW

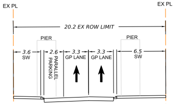
SECTION F-F

6 St SW, BETWEEN 4 Ave SW and 5 Ave SW

VIEW 3

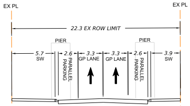

SC 123+484.015
TS 123+469.015
123+450
G
PI 123+416.363
Δ 01°35'21.1" LT
T 10.402m
L 20.802m
R 750.000m
PI 123+416.363
1.6m CLEARANCE STRUCTURE TO BUILDING
123+400
1.5m CLEARANCE STRUCTURE TO BUILDING
1.4m CLEARANCE STRUCTURE TO BUILDING
123+350
H
PEDESTRIAN ACCESS FOR STATION
123+300
EXISTING RED LINE LRT
PEDESTRIAN ACCESS FOR STATION
123+250
1.4m CLEARANCE STRUCTURE TO BUILDING
123+200
PI 123+189.341
PI 123+189.341
Δ 01°35'21.1" LT
T 10.402m
L 20.802m
R 750.000m
3m MIN SIDEWALK
LT=27.252m
PARALLEL PARKING 2.6m
N00°08'23.6"W
3.30 m
3.30 m
PARALLEL PARKING 2.6m
3m MIN SIDEWALK
LT=176.220m
N02°35'42.8"E
3m MIN SIDEWALK
PARALLEL PARKING 2.6m
3.30 m
3.30 m
PARALLEL PARKING 2.6m
3m MIN SIDEWALK
5 AVE SW
ST 123+441.763
2.2m CLEARANCE STRUCTURE TO BUILDING
G
CS 123+426.763
SC 123+405.961
5.7m CLEARANCE STRUCTURE TO BUILDING
TS 123+390.961
6 AVE SW
1.3m CLEARANCE STRUCTURE TO BUILDING
H
LRT STATION
1.6m CLEARANCE STRUCTURE TO BUILDING
7 AVE SW
1.4m CLEARANCE STRUCTURE TO BUILDING
ST 123+214.741
1.3m CLEARANCE STRUCTURE TO BUILDING
CS 123+199.741
1.2m CLEARANCE STRUCTURE TO BUILDING
SC 123+178.939


LRT STATION
-0.22%
CONCEPTUAL MEZZANINE LEVEL
EXISTING PLUS-15 (APPROXIMATE)
EXISTING PLUS-15 (APPROXIMATE)
1m
ASSUMED STRUCTURAL DEPTH
5.5m
6m
EXISTING RED/BLUE LRT TOR (APPROXIMATE)
123+450
123+400
123+350
123+300
123+250
123+200


EX PL
EX PL
20.2 EX ROW LIMIT
PIER
PIER
3.6 SW
2.6 PARALLEL PARKING
3.3 GP LANE
3.3 GP LANE
6.5 SW

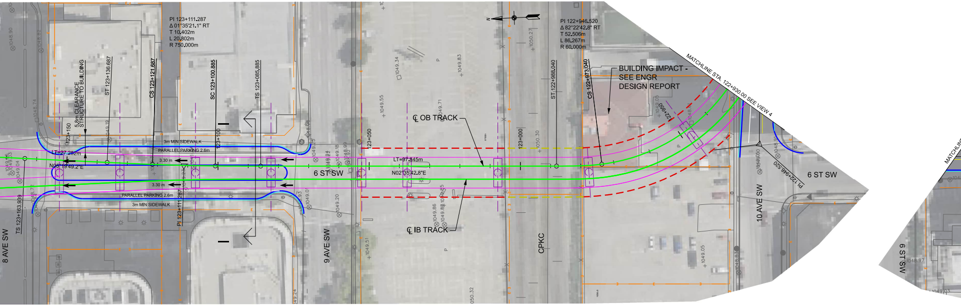
SECTION G-G

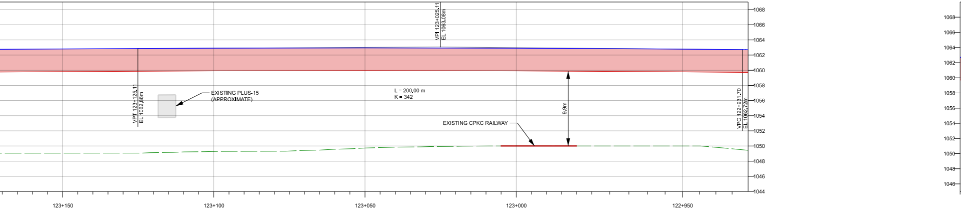
6 St SW, BETWEEN 5 AVE SW AND 6 AVE SW

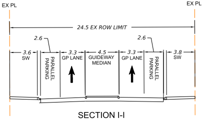

EX PL
EX PL
22.3 EX ROW LIMIT
PIER
PIER
5.7 SW
2.6 PARALLEL PARKING
3.3 GP LANE
3.3 GP LANE
2.6 PARALLEL PARKING
3.9 SW

SECTION H-H

6th St, Between 6th Ave and 8th Ave (Station)

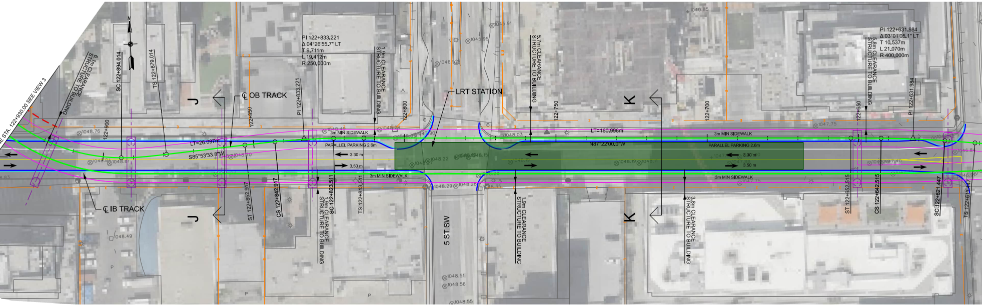

PI 123+111.287
Δ 01°35'21.1" RT
T 10.402m
L 20.802m
R 750.000m
PI 122+946.520
Δ 82°22'42.8" RT
T 52.506m
L 86.267m
R 60.000m
MATCHLINE STA. 122+930.00 SEE VIEW 4
BUILDING IMPACT - SEE ENGR DESIGN REPORT
5.8m CLEARANCE STRUCTURE TO BUILDING
ST 123+136.687
CS 123+121.687
SC 123+100.885
TS 123+085.885
ST 122+988.040
CS 122+973.040
TS 123+163.939
PI 123+111.287
PI 122+946.520
123+150
123+100
123+050
123+000
122+950
3m MIN SIDEWALK
PARALLEL PARKING 2.6m
3.30 m
3.30 m
PARALLEL PARKING 2.6m
3m MIN SIDEWALK
LT=27.262m
N00°19'49.2"E
LT=97.845m
N02°35'42.8"E
℄ OB TRACK
℄ IB TRACK
6 ST SW
6 ST SW
6 ST SW
8 AVE SW
9 AVE SW
10 AVE SW
CPKC
N
1049.55
1049.34
1049.83
1049.71
1050.27
1050.30
1049.86
1049.88
1049.51
1049.05
1049.20
1049.18
1049.24
1050.32
1048.90
1048.74
1048.97

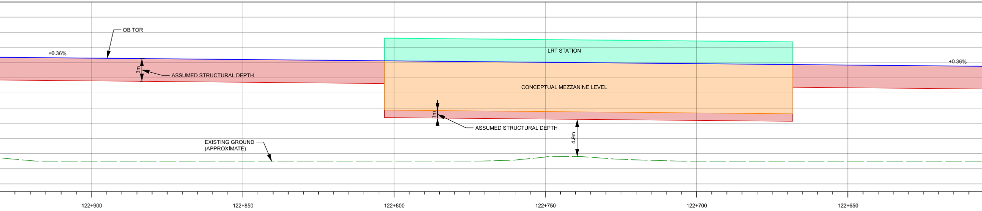


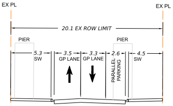

EX PL
EX PL
24.5 EX ROW LIMIT
2.6
2.6
3.6
SW
PARALLEL PARKING
3.3
GP LANE
4.5
GUIDEWAY MEDIAN
3.3
GP LANE
PARALLEL PARKING
3.8
SW

SECTION I-I

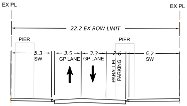
6 St SW, BETWEEN 8 AVE SW AND 9 AVE SW


STA. 122+930.00 SEE VIEW 3
6.1m CLEARANCE STRUCTURE TO BUILDING
SC 122+894.014
TS 122+879.014
J
℄ OB TRACK
122+900
122+850
PI 122+833.221
Δ 04°26'55.7" LT
T 9.711m
L 19.412m
R 250.000m
1.9m CLEARANCE STRUCTURE TO BUILDING
122+800
LRT STATION
5.7m CLEARANCE STRUCTURE TO BUILDING
122+750
K
122+700
122+650
PI 122+631.984
5.8m CLEARANCE STRUCTURE TO BUILDING
PI 122+631.984
Δ 03°01'05.1" LT
T 10.537m
L 21.070m
R 400.000m
LT=26.097m
S85°53'33.8"W
3m MIN SIDEWALK
PARALLEL PARKING 2.6m
3.30 m
3.50 m
LT=160.996m
N87°22'00.0"W
1048.76
1048.84
1048.81
1048.70
1048.49
1048.22
1048.27
1048.15
1048.19
1048.11
1048.03
1048.29
1048.28
1048.35
1048.51
1048.56
1048.55
1045.91
1045.95
1046.52
1040.85
1047.75
1047.88
1047.40
1046.84
℄ IB TRACK
ST 122+852.917
CS 122+842.917
1.9m CLEARANCE STRUCTURE TO BUILDING
SC 122+823.511
TS 122+813.511
5 ST SW
1.9m CLEARANCE STRUCTURE TO BUILDING
3.8m CLEARANCE STRUCTURE TO BUILDING
ST 122+652.515
CS 122+642.515
SC 122+621.447
TS 122+611.447
P

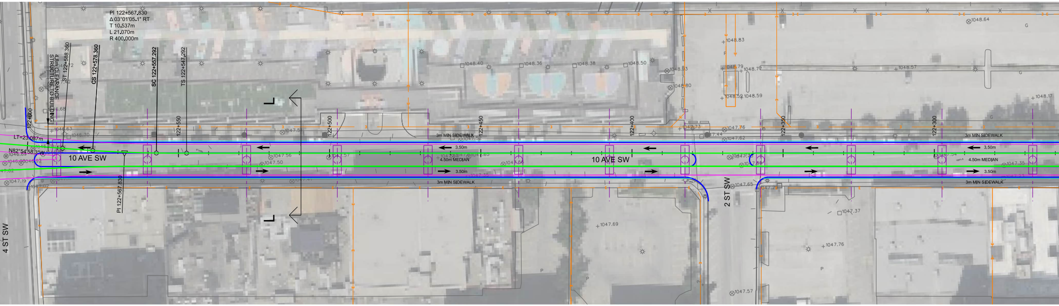

OB TOR
+0.36%
3m
ASSUMED STRUCTURAL DEPTH
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
1m
ASSUMED STRUCTURAL DEPTH
4.9m
EXISTING GROUND (APPROXIMATE)
+0.36%
122+900
122+850
122+800
122+750
122+700
122+650

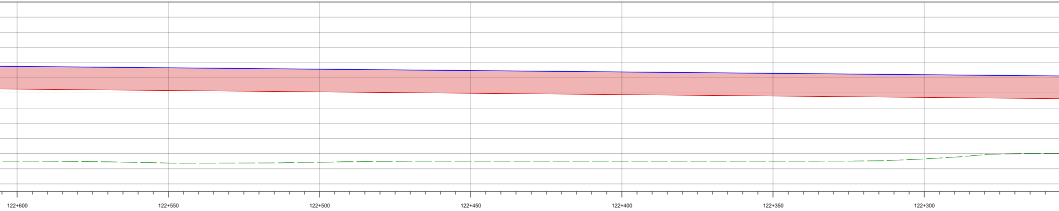

EX PL
EX PL
20.1 EX ROW LIMIT
PIER
PIER
5.3 SW
3.5 GP LANE
3.3 GP LANE
2.6 PARALLEL PARKING
4.5 SW

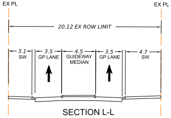
SECTION J-J
10th AVE SW, BETWEEN 5th ST SW and 6th ST SW


EX PL
EX PL
22.2 EX ROW LIMIT
PIER
PIER
5.3 SW
3.5 GP LANE
3.3 GP LANE
2.6 PARALLEL PARKING
6.7 SW

SECTION K-K
10th AVE SW, BETWEEN 4th ST SW and 5th ST SW


PI 122+567.830
Δ 03°01'05.1" RT
T 10.537m
L 21.070m
R 400.000m
4.8m CLEARANCE STRUCTURE TO BUILDING
ST 122+588.360
CS 122+578.360
SC 122+557.292
TS 122+547.292
PI 122+567.830
LT=23.087m
N82°54'58.3"W
122+600
122+550
122+500
122+450
122+400
122+350
122+300
10 AVE SW
10 AVE SW
4 ST SW
2 ST SW
3m MIN SIDEWALK
3m MIN SIDEWALK
3m MIN SIDEWALK
3m MIN SIDEWALK
3.50m
4.50m MEDIAN
3.50m
3.50m
4.50m MEDIAN
3.50m
L
L

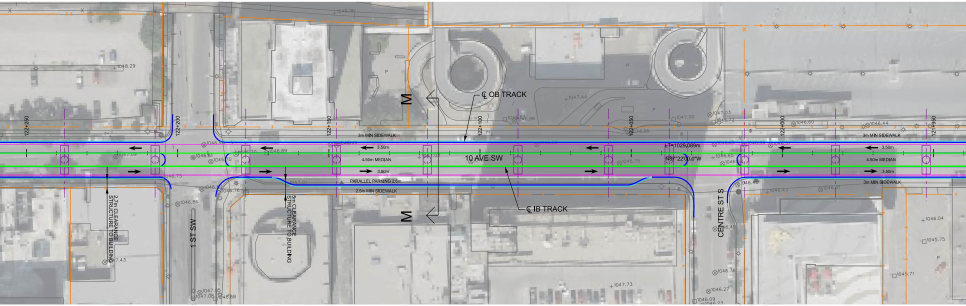



EX PL
EX PL
20.12 EX ROW LIMIT
3.1
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.7
SW

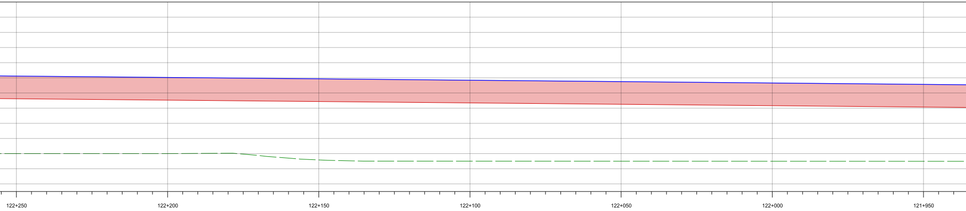
SECTION L-L

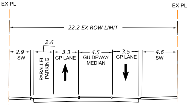
10 Ave SW, BETWEEN 4th St SW to 1st ST SW AND CENTRE ST AND MACLEOD TR

VIEW 4



122+250
122+200
122+150
122+100
122+050
122+000
121+950
℄ OB TRACK
℄ IB TRACK
10 AVE SW
1 ST SW
CENTRE ST S
M
M
3m MIN SIDEWALK
3.50m
4.50m MEDIAN
4.50m MEDIAN
PARALLEL PARKING 2.6m
2.5m MIN SIDEWALK
LT=1029.089m
N87°22'00.0"W
2.7m CLEARANCE STRUCTURE TO BUILDING
5m CLEARANCE STRUCTURE TO BUILDING
+1048.18
+1048.29
+1047.44
+1047.73
1047.03
1047.00
1046.60
1046.44
1046.04
1045.75
1045.71
1046.86
1046.36
1046.27
1046.09
1047.05
1047.08

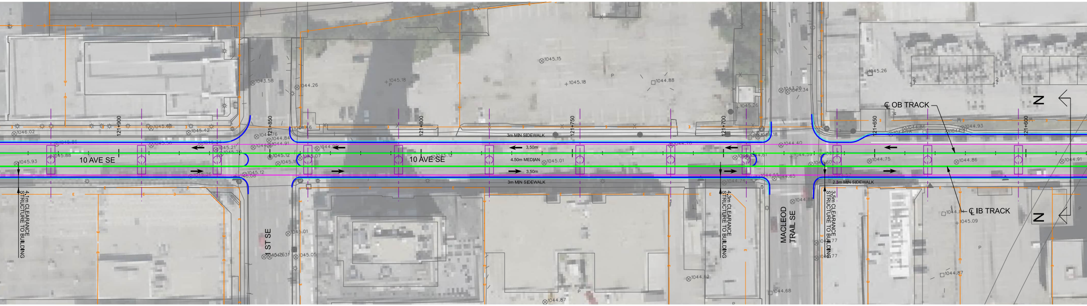


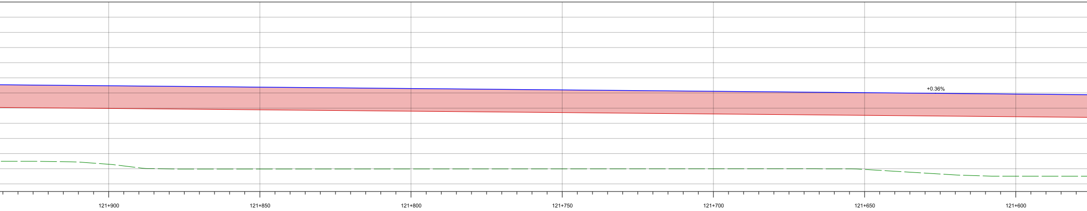


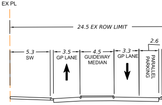
EX PL
EX PL
22.2 EX ROW LIMIT
2.9
SW
2.6
PARALLEL PARKING
3.3
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.6
SW

SECTION M-M

10 AVE SW, BETWEEN 1 ST SW and CENTRE ST

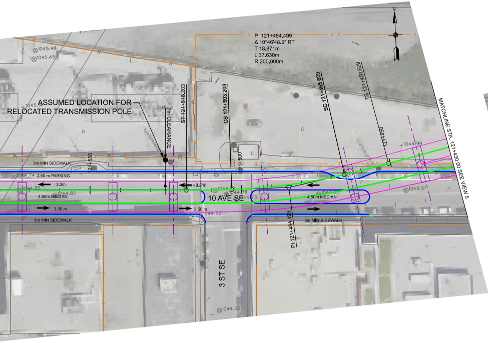

10 AVE SE
10 AVE SE
1 ST SE
MACLEOD TRAIL SE
℄ OB TRACK
℄ IB TRACK
N
N
3m MIN SIDEWALK
3.50m
4.50m MEDIAN
3.50m
3m MIN SIDEWALK
2.3m MIN SIDEWALK
4.1m CLEARANCE STRUCTURE TO BUILDING
4.3m CLEARANCE STRUCTURE TO BUILDING
3.5m CLEARANCE STRUCTURE TO BUILDING
121+900
121+850
121+800
121+750
121+700
121+650
121+600
1045.15
1045.18
1045.18
1044.88
1043.58
1044.26
1045.26
1045.26
1046.02
1045.42
1045.93
1045.88
1045.21
1045.12
1045.12
1045.01
1044.40
1044.75
1044.86
1044.91
1044.93
1045.09
1044.87
1044.88
1044.62
1044.68
1044.87
1045.01
1045.05

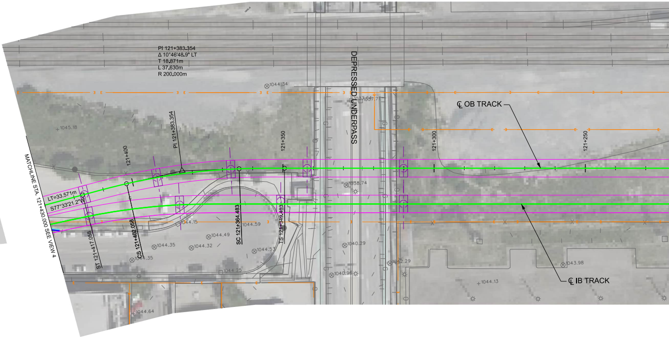


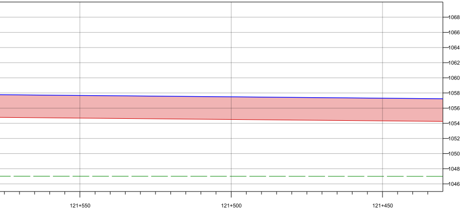

EX PL
24.5 EX ROW LIMIT
2.6
5.3
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.3
GP LANE
PARALLEL PARKING

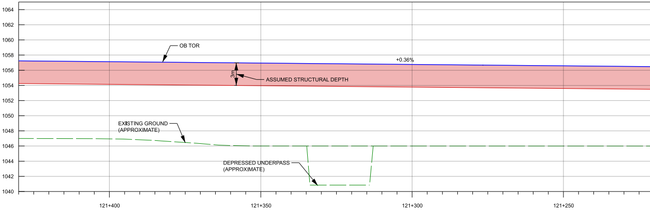
SECTION N-N

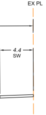
10 AVE SE, EAST OF MACLEOD TR TO CUL-DE-SAC


PI 121+484.499
Δ 10°46'48.9" RT
T 18.871m
L 37.630m
R 200.000m
ASSUMED LOCATION FOR RELOCATED TRANSMISSION POLE
7m CLEARANCE
ST 121+518.203
CS 121+503.203
SC 121+465.629
TS 121+450.629
121+550
121+500
121+450
PI 121+484.499
3m MIN SIDEWALK
2.60 m PARKING
3.3m
4.50m MEDIAN
3.50 m
10 AVE SE
3 ST SE
MATCHLINE STA. 121+430.00 SEE VIEW 5
1045.48
1045.45
1044.99
1044.51
1044.55

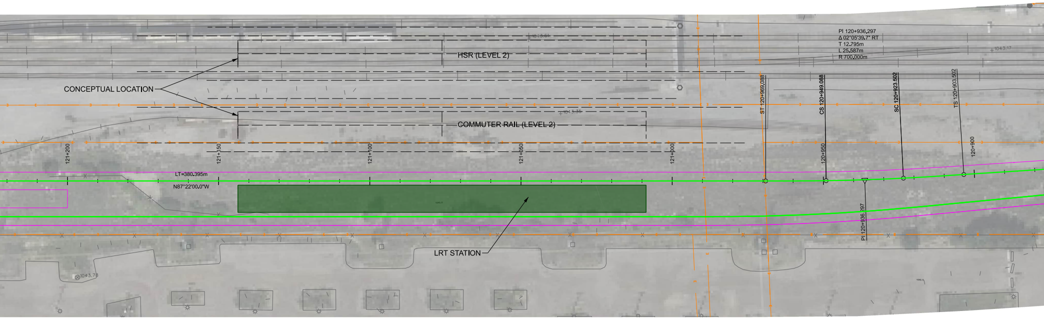

PI 121+383.354
Δ 10°46'48.9" LT
T 18.871m
L 37.630m
R 200.000m
DEPRESSED UNDERPASS
℄ OB TRACK
℄ IB TRACK
MATCHLINE STA. 121+430.000 SEE VIEW 4
LT=33.571m
S77°33'21.2"W
ST 121+417.058
CS 121+402.058
PI 121+383.354
SC 121+364.483
TS 121+349.483
121+400
121+350
121+300
121+250
1044.34
1045.18
1038.74
1044.15
1044.49
1044.35
1044.32
1044.59
1044.53
1040.29
1040.96
1042.29
1043.98
1044.13
1044.64


1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
121+550
121+500
121+450

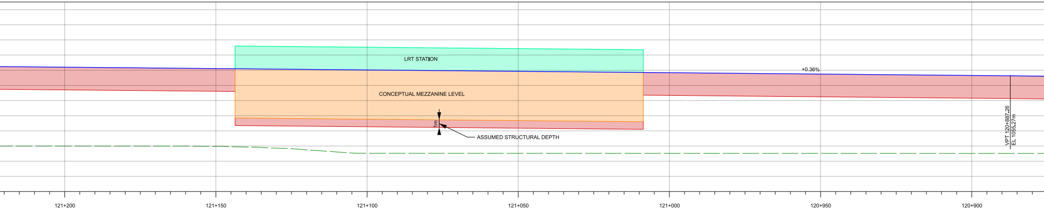

1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
1040
OB TOR
+0.36%
3m
ASSUMED STRUCTURAL DEPTH
EXISTING GROUND (APPROXIMATE)
DEPRESSED UNDERPASS (APPROXIMATE)
121+400
121+350
121+300
121+250



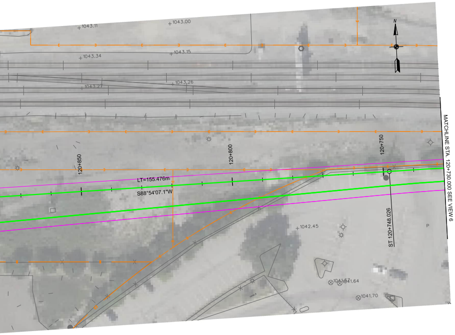
VIEW 5



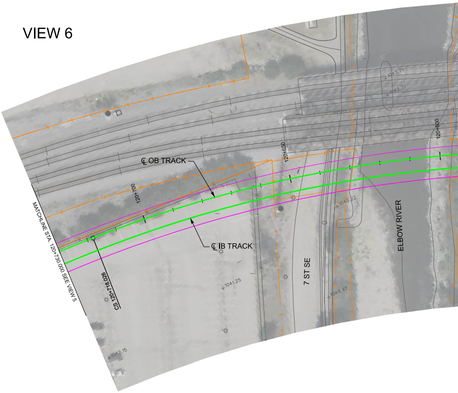
CONCEPTUAL LOCATION
HSR (LEVEL 2)
COMMUTER RAIL (LEVEL 2)
LRT STATION
LT=380.395m
N87°22'00.0"W
PI 120+936.297
Δ 02°05'39.7" RT
T 12.795m
L 25.587m
R 700.000m
ST 120+969.088
CS 120+949.088
SC 120+923.502
TS 120+903.502
PI 120+936.297
121+200
121+150
121+100
121+050
121+000
120+950
120+900
1043.61
1043.35
1043.17
1043.78

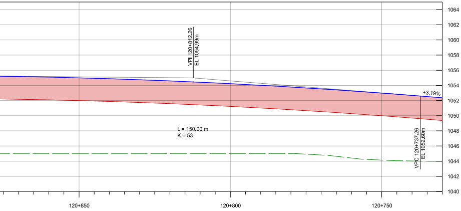


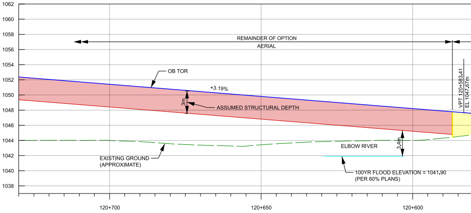
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
1m
ASSUMED STRUCTURAL DEPTH
+0.36%
VPT 120+887.26
EL 1055.27m
121+200
121+150
121+100
121+050
121+000
120+950
120+900

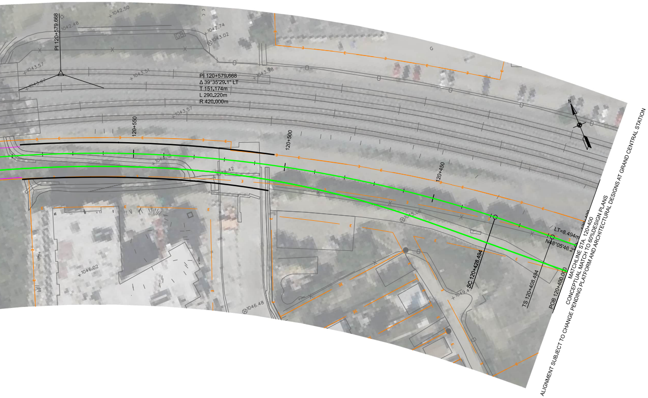

1043.11
1043.00
N
1043.34
1043.15
1043.26
1043.27
120+850
120+800
120+750
LT=155.476m
S88°54'07.1"W
1042.45
ST 120+748.026
P
1041.67
1041.64
1041.70
MATCHLINE STA. 120+730.000 SEE VIEW 6

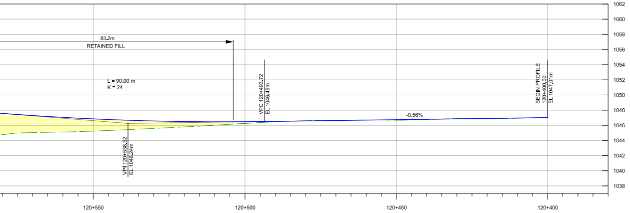
VIEW 6


1043.71
1043.71
120+600
120+650
120+700
℄ OB TRACK
℄ IB TRACK
1040.22
ELBOW RIVER
7 ST SE
1041.25
1040.47
CS 120+718.026
MATCHLINE STA. 120+730.000 SEE VIEW 5
1042.15






PI 120+579.668
+1042.50
+1042.48
+1042.74
+1043.02
+1043.57
+1043.67
+1043.51
+1043.38
PI 120+579.668
Δ 39°35'29.1" LT
T 151.174m
L 290.220m
R 420.000m
+1043.57
120+550
120+500
120+450
+1044.12
+1044.42
+1045.06
+1046.02
+1046.48
+1049.47
N
LT=8.494m
N48°05'46.2"
SC 120+428.494
TS 120+408.494
POB 120+400.000
MATCHLINE STA. 120+400
CONCEPTUAL MATCH TO 60%DESIGN PLANS
ALIGNMENT SUBJECT TO CHANGE PENDING PLATFORM AND ARCHITECTURAL DESIGNS AT GRAND CENTRAL STATION



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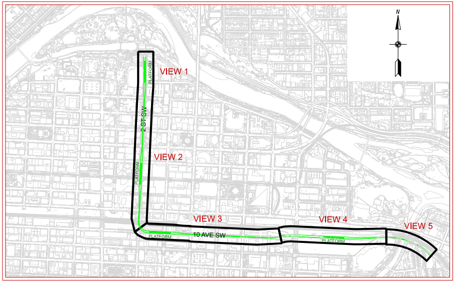
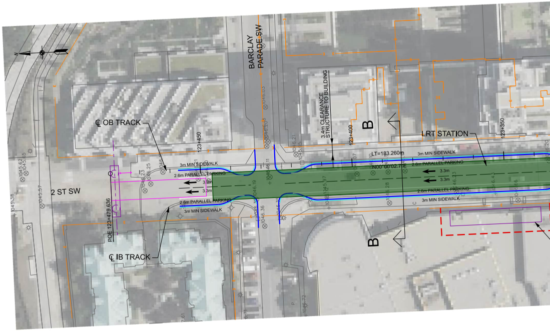
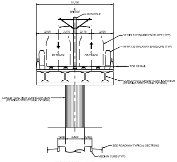
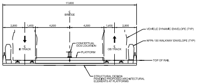
KEYMAP


N
VIEW 1
VIEW 2
VIEW 3
VIEW 4
VIEW 5
PLATFORM
2 ST SW
10 AVE SW
PLATFORM
PLATFORM
PLATFORM

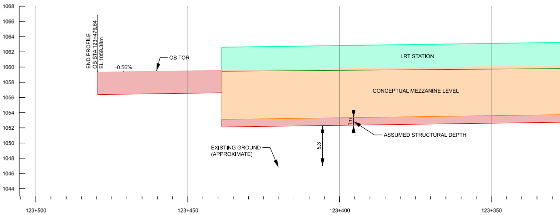

BARCLAY PARADE SW
2 ST SW
℄ OB TRACK
℄ IB TRACK
LRT STATION
3.4m CLEARANCE STRUCTURE TO BUILDING
123+450
123+400
123+350
POE 123+479.636
LT=183.260m
N00°00'02.7"E
3m MIN SIDEWALK
2.6m PARALLEL PARKING
3.3m
3.3m
2.6m PARALLEL PARKING
3m MIN SIDEWALK
B
B


10,150
℄ BRIDGE
OCS POLE
2,900
2,175
2,175
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
℄ OB TRACK
TOP OF RAIL
CONCEPTUAL GIRDER CONFIGURATION (PENDING STRUCTURAL DESIGN)
CONCEPTUAL PIER CONFIGURATION (PENDING STRUCTURAL DESIGN)
1,000
2,500
1,000
SEE ROADWAY TYPICAL SECTIONS
MEDIAN CURB (TYP)

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, SINGLE PIER


17,600
℄ BRIDGE
2,900
1,400
4,500
4,500
1,400
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
CONCEPTUAL OCS LOCATION
PLATFORM
℄ OB TRACK
TOP OF RAIL
STRUCTURAL DESIGN PENDING PROPOSED ARCHITECTURAL ELEMENTS AT PLATFORMS

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, CENTER PLATFORM


1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
END PROFILE
OB STA 123+479.64
EL 1059.38m
-0.56%
OB TOR
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
1m
ASSUMED STRUCTURAL DEPTH
EXISTING GROUND (APPROXIMATE)
5.3
123+500
123+450
123+400
123+350

DATE: 11/22/2024
TIME: 7:54 AM

SHEET # 2 OF 3

NOT FOR CONSTRUCTION

GREEN LINE LRT
ALTERNATIVE ALIGNMENTS ASSESSMENT
2ND ST SW OPTION

SCALE	H1:500 / V1:200
DRAWN	CHRISTINA EDGAR
DESIGNED	CE/MH/MY
CHECKED	PENG ZHAO
IN-CHARGE	PAUL BASSI
DATE	11/22/2024
DESIGN SUBMITTAL	ALTERNATIVE ANALYSIS

REV	DWG No.	CONTRACT
0	PLOT_Opt-2nd	#########

FILE NAME: CalgGL_PLOT_Opt-2nd
USER NAME: c.edgar

Alberta

AECOM
SUITE 300
48 QUARRY PARK BLVD. S.E.
CALGARY, AB T2C 5P2, CANADA
AECOM.COM

HORIZONTAL
0 5 10 15 20 25
SCALE 1:500m

VERTICAL
0 2 4 6 8 10
SCALE 1:200m

IN PROGRESS REVIEW

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date 11/27/24
PERMIT NUMBER: P10450
The Association of Professional Engineers, Geologists and Geophysicists of Alberta.

LEGEND

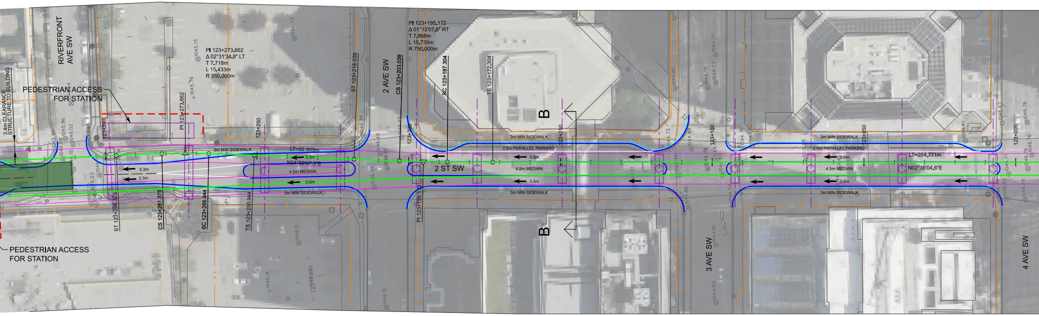
🟩	PROPOSED GREEN LINE CENTERLINE
🟦	PROPOSED ROADWAY CURB
—	PROPOSED SIDEWALK (SW)
—	PROPOSED BRIDGE DECK
—	*PROPOSED BRIDGE BENT/PIERS* (SEE NOTE 1)
— E —	EXISTING RIGHT OF WAY (ROW)
— — —	PROPOSED RIGHT OF WAY (PROW)
— — —	PROPOSED EASEMENT

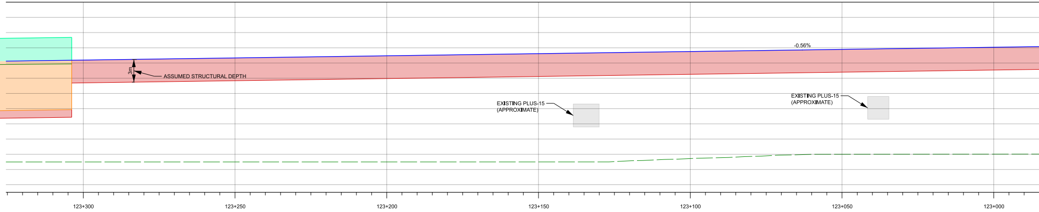
NOTES

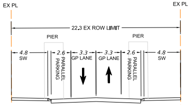
1. ALL UNITS IN METERS (m) UNLESS OTHERWISE SPECIFIED.
2. EXISTING GROUND LINE IN PROFILE IS GIS DATA (NOT SURVEY-BASED). SEE ENGINEERING DES
3. PROPOSED BRIDGE BENT AND PIER LOCATIONS ARE CONCEPTUAL AND ARE SHOWN ONLY FOR DESIGN. LOCATION AND CONFIGURATION OF BRIDGE STRUCTURES TO BE DETERMINED PEND
4. SEE ARCHITECTURAL DRAWINGS FOR CONCEPTUAL COLUMN PLACEMENT AT LRT STATIONS.
5. PEDESTRIAN ACCESS LOCATIONS AT PLATFORMS ARE CONCEPTUAL ONLY AND TO BE REFINED
6. BACK OF SIDEWALK LIMITS TO MATCH EXISTING ROW OR BUILDING FACE, DEPENDING ON EXIS
7. PROPOSED DRIVEWAYS NOT SHOWN AND TO BE ANALYZED IN FURTHER DESIGN PHASES.

ABBREVIATIONS

CPKC	CANADIAN PACIFIC KANSAS CITY	OB	OUTBOUND
GP	GENERAL PURPOSE	OCS	OVERHEAD CATENARY SYSTEM
IB	INBOUND	ROW	RIGHT OF WAY
LRT	LIGHT RAIL TRANSIT	SW	SIDEWALK

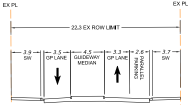

RIVERFRONT AVE SW
PEDESTRIAN ACCESS FOR STATION
3.4m CLEARANCE STRUCTURE TO BUILDING
PI 123+273.662
Δ 02°31'34.8" LT
T 7.718m
L 15.433m
R 350.000m
PI 123+273.662
123+300
123+250
ST 123+218.039
2 AVE SW
CS 123+203.039
PI 123+195.172
Δ 01°12'07.6" RT
T 7.868m
L 15.735m
R 750.000m
SC 123+187.304
TS 123+172.304
123+200
123+150
123+100
123+050
123+000
B
B
3m MIN SIDEWALK
2.6m PARALLEL PARKING
3.5m
4.5m MEDIAN
3.3m
3.3m
LT=32.905m
N04°58'57.5"E
2 ST SW
LT=284.771m
N02°38'04.6"E
ST 123+296.375
CS 123+281.375
SC 123+265.944
TS 123+250.944
PI 123+195.172
PEDESTRIAN ACCESS FOR STATION
3 AVE SW
4 AVE SW


-0.56%
3m
ASSUMED STRUCTURAL DEPTH
EXISTING PLUS-15 (APPROXIMATE)
EXISTING PLUS-15 (APPROXIMATE)
123+300
123+250
123+200
123+150
123+100
123+050
123+000


EX PL
EX PL
22.3 EX ROW LIMIT
PIER
PIER
4.8 SW
2.6 PARALLEL PARKING
3.3 GP LANE
3.3 GP LANE
2.6 PARALLEL PARKING
4.8 SW

SECTION A-A

2nd St, Eau Clair to 2nd Ave (Station)


EX PL
EX PL
22.3 EX ROW LIMIT
3.9 SW
3.5 GP LANE
4.5 GUIDEWAY MEDIAN
3.3 GP LANE
2.6 PARALLEL PARKING
3.7 SW

SECTION B-B

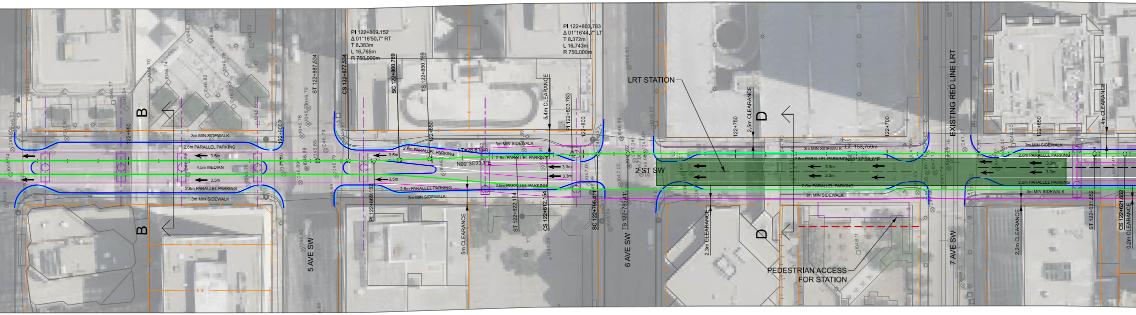
2nd St, 2nd Ave to 4th Ave

SIGN REPORT FOR FURTHER INFORMATION.
R THE PURPOSE OF ROADWAY TRANSITION
ING STRUCTURAL DESIGN AND ANALYSIS.

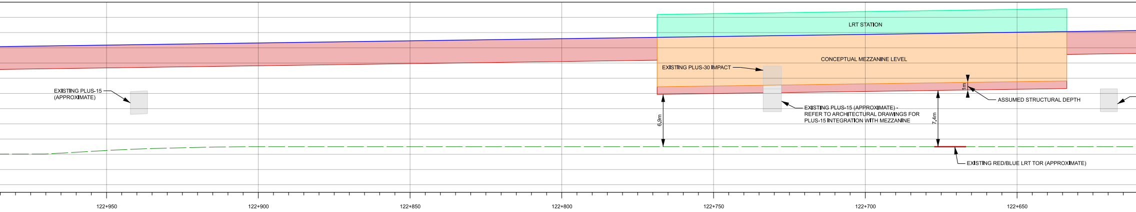
D IN FURTHER DESIGN PHASE.
STING CONDITIONS.

TOR TOP OF RAIL

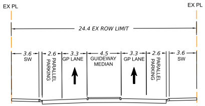
VIEW 1



B
B
D
D
PI 122+869.152
Δ 01°16'50.7" RT
T 8.383m
L 16.765m
R 750.000m
PI 122+803.783
Δ 01°16'44.7" LT
T 8.372m
L 16.743m
R 750.000m
LRT STATION
2 ST SW
5 AVE SW
6 AVE SW
7 AVE SW
EXISTING RED LINE LRT
PEDESTRIAN ACCESS FOR STATION
3m MIN SIDEWALK
2.6m PARALLEL PARKING
3.5m
4.5m MEDIAN
3.3m
LT=28.610m
LT=153.759m
N00°35'23.7"E
N02°37'58.6"E
5.4m CLEARANCE
5m CLEARANCE
2.5m CLEARANCE
2.3m CLEARANCE
2.2m CLEARANCE
4m CLEARANCE
0.2m CLEARANCE
122+950
122+900
122+850
122+800
122+750
122+700
122+650
ST 122+887.534
CS 122+877.534
SC 122+860.769
TS 122+850.769
PI 122+869.152
ST 122+822.154
CS 122+812.154
PI 122+803.783
SC 122+795.411
TS 122+785.411
ST 122+631.652
CS 122+621.652



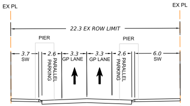
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
EXISTING PLUS-30 IMPACT
EXISTING PLUS-15 (APPROXIMATE)
EXISTING PLUS-15 (APPROXIMATE) - REFER TO ARCHITECTURAL DRAWINGS FOR PLUS-15 INTEGRATION WITH MEZZANINE
ASSUMED STRUCTURAL DEPTH
1m
6.9m
7.4m
EXISTING RED/BLUE LRT TOR (APPROXIMATE)
122+950
122+900
122+850
122+800
122+750
122+700
122+650



EX PL
EX PL
24.4 EX ROW LIMIT
3.6 SW
2.6 PARALLEL PARKING
3.3 GP LANE
4.5 GUIDEWAY MEDIAN
3.3 GP LANE
2.6 PARALLEL PARKING
3.6 SW

SECTION C-C

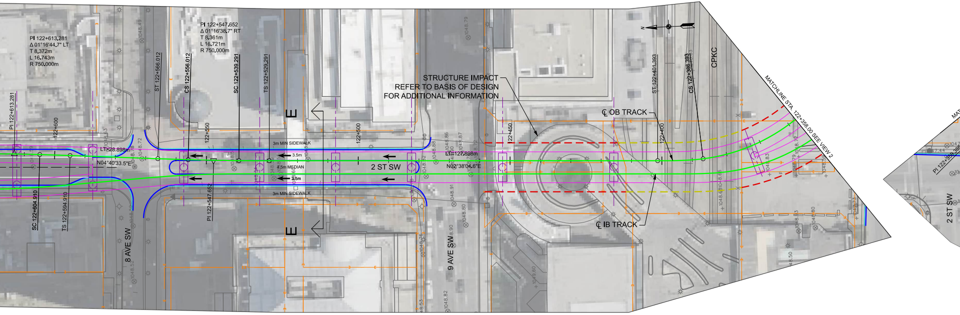
2nd St, 4th Ave to 5th Ave

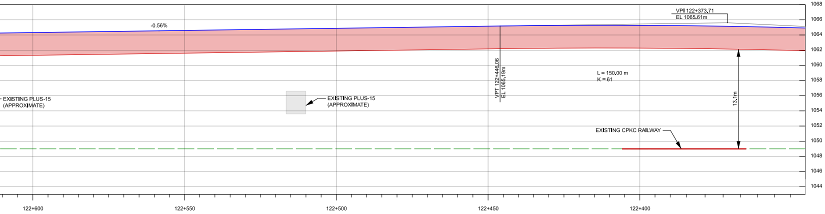


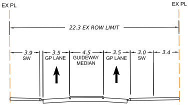
EX PL
EX PL
22.3 EX ROW LIMIT
PIER
PIER
3.7 SW
2.6 PARALLEL PARKING
3.3 GP LANE
3.3 GP LANE
2.6 PARALLEL PARKING
6.0 SW

SECTION D-D

2nd St, 6th Ave to 8th Ave

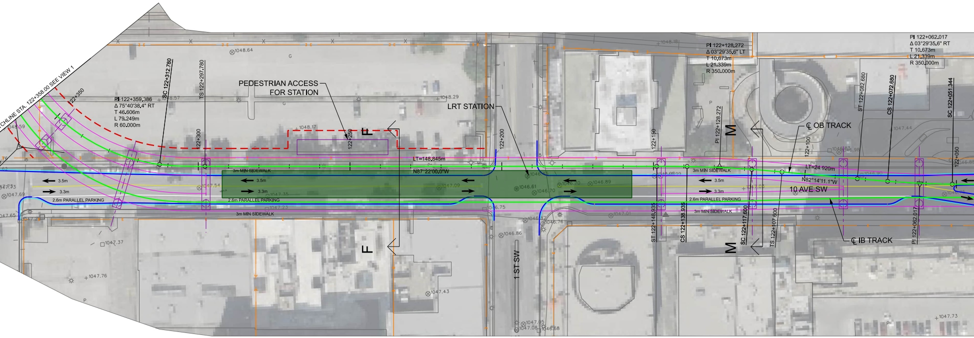

PI 122+613.281
Δ 01°16'44.7" LT
T 8.372m
L 16.743m
R 750.000m
PI 122+547.652
Δ 01°16'38.7" RT
T 8.361m
L 16.721m
R 750.000m
PI 122+613.281
122+600
SC 122+604.910
TS 122+594.910
ST 122+566.012
CS 122+556.012
122+550
PI 122+547.652
SC 122+539.291
TS 122+529.291
122+500
122+450
ST 122+401.393
122+400
CS 122+386.393
CPKC
LT=28.898m
N04°40'33.5"E
LT=127.898m
N02°38'04.6"E
3m MIN SIDEWALK
3.5m
4.5m MEDIAN
3.5m
3m MIN SIDEWALK
2 ST SW
8 AVE SW
9 AVE SW
2 ST SW
E
E
STRUCTURE IMPACT
REFER TO BASIS OF DESIGN
FOR ADDITIONAL INFORMATION
℄ OB TRACK
℄ IB TRACK
MATCHLINE STA 122+358.00 SEE VIEW 2
N


1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
-0.56%
VPI 122+373.71
EL 1065.61m
VPT 122+446.06
EL 1065.19m
L = 150.00 m
K = 61
13.1m
EXISTING PLUS-15
(APPROXIMATE)
EXISTING PLUS-15
(APPROXIMATE)
EXISTING CPKC RAILWAY
122+600
122+550
122+500
122+450
122+400

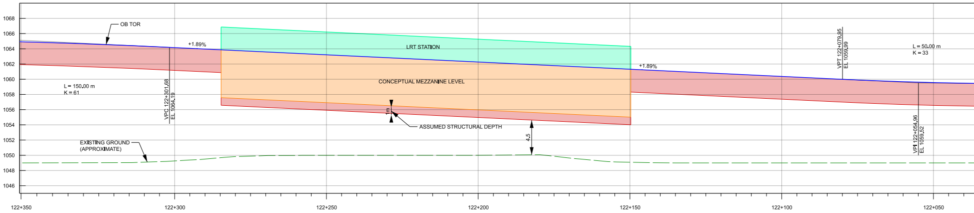

EX PL
EX PL
22.3 EX ROW LIMIT
3.9
SW
3.5
GP LANE
4.5
GUIDEWAY
MEDIAN
3.5
GP LANE
3.0
SW
3.4

SECTION E-E

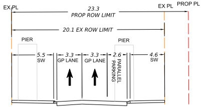
2nd St, 8th Ave to 9th Ave



MATCHLINE STA. 122+358.00 SEE VIEW 1
PI 122+359.386
Δ 75°40'38.4" RT
T 46.606m
L 79.249m
R 60.000m
SC 122+312.780
TS 122+297.780
122+350
122+300
122+250
122+200
122+150
122+100
122+050
PEDESTRIAN ACCESS FOR STATION
LRT STATION
F
F
M
M
LT=148.845m
N87°22'00.0"W
3m MIN SIDEWALK
3.5m
3.3m
2.6m PARALLEL PARKING
1 ST SW
10 AVE SW
PI 122+128.272
Δ 03°29'35.6" LT
T 10.673m
L 21.339m
R 350.000m
PI 122+128.272
ST 122+148.935
CS 122+138.935
SC 122+117.600
TS 122+107.600
LT=24.920m
N82°14'11.1"W
℄ OB TRACK
℄ IB TRACK
ST 122+082.680
CS 122+072.680
SC 122+051.344
PI 122+062.017
PI 122+062.017
Δ 03°29'35.6" RT
T 10.673m
L 21.339m
R 350.000m
1048.64
1048.29
1048.17
1048.18
1047.54
1047.09
1046.61
1046.70
1046.89
1046.75
1046.86
1047.43
1047.37
1047.76
1047.69
1047.73
1047.05
1047.08
1046.58



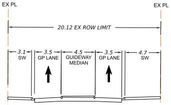
1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
OB TOR
+1.89%
+1.89%
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
1m
ASSUMED STRUCTURAL DEPTH
4.5
L = 150.00 m
K = 61
VPC 122+301.68
EL 1064.19
VPT 122+079.95
EL 1059.99
L = 50.00 m
K = 33
VPI 122+054.96
EL 1059.52
EXISTING GROUND (APPROXIMATE)
122+350
122+300
122+250
122+200
122+150
122+100
122+050



EX PL
EX PL
PROP PL
23.3
PROP ROW LIMIT
20.1 EX ROW LIMIT
PIER
PIER
5.5
SW
3.3
GP LANE
3.3
GP LANE
2.6
PARALLEL PARKING
4.6
SW

SECTION F-F

10 Ave, 1st St to 2nd St (Station)

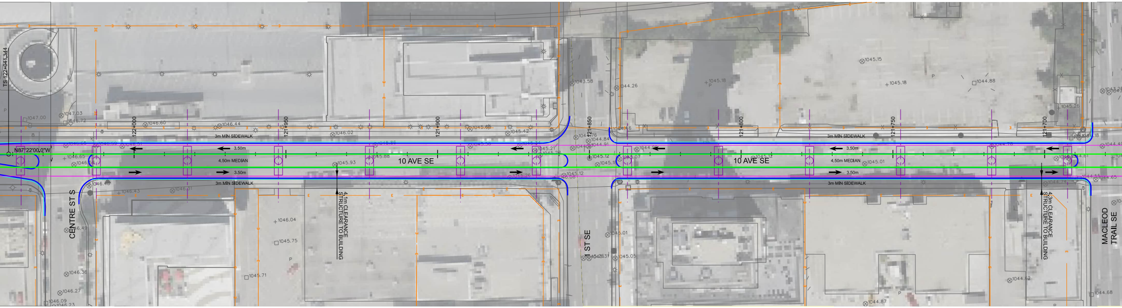


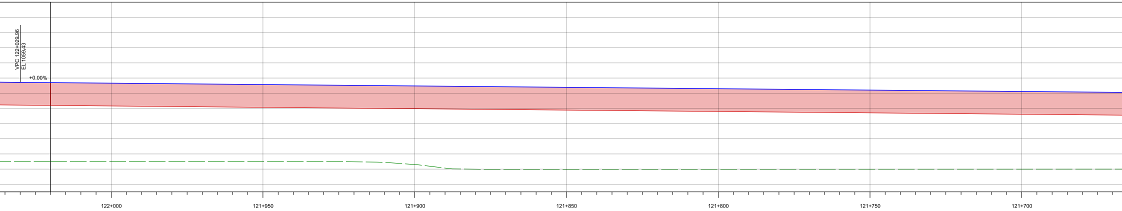
EX PL
EX PL
20.12 EX ROW LIMIT
3.1
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.7
SW

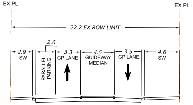
SECTION L-L

10 Ave SW, BETWEEN 4th St SW to 1st ST SW
AND CENTRE ST AND MACLEOD TR

VIEW 2

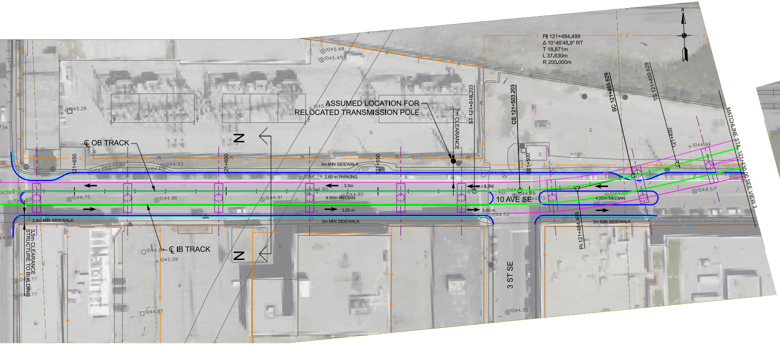

TS 122+041.344
N87°22'00.0"W
10 AVE SE
10 AVE SE
3m MIN SIDEWALK
3m MIN SIDEWALK
3m MIN SIDEWALK
3m MIN SIDEWALK
4.50m MEDIAN
4.50m MEDIAN
3.50m
3.50m
3.50m
3.50m
122+000
121+950
121+900
121+850
121+800
121+750
121+700
CENTRE ST S
1 ST SE
MACLEOD TRAIL SE
4.1m CLEARANCE STRUCTURE TO BUILDING
4.3m CLEARANCE STRUCTURE TO BUILDING
1047.00
1047.03
1046.72
1046.60
1046.44
1046.02
1045.93
1045.88
1045.42
1045.21
1043.58
1044.26
1045.18
1045.15
1045.18
1044.88
1045.26
1044.84
1044.91
1045.12
1045.12
1045.07
1045.01
1046.65
1046.43
1046.31
1046.04
1045.75
1045.71
1046.49
1046.36
1046.27
1046.09
1046.23
1045.01
1045.05
1044.62
1044.87
1044.68

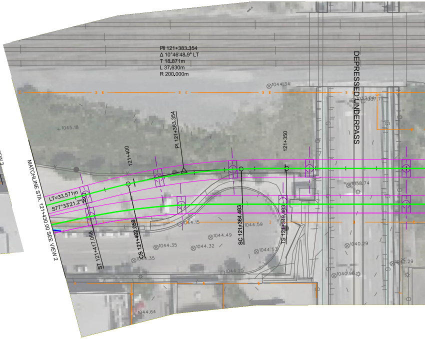

VPC 122+029.96
EL 1059.43
+0.00%
122+000
121+950
121+900
121+850
121+800
121+750
121+700

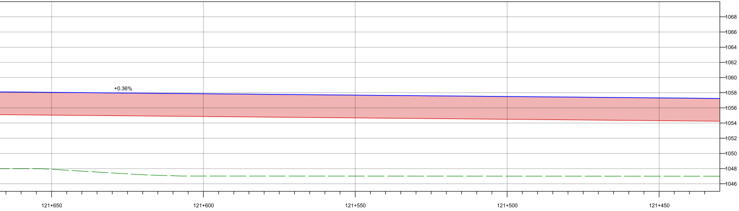

EX PL
EX PL
22.2 EX ROW LIMIT
2.9
SW
2.6
PARALLEL PARKING
3.3
GP LANE
4.5
GUIDEWAY MEDIAN
3.5
GP LANE
4.6
SW

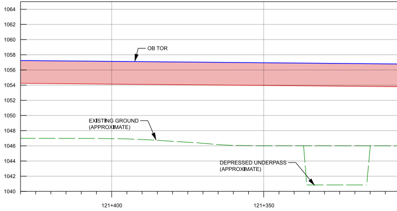
SECTION M-M

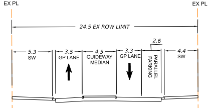
10 AVE SW, BETWEEN 1 ST SW and CENTRE ST


PI 121+484.499
Δ 10°46'48.9" RT
T 18.871m
L 37.630m
R 200.000m
ASSUMED LOCATION FOR
RELOCATED TRANSMISSION POLE
℄ OB TRACK
℄ IB TRACK
7m CLEARANCE
ST 121+518.203
CS 121+503.203
SC 121+465.629
TS 121+450.629
PI 121+484.499
MATCHLINE STA. 121+430.00 SEE VIEW 3
121+650
121+600
121+550
121+500
121+450
3m MIN SIDEWALK
2.60 m PARKING
3.3m
4.50m MEDIAN
3.50 m
2.3m MIN SIDEWALK
3.5m CLEARANCE STRUCTURE TO BUILDING
10 AVE SE
3 ST SE
N
1045.48
1045.45
1045.26
1044.93
1044.86
1044.75
1044.91
1044.82
1044.85
1044.76
1044.73
1044.99
1044.51
1044.52
1045.09
1044.87
1044.55
1044.77


PI 121+383.354
Δ 10°46'48.9" LT
T 18.871m
L 37.630m
R 200.000m
DEPRESSED UNDERPASS
MATCHLINE STA. 121+430.00 SEE VIEW 2
LT=33.571m
S77°33'21.2"W
PI 121+383.354
121+400
121+350
ST 121+417.058
CS 121+402.058
SC 121+364.483
TS 121+349.483
1044.34
1045.18
1044.15
1044.59
1044.49
1044.35
1044.32
1044.53
1044.25
1044.64
1038.74
1040.29
1040.96
1037.77



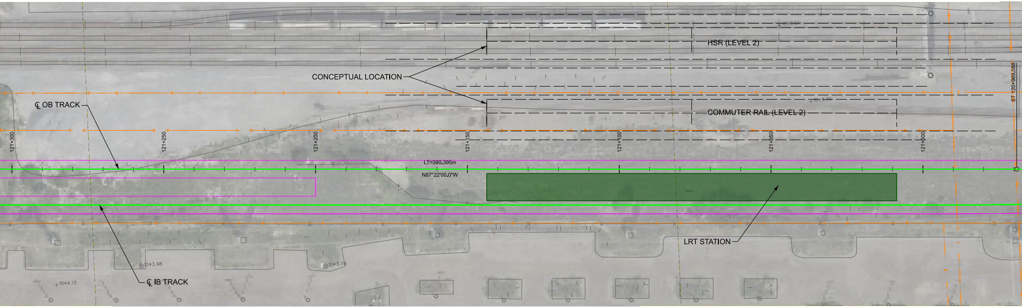


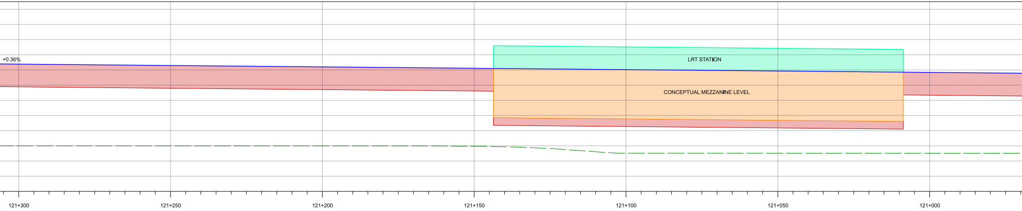

EX PL
EX PL
24.5 EX ROW LIMIT
5.3
SW
3.5
GP LANE
4.5
GUIDEWAY
MEDIAN
3.3
GP LANE
2.6
PARALLEL
PARKING
4.4
SW

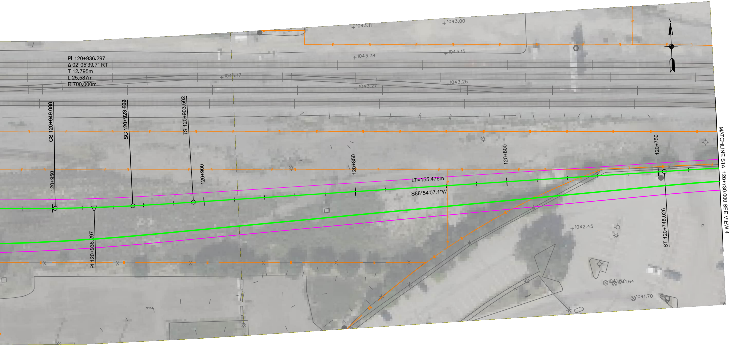
SECTION N-N

10 AVE SE, EAST OF MACLEOD TR TO CUL-DE-SAC

VIEW 3

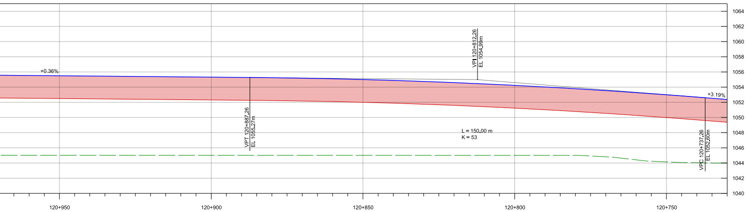

HSR (LEVEL 2)
CONCEPTUAL LOCATION
COMMUTER RAIL (LEVEL 2)
℄ OB TRACK
ST 120+969.088
121+300
121+250
121+200
121+150
121+100
121+050
121+000
1043.61
1043.35
LT=380.395m
N87°22'00.0"W
LRT STATION
1043.98
1043.78
1044.13
℄ IB TRACK

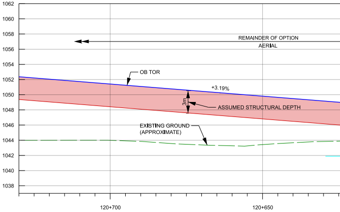

+0.36%
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
121+300
121+250
121+200
121+150
121+100
121+050
121+000

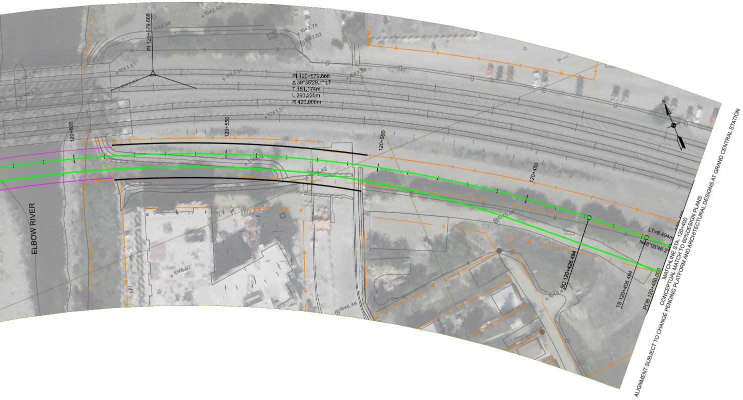

PI 120+936.297
Δ 02°05'39.7" RT
T 12.795m
L 25.587m
R 700.000m
CS 120+949.088
SC 120+923.502
TS 120+903.502
PI 120+936.297
120+950
120+900
120+850
120+800
120+750
ST 120+748.026
LT=155.476m
S88°54'07.1"W
1043.11
1043.00
1043.34
1043.15
1043.17
1043.27
1043.26
1042.45
1041.67
1041.64
1041.70
N
MATCHLINE STA. 120+730.000 SEE VIEW 4

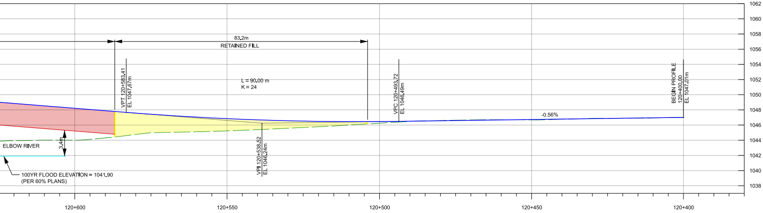
VIEW 4

℄ OB TRACK
℄ IB TRACK
120+700
120+650
CS 120+718.026
MATCHLINE STA. 120+730.000 SEE VIEW 3
7 ST SE
1041.25
1042.15
1040.22
1040.42

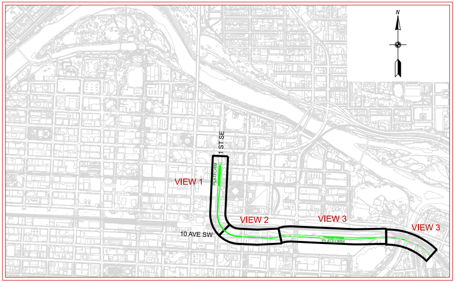

1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
1040
+0.36%
+3.19%
VPI 120+812.26
EL 1054.99m
VPT 120+887.26
EL 1055.27m
VPC 120+737.26
EL 1052.60m
L = 150.00 m
K = 53
120+950
120+900
120+850
120+800
120+750

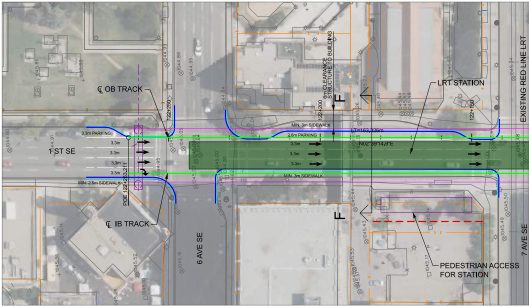

1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
1040
1038
REMAINDER OF OPTION
AERIAL
OB TOR
+3.19%
3m
ASSUMED STRUCTURAL DEPTH
EXISTING GROUND
(APPROXIMATE)
120+700
120+650

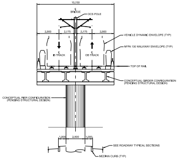

PI 120+579.668
PI 120+579.668
Δ 39°35'29.1" LT
T 151.174m
L 290.220m
R 420.000m
1042.50
1042.48
1042.74
1043.02
1043.57
1043.67
1043.71
1043.71
1043.51
1043.58
1043.57
1044.12
1044.42
1045.06
1046.02
1046.48
1049.4
120+600
120+550
120+500
120+450
ELBOW RIVER
N
LT=8.494m
N48°05'46.2"
SC 120+428.494
TS 120+408.494
POB 120+400.000
MATCHLINE STA. 120+400
CONCEPTUAL MATCH TO 60% DESIGN PLANS
ALIGNMENT SUBJECT TO CHANGE PENDING PLATFORM AND ARCHITECTURAL DESIGNS AT GRAND CENTRAL STATION



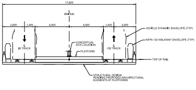
© 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS


N
1 ST SE
PLATFORM
VIEW 1
VIEW 2
VIEW 3
VIEW 3
10 AVE SW
PLATFORM

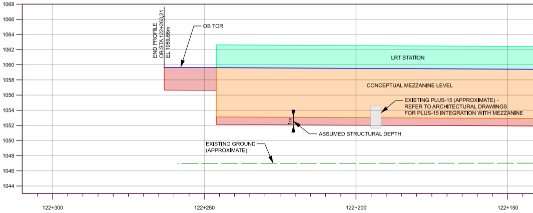

℄ OB TRACK
℄ IB TRACK
1 ST SE
6 AVE SE
7 AVE SE
EXISTING RED LINE LRT
LRT STATION
PEDESTRIAN ACCESS FOR STATION
6m CLEARANCE STRUCTURE TO BUILDING
F
F
3.3m PARKING
2.6m PARKING
MIN. 3m SIDEWALK
MIN. 2.5m SIDEWALK
3.3m
3.3m
3.3m
3.3m
POE 122+263.211
122+250
122+200
122+150
L=163.326m
N02°39'14.9"E
1044.80
1044.91
1044.93
1044.88
1044.95
1044.84
1044.95
1045.85
1045.69
1045.26
1045.23
1045.40
1045.44
1045.47
1045.48
1045.52
1045.14
1045.36
1045.52
1045.16
1045.10
1045.24
1045.44
1045.43
1045.17
1045.14
1045.49
1045.50
1045.48
1045.14
GB
GB


10,150
℄ BRIDGE
OCS POLE
2,900
2,175
2,175
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
℄ OB TRACK
TOP OF RAIL
CONCEPTUAL GIRDER CONFIGURATION (PENDING STRUCTURAL DESIGN)
CONCEPTUAL PIER CONFIGURATION (PENDING STRUCTURAL DESIGN)
1,000
2,500
1,000
SEE ROADWAY TYPICAL SECTIONS
MEDIAN CURB (TYP)

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, SINGLE PIER


17,600
℄ BRIDGE
2,900
1,400
4,500
4,500
1,400
2,900
VEHICLE DYNAMIC ENVELOPE (TYP)
NFPA 130 WALKWAY ENVELOPE (TYP)
℄ IB TRACK
℄ OB TRACK
CONCEPTUAL OCS LOCATION
PLATFORM
TOP OF RAIL
STRUCTURAL DESIGN PENDING PROPOSED ARCHITECTURAL ELEMENTS AT PLATFORMS

PROPOSED GREEN LINE LRT
AERIAL STRUCTURE, CENTER PLATFORM


1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
END PROFILE
OB STA 122+263.21
EL 1059.66m
OB TOR
LRT STATION
CONCEPTUAL MEZZANINE LEVEL
EXISTING PLUS-15 (APPROXIMATE) - REFER TO ARCHITECTURAL DRAWINGS FOR PLUS-15 INTEGRATION WITH MEZZANINE
1m
ASSUMED STRUCTURAL DEPTH
EXISTING GROUND (APPROXIMATE)
122+300
122+250
122+200
122+150

SHEET # 3 OF 3

NOT FOR CONSTRUCTION

GREEN LINE LRT
ALTERNATIVE ALIGNMENTS ASSESSMENT
1ST ST SE OPTION

SCALE	H1:500 / V1:200
DRAWN	CHRISTINA EDGAR
DESIGNED	CE/MH/MY
CHECKED	PENG ZHAO
IN-CHARGE	PAUL BASSI
DATE	11/22/2024
DESIGN SUBMITTAL	ALTERNATIVE ANALYSIS

REV	DWG No.	CONTRACT
0	PLOT_Opt-1st	#########

SUITE 300
48 QUARRY PARK BLVD. S.E.
CALGARY, AB T2C 5P2, CANADA
AECOM.COM

HORIZONTAL
0 5 10 15 20 25
SCALE 1:500m

VERTICAL
0 2 4 6 8 10
SCALE 1:200m

IN PROGRESS
REVIEW

PERMIT TO PRACTICE
AECOM Canada Ltd.
Signature
Date 11/27/24
PERMIT NUMBER: P10450
The Association of Professional Engineers, Geologists and Geophysicists of Alberta.

LEGEND

━━	PROPOSED GREEN LINE CENTERLINE
━━	PROPOSED ROADWAY CURB
━━	PROPOSED SIDEWALK (SW)
━━	PROPOSED BRIDGE DECK
━━	*PROPOSED BRIDGE BENT/PIERS* (SEE NOTE 1)
── E ──	EXISTING RIGHT OF WAY (ROW)
‒ ‒ ‒	PROPOSED RIGHT OF WAY (PROW)
‒ ‒ ‒	PROPOSED EASEMENT

NOTES

1. ALL UNITS IN METERS (m) UNLESS OTHERWISE SPECIFIED.
2. EXISTING GROUND LINE IN PROFILE IS GIS DATA (NOT SURVEY-BASED). SEE ENGIN
3. PROPOSED BRIDGE BENT AND PIER LOCATIONS ARE CONCEPTUAL AND ARE SHOW DESIGN. LOCATION AND CONFIGURATION OF BRIDGE STRUCTURES TO BE DETERM
4. SEE ARCHITECTURAL DRAWINGS FOR CONCEPTUAL COLUMN PLACEMENT AT LRT S
5. PEDESTRIAN ACCESS LOCATIONS AT PLATFORMS ARE CONCEPTUAL ONLY AND TO
6. BACK OF SIDEWALK LIMITS TO MATCH EXISTING ROW OR BUILDING FACE, DEPEND
7. PROPOSED DRIVEWAYS NOT SHOWN AND TO BE ANALYZED IN FURTHER DESIGN P

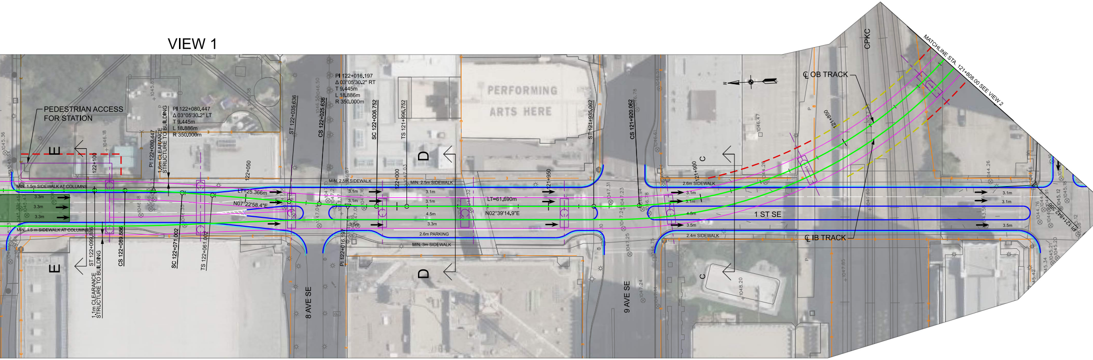
ABBREVIATIONS

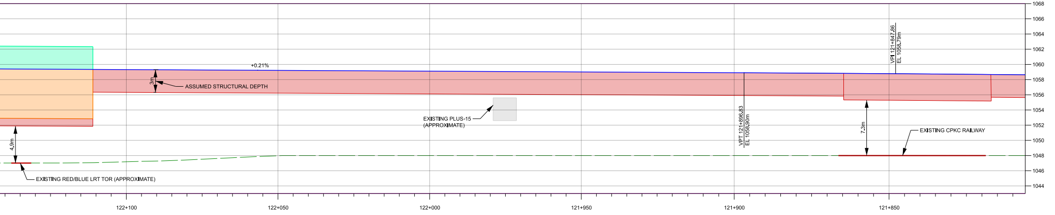
CPKC	CANADIAN PACIFIC KANSAS CITY	OB	OUTBOUND
GP	GENERAL PURPOSE	OCS	OVERHEAD CATENARY SYST
IB	INBOUND	ROW	RIGHT OF WAY
LRT	LIGHT RAIL TRANSIT	SW	SIDEWALK

DATE: 11/21/2024
TIME: 11:25 PM

FILE NAME: CalgGL_PLOT_Opt-1st
USER NAME: c.edgar

VIEW 1

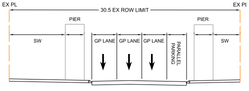

PEDESTRIAN ACCESS FOR STATION
E
E
PI 122+080.447
Δ 03°05'30.2" LT
T 9.445m
L 18.886m
R 350.000m
1.6m CLEARANCE STRUCTURE TO BUILDING
1.1m CLEARANCE STRUCTURE TO BUILDING
122+100
122+050
ST 122+099.886
CS 122+089.886
SC 122+071.002
TS 122+061.002
MIN. 1.5m SIDEWALK AT COLUMNS
MIN. 1.5 m SIDEWALK AT COLUMNS
3.3m
3.3m
3.3m
LT=25.366m
N07°22'58.4"E
ST 122+035.636
CS 122+025.636
PI 122+016.197
Δ 03°05'30.2" RT
T 9.445m
L 18.886m
R 350.000m
PI 122+016.197
SC 122+006.752
TS 121+996.752
8 AVE SE
MIN. 2.5m SIDEWALK
MIN. 2.5m SIDEWALK
3.1m
3.1m
4.5m
3.3m
3.5m
2.6m PARKING
MIN. 3m SIDEWALK
122+000
D
D
PERFORMING ARTS HERE
LT=61.690m
N02°39'14.9"E
121+950
ST 121+935.062
CS 121+920.062
9 AVE SE
121+900
C
C
2.6m SIDEWALK
2.4m SIDEWALK
1 ST SE
121+850
℄ OB TRACK
℄ IB TRACK
CPKC
N
MATCHLINE STA. 121+808.00 SEE VIEW 2
PI 121+842.386


+0.21%
3m
ASSUMED STRUCTURAL DEPTH
EXISTING PLUS-15 (APPROXIMATE)
4.9m
EXISTING RED/BLUE LRT TOR (APPROXIMATE)
VPT 121+896.83
EL 1058.90m
VPI 121+847.86
EL 1058.79m
7.3m
EXISTING CPKC RAILWAY
1068
1066
1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
122+100
122+050
122+000
121+950
121+900
121+850

EERING DESIGN REPORT FOR FURTHER INFORMATION.
N ONLY FOR THE PURPOSE OF ROADWAY TRANSITION
INED PENDING STRUCTURAL DESIGN AND ANALYSIS.
STATIONS.
BE REFINED IN FURTHER DESIGN PHASE.
NG ON EXISTING CONDITIONS.
HASES.

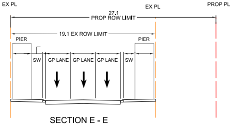
TEM

TOR TOP OF RAIL


EX PL
EX PL
30.5 EX ROW LIMIT
PIER
PIER
SW
GP LANE
GP LANE
GP LANE
PARALLEL PARKING
SW

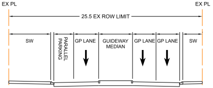
SECTION F - F

1st STREET SE, 7th AVE SE TO 6th AVE SE


EX PL
EX PL
PROP PL
27.1
PROP ROW LIMIT
19.1 EX ROW LIMIT
PIER
PIER
SW
GP LANE
GP LANE
GP LANE
SW

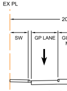
SECTION E - E

1st STREET SE, 8th AVE SE TO 7th AVE SE


EX PL
EX PL
25.5 EX ROW LIMIT
SW
PARALLEL PARKING
GP LANE
GUIDEWAY MEDIAN
GP LANE
GP LANE
SW

SECTION D - D

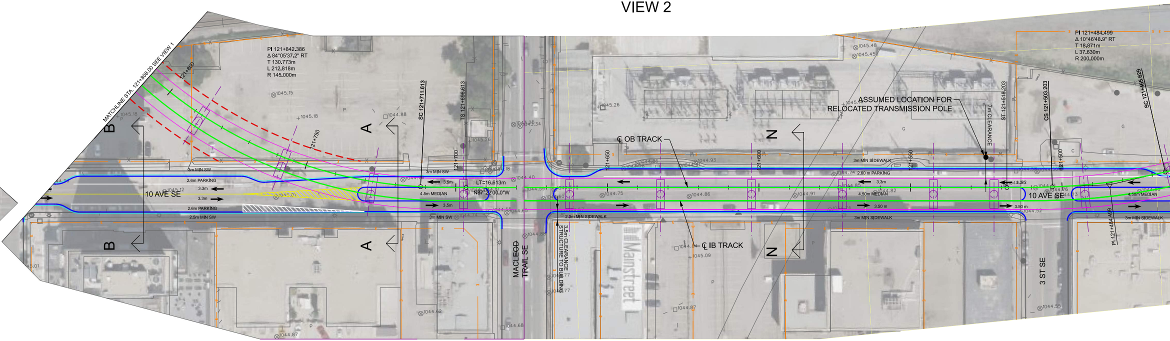
1st STREET SE, 9th AVE SE TO 8th AVE SE

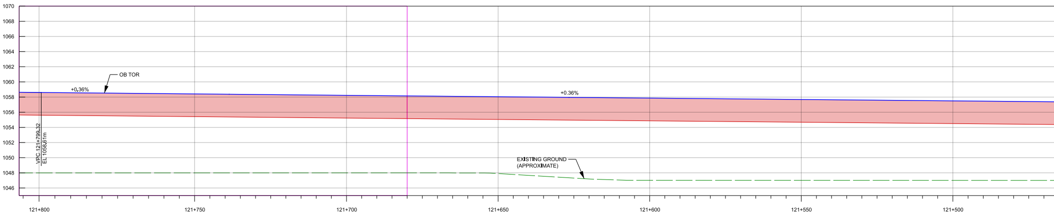

EX PL
20
SW
GP LANE
GU

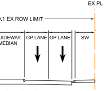
SECT

1st STREET SE,

VIEW 2

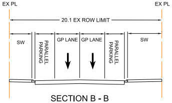

MATCHLINE STA. 121+808.00 SEE VIEW 1
PI 121+842.386
Δ 84°05'37.2" RT
T 130.773m
L 212.818m
R 145.000m
121+800
121+750
121+700
121+650
121+600
121+550
121+500
SC 121+711.613
TS 121+696.613
ST 121+518.203
CS 121+503.203
SC 121+465.629
PI 121+484.499
PI 121+484.499
Δ 10°46'48.9" RT
T 18.871m
L 37.630m
R 200.000m
B
A
N
3m MIN SW
2.6m PARKING
3.3m
3.3m
2.6m PARKING
2.5m MIN SW
10 AVE SE
4.5m MEDIAN
3.5m
3.5m
LT=16.613m
N87°22'00.0"W
MACLEOD TRAIL SE
3.5m CLEARANCE STRUCTURE TO BUILDING
℄ OB TRACK
℄ IB TRACK
2.3m MIN SIDEWALK
3m MIN SIDEWALK
2.60 m PARKING
4.50m MEDIAN
3.50 m
ASSUMED LOCATION FOR RELOCATED TRANSMISSION POLE
7m CLEARANCE
3 ST SE
4.50m MEDIAN
3m MIN SIDEWALK
Mainstreet
1045.15
1045.18
1044.88
1045.26
1044.40
1044.87
1044.62
1044.68
1044.75
1044.86
1044.91
1044.82
1045.48
1045.45
1045.09
1044.87
1044.55
1044.52
1044.93




EX PL
.1 EX ROW LIMIT
UIDEWAY MEDIAN
GP LANE
GP LANE
SW

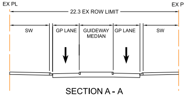
TION C - C

10th AVE SE TO 9th AVE SE


EX PL
EX PL
20.1 EX ROW LIMIT
SW
PARALLEL PARKING
GP LANE
GP LANE
PARALLEL PARKING
SW

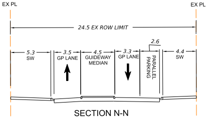
SECTION B - B

1st STREET SE, MACLEOD TRAIL SE TO 1st ST SE


EX PL
EX PL
22.3 EX ROW LIMIT
SW
GP LANE
GUIDEWAY MEDIAN
GP LANE
SW

SECTION A - A

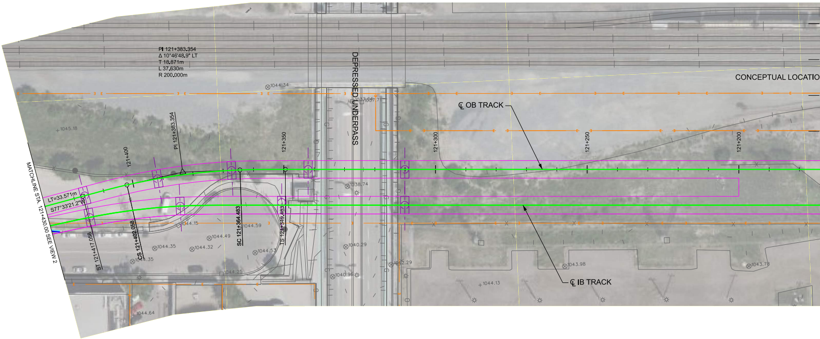
1st STREET SE, MACLEOD TRAIL SE TO 1st ST SE

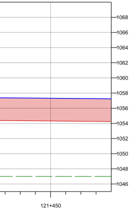

EX PL
EX PL
24.5 EX ROW LIMIT
5.3
SW
3.5
GP LANE
4.5
GUIDEWAY MEDIAN
3.3
GP LANE
2.6
PARALLEL PARKING
4.4
SW

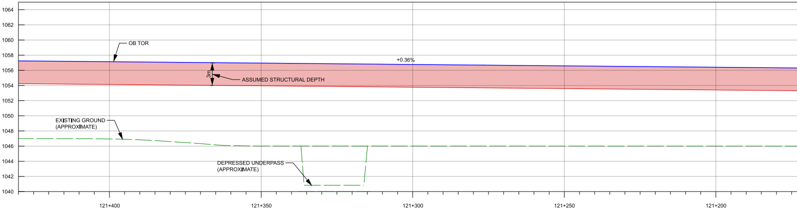
SECTION N-N

10 AVE SE, EAST OF MACLEOD TR TO CUL-DE-SAC

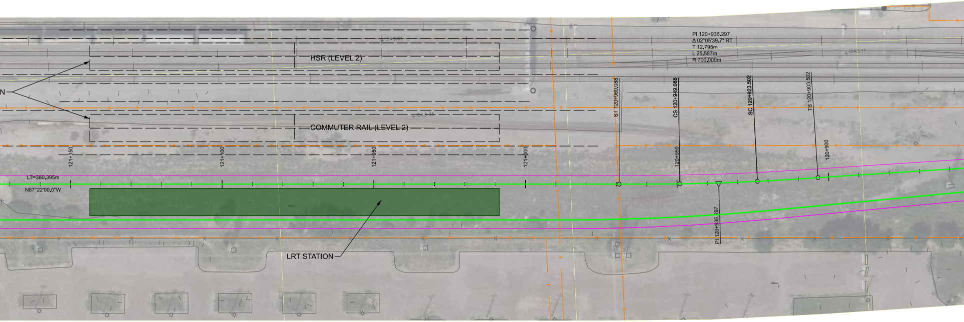
N
TS 121+450.629
121+450
+1044.99
1044.51
MATCHLINE STA. 121+430.00 SEE VIEW 3


PI 121+383.354
Δ 10°46'48.9" LT
T 18.871m
L 37.630m
R 200.000m
1044.34
+1045.18
MATCHLINE STA. 121+430.00 SEE VIEW 2
LT=33.571m
S77°33'21.2"W
121+400
PI 121+383.354
121+350
ST 121+417.058
CS 121+402.058
SC 121+364.483
TS 121+349.483
1044.15
1044.59
1044.49
1044.35
1044.32
1044.53
1044.35
1044.25
1044.64
DEPRESSED UNDERPASS
1037.64
1037.71
1038.74
1040.29
1040.96
1042.29
121+300
℄ OB TRACK
121+250
121+200
CONCEPTUAL LOCATIO
1043.98
1043.78
+1044.13
℄ IB TRACK

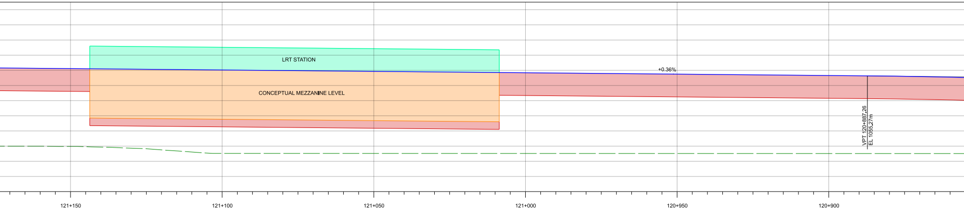




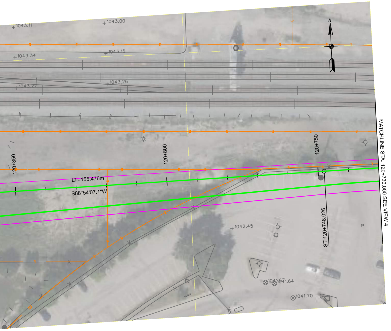
VIEW 3



HSR (LEVEL 2)
N
COMMUTER RAIL (LEVEL 2)
PI 120+936.297
Δ 02°05'39.7" RT
T 12.795m
L 25.587m
R 700.000m
1043.17
ST 120+969.088
CS 120+949.088
SC 120+923.502
TS 120+903.502
121+150
121+100
121+050
121+000
120+950
120+900
LT=380.395m
N87°22'00.0"W
PI 120+936.297
LRT STATION

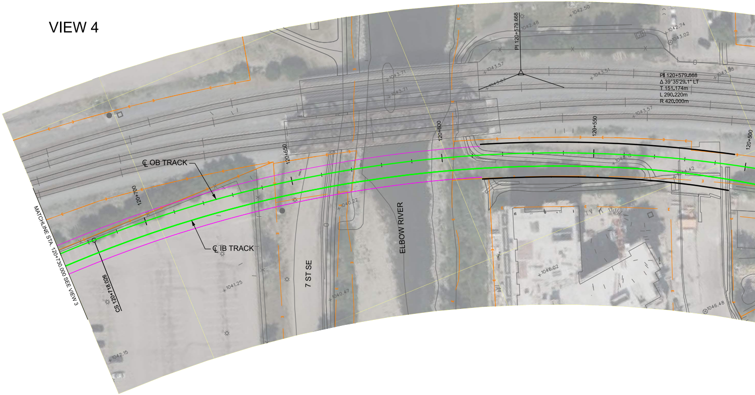


LRT STATION
CONCEPTUAL MEZZANINE LEVEL
+0.36%
VPT 120+887.26
EL 1055.27m
121+150
121+100
121+050
121+000
120+950
120+900

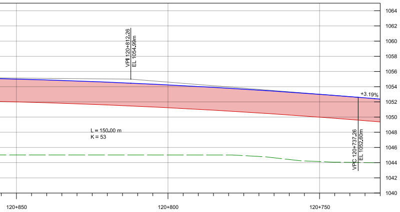


1043.11
1043.00
1043.34
1043.15
1043.27
1043.26
N
MATCHLINE STA. 120+730.000 SEE VIEW 4
120+850
120+800
120+750
LT=155.476m
S88°54'07.1"W
ST 120+748.026
1042.45
1041.67
1041.64
1041.70
P

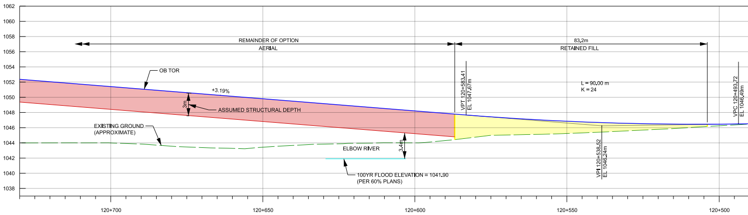
VIEW 4



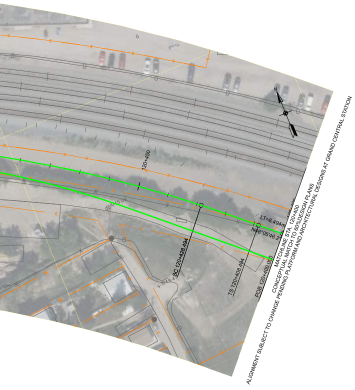
1042.50
1042.48
1042.74
1043.02
PI 120+579.668
1043.57
1043.67
1043.71
1043.71
1043.51
1043.58
PI 120+579.668
Δ 39°35'29.1" LT
T 151.174m
L 290.220m
R 420.000m
1043.57
120+600
120+550
120+500
120+650
120+700
℄ OB TRACK
℄ IB TRACK
1040.22
1041.25
1040.47
7 ST SE
ELBOW RIVER
MATCHLINE STA. 120+730.000 SEE VIEW 3
CS 120+718.026
1046.02
1046.48
1042.15



1064
1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
1040
VPI 120+812.26
EL 1054.99m
+3.19%
L = 150.00 m
K = 53
VPC 120+737.26
EL 1052.60m
120+850
120+800
120+750

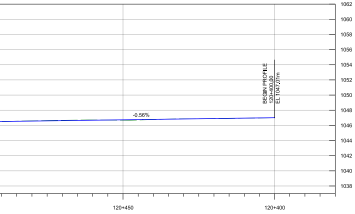


1062
1060
1058
1056
1054
1052
1050
1048
1046
1044
1042
1040
1038
REMAINDER OF OPTION
AERIAL
83.2m
RETAINED FILL
OB TOR
+3.19%
3m
ASSUMED STRUCTURAL DEPTH
VPT 120+583.41
EL 1047.67m
L = 90.00 m
K = 24
VPC 120+493.72
EL 1046.49m
EXISTING GROUND
(APPROXIMATE)
ELBOW RIVER
3.4m
100YR FLOOD ELEVATION = 1041.90
(PER 60% PLANS)
VPI 120+538.52
EL 1046.24m
120+700
120+650
120+600
120+550
120+500


120+450
SC 120+428.494
TS 120+408.494
POB 120+400.000
LT=8.494m
N48°05'46.2"
1045.06
1049.4
N

MATCHLINE STA. 120+400
CONCEPTUAL MATCH TO 60%DESIGN PLANS

ALIGNMENT SUBJECT TO CHANGE PENDING PLATFORM AND ARCHITECTURAL DESIGNS AT GRAND CENTRAL STATION



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Calgary Green Line: Appendix 2

Utility Conflict Matrix

AECOM

Date Prepared: 11/25/2024

General Note: Utility conflicts are identified using city-provided GIS utility information with proposed LRT structures. Utilities conflict matrix will need to be updated as design and survey progresses in the next design phase.

CONFLICT CATEGORY:	
YES	Less than 3m separation with proposed structure and ex water/sewer/storm. Less than 7m separation between Enmax electric line to proposed structure
NO	More than 3m separation with proposed structure and ex water/sewer/storm. More than 7m separation between Enmax electric line to the proposed structure

Calgary LRT Utility Conflicts Matrix

OPTION 1 ST

SN	UTILITY	SIZE (mm)	Size (inces)	Size (Ft)	MATERIAL	CONFLICT LENGTH (M)	CONFLICT CATEGORY	CONFLICT WITH	LOCATION
1	Water	400	15.7	1.3	PVC	96	YES	Potential conflict with LRT columns	Along 1st St SW between 6 Ave and 7 Ave SE
2	Water	300	11.8	1.0	YDI	99	YES	Potential conflict with LRT columns	Along 1st St SW between7 Ave & 8 Ave SE
3	Water	400	15.7	1.3	PDI	122	YES	Potential conflict with LRT columns	Along 1st St SW between 8 Ave and 9 Ave SE
4	Water	900	35.4	3.0	ST	20	YES	Potential conflict with LRT columns	Along 10 Ave between 1st ST SE and Macledo TR SE
5	Water	400	15.7	1.3	PDI	122	YES	Potential conflict with LRT columns	Along 10 Ave between 1st ST SE and Macledo TR SE
6	Sanitary Sewer	Minor	Minor	Minor	Minor	289	YES	Potential conflict with LRT columns	Along 1st SW between 6 Ave SE & 9 Ave SE
7	Sanitary Sewer	Minor	Minor	Minor	Minor	47	YES	Potential conflict with LRT columns	Along 10 Ave & West of Macleod Trail SE
8	Storm Sewer	1050	41.3	3.4	CONC	23	YES	Potential conflict with LRT columns	Along 1st St SW between 6 Ave and S of 5 Ave SE
9	Storm Sewer	900	35.4	3.0	CONC	118	YES	Potential conflict with LRT columns	Along 1st St SW between 7 Ave SE and 6 Ave SE
10	Storm Sewer	750	29.5	2.5	CONC	196	YES	Potential conflict with LRT columns	Along 1st St SW between 8 Ave and 9 Ave SE
11	Storm Sewer	Minor	Minor	Minor	Minor	65	YES	Potential conflict with LRT columns	Along 10 Ave SE between 1 St SE & Macleod Trail SE
12	Electric Lines	UG Dist Duct Bank	-	-	-	400	YES	Potential conflict with LRT columns	Along 1st St
13	Electric Lines	UG Transission	-	-	-	90	YES	Potential conflict with LRT columns	Along 10 Ave
14	Electric Lines	UG Dist Duct Bank	-	-	-	80	YES	Potential conflict with LRT columns	Along 10 Ave

OPTION 2 St

SN	UTILITY	SIZE (mm)	Size (inces)	Size (Ft)	MATERIAL	CONFLICT LENGTH (M)	CONFLICT CATEGORY	CONFLICT WITH	LOCATION
1	Water	300	11.8	1.0	YDI/CI	1000	YES	Potential conflict with LRT columns	Along 2nd St SW between Sau Claire AV SW to 9 Ave SW
2	Water	900	35.4	3.0	ST	300	YES	Potential conflict with LRT columns	Along 10 Ave between 2nd St SW & Center St
3	Water	150	5.9	0.5	PVC	300	YES	Potential conflict with LRT columns	Along 10 Ave between 2nd St SW & Center St
4	Sanitary Sewer	Minor	Minor	Minor	PVC/CONC/VCT	1184	YES	Potential conflict with LRT columns	Along 2nd St SW between N of Riverfront Ave SW & 9 Ave SW
5	Sanitary Sewer	Minor	Minor	Minor	VCT	145	YES	Potential conflict with LRT columns	Along 10 Ave SW between 2 St SW of 1 St SW
6	Sanitary Sewer	500	19.7	1.6	VCT	42	YES	Potential conflict with LRT columns	Along 10 Ave between 1 St SW & Center St
7	Sanitary Sewer	500	19.7	1.6	CONC	125	YES	Potential conflict with LRT columns	Along 10 Ave between 1 St SW & Center St
8	Storm Sewer	1350	53.1	4.4	CONC	282	YES	Potential conflict with LRT columns	Along 2nd St SW between 3 Ave SW & N of Riverfront Ave SW
9	Storm Sewer	1500	59.1	4.9	CONC	46	YES	Potential conflict with LRT columns	Along 2nd St SW between 6 Ave SW & 3 Ave SW
10	Storm Sewer	1200	47.2	3.9	CONC	119	YES	Potential conflict with LRT columns	Along 2nd St SW between 7 Ave SW & 6 Ave SW
11	Storm Sewer	900	35.4	3.0	CONC	200	YES	Potential conflict with LRT columns	Along 2nd St SW between 9 Ave SW & 7 Ave SW
12	Electric Lines	UG Dist Duct	-	-	-	583	YES	Potential conflict with LRT columns	Along 2nd St
13	Electric Lines	UG Dist Duct Bank	-	-	-	533	YES	Potential conflict with LRT columns	Along 2nd St
14	Electric Lines	UG Dist Duct	-	-	-	88	YES	Potential conflict with LRT columns	Along 10 Ave
15	Electric Lines	UG Dist Duct Bank	-	-	-	255	YES	Potential conflict with LRT columns	Along 10 Ave
16	Electric Lines	UG Transission	-	-	-	170	YES	Potential conflict with LRT columns	Along 10 Ave

OPTION 6 ST

SN	UTILITY	SIZE (mm)	Size (inces)	Size (Ft)	MATERIAL	CONFLICT LENGTH (M)	POTENTIAL CONFLICT	CONFLICT WITH	LOCATION
1	Water	300	11.8	1.0	YDI	243	YES	Potential conflict with LRT columns	Along 2 St SW towards N of 2 Ave SW
2	Water	535	21.1	1.8	YDI	589	YES	Potential conflict with LRT columns	Along 2 Ave SW between 6 St SW & 2 St SW
3	Water	200	7.9	0.7	YUDI	87	YES	Potential conflict with LRT columns	Along 6 st SW between 2 and 3 Ave SW
4	Water	200	7.9	0.7	CI	106	NO	More than 3m Away from LRT columns	Along 6 st SW between 4 and 5 Ave SW
5	Water	200	7.9	0.7	CI/DI	422	YES	Potential conflict with LRT columns	Along 6 st SW between 5 and 9 Ave SW
6	Water	900	35.4	3.0	ST	342	YES	Potential conflict with LRT columns	Along 10 Ave SW between 6 St SW and 4 St SW (N side)
7	Water	150	5.9	0.5	CI	332	NO	More than 3m Away from LRT columns	Along 10 Ave SW between 6 St SW and 4 St SW (S side)
8	Water	900	35.4	3.0	ST	721	NO	More than 3m Away from LRT columns	Along 10 Ave SW between 4 St SW & West of 1 ST SE (N side)
9	Water	250	9.8	0.8	CI	420	YES	Potential conflict with LRT columns	Along 10 Ave SW between 4 St SW to 1 St SW (S side)
10	Water	150	5.9	0.5	CI	338	YES	Potential conflict with LRT columns	Along 10 Ave SW between 1 St SW & 1 St SE (S side)
11	Water	900	35.4	3.0	ST	150	YES	Potential conflict with LRT columns	Along 10 Ave SW between1 ST SE & Macleod TR SE (N side)
12	Water	250	9.8	0.8	PVCG	482	YES	Potential conflict with LRT columns	Along 10 Ave SW between 1 St SE & Olympic Way SE (S side)
13	Water	900	35.4	3.0	ST	347	NO	More than 3m Away from LRT columns	Along 10 Ave SW between Macleod TR SE & Olympic Way SE (N side)
14	Sanitary Sewer	750	29.5	2.5	Conc	151	YES	Potential conflict with LRT columns	Along 10 Ave Sw between 6 St SW & 5 St SW
15	Sanitary Sewer	500	19.7	1.6	Conc	340	YES	Potential conflict with LRT columns	Along 10 St SE between 1 St SW & 1 St SE
16	Sanitary Sewer	Minor	Minor	Minor	Conc	242	YES	Potential conflict with LRT columns	Along 2 St SW & N of 2 Ave SW
17	Sanitary Sewer	Minor	Minor	Minor	PVC	578	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 3 and 6 St SW
18	Sanitary Sewer	Minor	Minor	Minor	PVC/Conc	191	YES	Potential conflict with LRT columns	Along 6 st SW between 2 and 6 Ave SW
19	Sanitary Sewer	Minor	Minor	Minor	Conc/VCT	1076	YES	Potential conflict with LRT columns	Along 10 St SE between Macleod Trail SE & 5 St SW
20	Storm Sewer	Minor	Minor	Minor	PVC/Conc	574	YES	Potential conflict with LRT columns	Along 10 Ave SE between 6 St SW & Macleod Trail SE
21	Storm Sewer	1350	53.1	4.4	Conc	244	YES	Potential conflict with LRT columns	Along 2 St SW & N of 2 Ave SW
22	Storm Sewer	1050	41.3	3.4	Conc	157	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 3 St SW & 2 St SW
23	Storm Sewer	600	23.6	2.0	Conc	101	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 3 St SW
24	Storm Sewer	525	20.7	1.7	Conc	134	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 5 St SW
25	Storm Sewer	900	35.4	3.0	Conc	90	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 5 and Eest 6 St SW
26	Storm Sewer	750	29.5	2.5	Conc	70	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 6 and West 5 St SW
27	Storm Sewer	525	20.7	1.7	Conc	125	YES	Potential conflict with LRT columns	Along 10 Ave SE between 3 St SE & 4 St SE
28	Storm Sewer	Minor	Minor	Minor	Conc	130	YES	Potential conflict with LRT columns	Along 2nd Ave SW between 4 and 5 St SW
29	Electric Lines	UG Dist Duct	-	-	-	225	YES	Potential conflict with LRT columns	Along 2nd St
30	Electric Lines	UG Dist Duct	-	-	-	345	YES	Potential conflict with LRT columns	Along 2nd Ave
31	Electric Lines	UG Dist DuctBank	-	-	-	290	YES	Potential conflict with LRT columns	Along 2nd Ave
32	Electric Lines	UG Dist Duct	-	-	-	529	YES	Potential conflict with LRT columns	Along 6th St
33	Electric Lines	UG Dist DuctBank	-	-	-	211	YES	Potential conflict with LRT columns	Along 6th St
34	Electric Lines	UG Dist Duct	-	-	-	730	YES	Potential conflict with LRT columns	Along 10 Ave
35	Electric Lines	UG Dist DuctBank	-	-	-	869	YES	Potential conflict with LRT columns	Along 10 Ave
36	Electric Lines	UG Transission	-	-	-	393	YES	Potential conflict with LRT columns	Along 10 Ave

Calgary Green Line: Appendix 3

Stations and Urban Integration Design Options

AECOM

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LIST OF ACRONYMS

CPKC	Canadian Pacific Kansas City Railway
HSR	High Speed Rail
LRT	Light Rail Transit
MEP	Mechanical, Electrical, and Plumbing
Plus-15	Pedway Network
RDC	Remington Development Corporation
ROW	Right-of-Way
SDM	Station Design Matrix
VCE	Vertical Circulation Elements

STATIONS & URBAN INTEGRATION DESIGN OPTIONS

Stations & Urban Design Analysis Overview

The Calgary Green Line Alternative Alignments Assessment includes a study for the proposed stations and their urban integration. The goal of this study is to identify and solve the impacts of the stations proposed into the existing urban environment, focusing on understanding the stations spatial needs and the impacts they could cause within the right-of-way, roadway, and sidewalks.

Once the critical parameters for the stations are detected, specific solutions for each case are developed using prototype stations. The prototype stations have been adjusted and adapted to the site conditions.

This report documents the station options and their urban integration, and also provides an overview of the design intent and the architectural key aspects.

Design Strategy Description

The design strategy implemented to develop the station locations was closely linked with the development of the alignment for each option. In parallel with the proposed options, functional schemes of the stations have been developed based on the type of infrastructure, the proposed route, and the existing urban conditions.

Through the functional study of the schemes, a matrix has been developed that compiles the critical data of these schemes, providing us with a preliminary approach to the design and integration of the stations.

Introduction to the Station Design Matrix (SDM)

The Stations Design Matrix (SDM) gives us a rough overview of the requirements for the different station configurations, independently of the spatial conditions that the site or the alignment design option may provide us.

The key aspect of the SDM is to provide data on the critical parameters that must be considered in the insertion and selection of the station type according to the identified location, to support better decisions regarding the overall infrastructure design and alignment of the Green Line LRT. This table serves as a tool to identify the boundaries of the design and its feasible limits. It is useful for confirming or discarding locations, station types, or alignment typologies.

Stations Design Options Summary Station Design Matrix (SDM)

Table 1. Stations Design Options Matrix (SDM)

STATION	DESCRIPTION	LEVEL	PLATFORM	PLATFORM WIDTH	MEZZANINE	ACCESS TYPE	STRUCTURE TYPE	PLATFORM LENGTH	TOTAL LENGTH	MINIMUM RECOMMENDED STREET WIDTH	STAIR BOXES	MINIMUM STATION WIDTH
OPT CA	EL-CP-MZ-CA-CS	Elevated	**Center**	9m	Yes	Center Staircase core	Center Piers	130m	130m	≥21.60m	Central	16.05m
OPT CB	EL-CP-MZ-SA-SS	Elevated	**Center**	9m	Yes	Side Staircase cores	Side Piers	130m	130m	≥21.50m + space for stair boxes	Lateral	16.05m
OPT CC	AG-CP-SR-SA-NS	At-Grade	**Center**	6m	N/A	Side roads crosswalk	Canopy	130m	140m	≥25.05m	N/A	13.05m
OPT SA	EL-SP-MZ-CA-CS	Elevated	**Side** (x2)	4m (x2)	Yes	Center Staircase core	Center Piers	130m	140m	≥21,20m	Central	23.75m
OPT SB	EL-SP-MZ-SA-CA	Elevated	**Side** (x2)	4m (x2)	Yes	Side Staircase cores	Center Piers	130m	140m	≥17.60m + space for stair boxes	Lateral	23.75m
OPT SC	AG-SP-SR-SA-NS	At-Grade	**Side** (x2)	4m (x2)	N/A	Sidewalks	Canopy	130m	140m	≥27.75m	N/A	15.75m
OPT SNA	EL-SP-MZ-CA-CS-N	Elevated	**Side** (x2)	4m (x2)	Yes	Center Staircase core	Center Piers	130m	140m	≥21,20m	Central	20.35m
OPT SNB	EL-SP-MZ-SA-CS-N	Elevated	**Side** (x2)	4m (x2)	Yes	Side Staircase cores	Side Piers	130m	140m	≥17.60m + space for stair boxes	Lateral	20.35m

* All the options have been considered based on 4 lanes of 3.4m width. Reduction of this dimension may allow feasibility of different options.
* All the stations with mezzanine can assume different types of Stair boxes, the type of stair box indicated has been proposed accordingly to the main structure in order to minimize the site spatial requirements

Station Design Key Parameters & Criteria

Level of the Station: At-grade Station or Elevated Station Design Options

At-Grade Stations

At-grade stations are a cost-effective solution for a light rail system, but they have a high impact on the city and street operations due to space requirements. As shown in the analysis, an at-grade solution has a huge impact within the existing environment. The preliminary options included a variety of at-grade LRT configurations that were later removed from further evaluation as documented in the Calgary Green Line Alternative Alignments Assessment.

Pros	Cons
• Lower cost in comparison with elevated or underground infrastructure. • No direct impact nor visual impact within the building façades. • Scalable solution, shorter platform can be built on early stages and extend it later. • Pedestrian access can be easily connected to sidewalks. • No integrations needed with existing pedestrian bridges.	• High impact on the street and travel lanes due non shared traffic/LRT lanes. • Additional buildings may be required in order to allocate the MEP rooms.

Elevated Stations

Elevated stations were analyzed to match the proposed Green Line alignment options. Elevated stations are a typical solution within built environments due to the flexibility they provide and their limited impact on the street level.
Although elevated stations are a more expensive solution than at-grade stations due to the infrastructure needed, they are generally cheaper than underground stations. They also mitigate street-level impacts by minimizing their footprint to columns and vertical circulation elements. However, they present a significant visual impact and require a comprehensive strategy to address their proximity to buildings and plots.

Pros	Cons
• Stations have limited impacts on existing streets and traffic lanes. • Mezzanine levels are an ideal solution for allocate technical rooms and transferring pedestrian movement from sidewalks to platforms.	• Costly in comparison with at grade stations/infrastructure. • May have visual impact within the building façades. • Non scalable solution, platform should be built with the final platform length desired from the start due the complexity of enlarge the civil infrastructure later. • Pedestrian access has an impact to ground level. • Integration with existing pedestrian bridges.

Platform arrangement: Center Platform VS Lateral Platforms

Station type has a direct impact on the track alignment and the infrastructure needed at these locations such as vertical circulation elements, column placement, size of bridge structure, etc. Both station types, center platform or side platform, present different functional and dimensional characteristics.

Center Platform:

A center platform design allows for simplified pedestrian access and minimized width compared to side platforms. Center platforms also allow for a single access point at the street level while also maintaining compatibility with other access options, such as integration with a mezzanine level. A center platform is typically narrower than equivalent side platforms making them ideal for locations where space is limited. However, further analysis to evaluate optimization of station width is recommended in future design phases.

To meet local and national safety requirements, center platforms need emergency exits at both platform ends. For that reason, this type of station needs vertical circulation elements at the end of each side. The current design includes the required vertical circulation elements at proposed locations and would not result in building impacts. However, analysis of the location of these elements should be continued in the next design phases to ensure adequate safety for patrons and proper integration with the surrounding environment.

Side Platform:

A side platform configuration allows LRT tracks to remain tangent but also requires a wider station design and additional vertical circulation elements. While maintaining tangential track on approach and departure to the station simplifies alignment design, the duplicate side platforms result in a slightly wider construction to accommodate the required additional vertical circulation elements.

This design does allow the opportunity to maintain the same number of evacuations exits as compared to center platform design, by providing a level crossing, crossing to the opposite platform. This could result in the need for longer stations compared to center platform stations due to the space needed for level crossings.

Minimum width requirement.

Station Minimum Width dimension:

The concept of this parameter indicates the minimum width required for the station, referring only to the size of the station. It does not consider additional distances to sidewalks or buildings. This parameter is used to rule out the feasibility of an option if the exact width available between facades or other elements that may be an interference is known.

Minimum Street Width Recommended:

This parameter has been included to emphasize the minimum dimensions recommended at street level for the insertion of different types of stations. The dimensions are taken at street level, which is wider than the station width itself.
Since the layout runs through various types of streets with changing sections, it is vital to review the available space according to the needs of each typology, preserving the minimum functionality at street level. Structural piles or stair access has been considered together with several other factors such as traffic lanes, parking, and sidewalks in the provided dimension. The stations selected in the presented alignment versions are mainly conditioned by the lack of space on the street in combination with the previous street functionality.

Ultimately, stations that fit the parameters of the roadway and infrastructure are chosen, and based on this parameter, the station options that cannot fit within the available space will be discarded for those locations that cannot provide the minimum required space.

Other parameters:

Some other important parameters have been indicated within the SDM to give a complete vision of the station needs and station typologies:

Mezzanine Level:

Since all elevated stations have been proposed above the existing Plus-15 pedestrian bridges, it is possible to introduce a mezzanine level in all elevated stations, just below the elevated structure.

The mezzanine level will incorporate the technical rooms required by the station MEP systems. They will also serve as a transfer level which connects the different platforms with the access cores and stairs. The mezzanine level is only proposed for elevated stations. The technical rooms for at-grade stations will be in separate technical buildings.

Access Type and Stairs boxes:

Each elevated station needs to be adapted to the different external conditions according to the existing conditions. Vertical circulation elements are identified according to the type of access proposed. These areas can be located centered or laterally to the station. The connection can be arranged at a variable distance as per the street width and the sidewalk distances by adjusting the length of the pedestrian bridge that connects the stairs with the mezzanine.

In the case of at-grade stations, access can be directly from the sidewalk or may require additional crossings to reach the platform if it is A center platform.

Structure Type

No structural analysis was completed at this phase of the analysis. The structural type details are conceptual only and require additional analysis to establish feasibility. The reason for indicating the type of structure is to understand the impacts at street level.

The type of structure parameter has been included to indicate the type of infrastructure assumed for each type of station. Although complex structural solutions that explore unconventional options can be proposed, industry standards emphasize applying the loads of the LRT as directly as possible onto the supports, avoiding increased costs and complex solutions to resolve structural eccentricity.

The side platform solution is presented as the one with the least structural impact, usually resolved with a single center row of piles. The center platform solution, on the other hand, requires straddle bent columns. The at-grade solution does not require a large structure, only the necessary one for the pergola of each platform, as well as the platforms themselves.

Station Options Review

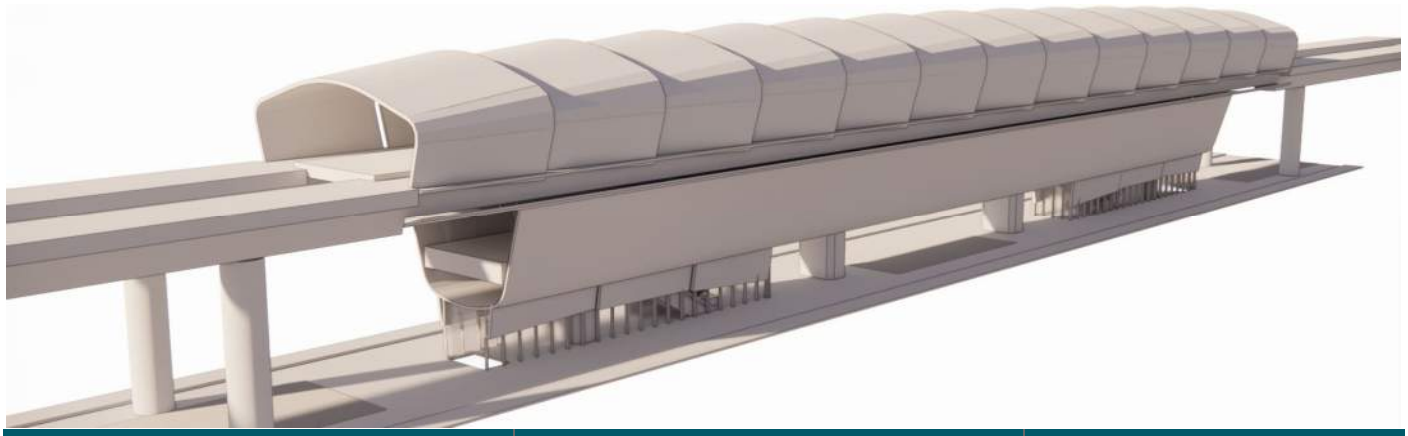
The following chapter captures a schematic description of the different types of stations that have been presented in the SDM. The presented designs are general configurations adhere to the previously explained design options parameters to illustrate generic station arrangement for each type. The selection of any of the options presented will require a complementary design effort to adapt it to the site characteristics as per the urban environment in the selected locations.

Center Platform Design Options

Option CA – Center platform, elevated station with technical mezzanine, center VCE's and center piers.

The CA option is an elevated station with a center platform that proposes access to the station from a center entrance. It is an alternative with low impact on the roadway if it is centrally located, in an accessible median island. If the station is located off-center on roads and near the sidewalks, access can be made almost directly over the sidewalk.

Figure 1. Option CA – Schematic Axonometry



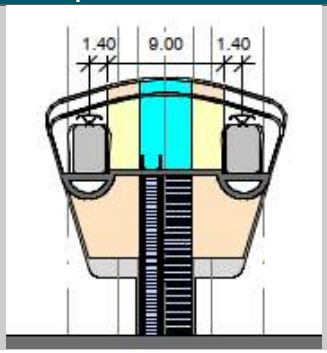
Pros	Cons	Option CA – 16.06m W
• Reduced Overall Station width • Good integration with existing roads • Mezzanine level serves as Tech Rooms space. • Mezzanine level allow horizontal movements from sidewalks to platforms. • The lowest cost elevated central solution	• More expensive than At-Grade options. • May have visual impact within the building façades. • Pedestrian access needs to be address by central island crossing roads at-grade • Non-scalable solution	

Figure 2. Option CA – Platform Level Schematic Floor Plan

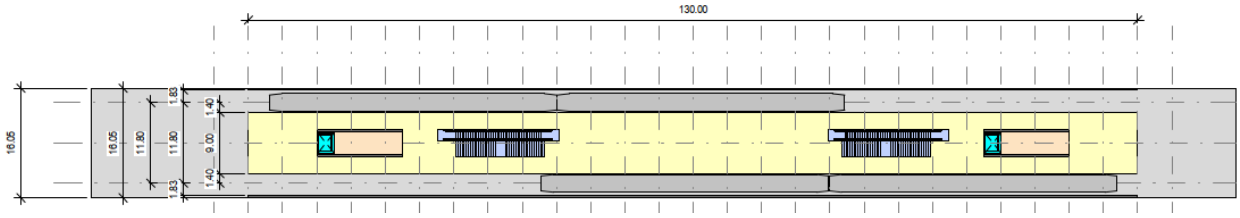
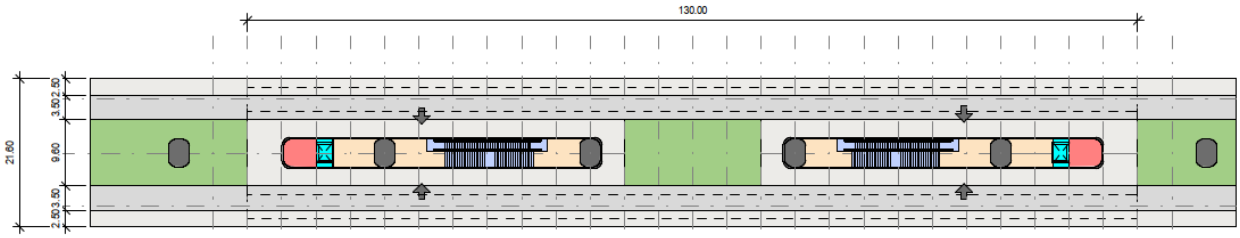


Figure 3. Option CA – At Grade Level Schematic Floor Plan



Option CB – Center platform, elevated station with technical mezzanine, side VCE's and straddle bents.

The CB option is an elevated station with a center platform but differs from the CA option in the column placement and access. In this option, these elements are on the sides.

Figure 4. Option CB – Schematic Axonometry

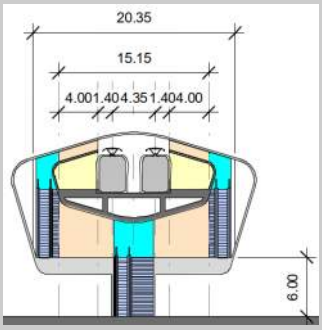
Pros	Cons	Option CB – 16.06m W
• Reduced Overall Station width • Very good integration with existing roads & streets. • Direct access form sidewalks and surrounding areas. • Mezzanine level serves as Tech Rooms space. • Mezzanine level allow horizontal movements from sidewalks to platforms.	• More expensive in comparison with AG or Center Elevated stations • More expensive than At-Grade options. • May have visual impact within the building façades. • Pedestrian access needs to be address by central island crossing roads in at-grade • Non-scalable solution	

Figure 5. Option CB – Platform Level Schematic Floor Plan

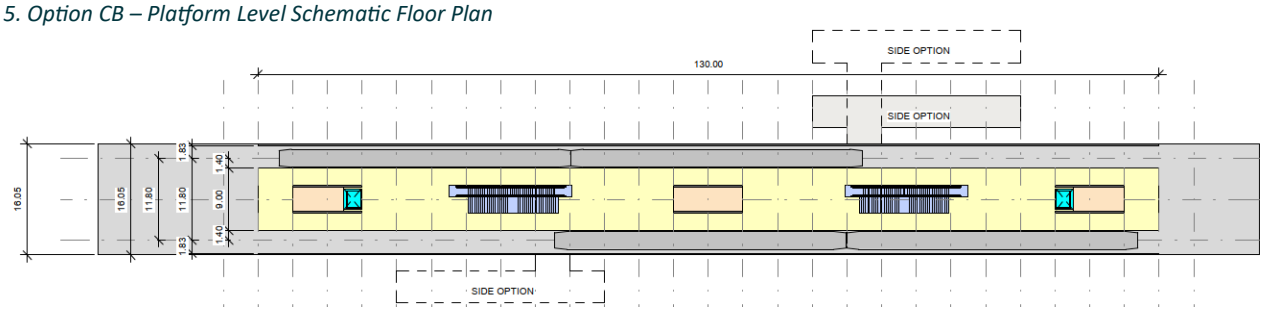
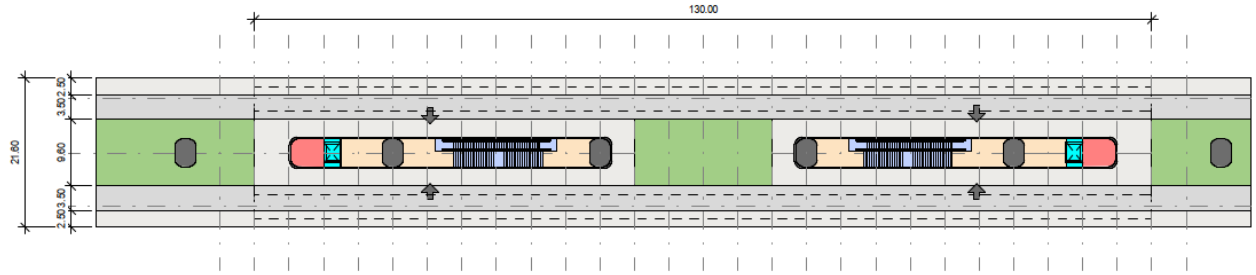


Figure 6. Option CB – At Grade Level Schematic Floor Plan

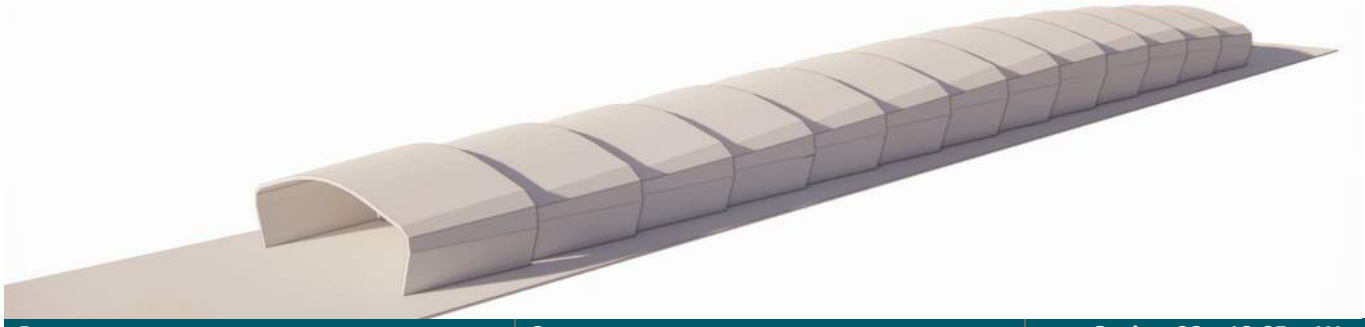


Option CC – Center platform, at-grade station. 13.05m

The CC option is an at-grade station with a center platform. This typology can be combined in wider streets by taking advantage of a wider median that can be used for a platform. Due to the space requirements at the at-grade level, this type of station will

impact existing traffic lanes. Hybrid options may be studied if the traffic can share the lane used by the LRT, like certain tram systems. The great advantage of at-grade infrastructure is its faster construction and overall lower cost.

Figure 7. Option CC – Schematic Axonometry



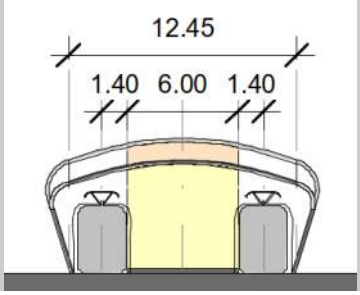
Pros	Cons	Option CC – 13.05m W
• Lower cost in comparison with elevated or underground infrastructure. • Reduced visual impact • Good interface with pedestrian networks • Scalable solution on time as per demand • No interference Plus-15 Skywalk network	• Wider streets are needed • Bad interface with traffic lanes • High impact on the street, in general, bad interface with built environment.	

Figure 8. Option CC – Platform Level Schematic Floor Plan

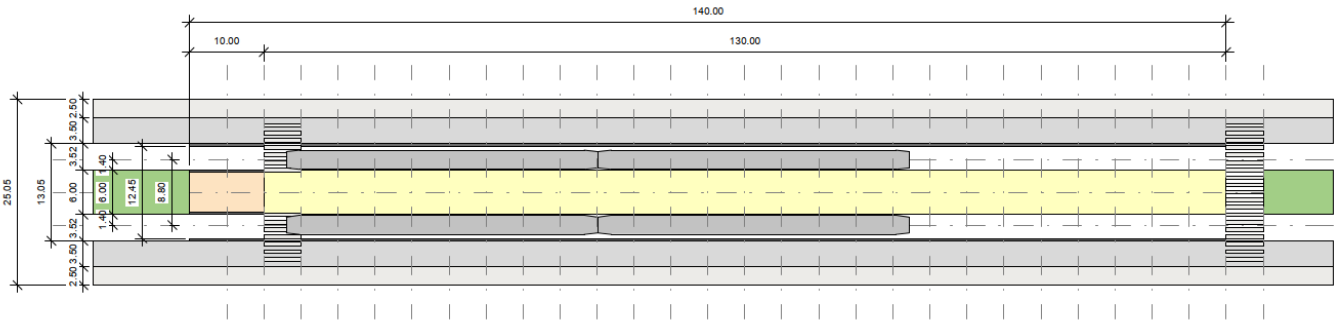
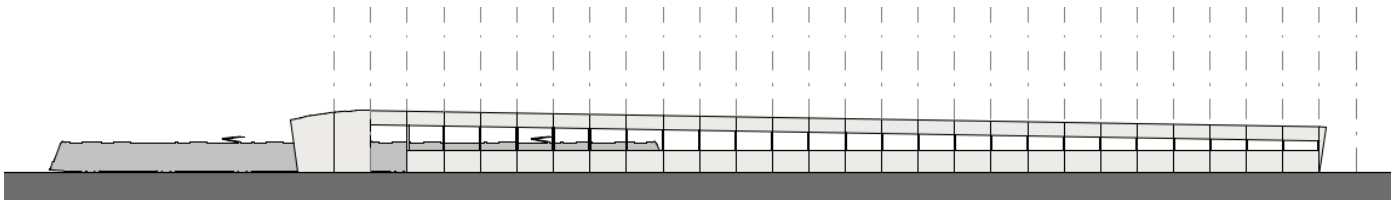


Figure 9. Option CC – Schematic Elevation

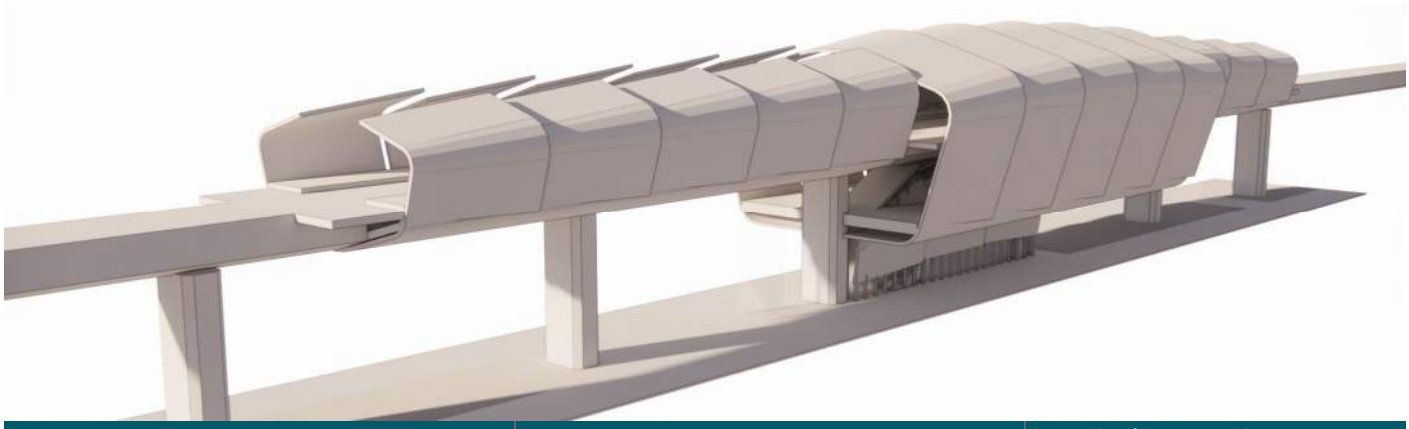


Side Platform Stations Design Options

Option SA – Side platforms, elevated station with technical mezzanine, central VCE's and center piers.

The SA option is an elevated station with a side platform that proposes access to the station from a central entrance, which is aligned with the structural piles. It is an alternative with low impact on the roadway if it is centrally inserted in an accessible median island, or if the station itself is located off-center on roads that allow it, near the sidewalks.

Figure 10. Option SA – Schematic Axonometry



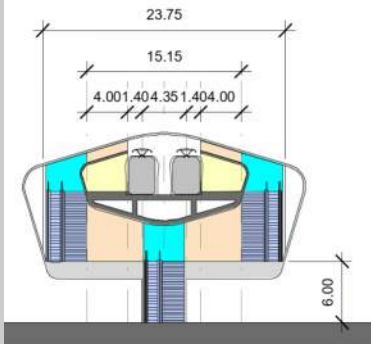
Pros	Cons	Option SA – 23.75m W
• Good integration with existing roads & streets • Mezzanine level serves as Tech Rooms space. • Mezzanine level allow horizontal movements from sidewalks to platforms. • Simple centered elevated viaduct solution	• Larger Overall Station width • More expensive than At-Grade options. • May have visual impact within the building façades. • Pedestrian access needs to be address by central island crossing roads in at-grade • Non-scalable solution	

Figure 11. Option CB – Platform Level Schematic Floor Plan

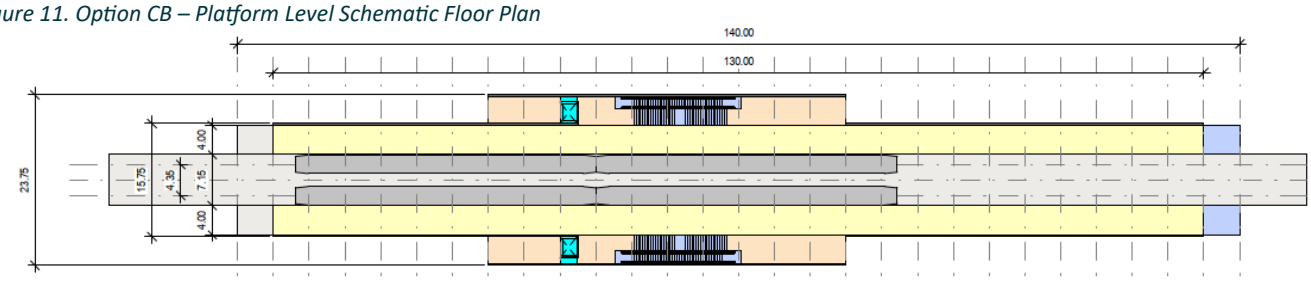
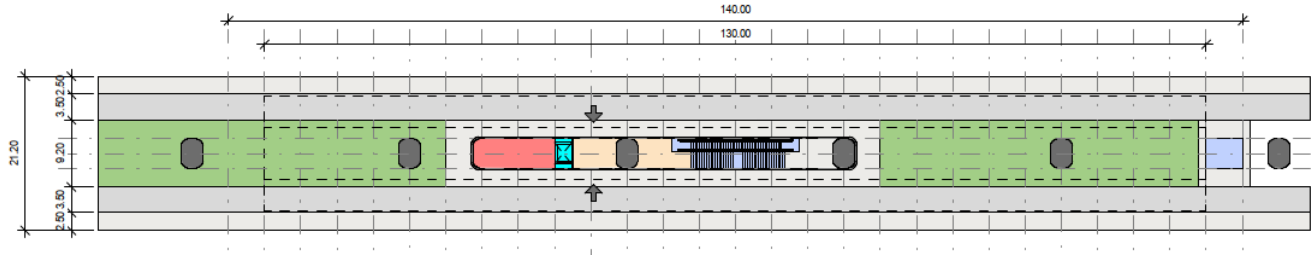


Figure 12. Option CB – At Grade Level Schematic Floor Plan



Option SB – Side platforms, elevated station with technical mezzanine, side VCE's and center piers.

The SB option is an elevated station with a side platform that differs from the SA option by moving access to the side.

Figure 13. Option SB – Schematic Axonometry

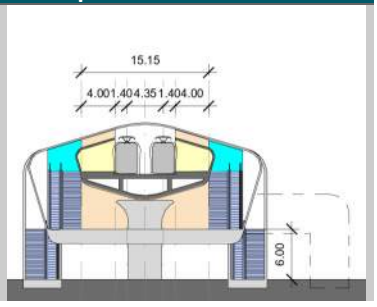
Pros	Cons	Option SB – 23.75m W
• Good integration with existing roads & streets • Mezzanine level serves as Tech Rooms space. • Mezzanine level allow horizontal movements from sidewalks to platforms. • The lowest cost viaduct solution	• Larger overall station width • More expensive than At-Grade options. • May have visual impact within the building façades. • Pedestrian access needs to be address by central island crossing roads in at-grade • Non-scalable solution	

Figure 14. Option SB – Platform Level Schematic Floor Plan

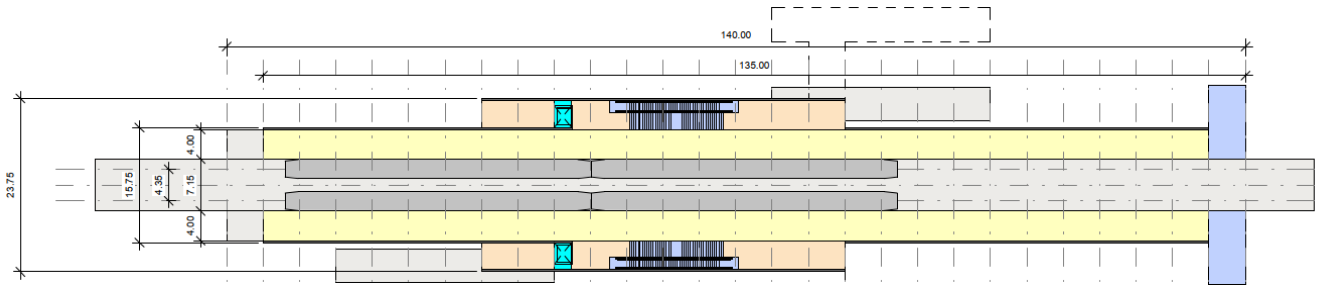
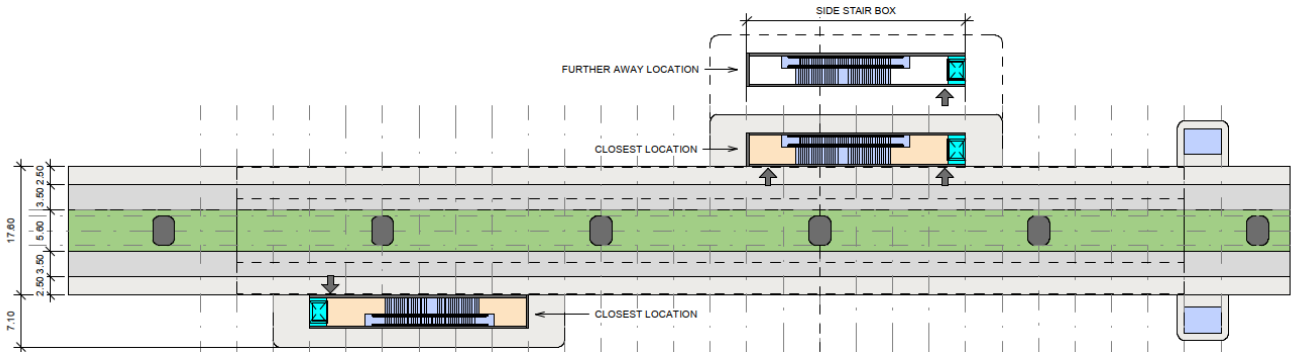


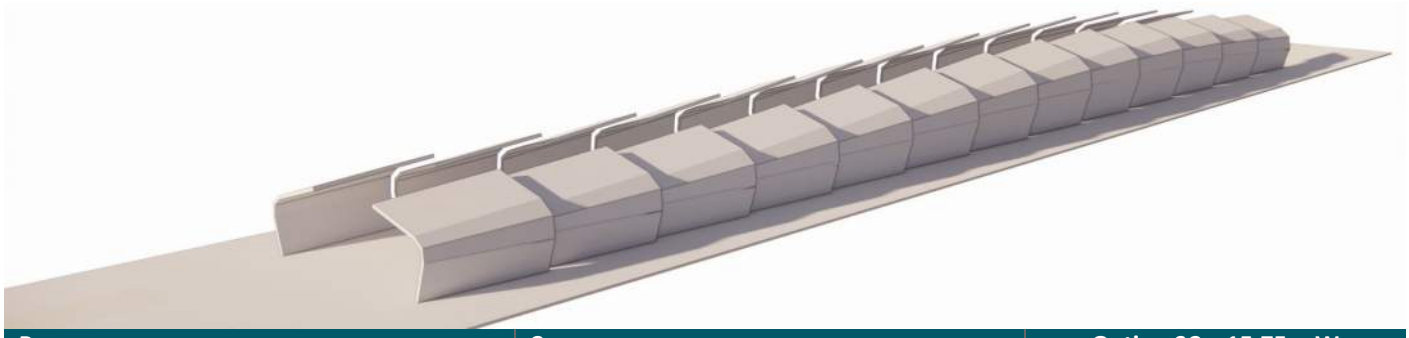
Figure 15. Option SB – At-Grade Level Schematic Floor Plan



Option SC – Side platforms, at grade station.

The SC option is an at-grade station with side platforms. This typology is already found in certain areas of the 7th Ave SW, in the Calgary downtown area. This type of station takes advantage of the sidewalk's connectivity. This type of station needs to be used in wider right of ways should vehicle lanes need to be accommodated. It can be modified with longer distances between the platforms to allow traffic lanes in the middle at the same time the platforms remain next to the sidewalks. Due to the space consumption at the at-grade level, this type of station will cause impacts to the traffic lanes if the traffic does not allow its inclusion alongside the LRT stopping lanes. Hybrid options may be studied if the traffic can share the lane used by the LRT, like certain tram systems. The advantage of at-grade infrastructure is its faster construction and overall lower cost.

Figure 16. Option SC – Schematic Axonometry



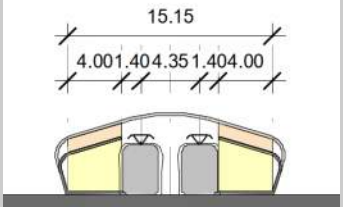
Pros	Cons	Option SC – 15.75m W
• Lower cost in comparison with elevated or underground infrastructure. • Reduced visual impact • Good interface with pedestrian networks • Scalable solution on time as per demand • No interference Plus 15 Skywalk network	• Wider streets are needed • Bad interface with traffic lanes • High impact on the street, in general, bad interface with built environment.	

Figure 17. Option SC – Platform Level Schematic Floor Plan

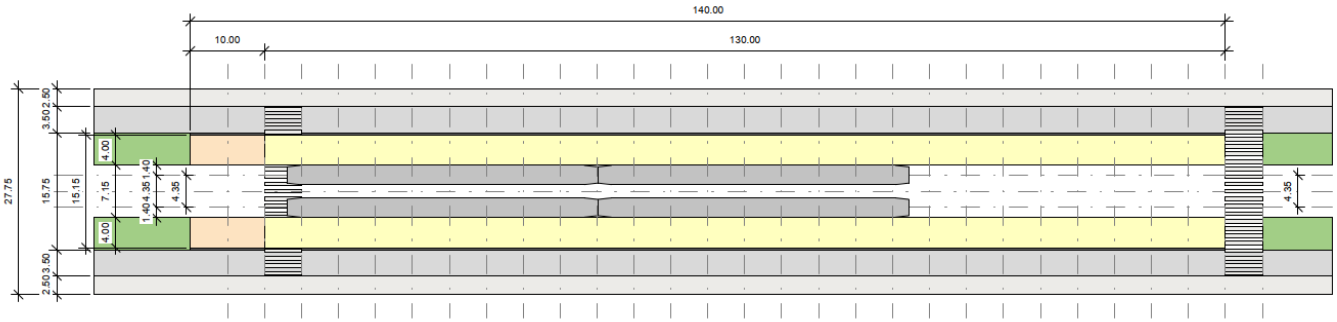
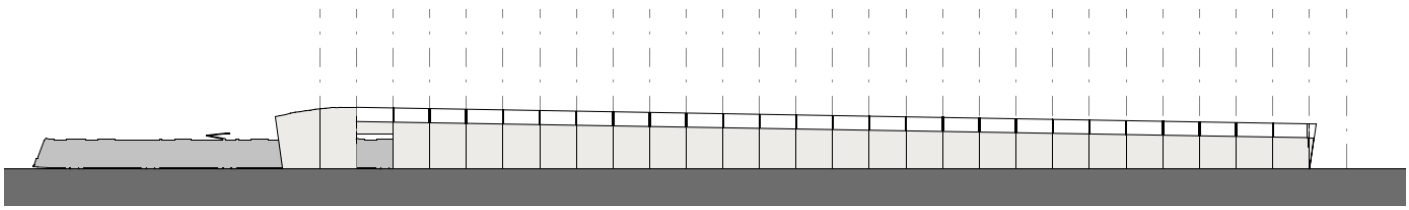


Figure 18. Option SC – Schematic Elevation

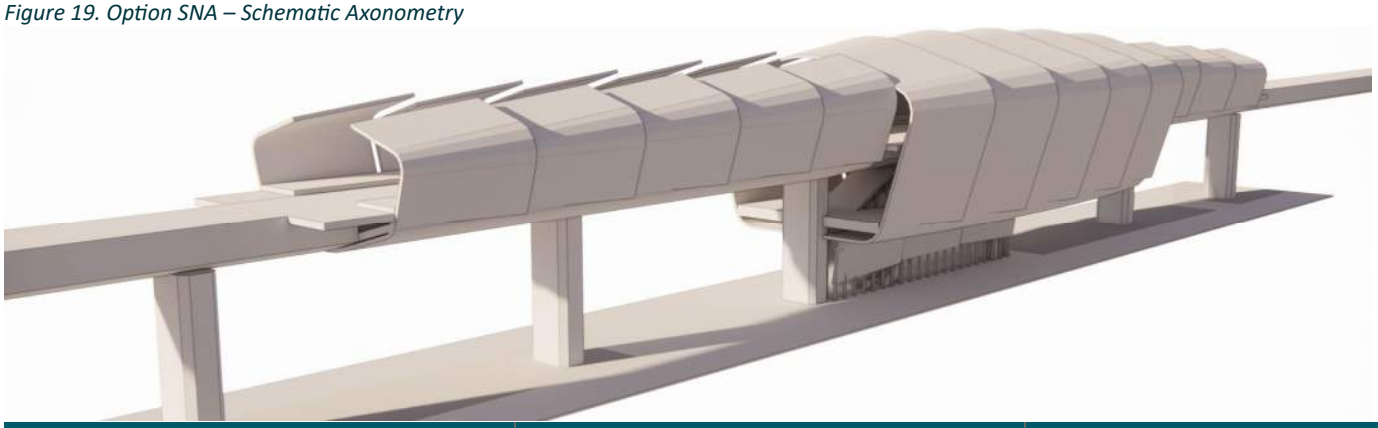


Narrow Design Options

In order to provide more flexibility to the options, narrow configurations for the side platform types have also been studied. The narrow options are optimized layouts similar to their counterpart options SA and SB, but instead, a parallel configuration for stairs and escalators places the vertical communication elements in a single line, reducing the overall width of the station. The result is a station that reduces the overall width at the expense of a less intuitive circulation and a longer travel path in the platform.

Option SNA – Side platforms, elevated station with technical mezzanine, center VCE's and center piers.

Figure 19. Option SNA – Schematic Axonometry



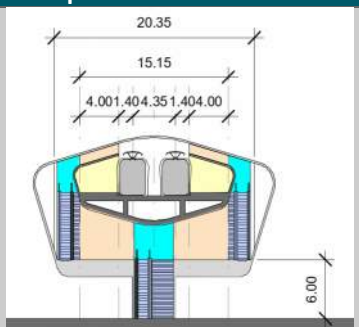
Pros - *(Considering the base on the SA)*	**Cons** - *(Considering the base on the SA)*	**Option SNA – 20.35m W**
• Narrow Station capable of being inserted in smaller streets • Other adjustments can be applicable to increase narrowing	• The level of service, pedestrian walkable spaces are stretch and less comfortable • A reduced level of service decreases the station capacity (passengers/time) • Further studies should be undertaken based on station capacity and demand to guarantee a correct functionality.	

Figure 20. Option SNA – Platform Level Schematic Floor Plan

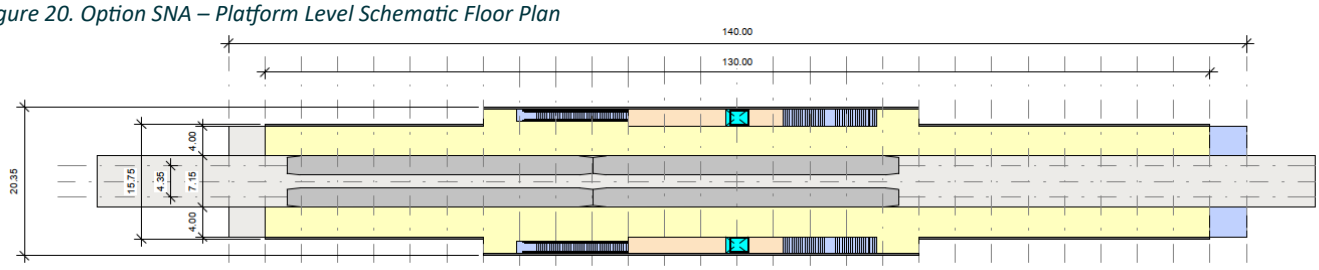
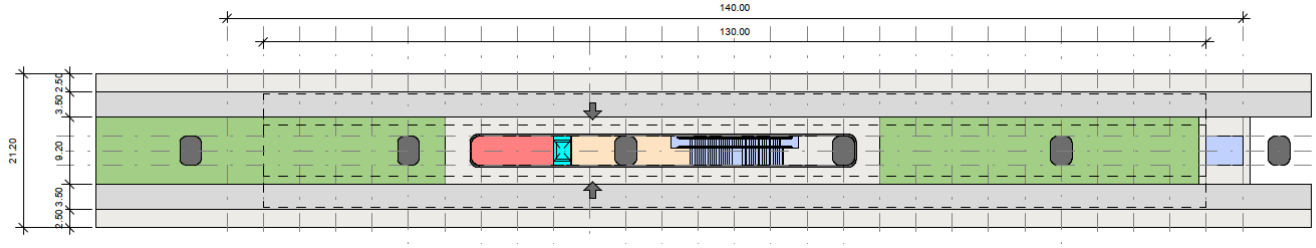


Figure 21. Option SNA – At Grade Level Schematic Floor Plan



Option SNB – Side platforms, elevated station with technical mezzanine, side VCE's and center piers.

Figure 22. Option SNB – Schematic Axonometry

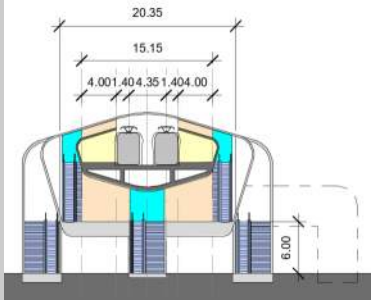
Pros - *(Considering the base on the SA)*	**Cons -** *(Considering the base on the SA)*	**Option SNB – 20.35m W**
• Narrow Station capable of being inserted in smaller streets • Other adjustments can be applicable to increase narrowing	• The level of service, pedestrian walkable spaces are stretch and less comfortable • A reduced level of service decreases the station capacity (passengers/time) • Further studies should be undertaken based on station capacity and demand to guarantee a correct functionality.	

Figure 23. Option SNB – Platform Level Schematic Floor Plan

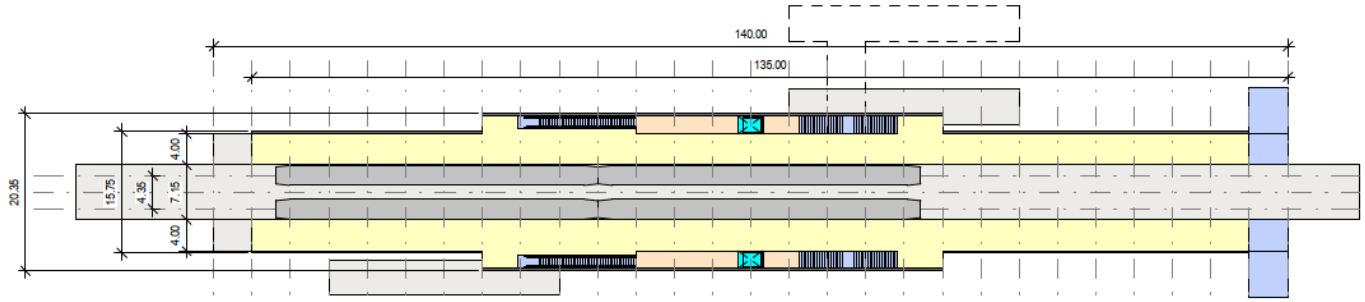
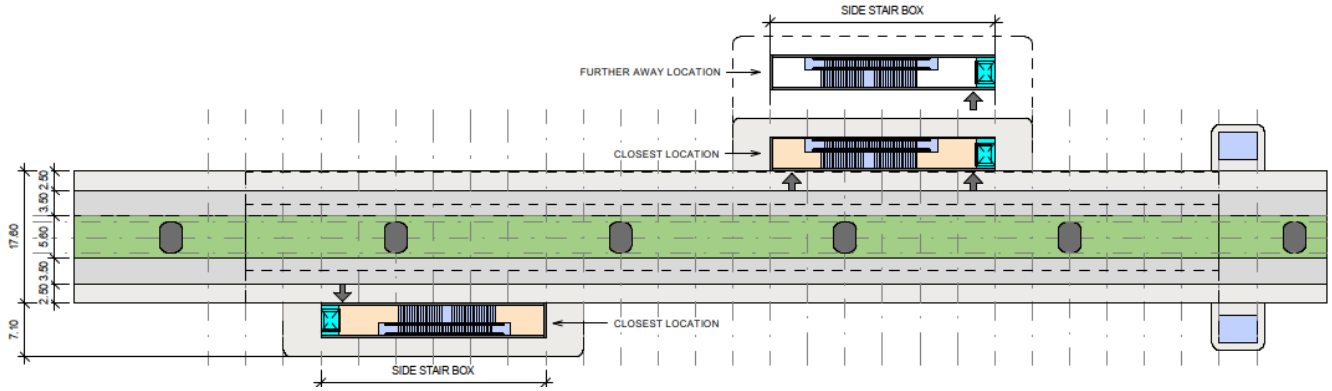


Figure 24. Option SNB – At Grade Level Schematic Floor Plan



Stations Design Intent & Prototypal Station

Prototype selection.

According to the selected alignment options, the proposed track is an elevated structure. Therefore, all the stations are proposed to be elevated. At the same time, the built environment in the vicinity of the selected station locations is very constrained. In most of the locations, the existing ROW width is variable, but it is approximately 20 meters, depending on the street. The elevated stations side platforms proposed (width is 23.75 meters) in this report cannot be accommodated without additional ROW impacts.

The elevated stations with narrow configurations will suffer the same problem. At certain points, the station width may fit the dimensions, but the distance to the façades and properties will not be enough to guarantee a correct design and functionality for the station and the buildings themselves. Note that being closer to an existing façade is not only a problem for visibility, natural lighting, and ventilation, but also poses a significant fire & life safety strategy risk, as the fire may propagate due to the short distance (<3m).

Additionally, according to the street configuration design, utilizing the sidewalks and existing parallel parking lanes presents an opportunity to mitigate the impact of additional ROW needs. Therefore, this report's evaluation proposes an elevated station with a center platform, technical mezzanine, side VCE's, and straddle bents (CB).

Figure 25. Station prototype – Schematic Model – Street level View

Other solutions: Narrower platforms.

Even though this alternative was not considered within this study, more typology options may be considered in the future if additional analysis is undertaken considering in detail the dimensioning of the pedestrian spaces accordingly to the established passengers demand per station on the Green Line LRT. Reducing the platform width would increase the distance between the building facades and the structure edge.

It is important to identify which elements may become narrower based on the demand, considering a reduction on the vertical connection core dimensions or the platform width spaces.

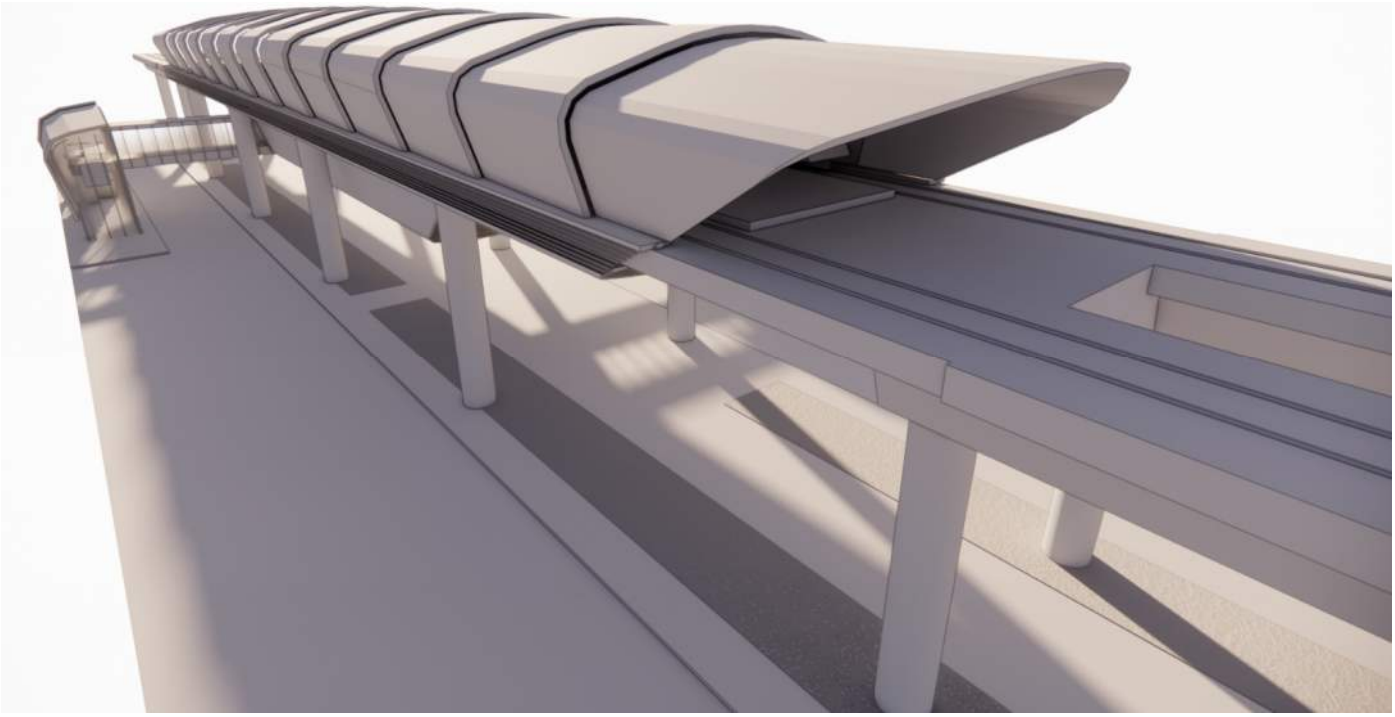
Design Intent.

The elevated LRT stations have been inspired by the need to protect and safeguard travelers that will be using the public transport system during adverse climate conditions, drawing inspiration from the protective shape and functionality of an armadillo. The stations put emphasis on the structure that covers the track and the platforms along the station extension, creating a protective roof shape.

The rounded ribs are made with structural rings specifically designed to withstand snow loads, and the shape avoids accumulation of snow on the top levels with a roof slope of 30%. The main purpose of the design is to preserve the platform surface from snow/rain and keep it safe from any operational disturbance that snow accumulation may cause. By protecting these areas, the operational cost will also become lower since it won't be necessary to maintain the accessibility of the walkable surfaces. Ideally, this shape will bring us not only a nice shape but also a logical design that provides safe and resilient infrastructure.
The roof upper areas will be built with opaque materials to protect the passenger's space, but opposite to this surface, the sides and the lower areas of the ring structure will present a cladding with panels that can be perforated or stretched, creating a permeable skin for the envelope that can ventilate or even provide views to certain areas.

The roof design over the platform includes openings between the different ring structures which are south oriented. It has been designed to facilitate ventilation during the summer season, avoiding overheating of the structure and the passenger space, but at the same time is in the opposite direction to the prevailing wind direction, thus also protecting the passengers from the winter weather conditions.
This strategic design improves the thermal comfort of the stations and, overall, the design combines functionality and aesthetic value to create stations that are not only safe and resilient but also attractive and integrated within a modern urban environment.

Figure 26. Station prototype – Schematic Model – South Aerial View



Prototype Design Drawings.

Figure 27. Station prototype – Street level floorplan

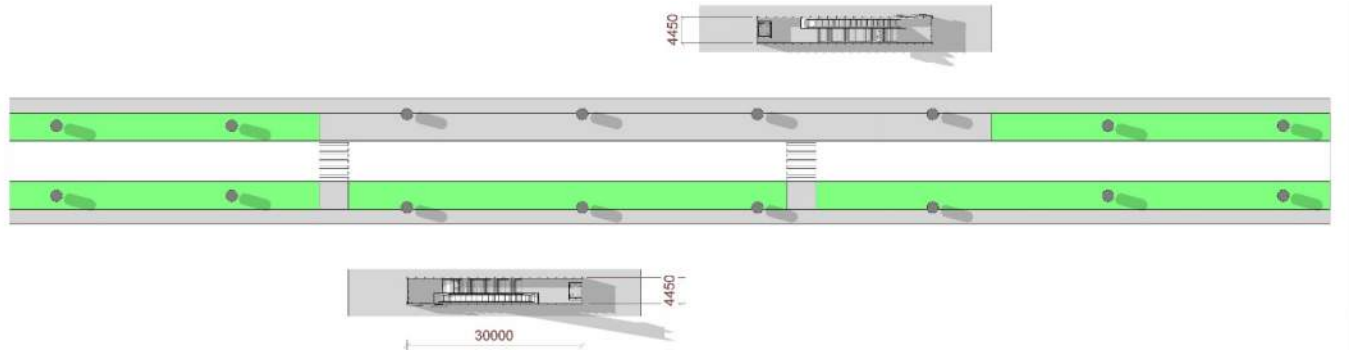


Figure 28. Station prototype – Mezzanine level floorplan

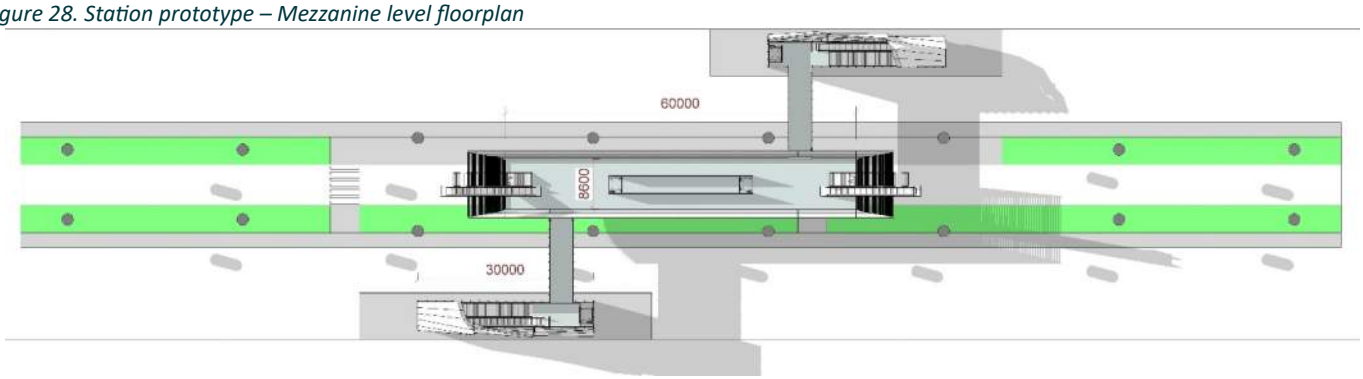


Figure 29. Station prototype – Mezzanine level floorplan

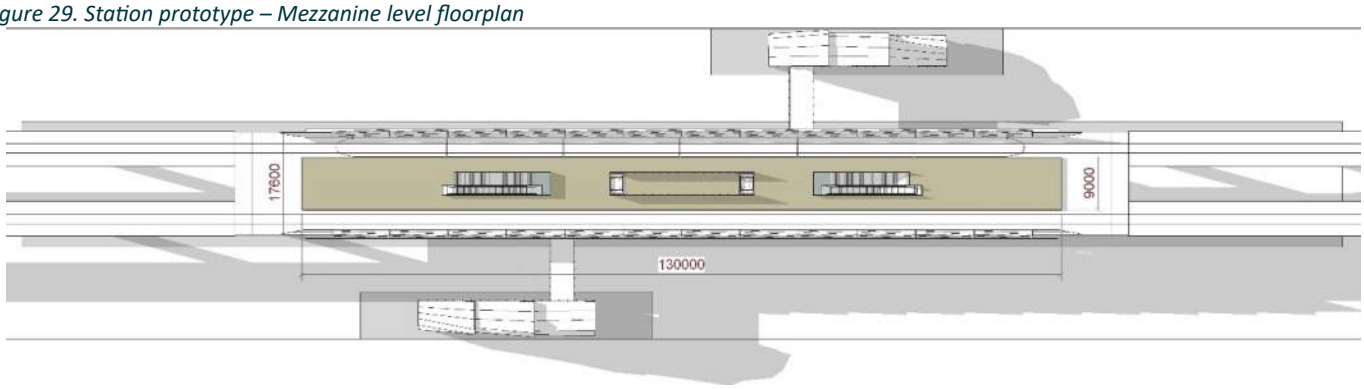


Figure 30. Station prototype – Roof level floorplan

Figure 31. Station prototype – Elevations

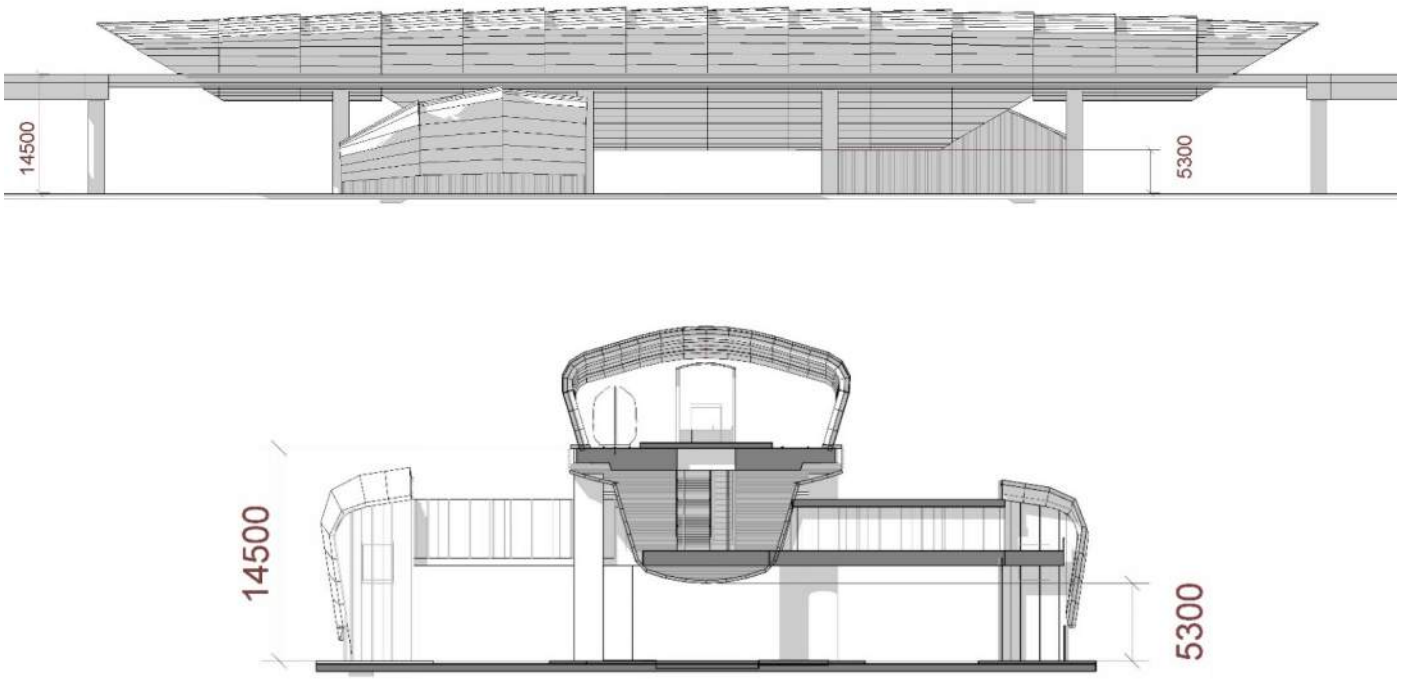
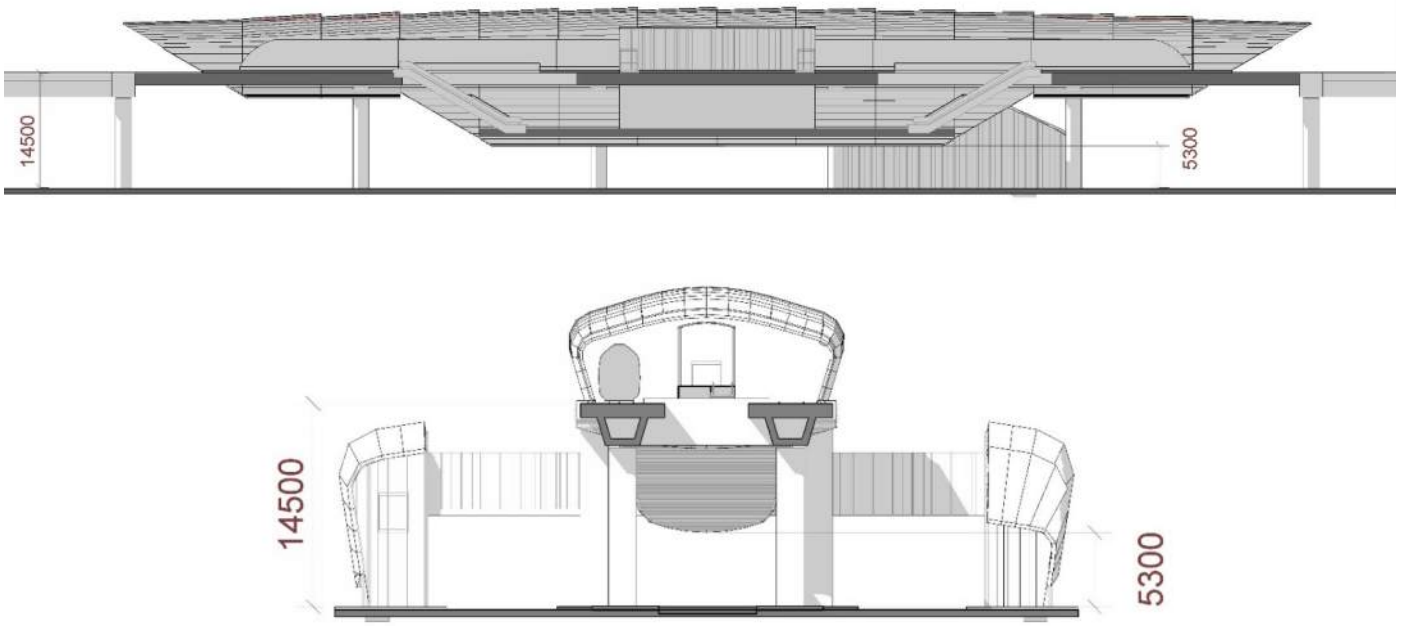


Figure 32. Station prototype – Elevations



Stations Site Integration

Site locations.

In accordance with the selected alignment options, seven different locations have been considered for the station locations. These locations have been studied in detail, considering the built urban environment along with the road network and the boundaries of private properties. The station locations correspond to the alignments as follows:

- 1st Street SE Option
  - 7th Ave. SE
  - Grand Central Stations
- 2nd Street SW Option
  - Eau Claire Station
  - 7th Ave. SE
  - 10th Ave.
  - Grand Central Stations
- 6th Street SE Option
  - Eau Claire Station
  - 7th Ave. SE
  - 10th Ave.
  - Grand Central Stations

Figure 33. Stations Location Map

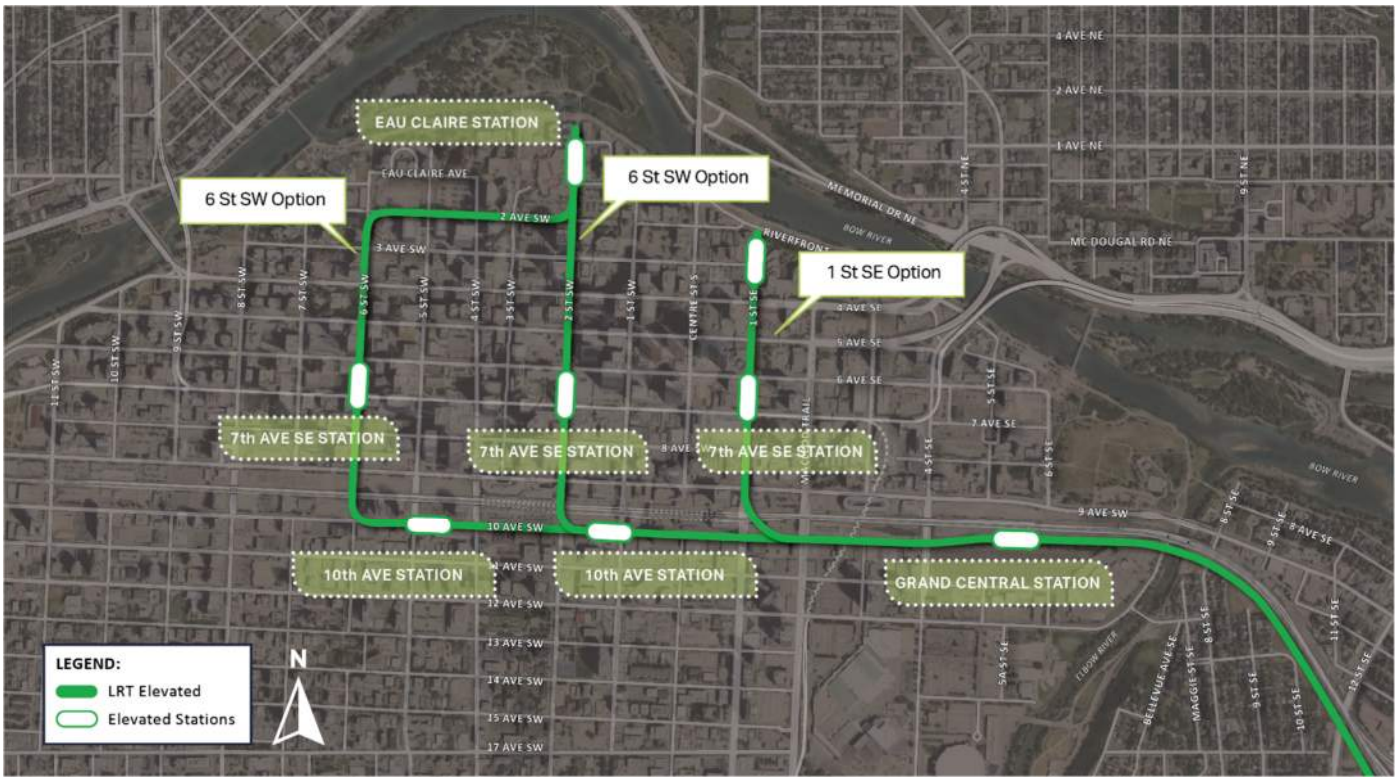
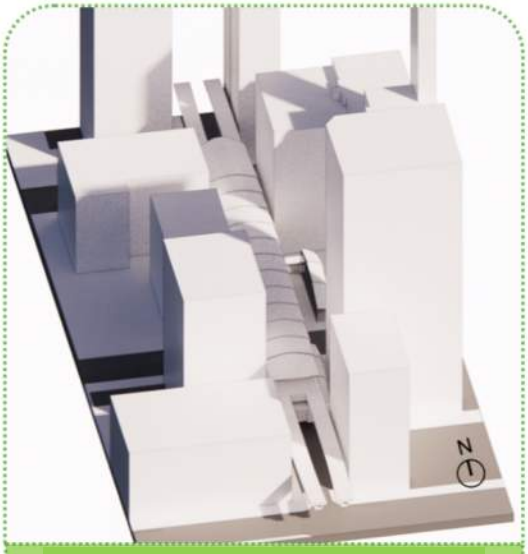


Figure 34. Site Locations – Overall 3D Views

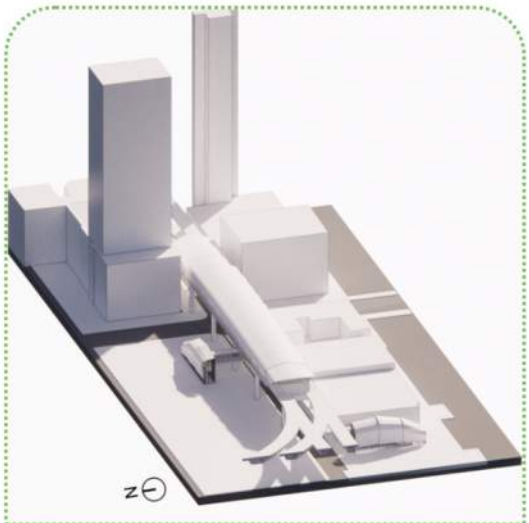
1st St SE Option – 7th Ave SE Station

Eau Claire Station

[2nd St. SW / 7th Ave. SE] Station



6th St SW Option – 7th Ave SE Station



2nd St SW Option – 10th Ave Station

6th St SW Option – 10th Ave Station

Site adaptations.

1st Street SE Option - 7th Avenue SE Station Site

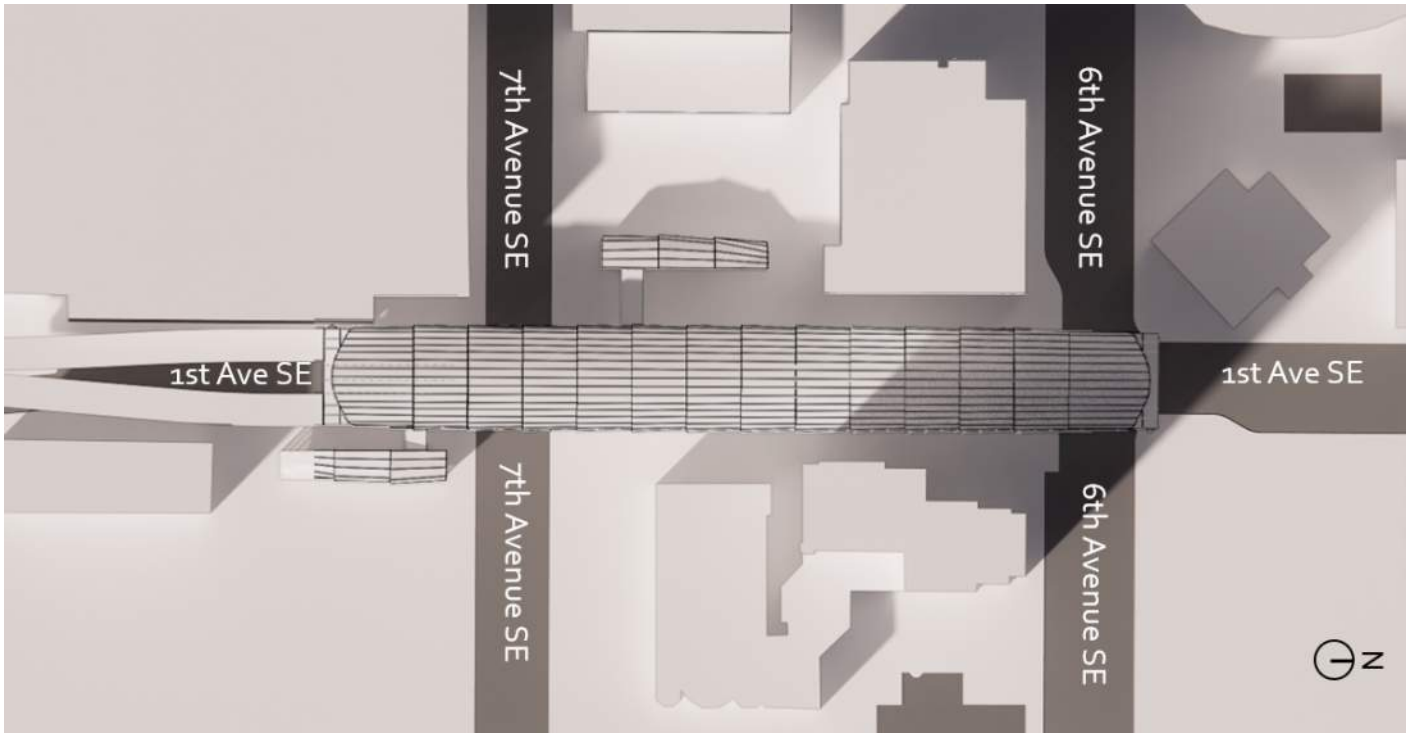
Figure 35: 7th Avenue Station Area

The proposed 7th Avenue SE station offers users a connection between the LRT Green Line and the existing Red Line and Blue Line. The elevated station includes a mezzanine level and two vertical circulation elements providing street level access. Two VCEs are currently shown on private property and require additional ROW: at the northwest corner of the intersection of 1st Street SE and 7th Avenue SE and at Olympic Plaza Park. Neither location results in a direct impact to buildings and feedback from City Staff noted potential redevelopment at Olympic Plaza Park.

In addition, this station mezzanine would integrate the Plus-15 structure connecting the Andrew Davison Building and Carter Place.

Construction challenges and permanent indirect impacts to the building in this location should be considered. The southwest and southeast corner of 7th Avenue SE would have less than 2-meter horizontal clearance between the building and the structure edge. Future analysis is recommended to evaluate reducing the width of the station to increase the horizontal clearance. Indirect impacts could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

Figure 36. 1st Street SE Option – 7th Avenue SE Station - General Plan View



1st Street SE Option – 7th Avenue SE Station Drawings

Figure 37. [1st Street SE – 7th Avenue SE] Station – Street level floorplan

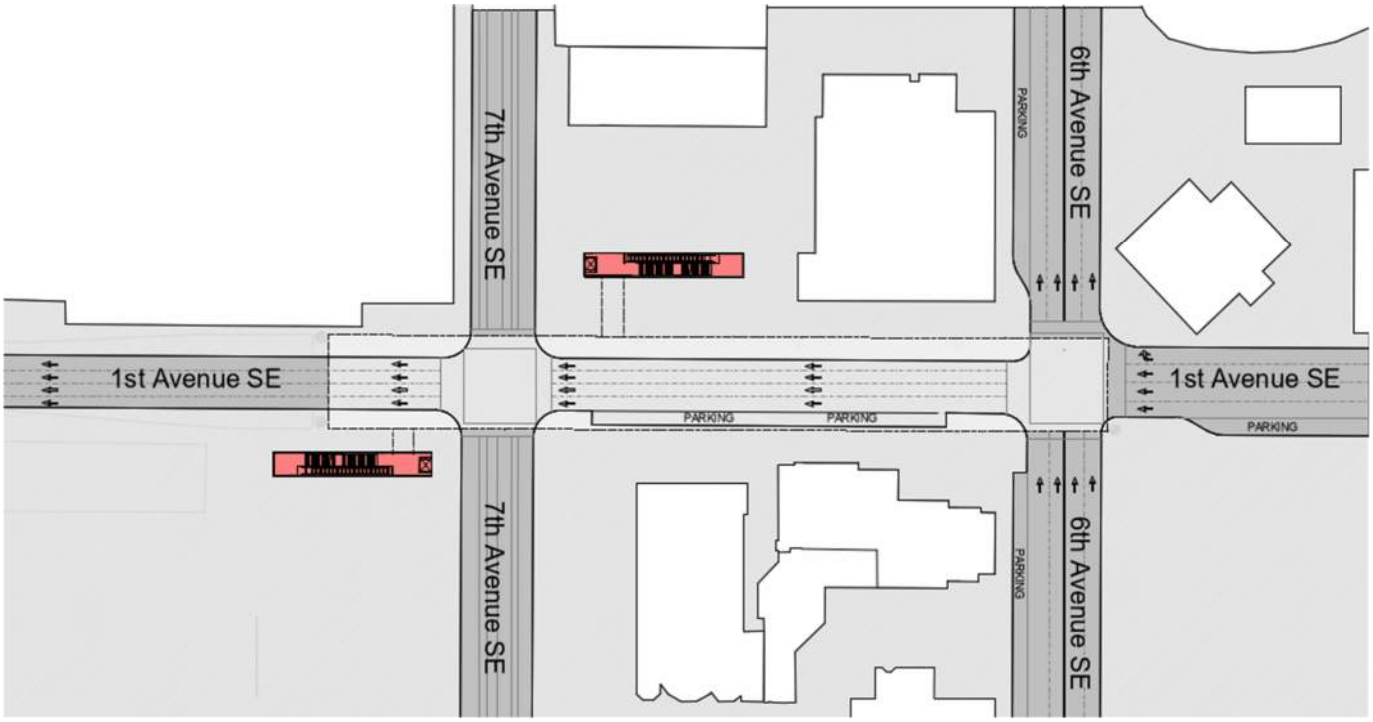
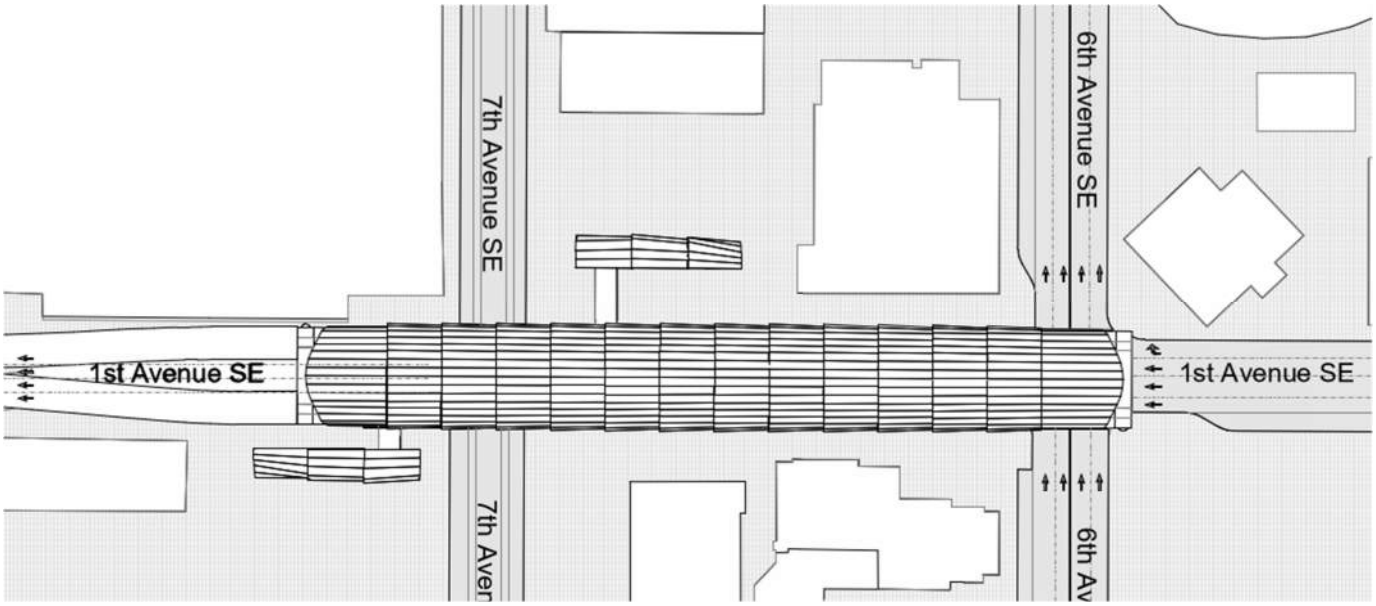


Figure 38. 1st Street SE Option – 7th Avenue SE Station – Roof level floorplan



1st Street SE Option – 7th Avenue SE Station Images

Figure 39. 1st Street SE Option – 7th Avenue SE Station - Aerial View

Figure 40. 1st Street SE Option – 7th Avenue SE Station - Street View (looking north)

Eau Claire Station

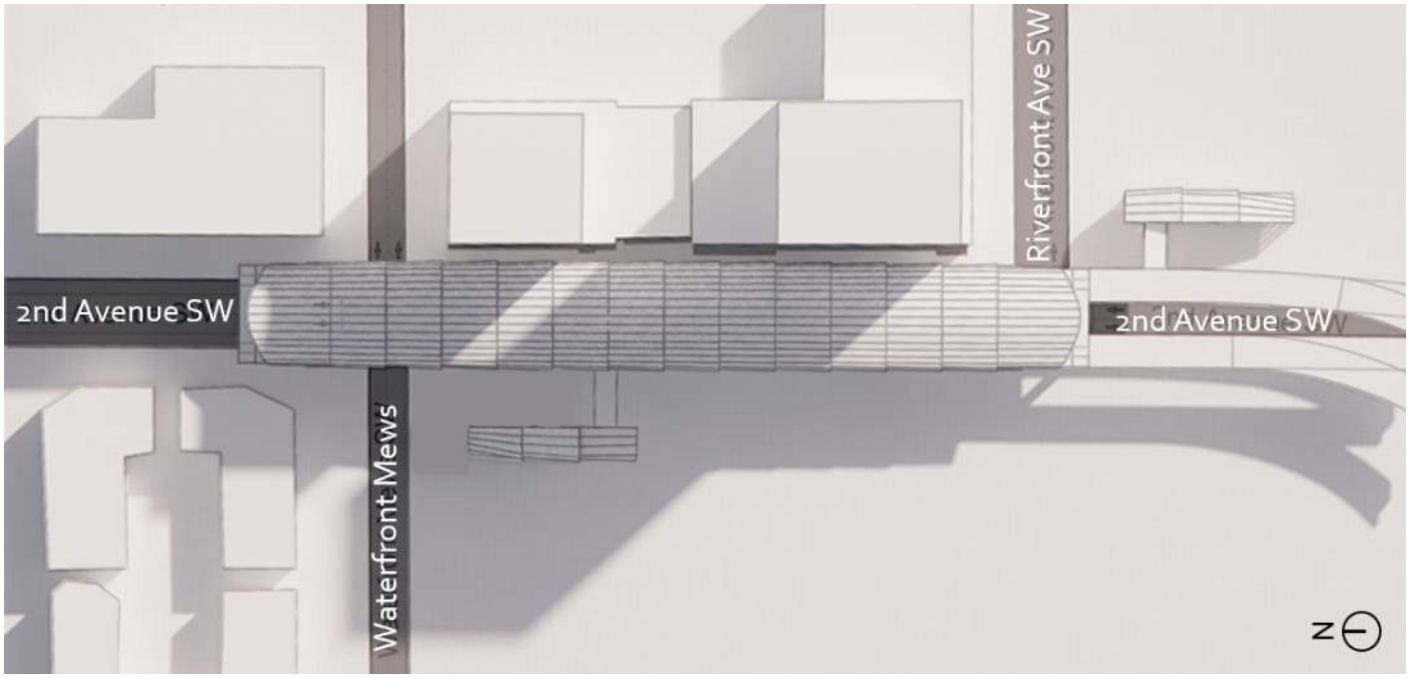
The proposed station at Eau Claire would be the terminus station for the 2nd Street SW and 6th Street SW options. A station at this location would be compatible with a vision for expansion north of the Bow River.

The proposed elevated station would include platforms and a mezzanine with street-level access provided by two VCE locations. The two VCEs require additional ROW from private property at the southeast corner of Riverfront Avenue SW and on the west side of 2nd Street SW. The VCEs on the west side assumes the demolition of the Eau Claire Market building.

An aerial view of the proposed station is shown in **Error! Reference source not found.** below.

Figure 41: Eau Claire Station Area

Figure 42. Eau Claire Station - General Plan View



Eau Claire Station Drawings

Figure 43. Eau Claire Station – Street level floorplan

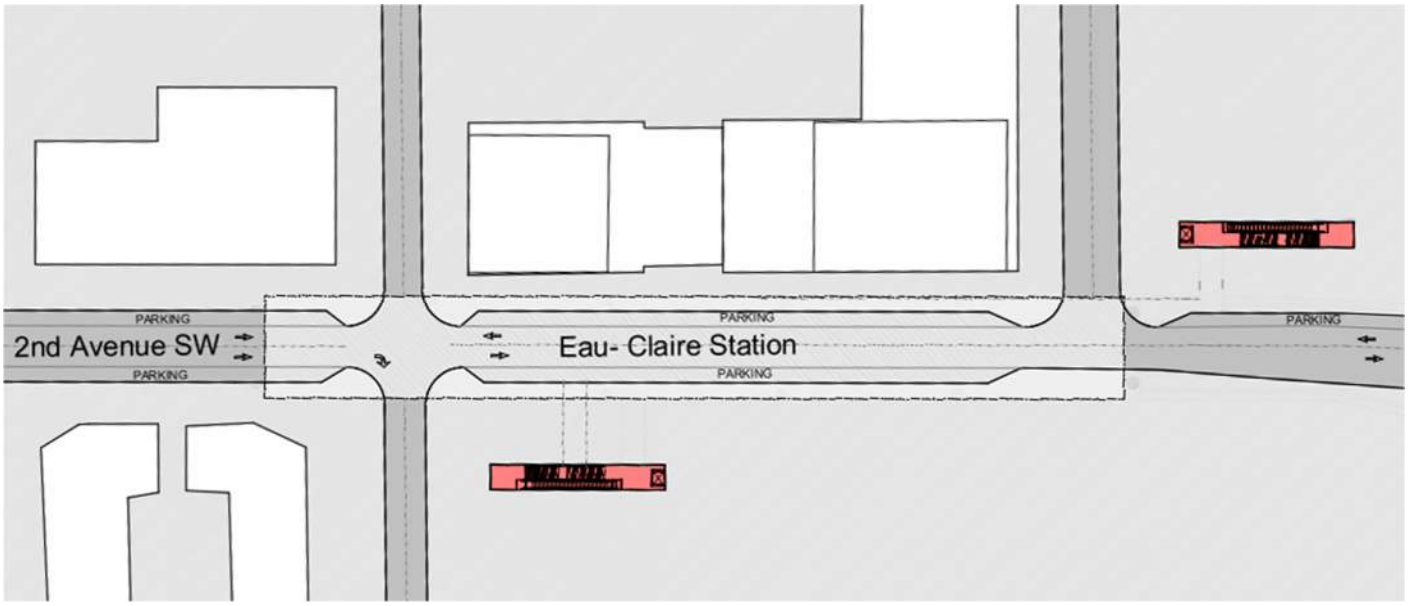
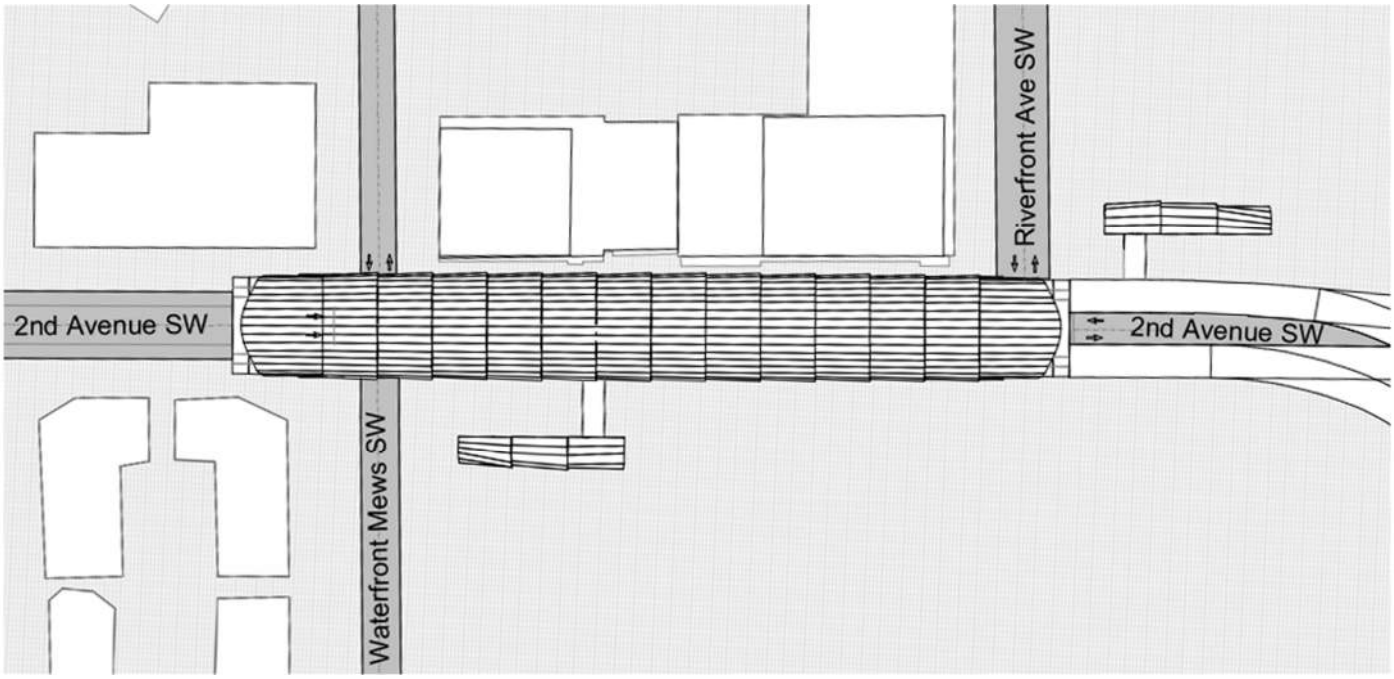


Figure 44. Eau Claire Station – Roof level floorplan



2nd Street SW Option - 7th Avenue SW Station

The proposed station would be on 2nd Street SW between 6th Avenue SW and 8th Avenue SW, and it offers Green Line riders transfer opportunities to existing Red Line and Blue Line.

An elevated station at this location poses unique challenges due to existing Plus-15 and Plus-30 structures. The proposed station mezzanine would remove the Plus-30 structure and integrate the Plus-15 structure beneath. The integrated mezzanine and Plus-15 would provide a seamless connection between the Plus-15 skywalk and station vestibule.

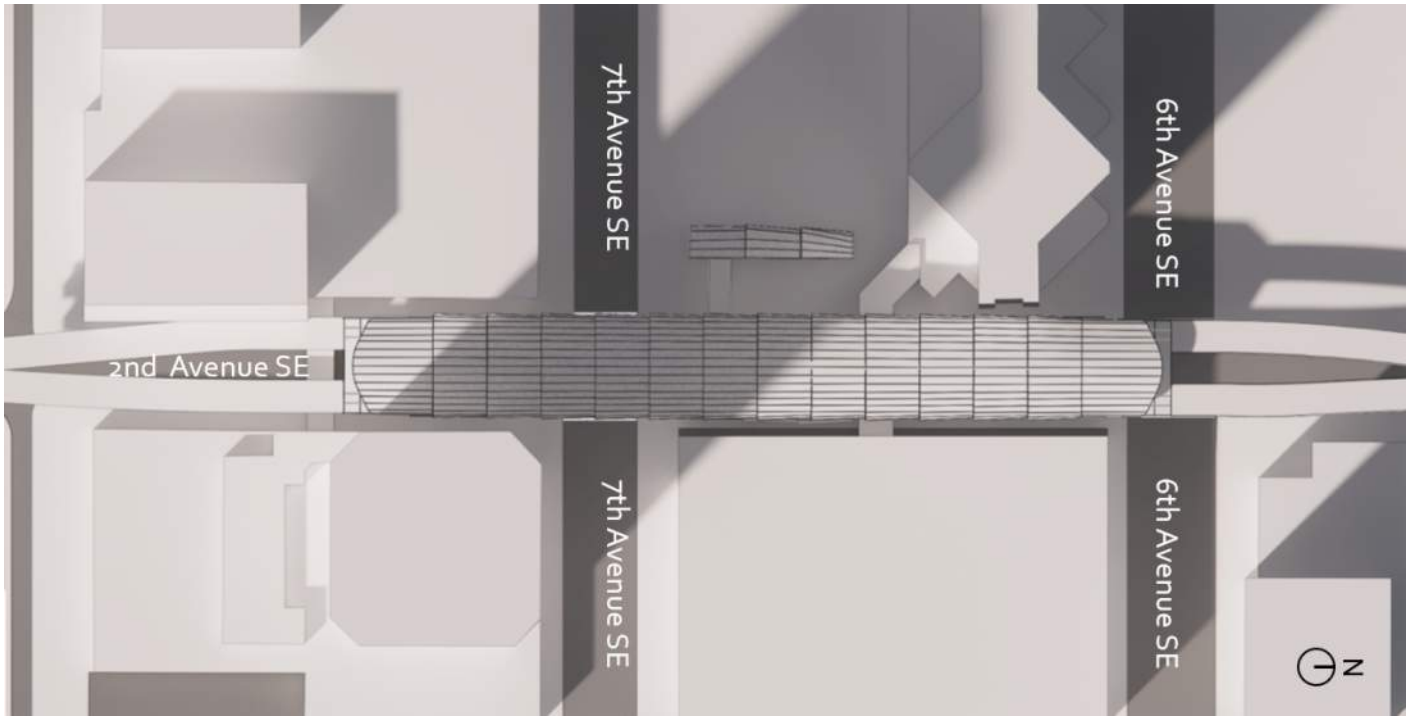
Further elevating the Green Line platform over the Plus-30 structure would result in a taller and more costly structure; therefore, further elevating the station was not proposed.

Figure 45: 7th Avenue SW Station Area

The elevated station would be served by two different VCE locations providing street level access. One is placed at the northeast corner of 7th Avenue SW and requires additional ROW. The other one is assumed to be on public ROW.

Additional constraints at this location include low horizontal clearance from existing adjacent buildings on the west side of 2nd Avenue SW. Preliminary assessment shows less than 1-meter horizontal clearance between the building and station structure edge and three other locations where the horizontal clearance is less than 2.5 meters. Future analysis is recommended to evaluate reducing station width to increase the horizontal clearance. Engineering drawings in Appendix 1 identify these locations. Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

Figure 46. 2nd Street SW Option – 7th Avenue SE Station - General Plan View



2nd Street SW Option – 7th Avenue SE Station Drawings

Figure 47. 2nd Street SW Option – 7th Avenue SE Station – Street level floorplan

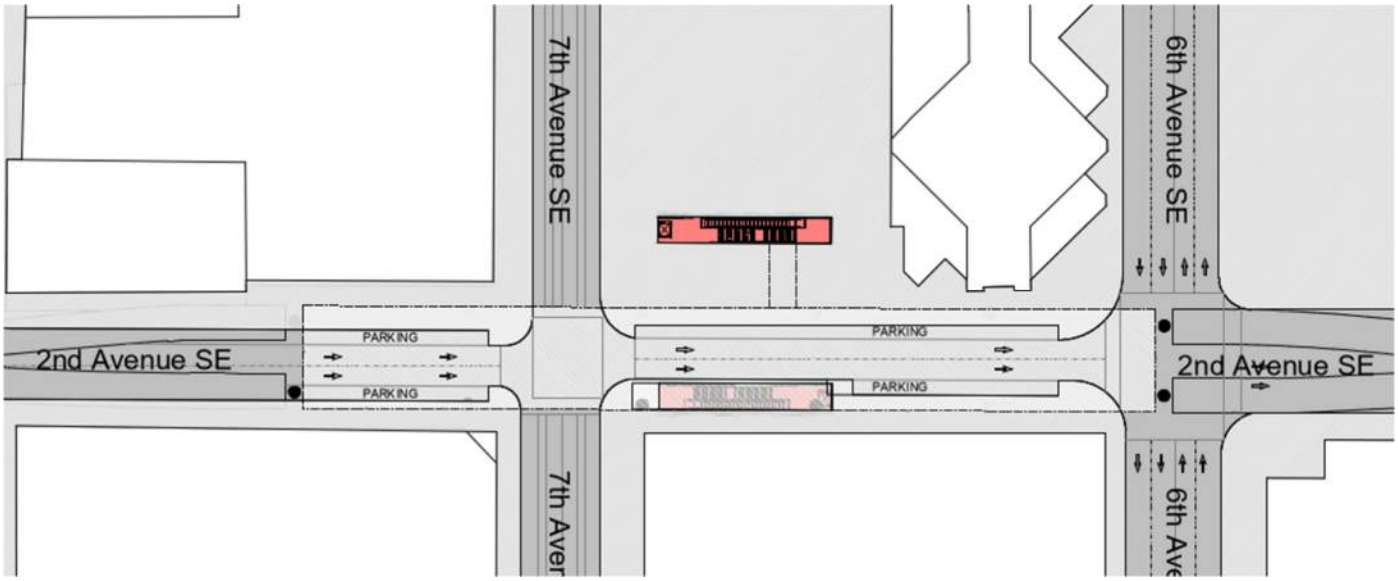
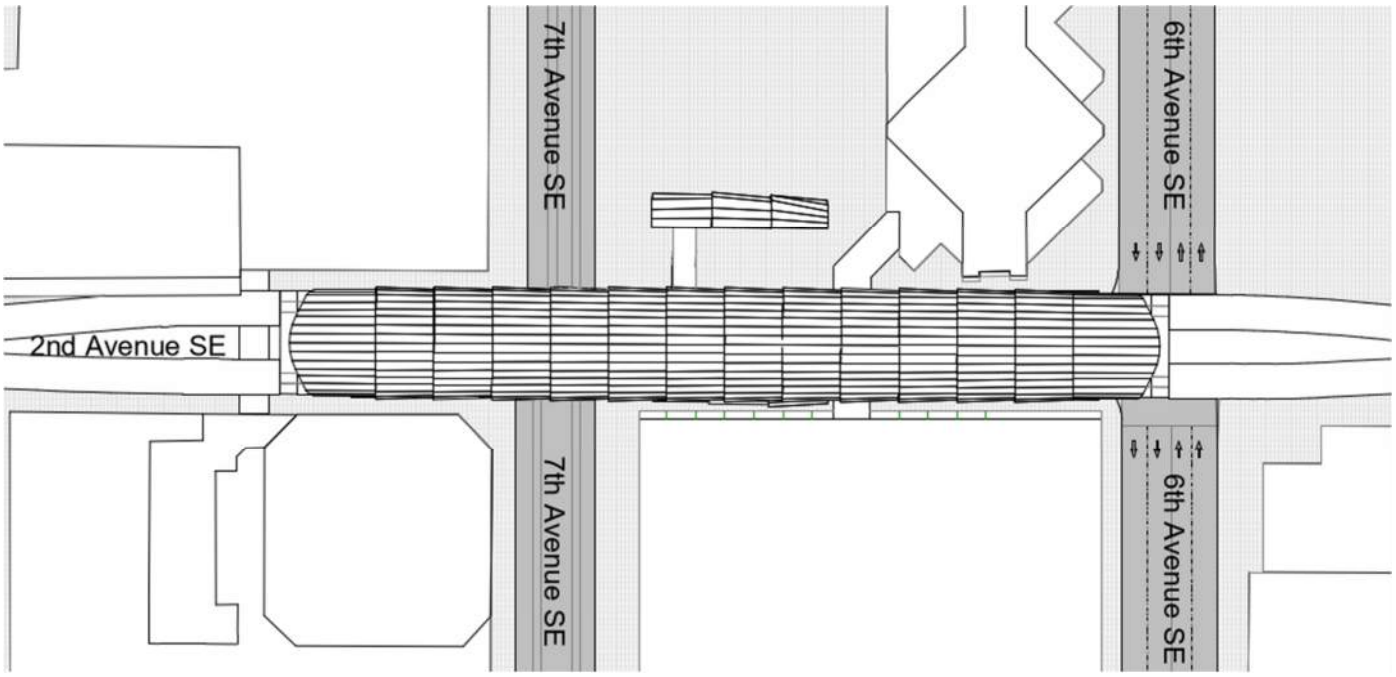


Figure 48. 2nd Street SW Option – 7th Avenue SE Station – Roof level floorplan



2nd Street SW Option – 7th Avenue SE Station Images

Figure 49. 2nd Street SW Option – 7th Avenue SE Station - Aerial View

Figure 50. 2nd Street SW Option – 7th Avenue SE Station - Street View (looking north)

6th Street SW Option - 7th Avenue SW Station Site

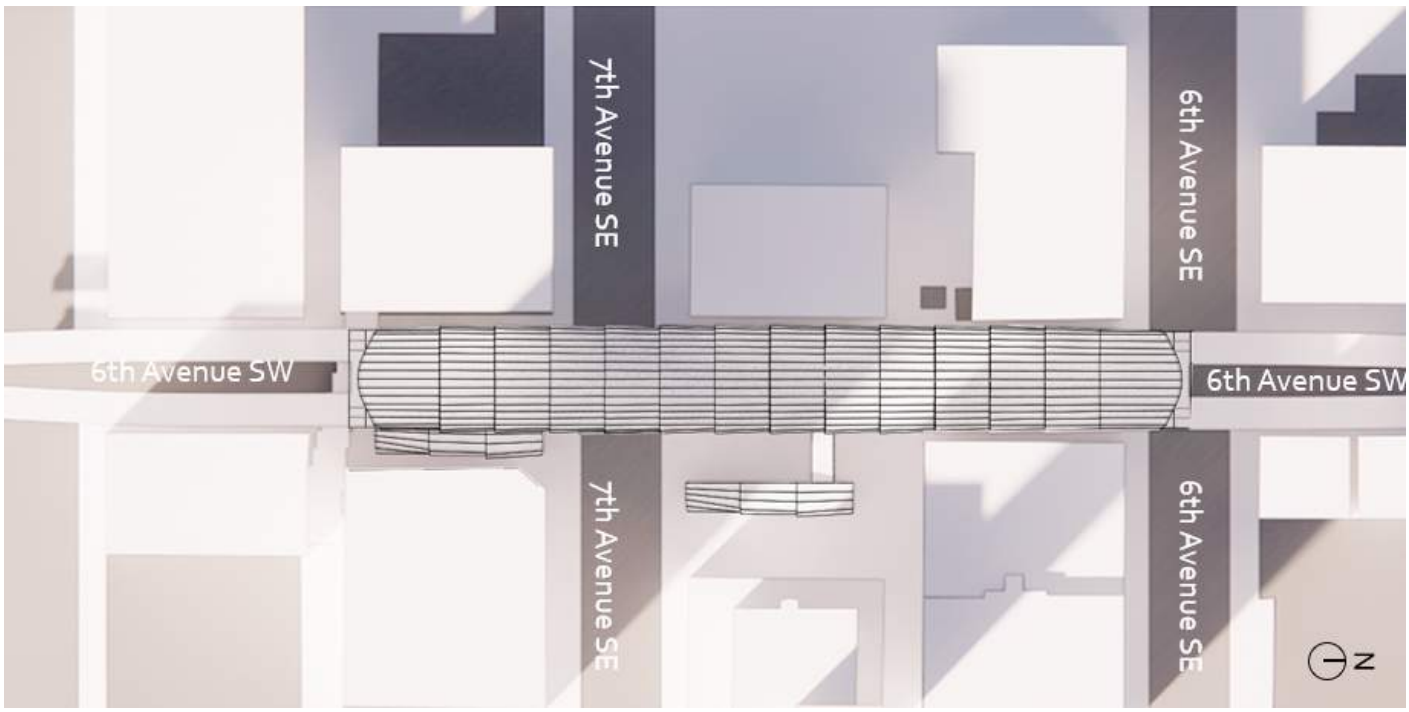
The proposed station would be on 6th Street SW between 6th Avenue SW and 8th Avenue SW, and it offers Green Line riders transfer opportunities to existing Red Line and Blue Line.

The proposed elevated station would include platforms and a mezzanine with street-level access provided by two VCE locations. The two VCEs require additional ROW from adjacent private property located east of the guideway north and south of 7th Avenue SW.

Figure 51: 7th Avenue SW Station Area

This station has ten highly constrained locations where the buildings and structure edge have between 1- and 2-meter horizontal clearance. Future analysis is recommended to evaluate reducing station width to increase horizontal clearance. Engineering drawings in Appendix 1 identify these locations. Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

Figure 52. 6th Street SW Option – 7th Avenue SE Station - General Plan View



6th Street SW Option – 7th Avenue SE Station Drawings

Figure 53. 6th Street SW Option – 7th Avenue SE Station – Street level floorplan

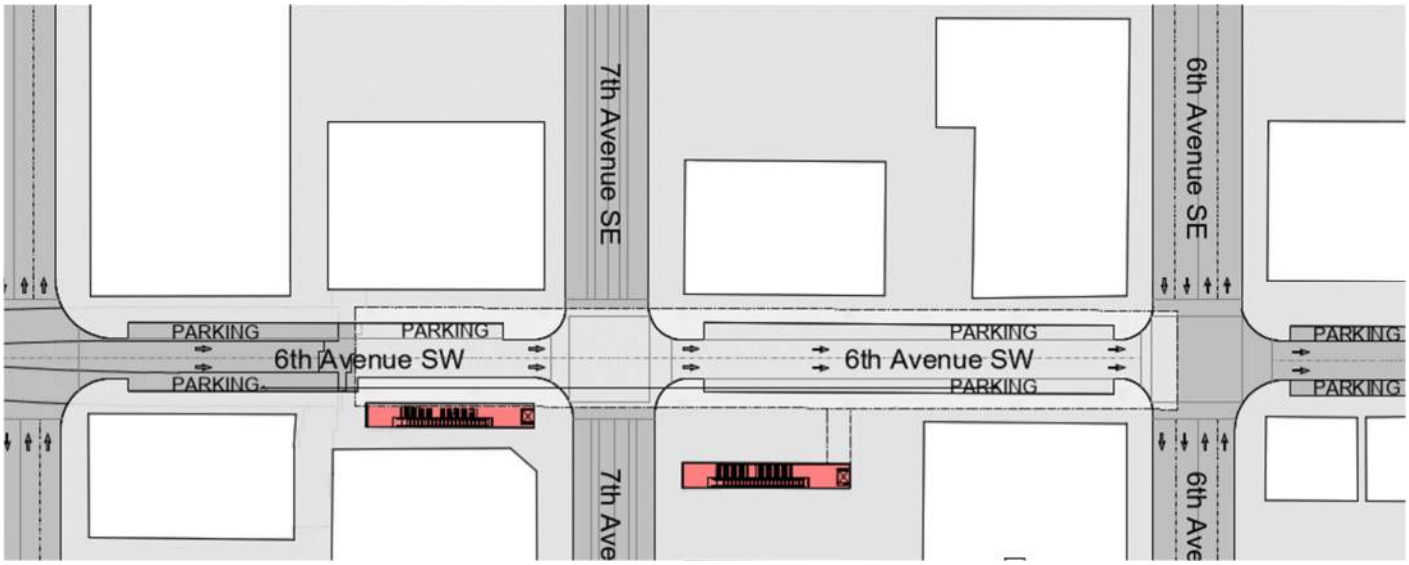
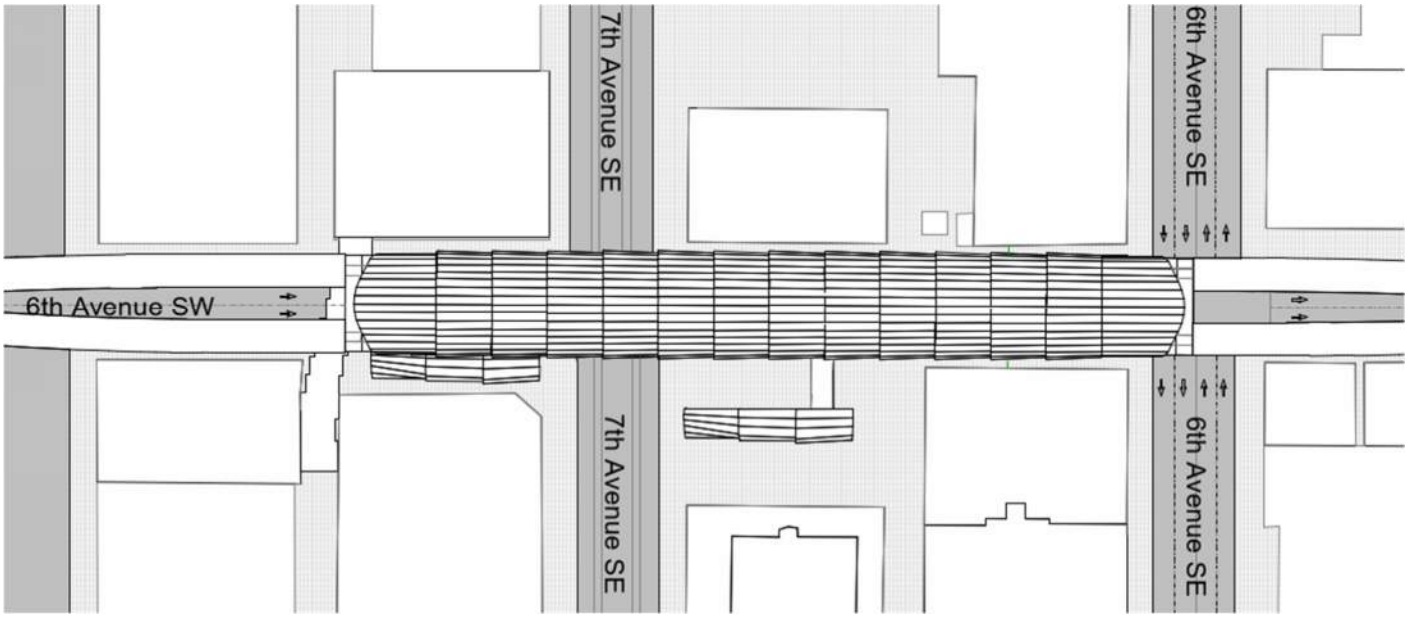


Figure 54. 6th Street SW Option – 7th Avenue SE Station – Roof level floorplan



2nd Street SW Option - 10th Avenue Station Site

The proposed station would be located along 10th Avenue, near the 2nd Street SW intersection. This site was chosen based on direction to push the location as far west as possible. An existing surface parking lot here also provide opportunity for placement of VCEs.

The proposed elevated station includes a mezzanine level providing street-level access via two different VCE locations, one would be at the north surface parking lot. The other one is assumed to be on public ROW. **Error! Reference source not found.** below shows one of the vertical access elements along 2nd Street SW.

Figure 55: 10th Avenue Station Area

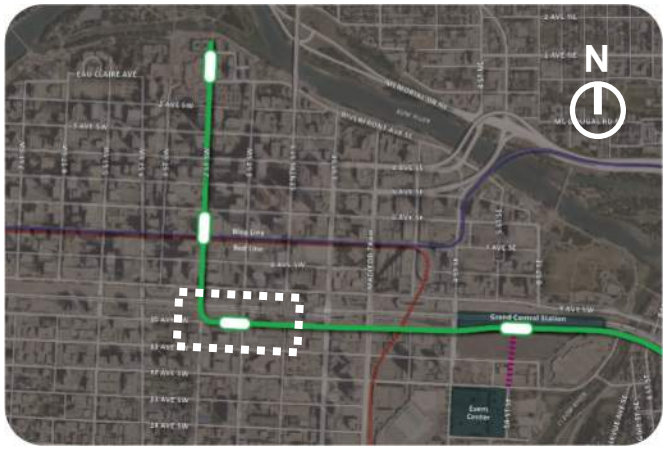
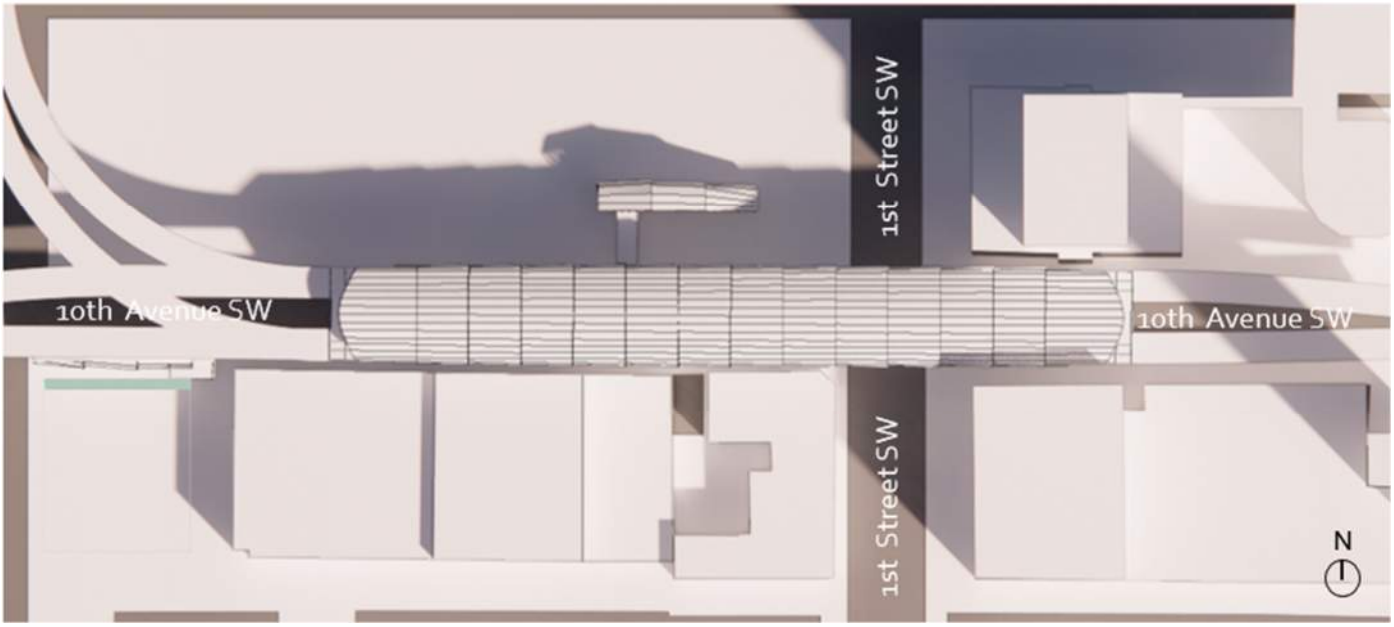


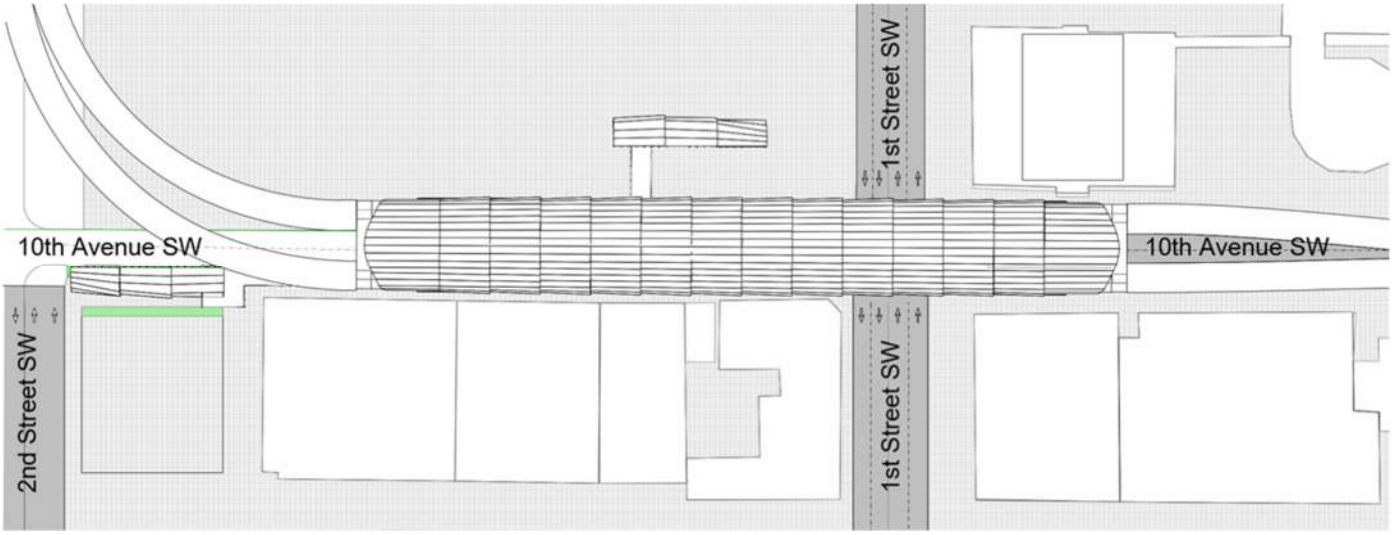
Figure 56. 2nd Street SW Option – 10th Avenue Station - General Plan View



2nd Street SW Option – 10th Avenue Station Drawings

Figure 57. 2nd Street SW Option – 10th Avenue Station – Street level floorplan

Figure 58. 2nd Street SW Option – 10th Avenue Station – Roof level floorplan



2nd Street SW Option– 10th Avenue SE Station Images

Figure 59. 2nd Street SW Option – 10th Avenue Station - Aerial View

Figure 60. 2nd Street SW Option – 7th Avenue Station - Street View (looking east)

6th Street SW Option - 10th Avenue Station

The proposed station would be located along 10th Avenue, near the 6th Street SW intersection. This site was chosen based on direction to push the location as far west as possible.

Constraints at this location include adjacent buildings on all sides of the station creating challenges for VCE placement The elevated station includes a mezzanine level providing street-level access via two VCE locations all to be placed in public ROW.

There are three highly constrained places where less than 2- meter horizontal clearance from structure edge to building are identified. Future analysis is recommended to evaluate reducing station width to increase horizontal clearance. Engineering drawings in Appendix X identify these locations. Indirect impacts due to low horizontal clearance could include changes to building operations and maintenance plans and/or fire and life safety and emergency response plans.

Figure 61: 10th Avenue Station Area

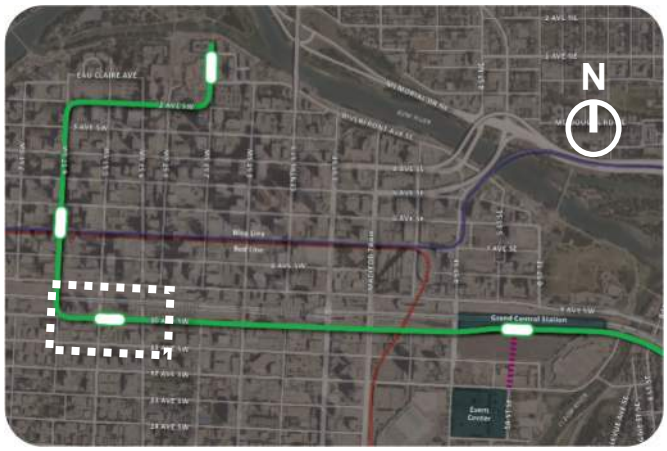
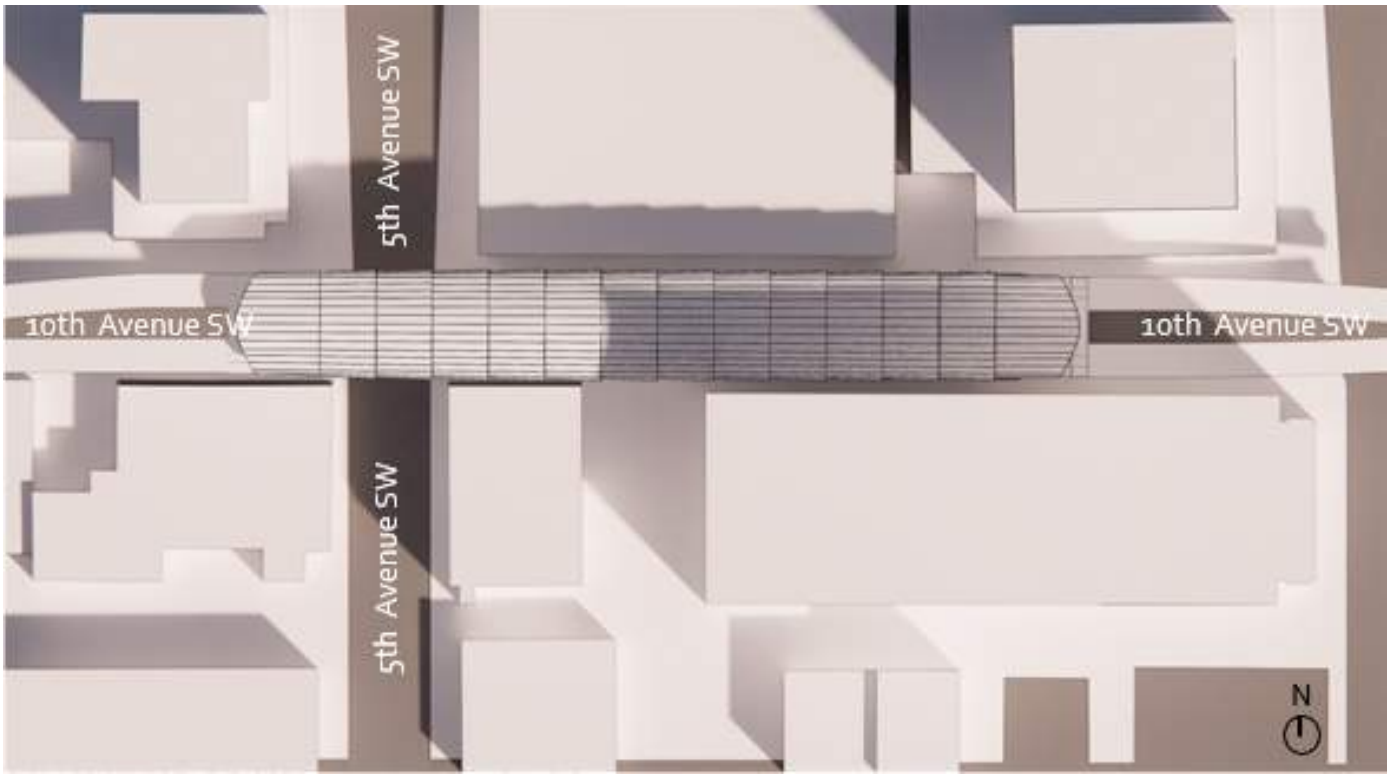


Figure 62. 6th Street SW Option – 10th Avenue Station - General Plan View



6th Street SW Option – 10th Avenue Station Drawings

Figure 63. 6th Street SW Option– 10th Avenue Station – Street level floorplan

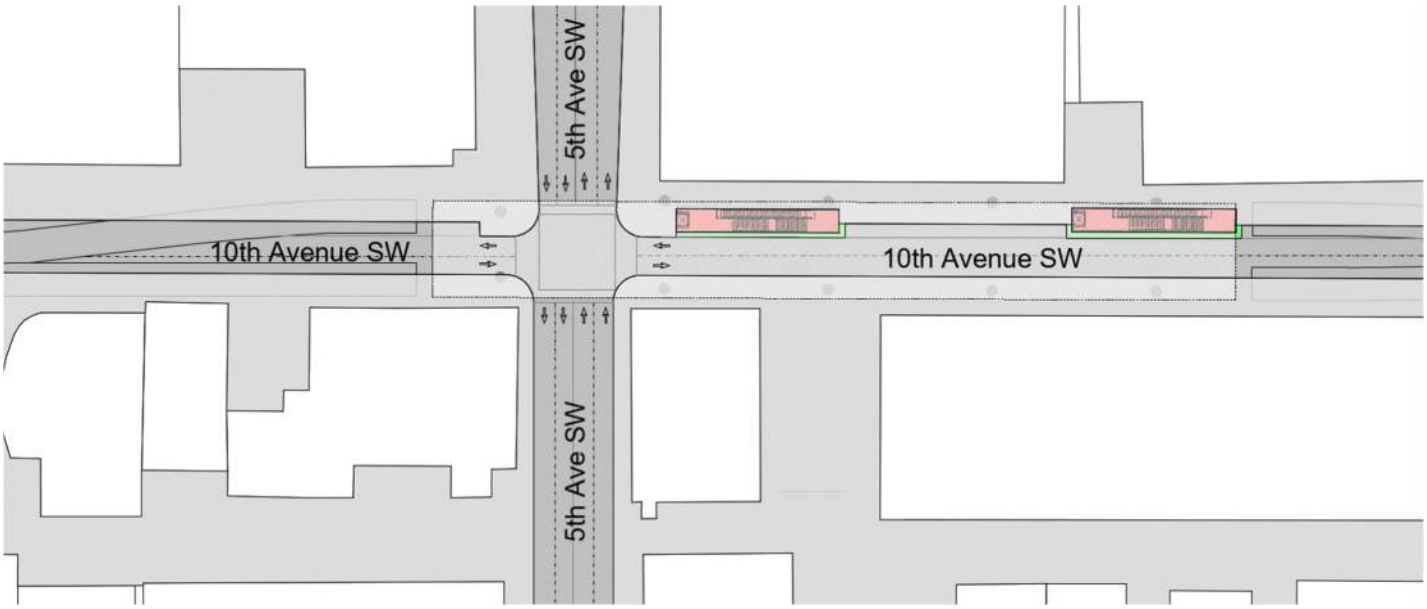
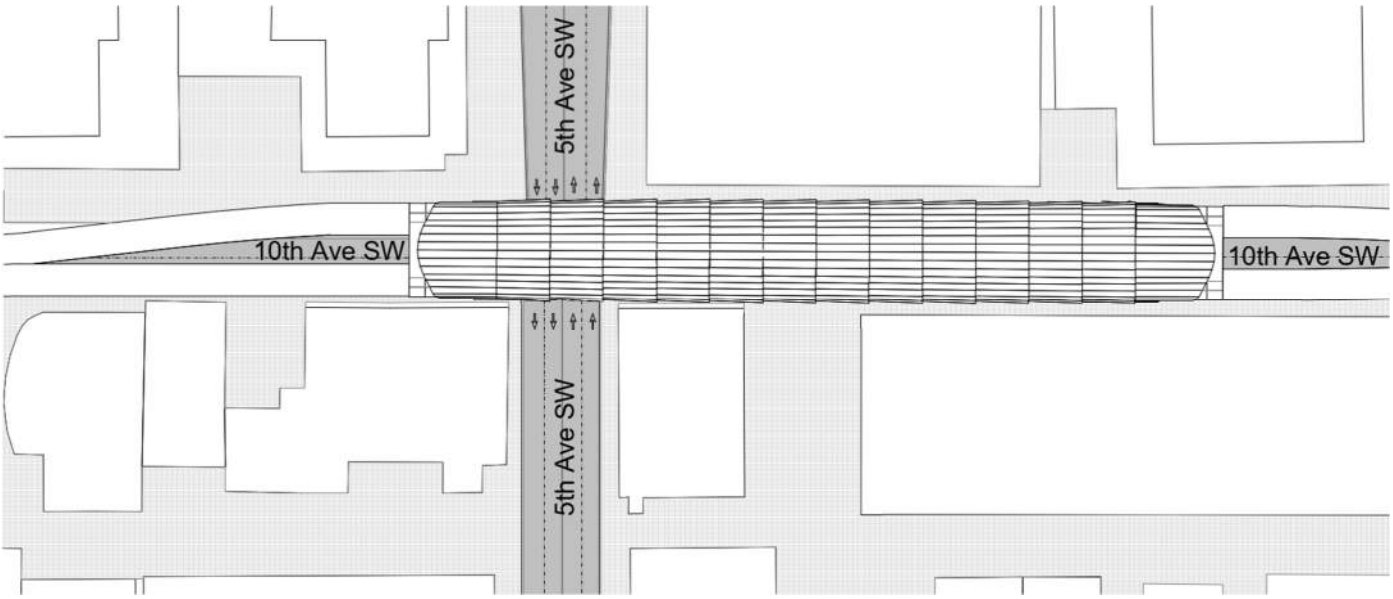


Figure 64. 6th Street SW Option – 10th Avenue Station – Roof level floorplan



6th Street SW Option – 10th Avenue SW Station Images

Figure 65. 6th Street SW Option – 10th Avenue Station - Aerial View

Figure 66. 6th Street SW Option – 10th Avenue Station - Street View (looking west)

Grand Central Station

Background and previous work

The proposed Green Line station at Grand Central Station would be located just west of the Elbow River and would be included in all three remaining options.
The Grand Central Station in Calgary has been a long-term object of design & analysis and has been evolving along different phases:

In 2021, Remington Development Corporation (RDC) provided a first concept design which set up the functional arrangement and the principles of an elevated HSR line over the National Railway Network by the Canadian Pacific freight railways and a provision of several platforms for other railways systems such as the Banf Line and the Green Line LRT.

In 2022 and 2023, AECOM continued the previous works developed by RDC and developed new concept of stations.

Figure 67. [Grand Central Station by AECOM 2022-2023] – Station site integration

Local Context: Proposed Alignments & Location Opportunity

Multiple alignment options were considered during the study where the Green Line bypassed the Grand Central location to connect with the Red Line and Blue Line. However, the Green Line connects with the central downtown area and passes near the Grand Central location, thus representing an opportunity to achieve greater connectivity with the HSR link that leads to the airport by integrating further with other transit opportunities. This also allows Green Line users, especially those from the growing neighborhoods in the southeast, as well as those connecting to the Green Line at any of the previously presented stations, to benefit from greater transit connectivity.

Proposed Station

The proposed station for Grand Central Station takes into consideration the same principles provided for Prairie Link HSR Location and Concept Studies back in 2022 and 2023.
These design principles covered all locations, so we thought it sensible to respect them in the current proposal for the integration of the Green Line into Calgary's Grand Central Station.

Concepts for the future Grand Central Station will be developed by the Government of Alberta as part of the Passenger Rail Master Plan and will likely include separate dedicated platforms for each of HSR and commuter rail in accordance with the Government's vision for passenger rail.

The proposed Grand Central Station design goal would develop a mobility hub providing users multimodal choice with local and regional connections into the Beltline and downtown areas. Potential section views and renderings, shown in Figures X and X show station configuration and a conceptual perspective view.

The Green Line LRT alignment crosses the Elbow River elevated over an elevated structure and maintains the same elevation as the HSR/Commuter Rail tracks. At the same time, to maintain the integrity and a single level all along the main vestibule, the mezzanine level is placed between grade and platform levels, so both the Commuter Rail platform and Green Line platform will be at the same level as the HSR platform. This allows the Commuter Rail and Green Line tracks to cross the main vestibule at the same level, as shown in the drawings. The main vestibule offers a view of trains coming in and out the main lobby, and the immediate space of HSR hall is distinguished by having a clear view to the ceiling.

The roof consists of a single plane that covers the double height of the main lobby up to platforms level. In the access area, where the stairs and elevators are located, the roof extends with an elegant overhang over the north and south access plazas.
Finally, the roof is perforated in the central area and a series of skylights are installed, specially designed for adequate lighting within the lobby.

Figure 68. Grand Central Station & Green Line LRT Integration – Functional Section

Grand Central Station plot limits

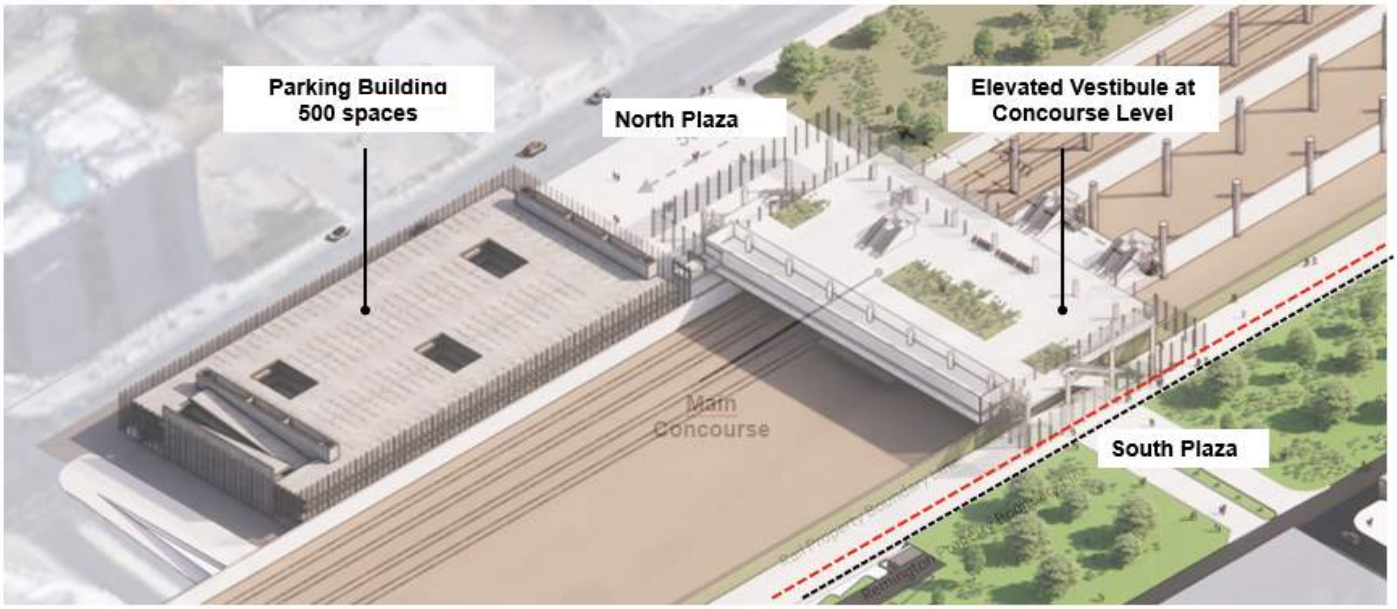
The Grand Central Station has been proposed north of a new development area located within the south plots. The Green Line LRT station exists inside the Grand Central Station, without impacting the development plot.
The previously completed station design provided a large roof that overhung the Remington central square, we note that the Green Line LRT station does not require that overhung roof structure, and the current design is just following the previous one without modifying it.

Figure 69. Grand Central Station & Green Line LRT Integration – Property limits & Roof extension

Grand Central Station functionality

The Grand Central Station is conceived as a bridge that connects both ends of the city (north/south) through a concourse with dual access in both directions. The concourse is elevated above the tracks of the Canadian Pacific Freight Railways, overcoming the physical barrier that divided both neighborhoods.

Figure 70. Grand Central Station & Green Line LRT Integration – Vestibule / Concourse Level Axonometry

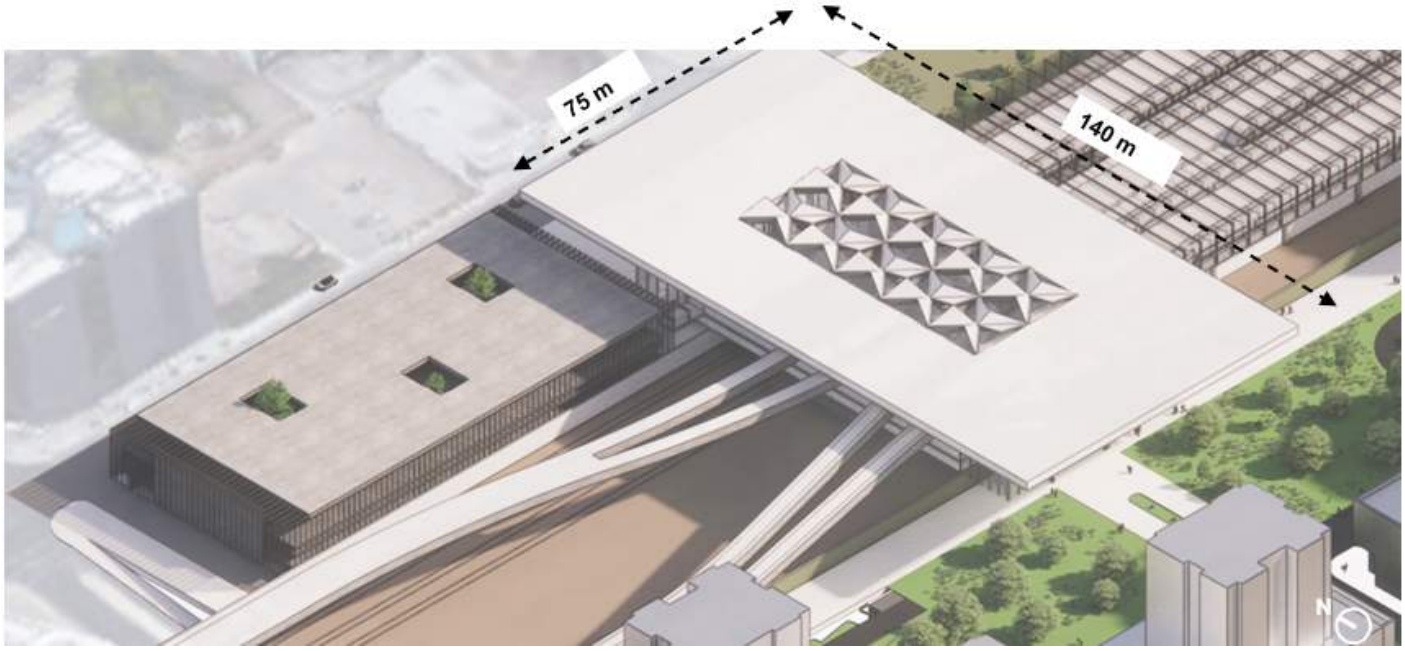


Above the concourse are the platforms as well as the tracks for the different railway systems, thus allowing for a large interchange space while the circulations pass through the transport hub with minimal impact.

Figure 71. Grand Central Station & Green Line LRT Integration – Platform Level Axonometry

Finally, the entire space is encompassed within a single volume, which, as we have seen in the previous station designs, consolidates the presence of the building in the surrounding area, endowing it with the required significance while protecting travelers both inside and within the vicinity of the station.

Figure 72. Grand Central Station & Green Line LRT Integration – Roof Level Axonometry



Grand Central Station Drawings

Figure 73. Grand Central Station & Green Line LRT Integration – Overall view next to Remington Development

Figure 74. Grand Central Station & Green Line LRT Integration – Schematic At-Grade Level Floorplan

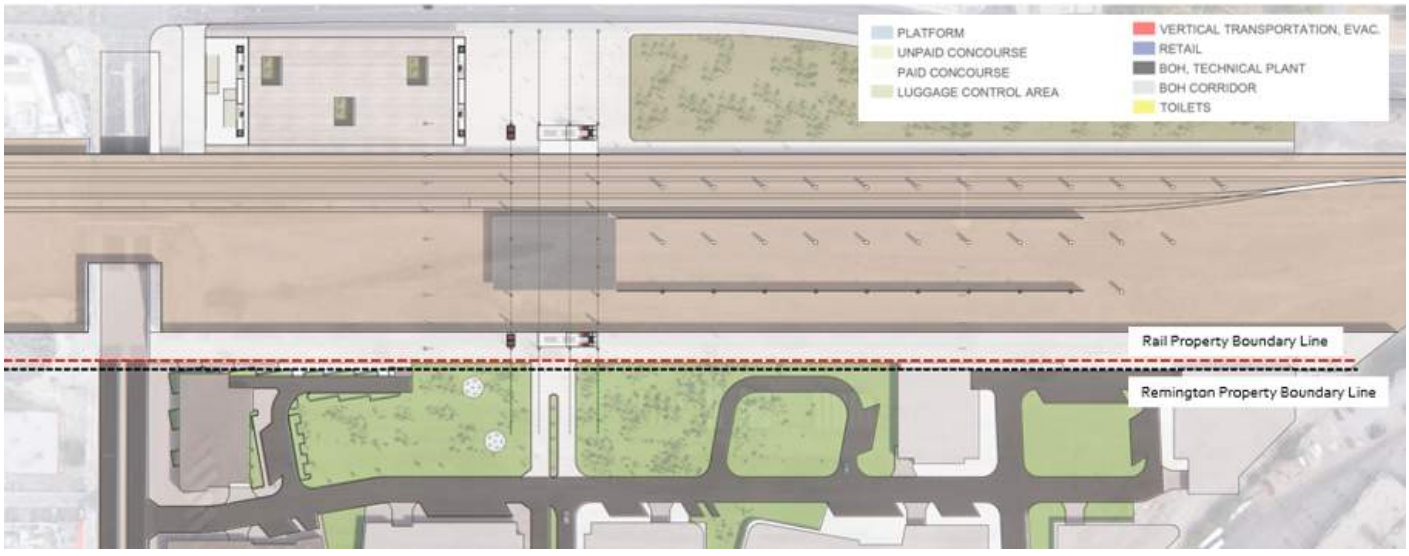


Figure 75. Grand Central Station & Green Line LRT Integration – Schematic Concourse Level Floorplan

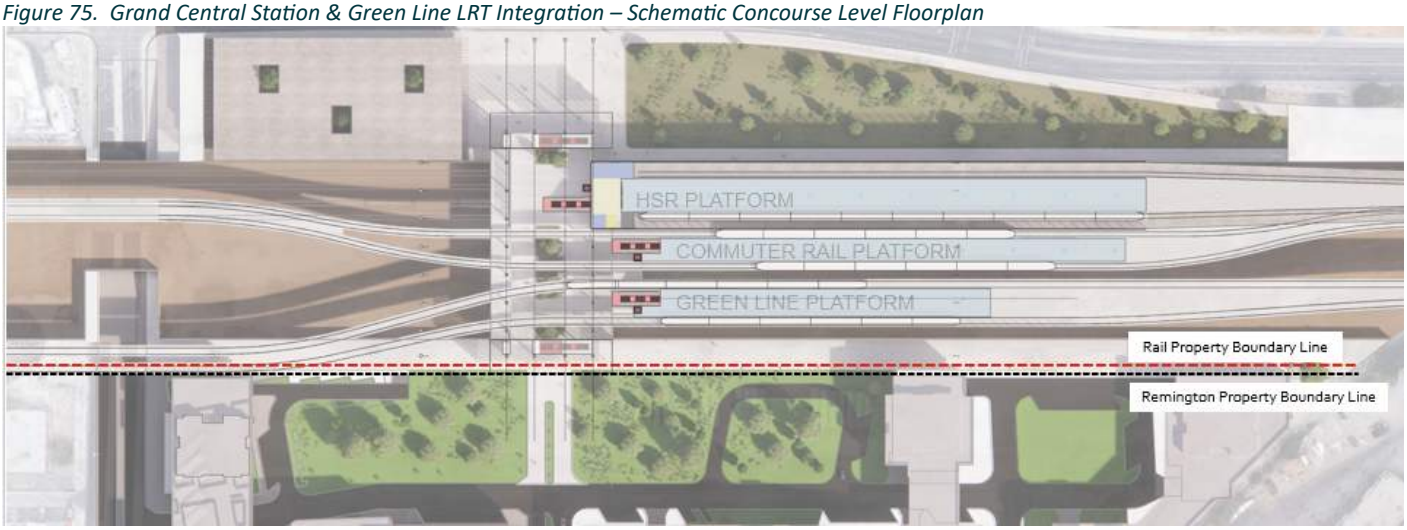


Figure 76. Grand Central Station & Green Line LRT Integration – Schematic Platform Level Floorplan

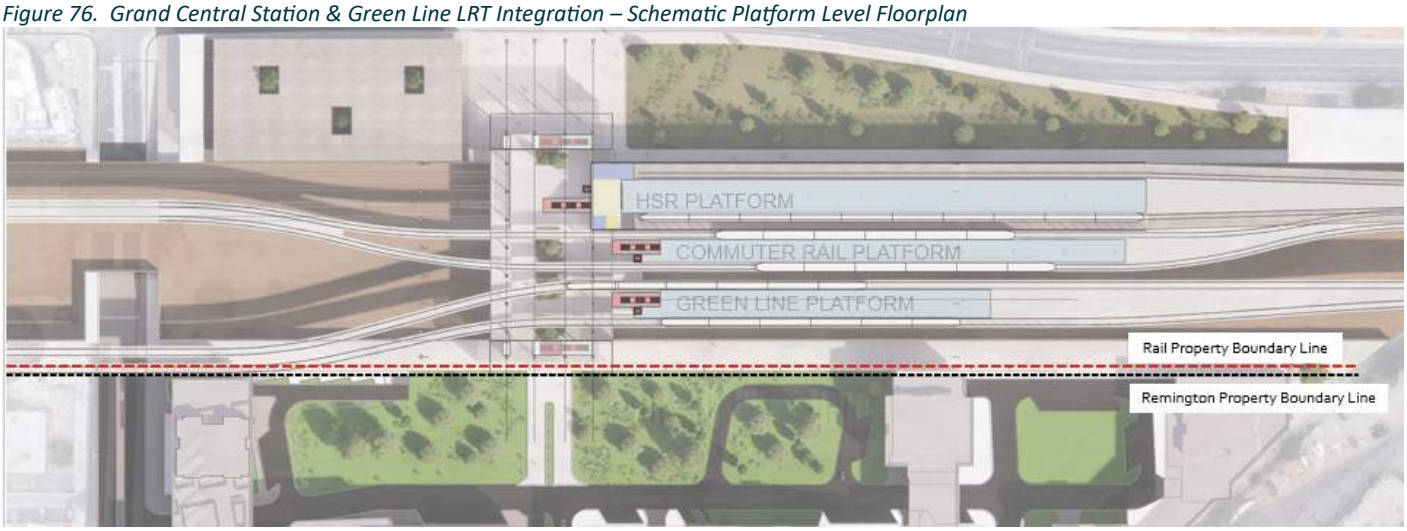
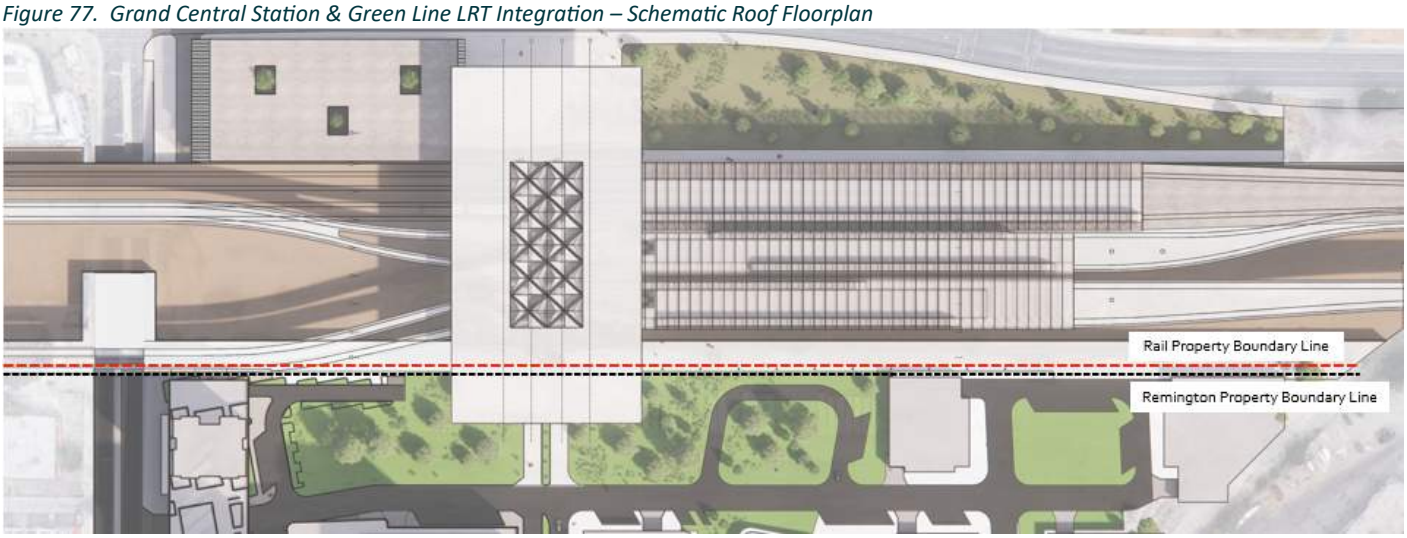


Figure 77. Grand Central Station & Green Line LRT Integration – Schematic Roof Floorplan



Grand Central Station Renders

Figure 78. Grand Central Station & Green Line LRT Integration – North Entrance exterior view

Figure 79. Grand Central Station & Green Line LRT Integration – South Entrance exterior view

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Calgary Green Line: Appendix 5

Ridership Report

AECOM

RIDERSHIP REPORT

Report Purpose

This report presents a range of indicators to support the assessment of potential Green Line alignments. This includes alignment in Calgary's downtown and extensions to the south. The report includes the following:

- Option definition and travel times
- Station population and jobs catchments
- Rolling stock fleet requirements
- Ridership forecasts
- Travel time savings

The analysis presented is **comparative** between the options to understand the relative differences in ridership and travel time savings.

Option Definition and Travel Times

The figures below present the 4 options in the downtown area.

Figure 1. 1st St SE Option

Figure 2. 2nd St SW Option

Figure 3. 6th St SW Option

Figure 4. 10th Av SW Option

We have also examined route extensions to the south previously considered by the City of Calgary within its long term vision for the Green Line. These include extensions to McKenzie Towne (two stops with an interim stop at Prestwick), then to Auburn Bay/Mahogany (one stop) and finally to Seton (two stops).

Table 1 provides the option's travel times and distances. The travel times are based on Green Line LRT analysis adjusted for the revised alignments. The travel times have been estimated as follows:

- Same travel time for 2nd St SW option as previous Green Line LRT
- Same travel time for all options south of 4 St SE station (Grand Central station)
- Similar travel times in downtown for underground LRT and elevated sections

Table 1: Option Travel Times

	Option	Distance (kms)	Travel Time (mins)	Average Speed (kph)	Number of Stations
Downtown Options	1st Street SE-Shepard	17.3	29.9	34.6	12
	2nd Street SW-Shepard	17.8	31.5	33.9	13
	6th Street SW-Shepard	19.0	35.3	32.2	13
	10th Av SW-Shepard	17.4	29.2	35.8	12
Southern Extensions	Shepard-McKenzie Towne	2.7	3.7	44.2	2
	McKenzie Towne-Auburn Bay	2.6	3.2	43.4	1
	Auburn Bay-Seton	3.1	3.2	45.7	2

Downtown Station Population and Jobs Catchments

Population and jobs catchments in the downtown provide an indication of potential ridership potential with the higher the catchment, the higher the ridership potential. Note that catchment analysis for southern terminal stations was not carried out as the stations are common to the various downtown alignment options. Analysis undertaken on 400 metres (5 minutes' walk) and 800 metres (10 minutes' walk) catchments which are standard catchment values and shown in *Table 2*.

Table 2: Downtown Stations Population and Job Catchments (2048)

Option	Downtown stations	400m catchment (5 minutes' walk)		800m catchment (10 minutes' walk)	
		2048 Population	2048 Jobs	2048 Population	2048 Employ
1st Street SE	3	29,394	80,815	63,453	160,840
2nd Street SW	4	46,132	150,631	87,251	210,845
6th Street SW	4	53,064	170,012	100,777	204,955
10th St SW	3	38,214	108,147	93,229	218,624

Figure 5 and *Figure 6* provide a graphical representation of the population and jobs catchments. Note that data presented as population and job density to account for the zone sizes.

Figure 5. Downtown Stations Population Catchments (2048)

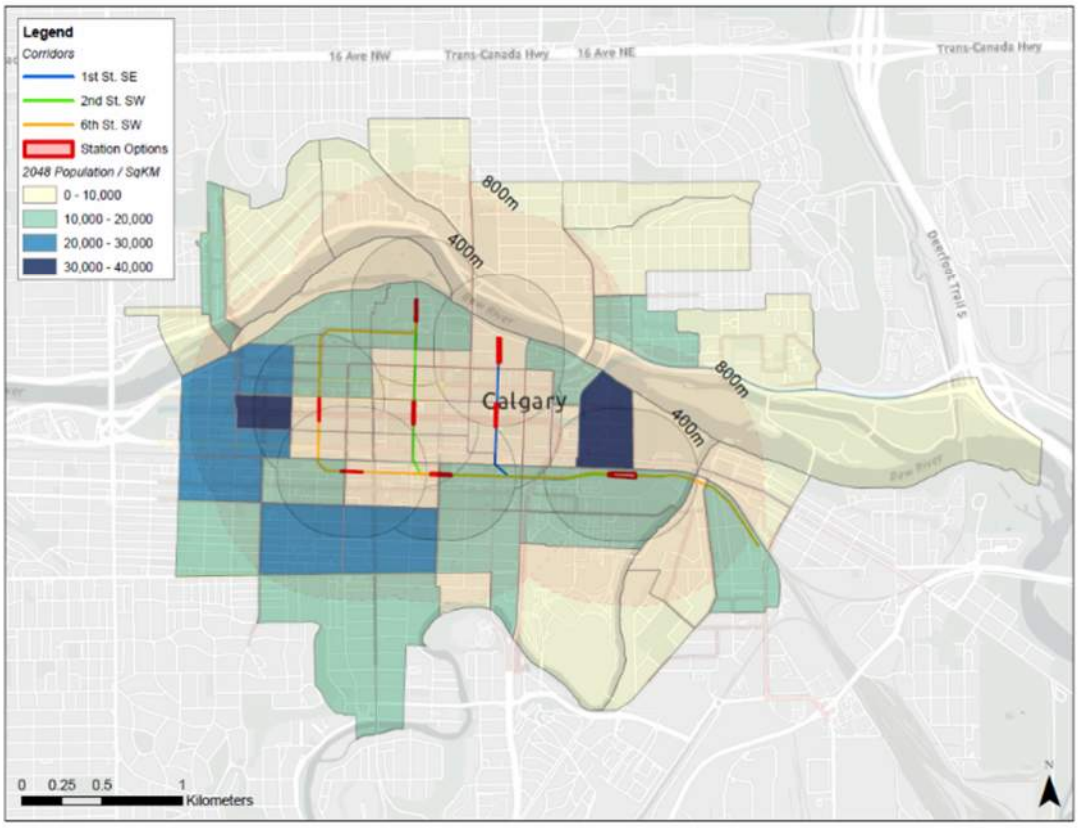
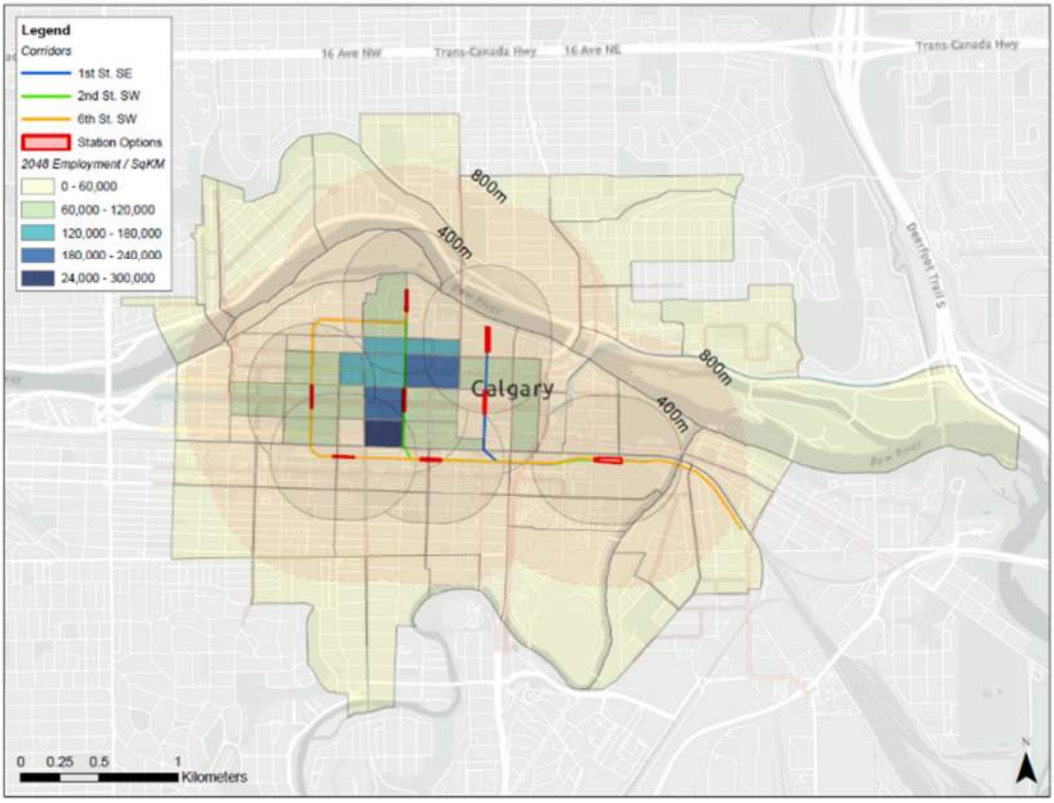


Figure 6. Downtown Stations Population Catchments (2048)



Rolling Stock Fleet Requirements

The rolling stock fleet requirements are shown in *Table 3*.

Table 3: Rolling Stock Fleet Requirements

Option	Station	Travel Time (mins)	Fleet (7.5 tph / 8 min frequency)	Fleet (12 tph / 5 min frequency)
1st Street SE- Shepard	Eau Claire	29.9	22	34
	7th Ave SW	28.2	20	32
2nd Street SW-Shepard	Eau Claire	31.6	22	34
	7th Ave SW	29.4	20	32
6th Street SW-Shepard	Eau Claire	35.3	24	38
	7th Ave SW	30.0	22	34
10th St SW-Shepard	2nd St SW	27.7	20	32
	6th St SW	29.2	20	32
Grand Central- Shepard	-	25.6	18	30

Note: 'tph' – trains per hour

** Terminates at 1st St SE & 3rd Ave SE (rather than Eau Claire)*

The estimated fleet requirements in the table are based on the following:

- Travel times in the table above
- 5 minutes layover time
- 15% spare ratio
- 2 cars per train

The fleet requirements for extending the route south include:

- Shepard - McKenzie Towne: 2 additional cars (7.5 tph/8 minutes frequency) or 4 additional cars (12 tph/5 minutes frequency)
- McKenzie Towne - Auburn Bay: 2 additional cars (7.5 tph/8 minutes frequency) or 2 additional cars (12 tph/5 minutes frequency)
- Auburn Bay - Seton: 2 additional cars (7.5 tph/8 minutes frequency) or 4 additional cars (12 tph/5 minutes frequency)

Ridership Forecasts

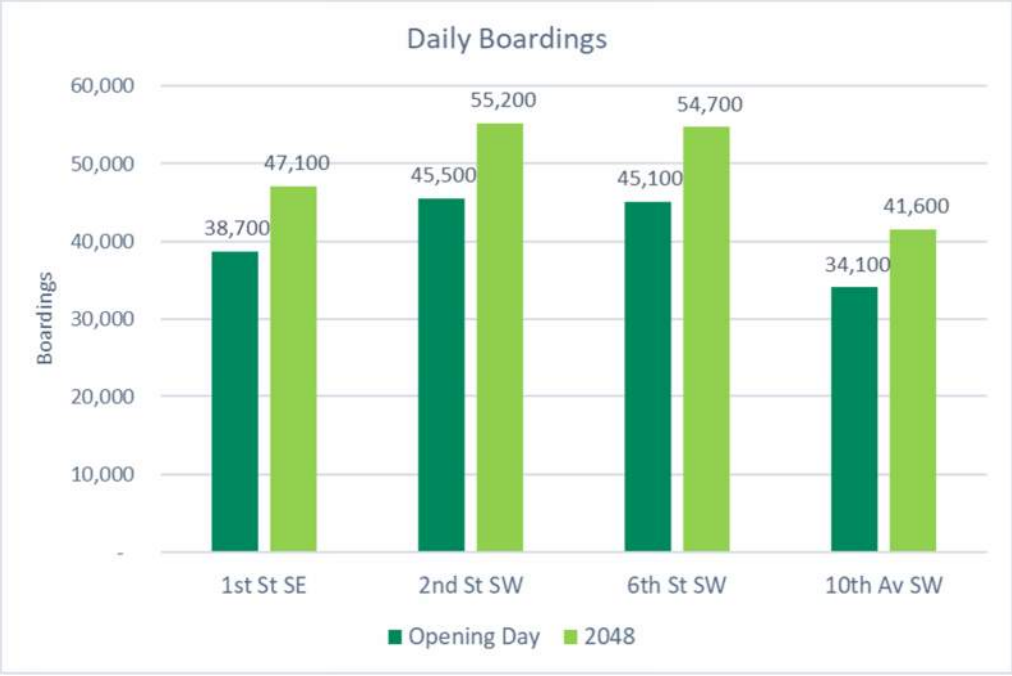
The basis for the ridership analysis was the City of Calgary's previous Green Line LRT 2nd St SW – Shepard project ridership forecasts. The results pivot off those model runs and use a consistent methodology to the Green Line LRT team through their value engineering phase(s) and by Calgary Transit in developing supporting bus network planning.

The ridership derived from the following:

- Same boardings for 2nd St SW option as Green Line LRT 2nd St SW-Shepard forecasts
- Station area catchment: the number of people and jobs within 5- and 10- minutes walk of a station (see *Table 2*); and
- Total travel time: including in-vehicle time (see *Table 1*) and start/end-of-journey walk time

Figure 7 presents the daily boardings for all options from Shepard to their northern terminus.

Figure 7. Option Daily Boardings



The 2nd St SW and 6th St SW options perform similarly to each other due to catchment totals and trip length.

- 2nd St option provides faster journey times from Shepard to 7th Ave SW (over 30 seconds) and Eau Claire (3min 45 sec)
- 6th St SW option captures marginally less people due to the longer travel time, but this is counterbalanced by the higher 400 metres population and job catchments

Lower ridership volumes on options that do not reach the centre of downtown (at 1 St SE or 10th Av SW). These options force riders to walk to their final destination as follows:

- 1st St SE option does not include a stop in the Beltline area and does not capture as many people and jobs as the downtown station(s) are 300-500m east of the centre of downtown (-16% daily ridership)
- All options that terminate on 10th Ave SW (and do not cross the CPKC corridor) do not capture as many downtown jobs and force an end-of-journey walk of 400m+ north to reach the centre of downtown (-19% daily ridership)

The impacts of potential shortening the line by terminating at 7th Av SW and 10th Av SW in the downtown area and extending the line southbound are shown in *Table 4*. The table also shows the forecasts for an option where the service stops at Grand Central station and does not enter the downtown.

Table 4: Ridership Impacts (2048)

	Option	6th St SW	2nd St SW	1st St SE
Downtown Options	Shepard - Eau Claire	54,700	55,200	47,100
	Shepard - 7th Av SW	50,900	51,200	43,700
	Shepard - 10th Av SW	41,600	41,100	23,700
Southern Extensions	McKenzie Towne - 7th Av SW	54,600	54,900	46,900
	Auburn Bay - 7th Av SW	57,400	57,700	49,200
	Seton - 7th Av SW	62,000	62,300	53,200

Note: Red cells represent services to Grand Central Station

The table shows the large impact of terminating the line on the Beltline (10th Av SW) for all options. This is in line with the findings above where the 10th Ave SW option resulted in the lowest ridership option as it does not cross the CPKC corridor and therefore does not capture as many downtown jobs and forces additional walk time for riders to reach their final destination. This impact is even pronounced in the option where the line is terminated at Grand Central station (in red).

For simplicity the ridership for the Southern Extensions in Table 4 only shows the ridership to 7th Ave SW in the downtown (rather than to each of Eau Claire, 7th Ave SW and 10th Ave SW) and provides a useful illustration of the relative performance/ridership impacts of each of the southern extensions with McKenzie Towne attracting 3,200-3,700 additional trips, Auburn Bay an additional 5,500-6,500 and Seton 9,500-11,100 additional trips on the Green Line.

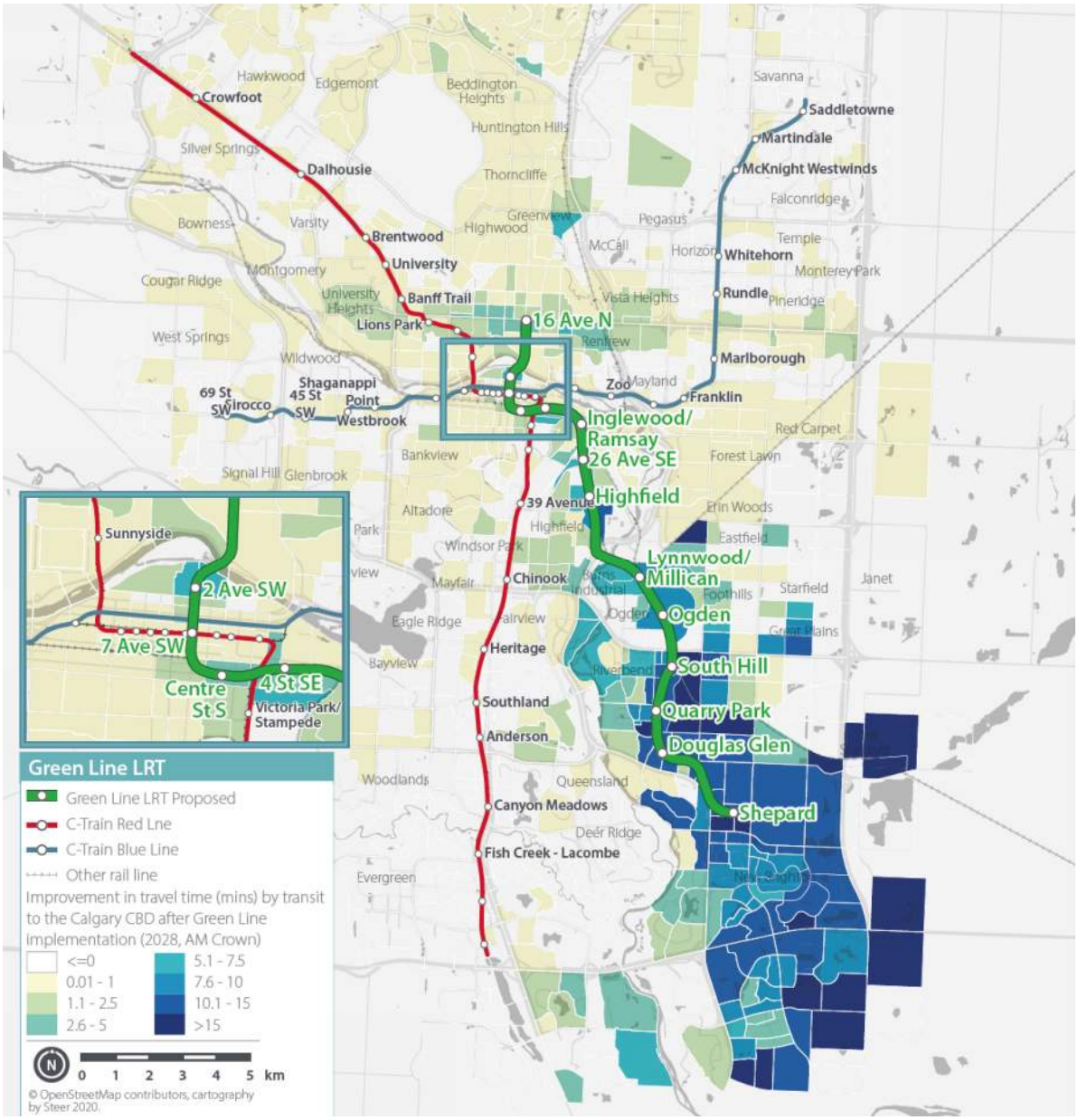
Travel Time Savings

The Green Line will offer travel time savings as:

- Existing services between Downtown and Shepard (and stations further south) take over 60 minutes and provided every 15 minutes (bus route 302)
- Green Line will offer a reliable 30 minutes' travel time every 5 to 8 minutes
- Average travel time savings of 10 minutes in opening day increasing to 13 minutes by 2048 to Shepard with users in the far south/southeast saving up to 25-30 minutes per trip.

Figure 8 shows a graphical representation of the travel time savings with the largest savings in the southeast sector of the city.

Figure 8. Travel Time Savings (Opening Day)



Travel time savings (and therefore overall project benefits) for each option are impacted by:

- Length of options (travel time and stations)
- First mile/last mile travel time from station locations
    - Downtown Avenue (east-west) blocks are ~170m = 2.2 min walk
    - Downtown Street (north-south) blocks are ~100m = 1.3 min walk
    - 10th Ave SW – 9th Ave SW (across CPKC) is ~150m = 1.9 min walk

Table 5 presents an estimate of travel time savings for the various downtown options as well as the Southern Extensions. While these cannot be directly translated into monetised, quantified benefits, they do provide a good indication of the relative benefits of the options compared to each other. A full quantified benefit assessment could be included in future planning assessments.

Table 5: Travel Time Benefits

	2048 Daily (minutes)	6th St SW	2nd St SW	1st St SE
Downtown Options	Shepard - Eau Claire	673,000	714,000	374,000*
	Shepard - 7th Av SW	564,000	597,000	291,000
	Shepard - 10th Av SW	253,000	274,000	4,000**
Southern Extensions	McKenzie Towne - 7th Av SW	722,000	760,000	408,000
	Auburn Bay - 7th Av SW	862,000	904,000	517,000
	Seton - 7th Av SW	1,081,000	1,130,000	685,000

** Terminates at 1st St SE & 3rd Ave SE (rather than Eau Claire)*

*** Shepard to Grand Central Station (4th St SE)*

The option travel time savings pivot off the Shepard-Eau Clair 2nd St SW and are estimated based on the ridership, alignment and station locations of the various options as indicated above. The travel time savings gradually reduce as the line is shortened with the highest benefits for the Shepard-Eau Claire route and the lowest when the line is stopped at 10th Ave SW. The 2nd St SW and 6th St SW provide a similar level of travel time savings as they include the same number of stations serving most of the downtown while the 1st SE option shows reduced benefits as there is one station less and the alignment is focused on the east away from the centroid of downtown.

Note the low level of travel time savings for the Shepard to Grand Central station option. The main challenge with that option is that passengers can access the edge of the downtown but are then faced with a long walk (1.8km ~ 20 mins) or a transfer to a bus (incurring a transfer penalty and then 5-10 mins on a bus). A test was run previously with the Green Line terminating at the Red Line (at Erlton Station, south of the downtown) and the test showed negative benefits/total travel time savings which highlights the impact of not providing a link into the downtown core.

The benefits for users for the southern extensions include benefits for existing users (who are travelling from south of Shepard) and the additional demand generated from the line extending south.

Calgary Green Line: Appendix 6

Evaluation Criteria Assessment Scoring Results

AECOM

Evaluation Criteria Assessment Scoring Results

The table below provides detail on criteria description and scoring. Information here informed summary evaluation tables in the Green Line Alternative Alignment Assessment report.

Table 1 Green Line Alternative Alignment Assessment ECA Scoring Matrix

				1st Street SE			2nd Street SW			6th street SW		
Category	**Evaluation Criteria (Language Update)**	**Description**	**Metric**	**10th Avenue Segment**	**7th Avenue segment**	**Bow River Segment**	**10th Avenue Segment**	**7th Avenue Segment**	**Eua Claire Segment**	**10th Avenue Segment**	**7th Avenue Segment**	**Eua Claire Segment**
Transit Considerations	Ridership	Potential ridership at year 2048 from Shepard. Segments are cumulative.	Quantitative, 2048, from Shepard	0	1	1	1	3	4	3	5	3
	Transit operations	Potential run time from Shepard to station areas on each segment. Segments are cumulative	Run Times, from Shepard	0	4	3	4	3	2	4	3	2
			Sum	0	5	4	5	6	6	7	8	5
Transportation/ Multimodal	Mobility Network Impacts	Potential for removal of traffic lane.	Count of locations where a lane may be removed.	5	1	1	5	5	5	5	5	5
		Potential for removal of dedicated left turn lane. In many cases these could be mitigated through movement of pier or movement of parking designation	Count of locations where a lane may be removed.	5	5	5	5	1	5	5	1	1
	Strategic Transit Network Connections	Potential to transfer to Red and blue line within 160m	Yes/No	1	5	1	1	5	1	1	5	1
		Potential to transfer to MAX/BRT within 160m of station area	Count	1	5	5	1	5	1	1	5	1
	Pedestrian Connectivity	Guideway and structure piers may cause intermittent impacts to the pedestrian realm.	Yes/No	5	1	1	1	1	1	1	1	1
	Bicycle Connectivity	Stations per segment are located within the existing bicycle facility network	Yes/No	1	1	5	1	1	5	1	1	5
			Sum	18	18	18	14	18	18	14	18	14
Population/Employment Access	Population Served (400m)	Year 2048 population data by TAZ intersected by station area 400m buffer. Segments are cumulative.	Quantitative	1	1	3	1	5	5	1	5	5
	Access to Employment (400m)	Year 2048 employment data by TAZ intersected by station area 400m buffer. Segments are cumulative.	Quantitative	1	1	1	1	5	5	3	5	5
			Sum	2	2	4	2	10	10	4	10	10
Urban Development/ Urban Realm	Impacts to parking	Guideway and structure may necessitate removal of on-street parking zones.	Count of parking zones removed.	5	5	5	3	3	5	1	3	3
		Guideway and structure piers may cause intermittent impacts to parking zones, in these cases zones are not removed, but may have reduced number of stalls.	Count of zones with intermittent piers in parking zones.	5	1	3	5	1	1	5	5	3
	TOD and Development Potential	Stations in proximity to planned districts including the River District Master Plan and Beltline Area Redevelopment Plan	Qualitative	5	5	1	3	1	1	5	1	1
		Desktop review of vacant or developing parcels in proximity to stations areas.	Yes/No	3	1	1	3	1	3	3	1	3
			Sum	18	12	10	14	6	10	14	10	10
Environmental Impacts	Noise	Proposenity for noise impacts in proximity to turns and station areas.	Count	3	5	4	3	4	2	2	5	2
	Visual Aesthetic	Perception of change to viewshed based on surrounding land use.	Qualitative	5	3	5	5	3	5	5	5	5
	Land Impacts	Potential for property displacement, full or partial expropriation.	Count	1	4	3	1	3	2	2	3	1
			Sum	9	12	12	9	10	9	9	13	8
Feasibility / Deliverability	Constructability	Complexity of construction,# of tight curves, and construction in tight quarters	Qualitative	1	3	3	1	5	3	1	5	5
	Impacts to Utilities	Categorized, high/medium/low utility impacts based on size	Count	5	3	5	3	3	3	1	3	1
	Existing BuildingImpacts	Potential for impacts to driveway or service entry access points.	Count	5	3	5	1	1	3	3	3	3
	Indirect risks	Potential for multi-agency coordination, or stakeholders for impact mitigation	Qualitative	5	1	3	5	1	3	5	1	1
			Sum	16	10	16	10	10	12	10	12	10

Calgary Green Line: Appendix 7

Options Eliminated

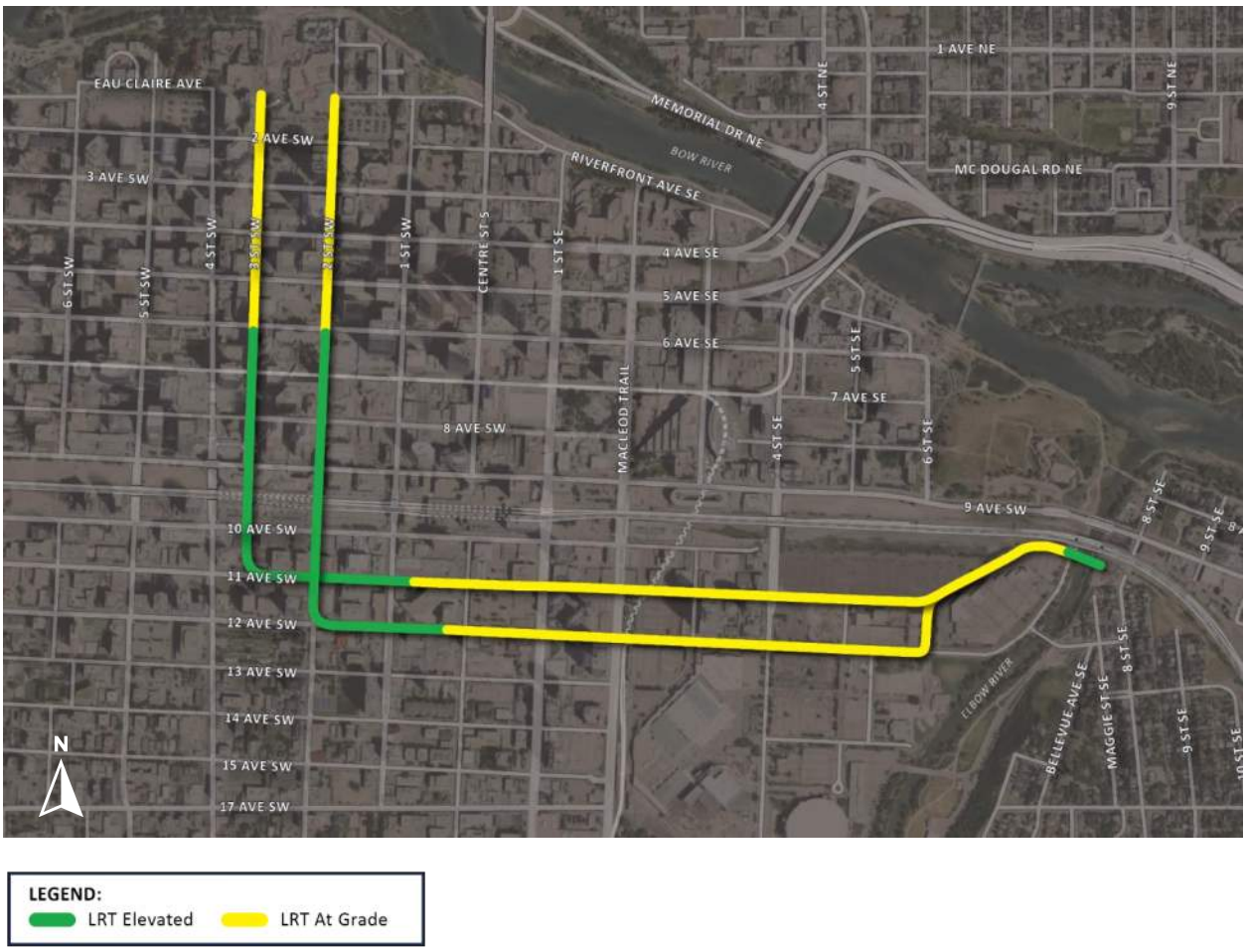
AECOM

Options Removed from Further Evaluation

Option 1A and 1B: At Grade on 11th or 12th Avenue and 2nd or 3rd Street SW – End at Eau Claire

These options have east-west alignments along 11th or 12th Avenue and north-south alignments along 2nd Street and 3rd Street SW. Due to the Canadian Pacific Kansas City (CPKC) rail line, the route would need to be depressed to avoid the parkade. This depression would either be lengthy (approximately 1 kilometer) or affect cross streets, and the transition from tunnel to at-grade would close intersections along 2nd Street SW. For these reasons, the alignment was moved to 10th Avenue and these options were eliminated from further evaluation.

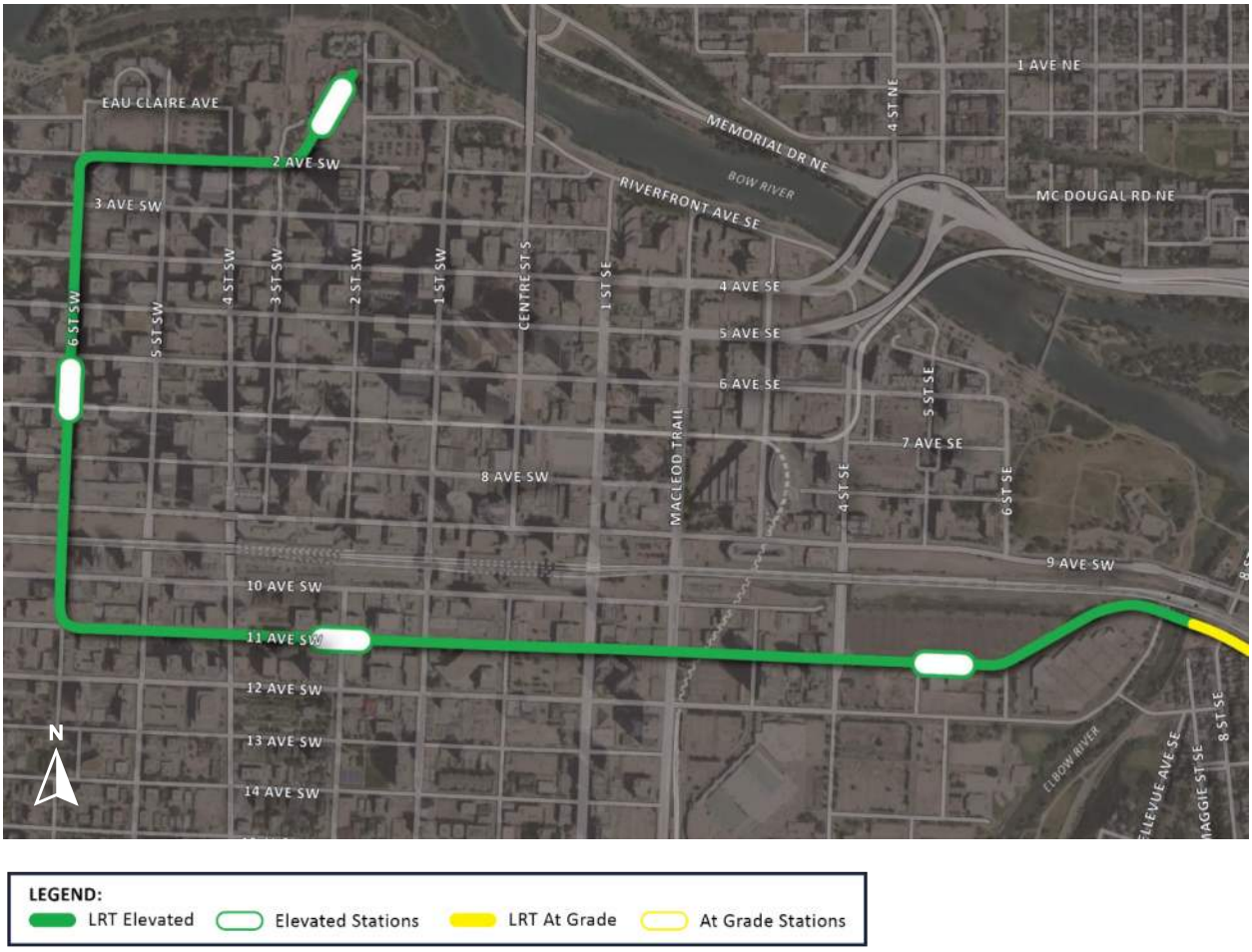
Figure 1. Map of Option 1A and 1B



Option 2A: Elevated on 11th or 12th Avenue and 6th Street SW

These options have an east-west alignment along 11th or 12th Avenue before turning north on 6th Street SW and then east again on 2nd Avenue SW and terminating along Riverfront Avenue. Although this route has several pros such as no operational impacts on Red/Blue lines due to elevated crossings, future extension potential to the north, pedestrian connections to Grand Central Station and Calgary's Arena Entertainment District, and keeping the Green Line separated from the Red/Blue lines downtown, the route has multiple traffic impacts to both 11th Avenue and 12th Avenue. Therefore, Option 2A was eliminated from further evaluation.

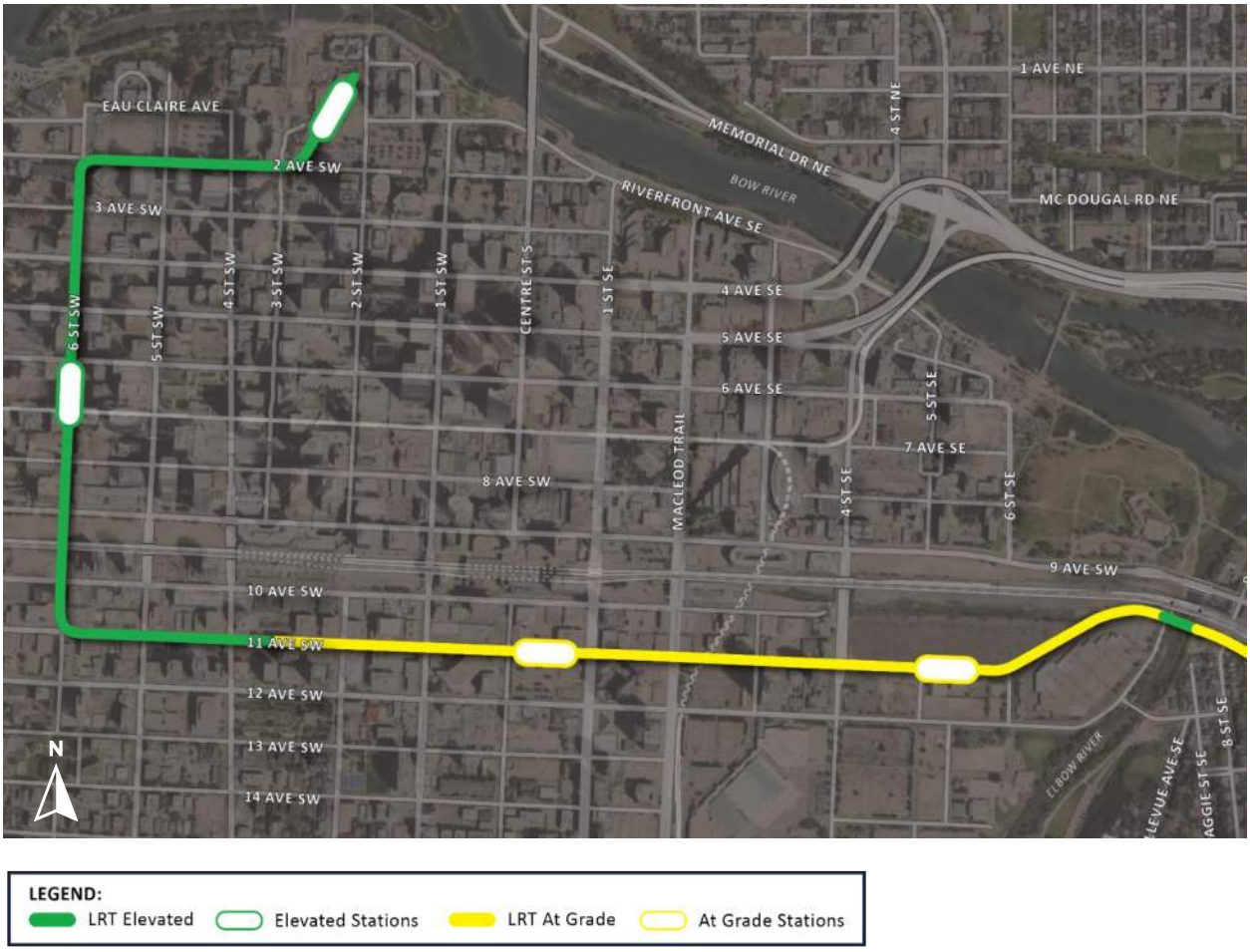
Figure 2. Map of Option 2A



Option 2B: At Grade/Elevated on 11th Avenue or 12th Avenue and 6th Street SW

These options are similar to 2A, except with an at-grade/elevated alignment at 11th or 12th Avenue and 6th Street SW. This route has all the benefits of 2A as well as the traffic impacts to 11th Avenue and 12th Avenue. Specifically, the at-grade portion of this option has impacts to north/south traffic. Therefore, these options were also eliminated from further evaluation.

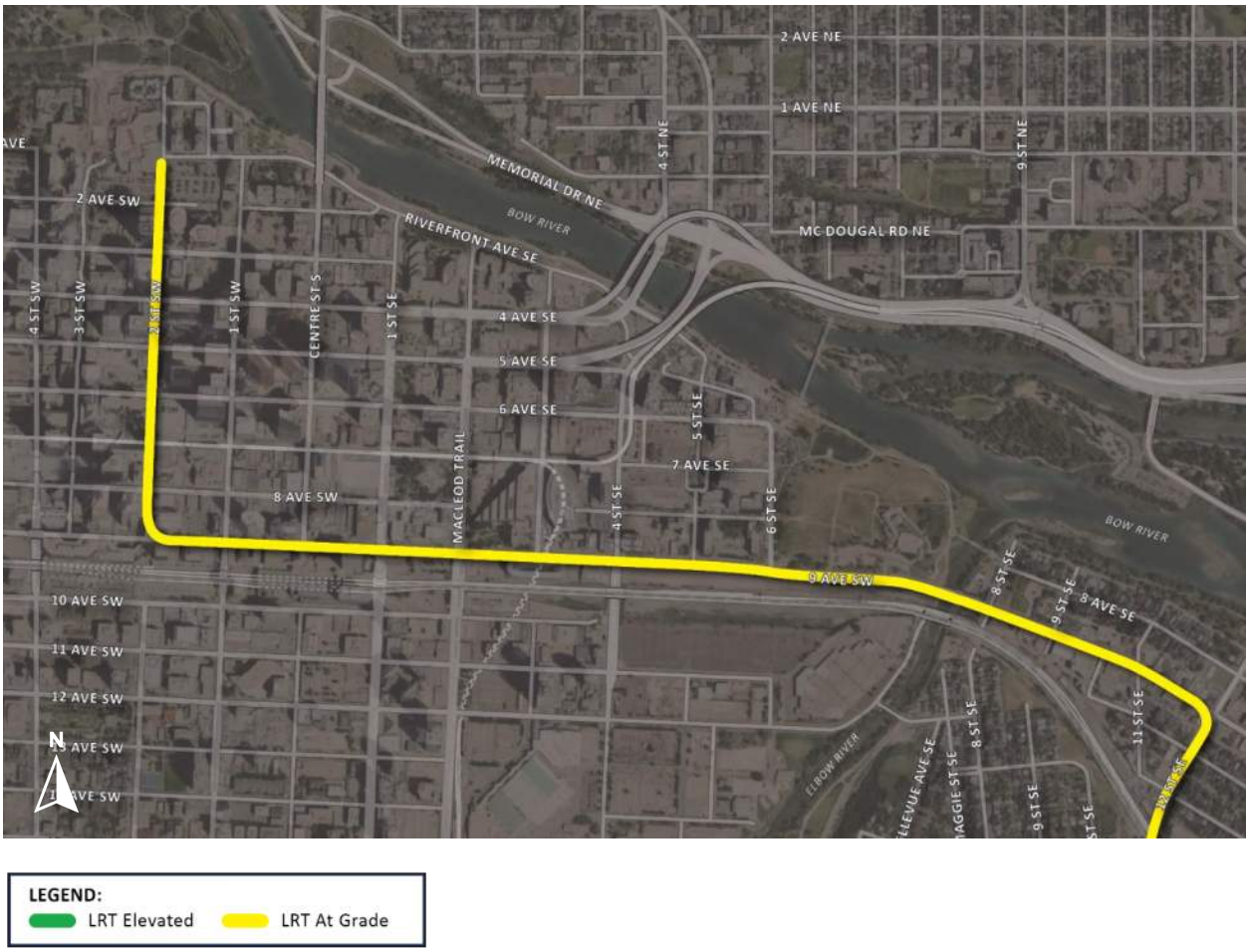
Figure 3. Map of Option 2B



Option 3: At Grade on 9th Avenue and 2nd (or 3rd) Street SW – End at Eau Claire

These options have an east-west alignment along 9th Avenue before turning north on 2nd or 3rd Street SW and terminating at Riverfront Avenue. This route has no direct connection to Grand Central Station, and the at-grade crossing of the Green Line with the existing Red/Blue lines would have significant operational impacts to existing services. In addition, the route runs through the Inglewood Community. Therefore, this route was eliminated from further evaluation.

Figure 4. Map of Option 3



Option 4: At Grade on 12th Street SE and 9th Avenue – End at 7th Avenue

This option is at-grade along 12th Street SE and 9th Avenue and terminates at City Hall after 4th Street. It had no direct connection to Grand Central Station. It also runs through the Inglewood Community and impacts to the Red/Blue lines by ending east of City Hall. Therefore, this route was eliminated from further evaluation.

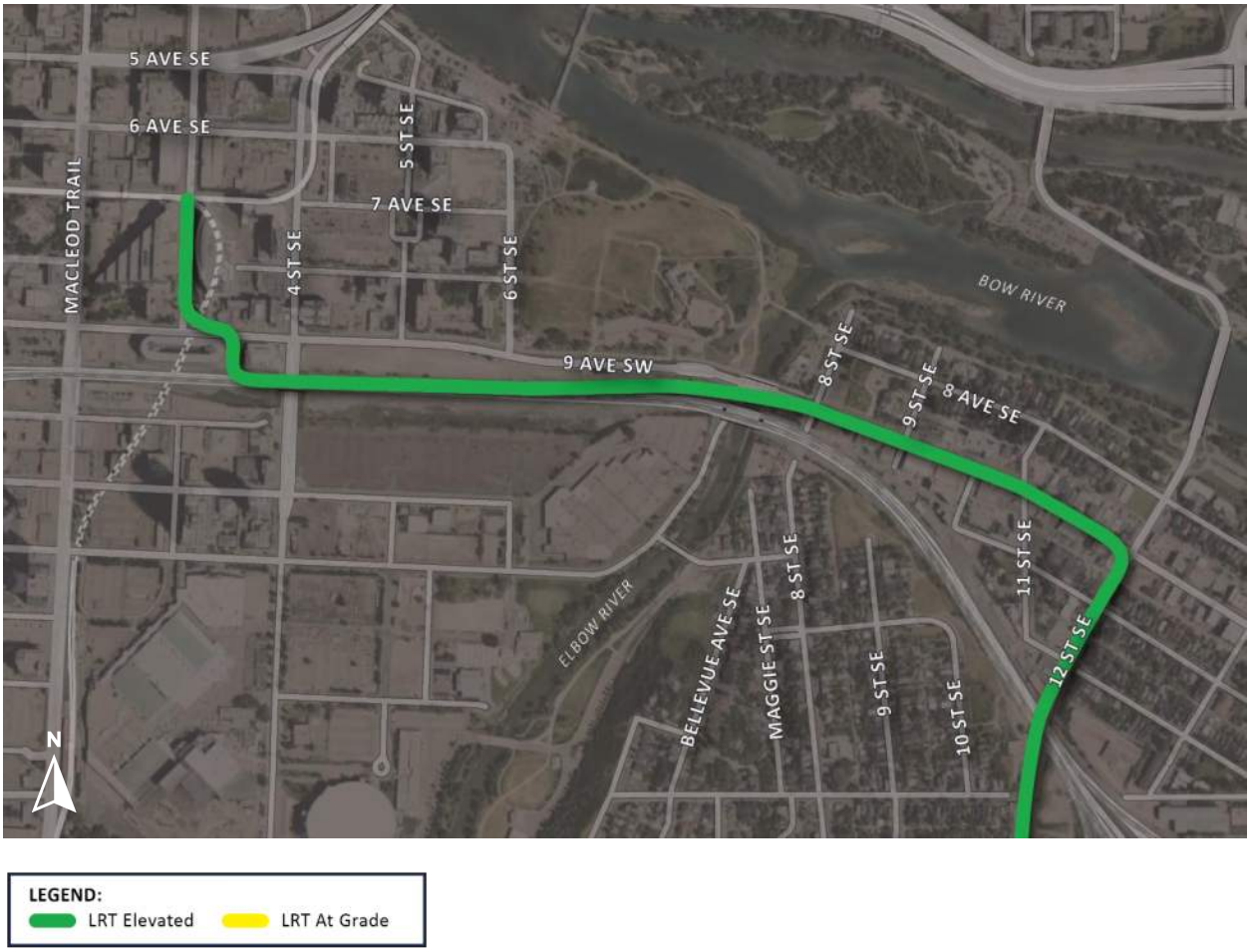
Figure 5. Map of Option 4

Option 5: Elevated West of Elbow River – End at 3rd Street SE (City Hall)

Option 5A

This option runs along 9th Avenue and is elevated over the CPKC rail line before turning north on 3rd Street SE between buildings, terminating at the Red/Blue Line intersection at 7th Avenue SE. Option 5A is elevated south of the future Grand Central Station, and the light rail would have gone between the Calgary Platform and the Energy Building. There would have been no impact to existing north/south traffic when crossing the rail line. However, this option was not technically feasible due to impacts to the Red/Blue lines by ending east of City Hall.

Figure 6. Map of Option 5A



Option 5B

This option is elevated south of the CPKC rail line before crossing north over the rail line and ending on 7th Avenue SE south of City Hall at the intersection of the Red/Blue lines. There would have been no impact to north-south traffic at the rail line. However, this route impacted the parking structure and the Red/Blue lines by ending east of City Hall, and thus, it was eliminated from further evaluation.

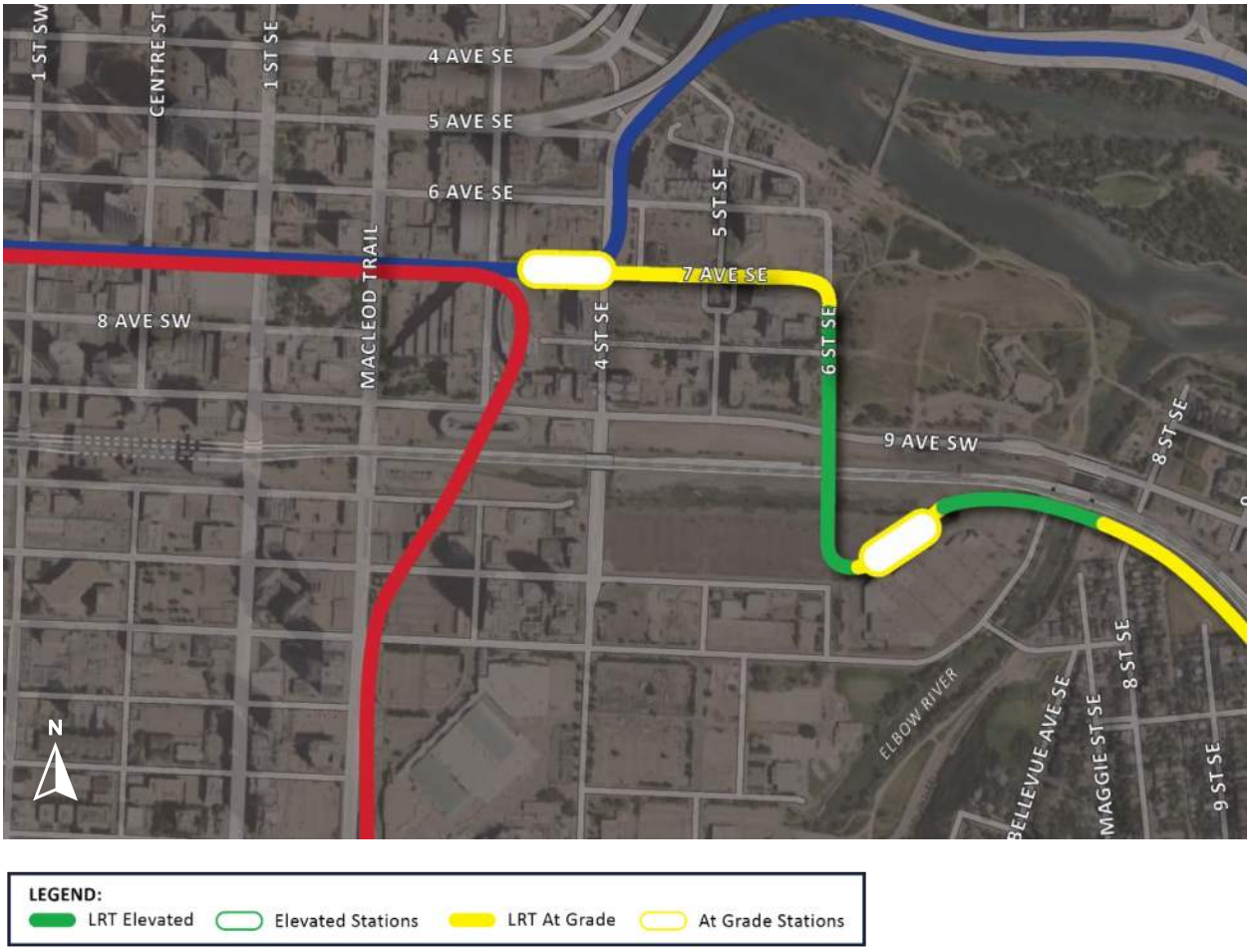
Figure 7. Map of Option 5B

Option 6A and 6B: Underpass at 6th Street SE and At-Grade or Elevated City Hall Station – End at 7th Avenue

Option 6A

Option 6A has an underpass south of the rail line and another on 7th Avenue. The northern terminus near the existing Red/Blue lines allowed passengers to connect to the Green Line, and there would be a station near City Hall. There would be no impacts to existing north-south traffic crossing the CPKC rail line, and construction costs could be saved by utilizing/widening the new 6th Street underpass currently under design/construction for the new light rail. However, this route had significant impacts to the Red/Blue lines by terminating east of City Hall, and thus, it was eliminated from further evaluation.

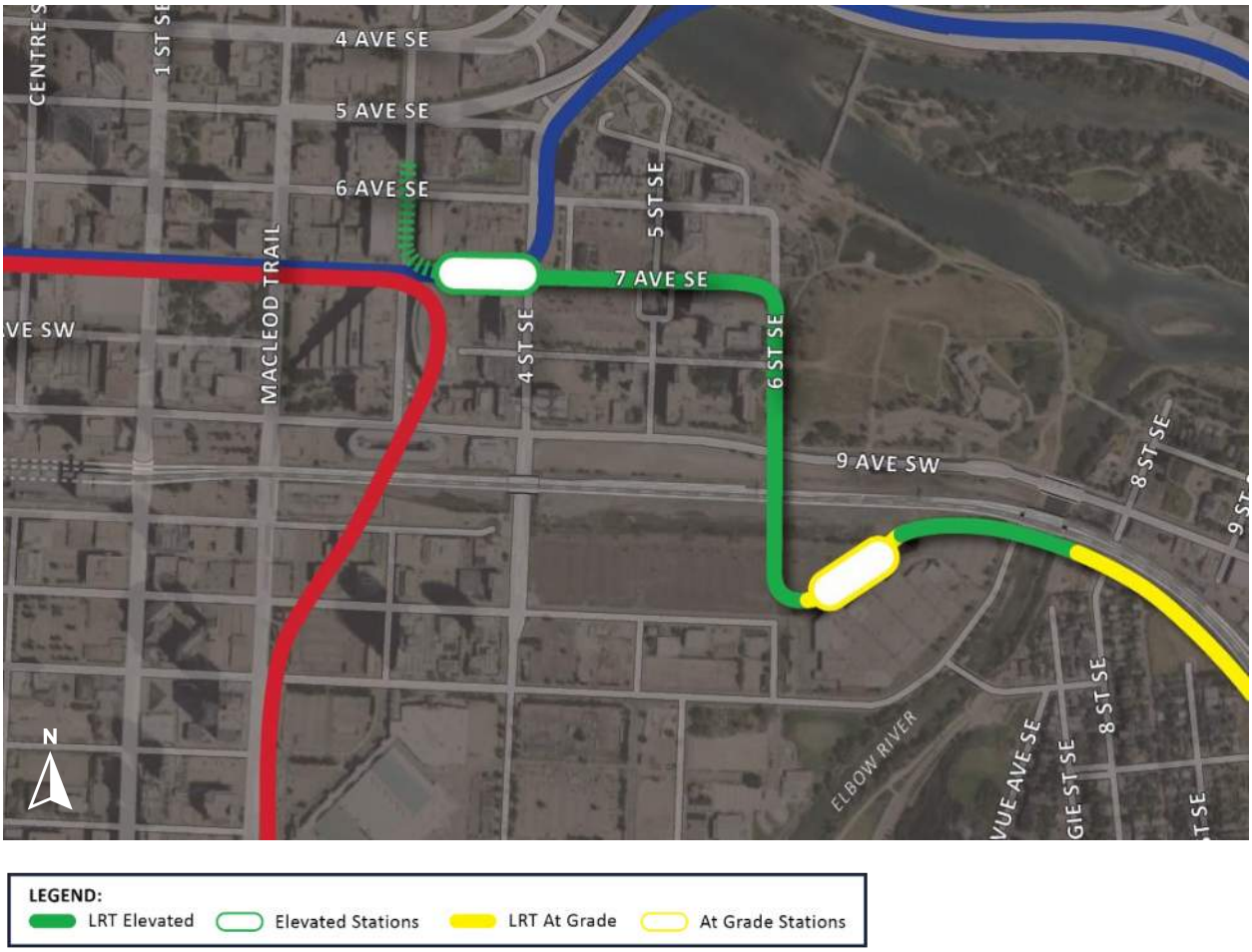
Figure 8. Map of Option 6A



Option 6B

Option 6B is similar to Option 6A, with an extension past the northern underpass to continue past 6th Avenue SE. This route allowed for future northern connection of the Green Line as well as connection with the Red/Blue lines. However, the route was eliminated due to terminating east of City Hall.

Figure 9. Map of Option 6B



Option 7: Green Line Interline with Red Line Using Existing Tunnel

Option 7 is interlined with the Red Line. However, future expansion to the north would have been extremely difficult or impossible. It would have required a system-wide upgrade for the Red/Blue lines to accommodate Green Line vehicles in the Red Line tunnel. There were also operational challenges managing the Red/Green interline near the intersection with the Red/Blue interline. Finally, the Red/Blue lines interconnection was unfeasible due to the different voltage of the Green Line. Therefore, this option was eliminated from further evaluation.

Figure 10. Map of Option 7

Option 8: Plenary/Liricon Proposal

This option follows the CPKC rail line alignment until 4th Street SE. This route placed the Green Line further from potential ridership in the Belt Line and downtown area, and it would not allow further expansion to the north. Riders would need to utilize the new Plus-15 network to connect to the Red/Blue lines. In addition, there would be impacts to the CPCK railway during construction. There would also be costs associated with other proposed infrastructure. Finally, there is uncertainty of Green Line Grand Central Station integration with high-speed rail. Therefore, this option was removed from further evaluation.

Figure 11. Map of Option 8

Calgary Green Line: Appendix 8

Vertical Circulation Elements (VCE) Locations

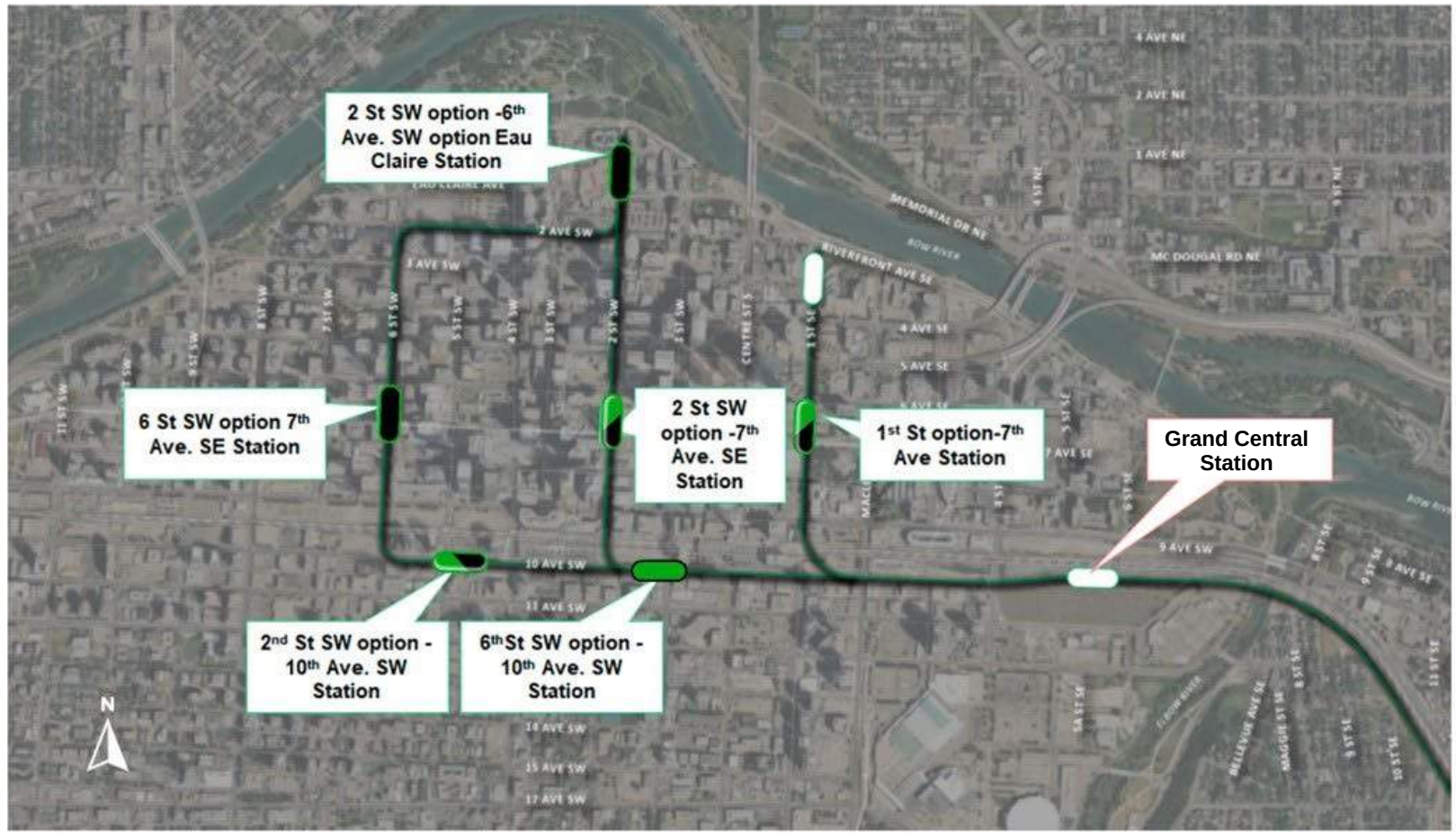
AECOM

2nd St SW - 6th Ave.SW Eau Claire Station

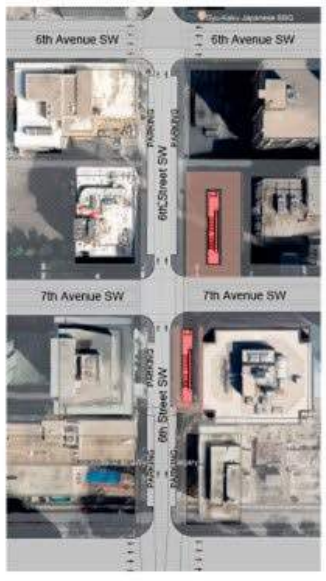
LEGEND

- Station Access located in private property
- Station Access located in public property
- Station Access located in public and private property

- Public Land Property
- Private Land Property



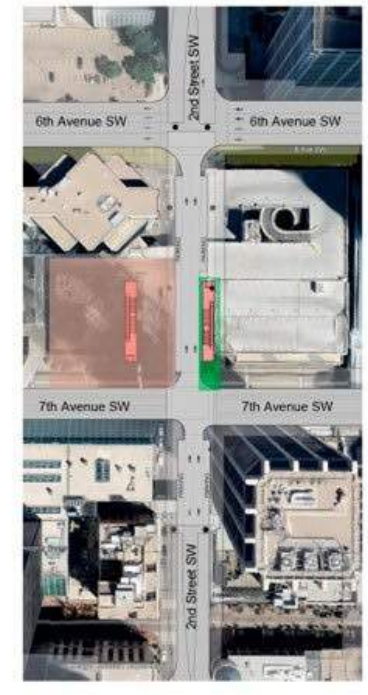
1st St SW - 7h Ave. SW Station



6th St SW - 7th Ave.SE Station

2nd St SW - 10th Ave. SW Station

6th St SW - 10th Ave. SW Station



2nd St SW - 7h Ave. SE Station

Calgary Green Line: Appendix 9

Documents Reviewed

AECOM

Document Title	File type	Author	Publish Date	Disciplines
2021 Review Documents	Folder		unknown	various
Beltline Power Transmission Relocation	Folder	ENMAX	2023	various
CAD files	Folder		unknown	various
IIP 01 Extracts - General Information and Interfaces	Folder	CAF	unknown	various
IIP 03 Extracts - Track and Right of Way Interfaces Extracts	Folder	CAF	Dec-22	various
IIP 04 Extracts Station Interfaces	Folder	CAF	2022	various
June 2017 Approved Alignment 160th to Seton	Folder		Jun-17	various
Requested Data	Folder	Hatch	2022	various
Sample Station drawings	Folder		unknown	Arch
Southeast Alignment	Folder	Bow	2024	various
07_Transit time change_manual	PDF	Steer	2020	Planning
2020 08 24 Provincial Review = Alignment Options Review	PPTX	City of Calgary	25/8/2020	Planning
2022-traffic counts_AADT	PDF	City of Calgary	2022	Traffic
3 Phase 1 - Reference Concept Design - Downtown Segment	PDF	Hatch	Sep-22	Engineering
Alignment Options Review - Supporting Slides	PDF	Steer	N/A	Planning
Acquired Properties Map	PDF	N/A	N/A	Planning
Attachment 8 - Alignment Options Review Summary	PDF	Steer	22/5/2020	Planning
Calgary Green Line Assessment September 9 2024	PPTX	AECOM	9/9/2024	Capture Team
Calgary Green Line LRT Stage 1 Business Case GC2020-0583	PDF	Steer	May-20	various
Consolidated Green Line LRT Stage 1 Business Case	PDF	City of Calgary	Jul-20	various
Downtown Options Review - February 2021	PDF	City of Calgary	Feb-21	Public Involven
downtown_final_report	PDF	Clifton ND Lea	Feb-06	Planning
Elbow River Bridge CAD files	ZIP		unknown	Engineering
GL - Provincial Technical Discussion March 17 2021	PDF	City of Calgary	12/3/2021	Engineering
GoA GL Review - Section F - Ridership	PDF	City of Calgary	unknown	Planning
Green Line Business Case - Supporting Slides	PPTX	Steer		various
Green Line LRT 2022 RFP	PPTX	AECON, Dragados, accio	4/12/2022	Engineering
Green Line Master Plan	KMZ	N/A	unknown	Planning
GREEN LINE QUARTERLY UPDATE AND CENTRE CITY ALIGNM Attach 1 Centre City Multiple Account Evaluation Summary Report	PDF	City of Calgary	May-15	various
GREEN LINE QUARTERLY UPDATE AND CENTRE CITY ALIGNM Attach 2 2Relative Risks for the Green Line Centre City Options (1)	PDF	City of Calgary	unknown	various
GREEN LINE QUARTERLY UPDATE AND CENTRE CITY ALIGNM Attach 2 2Relative Risks for the Green Line Centre City Options	PDF	City of Calgary	unknown	various
Green_Line_Public_Presentation_May_20_optimized	PDF	City of Calgary	5/20/2020	Planning
Green-Line-committee-Public-Presentation-Centre-City-Options-jan-28-2020	PDF	City of Calgary	1/28/2020	Public Involven
Green-Line-committee-stage-1-alignment-options-dec-17-2019	PDF	City of Calgary	12/17/2019	Public Involven
LRT crossings example	PDF	Parsons, HRT	10/18/2011	Engineering
Modelling and Ridership Review - Supporting Slides	PPTX	Steer	unknown	Planning
NORTH CENTRAL LRT CENTRE CITY OPTIONS TT201501 Attach 2 Elevated Structure	PDF	Stantec	9/1/2014	various
Property Economic Impact Assessment GC2020-0583	PDF	Hatch	2020	Finance
Segment 2 Risk Mitigation Measures for Underground Infrastructure 20210406	PDF	City of Calgary	4/6/2021	Engineering
southeast_lrt_compendium	PDF	City of Calgary	Dec-10	various
CoC Forecasting Tool	WEB	City of Calgary	unknown	various
Coc Traffic Counts System	WEB	City of Calgary	unknown	Traffic
Green Line Committee Meeting	WEB	City of Calgary	6/1/2021	Public Involven

Coc Future Green Line Extensions	WEB	City of Calgary	unknown	various
Green Line LRT Alignment: 160 Avenue N to Seton	WEB	City of Calgary	6/26/2017	Public Involven
Green Line LRT Alignment: 160 Avenue N to Seton	WEB	City of Calgary	Jun-17	Engineering
Planning & Development Resource Library	WEB	City of Calgary	unknown	Engineering

Summary
See associated Read Me; Original approved GL and stations; Report summarizing outcomes of alignment options review; Functionla plan for north of Elbow river
Design package for transmission line relcoation in Victoria park for GL
Mostly dgns of existing ROW and utilities; also contains bat habitat assessments for various buildings
LRT unit assembly; Transmission line relocations in Beltline
Details on LRV design specifications including dynamic envelope
Details on LRV passenger flow/accessibility and platform interface
Plan drawings including alignment overview, overlay maps, plan/profiles for North & Southeast segments
Contains environmental reports and Mobility & Traffic Management plans
Architectual drawings for Davies Transit Centre, Misericordia Station, and West Edmonton Mall Station LRT
Set of files from Bow Transit Connectors including drawings for retaining walls, bridges, comms, roadway, maintence & storage, stations, track alignment, and utilities
Map of neighborhoods along green line colored by improved travel time
Satellite imagery explaing the impact of Green line on existing red and blue line under different scenarios
ADWT for major roads in downtown Calgary
209 pg with full plot of planned Green Line as of 2022
Overview of 8 alignment options, including demand expectations and projected ridership
Satellite imagery showing city-owned land, including plots recommended to be sold
46 page report detailing 8 alignment options and concluding with support for option A2 (updated stage 1 alignment). Includes tables with MAE comparisons, costs, and risks.
Green line assessment regarding AECOM's proposal
Business Case report
Business Case report for Stage 1
Comparison of connecting Green line to Red/Blue line downtown
Feasibility study; Compares options for north and south LRT
Contains dozens of CAD files related to Elbow River Bridge
Overview of technical requirements for Green line including tunneling, property requirements, stations, risk & mitigations, utility relocation project, power & train control systems, and the MSF
Ridership of proposed GL Stage 1
Business Case for stage supporting slides
Kickoff Meeting PPTX. Incudes cross-sections for multiple overpasses and stations along Phase 1 route. Includes layout for maintence facility.
KMZ file contains roadway linework and alignment for Phase 1
N/A
N/A
N/A
Contains overview of Green line update post pandemic, side-by-side comparison of 2017 vs 2020, renderings for Centre St North, Bow River crossing, and other downtown stations. Refers to downtown area as 'Seg 2' and everything south of downtown as 'Seg 1
Public presentation; High level overview of changes post pandemic
Public presentation; High level overview of changes post pandemic
Detailed CAD sheets of as-builts for LRT curve in downtown Houston
Confirms estimated ridership of 8000 riders during peak hour
Discusses feasibility of elevated structure as cost cutting measure downtown
Report on Green Line impacts to property value and property tax revenue
Overview of Segment 2 economic risk mitigation strategies
Early CAD drawings and alignment of segment 1
City website contains libraries for Land use assumptions. Road system "number of lane" maps, Road system classification maps, Anticipated project maps, Transportation zone maps, Speed limit maps, Truck route maps, and Transit Assumptions
Traffic counts map for City of Calgary
Public committee meeting

City of Calgary Green line page
City Council meeting
Full CAD sheets of original Green Line alignment including profile
Technical specifications library for road, water line, sewer, landscape, lighting, bridge construction, and more