Attachment 7

EDMONTON LRT EXPANSION

DOWNTOWN LRT CONNECTOR CONCEPT PLAN

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THE CITY OF Edmonton

Downtown LRT Connector

Additional Planning

Report

October 2011 (revised)

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1 Introduction

Summary

1.1 In January, 2011, Edmonton City Council approved the concept design for the Southeast and West Light Rail Transit (LRT) project connecting Mill Woods to downtown to West Edmonton. The 2.1 kilometer Downtown LRT Connector crossing the core of downtown with new low-floor, urban style light rail was presented to City Council in June 2011. City Council provided direction to administration to undertake additional examination of three issues:

- Further engagement with Grant MacEwan University and NorQuest College to identify the appropriate station configuration for the Campus Stop.
- Further engagement with the local community along 102 Avenue and 102A Avenue, between 97 Street and 95 Street to obtain input on alternative alignments.
- Provide additional analysis on the structural integrity of the Chinatown Gate and the ability to protect the gate during construction and operations (should the selected LRT alignment pass through the gate).

1.2 Since the approval of the Southeast and West LRT concept plans by City Council, Administration has commenced the next stage of design, the preliminary engineering (PE), of the full corridor (Mill Woods through Downtown to West Edmonton); however, the PE has been staged to allow these issues to be resolved, before beginning work on the Downtown sections.

1.3 Administration has completed the additional tasks requested by City Council. The input from the project stakeholders resulting in significant amendments to the proposed plans. The adjustments resulted in an option that maximizes the benefits of low-floor, urban style transit while mitigating impacts (where possible). The additional consultation resulted in the following key modifications to the proposed plan:

- Support for continued evaluation and development of the Diagonal 107 Street Stop option in parallel with the alternate proposal on 107 Street.
- A modified LRT alignment extending along 102 Avenue between 97 Street and 95 Street that:
  - Eliminates property acquisition and direct impacts to developed properties.
  - Proposes a shifted and narrower portal between 96 Street and 95 Street.
  - Shifts the alignment to the south side of 102 Avenue to provide a continuous traffic lane and maintains critical access points to the north.
  - Maintains emergency access to senior's facilities.
  - Provides additional parking to serve the local community.
  - Provides mid-block pedestrian crossings to maintain community connectivity.

- Proposes improvements to the pedestrian environment (improved sidewalks, crossings, transit access, etc.). Improvements would include elements reflecting the importance of the neighbourhood's Chinese cultural heritage, such as street furniture, light fixtures, and portal aesthetic treatments.
- Results in no direct impact to the Chinatown Gate. (This is true for all options proposed, including the original recommendation.)
- Maintains multiple access options for the potential development at 102 Avenue and 96 Street.
- Respects and supports the Quarters Plan and the Capital City Downtown Plan (CCDP).

1.4 The design modifications proposed to the alignment along 102 Avenue (between 97 Street and 95 Street) were a direct result of the valuable input obtained through consultation with the local community over the summer 2011. However, public sentiments expressed by many stakeholders oppose the LRT alignment on 102 Avenue, regardless of the proposed mitigations and design refinements.

1.5 Additional details on the design changes, the engagement process, and analysis are provided in the subsequent sections of this report.

1.6 Appendix C includes details of the capital cost estimate for the revised concept design for the complete Downtown LRT alignment.

Purpose & Background

1.7 The purpose of this report is to provide an overview of the additional consultation, analysis, and design modifications related to the 107 Street Stop and corridor options analysis from 97 Street to 95 Street along 102 Avenue and 102A Avenue. Additional details are provided on the preliminary results of the Chinatown Gate structural assessment, as requested by City Council as an informational report.

Background

1.8 In June 2009, City Council adopted the long-term LRT Network Plan that defined the future size, scale, and operation of the regional LRT system. The Network Plan makes downtown Edmonton the focal point of the system, with the determination that a street-level LRT system would be needed in the downtown core to serve future system expansion separate from the existing LRT system in the downtown tunnel.

1.9 The concept engineering phase builds upon the earlier efforts completed to identify the LRT corridor through the downtown which was approved in June 2010 at a statutory public hearing of City Council in conjunction with the CCDP. The corridor approved by City Council identified the streets and avenues the LRT would follow through the downtown.

1.10 In May, 2011, City Council reviewed subsequent stage of design, the concept engineering. The concept engineering further refined the approved corridor,

identifying the specific concept alignment and station stop details. With the exception of the 107 Street Stop and the approximately 600 metre segment of the corridor in the Quarters area, City Council did not identify other elements of the engineering to be reviewed.

Urban Style – City Scale LRT

1.11 The new long-term LRT network plan currently being advanced by the City of Edmonton includes a style of LRT that differs from the current LRT lines. The focus of future LRT expansion will be to provide an urban style - city scale system, an approach that will provide closer stop spacing and improved links to communities, supporting the City's vision for a more compact, sustainable and liveable city. An Urban Style – City Scale system is defined in the LRT Network Plan as:

- Urban Style: A style of system that offers: reduced scale platforms and stops; modern low floor LRT vehicles; frequent stops; transit priority; serving dense urban corridors.
- City Scale: Distinctive design that provides: identity; seamless integration; easily accessible; supportive of land use plans, and walkable communities.

1.12 Figure 1.1 provides examples of urban style - city scale LRT in Dublin and Amsterdam showing related transit oriented development (TOD) and the integration of LRT into existing city streetscapes.

1.13 Figure 1.1 Examples of Urban Style – City Scale LRT

LRT/Stop - Dublin, Ireland

Alignment - Amsterdam, Netherlands

City Plans

1.14 The development and assessment of the recommended corridor for LRT through the downtown has been influenced by The City of Edmonton's strategic vision, which aims for a more compact, livable and sustainable city, where people have the opportunity to choose and use alternative transportation modes. In turn, this approach is also set out in the following City plans:

- "The Way Ahead", the Strategic Plan
- "The Way We Grow", the Municipal Development Plan (MDP)
- "The Way We Move", the Transportation Master Plan (TMP)

- The LRT Network Plan
- The “Capital City Downtown Plan” (CCDP)

2 107 Street Stop & Diagonal 107 Street Stop

Overview

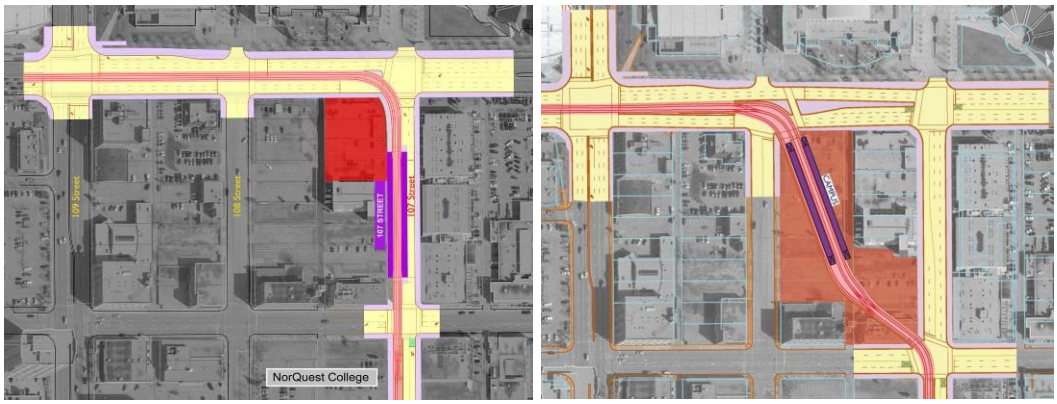
2.1 During the development, assessment and recommendations of the Downtown LRT concept design, multiple stop locations were considered in the vicinity of 107 Street, between 104 Avenue and 102 Avenue. The objective of the stop location in this area is to provide a direct and convenient transit service to Grant MacEwan University, NorQuest College, and the Warehouse neighbourhood.

Options Development

2.2 The evaluation presented to City Council in May 2011 demonstrated support for a stop location to strategically serve both Grant MacEwan and NorQuest. Of those options evaluated, two options rose to the top as the most promising. The two most promising options are graphically displayed in Figure 2.1.

- 107 Street Stop – A stop located on 107 Street, just south of 104 Avenue. This stop was located primarily within the street right-of-way to avoid potential impacts.
- Diagonal 107 Street Stop – A stop situated diagonally across the block south of 104 Avenue and west of 107 Street. This option was dependent on a joint development occurring in the vacant land surrounding (and above) the potential station.

FIGURE 2.1 107 STREET & DIAGONAL 107 STREET STOP DESIGNS



2.3 At the time of City Council's review in May 2011, there was interest from both Grant MacEwan University and NorQuest College to investigate development of a joint facility associated with the Diagonal 107 Street Stop option. However, at that time, consensus could not be reached. Without consensus of these two major stakeholders, the Diagonal 107 Street Stop option was infeasible, given development would require the support and financial participation of both institutions. Therefore, the 107 Street Stop option was proposed by Administration as the preferred stop option, due to the fact the City could design and construct this stop without external participation. While both stops serve the area well and would be successful LRT transit connections, the

Campus Stop design provided a unique opportunity to integrate the two institutions of higher learning around a well-served LRT stop.

Diagonal 107 Street Stop Option Advanced

2.4 In May 2011, City Council requested that Administration further facilitate discussions between Grant MacEwan University and NorQuest College to reach final consensus on support for the location of a stop serving both campuses and the surrounding neighbourhood.

2.5 City Administration organized additional conversations between the two institutions. Grant MacEwan University also developed their own early design concepts for development around and above the Diagonal 107 Street Stop. Based on the additional discussions, both Grant MacEwan University and NorQuest College have expressed support for the Diagonal 107 Street Stop. The two institutions have agreed to work together to advance potential development associated with this stop configuration. As previously noted, the success of the Diagonal 107 Street Stop is still dependent on development of the joint educational facilities surrounding and above the proposed stop. Grant MacEwan University and NorQuest College would require external (likely Provincial) funding to advance this development. Therefore, the City Administration proposes to continue to advance the Diagonal 107 Street Stop design in parallel with the ongoing development of the previously proposed 107 Street Stop design.

Next Steps

2.6 City Administration will advance the design for both the Diagonal 107 Street Stop and the 107 Street Stop as part of the PE design to ensure that both options are viable once there is a commitment to the project.

2.7 Grant MacEwan University and NorQuest College will continue to work together to seek funding and advance the joint development associated with the Diagonal 107 Street Stop. Should Grant MacEwan University and NorQuest College be successful in their funding and development endeavours, the Diagonal 107 Street Stop design will be advanced. However, the City will continue to develop and be prepared to develop the 107 Street Stop option, if this development cannot be funded within the construction time frame of the new LRT line.

3 The Quarters Alignment & Stop Evaluation

The Quarters Alignment & Stop Overview

3.1 As a condition for approval of the Downtown LRT concept engineering, City Council provided direction to administration to undertake additional examination of the LRT alignment in the area of 102 Avenue and 102A Avenue, between 97 Street and 95 Street. City Council directed Administration to conduct further engagement with the local stakeholders to obtain input on the alignment and potential alternative options.

Study Boundary

3.2 The study boundaries are presented in Figure 3.1 below. The boundaries include the Quarters Stop in the area from 97 Street to 95 Street, between 102 Avenue and 102A Avenue.

FIGURE 3.1 STUDY AREA

Process & Community Involvement

3.3 Based on the direction provided by City Council, Administration engaged directly with the local community in the Quarters/Chinatown/Boyle Street area. This included a series of three meetings with residents, business owners, property owners, and other stakeholders from the community surrounding 102 Avenue and 102A Avenue, between 95 Street and 97 Street. The goal of these consultation sessions was to obtain additional stakeholder input on the LRT alignment through this area, including options along 102 Avenue and 102A Avenue. The input received has served to inform the City's analysis of LRT options. Following the additional consultation and analysis, the Transportation Planning Branch is now reporting back to City Council with a recommended LRT alignment through the area.

3.4 Administration interviewed key members of the Boyle Street Community League and the Chinese Benevolent Association to solicit their input before developing the Public Involvement Plan (PIP) for the project. This input was evaluated and the plan was then

shared with key stakeholders in advance of the commencement of this additional consultation. Additionally, in the first workshop, the project team overviewed the consultation process with the stakeholder groups.

3.5 The sections below summarize the consultation activities and results from each step in the process.

Workshop 1 and Neighbourhood Walking Tour (July 24, 2011)

3.6 The process began with a walking tour of the study area with the project team and consultation participants. Participants were tasked with sharing their detailed local knowledge of the area, including important local facilities, cultural centres, pedestrian and vehicular traffic patterns, current patterns of usage of access/departure from buildings, parking and loading/unloading areas, urban design, land use and any other significant features of the area whether or not related to the LRT planning. The goal of the walking tour was to have locals tell the project team what is important about their community.

3.7 Following the tour, a workshop was held to understand the important aspects of the community and transfer this knowledge from the local residents to the project team. This workshop also provided an opportunity for stakeholders to identify their issues and aspirations for the study area.

3.8 This workshop provided basic background on the direction by City Council, the consultation process, and an activity. The participants broke into smaller groups to work with aerial graphics and identify important aspects of the community (buildings, gathering places, etc.) as well as issues and opportunities for LRT within the study area.

3.9 The most common themes identified through the group exercise are detailed below. These comments represent the general themes from the meeting and are paraphrased from the original comments.

- *Chinatown Gate* - Chinatown Gate is an important historic site with symbolism and cultural meaning and is tied to a cultural contract with the City of Harbin, China. (The gate was a gift from the City of Harbin.)
- *Community/Cultural Identification* - 102 Avenue area is the core of the Chinese community with many important cultural, recreational, and residential organizations/facilities that serve residents from all parts of Edmonton.
- *102 Avenue* - 102 Avenue is an important street carrying many pedestrians, buses, and traffic out of downtown Edmonton.
- *102A Avenue* - 102A Avenue has more vacant lots (specifically on the north side) and is not as highly used by vehicles, pedestrians, or buses as is 102 Avenue.
- *Underground Option* - If the LRT was located underground, any potential negative impacts would be mitigated.

- *Development/Housing* - Even with the multiple residential, cultural, and business uses, the area would benefit from more development and activity to draw new people.
- *Parking/Vehicular Access* - Many of the attendees at cultural activities, those frequenting businesses, and the families of senior facility residents come from across Edmonton. Emergency access is critically important to the senior's facilities on both the 102 and 102A Avenues. Therefore, most visitors arrive to the area in vehicles so vehicular access and parking remain important.
- *Pedestrian Realm & Crosswalks* - This area attracts many pedestrians moving through the area, as well as those pedestrians who live in the area. Seniors walk along 102 Avenue and the staff of local businesses cross 102 Avenue on foot throughout the day. Pedestrian safety, with provision for mid-block crosswalks is important.

Workshop #2 (August 21, 2011)

3.10 This workshop focused on working with the stakeholder to develop LRT alternatives/options within the study area for further analysis. A total of 19 residents attended.

3.11 Stakeholders developed LRT options on both 102 and 102A Avenues with both surface and below ground options. The stakeholders worked within the design constraints using scaled LRT puzzle pieces, accurately designed for each potential option. This process helped stakeholders better understand the constraints and trade-offs associated with various designs. The designs developed by the stakeholders were analysed using the consistent criteria and analysis used along the entire Downtown LRT corridor. More details on the analysis are provided later in this section.

3.12 The following key themes were expressed by the group in developing the options for 102A and 102 Avenues.

- The cultural character of the street should be reinforced with all the LRT options.
- The area should have a stop.
- Impacts to buildings should be avoided.
- Access and parking to the existing Chinese seniors residential buildings should be provided.
- Recognize cultural importance of the area.
- The Chinatown gate should not be impacted.
- A number of groups noted they developed 102 Avenue options reluctantly, due to a preference for 102A Avenue.
- Provision of pedestrian crossing points at midblock.

Information Meeting #3 (October 5, 2011)

3.13 This information meeting provided an opportunity for Administration to share the results of the analysis. Administration presented their proposed recommendation to City Council. Additional input was collected at this meeting and documented for presentation to City Council.

3.14 A total of 45 participants attended the meeting.

Options Development

3.15 Through workshop #2, the stakeholders seized the opportunity to develop new options along both 102 Avenue and 102A Avenue, within the study area. As noted above multiple teams of stakeholders developed a series of four options. The options developed by each team were translated into composite options for analysis.

- 102A Avenue Surface Option – Option following 102A Avenue on the surface with a stop west of 96 Street. A portal is proposed beginning east of 96 Street on the north side of 102A Avenue. A single traffic lane, parking/drop off access, pedestrian crossings, and enhanced sidewalks are provided.
- 102A Avenue Subsurface Option – Option following 102A Avenue, transitioning from the surface to a portal with a single traffic lane is located between 97 Street and 96 Street. An underground station is proposed between 96 Street and 97 Street. Parking/drop off access, pedestrian crossings, and sidewalks are provided. Multiple traffic lanes are maintained between 96 Street and 95 Street on 102A Avenue.
- 102 Avenue Surface Option – Option following 102 Avenue on the surface with a stop west of 96 Street. A portal is proposed beginning east of 96 Street on the south side of 102A Avenue. A single traffic lane, parking/drop off access, pedestrian crossings, and enhanced sidewalks are provided.
- 102 Avenue Subsurface Option – Option following 102 Avenue, transitioning from the surface to a portal with a single traffic lane is located between 97 Street and 96 Street. An underground station is proposed between 96 Street and 97 Street. Parking/drop off access, pedestrian crossings, and sidewalks are provided. Multiple traffic lanes are maintained between 96 Street and 95 Street on 102 Avenue.

3.16 Graphics of each option analysed are presented in Appendix A.

Options Analysis

Process & Criteria

3.17 Prior to beginning the analysis, Administration provided the design details of each option to stakeholders for final consideration. These four options were then advanced to the analysis phase to compare and contrast their potential benefits and impacts.

3.18 The criteria and analysis conducted mirrored the consistent process followed on all new LRT corridors proposed throughout the City. The process and criteria were previously reviewed and approved by City Council and consistently used for selection

of the Southeast LRT, West LRT, Northwest LRT, and approved segments of the Downtown LRT.

3.19 The categories of City Council approved criteria include:

- Feasibility/Constructability
- Land-use and Promoting Compact Urban Form
- Movement of People & Goods
- Natural Environment
- Parks, River Valley & Ravine System
- Social Environment

3.20 Screening involves comparing each of the options against one another. All options at this level of analysis have been advanced because they are feasible and are strong performers. The role of the final screening analysis is to identify the key differences in terms of benefits and potential impacts to differentiate the option. The criteria helped to screen out those options that did not compare favourably and advance only the most promising option. The detailed criteria and sub-criteria are provided in Appendix B. To provide a fair comparison for all communities along the proposed LRT alignments, it was critical that the criteria be applied consistently, as it was applied to other approved segments of the alignment.

Analysis

3.21 Based on application of the criteria, the 102 Avenue Surface option was identified as the best performing option. Several discriminating factors contributed to 102 Avenue Surface option's superior performance when compared to the other options.

Feasibility/Constructability

3.22 In general the surface options compared more favourably to subsurface (underground) options. Underground options result in significantly more impact during construction and are significantly more expensive. All options would require a portal be located somewhere within the study area. Options along 102A Avenue also included more property acquisition and impact to existing properties due to a slightly longer length.

Land-use & Promoting Compact Urban Form

3.23 The analysis of land use compares both the existing and future planned land use for the area. The analysis takes into account the development/redevelopment potential, as well as the existing and potential future markets. The key differentiators related to land use in the corridor focused on the location of denser future land use for residential and commercial along the 102 Avenue alignment. The more intense land use also translates to higher future population density in this same area. Through community consultation, multiple important community facilities, residential, and commercial properties were identified along 102 Avenue. The presence of these existing successful facilities also serves as a primer for future infill redevelopment for the vacant or underutilized parcels in the area. Many of the existing buildings in the

area serve a cultural function for the area's Chinese community. Given this concentration of cultural facilities, the 102 Avenue provides a greater opportunity to reinforce the area's cultural identity.

Movement of People & Goods

3.24 The movement of people and goods is linked intrinsically with the direct service provided to high population and activity centres. With the potential for higher density development, 102 Avenue would provide greater connectivity to both current and future population/transit ridership and activity centres. The most direct connections to these populations would likely result in higher transit access and ridership. 102 Avenue would allow for easier street integration, due to the existing higher pedestrian activity and greater street life than other options.

Natural Environment

3.25 This area is primarily a built, urban environment, with no natural features or natural waterways within the study area. Therefore this criteria was not used.

Parks, River Valley & Ravine System

3.26 There are no existing elements of parks, river valley, or ravine system within the study area. Therefore, this analysis focused on the ability for the option to provide a strong streetscape environment. LRT stations can improve streetscape through physical improvements (new infrastructure, landscaping) and through increased activity brought by passengers boarding and alighting. 102 Avenue is more developed and has more existing cultural identity and therefore presents a better opportunity to provide enhancements. 102A Avenue is relatively undeveloped, with limited cultural identity.

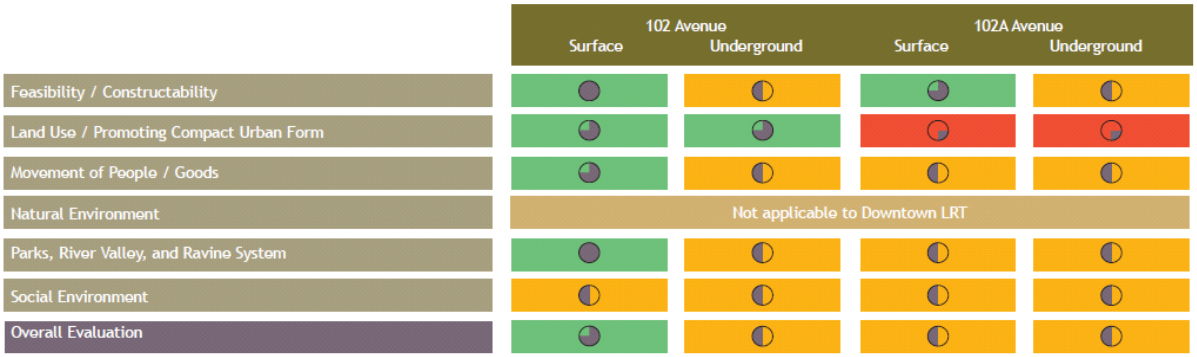
Social Environment

3.27 All of the options analysed were designed by the team to avoid and minimize impacts. This included adjusting designs to avoid property acquisition. Some property acquisition would be required for all of the options analysed; however, both surface options required the least acquisition. Additionally, the 102 Avenue Surface option required acquisition of only currently vacant parcels of land. Potential impacts were considered to the Chinatown Gate as an important cultural symbol for the community. Trains for the 102 Avenue options will pass through the gate while options on 102A Avenue will have no impact. The analysis assessed if options would hinder movement through the community or sever different parts of the study area. The 102 Avenue Surface option would create the greatest severance due to the portal running between 95th Street and 96th Street where there is an existing cross walk. Portal locations for all the other options create equal severance.

Analysis Results

3.28 Figure 3.2 provides an overview of the analysis results, comparing each option.

FIGURE 3.2 ANALYSIS RESULTS



3.29 No single sub-criteria determined the results of the analysis. It was a comprehensive consideration of all criteria and the potential incremental differences between options. The consideration of the multiple sub-criteria resulted in identification of the 102 Avenue Surface option rising to the top as Administration's recommendation. Appendix B provides a detailed breakdown of the sub-criteria and comparison of each option.

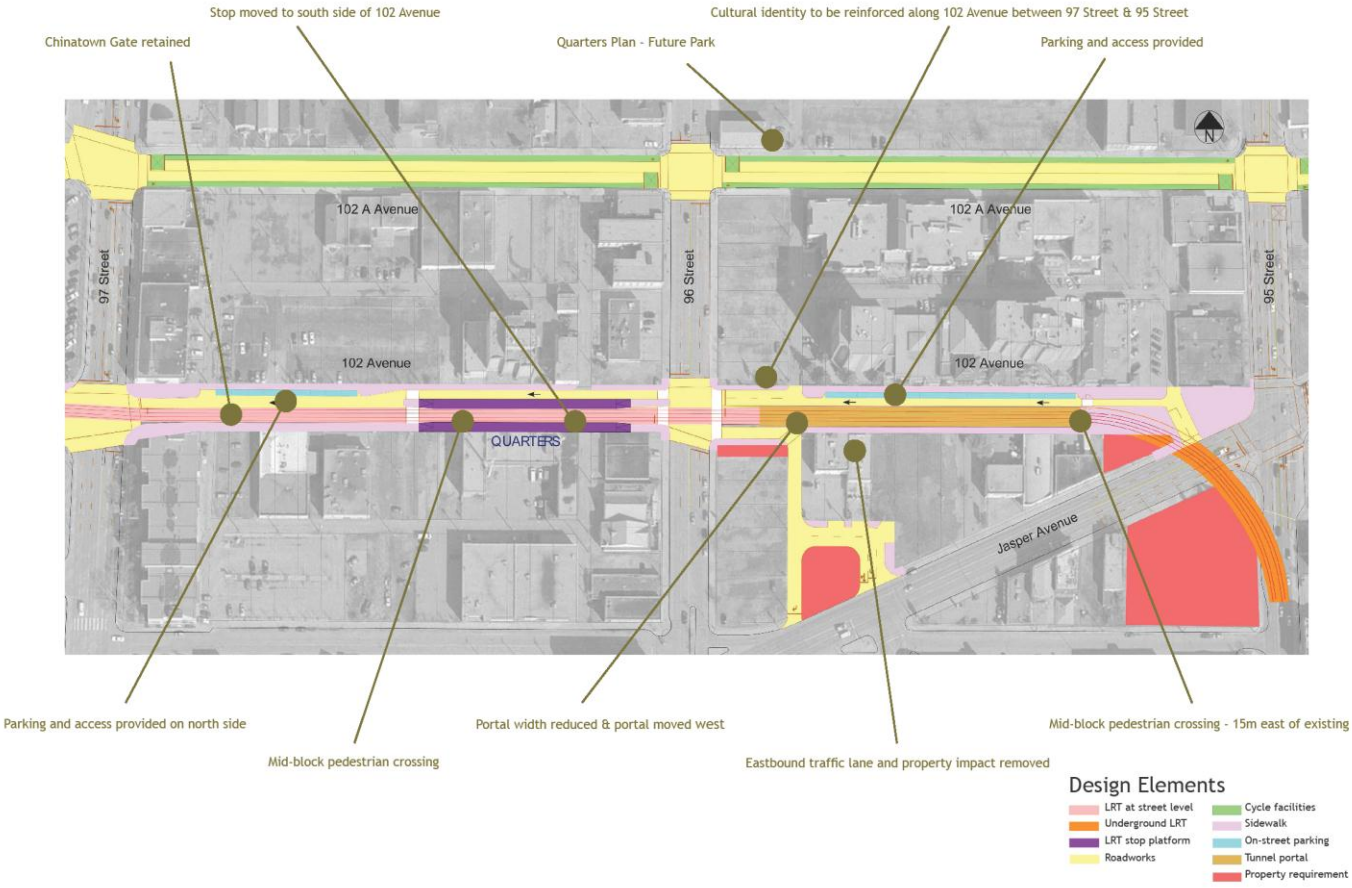
Recommended Alignment

3.30 Details of the proposed 102 Avenue Surface option are provided in Figure 3.3. As a result of the additional community consultation, this option is greatly improved over the original design brought forward to City Council in May 2011. The proposed option:

- Eliminates property acquisition and direct impacts to developed properties (reducing cost).
- Proposes a shifted and narrower portal between 96 Street and 95 Street.
- Shifts the alignment to the south side of 102 Avenue to provide a continuous traffic lane and maintains critical access points.
- Maintains emergency access to senior's facilities.
- Provides additional parking to serve the local community.
- Provides mid-block pedestrian crossings to maintain community connectivity.
- Proposes improvements to the pedestrian environment (improved sidewalks, crossings, transit access, etc.). Improvements would include elements reflecting the importance of the neighbourhood's Chinese cultural heritage, such as street furniture, light fixtures, and portal aesthetic treatments.
- Results in no impact to the Chinatown Gate. (This is true for all options proposed, including the original recommendation.)

- Maintains multiple access options for the potential hotel development at 102 Avenue and 96 Street.
- Respects and supports the Quarters Plan and the CCDP.

FIGURE 3.3 PROPOSED 102 AVENUE SURFACE OPTION



3.31 Appendix C provides a detailed summary of input from stakeholders received through the consultation process. A variety of feedback was received on Administration's recommendation of the 102 Avenue Surface option. Many stakeholders continue to express their desire to locate the LRT alignment on 102A Avenue. Concerns were also expressed by some stakeholders that they desired more involvement in the analysis process.

Next Steps

3.32 Administration has advanced the 102 Avenue Surface option due to its ability to best meet the overall community, transportation, and land use goals identified through the alignment process and evaluation. Through the additional stakeholder consultation, many modifications have been made to the proposed design to address community concerns. Administration is committed to continuing to work with the local community stakeholders to address their concerns as the design moves forward.

APPENDIX

A

OPTIONS

Session 2 - Options Developed by Stakeholders

On August 21st, the second in a series of three meetings was held at the Winspear Centre with residents, business/land owners and community group representatives from the community surrounding 102 Avenue and 102A Avenue, between 95 Street and 97 Street.

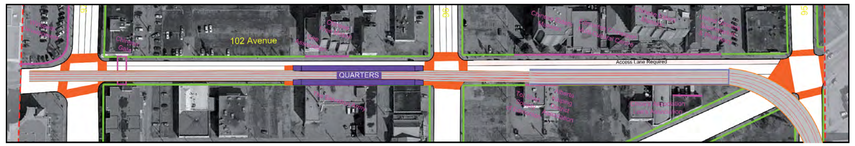
Participants attending this session were split into five groups, with each group given the opportunity to design four LRT options within the study boundary.

The four options included:

- 102A Avenue Surface
- 102A Avenue Underground
- 102 Avenue Surface
- 102 Avenue Underground

102 Ave Surface Options

Group 1



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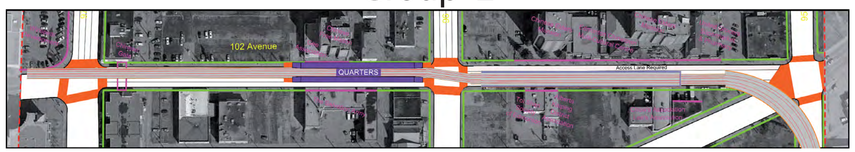

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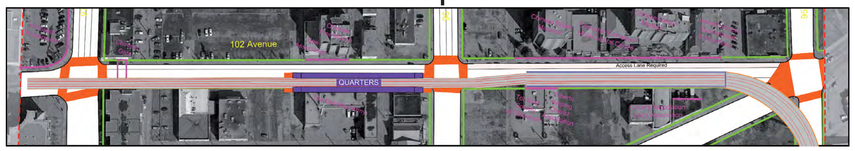

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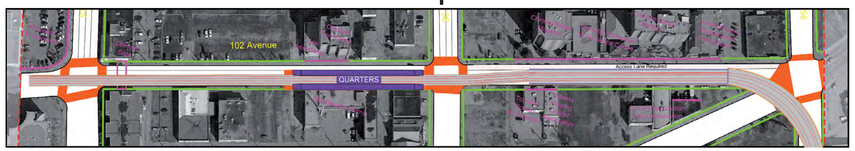
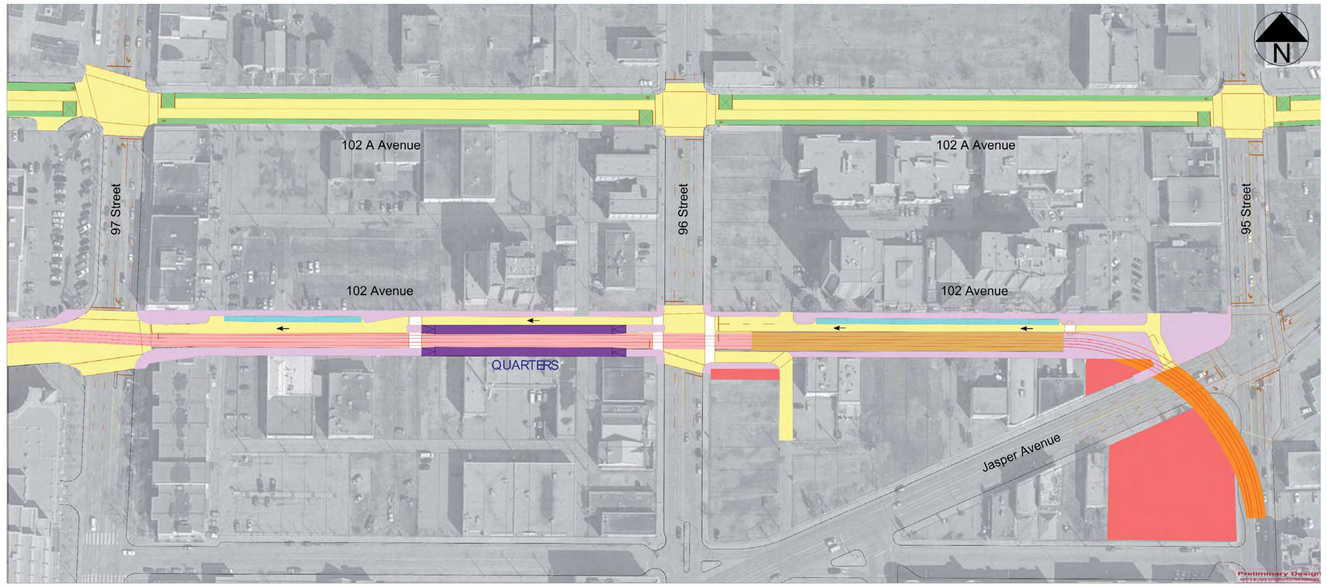


Group 5

Evaluation Option



New and Recommended Elements

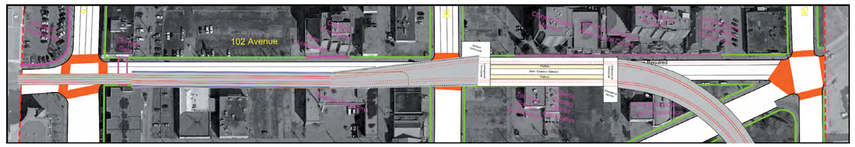
- LRT at street level
- Underground LRT
- LRT stop platform
- Roadworks
- Cycle facilities
- Sidewalk
- On-street parking
- Tunnel portal
- Property requirement

Stakeholder Elements Included in Design

- The stop is located on the south side of 102 Ave
- The stop is located between 96th Street and 97th Street
- On street parking is provided on 102 Ave

102 Ave Underground Options

Group 1



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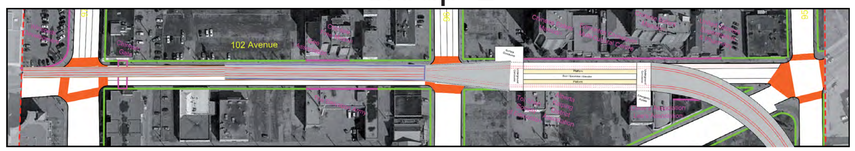

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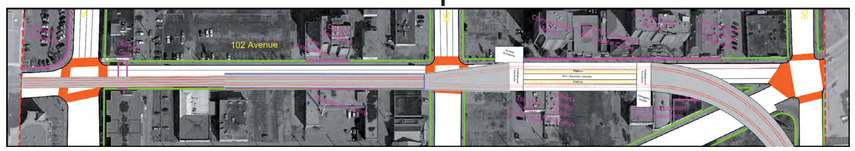

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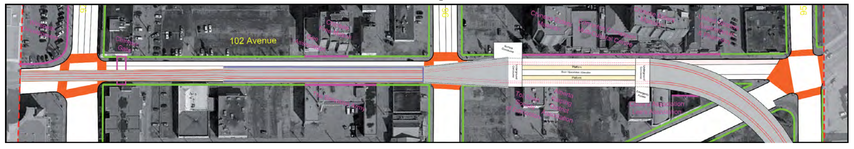

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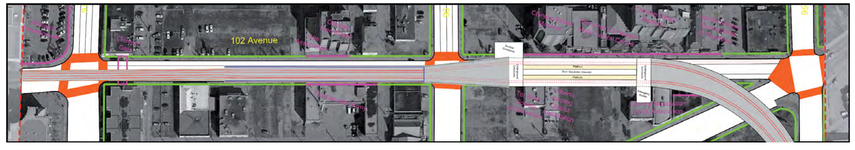
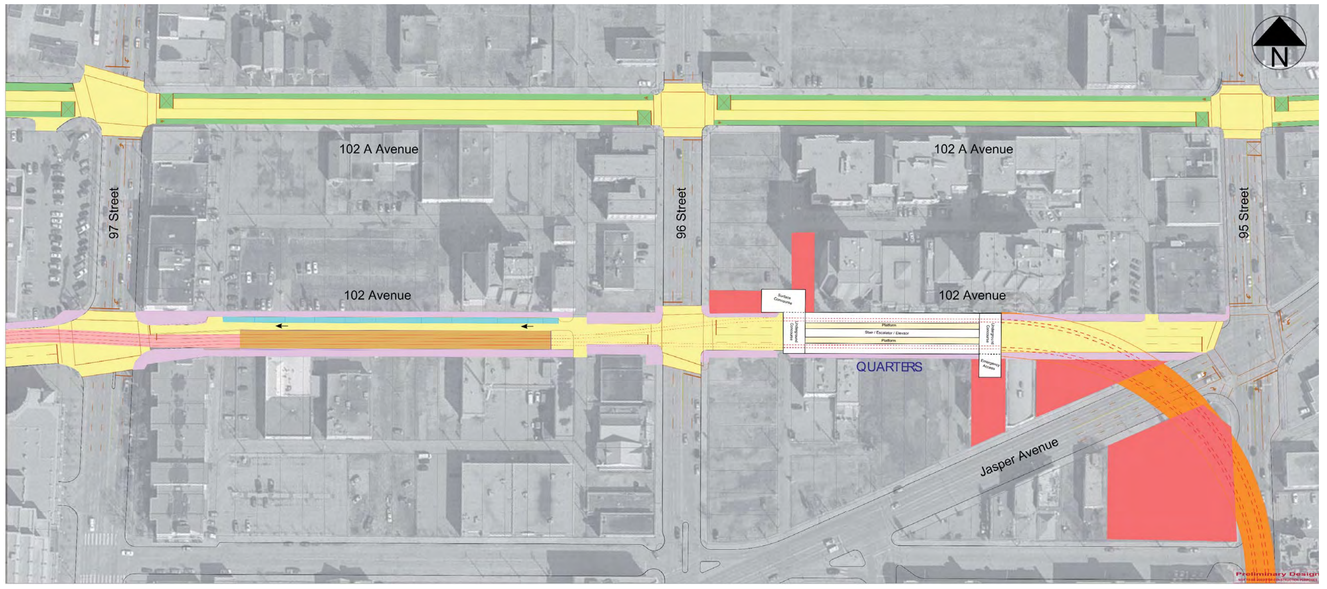


Evaluation Option



New and Recommended Elements

- LRT at street level
- Underground LRT
- LRT stop platform
- Roadworks
- Cycle facilities
- Sidewalk
- On-street parking
- Tunnel portal
- Property requirement

Stakeholder Elements Included in Design

- Traffic lanes and parking above underground stop
- The stop is located between 95th Street and 96th Street
- Sidewalk and traffic lanes are provided with portal

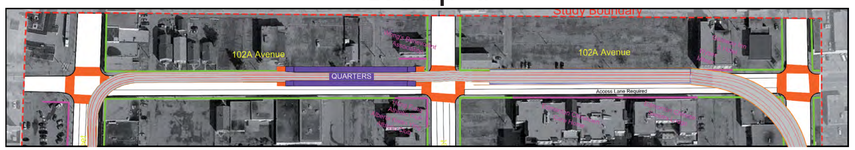
THE CITY OF Edmonton

102 A Ave Surface Options

Group 1

Group 2

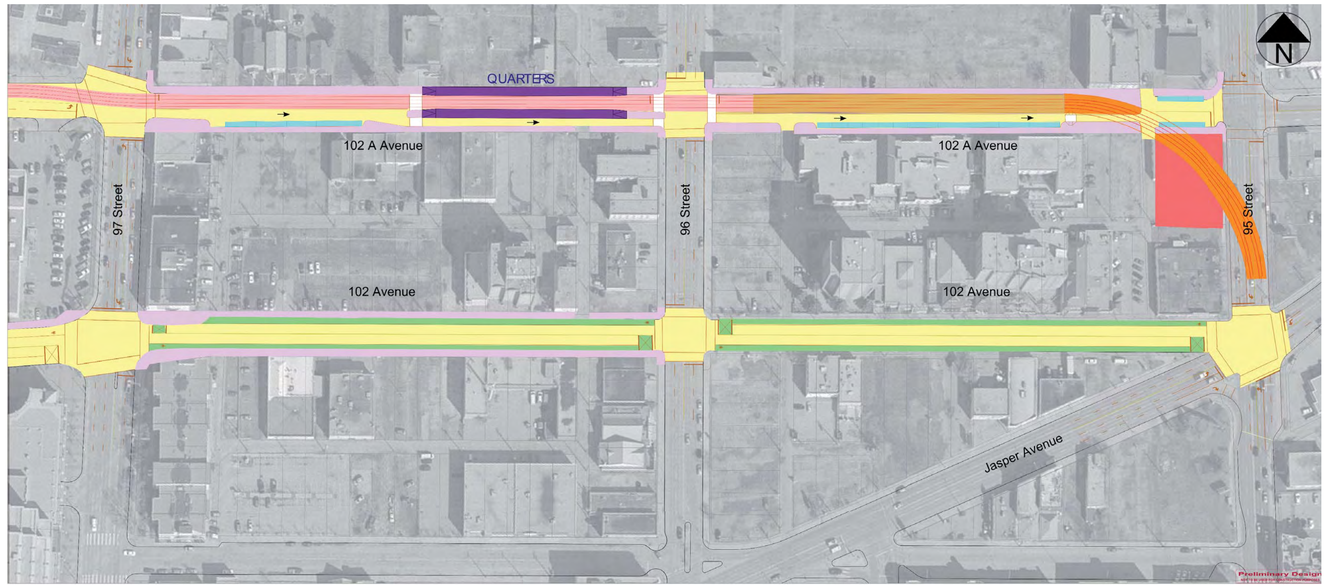
Group 3



Group 4

Group 5

Evaluation Option



New and Recommended Elements

- LRT at street level
- Underground LRT
- LRT stop platform
- Roadworks
- Cycle facilities
- Sidewalk
- On-street parking
- Tunnel portal
- Property requirement

Stakeholder Elements Included in Design

- The stop is located on north side of 102A Ave
- The stop is located between 96th Street and 97th Street
- Traffic lanes and sidewalk are provided south of the stop

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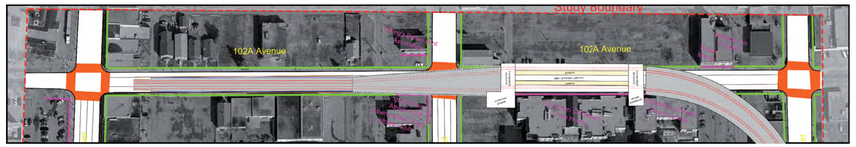
102 A Ave Underground Options

Group 1



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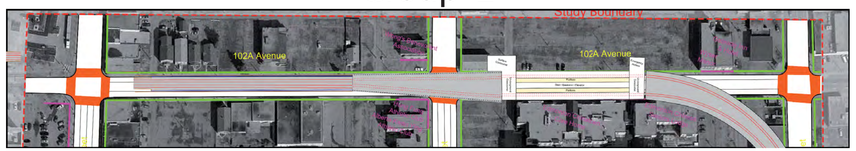

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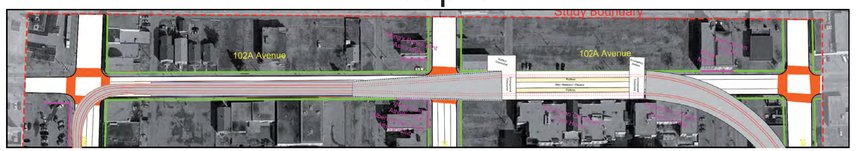

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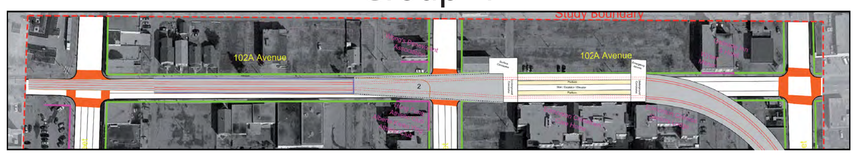

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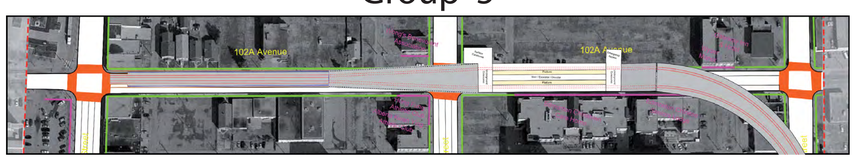
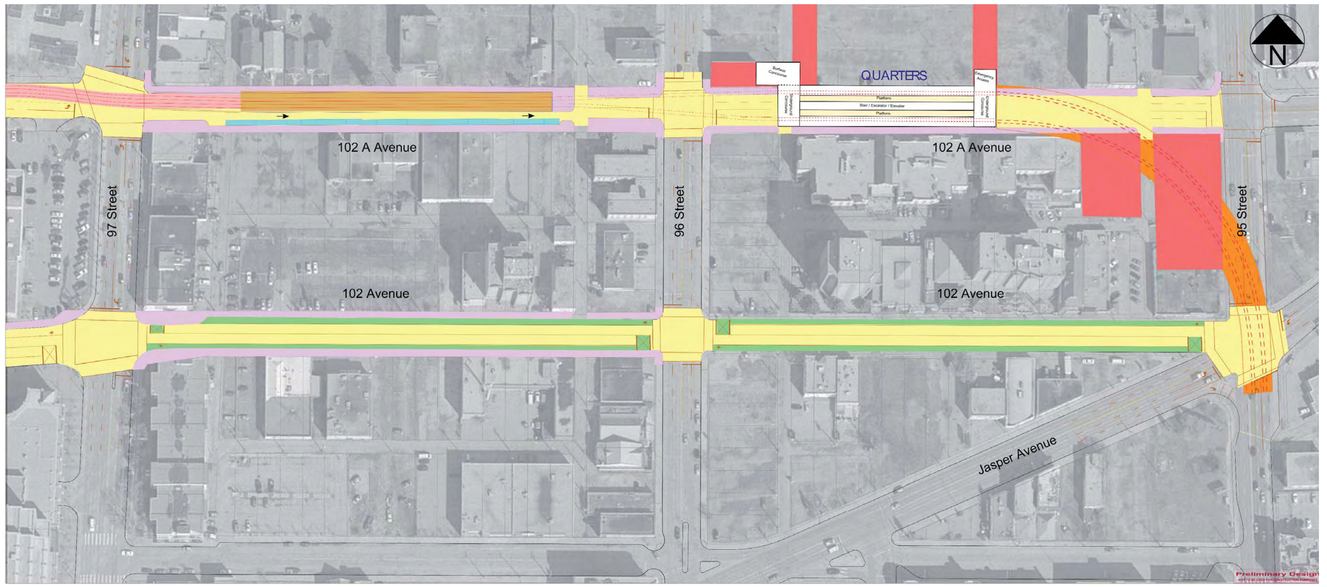


Evaluation Option



New and Recommended Elements

- LRT at street level
- Underground LRT
- LRT stop platform
- Roadworks
- Cycle facilities
- Sidewalk
- On-street parking
- Tunnel portal
- Property requirement

Stakeholder Elements Included in Design

- Stop location and orientation between 95th Street and 96th Street
- Sidewalks provided on both sides of portal
- One way traffic provided on south side of portal

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APPENDIX

B

EVALUATION

Session 3 - LRT Project Evaluation - Evaluation Criteria

The following Council-adopted evaluation criteria are used to evaluate all City of Edmonton LRT routes.

LRT Criteria	Individual Criterion
Feasibility / Constructability *Does the option provide a good solution?* *Is it cost effective?* *Can it be built?*	Capital cost Operating cost Grade separated intersections Impact on bus services Cost per rider Route length At grade intersections Number of stops Average stop spacing Connections to future routes
Land Use - Promoting Compact Urban Form *Does the option integrate with existing transit?* *Does it serve existing population / employment?* *Does it serve future population / employment?* *Does it serve activity centres, community centres, leisure etc?* *Will the option provide improved community connectivity?* *Will the option facilitate development?*	Transit integration Population within 400m Employment within 400m Student population within 400m Future population Future employment
	Number of activity centres (employment, theatres, colleges, residences, shopping, etc.) Supportive of Transportation Master Plan, Municipal Development plan, and Capital CIty Downtown Plan Housing density Zoning Development proposals Vacant land
	Opportunities for improved streetscape, boundary treatment, landscaping, planting, trees Community identity through the linking of CCDP-designated zones or neighbourhoods Ability to facilitate TOD Impetus for redevelopment Facilitation of increased density/mixed use development

LRT Criteria	Individual Criterion
Movement of People & Goods *Does the option impact on existing transportation?* *Does the option integrate with existing transportation?*	Integration of right of way with street Increase in transit ridership Integration with transit Integration with bicycles Integration with pedestrians Transit network impacts Road network impacts
Natural Environment *Does the option impact on the natural environment?*	Impact on riparian habitat Stream / rivers crossed Consistent with regulations governing natural areas Area disturbed during construction
Parks, River Valley & Ravine System *Does the option impact on parks and open space?* *Does option provide improvements to parks and open space?*	Opportunities for improved streetscape, boundary treatment, landscaping, planting, trees Impacts on parks / open space
Social Environment *Does the option impact on property?* *Does it impact heritage building?* *Does it impact cultural sites?* *Is there an solution which mitigates the impact?* *Does it support employment, transit dependant users?*	Property and land impacts Heritage building impacts Cultural / heritage sites adjacent to route
	Ability to mitigate neighbourhood impacts Creation of physical barriers or severance Noise and vibration impacts
	Employment generated Student population within 400m Lower income / no car / seniors within 400m

Feasibility / Constructability - Evaluation

Feasibility / Constructability

	102 Avenue		102A Avenue		
	Surface	Underground	Surface	Underground	Comments
Capital cost	$50.9 mllion	$122.8 mllion	$63.2 million	$135.0 million	Concept design cost estimate
Operating cost	Low	High	Low	High	Underground stations have a significantly higher operating cost
Grade separated intersections	1 intersection	2 intersections	1 intersection	2 intersections	Underground options go under 96 Street
Impact on bus services	Bus service revised for all options considered				
Cost per rider	Low	High	Low	High	High capital cost options increase cost per rider
Route length	720 metres	720 metres	800 metres	800 metres	
At grade intersections	2 intersections	1 intersection	2 intersections	1 intersection	Surface options run across 96 & 97 Streets
Number of stops	One stop provided with all options				
Average stop spacing	Evaluated as equal for all options				
Connection to future routes	Evaluated as equal for all options				
Evaluation Result					102 Ave Surface option - Lowest cost, Short route

Land Use / Promoting Compact Urban Form - Evaluation

Land Use / Promoting Compact Urban Form	102 Avenue Surface	102 Avenue Underground	102A Avenue Surface	102A Avenue Underground	Comments
Population within 400 metres	Medium	Medium	Low	Low	Population currently higher on 102 Avenue
Future population	High	High	Medium	Medium	Future higher density focused on 102 Avenue
Future employment	Medium	Medium	Medium	Low	Future higher density focused on 102 Avenue
Number of activity centres	11 Centres	11 Centres	3 Centres	3 Centres	
Supportive of Transportation, Municipal Development Plans	High	High	Medium	Medium	102 Ave supportive of planned higher density
Housing density	Medium	Medium	Low	Low	
Vacant land	Medium Area	Medium Area	Large Area	Large Area	102A Ave has significant adjacent vacant land
Opportunities for streetscape improvements	High	High	Medium	Medium	102 Ave more cultural / vibrant street
Community identity - Linking of neighbourhoods	High	High	Low	Low	102 Ave at centre of community
Ability to facilitate Transit Oriented Development	High	High	Low	Low	102 Ave supportive of planned higher density
Impetus for redevelopment	High	High	Low	Low	102 Ave supportive of planned higher density
Facilitation of increased density - mixed use development	High	High	Low	Low	102 Ave supportive of planned higher density
Transit Integration, employment and student population within 400m, zoning, and development proposals	Evaluated as equal for all options				
Evaluation Result					102 Ave with existing and future density

Population

Medium Density

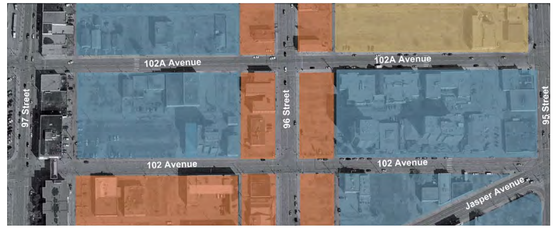
Low Density

Activity Centres & Vacant Land

Activity Centres

Vacant Land

Future Population / Employment Density



High Density

Medium Density

Low Density

Movement of People/Goods and Parks, River Valley, and Ravine System - Evaluation

		102 Avenue		102A Avenue		
		Surface	Underground	Surface	Underground	Comments
Movement of People/Goods	Integration of right of way with street	High	Medium	Medium	Medium	102 Ave surface route integrates well with street
	Increase in transit ridership	Medium	Medium	Low	Low	102 Ave will benefit from increased ridership due to activity centres
	Integration with transit system	Evaluated as equal for all options				All routes will connect to the LRT system
	Integration with bicycles	Medium	Medium	Low	Low	102 Ave routes are closer to planned bike routes
	Integration with pedestrians	High	Medium	Medium	Medium	102 Ave currently has more pedestrian activity
	Transit network impacts	Evaluated as equal for all options				All routes will impact the transit network
	Road network impacts	Medium	Medium	High	High	102 A Ave routes will need to rejoin 102 Ave west of 97th St
	Evaluation Result					No route has significant student population
Parks, River Valley and Ravine System	Opportunities for improved streetscape, boundary treatment, landscaping, planting trees	High	Medium	Medium	Medium	102 Ave surface construction will present an opportunity for streetscape improvement
	Impacts on parks / open space	Evaluated as equal for all options				No routes deliver significant impacts on parks
	Evaluation Result					102 Surface route represents opportunity for improvement with little negative impact

Social Environment - Evaluation

		102 Avenue		102A Avenue		
		Surface	Underground	Surface	Underground	Comments
Social Environment	Property and land impacts	$5.3 million	$8.7 million	$4.1 million	$10.3 million	Concept Design Cost Estimate
	Heritage building impacts	Evaluated as equal for all options				No option has impact on heritage buildings
	Cultural / heritage sites adjacent to route	1	1	0	0	The “Chinatown Gate” is located on 102 Ave
	Ability to mitigate neighbourhood impacts	Evaluated as equal for all options				All options require the development of a portal
	Creation of physical barriers or severance	High	Medium	Medium	Medium	102 Ave surface route may interfere with crossing
	Noise and vibration impacts	Evaluated as equal for all options				
	Employment generated	Evaluated as equal for all options				
	Student population within 400m	Evaluated as equal for all options				No route has significant student population
	Lower income / no car / seniors within 400m	High	High	Medium	Medium	102 Ave is located closest to more senior housing
	Evaluation Result					All routes received similar scores for social environment

Senior and Affordable Housing

Senior and Affordable Housing

Property and Land Impacts 102 Ave

Surface

Underground

Property and Land Impacts 102A Ave

Surface

Underground

Overall Evaluation

	102 Avenue		102A Avenue		Option Evaluation Comments
	Surface	Underground	Surface	Underground	
Feasibility / Constructability					The 102 Ave surface option received the top score due to its economic feasibility, ability to integrate with present and future land use,accessibility to seniors and low income housing, and connection to current and future ridership. The 102 Ave underground option scored lower due to high costs for the underground station, greater property impacts, and reduced potential to improve the surrounding streetscape. The 102A Ave surface option scored lower due to higher costs caused by more right of way requirements, lower present and future population adjacent to the option, and decreased opportunities to connect seniors and lower income households to transit. The 102A Ave underground scored the lowest as it would incur the highest cost.
Land Use / Promoting Compact Urban Form					
Movement of People / Goods					
Natural Environment	Not applicable to Downtown LRT				
Parks, River Valley, and Ravine System					
Social Environment					
Overall Evaluation					

Overall Evaluation Results

Feasibility / Constructability
- All the options include the need for a portal-
- Underground options are significantly more expensive
- Underground options more impactful during construction
- 102A options require more right of way and cost more

Land Use / Promoting Compact Urban Form
- Current and future population density is higher on 102 Ave corridor
- Number of present and future activity centres is greater on 102 Ave
- Greater opportunity to reinforce cultural identify on 102 Avenue due to substantive cultural buildings and resources on 102 Avenue

Movement of Goods and People
- 102 Ave has greater connectivity to both current and future population / ridership
- All options will impact the road network

Park, River Valley and Ravine System
- 102 Ave surface option presents the greatest opportunity to improve the streetscape

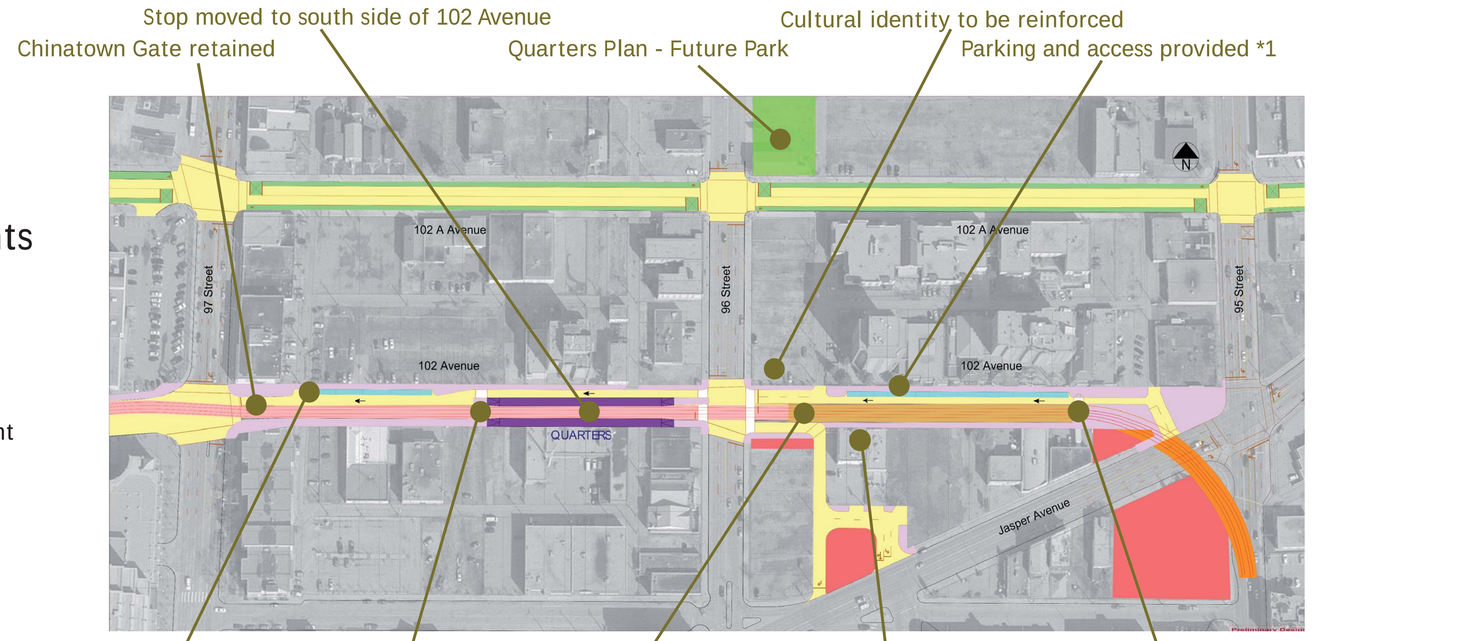
Natural Environment
- These criteria were not applicable to any option

Social Environment
- Property impacts are higher for underground options due to increased construction
- Property impacts are similar on 102 Ave and 102A Ave
- There are more cultural heritage sites on 102 Avenue
- The Chinatown Gate on 102 Ave will be retained for all options - the 102 Ave options will run through it
- No option mitigates the need for a portal
- Potentially, the 102 Ave options' portal creates the greatest barrier
- Potentially, the 102 Ave portal barrier can be mitigated by retaining current pedestrian crossings
- Potential noise and vibration impacts are the same on both corridors
- 102 Avenue has greater connectivity to lower income and senior housing

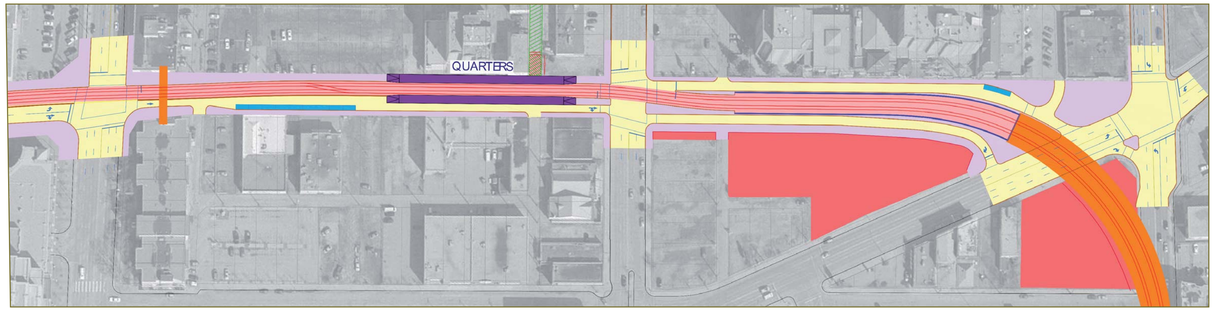
Administration's Recommendation / Changes Incorporated From Feedback

New and Recommended Elements

- **LRT at street level**
- Underground LRT
- LRT stop platform
- Roadworks
- Cycle facilities
- Sidewalk
- On-street parking
- Tunnel portal
- Property requirement



Original LRT Route Proposal (Spring 2011)



*1 Frontage parking to be provided subject to design constraints

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APPENDIX

C

CAPITAL COST ESTIMATE

C1 COST ESTIMATE – DOWNTOWN LRT QUARTER TO GRANT MACEWAN

Construction ($ M)		**$120**
	Roadwork and Trackwork	**$65**
	Signals and Systems	**$35**
	Stations	**$20**
Land ($ M		**$30**
Engineering and Construction Admin (S M)		**$15**

Total ($ M) – 2010/11	**$165**

Total ($ M) Inflated to 2017	**$195**

Revised Quarters area recommended alignment cost estimate

Property impacts and associated costs reduced

Including Campus diagonal stop