



DOWNTOWN UNDERPASS URBAN DESIGN GUIDELINES

Linking Downtown and Beltline
JULY 2010



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Executive Summary



The Downtown Underpass Urban Design Guidelines (the “Guideline”) is a non-statutory document providing comprehensive urban design guidance for the development of new underpasses and any improvements to existing underpasses within the Centre City area. The Guideline includes urban design principles and design solutions which address common issues associated with Calgary’s downtown underpasses related to the following categories: Safety, Connectivity, Accessibility, Context, Vitality, Greenery and Beauty. The intent of the Guideline is to create best-practice solutions in underpass design and improvements that would guide the public and private sectors. It is intended to achieve a high-quality public realm, pedestrian and cyclist linkages, as directed by the Centre City Plan. The underpasses are gateways to the Centre City’s destinations for work, arts and culture, administration and retail. These gateways have to be designed as highly functional and inviting for the various needs of pedestrians, cyclists, public transit and motorists. The current physical state of the downtown underpasses is in obvious contradiction to their mobility and gateway functions within the Centre City.

This Guideline brings together a unified vision for all underpasses with careful considerations for local context. This context is described by selected criteria, which will allow a comprehensible and traceable evaluation for all Underpass Elements: bridge structure, retaining walls, active edges, lighting, sidewalk/multi-use pathways, medians, landscaping, universal design, pedestrian signage, utility infrastructure integration, and underpass art.

Based on general urban design principles which address: safety, connectivity, accessibility, context, vitality, greenery and beauty, and the Underpass Analysis, detailed guidelines for all significant underpass elements have been developed. For every one of the underpass design elements, the Guideline provides an introduction, the guideline text, the images, and conceptual drawings showing design opportunities

The Guideline distinguishes between new underpasses and existing underpasses as different aspects which have to be addressed.

The new 4 Street SE underpass construction commenced in Summer 2009. A pilot design for the future 4 Street SE is part of this Guideline. The intention of the pilot design is to demonstrate a range of design opportunities for all evaluated underpasses.

The successful implementation of this Guideline requires collaboration of affected business units within the City of Calgary.



Role and Intent of the Guideline

The Downtown Underpass Design Guideline (the “Guideline”) is a non-statutory document providing comprehensive urban design guidance for the future development of any new underpass and future improvement of existing underpasses within the Centre City area. The Guideline includes urban design principles and design solutions which address urgent and pressing issues related to Calgary’s downtown underpasses based on the following principles:

Safety, connectivity, accessibility, context, vitality, greenery and beauty.

Policy Section 6.1 in the Centre City Plan addresses the “Movement and Access System”: “Establish north-south connections and overcome existing barriers (e.g., the CPR tracks, the Bow River, and the Elbow River) by facilitating the implementation of the proposed underpasses, overpasses, pedestrian bridges and other integrated design initiatives.” In addition, the Centre City Plan Section 4.3.2 proposes that physical enhancements to existing and potentially new vehicular underpasses play an important role in implementing the Canadian Pacific Railway (CPR) corridor vision over time.

The Guideline addresses the relationship and potential design treatments for such design elements as bridge structure, retaining walls, active edges, lighting, sidewalk/multi-use pathways, medians, landscaping, universal design, pedestrian signage, utility infrastructure integration, and underpass art.

The Guideline’s intent is to set the stage for a coordinated action and implementation by related business units and the active partnership of stakeholders.

The scope of work involves eight existing underpasses (7 Street SE, Macleod Trail SE, 1 Street SE, 1 Street SW, 4 Street SW, 5 Street SW, 8 Street SW, 14 Street SW), one underpass under construction (4 Street SE), one proposed underpass (2 Street SW), and one potential underpass (11 Street SW). The study area for each underpass covers the south-north streets, and the lands immediately adjacent to the underpass between 9 Avenue and 10 Avenue.

Public Engagement



The following internal and external stakeholders were involved in this project to ensure their values are considered and reflected in the Guideline:

Internal Stakeholder Circulation and Comments

Land Use Planning & Policy/Centre City

Transportation Planning/Centre City

Transportation Planning/Pedestrian and Bicycle Policy & Projects

Transportation Planning/Network Planning

Transportation Planning/Development Services

Transportation Planning/Transportation Solutions

Calgary Transit

Roads/ Subdivision Development

Roads/Streetlighting

Roads/ Bridges & Structures

Roads/Traffic Engineering

Recreation/Public Art

Parks/Urban Forestry

Centre City Implementation

External Stakeholder Circulation and Comments

Calgary Municipal Land Corporation (CMLC)

Marshall Tittlemore Architects (MTA)

Calgary Downtown Association

Beltline Community Association

Victoria Crossing BRZ

“4 Street SE Community Link”

The urban design principles included in this Guideline were largely drawn from the “4 Street SE Community Link” stakeholder Sessions held during 2005-2006, which involved the following participants:

Alan Jacobs

McElhanney Consulting

Scatliff+Miller+Murray

Buckland Taylor

Alderman Druh Farrell, Ward 7

Alderman John Mar, Ward 8

Alderman Madeleine King, Former (Ward 8 Alderman)

Land Use Planning and Policy, City of Calgary

Transportation, City of Calgary

Corporate Properties, City of Calgary

Parks, City of Calgary

Recreation/Public Art, City of Calgary

Victoria Crossing BRZ

1.0 Introduction



Centre City, Calgary's Hub and the Importance and Function of Its Underpasses

The following map illustrates the strategic importance of underpasses in relation to mobility within Calgary's Centre City. Approximately 34,000 people live within the Centre City, and 160,000 people are employed here and commute daily to and from this area. 89% of Canada's oil and gas companies are headquartered in the Centre City, as well as over 6,400 businesses, over 13 art and culture spots are contained here. The Centre City is the economic engine of Calgary and contributes largely to the City's revenues. The underpasses are gateways to the destinations for work, arts and culture, administration and retail. These gateways have to be designed as highly functional and inviting for the various needs of pedestrians, cyclists, public transit and motorists.



- Existing Underpasses: 7 Street SE, MacLeod Trail, 1 Street SE, Centre Street, 1 Street SW, 4 Street SW, 5 Street SW, 8 Street SW, 14 Street SW
- Proposed Underpasses: 4 Street SE, 2 Street SW
- Potential Underpass: 11 Street SW

1.0 Introduction



General Underpass Issues

The current physical state of downtown underpasses is in contradiction to their mobility and gateway functions within the Centre City. A cursory glance into the underpasses unveils a list of issues which make this Guideline necessary:

- Visually unappealing bridges with rusting, dirty, dark steel and concrete structures
- Narrow pedestrian right-of-ways with low ceilings and poor lighting levels under the bridge
- Light/dark contrast (Black frame impact) while approaching the bridge resulting in negative safety perceptions and comfort levels
- Sidewalks flanked by high concrete walls covered with cracks and peeling paint
- Poor drainage caused by rainwater overflow and snow melting resulting in water pooling or icy conditions depending on the time of the year
- Structures used as shelters and toilets for the homeless and places for birds to roost
- Litter and debris collected throughout resulting in an unkempt, unsafe appearance
- Missed opportunities for lower level access to buildings, possible storefronts, patios and landscaping
- Lack of wayfinding elements
- No defined bicycle paths and/or missing street right-of-way space for cyclists
- Pedestrian paths at underpass entrances and street crossings cluttered





CPR Corridor Potential and Underpasses

The following image illustrates the extent of the CPR corridor within the Centre City. The large amount of newly built or approved buildings within the last 5 years is an indicator of the attraction and economic potential of the corridor and its adjacent lands. Every underpass is attached to developed or developable lands. Successful underpass design and improvements rely on a coordinated approach to public improvement working with private developments. The Guideline considers underpass design to include the adjacent developments.



-  CPR CORRIDOR
-  NEWLY BUILT OR APPROVED BUILDINGS

Newly Built or Approved Buildings by 2008

According to the Centre City Plan, Canadian Pacific Railway (CPR) continues to be a central transportation corridor in the long term but with future developments, it complements and defines adjoining uses. As gateways from and to Downtown and major south-north connections between Downtown and Beltline, underpasses play an important role in establishing both horizontal and vertical linkages so that the CPR corridor vision could be realized over time.

1.0 Introduction



New 4 Street SE Underpass

The design and engagement process for the 4 Street SE Underpass started in 2006. Currently there are eight existing underpasses connecting the downtown core with its southern neighbourhoods. In addition to these existing underpasses, the 4 Street SE underpass will provide a new connection between the Stampede Park and the Downtown East Village, as well as the planned high-density mixed-use development (“Rail Town”), a potential high speed rail station for passenger services and a future Southeast LRT / C-train station. The Stakeholder engagement process developed the following vision for the 4 Street SE underpass:

“ A welcoming, high quality, pedestrian-orientated, multi-modal continuous connection between the high streets of two vibrant, dense, urban neighborhoods”.

Within the context of the Centre City Plan, it was identified that there is a need to provide urban design guidelines for all existing and proposed underpasses in order to contribute to the development of the CPR corridor vision. Using the 4 Street SE underpass as a case study, this Guideline creates a unified vision for all underpasses with careful considerations given to local context.



2.1 CRITERIA

2.0 Underpass Analysis

Each underpass has a specific physical and planning policy context. This context is described by selected criteria, which will allow a comprehensive and comparable evaluation:

	Criteria	Descriptions
Physical Context	Built Form	Depicts the built environment and the newly built or approved developments in close proximity to the underpass
	Pedestrian Realm	Describes the visible and tangible elements for pedestrians
	Redevelopment Opportunities	Describes potential redevelopment opportunities such as parking lots, empty sites, underutilized sites adjacent to the underpass
	Linkages	Describes existing and potential connections for pedestrians, cyclists and transit
	Road Design	Depicts the dimensions of the road cross section design
Policy Context	Centre City Plan Beltline ARP	Describes key policy directions for pedestrian and cyclist mobility

A glossary (see Appendix A) provides definitions for the various terms and expressions used in this Guideline.

2.0 Underpass Analysis

2.2 EVALUATION AND RECOMMENDATIONS OF UNDERPASS ELEMENTS



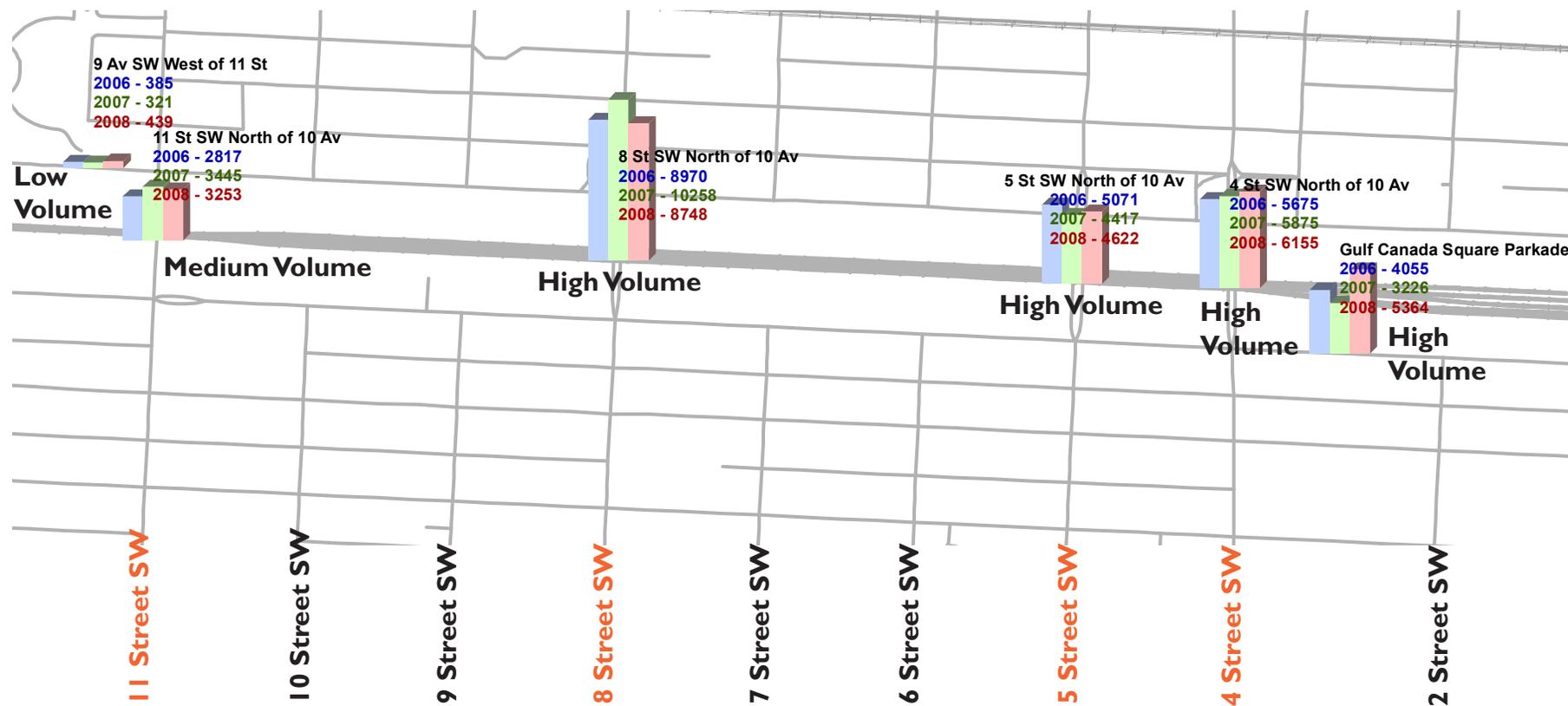
Design Elements	Descriptions	Evaluation	Recommendations
<ul style="list-style-type: none"> Bridge Structure Balustrades Retaining Walls Sidewalks Stairs and Ramps (if any) Medians Railings Pedestrians/Buildings or Parking Lot Interface Functional Lighting Active Edges Advanced Lighting Bike Facilities Landscaping Universal Design Pedestrian Signage Underpass Art 	<p>The listed underpass elements are identified “design elements” within an underpass.</p> <p>The elements represent typical physical structures/installations which either could be found in any of the evaluated underpasses or should be considered as part of a new underpass design in the future.</p> <p>All elements are prone to deterioration and destruction and require constant care, repair, update or alteration.</p>	<p>The analysis is value-based and has been undertaken during spring 2009 through site visits. Value-based criteria are:</p> <ul style="list-style-type: none"> • Surface physical impression • Functionality • Safety • Existing or Non-existing. <p>3 groups of conditions (poor/fair/good) provide base materials for further recommendations.</p> <p>The structural condition of the bridge has been evaluated by City of Calgary, Roads (Structures & Bridges).</p> <p>A detailed photo documentation is also part of the work.</p>	<p>Based on:</p> <ul style="list-style-type: none"> • the context analysis, • the site analysis, and • the evaluation, <p>Recommendations for each single design element are made providing a catalogue for future improvements.</p>

See Appendix 2 for detailed analysis results.



2.0 Underpass Analysis

2.3 ADDITIONAL CRITERIA: PEDESTRIAN VOLUMES and CCP KEY PEDESTRIAN LINKAGES

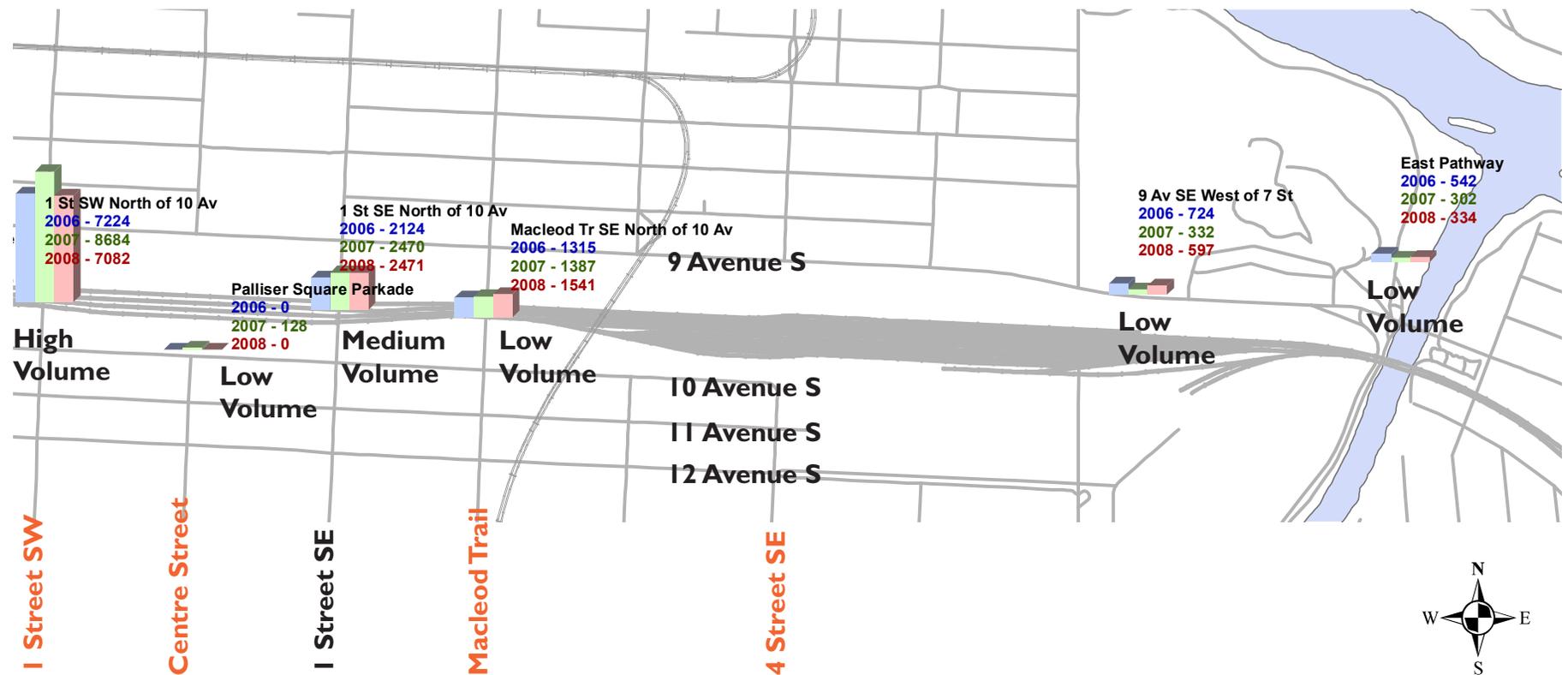


The diagram shows the highest (daily) pedestrian counts between 2006 and 2008. The highlighted streets are the key pedestrian corridors as identified by the Centre City Plan (May 2007).

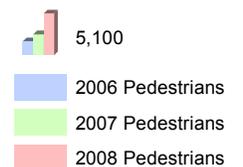
2.0 Underpass Analysis



2.3 ADDITIONAL CRITERIA: PEDESTRIAN VOLUMES and CCP PEDESTRIAN LINKAGES



Legend



2.0 Underpass Analysis



2.3 ADDITIONAL CRITERIA: PEDESTRIAN VOLUMES and CCP KEY PEDESTRIAN LINKAGES

High Volume - I Street SW



Medium Volume - I Street SE



Low Volume - Macleod Trail SE



3.0 Urban Design Principles



The design and improvement of the downtown underpasses require a guiding vision. The following Urban Design Principles provide a general framework for this Guideline and should be applied to the design and improvement of all structural and functional elements of the underpasses as outlined in Section 4.0:

Safety

Provide an open and clean appearance to the underpass structure, accompanied by integrated lighting features (the use of inviting materials and color schemes on retaining walls, underpass ceilings and sidewalk surfaces).

Connectivity

Provide seamless connections for pedestrians and cyclists as well as motorists between Downtown and the Beltline neighbourhoods.

Accessibility

Provide barrier-free sidewalk and path surfaces and comfortable connections to adjacent uses for users.

Context

Relate the design treatments of the underpasses to the historical context, local character and existing policy directions.

Vitality

Strongly encourage active uses along underpass streets (small shops, restaurants, services, art galleries, fitness studios, etc.) for any new development at the underpasses.

Greenery

Maximize landscaping opportunities at retaining walls, medians, corners, parking lots, and transition areas between public and private properties.

Explore possibilities to introduce natural light underneath the bridge structure

Beauty

Incorporate artistic elements into retaining walls, medians, sidewalk surfaces and active use building frontages.



4.0 Underpass Design Guidelines

General Guidelines

1. The Guideline applies to all south-north underpass streets, and the properties adjacent to each underpass street between 9 Avenue and 10 Avenue.
2. All improvements must be in accordance with CSA S6-06, Canadian Highway Bridge Design Code and The City of Calgary Design Guideline for Bridges and Structures. This applies to all structural elements listed in this Guideline.
3. The structural integrity of each bridge will be maintained. It is the intention to encourage owners at the time of the redevelopment to open retaining walls along their property for new uses in order to achieve the documents "active edge" intention.
4. Clarification and examination of the detailed ownership of retaining wall sections, sidewalks, stairwells, setback areas, and balustrades will be necessary for the further implementation of this document.
5. The aesthetic upgrade (encasing of pipes, cables, pillars, cross supports, support walls; or alternatively colouring of pipes, cables, and structural elements) should be dealt with on a case by case basis, depending on the overall design concept and theme of each underpass. The implementation will include engagement meetings with utility stakeholders and the definition of solutions.
6. All underpasses (with the exception of 5 St SW) may require setback clearance in accordance to the Pedestrian and Bicycle Needs Policies of the City of Calgary. In cases of retrofits innovative design and operation solutions have to be developed to optimize the use of the underpass right-of-ways.
7. Collaboration of Key Stakeholders will be crucial to successful implement of this Guideline. Those Stakeholders may include Tourism Calgary, Calgary Economic Development, Calgary Downtown Association, the City of Calgary, and landowners.

4.0 Underpass Design Guidelines



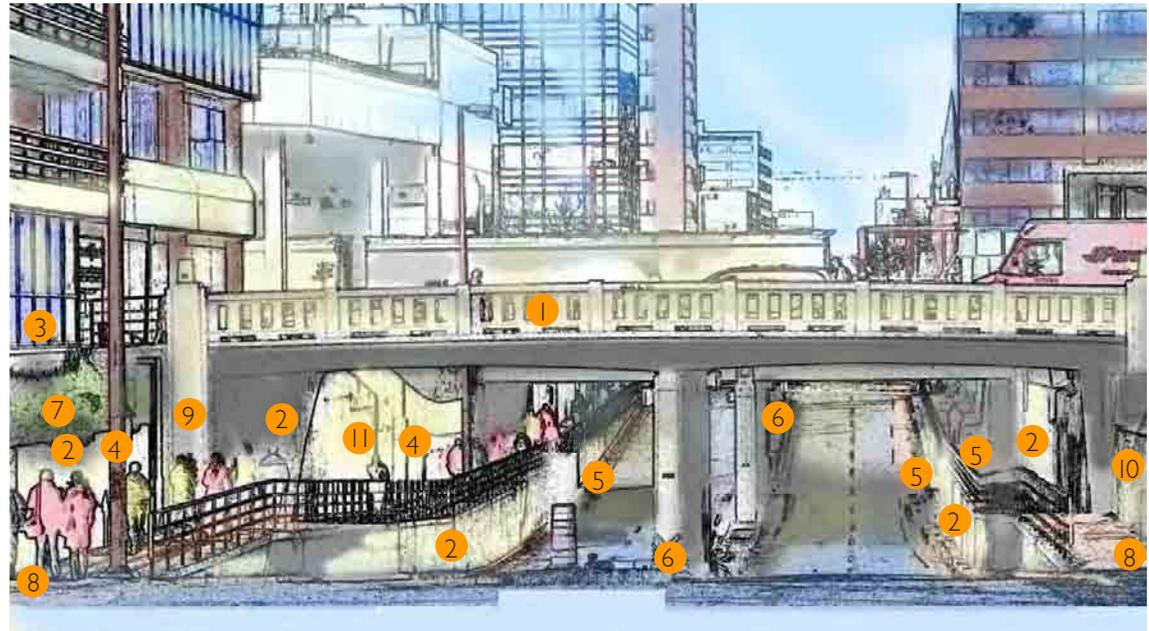
Detailed Guidelines

Detailed guidelines for all significant underpass elements have been developed based on the Local Context Analysis (see Appendix B).

For every one of the design elements in this section, the Guideline provides:

- a general introduction about the purpose of the design requirements
- the guideline text
- the images
- conceptual drawings illustrating design opportunities.

The Guideline distinguishes between new underpasses and existing underpasses as presenting different challenges which have to be addressed.



- | | |
|-------------------------------------|--|
| 1. Balustrade / Bridge Structure | 9. Pedestrian Signage |
| 2. Retaining Walls | 10. Utility Infrastructure Integration |
| 3. Building Interface / Active Edge | 11. Underpass Art |
| 4. Lighting | |
| 5. Sidewalk / Multi-Use Pathways | |
| 6. Median | |
| 7. Landscaping | |
| 8. Universal Design | |

Note: This illustration uses 4th Street SW Underpass as an example.

4.0 Underpass Design Guidelines



4.1 BRIDGE STRUCTURE

4.1.1 Bridge Design

1. For new underpass bridges the clear span should be maximized through the design of pillars, support beams and walls. The superstructure should be visually “floating”.
2. For new underpasses the utility infrastructure should not conflict with the aesthetic of the bridge structure. All utility infrastructure should be integrated into the bridge design so that the pedestrian realm is free from any obstruction (see details in Section 4.10).
3. Consider the use of vertical drains to provide a smooth surface for pedestrians and cyclists underneath the bridge.



8 St SW



Image shows maximized clear span for a new bridge with integrated utility lines.

4.0 Underpass Design Guidelines



4.1 BRIDGE STRUCTURE

4. Existing structural elements such as pillars, beams, and supporting walls of the bridges, which have fallen into disrepair, should undergo regular maintenance and enhancement through painting, repairing and frequent cleaning.



5. Existing pipes and cables underneath the superstructure should be either encased or visibly enhanced through bright coloring.



6. The gateway character of the underpass into downtown should become a dominant design feature for the bridge.



Image shows bridge enhancement and a welcoming gateway design

4.0 Underpass Design Guidelines



4.1 BRIDGE STRUCTURE

4.1.2 Bridge Balustrade

The bridge balustrade is less of a structural element than a decorative one. It gives the underpass a finished appearance from various vantage points and visually pulls both sides of the underpass with its retaining walls together contributing to the gateway character.

1. Existing concrete balustrades on bridges constructed prior to the 1950s should be repaired. Existing steel railings should be replaced, or visually enhanced.
2. Balustrade material and design should match the bridge and underpass theme in colour and material to provide a cohesive look.



14 St SW



1 St SW



Image shows conceptual balustrade enhancement with integrated lighting elements.

4.0 Underpass Design Guidelines



4.1 BRIDGE STRUCTURE

3. Balustrades could be enhanced with Brise-Soleils (sun-shading techniques). Solar cell panels in Brise-Soleils could be entertained to provide power for bridge illumination.



Sun shading example

4. Third-party commercial advertising on the balustrade should not be permitted, in order to maintain clarity of the bridge structure and to enhance the underpass design. Community and cultural branding could be entertained to a maximum coverage of 50 per cent of the balustrade



8 St SW

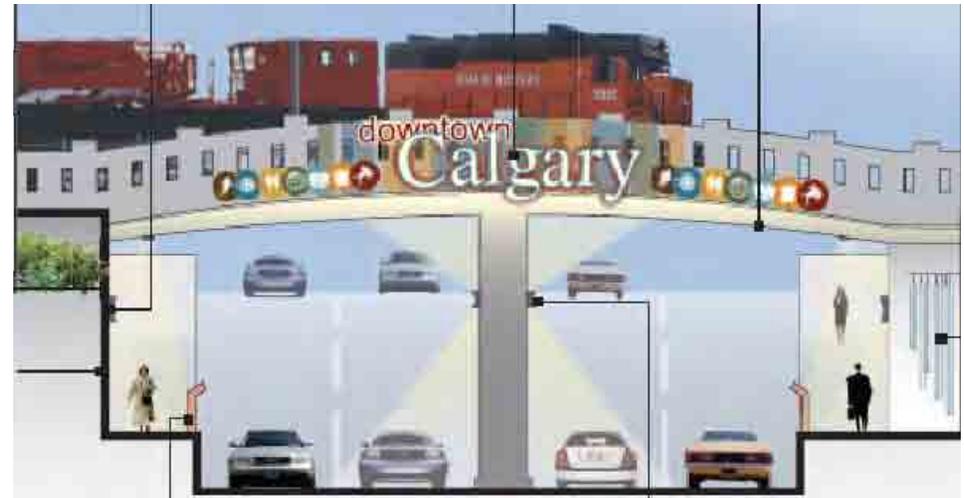


Image shows conceptual balustrade enhancement with community and cultural branding.

4.0 Underpass Design Guidelines



4.1 BRIDGE STRUCTURE

4.1.3 Railings

1. The material, colour and pattern should be complementary to the individual underpass theme, or enhance the visual appearance of the underpass as a gateway to downtown.
2. Provide railings along the traffic side of a sidewalk where grade differences between the sidewalk and the traffic lanes exist.
3. The height of the railings and the separation between partitions should address any safety and code concerns.
4. The material of the railings should be durable to protect both pedestrian and cyclist (in the case of an off-street multi-use pathway). Protrusion at handlebar height should be avoided.
5. The railings should be regularly maintained, including yearly cleaning and repainting.



1 St SW



Image shows conceptual railing design for pedestrian and cyclist safety.

4.0 Underpass Design Guidelines



4.2 RETAINING WALLS

1. Retaining walls are prominent and distinctive underpass elements. Retaining walls can be divided into three sections: The retaining walls of Sections 1 and 2 require permanent design solutions, the retaining walls of Section 3 require both temporary and permanent design solutions. (see right image)

2. The replacement of retaining walls by innovative structures and uses where there is an opportunity to create an “active edge” (see Section 4.3).

The following table shows the application of various design cases for the retaining wall sections.



Section 1



Section 2



Section 3



Section 1: The retaining walls along the traffic lanes underneath the sidewalk podium.

Section 2: The retaining walls underneath the CP Rail bridge structure.

Section 3: The retaining walls that separate the underpass along the sidewalk podium from the adjacent properties.

Image shows conceptual retaining walls of an underpass.



4.0 Underpass Design Guidelines

4.2 RETAINING WALLS

		Retaining Wall Section	Temporary Solution	Permanent Solution
New Underpasses—4th St SE and 2nd St SW	Section 1	The retaining walls along the traffic lanes underneath the pedestrian and bike paths	No temporary solution	Concrete slabs with durable and bright colored coating
	Section 2	The retaining walls underneath the CP Rail bridge structure	No temporary solution	Design features include: <ul style="list-style-type: none"> Enhanced design (see Sections 4.4 Lighting, 4.7 Landscaping, 4.9 Pedestrian Signage and 4.11 Underpass Art) A “theme” application (e.g. Rail history, Stampede, Gateway to Downtown) throughout the underpass Colourful and durable materials such as ceramic tiles or glazed bricks which can resist vandalism (graffiti), climate impact and aging
	Section 3	The retaining walls that separate the underpass from the adjacent properties.	Section 3 of the retaining wall is temporary until new developments take place. New developments, which are bordering retaining walls, are required to transform temporary retaining walls into permanent solution. Individual concrete slabs could provide a temporary solution.	Design features include: <ul style="list-style-type: none"> Active edge solutions (see Section 4.3). Enhanced design (see Sections 4.4 Lighting, 4.7 Landscaping, 4.9 Pedestrian Signage and 4.11 Underpass Art) A “theme” application (e.g. Rail history, Stampede, Gateway to Downtown) throughout the underpass Colourful and durable materials such as ceramic tiles or glazed bricks which can resist vandalism (graffiti), climate impact and aging for a long time Materials for the coping which give the retaining wall a visual finish

4.0 Underpass Design Guidelines



4.2 RETAINING WALLS

		Retaining Wall Section	Temporary Solution	Permanent Solution
Existing Underpasses	Section 1	The retaining walls along the traffic lanes underneath the pedestrian and bike paths	Not applicable	Concrete slabs with durable and bright colored surface materials
	Section 2	The retaining walls underneath the bridge structure	Not applicable	<p>Design features include:</p> <ul style="list-style-type: none"> Enhanced design (see Sections 4.4 Lighting, 4.7 Landscaping, 4.9 Pedestrian Signage, and 4.11 Underpass Art) A “theme” application (e.g. Rail history, Stampede, Gateway to Downtown) throughout the underpass Application of colorful and durable materials such as ceramic tiles or glazed bricks which can resist vandalism, climate impact and aging for a long time
	Section 3	The retaining walls that separate the underpass from the adjacent properties.	Not applicable	<p>Design features include:</p> <ul style="list-style-type: none"> Active edge solutions (see Section 4.3). Enhanced design (see Sections 4.4 Lighting, 4.7 Landscaping, 4.9 Pedestrian Signage, and 4.11 Underpass Art) A “theme” application (e.g. Rail history, Stampede, Gateway to Downtown) throughout the underpass Colorful and durable materials such as ceramic tiles or glazed bricks which can resist vandalism, climate impact and aging for a long time Materials for the coping which give the retaining wall a visual finish

4.0 Underpass Design Guidelines



4.3 ACTIVE EDGES

“Active Edge” is characterized by continuous, pedestrian-oriented storefronts along both sides of an underpass street with windows and doors facing directly to the sidewalk. It starts on either side of the bridge structure that supports the rails. As a pedestrian accessible area, it needs additional design components (building facades, pedestrian signage, lighting, trees, street furniture, landscaping, outdoor patios, art, etc.), which contribute to the pedestrian friendliness.

- 1. Building uses:** In order to create “active edges”, new and existing buildings should provide and adapt to pedestrian-oriented retail uses at the sidewalk level along the underpass street.
- 2. Building frontages:** New buildings and renovations of existing buildings should provide a frontage interface along the underpass street directly accessible from the public sidewalk. The building frontage interface may include the following elements:
 - Frequent building entrances every 15 metres along the street directly accessible from the sidewalk level with minor grade changes
 - Window openings with large window panes
 - Façade design and window illumination geared towards pedestrians
 - Colonnades, overhangs, patios, sitting areas, landscaping, public art, stairs and ramps
 - Electrical or spotlighted advertising signs and blade signs attached to storefronts
 - Corner setback and corner treatment of buildings to adapt to grade changes
 - Patios, landscaping, kiosks and decorative elements
- 3. Setback:** Regulated setbacks according to the Land Use Bylaw are 2.134 m along both sides of all underpass streets. 1 Street SE, Macleod Trail SE and 14 Street SW have a 5.182 m setback on both sides of the street. These regulated setbacks apply only to the north side of the 9 Avenue SW and south side of 10 Avenue SW and omits the CPR corridor between 9 Avenue SW and 10 Avenue SW (the underpass block). To be consistent with the Land Use Bylaw and to allow flexibility in creating improved pedestrian interface with bike facilities, tree and furnishing zones etc., this Guideline recommends sidewalk level setback requirements of 2.134m and 5.182m, within the CPR corridor area.



Setback example of a new development on CPR corridor



4.0 Underpass Design Guidelines



4.3 ACTIVE EDGES

Case I: Improvement of existing situations (where structurally and functionally feasible)

1. Encourage the adaptive reuse of existing buildings, by providing small retail uses accessible from street corners.
4. Open up doors and windows facing the street, and provide stairs and ramps to address the grade differences.
5. Discourage fences along private property lines.
6. Encourage stepped, landscaped retaining walls or other retaining wall treatments.
7. Provide recessed plaza areas/patios.
8. Use window illumination and design that is pedestrian scaled.
9. Provide landscaping along building setback areas and parking lot edges.
10. Provide comfortable seating opportunities on the lower portion of the retaining walls.
11. Use lighting, murals, signs, and other approaches to enhance building façades facing the streets.



Situation at MacLeod Trail: Minor grade difference between sidewalk and private properties - Potential for adaptive reuse, opening up doors and windows, patios, etc.



Image shows conceptual active edges

4.0 Underpass Design Guidelines

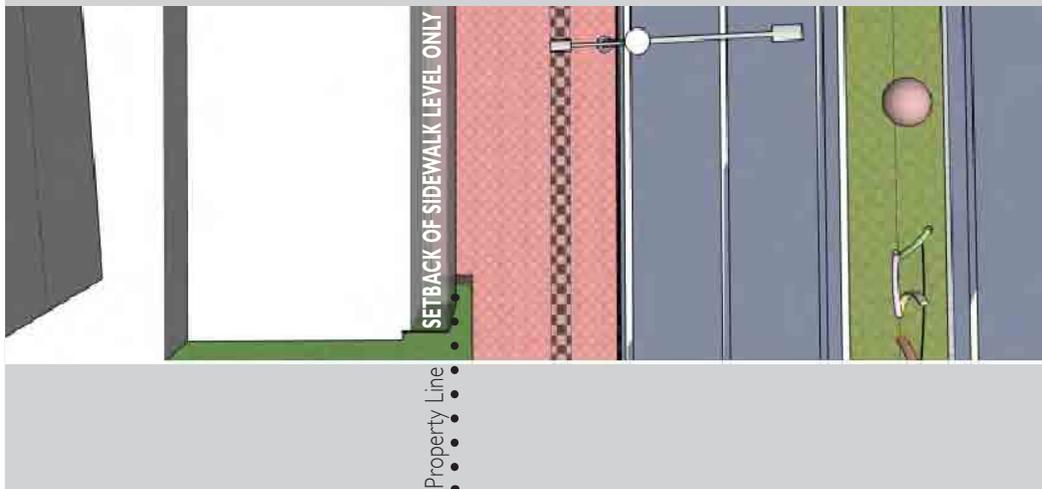


4.3 ACTIVE EDGES

Case 2: New Development - build to property line

1. To provide an active edge, any new development should include the building uses, the frontages, and the setbacks as recommended in this section of the guideline.
2. In case of building to property line, a setback should be required at the sidewalk level only to widen up the pedestrian realm, while all the other levels can be built to the property line.

Image shows conceptual setback design - build to property line



4 ST SW



4.0 Underpass Design Guidelines



4.3 ACTIVE EDGES

Case 3: New Development - large setback from property line

1. Encourage larger building setback areas which function as publicly accessible private space. The setback areas could be designed as a linear plaza or park along the sidewalk, or as a courtyard or sunken plaza.
2. The setback areas should be surrounded by active uses.
3. Interior and exterior stairs, elevators, and ramps may be required to deal with the grade differences between the sidewalk and the natural grades. A combination of sloped or stepped landscaping and retaining walls of adjacent properties may also be considered.

Image shows conceptual setback design and grade changes - large setback



Image of a sunken plaza design along the underpass street





4.0 Underpass Design Guidelines

4.3 ACTIVE EDGES

OPTION A

OPTION B

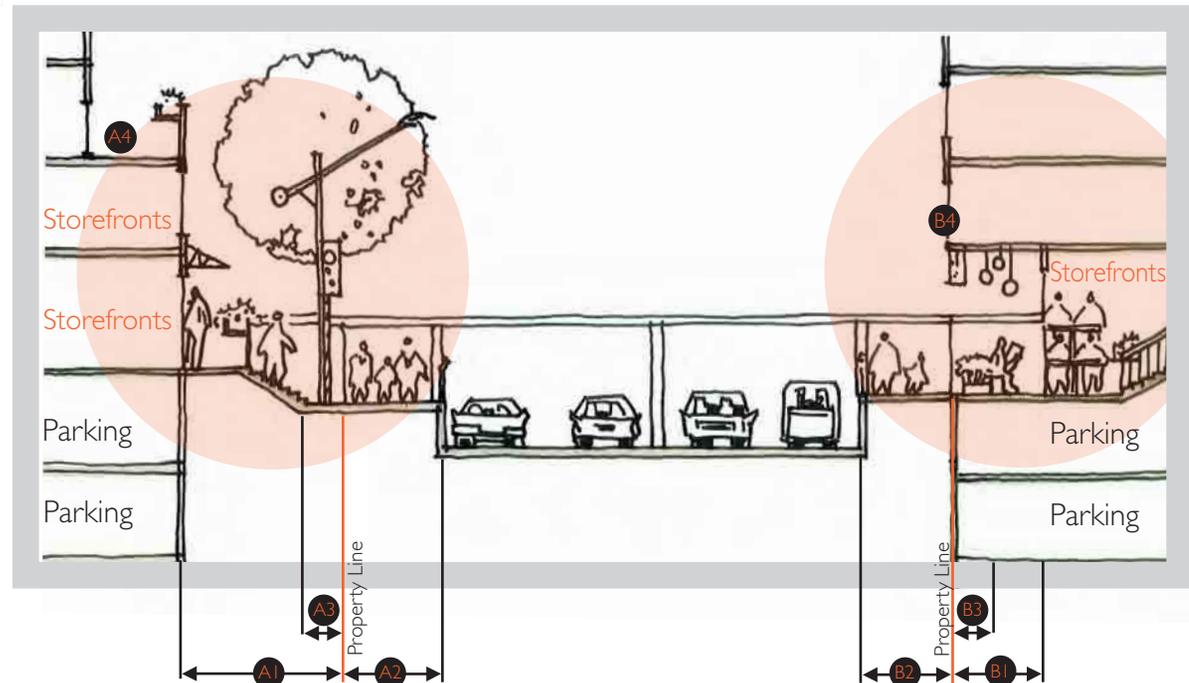
Case 4: New Development - grade differences

Option A - 5.182m setback with exterior stairs

- A1: 5.182m required setbacks from property line (PL).
- A2: Maintain 3m clear sidewalk zone
- A3: 1.5m tree and furnishing zone
- A4: Additional 3m setbacks for upper levels
 - Require active uses along the sidewalks
 - Provision of exterior stairs, ramps, and patios to deal with grade differences between sidewalks and active uses
 - Require frequent entrances every 15m along the sidewalks

Option B - 2.134m setback with interior stairs

- B1: 2.134m required setbacks from P.L. only for the active uses at the sidewalk level
- B2: Maintain 3m clear sidewalk zone
- B3: 1.5m zone for landscaping and furnishing
- B4: No setback requirements for upper levels
 - Require active uses at the sidewalk level with no exterior grade changes
 - Provision of interior stairs and ramps to deal with grade differences



4.0 Underpass Design Guidelines



4.4 LIGHTING

4.4.1 Functional Lighting

The strategic lighting of underpass structures is a key element in achieving the desired design impact creating “gateways to downtown”. Incorporating strategic lighting into the underpass creates an appearance of an attractive, safe environment. Lighting is an integral element in the development of an attractive Centre City and should include the following elements:

Lighting of traffic lanes

Lighting of traffic lanes is essential for comfort and safety. Approaching the underpass, the usual “black hole window” effect should be avoided by a high luminance underneath the bridge structure:

1. Consider the application of lighting technology underneath the bridge that provides high pavement luminance which makes it possible for objects to be seen.
2. Mast lighting should be integrated into the median. With mast location on the median, the lighting design could visually contribute to the underpass overall design and theme.



Image shows conceptual lit-up underpass traffic lanes.



5 ST SW

4.0 Underpass Design Guidelines



4.4 LIGHTING

Lighting of pedestrian areas including stairwells, ramps and hand rails

The sense of comfort and safety in an underpass is of high importance for pedestrians and is a crucial factor for providing an attractive and pedestrian-friendly environment:

1. In addition to the illumination of the underpass structure, lighting elements forming a “light path” should be embedded into the sidewalk surface, stairwells and ramps. Embedded lighting elements underneath the bridge span to separate the pedestrian areas from bike paths are encouraged.
2. In addition to high mast lighting which provides luminance for the traffic lanes and sidewalks, pathway lighting is encouraged to provide additional lighting atmosphere for pedestrians and cyclists.



Image shows conceptual lit-up pedestrian area underneath rail bridge structure.

4.0 Underpass Design Guidelines



4.4 LIGHTING

Lighting of bridge structures

Avoidance of dark surfaces and unlit corners is essential for creating an inviting ambiance especially during nighttime and during poor weather conditions.

Typically the underside of bridge structures and the pillars provide poor visibility and dark zones. Lighting elements should be positioned on the underside of the bridge to provide a bright passageway without leaving dark or shaded areas.

1. Distinguish lighting elements to provide a comprehensive illumination in addition to the functional lighting (see Section 4.4.1) should be incorporated into the balustrade and the retaining walls along the sidewalk.



Image shows conceptual lighting underneath a rail bridge structure, and shows illumination of retaining walls along sidewalk and balustrade



4.0 Underpass Design Guidelines

4.4 LIGHTING

Lighting of foliage / Seasonal lighting

1. Trees, bushes and planter boxes appear black after dark. Clear visibility is essential within the underpass. Trees, bushes or planter boxes within the underpass right-of-way or within the set-back zone along the retaining walls of the underpass should be illuminated.
2. The gateway feature of the underpasses may be enhanced through the installation of seasonal lighting (e.g., Christmas and Stampede).

Lighting of facades and active edges

1. The design of an “active edge” is successful, if building design and public realm design complement one another (see Section 4.3). Building façades along the underpass “active edge” should be illuminated to provide an inviting atmosphere at night and after dark, and to complement the street illumination.
2. Opportunities should be explored to introduce natural lighting to the underpass. This may include the integration of the following elements where structurally feasible: openings, prisms, mirrors, translucent materials.



4.0 Underpass Design Guidelines



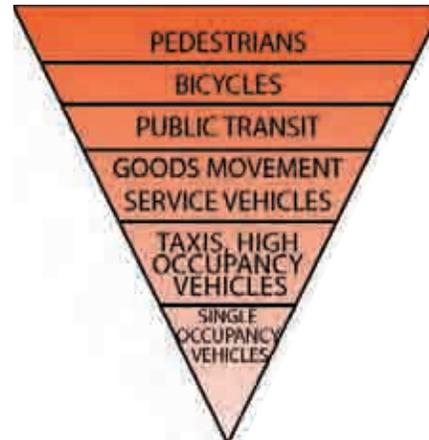
4.5 SIDEWALK / MULTI-USE PATHWAY

4.5.1 Pedestrian First

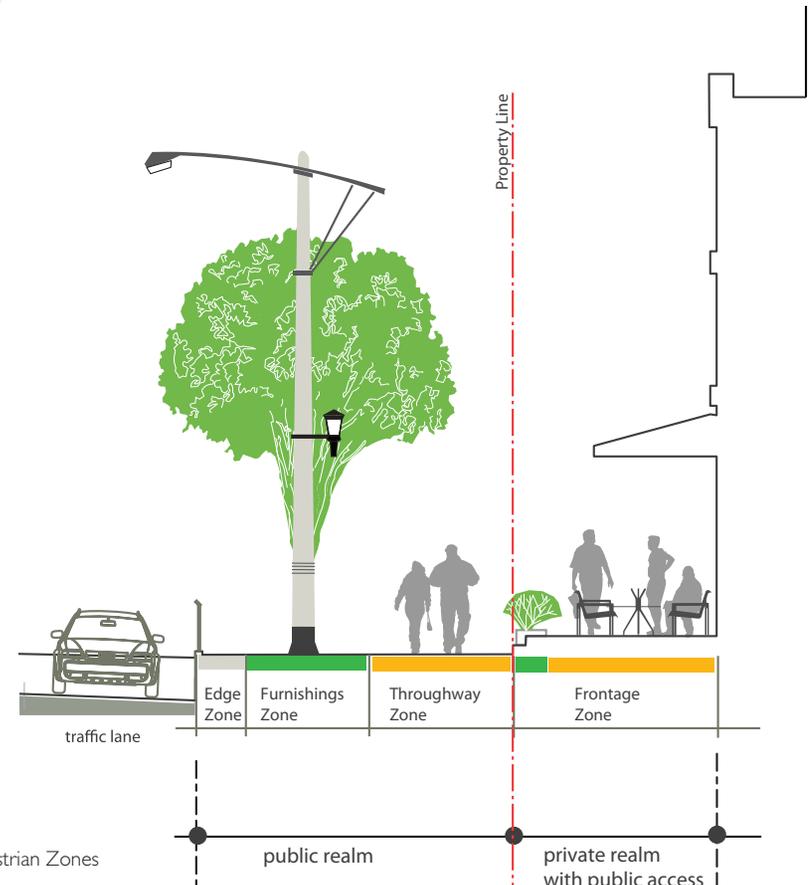
One of the objectives of the Centre City Plan is to make the Centre City a walkable place that is safe, secure, accessible, legible, interesting and enjoyable for pedestrians and cyclists.

The design of the pedestrian realm (including edge zone, furnishings zone, throughway zone, frontage zone as illustrated at the right) at underpasses plays a key role in fulfilling the concept of “pedestrian first”. Section 4.5 focuses on the throughway zone of the pedestrian realm.

Section 4.5 illustrates options for bicycle access at underpass streets, which include off-street multi-use pathways, on-street shared travel lanes, and on-street bike lanes.



Adapted from the *Centre City Plan*, 2007



Underpass Street Pedestrian Zones

4.0 Underpass Design Guidelines



4.5 SIDEWALK / MULTI-USE PATHWAY

4.5.2 Sidewalk and Cycle-Path (Off-Street Multi-Use Pathway), and On-Street Bike Lane Dimensions

1. New development along the underpass street should provide a 3m sidewalk width (the “throughway zone”) with minimum obstructions. A sidewalk width less than 2.4m is prohibited. With limited space, an expanded sidewalk area can be achieved through the use of building setback at the sidewalk level comprising part of the throughway zone (refer to Section 4.3 Active Edges for recommended setback requirements). The expanded area should remain free of physical obstructions.

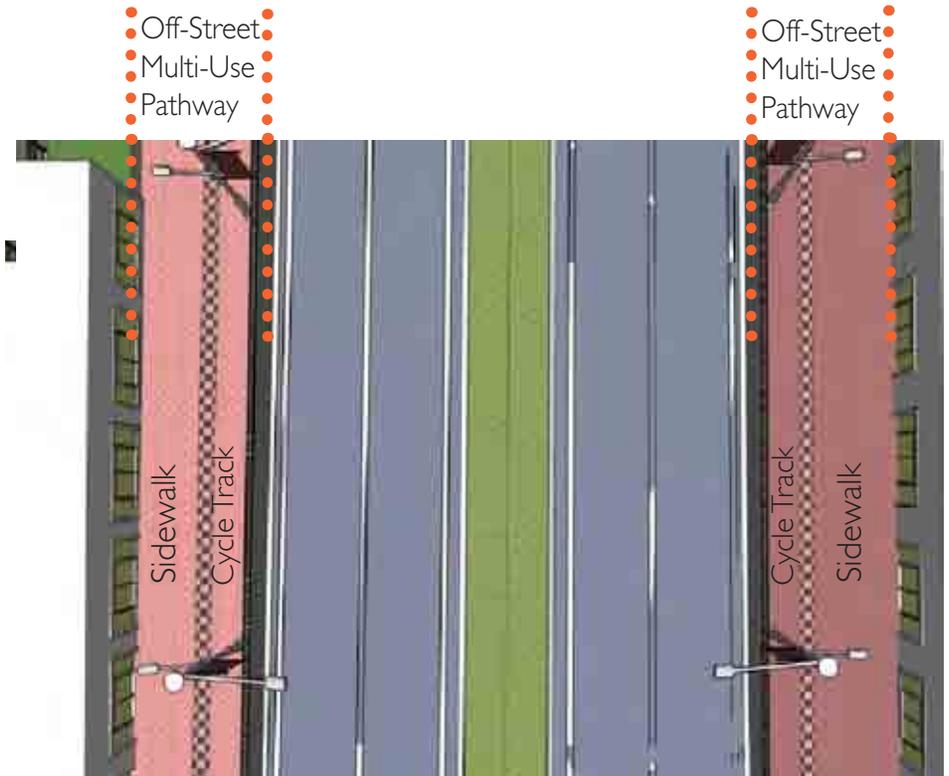
2. The width of an Off-Street Multi-use Pathway should be 4.5-5.0m comprised of a 3m (sidewalk) and 1.5-2m (cycle track).



8 ST SW Sidewalk



4 ST SW Sidewalk



4.0 Underpass Design Guidelines



4.5 SIDEWALK / MULTI-USE PATHWAY

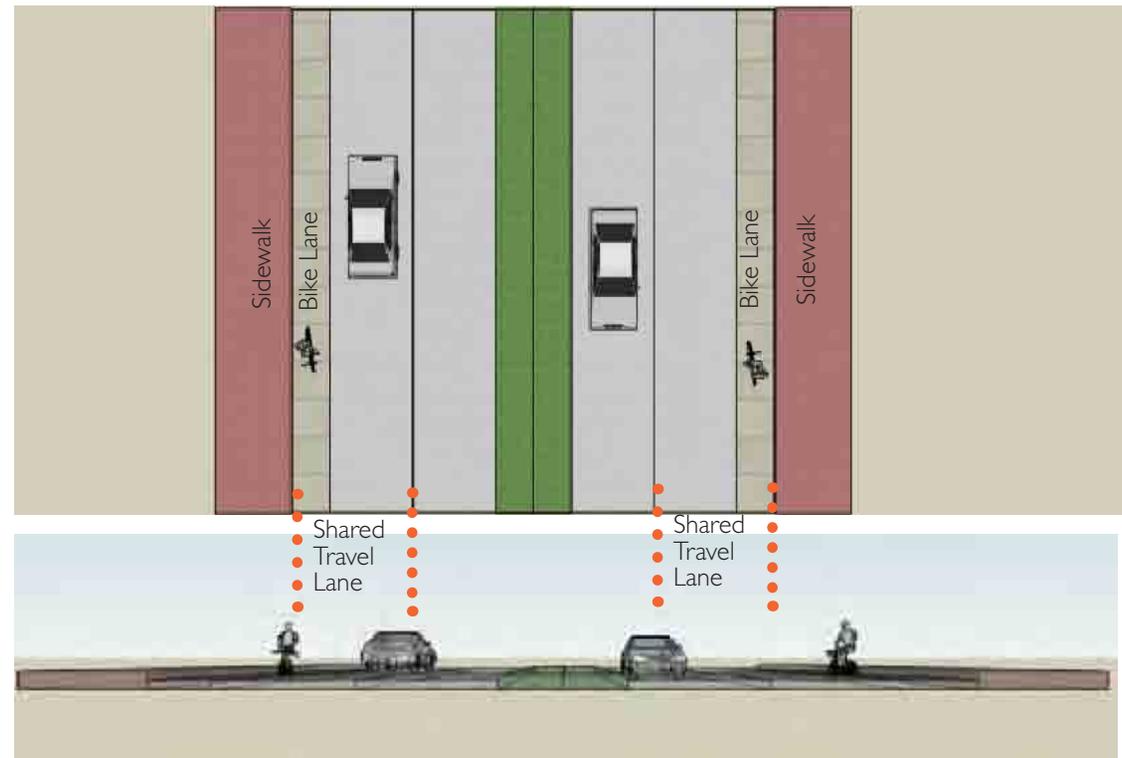
- Underpasses with high bicycle volumes should be provided with additional cycle facilities:
 - The width of an on-street shared travel lane should be 4.0-4.5m
 - The width of an on-street bike lane should be 1.5-2m
- All stairs should be provided with a bike channel.



5 ST SW Shared Travel Lane



4 ST SW Inappropriate Sidewalk Use





4.0 Underpass Design Guidelines

4.5 SIDEWALK / MULTI-USE PATHWAY

4.5.3 Pedestrian Realm Design and Avoidance of Physical Obstructions

The typical sidewalks at the underpasses vary in elevations and widths from the 9 and 10 Avenue intersections down to the sidewalk levels under the bridges.

1. In case of new construction, the elevation of the street should be coordinated with the elevation of the sidewalk and surrounding buildings.
2. Provide smooth and moderate grades and cross slopes to ensure comfortable walking and seamless transition between different grades (e.g. street corners, sidewalks/multi-use pathways, entrances to adjacent buildings) according to code.
3. Where possible, a minimum 1.5m furnishing zone (also functioning as landscaping zone and utility corridor) should be provided between traffic lane and the throughway zone.
4. New developments are encouraged to provide rest areas (outdoor patios, street furniture, trees, flower beds, planters, etc.) within the building frontage zone as an extension of the sidewalk/multi-use pathway.
5. Building entrances facing the underpass street should provide stairs and ramps. The entire sidewalk or a portion of the sidewalk adjacent to the building can be ramped to provide wheelchair access. Where the sidewalk is not wide enough to accommodate both stairs and ramps at the entrances, an alternative corner entrance with at-grade access to the building hallway should be provided.
6. For high pedestrian volume underpasses, opportunities for lighting and public art embedded in the sidewalk should be explored to enhance the streetscape character.



Image shows grade transitions including outdoor patios, ramps and landscaping for accommodating high pedestrian volume.

4.0 Underpass Design Guidelines



4.5 SIDEWALK / MULTI-USE PATHWAY

7. The pedestrian routes should be free of any physical obstruction (e.g., signal poles, lighting bases, garbage cans, parking metres). If there is no optional space for the physical elements, the sidewalk width should be increased to ensure usable minimum pedestrian space of 2.4m in both width and height.



Concrete lighting base at underpass street corner

8. Street corners should be clear of any physical obstruction as well. Any adjacent private development is encouraged to provide a recessed corner plaza area combined with the building entrance.



Tripping hazard at underpass street corners

9. Other physical obstructions attached to the bridge structure and retaining walls (such as lighting elements, utility pipes, signage, etc.) should be avoided due to their intrusion to the sidewalk space.



Utility pipes over a stairwell on 8 ST SW

10. Any uneven sidewalk surface should be avoided to prevent hazards for pedestrians and cyclists.

11. Improved drainage design (instead of horizontal drainage with catch basins located in the middle of a sidewalk) should be considered in order to provide a smooth and dry sidewalk surface.



Corner sample design of pedestrian transition between different grades:

- At-grade building entrance at street corner
- Building entrance facing to the underpass street combined with gentle sloped sidewalk, stairs, patios, colonnades, and landscaping



4.0 Underpass Design Guidelines

4.5 SIDEWALK/MULTI-USE PATHWAY

4.5.3 Pedestrian and Cyclist Realm Materials

1. The sidewalk/multi-use pathway materials generally consist of concrete or asphalt.
2. All sidewalk/multi-use pathway materials should be hard surfaced, durable and slip-resistant considering the winter conditions in Calgary.
3. For underpasses with a high pedestrian volume (see Section 2.3) should explore the use of coloured asphalt, coloured and stamped concrete, and other decorative materials (tile, stone and brick). The pavers should be large and smooth enough to avoid uncomfortable vibration for cyclists and people using wheeled conveyances.
4. The combination of concrete/asphalt and decorative materials are recommended (e.g., concrete sidewalks with brick/stone trim) for sidewalk/multi-use pathway.
5. In the case of a multi-use pathway design, coloured concrete/stone/brick trim is recommended to provide a visible transition edge. Level changes should be avoided between the sidewalk and the cycle track. Small lighting elements embedded in the trim zone can be considered to ensure visibility during evenings for cyclists and pedestrians including the visually challenged.



Combination of different materials



4.0 Underpass Design Guidelines



4.6 MEDIANS

All downtown underpasses should be provided with attractive street medians. Pending on the available median width, a variety of median design elements should be applied so that the median becomes part of the image-building for the underpasses as gateways into downtown:

1. Based on the City of Calgary Transportation road design specifications and Parks Sustainable Development Guidelines for Trees, Shrubs and Ground Covers 2009, the underpass medians could accommodate planter areas for shrubs and grass, which would survive the harsh median conditions. (Note: The downtown underpass medians width will not allow sustainable tree planting).
2. During the vegetation period, seasonal flower planting should be part of the yearly underpass maintenance.
3. If planting within the median is not possible or feasible, the median should incorporate rock garden design or rock formations.



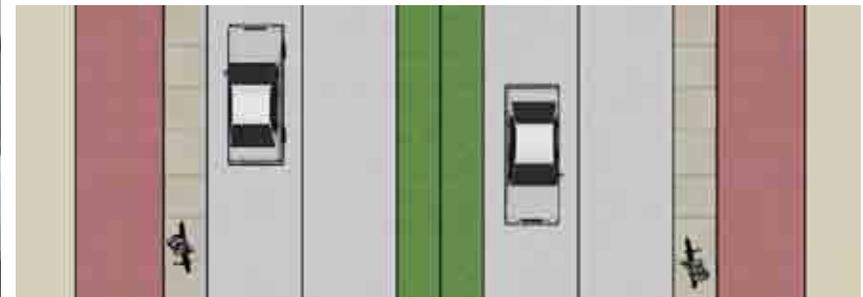
5 ST SW Median



Median with seasonal flower planting



4 ST SW Median





4.0 Underpass Design Guidelines

4.6 MEDIANS

4. In conjunction with Underpass Art (see Section 4.11) the median design elements could support art themes, specific promotional activities of the downtown business community, and wayfinding signage.
5. Medians should accommodate street lighting posts, which provide traffic lane lighting. Lighting post combined with banner holders (see Section 4.4.) could contribute to the overall appearance of the underpass.



Median with flower pots and art feature



Median with light posts and banners

4.0 Underpass Design Guidelines



4.7 LANDSCAPING

The *Centre City Plan* calls for urban ecology as part of a responsible approach to city building. The Plan suggests every new and renovated building is an opportunity to meet this objective. There is currently a deficiency of green space available to meet the needs of residents and office workers living and working in the Centre City area. Trees, shrubs, flower beds, and even grass are part of the streetscape design that increases the level of pedestrian comfort. Currently the following issues are identified that need attention while a new development or improvements to an existing development is proposed along the underpass streets:

- There is a lack of landscaping along the streets, surface parking lots, at the medians, corners, and retaining walls.
- The interfaces (often defined by landscaping) between pedestrian realm and adjacent developments are poorly designed.
- The adjacent vacant lands or parking lots do not provide a variety of ecological design treatments such as well-maintained landscaped street edges, permeable surfaces to manage stormwater on-site, bio-retention areas for snow storage.

The following landscaping interventions should be incorporated when an improvement of an existing underpass/development or a new underpass/development is being considered:

1. Retain and protect existing trees, vegetation and natural slopes.
2. Integrate existing landscaping features into the overall public realm and landscaping design.



Existing street interface



Existing park bordering | Street SE - opportunities for better pedestrian interface



landscaping treatment on 8 Street SW

4.0 Underpass Design Guidelines



4.7 LANDSCAPING

3. Maximize landscaping opportunities at retaining walls, medians, corners, parking lots, building setback areas, and areas between sidewalks and traffic lanes where possible.
4. Consider providing flower beds/planters to beautify the streets where limited space is available for trees.
5. Where landscaping might obstruct driver and pedestrian views, use lower shrubs and high-branching trees.
6. Provide surface for comfortable seating at the edge of the planters/flowers beds.
7. Where retaining walls cannot be avoided, provide lower terraces, use durable, attractive materials, and incorporate intensive soft landscaping.



Images from the vicinity of underpasses



Landscaped retaining walls



Image of landscaping integration into underpass streets.

4.0 Underpass Design Guidelines



4.7 LANDSCAPING

8. Green Surface Parking Lots

- Provide landscaped edges along the underpass streets to soften and screen the surface parking lots, instead of using fences.
- Where possible, use permeable pavers (e.g., open joint pavers, turf grid, porous asphalt, pervious concrete) instead of standard concrete paving at parking lots and some other low-traffic flow areas.
- Ensure the materials selected are durable enough to withstand the anticipated traffic loading stresses and potential maintenance impacts.
- The landscaping edges of the parking lots should be well-maintained.



Landscaped edge along parking lot



Permeable pavers at parking lot



Permeable pavers - turf grid



Permeable paving - porous asphalt



4.0 Underpass Design Guidelines

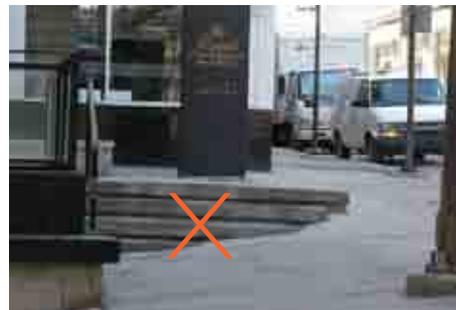
4.8 UNIVERSAL DESIGN

Stairs, ramps, pavements, and railings encompassed into the underpass structure should provide a cohesive solution and a well-designed environment for people of all abilities. Design solutions should also respond to the climate variations in Calgary. Design elements (All Designs refer to Alberta Building Code 2006 and City of Calgary Access Design Standards—Draft 2009) should include:

1. Tactile surface tiles which form a grid throughout the underpass structure and help to direct people safely through the underpass and across adjacent roads
2. Concrete slates with higher roughness to provide walking safety in various weather conditions
3. Colored and special reinforced step-edges on stairs to provide guidance and slip resistance
4. Visual separation of sidewalk and bikeways with colored tile or stone



4 ST SW



1 ST SW



1 ST SW



Image of a tactile system in underpasses that at the same time separates pedestrians and bikers.

4.0 Underpass Design Guidelines



4.8 UNIVERSAL DESIGN

5. Seamless treatment of corner situations and ramps to allow wheelchair and barrier-free usage by curb ramps at intersections and crosswalks
6. Seamless access and an easy transition into the buildings along underpass streets
7. Handrails along sidewalks, ramps and stairs which are easy to grasp and provide a firm and comfortable grip
8. Auditory braille at underpasses and key intersections, or GPS Braille at sidewalks and adjacent buildings (i.e., “talking sidewalk”, “talking buildings”) to guide the visually challenged to transit stops and surrounding destinations



Examples of barrier-free curb solutions including tactile systems.



Image of an auditory tactile system.

4.0 Underpass Design Guidelines



4.9 PEDESTRIAN SIGNAGE

The Centre City Plan identifies all underpasses as gateways from and to Downtown. As the major south-north linkages between the Downtown and Beltline neighbourhoods, underpasses can become spots where visitors, workers, and residents find information and interpretive features that they can use to explore and discover. Good signage can play an important role in supporting the public realm and contributing to a distinctive local identity. The intent has been consistent in recent policy work related to the subject, including the Calgary Downtown Retail District Strategy (2009) and the Animated Public Art Report (2008). This Guideline focuses primarily on the pedestrian realm. The intent is to:

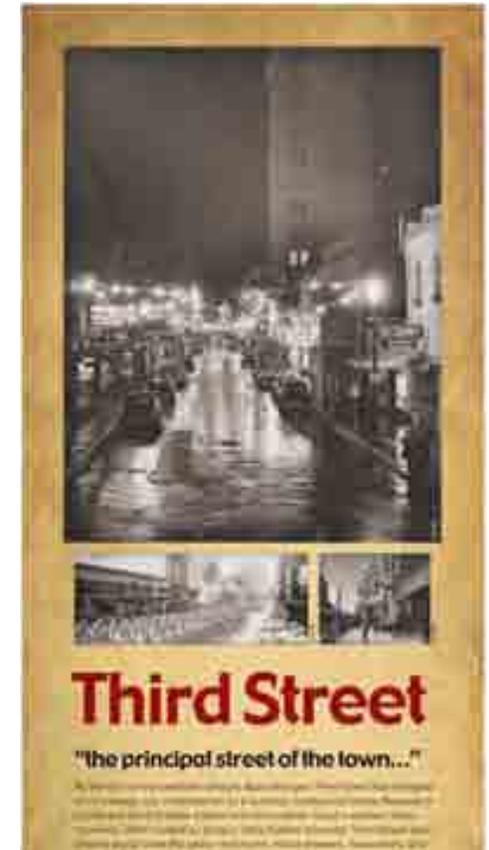
- Enhance the gateway features of all underpasses through proper pedestrian signage
- Improve the wayfinding and legibility
- Enrich the pedestrian experience

Pedestrian Signage

1. Provide wayfinding signage to direct and orient pedestrians and cyclists to surrounding key destinations, as well as the public transit network where applicable.
2. To maximize pedestrian feel along the underpass streets, encourage pedestrian-scaled retail signage on canopies and blade retail signage perpendicular to the retail facades comprising part of the building frontages



Sample of Underpass Wayfinding Signage.



Sample for directional signage design related to the historical context.

4.0 Underpass Design Guidelines



4.9 PEDESTRIAN SIGNAGE

3. Use branding signage at underpasses to enhance the gateway features of the underpasses (See Section 4.1.2 Bridge Structure)
4. Use banner or art signage as distinctive features to beautify the streets.
5. Where possible, consider using interpretive signage to celebrate local heritage
6. Install pedestrian signage at appropriate locations (e.g. retaining wall, lighting pole, balustrade, pavement, storefront, street corner, etc.) depending on the type, size and potential impact of the signage on pedestrian realm. The location, size and design of the signage must not distract the drivers and overpower adjacent structures. It must respect the scale and material of the adjacent structures, as well as the streetscape character of the area. It must not protrude onto the sidewalk or obstruct the pedestrian flow.
7. Avoid visual clutter and signage proliferation that detract from the quality of the pedestrian realm. Design the signage to be part of the overall graphic system for the underpass and its surrounding area to establish the visual continuity of the pedestrian realm. Require a scale, orientation and level of detail that is distinctive from traffic signs in order to improve legibility and avoid confusion and distraction for drivers.
8. Encourage the use of custom-designed signage as public art to enrich pedestrian experience depending on the local character of the area (see Section 4.11 Public Art).

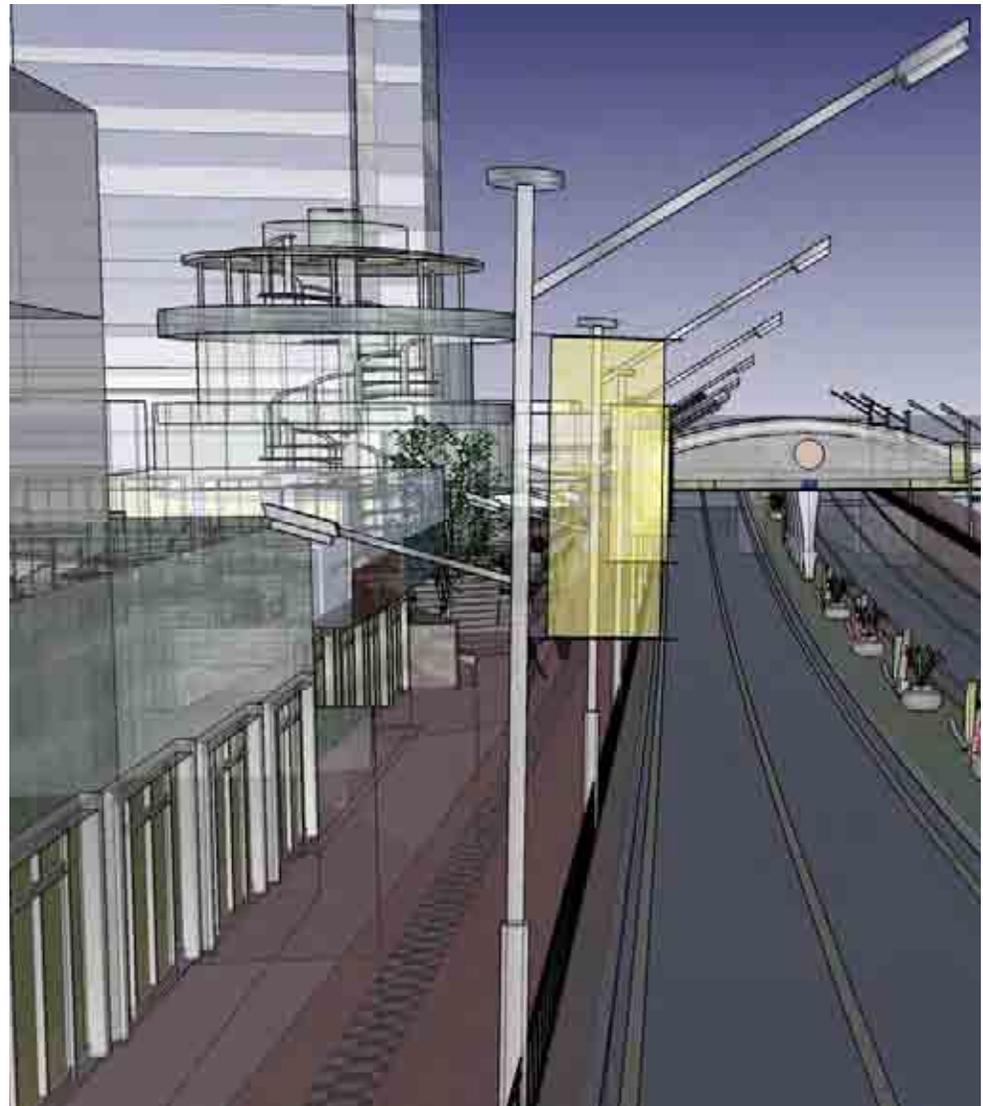


Image of banners in underpasses.



4.0 Underpass Design Guidelines

4.9 PEDESTRIAN SIGNAGE

9. Develop free-standing, illuminated, directional kiosks at appropriate locations, featuring maps of the Centre City destinations combined with newspaper/magazine stands and wayfinding (consistency with Wayfinding Study, Centre City Implementation, 2010) features. Kiosks could also function as special structures to pronounce gateway elements.
10. Animated wayfinding or signage are at the discretion of the Approving Authority, based on the local context of the underpass and the evaluation criteria defined in Land Use Bylaw IP2007 (Sign regulations such as approval procedure, location, type, size, lettering, colour, illumination).



Sample of Pedestrian Signage and Wayfinding

4.0 Underpass Design Guidelines



4.10 UTILITY INFRASTRUCTURE INTEGRATION

The nature of underpasses as below grade buildings exposes the technical infrastructure and utility lines of the city's buildings and roads. The exposed utility infrastructure should not contradict the design improvements promoted by this Guideline:

1. Incorporate utility pipes in new underpasses into bridge structures so that they are not visible.
2. Visible utility pipes at existing underpasses should blend into underpass colour and design theme and should be made less visible. Stairwells and pedestrian passages should not be bridged by visually open pipelines or utility lines.
3. Stormwater pump stations in new underpasses should become an integral part of the underpass design. Pump station access areas, doors and windows should be integrated into the retaining wall design.



8 ST SW



12 ST SW



5 ST SW



Image of an underpass structure with integrated non-visible utility lines cocealed by lighting elements.



4.0 Underpass Design Guidelines

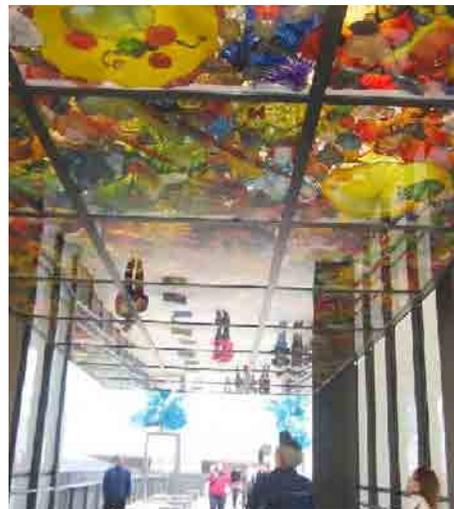
4.1 | UNDERPASS ART

Art in underpasses is any work of art or design that is created by an acknowledged artist specifically to be sited in a public space, or in the public accessible private space along the underpass streets. Public art installations are at the discretion of the Approving Authority, based on the Corporate Public Art Policy (CPS 2009-33) which outlines the City's art policy and encourages art within the pedestrian realm. The intent of underpass art installations is to:

- Give pedestrians a direct or subconscious feeling of comfort and safety
- Commemorate specific events and historic figures, to give character to the gateway function into downtown and to establish ownership of the underpass realm.
- Make living, working and visiting Calgary an interesting, thought-provoking and creative experience.



Retaining wall sculptures



Ceiling installations



Image of wall art and median art in underpasses environment

4.0 Underpass Design Guidelines



4.1 | UNDERPASS ART

1. Install underpass art at strategic locations including retaining walls, corner situations, bridge balustrades, building walls and setback areas. Art objects shall not encroach into the sidewalk zone. Animated art shall not interfere with traffic regulations.
2. Art installations in underpasses could be temporary or become a permanent public feature. In both cases the outdoor exhibits require ongoing maintenance due to exposure to the elements, vandalism and pollution.
3. Other underpass art installations can be the display of artistic features within the underpass e.g. murals, mosaics, and photo installations. These artistic displays could become a constantly changing scenery provided by community groups, schools, and art classes. The available wall space can be turned into an interesting, thought-provoking and creative experience.
4. Allow animated wayfinding public art only at strategic locations (e.g., commercial streets, major public spaces, entertainment districts), and at the discretion of the Approving Authority, based on the local context of the underpass.



Temporary Displays



Façade projection



Lighting installation



Mosaic art installation on the retaining wall under the bridge



5.0 Implementation Recommendations

5.1 IMPLEMENTATION

A successful implementation of this Guideline requires the collaborative work of business units of the City of Calgary. Parallel to this work, the building of partnerships with key stakeholders will be necessary to provide ownership.

The underpass design elements will be implemented through the development review process. This applies to any new development permit application and renewal of an existing development permit application along the underpass street between 9 Avenue and 10 Avenue.

City-initiated public improvement projects will be coordinated through:

- The business planning and budget coordination process
- Land Use Planning and Policy work program
- Transportation work program
- Centre City Implementation work program

The process involves City of Calgary internal business units as well as external stakeholders such as Tourism Calgary, Downtown and Beltline Business Associations, CPR, the Calgary Stampede and landowners along the underpass streets.

This Guideline ties into other ongoing Land Use Planning and Policy work program including new CM-2 bonus system and CPR special area study. By the time these projects are completed and approved by Council, more funding opportunities may have been explored with an established density bonus system and a CPR Special Area Investment Fund. Other funding sources may also be considered (such as Downtown Investment Fund, Beltline Community Investment Fund, etc.), which can be determined on a case by case or site by site basis. Timing for the underpass improvements will depend on City work programs and priorities as well as on the priorities of other stakeholders. The priorities as recommended in the following section should serve as a guide in the development of future new underpasses and existing underpass improvements.

5.0 Implementation Recommendations



5.2 PRIORITIES

The following table could be used as a decision-making tool to set priorities for the implementation of any new underpass and existing underpass improvements:

- **NP1:** new underpass, all design guidelines apply (Section 4.0)
- **NP2:** proposed underpass as per Centre City Plan (2007), all design guidelines apply (Section 4.0)
- **NP3:** potential underpass, all design guidelines apply (Section 4.0)

- **EP1:** short-term improvements, relatively low cost
- **EP2:** short-term improvements, medium cost
- **EP3:** mid-term improvements, high cost

- **P1:** 1st priority **P2:** 2nd priority **P3:** 3rd priority

In terms of priority, two approaches (or the combination) are suggested in this Guideline:

1. Underpass-based improvements

- It means dealing with one selected underpass at a time and applying all major design elements suggested in this Guideline to that particular underpass.
- 4 Street SE, Macleod Trail SE, 1 Street SW, 4 Street SW, and 8 Street SW are identified as priorities for underpass-based improvements.

2. Underpass element-based improvements

- It means dealing with one or more underpass elements for a few selected underpasses at a time. This may involve both element-based basic improvements and aesthetic upgrades depending on the funding available.
- All underpasses are identified as priorities for element-based basic improvements.
- 4 Street SE, Macleod Trail SE, 1 Street SW, 4 Street SW, and 8 Street SW are identified as priorities for element-based aesthetic upgrades.



5.0 Implementation Recommendations

	Criteria				Priorities	
	Underpass	Overall Physical Condition	CPP (City Centre Plan) Importance	Pedestrian / cyclist Volume	Priority - All Elements (average)	Priority - All
New Underpasses	4 St SE	N / A	High	N/A	NP1	PI
	2 St SW	N / A	High	High	NP2	P3
	11 St SW	N / A	High	Medium	NP3	P3
Existing Underpasses	MacLeod Tr SE	Poor	High	Low	EP1	PI
	1 St SE	Poor	Low	Medium	EP3	P2
	1 St SW	Fair	High	High	EP2	PI
	4 St SW	Poor	High	High	EP2	PI
	5 St SW	Fair	High	High	EP3	P2
	8 St SW	Fair	High	High	EP1	PI
	14 St SW	Poor	Low	N / A	EP2	P2
	7 St SE	Poor	Low	Low	EP3	P2

Appendices



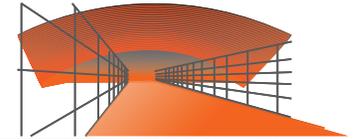
Appendix A: Glossary	A2
Appendix B: Underpass Analysis	A3
Appendix C: Case Study.....	A63
Appendix D: Project Credits	A77



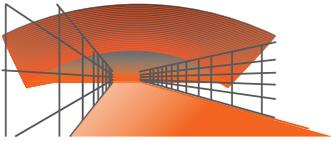
Appendix A: Glossary

- Underpass:** Passageway for vehicles or pedestrians that runs under a railway. The passageway includes the complete street body below grade between 9 Avenue and 10 Avenue SE/SW.
- Active Edge:** The building line along the underpass sidewalks, which is characterized by continuous pedestrian oriented fronts with window and doors open to the sidewalk.
- Retaining Wall:** Walls that separate the underpass along the sidewalk podium from the adjacent properties, walls underneath the sidewalk podium along the traffic lanes and walls underneath the bridge span.
- Pedestrian Realm:** The publicly accessible space between street curb and building line.
- Additional Lighting:** Illuminates the street, the bridge structure, retaining walls, and adjacent buildings with luminaires in addition to the functional street lighting to provide a comprehensively lit street.
- Universal Design:** Street surface design which provides access for people of all abilities.
- Bridge Structure:** Structure supporting the railway that runs across the street
- Pedestrian Signage:** Directs and orients pedestrians and cyclist to surrounding key destinations (e.g. transit, retail areas, public buildings and locations) in addition to traffic signage.
- Public Art:** Art in underpasses is any work of art or design that is created by an acknowledged artist specifically to be sited in a public space, or in the public accessible private space
- Braille:** The Braille system is a method that is widely used by blind people to read and write. Braille was devised in 1821 by Louis Braille, a blind Frenchman. Each Braille character or cell is made up of six dot positions, arranged in a rectangle containing two columns of three dots each. Urban Braille is a term used by planners for a Braille system in the public realm.
- GPS Braille:** A freely accessible system which supports a braille system in the public realm. The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver.

Appendix B: Underpass Analysis



1.0	7 Street SE Underpasses.....	A4
2.0	4 Street SE Underpass (Under Construction).....	A9
3.0	Macleod Trail SE Underpass.....	A12
4.0	1 Street SE Underpass.....	A19
5.0	1 Street SW Underpass	A25
6.0	2 Street SW Underpass (Proposed Underpass).....	A32
7.0	4 Street SW Underpasses	A35
8.0	5 Street SW Underpass	A41
9.0	8 Street SW Underpasses	A47
10.0	11 Street SW Crossing (Potential Underpass)	A53
11.0	14 Street SW Underpass	A57



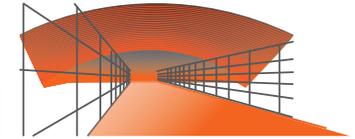
Appendix B: Underpass Analysis

I.0 7 STREET SE UNDERPASS

I.1 Local Context



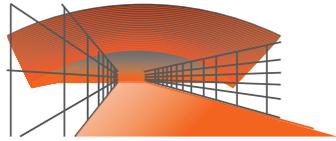
Appendix B: Underpass Analysis



I.0 7 STREET SE UNDERPASS

I.2 Context Analysis

	Criteria	Ref No.	Descriptions
Physical Context	Built Form	1 2 4	<ul style="list-style-type: none"> • Elbow River bridge with underpass built in 1912 with 2m / 6' 6" clearance for vehicles and very low clearance for pedestrians and bikers along Elbow River • Underpass for pedestrian and bikers on the East side of Elbow River • No buildings in close vicinity of the underpass • Street does not accommodate clear visibility, when approaching underpass
	Pedestrian Realm	2,5 3 7	<ul style="list-style-type: none"> • Unattractive pedestrian realm underneath bridge due to very low bridge ceiling; darkness during day times • Single sidewalk and bike-path between street and Elbow River • Pedestrian and bike path continuous underneath 9 AV SE bridge
	Redevelopment Opportunities	A	<ul style="list-style-type: none"> • Corner lot potential on (9 AV SE and 7 St for commercial use)
	Linkages	3,7	<ul style="list-style-type: none"> • Major regional multi-use path link along Elbow River
	Road Design	4,5,6	<ul style="list-style-type: none"> • 2 one-way traffic lanes (clearance, width, and curve radii do not fulfill current road design standards) • Vehicles taller 6'6" get stuck frequently underneath bridge
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> • Key On-Street Bicycle Route crosses 9 AV SE



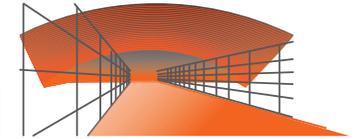
Appendix B: Underpass Analysis

I.0 7 STREET SE UNDERPASS

I.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure	√			
Balustrades	√			
Retaining Walls	√			
Sidewalks, Stairs and Ramps (if any)	√			
Medians (none)	-	-	-	-
Railings	√			
Pedestrian/Building or Parking Lot Interface				
Functional Lighting	√			
Active Edges (none)	-	-	-	-
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)		√		
Landscaping	√			
Universal Design (none)	-	-	-	√
Pedestrian Signage		√		
Underpass Arts (none)	-	-	-	-

Appendix B: Underpass Analysis



I.0 7 STREET SE UNDERPASS

I.4 Recommendations

Design Elements	Recommended	Section No. For Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> The steel structure is in need of overall cleaning (graffiti removal), derusting and painting. 	4.1
Balustrades	<ul style="list-style-type: none"> See above 	4.1
Retaining Walls	<ul style="list-style-type: none"> The retaining wall supporting the bridge structure needs a bright paint which should be renewed frequently. The railroad dam needs additional fortification and landscaping to prevent gravel and dirt from sliding onto the street. 	4.2
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> No recommendations 	
Medians	<ul style="list-style-type: none"> n/a 	
Railings	<ul style="list-style-type: none"> The railings on both sides of the sidewalk are crooked and need adjustment 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> n/a 	
Functional Lighting	<ul style="list-style-type: none"> Improved functional lighting to brighten the bridge realm 	4.4



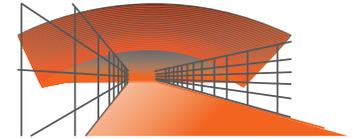
Appendix B: Underpass Analysis

I.0 7 STREET SE UNDERPASS

I.4 Recommendations

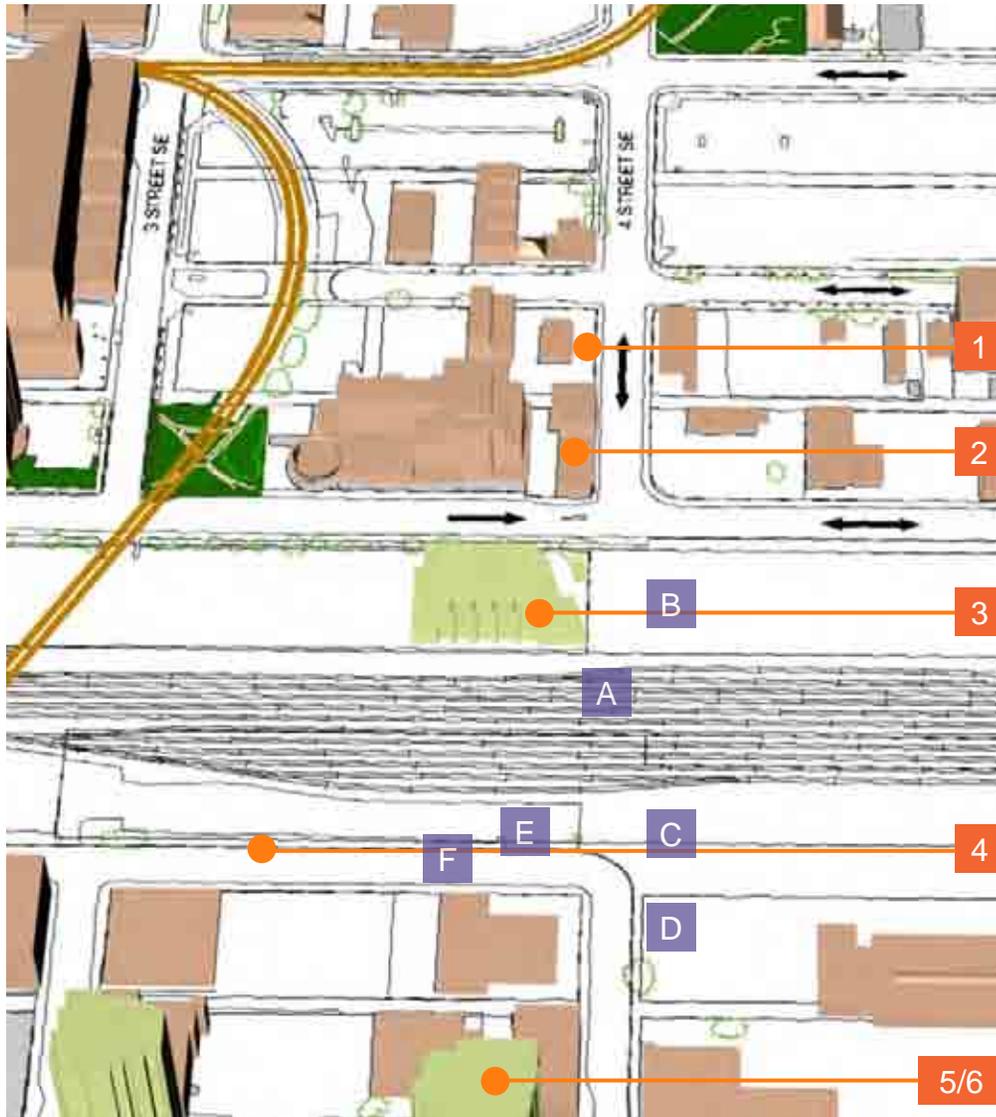
Design Elements	Ideas/Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> • n/a 	
Advanced Lighting	<ul style="list-style-type: none"> • n/a 	
Bike Facilities	<ul style="list-style-type: none"> • Maintain off-street multi-use pathway separated from traffic lanes 	4.5
Landscaping	<ul style="list-style-type: none"> • landscaping of railroad steep slope or dam and road steep slopes of 9 Av SE to enhance the bridge realm as part of the Elbow River scenery 	4.7
Universal Design	<ul style="list-style-type: none"> • n/a 	
Pedestrian Signage and Underpass Arts	<ul style="list-style-type: none"> • Use pedestrian signage at appropriate locations to direct, advertise and tell stories 	4.9

Appendix B: Underpass Analysis



2.0 4 STREET SE UNDERPASS (UNDER CONSTRUCTION)

2.1 Local Context





Appendix B: Underpass Analysis

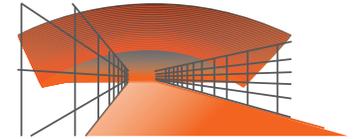
2.0 4 STREET SE UNDERPASS (UNDER CONSTRUCTION)

2.2 Recommendations

		Ref No.	Descriptions
Physical Context	Built Form	1 2 5 4 3	<ul style="list-style-type: none"> • Adjacent to historical warehouse district • King Edward hotel as a designated Category A building of historical and social significance and site of the future Cantos's National Music Centre • New "Arriva" building as a good example of high-density residential development in the area • Many under-developed and vacant lands • New "District Energy" building on 4 St SE and 9 Ave SE
	Pedestrian Realm	5,6	<ul style="list-style-type: none"> • Uneven pavement and deteriorating sidewalk quality in most areas • High-quality pedestrian realm (active use at the podium level, high-quality pavement, sidewalk with trees) at "Arrival" • Lack of pedestrian activities because of the mainly single purpose buildings and a lack of residential use in the area
	Redevelopment Opportunities	B, D A A,E,C	<ul style="list-style-type: none"> • New "urban village" as envisioned in the Downtown East Village ARP • New "Railtown" proposal for the Remington lands • Upcoming construction of the new 4th Street SE Underpass • Calgary Stampede new "high street" proposal with a variety of retail uses, public spaces, street trees and on-street parking • In partnership with CP, the City plays an important role in future redevelopment of the area directly adjacent to the proposed underpass bridge.
	Linkages		<ul style="list-style-type: none"> • Close proximity to the Warehouse District, Stampede Park and East Village • Major transportation initiative linking East Village and Calgary Stampede • Major south-north link for pedestrians and cyclists
	Road Design	F	<ul style="list-style-type: none"> • 2-way traffic with 4 lanes • Potential closure of 10th Avenue • Provision of both on-street and off-street bike facilities • Incorporation of landscaping opportunities in the median design

As 4 Street SE Underpass is taken as a case study in this Guideline, please refer to Section 5.0 of this Guideline for details.

Appendix B: Underpass Analysis



2.0 4 STREET SE UNDERPASS (UNDER CONSTRUCTION)

2.2 Recommendations

		Ref No.	Descriptions
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none">• Proposed high-speed rail route along CP tracks• Proposed SE LRT line (at grade) and LRT station along the CP tracks• 4 Street SE as a Pedestrian Corridor; Key On-street Bicycle Route, Pedestrian/Retail Street• Within character areas—North Stampede Entrance Way and historical Warehouse District



Appendix B: Underpass Analysis

3.0 MACLEOD TRAIL SE

3.1 Local Context



1



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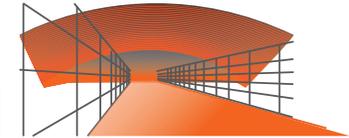


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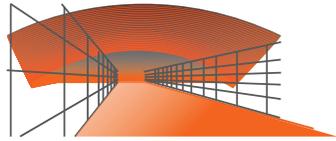
Appendix B: Underpass Analysis



3.0 MACLEOD TRAIL SE

3.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form		<ul style="list-style-type: none"> • Close proximity to the special places including the Warehouse District, Stampede Park, Steven Avenue, the Municipal Building and the Olympic Plaza Cultural District • New “Keynote” development that is under construction including 457 residential units, an office building and commercial uses at grade
	Pedestrian Realm	2,4 5 1,3 5 7 8 6	<ul style="list-style-type: none"> • Currently not a high pedestrian volume street • Rusty bridge structure, balustrades and railings • Commercial advertising at the balustrade facing to the south where the traffic comes from • Water run off on retaining walls especially under the bridge • Poor lighting conditions under the bridge • High fencing along private properties and the stormwater pump station • visible garbage on the street and in the landscaped areas • Functional directional signage to parking lots and Fort Calgary Historical Park • Landscaping along the parking lot edge and some building setback areas
	Redevelopment Opportunities	A,B,C,E D	<ul style="list-style-type: none"> • Vacant and virtually vacant developable lands surrounding the underpass bridge • Newly approved “Sky Tower” bringing in 220 residential units as well as office commercial to the area
	Linkages		<ul style="list-style-type: none"> • Major pedestrian linkages among above-mentioned special places • Major gateway to Downtown from south part of the city with high traffic volume (over 20,000 vehicles per day) • Major south-north bus route into Downtown
	Road Design	6	<ul style="list-style-type: none"> • 4 one-way traffic lanes • No Median • Approx. 2,4 m sidewalk



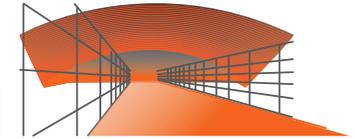
Appendix B: Underpass Analysis

3.0 MACLEOD TRAIL SE

3.2 Context Analysis

		Ref No.	Descriptions
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> Proposed high-speed rail route along CP tracks Proposed SE LRT line (at grade) and LRT station along the CP tracks 4 Street SE as a Pedestrian Corridor; Key On-street Bicycle Route, Pedestrian/Retail Street Within character areas—North Stampede Entrance Way and historical Warehouse District Potential location for public art at the underpass bridge

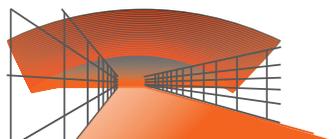
Appendix B: Underpass Analysis



3.0 MACLEOD TRAIL SE

3.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure	√			
Balustrades	√			
Retaining Walls		√		
Sidewalks, Stairs and Ramps (if any)		√		
Medians (none)	-	-	-	√
Railings	√			
Pedestrian/Building or Parking Lot Interface		√		
Functional Lighting	√			
Active Edges (none)	-	-	-	√
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping		√		
Universal Design (none)	-	-	-	√
Pedestrian Signage		√		
Underpass Arts (none)	-	-	-	√



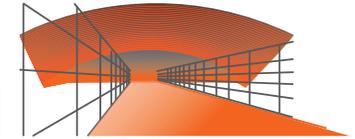
Appendix B: Underpass Analysis

3.0 MACLEOD TRAIL SE

3.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> New painting required 	4.1
Balustrades	<ul style="list-style-type: none"> New painting required Discourage commercial advertising on balustrades Branding opportunities on balustrades 	4.1
Retaining Walls	<ul style="list-style-type: none"> Embed small lighting features in the concrete walls Use waterproof solutions to avoid water run off on retaining walls Encourage “green” retaining walls Consider using durable, easy to clean, graffiti-proof materials Install picture frames on the walls for changeable interpretive signage or art display Use ceramic tiles to create mosaic art on the walls Where applicable, provide surface for comfortable sitting at the lower portion of the retaining walls 	4.2
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> Add sidewalks to north side of 10 Avenue Clear the clutter (lighting poles, garbage cans, etc.) at the corners Use durable, high-quality pavement for sidewalks 	4.5 4.8
Medians	<ul style="list-style-type: none"> Due to limited road Right-of-way width (about 20.1m) and requirements for 4 traffic lanes (13.4m), there is no space for a median under current conditions 	4.6
Railings	<ul style="list-style-type: none"> New railings to replace the rusted ones 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> Clean up the visible garbage Discourage fencing around private properties Maximize landscaping opportunities at the setback areas 	4.7 4.3
Functional Lighting	<ul style="list-style-type: none"> Require new lighting to brighten the area under the bridge 	4.4

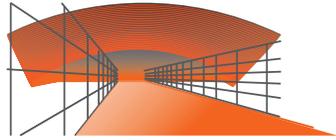
Appendix B: Underpass Analysis



3.0 MACLEOD TRAIL SE

3.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages along the street for all new developments Wherever opportunities exist, renovate existing buildings to open doors and windows facing to the street and provide active edges along the street 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting of traffic lanes, bridge structure, balustrades, retaining walls, foliage and building facades to enhance pedestrian experience 	4.4
Bike Facilities	<ul style="list-style-type: none"> Provide multi-use pathway along east side of the street 	4.5
Landscaping	<ul style="list-style-type: none"> Due to limited road Right-of-way width (about 20.1m) and requirements for 4 traffic lanes (13.4m), there is not enough space in the public domain for a minimum 1.5m tree/planter/flower bed and furnishing zone while maintaining a 3m wide clear pedestrian zone, unless: A 5.182m setback on both sides of the street (to be consistent to the Bylaw setback requirements) is required for the first level of any new development along the street, which will widen the pedestrian realm and transform the street into a boulevard streetscape character 	4.5 4.7
Universal Design	<ul style="list-style-type: none"> As a future high pedestrian volume street, the design of the sidewalk must provide full access for the physically challenged including the visually challenged 	4.8
Pedestrian Signage	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories 	4.9
Underpass Arts	<ul style="list-style-type: none"> Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations such as building setback areas, corners, furnishing and tree zones Underpass arts as the storytelling feature to celebrate local history 	4.11



Appendix B: Underpass Analysis

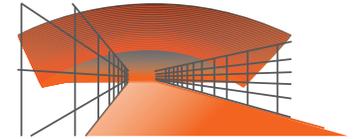
3.0 MACLEOD TRAIL SE

3.4 Recommendations

Although Macleod Trail SE underpass currently has low pedestrian volume and high vehicular traffic volume, the underpass and its surrounding area should be on the priority list for future improvements, considering its high importance in implementing the visions of the Centre City Plan and the Beltline ARP. In the long term, it will be transformed into a pedestrian-oriented area with high-quality public realm and private developments.

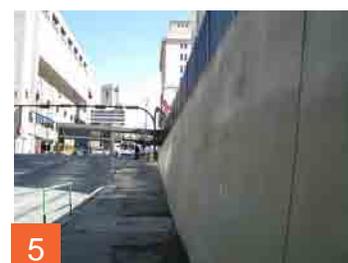
Design elements of the proposed MacLeod Trail major road construction project (Planning phase in 2009) between 7 St and 8 ST should correlate to the future underpass redesign..

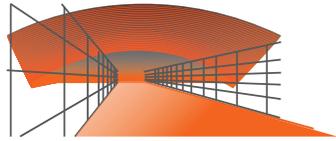
Appendix B: Underpass Analysis



4.0 | STREET SE UNDERPASS

4.1 Local Context





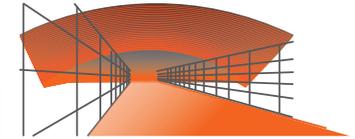
Appendix B: Underpass Analysis

4.0 | STREET SE UNDERPASS

4.1 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	5	<ul style="list-style-type: none"> Close proximity to the special places including the Warehouse District, the Olympic Plaza, Steven Avenue, and Calgary Tower. New “Palliser South” (10/11) and “Palliser Square” (14) office developments are under construction.
	Pedestrian Realm	1,5 4,5 2 7 1 4 8 3	<ul style="list-style-type: none"> Currently not a high pedestrian volume street Cracked sidewalk pavement High concrete retaining walls along private properties with untreated surface Rusty bridge structure, balustrades and railings Commercial advertising at the balustrade facing to the north where the traffic comes from Water run off on retaining walls especially under the bridge; litter Poor lighting conditions under the bridge High fencing along private properties Directional signage (stand-alone kiosk) to parking lots and parkades on private properties Few landscaping along the parking lot edge and building setback areas Blue and orange paint found on the portion of the bridge structure around pedestrian realm Clutters (garbage cans, lighting poles, parking machines) at street corners
	Redevelopment Opportunities	A B C	<ul style="list-style-type: none"> Large vacant developable lands at the southeast corner of the underpass bridge Newly approved “Sky Tower” will bring in 220 residential units and office commercial to the area Newly approved (land use application) “Mustard Seed” will bring in 407 residential units to the area
	Linkages		<ul style="list-style-type: none"> Gateway from Downtown to south part of the city with high traffic volume Major south-north bus route into Downtown No physical or visual link between the public accessible privately owned corner park at 9 Avenue and 1 Street SE
	Road Design		<ul style="list-style-type: none"> 4 one-way traffic lanes No Median
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> Proposed high-speed rail route along CP tracks Proposed SE LRT line (underground to above-grade transition area) along the CP tracks 1 Street SE as a Major Bus Route, Proposed Key On-street Bicycle Route, with Boulevard streetscape characters Within character areas—historical Warehouse District Potential location for art at the underpass bridge

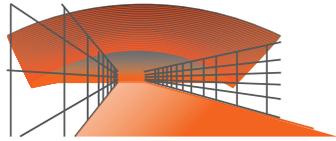
Appendix B: Underpass Analysis



4.0 | STREET SE UNDERPASS

4.2 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure		√		
Retaining Walls	√			
Sidewalks, Stairs and Ramps (if any)	√			
Medians (none)	-	-	-	√
Railings	√			
Pedestrian/Building or Parking Lot Interface		√		
Functional Lighting	√			
Active Edges (none)			√ Palliser South	√
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping	√			
Universal Design (none)	-	-	-	√
Pedestrian Signage			√	
Underpass Arts (none)	-	-	-	√



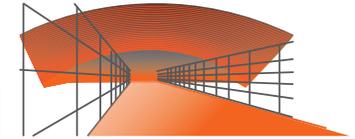
Appendix B: Underpass Analysis

4.0 | STREET SE UNDERPASS

4.3 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> • New coordinated painting required for all structure elements 	4.1
Balustrades	<ul style="list-style-type: none"> • New painting required • Discourage commercial advertising on balustrades • Branding opportunities on balustrades 	4.1
Retaining Walls	<ul style="list-style-type: none"> • Embed small lighting features in the concrete walls • Use waterproof solutions to avoid water run off on retaining walls • Encourage “layered” and “green” retaining walls • Consider using durable, easy to clean, graffiti-proof materials • Install picture frames on the walls for changeable interpretive signage or art display • Use ceramic tiles to create mosaic art on the walls • Where applicable, provide surface for comfortable sitting at the lower portion of the retaining walls 	4.2
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> • Add sidewalks to north side of 10 Avenue • Clear the clutter (lighting poles, garbage cans, etc.) at the corners • Replace cracked concrete sidewalks with new ones 	4.5 4.8
Medians	<ul style="list-style-type: none"> • Due to limited road Right-of-way width (about 20.1m) and requirements for 4 traffic lanes (13.4m), there is no space for a median under current condition 	4.6
Railings	<ul style="list-style-type: none"> • New railings to replace the rusted ones 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> • Clean up the visible garbage • Discourage fencing around private properties • Maximize landscaping opportunities at the setback areas 	4.3 4.7
Functional Lighting	<ul style="list-style-type: none"> • Require new lighting to brighten the area under the bridge 	4.4

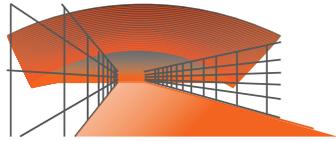
Appendix B: Underpass Analysis



4.0 | STREET SE UNDERPASS

4.3 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages along the street for all new developments Wherever opportunities exist, renovate existing buildings to open doors and windows facing to the street and provide active edges along the street 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting of traffic lanes, bridge structure, balustrades, retaining walls, foliage and building facades to enhance pedestrian experience 	4.4
Bike Facilities	<ul style="list-style-type: none"> Provide multi-use pathway along west side of the street 	4.5
Landscaping	<ul style="list-style-type: none"> Due to limited road Right-of-way width (about 20.1m) and requirements for 4 traffic lanes (13.4m), there is not enough space in the public domain for a minimum 1.5m tree and furnishing zone while maintaining a 3m wide clear pedestrian zone, unless: A 5.182m setback on both sides of the street (to be consistent to the Bylaw setback requirements) is required for the first level of any new development along the street, which will widen the pedestrian realm and transform the street into a boulevard streetscape character 	4.3 4.7
Universal Design	<ul style="list-style-type: none"> The design of the sidewalk must provide full access for the physically challenged including the visually challenged 	4.8
Pedestrian Signage	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories 	4.9
Underpass Arts	<ul style="list-style-type: none"> Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations such as building setback areas, corners, furnishing and tree zones Underpass arts as the storytelling feature to celebrate local history 	4.11



Appendix B: Underpass Analysis

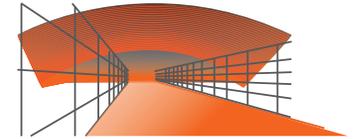
4.0 1ST STREET SE UNDERPASS

4.3 Recommendations

1 Street SE underpass currently has high vehicular traffic volume but low pedestrian volume. Therefore, the main focus of the underpass and its surrounding area improvements in the short term should be on basic elements and poor/fair conditions as checked in the Evaluation Matrix. In the long term, new design features as recommended here may be applied.

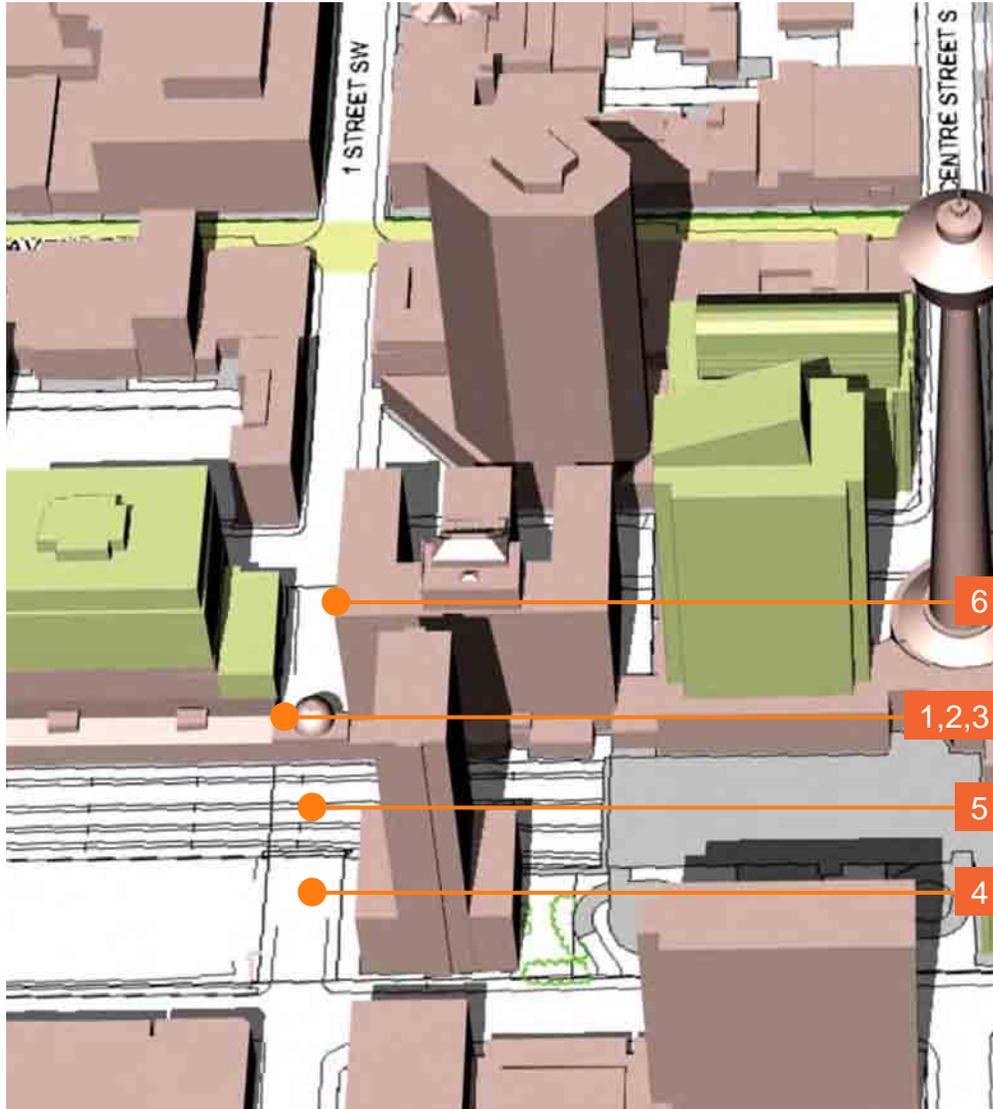
The recent development on the corner of 1 Street SE and 10 Ave (see Picture 6) is setting a good example for integrating the public and private realm..

Appendix B: Underpass Analysis



5.0 | STREET SW UNDERPASS

5.1 Local Context





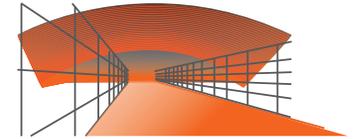
Appendix B: Underpass Analysis

5.0 I STREET SW UNDERPASS

5.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	2 3 6	<ul style="list-style-type: none"> • Close proximity to special places including the Warehouse District, Central Memorial Park, and Haultain Park; new office and commercial developments are under construction including Homburg Harris Centre, Bankers Court, Grenville Germain Complex, and Palliser Square Redevelopment • A heritage underpass located at the old CPR train station, and surrounded by a number of heritage buildings along the street • The dome structure at +15 level extending historic Fairmount Palliser Hotel across I Street SW provides a recognizable image of the area • Palliser Hotel provides active edge frontage with it's basement doors and windows
	Pedestrian Realm	2 1 1 3 1 2	<ul style="list-style-type: none"> • A very high pedestrian volume street • Cracked sidewalk condition, uneven concrete pads at the corner; which make it difficult for pedestrians especially the physically challenged. • The commemorative CPR train sculptures attached on the retaining walls underneath the bridge structure are unique features that enhance the pedestrian experience in the area. • Visible water run off on retaining walls underneath the bridge; Catch basin in the middle of sidewalk. • Special designed railings consistent to the overall heritage train theme. • Poor lighting conditions under the bridge. • Poor maintenances - rusty railings, graffiti, dusty train sculpture, etc. • New development along west side of the street shows some efforts in improving the building interface by opening doors at sidewalk level, special façade treatments and corner treatments at the 9th AV interface. However, no active use is currently provided to enhance pedestrian experience. • Landscaping along the parking lot edge and some building setback areas.
	Redevelopment Opportunities	A	<ul style="list-style-type: none"> • Vacant developable land at southwest corner of the underpass bridge, which is currently a surface parking lot.
	Linkages		<ul style="list-style-type: none"> • Major pedestrian linkages between Downtown and east part of the Beltline. • Major pedestrian and bicycle link between the Bow River and the Elbow River pathway systems.
	Road Design		<ul style="list-style-type: none"> • 4 two-way traffic lanes • No Median

Appendix B: Underpass Analysis



5.0 I STREET SW UNDERPASS

5.2 Context Analysis

		Ref No.	Descriptions
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none">• Proposed SE LRT line (underground portion) along the CP tracks• I Street SW as a Pedestrian Corridor, Major Bus Route, Key On-street Bicycle Route, with High Street streetscape characters• Within character areas—historical Warehouse District• I Street SW as the Proposed Neighbourhood Centre for the neighbourhood of Victoria Crossing Centre.• Potential location for public art at the underpass bridge



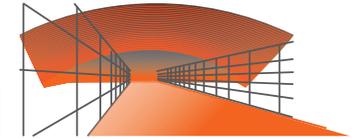
Appendix B: Underpass Analysis

5.0 | STREET SW UNDERPASS

5.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure		√		
Balustrades		√		
Retaining Walls		√		
Sidewalks, Stairs and Ramps (if any)	√			
Medians (none)	-	-	-	√
Railings		√		
Pedestrian/Building or Parking Lot Interface		√		
Functional Lighting	√			
Active Edges (none)		√		
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping		√		
Universal Design (none)	-	-	-	√
Pedestrian Signage		√		
Underpass Arts (none)	√			

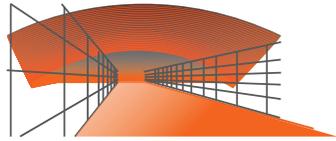
Appendix B: Underpass Analysis



5.0 | STREET SW UNDERPASS

5.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> New painting required 	4.1
Balustrades	<ul style="list-style-type: none"> New painting required Discourage commercial advertising on balustrades Branding opportunities on balustrades 	4.1
Retaining Walls	<ul style="list-style-type: none"> Use waterproof solutions to avoid water run off on retaining walls Consider using durable, easy to clean, graffiti-proof surface materials (e.g., ceramic tiles) and embedded lighting features to enhance the heritage train sculptures attached to the walls 	4.2
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> Add sidewalks to north side of 10 Avenue Clear the clutters (lighting poles, garbage cans, etc.) at the corners Sidewalk improvement at corners to ensure accessibility and safety Use durable, high-quality pavement for sidewalks 	4.5 4.8
Medians	<ul style="list-style-type: none"> Due to limited road Right-of-way width (about 20.1m) and requirements for 4 traffic lanes (13.4m), there is no space for a median under current conditions 	4.6
Railings	<ul style="list-style-type: none"> New painting required 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> Clean up the visible garbage Discourage fencing around private properties Maximize landscaping opportunities at the setback areas 	4.3 4.7
Functional Lighting	<ul style="list-style-type: none"> Require new lighting to brighten the area under the bridge 	4.4



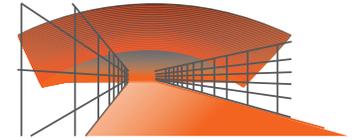
Appendix B: Underpass Analysis

5.0 | STREET SW UNDERPASS

5.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages along the street for all new developments Wherever opportunities exist, renovate/reconfigure existing buildings to open doors and windows facing to the street and provide active uses 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting of traffic lanes, bridge structure, balustrades, retaining walls, foliage and building facades to enhance pedestrian experience Use seasonal lighting to enhance pedestrian experience 	4.4
Bike Facilities	<ul style="list-style-type: none"> Due to the narrowness of the street, shared travel lanes (on-street bike facilities) are proposed 	4.5
Landscaping	<ul style="list-style-type: none"> Landscaping (tree, flower bed, and furnishing zone) should be provided in the 2.134m setback zone for at least the first level of any new development 	4.7 4.3
Universal Design	<ul style="list-style-type: none"> As a high pedestrian volume street, the design of the sidewalk must provide full access for the physically challenged including the visually challenged 	4.8
Pedestrian Signage	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories 	4.9
Underpass Arts	<ul style="list-style-type: none"> Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations such as building setback areas, corners, furnishing and tree zones Underpass arts as the storytelling feature to celebrate local history 	4.11

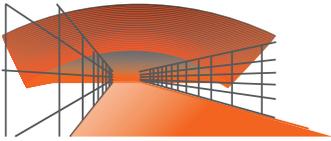
Appendix B: Underpass Analysis



5.0 | STREET SW UNDERPASS

5.4 Recommendations

1 Street SW underpass currently has a high concentration of pedestrian movement. The underpass and its surrounding area should be on the high priority list for future improvements. It will be transformed to a high street as envisioned in the Centre City Plan. The pedestrian realm, especially the interface zone should accommodate a full range of activities from retail to hospitality (patios) as well as other activities. The theme of the underpass improvement should build on its existing historic character and traditional style of a main street.



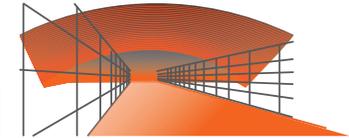
Appendix B: Underpass Analysis

6.0 2 STREET UNDERPASS (PROPOSED)

6.1 Local Context



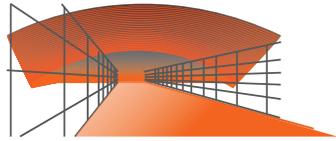
Appendix B: Underpass Analysis



6.0 2 STREET UNDERPASS (PROPOSED)

6.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	4	<ul style="list-style-type: none"> Close proximity to the special places including Steven Avenue and Barclay Mall to the north, Central Memorial Park and Haultain Park to the south, and the Warehouse District. Located in the heart of the Centre City, in close proximity to major businesses, entertainment and cultural amenities. New office commercial developments are under construction including Homburg Harris Centre and Bankers Court.
	Pedestrian Realm	2,5,6	<ul style="list-style-type: none"> A huge ramp structure located at the end point of 2 Street SW in between 9 Avenue and the CPR tracks functions as a main vehicular access to the Gulf Canada Parkade from 9th Avenue. There is currently no pedestrian link crossing the train tracks.
	Redevelopment Opportunities	1	<ul style="list-style-type: none"> The Centre City Plan has identified 2 Street SW between 9 Avenue and 10 Avenue as the potential location for a Multi-modal Transit "Station", which consists of: "Multi-level (at-grade, underground, +15 and +30) interconnected and climate-controlled interface points between the CPR train, SE leg of the LRT on 10 Avenue S, Calgary Transit (buses and LRT) on 9 and 10 Avenue S, future 8 Avenue S and existing Transit Mall on 7 Avenue S." A new underpass - 2 Street SW Underpass will be integrated into the proposed Multi-modal Transit "Station". Vacant developable land at southeast corner of the future underpass bridge, which is currently a surface parking lot.
	Linkages	4	<ul style="list-style-type: none"> Potential major pedestrian and bicycle linkages between Downtown and Beltline. Potential major pedestrian and bicycle link between the Bow River and the Elbow River pathway systems.
	Road Design	5,6	<ul style="list-style-type: none"> Potential space for bike-lanes and wide sidewalks Potential 2 one-way traffic lanes
Policy Context	Centre City Plan Beltline ARP	1	<ul style="list-style-type: none"> Proposed Multi-modal Transit "Station" Proposed SE LRT line (underground portion) along the CP tracks 2 Street SW as a Pedestrian Corridor; Key On-street Bicycle Route Within character areas—historical Warehouse District Close to future 8 Avenue Subway 2 Street SW as a High Pedestrian Movement Street



Appendix B: Underpass Analysis

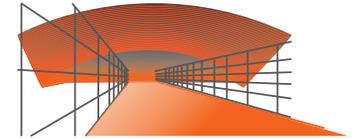
6.0 2 STREET UNDERPASS (PROPOSED)

6.3 Recommendations

Considering the complexity of the project that involves major infrastructure investment and public/private partnerships, further studies are required to ensure the alignments of all the initiatives and proposals so that the overall vision of a Multi-modal Transit "Station" can be realized in the future. Detailed guidelines as listed in Section 4.0 should be applied depending on the situation. As a rule of thumb, the following points are highlighted to guide the decision-making process related to the design of this particular future underpass and its surrounding developments:

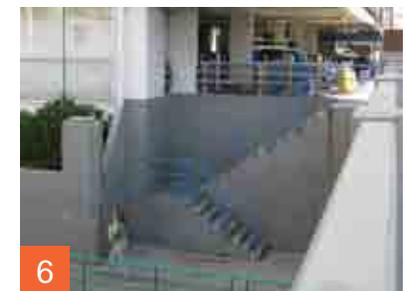
- According to a recent study undertaken by the City's Transportation Department, 2 Street SW comparing to other Downtown streets has the highest 16-hour inbound bike volumes. Therefore it is crucial to integrate bike facilities into the future underpass design:
- Provide off-street multi-use pathway all along 2 Street SW at the sidewalk level as the primary horizontal link to the river pathway system; or alternatively, provide on-street separated bike lanes.
- Provide convenient bike parking (Class I Bike Parking) and horizontal and vertical bike access to any new transit station (at grade, underground), as well as the inside of the trains to encourage the use of public transit.
- The future multi-level structure (the multi-modal transit "station") should become a dynamic transit hub of both horizontal and vertical connections where people from all over the city come and go - taking public transit, transferring to another transit line, riding bikes to the river pathway system, or simply walking to their destinations. As a people gathering place, some supportive retail uses (e.g., small restaurants, shops, newspaper and magazine stores) at all levels (underground, at-grade, +15, and +30) are necessary and they have great potential to sustain and thrive.
- All the entry points to the multi-modal transit "Station" should be visible, accessible for all.
- Since both future SE LRT on 10 Avenue S and future 8 Avenue Subway will be underground, it would be possible to work with CP and other property owners regarding provision of below-grade plazas and shops under the tracks and pedestrian/bike access points right underneath the future underpass bridge integrated with the multi-level "Station".
- Use street corners as the key entrances to the "Station". Some innovative design solutions should be considered to design the corners as the focal points of the public realm system (e.g. a recessed area at the corner for a kiosk, a sunken plaza surrounded by below-grade shops with direct links to the underground transit stations).

Appendix B: Underpass Analysis



7.0 4 STREET SW UNDERPASS

7.1 Local Context





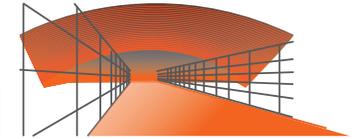
Appendix B: Underpass Analysis

7.0 4 STREET SW UNDERPASS

7.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	4	<ul style="list-style-type: none"> 1955 bridge structures (CPR and 9 Av SW crossing), surrounded by high-density office and parkade on east side and new retail and office (under construction) on west side of underpass
	Pedestrian Realm	1,2,4	<ul style="list-style-type: none"> dark and narrow pedestrian realm underneath both bridges; unlit situation even in daylight; no space available to allow biking
		6	<ul style="list-style-type: none"> No active edge conditions along retaining walls on both side of underpass; grey colored walls providing uninviting environment
		1	<ul style="list-style-type: none"> Black frame-effect underneath both bridges;
		4	<ul style="list-style-type: none"> opportunity of create a new active edge by opening up the retaining wall bordering the 8 Av construction site
		5 6	<ul style="list-style-type: none"> Narrow median (< 2 metres) with raised concrete Narrow stairwells leading from 10 Av down to underpass; insufficient for people with physical handicaps; uncomfortable realm after dark
Redevelopment Opportunities	A B 4	<ul style="list-style-type: none"> Corner lots (present uses: surface parking) on 8 and 9 Ave SW offers a variety of development solutions and opportunities to create active edge along 5th underpass; bridging opportunity utilizing CPR air-space 	
Linkages		<ul style="list-style-type: none"> Major pedestrian linkage with high frequency between Beltline, Stephen Ave. Mall, and Eaton Centre, 	
Road Design		<ul style="list-style-type: none"> 4 one-way traffic lanes 2.0 metre / 6.5 feet median < 2.0 metre / < 6.5 feet sidewalk 	
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> Major bus route Pedestrian corridor

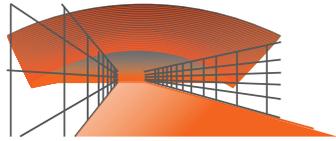
Appendix B: Underpass Analysis



7.0 4 STREET SW UNDERPASS

7.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure			√	
Balustrades		√		
Retaining Walls		√		
Sidewalks, Stairs and Ramps (if any)	√		√	
Railings	√		√	
Pedestrian/Building or Parking Lot Interface			√	
Functional Lighting	√			
Active Edges (none)	-	-	-	√
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping (none)	-	-	-	√
Universal Design (none)	-	-	-	√
Pedestrian Signage (none)	-	-	-	√
Underpass Arts (none)	-	-	-	√



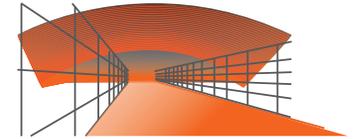
Appendix B: Underpass Analysis

7.0 4 STREET SW UNDERPASS

7.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> no recommendations 	4.1
Balustrades	<ul style="list-style-type: none"> embed lighting fixtures to enhance balustrade 	4.1
Retaining Walls	<ul style="list-style-type: none"> embed small lighting features in the concrete walls underneath bridge structure Encourage “green” retaining walls as part of developments Install picture frames on the walls for changeable interpretive signage or art display 	4.4 4.7 4.1.1
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> overall improvement of stairwells; consider lift to 9 Av SW 	4.8
Medians	<ul style="list-style-type: none"> entertain median upgrade with e.g. vertical artistic elements, median lighting features no recommendations 	4.6
Railings	<ul style="list-style-type: none"> Replace railing with new designed railing 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> no recommendations 	4.3
Functional Lighting	<ul style="list-style-type: none"> install street lighting on median 	4.4 4.6

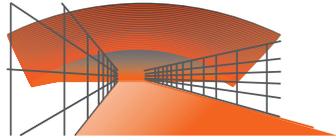
Appendix B: Underpass Analysis



7.0 4 STREET SW UNDERPASS

7.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages along the underpass street at the sidewalk level for all new developments Wherever opportunities exist, redevelop existing buildings on basement and /or street level and provide active edges along the street 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting of traffic lanes, bridge structure of both bridges, balustrades, retaining walls, foliage and building facades to enhance pedestrian area quality 	4.4
Bike Facilities	<ul style="list-style-type: none"> Provide on-street shared travel lane along east side of the street 	4.5
Landscaping	<ul style="list-style-type: none"> Due to limited road Right-of-way width (about 20m) and requirements for 4 traffic lanes (13.4m) and median (2m), there is not enough space in the public domain for a minimum 1.5m tree and furnishing zone while maintaining a 3m wide clear sidewalk, unless: A 5.182m setback on both sides of the street (to be consistent to the Bylaw setback requirements) is required for the first level of any new development along the street, which will widen the area underneath the bridge and transform the street into a boulevard streetscape character 	4.7
Universal Design	<ul style="list-style-type: none"> As a high pedestrian-volume street, the design of the sidewalk must provide full access for the physically challenged including the visually challenged. The stairwells need to be upgraded. 	4.8
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations such as building setback areas, corners, furnishing and tree zones 	4.9 4.11



Appendix B: Underpass Analysis

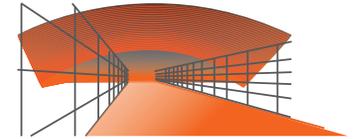
7.0 4TH STREET SW UNDERPASS

7.4 Recommendations

Considering the:

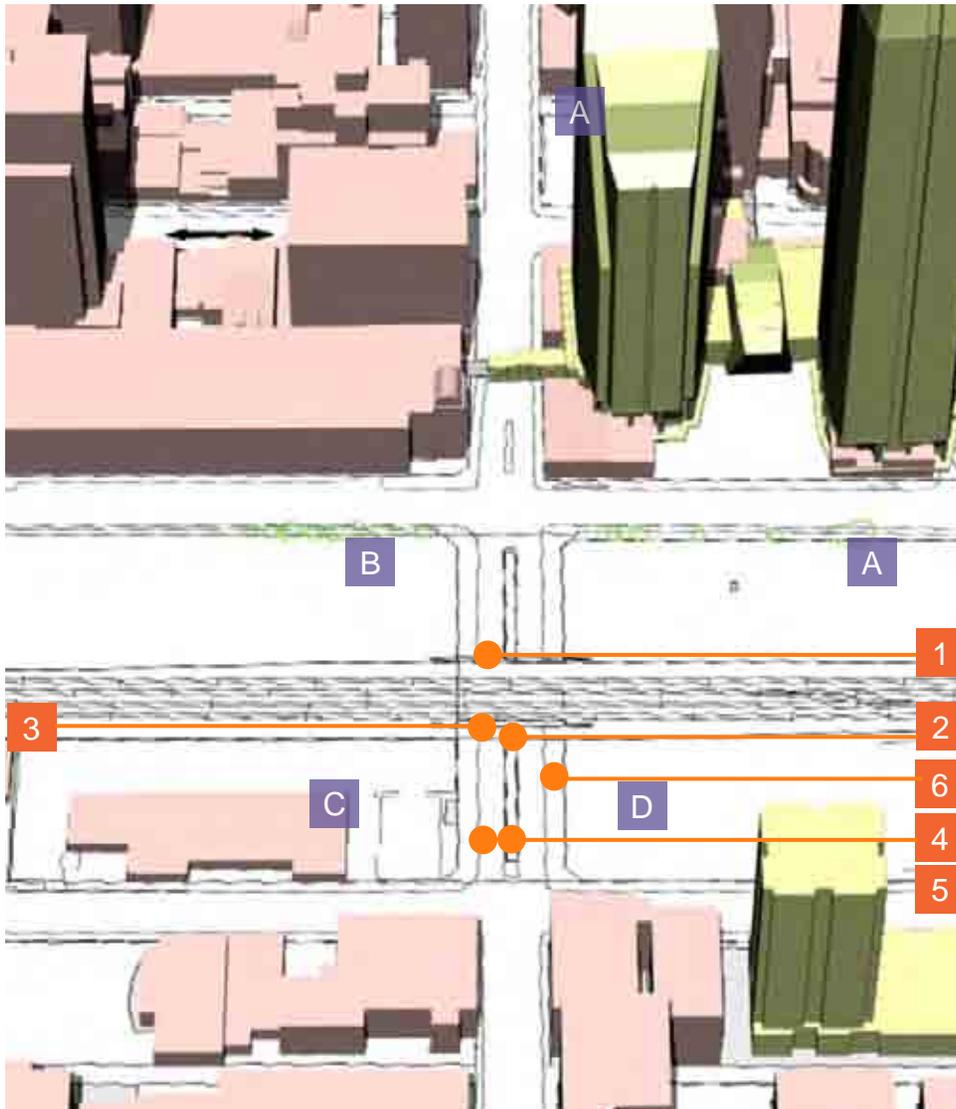
- High pedestrian and cyclist volume to Downtown from the areas South of the Beltline (Mission, Earlton, Victoria Park)
- High CCP importance
- Overall physical need for improvements on various underpass elements
- Newly opened high-end retail locations at the northern entrance of the underpass (Holt Renfrew)
- Additional coming retail locations directly bordering the West side of the underpass (8th Ave place)
- 4 Street underpass requires a high priority for implementation of this Guideline.

Appendix B: Underpass Analysis



8.0 5 STREET SW UNDERPASS

8.1 Local Context





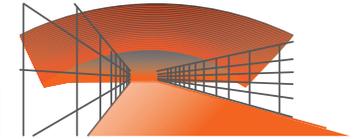
Appendix B: Underpass Analysis

8.0 5 STREET SW UNDERPASS

8.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	1	<ul style="list-style-type: none"> No existing built-up areas bordering the retaining walls
	Pedestrian Realm	1,4	<ul style="list-style-type: none"> Pedestrian realm with wide sidewalks (3 metres) allowing comfortable space for heavy pedestrian traffic; bikers use sidewalk as dedicated Multi-use Pathway
		3	<ul style="list-style-type: none"> Plain concrete wall instead of steel railing separates sidewalk from car lanes
		1	<ul style="list-style-type: none"> Plain concrete retaining walls underneath bridge structure: no wall-mounted lighting fixtures or decorative elements
		2	<ul style="list-style-type: none"> Plain, wide median (3 metres) with raised concrete surface; balustrade with aggregate concrete slabs; sewer pipe along South balustrade
		1	<ul style="list-style-type: none"> Aggregated concrete plates mounted on retaining wall with red colored pipe handrail and red colored pipe railing on top side
		5	<ul style="list-style-type: none"> Featured stormwater sewer plant building with separate entrance from side
4	<ul style="list-style-type: none"> Wide corner radii with uncluttered pedestrian realm at underpass entrances at the south corners; inviting corner solution (trees, red colored pipe handrails on southern end) 		
1	<ul style="list-style-type: none"> Clean and even surfaces underneath bridge structure with ceiling downlighting (black frame-effect) 		
6	<ul style="list-style-type: none"> Attractive pedestrian realm along 5 St SW (West side) 		
Policy Context	Redevelopment Opportunities	A,B C, D	<ul style="list-style-type: none"> Corner lots (present uses: surface parking) on 8 and 9 Av SW offer a variety of development solutions and opportunities to create active edges along 5th underpass (e.g. bridging opportunity utilizing CPR air-space)
	Linkages	6	<ul style="list-style-type: none"> Major pedestrian linkage with high frequency between Beltline, Stephen Ave. Mall, Eaton Centre, restaurant and pub destinations along 5 St north of CPR tracks
	Road Design		<ul style="list-style-type: none"> 4 one-way traffic lanes 2.5 metre / 8 feet median 3 metre clearance for sidewalk
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> Pedestrian corridor Existing On-Street Bicycle Route Proposed Key On-Street Bicycle Route

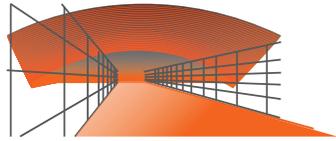
Appendix B: Underpass Analysis



8.0 5 STREET SW UNDERPASS

8.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate Improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure			√	
Balustrades			√	
Retaining Walls			√	
Sidewalks, Stairs and Ramps (if any)			√	
Medians			√	√
Railings			√	
Pedestrian/Building or Parking Lot Interface			√	
Functional Lighting		√	√	
Active Edges		√		√
Advanced Lighting		√		√
Bike Facilities			√	
Landscaping			√	
Universal Design				√
Pedestrian Signage			√	
Underpass Arts				√



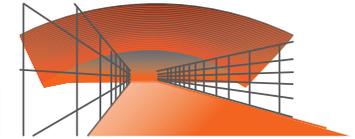
Appendix B: Underpass Analysis

8.0 5 STREET SW UNDERPASS

8.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> no recommendations 	4.1
Balustrades	<ul style="list-style-type: none"> balustrade design upgrade required: embed small lighting fixtures as part of lighting theme 	4.1
Retaining Walls	<ul style="list-style-type: none"> embed small lighting features in the concrete walls underneath bridge structure; create lighting scheme Encourage “green” retaining walls Install picture frames on the walls for changeable interpretive signage or art display 	4.2 4.4 4.11
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> no recommendations 	
Medians	<ul style="list-style-type: none"> entertain median upgrade with e.g. vertical artistic elements, median lighting features no recommendations 	4.6
Railings	<ul style="list-style-type: none"> No recommendations 	
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> no recommendations 	
Functional Lighting	<ul style="list-style-type: none"> No recommendations 	

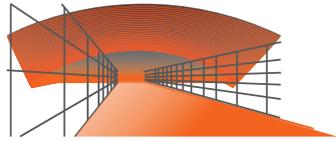
Appendix B: Underpass Analysis



8.0 5 STREET SW UNDERPASS

8.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages along the underpass street at the sidewalk level for all new developments 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting underneath of bridge structure, at retaining walls and at the balustrade 	4.4
Bike Facilities	<ul style="list-style-type: none"> Provide on-street shared travel lanes along west side of the street 	4.5
Landscaping	<ul style="list-style-type: none"> A 5.182m setback on both sides of the street (to be consistent to the Bylaw setback requirements) is required for the first level of any new development along the street, which will widen the area underneath the bridge and along the retaining wall and transform the street into a boulevard-streetscape character The 3m wide median could allow planters at selected locations 	4.7
Universal Design	<ul style="list-style-type: none"> As a high pedestrian-volume street, the design of the sidewalk must provide full access for the physically challenged including the visually challenged. 	4.8
Pedestrian Signage and Underpass Arts	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations such as building setback areas, corner situations, furnishing and tree zones 	4.9 4.11



Appendix B: Underpass Analysis

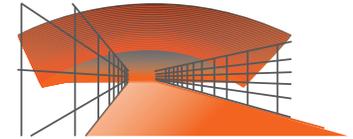
8.0 5 STREET SW UNDERPASS

8.4 Recommendations

The 5 Street SW Underpass is a fairly new underpass designed in a fashion to accommodate both vehicular, pedestrian and bicycle traffic. The corner sections are providing enough space for a clear path for pedestrians. The visibility into the underpass and underneath the bridge is good; there are no dark corners or shadow casts. Despite the lighting a black-frame exists. The overall impression is a very functional one.

In the future the emphasis should be on encouraging developments to open up their basements onto the underpass and to create active edges along the pedestrian zone. In addition the wide median could be a location for artistic displays and additional decorative lighting.

Appendix B: Underpass Analysis



9.0 8 STREET SW UNDERPASS

9.1 Local Context





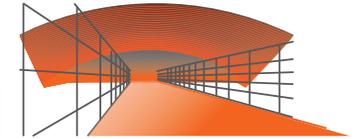
Appendix B: Underpass Analysis

9.0 8 STREET SW UNDERPASS

9.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	6	<ul style="list-style-type: none"> • Low density land use solution at the north-west underpass corner (clinic) incl. pedestrian permeability; open space around building, which encourages pedestrian traffic • Built form and use (restaurant, pub) does not open to pedestrian realm; façade without providing architectural active edge solutions
	Pedestrian Realm	3	<ul style="list-style-type: none"> • Pedestrian realm which is creating various barriers for people with physical handicaps
		1	<ul style="list-style-type: none"> • Attractive patio solution (bar and restaurant) with opens up the retaining wall, landscaped building frontage and clear visibility from sidewalk
		4	<ul style="list-style-type: none"> • Commercial advertising at the balustrade, which covers complete balustrade; poor lighting conditions under the bridge; structural pillars which allow light and visual openness, poor lighting
		3	<ul style="list-style-type: none"> • Stairwells underneath sewage pipes
6	<ul style="list-style-type: none"> • No active edge conditions along north-east retaining wall; grey colored uninviting building facade 		
5	<ul style="list-style-type: none"> • Inviting corner solution (retail), creating pedestrian traffic 		
Redevelopment Opportunities	A	<ul style="list-style-type: none"> • Corner lots (present uses: restaurant and car dealership) on 9th Ave SW and 8th St SW offer a variety of development solutions and opportunities to create active edge along 8th underpass 	
B			
Linkages		<ul style="list-style-type: none"> • Major pedestrian linkage between Beltline and 8th St C-train Station with very high frequency • Important retail destinations (Safeway, Outdoor shops) and restaurant / pub destinations south of CPR Tracks 	
Road Design		<ul style="list-style-type: none"> • 4 one-way traffic lanes • Approx. 1 metre / 3 feet median • Approx. 2.6 metre sidewalk 	
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> • Pedestrian corridor • Major Bus Route • Existing On-Street Bicycle Route • Proposed Key On-Street Bicycle Route

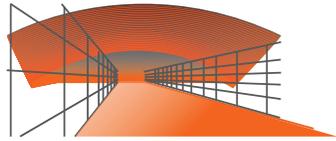
Appendix B: Underpass Analysis



9.0 8 STREET SW UNDERPASS

9.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions			
	Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure		√		
Balustrades		√		
Retaining Walls	√			
Sidewalks, Stairs and Ramps (if any)		√		
Medians	√			√
Railings	√			
Pedestrian/Building or Parking Lot Interface	√	√		
Functional Lighting	√			
Active Edges			√	√
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping			√	√
Universal Design (none)	-	-	-	√
Pedestrian Signage		√		
Underpass Arts (none)	-	-	-	√



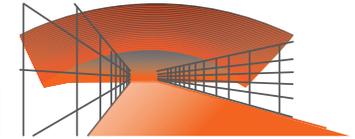
Appendix B: Underpass Analysis

9.0 8 STREET SW UNDERPASS

9.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> New painting of steel structure from CPR bridge required 	4.1
Balustrades	<ul style="list-style-type: none"> New balustrade required: encase sewer pipes Discourage third-party commercial advertising on balustrades, but allow branding opportunities on balustrades 	4.1
Retaining Walls	<ul style="list-style-type: none"> Embed small lighting features in the concrete walls Use waterproof solutions to avoid water run off on retaining walls Encourage “green” retaining walls close to existing landscaped areas Consider using durable, easy to clean, graffiti-proof materials Install picture frames on the walls for changeable interpretive signage or art display Use ceramic tiles to create mosaic art on sections of the walls Where applicable, provide surface for seating at the lower portion of the retaining walls adjacent to existing restaurants Enhance stormwater pump-station entrance 	4,4 4.2 4.1.1
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> Widen stairwells on both side of bridge onto 9 Av SW Replace sidewalk-stairs on 9 Av SW with ramp 	4.8
Medians	<ul style="list-style-type: none"> Upgrade median with concrete pedestal and some vertical artistic elements and landscaping; add median lighting 	4.6
Railings	<ul style="list-style-type: none"> Replacement of railings 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> Clear the dirt corners from debris at the bridge corners Encourage foliage lighting 	4.3 4.4
Functional Lighting	<ul style="list-style-type: none"> Require new lighting to brighten the area under the two bridges 	4.4

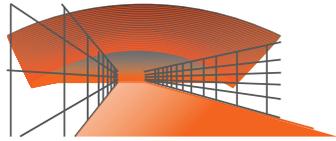
Appendix B: Underpass Analysis



9.0 8 STREET SW UNDERPASS

9.4 Recommendation

Design Elements	Recommendations	Section No. for Design Guidelines
Active Edges	<ul style="list-style-type: none"> Require active use building frontages at sidewalk level for all new developments Encourage active building frontages in existing buildings 	4.3
Advanced Lighting	<ul style="list-style-type: none"> Consider advanced lighting underneath of bridge structure, at retaining walls and at the balustrade of both bridges 	4.4
Bike Facilities	<ul style="list-style-type: none"> 8 St. SW is an existing key bicycle route 	4.5
Landscaping	<ul style="list-style-type: none"> Existing landscaping sets a good example, with the exception of the space surrounding the clinic building which requires improvements (e.g. façade greening, planters surrounding the parking lot) 	4.7
Universal Design	<ul style="list-style-type: none"> As a high pedestrian-volume street, the design of the sidewalk must provide full access for the physically challenged including provisions for the visually challenged. 	4.8
Pedestrian Signage and Underpass Arts	<ul style="list-style-type: none"> Use pedestrian signage at appropriate locations to direct, advertise and tell stories Underpass arts at the balustrades, the retaining walls, or embedded in the sidewalks Underpass arts at appropriate locations e.g. at building setback areas, building corners, furnishing and tree zones 	4.9 4.11



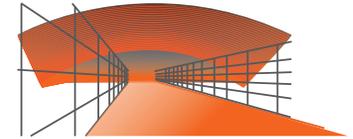
Appendix B: Underpass Analysis

9.0 8 STREET SW UNDERPASS

9.4 Recommendations

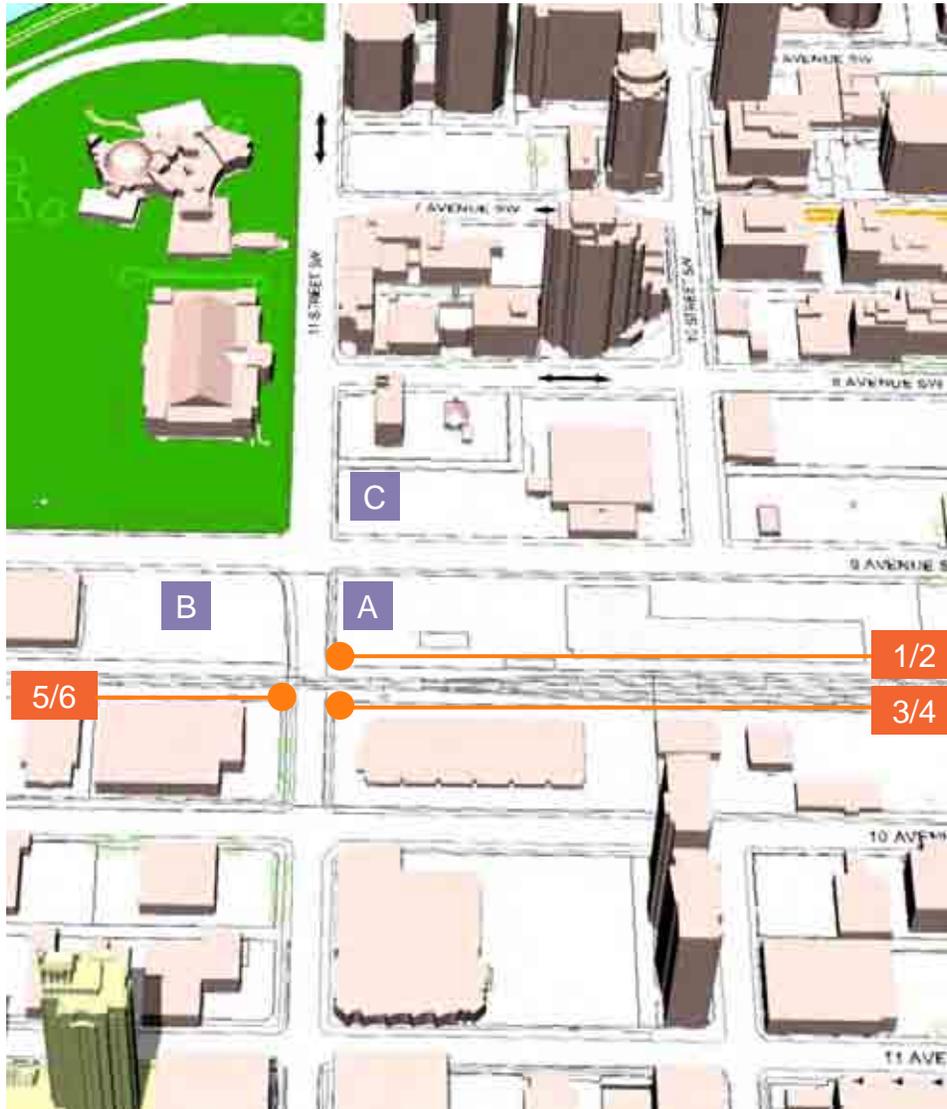
The 8 Street SW Underpass accommodates two bridges and has the highest daily pedestrian volume of all examined underpasses. Some retailers along the underpass set a good example in providing landscaping and active edge use although there are major deficiencies along the underpass street as the analysis shows. The potential of this underpass justifies a major reconstruction and redesign.

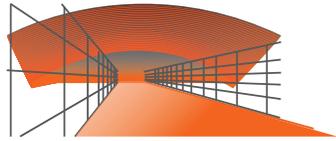
Appendix B: Underpass Analysis



10.0 || STREET CROSSING (POTENTIAL UNDERPASS)

10.1 Local Context





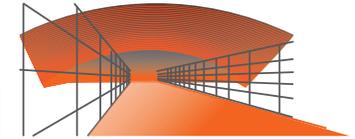
Appendix B: Underpass Analysis

10.0 | I STREET CROSSING (POTENTIAL UNDERPASS)

10.2 Context Analysis

		Ref No.	Descriptions (3 bridges)
Physical Context	Built Form	1,2,3	<ul style="list-style-type: none"> At grade railroad crossing, surrounded by car-dealerships, parking lots and low density office and commercial on north and south side
	Pedestrian Realm	1,2,5	<ul style="list-style-type: none"> Sidewalk with changing concrete and blacktop surface Wide setbacks of buildings of 10 metres; no active edge conditions within crossing realm
		4,5,6 7	<ul style="list-style-type: none"> 2 metre wide gravel stop separating sidewalk from lane Raised concrete sidewalk with curb on west side of I I Street, landscaped commercial properties along sidewalk Insufficient basic lighting for sidewalks
	Redevelopment Opportunities	A	<ul style="list-style-type: none"> Corner lots (present uses: surface parking, automotive on 10 Avenue SW offer a variety of development solutions and opportunities to create active edges along I I Street; bridging opportunity utilizing CPR air-space
		B	<ul style="list-style-type: none"> Approved Development Permit on corner of 10 Avenue (The Montreaux) with 1400 units New opportunities along west side of underpass for commercial
Linkages		<ul style="list-style-type: none"> Major pedestrian and biker linkage between Beltline, Millenium Park and Bow River 	
Engineering Design Standards		<ul style="list-style-type: none"> One-way traffic lanes On-street bike paths approximately 1.4 metre / 4.5 feet 1.4 metre / 4.5 feet sidewalks 	
Policy Context	Centre City Plan Beltline ARP		<ul style="list-style-type: none"> On-Street Bicycle Route

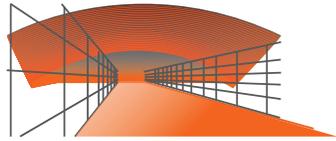
Appendix B: Underpass Analysis



10.0 || STREET CROSSING (POTENTIAL UNDERPASS)

10.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions Criteria: Surface Physical Impression, Functionality, Safety, Existing or Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure				n/a
Balustrades				n/a
Retaining Walls				n/a
Sidewalks, Stairs and Ramps (if any)				n/a
Medians				n/a
Railings				n/a
Pedestrian/Building or Parking Lot Interface				n/a
Functional Lighting	√			
Active Edges				√
Advanced Lighting				n/a
Bike Facilities			√	
Landscaping			√	
Universal Design				n/a
Pedestrian Signage	√			√
Underpass Arts				n/a



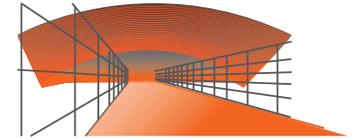
Appendix B: Underpass Analysis

I0.0 I I STREET CROSSING (POTENTIAL UNDERPASS)

I0.4 Recommendations

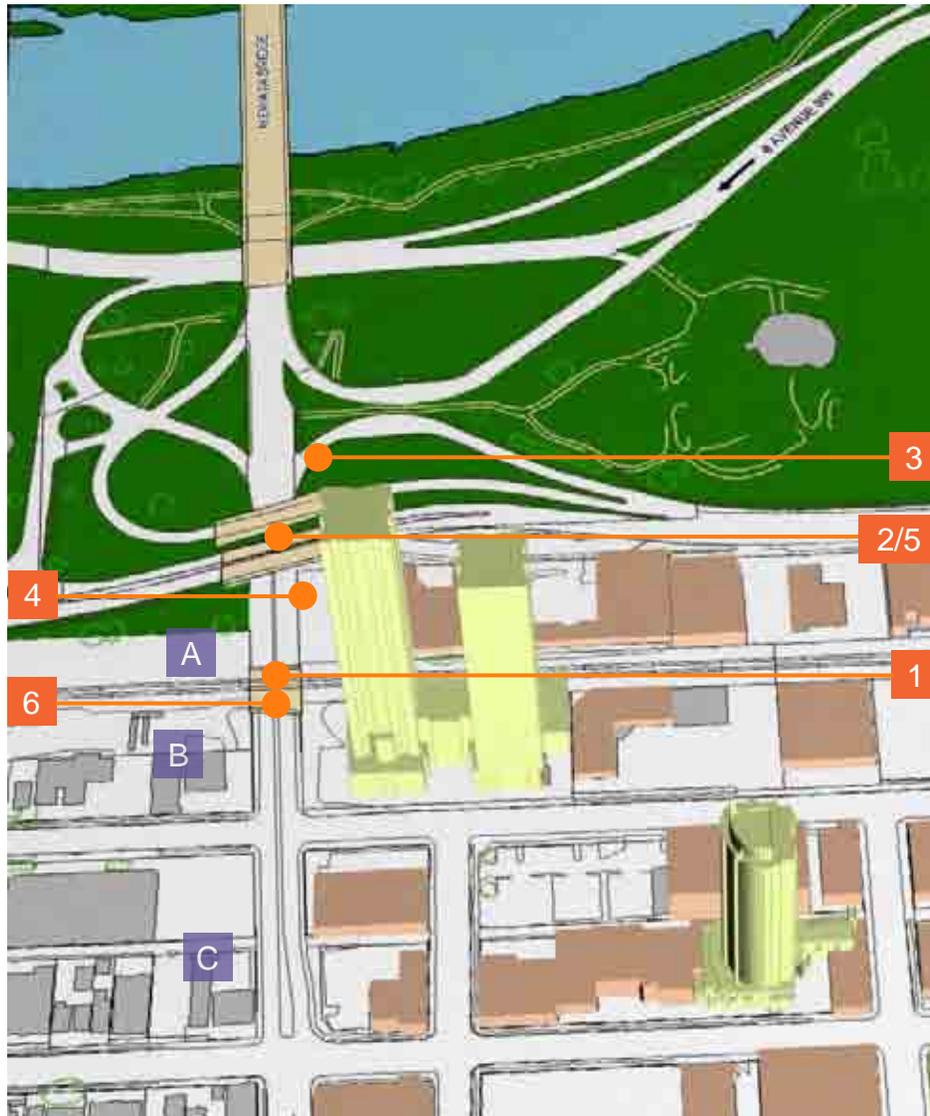
Recommendations	Section No. for Design Guidelines
The potential to become a new underpass has to be determined by traffic scenarios and transportation strategies.	
To improve the pedestrian realm on short term, sidewalk widening and new surface on the east side of I I St SW and additional basic lighting is required.	4.4 4.5
Recommend on-street bike lane separated from traffic lanes when the underpass is being built.	4.5

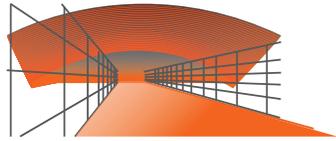
Appendix B: Underpass Analysis



11.0 14 STREET SW UNDERPASS

11.1 Local Context





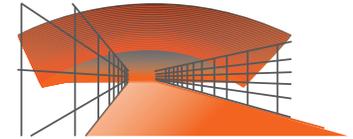
Appendix B: Underpass Analysis

11.0 14 STREET SW UNDERPASS

11.2 Context Analysis

		Ref No.	Descriptions
Physical Context	Built Form	1	<ul style="list-style-type: none"> Major provincial highway (1A) with very high traffic volume Light industrial and commercial land use on both sides of the underpass between 10 Av and 11 Av; built form which does not open to pedestrian realm along the underpass (chain link fences, steep berms); industrial and commercial buildings e.g. lightings store, auto dealerships and auto repair CPR bridge from approx. 1950ties (same style as 4th SW underpass); 2 overpasses for 8 Av SW
	Pedestrian Realm	2 6 3 2 1 1 5	<ul style="list-style-type: none"> Pedestrian realm within this 3-bridge environment provides an approx. 2.5 metres wide pathway; wide stairwells on both side of bridge structure; green berms on north and south sides of bridge Sidewalk at grade underneath 8 Ave. bridges, grade separation underneath CPR Unsecured pedestrian crossings at street exit to 9 Ave SW Clean but rough concrete environment underneath 9 Ave street bridges No active edge conditions along retaining walls; large storm water pump station area Green berms with dispersed bushes and trees creating somewhat comfortable atmosphere Underpass used frequently used by joggers and bikers to and from Millenium Park and Bow River pathway; bikers use mainly street lane (observation during photo shooting)
	Redevelopment Opportunities	A,B,C	<ul style="list-style-type: none"> Approved Development Permit on corner of 10 Ave (The Montreaux) with 1400 units New opportunities along west side of underpass for commercial
	Linkages		<ul style="list-style-type: none"> No linkage indication in CCP on 14 St SW underpass Important retail destinations (Safeway, Outdoor shops) and restaurant / pub destinations south of CPR Tracks
	Road Design		<ul style="list-style-type: none"> 4 one-way traffic lanes 1 metre / 3 feet median 2.0 –2.4 metres sidewalks
Policy Context	Centre City Beltline PlanARP		<ul style="list-style-type: none"> High Traffic Volume Street Key On-Street Bicycle Route crossing bridge on 10 Av SW

Appendix B: Underpass Analysis



11.0 14 STREET SW UNDERPASS

11.3 Evaluation Matrix

Design Elements	Evaluation of Existing Conditions Non-existing, Structural Condition (evaluated by City of Calgary, Roads)			
	Poor Conditions Immediate improvement required	Fair Conditions May need some improvement	Good Conditions May not need improvement in the short term	Not Applicable Currently non-existing features which are strongly recommended
Bridge Structure			√	
Balustrades			√	
Retaining Walls		√		
Sidewalks, Stairs and Ramps (if any)		√		
Medians		√		
Railings		√		
Pedestrian/Building or Parking Lot Interface		√		
Functional Lighting	√			
Active Edges	-	-	-	√
Advanced Lighting (none)	-	-	-	√
Bike Facilities (none)	-	-	-	√
Landscaping		√		√
Universal Design (none)	-	-	-	√
Pedestrian Signage			√	
Underpass Arts (none)	-	-	-	√



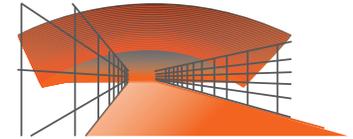
Appendix B: Underpass Analysis

11.0 14 STREET SW UNDERPASS

11.4 Recommendations

Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> • New painting of steel structure from CPR bridge required 	4.1
Balustrades	<ul style="list-style-type: none"> • New balustrade required: encase sewer pipes • Discourage third-party commercial advertising on balustrades, but allow branding opportunities on balustrades 	4.1
Retaining Walls	<ul style="list-style-type: none"> • Embed small lighting features in the concrete walls • Use waterproof solutions to avoid water run off on retaining walls • Encourage “green” retaining walls close to existing landscaped areas • Consider using durable, easy to clean, graffiti-proof materials • Install picture frames on the walls for changeable interpretive signage or art display • Use ceramic tiles to create mosaic art on sections of the walls • Enhance stormwater pump-station entrance 	4.2 4.4
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> • Widen stairwells on both side of bridge onto 9 Av SW • Replace sidewalk-stairs on 9 Av SW with ramp 	4.5
Medians	<ul style="list-style-type: none"> • Upgrade median with concrete pedestal and some vertical artistic elements and landscaping; add median lighting 	4.6
Railings	<ul style="list-style-type: none"> • Replacement of railings 	
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> • Clear the dirt corners from debris at the bridge corners • Encourage foliage lighting 	
Functional Lighting	<ul style="list-style-type: none"> • Require new lighting to brighten the area under the two bridges 	4.4

Appendix B: Underpass Analysis

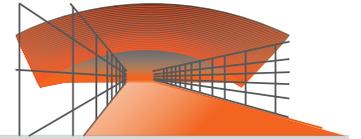


11.0 14 STREET SW UNDERPASS

11.4 Recommendations

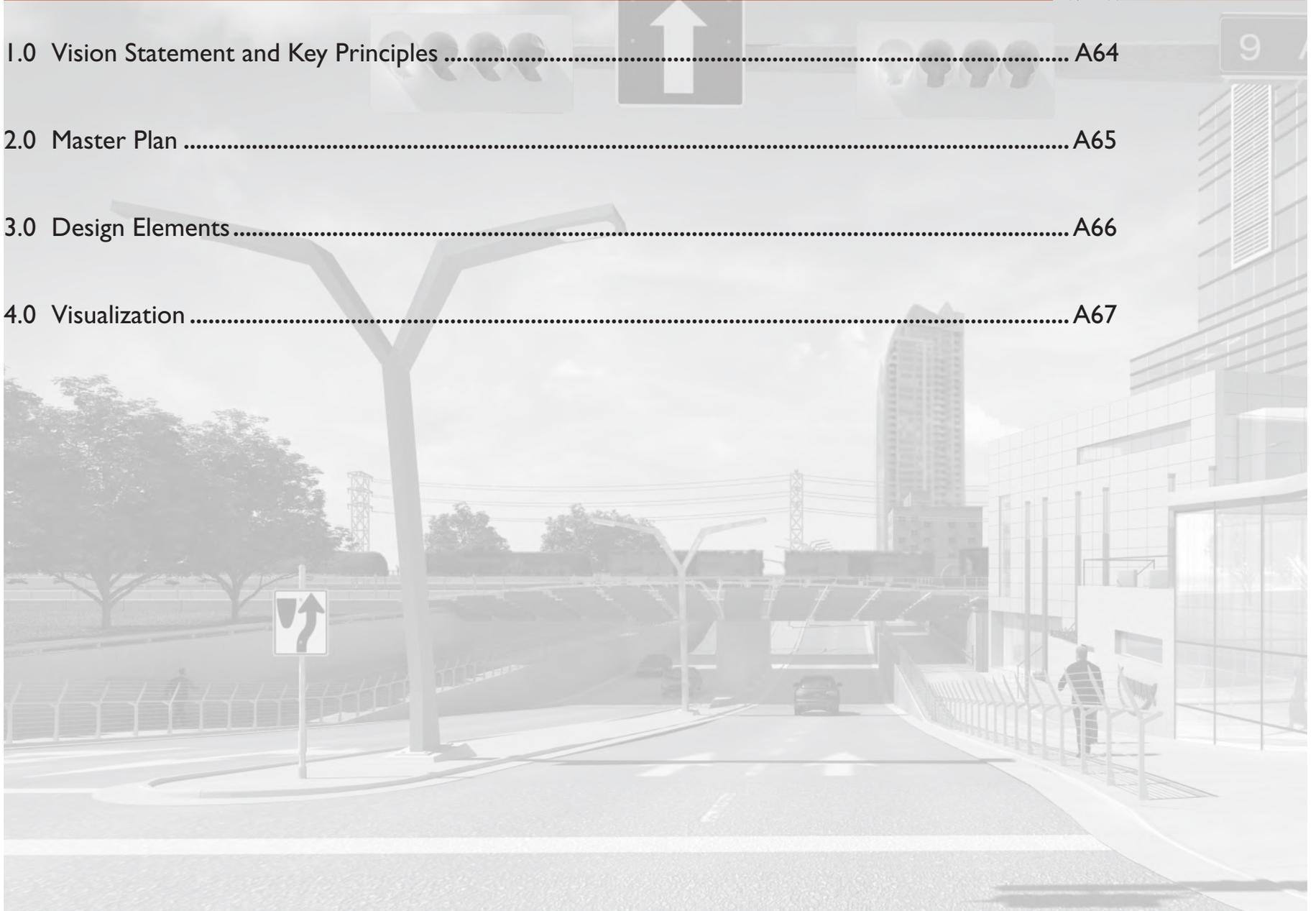
Design Elements	Recommendations	Section No. for Design Guidelines
Bridge Structure	<ul style="list-style-type: none"> No recommendation 	4.1
Balustrades	<ul style="list-style-type: none"> No recommendation 	4.1
Retaining Walls	<ul style="list-style-type: none"> Embed small lighting features in the concrete walls of all three bridges Encourage “green” retaining walls, especially around stormwater pump-station Install picture frames on walls for changeable interpretive signage or art display of all three walls Use ceramic tiles to create mosaic art on some sections of the walls Enhance stormwater pump-station entrance 	4.4 4.2 4.1.1 4.1.0
Sidewalks, Stairs and Ramps	<ul style="list-style-type: none"> Provide new surface blacktop for sidewalk Provide street markings, signage and lighting for safer crossing of street exits to 9 AV SW 	4.8
Median	<ul style="list-style-type: none"> Upgrade median with e.g. concrete pedestal and add decorative median lighting elements 	4.6
Railings	<ul style="list-style-type: none"> Paint railings 	4.1
Pedestrian/Building or Parking Lot Interface	<ul style="list-style-type: none"> Due to steep slopes the creation of interfaces with building fronts and entrances is a challenge 	4.3
Functional Lighting	<ul style="list-style-type: none"> Require new lighting to brighten the area under the CPR bridge during daytime and after dark 	4.4

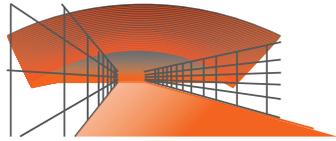
Appendix C Case Study



4TH STREET SE UNDERPASS

1.0 Vision Statement and Key Principles	A64
2.0 Master Plan	A65
3.0 Design Elements	A66
4.0 Visualization	A67





I.0 Vision Statement and Key Principles

4TH STREET SE UNDERPASS

During 2007 and 2008 stakeholders for the proposed 4 Street SE Underpass discussed the future design of this underpass and agreed on a Vision Statement and Key Principles in order to achieve a high quality public realm:

Vision Statement

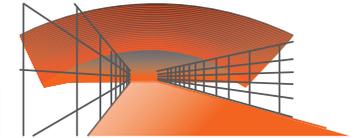
“ A welcoming, high quality, pedestrian orientated, multi modal continuous connection between the high streets of two vibrant, dense, urban neighborhoods.”



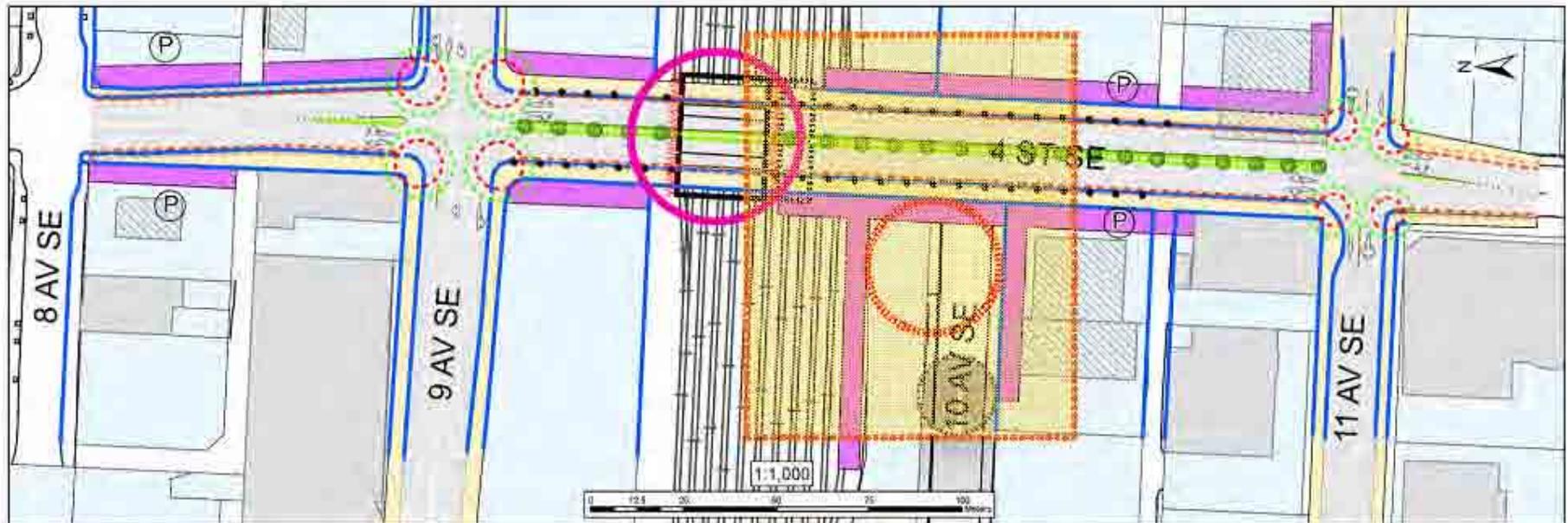
Key Principles

1. Pedestrians and cyclists are a first priority.
2. A continuous pedestrian experience from neighborhood to neighborhood.
3. Safety: must provide a sense of security.
4. Minimize lowering of existing intersections.
5. Universal accessibility for all pedestrians and cyclists to be provided at grade.
6. Minimize impact of vehicles on pedestrians (corner radii).
7. Design must encourage civil behavior.
8. Beauty and grace to be reflected in structure and proportion (overpass).
9. Structure shall be comfortable, inviting (lighting and space are key).
10. Structure must enhance adjacent development with active edge opportunities.
11. Maximize clear span.
12. Local collector street standard must be respected.
13. Design should celebrate existing built heritage.
14. Lane widths should be designed to minimum standards, outside lanes to accommodate cyclists.
15. Maintain on-street parking (north and south of structure).
16. Public art and structure as art to be integrated into design.
17. East/West connectivity south of the underpass a priority.
18. Design should incorporate sustainable “green” principles.

2.0 Master Plan



4TH STREET SE UNDERPASS



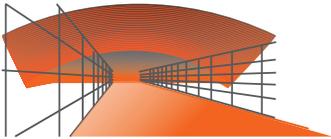
Legend

	Balustrade		4 Street Bridge
	Possible On-Street parking sections		Future LRT Bridge
	10th Avenue Cul-de-sac		Future Buildings
	Activity Node		Existing Buildings
	4th Street Underpass		Existing Buildings To Be Redeveloped
	Landscaped Corners		Street Level active use building frontages
	Corner Radii		Median
	Trees		Multi-use pathways
	Railings		Railroad Tracks
	Off Street Bicycle Route		Traffic Lanes
	On Street Bicycle Route		

Area (see illustration on the next page)

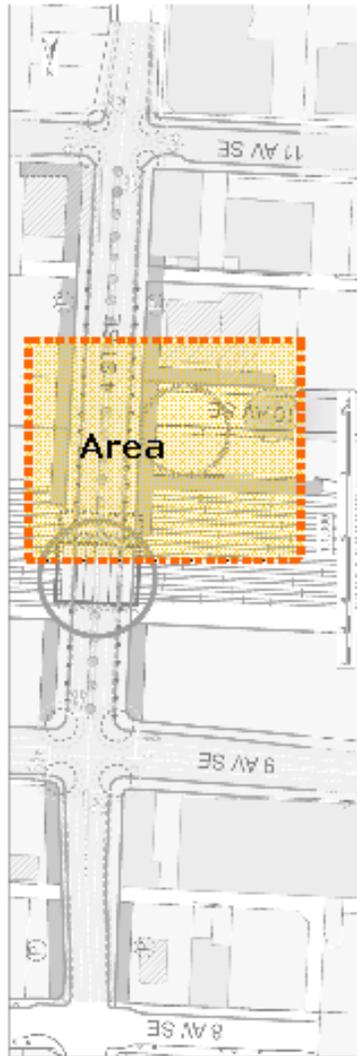
The master plan for 4 Street SE Underpass has incorporated the key principles as identified by the stakeholder groups for this underpass and many design elements that are proposed in this Guideline, including active edges, sidewalk/multi-use pathway, medians, landscaping, underpass art, etc..

Since the construction of the underpass structure and utility infrastructure has started in 2009, this mater plan is not a reflection of what is happening on the ground, but a representation of best-practice urban design solutions.

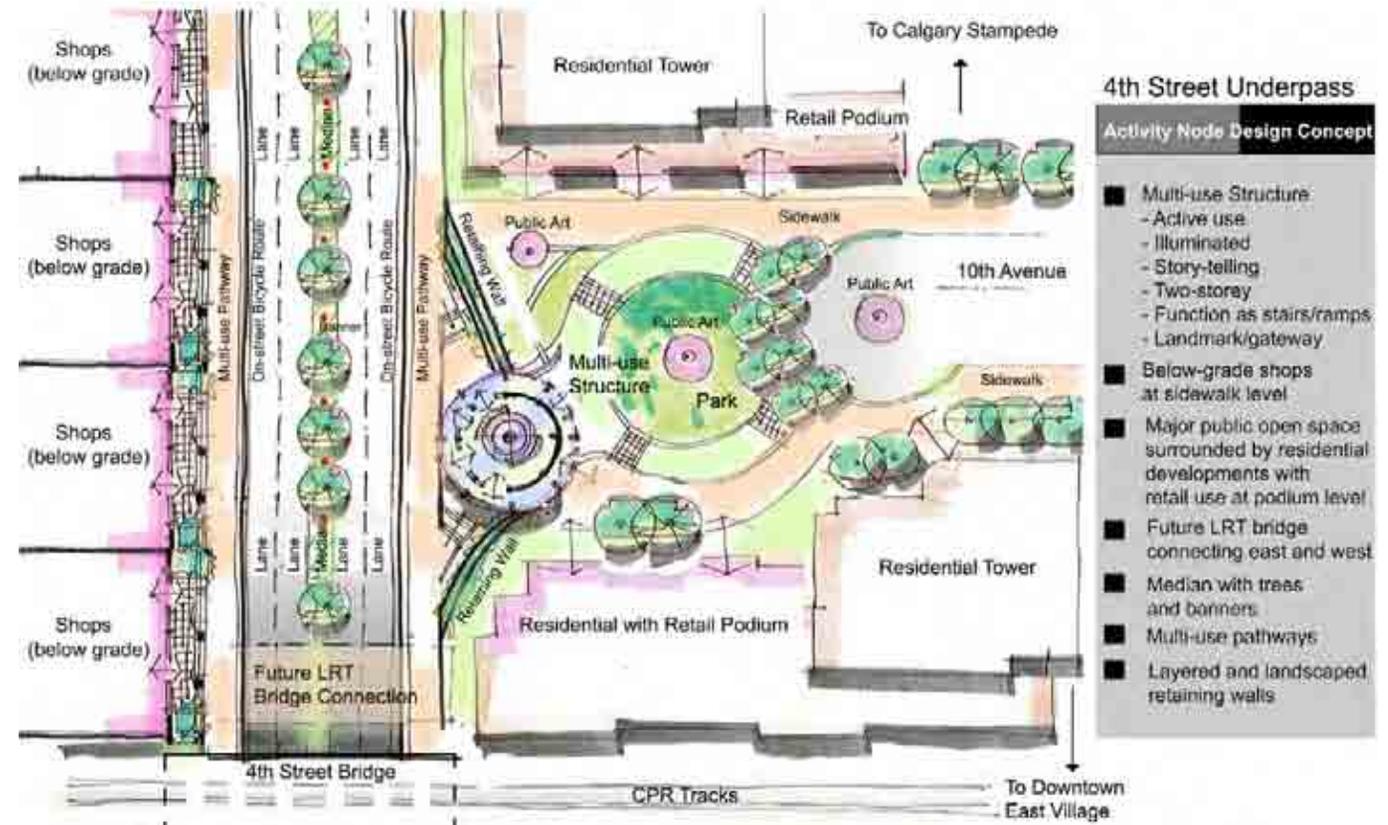


4TH STREET SE UNDERPASS

3.0 Design Elements

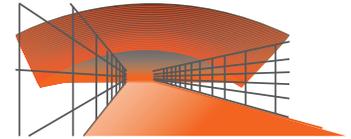


The design of active edges includes continuous active use building frontages at sidewalk level, and an activity node. The activity node provides a focal point in the area, an east-west pedestrian/bike connection, and a large green space in between the proposed high-density residential developments. The multi-use structure breaks down the long linear retaining walls and the grade difference between the sidewalk level and surrounding private properties. The 2-storey structure functions as stairs and ramps, as well as a landmark feature by incorporating active use, special lighting, and public art into the design.



4.0 Visualization

4TH STREET SE UNDERPASS



The visualization demonstrates the variety of urban design opportunities within an underpass retrofit or new construction.

The internal and external engagement and consulting processes for the new 4 Street SE underpass commenced in 2006, leading up to the design currently under construction. During the development of these guidelines, because it was completely new, 4 Street SE was used to illustrate as full a range as possible of the possible design opportunities. The consultants for the underpass urban design concept currently under construction were engaged during the creation of this document and the implemented design reflects many of the concepts discussed.

4.0 Visualization

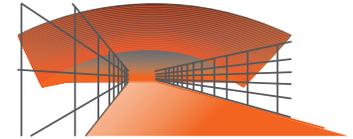


4TH STREET SE UNDERPASS



- 1 Bridge Structure
- 2 Sidewalk Zone
- 3 Off-Street Multi-Use Pathway
- 4 Active Edges
- 5 Underpass Arts
- 6 Universal Design Textile System Separating Sidewalk and Cycle Track

4.0 Visualization



4TH STREET SE UNDERPASS



- 1 Bridge Structure
- 2 Sidewalk Zone
- 3 Active Edges
- 4 Median

4.0 Visualization

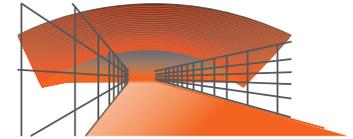


4TH STREET SE UNDERPASS

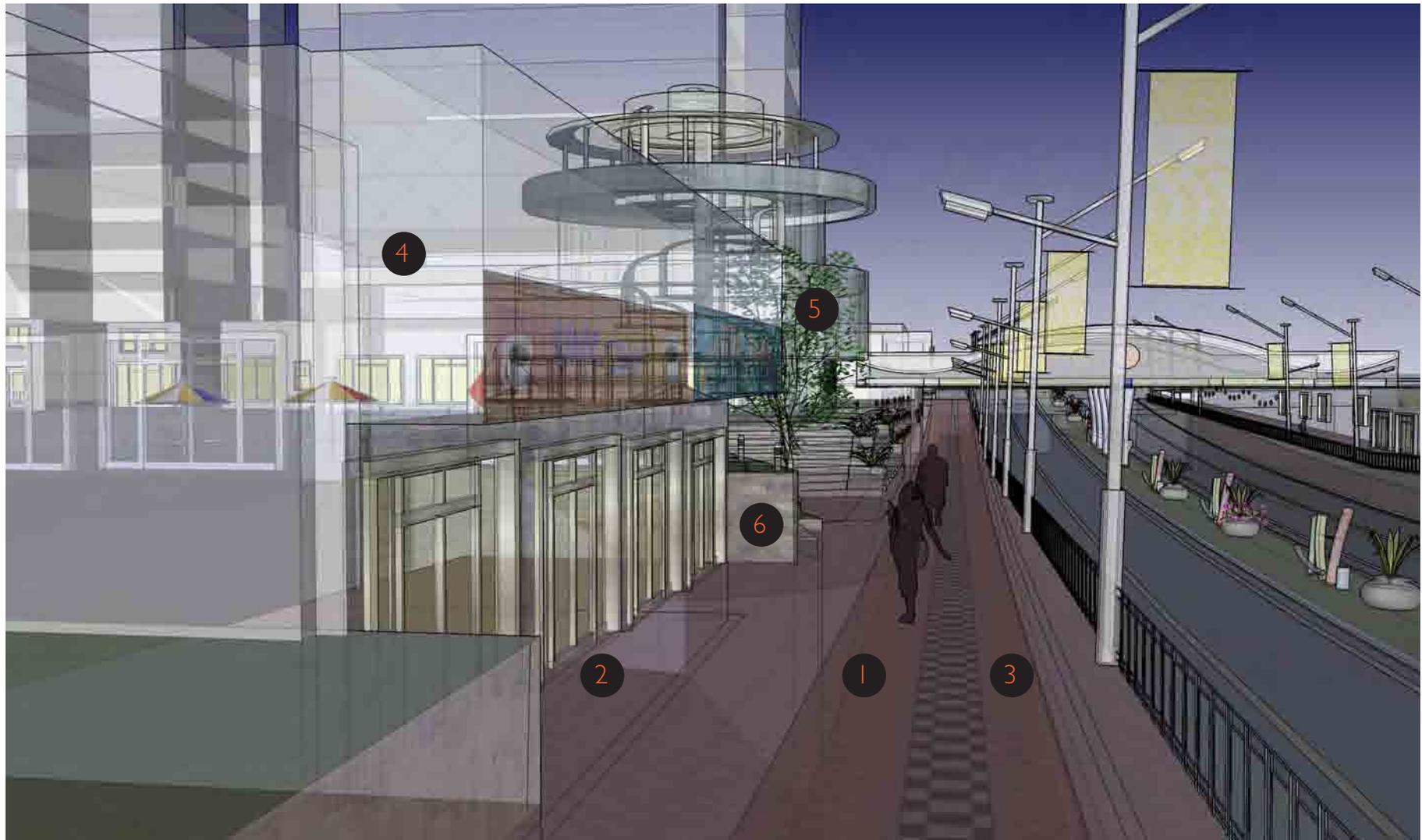


- 1 Activity Node/Multi-use Structure
- 2 Storefronts
- 3 Public Accessible Private Plaza/Park
- 4 Sidewalk Zone
- 5 Bridge Structure
- 6 Multi-Use Pathway

4.0 Visualization



4TH STREET SE UNDERPASS



- 1 Bridge Structure
- 2 Sidewalk
- 3 Off-Street Multi-Use Pathway
- 4 Active Edges
- 5 Underpass Arts
- 6 Universal Design Textile System Separating Sidewalk and Cycle Track

4.0 Visualization

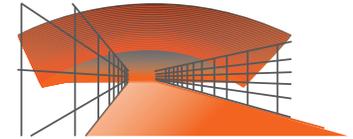


4TH STREET SE UNDERPASS



- 1 Plaza / Park
- 2 Activity Node/Multi-use Structure
- 3 High-density Residential Development
- 4 Active Edge
- 5 Universal Design
- 6 Arts

4.0 Visualization



4TH STREET SE UNDERPASS



Night time Visualization

4.0 Visualization



4TH STREET SE UNDERPASS

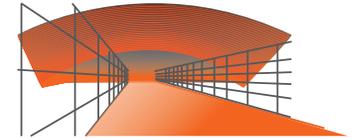
4 Street SE Underpass Consultant Design



Image by Marshall Tittlemore Architects

- 1 Plaza / Park
- 2 On-Street Bike Path
- 3 Street Lighting and Illumination Combined
- 4 Active Edge
- 5 Bridge Structure and Balustrade

4.0 Visualization



4TH STREET SE UNDERPASS

4 Street SE Underpass Consultant Design

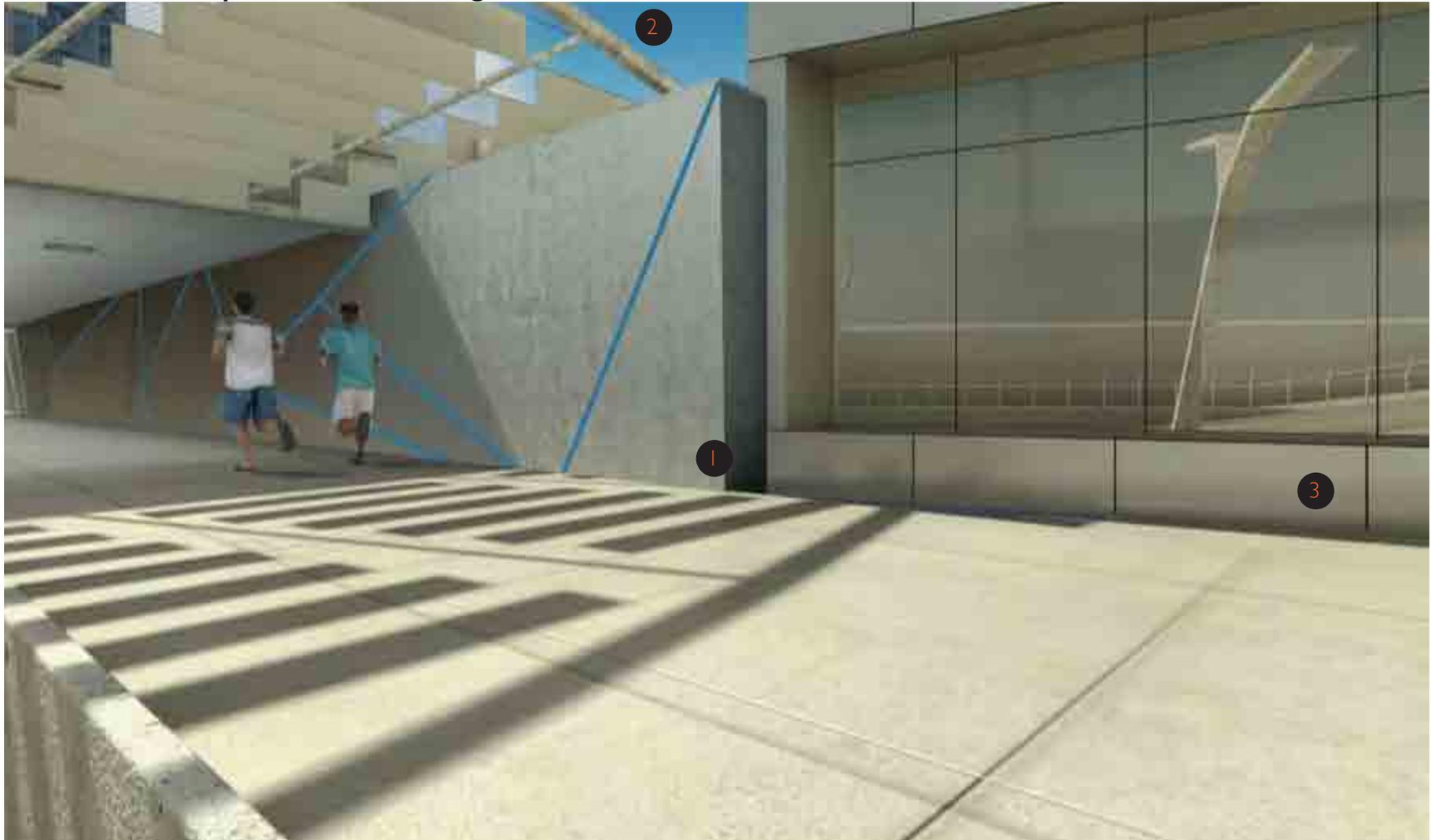


Image by Marshall Tittlemore Architects

- 1 Retaining Wall with illumination features
- 2 Bridge balustrade with bris-de-soleil public art combined
- 3 Active Edge basement-level openings and store/office fronts



4TH STREET SE UNDERPASS

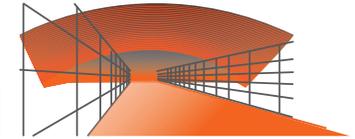
4 Street SE Underpass Consultant Design



- 1 Plaza / Park (10 Ave cul-de-sac)
- 2 Seamless pedestrian links and ramps
- 3 Wayfinding and street map
- 4 Off-street Multi-use Pathway
- 5 Patios

Image by Marshall Tittlemore Architects

Appendix D: Project Credits



DOWNTOWN UNDERPASS URBAN DESIGN GUIDELINES

Project Preparation

Urban Design & Heritage
Centre City Planning & Design
Land Use Planning & Policy
The City of Calgary

Internal Stakeholder Circulation

Land Use Planning & Policy/Centre City
Transportation Planning/Centre City
Transportation Planning/Pedestrian and Bicycle Policy & Projects
Transportation Planning/Network Planning
Transportation Planning/ Development Services
Transportation Planning/Transportation Solutions
Calgary Transit
Roads/ Subdivision Development
Roads/Streetlighting
Roads/ Bridges & Structures
Roads/Traffic Engineering
Recreation/Public Art
Parks/Urban Forestry
Centre City Implementation

“4 Street SE Community Link” Engagement Sessions 2005-2006

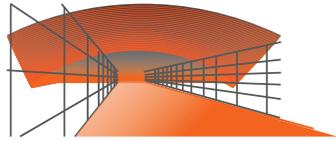
Alan Jacobs
McElhanney Consulting
Scatliff+Miller+Murray
Buckland Taylor
Aldermen, Ward 7 and Ward 8
Land Use Planning & Policy, City of Calgary
Transportation, City of Calgary
Corporate Properties, City of Calgary
Parks, City of Calgary
Recreation/Public Art, City of Calgary
Victoria Crossing BRZ

External Stakeholder Circulation

Calgary Municipal Land Corporation (CMLC)
Marshall Tittlemore Architects (MTA)
Calgary Downtown Association
Beltline Community Association
Victoria Crossing BRZ

Contact

Land Use Planning & Policy
The City of Calgary
P.O. Box 2100, Stn M #8117
Calgary, AB T2P 2M5



Appendix D: Project Credits

DOWNTOWN UNDERPASS URBAN DESIGN GUIDELINES

Photo Credits



Marshall Tittlemore Architects



Ingenieurbuero Barrierefreies Planen + Bauen,
Fulda (Germany)



Marshall Tittlemore Architects



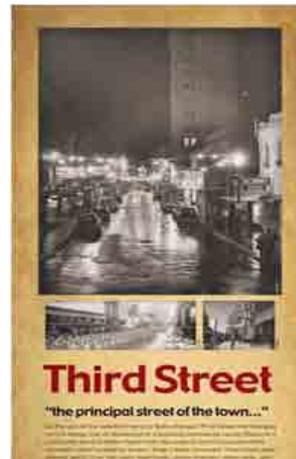
Corbin



Marshall Tittlemore Architects



Festival of Light Berlin

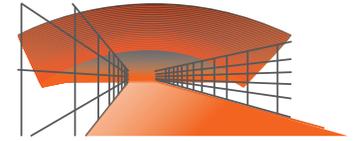


Corbin



Festival of Light Berlin

Appendix D: Project Credits



DOWNTOWN UNDERPASS URBAN DESIGN GUIDELINES



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Calgary Downtown Retail District Strategy



Calgary Downtown Retail District Strategy