

# Our Montrose

**SOUTH MONTROSE SITE MASTER PLAN**

JUNE 2016







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intelligent futures 

January 2016

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intelligent futures 

March 2016

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An aerial architectural rendering of a modern building complex, overlaid with a semi-transparent green filter. The central building features a prominent, angular, white roof structure with multiple levels and a series of vertical glass panels along its side. To the left, a large, open plaza area is populated with numerous small human figures, suggesting a public space or pedestrian walkway. The surrounding urban environment includes other buildings, streets with cars, and trees. The overall scene is presented in a clean, illustrative style.

# EXECUTIVE SUMMARY

# 1 INTRODUCTION

The Master Plan identifies public and private programming opportunities in order to develop the South Montrose Site into an arts and cultural district in a phased approach.

The goal of this Master Plan is to provide a vision that responds to the policies and guidelines highlighted in the 2004 *Downtown Enhancement Area Redevelopment Plan* (DEP). The vision transforms the South Montrose Site into a sustainable and dynamic cultural destination that serves as a downtown focal point, and encourages year-round activity.

The South Montrose Site Master Plan is a process that began in September 2015. The Master Plan process was organized in four phases:

- Pre-Engagement

- Phase 1 - Administration and Stakeholder Workshop #1
- Phase 2 - Administration and Stakeholder Workshop #2
- Phase 3 - Final Master Plan Documentation

## 2 POLICY & ENGAGEMENT

In 2004, City Council adopted the DEP which functions as a policy guide for land use and development activity within the Downtown core. The DEP outlines policies and guidelines for the future development of the South Montrose Site.

Under the City of Grande Prairie *Bylaw C-1260*, the South Montrose Site is designated as Central Commercial District. This designation permits the development of commercial, residential, institutional, cultural and other related uses in this area in accordance with the DEP.

The Cultural Master Plan identifies the South Montrose Site as a potential cultural district focal point. It also identifies a new Performing Arts Centre (PAC) as a potential city facility, stating “the majority of the discussion to date has centred around locating the PAC on the Montrose Site and creating a centralized cultural district.

In 2015, City Council approved the *Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project* report that sought to implement a portion of the DEP.

The report provides recommendations for the phased enhancement of the Downtown area, which includes areas surrounding the South Montrose Site.

From November 2015 to January 2016, the Grande Prairie community was encouraged to provide feedback on the future of the South Montrose Site. The participating citizens answered a series of questions related to the future vision of the South Montrose Site and what they felt would be most appropriate for the area. A series of workshops was held on December 15th, 2015 with City Administration and key stakeholders to give specific feedback on what they felt should be incorporated into the South Montrose Site.

The second round of engagement, between February 23rd and March 14th, 2016, offered the citizens of Grande Prairie an opportunity to give feedback on three preliminary layout options for the site. The public provided input through an online survey, or a paper complement at a kiosk station in the Montrose Cultural Centre. Another series of workshops was held on February 25th, 2015 with City Administration and key stakeholders. They provide detailed feedback on the three preliminary layout options in a more intimate group setting.

## 3 SOUTH MONTROSE SITE

The currently vacant South Montrose Site predominantly consists of grass and a temporary gravel surface parking lot on the western edge.



The site is bordered by 98th Street to the east, the Montrose Cultural Centre and 103rd Avenue to the north, 99th Street to west and 101st Avenue to the south.

Several major civic, provincial and cultural facilities surround the South Montrose Site. This includes the Centre for Creative Arts, the RCMP building, the courthouse, the provincial building, the public school board, the Montrose Cultural Centre (the Art Gallery, the Grande Prairie Public Library and Teresa Sargent Hall) and City Hall.

Approved by City Council in 2012, the concourse consists of linear paved spaces with integrated soft landscaping. Located south of the Montrose Cultural Centre, construction of the concourse is scheduled to begin summer 2016.

## 4 MASTER PLAN

*The South Montrose Site Master Plan aims to build on Grande Prairie's heritage and cultural background by creating an epicenter for arts and culture for the region. Based on community input and City policies, the Master Plan will fulfill the site's potential as a cultural hub with year-round activity.*

The Master Plan incorporates three key features which reflect policies in the DEP and feedback from the two phases of engagement. These include: (1) a mixed-use building; (2) a Performing and Media Arts Centre (PMAC); and (3) a plaza.

The mixed-use building on the southwest corner of the site can serve as a prominent gateway feature from downtown, into what is being considered as Grande Prairie's Cultural District. Grande Prairie City Council expressed the desire to explore the mixed-use building in various heights and forms:

- 4-Storey Mixed-use Mid-Rise;
- 6-Storey Mixed-use Mid-Rise;
- 12-Storey Mixed-use High-Rise; and
- 12-Storey Mixed-use 'Cultural Hub'

The PMAC, on the south-east corner of the site, serves as a destination for arts and cultural activities. Residents felt that the introduction of a PMAC is a significant need and could serve as a possible extension of existing space for more cultural activities. Furthermore, the addition of the PMAC enhances the South Montrose Site as a key arts and cultural district within the downtown.

The plaza, framed between the mixed-use building and PMAC, serves as an outdoor "Living Room" space for residents and visitors of Grande Prairie to meet, socialize, relax and experience related art and cultural activities. The configuration of the plaza can take on two forms: (1) a recessed plaza; and (2) a plaza flush with 101st Avenue. Each scenario addresses specific desires mentioned throughout the public engagement process.

Overall, the layout of the South Montrose Site Master Plan allows flexibility for the mixed-use building, PMAC and plaza to take on various

heights, massing's and forms; without negatively affecting the integrity of the Master Plan vision and design.

## 5 NEXT STEPS

In order to maintain the integrity of the Master Plan vision during future detailed design exercises, a set of design principles were developed:

- Strong Arts & Cultural Identity;
- Community Gathering Place;
- Flexible Programming & Ample Amenities;
- Site Access, Connectivity & Views;
- Environmental Consideration & Seasonal Comfort; and
- Integrated Design

Moving forward, the City of Grande Prairie needs to determine which site element - the mixed-use building, PMAC or plaza - is a priority to develop first. Also, the City should consider conducting either a feasibility or market analysis study for the mixed-use building in order to determine it's viability and potential utilization. The plaza will need to undergo further detailed design in order to determine the exact kit of parts and programming that will be incorporated into the design. Finally, the City will need to determine an appropriate funding strategy in order to have the necessary revenue to develop and phase each of the key South Montrose Site Master Plan features.

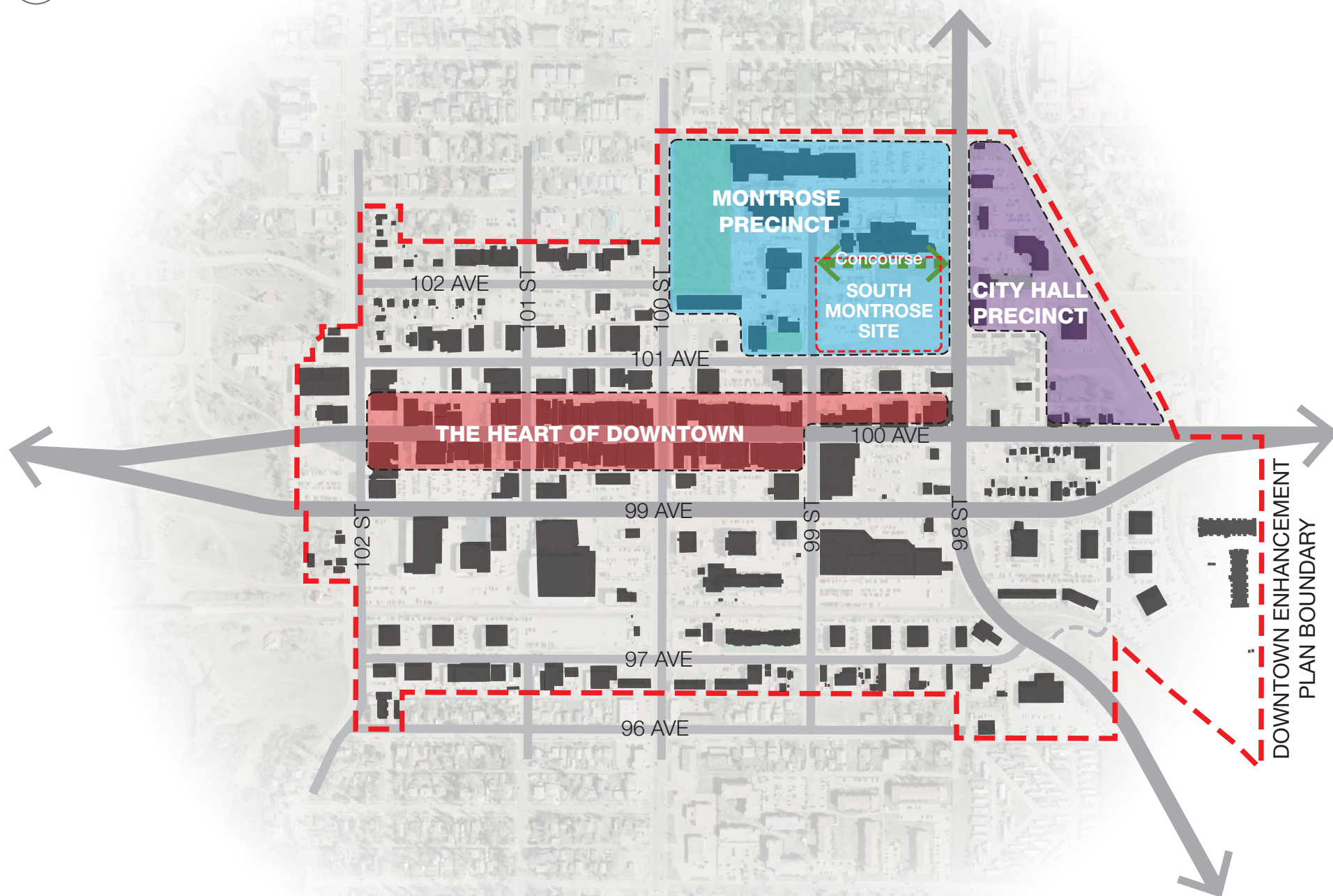






# INTRODUCTION





**Figure 1.1** Grande Prairie Downtown Context (Downtown Enhancement Project Report, 2015 - Updated for South Montrose Site Master Plan) [NTS]

## 1.1 BACKGROUND

The City of Grande Prairie issued a Request for Proposals (RFP) for urban design, engineering and landscape architecture services for the preparation of a Master Plan for the South Montrose Site. The Master Plan will identify public and private programming opportunities in order to develop the site into an arts and cultural district in a phased approach.

In 2004, City Council adopted the *Downtown Enhancement Area Redevelopment Plan* (DEP) which functions as a policy guide for land use and development activity within the Downtown core. The DEP addressed the Montrose precinct, which the South Montrose Site is located in. The DEP outlines policies and guidelines for the future development of the site. Further details on the DEP are provided in

*Section 2 - Policy & Engagement* of this Master Plan document.

In 2012, City Council approved drawings for a concourse design for the northern portion of the South Montrose Site. As part of the RFP issued by the City of Grande Prairie, urban design, engineering and landscape architecture services were also requested for the detailed engineering and construction supervision of the approved concourse design. Construction of the concourse is set to begin in the summer of 2016.

On August 22nd, 2014, City Council was involved in a workshop to shape the vision for the redevelopment of the South Montrose Site, south of the planned concourse. The workshop resulted in the identification of specific site programming and district planning opportunities, as well as a preliminary vision for the site. City Council identified particular uses for the site including: a major regional cultural facility (performing arts centre); a civic square; opportunity for private development (a mixed use building with the potential to accommodate ground floor commercial, with residential and/or office development on upper floors); and landscape amenities. Underground parking was envisioned for this site as a possible extension of the existing structure beneath the Montrose Cultural Centre. Details regarding the visioning workshop are provided in *Section 2 - Policy & Engagement*.

In 2015, City Council approved the *Downtown Infrastructure Assessment, Streetscape*

*Enhancement & Rehabilitation Project* report that sought to implement a portion of the DEP. The report provides recommendations for the phased enhancement of the Downtown area, which includes areas surrounding the South Montrose Site. Further details are provided in *Section 2 - Policy & Engagement*.

## 1.2 STUDY AREA

The South Montrose Site is a City-owned 2.2 hectare vacant property within the Montrose Precinct defined in the DEP. Along with the South Montrose Site, the Montrose Precinct currently consists of major civic and provincial facilities, such as a courthouse, provincial building, art gallery, public school board, RCMP building and Centre for Creative Arts. Located adjacent to the Montrose Precinct is the City Hall Precinct to the east, and the 'Heart of Downtown' (100th Avenue) to the south.

## 1.3 MASTER PLAN GOALS & OBJECTIVES

A Master Plan is a long-term comprehensive strategy intended to provide direction for the future development of a site. The goal of this Master Plan is to provide a vision that responds to the policies and guidelines highlighted in the 2004 *Downtown Enhancement Area Redevelopment Plan*. The vision transforms the South Montrose Site into a sustainable and dynamic cultural destination that serves as a downtown focal point, and encourages year-round activity.

The objectives of the South Montrose Site Master Plan are to:

- Create a unique vision that responds to the distinct downtown context, dynamic northern climate and greater community needs;
- Demonstrate the interrelationship between the envisioned mixed-use building, Performing and Media Arts Centre and plaza, and how they integrate with the proposed concourse plan and surrounding context;
- Study scenarios for the potential mixed-use building that illustrate various massings, articulations and uses;
- Provide preliminary architectural design and programming recommendations for the Performing and Media Arts Centre;
- Visualize a conceptual plaza design highlighting potential amenities and programming opportunities;
- Assess various parking scenarios such as underground parking on the site, or a surface parking structure within walking distance of the vicinity;
- Provide a set of principles to guide the future development of the site so that it follows the master plan vision; and

- Develop a phased approach which allows for flexibility in the construction each of the desired site features.

## 1.4 MASTER PLAN PROCESS

The South Montrose Site Master Plan is a process that began in September 2015. The Master Plan process was organized in four phases:

- Pre-Engagement
- Phase 1 - Administration and Stakeholder Workshop #1
- Phase 2 - Administration and Stakeholder Workshop #2
- Phase 3 - Final Master Plan Documentation

### Pre-Engagement

Due to a low level of awareness of the redevelopment of the South Montrose Site, the initial process incorporated the use of pre-engagement tactics to increase general interest and attention for the site. Forms of pre-engagement tactics included a newsletter featurette, as well as the use of social media. This ensured that citizens had the necessary context and information to contribute thoughtful feedback during the engagement process. Pre-engagement launched several weeks prior to the first administration and stakeholder workshops that were held in December 2015.

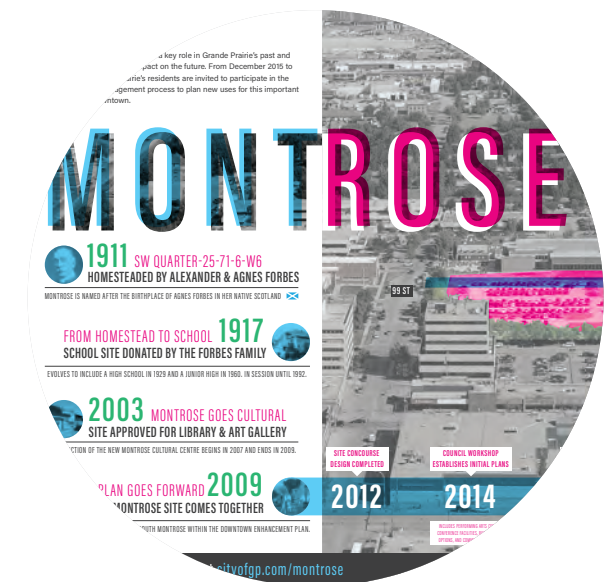


Figure 1.2 Pre-Engagement

### Phase 1 - Administration and Stakeholder Workshop #1

From November 2015 to January 2016, the Grande Prairie community was encouraged to provide feedback on the future of the South Montrose Site. The first phase of engagement focused on participation through online and paper surveys. The participating citizens answered a series of questions related to the future vision of the South Montrose Site and what they felt would be most appropriate for the area. A series of workshops was held on December 15th, 2015 with City Administration. Key stakeholders were invited to give specific feedback on what they felt should be





**Figure 1.3** Phase 1 - Administration & Stakeholder Workshop #1



**Figure 1.4** Phase 2 - Administration & Stakeholder Workshop #2



**Figure 1.5** Phase 3 - Final Master Plan Documentation

incorporated into the South Montrose Site. Further details highlighting the engagement and workshop process are outlined in *Section 2 - Policy & Engagement* of this Master Plan document.

### **Phase 2 - Administration and Stakeholder Workshop #2**

The second round of engagement, between February 23rd and March 14th, 2016, offered the citizens of Grande Prairie an opportunity to give feedback on three preliminary layout options for the site. The public provided input through an online survey, or a paper complement at a kiosk station in the Montrose Cultural Centre. Another

series of workshops was held on February 25th, 2015 with City Administration. Key stakeholders were invited to provide detailed feedback on the three preliminary layout options in a more intimate group setting. The Phase 2 engagement and workshop process is outlined in *Section 2 - Policy & Engagement* of this Master Plan document.

### **Phase 3 - Final Master Plan Documentation**

The culmination of the master plan process resulted in the completion of this document, which provides a vision for the South Montrose Site as a 'sustainable and dynamic cultural destination that serves as a downtown focal

point and encourages all-season activity'. The Master Plan document reflects the feedback, issues and concerns raised in both rounds of engagement, and provides a set of principles to guide the future development of the site in a phased approach.







**POLICY & ENGAGEMENT**



**Figure 2.1** Rendering of South Montrose Site Plan within the Context of the Surrounding Area  
(Downtown Enhancement Plan, 2004) [NTS]



## 2.1 PLANNING CONTEXT

### 2.1.1 LAND USE BYLAW C-1260

Under the City of Grande Prairie *Bylaw C-1260*, the South Montrose Site is located within the Downtown Enhancement Plan Boundary and designated as Central Commercial District. This designation permits the development of commercial, residential, institutional, cultural and other related uses in this area in accordance with the 2004 *Downtown Enhancement Area Redevelopment Plan* (DEP).

Other notable standards that would pertain to the visioning process for the South Montrose Site Master Plan include:

- Minimum 24 residential units and three (3) storeys in height (*Section 91.2*)
- Maximum 6 storey building height – “except for 12 Storeys for apartment Buildings and Mixed Use Apartment Building” (*Section 91.4*)
- No required parking stalls for any development within the Central Commercial District (*Section 75.2*)

### 2.1.2 DOWNTOWN ENHANCEMENT AREA REDEVELOPMENT PLAN

Adopted in 2004 by Grande Prairie City Council, the *Downtown Enhancement Area Redevelopment Plan* (DEP) functions as a policy guide for land use and development activity within the downtown core. For the South Montrose Site in particular, the document envisions the area becoming “the cultural district in the heart of Grande Prairie that will highlight the artistic soul of the city” (p. 33).

The DEP addresses four objectives that will guide the vision for the site:

- “Cultural Relevance: To foster a living space tailored to the needs and desires of the community and contribute to Grande Prairie’s unique identity.
- Accessibility and Safety: Ensure citizens and visitors can comfortably access the site in security.
- Climate Appropriate: To mitigate the climate to allow for outdoor use throughout the day, week and year.
- Environmentally Sustainable: To create an efficient and environmentally respectful design to meet the needs of future generations while meeting the needs today.” (DEP, p. 33)

According to the DEP, “uses that fall under the term ‘cultural facility’ include a performing arts centre, an independent film theatre, a farmers/ public market, a museum or similar uses”. Previous community and Council consultations have recommended having a performing arts centre as the principle facility on the South Montrose Site.

The concept for the site - as seen in Figure 2.1 - calls for it to be a cultural and event centre, integrating outdoor and indoor space with an approach that is interesting. It includes three primary elements:

- *The Town Square* - Serves as an informal gathering area, and premier event and festival space;
- *The Greenway* - Promenade that bisects the site and serves as a connection between City Hall and Muskoseepi Park; and
- *Additional cultural facilities* - Space for one or two cultural facilities to help realize the site as an arts and cultural precinct.



**Figure 2.2** Conceptual Rendering of the Shared Avenue at 101st Avenue and 101st Street (Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project, 2015)

## 2.1.3 CULTURAL MASTER PLAN

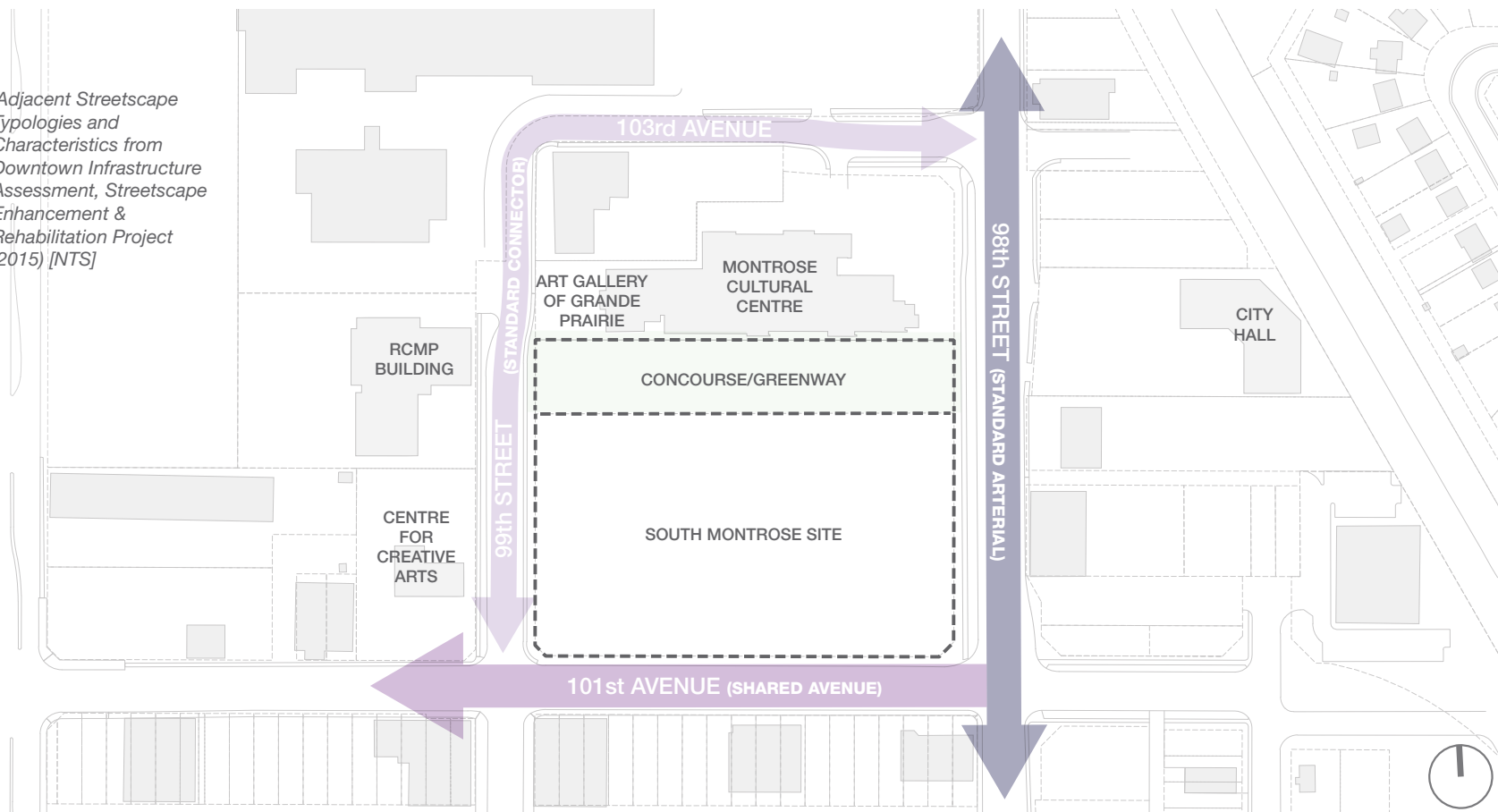
The Cultural Master Plan identifies the South Montrose Site as a potential cultural district focal point. It also identifies a new Performing Arts Centre (PAC) as a potential city facility, stating “the majority of the discussion to date has centred around locating the PAC on the Montrose Site and creating a centralized cultural district. Although other sites were suggested, Council needs to confirm whether the PAC will be located on the Montrose site” (Cultural Master Plan, p. 15).

## 2.1.4 DOWNTOWN INFRASTRUCTURE ASSESSMENT, STREETScape ENHANCEMENT & REHABILITATION PROJECT

In 2015, Grande Prairie City Council adopted the *Downtown Infrastructure Assessment, Streetscape Enhancement and Rehabilitation Project* report, which was developed to guide the implementation of a portion of the DEP. The purpose of the report was to provide Council and City Administration recommendations based on project findings related to utility/ infrastructure assessment, public engagement and streetscape enhancement.

The identified street typologies in the *Downtown Enhancement Project*, adjacent to the South Montrose Site, will need to be cohesively integrated into the South Montrose Site Master Plan vision - in particular 101st Avenue to the south as a Shared Avenue. This specific classification - as seen in Figure 2.3 - defines 101st Avenue as being a “festival street”; shifting priority over to the urban pedestrian experience. Having the Shared Avenue adjacent to the South Montrose Site potentially provides for a unique opportunity for future programming to extend onto the street.

**Figure 2.3** Adjacent Streetscape Typologies and Characteristics from Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project (2015) [NTS]



Standard Connector (98th Street / 103rd Avenue)	Standard Arterial (98th Street)	Shared Avenue (101st Avenue)
<ul style="list-style-type: none"> <li>• ±21.0m to 24.0m Right-of-way</li> <li>• One northbound and one southbound vehicular lane</li> <li>• Two lanes of standard on-street parking</li> <li>• Drive lanes reduced in size from 3.70m to 3.50m</li> </ul>	<ul style="list-style-type: none"> <li>• ±25.0m Right-of-way</li> <li>• Two northbound and two southbound vehicular lanes</li> <li>• No on-street parking</li> <li>• Drive lanes reduced in size from 3.70m to 3.50m</li> </ul>	<ul style="list-style-type: none"> <li>• ±20.0m Right-of-way</li> <li>• Maintain two-way vehicular lanes and two parking lanes on either side</li> <li>• Drive lanes can be reduced in size from 3.70m to 3.50m</li> <li>• On-street parking separated by flush curb with paving treatment from building facade to building facade</li> <li>• Continuous concrete swale and bollards delineate pedestrian and vehicular zones</li> </ul>



## 2.2 COMMUNITY ENGAGEMENT

### 2.2.1 2014 VISIONING WORKSHOP

In August 2014, a workshop with City Council was facilitated in order to shape a vision for the redevelopment of the South Montrose Site. The workshop sought to test the option of a performing arts centre as the principle use on the site. For the workshop, Council was tasked with brainstorming and generating a list of desired indoor and outdoor activities for the South Montrose Site.

The most common indoor programming suggestions were as follows:

- Performing arts centre;

OUTDOOR PROGRAMMING	INDOOR PROGRAMMING	SITE PLANNING	PLANNING PROCESS
<b>Water Feature*</b>	<b>Performing Arts Centre*</b>	<b>Connections*</b>	<b>Defined Land Use Parcels*</b>
Skating rink*	Theatre(s) (1000 seats)*	Tunnels / breezeways / covered square*	Greenway (immediate City development)
Stormwater management	Conference / convention facilities*	Temporary paths to gauge use	Public Square (short term City development)
<b>Outdoor Performance*</b>	Performing arts school	Pedestrian linkages to 99th, 100th Avenue & City Hall*	Performing Arts Centre (future development / PPP)
Outdoor stage / amphitheater*	Media arts facilities		Mixed Use (future private development / revenue)
Lookout terrace*	Museum	<b>Two Buildings*</b>	
Project onto back of PAC	<b>Mixed Use*</b>	Performing Arts Centre*	
<b>Active Program*</b>	Retail / restaurants / pubs / cafes at grade*	Mixed use building*	
Skateboard features*	Residential upper storeys*	<b>Transit</b>	
Interactive features	College	Bus stop / laybys	
Paintball range	New City Hall	Downtown shuttle	
Zip lining		<b>Parking*</b>	
<b>Passive Program*</b>		Shared underground parking*	
Outdoor exhibits		Structure with at grade retail	
Farmer's market		Aesthetic surface parking	
Seating / relaxation area*		Off-site parking	
<b>Tourist Features</b>			

\*common response

**Figure 2.4** 2014 Council Workshop Conceptual Programming Plan (South Montrose Site Report Brief, 2014)

- Building with performing arts, conference and convention facilities for rent;
- Mixed-use building with retail at grade and residential above; and
- Coffee shops and cafés.

The most common outdoor programming suggestions were as follows:

- Water feature; on-site stormwater management system that can turn into skating rink;
- Skateboard features; and

- Outdoor performance space for weekly concerts, street performers, etc. (outdoor stage, amphitheater).

Following the brainstorming session, City Council was then encouraged to sketch preliminary site configurations; using scaled footprints of a performing arts centre and public open space precedents. A second building location was also tested due to the site's large size and potential. A conceptual programming plan was generated using the list of suggestions generated during the workshop.



The conceptual plan divides the site into five zones, as described below:

- *The Montrose Greenway* - Builds upon the existing “Concourse” plan that creates a linear connection south of the Montrose Cultural Centre, from City Hall to the east towards Jubilee and Muskoseepi Parks to the west. It provides opportunities for a dynamic Greenway and to create a connection south towards a potential Civic Square.
- *The Pedestrian Hub* - Provides a passive plaza at the front entrance of the Montrose Cultural Centre; serving as the centre of a “pinwheel” formation of the Greenway connections.
- *The Civic Square* - Offers a prominent civic space at the corner of 101st Avenue and 99th Street; framed between a Mixed Use Building to the north, and a Performing Arts and Conference Centre to the east.
- *The Mixed Use Building* - Provides density to the site and a dynamic streetscape experience along 99th Street and the Civic Square.
- *The Performing Arts & Conference Centre* - Celebrates the building at the corner of 101st Avenue and 98th Street, bordered by open space to the north and west.

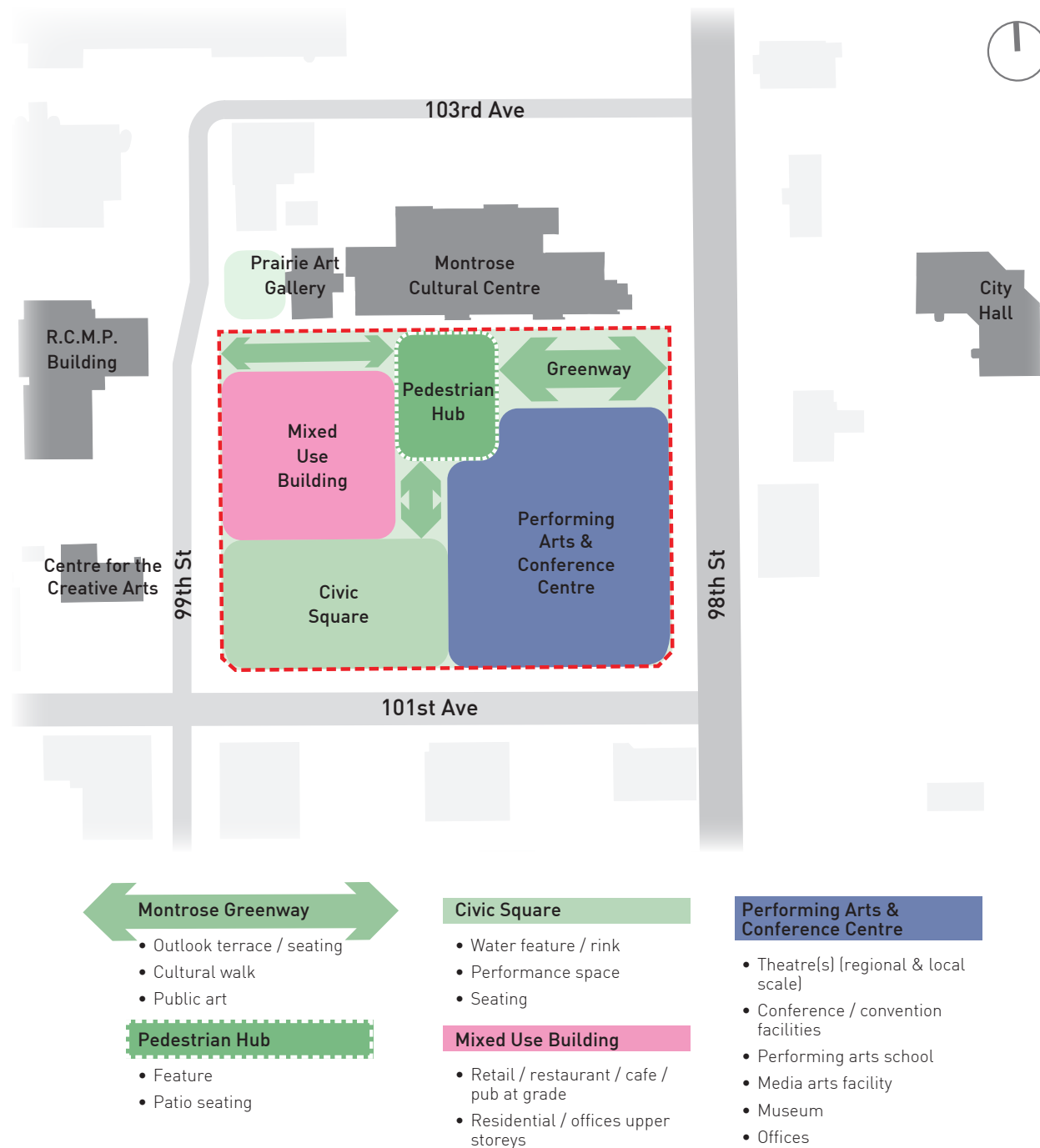


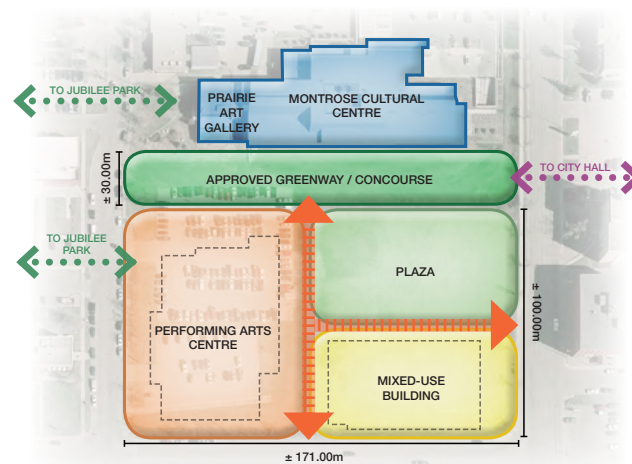
Figure 2.5 2014 Council Workshop Conceptual Programming Plan (South Montrose Site Report Brief, 2014)

## 2.2.2 PHASE 1 PUBLIC ENGAGEMENT AND WORKSHOP

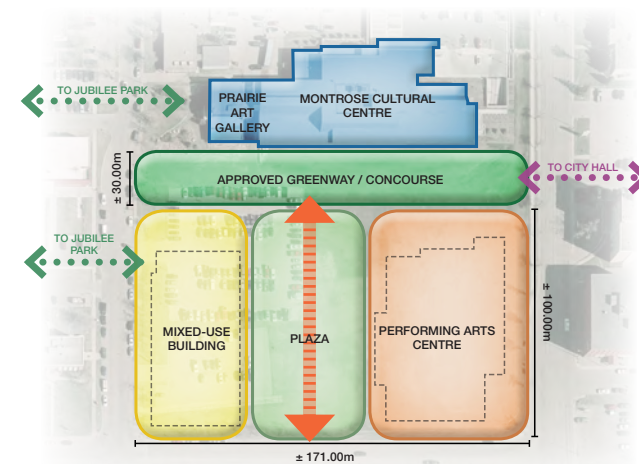
### Public Engagement

From November 2015 to January 2016, citizens of Grande Prairie were encouraged to provide feedback on the programming and preliminary design of South Montrose Site. The public engagement launch focused on participation through online and paper surveys. This process allowed for a broader form of citizen engagement. The public was asked to complete a series of questions related to the future vision for the South Montrose Site and what they feel would be most appropriate for the site. The survey covered the following areas:

- The type of uses they wanted to see for the South Montrose Site;



Civic Focused Option



Cultural Focused Option

- Other programming options they feel would work on the site;
- Their preferred public space forms and outdoor amenities;
- Arts/cultural or public spaces/plazas from elsewhere that they would like to see as an inspiration for the site's master plan; and
- Existing arts and cultural facilities they currently use within the city.

In total, the survey generated 1,051 responses between December 10th, 2015 and January 5th, 2016.

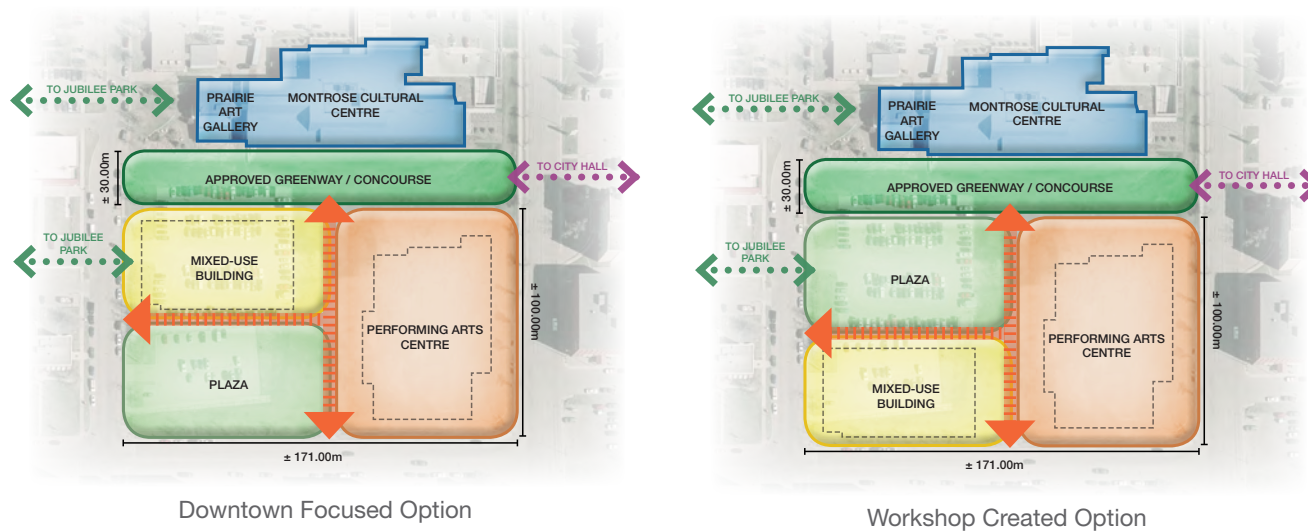
### Workshops

On December 15th, 2015, a series of workshops (an internal City Administration workshop and an external invited stakeholder workshop) was held at the Montrose Cultural Centre. The purpose

of the workshops was to obtain feedback from key stakeholders - City Administration, the Downtown Association, the local arts and culture community, and City Councillors - on what they felt should be incorporated into the South Montrose Site.

Unlike the online engagement, these workshops held a more focused discussion with the attendees. Workshop attendees participated in a series of exercises that encouraged them to choose their preference of various precedents and concepts for the South Montrose Site.

Each workshop began with a discussion about participants' favourite public spaces and cultural hubs. Attendees then discussed potential uses, design options and outdoor activities appropriate to the site, based on national and international examples. The workshop concluded with a discussion about potential



**Figure 2.6** Preliminary Layout Options Presented at the Phase 1 Stakeholder Workshop on December 15th, 2015

layout options and allowed participants to offer insight into important local factors and uses for the designers to consider.

### Overall Results

Survey respondents indicated that art/cultural facilities and park space were the best uses for the South Montrose Site. Based on those uses, respondents elaborated on the inclusion of a performing arts centre, a conference centre, space for food trucks, a venue for short films and a space for community gardens – to name a few. Furthermore, the notion of a performing arts centre was continually respondent's top choice among Council's recommended programs. The addition of a mixed-use building appeared frequently throughout the ranking.

In terms of landscape programming, respondents chose 'Flexible Plaza Space' as

the most favoured public space amenity, with 'Outdoor Performance Space' being the second favoured. The issue of parking was continually brought up throughout the engagement process.

For both internal and external workshops, the top three preferred site uses were the performing arts centre; tie between the convention centre and commercial uses; and other arts and cultural uses. The top three preferred landscape programming options for the site included 'interactive features and art'; tie between 'outdoor winter activities' and 'flexible plaza space'; and 'flexible seating'. With respect to the layout preference results, both groups suggested a fourth layout option locating the plaza across from the RCMP building and the mixed-use development at the corner of 101st Avenue and 99th Street. This was the most popular option for the external stakeholder

session because the plaza would be protected from the incoming southwest winds and solar exposure.

For the internal session, the top choice was the Civic Focused Layout. The Cultural, Downtown and 'workshop created' fourth option each received between five and seven votes of the total voter counts. In contrast, the external stakeholder group spent more time drawing their own options and experimenting with building combinations to achieve a larger plaza space. A full report of the Phase 1 results can be found in *Appendix A*.

## 2.2.3 PHASE 2 PUBLIC ENGAGEMENT AND WORKSHOP

### Public Engagement

The second round of engagement offered citizens of Grande Prairie another opportunity to provide feedback with respect to three preliminary layout options determined by the 'Functional Principles Test' (see *Appendix C*). Citizens were able to provide input through an online survey, or through a paper complement at a kiosk station at the Montrose Cultural Centre. In total, the survey generated 450 responses between February 23rd and March 14th, 2016.

The survey covered the following areas:

- Review of the initial layout options generated from the 'Functional Principles Test';
- Feedback on a preferred layout option;
- Selection of top three businesses or services that they would like to see in the mixed-use building;
- Indication of preferred style/format for each of the top six priorities from the Phase 1 Engagement: Flexible Plaza Space, Outdoor Performance Space, Children's Playground, Interactive Features/Art, Skating Rink and Water Feature; and
- Additional comments.

### Workshops

On February 25th 2016, another series of workshops was held for invited key stakeholders - i.e. City Administration, Downtown Association, local arts and culture community, City Councillors and surrounding community. Similar to Phase 1, attendees were asked to provide feedback to the same material and questions covered in the survey.

Both of the workshops followed the same format. Each began with a presentation providing an overview of the previous work done to date for the South Montrose Site. Attendees were provided a brief summary of the Phase 1 Engagement process and the corresponding results, as well as a streamlined explanation of the 'Functional Principles Test' which helped determine the most appropriate layout options to move forward with into the Phase 2 Engagement. A quick review of each of the initial master plan options and their features was presented.

The exercise portion of the workshops consisted of the attendees splitting into three groups in order to have a more intimate discussion about the three layout options with a design team member. The three groups were then split into smaller groups where they had the opportunity to provide feedback on each option, and rank their choices for uses in the mixed-use building and preferred style for plaza programming.

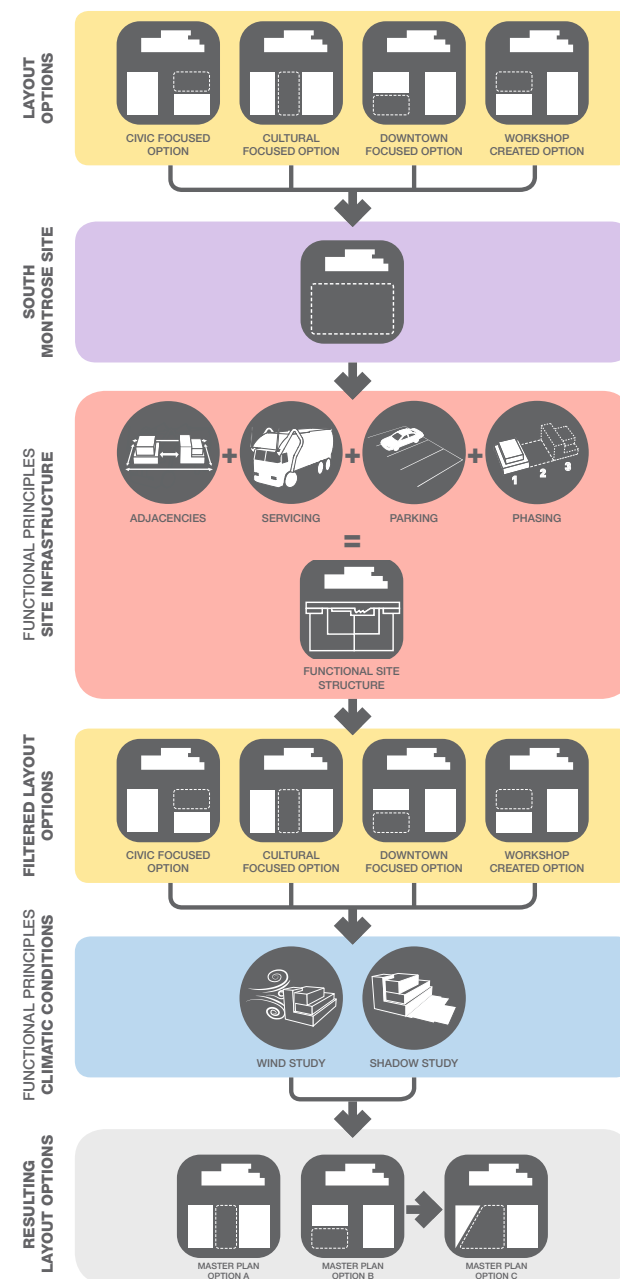


Figure 2.7 2014 Council Workshop Conceptual Programming Plan (South Montrose Site Report Brief, 2014)





Master Plan Option A



Master Plan Option B



Master Plan Option C

**Figure 2.8** 2014 Council Workshop Conceptual Programming Plan (South Montrose Site Report Brief, 2014)

## Overall Results

With respect to the presented initial layout options, the most popular of the three options was Option C. Option A was the least preferred option. Option C rated the highest in all categories of the evaluation:

- Site access;
- Views and connections to the Montrose Cultural Centre;
- Opportunities for flexible plaza programming;
- Comfort in all seasons; and
- An interesting mixed-use building.

Furthermore, Option C was preferred for its larger plaza space and for providing more sunlight.

Participants were also given the opportunity to select their top three businesses or services that they would like to see in the mixed-use building. Overall, the top five responses were 'Restaurant', 'Event Space', 'Conference Facilities', 'Learning Facilities' and 'Sports and Recreation'.

Participants provided their preferred styles/formats for the top six landscape programming options that were identified by the Phase 1 survey. Uses reviewed included: 'Flexible Space', 'Outdoor Performance Space', 'Children's Playground', 'Interactive Feature/Art', 'Skating Rink' and 'Water Feature'. Overall, the 'Water Feature' was the least preferred as it was noted that smaller local water features are

currently underutilized and that it may not be functional during the winter months.

Under additional comments, the most frequently raised issues were related to parking. The feedback ranged from asking for the site to remain as parking, to questioning the cost of underground parking and feeling unheard in the last phase when they mentioned parking.

Subsequent themes that resulted from the parking comments included the following: 'General Positive Comments', 'Questions/Concerns' and 'General Negative Comments'. Some of the 'General Positive Comments' consisted of support for the project, with many looking forward to it. Comments from the 'Questions/Concerns' theme ranged from asking if food trucks would be allowed on the plaza, to concerns about people living in the Rotary House Shelter nearby. 'General Negative Comments' included wanting to keep the cost of the project down, keeping green space and making it welcoming. A full report of the Phase 2 results can be found in *Appendix B*.



# SECTION

# 3





**SOUTH MONTROSE SITE**



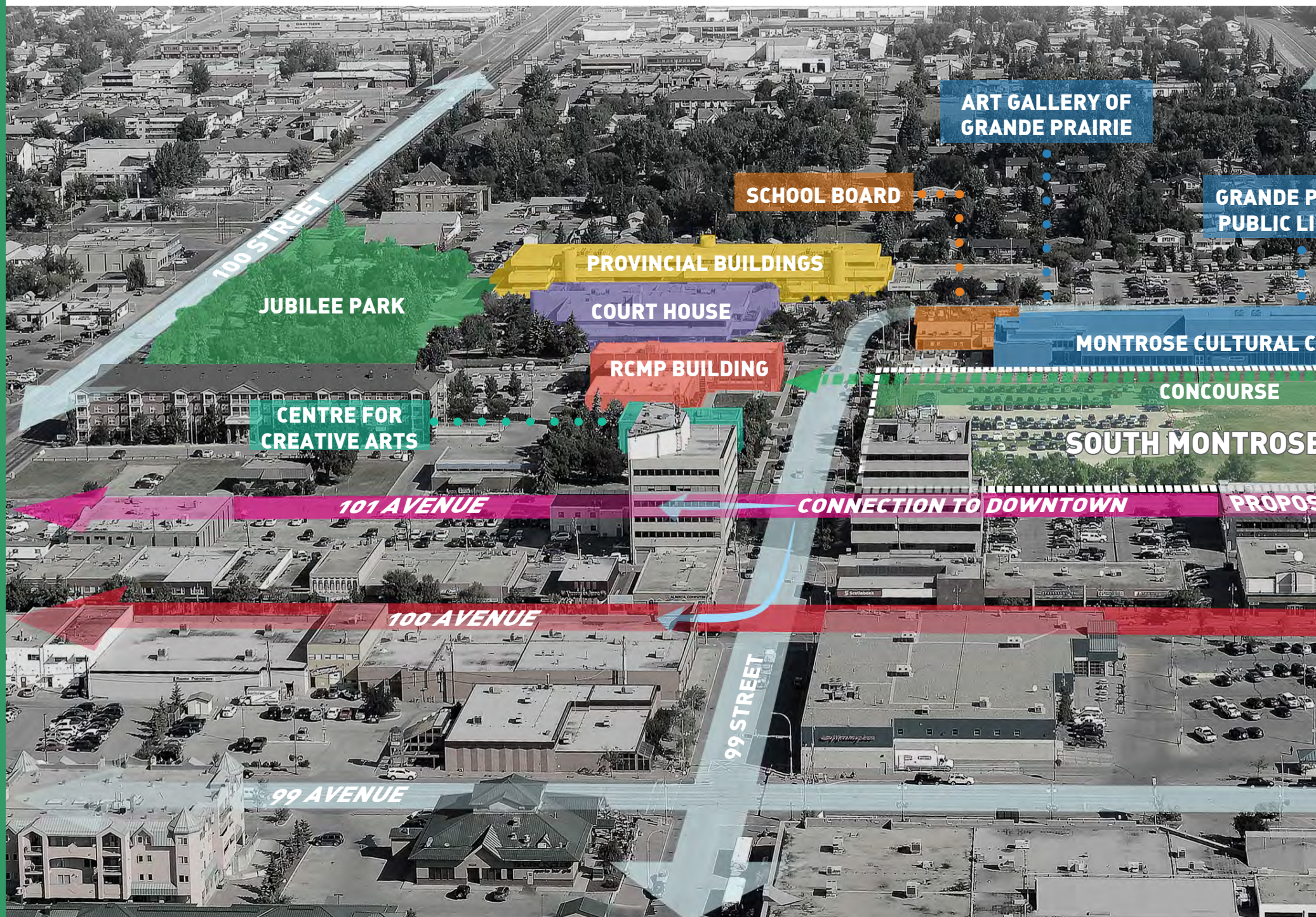




Figure 3.1 South Montrose Site Context



## 3.1 SITE CONTEXT

The 2.2 hectares South Montrose Site is bordered by 98th Street to the east, the Montrose Cultural Centre and 103rd Avenue to the north, 99th Street to the west and 101st Avenue to the south. Surrounding the South Montrose Site are several major civic, provincial and cultural facilities. This includes: the Centre for Creative Arts, the RCMP building, the courthouse, the provincial building, the public school board, the Montrose Cultural Centre (the Art Gallery, the Grande Prairie Public Library and Teresa Sargent Hall) and City Hall.

The northern edge of the South Montrose Site, adjacent to the rear of the Montrose Cultural Centre, will incorporate a 30m wide concourse. This concourse serves as a linear open green space and an east-west route from City Hall to Jubilee Park. The intersection of 101st Avenue and 99th Street serves as a key junction toward 100th Avenue, or the proposed urban avenue as classified in the *Downtown Infrastructure Assessment, Streetscape Enhancement, and Rehabilitation Project* report, and the heart of downtown Grande Prairie.





Figure 3.2 Aerial View of South Montrose Site

## 3.2 EXISTING CONDITIONS

The South Montrose Site currently remains vacant, consisting predominantly of grass and a temporary gravel surface parking lot on the western edge. Existing vegetation, which primarily borders the southern and western edge of the site, includes *Fraxinus pennsylvanica* (green ash) and *Caragana* sp. (common caragana).

Geotechnical studies completed for the concourse - see *Appendix E* - revealed certain aspects that could also pertain to the South Montrose Site. Overall, the topography of

the site gently slopes towards the south, with a less than 5:1 slope ratio away from the Montrose Cultural Centre for 10m until it becomes relatively flat. Investigation into the subsurface revealed a soil profile consisting of surficial topsoil, clay fill, buried organics, clay and clay till – in descending order. Furthermore, observations into the groundwater conditions suggests a relatively deep water table and a low permeable subgrade, as groundwater was present at a depth of 6.14m below grade near the northern portion of the temporary parking lot. Overall, further assessment of the subsurface will need to be completed in order to determine the exact conditions.

Investigation into the subsurface infrastructure in and around the South Montrose Site - described in the *Downtown Enhancement Project* report - revealed that the sanitary sewer is past its serviceable life, and the storm sewer is near its functional lifespan. The water distribution is considered adequate in most locations. It is recommended that areas that require any utility upgrades should be “designed and constructed to maximize long term capital and operation cost effectiveness” (*Downtown Enhancement Project*, p. 7) – especially with the potential introduction of site structures such as a mixed-use building and a performing arts centre on the South Montrose Site.





Montrose Cultural Centre (Rear Side of Building)



Open Lawn Fronting Rear of Montrose Cultural Centre



Temporary Gravel Parking Lot Entrance on 99th Street

**Figure 3.3** Existing South Montrose Site Conditions



**Figure 3.4** Concourse Rendering

## 3.3 CONCOURSE

Located south of the Montrose Cultural Centre are design plans for an approximate 30m by 180m South Montrose concourse. The design consists of linear paved spaces with integrated soft landscaping. Approved by City Council in 2012, the concourse has undergone the necessary public consultation process and design review to ensure that it integrates with the rest of the South Montrose Site plan.

The features of the design incorporate a central plaza fronting Teresa Sargent Hall with spaces designated for pedestrian seating and planting

zones. The site furnishings included within the concourse reflect the themes and styles suggested in the *Downtown Infrastructure Assessment, Streetscape Enhancement, and Rehabilitation Project* report. Planting proposed for the area consists of species that are native to Central and Northern Alberta. Construction of the concourse is scheduled to begin summer 2016.







**MASTER PLAN**



# 4.1 VISION

The South Montrose Site Master Plan aims to build on Grande Prairie's heritage and cultural background by creating an epicenter for arts and culture for the region. Based on community input and City policies, the Master Plan will fulfill the site's potential as a cultural hub with year-round activity.







Figure 4.1 South Montrose Site within Downtown Grande Prairie Context





Jubilee Park

103rd Street

99th Street

98th Street

101st Avenue (Shared Festival Street)



**Figure 4.2** South Montrose Site Master Plan [NTS]



## 4.2 THE MASTER PLAN

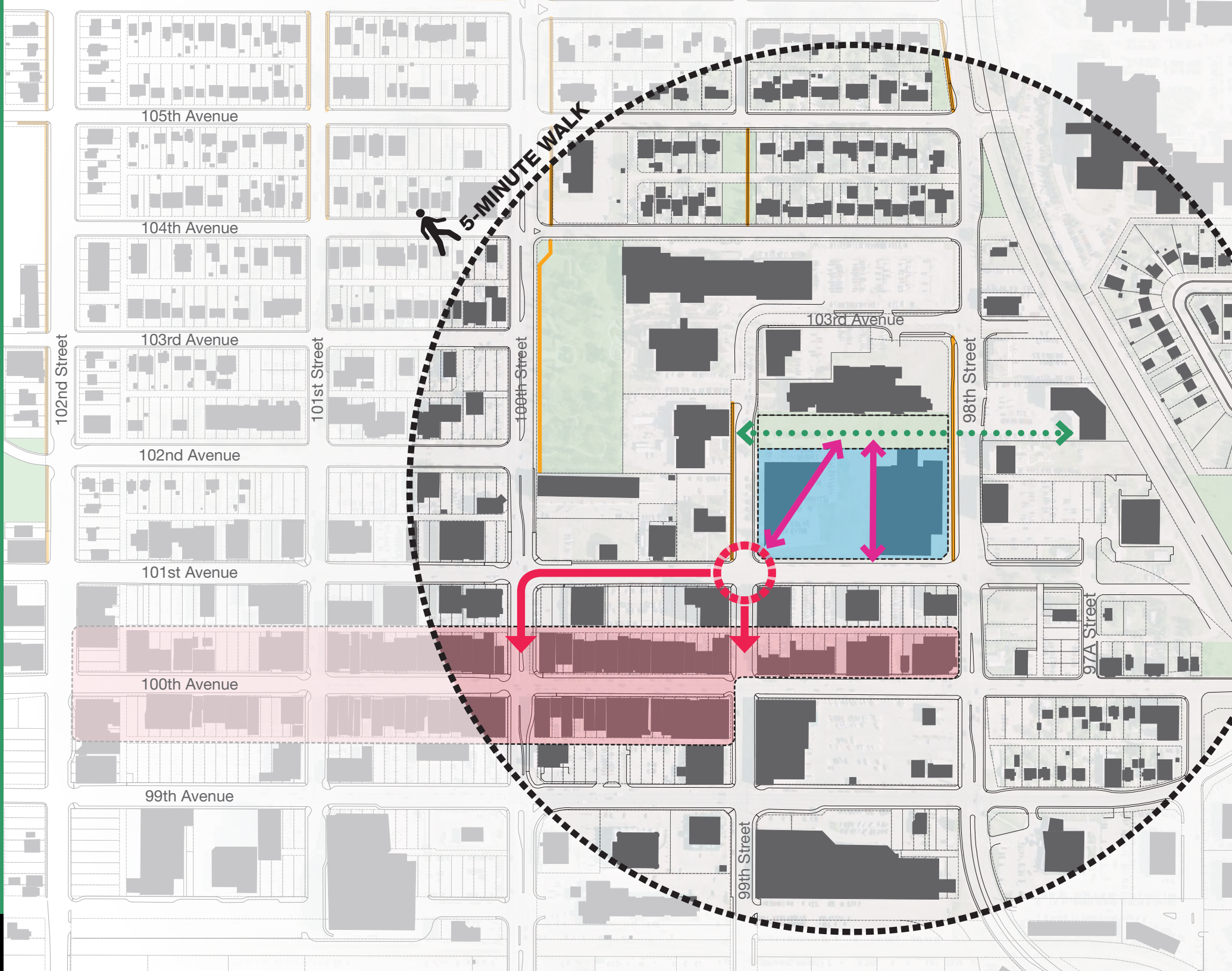
The South Montrose Site Master Plan incorporates three key features which reflect policies in the *Downtown Enhancement Redevelopment Plan*, and feedback from the public and key stakeholders from the two phases of engagement. These features include: (1) a mixed-use building; (2) a Performing and Media Arts Centre (PMAC); and (3) a plaza.

The overall layout addresses the design of the concourse and existing Montrose Cultural Centre in order to develop one holistic and cohesive plan. The plaza space, which is centrally located on the site, is framed between the mixed-use building on the west and PMAC to the east. This framing condition provides direct views of the Montrose Cultural Centre and the concourse from 101st Avenue – the proposed ‘Shared Festival Street’. The recommended angular, or ‘wedge’, condition on the east facing portion of the mixed-use building provides a visually strong diagonal connection between the Montrose Cultural Centre and the south-west corner

### Legend

- 1** Montrose Cultural Centre
- 2** Concourse
- 3** Mixed-use Building
- 4** Performing and Media Arts Centre
- 5** Plaza
- 6** Service Area
- ↔** Underground Parking Access (Full In-Out Turn)
- ↔** Underground Parking Access (Right In-Right Out Turn Only)









**Figure 4.3** Connectivity of South Montrose Site to Surrounding Sidewalk Network and Downtown [NTS]

#### Legend

-  South Montrose Site
-  Heart of Downtown \*
-  Key Intersection
-  Direction to Downtown
-  Major Pedestrian Walkway Through South Montrose Site
-  East-West Concourse Connection
-  Sidewalk Network \*\*

\* Heart of Downtown boundary based on Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project

\*\* Sidewalk Network based on City of Grande Prairie Recreation Map

towards the direction of downtown. Maintaining this visual connection remains a priority within the Grande Prairie community.

The Master Plan layout allows for full west and south sun exposure onto the plaza. The location of the mixed-use building on the south-west corner reasonably blocks unfavourable winds coming from that general direction. Servicing for both the mixed-use building and PMAC would occur on the northern side of each building. At a combined approximate surface area of ~10,120 sq.ft., the service area is large enough to accommodate a typical large truck or vehicle (i.e. catering truck, delivery van, box truck, garbage truck). Larger trucks, such as a semi-trailer, delivering equipment for potential performances in the PMAC would have to park along 98th Street.

At a larger context, the South Montrose Site Master Plan connects with the downtown commercial areas, and surrounding sidewalk and trail network as defined in the Grande Prairie Recreation Map. This could result in the South Montrose Site possibly serving as a destination point for some of these networks.

Overall, the layout of the South Montrose Site Master Plan allows flexibility for the mixed-use building, PMAC and plaza to take on various heights, massing's and forms; without negatively affecting the integrity of the Master Plan vision and design. These options are described in more depth in the following sections.



**Figure 4.4** Aerial Perspective of South Montrose Site with Flush Plaza Condition



## 4.3 BUILT FORM

The inclusion of both the mixed-use building and PMAC, along with the existing Montrose Cultural Centre to the north, within the South Montrose Site forms a strong triangulated connection; framing the plaza and concourse which results in a unified plan. Primary architectural features that the mixed-use building and PMAC encompass in order to enhance the visual aesthetic and pedestrian experience of the South Montrose Site include:

- Each building face appears to serve as a primary façade;
- Building façades fronting the plaza and 101st Avenue (Shared Festival Street) are transparent in order for indoor and outdoor activity to be seen; and
- Main entry points into each building are present on the plaza and adjacent streets.

As previously mentioned, the South Montrose Site Master Plan allows for the mixed-use building and PMAC to take on various forms without negatively affecting the integrity of its vision and design.

The subsequent sections provide specific details regarding the mixed-use building and PMAC that City Administration and Council can take into consideration when determining the most appropriate built form for the South Montrose Site.

### 4.3.1 MIXED-USE BUILDING

The mixed-use building on the southwest corner of the South Montrose Site can serve as a prominent gateway feature from the direction of downtown, into what is being considered as Grande Prairie's Cultural District. Based on the existing policies and public feedback, the primary uses that should be incorporated into the building are commercial/retail at the surface with residential above – in addition to potential office amenities incorporated between the commercial/retail and residential.

Servicing for the mixed-use building will occur on the northern face – south of the concourse boundary – with access at grade on 99th Street. Since the servicing area is on the surface, architectural screening will need to be incorporated to screen the space, while still contributing to the overall aesthetic of the South Montrose Master Plan vision.

Access to potential underground parking, exclusively for the mixed-use building, is incorporated into the building design with access on 99th Street. Although parking for new development is not required within this district under *Section 75.2 of Bylaw C-1260*, it is recommended that an underground parking structure be incorporated.

In addition, the shape of the underground parking structure is dependent on the preferred plaza design (see *Section 4.4*). If the plaza is recessed, then the first level will need to take on a triangular footprint so it does not impede

with the adjacent recessed plaza space. Any subsequent levels of underground parking can then be more rectangular. Should the plaza be flush with 101st Avenue, then the first – and subsequent – levels of the underground parking structure can be rectangular in nature.

An important design feature for the mixed-use building is a diagonal 'wedge' condition for the eastern face of the building. Incorporating the 'wedge' condition into the articulation of the mixed-use building maintains the visual exposure towards the Montrose Cultural Centre from the direction of downtown. This was deemed a priority amongst the residents and key stakeholders during the public engagement process. The height and overall massing of the building can take on multiple forms.

Grande Prairie City Council expressed the desire to explore the following model height options with various forms: 4-Storey, 6-Storey and 12-Storey. The subsequent pages present a study for each of the three mixed-use building height options, with an additional 12-Storey 'cultural hub' option. The building massing for each scenario is conceptual in nature and is subject to future change. Preliminary cost estimates for each scenario were based on Edmonton standards from the *Canadian Cost Guide 2016*. Parking stall estimates were calculated using *Section 72 of Bylaw C-1260*. Furthermore, market and feasibility studies should be completed in the future in order to determine the viability of the building uses in relation to the Grande Prairie context.



#### 4-Storey Mixed-use Mid-rise

The 4-Storey Mixed-use building scenario encompasses an approximate gross floor area of ~63,300 sq.ft (excluding underground parking); with a preliminary construction cost estimate of \$17,582,000 (including underground parking). The shape of the building is conventional in nature, but partially retains the angular building face condition for visual exposure towards the Montrose Cultural Centre from downtown. The articulation and height of the building allows the plaza to experience full sun exposure during the winter and summer months.

Along the western facade of the mixed-use building is a recessed inlet which serves as the primary access into the residential units above. In total, this scenario generates approximately 45 residential units throughout – with units

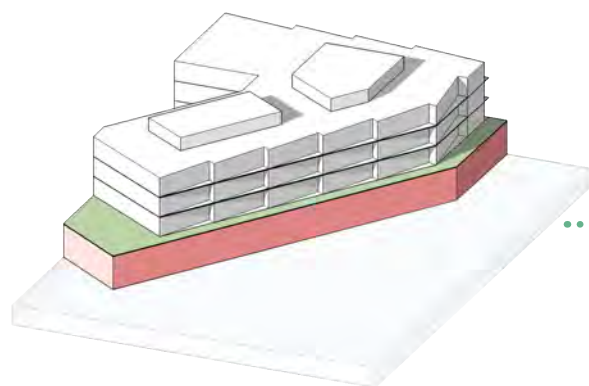
ranging between 600 sq.ft. and 1000 sq.ft. in size.

The retail/commercial component is located on the ground floor of the building, with primary views fronting the plaza. Overall, the retail/commercial component encompasses an approximate gross floor area of ~15,800 sq.ft. Other potential features incorporated into the 4-Storey scenario include the opportunity for roof-top terraces on the southern and north-eastern portion of the building; on the second storey with views onto the plaza and towards the direction of downtown.

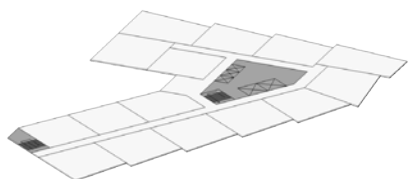
The approximate number of parking stalls required for the residential component would be 74, with the commercial/retail component requiring 22 stalls. With a gross floor area of ~44,400 sq.ft. for underground parking, the total

parking count would equal to 105. Therefore, the 4-Storey building would require approximately 1 level of underground parking in order to achieve such a yield. It should be noted that the number of levels also depends on the final plaza design. *Figure 4.5* illustrates underground parking adjacent to the recessed plaza scenario.

Figure 4.5 4-Storey Building Analysis



Approximate Cost of Building  
**\$17,582,000**



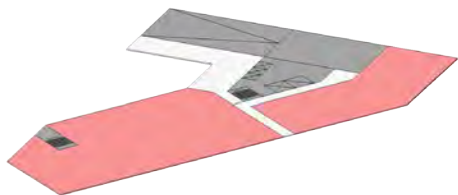
#### RESIDENTIAL

Total Gross Floor Area (3 Storeys)

**~47,500 sq.ft.**

Total Number of Units

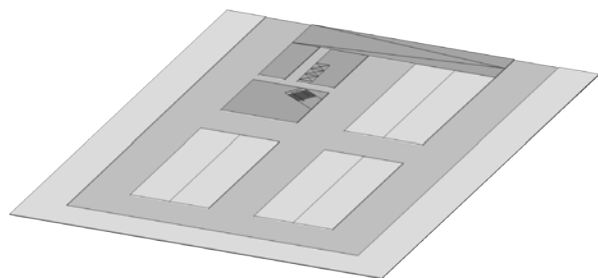
**45**



#### COMMERCIAL/RETAIL

Total Gross Floor Area (1 Storey)

**~15,800 sq.ft.**



#### UNDERGROUND PARKING

Total Gross Floor Area (1 Level)

**~44,400 sq.ft.**

Total Number of Stalls

**105**

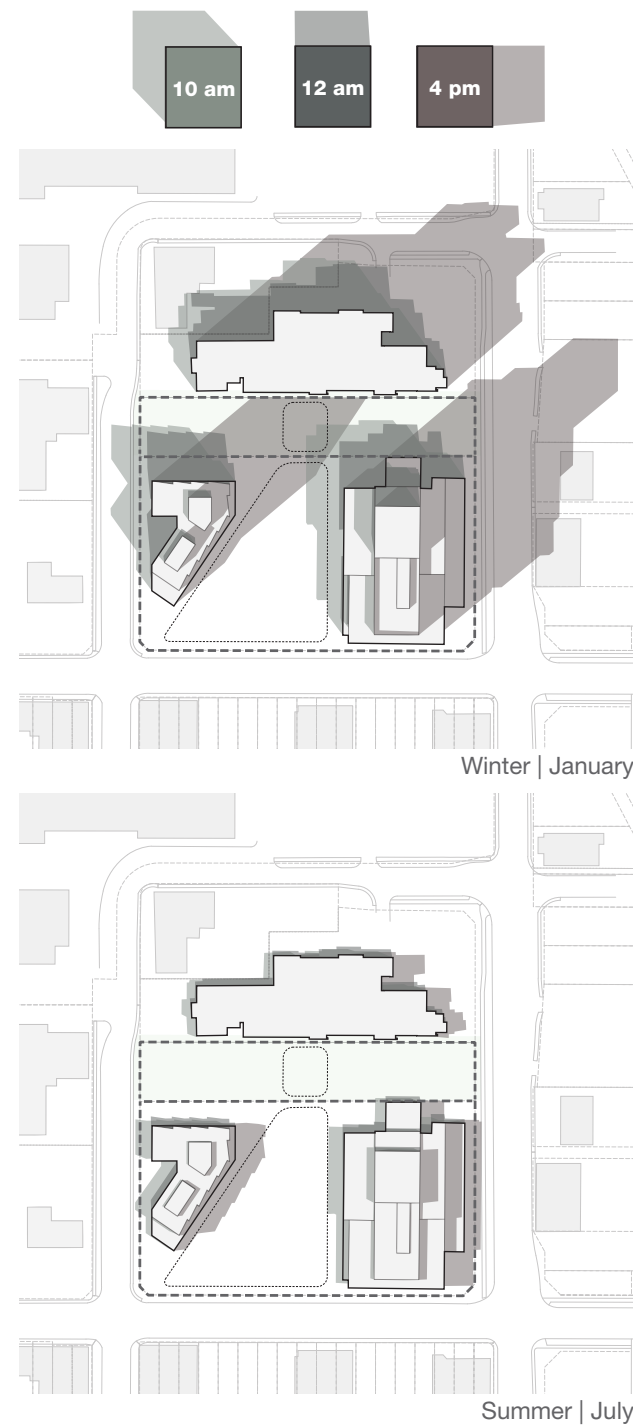


Figure 4.6 4-Storey Shadow Study



### 6-Storey Mixed-use Mid-rise

The 6-Storey Mixed-use building scenario encompasses an approximate gross floor area of ~102,720 sq.ft (excluding underground parking); with a preliminary construction cost estimate of \$26,514,000 (including underground parking). The unique shape of the building, which fully utilizes the 'wedge' condition, allows for maximum visual exposure towards the Montrose Cultural Centre from the direction of downtown. The ground floor, which contains the retail/commercial amenities has a smaller floor plate compared to the upper storeys. This allows for a cantilever condition on all sides of the building; creating microclimatic spaces along the ground floor perimeter of the building. Furthermore, the articulation of the building allows the plaza to experience favourable sun exposure year-round.

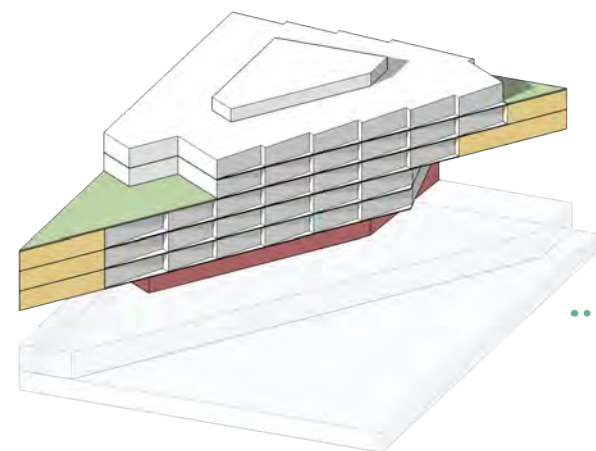
Overall, this scenario generates approximately 69 residential units throughout – with units ranging in size between 600 sq.ft. and 1000 sq.ft. With respect to access, entry into the residential component on the upper storeys are primarily from the plaza. In total, the retail/commercial component encompasses an approximate gross floor area of ~13,220 sq.ft.

Similar to the 4-Storey scenario, the massing allows for potential roof-top terraces to be incorporated. These components can be included on the 5th floor facing south-east, and on the 6th floor facing north-east. Furthermore, areas incorporating the hard angular edges from floor 2 to 4 can be utilized as flexible spaces; which can serve as potential office amenities or space for cultural activities.

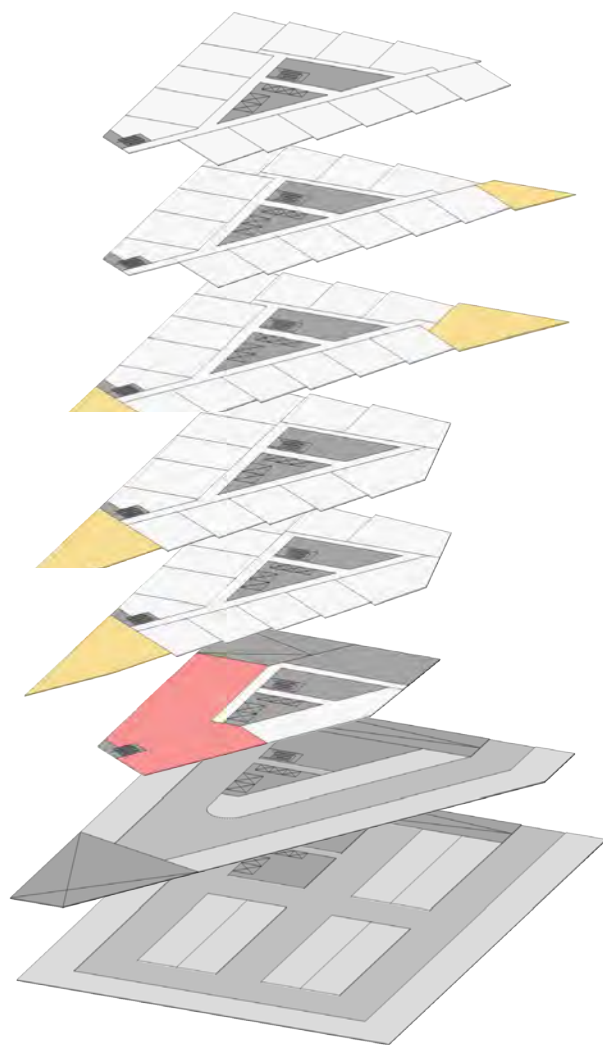
The approximate number of parking stalls

required for the residential component would be 114, with the commercial/retail component requiring 15 stalls. With a gross floor area of ~70,800 sq.ft. for underground parking, the total parking count would equal to 150. Therefore, the 6-Storey building would require approximately 2 levels of underground parking in order to achieve such a yield. As with the previous scenario, the number of levels also depends on the final plaza design. *Figure 4.7* illustrates underground parking adjacent to the recessed plaza scenario.

Figure 4.7 6-Storey Building Analysis



..... \$ Approximate Cost of Building  
**26,514,000**



..... **RESIDENTIAL**

Total Gross Floor Area (5 Storeys)

**~86,400 sq.ft.**

Total Number of Units

**69**

..... **FLEX SPACE**

Total Gross Floor Area

**~3,100 sq.ft.**

..... **COMMERCIAL/RETAIL**

Total Gross Floor Area (1 Storey)

**~13,220 sq.ft.**

..... **UNDERGROUND PARKING**

Total Gross Floor Area (2 Levels)

**~70,800 sq.ft.**

Total Number of Stalls

**150**

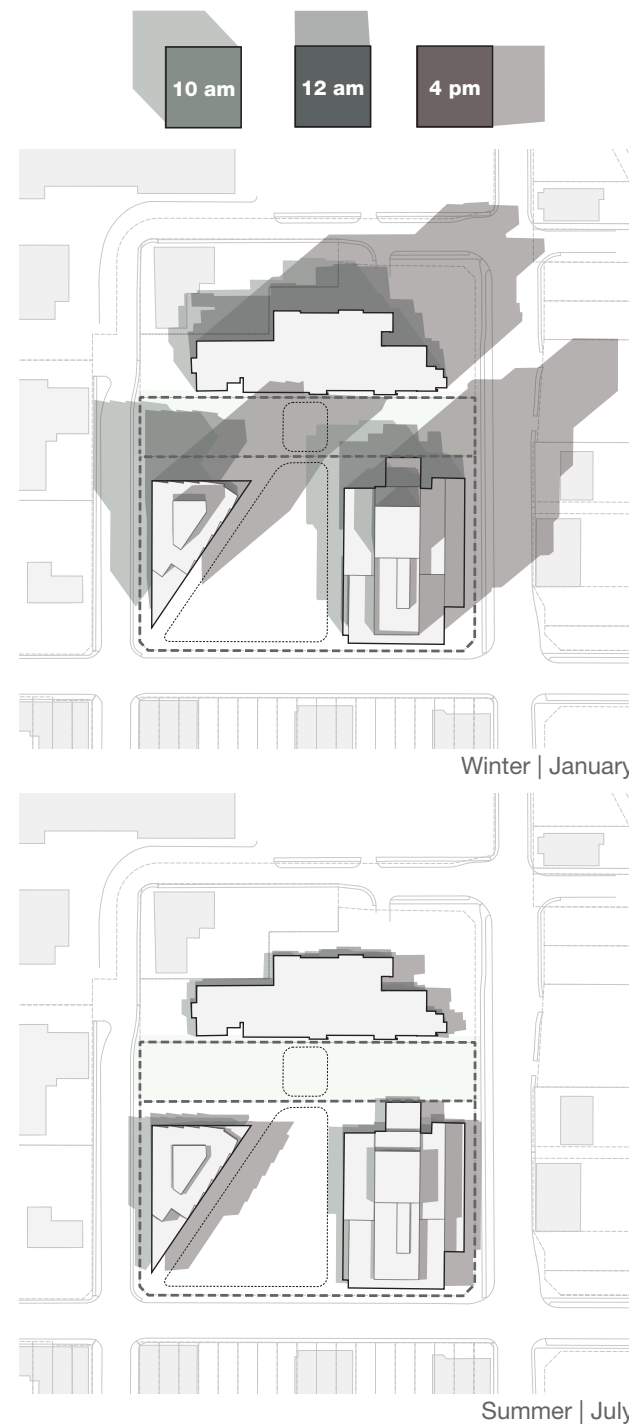


Figure 4.8 6-Storey Shadow Study



### 12-Storey Mixed-use High-rise

The 12-Storey Mixed-use building scenario encompasses an approximate gross floor area of ~148,750 sq.ft (excluding underground parking); with a preliminary construction cost estimate of \$46,100,000 (including underground parking). The configuration of the building consists of a ground floor podium with tower above. The entire building will partially incorporate the angular building facade condition to maintain visual exposure towards the Montrose Cultural Centre from the direction of downtown. The stepped-back tower above the ground floor increases visual permeability towards the Montrose Cultural Centre. Furthermore, the articulation of the building allows the plaza to experience favourable sun exposure during the winter months, but some shadowing during the summer months in the evening.

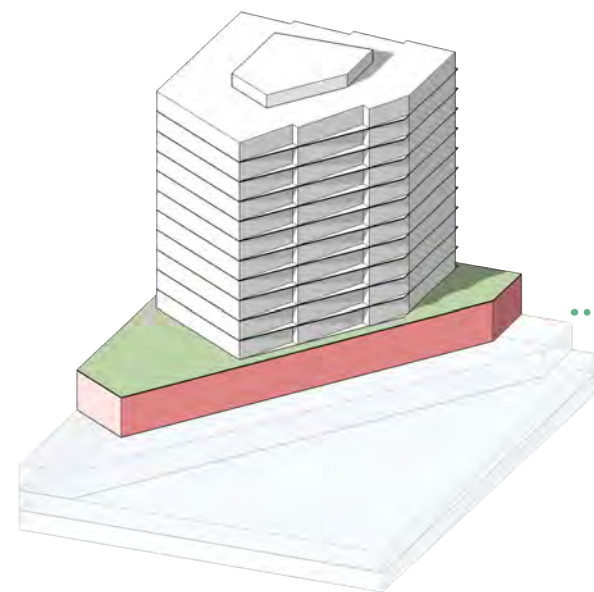
As with the 4-Storey and 6-Storey scenario, the ground floor consists of retail/commercial amenities, and the upper storeys contain residential. In total, the scenario produces approximately 110 residential units throughout – with units ranging between 600 sq.ft. and 1000 sq.ft. in size. Primary access into the residential units above would be on 99th Street. Retail/commercial amenities on the ground floor occur along the entire eastern face of the building, with some units fronting onto 99th Street. In total, the retail/commercial component would encompass an approximate gross floor area of ~19,650 sq.ft.

Similar to the 4-Storey and 6-Storey scenarios, the articulation of the building allows for potential roof-top terraces to be incorporated on the second floor of the building – above the podium. Potential roof-top terraces would be located on

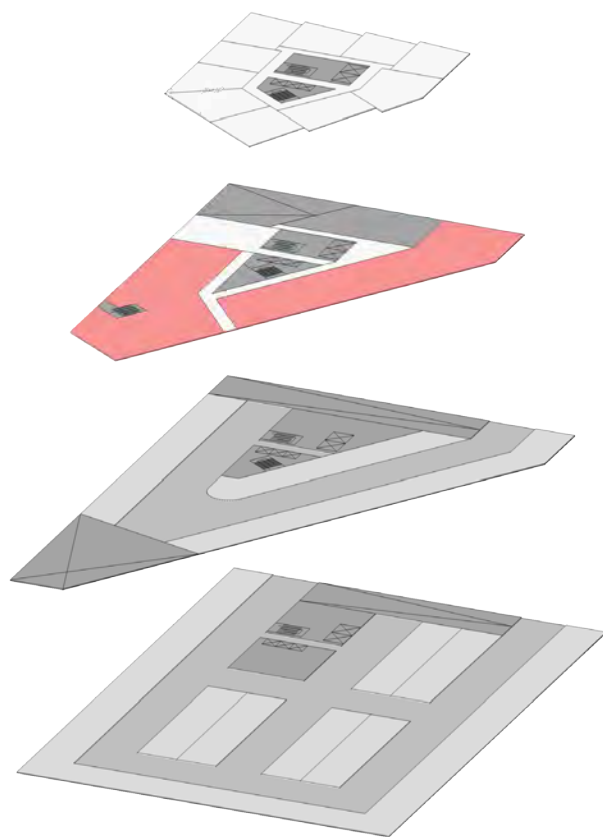
the southern and north-eastern portion of the building, with views onto the plaza and towards the direction of downtown.

The approximate number of parking stalls required for the residential component would be 182, with the commercial/retail component requiring 28 stalls. With a gross floor area of ~115,100 sq.ft. for underground parking, the total parking count would be 255. Therefore, the 12-Storey building would require approximately 3 levels of underground parking in order to achieve such a yield. As with the prior scenarios, the number of levels also depends on the final plaza design. *Figure 4.9* illustrates underground parking adjacent to the recessed plaza scenario.

Figure 4.9 12-Storey Building Analysis



Approximate Cost of Building  
**\$46,100,000**



..... RESIDENTIAL

Total Gross Floor Area (11 Storeys)

**~129,100 sq.ft.**

Total Number of Units

**110**

..... COMMERCIAL/RETAIL

Total Gross Floor Area (1 Storey)

**~19,650 sq.ft.**

..... UNDERGROUND PARKING

Total Gross Floor Area (3 Levels)

**~115,100 sq.ft.**

Total Number of Stalls

**255**

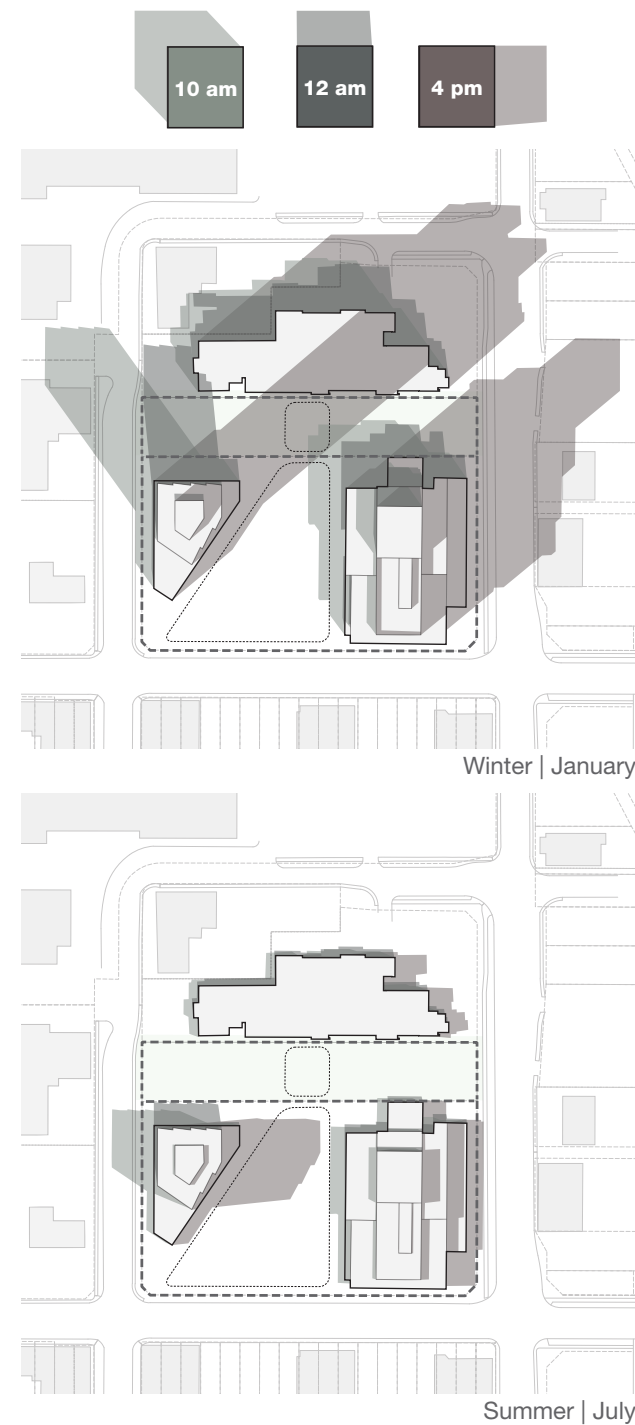


Figure 4.10 12-Storey Shadow Study



## 12-Storey Mixed-use 'Cultural Hub'

The 12-Storey Mixed-use 'Cultural Hub' building provides an alternate option to the 12-Storey Mixed-use High-rise scenario. This building incorporates several other amenities, including the desired commercial/retail and residential. These other amenities help in transforming the building into a cultural hub for the downtown. The articulation and massing of this building combines that of the 6-Storey and prior 12-Storey scenarios. Shadows casted from the building allows the plaza to experience favourable sun exposure during the winter months, but some shadowing during the summer months in the evening.

The ground floor containing the retail/commercial amenities has a smaller floor plate compared to the upper storeys - allowing for a cantilever affect on all sides. This helps in creating microclimatic spaces along the ground floor perimeter of the building.

The second and third floors provide flexible spaces for possible office, studio, gallery, incubator and performance spaces for artists and other disciplines. The shape of these two floors would utilize the 'wedge' condition; allowing for full visual exposure towards the Montrose Cultural Centre from the direction of downtown. The upper floors would consist of residential units; possibly consisting of single and family size units, live/work and affordable units.

With a gross floor area of ~113,000 sq.ft., the residential floors would approximately generate 90 units. The two floors of flexible space would encompass a gross floor area of 39,300 sq.ft. The commercial/retail would yield an approximate area of ~19,050 sq.ft.

The approximate number of parking stalls required for the residential component would be 149, with the commercial/retail component requiring 28 stalls. The flex space would require 73 stalls. With a gross floor area of ~115,100 sq.ft. for underground parking, the total parking count would equal to 255. Therefore, this scenario would require approximately 3 levels of underground parking in order to achieve such a yield. As with the other scenarios, the number of levels also depends on the final plaza design. *Figure 4.12* illustrates underground parking adjacent to the recessed plaza scenario. Overall, the estimated total cost for the 12-Storey Multi Mixed-use scenario would be \$54,213,300.

A prime example for this scenario, which can serve as a precedent for the City of Grande Prairie, is the Artists Quarters in Edmonton, Alberta. The development – a partnership between Arts Habitat Edmonton, Artists Urban Village and the City of Edmonton – is a response to Edmonton's arts and cultural community need for "affordable, appropriate and sustainable work space and the proven need for affordable housing options for low-income professional arts" ([http://www.](http://www.artistsurbanvillageedmontonab.com/the-artists-quarters.html)



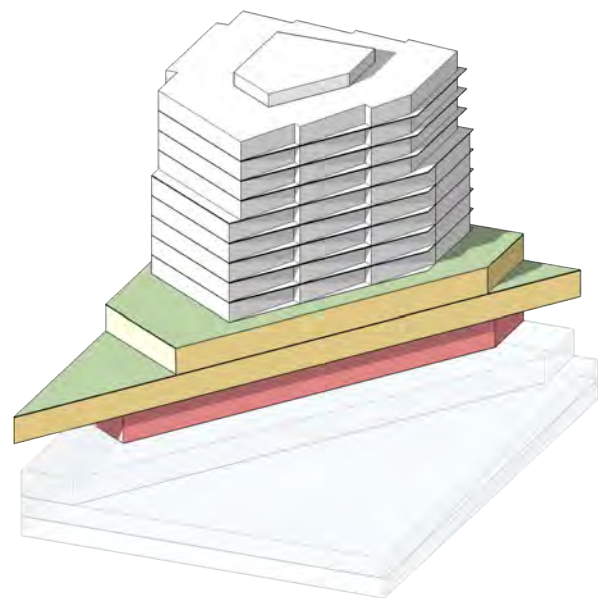
**Figure 4.11** Artists Quarters Rendering - Edmonton, Alberta  
(Photo Source. <http://artshab.com/spaces/artists-quarters/t.jpg>)

[artistsurbanvillageedmontonab.com/the-artists-quarters.html](http://artistsurbanvillageedmontonab.com/the-artists-quarters.html)).

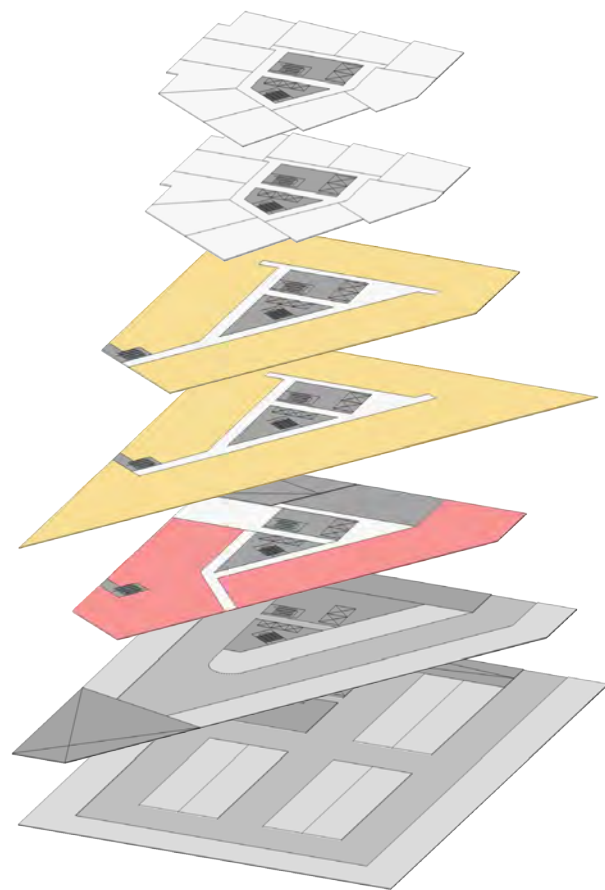
Features of the Artists Quarters example include:

- *Residential Component* – 60 units of single/family size units, live/work, separate art studios and affordable housing; and
- *Multi-use Component* – 40,000 sq.ft. of small to mid-size studios, office space, gallery, studio, workshop, performance, rehearsal and retail

Figure 4.12 12-Storey Mixed-use 'Cultural Hub' Analysis



..... \$ Approximate Cost of Building  
**54,213,300**



..... **RESIDENTIAL**

Total Gross Floor Area (9 Storeys)

**~113,000 sq.ft.**

Total Number of Units

**90**

..... **FLEX SPACE**

Total Gross Floor Area (2 Storeys)

**~39,300 sq.ft.**

..... **COMMERCIAL/RETAIL**

Total Gross Floor Area (1 Storey)

**~19,050 sq.ft.**

..... **UNDERGROUND PARKING**

Total Gross Floor Area (3 Levels)

**~115,100 sq.ft.**

Total Number of Stalls

**255**

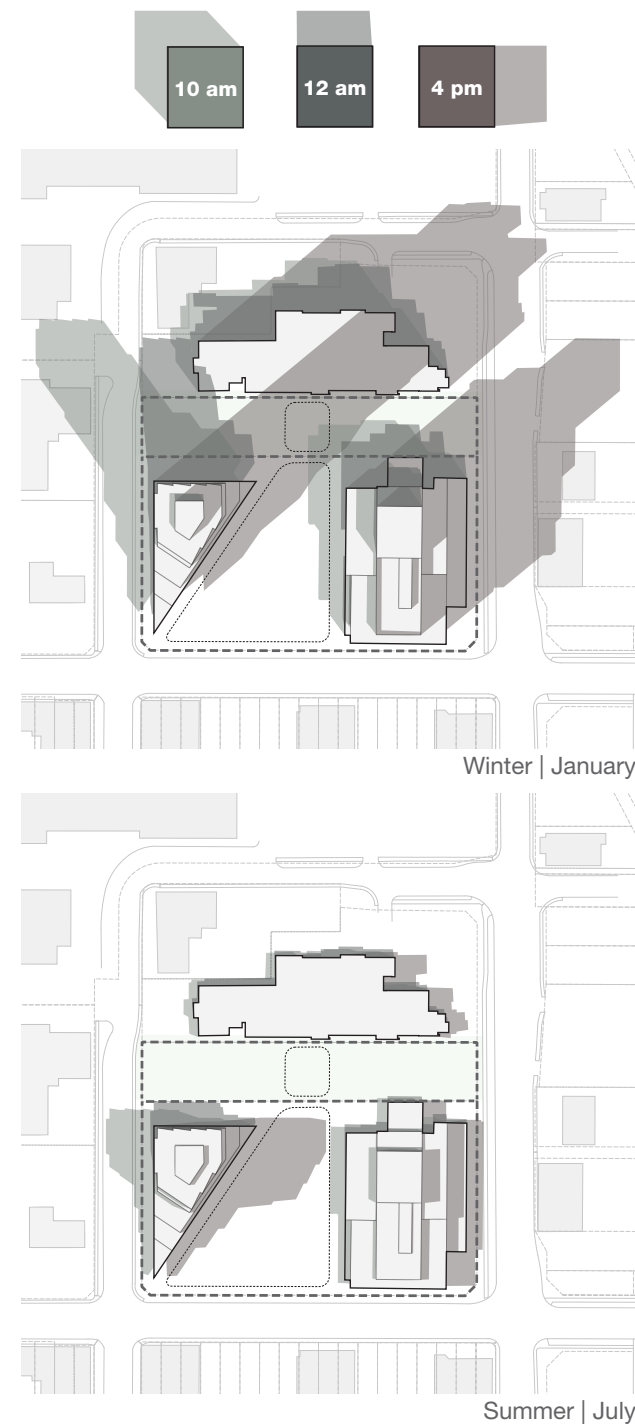
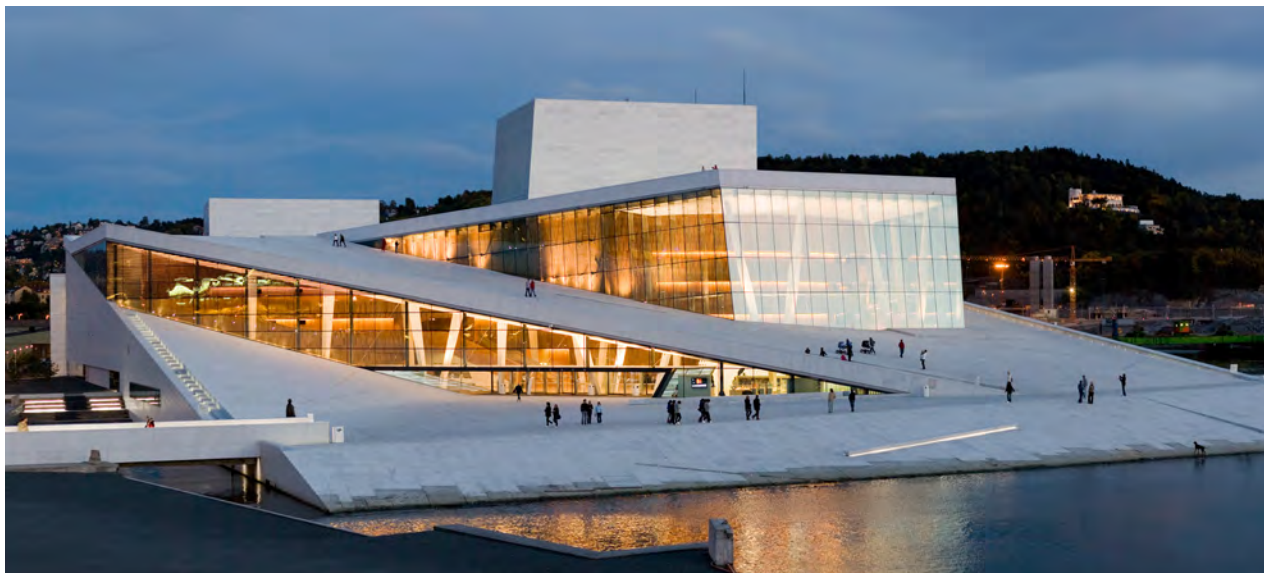


Figure 4.13 12-Storey Mixed-use 'Cultural Hub' Shadow Study





**Figure 4.14** Oslo Opera House (Oslo, Norway)

(Photo Source. [https://upload.wikimedia.org/wikipedia/commons/1/10/Full\\_Opera\\_by\\_night.jpg](https://upload.wikimedia.org/wikipedia/commons/1/10/Full_Opera_by_night.jpg))

### 4.3.2 PERFORMING AND MEDIA ARTS CENTRE

Having been deemed a priority amongst Grande Prairie residents during the public engagement process, the Performing and Media Arts Centre (PMAC), on the south-east corner of the South Montrose Site, serves as a destination for arts and cultural activities. Residents felt that the introduction of a PMAC on the site is a significant need and could serve as a possible extension of existing space for more cultural activities. Furthermore, the addition of the PMAC further enhances the South Montrose Site as a key arts and cultural district within the downtown.

For the size of the PMAC, it is recommended that an approximate gross floor area of

~150,000 to ~200,000 sq.ft. would be the most appropriate scale for the South Montrose Site. This recommended size equates to approximately 800 to 1000 seats for the main performing arts theatre. The recommended size allows for other uses to be incorporated into the building such as community studios, multi-purpose rooms and conference related facility spaces.

The massing of the PMAC facility should respect the surrounding context, with the western and southern building face serving as primary access points. Moreover, the main entrance hall and mezzanines should be located along the western edge of the building – which is to fully glazed and translucent - to allow for indoor activity to be visually exposed towards the plaza. The Phase

1 public engagement workshop revealed that stakeholders preferred the architectural design of the Oslo Opera House - see *Figure 4.14* - as it served as an invitation to enjoy and interact with the building. Therefore, it is recommended that the surrounding public space be integrated with the PMAC building in some form. For example, an outdoor mezzanine space - accessible from the plaza - built with the western face of the building allowing for more views onto the plaza and additional amenity space.

Currently, a feasibility study is underway to determine and clarify the specifics of the PMAC. The feasibility process will assist determining the scope of the project, its capital and operating costs, and governance and funding models.





Figure 4.15 Performing and Media Arts Centre Concept





Figure 4.16 Performance on the Plaza (Flush Plaza Condition)





## 4.4 PLAZA

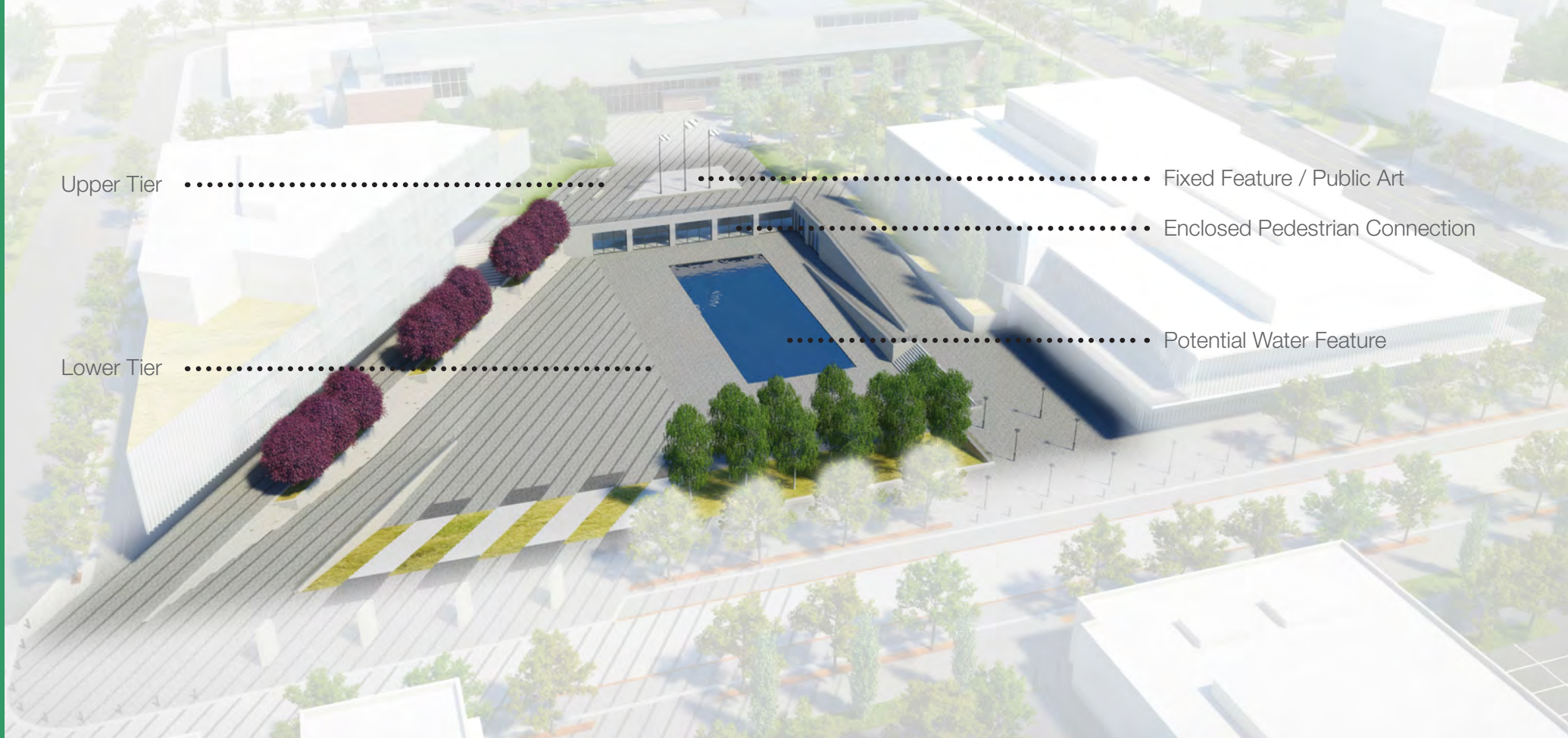
The plaza, framed between the mixed-use building and Performing and Media Arts Centre (PMAC), serves as an outdoor “Living Room” space for residents and visitors of Grande Prairie to meet, socialize, relax and experience related art and cultural activities. It incorporates designs for the proposed concourse and ‘Shared Festival Street’ scheme for 101st Avenue by integrating specific features to develop a uniform public space for the entire site and surrounding context. The integration of the plaza with 101st Avenue allows for activity to spill out onto the street, extending the plaza space beyond its limits when needed.

Overall, the plaza encompasses an approximate area of ~81,800 sq.ft. The design consists

of an upper and lower tier area in order to accommodate the subtle grade change. The upper tier functions as a transitional zone, integrating the concourse plaza with the proposed plaza space to the south. This area can incorporate more passive recreational programming and civic initiatives; as well as a viewing platform towards the lower tier. The lower tier can be utilized for more active recreational programming. This space can incorporate much larger programming such as band/theatrical performances, markets and festivals.

The configuration of the plaza can take on two forms: (1) a recessed plaza; and (2) a plaza flush with 101st Avenue. Each scenario addresses specific desires mentioned throughout the public engagement process. The following sections provide details regarding each plaza scenario.





**Figure 4.17** Recessed Plaza Condition

## 4.4.1 RECESSED PLAZA

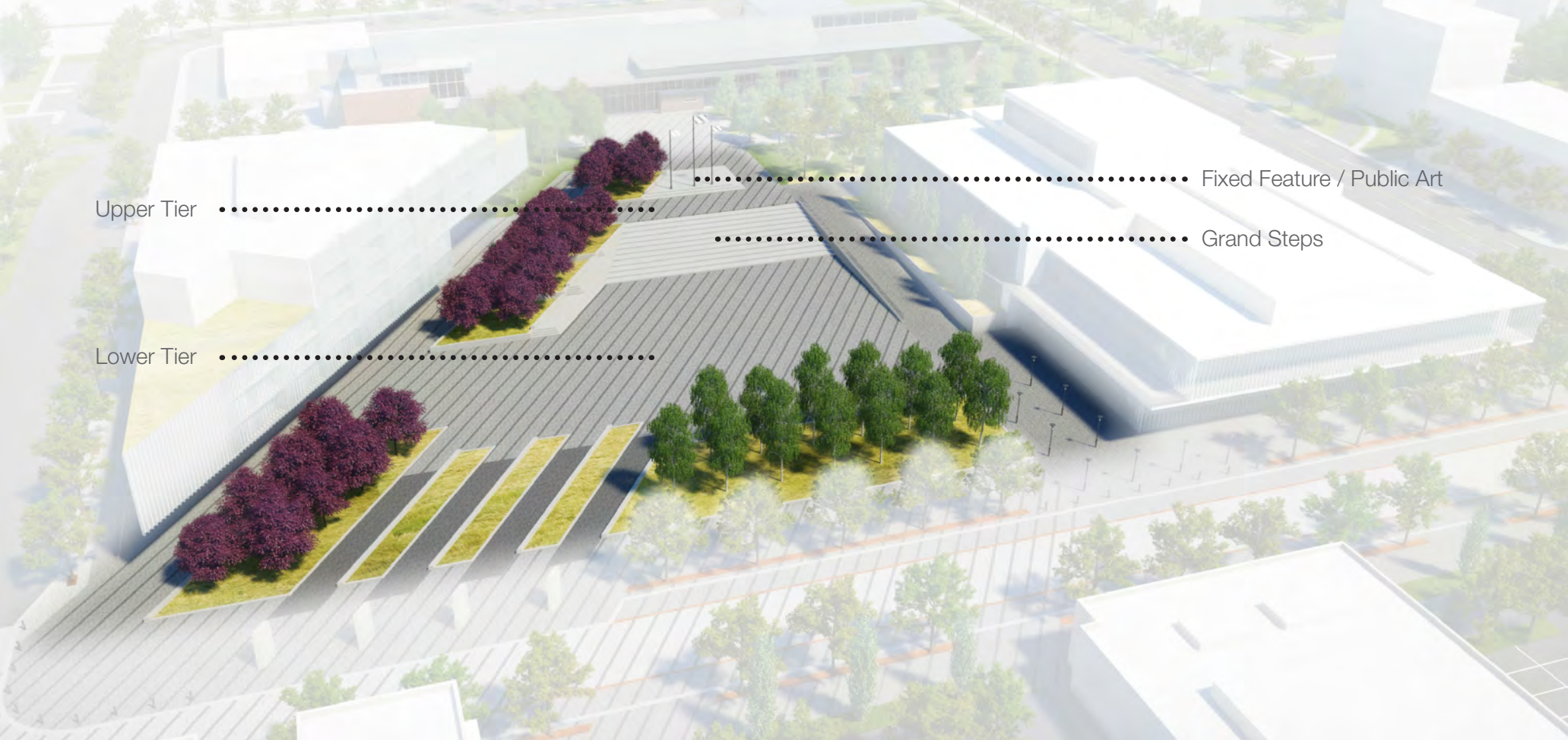
The design of a recessed plaza addresses the unfavorable climatic conditions – i.e. strong south-westerly winds – cited by residents, City Administration and stakeholders during the public engagement process. The recessed plaza space allows for reasonable protection from such unfavourable climatic conditions, without the need for incorporating tall or dense features

and vegetation that could potentially obstruct views towards the Montrose Cultural Centre.

In addition, the recessed plaza allows for an enclosed pedestrian connection between the mixed-use building and Performing and Media Arts Centre (PMAC). This was a favourable feature amongst public engagement participants, as during the winter months it: (1) provides a protected passageway between the two buildings; (2) allows for temporary kiosks/

vendors and a place of refuge for residents during programmable winter activities on the plaza; and (3) serves as potential storage for events in the plaza, site furnishing and a potential zamboni for a skating rink. The recessed plaza also creates an ‘amphitheatre-style’ setting which is more suitable for viewing potential performances on the space.





**Figure 4.18** Flush Plaza Condition

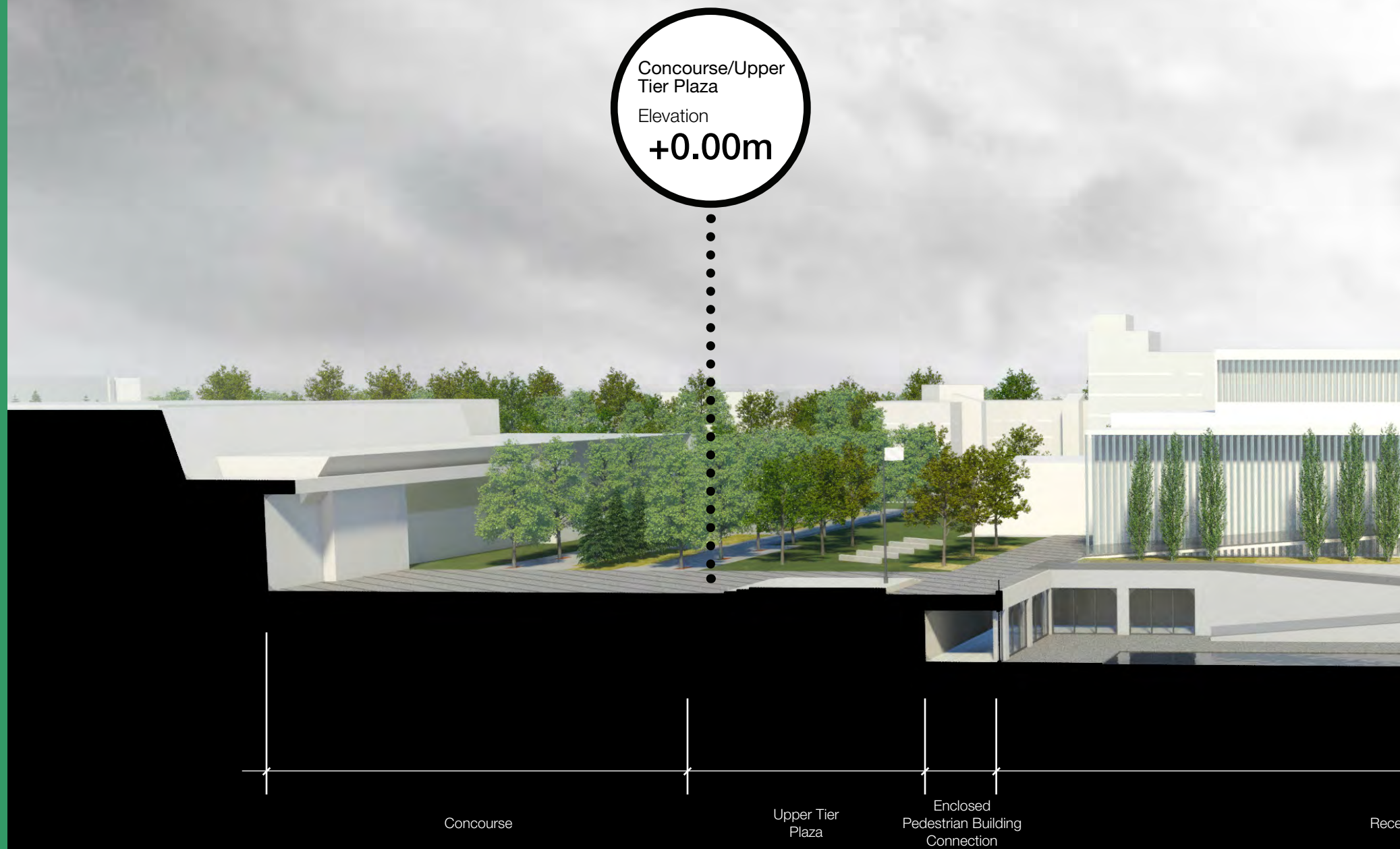
## 4.4.2 FLUSH PLAZA

The flush plaza removes the enclosed pedestrian connection between the mixed-use building and the PMAC; which is then replaced with grand steps and terracing to accommodate the grade change from the concourse. These grand steps and terracing serve as a major focal point for the space, functioning as informal seating as well as potential performance seating.

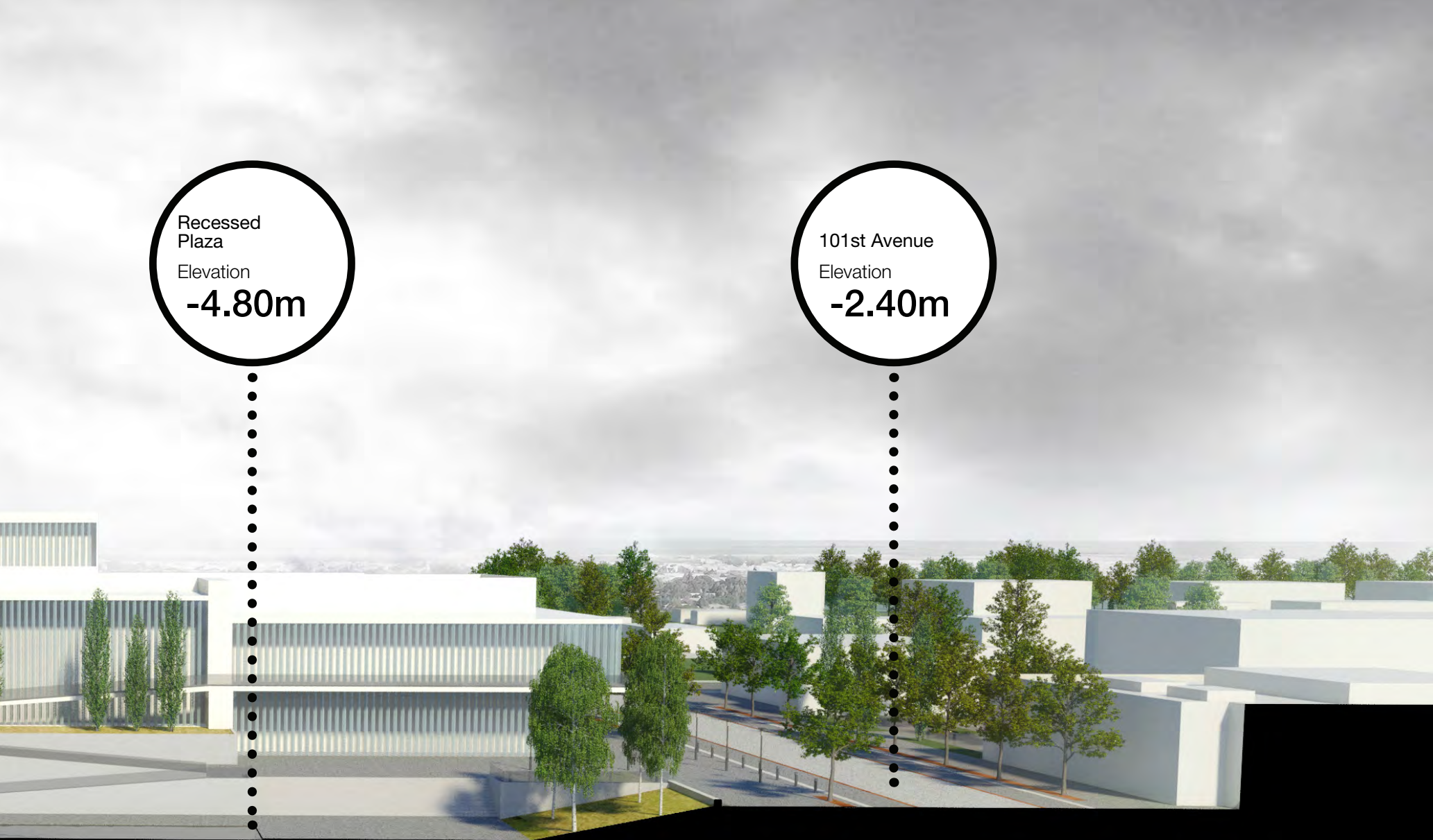
As the plaza is now flush with 101st Avenue and exposed on street level, some form of buffering tactic will need to be incorporated in order to block the unfavourable strong south-westerly winds that could potentially be experienced within the space. Incorporating dense planting and vegetation is one strategy that could help mitigate the unfavorable climatic conditions within the plaza. Another option would be to introduce fixed public art installations, which could serve as a mitigation strategy to block

out unfavorable climatic conditions, and also as visual interest highlighting the main arrival to the South Montrose Site plaza. Introducing such mitigation strategies could potentially inhibit views into the plaza and towards the Montrose Cultural Centre.





**Figure 4.19** Recessed Plaza Section



Recessed  
Plaza

Elevation

**-4.80m**

101st Avenue

Elevation

**-2.40m**

Recessed Plaza (Lower Tier)

Planting to  
Accommodate  
Grade Change

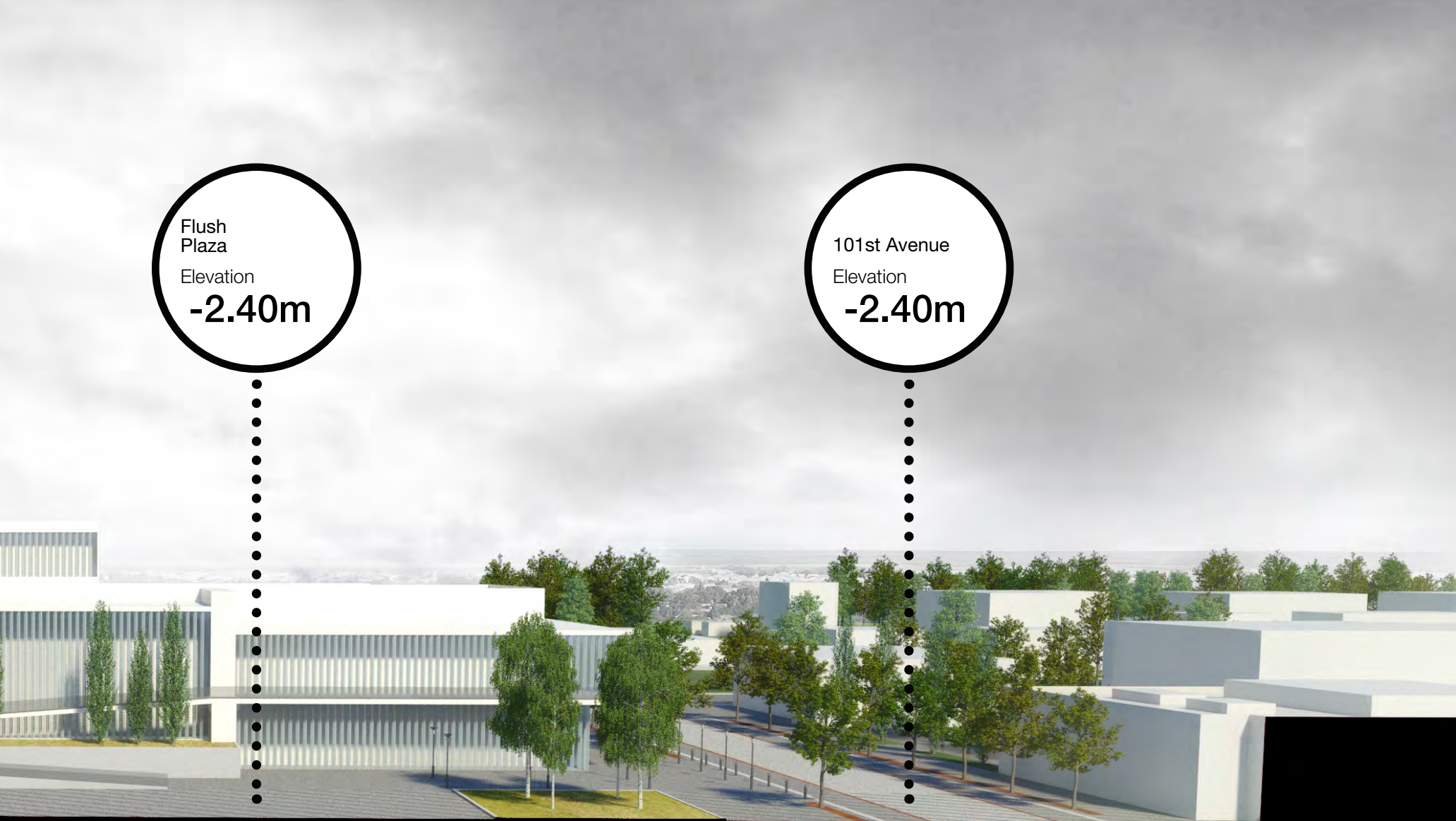
Transition Space  
Between Plaza and  
'Shared Festival Street'

101st Avenue  
'Shared Festival Street'





**Figure 4.20** Flush Plaza Section



Flush  
Plaza

Elevation

**-2.40m**

101st Avenue

Elevation

**-2.40m**

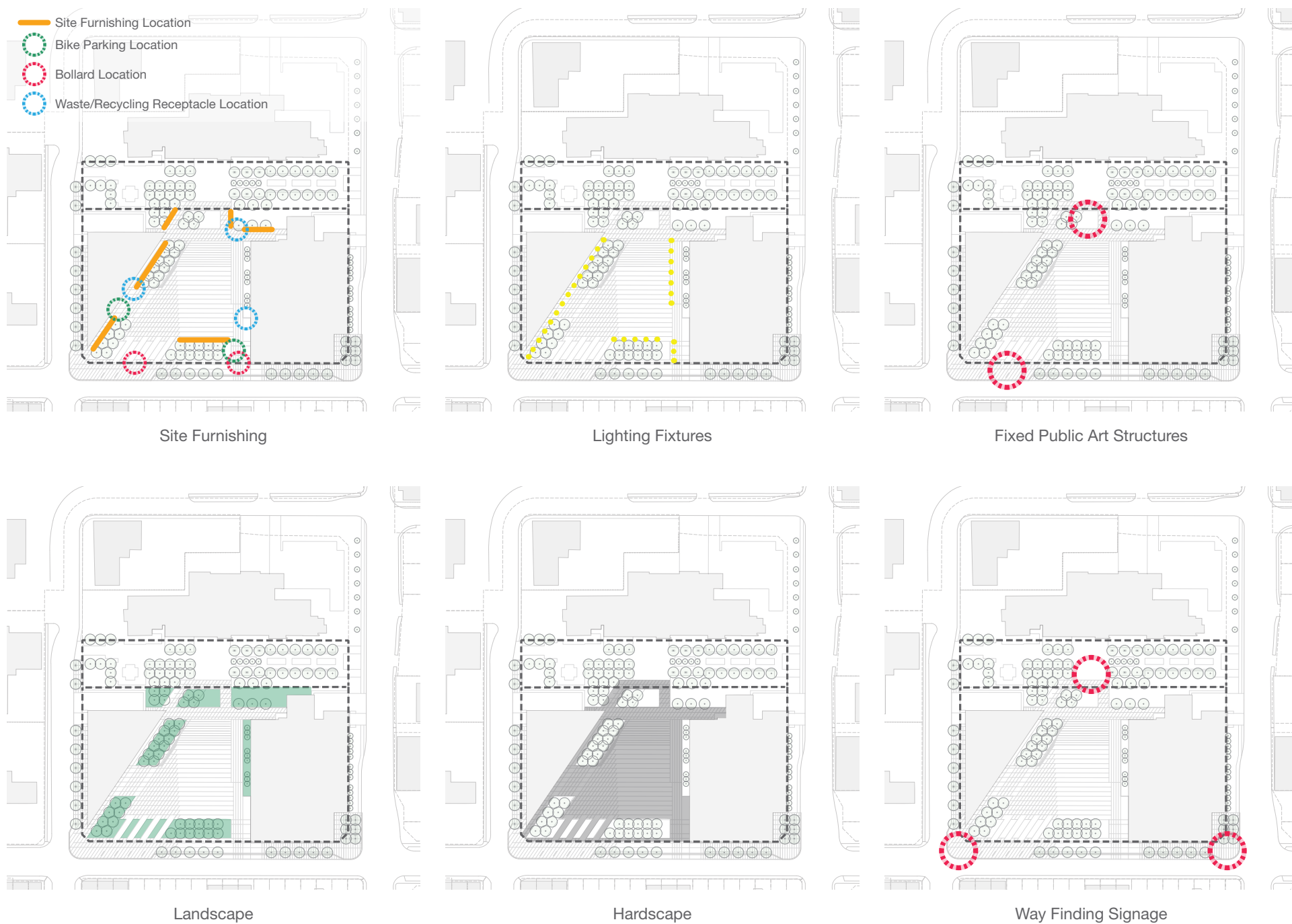
Flush Plaza with 101st Avenue (Lower Tier)

Planting Buffer

Transition Space  
Between Plaza and  
'Shared Festival Street'

101st Avenue  
'Shared Festival Street'





**Figure 4.21** Kit of Part Locations

## 4.5 PUBLIC SPACE KIT OF PARTS & PROGRAMMING

Incorporating the appropriate public space kit of parts and programming is fundamental to realizing the Master Plan vision for the South Montrose Site. This will help in creating an environment that is attractive, comfortable and usable year-round for the residents and visitors of Grande Prairie. The following subsections provide recommendations for the public space kit of parts, and how to integrate the desired programming from the public engagement into the site.

### 4.5.1 KIT OF PARTS

#### Site Furnishing

Site furnishings include fixed benches, moveable seating, retractable bollards, bike racks and waste and recycling containers. The style for

each of these features should match those incorporated in the proposed concourse design, and those highlighted for the 'Shared Festival Street' in the *Downtown Infrastructure Assessment, Streetscape Enhancement and Rehabilitation Project* report (*Downtown Enhancement Project*). Having a consistent site furnishing theme with the concourse and 'Shared Festival Street' will assist in developing a uniform design palette for the South Montrose Site and adjacent context.

Each of these features should be located in the following areas (as seen in *Figure 4.21*):

- Fixed benches and movable seating should be located along the edges of the plaza to allow for viewing spots towards potential events and performances, and passive activity. Furthermore, these features should also be located along pedestrian routes such as the those adjacent to the mixed-use building and

Performing and Media Arts Centre (PMAC).

- Bollards should be placed between the South Montrose Site property line and 101st Avenue right-of-way in order to prevent vehicles from entering the plaza at certain times.
- Bike racks should be situated near entrances into the mixed-use building and PMAC, as well as close to major access points into the plaza, in order to encourage the use of alternative modes of transit to the site.
- Waste and recycling containers should be located near entrances into the mixed-use building and PMAC, and along the edges of the plaza in order to encourage a clean city.



Bench with No Back Rest



Bench with Back Rest



Waste/Recycling Receptacle



Bike Rack



Bollard

**Figure 4.22** Site Furnishing Precedents (Bench and Waste/Recycling Receptacle by Equiparc / Bike Rack by Forms + Surfaces / Bollard by Maglin)





**Figure 4.23** Pedestrian Scaled Lighting Precedent (K581 Cobra Strut by King Luminaire)



**Figure 4.24** Fixed Public Art Sculpture Precedent (Wonderland Sculpture - Calgary, Alberta)  
(Photo Source, <https://s-media-cache-ak0.pinimg.com/564x/a9/7b/1b/a97b1b2136a7c9f666e4c46a9f33ab01.jpg>)



**Figure 4.25** Native Tree Species Precedents  
(Top Image. *Tilia cordata* - Littleleaf Linden)  
(Bottom Image. *Populus tremuloides* - Trembling Aspen)

## Lighting Fixtures

As the plaza is framed by the mixed-use building and PMAC, the space should receive a reasonable amount of indirect light from each of the buildings. This should help illuminate the plaza space during events and performances occurring in the evening. Additional pedestrian scaled lighting should be added to help define key walkways, seating areas and spaces that receive minimal lighting. The style for the pedestrian scaled lighting features should reflect those being incorporated in the concourse design in order to create a consistent theme.

## Fixed Public Art Structures

Incorporating public art into the plaza can enhance the character and identity of the South Montrose Site as being the arts and cultural district of downtown Grande Prairie. Public art should be incorporated along the southern edge of the site; acting as a gateway feature to invite residents and visitors to experience the plaza, surrounding spaces and buildings. Furthermore, a structure at this location – depending on its design – could serve as a measure to reasonably block the unfavorable south-westerly winds. Another public art piece should be located

on the upper tier plaza in order to encourage pedestrian movement up to the concourse and Montrose Cultural Centre from 101st Avenue.

## Landscape

Introducing planting areas contributes to the overall aesthetics of the South Montrose Site. In order to maintain consistency with the design of the concourse, the South Montrose Site should incorporate similar planting schemes within the plaza and adjacent walkways. Plant material incorporated into the landscape should be native to Central and Northern Alberta.

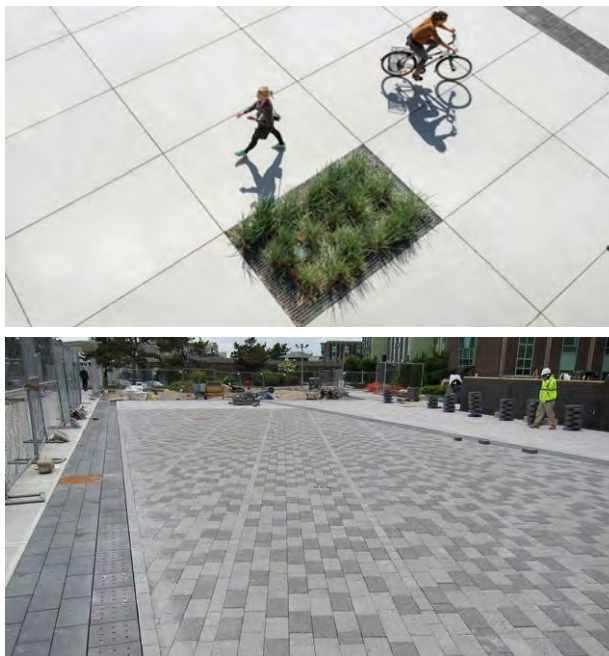


**Figure 4.26** Native Shrub Species Precedents  
(Top Image. *Sporobolus heterolepis* - Prairie Dropseed)  
(Bottom Image. *Calamagrostis x acutiflora* 'Karl Foerster' - Feather Reed Grass)

Depending on City Council's decision over a preferred plaza configuration, a plaza flush with 101st Avenue would require more vegetation in order to reasonably buffer the unfavorable south-westerly winds, as per feedback from the public engagement. On the other hand, a recessed plaza would require minimal planting, and serve more as an aesthetic feature.

### Hardscape

Hardscape throughout the South Montrose Site should consist of paving similar to the concourse, and those suggested for the 'Shared



**Figure 4.27** Plaza Paving Precedents  
(Top Image. Concrete Paving with Regular Interval Control Joints)  
(Bottom Image. Unit Paving Bands)

Festival Street' in the *Downtown Enhancement Project* in order to achieve a uniform design. To provide some variation, the poured concrete condition – used in the concourse – should be supplemented with unit pavers as an accent to enhance specific areas of importance within the South Montrose Site. This includes potential active areas within the plaza, key pedestrian walkways and primary access points into the overall site.

### Way Finding Signage

Including way finding signage provides direction



**Figure 4.28** Way Finding Signage Style (*Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project, 2015*)

for residents and visitors to explore all the potential amenities being introduced within the South Montrose Site. Signage should be located on the upper tier plaza so that residents and visitors exiting the Montrose Cultural Centre can receive proper direction to amenities to the south. Furthermore, signage should also be situated at the corners of 98th Street and 101st Avenue and 99th Street and 101st Avenue to provide residents and visitors direction towards amenities to the north – i.e. the concourse and facilities within the Montrose Cultural Centre.



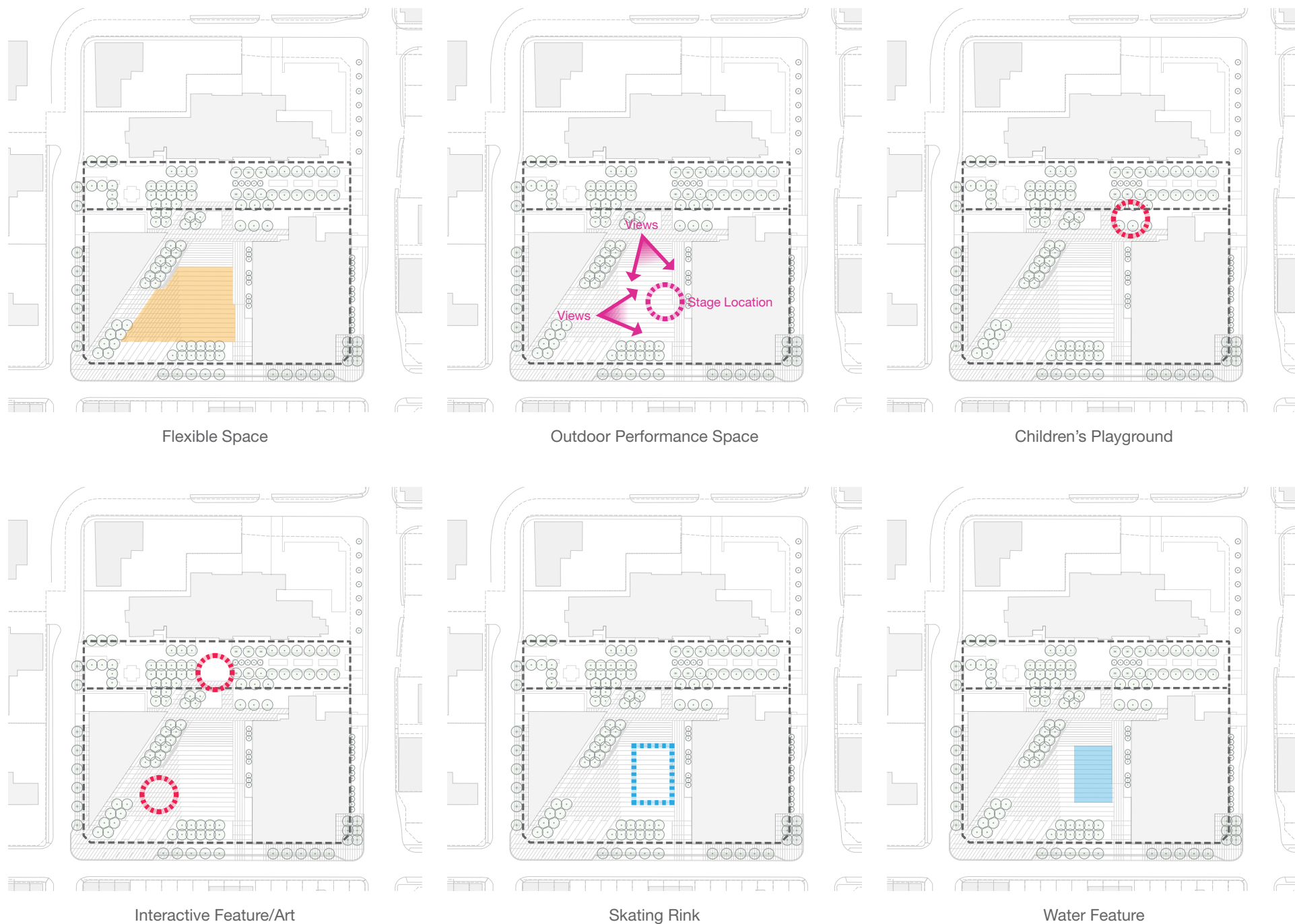


Figure 4.29 Programming Locations



**Figure 4.30** *Movie in the Square (Market Square - Guelph, Ontario)*

(Photo Source. <http://kristinandanita.ca/wp-content/uploads/2014/07/guelph-market-square-kristin-and-anita-1.jpg>)



**Figure 4.31** *Interactive Art Installations (Place des Festivals - Montreal, Quebec)*

(Photo Source. <http://www.dailydooh.com/wp-content/uploads/2014/12/quartier-5-prismatica.jpg>)

## 4.5.2 PROGRAMMING

### Flexible Space

At an approximate area of ~81,800 sq.ft., the plaza provides a large surface to hold various passive and active recreational activities and events. The lower tier plaza space could be used for much larger programming such as band/theatrical performances, markets and festivals. As the space is adjacent to the proposed 'Shared Festival Street' 101st Avenue, it allows potential events to spill onto the street for expanded active space.

### Outdoor Performance Space

Outdoor band/theatrical performances should occur on the lower tier plaza as it provides a sufficient amount of space to hold such potential programming. It is recommended that a temporary stage be situated on either the eastern or southern side of the plaza in order to utilize fixed seating in the landscape as viewing spots.

### Interactive Feature/Art

Interactive features and art, whether temporary or fixed into the landscape, should be

incorporated throughout the South Montrose Site in order to encourage exploration and enhance the public realm. Incorporating such features will help realize the South Montrose Site as the arts and cultural district of Downtown Grande Prairie. The plaza space can provide opportunities for local artists to display their work, and for the Art Gallery of Grande Prairie to temporarily expand their gallery space outdoors for special occasions.





**Figure 4.32** *Sculptural Playground (Silver Towers Playground - New York, New York)*  
(Photo Source. <http://cdn2.arquitecturaideal.com/wp-content/uploads/2015/09/arquitectos-creanparques-infantiles-4.jpg>)



**Figure 4.33** *Active Playground Features (Hunter's Point South Waterfront Park - Long Island City, New York)*  
(Photo Source. <https://www.playlsi.com/en/commercial-playground-equipment/playgrounds/hunters-point-south-waterfront-park>)

## Children's Playground

Should the City of Grande Prairie decide on incorporating a children's playground on the South Montrose Site, it is recommended that the feature be located on the upper tier plaza. This allows for a more intimate play space, away from potential larger programming taking place on the lower tier plaza, and it will receive natural surveillance from the Montrose Cultural Centre - in particular the Grande Prairie Public Library.

The style of playground should be sculptural and

contain a number of activities in order to provide interest and reflect the notion of this area as being an arts and cultural district. Furthermore, the playground should comply with the City of Grande Prairie's Parks Master Plan policies in order to ensure that it is designed for safety, accessibility and ease of maintenance.

## Water Feature

Water features help provide visual interest and create a sense of ambiance for those enjoying

the space. As the plaza is quite large and flexible in nature, it is possible to incorporate a water feature such as a reflective pool or in-ground jets to help further enhance and animate the pedestrian atmosphere. This would be ideal especially when the plaza space is not in use for events or performances.

Past experiences with water features in Grande Prairie have proven to garner significant maintenance and safety issues. Furthermore, feedback from the public engagement process



**Figure 4.34** In-ground Water Jets (Yonge-Dundas Square - Toronto, Ontario)

(Photo Source. [https://upload.wikimedia.org/wikipedia/commons/8/82/Fountains\\_in\\_Yonge\\_Dundas\\_Square.jpg](https://upload.wikimedia.org/wikipedia/commons/8/82/Fountains_in_Yonge_Dundas_Square.jpg))



**Figure 4.35** Temporary Skating Rink (Victoria Park - London, Ontario)

(Photo Source. <https://www.london.ca/residents/Recreation/Arenas-Skating/PublishingImages/Vic%20Park.JPG>)

had water features as the least preferred of the programming options. Overall, it will be up to the City of Grande Prairie to determine whether a water feature should be incorporated into the plaza.

### Skating Rink

Incorporating a skating rink provides active recreation and enhances the plaza space during the winter months. Should the City of Grande Prairie decide that skating be a

permanent activity during the winter months, it is recommended that a shallow reflective pool be incorporated into the plaza design. This provides a surface that can be easily transformed into a skating rink.

If the City of Grande Prairie does not prefer incorporating a water feature, then temporary boards would have to be constructed and flooded. Should this be the option for introducing skating during the winter months, then consideration should be given for having

an accessible water source nearby for flooding, use of appropriate ground surface material and ease of access for maintenance equipment (i.e. water truck, zamboni, snow blowers). Overall, any skating rink should be located on the lower tier of the plaza.

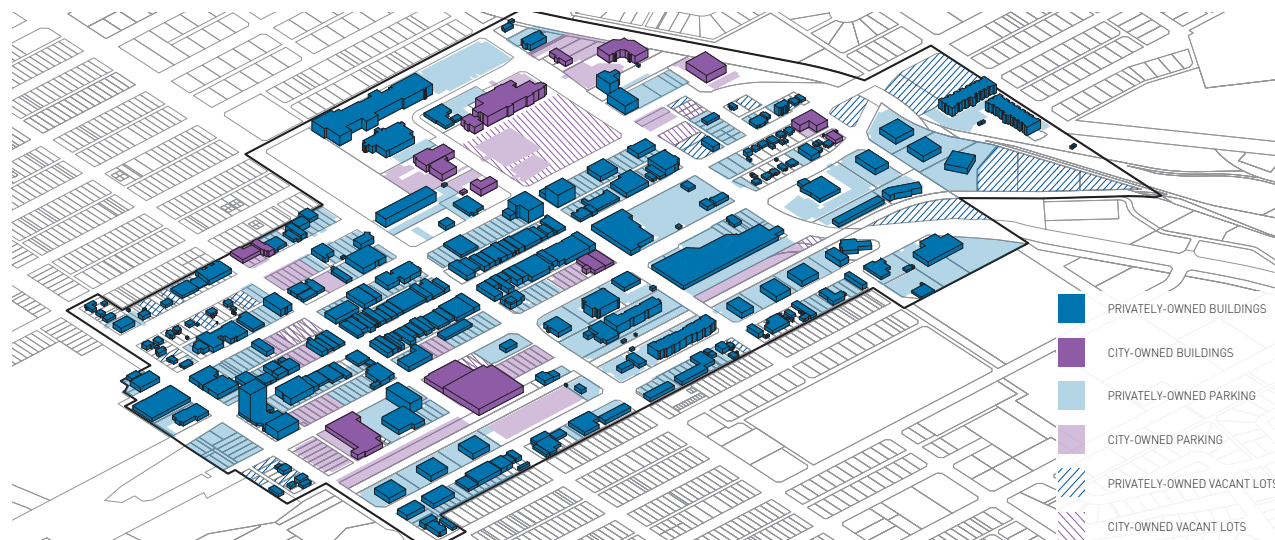


## 4.6 PARKING SCENARIOS

The notion of parking, located either underground or on the surface within the vicinity of the South Montrose Site, has been a continuous discussion amongst residents of the City of Grande Prairie. Initial work presented in the *Downtown Enhancement Project* highlighted city-owned parking and vacant lots within the Downtown Enhancement boundary and provided recommended locations for potential parking structures. The following describes two potential scenarios for which public parking can be accommodated for the South Montrose Site: (1) underground parking beneath the Performing and Media Arts Centre (PMAC); and (2) a surface parking structure within the vicinity of the South Montrose Site. In order to provide preliminary cost estimates for each parking scenario, Edmonton standards from the Canadian Cost Guide 2016 were used. Overall, the preferred scenario will need to undergo further detailed design work and assessment.

### 4.6.1 UNDERGROUND PARKING

Should the City of Grande Prairie decide to incorporate underground parking within the South Montrose Site, the most appropriate scenario should be to locate two levels beneath the PMAC on the eastern portion of the site. Access to the underground parking should be integrated into the PMAC building along 98th Street. Using the City of Grande Prairie parking stall and drive aisle standards for large vehicles



**Figure 4.36** City-Owned Parking and Vacant Lots (*Downtown Infrastructure Assessment, Streetscape Enhancement and Rehabilitation Project, 2015*)

(i.e. pick-up truck), two levels of underground parking would generate 262 parking stalls at an approximate total area of ~118,000 sq.ft. Applying the Edmonton standards from the Canadian Cost Guide 2016, preliminary costs for an underground parking structure would be estimated at \$17,110,000.

### 4.6.2 OFF-SITE ABOVE GROUND PARKING STRUCTURE

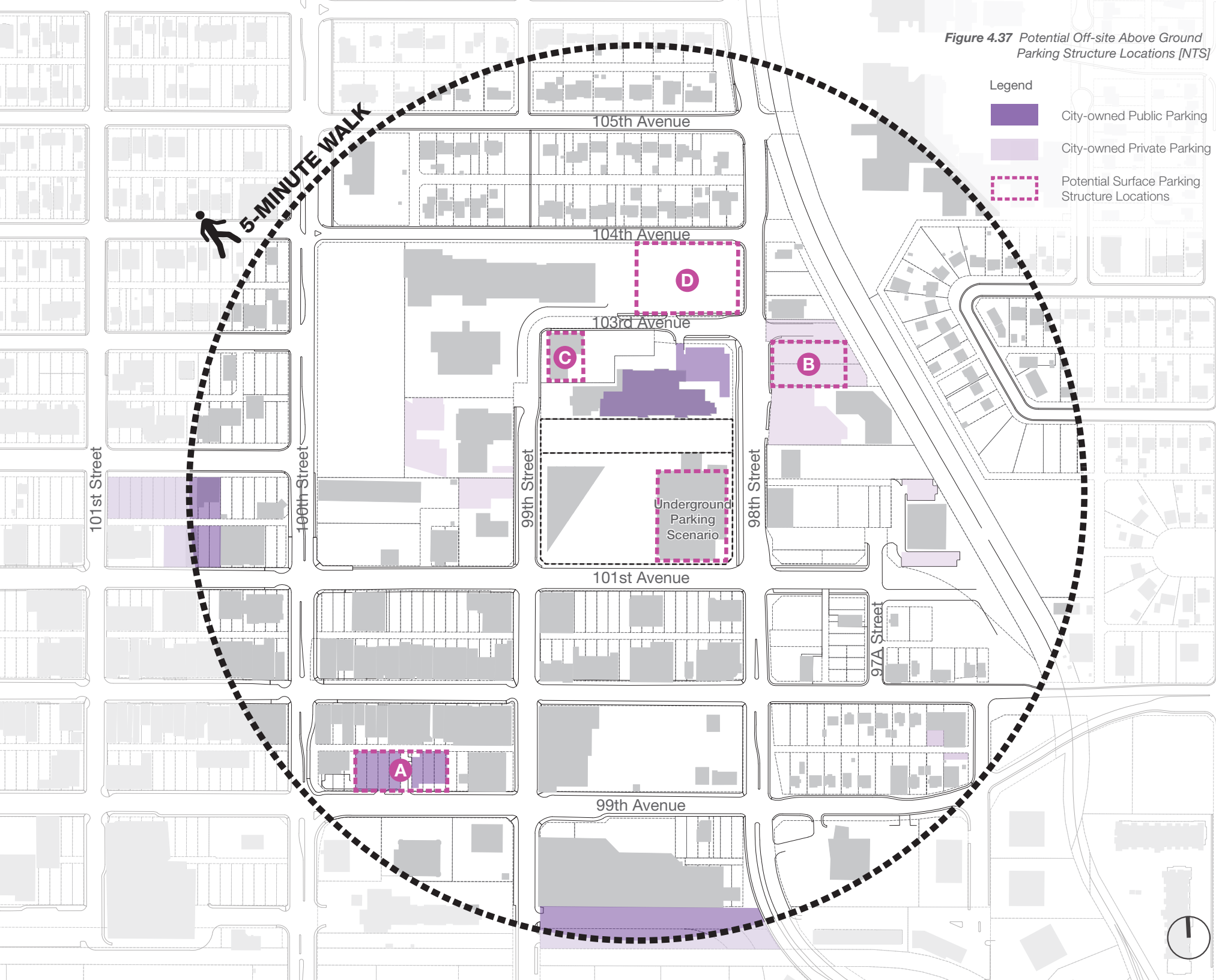
If underground parking is not preferred by the City of Grande Prairie, there are several city-owned public and private parking lots that can serve as potential candidates for an above ground parking structure. Within a 5-minute walking radius (400m) from the South Montrose Site, the *Downtown Enhancement Project* highlighted three potential areas for an above

ground parking structure. Furthermore, the City has asked to explore a potential parking structure on the existing Provincial Building parking lot – north of the Montrose Cultural Centre (see Location D).

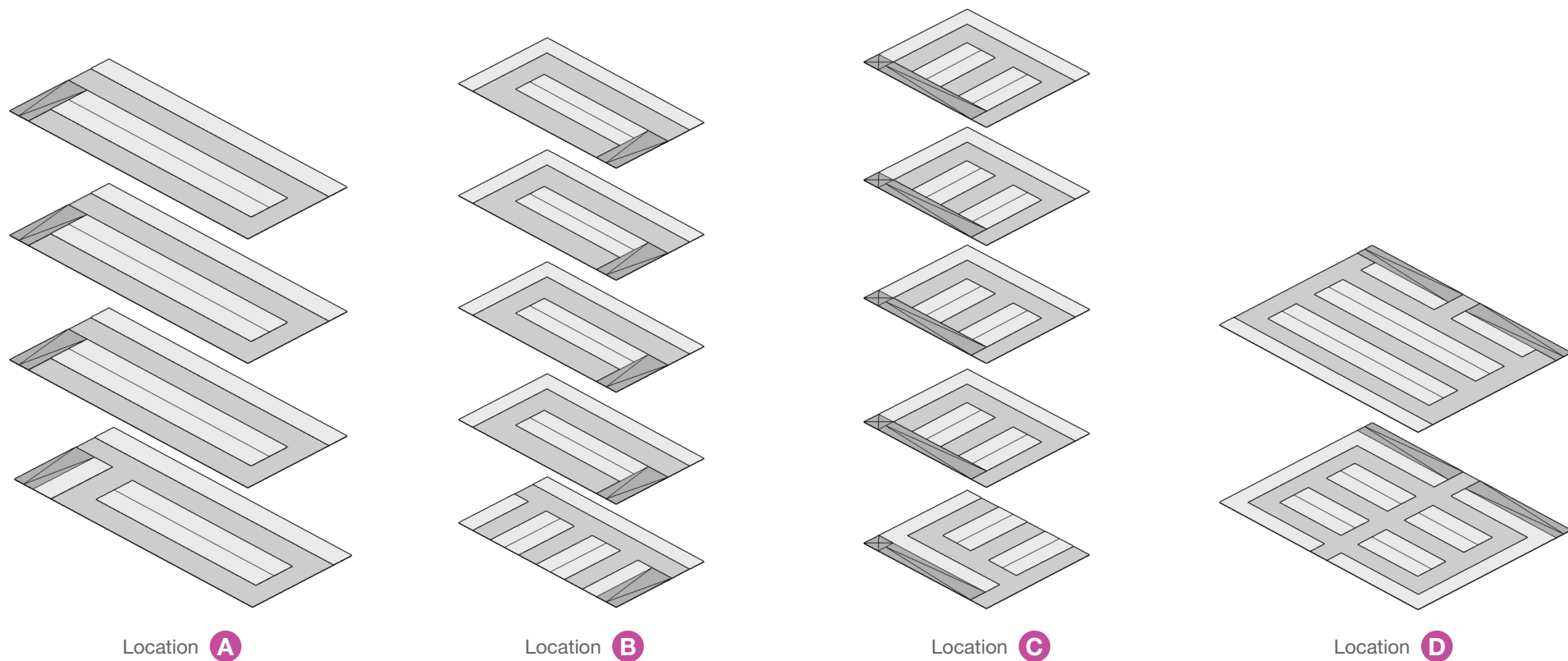
*Figure 4.37* and *Figure 4.38* illustrates potential locations for above ground parking structures and their associated costs. Each option demonstrates the size needed for their particular location to accommodate the same parking stall yield as the underground parking scenario beneath the PMAC.

For all the options, the City of Grande Prairie *Bylaw C-1260 Section 72* was used for parking stall and drive aisle standards. Associated costs used the Edmonton standards from the *Canadian Cost Guide 2016*.

Figure 4.37 Potential Off-site Above Ground Parking Structure Locations [NTS]







	Location A	Location B	Location C	Location D
Gross Floor Area Per Level	~26,970 sq.ft.	~25,740 sq.ft.	~23,245 sq.ft.	~55,860 sq.ft.
Number of Parking Stalls for First Level	70	71	55	154
Number of Parking Stalls for Each Subsequent Level	73	62	59	153
Number of Levels Required to Match Underground Parking Scenario Yield	4	5	5	2
Total Number of Parking Stalls	289	319	291	307
Cost per Level	\$2,700,000	\$2,570,000	\$2,320,000	\$5,590,000
<b>Total Cost of Parking Structure</b>	<b>\$10,790,000</b>	<b>\$12,870,000</b>	<b>\$11,620,000</b>	<b>\$11,170,000</b>

**Figure 4.38** Off-site Parking Structure Analysis

## 4.7 SITE SERVICING

*Appendix D* provides a detailed assessment report by InfraCor related to the site servicing of the South Montrose Site. In terms of stormwater management, it was determined that 251 m<sup>3</sup> of storage would be required to withstand a storm event of 95.73 mm/hr (1:100). Assuming an average depth of 0.20m within any ponding areas, the total ponding area required is 3,770 m<sup>2</sup>. This can be integrated within the approximately ~6,100 m<sup>2</sup> of open space currently shown in the preliminary Master Plan. Furthermore, it was also stated that off-site storm infrastructure is not projected to require upgrades.

However, if possible, storm ties should be made to the manholes at the southwest or southeast of the site, at the intersections with 101st Avenue. The northern two manholes of 99th Street and the manhole directly east of the site on 98th Street should be avoided, as they

are projected to surcharge to within 0.50m of ground level in the 1:100 event.

With respect to sanitary sewer, the flow from a large redevelopment such as the South Montrose Site will very likely trigger a life cycle upgrade to current standards (e.g. PVC sewer), if only due to the difficulty of tying services into the aged infrastructure. The extent of the life cycle replacement will depend on a condition assessment during detailed design, but can be reasonably expected to extend downstream to the next higher size of sewer; in this case from the tie-in within 99th Street southwards to 100th Avenue.

Water distribution services for the potential buildings on the site should be to the south or east, to take advantage of the larger water mains. Specific sizing of water services will need to be determined during detailed design, however given the size & height (up to 6 storeys) of buildings a dual service is likely required for each building.

In terms of incorporating an underground parking structure, sanitary servicing must come from the west (99th Street), and water must come from the south (101st Avenue) or east (98th Street). Therefore, a route for services must be left free of underground parking conflicts from the road to the west, and from the road to the south or east, to a water/mechanical room in each building. The water/mechanical room can be located in the parkade level and services can be brought directly into the P1 level.

Stormwater collection in the plaza area can be plumbed through the building storm services, if necessary. Therefore, it does not pose as significant a conflict with a potential underground parking structure. The main constraint will be the depth of the storm tie-in, which will dictate how much grade can be established on storm collection. The public storm system in the vicinity is approximately 2.5m below grade. As a result, storm servicing is feasible provided that it does not have to extend across the entirety of the site.



# 5

## SECTION





**NEXT STEPS**



# 5.1 DESIGN PRINCIPLES

In order to maintain the integrity of the Master Plan vision during future detailed design exercises and beyond, a set of design principles were developed that corresponds to the public engagement feedback and best design practices. These principles are as follows:



## Strong Arts & Cultural Identity

- Respect the local culture, characteristics and history/traditions in the design.
- Include landscape elements that reflect the identity of Grande Prairie.
- Include a Performing and Media Arts Centre with an extension of space for more cultural activities.
- Integrate with Art Gallery of Grande Prairie/ Montrose Cultural Centre and Centre for Creative Arts to form a centralized cultural district.



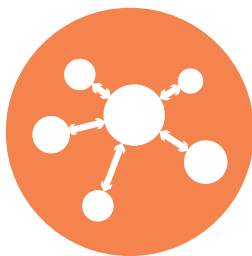
## Community Gathering Place

- Create a central space for the citizens of Grande Prairie to congregate, interact, relax and enjoy.
- Create a place that instills a sense of civic pride and enhances quality of life
- Ensure accessibility for people of all ages groups, abilities and socio-economic backgrounds.
- Include landscape features that identify areas of activity, circulation, entry points, seating and gathering areas.



## Flexible Programming & Ample Amenities

- Allow for interchangeable and varied venues, uses and year-round activities, including plaza space; outdoor performance space; interactive features and art; outdoor winter activities; and seating.
- Include a mixed-use building to provide more amenities on site, and activate the ground level edges along the open space.
- Provide adequate parking to serve the Performing and Media Arts Centre, mixed-use building and plaza space.
- Incorporate significant underground parking to not detract from the quality of the ground level environment.



### Site Access, Connectivity & Views

- Ensure accessibility by all modes of transportation (vehicular, public transit, biking and walking).
- Create a seamless transition between the plaza and the shared avenue to take advantage of expanded open space for events and temporary activities.
- Ensure building entrances/main edges overlook the public space to provide a sense of natural surveillance and conform to Crime Prevention Through Environmental Design (CPTED) principles.
- Maintain views and sightlines towards the concourse and Montrose Cultural Centre.



### Environmental Consideration & Seasonal Comfort

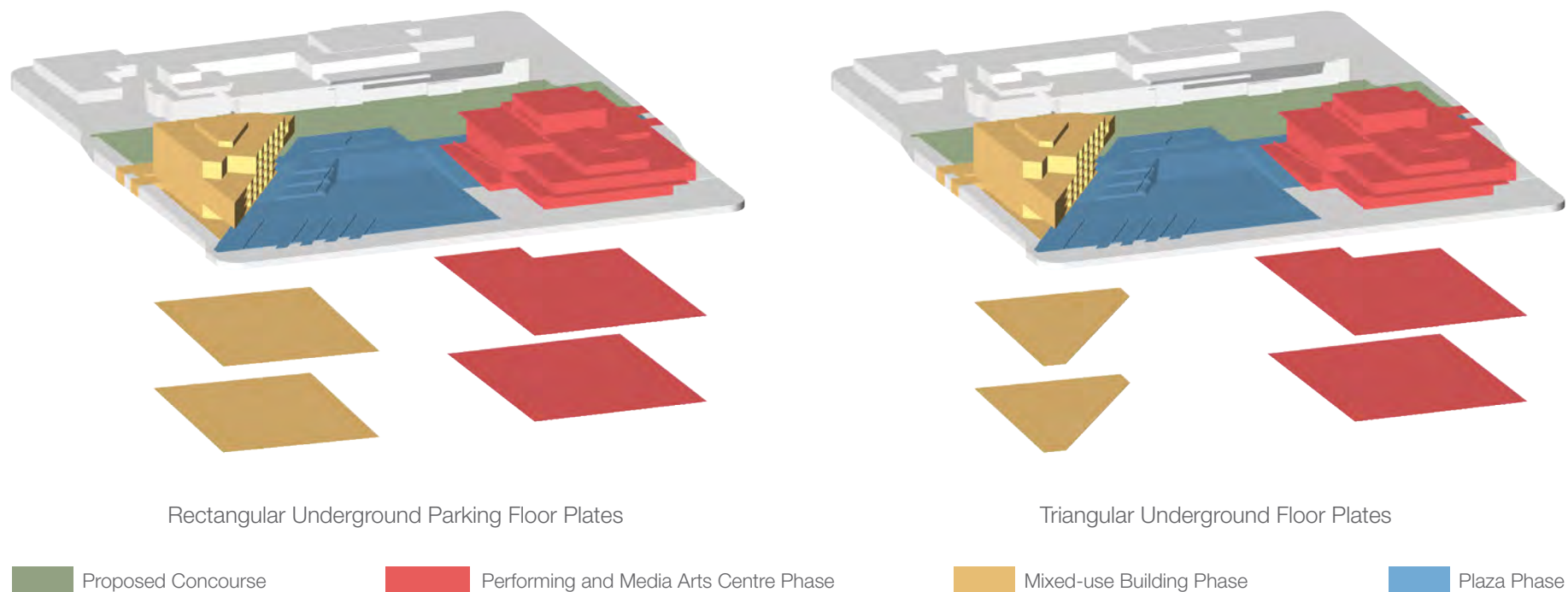
- Maximize innovative sustainable conservation strategies with respect to water, waste and energy.
- Minimize obstruction of the plaza space during the winter months for solar gain.
- Develop buffering tactics to prevent cold wind exposure during the winter months.
- Provide seasonally specific programming and events, encouraging year-round activity.



### Integrated Design

- Integrated community and architectural design to enhance the identity of the area and establish or reinforce a connection with the character of Grande Prairie.
- Architecture to maintain a strong orientation between adjacent streets, interior public space, the concourse and the Montrose Cultural Centre.
- Architectural quality should elevate the prominence and importance of the overall public space.
- Complement the plaza through architectural design to reflect a strong, coherent identity.





**Figure 5.1** Flush Plaza Phasing Scenario

## 5.2 PHASING

The layout for the South Montrose Site Master Plan allows for either the mixed-use building, the Performing and Media Arts Centre (PMAC) or the plaza to be interchangeably phased. However, the order of phasing could be affected depending on the plaza preference, recessed or flush, and the ability for the City to subdivide and sell off the mixed-use building portion of the site. The following sub-headings describe the phasing conditions.

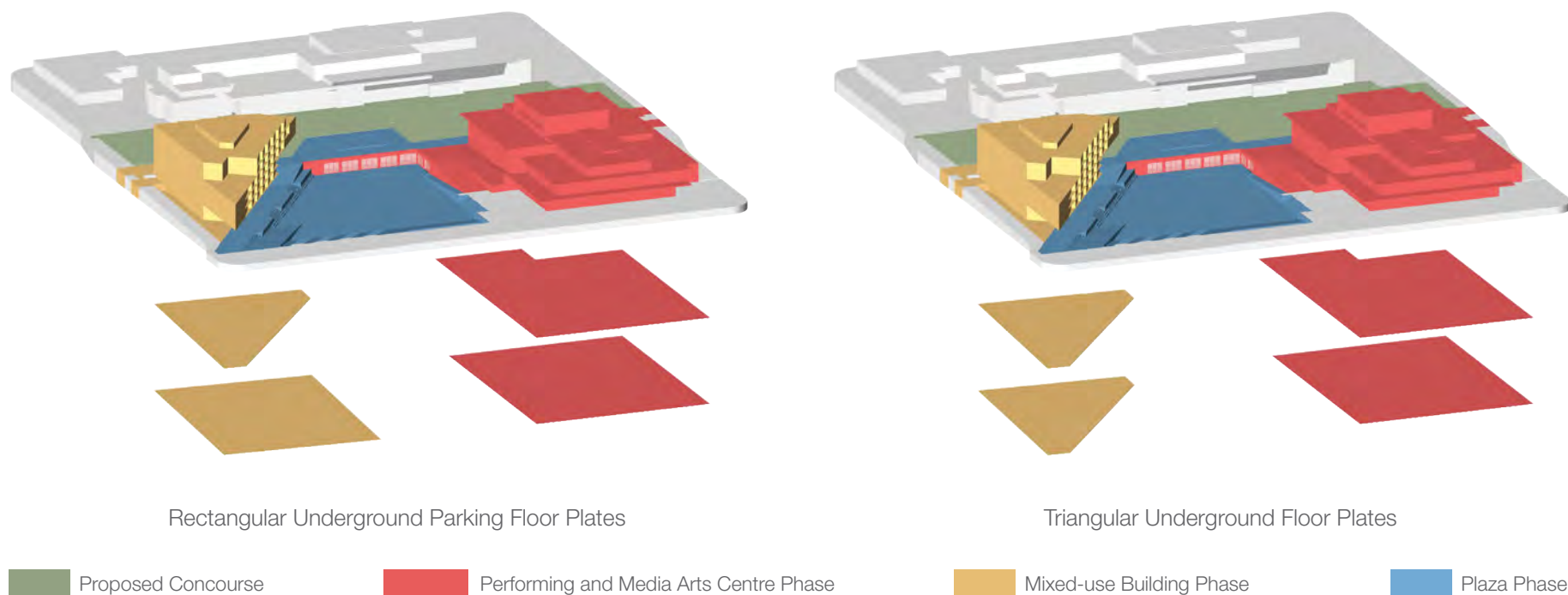
### Flush Plaza

Should the City decide on the flush plaza configuration and develop the entire site as a city-owned initiative, then a rectangular underground parking floor plate could be incorporated for the mixed-use building. A rectangular underground floor plate generates the most efficient parking stall yield. However, this scenario would require the mixed-use building to be built first to avoid removing a portion of the plaza at a later phase.

If the City decides the construction of the plaza should come first, then the mixed-use building

would need to incorporate a triangular floor plate to avoid the same condition of removing a portion of the plaza at a later phase. The triangular floor plate provides an inefficient parking layout. Although removing a portion of the plaza to accommodate a rectangular underground parking floor plate in a later phase is viable, it is not ideal from a construction and cost stand point.

Should the City decide to subdivide the mixed-use building area, then a triangular floor plate would need to be incorporated to avoid impeding with the plaza.



**Figure 5.2** Recessed Plaza Phasing Scenario

In regards to the PMAC, the building and potential underground parking could be developed in any phase without affecting the development of plaza and mixed-use building.

### Recessed Plaza

Should the City decide on the recessed plaza configuration and develop the entire site as a city-owned initiative, then a triangular underground parking floor plate would need to be incorporated for the mixed-use building - with subsequent levels able to take on the rectangular form. This would avoid conflicts with the recessed plaza. However, this scenario

would require the mixed-use building to be built first to avoid removing a portion of the plaza at a later phase.

If the City decides the construction of the plaza should come first, then the mixed-use building would need to incorporate the triangular floor plate for all levels of underground. This condition would be the same should the City of Grande Prairie decide to subdivide mixed-use building area.

With respect to the PMAC, the building and potential underground parking could be developed in any phase. However, the enclosed

pedestrian connection between the two buildings would have to be constructed after the completion of both the PMAC and mixed-use building. During the interim construction phase of either the PMAC or mixed-use building, the area encompassing the proposed enclosed pedestrian connection would be a temporary landscaped slope.



Mixed-use Building (Including Parking)	
4-Storey	\$17,582,00
6-Storey	\$26,514,000
12-Storey	\$46,100,000
12-Storey (Multi-Mixed-Use)	\$54,213,300

Plaza	
Recessed	\$8,875,000
Flush with 101st Avenue	\$6,220,000

Off-site Parking Structure Options	
Location A (289 Stalls / 4 Levels)	\$10,790,000
Location B (319 Stalls / 5 Levels)	\$12,870,000
Location C (291 Stalls / 5 Levels)	\$11,620,000
Location D (307 Stalls / 2 Levels)	\$11,170,000

Performing and Media Arts Centre	
Building	\$40,000,000 to \$90,000,000
Underground Parking (262 Parking Stalls)	\$17,110,000
Enclosed Pedestrian Connection	\$2,800,00

Off-site Work Adjacent to 101st Avenue* <i>Along 101st Avenue, between 99th and 98th Street</i>	
Demolition	\$226,097
Roadway	\$1,288,071
Deep Utilities	\$395,099
Streetscape Elements	\$918,093
<b>TOTAL</b>	<b>\$2,827,360</b>

\* Cost interpolated from *Downtown Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project* report summary cost

**Figure 5.3** Line Item Costing

## 5.3 COST ESTIMATES

The preparation of preliminary cost estimates will assist the City in setting capital budgets for South Montrose Site Master Plan moving forward. Excluded from these estimates are infrastructure and site work related to the mixed-use building and the Performing and Media Arts Centre (PMAC). Detailed designs for each of the buildings are required in order to formulate a cost estimate that is representative.

Moreover, costs associated with off-site work (adjacent infrastructure and streetscape) has already been highlighted in the *Downtown*

*Infrastructure Assessment, Streetscape Enhancement & Rehabilitation Project* report - see Figure 5.3 'Off-site Work Adjacent to 101st Avenue'. The presented costs in the report can serve as a baseline measure for determining potential costs that tie the streetscape improvement work to the South Montrose Site Master Plan.

The layout for the South Montrose Site allows for either the mixed-use building, the PMAC or the plaza to be interchangeably phased. Figure 5.3 provides a list of preliminary costs for each component in order to calculate a corresponding budget for a preferred phased scenario.

Assumptions made for this preliminary cost estimate include the following:

1. All cost estimates are preliminary and subject to review;
2. Construction costs for the mixed-use building, the PMAC and the underground/surface parking structures are based on Edmonton standards from the *Canadian Cost Guide 2016*;
3. Individual item costs do not include any contingency unless otherwise stated.

## 5.4 FUNDING OPPORTUNITIES

As the City moves forward with the future development of the South Montrose Site, a funding strategy needs to be determined in order to begin the process of realizing the Master Plan vision. If Federal and Provincial grants are not readily available, two potential options can be considered.

The first option could consist of subdividing the area encompassing the mixed-use building and selling it off to a prospective developer. Selling off the subdivided piece would allow the City to use the accumulated reserves to partially fund the plaza and PMAC. If subdividing the mixed-use area is the preferred strategy, then it is important for City Administration to place a strict level of subdivision control over the property in order to maintain the integrity of the South Montrose Site Master Plan vision. This can be done by enforcing the Design Principles, as stated in *Section 5.1*, as guidelines onto the potential developer as part of the purchasing agreement.

Another option could be forming partnerships with organizations who would have a vested interest in the development of the South Montrose Site as an arts and cultural district. This could include the Provincial or Federal Government or non-profit organizations. As mentioned in *Section 4.3.1*, the Artist Quarters in Edmonton, Alberta was a partnership between Arts Habitat Edmonton, Artists Urban Village and the City of Edmonton. To reiterate, the

development was a response to Edmonton's arts and cultural community need for "affordable, appropriate and sustainable work space add the proven need for affordable housing options for low-income professional arts" (<http://www.artistsurbanvillageedmontonab.com/the-artists-quarters.html>).

The City of Edmonton was able to fund this project by committing \$8.3 million - which includes \$2.3 million in land contribution - and anticipating support from the Government of Alberta and Government of Canada. Organizations who will encompass space in the Podium, contributed to the project through:

- "participation in government and stakeholder relations efforts;
- a coordinated capital campaign, contributions from reserve funds; and
- mortgage/debt financing."

(<http://artshab.com/spaces/artists-quarters/>).

The City of Grande Prairie should market the South Montrose Site Master Plan as a way to attract potential arts and cultural organizations and investors. This could serve as a valuable tool in attracting such partners to contribute financially to the overall development of each component on the South Montrose Site.

## 5.5 FUTURE ACTIONS

The first step for the City of Grande Prairie is to determine which site element - the mixed-use

building, PMAC or plaza - is a priority to develop first. As highlighted in *Section 5.2*, there are a number of factors that need to be considered depending on which site element is deemed a priority. More importantly, the City needs to determine whether the mixed-use building will be a City initiative, or subdivide the encompassing area and sell it off to a potential developer.

As a feasibility study for the Performing and Media Arts Centre (PMAC) is currently underway, the City should also consider conducting either another feasibility or market analysis study for the mixed-use building. This will help in determining whether a mixed-use building on the South Montrose Site would be viable and fully utilized if built.

The plaza will need to undergo further detailed design in order to develop a more thorough plan. The City will need to determine the exact kit of parts and programming that will be incorporated into the plaza design. This should be done amongst City Administration and Council, and through another engagement workshop with the public.

Finally, the City will need to determine an appropriate funding strategy going forward for realizing the development of the South Montrose Site Master Plan vision. As stated in *Section 5.4*, there are several scenarios that the City of Grande Prairie can consider.





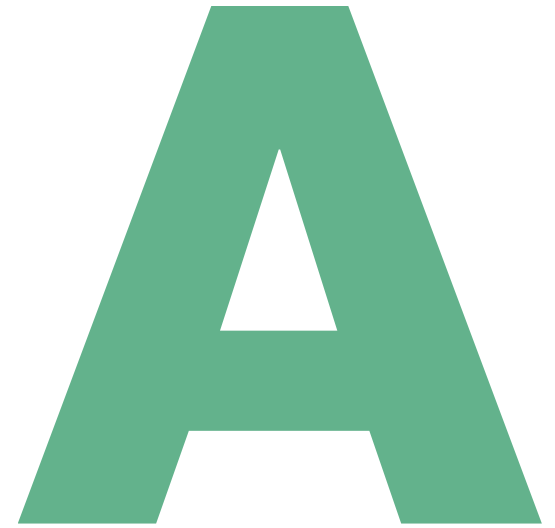









# APPENDIX



## **our Montrose Phase 1: Administration, Stakeholder and Public What We Heard Report**

intelligent futures 

January 2016

Pages: 21





# ourMontrose

PHASE 1: ADMINISTRATION, STAKEHOLDER AND PUBLIC  
WHAT WE HEARD REPORT

January 2016

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# WHAT WE HEARD REPORT

## 1.0 ourMontrose Engagement Overview

The focus of the first phase of the ourMontrose engagement process was to continue the conversation about the South Montrose Site, building upon the prior work, direction and policy established for the site. Since the site was not a blank slate, stakeholders required background information about the site's history to inform their comments.

This phase of engagement took place from November 2015 to January 5, 2016. It focused on two key methods for citizen participation: an online survey (with a paper survey complement) and a workshop series (one administration workshop and another invited stakeholder workshop). The survey allowed for broader citizen engagement, while the workshops supported more focused discussions with representatives from key stakeholders including city administration, the Downtown Association, the local arts and culture community and City Councillors, among others.

Overall, more than 1,100 Grande Prairie (and surrounding area) residents participated in this first phase of engagement about potential uses for the South Montrose Site. The feedback from this first phase of engagement will be considered with existing policy direction, best practices and design expertise to inform the future master plan for the site.

# THE ONLINE SURVEY RESULTS



## 2.0 About the Online Survey

This survey allowed for broader citizen feedback on the South Montrose Site. It ran from December 10, 2015 to January 5, 2016. Online traffic was referred from [www.cityofgp.ca/ourmontrose](http://www.cityofgp.ca/ourmontrose), and a paper version was available at The Montrose Cultural Centre and other locations around the city.

Over the four weeks of the survey, **1051** people participated. The survey asked the following seven questions:

### 1. Thinking about the future of the South Montrose Site, what do you see as the best uses?

*This question provided eight options (municipal uses, institutional uses, art/cultural facilities, park space, recreational uses, commercial uses, housing, office/start-up space) as well as an 'other' category for participants to offer their insights.*

### 2. City Council has recommended several programs and uses for the site. Please mark your priorities.

*This question offered a series of options (performing arts centre, mixed use building, parking, transit opportunities, greenway/pedestrian links, public square) for participants to rank in order of their priorities from 1 to 7.*

### 3. The South Montrose Site could include many different public uses and amenities. What public spaces and amenities would you like to see included?

*The participants were offered 12 outdoor space options to choose from as well as space to suggest their own uses. These options included children's play equipment, skating rink, outdoor performance space, outdoor exhibits, passive seating, water feature, skateboard feature, interactive features/art, flexible seating area, outdoor winter activities, winter shelter and flexible plaza space.*

### 4. What public space, recreational and cultural facilities do you use in Grande Prairie?

*A list of recreational and cultural facilities within Grande Prairie was presented to participants to select the facilities they patronize the most, in order to generate information on what spaces they value the most in the city.*

5. Are there any arts/cultural or public spaces/plazas that you enjoy in Grande Prairie or elsewhere that you would like to see as an inspiration for the South Montrose site? And if so -- why?

*This open-form question allowed participants to offer their suggestions on spaces within Grande Prairie and beyond that could be inspirational to the project team in the master planning process.*

6. Do you have any additional comments you'd like to share?

*This provided participants with an area to offer any thoughts, considerations or insights they have for the South Montrose Site.*

7. What neighbourhood do you live in?

*This question helped to provide an overview of the participant's locations. .*

The following pages summarize the results from the online survey regarding these questions.

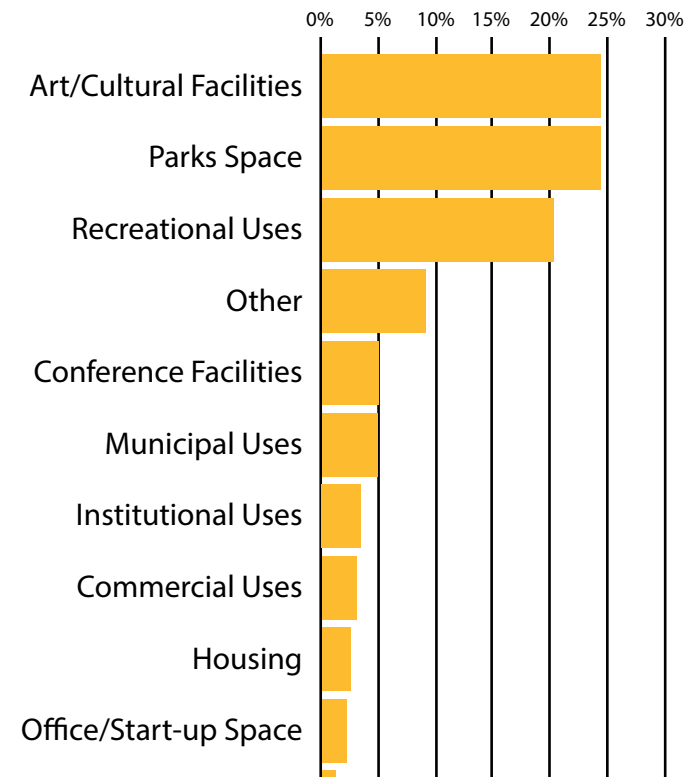


## Thinking about the future of the South Montrose Site, what do you see as the best uses?

The most common response, as seen in the table to the right, was a tie between art/cultural facilities and a parks space, each with 24% support. When participants were asked to elaborate, they spoke to the specific activities they'd like to see on the site including community gardens, a conference or performing arts centre, space for food trucks, venue for short films, etc.

Beyond specific site uses, most of the 'why' responses spoke to the need for parking on this site.

### Preferred Uses for the South Montrose Site














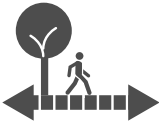






City Council has recommended several programs and uses for the site. Arrange the uses to match your priorities.

The table to the right indicates the three most popular uses picked for each of the six priorities that participants selected from:

1. Performing Arts Centre
2. Mixed Use Building
3. Parking
4. Transit Opportunities
5. Greenway/Pedestrian Links to City Hall/Downtown
6. Public Space

Beyond the overall top pick of performing arts centre, participants supported public squares, greenway/pedestrian linkages to City Hall/Downtown and mixed use buildings. These options also had repeat mentions in the top four of six priorities. The mixed use building, though predominately chosen third, appeared frequently throughout the ranking.

## Priorities for Site Use Based on City Council Recommendations

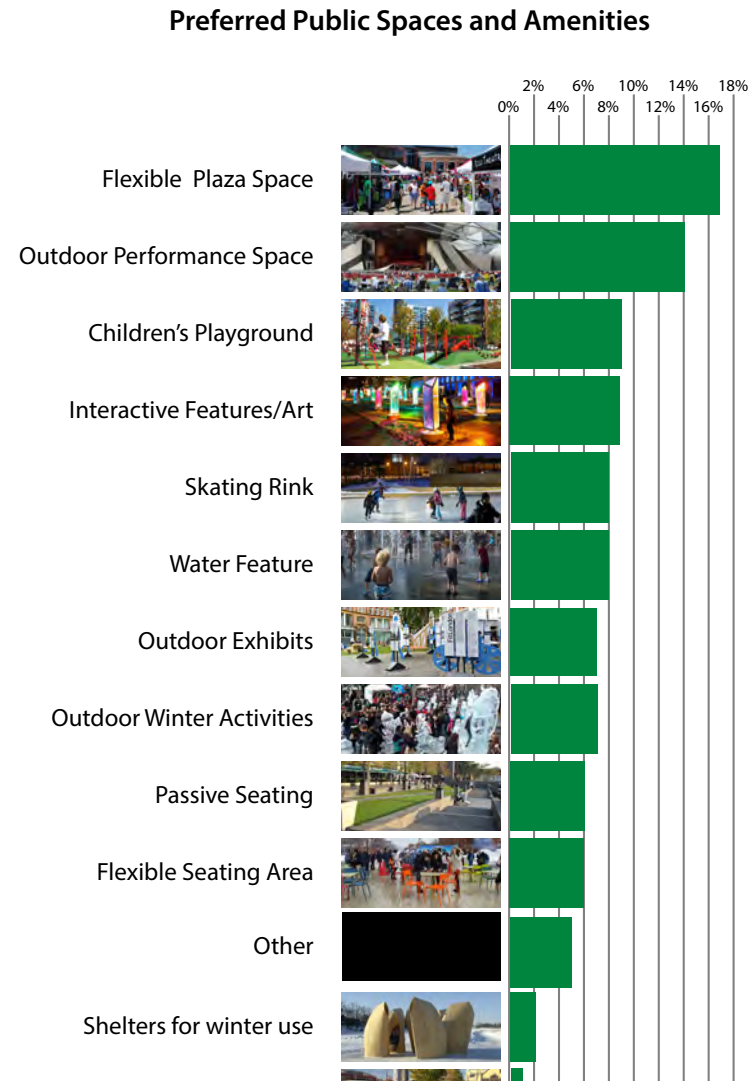
PRIORITY #1	 Performing Arts Centre (35.5%)	 Public Square (25.8%)	 Parking (17.8%)
PRIORITY #2	 Public Square (32%)	 Greenway/Pedestrian Linkages (23.7%)	 Mixed Use Building (17%)
PRIORITY #3	 Greenway/Pedestrian Linkages (26%)	 Public Square (21.3%)	 Mixed Use Building (18.2%)
PRIORITY #4	 Mixed Use Building (25%)	 Transit Opportunities (17.6%)	 Greenway/Pedestrian Linkages (17.1%)
PRIORITY #5	 Transit Opportunities (29.8%)	 Parking (19.9%)	 Mixed Use Building (19.4%)
PRIORITY #6			



## What public spaces and amenities would you like to see on this site?

The most favoured public space amenities were Flexible Plaza Space (17%) and Outdoor Performance Space (14%). The remaining options saw fairly even support, other than shelters for winter use and skateboard features, which ranked the lowest overall. Children's play equipment, interactive feature/art, skating rink, and water features each captured 8-9% of the total response, just slightly above the remaining options.

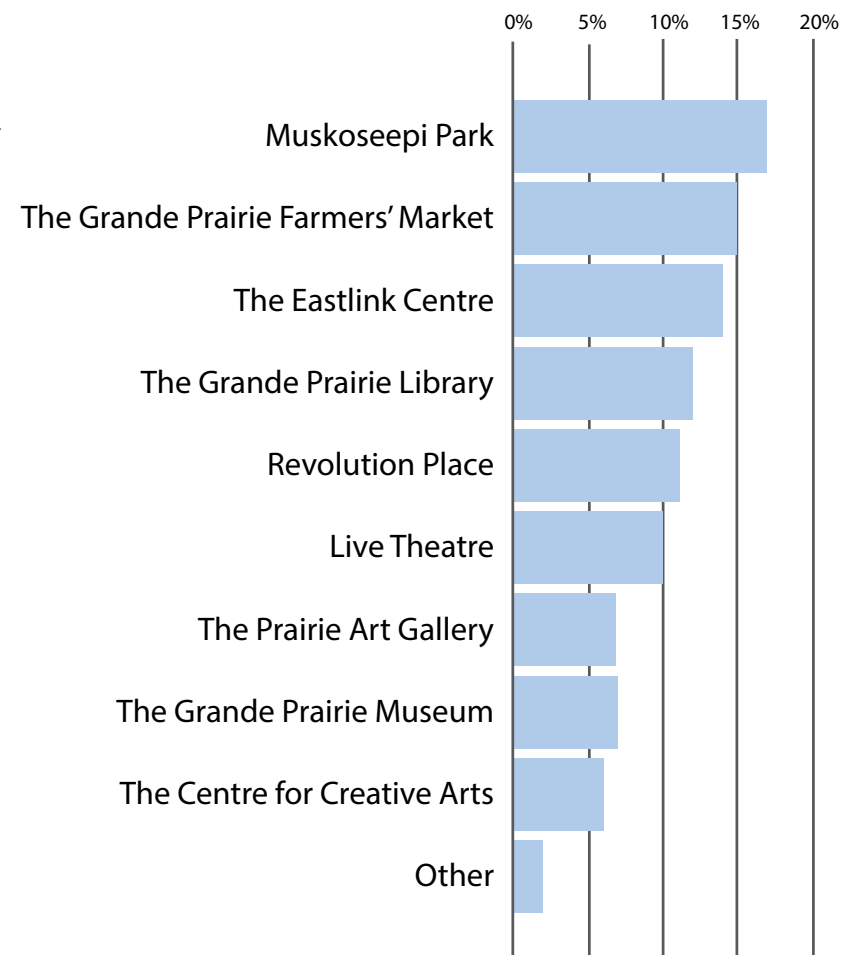
Participants also stressed the need for the continued availability of parking on the site. Parking was the most popular 'other' suggestion. Many of the participants chose to suggest other amenities used the 'why' section to speak to the need for parking at this site.



## What public space, recreational and cultural facilities do you use in Grande Prairie?

When asked about what recreational and cultural facilities residents already use, Muskoseepi Park (17%), The Grande Prairie Farmers' Market (15%) and The Eastlink Centre (14%) were highly ranked. The next two most popular options included The Grande Prairie Public Library (12%) and Revolution Place (11%).

The 'other' option was chosen by only 2% of participants. Other places suggested included parks, playgrounds, trails, the Coca Cola Centre, Centre 2000, Grande Prairie Regional College and Grande Prairie Regional Archives.

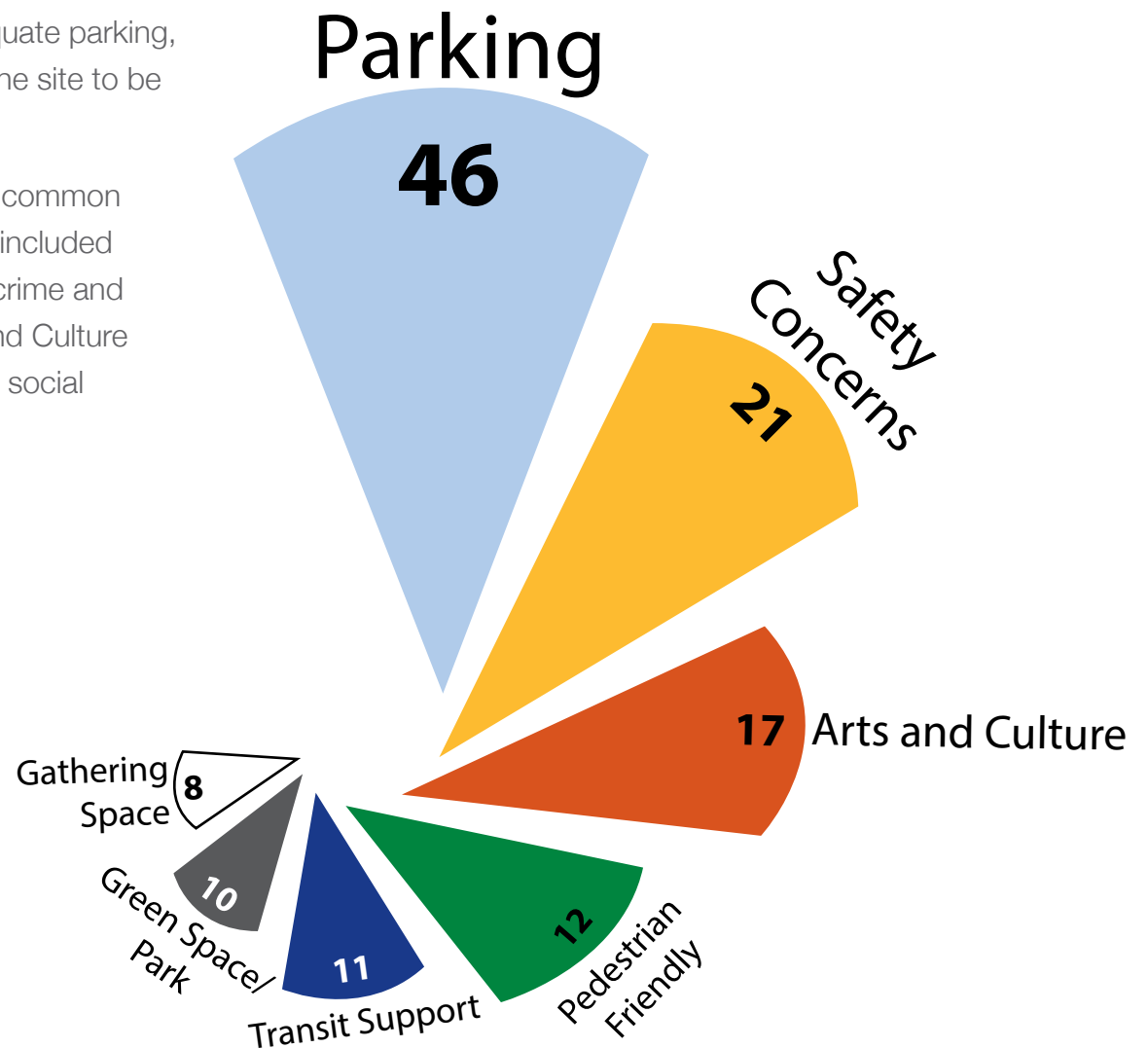




Do you have any additional comments you'd like to share?

The most frequently raised other comments are illustrated in the diagram below. The dominant topic in this section was parking. Comments ranged from providing adequate parking, including underground parking, to not allowing the site to be under-utilized as a parking lot.

Safety and Arts and Culture were the next most common issues raised. Comments in the safety category included concerns about antisocial behaviour, drug use, crime and the proliferation of homeless people. The Arts and Culture category included comments encouraging more social opportunities and community connections.



Are there any arts/cultural or public spaces /plazas that you enjoy in Grande Prairie or elsewhere that you would like to see as an inspiration for the South Montrose site?

Many arts/cultural facilities and/or public spaces/plazas around Alberta, Canada and the world were suggested by participants in both the online survey and the workshop. The diagrams below and to the right combine the suggestions from the survey and workshops to present a comprehensive picture of the places suggested.

When speaking of their inspirations and the qualities of the spaces they value, participants specified the following uses:



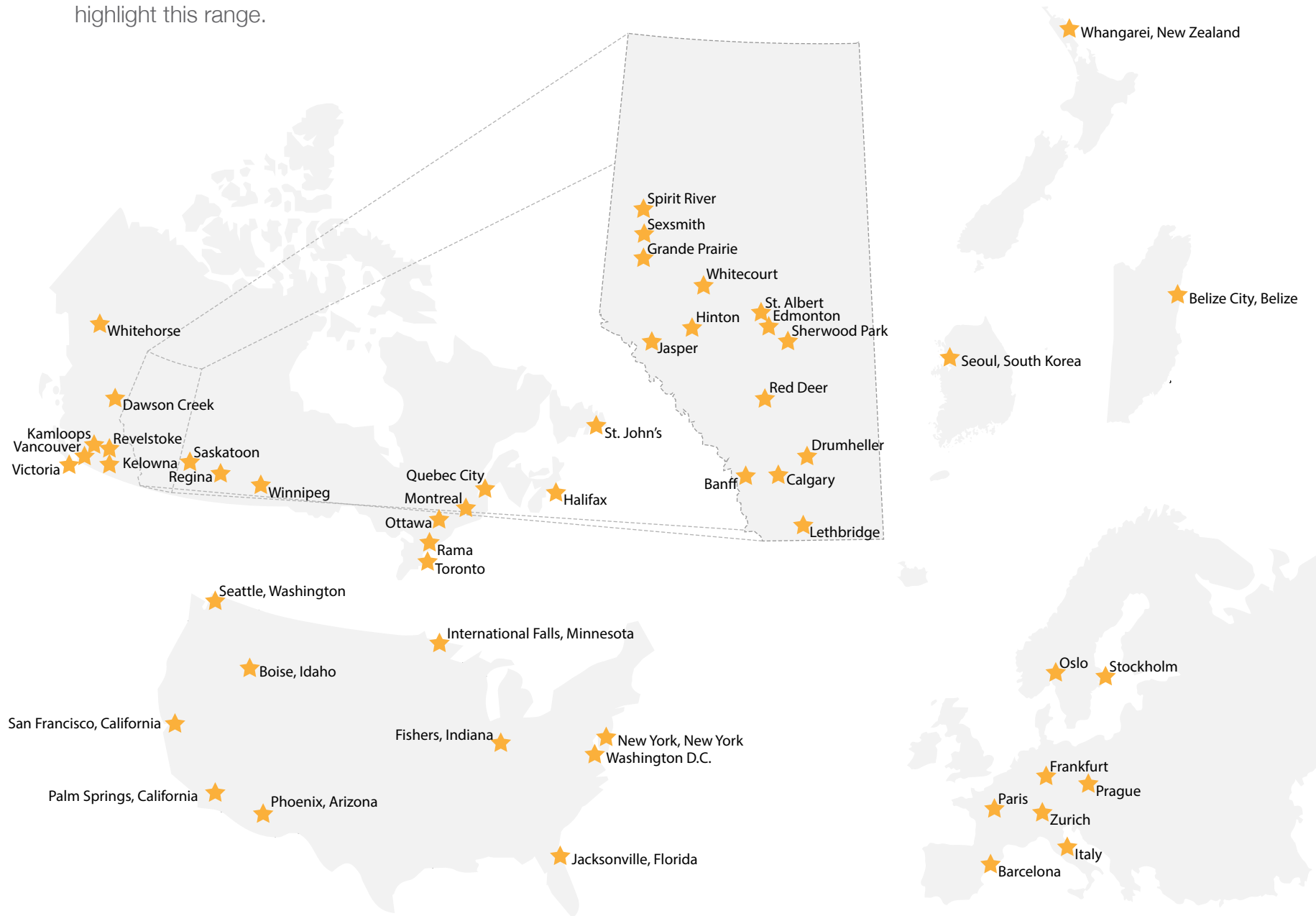
Many spaces were cited multiple times as shown in the list to the right.

### Most Popular Places

<b>45</b>	Churchill Square, Edmonton
<b>13</b>	Muskoseepi Park, Grande Prairie
<b>8</b>	Olympic Plaza, Calgary
<b>5</b>	Alberta Legislature
<b>5</b>	Grande Prairie Regional College, Grande Prairie
<b>4</b>	Jubilee Auditorium, Edmonton
<b>4</b>	William Hawrelak Park, Edmonton
<b>4</b>	Winspear Centre, Edmonton
<b>4</b>	The Eastlink Centre, Grande Prairie
<b>4</b>	The Forks, Winnipeg
<b>3</b>	Nathan Phillips Square, Toronto
<b>3</b>	Yonge and Dundas Square, Toronto
<b>3</b>	European Squares (generally)
<b>3</b>	St. Albert (generally)
<b>3</b>	Prairie Art Gallery, Grande Prairie
<b>3</b>	Jubilee Park, Grande Prairie
<b>2</b>	Stephen Avenue, Calgary
<b>2</b>	Prince's Island Park, Calgary
<b>2</b>	Grande Prairie Public Library
<b>2</b>	Montrose Cultural Centre, Grande Prairie (overall)
<b>2</b>	Whitecourt (generally)
<b>2</b>	Town Square, Kelowna
<b>2</b>	Casino Rama Entertainment Centre

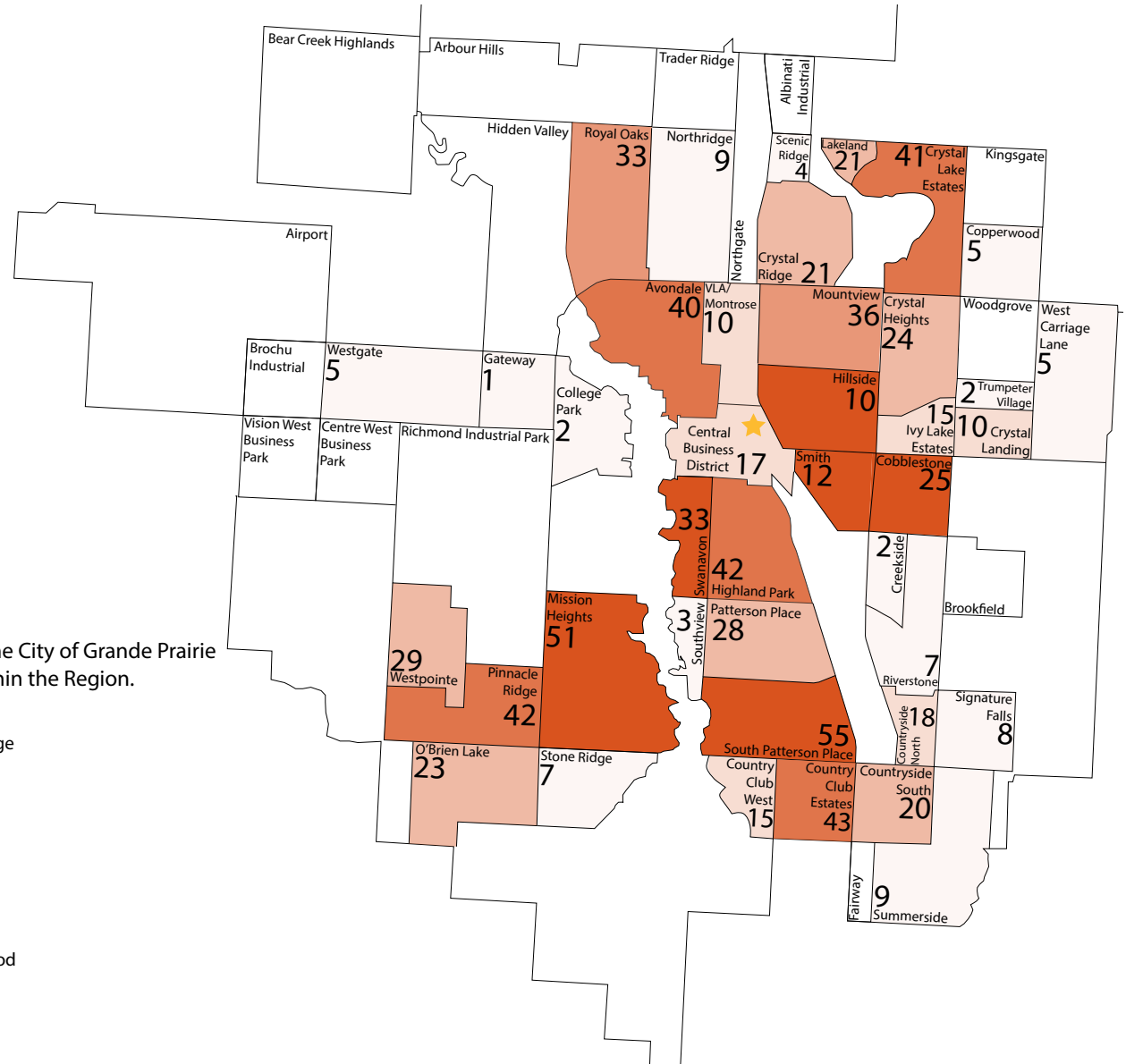


Arts and culture facilities and public spaces from across the world inspired participants. The following images highlight this range.



## What neighbourhood do you live in?

The online survey benefited from wide participation from across the city and region. In total we heard from **52** communities within and around Grande Prairie.



### The 10 communities with the highest response rate

<b>55</b>	South Patterson Place
<b>51</b>	Mission Heights
<b>43</b>	Country Club Estates
<b>42</b>	Pinnacle Ridge
<b>42</b>	Highland Park
<b>41</b>	Crystal Lake Estates
<b>40</b>	Avondale
<b>36</b>	Mountview
<b>33</b>	Royal Oak
<b>33</b>	Swanavon

### Areas beyond the City of Grande Prairie borders but within the Region.

<b>19</b>	County
<b>3</b>	Beaverlodge
<b>1</b>	Bezanson
<b>1</b>	Calgary
<b>6</b>	Clairmont
<b>1</b>	Dimsdale
<b>1</b>	Grovedale
<b>1</b>	Hythe
<b>4</b>	Sexsmith
<b>4</b>	Wedgewood
<b>1</b>	Wembley



# THE WORKSHOP RESULTS

### 3.0 About the Workshops

Both the administration and the stakeholder workshops followed the same format, beginning with a discussion about the participant's favourite public spaces and cultural hubs from anywhere in the world (these results are combined with the results of the online engagement for the same question on the previous two pages). Attendees then discussed potential uses, design options and outdoor activities appropriate for the site based on national and international examples. The workshop concluded with a discussion about potential layout options and allowed participants to offer insight into important local factors and uses for the designers to consider when master planning this site.

Both workshops were hosted on December 15, 2015 at the Montrose Cultural Centre. The internal workshop had 24 attendees and the external workshop had 28 attendees.



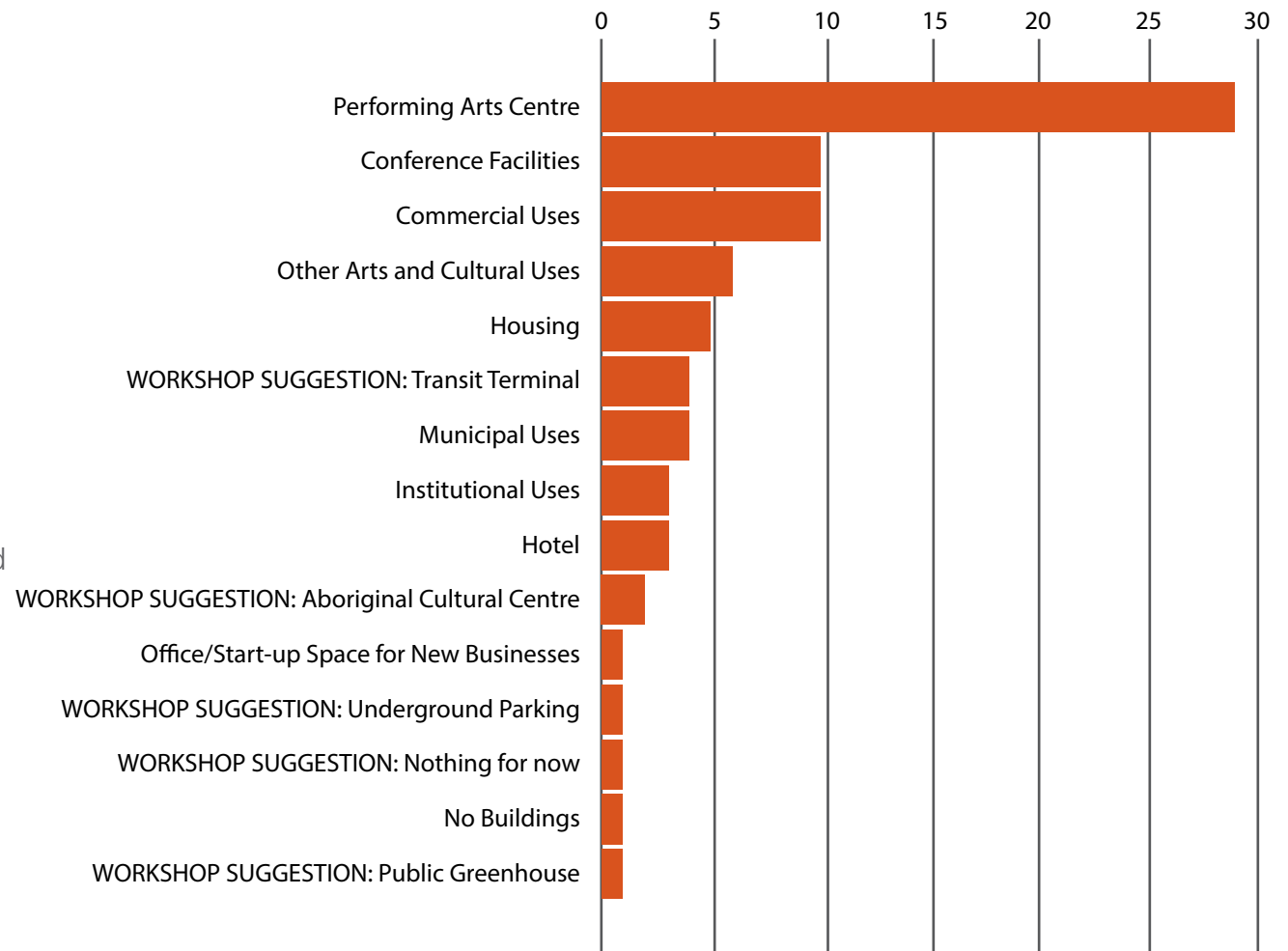


## Preferred Uses from the Workshop Discussion

Each table in the workshops was given two sets of 10 poker chips to illustrate their preferences in each activity. The first activity revolved around their preferred uses for the site. The performing arts centre was clearly the most popular option followed by conference facilities, commercial uses and other arts and cultural uses.

Many tables also suggested uses and included those in their priorities. These included transit terminals, an aboriginal cultural centre, underground parking and a public greenhouse.

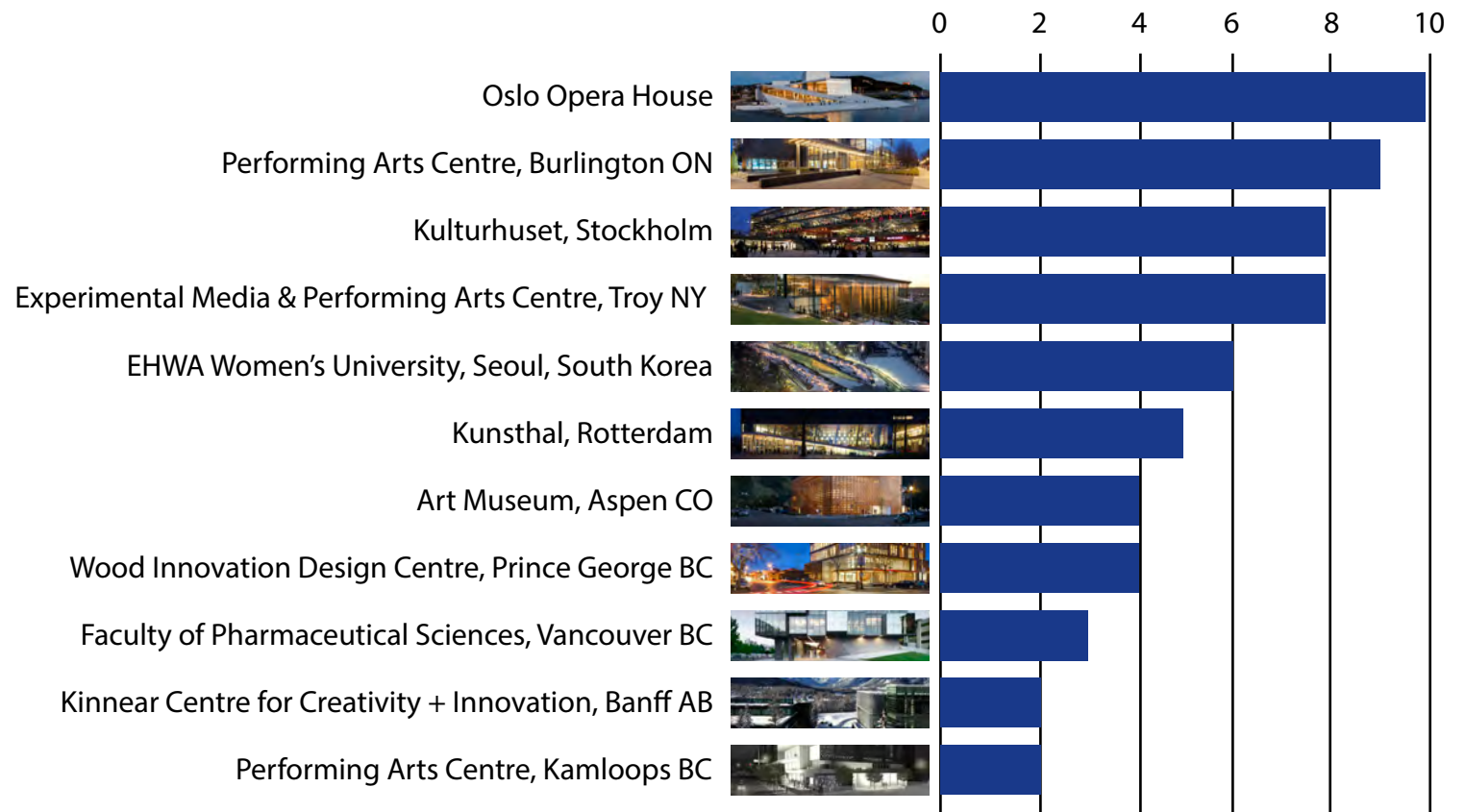
The reasoning participants gave to the priorities largely revolved around creating lots of activity on the site, facilitating an arts and culture hub, drawing people downtown, serving a community need and creating flexible spaces.



## Preferred Design Inspirations from the Workshop Discussion

Numerous design inspirations were presented to participants at the workshop to discuss and prioritize with poker chips. Many of the examples came from other winter cities in Canada and often had an arts, cultural or innovation focus.

The Oslo Opera House was the most popular among participants, followed by Burlington Ontario's Performing Arts Centre and the Kulturhuset in Stockholm. In their comments, people focused on buildings that would complement the Montrose Cultural Centre, offer a comfortable pedestrian experience, demonstrate sustainability, incorporate flexible spaces and create an inviting design. Parking frequently arose as an important component to the site.



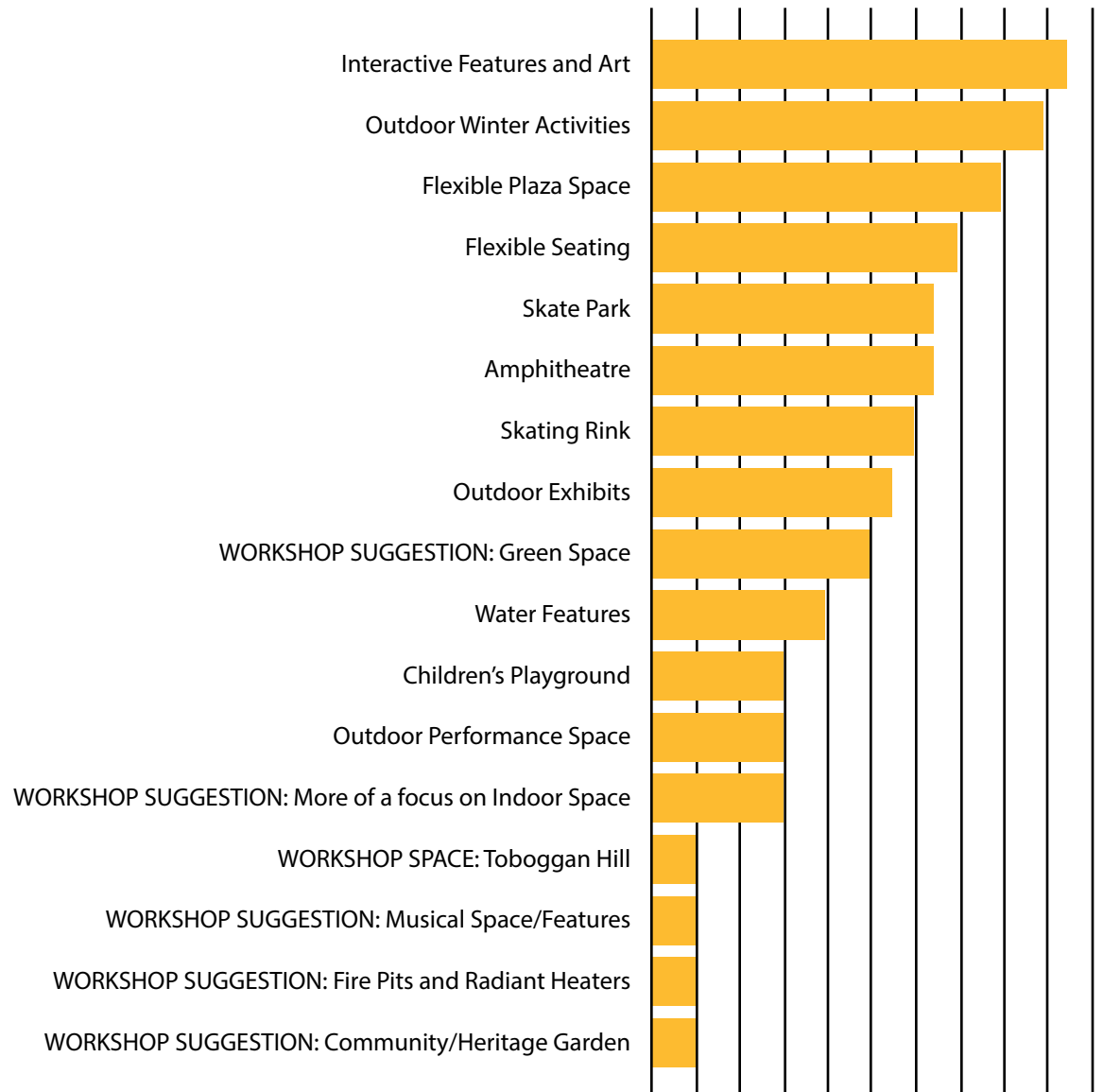


## Preferred Landscape Elements from the Workshop Discussion

After discussing potential uses and building design, participants focused on the outdoor space and its programming. Many potential uses were presented and participants also had the opportunity to suggest additional uses to consider and prioritize.

Interactive features and art, outdoor winter activities and a flexible plaza space were suggested most often in this exercise. Other suggestions included green space, a toboggan hill, music space, fire pits and community gardens.

The winter shelter idea did not receive any votes to place it on the ranking. Also, participants included many suggestions that did not make the final ranking, such as rooftop bars/ice bars, rooftop gardens and public graffiti walls.



## Preferred Layout Options from the Workshops

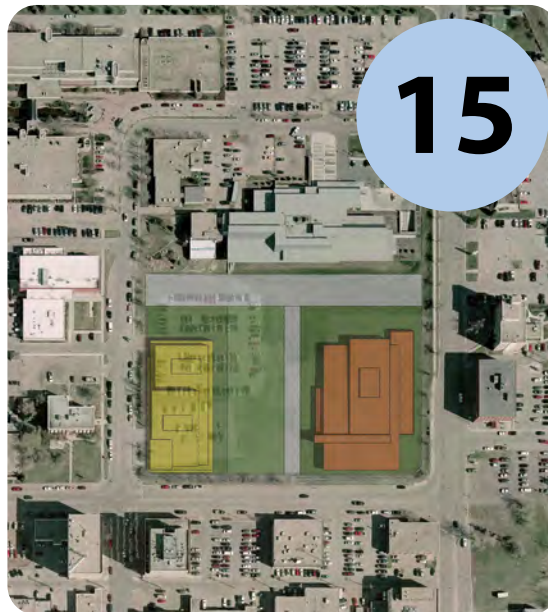
The design team presented three layout options for the workshop participants to consider. Each of these options demonstrated a particular focus: civic, culture and downtown. Participants were asked to evaluate the pros and cons, suggest other layouts and vote on their preferred options.

Out of the three options presented, the civic and culture focuses received the most votes. Participants could also create their own layouts, which are illustrated on the next page, and which were included in voting. Participants largely preferred options where the greenway/concourse flowed directly into the plaza and layouts that left open space near the Montrose Cultural Centre. They also considered flow, wind, shadow, exposure to traffic and winter comfort. Participants were thoughtful about the interface between the Montrose Cultural Centre and the South Montrose Site and wanted to ensure both were integrated attractively, comfortably and functionally.

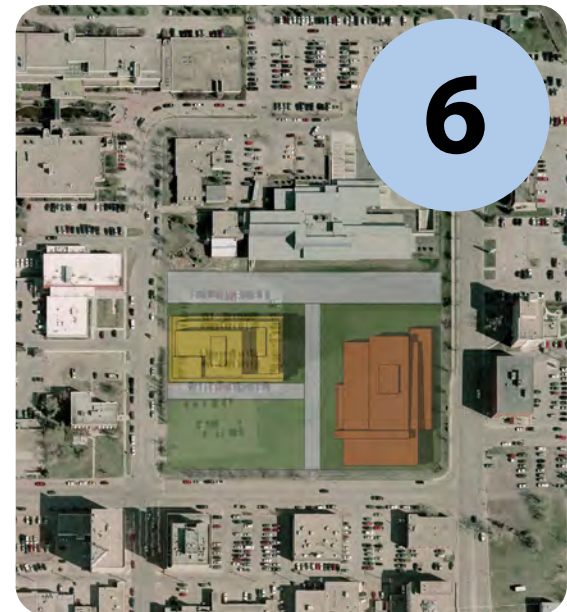
Civic Focused



Culture Focused

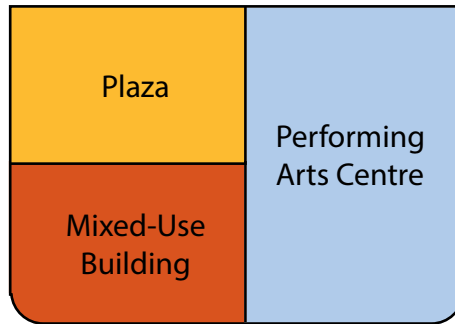


Downtown Focused





## WORKSHOP SUGGESTION



23

*\*note that one table gave this option 18 votes.*

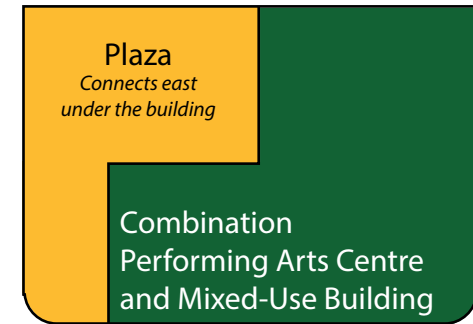
## WORKSHOP SUGGESTION



2

*\*note this option allows the plaza to extend underneath the performing arts centre and mixed use building.*

## WORKSHOP SUGGESTION



0

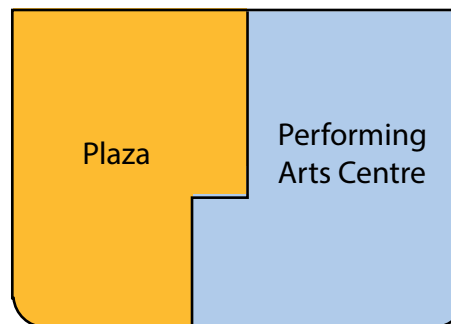
*\*note this option also allows the plaza to extend underneath the performing arts centre and mixed use building.*

## WORKSHOP SUGGESTION



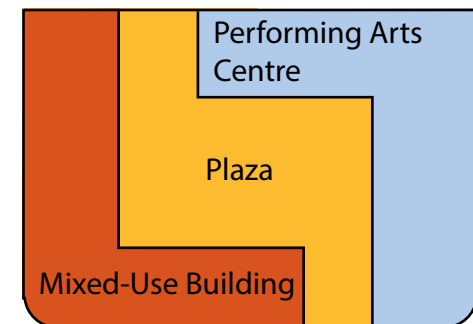
0

## WORKSHOP SUGGESTION



0

## WORKSHOP SUGGESTION



0

*\*this idea included +15 connections to surrounding buildings, residential uses, flexible spaces, transit, walkways through the building and food-related uses.*

## 4.0 Next Steps

### **Administration and Stakeholder Workshops #2**

To continue the conversation about the future of the South Montrose Site, a second set of workshops will be held in the beginning of February 2016. As with the first workshop series, the Phase 2 sessions will include an internal (administration) workshop for staff representing various city departments, and a workshop for stakeholders representing the Downtown Association, the arts and cultural community in Grande Prairie and City Council, among others.

These workshops will include discussion about design principles to frame future development on the site and will present two design options, based on the first phase's feedback, for participants to comment upon. The results from these workshops, feedback from the Phase 2 engagement strategies, existing policy direction and the expertise of the design team will be used to create a master plan for the site. This plan will be presented publicly at the end of April 2016 after committee approval.

### **Continuation of Public Engagement**

A thorough public engagement program involves providing multiple entry points into the conversation through three key avenues: in-person, online and in-situ (place based). Offering a variety of methods for the public to have their say ensures an accessible and thorough engagement process.

To complement the Phase 2 administration and stakeholder workshops described above, an online survey will be created along with a paper survey version available at the Montrose Cultural Centre. For citizens who do not wish to fill out a survey, a kiosk will be available at the Montrose Cultural Centre allowing participants to provide quick feedback on-site, and to share their design preferences. This kiosk will be manned at specific times with a City of Grande Prairie staff member to answer questions, discuss the project and collect additional insights. Digital engagement options will also be provided during this phase, including opportunities for the public to provide feedback and vote via text and mobile apps. The results from these Phase 2 engagement opportunities will then be compiled and used to inform the final master plan.

For more information and project updates, please visit [cityofgp.ca/ourmontrose](http://cityofgp.ca/ourmontrose).






# APPENDIX

# B

## **our Montrose Phase 2: Administration, Stakeholder and Public What We Heard Report**

intelligent futures 

March 2016

Pages: 17





# ourMontrose

PHASE 2: ADMINISTRATION, STAKEHOLDER AND PUBLIC  
WHAT WE HEARD REPORT

March 2016

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# WHAT WE HEARD REPORT

## 1.0 ourMontrose Engagement: Phase 2 Overview

ourMontrose is a community engagement process designed to give Grande Prairie residents a voice in shaping the future of the South Montrose Site in downtown Grande Prairie.

The first phase of engagement took place from November 2015 to January 5, 2016, and gave more than 1,100 citizens a chance to provide feedback on potential uses for the site. In this phase, citizen priorities for the site included arts/cultural facilities, parks spaces and recreational facilities. *(A copy of the full What We Heard report from Phase 1 is available for download at [cityofgp.com/ourMontrose](http://cityofgp.com/ourMontrose).)*

This community feedback, existing policy guidelines and unique site considerations (including infrastructure and climate realities) were used to develop three initial design concepts for the site.

The second phase of engagement, from February 23 to March 14, 2016, included a chance for more than 500 participants to review these initial proposed designs for the site, and to offer feedback on potential amenities. Each of the design concepts included citizen priorities (a Performing and Media Arts Centre, a plaza space, recreational options and a mixed use building), as well as 475 underground parking stalls.

In Phase 2, citizens were able to provide input through online and print surveys, at an information kiosk in the Montrose Cultural Centre, via social media and at two stakeholder workshops.

The results of the second phase of engagement are detailed in this report.

# ENGAGEMENT RESULTS



## 2.0 Approach to Phase 2 Engagement

Phase 2 ourMontrose engagement consisted of online and paper surveys, social media feedback, and stakeholder workshops. The following incorporates the results received from all feedback channels.

Over almost three weeks of engagement, more than **500** people participated.

The survey asked the following four questions:

### 1. Having reviewed the options, which is your preferred design?

*This question presented three options for layouts of the site involving a mixed-use building, plaza space, and a pond/skating feature. There was an opportunity for participants to address why they chose one over the others.*

### 2. Check the top three (3) businesses or services you'd like to see included in the mixed use building.

*Participants were presented with a list of businesses or services (Conference Facilities, Event Space, Housing, Learning Facilities, Municipal Government Uses, Office Space, Pub/Bar, Restaurant, Retail, Services Uses (e.g. hair salon), Sports and Recreation Facilities) and had to select the three they preferred to see on the site. There was space for them to include other suggestions or additional comments.*

### 3. In previous engagement, the community chose six (6) uses as their priorities for the plaza and public space. Select your preferred style/format for each of these options.

*This question presented three pictures as options for each use (Flexible Plaza Space, Outdoor Performance Space, Children's Playground, Interactive Features/Art, Skating Rink, Water Feature) and asked participants to select the one they liked the most. For each use there was the option to explain why the choice was made.*

### 4. Do you have any additional comments you'd like to share? (Online only)

*This question allowed people to add any other thoughts or input in addition to what was asked of them in the survey.*

The following pages summarize the results regarding these questions.

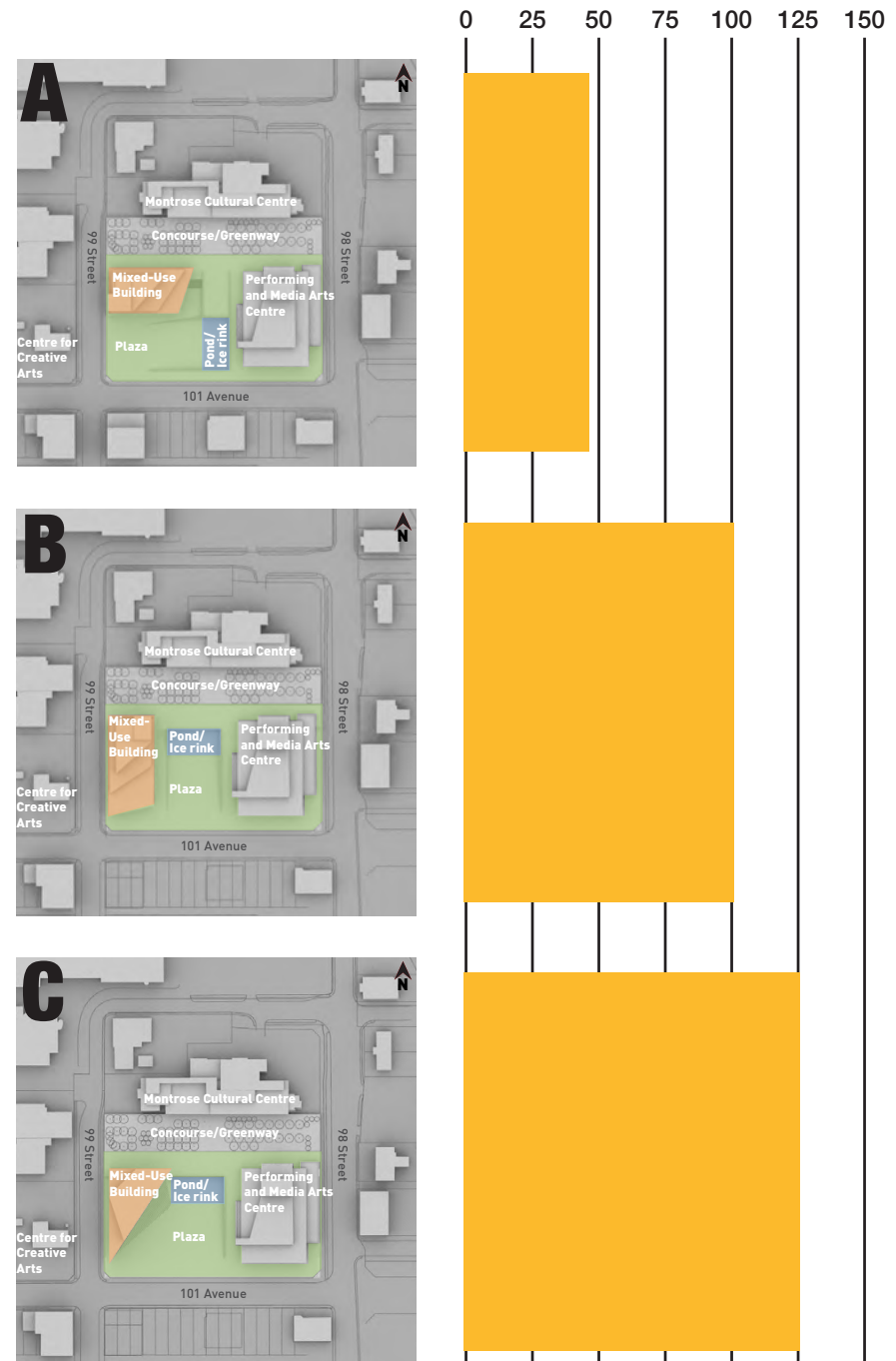
## Question 1:

Having reviewed the options, which is your preferred design?

The most popular of the three options was Option C (126), followed by Option B (101), with Option A (45) being the least preferred option.

The mixed use building was one of the top reasons for those who selected B or C. Some of these reasons were the same (interesting looking) while others were in opposition (how big or small it was). Option B was also popular for its protection from the elements, especially the wind. Option C was preferred for its larger plaza space and the sunlight.

The main issue people had with Option A was the plaza exposure to the elements and roadway. Those who liked it cited its sunlight, easy access to downtown, and openness.



## Question 2:










Check the top three (3) businesses or services you'd like to see included in the mixed use building.

The most popular options from the list of potential uses for the mixed use building (*Conference Facilities, Event Space, Housing, Learning Facilities, Municipal Government Uses, Office Space, Pub/Bar, Restaurant, Retail, Services Uses (e.g. hair salon), Sports and Recreation Facilities*) are shown to the right. These choices are not in a priority sequence, the popularity of the option is best measured by the number of votes (seen below the option icon).

After the obvious top two choices of Event Space and Restaurant, participants chose Conference Facilities, Learning Facilities, and Sports and Recreation. It should be noted that while Pub/Bar did not appear on this list, many felt that this was the same as the restaurant option.

The "Other" suggestions included things like Parking, Arts & Culture Oriented, and All Day Use.

### Top choices for uses in the mixed use building

CHOICE #1	 Event Space (45)	 Restaurant (42)	 Conference Facilities (41)
CHOICE #2	 Restaurant (48)	 Event Space (40)	 Learning Facilities (39)
CHOICE #3	 Restaurant (43)	 Event Space (37)	 Sports and Recreation (28)



### Question 3:

In previous engagement, the community chose six (6) uses as their priorities for the plaza and public space. Select your preferred style/format for each of these options.

#### **Flexible Space**

Options 1 and 2 were noticeably more popular than Option 3 due in part to their ability to accommodate large groups. Commercial Kiosks and Openness were also cited as reasons for their popularity. Across all three options, people felt their choice maximized the flexibility of the plaza.

#### **Outdoor Performance Space**

The grass and green space - along with its openness and tiered amphitheater style terrain - of Option 3 made it the most popular option. The seating and tiered terrain was also highly valued in Option 2 with Flexibility and Easy Maintenance cited as Option 1's strengths.

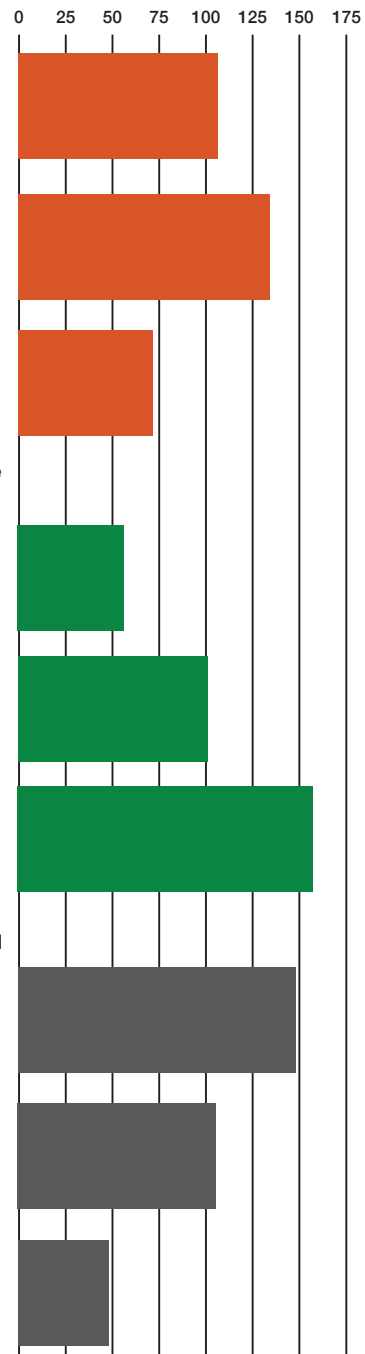
#### **Children's Playground**

Option 1's design and layout and variety of activities made it the most popular option. Option 2 was preferred by many due to its design and ability to double as public art.

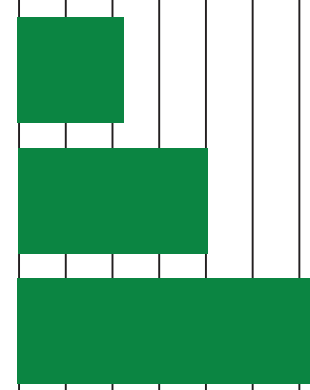
#### **Interactive Feature/Art**

Option 1 and 2 were very close in popularity with only 16 votes separating them. The scale and multi-use factor was the tipping point for Option 1. Other reasons given for all three were visual appeal and the fact they were seen as artistic.

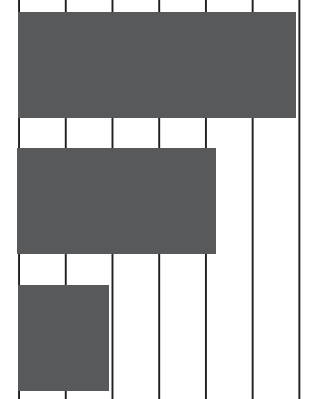
### Flexible Space



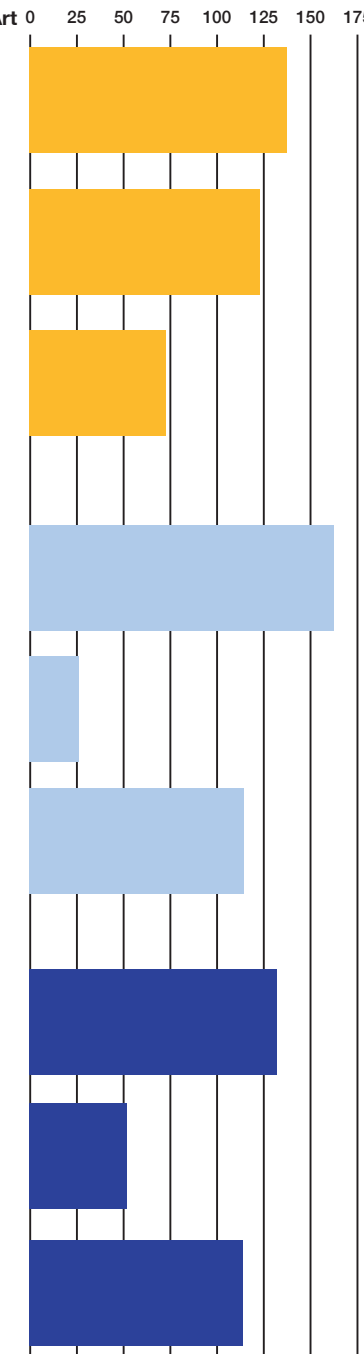
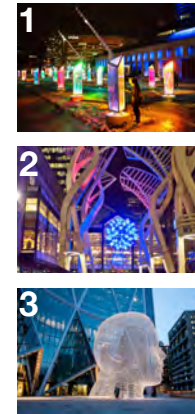
### Outdoor Performance Space



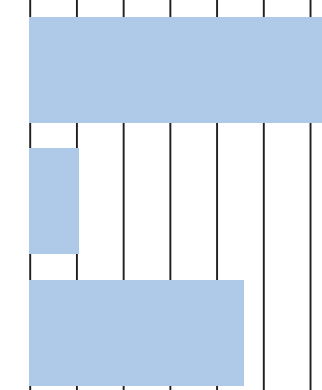
### Children's Playground



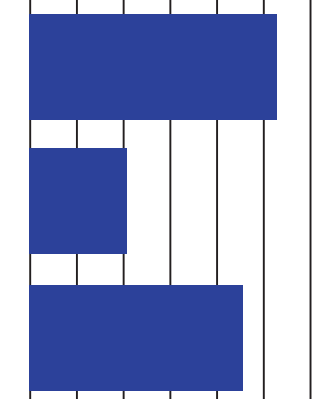
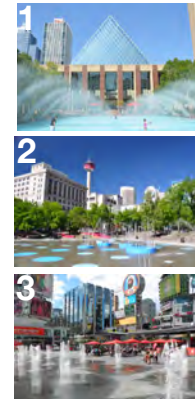
### Interactive Feature/Art



### Skating Rink



### Water Feature



## **Skating Rink**

This feature had the widest range of results with Option 1 being the most popular (163) and Option 2 chosen by only 26 participants. The idea of an indoor or covered rink was not appealing. This is further shown in Option 1 being chosen due to its openness, simplicity, and being outdoors. Option 3 was cited for its path design and being something new for Grand Prairie.

## **Water Feature**

The idea of a water feature was a more contentious feature than the rest with more choosing “none” as an option compared to any other features. Participants cited climate and underuse of similar features already in place. Adding to this, water conservation was a big reason why people chose Options 2 and 3, particularly for the ability to turn the water off in Option 3. Overall Option 1 was the most popular, and was chosen for its design and the fact that it includes a pool.



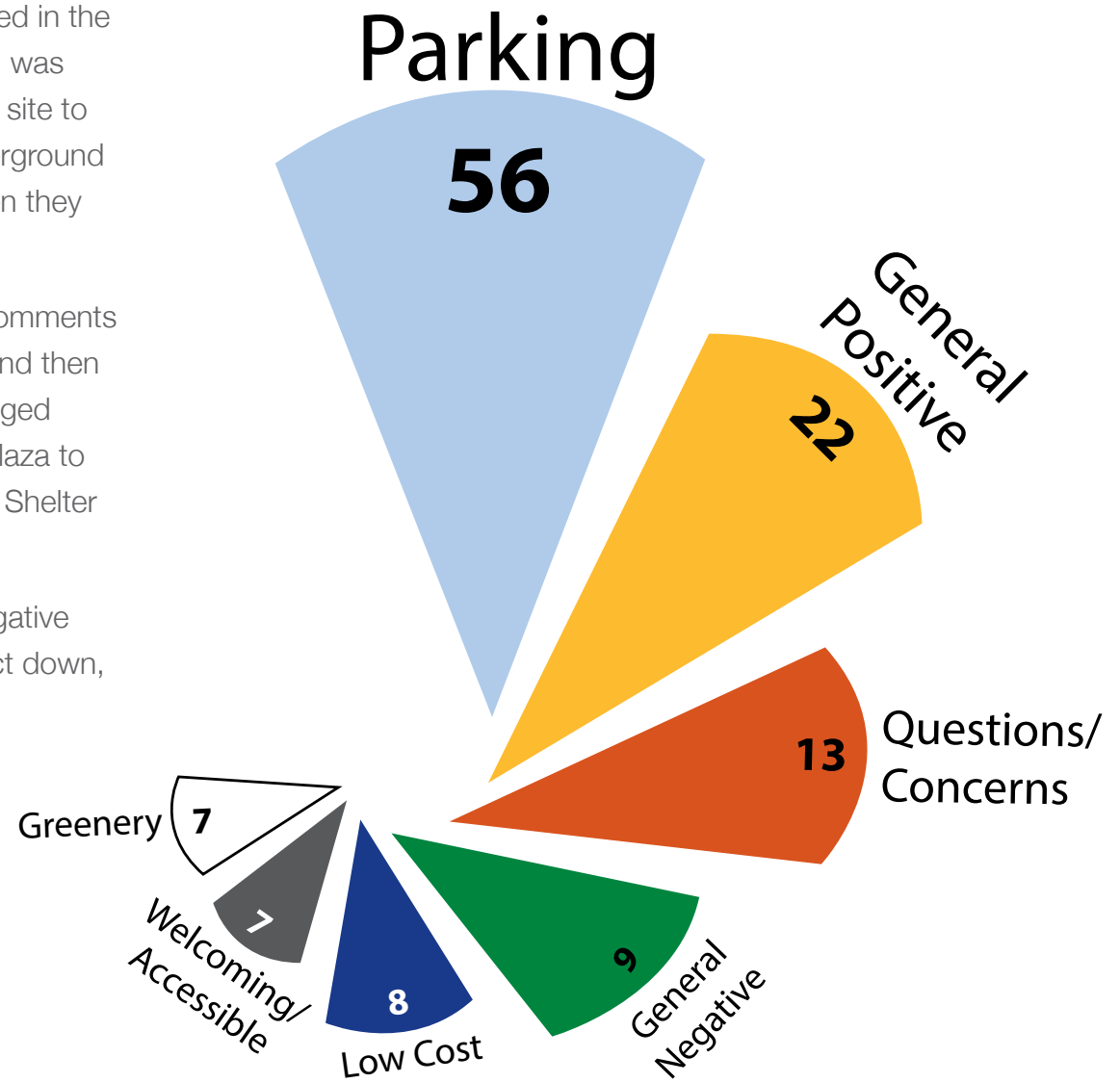
#### Question 4:

Do you have any additional comments you'd like to share?

The most frequently raised comments are illustrated in the diagram below. The dominant topic in this section was parking. The feedback ranged from asking for the site to remain as parking to questioning the cost of underground parking and feeling unheard in the last phase when they mentioned parking.

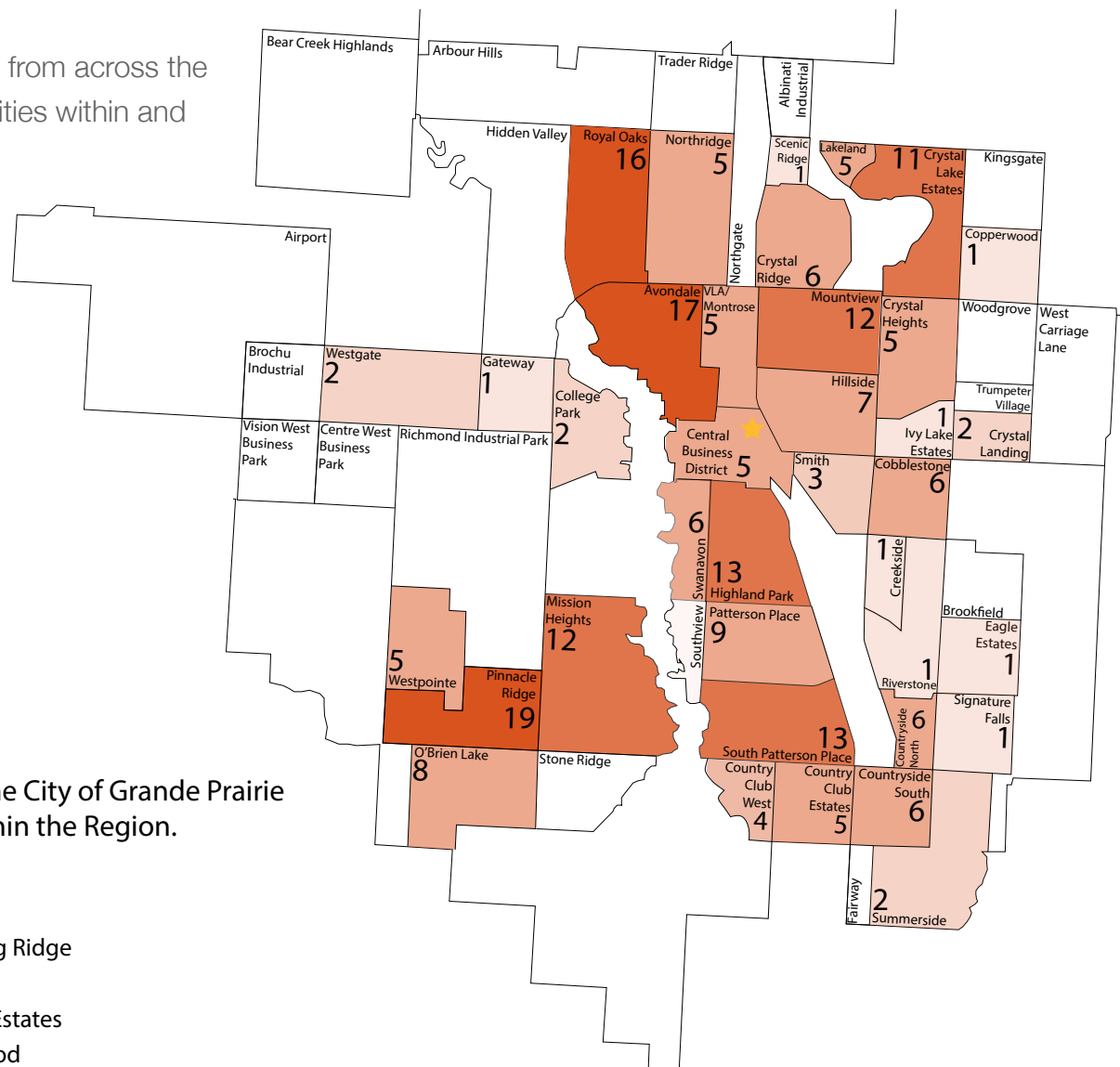
The next common theme was General Positive Comments supporting the project and looking forward to it, and then Questions/Concerns about the project. These ranged from asking if food trucks will be allowed on the plaza to concerns about people living in the Rotary House Shelter nearby.

Other common themes seen included general negative comments, wanting to keep the cost of the project down, keeping green space, and making it welcoming.



## What neighbourhood do you live in?

The online survey benefited from wide participation from across the city and region. In total we heard from **44** communities within and around Grande Prairie.



### The 5 communities with the highest response rate

- 19** Pinnacle Ridge
- 17** Avondale
- 16** Royal Oaks
- 13** South Patterson Place
- 13** Highland Park

### Areas beyond the City of Grande Prairie borders but within the Region.

- 6** County
- 6** Sexsmith
- 4** Whispering Ridge
- 2** Clairmont
- 1** Lakeview Estates
- 1** Wedgewood

# THE WORKSHOPS



### 3.0 About the Workshops

In February 2016, two workshops were hosted to give stakeholders an opportunity to provide additional input. These stakeholders included staff from The City of Grande Prairie, City Councillors, representatives from the Downtown Business Association, local arts and culture organizations and businesses and groups located near the South Montrose Site.

A total of 69 individuals participated in the stakeholder workshops, providing input on the initial design concepts, potential programming for the plaza space and potential uses for the mixed use building.



At the workshops, participants were asked to discuss and provide feedback on the same three questions asked on the online and paper surveys and this feedback is incorporated in the previous section. In addition, they were provided with the opportunity to evaluate each of the three options using a scorecard and discuss each options positive and negative qualities.

The scorecard had participants score components on a scale of 1-5 with 5 being the best:

- Provides good site access
- Provides good views and connections to the Montrose Cultural Centre
- Provides opportunities for flexible plaza programming
- Provides comfort in all seasons
- Provides an interesting mixed use building

In all of above the categories in both workshops, Option C rated the highest.

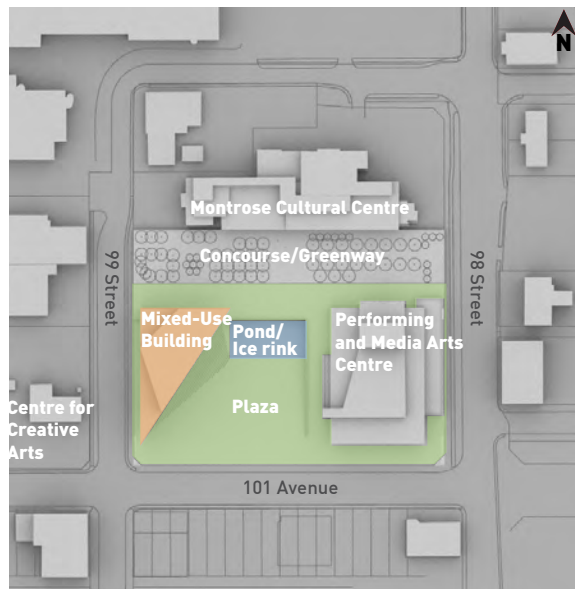
	A	B	C
Provides good site access	2.98	2.97	3.84
Provides good views and connections to the Montrose Cultural Centre	3.00	2.40	4.12
Provides opportunities for flexible plaza programming	3.09	2.87	3.96
Provides comfort in all seasons	3.28	2.56	3.40
Provides an interesting mixed use building	3.19	2.92	3.55

The participants were also asked to note the positive and negative qualities for each.

Option A was seen as inviting, open, and with an easy connection to downtown. The most common arguments against it were the lack of sightline of the Montrose Cultural Centre, natural element concerns like wind and shadows, and concerns about the plaza being near main roads.

Option B was liked for its wind protection and good sightlines of the Montrose Cultural Centre (though the latter was also a common negative). The combination of plaza and mixed use building was seen as positive for the functionality of the building and the flexibility of the plaza. But it was criticized for being closed off and unwelcoming and having lighting issues.

Option C was liked for the sightline of the Montrose Cultural Centre and its access and connectivity to downtown. It was also viewed as safe, open, and protected from the elements. There was one recurring negative, though, and that was the mixed use building. It was criticized primarily for its shape lacking functionality and being more expensive to build.





# NEXT STEPS

#### 4.0 Next Steps

The community feedback provided during Phase 2 of the ourMontrose public engagement process will be used by the design team in the development of a final Master Plan for the South Montrose Site.

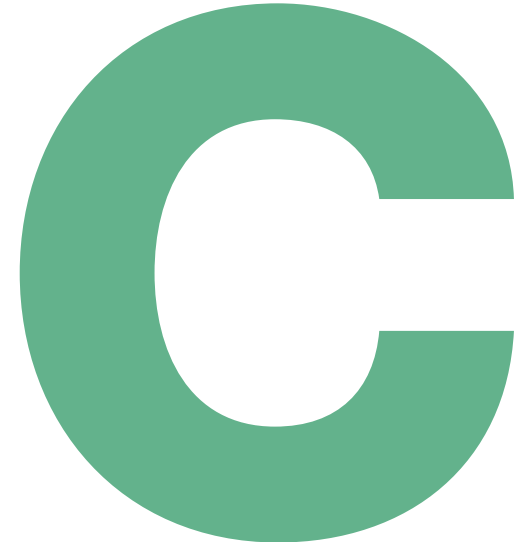
Phase 3 of the ourMontrose process will include the release of the final Master Plan in May 2016.

Further information is available at [cityofgp.com/ourMontrose](http://cityofgp.com/ourMontrose).





# APPENDIX



## our Montrose “Functional Principles Test” Layout Options Filtering Process Phase 2: Public, Administration & Stakeholder Engagement

**NAK**   
design strategies

Williamson Chong Architects

February 2016

Pages: 48





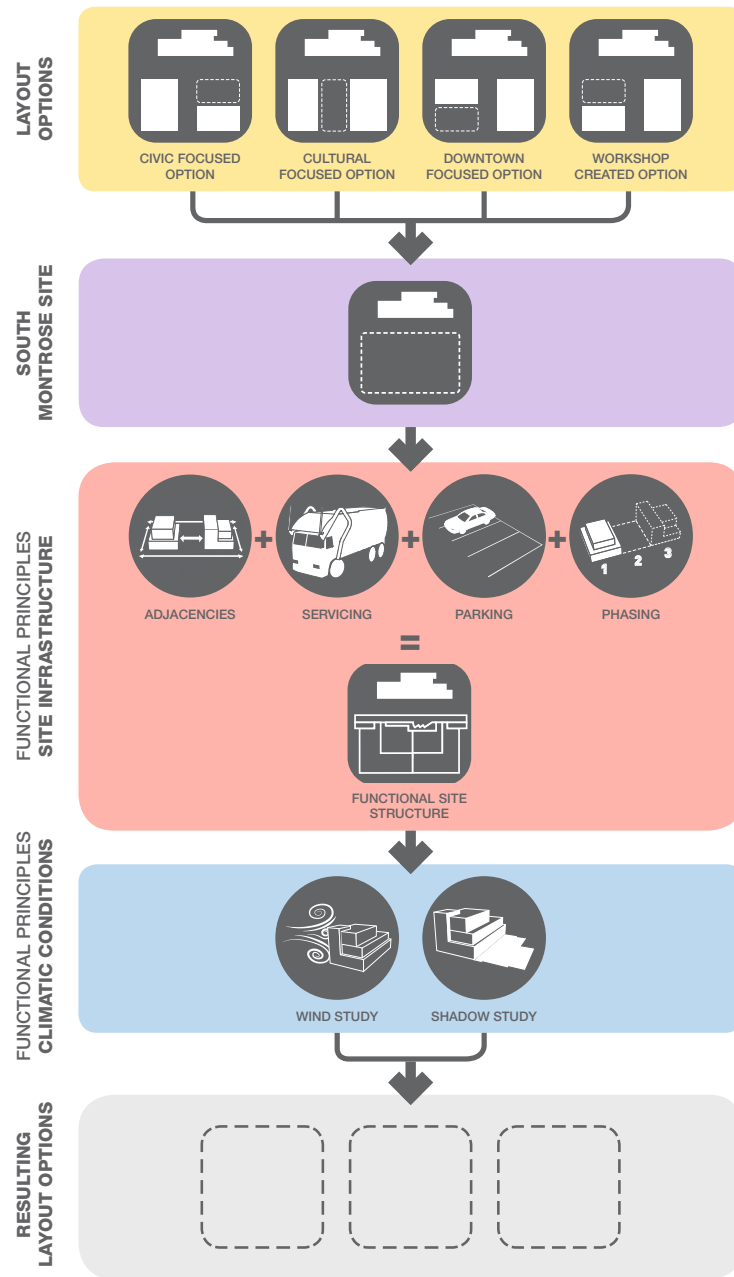
# **“FUNCTIONAL PRINCIPLES TEST” LAYOUT OPTIONS FILTERING PROCESS**

**PHASE 2: PUBLIC, ADMINISTRATION & STAKEHOLDER  
ENGAGEMENT**

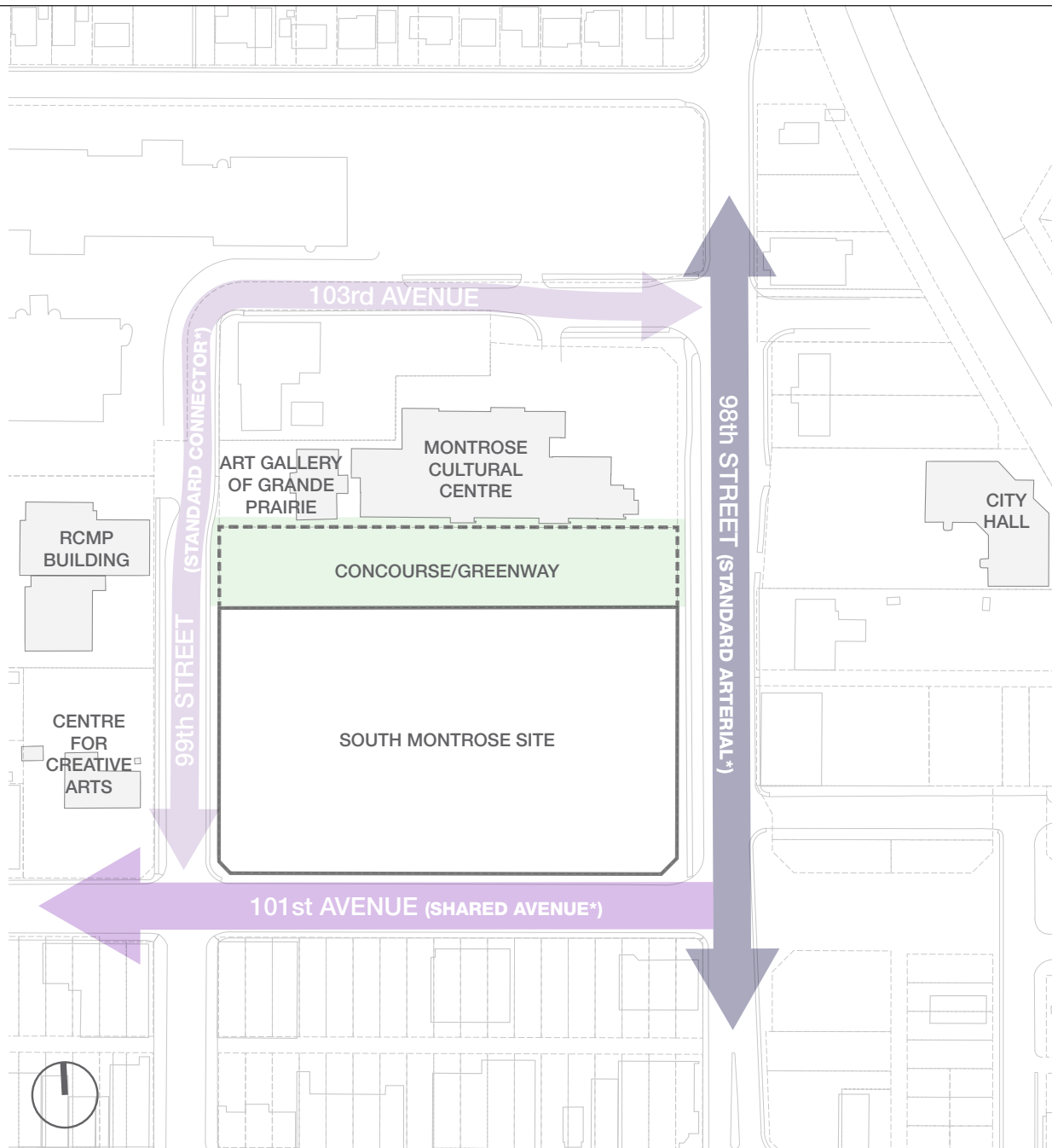
FEBRUARY 2016

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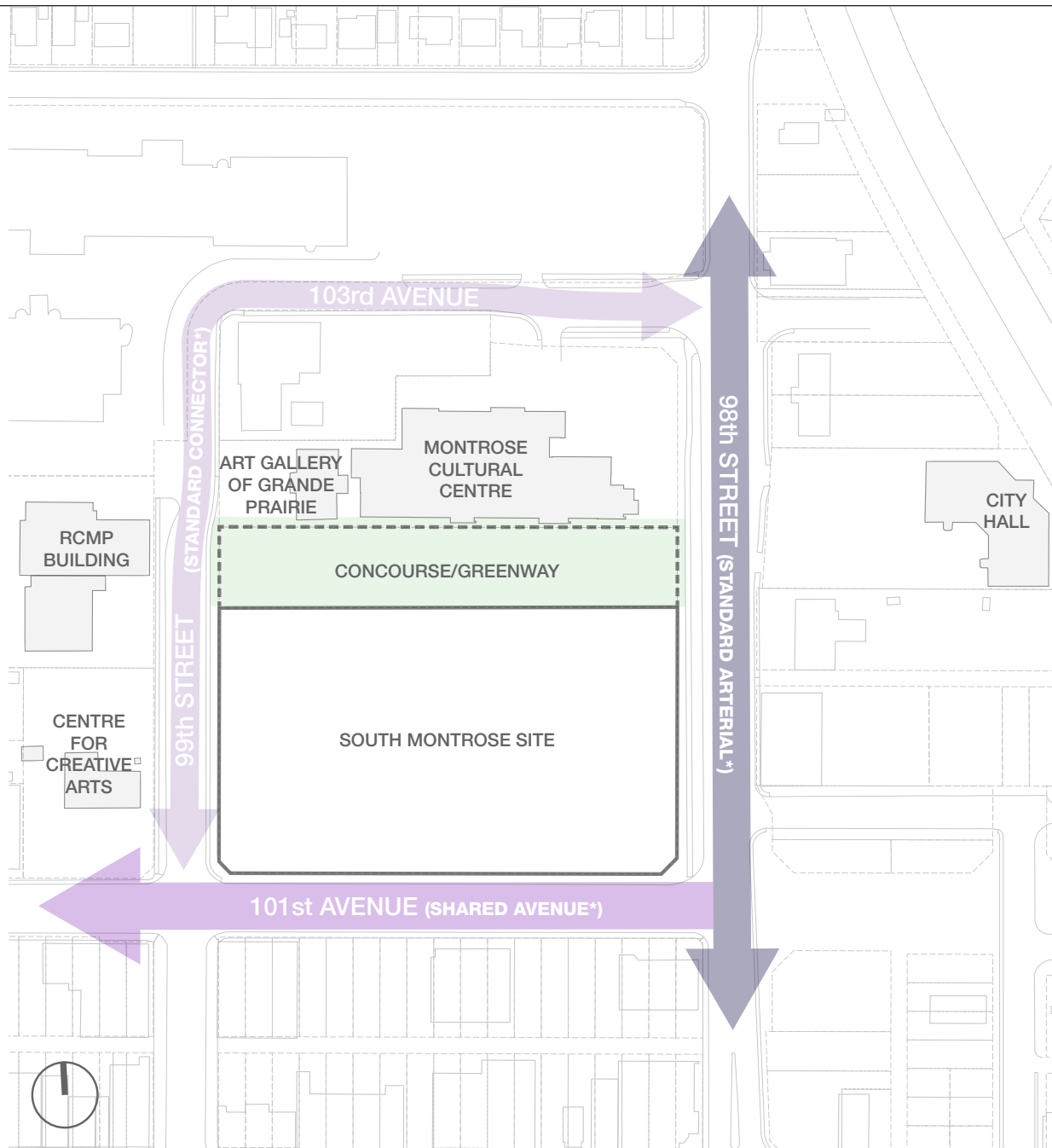
- Layout options presented during the Phase 1 workshop - including the created layout option - will undergo a “test” to filter out the most appropriate options for the South Montrose site and/or reveal new options based on the results
- In order to “test” the layout options, an assessment of the uses and characteristics surrounding the South Montrose will be conducted, and then establish an efficient “Functional Site Infrastructure” scenario based on a set of “Functional Principles”
- These “Functional Principles” - consisting of ‘Site Infrastructure’ and ‘Climatic Conditions’ - were developed from the Phase 1 online engagement and workshop feedback
- Layout options will be overlaid on the “Functional Site Infrastructure” scenario in order to determine which option relates best to the infrastructure conditions
- Layout options will also be tested with respect to wind direction and shadow impacts
- The resulting layout options will be carried forward into the master planning process



### ADJACENT BUILDING USES

- North side of South Montrose site:
  - Montrose Cultural Centre
  - Art Gallery of Grande Prairie
  - Approved Concourse/Greenway
- West side of South Montrose site:
  - RCMP Building
  - Centre for Creative Arts
- East side of South Montrose site:
  - City Hall

\* Street classification based on Downtown Streetscape Enhancement Project

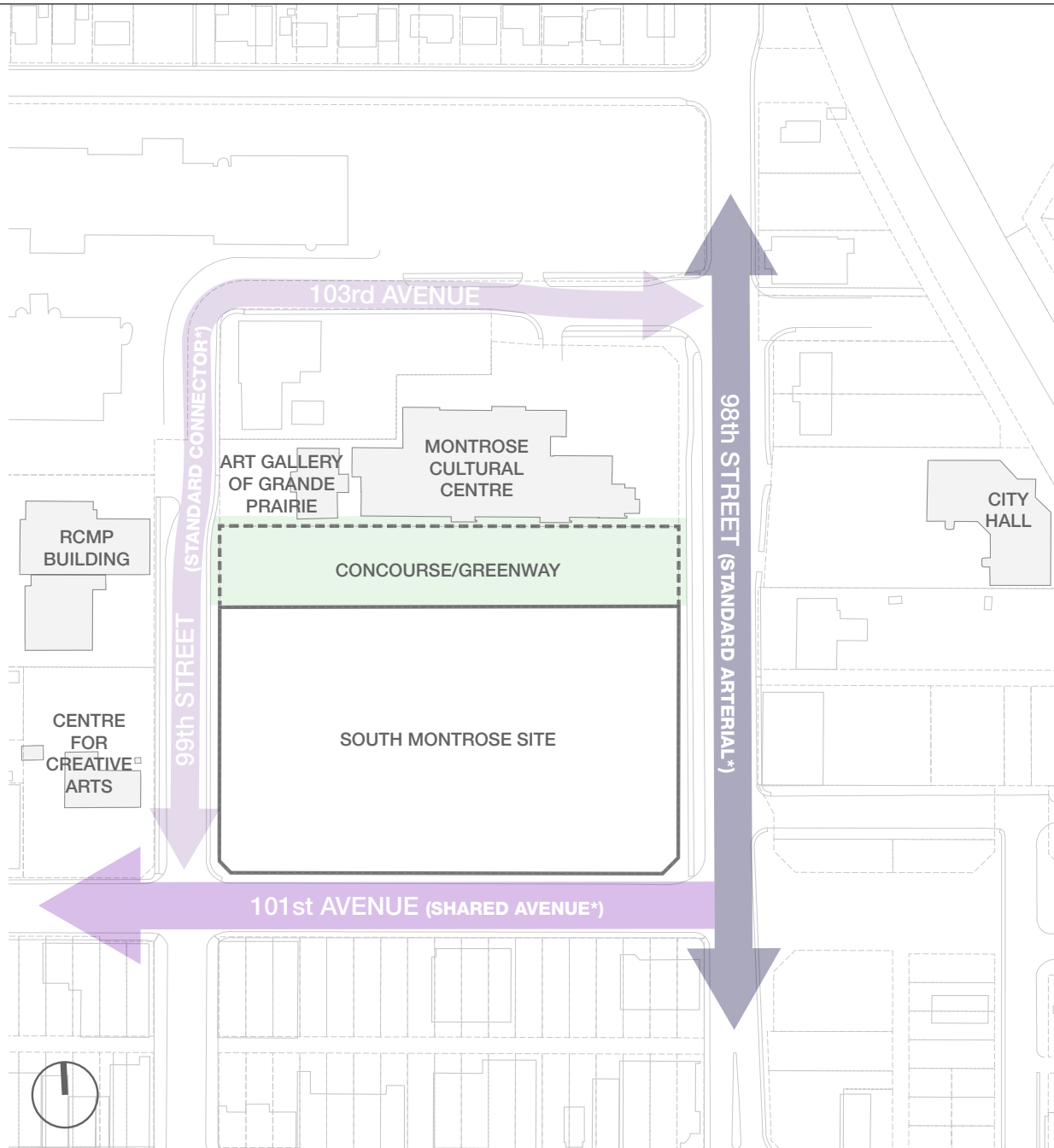


### ADJACENT STREETS AND CHARACTERISTICS \*:

- Standard Connector (99th Street):
  - ±21.0m to 24.0m Right-of-way
  - One northbound and one southbound vehicular lanes
  - Two lanes of standard on-street parking
  - Drive lanes reduced in size from 3.70m to 3.50m
- Standard Arterial (98th Street):
  - ±25.0m Right-of-way
  - Two northbound and two southbound vehicular lane
  - No on-street parking
  - Drive lanes reduced in size from 3.70m to 3.50m

\* Street classification and characteristics based on Downtown Streetscape Enhancement Project

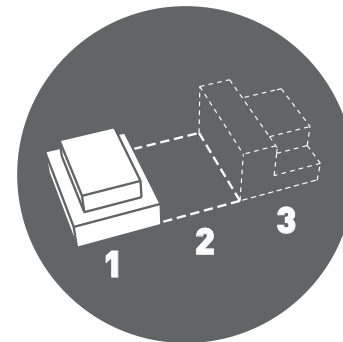
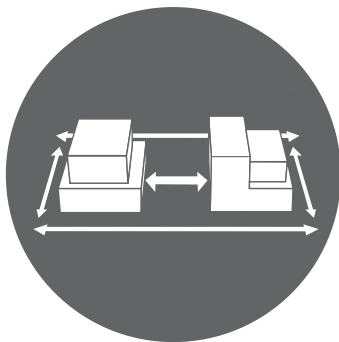




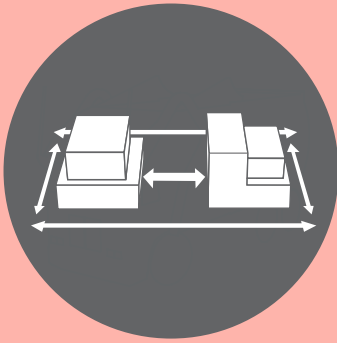
- Shared Avenue (101st Avenue)
  - ±20.0m Right-of-way
  - Maintain two-way vehicular lanes and two parking lanes on either side
  - Drives lanes can be reduced in size from 3.70m to 3.50m
  - On-street parking separated by flush curb with paving treatment from building facade to building facade
  - Continuous trench drain and bollards delineates pedestrian and vehicular zones

\* Street classification and characteristics based on Downtown Streetscape Enhancement Project

# FUNCTIONAL PRINCIPLES: **SITE INFRASTRUCTURE**



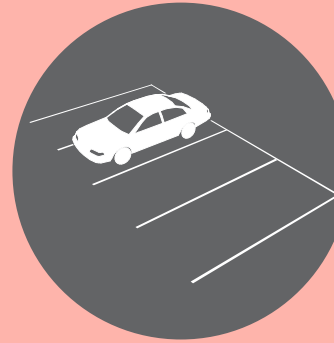
## SITE INFRASTRUCTURE

**ADJACENCIES**

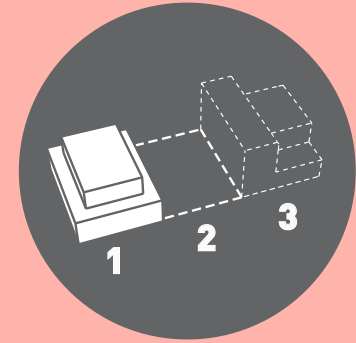
- Assess the important views and potential service entry locations with respect to the surrounding uses

**SERVICING**

- Assess several scenarios with respect to entry points, servicing form and loading design options

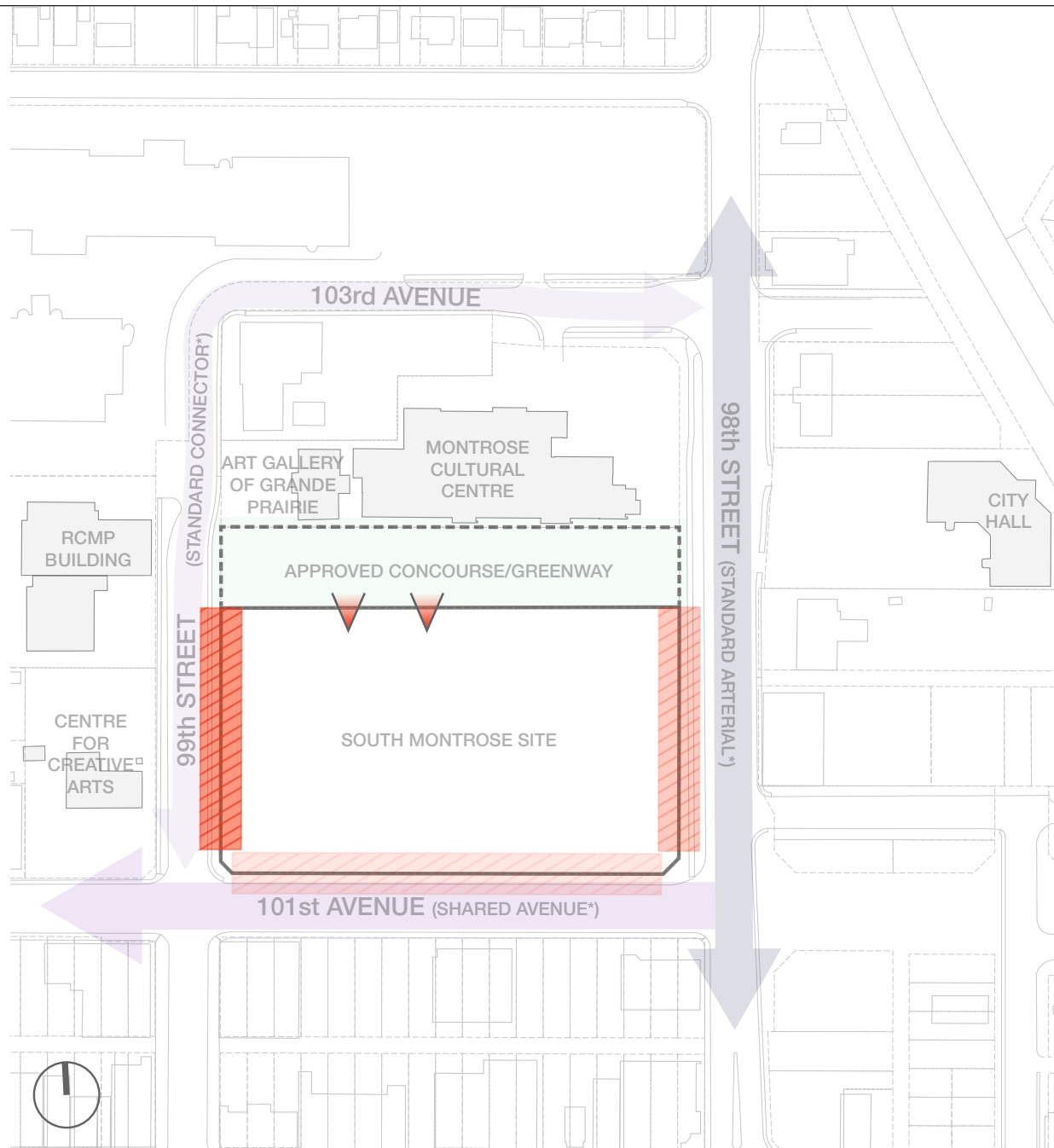
**PARKING**




- Discuss potential underground parking scenarios and resulting parking yields

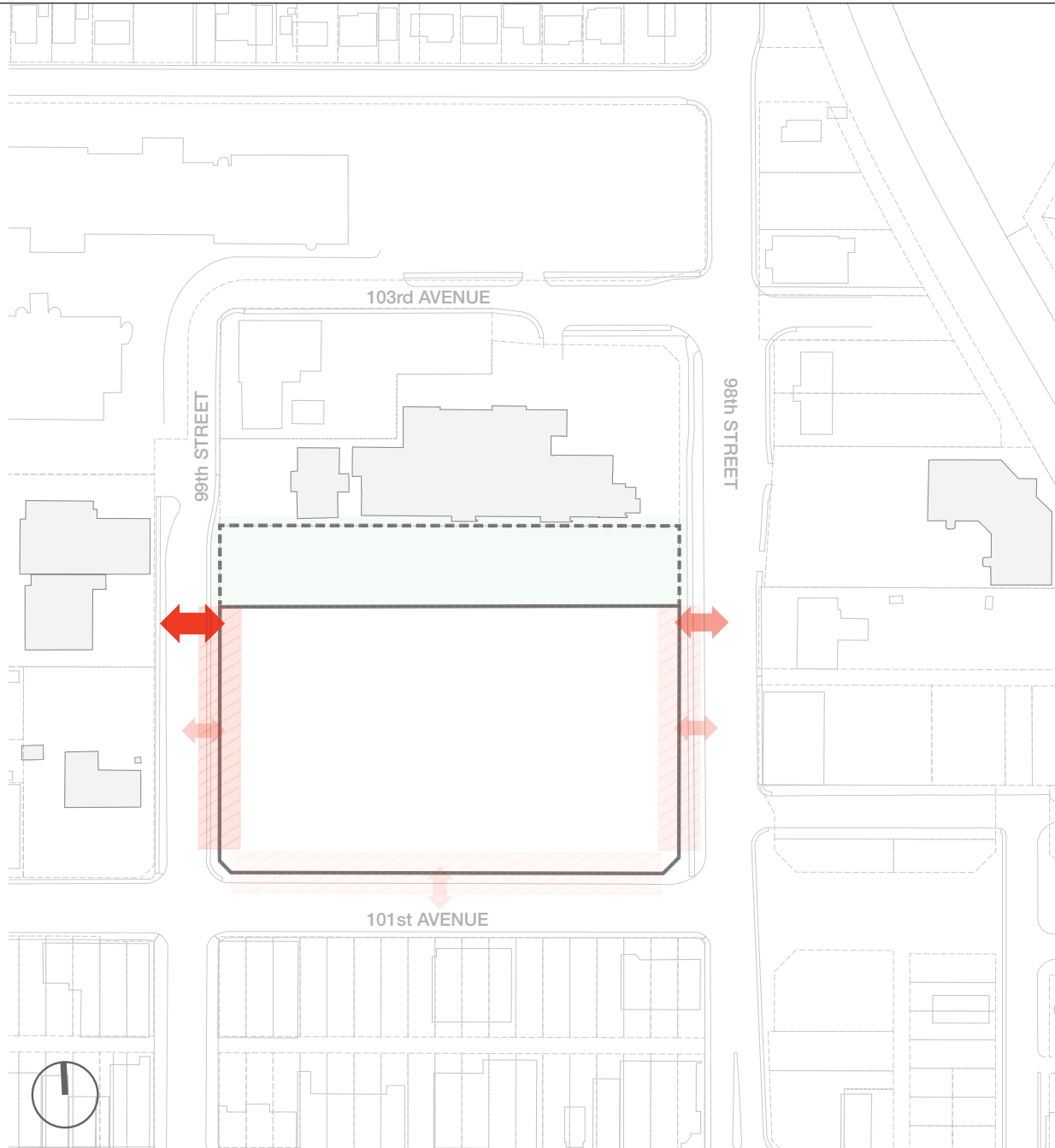
**PHASING**

- Discuss the build-out phase of the site programming elements in relation to the infrastructure layout



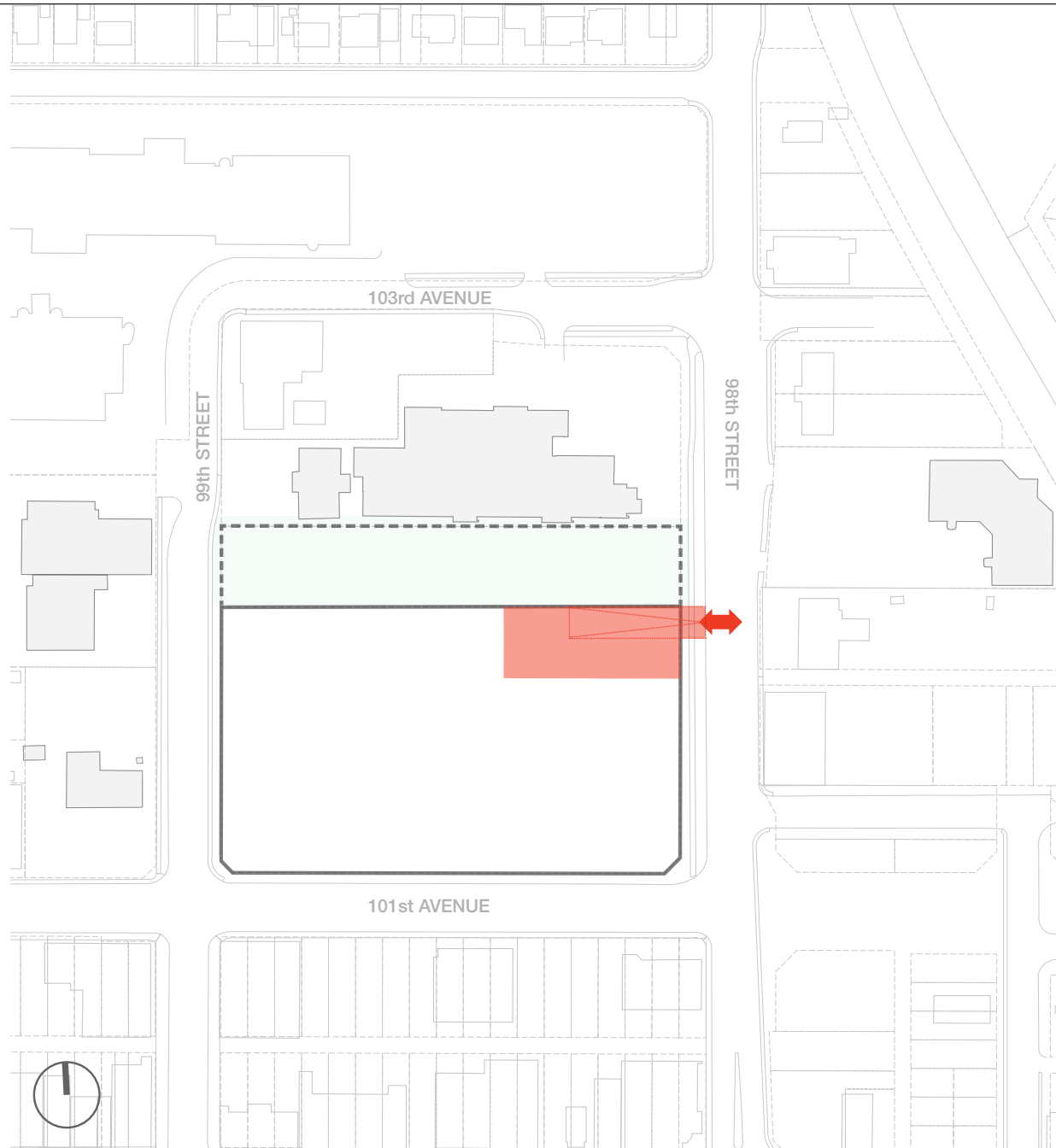


- 
☐ Maintain views toward the Montrose Cultural Centre, Art Gallery of Grande Prairie and Concourse/ Greenway
- 
☐ Main access location along 101st Avenue is not desirable as it potentially conflicts with the use of the Shared Avenue (101st Avenue) as extended public space
- 
☐ Main access location along 98th Street is acceptable, but less desirable as it potentially conflicts with major arterial traffic
- 
☐ Main access location along 99th Street is most desirable as it does not conflict with either issue, and hides the servicing access from the more 'active' streets



## SERVICE ENTRY LOCATION

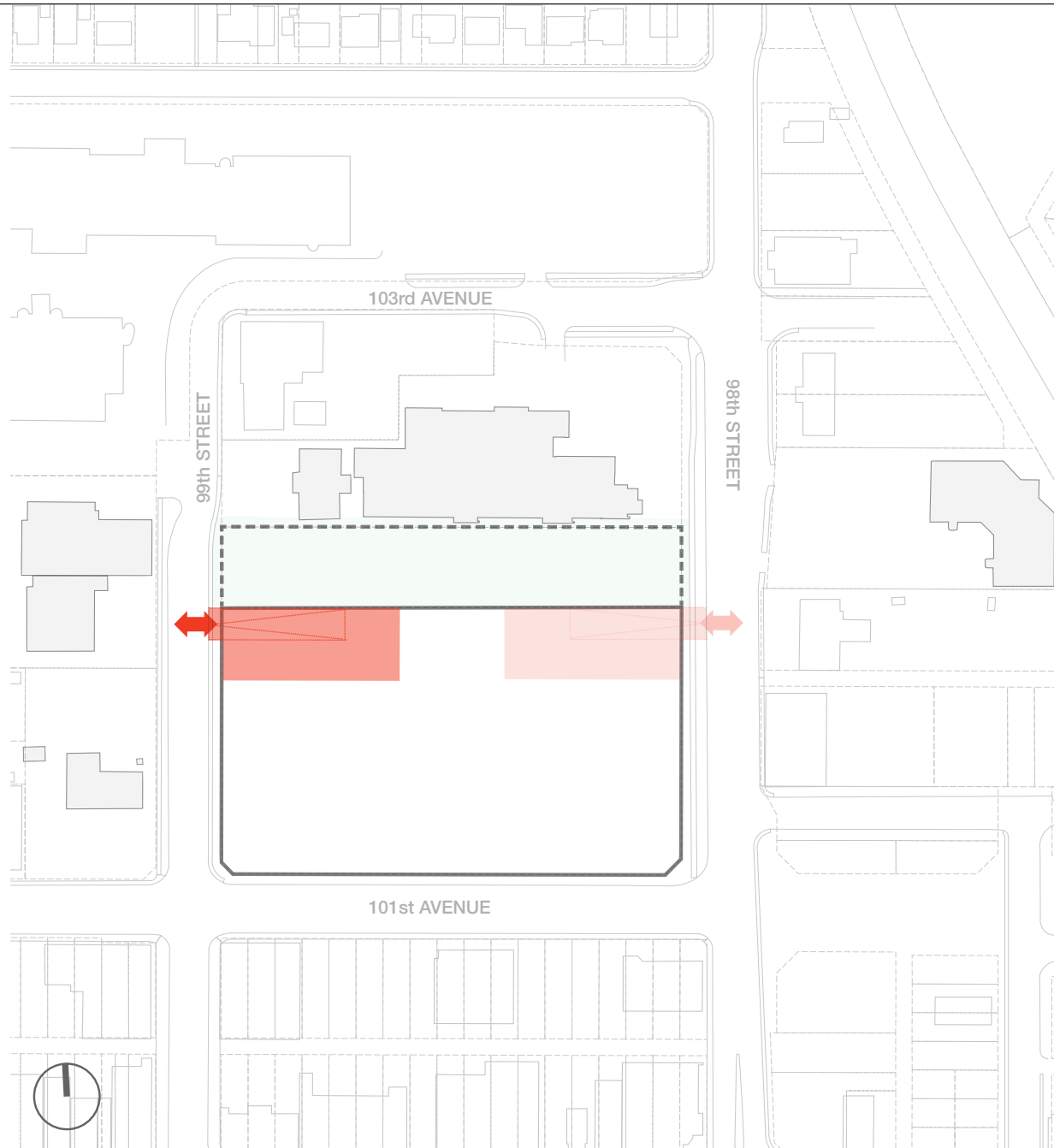
- ↔ □ Mid-site service entry along 101st Avenue is not desirable as it conflicts with the potential use of the Shared Avenue (101st Avenue) as extended public space
- ↔ □ Mid-site service entry along 98th or 99th Street is not desirable as it bisects the overall site, reducing the overall utilization of an efficient site infrastructure layout
- ↔ □ Service entry adjacent to the approved Concourse/Greenway on 98th Street is less desirable due to truck loading and the potential traffic conflicts of being along a north-south arterial
- ↔ □ Service entry adjacent to the approved Concourse/Greenway along 99th Street is most desirable as it provides thorough in/out manoeuvrability of a service vehicle without impacting major traffic, as well as full utilization of the site for an efficient site infrastructure layout



## SERVICE AREA WITH ENTRY AT GRADE

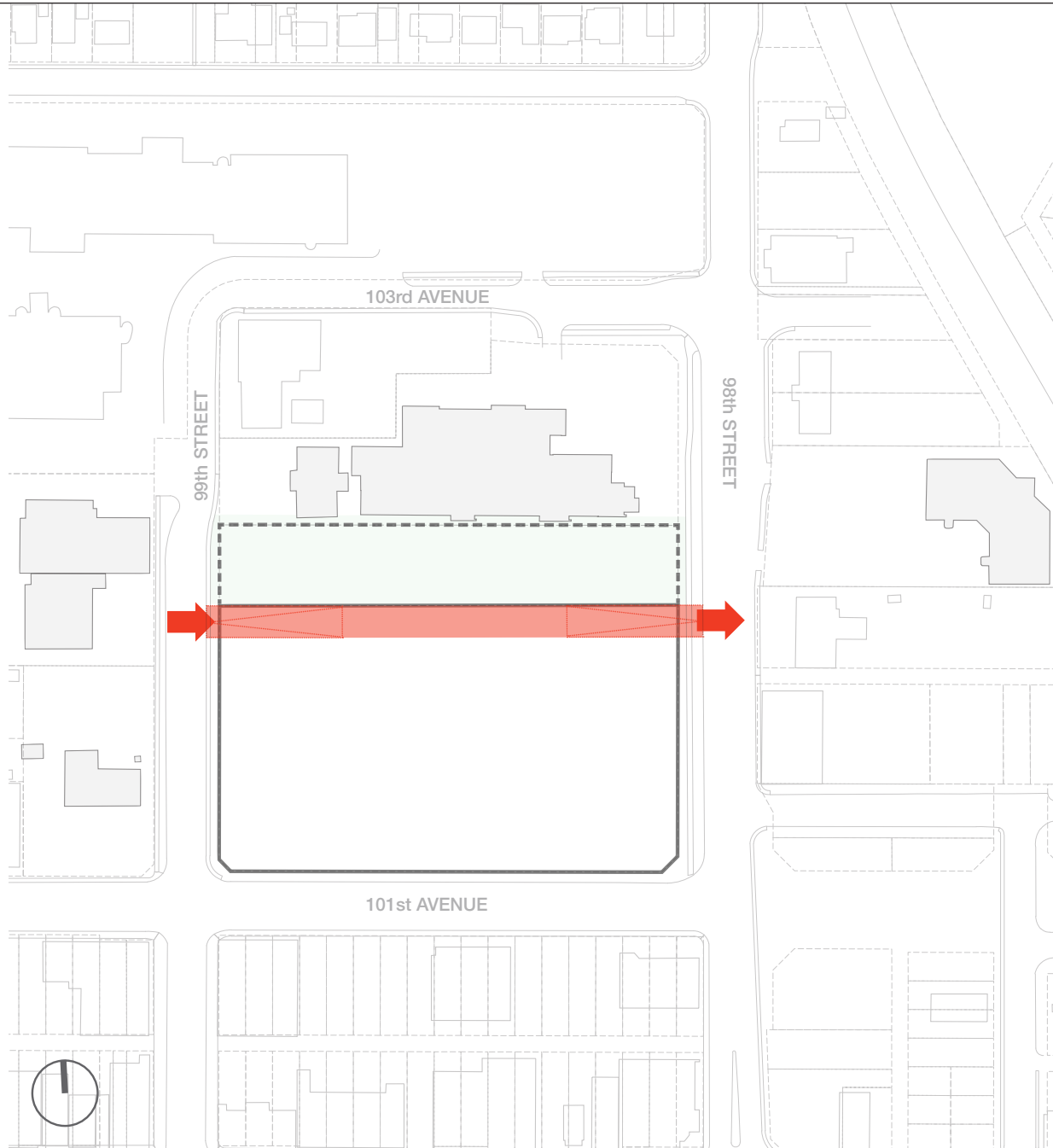
- Separated service area with entry at grade - adjacent to the Concourse/Greenway, with access on 98th Street - is less desirable as it exposes the service entry on the surface and only caters to the building use on the side it is located





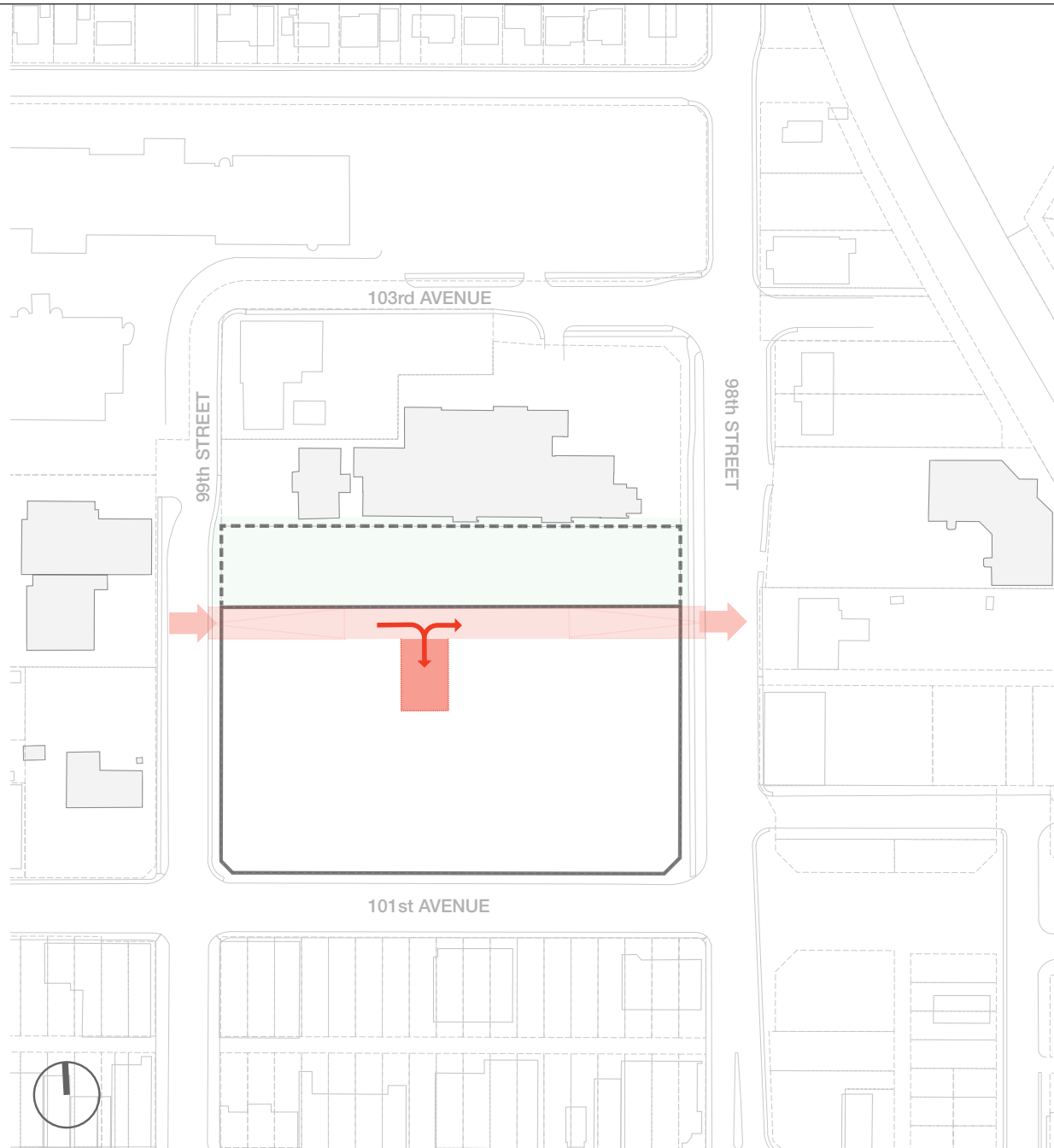
## SERVICE AREA WITH ENTRY AT GRADE

- Separated service area with entry at grade - adjacent to the Concourse/Greenway, with access on 99th Street - is less desirable as it exposes the service entry on the surface and only caters to the building use on the side it is located
- Subsequent separated servicing area at later phases reduces the sub-surface infrastructure area potential for other amenities (i.e. parking)



## SERVICE CHANNEL

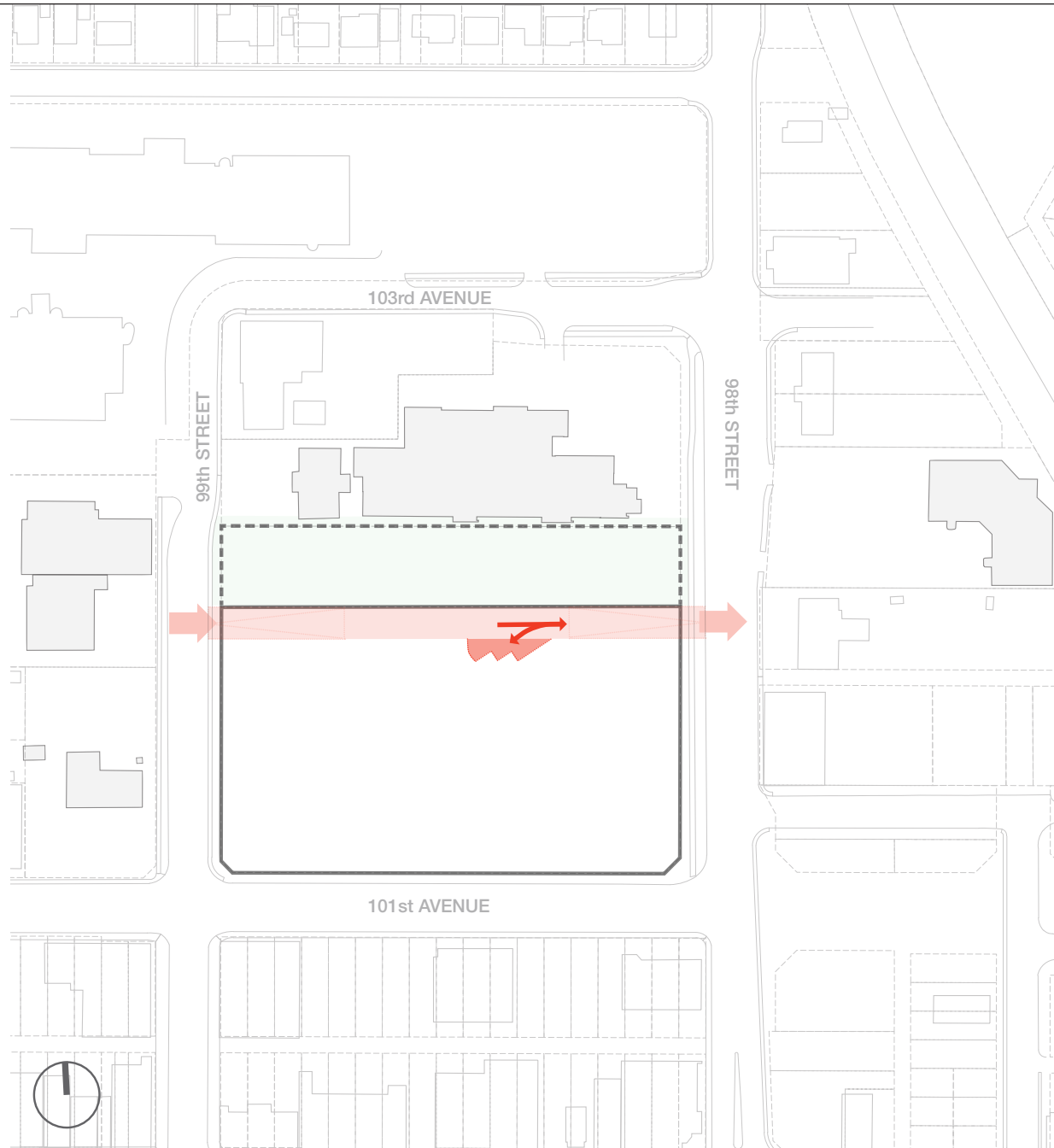
- Sub-surface service channel running east-west along the Concourse/ Greenway is most desirable as it creates a “clothes line effect” of being able to service multiple elements at first build, and future phases
- It fully utilizes the site by providing ample room for sub-surface amenities such as underground parking and other site infrastructure elements
- A one-way, east-west service channel provides an efficient travel route and encompasses less area
- Having the service channel underground will not visually impact the adjacent Concourse/Greenway
- Sub-surface service channel allows for more building faces to be active



## SERVICE LOADING DESIGN

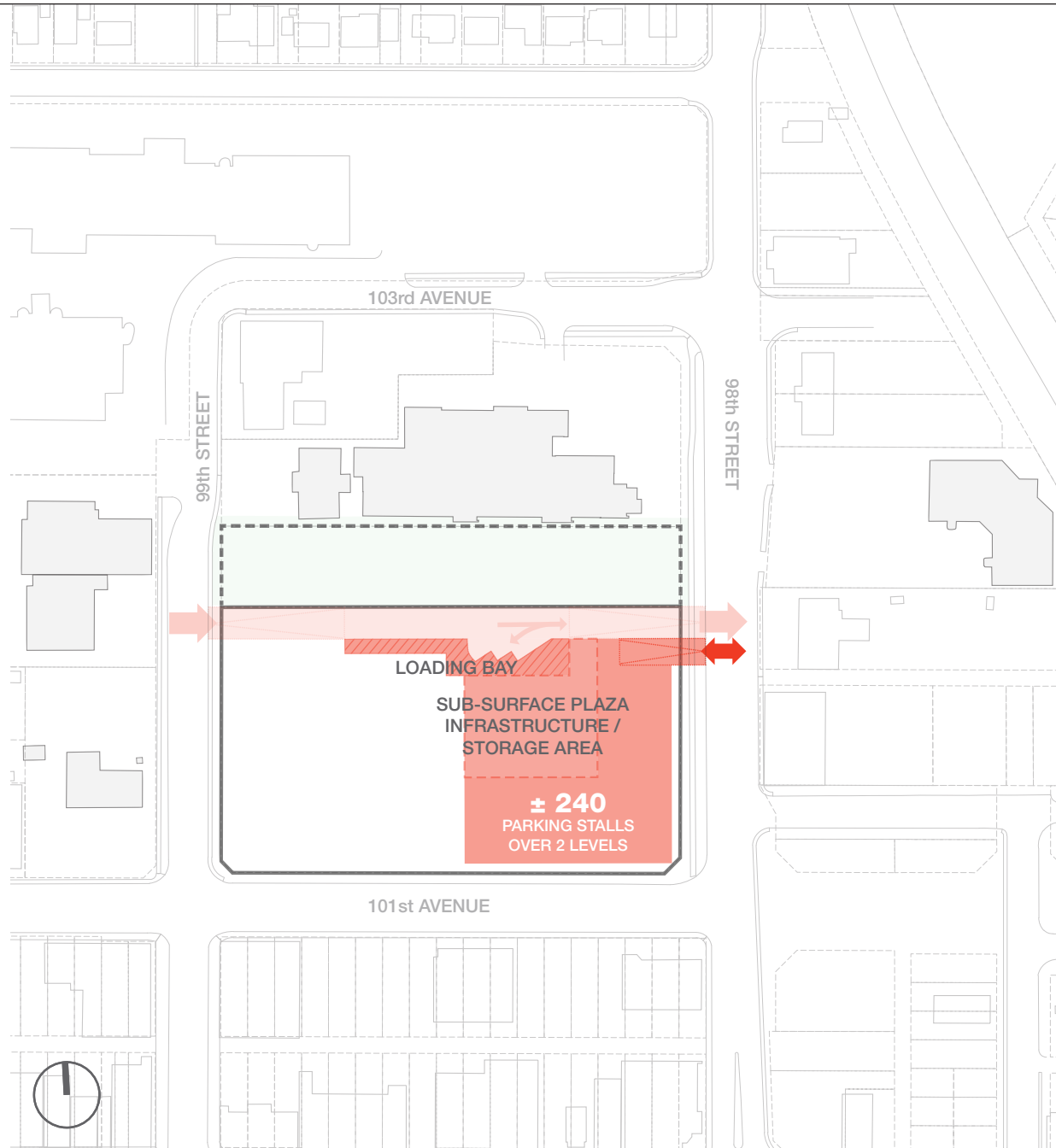
- Perpendicular loading design is least desirable as it will need to encompass a larger turning radius and overall apron for service vehicle manoeuvrability and stationing





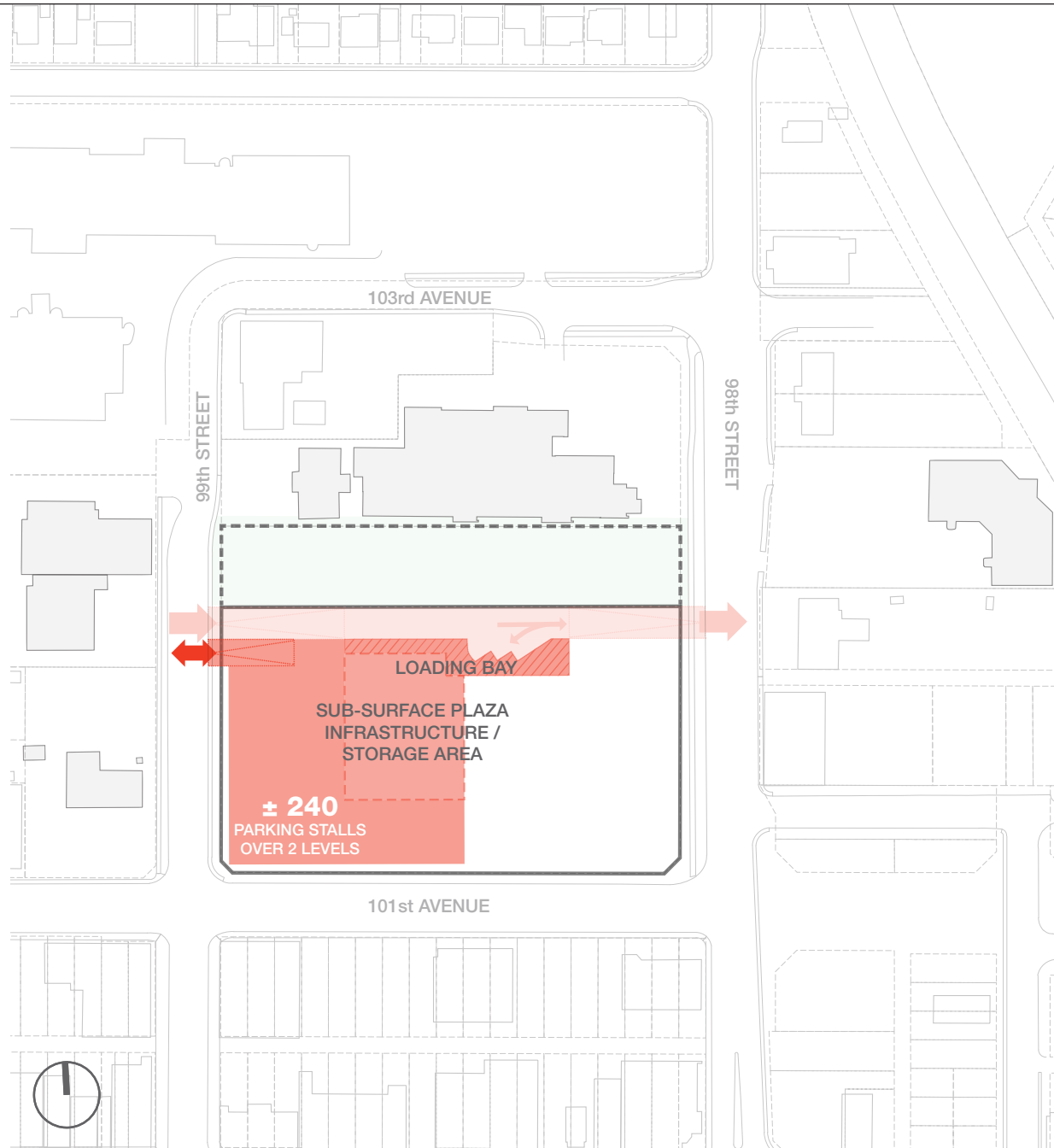
## SERVICE LOADING DESIGN

- Saw-tooth loading design is most desirable as it requires less apron space and minimizes large turning radii for service vehicles



## 98th STREET UNDERGROUND PARKING ACCESS

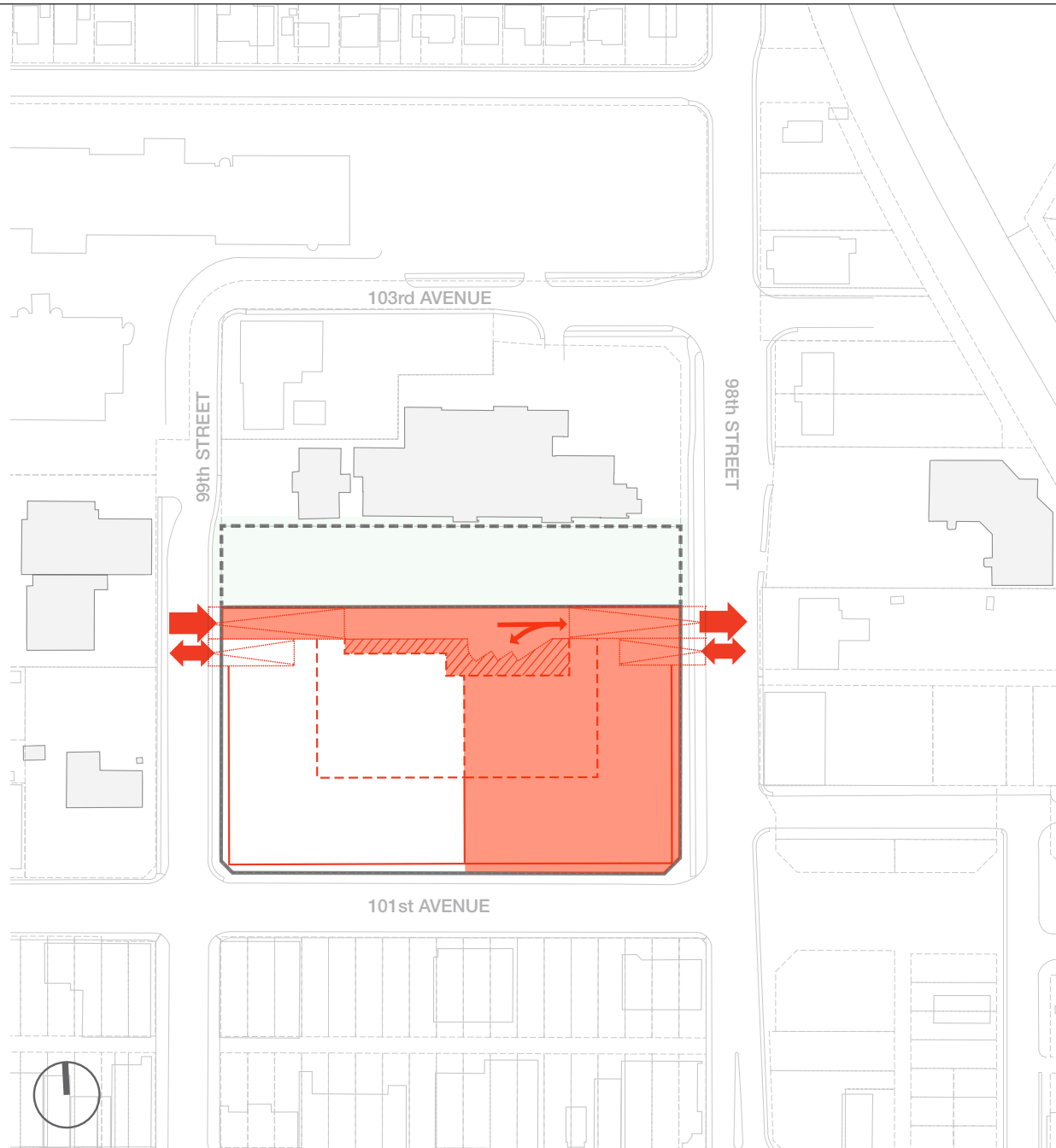
- In/out vehicular access for underground parking on 98th Street
- Underground parking area yields  $\pm 240$  stalls over two levels ( $\pm 120$  stalls per level)
- Parking area efficiently located to accommodate at grade building location
- Underground parking location can easily be incorporated into a phased build-out



## 99th STREET UNDERGROUND PARKING ACCESS

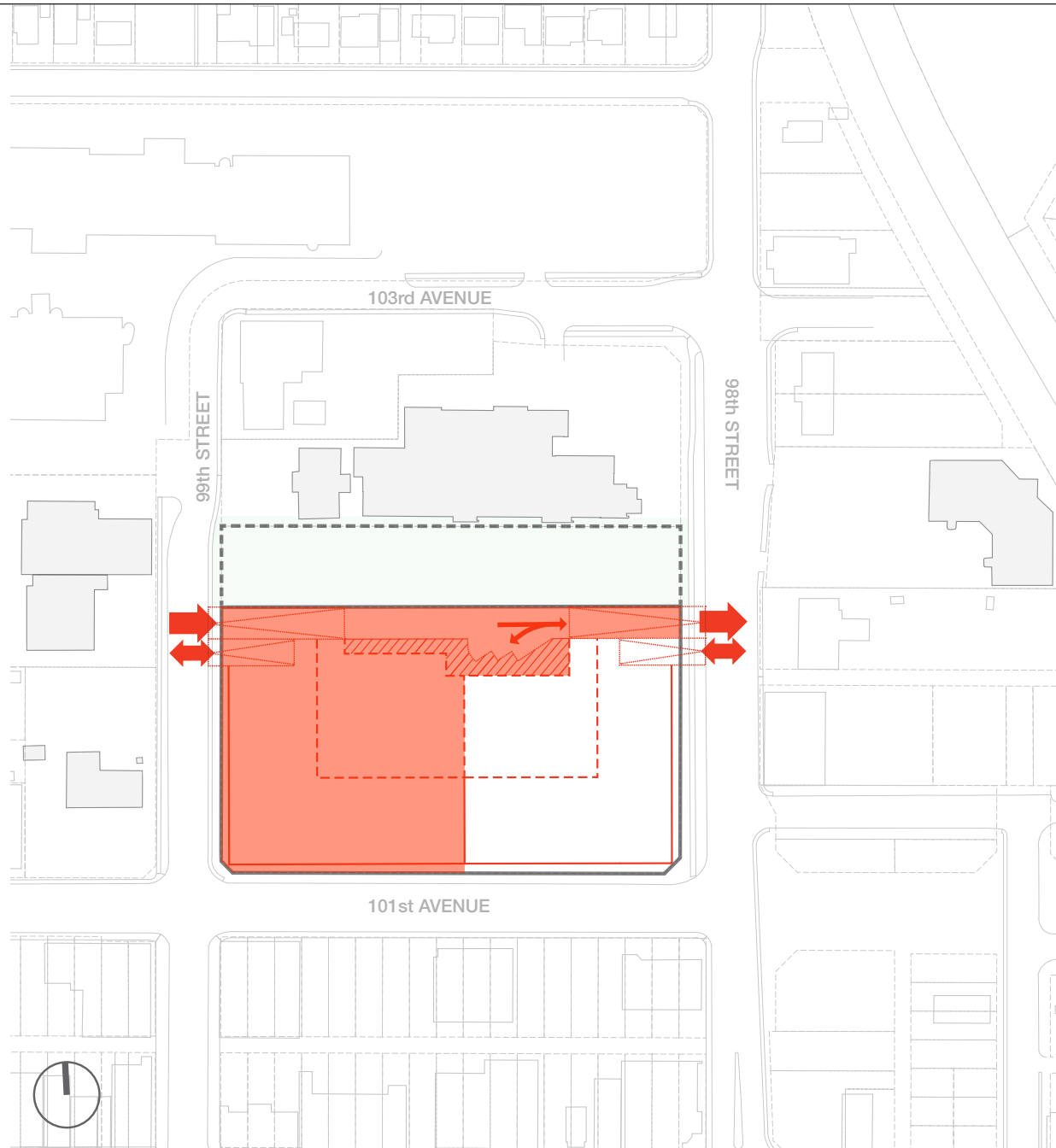
- In/out vehicular access for underground parking on 99th Street
- Layout mirrors that of the 98th underground parking access
- Underground parking area yields  $\pm 240$  stalls over two levels ( $\pm 120$  stalls per level)
- Parking area efficiently located to accommodate at grade building location
- Underground parking location can easily be incorporated into phase build-out





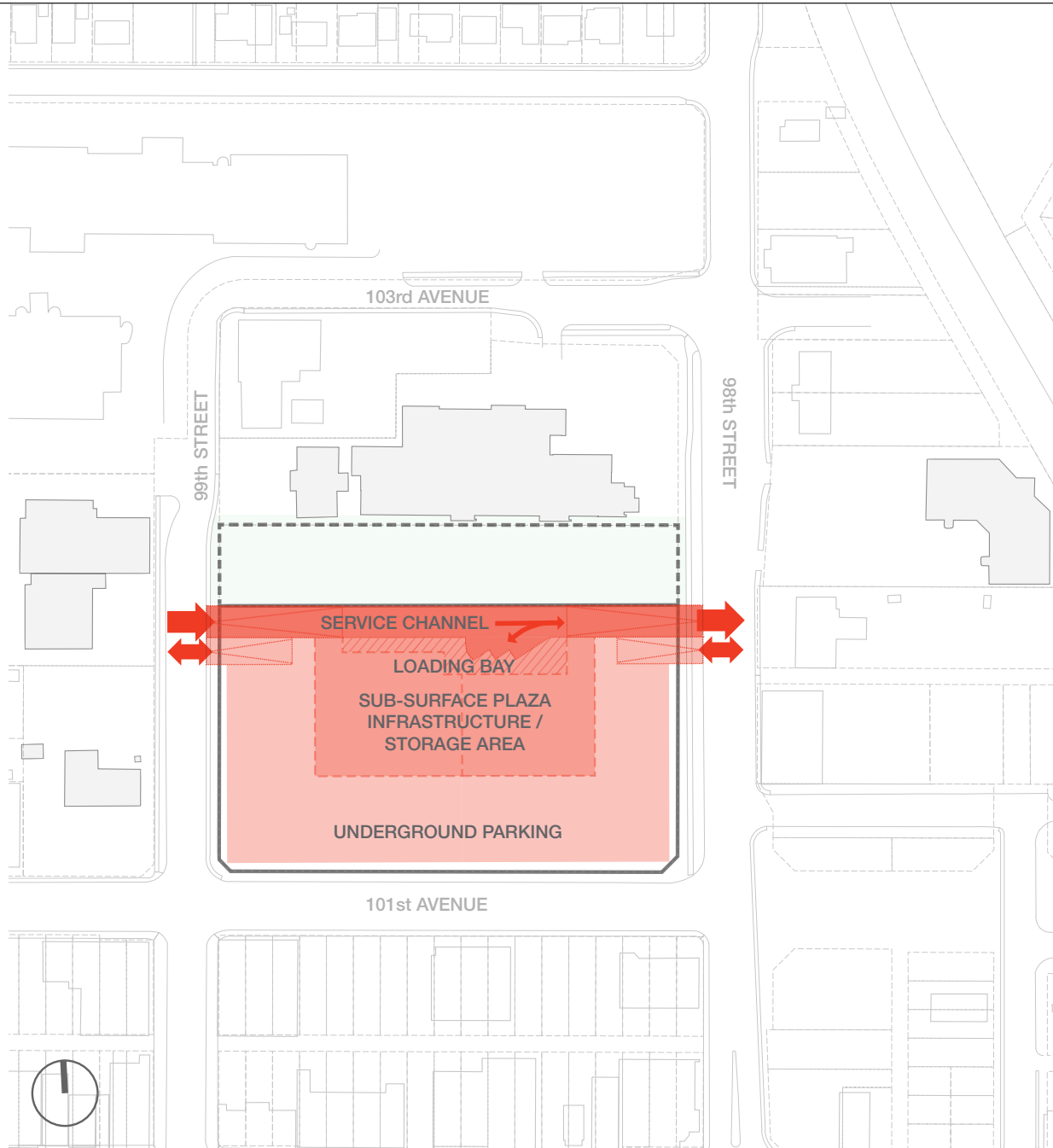
## FIRST PHASE ON 98th STREET

- Resulting site infrastructure layout suggests either the Performing and Media Arts Centre or mixed-use building could be built first on the site, but the first building must be accompanied by the public plaza



## FIRST PHASE ON 99th STREET

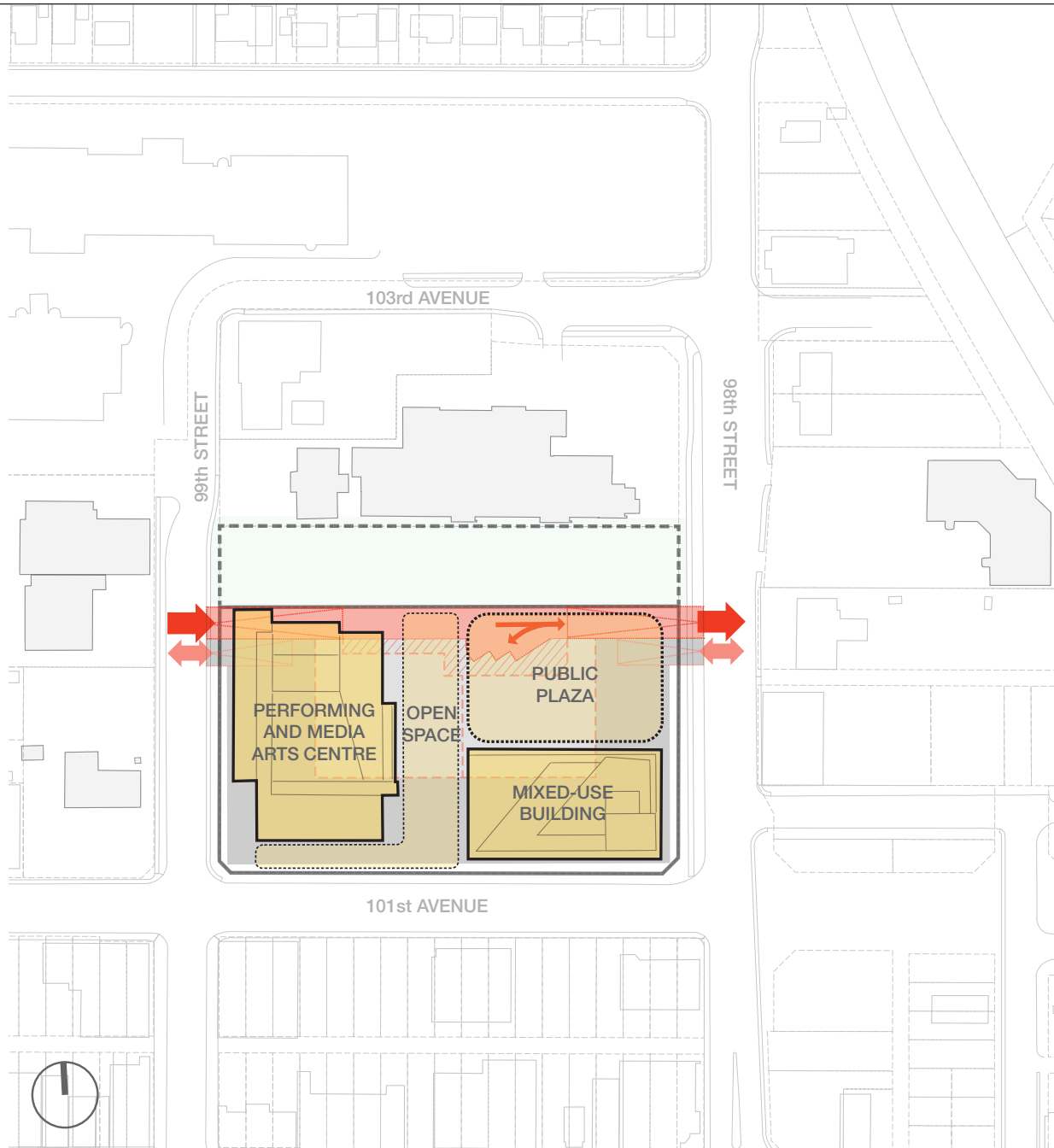
- Resulting site infrastructure layout suggests either the Performing and Media Arts Centre or mixed-use building could be built first on the site, but the first building must be accompanied by the public plaza



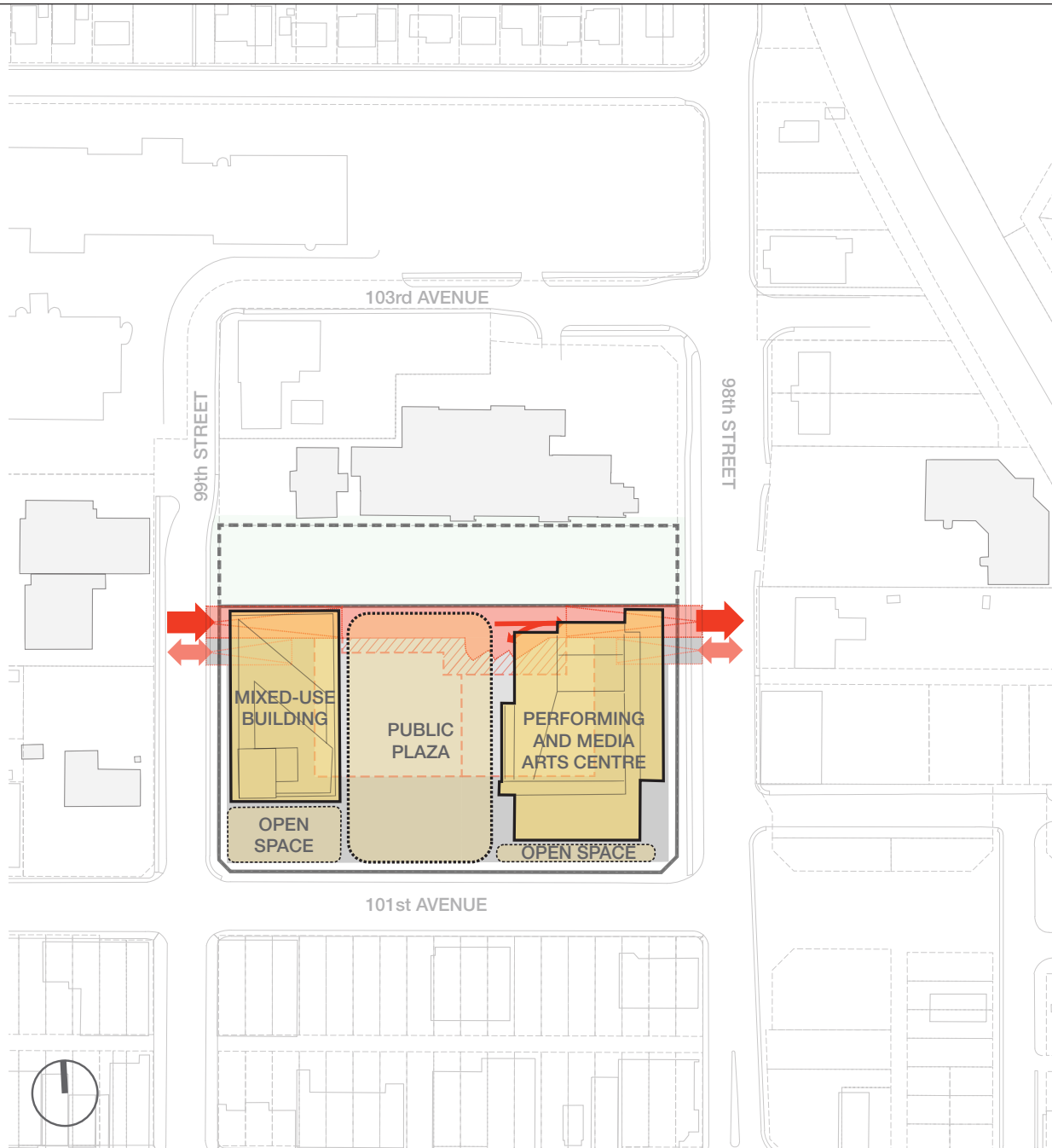
- Sub-surface service channel running east-west along the Concourse/ Greenway creates a “clothes line effect” where multiple at grade and sub-surface elements can connect to the channel
- Sub-surface plaza infrastructure/storage area and underground parking layout mirrored on either side allows for a flexible phased build-out at grade, with the potential for either building to be constructed in the first phase



# LAYOUT OPTIONS OVERLAY

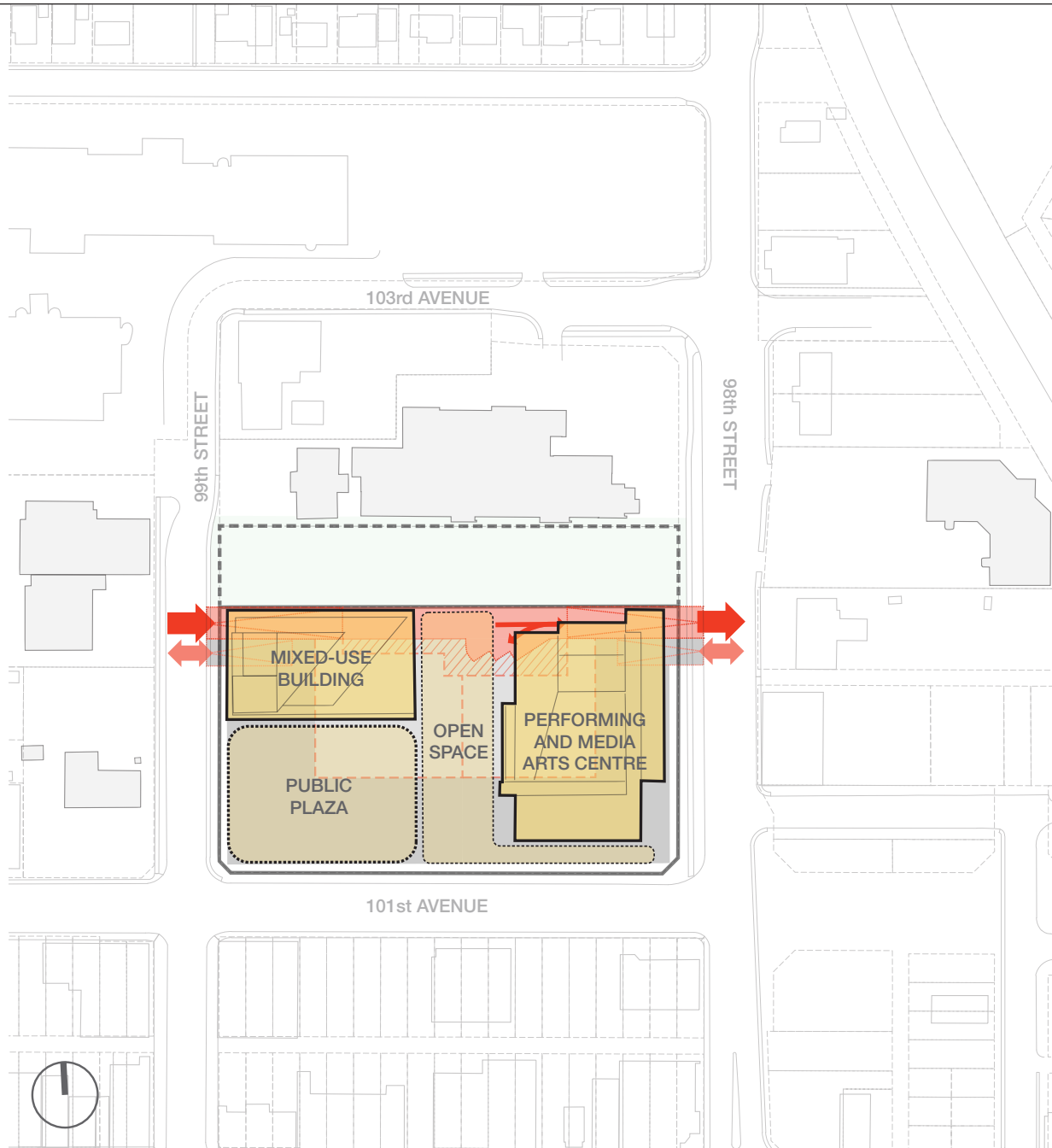


- Performing and Media Arts Centre (PMAC) located along sub-surface service channel - which allows for direct servicing access
- Sub-surface service channel entry and underground parking entry/exit on 99th Street is functional for the PMAC building - eliminates the visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into the building
- Mixed-use building location is not functional with the sub-surface service channel as it will need a secondary connection from the channel
- Sub-surface service channel exit and underground parking entry/exit on 98th Street impacts the public plaza as they would be visible on the surface
- Public plaza not located centrally above the sub-surface plaza infrastructure area which limits the arrangement of certain landscape elements (i.e. water features)

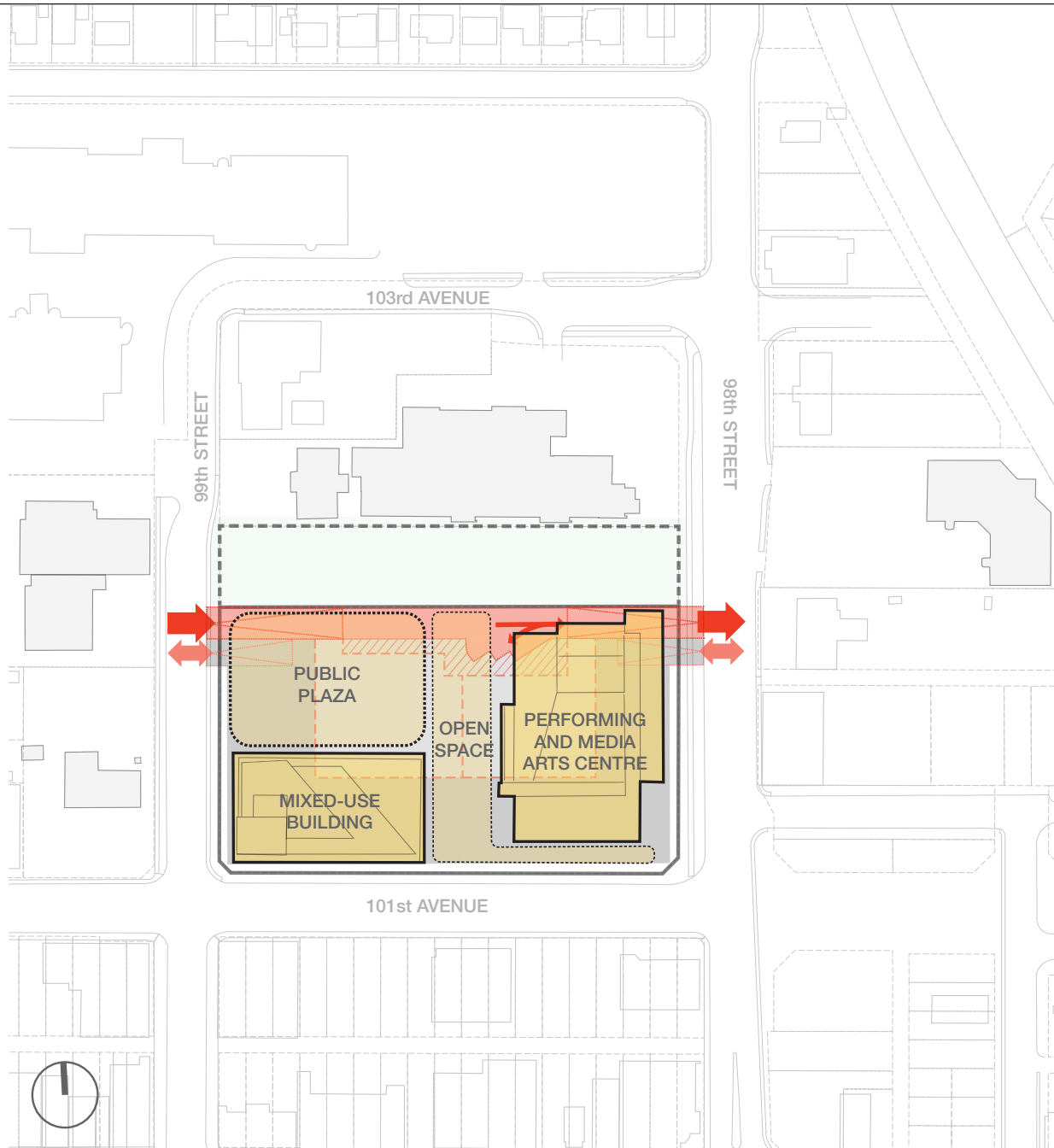


- Performing and Media Arts Centre (PMAC) and mixed-use building located along sub-surface service channel - which allows for direct servicing access
- Sub-surface service channel entry/exit is functional for both the mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- Underground parking entry/exit is functional for both mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- Centre of public plaza relatively encompasses the sub-surface plaza infrastructure area - which allows for more flexibility when arranging certain landscape elements (i.e. water features)

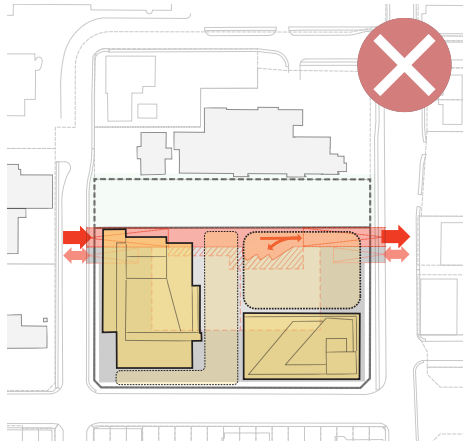




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- Underground parking entry/exit is functional for both mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- Public plaza not located centrally above, and encompasses a small portion of the sub-surface plaza infrastructure area which limits the arrangement of certain landscape elements (i.e. water features)

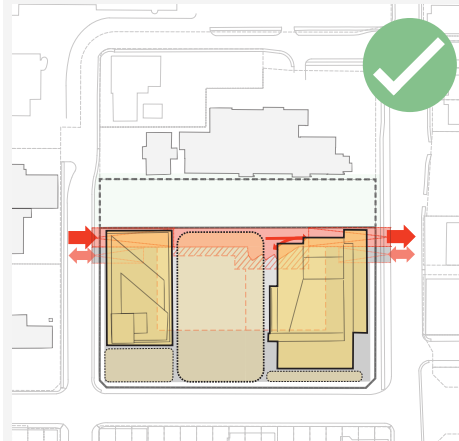


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- Sub-surface service channel entry and underground parking entry/exit on 99th Street impacts the public plaza as they would be visible on the surface



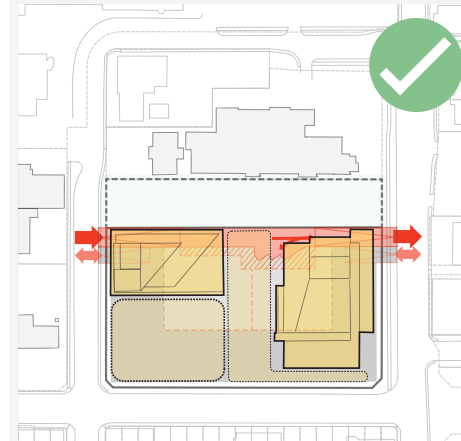
### CIVIC FOCUSED OPTION

- ✓ Performing and Media Arts Centre (PMAC) located along sub-surface service channel - which allows for direct servicing access
- ✓ Sub-surface service channel entry and underground parking entry/exit on 99th Street is functional for the PMAC building - eliminates the visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into the building
- ✗ Mixed-use building location is not functional with the sub-surface service channel as it will need a secondary connection from the channel
- ✗ Sub-surface service channel exit and underground parking entry/exit on 98th Street impacts the public plaza as they would be visible on the surface
- ✗ Public plaza not located centrally above the sub-surface plaza infrastructure area which limits the arrangement of certain landscape elements (i.e. water features)



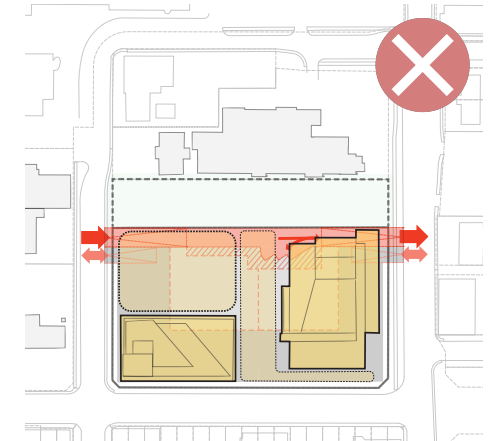
### CULTURAL FOCUSED OPTION

- ✓ Performing and Media Arts Centre (PMAC) and mixed-use building located along sub-surface service channel - which allows for direct servicing access
- ✓ Sub-surface service channel entry/exit is functional for both the mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- ✓ Underground parking entry/exit is functional for both mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- ✓ Centre of public plaza relatively encompasses the sub-surface plaza infrastructure area - which allows for more flexibility when arranging certain landscape elements (i.e. water features)



### DOWNTOWN FOCUSED OPTION

- ✓ Performing and Media Arts Centre (PMAC) and mixed-use building located along sub-surface service channel - which allows for direct servicing access
- ✓ Sub-surface service channel entry/exit is functional for both mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- ✓ Underground parking entry/exit is functional for both mixed-use building and PMAC - eliminates visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into each building
- ✗ Public plaza not located centrally above, and encompasses a small portion of the sub-surface plaza infrastructure area which limits the arrangement of certain landscape elements (i.e. water features)

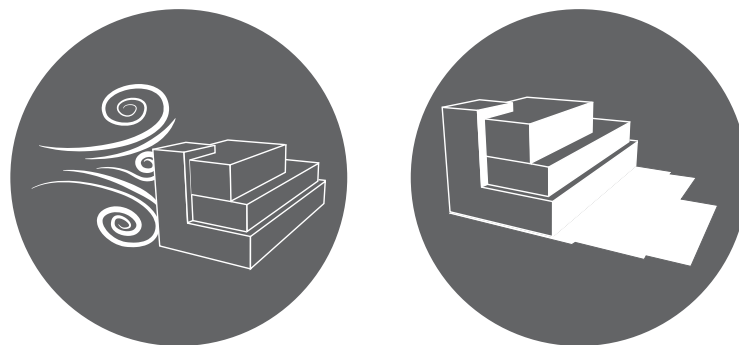


### WORKSHOP CREATED OPTION

- ✓ Performing and Media Arts Centre (PMAC) located along sub-surface service channel - which allows for direct servicing access
- ✓ Sub-surface service channel exit and underground parking entry/exit on 98th Street is functional for the PMAC building - eliminates the visual impacts onto the Concourse/Greenway and potential open space as it can be integrated into the building
- ✗ Public plaza not located centrally above the sub-surface plaza infrastructure area which limits the arrangement of certain landscape elements (i.e. water features)
- ✗ Mixed-use building location is not functional with the sub-surface service channel as it will need a secondary connection from the channel
- ✗ Sub-surface service channel entry and underground parking entry/exit on 99th Street impacts the public plaza as they would be visible on the surface

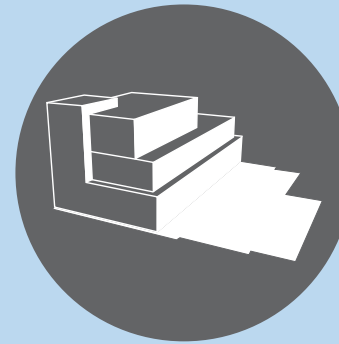


# FUNCTIONAL PRINCIPLES: **CLIMATIC CONDITIONS**



CLIMATIC  
CONDITIONS**WIND STUDY**

- Assess the impacts of wind direction on the public plaza and open space

**SHADOW STUDY**

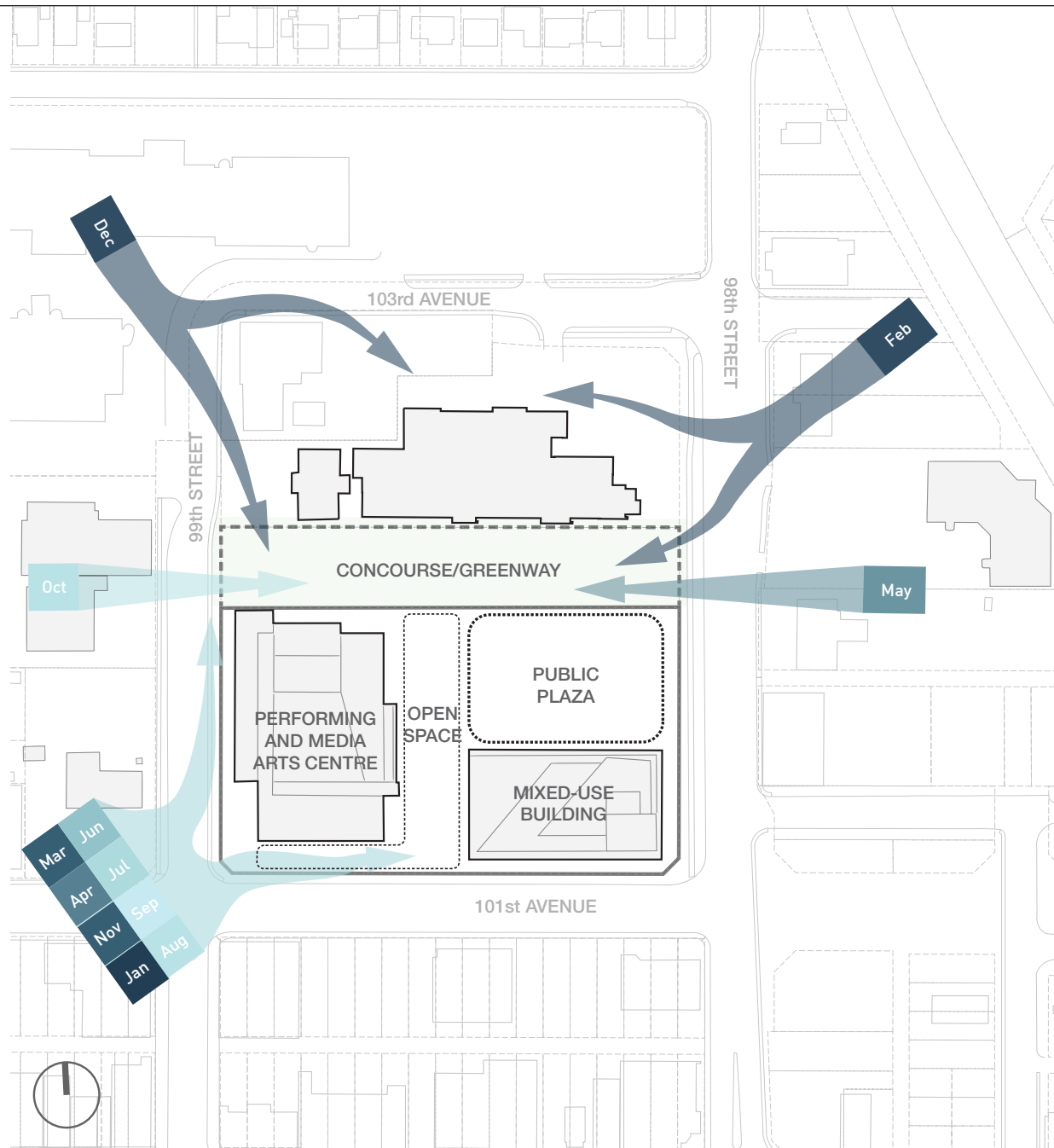
- Assess the impacts of shadows on the public plaza and open space

**Dominant Wind Direction \***

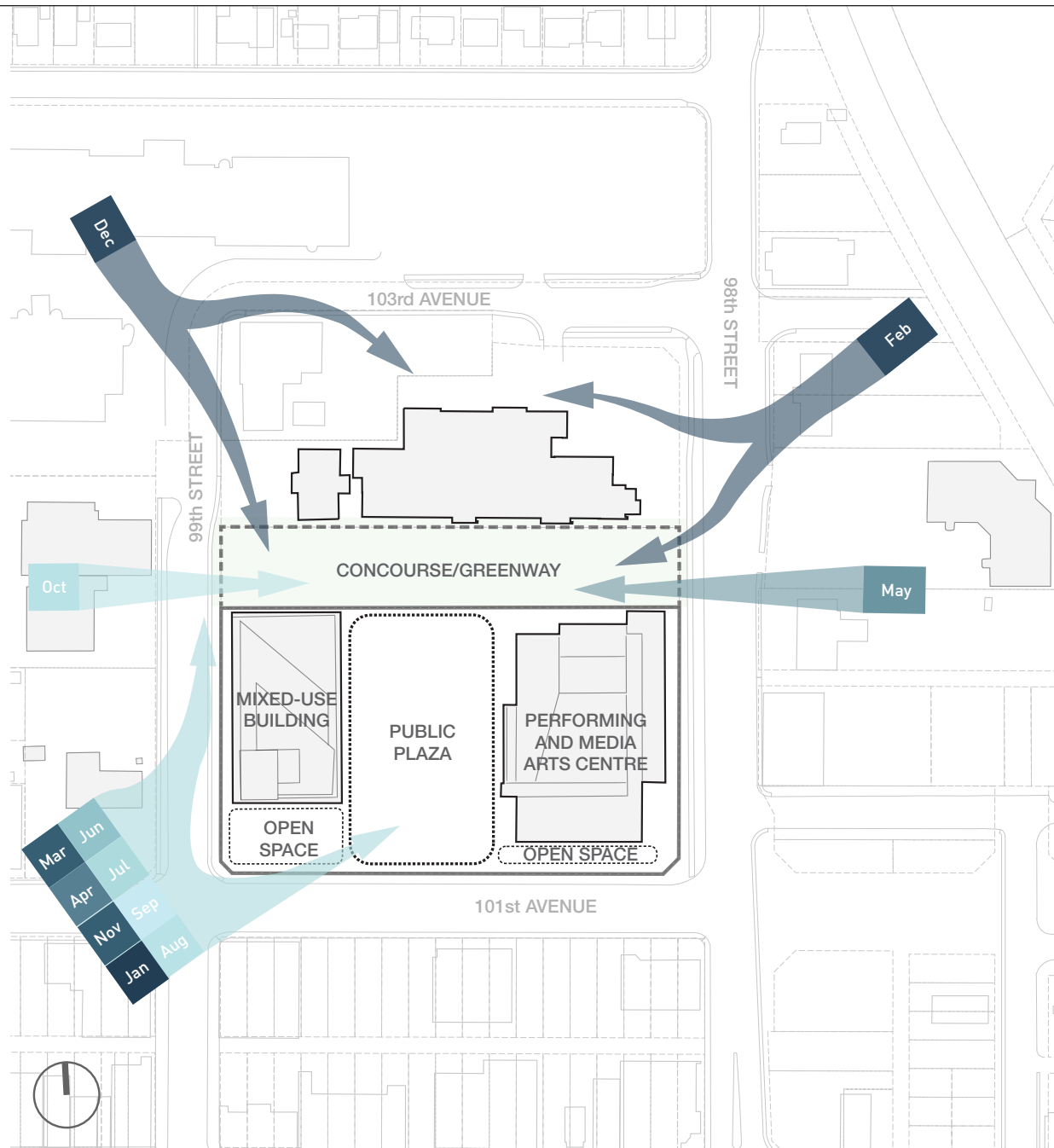
\* Information Source: [http://www.windfinder.com/windstatistics/grande\\_prairie\\_airport](http://www.windfinder.com/windstatistics/grande_prairie_airport)

# WIND STUDY

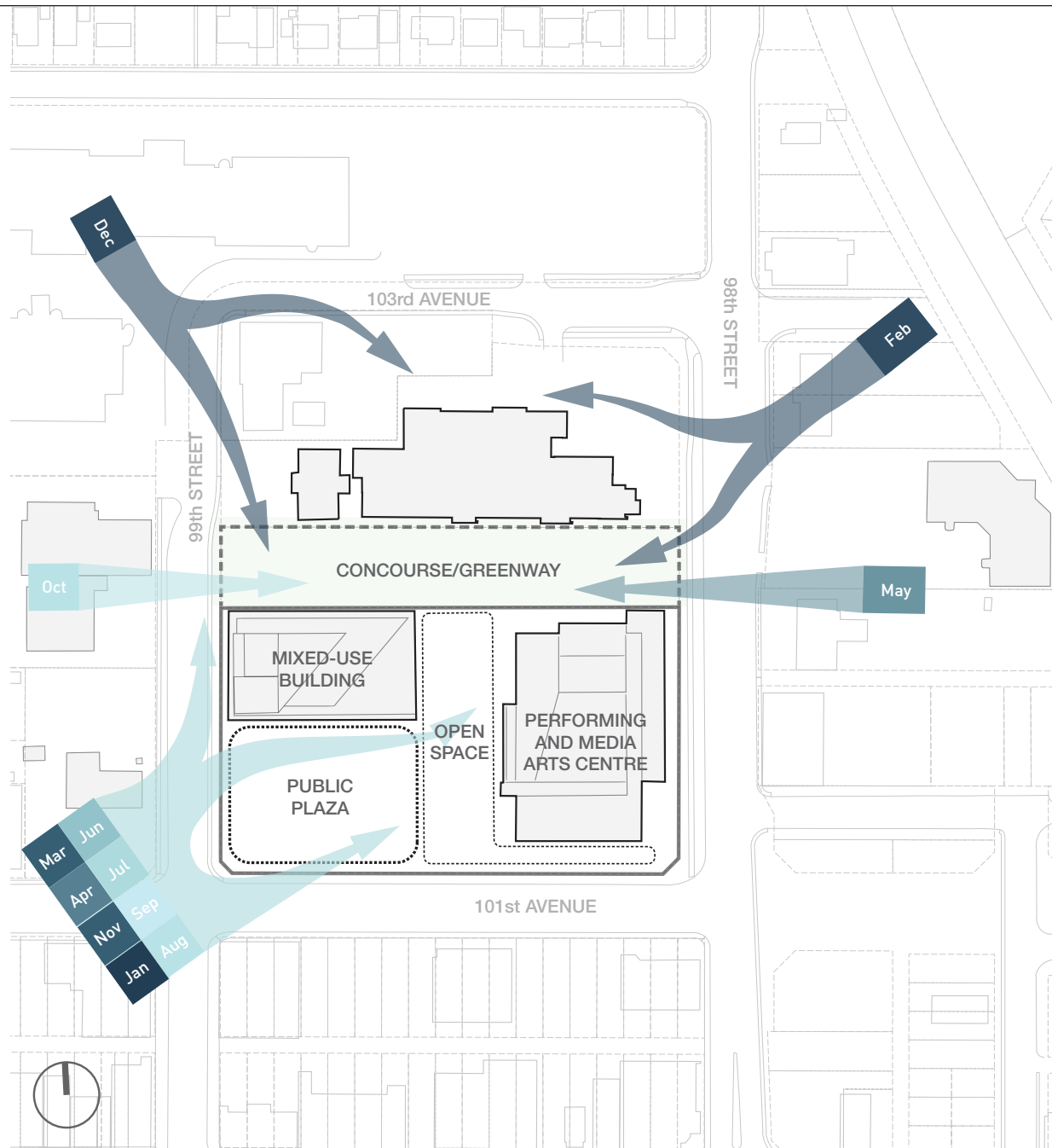




- Public plaza and northern portion of potential open space is exposed to north-easterly and easterly winds during the months of February and May - which is exposed to cold winds during the winter months
- Performing and Media Arts Centre blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space and public plaza
- Performing and Media Arts Centre blocks dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - relatively blocking unfavourable winds into the potential open space

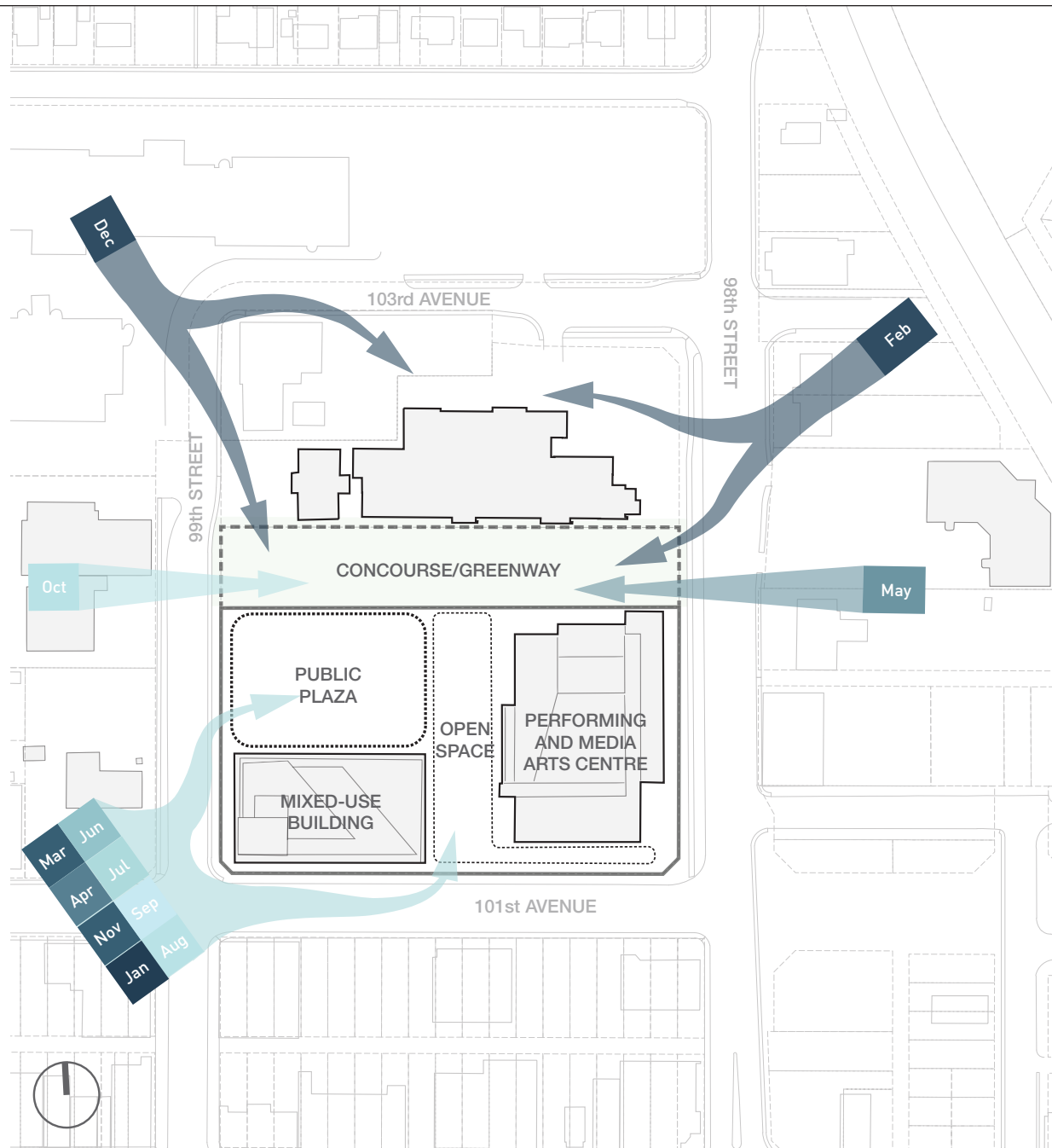


- Performing and Media Arts Centre blocks north-easterly and easterly winds during the months of February and May - relatively blocking unfavourable winds into the public plaza
- Mixed-use building blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space
- Mixed-use building relatively blocks dominant south-westerly winds to the north, but is exposed at the south during the months of January, March, April, June, July, August, September, November - allowing favourable cool winds during the summer, but cold winds during the winter

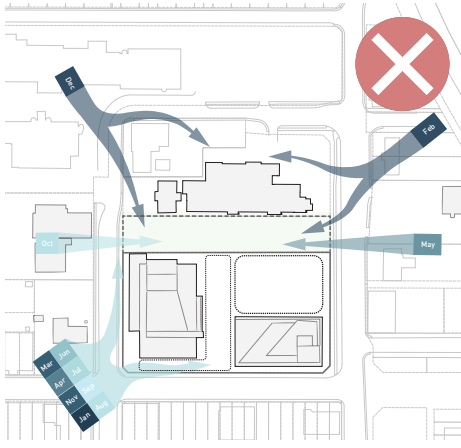


- Performing and Media Arts Centre blocks north-easterly and easterly winds during the months of February and May - relatively blocking unfavourable winds into the potential open space
- Mixed-use building blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space
- Public plaza and open space to the south are exposed to the dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - allowing favourable cool winds during the summer, but cold winds during the winter



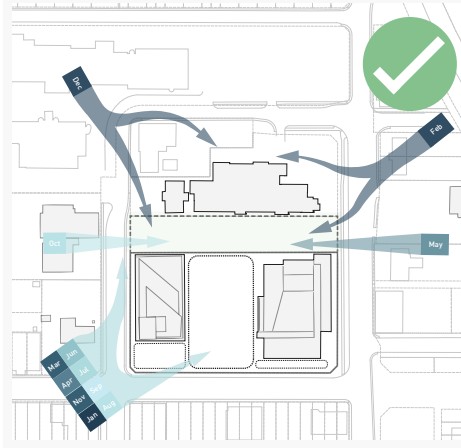


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- Public plaza and northern portion of potential open space is exposed to the north-westerly and westerly winds during the months of October and December - which is exposed to cold winds during the winter months
- Mixed-use building blocks dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - relatively blocking unfavourable winds into the public plaza potential open space



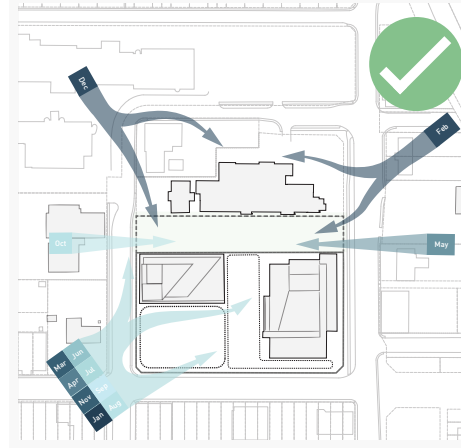
### CIVIC FOCUSED OPTION

- ❌ Public plaza and northern portion of potential open space is exposed to north-easterly and easterly winds during the months of February and May - which is exposed to cold winds during the winter months
- ✅ Performing and Media Arts Centre blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space and public plaza
- ✅ Performing and Media Arts Centre blocks dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - relatively blocking unfavourable winds into the potential open space



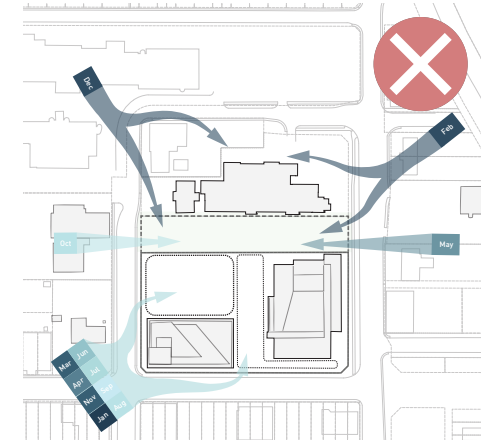
### CULTURAL FOCUSED OPTION

- ✅ Performing and Media Arts Centre blocks north-easterly and easterly winds during the months of February and May - relatively blocking unfavourable winds into the public plaza
- ✅ Mixed-use building blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space
- ✅ Mixed-use building relatively blocks dominant south-westerly winds to the north, but is exposed at the south during the months of January, March, April, June, July, August, September, November - allowing favourable cool winds during the summer, but cold winds during the winter



### DOWNTOWN FOCUSED OPTION

- ✅ Performing and Media Arts Centre blocks north-easterly and easterly winds during the months of February and May - relatively blocking unfavourable winds into the potential open space
- ✅ Mixed-use building blocks north-westerly and westerly winds during the months of October and December - relatively blocking unfavourable winds into the potential open space
- ✅ Public plaza and open space to the south are exposed to the dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - allowing favourable cool winds during the summer, but cold winds during the winter

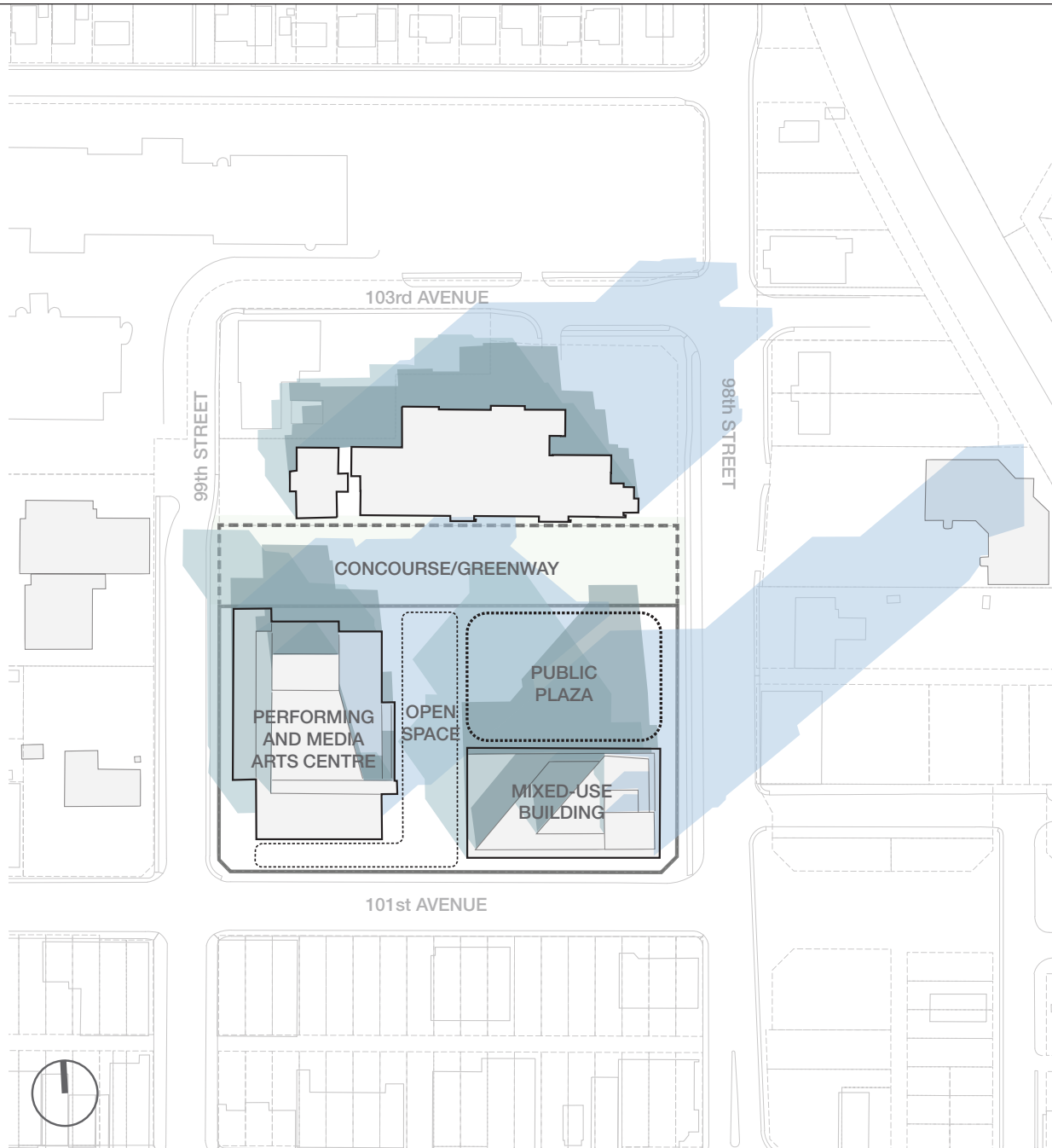


### WORKSHOP CREATED OPTION

- ✅ Performing and Media Arts Centre blocks north-easterly and easterly winds during the months of February and May - relatively blocking unfavourable winds into the potential open space and public plaza
- ❌ Public plaza and northern portion of potential open space is exposed to the north-westerly and westerly winds during the months of October and December - which is exposed to cold winds during the winter months
- ✅ Mixed-use building blocks dominant south-westerly winds during the months of January, March, April, June, July, August, September, November - relatively blocking unfavourable winds into the public plaza potential open space

# **SHADOW STUDY: WINTER | JANUARY 15th**





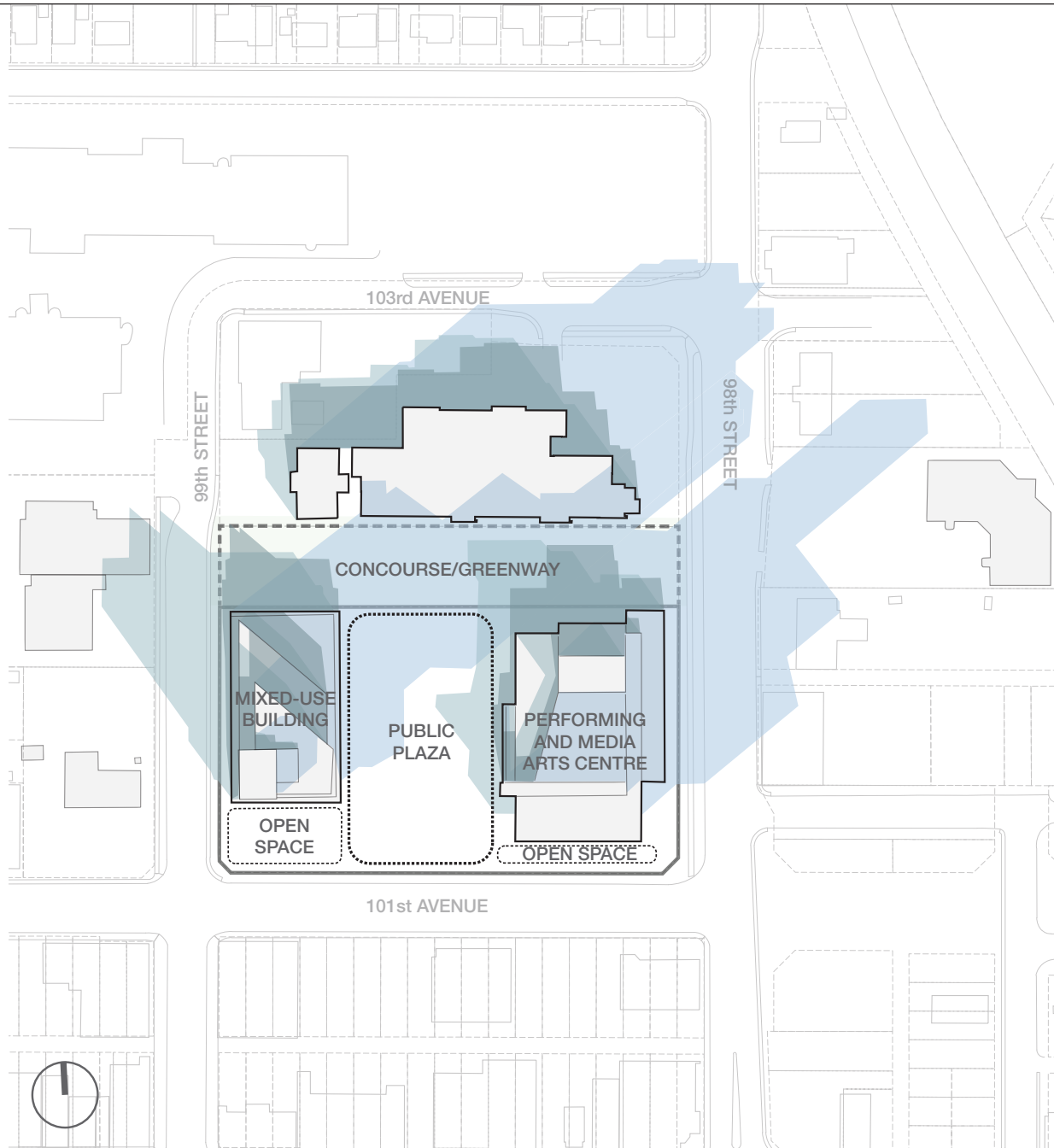
## WINTER | JANUARY 15th

10 am

12 pm

4 pm

- Public plaza and majority of potential open space experiences dominant shadowing at 10 AM, 12 PM and 4 PM from the mixed-use building - reducing favourable sun exposure throughout the day
- Central and western edge of Concourse/Greenway experiences shadowing 10 AM, 12 PM and 4 PM from the Performing and Media Arts Centre and 10 AM shadowing from the mixed-use building - reducing favourable sun exposure throughout the day
- Performing and Media Arts Centre casts 4 PM shadowing onto the public plaza - reducing favourable sun exposure



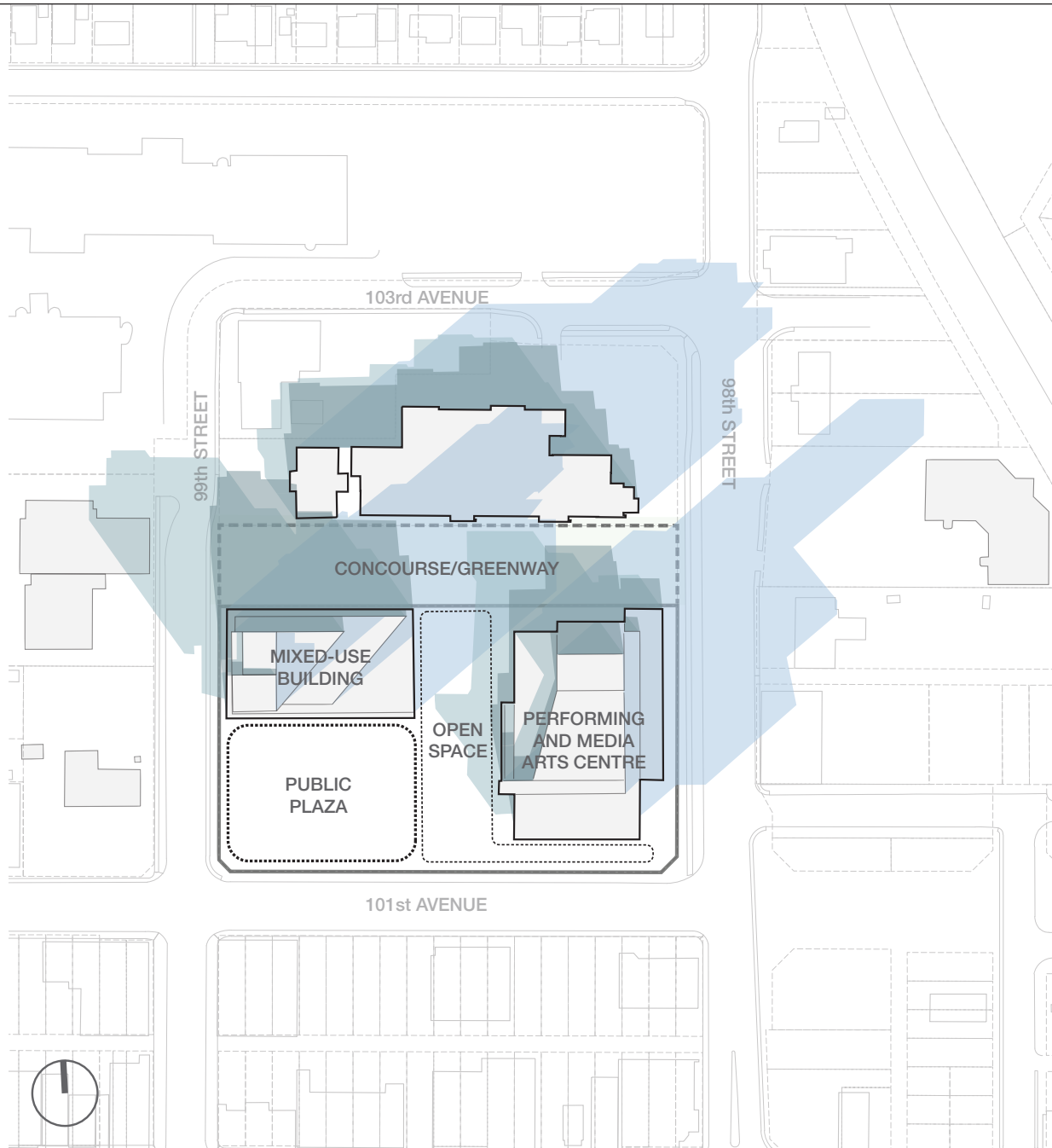
WINTER | JANUARY 15th

10 am

12 pm

4 pm

- Northern portion of public plaza (and along the eastern edge of the mixed-use building) experiences 4 PM shadowing - allowing favourable sun exposure throughout the majority of the day
- Performing and Media Arts Centre casts minimal 10 AM and 12 PM shadowing onto the public plaza along its western edge - allowing some favourable sun exposure
- Concourse/Greenway experiences constant shadowing throughout the day
- Potential open space south of the mixed-use building and public plaza experiences favourable sun exposure throughout the day



WINTER | JANUARY 15th

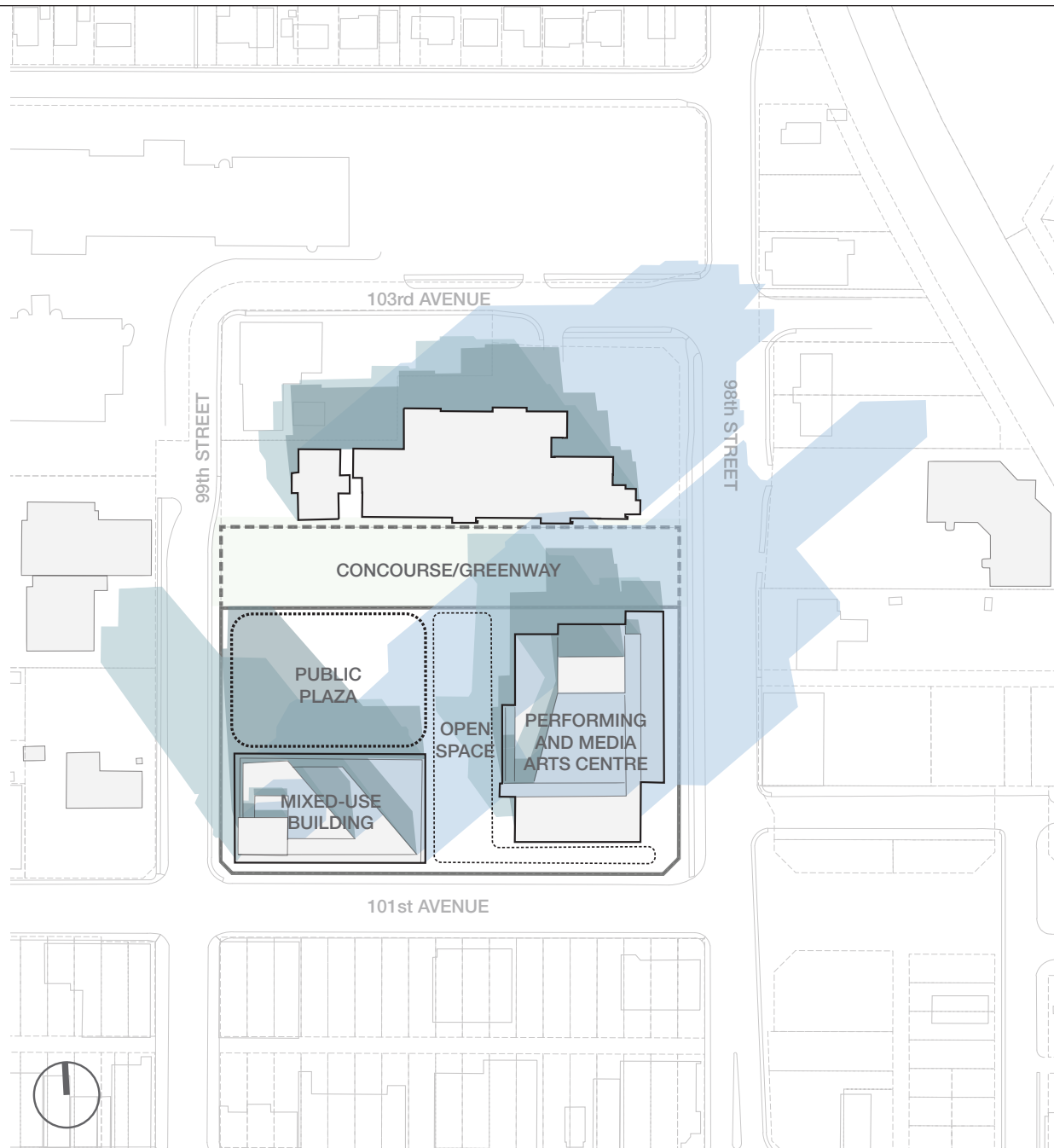
10 am

12 pm

4 pm

- Potential open space south of the Concourse/Greenway experiences 4 PM shadowing from the mixed-use building and 10 AM shadowing from the Performing and Media Arts Centre
- Concourse/Greenway experiences constant shadowing throughout the day
- Public plaza and majority of potential open space to the south experiences favourable sun exposure throughout the day





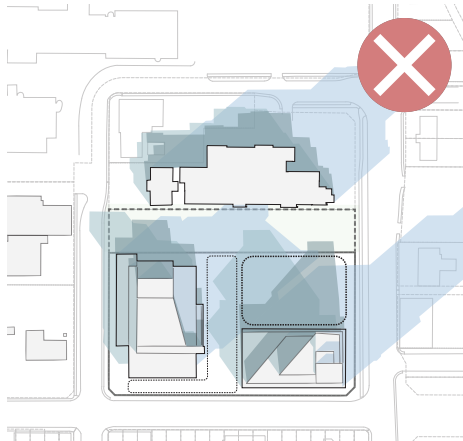
## WINTER | JANUARY 15th

10 am

12 pm

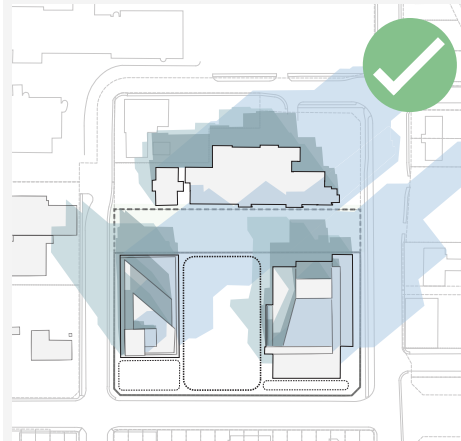
4 pm

- Public plaza and majority of potential open space experiences dominant shadowing at 10 AM, 12 PM and 4 PM from the mixed-use building - reducing favourable sun exposure throughout the day
- Eastern edge of Concourse/Greenway experiences shadowing 10 AM, 12 PM and 4 PM from the Performing and Media Arts Centre and 4 PM shadowing from the mixed-use building - reducing favourable sun exposure
- Western edge of Concourse/Greenway experiences no shadowing throughout the day



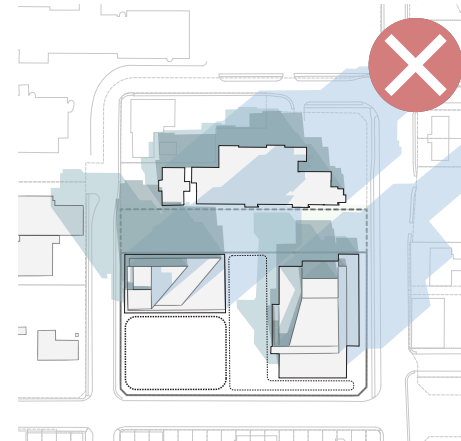
## CIVIC FOCUSED OPTION

- ❌ Public plaza and majority of potential open space experiences dominant shadowing at 10 AM, 12 PM and 4 PM from the mixed-use building - reducing favourable sun exposure throughout the day
- ❌ Central and western edge of Concourse/Greenway experiences shadowing 10 AM, 12 PM and 4 PM from the Performing and Media Arts Centre and 10 AM shadowing from the mixed-use building - reducing favourable sun exposure throughout the day
- ❌ Performing and Media Arts Centre casts 4 PM shadowing onto the public plaza - reducing favourable sun exposure



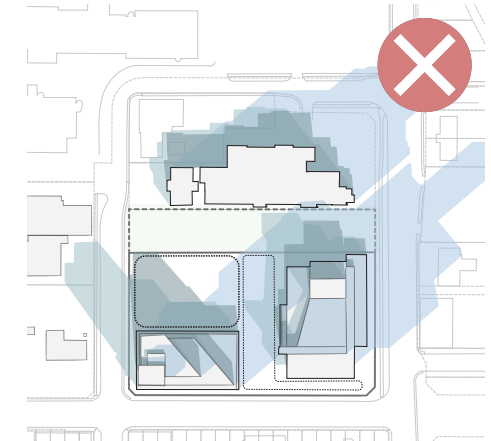
## CULTURAL FOCUSED OPTION

- ✅ Northern portion of public plaza (and along the eastern edge of the mixed-use building) experiences 4 PM shadowing - allowing favourable sun exposure throughout the majority of the day
- ✅ Performing and Media Arts Centre casts minimal 10 AM and 12 PM shadowing onto the public plaza along its western edge - allowing some favourable sun exposure
- ❌ Concourse/Greenway experiences constant shadowing throughout the day
- ✅ Potential open space south of the mixed-use building and public plaza experiences favourable sun exposure throughout the day



## DOWNTOWN FOCUSED OPTION

- ❌ Potential open space south of the Concourse/Greenway experiences 4 PM shadowing from the mixed-use building and 10 AM shadowing from the Performing and Media Arts Centre
- ❌ Concourse/Greenway experiences constant shadowing throughout the day
- ✅ Public plaza and majority of potential open space to the south experiences favourable sun exposure throughout the day

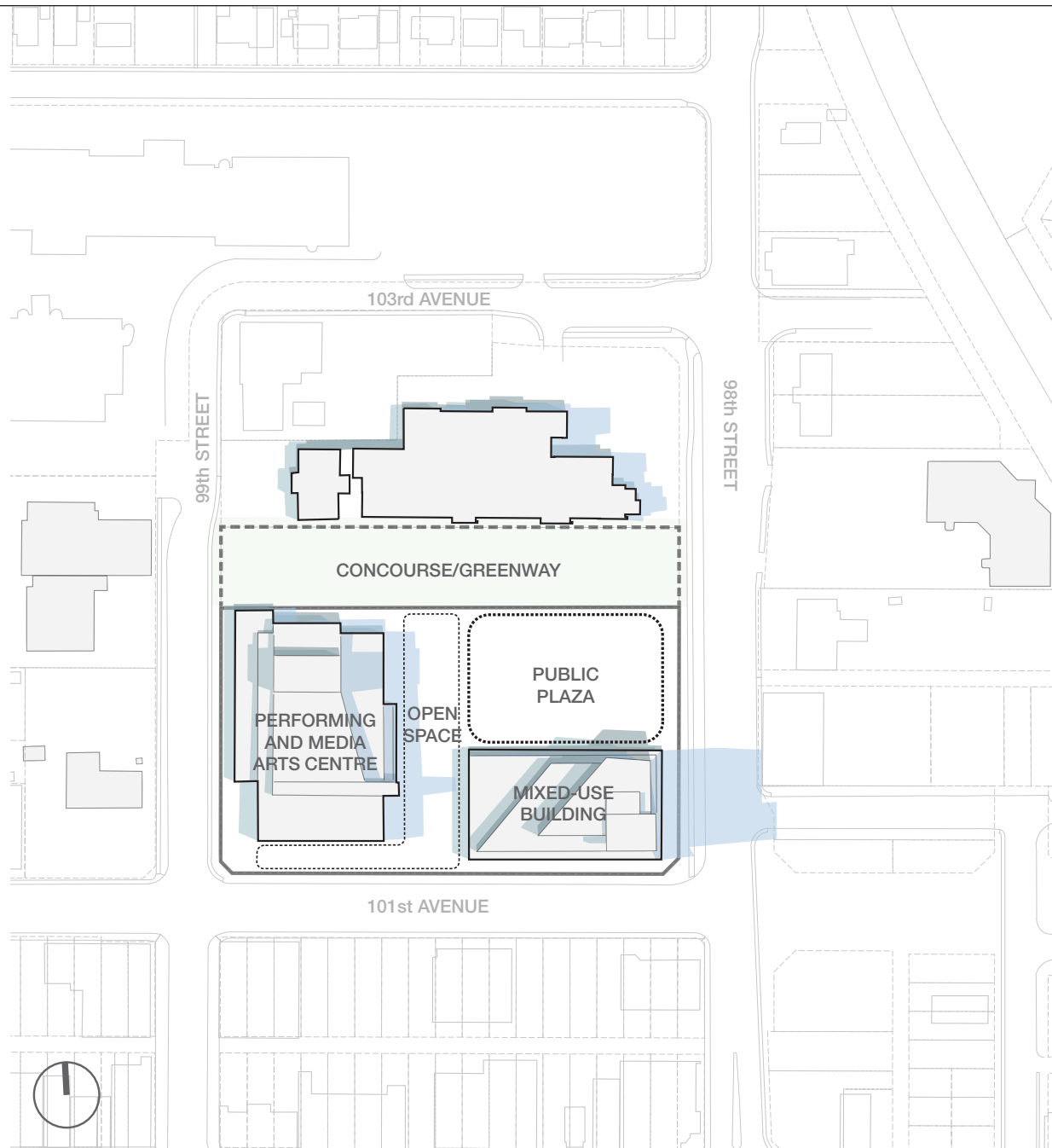


## WORKSHOP CREATED OPTION

- ❌ Public plaza and majority of potential open space experiences dominant shadowing at 10 AM, 12 PM and 4 PM from the mixed-use building - reducing favourable sun exposure throughout the day
- ❌ Eastern edge of Concourse/Greenway experiences shadowing 10 AM, 12 PM and 4 PM from the Performing and Media Arts Centre and 4 PM shadowing from the mixed-use building - reducing favourable sun exposure throughout the day
- ✅ Western edge of Concourse/Greenway experiences no shadowing throughout the day

# **SHADOW STUDY: SUMMER | JULY 15th**





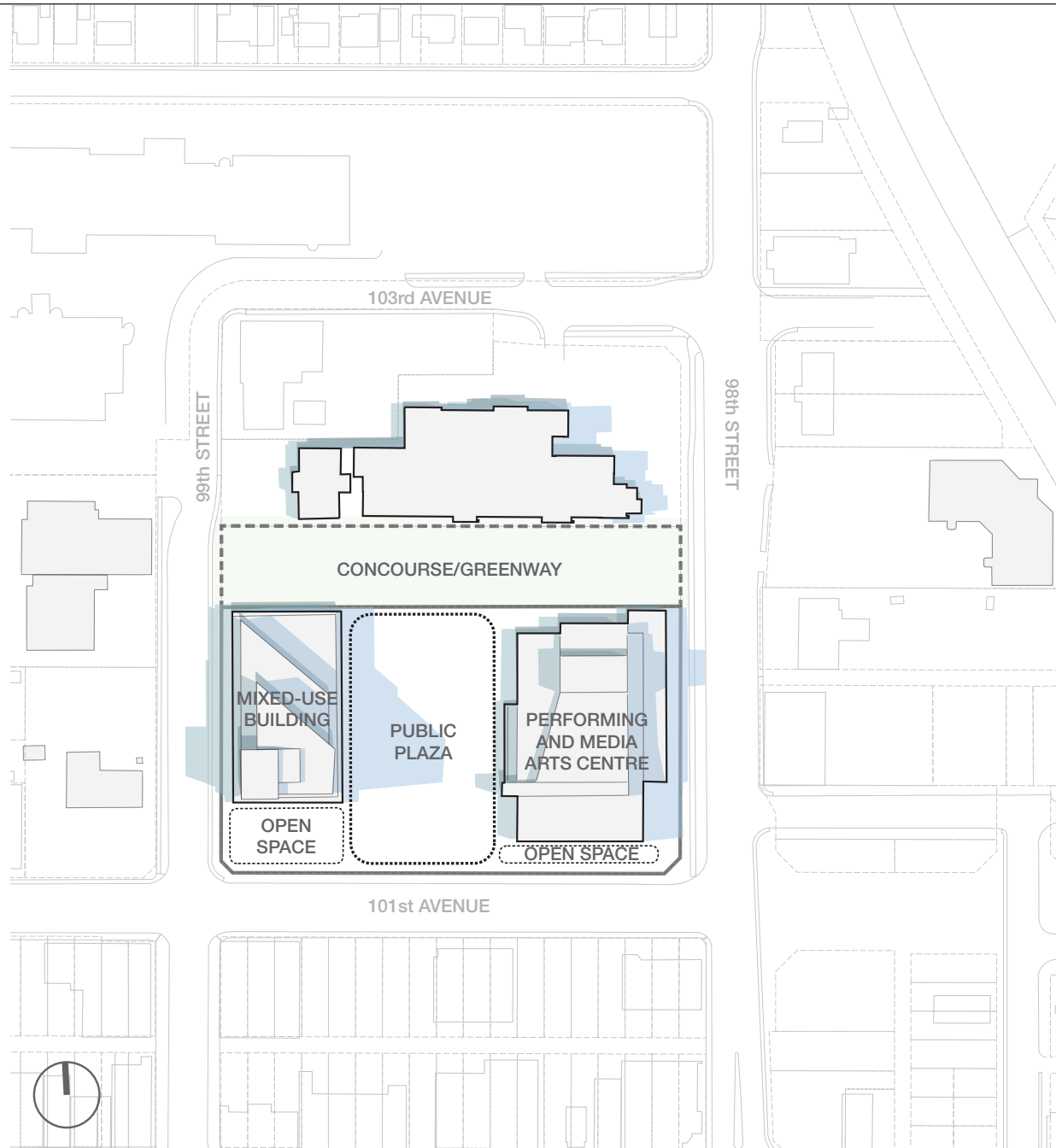
SUMMER | JULY 15th

10 am

12 pm

4 pm

- Public plaza experiences very minimal 10 AM and 12 PM shadowing along the northern edge of the mixed-use building
- Performing Arts Building casts minimum 4 PM shadowing onto the potential open space



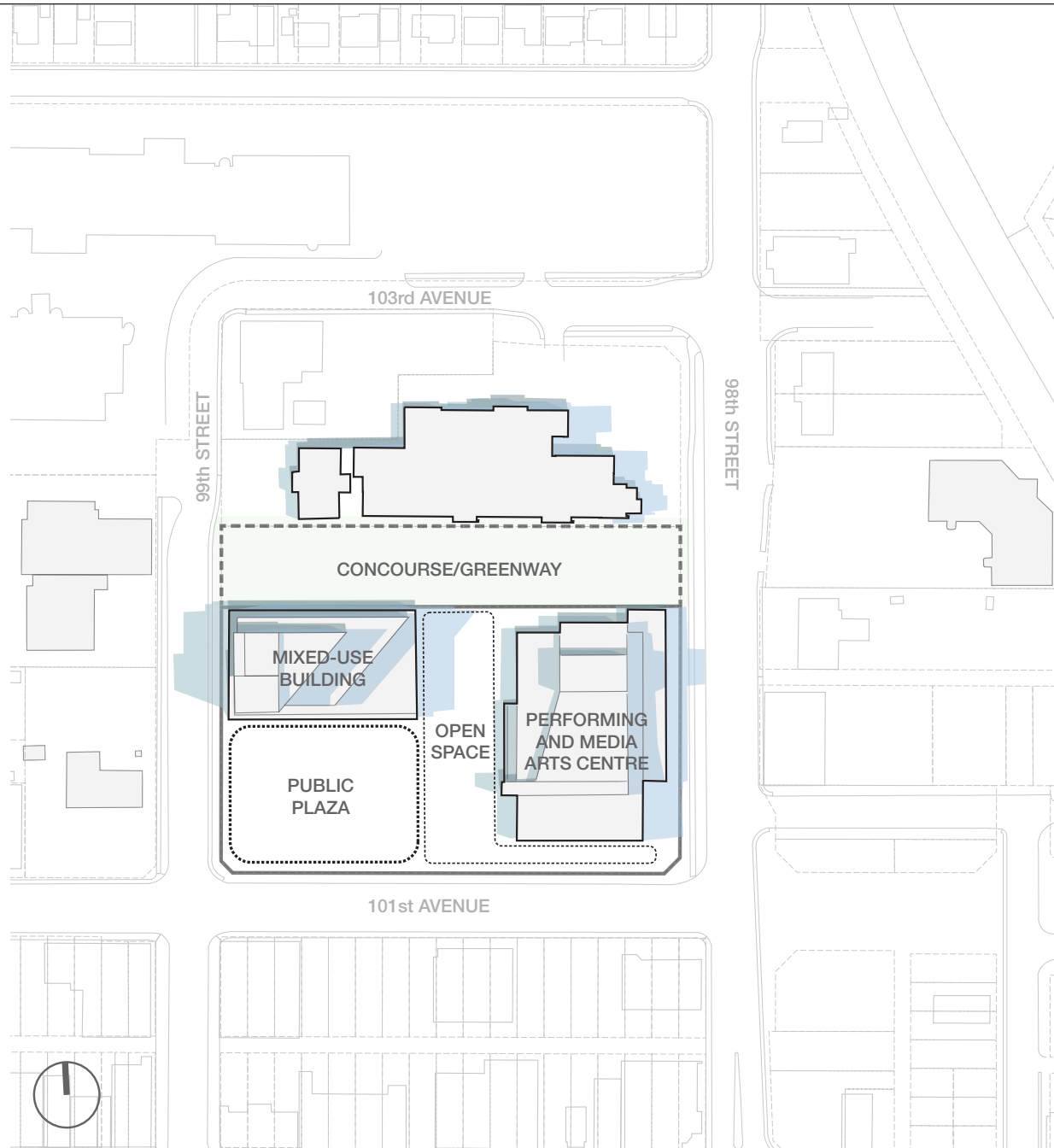
SUMMER | JULY 15th

10 am

12 pm

4 pm

- Public plaza experiences 4 PM shadowing from the mixed-use building
- Performing and Media Arts Centre casts minimal 10 AM shadowing onto the public plaza near its western edge



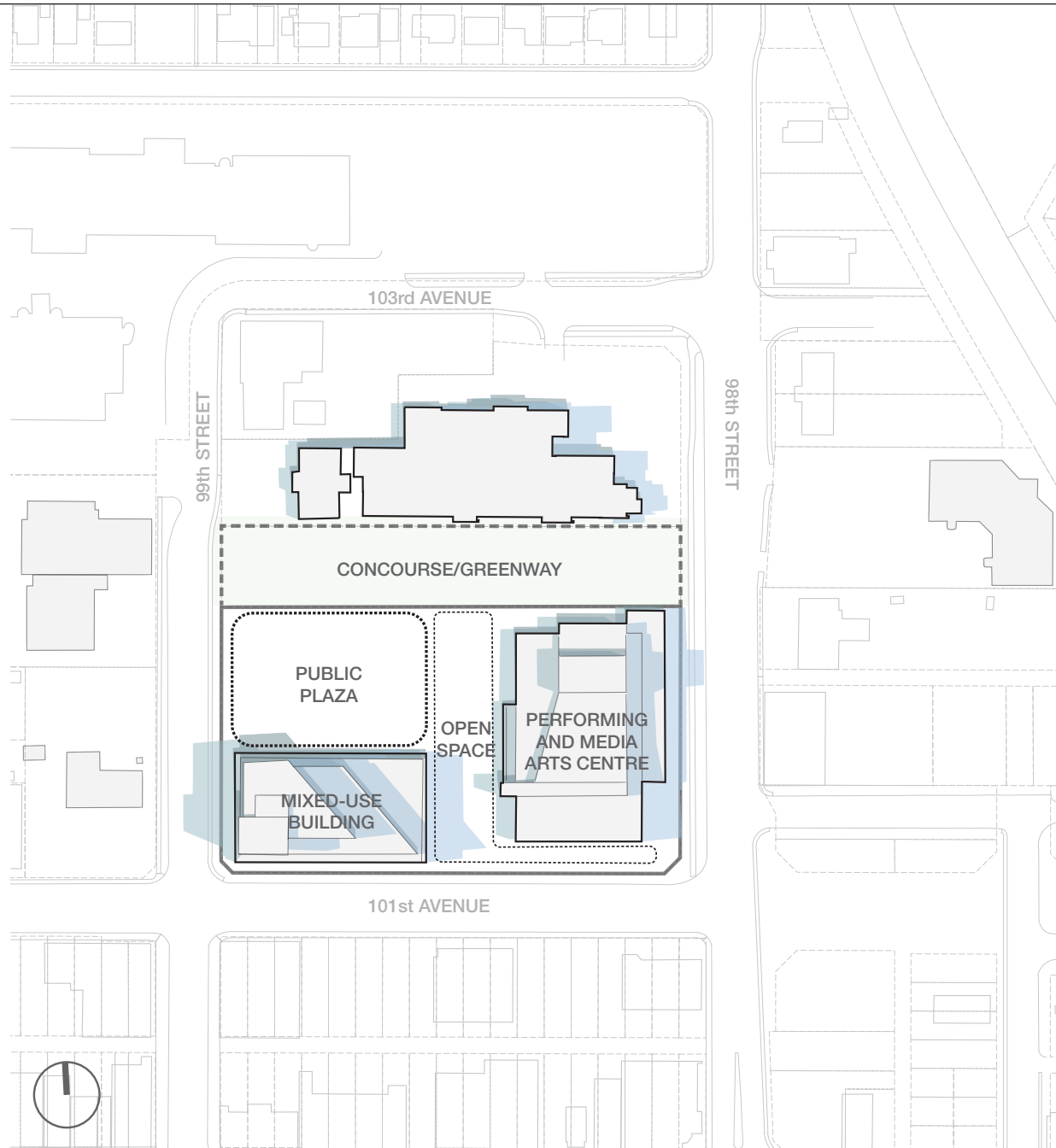
SUMMER | JULY 15th

10 am

12 pm

4 pm

- Public plaza does not experience any shadowing
- Open space south of the Concourse/ Greenway experiences minimal 4 PM shadowing from the mixed-use building and 10 AM shadowing from the Performing and Media Arts Centre



SUMMER | JULY 15th

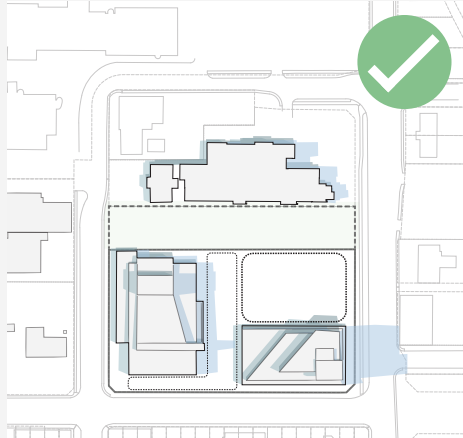
10 am

12 pm

4 pm

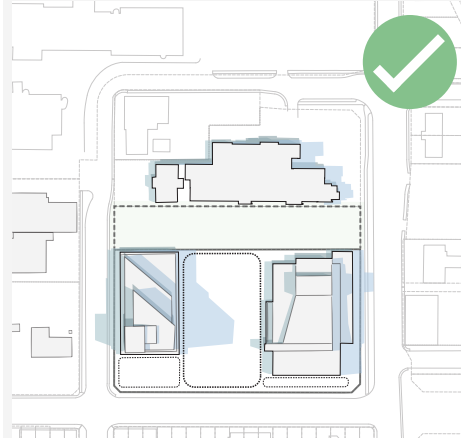
- Public plaza experiences very minimal 12 PM shadowing along the northern edge of the mixed-use building
- Performing Arts Building casts minimal 10 AM shadowing onto southern area of the open space
- Mixed-use building casts 4 PM shadowing onto southern area of the open space





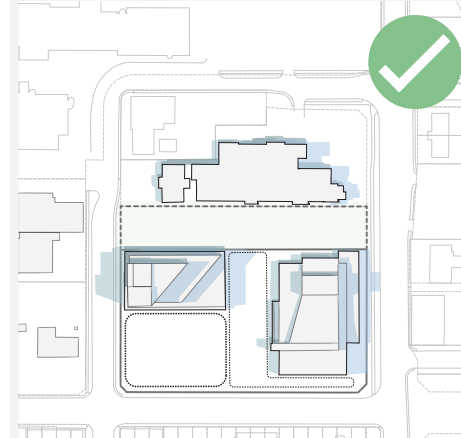
### CIVIC FOCUSED OPTION

- ✓ Public plaza experiences very minimal 10 AM and 12 PM shadowing along the northern edge of the mixed-use building
- ✓ Performing Arts Building casts minimum 4 PM shadowing onto the potential open space



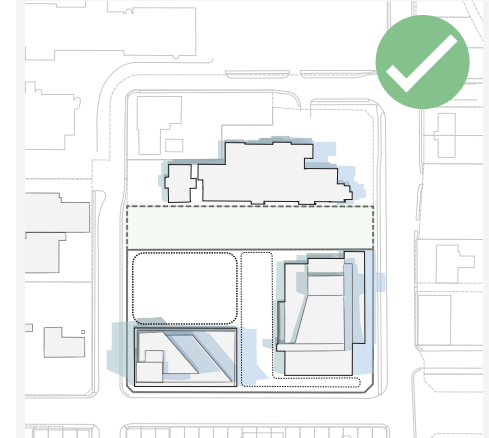
### CULTURAL FOCUSED OPTION

- ✓ Potential open space does not experience any shadowing - summer sun exposure can be mitigated through
- ✓ Public plaza of the Concourse/Greenway experiences minimal 4 PM shadowing from the mixed-use building and 10 AM shadowing from the Performing and Media Arts Centre



### DOWNTOWN FOCUSED OPTION

- ✓ Public plaza does not experience any shadowing
- ✓ Open space south of the Concourse/Greenway experiences minimal 4 PM shadowing from the mixed-use building and 10 AM shadowing from the Performing and Media Arts Centre










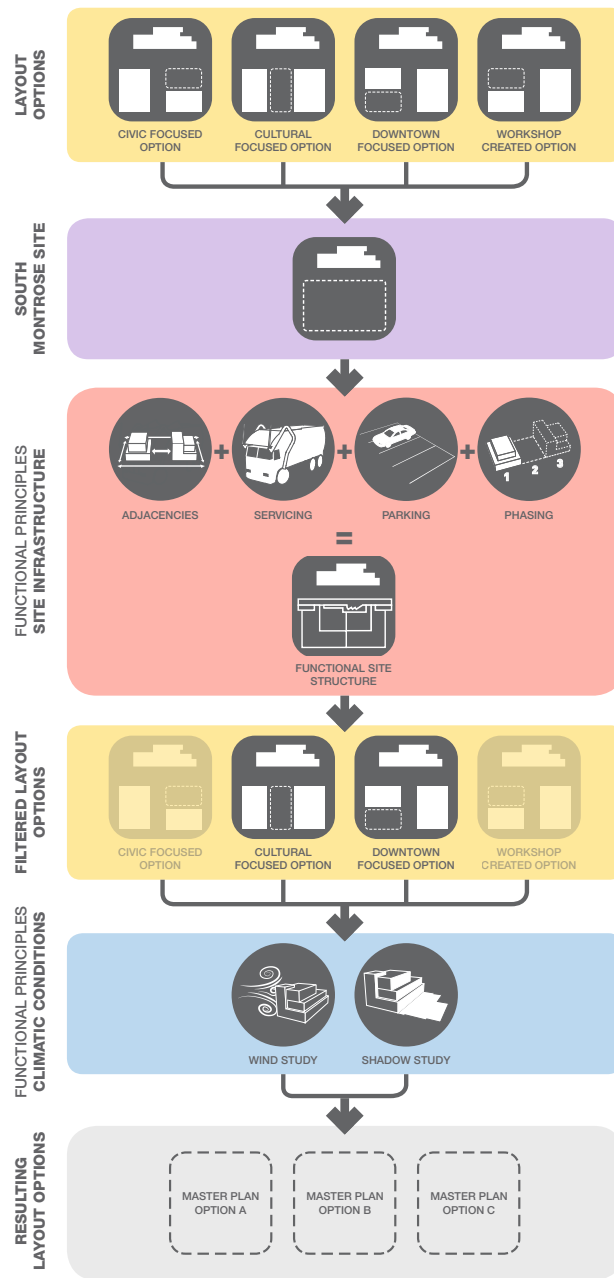
### WORKSHOP CREATED OPTION

- ✓ Public plaza experiences very minimal 12 PM shadowing along the northern edge of the mixed-use building
- ✓ Performing Arts Building casts minimal 10 AM shadowing onto southern area of the open space
- ✓ Mixed-use building casts 4 PM shadowing onto southern area of the open space

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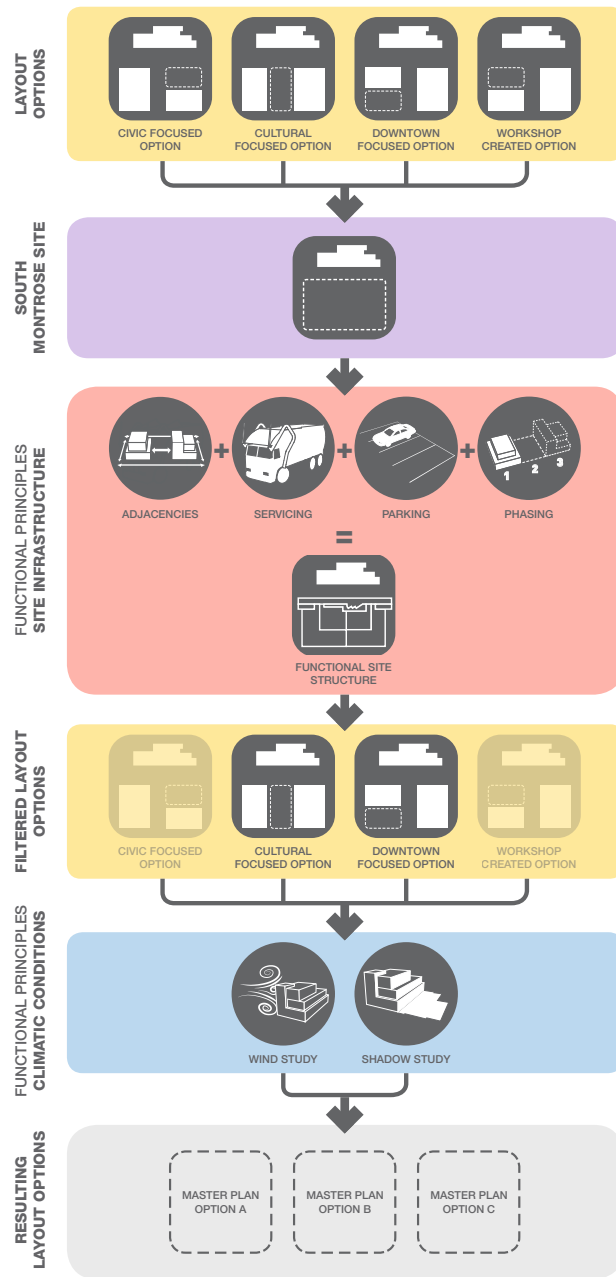
# LAYOUT OPTIONS TEST SUMMARY

	<div></div> <div>CIVIC FOCUSED OPTION</div>	<div></div> <div>CULTURAL FOCUSED OPTION</div>	<div></div> <div>DOWNTOWN FOCUSED OPTION</div>	<div></div> <div>WORKSHOP CREATED OPTION</div>
<div></div> <div>FUNCTIONAL SITE STRUCTURE</div>	<div><div>✓</div><div>✓</div><div>✗</div><div>✗</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✓</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✗</div><div>✗</div><div>✗</div></div>
<div></div> <div>WIND STUDY</div>	<div><div>✓</div><div>✓</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✗</div></div>
<div></div> <div>SHADOW STUDY</div>	<div><div>✓</div><div>✓</div><div>✗</div><div>✗</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✓</div><div>✓</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✗</div><div>✗</div></div>	<div><div>✓</div><div>✓</div><div>✓</div><div>✓</div><div>✗</div><div>✗</div></div>



- The resulting structure incorporates a sub-surface service channel running east-west along the Concourse/Greenway, which creates a “clothes line effect” where multiple surface and sub-surface elements can connect to the channel, thereby providing a very efficient servicing scenario
- A sub-surface plaza infrastructure/storage area and underground parking layout mirrored on either side allows for a flexible phased build-out at grade, with the potential for either building to be constructed in the first phase
- The Cultural Focused Option and Downtown Focused Option fit best with the ‘Functional Site Structure’ as the building locations allow direct servicing access due to their proximity to the sub-surface service channel
- In addition, the sub-surface service channel and underground parking entry/exit can be integrated into each building, therefore eliminating visual impacts onto the Concourse/Greenway and potential open space





- The second set of 'Functional Principles' assessed the 'Climatic Conditions' of wind direction and shadow impacts on the public plaza and open space for the Cultural Focused Option and Downtown Focused Option
- The building locations in the Cultural Focused Option and Downtown Focused Option reasonably block the unfavourable winter winds entering the Public Plaza and open space from the north-west in December, and the north-east in February
- Both layout options experience favourable sun exposure during the winter months



# APPENDIX

# D

## South Montrose Servicing Assessment

***InfraCor***

May 4, 2016

Pages: 3





May 04, 2016

Project #: 1510032

## SOUTH MONTROSE SERVICING ASSESSMENT

### Stormwater Management

The stormwater constraints were examined based on the results of the 2012 Grande Prairie Storm Drainage Master Plan by Focus Engineering. The Plan recommends that:

*“For infill or redevelopment in neighbourhoods that do not have a stormwater management facility the City should adopt a requirement for stormwater management on parcels large enough to support some level of stormwater management. For instance, the City of Edmonton requires parcels larger than 0.2 ha to provide stormwater management to restrict flows to 0.035 m<sup>3</sup>/s/ha with the return period varying from the 1:5 year when there is a downstream stormwater management facility to 1:100 year when there is no downstream facility.”*

This project constitutes a redevelopment in an area which does not have a stormwater management facility, therefore in our judgement a release rate of 35 L/s/ha in a 1:100 year event is appropriate. Given a total development area (including the concourse to the north, but not the cultural centre) of 2.27 ha, this results in a total storm sewer release rate of 79.5 L/s.

Based on the preliminary plan for the southern part of the site, we anticipate that site coverage will ultimately be approximately 30% building, 50% paving, and 20% landscaping, for an overall rational method coefficient of 0.84. With a 95.73 mm/hr (1:100) event this requires 251 m<sup>3</sup> of storage. Assuming an average depth of 0.20m within any ponding areas the total ponding area required is 3,770 m<sup>2</sup>. This can be integrated within the approximately ~6,100 m<sup>2</sup> of open space currently shown in the preliminary site plan. Note that these areas would only pond during extreme rainfall events (1:2 and upwards), not during every rainfall.

The off-site storm infrastructure is not projected to require upgrades based on Figure 5.13 of the Drainage Master Plan. If possible, storm ties should be made to the manholes at the southwest or southeast of the site, at the intersections with 101<sup>st</sup> Avenue. The northern two manholes of 99<sup>th</sup> Street and the manhole directly east of the site on 98<sup>th</sup> Street should be avoided, as they are projected to surcharge to within 0.50m of ground level in the 1:100 event.

### Sanitary Sewer

The 2015 Downtown Infrastructure Assessment by Morrison Hershfield determined that the main servicing constraint for the sanitary sewers in the downtown area is the high level of inflow and infiltration due to age/condition of the existing vitrified clay tile sewers, which are beyond serviceable life. The report states that “The additional dry weather flow for the redevelopment is not significant in comparison to the total peak wet weather flow”. The sanitary sewer within 99<sup>th</sup> Street is vitrified clay tile, and we agree with Morrison Hershfield’s assessment that is past serviceable life. The addition of more

sanitary sewer flow from a large redevelopment such as the South Montrose project will very likely trigger a life cycle upgrade to current standards (e.g. PVC sewer), if only due to the difficulty of tying services into the aged infrastructure. The extent of the life cycle replacement will depend on a condition assessment during detailed design but can be reasonably expected to extend downstream to the next higher size of sewer; in this case from the tie-in within 99<sup>th</sup> Street southwards to 100<sup>th</sup> Avenue.

For planning purposes, InfraCor estimated that the Performing Arts Centre seats up to 4,000 as a concert venue, which would produce an average daily flow of 128 m<sup>3</sup>. The 9,750 m<sup>2</sup> mixed-use building was estimated as a purely residential development, which represents a worst-case scenario for sanitary flow generation. Assuming ~35 m<sup>2</sup> of gross floor area per resident, or 280 residents, the mixed-use building will produce an average daily flow of 106 m<sup>3</sup>. Together these flows represent a peak dry flow rate of 10.6 L/s, which for a 200 mm PVC sanitary sewer at minimum slope represents 50% of capacity. Fortunately, the life cycle upgrades identified will free up capacity by reducing inflow and infiltration flows. Given the findings of the Morrison Hershfield report, we expect reductions in inflow and infiltration will more than offset the 10.6 L/s impact on the downstream sanitary infrastructure; therefore the off-site sanitary upgrades will be limited to life cycle requirements.

## Water Distribution

Figure 5 of the Downtown Infrastructure Assessment by Morrison Hershfield shows eight hydrants in the adjacent roadways; with such dense coverage private hydrants are not expected to be required. 250mm AC water mains available in 101<sup>st</sup> Avenue and 98<sup>th</sup> Street, and a 150mm AC water main is available in 99<sup>th</sup> Street. Services for buildings of this size should be to the south or east, to take advantage of the larger water mains. Specific sizing of water services will need to be determined during detailed design, however given the size & height (up to 6 storeys) of buildings a dual service is likely required for each building.

The Downtown Infrastructure Assessment modeled sufficient fire flows at the intersections of 99<sup>th</sup> Street and 101<sup>st</sup> Avenue, and 98<sup>th</sup> Street and 101<sup>st</sup> Avenue. No off-site water upgrades are expected to be required.

## Servicing/Parkade Conflicts

The preliminary site plans incorporate underground parkades. Although exact servicing designs will be determined during detailed design, at a high level there are a few considerations for the site plan.

Sanitary servicing must come from the west (99<sup>th</sup> Street), and water must come from the south (101<sup>st</sup> Avenue) or east (98<sup>th</sup> Street). Therefore, a route for services must be left free of parkade conflicts from the road to the west, and from the road to the south or east, to a water/mechanical room in each building. The water/mechanical room can be located in the parkade level and services can be brought directly into the P1 level.

Storm collection in the plaza area can be plumbed through the building storm services if necessary, and therefore does not pose as significant a conflict with parkades. The main constraint will be the depth of the storm tie-in, which will dictate how much grade can be established on storm collection. The public storm system in the vicinity is approximately 2.5m below grade, therefore storm servicing is feasible provided that it does not have to extend across the entirety of the site (i.e. each building will draw a service from a nearby storm main, or one storm tie that must be located centrally).

## Corporate Authorization

This document was prepared by InfraCor Consulting Ltd. and is intended for the use of the City of Grande Prairie, their consultants, and contractors. The contents of the report represent InfraCor Consulting Ltd's best judgement based on the information available at the time of preparation. Any third party which uses, relies on, or makes decisions based on the information in this report does so at its own risk. InfraCor Consulting Ltd. accepts no responsibility for damages suffered by any third party as a result of any such use, reliance, or decisions.



P12707

CORPORATE PERMIT

RESPONSIBLE ENGINEER





# APPENDIX

# E

## **Geotechnical Investigation Report South Montrose Concourse Grande Prairie, Alberta**



May 2016

Pages: 50

## GEOTECHNICAL INVESTIGATION

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SOUTH MONTROSE SITE  
GRANDE PRAIRIE, ALBERTA

### PREPARED FOR

NAK DESIGN STRATEGIES  
CALGARY, ALBERTA



### PREPARED BY

PARKLAND GEOTECHNICAL CONSULTING LTD.  
CALGARY, ALBERTA



PROJECT No. CA0192  
MAY 2016

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Limitations	General Terms, Conditions and Limitations



## 1.0 INTRODUCTION

The City of Grande Prairie is proposing to develop a 2.2 hectare multi-use recreational site in Grande Prairie, Alberta. Parkland Geotechnical Consulting Ltd. (ParklandGEO) was requested to perform a geotechnical investigation of the site as part of the preliminary stage of the proposed development. The scope of the work is outlined in ParklandGEO's proposal dated July 21, 2015 (File# PRO4410). Authorization to proceed with this investigation was given by Mr. Jack Vanstone of NAK Design Strategies, acting on behalf of the City of Grande Prairie. This report summarizes the results of the field and laboratory testing programs and presents geotechnical recommendations for general site development.

### 1.1 PREVIOUS INVESTIGATIONS

ParklandGEO issued a previous geotechnical report for the adjacent South Montrose Concourse on March 3, 2016.

- “*Geotechnical Investigation - South Montrose Concourse, Grande Prairie, Alberta*”, prepared for *The City of Grande Prairie*, prepared by *Parkland Geotechnical Consulting Ltd.*, dated March 3, 2016. (File #CA0211).

A geotechnical report for a development north of the subject property was provided to ParklandGEO for review as part of this investigation.

- “*Grande Prairie Public Library/Prairie Art Gallery Addition - Geotechnical Investigation - Grande Prairie, Alberta*,” prepared for *City of Grande Prairie*, prepared by *Thurber Engineering Ltd.*, dated June 7, 2004. (File No. 14-17-21.)

## 2.0 PROJECT INFORMATION

### 2.1 SITE DESCRIPTION

The subject property is located on 2.2 hectares of land located south of the Montrose Cultural Centre, at 9839 - 103 Avenue in downtown Grande Prairie, Alberta. The site is shown on the Key Plan, Figure 1. At the time of the field investigation, the site was snow covered however, based on recent aerial maps, the site is predominately grass covered and a gravel surfaced parking lot is located on the west side of the property. The site gently slopes to the south at less than 5H:1V away from the existing building for about 10 m, at which point it becomes relatively level. There was an elevation difference of less than 1.2 m between the five borehole locations. The site is bordered by the Montrose Cultural Centre to the north, 98<sup>th</sup> Street to the east, 99<sup>th</sup> Street to the west, and 101 Avenue to the south. The surrounding land use was generally commercial developments. The subject property is shown on the Site and Aerial Plans, Figures 2 and 3.

## **2.2 PROJECT DESCRIPTION**

The proposed developments include a performing arts centre, a mixed use building, a civic square, and landscaping features. An underground parkade is also being considered. Planning for the development is presently in its preliminary stages and a building layout was not available at the time of this investigation. Photographs taken at the time of the field investigation are shown on Figure 4.

## **3.0 FIELD AND LABORATORY PROGRAM**

On November 3, 2015, five boreholes (Boreholes 1 to 5) were drilled across the site to depths of 9.5 m below grade. On January 26, 2016, three additional boreholes (Boreholes 6 to 8) were drilled for the proposed concourse, directly south of the cultural centre, to depths of 6.5 m below grade. The locations of the boreholes are shown on the Aerial Site Plan, Figure 2. The soils encountered were visually examined during drilling and logged according to the Modified Unified Soil Classification System. Standard Penetration Tests (SPTs) were performed at selected depths in the boreholes. Soil samples were taken at 1.0 m depth intervals to determine the soil/moisture profile. All soil samples were returned to ParklandGEO's soil laboratory for selected testing to determine the soil properties.

Upon completion of drilling, standpipes were installed in Boreholes 1 to 5. Groundwater level measurements were taken upon completion of drilling and on December 11, 2015. The ground surface elevations at the borehole locations were surveyed by ParklandGEO personnel.

## 4.0 SOIL CONDITIONS

The general the soil profile encountered at the borehole locations was, in descending order: topsoil; fill; buried organics; clay; and clay till. The detailed soil conditions encountered at each borehole location are described on the borehole logs in Appendix A. The soil test results and definitions of the terminology and symbols used on the borehole logs are provided on the explanation sheets, also in Appendix A. The following is a brief description of the soil types encountered.

### 4.1 TOPSOIL

A surficial layer of topsoil up to 100 mm thick was encountered at each borehole location, except Borehole 6. The topsoil was silty and contained little to trace sand, was moderately organic, black and moist. Based on observations and experience, topsoil thicknesses are expected to vary and may exist in greater thicknesses across the site. In general, this topsoil is considered to be weak and compressible under load.

### 4.2 FILL

A 400 mm thick layer of silty sand fill was encountered below the topsoil in Borehole 3. The sand was fine grained and poorly graded with little to some clay and trace gravel. The sand was encountered in a damp condition. Due to the proximity of the borehole to the adjacent parking lot, the sand was most likely placed during development of the parking area.

Clay fill was encountered in Boreholes 6, 7, and 8, and extended to depths of 0.8, 2.5, and 2.0 m below grade, respectively. The fill contained little to some silt, trace to little sand, trace to little gravel, and was stiff. The Liquid Limit (LL) of the fill was 58 percent and the Plasticity Index (PI) was 43 percent, indicating that the fill was generally high plastic. The moisture content of the fill ranged from 16 to 31 percent. This fill was most likely placed during the development of the Montrose Cultural Centre to the north between 2006 and 2010.

### 4.3 BURIED ORGANICS

A 200 mm thick layer of buried organic soil was encountered below the fill at a depth of 0.8 m in Borehole 6. The organic soil was moist and black. The organic content of the soil sample tested was 10 percent, which is considered to be low to moderate. It is possible that deeper and/or thicker layers of buried organic soil are present elsewhere at the site.

#### **4.4 CLAY**

A 700 mm thick layer of silty clay was encountered below the topsoil in Borehole 1. The silty clay was medium to low plastic with a stiff consistency. Occasional rust stains and coal inclusions were noted in the material. The fill was encountered in a damp condition.

Lacustrine clay was encountered below the topsoil and/or fill at each borehole location and extended to depths ranging from 5.0 to 6.8 m below grade. The clay was a variable mixture of silt, sand, and little to trace gravel. Occasional rust stains and cobble inclusions were noted in the clay. The LL of the clay ranged from 44 to 90 percent and the PI ranged from 31 to 72 percent, indicating that the clay is medium to high plastic. The Standard Penetration Test (SPT) "N" values ranged from 8 to 22 blows per 300 mm of penetration, indicating that the clay has stiff to very stiff consistency. The moisture content of the clay ranged from 15 to 33 percent which is considered to be above the Optimum Moisture Content (OMC) for this material.

#### **4.5 CLAY TILL**

Clay till was encountered below the lacustrine clay at depths of 5.0 to 6.8 m below grade in each borehole. The till extended beyond the maximum 9.5 m depths drilled. In general, the clay till contained some silt, some sand, trace to little gravel, and was medium to high plastic. Occasional rust stains and coal inclusions were noted within the till. Although not encountered during this investigation, the local clay till is known to contain large boulders and water bearing sand lenses. The SPT "N" values ranged from 16 to 32 blows per 300 mm of penetration, indicating that the clay till has a very stiff to hard consistency. The consistency seemed to increase at a depth of about 7.0 m. The moisture content of the clay till ranged from 14 to 19 percent which is near the OMC for this material.

#### **4.6 WATER SOLUBLE SULPHATES**

Soil samples were taken at selected depths in the boreholes for water soluble sulphate concentration testing. The concentrations of sulphates are expressed as a percentage of the dry mass of soil. The concentrations of water soluble sulphates in the soil samples tested were as high as 0.26 percent, which indicates a "severe potential for sulphate attack on buried concrete in direct contact with soil." The following table summarizes the soil test results.



**TABLE 1**  
**SOIL TEST SUMMARY**

BH #	Depth (mbg)	Soil Sulphate Results (%)
1	7.0	0.113
2	2.0	0.023
3	7.0	0.133
4	2.0	0.255
5	7.0	0.140
6	2.0	0.019
7	2.0	0.156
8	2.0	0.213

## 5.0 GROUNDWATER

No groundwater seepage was observed in the boreholes during or after drilling. Groundwater levels were measured on December 11, 2015. The following table summarizes the observed groundwater conditions.

**TABLE 2**  
**GROUNDWATER MEASUREMENTS**

BH #	Ground Elevation (m)	Depth of Borehole (m)	Groundwater Level on Dec. 11, 2015 (mbg)	Groundwater Elevation on Dec. 11, 2015 (m)
1	658.9	9.5	9.40	649.50
2	659.0	9.5	Dry	< 649.50
3	658.6	9.5	6.14	652.46
4	659.2	9.5	6.45	652.75
5	659.7	9.5	7.25	652.45

Groundwater elevations are expected to fluctuate on a seasonal basis and will be highest after periods of heavy or prolonged precipitation and snow-melt. The observed groundwater conditions suggest a relatively deep groundwater table and a low permeable subgrade. The low permeable subgrade may inhibit groundwater infiltration and lead to perched conditions during periods of higher precipitation.

## 6.0 DISCUSSION AND RECOMMENDATIONS

### 6.1 GEOTECHNICAL EVALUATION

The proposed developments is expected to include a performing arts centre, a mixed use building, a civic square, and landscaping features. It is understood that an underground parkade is also being considered. The overall depth of the underground parkade is expected to be in the order of 4 m below grade. Foundation loads for the buildings are expected to be moderate to heavy depending on the possible parkade configuration. Paved parking areas and access roads at the site are expected to be subject to frequent light vehicle traffic and occasional heavy truck traffic.

The soil profile was generally consistent and the groundwater table was relatively deep in the proposed development areas. The near surface high plastic clays encountered will require careful consideration prior to and during construction, however, with proper site preparation measures, the subsurface conditions will be suitable for the proposed developments. The main geotechnical issues are discussed below.

1. Near surface high plastic clays were encountered at the site. This soil will impact shallow foundations, slabs and pavements since these clays are prone to swelling (heave) and shrinkage with changes in soil moisture content. Deep pile foundations are preferable over conventional footings at this site due to the presence of the high plastic clays at typical footing depths. Problems related to swelling clays and some recommendations to mitigate these problems are presented in Section 6.2.
2. Pile foundations are considered to be the most practical foundation option for the soil conditions at this site. Recommendations have been provided for bored cast-in-place concrete piles which are considered to be well suited to the soil conditions. Recommendations for other deep foundations such as driven steel piles can be provided upon request.
3. The site soil conditions are less suitable for footing foundations due to the presence of high plastic clays at typical footing depths. If footings are considered, special precautions must be taken during preparation of the bearing surfaces to ensure that the in-situ soil moisture is not significantly altered during construction. All bearing surfaces must be covered with a mud slab (ie. lean mix concrete) immediately after excavation to prevent exposed clays from drying out excessively. Preparation of the bearing surfaces should be monitored by a qualified geotechnical engineer to verify that design criteria are met.
4. Deeper large footings or a monolithic mat foundation may be considered for the parkade structure. Detailed settlement analysis and a review of the proposed bearing pressures versus swelling potential will need to be undertaken as part of the design if large footings or a mat foundation is selected for the parkade structure. In general, mixing of shallow and

deep foundation systems is not recommended unless the structural elements act independently, because footings will experience greater sensitivity to vertical movement due to settlement and swelling.

5. The near surface clay soils will be moderately frost susceptible within the zone of seasonal frost (estimated to an average depth of 2.6 m below grade). Frost considerations are discussed in Section 6.5.
6. Due to the fine grained nature of the surficial soils, subgrade conditions may be adversely impacted by wet weather and seasonal groundwater including temporary perched conditions in the upper deposits. Shallow groundwater in fine grained silty soils are a concern because of the potential for groundwater to “pump up” to surface due to repetitive construction traffic resulting in a significant weakening/failure of the subgrade.
7. The surficial silty clay will provide a low to moderate level of subgrade support for pavement areas. The silty subgrade will be stable if not excessively disturbed. Like most fine grained soils, these materials will encounter some problems if surface fill or backfill materials are placed during periods of wet weather when perched groundwater conditions are present.

## 6.2 SWELLING CLAY ISSUES

Near surface high plastic clays were encountered at the site. This is typical for many areas around Grande Prairie. High plastic soils will exhibit volume changes such as swelling (heave) and shrinkage with changes in soil moisture content. The typical problem with swelling soils is that they are exposed and allowed to dry out during construction, and then, once concrete flatwork or pavement is placed over the soil, the evapo-transpiration conditions change and the soils gain moisture resulting in swelling (heave). Since structural features are placed after shrinkage, the effects of swelling are magnified when the soil re-establishes a new soil - moisture equilibrium. Swelling pressures in excess of 200 kPa are considered possible at this site which is well in excess of some foundation and typical slab loads. The swelling problems area magnified by the variation of plasticity in the subgrade, which might lead to non uniform swelling and harmful differential heave.

If swelling is a concern, the ideal option is to provide a structurally supported floor slab underlain by a crushable void form or crawl space. This option is relatively expensive but it will provide the most predictable level of slab performance and may be justified for slabs with strict vertical tolerances. If the Owner is willing to accept some risk then it may be acceptable to construct a grade supported slab and try to minimize the potential for differential slab movement. If subgrade conditions are uniform, heave will still occur but the potential for differential heave may be reduced. The following construction practices can be used to try and reduce possible problems with heaving/shrinking:

1. Higher plastic clays could be removed and replaced or mixed with a suitable low to medium plastic material. However, given the thick deposits of high plastic clay at this site removal may not be considered to be practical. An alternative to removing the high plastic clay is to cap it with low to medium plastic clay which will provide a seal and help prevent the underlying high plastic clay from experiencing significant moisture increase, which would induce swelling. A minimum of 1.0 m of cover is recommended. With either of the options above, a diligent testing program should be carried out to ensure that sufficient density and moisture content are achieved. More recommendations for site preparation are presented in Section 5.3.
2. Swelling pressures and heave potential are reduced when soil moisture contents approach 35 percent. Soils drier than this will be subject to higher swelling. The existing moisture content ranged from 15 to 33 percent. It is crucial not to allow exposed subgrade soils to dry during construction through the use of protective layer such as mud slabs; or the subgrade can be saturated by flooding or injection prior to placement of the gravel base and slab.
3. The design of water lines and heating ducts beneath slab on grade floors can have a significant impact on subgrade soils and require very careful design and construction measures.
4. Interior non-load bearing walls need to be designed to accommodate potential vertical movement of the slab.
5. Exterior drainage around the building perimeter is important to minimize the potential for infiltration into subgrade soils. Roof and other drains should discharged into storm sewers. If this is not possible, roof drains should discharge well clear of the building. The use of paving stones adjacent to buildings is also not recommended unless special design considerations are used to promote the drainage of water away from buildings. Pavement areas around the building should be kept high, especially in the gravel surfaced areas. The surface of the top of the subgrade should mirror the surface grades and shed infiltration water away. The placement of snow piles from parking or landscaped areas should be located well away from buildings.
6. Landscaping should be designed to minimize the need for watering adjacent to the proposed building. Planting trees and larger shrubs within 1 - 2 m of the building should be avoided, because root systems can take moisture from subgrade soils and lead to possible subgrade shrinkage and settlement.

These steps can be taken to reduce and possibly eliminate the detrimental effects of swelling clays on foundations and slab work. Due the nature of these soils however, there is no procedure that can be followed that can to totally eliminate the risk other than construction of a structural floor slab.



### 6.3 SITE PREPARATION

All topsoil, buried organics or weak native subgrade should be removed from areas to be occupied by the proposed building and pavement areas. Topsoil could be stockpiled for future landscaping use at the site. Once the area is stripped, the exposed subgrade should be proofrolled under the supervision of experienced geotechnical personnel to identify potential soft areas prior to fill placement.

The proposed parkade structure is expected to be excavated to a depth of at least 4 to 5 m below grade. Care will need to be taken when exposing the high plastic clay soils since exposure will affect the soil moisture content of these deposits and will promote future heave. Ideally, it is recommended to undertake bulk excavations to within 150 to 300 mm of final subgrade elevation. The final excavation can be undertaken in a manner to expose larger areas of the subgrade and allow the placement of a thin mud slab of lean mix concrete to protect the surface from disturbance and desiccation while the parkade floor is being prepared and cast.

In pavement areas and building areas that are not in cut the exposed subgrade soils should be scarified to a minimum depth of 150 mm, moisture adjusted and compacted to a minimum of 98 percent of Standard Proctor Maximum Dry Density (SPMDD). In building areas, the clay surface should be moisture adjusted to a moisture content 2 to 4 percent above Optimum Moisture Content (OMC). The preparation of these subgrade areas should be carefully monitored to detect potential soft spots. The work should be monitored by experienced geotechnical personnel to verify that the final exposed soils are uniform and stable. If soft subgrade conditions are encountered the site preparation procedures should be reviewed based on the actual subgrade conditions, final grades and intended use for the designated area. Typically soft areas should be sub-cut and replaced with a suitable fill material. The depth of excavation should be sufficient to remove the soft material or to bridge over the material to give proper support to slabs and pavement structures.

Fill required to bring the site up to grade should be low to medium plastic clay, well graded select granular material such as sand or gravel. The native surficial clay is a medium to high plastic which is marginally suitable for use as engineered fill. High plastic clay should be selectively used or should be mixed with lower plastic clays to reduce swelling potential. If high plastic clay must be used as fill, it should be placed well wet of OMC.

Shallow fill material within the proposed building areas should be placed to a uniform density of 98 percent of Standard Proctor Maximum Dry Density (SPMDD-ASTM D698). Fills of over 1.0 m deep, including trench backfill within the building, should be placed uniformly to at least 100 percent of SPMDD and be either at or slightly over OMC. Exterior backfill outside of building footprints should be placed in thin lifts compacted to at least 95 percent of SPMDD. Compliance with this recommendation for exterior areas is important because poorly compacted backfill adjacent to foundation structures will settle, which may lead to ponding of surface water against foundation walls or grade beams. It is recommended the maximum thickness of any lift after compaction should not exceed 200 mm. Uniformity is of most importance. If soft subgrade conditions are

encountered these compaction recommendations and proposed construction procedures should be reviewed.

Site grading during and after construction is an important consideration. Flatwork surfaces and the landscaped areas should be sloped and graded to effectively and rapidly remove all surface water during and after construction. Excess surface water should be drained away from the building site as quickly as possible, both during and after construction. Site drainage should be directed away from the foundation walls. It is recommended to provide a 5 percent backslope from the buildings for a distance of at least 3 m. The slope of exterior backfill should be checked periodically to verify water is shed away from the buildings. If the backfill settles causing water to pond against the foundation walls, the surface should be regraded.

Roof and other drains should discharge into storm sewers or, if this is not possible, should discharge well clear of the buildings. Landscaping should be designed to minimize the need for watering adjacent to the proposed buildings. Water should not be allowed to pond adjacent to the proposed buildings or on the proposed pavement areas. A minimum grade of 2 percent is recommended to promote surface runoff and minimize potential saturation and degradation of the subgrade. High traffic areas within the site should be kept high. The surface of the top of the subgrade should mirror the surface grades and shed infiltration water away from areas of high traffic.

## **6.4 ALBERTA BUILDING CODE**

In accordance with the most recent version of the Alberta Building Code (ABC), the use of Limit States Design (LSD) is required for the design of buildings and their structural components including foundations. The limit states of LSD design are classified into two groups; the Ultimate Limit States (ULS) and the Serviceability Limit States (SLS). The ULS design requirements in the ABC reference the Structural Commentaries in the User Guide of the National Building Code of Canada (NBCC).

### **6.4.1 Ultimate Limit States (ULS)**

The ULS case is primarily concerned with safety and the levels of load and resistance at the point of collapse or structural failure. The geotechnical value for this case is the ultimate resistance. For foundation design this ultimate resistance value is reduced using a Geotechnical Resistance Factor (GRF) which is based on the reliability index of the geotechnical data used to determine the ultimate resistance for the foundation loading case. The following GRF values should be used for foundation design at this site.

**TABLE 3**  
**LSD GEOTECHNICAL RESISTANCE FACTORS**

<b>GEOTECHNICAL CASE</b>		<b>Resistance Factors</b>
<b>DEEP FOUNDATIONS (PILES)</b>		
Vertical resistance by semi-empirical analysis and in-situ test data		0.4
Vertical resistance from analysis of dynamic monitoring results		0.5
Vertical resistance from analysis of static load test results		0.6
Uplift resistance by semi-empirical analysis and in-situ test data		0.3
Uplift resistance from analysis of static load test results		0.4
Lateral Load Resistance		0.5
<b>SHALLOW FOUNDATIONS (FOOTINGS)</b>		
Vertical resistance by semi-empirical analysis and in-situ test data		0.5

\* NBCC - Users Guide - Structural Commentaries (Part 4 of Division B) - Commentary K - Foundations.

#### **6.4.2 Serviceability Limit States (SLS)**

The SLS case occurs when the foundation loads cause movements or vibrations that are greater than the structure can tolerate before the intended use of the structure is restricted or hindered. The SLS case is addressed by determining the maximum available resistance to keep the foundation deformation within tolerable limits under service loads (i.e. settlement, lateral deflection, etc.). Typically, the foundation loads, configurations and serviceability tolerances have to be known to properly determine geotechnical SLS resistance values. In some foundation cases, such as small footings, basic assumptions can be used to provide preliminary SLS resistance values under specific stated conditions.

For pile foundations under axial loading conditions, the SLS resistance is addressed by determining the limiting load to keep foundation settlements within tolerable limits. Tolerable total and differential settlements should be verified by the structural engineer, but for normal buildings the tolerable limit of total settlement for foundations is typically about 25 mm. For the pile sizes expected on this project, less than 25 mm of settlement is expected to be required to mobilize the ultimate resistance. Therefore, the serviceability limit states are not expected to govern this foundation design unless very strict settlement tolerances are required (i.e. less than 10 to 15 mm of settlement). The settlement potential of the proposed piles may be checked once pile design and loading conditions are finalized.

### 6.4.3 Seismic Considerations

The Alberta Building Code requires buildings to be designed to resist a minimum earthquake force. The formula for obtaining minimum earthquake force is dependent on several factors including Foundation Factor (F) which should be determined using a Site Class of C for this site (Table 4.1.8.4.A). The subgrade soil is a stiff to very stiff clay overlying a stiff to hard clay till based on the Standard Penetration Testing.

### 6.5 PILE FOUNDATIONS

#### 6.5.1 Bored Cast In Place Concrete Piles - ULS Design

The soil conditions for this site are suitable for bored cast-in-place concrete piles. Either straight-shaft skin friction or belled end-bearing piles could be considered. Bored cast-in-place concrete piles may be designed based on the ultimate skin friction or end bearing resistance provided in the following table:

**TABLE 4**  
**BORED CAST-IN-PLACE CONCRETE PILES - ULTIMATE RESISTANCE**

Soil Type	Depth (m)	Ultimate Resistance (kPa)	
		Skin Friction	End Bearing
Clay	0 - 1.5*	0	-
Clay	1.5 - 6.0	45	-
Clay Till	6.0 +	60	1250

\* For heated structures. For unheated structures use 2.5 m.

The ultimate resistance values in this table are based on semi-empirical data; therefore the factored ULS resistance should be calculated by multiplying the ultimate values above by a GRF of 0.4. The upper 1.5 m of pile shaft or the length of shaft embedded in fill, whichever is greater, should be assumed to carry no load. For unheated buildings or structures, the upper 2.5 m of pile shaft should be assumed to carry no load. Piles installed through new fills should be assumed to have a downdrag (negative skin friction) equal to 15 kPa for the section of pile within the fill. The downdrag is an ultimate load. The end bearing contribution to pile capacity should be neglected in the design of bored friction piles.

For end bearing piles (ie. belled piles), the shaft should be assumed to carry no load. For end bearing piles, care must be taken to provide a bearing surface at the base of the pile free from all loose and disturbed soil. Additional recommendations for cast-in-place concrete piles at the site are as follows:



1. To resist uplift forces created by frost action, the minimum depth of straight shaft piles for heated structures should be 6.0 m below final grade. The minimum depth of straight shaft piles for unheated structures should be 7.0 m below final grade. Belled piles should have a minimum depth of 5.0 m below final grade.
2. Steel casing should be available on site during construction and should be used to prevent sloughing and groundwater seepage into the drill-hole, if required.
3. Pile excavations should be filled with concrete immediately upon completion of the pile excavation.
4. If belled piles are used:
  - the bell diameter should not exceed the shaft diameter by more than a factor of 2.5.
  - a bell to shaft ratio of 3:1 would be acceptable, as long as the roof of the bell is steeper than 1:1 or 45° to ensure that the entire load being transferred to the bell is spread over the entire area of the bell.
  - the minimum distance from the underside of any sand layer to the roof of the bell should be 1.5 m.
  - bells should not be placed within sand lenses, sand, gravel, or coal layers (if encountered).
  - to avoid potential settlement in loose soils remaining after shaft is drilled, the base of the bell should be founded a minimum of 100 mm below the final depth achieved by the auger used to drill the shaft.
5. Steel reinforcement should extend the full length of the pile for belled end bearing piles and at least 6 m for straight shaft friction piles. The minimum recommended pile diameter is 400 mm.
6. All pile installations should be inspected by a qualified geotechnical engineer or technician to verify that design criteria are met or exceeded

6.5.2 Frost Action on Piles

Pile shafts within the frost zone of the subgrade will be subjected to adfreeze forces which can cause frost jacking. The minimum embedment depths given in Sections 6.5.1 are intended to counter these forces and prevent uplift from frost.

Frost heave and/or soil swelling forces will act on the underside of pile caps and grade beams with upward heaving pressures in the order of 200 kPa or greater. The potential of for these forces can be greatly reduced by the placement of a compressible material or by providing a void of at least 125 mm between the underside of the concrete cap or grade beam and soil. A product such as Voidform or an equivalent is recommended. If a compressible material is used as an alternative to the Voidform, the uplift pressure acting on the underside of the concrete may be taken as the crushing strength of the compressible medium. The finished grade adjacent to foundation walls should be sloped away so that surface runoff is not allowed to infiltrate and collect in the void space or in the compressible medium. If water is allowed to accumulate in the void space or the compressible medium becomes saturated, the beneficial effect will be negated and frost heaving/soil swelling pressures will occur.

6.6 FOOTINGS

The site soil conditions are less suitable for footing foundations due to the presence of high plastic clays at typical footing depths. Deep pile foundations are preferable at this site. If footings are considered, all bearing surfaces must be covered with a mud slab immediately after excavation to prevent exposed clays from drying out excessively. Footings should not be oversized to reduce the bearing pressure because the larger footing and lower bearing pressure will reduce resistance to heave.

Footings founded on native silty clay and clay till may be designed based on the Ultimate Limit States (ULS) and Serviceability Limit States (SLS) using the bearing resistance values given in the following table:

TABLE 5  
BEARING RESISTANCE FOR FOOTINGS

Type	ULS (kPa)		SLS (kPa)
	Unfactored	Factored	
Strip Footing	300	150	100
Spread Footing	360	180	120

\* For footings bearing in native site soils within 3.0 m of existing grade.

The “factored” ULS resistance given above has been calculated by multiplying the unfactored bearing capacity values by a geotechnical resistance factor of 0.5, in accordance with the building code as summarized in Section 6.4. The SLS bearing resistance values given above are based on limiting the settlement to 25 mm or less, and are applicable to footings with a maximum dimension of 1.2 m wide or  $1.5 \times 1.5 \text{ m}^2$ . If very strict settlement tolerances are required or if larger footings are proposed, the footing sizes and settlement potential should be reviewed.

Preparation of the bearing surfaces should be monitored by a qualified geotechnical engineer prior to placement of footings to verify that design criteria are met. The following additional recommendations are submitted for footing design and construction:

1. It is assumed all footings will be below the depth of frost. Excavations should be undertaken in such a manner to reduce disturbance to the exposed subgrade. All loosened or disturbed soil should be removed from the bearing surface. The clay and clay till deposits are high plastic. It is crucial not to allow this material to dry out during or after construction through the use of a protective layer such as a mud slab; or the subgrade can be saturated by flooding or injection prior to placement of the footings or slabs.
2. For protection against frost action, exterior footings in continuously heated structures should be provided with a minimum depth of ground cover of 1.5 m. Isolated footings and exterior footings in unheated structures will require at least 2.5 m of ground cover. Styrofoam insulation may be used to prevent frost penetration where adequate depths of ground cover cannot be economically provided.
3. If unsuitable soil is encountered at (or below) footing depth, the unsuitable material must be subcut and replaced with lean mix concrete.
4. Excavations should be protected against large amounts of surface water run-off and seepage water through the use of conventional sumps and ditches, if required. The exposed surface may be protected with a thin mud slab of lean mix concrete.
5. Foundation soils must not be allowed to freeze at anytime during or after construction. Footings founded on frozen soils will settle when the founding soils are weakened by thawing.

## 6.7 GRADE SUPPORTED SLABS

Typical to many areas of Grande Prairie, the site soil conditions are not well suited to slab on grade floor construction within the surficial clays, because of high plastic swelling soils. Ideally, the preferred design option is to provide structurally supported slabs. If grade supported slabs are proposed, it is suggested to remove and replace 1.0 m of the high plastic clay subgrade with low to medium plastic clay. It should be noted that this level of subgrade replacement is rarely done and suitable replacement soils are not easily found in Grande Prairie.

The swelling potential for the clay on this site is estimated between 50 to 150 mm, depending on what precautions are taken to minimize drying of the subgrade during construction. For concrete slab design, a modulus of subgrade reaction ( $K_s$ ) of 30,000 kN/m<sup>3</sup> may be used for slabs placed on at least 150 mm of gravel base compacted to 98 percent of SPMDD. The following recommendations are provided for grade supported floor slabs in buildings which will be continuously heated:

1. Grade supported slabs should be supported on 150 mm of base gravel. The gravel should consist of well graded, free draining, granular base with a maximum aggregate size of 50 mm and less than 10 percent passing the 0.080 mm sieve. The gravel should be compacted uniformly to 98 percent SPMDD.
2. It is important not to allow clay subgrades to dry out during or after construction. This is crucial for high plastic clays. Prior to placement of the gravel base for the slab, the subgrade underneath the slab should be saturated to provide moisture for swelling prior to placement of slabs to reduce potential for swelling after the slab is placed.
3. Slabs should be constructed independently of all walls, columns and grade beams and may be tied into the grade beam with dowels at doorways. Alternatively, the slab can be tied into the grade beam at all points provided that a construction joint or cut is placed parallel to the grade beam and at a distance of approximately 2.0 m.
4. Slabs should be provided with construction joints or sawcuts consistent with local practice and should be reinforced with steel bars dimensioned in accordance with the structural engineer's requirements. The reinforcing bars can be carried through the saw-cut joints.
5. Non-load bearing partitions should be designed to accommodate slight vertical movements. Mechanical equipment placed on floor slabs should be designed to permit some releveling should the equipment be susceptible to small changes in level.



6. Piping and electrical conduit connections should be laid out to permit some flexibility, as vertical movement of such equipment as water meters, furnaces and electrical equipment may cause distress in the pipes. This provision is particularly important where there are short pipe runs between mechanical equipment and points where piping passes through the walls. Heating ducts beneath the floor should be insulated with at least 75 mm of rigid insulation to prevent drying of subgrade soils. If possible, water lines should not be placed beneath slab on grade floors.

If slabs with very strict tolerances for vertical movement are proposed at this site, structural floor slabs should be considered. The performance levels for structural slabs can be engineered.

## 6.8 LATERAL EARTH PRESSURES

Lateral earth pressures will act against the foundation walls of the underground parkade. In addition, if a shored excavation is used, lateral earth pressures will act against the shoring walls. Three earth pressure cases will exist at this site.

Active Case. Active earth pressures ( $K_A$ ) should be used behind retaining walls which are unrestrained at the top and flexible walls which are allowed to move away from the restrained soil mass (ie. shoring).

"At Rest" Case. "At rest" pressures ( $K_0$ ) should be used behind retaining walls which are restrained at the top and would include typical basement walls for the possible underground parkade. At-rest conditions should be assumed for any sections of the shoring wall required to support adjacent development to minimize potential loss of support for existing foundations.

Passive Case. Passive earth pressures ( $K_P$ ) act on the front of a wall (ie. against the base of the wall). Horizontal stresses on the wall push against the soil creating a much larger resisting force than is produced by the active or at rest conditions.

Lateral earth pressures may be computed using the following equation:

$$P = K Q + K \gamma H$$

where:

P =	lateral earth pressure at depth H below ground level (kPa)
Q =	Any surcharge loading at the ground surface (kPa)
K =	coefficient of lateral earth pressure
$\gamma$ =	total unit weight of backfill compacted to 95 % SPMDD (kN/m <sup>3</sup> )
H =	depth below ground level

The preceding relationship makes no allowance for hydrostatic pressures to build up behind the wall. This relationship may be used if the parkade elevation is above the high groundwater elevation or if a sub-drainage system capable of handling the anticipated groundwater flows is installed.

Recommended design values for these parameters depend on the type of backfill used. Recommended design values are given in the following table.

**TABLE 6**  
**LATERAL EARTH PRESSURE PARAMETERS**

Type of Backfill	Total Unit Weight (kN/m <sup>3</sup> )	Coeff. of Lateral Earth Pressure		
		K <sub>A</sub>	K <sub>O</sub>	K <sub>p</sub>
Native clay material	18.0	0.51	0.6	2.0
Native clay till material	19.0	0.45	0.6	2.2
Free draining granular material	21.5	0.33	0.4	3.0

The preceding relationship makes no allowance for additional horizontal forces due to frost build up behind the wall on the assumption that heat or frost protection will be utilized. The earth pressure relationship given above assumes nominal compaction of the backfill to a maximum of 95 percent SPMD. Only light, hand operated equipment should be operated within 1.5 m of walls and walls should be braced prior to backfilling. If higher levels of compaction are proposed, the earth pressure relationship given above should be reviewed. If no frost protection is provided the active or at rest lateral earth pressures pushing on the wall should be increased by a factor of 2 for the depth of frost.

## 6.9 SUB-DRAINAGE SYSTEM

The local groundwater table appears to be relatively deep at this site. This site will be subject to infiltration from snow melt and precipitation. Seasonal perched groundwater conditions from this infiltration will have the potential to intersect through the footprint of the parkade structure.

A perimeter sub-drainage system is recommended for the underground structure. The permanent sub-drainage system (weeping tile drain) should consist of a minimum 200 mm diameter perforated rigid plastic pipe surrounded by a filter of free draining gravel and enveloped in a filter fabric. The filter gravel should provide at least 150 mm of free draining washed rock or clean crushed gravel cover over the weeping tile pipe. The drain pipes do not need to be enveloped in filter cloth if the gravel drain is wrapped. The drain pipes should be sloped towards one or multiple collection sumps. Each sump should be provided pumps for dewatering. The subdrainage system should be provided with clean-outs for protection against siltation.

It is recommended to use medium to high plastic select clay backfill to provide a clay cap at ground surface above the weeping tile to minimize infiltration flows. The back-slope away from the buildings as recommended in Section 6.3 will be an important consideration in reducing infiltration into the sub-drainage systems.

## **6.10 EXCAVATIONS AND BACKFILL**

All excavation work must comply with the requirements of the Alberta Occupational Health and Safety Code (OHS Code, 2009). The OHS Code contains the technical requirements that support the Act and Regulation.

Excavation side slopes are not expected to be able to stand near vertical for extended periods of time. For excavations, the soils must be sloped to within 1.5 m of the bottom of the excavation at an angle of not less than 45 degrees measured from the vertical (1H:1V). Alternatively, near vertical trenched excavations may be constructed in conjunction with a movable shield.

For excavations through old fill, organic soil or groundwater, flatter side-slopes may be required. Stockpiles of materials and excavated soil should be kept back from the crest by a distance equal to at least the depth of excavation. Similarly, wheel loads should be kept back at least 1 m from the crest.

The underground parkade excavation is not expected to require a significant volume of backfill. The fill should be placed evenly around the basement structure to distribute the stresses on the structure during backfilling procedures. Recommendations regarding fill materials and compaction specifications given above in Section 6.3 should be followed. Compliance with compaction recommendations around buildings is especially important, because poorly compacted backfill adjacent to foundation walls or grade beams will settle and may lead to ponding of surface water.

## **6.11 CONCRETE**

Water-soluble sulphate concentrations from the samples tested indicated a severe potential for chemical attack of subsurface concrete. Therefore, Sulphate Resistant (Type HS) hydraulic cement is recommended for use in all subsurface concrete in contact with the soil at this site in accordance with CSA Standard CAN-A23.1-14. The recommended minimum 56 day compressive strength is 32 MPa with a water cement ratio of 0.45. All concrete exposed to a freezing environment either during or after construction should be air entrained.

## **6.12 SIDEWALKS AND EXTERIOR FLATWORK**

The subgrade soils at the site are moist and fine grained and therefore moderately susceptible to ice lens formation. Frost heave of exterior flatwork in front of doorways is a common problem in Alberta especially in areas shaded by buildings. Unprotected sidewalks dowelled into foundations often tip up due to heave rotating around the dowel connection, blocking doors and promoting drainage towards the foundation wall. Unprotected sidewalks that are not dowelled into foundations may heave adjacent to the wall blocking doors and crushing any exterior wall facing not given enough clearance above the sidewalk.

If possible, exterior sidewalks should be moved away from foundation walls and exterior flatwork or sidewalks in front of doorways should be designed to minimize the impact of frost penetration on foundation walls and doors. The use of rigid structural insulation, heat tracing or a crushable, non-degradable void form material (so the void does not fill with water) should be considered in front of doorways. At least 50 mm of rigid insulation (Styrofoam HI or equivalent) should be placed below flatwork to restrict frost penetration into the subgrade soils. The insulation should taper out from the buildings, providing a gradual transition to unprotected subgrade. The exterior flatwork should slope away from the building and the sidewalk/building interface should be sealed to prevent seepage of surface runoff into the foundation soils.

## **6.13 PAVEMENTS**

### **6.13.1 Rigid Concrete Pavement**

If an underground parking structure is proposed for this development, the basement slab will effectively be a rigid concrete pavement.

The rigid concrete pavement section should be supported by at least 150 mm of gravel conforming to Alberta Transportation (AT) specifications, as shown on Table 8. A modulus of subgrade reaction ( $K_s$ ) of 30,000 kN/m<sup>3</sup> may be used. The surface layer should consist of at least 175 mm of reinforced concrete with a minimum 28 day compressive strength of 25 MPa. The maximum aggregate size should be 20 mm and the concrete mix should contain 5 - 7 percent air entrainment. The slump when placed should not exceed 100 and the net water cement ratio, by weight, should not exceed 0.5.

Contraction joints should be spaced no less than 4.5 m apart. Good finishing practices should follow placement of concrete. Reinforcement details can be provided when the final panel configuration is established.



### 6.13.2 Flexible Asphalt Pavement

Proposed pavement design sections are based on the assumption that the pavement will be constructed on a stable, prepared subgrade with a soaked California Bearing Ratio (CBR) of 3.0. This is indicative of a relatively low level of subgrade support as expected during spring thaw when the subgrade soils will exist in a weakened condition. If soft subgrade conditions are encountered, it is assumed that the subgrade will be improved with coarse gravel to support construction traffic and paving activities. This subgrade improvement gravel is placed together with the subbase.

Two flexible pavement designs are proposed for this site, one for light traffic in the parking areas; and one for heavier traffic on access roads and any truck loading areas. The assumed loading for heavy truck traffic is 10 trucks per day. If it is anticipated that traffic will exceed these levels, the design sections provided below should be reviewed.

**TABLE 7**  
**FLEXIBLE PAVEMENT DESIGN**

	Light	Moderate
Asphalt Concrete Pavement (ACP)	75 mm	100 mm
20 or 25 mm Granular Base Course	300 mm	450 mm
Prepared Subgrade (150 mm)	Yes	Yes

The performance of the proposed pavement design section will be, in part, dependent on achieving an adequate level of compaction in the subgrade and pavement materials. The recommended levels of compaction for the granular materials in the pavement section should be a minimum of 98 percent of SPMDD. The asphalt concrete should be compacted to a minimum of 97 percent of Marshall density based on a 50 blow laboratory Marshall test. It is recommended to use pavement materials conforming to the following specifications:

**TABLE 8**  
**ASPHALT CONCRETE**

Parameter	Specification
Stability (kN, minimum)	8.0
Flow (mm)	2 - 4
Air Voids (percent)	3 - 5
VMA (minimum percent)	14.5
Asphalt Cement (penetration grade)	150 - 200 (A)

Aggregate materials for base gravel should be composed of sound, hard, durable particles free from organics and other foreign material. It is recommended to use aggregates conforming to the following Alberta Transportation (AT) specifications.

**TABLE 9**  
**RECOMMENDED AGGREGATE SPECIFICATIONS**

AT Specifications	
Asphalt Gravel	Designation 1, Class 12.5 or 16
Crushed Base Gravel	Designation 2, Class 20 or 25
Subbase Gravel	Designation 2, Class 40

Based on the availability of local materials at the time of tendering or construction, alternate materials could be considered upon review by the geotechnical engineer.

The parking areas should be sloped and graded to effectively remove all surface water as rapidly as possible. To minimize the occurrence of surface water ponding in parking areas, surface grades of at least 2 percent are recommended. Allowing water to pond on the pavement surface will lead to infiltration of the water into the subgrade which could result in weakening of the subgrade soils.

#### **6.14 INSPECTION**

It is recommended that on-site inspection and testing be performed to verify that actual site conditions are consistent with assumed conditions which meet or exceed design criteria. Based on the Alberta Building Code, adequate levels of inspection include: testing of engineered fill, review of all completed bearing surfaces for footings and full time inspection during construction of deep foundations.

## 7.0 CLOSURE

This report is based on the findings at eight borehole locations at the site, soil testing and a review of other available site information. If new information or different subsoil/groundwater conditions are encountered, this office must be notified and recommendations submitted herein will be reviewed and revised as required. This report has been prepared for the exclusive use of **The City of Grande Prairie, NAK Design Strategies**, and their approved agents for the specified application to the proposed South Montrose Site developments in Grande Prairie, Alberta. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. Use of the report is subject to acceptance of the General Terms and Conditions provided in the Limitations appendix of this report.

Respectfully submitted,  
**PARKLAND GEOTECHNICAL CONSULTING LTD.**

APEGA Permit #07312



Aisha Wynne,  
Geotechnical Engineer

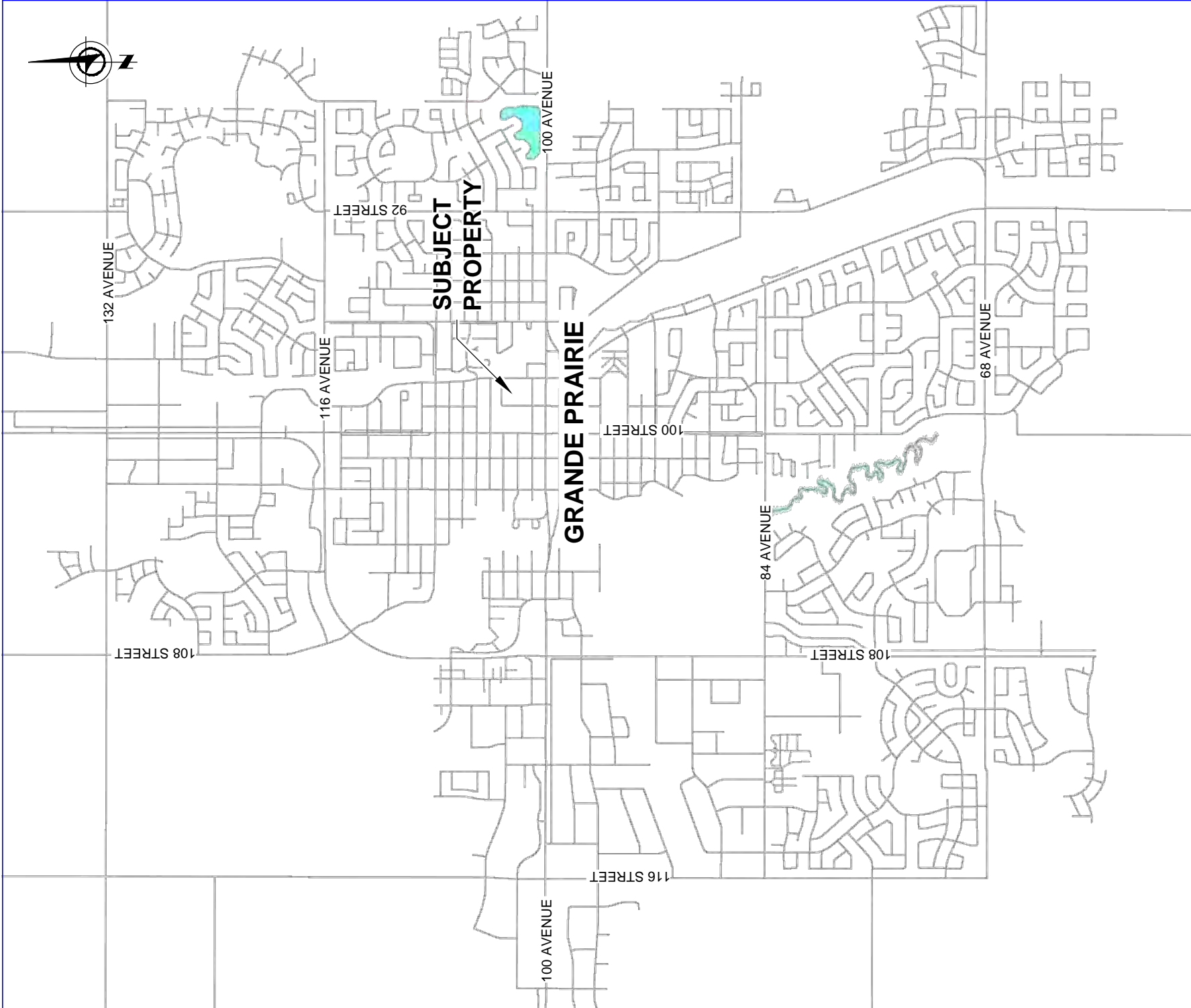
Reviewed by:  
Mark Brotherton, P.Eng.



## FIGURES

- Figure 1 - Key Plan
- Figure 2 - Site Plan
- Figure 3 - Aerial Plan
- Figure 4 - Site Photographs



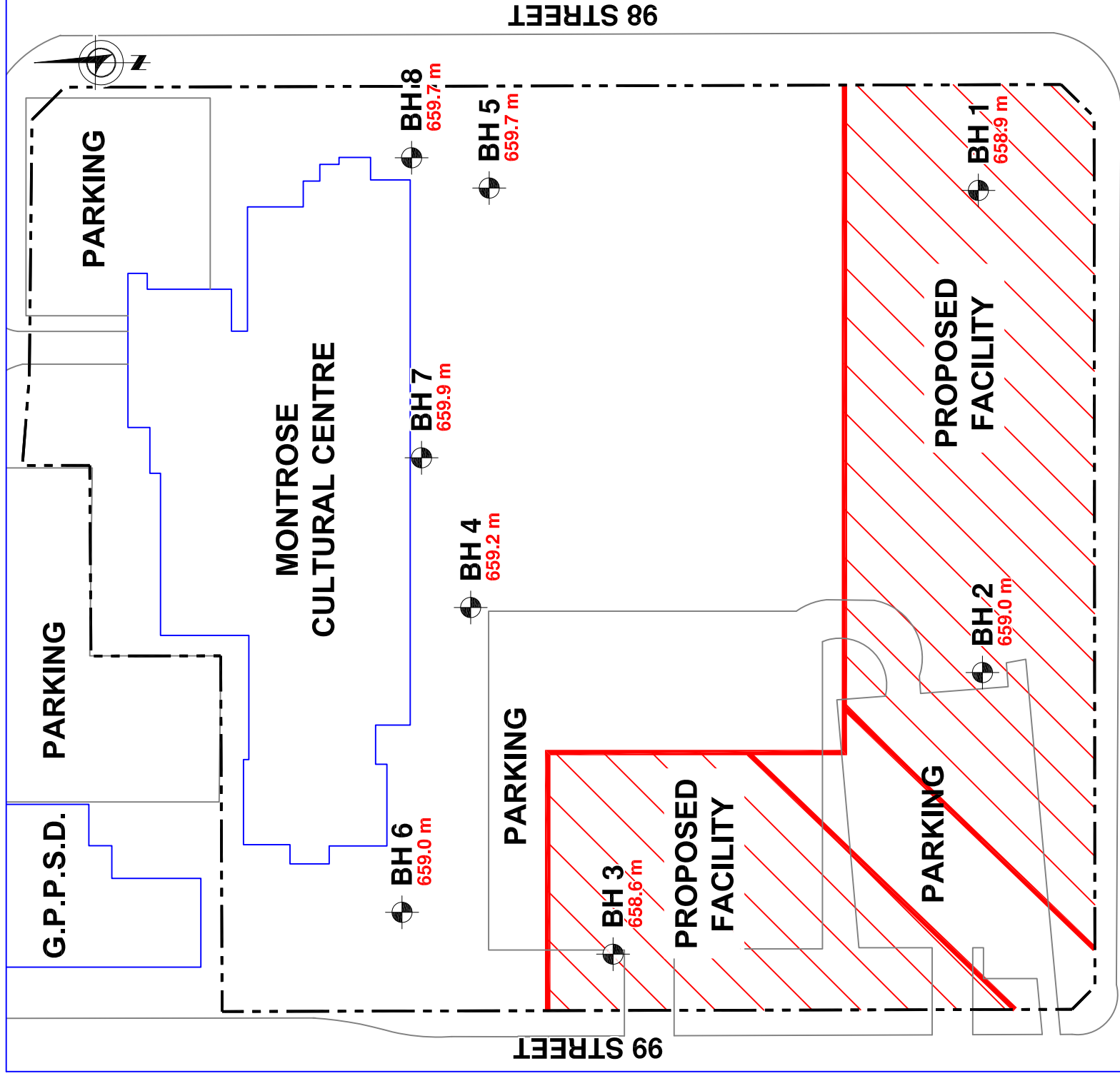




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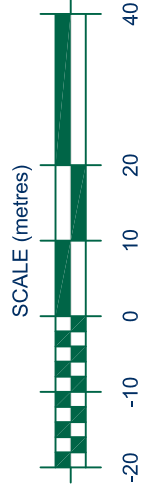
**KEY PLAN**

SOUTH MONTROSE SITE GRANDE PRAIRIE, ALBERTA			
DRAWN: SP	CHK'D.: AW	REV #: 0	DATE: MAY 2016
SCALE: NTS	JOB NO. CA0192		FIGURE NO. 1



ALL BOREHOLE LOCATIONS ARE APPROXIMATE

658.9 m SURFACE ELEVATION



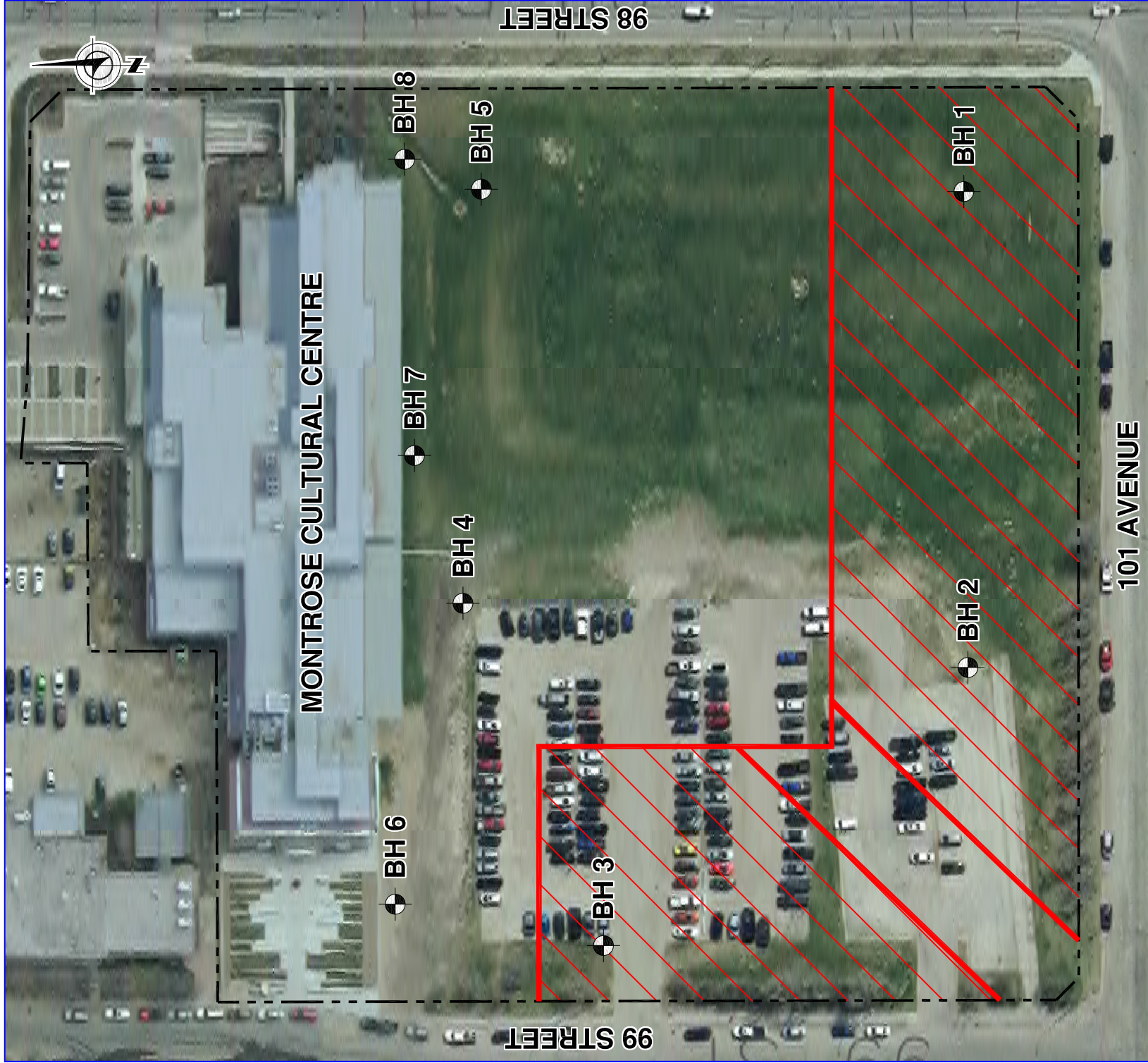
CLIENT:




## SITE PLAN

SOUTH MONTROSE SITE  
GRANDE PRAIRIE, ALBERTA

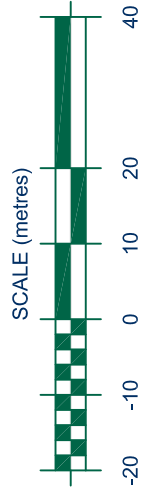
DRAWN: SP	CHK'D.: AW	REV #: 0	DATE: MAY 2016
SCALE: 1:1000	JOB NO. CA0192	FIGURE NO. 2	



NOTE: AERIAL PHOTOGRAPH OBTAINED FROM THE CITY OF GRANDE PRAIRIE WEB MAP, DATED 2014.

 PROPOSED FACILITIES

 ALL BOREHOLE LOCATIONS ARE APPROXIMATE



CLIENT:

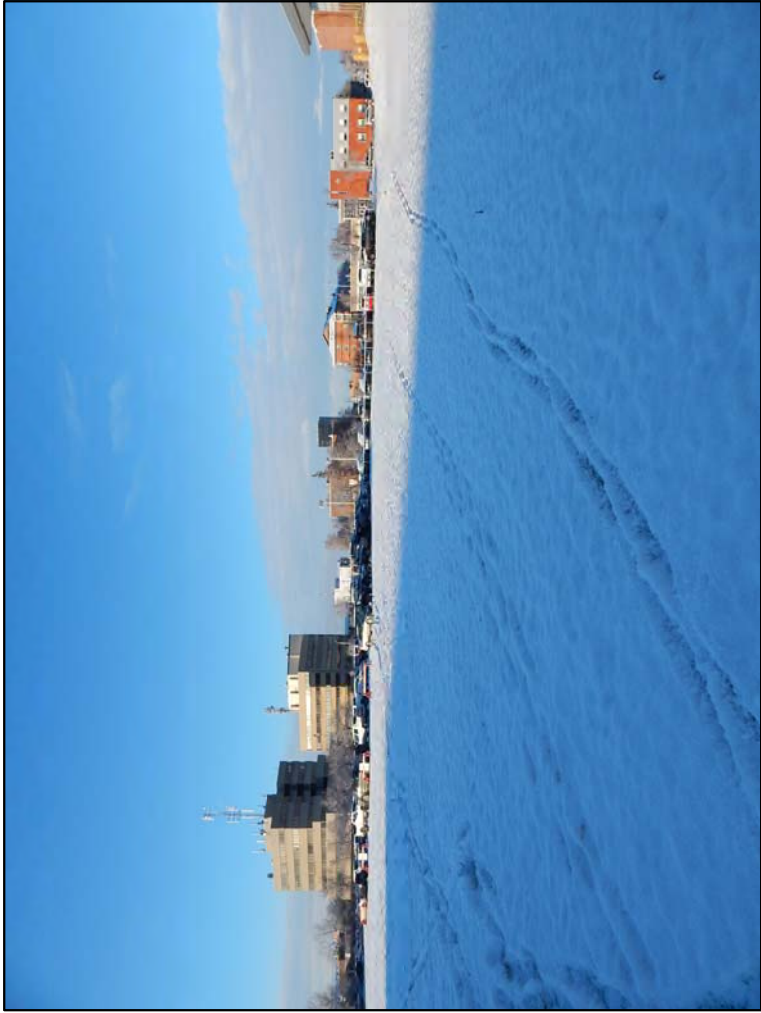


## AERIAL PLAN

SOUTH MONTROSE SITE  
GRANDE PRAIRIE, ALBERTA

DRAWN: SP	CHK'D.: AW	REV #: 0	DATE: MAY 2016
SCALE: 1:1000	JOB NO. CA0192	FIGURE NO. 3	





February 4, 2016 - Proposed development area. Facing southwest.



February 9, 2016 - Proposed development area. Facing northeast.

CLIENT:



**SITE PHOTOGRAPHS**

SOUTH MONTROSE SITE  
GRANDE PRAIRIE, ALBERTA

DRAWN: SP	CHK'D.: AW	REV #: 0	DATE: MAY 2016
SCALE:	JOB NO. CA0192	FIGURE NO. 4	





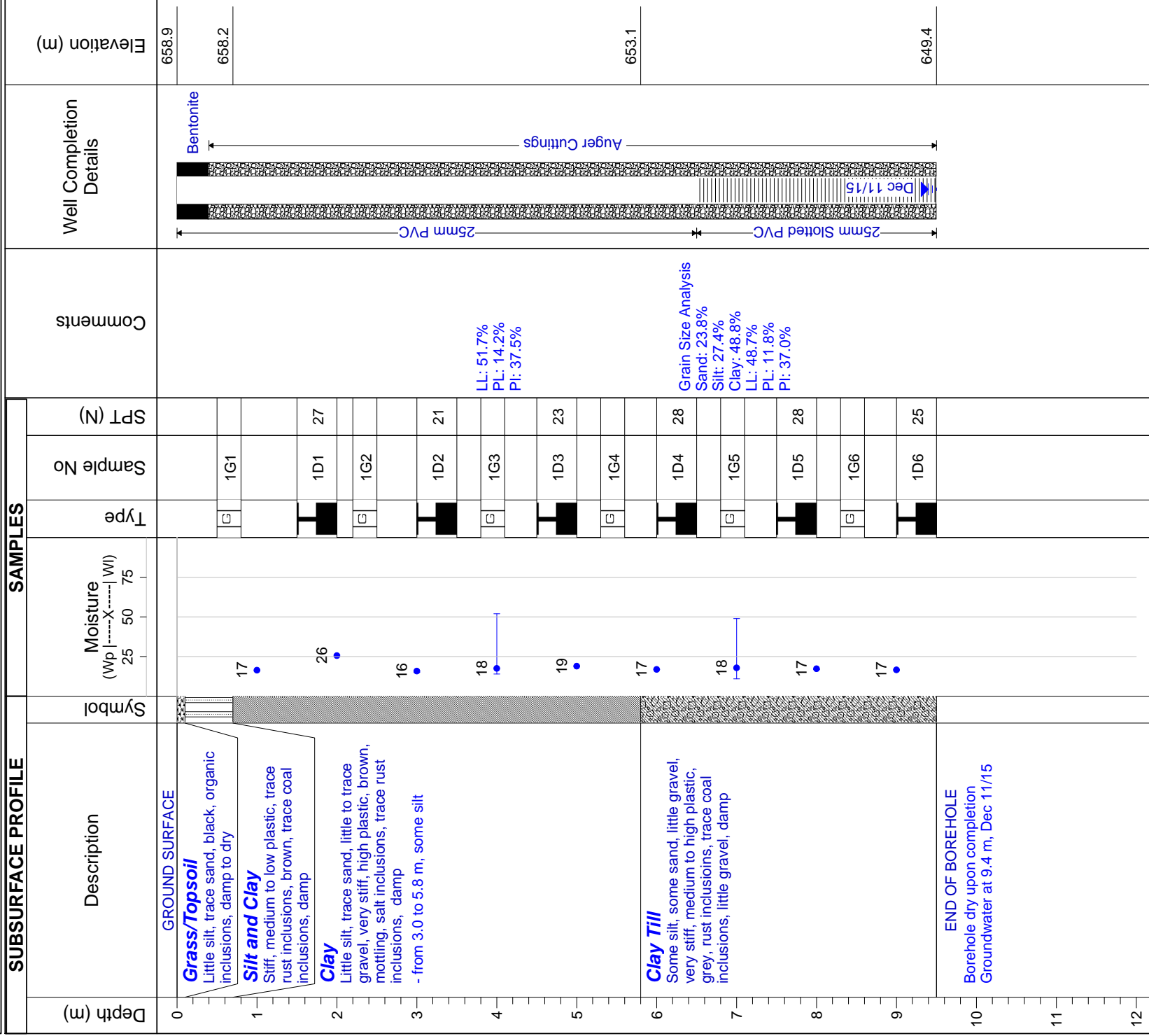
## **APPENDIX A**

Borehole Logs  
Soil Test Results  
Explanation Sheets



CLIENT: NAK Design Strategies  
SITE: South Montrose Site

**BOREHOLE NO.: 15-01**  
PROJECT NO.: CA0192  
BH LOCATION:



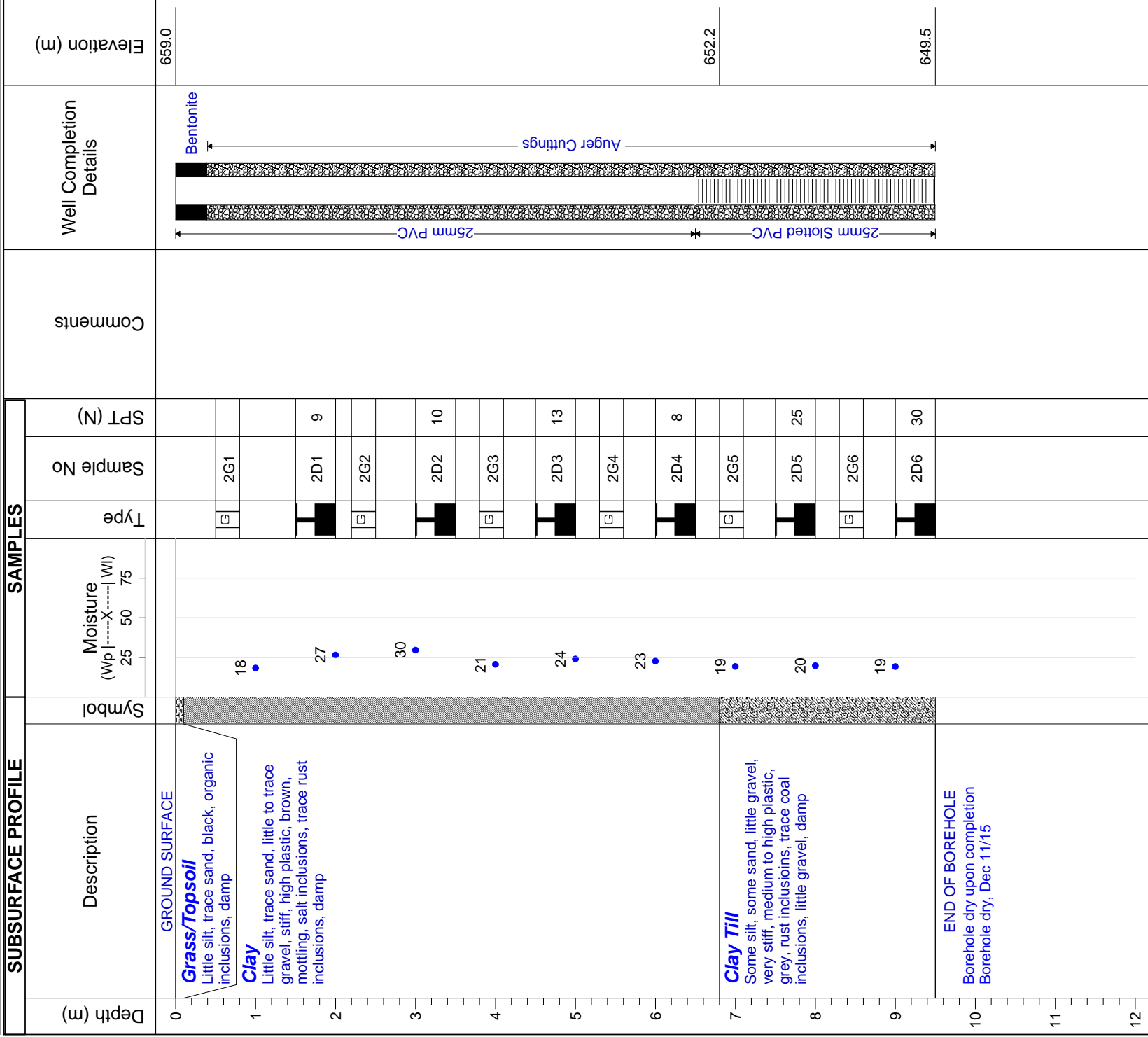
LOGGED BY: K.A  
CONTRACTOR: Frontier Enviro-Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

DATE: Nov 3, 2015  
GROUND ELEVATION (m): 658.9  
NORTHING (m): 6115382  
EASTING (m): 386052



CLIENT: NAK Design Strategies  
SITE: South Montrose Site

**BOREHOLE NO.: 15-02**  
PROJECT NO.: CA0192  
BH LOCATION:



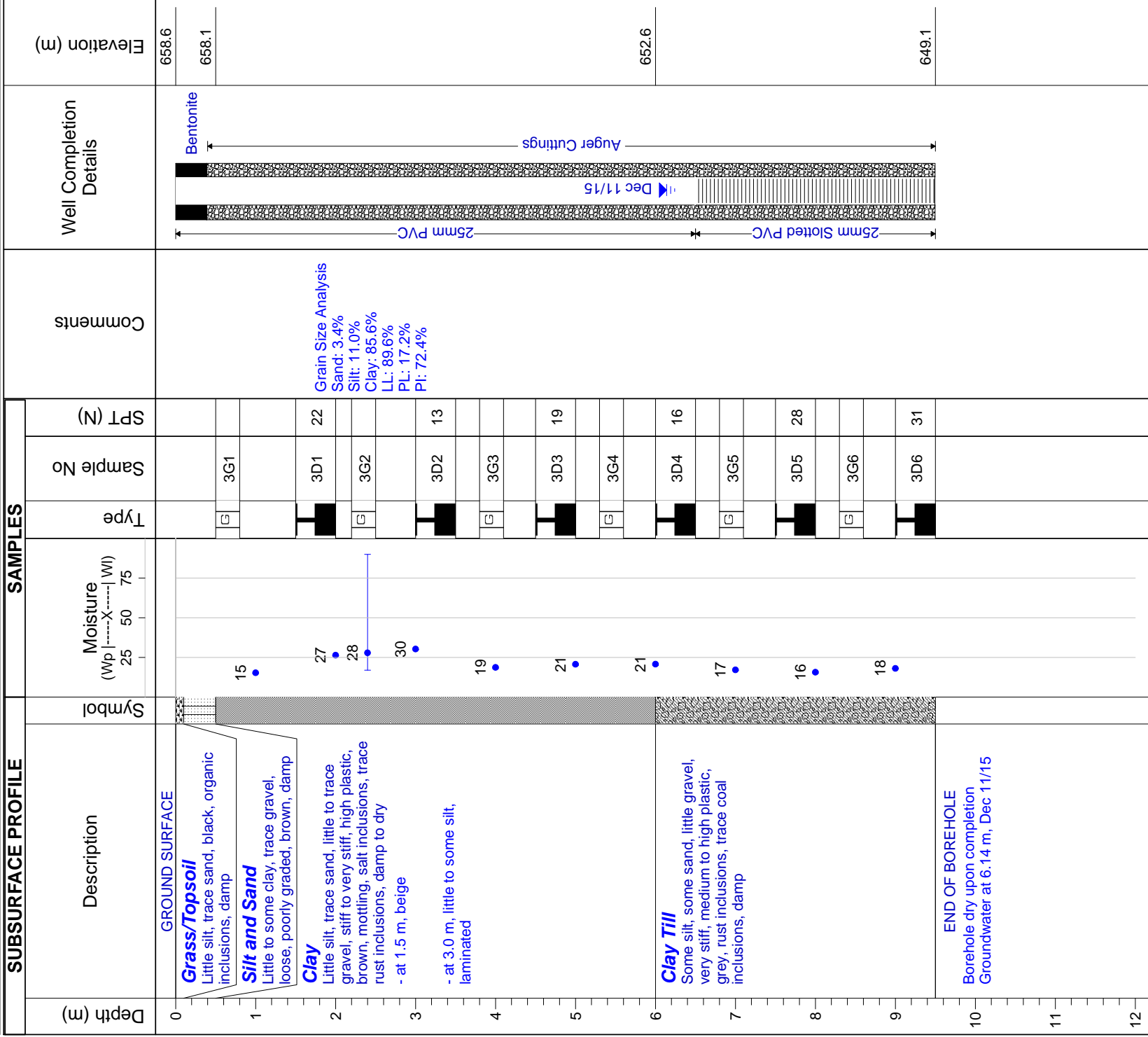
LOGGED BY: K.A  
CONTRACTOR: Frontier Enviro-Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

DATE: Nov 3, 2015  
GROUND ELEVATION (m): 659.0  
NORTHING (m): 6115384  
EASTING (m): 385963



CLIENT: NAK Design Strategies  
SITE: South Montrose Site

**BOREHOLE NO.: 15-03**  
PROJECT NO.: CA0192  
BH LOCATION:



LOGGED BY: K.A  
CONTRACTOR: Frontier Enviro-Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

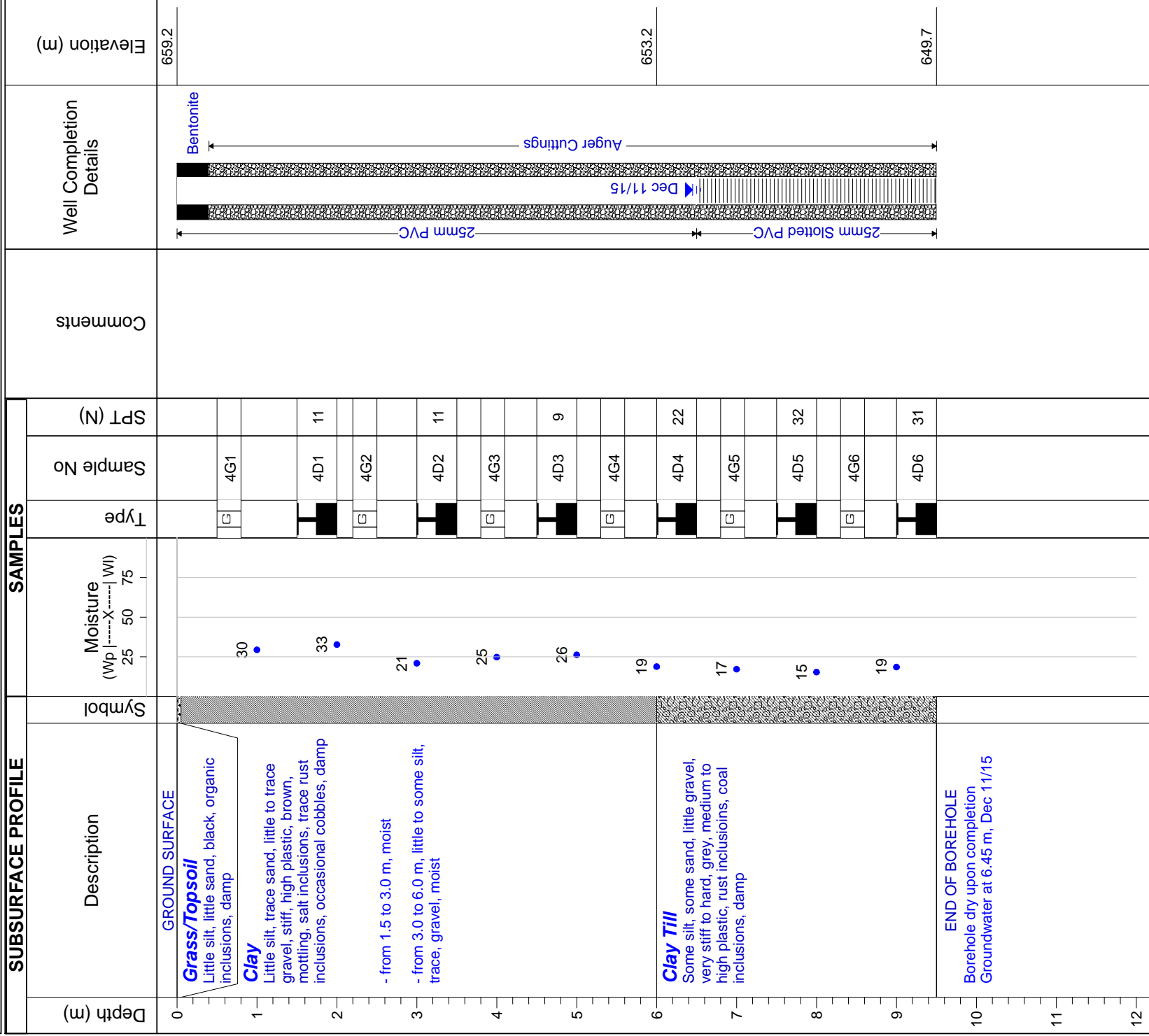
DATE: Nov 3, 2015  
GROUND ELEVATION (m): 658.6  
NORTHING (m): 6115453  
EASTING (m): 385912





CLIENT: NAK Design Strategies  
SITE: South Montrose Site

**BOREHOLE NO.: 15-04**  
PROJECT NO.: CA0192  
BH LOCATION:



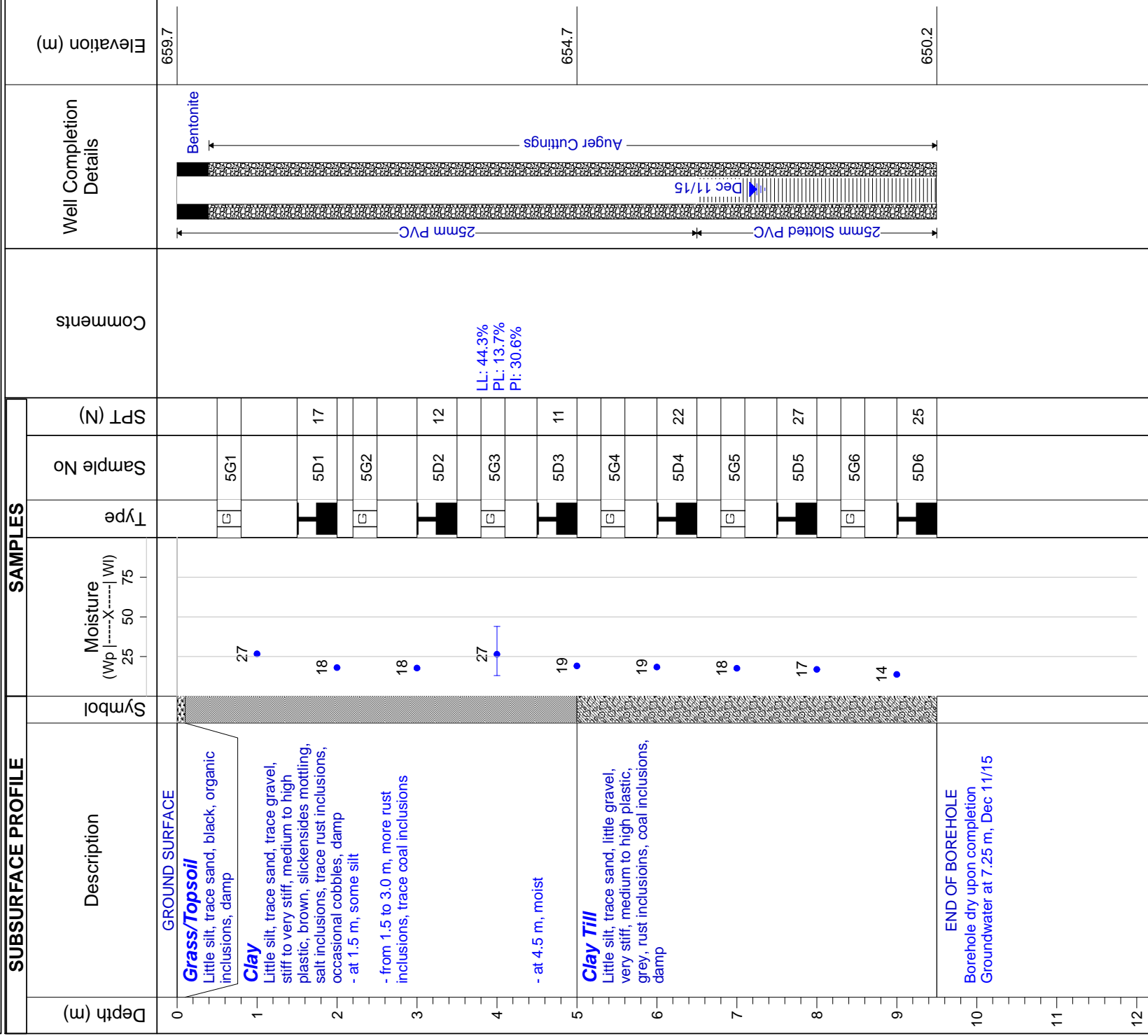
LOGGED BY: K.A  
CONTRACTOR: Frontier Enviro-Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem

DATE: Nov 3, 2015  
GROUND ELEVATION (m): 659.2  
NORTHING (m): 6115478  
EASTING (m): 385977



CLIENT: NAK Design Strategies  
SITE: South Montrose Site

**BOREHOLE NO.: 15-05**  
PROJECT NO.: CA0192  
BH LOCATION:



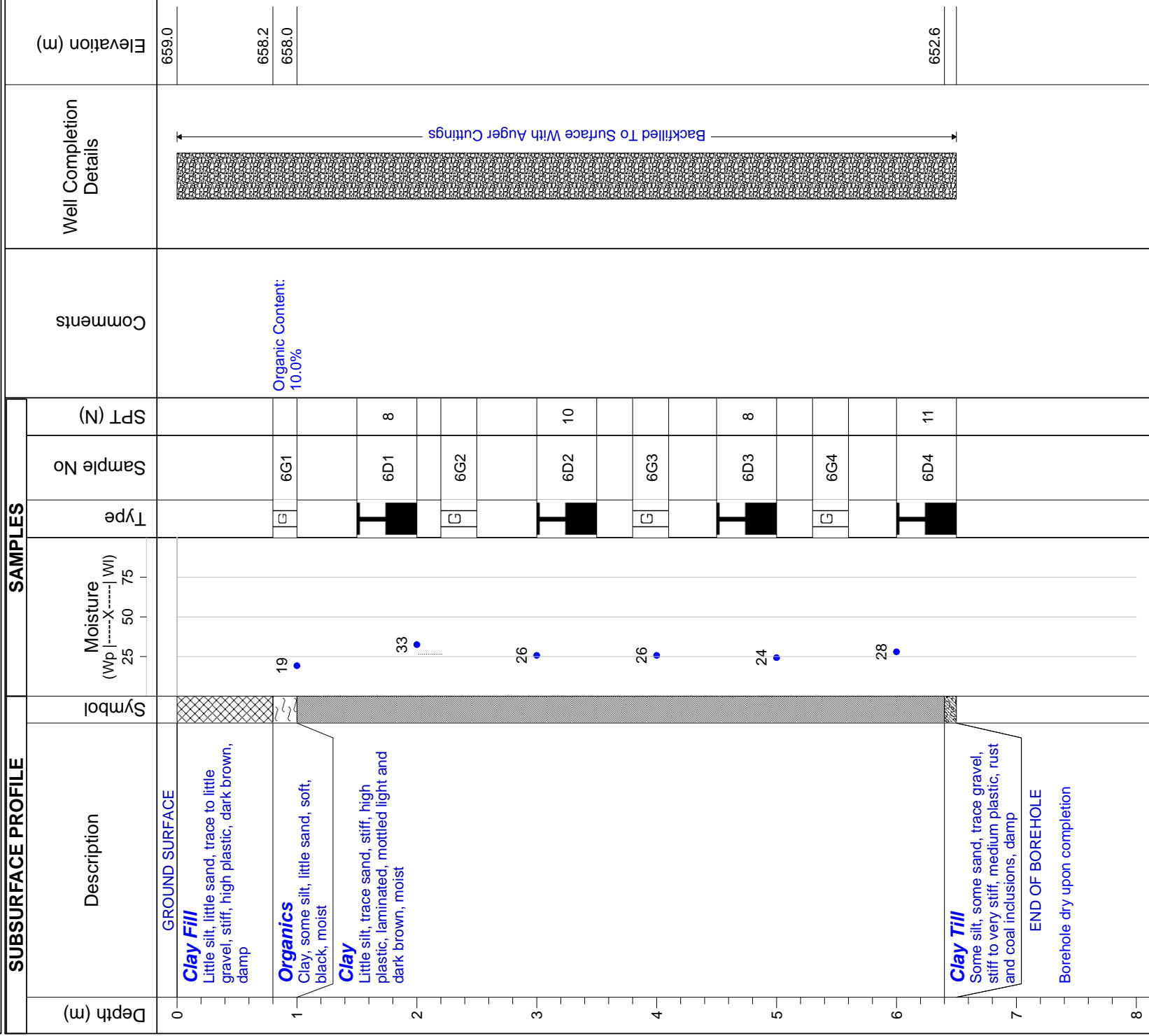
LOGGED BY: K.A  
CONTRACTOR: Frontier Enviro-Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

DATE: Nov 3, 2015  
GROUND ELEVATION (m): 659.7  
NORTHING (m): 6115474  
EASTING (m): 386053



CLIENT: NAK Design Strategies  
SITE: Montrose Supplementary Boreholes

**BOREHOLE NO.: 16-06**  
PROJECT NO.: CA0211  
BH LOCATION:



LOGGED BY: CS  
CONTRACTOR: Frontier Enviro Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

DATE: January 26, 2016  
GROUND ELEVATION (m): 659.00  
NORTHING (m): 6115493  
EASTING (m): 385920



CLIENT: NAK Design Strategies  
SITE: Montrose Supplementary Boreholes

**BOREHOLE NO.: 16-07**  
PROJECT NO.: CA0211  
BH LOCATION:

SUBSURFACE PROFILE			SAMPLES			Comments	Well Completion Details	Elevation (m)
Depth (m)	Description	Symbol	Moisture (Wp  -----X-----  Wl)	Type	Sample No			
0	GROUND SURFACE							659.9
0.5	<b>Topsoil</b> Some silt, little sand, dark brown, damp							
1.1	<b>Clay Fill</b> Little silt, little sand, trace to little gravel, stiff, high plastic, medium gray, dry to damp  - At 1.1 m, trace sand, dark brown, damp		16	G	7G1			
2.5	<b>Sand</b> Fine grained, little silt, trace clay, poorly graded, compact, light brown, damp		28		7D1			657.4
2.6				G	7G2			657.1
3.2	<b>Clay</b> Little silt, trace sand, stiff, medium to high plastic, dark brown, moist		18		7D2			
4.1			21	G	7G3			
4.8			28		7D3			
5.7			31	G	7G4			653.9
6.2	<b>Clay Till</b> Some silt, some sand, trace gravel, very stiff, medium plastic, dark brown, rust and coal inclusions, damp				7D4			653.4
6.5	END OF BOREHOLE Borehole dry upon completion							
8								



Grain Size Analysis  
Clay: 58.3%  
Silt: 16.7%  
Sand: 19.3%  
Gravel: 5.8%  
LL: 57.5%  
PL: 14.3%  
PI: 43.2%

LOGGED BY: CS  
CONTRACTOR: Frontier Enviro Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem  
NOTES:

DATE: January 26, 2016  
GROUND ELEVATION (m): 659.86  
NORTHING (m): 6115486  
EASTING (m): 386004





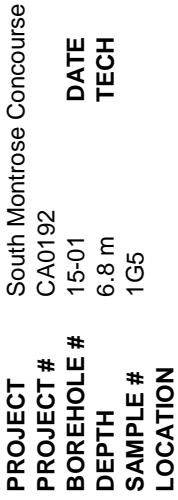
CLIENT: NAK Design Strategies  
SITE: Montrose Supplementary Boreholes

BOREHOLE NO.: 16-08  
PROJECT NO.: CA0211  
BH LOCATION:

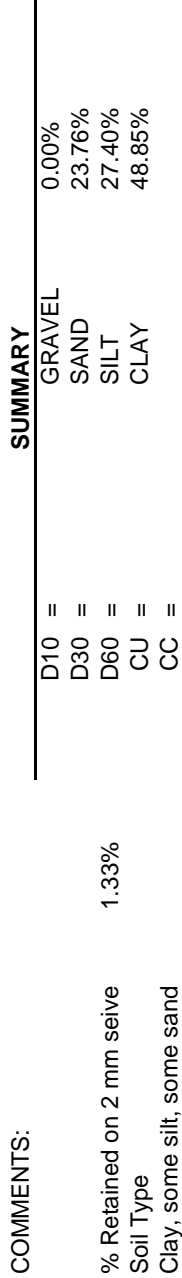
SUBSURFACE PROFILE			SAMPLES			Comments	Well Completion Details	Elevation (m)
Depth (m)	Description	Symbol	Moisture (Wp  ----X----  Wl)	Type	Sample No			
0	GROUND SURFACE							659.7
0.2	<b>Topsoil</b> Some silt, little sand, dark brown, damp							
0.5	<b>Clay Fill</b> Little to some silt, little sand, stiff, high plastic, medium gray, dry to damp		31	G	8G1			
1.5	- From 0.5 to 0.8 m, light grey, trace gravel							
2.0	- From 1.0 to 2.0 m, 10 cm thick slickensided seams alternating with light brown silty seams		20		8D1			657.7
2.5	<b>Clay</b> Little silt, trace sand, stiff, medium to high plastic, mottled light and dark brown, moist			G	8G2			
3.0			18					
3.5					8D2			
4.0			20	G	8G3			654.7
4.5								
5.0	<b>Clay Till</b> Some silt, some sand, trace gravel, hard, medium plastic, dark brown, rust, coal and gypsum inclusions, damp to moist		19		8D3			
5.5				G	8G4			
6.0			19					653.2
6.5					8D4			
7.0	END OF BOREHOLE Borehole dry upon completion							
8.0								

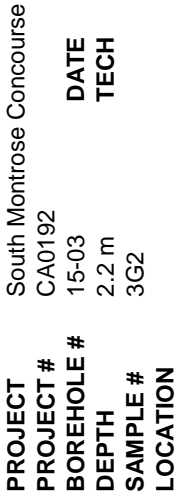
LOGGED BY: CS  
CONTRACTOR: Frontier Enviro Drilling Ltd  
RIG/METHOD: Truck Mounted Solid Stem

DATE: January 26, 2016  
GROUND ELEVATION (m): 659.66  
NORTHING (m): 6115487  
EASTING (m): 386060

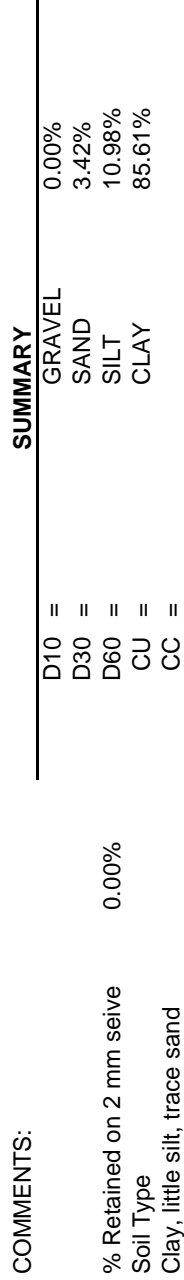


CLAY	SILT	SAND		GRAVEL		COBBLES
		FINE	MEDIUM	COARSE	FINE	





CLAY	SILT	SAND		GRAVEL		COBBLES
		FINE	MEDIUM	COARSE	FINE	

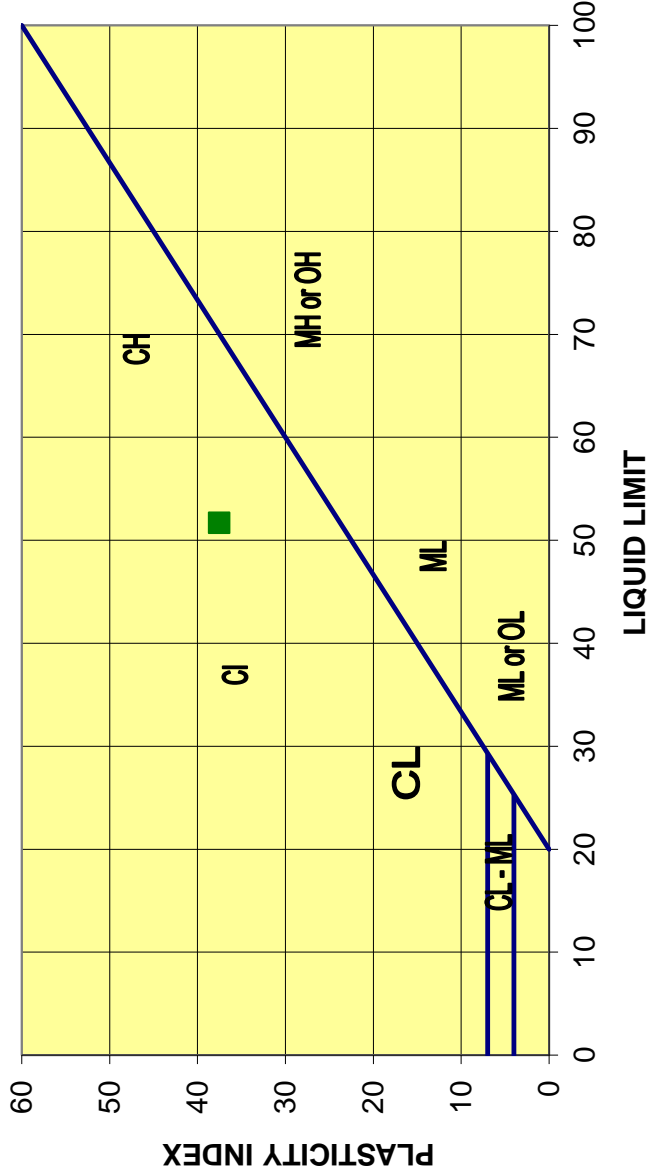


## SOIL PLASTICITY SUMMARY

LIQUID LIMIT (LL)			
Trial No.	1	2	
No. Blows	26	23	
Wt. Sample Wet + Tare	52.211	54.252	
Wt. Sample Dry + Tare	44.382	45.739	
Wt. Water	7.829	8.513	
Tare Container	29.282	29.326	
Wt. Dry Soil	15.100	16.413	
Moisture Content	51.848	51.867	
Corrected for Blow Count	52.094	51.347	
<b>Liquid Limit Average</b>	<b>51.7</b>		

PLASTIC LIMIT (PL)			
Trial No.	1	2	3
Wt. Wet Worm + Tare	12.725	12.700	12.643
Wt. Dry Worm + Tare	12.586	12.556	12.493
Wt. Water	0.139	0.144	0.150
Tare Container	11.567	11.549	11.466
Wt. Dry Worm	1.019	1.007	1.027
Moisture Content	13.641	14.300	14.606
<b>Plastic Limit Average</b>	<b>14.2</b>		

<b>PLASTICITY INDEX (PI) = LL-PL</b>	<b>37.5</b>
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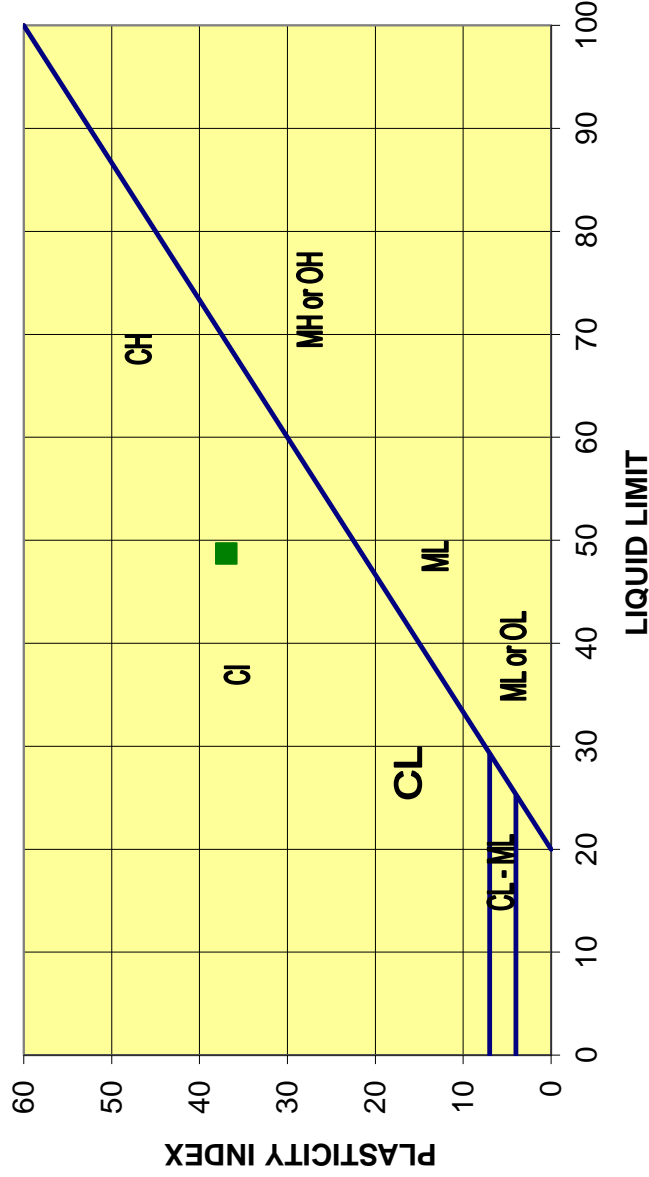
PROJECT# CA0192  
PROJECT South Montrose Concourse  
BOREHOLE 15-01  
DEPTH 6.8 m  
SAMPLE # 1G5  
DATE 8-Dec-15  
TECH JL

## SOIL PLASTICITY SUMMARY

LIQUID LIMIT (LL)			
Trial No.	1	2	
No. Blows	20	23	
Wt. Sample Wet + Tare	56.096	54.426	
Wt. Sample Dry + Tare	47.085	46.167	
Wt. Water	9.011	8.259	
Tare Container	28.887	29.572	
Wt. Dry Soil	18.198	16.595	
Moisture Content	49.516	49.768	
Corrected for Blow Count	48.197	49.268	
Liquid Limit Average	48.7		

PLASTIC LIMIT (PL)			
Trial No.	1	2	3
Wt. Wet Worm + Tare	12.654	12.578	12.647
Wt. Dry Worm + Tare	12.545	12.461	12.535
Wt. Water	0.109	0.117	0.112
Tare Container	11.597	11.511	11.563
Wt. Dry Worm	0.948	0.950	0.972
Moisture Content	11.498	12.316	11.523
Plastic Limit Average	11.8		

PLASTICITY INDEX (PI) = LL-PL 37.0

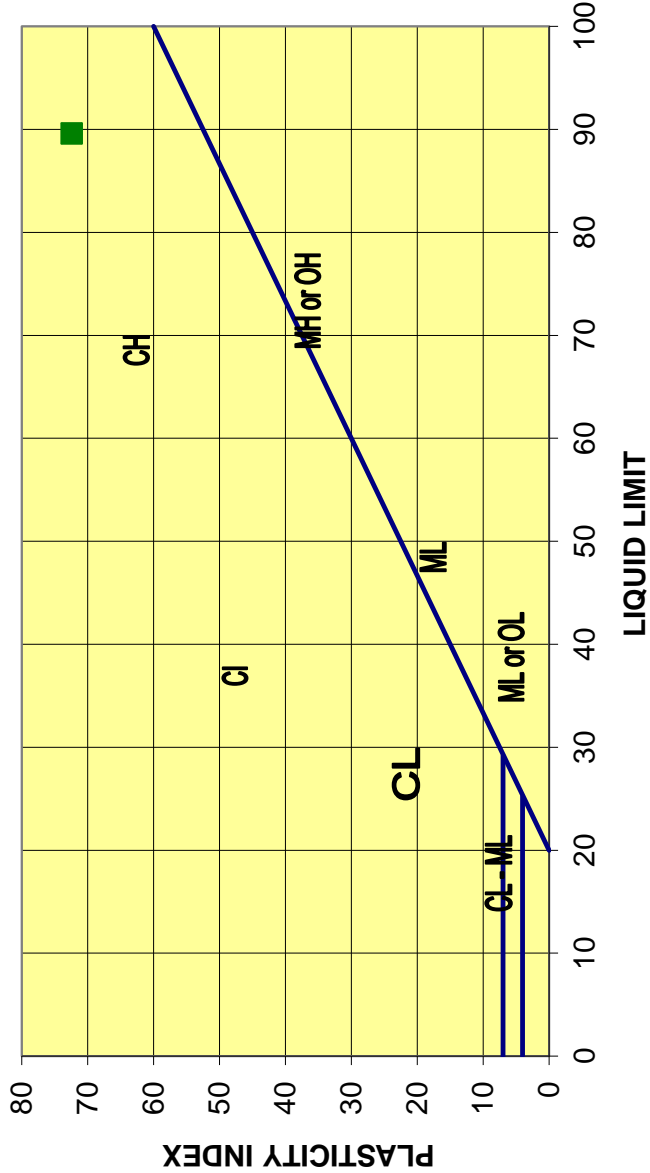


## SOIL PLASTICITY SUMMARY

LIQUID LIMIT (LL)			
Trial No.	1	2	
No. Blows	29	28	
Wt. Sample Wet + Tare	50.248	50.614	
Wt. Sample Dry + Tare	40.350	40.533	
Wt. Water	9.898	10.081	
Tare Container	29.115	29.122	
Wt. Dry Soil	11.235	11.411	
Moisture Content	88.100	88.345	
Corrected for Blow Count	89.696	89.564	
<b>Liquid Limit Average</b>	<b>89.6</b>		

PLASTIC LIMIT (PL)			
Trial No.	1	2	3
Wt. Wet Worm + Tare	12.477	12.383	12.546
Wt. Dry Worm + Tare	12.341	12.249	12.395
Wt. Water	0.136	0.134	0.151
Tare Container	11.541	11.467	11.532
Wt. Dry Worm	0.800	0.782	0.863
Moisture Content	17.000	17.136	17.497
<b>Plastic Limit Average</b>	<b>17.2</b>		

<b>PLASTICITY INDEX (PI) = LL-PL</b>	<b>72.4</b>
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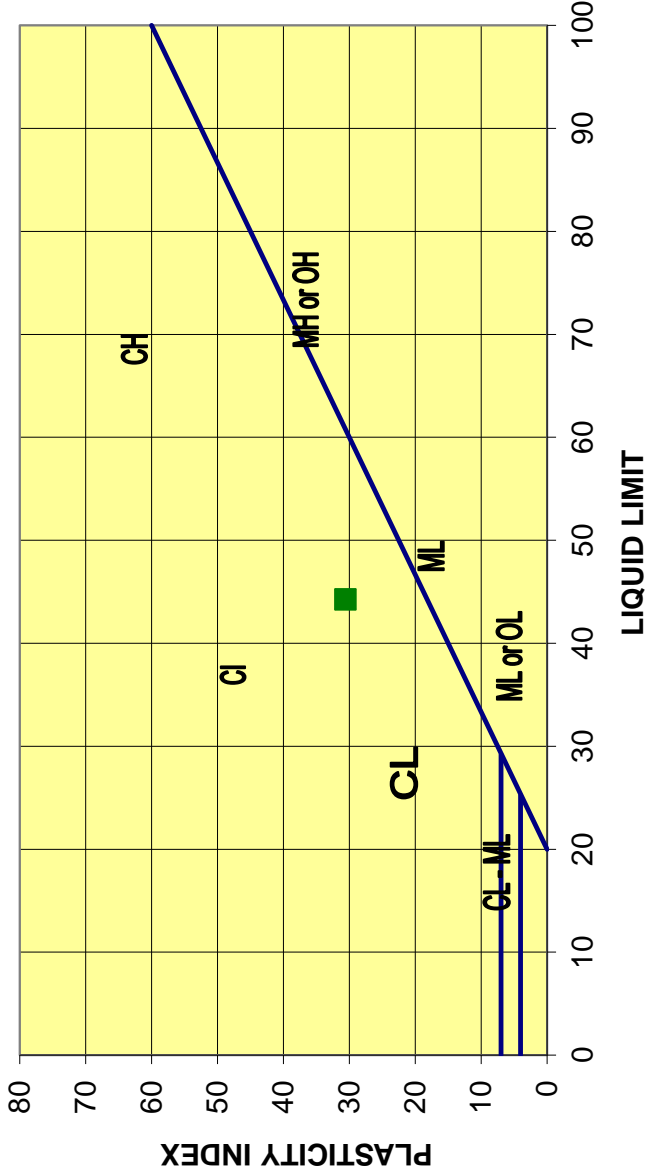


SOIL PLASTICITY SUMMARY

LIQUID LIMIT (LL)			
Trial No.	1	2	
No. Blows	28	29	
Wt. Sample Wet + Tare	58.050	53.340	
Wt. Sample Dry + Tare	49.270	46.078	
Wt. Water	8.780	7.262	
Tare Container	29.125	29.422	
Wt. Dry Soil	20.145	16.656	
Moisture Content	43.584	43.600	
Corrected for Blow Count	44.186	44.390	
Liquid Limit Average	44.3		

PLASTIC LIMIT (PL)			
Trial No.	1	2	3
Wt. Wet Worm + Tare	12.705	12.751	12.635
Wt. Dry Worm + Tare	12.564	12.612	12.494
Wt. Water	0.141	0.139	0.141
Tare Container	11.526	11.581	11.495
Wt. Dry Worm	1.038	1.031	0.999
Moisture Content	13.584	13.482	14.114
Plastic Limit Average	13.7		

PLASTICITY INDEX (PI) = LL-PL	30.6
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The terms and symbols used on the borehole logs to summarize the results of the field investigation and subsequent laboratory testing are described on the following two pages.

The borehole logs are a graphical representation summarizing the soil profile as determined during site specific field investigation. The materials, boundaries, and conditions have been established only at the borehole location at the time of drilling. The soil conditions shown on the borehole logs are not necessarily representative of the subsurface conditions elsewhere across the site. The transitions in soil profile usually have gradual rather than distinct unit boundaries as shown on the borehole logs.

1. **PRINCIPAL SOIL TYPE** – The major soil type by weight of material or by behaviour.

Material	Grain Size
Boulders	Larger than 300 mm
Cobbles	75 mm to 300 mm
Coarse Gravel	19 mm to 75 mm
Fine Gravel	5 mm to 19 mm
Coarse Sand	2 mm to 5 mm
Medium Sand	0.425 mm to 2 mm
Fine Sand	0.075 mm to 0.425 mm
Silt & Clay	Smaller than 0.075 mm

2. **DESCRIPTION OF MINOR SOIL TYPE** – Minor soil types are identified by weight of minor component.

Percent	Descriptor
35 to 50	and
20 to 35	some
10 to 20	little
1 to 10	trace

3. **RELATIVE STRENGTH OF COARSE GRAINED SOIL** – The following terms are used relative to Standard Penetration Test (SPT), ASTM D1586, N value for blows per 300 mm.

Description	N Value
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Over 50

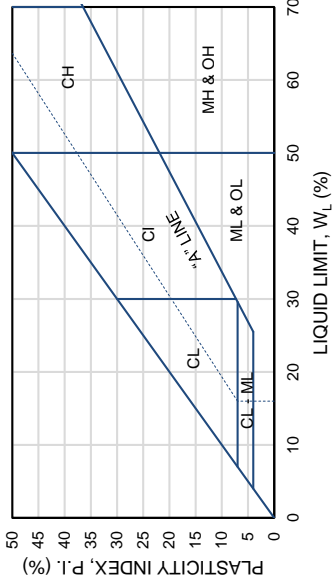
4. **CONSISTENCY OF FINE GRAINED SOILS** – The following terms are used relative to undrained shear strength and Standard Penetration Test (SPT), ASTM D1586, N value for blows per 300 mm. It is noted that this correlation needs to be used with caution as the correlation is only very approximate.

Description	Undrained Shear Strength, $C_u$ (kPa)	N Value
Very Soft	Less than 12	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 150	15 to 30
Hard	Over 150	Over 30



# THE PARKLANDGEO CONSULTING GROUP EXPLANATION OF TERMS AND SYMBOLS

MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS				
MAJOR DIVISION	GROUP SYMBOL	GRAPH SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN NO. 200 SIEVE)	GRAVELS MORE THAN HALF COARSE GRAINS LARGER THAN NO. 4 SIEVE	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURE, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$
		GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
	DIRTY GRAVELS (WITH SOME FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12% ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE OR P.I. LESS THAN 7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT PASSES NO. 200 SIEVE)	SANDS MORE THAN HALF FINE GRAINS SMALLER THAN NO. 4 SIEVE	SW	WELL GRADED SANDS, GRAVELLY SANDS WITH LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ to } 3$
		SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
	DIRTY SANDS (WITH SOME FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12% ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
		SC	CLAYEY SANDS, SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE OR P.I. LESS THAN 7
HIGHLY ORGANIC SOILS	SILTS BELOW "A" LINE NEGLECTABLE ORGANIC CONTENT	ML	INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)
		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	
	CLAYS ABOVE "A" LINE NEGLECTABLE ORGANIC CONTENT	CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY SOILS	
		CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS	
	ORGANIC SILTS & CLAYS BELOW "A" LINE	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW AND MEDIUM PLASTICITY	
HIGHLY ORGANIC SOILS	ORGANIC SILTS & CLAYS BELOW "A" LINE	OH	ORGANIC CLAYS OF HIGH PLASTICITY, ORGANIC SILTS	STRONG COLOR OR ODOR, AND OFTEN FIBROUS TEXTURE
		Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	



## NOTES ON SOIL CLASSIFICATION AND DESCRIPTION:

1. Soil are classified and described according to their engineering properties and behaviour.
2. Boundary classification for soil with characteristics of two groups are given combined group symbols (e.g. GW-GC is a well graded gravel sand mixture with clay binder between 5 and 12%).
3. Soil classification is in accordance with the Unified Soil Classification System (ASTM D2487) with the exception that an inorganic clay of medium plasticity (CI) is recognized.
4. The use of modifying adjectives may be employed to define the estimated percentage range by eight of minor components.



## LIMITATIONS

General Terms, Conditions and Limitations

The use of this attached report is subject to the following general terms and conditions.

1. **STANDARD OF CARE** - In the performance of professional services, ParklandGEO used the degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession practicing in the same or similar localities. No other warranty expressed or implied is made in any manner.
2. **INTERPRETATION OF THE REPORT** - The CLIENT recognizes that subsurface conditions will vary from those encountered at the location where borings, surveys, or explorations are made and that the data, interpretations and recommendation of ParklandGEO are based solely on the information available to him. Classification and identification of soils, rocks, geological units, contaminated materials and contaminant quantities will be based on commonly accepted practices in geotechnical or environmental consulting practice in this area. ParklandGEO will not be responsible for the interpretation by others of the information developed.

3. **SITE INFORMATION** - The CLIENT has agreed to provide all information with respect to the past, present and proposed conditions and use of the Site, whether specifically requested or not. The CLIENT acknowledged that in order for ParklandGEO to properly advise and assist the CLIENT, ParklandGEO has relied on full disclosure by the CLIENT of all matters pertinent to the Site investigation.

4. **COMPLETE REPORT** - The Report is of a summary nature and is not intended to stand alone without reference to the instructions given to ParklandGEO by the CLIENT, communications between ParklandGEO and the CLIENT, and to any other reports, writings or documents prepared by ParklandGEO for the CLIENT relative to the specific Site, all of which constitute the Report. The word "Report" shall refer to any and all of the documents referred to herein. In order to properly understand the suggestions, recommendations and opinions expressed by ParklandGEO, reference must be made to the whole of the Report. ParklandGEO cannot be responsible for use of any part or portions of the report without reference to the whole report. The CLIENT has agreed that "This report has been prepared for the exclusive use of the named CLIENT. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. ParklandGEO accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report."

The CLIENT has agreed that in the event that any such report is released to a third party, the above disclaimer shall not be obliterated or altered in any manner. The CLIENT further agrees that all such reports shall be used solely for the purposes of the CLIENT and shall not be released or used by others without the prior written permission of ParklandGEO.

5. **LIMITATIONS ON SCOPE OF INVESTIGATION AND WARRANTY DISCLAIMER**

There is no warranty, expressed or implied, by ParklandGEO that:

- a) the investigation uncovered all potential geo-hazards, contaminants or environmental liabilities on the Site; or
- b) the Site is entirely free of all geo-hazards or contaminants as a result of any investigation or cleanup work undertaken on the Site, since it is not possible, even with exhaustive sampling, testing and analysis, to document all potential geo-hazards or contaminants on the Site.

The CLIENT acknowledged that:

- a) the investigation findings are based solely on the information generated as a result of the specific scope of the investigation authorized by the CLIENT;
- b) unless specifically stated in the agreed Scope of Work, the investigation will not, nor is it intended to assess or detect potential contaminants or environmental liabilities on the Site;
- c) any assessment regarding geological conditions on the Site is based on the interpretation of conditions determined at specific sampling locations and depths and that conditions may vary between sampling locations, hence there can be no assurance that undetected geological conditions, including soils or groundwater are not located on the Site;
- d) any assessment is also dependent on and limited by the accuracy of the analytical data generated by the sample analyses;
- e) any assessment is also limited by the scientific possibility of determining the presence of unsuitable geological conditions for which scientific analyses have been conducted; and
- f) the laboratory testing program and analytical parameters selected are limited to those outlined in the CLIENT's authorized scope of investigation; and
- g) there are risks associated with the discovery of hazardous materials in and upon the lands and premises which may inadvertently discovered as part of the investigation. The CLIENT acknowledges that it may have a responsibility in law to inform the owner of any affected property of the existence or suspected existence of hazardous materials and in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed. The CLIENT further acknowledges that any such discovery may result in the fair market value of the lands and premises and of any other lands and premises adjacent thereto to be adversely affected in a material respect.

6. **COST ESTIMATES** - Estimates of remediation or construction costs can only be based on the specific information generated and the technical limitations of the investigation authorized by the CLIENT. Accordingly, estimated costs for construction or remediation are based on the known site conditions, which can vary as new information is discovered during construction. As some construction activities are an iterative exercise, ParklandGEO shall therefore not be liable for the accuracy of any estimates of remediation or construction costs provided.

7. **LIMITATION OF LIABILITY** - The CLIENT has agreed that to the fullest extent permitted by the law ParklandGEO's total liability to CLIENT for any and all injuries, claims, losses, expenses or damages whatsoever arising out of or in anyway relating to the Project is contractually limited, as outlined in ParklandGEO's standard Consulting Services Agreement. Further, the CLIENT has agreed that to the fullest extent permitted by law ParklandGEO is not liable to the CLIENT for any special, indirect or consequential damages whatsoever, regardless of cause.

8. **INDEMNIFICATION** - To the fullest extent permitted by law, the CLIENT has agreed to defend, indemnify and hold ParklandGEO, its directors, officers, employees, agents and subcontractors, harmless from and against any and all claims, defence costs, including legal fees on a full indemnity basis, damages, and other liabilities arising out of or in any way related to ParklandGEO's work, reports or recommendations.







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