ACTIVE TRANSIT AS URBAN INFRASTRUCTURE: THE VEHICLE FOR PROMOTING PUBLIC HEALTH THROUGH ARCHITECTURE

by

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ABSTRACT

This thesis studies ways that architecture and urban infrastructure can encourage the citizens of a sprawling city to engage with their environment and thereby improve their physical and mental health. This is done by promoting active transportation and social interaction through a re-development of transit station typologies and urban infrastructure. This project aims to provide Edmonton, Alberta with a network of stops that are more than transit stations- which will also serve as community centers: connecting housing, community, amenities, pedestrian-friendly zones and a more visible infrastructure for active transportation. This network will begin to facilitate a positive shift in the lifestyle of the sedentary driver in a sprawled city.

ACKNOWLEDGEMENTS

To my committee, Christine Macy and Niall Savage, thank you for your input throughout this entire thesis process. Your guidance and encouragement have led me down paths that not only inspired my thesis, but will continue to inspire my future work in Architecture.

Thank you mom and dad for your support for the last four years. Without you two, none of this would have been possible.

Thank you to Fatima and Cait and to all the others who provided the laughs, the support and the conversations that got me through architecture school.

and of course, thank you to Colin for the endless patience and unconditional love.

CHAPTER 1: INTRODUCTION

The Croton Aqueduct system (1842), Olmsted's Central Park (1857), the Tenement House Act of 1901 and New York's subway system (1904) are all examples of urban design solutions that were implemented to address serious public health concerns. In the late 19th and early 20th centuries, rapid urban growth resulted in dark, overcrowded, unsanitary conditions where deadly, infectious diseases were able to spread rapidly throughout cities. The collaboration between urban planners, architects, medical professionals and government officials was crucial in order to develop urban design strategies to address the issues in public health during this time.[1]

In the 21st century, as North America faces a new set of health concerns, once again the intervention of architects and designers is necessary. Chronic diseases such as heart disease, strokes, cancers and diabetes affect more than 70% of the North American population. The leading risk factors for these diseases are obesity, physical inactivity, poor diet and smoking. The separation of land uses and the suburban landscape prevalent in current urban planning models makes populations reliant on the automobile for nearly every urban activity; this dependence leads to a sedentary lifestyle that is at the root of many of today's chronic illnesses. The best environmental design practices to fight these issues are only now being identified and deployed.[2]

In order to study the topic of architecture and public health, this thesis will use the city of Edmonton, Alberta as a case study. Edmonton is one of the most sprawling cities in Canada, and its population's ability to receive adequate physical activity and social interaction is limited.[3] It is a city that is dependent on the vehicle; where the northern climate inhibits outdoor activity for many; and where walking or cycling

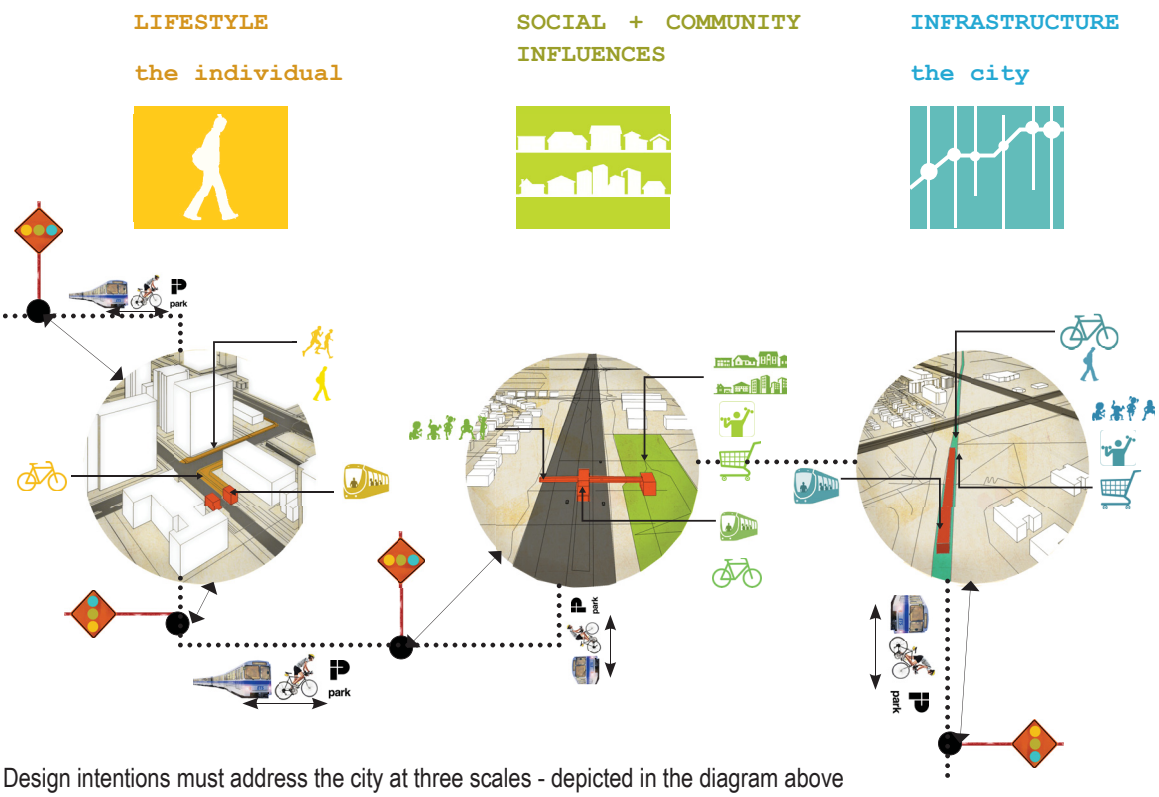
1 Karen Lee, *Active Design Guidelines* (New York: City of New York, 2010), 13.

2 Ibid.

3 Alberta Health Services, *Urban Sprawl and Heath* (Edmonton: Alberta Public Health, 2009), 1.

as a mode of transportation is rarely an option due to its extremely low population density. This thesis questions how public health issues can be addressed through architecture and urban design in contemporary populations. In order to do this, there are three design intentions: 1) the articulation and identification of active transportation throughout the city in the form of visible infrastructure; 2) the incorporation of existing conditions wherever, however possible to maximize effect and minimize investment and 3) the addition of necessary and accessible amenity directly on site (at the station) to promote social interaction, physical activity and the use of the public transit line.

These three intentions result in centers for transportation, housing, active design, amenity as well as a visible infrastructure found throughout Edmonton; they create street presence and a new transit identity and lastly, add highly desirable development that will bring money to the city to offset the investment in infrastructure.



Design intentions must address the city at three scales - depicted in the diagram above

The issue in focus stems from a contemporary lifestyle in which sedentary jobs take the place of manual labor; vehicles replace walking and cycling; elevators and escalators supplant stair climbing; and televisions and computers displace leisure pursuits. The design of buildings, streets, neighborhoods and cities can restrict a population's ability to maintain a healthy physical and mental state and the results of the three design intentions provide solutions that will allow for the adoption of an alternative lifestyle not geared around the use of a vehicle but rather, the use of public transit and active transportation pathways. Interventions in the infrastructure are proposed throughout the city to provide connections to pathways and the multi-purpose stations that act as community centers.

Community Health and Urban Design

Daily routines are directly influenced by the design of the built environment. The placement of transportation networks, public green spaces, amenities, grocery stores and schools impacts the activities people are willing to engage in.[4] If the built environment is not conducive to an active lifestyle, only those who are committed to their physical and mental health will meet their physiological need for daily activity. Public health researchers have recently conducted many studies that reveal significant health benefits from moderate forms of exercise that include walking, cycling and light jogging; these forms of exercise may enable a "broader cross section of the population to become physically active".[5] Moderate physical activity does not have to be an additional task; it can be purposive, that is part of daily routine. "The Canadian Physical Activity Guidelines recommend that to achieve health benefits, adults should partake in at least 150 minutes of moderate-vigorous physical activity per week, made up of time periods of at least 10 minutes; in 2013, only 1 in 5 Canadian adults met this requirement".[6] Physical activity has been shown to lower

4 Lawrence D. Frank et al, *Health and Community Design: The Impact of the Built Environment on Physical Activity* (Washington: Island Press, 2003), 1-3.

5 Ibid, 5.

6 Statistics Canada, *Directly Measured Physical Activity of Adults, 2012 and 2013, Health Fact Sheet* (Statistics Canada Catalogue, 2015), 82-625X.

the risk as much as 50% for many chronic conditions prevalent in the 21st century.[7]

Henri Lefebvre advocates for the rights and ownership that populations have over the design of cities. He believes that we have the right to change our lifestyles by changing the city in which we live. Adapting to a new set of urban design guidelines that promote physically activity can, by this theory, alter daily routine. Providing solutions that benefit public health is the job of urban designers, planners and architects.[8]

Over a century ago, North American cities were designed as highly walkable places. Schools, industries, commercial buildings and retail stores were located in close proximity to dwellings. The compact city allowed people to fulfill their everyday routines by walking and trolley riding. This type of urban design provided an active lifestyle; however, the density caused its own set of health problems such as overcrowding and unsanitary conditions.[9] Prevention of the spread of infectious diseases was one factor in the redesign of the compact city.

As a result of this re-design, houses were separated from industries and buildings were located at a great distance from one another, with expansive green spaces in between. This separation was applied in hopes that the issues caused by overcrowding would be resolved and public health would be increased. The result is the predominant form of North American cities today; this includes sprawling residential suburbs, land uses that are separated from one another and a population highly reliant on automobile transportation.[10]

Criticism of this contemporary model has arisen in the last couple of decades; people are not satisfied with many attributes of the suburban lifestyle. Traffic con-

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7 Ibid.

8 Henri Lefebvre, *The Production of Space* (Oxford: Blackwell Publishers,1991), 1-68.

9 Lee, *Active Design Guidelines*,10-14.

10 Howard Frumpkin et al, *Urban Sprawl and Public Health* (Washington: Island Press, 2004), 26-44.

gestion, the endless amount of unappealing highway infrastructure and the homogenous landscape of suburban housing are all common critiques of this form of development.[11]

Contemporary, sedentary lifestyles are not only a result of an over reliance on the automobile; many other aspects of daily life in the 21st century lead to inactivity: the eight to twelve hour workday that is common to the working couple makes it challenging to commit the extra time to exercise outside of the regular work-commute-eat-sleep schedule. Social media contributes to inactivity; people are made to believe that in order to be healthy, daily, vigorous exercise is required. The images we see on magazine covers and on social networks make that lifestyle seem unattainable to working parents, the elderly, busy professionals, children, and those with a low income.

According to Lawrence Frank et al. there are three main categories of the built environment that contribute to our daily routines, and offer opportunities that will improve public health[12]:

> 1) Transportation Systems: The built landscape is connected through a set of streets, highways, bus lanes and transport lines. These systems determine how feasible it is to get from one place to the next through a mode other than the vehicle.
>
> 2) Land Use Patterns: the way in which residences, offices, grocery stores and other places are arranged. This arrangement can often make journeys by foot or bicycle impractical. Land use patterns also influence the disposition and availability to facilities, making them inaccessible for many people.
>
> 3) Urban Design characteristics influence how people perceive their communities. Although people may not recognize it, what the city spends money on is what they learn to value.

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11 Peter Calthorpe and Doug Kelbaugh, *The Pedestrian Pocketbook* (New York: Princeton Architectural Press, 1989), 7-9.

12 Frank et al, *Health and Community Design*, 117,137,152.

According to the World Health Organization, healthy urban planning considers the population's best interest above the design of buildings, streets and open spaces; in order to make the shift from a car dependent culture to one centered around active transportation, the focus must be on people and activities as opposed to solely on buildings. [13]

Health is not merely the absence of disease or infirmity but a state of complete physical, mental and social well-being. The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being.[14] The built environment is one of many contributors to public health, Hugh Barton and Catherine Tsourou outline a number of strategies for integrating health and environmental quality into the design of cities. Every city has a network of roads, public transportation lines and cycling infrastructure. The integration of active transport in to daily routine is vital in order to increase physical activity levels among the general population. The popularity of each mode of transportation depends on the articulation of these networks. According to Barton and Tsourou, the priorities of a healthy transportation network include:

> 1) Encouraging regular healthy exercise in the form of walking and cycling which increases people's sense of well-being and reduces the chances of chronic diseases;
>
> 2) Improving access to jobs and services to reduce the reliance on the vehicle;
>
> 3) Enhancing the opportunity for social interaction and the development of a sense of community (road traffic can be a significant cause of alienation and isolation in cities) and
>
> 4) Reducing the consumption of scarce energy and road-building resources.

13 Hugh Barton and Catherine Tsourou, *Healthy Urban Planning* (New York: Spon Press, 2000), 8.

14 Ibid.

Architects, urban designers and planners are not the only ones that are responsible for the healthy design of cities. Dr. Karen Lee, a medical physician, collaborated with a group of architects, government officials, designers and city planners to write a publication on “active design” guidelines. They advocate for the collaboration between medical professionals, architects and urban planners, stating that the participation from each group is crucial “to reverse the design trends that have contributed to declining physical activity”.[15] It is the job of urban planners and architects to begin to develop strategies of changing our built environment so that incorporating physical activity into daily life is possible.

This thesis will explore a new type of infrastructure within Edmonton, Alberta. The goal is to develop urban design strategies which can motivate people towards a healthier lifestyle, particularly by promoting activity and movement in daily life through infrastructure and a network of public transit stations that house more than an LRT platform.

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15 Lee, *Active Design Guidelines,* 16.

CHAPTER 2: SITE

Edmonton: A City Driven by the Vehicle

Population: 812, 201 (2011)
Population Density: 123 people/ square kilometre
Land Area: 9,426.73 square kilometres
Incorporated as a City: 1904

Edmonton has one of the largest land areas of any Canadian city, yet one of the lowest population densities. Its downtown was abandoned for the suburbs when the city experienced its major boom after WWII - a time when the vehicle was new, exciting and affordable for the middle class family. The city's population almost doubled in the 1950s and with high world oil prices in the 1970s, the city reached a population of 521,000 making it the largest, most northern city in North America. Today, highway infrastructure dominates the city and connects the rapidly growing suburbs.

Edmonton is 111 years old and is still in a state of transition; the downtown is rapidly growing with infill and gentrifying; newly built residential towers are increasing population density; and high levels of employment opportunities are increasing the city's population. One thing, however, remains clear - Edmonton is a city that is driven by oil and gas prices. The attachment to the vehicle is strong in this winter city; Edmontonians often identify themselves with the vehicles they drive. The solution is not to get rid of the highway and road infrastructure all together, but to adapt it in order to alter the attitude towards the automobile through strategic urban design.

Currently, the state of public transportation in Edmonton is poor. There is only one line that runs north and south of the city. A mere 11% of the population relies on this system to commute to work, while 82% of Edmontonians rely on their vehicles for all daily trips. Navigating the city through an alternative mode of transportation is often impractical and it is not unusual for people to spend more than two hours per day alone in their vehicles. In Alberta, 61% of adults and 22% of children are

now considered overweight or obese. The health care services required for people living with obesity are roughly 40% greater than for people of normal weight. Up to 90% of all Type 2 diabetes, 25 - 30% of cancers, 80% of cardiovascular disease and 90% of all knee replacements occur in people who are classified as obese. In 2005, Alberta Health Services estimated the economic burden of obesity in the province to be $1.27 billion annually.[16]

Edmonton: Transit identity

Factors contributing to the low ridership of Edmonton's LRT system are the low public profile for public transit and the absence of a public transport identity. Oversized trucks dominate the highways, and the city chooses to subsidize this car culture as opposed to investing money in public transit, furthering the adoration of the vehicle amongst the population.

Transit stations in Edmonton are isolated, unnoticed, and disconnected from the public realm. The architecture of the stations does not help Edmontonians to notice them or to understand how they can help to conveniently navigate through the city. As the city grows, a lifestyle that centers around the use of the vehicle only furthers the isolation between the driver and their community, and inhibits any form of purposive physical activity. The increase in highway infrastructure and suburban developments will only lead to an increased reliance on the vehicle enabling the sedentary lifestyle that accompanies vehicle dependency - the exact lifestyle that will lead to the chronic health issues that moderate forms of physical activity can prevent.

16 Alberta Health Services, *Obesity Statistics in Alberta* (Alberta Public Health, 2015), 1.

Present-day transit stations in Edmonton:

Site Condition 1:
Corona Station :
107 St. & Jasper Ave., Downtown Edmonton

Site Condition 1:
Grandin Station
110 St. Downtown Edmonton

Site Condition 2:
Mature Neighbourhoods
Stadium Station :
84 St. & 111 Ave.
North Edmonton

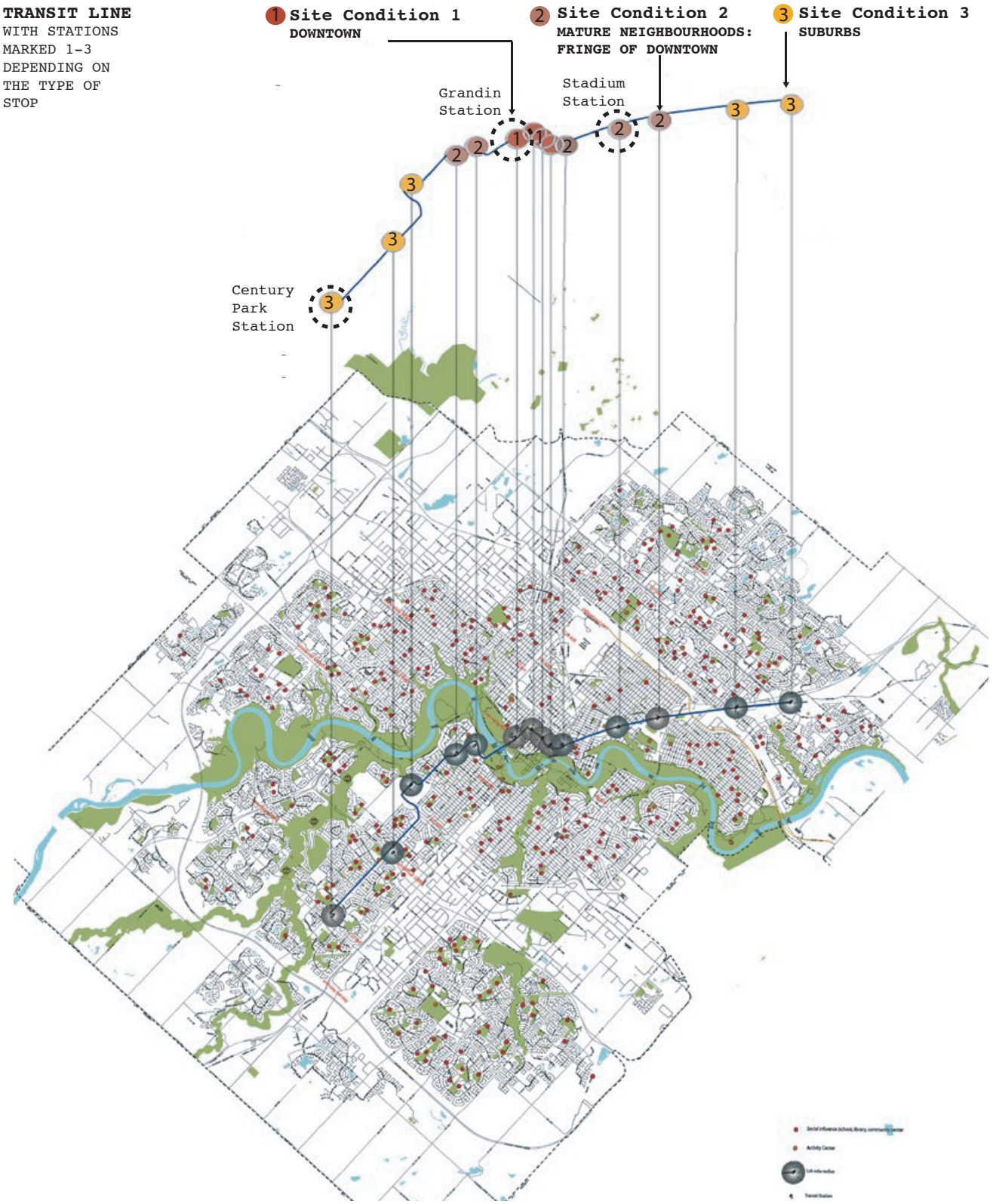
Site Condition 3:
Suburbs
Century Park Station : 111 St. & 23 Ave.
South Edmonton

Site Selection

In order to change perceptions of infrastructure and how it impacts daily life, the transit station typology needs to be reassessed by designers in not only Edmonton, but in sprawling cities across North America. There is a missed opportunity for program, an alternative daily routine, and a larger network of infrastructure that connects alternative modes of transportation and with this thesis I create stops in the city that are more than just transit stations. They are mixed-use centers found throughout the city that build onto Edmonton's existing transit stations and will connect public transit lines, active transportation routes and multiple opportunities for physical activity within and around the stops.

There are three typologies that respond to different types of site conditions found in Edmonton: which are 1) the downtown 2) mature neighbourhoods and 3) the suburbs. These conditions were determined through a comparison of street layouts, historic characteristics, demographics, and accessibility to Edmonton's river valley. Each stop along the existing LRT line falls in to one of the three types of sites and this thesis proposes strategies to address scale, program, and connections to active transit pathways at each type of station.

EDMONTON'S LIGHT RAIL TRANSIT LINE
WITH STATIONS MARKED 1-3 DEPENDING ON THE TYPE OF STOP

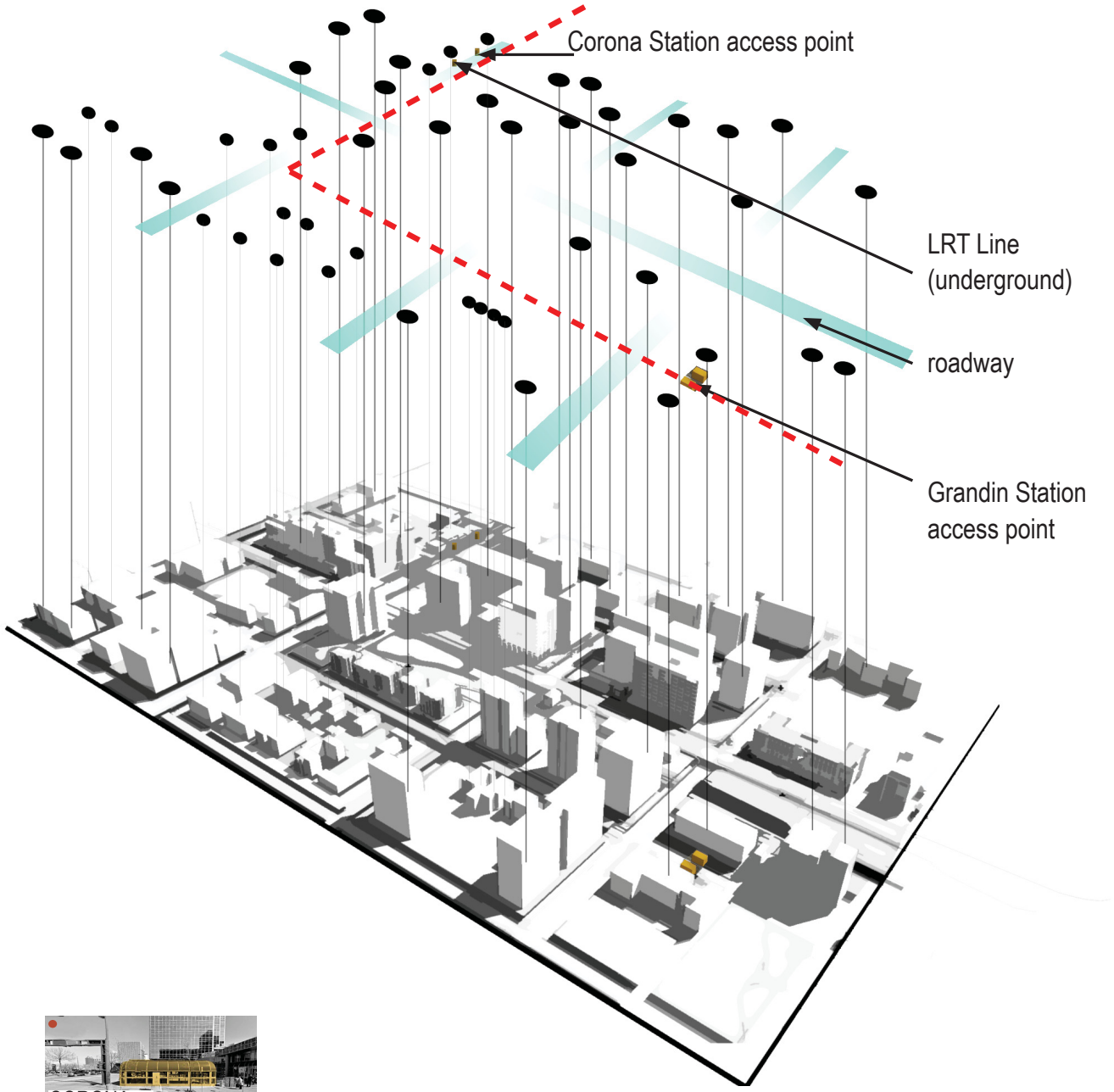


Network of stops within the city. The numbers correspond to the three types of stops.

The network of public transit stops combined with direct linkages to active transit routes will impact the city at three levels: by providing amenity for the individual, by creating communities at the building scale and by facilitating alternative modes of transport at the city scale.

The morphology of each site condition differs significantly. It is crucial that each of the three conditions are addressed in this thesis in order to promote public health throughout the city of Edmonton via the network of stations and infrastructure.

Site Condition 1: Downtown - The LRT line runs underground throughout Edmonton's downtown. The stops are small, unnoticed shelters located on the sidewalks. They house a narrow staircase that leads to an underground LRT platform. These stations are accessible to those who live and work in Edmonton's relatively denser downtown; however, they lack any kind of architectural language between one another.

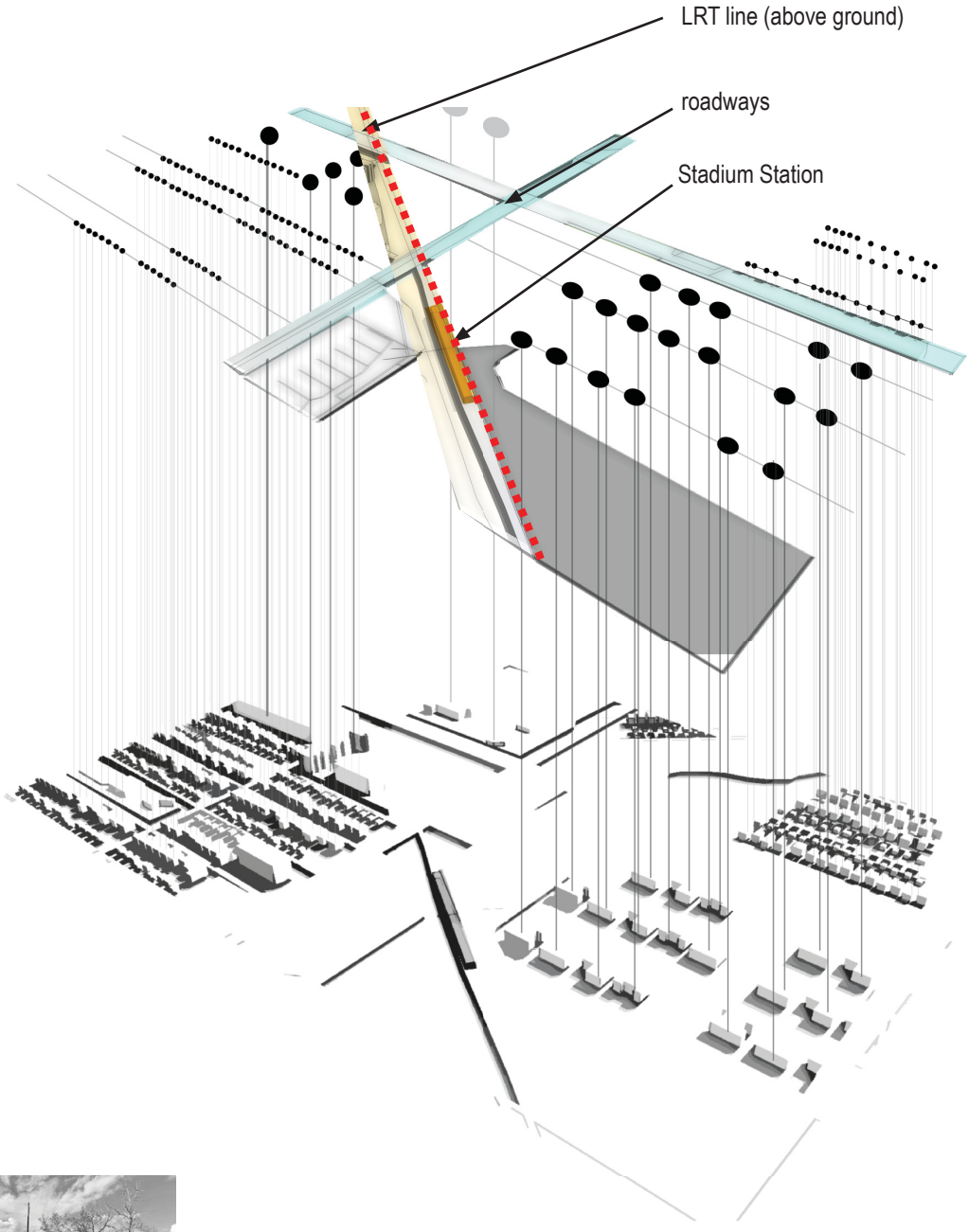



CORONA


GRANDIN

Site Condition 1:
The yellow building shows Grandin station sitting above ground as a small shelter amidst the gridded street layouts of Edmonton's downtown.

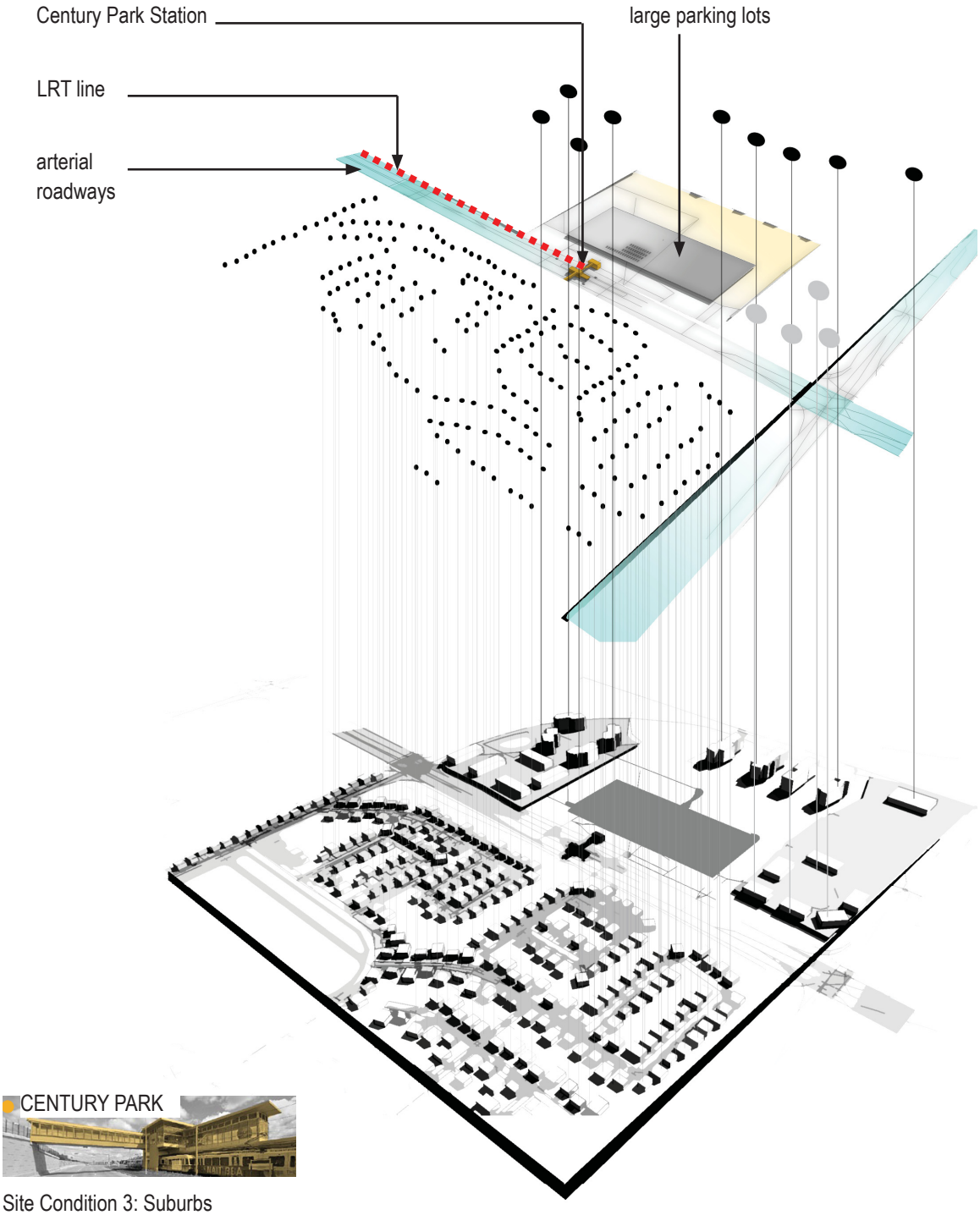
Site Condition 2: Mature Neighbourhoods - The LRT runs above ground in this area. The line cuts through the middle of many blocks, breaking the gridded street layout. This section of the line makes for isolated stations that are located away from the main roadways.



STADIUM

Site Condition 2:
The yellow building shows Stadium station. Note the location of the LRT line. It is separated and disconnected from the main roadways.

Site Condition 3: Suburbs - The LRT runs above ground throughout the suburbs and parallel to a main arterial road. These stations are islands in the middle of a sea of parking lots. They are geared for the driver as opposed to the pedestrian and are disconnected from the suburban streets.



Site Condition 3: Suburbs
The yellow building shows Century Park station. Note the large arterial roads and parking lots that disconnect the station from dwellings.

CHAPTER 3: PROGRAM

This thesis proposes to foster population health through interventions in the infrastructure associated with transit stations. The addition of social and recreational program to transit stops will start to populate the unnoticed, isolated and disconnected transit stations of Edmonton. A ten-minute walk, or five-minute cycle to each stop offers the suggested level of moderate exercise that an adult needs each day (approximately 20 minutes). Three design intentions have informed the development of program to be associated with the stations.

1) Facilitating Active Transportation

Edmonton's many pathways are used for cycling, walking and running, particularly in the river valley. The system however, is poorly marked and unless you take the time to research the routes strategically, the network of paths goes unnoticed by many. This thesis proposes to link up these pathways with each other and to the LRT through a visible infrastructure that is found throughout the city. The active transportation infrastructure provides people easy access to public transit, and opportunities for stair climbing, socializing, dog walking etc.

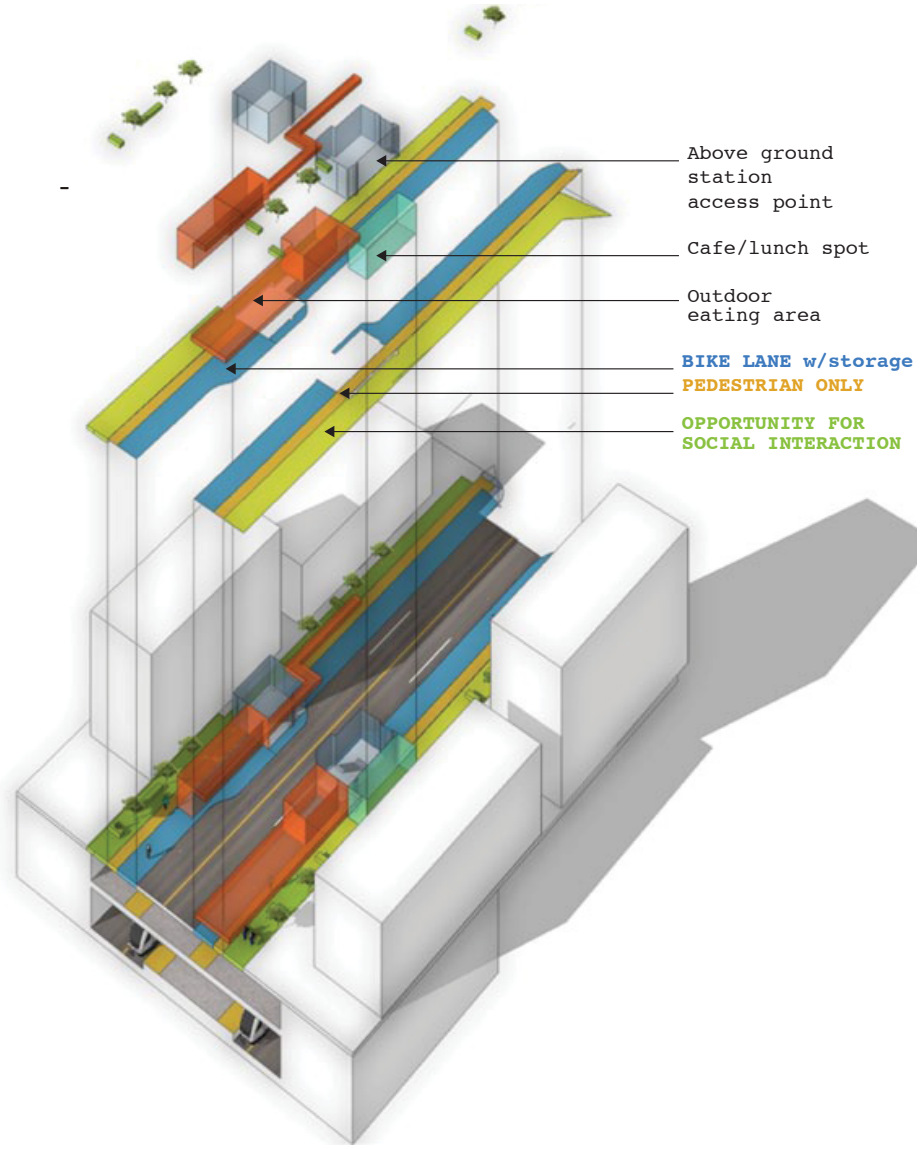
2) Building on Existing Conditions

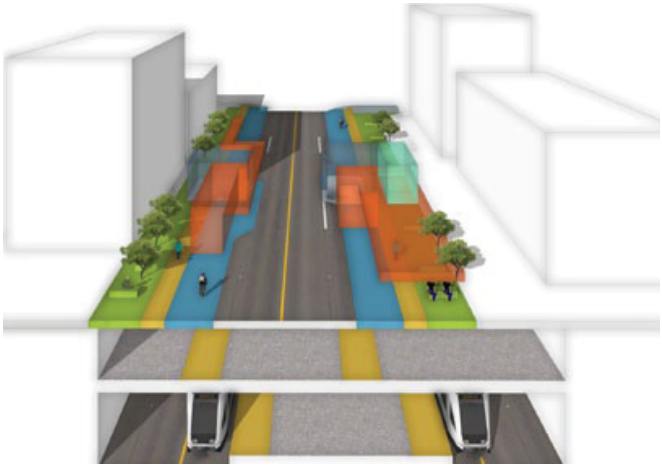
Edmonton's attitude towards active and public transportation needs to be changed in order to achieve the goals of this thesis. The creation of a new transit identity is crucial because in most sprawling cities it is difficult to get people out of their cars. Drivers have to see the transit stops easily if they are going to be encouraged to use the system. By introducing a common architectural language shared by all stops on the network, alternative modes of transportation gain brand recognition throughout the city. Site specific design that uses green spaces and amenities expand the station's reach further into the community, attracting more riders.

Connecting stops to their neighborhood contexts creates opportunity for development plots that could offset the city's investment in an active transit infrastructure. Such development plots for residential and/or commercial development would be highly desirable due to their proximity to the station, the active transit pathways and the neighborhoods within a 5 minute walk (400m) of the transit stop.

3) Providing Amenity at the Station

Edmonton's transit stations are designed strictly for LRT access. Only 11% of Edmonton's population currently relies on public transit. The transit stop needs to re-invented. Stations need to be incorporated into the every day routines of people living in the metropolitan area. While program is essential at each stop; its specific character will vary depending on the location and site condition. The diagrams on the following pages illustrate the kinds of program that could be coupled with each site condition.

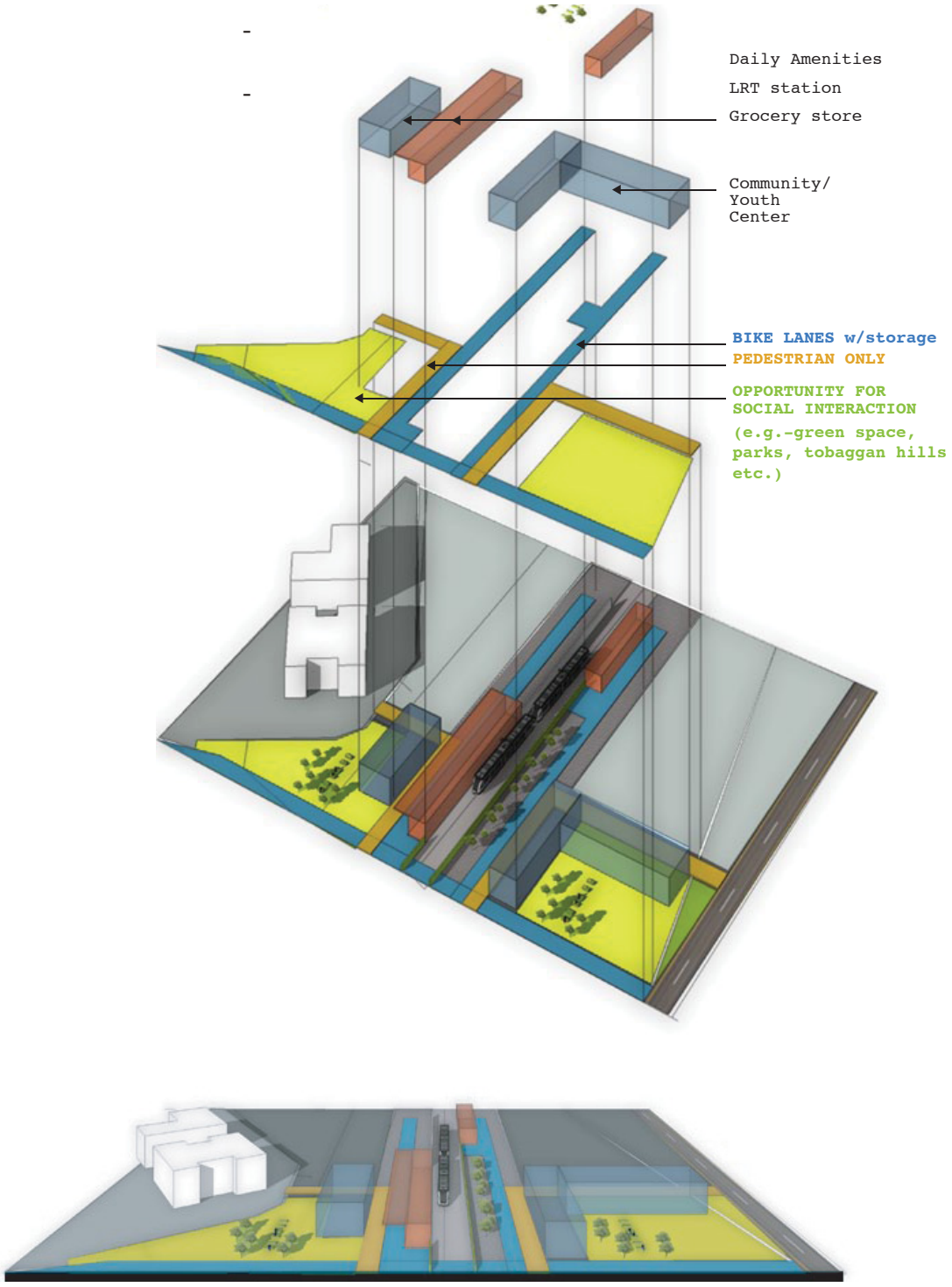




Site Condition 1: Downtown

Program Opportunities

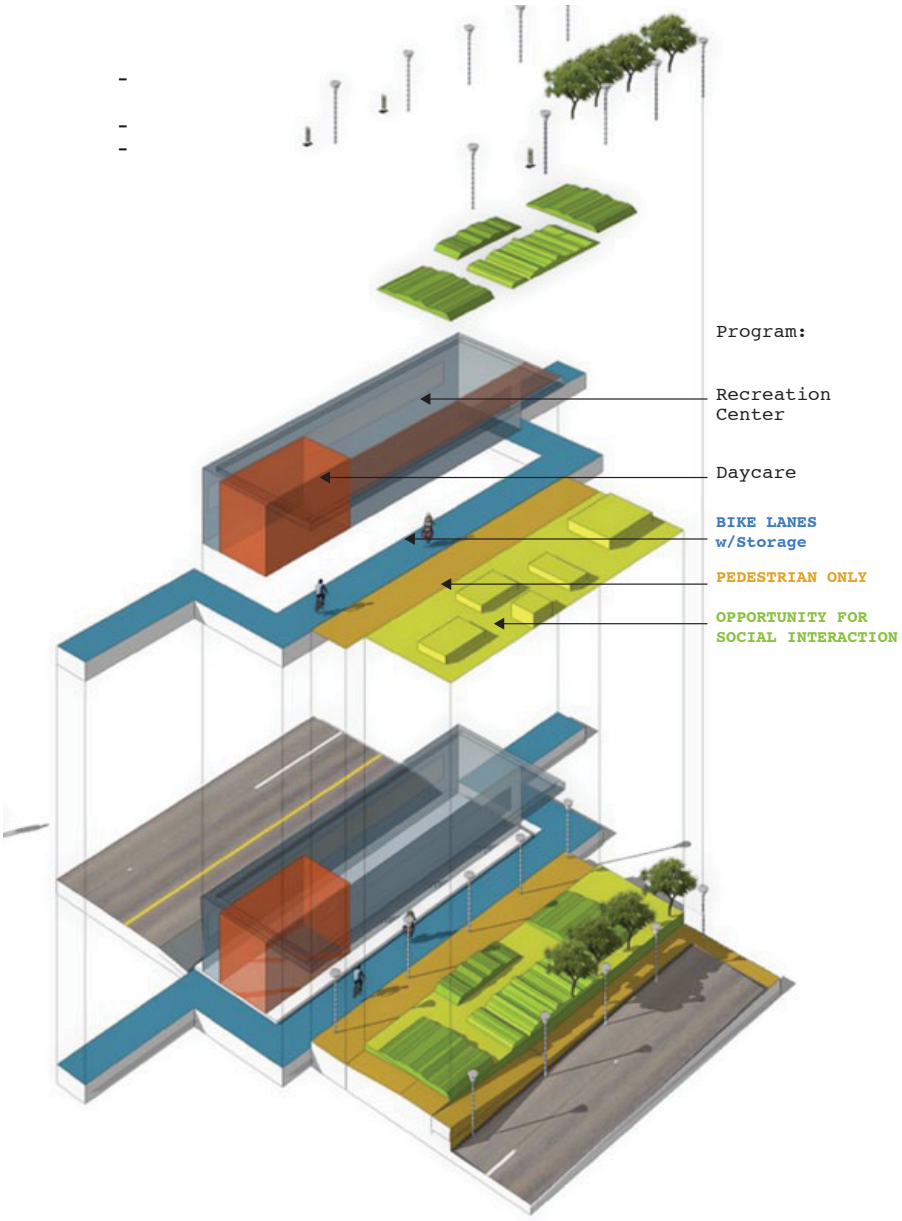
The downtown location allows for a small opportunity for program to be added to the shelters alongside the sidewalks. They provide a perfect opportunity to give the office worker a place to meet, eat lunch and socialize on his way to or from the office. They also provide a safe and public area to store bicycles.

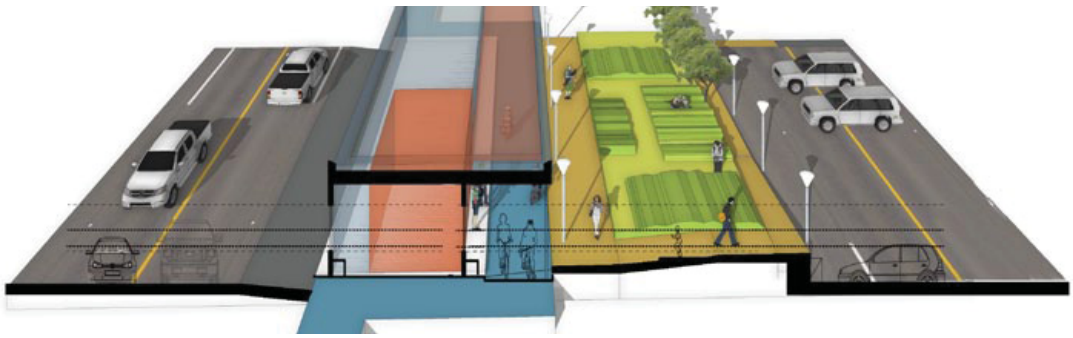


Site Condition 2: Mature Neighborhoods

Program Opportunities

The mature neighbourhood location allows for the opportunity for active transportation to run parallel to the above ground LRT line. These stations need to act as community connectors as they are isolated from the main roadways and blocks. Populating these areas with amenities is crucial to draw in as much of the public as possible.





Site Condition 3:
Program Opportunities
The suburban location allows for the opportunity for the largest scale of program and amenity. At all of these locations there is enough available land area to expand the program of the station.

The Order of Stops

The first type is the smallest in scale and is located downtown. These stops are geared for the commuter and create nodes in the downtown that promote the use of the LRT. The existing stations now are unnoticed, and the goal of this type of station is to generate a place for the commuter to lock up his bike, for the office workers to meet and gather before a meeting, and for easy access to the program offered at the two other types of stops.

current issues
- unnoticed by pedestrians
- unwelcoming- under used
- dark, small, dissimilar

1: Downtown

An image of the existing conditions at Grandin station.
The rendering on the bottom depicts an initial schematic design of how to integrate this type of station into site condition 1.

The second type of stop is in Edmonton's mature neighborhoods, located between the downtown and the suburbs. These stops are larger in scale than the ones in site condition 1 and play an important role in their communities. They are mixed use, providing program such as grocery stores, daycares, and community centers. The goal for these stops is to populate the area with daily activities to reconnect the transit station to the community.

current issues

ISOLATED from residential

LRT CUTS through neighborhoods

high crime zone - ABANDONED

design intentions

Provide daily amenities

Community driven activity

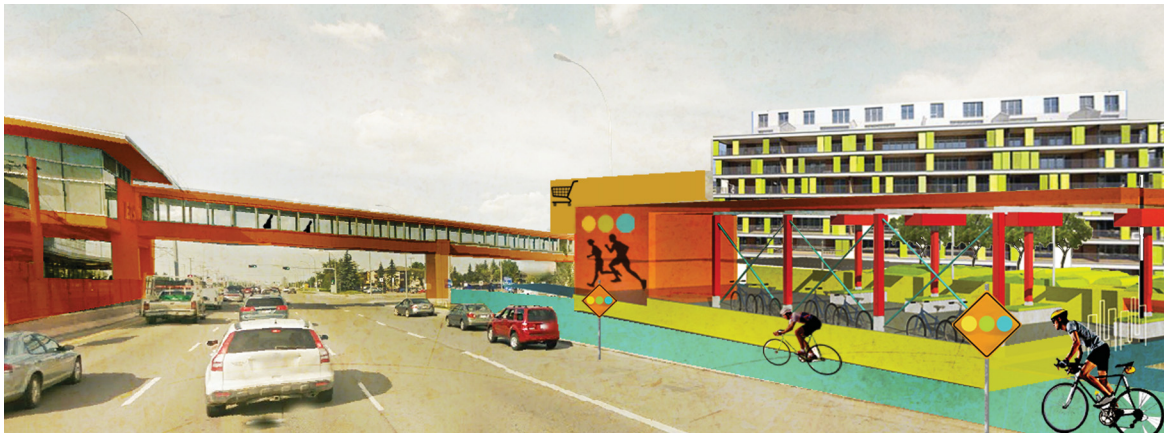
Active paths create identity

2: Mature Neighbourhoods

An image of the existing conditions at Stadium station.
The rendering shows an initial schematic design of how to integrate this type of station into site condition 2.

The largest stops are located in site condition 3 - the suburbs. As a result of the dendritic street layout that encourages the use of a vehicle, the suburbs pose the largest challenge to public health. These types offer the greatest amount of land area due to their sprawling nature. These stops are mixed use hubs within the community that facilitate the use of the LRT as well as provide enough program to encourage physical activity geared for the family. They are packed with amenities and housing types and are easily accessed by suburban neighborhoods. The key is to create

current issues
- Disconnected from residential
- 8 Lanes of traffic to cross
- no program around any station



design intentions
- Create a landmark visible from road
- 5 min. walk from neighbourhoods
- Provide family activities

3: Suburbs

An image of the existing conditions at Century Park station.
The rendering on the bottom shows an initial schematic design of how to integrate this type of station into site condition 3.

centers in the suburbs that are not reliant on the use of the vehicle, making it convenient to fulfill daily routines- including daycare drop off, shopping, socializing and exercising. All without the use of an automobile.

CHAPTER 4: DESIGN

There are two scales of design that are addressed as a part of the thesis; the building scale and the city scale. The former speaks to the station type itself and deals with attracting people, drawing them in, and facilitating the use of public and active transportation. The latter involves expanding the reach of the project through connections, interventions and developments within the entire city that facilitate the use of active transportation. These two scales are equally necessary in achieving a shift towards the betterment of public health in Edmonton's vehicle dominated culture.

The three intentions are applied to the three site condition and three frameworks are set up to indicate how active transportation, the LRT line and stations can be integrated into the existing fabric of each site condition.

Framework 1: Downtown

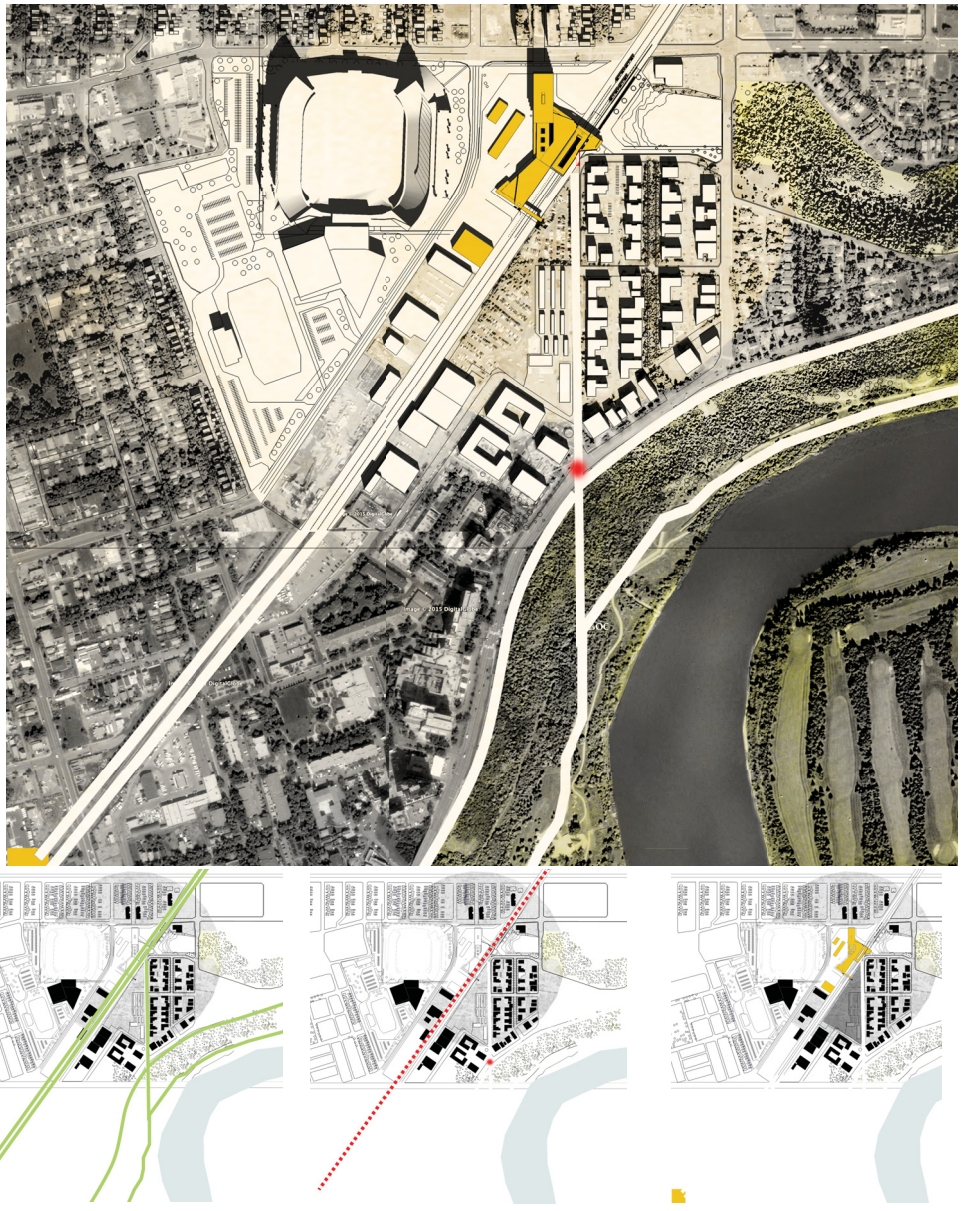
The connection to active transit in this typology is geared around the river valley connecting both the upper and lower edges of the embankment through an elevator, and a bridge that connects two pathways that are currently disconnected on the east and west sides of the high level bridge.

ACTIVE TRANSIT LRT TRANSIT STATION

The diagrams indicate the location of the three major aspects of the downtown site: The routes for Active Transit, the LRT line and the location of the transit station.

Framework 2: Mature Neighbourhoods

This type serves as a community connector. The LRT line in this typology runs above ground which creates the opportunity for an active transit route to run parallel to the LRT line. This pathway can start to tie neighborhoods together to create a stronger sense of community. The intervention in the infrastructure here is again located at the river valley with a set of stairs that avoids contact with the vehicular road above.

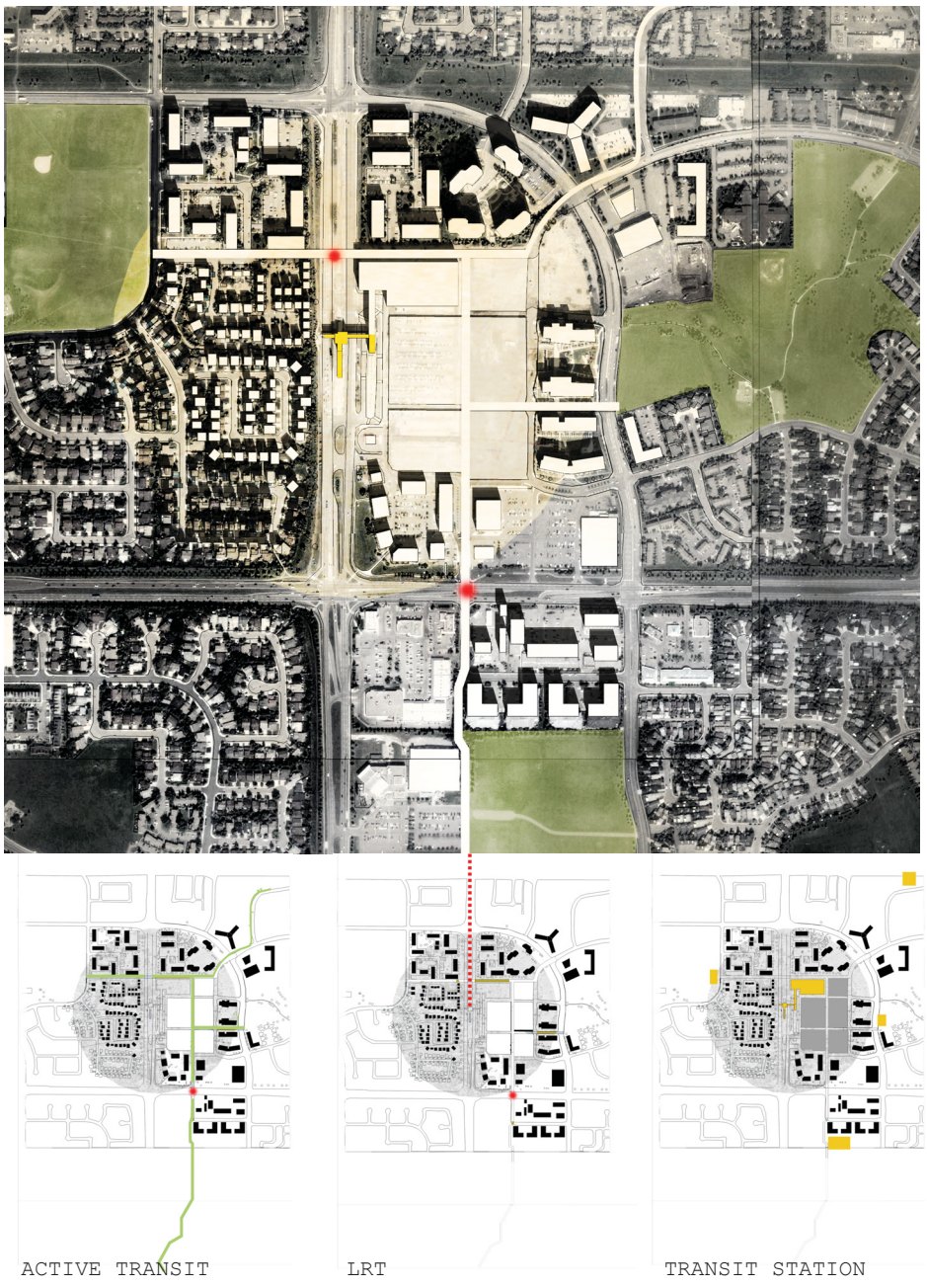


ACTIVE TRANSIT LRT TRANSIT STATION

The diagrams indicate the location of the three major aspects in the mature neighbourhoods: The routes for Active Transit, the LRT line and the location of the transit station.

Framework 3: Suburbs

In order to take advantage of the existing conditions in this typology, the active transit path is designed to connect multiple existing green spaces that surround the stop. This network will begin to activate these unused green spaces. The express-ways here will be depressed to keep the pedestrian pathway at grade.



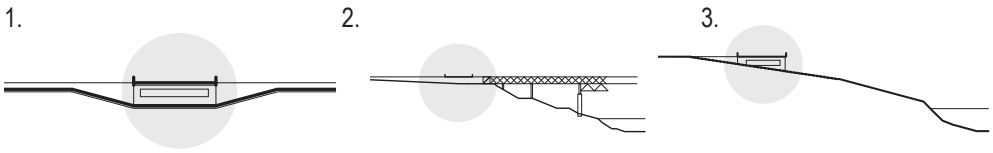
The diagrams indicate the location of the three major aspects in the suburbs: The routes for Active Transit, the LRT line and the location of the transit station.

Interventions in the Infrastructure

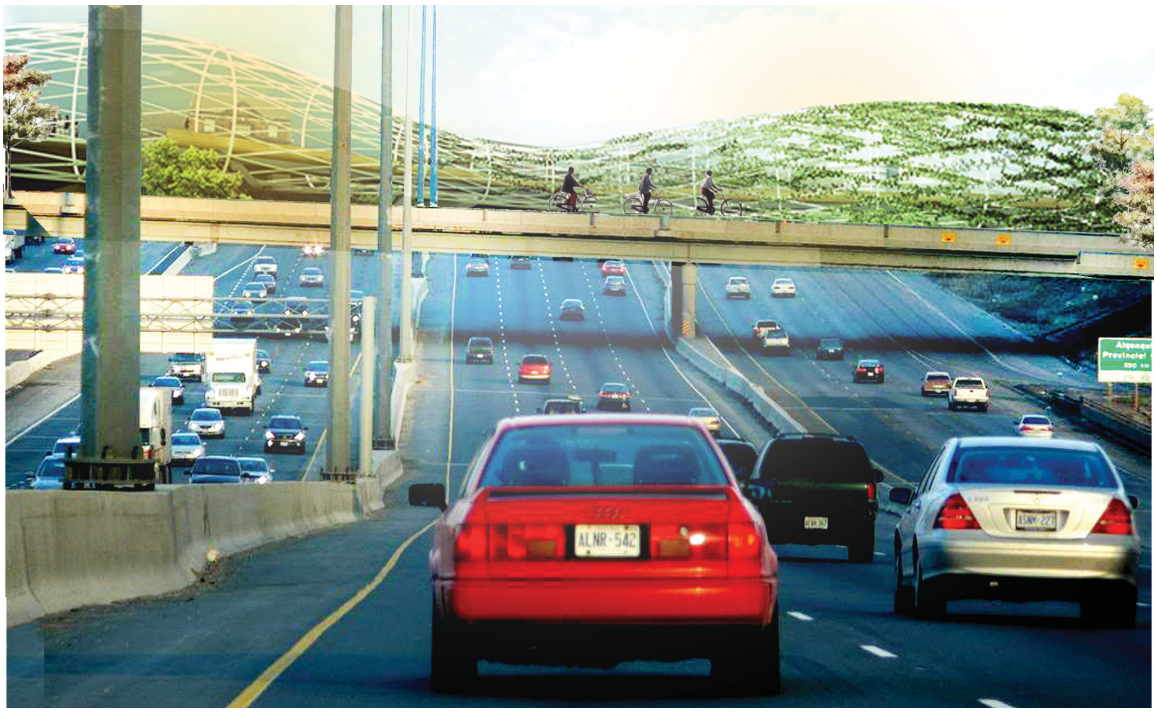
Transportation infrastructure in Edmonton means highways, road networks, and large overpasses. This thesis proposes a new kind of infrastructure that combines public transit and active modes of transportation such as cycling and cross country skiing; making these forms of moderate exercise an attractive alternative to the vehicle.

The interventions in the infrastructure are placed within a five minute walk (400m radius) of transit stops. This proximity allows commuters to walk, bike or ski to the station and then take public transit elsewhere. The location of this infrastructure has been determined using existing conditions such as parks, bicycle paths, streets and roads. Using the existing conditions will minimize the cost of the infrastructure while maximizing the effect of the intervention by strengthening the connection of the infrastructure to the city. This new 'active network' of stops will link pedestrian pathways at ground level and start to create a transit identity throughout the city through pathways and stations. In terms of the pathways, the critical issue is continuity — for pedestrians and for cyclists, since changes in grade for them, require much more effort than they do for a vehicle. Recognizing this, I've developed some design strategies to resolve intersections between vehicular roads and the active transit pathways this thesis is promoting. These strategies are:

1. Interventions located above a depressed road to keep the pedestrian path at grade 2. Infrastructure located above a sloped road to connect existing pathways and 3. Interventions located below a road at river valley junctures:



Three strategies for the active transit pathways.



A photo montage of how the road and the active transit pathway relate to one another. The road in this example is depressed to allow for the pathway above to remain at ground level.

A photo montage of how the road and the active transit pathway relate to one another. The active transit pathway is clearly visible to the drivers below. This visibility will encourage and promote the active pathway in order to bring awareness to the drivers below.

A photo montage of how the road and the active transit pathway relate to one another. In this example, there is a bridge that connects the east and west sides of one of Edmonton's most use bridges: the High Level Bridge. This connection point allows for the meeting of the active transit pathway to the trolley line that runs from downtown Edmonton to the south side of the river.

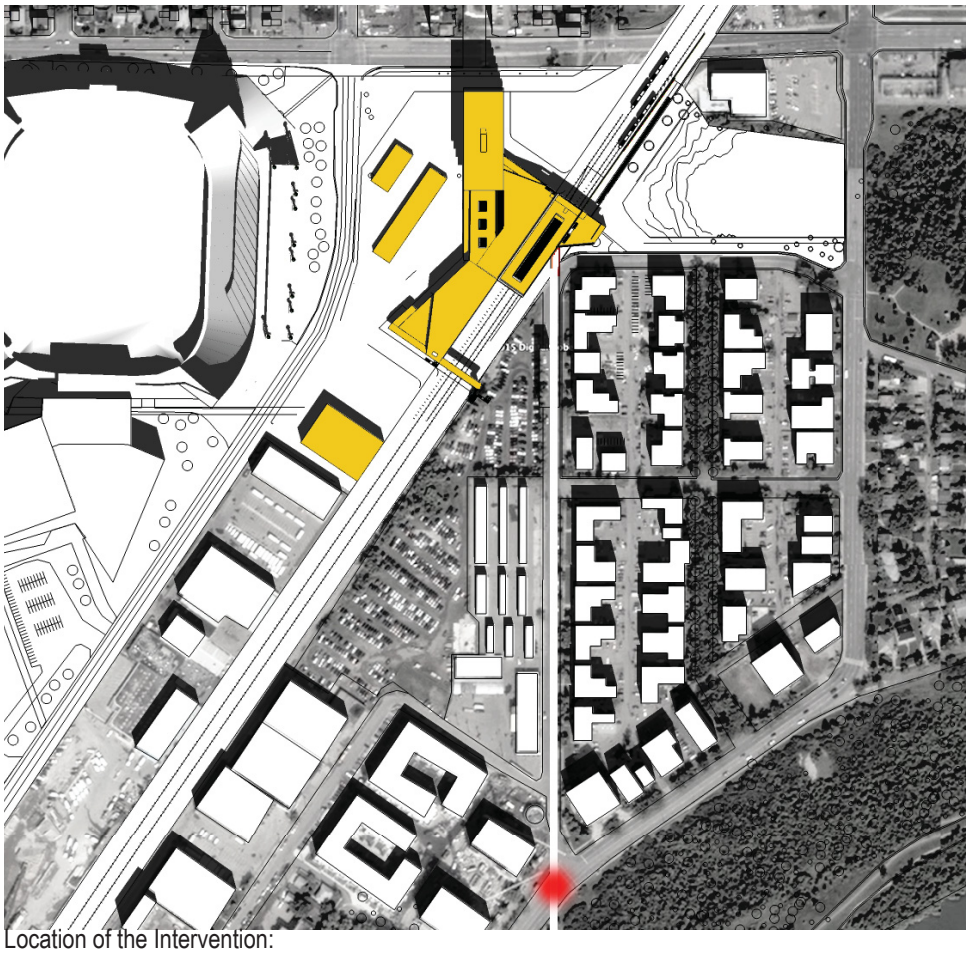
A photo montage of how the road and the active transit pathway relate to one another. The Active Transit Pathway in this example avoids the road by going underneath it. This example is located at the river valley juncture and creates an open space that allows for the movement of pedestrians and cyclists.

Testing Ground: Stadium Station

In order to test the three design intentions of this thesis, a site in the mature neighborhood has been selected. This site offers a range of characteristics that are found in both the downtown and suburban contexts; therefore, through the design of this site, lessons are learned that can be applied and visualized for the other two frameworks. The three intentions are addressed below through a design for a mature neighborhood. This particular site is next to the sports arena, a major arterial with buses, and the river valley.

Intention 1

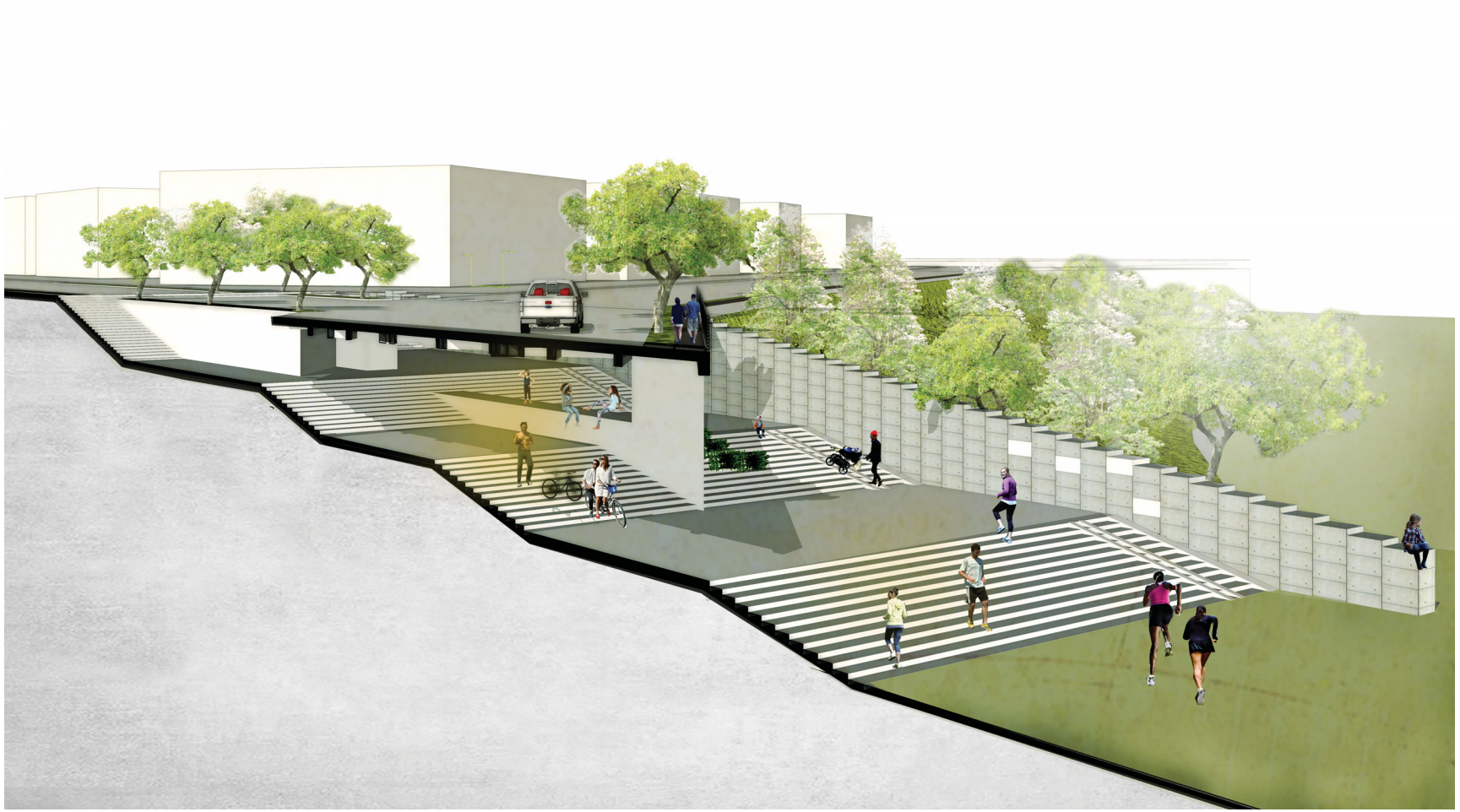
To make active transportation networks visible.



Location of the Intervention:
The location of the intervention at the Stadium Station site is at the river valley juncture south of the site.

The site chosen for the mature neighborhood is where Stadium Station is currently located. In order to connect this site to existing active transit pathways in the city, an intervention at the river valley junction is required. Currently, there is no direct route from the paths in the river valley to the station.

The linkage is created by a generous stair at the river valley juncture. The River Valley Esplanade connects the upper and lower edges of the river valley. A road is bridged above the stairs to allow for the separation of pedestrians and vehicles above.



The River Valley Esplanade:
Infrastructure Intervention for Framework 2

1: The River Valley Esplanade:
Infrastructure Intervention for Framework 2
Refer to Site plan on p. 38 for location (1)

Intention 2

The incorporate existing conditions wherever and however possible to maximize effect and minimize investment:

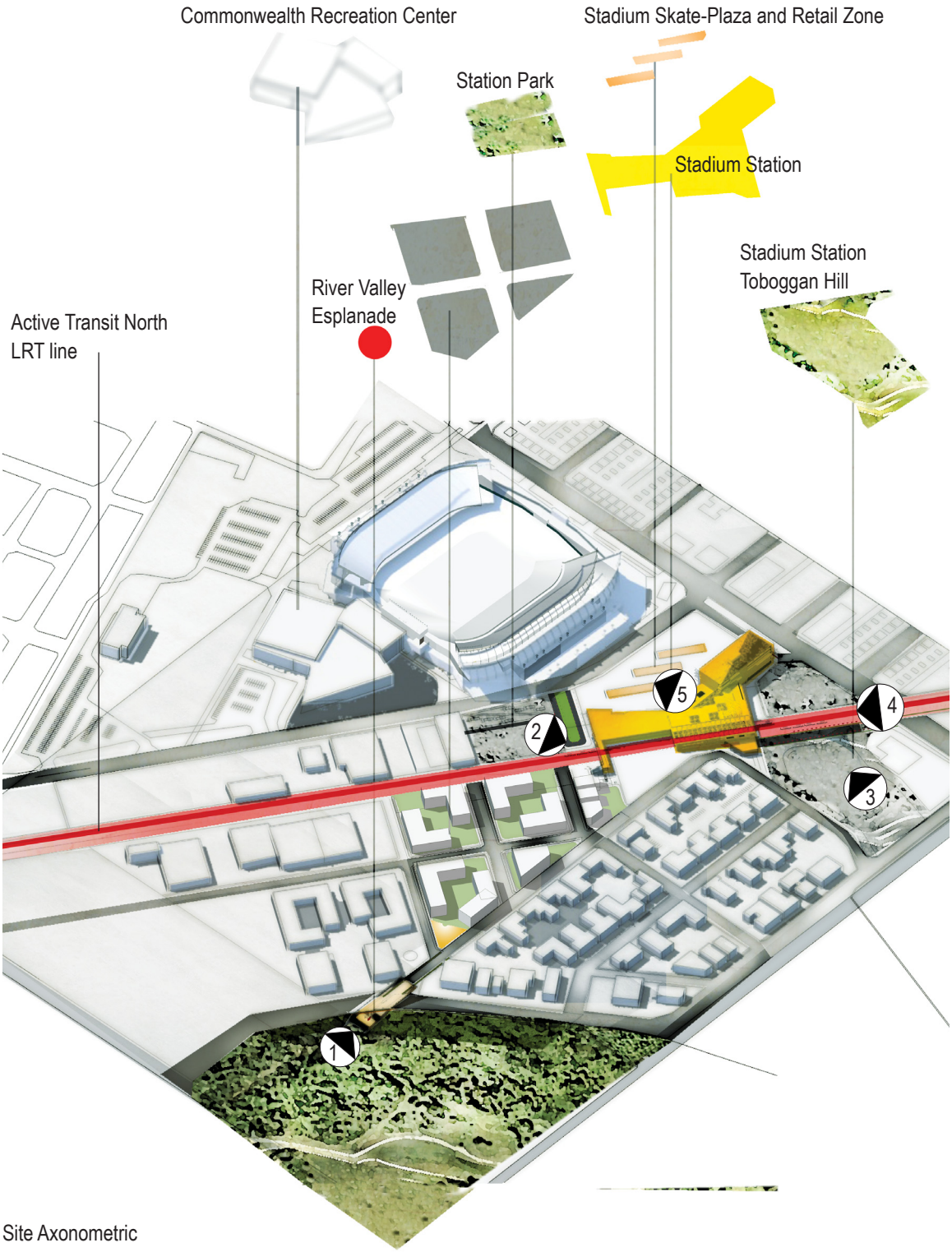
A number of aspects in the site design of Stadium Station use existing conditions to maximize the effect that the station has on its surrounding. These include:

The form of the building: The south arm directs users to the recreation facilities located directly across from the station. Included in these facilities are an open football stadium that houses the Edmonton Eskimo's games; a newly built recreation center that houses an indoor soccer field, an indoor basketball court, a swimming pool, multiple community rooms, exercise facilities and offices; and multiple outdoor recreation areas such as tennis and basketball courts, open green spaces; and ample parking.

The Outdoor Activity Zones on site: An existing ravine on the north side of the building creates the opportunity for a city-run toboggan hill. Currently, there are seven toboggan hills in Edmonton. The *Stadium Station Hill* would be the most accessible in the city with its relationship to the LRT platform within the building.

The existing LRT line allows for the location of *Active Transit North* which is a pathway that runs parallel to the LRT line, connecting multiple neighbourhoods to each other and creates a direct route to the LRT platform. This pathway can be used by cyclists, runners, and pedestrians in the summer and cross country skiers in the winter.

The *Stadium Skate Plaza* on the east side of the building creates a zone that can be enjoyed in both the summer and winter months. The open plaza in the summer allows for a market and festival area. The Stadium Skate Plaza fills this area in the winter and is centered around warming huts/retail zones for the skaters to enjoy hot chocolate and a warm place to rest while maintaining visibility to the other skaters.



Site Axonometric
The location of the following amenities on site:

1: The River Valley Esplanade:
2: Station Park
3: Stadium Station Toboggan Hill
4: Active Transit North
5: Stadium Skate-Plaza

2: Stadium Park
Refer to Site plan on p. 38 for location (2)

3: Stadium Station Toboggan Hill
Refer to Site plan on p. 38 for location (3)

4: Active Transit North
Refer to Site plan on p. 38 for location (4)

5: Stadium Skate-Plaza
Refer to Site plan on p. 38 for location (5)

Intention 3

To add significant and meaningful amenities (at the station) to attract people to the station, promote social interaction, physical activity and the use of the public transit line.

In order to populate the station, activate the outdoor zones, and encourage the use of the LRT line, the development must be mixed use on many levels. This station is not merely an LRT stop with the addition of minor program; it is a complex that brings together the LRT stop, residential units, daily amenities, exercise pods, day care facilities, gathering zones, food pods, cafes, and retail zones. All of which rely on one another for the overall success of the complex.

The Residential Tower: There are 5 floors in this portion of the building that house up to 9, 1200 sq.ft. units on each floor. The combination of a medium rise residential tower and the station will immediately populate the building. The units are geared to all types of people, from the senior citizen - living alone who need access to public transit and amenity within a short walking distance; to the single mother with two children - who needs easy access to multiple activities and all daily amenities. The social floor (level 1) acts as a connecting space between the residential tower and the other program on site.

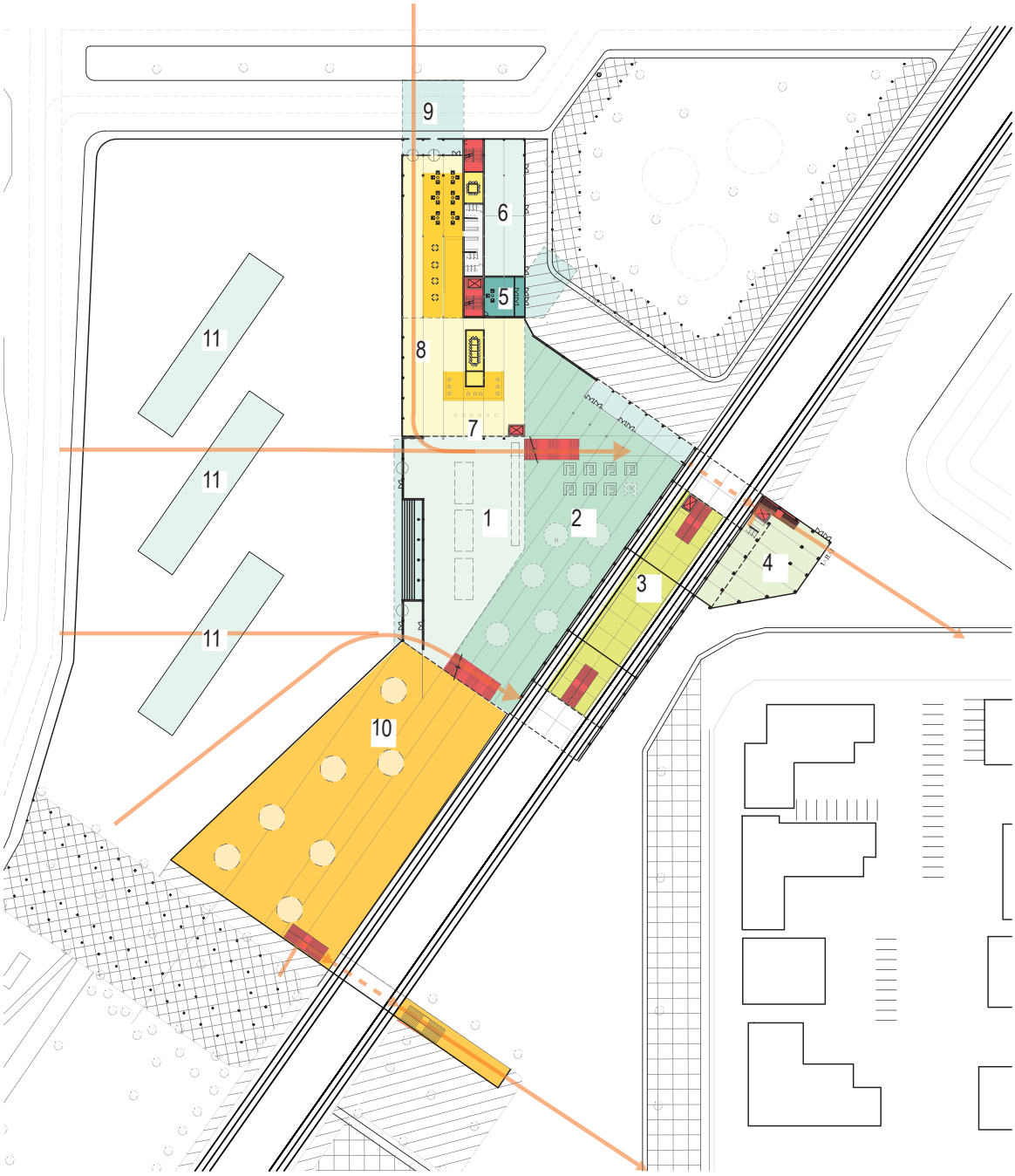
The LRT Station: The platform and ticket zone must be able to accommodate the Stadium's rush of people. The stadium seats 56,000 people; therefore, the multiple staircases in this space and direct circulation route to the open atrium allows for the easy flow of people necessary for footballs games and concerts.

Daily Amenities: In order to populate the building on a daily basis, the addition of daily amenities is crucial. These amenities include a grocery store, a liquor store, a pharmacy, access to banking, a post office, public library book drop-off, florist shop and a hair salon. These amenities are all located on level 1 in the south arm of the building.

The Rental Center: The success of Active Transit North, Stadium Station Toboggan Hill and Stadium Skate-Plaza rely on the accessibility of the required equipment. There is a rental center on the west side of the building that allows people to rent all the necessary equipment. This will aid those who cannot afford to purchase their own equipment and allows people to travel by public transit to and from these activity zones.

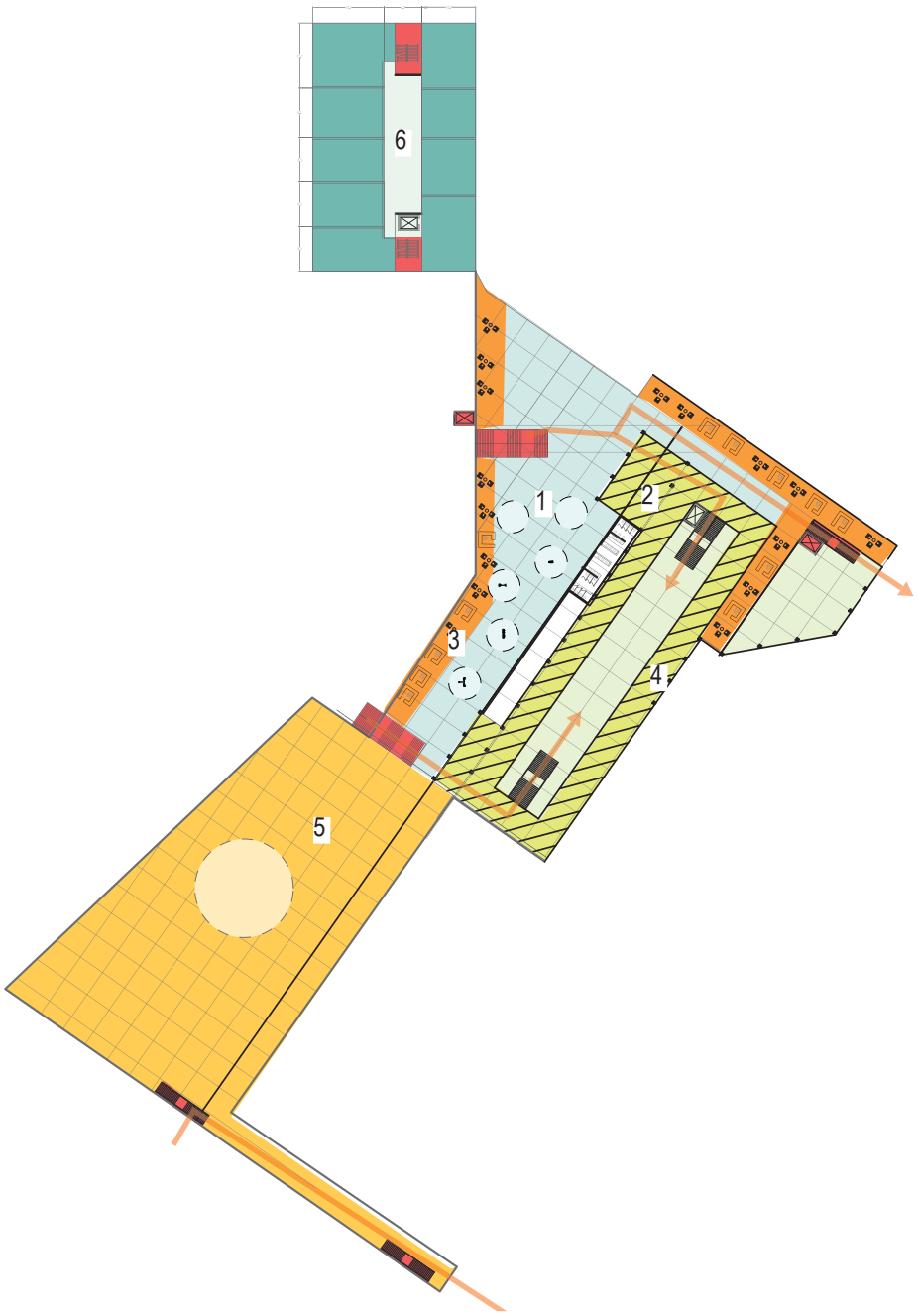
The Bus Drop Off: The complex does not only house the LRT platform, it encourages the use of Edmonton's city buses. The drop off is located on the North Side of the building. There is a social area in this arm of the building that accommodates those waiting for their bus.

The following drawings indicate the location of the program mentioned.



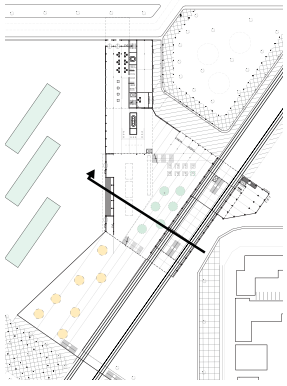
Floor Plan : Level 1

1.	Atrium	7.	Information
2.	Food Pods	8.	Social area, cafe
3.	LRT Platform	9.	Bus stop entrance
4.	Rental Center	10.	Grocery store
5.	Residential Private Entrance	11.	Commercial plaza, warming zones
6.	Retail		



Floor Plan : Level 2

1. Exercise Pods
2. Ticket Zone
3. Social Gathering
4. Bike Storage
5. Day Care/Teen Zone
6. Residential Apartments



Cross section through the atrium, food pods, LRT platform and exercise pods

Cross Section through the LRT platform

The central atrium space and the public, social stair that leads to the LRT ticket zone on the second floor.

A view in to the LRT ticket zone

CHAPTER 5: CONCLUSION

This thesis, while focused on one stop along Edmonton's one LRT line, was undertaken as a means of questioning how sprawling cities can begin to encourage an active lifestyle that replaces the sedentary one facilitated by the vehicle. Edmonton, like many other sprawling cities dominated by highways and large parking lots forces a sedentary lifestyle in its population by subsidizing and promoting a car culture. Edmonton is far from the only Canadian city where the majority of the population commutes by vehicle. Populations all over North America have disconnected themselves from the active lifestyle that comes with a dense, walkable community and become so accustomed to using their vehicles that daily life without it seems impossible.

This thesis is an initial attempt to tackling an issue that will be at the heart of many urban designers for years to come. My hope is to generate the discussion of how to promote public health through the articulation and identification of alternative modes of transport and new typologies of stations.

A photo montage of the familiar feeling of being stuck in a traffic jam does not only apply to Edmonton, but to cities all over the world.

The method to doing this in Edmonton may differ from those in other cities; however, there are key aspects that can be taken from this thesis work and applied to cities elsewhere:

The breakdown of station types depending on differing site conditions: Edmonton's city layout allowed for three distinct station typologies. Street layouts, density and historic characteristics provide a basis for this distinction.

The connection between public transit lines and active transit using existing conditions and interventions in infrastructure: Edmonton's River Valley posed the largest threat in maintaining an active transit pathway at grade level. Other cities will have their own issues to address; however, a set of interventions in the infrastructure can be developed in any city to maintain a grade level active transit pathways.

The development of Major Mixed Used Stations: Creative measures are to be taken to accommodate existing conditions, turning them in to activity zones. Daily amenities are key to draw people in to a complex that facilitates active and public transit.

Interventions may differ, program may be altered, existing conditions may provide alternative opportunities and active transit pathways may change form; however, if a solution to a sedentary lifestyle can be determined in the most sprawled city center in Canada, similar methods and new station typologies can be adopted to provide a healthier and more active quality of life for populations elsewhere.

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