

Supplementary Document

MArch Thesis Presentation
June 14, 2022

“Subdivided and Reconnected: Community Integrated
Transportation Hubs as a Response to Car-Centric
Growth”

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Subdivided and Reconnected:

Community Integrated Transportation Hubs as a Response to Car-centric Growth

by Jason Petersson

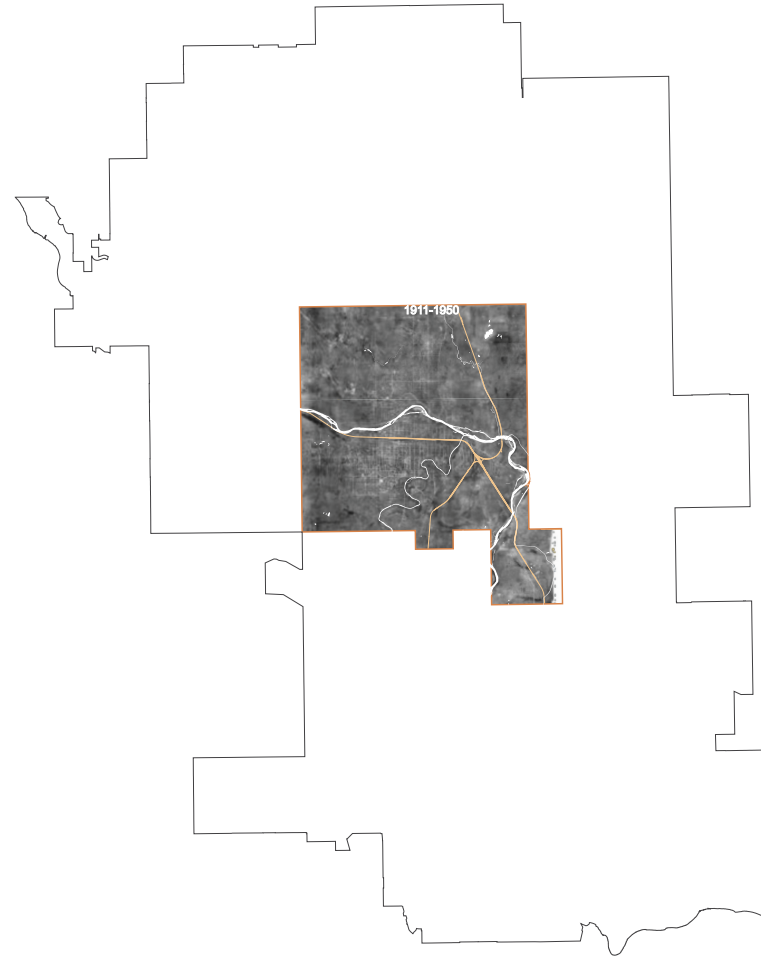
Thesis Abstract

In little over a century Calgary has gone from pioneer beginnings to an expansive urban area. The City of Calgary's policies have fostered the conditions for automobile-dominated, single-use and low-density neighbourhoods. This ideology has prioritized the construction of freeways over all other forms of transportation. This has isolated those without cars from the city by separating one community from another.

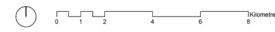
This thesis re-imagines Calgary's public transportation network as a multi-modal system that reconnects neighbourhoods and offers a more vibrant and integrated city. Two design projects- a neighbourhood transit hub and a central city transit hub- explore how such integrated transportation hubs can serve as catalysts for inclusive social interaction and improve quality of life.



TRAIN AND STREETCAR GROWTH



1924-1926: Post CP Rail
Growth



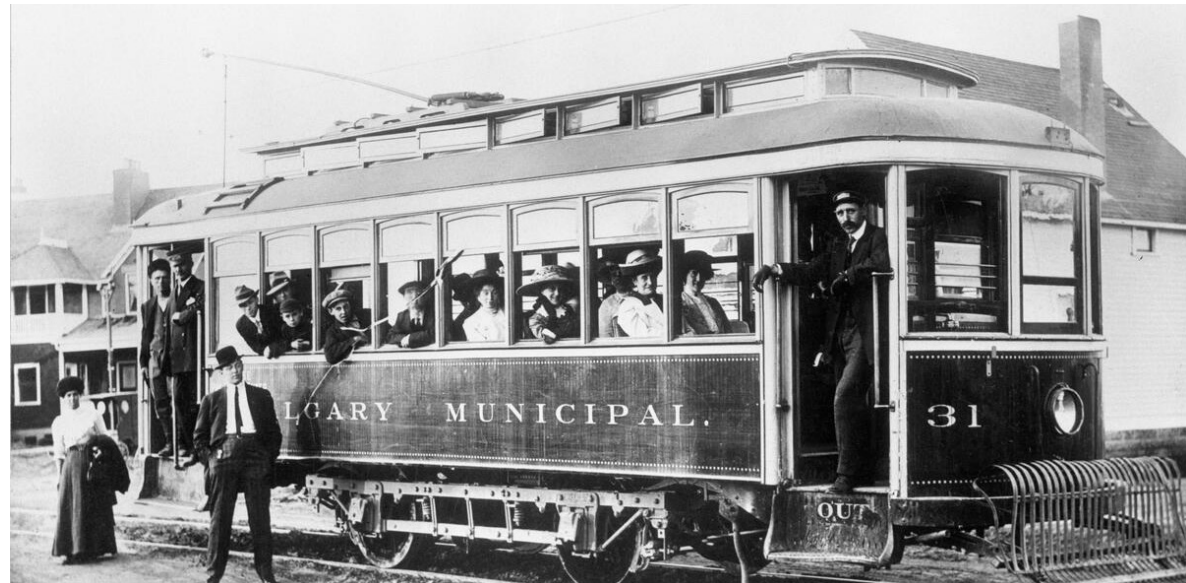
"Canadian Pacific
Railway Station,
Calgary, Alberta."
1920.

Glenbow Archives
PA-3895-22.



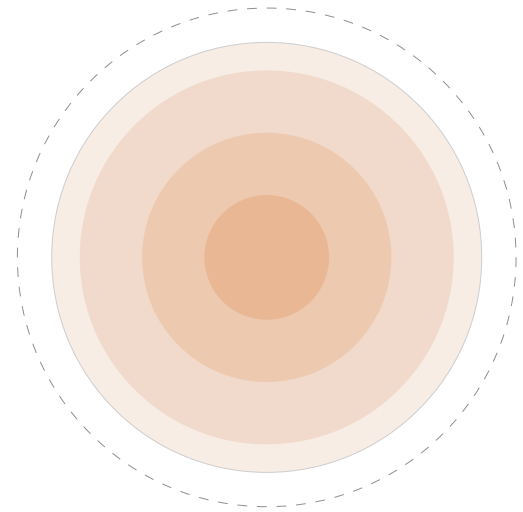
"Train in Rockies
west of Calgary,
Alberta." 1909.

Glenbow Archives
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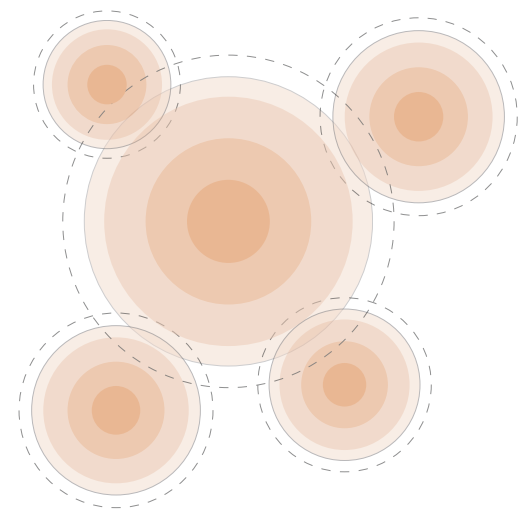


Slide 2: Throughout Calgary's history, transportation has always centered around one dominant transportation system. However, it wasn't until the westward expansion of the Canadian Pacific Railway that the city developed an urban presence. The construction of the CPR railway (shown in yellow on the map) and station in Calgary constituted the seed from which settlement spread outward, and when development spread too far to walk, the Calgary Electric Railway (streetcar) was introduced to service new communities.

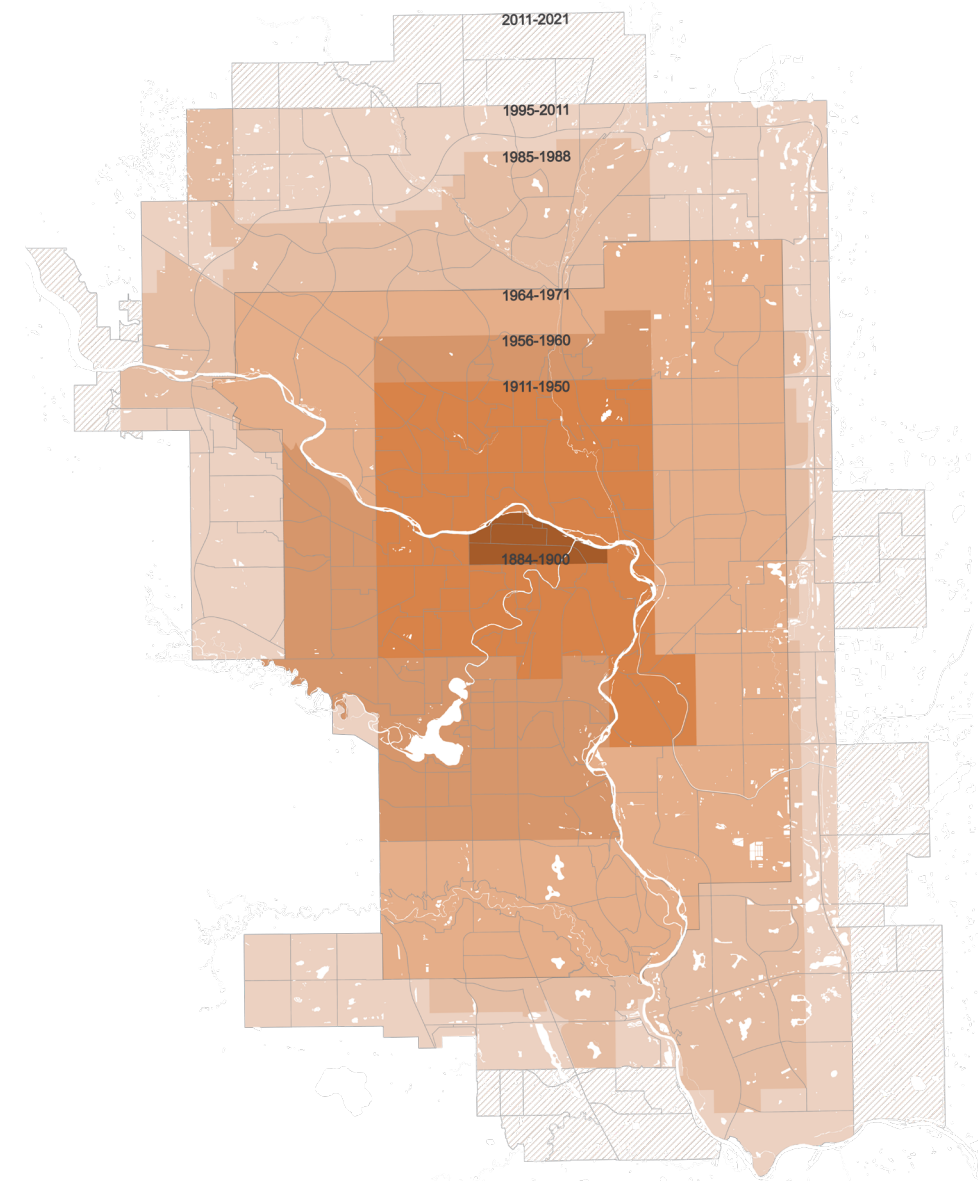
UNI-CITY GROWTH PATTERN AND LAND ANNEXATION



Calgary's Uni-City Growth Pattern

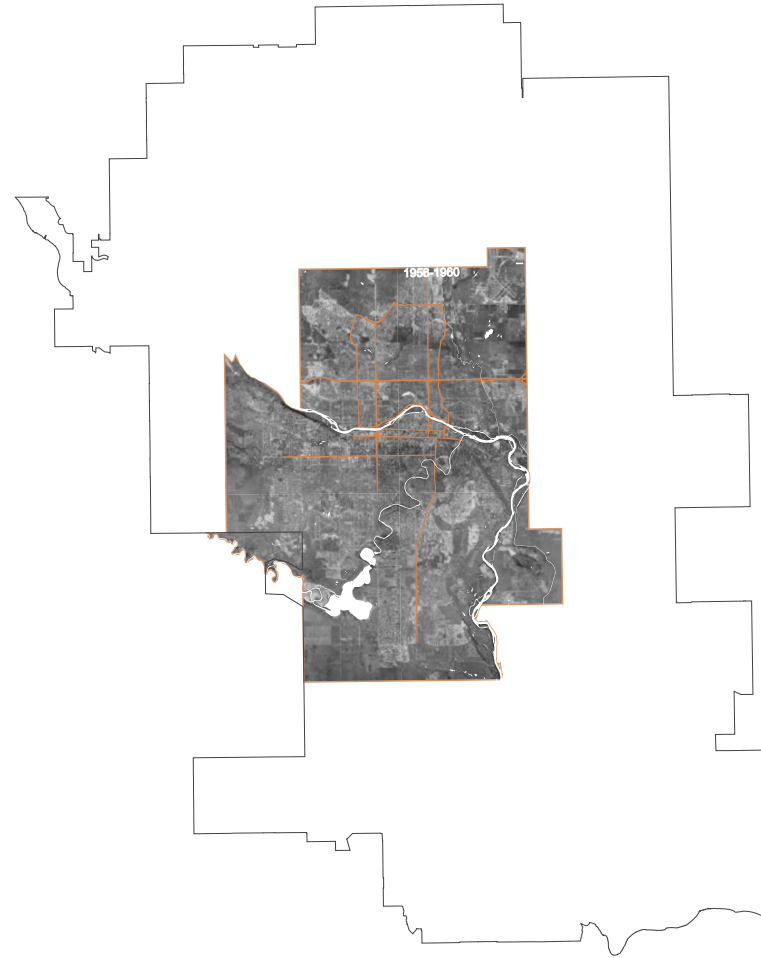


Typical Metropolitan Growth Pattern



Slide 3: This trend of dense, grided development continued until the 1950s, when the discovery of oil in Turner Valley south of the city fuelled development within Calgary. To meet the growing demand, Calgary decided to reject traditional growth models implemented by many other north American cities who developed into metropolitan regions when they spread wide enough to encompass fringe communities. Instead, Calgary adopted the uni-city growth strategy in 1954, which led to the city annexing land for future growth each time there was a lack of developable land within the city's boundaries. This severed any connection between the city of Calgary and surrounding communities.

SUBURBAN DEVELOPMENT AND NEIGHBOURHOOD UNIT



1962: Post-war Growth



Suburban Showhomes
in the new district of
Thornclyffe Heights.
July 2, 1955.

Glenbow Archives
NA-5600-6295b.



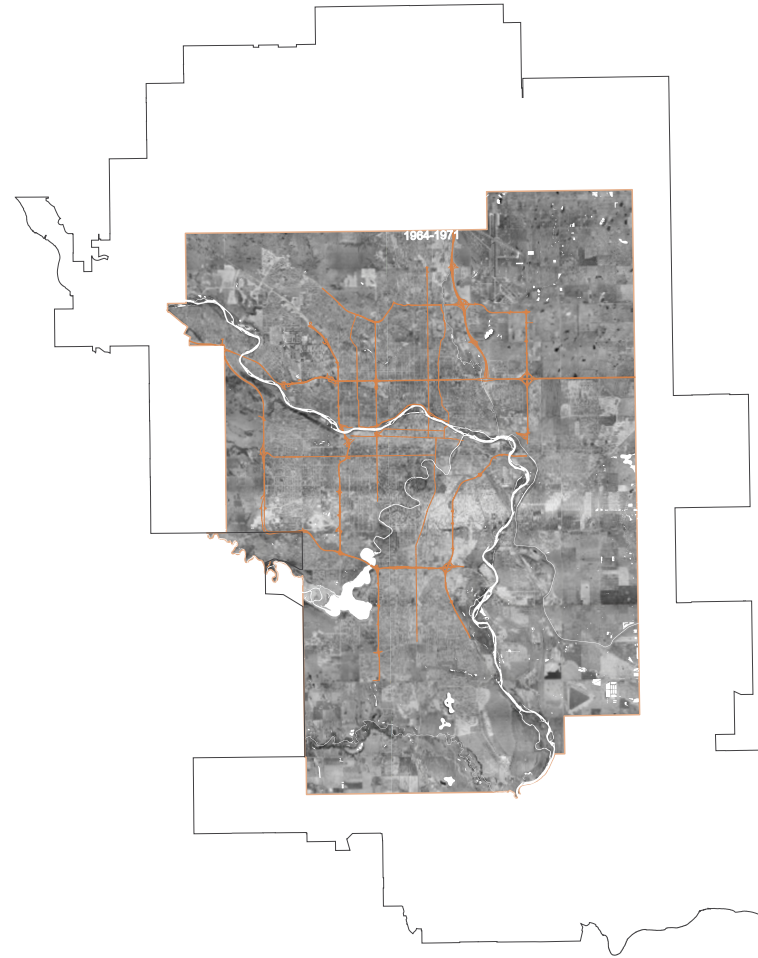
"Twenty-fourth
Street N.W. looking
south from 16th
Avenue." Present-
day Crowchild Trail.
1960.

City of Calgary
Archives.



Slide 4: The uni-city strategy influenced city Council to adopt the Neighbourhood Unit model for development (which I will discuss later), and the creation of single family residential suburban communities which were now made accessible by the post-war automobile.

INVESTING IN THE AUTOMOBILE



1972: Energy Crisis Oil
Boom Growth

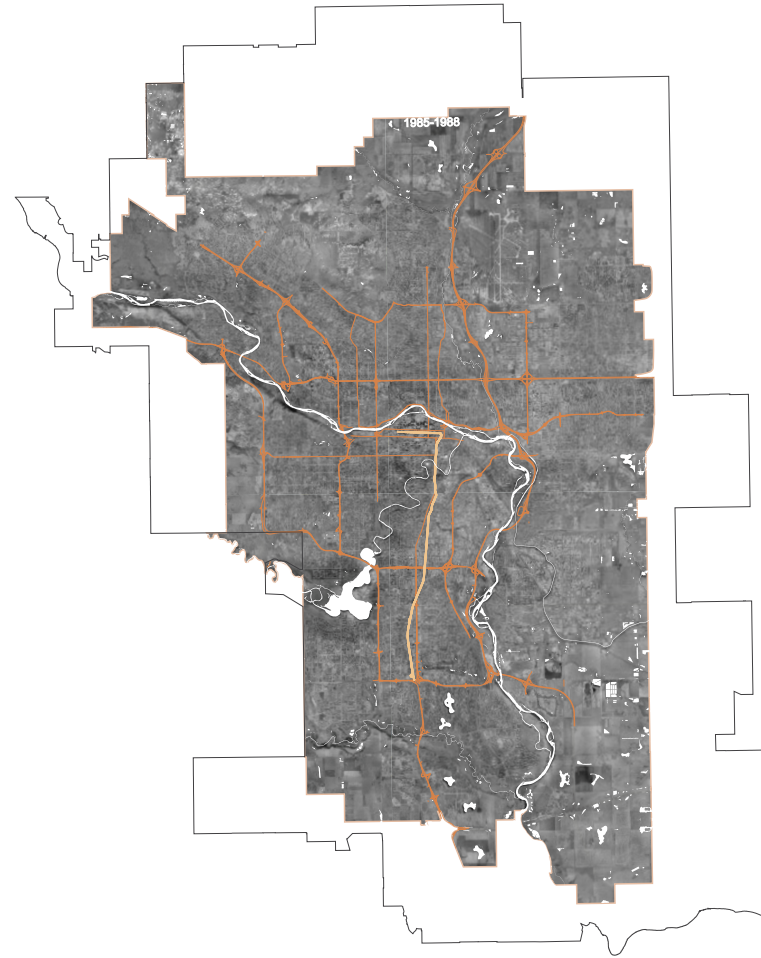


Glenbow Archives NA-2864-26732

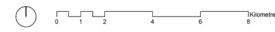
Opening of Deerfoot Trail, January 20,
1975. Glenbow Archives NA-2864-26732.

Slide 5: The city turned to the private sector to meet housing demand, and to facilitate the developer preferred suburban development, newly annexed land was then sold to developers at discounted prices to create new subdivisions. With each subdivision came new road infrastructure to service the sprawling communities. Primary road infrastructure is shown in orange on the map.

AUTOMOBILE DOMINANCE



1984. Pre Economic
Recession Growth



Aerial view of 16
Ave (Highway 1)
intersection with
Crowchild Trail and
University Drive.
August 28, 1984.
Photograph by Jim
Hall.

Glenbow Archives
NA-5654-100.



"Aerial view showing
Deerfoot Trail and
Memorial Drive
looking toward city
centre, Calgary,
Alberta." June 11,
1985. Photograph by
Jim Hall.

Glenbow Archives
NA-5654-140a.



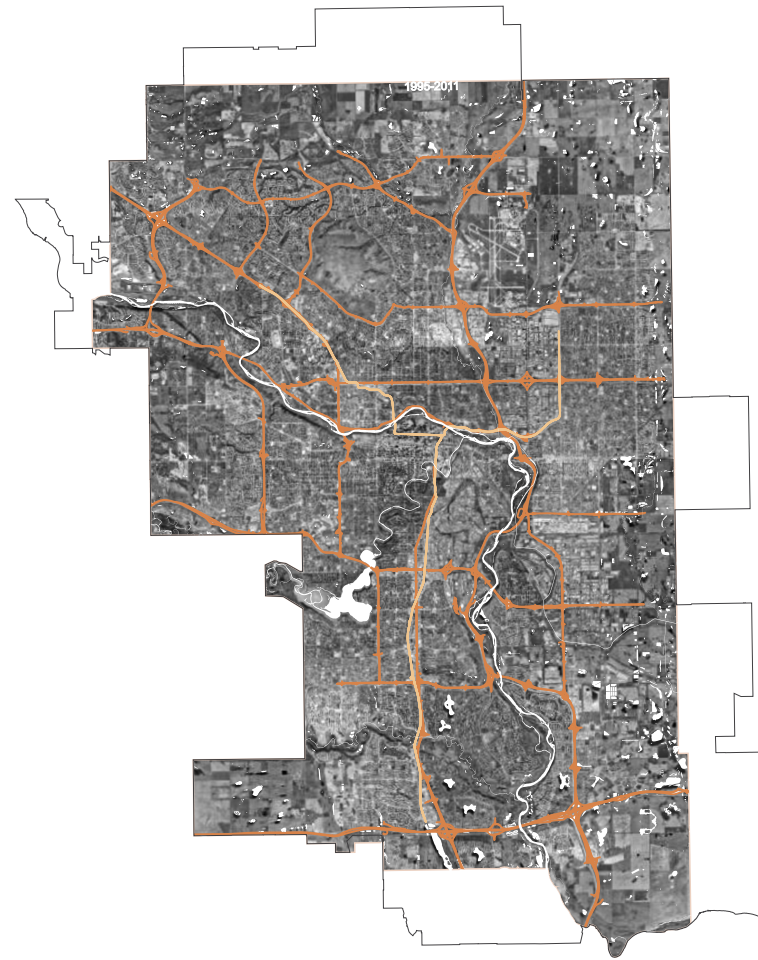
Slide 6: The automobile remained the city's sole primary transportation option until the creation of the first C-Train LRT line in 1981, which is shown in yellow on the map. This was enough time to solidify the automobile as the dominant form of transportation that continues to this day.

LRT EXPANSION

C-Train approaching Barlow Station. May 17, 2004. Photograph by John Bell.



C-Train at Marlborough Station, located in the middle of 36 Street NE. May 11, 2004. Photograph by John Bell.

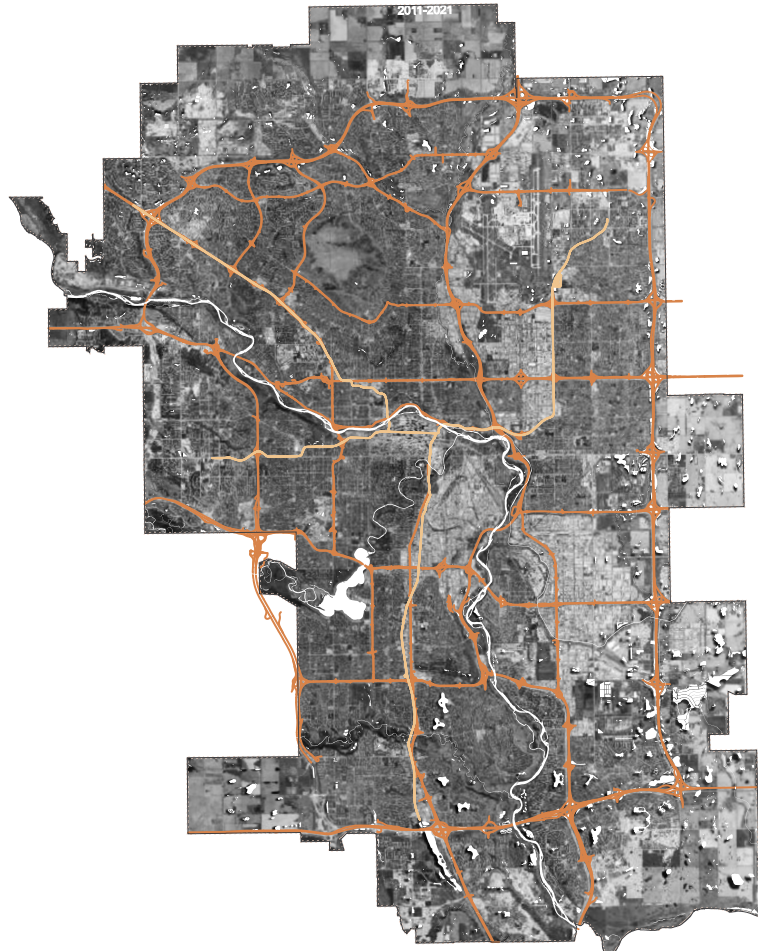


2005: Oil Sands Boom
Growth



Slide 7: The city continued to expand LRT lines into the 2000s, however the damage had already been done.

PRESENT-DAY CONDITIONS



2020: Present-day Growth

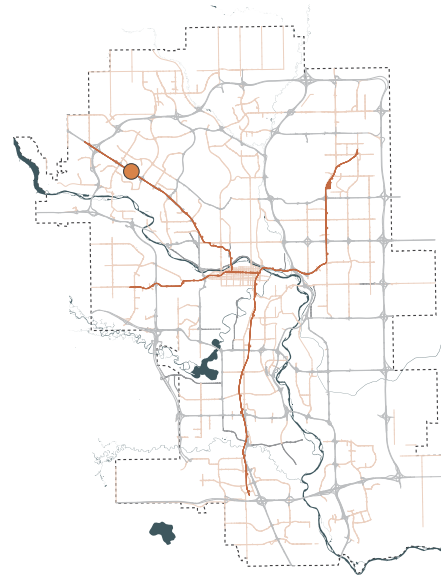


Crowfoot LRT Station located in the middle of Crowchild Trail. November 12, 2021.

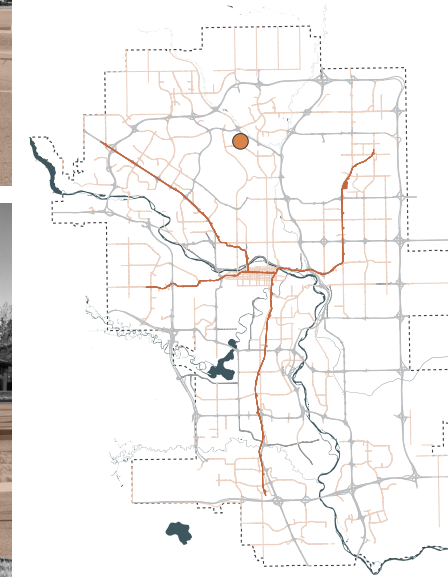
Slide 8: The impact of Calgary's automobile dominance extends beyond suburban communities. Years of planning policies and development strategies that have prioritized the automobile have neglected all other forms of transportation.

EXISTING CAR-CENTRIC TRANSIT STATION DESIGN

CROWFOOT LRT STATION



SANDSTONE BUS TERMINAL (PARK AND RIDE)



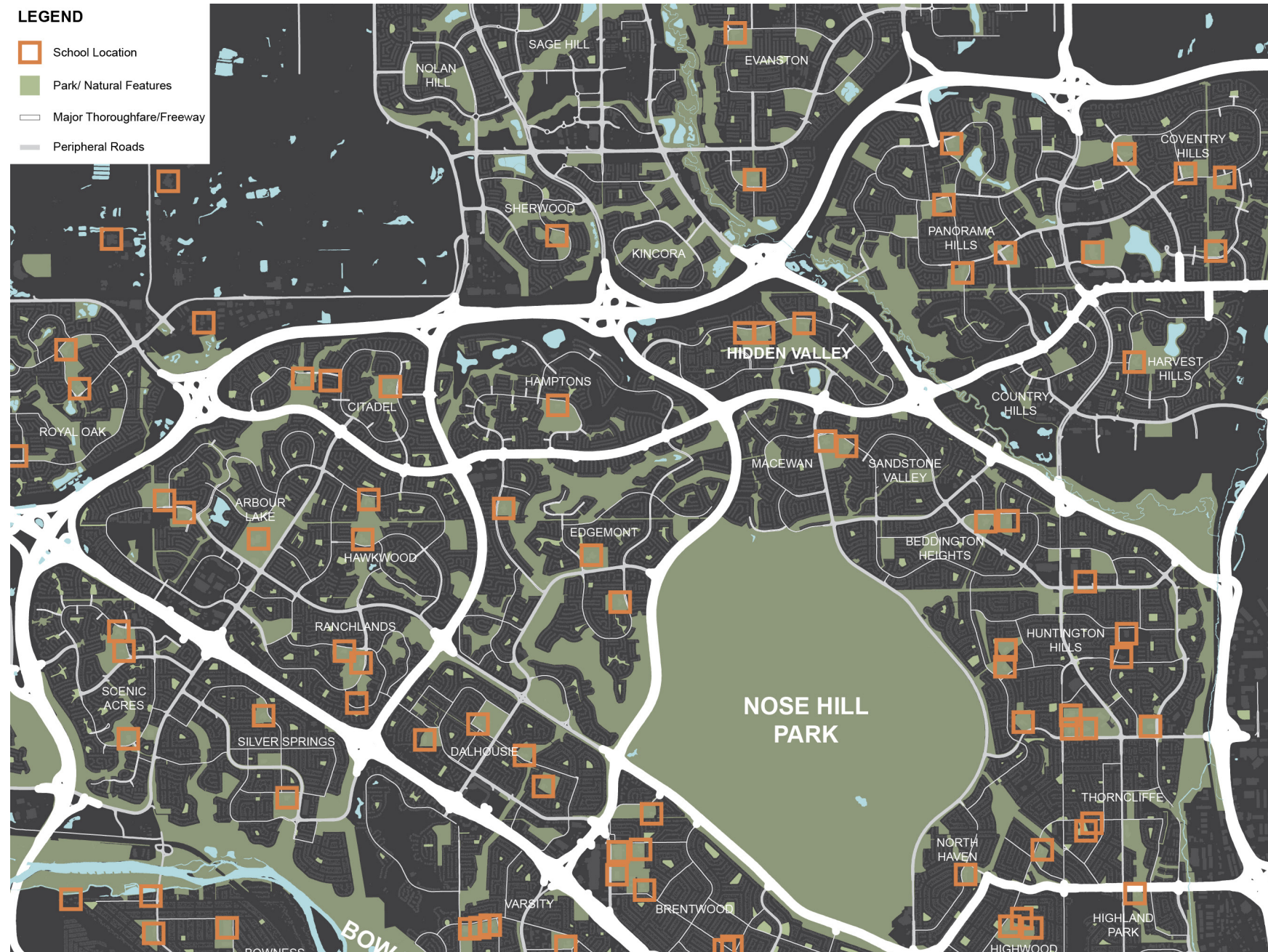
CITY TRANSIT HUB



NEIGHBOURHOOD BUS HUB

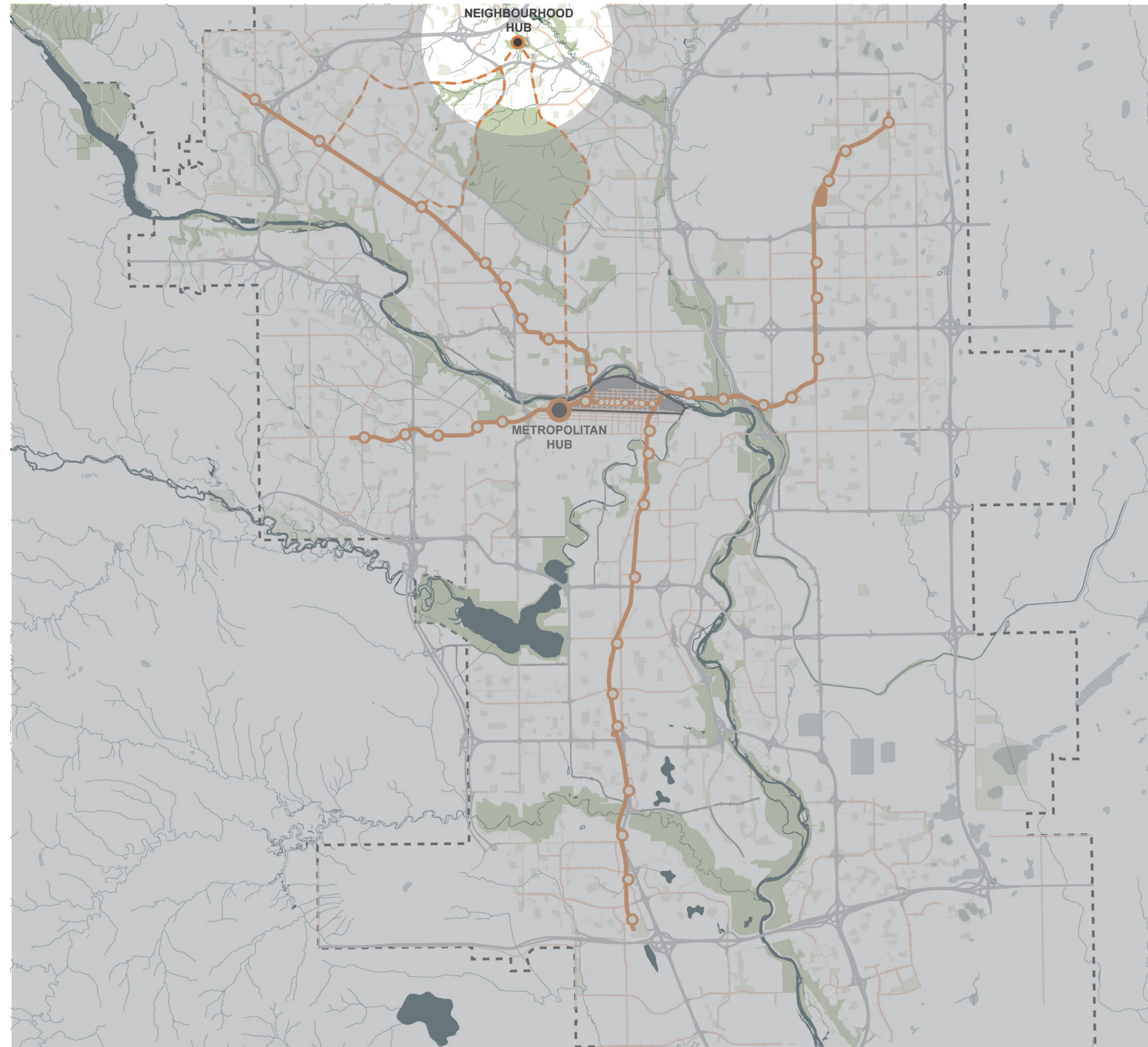
Slide 9: This impact is even visible at Calgary's existing transit stations, who often exist as single purpose buildings surrounded by unwalkable parking wastelands, which cater to the automobile over people. With LRT stations being the primary focus of Calgary's transit nodes, the suburban residents which are not within a walkable or bikeable distance from the stations often need to take a long route with various transfers to reach their destination. This further emphasizes the car as the most convenient option for most people and decreases transit ridership.

NEIGHBOURHOOD UNIT



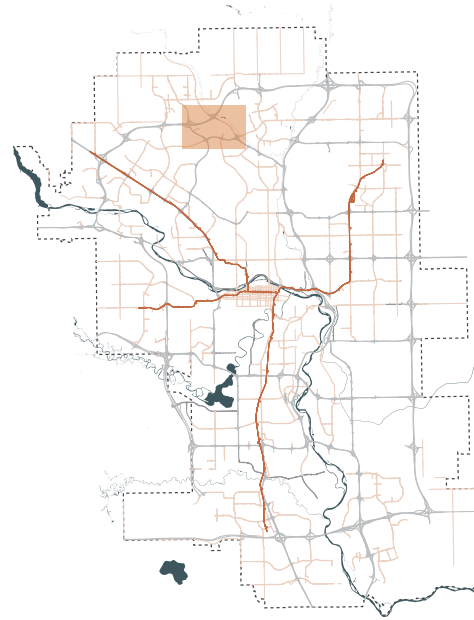
Slide 10: Suburban communities were developed following “The Neighbourhood Unit” framework, a typology which produced characteristics that are easily identifiable in most of Calgary’s suburban communities. The “neighbourhood unit” was initially proposed as the area served by the average elementary school (which are identified as orange squares in the map), and this concept was thought to provide a safe living environment for children, uninvaded by traffic, yet with direct access to major thoroughfares on the perimeter of the neighbourhood. However, in the haste to meet the demand of rapid urban growth, the small-scale character of the “neighbourhood unit” ideology was undermined by private developers who morphed the concept into large scale communities called “Sectors”.

NEIGHBOURHOOD HUB DESIGN PROPOSAL SITE

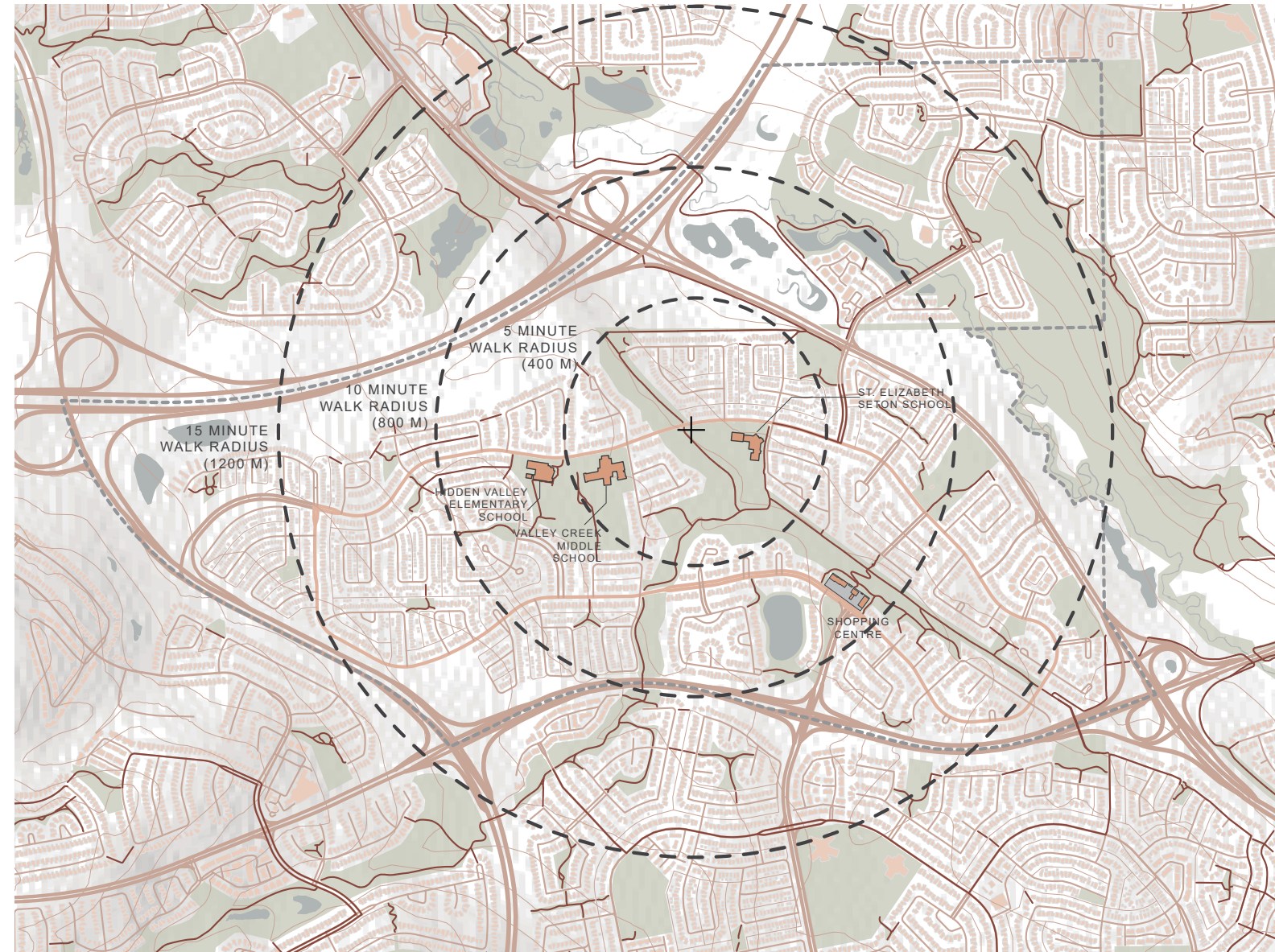


Slide 11: The issues with Calgary's transportation system start at the scale of the community, where cars are often the only convenient transportation option for suburban residents. My first design proposal is a Neighbourhood Hub in the community of Hidden Valley, in north-central Calgary.

SUBURBAN SITE- PROTOTYPICAL NEIGHBOURHOOD HUB



Existing car-oriented community shopping centre



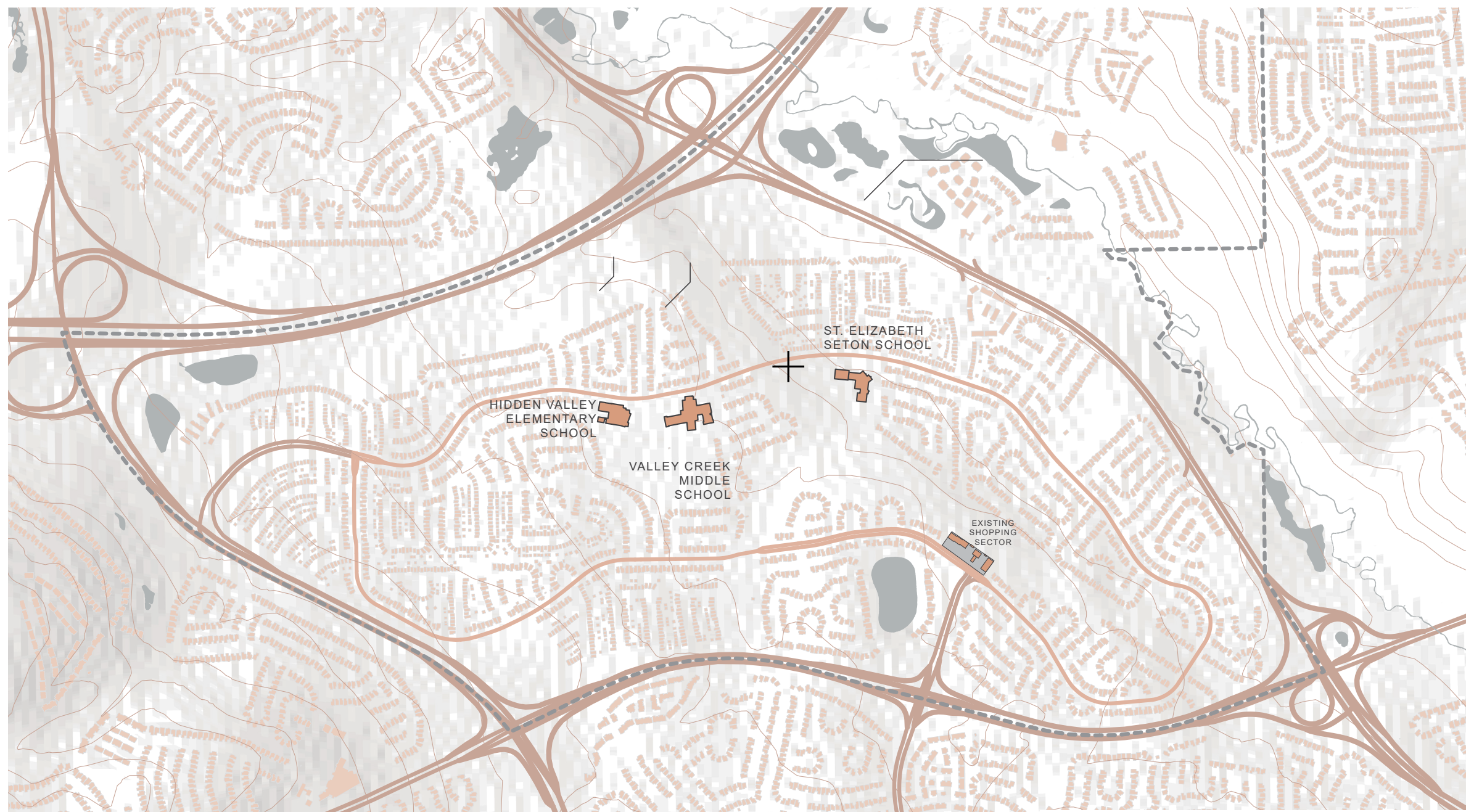
0 0.13 0.25 0.5 0.75 1 Kilometers



Slide 12: Hidden Valley is an example of a typical suburban community which was designed following the “Sector” typology. These “sectors” are far less compact than their neighbourhood unit counterparts, meaning that the small auto-centric commercial facilities on the periphery of the community adjacent to major roads are often too far of a distance to walk, forcing people to drive, even for small trips within their community. This lack of accessibility and walkability leads to fewer social interactions, and leaves its inhabitants isolated from the rest of the city. A criterion of 3 selected characteristics from the neighbourhood unit typology informed my site selection for a prototypical suburban neighbourhood transportation hub and given their widespread use throughout suburban development within the city, these principles can be applied to other communities as well.



Slide 13: The impact of Calgary's automobile dominance extends beyond suburban communities. Years of planning policies and development strategies that have prioritized the automobile have neglected all other forms of transportation.



Slide 14: Secondly, centrally located schools are always included with the development of each suburban community. These schools are often clustered along the main road, acting as a node where most activities and interactions between residents take place; making it the ideal location to bolster these interactions at the Neighbourhood Hub. The central location allows the Neighbourhood Hub to be within A 15-minute walking distance of most houses in the community.



Slide 15: The third characteristic that informed the site selection is its adjacency to the community pathway system that is also typical of suburban communities, making active transportation a convenient and viable transportation option.

SITE ANALYSIS



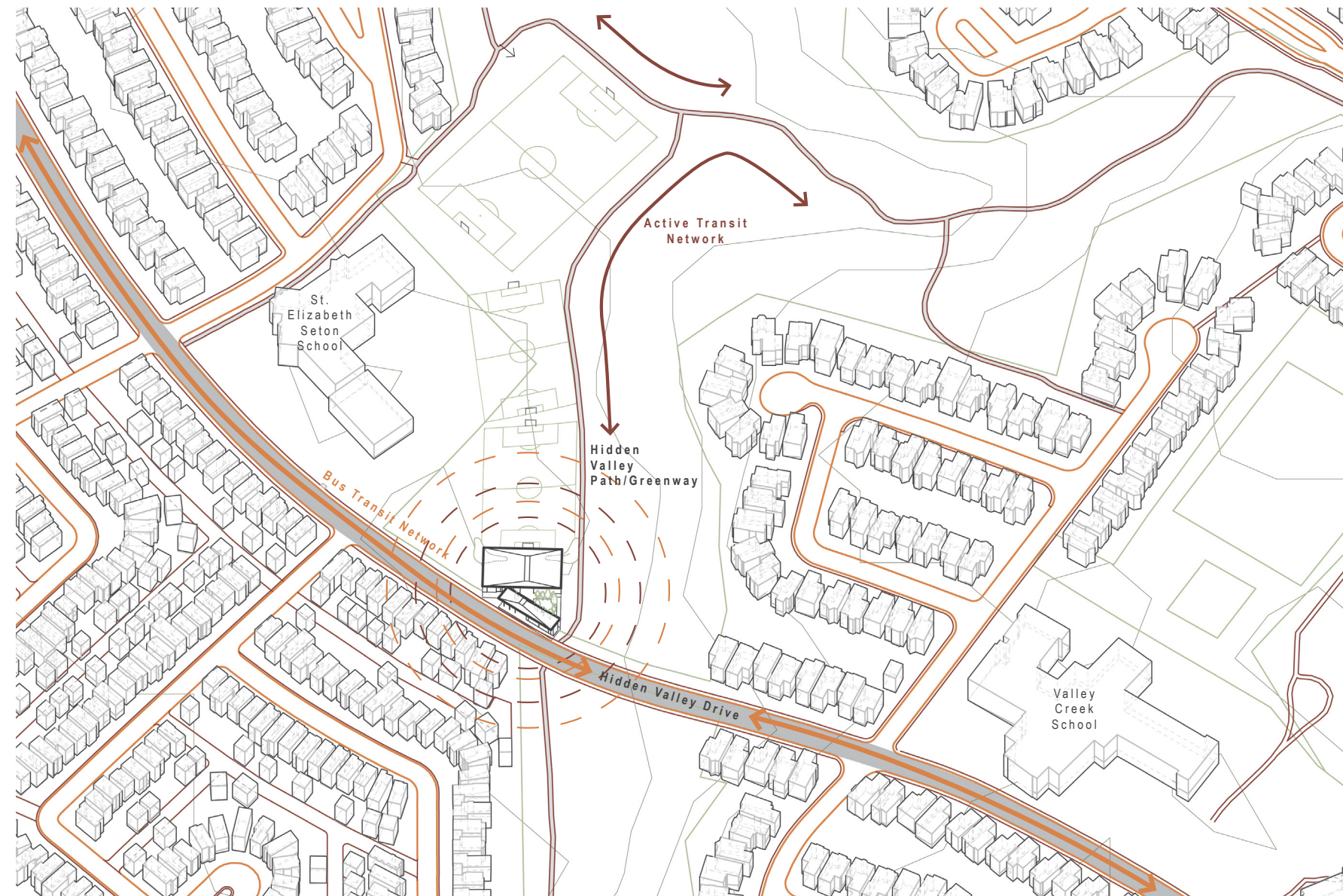
View of the site at the intersection of Hidden Valley Drive and pathway



View of the Neighbourhood Hub from the east side of the soccer field

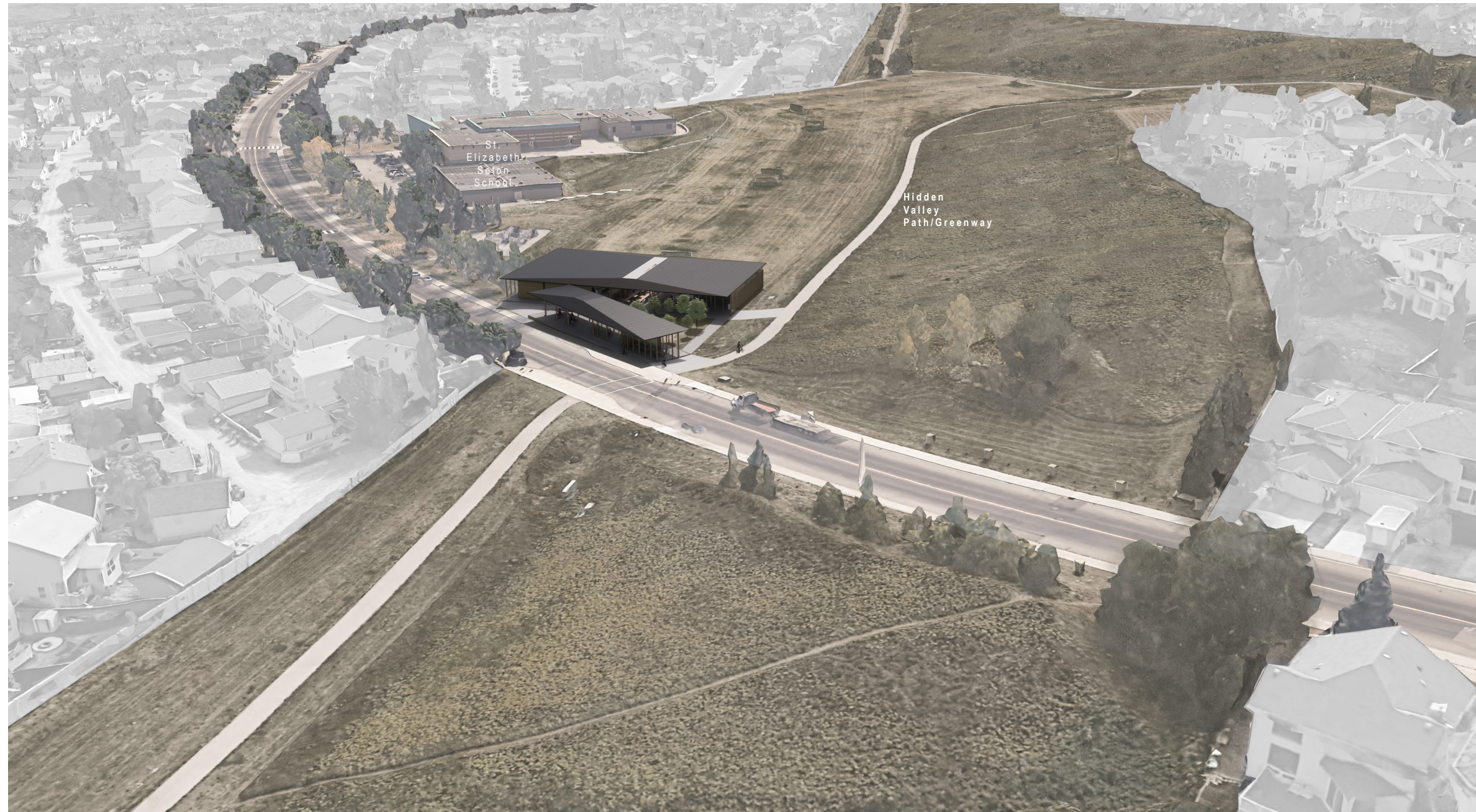


View of the Neighbourhood Hub site from above the Hidden Valley pathway system



Slide 16: These adjacencies are illustrated in this diagram of the Neighbourhood Hub site. On the left are photos of the existing site conditions..

CENTRALLY LOCATED NEIGHBOURHOOD HUB



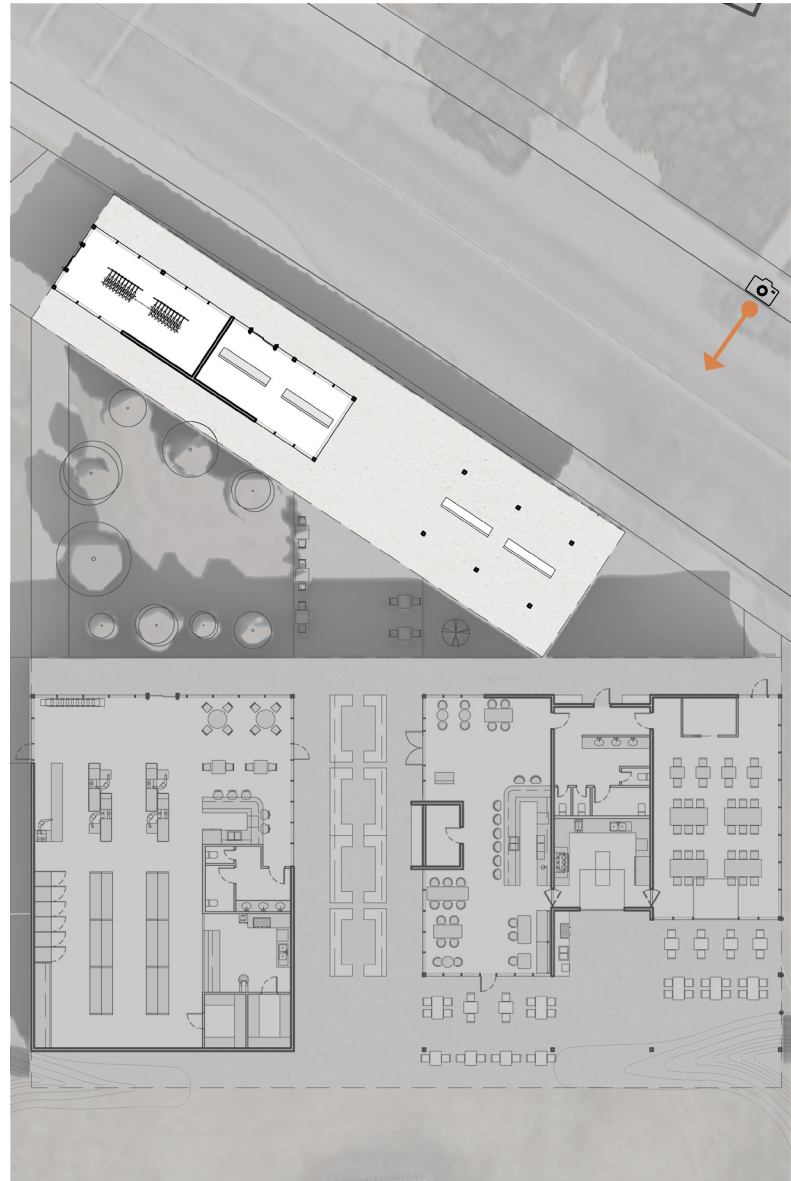
Slide 17: It is also important to consider the topography of the community, and the ideal location for the Neighbourhood Hub is at the lowest part in the community, making it easier for people to bike downhill to the Hub.

NEIGHBOURHOOD HUB PLAN



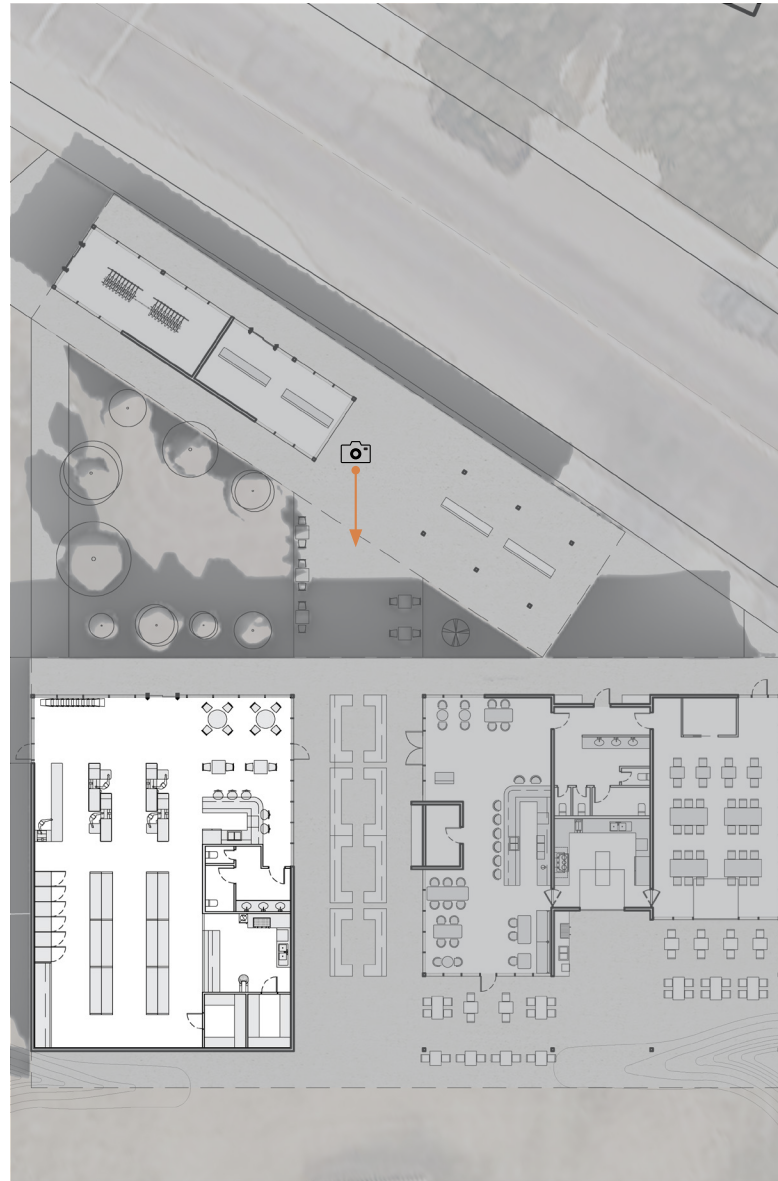
Slide 18: The plan is divided into two pavilions. The first pavilion is dedicated to transportation and is the building parallel to Hidden Valley Drive in the plan. This includes secure bike parking, bus waiting shelter and covered bus waiting areas. The second pavilion, the rectangular building in plan, houses the essential and social programming of the Neighbourhood Hub. The Neighbourhood market is on the left, and the Pub, Kitchen and multi-purpose Community Room are on the right of the pavilion.

TRANSPORTATION PAVILION



Slide 19: This streetscape render shows the transportation pavilion, with covered outdoor and indoor bus waiting areas. It also includes bicycle parking so cyclists can store their bikes securely if they are transferring to a different transportation mode for the remainder of their trip. Its location adjacent to the community pathway system and main road makes it convenient for commuters and incentivizes active transport.

NEIGHBOURHOOD MARKET



Slide 20: The Neighbourhood Market seen on the right of this image, allows community members to shop for groceries within their community. The market also provides local farmers and vendors with a space to sell their goods.

OUTDOOR MARKET HALL AND SEATING



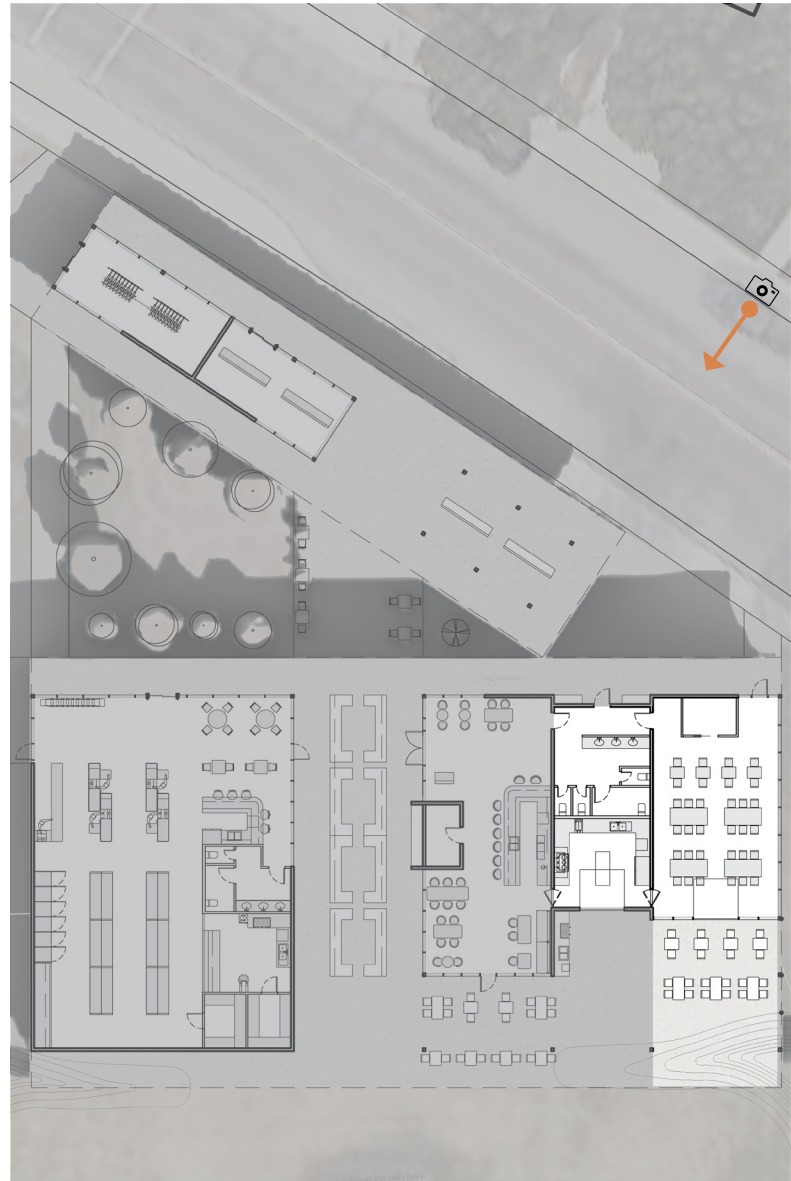
Slide 21: The market extends into the covered outdoor breezeway weather permitting. Additionally, the cafe located within the market is a spot for locals to meet up with friends. This view taken below the canopy of the transportation pavilion shows how both are near the transit stop, so anyone can grab food or beverage while they are waiting for the bus or ride-share.

NEIGHBOURHOOD PUB AND OUTDOOR DINING



Slide 22: The neighbourhood pub further strengthens the social infrastructure of the community by offering a space where locals can eat, drink and meet throughout the day and into the night, when the cafe is no longer operating. It is also a great way for the youth in the community to have a place to meet their friends, instead of having to drive to another community or downtown to grab a drink and socialize.

MULTI-PURPOSE COMMUNITY ROOM



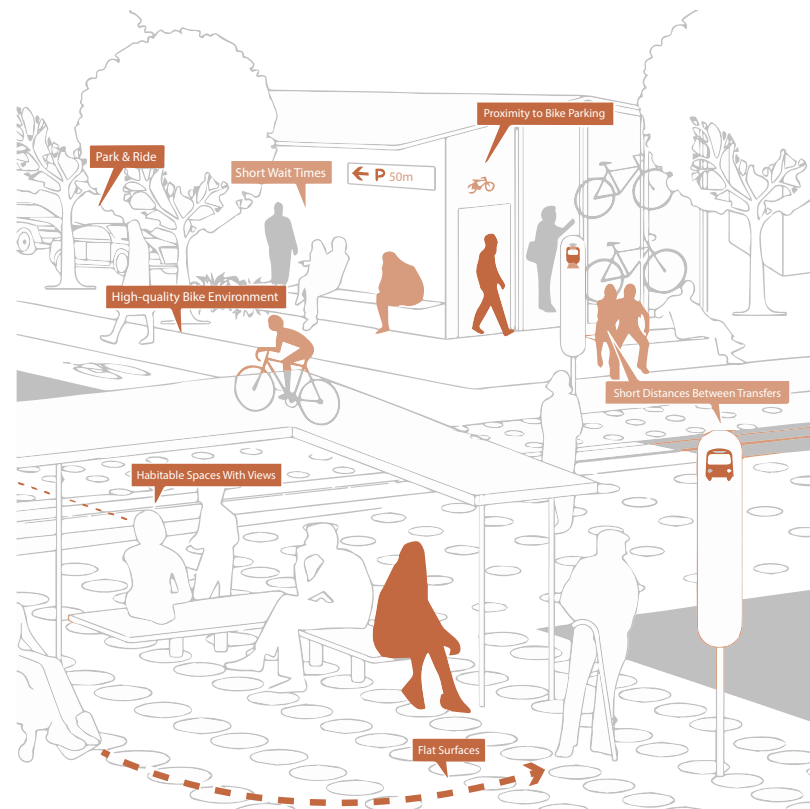
Slide 23: The community room shares the kitchen with the pub and is designed to be a flexible space that can be used for a variety of events such as community association meetings, birthdays, sports events, classes, and culinary workshops.



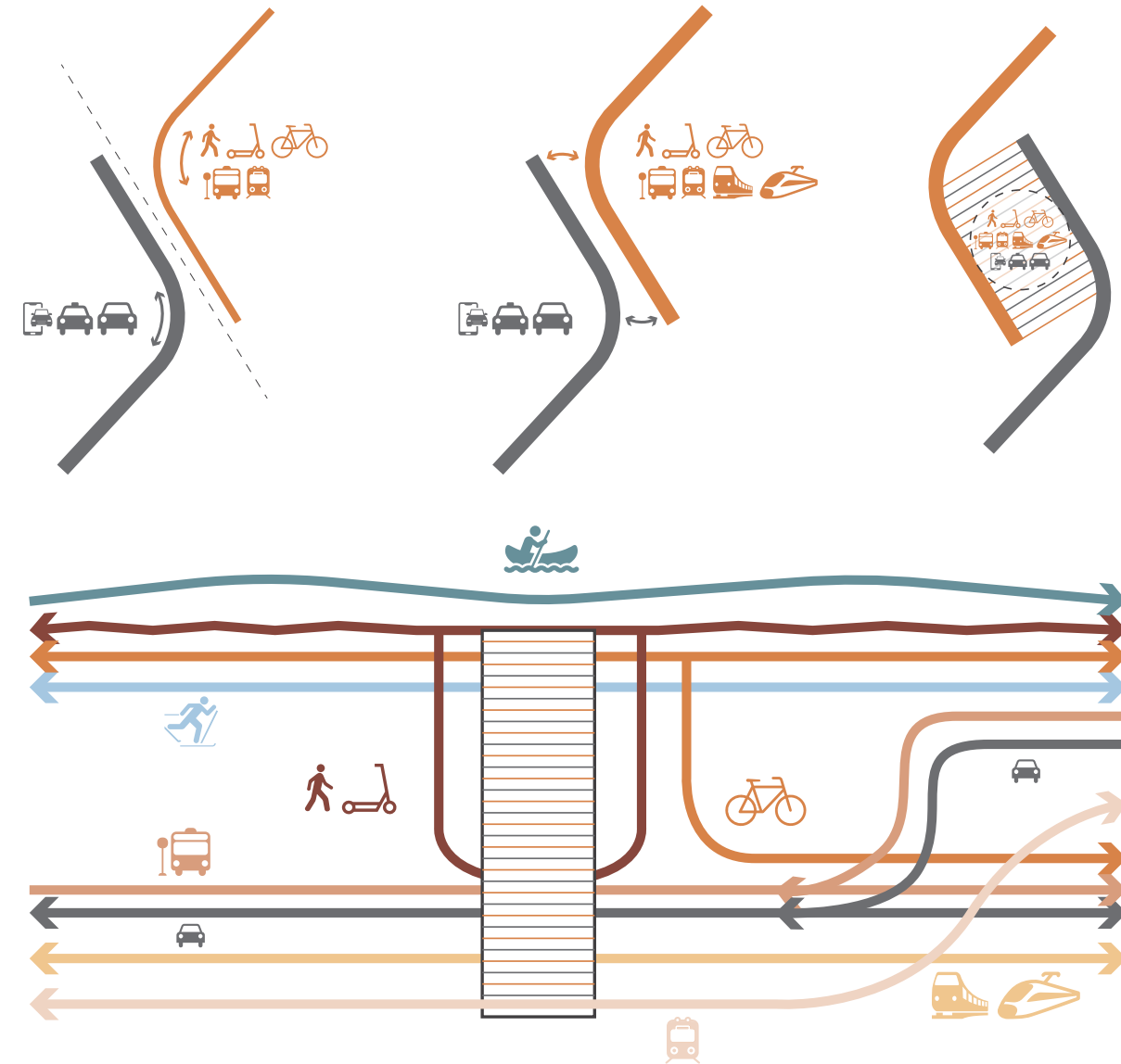
Slide 24: Finally, the design provides sheltered areas for spectators to watch games on the adjacent soccer field, which further activates the hub programming. Berms located at the corners of the soccer field create natural spaces for spectators to sit and frame the field. The neighbourhood hub identifies and addresses multiple lacking services within the community and conveniently integrates them into one cohesive building connected to the neighbourhood's transportation networks.

MULTI-MODAL TRANSPORTATION

- + A multi-modal transportation systems considers various modes (walking, cycling, automobile, public transit, etc.) and connections among modes.
- + a multi-modal system offers users diverse transport options that are effectively integrated, in order to provide a high degree of accessibility even for non-drivers.

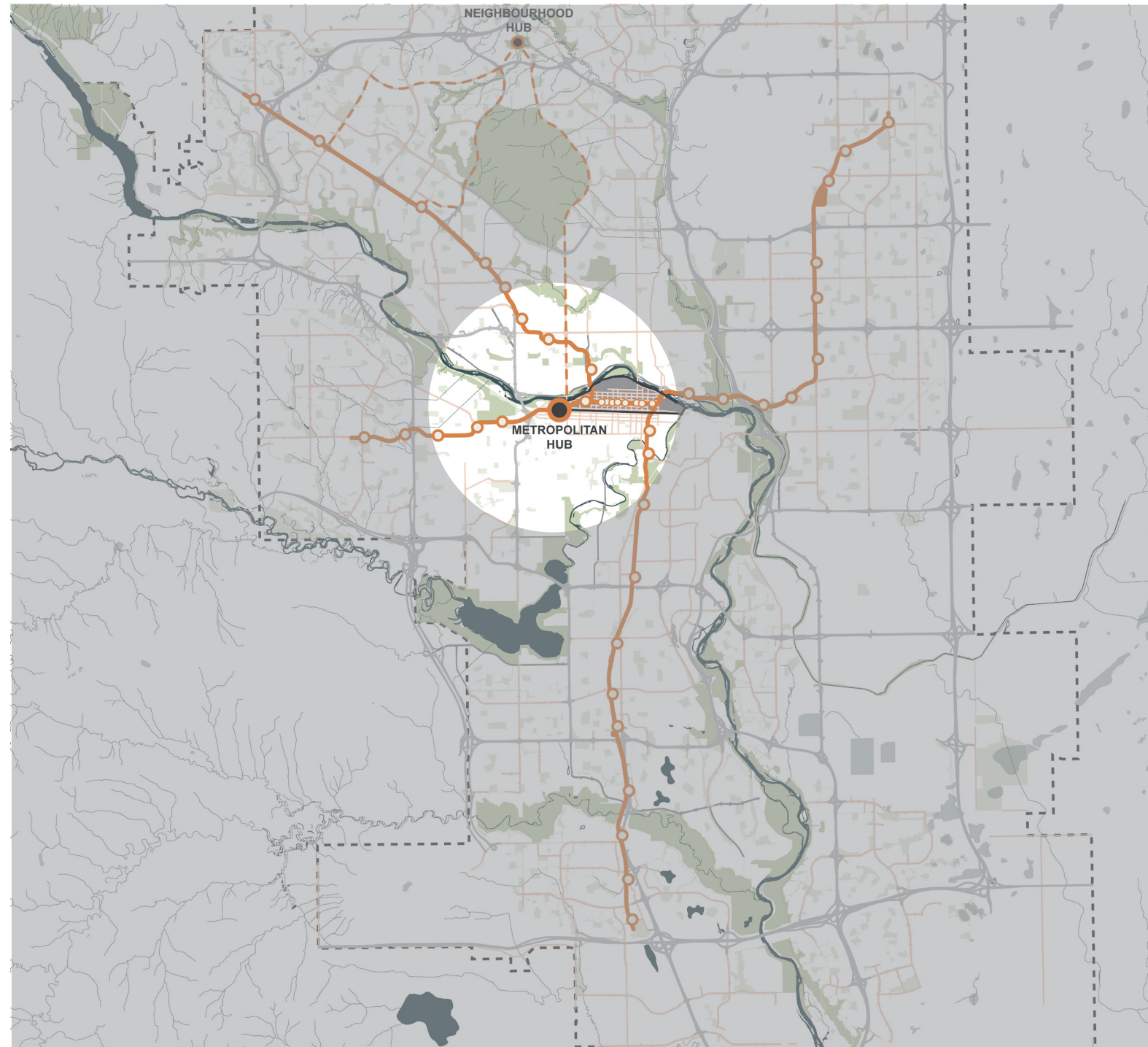


Multi-modal Integration Diagram. Image adapted from Transit Hubs as Meeting Place in Skane by Gehl



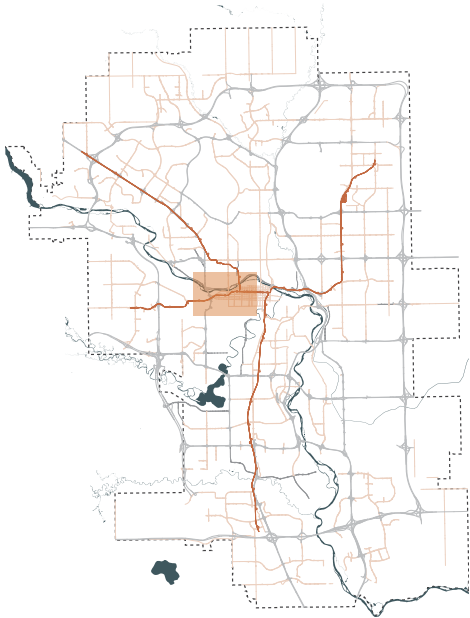
Slide 25: Now that there are convenient non-automobile transportation options available in suburban communities, the next step towards reducing Calgary's automobile dependence is to create an integrated transportation system that views active transportation with the same importance as LRT and bus transit to offer an accessible and cohesive network of systems. The concept of multi-modal transportation systems considers various modes (walking, cycling, public transit, automobile etc.) and connections among modes. A multi-modal transport system offers users diverse transport options that are effectively integrated, to provide a high degree of accessibility especially for non-drivers. The series of diagrams on the top right show the current lack of integration between transportation modes, followed by transit and private vehicle systems integration, and finally all the systems being connected by a building where all the systems intersect. The second intervention that needs to happen to create a successful multi-modal system is to effectively integrate all the city's transportation modes, linking the existing active transit pathways to transit, rail and shared mobility making alternative modes of transportation convenient for users. This is shown in the diagram on the bottom right, showing how all the city's systems can be connected by a building strategically located where all the systems meet.

METROPOLITAN HUB DESIGN PROPOSAL SITE

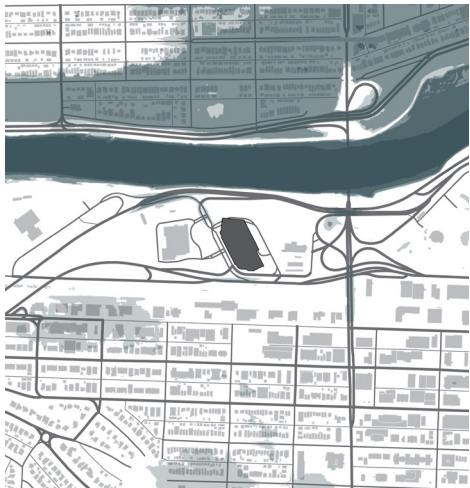


Slide 26: The design for a Metropolitan Hub applies this methodology to a central site next to Downtown Calgary in the West Village district of Sunalta, and here we will see how a transportation hub can be designed to integrate all the different systems and provide a place with the programming that will allow people to develop the social capital they need.

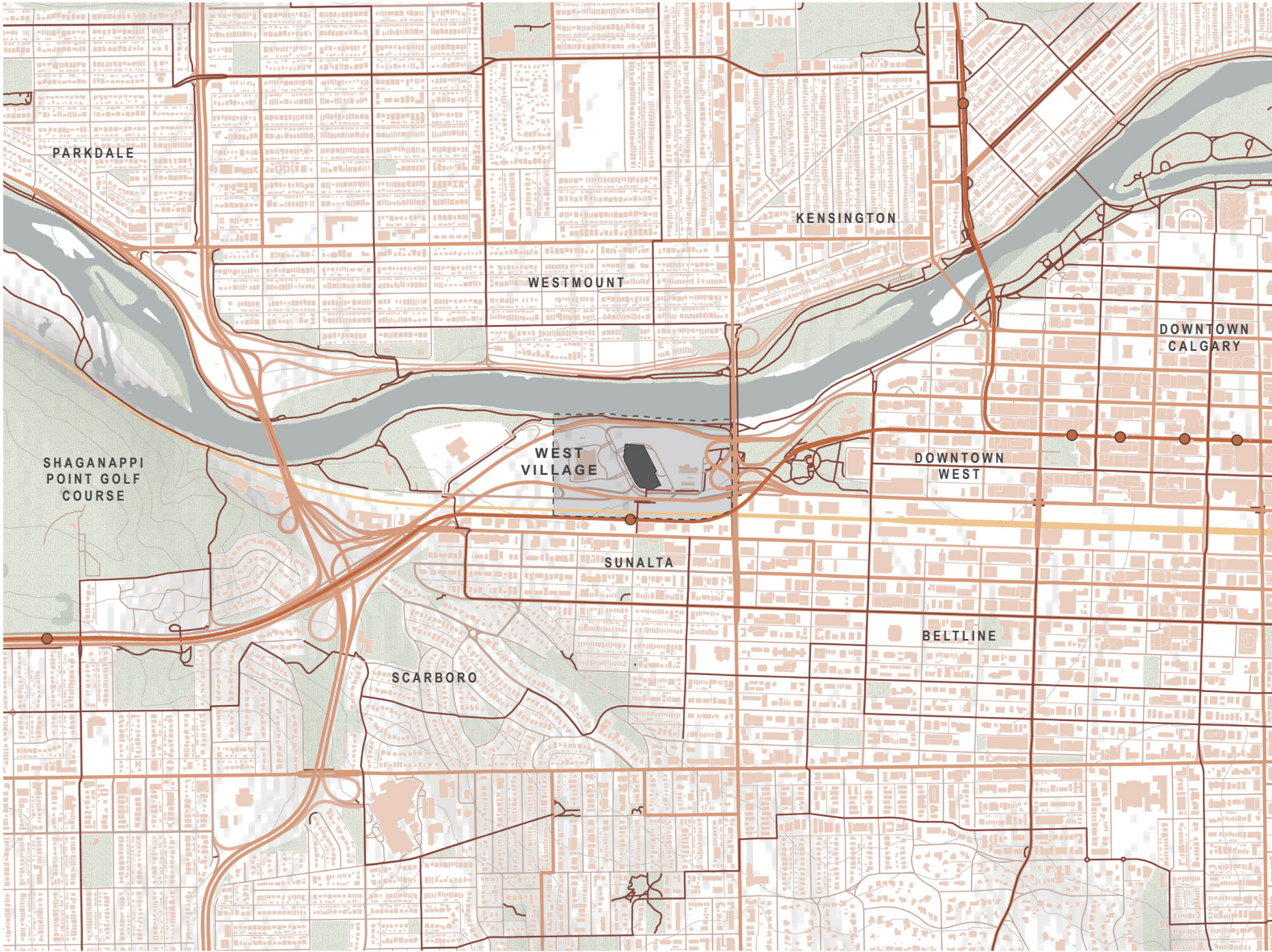
URBAN SITE- METROPOLITAN HUB



Site Plan Location in Calgary



Site Flood Risk Map



0 0.13 0.25 0.5 0.75 1 Kilometers

- Former Greyhound Bus Terminal
- Bike/ Pathway
- LRT Line
- BRT and Express Bus
- Major Roadway
- Rail Road
- Bow River
- Parks/ Natural Features

Slide 27: Calgary currently lacks a hub where all the city’s transportation modes are integrated- often making connections between modes difficult and decreasing convenience. The metropolitan hub is therefore a pivotal piece within Calgary’s transportation infrastructure, connecting suburban communities via the Neighbourhood Hub, to higher order LRT stations, and finally to the centre city where connections between modes can be made.

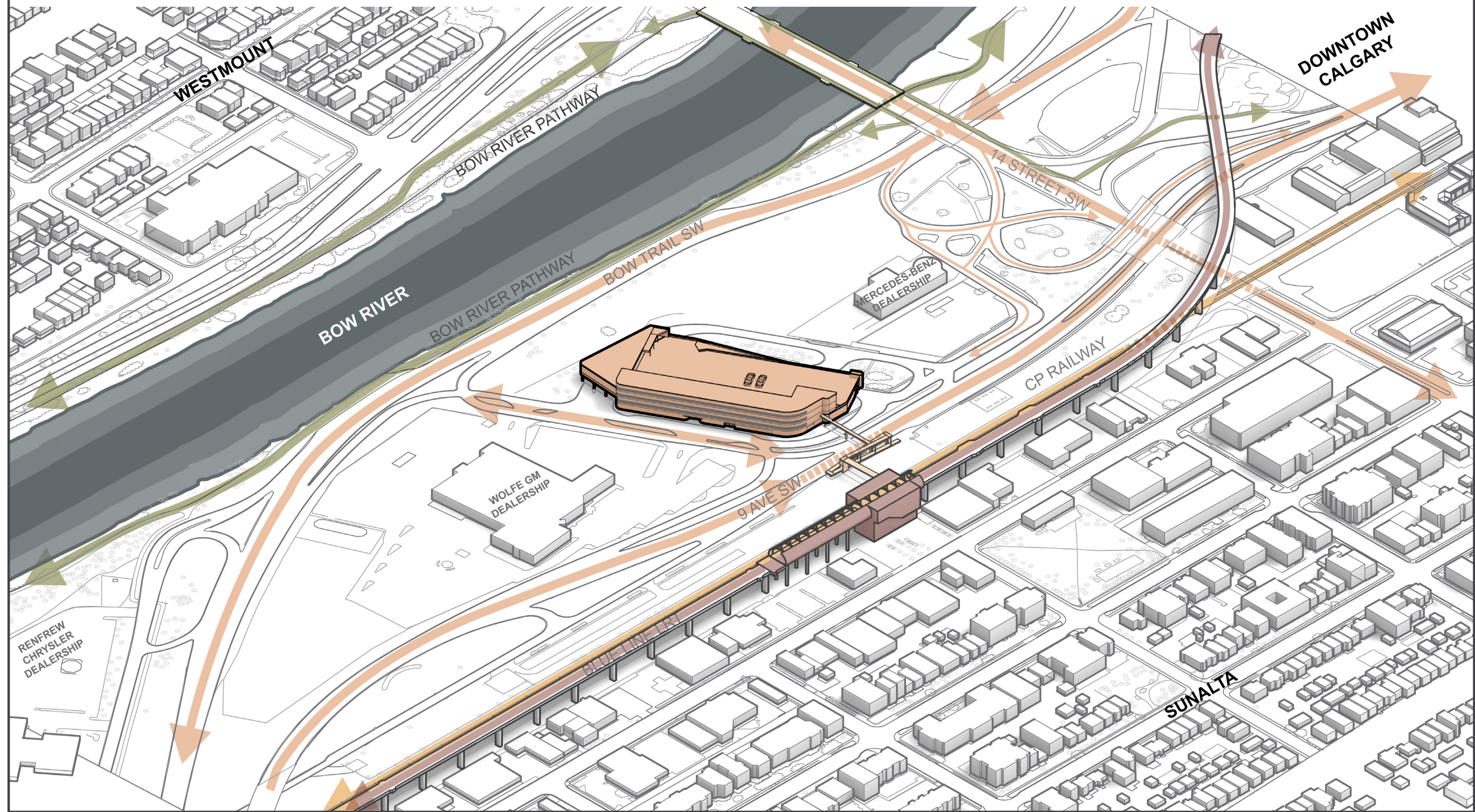
I identified the site of Calgary’s former Greyhound Bus Terminal as the only location where all the city’s existing transportation networks converge, as is shown in the site plan. In addition to the opportunities that are offered by these proximities, the site is underdeveloped being currently occupied by 3 car dealerships in addition to the former greyhound building, and the site is not located in a flood risk area.

EXISTING SITE CONDITION



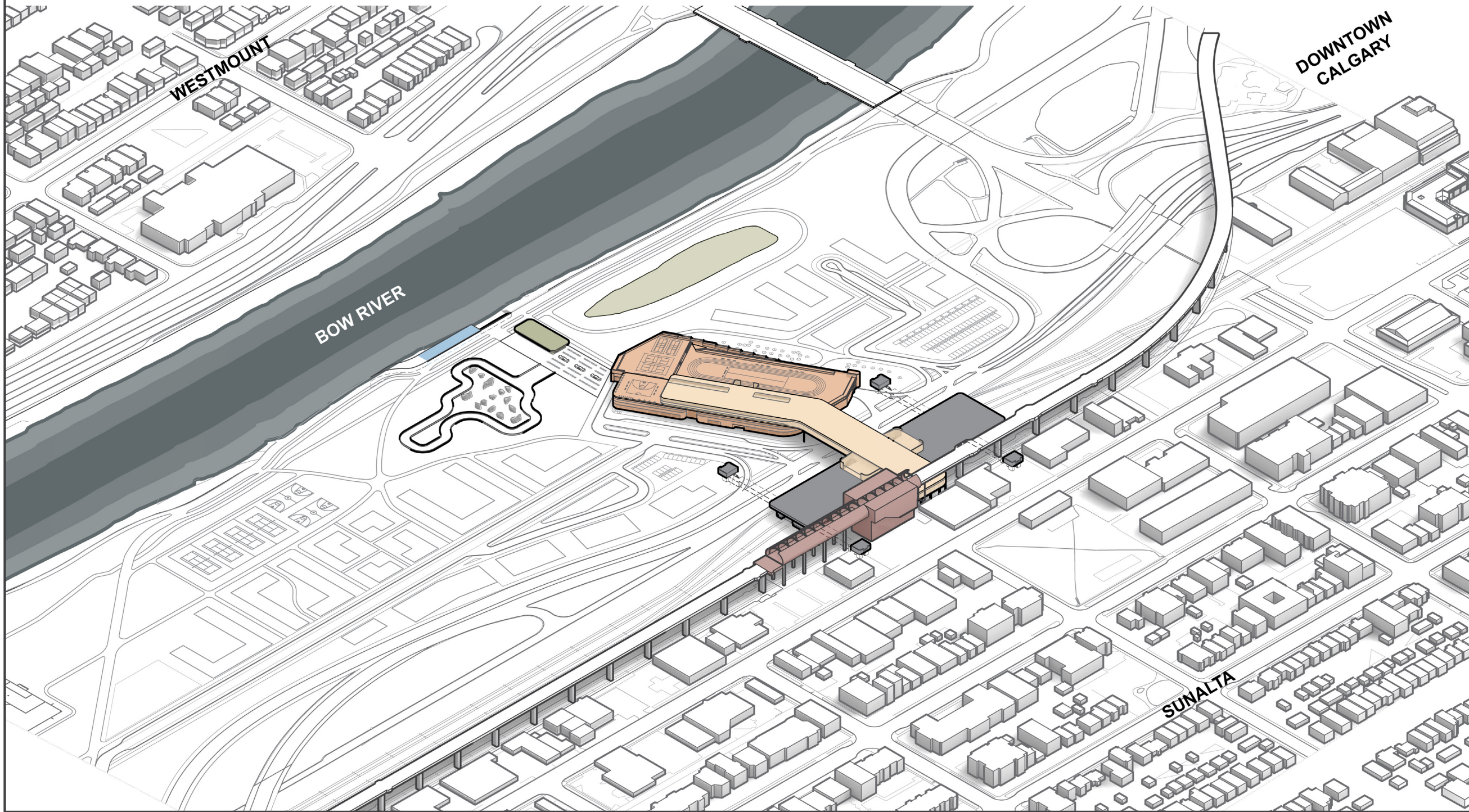
Slide 28: The former Greyhound Bus terminal building will be adapted for this project. The site has a direct connection to the LRT via the existing elevated Sunalta station directly south of the site, is next to the existing CP Rail lines for the incorporation of commuter rail, is adjacent to 9th Avenue which is the vehicular gateway into downtown and is the main entry point to the city for major Bus Rapid Transit lines. It is also within proximity of the Bow River Pathway for active and recreational transportation.

EXISTING SITE (SUNALTA)



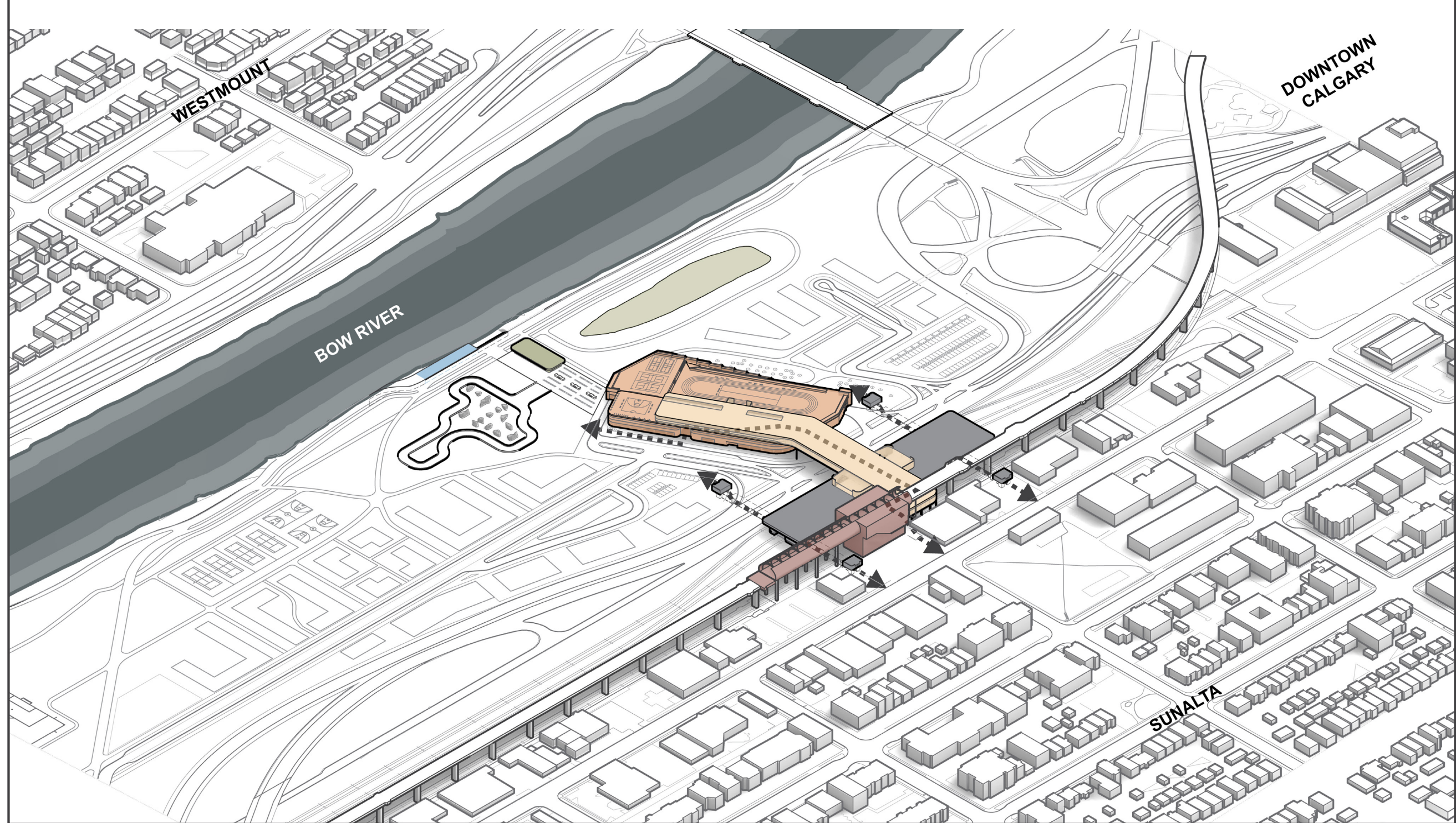
Slide 29: Here you can see the existing relationship between the former Greyhound Terminal to Sunalta Station via a series of poorly integrated pedestrian ramps and bridges. You can also see the current condition of the one-way 9th Avenue and Bow Trail freeways which surround the site, creating an island-like condition for the former greyhound terminal shown in orange. The current location of the Bow Trail freeway along the riverbank only leaves a small area for active transportation and pedestrians along the Bow River pathway.

DESIGN INTERVENTIONS



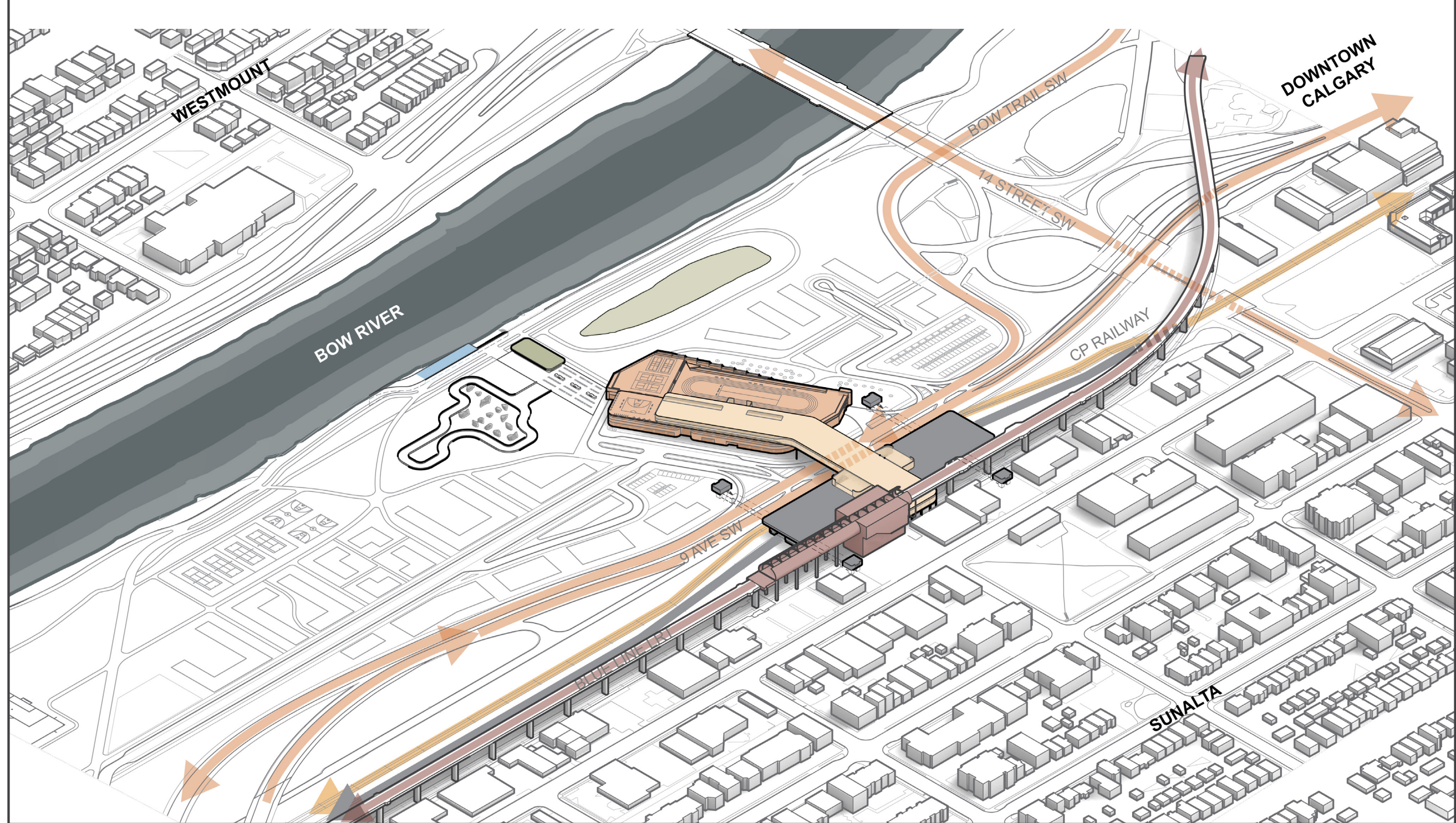
Slide 30: Here is the site with my design interventions, which includes a much more robust pedestrian bridge linking Sunalta station to the Railway Station, and then finally to the former greyhound building.

CONNECTING SUNALTA



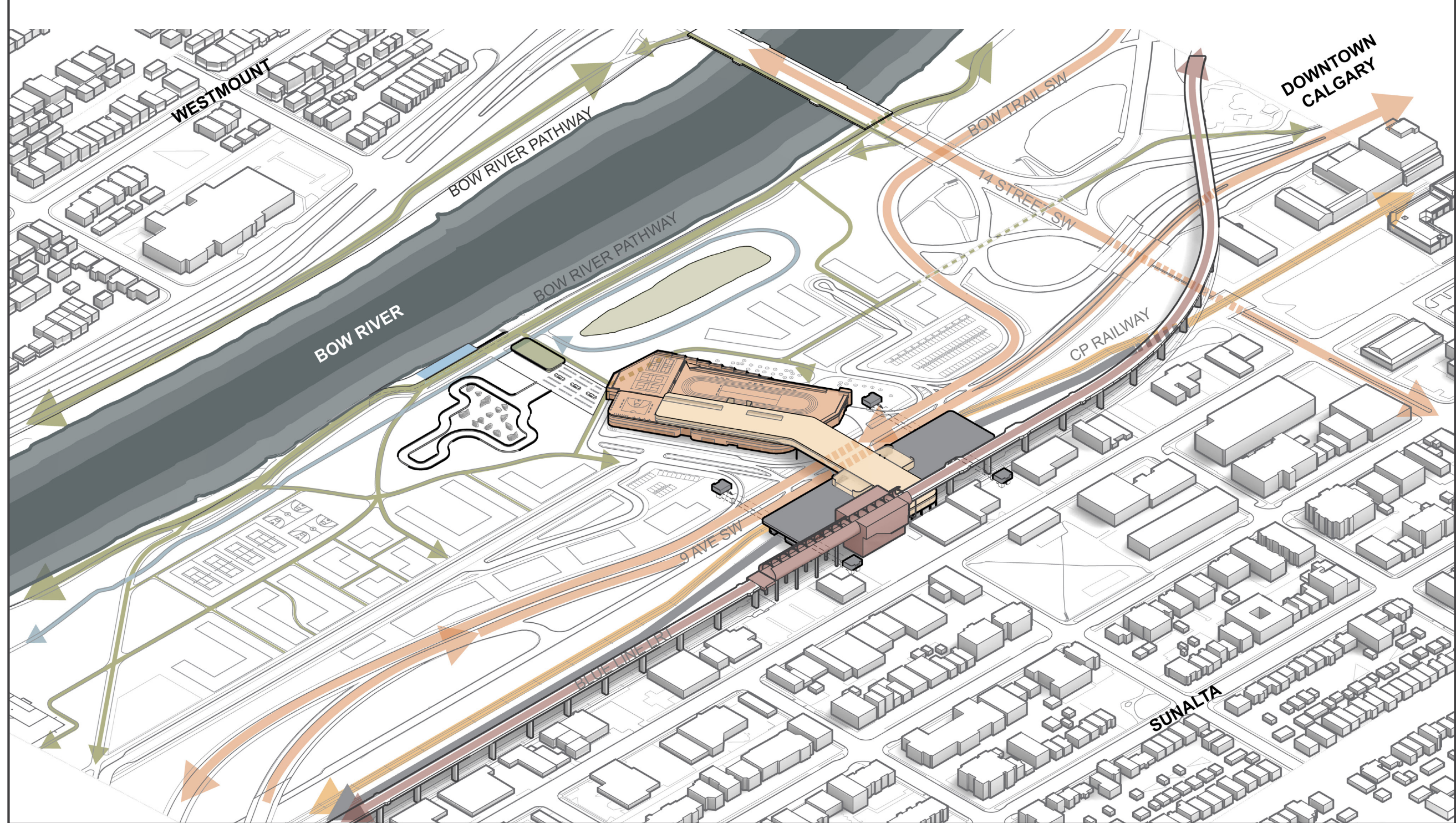
Slide 31: The CP Rail lines and 9 Avenue freeway have produced a physical divide between the West Village District and Sunalta. The proposed Metropolitan Hub design stitches Sunalta's urban fabric back together, by providing an integrated bridge accessed from Sunalta Station connecting to the former greyhound terminal, as well as two tunnels that connect the two parts of the community underground, and allow residents to easily access the train station.

RE-ROUTED VEHICULAR AND PROPOSED RAIL TRANSPORTATION



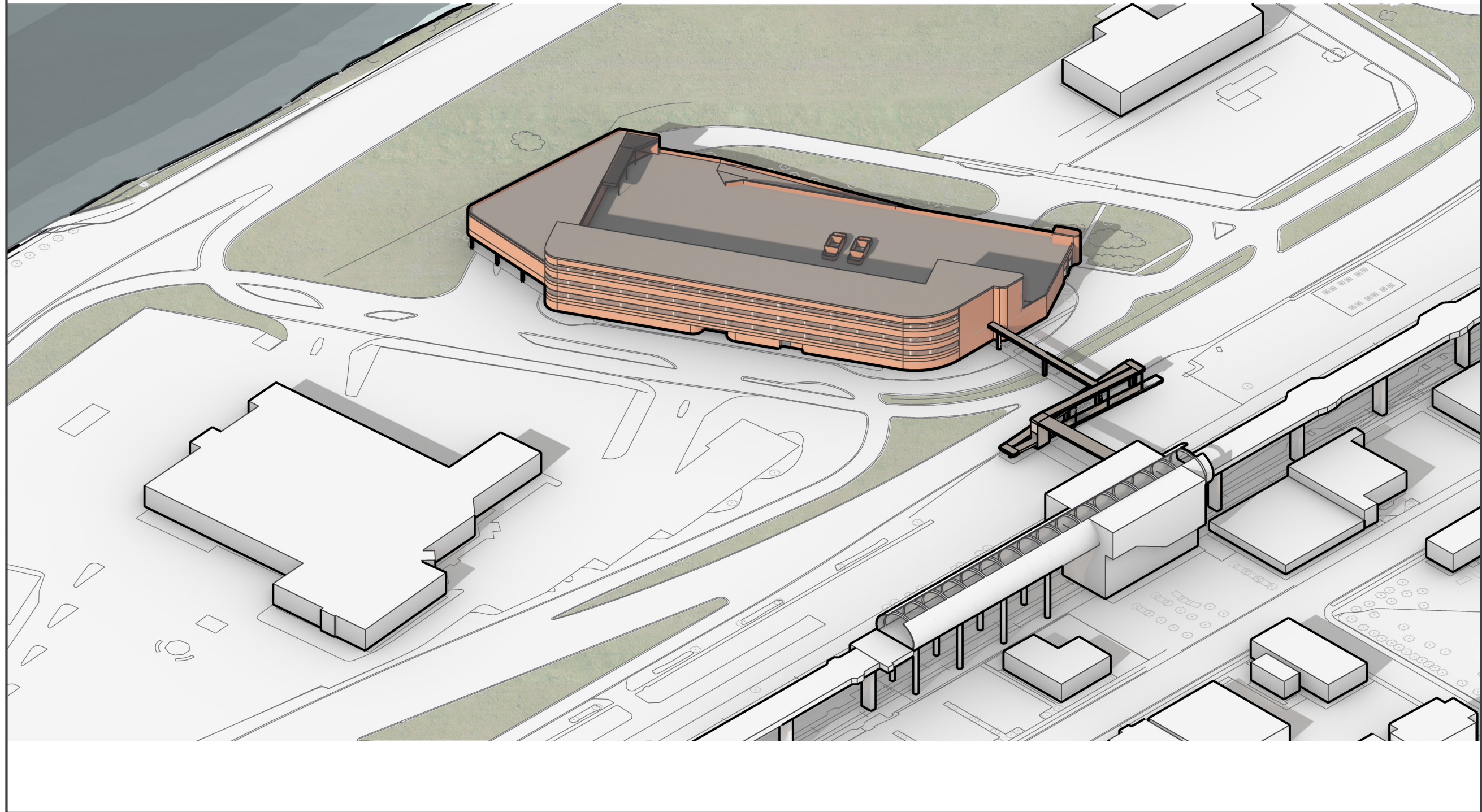
Slide 32: One-way westbound traffic on Bow Trail is re-routed to a consolidated two-way boulevard shared with 9 Avenue.

ACTIVE TRANSPORTATION



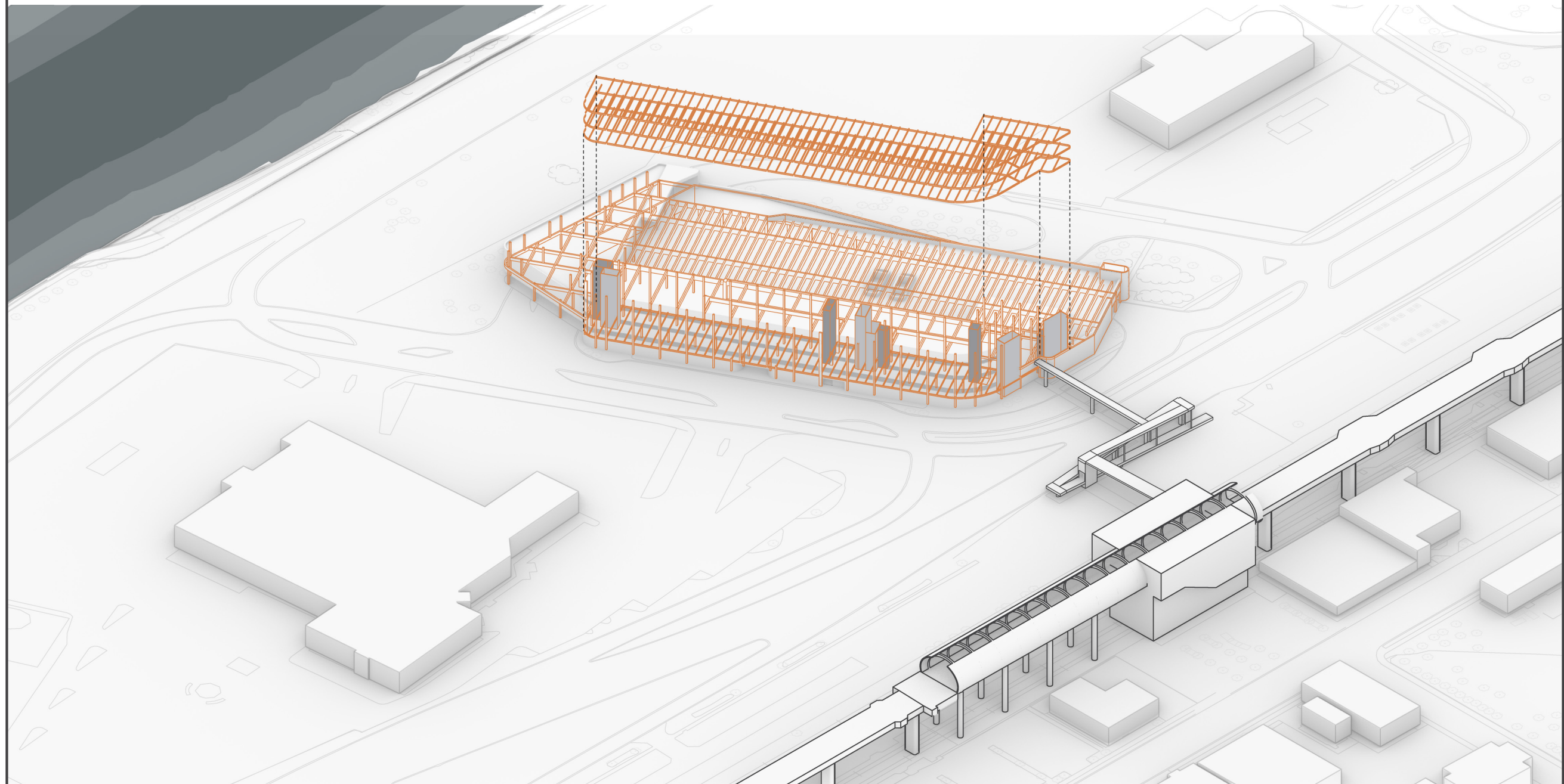
Slide 33: This opens up the riverfront to active transportation and recreation, which is supplemented by recreational programming included in my design proposal.

EXISTING SITE



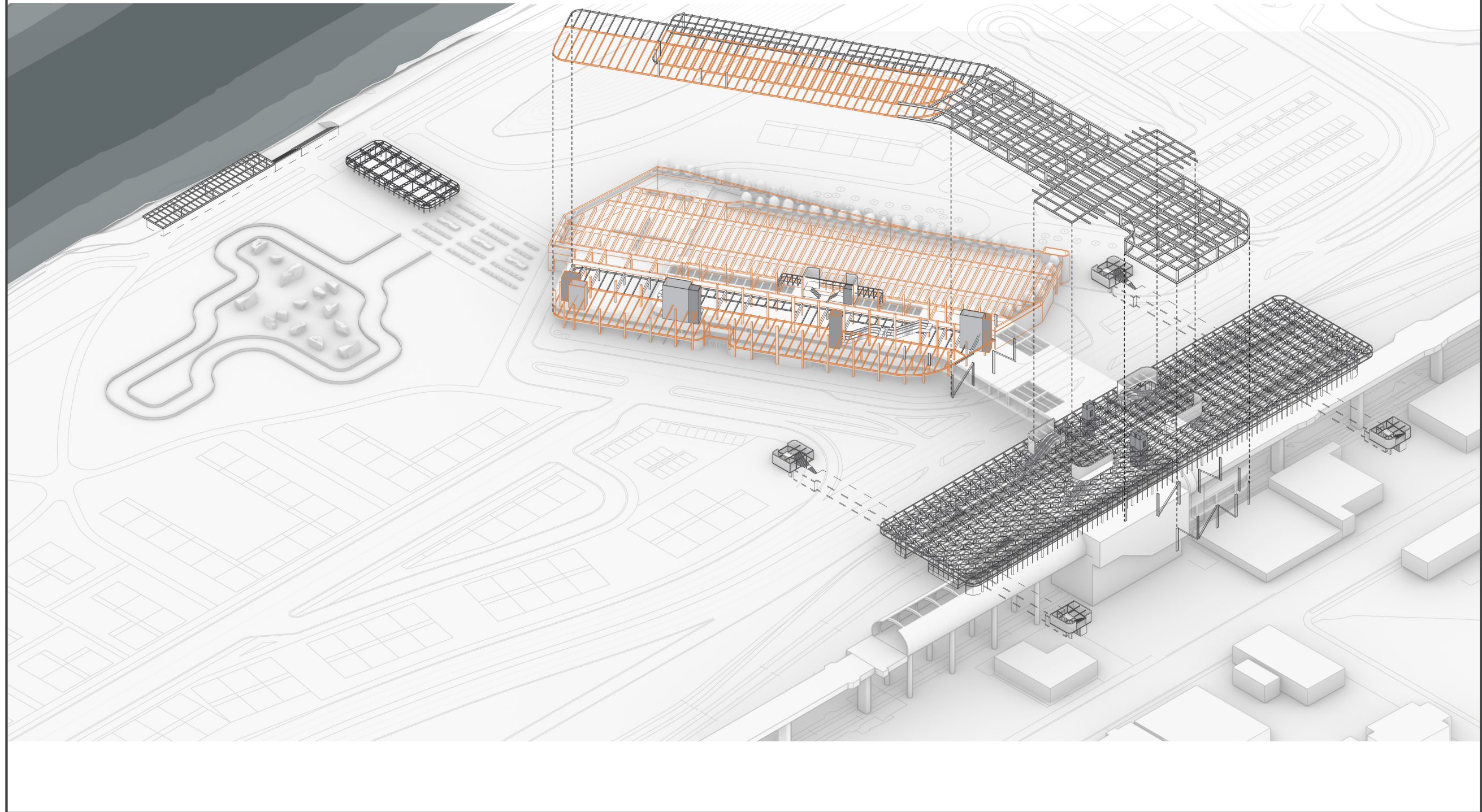
Slide 34: Much of the existing greyhound terminal structure is retained.

EXISTING GREYHOUND TERMINAL STRUCTURE



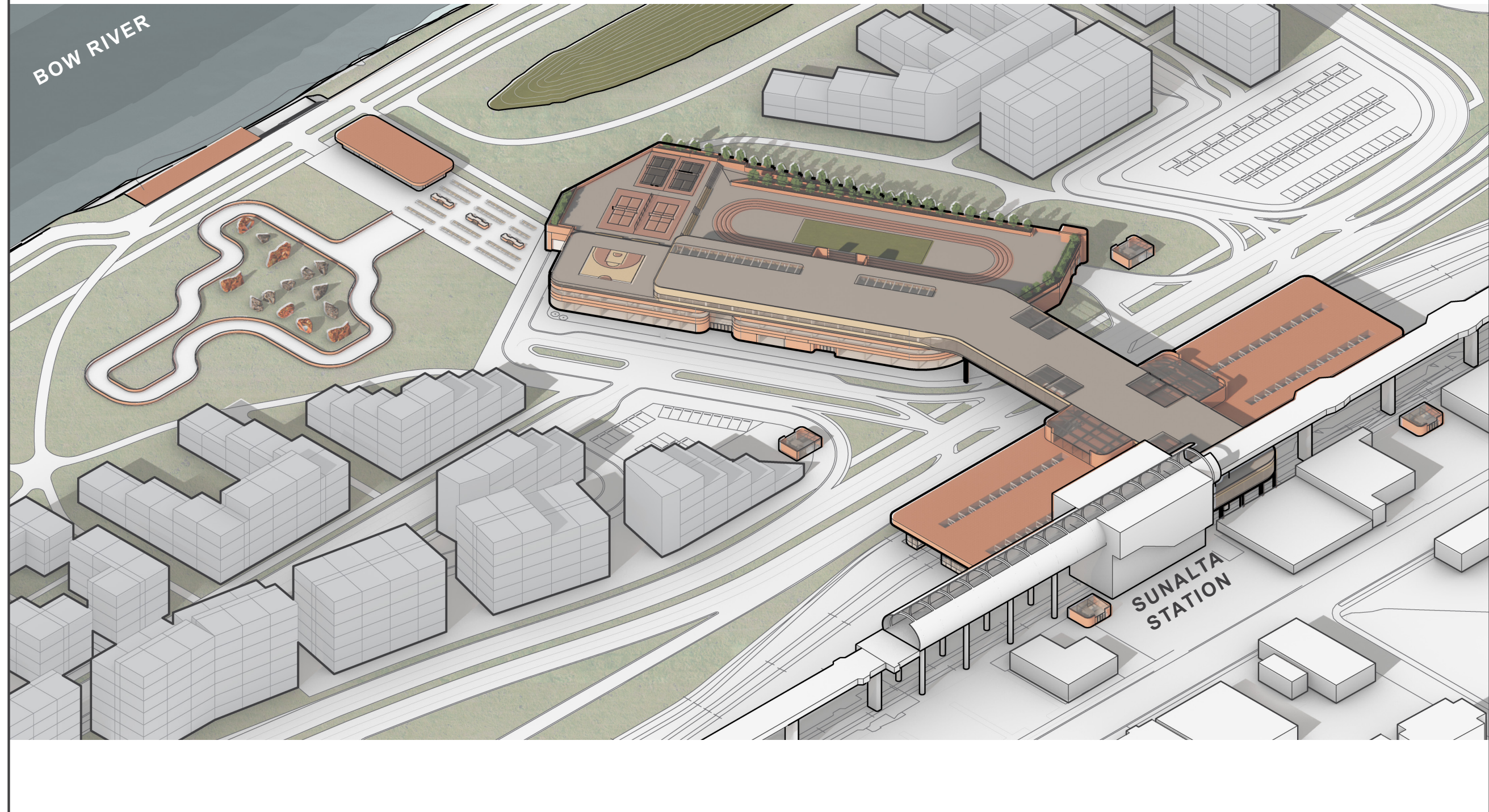
Slide 35: The existing structure (shown here in orange) is composed primarily of concrete columns and beams, with steel joists spanning between. The existing elevator cores are represented in dark grey, and stair cores in light grey.

EXISTING AND PROPOSED STRUCTURE



Slide 36: Here, shown again in orange, we see which aspects of the existing structure are retained, and we see how it integrates with the proposed structure shown in black linework. All proposed structure is comprised of steel members.

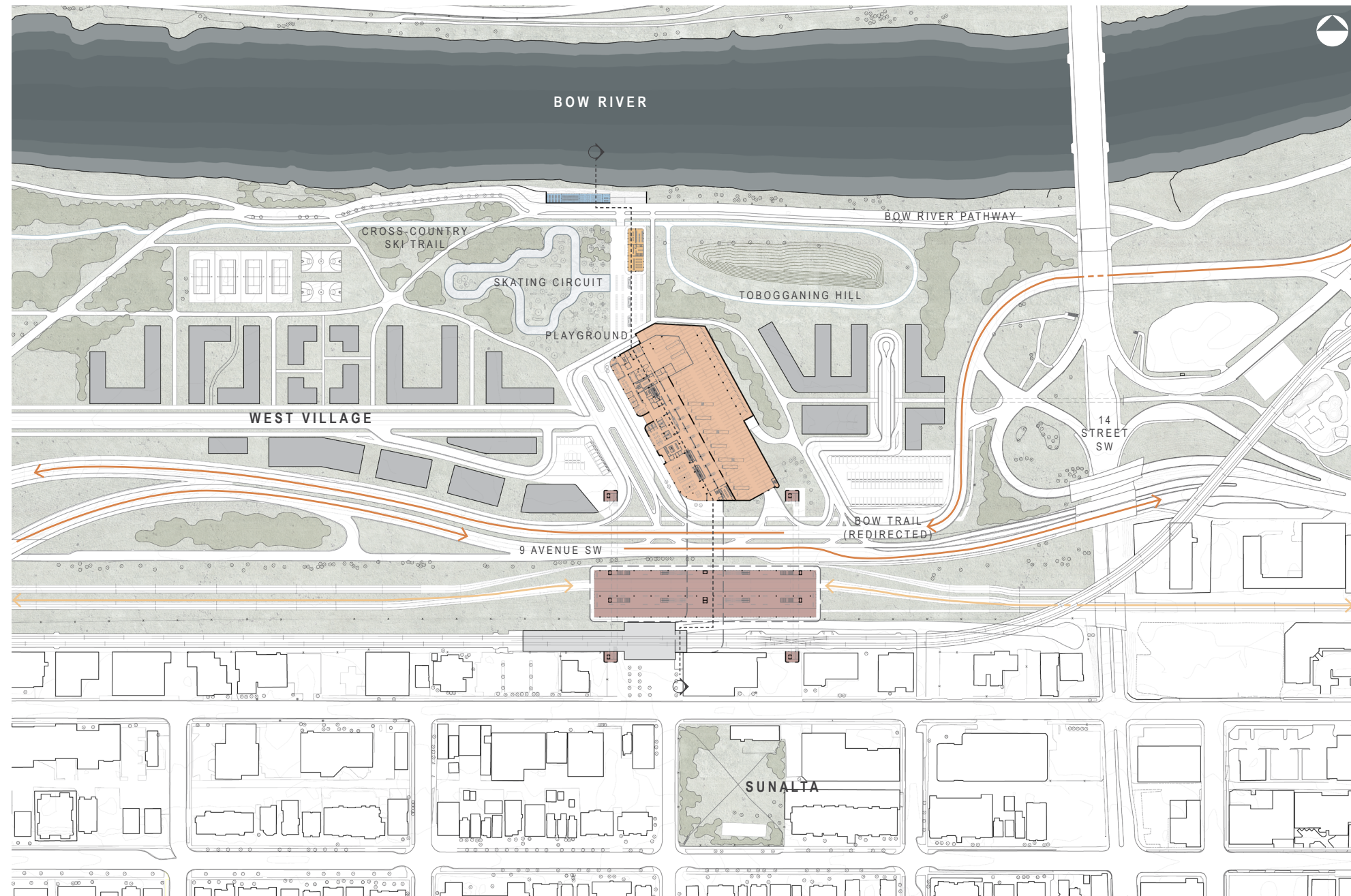
PROPOSED DESIGN AND FUTURE DEVELOPMENT



Slide 37: A series of 4 buildings create an architectural journey connecting Light Rail Transit at the Existing Sunalta Station to Active Transit and recreation along the Bow River. Future residential development massing is shown in grey.

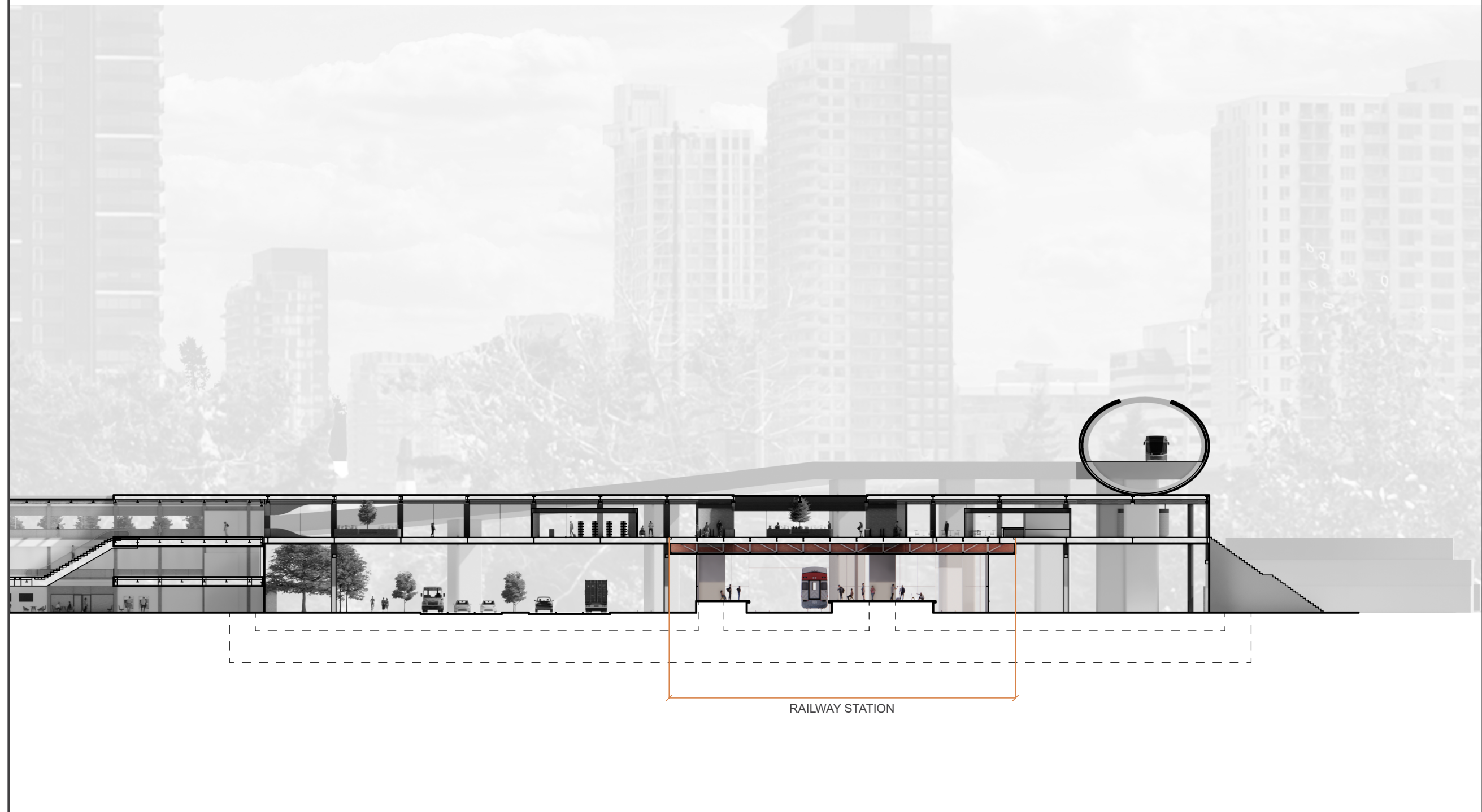
URBAN DESIGN STRATEGY

- Sunalta Station (Existing)
- Railway Station
- The Hub
- Land Rental Pavilion
- Water Rental Pavilion
- Future Residential Development



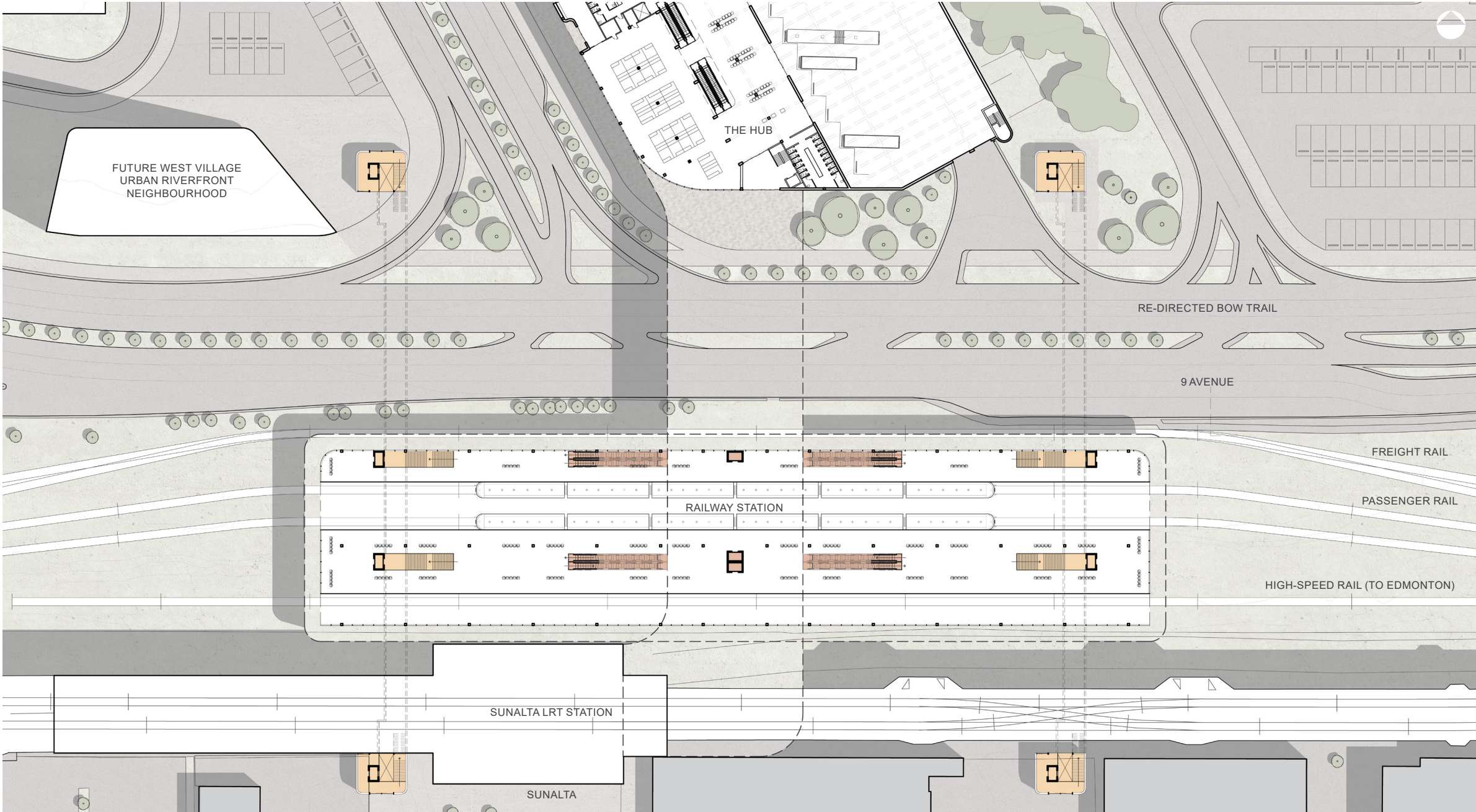
Slide 38: The railway station (highlighted in red) is the first building one passes on their journey to the bow river from Sunalta station. The former Greyhound Terminal (highlighted in orange) dubbed the Hub, acts as a node within the community, where a variety of programming is located, and offers direct Bus connections and shared mobility options. North of the Hub are two rental pavilions, one for recreation rentals (highlighted in yellow), and another for water recreation rentals (highlighted in blue). Together, these 4 buildings comprise the Metropolitan Hub.

RAILWAY STATION SECTION



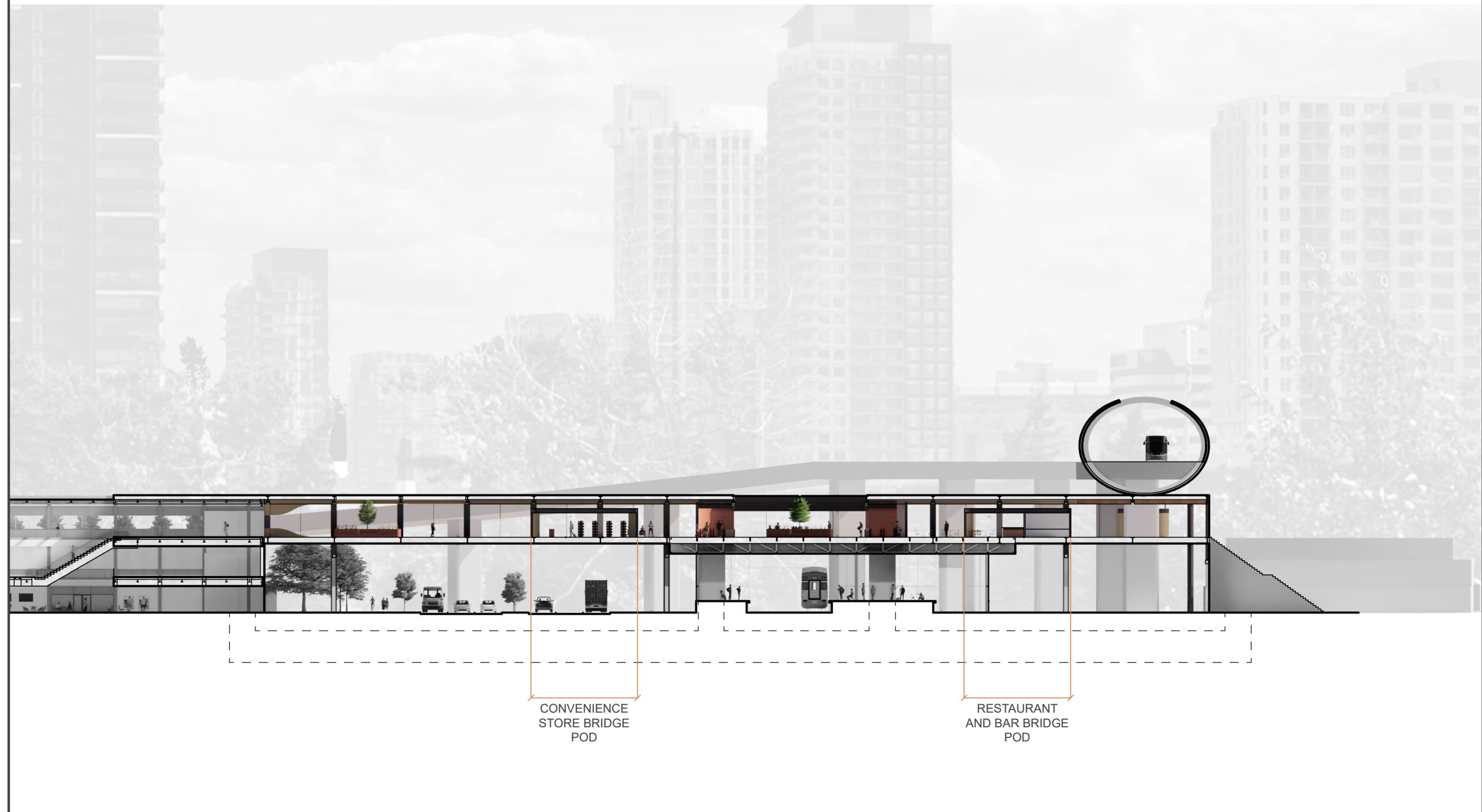
Slide 39: The passenger and high-speed railway Station is where inter-city and regional travelers connect with Calgary's transportation networks, and where urban dwellers can board a train to escape the city and access Canmore, Banff and the Rocky Mountain Parks west of the city, as well as Edmonton to the north.

RAILWAY STATION PLAN



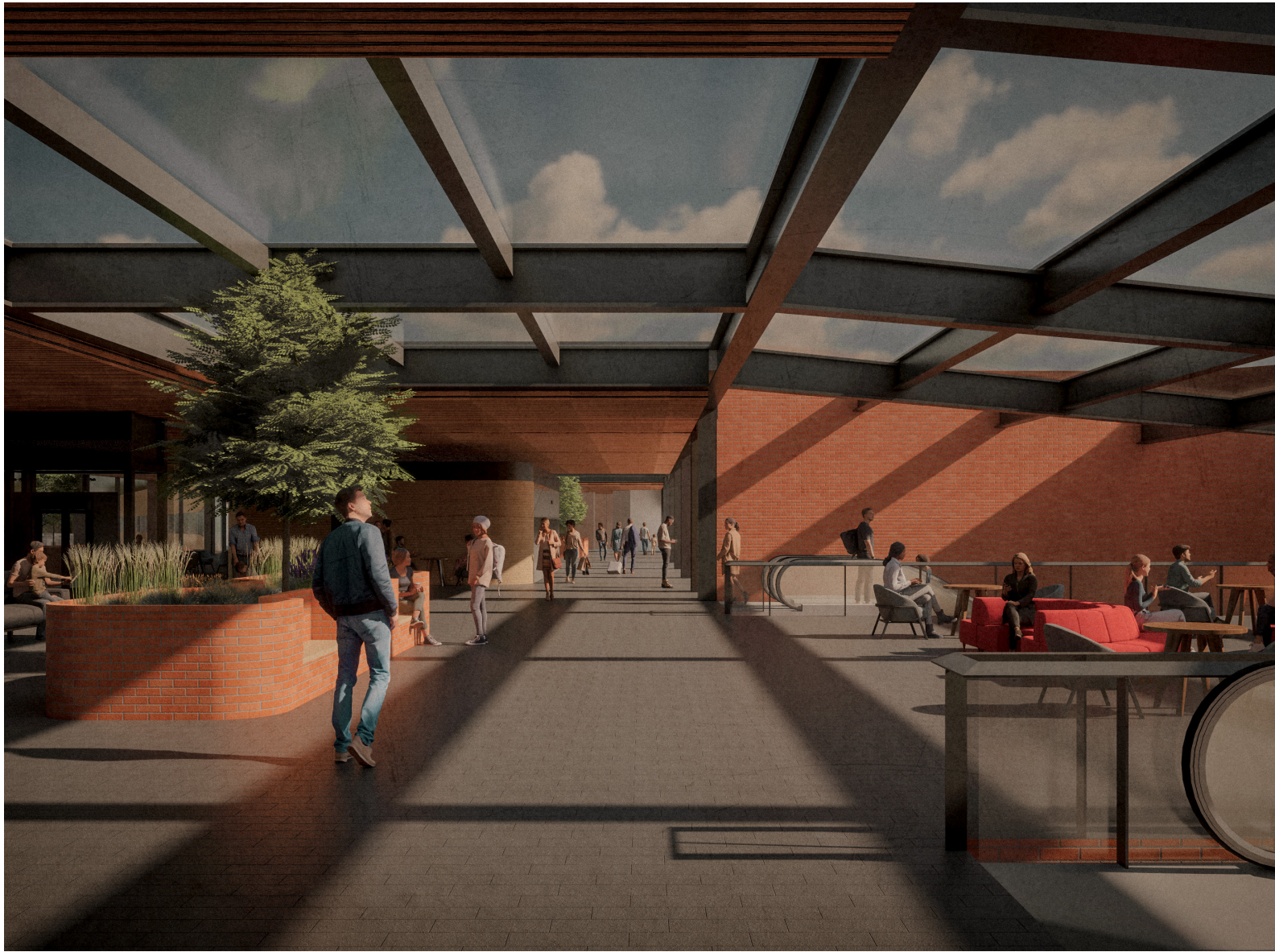
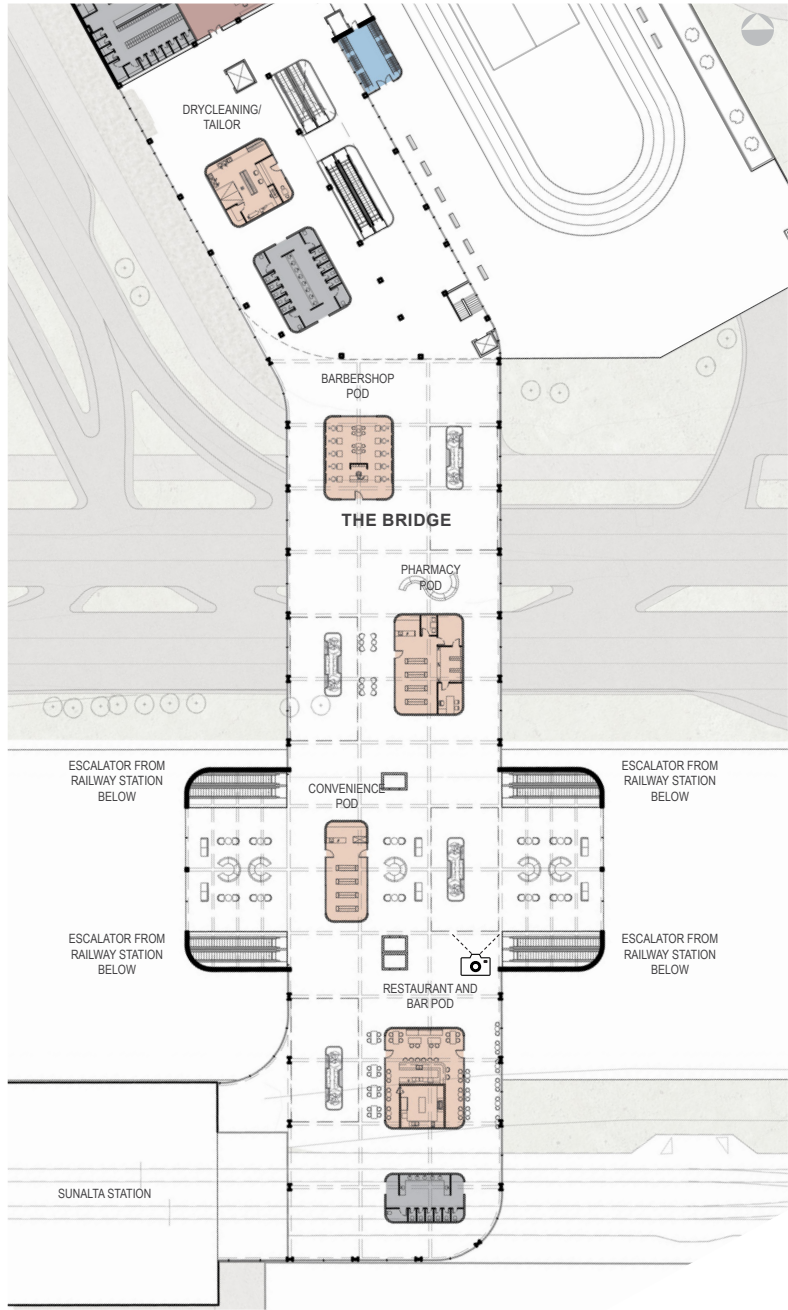
Slide 40: Stairs and entrance pavilions to the tunnels which connect the two districts of Sunalta and West Village below the station are highlighted in yellow. Escalators from the platform to the bridge above are highlighted in red.

THE BRIDGE SECTION



Slide 41: In the bridge located above the Railway Station, nested bridge pods allow for transportation complementary services and amenities to be conveniently located along a traveler's connection between modes.

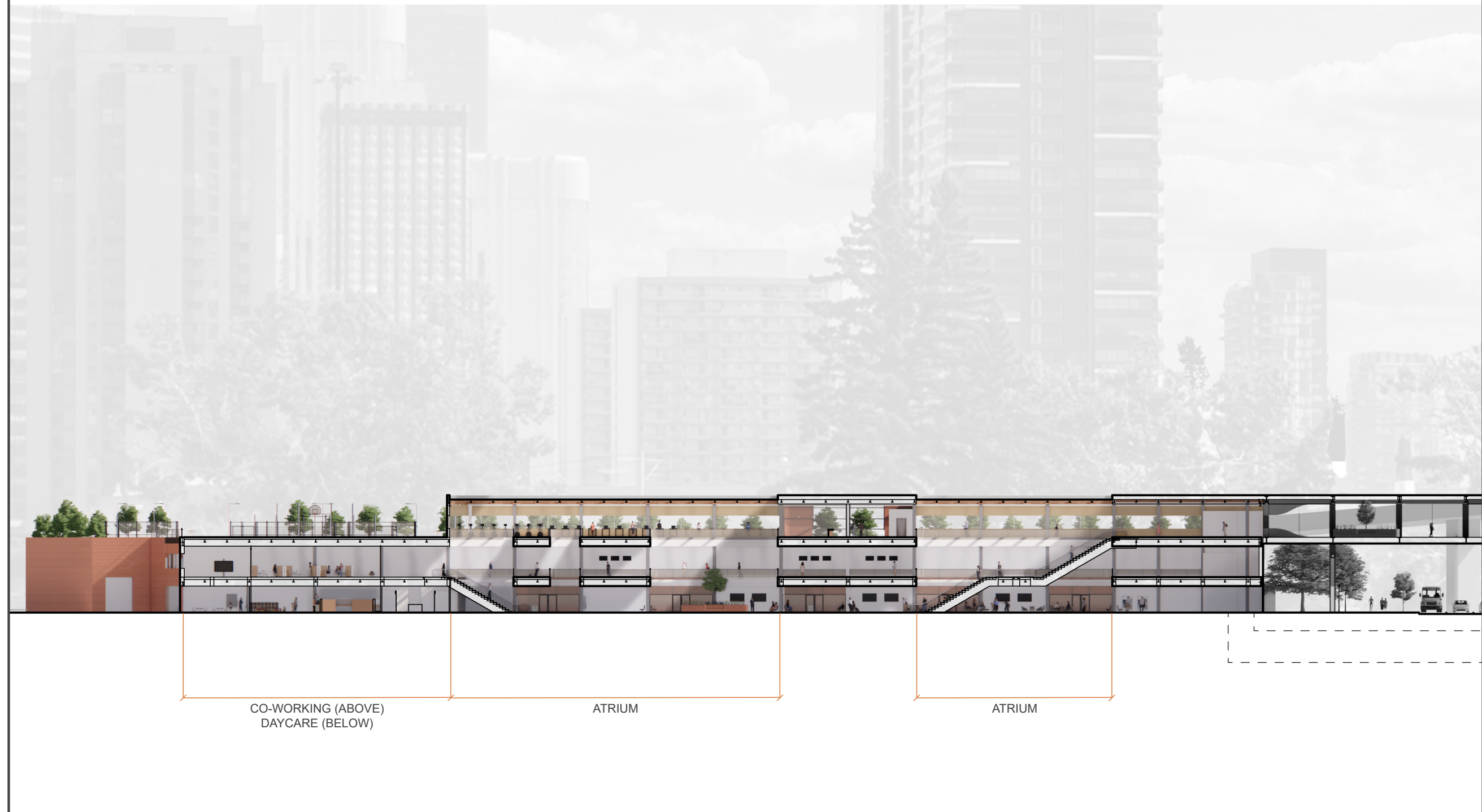
THE BRIDGE



- Bridge Pods
- Secure Bike Parking
- All-Gender W/C

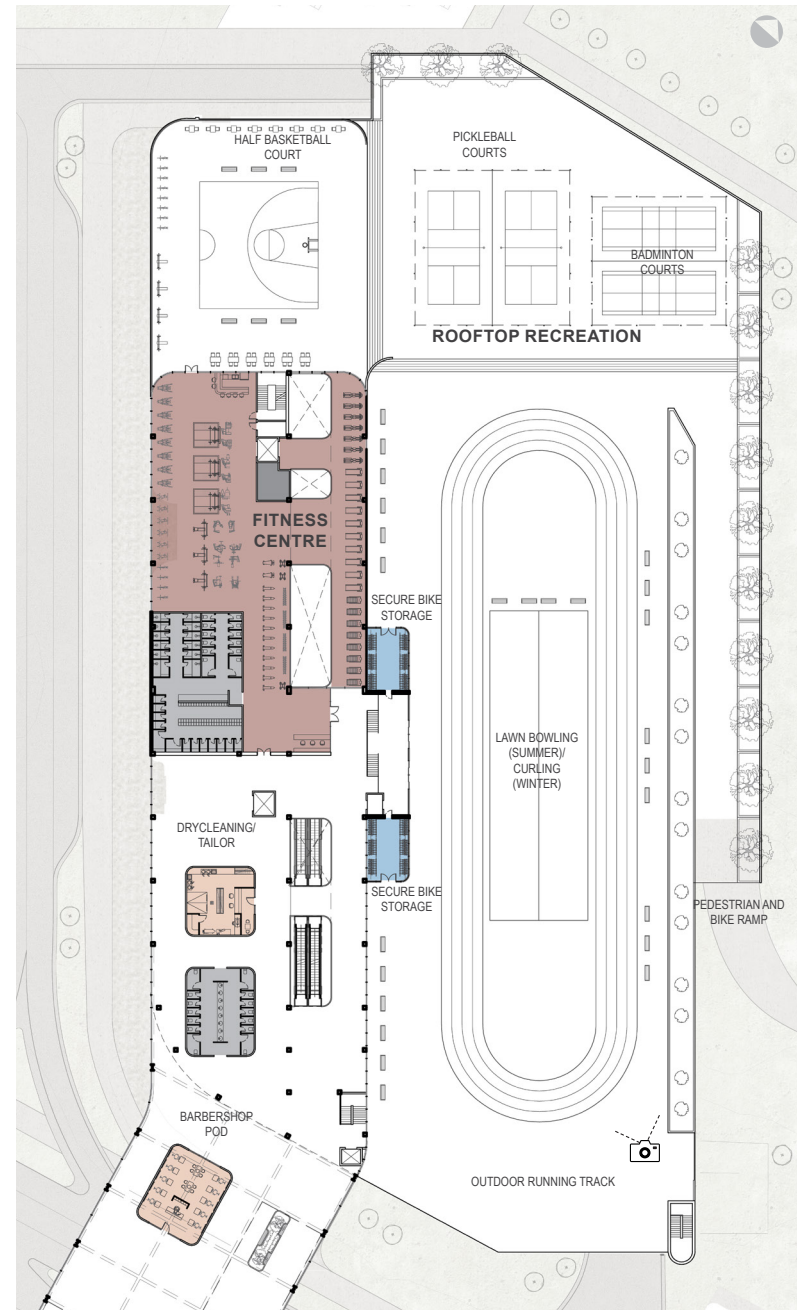
Slide 42: Bridge pods include a tailor and drycleaning, barbershop, pharmacy, convenience store and restaurant and bar. These program elements offer travelers services that fit conveniently in the waiting period for transfers between modes. The Restaurant and bar acts as a gathering place for travelers and locals alike and will keep activity in the building throughout the night. In addition to the bridge programming, diverse seating options provide users with spaces to gather, socialize and areas of repose in the bustling Hub.

THE HUB SECTION



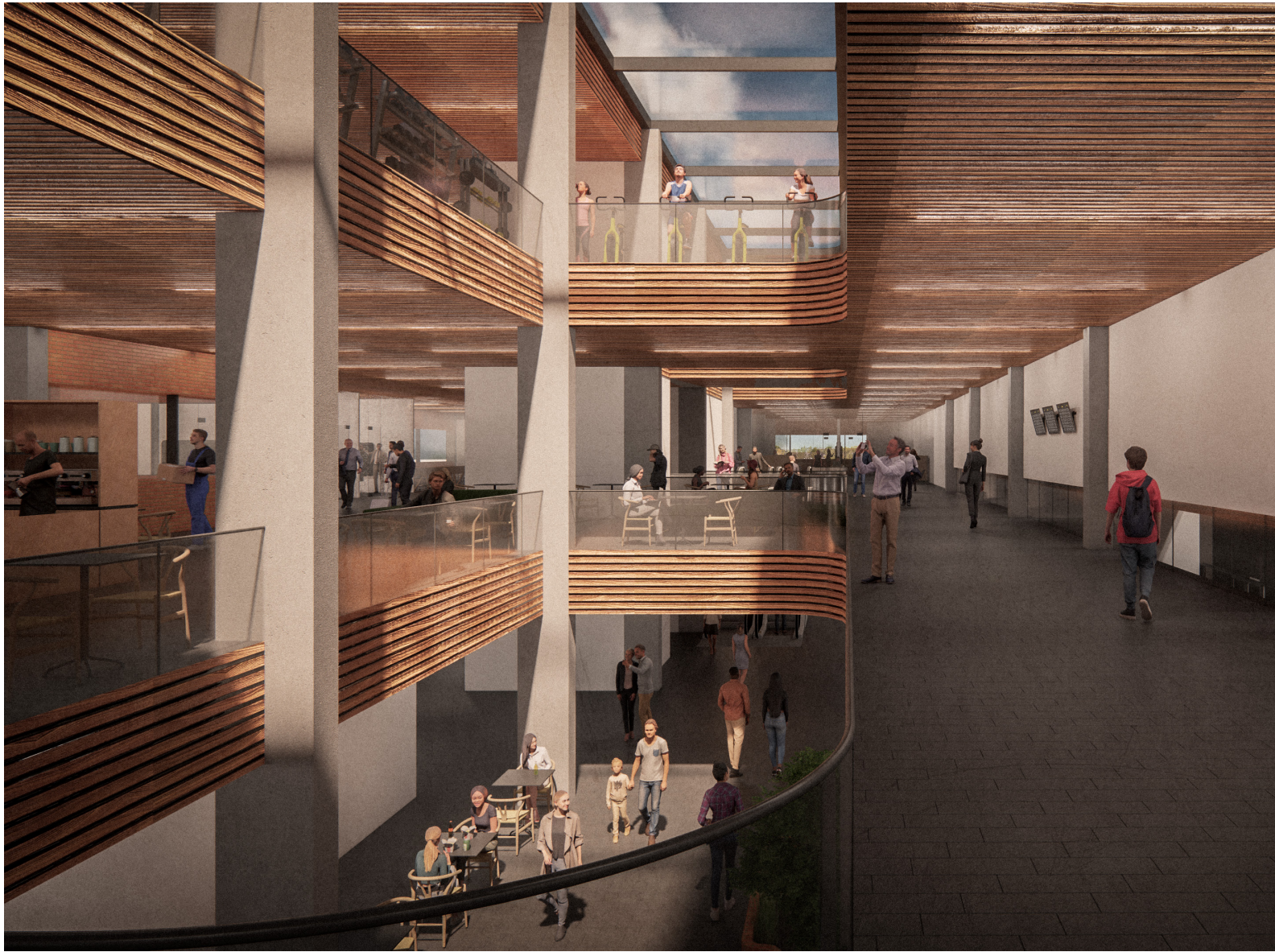
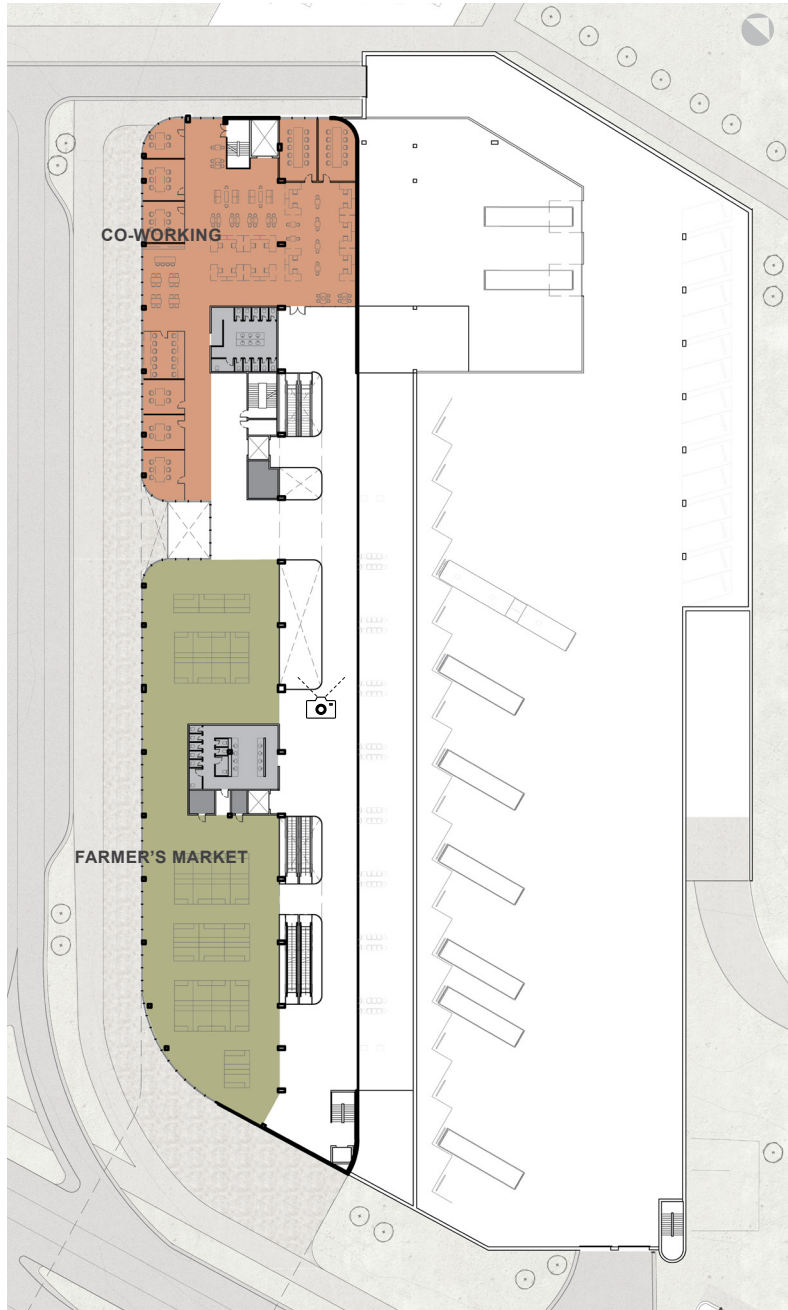
Slide 43: Here we see how the 3 floors of the hub relate to each other in a section cut through the atria, highlighting the primary circulation through the hub via escalators located below the skylights.

THE HUB BRIDGE LEVEL



Slide 44: The top floor of the Hub, the bridge level, includes a fitness center. By designing a typical weight room with corresponding outdoor fitness courts and recreation space on the rooftop, the recreation space that exists along the Bow River is extended to the Hub, creating a node for activity with all types of recreation clustered in one area. The existing car ramp is re-purposed as a bike and pedestrian ramp, with secure bike storage flanking the rooftop hub entry.

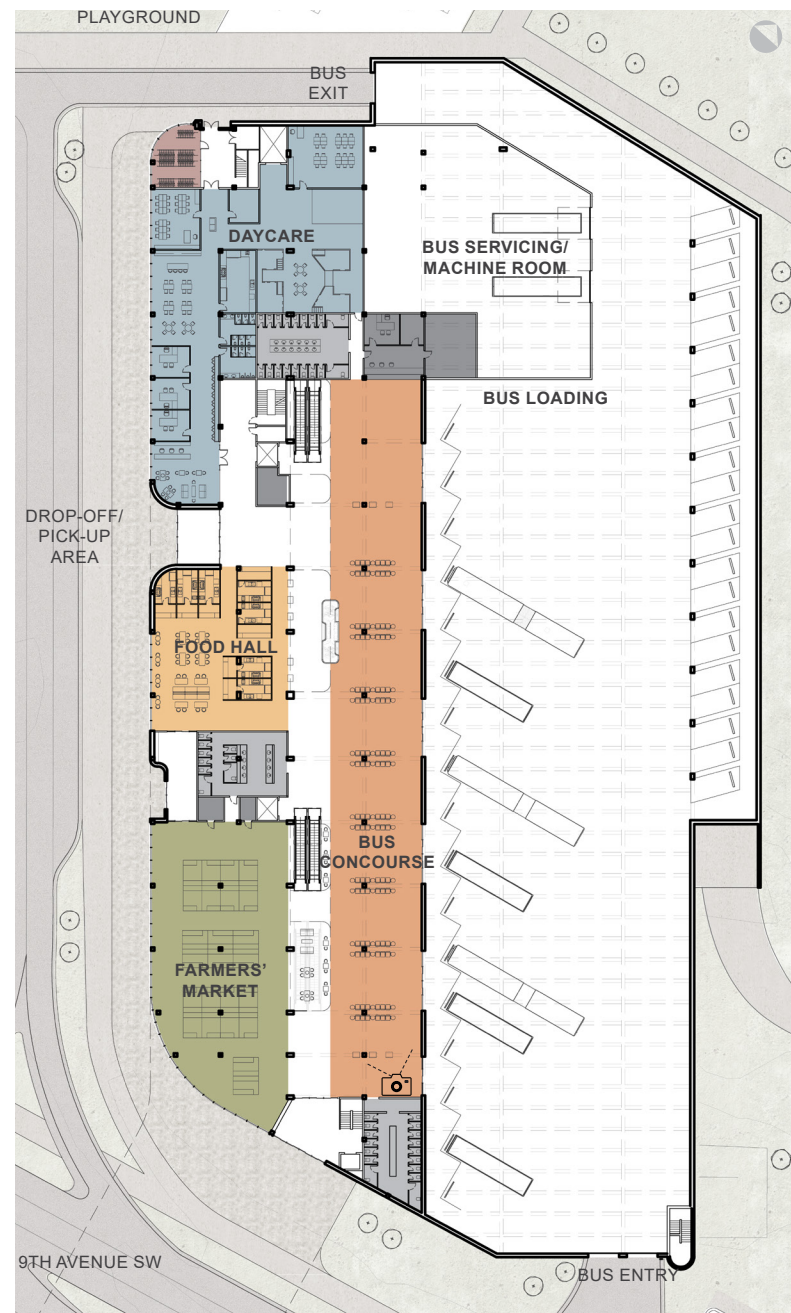
THE HUB MEZZANINE LEVEL



-  Farmer's Market/Event Space
-  Co-working
-  All-Gender W/C

Slide 45: Now down to the mezzanine level, where an upper-level extension of the farmers market on the ground floor (which we will be descending to shortly) is shown in green on the plan, which is a flexible space that can also be rented out for events. Co-working spaces are also located on the mezzanine level, allowing people to connect virtually as well as physically. Collaborative working spaces will become increasingly important as more people work remotely.

THE HUB GROUND LEVEL



Slide 46: Now on the ground floor, the bus passenger concourse (highlighted in orange) is located adjacent to the main circulation of the building. Buses are directly accessed from inside the building, making it a more comfortable waiting environment, and offering access to the amenities within the hub while passengers wait. Social programming is conveniently located adjacent to the bus concourse, which includes a local farmers market, and a food hall.

The market (highlighted in green) provides fresh local food to urban residents and commuters. Shopping for groceries is a weekly, if not daily ritual for most people. A downtown Farmers market allows urban residents to access locally grown food, and travellers can do their shopping without the need to make another stop along their journey.

The food hall (highlighted in yellow) offers a variety of food vendor stalls, to provide users with an array of food and beverage options depending on their time restraints.

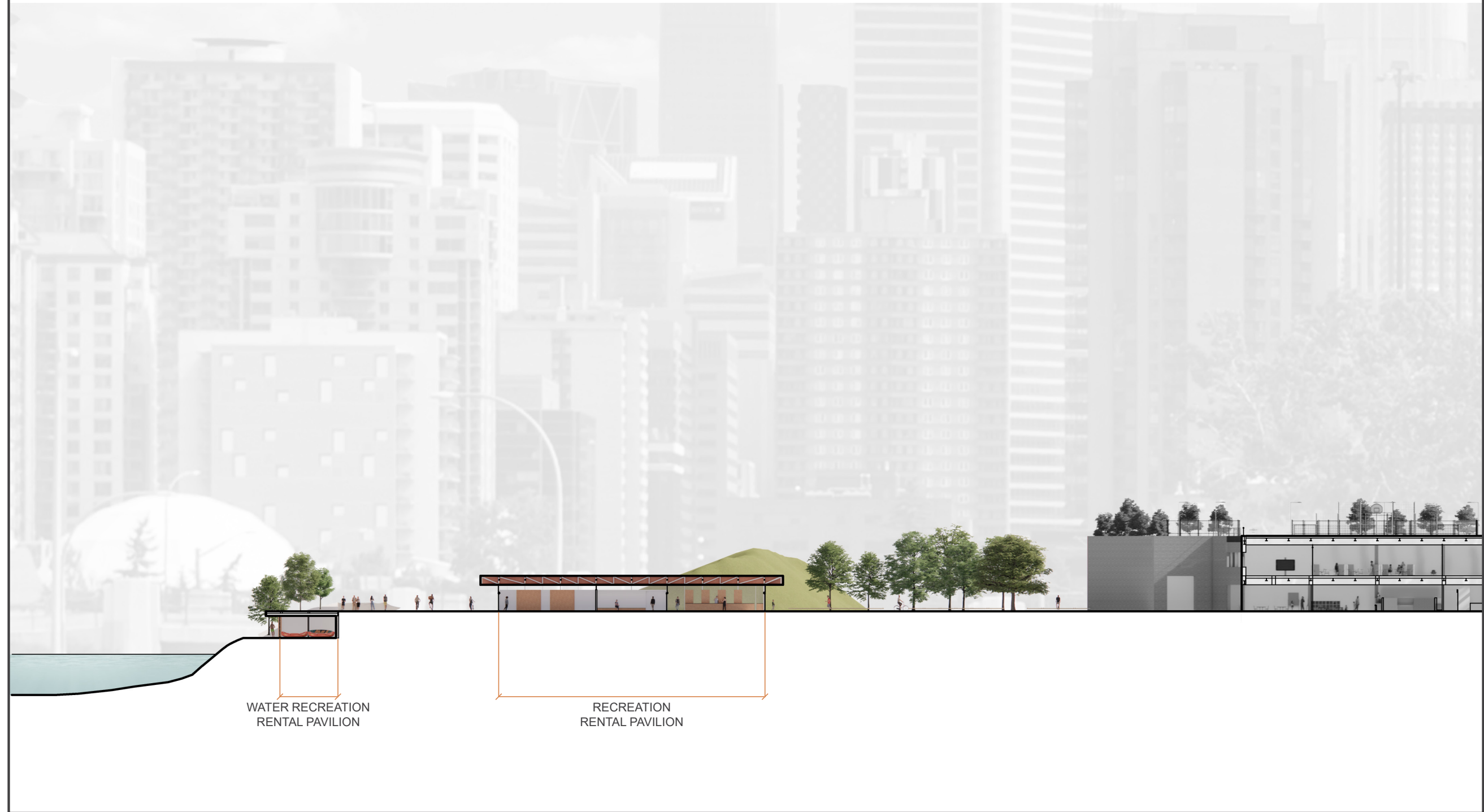
A daycare (highlighted in blue) is located on the northwest corner of the building, and secure bike parking, highlighted in red, is accessed off the pathway from the north entrance.

PLAYGROUND VIEW LOOKING SE TOWARDS THE HUB



Slide 47: An outdoor playground is located opposite the daycare to the north of the Hub. Commuters can drop their kids off at the daycare on their way to work and pick them up at the end of the day, making transit more convenient than driving by reducing the amount of stops along one's journey.

RENTAL PAVILIONS SECTION



Slide 48: After passing through the Hub and past the playground, the traveller arrives at the recreation rental pavilions.

RECREATION RENTAL PAVILIONS



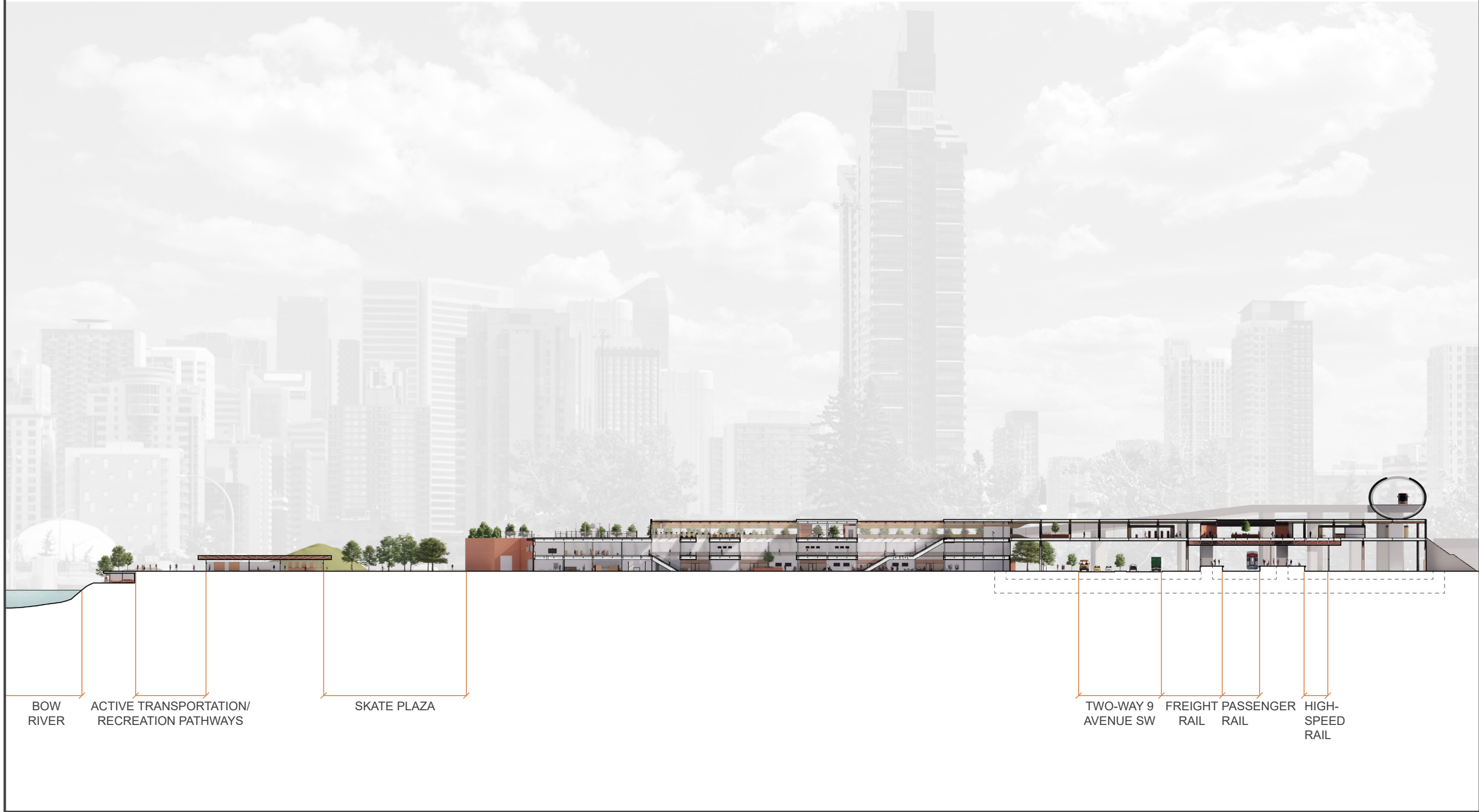
Slide 49: The recreation rental pavilion (highlighted in yellow) provides patrons with bike, roller skates, scooters, skateboards and other recreational rentals are conveniently located adjacent to the river pathway system to encourage active transportation. The water rental pavilion (highlighted in blue) offers boat rentals, such as kayaks, canoes and rafts.

SKATE CIRCUIT



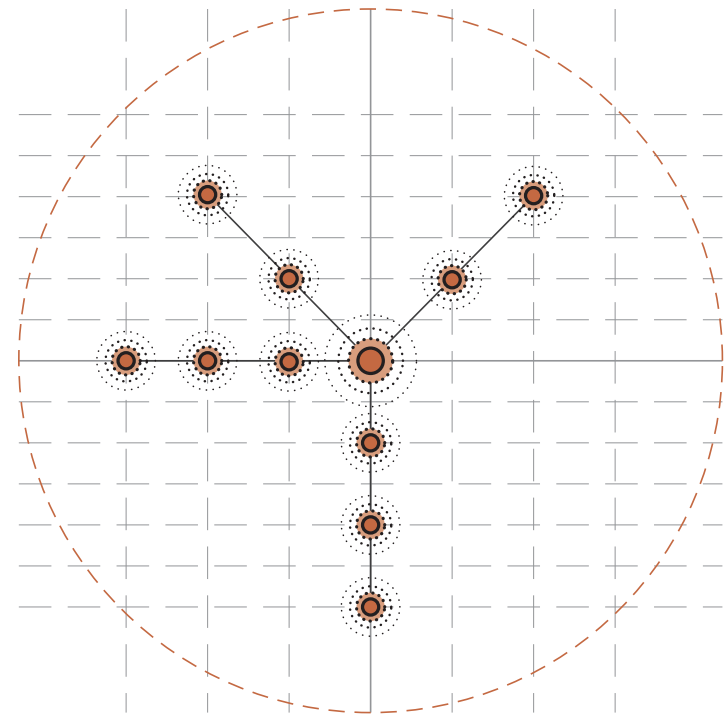
Slide 50: In the winter, roller skates are swapped out for ice skates, and cross-country skis are rented instead of scooters. This render shows the skate circuit in both the winter and summer, with the Recreation Rental Pavilion behind the rock/ice climbing walls in the background, and the downtown skyline behind it.

METROPOLITAN HUB LONGITUDINAL SECTION

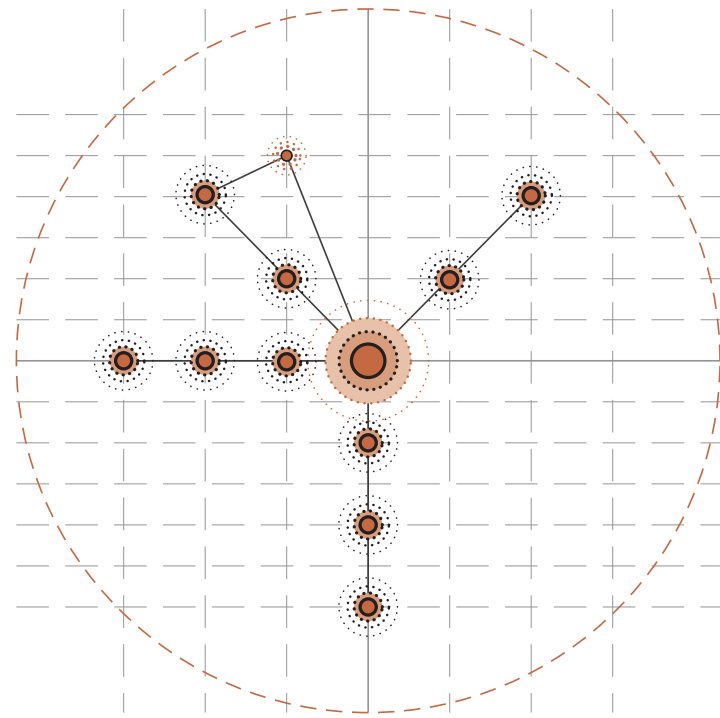


Slide 51: Community services and amenities are located within the Hub, altering the typical station typology by making it a hub for community instead of just being a “stop”. The metropolitan hub is not dedicated to travel alone: it is a place in its own right, with a local farmers market, co-working spaces, daycare, and various other social and cultural facilities enclosed within its shell. The metropolitan hub serves to re-connect communities that were excluded by Calgary’s uni-city growth strategy and land annexation. The station acts as a microcosm of the city, offering the transportation networks, amenities, and possibilities for social interaction that the city promises.

FUTURE MULTIPLICATION



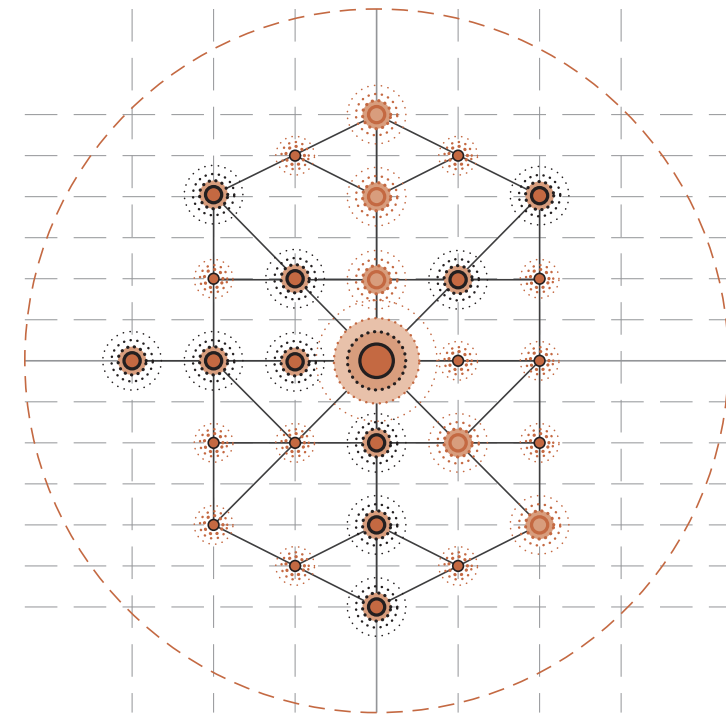
 Existing LRT Station Node



 Existing LRT Station Node

 Neighbourhood Hub


 Metropolitan Hub



 Existing LRT Station Node

 Neighbourhood Hub

 Metropolitan Hub

 Planned Green Line LRT Station Node

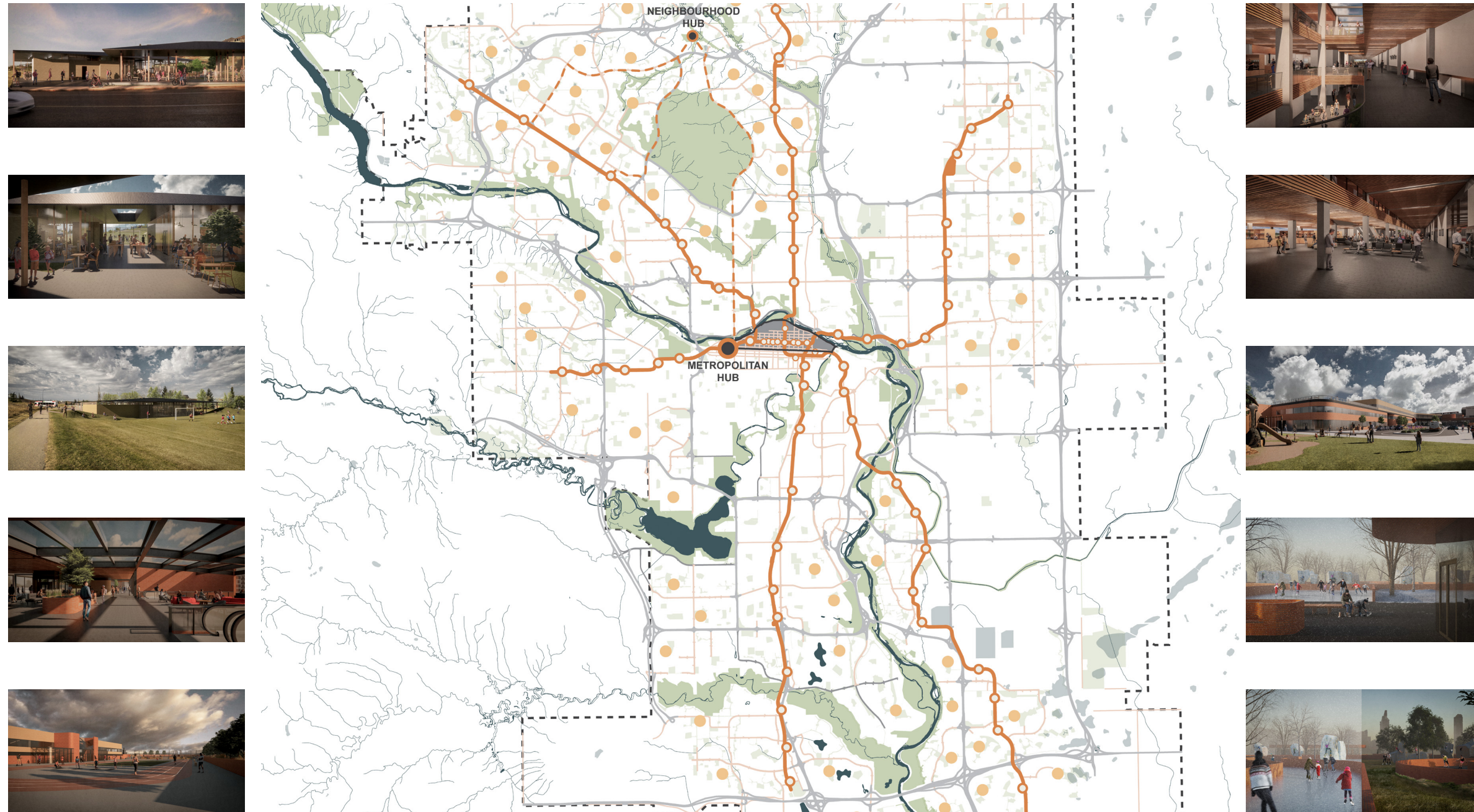
EXISTING

PROPOSED

FUTURE

Slide 52: Both the Neighbourhood Hub and Metropolitan Hub provide pivotal pieces within Calgary's transportation infrastructure to connect the dots between suburban communities and the central city by making it more convenient for Calgarians to shift away from automobile reliance and making transportation more accessible for all, while simultaneously enhancing Calgary's social infrastructure.

FUTURE NETWORK EXPANSION



Slide 53: My design proposals serve as a framework for future development within Calgary. These strategies can be applied to existing and future transportation hubs- offering a means of reducing Calgary's automobile dominance on a path towards an inclusive transportation network that integrates the city's transportation systems and reconnects communities.