PART 5: INFRASTRUCTURE

5.1 TRANSPORTATION

The Neighbourhood Plan establishes a foundation for the redevelopment of the UDistrict, and this will provide an opportunity for a complete mode shift where walking, cycling, and transit become preferred transportation choices. Streets within the Primary Redevelopment Area have been designed as complete streets, where all modes (walking, cycling, transit, and automobiles) can safely and comfortably move throughout the neighbourhood. A linear grid has also been developed within the Primary Redevelopment Area to break up larger blocks, provide more intersections, and allow future residents more direct routes to access local services by walking or cycling. Streets will become more attractive, vibrant, and interesting places with wider sidewalks, street furniture, street trees, and wayfinding signs.

Pedestrians

Within the UDistrict walking will be encouraged as the preferred mode of travel for all local trips. In order to facilitate this preference, all streets within the Primary Redevelopment Area will have sidewalks on both sides of the street, and all local services within the area will be safely accessible by foot.

The new pedestrian/cyclist overpass connecting Salton Road north and south of the Trans-Canada Highway will become an important component of encouraging walking within the Neighbourhood. The bridge will allow residents to access services on either side of the highway, as well as allow UFV students and staff a safe and direct route to school. Events at Abbotsford Centre will also become more accessible to pedestrian traffic.

UWalk will further enhance the pedestrian experience, as this corridor will provide direct access to the University Village which is home to Cascades Plaza, Abbotsford Centre, and UFV. The corridor itself will range in width from 2.4 m in Cascades Plaza to 4 metres in UWalk North. Street furniture, wayfinding signs and public art will be located throughout the corridor and will provide comfort, directions and visual interest. Pedestrian-scale street lights will also add to the attractiveness of this corridor, and will provide a safe and comfortable night-time environment.

5.1.1 Reduce Crossing Distances

Reduce crossing distances on local streets, and where possible on collector streets, by introducing curb bulges and other appropriate sidewalk treatments at intersections.

5.1.2 Future Mid-Block Crossing

When warranted, work with the Ministry of Transportation and Infrastructure to evaluate the feasibility of a mid-block crossing on McCallum Road between the roundabout and King Road. This study will be subject to a detailed traffic analysis to ensure operations of the Highway 1 ramp terminal intersection at the roundabout will not be adversely impacted.

5.1.3 Overpass Connection to UWalk

Design the Trans-Canada Highway overpass with an interim connection to Salton Road, but ensure that the ultimate pedestrian connection is made to UWalk North through City owned property at 1708 Salton Road.

5.1.4 Pedestrian Scale Street Lights

Install pedestrian-scale street lights along UWalk to create a safe and comfortable night-time environment.

5.1.5 Wayfinding

Provide wayfinding at key intersections along UWalk and ensure signs are placed in highly visible locations.

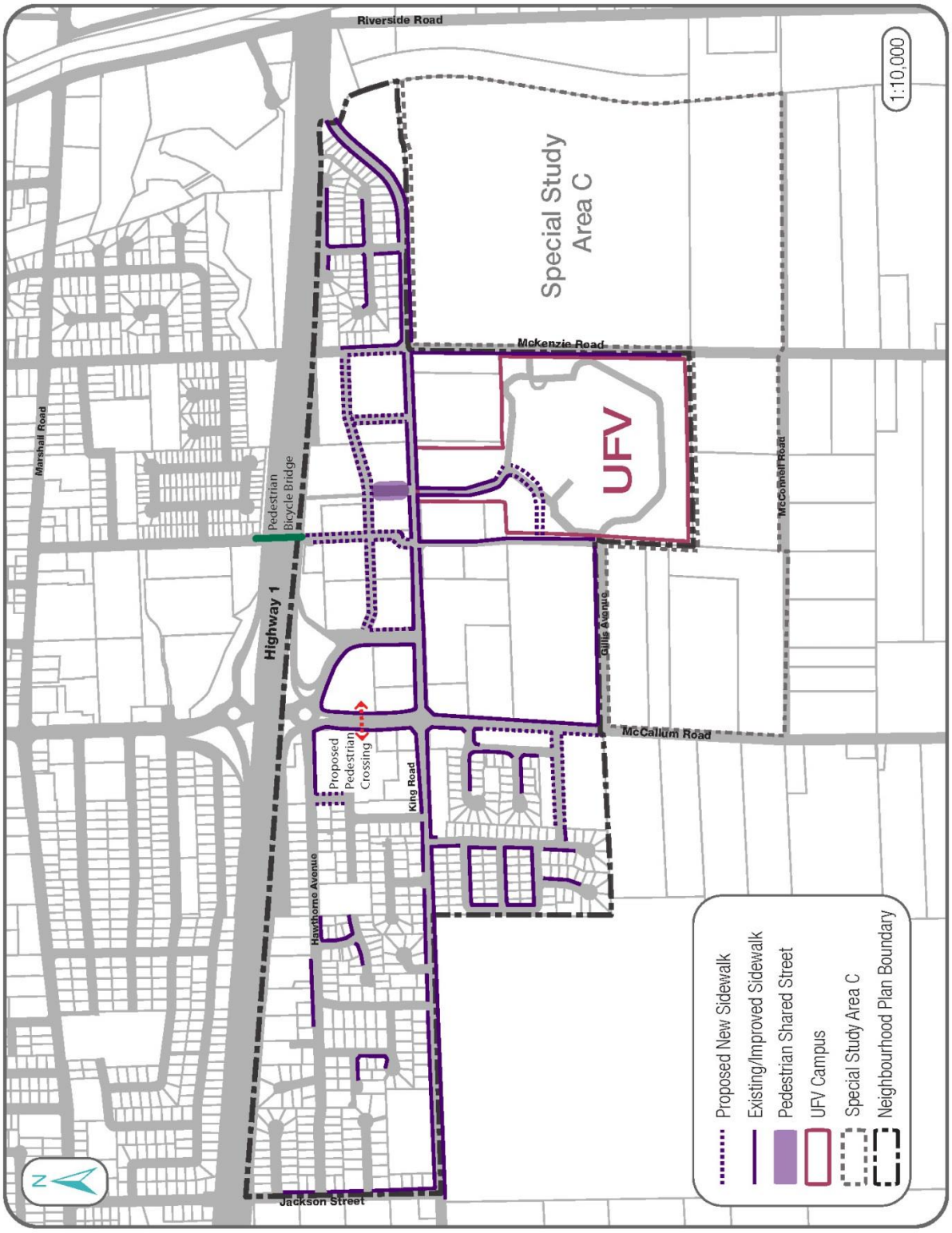


Figure 25 - Future Pedestrian Infrastructure

Renderings of pedestrian and cycling bridge over Highway 1 (art is conceptual)

Renderings of Pedestrian and cycling bridge over Highway 1

Cycling

To help create a culture of cycling within the UDistrict the neighbourhood has been designed to take advantage of the relatively flat topography, and facilitate cycling by providing cycling lanes on both sides of the street within the Primary Redevelopment Area. This will allow residents the ability to access local services by cycling. Through intersections and areas of potential conflict, pavement markings will be in place. Signalized intersections along King Road are planned to utilize two-stage left queue boxes for cyclists for protection and priority. A protected intersection design (as shown in the latest TAC Guidelines) could also be incorporated as a measure to protect cyclists within intersections.

Linkages to the remainder of the City have also been facilitated by the Trans-Canada Highway pedestrian/cycling overpass. This important piece of infrastructure will allow all ages and abilities to safely ride over the highway in a multi-use format sharing the space with pedestrians. The bridge will also allow commuter cyclists to access UFV and other employers in the neighbourhood.

Cycling within the UDistrict will be further encouraged by providing end of trip facilities such as bike lockers, bike racks, and access to public washrooms at key destinations (UFV and Abbotsford Centre). To further enhance cycling more bicycle parking should be mandated within in Multi-family buildings. To be consistent with other Metro Vancouver municipality's off-street bike parking should be raised from 0.25 stalls per unit to 1.25 stalls per unit. This measure will help 'future proof' buildings and help foster a culture of cycling.

5.1.6 Cycling Network

Create a network of safe and interconnected bike lanes that connect the neighbourhood to the campus, as well as the broader city cycling network.

5.1.7 Pavement Demarcation

Demarcate areas of potential conflict between cyclists and other modes of travel through pavement markings along roads, and at intersections and crossings.

5.1.8 End of Trip Facilities

The provision of end of trip facilities such as bike racks, bike lockers and access to public washrooms, should be considered as part of new developments or renovations.

5.1.9 Off-Street Bike Parking

Consider updating the off-street bike parking by-law to increase bike parking within multi-family buildings to 1.25 stalls per unit, in order to help facilitate a culture of cycling within the neighbourhood and increase this mode of travel.

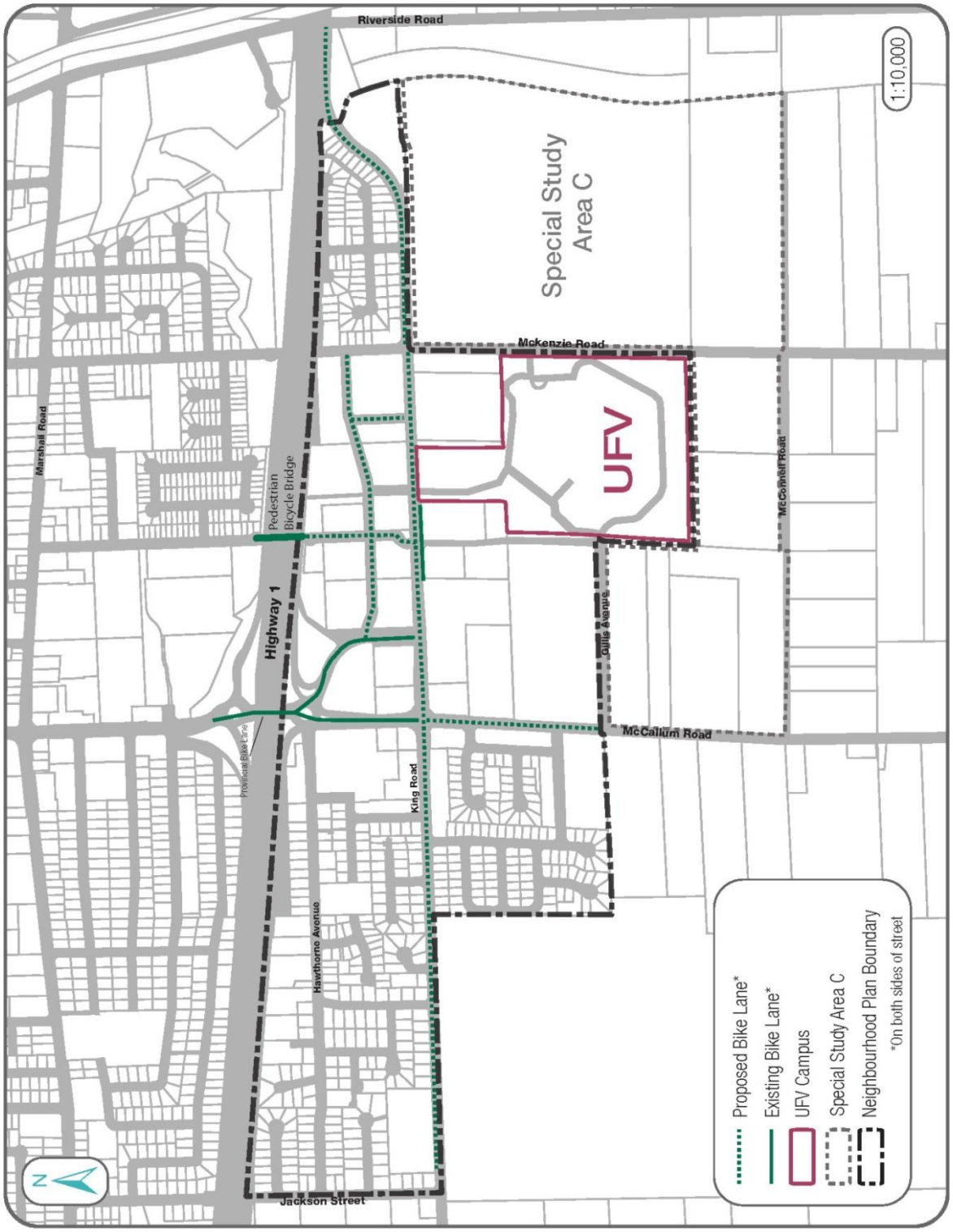


Figure 26 - Future Cycling Lanes

Transit

Being on the southern terminus of the Primary Transit Corridor the UDistrict was designed to be transit supportive in terms of its densities, mix of uses and pedestrian friendly urban design. The neighbourhood has large trip generators in Abbotsford Centre and UFV, and these two facilities help support a higher demand for transit service. The neighbourhood is also well positioned with transit service, as regional transit connections to surrounding communities and Metro Vancouver are located within the UDistrict. These regional connections provide residents and users of the neighbourhood with exceptional transit service, and this will reinforce the importance of the neighbourhood regionally.

To further enhance transit service in the neighbourhood, the current transit terminus will be relocated to the new 'front door' of the university, and will be centrally located on University Way in between Abbotsford Centre and university buildings A and B. This would mean that buses coming from McCallum Road onto King Road would travel down College Drive, then across and up University Way before exiting onto King Road, back towards McCallum. This relocation will put transit more front and centre which is important in order to raise its profile, and show that it is a vital part of the campus, stadium and neighbourhood.

Additional transit infrastructure improvements may see all future stops located as far side stops, which is considered to be best practice by BC Transit. The streets have been designed to leave bus stops in traffic in order to keep buses on time and frequencies running efficiently. Transit stops will also be enhanced with updated bus shelters that which will provide better amenities to users of the system.

5.1.10 Relocate Transit Terminus

Work with BC Transit and UFV to relocate the transit terminus in between Abbotsford Centre and the new main entrance for the campus along University Way.

5.1.11 Far Side Stops

Where possible locate bus stops on the far side of intersections, and keep buses in traffic for stops to allow for optimal service.

5.1.12 Bus Shelters

Improve the comfort, safety and convenience of bus shelters within the UDistrict to create a positive waiting experience for all transit users through targeted improvements such as weather protection, seating, lighting, and real time bus scheduling.

5.1.13 Timing and Design

The timing and design of both interim and ultimate transit routes, including rapid transit service, will be determined by BC Transit in consultation with the City of Abbotsford, and is subject to ridership demand in the plan area and available funding for the service.

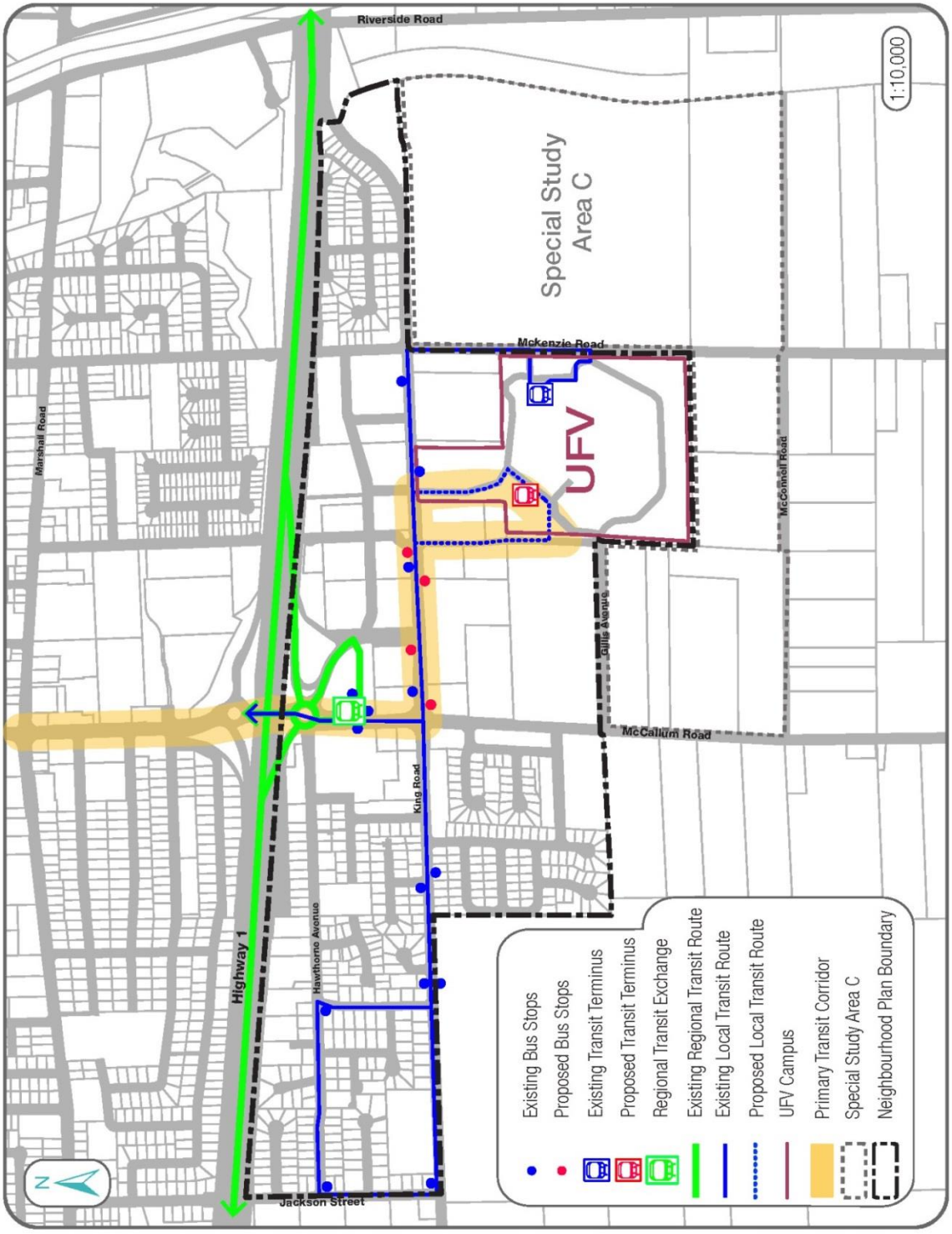


Figure 27 - Future Transit Service

Street Network

Street planning and design is critical to the success of the plan. On a network-wide level, connectivity and permeability are important principles to encourage walking and cycling. Intersection density can often be used as a gauge of the number of people walking in a neighbourhood. The UDistrict street network plan introduces new streets to create smaller blocks and more intersections.

The streets of the UDistrict should be places where people want to come, meet, sit, watch, as well as travel on. These streets should be places that recognize travel movement is important, but enhancing social cohesion, people's health and the environment are equally as important. The complete streets planned for the UDistrict will be streets for everyone. They have been designed and will be operated to enable safe access for all users, including pedestrians, cyclists, transit riders and motorists.

While initially King Road was considered to be narrowed to 2 travel lanes with a median/left turn lanes, it was concluded through modelling results that King Road should retain its 4 travel lanes between McCallum Road and University Way due to significant traffic volumes during peaks. East of University Way, King Road is planned to be reduced to 2 travel lanes. Left turn lanes will be provided on King Road at significant intersections. Right turn lanes are also proposed, where required to accommodate anticipated future turning movement volumes. King Road is also currently designated as a truck route. If this designation continues throughout the redevelopment process, the vision of the neighbourhood could be negatively impacted.

Other streets are proposed to generally retain their current number of travel lanes. Salton Road will be aligned with College Drive and the intersection with King Road will be signalized. Cascades Plaza, the northern extension of University Way north of King Road, will be a shared use street between King and Duke that provides a focus for the neighbourhood. Landscaping and surface treatments are planned to ensure that while vehicles are permitted, drivers feel they are visitors in a pedestrian first space. Two other unnamed streets are also proposed within the plan. The first will connect Hawthorne Avenue with Kirk Avenue while the second will link Kipling Street to McCallum Road with a connection to Kimberly Street. Both of these streets will provide connectivity and permeability to the network.

5.1.14 Street Network

The conceptual street network (Figure 15) is designed to provide access to the neighbourhood and localized movements within the neighbourhood. New streets and upgrades will be secured through the development process.

5.1.15 Street Classifications

The City's street classifications for the neighbourhood are shown on Figure 28 and are consistent with Map 4 – Urban Road Classification of the OCP.

5.1.16 Attractive Streets

Design streets as attractive, vibrant and unique people places consistent with the cross-sections found within the Street and Public Realm Design Guidelines contained within this plan.

5.1.17 Truck Route Consideration

Removal of the truck route designation on King Road between McCallum and Riverside Road will follow the direction stipulated within the Transportation and Transit Master Plan process.

5.1.18 Future Intersection

Right of way requirements to protect for the possibility of a single lane urban (as per BC Supplement to TAC Section 700, approximate 46m diameter) roundabout at the proposed Duke Avenue and King Connector Road should be considered and achieved through dedication at the time of redevelopment of the surrounding lands to the east. The potential roundabout should be offset (to the east) to maintain the intersection spacing from the McCallum interchange.

Figure 28 - Future Road Network

5.2 PARKING

One of the critical elements to the success of the neighbourhood will be to effectively manage parking. At full build out (in approximately 40 years), there will be roughly 6,000 more people living within the UDistrict, UFV will have about 1,600 more students and 370 more full time staff, and Abbotsford Centre will continue to host major marquee events. This exciting growth will invigorate the UDistrict, and will help to create a vibrant neighbourhood. To effectively handle the parking that could accompany this growth, the following sub-sections will address the City's plan to efficiently manage the situation.

Transportation Demand Management

Transportation Demand Management (TDM) is defined as the application of strategies and policies to reduce travel demand (specifically that of single-occupancy private vehicles), or to redistribute this demand in space or in time. A successful TDM program can influence travel behavior away from Single Occupant Vehicle (SOV) travel during peak periods towards more sustainable modes such as High Occupancy Vehicle (HOV) travel, transit, cycling or walking; it may even reduce the need to travel.

In order for TDM to work successfully the proper land use and density, and street infrastructure needs to be in place. The neighbourhood has been designed to accommodate TDM through positioning transit supportive land use and densities concentrated around nodes. These nodes are centered on the Primary Transit Corridor and are well positioned to enable residents to choose transit as a preferred mode of travel. Complete street infrastructure has also been designed to be built, and will complement the land use and provide users the choice of walking, cycling, riding transit or driving.

As the UDistrict is building out, TDM measures should be implemented to help create the desired mode shift that will help achieve the City's OCP target. Measures such as offering subsidized transit passes, shuttle buses connecting to rapid transit, providing enhanced bicycle parking, and having better end of trip facilities for cyclists will encourage residents to choose different modes of travel other than the automobile, and will help reduce SOV travel demand during the peak periods. This environment will allow the UDistrict to accommodate the additional growth, and not overburden the neighbourhood with an overabundance of parking.

5.2.1 TDM Strategy

To encourage the use of alternative modes of travel, the City should consider implementing a TDM strategy for the UDistrict to help reduce travel demand, and ensure that parking needs can be efficiently managed.

Off-Street Parking

The required supply of off-street parking for private developments should closely correlate to estimated vehicle ownership demand, but also look to emerging land use diversity, transit provision and trends in vehicle ownership. The UDistrict has the potential to decrease the off-street parking required for new developments, in conjunction with TDM measures. Housing tenure has also proven to play an important role in determining demand for off-street parking requirements. Studies have shown that vehicle ownership rates for renters can be up to 0.3 to 0.5 vehicles per unit less than for owners. Given the projected demographics of the neighbourhood and the socio-economic situation of many students attending UFV, there is a high possibility of the market providing more rental accommodation.

In order to efficiently utilize site area given the planned land use and density, underground parking will be the preferred manner to accommodate the demand.

5.2.2 Parking Requirements

The City may examine the feasibility of allowing parking reductions in private off-street parking requirements for residential developments provided additional amenities or cash in lieu is provided. Parking reductions would be considered on a case by case basis.

5.2.3 Underground

Encourage all new multi-family developments to locate required parking underground, and developments within the University Village are required to accommodate all required parking underground.

5.2.4 Shared

Encourage shared, common off-street non-residential parking to serve multiple users and destinations within the University Village.

On-street Parking

In order to facilitate street activity, support local business and provide additional parking for major events at Abbotsford Centre, the street network has been designed to maximize the number of on-street parking spaces. All streets within the neighbourhood will be available for on-street parking with the exception of a portion of King Road from the intersection of McCallum Road to the intersection of University Way. Within the Primary Redevelopment Area approximately an additional 250 spaces will be made available for on-street parking.

5.2.5 Maximize Parking

Maximize opportunities for permanent on-street parking throughout the neighbourhood by allowing parallel parking stalls on all public streets except for the portion of King Road from the intersection of McCallum Road to the intersection of University Way.

5.2.6 University Village

Parking within the University Village will be in high demand, parking in this vicinity should be controlled by time limits or pricing to encourage reasonable turnover of stalls.

5.2.7 Time Limits

In order to provide a turn-over of parking spaces, time limits should be implemented.

Event Management for Abbotsford Centre

Event management is an important consideration for the neighbourhood given the presence of the Abbotsford Centre in the ‘heart’ of the UDistrict. Event management should mitigate both traffic pressures as well as parking demands.

Vehicle trip generation and thus parking demand, apart from seating capacity and attendance, are greatly influenced by travel mode (i.e. automobile, transit, cycling, walking) and vehicle occupancy (i.e. the number of persons traveling in each vehicle). Targeted transportation planning can have a significant bearing on these influences, reducing both the number of vehicles and the accommodation to park them.

Events

The Centre’s seating capacity varies depending on the event. For sporting events the seating capacity is 7,000, although this level of attendance is generally not reached. A typical sporting event attendance will be around 3,250 people and for concerts and other events capacity varies from 1,000 to 8,500.

Travel Mode Split

The mode split achieved for events at the Centre should be dictated by the degree of travel demand management (TDM) pursued. This section outlines the regular 'business as usual' conditions, a travel mode split with a basic amount of TDM measures and conditions with the application of an aggressive TDM plan. These varied, but realistic levels of TDM are outlined below:

- Regular Operations: This is the least aggressive TDM model that provides ample parking, encourages the existing trend of automobile travel and offers auto-alternatives as an "option" only.
- Basic TDM: provides some constraints on availability and cost of parking to encourage non-auto modes as viable travel options.
- Aggressive TDM: provides significant constraints on automobile drivers to promote non-auto modes as the best way to get to the venue.

Mode splits which could realistically be expected from these TDM models for the Centre, upon full built out of the neighbourhood are set out in Table 3.

Mode	Regular Operations	Basic TDM Plan	Aggressive TDM Plan
Auto	89%	82%	72%
Transit	5%	11%	20%
Bike/Walk	6%	7%	8%

Table 3 - Mode Share

The splits shown in Table 3 are based on best practice and also consider the currently proposed land uses for the neighbourhood and pedestrian amenities and connections. These rates also take into consideration the OCP's transit policy which is meant to encourage additional transit use in the future. It is also assumed that as per the mix and density of uses outlined with this Plan, walking and cycling will be a preferred mode of many neighbourhood attendees.

TDM Options

The level of automobile use, associated mainly with attendees who live in Abbotsford will decrease as parking becomes constrained and additional transit services, transit promotions, and bike/walk facilities are enhanced under the 'basic' and 'aggressive' TDM plans. The following Table 4 outlines TDM options to be considered for either a basic or aggressive TDM strategy.

TDM Measure	Basic TDM Plan	Aggressive TDM Plan
Parking	Moderate cost to Parking	Increase parking charge and limit available stalls
Cycling	Offer bicycle parking valet service	
Transit	Free transit with event ticket purchase	-Provide additional transit services such as express transit service from Main Transit Exchange directly to UDistrict Transit Terminus -Provide additional regional transit service to Park and Ride

Table 4 - TDM Options by Mode

It is estimated that over 60% of attendees reside in Abbotsford and therefore these measures could have a significant impact on the overall mode split. TDM options are likely to be less applicable for out of town attendees, and private automobile will for the foreseeable future be the main travel mode; however the cost of parking can greatly influence the decision to car pool, which is key in reducing parking demand and congestion.

Anticipated Parking Demand

Table 5 summarises the anticipated parking demand based on the event type and TDM measure. The parking demand has been estimated based on two factors: auto mode split and average auto occupancy. For all scenarios, the auto occupancy has been assumed constant at 2.7 persons / vehicle (based on best practices). The auto mode split was assumed to vary based on the application of TDM measures as noted in the table, in order to estimate parking demand.

Event	Attendance (persons)	Regular Operations (89% Auto)	Basic TDM Plan (82% Auto)	Aggressive TDM Plan (72% Auto)	Frequency
Sporting	3,250	1,070	985	865	<1 per week
Concerts and performances (Low capacity)	1,000	330	305	265	Unknown (possibly every 2-3 weeks)
Concerts and performances (High capacity)	8,500	2,800	2,580	2,265	Unknown (possibly every 2-3 weeks)

Table 5 - Estimated parking demand

As shown, sporting events are expected to be the most frequent type of event at the Centre. It is difficult to estimate the future frequency of low and high demand events as this would depend on programming decisions by the site operator which are not known.

The parking demand for events is expected to vary greatly depending on the event. For a sporting event, which in the future is likely to be the most frequent type of event, is anticipated to draw a crowd of 3,250 and require parking for between 865 – 1,070 vehicles depending on the application of TDM measures.

For the next most common event, concerts and performances, there is a wide range of capacity and attendance, from 1,000 to 8,500 people. The minimum amount of parking demand that would be generated would fall between 265-300 vehicles, while the maximum would range from 2,265 – 2,800 vehicles.

Parking Supply

The potentially available parking supply for events was estimated within a reasonable (800 m or 10 minute walk) walk of Abbotsford Centre. The total supply is summarized in Table 6, and illustrated in Figure 29. This approximate parking supply is expected to change with the redevelopment of the neighbourhood, and this is why a short and long term estimate has been included. It is assumed that some on-street parking could have time restrictions in place so it has not been included in this analysis, but some parking stalls at UFV would be made available to support events.

Parking Supply Type	Location	Short Term	Long Term
Public	Arena Parking	210	210
Private	Phoenix Ballroom	60	60
Private	UFV	1,330	1,190 -1,315*
Public	Park N' Ride (main)	175	175
Public	Park N' Ride (overflow)	110	110
Private	Central Heights Church	480	0
Private	Existing Institutional	85	0
Private	Abbotsford Canadian Reformed Church	130	0
Private	Cabela's	305	305
Public	Gillis Ave and McKenzie Rd.	320	320
Total		3,205	2,370 – 2,495

Table 6 - Parking Supply Allocation

***These values were previously identified in the UFV Campus Master Plan and existing and future parking considerations were examined. These values represent the estimated planned supply depending on 2 options in Phase 1. It was assumed the off-street surface parking lot east of University Way would be redeveloped in part, and would include an underground parking lot (as part of a student housing, administrative bookstore development) and a surface lot. Option 1 assumes that the parkade for Area A has two levels of underground parking. Option 2 assumes that the parkade for Area A has 1.5 levels of underground parking.**

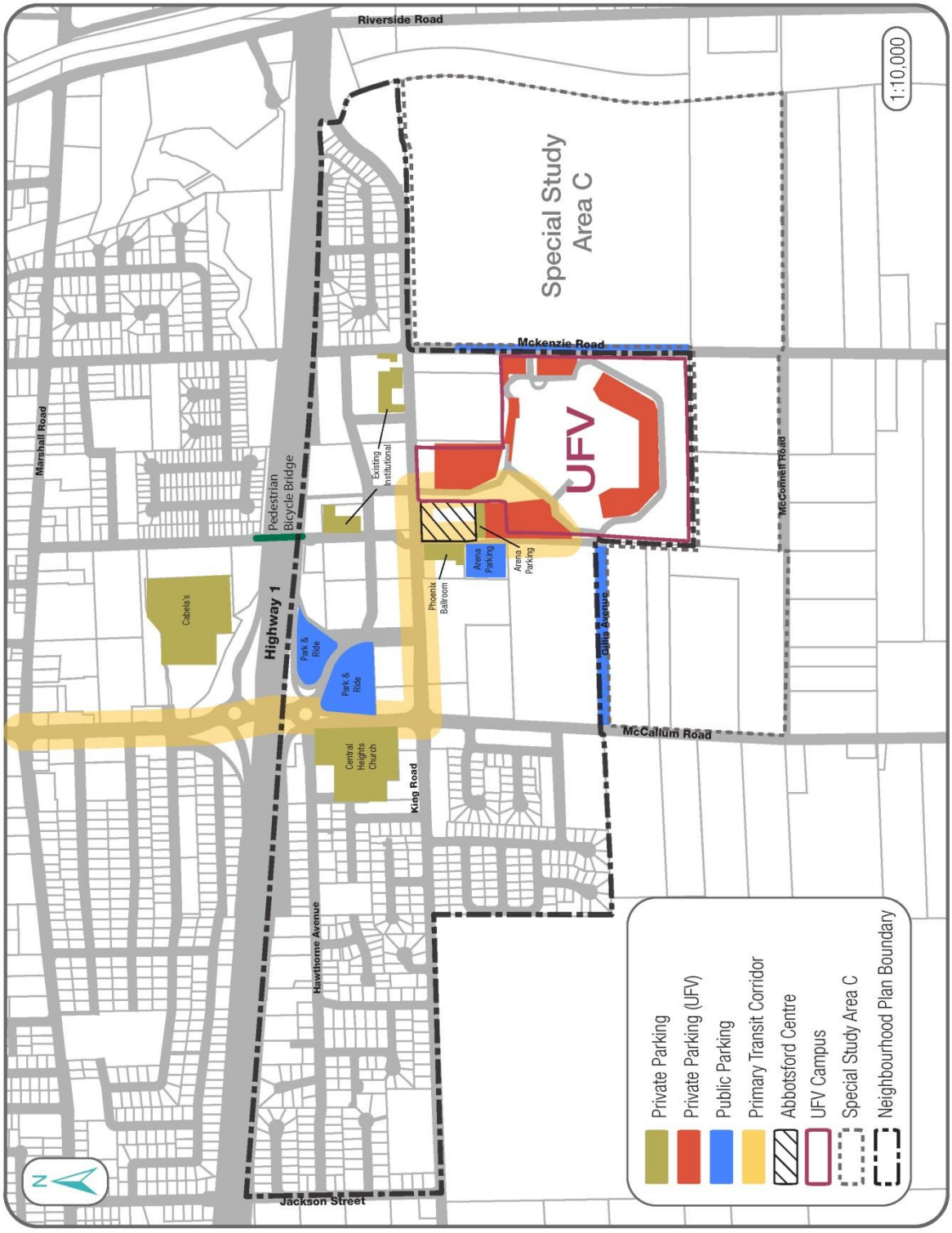


Figure 29 - Event Parking

Table 6 represents the maximum parking supply within 800 m that could be available to attendees of a high capacity event. It can be seen that with an auto mode split of about 82% or less, this supply would be sufficient to support the largest of events with 8,500 people. For the most frequent sporting event the existing and near term future area has sufficient parking capacity to accommodate the parking demand of 865 – 1,070 spaces, depending on the degree of TDM measures implemented and depending on the amount of private parking supply that can be secured.

Table 6 considers the near future parking supply of the UDistrict with little redevelopment, and at full build out. Also, included in Table 6 is an estimated supply of street parking that could be utilized for event parking. It is generally best practice to preclude street-parking from being used for event parking, given the long duration of stay which could negatively impact short term parking required for commercial uses. However, given the distance from commercial services of McKenzie Road and Gillis Avenue, these streets can be included for event parking.

To service the anticipated demand with available supply, good transit service couple with priced parking would be necessary to support lower auto mode splits to these large events. The city should consider developing an event transit service plan with BC Transit where the additional transit services are funded by the event organizers. It is possible that many of the private parking spaces within 800 m walking distance could be in use by owners of the parking stalls. For example, it may be that there is demand for UFV parking in the evenings and weekends in the future, although this will likely be significantly less than the daytime demand. It is possible, therefore, that event attendees may walk further than 800 m for major events with high demand.

Recommended Event Parking Actions

Events at Abbotsford Centre generate a wide variation in parking demand. The most common sporting events require about 1,100 stalls assuming the current mode split of approximately 89% and auto occupancy of 2.7 persons per car. Peak events with 8,500 people can generate the need for up to 2,800 stalls with no TDM program in place. Currently, there are about 3,200 private and public stalls within 800 m walking distance of Abbotsford Centre that potentially could support event parking demand. At build out, this supply is expected to reduce to about 2,400 stalls. To accommodate the parking demand associated with events the City should implement the following policies:

5.2.8 TDM Event Plan

The City should work with the operators of Abbotsford Centre and BC Transit to implement TDM measures to reduce auto mode share to 80% or less, focused on pricing parking and improving Transit services. During larger scale events, TDM measures should be more aggressive to address the higher potential parking demand.

5.2.9 Event Traffic Management Strategy

The City in collaboration with the operators of Abbotsford Centre should develop an Event Traffic Management Strategy to ensure that traffic pre and post events at Abbotsford Centre are efficiently managed.

5.2.10 Work with UFV

Work with UFV to develop a long term parking strategy, which would include a parking agreement to utilize UFV parking facilities including future underground parking as well as a future parking structure.

5.2.11 Cash in Lieu

Explore the option of providing developers the opportunity to make cash in lieu payments for off-street parking reductions which could then be used as a financial contribution towards parking within the neighbourhood. A cash contribution may be considered instead of an amenity, as per policy 5.2.2.

5.2.12 Secure Agreements

The City and Abbotsford Centre should work with private property owners within approximately 800m of Abbotsford Centre to secure agreements to utilize private parking lots during large events.

5.2.13 Time Restrictions

On-street time restrictions should be considered during events at Abbotsford Centre to discourage event attendees from using parking stalls required for local businesses. Parking stalls on Gillis Avenue and McKenzie Road would be exempt from this restriction.

5.3 SERVICING

The servicing section of the plan outlines the water, wastewater, and stormwater systems to service the growth and development planned within the UDistrict. The servicing is based on the land use map (see Figure 13), which took into consideration land use analysis, population projections as well as input from the public and stakeholders. This information was then used to inform modeling exercises for the various infrastructure systems. In order to ensure that the servicing within the neighbourhood can be implemented, and allow the contemplated land use and density to be achieved, policies have been included within each servicing sub-section. The following subsections will provide more detail for each of the necessary infrastructure systems.

5.3.1 Servicing Re-Assessment

Any proposed land use or transportation network changes to what is shown in this Neighbourhood Plan may require re-evaluation or modification of servicing infrastructure.

WATER ASSESSMENT

Water Servicing requirements for the UDistrict have been assessed through hydraulic modeling of the impacts of increased water demand on system capacity due to population growth projected in the neighbourhood. Modeling was carried out for average day, maximum day, peak hour demands and fire flow requirements for each parcel within the neighbourhood. The hydraulic capacity of the water distribution system for the pressure zone in this area of the City was evaluated to identify areas for upgrades and expansions to water distribution system infrastructure required to service the growth within the neighbourhood.

Existing Water Infrastructure

The UDistrict is connected to the City's water distribution system and is made up of approximately 10 km of water mains and 73 hydrants. Drinking water in the neighbourhood is divided into two parts along McKenzie Road. Water service west of McKenzie Road is fed from the north at Salton Road, and from the west at Hawthorne Avenue and King Road. Water Service east of McKenzie Road is fed from a single pipe at King Road.

Water Demand Analysis

Water demand analysis indicates that existing water infrastructure in the UDistrict is adequate to accommodate projected increases in average day and peak hour demands. Results from the water demand analysis are shown in Table 5.

	Future Water Demand (per capital)	Water Demand Increase from Existing (per capita)	Average Pressure (psi)	Projected Pressure Deficiency
Average Day Demand	300 L/day	+29.99 L/second	85.2	0
Maximum Day Demand	700 L/day	+69.99 L/second	-	-
Peak Hour Demand	1,050 L/day	+102.59 L/second	76.2	0

Table 7- Water Demand Analysis Summary

Water System Improvements

Water system improvements have been modeled and recommended base on hydraulic capacity assessment of the City water distribution system under future development conditions. Table 6 summarizes the recommendations for the system, based on the deficiencies identified for servicing the planned development and growth in the neighbourhood.

Location	Existing Diameter (mm)	Upgrade Diameter (mm)	Length (m)
Jackson Street	200	300	90
Hawthorne Avenue	150	300	215
Hawthorne Avenue	100	300	183
McCallum Road	200	300	345
King Road	200	250	302
College Drive	150	250	99
College Drive	150	200	97
College Drive	N/A	200	92
Gillis Avenue	N/A	200	245
McKenzie Road	N/A	200	149
King Crescent	100	200	268
King Crescent	150	200	26
Salton Road	200	300	247
Salton Road	250	300	7
South of Highway No. 1	150	250	112
King Connector Road	N/A	250	121
Proposed Duke Road between Salton Road and King Crescent	N/A	200	260
Proposed Duke Road between King Connector Road and Salton Road	N/A	250	223
Loop between King Connector Road and Highway No. 1	N/A	250	209
Total			3,290

Table 8 - Recommended Water System Upgrades

New pipe loops and pipe upgrades are recommended to satisfy increased demand under the proposed new land use designations, peak hour demands and fire flow requirements, in compliance with the City's Consolidated Waterworks Rates and Regulation Bylaw. There is approximately 1 km of water main reaching the end of its service life that the City plans to replace as part of UDistrict development. Furthermore, approximately 500 m of water mains that are part of a major feed into the UDistrict area (offsite) are undersized to meet projected demand.

The FUS fire flow requirements were not calculated as the development details (e.g. building structure type, exposure distances, fire protection, etc.) are not yet available. Once the FUS calculations are complete for the development buildings, the FUS required fire flows should be compared against the available fire flow results to make sure that there is adequate fire flow protection.

Although fire flow requirements are based upon design criteria, individual applicants for multi-family and ICI sites may find that Abbotsford's Building Division and Fire Department requirements for on-site fire protection exceed the capacity of the existing and/or proposed water main supply. Prior to the submission of a building permit, the applicant should confirm the on-site fire flow requirement that is triggered by the proposed building layout, material, and construction methods. In those cases when the grid system cannot provide sufficient flows and volumes to conform to the current version of the Fire Underwriters Survey Guide to Recommended Practice (Water Supply for Public Fire Protection, 1999), the applicant should demonstrate through construction techniques, material, or secondary on-site fire suppression system (i.e. building sprinklers) that the proposed development can be made to conform to these guidelines.

5.3.2 Water Main Upgrades

Approximate locations for future water main upgrades or replacements are identified on Figure 30 – Future Water Network, with ultimate servicing to be confirmed by the City of Abbotsford's Engineering Services.

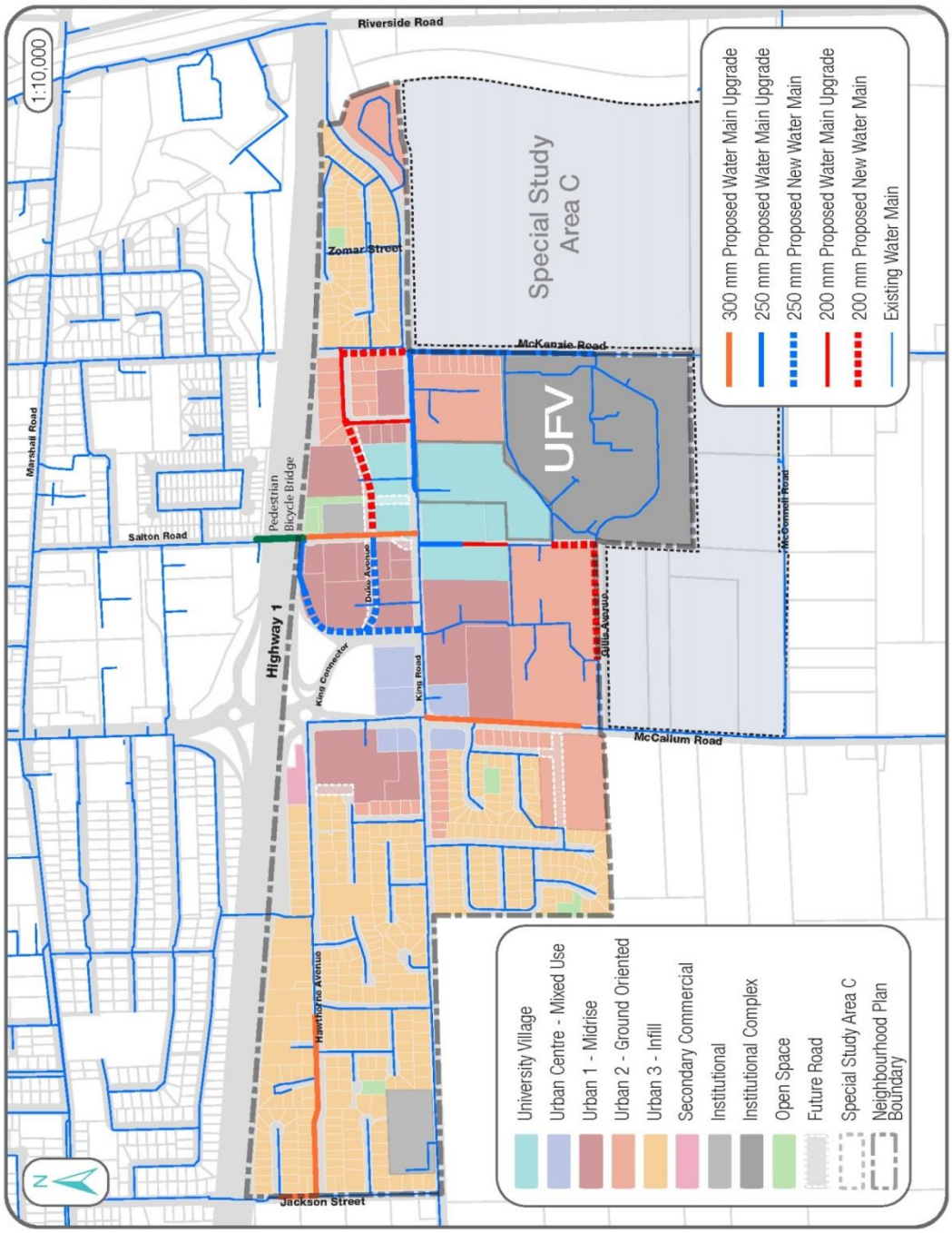


Figure 30 - Future Water Network

WASTEWATER ASSESSMENT

The Wastewater Assessment was completed using an updated hydraulic model using InfoSewer. The model builds on the Abbotsford city-wide sanitary model, which was developed as part of the Wastewater System Master Plan update in 2015. The updated model was used to conduct a hydraulic capacity assessment of base sanitary load and diurnal patterns of system flows projected under the land use map shown in Figure 13. Existing system efficiency was measured through and inflow and infiltration analysis that logged flow data at the Hawthorne and King Pump stations. Recommendations were developed to uphold levels of service to accommodate growth and comply with the City's current design criteria for sizing new sanitary mains.

Existing Wastewater Infrastructure

The UDistrict is part of Abbotsford's sanitary sewer collection system and covers an area of approximately 85 ha. The neighbourhood includes 7 km of sanitary mains, 129 sanitary manholes and 3 lift stations (two public and one private). UDistrict is split into three main sanitary catchments flowing to the Hawthorne Pump Station, King Road Pump Station and the Lonzo Pump Station, via the Riverside Drive trunk sewer main.

Sanitary Sewer Catchments

Figure 31 displays the catchment boundaries for the City's Hawthorne, King and UFV's private pump stations, together with catchments via gravity mains tributary to the east to Riverside Road, and to the north across the Trans-Canada Highway. Based on building phasing information from the UFV Campus Master Plan, future servicing of the northern campus may be provided by gravity sewers on King Road north to the King Pump Station. Based on the contours and existing sewer inverts, conceptual catchment boundaries in Area C (Special Study Area 'C') and possible discharge locations were developed and also displayed in Figure 31.

5.3.3 Sanitary Sewer Flow Catchments

The UDistrict consists of eight sanitary catchments based on topography and proposed land use, as shown in Figure 31 – Sanitary Sewer Flow Catchments. The catchments will function as annotated within the legend.

Wastewater Hydraulic Capacity Analysis

Hydraulic capacity analysis of gravity sewers in the UDistrict revealed a limited number of potential capacity bottlenecks in the system, which could be due to a significant population increase in the area. The majority of the deficiencies identified are along King Connector Road, directly downstream of the King Pump Station. Gravity sewer deficiencies are summarized in Table 10.

Capacity analysis of the King and Hawthorne Pump Stations revealed that, under the buildout conditions, the King Pump Station is not capable of meeting the flow rates projected under the Land Use Map (Figure 15). This is demonstrated by the fact that measured Peak Wet Weather flows (PWWF) are higher than both the modelled and reported capacity of the King Pump Station. Results from the pump station analysis are shown below in Table 9.

Pump Station	Modelled Capacity	Reported Capacity by City	Peak Wet Weather Flow (PWWF)
Hawthorne	35.6	39	34.4
King	26.6	26.8	28.2

Table 9 - UDistrict Wastewater Analysis Summary for City of Abbotsford Pump Stations

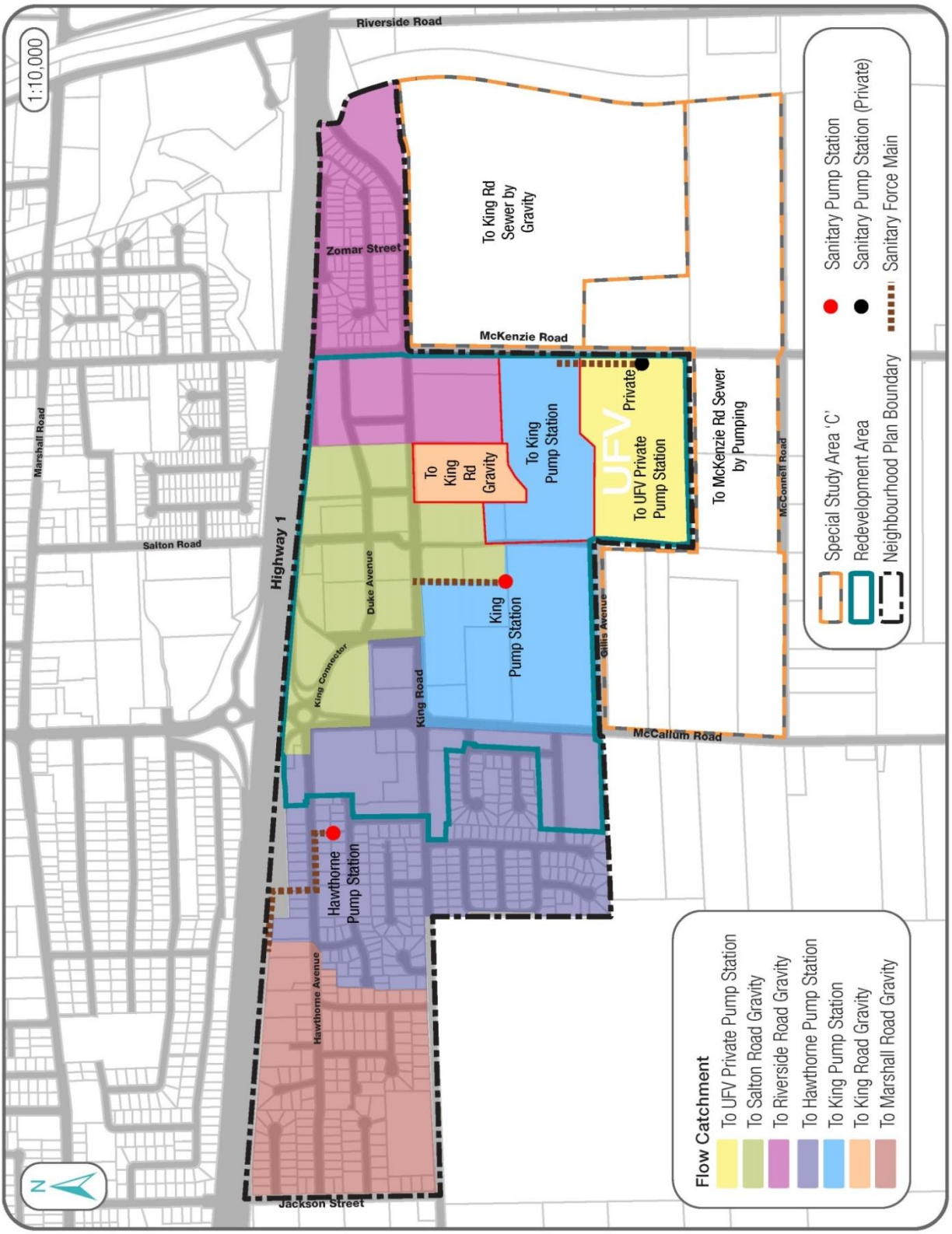


Figure 31 - Sanitary Sewer Flow Catchments

Recommended Wastewater System Improvements

Wastewater system improvements have been modeled and recommended based on hydraulic assessment of system capacity. Table 10 summarizes the recommendations for the system, based on deficiencies identified for servicing planned development and growth within the neighbourhood. Proposed wastewater system upgrades and additions are shown in Table 10 and illustrated in Figure 32.

Pipe Location	Existing Diameter (mm)	Upgrade Diameter (mm)	Length (m)
Gravity Sewer – Upgrades to Existing System (Upsize and Open Cut Replacement)			
Private property east of Salton Rd. near Gilmour Dr.	300	375	71
North of King Rd., East of Highway 1 on ramp	250	300	69
South of Highway 1, West of Salton Rd.	250	300	55
South of Highway 1, West of Salton Rd.	250	300	59
South of Highway 1, West of Salton Rd.	250	300	50
		Total	304
Pipe Location	**Existing Diameter (mm)**	**Upgrade Diameter (mm)**	**Length (m)**
Gravity Sewer – New Construction (Open Cut)			
Kimberley St. South of Kinsale Pl.	N/A	200	67
King Cres. East of Salton Rd.	N/A	200	151
		Total	218
Pump	**Existing Flow (L/s)**	**Upgrade Flow (L/s)**	**Total Dynamic Head (m)**
Pump Station – Upgrades to Existing System			
King Pump Station	26.8	35	10

Table 10 - Recommended Wastewater System Improvements

5.3.4 Wastewater System Improvements

The general alignments of the new and upgraded sanitary trunks required to service the UDistrict neighbourhood are identified in Figure 32 – Recommended Wastewater System Improvements, with ultimate servicing to be confirmed by the City of Abbotsford's Engineering Services.

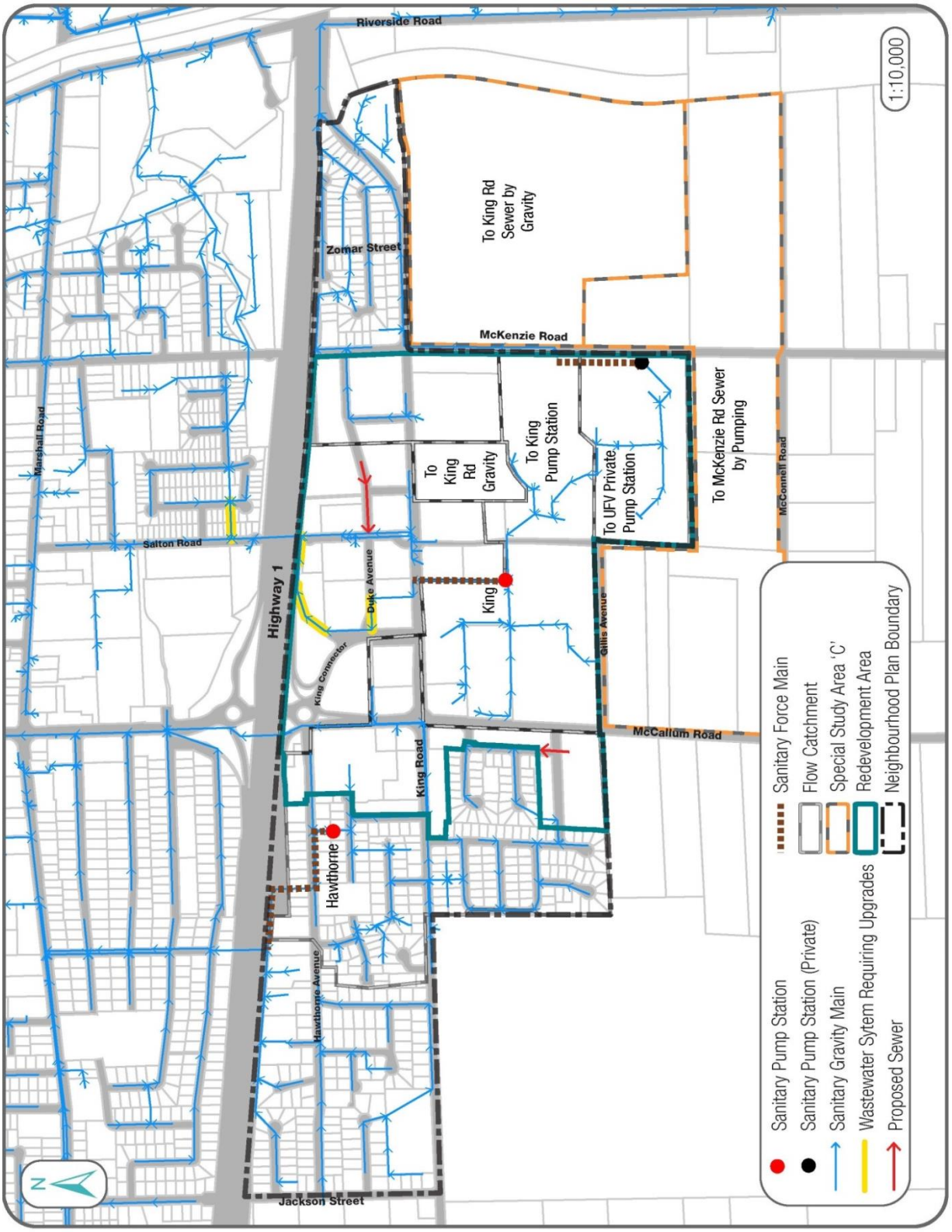


Figure 32 - Recommended Wastewater System Improvements

STORMWATER CAPACITY ASSESSMENT

An assessment was completed of the existing stormwater capacity to accommodate land use changes illustrated on the Land Use Map (Figure 15), and summarized strategies to achieve no-net-loss under future development in the neighbourhood. This assessment was based on a comparison of the 2008 Marshall Creek ISMP to analyze impacts that proposed land use changes as shown on Figure 15 (Land Use Map) might impact stormwater capacity.

Stormwater assessment was shaped by the following management criteria, outlined by the City of Abbotsford and in alignment with the 2016 OCP:

- Maximize onsite source controls to capture/infiltrate/reuse 49 mm of rainfall (the 6-month 24-hour storm);
- Maximize onsite detention facilities to detain and control flows to match predevelopment levels up to the 10-year storm event; and
- If on-site volume reduction and detention cannot be met, investigate feasibility of regional facilities to achieve targets.

Stormwater Capacity Analysis

A comparison of the proposed UDistrict Land Use Map and that used in the Marshall Creek ISMP Future Land Use Analysis shows that a large proportion of surfaces will become more impervious as re-development takes place. Two new roads (University Way North and Duke Avenue) are proposed and several roads are proposed to be widened.

With the increased imperviousness in the neighbourhood, additional pipes may become flagged as undersized to accommodate increased flows, if flows are not mitigated. Further assessment of existing stormwater infrastructure is required to determine which pipes may have been updated since the ISMP was completed in 2008.

Available soils mapping shows that a majority of the UDistrict area is in well-draining gravel and sandy soils. This means that pipe upgrades could be reduced or eliminated by utilizing on-site infiltration facilities to infiltrate up to the 100-year event flows. Similarly, runoff increases from new or more-impervious roadways can be mitigated with infiltrating source controls within the road right of ways (ROWs) in well-draining soils areas. Although not proposed in the ISMP, 100-year infiltration in well-draining soils has been recommended in areas of the City.

Recommended Stormwater System Improvements

Stormwater system improvements are recommended based on the capacity assessment of proposed UDistrict re-development, in comparison with capacity assessment completed for the neighbourhood in the Marshall Creek ISMP. Recommended stormwater system improvements are shown in Figure 26.

5.3.5 Stormwater System Improvements

The general alignment of the new stormwater mains required to service the road right of ways within the UDistrict have been identified in Figure 33 – Recommended Stormwater System Improvements (If infiltration systems are appropriately designed, the storm sewers may be redundant. However, they are included as conventional back-up or alternate to the infiltration systems). Ultimate stormwater servicing will be confirmed by the City of Abbotsford's Engineering Services.

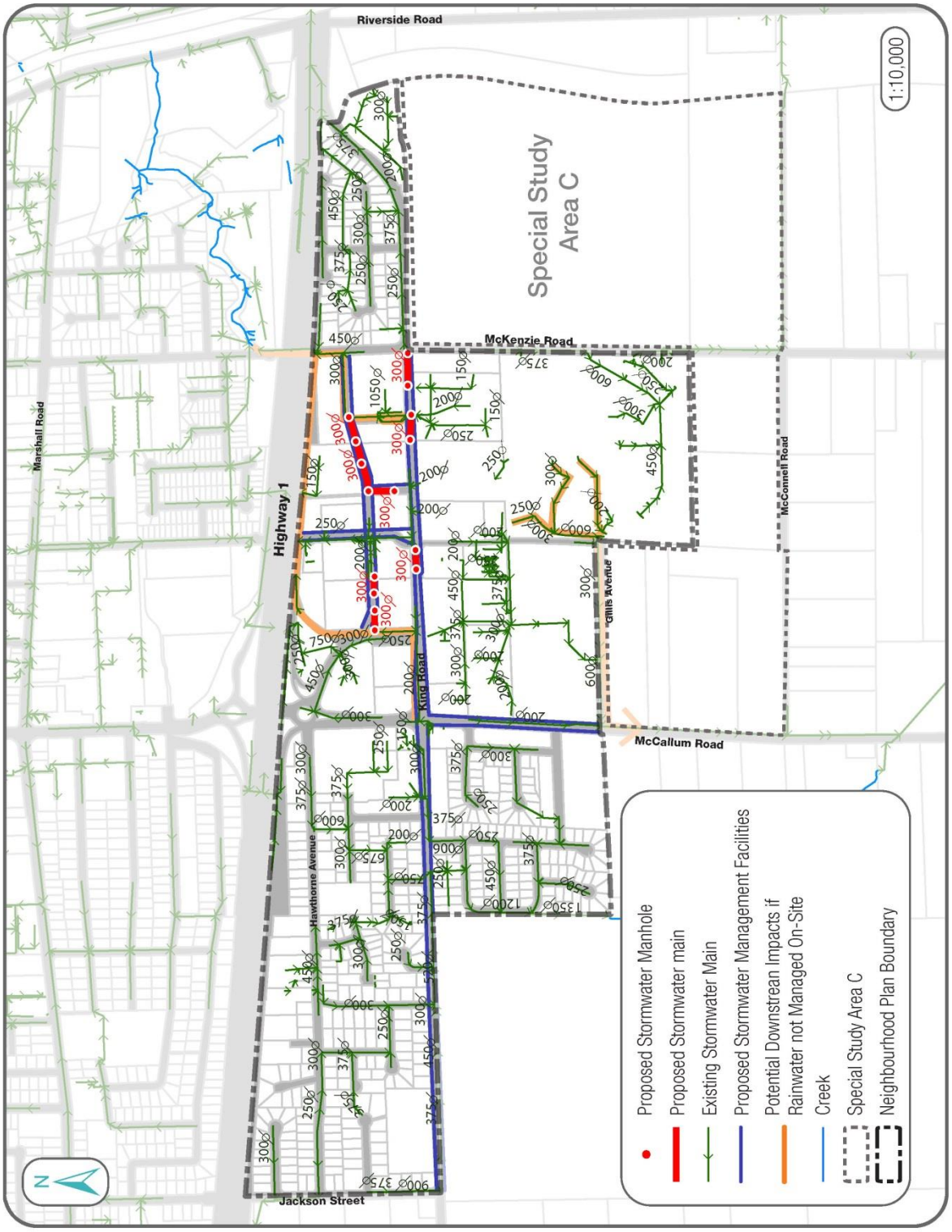


Figure 33 - Recommended Stormwater System Improvements

On-Lot Stormwater Management

The flow contribution to downstream storm sewers can be reduced by leveraging the well-draining soils which underlie a majority of the UDistrict area. Infiltrating all runoff up to the 100 year runoff in the well-draining areas will offset the potential increased flow from additional impervious area and runoff from development in any poorly-draining soils areas. It is recommended that volumetric reduction in areas with poorly draining soils be achieved by infiltrating 6 month 24 hour storm runoff and conveying the higher flows in storm sewers (10 year) and overland flow paths (100-year).

Detention facilities could be used in poorly-draining soils areas if the 100 year infiltration in the well-draining areas is sufficient to offset the increased flows in the poorly draining area development. Detention may include on-site or regional detention ponds, underground tanks, rooftop detention and parking lot surface detention.

Low impact development measures or source controls include features that promote the infiltration of water, including rain gardens, grass swales, pervious paving and absorbent soils for lawns and gardens.

If on-site storage and infiltration strategies are not implemented, or only partially implemented, a detailed assessment of the resulting increased flows and storm sewer upgrades would be required. The highlighted sections of pipe on Figure 33 may require upgrading. The extent and size would depend on the implementation of on-site infiltration.

In addition to on-site detention and infiltration features, water quality treatment is recommended for both infiltrated water to protect the longevity of infiltration trenches/rain gardens and the aquifer water quality and water going into storm sewers to protect the water quality in receiving creeks.

Road Right of Way Stormwater Management

As with the on-lot stormwater management, the excess runoff from road ROWs (roads, parking, sidewalks, etc.) should be managed at the source where possible using infiltration facilities. The 100 year runoff should be infiltrated in well-draining soils areas. This can be achieved using infiltration trenches, dry wells, or rain gardens. In poorly draining soils areas, the runoff should be safely conveyed in minor and major drainage systems and managed as follows:

a. 100 year infiltration in regional facilities located in well-draining soils: or

b. 100 year regional detention facilities (can be combined with the lot runoff detention requirements, if applicable); or

c. Connection to downstream drainage systems, if the 100 year infiltration in the well-draining areas is sufficient to offset the runoff increases in the poorly-draining soils areas.

Prior to infiltration or discharge systems leading to Marshall Creek, the road runoff should be treated to remove pollutants. This can be accomplished with:

a. rain gardens or swales in road ROWs that have sufficient width to accommodate this type of source control; or

b. street tree wells or planters in road ROWs that have insufficient width for rain gardens; or

c. manufactured treatment systems (oil/grit separators, cartridge filters) upstream of underground infiltration trenches.

The infiltration or detention facilities can be sized to mitigate only the increases in impervious area (portions of roads that were not impervious area prior to development), or sized larger to reduce the flows to the downstream drainage system to below predevelopment values. Sizing the facilities has the benefits of eliminating the need for storm sewers within the site and reducing existing downstream capacity issues.

Stormwater System Sizing

The proposed infiltration systems were sized using a runoff/infiltration/storage spreadsheet that checked all storm duration intensities from 5-minute to 24-hour.

The following assumptions are made in developing the sizes:

1. a 100 mm/hr infiltration rate (300 mm/hr / 3 factor of safety) in the well-draining soils;
2. a 300 mm deep rain garden surface swale;
3. a 1000 mm deep rock trench (below rain garden or by itself);
4. along a roadway, a rain garden or rock trench would be discontinuous and would average a length of 500m per kilometer (i.e. half the length of the road) along one or both sides;
5. regional facilities are not needed for the development I poor soils areas as the reduction in flows from the well-draining soils will more than offset the increases in the poorly-draining soils; and
6. existing storm sewers would remain and only be used as emergency/backup drainage routes.

The unit rain garden area needed is 530 m^2 per hectare of tributary impervious area. The unit infiltration trench area needed is 730 m^2 per hectare of tributary impervious area.

Based on the above unit sizes, the required linear rain garden and underlying rock trench width along a roadway would be as follows:

a. King Road (25m ROW) – 2.7m width. This would take up the two 1.5 tree strips and 1.35 wide rain gardens in each.

b. McCallum Road South (22m ROW) – 2.4m width. This would take up the two 1.5m tree strips with 1.2m wide rain gardens in each.

c. Salton Road (20m ROW) – 2.2m width. This would take up the two 1.5m tree strips with 1.1m wide rain gardens in each.

d. University Way North (18m ROW) – 2.0m width. This would take up the one 1.5m tree strip with 1.5m wide rain gardens and the treed portions of the 2.4m tree/parking strip with 2.4m wide rain garden.

e. Duke Avenue (20m ROW) 2.2m width. This would take up the two 1.5m tree strips with 1.1m wide rain gardens in each.

Tree wells (or the City-approved Filterra product) could be used in place of the rain gardens. The tree well or Filterra footprint sizing should follow the above unit sizing.

Alternatively, along roadway, an infiltration trench with catch basins intercepting the road runoff and oil/grit separators treating the water quality prior to each infiltration trench could be utilized. The required linear infiltration trench width would be as follows:

a. King Road (25m ROW) – 3.7 width. This would be a single trench likely located under the parking/biking lanes.

b. McCallum Road South (22m ROW) – 3.2m width. This would be a single trench likely located under the parking/bike lanes.

c. Salton Road (20m ROW) – 3.0m width. This would be a single trench like located under the parking/bike lanes.

d. University Way North (18m ROW) – 2.7m width. This would be a single trench likely located under the road/parking lane or under the 2.8m sidewalk/furnishing zone.

e. Duke Avenue (20m ROW) 3.0 width. This would be a single trench likely located under the parking/biking lanes.

In poorly-draining soils areas (soils mapping shows that only the eastern-most 150m portion of the site is in till soils), King Road and Duke Avenue should incorporate WQ treatment rain gardens and a storm sewer system for minor flows. Major flows should continue along roads. The WQ rain garden sizing is governed by the maximum impervious to pervious rain garden area ratio (I/P ratio) that should not be exceeded for longevity of the rain garden and minimized maintenance due to sediment accumulation. The maximum I/P ratio collector road is 30:1 meaning that the width of rain garden required 1/15th of the ROW width (given the assumption of discontinuous rain gardens). King Road requires a 1.7m wide rain garden and Duke requires a 1.4m wide rain garden. Alternatively, a manufactured treatment system could be used for these two short pieces of road.

Roadway Stormwater System Additions/Options

Recommended storm sewer additions and two options for stormwater infiltration improvements have been provided in Tables 11, 12 and 13. Storm sewers are included in currently un-serviced sections of road in the neighbourhood. If infiltration systems are appropriately designed, the storm sewers may be redundant. However, they are included as conventional back-up or alternate to the infiltration systems.

Note that the minimum storm sewer size with catch basin connections as per City design criteria is 300mm diameter. There are existing storm sewers smaller than this that may need to be upgraded to avoid 300 mm pipes draining to smaller downstream pipes.

Location	Existing Diameter (mm)	Upgrade Diameter (mm)	Length (m)
Duke Avenue	N/A	300	270
University Way	N/A	300	70
King Road	N/A	300	200

Table 11 - Recommended Storm Sewer Additions

Location	Length of Road (m)	Length of Rain Garden (m)	Width of Rain Garden (m)	Area of Rain Garden (m^2)
King Road	880	440	2.7	1188
King Road (poor soils)	150	75	1.7	128
Duke Avenue	500	250	2.2	550
Duke Avenue (poor soils)	150	75	1.4	105
McCallum Road	400	200	2.4	480
Salton Road	250	125	2.2	275
University Way N.	100	50	2.0	100

Table 12 - Recommended Rain Garden Option

Location	Length of Road (M)	Length of Trench (m)	Width of Trench (m)	Area of Trench (m^2)
King Road	880	440	3.7	1628
King Road (poor soils)	150	N/A – Use WQ Rain Garden		
Duke Avenue	500	250	3.0	750
Duke Avenue (poor soils)	150	N/A – Use WQ Rain Garden		
McCallum Road	400	200	3.2	640
Salton Road	250	125	3.0	375
University Way N.	100	50	2.7	135

Table 13 - Recommended Infiltration Trench Option

5.4 STREET AND PUBLIC REALM DESIGN GUIDELINES

ABOUT THE GUIDELINES

The UDistrict Street and Public Realm Design Guidelines compliment, and build upon, the University Village Development Permit Guidelines, and are applicable to all UDistrict streets and public realm areas within the Primary Redevelopment Area identified in the figure below.

Illustrated within the figure, are three different classifications for street and public realm improvements. They are as follows:

- Site-Specific Guidelines
- Enhanced Street Guidelines
- Development Bylaw Standard Streets

Within this section details will be provided to help understand the necessary specifications and requirements needed in order to create the envisioned street or public realm. Requirements for Development Bylaw Standard Streets are not addressed within this section of the plan, and can be found within the Development Bylaw.

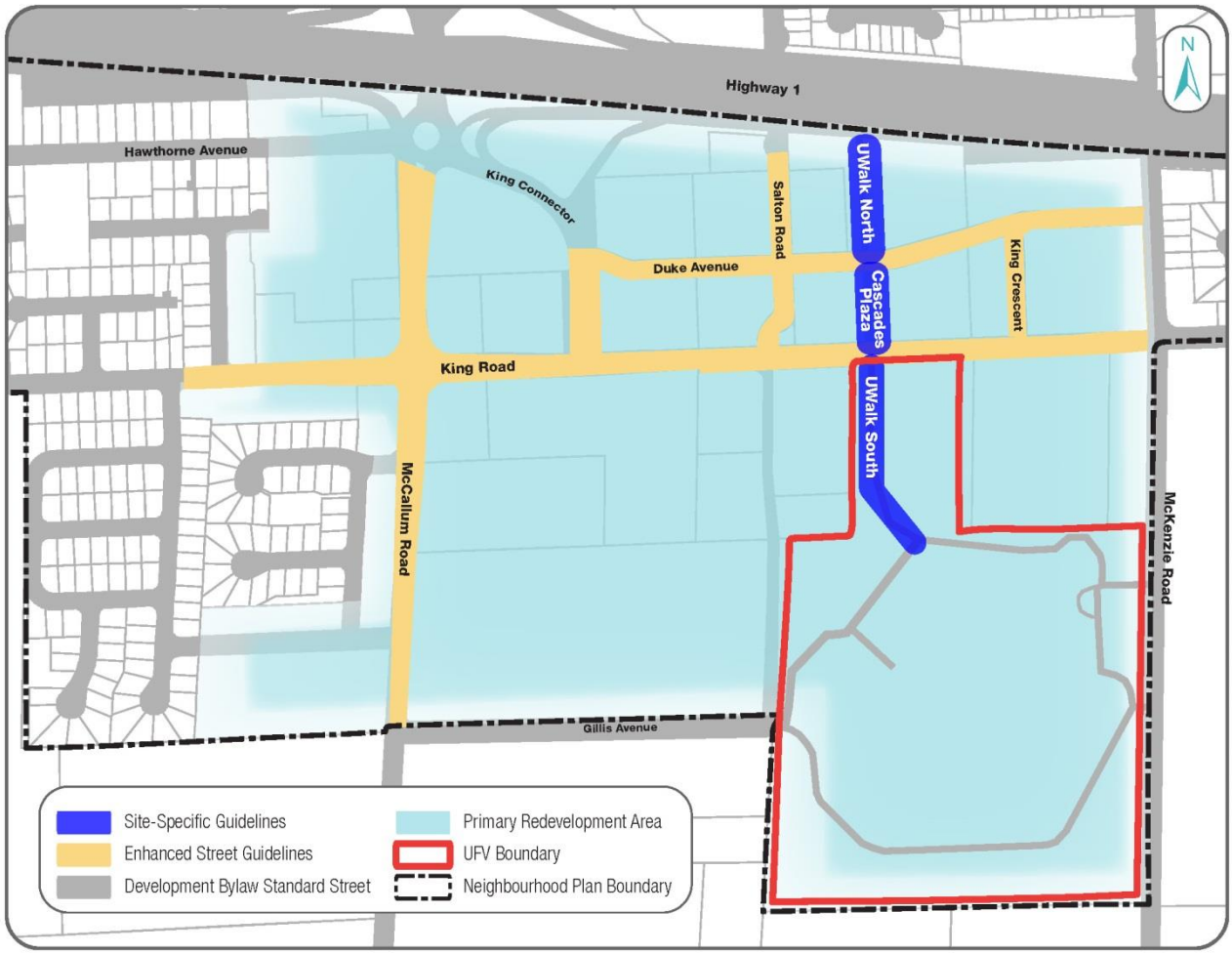


Figure 34 - Street and Public Realm Classifications

STREETSCAPE ZONES

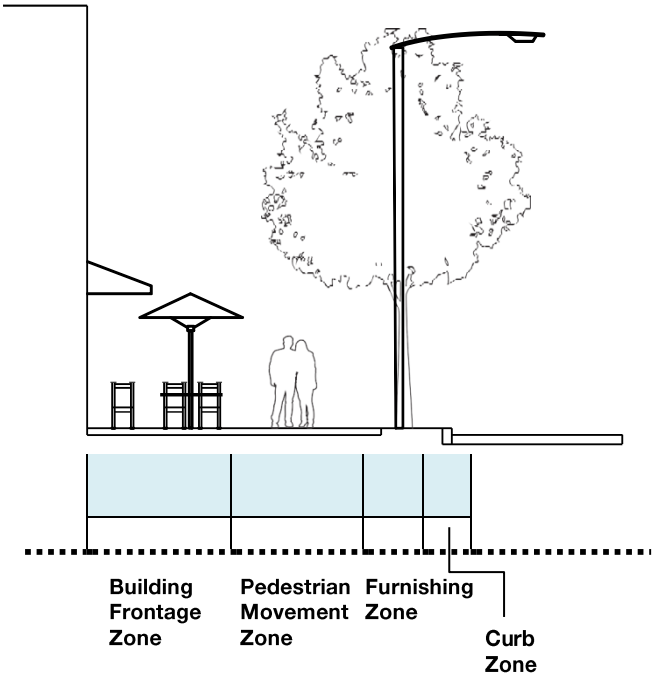
Complete Streets refers to a design approach for public streets which accommodate all street users. Under this approach, the design of the sidewalk is separated into four sections: the Curb Zone, the Furnishing Zone, the Pedestrian Movement Zone, and the Building Frontage Zone. Each section serves a distinct and unique purpose within the street. A diagram is provided on the following page that shows the four zones.

The **Curb Zone** is the area between the road and the Furnishing Zone. This zone may include parking pockets.

The **Furnishing Zone** is the area in between the Curb Zone and the Pedestrian Movement Zone. This is where street furniture such as benches, bike racks, garbage containers and trees are located. It is also acts as a buffer between walking on the sidewalk and the road.

The **Pedestrian Movement Zone** is the area between the Furnishing Zone and the Building Frontage Zone. It is the main path for people walking and should be free of obstacles. Elements from other street sections should not protrude into the Pedestrian Movement Zone. This zone considers universal access and helps make walking an enjoyable method of travel.

The **Building Frontage Zone** is defined as the space between the property line and the front of the building. The Building Frontage Zone is the location for sidewalk cafes or retail displays, and does not interfere with where people walk.



Streetscape Zones Example

SITE- SPECIFIC GUIDELINES

These guidelines were developed to provide specific guidance along UWalk, which is the primary linear north-south connection connecting University of the Fraser Valley and the neighbourhoods north of the highway. UWalk is comprised of three sections: UWalk North, a treed multi-use pathway connecting the pedestrian bridge to the neighbourhood; Cascades Plaza, a central and bustling shared street that can be blocked off to be used as an urban plaza; and, UWalk South, the main connection from the neighbourhood into the UFV Campus.

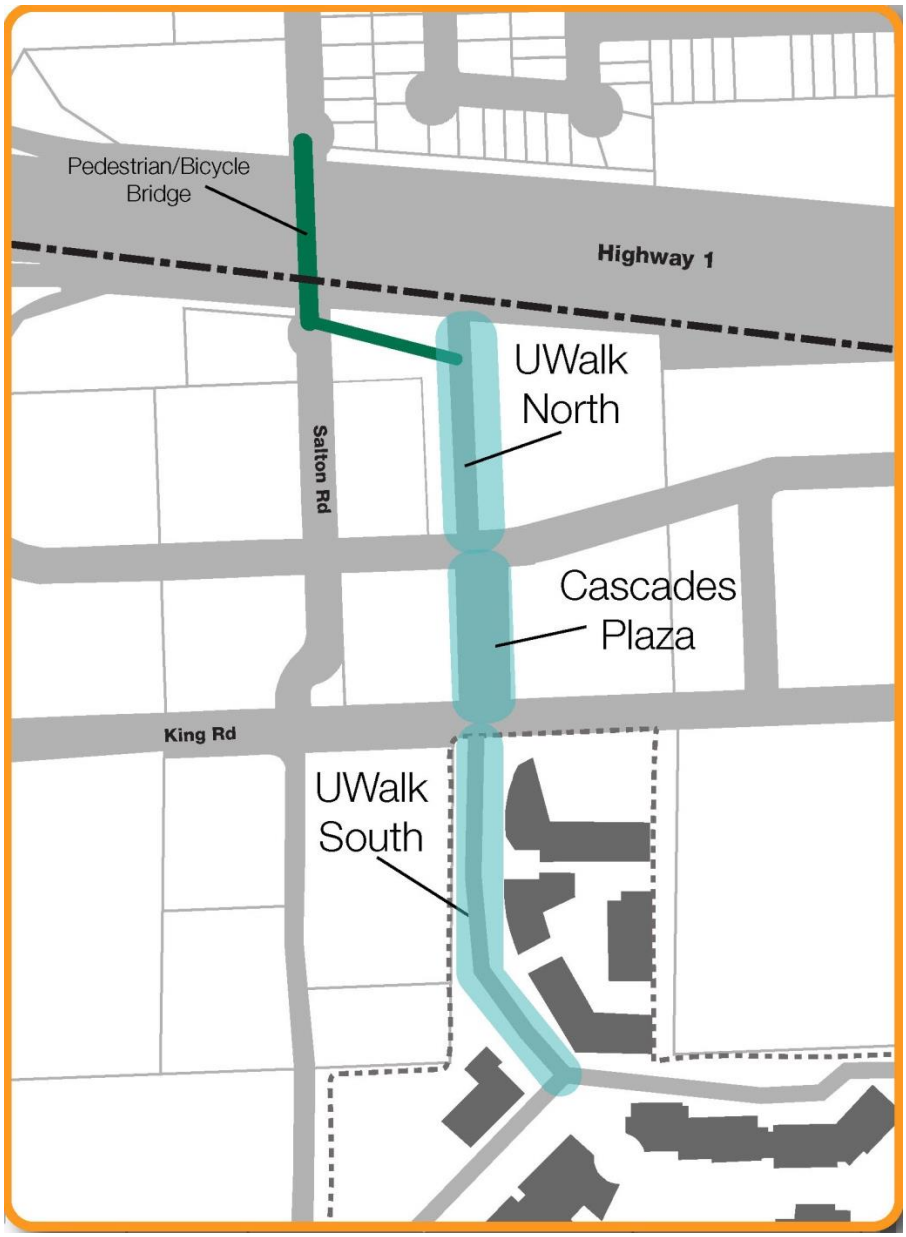


Figure 35 – UWALK

UWALK NORTH

The intent of UWalk North is to create an urban greenway connecting the pedestrian/cycling overpass to the intersection of Duke Avenue and Cascades Plaza. The space is defined by large trees on either side of a multi-use pathway with interspersed benches.

Surface Treatments

Pathway

- The 4 m wide bidirectional multi-use pathway should be constructed of asphalt.

Crosswalks

- Paving material such as stamped or saw cut concrete or other similar material should be considered.

Example: Stamped Concrete

Curb Bulge

- Provide paver band to delineate end of pathway and approach towards crosswalk around the curb letdown.
- Curb letdown treatment will be consistent with the material used for the shared street (Cascades Plaza), to create a sense of arrival to the University Village and continuity of the pathway towards the University.

Paving Band

- A concrete or basalt paving band should be utilized at both outside edges of the pathway to delineate the travel route from the furnishing zone.

Street Furnishings

Bollards

- Matte stainless steel or anodized aluminum bollards should be provided around the curb bulge to delineate the pathway from the road.

Example of Stainless Steel Bollards

Lighting

- Utilize the same family of lighting fixtures throughout the UDistrict. The pole and overall light standards for the UWalk should be sized to respond primarily to pedestrian and bicycle user needs.
- Matte stainless steel, as well as anodized aluminum should be considered
- Utilize night-friendly, downward-facing luminaires and shorter mounting arms (i.e. smaller scale fixtures on shorter poles).

Sample Light Standard

Public Art

- Provide space for a public art installation with an active transportation theme at the beginning of the multi- use pathway directly north of Duke Avenue to demarcate one of the gateways into the UDistrict.

Active Transportation Themed Art

Seating

- Require seating to have a consistent appearance and use materials such as predominantly heavy timber members with concrete and/or metal structural frame. Benches should be lined on either side of the walkway to allow for adequate rest stops and provide areas for quiet contemplation.
- Curved benches should be installed at the intersection of Duke Road to allow for gathering places and to define the character area.

Example of a curved bench

Street Trees and Landscaping

- Extend the street tree canopy from the university to the bridge deck; however, delineate this segment of the UWalk by utilizing distinct tree species. Deciduous, high-branching trees with wide, overarching canopies are encouraged for this section (Figure 23).
- Design the multi-use pathway as a tree-lined boulevard with trees lining the full length.
- Curb bulges should be landscaped with a combination of trees and low-lying plants such as flowers, shrubs, or bushes.

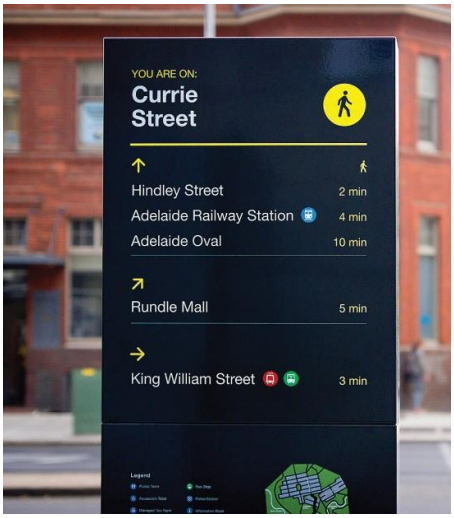
Example: Ginko Autumn Gold Trees

Waste & Recycling

- Give preference to waste management and recycling receptacles that are contemporary in design and coordinate with other streetscape furnishings (lighting and seating).

Wayfinding

- Directional signage at the end of the bridge deck should indicate travel routes and destinations within the neighbourhood, and incorporate nighttime illumination.
- Wayfinding signage with maps should be provided within the curb bulge showing directions to destinations within the greater UDistrict area.



High Contrast - Way Finding

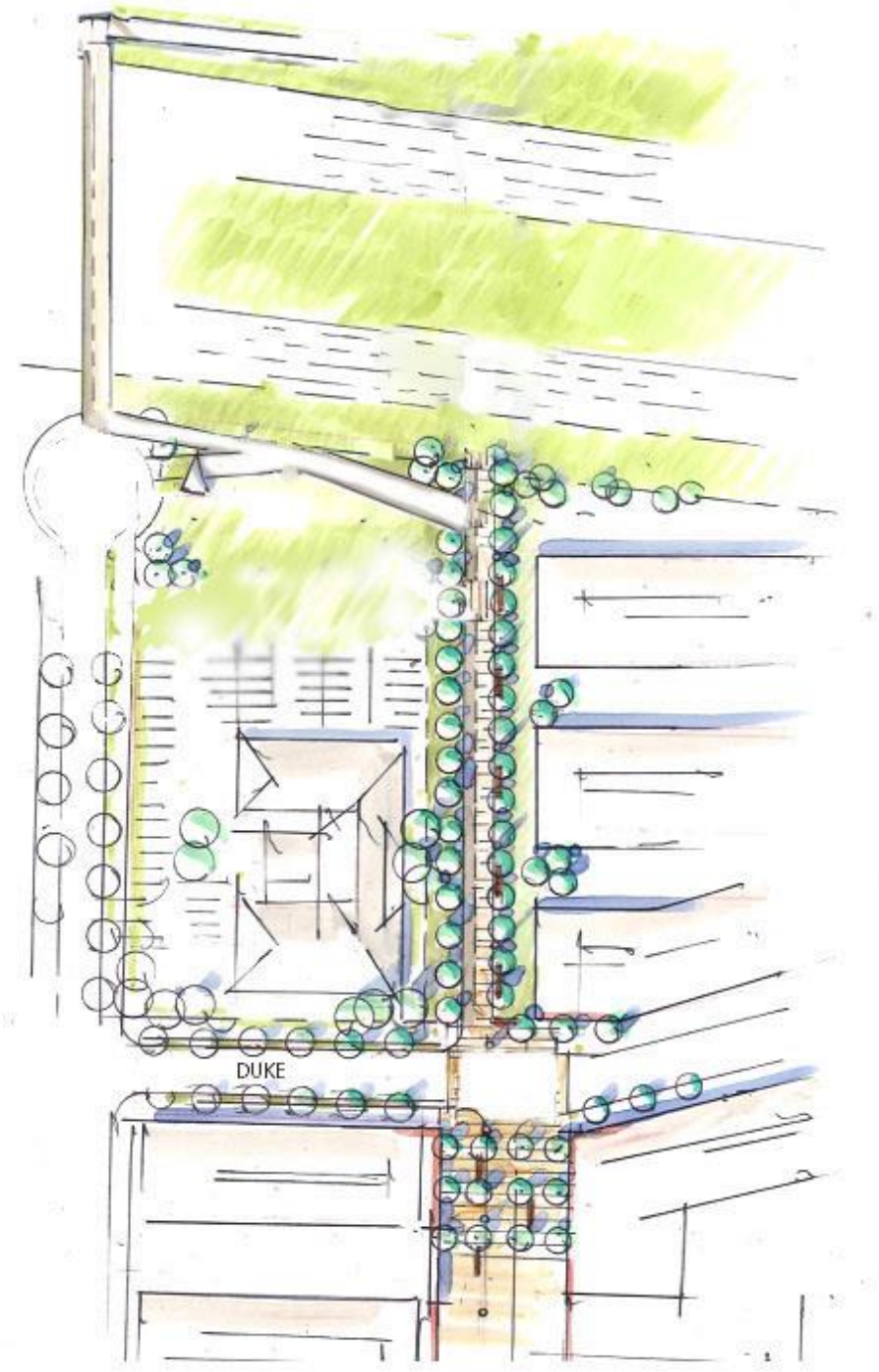
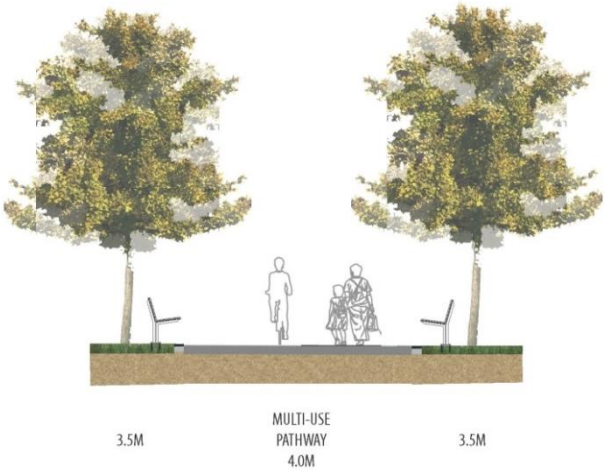


Figure 36 - UWalk North

Figure 37 - UWalk North Greenway



Typical Section | UWalk North Greenway

Total ROW = 11.00M

Figure 38 - UWalk North Typical Cross-section

CASCADES PLAZA

The intent of Cascades Plaza is to create a linear urban plaza that defines the space as a pedestrian-first realm that allows cars, taxis or service vehicles through, but in a controlled manner. To create this space, a continuous and consistent treatment of material such as stamped concrete, saw cut concrete or other similar treatment should extend uninterrupted from building face to building face, a bold and simple 'urban carpet' that successfully functions under pedestrian, bicycle, and vehicle use (including service trucks).

Surface Treatments

Paving Band

- A paving band should be utilized to delineate the edge between public and private spaces.

Paving Material

- Paving material such as stamped or saw cut concrete or other similar material should be considered to reinforce the unique space.

Curbs

- Along this predominantly retail-activated street, utilize a low cast-in-place or precast roll-curb to define the travel lanes while enabling vehicles to easily encroach up and over to the defined parking or loading spots.

Curb Bulges

- Curb letdowns should be identified by a special treatment, which will match the shared street paving material to create a cohesive and unified streetscape.

Intersections

- The University Way North and King Road intersection is the main intersection in the UDistrict and should create a sense of place and a unique identity. The intersection should be designed with distinct pavement material, signaling pedestrian and cyclist priority. This will help with left-turning movements into the shared street and will provide a visual cue to slow down.
- Concrete paving material should be used for the intersection, as well as for all four crosswalk areas which match the shared street paving material (or similar).
- The intersection at University Way North and Duke Avenue should use the same concrete paving treatment as the intersection at University Way North and King Road.

Sidewalks

- Paving band at the interface of the sidewalk with the concrete curb letdown to provide an edge effect and a sense of arrival at an intersection.
- Utilize consistent paving material, such as stamped or saw cut concrete, or other similar material with simple paving patterns that reinforce the space.
- Ensure that the paving material in the public right-of-way extends onto adjacent private land, including into entries.

Rainwater Management

- Utilize paved features in the middle of Cascades Plaza to capture and convey stormwater to the City's drainage system.
- High quality metal tree grates should be provided at the base of all street trees to enhance the design of the public realm, and to increase stormwater infiltration.

Street Furnishings

Accessibility

- To ensure universal accessibility, maintain and enhance connections, parking areas, building entrances, and open space access so that individuals of all physical abilities are able to move through the UDistrict without barriers or impediments.

Bike Racks

- Give preference to bike racks with a simple single ring design, which has the advantage of being readily sized to match anticipated demand by siting a row of rings in a high demand area, and can accommodate additional rings being added over time as demand increases.
- Situate bike racks near entrances of the plaza.

Simple ring bike racks

Bollards

- Consider using matte stainless steel or anodized aluminum bollards.
- Bollards to be provided around curb bulges to delineate the sidewalk from the road.
- Delineate on-street parking pockets with bollards to ensure separation and protection for pedestrians from traffic.
- Within the shared travel lanes, install removable bollards which can be utilized to create a plaza for public events and festivals when required.

Event Infrastructure

- Provide infrastructure to support hosting of special events and use by food trucks, including electrical outlets, water connections, and furnishings to support temporary equipment such as speakers and programmable lighting.

Power Pedestal for Food Trucks, New York

Event lighting

Lighting

- Utilize the same family of lighting fixtures throughout the UDistrict with enhanced form and design for Cascades Plaza. The overall light standards for the UWalk should be sized to respond primarily to pedestrian and bicycle user needs.
- Consider using matte stainless steel, as well as anodized aluminum.
- Light poles should have the ability to hold items beyond just lighting fixtures, i.e. wayfinding, signage, banners, minimizing the need to further accommodate additional poles in this area.
- Night friendly luminaires and light poles with two levels of lighting compared to elsewhere in the UDistrict should be considered.

Parklets

- Utilize parklets to enhance gathering spaces on Cascades Plaza. These could be integrated into the furnishing zone between pockets of on-street parking.

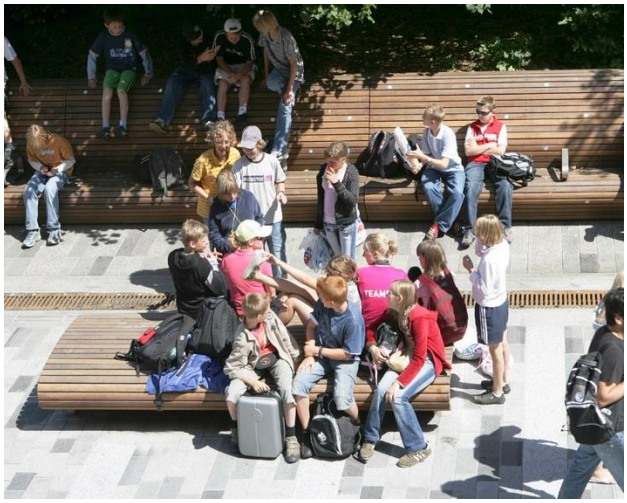
Public Art

- Treat the Plaza as the top priority within the UDistrict for major public art installations. Consideration should be given to gateways at intersections, and also within the furnishing zone (statutes, sculptures etc.).
- Incorporate innovative opportunities for public art into the public realm – mosaic tiles on sidewalks, customized manhole covers, etc.

Public Art

Seating

- Provide a variety of seating opportunities, including single and groups, with and without backs, and in sun and shade areas.
- Seating should consist of predominantly heavy timber members with concrete and /or metal structural frame.



Left: Group Seating, Right: LOOP Bench

- Curved benches should be installed at the intersection of Duke Avenue to allow for gathering places and to define this character area.
- To minimize sidewalk clutter, benches can be combined with other streetscape elements such as bike racks and lighting.

Curved bench examples

Street Trees and Landscaping Tree Canopy

- Provide street trees with close, regular spacing to create a continuous tree canopy. Large gaps in the street tree canopy should be avoided where possible (Figure 23).

Tree Placement

- Extend the tree canopy from the university through Cascades Plaza, providing regularly spaced plantings in the furnishing zone. Street trees should serve as a visual and physical buffer for pedestrians, and provide a greater sense of street enclosure.
- Delineate this segment of the UWalk by utilizing trees such as October Glory Maple to create a distinct identity.

Utilities

- Screen utility equipment, hydro meters, and similar in the public ROW with landscaping or high quality exterior cladding or wraps.

Waste & Recycling

- Give preference to waste management and recycling receptacles that are contemporary in design and coordinate with other streetscape furnishings (lighting and seating).

Wayfinding

- Provide wayfinding at north and south end of Cascades Plaza within the furnishing zone.

Weather Protection

- Integrate weather protection on buildings or in public spaces to provide comfort for people throughout the year.
- Weather protection may include trees and landscaping, or architectural elements such as canopies, colonnades, overhangs or pergolas.
- Provide weather protection on key pedestrian routes and gathering spaces (e.g. seating areas and entrances).
- Integrate both sunny and shaded areas to provide a range of comfortable gathering spaces.

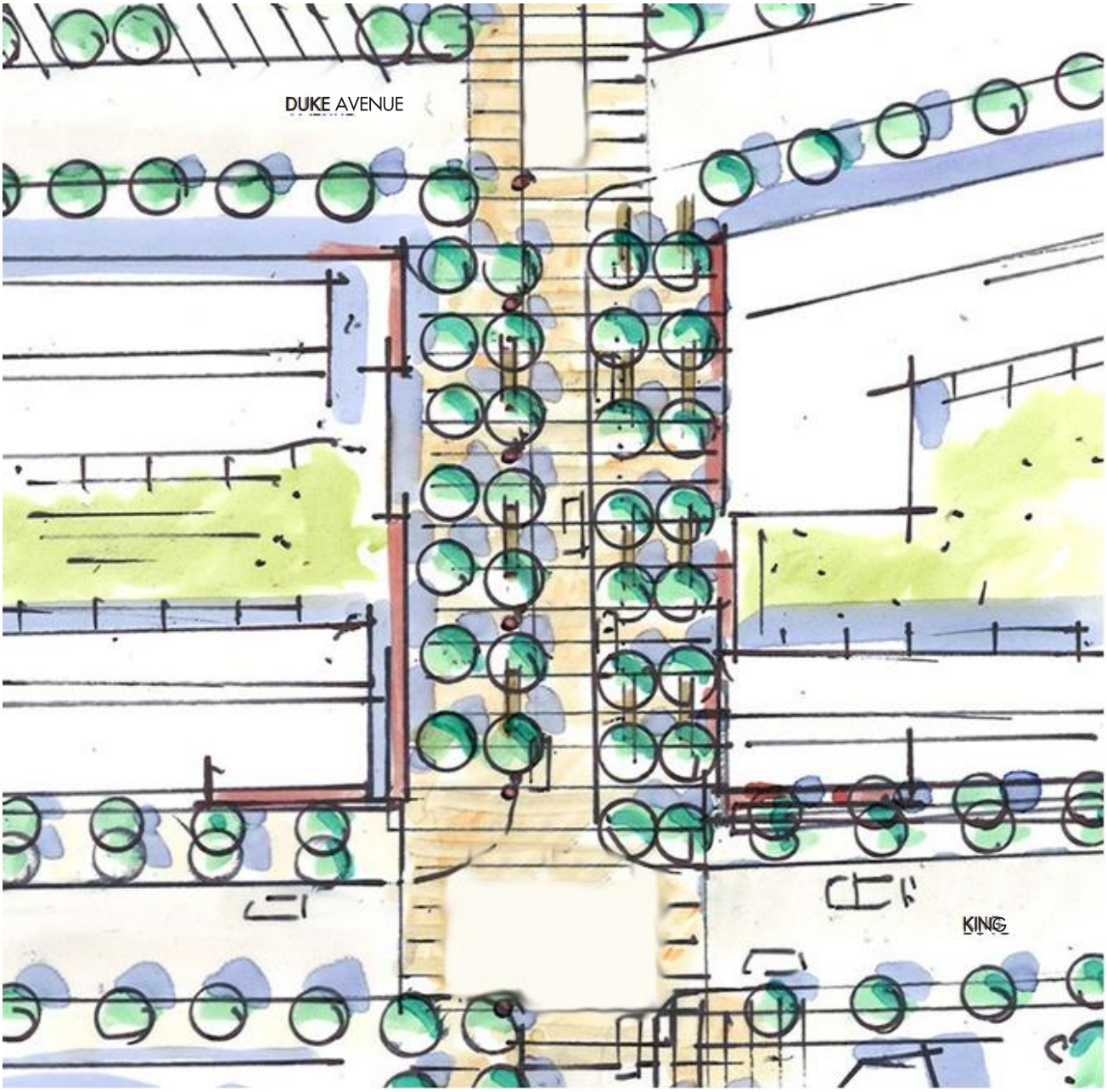
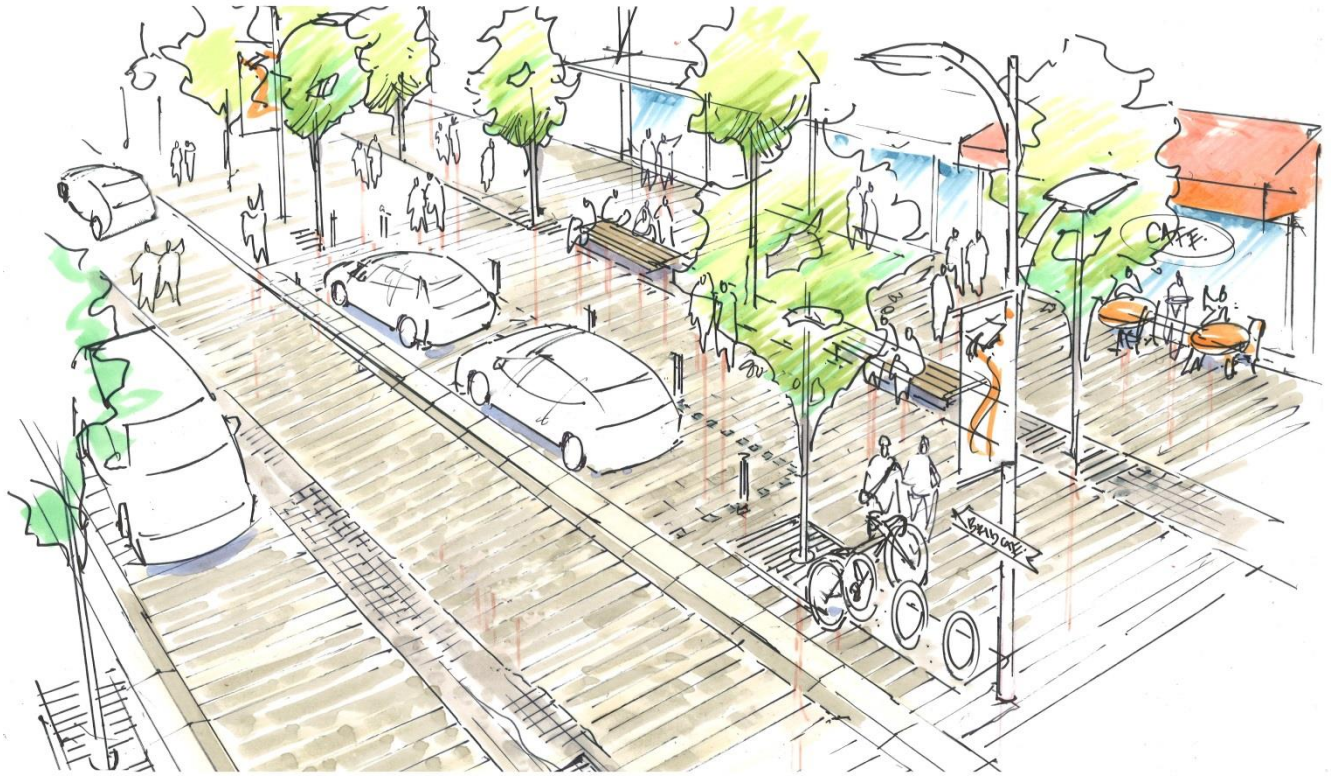


Figure 39 - Cascades Plaza



Street view of UWalk referencing roll-over curb, continuous unit paving across street, parking, seating, double row of trees, active retail edges, and a central paved feature for rainwater collection.

UWALK SOUTH

(For detailed design guidelines, refer to the UFV 2016 Campus Master Plan)

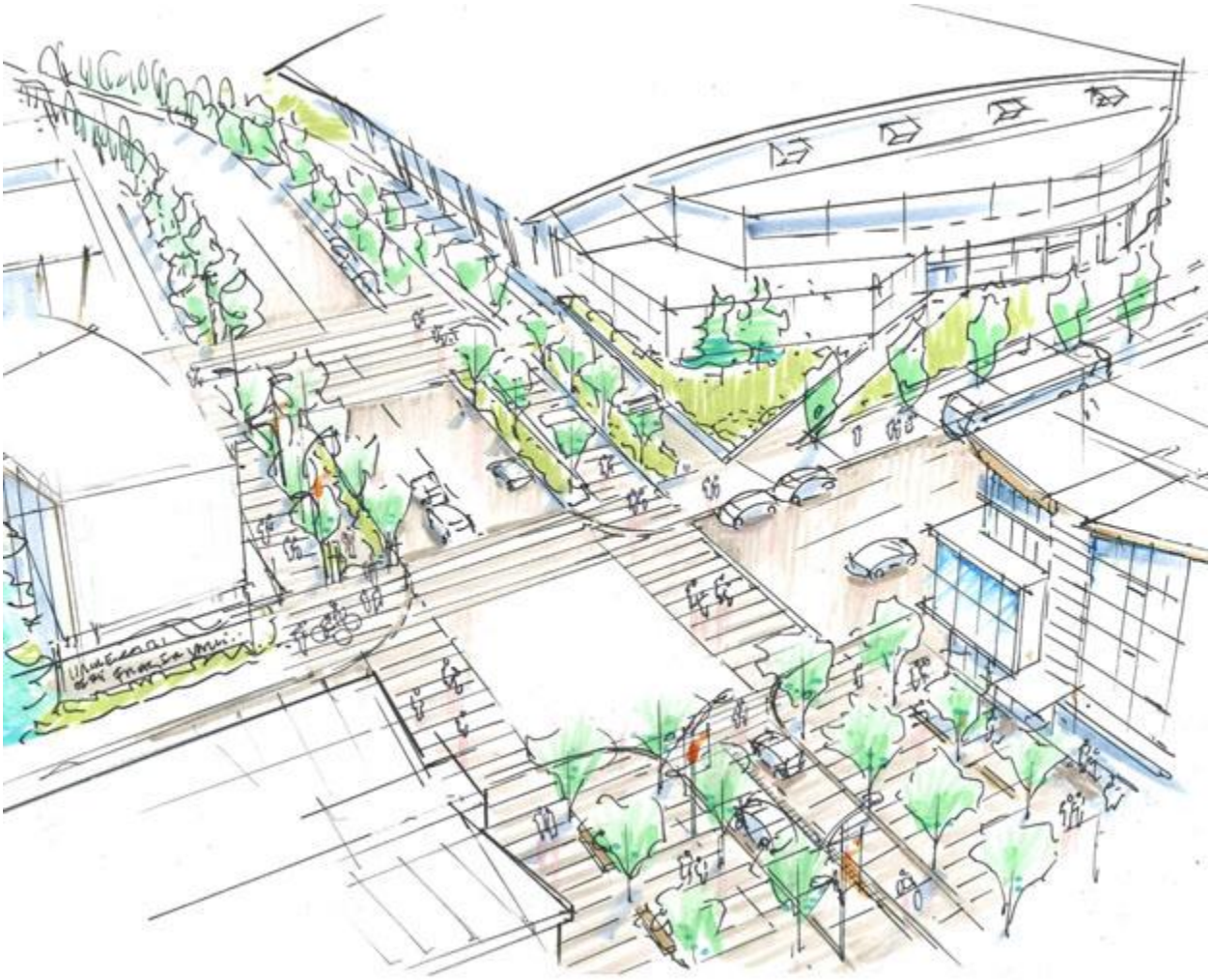


Figure 40 - UWalk South

STREET CLASSIFICATIONS

Cross-Sections

These Street Cross-Sections were created to describe the character and design intent for streets and plazas within the UDistrict. These sections are meant to complement the UDistrict Neighbourhood Development Permit Design Guidelines and the Streetscape Design Guidelines and serves as a guide for the construction, maintenance and improvement of the street network within the UDistrict.

Applicable Streets

Enhanced Street Guidelines

- Duke Avenue (20 M ROW)
- King Connector (28.7 M ROW)
- King Crescent (20 M ROW)
- King Road (26.5 M ROW)
- McCallum Road South (24 M ROW)
- Salton Road (20 M ROW)

Site-Specific Guidelines

- University Way North/Cascades Plaza (18 M ROW)

DUKE AVENUE (20 M ROW)

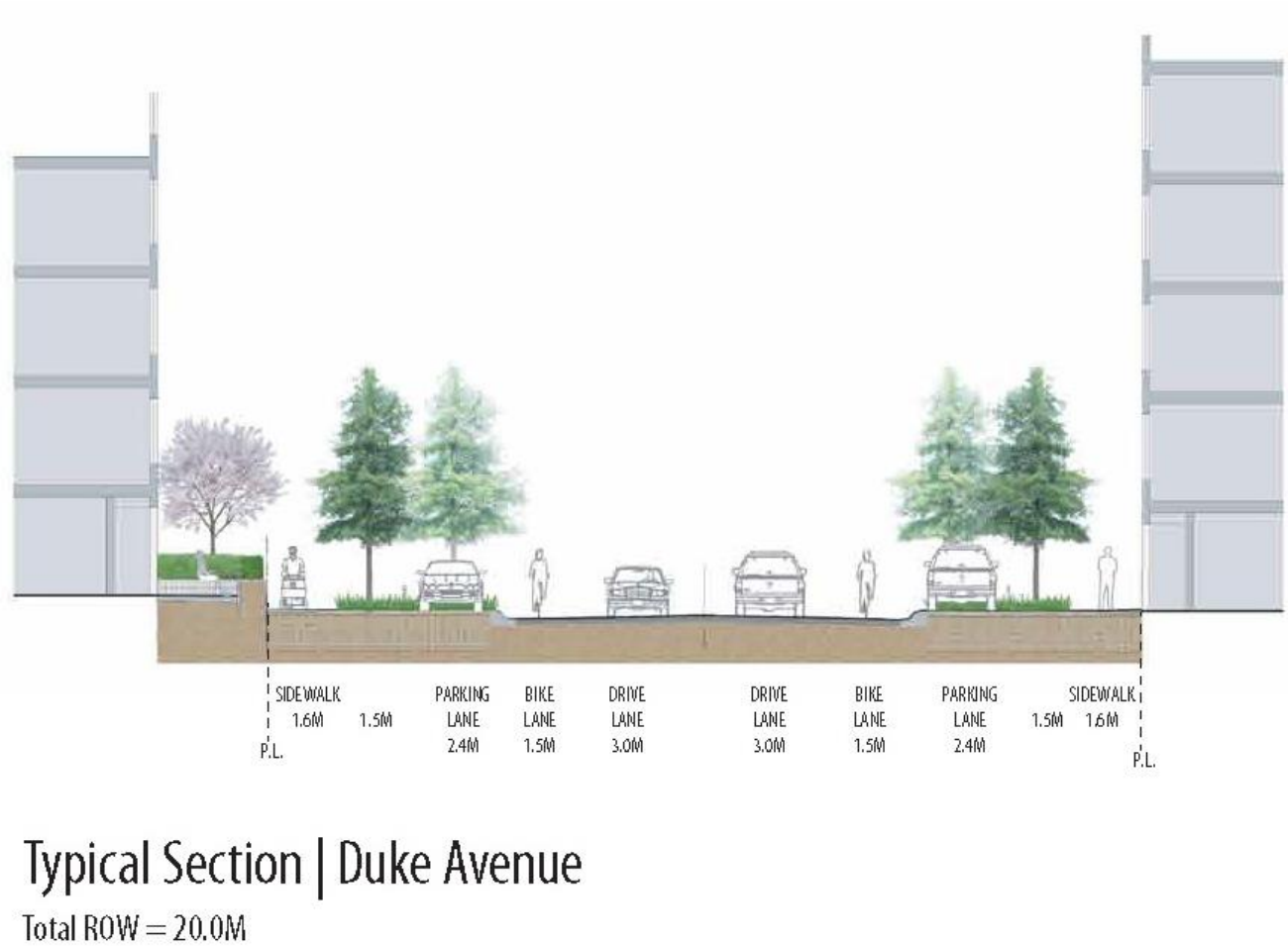


Figure 41 - Duke Avenue cross-section

Specifications

Street Classification – Local (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes and parking pockets on both sides of the street

Bike Lanes – Outboard of parking lanes on both sides of the street

Furnishing Zone – Street Trees (Persian Ironwood) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

KING CONNECTOR (28.7 M ROW)

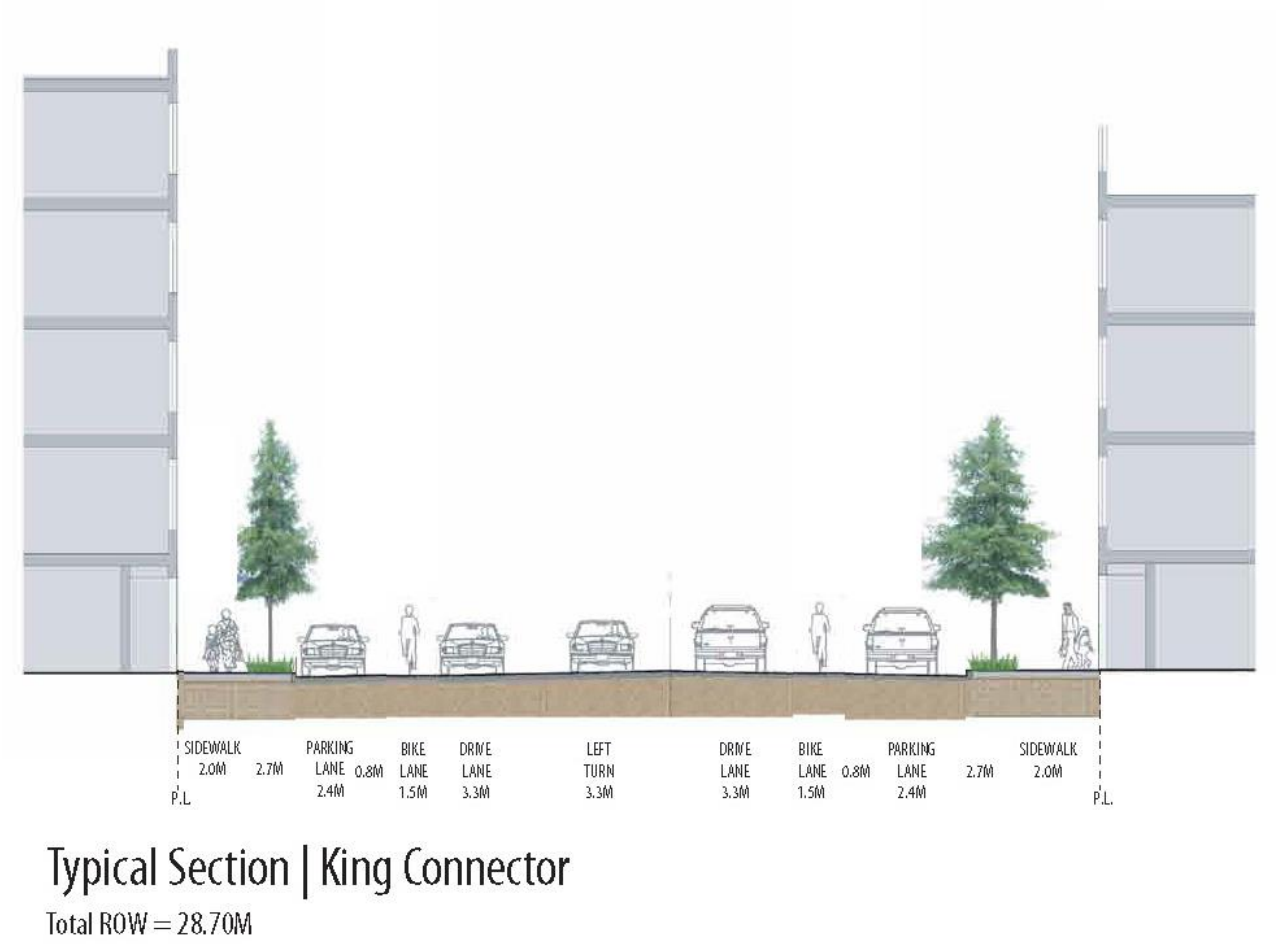


Figure 42 - King Connector cross-section

Specifications

Street Classification – Collector (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes, a turn lane, and parking lanes on both sides of the street

Bike Lanes – Outboard of parking lanes on both sides of the street

Furnishing Zone – Street Trees (Species Determined by PRC) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

KING CRESCENT (20 M ROW)

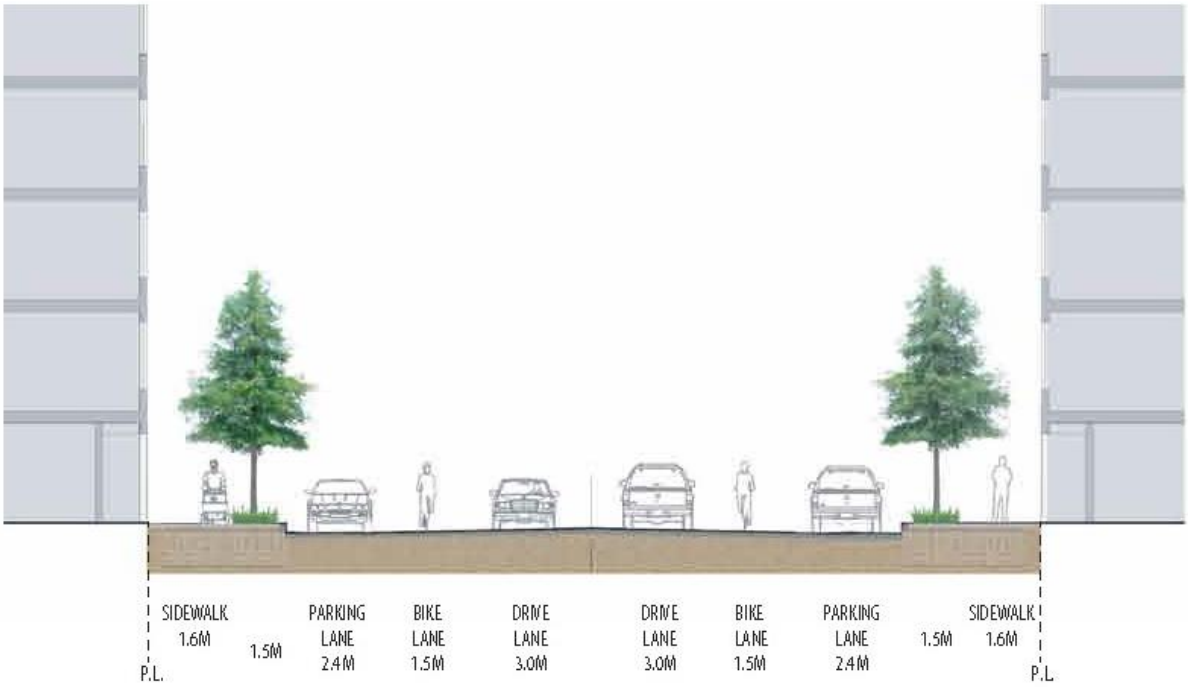


Figure 43 - King Crescent cross-section

Specifications

Street Classification – Local (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes and parking lanes on both sides of the street

Bike Lanes – Outboard of parking lanes on both sides of the street

Furnishing Zone – Street Trees (Species Determined by PRC) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

KING ROAD (26.5 M ROW)

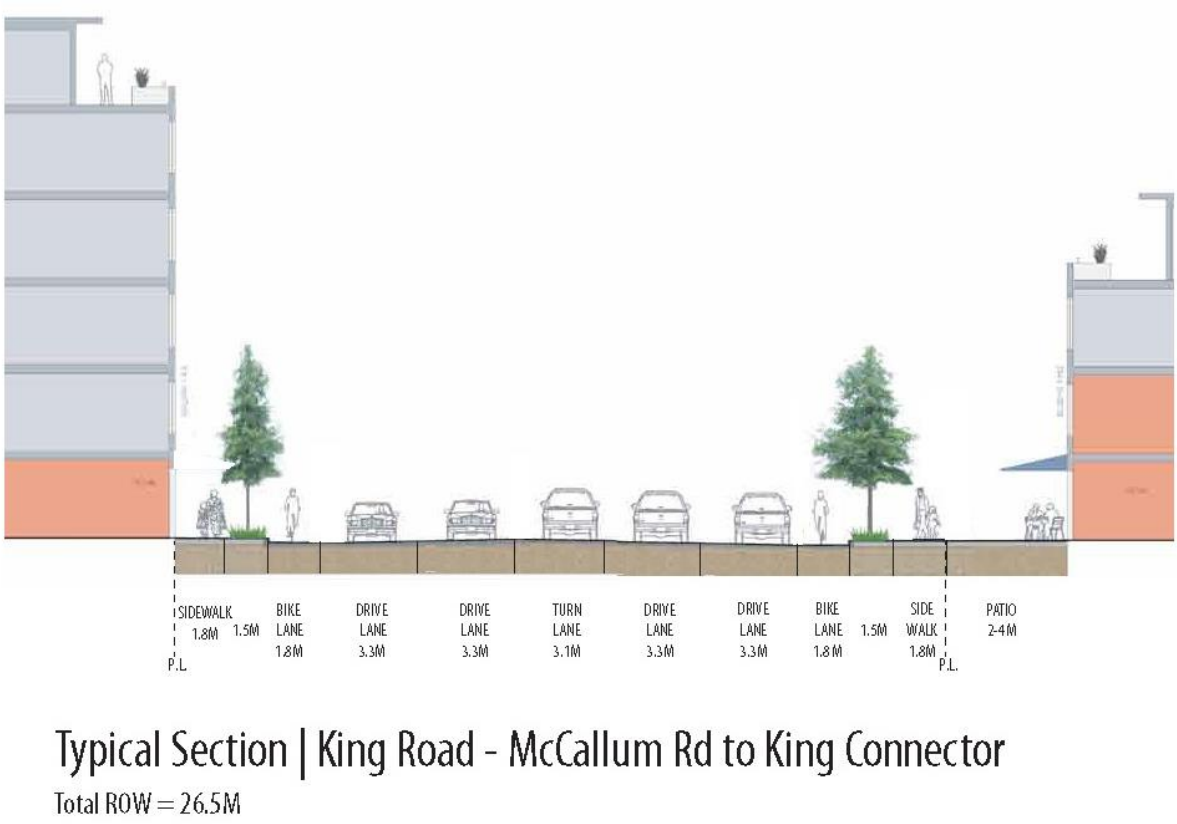


Figure 44 - King Road McCallum Road to King Connector cross-section

Specifications

Street Classification – Collector (Speed limit 50 km/hour)

Lane Configuration – Four travel lanes and a turn lane

Bike Lanes – Inboard of travel lanes on both sides of the street

Furnishing Zone – Street Trees (Sunburst Honey Locust) / Standard Street lights / benches and waste/recycling / Bus shelters*

Pedestrian Movement Zone – Sidewalks on both sides of the street

*In collaboration with BC Transit bus shelters will be upgraded and will provide seating, lighting, bicycle racks, garbage/recycling receptacles, signage displaying transit schedules and route information and will provide covered protection from the elements. The shelter will be a slight modification of the following:

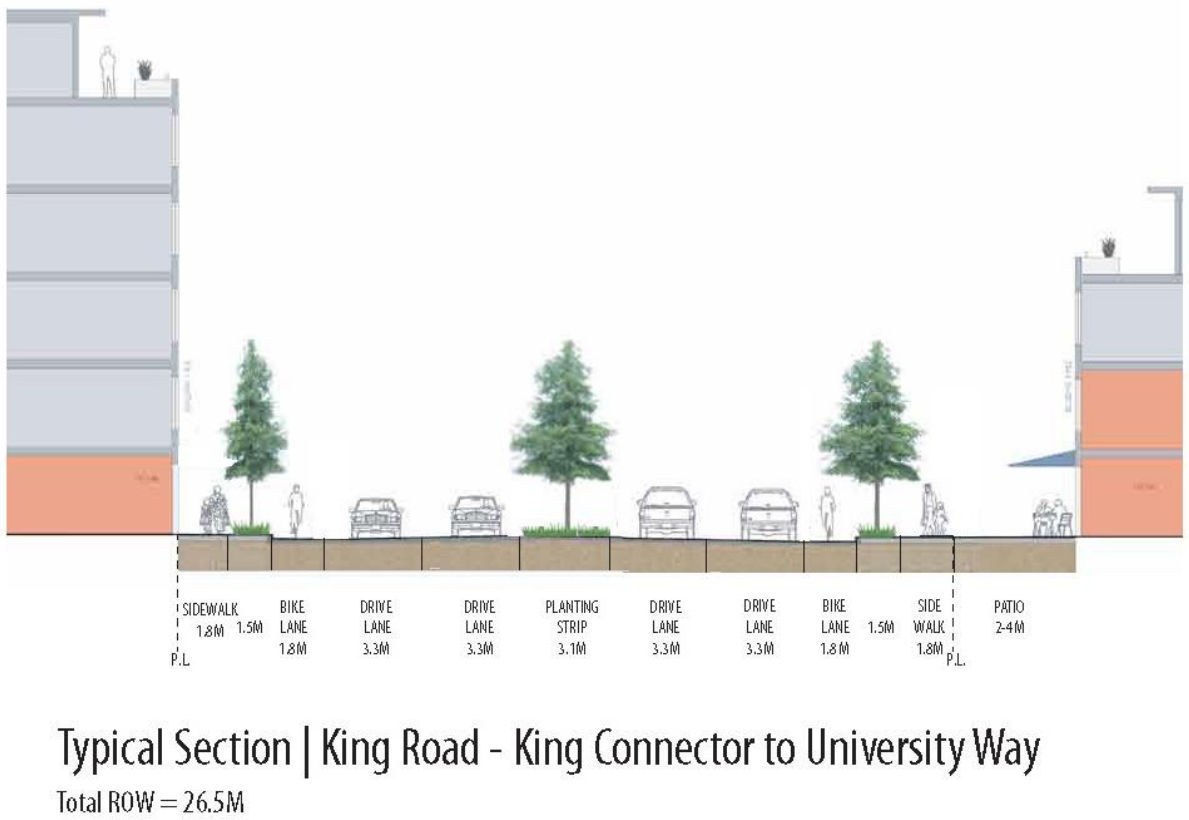


Figure 45 - King Road King Connector to University Way cross-section

Specifications

Street Classification – Collector (Speed limit 50 km/hour)

Lane Configuration – Four travel lanes and planted median (Sunburst Honey Locust)

Bike Lanes – Inboard of travel lanes on both sides of the street

Furnishing Zone – Street Trees (Sunburst Honey Locust) / Standard Street lights / benches and waste/recycling / Bus shelters*

Pedestrian Movement Zone – Sidewalks on both sides of the street

*In collaboration with BC Transit bus shelters will be upgraded and will provide seating, lighting, bicycle racks, garbage/recycling receptacles, signage displaying transit schedules and route information and will provide covered protection from the elements. The shelter will be a slight modification of the following:

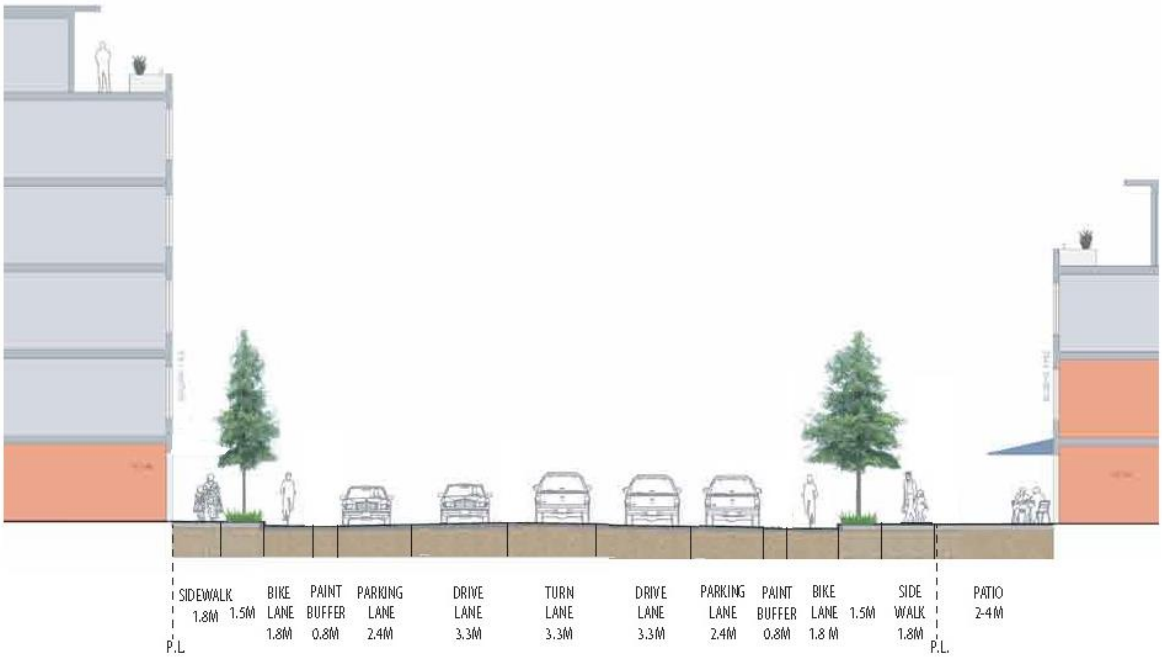


Figure 46 - King Road University Way to McKenzie Road cross-section

Specifications

Street Classification – Collector (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes, a turn lane, and parking lanes on both sides of the street

Bike Lanes – Inboard of parking lanes with painted buffers on both sides of the street

Furnishing Zone – Street Trees (Sunburst Honey Locust) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

MCCALLUM ROAD SOUTH (24 M ROW)

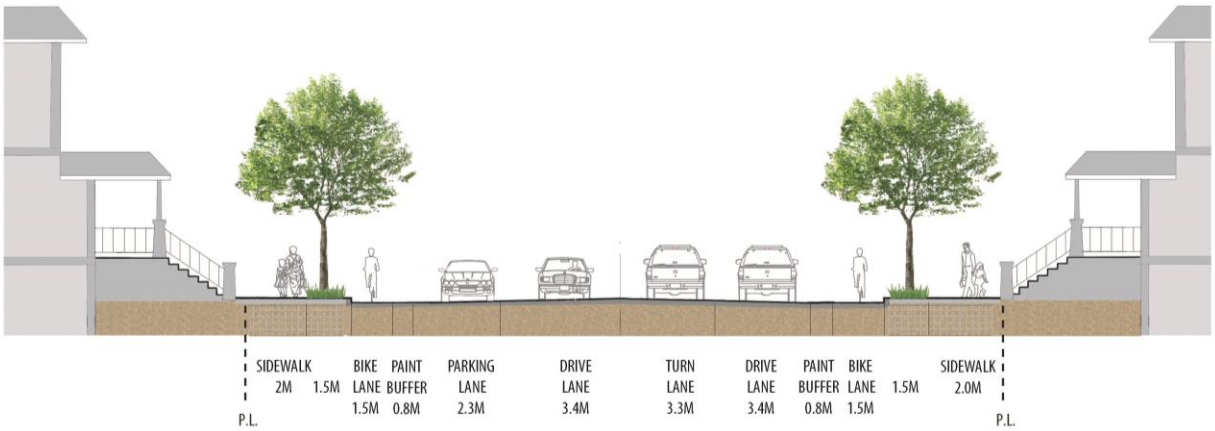


Figure 47 - McCallum Road

Specifications

Street Classification – Collector (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes, a turn lane, and a parking lane on the west side of the street

Bike Lanes – Inboard of west parking lane and inboard of east drive lane with painted buffers on both sides of the street

Furnishing Zone – Street Trees (Autumn Purple Ash) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

SALTON ROAD (20 M ROW)

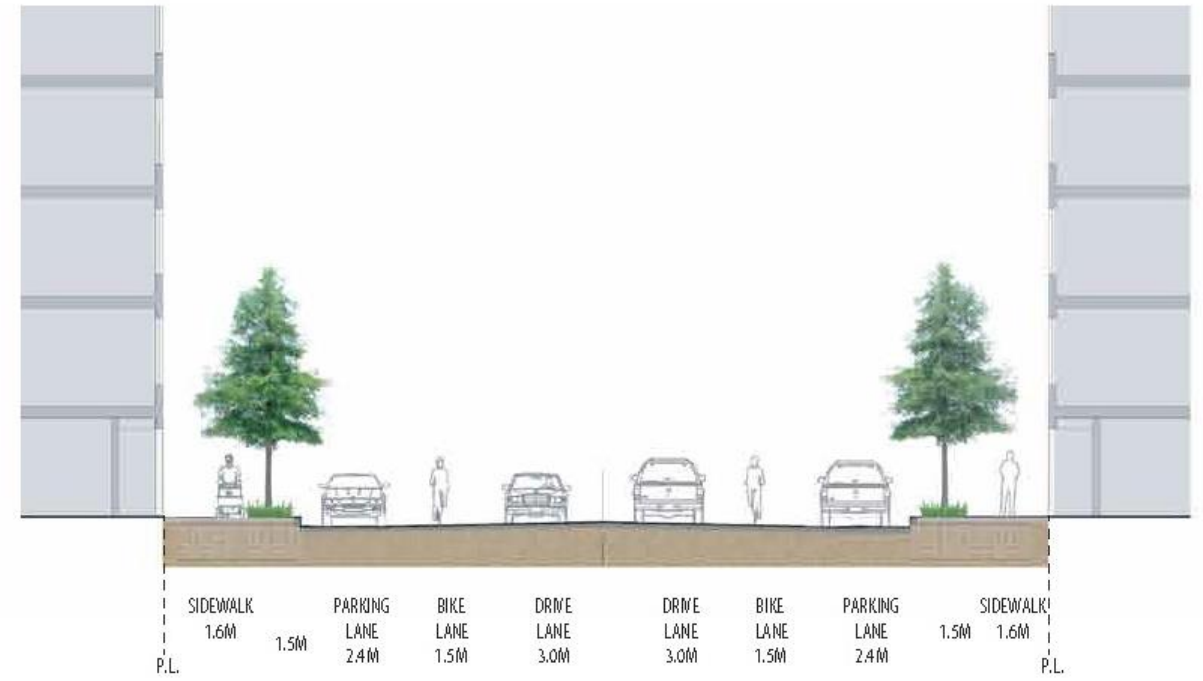


Figure 48 - Salton Road

Specifications

Street Classification – Local (Speed limit 50 km/hour)

Lane Configuration – Two travel lanes and parking lanes on both sides of the street

Bike Lanes – Outboard of parking lanes on both sides of the street

Furnishing Zone – Street Trees (Species Determined by PRC) / Standard Street lights / benches and waste/recycling

Pedestrian Movement Zone – Sidewalks on both sides of the street

UNIVERSITY WAY NORTH (18 M ROW)

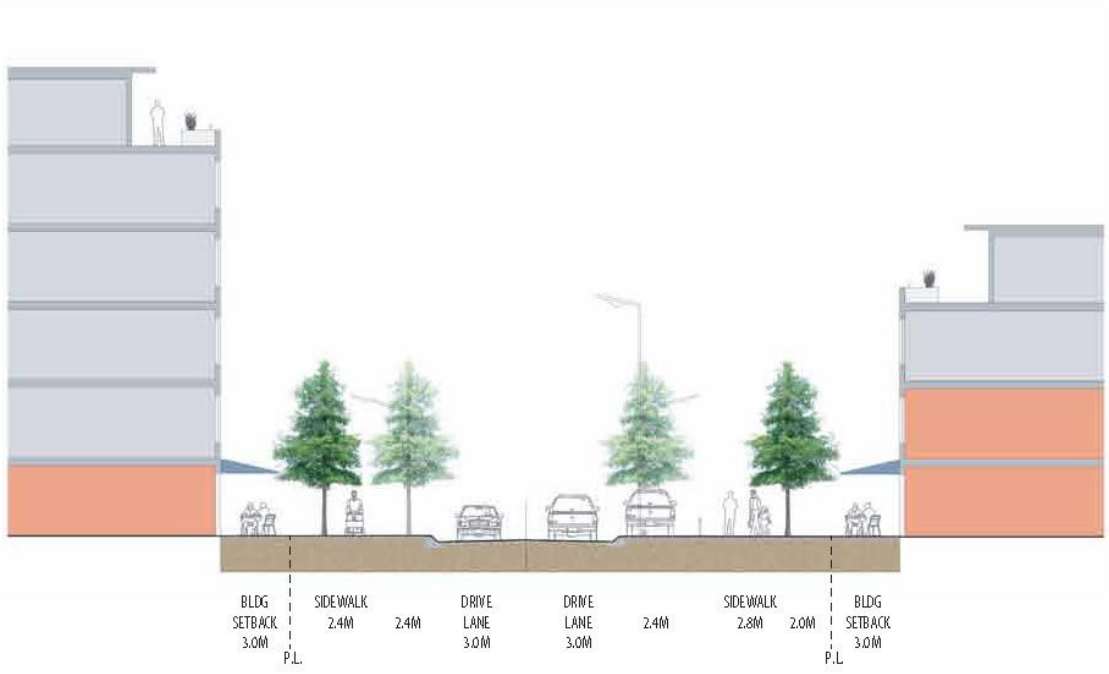


Figure 49 - University Way North

Specifications

Street Classification – Local (Speed limit 30 km/hour)

Lane Configuration – Two travel lanes and parking pockets on east side of the street

Bike Lanes – No bike lanes

Furnishing Zone – See Site-Specific Guidelines (Cascades Plaza) for requirements

Pedestrian Movement Zone – See Site-Specific Guidelines (Cascades Plaza) for requirements

Intersection Design

Intersection Design is an important consideration in creating a sense of place. Proper intersection design can activate and animate street crossings for all users, help to prioritize the pedestrian experience, enhance a sense of safety and create a coherent sense of design within the UDistrict.

This section outlines design guidelines for several different types of intersections. The intersections at King Road and University Way as well as the Intersection at University Way and Duke Road have been highlighted as they have increased design consideration due to their high visibility and defining role in the character of the UDistrict.

Intersections in the UDistrict will prioritize efficiency and safety, while also working to enhance a coherent sense of design.

Crosswalks will be featured, emphasizing the pedestrian pathway. Stripes or other high visibility patterns in intersections are preferred as they reinforce to vehicles that this is a pedestrian space.

Wayfinding will be included at all key intersections.

The paving band at the interface of the sidewalk with the concrete curb letdown should provide an edge effect and a sense of arrival.

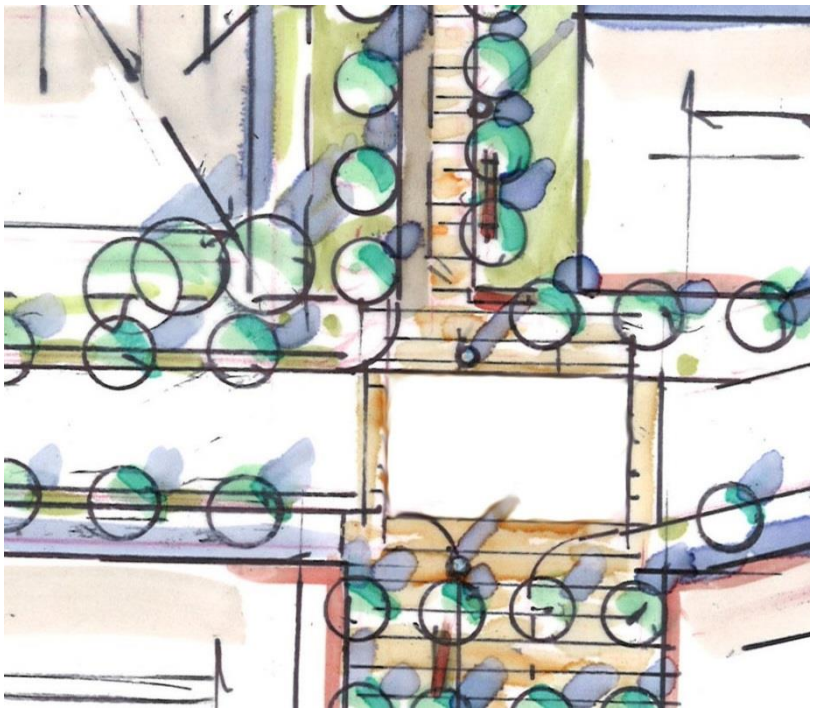


Figure 50 - Plan View of Intersection at UWalk North and Duke Avenue

Figure 51 - Rendering of UWalk North and Duke Avenue Intersection

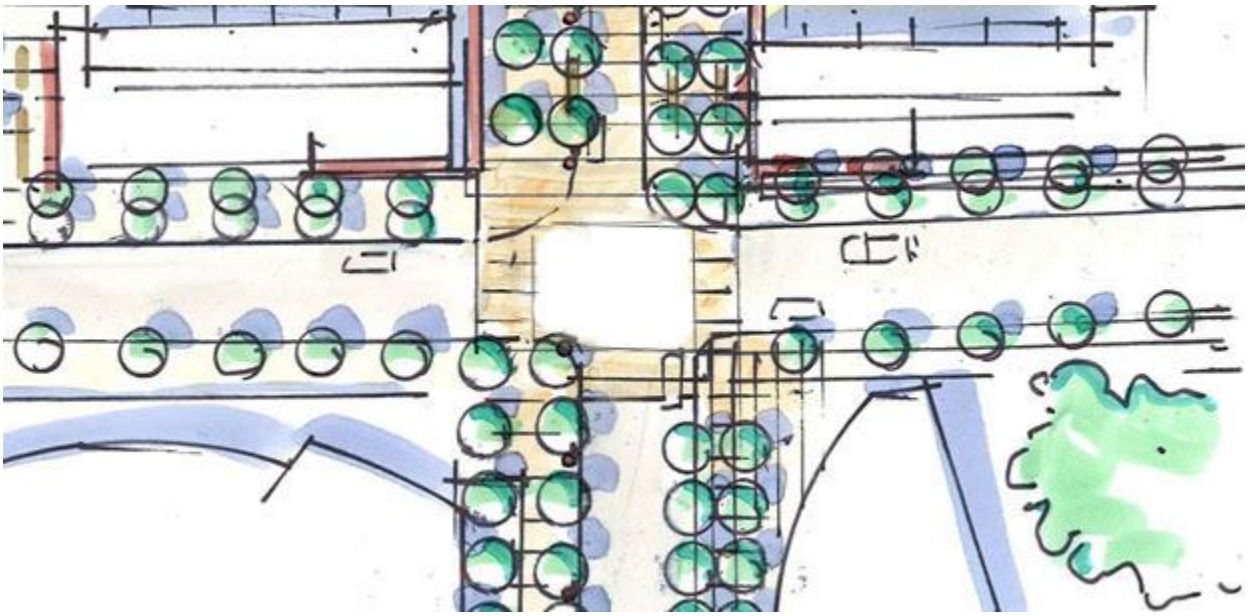


Figure 52 - Plan View of Intersection at King Road and University Way North /Cascades Plaza

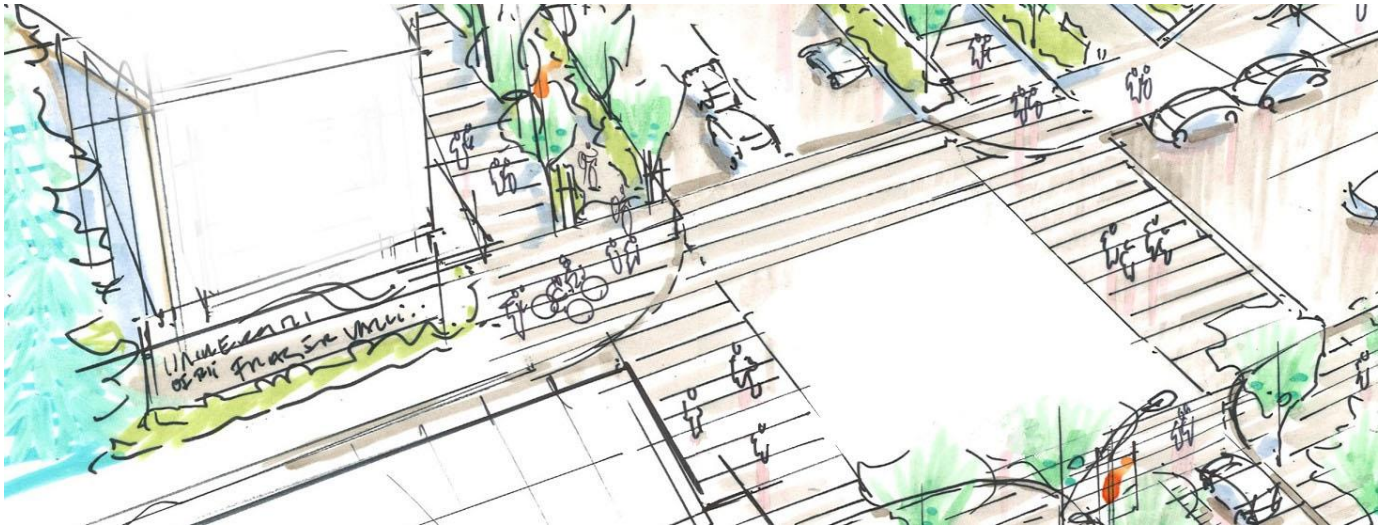


Figure 53 - Rendering of Intersection at King Road and University Way (UWalk South)