



MEMO #2 STANDARD ROAD

CROSS-SECTIONS

DEVELOPMENT

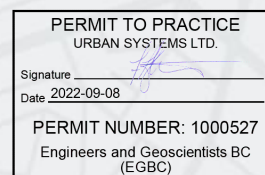
CITY OF KELOWNA

September 8, 2022

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*This Memo is #2 of 3. It is a complement and supporting document to **Memo #1 Functional Road Classification** and **Memo #3 Functional Road Classification System – Implementation Guidance**.*

1.0 INTRODUCTION

As part of the City's Transportation Master Plan (TMP) update, a new road classification system has been developed. The goals of the new road classification system include:

- Aligning with the 2040 Official Community Plan (OCP) and TMP.
- Simplifying the road classification system within a range of contexts commonly found across the City.
- Providing improved guidance for users of the road classification map (previously the 20-year Major Roads Map).

The cross-section development process is being delivered concurrently with updates to the road classification system and the Subdivision Servicing Bylaw 7900 (SDS Bylaw). Typical cross-sections are part of the SDS Bylaw, and are being updated to align with the OCP, TMP, changes to the road classification system as well as the design approach that is being reflected in the proposed updated SDS Bylaw.

The new road cross-sections developed as part of the SDS Bylaw and detailed in this memo have been developed with extensive input from a diverse technical team including external experts and various City of Kelowna departments through the Bylaw Working Group. This group included Infrastructure, Operations, Planning, Development Engineering, Transportation Engineering and external Engineering consultant representatives. This multi-disciplinary and multi-departmental team worked together to ensure the cross-sections are implementable and aligned with the objectives of Imagine Kelowna, and the newly adopted OCP and TMP as well as the perspectives of multiple City departments.

The OCP Road Classification Map and the SDS Bylaw, work together within a larger system of policies to guide the development of new transportation infrastructure. This memo describes each of the new cross-sections, including key assumptions and justifications used in their development.

Road classifications have been developed with guidance from the Transportation Association of Canada's (TAC) *Geometric Design Guide for Canadian Roads* (2017, TAC Design Guide) and current best practices. The scheme considers both the road's surrounding context and the road's function within the larger transportation network to form a matrix of twenty road classifications, shown in **Table 1.1**. This approach recognizes that while a road's function within the larger vehicle network may be consistent throughout its length, changes in its surrounding context can influence the number and types of other road users, and accordingly shift its cross section requirements.

Table 1.1: Recommended Road Classifications

		Road Network Function			
		Neighbourhood Street Network		Major Road Network	
		Local	Collector	Minor Arterial	Major Arterial
Land Use Context	Rural	Rural Local	Rural Collector	Rural Minor Arterial	Rural Major Arterial
	Hillside	Hillside Local	Hillside Collector	Hillside Minor Arterial	
	Suburban	Suburban Local	Suburban Collector	Suburban Minor Arterial	Suburban Major Arterial
	Industrial	Industrial Local	Industrial Collector		
	Core Area	Core Area Local	Core Area Collector	Core Area Minor Arterial	Core Area Major Arterial
	Urban Centre	Urban Centre Local	Urban Centre Collector	Urban Centre Minor Arterial	Urban Centre Major Arterial

Road cross-sections have been developed to support the goals and objectives of the OCP and TMP, including multimodal mobility and road safety, balanced against the surrounding context and considering the many needs within the right-of-way (ROW). This approach ensures that the identified road classifications' cross-section design elements align with the general vision, context and function of the corridor.

It is expected that new roads will be dedicated and constructed consistent with the typical cross-sections. Where additional functions for roads have been identified, guidance is provided in the form of four overlay maps, including; major projects, transit routes, active transportation routes, and truck routes. For these streets, additional right-of-way and roadway elements beyond typical cross-sections may be required. For some local streets cross-sections, where existing right-of-ways are constrained, dimensions that can be varied have been identified as ranges.

All streets work as a system, so new road infrastructure must ensure that it integrates with adjacent streets such that it is effective, safe and functional. Cross-sections are but one source of design guidance and work in coordination with other City policies and broader professional design guidance. While the road classification scheme and typical road cross-sections guide the design of roads within the City, adaptation will be required to specific contexts, particularly on existing streets.

2.0 STANDARD ROAD CLASSIFICATION CROSS-SECTIONS

Each road classification is described in the sections below, including a list of cross-section elements, their width, and justification. The cross-section attribute dimensions for all road classifications are also included in **Appendix B**. The standard road classification cross-sections do not consider overlays and each location should be checked with the provided overlay maps to identify additional attribute requirements. See **Section 3.0** for guidance on corridors within a designated overlay. Additionally, the standard road classification cross-sections do not consider non-linear elements (such as transit stops, intersection infrastructure or layouts, etc.) and project-specific context; additional right-of-way will be required to accommodate these elements with guidance from the updated SDS Bylaw.

For each standard road cross-section, the ROW width is provided (i.e., the recommended ROW width to be specified in the SDS Bylaw). Ranges are provided for some components to indicate where any extra ROW width should be allocated to have the most benefit. The lower end of any provided ranges indicates the absolute minimum attribute width and may be acceptable in constrained situations, such as some retrofits. The **Functional Road Classification System – Implementation User Guide** provides more information on when the minimum value of these ranges is appropriate.

The general approach for the facilities of each key user group are described below.

Pedestrians – Greater protection/separation of pedestrian facilities is provided on roads with higher vehicle speed and volumes (road classification), and increased priority for pedestrian accommodation, comfort and accessibility with higher expected pedestrian activity.

The sidewalk widths specified in the standard cross-sections are considered pedestrian clear zones and should not be used for patio space or any fixed items. The pedestrian clear zone should be maintained for pedestrian mobility only. Any patio space, placemaking spaces, or other fixed furniture needs to be addressed separately based on location context. They could be potentially located within the border, the parking lane, a widened ROW, or building setbacks (private property). If use of the parking lane is being considered it is important to ensure all requirements (such as parking, loading/unloading, transit stops, and turn-lanes at intersections) are taken into account.









Cyclists – Bike facilities are applied based on a complete network as identified in the proposed bicycle overlay. As bike lanes are a fundamental part of the transportation network standard cross-section with bike lane options have been provided where they are common. A standard 1.8m width (to the face of curb) of bike lane is applied throughout the network with increased separation provided in contexts with higher vehicle speed and volumes. Where parking is adjacent a dooring buffer is provided.

Transit – Transit is addressed through the transit overlay map as a complete network.

Vehicles – Traffic travel lane width is based on vehicle speed and volume and considering the priority of vehicle traffic within the specific land use context. Space allocated for vehicle traffic (i.e., vehicle travel lane width) increases as speed, volume, and priority of vehicle traffic increase.

The following sections provide an overview of each road class, an attributes table with each cross-sectional element and its justification, a sketch of the cross-section and finally a map illustrating typical examples of where the road classification occurs. The maps are not intended to illustrate every instance, but to give some examples of where the road classification applies to provide context to the cross-section. These maps also illustrate the existing and future road network and the City's bicycle network as per the Bicycle Overlay, as shown below in **Figure 2.1**.

Figure 2.1: Road Type Map Legend

	Bike Route				
	None	Primary Network		Secondary Network	
		Existing	Future	Existing	Future
Existing Road					
Future Road		N/A		N/A	

3.0 LOCAL

Local streets are primarily for access. Most traffic should be destined to the immediate or adjacent streets, or accesses. Users should be dominated by residents who live or customers/employees that work on the street. Compared to the major road network, traffic volumes and speeds should be low. Motorists should only expect to travel a short distance on local streets before reaching a collector or arterial for the rest of their journey; connections between neighbourhoods or collectors/arterials via local streets should be avoided. Access from local streets to adjacent parcels is generally supported except where lanes are present.

3.1 RURAL LOCAL

Local streets in rural areas anticipate low overall traffic demand, with typically less than 500 vehicles per day and very few pedestrians. Longer distance recreational road cycling is common within many of Kelowna's rural areas, and may introduce higher numbers of cyclists. The modal emphasis is vehicles within a rural/agricultural setting, and speeds may be higher (maximum 50km/h) relative to other local streets. The design vehicle is passenger car but trucks (WB-15) are accommodated to support agricultural traffic and activities. Existing bylaw ROWs vary between 15m and 18m (SS-R3 and SS-R4); the proposed ROW width is 16m. The recommended cross-section for rural local roads is described below in **Table 3.1** and **Figure 3.1**, with examples of these streets shown in **Figure 3.2**.

Table 3.1: Recommended Attributes for Rural Local Road Classification

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	3.0	<ul style="list-style-type: none"> Includes an open ditch. Utilities to be placed in border. 150mm depth below subgrade, and 4:1 desirable, 3:1 preferred, 2:1 max slopes adjacent to the road. See Appendix A for further details. Allowance should be adequate in most cases, but ditch to be designed based on geotechnical site conditions.
Sidewalk	-	-	<ul style="list-style-type: none"> N/A: Pedestrians accommodated with walkable gravel shoulder.
Gravel Shoulder	2	1.5	<ul style="list-style-type: none"> BC AT Guide recommends 1.5-2.0m for Bicycle and Pedestrian Accessible Shoulders¹. Allows for walkable gravel shoulder.
Paved Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	-	-	<ul style="list-style-type: none"> N/A: Not required.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Vehicle volume and speeds are assumed to be low, so bicycle use of travel lanes is appropriate unless on a specified bicycle route. See <i>Bicycle Overlay Map</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No bike facility.

¹ For rural roadways with a posted speed of less than 70km/h. See Table F-27 in the BC AT Guide.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Curb & Gutter	-	-	• N/A: Ditch in lieu.
Parking Lane	-	-	• N/A: No on-street parking provided.
Travel Lane	2	3.5	<ul style="list-style-type: none"> • No centreline. • Mixed traffic with cyclists (no paved shoulder). • TAC Design Guide recommends 3.0 to 3.7m for rural roadways with low speed and design hour directional volume < 450.
Median / Aux Lane	-	-	• N/A: Not required.
ROW Width		16.0	

Figure 3.1: Cross-Section for Rural Local Road Classification

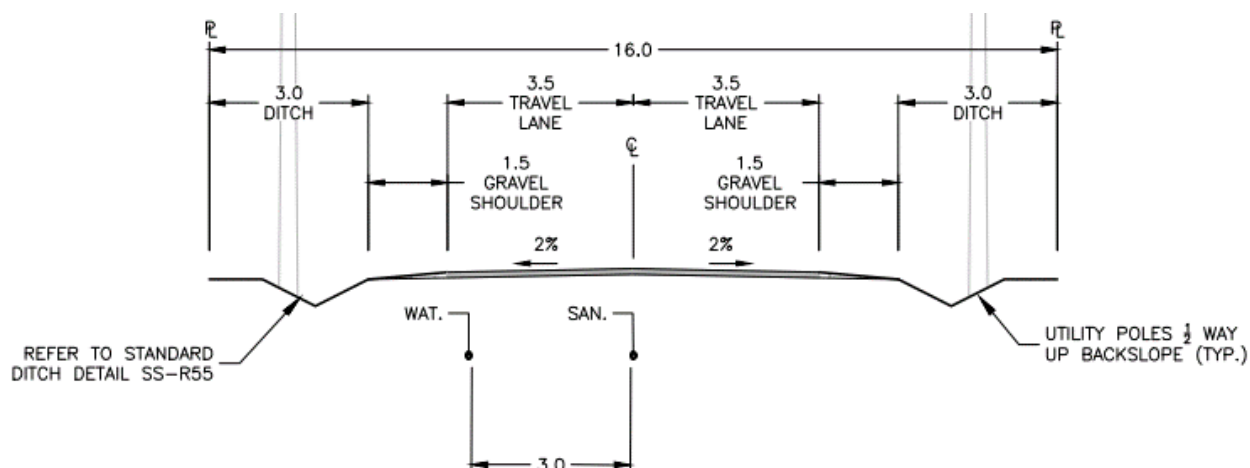
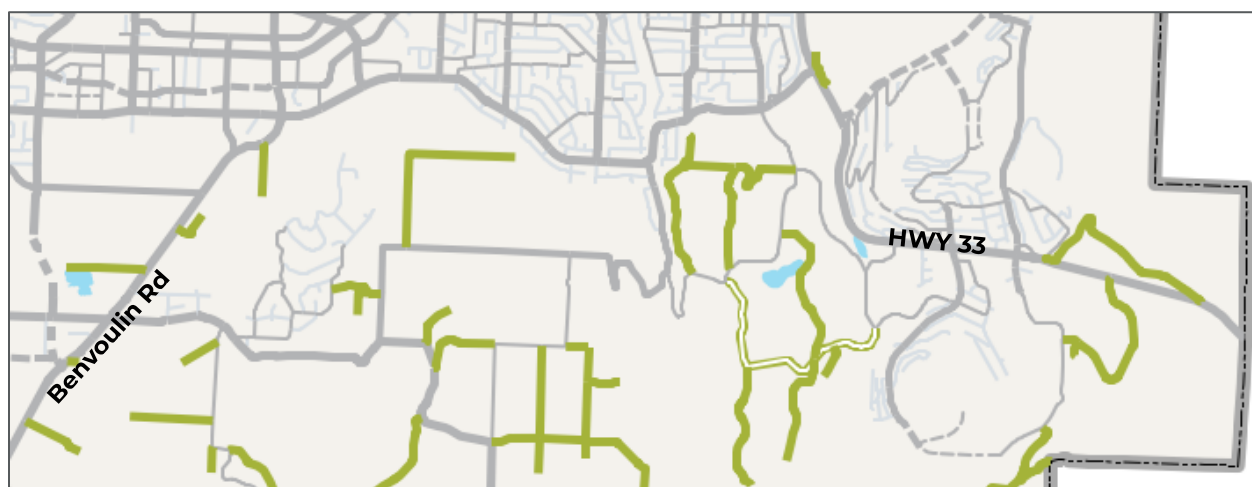


Figure 3.2: Rural Local Map Excerpt (Southeast Kelowna / Black Mountain)



3.2 HILLSIDE LOCAL

As Hillside cross-sections were recently developed, updates are not included in the scope of this project but are likely required in the future. The following diagrams are from the existing SDS Bylaw Schedule 5 Parts 5e and 5f, and apply to local roads in a Hillside context. One change is proposed, the replacement of rollover curb barrier, where this is shown as barrier curbs below in **Figure 3.4**, **Figure 3.5** and **Figure 3.6**. Examples of these streets are shown in **Figure 3.7**.

Figure 3.3: Village Local - Residential

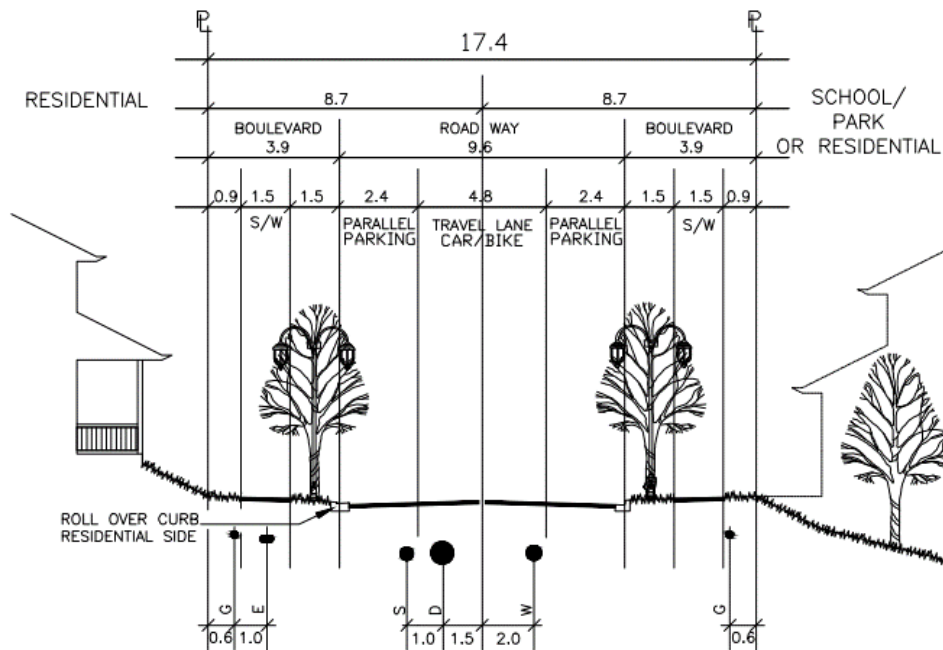


Figure 3.4: Local - Condition A (Development Both Sides)

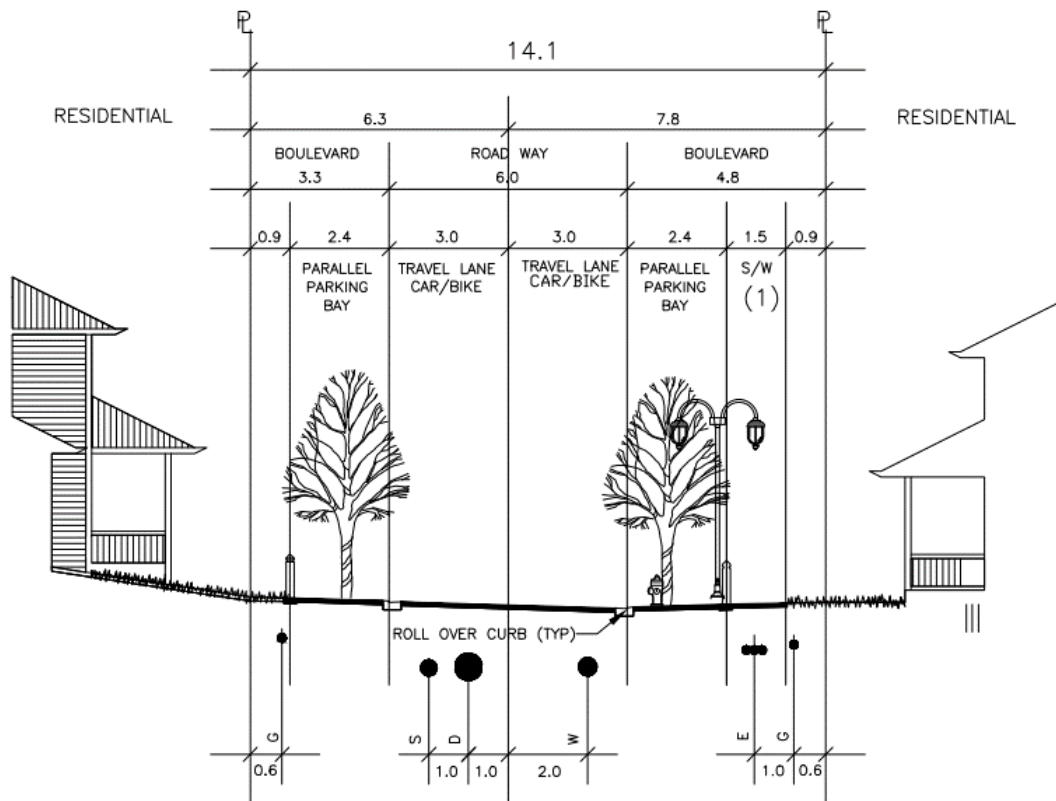


Figure 3.5: Local Condition B (Development One Side)

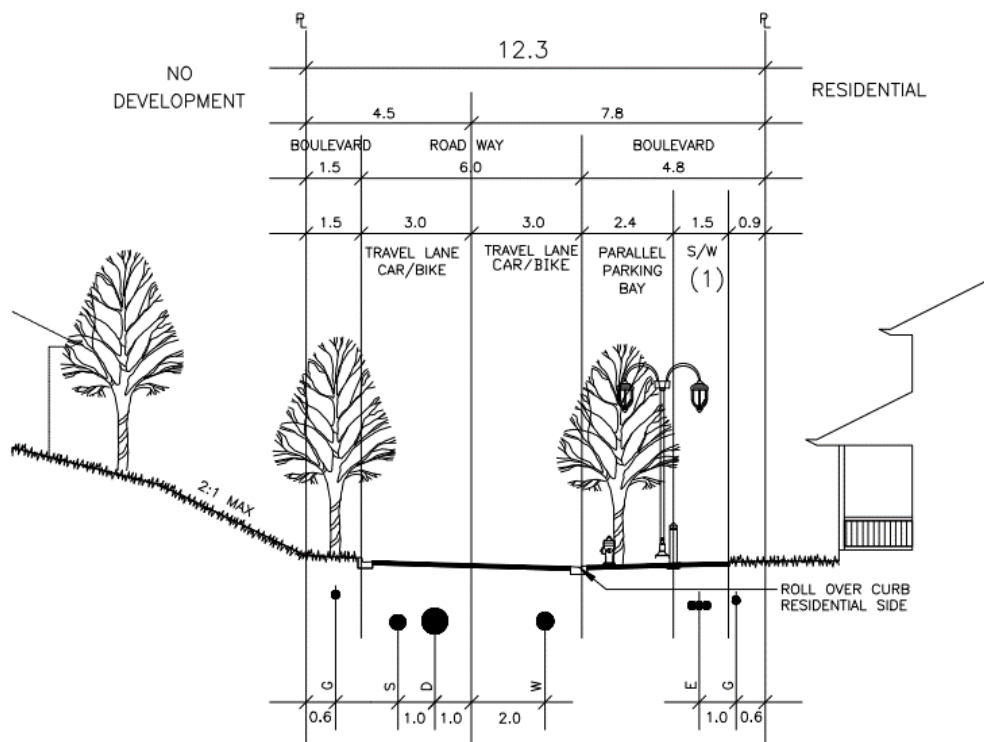


Figure 3.6: Local Condition C (No Development Either Side)

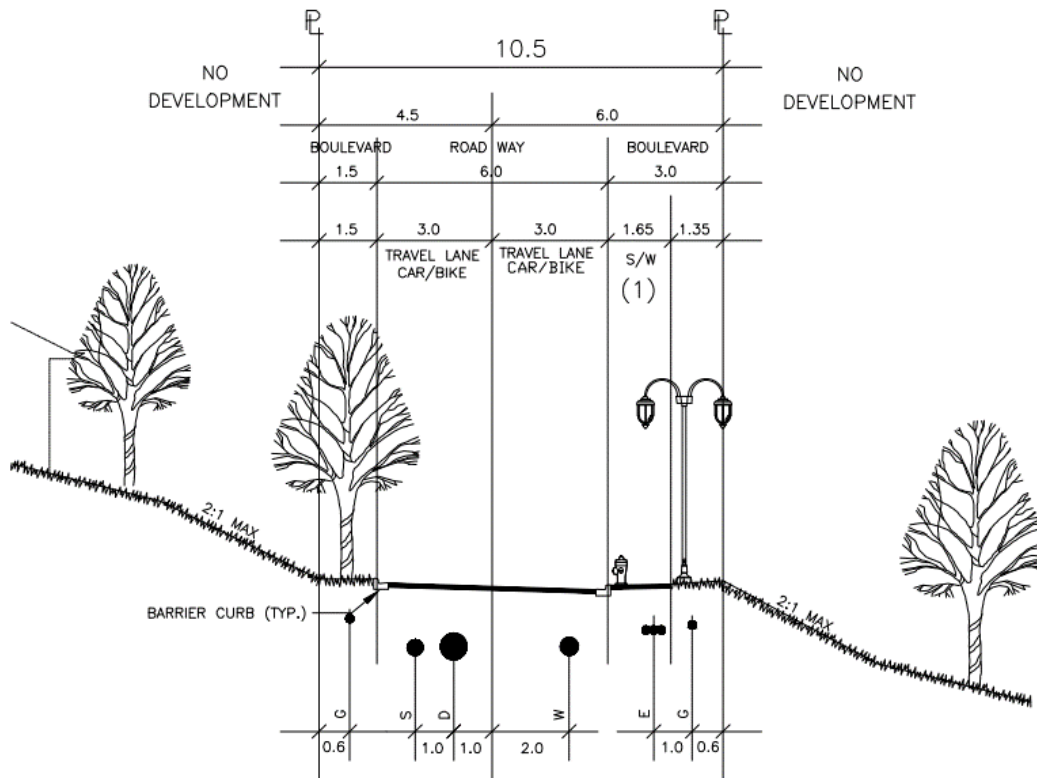
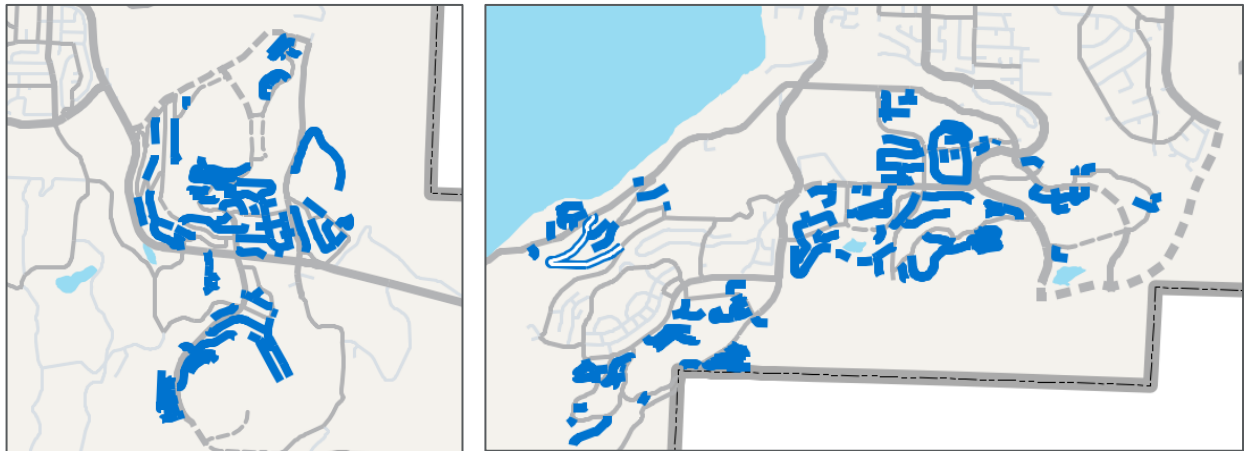


Figure 3.7: Hillside Local Map Excerpt (Black Mountain and Kettle Valley)



3.3 SUBURBAN LOCAL

Local roads in a suburban area anticipate low overall traffic demand, with typically less than 750 vehicles per day, and few pedestrians and cyclists. Vehicles and cyclists are accommodated within a single, wide travel lane. Passing vehicles use parking lanes to pass. Pedestrians are accommodated with a sidewalk on one side of the road. The design vehicle is a passenger car with service vehicles (such as fire and garbage trucks) accommodated. A wider border provides uncovered space for shallow utilities. Local roads have no access restrictions except where laneways are present. While pedestrian and cyclist volumes are generally low in suburban areas, they are higher adjacent to schools and parks, where a second sidewalk may be considered.

The existing Bylaw ROW is 15m to 18m (SS-R3 and SS-R4), and the proposed ROW is 16m. The recommended cross-section for Suburban Local roads is described below in **Table 3.2** and **Figure 3.8**, with examples of these streets shown in **Figure 3.9**.

Table 3.2: Recommended Attributes for Suburban Local Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	1.10	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m. Wider border to accommodate shallow utilities.
Sidewalk	1	1.8	<ul style="list-style-type: none"> TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min. BC AT Guide specifies 2.1m sidewalk is desirable for multi-family residential local roads and 1.8m is the constrained limit for both multi-family and single-family residential local roads. 1.8m enables two pedestrian to walk side-by-side while having adequate shy space from adjacent parked cars.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	1	1.8	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m. 1.5m minimum required width for trees. 1.8m dedicated to provide flexibility in cases where a sidewalk may be required / desired.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Vehicle volume and speeds are assumed to be low, so bicycle use of travel lanes is appropriate unless on a specified bicycle route. See <i>Bicycle Overlay Map</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No Bike Facility.
Curb & Gutter	2	0.45	
Parking Lane	2	2.1*	TAC Design Guide recommends 2.4m <i>*Effectively 2.4m with gutter</i>
Travel Lane	1	5.1	<ul style="list-style-type: none"> TAC Design Guide states shared lanes are suitable with speeds less than 40km/h and ADT under 2,500 veh/day, and recommends a width of 3.2 – 5.2m. No centreline. Mixed traffic with cyclists.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
			<ul style="list-style-type: none"> Ensure breaks in the parking are provided to allow vehicles to pass, such as driveways. Fire requirement is minimum 6m (including parking). If parking is omitted the travel lane width must be increased. Encourages lower speeds and aligns with the OCP objectives.
Median / Aux Lane	-	-	<ul style="list-style-type: none"> N/A: Not required.
ROW Width		16.0	

Figure 3.8: Cross-Section for Suburban Local Road Classification

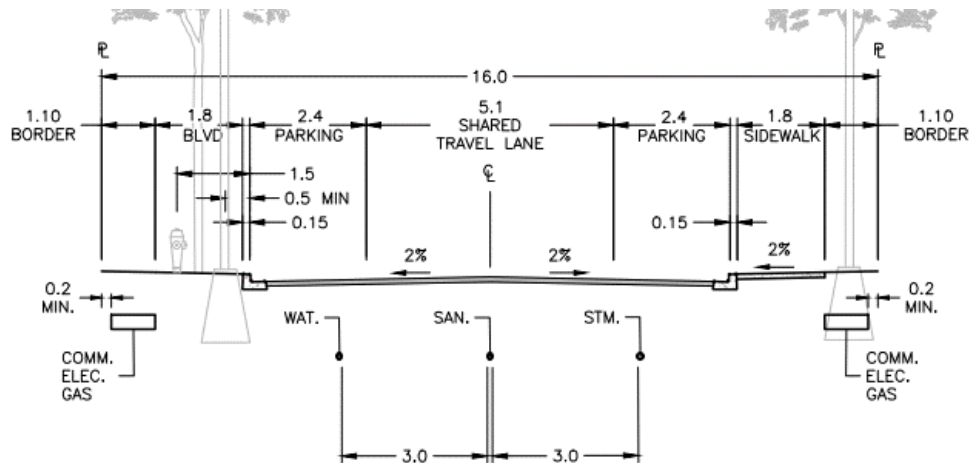


Figure 3.9: Suburban Local Map Excerpt (Rutland)



3.4 INDUSTRIAL LOCAL

Local roads in industrial areas anticipate low vehicle speeds (maximum 40km/h), low vehicle volumes (typically less than 1,000 vehicles per day), significant truck traffic, and moderate volumes of pedestrians and cyclists. The design vehicle is trucks (WB-20), with a modal emphasis on vehicles and no access restrictions. Accommodation of pedestrians and cyclists is provided to facilitate access to employment by sustainable modes. The existing bylaw ROW is 15m to 18m (SS-R3 and SS-R4), and the proposed ROW is 20m. The recommended cross-section for industrial local roads is described below in **Table 3.3** and **Figure 3.10**, with examples of these streets shown in **Figure 3.11**.

Table 3.3: Recommended Attributes for Industrial Local Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	1.95	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m.
Sidewalk	2	1.8	<ul style="list-style-type: none"> TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min. BC AT Guide specifies 2.1m separated sidewalk is desirable for industrial and 1.8m as constrained limit.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	-	-	<ul style="list-style-type: none"> 2.0m border is provided which is effectively a boulevard between the property line and sidewalk
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Vehicle volume and speeds are assumed to be low, so bicycle use of travel lanes is appropriate unless on a specified bicycle route. <i>See Bicycle Overlay Map</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No bike facility.

service vehicles (such as garbage/emergency trucks) being accommodated. Core Area Local roads emphasize active transportation with vehicles and cyclists accommodated within a single, wide travel lane. Passing vehicles use parking lanes to pass. Pedestrians are accommodated with separated sidewalks on both sides of the roadway.

Most of the City's future growth will be in Core Area and Urban Centre areas. This increase in density will result in more multi-family development and more people moving by walking, biking or riding transit. High quality pedestrian environments, including larger healthy urban trees, are important to support this densification. Therefore, wider boulevards are recommended, which may provide the opportunity for green infrastructure (drainage management) in some areas.

The existing Bylaw ROW is 15m to 18m (SS-R3 and SS-R4), and the proposed ROW is 18m. The recommended cross-section for Core Area Local roads is described below in **Table 3.4** and **Figure 3.12**, with examples of these streets shown in **Figure 3.13**.

Table 3.4: Recommended Attributes for Core Area Local Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	0.3	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m. In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	1.8	<ul style="list-style-type: none"> TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min. BC AT Guide specifies 2.1m sidewalk is desirable for multi-family residential local roads and 1.8m is the constrained limit for both multi-family and single-family residential local roads.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	2	1.95	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m. 1.5m minimum required width for trees, 2.0m is preferred Wider furnishing zones provide greater pedestrian comfort, and opportunities for Green Infrastructure.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Vehicle volume and speeds are assumed to be low, so bicycle use of travel lanes is appropriate unless on a specified bicycle route. <i>See Bicycle Overlay Map</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No Bike Facility.
Curb & Gutter	2	0.45	
Parking Lane	2	1.9*	<ul style="list-style-type: none"> Narrow parking lanes since speeds are low on local roads. <p><i>*Effectively 2.2m with gutter</i></p>
Travel Lane	1	5.2	<ul style="list-style-type: none"> TAC Design Guide states shared lanes are suitable with speeds less than 40km/h and ADT under 2,500 veh/day, and recommends a width of 3.2 – 5.2m. No centreline. Mixed traffic with cyclists.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
			<ul style="list-style-type: none"> Ensure breaks in the parking are provided to allow vehicles to pass, such as driveways. Fire requirement is minimum 6m (including parking). If parking is omitted the travel lane width must be increased to allow space for vehicles to pass. Encourages lower speeds and aligns with the OCP objectives.
Median / Aux Lane	-	-	N/A: Not required.
ROW Width		18.0	

Note: If ROW is less than 17m, dedication is required to reach 17m. When ROW is greater than 18m, the extra space should be allocated to the boulevard.

Figure 3.12: Cross-Section for Core Area Local Road Classification

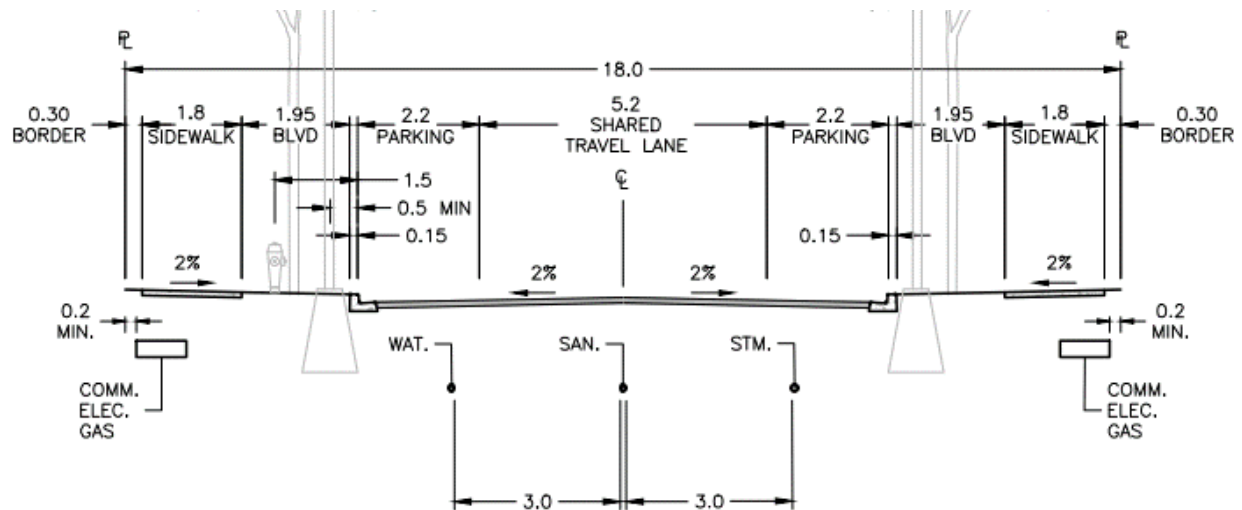
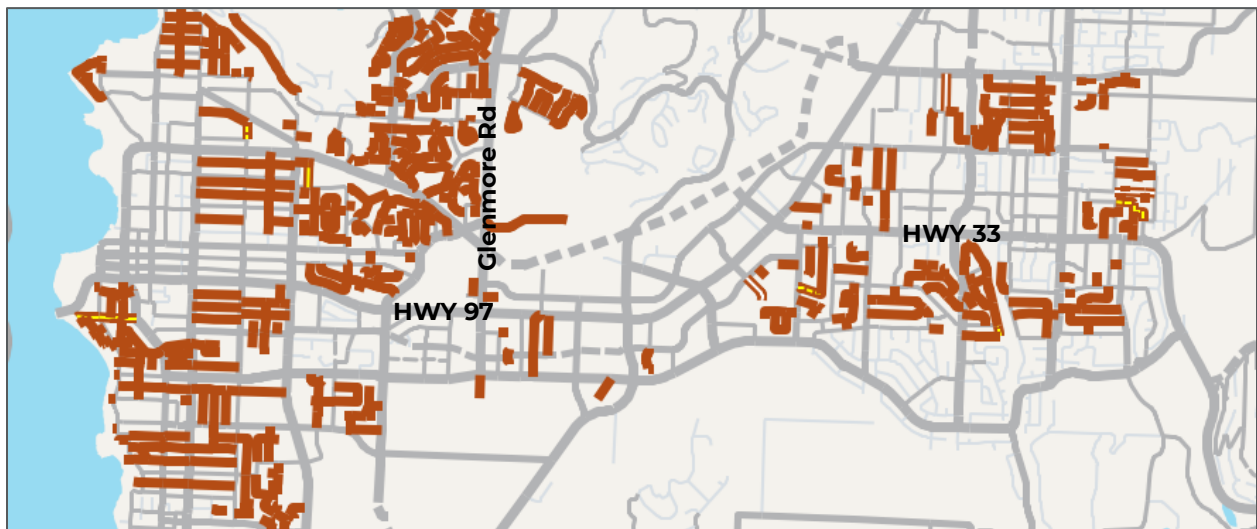


Figure 3.13: Core Area Local Map Excerpt (Downtown to Rutland)



3.6 URBAN CENTRE LOCAL

Local roads in an urban centre context are designed for low vehicle speeds (maximum 30km/h) and a typical volume of about 3,000 vehicles per day. Within Urban Centres, local roads may carry slightly higher volumes of traffic than the other land uses as a consequence of the higher development densities. The design vehicle is passenger vehicles with service vehicles (such as garbage/emergency trucks) being accommodated. Urban Centre Local roads emphasize active transportation vehicles and cyclists accommodated within a single, wide travel lane. Passing vehicles use parking lanes to pass. Pedestrians are accommodated with separated sidewalks on both sides of the roadway.

Most of the City's future growth will be in Core Area and Urban Centre areas. This increase in density will result in more multi-family development and more people moving by walking, biking or riding transit. High quality pedestrian environments, including larger healthy urban trees, are important to support this densification. Therefore, wider boulevards are recommended, which also provide the opportunity for green infrastructure (drainage management) in some areas.

The existing Bylaw ROW is 15 to 18m (SS-R3 and SS-R4), and the proposed ROW is 20m. The recommended cross-section for Urban Centre Local roads is shown below in **Table 3.5** and **Figure 3.14**, with examples of these streets shown in **Figure 3.15**.

Table 3.5: Recommended Attributes for Urban Centre Local Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	0.3	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m. In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	2.1	<ul style="list-style-type: none"> BC AT Guide specifies 2.1m sidewalk is desirable for multi-family residential local roads and 1.8m is the constrained limit for both multi-family and single-family residential local roads. Wider sidewalks to accommodate higher pedestrian traffic in urban centre land use.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	2	2.25	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m. Wider furnishing zones provide greater pedestrian comfort, and opportunities for Green Infrastructure. 1.5m minimum required width for trees.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Cyclist volume and vehicle speeds are assumed to be low, so bicycle use of travel lanes is appropriate unless on a specified bicycle route. <i>See Bicycle Overlay Map</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No Bike Facility.
Curb & Gutter	2	0.45	
Parking Lane	2	1.9*	<ul style="list-style-type: none"> Narrow parking lanes since speeds are low on local roads. <p><i>*Effectively 2.2m with gutter</i></p>
Travel Lane	2	3.0	<ul style="list-style-type: none"> No centreline. Mixed traffic with cyclists.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
			<ul style="list-style-type: none"> Wider than Core Area due to higher traffic volumes. Encourages lower speeds and aligns with the OCP objectives. Fire requirement is minimum 6m (including parking).
Median / Aux Lane	-	-	<ul style="list-style-type: none"> N/A: Not required.
ROW Width		20.0	

Figure 3.14: Cross-Section for Urban Centre Local Road Classification

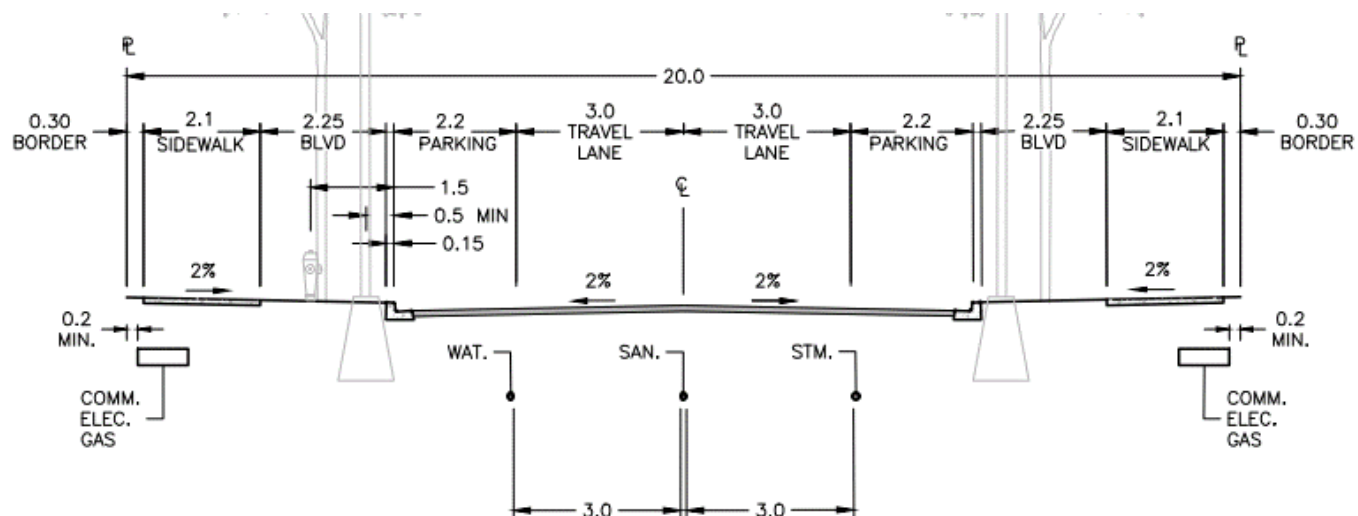


Figure 3.15: Urban Centre Local Map Excerpt (Downtown and Rutland)



4.0 COLLECTOR

Collectors are both used by residents who live or work on the street as well as providing connections within a neighbourhood between the local streets and the arterial roads. Typically, motorists should only need to travel a couple of blocks on a collector street to reach an arterial road. Driveways and on-street parking is common but more emphasis is placed on accommodating vehicles on collector streets compared to local streets. Given the short journey length and direct property access, motorists should expect to travel relatively slowly on collector streets. Separate space for pedestrians (sidewalks) is typically provided and, in some cases, separate space for cyclists may be provided (typically bicycle lanes).

4.1 RURAL COLLECTOR

Collector roads in a rural land use context are designed for low to moderate vehicle speeds (maximum 50km/h) and a volume of less than 8,000 vehicles per day. The design vehicle is trucks (WB-15), with a modal emphasis on vehicles, and no access restrictions. Pedestrian facilities include accessible shoulders, and the minimum bicycle facility is shoulders. The existing bylaw Rural Collector ROW is 18m to 22m² (SS-R5, SS-R6, and SS-R7), and the proposed ROW is 20m. The recommended attributes and cross-section diagram for collector roadways in a rural land use context are shown below in **Table 4.1** and **Figure 4.1**, with examples of these streets shown in **Figure 4.2**.

Table 4.1: Recommended Attributes for Rural Collector Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	4.4	<ul style="list-style-type: none"> Includes an open ditch. Utilities to be placed in border. 300mm depth below subgrade, and 4:1 preferred (3:1 max) slopes adjacent to the road. See Appendix A for further details. Allowance should be adequate in most cases, but ditch to be designed based on geotechnical site conditions..
Sidewalk	-	-	<ul style="list-style-type: none"> Pedestrians accommodated with walkable shoulder.
Gravel Shoulder	2	0.6	<ul style="list-style-type: none"> Required for pavement structure.
Paved Shoulder	2	1.8	<ul style="list-style-type: none"> Accommodates pedestrians and cyclists BC AT Guide recommends 1.5-2.0m for Bicycle and Pedestrian Accessible Shoulders³.
Boulevard	-	-	<ul style="list-style-type: none"> N/A: Not required.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Cyclists accommodated with 1.8m paved shoulder.

² Schedule 1 of the existing SDS Bylaw specifies a 22m ROW where the collector is on a bikeway route as defined by the PBMP or TMP, 20m ROW for commercial, industrial and major institutional (P1) zones, and 18m ROW for agricultural, residential, and public & institutional zones, except major institutional (P1).

³ For rural roadways with a posted speed of less than 70km/h. See Table F-27 in the BC AT Guide.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Bicycle Buffer	-	-	• N/A: No separated bicycle facility
Curb & Gutter	-	-	• N/A: Ditch in lieu.
Parking Lane	-	-	• N/A: No on-street parking provided.
Travel Lane	2	3.2	<ul style="list-style-type: none"> • Narrower than rural local since paved shoulder is provided. • TAC Design Guide recommends 3.0 to 3.7m, for rural roadways with low speed and design hour directional volume < 450.
Median / Aux Lane	-	-	• N/A: Not typically required on rural collector roads.
ROW Width		20.0	

Figure 4.1: Cross-Section for Rural Collector Road Classification

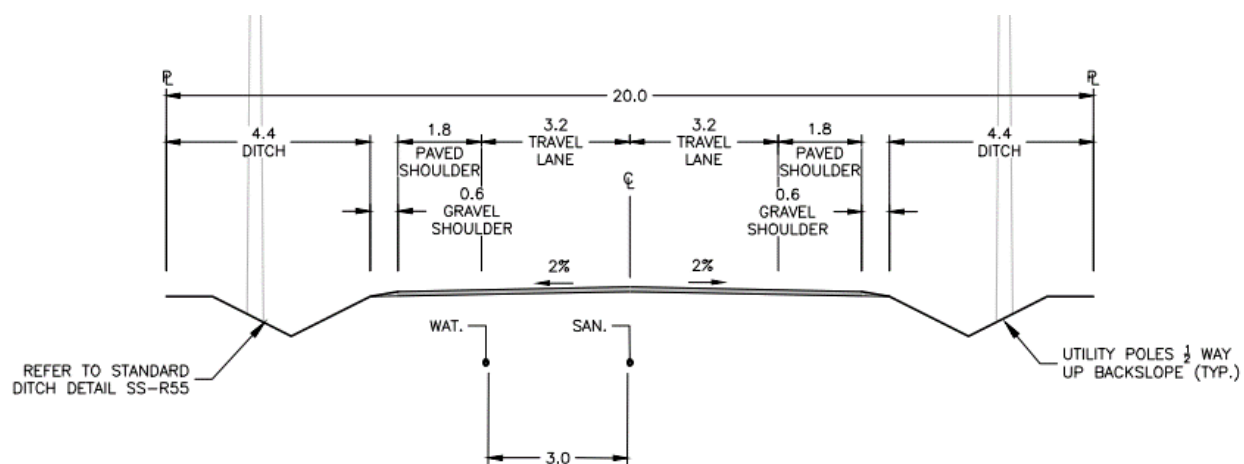
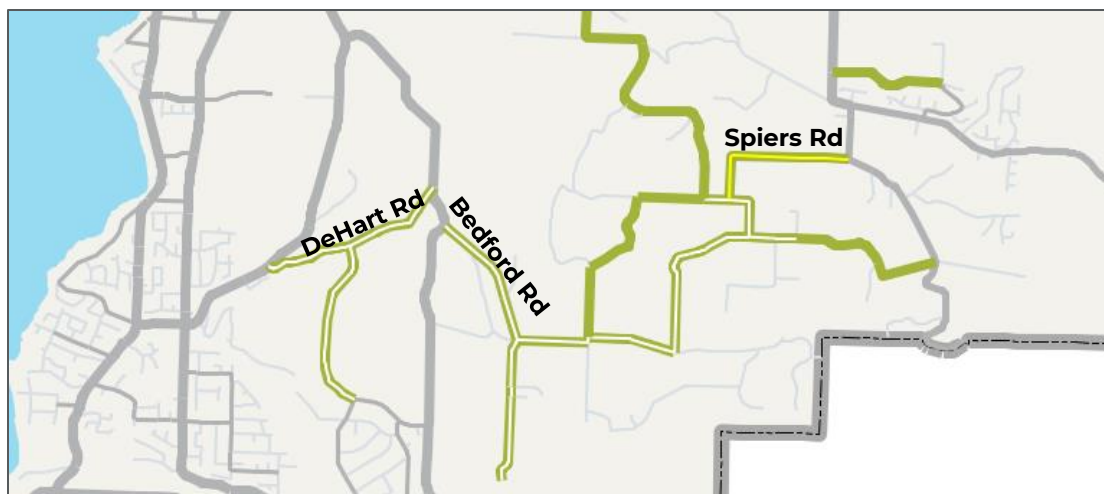


Figure 4.2: Rural Collector Map Excerpt (Southeast Kelowna)



4.2 HILLSIDE COLLECTOR

As Hillside cross-sections were recently developed, updates are not included in the scope of this project but are likely required in the future. The following diagrams are from the existing SDS Bylaw Schedule 5 Parts 5e and 5f, and should be applied to collector roads in a Hillside context. Examples of these streets are shown in **Figure 4.10**.

Figure 4.3: Village Collector Condition A (Retail/M.F. Fronting)

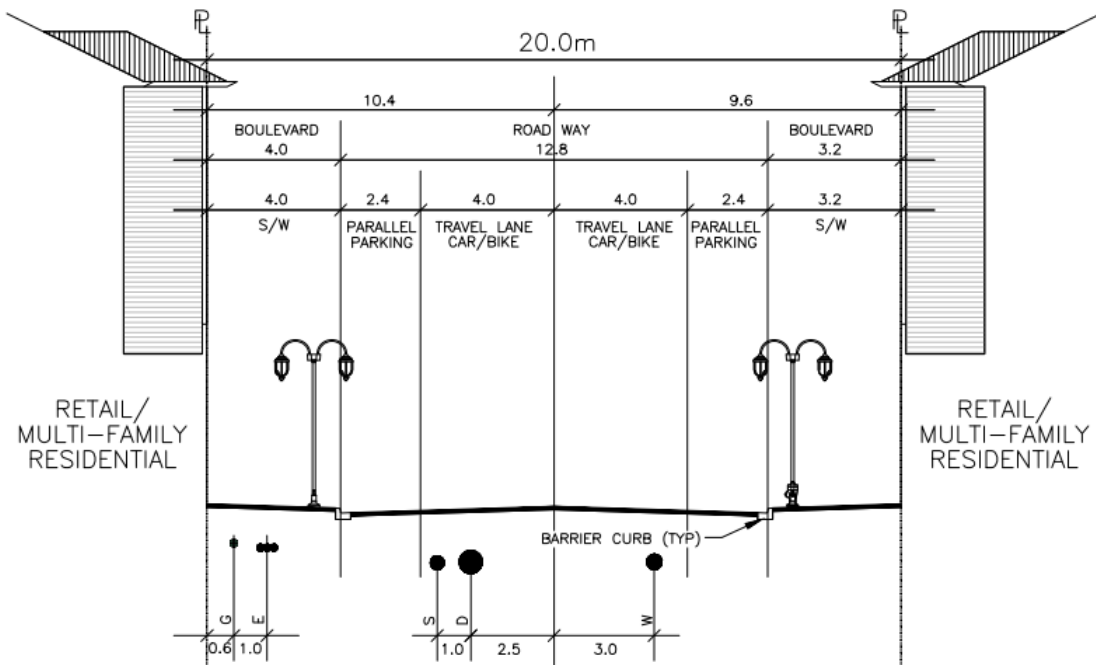


Figure 4.4: Village Collector Condition B (No Retail Fronting)

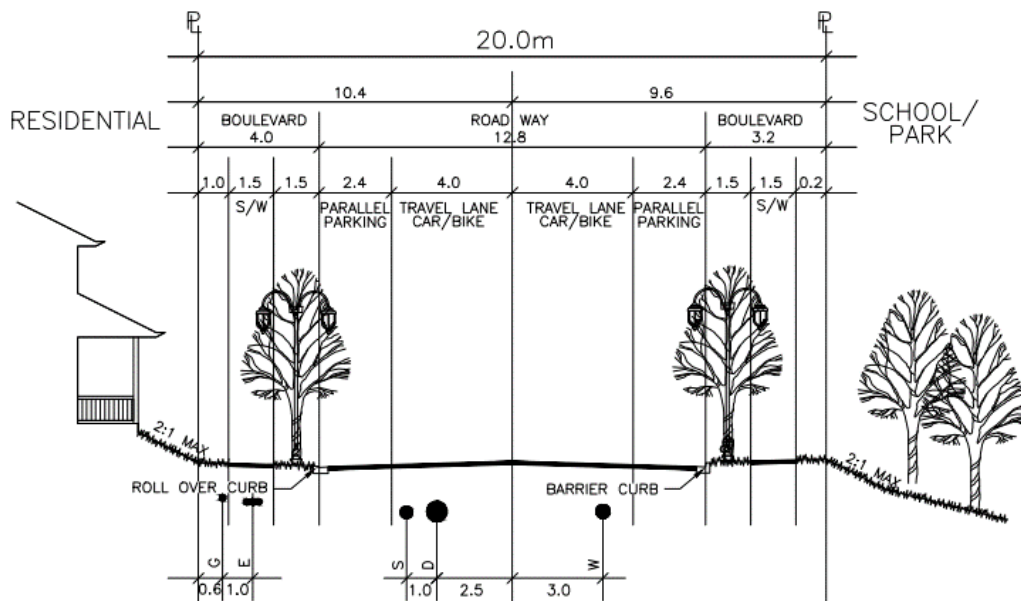


Figure 4.5: Minor Collector Condition A

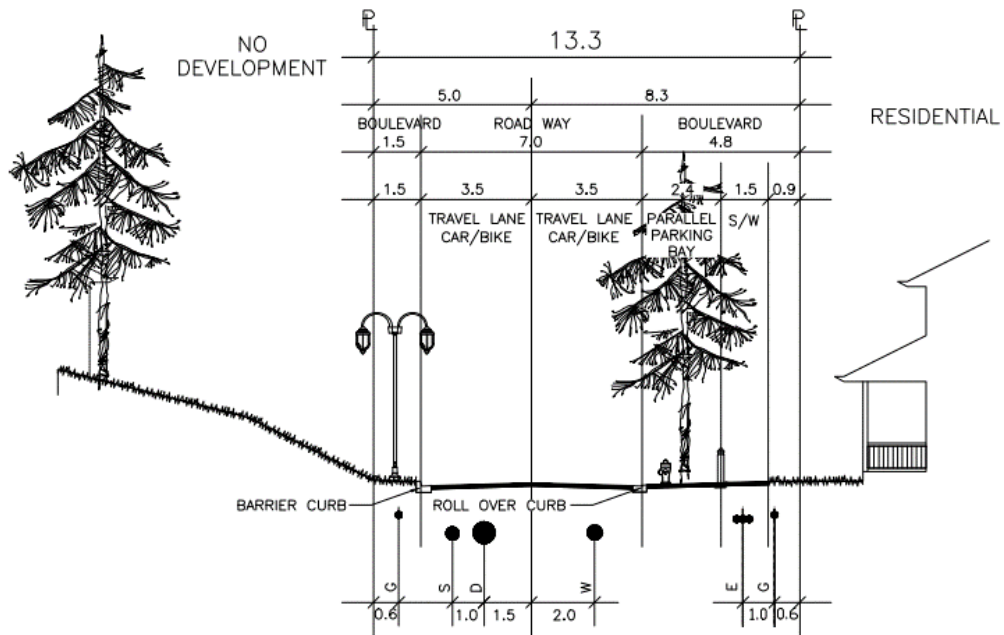


Figure 4.6: Minor Collector Condition B

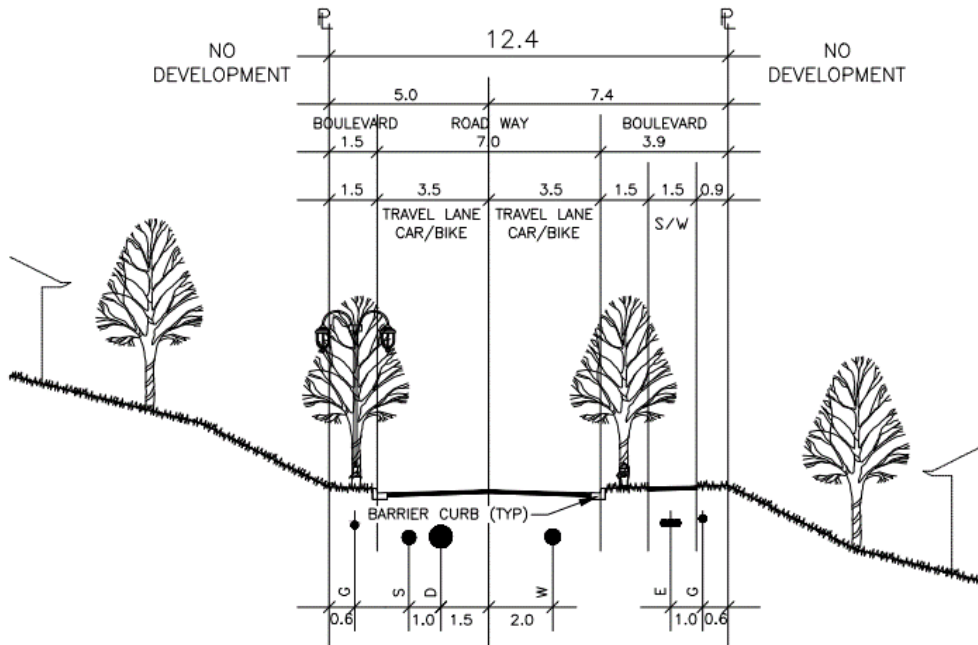


Figure 4.7: Collector Condition A (Development Both Sides)

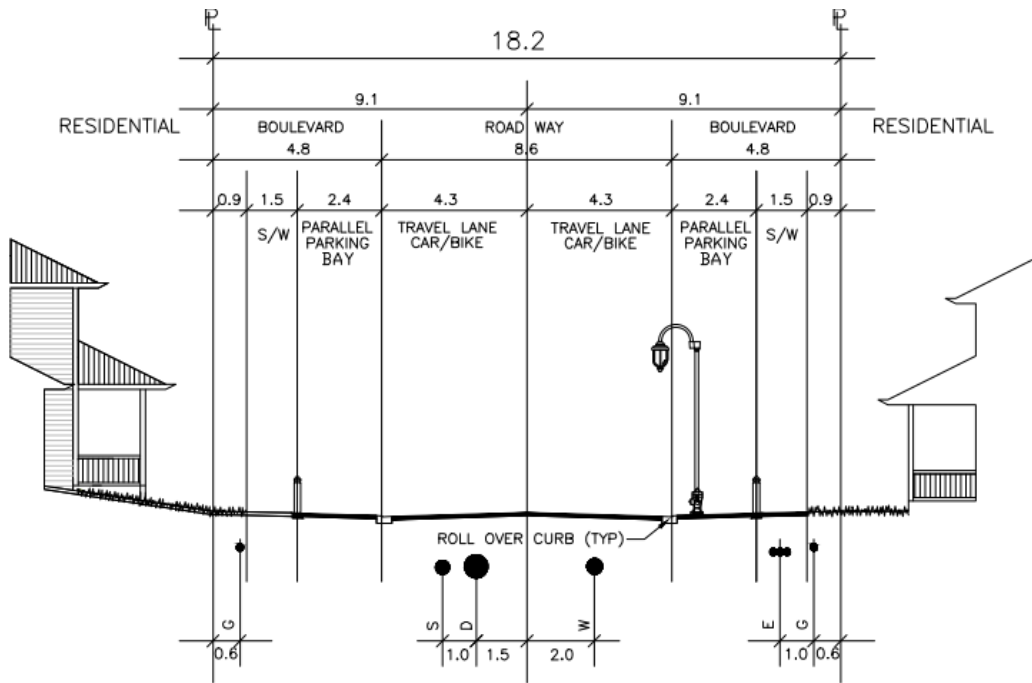


Figure 4.8: Collector Condition B (Development One Side)

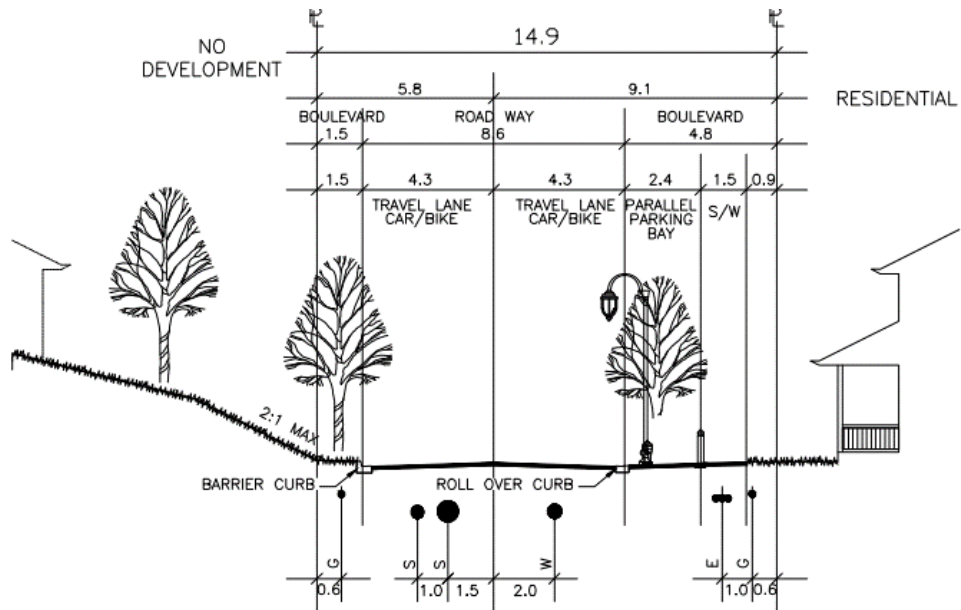


Figure 4.9: Collector Condition C (No Development Either Side)

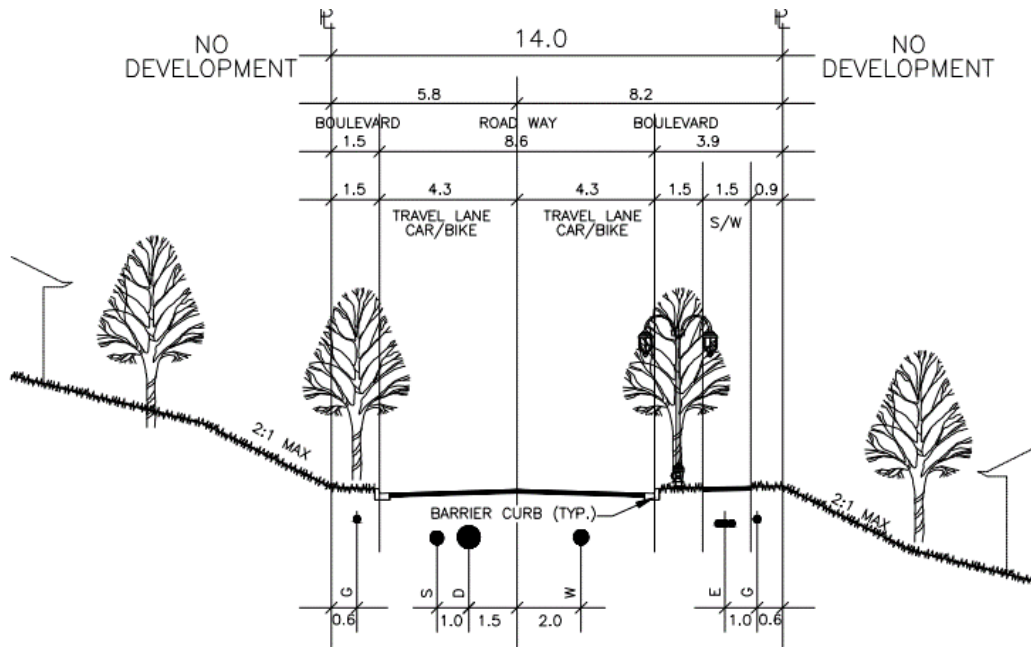
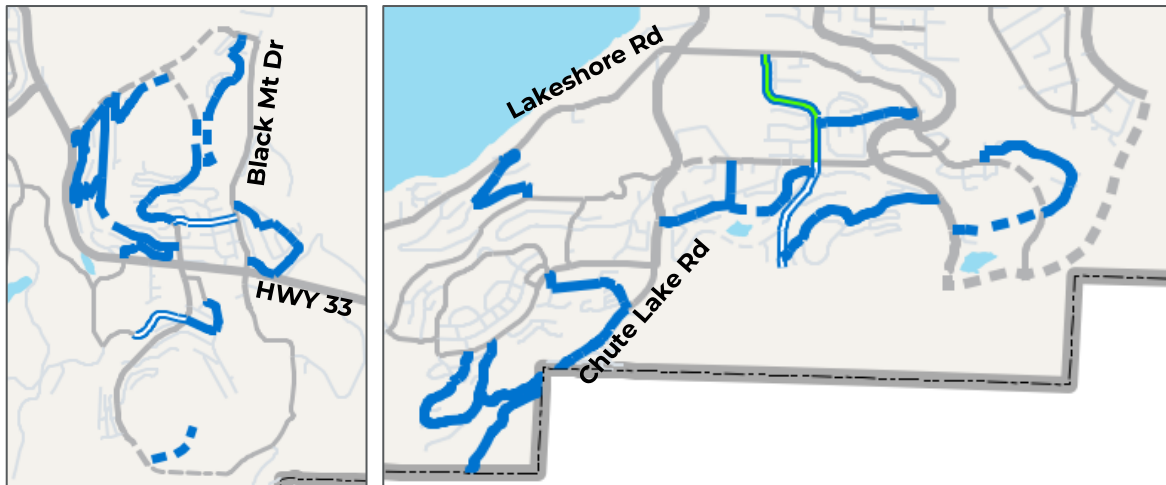


Figure 4.10: Hillside Collector Map Excerpts (Black Mountain and Kettle Valley)



4.3 SUBURBAN COLLECTOR

Collector roads in a suburban context are designed for low to moderate vehicle speeds and volumes. The identified design vehicle is passenger vehicles with service vehicles (such as garbage trucks or localized deliveries) being accommodated. Active transportation facilities include a sidewalk on one side and on-street bike lanes. The existing Bylaw ROW is 18m to 22m⁴ (SS-R5, SS-R6, and SS-R7), and the

⁴ Schedule 1 of the existing SDS Bylaw specifies a 22m ROW where the collector is on a bikeway route as defined by the PBMP or TMP, 20m ROW for commercial, industrial and major institutional (P1) zones, and 18m ROW for residential, health district, and public & institutional zones, except major institutional (P1).

proposed ROW is 20m with bike lanes and 18m without bike lanes. The recommended cross-section for Suburban Collector roads is shown below in **Table 4.4**, **Figure 4.11**, and **Figure 4.12**, with examples of these streets shown in **Figure 4.13**.

Table 4.2: Recommended Attributes for Suburban Collector Road Class

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	1.85 / 0.30	2	0.95	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.<i>With bike lanes</i> – 1.85m border on one side has flexibility to accommodate shallow utilities as an alternative/addition to under the sidewalk.
Sidewalk	2	1.8 / 1.5	2	1.5	<ul style="list-style-type: none">TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min, and a practical lower limit of 1.5m.BC AT Guide specifies 1.8m is the constrained limit for residential collector roads.Narrower sidewalks given that lower pedestrian volumes are anticipated.
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A
Boulevard	1	1.85	2	1.80	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.BC AT Guide recommends 2.0m for universally accessible pedestrian environments.
Minimum Bike Lane / MUP	2	1.5* / 1.8	-	-	<ul style="list-style-type: none">BC AT Guide desirable width for curbside bike lanes is 1.8m.Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	-	-	-	-	<ul style="list-style-type: none">BC AT Guide recommends minimum 0.9m buffer for protected bike lanes adjacent to parking to protect users from car doors.Bike lanes adjacent to traffic lane are unbuffered.
Curb & Gutter	2	0.45	2	0.45	
Parking Lane	1	2.1*	2	2.1*	<ul style="list-style-type: none">TAC Design Guide recommends 2.4m. <p><i>*Effectively 2.4m with gutter</i></p>

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
					<ul style="list-style-type: none">Parking is provided on the side of road opposite the boulevard (cross-section with bike lanes). <p><i>*Effectively 2.4m with gutter</i></p>
Travel Lane	2	3.2	2	3.2	<ul style="list-style-type: none">Narrower than BC Transit requirements (3.3m) as transit is typically not routed on collector roads but can be accommodated if required.
Median / Aux Lane	-	-	-	-	<ul style="list-style-type: none">Consider auxiliary lanes at intersections with arterials using the space from parking lanes.
ROW Width		20.0	20.0		

Figure 4.11: Cross-Section for Suburban Collector Road Classification (with bike lanes)

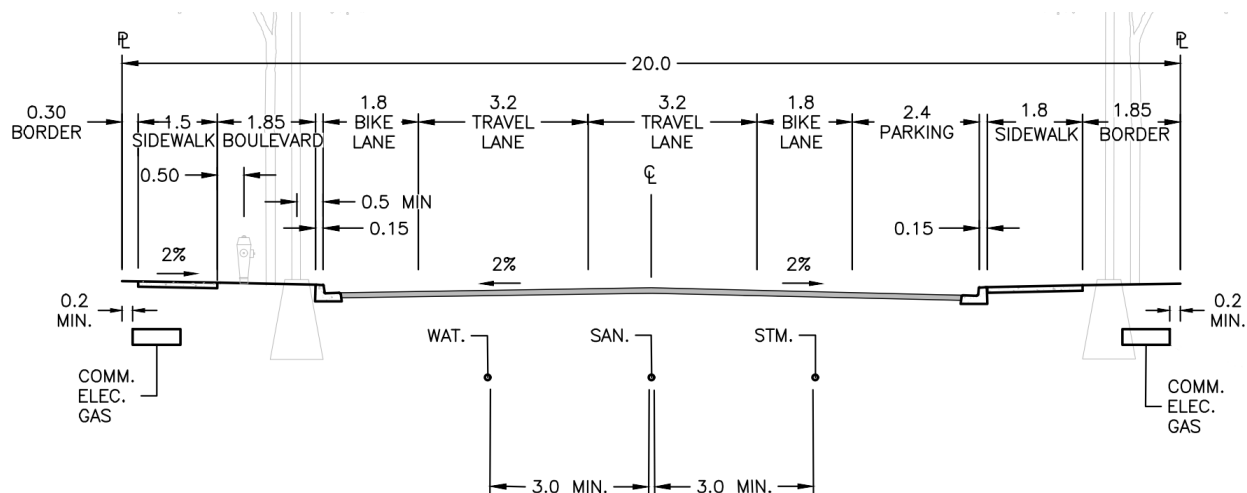


Figure 4.12: Cross-Section for Suburban Collector Road Classification (no bike lanes)

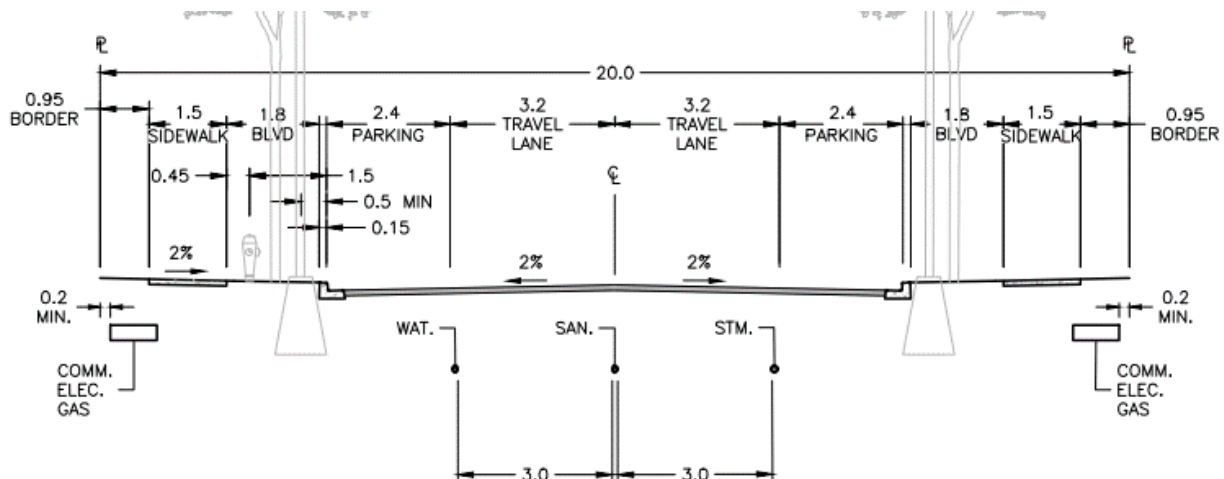


Figure 4.13: Suburban Collector Map Excerpt (Lower Mission / Crawford)



4.4 INDUSTRIAL COLLECTOR

Collector roads in an industrial context are designed for low to moderate vehicle speeds (maximum 50km/h) and volumes. The design vehicle is trucks (WB-20), with a modal emphasis on vehicles and no access restrictions. The existing bylaw ROW is 20m to 22m⁵ (SS-R5 and SS-R6), and the proposed ROW is 20m. The recommended cross-section for Industrial Collector roads is shown below in **Table 4.3** and **Figure 4.14**, with examples of these streets shown in **Figure 4.15**.

Table 4.3: Recommended Attributes for Industrial Collector Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	0.3	<ul style="list-style-type: none"> TAC Design Guide recommends 0.3 to 1.0m. In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	1.5	<ul style="list-style-type: none"> TAC recommends minimum 1.8m for pedestrian volume of <400 ped/15 min. BC AT Guide specifies 2.1m separated sidewalk is desirable for industrial and 1.8m as constrained limit.
Shoulder	-	-	<ul style="list-style-type: none"> N/A
Boulevard	2	1.85	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.

⁵ In Industrial Zones Schedule 1 of the existing SDS Bylaw specifies a 22m ROW where the collector is on a bikeway route as defined by the PBMP or TMP, and 20m ROW with no bike lanes.

			<ul style="list-style-type: none"> Wider furnishing zones provide greater pedestrian comfort and separation from traffic. 1.5m is the minimum required width for trees.
Minimum Bike Lane / MUP	-	-	<ul style="list-style-type: none"> Vehicle speeds are assumed to be low so bicycles will mix with vehicle traffic unless on a specified bicycle route. <i>See Bicycle Overlay Map.</i>
Bicycle Buffer	-	-	<ul style="list-style-type: none"> N/A: No bike facility
Curb & Gutter	2	0.45	
Parking Lane	2	2.4*	<ul style="list-style-type: none"> Wider to accommodate trucks. <p><i>*Effectively 2.7m with gutter</i></p>
Travel Lane	2	3.5	<ul style="list-style-type: none"> Mixed traffic with cyclists. Wider than other collectors to accommodate trucks.
Median / Aux Lane	-	-	<ul style="list-style-type: none"> Consider auxiliary lanes at intersections with arterials using the space from parking lanes.
ROW Width		20.0	

Figure 4.14: Cross-Section for Industrial Collector Road Classification

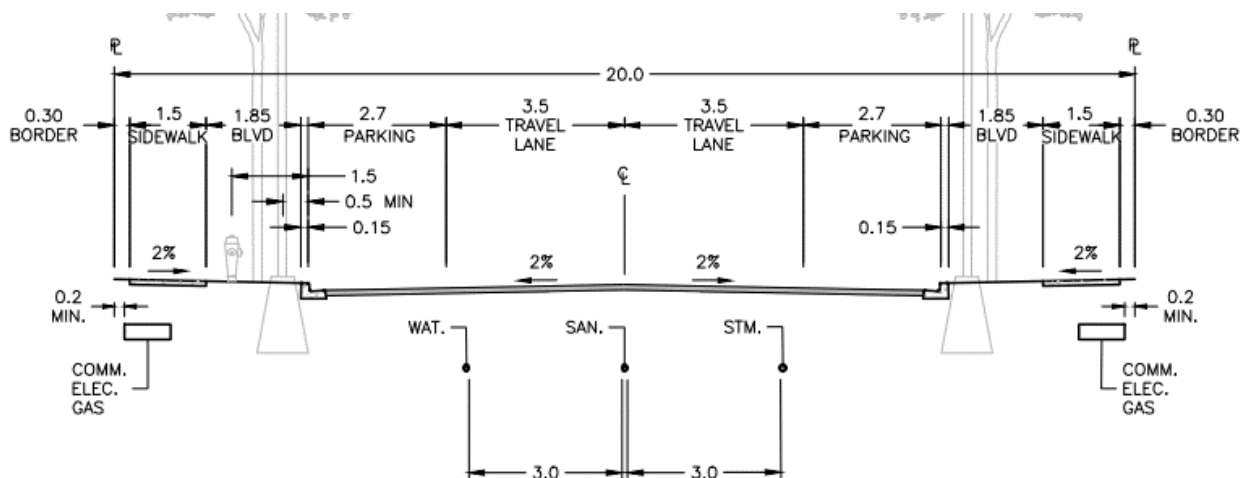


Figure 4.15: Industrial Collector Map Excerpt (Reid's Corner)



4.5 CORE AREA COLLECTOR

Collector roads in a core area context are designed for low to moderate vehicle speeds and volumes. The identified design vehicle is passenger car with service vehicles (such as garbage/emergency trucks or localized deliveries) being accommodated. Pedestrian facilities include separated sidewalks on both sides of the road. The existing bylaw ROW is 18m to 22m⁶ (SS-R5, SS-R6, and SS-R7), and the proposed ROW is 20m without bike lanes and 22m with bike lanes.

The recommended cross-section for Core Area Collector roads is shown below in **Table 4.4**, **Figure 4.16**, and **Figure 4.17**, with examples of these streets shown in **Figure 4.18**.

Table 4.4: Recommended Attributes for Core Area Collector Road Class

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	0.3	2	0.3	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	1.8	2	1.8	<ul style="list-style-type: none">TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min.BC AT Guide specifies 2.4m sidewalk is desirable for multi-family residential

⁶ Schedule 1 of the existing SDS Bylaw specifies a 22m ROW where the collector is on a bikeway route as defined by the PBMP or TMP, 20m ROW for commercial, industrial and major institutional (P1) zones, and 18m ROW for residential, health district, and public & institutional zones, except major institutional (P1).

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
					collector roads and 1.8m is the constrained limit for both multi-family and single-family residential collector roads.
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A
Boulevard	2	2.1	2	2.15	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.Wider furnishing zone provides greater pedestrian comfort with increased vehicle speeds and volume.
Minimum Bike Lane / MUP	2	1.5*	-	-	<ul style="list-style-type: none">TAC Design Guide recommends bike lane width is 1.8m to 2.1m.Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	1	0.9	-	-	<ul style="list-style-type: none">BC AT Guide recommends minimum 0.9m buffer for protected bike lanes adjacent to parking, to protect users from car doors.Bike lane adjacent to traffic lane is unbuffered.
Curb & Gutter	2	0.45	2	0.45	
Parking Lane	1	2.4	2	2.1*	<ul style="list-style-type: none">TAC Design Guide recommends 2.4m. <p><i>*Effectively 2.4m with gutter</i></p>
Travel Lane	2	3.2	2	3.2	<ul style="list-style-type: none">Narrower than BC Transit requirements (3.3m) as transit is typically not routed on collector roads but can be accommodated if required.
Median / Aux Lane	-	-	-	-	<ul style="list-style-type: none">Consider auxiliary lanes at intersections with arterials using the space from parking lanes.
ROW Width		22.0	20.0		

Figure 4.16: Cross-Section for Core Area Collector Road Classification (with bike lanes)

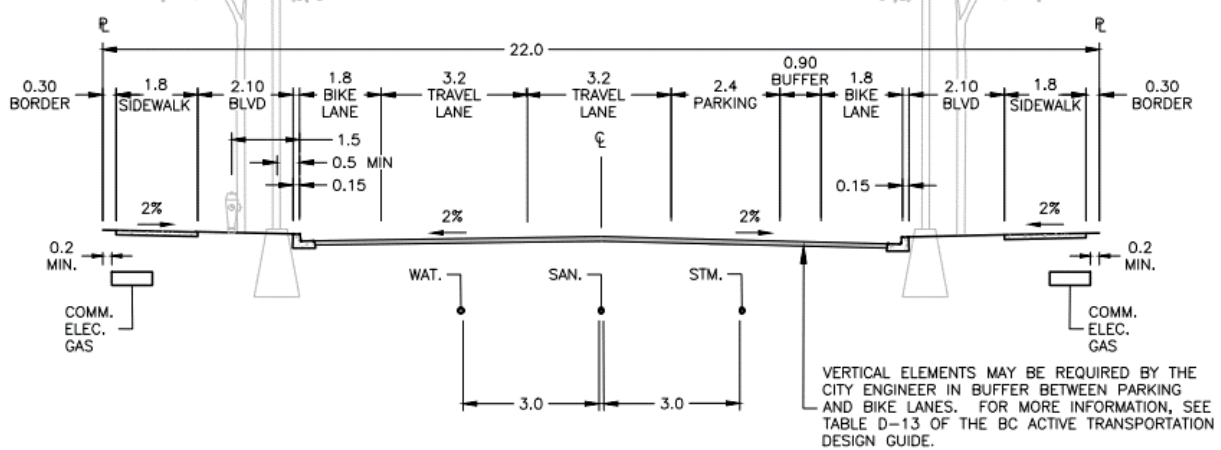


Figure 4.17: Cross-Section for Core Area Collector Road Classification (no bike lanes)

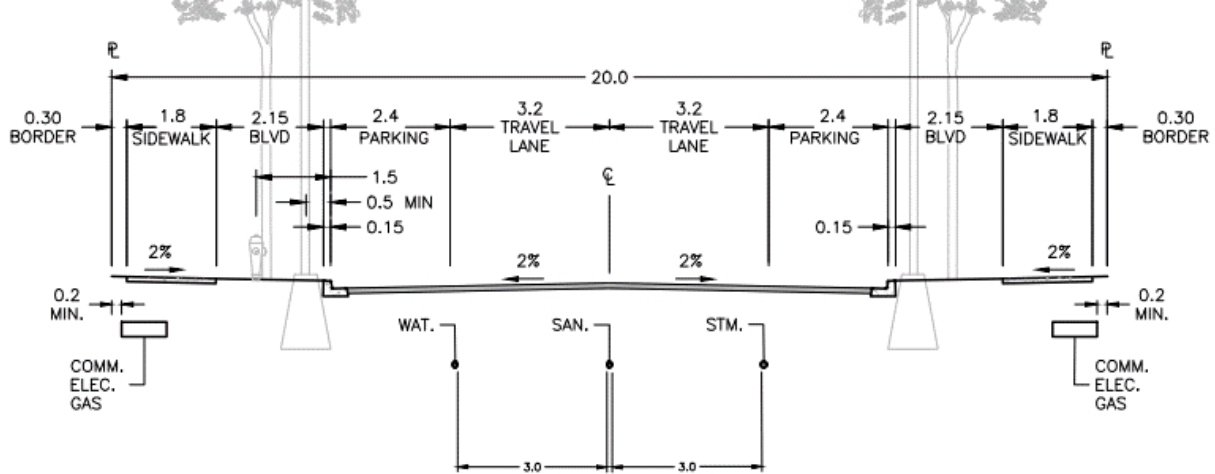
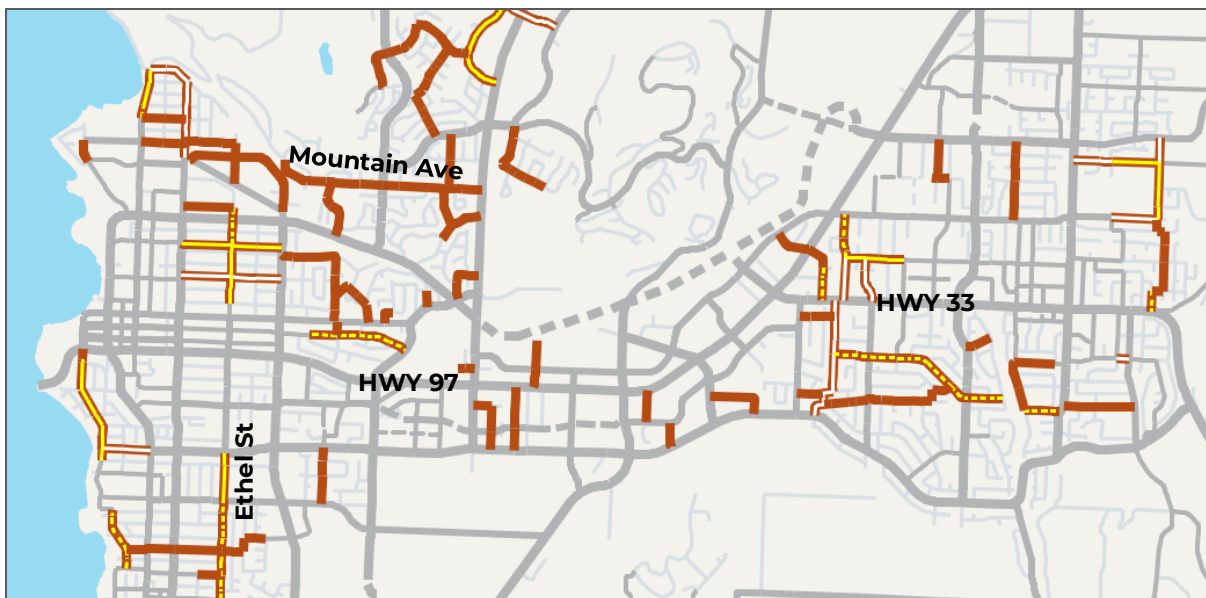


Figure 4.18: Core Area Collector Map Excerpt (Downtown to Rutland)



4.6 URBAN CENTRE COLLECTOR

Collector roads in an Urban Centre context are designed for low to moderate vehicle speeds and volumes. The identified design vehicle is passenger car with service vehicles (such as garbage/emergency trucks or localized deliveries) being accommodated. Pedestrian facilities include separated sidewalks on both sides of the road. The existing bylaw ROW is 18m to 22m⁷ with bike lanes (SS-R5, SS-R6, and SS-R7). The proposed ROW is 20m without bike lanes and 22m with bike lanes. The recommended cross-section for Urban Centre Collector roads is shown below in **Table 4.5**, **Figure 4.19** and **Figure 4.20**, with examples of these streets shown in **Figure 4.21**.

Table 4.5: Recommended Attributes for Urban Centre Collector Road Class

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	0.3	2	0.3	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	2.4	2	2.4	<ul style="list-style-type: none">BC AT Guide specifies 2.4m sidewalk is desirable for multi-family residential collector/arterial roads and 2.4-3.0m sidewalk is desirable for commercial areas.Wider sidewalk than core area to accommodate higher pedestrian volume in urban centre land use.
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Boulevard	2	1.5	2	1.55	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.Wider furnishing zones provide greater pedestrian comfort.1.5m minimum required width for trees.Narrower boulevard than Core Area Collector since land is at a higher premium in urban centres.
Minimum Bike Lane / MUP	2	1.5*	-	-	<ul style="list-style-type: none">TAC Design Guide recommends bike lane width is 1.8m to 2.1m.Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>

⁷ Schedule 1 of the existing SDS Bylaw specifies a 22m ROW where the collector is on a bikeway route as defined by the PBMP or TMP, 20m ROW for commercial, industrial and major institutional (P1) zones, and 18m ROW for residential, health district, and public & institutional zones, except major institutional (P1).

	Recommendation				
	With Bike Lanes		No Bike Lanes		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Bicycle Buffer	1	0.9	-	-	<ul style="list-style-type: none">BC AT Guide recommends minimum 0.9m buffer for protected bike lanes adjacent to parking, to protect users from car doors.Bike lane adjacent to traffic lane is unbuffered.
Curb & Gutter	2	0.45	2	0.45	
Parking Lane	1	2.4	2	2.1*	<ul style="list-style-type: none">TAC Design Guide recommends 2.4m. <i>*Effectively 2.4m with gutter</i>
Travel Lane	2	3.2	2	3.2	<ul style="list-style-type: none">Narrower than BC Transit requirements (3.3m) as transit is typically not routed on collector roads but can be accommodated if required.
Median / Aux Lane	-	-	-	-	<ul style="list-style-type: none">Consider auxiliary lanes at intersections with arterials using the space from parking lanes.
ROW Width		22.0	20.0		

Figure 4.19: Cross-Section for Urban Centre Collector Road Classification (with bike lanes)

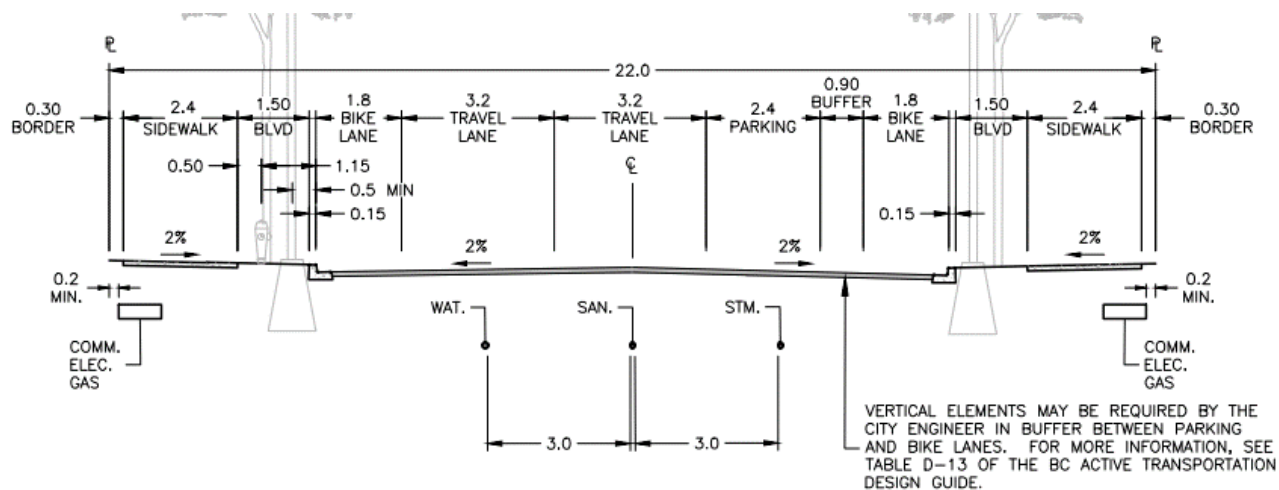


Figure 4.20: Cross-Section for Urban Centre Collector Road Classification (no bike lanes)

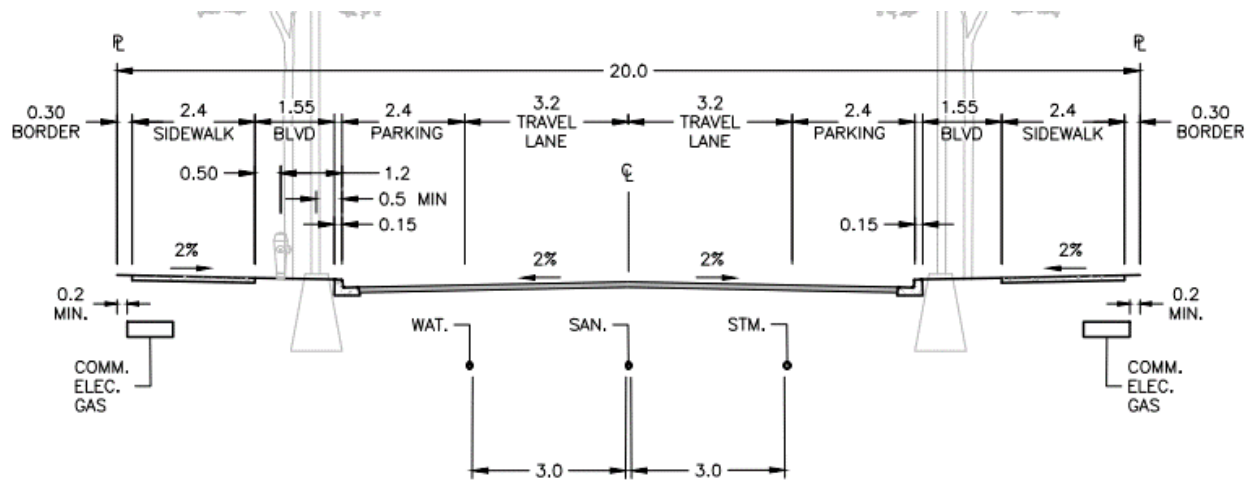
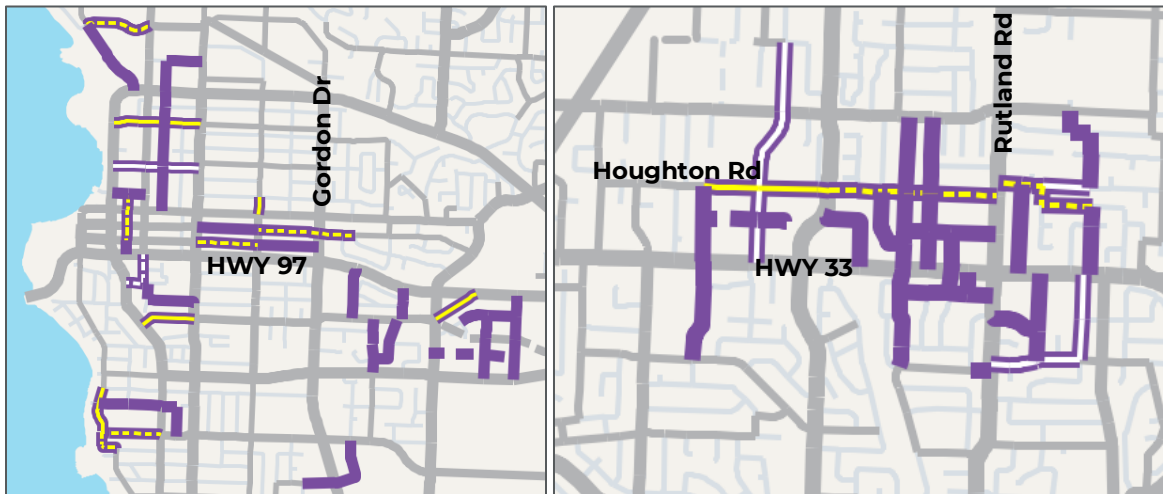


Figure 4.21: Urban Centre Collector Map Excerpt (Downtown and Rutland)



5.0 MINOR ARTERIAL

Minor Arterials are focused on facilitating moderate to long journeys within the City and prioritize traffic movement over access. Vehicle speeds tend to be higher on Minor Arterials than Collectors. While some businesses or multi-family buildings will have direct access, the location, design, and alternative access options are considered before providing direct access to a Minor Arterial. Given the higher vehicular volumes and speeds, pedestrians and cyclists are typically physically separated from vehicles with buffers or boulevards, and/or with a multi-use path (MUP) facility. Parking is allowed in some contexts but is often limited. Minor Arterials have two to three travel lanes.

5.1 RURAL MINOR ARTERIAL

Minor arterial roads in a rural context are designed for moderate vehicle speeds and moderate to high vehicle volumes. The design vehicle is trucks (WB-20), with a modal emphasis on vehicles and some access restrictions. The existing Bylaw ROW is 30m⁸ (SS-R10 and SS-R13), and the proposed ROW is 22m without a MUP and 24m with a MUP. The recommended cross-section for Rural Minor Arterial roads is shown below in **Table 5.1**, **Figure 5.1** and **Figure 5.2**, with examples of these streets shown in **Figure 5.3**.

Table 5.1: Recommended Attributes for Rural Minor Arterial Road Class

	Recommendation				
	With MUP		No MUP		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	4.6	2	4.7	<ul style="list-style-type: none">Includes an open ditch.Utilities to be placed in border.300mm depth below subgrade, and 4:1 preferred (3:1 max) slopes adjacent to the road.See Appendix A for further details.Allowance should be adequate in most cases, but ditch to be designed based on geotechnical site conditions.
Sidewalk	-	-	-	-	<ul style="list-style-type: none">Pedestrians accommodated with MUP or walkable shoulder.
Gravel Shoulder	2	0.6	2	0.6	<ul style="list-style-type: none">Required for pavement structure.
Paved Shoulder	2	1.5	2	1.8	<ul style="list-style-type: none">1.5m paved shoulder with MUP allows disabled vehicles to safely pull over and accommodates confident cyclists who choose not to use the MUP.1.8m paved shoulder without MUP accommodates pedestrians and cyclists.BC AT Guide recommends minimum 1.8m walkable/cyclist accessible shoulder for no separation/rural context.

⁸ Existing SDS Bylaw also includes a 20m rural arterial cross-section, noting “30m future ROW”.

	Recommendation				
	With MUP		No MUP		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Boulevard	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Minimum Bike Lane / MUP	1	3.8	-	-	<ul style="list-style-type: none">Fully separated MUP for pedestrians and cyclists when on a primary bike route due to higher vehicle speeds and volumes.Located outside of ditch.3.0m paved plus 0.4m allowance on each side for gravel shoulders.
Bicycle Buffer	-	-	-	-	<ul style="list-style-type: none">N/A: Ditch in lieu.
Curb & Gutter	-	-	-	-	<ul style="list-style-type: none">N/A: Ditch in lieu.
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	2	3.4	2	3.4	<ul style="list-style-type: none">Consistent with suburban Minor Arterial cross-sections.Meets minimum required width for transit.
Median / Aux Lane	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
ROW Width		24.0	21.0		

Figure 5.1: Cross-Section for Rural Minor Arterial Road Classification (with MUP)

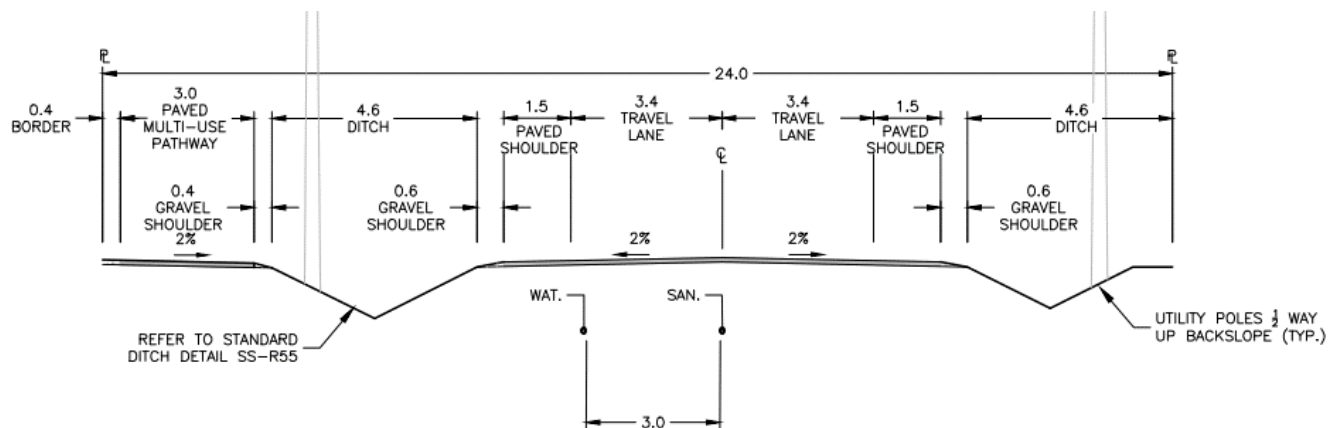


Figure 5.2: Cross-Section for Rural Minor Arterial Road Classification (no MUP)

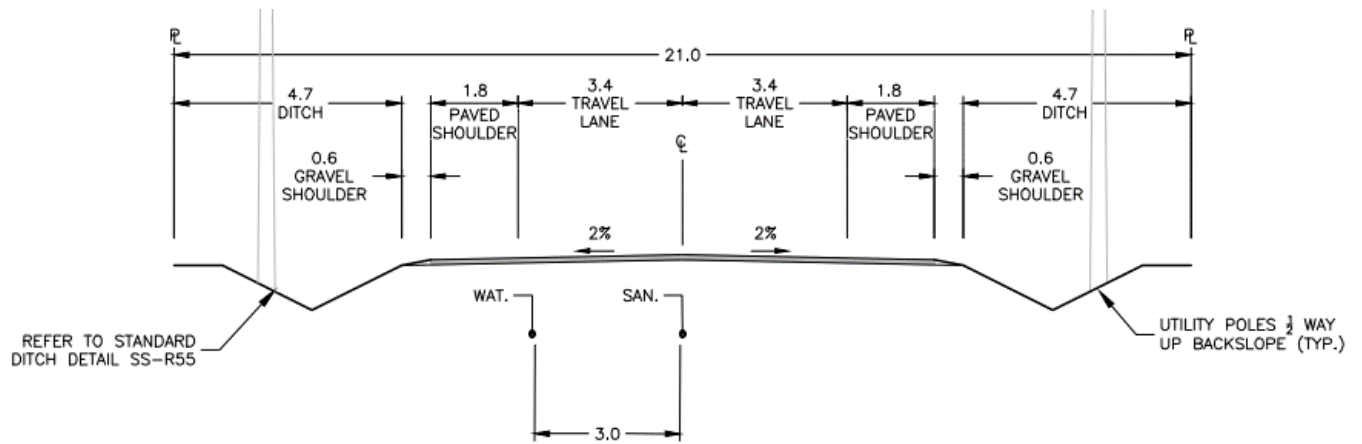


Figure 5.3: Rural Minor Arterial Map Excerpt (Pandosy to East Kelowna)



5.2 HILLSIDE MINOR ARTERIAL

As Hillside cross-sections were recently developed, updates are not included in the scope of this project but are likely required in the future. The following diagrams are from the existing SDS Bylaw Schedule 5 Parts 5e and 5f, and should be applied to minor arterial roads in a Hillside context. Examples of these streets are shown in **Figure 5.7**.

Figure 5.4: Arterial Condition A (Village Parkway)

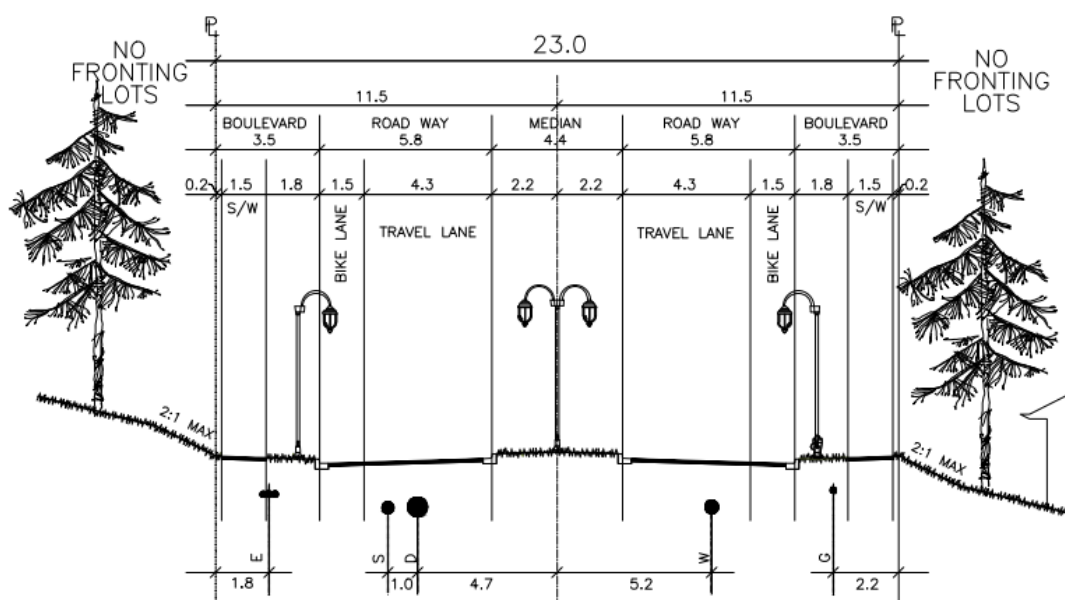


Figure 5.5: Arterial Condition B (with 0.8km Walking Distance of Village)

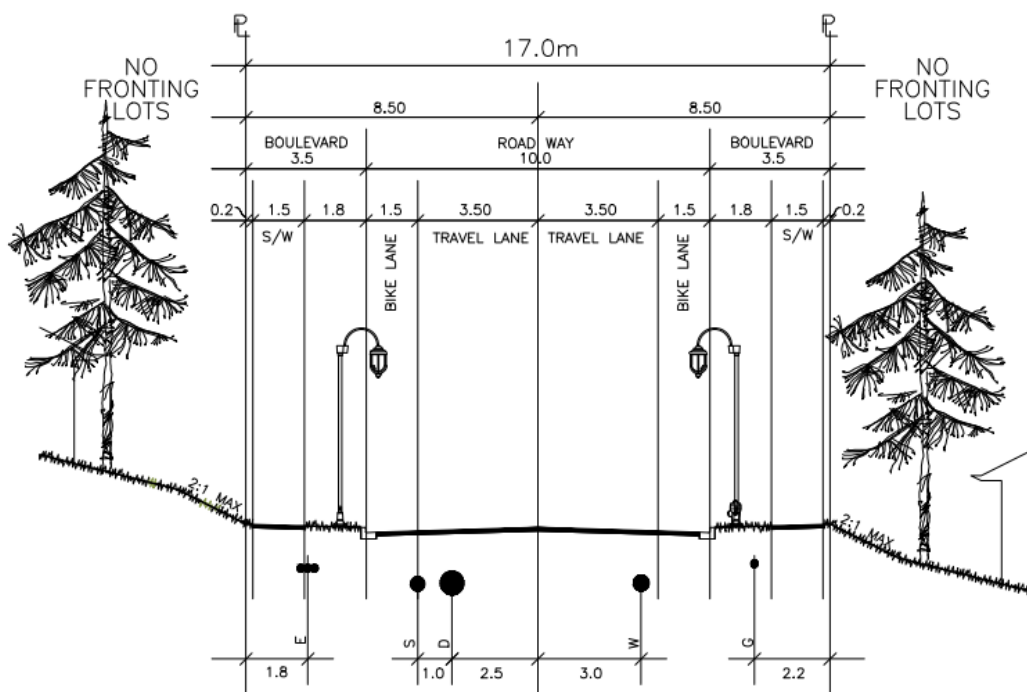


Figure 5.6: Arterial Condition C (Greater than 0.8km Walking Distance of Village)

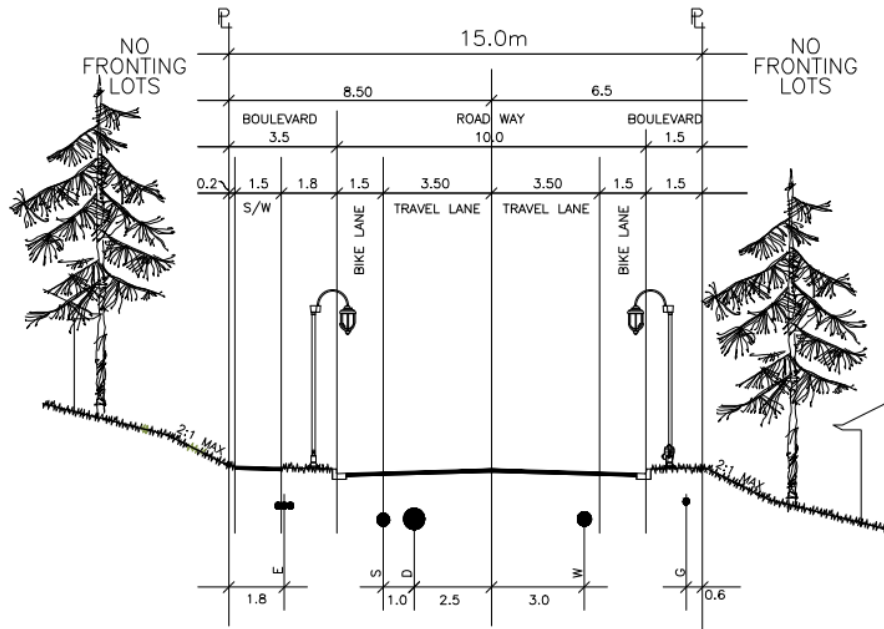


Figure 5.7: Hillside Minor Arterial Map Excerpt (Wilden)



5.3 SUBURBAN MINOR ARTERIAL

Minor arterial roads in a suburban context are designed for moderate vehicle speeds and moderate to high vehicle volumes. The design vehicle is trucks (WB-20), with a modal emphasis on both vehicles and active transportation. The existing Bylaw ROW is 20m to 28m (SS-R12, SS-R15, and SS-R16), and the proposed ROW is typically 20m and increases to 22m when approaching intersections with collectors or above. The wider 22m ROW provides sufficient space to accommodate a left-turn lane. The recommended cross-section for Suburban Minor Arterial roads is shown below in **Table 5.3**, **Figure 5.8** and **Figure 5.9**, with examples of these streets shown in **Figure 5.10**.

Table 5.2: Recommended Attributes for Suburban Minor Arterial Road Class

	Recommendation				
	Typical		At Intersections with Collectors and Above		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	1.45	2	0.25	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m can cause issues with construction and maintenance.All other elements are minimums and 0.25 was selected instead of widening
Sidewalk	2	1.8	2	1.8	<ul style="list-style-type: none">TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min, and a practical lower limit of 1.5m.BC AT Guide specifies 1.8m is the constrained limit for residential arterial roads.Constrained sidewalk width used since lower pedestrian volumes are anticipated.
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Boulevard	2	1.80	2	1.50	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.
Minimum Bike Lane / MUP	2	1.5*	2	1.5*	<ul style="list-style-type: none">BC AT Guide desirable width for curbside bike lanes is 1.8m.Higher standard may be required on a specified bicycle route. <i>See Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.6	2	0.6	<ul style="list-style-type: none">BC AT Guide recommended minimum for buffered bike lane.
Curb & Gutter	2	0.45	2	0.45	

	Recommendation				
	Typical		At Intersections with Collectors and Above		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	2	3.4	2	3.4	<ul style="list-style-type: none">Width accommodates current and future transit and truck routes.Marginally wider than Core Area or Urban Centre Minor Arterials since a higher proportion of trucks and higher speeds are anticipated.
Median / Aux Lane	-	-	1	3.0	<ul style="list-style-type: none">Left-turn lane on approach to intersections with collectors and above, or where warranted.
ROW Width		22.0	22.0		

Figure 5.8: Cross-Section for Suburban Minor Arterial Road Classification (mid-block)

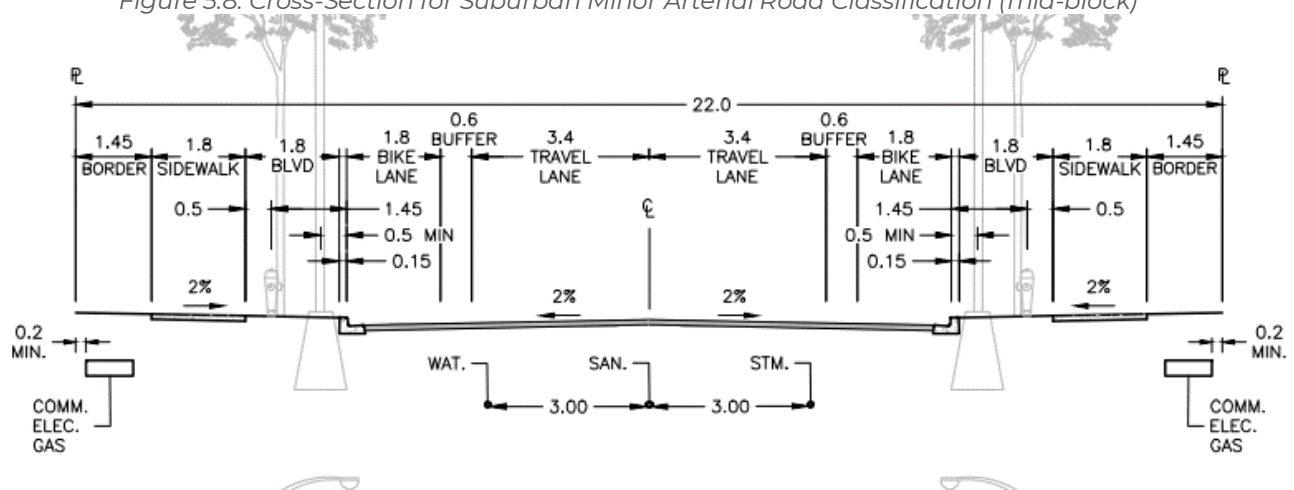


Figure 5.9: Cross-Section for Suburban Minor Arterial Road Classification (with auxiliary lane)

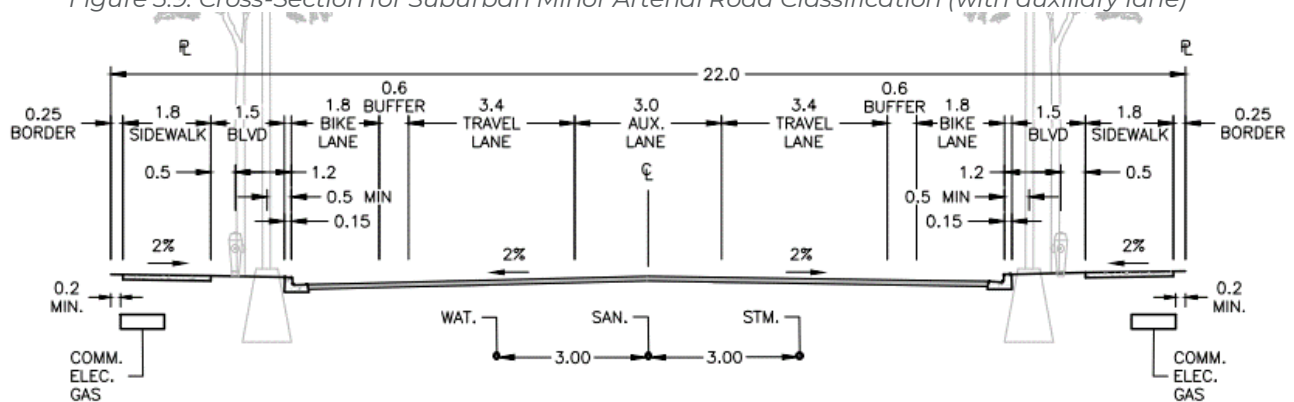


Figure 5.10: Suburban Minor Arterial Map Excerpt (Mission)



5.4 CORE AREA MINOR ARTERIAL

Minor arterial roads in a core area context are designed for moderate vehicle speeds and moderate to high vehicle volumes. The design vehicle is trucks (WB-20), with a modal emphasis on both vehicles and active transportation. Pedestrian facilities include separated sidewalks on both sides of the road. Minimum bicycle facilities are buffered bike lanes. The existing Bylaw ROW is 25m to 28m (SS-R15, and SS-R16), and the proposed ROW is 25m. The recommended cross-section for Core Area Minor Arterial roads is shown below in **Table 5.3**, **Figure 5.11** and **Figure 5.12**, with examples of these streets shown in **Figure 5.13**. This cross section allows for parking on one side mid-block which can then be terminated, and a left-turn lane developed at intersections, as required.

Table 5.3: Recommended Attributes for Core Area Minor Arterial Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	0.3	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m. In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	2.1	<ul style="list-style-type: none"> BC AT Guide specifies 2.4m sidewalk is desirable and 1.8m is constrained limit for multi-family residential collector/arterial roads and 2.4-3.0m sidewalk is desirable for commercial areas with 2.1m as the constrained limit. Wider sidewalks to accommodate higher level of pedestrian activity in core areas.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	2	2.25	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m. Wider furnishing zone provides greater pedestrian comfort with increased vehicle speeds and volume.

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Minimum Bike Lane / MUP	2	1.5*	<ul style="list-style-type: none"> TAC Design Guide recommends bike lane width of 1.8m to 2.1m. BC AT Guide desirable for protected bike lanes is 2.5m with 1.8m acceptable in constrained locations. Higher standard may be required on a specified bicycle route. <i>See Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.9* / 0.6**	<ul style="list-style-type: none"> BC AT Guide recommends minimum 0.9m buffer for protected bike lanes adjacent to parking, to protect users from car doors. <i>With parking</i> – 0.9m buffer provided on both sides to maintain a consistent curbline for when a left-turn lane is required. In constrained situations the buffer can be reduced to 0.6m on the side without parking. <i>With left-turn lane</i> – 0.6m buffer provided on both sides. <p><i>*With Parking</i> <i>**With left-turn/auxiliary lane</i></p>
Curb & Gutter	2	0.45	
Parking Lane	1	2.4	<ul style="list-style-type: none"> TAC Design Guide recommends 2.4m. Parking to be provided mid-block. Parking can be terminated approaching an intersection to accommodate a left-turn lane.
Travel Lane	2	3.3	<ul style="list-style-type: none"> Width accommodates current and future transit and truck routes.
Median / Aux Lane	1	3.0	<ul style="list-style-type: none"> Left-turn lane on approach to intersections with collectors and above, or where warranted. Parking to be terminated and bicycle buffer reduced to 0.6m to accommodate the left-turn lane.
ROW Width		24.0	

Figure 5.11: Cross-Section for Core Area Minor Arterial Road Classification (with parking lane)

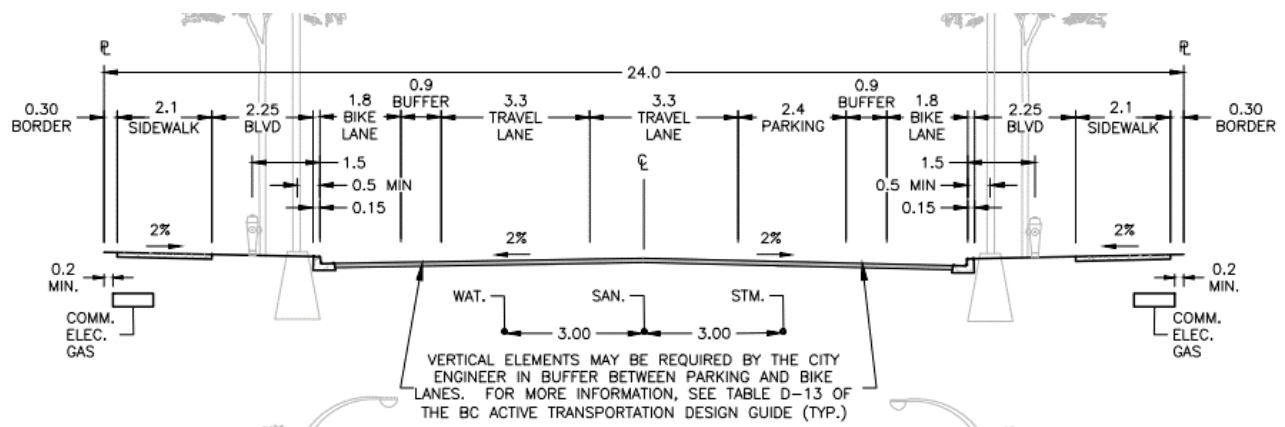


Figure 5.12: Cross-Section for Core Area Minor Arterial Road Classification (with auxiliary lane)

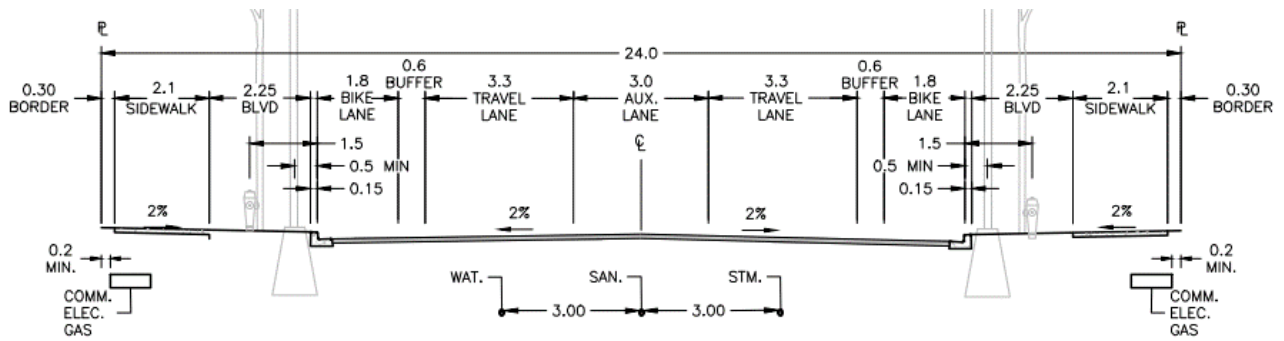
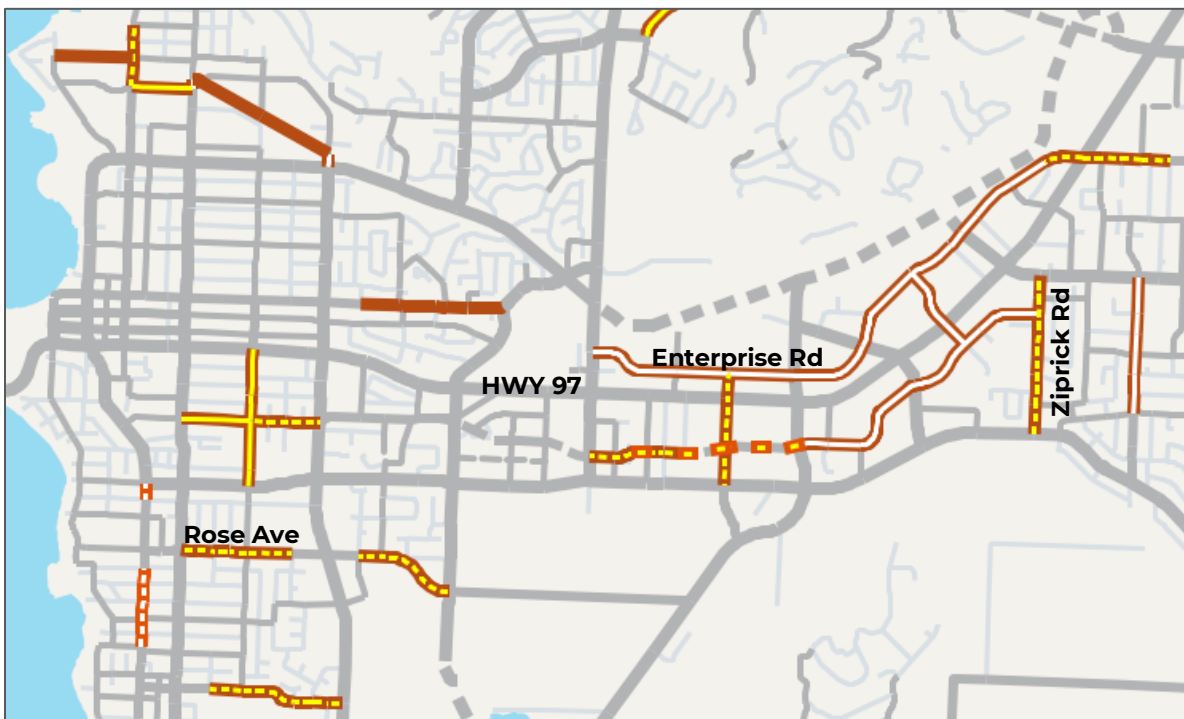


Figure 5.13: Core Area Minor Arterial Map Excerpt (Downtown to Leathead)



5.5 URBAN CENTRE MINOR ARTERIAL

Minor arterial roads in an Urban Centre context are designed for moderate vehicle speeds and a moderate to high vehicle volume. The design vehicle is trucks (WB-20), with a modal emphasis on active transportation and some access restrictions. Pedestrian facilities include separated sidewalks on both sides of the road, and minimum bicycle facilities require some separation. The existing Bylaw ROW is 25 to 28m (SS-R15, and SS-R16), and the proposed ROW is 25m. The recommended cross-section for Urban Centre Minor Arterial roads is shown below in **Table 5.4**, **Figure 5.14**, and **Figure 5.15**, with examples of these streets shown in **Figure 5.16**. This cross section allows for parking on one side mid-block which can then be terminated and a left-turn lane developed at intersections, as required.

Table 5.4: Recommended Attributes for Urban Centre Minor Arterial Road Class

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Border	2	0.3	<ul style="list-style-type: none"> TAC Design Guide recommends range of 0.3 to 1.0m. In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	3.0	<ul style="list-style-type: none"> BC AT Guide specifies 2.4-3.0m sidewalk is desirable for commercial areas with 3.0-4.0m sidewalks desirable in areas of high pedestrian activity. Wider sidewalk to accommodate higher pedestrian volumes in urban centres.
Shoulder	-	-	<ul style="list-style-type: none"> N/A: Not required.
Boulevard	2	1.85	<ul style="list-style-type: none"> TAC Design Guide recommends furnishing zone is 0.5 to 3.0m. Wider furnishing zone provides greater pedestrian comfort with increased vehicle speeds and volume. Reduced from 2.0m preferred width for street trees to maintain 25m ROW.
Minimum Bike Lane / MUP	2	1.5*	<ul style="list-style-type: none"> TAC Design Guide recommends bike lane width is 1.8m to 2.1m. BC AT Guide desirable for protected bike lanes is 2.5m with 1.8m acceptable in constrained locations. Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i>. <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.9* / 0.6**	<ul style="list-style-type: none"> BC AT Guide recommends minimum 0.9m buffer for protected bike lanes adjacent to parking, to protect users from car doors. <i>With parking</i> – 0.9m buffer provided on both sides to maintain a consistent curbline for when a left-turn lane is required. In constrained situations the buffer can be reduced to 0.6m on the side without parking. <i>With left-turn lane</i> – 0.6m buffer provided on both sides. <p><i>*With Parking</i> <i>**With left-turn lane</i></p>

Attribute	Recommendation		Comments / Justification
	Quantity	Width (m)	
Curb & Gutter	2	0.45	
Parking Lane	1	2.4	<ul style="list-style-type: none"> TAC Design Guide recommends 2.4m. Parking to be provided mid-block; also accommodates loading, bus stops, prevents delivery trucks parking in bike lanes or travel lanes, etc. Can be terminated approaching an intersection to accommodate left-turn lane.
Travel Lane	2	3.3	<ul style="list-style-type: none"> Width accommodates current and future transit and truck routes.
Median / Aux Lane	1	3.0	<ul style="list-style-type: none"> Optional on approach to intersections. Parking to be terminated and bicycle buffer reduced to 0.6m to accommodate the left-turn lane.
ROW Width		25.0	

Figure 5.14: Cross-Section for Urban Centre Minor Arterial Road Classification (with parking lane)

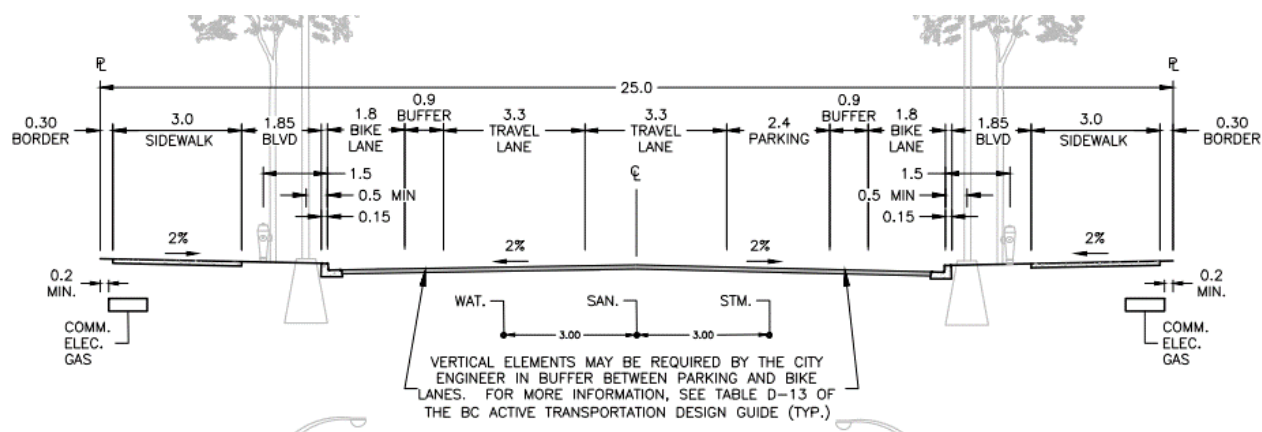


Figure 5.15: Cross-Section for Urban Centre Minor Arterial Road Classification (with auxiliary lane)

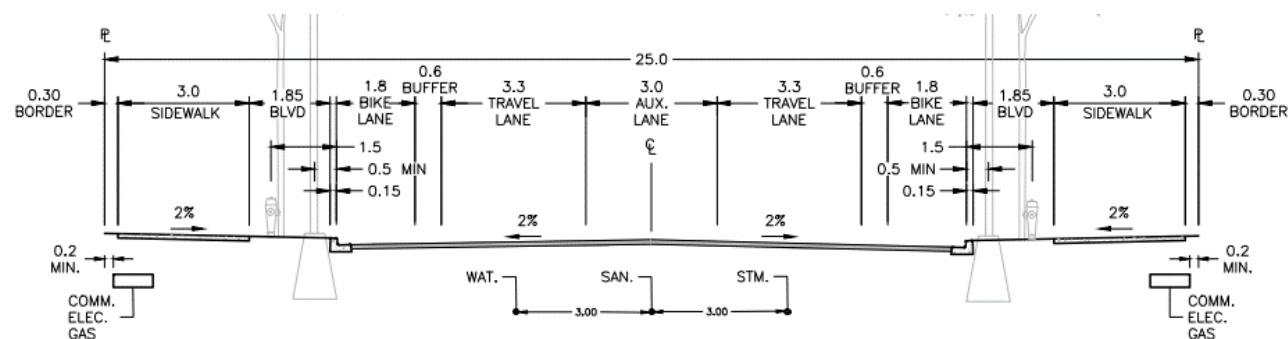
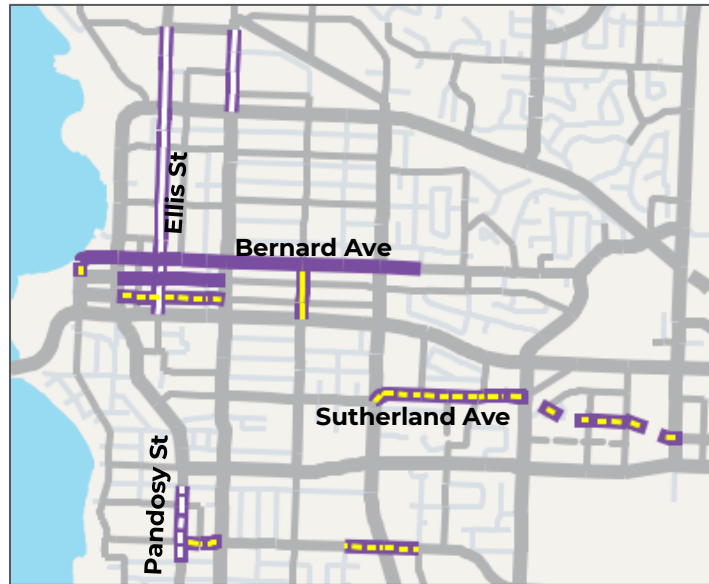


Figure 5.16: Urban Centre Minor Arterial Map Excerpt (Downtown)



6.0 MAJOR ARTERIAL

Major Arterials are intended to provide a continuous route for longer journeys within the City. Vehicle volumes and speeds tend to be highest, therefore, pedestrians and cyclists are typically physically separated from vehicles. Driveways are very limited with land access being provided via adjacent lower-class roads whenever feasible. Generally, Major Arterials do not have on-street parking and often have four or more travel lanes.

6.1 RURAL MAJOR ARTERIAL

Major arterial roads in a rural context are designed for moderate to high vehicle speeds. The design vehicle is trucks (WB-20), with a modal emphasis on vehicles and has some access restriction. The existing bylaw ROW is 30m (SS-R10). A 3-lane and 5-lane version of the cross section has been developed.

For the 3-lane version, the proposed ROW is 29.0m with a MUP and 26.0m without a MUP. The recommended cross-sections for the 3-Lane Rural Major Arterial roads are shown below in **Table 6.1**, **Figure 6.1**, and **Figure 6.2**.

For the 5-lane version, the proposed ROW is 36.0m with a MUP and 33.0m without a MUP. The recommended cross-sections for the 5-Lane Rural Major Arterial roads are shown below in **Table 6.2**, **Figure 6.3**, and **Figure 6.4**.

Examples of these streets are shown in **Figure 6.5**.

Table 6.1: Recommended Attributes for Rural Major Arterial Road Class (3-Lane)

	Recommendation (3-Lane)				
	With MUP		No MUP		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	4.5	2	4.7	<ul style="list-style-type: none">Includes an open ditch.Utilities to be placed in border.300mm depth below subgrade, and 4:1 preferred (3:1 max) slopes adjacent to the road.See Appendix A for further details.Allowance should be adequate in most cases, but ditch to be designed based on geotechnical site conditions.Slightly reduced ditch allowance with MUP to accommodate 36.0m ROW (some flexibility provided by MUP).
Sidewalk	-	-	-	-	<ul style="list-style-type: none">Pedestrians accommodated with MUP or walkable shoulder.
Gravel Shoulder	2	0.6	2	0.6	<ul style="list-style-type: none">Required for pavement structure.
Paved Shoulder	2	1.8	2	2.1	<ul style="list-style-type: none">BC AT Guide recommends minimum 1.8m walkable/cyclist accessible shoulder for no separation/rural context (Figure C-26).

	Recommendation (3-Lane)				
	With MUP		No MUP		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
					<ul style="list-style-type: none">• <i>With MUP</i> – 1.8m paved shoulder allows disabled vehicles to safely pull over and accommodates confident cyclists who choose not to use the MUP.• <i>Without MUP</i> – 2.1m paved shoulder accommodates pedestrians and cyclists.• Wider shoulders than Rural Minor Arterial since vehicle speeds are higher.
Boulevard	-	-	-	-	<ul style="list-style-type: none">• N/A: Not required.•
Minimum Bike Lane / MUP	1	4.0	-	-	<ul style="list-style-type: none">• Fully separated MUP for pedestrians and cyclists when on a primary bike route due to higher vehicle speeds and volumes.• Located outside of ditch.• 3.0m paved plus 0.5m gravel allowance on either side to accommodate pavement structure/back boulevard.
Bicycle Buffer	-	-	-	-	<ul style="list-style-type: none">• N/A: Ditch in lieu.
Curb & Gutter	-	-	-	-	<ul style="list-style-type: none">• N/A: Ditch in lieu.
Parking Lane	-	-	-	-	<ul style="list-style-type: none">• N/A: No on-street parking provided.
Travel Lane	2	3.4	2	3.4	<ul style="list-style-type: none">• 3.4m travel lanes to accommodate large vehicles.
Median / Aux Lane	1	3.2 + 1.2	1	3.2 + 1.2	<ul style="list-style-type: none">• 4.4m allowance includes 3.2m for an auxiliary (left-turn) lane and 1.2m for a central median.
ROW Width		29.0		26.0	

Figure 6.1: Cross-Section for Rural Major Arterial Road Classification (3-Lane, with MUP)

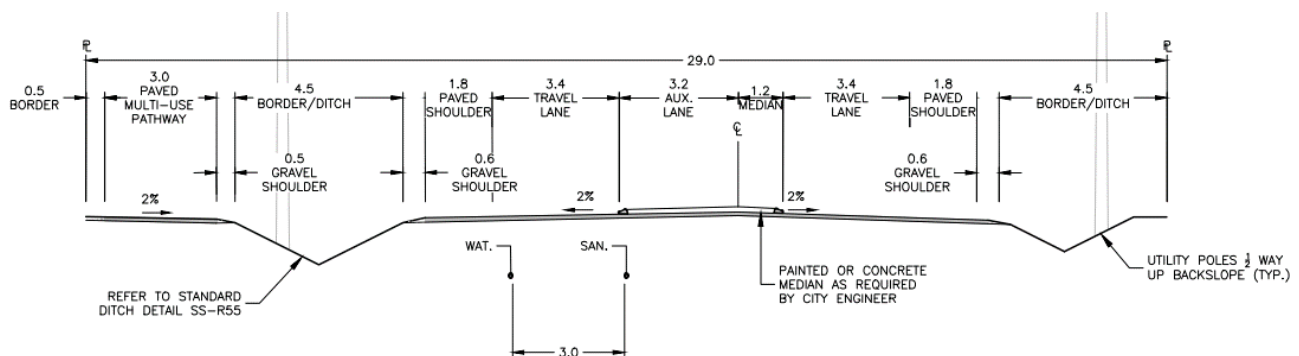


Figure 6.2: Cross-Section for Rural Major Arterial Road Classification (3-Lane, no MUP)

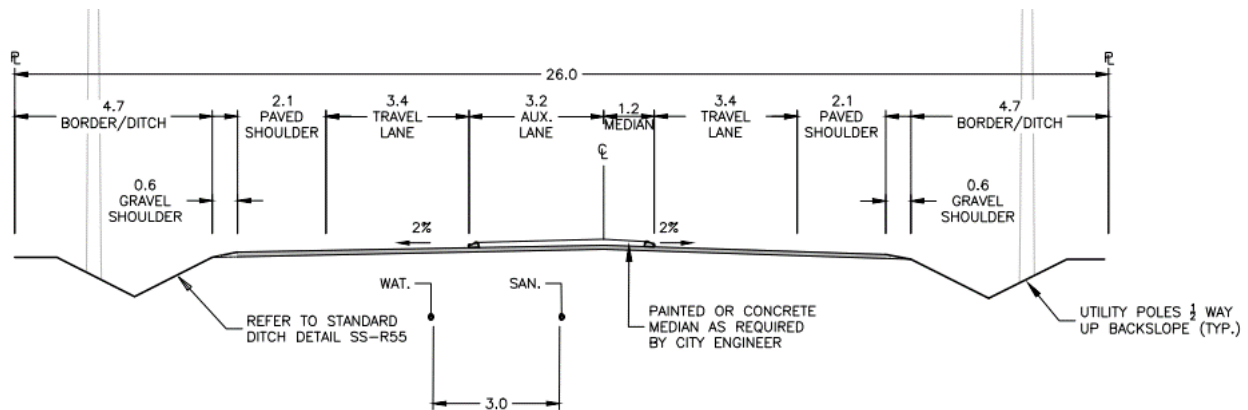


Table 6.2: Recommended Attributes for Rural Major Arterial Road Class (5-Lane)

Attribute	Recommendation (5-Lane)				Comments / Justification
	Quantity	Width (m)	Quantity	Width (m)	
Border	2	4.6	2	4.8	<ul style="list-style-type: none"> Includes an open ditch. Utilities to be placed in border. 300mm depth below subgrade, and 4:1 preferred (3:1 max) slopes adjacent to the road. See Appendix A for further details. Allowance should be adequate in most cases, but ditch to be designed based on geotechnical site conditions. Slightly reduced ditch allowance with MUP to accommodate 36.0m ROW (some flexibility provided by MUP).
Sidewalk	-	-	-	-	<ul style="list-style-type: none"> Pedestrians accommodated with MUP or walkable shoulder.
Gravel Shoulder	2	0.6	2	0.6	<ul style="list-style-type: none"> Required for pavement structure.
Paved Shoulder	2	1.8	2	2.1	<ul style="list-style-type: none"> BC AT Guide recommends minimum 1.8m walkable/cyclist accessible shoulder for no separation/rural context (Figure C-26). <i>With MUP</i> – 1.8m paved shoulder allows disabled vehicles to safely pull over and accommodates confident cyclists who choose not to use the MUP. <i>Without MUP</i> – 2.1m paved shoulder accommodates pedestrians and cyclists. Wider shoulders than Rural Minor Arterial since vehicle speeds are higher.
Boulevard	-	-	-	-	<ul style="list-style-type: none"> N/A: Not required.

	Recommendation (5-Lane)				
	With MUP		No MUP		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Minimum Bike Lane / MUP	1	4.0	-	-	<ul style="list-style-type: none">Fully separated MUP for pedestrians and cyclists when on a primary bike route due to higher vehicle speeds and volumes.Located outside of ditch.3.0m paved plus 0.5m gravel allowance on either side to accommodate pavement structure/back boulevard.
Bicycle Buffer	-	-	-	-	<ul style="list-style-type: none">N/A: Ditch in lieu.
Curb & Gutter	-	-	-	-	<ul style="list-style-type: none">N/A: Ditch in lieu.
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	4	3.4	4	3.4	<ul style="list-style-type: none">3.4m travel lanes to accommodate large vehicles.
Median / Aux Lane	1	3.2 + 1.2	1	3.2 + 1.2	<ul style="list-style-type: none">4.4m allowance includes 3.2m for an auxiliary (left-turn) lane and 1.2m for a central median.
ROW Width		36.0		33.0	

Figure 6.3: Cross-Section for Rural Major Arterial Road Classification (5-Lane, with MUP)

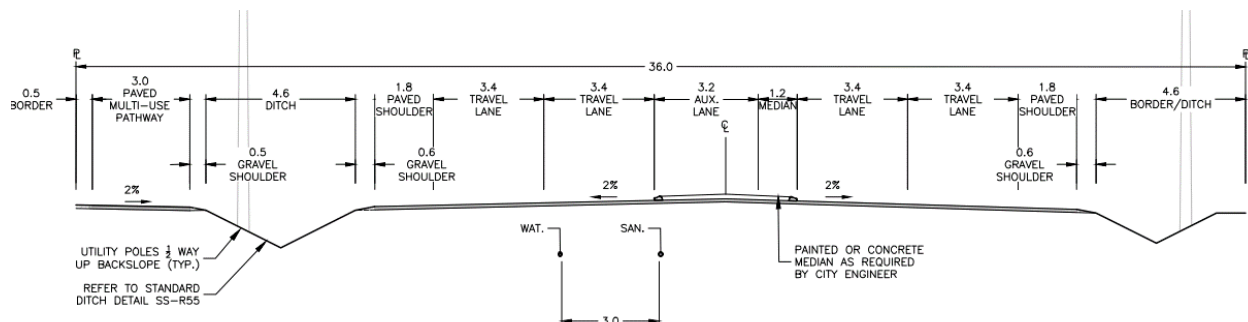


Figure 6.4: Cross-Section for Rural Major Arterial Road Classification (5-Lane, no MUP)

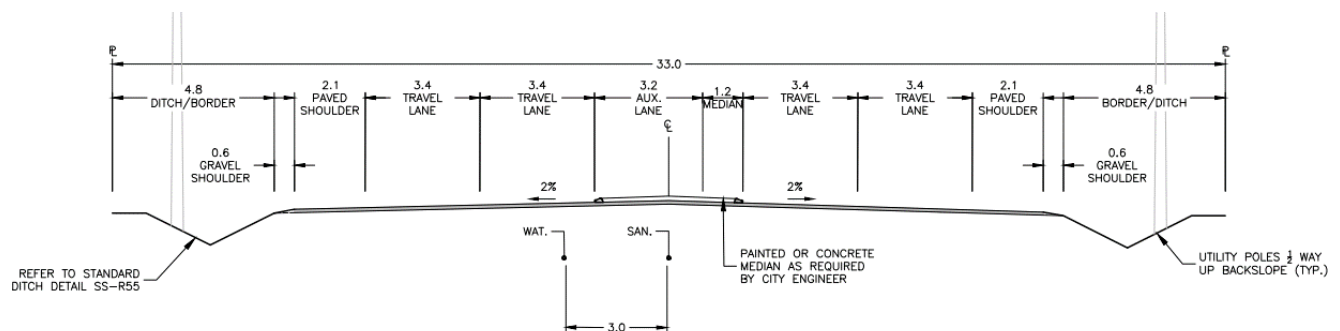
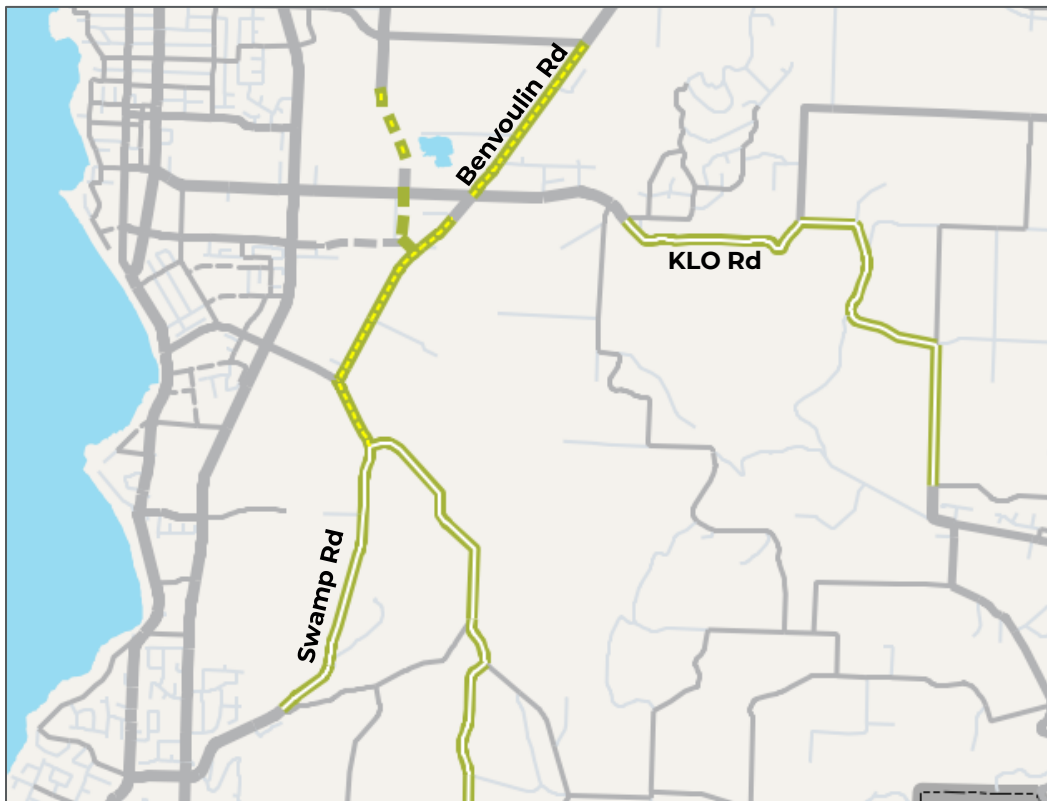


Figure 6.5: Rural Major Arterial Map Excerpt (South Pandosy / Southeast Kelowna)



6.2 SUBURBAN MAJOR ARTERIAL

Major arterial roads in a suburban context are designed for moderate to high vehicle speeds. The design vehicle is trucks (WB-20), with a modal emphasis on both vehicles and access is restricted. Active transportation facilities include sidewalks and on-street, buffered bike lanes. The existing bylaw ROWs is 30m (SS-R11), and the proposed ROW is 24m with two travel lanes and 30m with four travel lanes. The recommended cross-section for Suburban Major Arterial roads is shown below in **Table 6.3**, **Figure 6.6** and **Figure 6.7**, with examples of these streets shown in **Figure 6.8**.

Table 6.3: Recommended Attributes for Suburban Major Arterial Road Class

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	0.3	2	0.15	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	1.8	2	1.8	<ul style="list-style-type: none">TAC Design Guide recommends minimum 1.8m for pedestrian volume of <400 ped/15 min, and a practical lower limit of 1.5m.

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
					<ul style="list-style-type: none">BC AT Guide specifies 1.8m is the constrained limit for residential collector roads.Narrower sidewalks since lower pedestrian volumes are anticipated.
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Boulevard	2	1.75	2	1.50	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.Narrower boulevard since lower pedestrian activity is anticipated.
Minimum Bike Lane / MUP	2	1.5*	2	1.5*	<ul style="list-style-type: none">TAC Design Guide recommends bike lane width is 1.8m to 2.1m.BC AT Guide desirable width for curbside bike lanes is 1.8m.Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.6	2	0.6	<ul style="list-style-type: none">BC AT Guide recommends bicycle buffer width of 0.6m to 0.9m.TAC Design Guide recommends separated bike lanes for vehicle speeds of 50 to 80km/h.TAC Design Guide recommends bicycle buffer width is 0.3m to 0.9mPhysical separation may be provided where desired.
Curb & Gutter	2	0.45	2	0.45	<ul style="list-style-type: none">
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	2	3.4	4	3.4	<ul style="list-style-type: none">Width accommodates current and future transit and truck routes.Marginally wider than Core Area or Urban Centre Minor Arterials since a higher proportion of trucks and higher speeds are anticipated.
Median / Aux Lane	1	3.2 + 1.2	1	3.2 + 1.2	<ul style="list-style-type: none">3.2m auxiliary (left-turn) lane and 1.2m median.Tree median in mid-block sections where left turn lanes are not required.
ROW Width		24.0	30.0		

Figure 6.6: Cross-Section for Suburban Major Arterial Road Classification (3-Lane)

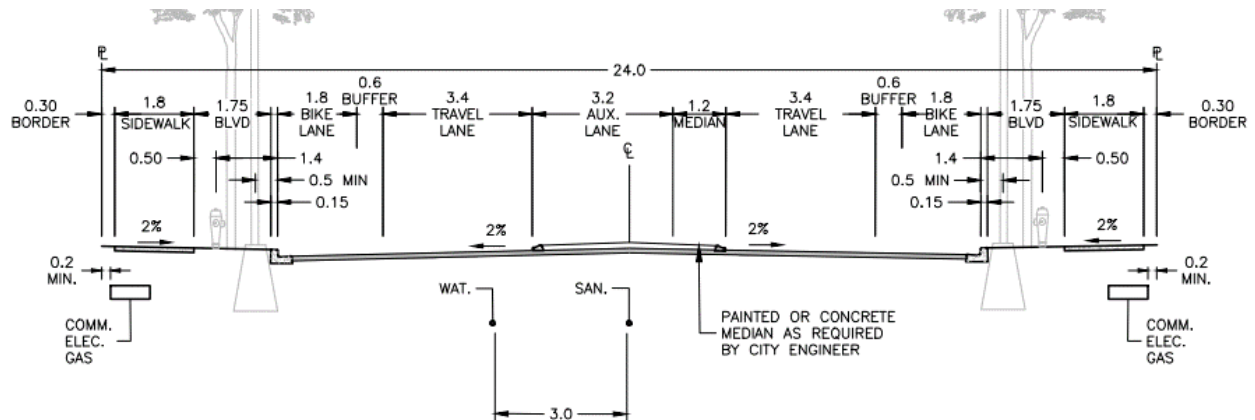


Figure 6.7: Cross-Section for Suburban Major Arterial Road Classification (5-Lane)

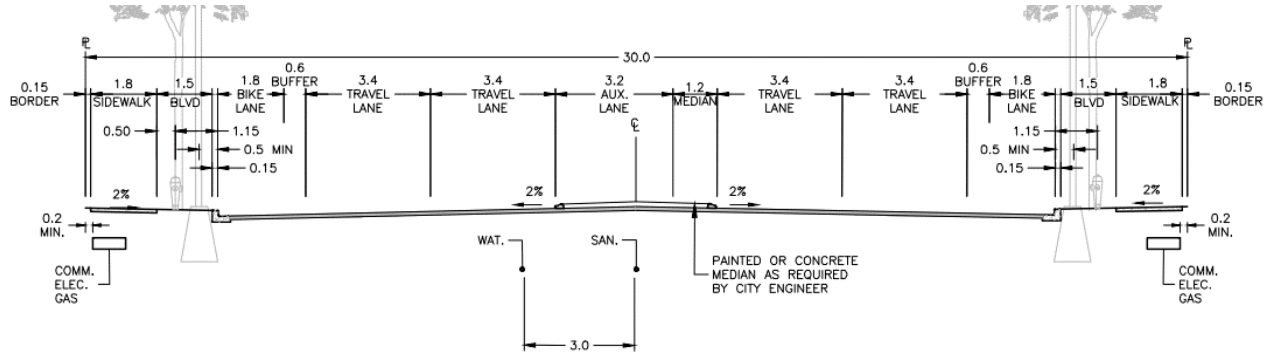
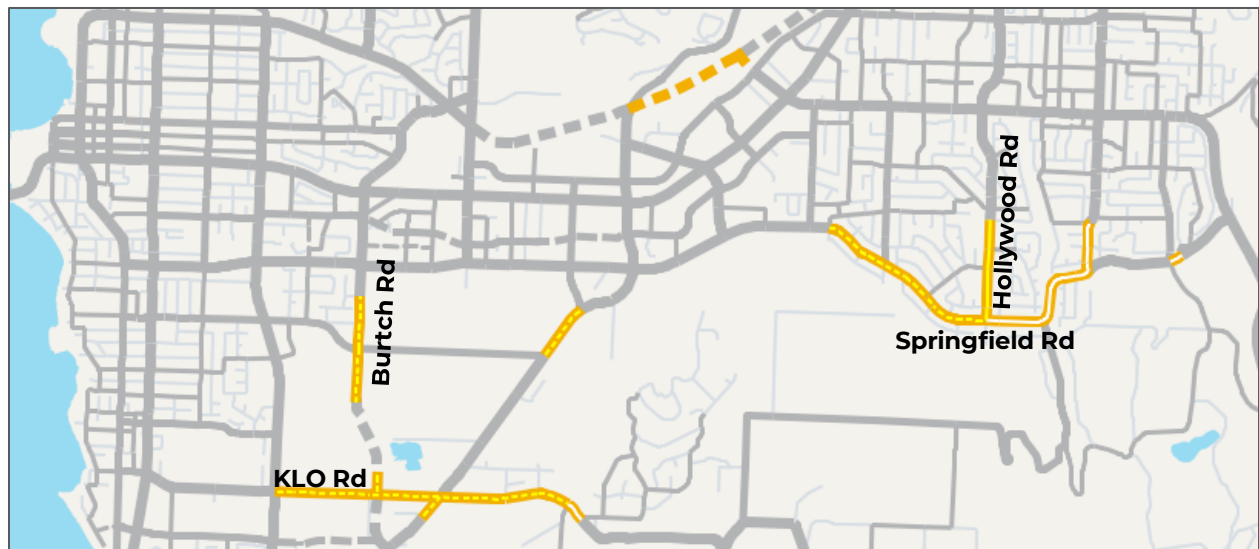


Figure 6.8: Suburban Major Arterial Map Excerpt (Downtown to Rutland)



6.3 CORE AREA MAJOR ARTERIAL

Major arterial roads in a core area context are designed for moderate to high vehicle speeds. The design vehicle is trucks (WB-20), with a modal emphasis on both vehicles and active transportation, and access is restricted. Pedestrian facilities are separated sidewalks and bicycle facilities are buffered bike lanes (painted) that may be physically separated (delineators, curb, etc.), if desired. The existing bylaw ROWs are 28m to 35m (SS-R8, SS-R9, and SS-R14), and the proposed ROW is 25m with two travel lanes and 32m with four travel lanes. The recommended cross-section for Core Area Major Arterial roads is shown below in **Table 6.4**, and **Figure 6.9** and **Figure 6.10**, with examples of these streets shown in **Figure 6.11**.

Table 6.4: Recommended Attributes for Core Area Major Arterial Road Class

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	0.3	2	0.3	<ul style="list-style-type: none">TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	2.1	2	2.1	<ul style="list-style-type: none">BC AT Guide specifies 2.4m sidewalk is desirable and 1.8m is constrained limit for multi-family residential collector/arterial roads and 2.4-3.0m sidewalk is desirable for commercial areas with 2.1m as the constrained limit.Wider sidewalks to accommodate higher level of pedestrian activity in core areas.?? And consider accessibility needs??
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Boulevard	2	2.15	2	2.10	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.Wider furnishing zone provides greater pedestrian comfort with increased vehicle speeds and volume.
Minimum Bike Lane / MUP	2	1.5*	2	1.5*	<ul style="list-style-type: none">TAC Design Guide recommends bike lane width is 1.8m to 2.1m.BC AT Guide desirable for protected bike lanes is 2.5m with 1.8m acceptable in constrained locations.Higher standard may be required on a specified bicycle route. <i>See Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.6	2	0.6	<ul style="list-style-type: none">BC AT Guide recommends bicycle buffer width of 0.6m to 0.9m.TAC Design Guide recommends separated bike lanes for vehicle speeds of 50 to 80km/h.

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
					<ul style="list-style-type: none">TAC Design Guide recommends bicycle buffer width is 0.3m to 0.9mPhysical separation may be provided where desired.
Curb & Gutter	2	0.45	2	0.45	<ul style="list-style-type: none">
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	2	3.3	4	3.3	<ul style="list-style-type: none">Width accommodates current and future transit and truck routes.
Median / Aux Lane	1	3.0 + 1.2	1	3.0 + 1.2	<ul style="list-style-type: none">3.0m auxiliary (left-turn) lane and 1.2m median.Tree median in mid-block sections where left turn lanes are not required.
ROW Width		25.0	31.5		

Figure 6.9: Cross-Section for Core Area Major Arterial Road Classification (3-Lane)

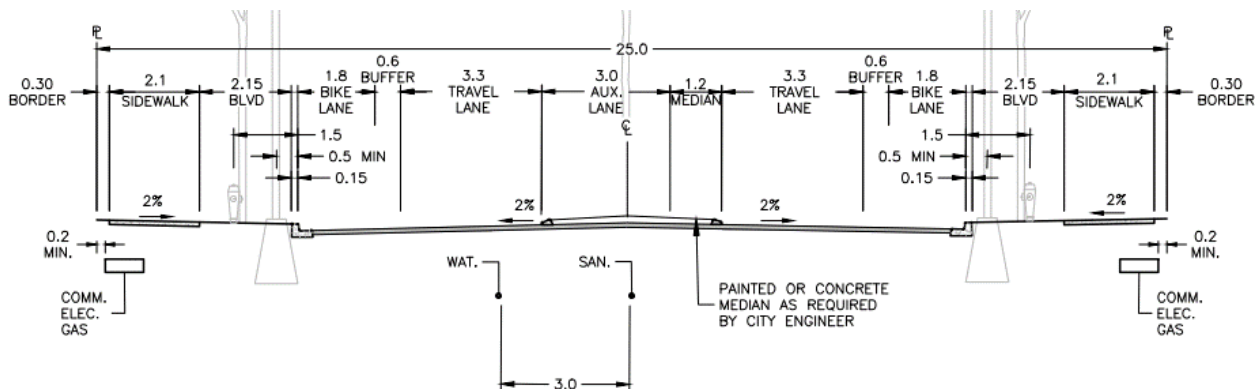


Figure 6.10: Cross-Section for Core Area Major Arterial Road Classification (5-Lane)

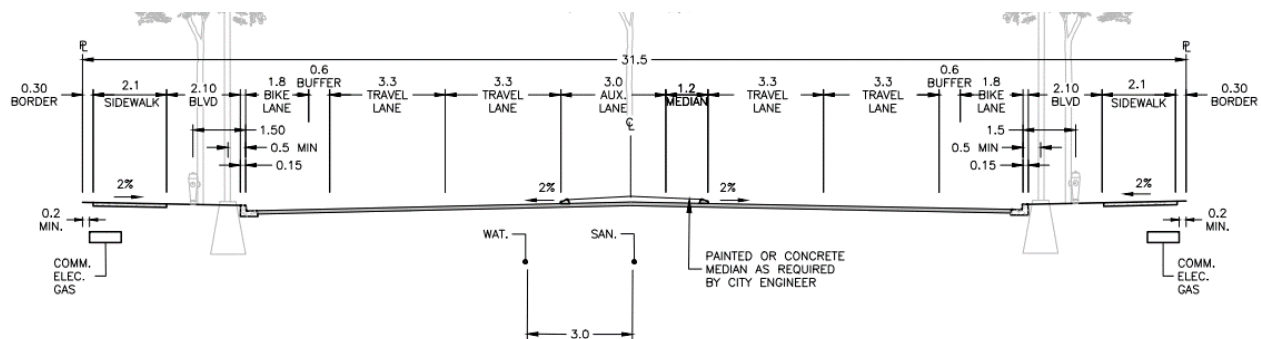


Figure 6.11: Core Area Major Arterial Map Excerpt (Downtown to Rutland)



6.4 URBAN CENTRE MAJOR ARTERIAL

Major arterial roads in an urban centre context are designed for moderate vehicle speeds. The design vehicle is trucks (WB-20), with a modal emphasis on both vehicles and active transportation, and no direct access. Pedestrian facilities are separated sidewalks and bicycle facilities consist of buffered bike lanes that may be physically separated, if desired. The existing bylaw ROWs are 28m to 35m (SS-R8, SS-R9, and SS-R14), and the proposed ROW is 26m with two travel lanes and 32m with four travel lanes. The recommended cross-section for Urban Centre Major Arterial roads is shown below in **Table 6.5**, and **Figure 6.12** and **Figure 6.13**, with examples of these streets shown in **Figure 6.14**.

Table 6.5: Recommended Attributes for Urban Centre Major Arterial Road Class

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Border	2	0.3	2	0.3	<ul style="list-style-type: none">Borders may not be necessary adjacent to lawns, parks, or other open spaces.TAC Design Guide recommends range of 0.3 to 1.0m.In retrofit situations, borders less than 0.3m cause issues with construction and maintenance.
Sidewalk	2	3.0	2	3.0	<ul style="list-style-type: none">BC AT Guide specifies 2.4-3.0m sidewalk is desirable for commercial areas with 3.0-4.0m sidewalks desirable in areas of high pedestrian activity.Wider sidewalk to accommodate higher pedestrian volumes in urban centres.

	Recommendation				
	3-Lane		5-Lane		
Attribute	Quantity	Width (m)	Quantity	Width (m)	Comments / Justification
Shoulder	-	-	-	-	<ul style="list-style-type: none">N/A: Not required.
Boulevard	2	2.10	2	2.05	<ul style="list-style-type: none">TAC Design Guide recommends furnishing zone is 0.5 to 3.0m.Wider furnishing zone provides greater pedestrian comfort with increased vehicle speeds and volume.
Minimum Bike Lane / MUP	2	1.5*	2	1.5*	<ul style="list-style-type: none">TAC Design Guide recommends bike lane width is 1.8m to 2.1m.BC AT Guide desirable for protected bike lanes is 2.5m with 1.8m acceptable in constrained locations.Higher standard may be required on a specified bicycle route. See <i>Bicycle Overlay Map</i> <p><i>*Effectively 1.8m with gutter</i></p>
Bicycle Buffer	2	0.6	2	0.6	<ul style="list-style-type: none">BC AT Guide recommends bicycle buffer width of 0.6m to 0.9m.TAC Design Guide recommends separated bike lanes for vehicle speeds of 50 to 80km/h.TAC Design Guide recommends bicycle buffer width is 0.3m to 0.9mPhysical separation may be provided where desired.
Curb & Gutter	2	0.45	2	0.45	
Parking Lane	-	-	-	-	<ul style="list-style-type: none">N/A: No on-street parking provided.
Travel Lane	2	3.3	4	3.3	<ul style="list-style-type: none">Width accommodates current and future transit and truck routes.
Median / Aux Lane	1	3.0	1	3.0	<ul style="list-style-type: none">Accommodates auxiliary lane or median.No allowance for median left-turn signals. Must be provided on a mast-arm, if required.Tree median in mid-block sections where left turn lanes are not required.
Proposed ROW Width		25.5	32.0		

Figure 6.12: Cross-Section for Urban Centre Major Arterial Road Classification (3-Lane)

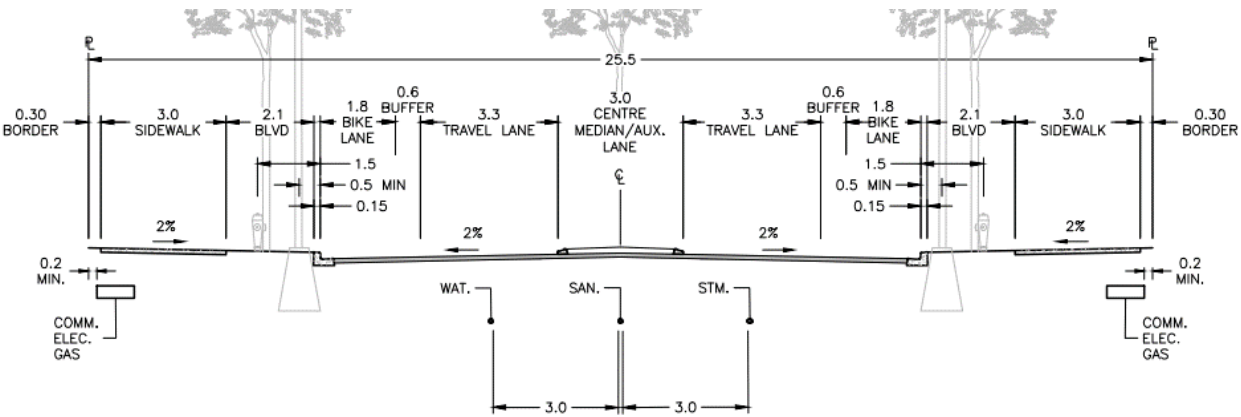


Figure 6.13: Cross-Section for Urban Centre Major Arterial Road Classification (5-Lane)

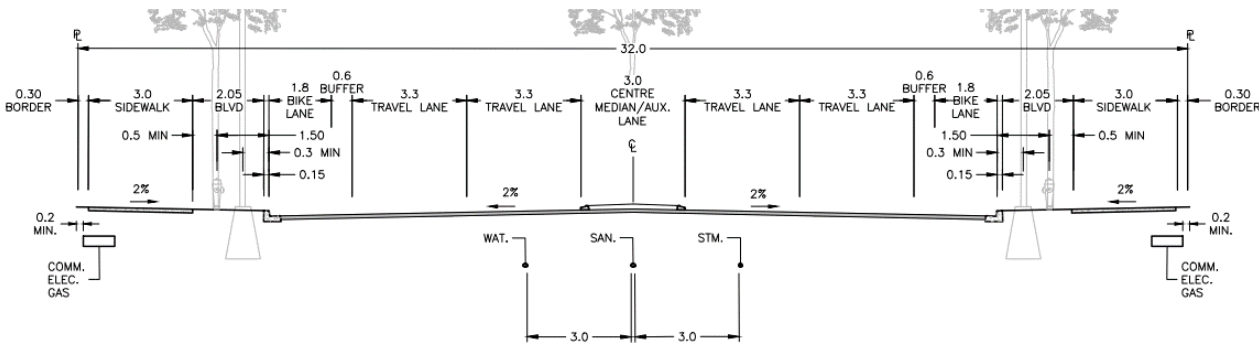


Figure 6.14: Urban Centre Major Arterial Map Excerpt (Downtown)



7.0 HIGHWAYS

Roadways classified as Highway are under the BC Ministry of Transportation and Infrastructure's jurisdiction. However, these roadways should meet the requirements of a Major Arterial of the appropriate land use context for facilities behind the curb (i.e., boulevard and sidewalk).

8.0 OVERLAYS

The standard cross sections provided above respond to the priorities and objectives of the City based on the land use context and the road classification. This provides a framework to address the primary needs of each road segment throughout the City based on the general context. However, a number of transportation considerations influence the operations and needs of the road network and inform in the design process. Overlays have been developed to represent these additional considerations, as they often represent a network that transcends land use or road classification. These overlays are critical to delivering on a functional road network and on the City of Kelowna's priority projects and objectives. The objective of the overlays is to define the situations that require additional consideration, or cases where aspect(s) of the identified road type cross-section should be customized to fit a unique context.

Four Overlays have been developed, as listed below:

- Bicycles
- Trucks
- Transit
- TMP Projects

Further details on these Overlays is included in the **Functional Road Classification Memo**, and guidance on how to implement the Overlays with the standard cross-sections can be found in the **Functional Road Classification System – Implementation User Guide**.

9.0 CLOSING

This memorandum presents the proposed road cross-sections for the SDS Bylaw update. Additional details and examples on the implementation are in the Functional Road Classification System – Implementation User Guide.

APPENDIX A: DITCH CROSS SECTIONS

APPENDIX B: CROSS-SECTION ATTRIBUTE SUMMARY TABLE

Road Cross-Section Summary¹

Road Classification ¹	Land Use	Maximum Units Served	Cross Section Drawing #	Lanes (excl. special purpose) ²		Median ³ /Aux. Lane		Shoulders		Parking ⁴		Pavement Width (m)	Drainage			Sidewalks			Blvds ⁴		Border ⁵		Bicycle Facilities (see OCP Map 13.3)						ROW Width (m)	
				#	Width (m) ²	Y/N	Width (m) ²	Y/N	Width (m)		Y/N #		Width (m)	Ditch ⁵	Curb & Gutter		Y/N	#	Width (m)	Y/N #	Width (m)	Y/N #	Width (m)	MUP		Bike Lane ⁴		Bike Buffer		
									Gravel	Paved					Barrier	Rollover								Y/N	Width (m)	Y/N	Width (m)	Y/N		Width (m)
Emergency Access	All	--	--	1	6.0	✖	--	✖	--	✖	--	6.0	✖	✖	✖	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	6.0	
	Hillside	--	--	1	4.5	✖	--	✖	--	✖	--	4.5	✖	✖	✖	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	4.5	
Laneway ⁶	Hillside ⁹	10	XS-R01	1	5.7	✖	--	✖	--	✖	--	5.1	✖	✖	✓	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	6.0	
	Suburban	--	XS-R02	1	6.0	✖	--	✖	--	✖	--	6.0	✖ ⁷	✖	✖	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	6.0	
	Core Area	--	XS-R02	1	7.6	✖	--	✖	--	✖	--	7.6	✖ ⁷	✖	✖	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	7.6	
	Urban Centre	--	XS-R02	1	7.6	✖	--	✖	--	✖	--	7.6	✖ ⁷	✖	✖	✖	--	--	✖	--	✖	--	✖	--	✖	--	✖	--	7.6	
Local	Rural	--	XS-R20	2	3.5	✖	--	2	1.5	--	✖	--	7.0	✓	✖	✖	✖	--	--	✖	--	2 ⁸	3.0 ⁸	✖	--	✖	--	✖	--	16.0
	Hillside	200	XS-R21	1	4.8	✖	--	✖	--	--	2	2.4	9.0	✖	✓	✓	✓	2	1.5	2	1.35	2	0.9	✖	--	✖	--	✖	--	17.4
		200	XS-R22	2	3.0	✖	--	✖	--	--	2 ⁹	2.4 ⁹	10.2/5.4	✖	✖	✓	✓	1	1.5	2	2.25 ⁹	2	0.9	✖	--	✖	--	✖	--	14.1
		200	XS-R23	2	3.0	✖	--	✖	--	--	1	2.4 ⁹	7.8/5.4	✖	✓	✓	✓	1	1.5	2	1.35/2.25 ⁹	1	0.9	✖	--	✖	--	✖	--	12.3
		200	XS-R24	2	3.0	✖	--	✖	--	--	✖	--	5.4	✖	✓	✖	✓	1	1.5	2	1.35	✖	--	✖	--	✖	--	✖	--	10.5
	Suburban	--	XS-R25	1	5.1	✖	--	✖	--	--	2	2.4	9.3	✖	✓	✖	✓	1	1.8	1	1.8	2	1.10	✖	--	✖	--	✖	--	16.0
	Industrial	--	XS-R26	2	3.4	✖	--	✖	--	--	2	2.7	11.6	✖	✓	✖	✓	2	1.8	✖	--	2	1.95	✖	--	✖	--	✖	--	20.0
	Core Area	--	XS-R27	1	5.2	✖	--	✖	--	--	2	2.2	9.0	✖	✓	✖	✓	2	1.8	2	1.95	2	0.3	✖	--	✖	--	✖	--	18.0
Urban Centre	--	XS-R28	2	3.0	✖	--	✖	--	--	2	2.2	9.8	✖	✓	✖	✓	2	2.1	2	2.25	2	0.3	✖	--	✖	--	✖	--	20.0	
Collector	Rural	--	XS-R40	2	3.2	✖	--	✓	0.6	1.8	✖	--	10.0	✓	✖	✖	✖	--	--	✖	--	2 ⁹	4.4 ⁹	✖	--	✖	--	✖	--	20.0
	Hillside	600	XS-R41	2	4.0	✖	--	✖	--	--	2	2.4	12.2	✖	✓	✖	✓	2	3.2/4.0	2	3.2/4.0	✖	--	✖	--	✖	--	✖	--	20.0
		600	XS-R42	2	4.0	✖	--	✖	--	--	2	2.4	12.2	✖	✓	✓	✓	2	1.5	2	1.35	2	1.0/0.2	✖	--	✖	--	✖	--	20.0
		600	XS-R43	2	4.3	✖	--	✖	--	--	2 ⁹	2.4 ⁹	12.8	✖	✖	✓	✓	2	1.5	2	2.25 ⁹	2	0.9	✖	--	✖	--	✖	--	18.2
		600	XS-R44	2	4.3	✖	--	✖	--	--	1 ⁹	2.4 ⁹	10.4	✖	✓	✓	✓	1	1.5	2	1.35/2.25 ⁹	1	0.9	✖	--	✖	--	✖	--	14.9
		600	XS-R45	2	4.3	✖	--	✖	--	--	✖	--	8.0	✖	✓	✖	✓	1	1.5	2	1.5/1.35	1	0.9	✖	--	✖	--	✖	--	14.0
		500	XS-R46	2	3.5	✖	--	✖	--	--	1 ⁹	2.4 ⁹	8.8	✖	✓	✖	✓	1	1.5	2	1.5/2.4 ⁹	1	0.9	✖	--	✖	--	✖	--	13.3
		500	XS-R47	2	3.5	✖	--	✖	--	--	✖	--	6.4	✖	✓	✖	✓	1	1.5	2	1.35	1	0.9	✖	--	✖	--	✖	--	12.4
	Suburban	--	XS-R48	2	3.2	✖	--	✖	--	--	2	2.4	10.6	✖	✓	✖	✓	2	1.5	2	1.8	2	0.95	✖	--	✖	--	✖	--	20.0
		--	XS-R49	2	3.2	✖	--	✖	--	--	1	2.4	11.8	✖	✓	✖	✓	2	1.8/1.5	1	1.85	2	0.3/1.85	✖	--	✓	1.8	✖	--	20.0
	Industrial	--	XS-R50	2	3.5	✖	--	✖	--	--	2	2.7	11.8	✖	✓	✖	✓	2	1.5	2	1.85	2	0.3	✖	--	✖	--	✖	--	20.0
	Core Area	--	XS-R51	2	3.2	✖	--	✖	--	--	2	2.4	10.6	✖	✓	✖	✓	2	1.8	2	2.15	2	0.3	✖	--	✖	--	✖	--	20.0
		--	XS-R52	2	3.2	✖	--	✖	--	--	1	2.4	12.7	✖	✓	✖	✓	2	1.8	2	2.10	2	0.3	✖	--	2	1.8	1	0.9	22.0
	Urban Centre	--	XS-R53	2	3.2	✖	--	✖	--	--	2	2.4	10.6	✖	✓	✖	✓	2	2.4	2	1.55	2	0.3	✖	--	✖	--	✖	--	20.0
--		XS-R54	2	3.2	✖	--	✖	--	--	1	2.4	12.7	✖	✓	✖	✓	2	2.4	2	1.5	2	0.3	✖	--	2	1.8	1	0.9	22.0	

Road Classification ¹	Land Use	Maximum Units Served	Cross Section Drawing #	Lanes (excl. special purpose) ²		Median ³ /Aux. Lane		Shoulders		Parking ⁴		Pavement Width (m)	Drainage			Sidewalks			Blvds ⁴		Border ⁵		Bicycle Facilities (see OCP Map 13.3)						ROW Width (m)		
				#	Width (m) ²	Y/N	Width (m) ²	Y/N	Width (m)		Y/N #		Width (m)	Ditch ⁵		Curb & Gutter		Y/N	#	Width (m)	Y/N #	Width (m)	Y/N #	Width (m)	MUP		Bike Lane ⁴			Bike Buffer	
									Gravel	Paved				Y/N	Barrier	Rollover	Y/N								Width (m)	Y/N	Width (m)	Y/N		Width (m)	Y/N
Minor Arterial	Rural	--	XS-R60	2	3.4	✕	--	✓	0.6	1.8	✕	--	10.4	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.7 ⁸	✕	--	✕	--	✕	--	21.0	
		--	XS-R61	2	3.4	✕	--	✓	0.6	1.5	✕	--	9.8	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.6 ⁸	1	3.8	✕	--	✕	--	24.0	
	Hillside ⁵	>600	XS-R62	2	4.3	✓	4.4	✕	--	--	✕	--	11.0	✕	✓	✕	✓	2	1.5	2	1.65	2	0.2	✕	--	2	1.5	✕	--	23.0	
		>600	XS-R63	2	3.5	✕	--	✕	--	--	✕	--	9.4	✕	✓	✕	✓	2	1.5	2	1.65	2	0.2	✕	--	2	1.5	✕	--	17.0	
		>600	XS-R64	2	3.5	✕	--	✕	--	--	✕	--	9.4	✕	✓	✕	✓	1	1.5	2	1.65/1.5	1	0.2	✕	--	2	1.5	✕	--	15.0	
	Suburban	--	XS-R65	2	3.4	✕	--	✕	--	--	✕	--	11.0	✕	✓	✕	✓	2	1.8	2	1.80	2	1.45	✕	--	2	1.8	2	0.6	22.0	
		--	XS-R65	2	3.4	✓	3.0	✕	--	--	✕	--	14.0	✕	✓	✕	✓	2	1.8	2	1.50	2	0.25	✕	--	2	1.8	2	0.6	22.0	
	Core Area	--	XS-R66	2	3.3	✕	--	✕	--	--	1	2.4	13.8	✕	✓	✕	✓	2	2.1	2	2.25	2	0.3	✕	--	2	1.8	2	0.9	24.0	
		--	XS-R66	2	3.3	✓	3.0	✕	--	--	✕	--	13.8	✕	✓	✕	✓	2	2.1	2	2.25	2	0.3	✕	--	2	1.8	2	0.6	24.0	
	Urban Centre	--	XS-R67	2	3.3	✕	--	✕	--	--	1	2.4	13.8	✕	✓	✕	✓	2	3.0	2	1.85	2	0.3	✕	--	2	1.8	2	0.9	25.0	
--		XS-R67	2	3.3	✓	3.0	✕	--	--	✕	--	13.8	✕	✓	✕	✓	2	3.0	2	1.85	2	0.3	✕	--	2	1.8	2	0.6	25.0		
Major Arterial	Rural	--	XS-R80	2	3.4	✓	4.4	✓	0.6	2.1	✕	--	15.4	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.7 ⁸	✕	--	✕	--	✕	--	26.0	
		--	XS-R81	2	3.4	✓	4.4	✓	0.6	1.8	✕	--	14.8	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.5 ⁸	1	4.0	✕	--	✕	--	29.0	
		--	XS-R82	4	3.4	✓	4.4	✓	0.6	2.1	✕	--	22.2	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.8 ⁸	✕	--	✕	--	✕	--	33.0	
		--	XS-R83	4	3.4	✓	4.4	✓	0.6	1.8	✕	--	21.6	✓	✕	✕	✕	--	--	✕	--	2 ⁸	4.6 ⁸	1	4.0	✕	--	✕	--	36.0	
	Suburban	--	XS-R84	2	3.4	✓	4.4	✕	--	--	✕	--	15.4	✕	✓	✕	✓	2	1.8	2	1.75	2	0.3	✕	--	2	1.8	2	0.6	24.0	
		--	XS-R85	4	3.4	✓	4.4	✕	--	--	✕	--	22.2	✕	✓	✕	✓	2	1.8	2	1.50	2	0.15	✕	--	2	1.8	2	0.6	30.0	
	Core Area	--	XS-R86	2	3.3	✓	4.2	✕	--	--	✕	--	15.0	✕	✓	✕	✓	2	2.1	2	2.15	2	0.3	✕	--	2	1.8	2	0.6	25.0	
		--	XS-R87	4	3.3	✓	4.2	✕	--	--	✕	--	21.6	✕	✓	✕	✓	2	2.1	2	2.10	2	0.3	✕	--	2	1.8	2	0.6	31.5	
	Urban Centre	--	XS-R88	2	3.3	✓	3.0	✕	--	--	✕	--	13.8	✕	✓	✕	✓	2	3.0	2	2.10	2	0.3	✕	--	2	1.8	2	0.6	25.5	
		--	XS-R89	4	3.3	✓	3.0	✕	--	--	✕	--	20.4	✕	✓	✕	✓	2	3.0	2	2.05	2	0.3	✕	--	2	1.8	2	0.6	32.0	
Provincial ¹⁰ Highway			Design to be approved by MOTI																												

Notes:

1. Refer to [Map 13.1 - Functional Road Classification](#) within the [Official Community Plan](#).
2. Additional width may be required to accommodate active transportation corridors, transit facilities or by special purpose lanes at intersections. Refer to [Map 13.2 – Transit Overlay](#), [Map 13.3 – Biking Overlay](#), [Map 13.4 – Truck Overlay](#), and [Map 13.5 – DCC Project Overlay](#) of the **City's Official Community Plan**. Special purpose lanes are required as per site conditions, projected traffic volumes and [TAC Geometric Design Guide for Canadian Roads](#). Where a primary Biking Route is identified on OCP Map 13.3 Bike Overlay Map up to 2 m of additional ROW may be required.
3. Raised medians and boulevards should be planted as per Landscape and Irrigation, Section 7 of this Bylaw.
4. Parking and bicycle lane width measured from face of curb.
5. Where existing dedicated ROW exceeds the standard cross-sectional ROW identified, additional space is to be allocated to street elements such as boulevard or borders.
6. If an Industrial Laneway is required, it must be designed to accommodate the anticipated design vehicle.
7. Drainage is by inverted crown with storm system.
8. Border includes width for ditch; border for MUP included in MUP width.
9. Alternating between parking bays and boulevard.
10. Provincial frontage improvements (back of curb to property line), unless directed by the province, to be based on major arterial road classification, land use context, and an additional 1 m of boulevard wi