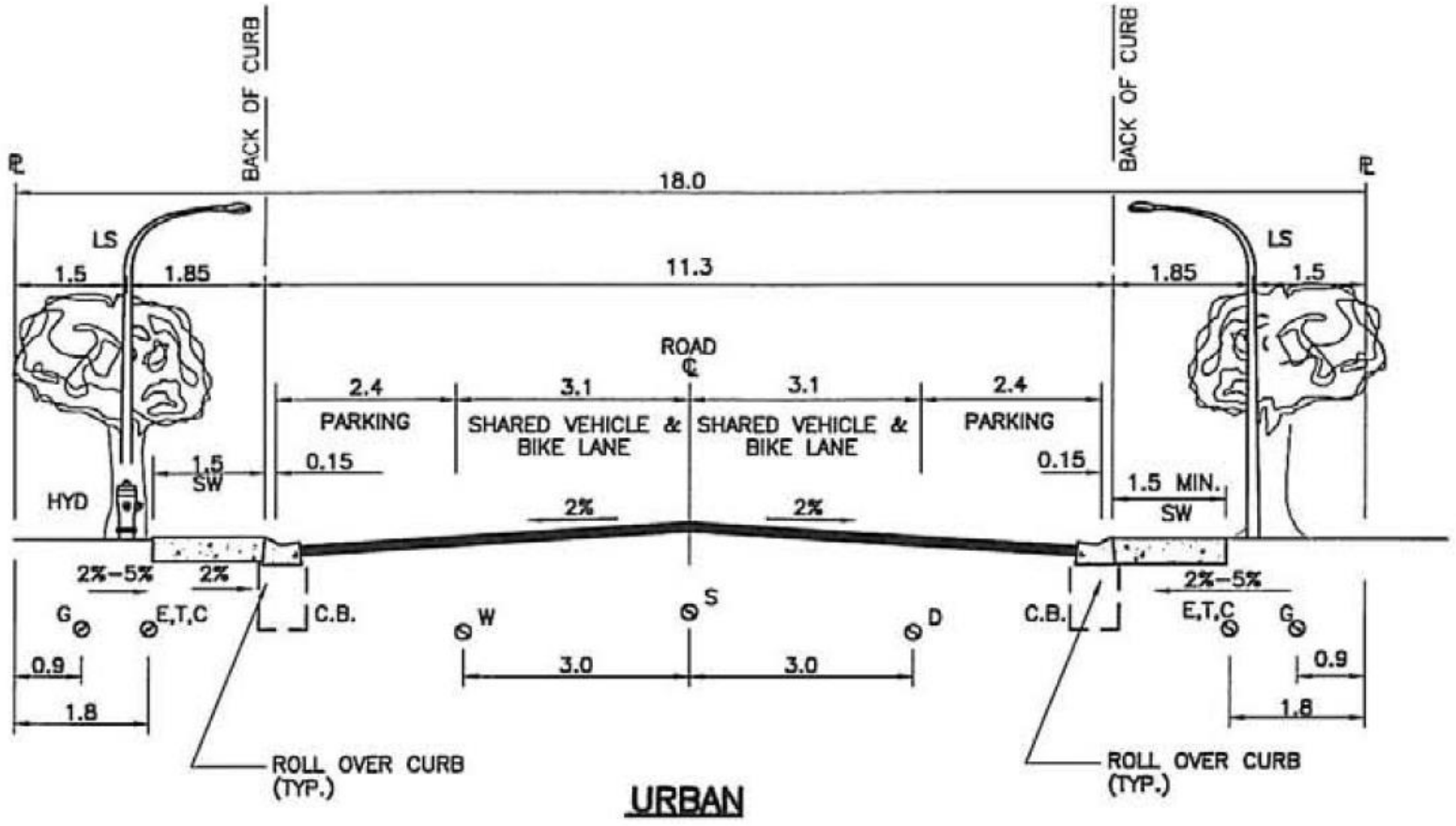
NEXT GENERATION ROAD CROSS SECTIONS FOR ALL AGES & ABILITIES

City of Kelowna

WHAT IS CROSS SECTION?

A cross section is a snapshot of all road features contained within the right-of-way at a given point of the roadway.



EXISTING CROSS SECTION ISSUES

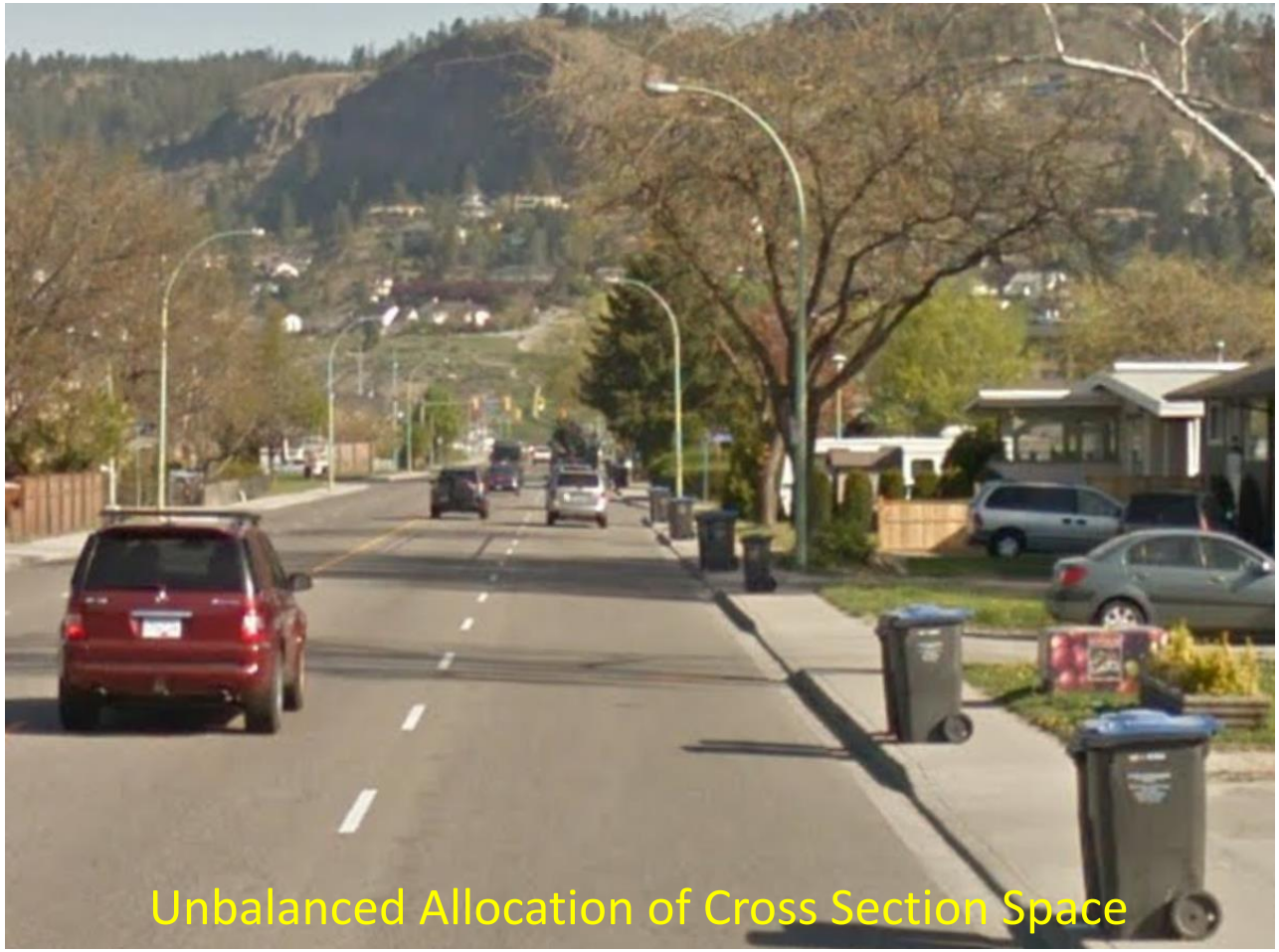
1. Excessive focus on vehicular capacity (not safety)

2. Context insensitive

3. Inadequate accommodation of pedestrians & cyclists of all ages & abilities

FOCUSED ON VEHICULAR CAPACITY

1. Wide multiple vehicular lanes primarily for capacity
2. Narrow, one-side only or no sidewalk
3. Narrow or no bikeway
4. Narrow or no boulevard



Unbalanced Allocation of Cross Section Space

CONTEXT INSENSITIVE

1. Only urban & rural cross sections to represent a diverse range of contexts

2. Identical cross section features irrespective of needs whether it is City center or sub-urban

3. Mismatch between cross sections & user expectations creating safety & operational challenges

Diverse Topography, Land Use & Natural Features

PEDESTRIAN ISSUES

1. Only one type of walking facility to serve all types of pedestrians & trip purposes (no cross sections for shared-use pathways)

2. Inadequate sidewalk width (1.5 m)

3. Inconvenient & hazardous driveway let-downs

4. Lack of consideration for special pedestrian needs

Narrow Monolithic Sidewalk with Frequent Driveways

CYCLING ISSUES

1. Only one type of cycling facility (bike lanes) to serve all types of cycling purposes, routes & cyclists (no cross sections for cycle tracks, shared-use pathways & 'Sharrows')

2. Inadequate facility widths (1.2 m & 1.5 m)

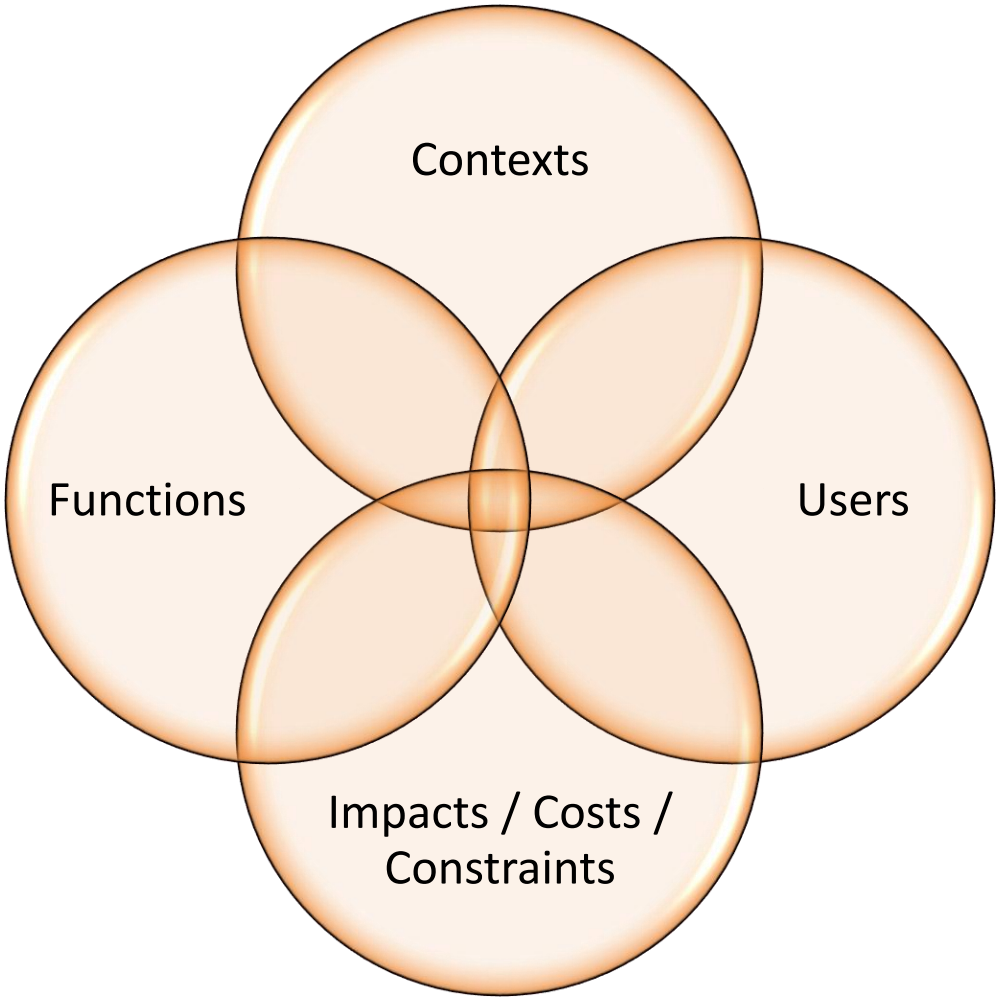
3. No segregation from vehicular traffic or parking

4. Bike lanes often used for snow storage during winter times (where there is no boulevard or parking)

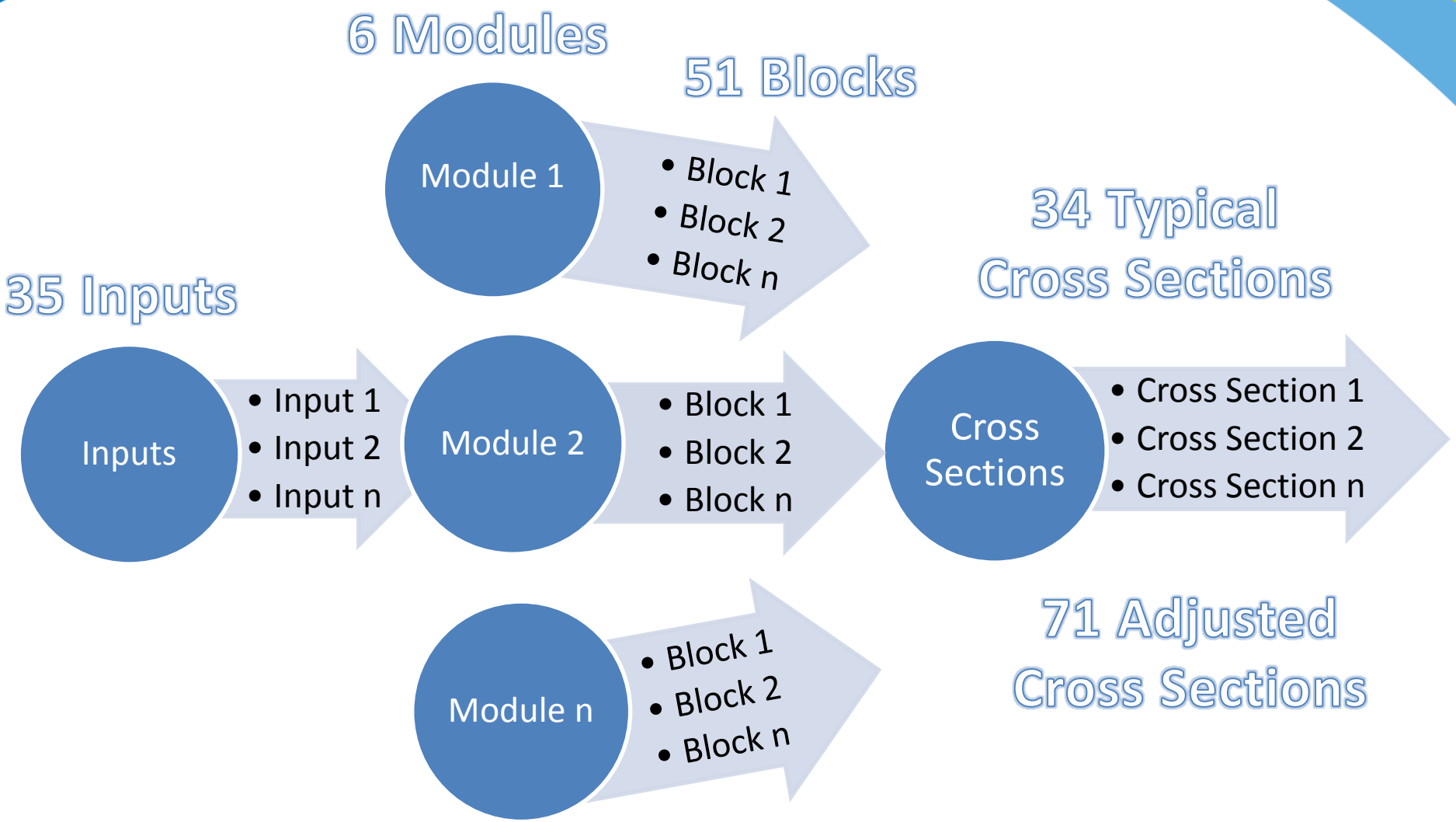
Challenging Cycling Conditions

CROSS SECTION APPROACH

1. Determine inputs
2. Establish cross-section components (Modules, Blocks)
3. Identify constraints, costs & impacts
4. Generate cross-section options; Review; Adjust
5. Select preferred cross section

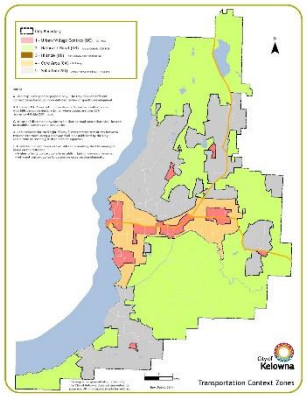


CROSS SECTION PROCESS



CONTEXT ZONES (INPUTS)

Divides the City into 5 Context Zones based on the levels of urbanization, density & compactness



LAND USE (INPUTS)

Context Zones further divided into 4 Land Uses to establish servicing requirements

FUNCTIONS (INPUTS)

3 Vehicular Functions

2 Active Functions

DESIGN USERS (INPUTS)

6 Vehicles






3 cyclists



3 Pedestrians



INPUTS (TOTAL=35)

Context		Auto			Active		
Zone (5)	Land Use (4)	Function (3)	Design Speed (6)	Design User (6)	Function (2)	Design Speed (3)	Design User (6)
Urban / Village Centre (UC)	Agricultural	Mobility	70 km/hr	WB20	Primary	30 km/hr	Pedestrians
Natural / Rural (NR)	Residential	Collection / Distribution	60 km/hr	HSU	Supporting	20 km/hr	W/C Assisted Pedestrians
Hillside (HS)	Industrial	Access / Destination	50 km/hr	MSU		10 km/hr	Pedestrians with Special Needs
Core Area (CA)	Commercial		40 km/hr	LSU			Advanced Cyclists
Sub-urban (SU)			30 km/hr	B12			Intermediate Cyclists
			20 km/hr	P			Novice Cyclists

MODULES & BLOCKS

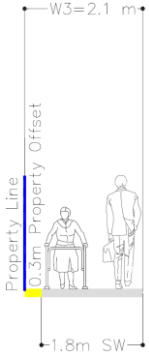
Modules: Categories representing the extent of mode mix or segregation

Blocks: Components of cross sections based on 'Inputs'

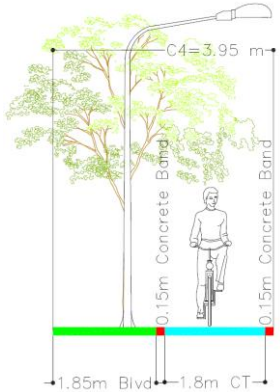
No.	Modules	Examples	Blocks (Total 51)
1	Walking (W)	Sidewalks	7
2	Cycling (C)	Cycle Tracks	5
3	Driving (D)	Vehicular lanes	12
4.	Shared (S)		
4.1	Walking & Cycling (WC-S)	Shared-use Pathways	4
4.2	Cycling & Driving (CD-S)	Vehicular lanes with bike Lanes or 'Sharrows'	19
4.3	Walking, Cycling & Driving (WCD-S)	Rear Lanes	4

CROSS SECTION GENERATION

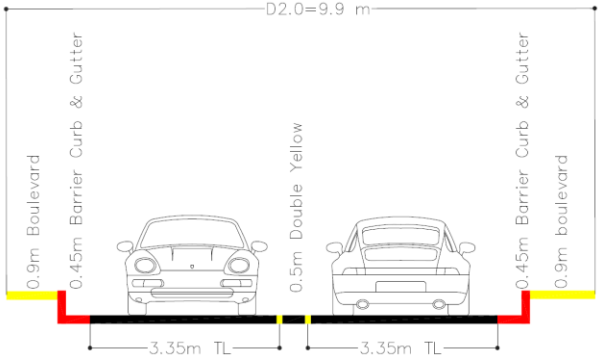
Module: Walking
Block: W3



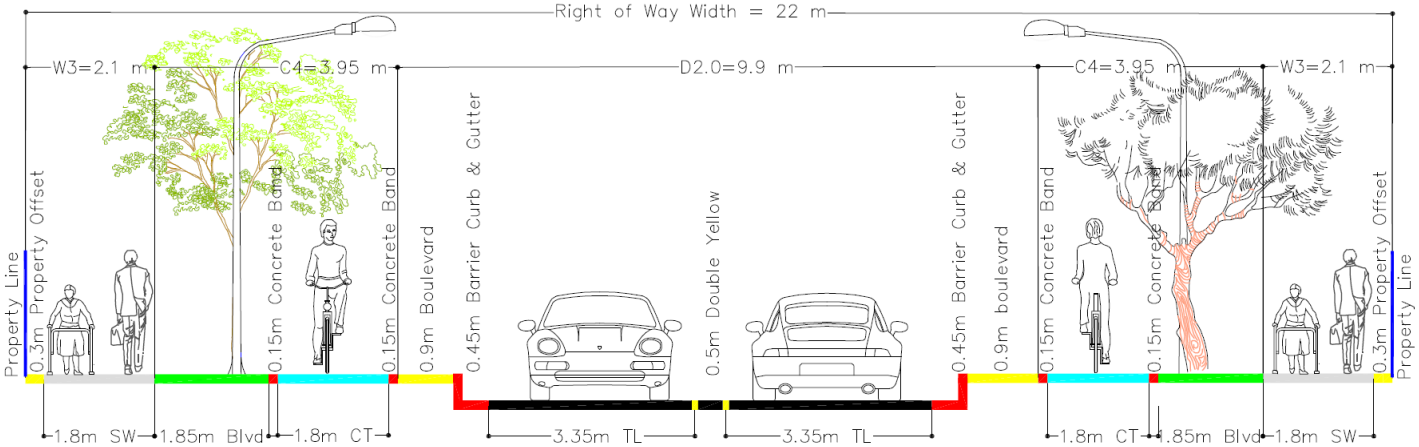
Module: Cycling
Block: C4



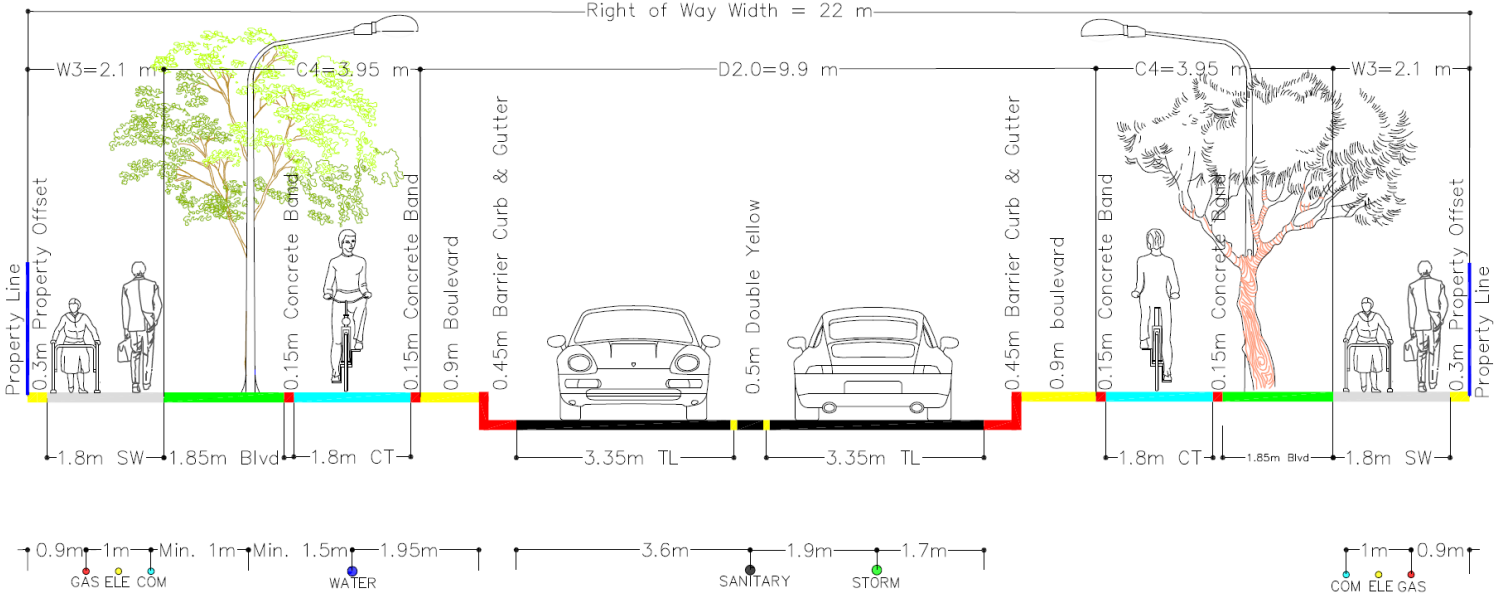
Module: Driving
Block: D2.0



Cross Section



CROSS SECTION EXAMPLE



Variations	Features	Adjustments	RoW Width, m
		Urbanized	
CA–22	2L.U–2SW.2.1CT	Figure 1	22
UC–22	2L.U–2SW.2.1CT	Add 0.15 m urban Braille shorelines; Reduce boulevards to 1.7 m & property line offsets to 0.15 m	22
SU–22	2L.U–2SW.2.1CT	Reduce sidewalks to 1.5 m; Increase boulevards between sidewalks & cycle tracks to 2.15 m	22
HS2–21	2L.U–2SW.2.1CT	Fronting lots on both sides: Reduce sidewalks to 1.5 m, boulevards between sidewalks & cycle tracks to 1.65 m	21
HS1–22	2L.U–2SW.2.1CT	Fronting lots on one side: Reduce sidewalks to 1.5 m, boulevards between sidewalks & cycle tracks to 1.8 m (both sides); Increase offset from the edge of the side slope to 1.0 m (on side with no fronting lots)	22
HS0–22	2L.U–2SW.2.1CT	No fronting lots on either side: Reduce sidewalks to 1.5 m, boulevards between sidewalks & cycle tracks to 1.45 m; Increase offsets from the edge of the side slopes to 1.0 m	22
		Non–urbanized	
NR–25	2L.U–1SW.2.1CT	Figure 3	25

Notes:

- Function: Minor arterial with cycle tracks
- Design Speed: 60 Km/hr
- Provision for Cuts/Fills, Side Slopes, Setbacks & Roadside Barriers: Additional
- Storm Drainage: Roadway (100 Yr. flow), Drainage ditch/swale (5 Yr. flow)
- Shallow Utilities Setbacks: Min. 1 m (tree), 0.9 m (property line), 1.5 m (deep utilities)
- Shallow Utilities Placement under Tree: Min. 1.2 m deep joint trench / conduit from the finished surface separated by root barriers
- Deep Utilities Setbacks: Min. 1.5 m (property line, shallow utilities, tree), 3 m between water & sanitary / storm, 1.5 m between sanitary & storm

Legend:

BL: Bikelane
Blvd: Boulevard
CA: Core Area
COM: Telephone, Cable TV, Communication Cable
CT: Cycle Track
D: Divided
DD: Drainage Ditch
DS: Drainage Swale
ELE: Electrical (Primary & Secondary)
HS: Hillside
L: Lane
NR: Natural/Rural
P: Parking
RoW: Right of Way
SU: Suburban
SUL: Shared–use Laneway
SUP: Shared–use Pathway
SUR: Shared–use Roadway
SW: Sidewalk
TL: Traffic Lane
U: Undivided
UC: Urban Centre

CROSS SECTION VARIATIONS

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CROSS SECTION INVENTORY

Function			Active	Typical		Adjusted			Total Typical & Adjusted
				Core Area (CA)	Natural / Rural (NR)	Urban Centre (UC)	Sub-urban (SU)	Hillside (HS) Fronting Both, One or No Sides	
Active	Off-road Pathway		Primary	1	1	1	1	3	7
Auto	Shared Lane		Supporting	1	1	1	1	3	7
	Local	Cul-de-sac	Supporting	1	1	1	1	3	7
		Non-through		1	1	1	1	3	7
		Through		1	1	1	1	3	7
	Collector	Major	Primary	1	1	1	1	3	7
			Supporting	1	1	1	1	3	7
		Minor	Primary	1	1	1	1	3	7
			Supporting	1	1	1	1	3	7
	Arterial	Major	Primary	2	2	1	2	3	10
			Supporting	2	2	1	2	3	10
		Minor	Primary	2	2	2	2	3	11
			Supporting	2	2	2	2	3	11
Total				17	17	15	17	39	105

‘NEXT GENERATION’

- New ‘Modular’ approach profoundly different than the traditional ‘Standard’ or ‘Context Sensitive’ cross sections
- Introduction of ‘Active’ transportation functions to complement traditional ‘Auto’ functions
- Universally adaptable to suit diverse range of policy objectives, constraints & contexts

‘ALL AGES & ABILITIES’

- Inclusion of pedestrians & cyclists of all ages & abilities as design inputs
- Accommodation of safety & operational requirements of vulnerable road users
- Varying levels of mode mix (or separation) to set network connections for all types of pedestrians & cyclists