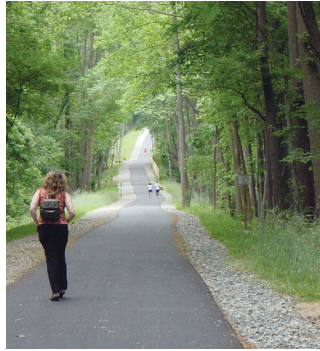


Lakes District and Schooner Cove

Project Specific Street Standards



August | 2012




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TABLE OF CONTENTS

1.0	Introduction to Fairwinds	7
2.0	Re-evaluating Current Practice and Future Growth at Fairwinds	8
3.0	Biophysical Constraints and Proposed Program	10
4.0	Section 1400 Applied to Fairwinds	12
5.0	Project Specific Street Standards: Responding to an Identified Need	16
6.0	Proposed Project Specific Street Standards	17
7.0	Greenhouse Gas Reduction and Local Environmental Objectives	38
8.0	Upholding the MoTI Mandate: Addressing Responsibility and Liability	40
9.0	Technical Standards Summary	41



LEGEND

-  The Lakes District Neighbourhood Plan Area within OCP-designated Fairwinds Urban Containment Boundary
-  Fairwinds Urban Containment Boundary
-  Schooner Cove Neighbourhood Plan Area within OCP-designated Schooner Cove Urban Containment Boundary



1.0 INTRODUCTION TO FAIRWINDS

As the undeveloped lands within the Fairwinds and Schooner Cove Urban Containment Boundaries (UCB), the Lakes District and Schooner Cove have undergone comprehensive re-examination and re-design in order to update the 25-year old master plan created in 1983. All aspects of community planning, from land use and transportation, to civic infrastructure and servicing, have been evaluated, and opportunities to apply Best Management Practices identified.

During the Regional District of Nanaimo (RDN) public process leading to adoption of Neighbourhood Plans for the Lakes District and Schooner Cove an opportunity to adopt Project Specific Street Standards based on hillside topography and urban residential uses was identified. In collaboration with the Ministry of Transportation and Infrastructure (MoTI), the proposed Project Specific Street Standards are designed to realize significant and tangible improvements in the safety, efficiency and efficacy of new road networks within the urban hillside neighbourhoods.

The following chapters contain:

- an evaluation of current street standards which guide road construction within the Fairwinds and Schooner Cove UCB;
- a rationale for revisiting current street design standards for hillside environments, including Fairwinds;
- a proposed set of Project Specific Street Standards, including a street hierarchy and cross sections, applicable to new streets within the neighbourhoods; and,
- design considerations related to the Ministry of Transportation and Infrastructure's (MoTI) Section 1400.

Beyond physical design criteria, Project Specific Street Standards target operational efficiencies with particular attention to capital investment (i.e. new roads) and long-term operating costs, including management and contract maintenance. In addition, the development of Project Specific Street Standards represents an innovative and measurable means to address Provincial policy objectives with respect to greenhouse gas emissions reduction and climate change.

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Hillside road design should respond to challenging topography by reducing road platforms and associated cut and fills.



Trees and sidewalks comprise essential components of attractive and pedestrian oriented neighbourhoods.



landscaping and green stormwater management can be incorporated into the Standards.

2.0 RE-EVALUATING CURRENT PRACTICE AND FUTURE GROWTH AT FAIRWINDS



Streetscapes within Fairwinds do not reflect the vision and desired form of the neighbourhood.



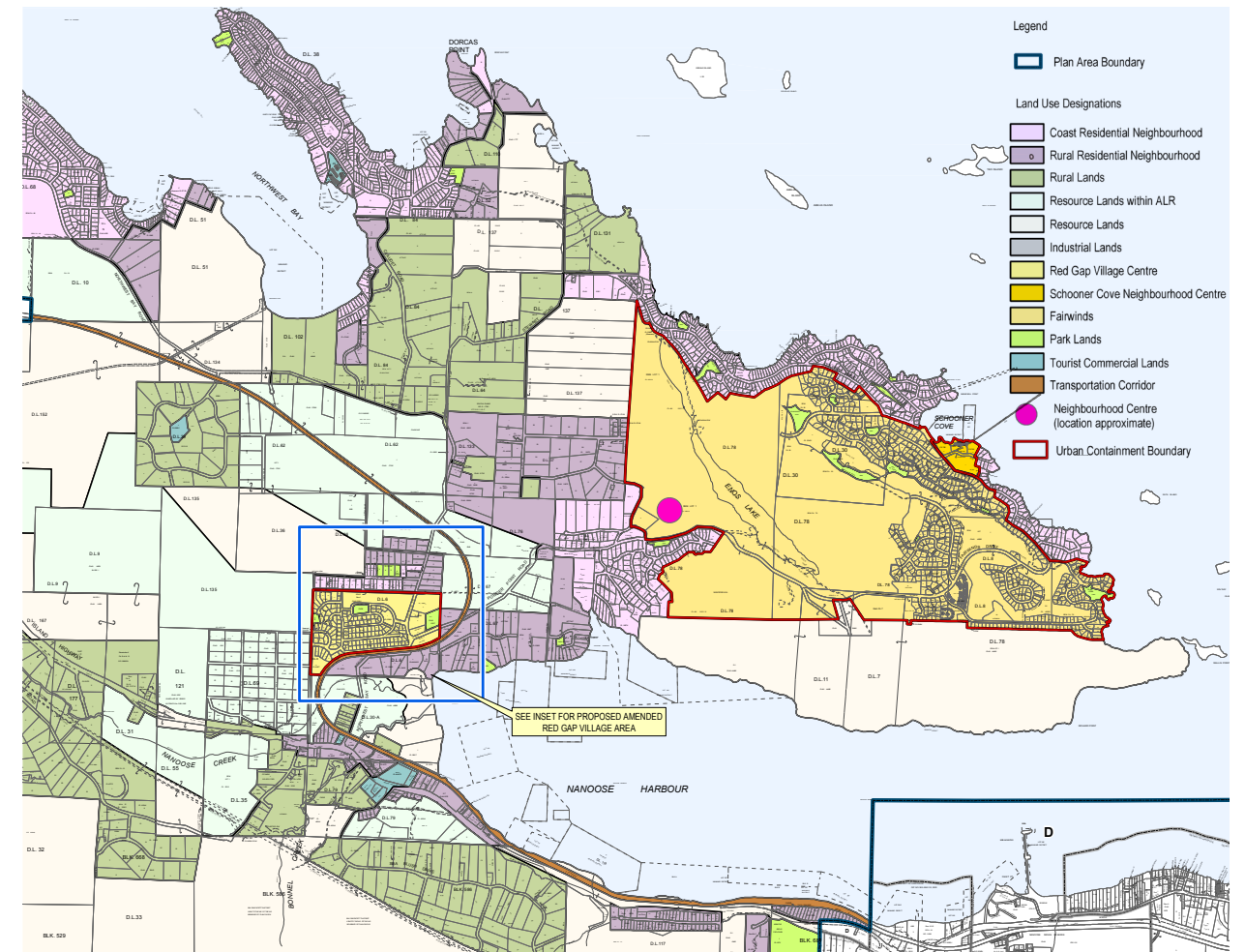
Reduced street widths, mature landscaping and separated pedestrian facilities contribute to an attractive neighbourhood.

The identification of the Lakes District and Schooner Cove as designated growth areas within the Regional District of Nanaimo's (RDN) *Regional Growth Strategy*, and the Nanoose Bay *Official Community Plan (OCP)*, provides an opportunity for thoughtful land use planning which accommodates new growth while maintaining the distinct qualities that continue to define Fairwinds as a desirable place to live. The Project Specific Street Standards represent a critical component in planning for future growth and development within Fairwinds and Schooner Cove Urban Containment Boundaries.

Through the recent adoption of Neighbourhood Plans for the Lakes District and Schooner Cove, the RDN has developed a technically rigorous, socially responsible and ecologically sustaining plans for the designated growth areas. The proposed Project Specific Street Standards, a deliberately designed street hierarchy tailored to the hillside topography and urban, compact forms of development, reflect the implementation of the Neighbourhood Plans. Project Specific Street Standards for the neighbourhoods contribute to:

- **Improved Driver and Pedestrian Safety** through reduction of design speed and greater "fit" of street alignments to existing landform;
- **Reductions to Construction and Maintenance Costs** through minimizing road platform widths and associated cut & fill;
- **Minimized Visual and Environmental Impact** on hillsides and landscapes;
- **Improved Water Quality** through the reduction of impervious surfaces and minimizing stormwater discharge; and,
- **Improved Neighbourhood Experience** through the development of a human scaled and pedestrian friendly streetscape, including separation of pedestrian facilities.

EXCERPT FROM NANOOSE BAY OFFICIAL COMMUNITY PLAN LAND USE DESIGNATIONS & URBAN CONTAINMENT BOUNDARY



Both Fairwinds and Schooner Cove are designated growth areas within the RDN's *Regional Growth Strategy*, and the Nanoose Bay *Official Community Plan (OCP)* (shown above). In concentrating future growth within these designated areas, the RDN aims to support the development of more complete and livable communities. Street design is a key component of community design; through these Standards, street networks and cross sections promote a compact and pedestrian oriented urban neighbourhood.

3.0 BIOPHYSICAL CONSTRAINTS AND PROPOSED PROGRAM



Single family homes are integrated into the hillside topography.



With sensitive design, townhomes can be integrated into the natural landscape.



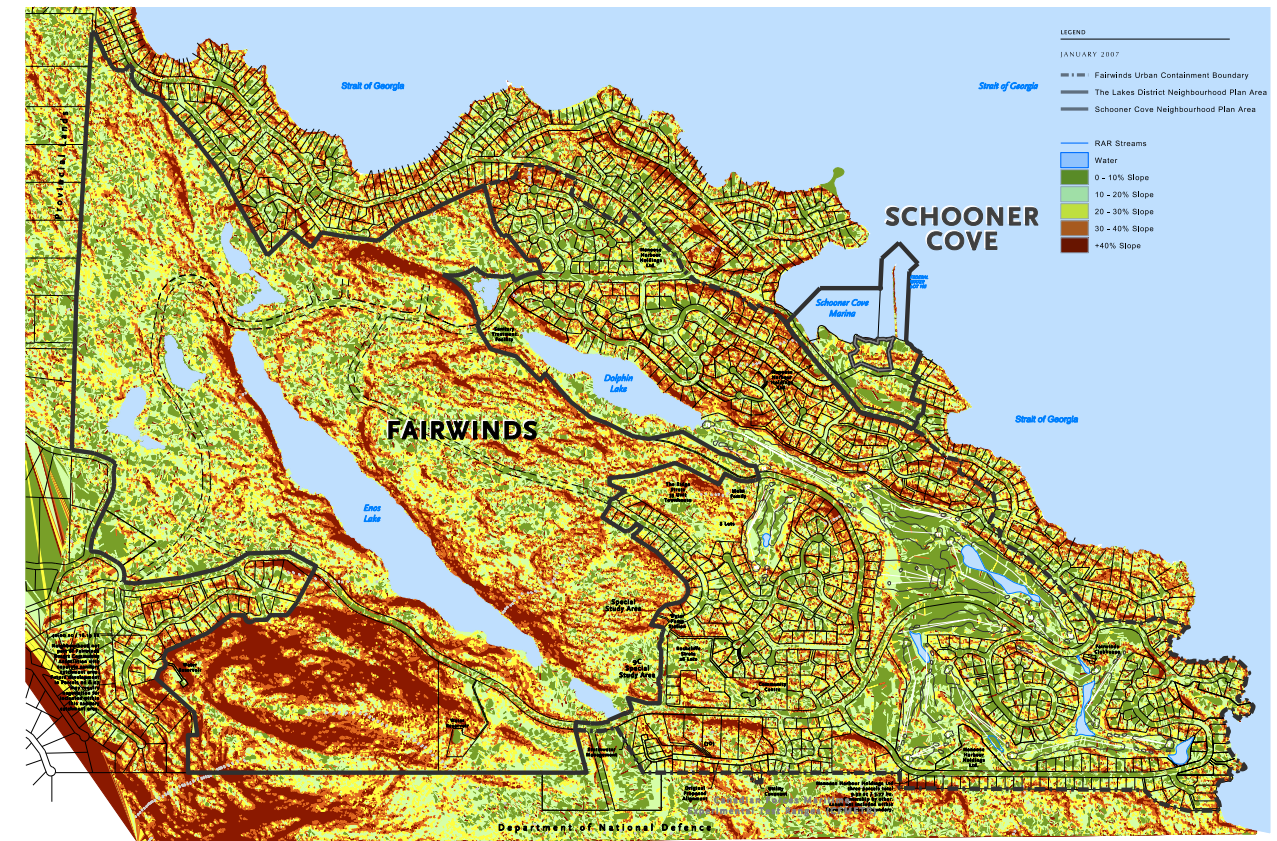
As planners, designers and engineers, we are often tasked with the simple challenge of “making things work.” In the context of community development, the due diligence required to minimize risk and optimize success begins with two fundamental inventories: a careful catalogue of biophysical constraints, including geotechnical, environmental and landform analysis; and a comprehensive physical program for the future neighbourhood. The greatest challenge, however, lies in finding ways to make the two fit.

The Lakes District and Schooner Cove Neighbourhood Plan areas are characterized by complex terrain and potentially fragmented development nodes. While significant portions of the lands are developable, the hillside environment presents significant physical constraints to access, street layouts and overall neighbourhood design.

In addition to the complexity of the terrain, the development program (as directed by the OCP Bylaw #1400, Schedules B and C Neighbourhood Plans) highlights a greater need to consider the effect of street design on the development of more compact, pedestrian-friendly and sustainable communities. Through the adoption of Project Specific Street Standards for the Lakes District and Schooner Cove, site adaptive strategies targeting other sustainability goals, such as stormwater management, alternative transportation and energy use, have also be addressed.

At the neighbourhood scale, streets provide the single-most critical linkage, and defining experience, between the surrounding landscape and the built program. Within the Lakes District and Schooner Cove, Project Specific Street Standards will ensure that the development program fits the varied topography while addressing the MoTI’s mandate to facilitate, “safe, efficient, and effective movement of people and goods.”

FAIRWINDS AND SCHOONER COVE LANDSCAPE ANALYSIS - SLOPE SYSTEMS



While a large portion of Fairwinds is constrained by fragmented development areas and steep slopes in excess of 30% , the gentler terrain can accommodate significant development. To facilitate development within this challenging context, Project Specific Street Standards guide street design in a manner that is both sensitive to the natural landscape and compatible with the existing neighbourhood character.

4.0 SECTION 1400 AS APPLIED TO FAIRWINDS TODAY

MOT SECTION 1400



Fairwinds collector roads are overbuilt for the density of the community.



Wide local streets in Fairwinds are not scaled for pedestrians or cyclists.

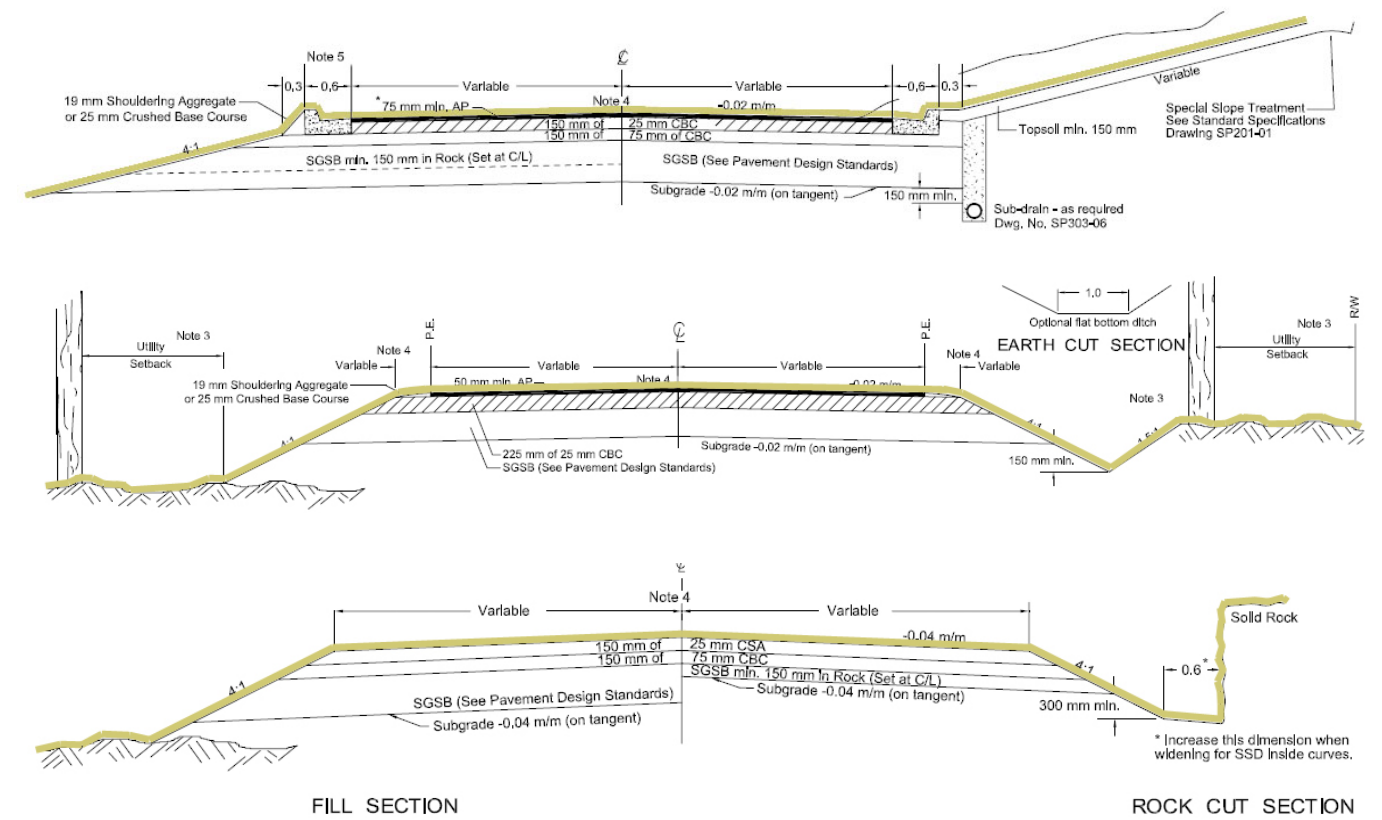
The existing neighbourhood at Fairwinds is generally composed of low density single family (RS-1) residential land uses organized along Fairwinds Drive and Dolphin Drive. Roughly 45% of the lands within the Fairwinds Urban Containment Boundary (UCB) are developed to take advantage of views to the Strait of Georgia and the Fairwinds Golf Course.

Efforts to minimize development impacts have focused on constructing low-density housing in the areas most easily accessed, but have overlooked street design as a means to support low impact neighbourhood design. Intended for rural contexts, the application of Section 1400 Standards is inconsistent with the urban context of the Fairwinds and Schooner Cove Urban Containment Boundary designation.

Within Fairwinds, Section 1400 Standards have resulted in streets which are generally overbuilt for the ultimate density of the residential neighbourhoods. Pedestrians, cyclists and other alternative modes of transportation have been subsequently discouraged due to high traffic speeds and a lack of safe, designated travel routes.

Additionally, specific design standards contained within Section 1400, including turn radii, road widths and maximum grades, limit the ability of street design to respond to the hillside topography which characterizes the majority of the site. Finally, further review of MoTI Standards indicate opportunities to achieve Provincial Greenhouse Gas reduction goals and improve local environmental conditions.

The following sections illustrate and provide an analysis of MoTI Section 1400 street standards for urban collector and local roads, as applied within the Fairwinds UCB.



Collector

Rural (Fig.1420.F)		Urban (Fig.1420.H)		
Top Width	Paved Width	Top Width	Paved Width	Parking
10.0	8.0	10.0	8.2	one side
1.0 gravel shoulder		0.6 curb plus 0.3 gravel shoulder		

Local

Rural (Fig.1420.G)		Urban (Fig.1420.H and I)		
Top Width	Paved Width	Top Width	Paved Width	Parking
8.0	7.0	11.8	10.0	both sides
		10.0	8.2	one side
0.5 gravel shoulder		0.6 curb plus 0.3 gravel shoulder		

Technical cross-sections translate Section 1400 standards to current as-built conditions within the Fairwinds UCB.



Fairwinds collector roads, shown in the two photos above, swell to 12.7m of paved width and are overscaled for the public realm.



Local streets in Fairwinds, shown in the two photos above, result in 10.3 of uninterrupted impervious surface.

4.1 Fairwinds Road Network

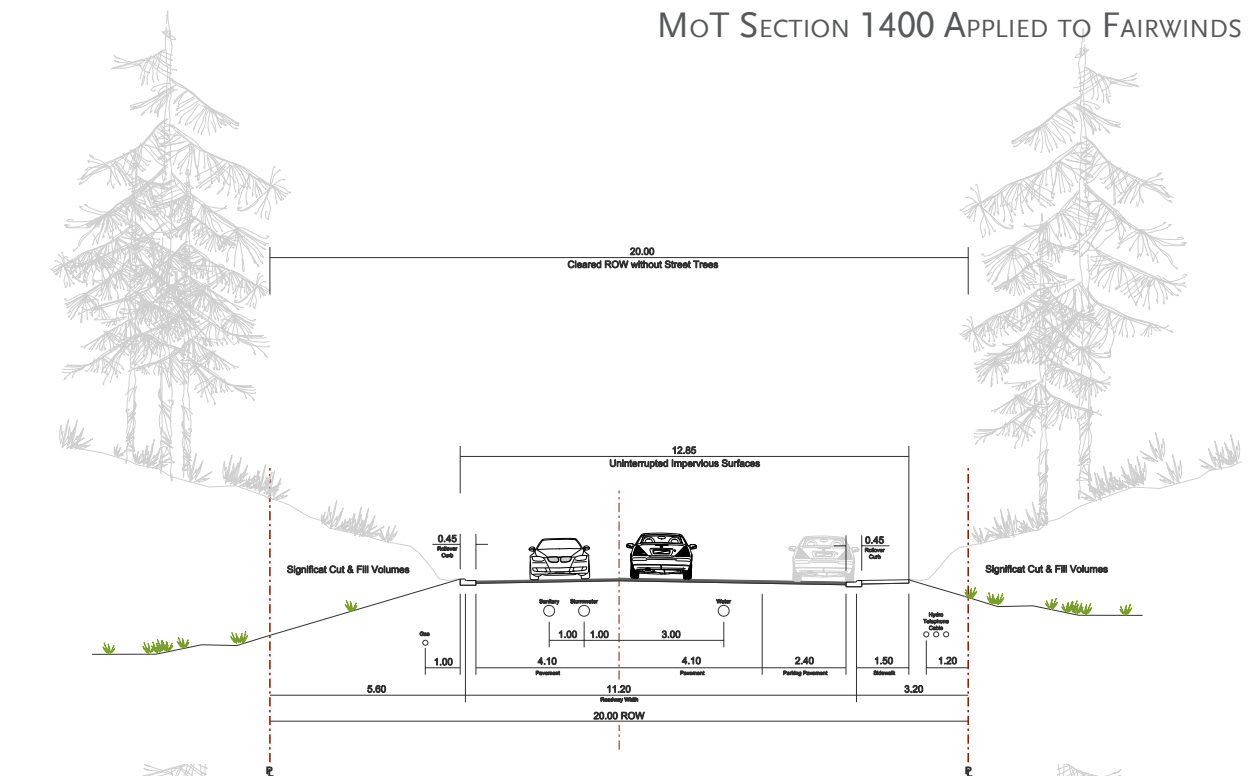
Application of Section 1400 Standards to Fairwinds' collector streets, which provide 'for traffic movement between arterials and local streets with some direct access to adjacent property' (MoTI) assumes a 60 km/h design speed and results in an 8.8m (~28'10.5") wide paved road on Fairwinds and Dolphin Drives. Where designated parking pullouts occur, asphalt surfacing swells to 11.2m (~36' 9"). When sidewalks are located adjacent to the carriageway, the extent of uninterrupted impervious surface extends an additional 1.5m to a total width of 12.7m (41'8").

The application of Section 1400 standards to Fairwinds' Local streets, which are 'primarily for access to residences, businesses, or other abutting property' assumes a 30 km/h design speed, yet utilizes the same typical cross sectional design as the collector streets, resulting in an 8.8m (~28'10.5") wide roadway. With the addition of sidewalks adjacent to the curb and carriageway, the extent of uninterrupted impervious surface extends an additional 1.5m to a total width of 10.3m(33'9").

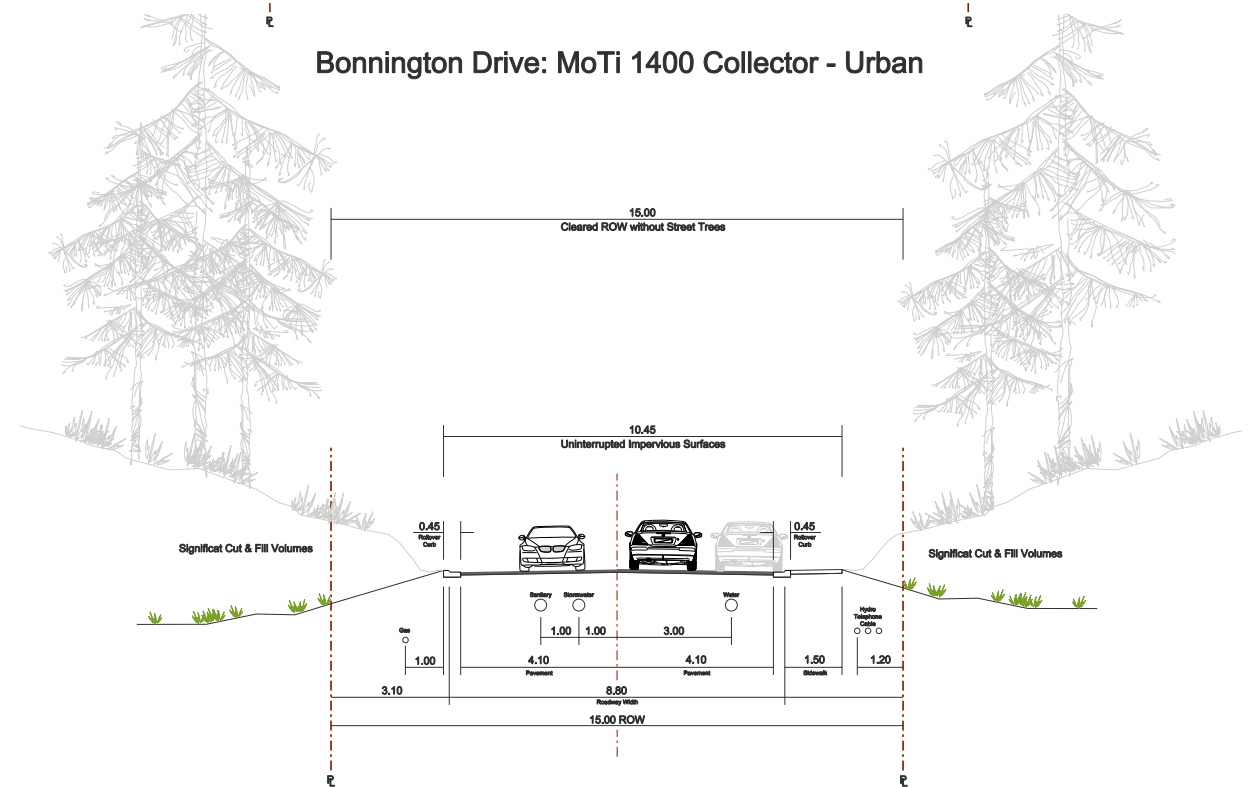
The resulting neighbourhood experience within Fairwinds – illustrated at right – is that of streets over-scaled to the community, its pedestrian-oriented program and local traffic volumes. Furthermore, the street design criteria, as governed by high design speeds, result in horizontal and vertical alignments that are at odds with the varied topography and conducive to speeding.

Equally important are the implications to capital investment, including road building, as well as long term management and maintenance of over-sized infrastructure. When combined with decreased pedestrian safety, increased stormwater runoff and potential impacts to freshwater quality, there is a clear need to consider Project Specific Street Standards within the Fairwinds and Schooner Cove Urban Containment Boundaries.

MoT SECTION 1400 APPLIED TO FAIRWINDS



Bonnington Drive: MoTi 1400 Collector - Urban



Beldon Place: MoTi 1400 Local - Urban

5.0 PROJECT SPECIFIC STANDARDS: RESPONDING TO AN IDENTIFIED NEED



Well designed hillside streets respond to the natural landscape, highlight views and contribute to a pedestrian friendly public realm.



Reduced widths and turn radii allow responsiveness to topography.

Through the development of its Section 1500 Standards, the Ministry of Transportation and Infrastructure has demonstrated leadership and innovation in the development of alternative standards for use in specific situations where existing standards are not suited to the project or to its landscape.

Similarly, the Project Specific Street Standards respond to the need to address implications of steep slope environments, dedicated pedestrian uses, on-street parking and uninterrupted impervious surfaces.

Key similarities between the MoT's Section 1500 and the proposed Project Specific Street Standards include:

- Reduced carriageway width;
- Provision for on-street parking;
- Dedicated pedestrian corridor; and,
- Reduced right-of-way width.

The benefits of Project Specific Street Standards are shared by the Fairwinds community, the Ministry of Transportation and the Regional District of Nanaimo, including: lower design speeds; improved safety; reduced right-of-ways and paved surfaces; improved environmental function and reduced GHG emissions; decreased capital and maintenance costs; and a greener, cleaner and more sustainable community.

6.0 PROPOSED PROJECT SPECIFIC STREET STANDARDS

The Project Specific Street Standards represent site tailored specifications for a Parkway Collector and Minor Collector streets, as well as neighbourhood Local Streets within the Lakes District and Schooner Cove neighbourhoods. Design speeds are reduced from 60km/h to 50km/h for the Schooner Cove Parkway. For the Minor Collector and Local streets, MoTI's design speed of 30km/h remains applicable.

With the reduction in design speed for collector streets, the Project Specific Street Standards allow for a maximum grade of 10% for parkway and collector roads (12% permitted where necessary due to topographic constraints), and maximum of 12% for local streets. Additional modifications include:

- Right-of-way;
- Carriageway width;
- Parking;
- Shoulders & curbs;
- Sidewalks;
- Stormwater management;
- Utility corridors; and,
- Street lighting.

The proposed Project Specific Street Standards address program elements outside the vehicular carriageway based on adjacent land uses and program, including "above the curb" uses, such as pedestrian circulation, stormwater management infrastructure, and on-street parking. The following pages highlight specifications within the Project Specific Standards as a means of comparison with MoTI's Section 1400 standards.



The proposed Project Specific Street Standards allow for stormwater management systems, such as raingardens, within the Right-of-Way.

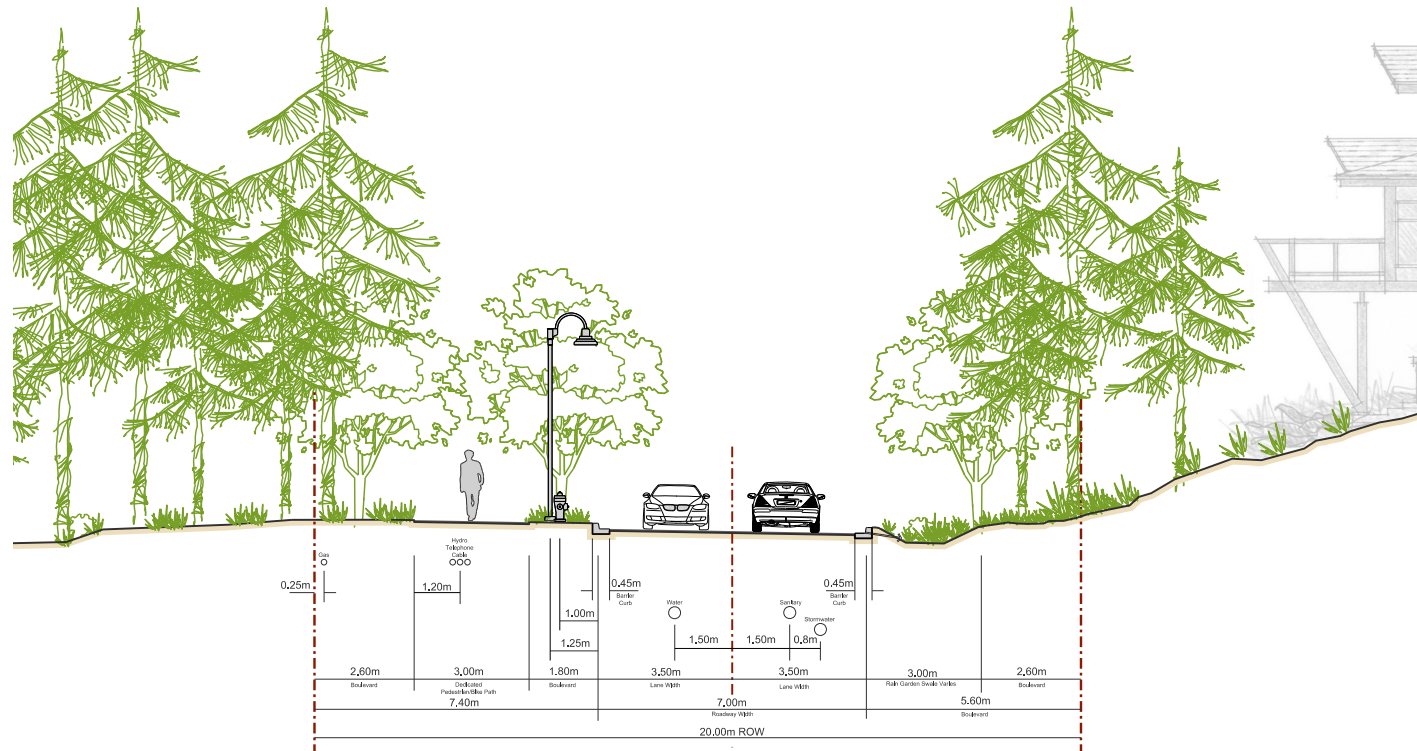


Within the proposed Standards, elements such as street lighting and utilities are incorporated into the Right-of-Way.

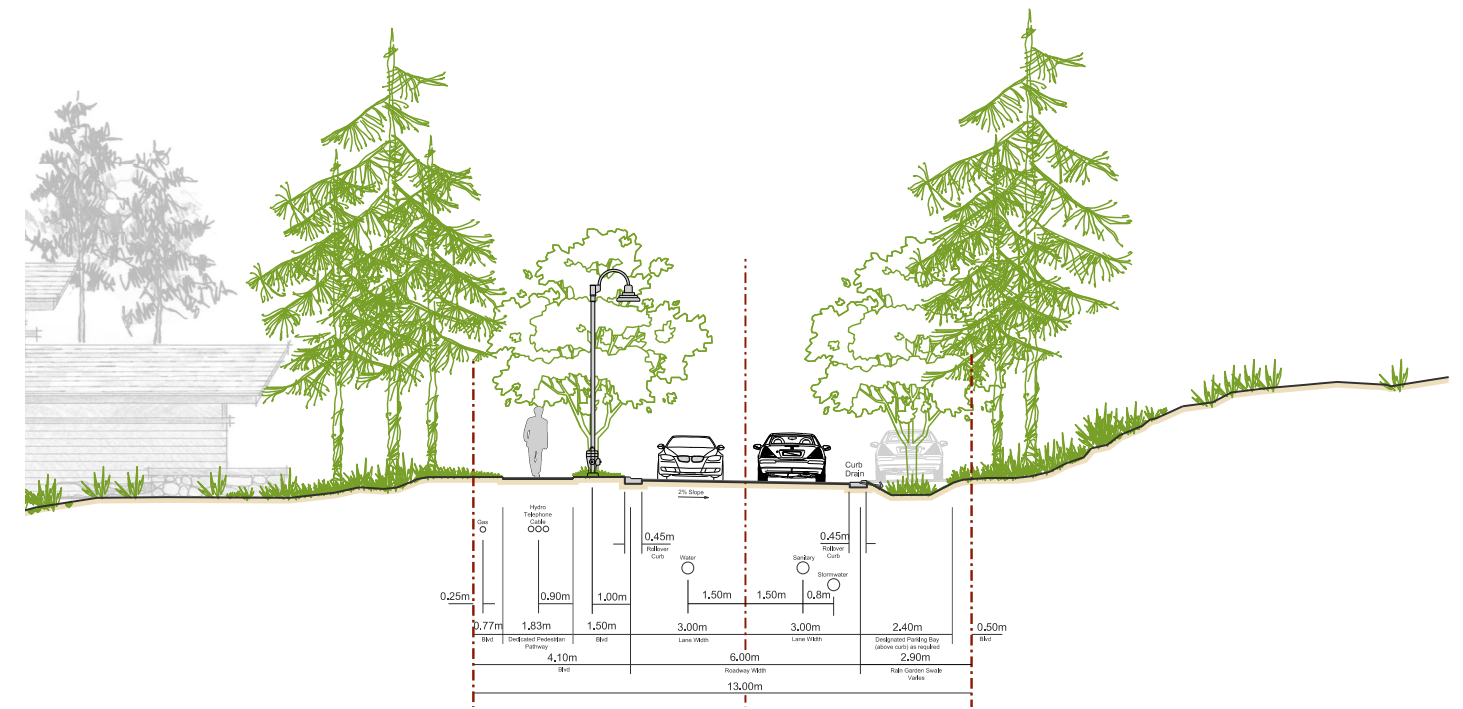


Curbs and curb cuts are addressed within the Standards in order to delineate road edge, ensure efficient access and direct stormwater run-off.

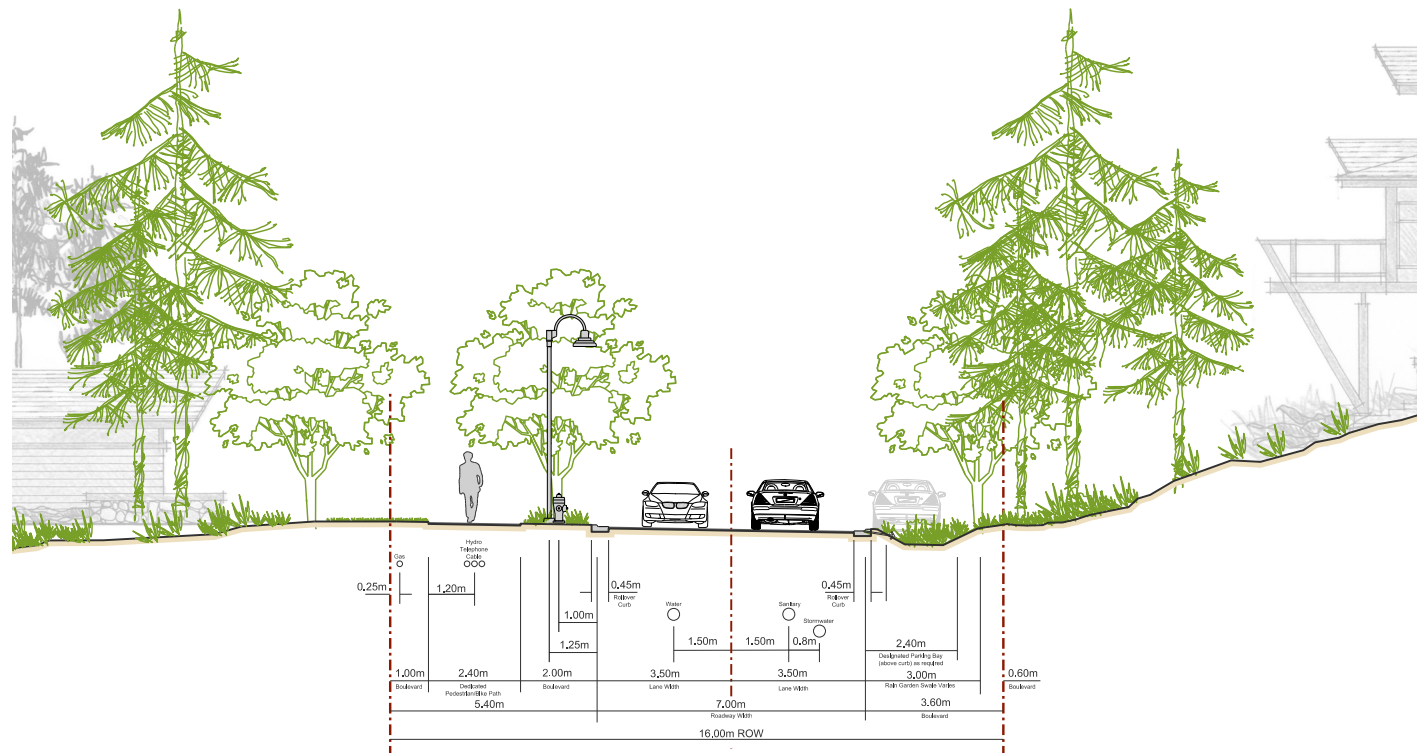
PARKWAY COLLECTOR STREET



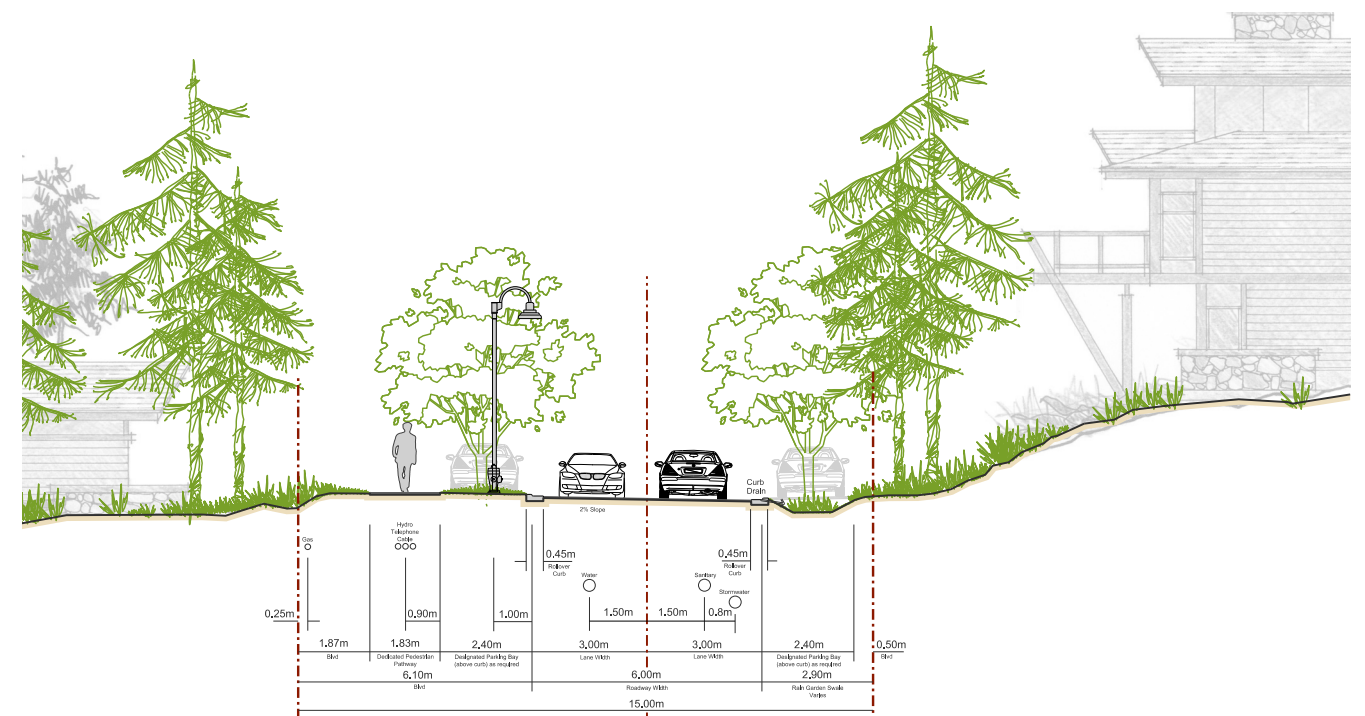
NEIGHBOURHOOD LOCAL - Single Fronting



MINOR COLLECTOR STREET



NEIGHBOURHOOD LOCAL - Double Fronting





Reduced street Right-of-Ways provide access within fragmented terrain, while minimizing visible cut and fills.



Utilities are accommodated within the landscaped portion of the Right-of-Way



Right-of-Way accommodates parking within pull-out bays adjacent the carriageway.

6.1 STREET RIGHT-OF-WAY

The street right-of-way (ROW) width is largely determined by the ultimate program of the designated roadway. In the Project Specific Street Standards, right-of-way width is intentionally limited to reduce the impact of development, such as cut and fill slopes and development servicing in hillside environments, while ensuring that a safe and effective roadway is maintained for both motorized vehicles and pedestrians.

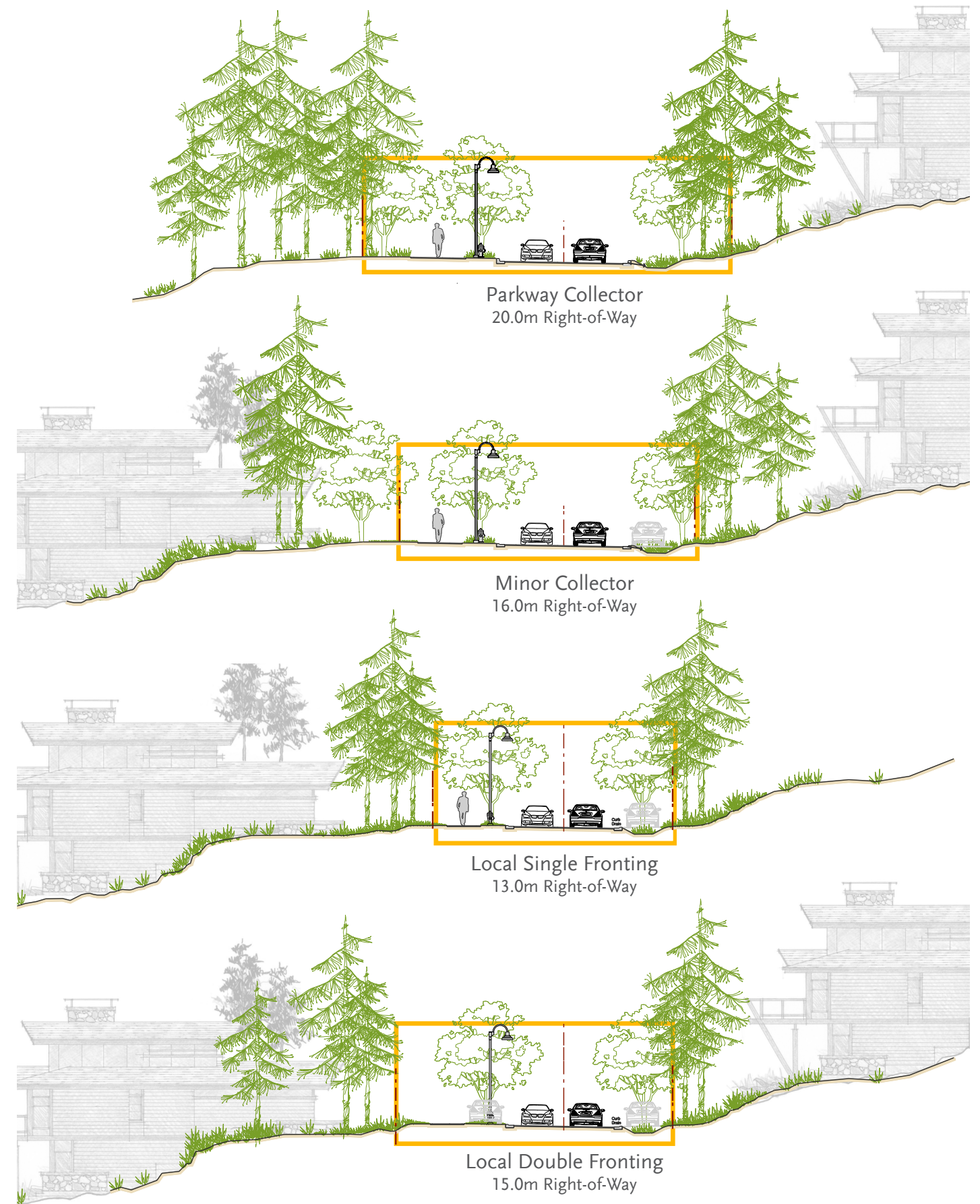
Proposed Typical Street ROW widths:

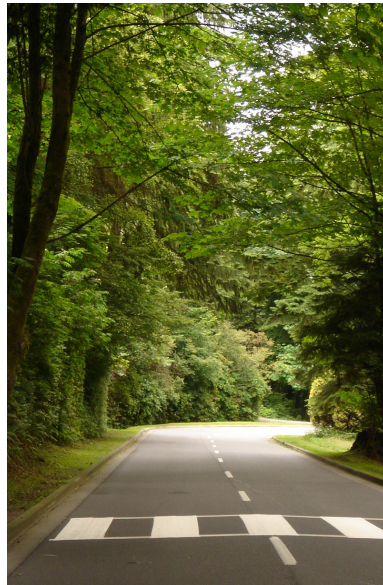
Parkway Collector:	20.0m
Minor Collector:	16.0m
Local - Single Fronting Condition:	13.0m
Local - Double Fronting Condition:	15.0m

Conditional Design Variations:

Conditional ROW requirements are based on carriageway width (determined by street type and design speed) as well as required “above the curb” street elements, such as on-street parking requirements. Variations to the typical right-of-way conditions may include:

- Street classification based on neighbourhood design/land use program and density;
- Divided streets (i.e. central boulevard designs);
- Residential fronting conditions (double or single fronting);
- Single or double-sided on-street parking;
- Pedestrian network;
- Utility corridor and stormwater management; and
- Cut and fill slope extents.





Narrow carriageway widths reduce development and visual impact.



Reduced streets widths enable responsiveness to the hillside topography and compliment neighbourhood design.

6.2 CARRIAGEWAY WIDTH

Carriageway widths for the Project Specific Street Standards are reduced to reflect slower design speeds for the Parkway (50km/h), Minor Collector (30 km/h) and Local street (30 km/h).

Community Parkway and Minor Collector widths:

For both the Parkway and Minor Collector streets, a 7.0m carriageway width is applied. The Parkway does not accommodate parking, while the design for Minor Collector allows for limited on-street parking “above the curb” in designated areas.

Community Parkway and Minor Collector street design assumes no direct access to development; although properties may have legal frontage along collector streets, access will occur via local streets and shared driveways only.

Neighbourhood Local Widths:

Neighbourhood Local streets are characterized by a carriageway width of 6.0m. Local streets are designed to service up to 100 units, allow for limited on-street “above the curb” parking, and assume single and double fronting development conditions.

Carriageway widths are proposed based on the comprehensive land use masterplan adopted in the Lakes District and Schooner Bay Neighbourhood Plans, and substantiated in the Traffic Impact Study.





Parking pads provide parking outside the carriageway may be surfaced with permeable material to reduce stormwater run-off.



Parking pads adjacent the carriageway reduced the total paved surface.

6.3 PARKING

The Project Specific Street Standards address parking within the right-of-way through designated parking areas or parking pads located “above the curb,” adjacent to the carriageway. Parking is also accommodated on private driveways through the zoning specification of 6.0m minimum building setback from the back of curb or sidewalk.

Parking pads are located above the street’s rollover curb and are further delineated from the carriageway through the use of distinct surfacing materials.

Conditional Design Variations:

- Single or double fronting “above the curb” on-street parking, depending on adjacent land use such as residential density and parking requirements;
- Parking pads surfaced with permeable materials, such as pavers, can serve as stormwater infiltration and/or storage galleries linked to the stormwater and raingarden system; and,
- Designated parking pads provide additional space for snow storage during road clearing and maintenance during winter months.





Curbs delineate street edge while allowing driveway and sidewalk access without curb cuts.



Curb cuts can be used to direct stormwater flow towards raingardens.



Where on-street parking is not permitted, panel curbs and gravel or unpaved surfaces may be used to reduce impermeability.

6.4 SHOULDERS and CURBS

The Project Specific Street Standards specify barrier curbs for the Parkway Collector, with rollover curbs for Minor Collector and Local streets in order to maintain a clearly delineated street edge for safety and maintenance considerations, while allowing driveway access to the carriageway without requiring a curb cut.

Conditional Design Variations:

- In areas constrained by steep slopes (where maximum grades reach and/or exceed 10%) barrier curbs may be preferable in order to address safety concerns;
- Where applicable, rollover curbs may be fitted with designated “curb cuts” as a means to facilitate stormwater diversion to raingarden infiltration systems; and,
- In areas where on-street parking is not required, panel curbs and gravel shoulders may be used to further reduce the concentration of stormwater flows while maintaining a green streetscape.





Residential sidewalk using concrete and brick surfacing. Road setback provides a buffer to enhance the pedestrian experience. Utilities are placed within the buffer.



Street setbacks and landscape buffering contribute to a safe pedestrian oriented streetscape.

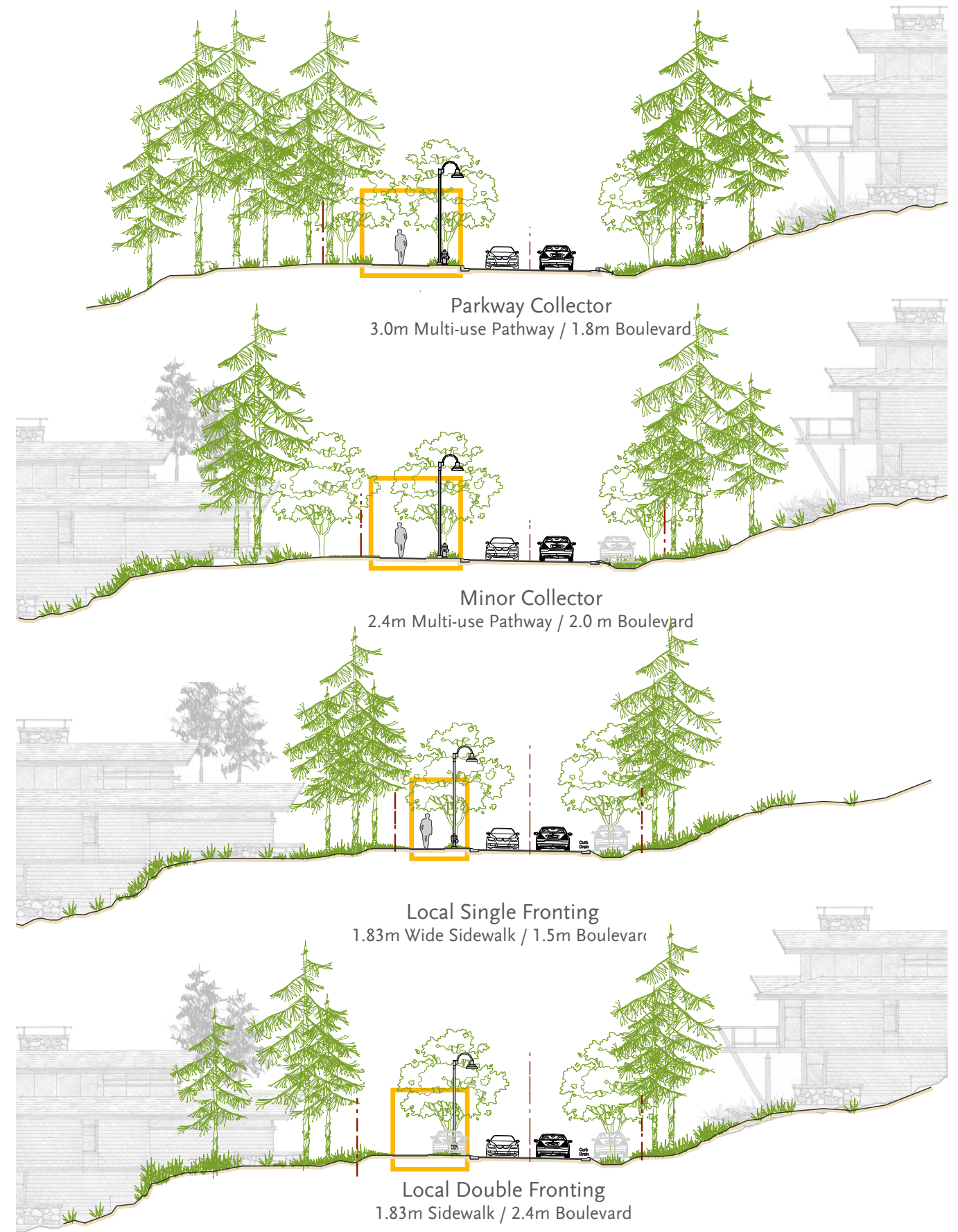
6.5 SIDEWALKS

In addition to planning and design considerations for the automobile, the Project Specific Street Standards carefully integrate pedestrians, cyclists, and other forms of alternative transportation within the context of complete neighbourhood design.

Sidewalks are generally located on the side of the street fronted by development or dedicated park as a means of providing direct access to neighbourhood destinations. Local streets require a minimum 1.5m boulevards between sidewalks and the back of curb as a means to reduce the extent of contiguous impermeable surfaces, and to provide a safety buffer between pedestrians and vehicle traffic.

The Parkway and Minor Collector street standards include provisions for a 3.0m (10ft) and 2.4m (8ft) respectively multi-use shared pathway to accommodate pedestrians, cyclists and personal mobility vehicles (PMVs) as a dedicated route for alternative transportation within the neighbourhood.

Alternatively, the Project Specific Street Standards specify a 1.83m (6ft) wide sidewalk to accommodate pedestrians in lower traffic volume areas serviced by Local streets.





Permeable surfaces, can be used for parking pads to reduce stormwater run-off and maximize infiltration.



Parking pads adjacent the carriageway are surfaced with permeable materials and linked to raingarden systems.



Raingardens adjacent the street absorb and filter stormwater while contributing to the streetscape aesthetic and pedestrian experience.

6.6 STORMWATER MANAGEMENT

The Project Specific Street Standards address stormwater quality and quantity through implementing Best Management Practices in the form of green infrastructure incorporated into the street right-of-way cross section.

In combination with conventional piped systems, infiltration galleries and raingarden swales form a linear feature along proposed streets as a means of capture runoff closest to its source, reduce runoff volume and rate of flow, and expedite stormwater infiltration into permeable soils and/or constructed detention facilities.

Beyond the public road right-of-way, detention facilities may be located to receive stormwater flows that exceed the raingarden's natural ability to absorb runoff generated by large storm events.

Conditional Design Variations:

- Parking pad surfaces with permeable materials can serve as stormwater infiltration/storage galleries and are linked to the larger raingarden system;
- Right-of-ways through developable areas of steeper terrain may require conventional piped stormwater systems, located under the carriageway;

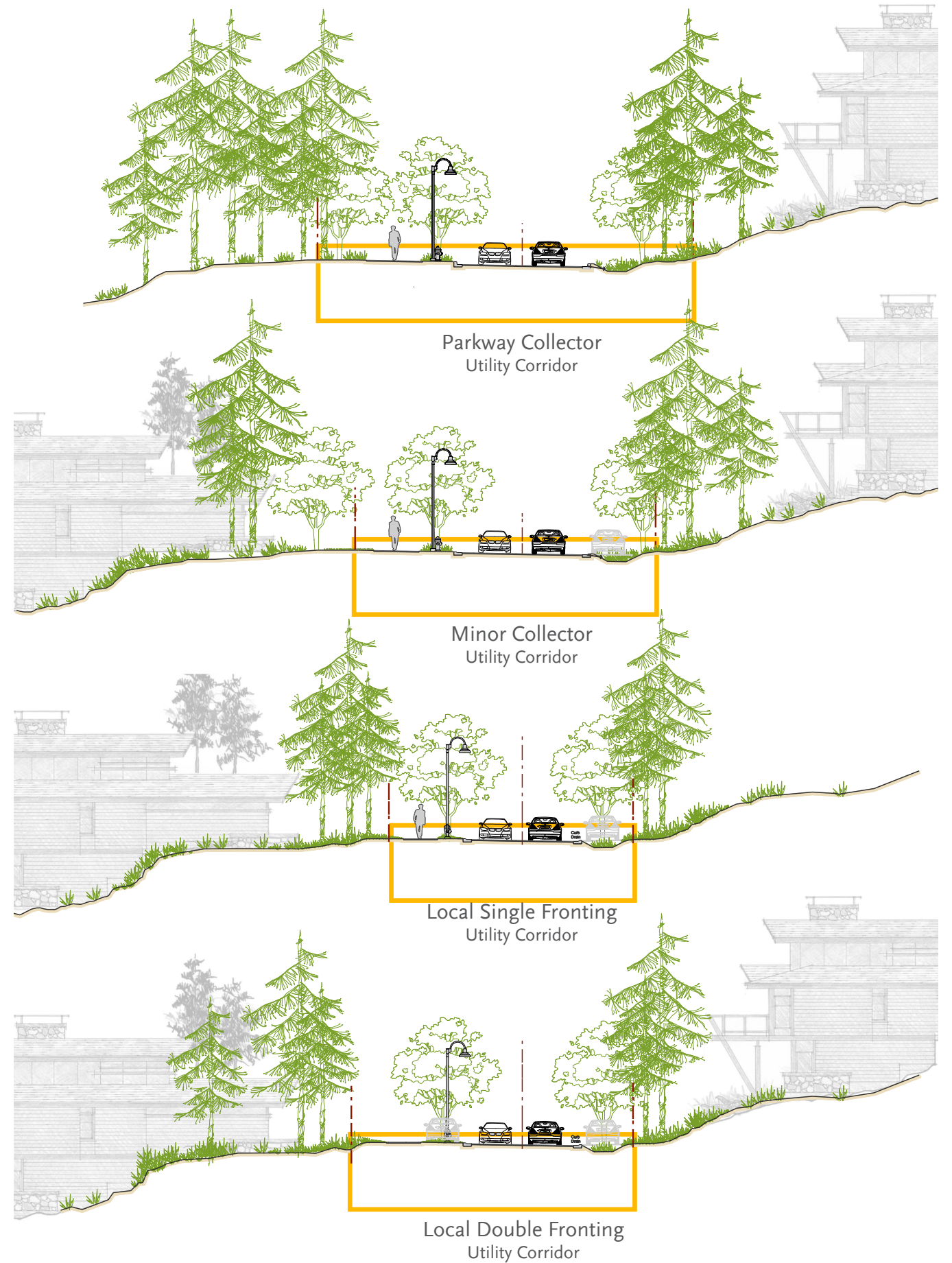




6.7 UTILITY CORRIDORS

Utility corridors within the Project Specific Street Standards refer specifically to shallow services within the right-of-way located outside the carriageway. All sanitary sewer, piped stormwater and potable water are located below the carriageway to protect against freezing during winter months.

To maximize the right-of-way available, shallow services, including hydro, telephone, cable and/or fibre-optic, are located beneath the sidewalk or pedestrian pathway system. For ease of maintenance and repair, gas servicing lines, where applicable, are located within 25cm of the road ROW parallel to property lines.

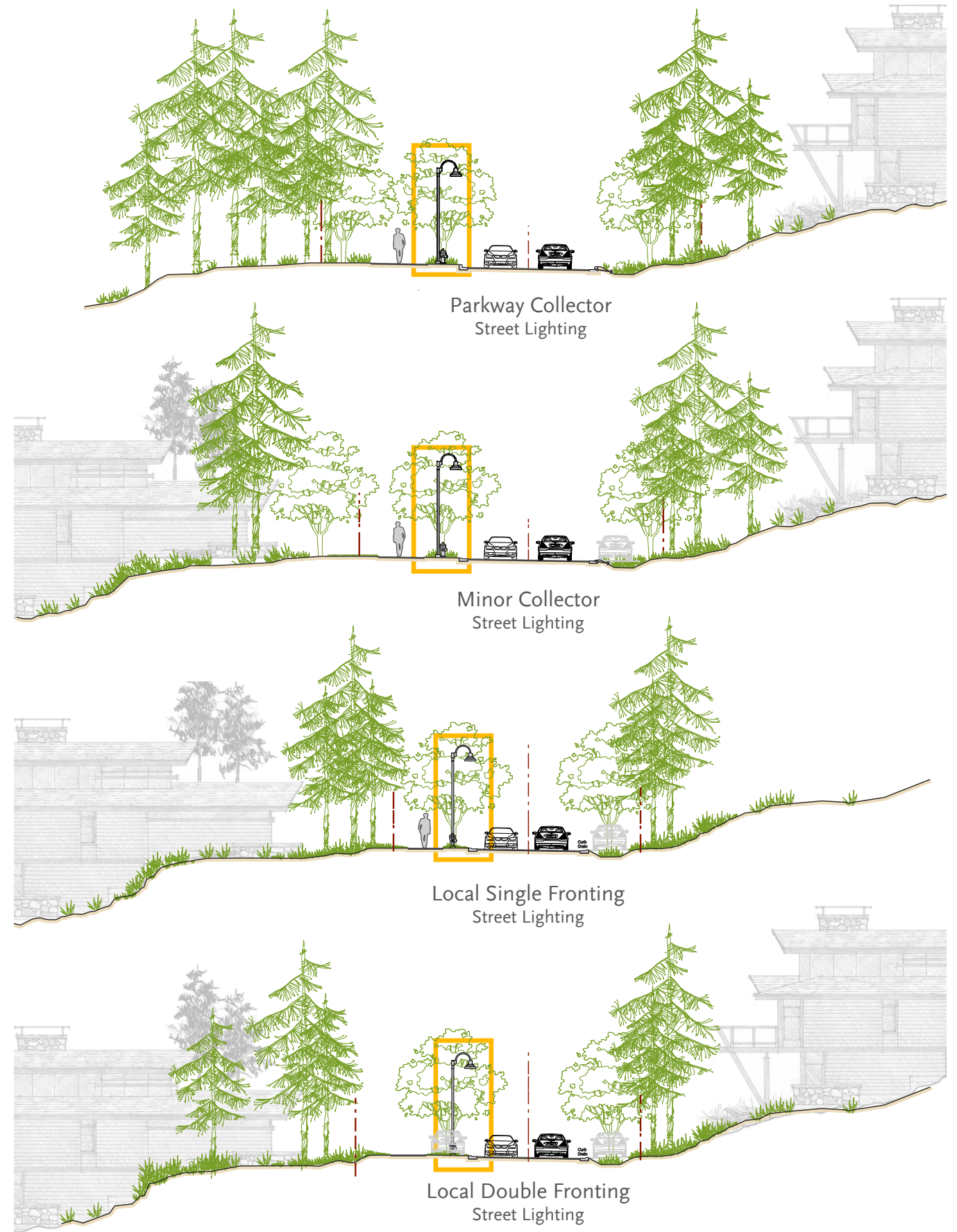




6.8 LIGHTING

Street lighting, when desired and/or required, is located within the utility corridor at the approximate midpoint of the boulevard separating vehicular and pedestrian circulation.

All lighting relates to a human scale and conforms to Dark Sky lighting principles, including the strict use of cut-off luminaries, as a means of maintaining the rural character of the community.





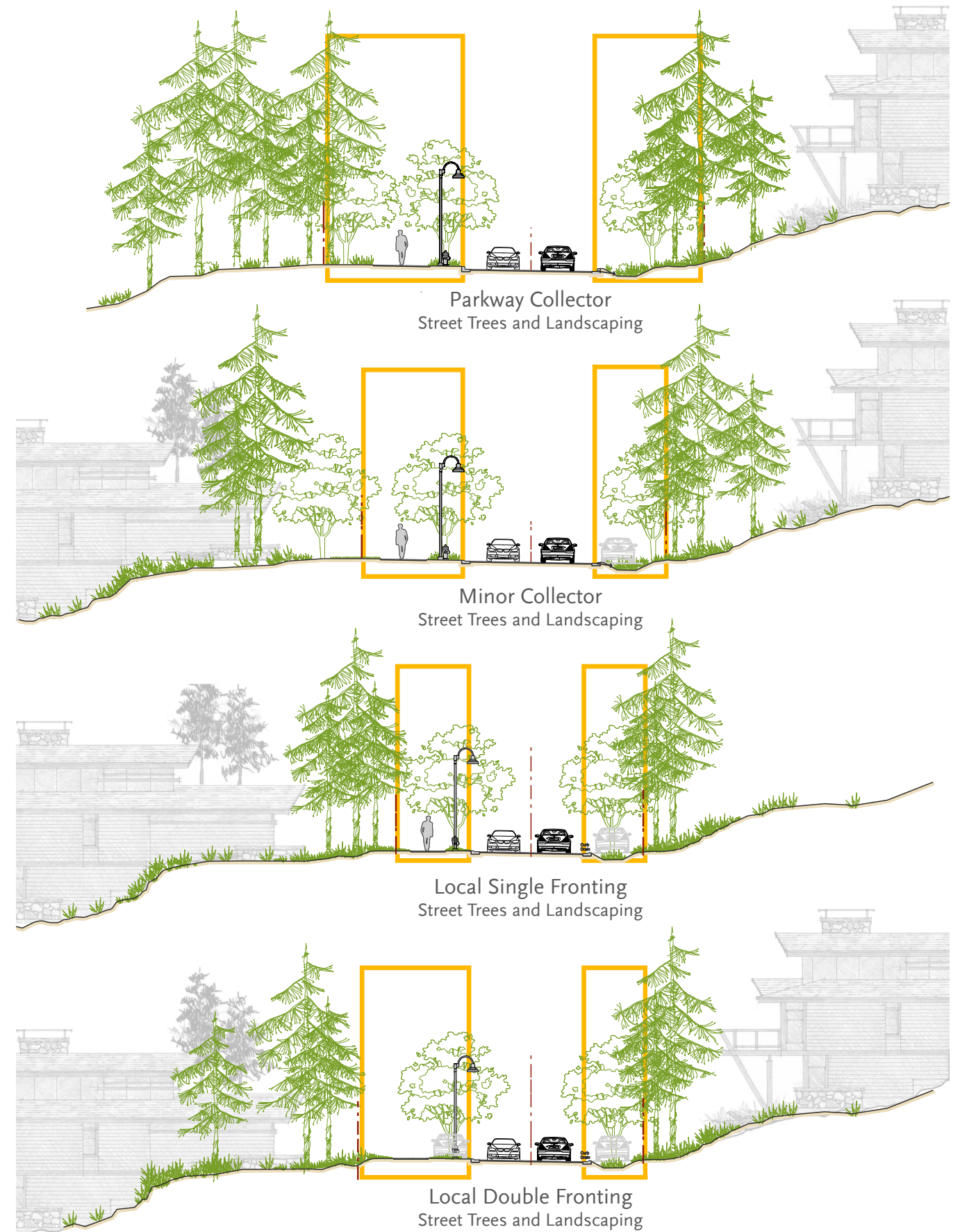
6.9 STREET TREES and LANDSCAPING

Street trees and landscaping perform important roles within the streetscape with numerous environmental and aesthetic benefits, as well as serving as physical buffers between land uses, pedestrians and vehicles. For traffic safety, vegetation must be balanced with safe clearance requirements and sight lines. Trees on the street provide dappled light to walk and ride through, they rustle in the wind and they display the passing of the seasons. Trees modify the microclimate – on hot sunny days the street is cool and on rainy days there is a relatively dry place to walk. Trees also foster a sense of comfort and safety for drivers and pedestrians by creating an edge between the sidewalk and the moving traffic. Street trees contribute to the livability of a street.

Street trees also create a distinctly urban feel in a neighbourhood – boulevards lined with trees create a very strong linear pattern. In areas such as Schooner Cove and the Lakes District, natural landscape will remain prominent. While in some instances, such as along the Parkway Collector, street trees are appropriate; in other areas a more natural approach is desired.

Streets that have a tighter “fit” to the natural landscape will not be required to incorporate street trees. For Local Streets and private streets, street trees are considered optional. The planting of stands of native trees and vegetation is encouraged in these areas to contribute some of the elements of livability that would otherwise be missed with the elimination of formal street lined tree plantings. No trees or shrubs shall be planted within the vertical or horizontal clearance zones as specified in the Lakes District Trail Standards or the Schooner Cove Pathway Standards, and the following guidelines apply:

- Plant masses should not be planted where they impede visibility along the road;
- Native replanting should be used in natural areas for restoration and screening;
- Changes in drainage patterns should be minimized;
- Trees planted near roads or trails should not damage surfaces or bases;
- Root barriers along the road should be used to prevent roots from growing under hard surfaces; and,
- Plantings may be used for privacy screening, road softening and enhanced aesthetics adjacent the roadway. However, tall and/or dense plantings should be avoided for safety and security reasons.



7.0 GREENHOUSE GAS REDUCTION & LOCAL ENVIRONMENTAL OBJECTIVES

Project Specific Street Standards represent an innovative and measurable means to address Provincial policy objectives with respect to greenhouse gas (GHG) emissions reduction and climate change, as well as to address the community's environmental goals as reflected in the Official Community Plan (OCP).

According to the *BC Climate Action Plan- June 2008* "transportation is the leading contributor to GHG emissions". Reduced street ROWs and carriageway widths, along with reduced traffic speeds and road building disturbance reflected in the Project Specific Street Standards is directly related to the reduction of overall GHG emissions and improvements to the local environment.

Reduced Kilometers Driven

One target of GHG reduction is to change travel behaviour, including reducing total kilometers driven. Through improving the experience and convenience of alternative modes of transportation, fewer residents will choose to drive for short trips, thereby reducing overall GHG emissions. Within these Standards, specific improvements to non-motorized modes of travel include improving safety through reducing traffic speeds, accommodating pedestrians within buffered networks of sidewalks and pathways on every street, and providing for cycling and non-motorized modes within higher volume roads.

Maximizing Use of Materials

Project Specific Street Standards seek to minimize process by-products, raw material use, and waste in road construction. The use of asphalt, a petroleum derivative, is minimized through reducing right-of-ways and paved widths to shrink overall GHG emissions, as well as cost of materials, long-term maintenance and repairs to road surfacing.

Landscaping and GHG Capture

Serving as a physical buffer to traffic and an improvement to streetscape aesthetics, street trees and landscaping also capture GHG, improve local air quality, and reduce erosion of top soil. Reduction of right-of-way widths minimizes natural landscape disturbance, while the Standards encourage re-vegetation within boulevards.

Stormwater Management

By reducing overall pavement widths, minimizing impervious surfaces, and using Best Management Practices in stormwater management, the Standards improve local environmental conditions through increased infiltration, reduced stormwater runoff and decreased impact downstream on wetlands, rivers, lakes, oceans.

Reduced Footprint

Minimizing the extent of disturbance through better fitting the terrain reduces the physical, visual and environmental impacts of the development footprint resulting in narrower road widths and increased permeable surfaces.

Together, Project Specific Street Standards implement improvements to the existing road standards at Fairwinds, including reduced GHG emissions in accordance with the Climate Action Plan, and improvements to the local environment.

8.0 UPHOLDING THE MOTI MANDATE: ADDRESSING LIABILITY & RESPONSIBILITY

The Project Specific Street Standards have been developed in collaboration with the Ministry of Transportation and Infrastructure (MoTI). The Project Specific Street Standard proposed for public roads will require that MoTI assume responsibility for long term maintenance and that MoTI be satisfied with the performance and safety of all public roads.

The Project Specific Street Standards are intended to be adopted for the Lakes District and Schooner Cove neighbourhoods in conjunction with the RDN Local Service Area Bylaws to fund and administrate the maintenance and operation of street facilities (back of curb features and infrastructure) in addition to those typically financed and managed by MoTI.

9.0 TECHNICAL STANDARDS SUMMARY

As policy-makers, planners, designers and engineers of the built environment, it falls within our individual and collective responsibilities to carefully consider the long-term implications of our decision making. Our charge has continually expanded to address the evermore challenging and complex demands presented by our growing impact on the world.

As we continue to develop our respective expertise in the exploration and implementation of sustainable community planning and design, we recognize the need for collaboration and innovation. Arguably, the most obvious case for such an approach is presented in the planning and design of our everyday streetscapes.

In the context of design standards for streets, while we have mastered many of the technical constraints inherent in the design and implementation of safe and efficient transportation systems, the 'rules of the game' have become more sophisticated. Expectations have expanded to demand that the design of streets consider a full spectrum of planning and design objectives, including implications to fundamental social interaction, ecological health and long-term fiscal responsibility.

The development of Project Specific Street Standards revisits our existing assumptions surrounding street design, re-examines the role of streets in the public realm, and proposes an alternative set of design standards as a means to deliberately address the many impacts—positive and negative—that streets have on our communities.

Project Specific Street Standards are summarized and quantified in the following Design Summary, completed by InterCAD, including the fundamental engineering design criteria governing horizontal and vertical road alignments, and reflect the street hierarchy and classification adopted within the Lakes District and Schooner Cove Neighbourhood Plans.

Project Specific Street Standards for the Lakes District and Schooner Cove the following four types: Parkway Collector, Minor Collector and Local Street(both single and double fronting conditions).

Project Specific Street Standards Summary

Street Conditions		Street Section Specification							
Street Types	Max Units Served	Design Speeds (km/h)	Max. Grade	ROW (m)	Carriageway (m)	Parking	Curb & Gutter	Sidewalks(m)	Street Trees
Parkway Collector	2000	50 (40) ¹	10 (12) ²	20 ³	7 ³	none	barrier curb	3	required
Minor Collector	600	30	10 (12) ²	16	7	optional one side ⁴	rollover curb	2.4	required
Local Street (Single Fronted)	100	30	12	13	6	required one side ⁴	rollover curb	1.83	required
Local Street (Double Fronted)	100	30	12	15	6	required both sides ⁴	rollover curb	1.83	required

¹ Minimum permitted design speed reduction, where necessary due to topographic constraints, and approved by the local municipality

² maximum grade permitted where necessary due to topographic constraints and as approved by the local municipality.

³ Where required, ROW and street widths will be increased at major intersections to provide for separate turning lanes.

⁴ all parking shall be managed on-site or within small parking pullouts, as required.

Alignment Design Criteria Summary

1. Horizontal Curve Radii			
Criteria	50 km/h	40 km/h	30 km/h
Roadway Crossfall			
normal crown (-2%)	105m	55m	30m
2% superelevation	90m	50m	25m
4% superelevation	80m	45m	20m
6% superelevation	-	-	-
Through Intersections	120m	75m	-
2. Superelevation			
Criteria	50 km/h	40 km/h	30 km/h
Maximum Superelevation	4%	4%	4%
Maximum Superelevation at Intersections	4%	4%	4%
3. Superelevation Transition Lengths			
Criteria	50 km/h	40 km/h	30 km/h
Transition Lengths (2 / 4-lane roadways)			
normal crown to +2%	22m / 34m	20m	20m
normal crown to +4%	33m / 50m	30m	30m
normal crown to +6%	-	-	-
Min Tangent Length between reversing curves			
2% superelevation (2 / 4-lane roadways)	13m / 20m	12m	12m
4% superelevation	26m / 40m	24m	24m
6% superelevation	-	-	-

1 Values for transition lengths include tangent runoff applied at the same rate as superelevation runoff.

2 60% of superelevation runoff occurs on the tangent approach and 40% on the curve, resulting in a minimum length of tangent between reversing curves of 120% of the superelevation runoff length.

Alignment Design Criteria Summary

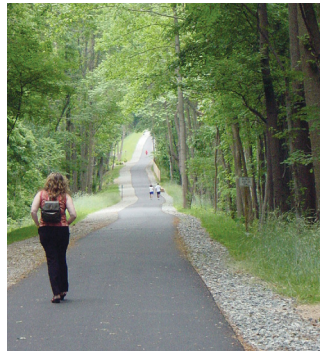
4. Gradients			
Criteria	50 km/h	40 km/h	30 km/h
Minimum Grade	0.5%	0.5%	0.5%
Maximum Grades			
on horizontal tangents	11%	12%	12%
on minimum radius horizontal curves ¹	10%	10%	10%
Grades Through Intersections			
Through condition approach grade	8%	8%	-
approach distance for through road ²	5m	0m	-
Stop condition approach grade	5%	6%	6%
approach distance for stopping road ²	15m	5m	5m
<p>1 Applies where radius is less than 1.5 times minimum allowable radius.</p> <p>2 Minimum distance back from the gutter line that the specified grade may not be exce</p> <p>3 15m approaching a Collector Road / 5m approaching a Local Road.</p>			
5. Vertical Curve K Values			
Criteria	50 km/h	40 km/h	30 km/h
Minimum Crest	7	4	2
Minimum Sag	7	4	2
Crest / Sag on approach to stop condition	3	2	2
<i>K values listed assume that new roadways will be illuminated</i>			
6. Stopping Sight Distances			
Criteria	50 km/h	40 km/h	30 km/h
Down grades:			
12%	78	52	34
9%	73	50	32
6%	69	48	31
3%	66	46	30
0%	63	45	30
Up grades:			
3%	61	44	29
6%	59	42	29
9%	57	41	28
12%	56	40	28
7. Decision Sight Distance			
Minimum decision sight distance for 50 km/h: 75m - 145m			

1. Note that decision sight distance applies only to multi-lane roads at intersections.

2. The range of values recognizes the variation in complexity that occurs at various sites. For less complex situations, value towards the lower end of the range are appropriate and for more complexity, values at the upper end are used.

Lakes District and Schooner Cove

Project Specific Street Standards



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