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DESIGN CRITERIA

8.01 INTRODUCTION

.1 Scope:

The City of Nanaimo has adopted a Complete Streets framework in an effort to create a more Complete Community and Complete Network. This design philosophy prioritizes universal design and the need for streets to be designed for all users, regardless of mode, age, or ability. This includes, but is not limited to, pedestrians, cyclists, transit, commercial vehicles and motorists.

All transportation infrastructure shall be designed in accordance to the following design criteria. The construction shall be in accordance to the outlined specifications and installation requirements captured throughout all sections of the Manual of Engineering Standards and Specifications.

.2 Objectives:

The objectives of this section are to:

(a) Improve safety and comfort for all modes.
(b) Provide accessibility for people of all ages and abilities through Universal Design.
(c) Accommodate larger vehicles and turning radii where needed, to account for truck routes, transit routes and emergency vehicles.
(d) Improve travel time reliability on the street network for all modes, with emphasis on transit and goods movements.
(e) Incorporate smart infrastructure opportunities to support emerging transportation technologies.
(f) Encourage attractive streetscapes that respond to surrounding land uses, providing opportunities for place-making, social interaction, and art.
(g) Improve local ecology through stormwater management and vegetation.

.3 City Initiatives:

This manual should be used in accordance with the most recent version of other City guidelines, policies, and bylaws including, but not limited to, those listed below:

(a) Official Community Plan
(b) Nanaimo Transportation Master Plan
(c) Nanaimo's Complete Streets Guidelines

.4 Government Resources:

In addition, this manual should be used in accordance with other applicable government policies, guidelines, and documents, including but not necessarily limited to, the following:

(a) Ministry of Transportation and Infrastructure (MoTI):

(i) BC Supplement to Transportation Association of Canada (TAC)
(ii) British Columbia Community Road Safety Toolkit
(iii) Active Transportation Design Guide

(b) BC Transit:

(i) Transit Future Plan
(ii) Bus Stop Infrastructure Design Summary
(iii) Infrastructure Design Guidelines

.5 Industry Resources:

In addition, this manual should be used in accordance with other applicable guidelines and documents, including but not necessarily limited to, the most recent versions of the following:

(a) Transportation Association of Canada (TAC):

(i) Geometric Design Guide for Canadian Roads
(ii) Manual of Uniform Transportation and Traffic Control Devices (MUTCD)
(iii) Pedestrian Crossing Control Manual
(iv) Bikeway Traffic Control Guidelines for Canada
(v) Canadian Guide to Traffic Calming

(b) Institute of Transportation Engineers (ITE) Transportation Planning Handbook.

(c) National Association of City Transportation Officials (NATCO):

(i) Urban Street Design Guide
(ii) Urban Bikeway Design Guide
(iii) Transit Street Design Guide

.6 Design Deviation:

City of Nanaimo mobility networks have been constructed over many years using design criteria and practices that were in place at the time. The current criteria and best practices are to be used when designing all new infrastructure. When retrofitting existing corridors, limitations will create challenges with design and compromises may be necessary. Existing pedestrian and cycling facilities will be evaluated on a case-by-case basis and upgraded as resources permit. When replacing existing infrastructure, should the existing system not meet current criteria, the Engineer will be responsible to ensure

the design is appropriate, founded on solid engineering principles and practices, and approved by the City Engineer.

.7 Development and Deviation Requirements:

(a) Responsibilities:

It is the Engineer's responsibility to ensure that all applicable guidelines, standards, bylaws and other regulations and policies are strictly followed.

(b) Reporting:

(i) The City may require various studies to be submitted to the City Engineer for approval. These could include, but are not limited to a:

1. Transportation Impact Assessment
2. Parking Study
3. Transportation Demand Management Plan
4. Road Safety Audit

(ii) If design standards cannot be met due to the existing conditions, it shall be documented and a design deviation memo shall be submitted to the City Engineer for approval.

8.02 DEFINITIONS

.1 For the purpose of this specification, the following definitions apply, unless otherwise noted:

(a) Curb refers to concrete curbs with or without integral gutters.
(b) Curb Ramp refers to the transitional grade between two surfaces (typically a sidewalk and a street crosswalk).
(c) Tactile Walking Surface Indicator (TWSI), also referred to as detectable warning surfaces or tactile attention indicators, are standardized walking surfaces that convey information to people with vision loss through texture.

(i) Attention TWSIs – sometimes called warning TWSIs, call attention to key hazards such as vehicle-pedestrian conflict zones, the start of a staircase, or the edge of a platform.
(ii) Guidance TWSIs – also known as wayfinding TWSIs, provide information about the direction of travel through open spaces. They are designed to guide a person on a designated path of travel.

(d) Sidewalk refers to concrete sidewalks located within a road right-of-way accommodating pedestrians.
(e) Walkway refers to asphalt or concrete sidewalks located outside a road right-of-way accommodating pedestrians.
(f) Multi-use path refers to an asphalt, concrete, or gravel pathway accommodating pedestrians, cyclists, and other wheeled modes.

(g) Bike path refers to asphalt pathways located within a road right-of-way accommodating cyclists and other wheeled modes.

(h) Elephants' Feet markings refer to a series of white painted squares that delineate a crosswalk where cycling is permitted and dismounting is not required.

(i) Design Vehicle refers to the least maneuverable vehicle that routinely uses a street or a facility to prevent the overdesign of a street.

(j) Control Vehicle refers to the least maneuverable vehicle that is ever planned to use a street, but potentially at very low speeds or with multi-point turns.

(k) Woonerf refers to a shared street with various modes utilizing the same space in a traffic calmed environment.

8.03 STREET TYPES AND CLASSIFICATIONS

.1 Mobility Streets:

The Mobility classification includes specifically selected nodes or corridors where higher density development is present or expected to occur. These streets focus on increased public space and accommodation for all modes, with an emphasis on sustainable transportation.

(a) Mobility Local:

(i) Mobility Local Streets can be considered as a destination. People will come here to visit commercial destinations, and will arrive on foot from higher density mixed use development nearby, or via bicycle, transit or car from further afield. The street design will encourage lower speeds where bicycles can safely mix with traffic. Wide sidewalks will provide opportunities for seating and activity to spill out on the sidewalk turning the street into a vibrant public space. Like the urban local roads, entry and exit from such streets should be across continuous and raised crosswalks that slow vehicles down entering or leaving these Mobility Local Streets. Where on-street parking is provided, it should be in a style that blurs the line between roadway and sidewalk, making the street more pedestrian friendly and encouraging slower speeds. Street trees are recommended at frequent spacing between parked vehicles. Shared use designs such as the Woonerf concept may be applicable here.

(b) Mobility Collector:

(i) The Mobility Collector provides a connection for all modes between Mobility Local Streets and Mobility Arterial Streets. This classification is multi-functional providing land access, on-street parking where it supports adjacent land uses, and typically accommodates higher volumes of traffic than a Local Street. Commercial activity is still expected to be a priority on these streets and sidewalks are wide to accommodate spillover uses from adjacent properties and add vibrant life to the street. Parking is provided in parking pockets which then provide space for landscaping or furniture or bicycle parking. Street trees are provided between the bike path and

sidewalk, helping to separate bicycles from pedestrians on these activity streets.

(c) Mobility Arterial:

(i) Mobility Arterial streets carry traffic for all modes between the principle areas of traffic generation. Pedestrian activity on the street is expected to be lower relative to vehicular traffic. Mobility arterial streets shall be designed to minimize direct access to development with access provided by adjoining streets of lower classifications. Parking is prohibited on these streets. Their location within mobility hubs will generally mean that while these carry higher volumes, vehicle speeds should be lower than more suburban environments and less separation is required between opposing directions of traffic. Median islands are generally not present on these streets. Bicycles are accommodated on bike paths between the sidewalk and boulevard. Intersections have protected facilities.

.2 Urban Streets:

The Urban classification includes all areas outside of mobility hubs or industrial areas. It forms the majority of the City's streets and is typically associated with lower density development, single family homes, or smaller scale commercial areas.

These streets try to balance the needs of all modes, providing less pedestrian accommodation than streets classified in the Mobility category, while providing increased traffic capacity.

(a) Urban Local:

(i) Urban Local Streets primarily carry traffic with an origin and/or destination along its length. It is not intended to carry large volumes of traffic or through traffic other than to immediately adjoining streets. They are intended to be lower volume, slower streets where it is safe for cyclists to share the road with motor vehicle traffic. In some cases, they may be supplemented by measures to create neighbourhood bikeways. Road widths are relatively narrow to encourage slower vehicle speeds, on-street parking is provided in pocket parking adjacent to residential driveways where practical, and where it can be integrated with boulevards and street trees. Pedestrians take priority on such streets and, as such, intersection designs favour pedestrian priority through raised and continuous sidewalks at the intersections with Collector Streets. This aims to calm traffic as it enters the neighbourhood and reinforce a change in priorities.

(b) Urban Collector:

(i) The Urban Collector Streets provide a connection for all modes between Urban Local Streets and Urban Arterial Streets. This classification is multi-functional, providing land access, some on-street parking where it supports adjacent land uses, and typically accommodates higher volumes of traffic than a Local Street. Narrow lane widths that still support bus and truck movements are recommended to manage vehicle speeds. Curb extensions at frequent intervals along the street add further friction, particularly where parking is underutilized and provide space for street trees. Bike paths between the sidewalk and parking/boulevard provide safety for cyclists. Intersections with other Collector Streets or Arterial Streets shall provide protected intersection designs for cyclists. Where on-street parking is provided, there must be a suitable door zone buffer between vehicles and the bike path. Intersection corners may require the use of compound curves to accommodate the appropriate design vehicle.

(c) Urban Arterial:

(i) Urban Arterial streets carry traffic for all modes between the principle areas of traffic generation. They are intended to carry large volumes of all types of traffic. Urban arterial streets shall be designed to minimize direct access to development with access provided by adjoining streets of lower classifications. Parking is prohibited on these streets. These streets may often feature multiple travel lanes, and, as such, the design vehicle and the control vehicle may differ. Like Collector Streets, cyclists are accommodated on bike paths between wide boulevards and sidewalks, and intersection shall be designed as protected intersections.

.3 Industrial Streets:

The Industrial classification includes specifically selected streets that serve industrial development. These streets focus on the accommodation of larger vehicles; however, employees and customers still have to get to work in these locations and this can be done by sustainable modes, if designed appropriately. It is not anticipated that there would be industrial arterial roads, rather Industrial Collector Streets would connect to Urban Arterial Streets or Provincial Highways.

(a) Industrial Local:

(i) Industrial Local streets will provide direct access to industrial businesses. They will typically be used by employees, customers, and delivery vehicles. The street design features wider travel lanes and parking lanes more suited to larger vehicles. Multi-use paths are separated from vehicles by a boulevard helping separate pedestrians and cyclists from large vehicles.

(b) Industrial Collector:

(i) The Industrial Collector provides a connection for all modes between Urban Arterial Streets and Industrial Local Streets. This classification is multi-functional providing land access, on-street parking, and typically accommodates higher volumes of traffic than a Local Street. Bike paths are provided to provide employees with sustainable transportation choices. It is important that these be separated from the parking lane by a door zone. Sidewalks are provided adjacent to the bike path, separated by a small buffer.

.4 Half Road Dedication and Construction:

(a) Half road construction shall be limited to situations where future development of surrounding properties will result in dedication and construction of the full road.

(b) All design parameters shall match those specified as per the City's Road Classification Network and Cross Sectional Standard Drawings.

(c) The road width requirements will be to construct the lesser of 1 m beyond the opposing back of curb, or 4.6 m past the centerline, unless otherwise determined by the City Engineer.

(d) Parking is not supported where ultimate weekday traffic volumes are anticipated to exceed 300 veh/day.

(e) Half road construction for lanes is not supported in new development.

(f) Drainage must be contained and conveyed to the storm system within the pavement surface. Open channel drainage may be considered along the interim road edge with additional dedication for a drainage swale.

(g) For half roads with no exit, a temporary turnaround must be designed and constructed, as per Standard Drawing No. R-TT.

(h) Parking must be restricted through signage where not accommodated.

.5 Cul-de-Sac:

(a) Use of cul-de-sacs shall be limited to situations where in the opinion of the City Engineer, there is no possibility of future road connection, such as abutting an environmentally sensitive area or topographic barrier. Abutting land with potential for further subdivision under the current zoning, will not be considered an impediment to future connections.

(b) Cul-de-sacs shall be limited to 90 m in length and shall be constructed to the applicable local road standard.

(c) Cul-de-sacs shall terminate with a 6 m wide road dedication suitable for use as a future pedestrian and cycling connection. Final development and construction of the connection will be the responsibility of the City.

.6 Temporary Turn-a-Rounds:

(a) Temporary asphalt turn-a-rounds shall be required for all temporary dead end streets and designed as per Standard Drawing No. R-TT.

(b) Extent of works is to be determined on a site specific basis and approved by the City Engineer.

.7 Other:

Streets that do not conform to the above classifications, such as rural streets and laneways, shall be designed in collaboration with the City Engineer and in accordance to the cross-sections provided within the Standard Drawings.

8.04 GEOMETRICS

.1 Horizontal and vertical alignments including horizontal curvature, stopping sight distances, vertical curvature, and intersection geometry shall be based on the TAC Geometric Design Guide for Canadian Roads.

.2 Dimensions:

(a) Dimensions are to be designed according to the requirements outlined in the Standard Drawings, unless otherwise approved by the City Engineer.
(b) Lane widths include gutter measurements, unless otherwise specified.
(c) Large variations in lane widths are to be avoided. Where extra width exists, priority is to be given to active transportation, boulevards, or medians.
(d) Where urban local roads are constructed in a reduced road right-of-way, in no case shall the pavement width be less than 6.6 m.

(e) Right-of-way widths:

Road Class	Minimum R/W Width (m)	STD. DWG. No.
Mobility Arterial	30.0	MA-XS1
Mobility Collector	28.4	MC-XS1, MC-XS2
Mobility Local	20.0	ML-XS1
Urban Arterial	34.5	UA-XS1
Urban Collector	25.0 – 26.7	UC-XS1, UC-XS2
Urban Local	20.0	UL-XS1
Industrial Collector	25.0	IC-XS1
Industrial Local	22.0	IL-XS1
Rural Local	20.0	RL-XS1
Lane	8.0	L-XS1
Half Road	<14.0	HR-XS1

(f) In constrained corridors, with approval from the City Engineer, a statutory right-of-way may be utilized to achieve the required width needed to achieve the cross-sectional elements.

.3 Alignment and Curvature:

(a) Minimum radius of curb returns at street intersections shall be 6.0 m for mobility and urban streets, and 8.0 m for industrial streets.

(b) Corner radii will be the minimum appropriate to accommodate the design and control vehicles approved by the City Engineer.

(c) Smaller corner radii can be implemented on roads where there are multiple turn lanes.

(d) Compound curves may be needed to accommodate turn movements into narrower receiving lanes.

(e) Intersections that require large turn radii for larger design vehicles, shall utilize mountable truck aprons to reduce the asphalt surface.

(f) Radius of curbs forming nodes at intersections or mid-block shall be a minimum 3.0 m concave or 5.0 m convex radius.

.4 Grades:

(a) Longitudinal:

All longitudinal grades shall meet the following criteria, unless approved by the City Engineer:

Classification	Minimum	Maximum
Gutter	0.5%	
Curb Return	1.0%	12%
Pedestrian Facilities	0.5%	12%
Residential driveway		20%
Lane	0.5%	12%
Local Road		10%*
Collector/Arterial		8%**
Intersection		5%

The City Engineer may grant a relaxation up to 12% for sections of road less than 100 m in length that have met all other geometric criteria and have identified a location for sanitation and recycling receptacles elsewhere. Further consideration for road grades will be considered for comprehensive land developments with challenging topography.

****Under exceptional circumstances, the City Engineer may relax the maximum.***

(b) Vertical Curves at Intersections (K Values)

Providing the minor intersecting street is marked as a STOP, the following K values must be used for the minor street, unless otherwise approved by the City Engineer:

Classification	Crest	Sag
Local	4	4*
Collector	6	6

The minimum may be reduced to 2 where the speed limit is 30 kmh or less

(c) Crown and Crossfall:

(i) All streets shall normally be a crown section. Crossfalls shall require prior approval from the City Engineer.

(ii) Pocket parking that utilizes a reverse crossfall must not exceed 4%.

(iii) Pedestrian and cycling crossfalls:

Minimum	1.0%
Recommended	2.0%
Maximum	4.0%*

Pedestrian and cycling crossfall grades in excess of 4.0% shall only be permitted for short sections at driveway or lane crossings, subject to approval by the City Engineer.

(d) Earthwork:

All earthwork shall meet the following cut/fill requirements:

Classification	Desirable	Maximum
Gravel	4H:1V	2H:1V
Earthwork	4H:1V	2H:1V
Rock		1H:4V

8.05 INTERSECTIONS

.1 Protected Intersection:

(a) Every intersection is site specific and detailed geometry will be approved by the City Engineer. The layout of a protected intersection shall use Standard Drawing No. R-PI as guidance.
(b) Bike paths will be offset sufficiently from the curb at the pedestrian crossing location to allow suitable space for a pedestrian sidewalk ramp between the curb and bike path; 2.5 m is preferable.
(c) Corner protection islands with raised barrier curb will be provided unless otherwise approved by the City Engineer and only in constrained retrofit situations may exceptions be permitted.
(d) Space will be provided between the pedestrian sidewalk ramp and the bike path ramp to accommodate placement of a signal pole.
(e) Crosswalk markings and elephant's feet markings on the roadway will be suitably offset from the intersection to permit the inclusion of the corner protection island in the design.
(f) Narrow pedestrian crossing markings (0.3 m width, 0.3 m gap) will be provided on the bike path to indicate to cyclists that pedestrians have priority.
(g) A stop bar for cyclists will be provided where cyclists approach the roadway.
(h) Where the bike path transition from or to the roadway, flat or valley curb will be used to smooth the transition.
(i) A Road Safety Audit is a mandatory requirement for any protected intersection designs.

.2 Roundabouts:

(a) Roundabouts shall be used as directed by the Nanaimo Transportation Master Plan and at the discretion of the City Engineer.
(b) When a roundabout is required, the extent of the works shall be determined on a site specific basis and approved by the City Engineer.
(c) The layout of a protected roundabout shall use Standard Drawing R-PRI as guidance.
(d) A Road Safety Audit is a mandatory requirement for any roundabouts designed.

.3 Raised Local Intersection:

(a) At raised intersections with local roads, the bike path and sidewalk will continue across the intersection without interruption. The intent is that vehicles cross the bicycle and pedestrian space rather than pedestrians and cyclists crossing the vehicle space. The layout of a protected intersection shall use Standard Drawing No. R-LRI as guidance.
(b) Where pedestrian sidewalk ramps are provided, they will be separated from the local ramp by a barrier curb and bollards to reduce the likelihood of vehicles turning in the pedestrian ramp.
(c) At the transition to the crosswalk, flat or valley curb will be used to provide a smooth path for people in wheelchairs or mobility devices.

(d) The ramp from the local street to the sidewalk will be 2.0 m in length, and the drainage requirements are to be approved by the City Engineer.

8.06 CURBS

.1 All roads shall require curb and gutter unless otherwise approved by the City Engineer.

.2 All curbs shall be non-mountable concrete barrier curbs, unless detailed in a Standard Drawing or otherwise approved by the City Engineer.

.3 Pocket parking delineation curb to be optional where there is no grade break between the abutting lane and the pocket parking. Rollover or valley curb to be used as a grade break for drainage purposes as per the Standard Drawings.

.4 Where intersecting streets have both mountable roll-over and non-mountable barrier curbs, non-mountable barrier curbs shall be required for the curb returns and along the tangent to the first driveway or lane crossing.

.5 Curbs within raised local road intersections, lane crossings, or industrial driveways require an additional concrete footing or reinforcing steel as shown on Standard Drawing No. CS-1.

.6 Asphalt curbs only to be used to provide a transition from new concrete curbs to existing roadworks, if required.

8.07 MEDIANS AND ISLANDS

.1 Medians:

(a) Designs should first consider raised and planted medians.
(b) Centre medians for divided roads shall be designed as per Standard Drawing No. CS-7.

.2 Traffic Islands:

(a) Traffic Islands require approval from the City Engineer.
(b) Traffic Islands shall aim to provide at-grade crossings.

8.08 BUFFERS

(a) Buffers are lateral spaces of varying colour and texture to separate one mode from another.
(b) Buffer widths shall be in accordance with the cross-sections found in the Standard Drawings.
(c) Alternative treatments, such as painted gore areas, different material types, curbs, landscaping or other physical features may be used if approved by the City Engineer.

8.09 FLEX ZONES

.1 The Flex zone is a fixed width within the cross-section that remains flexible in nature, so that various competing requirements can be achieved.

(a) Landscaping and street trees.
(b) Transit stops and bus shelters.
(c) Bike and vehicle pocket parking.
(d) Furniture & planters.
(e) Utility boxes, cabinets, and hydrants.
(f) Power poles and streetlights.
(g) Stormwater management.
(h) Waste receptacle placement.

.2 Cross-sectional elements between the curb and the property line may be reorganized to meet the needs of the corridor with approval from the City Engineer.

.3 In constrained corridors, with approval from the City Engineer, a statutory right-of-way may be utilized to achieve the required width needed to achieve the cross-sectional elements.

8.10 PEDESTRIAN FACILITIES

.1 Sidewalks and Walkways:

(a) Sidewalks and walkways shall be generous, unobstructed, and accessible. They shall be designed to the requirements outlined in this section and TAC's Geometric Design Guide for Canadian Roads, unless otherwise approved by the City Engineer.

(b) Sidewalks and walkways adjacent to trees shall have structural soil composite or soil cells to achieve the soil volume required for trees in accordance with Section 14.0 - Landscape.

.2 Tactile Walking Surface indicators (TWSI):

(a) Attention TWSIs are to be arranged in a square grid pattern, parallel to the main direction of travel.
(b) Attention TWSIs to measure a minimum 0.61 m wide and 1.5 m long. They are to measure across the entire width of a hazard, as per the Standard Drawings.
(c) Attention TWSIs should be used along tactile guidance paths to identify turns and other decision-making points.
(d) Guidance TWSIs should consist of a pattern of parallel, fat-topped, elongated bars that extend in the direction of travel.

.3 Crosswalks:

(a) Crosswalk locations shall be determined in accordance with the most current version of the TAC Pedestrian Crossing Control Guide or as required by the City Engineer.

(b) If sidewalks cross local streets, laneways, or high-volume accesses, designs should first consider raised and continuous sidewalks, as per Standard Drawing No. R-RLI.

(c) Mid-block crosswalks on collector and arterials must be approved by the City Engineer. Where possible, medians shall be utilized to accommodate a two-stage protected at-grade crossing.

.4 Curb Ramps:

(a) Ramps shall be designed to the requirements outlined in this section and the Standard Drawings.

(b) Ramps should land users safely in the crosswalk and in the desired direction of travel, lining up with the ramp across the street.

(i) Score lines will be provided on the curb ramp directing visually impaired users to the appropriate opposing curb ramp.

(ii) Safety yellow TWSIs will be placed across the sidewalk or curb ramp where pedestrians will cross the conflict area with vehicles or cyclists on arterial, collector, or local streets. ***(REVISED JULY 2022)***

(REVISED JULY 2022)

(c) Ramp orientations are dependent on sidewalk variations, as per Standard Drawing No. CS-12.

(d) Catch basins are not permitted within ramp let-downs and should be located up stream of the crosswalk.

(e) Constrained curb ramp details are only to be used where obstructions or geometry prevent the preferred design from being utilized.

.5 Termination and Transitions:

(a) Sidewalks shall be terminated in a manner that is safe for pedestrians as follows:

(i) At the beginning of the curb return if construction of the intersection is not required.
(ii) At the end of the curb return if construction of the intersection is required.
(iii) At the end of the development phase or property line.
(iv) At other specified locations as required by the City Engineer.

(b) Extend and terminate sidewalks as required to allow wheelchair access to pedestrian pushbuttons.

(c) Transition sidewalk refers to all portions of concrete or asphalt placed as "fill-in" sidewalk between existing curbs and sidewalk, sidewalks and inset building walls, sidewalks, and paved parking area.

(d) Transition sidewalk or walkway shall be constructed at all locations designated by the Engineer and shall be edged and finished in a manner compatible with the adjacent sidewalk or walkway and shall be to the satisfaction of the Engineer.

8.11 BICYCLE FACILITIES

.1 Bike paths and cycle tracks shall be designed in accordance with the road classification of the adjacent street, unless otherwise approved by the City Engineer.

.2 Crossings:

(a) Crossing locations shall be determined in accordance with the most current version of the TAC Geometric Design Guide for Canadian Roads or as required by the City Engineer.

(b) If a cycling facility on a collector street crossing a local street, raised and continuous bike paths and cycle tracks should first be considered.

(c) If a fully separated intersection crossing is not achievable, coloured bike boxes or a shared crossing with elephant's feet should be considered.

8.12 MULTI-USE FACILITIES

.1 Walkway and multi-use path pavement widths shall be a minimum of 3.0 m. A minimum unobstructed width of 4.0 m is required where vertical obstructions exist.

.2 Walkway right-of-ways width shall be a minimum of 6.0 m unless otherwise approved by the City Engineer.

.3 To prevent vehicles from entering a multi-use facility, splitter islands, bollards, or barrier posts may be utilized.

8.13 TRANSIT FACILITIES

.1 Bus stops and bus pullout locations will be determined by the City Engineer and the Regional District of Nanaimo Transit. .

.2 Transit stops and pullout configurations will adhere to the most current standards in BC Transit's Bus Stop Infrastructure Design Summary and Infrastructure Design Guidelines.

.3 Reinforced bus slabs shall be designed as per Standard Drawing No. CS-23.

8.14 MOTOR VEHICLE FACILITIES

.1 Lane and pavement widths shall be designed to the requirements outlined in this section, the Standard Drawings, and TAC's Geometric Design Guide, unless otherwise approved by the City Engineer.

.2 Parking:

(a) On streets within mobility hubs or other high density areas, on-street parking shall be provided within parking pockets between curb extensions.

.3 Driveways and Laneways:

(a) Driveways and laneways shall be designed in accordance with Standard Drawing No.'s CS-24, CS-25 and CS-26.
(b) A boulevard should be provided between the roadway and sidewalk, pathway, or bike path to provide separation of users and to provide suitable space for a driveway or laneway crossing letdown.
(c) The sidewalk, multi-use path, or bike path are to remain at a level grade past the driveway or laneway.
(d) Driveway and laneways shall be located in accordance with the City of Nanaimo's Crossing Control Bylaw.

(i) Maximum driveway width for single family residential lot shall be 6.0 m.
(ii) Maximum driveway width for all other zoned lots shall be 9.0 m, unless otherwise approved by the City Engineer.

8.15 BOLLARDS

.1 To prevent vehicles from entering a pedestrian, cycling, or multi-use facility, the design may require bollards, splitter islands, or barrier posts.
.2 Decorative bollards are the preferred treatment if required curbside.
.3 Splitter Islands are the preferred treatment at the entrances of walkways and paths, and shall be designed in accordance with Standard Drawing No. CS-20.
.4 Barrier posts shall be designed in accordance with Standard Drawing No. CS-30 and should be placed no closer than 1.5 m apart, and must be installed in odd numbers (one, three or five) so that the centre post is positioned on the centerline of the pathway.

8.16 HANDRAILS AND STAIRWAYS

.1 Handrails:

(a) Sidewalks or walkways adjacent to retaining walls or other vertical drops exceeding a slope of 1.5H:IV or height of 0.6 m shall require a handrail. Alternatively, a chain link fence may be installed, if approved by the City Engineer.
(b) Other unsafe areas, as determined by the City Engineer, may also require the installation of a handrail or chain link fence.

.2 Stairways:

(a) Where walkway grades exceed 12%, stairways shall be installed to suit adjacent topography.
(b) Walkways requiring stairways shall have a minimum of three stairs, and landings at all entrances to the walkway.
(c) Landings at a 2% grade are required at the top and bottom of all stairways. Stairways shall have a maximum of 12 risers between landings.
(d) At stairs and landings, attention TWSIs should commence one tread depth back from the leading edge of the nosing at the top step and extend across the width of the stairs. The attention TWSI alerts a person with vision loss that there is a set of stairs ahead and to seek the support of a handrail for safe navigation.
(e) Concrete stairways shall be designed in accordance with Standard Drawing No.'s CS-32 and CS-33.
(f) Wooden stairways shall be designed in accordance with Standard Drawing No.'s CS-34 and CS-35.

8.17 FENCES

.1 Fences shall be designed in accordance with Standard Drawing No.'s CS-36 and CS-37, unless otherwise approved by the City Engineer.

8.18 PAVEMENT MARKINGS

.1 The design and construction of all roads shall include the design and application of pavement, hazard, and delineation markings in accordance with the most current standards contained in the MUTCD.

.2 When particular design criteria is not specified in the MUTCD, the Manual of Standard Traffic Signs and Pavement Markings distributed by the Ministry of Transportation and Infrastructure may be considered.

.3 Green conflict paint applications to be evaluated by the City Engineer, but are to be used:

(a) Where bicycle facilities cross major driveways and laneways, intersections with permissive left and right turn motor vehicle conflicts, or where there is poor compliance with turn restrictions.
(b) Where bicycle lanes approach an intersection away from the curb, either due to a bicycle only turn lane or where a dedicated right turn is located to the right of a bicycle lane.

(c) In bike boxes and two-stage turn boxes.

8.19 TRAFFIC SIGNAGE

.1 The design and construction of all roads shall include the design and installation of traffic signs (regulatory and warning) and traffic signals, in accordance with the most current standards contained in the MUTCD.

.2 Round stock sign poles are the preferred pole type.

.3 Perforated steel sign poles shall be installed in soil and not set in concrete.

.4 Street name signs shall be provided at all intersections. Where possible, the street name sign shall be located above a traffic sign at one corner of the intersection.

.5 Address signage must be visible from the street. Where a common driveway accesses multiple properties or where homes are not visible from the street, address signs may be located within road right-of-way.

SECTION 8 – TRANSPORTATION SPECIFICATIONS

8.20 SCOPE

.1 All transportation infrastructure shall be constructed in accordance to the outlined specification requirements captured throughout all sections of the Manual of Engineering Standards and Specifications.

.2 Only those products approved by the City Engineer and listed in the City of Nanaimo Approved Products List will be accepted for installation.

8.21 INTERSECTIONS

.1 Intersections that require truck aprons shall be constructed with concrete that is pigmented brick red and stamped using a brick pattern.

8.22 TACTILE WARNING SURFACE INDICATORS (TWSI)

.1 Attention TWSIs

(a) Cast-in-place or recessed installations are the preferred installation method. Surface application are only considered if cast-in-place cannot be achieved.
(b) Surface retrofit applications are to be installed with beveled edges to decrease the likelihood of tripping and attached firmly to prevent edges from lifting.
(c) Preferred colour for attention TSWIs to be used on platforms, staircases, and curb ramps where pedestrians will cross paths with vehicles or cyclists, is safety yellow. ***(REVISED JULY 2022)***
(d) Stamped or metal attention domes may be used alternatively where pedestrians will be crossing paths with cyclists, as per the Standard Drawings.
(e) Circular truncated domes installed on a walking surface should have the following measurements:

(i) The height of the domes should be four to five millimetres.

(ii) The diametre of the top of the domes should be between 12 and 25 mm.

(iii) The diametre of the lower base of the domes or cones should be 10 mm (+/- 1 mm) more than the diametre of the top.

.2 Guidance TWSIs

(a) To clearly differentiate warning information from guidance information, safety yellow should not be used for guidance TWSIs.
(b) Guidance Bars installed on a walking surface should have the following measurements:

(i) The height of the bars should be four to five millimetres.
(ii) The top of the elongated bars should have a width between 17 and 30 mm.
(iii) The width of the base of the bars should be 10mm (+/- 1 mm) wider than the top.
(iv) The top length of the bars should be at least 270 mm.

(v) If drainage is a concern, a space of 10 – 30 mm should be provided at the ends of the bars.

8.23 MEDIANS AND ISLANDS

.1 Medians and islands are to have concrete infill with a brushed finish, stamped finish, or landscaping as directed by the City Engineer.

8.24 BUFFERS

.1 Buffers and curb-side landings are to utilize colour and/or texture to demarkate the separation of modes. This can be achieved through stamped concrete, coloured concrete, or concrete pavers.

8.25 PAVEMENT MARKINGS

.1 All road markings shall be thermoplastic with a minimum thickness of 3 mm.

8.26 TRAFFIC SIGNAGE

.1 Posts and Bases:

(a) Street name and traffic sign posts and anchors shall be roll formed from strip steel (structural quality) in accordance with ASTM A653, Grade 33.

.2 Fasteners:

(a) Non-corrosive metal fasteners shall be used for attaching all signs to their supports to avoid discolouration.

.3 Street Name Signs:

(a) Street name signs shall be double sided and constructed of 3 mm x 200 mm flat sign grade aluminum with rounded corners.
(b) Signs shall consist of diamond grade reflective sheeting with transparent blue Electro Cut vinyl. Letters shall be 150 mm Helvetian Med font and shall be upper and lower case.
(c) The abbreviations, St., Dr., Pl, Rd., etc., are to be the same height as the street name.

.4 Traffic Signs:

(a) Traffic sign shapes, colours, dimensions, symbols and wording shall be in accordance with the standards detailed in the most current Motor Vehicle Act Regulations.
(b) Illumination or reflectorization of signs shall also be in accordance with the standards detailed in the most current Motor Vehicle Act.
(c) Signs shall be made on 12 gauge (3 mm) sign grade aluminum.

(d) Reflective sheeting shall be diamond grade. Signs for Parking Restrictions, Loading Zones, Bus Stops and No Stopping shall be engineering grade and no more than 300 mm wide.

SECTION 8 – TRANSPORTATION
INSTALLATION

8.40 SCOPE

.1 All transportation infrastructure shall be installed in accordance to the requirements captured throughout all sections of the Manual of Engineering Standards and Specifications.

8.41 REMOVALS

.1 Removals shall be done in accordance with Section 4.0 – Excavation, Bedding and Backfill.

.2 Existing asphalt pavement, sidewalk, curb and gutter shall be cut in a straight line parallel to the line of the proposed work.

.3 Existing concrete pavement, sidewalk, curb and gutter shall be removed by cutting the concrete at the nearest joint or other location designated by the Engineer.

.4 The top surface of the remaining concrete section shall have a neat vertical face with a straight edge for a minimum of ¼ the depth of the section.

.5 All material removed shall be disposed of as waste material.

8.42 BACKFILL AND GRADING

.1 Backfill and grading shall be done in accordance with Section 4.0 Excavation, Bedding and Backfill.

.2 The gravel road base adjacent to the curb shall be filled tight to the curb, graded, compacted, and left in a neat condition.

.3 The boulevard area adjacent to the curb or sidewalk shall be cleared of construction debris and raked clear of all rock exceeding 50 mm in its largest dimension.

.4 The boulevard area shall be backfilled to within 50 mm of the top of the curb for a minimum width as shown on the drawings, such that the water does not undermine the curb installation. Backfill shall be compacted to 90% of Modified Proctor Density (ASTM D1557).

.5 Boulevards shall be graded and prepared suitable for placement of topsoil, or as otherwise directed by the Engineer.

.6 Sod, plants, and trees to be installed as per Section 14.0 – Landscape.

8.43 TACTILE WARNING SURFACE INDICATORS (TWSI)

.1 TWSIs are to be installed in accordance with the manufacturer's recommendations.

8.44 PAVEMENT MARKINGS

.1 Layout of markings shall be as per the construction drawings or as per direction from the City Engineer.

.2 Thermoplastic shall be applied in accordance with the manufacturer's recommendations.

8.45 TRAFFIC SIGNAGE

.1 Posts and Bases:

(a) Sign post bases installed within concrete, shall be installed as per Standard Drawing No. CS-40.
(b) Sign post bases installed within soil, shall be installed as per Standard Drawing No.'s CS-40 or CS-41.
(c) Anchor posts shall be provided for sign base installations where native soils are unable to hold the sign rigidly in its proper and permanent position and to prevent it from swaying in the wind, from being turned, or otherwise displaced.
(d) Sign installation shall not impede on the clear zone of a pedestrian or cycling facility. A minimum 1.2 m must be accommodated on pedestrian facilities and 1.5 m on cycling or multi-use facilities.

.2 Signs:

(a) All signs to conform to the most current standards in the MUTCD.
(b) Signs shall be installed as per the Standard Drawings.
(c) Street name and traffic signs shall be as per the construction drawings or as per direction from the City Engineer.
(d) All signs shall be mounted perpendicular to the direction of traffic, facing the direction of traffic they are intended to service, except in the case of No Parking and No Stopping signs.
(e) Reflectorized signs shall be placed at a slight angle away from approaching traffic.
(f) Unless otherwise specified, street signs shall be supplied by the City of Nanaimo at the Developer's expense.

8.46 CLEAN UP

.1 The construction site shall be kept clean and safe throughout the duration of the project.

.2 Special precautions shall be made for sites that experience heavy pedestrian, cycling, and motor vehicle volumes.

.3 Fire hydrants shall be left clear for hose connections at all times.

.4 Prior to completion of construction, all existing and newly constructed drainage ditches, waterways and culverts shall be cleaned to restore their full effectiveness.

.5 All areas affected by the construction operation shall be cleaned of all loose rock, boulders, and debris.