

REPORT

Lower Capilano – Marine Drive Village Centre Functional Design Report



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District of North Vancouver

Lower Capilano – Marine Drive Village Centre

Functional Design Report

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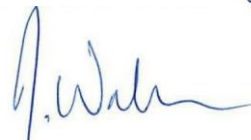
Final Report

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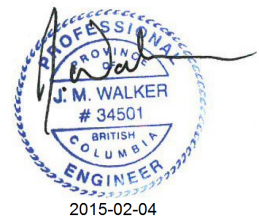
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Executive Summary

The Capilano Marine Village (Lower Capilano Marine Village) is one of the four neighbourhoods identified in the District of North Vancouver's Official Community Plan as a Village Centre and key area for growth. The vision for the area is a mixed use village centre with a multi-modal transportation network, supporting pedestrians, cyclists, transit and motor vehicles. A conceptual plan of the Lower Capilano Marine Village Centre, developed by the District, is identified in Figure 1-1, below:



Source: District of North Vancouver Lower Capilano Marine Village implementation Plan (2013)

Figure ES-1: Lower Capilano - Marine Village Centre

The development of the Lower Capilano Marine Village is guided by the following documents, which preceded this study:

- District of North Vancouver Official Community Plan: Lower Capilano-Marine Village Centre (District of North Vancouver, 2011)
- Lower Capilano Marine Village Centre Implementation Plan (District of North Vancouver, 2013)
- Lower Capilano Marine Village Centre Transport Plan (CTS, 2013)
- Lower Capilano Marine Village Centre Design Guidelines and Streetscape Details (District of North Vancouver, 2014)

The objective of this study was to prepare preliminary functional road network drawings to support District discussions on future development opportunities including cost recovery and identifying preliminary property requirements.

Preliminary functional road network designs were prepared referencing District of North Vancouver, TAC's Geometric Design Guide for Canadian Roads, and TransLink's Infrastructure Design Guidelines. Designs were built of work by others including concept designs prepared as part of the Lower Marine – Capilano Village Transport Plan prepared by CTS. The CTS report, along with traffic assessments prepared as part of the Larco development, provided the traffic analysis input for storage bay lengths, overview assessments of interim conditions, and considerations on transit routing .

The functional design was developed based on the long-term plans for the study area and not all properties are expected to develop at the same time. Development of the long-term transportation network and planned streetscaping improvements that require land acquisition will have to be phased, where appropriate, to coincide with development.

The properties within the study area can generally be assigned to three categories:

1. Short- and mid- term development potential: some property owners in the study area have expressed an interest to the District in developing their properties under the guidance provided by the OCP and Lower Capilano Implementation Plan. Some have prepared materials required for zoning changes and development permits, while others have had expressed less formal interest. The phasing and implementation strategy includes a short discussion on how the street network can be expected to evolve as these developments proceed.
2. Long-term development potential: these properties may develop over the long-term, but are not expected to make significant changes to their properties in the short- and mid- term. The phasing and implementation strategy addresses the interim requirements to accommodate these sites.
3. Unlikely to develop: these properties are unlikely to develop and the long-term concept does not include property take from these properties or changes in geometry that may affect these properties. These properties generally include those south of Marine Drive, east of McGuire Ave, and a portion of the properties north of Curling Road at the western edge of the study area. These properties are not addressed in this phasing and implementation strategy, since the long-term plan will be achieved along with development assigned to category 2 – Long-term development potential.

Given the anticipated phasing scenarios for redevelopment, there are interim implementation strategies possible for several of the corridors identified within the study area. Strategies generally include alternative laning configurations, interim curb alignments and reduced standards. Interim options will require further detailed analysis and review as redevelopment occurs.

Class ‘C’ cost estimates for the road network were also completed as part of the study. Based on the designs completed to date, the long term road network vision is anticipated to cost \$7,240,000.

Utilities, detailed grading, environmental and geotechnical considerations, detailed legal and topographic survey, and other details were not evaluated or prepared as part of this study, but may present additional constraints and costs to the ultimate design or phasing strategies identified in this document. It is understood that the District will require future developments to evaluate the preliminary concept further as part of their detailed site designs to assist the District in confirming road dedications and to ensure that the proposed network will operate at a satisfactory level with the land uses proposed by proponents.

Achieving the long term vision and developing a complete community is achievable, and can be phased with possible interim strategies in the near to mid-term scenarios. This study and report builds off previously completed works by others, and provides a basis for discussion and support of District staff in assessing the long term requirements of the road network, and to help address development inquiries for the area. Further stages of detailed design and traffic analysis, whether by the District or through development applications, will continually help guide and focus the implementation and requirements to achieve the vision.

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1.0 Context

The Capilano Village Centre (Lower Capilano Marine Village) is one of the four neighbourhoods identified in the District of North Vancouver's Official Community Plan as a Village Centre and key area for growth. The development of the Lower Capilano Marine Village is guided by the following documents:

- District of North Vancouver Official Community Plan: Lower Capilano-Marine Village Centre (2011)
- Lower Capilano Marine Village Centre Implementation Plan (2013)
- Lower Capilano Marine Village Centre Transport Plan (2013)
- Lower Capilano Marine Village Centre Design Guidelines and Streetscape Details (Draft, 2014)

A conceptual plan of the Lower Capilano Marine Village Centre, developed by the District, is found in Figure 1-1, below



Source: District of North Vancouver Lower Capilano Marine Village implementation Plan (2013)

Figure 1-1: Lower Capilano - Marine Village Centre

In order to respond to development inquiries and to ensure that the transportation network is developed in a logical and consistent fashion, the District identified the need for an implementation plan for the area, which is noted above.

Subsequently, the District of North Vancouver retained Urban Systems to prepare a preliminary functional design for all roadways within the study area. This functional design is the subject of this report. The District of West Vancouver, TransLink, and the B.C. Ministry of Transportation and Infrastructure (MOTI) have received copies of this work and their comments have been incorporated into the final document. Squamish Nation has been made aware of this study and the resulting functional design.

As details concerning building and public space programming are finalized and more detailed survey and other information is available, it is important that the District maintains the flexibility to accept modifications to the functional concepts. The concepts provided in this report are intended to guide further stages of design to ensure that the overall transportation network is consistent and meets the needs of the community. It may be that, through additional work and detailed design development of individual properties and the area, modifications to the designs presented may be recommended such as to adjust or improve street or network operation as it relates to development scenarios, consideration of possible alternate streetscaping details, or other elements. The District has the ability to accept these changes as they arise through the detailed design process.

2.0 Network Requirements

The Lower Capilano-Marine Village Centre is a mixed use village centre with a multi-modal transportation network. The Lower Capilano Marine Village Transport Plan identified road network and transit improvements to accommodate anticipated development in the area along with background traffic growth. The District also is in the process of finalizing Design Guidelines and Streetscape Details and preferred cross-sections for the roads in the Village Centre. The needs outlined by these documents were used to inform the functional design and are outlined below.

2.1 Road Network

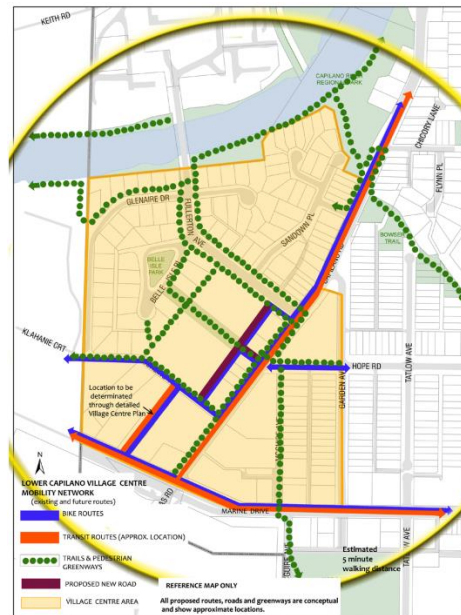
The Lower Capilano-Marine Village Centre section of the District's Official Community Plan (2011) proposed a future mobility network for the community. The proposed road network included a new road connecting Fullerton Avenue and Curling Road west of Capilano Road. The OCP also identified a new road connecting this north-south road to Capilano Road around Hope Road. The mobility network proposed in the OCP is illustrated in Figure 2-1.

- The Lower Capilano Marine Village Transport Plan (Transport Plan 2013) prepared by CTS in February 2013, assessed the impact of new trips on the road network associated with anticipated redevelopment in the Lower Capilano-Marine Village Centre. The report identified a number of improvements to the road network. The Transport Plan developed the mobility network to a concept plan by analyzing future forecast traffic volumes, intersection configuration, and control at key intersections. Based on the results of that analysis, the report recommended a number of improvements to the road network. These improvements are summarized below: Intersection improvements on Fullerton Avenue to provide both an eastbound left turn lane onto Capilano Road and a westbound left turn lane onto the new North-South Road.
- Intersection improvements on Curling Road to provide both an eastbound left turn lane onto Capilano Road, a westbound left turn lane onto the new North-South Road, and signalization of Curling Road at Capilano Road.
- Improvements to lane width and cross-section of Capilano Road, including provision of a new exclusive southbound left turn lane and exclusive southbound through lane at Capilano Road and Marine Drive.
- Development of wider McGuire Avenue to a 3 lane cross-section with centre left turn lanes.
- Cross Road aligned with McGuire Avenue extension.
- Transit priority on McGuire Avenue.
- New signal at McGuire Avenue.
- Multiple crossings optional/ alternate to Capilano Road and Marine Drive.
- Pending further consultation and consideration, possible future extension of Curling Road to Garden Avenue.

The most significant improvements and the form of the recommended road network from the Transport Plan were identified in the Lower Capilano-Marine Village Centre Implementation Plan (Implementation Plan). Transit integration planning work with Nelson\Nygaard led to revisions to the road network, which

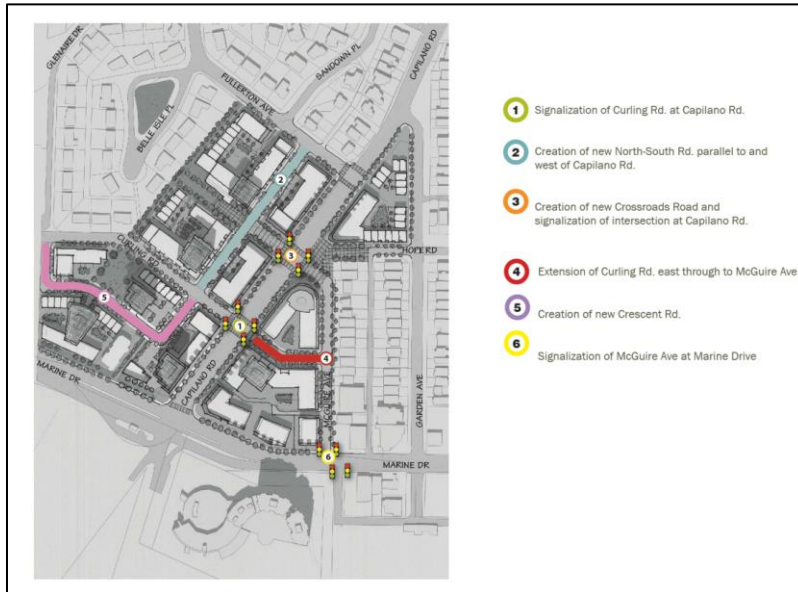
were incorporated into the Implementation Plan. This road network and the most significant improvements are shown in the road network map, as illustrated in Figure 2-1 and Figure 2-2.

The detailed concept developed as part of the Transport Plan is illustrated in Figure 2-3.



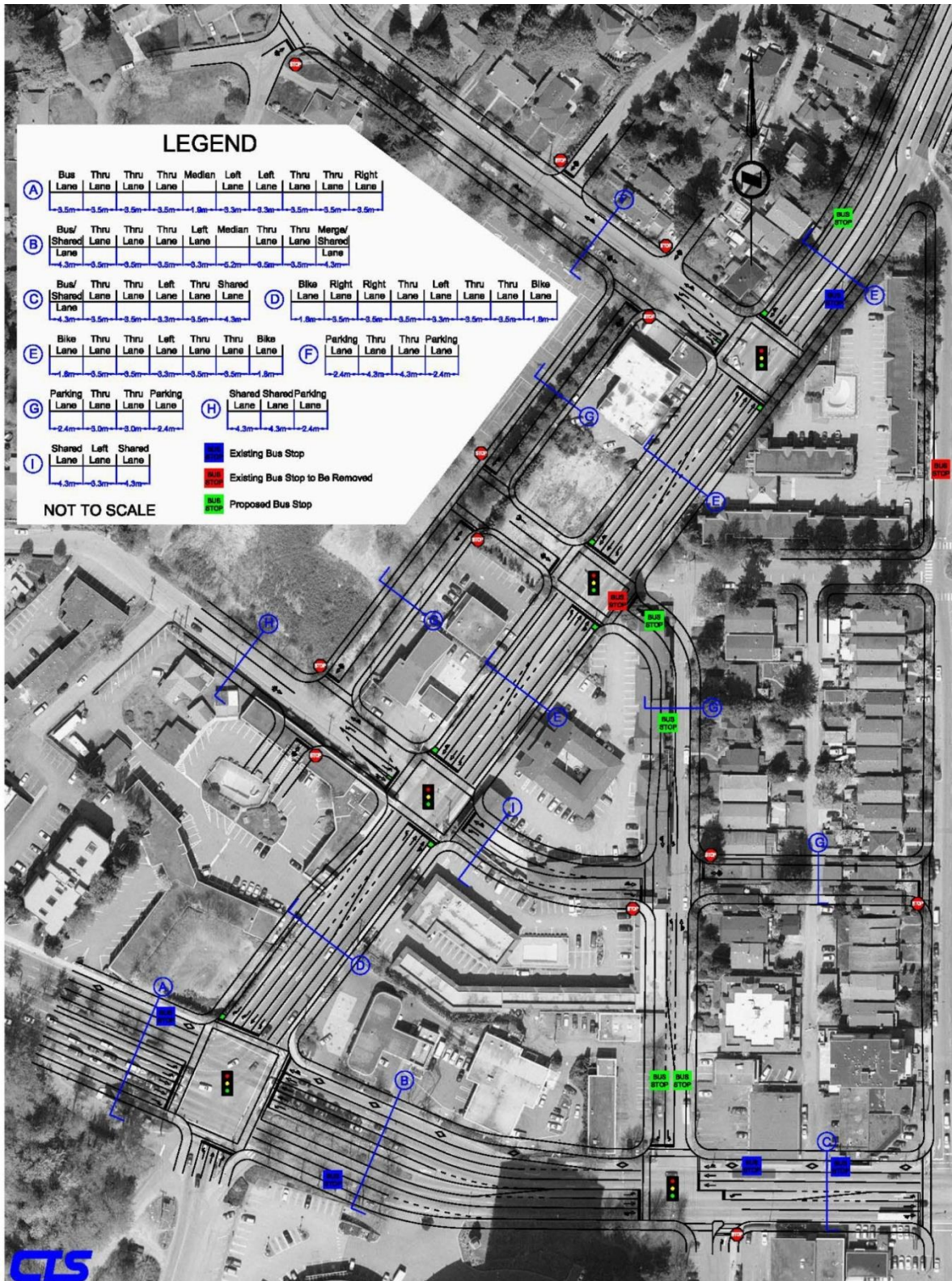
Source: District of North Vancouver Official Community Plan (2011)

Figure 2-1: Lower Capilano - Marine Village Centre Mobility Network Map from Official Community Plan



Source: District of North Vancouver Lower Capilano-Marine Village Implementation Plan (2013)

Figure 2-2: Lower Capilano - Marine Village Centre Road Network Map



Source: District of North Vancouver Lower Capilano-Marine Village Transport Plan (CTS, 2013)

Figure 2-3: Lower Capilano - Marine Village Centre Concept Plan

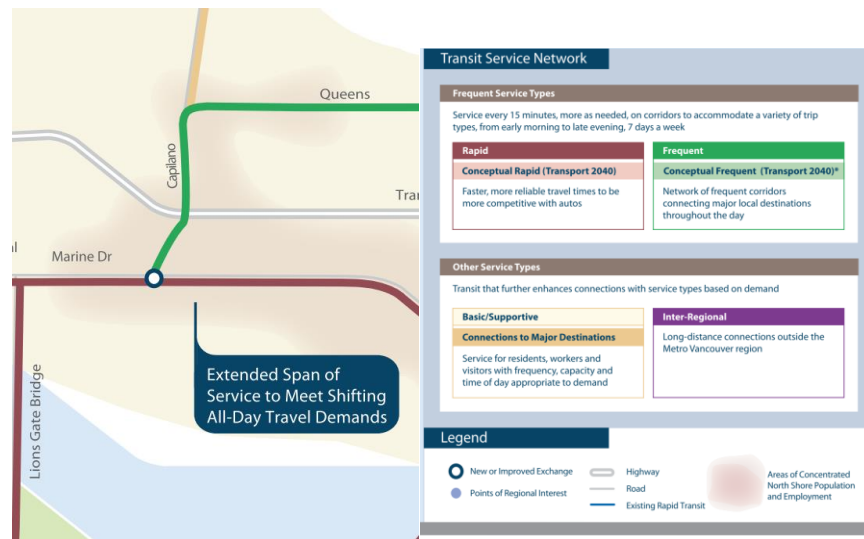
2.1.1 Current Proposed Road Network Design

The network proposed in the OCP has been refined through the functional design process. Road alignments have been adjusted based on input from key stakeholders and to minimize property acquisition requirements, while meeting needs for the vehicle and alternative mode networks. These changes have been made following discussions with key stakeholders and as a result of further analysis.

2.2 Transit Network

The Lower Capilano-Marine Village area currently has bus service on Marine Drive, Capilano Road, and Garden Avenue. Garden Avenue serves as a southbound bypass of Capilano Road, which experiences queuing and delays in the southbound direction during peak periods.

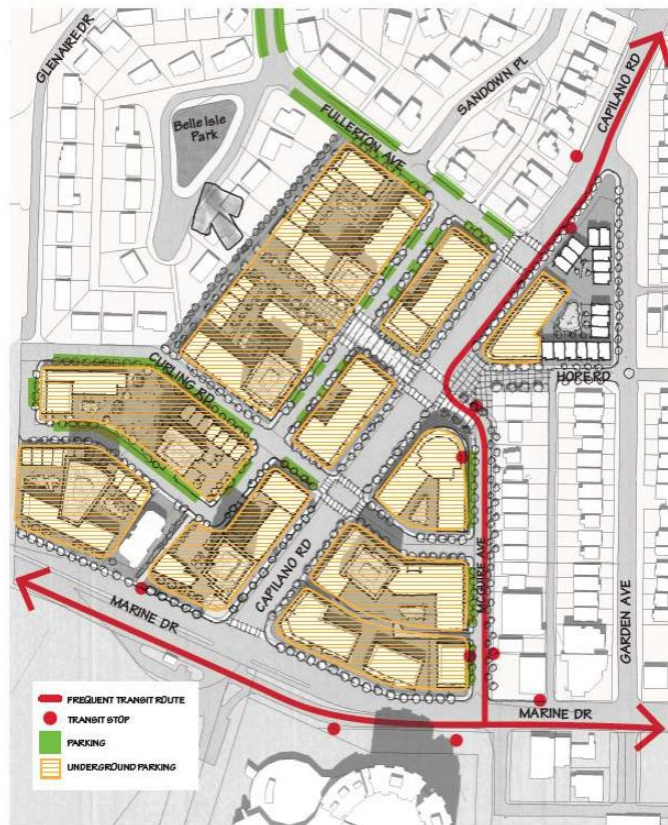
The North Shore Area Transit Plan indicates that Marine Drive is intended to have Rapid Transit service in the future. Marine Drive is currently listed as part of the Frequent Transit Network (FTN) and B-Line service is envisioned in the 2014 Mayor’s Vision for Metro Vancouver’s Transportation Network. Capilano Road (or an adjacent route) will have frequent transit service in the future. The proposed transit network for 2040 is illustrated in Figure 2-4.



Source: TransLink North Shore Area Transit Plan 2040 Transit Network Vision

Figure 2-4: North Shore Area Transit Plan 2040 Vision

The District’s Implementation Plan for the area identified a proposed transit network for the Lower Capilano-Marine Village. This plan includes rerouting transit currently travelling on Garden Avenue and Capilano Road to McGuire Avenue. Four bus stops are planned for McGuire Road. The transit network included in the Implementation Plan is illustrated in Figure 2-5.

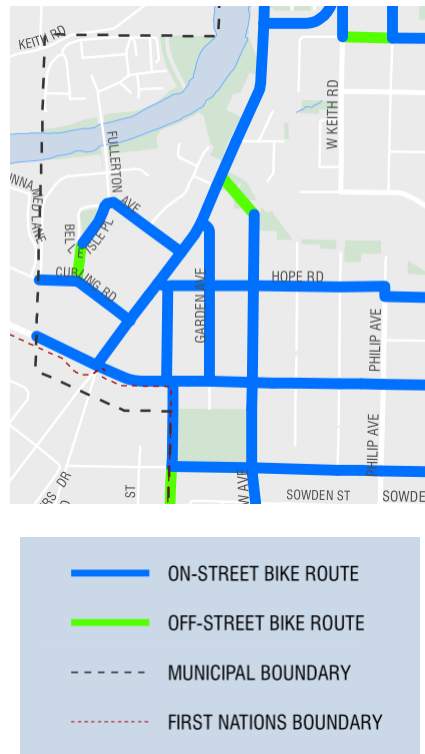


Source: District of North Vancouver Lower Capilano-Marine Village Implementation Plan (2013)

Figure 2-5: Lower Capilano - Marine Village Centre Transit Network Map

2.3 Cycling Network

The District and the City of North Vancouver jointly updated the North Vancouver Bicycle Master Plan in 2012. This plan included a cycling network in the Lower Capilano-Marine Village area. On-street bike routes are identified on Capilano Road, Marine Drive, Curling Road, Fullerton Avenue, McGuire Avenue, and Garden Avenue. Based on this plan, most roads in the study area require cycling accommodation. The bicycle network plan is shown in Figure 2-6. The Implementation Plan for the Lower Capilano Marine Village Centre area further identified additional cycling accommodation on the planned streets and pathways and is illustrated in Figure 2-7.



Source: North Vancouver Bicycle Master Plan (2012)

Figure 2-6: North Vancouver Cycling Master Plan



Source: District of North Vancouver Lower Capilano-Marine Village Implementation Plan (2013)

Figure 2-7: Lower Capilano - Marine Village Centre Cycling Network Map

2.4 Pedestrian Network

The Lower Capilano–Marine Village is intended to be a walkable neighbourhood. Wide sidewalks with boulevards are an important component of all planning work done for this area. Furthermore, the District’s plans include developing the pedestrian network further, with connections to key destinations, trails, and greenways.



Source: District of North Vancouver Lower Capilano-Marine Village Implementation Plan (2013)

Figure 2-8: Lower Capilano - Marine Village Centre Pedestrian Network Map

3.0 Design Criteria

The design criteria described below were used to develop the functional design for the transportation network in the Lower Capilano-Marine Village Centre.

3.1 Conceptual Design

The conceptual design for improvements to the Lower Capilano – Marine Village Centre was developed in 2013 as part of the Lower Marine-Capilano Village Transport Plan by CTS. The conceptual design proposed by this plan was augmented by other work prepared in advance of the functional design, including the following Improvements to Fullerton Avenue were proposed as part of the Fullerton Avenue Streetscape Plan, which was developed by the Fullerton Area Streetscape Improvement Committee in 2013 by Bunt and Associates and has concurrence from DNV staff and Council. Some conceptual design elements were further explored through the development of the Cap West Mixed Use Development: TIA Draft Report by Bunt and Associates.

3.2 Preliminary Functional Design

This section describes the design criteria adopted in the development of the preliminary functional design for the Lower Capilano – Marine Village Centre.

3.2.1 Other Inputs Influencing Current Functional Design

The product of this study is a preliminary functional design for the roadway. The functional design was informed by conceptual design work completed by others, as described earlier. Development of the preliminary functional design also incorporated the results of work by others. The following elements

- The Transport Study (CTS, 2013) provided a conceptual road network drawing using forecast traffic volumes which was used for general direction on laning requirements for the functional design.
- Bunt and Associates later completed additional network, as part of their work on behalf of the developers for the Larco site and Grouse Inn site. Work for the Larco site is documented in the Cap West Mixed Use Development Transportation Impact Assessment (Bunt, 2013).
- Bunt and Associates also prepared a traffic calming design for Fullerton Avenue for the neighbourhood that has been endorsed by the District. Urban Systems has synthesized the information from all provided documents to develop a functional design.
- PWL's Public Realm Planning works, provided by the District and incorporated where directed.

It is noted that while each document had synergies with the other, there were some key differences. These included:

- Assumptions on traffic volumes – the original CTS Transport Study included different trip generation and distribution assumptions than the Cap West Mixed Use Development Transportation Impact Assessment (Bunt, 2013). The results of Bunt's study did not change the intersection configurations in the long-term horizon.

- Requirements for Curling Road west of Capilano Road were developed in consultation with Bunt based on their work for the Larco and Grouse Inn Sites. It was determined that westbound left turns from Curling Road to Crescent Road should be restricted to improve traffic flow and reduce queuing. A third intersection on Curling Road between the two planned Crescent Road intersections is expected to provide alternative access to the Grouse Inn site.
- Design and laning requirements for Fullerton Avenue were taken from the Fullerton Avenue Traffic Calming Study by Bunt. These recommendations were assumed to supersede the earlier work by CTS.

Further refinements to site assumptions are anticipated through individual traffic impact studies that will be completed with each development.

Following discussions with TransLink and a high level review of transit movements and potential for short-cutting on McGuire Avenue, DNV agreed to transit-only restrictions for the southbound left at McGuire Avenue & Capilano Road and the eastbound left at Marine Drive & McGuire Road. With these restrictions in place, the northbound and southbound left turn lanes at McGuire Avenue & Curling Road are not expected to be required and have been removed from the current functional design. These restrictions are expected to slightly increase delay at Marine Drive and Capilano Road.

3.2.2 Design Guidelines

The following design guidelines were consulted to develop the design criteria for the functional design:

- TAC Geometric Design Guide for Canadian Roads (1999)
- District of North Vancouver Development Services Bylaw (2011)
- TransLink Infrastructure Design Guidelines (2010)

3.2.3 Typical Design Criteria

The functional design used the following design parameters, derived primarily from the previously prepared cross-sections provided by the District, and with reference to the guidelines above:

- Design speed: 30-50km/hr
- Design vehicle: Intercity Bus (I-BUS) / Tractor Trailer (22.7m) (WB-20)¹
- Lane width: 3.0 to 4.3 m

¹ Design vehicles noted were used to assess specific routes / movements with special needs (i.e. I-BUS for bus routes and WB-20 for goods movement routes). Curb radii at intersections were designed per DNV's design criteria or alternative designs provided by DNV which were already proposed by developers. Intersection movements were also confirmed using a Medium Single Unit (MSU) design vehicle. The functional design includes consideration for garbage trucks to navigate intersection movements as needed. Fire trucks are not constrained to a single lane and intersection movements can be navigated using the whole as required. Detailed design stages will further confirm specific turning movement requirements as additional details are developed. Adjustments made to accommodate specific turning movements during detailed design would not be expected to result in any additional ROW requirements.

- 3.0 m lanes for local roads and lanes where no transit vehicles and minimal heavy vehicles (delivery only) are expected
- 3.30 to 3.50 m lanes on transit routes, as identified in the District's desired cross-sections
- 3.5 m lanes on major arterials
- 4.3 m lanes where curb lanes are shared with cyclists
- Note: Per DNV directions, where cycling lanes are adjacent to the curb, the gutter pan was not included in the lane measurement. Where no cycling facility existed, the gutter pan was included in the lane width. This is illustrated in **Figure 3-1**.
- Cycle lane width: 1.8 to 2.0 m
 - 1.8 m for cycle lanes on arterial roads
 - 2.0 m for bicycle boulevards on collector roads
- Boulevard width: 2.0 m to accommodate landscaping
- Sidewalk width: 2.0 m to 3.0 m
- Design vehicle: I-Bus

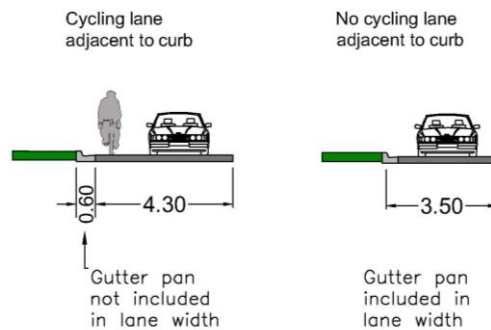


Figure 3-1: Inclusion of Gutter Pan in Lane Width

Each road required specific treatment within these ranges and are further detailed in Section 5.0.

4.0 Design Constraints

Design constraints within the study area primarily relate to the phasing and anticipated redevelopment timelines of individual properties.

While there is significant redevelopment opportunities identified, the timing of individual properties may prevent the full vision from being developed in the near term. Of particular note, the District identified that the two gas stations, the Shell and Petro Canada sites, are unlikely to redevelop in the near future. These locations are identified in Figure 4-1 below. These two sites may restrict the full development of the cycling facilities and streetscape widths desired. Phasing opportunities around these properties are highlighted in Section 8.0.

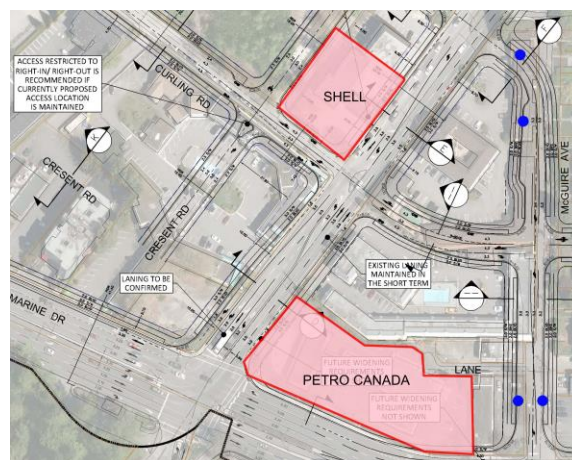


Figure 4-1: Shell and Petro Canada Sites

Utilities, detailed grading, environmental and geotechnical considerations, detailed legal and topographic survey, and other details were not evaluated or prepared as part of this study, but may present additional constraints to the ultimate design or phasing strategies identified in this document. It is understood that the District will require future developments to evaluate the preliminary concept further as part of their detailed site designs to assist the District in confirming road dedications and to ensure that the proposed network will operate at a satisfactory level with the land uses proposed by proponents.

5.0 Preliminary Functional Design

The proposed preliminary functional design for the Lower Capilano – Marine Village Centre area is included in Appendix A. The cross-sections associated with each road are included in Appendix B. This section includes a description of the proposed design, constraints, and considerations for each roadway.

5.1 Base Plans

To facilitate a review of the road network, including long-term needs and potential phasing options, base plans were generated for the study area using information provided by the District of North Vancouver. Information provided included cadastral mapping, such as property lines, approximate curb and sidewalk locations, approximate utility locations, and orthophotos for background images. It is noted that the information provided cannot be guaranteed for accuracy, but is generally suitable at this level of conceptual/ functional design.

5.2 Typical Sections

As a first step in developing the road network and property requirements, typical sections for the key roadways were developed based on sketches provided by the District of North Vancouver. The typical sections were revised and updated following review and feedback by the District. Typical sections for each roadway are included in Appendix B.

5.3 Road Network

Functional designs of the road network alignments were generated utilizing the proposed typical sections developed under the District's guidance and discussed above. These draft road alignments were used to begin consideration around property requirements, opportunities for phasing, and general network needs. A copy of the functional design for the road network is included in Appendix A. Individual details for each street within the road network are detailed in the sections below.

5.3.1 Marine Drive

Marine Drive is an east-west roadway serving local and regional traffic travelling through the District of North Vancouver. Businesses facing Marine Drive will not be permitted accesses in the future; these properties will have access from McGuire Avenue, Curling Road, or the Crescent Road. Marine Drive provides access to the City of Vancouver via the Lions Gate Bridge. Marine Drive is a major bus route on the FTN. Note that the West Vancouver municipal boundary referenced throughout this section is also marks the beginning of B.C. MOTI's jurisdiction

- Eastbound:
 - Existing design is maintained from the municipal boundary to midblock between Capilano Road and McGuire Avenue.
 - Existing south side curb and sidewalk maintained throughout study area.

- New 3.30 m eastbound left turn lane from Marine Drive to McGuire Avenue with 20.6 m of storage. As shown, the property to accommodate additional lane taken from north side. Availability of this property to be determined.
- New 3.30 m eastbound left turn lane from Marine Drive to Garden Avenue with 21.1 m of storage. As shown, property to accommodate additional lane taken from north side. Availability of this property to be determined.
- Westbound:
 - New westbound left turn lane from Marine Drive to Garden Avenue. Two westbound through lanes and one wide (4.3 m) shared transit/ bike lane also provided westbound at this location as existing. Property to accommodate additional lane taken from north side.
 - New westbound left turn lane from Marine Drive to McGuire Avenue. Two westbound through lanes and one wide (4.3 m) shared transit/ bike lane also provided westbound at this location as existing. As shown, property to accommodate additional lane taken from north side. Availability of this property to be determined.
 - Large curb radii for southbound right turn lane from McGuire Avenue to Marine Drive to accommodate bus movements. Property to accommodate larger radii taken from northwest corner.
 - Combined sidewalk and boulevard widened to 4.0 m from Garden Avenue to west of McGuire Avenue. As shown, property to accommodate additional lane taken from north side. Availability of this property to be determined; some alternative arrangement for a portion of the sidewalk and / or boulevard on private property may be applied to achieve this component of the functional design.
 - Existing curb and sidewalk maintained from midblock between Garden Avenue and McGuire Avenue to Capilano Road
 - Existing wide 4.3 m shared bus and cycle lane modified to one 3.5m bus lane and one elevated off-street 1.8 m cycle track from Capilano Road to West Vancouver municipal boundary. Accommodating the transit stop at Capilano Road is accomplished by shifting the cycle track to the north for the length of the stop.
 - New additional 4.0 m boulevard from Capilano Road to West Vancouver municipal boundary.
 - Sidewalk widened to 2.5 m from Capilano Road to West Vancouver municipal boundary.

Signal coordination should be explored along Marine Drive for the four closely spaced signals at Capilano Road, McGuire Avenue, Garden Avenue, and Tatlow Avenue. The Capilano Road / Marine Drive intersection is also in close proximity to the proposed new signals at Capilano Road / Curling Road, which is in close proximity to a second proposed new signal at Capilano Road / McGuire Avenue. The eastbound left turn phase at Capilano Road / Marine Drive will need to be coordinated with the northbound phase at Capilano Road / Curling Road. This is very important to avoid queuing into the Capilano Road / Marine Drive intersection. Because of the long cycle length at the Capilano Road / Marine Drive intersection, the intersection of at Curling Road / Capilano Road may require half cycle coordination.

During the morning and afternoon peak hours, traffic sometimes queues through the intersection of Capilano Road / Marine Drive. Northbound queues can be mitigated somewhat through effective signal coordination, as described above; however, westbound queues resulting from delays at the Lions Gate

Bridge are more difficult to mitigate. Signs warning drivers “Do Not Block Intersection” may be helpful, along with special pavement marking.

5.3.2 Capilano Road

Capilano Road is a major arterial joining the north residential areas in the District of North Vancouver to Marine Drive and connecting to Highway 1. Street-facing commercial is planned for Capilano Road and it will form an important part of the village heart. Businesses facing Capilano Road will not be permitted accesses in the future; these properties will have access from McGuire Avenue, Curling Road, or the North-South Community Street. Buses currently use Capilano Road northbound from Marine Drive to the north terminus of the study area. Southbound buses currently exit Capilano Road at Garden Avenue to avoid delays caused by southbound queues on Capilano Road from Marine Drive. In the future, transit is envisioned to use McGuire Avenue to Marine Drive to bypass Capilano Road congestion. There are existing northbound and southbound cycle lanes from Fullerton Avenue to Highway 1.

- Northbound
 - Existing cross-section is maintained north of Fullerton Avenue.
 - New 1.8 m cycle lane from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from east side. (It is noted that there is available room to incorporate the bicycle lane as an off-street cycle track, should the District prefer that option in future.² This may also support retaining the existing curb alignment for the interim and long term conditions. By maintaining the existing curb alignment more options are available for a consistent curb alignment throughout the corridor in the interim and ultimate conditions)
 - Existing northbound travel lanes widened to 3.5 m from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from east side.
 - Storage for northbound left turn lane from Capilano Road to Curling Road extended to 15.7 m. No property needed to accommodate; land taken from existing median.
 - New 3.3 m left turn from Capilano Road to McGuire Avenue Extension with 16.7 m of storage. No property needed to accommodate; land taken from existing median.
 - New 2.0 m boulevard from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from east side.
 - Sidewalk widened to 3.0 m from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from east side.
- Southbound
 - Existing cross-section is maintained north of Fullerton Avenue.
 - New 1.8 m cycle lane from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from west side. (It is noted that there is available room to incorporate the bicycle lane as an off-street cycle track, should the District prefer that option in future. This may also support interim strategies in retaining the existing curb alignment.)

² Both northbound and southbound the cross-section could be modified to include an elevated off-street cycle track on the outside of the curb lane. This reduces the required pavement width and may allow the District to maintain the existing curbs in the ultimate condition. Further work would be required at the detailed design stage to determine the widths required to maintain the existing curb.

- Existing southbound travel lanes widened to 3.5 m from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from west side.
- New 3.5 m southbound left turn lane from Capilano Road to Curling Road extension. No property required as space was taken from existing merge.
- New 2.0 m boulevard from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from west side.
- Sidewalk widened to 3.0 m from Fullerton Avenue to Marine Drive. Property to accommodate lane taken from west side.
- The southbound left from Capilano Road to McGuire Avenue is expected to be limited to transit only, subject to further analysis. This would provide a bypass for buses around southbound queuing in the morning peak period and restrict short-cutting of general purpose traffic on McGuire Avenue.

Traffic signal coordination should be explored along Capilano Road for the four closely spaced signals at Marine Drive, Curling Road, McGuire Avenue, and Fullerton Avenue.

5.3.3 McGuire Avenue

TransLink and the District have identified McGuire Avenue as a future bus route. Northbound buses currently using Capilano Road and southbound buses currently using Garden Avenue will use McGuire Avenue in the future once intersection and road improvements are implemented. McGuire Avenue will also provide access to residences and businesses. Businesses facing Capilano Road will not be permitted accesses in the future; these properties will have access from McGuire Avenue or Curling Road.

Three alternative alignment options for the McGuire Avenue extension across Capilano Road were evaluated. They included consideration of property impacts, redevelopment opportunities, and road functionalities. Ultimately, the District's preferred option remained consistent with that shown in their original concept sketches.

McGuire Avenue is expected to serve a small amount of local traffic, as well as being a significant bus, bike and pedestrian route. In this context, TransLink and the District agreed that buses would stop in lane and that 3.3 m travel lanes are permissible. Four bus stops are planned for McGuire Avenue – two northbound and two southbound. Shortcutting is expected to be limited by restricting left turns onto McGuire Avenue from southbound Capilano Road and eastbound Marine Drive. General notes regarding the design and alignment are below:

- Road realigned to provide linkage across Capilano Road as McGuire Avenue Extension at a new intersection. The existing intersection of Hope Road & McGuire Avenue is closed. Lane widths widened at intersection to accommodate turning movements of vehicles. Property to accommodate realignment taken from southeast corner of intersection.
- The design of a public plaza area on the northeast corner of McGuire Avenue and Capilano Road is currently being considered by the District. Additional options integrating transit movements with the plaza may be explored during detailed design stages.
- Existing 6 m two-way lane widened to two 3.3 m travel lanes (one northbound, one southbound). Property to accommodate additional width taken from west side.

- Northbound:
 - New 2.0 m sidewalk from Marine Drive to Capilano Road. Property to accommodate taken from west side.
 - New 2.0 m boulevard from Marine Drive to Capilano Road. Property to accommodate taken from west side.
 - New 2.0 m bike boulevard from Marine Drive to Capilano Road. Property to accommodate taken from west side.
- Southbound:
 - New 2.0 m sidewalk from Marine Drive to Capilano Road. Property to accommodate taken from west side.
 - New 2.6 m boulevard from Marine Drive to Capilano Road. Property to accommodate taken from west side.
 - New 2.0 m bike boulevard from Marine Drive to Capilano Road. Property to accommodate taken from west side.
 - New 2.4 m parking lane north and south of Curling Road. Property to accommodate taken from west side.

5.3.4 Curling Road

Curling Road is a local street providing access to some of the new development areas, as well as existing residences and businesses further west; it is the only access for some properties in the District of West Vancouver. The Transport Plan (CTS, 2013) identified a potential extension of Curling Road to Garden Avenue. This is conceptual in nature and is not included in the District's implementation plan. It is shown in the functional design to demonstrate how this type of extension would be integrated with other road improvements. Intersection requirements at Curling Road and Capilano Road were presented in the Transport Plan (CTS, 2013) and through the traffic studies prepared by Bunt and Associates for the Larco site.

- Westbound:
 - 4.3 m wide travel lane accommodating shared cycling facilities
 - 2.4 m parking lane, where space available
 - New 2.0 m boulevard from Capilano Road to western limits
 - Note: Adjacent to the Shell site, a 3.0m wide sidewalk/ boulevard space is designed for the interim condition.
 - New 2.0 m sidewalk
- Eastbound
 - 4.3 m wide travel lane accommodating shared cycling facilities
 - 2.4 m parking lane, where space available
 - 3.3m left turn bay at Capilano Road and at McGuire Avenue
 - New 2.0 m boulevard from Capilano Road to western limits
 - New 2.0 m sidewalk

Property requirements were balanced as best as possible from the north and south side of Curling Road. Road alignment is dictated, in part, by the interim condition needed adjacent to the Shell site with a 3.0 m sidewalk space.

5.3.5 Fullerton Avenue

Fullerton Avenue is a local street providing access to the Larco site and other existing residential and other uses. The Fullerton Avenue Streetscape Plan for Fullerton Avenue from the bridge over the Capilano River to west of the North-South Community Street was completed by Bunt and Associates and incorporated into the functional design.

- Fullerton Avenue west of North-South Community Street:
 - Existing wide lanes narrowed to 4.3 m wide
 - 2.4 m parking pockets
 - Raised crosswalk across Fullerton on east side of Sandown Place
 - Traffic circle at Belle Isle Place & Fullerton Avenue
 - Curb bulges at intersections

Per the Transportation Impact Assessment (TIA) completed by Bunt and Associates, no westbound left turn lane from Fullerton Avenue to the North-South Community Street was included in the design. This provides space for a longer eastbound left storage lane from Fullerton Avenue to Capilano Road and assumes westbound through vehicles can navigate around any westbound left-turning traffic that may momentarily queue at the North-South Road. Based on analysis by Bunt and Associates, a westbound left turn lane at Fullerton Avenue / North-South Community Road is not needed.

5.3.6 North-South Community Street

The North-South Community Street is focused on moving local traffic and pedestrians. It will provide access for deliveries to the parcels east of Capilano Road and will attract traffic, cyclists, and pedestrians travelling to the planned community centre. Parking and pick-up/ drop-off opportunities are provided on both sides of the road. This is a new road that replaces an existing lane. The road allowance is to be 16.0m. There is an existing 6.0 m lane north of Curling Road along a parallel alignment to the North-South Community Street. 4.0 m of this lane will be allocated to the properties on Capilano Road as a land swap for property to accommodate the expansion of Capilano Road. 14.0m of property for the North-South Community Street will be acquired from the Larco site.

The District held a co-design workshop with community members, representatives of developers, local land owners, District staff, and consultants on May 7, 2014. The North-South Community Street was a key element of this workshop. Urban Systems prepared a number of options as input to this session. PWL has separately prepared a concept plan for the street under consideration. The elements described below are per the original design work and are subject to revision.

- Northbound and southbound 3.0 m travel lanes
- 2.4 m parking lanes on both sides of the road and landscape bulges Street lighting to be incorporated into landscape bulges and / or sidewalk.
- 2.3 m sidewalks on both sides of the road

Options for the street have also included angled parking and various paving treatments.

5.3.7 Crescent Road

The current functional plan reflects the latest concept provided by the developer of the Grouse Inn Site. The road allowance for Crescent Road is to be 16.0m. The anticipated cross-section elements of this roadway include:

- 3.0m wide travel lanes on both sides of the road
- 2.4m parking lanes on both sides of the road, where space is available
- New 2.4 m boulevards on both sides of the road alternating with parking lanes to maintain 16,0 m cross-section.
- New 2.3 m sidewalks on both sides of the road

The District's current concept includes a cul-de-sac, with a multi-use pathway connection in line with the North-South Street.

6.0 Issues and Impacts

This section identifies the property impacts associated with the ultimate designs.

6.1 Property Requirements

Property impacts and requirements were detailed as part of the functional design. The property requirements detailed as part of this study provide initial estimation to support internal District discussions on potential redevelopment. It is anticipated that further refinement of property requirements will be established through detailed design work.

It is noted that the preferred streetscape and laning requirements require additional property impacts to what was originally anticipated by the District. In particular, the following are noted:

- Capilano Road:
 - Property requirements range between 6-10 m. Prior to this study, the District had anticipated only 4-8 m. This may be mitigated by encouraging consolidation and providing on-street loading for any heavy vehicle movements required by these sites.
- McGuire Avenue:
 - Laning requirements, such as requirements for bus turning radii, require additional right-of-way width from what was originally anticipated by the District in the typical sections provided.

Property requirements for the long-term transportation network are detailed in Appendix C.

6.2 Phasing and Interim Conditions

Detailed phasing and implementation discussion and strategies are outlined in Section 8.0 of this report. However, it is noted that the interim conditions may present issues on connectivity. It will be important to review opportunities, as redevelopment occurs, for internal network connections and alternate routing during interim stages of the ultimate vision, while minimizing costs.

6.3 Utilities

Utilities were not evaluated as part of the study, but may present additional constraints, costs and requirements on phasing of developments, and in development of the road network. There are, of note, several high value utilities of significance including Metro Vancouver mains, vaults and chambers, fibre optic lines, and other. It is recommended that the locations, possible impacts, and timing of utility upgrades, as well as the potential for undergrounding of utilities, be reviewed further as detailed designs are advanced and redevelopment opportunities are evaluated.

6.4 Geotechnical and Environmental Considerations

Geotechnical and environmental considerations were not considered as part of this study. These will be required to validate assumptions contained in this study.

7.0 Cost Estimates

Class 'C' cost estimates were prepared for all roads within the study area. Estimates were based on the ultimate condition, unless where explicitly noted on the drawings. The following design assumptions were included as part of the design and cost estimating:

- Estimates include allowances for Mobilization/Demobilization, Survey Layout, Traffic Management, and Quality Management
- Estimates and allowances for removals, relocations, and adjustments of existing surface infrastructure were included in the estimate.
- Road construction:
 - Milling and overlay of existing road areas, with the exception of McGuire Ave and the N-S Street, was included in the design – it is assumed that road structures are generally suitable.
 - Full depth road reconstruction was assumed for areas of road widening, as well as for the length of McGuire Ave and the N-S Street.
 - Curb and gutter are included throughout. Where possible, existing curb is retained, such as on the north side of Fullerton Avenue.
- Boulevard landscaping assumed topsoil, seed, and trees.
- Catchbasins and lead were included in the estimates, however storm sewer mains were not part of the scope of work, and not included in the estimate.
- Traffic signals were included in the estimate where noted as new, relocated, or possible upgrades.
- New streetlighting was assumed on all corridors. Streetlighting was assumed to be ornamental standard style lights and an allowance for pedestrian lighting was included.
- Hydro poles were assumed to be relocated where impacted by the design. Undergrounding of power/tel/cable was not included in the cost estimates. Undergrounding can be expected to cost between \$500 and \$5,000 per meter depending on the complexity of the utility. Conversion of transformer locations and building services would be additional. Interim phases may require maintaining overhead services until underground tie ins have been provided on all neighbouring properties. Consultation with utility providers is required before more detailed planning for undergrounding can be completed.
- Allowances for pavement markings and signage are included in the estimates
- Estimates include a 30% contingency, and 15% for Engineering and Supervision

Table 7-1, identifies the summary costs for each road segment including engineering and contingency allowances.

Table 7-1: Cost Estimate Summary

	Road Segment	Total Cost (incl. engineering and contingency)
1.0	Capilano Road	
	Marine Drive to Fullerton Ave	\$ 1,390,000
2.0	Marine Drive	
	District Boundary to Tatlow Ave	\$ 1,010,000
3.0	McGuire Street	
	Marine Drive to McGuire Avenue Extension	\$ 1,950,000
4.0	Curling Road	
	Glenaire Drive to Capilano Road	\$ 1,050,000
	Capilano Road to McGuire Ave	\$ 310,000
5.0	N-S Community Street	
	Curling Road to Fullerton Ave	\$ 650,000
6.0	McGuire Avenue Extension	
	N-S Community Street to Capilano Road	\$ 170,000
7.0	Crescent Road	
	Glenaire Drive to Curling Road (Developer design proposal TBC. Cost estimate not completed)	N/A
8.0	Fullerton Ave	
	Capilano Road to Glenaire Drive	\$ 640,000
9.0	Hope Road	
	McGuire Ave to Garden Ave	\$ 70,000
	TOTAL	\$ 7,240,000

It is noted that the cost estimates provided do not include underground servicing or utilities. Additional utility requirements, including servicing, may present additional costs to those listed above.

Detailed cost estimates for each of the road segments can be found in Appendix D.

8.0 Phasing and Implementation Strategy

This section provides a preliminary identification of the constraints that will inform the development of street elements and a potential phasing and implementation strategy. The functional design was developed based on the long-term plans for the study area and not all properties are expected to develop at the same time. Development of the long-term transportation network and planned streetscaping improvements that require land acquisition will have to be phased to coincide with development.

The properties within the study area can generally be assigned to three categories:

1. Short- and mid- term development potential: some property owners in the study area have expressed an interest to the District in developing their properties under the guidance provided by the OCP and Lower Capilano Implementation Plan. Some have prepared materials required for zoning changes and development permits, while others have expressed less formal interest.
2. Long-term development potential: these properties may develop over the long-term, but are not expected to make significant changes to their properties in the short- and mid- term. The phasing and implementation strategy addresses the interim requirements to accommodate these sites.
3. Unlikely to develop: these properties are unlikely to develop and the long-term concept does not include property take from these properties or changes in geometry that may affect these properties. These properties generally include those south of Marine Drive, east of McGuire Ave, and a portion of the properties north of Curling Road at the western edge of the study area. These properties are not addressed in this phasing and implementation strategy, since the long-term plan will be achieved along with development assigned to category 2 – Long-term development potential.

The sections below describe each corridor and some key intersections within the transportation network and identify how the components of the long-term strategy may be phased over time.

8.1 Corridors

8.1.1 Marine Drive

The long term plan for Marine Drive can be accomplished by modifying the curb and boulevard / sidewalk on the north side of the road. The south curb and median are expected to be maintained as-is in the long-term.

District of North Vancouver Municipal Boundary to Capilano Road

The District can widen the existing bus lane, add the elevated cycling track, and widen the boulevard and sidewalk to the north side of the road through this segment as property becomes available. Assuming the Grouse Inn site develops in the short-term, the portion from Capilano Road to the west end of the Grouse Inn property could be developed first, with the bike lane merging into the bus lane to meet the existing curb at the end of the property. Improvements on the remaining section could be delayed until all properties are available to provide a consistent cross-section. Alternatively, the elevated cycle track could

be used as a wide sidewalk or multi-use path in the interim until the full length becomes available. The office building to the west of the Grouse Inn is not likely to redevelop in the near future.

Marine Drive & Capilano Road Intersection

Changes to the northwest corner of this intersection (lane widening, corner reconstruction, sidewalk and boulevard widening, new turn lanes) can be completed when the Grouse Inn property redevelops. Changes to the south leg of the intersection do not require additional property, however will require coordination and support from the Squamish Nation. This leg should be completed at the same time as the changes to the northwest corner to ensure lane alignment across the intersection. Changes to the northeast corner can proceed after other improvements are in place.

Capilano Road to Tatlow Avenue

There are no changes to the curb locations proposed for Marine Drive from Capilano Road to midblock between Capilano Road and McGuire Avenue. From midblock between Capilano Road and McGuire Avenue to Tatlow Avenue, a series of new eastbound and westbound left turns are proposed. These turn bays should be constructed at the same time since they require that the centreline of the roadway to shift north. Alternatively, they could be constructed in pairs with the eastbound and westbound left turn bays at the same intersection constructed at the same time. This would require a transition between the existing curb and the new curb on the north side.

The proposed 4.0 m sidewalk / boulevard space on the north side of the road can be constructed along with the new curb on the north side as property becomes available.

The phasing of this work will be dependent on the redevelopment and property acquisition on the north side of Marine.

Marine Drive & McGuire Avenue Intersection

Improvements to Marine Drive can be completed before or after the widening of McGuire Avenue; however, completing these improvements separately would require the reconstruction of curbs on the north side of the intersection multiple times. The curb radii on the northwest corner (for the southbound right turn) must be constructed before transit service can be moved to McGuire Avenue.

8.1.2 Capilano Road

The long-term plan for Capilano Road requires property on both sides from Marine Drive to Fullerton Road. Throughout the corridor, the centreline has been maintained in the existing location; meaning that northbound and southbound improvements can be developed separately.

Marine Drive to Curling Road

The properties on the west side of Capilano Road are expected to develop before the properties on the east side. In particular, the Petro-Canada gas station at 1980 Marine Drive is expected to fall under the Long-Term Development potential category. This will limit the potential of fully developing the bicycle lane and streetscape along that segment of the corridor. When the property on the west side becomes available, improvements from the centreline to the back of sidewalk can be implemented.

Capilano Road & Curling Road Intersection

Phasing at this intersection will likely require multiple reconstructions. The west leg can be fully developed when the Grouse Inn property redevelops; however, the southbound bicycle lane, southbound vehicle lane widening, and improvements to the sidewalk and boulevard space north of the intersection require property from 1731 – 1735 Capilano Road, which are not expected to be available in the short-to mid-term. The existing curb on the west side of the north leg of the intersection would be expected to be maintained in this scenario, with the bike lane, widened through lanes, and sidewalk / boulevard to be added at a later date.

The east leg of the intersection can be implemented only with property from both 1748 Capilano Road and 1634 Capilano Road. Improvements to the east leg can be made independently of improvements to the west leg. The northeast corner of the intersection would be reconstructed in its final configuration with the implementation of the east leg. The southeast corner could also be developed at this time; however, the proposed northbound bike lane, northbound lane widening, and proposed sidewalk and boulevard would need to be transitioned from the existing configuration further south. It is the District's intention that the intersection is to be implemented to facilitate construction activities, regardless of which development proceeds first.

If the west leg is constructed before the east leg, the eastbound right turn lane would be marked as an eastbound right lane. The pavement markings should be updated for the final configuration. The same approach applies if the east leg is phased before the west leg.

Curling Road to McGuire Avenue

Like the previous segment, the east and west sides of the corridor can be developed separately through this segment.

McGuire Avenue / McGuire Avenue Extension & Capilano Road

The existing road configuration does not currently include an intersection at this location. Both the east and west legs rely on new right of way for implementation; however, each side requires property from a single parcel. The east and west legs of this intersection can be implemented in their long-term configurations independently. The east leg must be in place before transit service can be rerouted to McGuire Avenue.

The east leg of the intersection can be implemented along with improvements to the northeast and southeast corners of the intersection and to the northbound lanes, bicycle lane, boulevard, and sidewalk on Capilano Road immediately on either side of the intersection. It has been assumed that 1748 Capilano Road and 1634 Capilano Road will redevelop concurrently.

The west leg of the intersection can be implemented together with the northwest corner of the intersection and the southbound lanes, bicycle lane, boulevard, and sidewalk north of the intersection. There may be an interim condition where the southwest corner joins with the existing curb for southbound lanes south of

the intersection. This can be reconstructed with property facing Capilano Road becomes available between McGuire Avenue Extension and Curling Road.

McGuire Avenue to Fullerton Avenue

Like the previous segment, the east and west sides of the corridor can be developed separately through this segment. The current design ties to the recently constructed curb, sidewalk, and bike lane immediately at the intersection at Fullerton, minimizing additional property impacts.

Capilano Road & Fullerton Avenue Intersection

This intersection is currently signalized. Signal poles may have to be relocated to accommodate the interim and long-term design. Developer's consultants should be requested to assess the effects of phased development on this intersection to determine the appropriate timing for changes to the signal.

8.1.3 McGuire Avenue

As described earlier, the long-term plan for McGuire Avenue is to connect to Capilano Road near the existing Hope Road intersection³ and to widen McGuire Avenue to two lanes plus parking pockets and improved walking and cycling facilities between Capilano Road and Marine Drive. This change will allow transit service to be relocated to McGuire Avenue from both Garden Avenue and Capilano Road. This relocation of service cannot be implemented until the long-term plan for McGuire Avenue is fully implemented. This is described in further detail below.

Throughout McGuire Avenue, property is required from the west side of the corridor to allow for the proposed long-term plan. The east side is not anticipated to have any redevelopment to allow for property acquisition.

Marine Drive to Curling Road

This segment of the corridor requires land from three properties to achieve the long-term vision. The entire length of the segment will be required to be implemented at the same time to provide the desired service to transit vehicles. It may be possible to implement an interim condition if the northern two properties are available but the southern property is not. In this case, one 3.3 m shared left-right southbound lane could be provided along with a 2.0 m sidewalk on the west side of the road as an interim condition, subject to further review. This could allow for the development of the remaining portions of the road and may allow for transit to be relocated to McGuire before all property is available. This would require the reconstruction of a portion of curb, gutter, and sidewalk on the west side of McGuire from the existing lane south.

Curling Road & McGuire Avenue Intersection

This intersection will likely be developed as a "T" intersection with no east leg in the long-term. The remaining components should be implemented as a single phase when property from both 1748 Capilano Road and 1634 Capilano Road are available.

³ The intersection of Hope Road and Capilano Road will be closed to traffic when McGuire Avenue is extended.

Curling Road to Capilano Road

This segment of McGuire Avenue should be implemented as a single phase when property from 1748 Capilano Road is available.

Capilano Road to North-South Community Road (i.e. McGuire Avenue Extension)

McGuire Avenue Extension should be implemented as a single phase, as it can be entirely accommodated on District of North Vancouver Lot B.

8.1.4 Curling Road

District of North Vancouver Boundary to North-South Community Street

To achieve the final plan for this segment of the corridor requires property from both the north and south sides of the road. In the interim condition, the existing cross-section with narrower travel lanes and sidewalk can be maintained or, the south side can be developed in advance of the north side.

If property on the south side of the corridor is available first, the final road configuration from the centreline south can be implemented. The existing curb can likely be maintained on the north side in the interim condition.

Curling Road & North-South Community Road / Crescent Road Intersection

The north and south legs of this intersection can be developed independently along with the respective improvements to the North-South Community Street and Crescent Road.

North-South Community Street to Capilano Road

The interim condition shown in the report for this section should be developed in a single phase when property is available from the Grouse Inn site. When the property on the north side of Curling Road becomes available in the long term, a boulevard may be added to the north side. All travel lanes, as well as the boulevard and sidewalk from the south side are expected to be maintained in the long-term as constructed in the interim.

Capilano Road to McGuire Avenue

This segment of the corridor should be implemented as a single phase when property from both 1748 Capilano Road and 1634 Capilano Road are available.

McGuire Avenue to Garden Avenue

This section is not included on the functional plans, as is currently considered category three (i.e. development is not anticipated) and is not included in the District's implementation strategy for Lower Capilano. The general alignment of the Curling Road extension, west of McGuire, allows for the future extension to Garden Avenue, if desired.

8.1.5 Fullerton Avenue

District of North Vancouver Boundary to North-South Community Street

All long-term plans along this corridor will be implemented in the short- to mid- term as outlined in the Fullerton Streetscape Plan. The north curb edge is anticipated to be retained, with the exception of those locations with traffic calming elements such as curb bulges etc. Where widening is required, it is anticipated to be done through property acquisition to the south with redevelopment.

North-South Community Street to Capilano Road

The existing paved space (curb to curb) is sufficient for the proposed long-term loading; however, improvements to the sidewalk and boulevard on the south side of the corridor can only be accommodated with redevelopment of 1847 Capilano Road. The existing sidewalk should be maintained in the interim condition.

8.1.6 North-South Community Street / Crescent Road

Fullerton Avenue to Curling Road (i.e. North-South Community Street)

This complete section of North-South Community Street can be developed when property becomes available on the west side of the corridor.

Curling Road & Crescent Road Intersection

This intersection could be constructed as a “T” with either the north or south legs proceeding first. The southwest and southeast corners can be expected to be implemented in their final form with the construction of the south leg. The northeast and northwest corners can be expected to be implemented in their final form with the construction of the north leg.

Curling Road to Curling Road (i.e. Crescent Road)

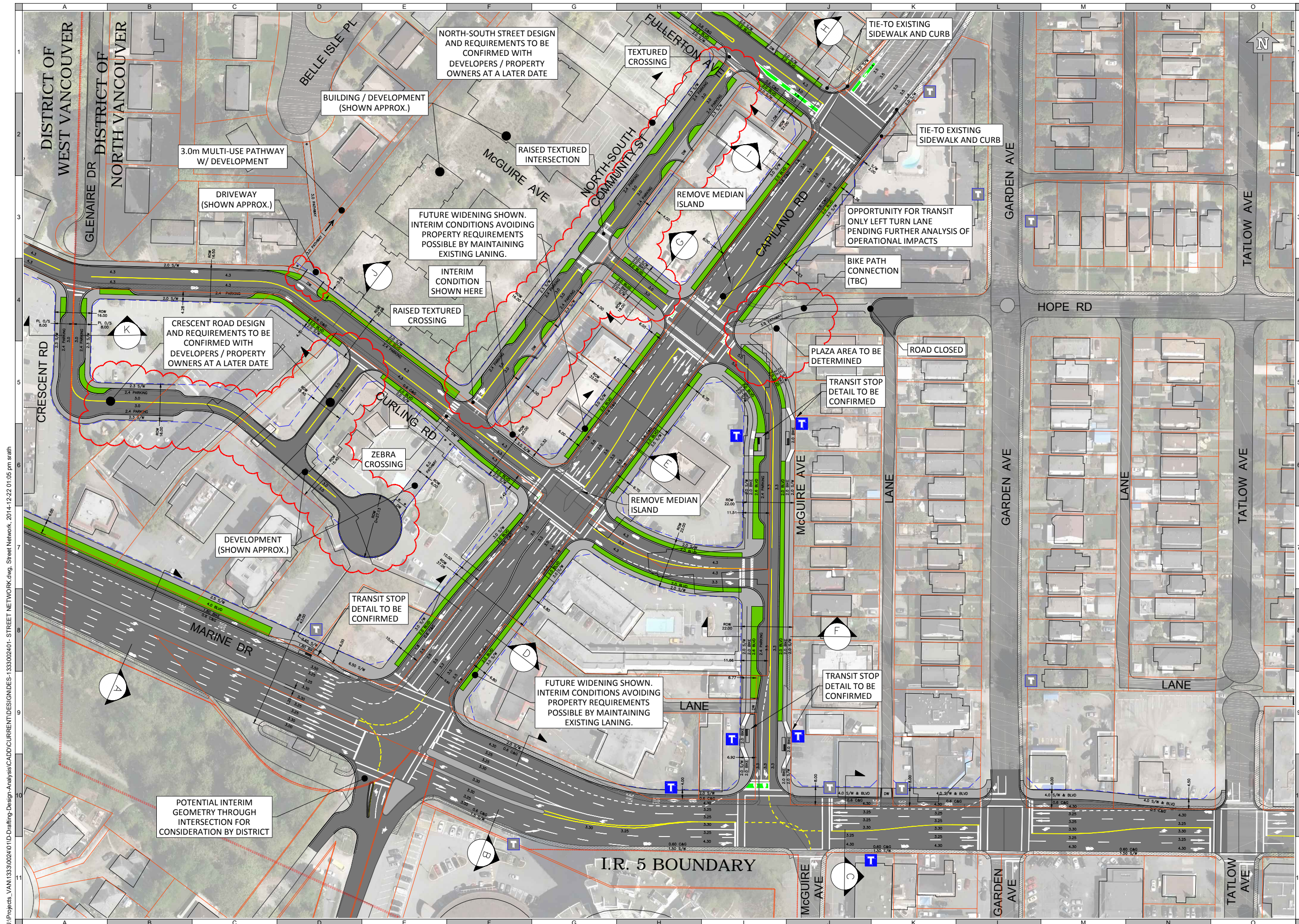
The full cross-section of this street is proposed for what is currently private property. The corridor is expected to be phased along with development.

9.0 Closing

Achieving the long term vision and developing a complete community is achievable, and can be phased with possible interim strategies in the near to mid-term scenarios. This study and report builds off previously completed works by others, and provides a basis for discussion and support of District staff in assessing the long term requirements of the road network, and to help address development inquiries for the area. Further stages of detailed design and traffic analysis, whether by the District or through development applications, will continually help guide and focus the implementation and requirements to achieve the vision.

Appendix A

Preliminary Functional Design Drawings



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- LEGEND**
- - EXISTING LEGAL LOT BOUNDARY
 - - PROPOSED LEGAL LOT BOUNDARY
 - T - PLANNED BUS STOP
 - T - EXISTING BUS STOP

Professional Seals

ISSUED FOR FINAL CONCEPT
 December 19, 2014
 urbansystems.ca

#	Date	Issue / Revision	App

District of North Vancouver

URBAN systems

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Quality Control by: JW
 Designed by: SR
 Drawn by: SR

Lower Capilano-Marine Village
 PRELIMINARY FUNCTIONAL DESIGN

Sheet Number: 1 of 2
 Project Number: 1333.0024.01
 Drawing Number: 1
 Revision: ---

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LEGEND

- - EXISTING LEGAL LOT BOUNDARY
- - PROPOSED LEGAL LOT BOUNDARY
- T - PLANNED BUS STOP
- T - EXISTING BUS STOP

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 December 19, 2014
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#	Date	Issue / Revision	App

District of North Vancouver

URBAN systems

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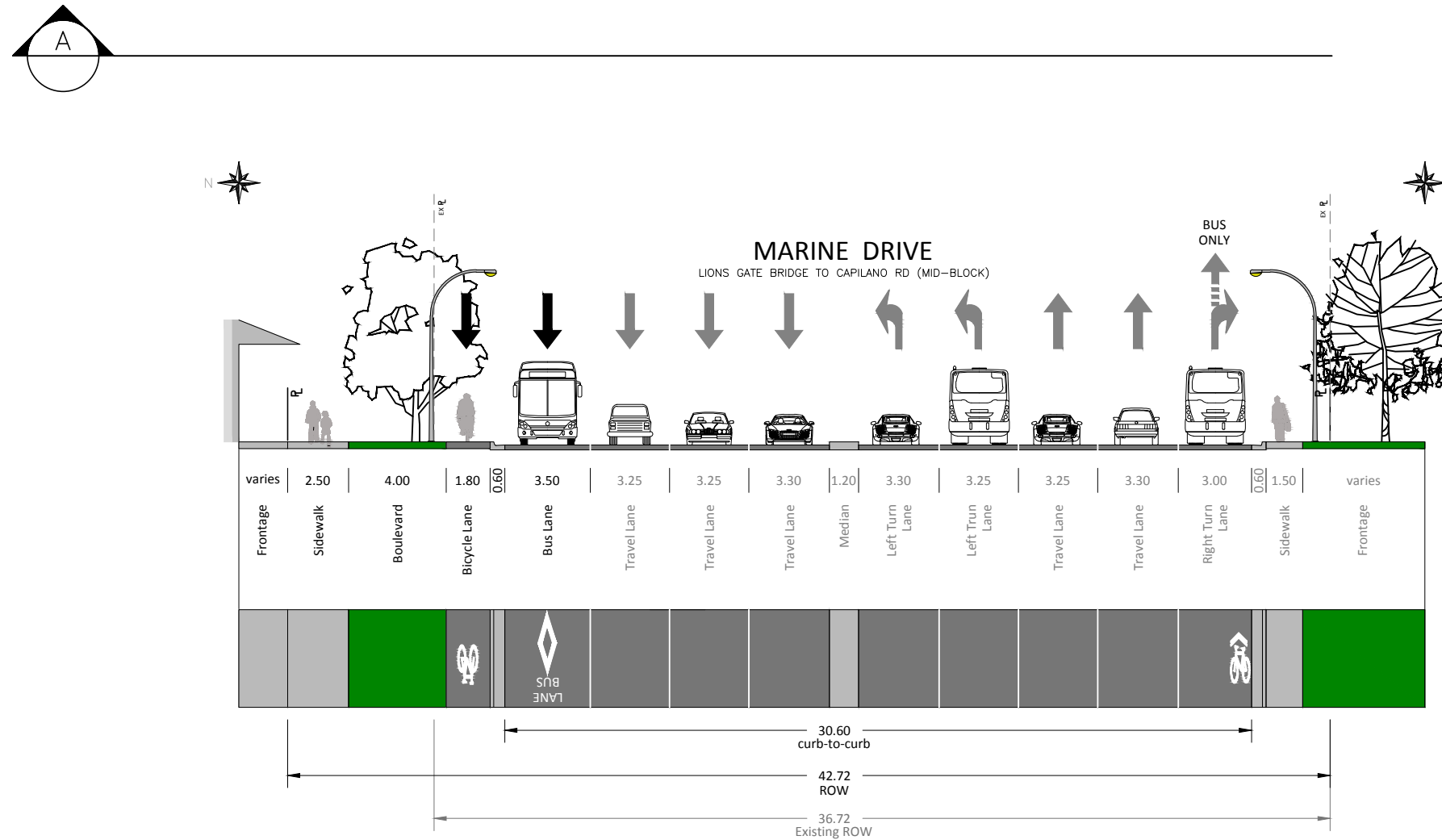
Quality Control by: JW
 Designed by: SR
 Drawn by: SR

Lower Capilano-Marine Village
 PRELIMINARY FUNCTIONAL DESIGN

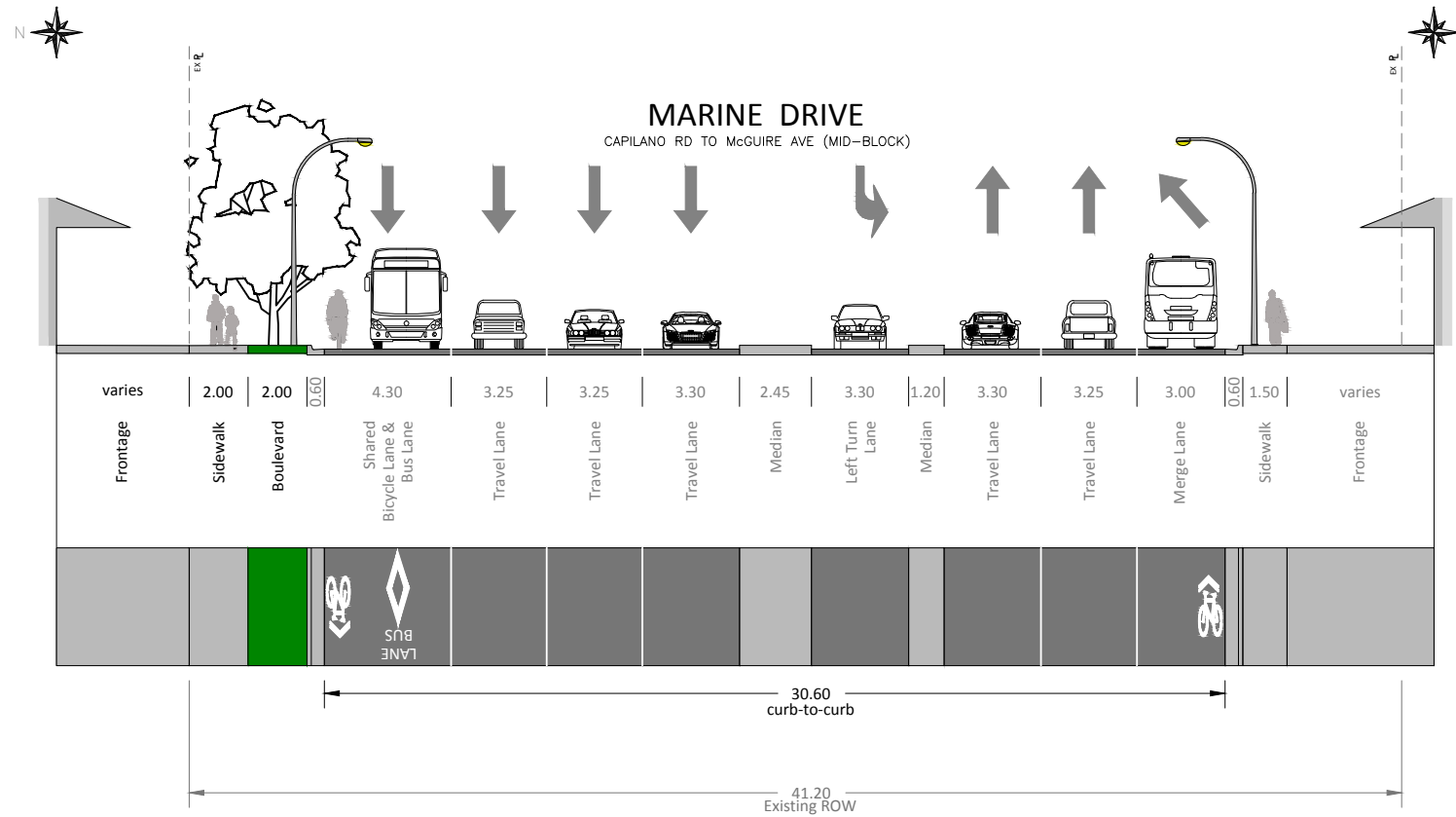
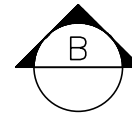
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 Project Number: 1333.0024.01
 Drawing Number: 2
 Revision: ---

Appendix B

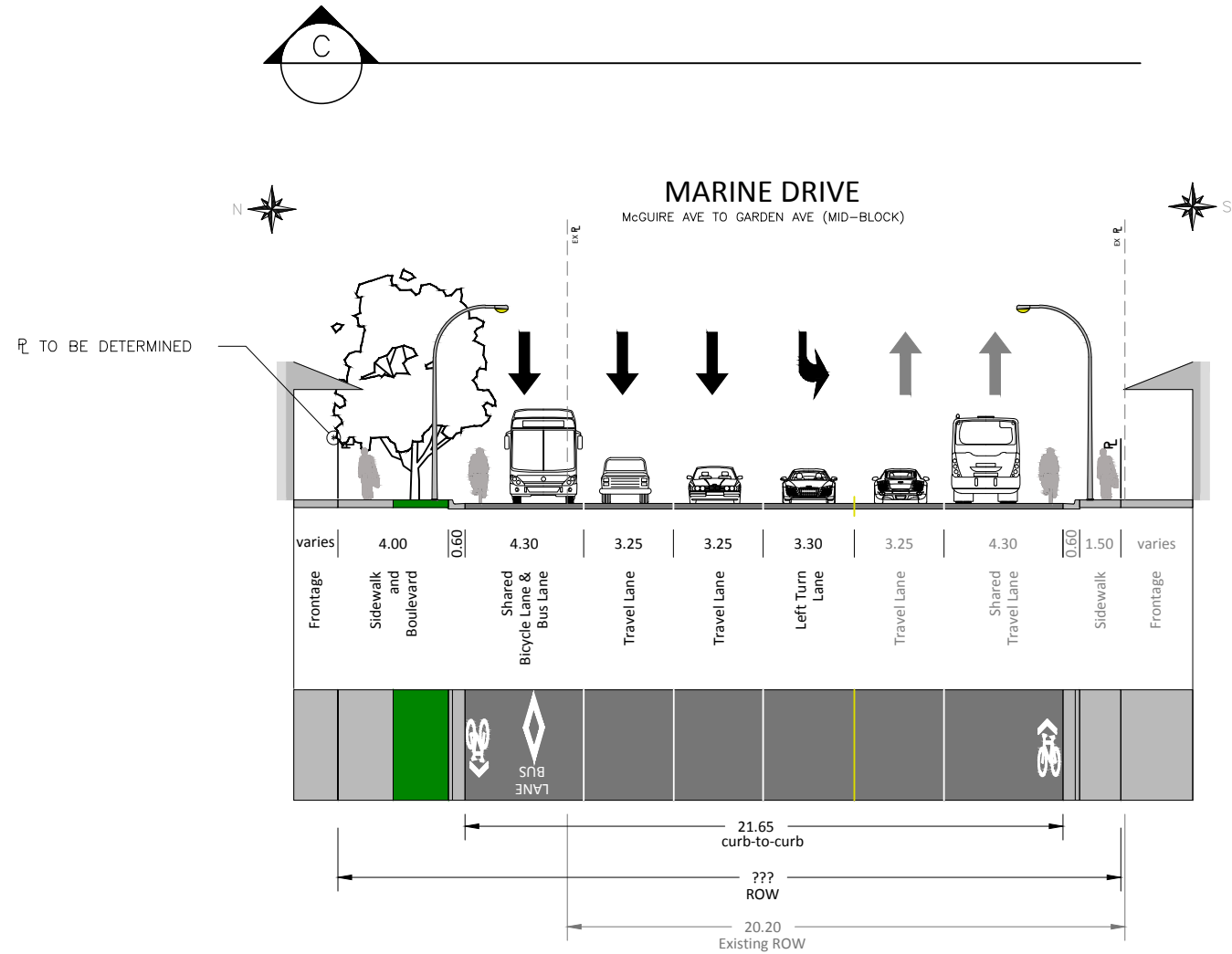
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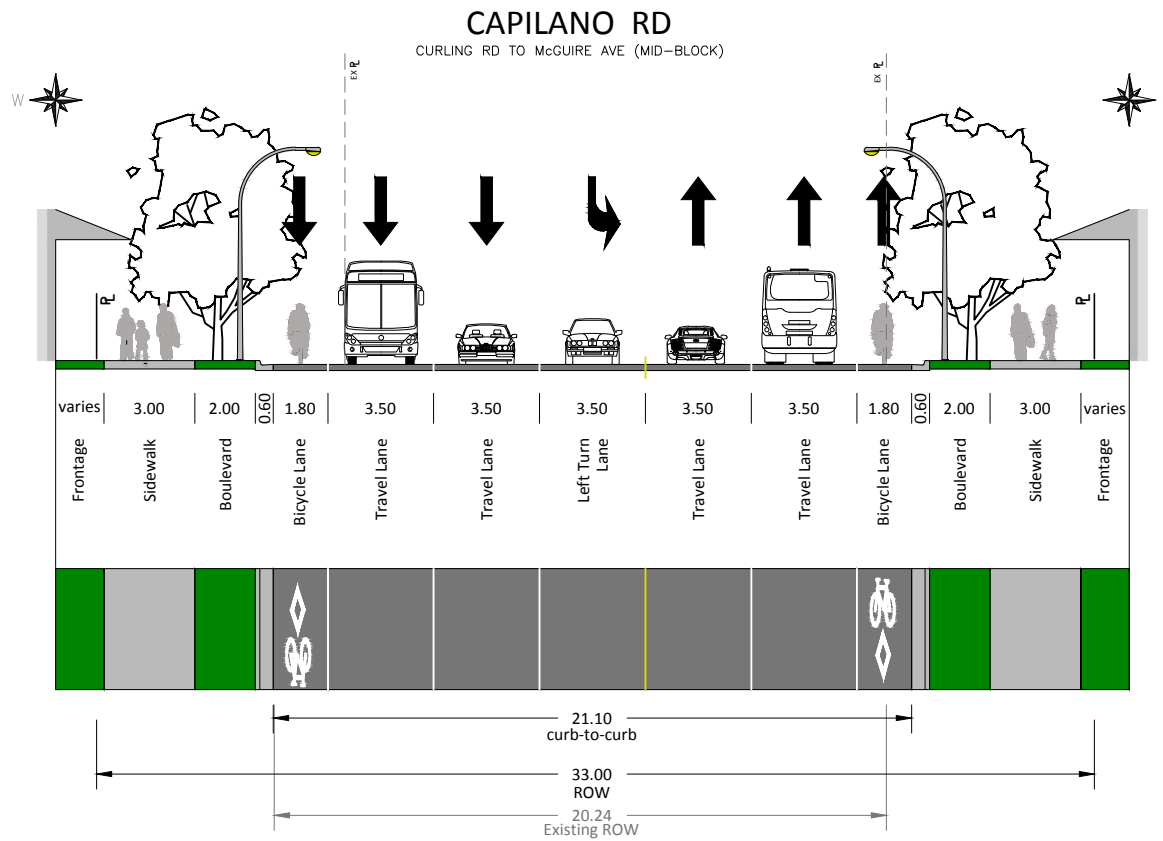
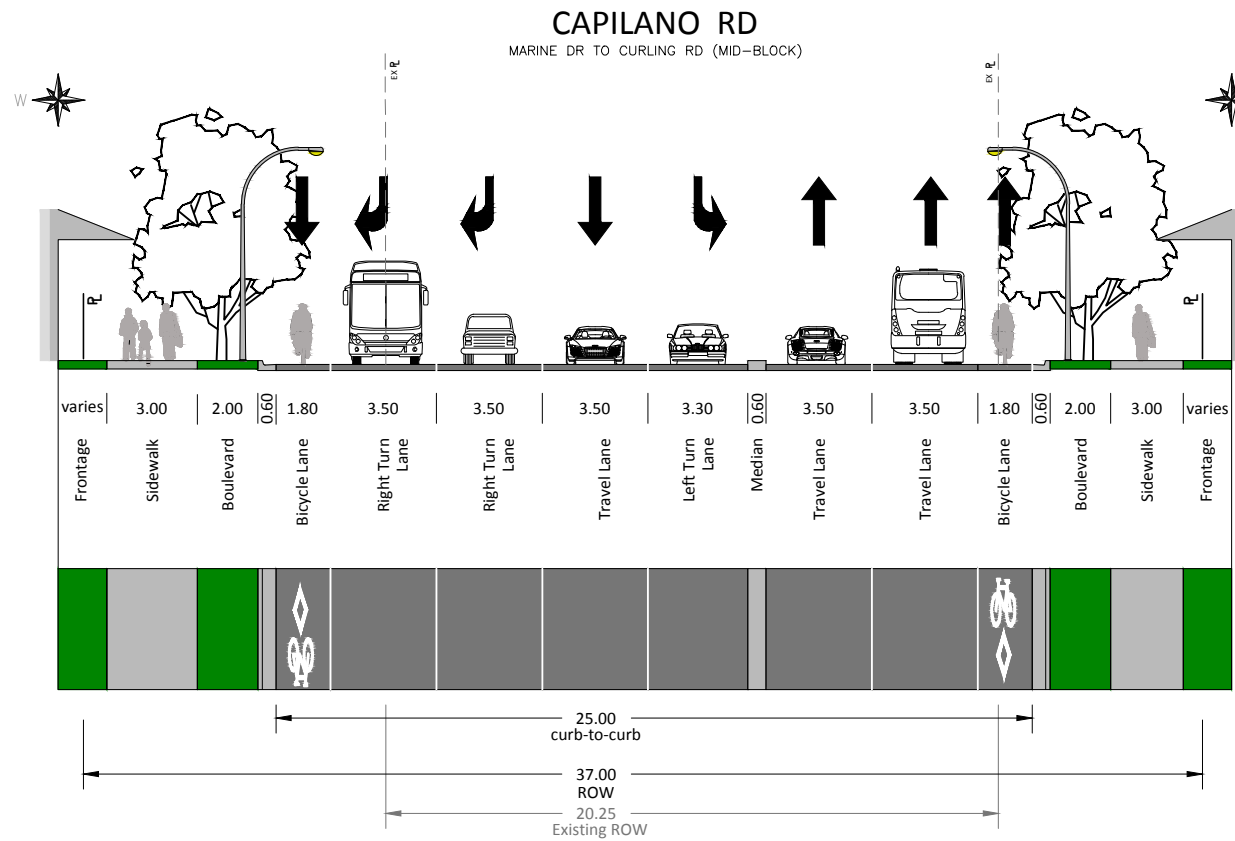
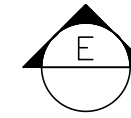
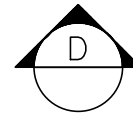


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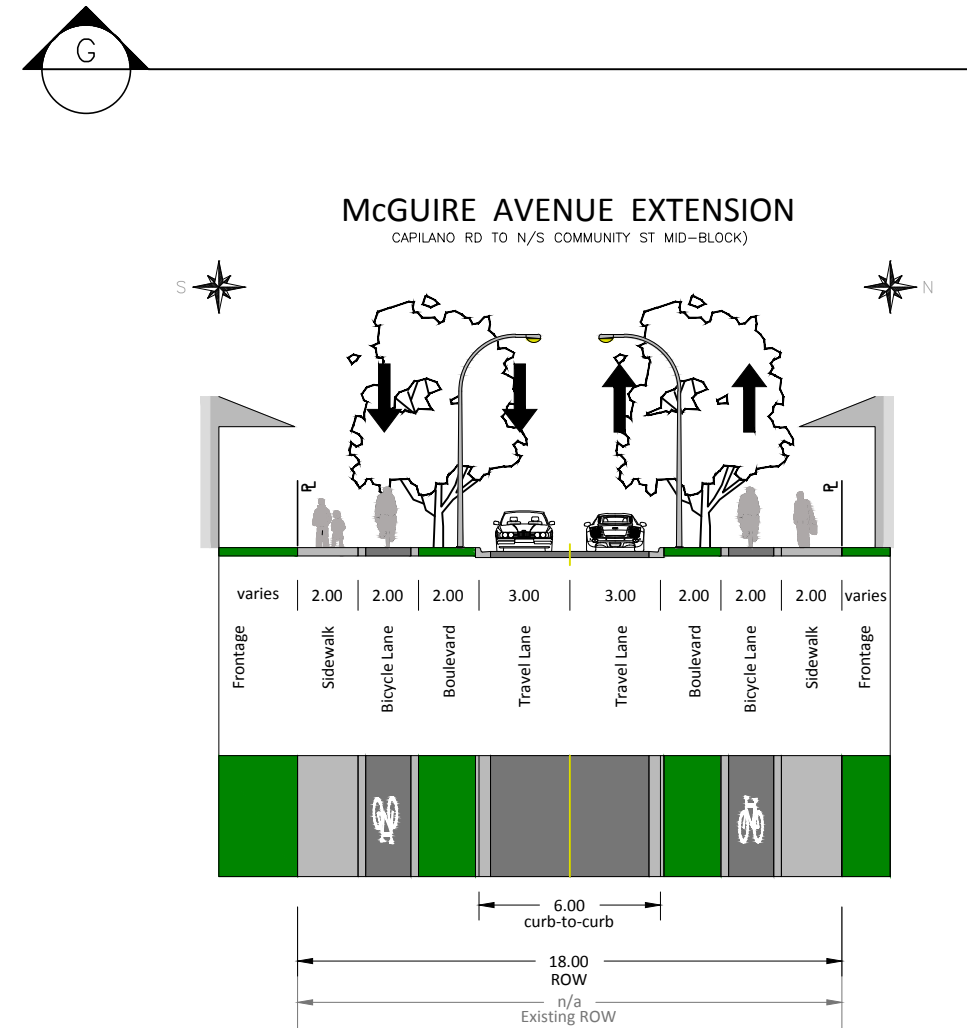
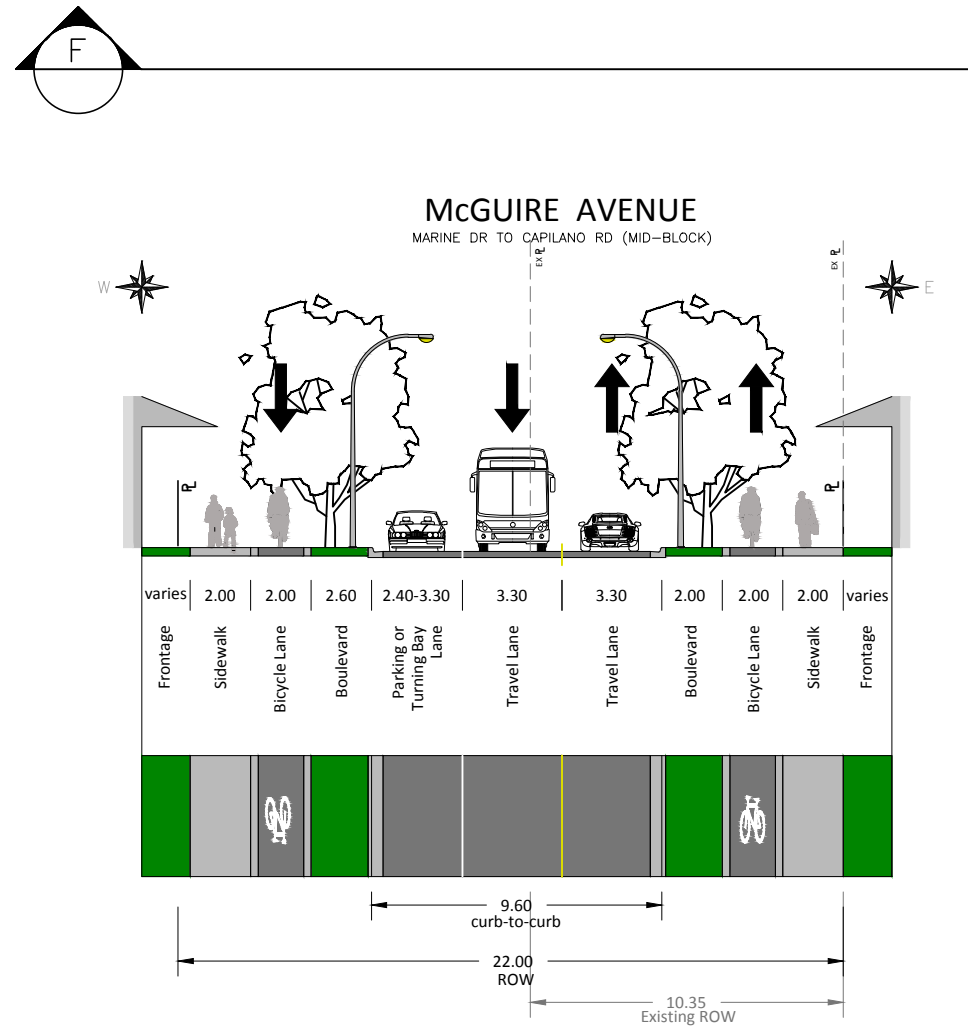


* PROPERTY LINE TO BE DETERMINED. SIDEWALK MAY BE PERMITTED ON PRIVATE PROPERTY.

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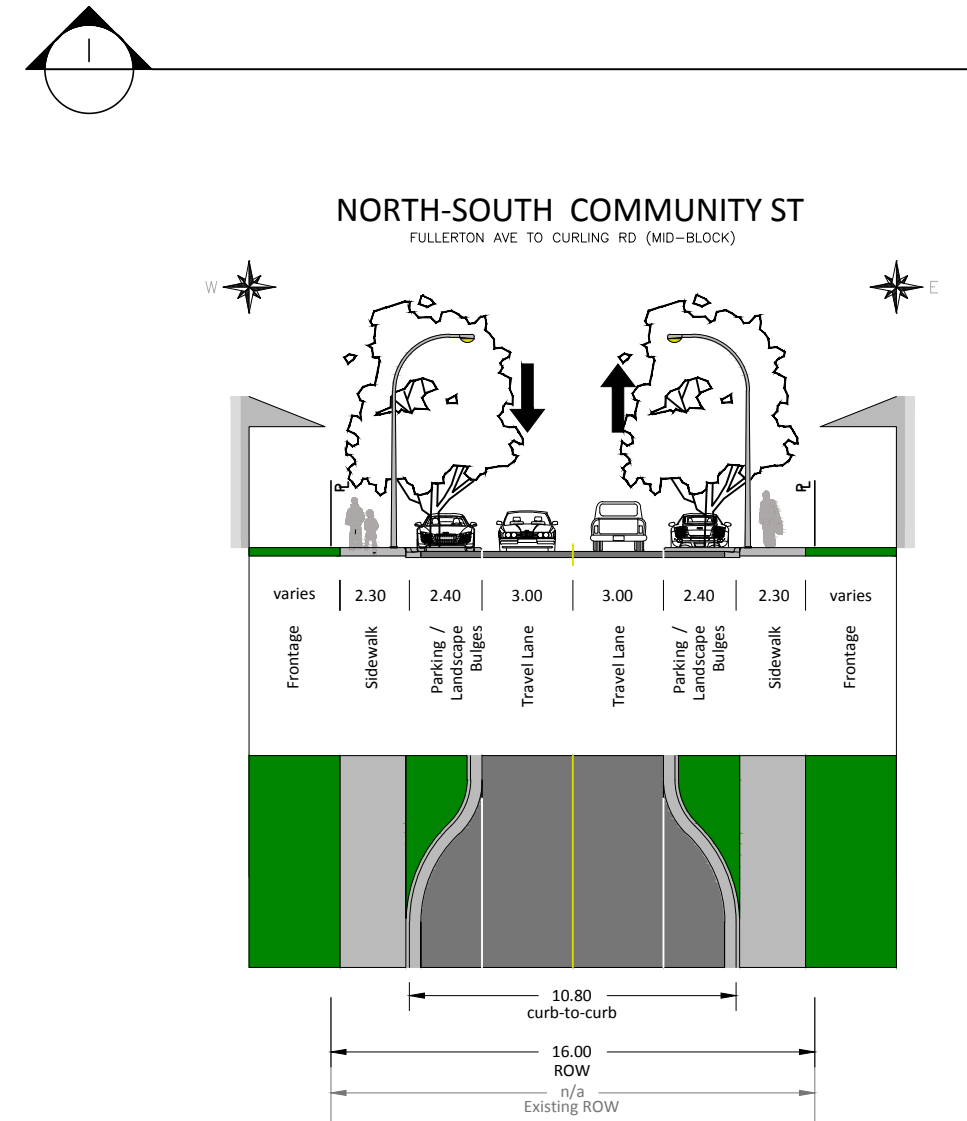
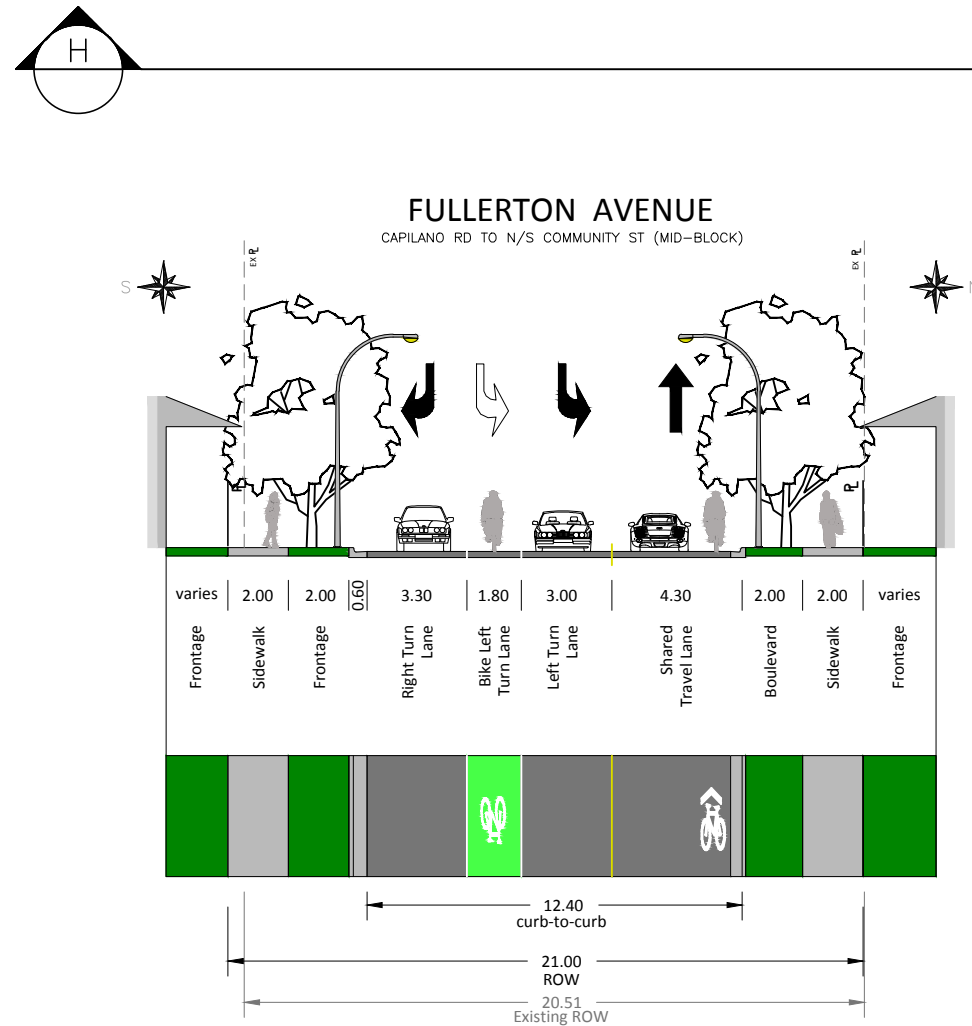


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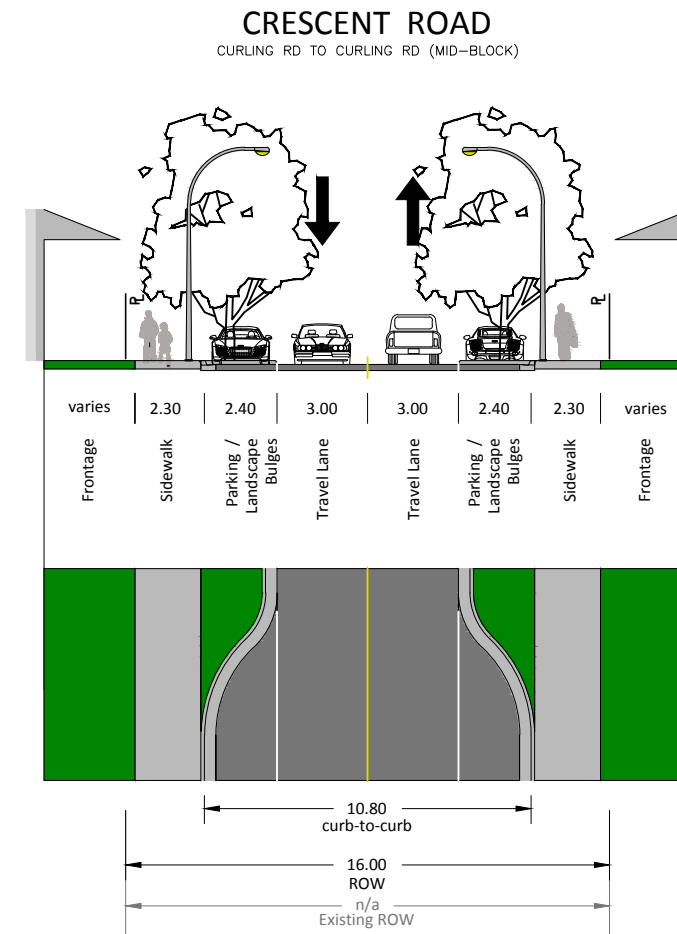
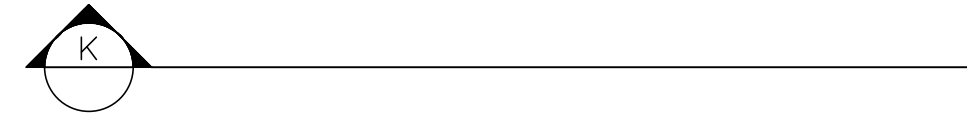
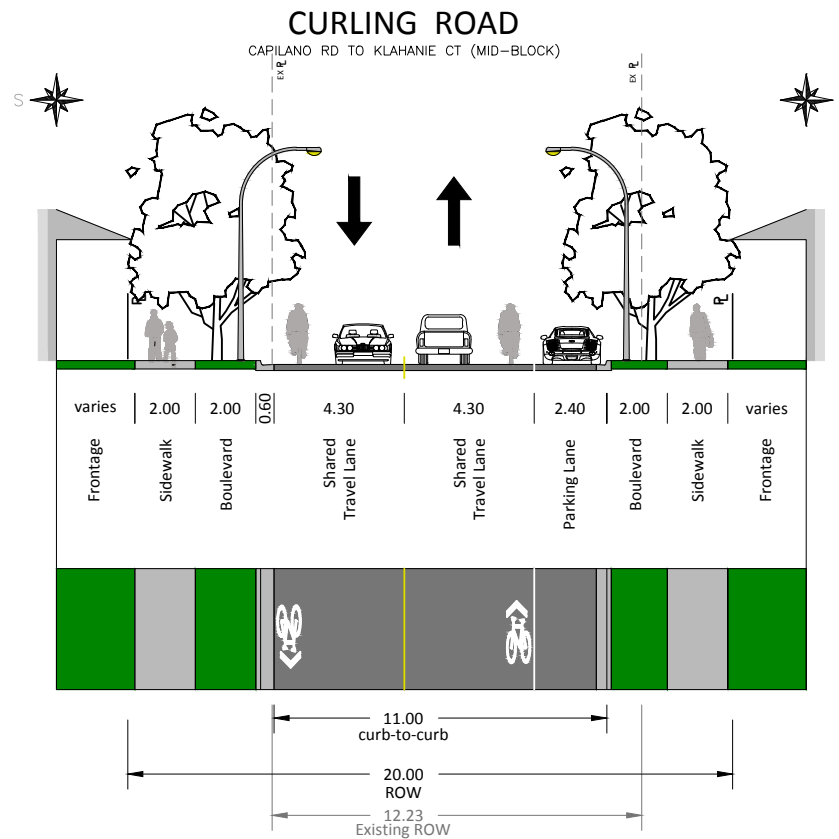
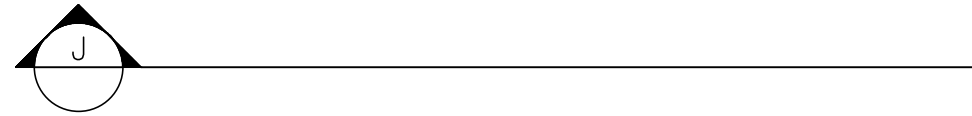
* FINAL CROSS-SECTION TO BE DETERMINED THROUGH DETAIL DESIGN.

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* FINAL CROSS-SECTION TO BE DETERMINED THROUGH DETAIL DESIGN.

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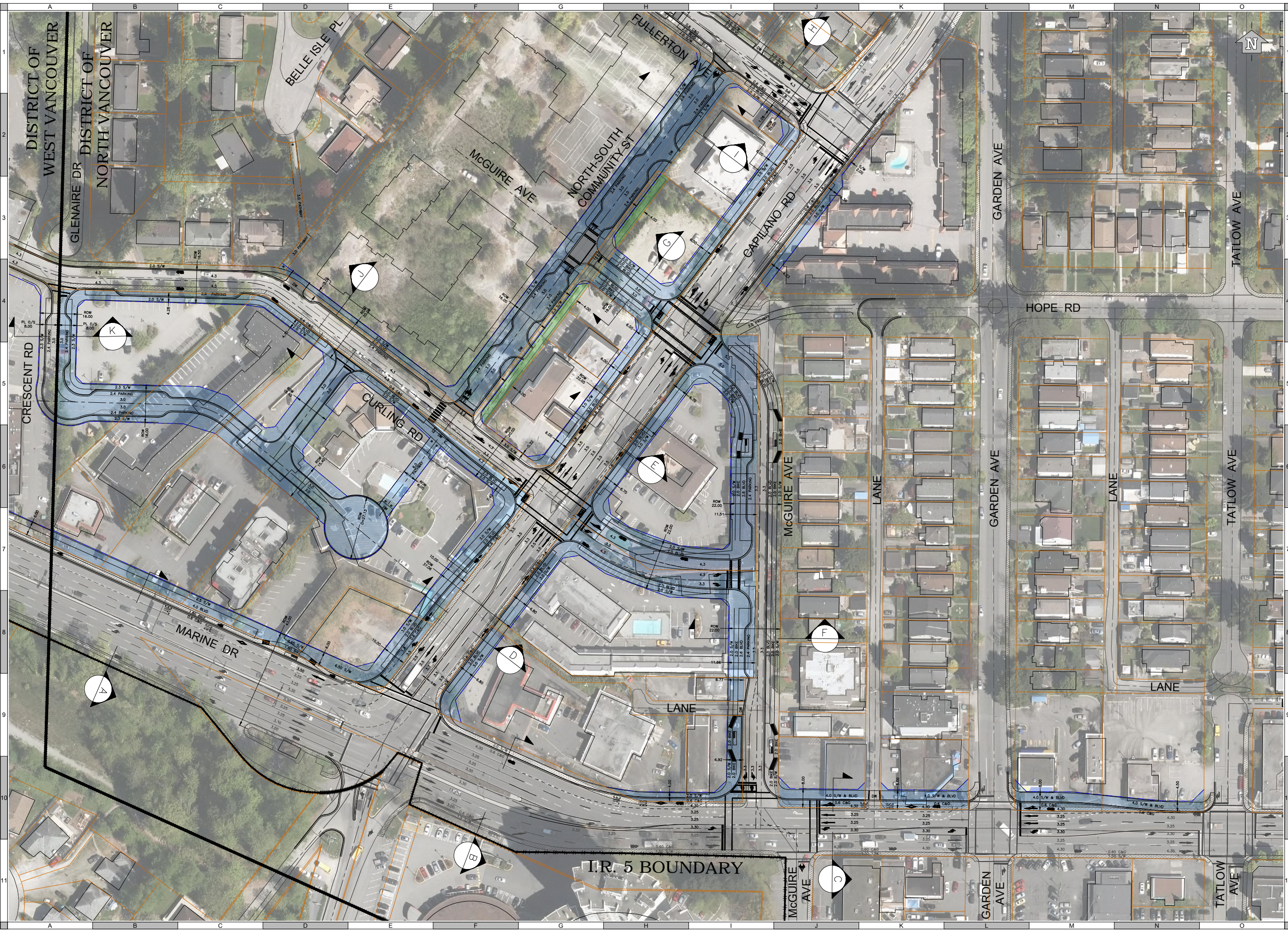
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Appendix C

Long-Term Property Impacts

U:\Projects_VAN\1333002401\0-Drafting-Design-Analysis\CADD\CURRENT\PRODUCTION\FIG-1333002401-1-LAND ACQUISITION.dwg, Land Acquisition, 2014-12-19 03:35 pm srath



ATTENTION
 This drawing is prepared for the sole use of District of North Vancouver. No representations of any kind are made by Urban Systems Ltd. or its employees to any party with whom Urban Systems Ltd. does not have a contract.

NOTE:
 BASE INFORMATION, INCLUDING ALL CADASTRAL, LEGAL AND TOPOGRAPHIC DETAILS WERE PROVIDED BY THE DISTRICT OF NORTH VANCOUVER. NO WARRANTY OF THIS DATA IS PROVIDED AND SHOULD BE CONFIRMED AS AND WHERE REQUIRED FOR USE.

NOTE: THIS DRAWING IS TO BE CONSIDERED PRELIMINARY ONLY AND IS INTENDED TO PROVIDE INTERNAL GUIDANCE ON DEVELOPMENT APPLICATIONS. DETAILED ROAD GEOMETRY AND REQUIREMENTS TO BE CONFIRMED AS PART OF FUTURE DETAILED DESIGN.

- LEGEND**
- EXISTING LEGAL LOT BOUNDARY
 - PROPOSED LEGAL LOT BOUNDARY
 - PROPOSED DNV PROPERTY TO ACQUISITION
 - PROPOSED LAND SWAP

Professional Seals

ISSUED FOR FINAL CONCEPT
 December 19, 2014
urbansystems.ca

#	Date	Issue / Revision	App

District of North Vancouver

URBAN systems

Scale 1:10000
 7.5m 0 7.5 15 22.5

Quality Control by: JW
 Designed by: SR
 Drawn by: SR

Lower Capilano-Marine Village
 LONG-TERM PROPERTY IMPACTS

Sheet Number: B1 of B2
 Project Number: 1333.0024.01
 Drawing Number: B1
 Revision: ---

U:\Projects_VAN\1333002401\0-Drafting-Design-Analysis\CADD\CURRENT\PRODUCTION\FIG-1333002401- LAND ACQUISITION.dwg, Land Acquisition (2), 2014-12-19 03:35 pm srath



ATTENTION
 This drawing is prepared for the sole use of District of North Vancouver.
 No representations of any kind are made by Urban Systems Ltd. or its employees to any party with whom Urban Systems Ltd. does not have a contract.

NOTE:
 BASE INFORMATION, INCLUDING ALL CADASTRAL, LEGAL AND TOPOGRAPHIC DETAILS WERE PROVIDED BY THE DISTRICT OF NORTH VANCOUVER. NO WARRANTY TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THIS DATA IS PROVIDED AND SHOULD BE CONFIRMED AS AND WHERE REQUIRED FOR USE.

NOTE: THIS DRAWING IS TO BE CONSIDERED PRELIMINARY ONLY AND IS INTENDED TO PROVIDE INTERNAL GUIDANCE ON DEVELOPMENT APPLICATIONS. DETAILED ROAD GEOMETRY AND REQUIREMENTS TO BE CONFIRMED AS PART OF FUTURE DETAILED DESIGN.

LEGEND

- - EXISTING LEGAL LOT BOUNDARY
- - PROPOSED LEGAL LOT BOUNDARY
- - PROPOSED DNV PROPERTY TO ACQUISITION
- - PROPOSED LAND SWAP

Professional Seals

ISSUED FOR FINAL CONCEPT
 December 19, 2014
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#	Date	Issue / Revision	App

District of North Vancouver

URBAN systems

Scale 1:1000
 7.5m 0 7.5 15 22.5

Quality Control by: JW
 Designed by: SR
 Drawn by: SR

Lower Capilano-Marine Village
 LONG-TERM PROPERTY IMPACTS

Sheet Number: B2 of B2
 Project Number: 1333.0024.01
 Drawing Number: B2
 Revision: ---

Appendix D

Class 'C' Cost Estimates



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

McGUIRE AVE
(Capilano Rd to Marine Dr)
Length: ~200 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 45,500
1.02	Survey Layout	L.S.	1	4.0%	\$ 45,500
1.03	Traffic Management	L.S.	1	3.5%	\$ 39,800
1.04	Quality Management	L.S.	1	3.0%	\$ 34,100
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt Removal	sq. m	1600	\$ 7.50	\$ 12,000
2.02	Concrete Curb and Gutter Removal	l.m.	425	\$ 15.00	\$ 6,375
2.03	Sidewalk Removal	sq. m	35	\$ 7.00	\$ 245
2.04	Adjust Ex. Appurtenances (MH's, WV's, JB's, etc) (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
2.05	Relocate Existing Hydro Pole	each	6	\$ 10,000.00	\$ 60,000
2.06	Relocate Fire Hydrant	each	1	\$ 7,500.00	\$ 7,500
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	1650	\$ 65.00	\$ 107,250
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	1650	\$ 30.00	\$ 49,500
3.03	Concrete Curb and Gutter	l.m.	370	\$ 60.00	\$ 22,200
3.04	Concrete Sidewalk / Asphalt Pathway (incl. base gravel)	sq. m	1700	\$ 60.00	\$ 102,000
3.05	Boulevard Landscaping (Top Soil and Seed)	sq.m	550	\$ 12.00	\$ 6,600
3.06	Boulevard Trees	each	12	\$ 1,000.00	\$ 12,000
3.07	Plaza (Allowance)	LS	1	\$ 50,000.00	\$ 50,000
3.08	Bus Shelter	each	4	\$ 10,000.00	\$ 40,000
3.09	Hope Road Closure	LS	1	\$ 30,000.00	\$ 30,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	7	\$ 3,500.00	\$ 24,500
4.02	Storm Sewer (Not Included in Estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	5	\$ 12,000.00	\$ 60,000
5.02	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	5	\$ 6,000.00	\$ 30,000
5.03	Traffic Signal (incl. conduit, wiring, bases, poles, cabinet, etc)	each	2	\$ 250,000.00	\$ 500,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
6.02	Signage - New and Removal/Replacement (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
SUBTOTAL COST ESTIMATE					\$ 1,300,000
Contingency			30%		390,000
SUBTOTAL COST ESTIMATE					1,690,000
Engineering & Supervision			15%		254,000
TOTAL COST ESTIMATE					\$ 1,950,000

Notes:

- No geotechnical or environmental review or analysis was conducted as part of this study. Estimates assume typical road structure depths.
- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catch basins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

CURLING RD
(Dist.BDY to Capilano Rd)
Length: ~230 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 24,400
1.02	Survey Layout	L.S.	1	4.0%	\$ 24,400
1.03	Traffic Management	L.S.	1	3.5%	\$ 21,400
1.04	Quality Management	L.S.	1	3.0%	\$ 18,300
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt Removal	sq. m	130	\$ 7.50	\$ 975
2.02	Asphalt milling (full areas of existing roadway)	sq. m	1650	\$ 3.50	\$ 5,775
2.03	Concrete Curb and Gutter Removal	l.m.	450	\$ 15.00	\$ 6,750
2.04	Sidewalk Removal	sq. m	400	\$ 7.00	\$ 2,800
2.05	Adjust Ex. Appurtenances (MH's, WV's, JB's, etc) (Allowance)	L.S.	1	\$ 5,000.00	\$ 5,000
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	800	\$ 65.00	\$ 52,000
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	800	\$ 30.00	\$ 24,000
3.03	Asphalt Overlay (existing road) (50mm)	sq. m	1650	\$ 15.00	\$ 24,750
3.04	Concrete Curb and Gutter	l.m.	425	\$ 60.00	\$ 25,500
3.05	Concrete Sidewalk (incl. base gravel)	sq. m	1030	\$ 60.00	\$ 61,800
3.06	Boulevard Landscaping (Top Soil and Seed)	sq.m	400	\$ 12.00	\$ 4,800
3.07	Boulevard Tree	each	12	\$ 1,000.00	\$ 12,000
3.08	Multi-use Pathway (incl. base gravel)	sq.m	180	\$ 60.00	\$ 10,800
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	6	\$ 3,500.00	\$ 21,000
4.02	Storm Sewer (Not Included in Estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	5	\$ 12,000.00	\$ 60,000
5.02	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	5	\$ 6,000.00	\$ 30,000
5.03	Traffic Signal (incl. conduit, wiring, bases, poles, cabinet, etc)	each	1	\$ 250,000.00	\$ 250,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 10,000.00	\$ 10,000
6.02	Signage - New and Removal/Replacement (Allowance)	LS	1	\$ 1,500.00	\$ 1,500
SUBTOTAL COST ESTIMATE					\$ 698,000
Contingency			30%		209,400
SUBTOTAL COST ESTIMATE					907,400
Engineering & Supervision			15%		136,000
TOTAL COST ESTIMATE					\$ 1,050,000

Notes:

- No geotechnical or environmental review or analysis was conducted as part of this study. Estimates assume typical road structure depths.
- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catch basins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

CURLING RD - EXT. ONE
(Capilano Rd to McGuire Ave)
Length: ~70m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 7,200
1.02	Survey Layout	L.S.	1	4.0%	\$ 7,200
1.03	Traffic Management	L.S.	1	3.5%	\$ 6,300
1.04	Quality Management	L.S.	1	3.0%	\$ 5,400
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	1050	\$ 65.00	\$ 68,250
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	1050	\$ 30.00	\$ 31,500
3.03	Concrete Curb and Gutter	l.m.	160	\$ 60.00	\$ 9,600
3.04	Concrete Sidewalk (incl. base gravel)	sq. m	240	\$ 60.00	\$ 14,400
3.05	Boulevard Landscaping (Top Soil and Seed)	sq.m	230	\$ 12.00	\$ 2,760
3.06	Boulevard Tree	each	2	\$ 1,000.00	\$ 2,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	2	\$ 3,500.00	\$ 7,000
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	2	\$ 12,000.00	\$ 24,000
5.02	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	2	\$ 6,000.00	\$ 12,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 4,000.00	\$ 4,000
6.02	Signage - New (Allowance)	LS	1	\$ 2,000.00	\$ 2,000
SUBTOTAL COST ESTIMATE					\$ 204,000
Contingency			30%		61,200
SUBTOTAL COST ESTIMATE					265,200
Engineering & Supervision			15%		40,000
TOTAL COST ESTIMATE					\$ 310,000

Notes:

- No geotechnical or environmental review or analysis was conducted as part of this study. Estimates assume typical road structure depths.
- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catch basins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

McGUIRE AVE EXTENTION
(N/S Comm. St to Capilano Rd)
Length: ~32m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 3,800
1.02	Survey Layout	L.S.	1	4.0%	\$ 3,800
1.03	Traffic Management	L.S.	1	3.5%	\$ 3,300
1.04	Quality Management	L.S.	1	3.0%	\$ 2,900
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	280	\$ 65.00	\$ 18,200
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	280	\$ 30.00	\$ 8,400
3.03	Concrete Curb and Gutter	l.m.	75	\$ 60.00	\$ 4,500
3.04	Concrete Sidewalk / Asphalt Pathway (incl. base gravel)	sq. m	190	\$ 60.00	\$ 11,400
3.05	Boulevard Landscaping (Top Soil and Seed)	sq.m	90	\$ 12.00	\$ 1,080
3.06	Boulevard Tree	each	4	\$ 1,000.00	\$ 4,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	2	\$ 3,500.00	\$ 7,000
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	2	\$ 12,000.00	\$ 24,000
5.02	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	2	\$ 6,000.00	\$ 12,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 1,500.00	\$ 1,500
6.02	Signage - New (Allowance)	LS	1	\$ 2,000.00	\$ 2,000
SUBTOTAL COST ESTIMATE					\$ 108,000
Contingency			30%		32,400
SUBTOTAL COST ESTIMATE					140,400
Engineering & Supervision			15%		21,000
TOTAL COST ESTIMATE					\$ 170,000

Notes:

- No geotechnical or environmental review or analysis was conducted as part of this study. Estimates assume typical road structure depths.
- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catchbasins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

N-S COMMUNITY ST
(Fullerton Ave to Curling Rd)
Length: ~180 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 15,100
1.02	Survey Layout	L.S.	1	4.0%	\$ 15,100
1.03	Traffic Management	L.S.	1	3.5%	\$ 13,200
1.04	Quality Management	L.S.	1	3.0%	\$ 11,400
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt Removal	sq. m	501	\$ 7.50	\$ 3,758
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	1950	\$ 65.00	\$ 126,750
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	1950	\$ 30.00	\$ 58,500
3.03	Concrete Curb and Gutter	l.m.	370	\$ 60.00	\$ 22,200
3.04	Concrete Sidewalk (incl. base gravel)	sq. m	830	\$ 60.00	\$ 49,800
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	5	\$ 3,500.00	\$ 17,500
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	5	\$ 12,000.00	\$ 60,000
5.02	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	5	\$ 6,000.00	\$ 30,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 3,500.00	\$ 3,500
6.02	Signage - New (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
SUBTOTAL COST ESTIMATE					\$ 432,000
Contingency			30%		129,600
SUBTOTAL COST ESTIMATE					561,600
Engineering & Supervision			15%		84,000
TOTAL COST ESTIMATE					\$ 650,000

Notes:

- No geotechnical or environmental review or analysis was conducted as part of this study. Estimates assume typical road structure depths.
- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catchbasins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

FULLERTON AVE
(Glenaire Dr to Capilano Rd)
Length: ~275 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 14,900
1.02	Survey Layout	L.S.	1	4.0%	\$ 14,900
1.03	Traffic Management	L.S.	1	3.5%	\$ 13,000
1.04	Quality Management	L.S.	1	3.0%	\$ 11,200
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt Removal	sq. m	780	\$ 7.50	\$ 5,850
2.02	Asphalt milling (full areas of existing roadway)	sq. m	3040	\$ 3.50	\$ 10,640
2.03	Concrete Curb and Gutter Removal	l.m.	515	\$ 15.00	\$ 7,725
2.04	Sidewalk Removal	sq. m	360	\$ 7.00	\$ 2,520
2.05	Adjust Ex. Appurtenances (MH's, WV's, JB's, etc) (Allowance)	L.S.	1	\$ 10,000.00	\$ 10,000
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	0	\$ 65.00	\$ -
3.02	Asphalt Overlay (existing road) (50mm)	sq. m	3050	\$ 15.00	\$ 45,750
3.03	Concrete Curb and Gutter	l.m.	670	\$ 60.00	\$ 40,200
3.04	Concrete Sidewalk (incl. base gravel)	sq. m	250	\$ 60.00	\$ 15,000
3.05	Traffic Circle Apron and Medians	sq. m	30	\$ 60.00	\$ 1,800
3.06	Traffic Circle and Medians Concrete Curb	l.m.	40	\$ 60.00	\$ 2,400
3.08	Boulevard Landscaping (Top Soil and Seed)	sq.m	150	\$ 12.00	\$ 1,800
3.09	Boulevard Trees	each	7	\$ 1,000.00	\$ 7,000
3.10	Speed Humps with Crosswalk	each	2	\$ 10,000.00	\$ 20,000
3.11	Speed Humps	each	1	\$ 5,000.00	\$ 5,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	11	\$ 3,500.00	\$ 38,500
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Install new street lighting (incl. conduit, wiring, base, pole, fixture)	each	3	\$ 7,500.00	\$ 22,500
5.02	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	4	\$ 12,000.00	\$ 48,000
5.03	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	4	\$ 6,000.00	\$ 24,000
5.04	Relocate and upgrade traffic signals	each	1	\$ 50,000.00	\$ 50,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 7,000.00	\$ 7,000
6.02	Signage - New and Removal/Replacement (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
SUBTOTAL COST ESTIMATE					\$ 425,000
Contingency			30%		127,500
SUBTOTAL COST ESTIMATE					552,500
Engineering & Supervision			15%		83,000
TOTAL COST ESTIMATE					\$ 640,000

Notes:

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- Unless otherwise noted, estimates assume standard paving materials only. Allowances for decorative bricks, pavers, or other treatments not included.
- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catch basins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

CAPILANO RD
(Fullerton Ave to Marine Dr)
Length: ~300 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 32,300
1.02	Survey Layout	L.S.	1	4.0%	\$ 32,300
1.03	Traffic Management	L.S.	1	3.5%	\$ 28,300
1.04	Quality Management	L.S.	1	3.0%	\$ 24,200
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt milling (full areas of existing roadway)	sq. m	5600	\$ 3.50	\$ 19,600
2.02	Median Traffic Island Removal	sq. m	115	\$ 10.00	\$ 1,150
2.03	Concrete Curb and Gutter Removal	l.m.	600	\$ 15.00	\$ 9,000
2.04	Sidewalk Removal	sq. m	1050	\$ 7.00	\$ 7,350
2.05	Adjust Ex. Appurtenances (MH's, WV's, JB's, etc) (Allowance)	LS	1	\$ 10,000.00	\$ 10,000
2.06	Relocate Existing Hydro Pole	each	7	\$ 10,000.00	\$ 70,000
2.07	Relocate Fire Hydrant	each	3	\$ 7,500.00	\$ 22,500
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	1600	\$ 65.00	\$ 104,000
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	1600	\$ 30.00	\$ 48,000
3.03	Asphalt Overlay (existing road) (50mm)	sq. m	5600	\$ 15.00	\$ 84,000
3.04	Concrete Curb and Gutter	l.m.	541	\$ 60.00	\$ 32,460
3.05	Concrete Median	l.m.	91	\$ 60.00	\$ 5,460
3.06	Concrete Sidewalk (incl. base gravel)	sq. m	1850	\$ 60.00	\$ 111,000
3.07	Boulevard Landscaping (Top Soil and Seed)	sq.m	915	\$ 12.00	\$ 10,980
3.08	Boulevard Trees	each	32	\$ 1,000.00	\$ 32,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	15	\$ 3,500.00	\$ 52,500
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	12	\$ 12,000.00	\$ 144,000
5.05	Relocate Cantilever Signs	each	2	\$ 5,000.00	\$ 10,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 25,000.00	\$ 25,000
6.03	Signage - New and Removal/Replacement (Allowance)	LS	1	\$ 7,500.00	\$ 7,500
SUBTOTAL COST ESTIMATE					\$ 924,000
Contingency			30%		277,200
SUBTOTAL COST ESTIMATE					1,201,200
Engineering & Supervision			15%		180,000
TOTAL COST ESTIMATE					\$ 1,390,000

Notes:

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- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catchbasins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

MARINE DR
(Dist. BDY to Tatlow Ave)
Length: ~620 m

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 23,600
1.02	Survey Layout	L.S.	1	4.0%	\$ 23,600
1.03	Traffic Management	L.S.	1	3.5%	\$ 20,600
1.04	Quality Management	L.S.	1	3.0%	\$ 17,700
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Concrete Curb and Gutter Removal	l.m.	430	\$ 15.00	\$ 6,450
2.02	Sidewalk Removal	sq. m	810	\$ 7.00	\$ 5,670
2.03	Adjust Ex. Appurtenances (MH's, WV's, JB's, etc) (Allowance)	L.S.	1	\$ 10,000.00	\$ 10,000
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	1000	\$ 65.00	\$ 65,000
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	1000	\$ 30.00	\$ 30,000
3.03	Concrete Curb and Gutter	l.m.	500	\$ 60.00	\$ 30,000
3.04	Concrete Sidewalk / Asphalt Pathway (incl. base gravel)	sq. m	1650	\$ 60.00	\$ 99,000
3.05	Boulevard Landscaping (Top Soil and Seed)	sq.m	400	\$ 12.00	\$ 4,800
3.06	Install new bus shelter	each	3	\$ 10,000.00	\$ 30,000
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	11	\$ 3,500.00	\$ 38,500
4.02	Storm Sewer (not included in estimate)				
05	SECTION 5 - ELECTRICAL				
5.01	Relocate and upgrade traffic signals	each	1	\$ 100,000.00	\$ 100,000
5.01	Street Lighting w/ Ped Lighting (incl. conduit, wiring, base, pole, fixture)	each	12	\$ 12,000.00	\$ 144,000
5.03	Relocate Cantilever Signs	each	1	\$ 5,000.00	\$ 5,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Markings and Symbols (Allowance)	LS	1	\$ 15,000.00	\$ 15,000
6.03	Signage - New and Removal/Replacement (Allowance)	LS	1	\$ 5,000.00	\$ 5,000
SUBTOTAL COST ESTIMATE					\$ 674,000
Contingency			30%		202,200
SUBTOTAL COST ESTIMATE					876,200
Engineering & Supervision			15%		131,000
TOTAL COST ESTIMATE					\$ 1,010,000

Notes:

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- Utilities were not included as part of the scope of this study, and are not included in the cost estimates, with the exception of hydro pole relocations and allowances for catch basins. Utilities and servicing to be confirmed by the District and/or developers as required.



**District of North Vancouver
Lower Capilano-Marine Village
Street Network Improvements
CLASS 'C' CONSTRUCTION COST ESTIMATE**

HOPE RD
(McGuire Ave to Garden Ave)

Prepared by: S.Rath
Checked by: J.Walker

Date: 19-Dec-14
Job Number: 1333.0024.01

Item #	Description of Work	Unit of Measure	Approx. Quantity	Unit Price	Extended Amount
01	SECTION 1 - GENERAL				
1.01	Mobilization/Demobilization	L.S.	1	4.0%	\$ 1,600
1.02	Survey Layout	L.S.	1	4.0%	\$ 1,600
1.03	Traffic Management	L.S.	1	3.5%	\$ 1,400
1.04	Quality Management	L.S.	1	3.0%	\$ 1,200
02	SECTION 2 - REMOVALS AND ADJUSTMENTS				
2.01	Asphalt Removal	sq. m	430	\$ 7.50	\$ 3,225
2.02	Asphalt milling (full areas of existing roadway)	sq. m	125	\$ 3.50	\$ 438
2.04	Concrete Curb and Gutter Removal	l.m.	150	\$ 15.00	\$ 2,250
2.05	Sidewalk Removal	sq. m	65	\$ 7.00	\$ 455
03	SECTION 3 - ROADWORKS				
3.01	Road Construction (incl excavation - 700mm, base - 300mm & sub base - 300mm)	sq. m	65	\$ 65.00	\$ 4,225
3.02	Asphalt (Bottom Lift, Top Lift) (100mm)	sq. m	65	\$ 30.00	\$ 1,950
3.03	Asphalt Overlay (existing road) (50mm)	sq. m	130	\$ 15.00	\$ 1,950
3.04	Concrete Curb and Gutter	l.m.	50	\$ 60.00	\$ 3,000
3.05	Concrete Sidewalk (incl. base gravel)	sq. m	160	\$ 60.00	\$ 9,600
04	SECTION 4 - DRAINAGE				
4.01	Catch basins and Lead	each	0	\$ 3,500.00	\$ -
4.02	Storm Sewer				
05	SECTION 5 - ELECTRICAL				
5.01	Pedestrian Lighting (incl conduit, wiring, base, pole, fixture)	each	2	\$ 6,000.00	\$ 12,000
06	SECTION 4 - SIGNING AND PAVEMENT MARKINGS				
6.01	Pavement Marking	LS	0	\$ 1,500.00	\$ -
6.02	Pavement Symbols	each	0	\$ 350.00	\$ -
6.03	Signage - remove to storage and reinstallation/ new	LS	0	\$ 1,500.00	\$ -
SUBTOTAL COST ESTIMATE					\$ 45,000
Contingency			30%		13,500
SUBTOTAL COST ESTIMATE					58,500
Engineering & Supervision			15%		9,000
TOTAL COST ESTIMATE					\$ 70,000

Notes:

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