

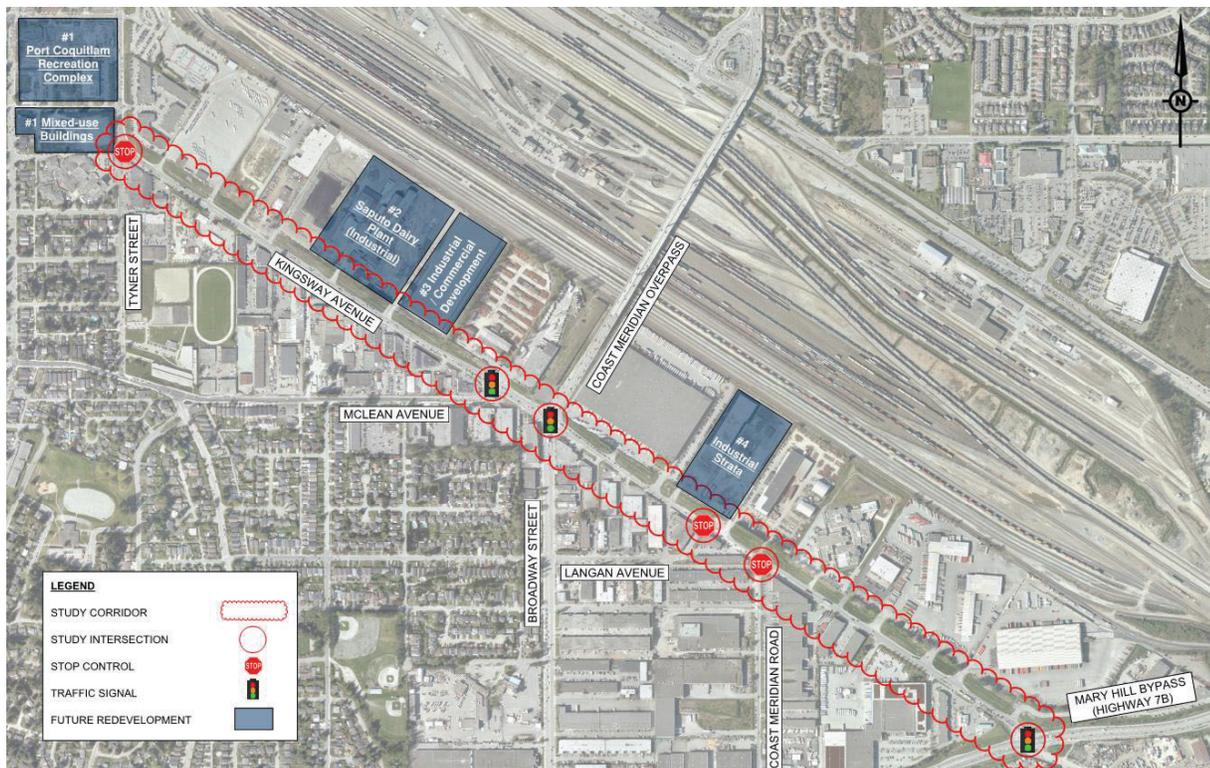


To: **City of Port Coquitlam** Date: **February 13, 2020**  
 Attention: **Jason Daviduk, P. Eng.** Project No.: **32340**  
 Cc: **Melony Burton, ASCT, MBA**  
 Reference: **Kingsway Avenue Conceptual Design – Traffic Study and Planning Memorandum Final**  
 From: **Neal Cormack, P. Eng., ENV SP**  
 Cc: **Chris Boit, P.Eng.**

## 1.0 Introduction

### 1.1 Background

ISL Engineering and Land Services Ltd. (ISL) was retained by the City of Port Coquitlam (the City) to develop a suitable concept (interim and ultimate) for the road cross section along Kingsway Avenue between Tyner Street and Mary Hill Bypass (Highway 7B), as shown in **Figure 1.1**, to provide an efficient movement of vehicles, people, and goods. According to the City’s *2013 Master Transportation Plan*, Kingsway Avenue is classified as an arterial, which connects Westwood Street to Mary Hill Bypass. Currently, the study corridor has two travel lanes (one lane in each direction) with turning bays and lanes (dedicated and shared). It is surrounded mainly by industrial developments on both sides, and it is designated as a truck route as well as part of TransLink’s Major Road Network (MRN).



**Figure 1.1 Study Area**



## 1.2 Objective

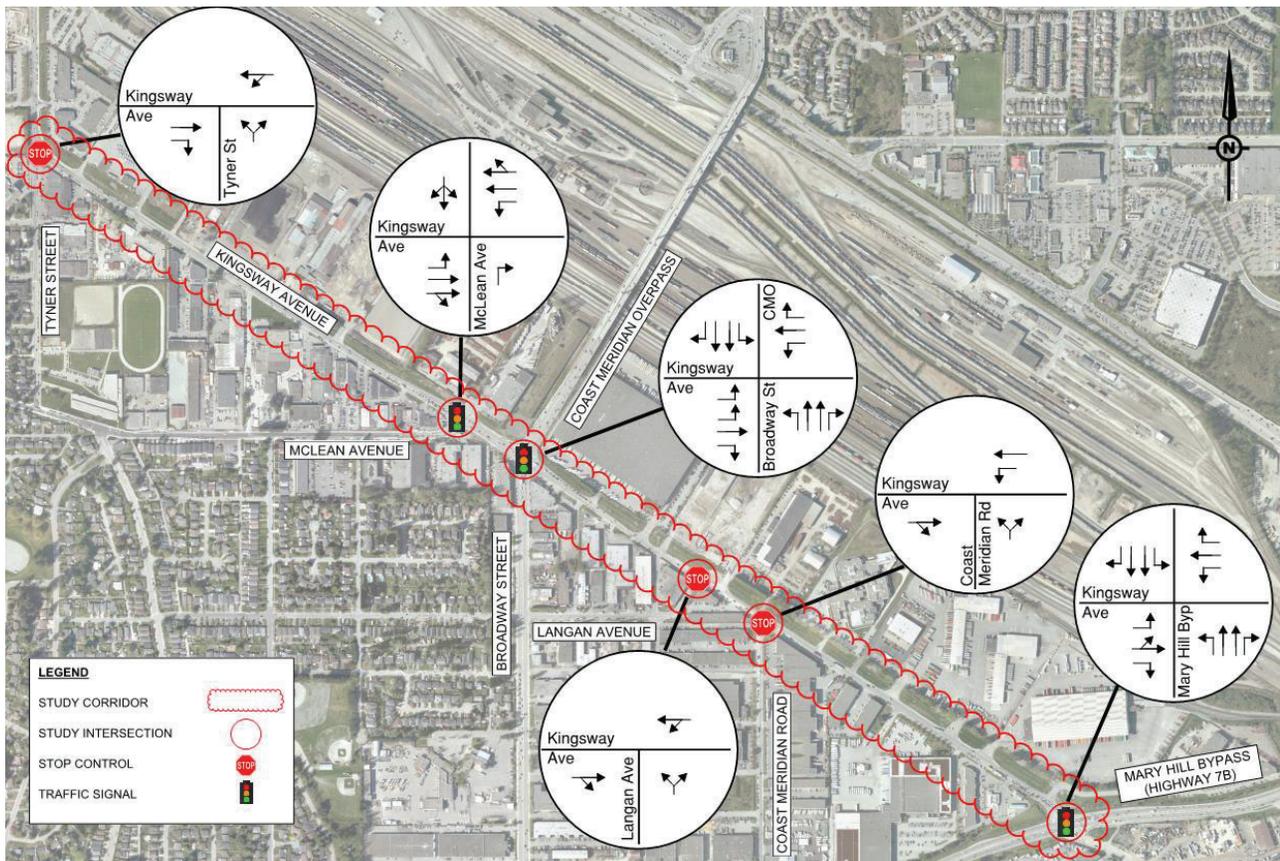
This Traffic Study and Planning Memorandum is intended to support and use as input for the engineering work of roadway cross-section design. The objectives of this technical memorandum are to assess the existing traffic condition (2019) and to identify the future traffic performances of the study corridor, and hence to recommend and justify the preferred design criteria for the interim (2029, 10-year) and ultimate (2044, 25-year) horizons.

## 1.3 Study Intersection

There are six key intersections located along the study corridor, namely from west to east with road classification and designation of the side street and existing traffic control type:

- Tyner Street (local road) – stop-controlled
- McLean Avenue (arterial) – signalized
- Coast Meridian Overpass / Broadway Street (both arterials and part of truck route and MRN) – signalized
- Langan Avenue (collector) – stop-controlled
- Coast Meridian Road (collector) – stop-controlled
- Mary Hill Bypass (highway) – signalized (managed by BC Ministry of Transportation and Infrastructure)

Along with the above intersection characteristics, the existing lane configuration can be found in **Figure 1.3**.



**Figure 1.3 Existing Intersection Traffic Control and Lane Configuration (as of June 2019)**



## 2.0 Existing Traffic Volume (2019)

Multi-year (2016-2018) traffic counts of the study intersections, including the number of crossing pedestrians and cyclists, and corridor sections were collected from the City. For this study, all surveyed traffic volumes were projected to 2019, using the same annual background growth rate from recent traffic studies of nearby redevelopments. A linear annual growth rate of 1.5% was applied to the available data, and the estimated 2019 traffic volumes along the study corridor were balanced based on the existence of industrial driveways between intersections. The 2019 turning movement volumes during the weekday AM and PM peak hours are shown in **Table 2**.

**Table 2** 2019 Estimated Traffic Volume

| Study Intersection<br>(along Kingsway Ave) | Eastbound |      |       | Westbound |      |       | Northbound |       |       | Southbound |       |       | Total        |
|--|-----------|------|-------|-----------|------|-------|------------|-------|-------|------------|-------|-------|--------------|
|  | Left      | Thru | Right | Left      | Thru | Right | Left       | Thru  | Right | Left       | Thru  | Right |              |
| <b>AM</b>                                  |           |      |       |           |      |       |            |       |       |            |       |       |              |
| Tyner St                                   | -         | 495  | 95    | 50        | 645  | -     | 65         | -     | 75    | -          | -     | -     | <b>1,425</b> |
| McLean Ave                                 | 10        | 459  | 40    | 485       | 660  | 15    | -          | -     | 290   | 11         | 5     | 5     | <b>1,980</b> |
| CMO / Broadway St                          | 245       | 300  | 215   | 40        | 479  | 25    | 109        | 270   | 35    | 70         | 525   | 572   | <b>2,885</b> |
| Langan Ave                                 | -         | 430  | 25    | 55        | 495  | -     | 5          | -     | 60    | -          | -     | -     | <b>1,070</b> |
| Coast Meridian Rd                          | -         | 410  | 80    | 65        | 535  | -     | 40         | -     | 35    | -          | -     | -     | <b>1,165</b> |
| Mary Hill Byp                              | 255       | 135  | 95    | 20        | 60   | 25    | 90         | 1,085 | 20    | 135        | 2,005 | 735   | <b>4,660</b> |
| <b>PM</b>                                  |           |      |       |           |      |       |            |       |       |            |       |       |              |
| Tyner St                                   | -         | 725  | 65    | 80        | 800  | -     | 55         | -     | 75    | -          | -     | -     | <b>1,800</b> |
| McLean Ave                                 | 5         | 799  | 55    | 355       | 665  | 3     | -          | -     | 376   | 5          | 10    | 5     | <b>2,278</b> |
| CMO / Broadway St                          | 570       | 420  | 190   | 485       | 497  | 160   | 46         | 375   | 350   | 45         | 395   | 480   | <b>4,013</b> |
| Langan Ave                                 | -         | 530  | 15    | 60        | 545  | -     | 10         | -     | 75    | -          | -     | -     | <b>1,235</b> |
| Coast Meridian Rd                          | -         | 570  | 45    | 55        | 550  | -     | 55         | -     | 90    | -          | -     | -     | <b>1,365</b> |
| Mary Hill Byp                              | 400       | 305  | 55    | 40        | 85   | 170   | 55         | 2,300 | 20    | 30         | 1,110 | 445   | <b>5,015</b> |

Based on the link volumes data provided by the City, approximately 5% and 7% of total traffic volumes along the study corridor were heavy vehicles during the weekday AM and PM peak hours, respectively. The same heavy vehicle percentages were applied for all traffic analyses in this study.

## 3.0 Future Development Traffic

Based on the available information, the following four major traffic generators in the vicinity of the study corridor will be developed and opened within the interim 10-year horizon (numbers are in reference to Figure 1.1):

1. Port Coquitlam Recreation Complex along with Mixed-use Buildings at 2150 Wilson Avenue – consists of 120,286 square feet (sq. ft.) gross floor area (GFA) of a new recreation complex (to be replaced the existing one), plus 328 high-rise residential condominiums and 45 senior living units. As the development is located out of the study area, based on a previous traffic study, only a portion (about 25%) of the generated trips will be travelling through the study corridor to enter/exit the development site.
2. Saputo Dairy Plant (Industrial) at 1855/1889/1925 Kingsway Avenue – consists of 292,393 sq. ft. GFA of warehouse space and 5,508 sq. ft. GFA of auxiliary office space.
3. Industrial / Commercial Development at 1845 Kingsway Avenue – consists of 13 wholesale units, each unit with 12,620 sq. ft. GFA of warehouse space and 4,610 sq. ft. GFA of auxiliary office space.
4. Industrial Strata at 1545/1575/1579 Kingsway Avenue – consists of 178,420 sq. ft. GFA of warehouse space and 55,783 sq. ft. GFA of auxiliary office space.



To forecast vehicle trips generated inbound and outbound from future industrial and mixed-use developments during both weekday AM and PM peak periods, when unavailable from recent traffic studies, the Institute of Transportation Engineers (ITE) *Trip Generation Manual (10<sup>th</sup> Edition)* was considered. The ITE trips rates were established using Land Use Code 150 (Warehousing) and 712 (Small Office Building), similar to recent study findings. Associated directional splits (percentages of inbound and outbound traffic) for each land use type were also extracted from the ITE *Manual*. **Table 3** shows the summary of inbound and outbound generated traffic volumes during both peak hours for future major developments. In total, the four major developments will generate 420 and 615 vehicle trips during weekday AM and PM peak hours, respectively.

**Table 3 Peak Hour Trip Generation from Future Major Developments**

| #            | Development   | Land Use  | Classification (Land Use Code) | Unit                | Extent  | Peak Hour | Trip Rate | 2-Way Trip | Directional Split |     | Total Trip |            |     |
|--------------|---|---|--------------------------------|---------------------|---------|-----------|-----------|------------|-------------------|-----|------------|------------|-----|
|              |   |   |                                |                     |         |           |           |            | In                | Out | In         | Out        |     |
| 1            | Port Coquitlam Recreation Complex & Mixed-use Buildings | Trips using Kingsway Ave to enter/exit the site |                                |                     |         | AM        |           | 107        | 56%               | 44% | 60         | 47         |     |
|              |   | PM  |                                | 262                 | 55%     | 45%       | 144       | 118        |                   |     |            |            |     |
| 2            | Saputo Dairy Plant (Industrial)                         | Industrial                                      | Warehousing (150)              | ft <sup>2</sup> GFA | 292,393 | AM        | 0.17      | 50         | 77%               | 23% | 38         | 12         |     |
|              |   |   |                                |                     |         | PM        | 0.19      | 56         | 27%               | 73% | 15         | 41         |     |
|              |   | Office  | Small Office Building (712)    | ft <sup>2</sup> GFA | 5,508   | AM        | 1.92      | 11         | 83%               | 17% | 9          | 2          |     |
|              |   |   |                                |                     |         | PM        | 2.45      | 14         | 32%               | 68% | 4          | 10         |     |
| 3            | Industrial / Commercial Development                     | Industrial                                      | Warehousing (150)              | ft <sup>2</sup> GFA | 12,620  | AM        | 0.17      | 3          | 77%               | 23% | 2          | 1          |     |
|              |   |   |                                |                     |         | PM        | 0.19      | 3          | 27%               | 73% | 1          | 2          |     |
|              |   | Office  | Small Office Building (712)    | ft <sup>2</sup> GFA | 4,610   | AM        | 1.92      | 9          | 83%               | 17% | 7          | 2          |     |
|              |   |   |                                |                     |         | PM        | 2.45      | 11         | 32%               | 68% | 4          | 7          |     |
|              |   | Total (13 Wholesale Units)                      |                                |                     |         |           | AM        |            | 156               |     |            | 117        | 39  |
|              |   |   |                                |                     |         |           | PM        |            | 182               |     |            | 65         | 117 |
| 4            | Industrial Strata                                       | Industrial                                      | Warehousing (150)              | ft <sup>2</sup> GFA | 178,420 | AM        | 0.17      | 30         | 77%               | 23% | 23         | 7          |     |
|              |   |   |                                |                     |         | PM        | 0.19      | 34         | 27%               | 73% | 9          | 25         |     |
|              |   | Office  | General Office Building (710)  | ft <sup>2</sup> GFA | 55,783  | AM        | 1.16      | 65         | 86%               | 14% | 56         | 9          |     |
|              |   |   |                                |                     |         | PM        | 1.15      | 64         | 16%               | 84% | 10         | 54         |     |
| <b>Total</b> |   |   |                                |                     |         | AM        |           | <b>419</b> |                   |     | <b>303</b> | <b>116</b> |     |
|              |   |   |                                |                     |         | PM        |           | <b>612</b> |                   |     | <b>247</b> | <b>365</b> |     |

Regarding the trip distributions of future developments, it is understood that City’s new recreation complex along with mixed-use buildings would have different traffic patterns comparing with the industrial developments within the study area. Using the existing traffic patterns and engineering judgements, the following assumptions were made to distribute the generated trips appropriately:

- As Port Coquitlam Recreation Complex will generate and attract various trip purposes, the generated trips (25% of total trips) were distributed based on the existing traffic volumes at the study intersections, which is as follows during both weekday peak periods:
  - Inbound traffic – 50% from north through Coast Meridian Overpass, 40% from east through Mary Hill Bypass, and 10% from south through Broadway Street
  - Outbound traffic – 40% to north through Coast Meridian Overpass, 35% to east through Mary Hill Bypass, 20% to south through Broadway Street, and 5% to south through Tyner Street
- For the three future industrial developments:
  - During the AM peak – 50% from/to east through Mary Hill Bypass, 20% from/to northwest through Kingsway Avenue, 15% from/to south through Broadway Street, 10% from/to southwest through McLean Avenue (and Tyner Street due to right-out configuration at McLean Avenue), and 5% from/to north through Coast Meridian Overpass



- During the PM peak hour – 40% from/to east through Mary Hill Bypass, 35% from/to south through Broadway Street, 15% from/to northwest through Kingsway Avenue, 5% from/to southwest through McLean Avenue (and Tyner Street due to right-out configuration at McLean Avenue), and 5% from/to north through Coast Meridian Overpass

## 4.0 Future Traffic Volume (2029 and 2044)

To estimate the future traffic conditions, 10-year (2029) and 25-year (2044) horizon traffic patterns were studied for this cross-section design. In order to consider background traffic growth that is not generated by future developments, a linear annual growth rate of 1.5% was also applied to 2019 traffic volumes. Existing traffic volumes with background traffic growth and development generated trips were summed to determine the combined traffic volumes for both weekday peak hours of the horizon year 2029 and 2044, as shown in **Table 4.1** and **Table 4.2**.

**Table 4.1 2029 Estimated Traffic Volume**

| Study Intersection<br>(along Kingsway Ave) | EB  |       |     | WB  |       |     | NB  |       |     | SB  |       |     | Total |
|--|-----|-------|-----|-----|-------|-----|-----|-------|-----|-----|-------|-----|-------|
|  | L   | T     | R   | L   | T     | R   | L   | T     | R   | L   | T     | R   |       |
| AM   |     |       |     |     |       |     |     |       |     |     |       |     |       |
| Tyner St                                   | -   | 662   | 110 | 60  | 818   | -   | 75  | -     | 108 | -   | -     | -   | 1,832 |
| McLean Ave                                 | 15  | 626   | 57  | 561 | 937   | 20  | -   | -     | 344 | 15  | 10    | 10  | 2,595 |
| CMO / Broadway St                          | 306 | 411   | 267 | 53  | 664   | 31  | 161 | 315   | 48  | 89  | 605   | 698 | 3,648 |
| Langan Ave                                 | -   | 555   | 30  | 66  | 704   | -   | 12  | -     | 72  | -   | -     | -   | 1,375 |
| Coast Meridian Rd                          | -   | 524   | 97  | 75  | 766   | -   | 55  | -     | 45  | -   | -     | -   | 1,563 |
| Mary Hill Byp                              | 324 | 171   | 119 | 25  | 72    | 30  | 120 | 1,250 | 25  | 160 | 2,310 | 979 | 5,586 |
| PM   |     |       |     |     |       |     |     |       |     |     |       |     |       |
| Tyner St                                   | -   | 969   | 75  | 95  | 1,098 | -   | 65  | -     | 95  | -   | -     | -   | 2,396 |
| McLean Ave                                 | 10  | 1,169 | 79  | 414 | 984   | 5   | -   | -     | 436 | 10  | 15    | 10  | 3,133 |
| CMO / Broadway St                          | 716 | 598   | 302 | 574 | 679   | 189 | 99  | 435   | 409 | 55  | 455   | 631 | 5,141 |
| Langan Ave                                 | -   | 741   | 22  | 72  | 745   | -   | 16  | -     | 90  | -   | -     | -   | 1,686 |
| Coast Meridian Rd                          | -   | 807   | 61  | 65  | 735   | -   | 67  | -     | 105 | -   | -     | -   | 1,840 |
| Mary Hill Byp                              | 538 | 406   | 81  | 50  | 114   | 200 | 77  | 2,645 | 25  | 35  | 1,280 | 590 | 6,041 |

**Table 4.2 2044 Estimated Traffic Volume**

| Study Intersection<br>(along Kingsway Ave) | EB  |       |     | WB  |       |     | NB  |       |     | SB  |       |       | Total |
|--|-----|-------|-----|-----|-------|-----|-----|-------|-----|-----|-------|-------|-------|
|  | L   | T     | R   | L   | T     | R   | L   | T     | R   | L   | T     | R     |       |
| AM   |     |       |     |     |       |     |     |       |     |     |       |       |       |
| Tyner St                                   | -   | 777   | 135 | 70  | 963   | -   | 90  | -     | 123 | -   | -     | -     | 2,157 |
| McLean Ave                                 | 15  | 731   | 62  | 671 | 1,087 | 25  | -   | -     | 409 | 15  | 10    | 10    | 3,035 |
| CMO / Broadway St                          | 361 | 481   | 317 | 58  | 769   | 36  | 181 | 375   | 53  | 104 | 725   | 828   | 4,288 |
| Langan Ave                                 | -   | 655   | 35  | 81  | 819   | -   | 12  | -     | 87  | -   | -     | -     | 1,527 |
| Coast Meridian Rd                          | -   | 614   | 112 | 90  | 886   | -   | 60  | -     | 50  | -   | -     | -     | 1,813 |
| Mary Hill Byp                              | 384 | 201   | 144 | 30  | 87    | 35  | 140 | 1,495 | 30  | 190 | 2,760 | 1,144 | 6,641 |
| PM   |     |       |     |     |       |     |     |       |     |     |       |       |       |
| Tyner St                                   | -   | 1,134 | 90  | 110 | 1,278 | -   | 80  | -     | 110 | -   | -     | -     | 2,801 |
| McLean Ave                                 | 10  | 1,349 | 94  | 494 | 1,134 | 5   | -   | -     | 521 | 10  | 15    | 10    | 3,643 |
| CMO / Broadway St                          | 841 | 693   | 347 | 684 | 789   | 224 | 109 | 520   | 489 | 65  | 545   | 741   | 6,046 |
| Langan Ave                                 | -   | 861   | 27  | 87  | 865   | -   | 16  | -     | 105 | -   | -     | -     | 1,961 |
| Coast Meridian Rd                          | -   | 932   | 71  | 80  | 860   | -   | 82  | -     | 125 | -   | -     | -     | 2,150 |
| Mary Hill Byp                              | 628 | 471   | 96  | 55  | 134   | 235 | 92  | 3,165 | 30  | 45  | 1,530 | 690   | 7,171 |



## 5.0 Capacity Analysis

To determine the future roadway cross sections and lane configurations at the study intersections and corridor, intersection capacity analyses were conducted.

### 5.1 Link Volume and Corridor Capacity

To identify the future road cross sections, the estimated traffic demands (link traffic volumes) were compared with the existing study corridor capacity. *Highway Capacity Software (HCS)* was used to calculate volume over capacity (V/C) ratio for the existing and future demands considering the existing lane configurations. In *HCS*, V/C ratios are calculated based on various inputs, such as length of the road, the number of through lanes, lane width, two-way hourly volume, link volume directional split, and heavy truck percentage. It is assumed that if the V/C ratio surpasses 0.9, road improvement should be considered.

To better assess the traffic conditions, the study corridor was divided into five sections for *HCS*. Due to the short spacing between McLean Avenue and Coast Meridian Overpass / Broadway Street, it was assumed that the cross-section design of this section of the corridor should be determined from intersection operation performance and queue length analysis. Therefore, the peak hour link volumes, capacities, and V/C ratios for the other four road sections in each study horizon can be found in **Table 5.1** as well as **Figures 5.1**, **Figure 5.2**, and **Figure 5.3**.

**Table 5.1 Kingsway Avenue Link Capacity, Peak Hour Volume, and V/C ratio for 2019, 2029, and 2044**

| Road Section<br>(along Kingsway Ave)<br>Between | Link<br>Capacity<br>(VEH/HR) | Peak<br>Hour | 2019        |       |       |      | 2029        |       |       |      | 2044        |       |       |      |
|---|------------------------------|--------------|-------------|-------|-------|------|-------------|-------|-------|------|-------------|-------|-------|------|
|   |                              |              | Link Volume |       |       | V/C  | Link Volume |       |       | V/C  | Link Volume |       |       | V/C  |
|   |                              |              | EB          | WB    | 2-way |      | EB          | WB    | 2-way |      | EB          | WB    | 2-way |      |
| Tyner St &<br>McLean Ave                        | 2,945                        | AM           | 570         | 695   | 1,265 | 0.43 | 770         | 878   | 1,648 | 0.56 | 900         | 1,033 | 1,933 | 0.66 |
|   |                              | PM           | 800         | 880   | 1,680 | 0.57 | 1,063       | 1,193 | 2,256 | 0.77 | 1,243       | 1,388 | 2,631 | 0.90 |
| CMO / Broadway St &<br>Langan Ave               | 2,899                        | AM           | 405         | 544   | 949   | 0.33 | 548         | 748   | 1,296 | 0.44 | 638         | 863   | 1,501 | 0.51 |
|   |                              | PM           | 815         | 1,142 | 1,957 | 0.67 | 1,062       | 1,442 | 2,504 | 0.86 | 1,247       | 1,697 | 2,944 | 1.01 |
| Langan Ave &<br>Coast Meridian Rd               | 2,920                        | AM           | 490         | 550   | 1,040 | 0.36 | 627         | 770   | 1,397 | 0.48 | 742         | 900   | 1,642 | 0.56 |
|   |                              | PM           | 605         | 605   | 1,210 | 0.41 | 831         | 817   | 1,648 | 0.56 | 966         | 952   | 1,918 | 0.66 |
| Coast Meridian Rd &<br>Mary Hill Byp            | 2,922                        | AM           | 445         | 600   | 1,045 | 0.36 | 569         | 841   | 1,400 | 0.48 | 664         | 976   | 1,640 | 0.56 |
|   |                              | PM           | 660         | 605   | 1,265 | 0.43 | 912         | 800   | 1,712 | 0.59 | 1,057       | 940   | 1,997 | 0.68 |

As shown in the above table, it is expected that with the existing lane configuration, the road capacity at all four road sections along Kingsway Avenue would be able to meet the traffic demands until 2029.

In 2044, during the weekday PM peak hour, the road section between Tyner Street and McLean Avenue would have a V/C ratio at the threshold (0.90), and the section between Coast Meridian Overpass / Broadway Street and Langan Avenue would have a capacity deficiency (V/C > 1.00).

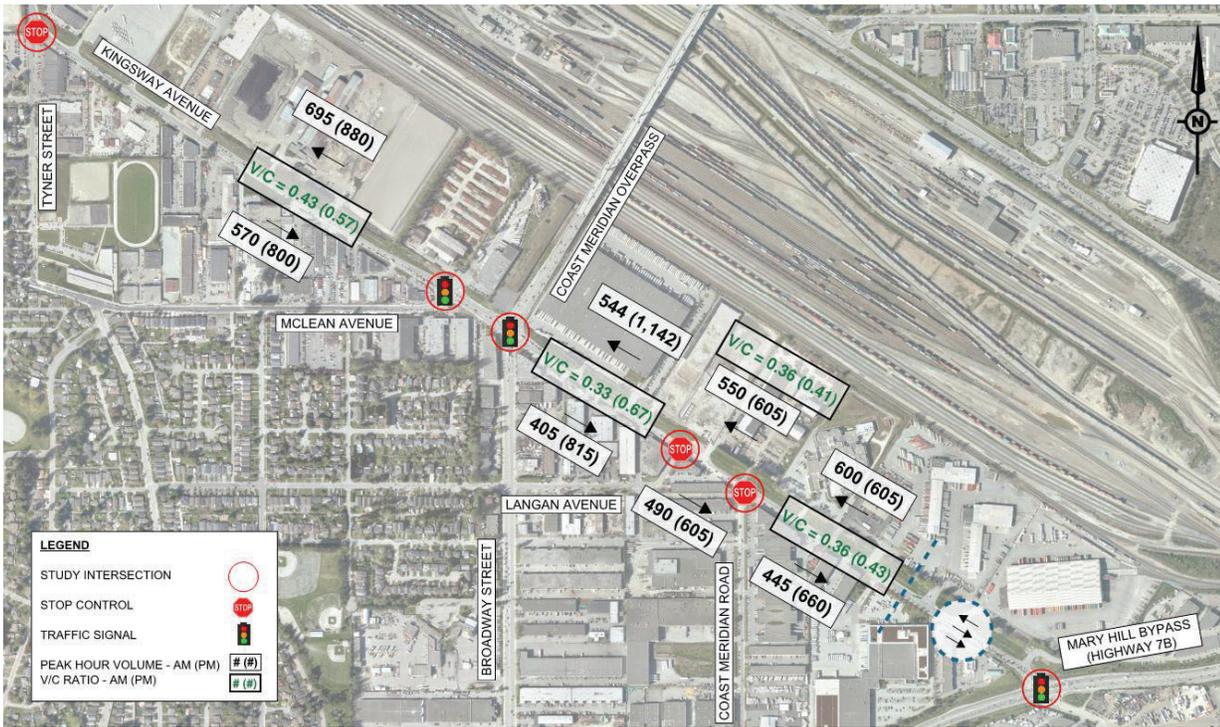


Figure 5.1 2019 Peak Hour Link Volume and V/C Ratio

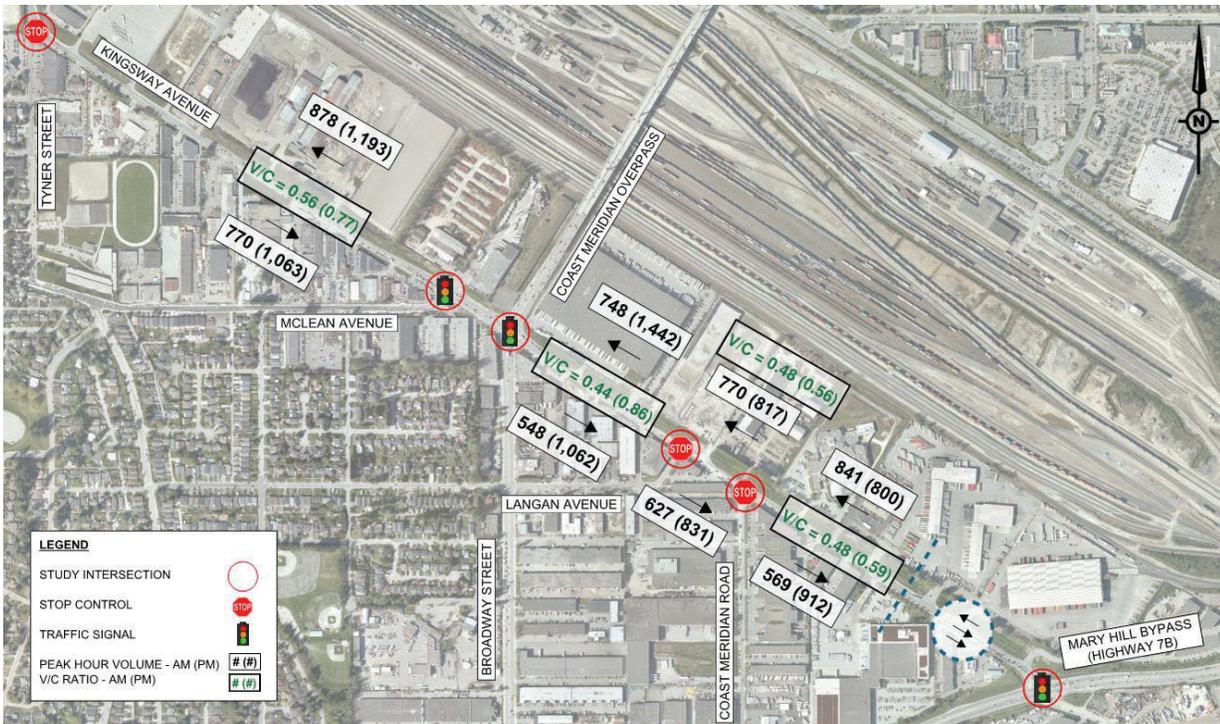


Figure 5.2 2029 Peak Hour Link Volume and V/C Ratio

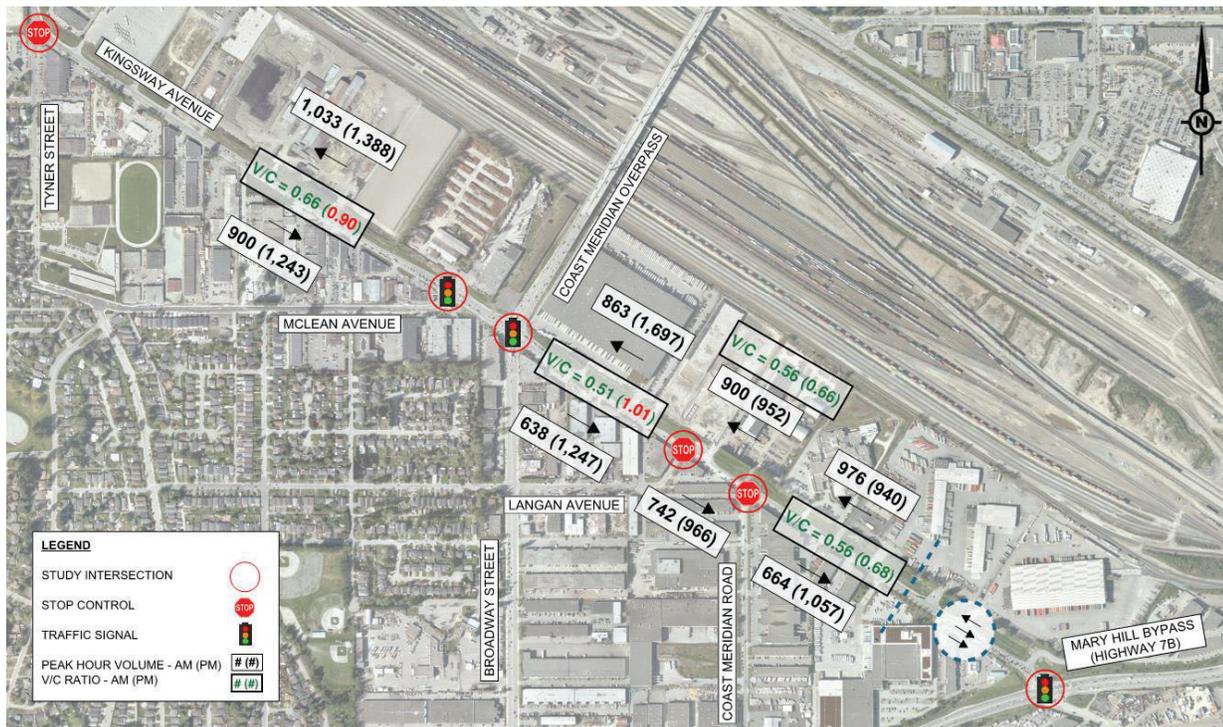


Figure 5.3 2044 Peak Hour Link Volume and V/C Ratio

## 5.2 Annual Average Daily Traffic (AADT)

Annual Average Daily Traffic (AADT) volumes for each section of Kingsway Avenue, based on the available daily traffic volumes provided by the City and using 1.5% linear annual traffic growth rate, were determined and shown in **Table 5.2**.

Table 5.2 AADT Volume for 2019, 2029, and 2044

| Road Section<br>(along Kingsway Ave)<br>Between | Annual Average Daily Traffic<br>Volume (VEH/DAY) |        |        |
|---|--|--------|--------|
|   | 2019   | 2029   | 2044   |
| Tyner St & McLean Ave                           | 15,850   | 18,120 | 21,530 |
| CMO / Broadway St & Langan Ave                  | 24,470   | 31,300 | 36,800 |
| Langan Ave & Coast Meridian Rd                  | 15,130   | 20,600 | 23,980 |
| Coast Meridian Rd & Mary Hill Byp               | 13,850   | 15,830 | 18,810 |

In accordance with design guidelines (bylaws) for other municipalities in British Columbia and Alberta, when the demand reaches approximately 20,000 to 35,000 vehicles per day, improvements are required to upgrade the roadway cross section from two to four lanes. This is also consistent with Table 5, as no road widening is recommended by 2029, except the section between Coast Meridian Overpass / Broadway Street and Langan Avenue. In 2044, the first three sections (that is, from Tyner Street to Coast Meridian Road) are warranted for road widening.



### 5.3 Intersection Operation Performance (Existing Traffic Control and Lane Configuration)

To further identify the need for road improvement, traffic operation performances at the study intersections were analyzed using *Synchro 9* software, which is based on the standard methods of the *Highway Capacity Manual (HCM)*. In *HCM*, measures of effectiveness were developed, including control delay (second per vehicle). Level of Service (LOS) is defined based on the average control delay (**Table 5.3**).

**Table 5.3** LOS Definition for Signalized and Unsignalized Intersections in HCM

| Traffic Control | LOS             | A    | B     | C     | D     | E     | F   |
|-----------------|-----------------|------|-------|-------|-------|-------|-----|
| Signalized      | Delay (SEC/VEH) | 0-10 | 10-20 | 20-35 | 35-55 | 55-80 | >80 |
| Unsignalized    |                 | 0-10 | 10-15 | 15-25 | 25-35 | 35-50 | >50 |

For capacity analysis in urban areas, LOS D or better is generally considered as acceptable LOS for both signalized and unsignalized intersections. The latest signal timing sheets, as provided by the City as well as BC Ministry of Transportation and Infrastructure, were used for this study; however, signal optimization was applied for all traffic signal analyses in 2029 and 2044.

The overall intersection and individual movement performances for both weekday AM and PM peak hours in existing condition (2019), along 10-year (2029) and 25-year (2044) horizons, under existing traffic control and lane configuration, were determined and consolidated in **Table 5.4**. The average delay, LOS, and critical movements at LOS E or F were determined. For the critical movements, EB, WB, NB, and SB correspond to eastbound, westbound, northbound, and southbound, respectively. L, T, and R imply left-turn, through, and right-turn movements. The discussion of intersection performance for each horizon year is also provided in the following sections.

**Table 5.4** Synchro Result for Existing Condition (2019), 10-year Horizon (2029), and 25-year Horizon (2044)

| Study Intersection along Kingsway Ave (Control Type) | Peak Hour | 2019      |     |                                   | 2029      |     |                                   | 2044      |     |  |
|--|-----------|-----------|-----|-----------------------------------|-----------|-----|-----------------------------------|-----------|-----|--|
|  |           | Delay (s) | LOS | Critical Movement                 | Delay (s) | LOS | Critical Movement                 | Delay (s) | LOS | Critical Movement                      |
| Tyner St (stop-controlled)                           | AM        | 5         | A   | NBLR                              | 21        | C   | NBLR                              | 63        | F   | NBLR                                   |
|  | PM        | 12        | B   | NBLR                              | 71        | F   | NBLR                              | 686       | F   | NBLR                                   |
| McLean Ave (signalized)                              | AM        | 12        | B   | -                                 | 17        | B   | -                                 | 24        | C   | -                                      |
|  | PM        | 15        | B   | -                                 | 27        | C   | -                                 | 52        | D   | EBT, EBR, WBL                          |
| CMO / Broadway St (signalized)                       | AM        | 53        | D   | EBL, WBT, NBL, SBR                | 106       | F   | EBL, EBT, WBT, NBL, SBR           | 158       | F   | EBL, EBT, WBT, NBL, SBR                |
|  | PM        | 45        | D   | EBL, EBT, NBL, NBT, SBT           | 114       | F   | EBL, EBT, WBL, WBT, NBL, SBT, SBR | 176       | F   | EBL, EBT, WBL, WBT, NBL, SBT, SBR      |
| Langan Ave (stop-controlled)                         | AM        | 2         | A   | -                                 | 2         | A   | -                                 | 3         | A   | -                                      |
|  | PM        | 2         | A   | -                                 | 3         | A   | -                                 | 6         | A   | NBLR                                   |
| Coast Meridian Rd (stop-controlled)                  | AM        | 2         | A   | -                                 | 5         | A   | NBLR                              | 13        | B   | NBLR                                   |
|  | PM        | 5         | A   | NBLR                              | 26        | D   | NBLR                              | 80        | F   | NBLR                                   |
| Mary Hill Byp (signalized)                           | AM        | 42        | D   | EBL, EBT, WBL, WBT, NBL, SBT      | 80        | E   | EBL, EBT, WBL, WBT, NBL, SBL, SBT | 154       | F   | EBL, EBT, WBL, WBT, NBL, SBL, SBT, SBR |
|  | PM        | 89        | F   | EBL, EBT, WBL, WBT, WBR, NBT, SBL | 159       | F   | EBL, EBT, WBL, WBT, WBR, NBT, SBL | 237       | F   | EBL, EBT, WBL, WBT, WBR, NBL, NBT, SBL |



- Existing Condition (2019) – All study intersections are currently operating at an acceptable LOS (D or better) during both weekday peak hours, except for the Mary Hill Bypass intersection that is operating inefficiently (LOS F) during the PM peak. Northbound movements at the Tyner Street intersection and Coast Meridian Road intersection were found to be critical (LOS E or F) during both peaks, which is due to high Kingsway Avenue east-west traffic volumes. At the intersection of Coast Meridian Overpass / Broadway Street and Kingsway Avenue, some movements were identified to be critical, such as eastbound and northbound left turns during both peaks. East-west approaches at the Mary Hill Bypass intersection are not operating efficiently during any of the peak hours.
- 10-year Horizon (2029) – The Tyner Street intersection will operate poorly (LOS F) during the PM peak hour. The intersection of Coast Meridian Overpass / Broadway Street and Kingsway Avenue will not operate efficiently during both peaks (LOS F), and more critical movements were identified at this intersection. Northbound movement at the Coast Meridian Road intersection will become critical in the AM peaks as well. The Mary Hill Bypass intersection performance will fail during both peaks.
- 25-year Horizon (2044) – Most of the study intersections will have a similar operation performance as in 2029. The Tyner Street and Kingsway Avenue intersection will operate poorly during both peak hours. In addition, the LOS at the Coast Meridian Road intersection will become F during the PM peak by 2044.

#### 5.4 Spillback and Weaving Analysis

Due to short spacing between two intersections and relatively high traffic demands in all directions, queue spillback and vehicle weaving could be concerns in the 2029 and 2044 horizon years. Hence, further traffic (spillback and weaving) analyses were considered and focused on two particular areas, intersections less than 100 metres (m) spacing along the study corridor: Tyner Street with Kelly Avenue (future roundabout) and McLean Avenue with Coast Meridian Overpass / Broadway Street.

Referring to **Table 5.4**, the Tyner Street and Kingsway Avenue intersection will operate poorly in the horizon years with the existing traffic control and lane configuration. Two potential configuration options (signalization and roundabout) for the study intersection were assessed, taking into account the future one-lane roundabout at Kelly Avenue. Upon further traffic analysis, it was determined that upstream spillbacks (95<sup>th</sup> percentile) from both intersections (Tyner Street eastbound and Kelly Avenue northbound approaches) could occur, limiting available movements at roundabouts. In 2044, 12 m (approximately two vehicles in length) of queue spillback was identified from the eastbound direction of Tyner Street. However, based on the overall intersection performance, signalization (LOS C or better) operates better than a roundabout (LOS F) during both peak periods and horizon years.

To further understand the road section between McLean Avenue and Coast Meridian Overpass / Broadway Street, weaving analysis was conducted for the study peak periods and horizon years. Both individual weaving movements (eastbound and westbound) through Kingsway Avenue between McLean Avenue and Coast Meridian Overpass were assessed. According to *HCS*, it was found that weaving operation performances were LOS D or better for both directions, with the exception of weekday PM peak hour in 2044 for eastbound movement with LOS E; that is, mainly northbound right turn from McLean Avenue to eastbound left turn to Coast Meridian Overpass. Therefore, potential improvements, such as modifying intersection signals and geometric design, could be considered.

#### 5.5 Queue Length Analysis

Queue length analysis was conducted using *SimTraffic* (traffic microsimulation of *Synchro*) for the existing condition (2019) and 10-year horizon (2029) under existing traffic control and lane configuration. Due to poor intersection performance for most of the study intersections along Kingsway Avenue in 2044, the queue length analysis cannot be reflected in *SimTraffic*.



**Table 5.5** and **Table 5.6** show the analysis results, in 2019 and 2029 for average and 95<sup>th</sup> percentile queue length, followed by a discussion for each horizon year. The existing storage lengths are also provided.

**Table 5.5 SimTraffic Result for Existing Condition (2019)**

| Study Intersection<br>(along Kingsway Ave) | Peak<br>Hour       | Measure of<br>Effectiveness<br>[Queue Length]<br>(m) | Kingsway Avenue |                 |    |    | Side Street |     |                 |     |
|--|--------------------|--|-----------------|-----------------|----|----|-------------|-----|-----------------|-----|
|  |                    |  | EB              |                 | WB |    | NB          |     | SB              |     |
|  |                    |  | L               | R               | L  | R  | L           | R   | L               | R   |
| Tyner St                                   | Storage Length (m) |  |                 | 25              |    |    |             |     |                 |     |
|  | AM                 | Average  |                 | 0               |    |    |             |     |                 |     |
|  |                    | 95th %ile  |                 | 4               |    |    |             |     |                 |     |
|  | PM                 | Average  |                 | 0               |    |    |             |     |                 |     |
|  |                    | 95th %ile  |                 | 0               |    |    |             |     |                 |     |
| McLean Ave                                 | Storage Length (m) |  | 20              |                 | 25 |    |             |     |                 |     |
|  | AM                 | Average  | 2               |                 | 28 |    |             |     |                 |     |
|  |                    | 95th %ile  | 9               |                 | 55 |    |             |     |                 |     |
|  | PM                 | Average  | 1               |                 | 26 |    |             |     |                 |     |
|  |                    | 95th %ile  | 5               |                 | 50 |    |             |     |                 |     |
| CMO / Broadway St                          | Storage Length (m) |  | 50              | 25              | 35 | 30 | 70          | 70  | 45 <sup>1</sup> | 55  |
|  | AM                 | Average  | 33              | 16              | 12 | 5  | 27          | 0   | 15              | 1   |
|  |                    | 95th %ile  | 55              | 55              | 43 | 36 | 51          | 0   | 44              | 15  |
|  | PM                 | Average  | 89              | 32              | 68 | 34 | 15          | 14  | 10              | 0   |
|  |                    | 95th %ile  | 132             | 74              | 79 | 95 | 40          | 60  | 23              | 0   |
| Langan Ave                                 | Storage Length (m) |  |                 |                 |    |    |             |     |                 |     |
|  | AM                 | Average  |                 |                 |    |    |             |     |                 |     |
|  |                    | 95th %ile  |                 |                 |    |    |             |     |                 |     |
|  | PM                 | Average  |                 |                 |    |    |             |     |                 |     |
|  |                    | 95th %ile  |                 |                 |    |    |             |     |                 |     |
| Coast Meridian Rd                          | Storage Length (m) |  |                 |                 | 25 |    |             |     |                 |     |
|  | AM                 | Average  |                 |                 | 7  |    |             |     |                 |     |
|  |                    | 95th %ile  |                 |                 | 17 |    |             |     |                 |     |
|  | PM                 | Average  |                 |                 | 6  |    |             |     |                 |     |
|  |                    | 95th %ile  |                 |                 | 16 |    |             |     |                 |     |
| Mary Hill Byp                              | Storage Length (m) |  |                 | 40 <sup>2</sup> | 40 | 25 | 45          | 120 | 45              | 120 |
|  | AM                 | Average  |                 | 15              | 4  | 0  | 23          | 0   | 49              | 114 |
|  |                    | 95th %ile  |                 | 65              | 11 | 0  | 56          | 2   | 92              | 220 |
|  | PM                 | Average  |                 | 36              | 8  | 8  | 12          | 0   | 16              | 4   |
|  |                    | 95th %ile  |                 | 102             | 22 | 41 | 51          | 0   | 49              | 19  |

Note:

- 1 – Through movements block the turning bays
- 2 – Left-turn movements block the right-turn bay

Accordingly, none of the stop-controlled intersections has storage capacity deficiencies. Based on 95<sup>th</sup> percentile-queue, westbound left-turn bay at McLean Avenue intersection and east-west turning bays (left and right turns) at the Coast Meridian Overpass / Broadway Street intersection have inadequate storage lengths during both weekday peak hours. Due to the significantly high volume of left-turn vehicles at the Mary Hill Bypass intersection, the eastbound right-turn bay is blocked by through traffic queues, considering the average queue length in both peak hours.



**Table 5.6 SimTraffic Result for 10-year Horizon (2029) – Existing Lane Configuration**

| Study Intersection<br>(along Kingsway Ave) | Peak<br>Hour       | Measure of<br>Effectiveness<br>[Queue Length]<br>(m) | Kingsway Avenue |     |     |     | Side Street |     |    |     |
|--|--------------------|--|-----------------|-----|-----|-----|-------------|-----|----|-----|
|  |                    |  | EB              |     | WB  |     | NB          |     | SB |     |
|  |                    |  | L               | R   | L   | R   | L           | R   | L  | R   |
| Tyner St                                   | Storage Length (m) |  |                 | 25  |     |     |             |     |    |     |
|  | AM                 | Average  |                 | 4   |     |     |             |     |    |     |
|  |                    | 95th %ile  |                 | 15  |     |     |             |     |    |     |
|  | PM                 | Average  |                 | 8   |     |     | 256         |     |    |     |
|  |                    | 95th %ile  |                 | 33  |     | 189 | 358         |     |    |     |
| McLean Ave                                 | Storage Length (m) |  | 20              |     | 25  |     |             |     |    |     |
|  | AM                 | Average  | 3               |     | 39  |     |             |     |    |     |
|  |                    | 95th %ile  | 11              |     | 65  |     |             |     |    |     |
|  | PM                 | Average  | 3               |     | 41  |     | 275         |     |    |     |
|  |                    | 95th %ile  | 17              |     | 67  |     | 338         |     |    |     |
| CMO / Broadway St                          | Storage Length (m) |  | 50              | 25  | 35  | 30  | 70          | 70  | 45 | 55  |
|  | AM                 | Average  | 41              | 32  | 25  | 18  | 93          | 1   | 22 | 3   |
|  |                    | 95th %ile  | 64              | 73  | 75  | 70  | 120         | 19  | 61 | 30  |
|  | PM                 | Average  | 72              | 33  | 67  | 31  | 53          | 31  | 13 | 1   |
|  |                    | 95th %ile  | 95              | 74  | 80  | 90  | 104         | 91  | 32 | 10  |
| Langan Ave                                 | Storage Length (m) |  |                 |     | 125 |     |             |     |    |     |
|  | AM                 | Average  |                 |     |     |     |             |     |    |     |
|  |                    | 95th %ile  |                 |     | 169 |     |             |     |    |     |
|  | PM                 | Average  |                 |     |     |     |             |     |    |     |
|  |                    | 95th %ile  |                 |     |     |     |             |     |    |     |
| Coast Meridian Rd                          | Storage Length (m) |  |                 |     | 25  |     |             |     |    |     |
|  | AM                 | Average  |                 |     | 11  |     |             |     |    |     |
|  |                    | 95th %ile  |                 |     | 36  |     |             |     |    |     |
|  | PM                 | Average  |                 |     | 9   |     |             |     |    |     |
|  |                    | 95th %ile  |                 |     | 18  |     |             |     |    |     |
| Mary Hill Byp                              | Storage Length (m) |  |                 | 40  | 40  | 25  | 45          | 120 | 45 | 120 |
|  | AM                 | Average  |                 | 60  | 5   | 2   | 35          | 0   | 62 | 130 |
|  |                    | 95th %ile  |                 | 117 | 14  | 16  | 70          | 0   | 96 | 215 |
|  | PM                 | Average  |                 | 35  | 20  | 29  | 15          | 0   | 28 | 14  |
|  |                    | 95th %ile  |                 | 100 | 63  | 77  | 58          | 0   | 72 | 43  |

It is expected that more turning movements would have capacity deficiencies by 2029, including:

- Tyner Street – capacity deficiency for the eastbound right-turn lane during the weekday PM peak hour, and substantial queue lengths in the westbound and northbound directions, which will affect the driveways and nearby intersections (such as Hawthorne Avenue at Tyner Street).
- McLean Avenue – the eastbound left-turn bay could be blocked by through movements, and it is expected that the westbound queue could affect the upstream intersection (Coast Meridian Overpass / Broadway Street) performance, during both peaks. The westbound approach queue could be extended further upstream and affect the traffic operation of the Langan Avenue intersection during the AM peak. Long northbound queue length is expected during the PM peak.
- Langan Avenue – westbound queue could spill over to Coast Meridian Road (upstream) in the AM peak.
- Coast Meridian Road – capacity deficiency of the westbound left-turn bay during the AM peak.



As most of the turning movements would have capacity deficiencies by 2029, it is expected that in 2044, the results would get even worse.

## 6.0 Signal Warrant Analysis

The Transportation Association of Canada (TAC) *Canadian Traffic Signal Warrant* was used to determine whether a traffic signal is warranted for all study stop-controlled intersections during the existing condition and study horizon years (2029 and 2044). The TAC *Warrant* uses cumulative factors methodology that includes a cross-product relationship of the vehicle-vehicle conflict and the vehicle-pedestrian conflict. It also considers various local factors such as pedestrian demographics, pedestrian exposure, as well as roadway and vehicle characteristics.

The warrant analysis requires two hours each for the morning, midday, and afternoon peak periods to calculate an average hourly volume. For conservative measures, it was assumed that peak hour volumes are the same for whole peak periods (two hours), and noon peak volumes were estimated as the average between the weekday AM and PM peak hours. The warrant score of 100 is the threshold for traffic signalization. The summary of the analyses is as follows:

- 2019 – The intersection of Tyner Street at Kingsway Avenue could be warranted for signalization, as its warrant score (122) is over 100. Other stop-controlled intersections were not found to be warranted for a traffic signal. However, as requested by the City, ISL completed additional traffic operation analysis and determined that traffic signal implementation would increase delay on Kingsway Avenue and could lead to vehicle spillover at Kelly Avenue. Therefore, a right in / right out access is proposed.
- 2029 – The intersection of Coast Meridian Road at Kingsway Avenue could be warranted for signalization with warrant score of 118 (over 100), and the traffic analysis also showed long delays for northbound vehicles to find a gap to turn into Kingsway Avenue.
- 2044 – In addition to the intersection at Coast Meridian Road, the intersection of Langan Avenue at Kingsway Avenue could be warranted for signalization considering traffic signal at Coast Meridian Road intersection. However, the warrant score was 110, which is not significantly higher than the threshold.

## 7.0 Traffic Performance Improvement

### 7.1 2029 Proposed Traffic Control and Lane Configuration

As indicated throughout Section 5.0, it is expected that with the existing lane configuration, the road capacity at all four road sections along Kingsway Avenue would be able to meet the traffic demands in 2029; therefore, no road widening is proposed for the overall study corridor. According to the capacity and signal warrant analyses, the following improvements could be considered to improve the traffic operations along the study corridor by 2029 (10-year horizon):

- At Tyner Street:
  - Restrict the westbound and northbound left-turn movements and implement a right in / right out access configuration.
- At McLean Avenue:
  - Add an additional dedicated westbound left-turn lane (dual left-turn lanes). Modify the southbound downstream lane (south leg) from one to two through lanes for about 70m.
  - Add an additional northbound right-turn lane (dual right-turn lanes) and convert from yield-controlled to signal.



- Coordinate with traffic signals at Coast Meridian Overpass / Broadway Street, especially between northbound right-turn and eastbound left-turn movements (to Coast Meridian Overpass).
- At Coast Meridian Overpass / Broadway Street:
  - Add an additional eastbound through lane from east of McLean Avenue for about 100m past Coast Meridian Overpass.
  - Add an additional westbound through lane west of Langan Avenue.
  - Add an additional southbound right-turn lane (dual right-turn lanes) and convert from yield-controlled to signal.
- At Coast Meridian Road:
  - Convert intersection from stop-controlled to full traffic signal.

## 7.2 2044 Proposed Traffic Control and Lane Configuration

In 2044 (25-year horizon), particularly during the weekday PM peak hour (where some performances are at and over the threshold – capacity deficiency), it is recommended that four-lane cross sections (two lanes in each direction) could be considered, given the land availability. According to the capacity analysis results, the following additional improvements could be considered to improve the traffic operations along the study corridor for the ultimate stage:

- At Tyner Street:
  - Remove the stop sign for Tyner Street northbound right-turn movement and make it free flow with a dedicated receiving lane on Kingsway Avenue eastbound.
- At McLean Avenue:
  - Add an additional westbound through lane (west of McLean Avenue) by changing the pavement markings only.
- At Coast Meridian Overpass / Broadway Street:
  - Add an additional westbound left turn lane (dual left turn lanes) and convert from protected-permissive to protected-only phase.
  - Add an additional eastbound through lane (east of Coast meridian Overpass) by changing the pavement markings only.



## 8.0 Geometric Design Criteria

The geometric design criteria for the roadways within the project limits are summarized in Table 8.1. These design criteria were based on the Transportation Association of Canada (TAC) standards and City of Port Coquitlam Bylaws (2241 and 4078).

**Table 8.1** *Geometric Design Criteria*

| Item                            | Existing Condition | PoCo (TAC) Criteria          | Achieved Criteria | Reference                  |
|---------------------------------|--------------------|------------------------------|-------------------|----------------------------|
| Legal Classification            | Arterial (MRN)     | Arterial                     | Arterial          | -                          |
| Posted Speed                    | 50 to 60 km/h      | -                            | 50 to 60 km/h     | -                          |
| Design Speed                    | -                  | 60 km/h                      | 60 km/h           | PoCo <sup>1</sup> : "C" 17 |
| Basic Lanes                     | 2 to 4             | -                            | 4 to 5            | -                          |
| Minimum Radius                  | -                  | 130 m                        | Existing          | PoCo <sup>1</sup> : "C" 17 |
| Minimum K Factor (Sag)          | -                  | 10                           | TBD               | PoCo <sup>1</sup> : "C" 18 |
| Minimum K Factor (Crest)        | -                  | 15                           | TBD               | PoCo <sup>1</sup> : "C" 18 |
| Maximum Grade                   | -                  | 9 %                          | TBD               | PoCo <sup>1</sup> : "C" 17 |
| Minimum Grade                   | -                  | 0.3 %                        | TBD               | PoCo <sup>1</sup> : "C" 18 |
| Max. Super Elevation            | -                  | 6 %                          | TBD               | PoCo <sup>1</sup> : "C" 17 |
| Minimum Stopping Sight Distance | -                  | 85 m                         | TBD               | PoCo <sup>1</sup> : "C" 17 |
| Lane Width                      | 3 to 4.5 m         | (3.3 to 3.7 m)               | 3.3 to 3.7 m      | TAC:C4 9                   |
| Left-Turn Lane Width            | 3 to 3.5 m         | (3 to 3.5 m)                 | 3.2 to 4.2 m      | TAC: C4 13-15              |
| Two-Way Left-Turn Lane Width    | 3.5 m              | 3.5 m or same as travel lane | 3.3 to 4.4 m      | TAC: C8 8.6.2              |
| Sidewalk Width                  | 0 to 3.5 m         | 0 to 1.5 m                   | 1.5 to 1.8 m      | PoCo <sup>1</sup> : "C" 25 |
| Parking Lane Width              | ~ 3.5 m            | 2.7 m                        | 2.6 to 2.8 m      | PoCo <sup>2</sup> : 7      |
| Multi-use Path Width            | -                  | (3 to 6 m)                   | 3 m               | TAC: C5 5.3.1.4            |
| <i>Barrier Curb Width</i>       | 0.15 m             | 0.15 m                       | 0.15 m            | MMCD: C4                   |
| Boulevard Width                 | -                  | (2 to 3 m)                   | -                 | TAC:C4 39                  |
| Utility Strip Width             | ~ 1 m              | 0.6 to 1.5 m                 | 0.4 to 4.2 m      | PoCo <sup>1</sup> : "D" 81 |
| Curb Return Radii               | -                  | 9 m                          | 8 to 9 m          | PoCo <sup>1</sup> : "C" 19 |
| Design Vehicle                  | WB-20              | WB-20                        | WB-20             | <i>Past Studies</i>        |



## 9.0 Concept Design Plan

The Concept Plan for Kingsway Avenue was based on the 2029 and 2044 Traffic Modelling and is shown in the following Figures:

Figures 9.1 through 9.4 shows the conceptual design plan for the interim (2029) design.  
 Figures 9.5 through 9.8 shows typical cross sections for the interim (2029) and ultimate (2044) design.  
 Figures 9.9 through 9.12 shows the conceptual design plan for the ultimate (2044) design.

### 9.1 Existing Cross Sections

The existing Kingsway Avenue cross section varies along the corridor and the roadway width varies from 14.0m to 14.6m measured face of curb to face of curb. Referring to Table 9.1, for ease of reference the existing cross sections can be broken down in the following segments.

**Table 9.1 Existing Cross Sections**

| Horizon Year                                   | Edge of Pavement | Right of Way | BC Hydro       | Port Coquitlam |          |            |              |             |             |                    |             |             |              |            |          |               |
|--|------------------|--------------|----------------|----------------|----------|------------|--------------|-------------|-------------|--------------------|-------------|-------------|--------------|------------|----------|---------------|
|  |                  |              | Multi-Use Path | Utility Strip  | Sidewalk | North Curb | Parking Lane | Travel Lane | Travel Lane | Way Left-Turn Lane | Travel Lane | Travel Lane | Parking Lane | South Curb | Sidewalk | Utility Strip |
| <b>Existing Sections</b>                       |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| <b>Tyner Street to West CMBC Driveway</b>      |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2019   | 14.00            | 20.00        |                | 1.00           | 3.00     | 0.15       | 3.00         |             | 4.00        |                    | 4.00        |             | 3.00         | 0.15       |          | 1.70          |
| <b>West CMBC Driveway to Broadway Street</b>   |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2019   | 14.60            | 20.00        |                | 3.40           |          | 0.15       | 3.30         |             | 4.00        |                    | 4.00        |             | 3.30         | 0.15       | 1.50     | 0.20          |
| <b>Broadway Street to West Sysco Driveway</b>  |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2019   | 14.00            | 20.00        |                | 1.20           | 3.00     | 0.15       | 3.00         |             | 4.00        |                    | 4.00        |             | 3.00         | 0.15       | 1.50     |               |
| <b>West Sysco Driveway to Mary Hill Bypass</b> |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2019   | 14.00            | 20.00        |                | 2.40           | 1.80     | 0.15       | 2.90         |             | 4.00        |                    | 3.50        | 3.60        |              | 0.15       | 1.50     |               |

#### 9.1.1 Tyner Street to West CMBC Driveway

This segment includes a total road width of 14.0m and includes one 7.0m travel lane in each direction with parking permitted on both sides of the roadway. A 3.0m sidewalk exists on the north side only.

#### 9.1.2 West CMBC Driveway to Broadway Street

This segment includes a total road width of 14.6m and one 7.3m travel lane in each direction with parking permitted on both sides of the roadway. A 1.5m sidewalk exists on the south side only.

#### 9.1.3 Broadway Street to West Sysco Driveway

This segment includes a total road width of 14.0m and includes one 7.0m travel lane in each direction with parking permitted on both sides of the roadway. The only segment that does not permit parking is west of Langan Avenue. A 3.0m sidewalk exists on the north side and a 1.5m sidewalk exists on the south side.



**9.1.4 West Sysco Driveway to Mary Hill Bypass**

This segment includes a total road width of 14.0m and includes one 6.9m travel lane on the north side and two travel lanes (3.5m and 3.6m) on the south side. Parking is permitted on the north side only. A 1.8m sidewalk exists on the north side and a 1.5m sidewalk exists on the south side.

**9.2 Proposed Interim and Ultimate Cross Sections**

The intent of this conceptual design is to provide a more consistent cross section that can be applied to Kingsway Avenue which meets the interim and future needs of vehicles, cyclists and pedestrians.

In order to accommodate the future traffic requirements at 2044, it is recommended that Kingsway Avenue be constructed as a minimum four-lane undivided arterial roadway with two (3.3m minimum) travel lanes in each direction. In the interim design, in order to accommodate the 2029 traffic volumes, it is recommended that Kingsway Avenue be constructed with a two way left turn lane in the center of the roadway with one travel lane in each direction. Utilizing the existing 20.0m right of way, it is recommended that a 14.0m -14.4m road width be constructed in order to accommodate parking on both sides of the roadway where possible and a minimum 1.5m sidewalk on the south side of the roadway. A 3.0m multi-use path is proposed on the north side located within BC Hydro’s right of way. This is generally the philosophy being considered for Kingsway Avenue, where the ultimate cross section can be accommodated within the proposed 14.0m -14.4m interim cross section road width with only milling and overlay and minor pavement marking changes being required for the future transition.

However, referring to Table 9.2, due to the constraints along the corridor and for ease of reference the proposed interim and ultimate cross sections can be broken down in the following segments.

**Table 9.2 Proposed Interim (2029) and Ultimate (2044) Cross Sections**

| Horizon Year                                   | Edge of Pavement | Right of Way | BC Hydro       | Port Coquitlam |          |            |              |             |             |                    |             |             |              |            |          |               |
|--|------------------|--------------|----------------|----------------|----------|------------|--------------|-------------|-------------|--------------------|-------------|-------------|--------------|------------|----------|---------------|
|  |                  |              | Multi-Use Path | Utility Strip  | Sidewalk | North Curb | Parking Lane | Travel Lane | Travel Lane | Way Left-Turn Lane | Travel Lane | Travel Lane | Parking Lane | South Curb | Sidewalk | Utility Strip |
| <b>Proposed Options</b>                        |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| <b>Tyner Street to Broadway Street</b>         |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2029   | 14.40            | 20.00        | 3.00           | 3.10           |          | 0.15       |              | 3.70        |             | 4.40               | 3.50        |             | 2.80         | 0.15       | 1.80     | 0.40          |
| 2044   | 14.40            | 20.00        | 3.00           | 3.10           |          | 0.15       |              | 3.70        | 3.50        |                    | 3.50        | 3.70        |              | 0.15       | 1.80     | 0.40          |
| <b>Broadway Street to Langan Ave</b>           |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2029   | 14.00            | 20.00        | 3.00           | 2.45           |          | 0.15       |              | 3.70        | 3.30        | 3.30               | 3.70        |             |              | 0.15       | 1.80     | 1.45          |
| 2044   | 14.00            | 20.00        | 3.00           | 2.45           |          | 0.15       |              | 3.70        | 3.30        |                    | 3.30        | 3.70        |              | 0.15       | 1.80     | 1.45          |
| <b>Langan Ave to West Sysco Driveway</b>       |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2029   | 14.00            | 20.00        | 3.00           | 4.20           |          | 0.15       |              | 3.70        |             | 4.20               | 3.50        |             | 2.60         | 0.15       | 1.50     |               |
| 2044   | 14.00            | 20.00        | 3.00           | 4.20           |          | 0.15       |              | 3.70        | 3.30        |                    | 3.30        | 3.70        |              | 0.15       | 1.50     |               |
| <b>West Sysco Driveway to Mary Hill Bypass</b> |                  |              |                |                |          |            |              |             |             |                    |             |             |              |            |          |               |
| 2029   | 14.00            | 20.00        | 3.00           | 4.20           |          | 0.15       |              | 3.70        | 3.30        | 3.30               | 3.70        |             |              | 0.15       | 1.50     |               |
| 2044   | 14.00            | 20.00        | 3.00           | 4.20           |          | 0.15       |              | 3.70        | 3.30        |                    | 3.30        | 3.70        |              | 0.15       | 1.50     |               |



### 9.2.1 Tyner Street to Broadway Street

Referring to Figures 9.1 and 9.5, Tyner Street and Kingsway Avenue would be constructed as a right in / right out intersection. This segment includes a total road width of 14.4m and requires the south curb to be moved approximately 0.5m to accommodate the proposed 1.8m sidewalk. One travel lane is proposed in each direction (3.7m and 3.5m) with parking permitted (2.8m) on the south side of the roadway. We have made provision for parking (2.6m pull outs) on the north side where possible, without requiring relocation of the BC Hydro transmission lines, which is cost prohibitive.

A 4.4m two way left turn lane is also provided. A 3.0m multi-use path is proposed on the north side located within BC Hydro's right of way and a 1.8m sidewalk is proposed on the south side to incorporate the existing power poles into the sidewalk construction and still allow a minimum of 1.2 m of unobstructed sidewalk for pedestrians.

Referring to Figure 9.5 and 9.9, the ultimate concept design would require the removal of the 4.4m two way left turn lane and replacement with two (3.5 and 3.7m) travel lanes in each direction. No curb modifications would be required.

### 9.2.2 McLean Avenue Intersection

Referring to Figure 9.2, the intersection of McLean Avenue with Kingsway Avenue will require traffic signal modifications to accommodate roadway widening on the south side of the intersection. Dual westbound left turn lanes are also being provided. An additional eastbound right-turn lane (dual right-turn lanes) are proposed including converting the movement from yield-controlled to signalization to avoid weaving issues. An additional eastbound through lane is also proposed.

Referring to Figure 9.10, the ultimate concept design west of McLean Avenue would require removing the 4.4m two way left turn lane and replacement with two (3.5 and 3.7m) travel lanes in each direction. No other modifications would be required.

### 9.2.3 Coast Meridian Overpass / Broadway Street Intersection

Referring to Figure 9.2, the intersection of Coast Meridian Overpass / Broadway Street with Kingsway Avenue will require traffic signal modifications to accommodate roadway widening on the north and south sides of the intersection. Dual eastbound left turn lanes are being provided including an additional eastbound through lane. Although only a corresponding single westbound left turn lane is technically required at the interim stage, for constructability reasons, we are proposing the future dual left turn lane is provided at the interim stage. An additional southbound right-turn lane (dual right-turn lanes) from the Coast Meridian Overpass are proposed including converting the movement from yield-controlled to signalization to avoid weaving issues.

Referring to Figure 9.10, the ultimate concept design east of Broadway Street would require an additional eastbound through lane which would be achieved by changing the pavement markings only. No other modifications would be required.

### 9.2.4 Broadway Street to Langan Avenue

Referring to Figure 9.3, this segment includes a total road width of 14.0m with two travel lanes (3.7m and 3.3m) on the north side of the roadway only and one travel lane (3.7m) on the south side of the roadway. A 3.3m two way left turn lane is also provided, which is less than desirable but matches the existing condition. A 3.0m multi-use path is proposed on the north side located within BC Hydro's right of way and a 1.8m sidewalk is proposed on the south side. It is anticipated that 5 Hydro Poles will have to be relocated in order to accommodate the roadway widening.



Referring to Figure 9.6 and 9.11, the ultimate concept design east of Broadway Street would require removing the 3.3m two way left turn lane and replacement with two ultimate (3.5 and 3.7m) travel lanes in each direction. No other modifications would be required.

### 9.2.5 Langan Avenue to West Sysco Driveway

Referring to Figure 9.3, this segment includes a total road width of 14.0m with one travel lane in each direction with parking permitted (2.6m) on the south side of the roadway only. A 4.2m two way left turn lane is also provided. A 3.0m multi-use path is proposed on the north side located within BC Hydro's right of way and the existing curb and gutter and 1.5m sidewalk is proposed to remain on the south side. The intersection of Coast Meridian Road and Kingsway Avenue would be constructed as a signalized intersection with a dedicated westbound left turn lane.

Referring to Figure 9.7 and 9.11, the ultimate concept design would require removing the 4.2m two way left turn lane and replacement with two ultimate (3.3 and 3.7m) travel lanes in each direction. No other modifications would be required.

### 9.2.6 West Sysco Driveway to Mary Hill Bypass

Referring to Figure 9.4 and 9.7, this segment includes a total road width of 14.0m with one 3.7m travel lane on the north side and two travel lanes (3.3m and 3.7m) on the south side. A 4.2m two way left turn lane is also provided. A 3.0m multi-use path is proposed on the north side located within BC Hydro's right of way and the existing curb and gutter and 1.5m sidewalk is proposed to remain on the south side. The existing sidewalk on the south side of Kingsway Avenue east of the Mary Hill Town Pantry, Chevron and Tim Horton's entrance would be extended to tie into the Mary Hill Bypass Intersection.

Referring to Figure 9.12, the ultimate concept design would require removing the 4.2m two way left turn lane and replacement with two ultimate (3.3 and 3.7m) travel lanes in each direction. No other modifications would be required.

## 9.3 Storage Bay and Taper Length

Storage bay lengths are measured from the stop bar to the start of the deceleration taper. As per the TAC Geometric Design Guide 2017 Section 9.17.4.3, the minimum storage bay length for a left turn lane is 15 m plus the deceleration taper length. The taper length is measured from the edge of the through lane at the start of the taper to the beginning of a full-width, left-turn lane at the end of the taper. As per TAC Geometric Design Guide 2017 Table 9.17.2, the minimum bay taper length for a left turn lane at a design speed of 60 km/h is at a taper ratio of 10:1 to the lane width. All required storage bay and taper lengths are summarized in table 9.3 below.



**Table 9.3** Summary of Storage Bay and Taper Lengths (Year 2029 Horizon)

| Study Intersection<br>(along Kingsway<br>Avenue) | 95th Percentile<br>Queue Length (m) | Storage Bay | Taper      | Comments  |
|--|-------------------------------------|-------------|------------|---|
|  |                                     | Length (m)  | Length (m) |   |
| <b>McLean Avenue</b>                             |                                     |             |            |   |
| EBL  | 18.5                                | 37          | 37         | Proposed single left turn.<br>Meets design guidelines.  |
| WBL  | 67.0                                | 134         | 39         | Proposed dual left turn.<br>Meets design guidelines.    |
| NBR  | 60.0                                | 118         | N/A        | Proposed dual right turn.<br>Meets design guidelines.   |
| <b>Coast Meridian Overpass / Broadway Street</b> |                                     |             |            |   |
| EBL  | 114.0                               | 171         | 44         | Proposed dual left turn.<br>Meets design guidelines.    |
| EBR  | 70.9                                | 74          | 36         | Proposed single right turn.<br>Meets design guidelines. |
| WBL  | 71.1                                | 75          | 62         | Proposed dual left turn.<br>Meets design guidelines.    |
| WBR  | 78.5                                | 96          | 60         | Proposed single right turn.<br>Meets design guidelines. |
| NBL  | 51.9                                | 60          | 38         | Proposed single left turn.<br>Meets design guidelines.  |
| NBR  | 72.8                                | 72          | 51         | Existing condition to remain.                           |
| SBL  | 29.0                                | 48          | 46         | Existing condition to remain.                           |
| SBR  | 107.8                               | 99          | 36         | Proposed dual right turn.<br>Meets design guidelines.   |
| <b>Langan Avenue</b>                             |                                     |             |            |   |
| N/A  | N/A                                 | N/A         | N/A        | N/A   |
| <b>Coast Meridian Road</b>                       |                                     |             |            |   |
| WBL  | 28.5                                | 35          | 50         | Proposed single left turn.<br>Meets design guidelines.  |



## 10.0 Opinion of Probable Cost

The estimated opinion of probable cost based on the interim conceptual design provided is approximately \$5.96M which includes a 25% contingency. The opinion of probable cost includes power pole relocation and relocation of existing street lights. There are a number of areas along the corridor which are not currently illuminated that the City may want to consider as part of the detailed design. These costs are not currently included.

Also, east of CMO the 3 phase power poles will have to be relocated (north PL). We have assumed they can be located on the south side of the R/W, at the back of sidewalk. We suspect they cannot be relocated to the north, as there is likely a minimum separation requirement from the transmission lines. If they cannot be relocated to the south, an option would be to underground the power. However this would cost an additional \$900k. These costs are not currently included and should be considered during detailed design

Please refer to Table 10 'Class C Cost Estimate' below for the opinion of probable cost.

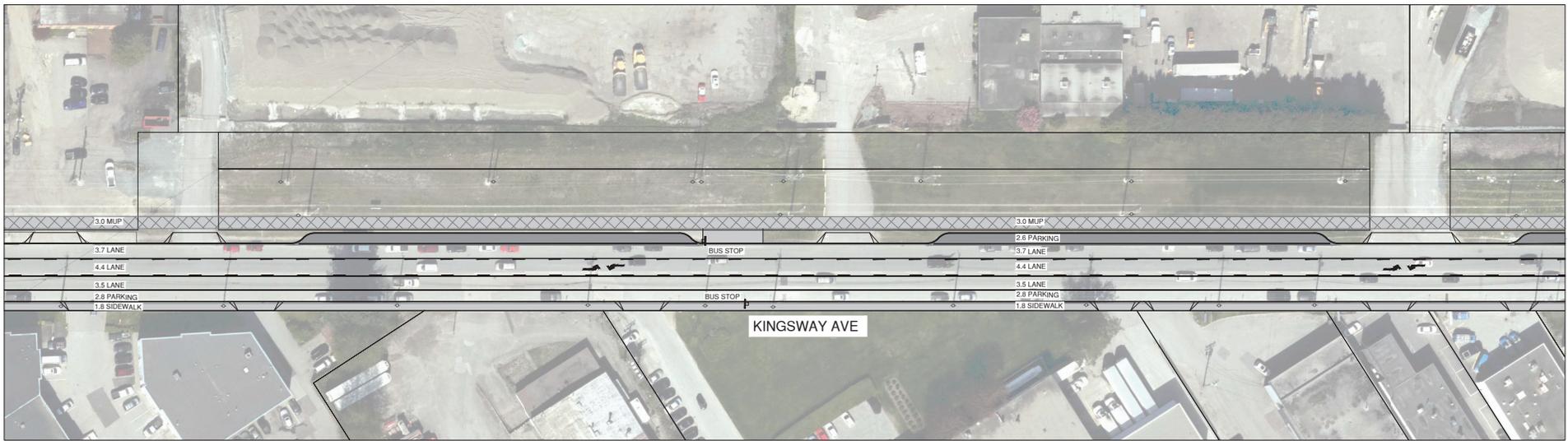
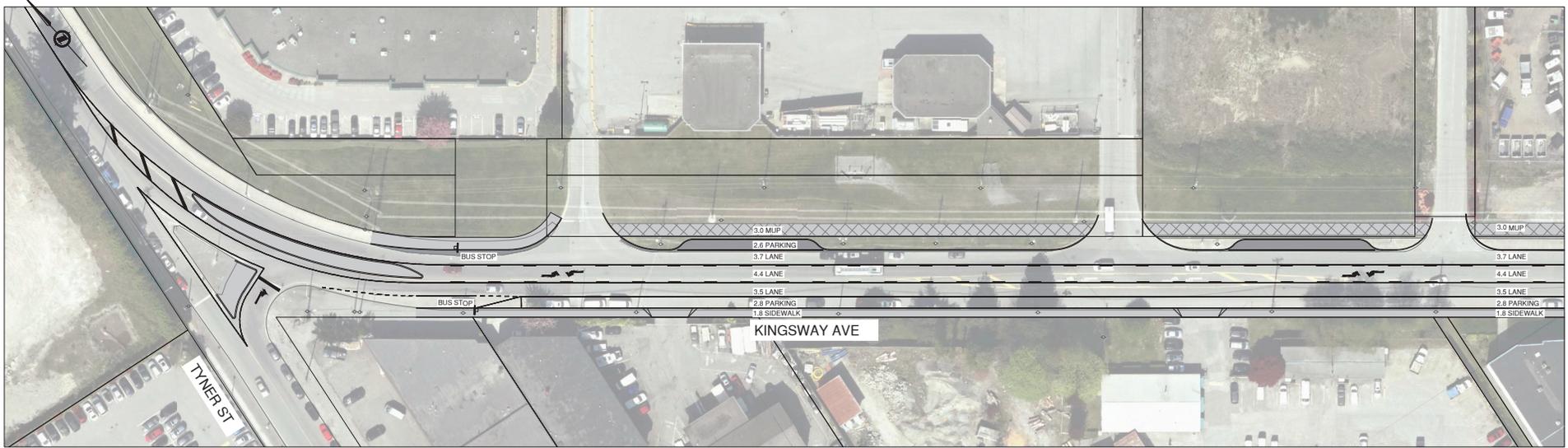
### *Table 10 Class C Cost Estimate*



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| ITEM NO.   | SSMP           | DESCRIPTION  | UNIT OF MEASURE | UNIT PRICE | Tyner to McLean |                     | CMO Intersection    |                     | CMO to Maryhill     |            | TOTAL QUANTITY | TOTAL COST |
|--|----------------|--|-----------------|------------|-----------------|---------------------|---------------------|---------------------|---------------------|------------|----------------|------------|
|  |                |  |                 |            | QTY             | COST                | QTY                 | COST                | QTY                 | COST       |                |            |
| <b>1.0 MMCD 03 30 20 - CONCRETE WALKS, CURBS AND GUTTERS</b>             |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 1.1  | 1.4.5          | Concrete Sidewalk (MMCD C2) (south side)   | Square Meter    | \$ 125     | 1325            | \$ 165,625          | 615                 | \$ 76,875           | 265                 | \$ 33,125  | 2205           | \$ 275,625 |
| 1.2  | 1.4.3<br>1.4.4 | Concrete Curb & Gutter (MMCD C5)   | Linear Meter    | \$ 120     | 1850            | \$ 222,000          | 1530                | \$ 183,600          | 1217                | \$ 146,040 | 4597           | \$ 551,640 |
| 1.3  | 1.4.6          | 150mm Depth Driveway Crossings (MMCD C7)   | Square Meter    | \$ 150     | 200             | \$ 30,000           |                     | \$ -                | 107                 | \$ 16,050  | 307            | \$ 46,050  |
| 1.4  | 1.4.3<br>1.4.4 | Concrete Median Infill (concrete)  | Linear Meter    | \$ 120     | 50              | \$ 6,000            | 450                 | \$ 54,000           |                     | \$ -       | 500            | \$ 60,000  |
| <b>2.0 MMCD 31 11 01 - CLEARING AND GRUBBING</b>                         |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 2.1  | 1.4.1          | Hedge Removal (Area in Plan, not elevation)  | Square Meter    | \$ 10      | 900             | \$ 9,000            | 300                 | \$ 3,000            | 260                 | \$ 2,600   | 1460           | \$ 14,600  |
| <b>3.0 MMCD 31 11 41 - SHRUB AND TREE PRESERVATION</b>                   |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 3.1  | 1.3.1S         | Hedge and Tree Preservation  | Lump Sum        | \$ 5,000   | 1               | \$ 5,000            | 1                   | \$ 5,000            | 1                   | \$ 5,000   | 3              | \$ 15,000  |
| <b>4.0 MMCD 31 24 13 - ROADWAY EXCAVATION, EMBANKMENT AND COMPACTION</b> |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 4.1  | 1.8.2<br>1.8.5 | Common Excavation - Off-Site Disposal  | Cubic Meter     | \$ 75      | 1636.5          | \$ 122,738          | 1825                | \$ 136,838          | 1964                | \$ 147,285 | 5425           | \$ 406,860 |
| 4.2  | 1.8.2<br>1.8.5 | Common Excavation - Off-Site Disposal MUP  | Cubic Meter     | \$ 75      | 886.5           | \$ 66,488           | 389                 | \$ 29,138           | 1100                | \$ 82,485  | 2375           | \$ 178,110 |
| 4.3  | 1.8.5          | Common Excavation - Off-Site Disposal - Concrete (South Curb)                        | Cubic Meter     | \$ 150     | 200             | \$ 30,000           | 411                 | \$ 61,718           | 120                 | \$ 17,925  | 731            | \$ 109,643 |
| 4.4  |                | OPTIONAL - Overexcavation - Off-Site Disposal (Includes MMCD Granular Base Backfill) | Cubic Meter     | \$ 150     | 65              | \$ 9,750            | 91                  | \$ 13,684           | 98                  | \$ 14,729  | 254            | \$ 38,162  |
| <b>5.0 MMCD 32 11 16.1 - GRANULAR SUBBASE</b>                            |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 5.1  | 1.4.3<br>1.4.4 | 300mm Depth MMCD Select Granular Subbase For Full Depth Pavement                     | Tonne           | \$ 50      | 1169.7          | \$ 58,485           | 1758.9              | \$ 87,945           | 2074                | \$ 103,686 | 5002           | \$ 250,116 |
| 5.2  | 1.4.3<br>1.4.4 | 100mm Depth MMCD Select Granular Subbase For Driveway Reconstruction                 | Tonne           | \$ 50      | 90              | \$ 4,500            |                     | \$ -                | 24                  | \$ 1,177   | 114            | \$ 5,677   |
| <b>6.0 MMCD 32 11 23 - GRANULAR BASE</b>                                 |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 6.1  | 1.4.2<br>1.4.3 | 150mm Depth MMCD Granular Base For Full Depth Pavement                               | Tonne           | \$ 50      | 725.85          | \$ 36,293           | 879                 | \$ 43,973           | 1037                | \$ 51,843  | 2642           | \$ 132,108 |
| 6.2  | 1.4.2<br>1.4.3 | 250mm Depth MMCD Granular Base For MUP   | Tonne           | \$ 50      | 1625            | \$ 81,263           | 712                 | \$ 35,613           | 2016                | \$ 100,815 | 4354           | \$ 217,690 |
| 6.3  | 1.4.2<br>1.4.3 | 150mm Depth MMCD Granular Base For South Sidewalk                                    | Tonne           | \$ 50      | 450             | \$ 22,500           | 320                 | \$ 16,022           | 26                  | \$ 1,297   | 796            | \$ 39,818  |
| <b>7.0 MMCD 32 12 13.1 - ASPHALT TACK COAT</b>                           |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 7.1  | 1.5.1          | Asphalt Tack Coat  | Square Meter    | \$ 1       | 1820            | \$ 1,820            | 2665                | \$ 2,665            | 3142                | \$ 3,142   | 7627           | \$ 7,627   |
| <b>8.0 MMCD 32 12 16 - HOT-MIX ASPHALT CONCRETE PAVING</b>               |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 8.1  | 1.5.1<br>1.5.2 | 50mm Depth Machine Laid MMCD Upper Course #1 (Widening)                              | Tonne           | \$ 120     | 364             | \$ 43,652           | 326                 | \$ 39,176           | 385                 | \$ 46,187  | 1075           | \$ 129,014 |
| 8.2  | 1.5.1<br>1.5.2 | 50mm Depth Machine Laid MMCD Lower Course #1 (Widening)                              | Tonne           | \$ 120     | 514             | \$ 61,652           | 326                 | \$ 39,176           | 385                 | \$ 46,187  | 1225           | \$ 147,014 |
| 8.3  | 1.5.1<br>1.5.2 | 50mm MMCD Upper Course #1 - MUP  | Tonne           | \$ 125     | 375             | \$ 46,875           | 159                 | \$ 19,830           | 449                 | \$ 56,136  | 983            | \$ 122,840 |
| <b>9.0 MMCD 32 17 23 - PAINTED PAVEMENT MARKINGS</b>                     |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 9.1  | 1.5.2          | All Permanent painted markings   | Lump Sum        |            | 1               | \$ 20,000           | 1                   | \$ 15,000           | 1                   | \$ 15,000  | 3              | \$ 50,000  |
| 9.2  | 1.5.2          | Eradication of existing painted markings   | Lump Sum        |            | 1               | \$ 15,000           | 1                   | \$ 10,000           | 1                   | \$ 10,000  | 3              | \$ 35,000  |
| 9.3  | 1.5.4          | All Signs  | Lump Sum        |            | 1               | \$ 5,000            | 1                   |                     | 1                   | \$ 3,000   | 3              | \$ 8,000   |
| <b>10.0 MMCD 32 91 21 - TOPSOIL AND FINISH GRADING</b>                   |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 10.1   | 1.4.1          | 100mm Depth Topsoil  | Cubic Meter     | \$ 100     | 150             | \$ 15,000           | 50                  | \$ 5,000            | 150                 | \$ 15,000  | 350            | \$ 35,000  |
| <b>11.0 MMCD 32 92 23 - SODDING</b>                                      |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 11.1   | 1.8.1          | Sodding  | Square Meter    | \$ 12      | 750             | \$ 9,000            | 200                 | \$ 2,400            | 1000                | \$ 12,000  | 1950           | \$ 23,400  |
| <b>12.0 MMCD 33 40 01 - STORM SEWERS</b>                                 |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 12.1   | 1.6.5          | 200mm PVC DR28 CB Lead   | Linear Meter    | \$ 400     | 475             | \$ 190,000          | 300                 | \$ 120,000          | 680                 | \$ 272,000 | 1455           | \$ 582,000 |
| <b>13.0 MMCD 33 44 01 - MANHOLES AND CATCH BASINS</b>                    |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 13.1   | 1.6.5          | Catch Basins (MMCD S11)  | Each            | \$ 3,600   | 28              | \$ 100,800          | 20                  | \$ 72,000           | 40                  | \$ 144,000 | 88             | \$ 316,800 |
| <b>14.0 MMCD 34 41 13 - TRAFFIC SIGNALS</b>                              |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| #REF!  | 1.9.1          | Traffic Signal modification (McLean Ave)   | L.S             | \$ 50,000  |                 |                     | 1                   | \$ 50,000           |                     | \$ -       | 1              | \$ 50,000  |
| #REF!  | 1.9.1          | Traffic Signals (CMO)  | L.S             | \$ 100,000 |                 |                     | 1                   | \$ 100,000          |                     | \$ -       | 1              | \$ 100,000 |
| #REF!  | 1.9.1          | Traffic Signals (Coast Meridian Rd)  | L.S             | \$ 200,000 |                 |                     |                     | \$ -                | 1                   | \$ 200,000 | 1              | \$ 200,000 |
| <b>15.0 MMCD 26 56 01 - Roadway Lighting</b>                             |                |  |                 |            |                 |                     |                     |                     |                     |            |                |            |
| 15.1   | 1.8.1          | Street Lighting (north and South)  | each            | \$ 7,500   | 6               | \$ 45,000           | 10                  | \$ 75,000           | 10                  | \$ 75,000  | 26             | \$ 195,000 |
| 15.2   |                | Relocation of Power pole   | each            | \$ 10,000  | 5               | \$ 50,000           | 7                   | \$ 70,000           | 22                  | \$ 220,000 | 34             | \$ 340,000 |
| <b>TOTAL COST (ROUNDED TO NEAREST \$1,000)</b>                           |                |  |                 |            |                 | <b>\$ 1,474,000</b> | <b>\$ 1,368,000</b> | <b>\$ 1,842,000</b> | <b>\$ 4,683,000</b> |            |                |            |
| <b>25% CONTIGENCY</b>  |                |  |                 |            |                 | <b>\$ 368,500</b>   | <b>\$ 342,000</b>   | <b>\$ 460,500</b>   | <b>\$ 1,170,750</b> |            |                |            |
| <b>CLASS C COST ESTIMATE</b>   |                |  |                 |            |                 | <b>\$ 1,842,500</b> | <b>\$ 1,710,000</b> | <b>\$ 2,302,500</b> | <b>\$ 5,853,750</b> |            |                |            |



ROAD WIDENING  
 100mm ASPHALT  
 150mm ROAD BASE  
 300mm SUB BASE

M.U.P.  
 50mm ASPHALT  
 100mm ROAD BASE  
 150mm SUB BASE

SIDEWALK  
 100mm CONCRETE  
 200mm ROAD BASE

NEW SIGNAL

CONCEPTUAL – INTERIM DESIGN – ALTERNATE

PLOT DATE: February 13, 2020

| REV NO | REVISIONS                              | DATE     | DRAWN | APPRD |
|--------|--|----------|-------|-------|
| 0      | CONCEPTUAL DESIGN                      | 19/09/09 | RC    | CNB   |
| 1      | REVISED CONCEPT                        | 19/11/12 | CJB   | CNB   |
| 2      | REVISED CONCEPT                        | 19/12/10 | CJB   | CNB   |
| 3      | ALTERNATE CONCEPT - RIGHT IN RIGHT-OUT | 20/02/13 | CJB   | CNB   |



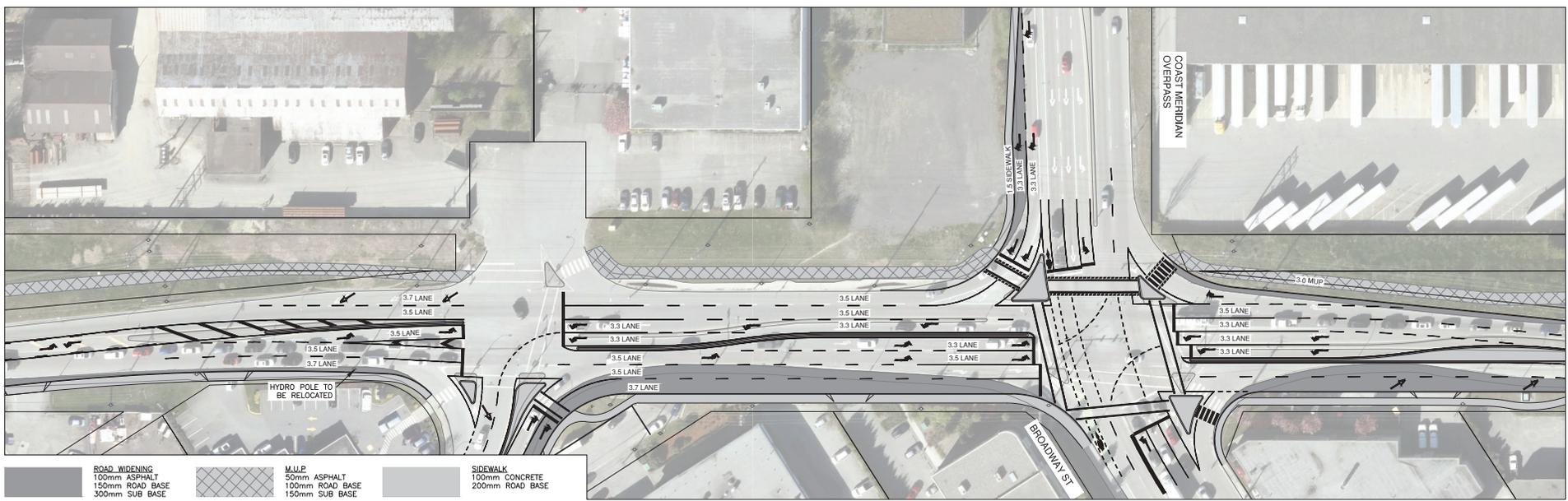
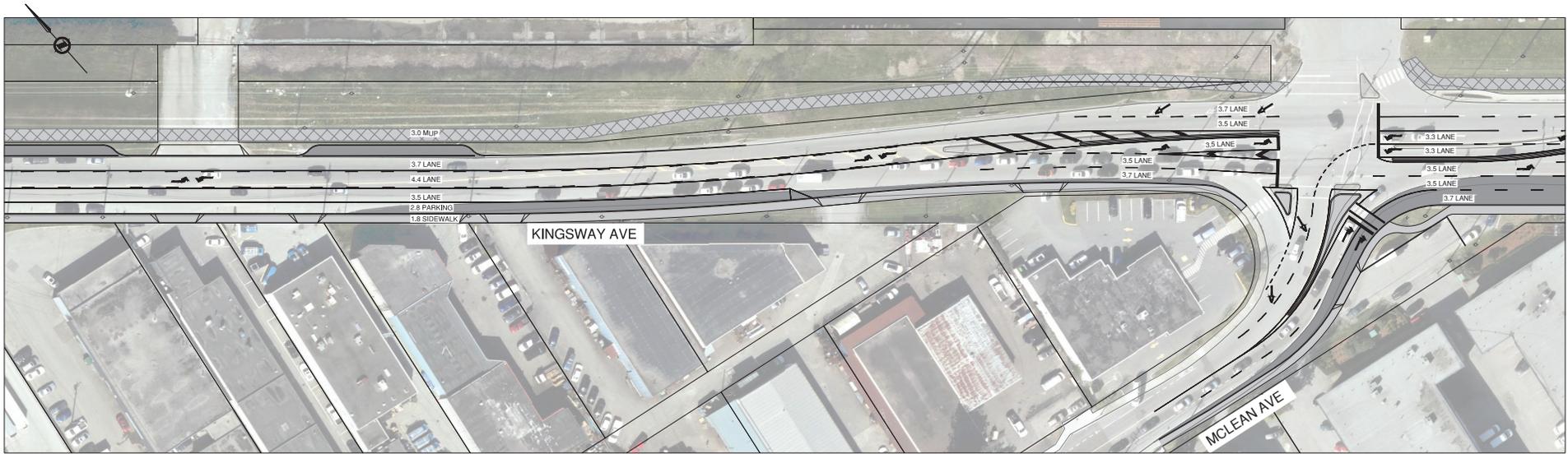
KINGSWAY AVENUE  
TYNER ST



|            |            |             |      |          |     |
|------------|------------|-------------|------|----------|-----|
| SCALE      | 1:500      | DESIGN NO.  | 3240 | DWG. NO. | 9.1 |
| DATE       | 2019-09-09 | DESIGN BY   | CJB  | REV.     |     |
| DRAWN BY   | RC         | APPROVED BY | CNB  |          |     |
| CHECKED BY | CNB        |             |      |          |     |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

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|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  | <b>ROAD WIDENING</b><br>100mm ASPHALT<br>150mm ROAD BASE<br>300mm SUB BASE |  | <b>M.U.P.</b><br>50mm ASPHALT<br>100mm ROAD BASE<br>150mm SUB BASE |  | <b>SIDEWALK</b><br>100mm CONCRETE<br>200mm ROAD BASE |
|--|--|--|--|--|--|

CONCEPTUAL — INTERIM DESIGN

PLOT DATE: November 21, 2019

| REV NO | REVISIONS         | DATE     | DRAWN | APPROD |
|--------|-------------------|----------|-------|--------|
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| 1      | REVISED CONCEPT   | 19/11/12 | CJB   | CMB    |



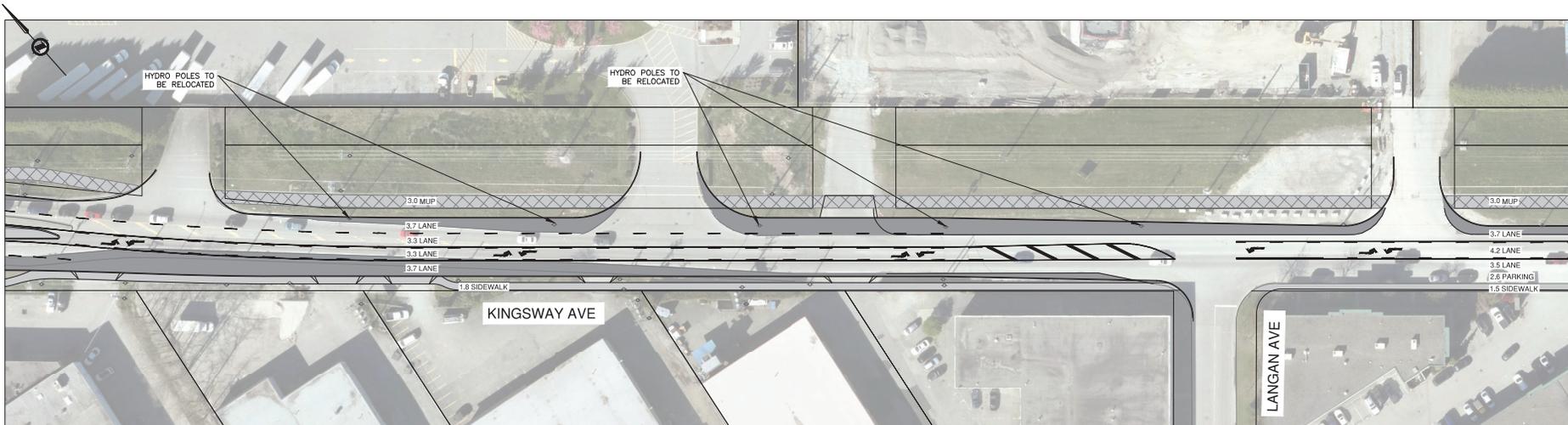
KINGSWAY AVENUE  
McLEAN AND CMO



|            |            |             |      |          |     |
|------------|------------|-------------|------|----------|-----|
| SCALE      | 1:500      | DESIGN NO.  | 3240 | DWG. NO. | 9.2 |
| DATE       | 2019-09-09 | DESIGN BY   | CJB  | REV.     | 1   |
| DRAWN BY   | RC         | APPROVED BY | CMB  |          |     |
| CHECKED BY | CMB        |             |      |          |     |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

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- ROAD WIDENING  
100mm ASPHALT  
150mm ROAD BASE  
300mm SUB BASE
- M.U.P.  
50mm ASPHALT  
100mm ROAD BASE  
150mm SUB BASE
- SIDEWALK  
100mm CONCRETE  
200mm ROAD BASE
- NEW SIGNAL

PLOT DATE: November 21, 2019

| REV NO | REVISIONS         | DATE     | DRAWN | APPRD |
|--------|-------------------|----------|-------|-------|
| 0      | CONCEPTUAL DESIGN | 19/09/09 | RC    | CMB   |
| 1      | REVISED CONCEPT   | 19/11/12 | CJB   | CMB   |



## KINGSWAY AVENUE LANGAN AND COAST MERIDIAN

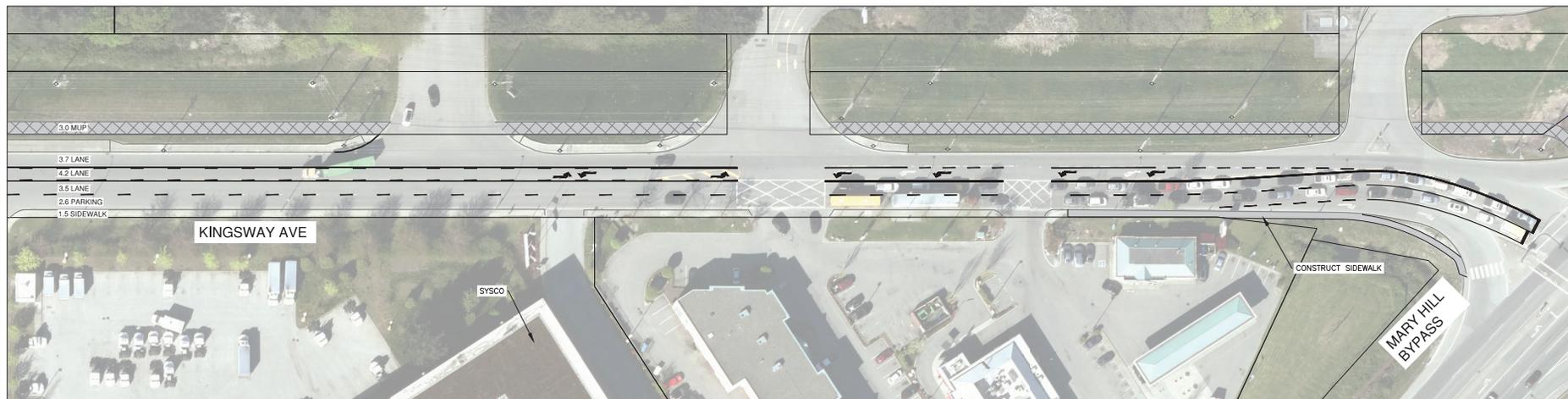
CONCEPTUAL – INTERIM DESIGN



|          |            |            |      |             |            |
|----------|------------|------------|------|-------------|------------|
| SCALE    | 1:500      | DESIGN NO. | 3240 | DWG. NO.    | <b>9.3</b> |
| DATE     | 2019-09-09 | DESIGN BY  | CJB  | REV.        |            |
| DRAWN BY | RC         | CHECKED BY | CMB  | APPROVED BY | CMB        |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: G:\Projects\18000\18000210\18000210\_Kingsway\_Ave\_Concept\_Design\102\_CAD\DWG\Drawing\9.3.306\_Conceptual\_and\_Landing\_Interim\_9.3.306\_Rev01.dwg



|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  | <b>ROAD WIDENING</b><br>100mm ASPHALT<br>150mm ROAD BASE<br>300mm SUB BASE |  | <b>M.U.P.</b><br>50mm ASPHALT<br>100mm ROAD BASE<br>150mm SUB BASE |  | <b>SIDEWALK</b><br>100mm CONCRETE<br>200mm ROAD BASE |
|--|--|--|--|--|--|

PLOT DATE: **November 21, 2019**

| REV NO | REVISIONS         | DATE     | DRAWN | APPRD |
|--------|-------------------|----------|-------|-------|
| 0      | CONCEPTUAL DESIGN | 19/09/09 | RC    | CMB   |
| 1      | REVISED CONCEPT   | 19/11/12 | CJB   | CMB   |
|        |                   |          |       |       |
|        |                   |          |       |       |



**KINGSWAY AVENUE**  
McLEAN AND CMO

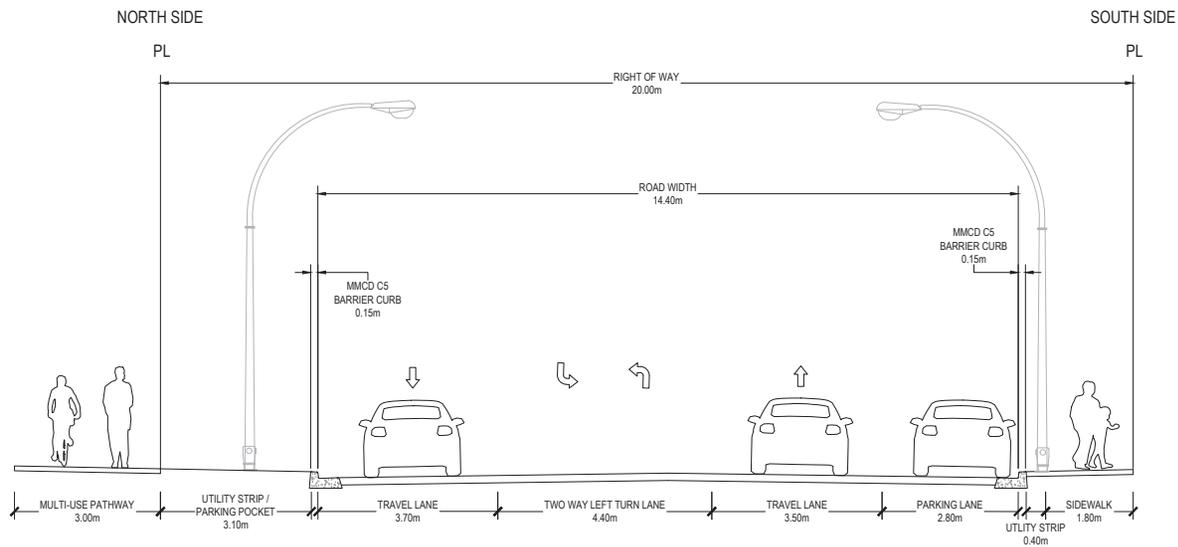
CONCEPTUAL – INTERIM DESIGN



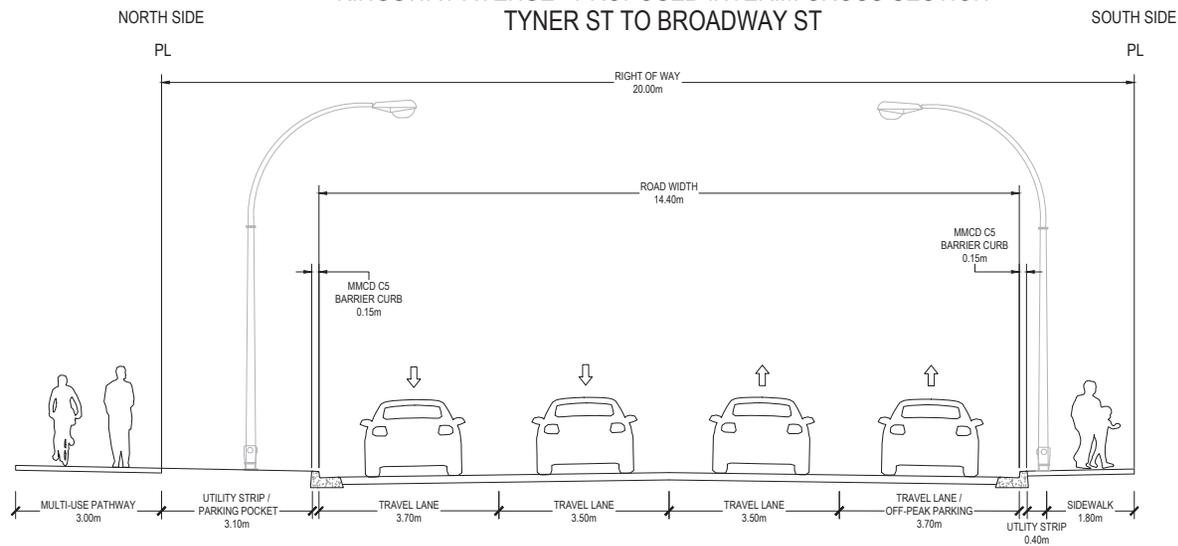
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|------------|------------|-------------|-------|----------|------------|
| SCALE      | 1:500      | DESIGN NO.  | 32345 | DWG. NO. | <b>9.4</b> |
| DATE       | 2019-09-09 |             |       |          |            |
| DRAWN BY   | RC         | DESIGN BY   | CJB   |          |            |
| CHECKED BY | CMB        | APPROVED BY | CMB   | REV.     | <b>1</b>   |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: G:\Projects\32000\32002\32002\32002\32002\Kingsway\_Ave\_Concept\_Design\02\_CADD\02\_Drawing\32345\_Geometric\_and\_Landing\_Interim\_Sheet\_9.4.dwg



KINGSWAY AVENUE - PROPOSED INTERIM CROSS SECTION  
TYNER ST TO BROADWAY ST



KINGSWAY AVENUE - PROPOSED ULTIMATE CROSS SECTION  
TYNER ST TO BROADWAY ST

CONCEPTUAL DESIGN

PLOT DATE: November 21, 2019

| REV NO | REVISIONS        | DATE       | DRAWN | APPROD |
|--------|------------------|------------|-------|--------|
| 1      | REVISED SECTIONS | 2019-10-08 | CB    | CB     |
| 2      | REVISED SECTIONS | 2019-11-12 | CB    | CB     |



KINGSWAY AVE PROPOSED INTERIM AND ULTIMATE SECTIONS  
TYNER ST TO BROADWAY ST



#603 4161 Louisa Road, Burnaby, B.C. V5C 5A8  
T: 604-663-4555 F: 604-663-0258

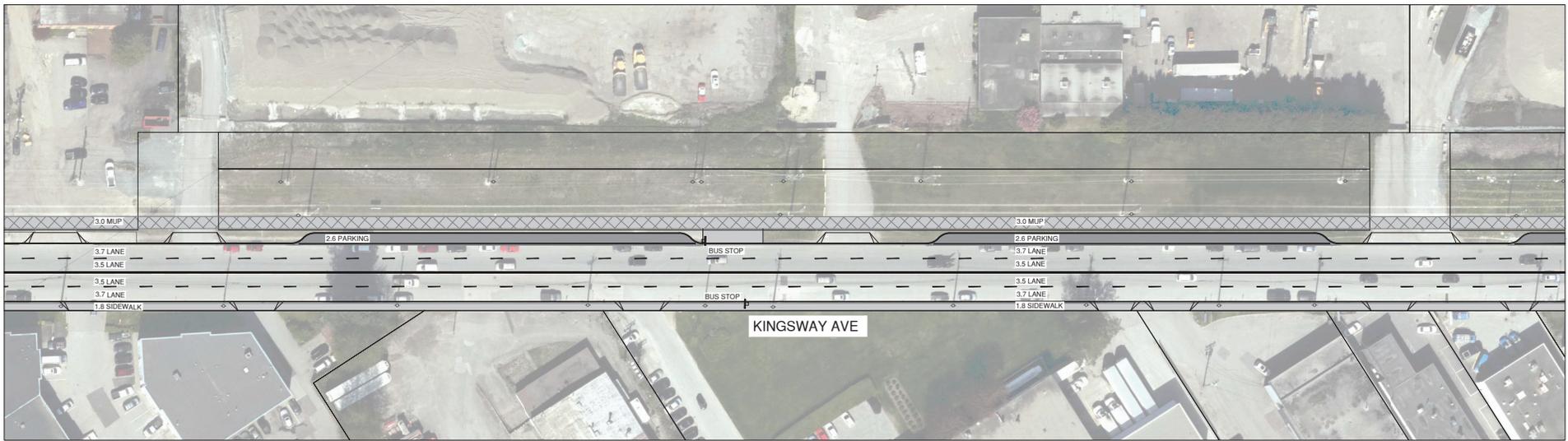
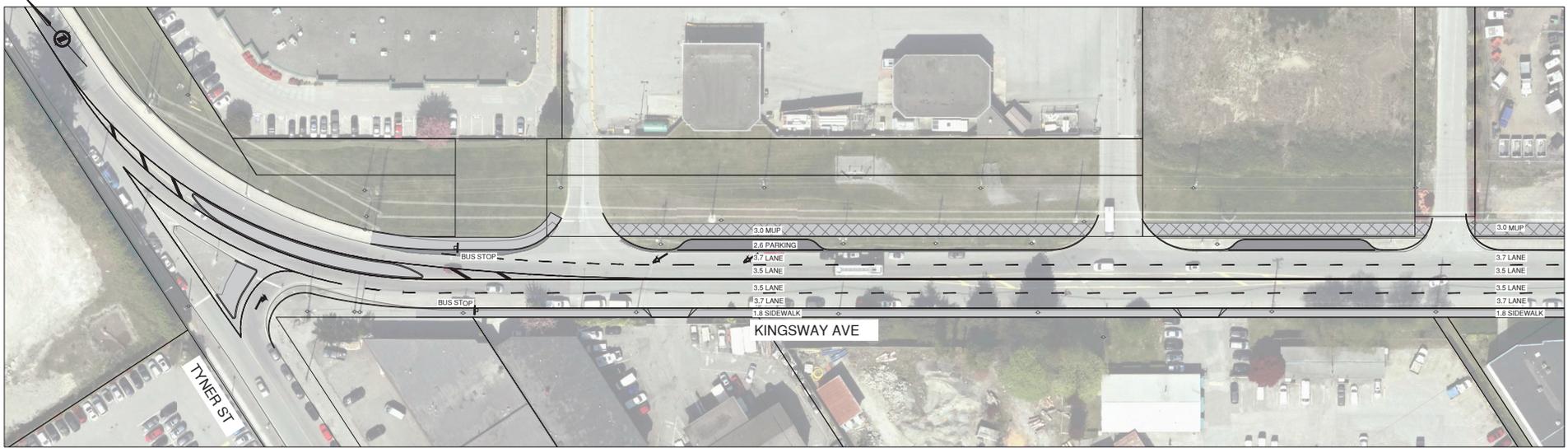
| SCALE      | DESIGN NO.  | DWG. NO.  |
|------------|-------------|-----------|
| 1:500      | 32340       | 9.5       |
| DRAWN BY   | DATE        | DESIGN BY |
| RC         | 2019-09-19  | CB        |
| CHECKED BY | APPROVED BY | REV. 2    |
| CB         | CB          |           |

DESTROY ALL PRINTS BEARING PREVIOUS NO.









- ROAD WIDENING  
100mm ASPHALT  
150mm ROAD BASE  
300mm SUB BASE
- M.U.P.  
50mm ASPHALT  
100mm ROAD BASE  
150mm SUB BASE
- SIDEWALK  
100mm CONCRETE  
200mm ROAD BASE
- NEW SIGNAL

PLOT DATE: February 13, 2020

| REV NO | REVISIONS                              | DATE   | DRAWN | APPRD |
|--------|--|--------|-------|-------|
| 0      | CONCEPTUAL DESIGN                      | 190909 | RC    | CMB   |
| 1      | REVISED CONCEPT                        | 191112 | CJB   | CMB   |
| 2      | REVISED CONCEPT                        | 191210 | CJB   | CMB   |
| 3      | ALTERNATE CONCEPT - RIGHT-IN RIGHT-OUT | 200213 | CJB   | CMB   |



## KINGSWAY AVENUE TYNER ST

CONCEPTUAL – ULTIMATE DESIGN – ALTERNATE

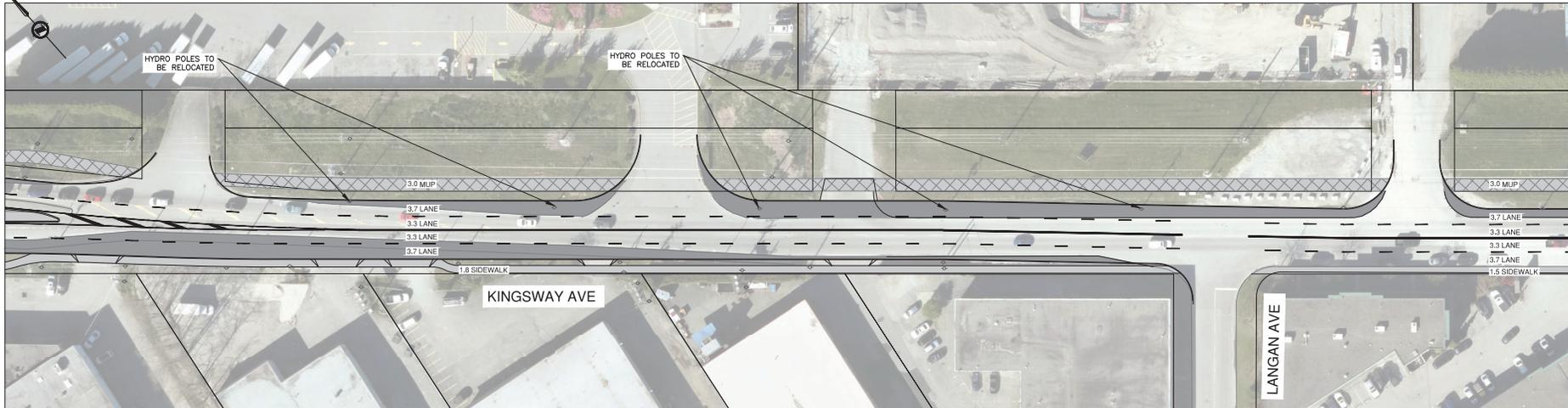


|            |       |             |            |           |     |
|------------|-------|-------------|------------|-----------|-----|
| SCALE      | 1:500 | DESIGN NO.  | 3240       | DWG. NO.  | 9.9 |
| DRAWN BY   | RC    | DATE        | 2019-09-09 | DESIGN BY | CJB |
| CHECKED BY | CMB   | APPROVED BY | CMB        | REV.      | 3   |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: G:\Projects\2020\20200213\_02\_Kingsway\_Ave\_Concept\_Design\02\_CAD\DWG\Drawing\3240\_Conceptual\_and\_Landing\_Ultimate\_Sheet\Rev02\_ALT\_9.9.dwg





- ROAD WIDENING  
100mm ASPHALT  
150mm ROAD BASE  
300mm SUB BASE
- M.U.P.  
50mm ASPHALT  
100mm ROAD BASE  
150mm SUB BASE
- SIDEWALK  
100mm CONCRETE  
200mm ROAD BASE
- NEW SIGNAL

PLOT DATE: November 21, 2019

| REV NO | REVISIONS         | DATE     | DRAWN | APPRD |
|--------|-------------------|----------|-------|-------|
| 0      | CONCEPTUAL DESIGN | 19/09/09 | RC    | CMB   |
| 1      | REVISED CONCEPT   | 19/11/19 | CJB   | CMB   |



## KINGSWAY AVENUE LANGAN AND COAST MERIDIAN

CONCEPTUAL – ULTIMATE DESIGN



|          |            |            |      |             |             |
|----------|------------|------------|------|-------------|-------------|
| SCALE    | 1:500      | DESIGN NO. | 3240 | DWG. NO.    | <b>9.11</b> |
| DATE     | 2019-09-09 | DESIGN BY  | CJB  | REV.        |             |
| DRAWN BY | RC         | CHECKED BY | CMB  | APPROVED BY | CMB         |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: G:\Projects\3000\3000\3000\3000\3000\Kingsway\_Ave\_Concept\_Design\02\_CAD\DWG\Drawing\3240\_Conceptual\_and\_Landing\_Ultimate\_Sheet\Road01.dwg



|   |  |   |  |   |  |
|---|--|---|--|---|--|
|  | <b>ROAD WIDENING</b><br>100mm ASPHALT<br>150mm ROAD BASE<br>300mm SUB BASE |  | <b>M.U.P.</b><br>50mm ASPHALT<br>100mm ROAD BASE<br>150mm SUB BASE |  | <b>SIDEWALK</b><br>100mm CONCRETE<br>200mm ROAD BASE |
|---|--|---|--|---|--|

PLOT DATE: November 21, 2019

| REV NO | REVISIONS         | DATE     | DRAWN | APPRD |
|--------|-------------------|----------|-------|-------|
| 0      | CONCEPTUAL DESIGN | 19/09/09 | RC    | CMB   |
| 1      | REVISED CONCEPT   | 19/11/19 | CJB   | CMB   |



KINGSWAY AVENUE  
McLEAN AND CMO

CONCEPTUAL – ULTIMATE DESIGN



|            |            |             |      |          |      |
|------------|------------|-------------|------|----------|------|
| SCALE      | 1:500      | DESIGN NO.  | 3240 | DWG. NO. | 9.12 |
| DATE       | 2019-09-09 | DESIGNED BY | CJB  | REV.     | 1    |
| DRAWN BY   | RC         | APPROVED BY | CMB  |          |      |
| CHECKED BY | CMB        |             |      |          |      |

DESTROY ALL PRINTS BEARING PREVIOUS NO.

File: G:\Projects\32000\32002\310\_Kingsway\_Ave\_Concept\_Design\02\_CADD\02\_Drawing\32365\_Geometric\_and\_Landing\_Ultimate\_Sheets\Road\_01.dwg