# MOODYVILLE AREA TRANSPORTATION STUDY

## Technical Report – FINAL

Transportation Division

Engineering, Parks and Environment

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# SUMMARY

This report summarizes the transportation analysis and provides recommendations for transportation improvements that support future development in the Moodyville area. This transportation study reflects the guiding principles outlined by various municipal plans, most importantly the 2014 Official Community Plan and the 2008 Long-Term Transportation Plan. These plans intend to improve local mobility and commuting opportunities for all residents while promoting the use of sustainable modes of transportation.

In evaluating the transportation requirements for this neighbourhood, this study considers the accessibility needs of current and new residents. The analysis pays particular attention to the impacts of new development on the road network and to the functionality, safety and design standards of the proposed measures.

The scope of the analysis includes:

- Optimized accessibility and network connectivity to create a neighbourhood with improved transportation alternatives for local mobility and commuting.
- Managed traffic volume and speeds through neighbourhood street design that reduces the opportunities for short-cutting and the future need for additional traffic calming measures.
- Suitable off-street parking supply to ensure that on-site parking is sufficient and that it offers a balance between neighbourhood needs and a sustainable use of motorized transportation.
- Preferable local street cross sections to provide guidance on the desired local character and functionality of the neighbourhood streets and the ultimate location of street infrastructure including sidewalks, boulevards, trails, curbs, and lane configuration.
- Necessary right-of-way and operational requirements for the East 3rd Street corridor to accommodate future transportation needs, to support the planned redevelopment of the Moodyville area and the overall City needs. East 3rd Street, as part of an east-west rapid transit corridor through the North Shore (identified by the 2040 North Shore Area Transit Plan) is a critical element of this study. Consequently, design concepts developed for 3rd Street reflect this wider context.

The transportation study is divided in two parts:

***Part A: Transportation Analysis and Operations***

This first part addresses the current transportation conditions and demand characteristics, the forecast for demand growth and potential mode shift, the connectivity, traffic control and parking requirements, and the proposed measures for improvement.

***Part B: Conceptual Design Options***

The second part contains the potential concepts for local street cross section design and the specific right-of-way options for East 3rd Street that best reflect the City's goals for sustainability and are required to accommodate future rapid transit.

This study uses two main sources of information: the 2011 Regional Trip Diary, which includes statistics and potential targets for local mode share and trip distribution, and the latest traffic counts and parking surveys that provide the traffic volume profiles and speeds, the indicators of intersection performance and capacity, and the estimation of parking demand. The evaluation includes other measures of transportation network performance such as accessibility to transit and cycling facilities, priority for pedestrians, greenway connections and neighbourhood auto access.

This study is also based on a number of assumptions about the magnitude and the timeline for redevelopment in the area. Regional and local trip generation rates are used to project the potential growth in demand and, consequently, the traffic flows that are likely to impact the local network.

The main conclusions of this analysis are the following:

1. East 3rd Street has sufficient remaining capacity to operate properly under the expected additional demand conditions without increasing the number of travel lanes. Operations can be optimized with additional traffic signals, modified lane configuration, or specific peak hour traffic management strategies.
2. East 3rd Street requires a 30.5m (100ft) right-of-way to properly provide enough width for pedestrian and boulevard space, while ensuring that the corridor can accommodate rapid transit systems in the future. There are a number of possible cross section designs that allow for different forms of rapid transit. The options developed by this study show how different concepts are suited for different street profiles and conditions.
3. Local neighbourhood streets can be narrower, providing appropriate traffic control without affecting residential access and road network performance. Most of the local streets will still require adequate provision of on-street parking on both sides of the street given the expected increase in development density. Preferred street designs will be determined on a block by block basis as the area redevelops.
4. Based on applicable regional statistics, the new development building types and densities in the Moodyville area will likely require 1.2 parking spaces per unit as per the current allowance.
5. There is an opportunity to significantly improve the area's cycling network functionality and attractiveness, connecting effectively to greenways, the Spirit Trail and other current bike routes, by accommodating bicycles on a portion of East 3rd Street from Queensbury to St Andrew's. This will require adding this section of East 3rd Street to the Bicycle Master Plan. Revisions to the Bicycle Master Plan will require Council endorsement. Currently, designated bicycle route on 3rd Street is east of Queensbury and with this proposal it would be further extended to the more central north/south designated bike route.

Based on a comprehensive analysis, the following list summarises the recommendations of this study:

## 1.0 NEIGHBOURHOOD TRANSPORTATION MEASURES

### 1.1 Accessibility and Connectivity

The grid structure of the local network facilitates access but must be modified in certain locations to improve connectivity. All streets should remain classified as *local* and maintain a narrow cross section. Access to transit facilities is a priority. As the area redevelops, the following principles should be considered in street design:

- Prioritize pedestrian connections north-south to transit stops and east-west to Lower Lonsdale
- Facilitate pedestrian crossings through corner curb extensions ("bulges") as development occurs
- Facilitate internal pedestrian movements by providing mid-block connections between:
  - 2nd Street and Alder Street/Spirit Trail (middle of 400 blocks)
  - 2nd Street and 1st Street/Spirit Trail by extending the Ridgeway Avenue corridor

### 1.2 Street Design and Traffic Control

Traffic will be controlled through street design to avoid introducing additional measures in the future. All streets can remain bi-directional to maximize access to the properties but short cutting can occur if priority is given to the east-west direction in particular on 1st, 2nd streets. As redevelopment occurs, all streets will require extensive work on curbs and sidewalks; the following is recommended for consideration in street design:

- Set the speed limit at 30km/h for local neighbourhood streets
- Provide minimum 2m wide sidewalks on both sides for all streets

- Provide minimum 1.5m wide boulevards on both sides for all streets
- Implement curb extensions (i.e. "bulges") to reduce crossing widths at corners
- Introduce traffic diverters at intersections of 1st, 2nd streets and St. David's Avenue to eliminate shortcutting
- Re-align 1st Street on the east and west sides St. David's Avenue
- Introduce a stop sign in east-west direction at 2nd Street and St. Patrick's to lower priority in this direction

### 1.3 On-Site Parking

Using the "Metro Vancouver Apartment Parking Study" (Metro Vancouver, 2012) as reference to validate the current parking allowance, strata developments in proximity to the Frequent Transit Network can be expected to require between 1.1 and 1.2 parking spaces per unit as shown by the study's surveys and counts. It is recommended to consider as part of the DPA guidelines to:

- Establish an allowance of 1.2 stalls per unit for multi-family development
- Allow additional parking provided by development to a maximum of 1.5 spaces per unit as per market demand
- Maintaining the reduction of parking capacity allowed depending on the ratio of market to rental housing, and provision of bicycle parking

### 1.4 On-Street Parking

There are two possible designs with different capacities for on-street parking. Both options can be considered for each street depending on the block density and timeline for redevelopment. However, increased development density will likely require parking on both sides for most streets. Areas expected to develop more slowly (e.g. 400 blocks) will need to maintain the current parking capacity for the foreseeable future.

The first concept includes parking on both sides with a narrow travel portion where cars cannot fully travel side by side. In this case, passing gaps (short sections where no parking is allowed) are needed for cars to pass each other. The second concept, with parking only on one side, has a wider travel portion so cars can pass each other comfortably. Point 3.1 of this summary explains these two concepts in more detail. Preferred street design and parking configurations will be considered on a block by block basis as the area re-develops. It is expected that most streets in the neighbourhood will have parking on both sides. Provision of parking on one side of the street should be considered for:

- St. David's Avenue to accommodate the greenway corridor
- 500 and 600 block of 1st Street east of St. David's to maintain appropriate width for sidewalks
- Alder street between St. Patrick's and St. David's avenues depending on the final use of the City lands on the south side which could be dedicated to park or other uses

## 2.0 EAST 3RD STREET CORRIDOR OPERATIONS

### 2.1 Capacity Utilization

The analysis of various growth scenarios show that 3rd Street has enough remaining capacity to operate properly under future conditions. The operation can be optimized with traffic signals and lane configuration but more analysis will be required to implement such changes. Operations of this corridor are influenced by Main Street and the Iron Workers Memorial Bridge operations. Therefore, providing additional lanes may have a counterproductive effect as they could turn into storage lanes. As such, is not recommended to widen the road to accommodate additional general purpose vehicle travel lanes. Instead, consider:

- Keeping one general purpose vehicle lane and one bus lane per direction through the Moodyville area

- Providing left turn bays east and westbound at all intersections between Queensbury and St. Andrew's avenues
- Maintaining current lane configuration at St. Georges and Lonsdale avenues and depending on final cross section design, providing right turn lanes elsewhere as needed

### 2.2 Signalization

Two scenarios were tested under full buildout conditions: one, the current limited signalization, and two, a full signal implementation at all intersections (between Queensbury and Lonsdale avenues). Full signalization of all intersections is required only in case of an exclusive right-of-way rapid transit system in the middle in the road. Otherwise, the installation of full signals will depend on the magnitude and timing of development. Within the Moodyville area, priority for signalization should be given to the intersections at St. David's and Queensbury. Based on the study results, it is recommended for consideration:

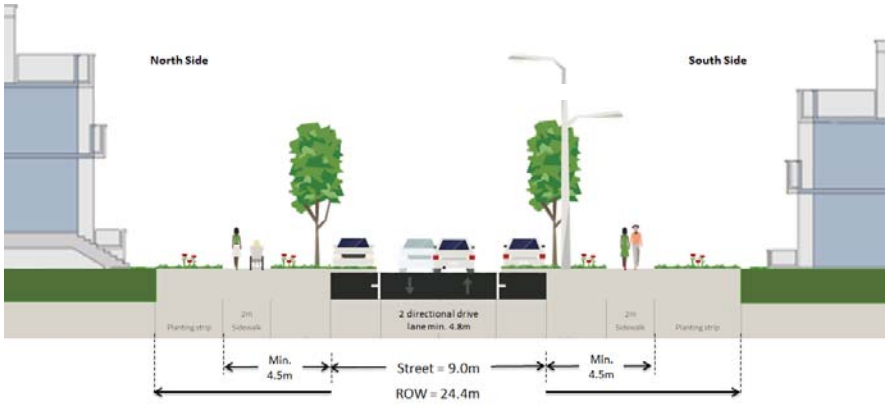
- Installation of a full signal at St. David's and 3rd Street intersection coinciding with the construction of the greenway connection and/or the redevelopment the bus depot site
- Conversion of the pedestrian signal at Queensbury Avenue to a full signal operation (this depends on development of the 700 block of 3rd Street and south side of 4th Street)
- Planning for the possibility of another full signal at either Moody or Ridgeway depending on the pace of development and, in particular, on the redevelopment of the transit depot site (a more detailed traffic analysis will be required since the specific plans for this site are undetermined at this time)
- *Only in case of rapid transit through the middle of the corridor*, implementation of full traffic signals and optimization of turning lane configurations at all intersections between Queensbury and St. Georges to accommodate rapid transit (this is not needed if rapid transit uses curbside lanes)

## 3.0 STREET CROSS SECTION CONCEPT DESIGNS

### 3.1 Local Streets

As discussed previously in point 1.4 of this summary, two concept designs were developed for local streets. Both options maximize pedestrian and boulevard space but vary parking capacity. Both concepts can be considered block-by-block as the area redevelops but a well-balanced and evenly distributed parking supply is needed for the higher redevelopment densities. Given the future area conditions, parking on both sides of the streets will most likely be the preferred solution in most cases. The following figure illustrates the local street cross section design with on-street parking on both sides. For example, this design would be applicable to 1st and 2nd streets. Refer to section 6.1 of the report for more details.

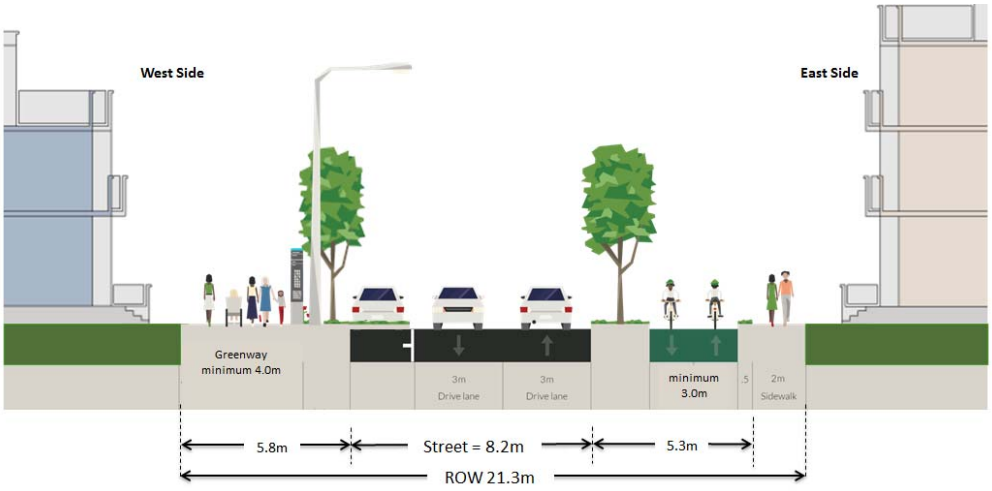
**Figure 1.** Local Street Cross Section Design with Parking on Both Sides of the Street




*CONCEPT 1: Parking on both sides, 9m street width, with passing gaps for side-by-side circulation*

Cross sections with parking on one side of the street would be applicable for greenway connections or on narrower streets such as 500 and 600 blocks of 1st Street to increase pedestrian realm. Figure 2 illustrates the local street cross section design with on-street parking on one side of the street for a greenway connector on St David's Avenue. A St David's example illustrates provision of 4m wide multi-use path on the west side of the street and bi-directional off-road protected bike lane parallel to pedestrian path on opposite side of street. This design is recommended for consideration as part of the St David's greenway project.

**Figure 2.** Cross Section Design with parking on one side of the street for St. David's Avenue




*CONCEPT 3: Parking on one side, 8.2m street width, with protected bi-directional bike track*

### 3.2 3rd Street Transit Corridor

For East 3rd Street, the principles applicable to cross section design are mainly to prioritize transit, maintain the street's role as an east-west arterial connection, and maximize the pedestrian realm including boulevard space. The cross section design must be flexible to adapt to the different street profiles of the local and extended part of the 3rd Street/Marine Drive corridor. Exclusive transit lanes, either a centre line guideway or curb-side lanes may not be the ultimate solution; however, planning for transit priority implies making exclusive transit lanes part of the long-term design options.

Several design concepts were developed for East 3rd Street; these options will be further refined as part of the corridor design process. Other sections of the corridor, with higher densities and closer to commercial areas such as Lonsdale, will require more analysis to establish the appropriate conceptual designs.

The various concepts include exclusive bus lanes, with or without parking or bike lanes as follows (refer to section Figure 36. of the report for more details):

- Concept A: Exclusive, centerline busway with parking on both sides and no bike lanes
- Concept B: Exclusive or shared curb-side transit lanes with parking on both sides and no bike lanes
- Concept C: Exclusive, centerline busway without parking and with buffered bike lanes on both sides
- Concept D: Exclusive or shared curb side lanes without parking and with buffered bike lanes on both sides

While concepts A and C would require traffic signals at every intersection to control turning movements, concepts B and D may require additional traffic signals but it is unlikely they would need them at every intersection.

The analysis shows that additional travel lanes are not required to support future traffic volumes. However, 3rd Street will remain a key east-west arterial transit connection and requires additional width to accommodate future

rapid transit. Furthermore, providing pedestrian space is a priority for 3rd Street to serve as the main link between the Moodyville Area and Lower Lonsdale. Consequently, all cross section options include a minimum sidewalk width of 2m and a minimum of 1.5m boulevard space.

Bicycle lanes can be accommodated within the 30.5m right-of-way in some sections of the corridor. The objective will be to provide the most effective connection between 3rd Street and other existing bike routes and greenway connections. The different concepts developed combine exclusive transit lane alignment with parking or bicycle lanes. Sections of East 3rd Street outside Moodyville area will be reviewed through the separate future planning processes.

It is recommended to consider for East 3rd Street through the Moodyville Area concept C or D (refer to section Figure 36. of the report for more details). The preferred option is to provide bicycle lanes between Queensbury and St. Andrew's avenues to connect efficiently with north-south greenway and bike facilities. The concept used will depend on the final cross section selected for exclusive transit lanes.

Cycling in the east-west direction will continue to be supported by 4th Street and the Spirit Trail. This will require revisions to the Bicycle Master Plan. Until the long-term vision for the corridor is achieved, addition designs for an interim or transitional set of solutions will be required for the curb location of redeveloped sections of 3rd Street. This will inform the short-term development within the long-term, sustainable vision for the corridor.

# 1 OBJECTIVES AND SCOPE

## 1.1 BACKGROUND

The 2014 Official Community Plan (OCP) designates Moodyville as part of a Development Permit Area (DPA) and a Frequent Transit Development Area (FTDA). These designations require the issue of consistent and standard guidelines for development applications. Redevelopment plans must incorporate transportation improvements for all modes, including infrastructure and other measures to deliver the vision for the future of the area.

The *MOODYVILLE AREA TRANSPORTATION STUDY* reflects the guiding principles outlined by various municipal plans, most importantly the 2014 OCP and the 2008 Long-Term Transportation Plan. These general principles put the emphasis on improving commuting and local mobility opportunities and accessibility for all users while promoting sustainable modes of transportation.

In evaluating the transportation needs for this neighbourhood, this study considers the needs of current and new residents, the development impacts on the road network, and the transportation safety, functionality and consistency of the proposed measures.

Rezoning of this area will affect transportation systems for the neighbourhood, in particular East 3rd Street operations. East 3rd Street is part of a larger east-west transit corridor through the City, both districts on the North Shore and the Squamish Nation. The design concepts specific to 3rd Street developed by this study reflect this wider context. The geographical scope of this this study, however, is limited to the Moodyville Area as the figure below illustrates.

**Figure 3.** Project Location and Context

## 1.2 SCOPE

The scope of the study can be summarized in five main points as follows:

1. *Accessibility and network connectivity*

This point reflects the priority given to active transportation modes (pedestrian and cycling), the accommodation of the greenway corridors and the Spirit Trail, and transit as part of the Frequent Transit Development Area. The goal is to create a neighbourhood with improved alternatives for local mobility and commuting. This part of the study also recognizes the need for resident auto access.

2. *Traffic control through street design*

In terms of street design and typology, this study proposes the appropriate concepts for road cross sections to support a walking and cycling environment, and help calm traffic, without compromising accessibility. Street design will be used to reduce short-cutting. The aim is to give the area a distinctive local character and to manage traffic flow through design, avoiding the introduction of additional traffic calming measures in the future.

3. *Parking requirements*

This element of the study includes an evaluation of the on-site parking requirements to ensure that on-site parking is sufficient and that it offers a balance between neighbourhood needs and a sustainable use of motorized transportation. Street design and on-street parking will be directly affected by the on-site parking provision.

4. *Neighbourhood streets cross section design*

This point includes preferable local street cross sections to provide guidance on the desired character and functionality of the neighbourhood streets and the ultimate location of street infrastructure including sidewalks, boulevards, trails, curbs, and lane configuration.

5. *Analysis of East 3rd Street right-of-way (ROW) and operation requirements*

This point specifically addresses the cross section requirements of East 3rd Street, within the Moodyville Area, to provide options *in the context of the 2040 North Shore Area Transit Plan.* This long-term plan identifies 3rd Street as a long-term east-west *rapid transit* corridor. This part of the study evaluates the transportation implications of the denser neighbourhood on 3rd Street operations, including intersections and transit priority.

The analysis requires a forecast for the future demand of the area. The forecast in this case includes several assumptions, such as percentage of land redeveloped, mode shift thresholds, trip rates, and origin-destination structure for the future demand. The concepts developed within each point are based on the demand forecasted to full buildout of the Moodyville area (70% of land use actually redeveloped as a worst-case scenario).

> *This study provides only long-term, full buildout concepts and proposals. The interim or transitional scenarios will be defined at a later time as development takes place.*

## 1.3 DOCUMENT CONTENT

The next several sections outline the findings of this study, which is divided in two parts:

**A Transportation Analysis and Operations**

This first part addresses the following points (see sections 2 to 5):

- Current transportation conditions and demand characteristics
- Forecast for demand growth and potential mode shift
- Connectivity and traffic control
- Parking requirements

**B Conceptual Design Options**

The second part (see section 6) contains the potential concepts for street cross section design, including:

- The local street cross sections
- The right-of-way options for East 3rd Street required to accommodate future rapid transit that best reflect the City's goals for sustainability

## 1.4 GUIDING PRINCIPLES AND REFERENCES

The main guiding documents for the Moodyville Transportation Study include local and regional plans. With respect to the Official Community Plan, the study's objectives reflect the OCP's transportation goals as listed in the following table (see section 8.4 for a fuller description):

**Table 1.** Study Alignment with OCP Objectives

| | |
|---|---|
| *Goal 1:* | *Prioritize walking, cycling, transit and goods movement over single-occupancy vehicles*<br>This goal refers to investing in cycling and pedestrian networks and improving accessibility to transit through projects identified in the 2040 North Shore Area Transit Plan |
| *Goal 2:* | *Integrate Land Use and Transportation Planning to reduce the need for car travel*<br>This point directly supports a *Frequent Transit Development Area* along Marine Drive and East 3rd Street, the management of on-street and off-street facilities to prioritize sustainable transportation and the optimization of the existing road network, expanding it only to favor sustainable transportation |
| *Goal 3:* | *Support a safe, accessible, resilient and affordable transportation system*<br>This objective specifically prioritizes maintaining the existing transportation infrastructure while accommodating the transportation needs of all users. |

Regionally, the North Shore Area Transit Plan (NSATP), a long-term vision and a priority list of projects for the near term developed by TransLink between 2010 and 2012, reflects how the Regional Transport 2040 Vision translates into improved transit for the North Shore. The main point from this plan that directly affects the Moodyville Transportation Study is the definition of Marine Drive/3rd Street/Main Street, across all jurisdictions on the North Shore, as a *rapid transit* corridor.

Other specific references for this study include:

Official Plans and By-laws:
- 2008 Long-Term Transportation Plan
- Lower Lonsdale East Traffic Calming Plan
- North Vancouver Bicycle Master Plan
- Transportation Study - Level 2 Guidelines
- Streets and Traffic Bylaw 1991
- Subdivision and Development Control Bylaw
- Pedestrian Plan - Treatments by area

External References:
- TL - Transit Passenger Facilities Design Guide
- TL - Transit Oriented Communities Design Guide
- TL - Bus Infrastructure Design Guide
- 2015 Mayors' Council Transportation Plan
- Complete Streets design concepts[1]
- NACTO Urban Streets Design Guidelines

Additional information includes:
- CNV traffic counts: hose & turning movements
- AAA Bicycle Network Map
- Moodyville Area Traffic Analysis (MMM Group)

[1] *The Complete Street concept provides a balanced street use for all modes but prioritizes sustainable modes in particular*

# 2 EXISTING CONDITIONS

## 2.1 LAND USE

The current land use within the Moodyville Area being pre-zoned is primarily single family housing with approximately 360 dwelling units. The building form and density influence trip generation rates and distribution. Section 3.1 addresses the effect of future land use on transportation issues.

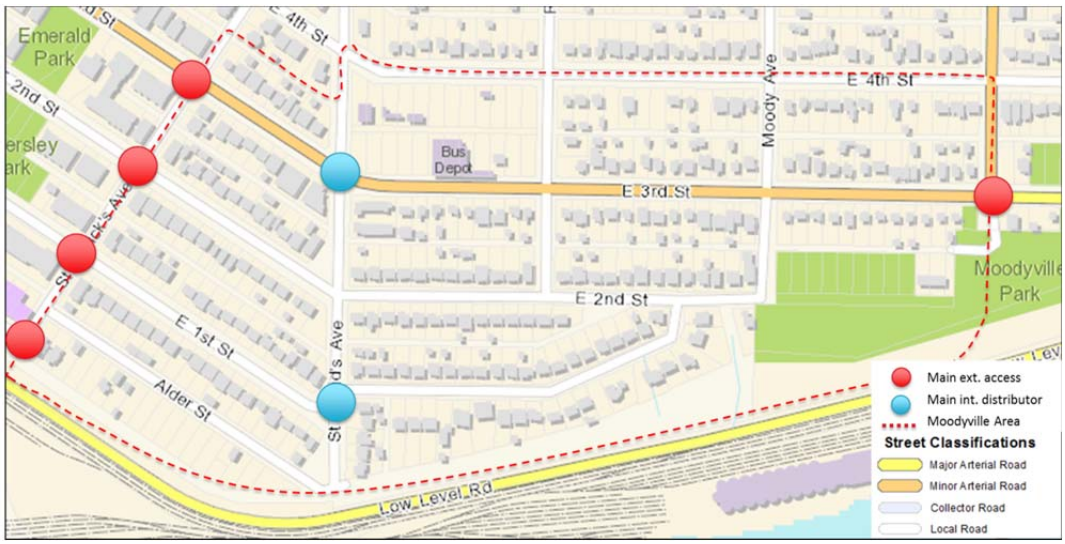
## 2.2 LOCAL AREA NETWORK AND ACCESSIBILITY

### 2.2.1 Road Network

All roads within Moodyville, except for 3rd Street, are classified as *local* roads, although there are a number of different right-of-way and road widths standards throughout the neighbourhood. The *local* road classification implies that the streets should be used only for access to the neighbourhood and that every effort must be made to maintain low, safe travel speeds and avoid traffic short-cutting through the area.

East 3rd Street is the main east-west arterial and transit corridor through the Moodyville Area. East 3rd Street connects Moodyville to the Lower Lonsdale and to the rest of the North Shore; the area is also indirectly supported in the east-west direction by the Low Level Road. In the north-south direction, St. David's Avenue is the main access road. The illustration below shows the main access and distribution nodes.

**Figure 4.** Access Points and Network Connectivity for Moodyville




East 1st and 2nd streets have a width that is wider than necessary for a neighbourhood street. This geometry may be encouraging short-cutting through 1st Street, in particular between St. Patrick's (coming from Esplanade) and St. David's avenues. The streets east of St. David's are considerably narrower but provide an easy and direct access to 3rd Street through Ridgeway and Moodyville avenues. There are no diverters or turn restrictions in the area making short-cutting easier.

The following two figures show the right-of-way and the road curb-to-curb widths for the area.

**Figure 5.** Road Right-of-Way of Streets in the Moodyville Area

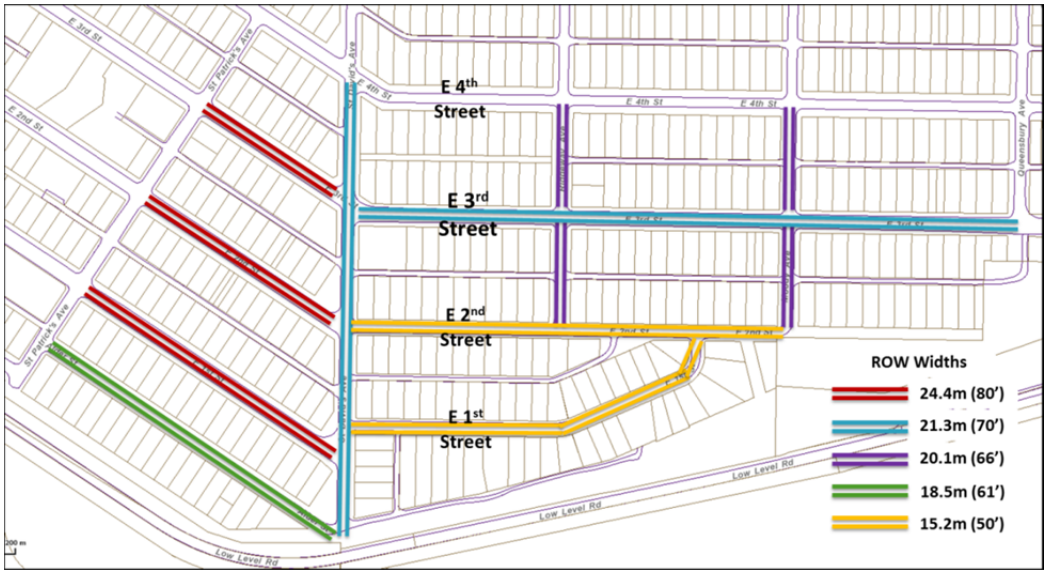



**Figure 6.** Road Curb-to-Curb Widths in the Moodyville Area


### 2.2.2 Transit Network

The Moodyville Area has a Frequent Transit Network (FTN) service along 3rd Street. The FTN provides high levels of transit service (i.e. overall average frequency of 15 minutes of less for at least 15 hours per day, seven days per week). In this case, there are two bus routes providing service through Moodyville: route 228, from Lonsdale Quay to Lynn Valley, and route 239, running east-west from Park Royal to Capilano University.

Route 239 provides a frequent service throughout the day, especially during peak hours with 10 minute intervals. The next table summarizes the transit service on 3rd Street. It has been estimated that Moodyville currently contributes a small percentage (3% to 9%) to the overall ridership of routes 228 and 239.

**Table 2.** Transit Service on East 3rd Street

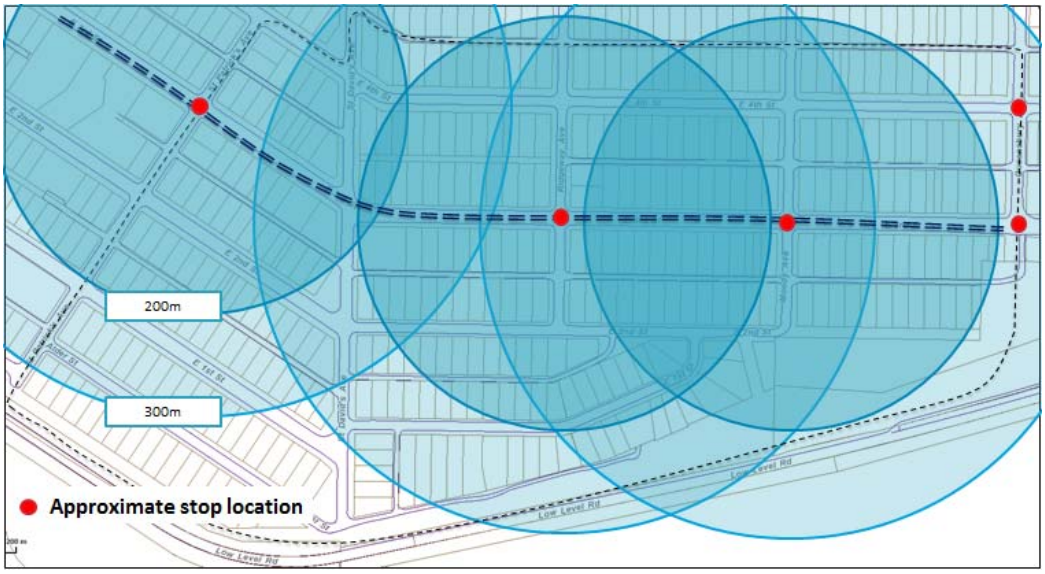
| Route | Route Name | Time of Day Frequency (min) | | | Boardings | | Average Stop Distance |
|---|---|---|---|---|---|---|---|
| | | AM Peak | Mid-Day | PM Peak | Total | % from DPA | |
| **239** | Capilano University/Park Royal | 10 | 10 | 10 | 10,520 | 3-4% | 370m |
| **228** | Lynn Valley/Lonsdale Quay | 15 | 30 | 15 | 2,866 | 6-9% | 270m |

**Figure 7.** Transit Routes and Stops in Moodyville


### 2.2.3 Pedestrian Network and Access

As the next figure shows, the access to transit stops is generally good. Accessibility is based on an access radius of 200 to 300m or approximately 3 to 5 minutes walking around the stops without accounting for road grades, which is an important consideration in this neighbourhood between Alder and 3rd streets.

**Figure 8.** Pedestrian Accessibility to Transit Stops

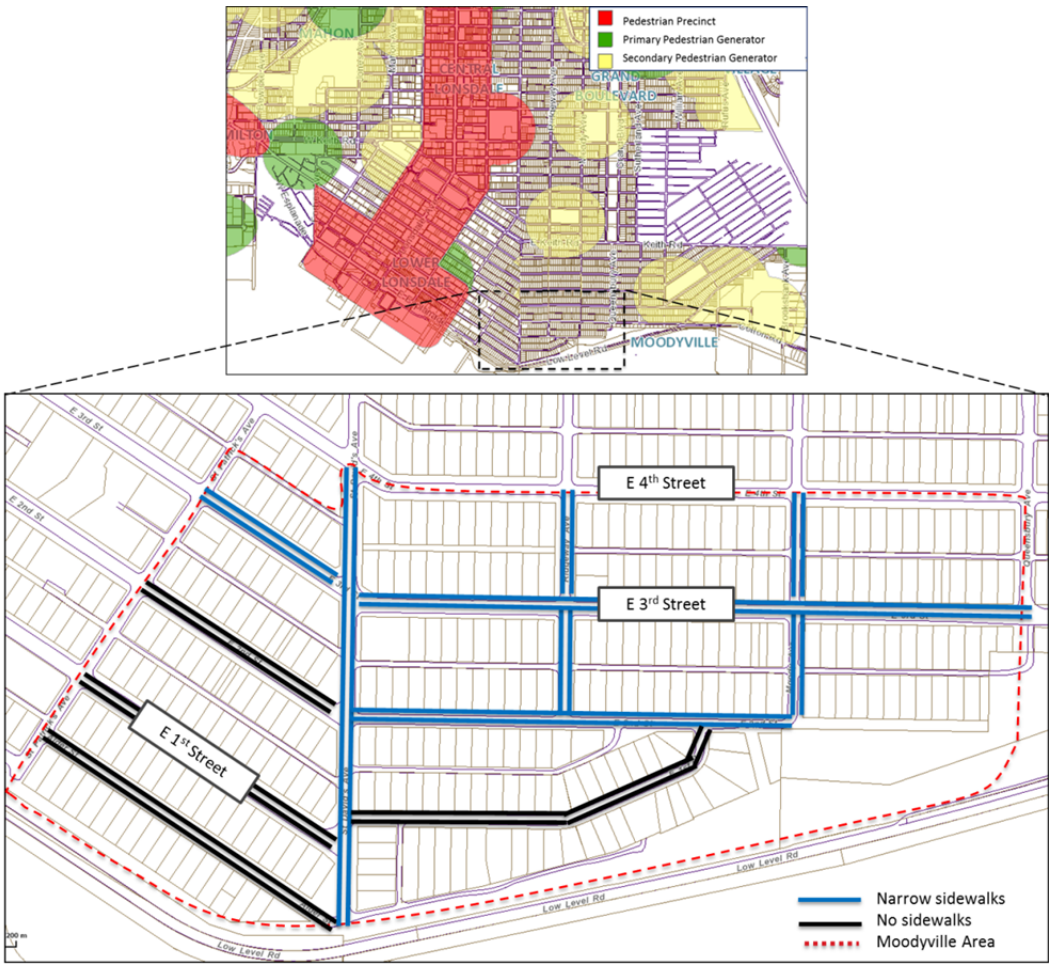


As can be seen, a 300m catchment radius covers a substantial part of the area. However, the ease of access is uneven given the differences in grade between Alder and 3rd streets. This fact must be kept in mind as part of the evaluation of the length of the blocks and local area connectivity if the design is to encourage pedestrian mobility.

Generally, people are willing to walk without much difficulty about 5 minutes to a bus stop and 10 to 15 minutes to a final destination or a rapid transit station. Beyond this distance, however, the likelihood of making the trip on foot diminishes and other modes become more attractive. Therefore, although 300m can generally be acceptable, grades and block length make the effective distance longer, affecting the perceived ease of access.

The next figure shows the Moodyville neighbourhood in the context of the current designated pedestrian generating areas in the City of North Vancouver (2008 Long-term Transportation Plan). The area is not currently a significant generator of walking trips. Nevertheless, the increase in density foreseen through redevelopment could change this situation substantially.

**Figure 9.** Current Pedestrian Network Conditions for Moodyville




The picture above also highlights the considerable lack of sidewalks in a large part of the local network. Moreover, with very few exceptions, all existing sidewalks in the rest of the network are narrower (1.5m width) than the current minimum standard (1.8m).

### 2.2.4 Cycling Network and Greenways

The next figure illustrates the existing designated active transportation network in the Moodyville Area. The main east-west cycling routes (shared lanes on 4th Street and bike lanes on Low Level Road) are currently on the north and south edges of the defined study area. The Low Level Road cycling facilities in particular are only accessible indirectly through St. Patrick's Avenue and the exit through Esplanade.

This limited access may not be enough to encourage Moodyville residents to take full advantage of the current cycling facilities. Nonetheless, the Spirit Trail offers additional cycling opportunities and the potential for further integration.

**Figure 10.** Current Bicycle and Greenways Designation in the Moodyville Area


The main connections between the Spirit Trail and the Green Necklace (on East Keith Road and Grand Boulevard) will be completed through the St. David's and Queensbury avenues greenway projects. This implies the need for special design considerations for these streets to ensure priority is given to pedestrians and cyclists along these roads.

## 2.3 DEMAND CHARACTERISTICS

### 2.3.1 Origin and Destination

TransLink's 2011 Trip Diary provides the origin and destination desire lines for North Vancouver. Desire lines are based on the distribution of destinations throughout the City, the North Shore and the region in general. Resident-specific trips are not available for each neighbourhood but for the City overall, the Trips Diary shows that about *83% of trips made by residents remain on the North Shore*.

Estimations are available for neighbourhood-specific trip structure for *all trips (by residents and non-residents) in and out* of each area. These values must be interpreted with caution since the sample becomes small when the totals are broken down into neighbourhoods. Nevertheless, the estimations are a good relative measure of the differences among neighbourhoods.

In this case, statistics show that 68% of trips from the Moodyville Area remain within the City or the District of North Vancouver, and up to 73% within the entire North Shore. Furthermore, the neighbourhood most likely to

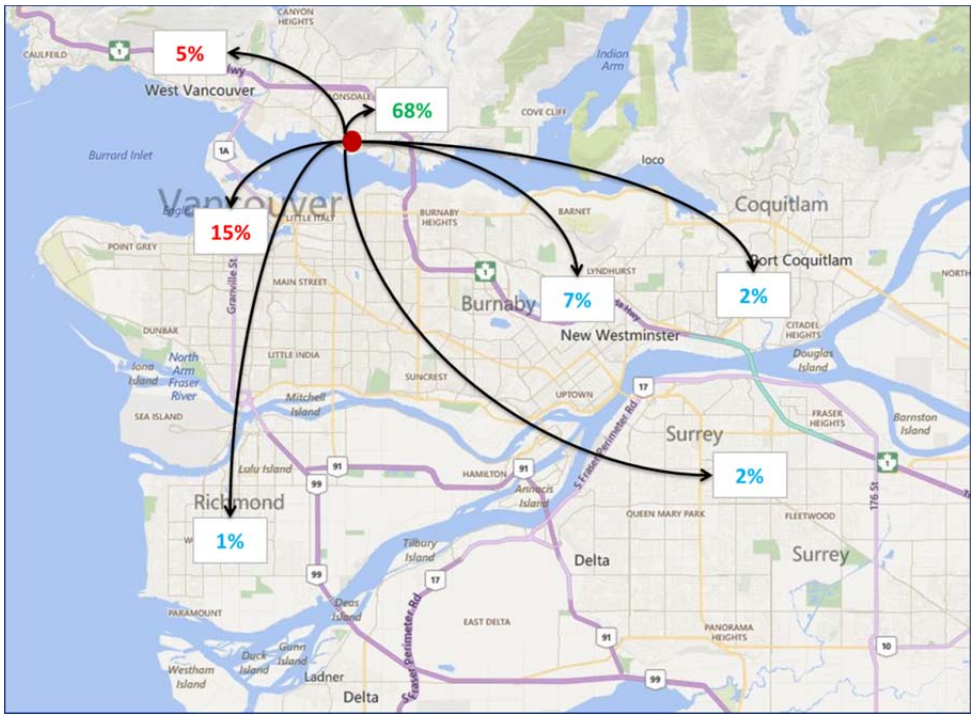
commute out of the North Shore is Lower Lonsdale with 35% of trips leaving the area. The following table summarizes the preferred destinations from every City of North Vancouver neighbourhood.

**Table 3.** Destination Distribution for Regional Daily Trips Originating from City of North Vancouver

| Origin | Destination | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | CNV + DNV | Vancouver | West Vancouver | Burnaby /New West. | Northeast Sector | Richmond/ Delta | Surrey | Langleys | P. Meadows /M. Ridge |
| **North of Highway 1** | 69% | 10% | 14% | 2% | 0% | 1% | 3% | 1% | 0% |
| **Central Lonsdale** | 67% | 12% | 9% | 6% | 2% | 1% | 1% | 0% | 0% |
| **Grand Boulevard** | 73% | 13% | 7% | 4% | 1% | 1% | 1% | 0% | 0% |
| **Lower Lonsdale** | 58% | 22% | 7% | 6% | 2% | 3% | 1% | 0% | 0% |
| **Mahon** | 82% | 10% | 2% | 3% | 0% | 2% | 1% | 1% | 0% |
| **Marine - Hamilton** | 69% | 9% | 14% | 4% | 2% | 0% | 1% | 0% | 0% |
| **Moodyville** | 68% | 15% | 5% | 7% | 2% | 1% | 2% | 0% | 1% |
| **Total CNV** | **67%** | **14%** | **9%** | **5%** | **2%** | **1%** | **1%** | **0%** | **0%** |

*Source: Trip Diary 2011*

**Figure 11.** Principal Desire Lines for Regional Daily Trips Originating from Moodyville



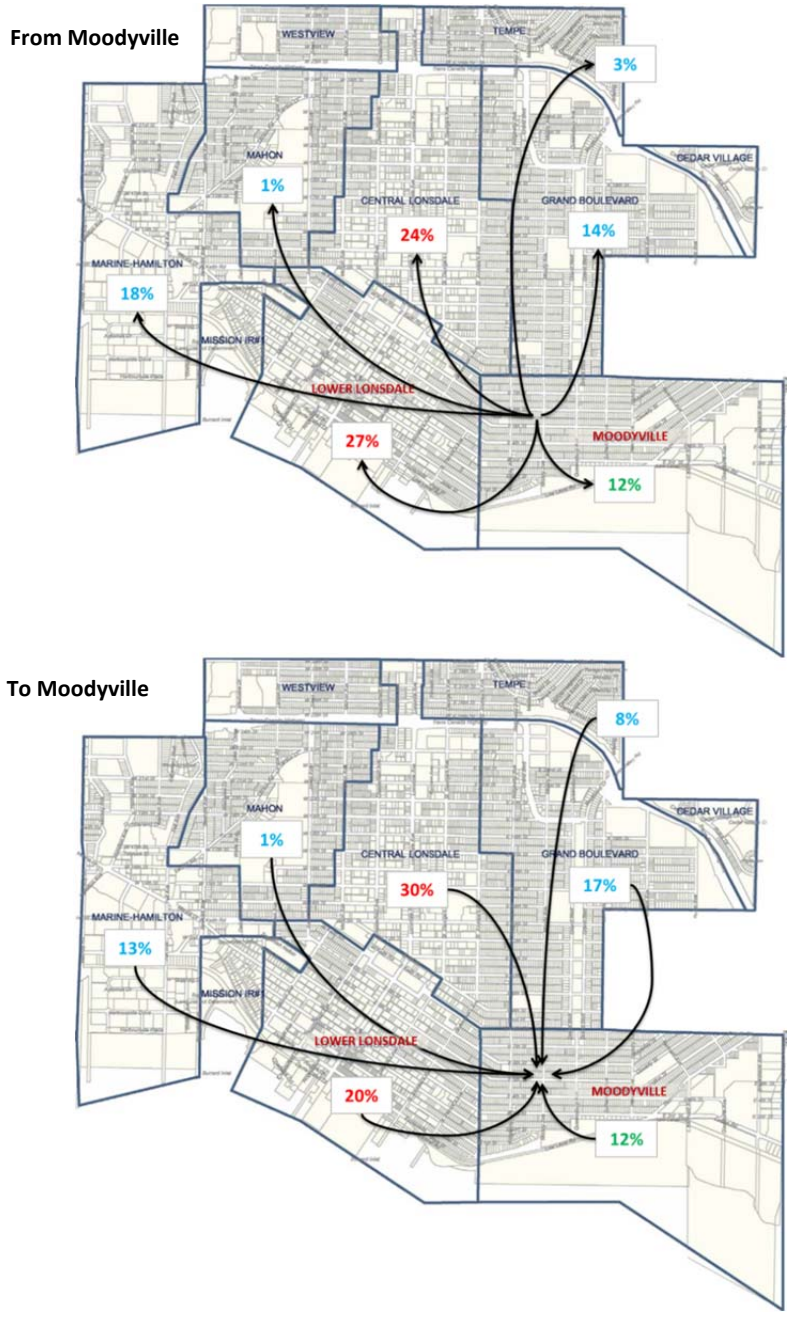

*Source: Trip Diary 2011*

The next set of statistics summarizes the structure of the demand from Moodyville to all other neighbourhoods in the City. In this case, 50% of the trips are concentrated to and from Lower and Central Lonsdale.

**Table 4.** Origin-Destination Distribution for Daily Trips per Neighbourhood

| Origins | Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | North of Highway 1 | Central Lonsdale | Grand Boulevard | Lower Lonsdale | Mahon | Marine - Hamilton | Moodyville | Total |
| **North of Highway 1** | 260 | 540 | 130 | 390 | 390 | 400 | 330 | **2440** |
| **Central Lonsdale** | 140 | 8310 | 2530 | 3710 | 810 | 2080 | 1240 | **18820** |
| **Grand Boulevard** | 80 | 2580 | 2080 | 810 | 120 | 440 | 700 | **6810** |
| **Lower Lonsdale** | 270 | 3990 | 760 | 3800 | 270 | 2340 | 810 | **12240** |
| **Mahon** | 0 | 710 | 50 | 440 | 1150 | 550 | 50 | **2950** |
| **Marine - Hamilton** | 310 | 2320 | 240 | 2330 | 620 | 2720 | 520 | **9060** |
| **Moodyville** | 130 | 960 | 580 | 1090 | 50 | 710 | 490 | **4010** |
| **Total** | **1190** | **19410** | **6370** | **12570** | **3410** | **9240** | **4140** | **56330** |

**Figure 12.** Origin-Destination Distribution for Local Daily Trips from/to Moodyville



### 2.3.2 Modal Split

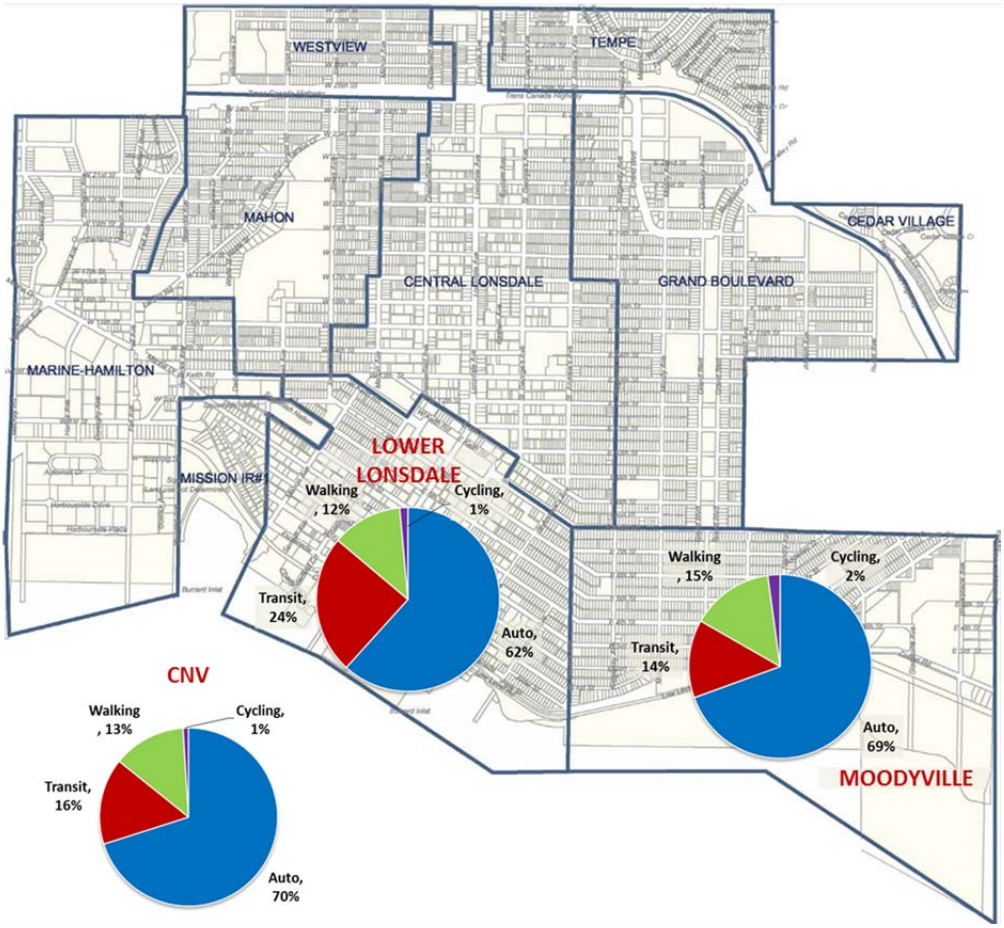
TransLink's 2011 Trip Diary also offers detailed information about modal split for local travel. The next table contains the observed modal share for city neighbourhoods. As would be expected in the urban context, Lower Lonsdale has the lowest proportion of auto use (62%) and the highest percentage of transit ridership (24%). However, the Moodyville Area shows a slightly higher proportion of walking and cycling.

**Table 5.** Observed Trip Mode Split for City of North Vancouver Neighbourhoods

| Mode | CNV Neighbourhood | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | North of Highway 1 | Central Lonsdale | Grand Boulevard | Lower Lonsdale | Mahon | Marine - Hamilton | Moodyville | CNV Total |
| **Auto** | 84% | 74% | 70% | 62% | 66% | 73% | 69% | 70% |
| **Transit** | 6% | 15% | 9% | 24% | 11% | 18% | 14% | 16% |
| **Walking** | 10% | 11% | 20% | 12% | 24% | 6% | 15% | 13% |
| **Cycling** | 0% | 1% | 1% | 1% | 0% | 3% | 2% | 1% |
| **Total** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** | **100%** |

*Source: Trip Diary 2011*

**Figure 13.** Observed Trip Mode Split for Moodyville and Lower Lonsdale Neighbourhoods




Although the sample size is relatively small, these estimations show that the future Moodyville area has the potential for growth in sustainable transportation mode share, in particular in transit if in the long-term it converges to levels similar to those of Lower Lonsdale. Cycling remains low presently but has seen a noticeable increase over the last several years. With the City's significant construction activity to build active transportation infrastructure in recent years, this trend is very likely to continue.

## 2.4 EAST 3RD STREET OPERATIONS

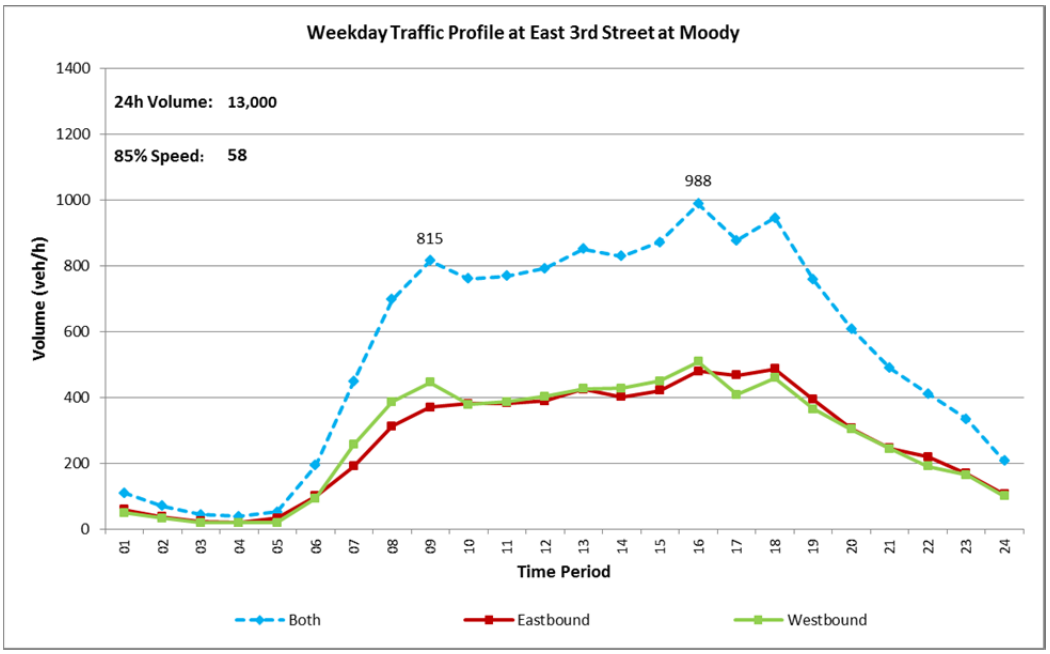
### 2.4.1 Traffic Conditions

An important part of this study is the analysis and evaluation of performance of traffic operations on 3rd Street as the key east-west arterial connection. The data collected for 3rd Street in this case includes screen line hose counts and parking use and turnover surveys within the study area boundaries; turning movement counts (TMCs) were collected at all intersections from Lonsdale to Queensbury avenues.

The following table and graph summarize the results for weekday and weekend volumes profiles on 3rd Street at about the mid-section of the area corridor (between Ridgeway and Moody avenues). These numbers represent averages of data collected over seven days.

Weekday traffic volumes are approximately 13,000vehicles/day while the 85th percentile speed[2] is close to 60km/h. The conditions are similar on weekends although the peak hours vary. The results also show that the volume in both directions is steady between 8am and 7pm. The peak hour occurs in the afternoon between 4pm and 6pm. The peak hour traffic represents about 8% of the daily volume.

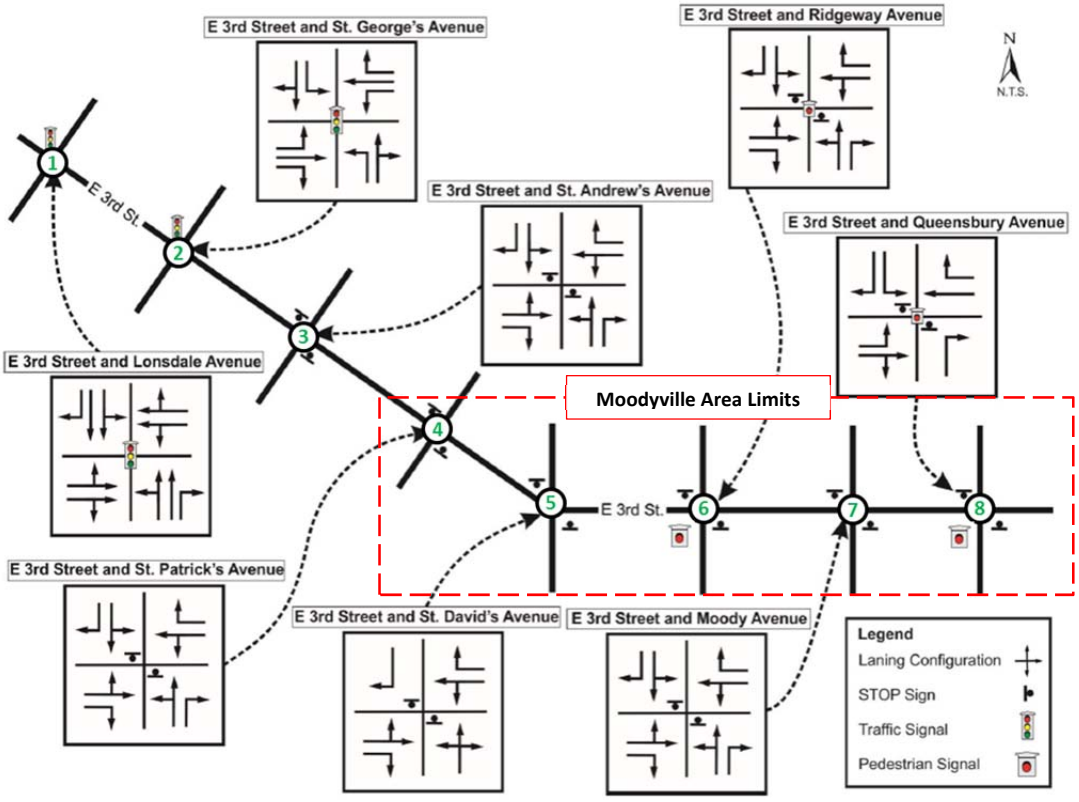
**Figure 14.** Weekday Traffic Volume Hourly Profile for East 3rd Street




For the purposes of this study, the scope of the traffic analysis included all intersections from Lonsdale to Queensbury avenues. The following figure illustrates the intersection turning movements and signalization within the 3rd Street corridor. There are only a limited number of traffic lights and no full signals within the limits of the Moodyville study area on 3rd Street.

[2] *85% of vehicles travel at or below this speed*

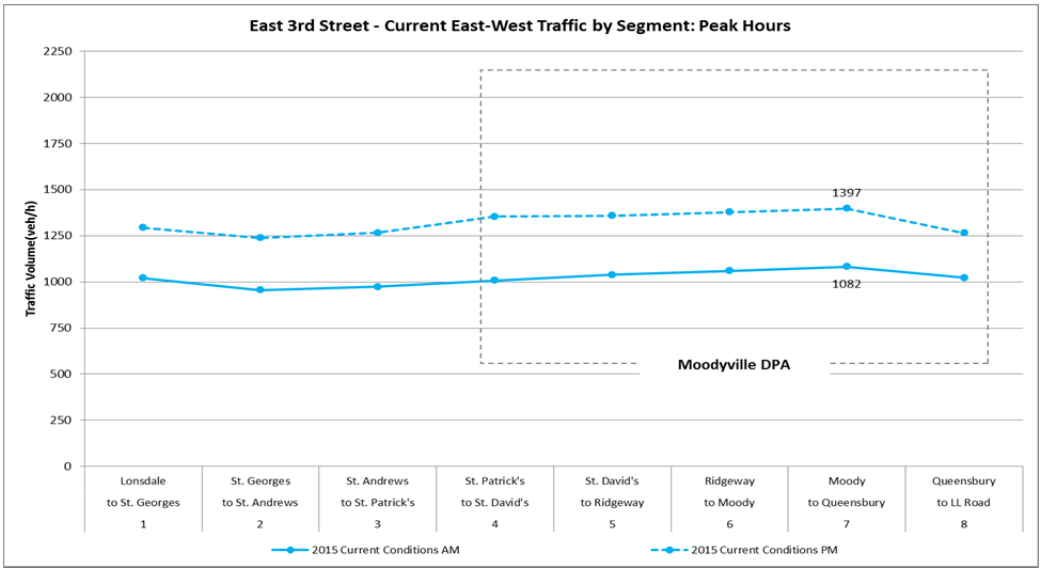
**Figure 15.** Current Operations and Signalization on East 3rd Street




Total intersection volumes peak in the afternoon at between 1,400 and 1,500 vehicles per hour. Within the Moodyville boundaries (St. Patrick's to Queensbury avenues), the north and south approaches carry only about 10% of the traffic. The dominance of the east-west direction is evident as the segment volumes are very similar to the intersection volumes. During the PM peak hour, the eastbout direction is slightly higher than the westbound, while in the AM both east and west directions are almost identical. Overall, as the next two graphs indicate, the PM volume is about 30% higher than the AM, although the distribution along the corridor is similar.

**Figure 16.** Observed Peak Hour Traffic Volumes at Intersections on East 3rd Street within Moodyville DPA

**Figure 17.** Observed Directional Peak Hour Volumes on East 3rd Street

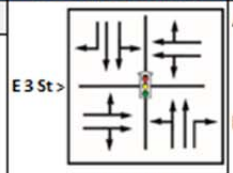
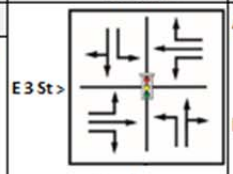
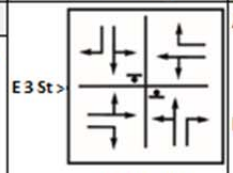
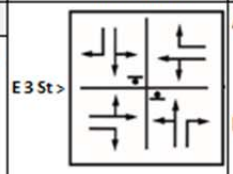
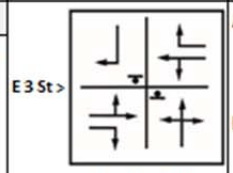
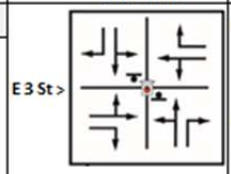
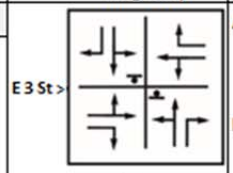
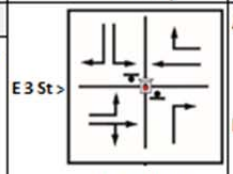



Most of the congestion on 3rd Street occurs at peak traffic times, especially during the afternoon. The conditions that cause excessive congestion are to a large degree outside of the City's control, in particular all the operational issues related to the Iron Workers Memorial Bridge. The Ministry of Transportation is carrying out work on new interchanges affecting Highway 1 to increase reliability and easier access to this corridor that should directly affect the operations on 3rd Street. However, currently there are no plans to add a new bridge or to increase road capacity at the North Shore crossings. In this context, the City's efforts must concentrate on optimizing the traffic operations for 3rd Street to accommodate the expected future growth.

The traffic data collected served to determine the level of congestion and capacity utilization for each intersection. These parameters dictate what is possible in terms of traffic signal optimization. The analysis shows that the intersections operate at acceptable levels. As expected, most of the congestion occurs as traffic approaches St. Georges and Lonsdale avenues. Otherwise, most of the delays occur in the north and south approaches of the minor streets which are stop controlled.

The following table summarizes the complete intersection performance evaluation under current conditions for the PM peak hour. Appendix B contains a more detailed calculation of levels of service for current and future conditions following the Synchro and Highway Capacity Manual (HCM) methodologies.

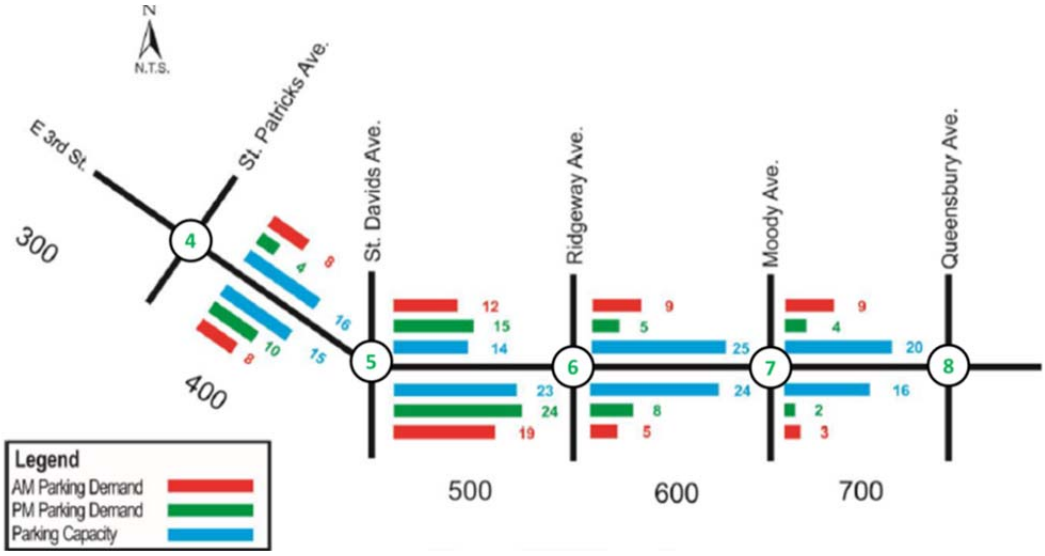
**Table 6.** East 3rd Street Intersection Performance under Current Conditions. PM Peak Hour

| Scenario > | Current Operation: Limited Traffic Lights. 1 lane/direction | | | |
|---|---|---|---|---|
| Intersection | Intersection Layout | Parameters | 2015 with Current Development | |
| | Current/Do-nothing | | East-West | North-South |
| 1 Lonsdale 3rd Street |   Lonsdale | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 69% | |
| | | Intersection Degree of Congestion | Low | |
| 2 St. Georges 3rd Street |   St. Georges | Approaches Degree of Congestion | Low | High |
| | | Intersection Capacity Utilization | 75% | |
| | | Intersection Degree of Congestion | Low | |
| 3 St. Andrews 3rd Street |   St. Andrews | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 61% | |
| | | Intersection Degree of Congestion | Low | |
| 4 St. Patrick's 3rd Street |   St. Patrick's | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 58% | |
| | | Intersection Degree of Congestion | Low | |
| 5 St. David's 3rd Street |   St. David's | Approaches Degree of Congestion | Low | Low |
| | | Intersection Capacity Utilization | 44% | |
| | | Intersection Degree of Congestion | Low | |
| 6 Ridgeway 3rd Street |   Ridgeway | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 53% | |
| | | Intersection Degree of Congestion | Low | |
| 7 Moody 3rd Street |   Moody | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 50% | |
| | | Intersection Degree of Congestion | Low | |
| 8 Queensbury 3rd Street |   Queensbury | Approaches Degree of Congestion | Low | Moderate-High |
| | | Intersection Capacity Utilization | 44% | |
| | | Intersection Degree of Congestion | Low | |

### 2.4.2 Parking

Parking occupancy and rotation was captured during the AM and PM peak hours. The figure below illustrates the parking capacity and demand by block which proves to be uneven along the corridor. For instance, the 500 block of East 3rd Street has the highest parking demand, with full occupancy in the afternoon. Based on site observations, a significant amount of this demand can likely be attributed to the bus depot which operates on a constrained site. Other segments, particularly the 600 and 700 blocks, are utilized at less than 30% capacity. This shows that there is lower than expected parking demand.

**Figure 18.** Parking Demand and Supply on 3rd Street within the Moodyville DPA




### 2.4.3 Collisions and Safety

The Insurance Corporation of British Columbia (ICBC) provided data from 2002 to 2013 to evaluate the occurrence of collisions in the corridor. The statistics in the next tables and graphs indicate there was a total of 624 collisions along East 3rd Street of which 150 (24%) were within the Moodyville Area limits.

**Table 7.** Collisions per year on East 3rd Street

| Year | E 3rd Street Total | | E 3rd Street w/i Moodyville area | |
|---|---|---|---|---|
| **2002** | 60 | 10% | 9 | 1% |
| **2003** | 51 | 8% | 11 | 2% |
| **2004** | 56 | 9% | 8 | 1% |
| **2005** | 56 | 9% | 13 | 2% |
| **2006** | 49 | 8% | 18 | 3% |
| **2007** | 56 | 9% | 15 | 2% |
| **2008** | 50 | 8% | 8 | 1% |
| **2009** | 47 | 8% | 14 | 2% |
| **2010** | 51 | 8% | 11 | 2% |
| **2011** | 54 | 9% | 19 | 3% |
| **2012** | 39 | 6% | 5 | 1% |
| **2013** | 55 | 9% | 19 | 3% |
| **Total** | 624 | 100% | 150 | 24% |

**Table 8.** Collisions per Intersection on East 3rd Street

| No. | East 3rd Street at... | Total | |
|---|---|---|---|
| 1 | Lonsdale Ave | 279 | 45% |
| 2 | St. Georges Ave | 117 | 19% |
| 3 | St. Andrew's Ave | 78 | 13% |
| 4 | St. Patrick's Ave | 23 | 4% |
| 5 | St. Davids Ave | 24 | 4% |
| 6 | Ridgeway Ave | 34 | 5% |
| 7 | Moody Ave | 28 | 4% |
| 8 | Queensbury Ave | 41 | 7% |
| | Total | 624 | 100% |

**Figure 19.** Collisions per year on East 3rd Street

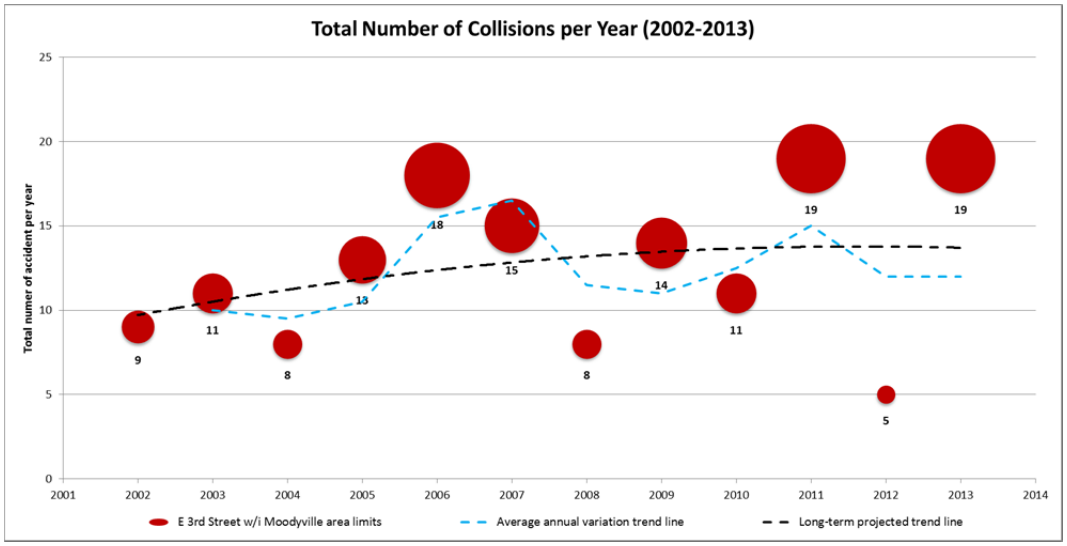
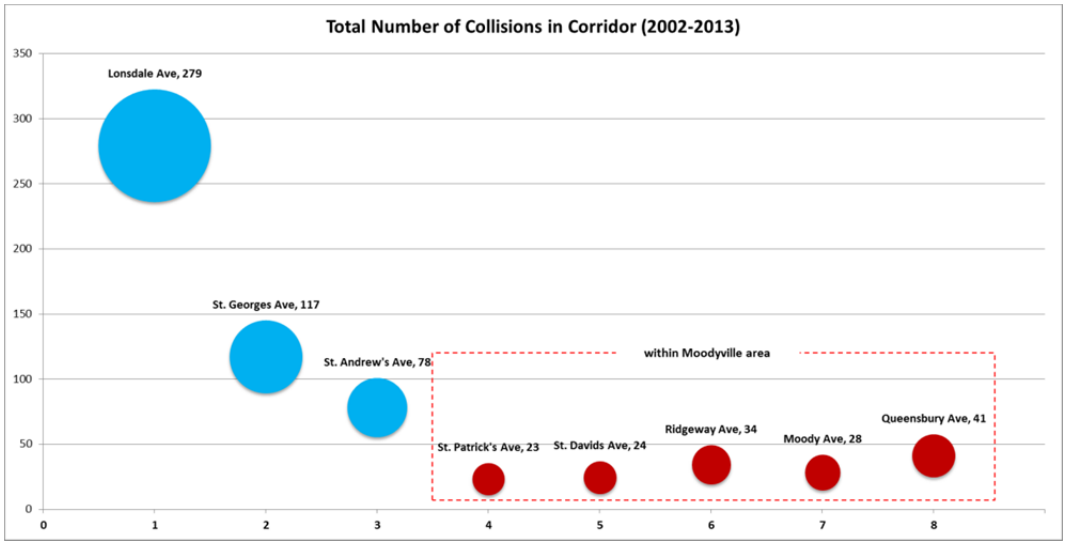



**Figure 20.** Collisions per Intersection on East 3rd Street




The results above show that, although there has been some variation in the total number of collisions, the average annual variation does not show a consistent increase. The long-term trend line shows a relatively stable rate of collisions, in line with general traffic growth. As expected, the higher level of traffic results in more collisions at intersections such as Lonsdale and St. Georges avenues.

Within the Moodyville Area boundaries, average collision rate remains low at between 2 and 4 incidents per intersection per year. Within the area the highest number of collisions can be seen at Queensbury Avenue, although all area-specific intersections show fewer collisions then the corridor average.

# 3 DEMAND FORECAST

## 3.1 FUTURE LAND USE

The current land use within what will constitute the Moodyville redeveloped area is primarily single family housing. There are presently approximately 360 dwelling units in the area. The rezoned development plan proposes up to 1,900 ground-oriented and low-rise apartment forms as shown by the next map of building typology and density distribution.

**Figure 21.** Building Forms and FSR that Affect Density and Trip Generation in the Moodyville Area


The building form and density have a direct effect on trip generation rates and distribution. For the purposes of this study, a 70% completion of the full redevelopment potential is considered a *Full Buildout* worst case scenario.

## 3.2 TRIP GENERATION

The generation of trips in and out of the area forms the basis for the future estimation of traffic and the potential modal shift. For this analysis, three scenarios are required:

1. **Current (2015):** this provides the base line to understand the magnitude of growth in demand which does not translate necessarily into traffic growth in the same proportion as the population growth
2. **Do-nothing (up to 2045):** this refers to the hypothetical situation where Moodyville would remain as is up to the same target year as a full buildout redevelopment (projected to 2045 for traffic analysis). This scenario

serves to answer "what-if" questions and provides a proper comparison of demand growth since the demand would naturally evolve with or without the new development.

3. **Full Buildout (20 to 25 year horizon, projected to 2045 for traffic analysis):** this refers to a situation where 70% of the total potential land approved for redevelopment is reached. In this case, the estimation assumes that this will likely occur in a maximum of 20 to 25 years but is extended to 2045 for consistency in the traffic analysis. The estimation procedure allows this target percentage to be modified in the future if required.

The Full Buildout scenario provides the long-term estimation of travel demand by *all* modes. The estimation of the actual number of trips per day generated in Moodyville requires a number of additional parameters as follows:

| **Basic Parameters:** | | **Share of daily traffic:** | | |
|---|---|---|---|---|
| **Capita/Dwelling =** | 2.40 Persons/unit | **AM =** 8.1% | **In =** 30% | **Out =** 70% |
| **Trip rate (all modes) =** | 3.03 Trips/day | | | |
| **Buildout =** | 70% of max. development | **PM =** 9.0% | **In =** 57% | **Out =** 43% |

All these parameters can be modified to re-estimate the demand if more scenarios need to be generated in the future. The 2011 Trip Diary provides the basic statistics for trip rates and household size. These numbers are general averages for North Vancouver. However, individual rates can be specified for each block within the Moodyville area to suit the different densities and building types.

The proportions of demand between AM and PM also come from the Trip Diary but are validated with the traffic counts available for the area. Finally, a 1% growth rate applies only to the growth in the *Do-nothing* scenario as a proxy for base growth in traffic if there was no redevelopment.

**Table 9.** Trip Generation Forecast for Moodyville Area – All Modes

| Year | Scenario | Dwellings | | | | | | Population | | | | | | Daily Trips Generated (all modes) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Block | | | | | | Block | | | | | | Block | | | | | |
| | | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total |
| 2015 | Current | 130 | 93 | 73 | 55 | 4 | 355 | 312 | 223 | 175 | 132 | 10 | 852 | 945 | 676 | 531 | 400 | 29 | 2582 |
| 2045 | Do nothing | 130 | 93 | 73 | 55 | 4 | 355 | 421 | 301 | 236 | 178 | 13 | 1148 | 1274 | 912 | 716 | 539 | 39 | 3480 |
| | **Full Buildout** | **397** | **498** | **263** | **166** | **11** | **1334** | **953** | **1194** | **630** | **398** | **25** | **3200** | **2886** | **3619** | **1909** | **1206** | **76** | **9697** |

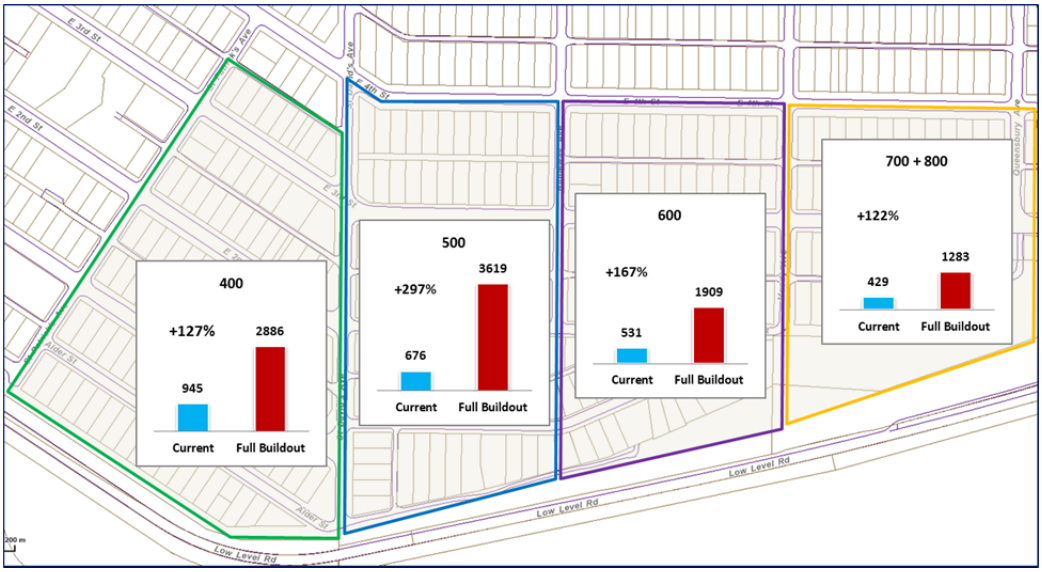
**Forecasted Peak Hour Trip Generation (all modes)**

| Period | Scenario | Total Trips | | | | | | Trips INTO DPA | | | | | | Trips OUT OF DPA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Block | | | | | | Block | | | | | | Block | | | | | |
| | | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total |
| AM | Do nothing | 103 | 74 | 58 | 44 | 3 | 282 | 31 | 22 | 17 | 13 | 1 | 85 | 72 | 52 | 41 | 31 | 2 | 197 |
| | **Full Buildout** | **234** | **293** | **155** | **98** | **6** | **785** | **70** | **88** | **46** | **29** | **2** | **236** | **164** | **205** | **108** | **68** | **4** | **550** |
| PM | Do nothing | 115 | 82 | 64 | 49 | 4 | 313 | 65 | 47 | 37 | 28 | 2 | 179 | 49 | 35 | 28 | 21 | 2 | 135 |
| | **Full Buildout** | **260** | **326** | **172** | **109** | **7** | **873** | **148** | **186** | **98** | **62** | **4** | **497** | **112** | **140** | **74** | **47** | **3** | **375** |

The estimation results in about 2.5 times more trips in and out the area at full buildout. Once the estimation is factored for direction and time period the specific peak hour demand for morning and afternoon can be obtained. The results indicate that the PM demand is slightly higher than the AM. The evaluation of operational performance is thus based on the PM peak conditions.

As the next figure illustrates, the highest growth is expected in the 500 blocks of the area, between St. David's and Ridgeway avenues. Considerably lower additional demand should be expected in the 400 and 700 blocks affecting the distribution of trips accessing the network.

**Figure 22.** Trip Generation Forecast for the Moodyville Area at Full Buildout




## 3.3 MODE SHIFT ESTIMATION

The next step is to determine how the expected demand will be distributed among the different modes. An analysis of the mode share reported in the Trip Diary helped to understand the realistic threshold for modal shift based on the observed mode split in the different City of North Vancouver neighbourhoods.

The current information about mode share in a selection of neighbourhoods that provides potential targets for attainable long-term mode shift is as follows:

1. *Moodyville:* this area represents the minimum threshold (i.e. worst case scenario) since the present mode split in Moodyville reflects the attractiveness the established modes and the improvements will further favour the sustainable travel alternatives.
2. *Lower Lonsdale:* this area shows what a realistic maximum target for transit use could be. The proximity of Lower Lonsdale to the Sea Bus and the service provided by six bus routes indicates that converging to such a high transit use will be difficult despite the improvements envisioned for Moodyville.
3. *Marine-Hamilton:* this neighbourhood shows the current maximum reported share for bicycles which remains relatively low (3%). Nevertheless, this is considered a reasonable minimum target and trends show that in the long-term such percentage can be exceeded if neighbourhood design favours cycling.
4. *Mahon:* this neighbourhood shows the highest walking mode share at 24%. Moodyville already reports 15% of daily trips as walking. This relatively high percentage within the City is encouraging and shows that considerable higher proportion of pedestrian mobility is attainable.

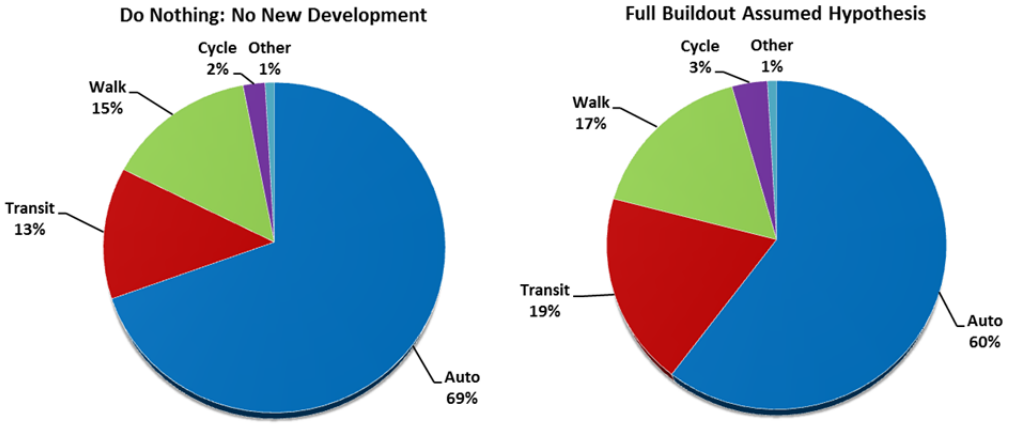
Furthermore, for the City in general, the share by *all sustainable modes together* is expected to reach a maximum of 45% by 2041; a more moderate estimate establishes this maximum at 40%. These accepted municipal and regional targets reflect the average for all residents of the City of North Vancouver.

With these thresholds, low, moderate and high hypotheses for potential shift to sustainable modes can be established for Moodyville-specific trips. In this case, the moderate hypothesis is taken as the most likely scenario and it is used to estimate the traffic based on auto mode share (driver plus passenger). The moderate hypothesis reflects the targets established by the City in the context of long-term regional targets for non-auto modes.

**Table 10.** Observed and Estimated Range of Mode Shift

| Scenario | Neigbourhood | Auto | Non-Auto | Transit | Walking | Bicycle | Other |
|---|---|---|---|---|---|---|---|
| Observed Mode Split 2011 | Moodyville | 69% | 31% | 13% | 15% | 2% | 1% |
| | Mahon (Max. Walking) | 66% | 34% | 8% | 24% | 0% | 3% |
| | Marine-Hamilton (Max. Cycling) | 73% | 27% | 16% | 6% | 3% | 2% |
| | Lower Lonsdale (Max. Transit) | 62% | 38% | 23% | 12% | 1% | 2% |
| Mode Shift Hypothesis | | | | | | | |
| Scenario | Mode Shift Hypothesis | Auto | Non-Auto | Transit | Walking | Bicycle | Other |
| Estimated Mode Shift 2045 | Low | 69% | 31% | 13% | 15% | 2% | 1% |
| | Moderate | 60% | 40% | 19% | 17% | 3% | 1% |
| | High | 55% | 45% | 21% | 19% | 5% | 1% |

**Figure 23.** Potential Minimum and Maximum Thresholds for Mode Shift



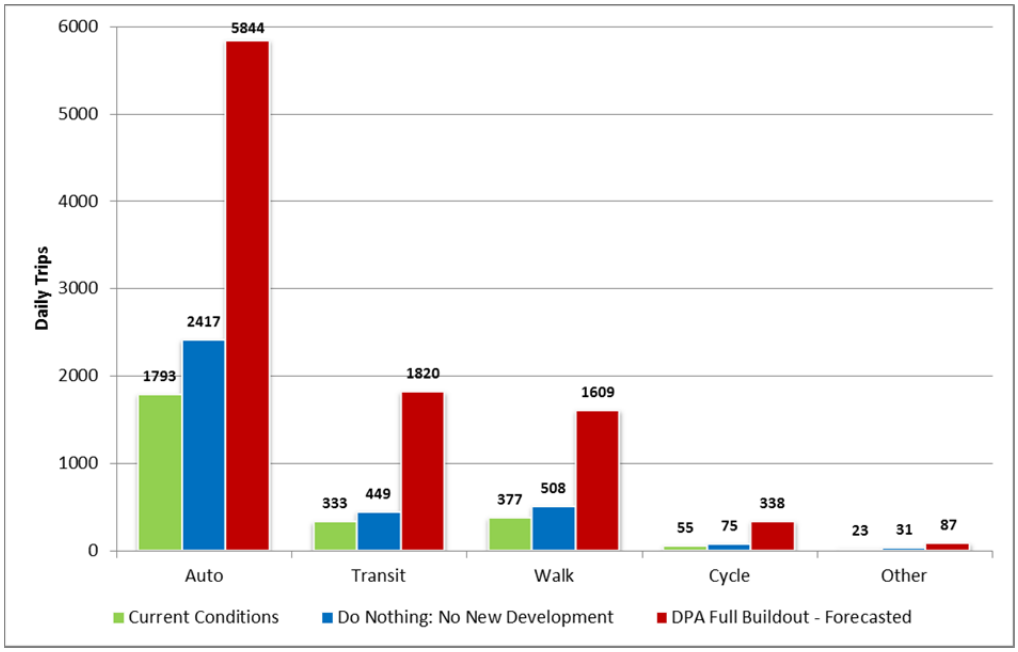

## 3.4 GROWTH SCENARIOS

The mode split estimation above allows a distribution for each of the growth scenarios outlined previously. The following table and graph summarize the results for each hypothesis. The moderate shift hypothesis is applied to the overall trip generation to calculate the expected trips per day and per peak hour. The main interest of these estimates is the auto demand that is later converted to traffic volumes.

**Table 11.** Forecasted Demand by Mode and Time Period

| Year | Block | Daily Demand | | | | | | AM Peak Trips | | PM Peak Trips | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Auto | Transit | Walk | Cycle | Other | Trips/day | Auto | Transit | Auto | Transit |
| 2015 | Current Conditions | 1793 | 333 | 377 | 55 | 23 | 2582 | 115 | 27 | 128 | 30 |
| 2045 | Do Nothing: No Development | 2417 | 449 | 508 | 75 | 31 | 3440 | 155 | 36 | 172 | 40 |
| | Full Buildout - LOW Mode Shift | 6737 | 1250 | 1415 | 208 | 87 | 9697 | 432 | 101 | 481 | 113 |
| | Full Buildout - MODERATE Mode Shift | 5844 | 1820 | 1609 | 338 | 87 | 9697 | 375 | 147 | 417 | 164 |
| | Full Buildout - HIGH Mode Shift | 5338 | 2002 | 1803 | 467 | 87 | 9697 | 343 | 162 | 381 | 180 |

**Figure 24.** Forecasted Daily Demand for Moodyville DPA for Various Growth Scenarios




## 3.5 PROJECTED TRAFFIC

The forecast includes the estimation of the traffic likely to affect the entire Moodyville Area, in particular on East 3rd Street. Traffic volumes have two components:

a. Background traffic: this component refers to through traffic volume, mostly in the east-west direction, that uses 3rd Street but does not have any part of the DPA as a final destination. This part of the volume is assumed to grow at a general average rate of 1% per year and reflects a city-wide average unrelated to the Moodyville specific traffic.

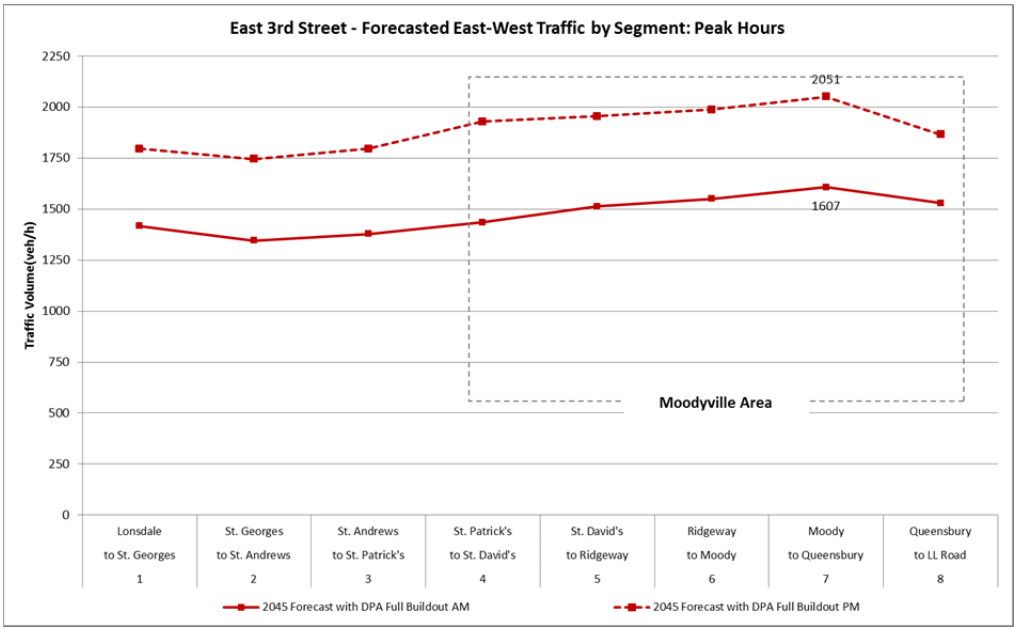
b. Area traffic: this second layer of traffic depends on the auto driver trips generated from each block within the Moodyville Area, as explained previously, and distributed over the preferred access points and roads based on desire lines for commuting (directional distribution) and observed turning movements.

The traffic estimation is carried out for AM and PM peak hours but only the PM traffic is used to evaluate performance and congestion since the afternoon represents the critical conditions for traffic. The next table and accompanying graph shows the profile expected for east-west traffic along 3rd Street.

**Figure 25.** Traffic Forecast on 3rd Street at Full DPA Buildout

| Segment | | | 2015 Current Conditions | | | | | | 2045 Forecast with DPA Full Buildout | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | AM | | | PM | | | AM | | | PM | | |
| No. | From | To | WB | EB | Total | WB | EB | Total | WB | EB | Total | WB | EB | Total |
| 1 | Lonsdale | St. Georges | 563 | 458 | **1021** | 524 | 769 | **1293** | 789 | 628 | **1417** | 719 | 1076 | **1795** |
| 2 | St. Georges | St. Andrews | 515 | 440 | **955** | 555 | 683 | **1238** | 736 | 609 | **1345** | 769 | 977 | **1746** |
| 3 | St. Andrews | St. Patrick's | 502 | 472 | **974** | 576 | 691 | **1267** | 724 | 654 | **1378** | 801 | 994 | **1795** |
| 4 | St. Patrick's | St. David's | 508 | 500 | **1008** | 608 | 746 | **1354** | 729 | 706 | **1435** | 856 | 1073 | **1929** |
| 5 | St. David's | Ridgeway | 512 | 527 | **1039** | 639 | 720 | **1359** | 733 | 780 | **1513** | 920 | 1036 | **1955** |
| 6 | Ridgeway | Moody | 518 | 542 | **1060** | 651 | 727 | **1378** | 736 | 815 | **1551** | 946 | 1042 | **1988** |
| 7 | Moody | Queensbury | 515 | 567 | **1082** | 661 | 736 | **1397** | 735 | 873 | **1607** | 988 | 1063 | **2051** |
| 8 | Queensbury | LL Road | 465 | 556 | **1022** | 661 | 603 | **1264** | 665 | 864 | **1529** | 987 | 878 | **1866** |

**Figure 26.** Segment Volume Profile Forecasted for 3rd Street at Full Moodyville Area Buildout

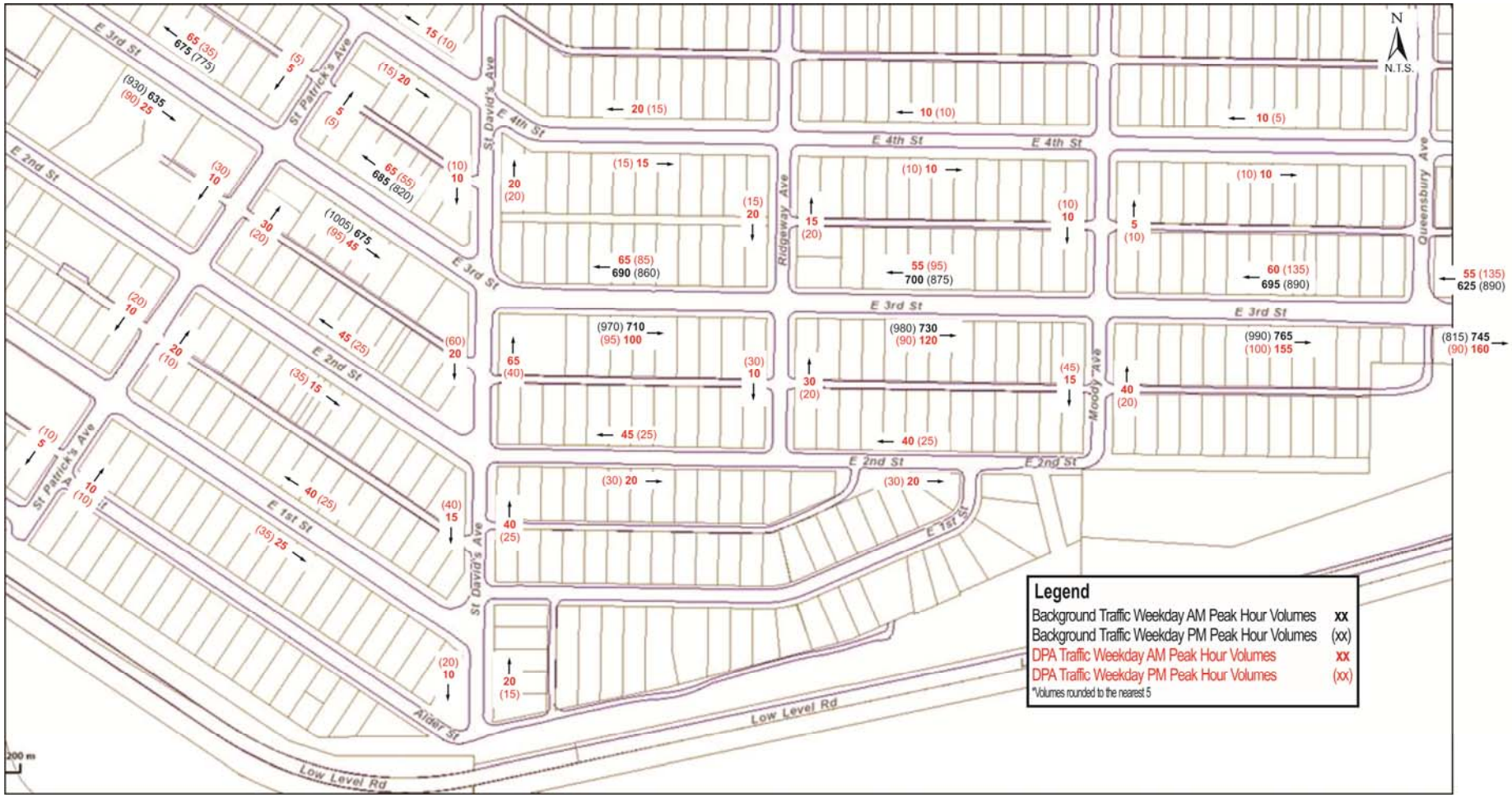



The complete forecasted traffic is estimated as follows:

| | | |
|---|---|---|
| *2045 Traffic* | = | *(2015 Total traffic – 2015 Site specific traffic)*compounded growth factor + (Area specific traffic at Full Buildout)* |

The compounded growth factor is 1% over 30 years applied only to background traffic. The map on the next page shows the different layers of traffic estimated for the entire area.

**Figure 27.** Estimated Local and External Traffic on the DPA Network at Full Buildout



# 4 LOCAL AREA TRANSPORTATION STRATEGIES

Based on the analysis from the preceding chapters, this section outlines the transportation measures and strategies desirable to achieve the vision for the Moodyville Area in the long term.

## 4.1 PARKING

A key issue in any residential area is the provision of parking. Providing too much parking capacity is costly, encourages auto use and limits the opportunities to accommodate non-motorized travel modes; excessively reducing the number of parking spaces, however, can create non-compliance with parking regulations and safety problems. The evaluation of parking allowance takes these competing needs into consideration. Nonetheless, it is assumed that in the future on-site parking will be prioritized over on-street parking in this neighbourhood.

### 4.1.1 On-Site Parking

The City of North Vancouver's Zoning Bylaw currently specifies 1.2 parking spaces per unit for low-rise apartment-type uses and 1.5 spaces for townhouse-type uses. Also as per the City's Zoning Bylaw, these amounts can be reduced through the provision of secure on-site bicycle parking. A lower rate of 0.75 per unit has been established for rental units.

The "Metro Vancouver Apartment Parking Study" (Metro Vancouver, 2012) provides a reference to compare with the City's required parking provisions. This Metro study assessed the parking supply and demand at apartment buildings across Greater Vancouver through household surveys and parking lots utilization counts. In the case of rental apartments on the Frequent Transit Network, the household surveys found an average of 0.91 spaces per unit while the counts indicate 0.82 spaces per unit. At strata developments in the proximity of the Frequent Transit Network (excluding those in the city of Vancouver and UBC) the study reported the following parking demands:

- Household survey: 1.34 vehicles owned per household and 1.19 parked vehicles per household
- Observed count: 1.08 parked vehicles per unit

Given these results, requiring 1.2 parking spaces per unit across the board for all multi-family dwellings in the area would be sufficient.

### 4.1.2 On-Street Parking

The parking capacity provided on street will depend on the final desired cross section design for each street and the density of each block in the area. Moreover, to preserve parking in general, and limit the number of access points and resulting conflicts with pedestrians and bicycles, new development should preferably maintain access through the laneways, although there may be some notable exception to this general rule.

There would be in general two design options where traffic volumes are low: either to allow parking on both sides of the street with a single lane for two-directional traffic, or to permit parking on only one side of the road but reducing the width for two travel lanes. Some of the streets, particularly east of St. David's Avenue are already narrow enough to implement either strategy while the rest needs to be redesigned to reduce widths without eliminating parking completely.

Parking demand for the neighbourhood should be accommodated primarily on site. This will allow street capacity to be used for overflow parking demand where needed. Inevitably, if street parking is available, some residents will

use it before using their own parkade. This is also a possibility if a unit has two cars but only one space. Providing most parking on site also reduces on street demands and will give the City more flexibility in allocating the right-of-way space between the different modes.

The next two figures show the current and proposed on-street parking distribution for Moodyville. The application of two-sides or one-side parking to specific streets will be determined at a later date based on careful consideration of the needs at each location. Nevertheless, future conditions indicate that it would be preferable to allow parking on both sides of most streets. The concept designs in chapter 6 illustrate how on-street parking can be accommodated with the other street design elements; section 7 summarizes the conclusions and considerations for parking provision and other transportation measures.

**Figure 28.** Current On-street Parking in Moodyville

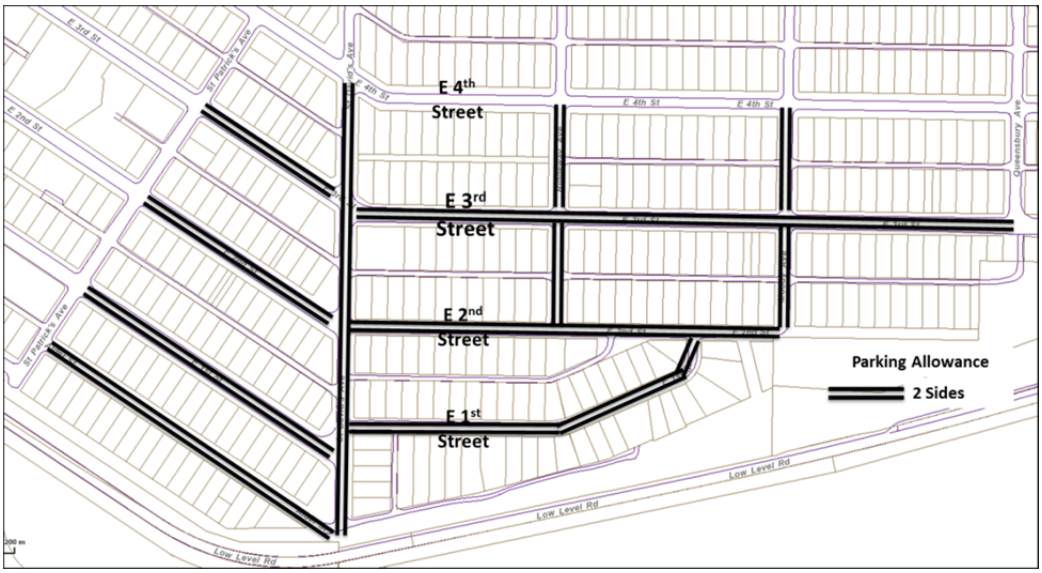
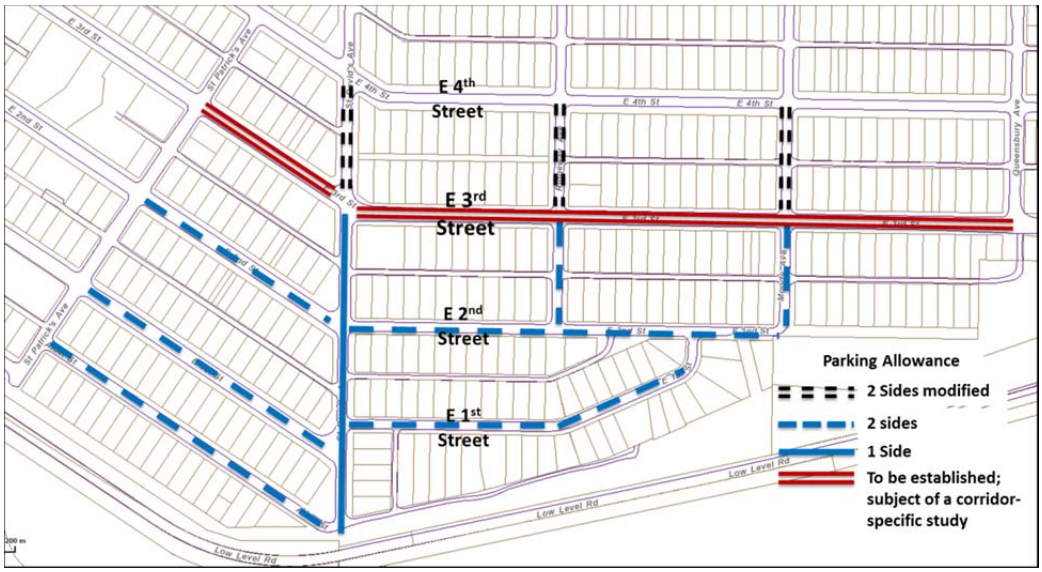



**Figure 29.** Proposed On-street Parking Modification for Moodyville



## 4.2 ACCESSIBILITY AND CONNECTIVITY

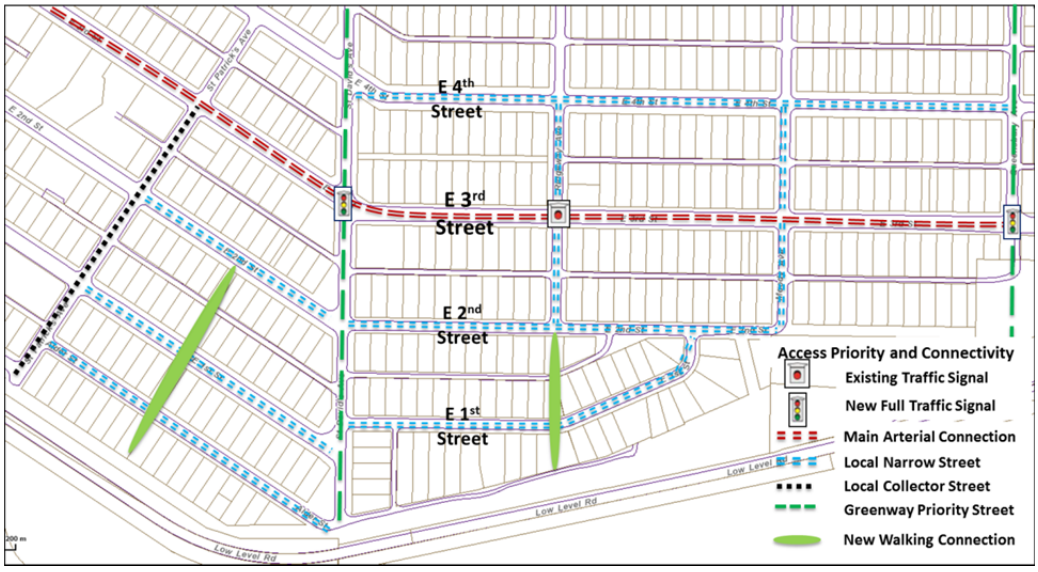
East 3rd Street will remain the main access route for the area in the east-west direction. Other parallel streets should be discouraged from channelling a significant amount of traffic while allowing convenient local access. Under this strategy, 1st and 2nd streets would give priority to pedestrians (or cyclists) over vehicles in the east-west direction. The objective is to encourage most of the traffic to rely on 3rd Street, eventually optimized with traffic signals (see section 5), while at the same time providing a balanced access grid with multiple entry and exit points.

In the north-south direction, St. David's Avenue will continue to be the main connection into the neighbourhood. This road is designated as the main greenway link between the Spirt Trail, at the south end of Moodyville, and the Green Necklace along East Keith Road. Accommodating this connection with a clear priority for pedestrian and cycling flows constitutes a key component of the redevelopment plan.

A second greenway connection will be provided through Queensbury Avenue, which is also a designated bicycle route. The growth and redevelopment along East 3rd Street implies additional traffic control measures will be necessary to facilitate operations and provide more efficient access to the area for all travel modes. In term of specific access points, the most likely scenario is that full traffic signals will be required at the intersections of Queensbury and St. David's avenues in the short term. Section 5 presents the specific analysis of traffic operations on 3rd Street.

To encourage pedestrian mobility within and out of the neighbourhood, it is important to provide convenient access to transit stops and greenways (north-south movements) and easy access to Lower Lonsdale (east-west direction). The grid pattern of the local road network will facilitate these movements. However, a key point of accessibility is to complete the grid to avoid excessively lengthy blocks that make walking routes unnecessarily long. Conceptually, this implies that green "walking alleys" would be ideal, first, as an extension of Ridgeway Avenue between 1st and 2nd streets and down to the Spirit Trail, and second, as a short cut between 1st and Alder streets also extended down to the Spirit Trail. A third additional connection could further improve pedestrian access between 1st and 2nd streets in the 400 block section.

**Figure 30.** Proposed Signalization, Prioritization and Connectivity



In terms of bicycle access, the only formally designated east-west bike route directly impacting Moodyville is 4th Street; however, cyclists frequently use 3rd Street as a direct and efficient east-west connection. Third Street has the advantage of being closer to areas of activity while providing convenient access to other north-south cycling or greenway routes such as Queensbury, St. David's, St. Andrew's, and Chesterfield avenues. Cyclists on 3rd Street also benefit from signalized crossings at arterials such as St. Georges, Lonsdale and Chesterfield.

To further encourage cycling in the neighbourhood, making a portion of 3rd Street part of the bicycle network would be desirable. A final decision would depend on the preferred design concept for 3rd Street (see section Figure 36. for further details). In any case, this change would require the modification of the Bicycle Master Plan.

## 4.3 STREET DESIGN AND TRAFFIC CONTROL

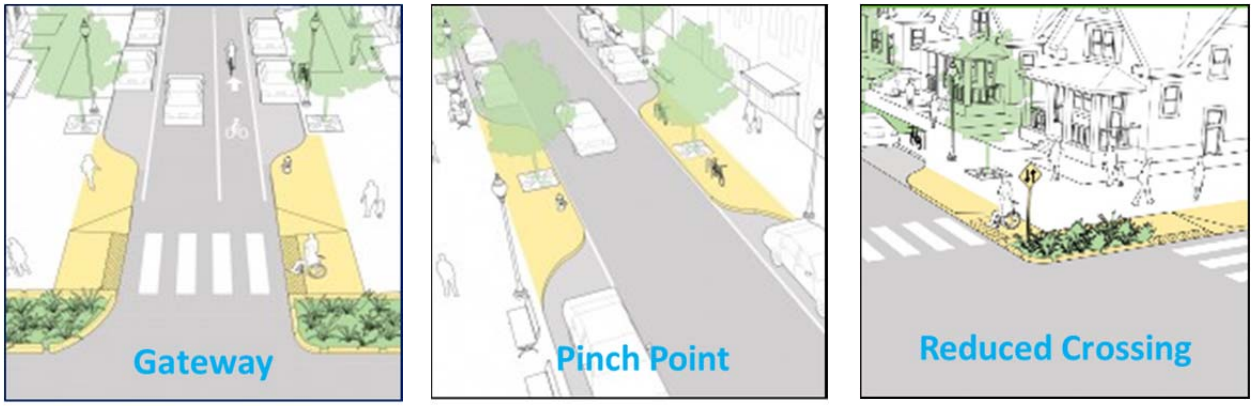
Traffic short-cutting through the neighbourhood and excessively high speeds will be discouraged through street design. The aim is to set the design speed and limit at 30km/h for local neighbourhood access streets, and 40km/h for collectors.

Street design has a major influence in traffic flow and speed. As described in the preceding section, local streets will be consistently narrow without impeding proper vehicle movements. Apart from allowing parking on one or both sides of a street, the concept design for the local road network should include features to provide an attractive walking experience such as:

- Sidewalks of minimum width of 2m on both sides of every street
- Minimum 1.5m boulevard space on each side of every street

This design should be complemented by curb extensions (i.e. "bulges") whenever possible to reduce crossing widths at corners. Curb extensions can also contribute to the control of vehicle speeds. The following figure illustrates potential design concepts for corner or mid-block extensions that may also include storm water management features such as rain gardens.

**Figure 31.** Potential Corner Treatments to Prioritize Safe Pedestrian Mobility in the Moodyville Area




*Source: National Association of City Transportation Officials (NACTO) – Urban Streets Design Guidelines*

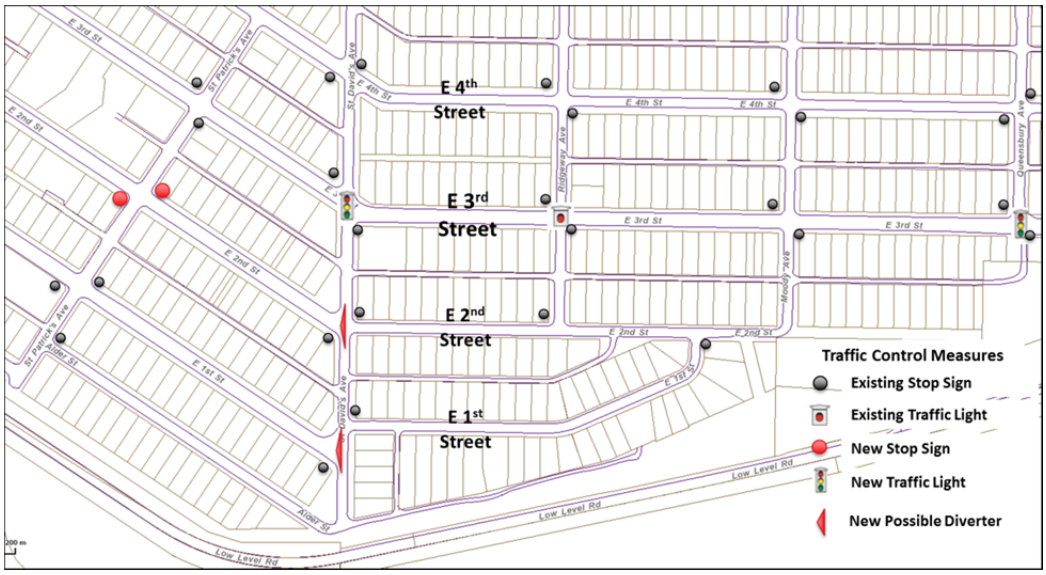
Street redesign will require extensive work as site redevelopment occurs gradually. As shown in previous sections, certain streets are already narrow enough to fit the target standard for the neighbourhood (8.2m to 9m road width) but lack either sidewalk, boulevard space or both.

Additionally, the current alignment of 1st Street is offset between the sections east and west of St. David's Avenue. Some work will be required to improve this alignment and make the intersection smaller and facilitate the pedestrian crossings for proper access to the greenway. Currently temporary curbs are installed at this location to reduce turning movement radius and speed between St. David's and 1st Street.

With respect to the control of traffic flow, all streets can remain bi-directional to maximize access to the properties. However, to ensure short cutting does not occur, additional measures are required. To emphasize the local character of 2nd Street, it would be desirable to switch the priority from east-west to north-south at the intersection with St. Patrick's Avenue; this would be similar to the signage that already exists between 1st Street and St. Patrick's. Additionally, introducing diverters, specifically on St. David's Avenue at 1st and 2nd streets would allow full local access while restricting vehicle movements from one side of the neighbourhood to the other to avoid short cutting.

As overall neighbourhood traffic increases additional measures can be introduced. Traffic circles for example, have substantial benefit in reducing speed and conflict points. However, they tend to have only a minor impact on volume reduction. The next figure shows where the traffic control measures would ideally be implemented.

**Figure 32.** Proposed Traffic Control and Potential Diverters



# 5 EAST 3RD STREET OPERATIONS

The new development in the area will generate additional trips from Moodyville that will affect 3rd Street operations. Auto trips will use different access points, head in different directions in and out of Moodyville, and access and leave the area at different times. The effect of the traffic growth is spread over the area and over time. However, the PM peak hour should remain the period of maximum demand. The traffic growth is also affected by the potential mode shift away from the private vehicle, as discussed previously in section 3.3.

With area-specific and external or background volumes in place, the intersections along East 3rd Street were re-evaluated under future conditions. The trip forecast analysis established two growth scenarios:

- *No Development (or Do-nothing)*: to establish a proper base of reference for changes to the operations in the future.
- *Full Buildout (at 70% of total Moodyville Area capacity as the worst case scenario for redevelopment)*: to estimate the critical levels of traffic congestion in the area.

These growth scenarios were combined with different alternatives for traffic operations on 3rd Street to evaluate the changes in performance at each intersection. These combinations results in different *traffic operations scenarios* as follows:

**a. No development growth under the same current operation**

This situation constitutes the base line for traffic analysis and represents the most likely scenario *if the Moodyville redevelopment did not go ahead*. The relative difference between this and any other alternative represents the actual improvement, or deterioration, of traffic operations in the future.

Maintaining the current operation implies no new traffic signals and, most importantly, the limitation of travel capacity to one lane per direction, except for turning lanes at intersections where required.

In this case, the results show that *3rd Street has enough remaining capacity to be able to operate properly under future no-development conditions*. As expected, however, the access to 3rd Street from the minor north-south streets deteriorates further and can cause considerable delays for specific turning movements. Once this happens, traffic signals will need to be considered at one or more locations to provide safe access to East 3rd Street.

**b. Full buildout growth under the same current operation**

This scenario is needed to assess the consequences of allowing the area growth to occur without taking any action to manage the additional demand on 3rd Street. This situation represents the worst case scenario for traffic on 3rd Street.

With no improvements, congestion and delays will deteriorate not only for the minor streets but also in the east-west direction on 3rd Street. The worst performing intersections would be Lonsdale and St. George's avenues. Considerable delays would occur on the minor street for movements trying to access the corridor.

The analysis shows that it is possible to function without changes to the current operation as congestion is not severe along most of the corridor. However, the current signalization is inadequate to accommodate a prioritized rapid transit operation on 3rd Street.

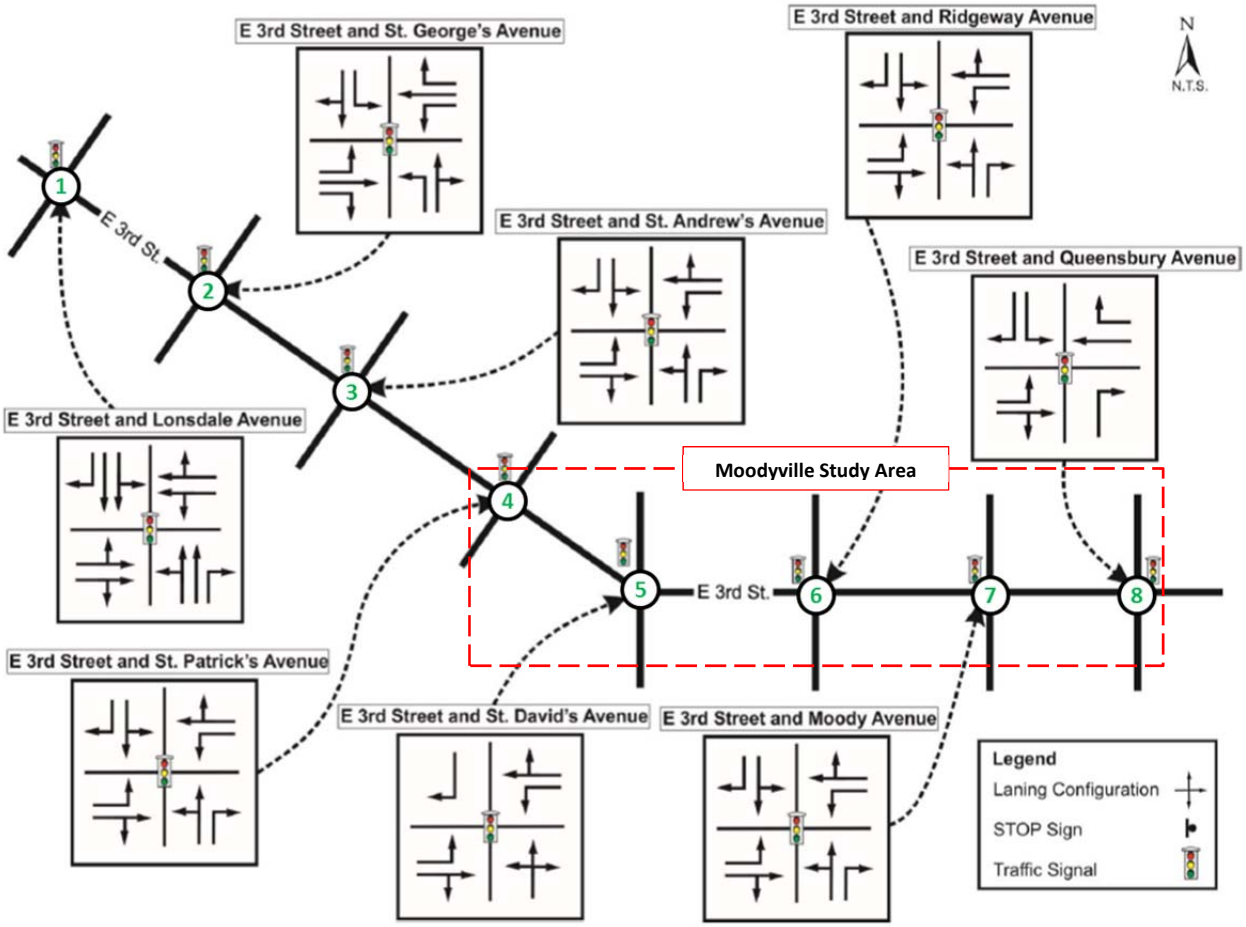
**c. Full buildout growth under optimized operation and current capacity**

This next scenario demonstrates how introducing coordinated traffic signals at every intersection can improve operations. This is a needed to manage turning movements and, most importantly, required to accommodate

reserved (exclusive) transit lanes through the middle of the corridor in the long term. Section Figure 36. of this document explains the options for the future design of the 3rd Street right-of-way.

Section 2.4 previously described the current signalization on 3rd Street; the figure below shows the modifications required in this case for an optimized fully signalized operation. To study the full buildout scenario, all intersections are signalized to determine where or if they are needed. As mentioned previously, a full signalization will be required if an exclusive right-of-way transit system is implemented through the middle of the corridor; full signalization would need to be re-evaluated in the case of other transit alignment options.

**Figure 33.** Optimized Operations on East 3rd Street with Traffic Signals at All Intersections




This future condition is based on a single through traffic lane per direction, with dedicated bus lanes and left turn bays. The signals are coordinated for optimal efficiency.

The analysis shows that intersection would operate at acceptable levels of delay and capacity utilization. A clear improvement would be noticeable for minor street turning movements without severely impacting the main east-west traffic progression. Northbound and southbound capacity utilization at Lonsdale and St. George's avenues will remain high but can improve considerably over the do-nothing alternative. In addition frequent parking and bus movements may create queues. Further analysis would be needed to determine the phased implementation of the signal improvements.

The need for signalization of the various intersections would be driven by the location and intensity of development. In general, however, a signal at St David's Avenue should be considered for early implementation as it is the main access to the area and must also accommodate the greenway connection.

Ridgeway, Moody and Queensbury avenues should also be expected to experience high traffic volumes. The implementation of signals should balance these traffic volumes properly.

Left turn movements from 3rd Street should be limited to protected phases only in the case of a transit corridor along the median or centre lanes. If median transit services are not provided, then left turn phases could be protected-permitted or permitted only, depending on the volume. This change would generally result in less delay as turning capacity can be increased or green time allocated to other movements.

**d. Full buildout growth under optimized operation and additional capacity**

The last scenario is useful to test if increasing lane capacity (to two lanes per direction) along the entire corridor would offer a significant operational advantage. This exercise is meant to inform a hypothetical situation but it is not a desired situation and contradicts OCP objectives. It is possible, however, to plan for a peak hour operation, for instance, under such conditions by managing parking restrictions. In any case, since operations on 3rd Street depend on traffic conditions further east on Main Street and the Iron Workers Memorial Bridge, additional general purpose vehicle travel lanes would likely end up serving as storage lanes rather than as effective additional capacity.

The results show that while capacity utilization would be lower, the performance of the intersections would only improve marginally compared to a similar operation with current capacity (see scenario c above).

Moreover, a local area analysis has limitations as the increased attraction of an expanded arterial to outside traffic cannot be reflected directly. Additional lanes may alter the balance between 3rd Street and other east-west arterials. The increase in capacity may also discourage other sustainable modes in the neighbourhood and negatively impact transit priority.

The next two tables provide the summary of the complete analysis for all four traffic scenarios. Appendix B contains the same analysis under Synchro and Highway Capacity Manual Level of Service methodology. Section 7 presents a summary of the conclusions and considerations on traffic operations and other measures.

**Figure 34.** East 3rd Street Intersection Performance. Forecasted Traffic with Current Operations. PM Peak

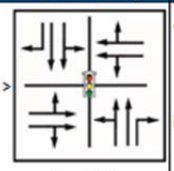
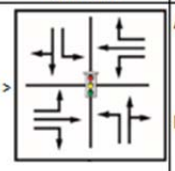
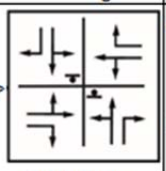
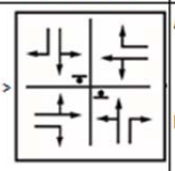
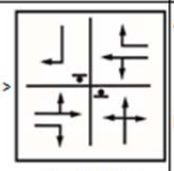
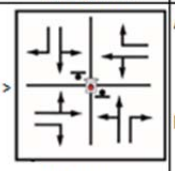
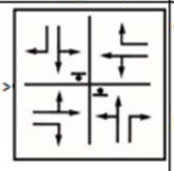
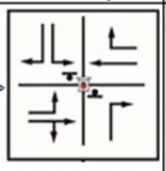
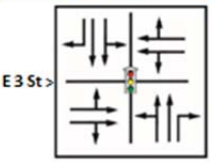
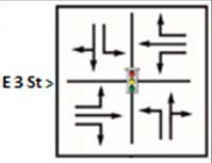
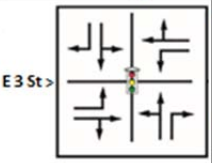
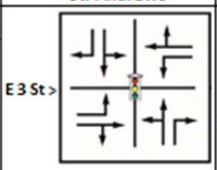
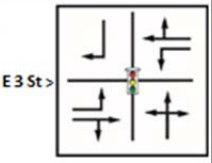
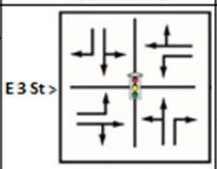
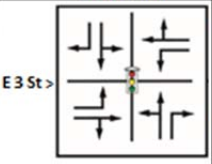
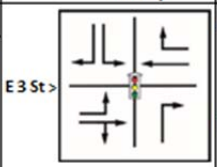
| Scenario > | Current Operation: Limited Numer of Traffic Signals. 1 lane/direction | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Intersection Layout | Parameters | 2045 with No Moodyville Development | | | | 2045 with Moodyville at Full Buildout | | | |
| | Current/Do-nothing | | EB | WB | NB | SB | EB | WB | NB | SB |
| 1 Lonsdale 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 89% | | | | 90% | | | |
| | | Degree of Congestion | Low | | | | Moderate | | | |
| 2 St. Georges 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 85% | | | | 89% | | | |
| | | Degree of Congestion | Moderate | | | | Moderate | | | |
| 3 St. Andrews 3rd Street |   | Approaches Degree of Congestion | Low | | High | | Low | | High | |
| | | Intersection Capacity Utilization | 78% | | | | 81% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 4 St. Patrick's 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 74% | | | | 70% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 5 St. David's 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate | | Low | | Moderate | |
| | | Intersection Capacity Utilization | 56% | | | | 53% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 6 Ridgeway 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 67% | | | | 65% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 7 Moody 3rd Street |   | Approaches Degree of Congestion | Low | | High | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 62% | | | | 62% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 8 Queensbury 3rd Street |   | Approaches Degree of Congestion | Low | | High | | Low | | High | |
| | | Intersection Capacity Utilization | 53% | | | | 53% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |

**Figure 35.** East 3rd Street Intersection Performance. Forecasted Traffic with Optimized Operations. PM Peak

| Scenarios > | Future Operation with Optimized Signals at All Intersections with Moodyville at Full Buildout | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Intersection Layout | Parameters | 2045 with Moodyville Full Buildout. 1 lane/direction | | | | 2045 with Moodyville Full Buildout. 2 lanes/direction | | | |
| | Optimized | | EB | WB | NB | SB | EB | WB | NB | SB |
| 1 Lonsdale 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate | | Low | | Moderate | |
| | | Intersection Capacity Utilization | 78% | | | | 70% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 2 St. Georges 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Moderate-High | |
| | | Intersection Capacity Utilization | 91% | | | | 73% | | | |
| | | Degree of Congestion | Moderate | | | | Low | | | |
| 3 St. Andrews 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Moderate | |
| | | Intersection Capacity Utilization | 66% | | | | 41% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 4 St. Patrick's 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate | | Low | | Low | |
| | | Intersection Capacity Utilization | 68% | | | | 37% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 5 St. David's 3rd Street |   | Approaches Degree of Congestion | Low | | Low | | Low | | Low | |
| | | Intersection Capacity Utilization | 63% | | | | 35% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 6 Ridgeway 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Low | |
| | | Intersection Capacity Utilization | 62% | | | | 36% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 7 Moody 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Low | |
| | | Intersection Capacity Utilization | 65% | | | | 36% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |
| 8 Queensbury 3rd Street |   | Approaches Degree of Congestion | Low | | Moderate-High | | Low | | Low | |
| | | Intersection Capacity Utilization | 54% | | | | 36% | | | |
| | | Degree of Congestion | Low | | | | Low | | | |

# 6 STREET CROSS SECTION CONCEPT DESIGN

This section presents various concept designs for cross sections for all streets in the area. As the main arterial and transit route, the 3rd Street designs must respond to very different considerations and are thus presented separately. These cross sections represent *only possible street concepts* that would help achieve the vision for the future character of this neighbourhood.

## 6.1 LOCAL STREETS

For local neighbourhood streets there are two alternative designs. Both concepts include wide sidewalks (2m on each side of the street), boulevard space to separate pedestrians from traffic or parked cars (minimum 1.5m), speed limit of 30km/h, and a narrow road width. The difference between the two concepts is whether or not parking will be allowed on both sides of the street as follows:

**Concept 1:** This option allows *parking on both sides of the street* and reduces the road width to the maximum of 9m which is a standard for local streets. This design permits a total of 4.8m for travel width in both directions but does not accommodate free circulation side by side. Therefore, this width would require the accommodation of mid-block sections to provide passing opportunities. Furthermore, this narrow travel lane space would not require separate cycling facilities since the design provides for traffic calming and slow vehicle movement.

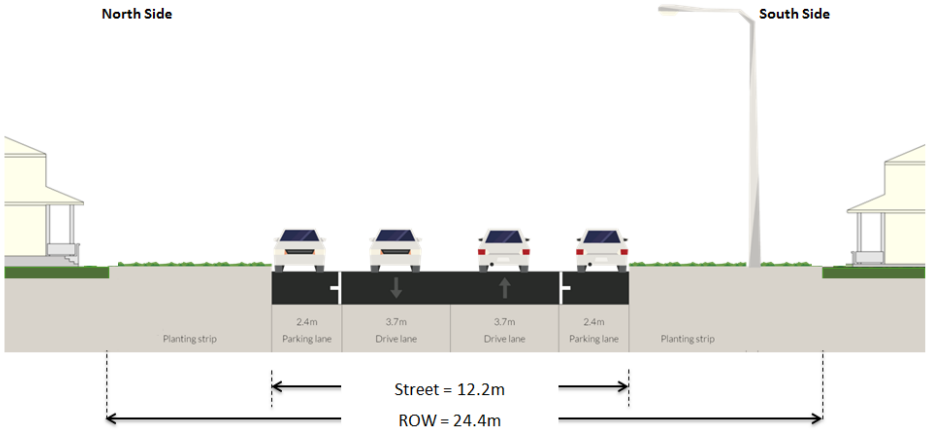
**Concept 2:** This design allows *parking on one side of the street* and reduces the road width to the minimum established by the City's Bylaw of 8.2m. This width permits up to 3m travel lanes in each direction and can support local cycling if required in the future.

Since streets in the Moodyville area have different right-of-way and road widths, and the different blocks will have different densities, the concepts described here are general and valid for all streets. Both concepts can be considered block by block as the area redevelops. Nonetheless, the need for a well-balanced and evenly distributed parking supply in the context of much *higher development densities indicates that parking on both sides will most likely be the preferred solution in most cases*.

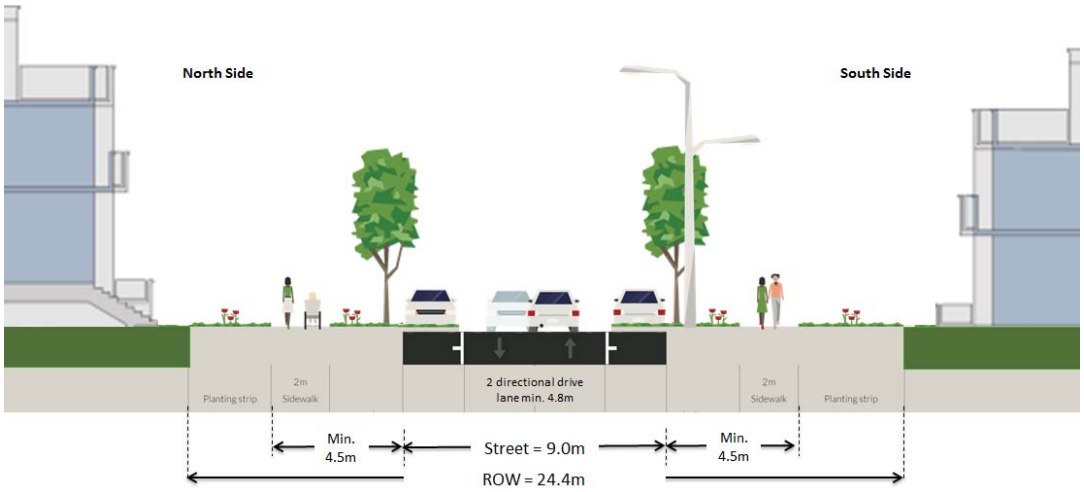
The greenway connection along St. David's Avenue requires a specific set of modified cross sections that provide wider pedestrian paths and protected bikeways. This modified design will ensure a safe and attractive connection between other cycling facilities and the Spirit Trail. Concepts 3 and 4 have thus been developed specifically for St. David's Avenue. A full evaluation of the optimal functional design for the greenway will be carried out in the future. In this case, however, parking limited to only one side would probably be preferred to maximize the space for walking and cycling and to reduce crossing widths.

The following figures illustrate the possible cross sections for local streets and the greenway. In the case of local streets, these illustrations are only a sample for the 400 block of 2nd Street. Section 7 contains a summary of the main conclusions and considerations for cross sections and other measures for local streets.

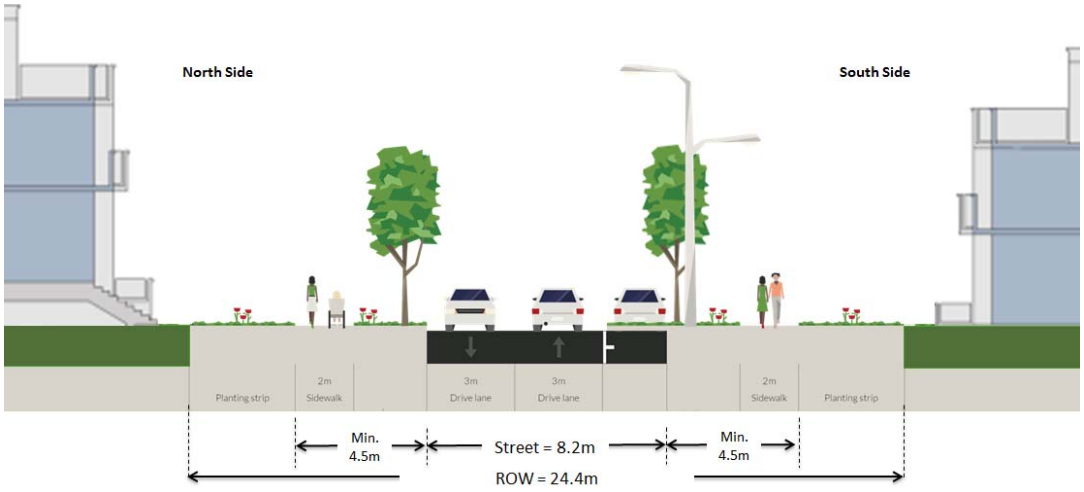
**Figure 36.** Potential Concept Designs for Local Neighbourhood Streets – General Examples




**Typical EXISTING** cross section: with wide travel lanes and parking on both sides of the street

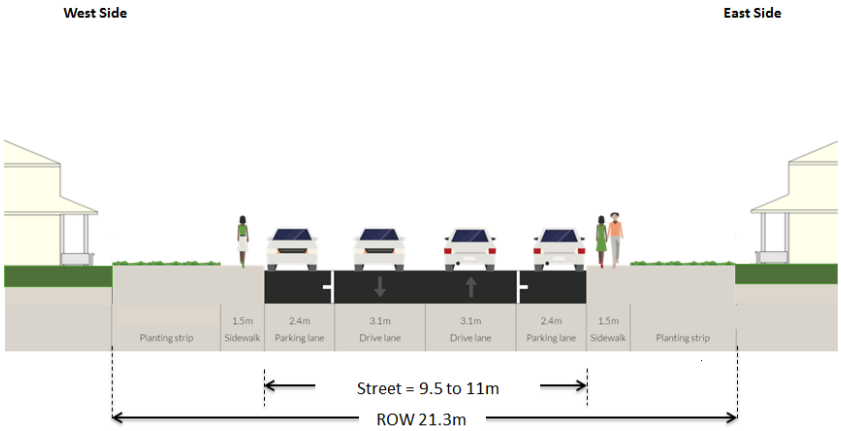



**CONCEPT 1**: parking on 2 sides, 9.0m road width, requires passing gaps for side-by-side circulation

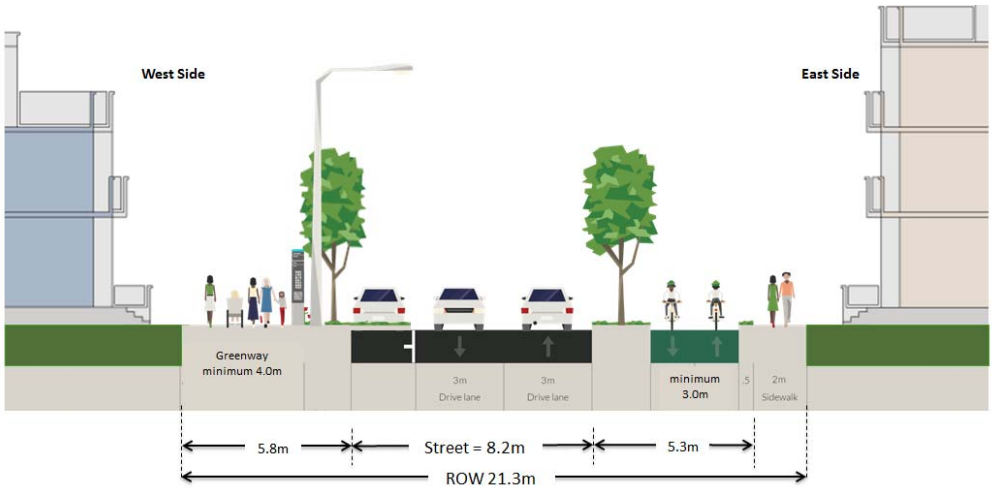



**CONCEPT 2**: parking on 1 side, 8.2m road width, possible to shared lanes with bikes

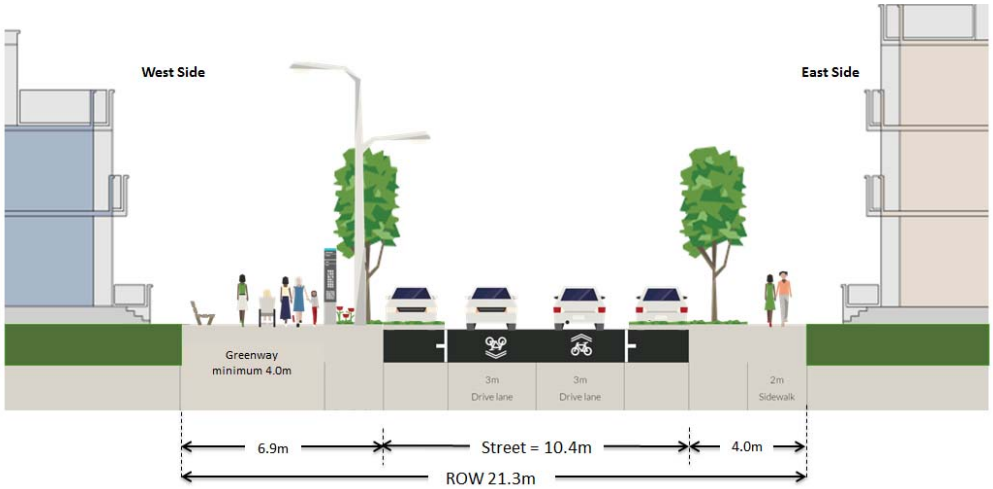
**Figure 37.** Potential Concept Designs for Greenway Corridor




**Typical EXISTING** cross section: with wide travel lanes and parking on both sides of the street




**CONCEPT 3**: parking on 1 side, 8.2m road width, with protected bi-directional bike track




**CONCEPT 4**: parking on 2 sides, 10.4m road width, shared lanes with bikes

## 6.2 3RD STREET TRANSIT CORRIDOR

The vision for 3rd Street/Marine Drive as a long-term east-west rapid transit corridor, stretching from Maplewood to Dundarave, is a prominent part of the North Shore Area Transit Plan completed in 2012. The concept designs for 3rd Street must, therefore, maintain the full potential to prioritize sustainable transportation over auto use in the future. The section of 3rd Street within Moodyville is a small but essential part of this corridor's larger context.

### 6.2.1 Right-of-Way Requirements

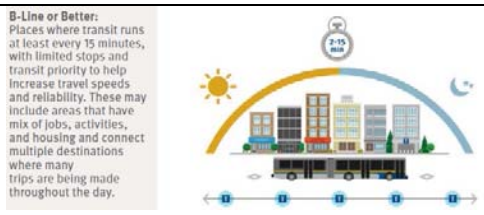
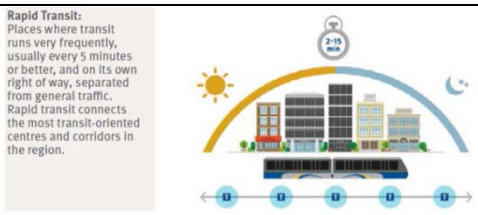
This study has determined that this corridor needs a 30.5m (100-foot) right-of-way to ensure that rapid transit, together with other modes of transportation, can be supported and prioritized in the long term. This width requirement has been determined respecting the following design principles and considerations:

1. **Prioritize transit**: to be truly effective, the corridor must accommodate some form of priority transit service in the future wherever possible. This may require making exclusive transit lanes part of the long-term design options, not necessarily the optimal solution.
2. **Maintain the role of 3rd Street as an important east-west arterial connection**: East 3rd Street will remain a key east-west arterial connection. The analysis shows that additional travel lanes are not required to support future traffic volume. Therefore, the proposed cross sections maintain the current number of travel lanes for traffic but allow the optimization of corridor operations through intersection improvements (lane configuration, additional turning lanes, and signalization).
3. **Maximize the pedestrian realm**: this is a priority for this project also reflected in the width of the proposed concepts. All options include a minimum sidewalk width of 2m in addition to a 1.5m minimum boulevard or tree buffer from the road.

The vision for 3rd Street, and consequently for its right-of-way requirements, also respects the goals of the 2014 OCP. The plan for 3rd Street is to maintain its role as an arterial road, considering the limited number of other east-west connections, while supporting a rapid transit system and favouring sustainable modes of transportation. Furthermore, the entire corridor may be the subject of a joint study by the City, the West and North Vancouver Districts, the Squamish Nation, Metro Vancouver and TransLink. This multijurisdictional effort demonstrates the interest of all stakeholders in pursuing the plan of rapid transit across the North Shore despite the different existing cross sections along such a long corridor.

The regional transportation plans identify East 3rd Street as a "B-Line or Better" corridor in the short term and a Rapid Transit corridor in the long term. In practice, this means that at a minimum it would need to support a B-Line but may potentially need to accommodate a higher-level system such as light rail. The regional definition of Rapid Transit states clearly that such systems should have their own right –of-way and be separated from traffic. The designation of Moodyville as part of a Frequent Transit Development Area implies this option should remain open. The following figure illustrates the concepts defined as "B-Line or Better" and "Rapid Transit"

**Figure 38.** Key Definitions within the Frequent Transit Network (TransLink 2014)

| B-Line or Better – Mayors' 10-Year Plan | Rapid Transit – North Shore Area Transit Plan 2040 |
|---|---|
|  *Key concept: "…limited stops with transit priority"* |  *Key concept: "…own ROW, separated from traffic"* |

### 6.2.2 Conceptual Cross Section Designs

As part of the Moodyville analysis, this transportation study has generated several conceptual designs for the future cross sections of 3rd Street. The reason for developing different alternatives is to maintain a flexible design, which recognizes that different profiles, cross sections and land uses must be accommodated along the entire corridor beyond the Moodyville Area.

At this time, *these cross sections are meant only to inform the interface between the future road and the proposed developments*. The first priority of these concepts is to ensure wide sidewalks and street trees are provided to accommodate a pedestrian corridor and, at the same time, to inform the redevelopment requirements.

With respect to cycling facilities, although 3rd Street is not a designated bike route, it would be a positive addition to the network to support sustainable transportation choices. Concepts that include cycling facilities support a multi-modal, sustainable corridor that would further the City's goals of reducing a car use. As part of the future transportation planning work, this option would be considered together with other cycling facilities in the area such as the 4th Street, which can remain a local, shared lanes bike route.

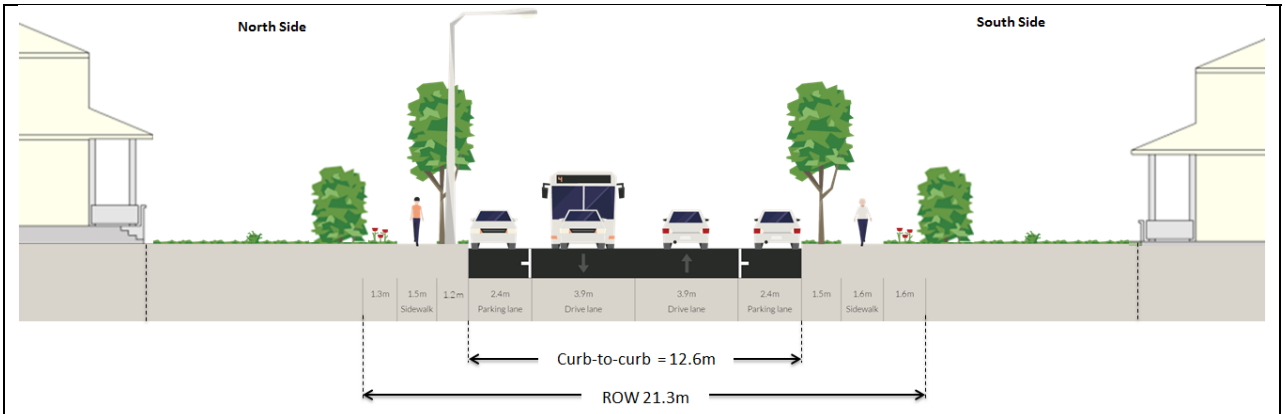
A *Complete Streets* design concept, such as the one sought for 3rd Street, is based on a balanced use of the public right-of-way to support transit and Frequent Transit Development Areas such as Moodyville. With these considerations providing the framework for design, the following options have been developed:

**Table 12.** Concept Designs for East 3rd Street Cross Sections

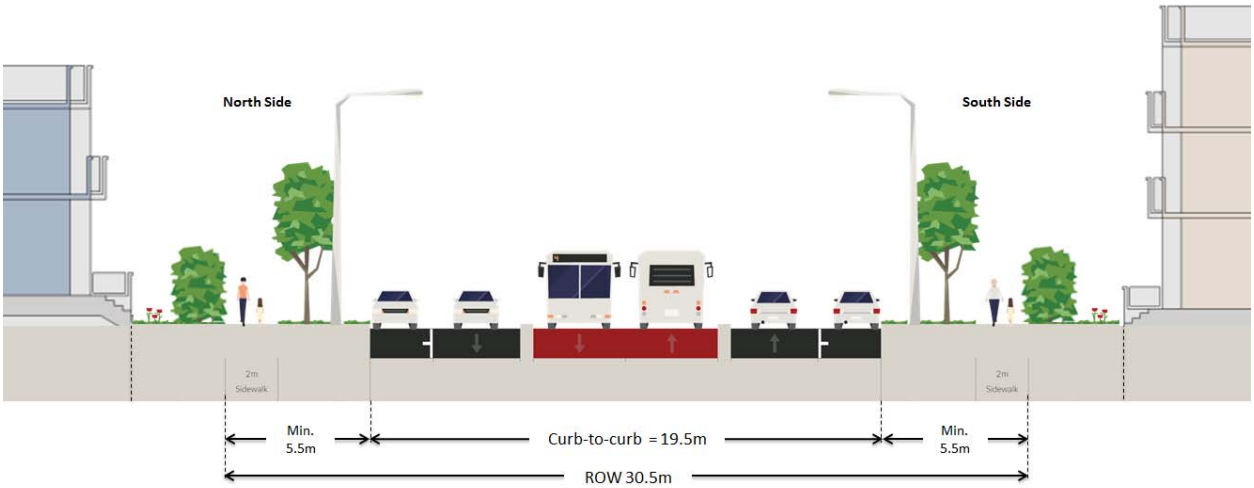
| Concept | Transit | Parking | Cycling | Walking/Boulevard | Remarks/Considerations |
|---|---|---|---|---|---|
| **A** | Exclusive, centerline busway | On both sides | None | Min. 2m sidewalk on each side; total 4.6m of combined sidewalk and boulevard/green space | Parking allowed next to a single travel lane constrained by busway can cause queuing and increase risk when opening parked car doors. Requires traffic signal at every intersection |
| **B** | Exclusive or shared curb side lanes | On both sides | None | Min. 2m sidewalk on each side; total 5.6m of combined sidewalk and boulevard/green space | Parking allowed next to an exclusive or shared bus lane increases risk during parking manoeuvers and can delay buses increasing transit times. May require traffic signal at intersections |
| **C** | Exclusive, centerline busway | None | Buffered bike lanes both sides | Min. 2m sidewalk on each side; total 4.5m of combined sidewalk and boulevard/green space | Bike lanes next to a single travel lane constrained by busway can operate smoothly but allows faster vehicle speeds. Requires traffic signal at every intersection |
| **D** | Exclusive or shared curb side lanes | None | Buffered bike lanes both sides | Min. 2m sidewalk on each side; total 5.2m of combined sidewalk and boulevard/green space | Bike lanes next to an exclusive or shared bus lane may be constrained at intersections due to bus stop width requirements. May require traffic signal at intersections |

The figures on the next two pages show the concepts developed for 3rd Street. Given the possibilities outlined above, for the specific context of Moodyville, the preferred option is to provide bicycle lanes (concepts C or D depending on the final cross section selected) between Queensbury and St. Andrew's avenues. This would provide an attractive and direct connection to the north-south bike routes on these two streets. Additionally, this option has the advantage of connecting efficiently with the greenway corridor on St. David's Avenue and, therefore, also quickly and safely to the Spirit Trail and the 4th Street bike route on the south and north sides of the Moodyville area respectively. Any change in designation requires the modification of the Bicycle Master Plan.

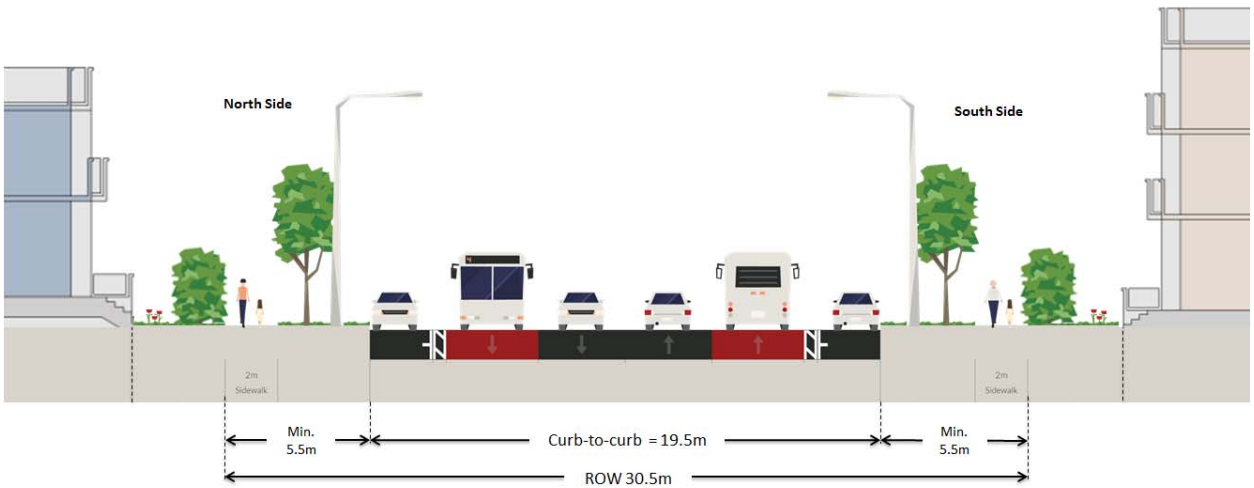
**Figure 39.** Concept Designs for East 3rd Street Corridor with Parking




**Typical EXISTING** cross section: with wide travel lanes and parking on both sides, narrow sidewalks

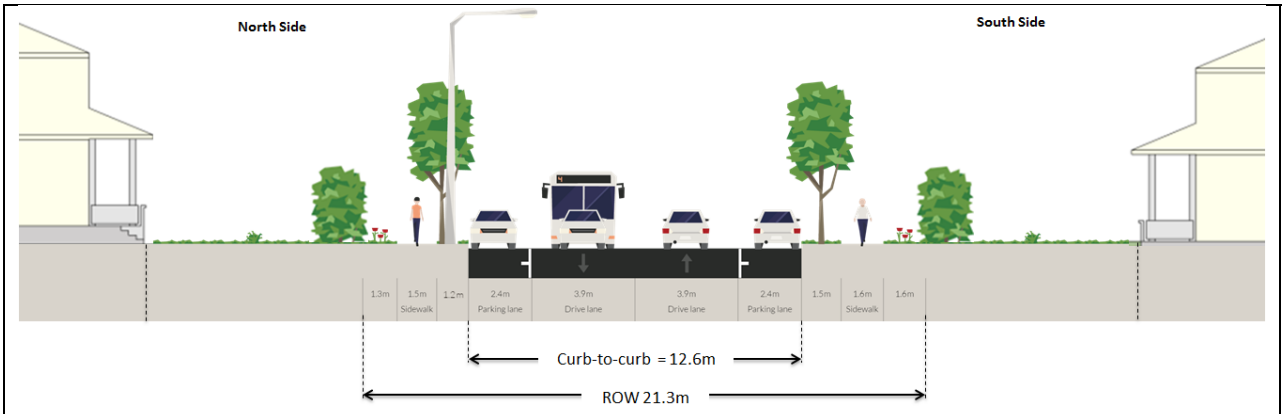



**CONCEPT A**: parking on 2 sides, 30.5m ROW, with median busway, wide sidewalks and boulevards

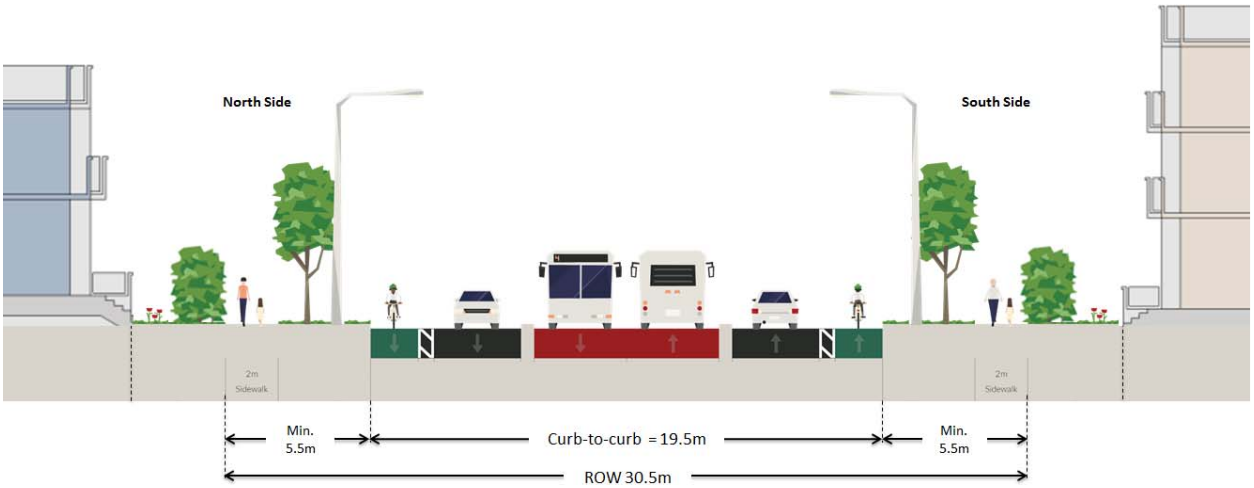



**CONCEPT B**: parking on 2 sides, 30.5m ROW, reserved bus lanes, wide sidewalks and boulevards

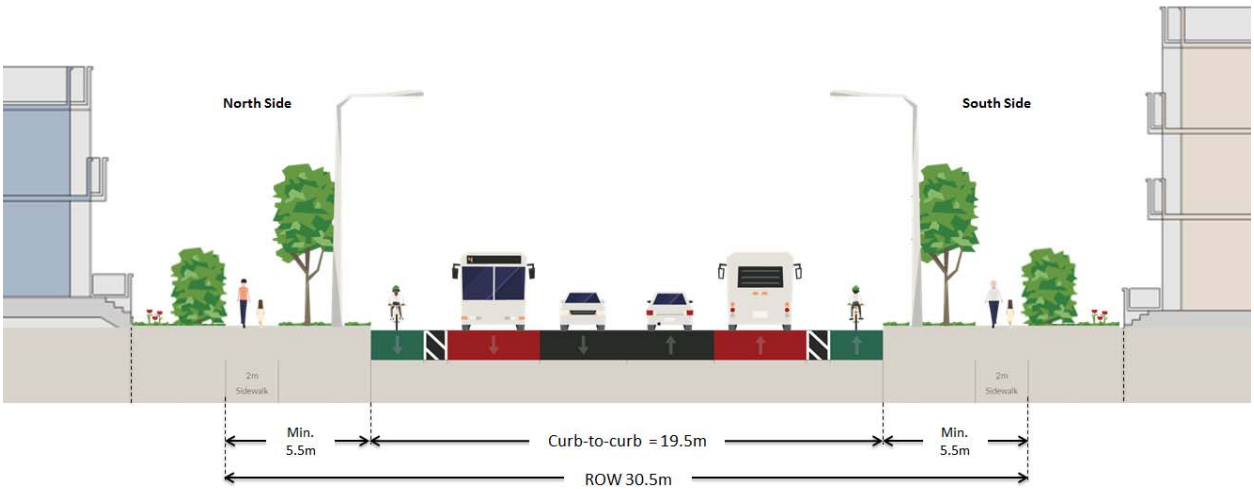
**Figure 40.** Concept Designs for East 3rd Street Corridor with Bike Lanes




**Typical EXISTING** cross section: with wide travel lanes and parking on both sides, narrow sidewalks




**CONCEPT C**: buffered bike lanes 2 sides, 30.5m ROW, median busway, wide sidewalks and boulevards




**CONCEPT D**: buffered bike lanes 2 sides, 30.5m ROW, reserved bus lanes, wide sidewalks and boulevards

# 7 CONCLUSIONS

This section summarizes the main conclusions and considerations on transportation measures for the Moodyville Area. The summary table at the end of this chapter contains a reference to the corresponding section(s) that explain each item in more detail.

## 7.1 NEIGHBOURHOOD TRANSPORTATION MEASURES

### 7.1.1 On-Site Parking

Using the "Metro Vancouver Apartment Parking Study" (Metro Vancouver, 2012) as reference to validate the current parking allowance, strata developments in proximity to the Frequent Transit Network can be expected to require between 1.1 and 1.2 parking spaces per unit as shown by the study's surveys and counts.

As part of the DPA guidelines, it would be reasonable to consider:

- Establishing an allowance of 1.2 stalls per unit for multi-family development
- Allowing additional parking provided by development to a maximum of 1.5 spaces per unit as per market demand
- Maintaining the reduction of parking capacity allowed depending on the ratio of market to rental housing, and provision of bicycle parking

### 7.1.2 On-Street Parking

There are two possible designs with different capacities for on-street parking. Both options can be considered for each street depending on the block density and timeline for redevelopment. However, increased development density will likely require parking on both sides for most streets. Areas expected to develop more slowly (e.g. 400 blocks) will need to maintain the current parking capacity for the foreseeable future.

The first concept includes parking on both sides with a narrow travel portion where cars cannot fully travel side by side. In this case, passing gaps (short sections where no parking is allowed) are needed for cars to pass each other. The second concept, with parking only on one side, has a wider travel portion so cars can pass each other comfortably. Section 7.3.1 ahead explains these two concepts in more detail. Preferred street design and parking configurations will be considered on a block-by-block basis as the area redevelops.

Most streets in the neighbourhood will likely have parking on both sides. However, provision of parking on one side of the street should be considered for:

- St. David's Avenue to accommodate the greenway corridor
- 500 and 600 block of 1st Street east of St. David's to maintain appropriate width for sidewalks and boulevards
- Alder Street between St. Patrick's and St. David's avenues depending on the final use of the City lands on the south side which could be dedicated to park or other uses

### 7.1.3 Accessibility and Connectivity

The grid structure of the local network facilitates access but must be modified in certain locations to improve connectivity. All streets should remain classified as *local* and maintain a narrow cross section. Access to transit facilities is a priority and must be taken into account for final street configuration.

As the area redevelops, the following principles should be considered for adequate accessibility:

- Prioritize pedestrian connections north-south to transit stops and east-west to Lower Lonsdale
- Facilitate pedestrian crossings through corner curb extensions ("bulges") as development occurs
- Facilitate internal pedestrian movements by providing mid-block connections between:
  - 2nd Street and Alder Street/Spirit Trail (middle of 400 blocks)
  - 2nd Street and 1st Street/Spirit Trail by extending the Ridgeway Avenue corridor

### 7.1.4 Street Design and Traffic Control

Traffic will be controlled through street design to avoid introducing additional traffic calming measures in the future. All streets can remain bi-directional to maximize access to the properties. However, short-cutting can occur if priority is given to the east-west direction in particular on 1st and 2nd streets. As redevelopment occurs, all streets will require extensive work on curbs and sidewalks.

The following considerations would improve street design:

- Set the speed limit at 30km/h for local neighbourhood streets
- Provide minimum 2m wide sidewalks on both sides for all streets
- Provide minimum 1.5m wide boulevards on both sides for all streets
- Implement curb extensions (i.e. "bulges") to reduce crossing widths at corners
- Introduce traffic diverters at intersections of 1st, 2nd streets and St. David's Avenue to eliminate shortcutting
- Re-align 1st Street on the east and west sides St. David's Avenue
- Introduce a stop sign in east-west direction at 2nd Street and St. Patrick's to lower priority in this direction

## 7.2 EAST 3RD STREET CORRIDOR OPERATIONS

### 7.2.1 Capacity Utilization

The analysis of various growth scenarios show that 3rd Street has enough remaining capacity to operate properly under future conditions. The operation can be optimized with traffic signals and lane configuration but more analysis will be required to implement changes. A more complex operation with full traffic signals at all intersections is required if transit lanes are implemented through the center line of the corridor (i.e. a busway).

More travel lanes are not required to support traffic needs. Operations of this corridor are influenced by Main Street and the Iron Workers Memorial Bridge operations. Therefore, providing additional lanes may have a counterproductive effect as they could turn into storage lanes. As such, is not recommended to widen the road to accommodate additional general purpose vehicle travel lanes.

In terms of optimizing capacity, consideration should be given to:

- Keeping one general purpose vehicle lane and one bus lane per direction through the Moodyville area
- Providing left turn bays east and westbound at all intersections between Queensbury and St. Andrew's avenues
- Maintaining the current lane configuration at St. Georges and Lonsdale avenues and if possible and, depending on final cross section design, providing right turn lanes elsewhere as needed.

### 7.2.2 Signalization

Two scenarios were tested under full buildout conditions: one, the current limited signalization, and two, a full signal implementation at all intersections (between Queensbury and Lonsdale avenues). Full signalization of all intersections is required *only in case of an exclusive right-of-way rapid transit system in the middle in the road*. Otherwise, the installation of full signals will depend on the magnitude and timing of development and further analysis. Within the Moodyville area, priority for signalization should be given to the intersections at St. David's and Queensbury.

Based on the study results, the following measures should be considered:

- Installation of a full signal at St. David's and 3rd Street intersection coinciding with the construction of the greenway connection and/or the redevelopment the bus depot site
- Conversion of the pedestrian signal at Queensbury Avenue to a full signal operation (this depends on development of the 700 block of 3rd Street and south side of 4th Street)
- Planning for the possibility of another full signal at either Moody or Ridgeway depending on the pace of development and, in particular, on the redevelopment of the transit depot site (a more detailed traffic analysis will be required since the specific plans for this site are undetermined at this time)
- *Only in case of rapid transit through the middle of the corridor*, implementation of full traffic signals and optimization of turning lane configurations at all intersections between Queensbury and St. Georges to accommodate rapid transit (this is not needed if rapid transit uses curbside lanes)

## 7.3 STREET CROSS SECTION CONCEPT DESIGNS

### 7.3.1 Local Streets

As discussed previously in point 7.1.2, two concept designs were developed for local streets. Both options maximize pedestrian and boulevard space but vary parking capacity. Both concepts can be considered block by block as the area redevelops but a well-balanced and evenly distributed parking supply is needed for the higher redevelopment densities. Given the future area conditions, parking on both sides of the streets will most likely be the preferred solution in most cases. In all cases, a narrow street design (9m maximum) will improve the chances of reducing short-cutting and managing travel speeds.

Cross sections with parking on one side of the street would be applicable for greenway connections or on narrower streets such as 500 and 600 blocks of 1st Street to increase pedestrian realm. For the greenway corridor on St David's Avenue specifically, an example of concept design illustrates the provision of 4m wide multi-use path on the west side of the street and bi-directional off-road protected bike lane parallel to a pedestrian path on opposite side. This design is recommended for consideration as part of the greenway project to favour walking and to reduce crossing widths.

Section 6.1 of this report provides more details on local street design concepts.

### 7.3.2 3rd Street Transit Corridor

For East 3rd Street, the principles applicable to cross section design are mainly to:

- Prioritize transit
- Maintain the street's role as an east-west arterial connection
- Maximize the pedestrian realm including boulevard space

The cross section design must be flexible to adapt to the different street profiles of the local and extended part of the 3rd Street/Marine Drive corridor. Exclusive transit lanes, either a centre line guideway or curb-side lanes may not be the ultimate solution; however, planning for transit priority implies making exclusive transit lanes part of the long-term design options.

Several design concepts were developed for East 3rd Street; these options will be further refined as part of the corridor design process. Other sections of the corridor, with higher densities and closer to commercial areas such as Lonsdale, will require more analysis to establish the appropriate conceptual designs.

The various concepts include exclusive bus lanes, with or without parking or bike lanes as follows (refer to section 6.2 for more details):

- Concept A: Exclusive, centerline busway with parking on both sides and no bike lanes
- Concept B: Exclusive or shared curb-side transit lanes with parking on both sides and no bike lanes
- Concept C: Exclusive, centerline busway without parking and with buffered bike lanes on both sides
- Concept D: Exclusive or shared curb side lanes without parking and with buffered bike lanes on both sides

While concepts A and C would require traffic signals at every intersection to control turning movements, concepts B and D may require additional traffic signals but it is unlikely they would need them at every intersection.

The analysis shows that additional travel lanes are not required to support future traffic volumes. However, 3rd Street will remain a key east-west arterial transit connection and requires additional width to accommodate future rapid transit. Furthermore, providing pedestrian space is a priority for 3rd Street to serve as the main link between the Moodyville Area and Lower Lonsdale. Consequently, all cross section options include a minimum sidewalk width of 2m and a minimum of 1.5m boulevard space.

Bicycle lanes can be accommodated within a 30.5m right-of-way in some sections of the corridor. The objective should be to provide the most effective connection between 3rd Street and other existing bike routes and greenways. The different concepts developed combine exclusive transit lane alignment with parking or bicycle lanes. Sections of East 3rd Street outside Moodyville Area will be reviewed through the separate future planning processes.

For East 3rd Street, through the Moodyville Area, concept C or D should be considered (refer to section 6.2 for more details). This preferred option could accommodate bicycle lanes between Queensbury and St. Andrew's avenues to connect efficiently with north-south greenway and bike facilities. The concept used will depend on the final cross section selected for exclusive transit lanes.

Cycling in the east-west direction will continue to be supported by 4th Street and the Spirit Trail. This will require revisions to the Bicycle Master Plan. Until the long-term vision for the corridor is achieved, additional designs for an interim or transitional set of solutions will be required for the curb location of redeveloped sections of 3rd Street. These interim scenarios will inform the short-term development within the long-term, sustainable vision for the corridor.

**Table 13.** Summary of Conclusions and Considerations

| Item | Remarks | Conclusions | Considerations | Section |
|---|---|---|---|---|
| **Demand Forecast & Mode Shift** | Low, moderate, high hypothesis available based on observed values from 2011 Trip Diary | • Larges transit mode share observed in Lower Lonsdale; long-term target for Moodyville<br>• Current Moodyville mode share is "worst case" scenario | • Adopt *moderate* target for long-term mode shift (up to 40% non-vehicle mode share)<br>• Assume full buildout as 70% of area redeveloped<br>• Maintain PM peak as critical time period<br>• Expect 40% to 45% more site-specific daily traffic | 3.3, 3.4, 3.5 |
| **Local Area Transportation Measures** | | | | |
| **On-Site Parking** | "2012 Metro Vancouver Apartment Parking Study" (includes surveys and counts) as reference to validate allowance | • Surveyed: strata developments in proximity to Frequent Transit Network on average report:<br>o 1.34 vehicle/ household<br>o 1.19 parked vehicles/household<br>• Observed: 1.08 parked vehicles/unit | • Establish the 1.2 stalls per unit for multi-family development<br>• Allow additional parking provided by development to a maximum of 1.5 spaces per unit<br>• Maintain reduction of parking allowance based on bicycle parking provided | 4.1.1 |
| **On-Street Parking** | Two possible designs allow different capacities for on-street parking depending on the block density | • Increased density will require to maintain parking on both sides on most streets<br>• Areas expected to develop more slowly (e.g. 400 blocks) will need to maintain parking | • Parking on both sides for all streets likely required, with regular passing gaps.<br>• Consider one side except for:<br>o St. David's Ave.: to accommodate greenway<br>o 500 and 600 block of 1st Street east of St. David's to maintain appropriate width for sidewalks<br>o Alder street between St. Patrick's and St. David's depending on the final use of the lands on south side | 4.1.2 |
| **Accessibility and Connectivity** | Grid-type network facilitates access but must be modified in certain locations to improve connectivity | • All streets should remain local and narrow but St. David's needs to accommodate a greenway<br>• 3rd Street and St. David's are main access routes to the area<br>• Access to transit a priority | • Prioritize pedestrian connections north-south to transit stops and east-west to Lower Lonsdale<br>• Facilitate crossings<br>• Facilitate internal pedestrian movements by providing mid-block connections between:<br>o 2nd Street and Alder Street/Spirit Trail (400 block)<br>o 2nd Street and 1st Street by extending Ridgeway Ave. | 4.2 |
| **Street Design and Traffic Control** | Traffic will be controlled through street design avoiding additional measures in the future as much as possible | • All streets can remain bi-directional to maximize access to the properties but short cutting can occur if priority is given to the east-west direction (in particular on 1st, 2nd streets)<br>• All streets will require extensive curb work but this can be done gradually as redevelopment occurs | • Set the speed limit at 30km/h for local neighbourhood streets<br>• Min. 2m sidewalks, both sides, all streets<br>• Min. 1.5m boulevard, both sides, all streets<br>• Curb extensions (i.e. "bulges") whenever possible to reduce crossing widths at corners<br>• Traffic diverters at 1st, 2nd streets and St. David's to eliminate shortcutting<br>• Re-align 1st Street east-west at St. David's<br>• Introduce stop sign in east-west direction at 2nd Street and St. Patrick's | 4.3 |
| **East 3rd Street Operations** | | | | |
| **Capacity Utilization** | Various scenarios defined to assess the effect of area growth on 3rd Street | • 3rd Street has enough remaining capacity to operate properly under future conditions.<br>• Two lanes per direction are not needed for regular operation but could be used during peak hours by removing parking<br>• Measure not be effective unless more capacity is provided east of Queensbury Avenue | • Keep 1 lane per direction through Moodyville; if more capacity is needed remove parking at peaks<br>• Provide left turn bays east and west bound at all intersections between Queensbury and St. Andrew's avenues<br>• More complex operation needed if transit lanes implemented through the center of the corridor<br>• Maintain current lane configuration and St. Georges and Lonsdale avenues to facilitate turning<br>• It may not be possible to provide right turn lanes elsewhere; depends on final cross section design | 5 |
| **Signalization** | Two scenarios tested at full buildout: current signalization and full signals at all intersections (bet. Queensbury & Lonsdale avenues) | • Full signalization of all intersections is required only in case of an exclusive right-of-way rapid transit system<br>• Otherwise, the installation of full signals will depend on the magnitude and timing of | • Install a full signal at intersection of St. David's and 3rd Street coinciding with bus depot site redevelopment and/or greenway connection<br>• Convert the pedestrian signal to full signal at Queensbury Avenue<br>• Plan for another full signal at either Moody or Ridgeway depending on the pace of development (more traffic analysis would be required) | 5 |

| Item | Remarks | Conclusions | Considerations | Section |
|---|---|---|---|---|
| **Signalization (cont.)** | | development<br>• The priority intersections for signalization are St. David's, Queensbury | • Implement full traffic signals at all other intersections between Queensbury and St. Georges to accommodate rapid transit long term if in the middle of the street (exclusive busway) | 5 |
| **Street Cross Section Concept Design** | | | | |
| **Local Streets** | Two concept designs available; both maximize pedestrian and boulevard space but vary parking capacity | • Both concepts can be considered block by block as the area redevelops<br>• Well-balanced and evenly distributed parking supply needed for much higher development densities<br>• Parking on both sides will most likely be the preferred solution in most cases | • Consider Concept 1 (parking allowed on both sides) for most local streets: 9m width<br>• Consider Concept 2 (parking allowed on one side) for local streets with limited ROW to avoid compromising pedestrian/boulevard space and sidewalk width: 8.2m width<br>• Evaluate block-by-block as development occurs if required to make final decision on design | 6.1 |
| **Greenway Connection** | Two concept designs available; both prioritize pedestrian and cycling but vary parking capacity | • Parking limited to only one side is preferred to maximize the space for walking and cycling and to reduce crossing widths<br>• Eliminating parking completely may encourage higher speeds and is therefore not appropriate in general | • Consider Concept 3 (parking allowed on one side and bi-directional cycle track) as the preferred option to accommodate:<br>o A 4m wide greenway pedestrian (or multiuse) path<br>o A bi-directional off-road protected bike lane parallel to pedestrian path on opposite side of street<br>• Complete the connection between 3rd Street and the Spirit Trail through Queensbury Avenue | 6.1 |
| **3rd Street Transit Corridor** | The principles applicable to cross section design are mainly:<br>1. Prioritize transit<br>2. Maintain the street's role as an east-west arterial connection<br>3. Maximize the pedestrian realm | • The cross section design must be flexible to adapt to the different street profiles of the local and extended part of the 3rd Street/Marine Drive corridor<br>• Transit priority implies making exclusive transit lanes part of the long-term design options, not necessarily the optimal solution.<br>• 3rd Street will remain a key east-west arterial connection; the analysis shows that additional travel lanes are not required to support future traffic volume<br>• Providing pedestrian space this is a priority for this; all options include a minimum sidewalk width of 2m and a minimum of 1.5m boulevard space | • Keep all concept design possibilities available to accommodate a wide variety of street profiles along the corridor<br>• For East 3rd Street specifically, consider providing bicycle lanes (concepts C or D depending on the final cross section selected) between Queensbury and St. Andrew's avenues to connect efficiently with north-south bike facilities<br>• Other sections, with higher densities and closer to commercial areas such as Lonsdale need more analysis to define a design<br>• Design an interim, transitional solution to accommodate short-term development within the long-term vision for the corridor<br>• Maintain the current number of travel lanes for traffic (1 per direction) but allow the optimization of corridor operations through intersection improvements (lane configuration, additional turning lanes, and signalization) | Figure 36. |

# APPENDICES

# 8 APPENDIX A: ADDITIONAL INFORMATION

## 8.1 DETAILED TRIP GENERATION

**Table 14.** Trip Generation Estimation by Block

| Year | Scenario | Dwellings | | | | | | Population | | | | | | Daily Trips Generated (all modes) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Block | | | | | | Block | | | | | | Block | | | | | |
| | | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total |
| 2015 | Current | 130 | 93 | 73 | 55 | 4 | 355 | 312 | 223 | 175 | 132 | 10 | 852 | 945 | 676 | 531 | 400 | 29 | 2582 |
| 2045 | Do nothing | 130 | 93 | 73 | 55 | 4 | 355 | 421 | 301 | 236 | 178 | 13 | 1148 | 1274 | 912 | 716 | 539 | 39 | 3480 |
| | | 0 | 24 | 26 | 26 | 0 | 76 | 0 | 58 | 62 | 62 | 0 | 182 | 0 | 175 | 189 | 189 | 0 | 553 |
| | | 95 | 158 | 59 | 59 | 7 | 378 | 228 | 379 | 142 | 142 | 17 | 907 | 691 | 1149 | 429 | 429 | 51 | 2749 |
| | Maximum | 123 | 153 | 167 | 152 | 8 | 603 | 295 | 367 | 401 | 365 | 19 | 1447 | 894 | 1113 | 1214 | 1105 | 58 | 4385 |
| | DPA | 48 | 68 | 74 | 0 | 0 | 190 | 115 | 163 | 178 | 0 | 0 | 456 | 349 | 494 | 538 | 0 | 0 | 1382 |
| | Potential | 61 | 72 | 0 | 0 | 0 | 133 | 146 | 173 | 0 | 0 | 0 | 319 | 444 | 524 | 0 | 0 | 0 | 967 |
| | | 68 | 106 | 0 | 0 | 0 | 174 | 163 | 254 | 0 | 0 | 0 | 418 | 494 | 771 | 0 | 0 | 0 | 1265 |
| | | 89 | 130 | 49 | 0 | 0 | 268 | 214 | 312 | 118 | 0 | 0 | 643 | 647 | 945 | 356 | 0 | 0 | 1949 |
| | | 83 | 0 | 0 | 0 | 0 | 83 | 199 | 0 | 0 | 0 | 0 | 199 | 604 | 0 | 0 | 0 | 0 | 604 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 567 | 711 | 375 | 237 | 15 | 1905 | 1361 | 1706 | 900 | 569 | 36 | 4572 | 4123 | 5170 | 2727 | 1723 | 109 | 13853 |
| | **Full Buildout** | **397** | **498** | **263** | **166** | **11** | **1334** | **953** | **1194** | **630** | **398** | **25** | **3200** | **2886** | **3619** | **1909** | **1206** | **76** | **9697** |

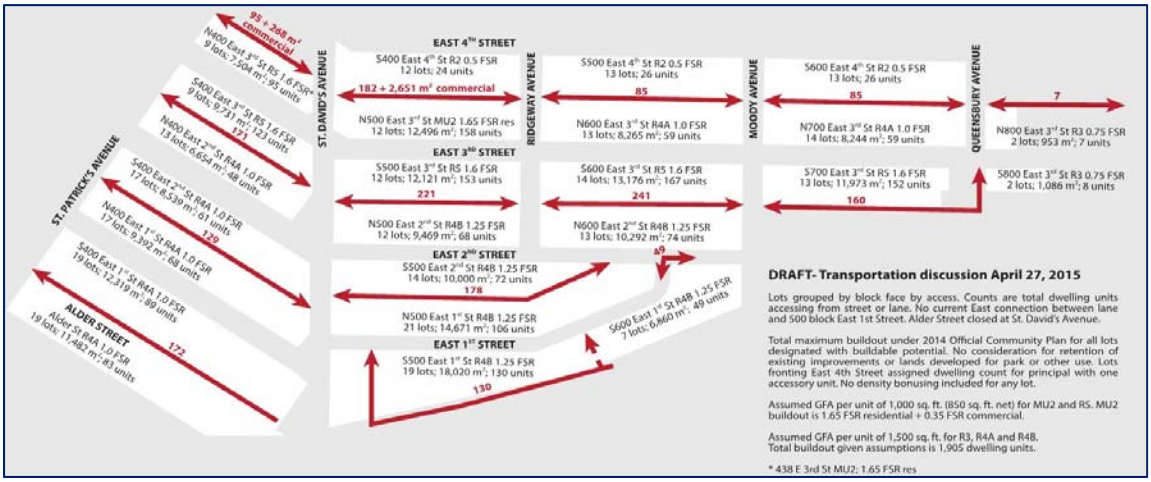
**AM Trip Generation (all modes)**

| Period Year | Scenario | AM Total Trips | | | | | | AM Trips INTO DPA | | | | | | AM Trips OUT OF DPA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Block | | | | | | Block | | | | | | Block | | | | | |
| | | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total |
| AM 2045 | Do nothing | 103 | 74 | 58 | 44 | 3 | 282 | 31 | 22 | 17 | 13 | 1 | 85 | 72 | 52 | 41 | 31 | 2 | 197 |
| | | 0 | 14 | 15 | 15 | 0 | 45 | 0 | 4 | 5 | 5 | 0 | 13 | 0 | 10 | 11 | 11 | 0 | 31 |
| | | 56 | 93 | 35 | 35 | 4 | 223 | 17 | 28 | 10 | 10 | 1 | 67 | 39 | 65 | 24 | 24 | 3 | 156 |
| | Maximum | 72 | 90 | 98 | 90 | 5 | 355 | 22 | 27 | 30 | 27 | 1 | 107 | 51 | 63 | 69 | 63 | 3 | 249 |
| | DPA | 28 | 40 | 44 | 0 | 0 | 112 | 8 | 12 | 13 | 0 | 0 | 34 | 20 | 28 | 31 | 0 | 0 | 78 |
| | Potential | 36 | 42 | 0 | 0 | 0 | 78 | 11 | 13 | 0 | 0 | 0 | 24 | 25 | 30 | 0 | 0 | 0 | 55 |
| | | 40 | 62 | 0 | 0 | 0 | 102 | 12 | 19 | 0 | 0 | 0 | 31 | 28 | 44 | 0 | 0 | 0 | 72 |
| | | 52 | 77 | 29 | 0 | 0 | 158 | 16 | 23 | 9 | 0 | 0 | 47 | 37 | 54 | 20 | 0 | 0 | 111 |
| | | 49 | 0 | 0 | 0 | 0 | 49 | 15 | 0 | 0 | 0 | 0 | 15 | 34 | 0 | 0 | 0 | 0 | 34 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 334 | 419 | 221 | 140 | 9 | 1122 | 100 | 126 | 66 | 42 | 3 | 337 | 234 | 293 | 155 | 98 | 6 | 785 |
| | **Full Buildout** | **234** | **293** | **155** | **98** | **6** | **785** | **70** | **88** | **46** | **29** | **2** | **236** | **164** | **205** | **108** | **68** | **4** | **550** |

**PM Trip Generation (all modes)**

| Period Year | Scenario | PM Total Trips | | | | | | PM Trips INTO DPA | | | | | | PM Trips OUT OF DPA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Block | | | | | | Block | | | | | | Block | | | | | |
| | | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total | 400 | 500 | 600 | 700 | 800 | Total |
| PM 2045 | Do nothing | 115 | 82 | 64 | 49 | 4 | 313 | 65 | 47 | 37 | 28 | 2 | 179 | 49 | 35 | 28 | 21 | 2 | 135 |
| | | 0 | 16 | 17 | 17 | 0 | 50 | 0 | 9 | 10 | 10 | 0 | 28 | 0 | 7 | 7 | 7 | 0 | 21 |
| | | 62 | 103 | 39 | 39 | 5 | 247 | 35 | 59 | 22 | 22 | 3 | 141 | 27 | 44 | 17 | 17 | 2 | 106 |
| | Maximum | 81 | 100 | 109 | 99 | 5 | 395 | 46 | 57 | 62 | 57 | 3 | 225 | 35 | 43 | 47 | 43 | 2 | 170 |
| | DPA | 31 | 45 | 48 | 0 | 0 | 124 | 18 | 25 | 28 | 0 | 0 | 71 | 14 | 19 | 21 | 0 | 0 | 53 |
| | Potential | 40 | 47 | 0 | 0 | 0 | 87 | 23 | 27 | 0 | 0 | 0 | 50 | 17 | 20 | 0 | 0 | 0 | 37 |
| | | 45 | 69 | 0 | 0 | 0 | 114 | 25 | 40 | 0 | 0 | 0 | 65 | 19 | 30 | 0 | 0 | 0 | 49 |
| | | 58 | 85 | 32 | 0 | 0 | 175 | 33 | 48 | 18 | 0 | 0 | 100 | 25 | 37 | 14 | 0 | 0 | 75 |
| | | 54 | 0 | 0 | 0 | 0 | 54 | 31 | 0 | 0 | 0 | 0 | 31 | 23 | 0 | 0 | 0 | 0 | 23 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | 371 | 465 | 245 | 155 | 10 | 1247 | 212 | 265 | 140 | 88 | 6 | 711 | 160 | 200 | 106 | 67 | 4 | 536 |
| | **Full Buildout** | **260** | **326** | **172** | **109** | **7** | **873** | **148** | **186** | **98** | **62** | **4** | **497** | **112** | **140** | **74** | **47** | **3** | **375** |

**Figure 41.** Expected Redevelopment Units for the Moodyville Area at Full Buildout




## 8.2 DETAILED MODE SPLIT

**Table 15.** Mode Split by Block

| Year | Block | Daily Demand | | | | | | AM Peak Trips | | PM Peak Trips | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Auto | Transit | Walk | Bicycle | Other | Trips/day | Auto | Transit | Auto | Transit |
| 2015 | Current Conditions | | | | | | | | | | |
| | Block | 69% | 13% | 15% | 2% | 1% | 100% | | | | |
| | 400 | 652 | 123 | 142 | 19 | 9 | 945 | 42 | 10 | 47 | 11 |
| | 500 | 467 | 88 | 101 | 14 | 7 | 676 | 30 | 7 | 33 | 8 |
| | 600 | 366 | 69 | 80 | 11 | 5 | 531 | 24 | 6 | 26 | 6 |
| | 700 | 276 | 52 | 60 | 8 | 4 | 400 | 18 | 4 | 20 | 5 |
| | 800 | 20 | 4 | 4 | 1 | 0 | 29 | 1 | 0 | 1 | 0 |
| | Total DPA | 1781 | 336 | 387 | 52 | 26 | 2582 | 115 | 27 | 128 | 30 |
| 2045 | Do Nothing: No DPA Development | | | | | | | | | | |
| | Block | 69% | 13% | 15% | 2% | 1% | 100% | | | | |
| | 400 | 879 | 166 | 191 | 25 | 13 | 1274 | 57 | 13 | 63 | 15 |
| | 500 | 629 | 119 | 137 | 18 | 9 | 912 | 41 | 10 | 45 | 11 |
| | 600 | 494 | 93 | 107 | 14 | 7 | 716 | 32 | 8 | 35 | 8 |
| | 700 | 372 | 70 | 81 | 11 | 5 | 539 | 24 | 6 | 27 | 6 |
| | 800 | 27 | 5 | 6 | 1 | 0 | 39 | 2 | 0 | 2 | 0 |
| | Total DPA | 2401 | 452 | 522 | 70 | 35 | 3440 | 155 | 37 | 172 | 41 |
| | DPA at Full Buildout - LOW Mode Shift | | | | | | | | | | |
| | Block | 69% | 13% | 15% | 2% | 1% | 100% | | | | |
| | 400 | 1992 | 375 | 433 | 58 | 29 | 2886 | 129 | 30 | 143 | 34 |
| | 500 | 2497 | 471 | 543 | 72 | 36 | 3619 | 161 | 38 | 179 | 42 |
| | 600 | 1317 | 248 | 286 | 38 | 19 | 1909 | 85 | 20 | 94 | 22 |
| | 700 | 832 | 157 | 181 | 24 | 12 | 1206 | 54 | 13 | 60 | 14 |
| | 800 | 53 | 10 | 11 | 2 | 1 | 76 | 3 | 1 | 4 | 1 |
| | Total DPA | 6691 | 1261 | 1455 | 194 | 97 | 9697 | 432 | 102 | 480 | 113 |
| | DPA at Full Buildout - MODERATE Mode Shift | | | | | | | | | | |
| | Block | 53% | 22% | 19% | 4% | 2% | 100% | | | | |
| | 400 | 1529 | 645 | 562 | 108 | 43 | 2886 | 99 | 52 | 110 | 58 |
| | 500 | 1917 | 808 | 705 | 135 | 54 | 3619 | 124 | 65 | 138 | 73 |
| | 600 | 1011 | 426 | 372 | 71 | 29 | 1909 | 65 | 35 | 73 | 38 |
| | 700 | 639 | 269 | 235 | 45 | 18 | 1206 | 41 | 22 | 46 | 24 |
| | 800 | 40 | 17 | 15 | 3 | 1 | 76 | 3 | 1 | 3 | 2 |
| | Total DPA | 5136 | 2165 | 1888 | 363 | 145 | 9697 | 332 | 175 | 368 | 195 |
| | DPA at Full Buildout - HIGH Mode Shift | | | | | | | | | | |
| | Block | 45% | 28% | 20% | 5% | 2% | 100% | | | | |
| | 400 | 1305 | 797 | 589 | 139 | 58 | 2886 | 84 | 65 | 94 | 72 |
| | 500 | 1636 | 999 | 738 | 174 | 72 | 3619 | 106 | 81 | 117 | 90 |
| | 600 | 863 | 527 | 389 | 92 | 38 | 1909 | 56 | 43 | 62 | 47 |
| | 700 | 545 | 333 | 246 | 58 | 24 | 1206 | 35 | 27 | 39 | 30 |
| | 800 | 35 | 21 | 16 | 4 | 2 | 76 | 2 | 2 | 2 | 2 |
| | Total DPA | 4383 | 2676 | 1978 | 465 | 194 | 9697 | 283 | 217 | 314 | 241 |

## 8.3 PROFILES FROM TRAFFIC COUNTS

**Table 16.** Traffic Volume Hourly Profile for East 3rd Street

| Direction | Hour | | | | | | | | | | | | | | | | | | | | | | Volume | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 00-01 | 01-02 | 02-03 | 03-04 | 04-05 | 05-06 | 06-07 | 07-08 | 08-09 | 09-10 | 10-11 | 11-12 | 12-13 | 13-14 | 14-15 | 15-16 | 16-17 | 17-18 | 18-19 | 19-20 | 20-21 | 21-22 | 22-23 | 23-24 | 24hr | 85% |
| **Weekday** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eastbound | 60 | 37 | 24 | 20 | 33 | 100 | 191 | 312 | 370 | 381 | 382 | 389 | 425 | 402 | 421 | 480 | 468 | 486 | 394 | 306 | 245 | 220 | 169 | 106 | 6421 | 57 |
| Westbound | 50 | 33 | 20 | 19 | 20 | 94 | 257 | 386 | 445 | 379 | 387 | 403 | 426 | 427 | 450 | 508 | 409 | 459 | 364 | 303 | 244 | 191 | 165 | 101 | 6540 | 60 |
| **Both** | **110** | **70** | **44** | **39** | **53** | **194** | **448** | **698** | **815** | **760** | **769** | **792** | **851** | **829** | **871** | **988** | **877** | **945** | **758** | **609** | **489** | **411** | **334** | **207** | **12961** | **58** |
| **Weekend** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Eastbound | 80 | 41 | 30 | 19 | 29 | 69 | 141 | 228 | 270 | 314 | 345 | 376 | 418 | 475 | 451 | 480 | 459 | 416 | 393 | 285 | 243 | 208 | 161 | 79 | 6010 | 58 |
| Westbound | 66 | 41 | 25 | 22 | 24 | 73 | 182 | 290 | 346 | 339 | 385 | 413 | 474 | 435 | 444 | 450 | 459 | 339 | 373 | 285 | 213 | 178 | 137 | 59 | 6052 | 61 |
| **Both** | **146** | **82** | **55** | **41** | **53** | **142** | **323** | **518** | **616** | **653** | **730** | **789** | **892** | **910** | **895** | **930** | **918** | **755** | **766** | **570** | **456** | **386** | **298** | **138** | **12062** | **59** |

**Table 17.** Peak Hour Volumes on East 3rd Street from TMCs

| Intersection | | | 2015 Current Conditions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AM | | | PM | | |
| No. | East-West | North-South | E-W | N-S | Total | E-W | N-S | Total |
| 1 | E 3rd Street | Lonsdale | 941 | 547 | **1488** | 1178 | 917 | **2095** |
| 2 | E 3rd Street | St. Georges | 973 | 505 | **1478** | 1324 | 663 | **1987** |
| 3 | E 3rd Street | St. Andrews | 942 | 122 | **1064** | 1259 | 149 | **1408** |
| 4 | E 3rd Street | St. Patrick's | 980 | 63 | **1043** | 1299 | 96 | **1395** |
| 5 | E 3rd Street | St. David's | 1012 | 49 | **1061** | 1385 | 52 | **1437** |
| 6 | E 3rd Street | Ridgeway | 1045 | 61 | **1106** | 1371 | 61 | **1432** |
| 7 | E 3rd Street | Moody | 1057 | 62 | **1119** | 1388 | 52 | **1440** |
| 8 | E 3rd Street | Queensbury | 1032 | 104 | **1136** | 1397 | 96 | **1493** |

Intersection volumes peak at between 1,400 and 1,500 vehicles/h in the afternoon. Within the DPA (St. Patrick's to Queensbury avenues), the north and south approaches carry only about 10% of the traffic.

| Segment | | | 2015 Current Conditions | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | AM | | | PM | | |
| No. | From | To | WB | EB | Total | WB | EB | Total |
| 1 | Lonsdale | St. Georges | 563 | 458 | **1021** | 524 | 769 | **1293** |
| 2 | St. Georges | St. Andrews | 515 | 440 | **955** | 555 | 683 | **1238** |
| 3 | St. Andrews | St. Patrick's | 502 | 472 | **974** | 576 | 691 | **1267** |
| 4 | St. Patrick's | St. David's | 508 | 500 | **1008** | 608 | 746 | **1354** |
| 5 | St. David's | Ridgeway | 512 | 527 | **1039** | 639 | 720 | **1359** |
| 6 | Ridgeway | Moody | 518 | 542 | **1060** | 651 | 727 | **1378** |
| 7 | Moody | Queensbury | 515 | 567 | **1082** | 661 | 736 | **1397** |
| 8 | Queensbury | LL Road | 465 | 556 | **1022** | 661 | 603 | **1264** |

The dominance of the east-west direction is evident as the segment volumes are very similar to the intersection volumes. During the PM peak hour, the eastbout direction is slightly higher while in the AM they are almost identical.

## 8.4 ALIGNMENT WITH 2014 OCP

Our intention is to match the OCP objectives to the Transportation Study objectives and recommendations as closely as possible while recognizing that some points in the OCP may not translate directly into effective measures for Moodyville. As stated in the OCP, there are three specific transportation goals, with corresponding objectives:

*Goal 1 Prioritize walking, cycling, transit and goods movement over single-occupancy vehicles*

*Objectives:*

- Invest in cycling and pedestrian networks and facilities to favor convenient transportation alternatives
- Improve accessibility to transit through projects identified in the 2040 North Shore Area Transit Plan
- Implement transportation demand management and other support measures

*Goal 2 Integrate Land Use and Transportation Planning to reduce the need for car travel*

*Objectives:*

- Designate land uses to minimize car dependency
- Support a Frequent Transit Development Area along Marine Drive and East 3rd Street
- Manage on-street and off-street facilities to prioritize sustainable transportation
- Optimize the existing road network; expand only to favor sustainable transportation

*Goal 3 Support a safe, accessible, resilient and affordable transportation system*

*Objectives:*

- Maintain the existing transportation infrastructure
- Accommodate the transportation needs of all users
- Enhance the affordability of transit

Given the goals above, we propose to adapt these to the context of the Moodyville area as follows:

**Table 18.** Official Community Plan 2014: Related Objectives and Context

| OCP Goals and Objectives | Proposed Transportation Points for Event |
|---|---|
| **Goal 1 Prioritize walking, cycling, transit over vehicles** | Prioritize active transportation and transit |
| • **Invest in cycling and pedestrian networks**<br>• **Pursue projects identified in the 2040 NSATP**<br>• **Implement transportation demand management** | A complete street approach prioritizes walking and cycling. This is of particular importance to the East 3rd Street corridor due to its potential to be both an activity area and an East-West arterial connection. *Transportation guidelines will identify standards to accommodate all the varied uses of the street*. Improving links between this neighbourhood and the City- and North Shore-wide bicycle and trail networks supports active transportation. This has health, environmental and economic benefits to both individuals and the neighbourhood at large. |
| **Goal 2 Integrate Land Use and Transportation Planning** | Integrate land use and transportation strategies |
| • **Designate land uses to minimize car dependency**<br>• **Manage sustainable on-street/off-street facilities**<br>• **Favor optimization the existing road network over expansion** | Transportation demand forecasts utilize future land use to ensure that neighbourhood design integrate effective facilities. This planning must balance parking demand with the commitment to support active transportation through demand side management. On-street parking competes with a variety of other uses in the road right-of-way, while increasing required off-site parking affects the cost of housing. |

| OCP Goals and Objectives | Proposed Transportation Points for Event |
|---|---|
| **Goal 3 Support a safe, accessible, resilient and affordable system** | Allocate road space for all modes |
| • **Maintain the existing transportation infrastructure**<br>• **Accommodate the transportation needs of all users**<br>• **Enhance the affordability of transit** | A growing population increases the total volume of trips and necessitates proactive management. Topics of consideration related to the future transportation needs of this neighbourhood include safety, ergonomics, aesthetics, continuity and consistency. In some circumstances, the closure of a street or laneway facilitates traffic flow increases pedestrian safety or is otherwise in support of the public interest. This creates opportunities to realize more social gathering and recreation spaces as well as increasing pedestrian permeability. |
| **3rd street corridor specific** | Plan for rapid transit |
| **Support a Frequent Transit Development Area on E 3rd Street** | One of the primary transportation objectives for this area is confirming that the future East 3rd Street can accommodate all modes efficiently. Since 1967, the City has pursued widening the East 3rd Street road right-of-way to 100 feet as an objective; this width is the foundation for the conceptual design alternatives under development. The North Shore Area Transit Plan identifies East 3rd Street as part of a rapid transit corridor in its 2040 vision. In the interim, the Mayor's plan anticipates B-Line or better service within the next decade. |

# 9 APPENDIX B: DETAILED TRAFFIC ANALYSIS

## 9.1 CURRENT CONDITION 2015

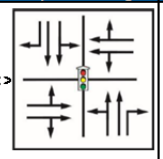
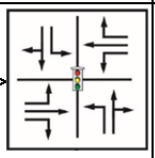
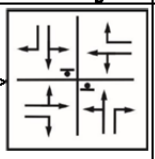
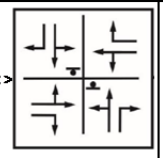
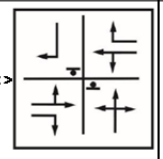
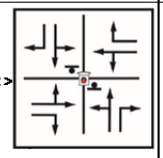
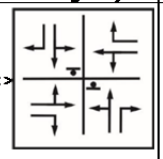
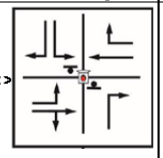
| Scenarios > | | Current Configuration | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Parameters | Intersection Layout | 2015 Current Operation - 1 lane / direction | | | | 2045 with Current Operation - 1 lane / direction. No DPA | | | | 2045 with Current Operation - 1 lane / direction. With DPA | | | |
| | | Current/Do-nothing | EB | WB | NB | SB | EB | WB | NB | SB | EB | WB | NB | SB |
| 1 | Approach LOS |  | A | A | C | C | A | A | C | C | A | B | C | C |
| Lonsdale | Delay (s) | | 6 | 6 | 25 | 28 | 8 | 8 | 23 | 27 | 10 | 11 | 21 | 23 |
| 3rd Street | Queue Length 95th (m) | | 18 | 34 | 19 | 34 | 31 | 55 | 22 | 42 | 30 | 56 | 22 | 42 |
| | Intersection LOS | | | B | | | | B | | | | B | | |
| | Capacity Utilization | | | 58% | | | | 70% | | | | 70% | | |
| | Utilization Increase | Lonsdale | | - | | | | 20% | | | | 21% | | |
| 2 | Approach LOS |  | B | B | C | D | B | B | D | D | B | B | D | D |
| St. Georges | Delay (s) | | 8 | 4 | 21 | 25 | 16 | 17 | 36 | 49 | 16 | 17 | 36 | 50 |
| 3rd Street | Queue Length 95th (m) | | 62 | 72 | 23 | 65 | 93 | 108 | 30 | 108 | 88 | 104 | 31 | 109 |
| | Intersection LOS | | | C | | | | C | | | | C | | |
| | Capacity Utilization | | | 71% | | | | 85% | | | | 84% | | |
| | Utilization Increase | St. Georges | | - | | | | 19% | | | | 18% | | |
| 3 | Approach LOS |  | A | A | C | C | A | A | D | F | A | A | D | F |
| St. Andrews | Delay (s) | | 0 | 1 | 17 | 22 | 0 | 1 | 31 | 103 | 0 | 1 | 30 | 108 |
| 3rd Street | Queue Length 95th (m) | | 0 | 1 | 2 | 8 | 0 | 1 | 6 | 45 | 1 | 1 | 6 | 47 |
| | Intersection LOS | | | A | | | | B | | | | B | | |
| | Capacity Utilization | | | 61% | | | | 78% | | | | 81% | | |
| | Utilization Increase | St. Andrews | | - | | | | 27% | | | | 33% | | |
| 4 | Approach LOS |  | A | A | C | C | A | A | C | D | A | A | C | D |
| St. Patrick's | Delay (s) | | 0 | 1 | 16 | 20 | 0 | 1 | 23 | 33 | 0 | 1 | 23 | 33 |
| 3rd Street | Queue Length 95th (m) | | 0 | 1 | 2 | 1 | 0 | 1 | 5 | 3 | 0 | 1 | 4 | 4 |
| | Intersection LOS | | | A | | | | A | | | | A | | |
| | Capacity Utilization | | | 58% | | | | 74% | | | | 70% | | |
| | Utilization Increase | St. Patrick's | | - | | | | 27% | | | | 21% | | |
| 5 | Approach LOS |  | A | A | B | B | A | A | C | B | A | A | C | B |
| St. David's | Delay (s) | | 0 | 0 | 14 | 12 | 0 | 0 | 19 | 14 | 0 | 0 | 19 | 14 |
| 3rd Street | Queue Length 95th (m) | | 0 | 0 | 3 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 5 | 1 |
| | Intersection LOS | | | A | | | | A | | | | A | | |
| | Capacity Utilization | | | 44% | | | | 56% | | | | 53% | | |
| | Utilization Increase | St. David's | | - | | | | 26% | | | | 20% | | |
| 6 | Approach LOS |  | A | A | C | C | A | A | D | D | A | A | D | D |
| Ridgeway | Delay (s) | | 0 | 0 | 18 | 20 | 1 | 0 | 26 | 33 | 1 | 0 | 27 | 32 |
| 3rd Street | Queue Length 95th (m) | | 0 | 0 | 1 | 3 | 1 | 0 | 1 | 7 | 1 | 0 | 2 | 7 |
| | Intersection LOS | | | A | | | | A | | | | A | | |
| | Capacity Utilization | | | 53% | | | | 67% | | | | 65% | | |
| | Utilization Increase | Ridgeway | | - | | | | 27% | | | | 23% | | |
| 7 | Approach LOS |  | A | A | B | C | A | A | C | E | A | A | C | D |
| Moody | Delay (s) | | 0 | 0 | 15 | 20 | 0 | 1 | 21 | 35 | 0 | 1 | 21 | 33 |
| 3rd Street | Queue Length 95th (m) | | 0 | 0 | 1 | 2 | 0 | 0 | 2 | 7 | 0 | 1 | 2 | 6 |
| | Intersection LOS | | | A | | | | A | | | | A | | |
| | Capacity Utilization | | | 50% | | | | 62% | | | | 62% | | |
| | Utilization Increase | Moody | | - | | | | 25% | | | | 25% | | |
| 8 | Approach LOS |  | A | A | B | C | A | A | C | F | A | A | C | F |
| Queensbury | Delay (s) | | 1 | 0 | 13 | 22 | 1 | 0 | 15 | 67 | 1 | 0 | 16 | 66 |
| 3rd Street | Queue Length 95th (m) | | 1 | 0 | 0 | 9 | 0 | 0 | 2 | 7 | 2 | 0 | 1 | 29 |
| | Intersection LOS | | | A | | | | A | | | | A | | |
| | Capacity Utilization | | | 44% | | | | 53% | | | | 53% | | |
| | Utilization Increase | Queensbury | | - | | | | 21% | | | | 21% | | |

**Figure 42.** East 3rd Street 2015 Hourly Volumes

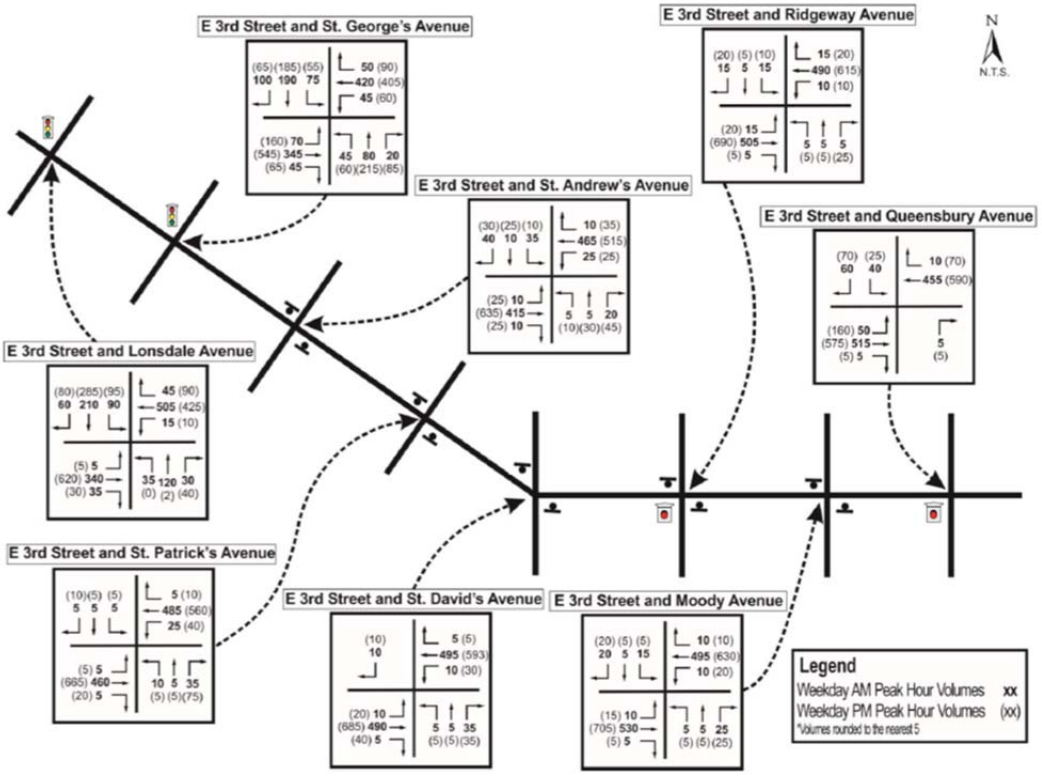



**Figure 43.** Pedestrian Volumes at Intersections on East 3rd Street – Lonsdale to Queensbury

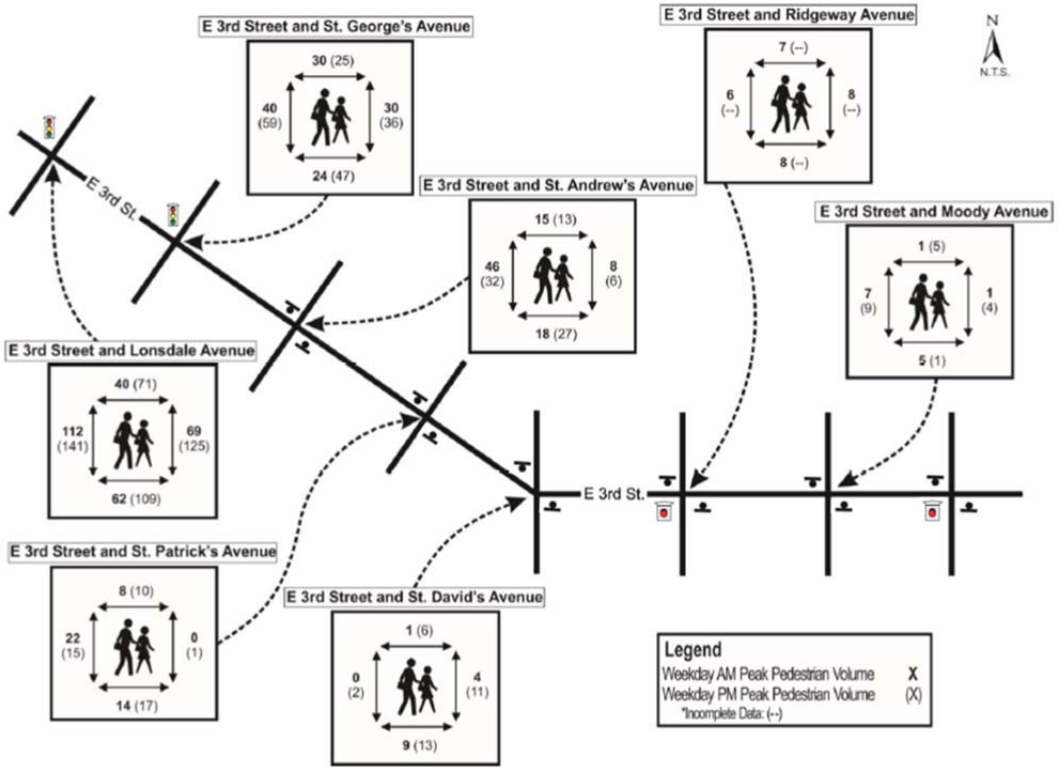


**Figure 44.** East 3rd Street 2015 LOS

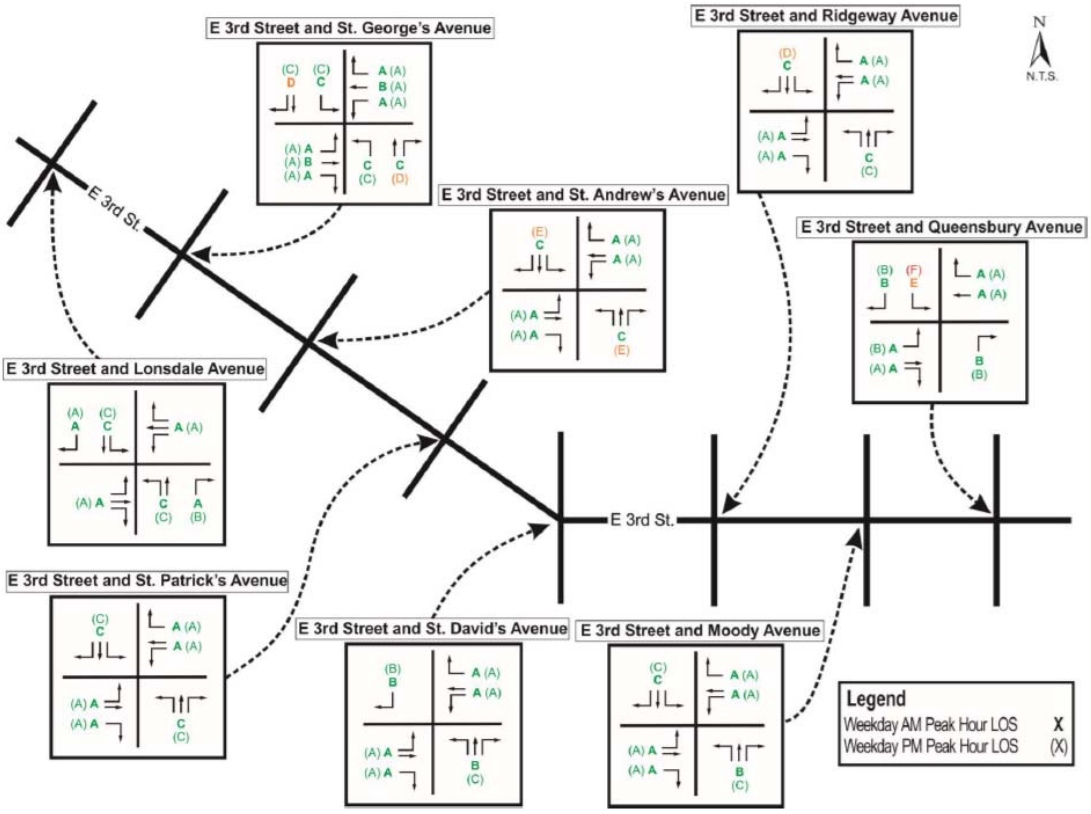
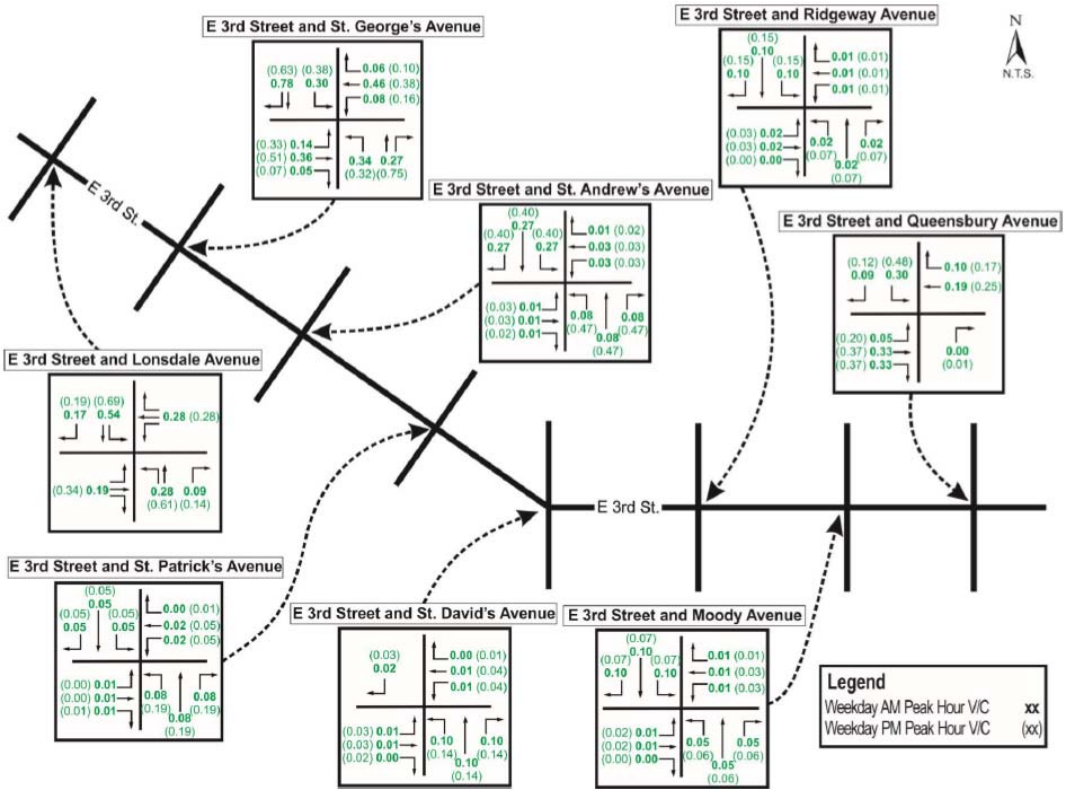
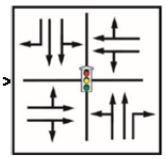
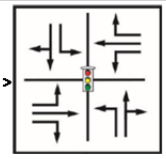
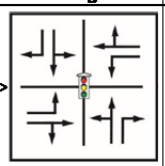
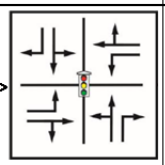
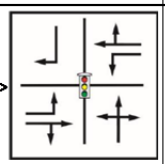
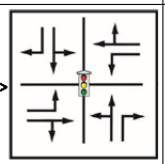
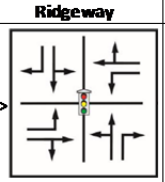
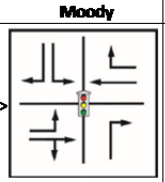



**Figure 45.** East 3rd Street 2015 V/C



## 9.2 FUTURE CONDITION 2045

| Scenarios > | | Future With Signals at All Intersections | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Parameters | Intersection Layout | 2045 with Optimized Signals - 1 lane / direction. With DPA | | | | 2045 with Optimized Signals - 2 lanes / direction. With DPA | | | |
| | | Optimized | EB | WB | NB | SB | EB | WB | NB | SB |
| 1 | Approach LOS |  | A | A | C | C | A | A | C | C |
| Lonsdale | Delay (s) | | 8 | 4 | 21 | 25 | 8 | 4 | 21 | 25 |
| 3rd Street | Queue Length 95th (m) | | 29 | 22 | 21 | 40 | 29 | 20 | 21 | 40 |
| | Intersection LOS | | | B | | | | B | | |
| | Capacity Utilization | | | 70% | | | | 70% | | |
| | Utilization Increase | Lonsdale | | 21% | | | | 21% | | |
| 2 | Approach LOS |  | B | B | C | D | B | A | C | D |
| St. Georges | Delay (s) | | 12 | 13 | 28 | 39 | 10 | 9 | 27 | 39 |
| 3rd Street | Queue Length 95th (m) | | 54 | 65 | 27 | 95 | 27 | 23 | 27 | 95 |
| | Intersection LOS | | | C | | | | B | | |
| | Capacity Utilization | | | 84% | | | | 73% | | |
| | Utilization Increase | St. Georges | | 18% | | | | 2% | | |
| 3 | Approach LOS |  | A | A | B | C | A | A | B | C |
| St. Andrews | Delay (s) | | 4 | 6 | 12 | 21 | 3 | 5 | 12 | 21 |
| 3rd Street | Queue Length 95th (m) | | 29 | 40 | 8 | 20 | 7 | 17 | 8 | 20 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 51% | | | | 41% | | |
| | Utilization Increase | St. Andrews | | -16% | | | | -32% | | |
| 4 | Approach LOS |  | A | A | B | B | A | A | B | B |
| St. Patrick's | Delay (s) | | 2 | 3 | 10 | 20 | 1 | 2 | 10 | 20 |
| 3rd Street | Queue Length 95th (m) | | 17 | 10 | 8 | 7 | 9 | 12 | 8 | 7 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 51% | | | | 37% | | |
| | Utilization Increase | St. Patrick's | | -12% | | | | -37% | | |
| 5 | Approach LOS |  | A | A | B | A | A | A | B | A |
| St. David's | Delay (s) | | 4 | 1 | 17 | 0 | 2 | 0 | 17 | 0 |
| 3rd Street | Queue Length 95th (m) | | 46 | 2 | 11 | 0 | 13 | 1 | 11 | 0 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 52% | | | | 35% | | |
| | Utilization Increase | St. David's | | 18% | | | | -20% | | |
| 6 | Approach LOS |  | A | A | B | B | A | A | B | B |
| Ridgeway | Delay (s) | | 4 | 3 | 14 | 17 | 2 | 2 | 14 | 17 |
| 3rd Street | Queue Length 95th (m) | | 6 | 14 | 4 | 9 | 6 | 7 | 4 | 9 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 52% | | | | 36% | | |
| | Utilization Increase | Ridgeway | | -2% | | | | -33% | | |
| 7 | Approach LOS |  | A | A | A | B | A | A | A | B |
| Moody | Delay (s) | | 3 | 4 | 6 | 15 | 2 | 1 | 6 | 15 |
| 3rd Street | Queue Length 95th (m) | | 50 | 49 | 4 | 8 | 22 | 9 | 4 | 8 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 54% | | | | 36% | | |
| | Utilization Increase | Moody | | 8% | | | | -27% | | |
| 8 | Approach LOS |  | A | A | A | B | A | A | A | B |
| Queensbury | Delay (s) | | 8 | 7 | 0 | 17 | 5 | 7 | 0 | 17 |
| 3rd Street | Queue Length 95th (m) | | 53 | 39 | 0 | 17 | 18 | 39 | 0 | 17 |
| | Intersection LOS | | | A | | | | A | | |
| | Capacity Utilization | | | 53% | | | | 36% | | |
| | Utilization Increase | Queensbury | | 20% | | | | -19% | | |

Synchro (Version 8) macroscopic traffic simulation software was used to evaluate performance of intersections in the study area for the study scenarios. All results are based upon the Highway Capacity Manual (Transportation Research Board, 2010) intersection capacity reports generated by the software.

As a target or design parameter, the following is considered appropriate for the study area:

- Signalized Intersections – LOS D and v/c < 0.90 for all movements
- Non-signalized Intersections – LOS D for individual movements

**Figure 46.** East 3rd Street 2045 Hourly Volumes

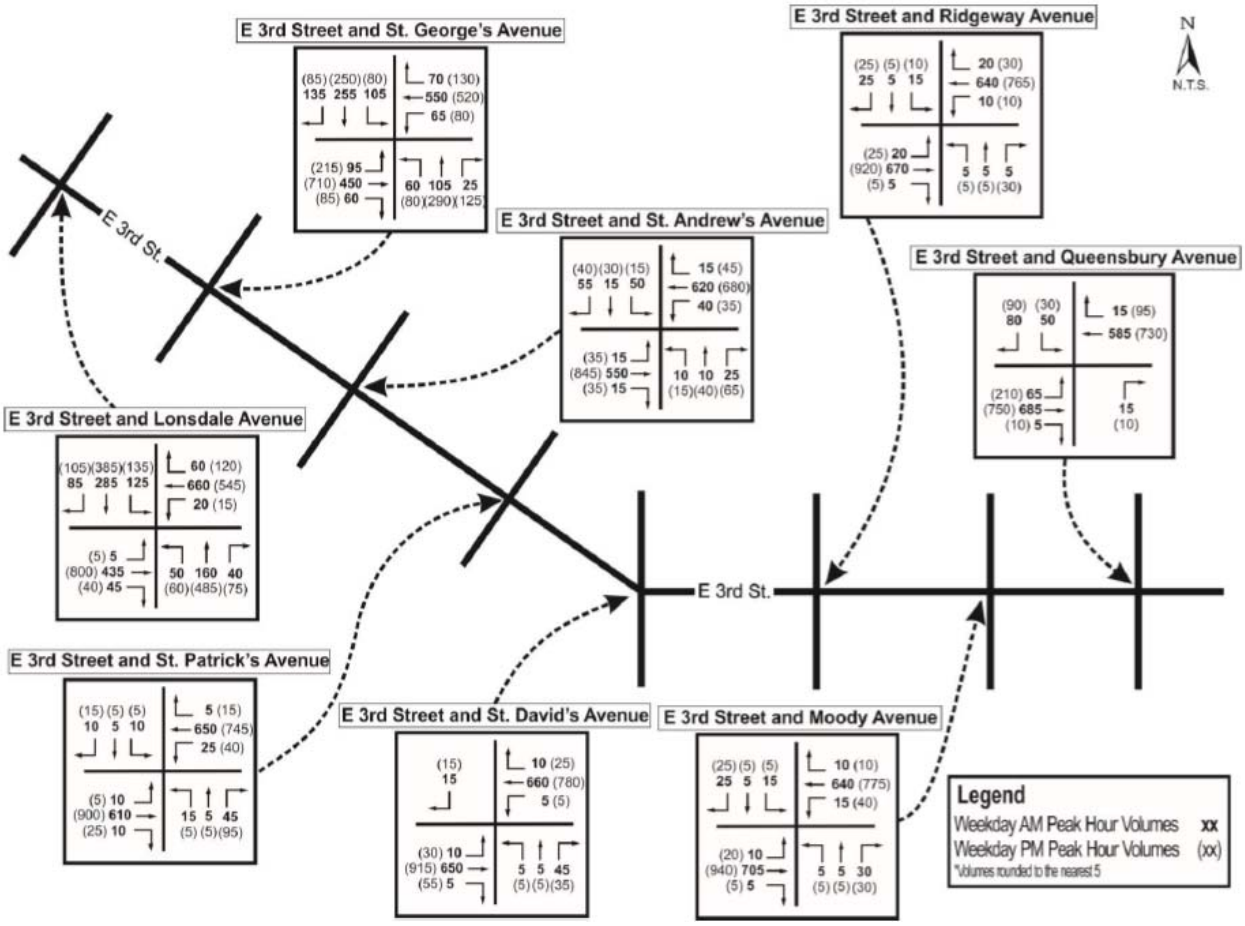


**Figure 47.** East 3rd Street 2045 LOS

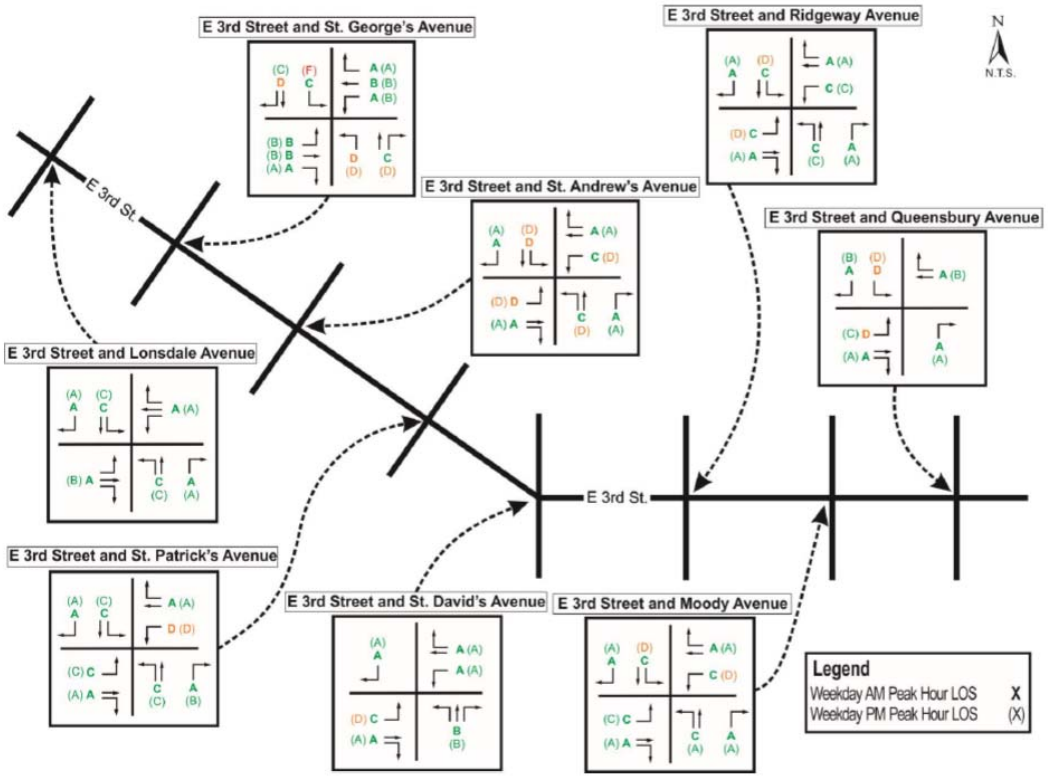



**Figure 48.** East 3rd Street 2045 V/C