2160 & 2080 EAST WELLINGTON ROAD

Traffic Impact Assessment

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1.0 INTRODUCTION

WATT Consulting Group is retained by East Wellington Developments Limited Partnership to prepare a Transportation Impact Assessment (TIA) for a proposed light industrial development at 2160 & 2080 East Wellington Road in the City of Nanaimo. The site location and study intersections are illustrated in **Figure 1**.

1.1 The Site Today

The site is bound by East Wellington Road to the south and Highway 19 (Nanaimo Parkway) to the east. The surrounding land use is industrial, rural resource, and rural residential. The site today is undeveloped with industrial lands to the north and east of the site and rural properties to the south and west. The area is generally accessed via East Wellington Road requiring vehicles to use the overpass to cross Highway 19. The general nature of the area is not expected to see significant changes in land use, based on the City Plan, beyond this development and therefore no significant increase in vehicle capacity needs.

1.2 Proposed Development

The proposed development could be up to 882,330 sq. ft. gross floor area (GFA) of light industrial land uses. The site is comprised of two lots: 2080 East Wellington which has R1 zoning (5.88 ha) and 2160 East Wellington Road which currently has a split zoning of I2 (9.18 ha) and R1 (10.2 ha). The total parcel area is 25.26 ha of which 9.18 ha is currently in the I2 zone. Rezoning for the 2080 East Wellington lot and residential zoned portion of 2160 East Wellington from R1 to I2 (Industrial) is being requested. This request is generally consistent with the City Plan.

The 2080 East Wellington parcel has a large wetland area which limits the potential industrial lot to approximately 0.32 ha. Therefore, of the proposed density, approximately half is on the existing I2 zoned portion of the site and half is on the portion being rezoned.

1.3 Terms of Reference

The terms of reference were written by Bunt & Associates and stated that the TIA would study all seven (7) intersections for Background 2026 AM and PM, Post Development 2026 AM and PM, Background 2036 AM and PM, and Post Development

2036 AM and PM with and without the Northfield Connector in all scenarios (extension of a new road through the site to connect East Wellington Road to the Highway 19 / Northfield Road intersection). Since the TOR was prepared, the Ministry of Transportation and Transit has requested that the intersection of Highway 19 / Jingle Pot Road be included in the analysis, for a total of eight (8) study intersections.

The Northfield Connector is not expected to be completed by 2026 as the actual routing / location of the Connector has not been identified and preliminary design has not been started. Design and construction would take more than two years to be completed from the time of this report. Therefore, this study assesses the 2026 opening year (with and without the development) with the existing road network. All eight intersections will be assessed in the both the 2026 and 2036 horizon years (background and post development) with and without the Northfield Connector, for comparison purposes.

The scope of work for this TIA is listed below:

- Utilize existing weekday AM and PM turning movement counts for study area intersections.
- Assess existing and 2026 background traffic conditions and report on v/c, delay, and queues.
- Generate traffic for proposed maximum density based on the proposed land use and density, using trip generation rates from the *ITE Trip Generation Manual (11th ed.)*.
- Determine trip distribution and assign site-generated traffic to the surrounding road network based on the existing road network (without the Northfield Road connection).
- Assess 2026 opening year post development traffic conditions with existing road network and identify any issues resulting from the addition of the development traffic.
- Identify potential mitigation measures to address potential issues due to development traffic in the 2026 opening year. This may include changes in traffic control (additional lanes, stop signs, traffic signals or roundabouts). Each mitigation measure will be reviewed at a high level to determine if it can feasibly be constructed within existing rights of way.
- Assess 2036 background and post-development traffic conditions with and without the Northfield Connector and identify any issues resulting from the development traffic and/or the new road connection.

- Review pedestrian, bicycle, and transit facilities in the area and identify any required improvements due to the development to improve the active transportation network. Assess up to 500m from development site. This includes integration with any existing facilities to/from the site. This will be reviewed in the context of the City Plan.

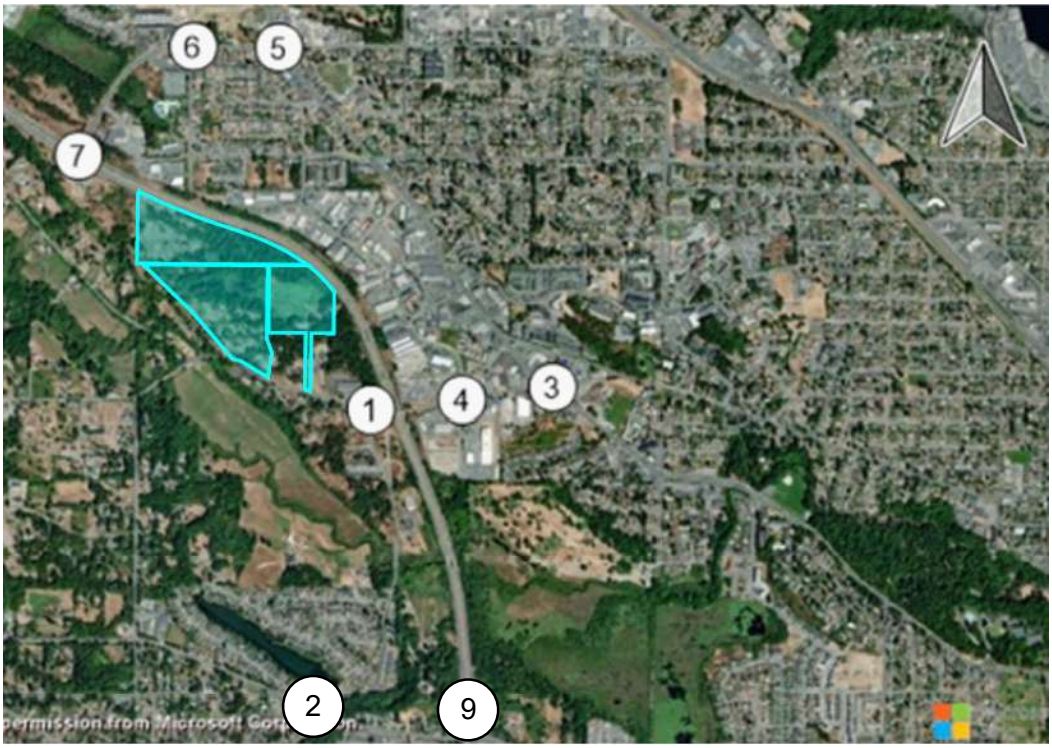


Figure 1 - Site Location and Study Intersections

#	Intersection	#	Intersection
1	East Wellington Road / Westwood Road (Stop Control)	5	Bowen Road / Northfield Road (Signal)
2	Jingle Pot Road / Westwood Road (Signal)	6	Northfield Road / Boxwood Road (Signal)
3	Bowen Road / East Wellington Road (Signal)	7	Highway 19 / Northfield Road (Signal)
4	East Wellington Road / Boxwood Road / Madsen Road (Stop Control)	9	Highway 19 / Jingle Pot Road

2.0 TRANSPORTATION CONTEXT

2.1 Road Network

2.1.1 Existing Road Network

The existing lane configuration and intersection control within the study area are illustrated in **Figure 2**. An outline of the characteristics of the existing roads and intersections within the study area are provided in **Table 1** and **Table 2**, respectively.

Table 1 – Existing Road Network

Road Name	Ownership	Classification	Posted Speed Limit	Features
East Wellington Road	City of Nanaimo	Industrial Collector / Urban Collector	50 km/h	Two 4.0m lanes (one in each direction) with paved shoulder on south side west of overpass. On overpass and east of highway there are two lanes.
Nanaimo Parkway (Highway 19)	MoTI	4 Lane Rural Divided Arterial	90 km/h	3.7m lanes (two in each direction divided by a land median); Provincial Truck Route/Hazardous Goods Route.
Westwood Road	City of Nanaimo	Urban Collector	50 km/h	Two 3.4-5.0m lanes (one in each direction) with street parking on the east side of the road between 188-232 Westwood Rd. East side has a paved shoulder.
Jingle Pot Road	City of Nanaimo	Urban Collector / Urban Arterial (East of Hwy 19)	50 km/h	Two 4.0m lanes (one in each direction) with a paved shoulder on the north side and a sidewalk on the south side. Part of the Municipal Truck Route (east of Highway 19)

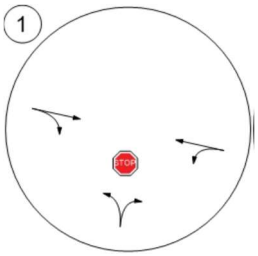
Boxwood Road / Madsen Road	City of Nanaimo	Industrial Collector / Local (south of East Wellington)	50 km/h	Two 3.4-3.7m travel lanes (one in each direction) with a mix of gravel shoulders, unbuffered bicycle lanes and a sidewalk with boulevard on the east side. Eventually the east side boulevard becomes parking bays. North of Dufferin Road on-street parking continues on the east side. North of Island Diesel Way there is parking on both sides of the road. Municipal Truck Route between Dufferin Crescent and Northfield Road
Bowen Road	City of Nanaimo	Mobility Arterial / Urban Arterial	50 km/h	Four 3.7m lanes (two in each direction) with a centre median and left turn lanes at intersections and driveways; Municipal Truck Route
Northfield Road	City of Nanaimo	Mobility Arterial / Urban Arterial	50 km/h	Two 3.6m lanes (one in each direction) with left turn at Boxwood Road. Sections of four lanes near Boxwood Road / Northfield Road and Bowen Road / Northfield Road. Municipal Truck Route between Bowen Road and Highway 19.

Table 2 – Study Area Intersection Overview

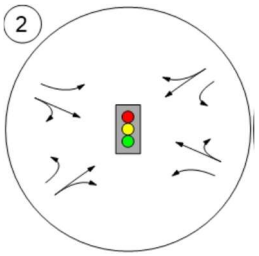
Intersection	Control Type	Crosswalks	Features
East Wellington Road / Westwood Road	Stop Controlled	West and South legs	"T" Intersection, no north leg; West crosswalk has pedestrian activated flashers. Parkway Trail connects to north side of the intersection and continues south from the southeast corner of the intersection.
Jingle Pot Road / Westwood Road	Signalized	All legs	Eastbound and westbound channelized right turns, left turn lanes on all legs

East Wellington Road / Madsen Road / Boxwood Road	Stop Controlled	South leg	Shared left/through/right lanes on all approaches
East Wellington Road / Bowen Road	Signalized	All legs	Northbound and southbound channelized right turns, westbound right turn lane, left turn lanes on all legs; Eastbound and westbound left turns are protected/permitted
Bowen Road / Northfield Road	Signalized	All legs	Northbound channelized right turns. Protected-permissive left turns on all movements. Road returns to a two-lane, two-way cross-section east and west of the signal. Signal is in coordination with Bowen Road / Boxwood Road as the reference intersection (controller).
Northfield Road / Boxwood Road	Signalized	All legs	Westbound channelized right turn, eastbound, westbound, and northbound left turn lanes, southbound right turn lane. In coordination with Bowen Road / Northfield Road. Protected left turns northbound and southbound. No right turn on red southbound.
Northfield Road / Highway 19	Signalized	North, East, West legs	Channelized right turn lanes and left turn lanes on all legs. Acceleration lanes provided on Highway 19 (eastbound and westbound right turns). Northbound and southbound left turn phases are protected. Eastbound and westbound are split phased.

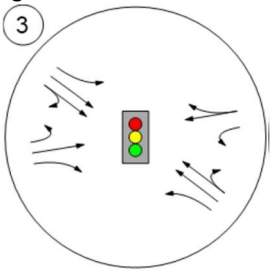
Highway 19 / Jingle Pot Road	Signalized	All legs	Channelized right turn lanes and left turn lanes on all legs. Acceleration lanes provided on Highway 19 (eastbound and westbound right turns). The northbound, southbound, and eastbound left turn phases are protected, while the westbound left turn phase is protected-permissive.



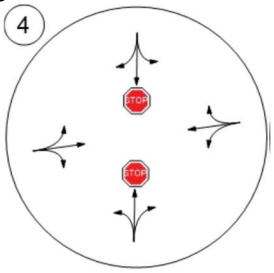
1. East Wellington Road / Westwood Road



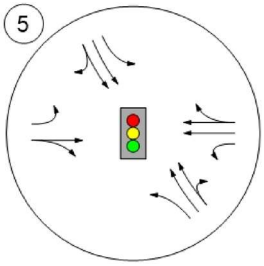
2. Jingle Pot Road / Westwood Road



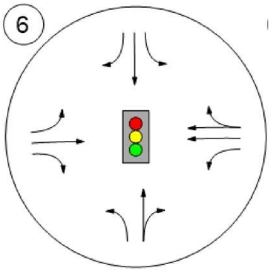
3. Bowen Road / East Wellington Road



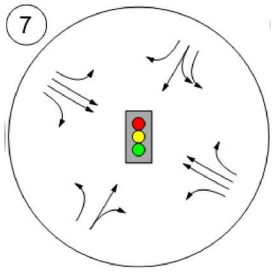
4. East Wellington Road / Boxwood Road / Madsen Road



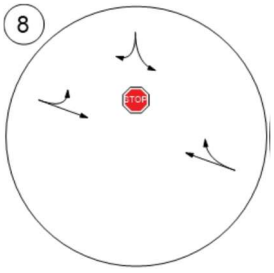
5. Bowen Road / Northfield Road



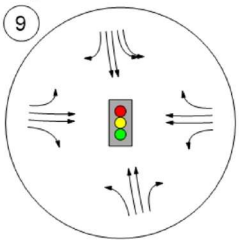
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road



8. East Wellington Road / Site Access



9. Highway 19 / Jingle Pot Road

Figure 2 – Lane Configuration and Intersection Control

2.1.2 Evolving Road Network

The City of Nanaimo has identified in their City Plan a connector road from the Highway 19 / Northfield Road intersection connecting to East Wellington Road. The proposed Northfield Connector route is illustrated as a line on a map with no topographical, environmental or constraint considerations. This line runs along the west side of the site (**Figure 3**). Further alignment assessment and preliminary design is required, by the developer, to determine the route from the site to Highway 19. The internal road network for the development could become this route; however, development of a new parallel route to Highway 19 within an industrial development may not be ideal.

The extension of Northfield Road west of the Highway 19 intersection is subject to Ministry of Transportation and Transit (MoTT) acceptance and approval. There are no current plans for changes to the Highway 19 / Northfield Road intersection by MoTT .

The City of Nanaimo complete the Midtown Gateway (Phase 2) project, during the process of this study, which is creating over 2 kms of new off-street active transportation pathways and creating a new vehicle network between Northfield Road and Bowen Road that will increase the safety and comfort for all users as well as the flow of traffic for commercial and industrial goods. Updated vehicle volumes provided by the City of Nanaimo from April 2026 were used in the latest version of this study; therefore, updated traffic patterns at the intersections of Northfield Road / Boxwood Road and Bowen Road / Northfield Road are expected to be reflected in the analysis.

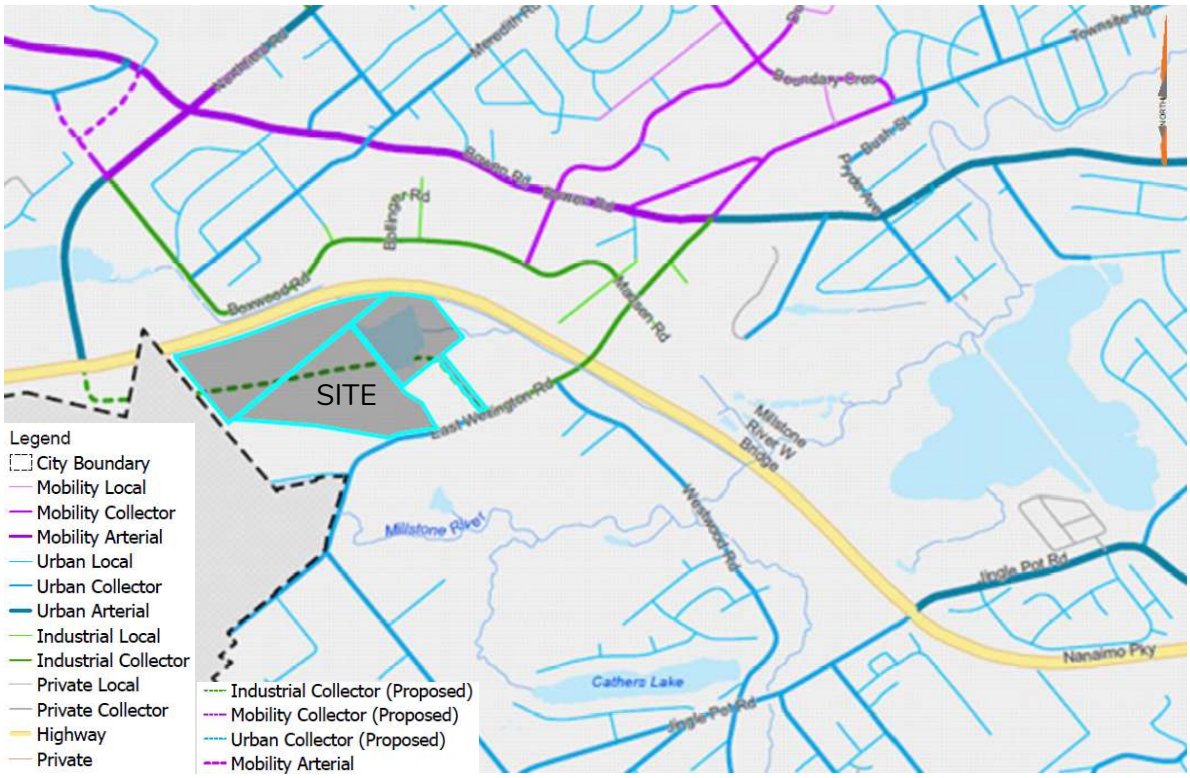


Figure 3 – Existing and Evolving Road Network

2.2 Transit Network

There are no transit routes running in the vicinity of the site and the Transit Future Plan does not have any planned routes, but this could be reviewed by RDN Transit and the City.

2.3 Cycling Network

2.3.1 Existing Cycling Network

The existing cycling network in the vicinity of the site is summarized in **Table 3**, and illustrated in **Figure 4**.

Table 3 – Existing Cycling Network

Road Name	Type of Facility	Features
East Wellington Road	Signed Route	Begins east of Westwood Road on both sides of the road, except for a section east of Hansen Road to Bowen Road where only on the south side of the road; Connects to Parkway Trail along Highway 19
Nanaimo Parkway (Highway 19)	Paved Shoulder	
Westwood Road	None	Westwood Rd has 50m of bike lanes on the north and south of Jingle Pot Road
Jingle Pot Road	Bike lanes / Signed Route / MUP	At the intersection of Jingle Pot Road / Westwood Road there are unbuffered bike lanes, east of Jingle Pot Road / Westwood Rd the north side of the road continues as a signed route which switches to bike lanes at the intersection with Third Street; the south side of the road has a MUP between Venuti Way and Third Street

Boxwood Road	Discontinuous bike lanes Protected bike lanes / MUP	There is a short section of bicycle lane southbound to the roundabout at Dufferin Crescent, and north there is an unbuffered bicycle lane on the west side from Tulas Road to near Dufferin Crescent. There are protected bike lanes and a multi-use pathway to the north of Northfield Road, serving the Midtown Gateway development.
Madsen Road	None	
Bowen Road	None	
Northfield Road	Signed Route	East of Bowen Rd: Signed Route, West of Bowen Rd: unmarked shoulder with short sections on the south side of the road have bike lanes
Parkway Trail	MUP	Multi-use trail that runs parallel to Highway 19. Fully protected.

Figure 4 – Existing Cycling Network

2.3.2 Evolving Cycling Network

The City Plan identifies that all of the key corridors within the study area are planned Secondary Active Mobility Routes except the section of East Wellington Road from Westwood Road to the municipal boundary, west of the site. Connection of the cycling facilities on Northfield Road between Bowen Road and Boxwood Road have been completed as part of the Midtown Gateway development. The development will add bicycle facilities along their East Wellington Road frontage and the section of the Northfield Road connector through the site to the City's standard cross sections.

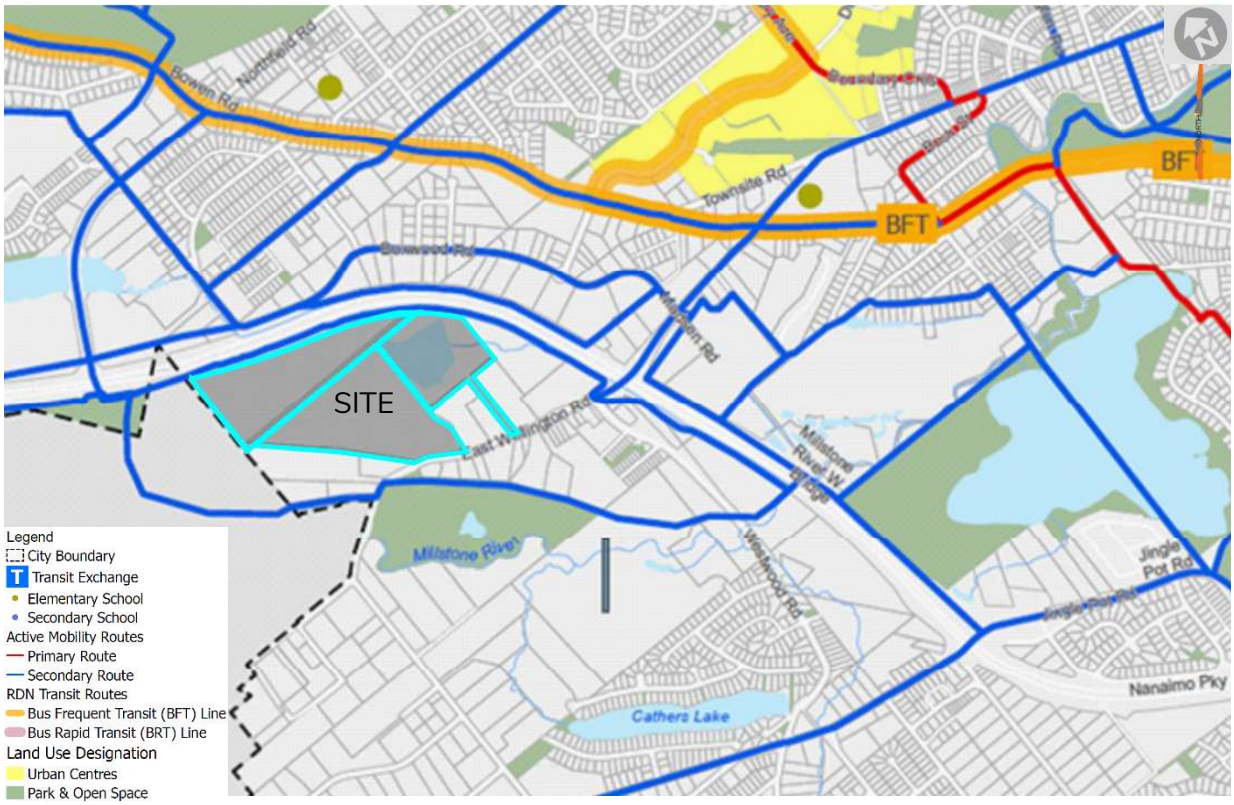


Figure 5 – Evolving Cycling Network

2.4 Pedestrian Network

2.4.1 Existing Pedestrian Network

The existing pedestrian network in the vicinity of the site is summarized in **Table 4**.

Table 4 – Existing Pedestrian Network

Road Name	Type of Facility	Features
East Wellington Road	Sidewalk, paved shoulder	Sidewalk on south side of the road from Westwood Rd to Madsen Rd, Asphalt on south side of the road from Madsen Rd to Townsite Rd; Crosswalk on west leg of East Wellington Rd / Westwood Rd
Nanaimo Parkway (Highway 19)	None	None
Westwood Road	Sidewalk, paved shoulder	Sections of sidewalk and boulevard on the west side but numerous gaps with no sidewalk or paved shoulder.
Jingle Pot Road	Sidewalk, paved shoulder	Sidewalk on both sides of the road at Westwood Road and Bowen Road intersections. Between Westwood Road and Bowen Road, the south side of the road has an asphalt path with a paved shoulder on the north.
Boxwood Road	Sidewalk, paved shoulder	Closest to East Wellington has only gravel shoulders, which transitions to unbuffered bicycle lanes and a sidewalk with boulevard on the east side. North of Dufferin Road the sidewalk switches to the west side. North of Island Diesel Way there is no sidewalks.
Madsen Road	None	None

Bowen Road	Sidewalk, paved shoulder	Sidewalk on both sides of the road from East Wellington Rd to Northfield Rd, south of East Wellington Rd a block on the west side of the road is asphalt only.
Northfield Road	Sidewalk, paved shoulder	Sidewalk at intersection corners, east of 2161 Northfield Rd sidewalk on the north side of the road which ends at Boxwood Rd and asphalt on the south side of the road. Sidewalk ends east of Bowen Rd and has a couple more discontinuous sections on the south side of the road east of Bowen Rd.
Parkway Trail	Paved MUP	Crosswalks available for road crossings

2.4.2 Evolving Pedestrian Network

Sidewalk have been added on the north side of Northfield Road between Boxwood Road and Bowen Road as part of the Midtown Gateway development.

3.0 PROPOSED DEVELOPMENT

The proposed development may have up to 882,330 sq. ft. light industrial density. Possible uses are auto parts sales, commercial school, furniture and appliance sales, tools/equipment rentals and sales, veterinary clinic, office, restaurants, and retail.

The key land uses and transportation-related elements of the proposed site plan are summarized in **Table 5**.

Table 5 – Development Proposal

Site Element	Details
Industrial GFA	882,330 sq. ft.
Vehicular Access	One full movement access on East Wellington Road. Potential for secondary access to north if Northfield Connector built.
Vehicular Parking Supply	As per the City of Nanaimo Parking Bylaw
Loading Space Supply	As per the City of Nanaimo Parking Bylaw
Bicycle Parking Supply	As per the City of Nanaimo Parking Bylaw

3.1 Site Access

The site access is planned to be on the east side of the 2160 East Wellington Road frontage. Due to the horizontal curve in the road and the vertical grade to the west (access is positioned at the top of a vertical crest curve) there are limited sight lines at this proposed location for a vehicle turning from a stop. This can be remedied by signalizing the intersection which eliminates the need for turning sight distance looking to the right to make the left turn. The turning sight distance for a right turning vehicle is met for a vehicle at a stop (looking to the left) which would allow for right turns on red at the signal. Based on current information, there may be sufficient sightlines for vehicles travelling eastbound to see the signal with sufficient stopping sight distance (65m), but this will need to be confirmed during detailed design of the signal and an assessment will be required to confirm if an advance warning flasher is required in the eastbound direction based on the sight lines.

The City has requested a roundabout for this intersection based on the site access road becoming the connector road; however, a roundabout is not operationally needed long term, even with the Northfield Connector. Right-of-way for a future roundabout (by others) will be provided at East Wellington Road / Northfield Connector (site road) from the development property. **Table 6** outlines the required and measured sight distances for the proposed site access location along 2160 East Wellington Road.

Table 6 – Turning Sight Distance Requirements at Site Access/East Wellington

Direction	Speed Limit	Required Sight Distance	Measured Sight Distance	Achieved?
Looking East & Turning Right	50 km/h	105m	105m	Yes
Looking East & Turning Left	50 km/h	105m	105m	Yes
Looking West & Turning Left	50 km/h	105m	50m	No

3.2 Site Internal Road

According to the City of Nanaimo's *City Plan* (2022), the proposed Northfield Connector is classified as a future industrial collector road. These roads features two-lane, two-way cross-section with 3.9m wide travel lanes, and a flex zone separating sidewalks and protected bicycle paths from vehicle traffic.

Based on discussions with the City of Nanaimo the internal road through the site, which will become the Northfield Connector, will be built to the Industrial Collector standard.

4.0 TRAFFIC OPERATIONS ANALYSIS

4.1 Traffic Analysis Scenarios and Time Periods

Traffic operations analysis has been undertaken during the weekday AM and PM peak periods under the following scenarios:

- Existing Conditions (**Section 4.4**)
- 2026 Background Conditions (**Section 4.5**)
- 2026 Post-Development Conditions without the Northfield Connector (**Section 4.6**)
- 2036 Background Conditions without the Northfield Connector (**Section 4.5**)
- 2036 Post-Development Conditions without the Northfield Connector (**Section 4.6**)
- 2036 Background Conditions with the Northfield Connector (**Section 5.2**)
- 2036 Post-Development Conditions with the Northfield Connector (**Section 5.3**)

The proposed Northfield Connector from Northfield Road to East Wellington Road is assumed to not be completed by opening day (2026) but may be completed by the horizon year of 2036; therefore, in 2036 both road network scenarios (with and without the connector) are analyzed.

The intersections of Northfield Road at Highway 19, Boxwood Road, and Bowen Road have been included in both the "without Northfield Connector" and the "with Northfield Connector" scenario, to investigate the differences at the intersections from the network changes. The recent intersection upgrades at Northfield Road / Boxwood Road, and at Bowen Road / Northfield Road, have also been integrated in to this version of the TIA.

The intersection of Highway 19 / Jingle Pot Road has been included in the analysis by request of the Ministry of Transportation and Transit (MoTT), to help inform how the existing movements from the area to Highway 19 (Nanaimo Parkway) are expected to change with the addition of the Northfield Connector.

4.2 Methodology and Performance Evaluation Criteria

Intersection capacity analysis for the existing and proposed conditions was completed using the Vistro software package, which uses the Highway Capacity Manual (HCM) evaluation methodology.

Results are measured in volume-to-capacity ratio, delay (seconds), 50th and 95th percentile queue length (metres). HCM does not generate reports for a 50th percentile queues for unsignalized intersections, therefore they will not be included in this report.

The volume-to-capacity ratio (v/c) is an indicator of the capacity utilization for the key movements in the intersection. A v/c of 1.0 indicates that certain governing traffic movements through the intersection are operating at maximum capacity.

The following values have been selected as the threshold between acceptable and unacceptable performance at the study area intersections:

- **v/c**: 0.9 or greater
- **Delay**: greater than 35 seconds on any given lane for unsignalized intersections, and greater than 55 seconds on any given lane for signalized intersections
- **Queue lengths**: exceeds existing storage length or obstructing upstream intersections

The existing storage lengths for the turn lane at the study area intersections are summarized in **Table 7**.

Table 7 – Existing Storage Capacity

Lane	Storage Length (m)
Jingle Pot Road / Westwood Road (Signalized)	
NBL	45
SBL	35
EBL	50
WBL	40
Bowen Road / East Wellington Road (Signalized)	
NBL	40
SBL	50
EBL	60
EBR	20
WBL	30
Bowen Road / Northfield Road (Signalized)	
NBL	130
SBL	50
EBL	105
WBL	55
Northfield Road / Boxwood Road (Signalized)	
NBL	40
SBL	50
SBR	60
EBL	100
EBR	200
WBL	50
WBTR	50
Highway 19 / Northfield Road (Signalized)*	
NBL	170
NBR	140
SBL	220
SBR	150
EBL	30
WBL	70
Highway 19 / Jingle Pot Road (Signalized)*	
NBL	165
NBR	200
SBL	200
SBR	200
EBL	65
EBR	15
WBL	45
WBR	375

*includes storage and PL length combined

4.3 Input and Calibration Parameters

Heavy Vehicle Percentage

The percentage of heavy vehicles for each movement was based on the turning movement counts. Where not available, a default value of 2 percent heavy vehicles was assumed. For movements that showed 0% a default value of 1% was assumed to be conservative.

Peak Hour Factor

Where available, the Peak Hour Factor (PHF) at each intersection was based on the obtained turning movement count data. Where not available, a default PHF of 0.90 was used.

According to the Highway Capacity Manual, typical peak hour factors range from 0.88 in rural areas to 0.92 in urban areas. Given that the project area is neither heavily urbanized nor remote and rural, a default PHF of 0.90 was selected.

Signal Timings

Existing signal timings were used for all scenarios.

Updated signal timings for the Northfield Road / Boxwood Road, and Bowen Road / Northfield Road were obtained from the City of Nanaimo in May 2026, incorporating the recent intersection upgrades. The new intersection configurations and timings have been updated in this traffic operations analysis.

4.4 Existing Conditions

4.4.1 Existing Traffic Volumes

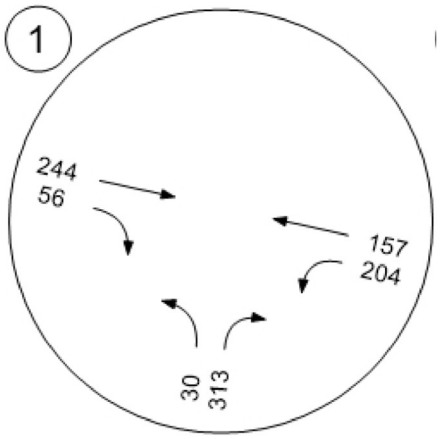
Traffic movement counts were collected by Bunt & Associates from February 13-15, 2024, from 07:00-09:00 and 16:00-18:00. The AM peak hour for this study is 07:45-08:45 and the PM peak hour is 16:00-17:00. The City provided an AM traffic count for the intersection of East Wellington Road / Westwood Road that had higher westbound left turn volumes (60 vph). Both the Bunt data and the City data for the intersection represented typical count days when school was in session. This illustrates that volumes can fluctuate from day to day and the analysis of the volumes is a snapshot of conditions. A sensitivity assessment of the City volumes for this intersection found that mitigation identified in the following sections does not change based on the volume of the westbound left turn.

The existing turning movement counts were reviewed to ensure general consistency in traffic volumes between intersections. The existing traffic volumes for the weekday AM and PM peak periods are illustrated in **Figure 6** and **Figure 7**, respectively.

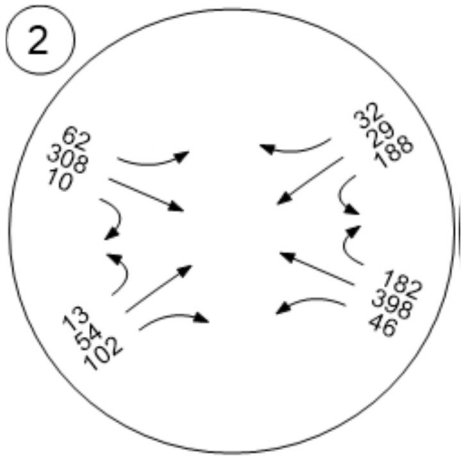
For the intersection of Highway 19 and Jingle Pot Road, which was added at the request of the Ministry of Transportation and Transit (MOTT), existing (2025) AM and PM turning movement counts were obtained from Synchro reports prepared for a nearby project completed by ISL Engineering.

For the intersections of Northfield Road / Boxwood Road and Bowen Road / Northfield Road, updated turning movement counts were obtained from the City of Nanaimo using the permanent intersection cameras in April 2026. These volumes, along with updated signal timing to reflect the recent laning changes, have been integrated into the analysis.

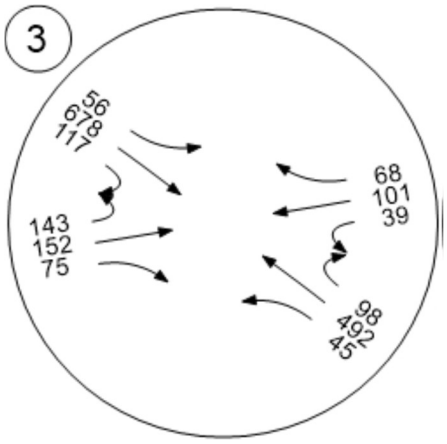
Average daily traffic (ADT) estimates for the *existing condition* are provided in **Figure 8** for reference. These two-way ADT estimates are based on PM peak hour traffic counts in the area and assume a k-factor of 10.



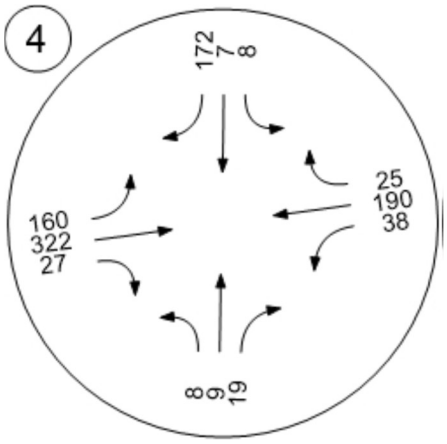
1. East Wellington Road / Westwood Road



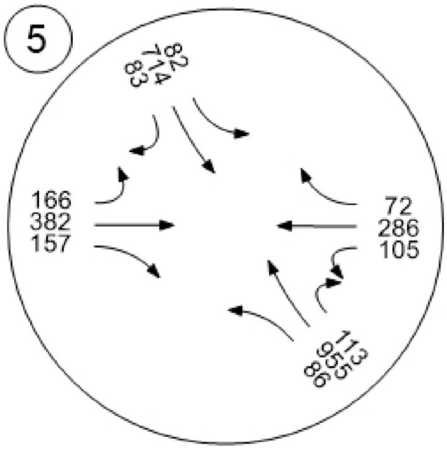
2. Jingle Pot Road / Westwood Road



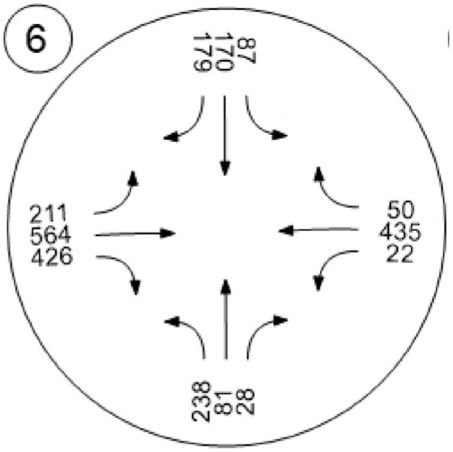
3. Bowen Road / East Wellington Road



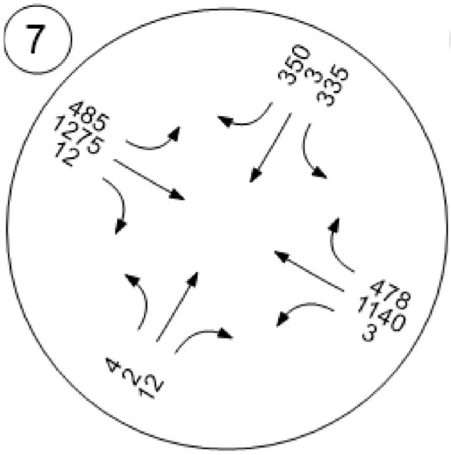
4. East Wellington Road / Boxwood Road / Madsen Road



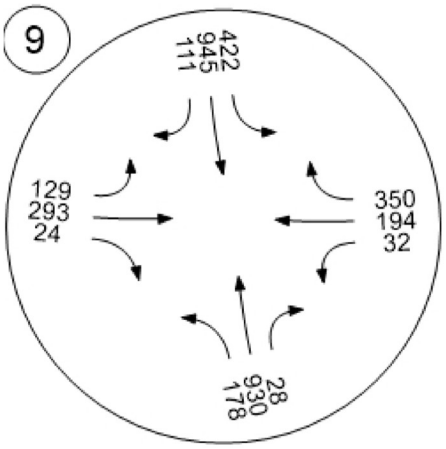
5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road

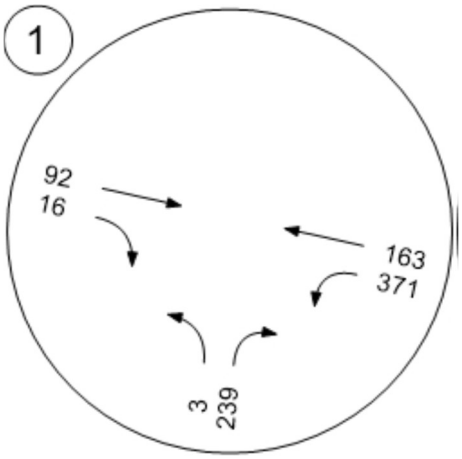


7. Highway 19 / Northfield Road



9. Highway 19 / Jingle Pot Road

Figure 6 – Existing Traffic Volumes – AM Peak Hour



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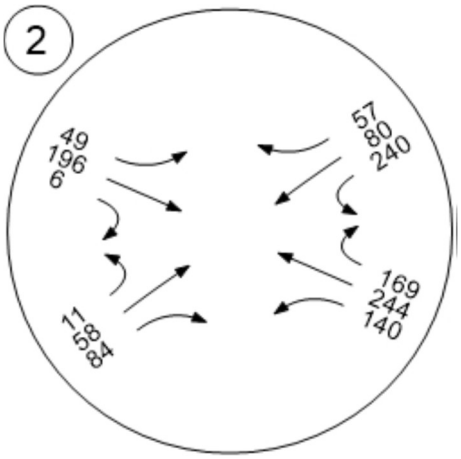
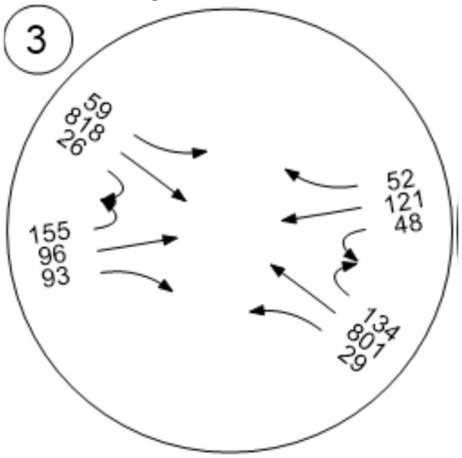


2. Jingle Pot Road / Westwood Road



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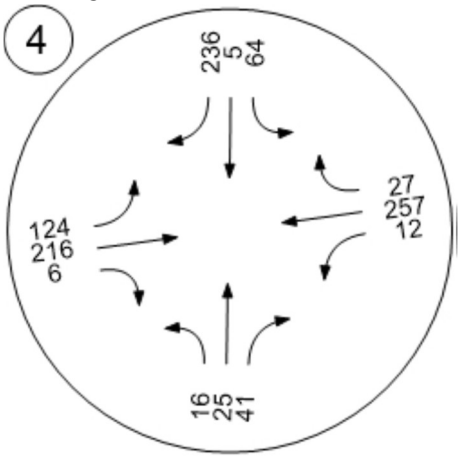
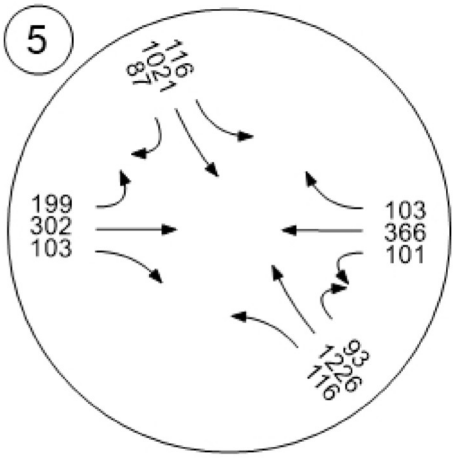


4. East Wellington Road / Boxwood Road / Madsen Road



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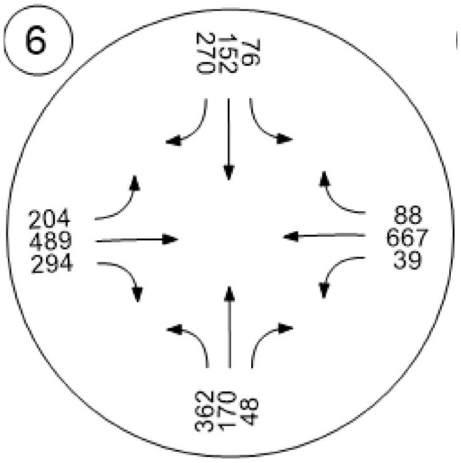
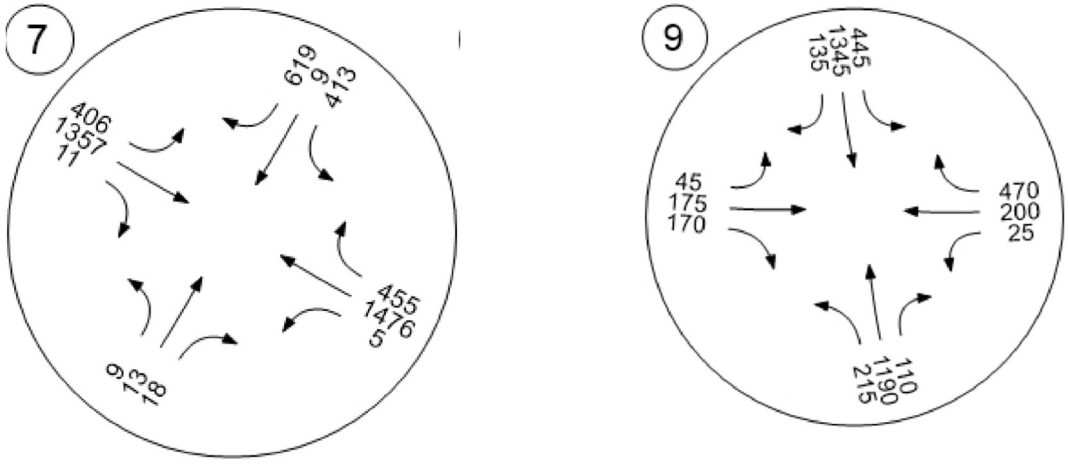


6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

9. Highway 19 / Jingle Pot Road

Figure 7 – Existing Traffic Volumes – PM Peak Hour

Figure 8 - Existing ADT Estimates

4.4.2 Existing Traffic Operations

Intersection analysis results for the existing AM and PM peak hours conditions are summarized in **Table 8** and **Table 9**.

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Table 8 – Existing Conditions – AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.41	16.3	-	24
EBT/R	0.00	0	-	0
WBL/T	0.16	4.6	-	3
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02	10.3	1	1/45
NBT/R	0.22	9.4	4	8
SBL	0.40	13.9	10	17/35
SBT/R	0.09	8.8	2	38
EBL	0.18	14.2	3	6/50
EBT/R	0.40	7.5	9	17
WBL	0.10	10.6	2	4/40
WBT/R	0.63	9	17	31
Bowen Road / East Wellington Road (Signalized)				
NBL	0.12	14.2	4	8/40
NBT	0.28	8.7	19	33
NBT/R	0.28	8.7	18	32
SBL	0.12	12.4	5	9/50
SBT	0.37	9.6	27	49
SBT/R	0.37	9.6	26	47
EBL	0.36	28.9	20	37/60
EBT	0.56	36.5	24	43
EBR	0.22	33.3	8	14/20
WBL	0.10	24.8	5	9/30
WBT/R	0.48	33.9	23	41

East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.08	23.5	-	4
SB	0.24	13.8	-	10
EB	0.12	2.5	-	2
WB	0.03	1.2	-	1
Bowen Road / Northfield Road (Signalized)				
NBL	0.25	19.6	9	16/130
NBT	0.98	87.5	157	214
NBT/R	0.98	89.1	154	210
SBL	0.31	24.6	10	17/50
SBT	0.72	33.5	67	104
SBT/R	0.72	33.7	65	102
EBL	0.35	19.2	19	34/105
EBT/R	0.95	67.9	129	181
WBL	0.36	25.9	13	24/55
WBT	0.39	29.0	26	47
WBT/R	0.40	29.1	25	45
Northfield Road / Boxwood Road (Signalized)				
NBL	1.08	254.7	142	204/40
NBT/R	0.23	32.9	16	28
SBL	0.81	62.0	21	37/50
SBT	0.63	45.4	34	61
SBR	0.76	49.0	38	66/60
EBL	0.39	16.6	23	42/100
EBT	0.71	28.3	94	138
EBR	0.00	0.0	0	0/200
WBL	0.06	16.3	2	4/50
WBT	0.35	24.5	34	60
WBT/R	0.35	24.6	33	59/50

Highway 19 / Northfield Road (Signalized)				
NBL	0.08	52.6	1	1/170
NBT	1.21	424.6	472	644
NBR	0.33	29.8	21	38/140
SBL	0.88	42.4	93	137/220
SBT	0.65	14.0	60	96
SBR	0.01	7.4	0	0/150
EBL	0.06	49.1	1	2
EBT/R	0.08	49.2	1	2
WBL	0.84	75.8	52	84/70
WBLT	0.84	83.0	44	74
WBR	0.52	46.0	21	38/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.84	54.2	35	62/165
NBT	0.79	29.4	67	104
NBR	0.03	19.0	1	3/200
SBL	0.82	43.7	37	64/200
SBT	0.73	25.7	63	99
SBR	0.09	17.5	5	10/200
EBL	0.82	57.7	28	50/65
EBT	0.60	40.0	25	45
EBR	0.00	0.0	0	0/15
WBL	0.10	28.1	4	8/45
WBT	0.68	46.7	18	33
WBR	0.00	0.0	0	0/375

= Value exceeding threshold X/X – Queue/Storage

Table 9 - Existing Conditions - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.25	10.5	-	8
EBT/R	0.00	0	-	0
WBL/T	0.25	5.5	-	6
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02	9.2	0	1/45
NBT/R	0.17	7.2	3	6
SBL	0.44	12	11	19/35
SBT/R	0.17	7.3	3	6
EBL	0.14	14	2	4/50
EBT/R	0.30	8.6	7	12
WBL	0.31	13	7	12/40
WBT/R	0.52	9.9	12	22
Bowen Road / East Wellington Road (Signalized)				
NBL	0.08	13.8	3	5/40
NBT	0.42	9.9	33	59
NBT/R	0.42	9.9	32	57
SBL	0.18	16	6	11/50
SBT	0.39	9.5	30	54
SBT/R	0.40	9.6	30	53
EBL	0.40	30.3	23	41/60
EBT	0.37	35.1	15	26
EBR	0.29	34.4	10	18/20
WBL	0.11	25.3	6	11/30
WBT/R	0.54	35.5	24	44
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.01	19	-	7
SB	0.31	21.9	-	32
EB	0.10	2.9	-	2
WB	0.01	0.3	-	0

Bowen Road / Northfield Road (Signalized)				
NBL	0.37	21.0	12	22/130
NBT	0.95	60.9	169	228
NBT/R	0.95	63.2	169	228
SBL	0.45	29.4	15	26/50
SBT	0.80	37.2	109	156
SBT/R	0.80	37.7	107	154
EBL	0.5	27.9	30	54/105
EBT/R	0.91	60.5	95	140
WBL	0.34	29.3	15	27/55
WBT	0.63	42.5	45	76
WBT/R	0.64	42.8	43	73
Northfield Road / Boxwood Road (Signalized)				
NBL	1.12	316.1	257	353/40
NBT/R	0.31	28.9	32	58
SBL	0.80	69.8	20	37/50
SBT	0.42	43.5	32	57
SBR	0.88	73.7	79	119/60
EBL	0.55	30.2	33	59/100
EBT	0.75	41.1	107	154
EBR	0.00	0.0	0	0/200
WBL	0.13	23.5	5	9/50
WBT	0.64	41.0	77	117
WBT/R	0.64	41.1	76	115/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.13	51.4	1	2/170
NBT	1.46	873.0	982	1398
NBR	0.30	27.5	18	33/140
SBL	0.87	40.6	74	113/220
SBT	0.73	16.4	73	112
SBR	0.00	9.1	0	0/150
EBL	0.07	44.1	2	3
EBT/R	0.13	44.6	3	6

WBL	0.85	75.2	57	91/70
WBLT	0.85	75.1	57	91
WBR	0.84	75.9	51	83/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.89	72.5	54	87/165
NBT	0.78	24.9	84	125
NBR	0.08	15.1	5	9/200
SBL	0.99	87.0	61	96/200
SBT	0.90	30.0	107	154
SBR	0.10	15.6	6	11/200
EBL	0.67	65.2	11	20/65
EBT	0.54	46.5	17	31
EBR	0.00	0.0	0	0/15
WBL	0.09	34.9	4	7/45
WBT	0.70	50.5	20	37
WBR	0.00	0.0	0	0/375

= Value exceeding threshold X/X – Queue/Storage

Most intersections adjacent to the study area currently operate well in both the AM and PM peak hours with no queuing issues. However, the northbound, southbound, and eastbound left turn movements at the intersection of Highway 19 / Jingle Pot Road fail to meet acceptable performance thresholds under existing PM peak hour conditions, due to the overall high volumes along the highway. The operations at this intersection are a known issue for the Ministry, and mitigations *options have been identified by MoTT as part of the Nanaimo Parkway and Nanoose Bay Corridor Study (2021)*for this segment of Highway 19 (Nanaimo Parkway). According to this analysis, signal timing optimization is expected to improve the existing southbound movements to acceptable levels; however, the northbound movements are limited by insufficient capacity and will require an additional northbound left turn lane to address failing operations or conversion of the intersection to an interchange.

At the intersections along Northfield Road, various movements operate below acceptable performance thresholds in both the AM and PM peak periods. At Bowen Road / Northfield Road, both northbound through lanes and the eastbound through/right lane operates below the acceptable performance thresholds. This intersection has been recently upgraded; therefore, no further mitigations are

recommended. Optimization to the signal timing as traffic grows in the area can be implemented to improve traffic operations in a minor capacity.

The fully protected northbound and southbound left turns at Northfield Road / Boxwood Road also operate below acceptable thresholds, with northbound queues reaching over 300m along Boxwood Road in the PM peak hour. Signal timing optimization can be implemented to improve operations; although, significant improvement is limited from a traffic operations perspective as a result of the fully protected nature of these movements.

Finally, at the intersection of Highway 19 / Northfield Road, operations in both the AM and PM peak are well beyond acceptable performance thresholds, with significant delay and queueing for the northbound through and the all westbound movements. No mitigations are recommended, as the intersection is expected to yield minimal benefit without adding additional capacity (such as an interchange).

4.5 Background Conditions (without Connector)

4.5.1 Corridor Growth

Corridor growth on all streets in the study area was forecast using a 1.0% annual linear growth rate applied to the observed volumes from 2024 to the 2026 and 2036 horizon years.

Intersection counts at Northfield Road / Boxwood Road and Bowen Road / Northfield Road were not scaled to 2026 horizon year, since they were obtained in April 2026.

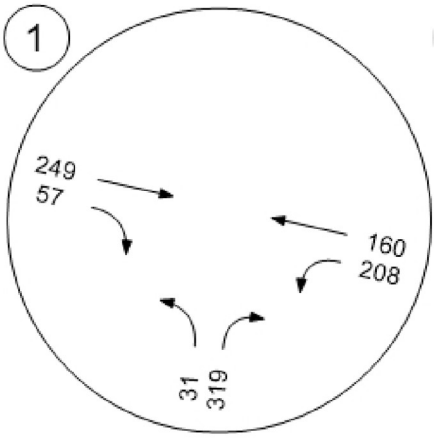
4.5.2 Concurrent Developments

No concurrent developments have been considered for this development. The growth rate covers any unknown development that may occur within the horizon years. There is a data centre planned for 2086 & 2090 East Wellington Road; however, it is not currently constructed and is not expected to generate significant traffic volumes.

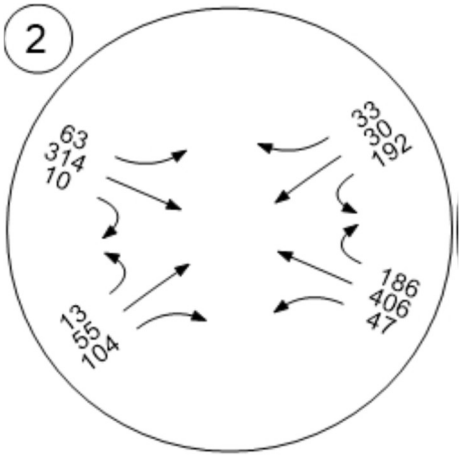
4.5.3 Background Traffic Volumes (without Connector)

Background traffic volumes are the existing traffic volumes with the corridor growth. Background traffic volumes for the opening day (2026) and 10-year post-development

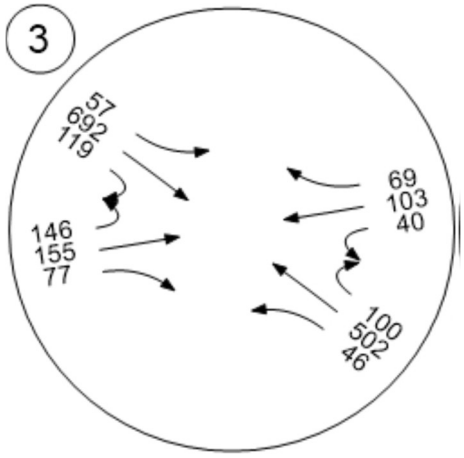
horizon years without the Northfield Connector are illustrated in **Figure 9**, **Figure 10**, **Figure 11**, and **Figure 12**, respectively (see **Section 5.0** for the figures with the Northfield Connector).



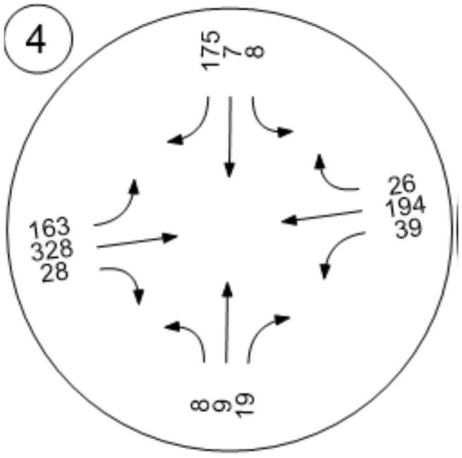
1. East Wellington Road / Westwood Road



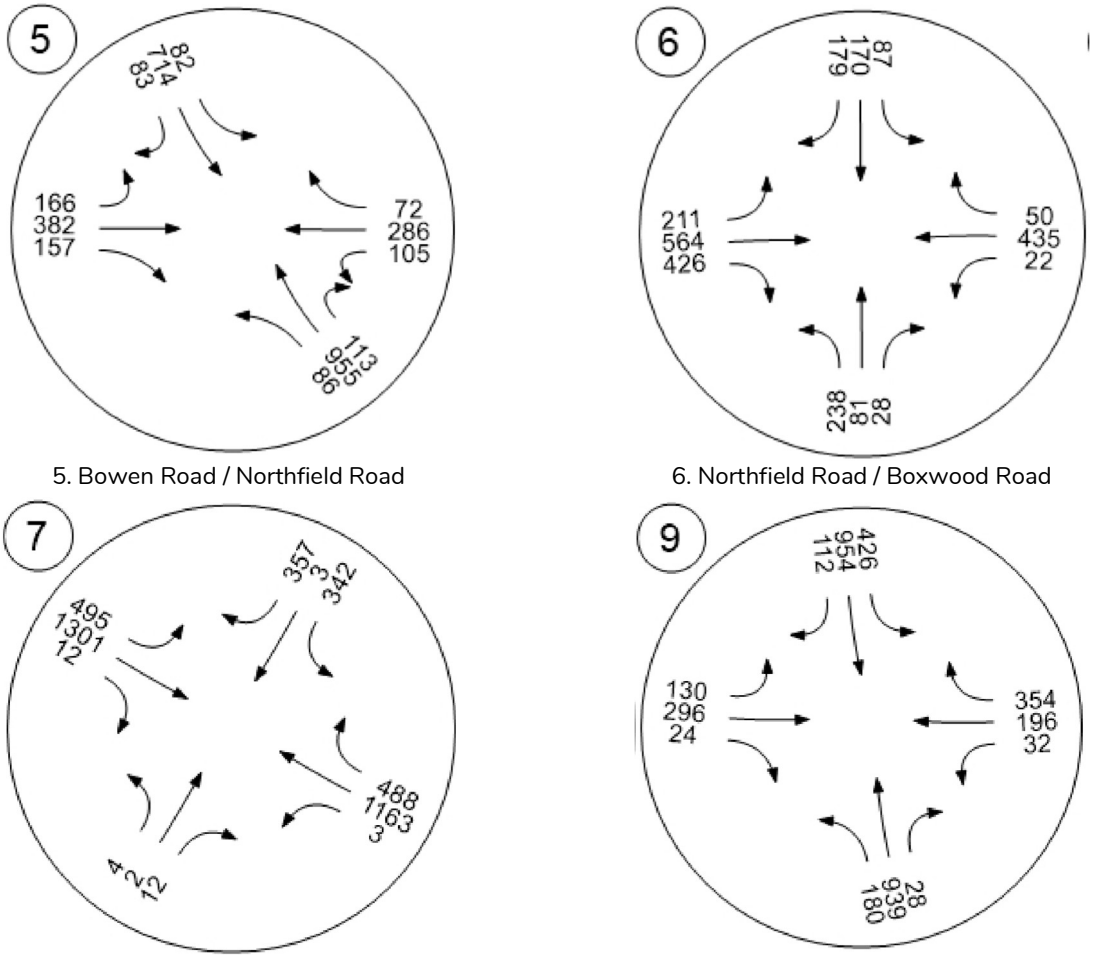
2. Jingle Pot Road / Westwood Road



3. Bowen Road / East Wellington Road



4. East Wellington Road / Boxwood Road / Madsen Road



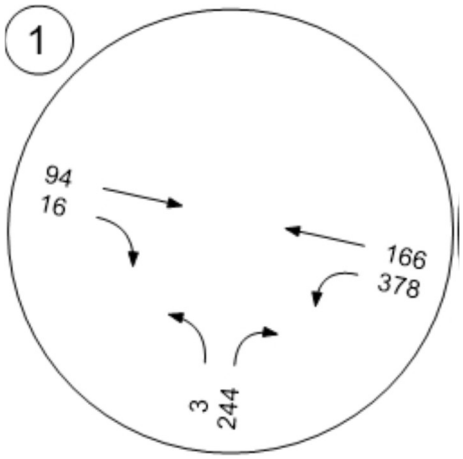
5. Bowen Road / Northfield Road

6. Northfield Road / Boxwood Road

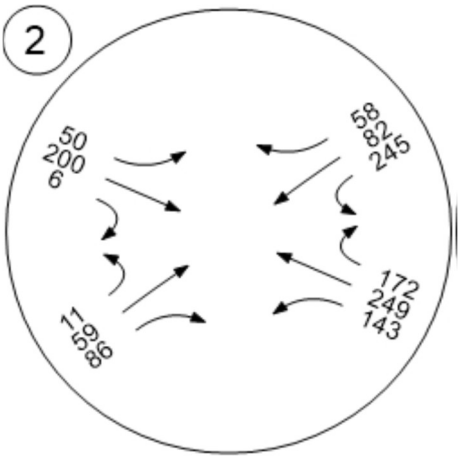
7. Highway 19 / Northfield Road

9. Highway 19 / Jingle Pot Road

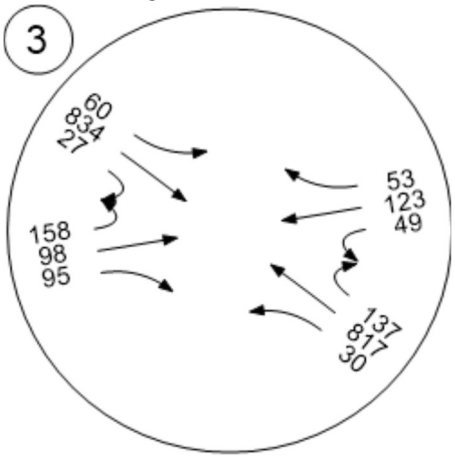
Figure 9 – 2026 Background Traffic Volumes – AM Peak Hour



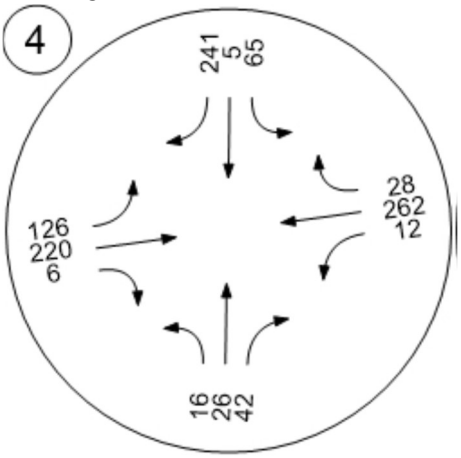
1. East Wellington Road / Westwood Road



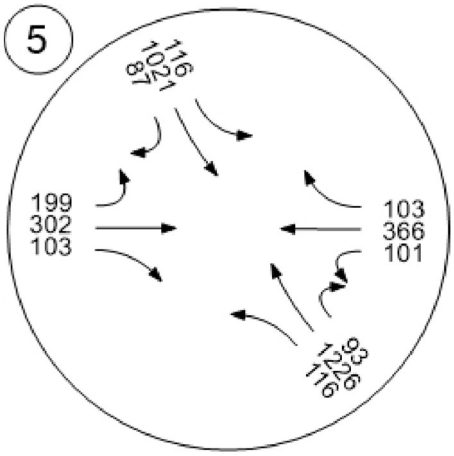
2. Jingle Pot Road / Westwood Road



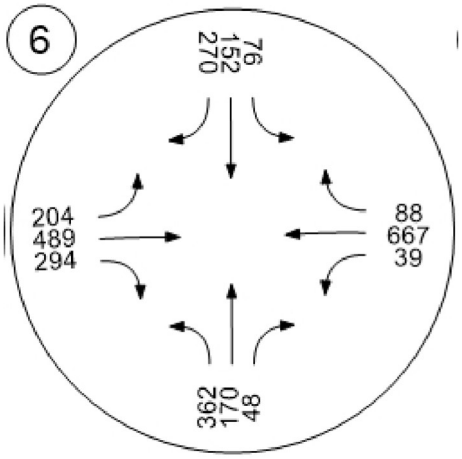
3. Bowen Road / East Wellington Road



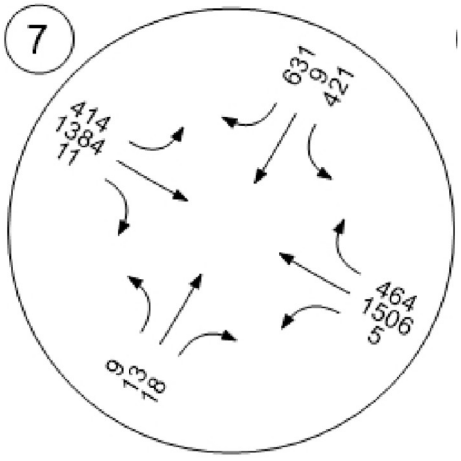
4. East Wellington Road / Boxwood Road / Madsen Road



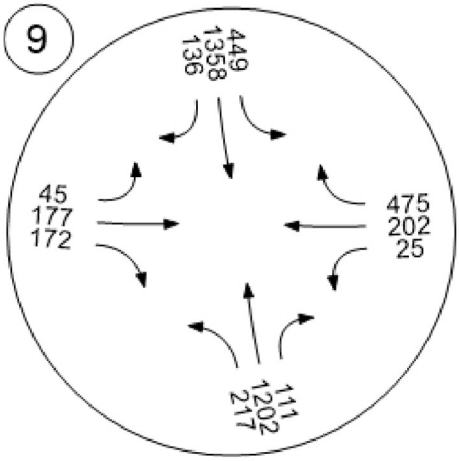
5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road

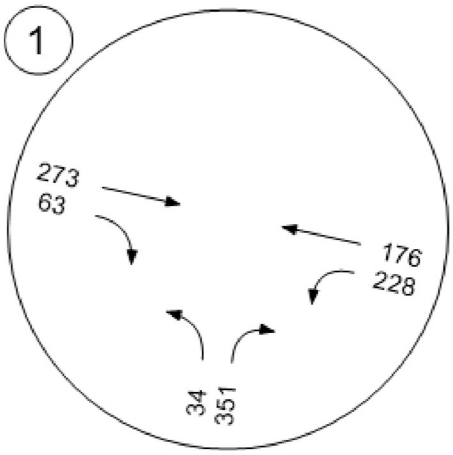


7. Highway 19 / Northfield Road

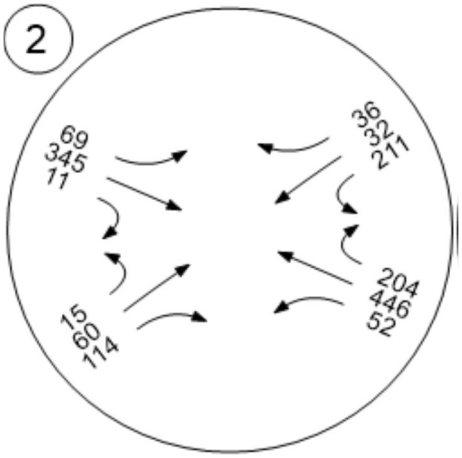


9. Highway 19 / Jingle Pot Road

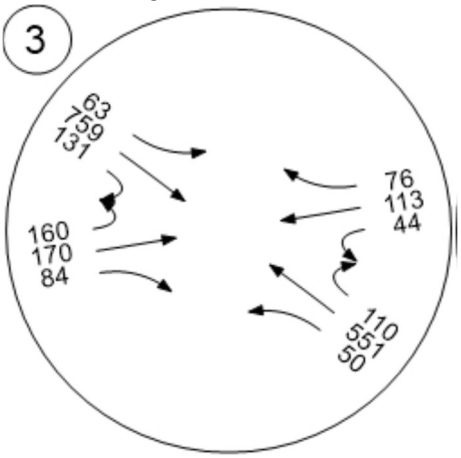
Figure 10 – 2026 Background Traffic Volumes – PM Peak Hour



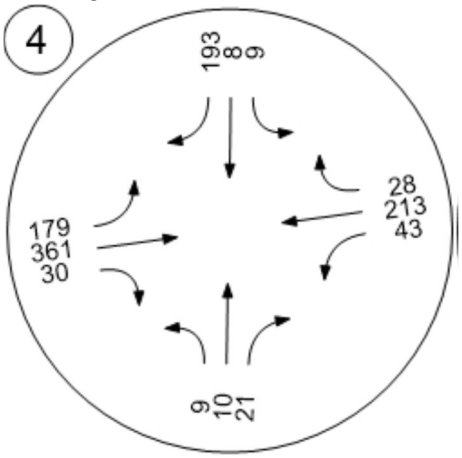
1. East Wellington Road / Westwood Road



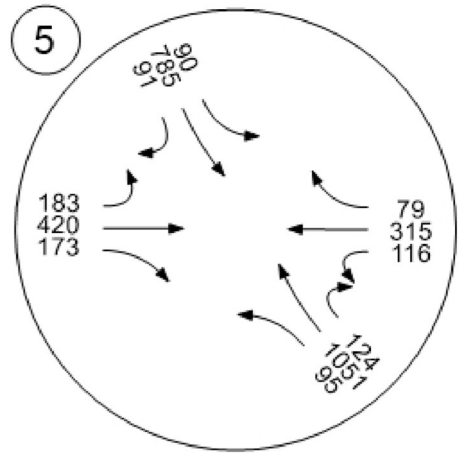
2. Jingle Pot Road / Westwood Road



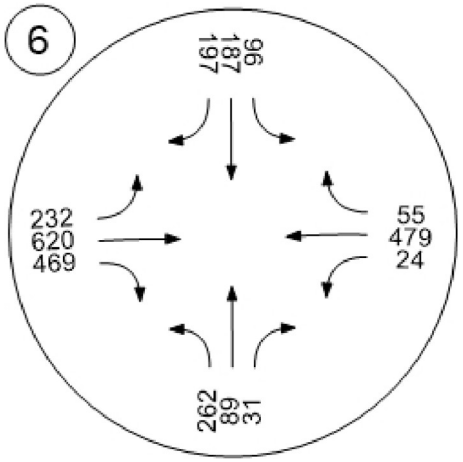
3. Bowen Road / East Wellington Road



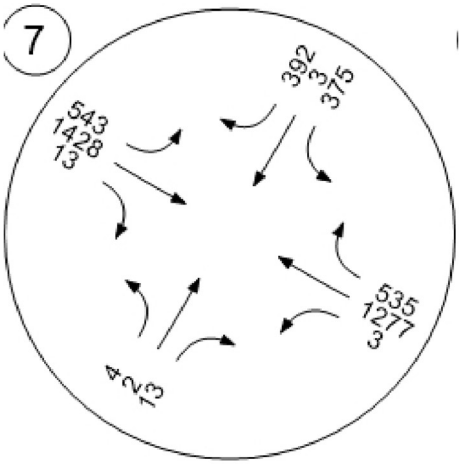
4. East Wellington Road / Boxwood Road / Madsen Road



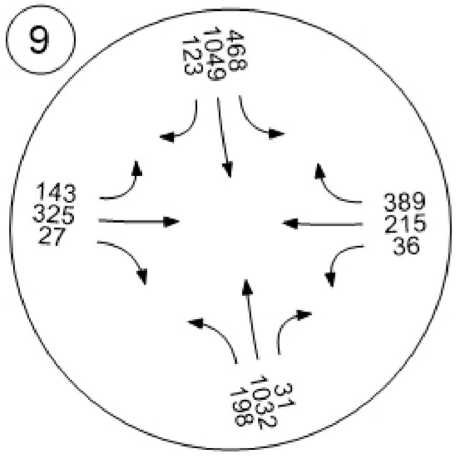
5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road

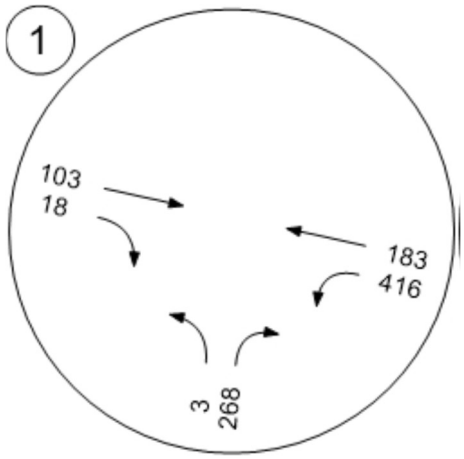


7. Highway 19 / Northfield Road

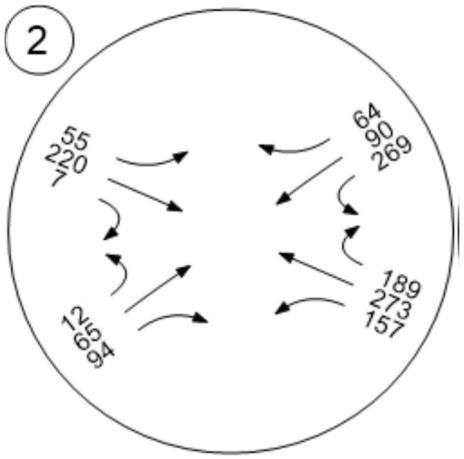


9. Highway 19 / Jingle Pot Road

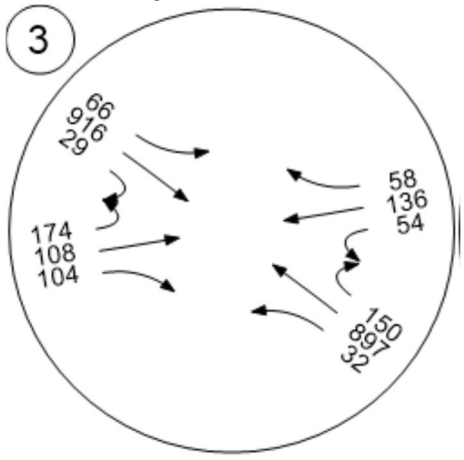
Figure 11 – 2036 Background without Northfield Connector Traffic Volumes – AM Peak Hour



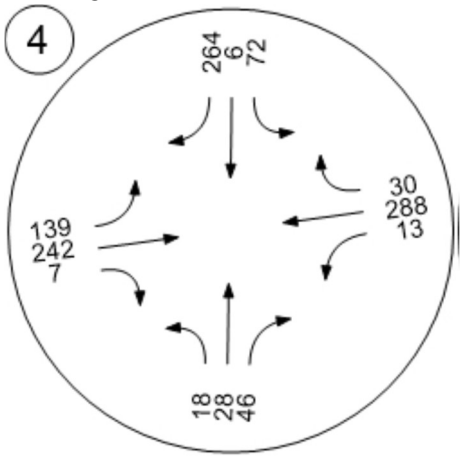
1. East Wellington Road / Westwood Road



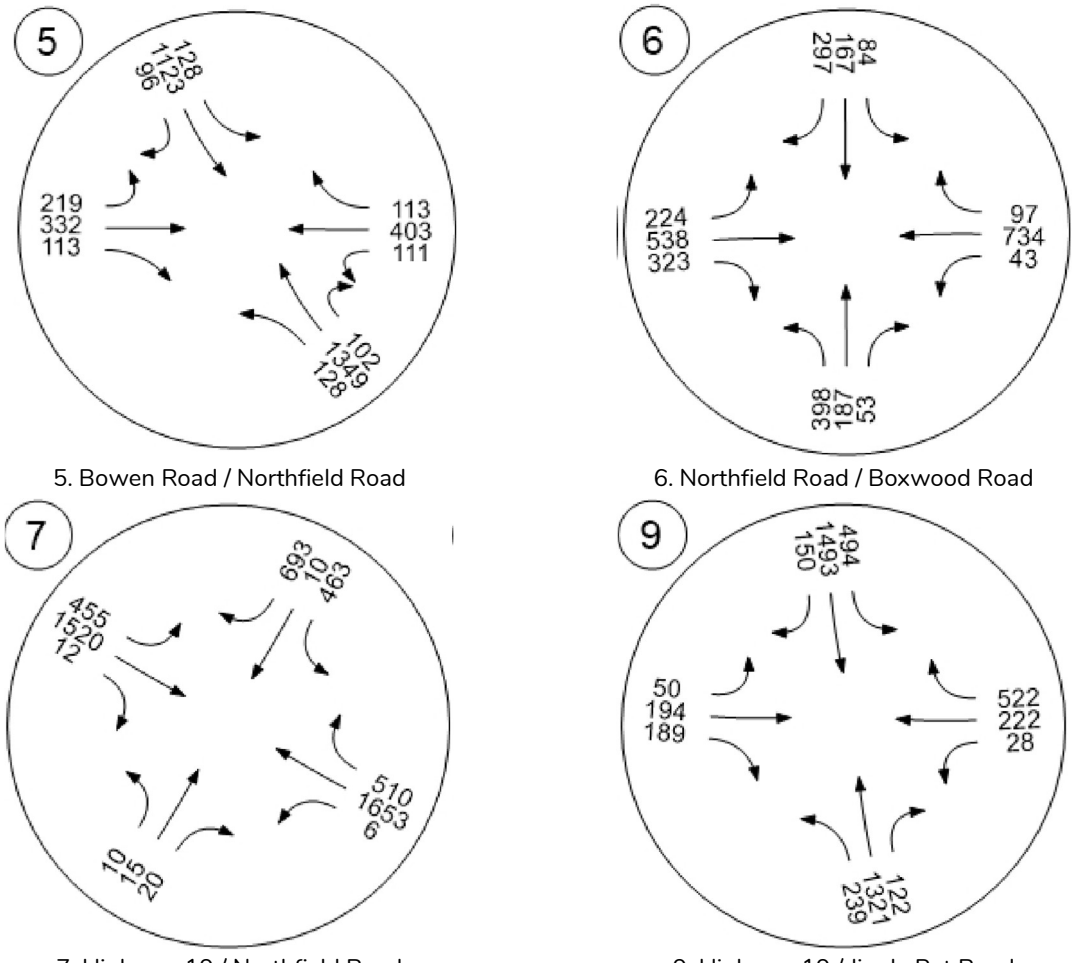
2. Jingle Pot Road / Westwood Road



3. Bowen Road / East Wellington Road



4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road

6. Northfield Road / Boxwood Road

7. Highway 19 / Northfield Road

9. Highway 19 / Jingle Pot Road

Figure 12 – 2036 Background without Northfield Connector Traffic Volumes – PM Peak Hour

4.5.4 Background Traffic Operations – 2026 (without Connector)

Intersection analysis results for 2026 under background conditions are summarized in **Table 10** and **Table 11**. Background 2026 is modelled with the existing road network and traffic control.

Table 10 - Background Conditions - 2026 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.42 (0.01)	16.9 (0.6)	-	26
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.17 (0.01)	4.6 (-)	-	3
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	10.4 (0.1)	1	1/45
NBT/R	0.22 (-)	9.6 (0.2)	5	8
SBL	0.41 (0.01)	14.0 (0.1)	10	18/35
SBT/R	0.09 (-)	9.0 (-0.2)	2	3
EBL	0.19 (0.01)	14.7 (0.5)	3	6/50
EBT/R	0.41 (0.01)	7.7 (0.2)	10	18
WBL	0.11 (0.01)	10.8 (0.2)	2	4/40
WBT/R	0.64 (0.01)	9.3 (0.3)	18	33
Bowen Road / East Wellington Road (Signalized)				
NBL	0.13 (0.01)	14.5 (0.3)	5	8/40
NBT	0.28 (-)	8.8 (0.1)	19	34
NBT/R	0.28 (-)	8.8 (0.1)	19	33
SBL	0.13 (0.01)	12.6 (0.2)	5	9/50
SBT	0.37 (0.60)	9.7 (0.1)	28	50
SBT/R	0.38 (0.01)	9.8 (0.2)	27	49
EBL	0.36 (-)	29.0 (0.1)	21	38/60
EBT	0.56 (-)	36.5 (-)	25	44
EBR	0.23 (0.01)	33.2 (-0.1)	8	14/20
WBL	0.10 (-)	24.7 (-0.1)	5	9/30
WBT/R	0.48 (-)	33.8 (-0.1)	23	41
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.08 (-)	24.4 (0.9)	-	4
SB	0.24 (-)	14.0 (0.2)	-	11
EB	0.12 (-)	2.5 (-)	-	3
WB	0.03 (-)	1.2 (-)	-	1

Bowen Road / Northfield Road (Signalized)				
NBL	0.25 (-)	19.6 (-)	9	16/130
NBT	0.98 (-)	87.5 (-)	157	214
NBT/R	0.98 (-)	89.1 (-)	154	210
SBL	0.31 (-)	24.6 (-)	10	17/50
SBT	0.72 (-)	33.5 (-)	67	104
SBT/R	0.72 (-)	33.7 (-)	65	102
EBL	0.35 (-)	19.2 (-)	19	34/105
EBT/R	0.95 (-)	67.9 (-)	129	181
WBL	0.36 (-)	25.9 (-)	13	24/55
WBT	0.39 (-)	29 (-)	26	47
WBT/R	0.4 (-)	29.1 (-)	25	45
Northfield Road / Boxwood Road (Signalized)				
NBL	1.08 (-)	254.7 (-)	142	204/40
NBT/R	0.23 (-)	32.9 (-)	16	28
SBL	0.81 (-)	62 (-)	21	37/50
SBT	0.63 (-)	45.4 (-)	34	61
SBR	0.76 (-)	49 (-)	38	66/60
EBL	0.39 (-)	16.6 (-)	23	42/100
EBT	0.71 (-)	28.3 (-)	94	138
EBR	0 (-)	0 (-)	0	0/200
WBL	0.06 (-)	16.3 (-)	2	4/50
WBT	0.35 (-)	24.5 (-)	34	60
WBT/R	0.35 (-)	24.6 (-)	33	59/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.09 (0.01)	53.1 (0.5)	1	1/170
NBT	1.25 (0.04)	488.8 (64.2)	531	730
NBR	0.34 (0.01)	30.5 (0.6)	22	40/140
SBL	0.88 (-)	43.1 (0.7)	97	141/220
SBT	0.66 (0.01)	14.2 (0.2)	63	99
SBR	0.01 (-)	7.3 (-0.1)	0	0/150
EBL	0.06 (-)	49.6 (0.5)	1	2
EBT/R	0.08 (-)	49.7 (0.5)	1	2

WBL	0.86 (0.02)	83.6 (7.8)	56	90/70
WBLT	0.86 (0.02)	92.1 (9.1)	48	79
WBR	0.54 (0.02)	47.1 (1.1)	22	40/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.84 (-)	54.9 (0.6)	36	63/165
NBT	0.79 (-)	29.8 (0.3)	69	107
NBR	0.03 (-)	19.2 (0.1)	1	3/200
SBL	0.82 (-)	44.3 (0.6)	38	65/200
SBT	0.74 (0.01)	26 (0.3)	64	101
SBR	0.09 (-)	17.7 (0.1)	5	10/200
EBL	0.82 (-)	58.3 (0.6)	28	51/65
EBT	0.6 (-)	40.4 (0.4)	26	46
EBR	0 (-)	0 (-)	0	0/15
WBL	0.1 (-)	28.4 (0.34)	4	8/45
WBT	0.68 (-)	47.2 (0.6)	19	33
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from existing conditions ## = Value exceeding threshold X/X – Queue/Storage

Table 11 – Background Conditions - 2026 – PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.26 (0.01)	10.5 (-)	-	9
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.26 (0.01)	5.5 (-)	-	6
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	9.3 (0.1)	0	1/45
NBT/R	0.17 (-)	7.3 (0.1)	3	6
SBL	0.45 (0.01)	12.2(0.2)	11	21/35
SBT/R	0.18 (0.01)	7.4 (0.1)	3	6
EBL	0.14 (-)	14.3 (0.3)	3	5/50
EBT/R	0.31 (0.01)	8.8 (0.2)	7	13
WBL	0.32 (0.01)	13.3 (0.3)	7	13/40
WBT/R	0.53 (0.01)	10.1 (0.2)	13	24

Bowen Road / East Wellington Road (Signalized)				
NBL	0.09 (0.01)	14.1 (0.3)	3	5/40
NBT	0.43 (0.01)	10.1 (0.2)	34	60
NBT/R	0.43 (0.01)	10.2 (0.3)	33	59
SBL	0.18 (-)	16.5 (0.5)	6	12/50
SBT	0.40 (0.01)	9.7 (0.2)	31	55
SBT/R	0.40 (-)	9.7 (0.1)	31	55
EBL	0.40 (-)	30.3 (-)	23	42/60
EBT	0.37 (-)	34.9 (-0.2)	15	27
EBR	0.29 (-)	34.3 (-0.1)	10	18/20
WBL	0.11 (-)	25.2 (-0.1)	6	11/30
WBT/R	0.54 (-)	35.4 (-0.1)	25	45
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.11 (0.10)	19.6 (0.6)	-	8
SB	0.32 (0.01)	23.9 (2.0)	-	36
EB	0.10 (-)	2.9 (-)	-	2
WB	0.01 (-)	0.3 (-)	-	0
Bowen Road / Northfield Road (Signalized)				
NBL	0.37 (-)	21 (-)	12	22/130
NBT	0.95 (-)	60.9 (-)	169	228
NBT/R	0.95 (-)	63.2 (-)	169	228
SBL	0.45 (-)	29.4 (-)	15	26/50
SBT	0.8 (-)	37.2 (-)	109	156
SBT/R	0.8 (-)	37.7 (-)	107	154
EBL	0.5 (-)	27.9 (-)	30	54/105
EBT/R	0.91 (-)	60.5 (-)	95	140
WBL	0.34 (-)	29.3 (-)	15	27/55
WBT	0.63 (-)	42.5 (-)	45	76
WBT/R	0.64 (-)	42.8 (-)	43	73
Northfield Road / Boxwood Road (Signalized)				
NBL	1.12 (-)	316.1 (-)	257	353/40
NBT/R	0.31 (-)	28.9 (-)	32	58
SBL	0.8 (-)	69.8 (-)	20	37/50

SBT	0.42 (-)	43.5 (-)	32	57
SBR	0.88 (-)	73.7 (-)	79	119/60
EBL	0.55 (-)	30.2 (-)	33	59/100
EBT	0.75 (-)	41.1 (-)	107	154
EBR	0 (-)	0 (-)	0	0/200
WBL	0.13 (-)	23.5 (-)	5	9/50
WBT	0.64 (-)	41 (-)	77	117
WBT/R	0.64 (-)	41.1 (-)	76	115/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.12 (-0.01)	50.7 (-0.7)	1	2/170
NBT	1.48 (0.02)	908.2 (35.2)	1027	1466
NBR	0.31 (0.01)	27.6 (0.1)	19	34/140
SBL	0.86 (-0.01)	40.6 (0)	75	114/220
SBT	0.73 (-)	17.6 (1.2)	76	115
SBR	0 (-)	8.5 (-0.56)	0	0/150
EBL	0.08 (0.01)	45.4 (1.3)	2	3
EBT/R	0.16 (0.03)	46 (1.4)	3	6
WBL	0.86 (0.01)	78.1 (2.9)	59	94/70
WBLT	0.86 (0.01)	78 (2.9)	59	94
WBR	0.85 (0.01)	78.1 (2.2)	52	85/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.89 (-)	74.1 (1.6)	55	89/165
NBT	0.79 (0.01)	25.1 (0.2)	85	127
NBR	0.08 (-)	15.1 (0)	5	9/200
SBL	1.01 (0.02)	102.1 (15.1)	68	106/200
SBT	0.9 (-)	30.9 (0.9)	111	158
SBR	0.1 (-)	15.7 (0.1)	6	12/200
EBL	0.67 (-)	65.6 (0.3)	11	20/65
EBT	0.54 (-)	46.7 (0.2)	17	31
EBR	0 (-)	0 (-)	0	0/15
WBL	0.09 (-)	35.1 (0.1)	4	7/45
WBT	0.7 (-)	50.7 (0.1)	21	37
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from existing conditions ## = Value exceeding threshold X/X – Queue/Storage

In the 2026 background scenario, most intersections operate at a comparable level to the existing conditions, since minimal traffic growth is expected throughout the network. Therefore, similar to the existing conditions, signal timing optimization helps, but does not fully mitigate, most of the movements that are failing to meet adequate levels of performance, such as the Northfield Road / Boxwood Road and Bowen Road / Northfield Road intersections. Additional capacity is needed to improve operations at the intersections along Highway 19 even without any development.

4.5.5 Background Traffic Operations – 2036 (without Connector)

Intersection analysis results for the horizon year 2036 under background conditions are summarized in **Table 12** and **Table 13**. Background 2036 without the Northfield Connector is modelled with the existing road network and traffic control (See **Section 5.0** for with the Northfield Connector)

Table 12 – Background Conditions – 2036 – AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.48 (0.07)	20.6 (4.3)	-	37
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.19 (0.03)	4.6 (-)	-	3
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.03 (0.01)	11.6 (1.3)	1	1/45
NBT/R	0.23 (0.01)	10.7 (1.3)	6	11
SBL	0.46 (0.06)	16.3 (2.4)	14	25/35
SBT/R	0.10 (0.01)	10.1 (1.3)	2	4
EBL	0.23 (0.05)	17.6 (3.4)	5	8/50
EBT/R	0.43 (0.03)	8.5 (1.0)	14	25
WBL	0.13 (0.03)	12.4 (1.8)	3	5/40
WBT/R	0.68 (0.05)	10.6 (1.6)	26	46

Bowen Road / East Wellington Road (Signalized)				
NBL	0.15 (0.03)	16.9 (2.7)	5	10/40
NBT	0.32 (0.04)	9.5 (0.8)	22	40
NBT/R	0.32 (0.04)	9.5 (0.8)	22	39
SBL	0.15 (0.03)	14.4 (2.0)	6	11/50
SBT	0.42 (0.05)	10.7 (1.1)	33	59
SBT/R	0.42 (0.05)	10.7 (1.1)	32	57
EBL	0.39 (0.03)	28.9 (-)	23	41/60
EBT	0.58 (0.02)	36.1 (-0.4)	27	48
EBR	0.24 (0.02)	32.6 (-0.7)	9	16/20
WBL	0.11 (0.01)	24.2 (-0.6)	5	10/30
WBT/R	0.51 (0.03)	33.7 (-0.2)	25	45
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.12 (0.04)	30.4 (+6.9)	-	6
SB	0.27 (0.03)	15.6 (+1.8)	-	14
EB	0.14 (0.02)	2.5 (-)	-	3
WB	0.04 (0.01)	1.3 (+0.1)	-	1
Bowen Road / Northfield Road (Signalized)				
NBL	0.29 (0.04)	20.9 (1.33)	10	19/130
NBT	1.09 (0.11)	225.7 (138.2)	315	419
NBT/R	1.09 (0.11)	230.6 (141.5)	311	415
SBL	0.34 (0.03)	26.2 (1.56)	11	20/50
SBT	0.8 (0.08)	38 (4.5)	80	121
SBT/R	0.8 (0.08)	38.3 (4.6)	78	118
EBL	0.4 (0.05)	19.7 (0.5)	21	38/105
EBT/R	1.04 (0.09)	150.6 (82.68)	231	307
WBL	0.42 (0.06)	28 (2.04)	15	27/55
WBT	0.42 (0.03)	29.3 (0.4)	29	53
WBT/R	0.43 (0.03)	29.5 (0.4)	28	51

Northfield Road / Boxwood Road (Signalized)				
NBL	1.19 (0.11)	430.7 (175.9)	225	318/40
NBT/R	0.25 (0.02)	32.7 (-0.2)	17	31
SBL	0.82 (0.01)	63.3 (1.25)	23	41/50
SBT	0.65 (0.02)	44.8 (-0.6)	37	65
SBR	0.78 (0.02)	49.9 (0.9)	42	72/60
EBL	0.44 (0.05)	18.4 (1.84)	27	49/100
EBT	0.8 (0.09)	34.3 (5.94)	116	165
EBR	0 (-)	0 (-)	0	0/200
WBL	0.08 (0.02)	18.5 (2.27)	2	4/50
WBT	0.41 (0.06)	27.1 (2.61)	39	68
WBT/R	0.41 (0.06)	27.2 (2.62)	39	67/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.09 (0.01)	55.6 (3)	1	1/170
NBT	1.43 (0.22)	820.9 (396.3)	825	1169
NBR	0.4 (0.07)	33.6 (3.77)	26	47/140
SBL	0.9 (0.02)	46.8 (4.4)	115	163/220
SBT	0.7 (0.05)	15 (0.9)	74	113
SBR	0 (-0.01)	7 (-0.34)	0	0/150
EBL	0.06 (-)	52 (2.9)	1	2
EBT/R	0.08 (-)	52.1 (2.9)	1	2
WBL	0.99 (0.15)	158.8 (83)	95	139/70
WBLT	0.99 (0.15)	173.4 (90.5)	81	121
WBR	0.62 (0.1)	53.9 (7.9)	27	49/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.87 (0.03)	69.6 (15.4)	49	81/165
NBT	0.85 (0.06)	34.2 (4.8)	90	133
NBR	0.03 (-)	20.7 (1.7)	2	3/200
SBL	0.87 (0.05)	50.8 (7.1)	48	80/200
SBT	0.79 (0.06)	29.8 (4.1)	85	126
SBR	0.1 (0.01)	19.2 (1.7)	7	12/200
EBL	0.84 (0.02)	70 (12.3)	37	64/65

EBT	0.62 (0.02)	44.7 (4.8)	32	58
EBR	0 (-)	0 (-)	0	0/15
WBL	0.12 (0.02)	31.9 (3.86)	6	10/45
WBT	0.72 (0.04)	53.2 (6.5)	23	42
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from existing conditions ## = Value exceeding threshold X/X – Queue/Storage

Table 13 – Background Conditions – 2036 – PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.29 (0.04)	10.9 (0.4)	-	10
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.29 (0.04)	5.6 (0.1)	-	6
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	9.1 (-0.1)	1	1/45
NBT/R	0.19 (0.02)	7.6 (0.4)	4	7
SBL	0.48 (0.04)	12.4 (0.4)	13	24/35
SBT/R	0.19 (0.02)	7.6 (0.3)	4	7
EBL	0.17 (0.03)	15.2 (1.2)	3	6/50
EBT/R	0.33 (0.03)	9.1 (0.5)	8	15
WBL	0.35 (0.04)	13.8 (0.8)	8	15/40
WBT/R	0.57 (0.05)	10.7 (0.8)	16	28
Bowen Road / East Wellington Road (Signalized)				
NBL	0.10 (0.02)	16.1 (2.3)	3	6/40
NBT	0.48 (0.06)	11.3 (1.4)	40	69
NBT/R	0.49 (0.07)	11.4 (1.5)	39	68
SBL	0.23 (0.05)	19.5 (3.5)	8	14/50
SBT	0.45 (0.06)	10.8 (1.3)	37	64
SBT/R	0.45 (0.05)	10.8 (1.2)	36	64
EBL	0.44 (0.04)	30.4 (0.1)	26	46/60
EBT	0.38 (0.01)	34.2 (-0.9)	16	29
EBR	0.30 (0.01)	33.5 (-0.9)	11	20/20

WBL	0.12 (0.01)	24.5 (-0.8)	7	12/30
WBT/R	0.57 (0.03)	35.2 (-0.3)	27	49
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.15 (0.14)	23.9 (4.9)	-	11
SB	0.37 (0.06)	37.4 (15.5)	-	63
EB	0.11 (0.01)	2.9 (-)	-	2
WB	0.01 (-)	0.3 (-)	-	0
Bowen Road / Northfield Road (Signalized)				
NBL	0.46 (0.09)	25.9 (4.94)	15	26/130
NBT	1.07 (0.12)	201 (140.09)	378	492
NBT/R	1.08 (0.13)	214 (150.82)	388	507
SBL	0.52 (0.07)	33.5 (4.04)	18	33/50
SBT	0.9 (0.1)	55.9 (18.73)	154	210
SBT/R	0.91 (0.11)	57.7 (20.05)	153	209
EBL	0.56 (0.06)	30.1 (2.19)	36	63/105
EBT/R	0.94 (0.03)	77 (16.44)	124	175
WBL	0.39 (0.05)	32.3 (2.99)	18	33/55
WBT	0.62 (-0.01)	42.6 (0.1)	52	85
WBT/R	0.63 (-0.01)	42.9 (0.14)	50	81
Northfield Road / Boxwood Road (Signalized)				
NBL	1.24 (0.12)	503.5 (187.37)	385	532/40
NBT/R	0.33 (0.02)	28.5 (-0.4)	35	62
SBL	0.8 (-)	68.4 (-1.4)	22	40/50
SBT	0.44 (0.02)	42.4 (-1.15)	34	61
SBR	0.91 (0.03)	82.3 (8.61)	93	136/60
EBL	0.68 (0.13)	38.4 (8.2)	41	70/100
EBT	0.86 (0.11)	52.6 (11.46)	135	188
EBR	0 (-)	0 (-)	0	0/200
WBL	0.18 (0.05)	26.5 (3.03)	6	10/50
WBT	0.7 (0.06)	43.9 (2.97)	88	131
WBT/R	0.7 (0.06)	44.1 (3)	87	129/50

Highway 19 / Northfield Road (Signalized)				
NBL	0.14 (0.01)	53 (1.6)	1	2/170
NBT	1.7 (0.24)	1292.7 (419.7)	1385	2028
NBR	0.35 (0.05)	30.3 (2.85)	23	41/140
SBL	0.87 (-)	42.6 (2)	88	130/220
SBT	0.79 (0.06)	19.6 (3.2)	93	137
SBR	0 (-)	8.4 (-0.65)	0	0/150
EBL	0.09 (0.02)	47.2 (3.1)	2	4
EBT/R	0.18 (0.05)	47.9 (3.4)	4	8
WBL	0.99 (0.14)	151.6 (76.4)	101	147/70
WBLT	0.99 (0.14)	151.2 (76.1)	101	147
WBR	0.97 (0.13)	146.8 (70.9)	88	130/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	1 (0.11)	140.7 (68.2)	94	137/165
NBT	0.87 (0.09)	28.6 (3.7)	104	151
NBR	0.09 (0.01)	15.5 (0.4)	6	10/200
SBL	1.13 (0.14)	294 (207.1)	156	225/200
SBT	1 (0.1)	56.9 (26.9)	170	229
SBR	0.11 (0.01)	16.2 (0.6)	7	13/200
EBL	0.71 (0.04)	69.6 (4.4)	13	23/65
EBT	0.56 (0.02)	47.2 (0.7)	19	35
EBR	0 (-)	0 (-)	0	0/15
WBL	0.1 (0.01)	35.2 (0.3)	5	8/45
WBT	0.71 (0.01)	51.3 (0.7)	23	42
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from existing conditions ## = Value exceeding threshold X/X – Queue/Storage

In the PM peak hour, the southbound left/through/right movement exceeds the threshold for delay at East Wellington / Boxwood Road. The implementation of a right turn lane will help mitigate this issue.

The issues identified in the existing and 2026 background scenarios persist at the intersection of Highway 19 / Jingle Pot Road in the 2036 PM background scenario. In addition to the left-turn movements, the southbound through movements also fails to

meet acceptable thresholds for v/c, delay, and/or 95th percentile queues. By 2036, as a result of background growth along Highway 19, the current intersection configuration and signal timing optimization is no longer sufficient and an interchange will be required for any meaningful improvement to traffic operations. The intersection of Highway 19 / Northfield Road will also require capacity upgrades for any traffic operations improvements.

Existing operational concerns at the intersections along Northfield Road (Boxwood Road, Bowen Road) further deteriorate by 2036 as a result of background growth in the area. Signal timing optimization as traffic patterns change in the future are recommended to help maintain traffic operations as close to acceptable performance thresholds as possible. Given that these intersections have been recently upgraded, no further mitigations are recommended.

4.6 Post-Development Conditions (without Connector)

4.6.1 Trip Generation

Vehicular trip generation rates for the proposed light industrial development are based on the *ITE Trip Generation Manual (11th Edition)* Industrial Park land use because the ITE Industrial Park land use is based on a similar mix of industrial space in an environment similar to this proposed development. The trip generation forecast for the site is provided in **Table 14**. The proposed development is forecast to generate 300 new trips in the weekday AM peak period and 300 new trips in the weekday PM peak period.

Table 14 – Trip Generation

Use	AM Peak Hour			PM Peak Hour		
	In	Out	2-Way	In	Out	2-Way
Trip Generation Rates						
Industrial Park (ITE LU 130)[1]	0.275	0.065	0.34	0.075	0.265	0.34
Vehicular Trip Generation						
Industrial Park (882,330 GFA)	243	57	300	66	234	300
Total	**243**	**57**	**300**	**66**	**234**	**300**

Notes:
1. Trip rates are per 1,000 sq. ft. GFA

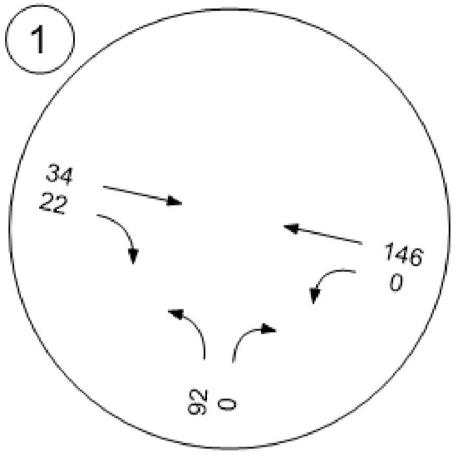
4.6.2 Trip Distribution and Assignment

The trip distribution pattern for site traffic was established based on existing traffic patterns, key origin/destinations in the region, and nearby truck routes. The distribution of inbound and outbound traffic adopted for the proposed development is outlined in **Table 15**.

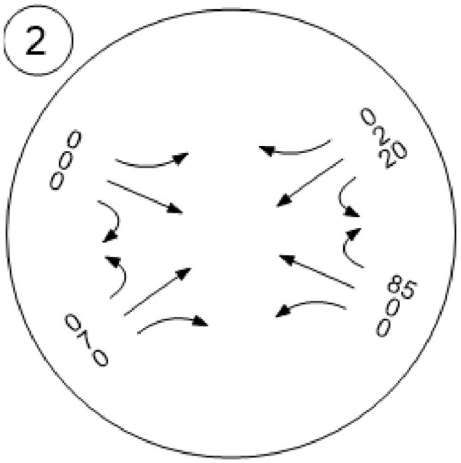
Table 15 – Site Traffic Distribution

Street (Using)	Region (From/To)	AM		PM	
		% In	% Out	% In	% Out
Highway 19	North	20	15	20	15
	South	15	15	10	10
Jingle Pot Road	South & East	20	20	20	20
Bowen Road	North	20	25	20	30
	South	5	5	10	5
East Wellington Road	East	15	15	15	15
	West	2	2	2	2
Westwood Road	South	3	3	3	3

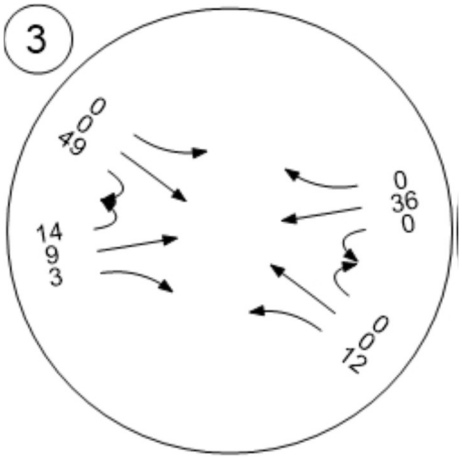
The trip assignment for the peak hours is illustrated in **Figure 13** and **Figure 14**, respectively.



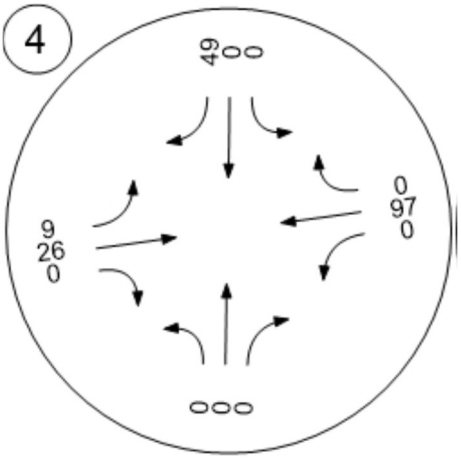
1. East Wellington Road / Westwood Road



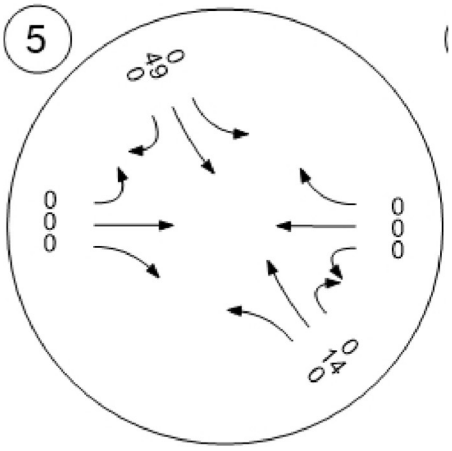
2. Jingle Pot Road / Westwood Road



3. Bowen Road / East Wellington Road



4. East Wellington Road / Boxwood Road / Madsen Road



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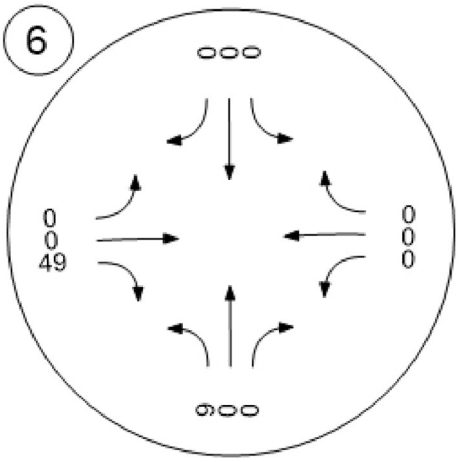
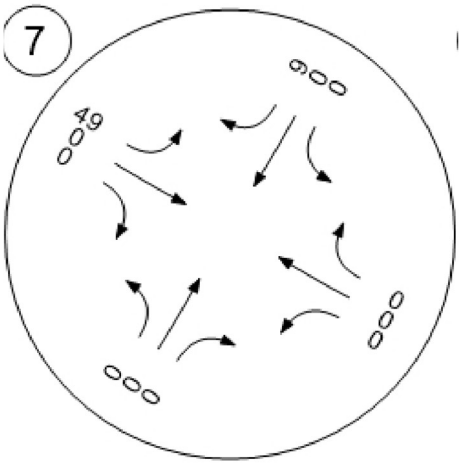
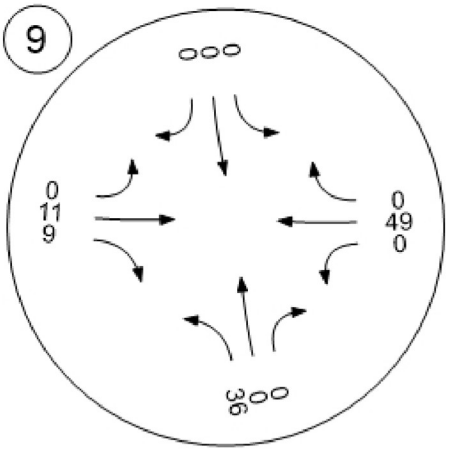


6. Northfield Road / Boxwood Road

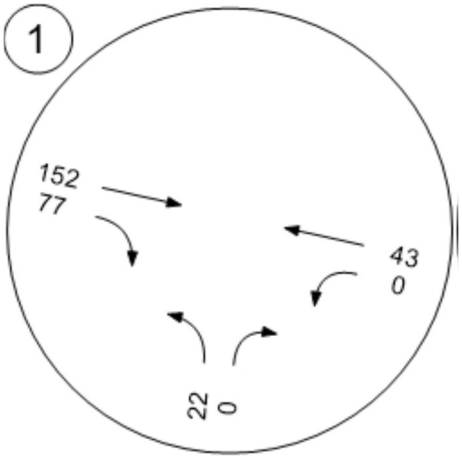


7. Highway 19 / Northfield Road

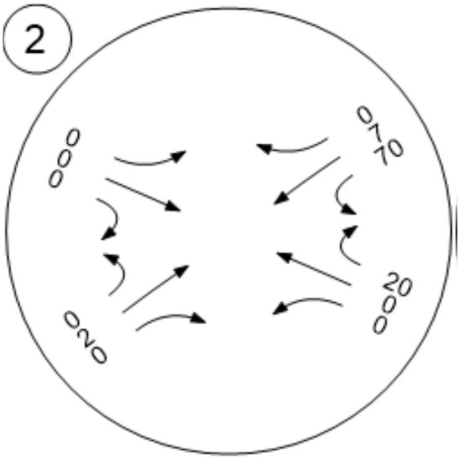


9. Highway 19 / Jingle Pot Road

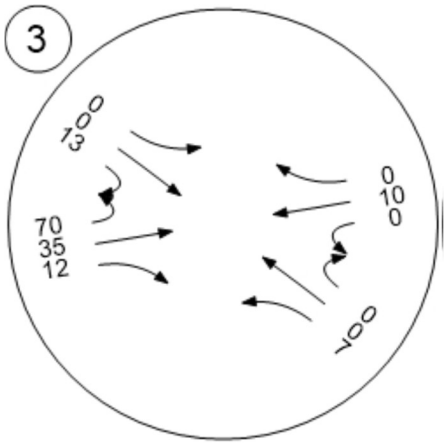
Figure 13 – Trip Assignment – AM Peak Hour



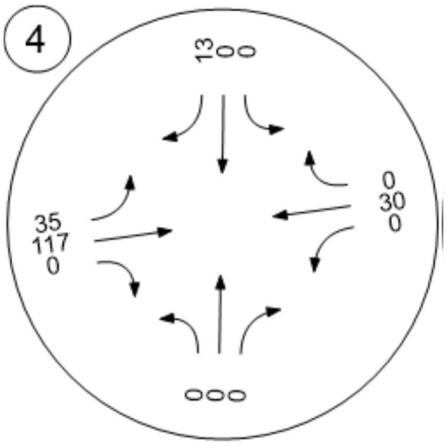
1. East Wellington Road / Westwood Road



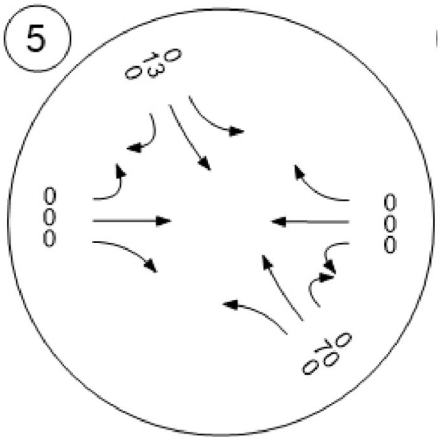
2. Jingle Pot Road / Westwood Road



3. Bowen Road / East Wellington Road



4. East Wellington Road / Boxwood Road / Madsen Road



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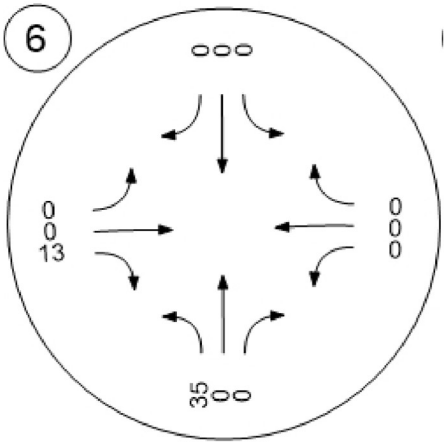
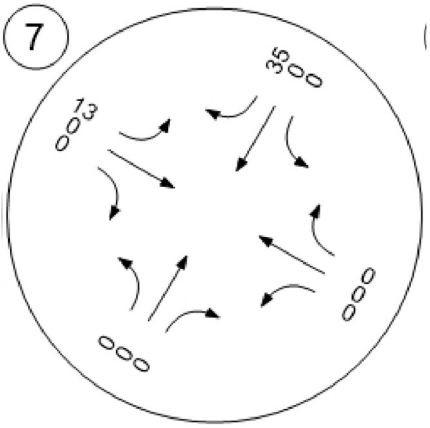
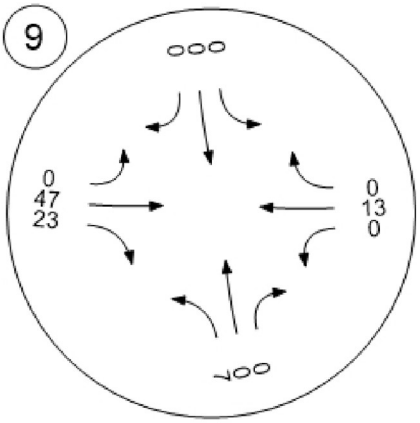


6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road



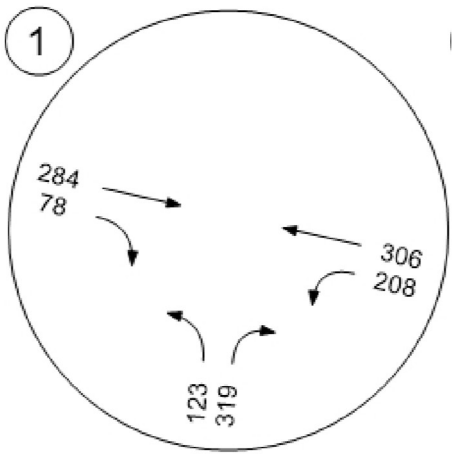
9. Highway 19 / Jingle Pot Road

Figure 14 - Trip Assignment – PM Peak Hour

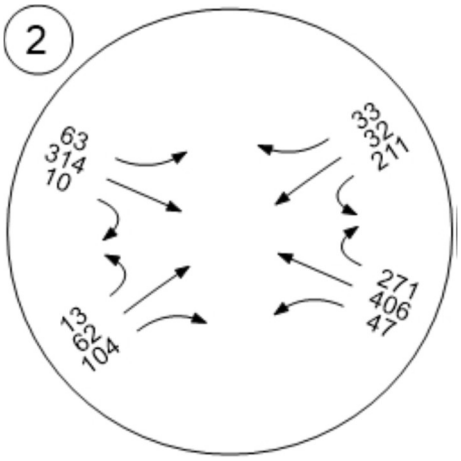
4.6.3 Post-Development Traffic Volumes (without Connector)

Post-development traffic volumes are the sum of background traffic volumes and site trips. Post-development traffic volumes for 2026 and 2036 without the Northfield Connector are illustrated in **Figure 15**, **Figure 16**, **Figure 17**, and **Figure 18**, respectively.

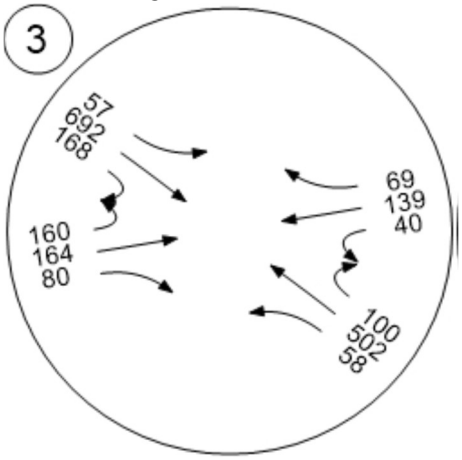
Average daily traffic (ADT) estimates for the *2036 post-development (without Northfield Connector) scenario* are provided in **Figure 18** for reference. These two-way ADT estimates are based on PM peak hour traffic counts in the area and assume a k-factor of 10.



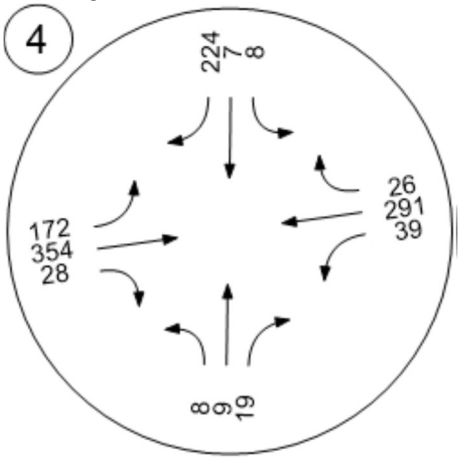
1. East Wellington Road / Westwood Road



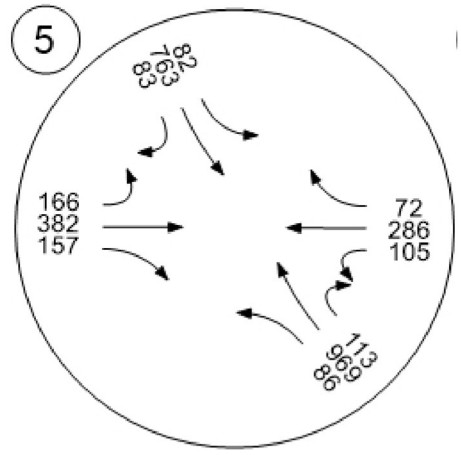
2. Jingle Pot Road / Westwood Road



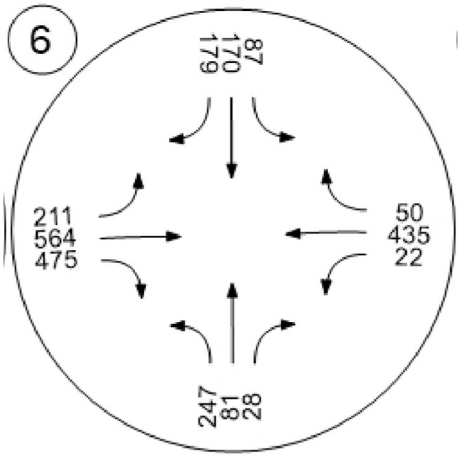
3. Bowen Road / East Wellington Road



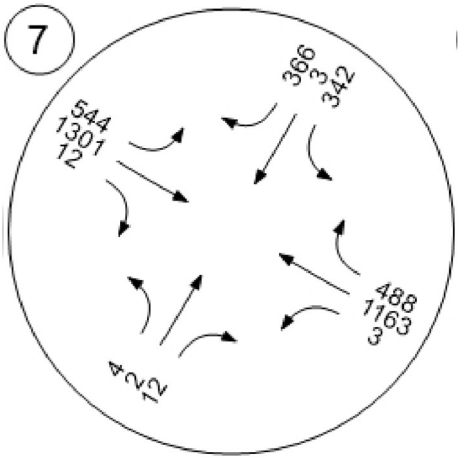
4. East Wellington Road / Boxwood Road / Madsen Road



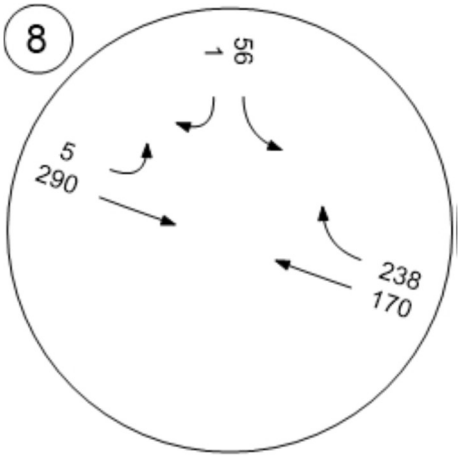
5. Bowen Road / Northfield Road



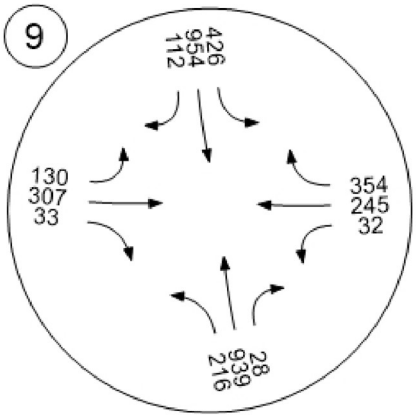
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

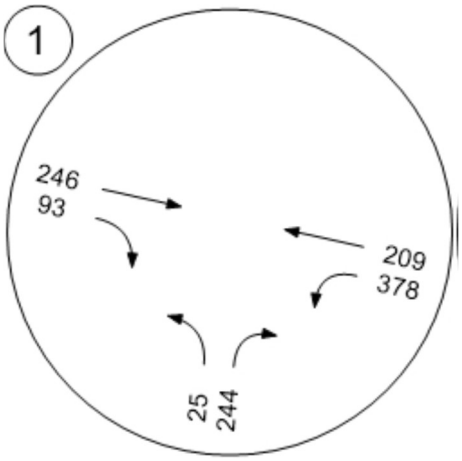


8. East Wellington Road / Site Access

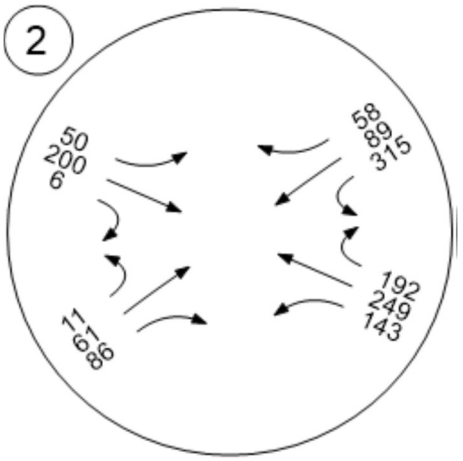


9. Highway 19 / Jingle Pot Road

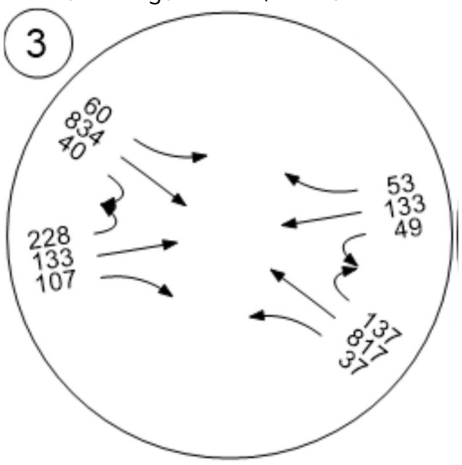
Figure 15 – 2026 Post Development Traffic Volumes – AM Peak Hour



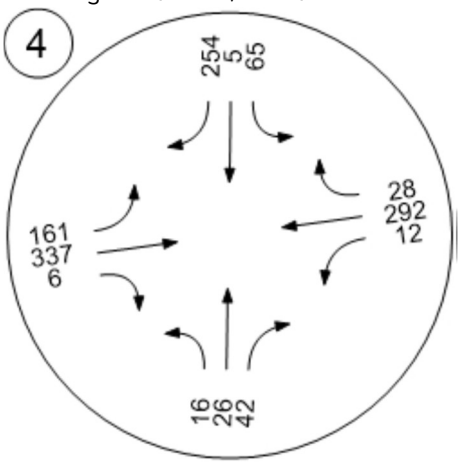
1. East Wellington Road / Westwood Road



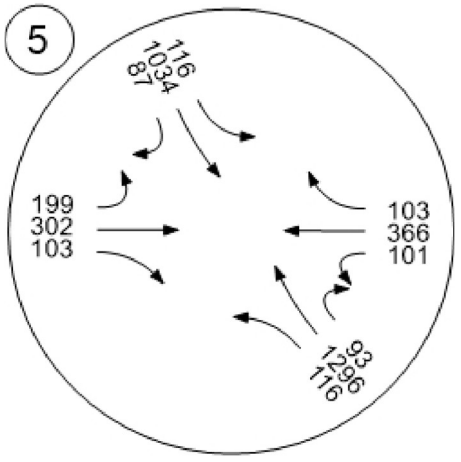
2. Jingle Pot Road / Westwood Road



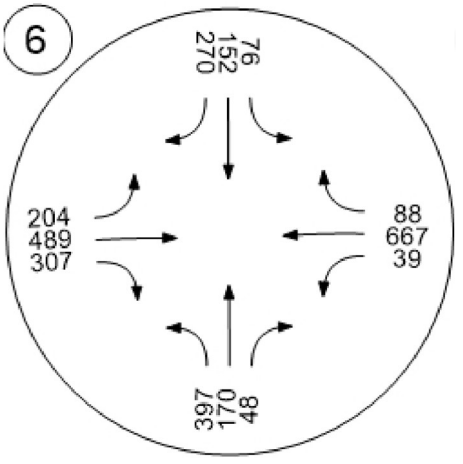
3. Bowen Road / East Wellington Road



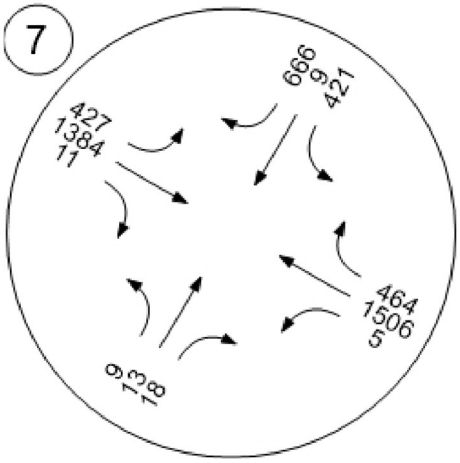
4. East Wellington Road / Boxwood Road / Madsen Road



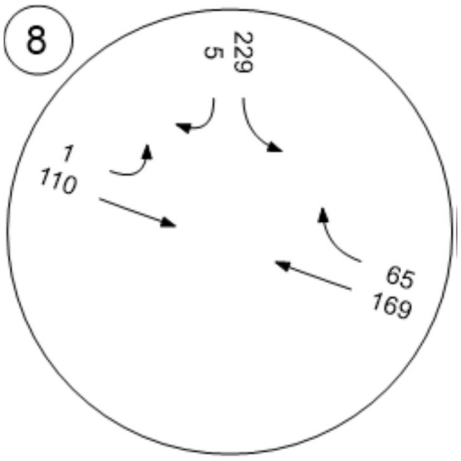
5. Bowen Road / Northfield Road



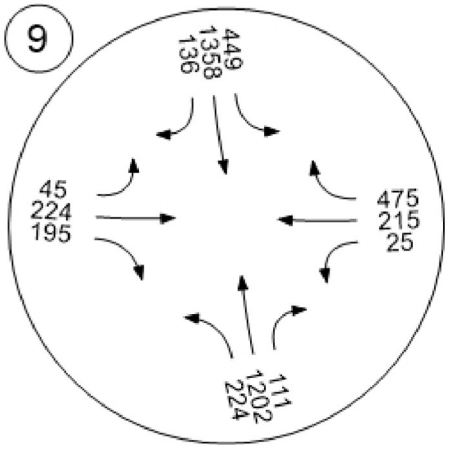
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

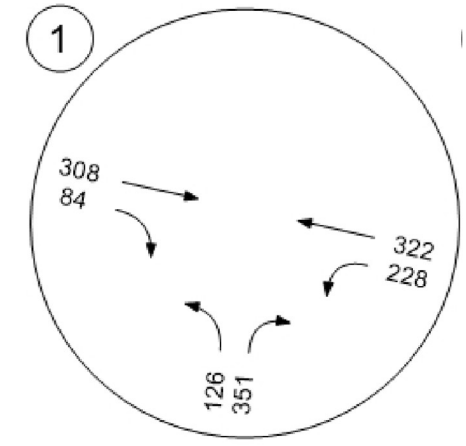


8. East Wellington Road / Site Access

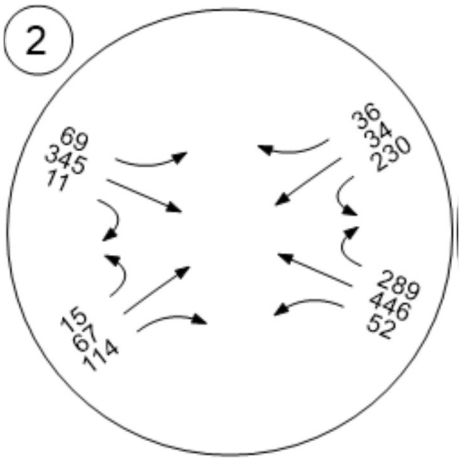


9. Highway 19 / Jingle Pot Road

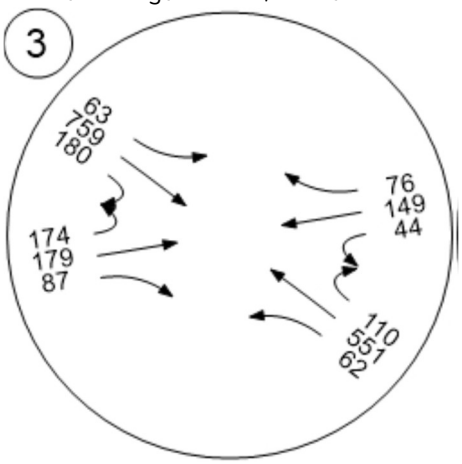
Figure 16 – 2026 Post Development Traffic Volumes – PM Peak Hour



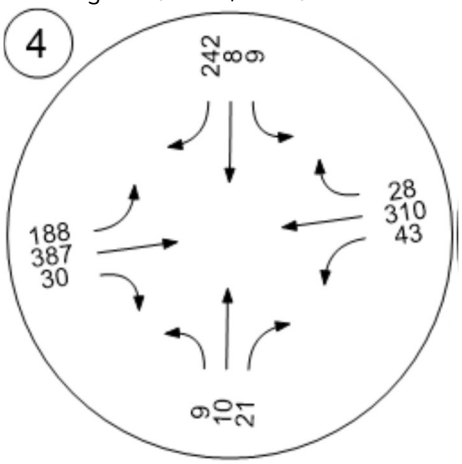
1. East Wellington Road / Westwood Road



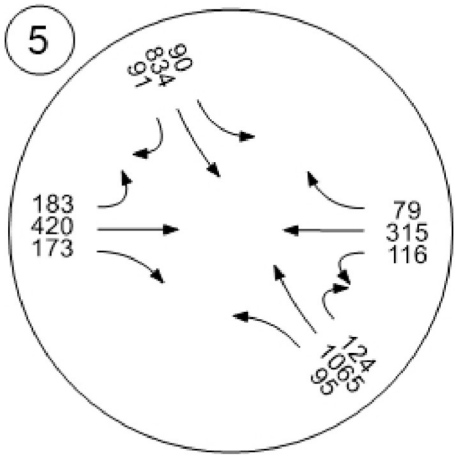
2. Jingle Pot Road / Westwood Road



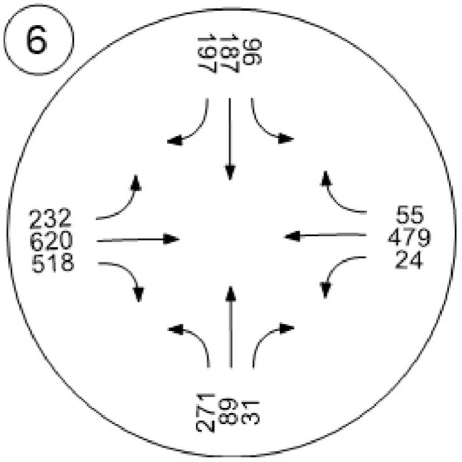
3. Bowen Road / East Wellington Road



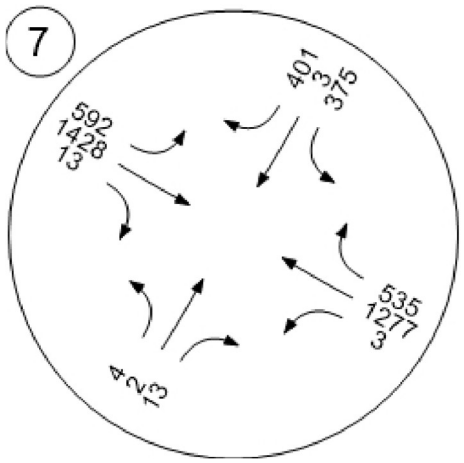
4. East Wellington Road / Boxwood Road / Madsen Road



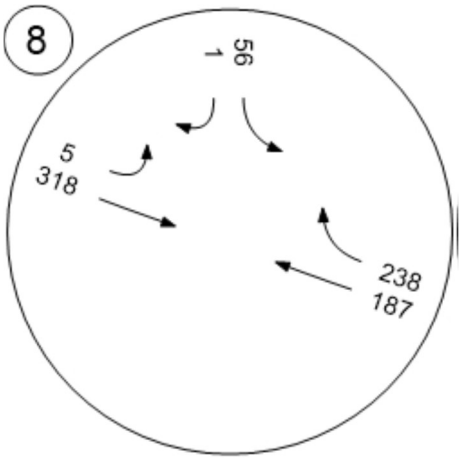
5. Bowen Road / Northfield Road



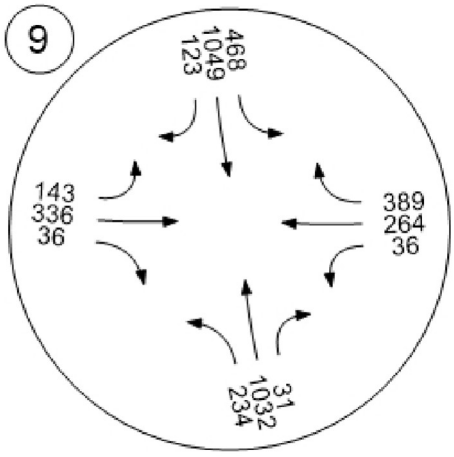
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

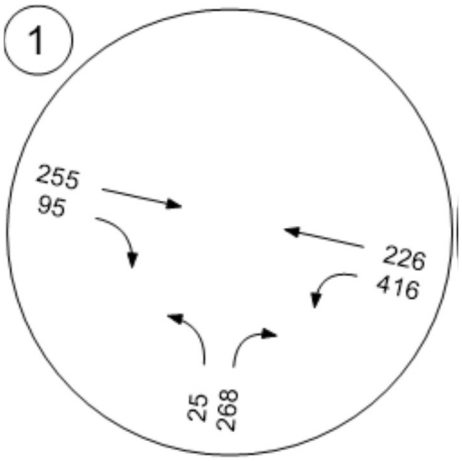


8. East Wellington Road / Site Access

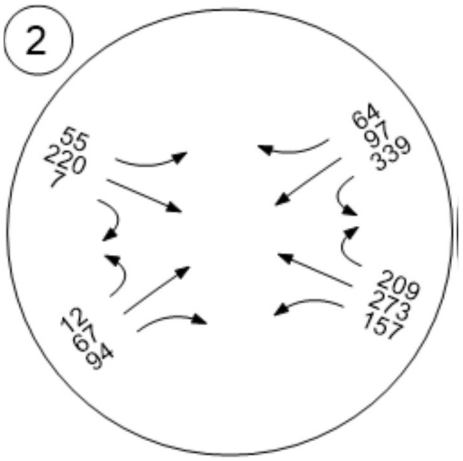


9. Highway 19 / Jingle Pot Road

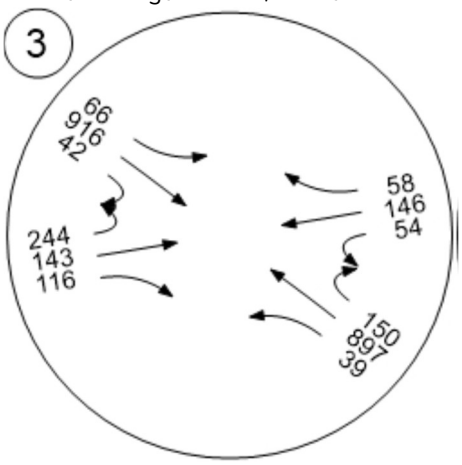
Figure 17 – 2036 Post Development without Northfield Connector Traffic Volumes – AM Peak Hour



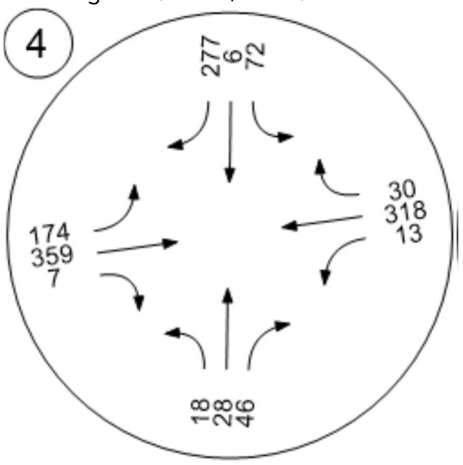
1. East Wellington Road / Westwood Road



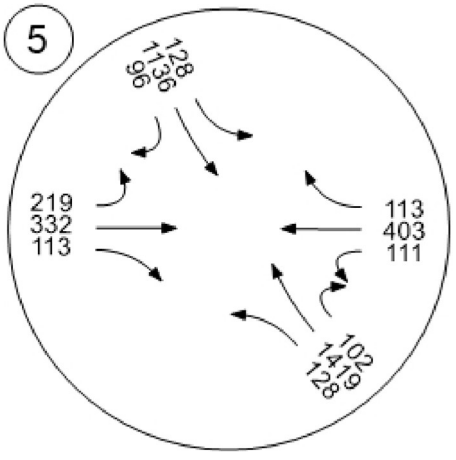
2. Jingle Pot Road / Westwood Road



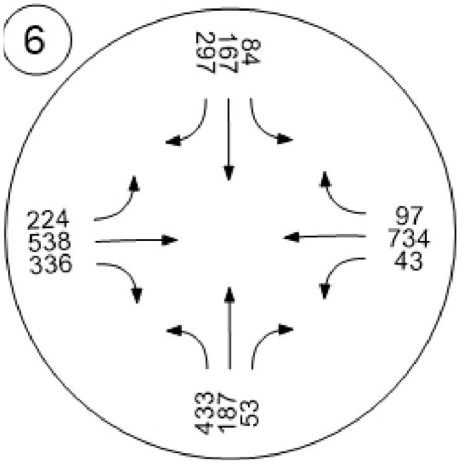
3. Bowen Road / East Wellington Road



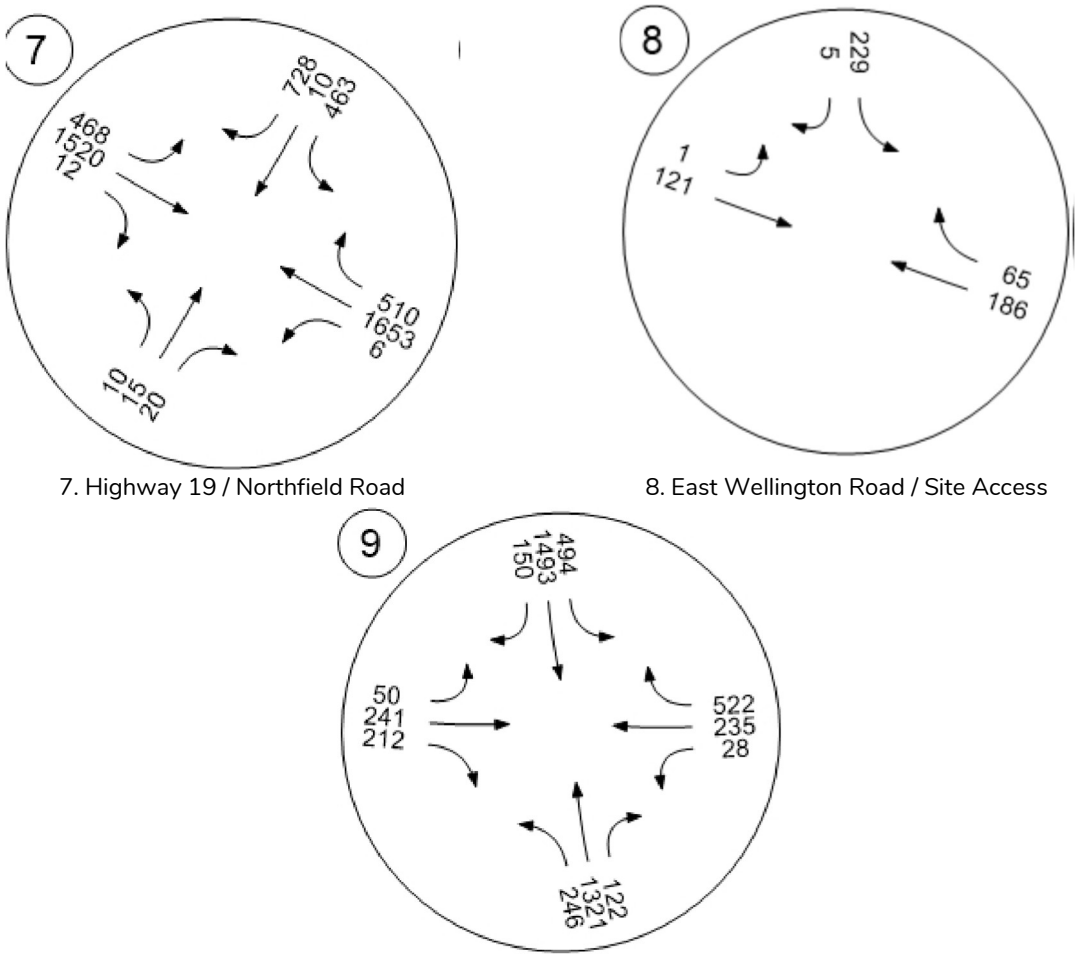
4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

Figure 18 – 2036 Post Development without Northfield Connector Traffic Volumes – PM Peak Hour

Figure 19 - 2036 Post-Development ADT Estimates (Without Connector)

4.6.4 Post-Development Traffic Operations – 2026 (without Connector)

Intersection analysis results for 2026 post development conditions are summarized in **Table 16** and **Table 17**. 2026 post development is modelled with the existing road network and traffic control.

Table 16 - Post-Development Conditions - 2026 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.63 (0.21)	223.8 (206.9)	-	261
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.17 (-)	3.40 (-1.20)	-	3
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	11.2 (0.8)	1	1/45
NBT/R	0.23 (0.01)	10.4 (0.8)	6	10
SBL	0.46 (0.05)	15.7 (1.7)	13	24/35
SBT/R	0.09 (-)	9.7 (0.7)	2	4
EBL	0.21 (0.02)	17.2 (2.5)	4	7/50
EBT/R	0.40 (-0.01)	8.2 (0.5)	12	21
WBL	0.11 (-)	11.6 (0.8)	2	4/40
WBT/R	0.69 (0.05)	10.5 (1.2)	25	44
Bowen Road / East Wellington Road (Signalized)				
NBL	0.17 (0.04)	15.9 (1.4)	6	11/40
NBT	0.29 (0.01)	9.0 (0.2)	20	35
NBT/R	0.29 (0.01)	9.1 (0.3)	19	34
SBL	0.13 (-)	12.9 (0.3)	5	9/50
SBT	0.40 (-0.07)	10.2 (0.5)	30	54
SBT/R	0.40 (0.02)	10.3 (0.5)	29	52
EBL	0.42 (0.06)	29.9 (10.9)	23	42/60
EBT	0.57 (0.01)	36.3 (-0.2)	26	47
EBR	0.23 (-)	32.9 (-0.3)	8	15/20
WBL	0.10 (-)	24.4 (-0.3)	5	9/30
WBT/R	0.58 (0.10)	34.6 (0.8)	29	52

East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.13 (0.05)	34.3 (9.9)	-	7
SB	0.35 (0.11)	17.6 (3.6)	-	19
EB	0.14 (0.02)	2.5 (-)	-	2
WB	0.03 (-)	0.9 (-0.3)	-	1
Bowen Road / Northfield Road (Signalized)				
NBL	0.26 (0.01)	20.1 (0.5)	9	16/130
NBT	0.99 (0.01)	98.6 (11.1)	171	230
NBT/R	0.99 (0.01)	100.5 (11.4)	168	227
SBL	0.31 (-)	24.8 (0.2)	10	17/50
SBT	0.76 (0.04)	35.5 (2)	74	113
SBT/R	0.76 (0.04)	35.7 (2.1)	72	111
EBL	0.35 (-)	19.2 (-)	19	34/105
EBT/R	0.95 (-)	67.9 (-)	129	181
WBL	0.36 (-)	25.9 (-)	13	24/55
WBT	0.39 (-)	29 (-)	26	47
WBT/R	0.4 (-)	29.1 (-)	25	45
Northfield Road / Boxwood Road (Signalized)				
NBL	1.12 (0.04)	318 (63.29)	172	245/40
NBT/R	0.23 (-)	32.9 (-)	16	28
SBL	0.81 (-)	62 (-)	21	37/50
SBT	0.63 (-)	45.4 (-)	34	61
SBR	0.76 (-)	49 (-)	38	66/60
EBL	0.39 (-)	16.6 (-)	23	42/100
EBT	0.71 (-)	28.3 (-)	94	138
EBR	0 (-)	0 (-)	0	0/200
WBL	0.06 (-)	16.3 (-)	2	4/50
WBT	0.35 (-)	24.5 (-)	34	60
WBT/R	0.35 (-)	24.6 (-)	33	59/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.09 (-)	55.6 (2.6)	1	1/170
NBT	1.3 (0.05)	594 (105.2)	610	847
NBR	0.36 (0.02)	33.1 (2.66)	24	43/140

SBL	0.9 (0.02)	46.9 (3.8)	115	164/220
SBT	0.64 (-0.02)	13.5 (-0.6)	63	99
SBR	0 (-0.01)	7 (-0.28)	0	0/150
EBL	0.06 (-)	52 (2.5)	1	2
EBT/R	0.08 (-)	52.2 (2.5)	1	2
WBL	0.90 (0.04)	103.2 (19.6)	65	102/70
WBLT	0.90 (0.04)	114.2 (22.1)	56	90
WBR	0.58 (0.04)	51.6 (4.5)	24	44/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.87 (0.03)	63.6 (8.8)	49	81/165
NBT	0.8 (0.01)	31.4 (1.6)	73	112
NBR	0.03 (-)	20.2 (1)	2	3/200
SBL	0.83 (0.01)	46.2 (2)	39	68/200
SBT	0.79 (0.05)	30.1 (4.1)	72	111
SBR	0.1 (0.01)	20.1 (2.4)	6	11/200
EBL	0.82 (-)	60.5 (2.1)	29	53/65
EBT	0.57 (-0.03)	40.1 (-0.3)	27	49
EBR	0 (-)	0 (-)	0	0/15
WBL	0.1 (-)	28.4 (0.02)	5	8/45
WBT	0.72 (0.04)	48.1 (0.8)	24	43
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

Table 17 - Post-Development Conditions - 2026 - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.33 (0.07)	20.4 (9.9)	-	26
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.31 (0.05)	5.5 (-)	-	7

Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	9.1 (-0.2)	0	1/45
NBT/R	0.16 (-0.01)	7.2 (-0.1)	4	7
SBL	0.54 (0.09)	13.1 (0.9)	17	31/35
SBT/R	0.17 (-0.01)	7.2 (-0.2)	4	7
EBL	0.16 (0.02)	16.8 (2.5)	3	6/50
EBT/R	0.32 (0.01)	10.3 (1.5)	9	16
WBL	0.35 (0.03)	15.3 (2.0)	8	15/40
WBT/R	0.57 (0.04)	12.0 (1.9)	17	31
Bowen Road / East Wellington Road (Signalized)				
NBL	0.12 (0.03)	18.1 (3.9)	4	7/40
NBT	0.48 (0.05)	13.5 (3.4)	42	71
NBT/R	0.48 (0.05)	13.6 (3.4)	40	69
SBL	0.20 (0.02)	20.5 (4.0)	7	13/50
SBT	0.45 (0.05)	13.1 (3.4)	38	66
SBT/R	0.45 (0.05)	13.1 (3.4)	38	66
EBL	0.52 (0.12)	30.0 (-0.3)	32	58/60
EBT	0.36 (-0.01)	30.7 (-4.2)	19	34
EBR	0.24 (-0.05)	29.5 (-4.8)	10	19/20
WBL	0.10 (-0.01)	21.4 (-3.8)	6	10/30
WBT/R	0.43 (-0.11)	30.0 (-5.4)	24	43
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.17 (0.06)	29.5 (9.9)	-	13
SB	0.44 (0.12)	50.8 (26.9)	-	80
EB	0.13 (0.03)	2.6 (-0.3)	-	2
WB	0.01 (-)	0.3 (-)	-	0
Bowen Road / Northfield Road (Signalized)				
NBL	0.38 (0.01)	21.4 (0.4)	12	22/130
NBT	0.99 (0.04)	86.6 (25.66)	218	285
NBT/R	0.99 (0.04)	91.8 (28.66)	222	290
SBL	0.47 (0.02)	31 (1.56)	15	27/50
SBT	0.8 (-)	37.6 (0.4)	112	159
SBT/R	0.8 (-)	38.2 (0.5)	110	158

EBL	0.5 (-)	28.5 (0.59)	31	56/105
EBT/R	0.91 (-)	62.6 (2.09)	98	143
WBL	0.34 (-)	29.9 (0.6)	15	28/55
WBT	0.63 (-)	43 (0.5)	46	77
WBT/R	0.64 (-)	43.3 (0.5)	44	74
Northfield Road / Boxwood Road (Signalized)				
NBL	1.23 (0.11)	498.1 (182.04)	381	527/40
NBT/R	0.31 (-)	28.9 (-)	32	58
SBL	0.8 (-)	69.8 (-)	20	37/50
SBT	0.42 (-)	43.5 (-)	32	57
SBR	0.88 (-)	73.7 (-)	79	119/60
EBL	0.55 (-)	30.2 (-)	33	59/100
EBT	0.75 (-)	41.1 (-)	107	154
EBR	0 (-)	0 (-)	0	0/200
WBL	0.13 (-)	23.5 (-)	5	9/50
WBT	0.64 (-)	41 (-)	77	117
WBT/R	0.64 (-)	41.1 (-)	76	115/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.12 (-)	51.4 (0.6)	1	2/170
NBT	1.5 (0.02)	939.3 (31.1)	1049	1501
NBR	0.31 (-)	28.2 (0.6)	19	35/140
SBL	0.86 (-)	40.8 (0.1)	78	118/220
SBT	0.73 (-)	17.4 (-0.2)	76	115
SBR	0 (-)	8.4 (-0.1)	0	0/150
EBL	0.08 (-)	46 (0.6)	2	3
EBT/R	0.16 (-)	46.6 (0.6)	4	6
WBL	0.87 (0.01)	82.1 (4)	61	97/70
WBLT	0.87 (0.01)	82 (4)	61	97
WBR	0.91 (0.06)	102.2 (24)	66	102/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.92 (0.03)	86.6 (12.5)	63	99/165
NBT	0.79 (-)	25.5 (0.4)	86	129
NBR	0.08 (-)	15.3 (0.2)	5	9/200

SBL	1.02 (0.01)	109.3 (7.2)	71	110/200
SBT	0.91 (0.01)	31.5 (0.6)	112	160
SBR	0.1 (-)	15.9 (0.2)	6	12/200
EBL	0.67 (-)	66.1 (0.5)	11	20/65
EBT	0.65 (0.11)	48.3 (1.6)	22	40
EBR	0 (-)	0 (-)	0	0/15
WBL	0.09 (-)	35 (-0.02)	4	7/45
WBT	0.71 (0.01)	50.7 (0.1)	22	40
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

In the AM peak hour, the northbound left/right movement at East Wellington Road / Westwood Road is exceeding the delay threshold. The implementation of a separate left turn lane will mitigate the issue. The Highway 19 / Jingle Pot Road intersection also operates with delays exceeding the threshold for the northbound and eastbound left turn movements in the AM peak, which can be mitigated with signal timing adjustments.

In the PM peak hour, the southbound approach at East Wellington / Boxwood Road / Madsen Road exceeds the delay threshold, as does the northbound left turn movement. Separated left turn lanes alone are not sufficient to improve operations of the intersection to an acceptable level. The implementation of a signal will improve the delay for all movements. A signal warrant was conducted and is warranted at this intersection. See **Section 6.0** for a discussion on the signal warrant assessment. A roundabout was not considered for this location due to the lack of right-of-way required to accommodate heavy trucks in a roundabout and the topography on Madsen Road.

The intersection of Highway 19 / Jingle Pot Road, post development, operates at a comparable level to the 2026 background traffic conditions, with the northbound, southbound, and eastbound left turns failing to meet acceptable thresholds. The addition of development traffic does not result in significant worsening of operations or queuing at Highway 19 / Jingle Pot Road; therefore, no mitigations are required due to the development.

The intersections along Northfield Road at Bowen Road, Boxwood Road, and Highway 19 all operate at consistent levels of service to the 2026 background condition, indicating that no further mitigations are required to development traffic.

The 2026 post development results for the proposed site access intersection are summarized in **Table 18** and **Table 19**.

Table 18 - Site Access Conditions – 2026 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.12	13.7	-	3
EBL/T	0.00	0.1	-	0
WBT/R	0.00	0	-	0

= Value exceeding threshold

Table 19 - Site Access Conditions - 2026 - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.34	13.0	-	12
EBL/T	0.00	0.1	-	0
WBT/R	0.00	0	-	0

= Value exceeding threshold

The proposed site access off East Wellington Road operates well under stop control with no queuing, delay, or capacity issues by the 2026 opening day in both the AM and PM peak periods.

4.6.5 Post-Development Traffic Operations – 2036 (without Connector)

The results of the analysis for 2036 post-development conditions without the Northfield Connector (see **Section 5.0** for with the connector) are summarized in **Table 20** and **Table 21**. Existing traffic control and road networks are modelled.

Table 20 - Post-Development Conditions - 2036 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.75 (0.27)	515.7 (495.1)	-	459
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.12 (-0.07)	3.5 (-1.1)	-	3
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.03 (-)	13.0 (1.4)	1	2/45
NBT/R	0.24 (0.01)	11.8 (1.1)	8	13
SBL	0.52(0.06)	18.9 (2.6)	18	33/35
SBT/R	0.10 (-)	11.1 (1.0)	3	5
EBL	0.26 (0.03)	20.8 (3.2)	6	10/50
EBT/R	0.42 (-0.01)	9.3 (0.8)	17	30
WBL	0.13 (-)	13.6 (1.2)	3	6/40
WBT/R	0.73 (0.05)	13.1 (2.5)	36	64
Bowen Road / East Wellington Road (Signalized)				
NBL	0.20 (0.05)	18.6 (1.7)	7	13/40
NBT	0.32 (-)	9.7 (0.2)	23	41
NBT/R	0.32 (-)	9.8 (0.3)	22	39
SBL	0.15 (-)	14.7 (0.3)	6	11/50
SBT	0.44 (0.02)	11.2 (0.5)	35	62
SBT/R	0.44 (0.02)	11.3 (0.6)	34	60
EBL	0.45 (0.06)	29.9 (1.0)	25	46/60
EBT	0.59 (0.01)	35.9 (-0.2)	28	51
EBR	0.24 (-)	32.2 (-0.4)	9	16/20
WBL	0.11 (-)	23.9 (-0.3)	5	10/30
WBT/R	0.60 (0.09)	34.5 (0.8)	31	56
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.19 (0.07)	46.9 (16.5)	-	10
SB	0.39 (0.12)	20.8 (5.2)	-	25
EB	0.16 (0.02)	2.6 (0.1)	-	3
WB	0.04 (-)	0.9 (-0.4)	-	1

Bowen Road / Northfield Road (Signalized)				
NBL	0.3 (0.01)	21.6 (0.6)	10	19/130
NBT	1.1 (0.01)	246.6 (21)	339	451
NBT/R	1.1 (0.01)	252 (21.4)	335	447
SBL	0.34 (-)	26.2 (0)	11	20/50
SBT	0.84 (0.04)	41.7 (3.7)	90	133
SBT/R	0.84 (0.04)	42.1 (3.8)	88	130
EBL	0.4 (-)	19.7 (-)	21	38/105
EBT/R	1.04 (-)	150.6 (-)	231	307
WBL	0.42 (-)	28 (-)	15	27/55
WBT	0.42 (-)	29.3 (-)	29	53
WBT/R	0.43 (-)	29.5 (-)	28	51
Northfield Road / Boxwood Road (Signalized)				
NBL	1.23 (0.04)	500.4 (69.78)	257	364/40
NBT/R	0.25 (-)	32.7 (-)	17	31
SBL	0.82 (-)	63.3 (-)	23	41/50
SBT	0.65 (-)	44.8 (-)	37	65
SBR	0.78 (-)	49.9 (-)	42	72/60
EBL	0.44 (-)	18.4 (-)	27	49/100
EBT	0.8 (-)	34.3 (-)	116	165
EBR	0 (-)	0 (-)	0	0/200
WBL	0.08 (-)	18.5 (-)	2	4/50
WBT	0.41 (-)	27.1 (-)	39	68
WBT/R	0.41 (-)	27.2 (-)	39	67/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.09 (-)	58.2 (2.7)	1	1/170
NBT	1.5 (0.07)	942.3 (121.3)	901	1288
NBR	0.41 (0.01)	36.5 (2.89)	28	51/140
SBL	0.92 (0.02)	51.8 (5)	137	190/220
SBT	0.69 (-0.01)	14.3 (-0.7)	74	113
SBR	0 (-)	6.7 (-0.3)	0	0/150
EBL	0.07 (0.01)	54.6 (2.6)	1	2

EBT/R	0.09 (0.01)	54.7 (2.6)	1	2
WBL	1.03 (0.04)	210.4 (51.6)	115	166/70
WBLT	1.03 (0.04)	225.5 (52.1)	97	143
WBR	0.66 (0.04)	59.8 (5.9)	30	54/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.93 (0.06)	90.8 (21.2)	70	108/165
NBT	0.86 (0.01)	36.3 (2.1)	96	140
NBR	0.03 (-)	21.9 (1.1)	2	3/200
SBL	0.88 (0.01)	53.1 (2.3)	50	83/200
SBT	0.84 (0.05)	34.2 (4.4)	94	138
SBR	0.11 (0.01)	21.6 (2.4)	7	13/200
EBL	0.85 (0.01)	74 (4)	39	67/65
EBT	0.59 (-0.03)	44.3 (-0.4)	34	60
EBR	0 (-)	0 (-)	0	0/15
WBL	0.12 (-)	31.9 (-0.04)	6	10/45
WBT	0.75 (0.03)	54 (0.8)	29	53
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

Table 21 - Post-Development Conditions - 2036 - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.37 (0.08)	25.1 (14.2)	-	36
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.35 (0.06)	5.7 (0.1)	-	8
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	9.8 (0.7)	1	1/45
NBT/R	0.17 (-0.02)	7.7 (0.1)	5	8
SBL	0.59 (0.11)	15.1 (2.7)	22	40/35
SBT/R	0.18 (-0.01)	7.8 (0.2)	5	9
EBL	0.19 (0.02)	18.9 (3.7)	4	7/50
EBT/R	0.34 (0.01)	11.1 (2.0)	11	20

WBL	0.39 (0.04)	17.0 (3.2)	11	19/40
WBT/R	0.61 (0.04)	13.2 (2.5)	22	39
Bowen Road / East Wellington Road (Signalized)				
NBL	0.14 (0.04)	21.4 (5.0)	5	9/40
NBT	0.54 (0.07)	15.0 (5.0)	49	81
NBT/R	0.54 (0.07)	15.2(5.0)	48	79
SBL	0.26 (0.04)	25.3(5.5)	9	17/50
SBT	0.50 (0.07)	14.5 (4.7)	45	75
SBT/R	0.51 (0.07)	14.5 (4.6)	45	75
EBL	0.54 (0.10)	30.1 (-0.6)	34	61/60
EBT	0.37 (-0.02)	30.1 (-4.9)	20	36
EBR	0.24 (-0.08)	28.9 (-5.6)	11	20/20
WBL	0.11 (-0.01)	20.8 (-4.2)	6	11/30
WBT/R	0.46 (-0.14)	29.8 (-6.4)	26	47
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.25 (0.1)	40.5 (16.6)	-	20
SB	0.59 (0.22)	175.6 (138.2)	-	192
EB	0.14 (0.03)	2.6 (-0.3)	-	3
WB	0.01 (-)	0.3 (-)	-	0
Bowen Road / Northfield Road (Signalized)				
NBL	0.47 (0.01)	26.1 (0.2)	15	26/130
NBT	1.13 (0.06)	284.3 (83.24)	496	652
NBT/R	1.14 (0.06)	301.1 (87.12)	510	673
SBL	0.52 (-)	33.5 (0.04)	18	33/50
SBT	0.91 (0.01)	58.2 (2.3)	159	216
SBT/R	0.92 (0.01)	60.3 (2.6)	158	215
EBL	0.56 (-)	30.1 (-)	36	63/105
EBT/R	0.94 (-)	77 (-)	124	175
WBL	0.39 (-)	32.3 (-)	18	33/55
WBT	0.62 (-)	42.6 (-)	52	85
WBT/R	0.63 (-)	42.9 (-)	50	81

Northfield Road / Boxwood Road (Signalized)				
NBL	1.35 (0.11)	692.8 (189.39)	514	719/40
NBT/R	0.33 (-)	28.5 (-)	35	62
SBL	0.8 (-)	68.4 (-)	22	40/50
SBT	0.44 (-)	42.4 (-)	34	61
SBR	0.91 (-)	82.3 (-)	93	136/60
EBL	0.68 (-)	38.4 (-)	41	70/100
EBT	0.86 (-)	52.6 (-)	135	188
EBR	0 (-)	0 (-)	0	0/200
WBL	0.18 (-)	26.5 (-)	6	10/50
WBT	0.7 (-)	43.9 (-)	88	131
WBT/R	0.7 (-)	44.1 (-)	87	129/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.14 (-)	53.6 (0.7)	1	2/170
NBT	1.72 (0.02)	1329.2 (36.5)	1407	2063
NBR	0.36 (0.01)	31 (0.7)	23	42/140
SBL	0.88 (0.01)	43.5 (0.9)	92	135/220
SBT	0.78 (-0.01)	19.3 (-0.3)	93	137
SBR	0 (-)	8.3 (-0.1)	0	0/150
EBL	0.09 (-)	47.8 (0.6)	2	4
EBT/R	0.18 (-)	48.5 (0.6)	4	8
WBL	1.00 (0.01)	163.6 (12.1)	107	154/70
WBLT	1.00 (0.01)	163.2 (12)	107	154
WBR	1.03 (0.06)	206.4 (59.6)	115	166/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	1.03 (0.03)	180.2 (39.5)	113	164/165
NBT	0.87 (-)	29.1 (0.5)	106	152
NBR	0.09 (-)	15.7 (0.2)	6	11/200
SBL	1.14 (0.01)	304.1 (10.1)	160	231/200
SBT	1 (-)	61.7 (4.8)	178	239
SBR	0.11 (-)	16.4 (0.2)	7	13/200

EBL	0.72 (0.01)	70.1 (0.5)	13	23/65
EBT	0.66 (0.1)	48.7 (1.5)	25	44
EBR	0 (-)	0 (-)	0	0/15
WBL	0.1 (-)	35.2 (0)	5	8/45
WBT	0.72 (0.01)	51.2 (0)	25	44
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

In the 2036 AM peak hour, the northbound left/right movement (if not mitigated by opening day 2026 with a separate turn lane) at East Wellington / Westwood Road will experience significantly more delay. If the separate northbound left turn lane is implemented, then the northbound left will operate near the desired delay threshold of 35s. Given the anticipated variation in projected traffic patterns, implementing upgraded traffic control to achieve minimal delay improvements for a side street left turn movement (for one hour of the day) is not recommended.

By 2036, in the AM and PM peak hour, the northbound left/through/right at East Wellington / Boxwood Road / Madsen Road (and the southbound movement in the PM peak hour) will exceed the delay threshold due to the projected increase in through traffic on East Wellington Road (assuming no mitigation in the 2026 Post Development scenario). If a signal is implemented, all movements will operate within acceptable levels of performance. This intersection meets the threshold for signalization in the long term if volumes are generated and grow as projected (see **Section 6.0** for signal warrant assessment).

In the PM peak hour, the southbound left 95th percentile queue length at Jingle Pot Road / Westwood Road exceeds its storage length by 5m and the 95th percentile queue of the eastbound left at Bowen Road / East Wellington Road exceeds its storage length by 1m. Since these are projected 2036 queue lengths, increases to the storage for less than a vehicle length is not recommended due to the development.

The intersection of Highway 19 / Jingle Pot Road operates at a comparable level to the 2036 background traffic conditions, with the southbound through and the northbound, southbound, and eastbound left turn movements failing to meet acceptable thresholds. The addition of development traffic does not result in significant worsening of operations or queuing at Highway 19 / Jingle Pot Road; therefore, no mitigations are required due to the development.

The intersections along Northfield Road at Bowen Road, Boxwood Road, and Highway 19 all operate at consistent levels of service to the 2036 background condition, indicating that no further mitigations are required to development traffic.

Intersection analysis results for the East Wellington Road / site access in 2036 are summarized in **Table 22** and **Table 23**.

Table 22 - Site Access Conditions – 2036 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.13	14.3	-	3
EBL/T	0.00	0.1	-	0
WBT/R	0.00	0	-	0

= Value exceeding threshold

Table 23 - Site Access Conditions - 2036 - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.35	13.5	-	13
EBL/T	0.00	0	-	0
WBT/R	0.00	0	-	0

= Value exceeding threshold

The proposed site access off East Wellington Road operates well under stop control with no queuing, delay, or capacity issues by the 2036 10-year horizon in both the AM and PM peak periods.

5.0 NORTHFIELD CONNECTOR

The City of Nanaimo wants to extend the west leg at the intersection of Highway 19 / Northfield Road to East Wellington Road. The connection will run through the site as the internal roadway for the development if the connection is made.

5.1 Northfield Connector Re-assignment

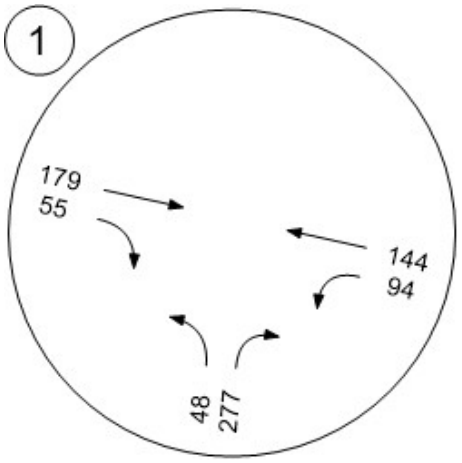
The Northfield Connector will change traffic patterns in the area by allowing southbound Highway 19 vehicles to turn right to directly access East Wellington Road rather than having to turn left onto Northfield Road, then connect using Boxwood Road or Bowen Road to access East Wellington Road. This trip re-assignment and analysis is based on the following methodology. A sensitivity analysis of the re-assignment was done with the City's higher reassignment of traffic. Section 5.1.1 outlines the sensitivity percentages and the impacts to the operations with this re-assignment. Sections 5.2 and 5.3 outline the results with WATT's trip re-assignment.

This connector is expected to shift approximately 9% of trips from southbound left on Highway 19 at Northfield Road to southbound right (50 AM trips, 40 PM trips). It will also shift traffic that is currently heading eastbound on East Wellington Road and using Boxwood Road or Bowen Road to Northfield Road and Highway 19. This is expected to shift approximately 20% of trips from eastbound on East Wellington Road before Westwood Road to the Northfield Connector (50 AM trips, 20 PM trips).

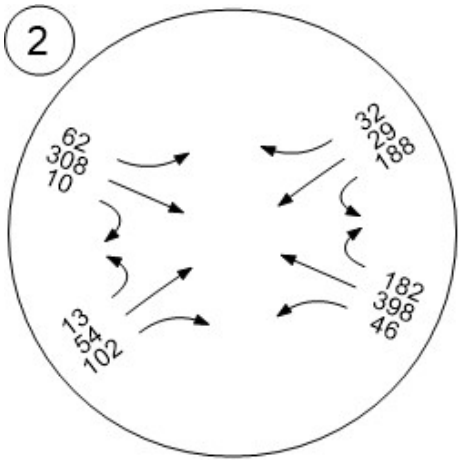
A small amount of traffic may decide to use the new connector from the Westwood Road area rather than utilizing Boxwood Road or Bowen Road to access Northfield Road and Bowen Road north. This is expected to shift approximately 7.5% from northbound right on Westwood Road at East Wellington Road to northbound left (25 AM trips, 20 PM trips).

Based on an approximately 36.5% adjustment of traffic this will shift approximately 125 AM peak hour trips and 80 PM peak hour trips, which is a relatively low amount of traffic based on the significant investment (cost) implementing the Northfield Connector. While shifting traffic away from the southbound left turn on Highway 19 (to a right turn) will help to reduce the southbound queue lengths and delays, overall, this is a relatively small volume of traffic compared to the existing volume of turning vehicles and through traffic on the north, south, and east approaches. This minimal shift in traffic would have limited impact on the operations at the intersection and therefore would have limited impact on MoTT's funding / planning for changes at this intersection to a higher level of traffic control (e.g., an interchange).

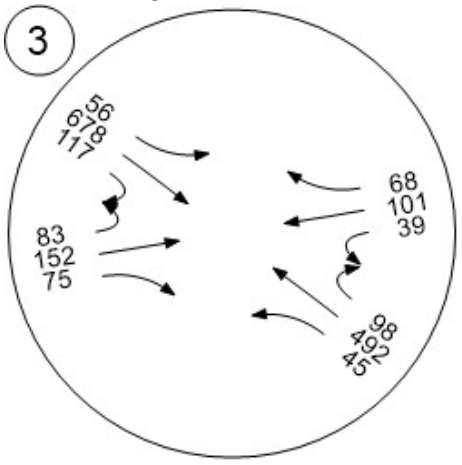
A review of the possible shifting of traffic from southbound Bowen Road (to East Wellington Road) to westbound Northfield Road was undertaken. Based on the current volumes turning southbound from Bowen Road to East Wellington Road there is limited traffic making this movement and therefore any shift in volume would be negligible. Additionally, any vehicles that are south or east of Bowen Road are unlikely to change their traffic pattern as it would be a circuitous route compared to their normal route to access East Wellington Road. The existing traffic volumes with adjustments from the Northfield Connector that are used for the analysis in Sections 5.2 and 5.3 are illustrated in **Figure 20** and **Figure 21**, respectively.



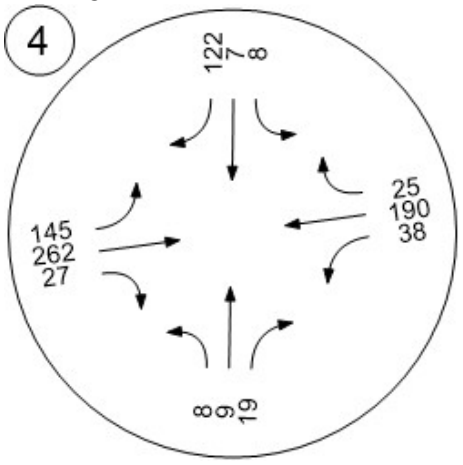
1. East Wellington Road / Westwood Road



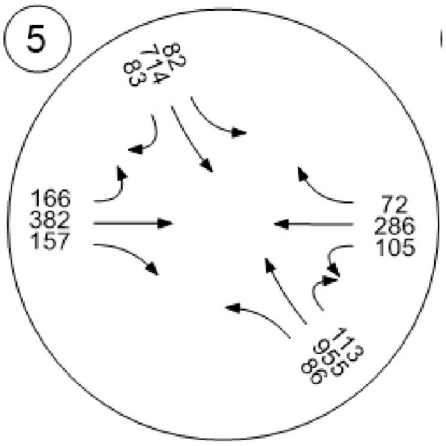
2. Jingle Pot Road / Westwood Road



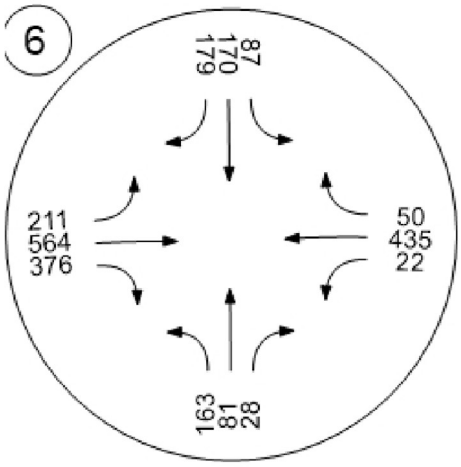
3. Bowen Road / East Wellington Road



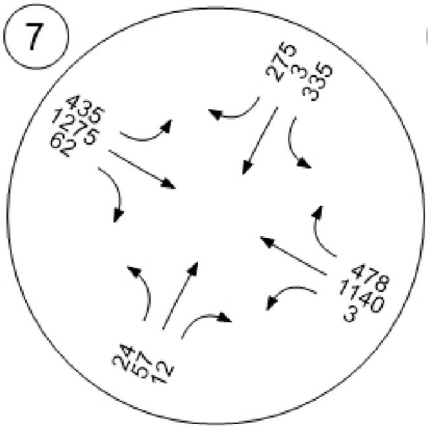
4. East Wellington Road / Boxwood Road / Madsen Road



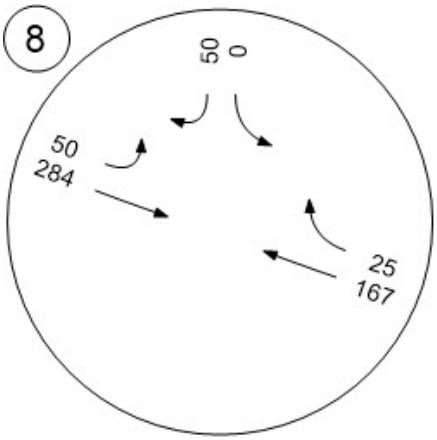
5. Bowen Road / Northfield Road



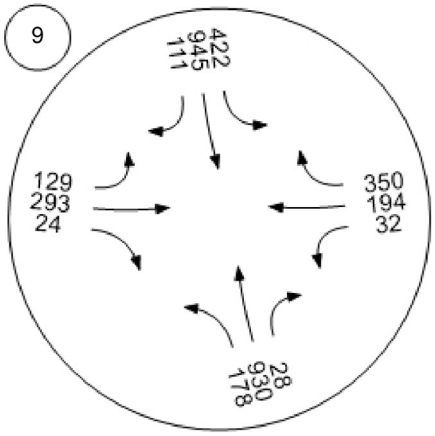
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

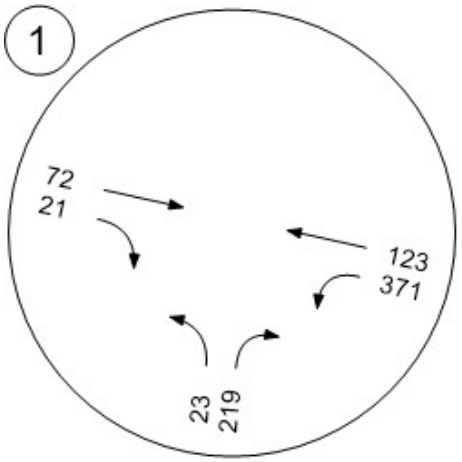


8. East Wellington Road / Site Access

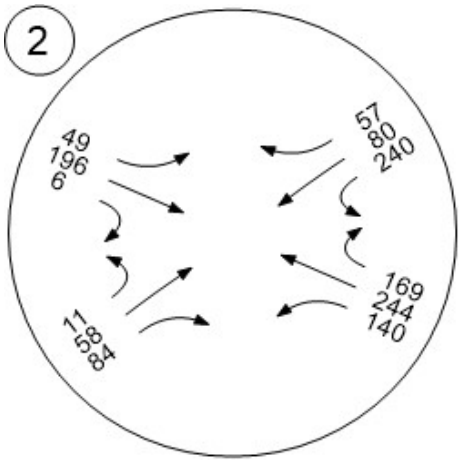


9. Highway 19 / Jingle Pot Road

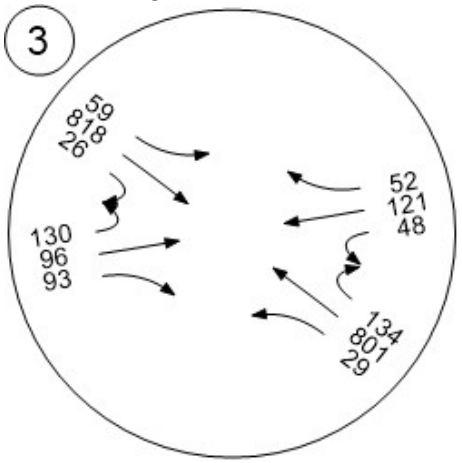
Figure 20 – Existing Traffic Volumes w/Northfield Connector – AM Peak Hour



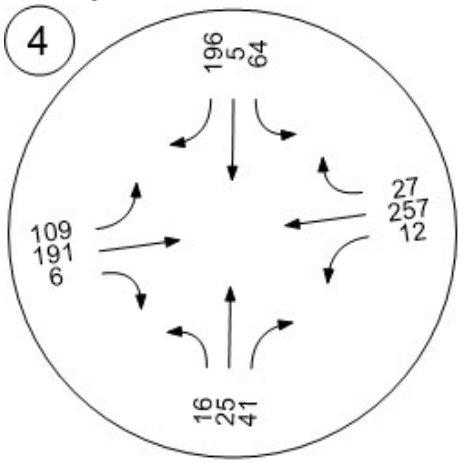
1. East Wellington Road / Westwood Road



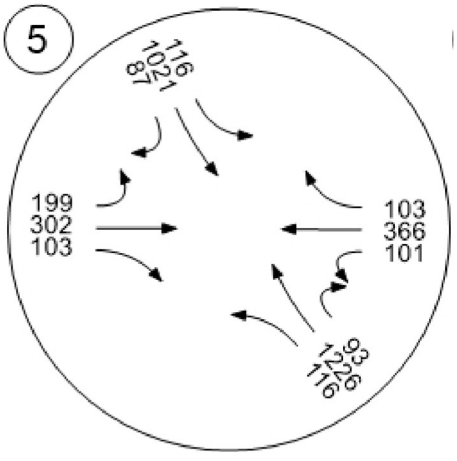
2. Jingle Pot Road / Westwood Road



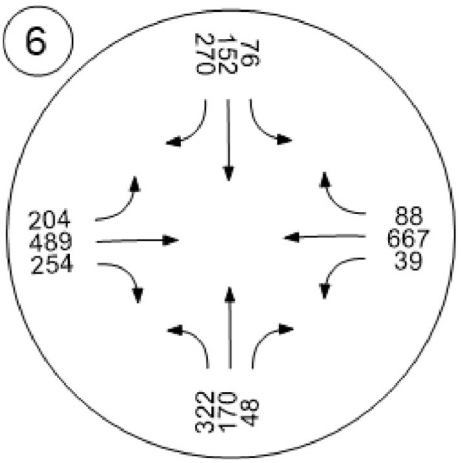
3. Bowen Road / East Wellington Road



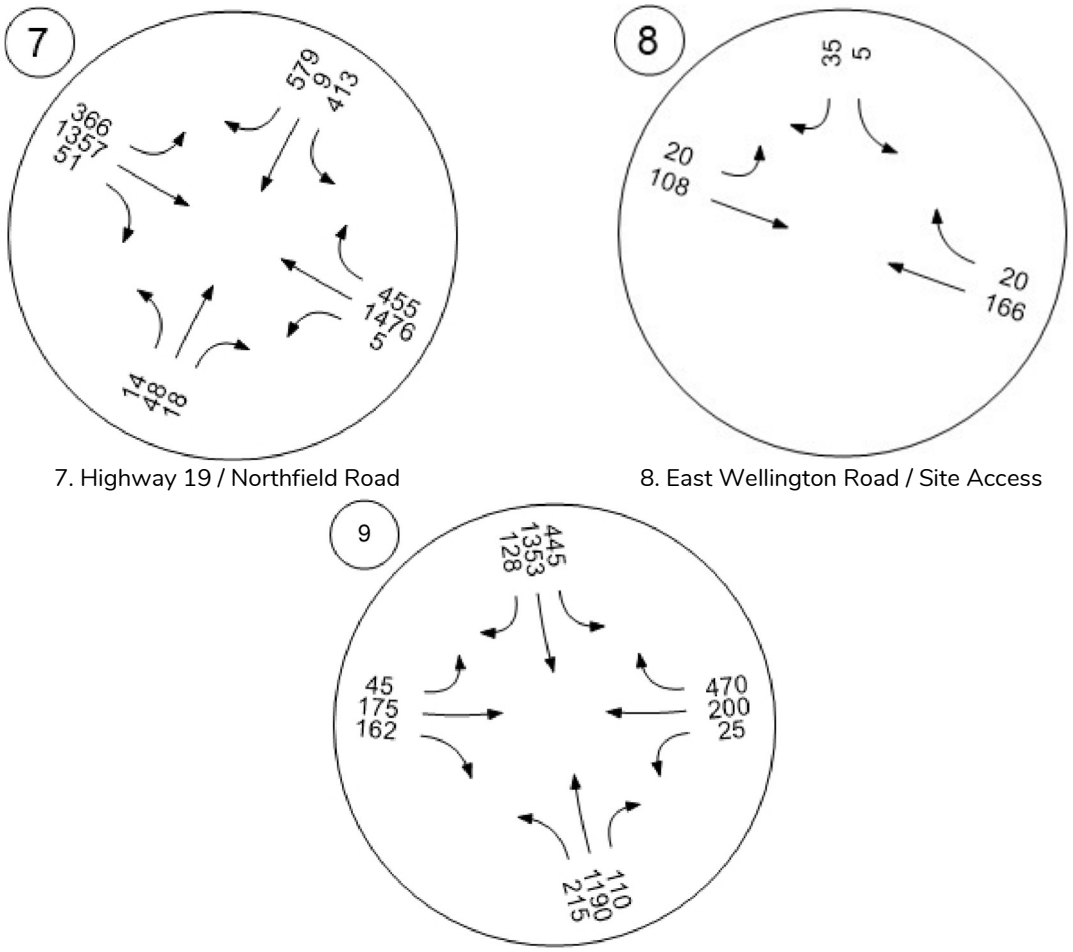
4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

Figure 21 – Existing Traffic Volumes w/Northfield Connector – PM Peak Hour

5.1.1 City of Nanaimo Northfield Connector Re-Assignment Sensitivity

The City provided their re-assignment assumption rates at the East Wellington Road / Westwood Road intersection which include 40% northbound right, 30% eastbound through, and 20% westbound left turning traffic diverted to the Northfield connector. WATT performed a high-level analysis of these projected changes in assignment and found the following:

- 40% northbound right divert to Northfield Connector results in failure or near failure (at worst 71 seconds of delay for the northbound left turn and a 95th percentile queue of 45m) in both the background and post-development 2036 scenarios, even with addition of a separate northbound left turn lane. This

indicates that a full 40% would likely not shift as it would become difficult to execute the left turn from stop control and will continue to turn right on to East Wellington Road to Boxwood Road / Bowen Road area

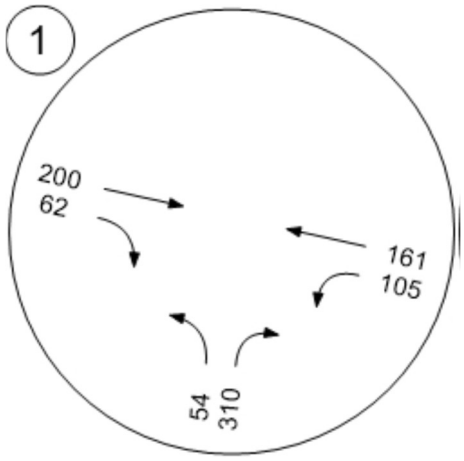
- Both 30% eastbound through and 20% westbound left diversions do not result in significant changes to the operations at East Wellington Road / Westwood Road.

Overall, if the City's higher shifts, compared to WATT's estimates, were to occur the only difference would be at the northbound left turn lane at East Wellington Road / Westwood Road that would require mitigation. Outside of the separate northbound left turn lane which has already been recommended, it is not recommended that any additional mitigation measures be implemented at this intersection due to this development. Further, a high-level TAC Signal Warrant was conducted with these higher re-assigned volumes, and a signal is not warranted at this intersection and therefore there is no difference between the higher and lower re-assignment. Any changes at this intersection due to the Northfield Road Connector would be the responsibility of the City.

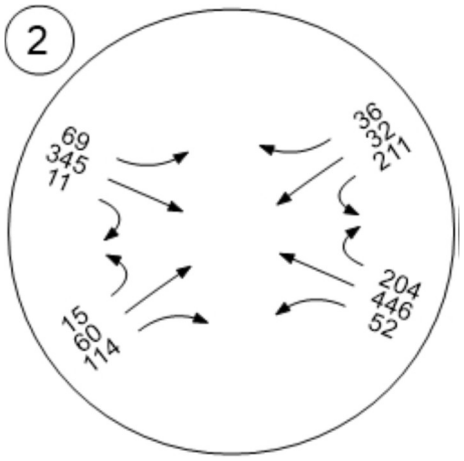
5.2 2036 Background Conditions with Northfield Connector

5.2.1 2036 Background Traffic Volumes with Northfield Connector

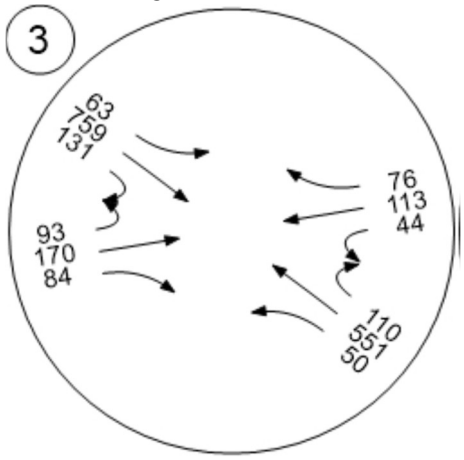
Background traffic volumes with the Northfield Connector are the adjusted existing traffic volumes with the corridor growth. Background traffic volumes for 2036 with the Northfield Connector are illustrated in **Figure 22** and **Figure 23**.



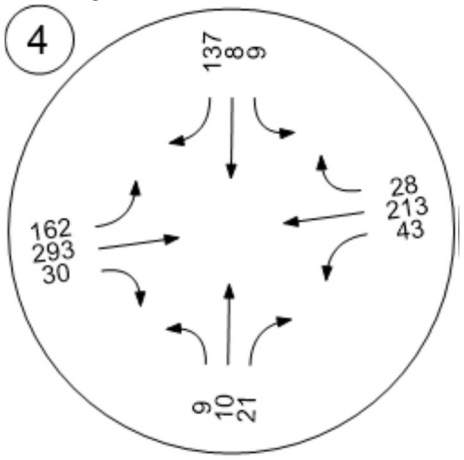
1. East Wellington Road / Westwood Road



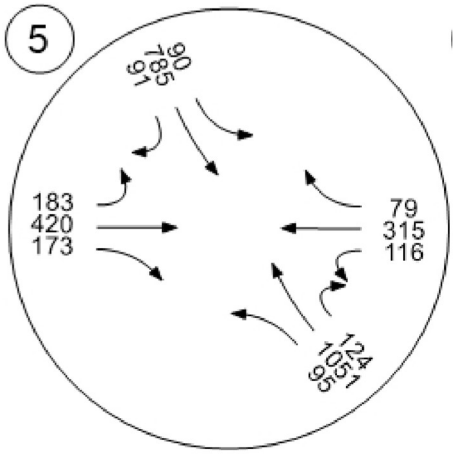
2. Jingle Pot Road / Westwood Road



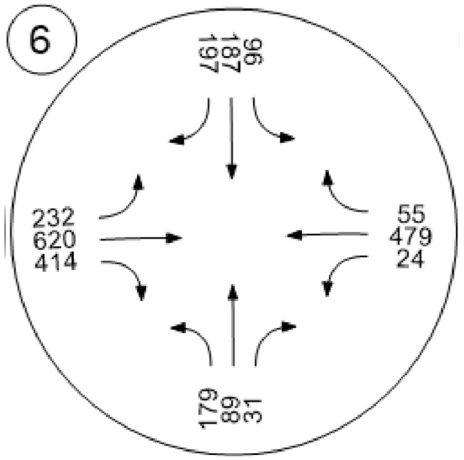
3. Bowen Road / East Wellington Road



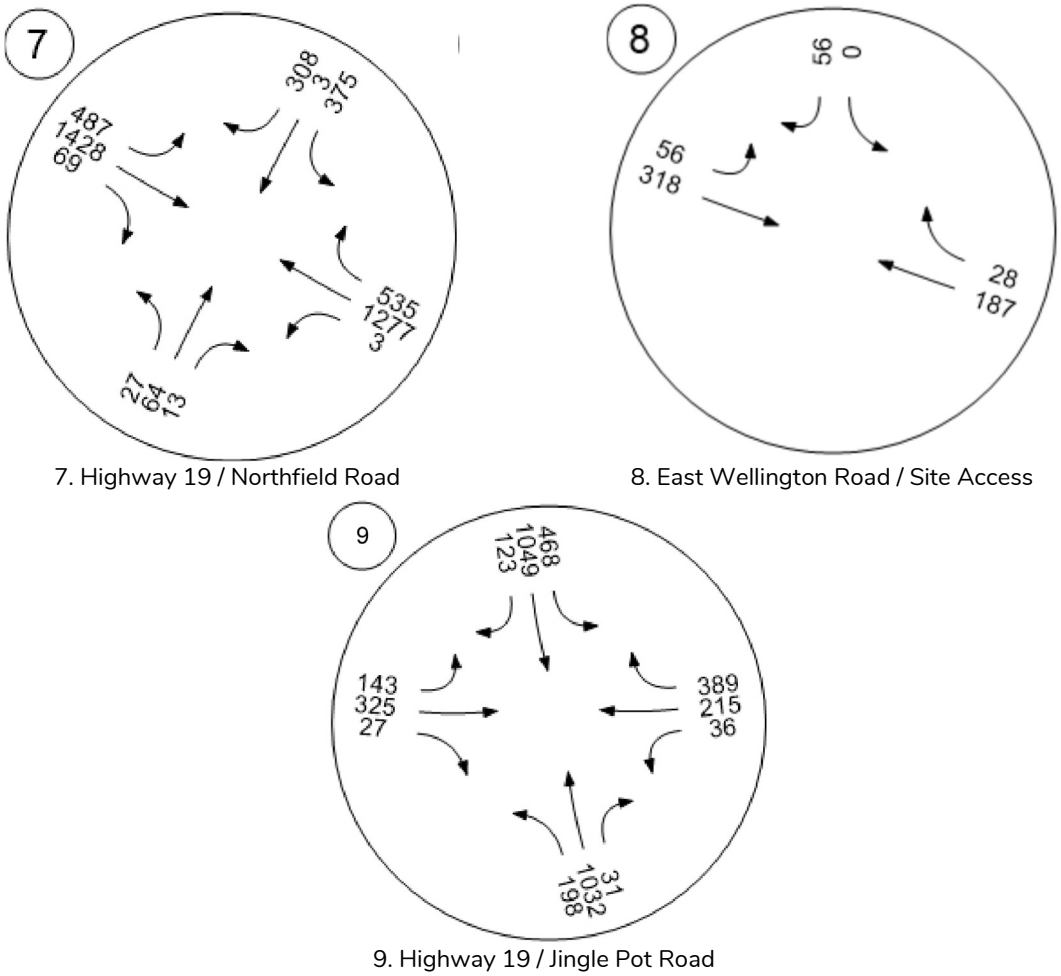
4. East Wellington Road/Boxwood Road/Madsen Road



5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road

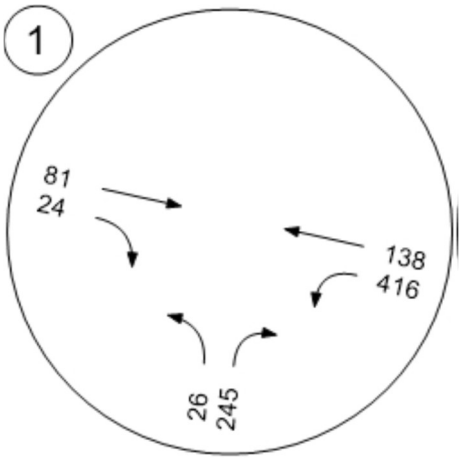


7. Highway 19 / Northfield Road

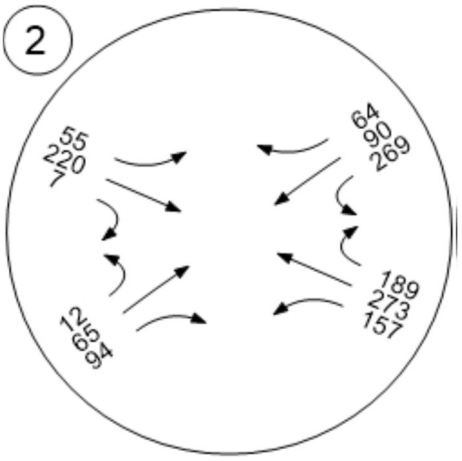
8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

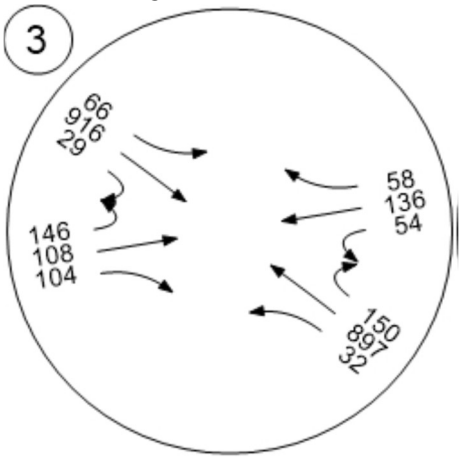
Figure 22 – 2036 Background Traffic Volumes w/Northfield Connector– AM Peak Hour



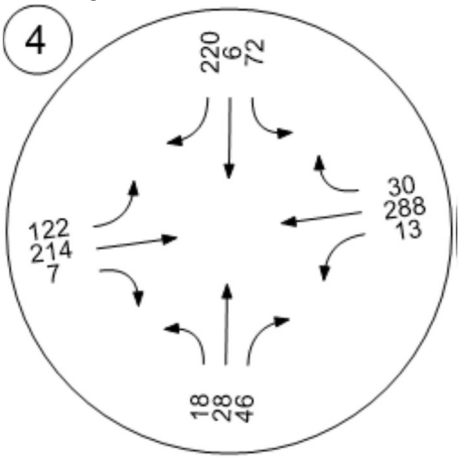
1. East Wellington Road / Westwood Road



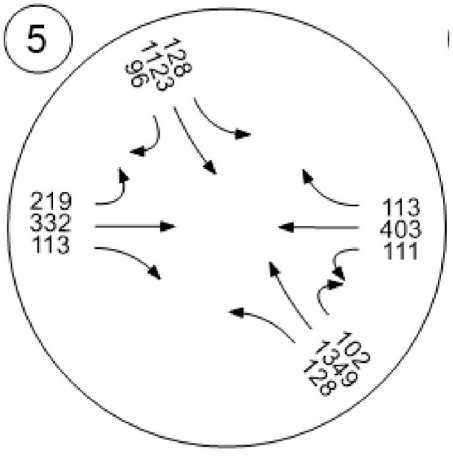
2. Jingle Pot Road / Westwood Road



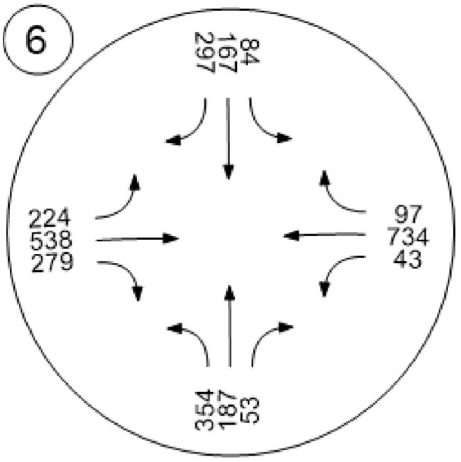
3. Bowen Road / East Wellington Road



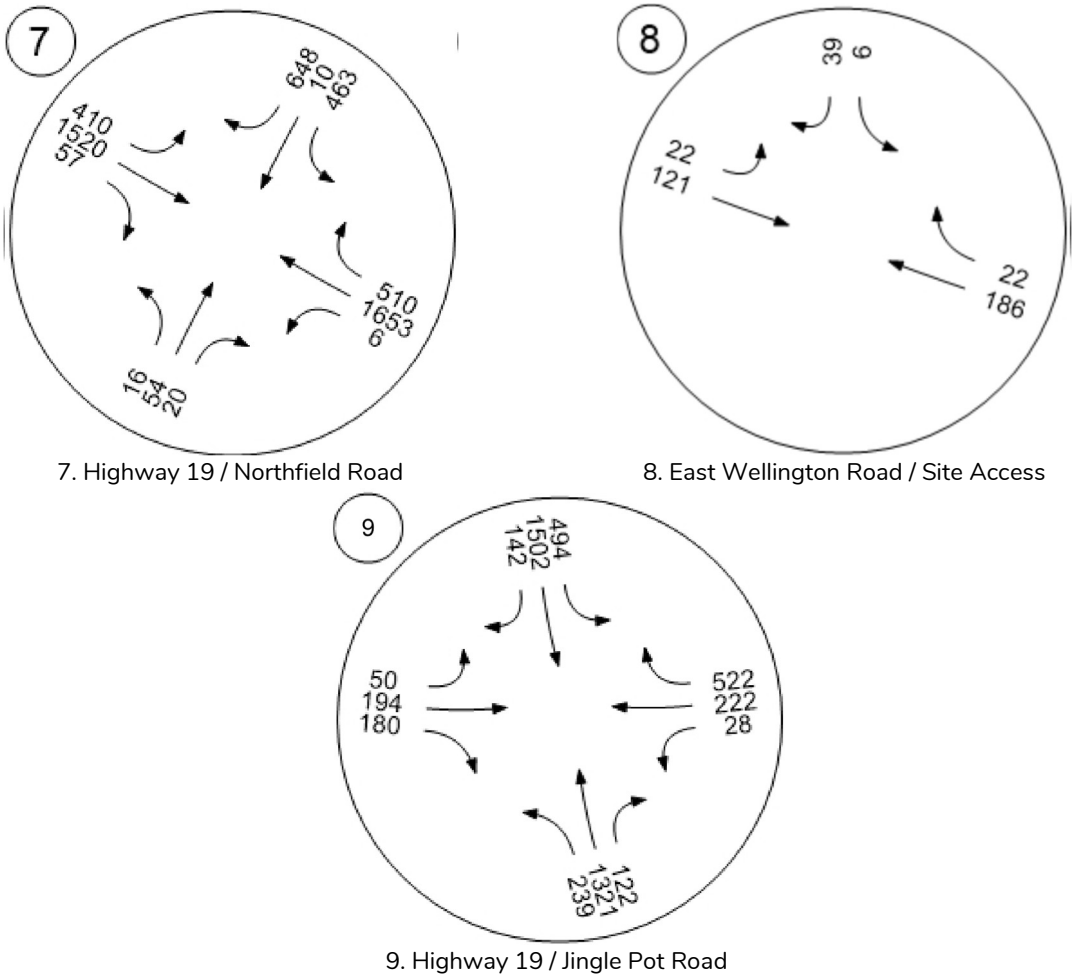
4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

Figure 23 - 2036 Background w/Northfield Connector Traffic Volumes – PM Peak Hour

5.2.2 2036 Background Traffic Operations with Northfield Connector

Intersection analysis results for 2036 under background conditions with the Northfield Connector completed are summarized in **Table 24** and **Table 25**. All intersections are modeled under existing laning and signal timing, for comparison to the without Connector scenario. The intersection of Highway 19 / Northfield Road was modelled with existing laning and signal timing, including eastbound and westbound split phasing to accommodate the dual westbound left turn.

Table 24 – 2036 Background Conditions w/Northfield Connector– AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.41	19.6	-	35
EBT/R	0	0	-	0
WBL/T	0.13	4	-	2
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.03	11.6	1	1/45
NBT/R	0.23	10.8	6	11
SBL	0.47	16.3	14	25/35
SBT/R	0.1	10.1	2	4
EBL	0.23	17.6	5	8/50
EBT/R	0.42	8.5	14	24
WBL	0.13	12.3	3	5/40
WBT/R	0.68	10.6	26	46
Bowen Road / East Wellington Road (Signalized)				
NBL	0.15	16.1	5	9/40
NBT	0.31	9.1	21	38
NBT/R	0.31	9.1	21	37
SBL	0.15	13.7	6	11/50
SBT	0.4	10.1	31	56
SBT/R	0.41	10.2	30	55
EBL	0.23	26.4	12	22/60
EBT	0.59	36.3	27	48

EBR	0.2	32.5	7	13/20
WBL	0.11	24.7	5	10/30
WBT/R	0.51	34.2	24	44
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.08	23.6	-	5
SB	0.19	14.3	-	9
EB	0.12	2.7	-	2
WB	0.04	1.2	-	1
Bowen Road / Northfield Road (Signalized)				
NBL	0.29	20.9	10	19/130
NBT	1.09	225.7	315	419
NBT/R	1.09	230.6	311	415
SBL	0.34	26.2	11	20/50
SBT	0.8	38.0	80	121
SBT/R	0.8	38.3	78	118
EBL	0.4	19.7	21	38/105
EBT/R	1.04	150.6	231	307
WBL	0.42	28.0	15	27/55
WBT	0.42	29.3	29	53
WBT/R	0.43	29.5	28	51
Northfield Road / Boxwood Road (Signalized)				
NBL	0.88	77.2	50	81/40
NBT/R	0.26	33.8	17	31
SBL	0.82	63.3	23	41/50
SBT	0.65	44.7	37	65
SBR	0.78	49.0	42	71/60
EBL	0.43	17.6	26	47/100
EBT	0.78	32.1	112	160
EBR	0.00	0.0	0	0/200
WBL	0.07	17.7	2	4/50
WBT	0.39	26.0	38	67
WBT/R	0.40	26.0	38	66/50

Highway 19 / Northfield Road (Signalized)				
NBL	0.09	56.2	1	1/170
NBT	1.45	848.0	842	1196
NBR	0.40	34.3	27	48/140
SBL	0.89	47.0	103	149/220
SBT	0.75	18.7	89	131
SBR	0.03	8.8	1	3/150
EBL	0.23	49.6	6	10
EBT/R	0.46	52.0	15	27
WBL	0.90	103.0	65	101/70
WBLT	0.90	103.3	64	101
WBR	0.49	48.6	20	35/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.87	69.6	49	81/165
NBT	0.85	34.2	90	133
NBR	0.03	20.7	2	3/200
SBL	0.87	50.8	48	80/200
SBT	0.79	29.8	85	126
SBR	0.10	19.2	7	12/200
EBL	0.84	70.0	37	64/65
EBT	0.62	44.7	32	58
EBR	0.00	0.0	0	0/15
WBL	0.12	31.9	6	10/45
WBT	0.72	53.2	23	42
WBR	0.00	0.0	0	0/375

= Value exceeding threshold X/X – Queue/Storage

Table 25 – 2036 Background Conditions w/Northfield Connector– PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.26	14.2	-	16
EBT/R	0	0	-	0
WBL/T	0.28	6	-	7
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02	9.1	0	1/45
NBT/R	0.19	7.6	4	7
SBL	0.48	12.3	13	23/35
SBT/R	0.19	7.6	4	7
EBL	0.17	15.3	3	6/50
EBT/R	0.33	9.1	8	15
WBL	0.35	13.7	8	15/40
WBT/R	0.57	10.7	16	28
Bowen Road / East Wellington Road (Signalized)				
NBL	0.1	15.8	3	6/40
NBT	0.47	11	39	67
NBT/R	0.47	11	38	66
SBL	0.22	18.9	8	14/50
SBT	0.45	10.6	36	63
SBT/R	0.45	10.6	36	63
EBL	0.37	29.2	21	38/60
EBT	0.39	34.6	16	29
EBR	0.26	33.5	9	17/20
WBL	0.12	24.8	7	12/30
WBT/R	0.56	35.3	27	48
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.12	20.2	-	9
SB	0.33	27.5	-	41
EB	0.1	2.9	-	2
WB	0.01	0.3	-	0

Bowen Road / Northfield Road (Signalized)				
NBL	0.46	25.9	15	26/130
NBT	1.07	201.0	378	492
NBT/R	1.08	214.0	388	507
SBL	0.52	33.5	18	33/50
SBT	0.90	55.9	154	210
SBT/R	0.91	57.7	153	209
EBL	0.56	30.1	36	63/105
EBT/R	0.94	77.0	124	175
WBL	0.39	32.3	18	33/55
WBT	0.62	42.6	52	85
WBT/R	0.63	42.9	50	81
Northfield Road / Boxwood Road (Signalized)				
NBL	1.10	276.1	230	316/40
NBT/R	0.33	28.5	35	62
SBL	0.80	68.4	22	40/50
SBT	0.44	42.4	34	61
SBR	0.91	82.3	93	136/60
EBL	0.68	38.4	41	70/100
EBT	0.86	52.6	135	188
EBR	0.00	0.0	0	0/200
WBL	0.18	26.5	6	10/50
WBT	0.70	43.9	88	131
WBT/R	0.70	44.1	87	129/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.14	52.3	1	2/170
NBT	1.67	1252.2	1360	1988
NBR	0.35	29.6	22	40/140
SBL	0.86	42.1	77	117/220
SBT	0.82	22.3	101	146
SBR	0.02	9.5	1	2/150
EBL	0.11	44.8	3	6
EBT/R	0.39	47.3	12	21

WBL	0.98	142.9	96	141/70
WBLT	0.98	142.1	97	142
WBR	0.90	97.6	62	98/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	1.00	140.7	94	137/165
NBT	0.87	28.6	104	151
NBR	0.09	15.5	6	10/200
SBL	1.13	294.0	156	225/200
SBT	1.00	62.4	180	241
SBR	0.11	16.1	7	12/200
EBL	0.71	69.6	13	23/65
EBT	0.56	47.2	19	35
EBR	0.00	0.0	0	0/15
WBL	0.10	35.2	5	8/45
WBT	0.71	51.3	23	42
WBR	0.00	0.0	0	0/375

= Value exceeding threshold X/X – Queue/Storage

The three intersections along East Wellington Road operate well with no queuing issues in both the AM and PM peak hour with no changes in laning or traffic control. Compared to the "Without Connector" scenario, the southbound movement delay at East Wellington Road / Boxwood Road improves by 10 seconds, bringing the performance to within the acceptable threshold.

At Bowen Road / Northfield Road and Highway 19 / Jingle Pot Road, traffic operations remain comparable to the 2036 Background "Without Connector" scenario, as the Northfield Connector is not anticipated to notably reroute vehicle traffic at these two intersections.

At Northfield Road / Boxwood, the northbound left turn volume continues to operate as the critical movement in both the AM and PM peak hours; however, this intersection has just been upgraded and is not expected to be mitigated due to the addition of the connector. In the PM peak, 95th percentile queues continue to exceed 300 metres (as occurs in the without scenario); however, these queues have decreased by over 200m when compared to the 2036 Background "Without Connector" scenario. Additional storage length on Boxwood Road is limited as a result of the adjacent Co-op Gas

Station driveway and residential homes (with restricted right-of-way) to the south. Signal timing optimization can help reduce these northbound queues and delay.

At Highway 19 / Northfield Road, the significant amount of northbound through traffic competing with the southbound protected left turns is a persistent problem at this intersection. While the reduction in southbound left turn movements as a result of the Northfield Connector slightly improves southbound left turn performance; the northbound movement sees a negligible improvement compared to the 2036 Background "Without Connector" option. The westbound approach also continues to operate below the acceptable threshold (at a poor operation) for delay, queues, and v/c in both peak hours. Even if the newly integrated eastbound approach were designed to remove split phasing and permit concurrent eastbound and westbound left turns onto Highway 19, the operational issues could not be meaningfully improved through signal timing and phasing adjustments alone in 2036 with the Northfield Road Connector. Any significant improvement would require a change in traffic control (i.e. an interchange), which would require MoTT input and acceptance.

Similar to the "Without Northfield Connector" background scenario, the intersection of Highway 19 / Jingle Pot Road continues to operate under failing conditions in the 2036 background scenario with the Northfield Connector. The northbound and southbound through and left turns movements fail to meet acceptable thresholds of performance, which require longer term mitigation by MoTT.

5.3 2036 Post Development Conditions with Northfield Connector

5.3.1 Site Trip Distribution and Assignment with Northfield Connector 2036

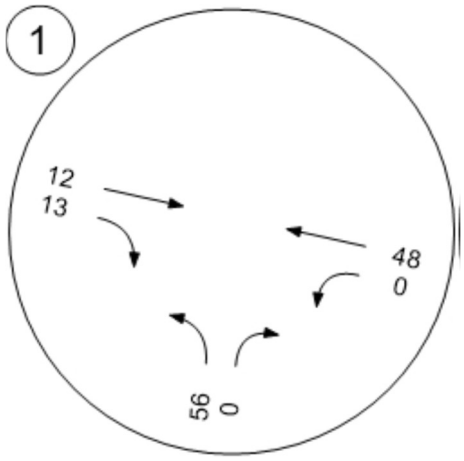
Since the development site is located closest to the Highway 19 / Northfield Road intersection, a portion of the site traffic will shift to this route over using East Wellington Road to connect down to the Highway 19 / Jingle Pot Road intersection.

The distribution of inbound and outbound site traffic with the Northfield Connector is outlined in **Table 26**.

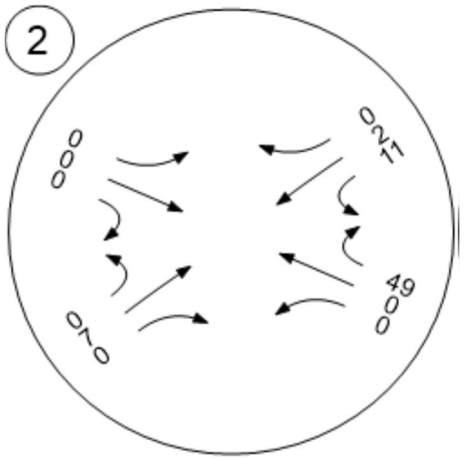
Table 26 - Trip Assignment – 2036 w/Northfield Connector

Street (Using)	Region (From/To)	AM		PM	
		% In	% Out	% In	% Out
Highway 19	North	20	15	20	15
	South	15	15	10	10
Jingle Pot Road	South & East	20	20	20	20
Bowen Road	North	20	25	20	30
	South	5	5	10	5
East Wellington Road	East	15	15	15	15
	West	2	2	2	2
Westwood Road	South	3	3	3	3

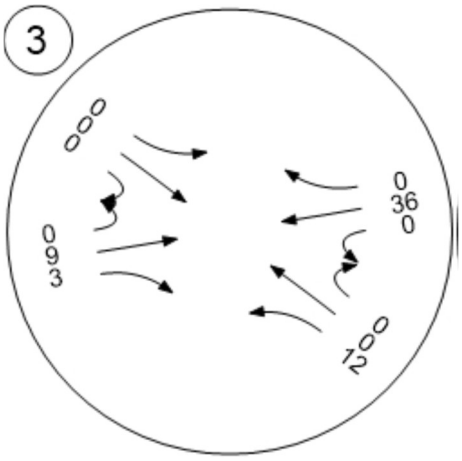
The trip assignment for the peak hours is illustrated in **Figure 24** and **Figure 25**, respectively.



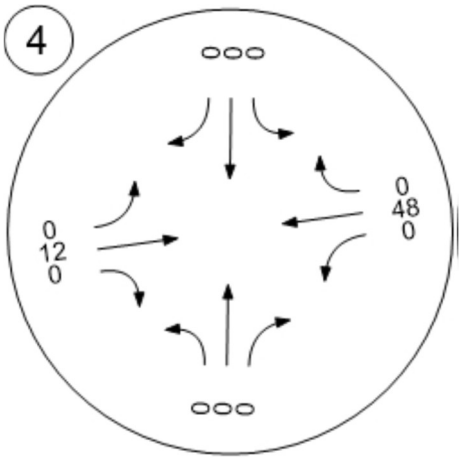
1. East Wellington Road / Westwood Road



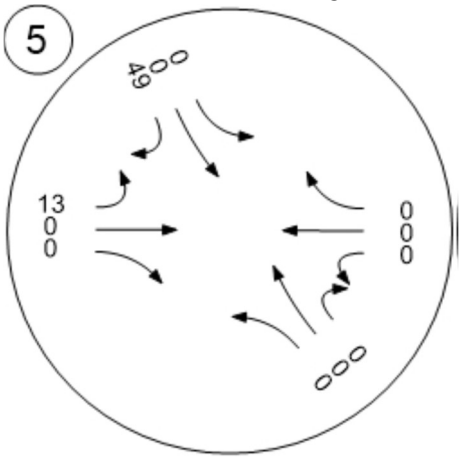
2. Jingle Pot Road / Westwood Road



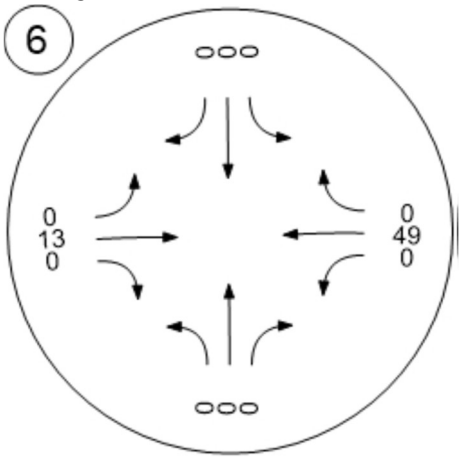
3. Bowen Road / East Wellington Road



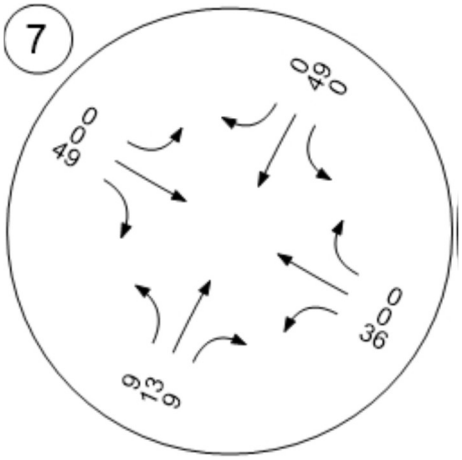
4. East Wellington Road / Boxwood Road / Madsen Road



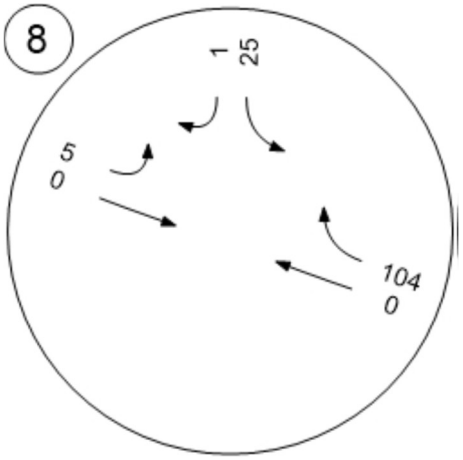
5. Bowen Road / Northfield Road



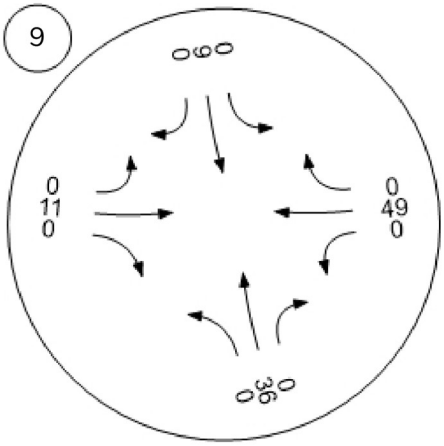
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

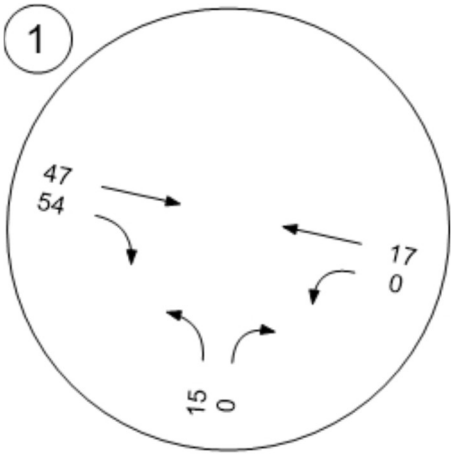


8. East Wellington Road / Site Access

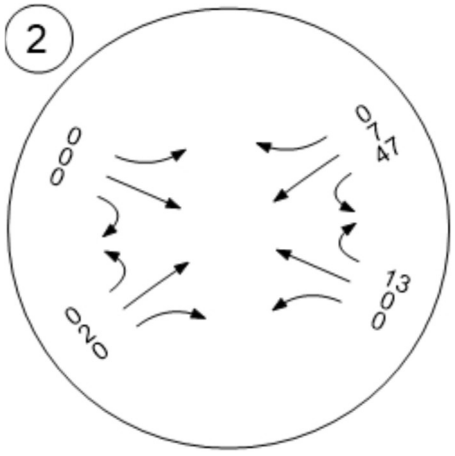


9. Highway 19 / Jingle Pot Road

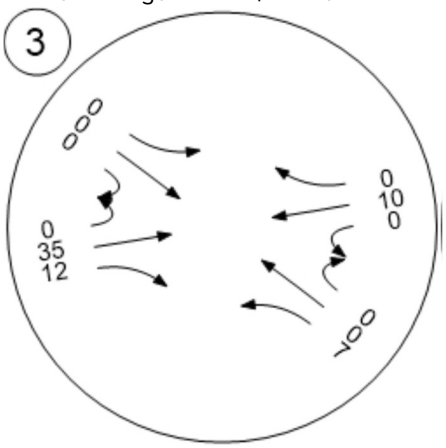
Figure 24 – Trip Assignment with Northfield Connector – AM Peak Hour



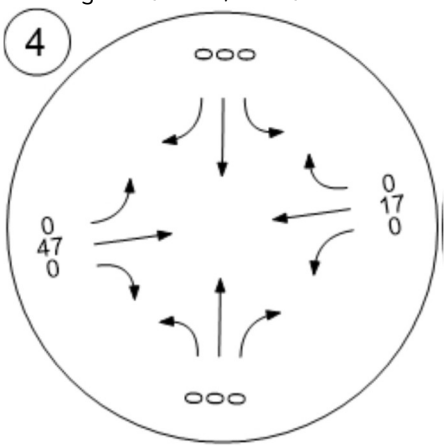
1. East Wellington Road / Westwood Road



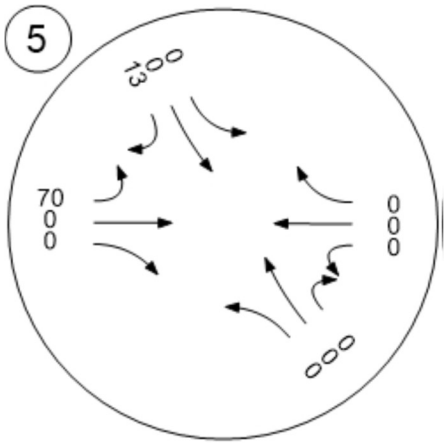
2. Jingle Pot Road / Westwood Road



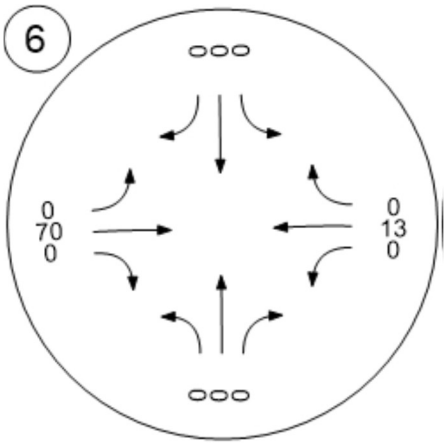
3. Bowen Road / East Wellington Road



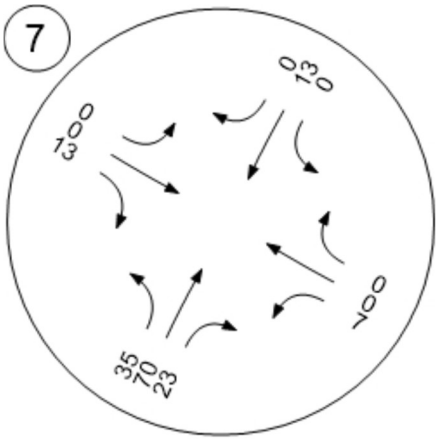
4. East Wellington Road / Boxwood Road / Madsen Road



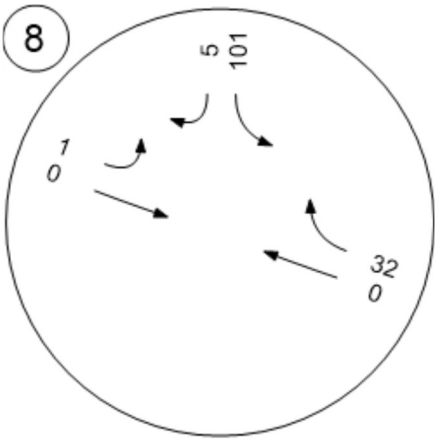
5. Bowen Road / Northfield Road



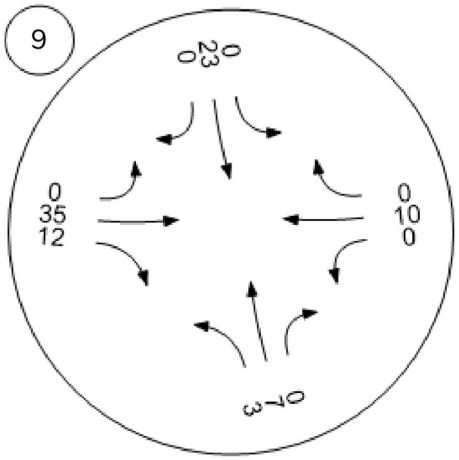
6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road



8. East Wellington Road / Site Access



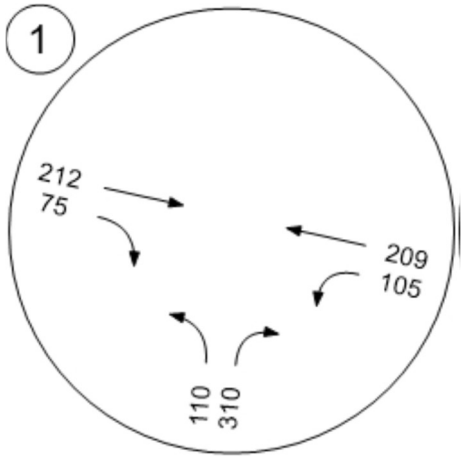
9. Highway 19 / Jingle Pot Road

Figure 25 – Trip Assignment with Northfield Connector – PM Peak Hour

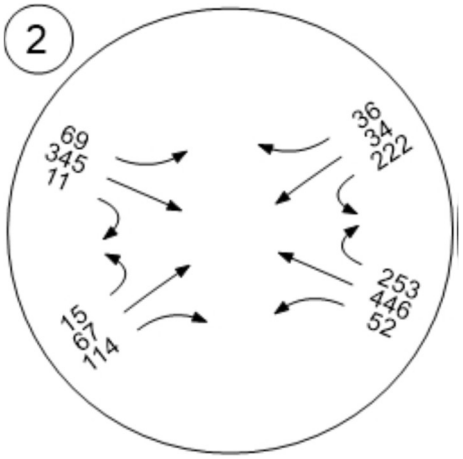
5.3.2 2036 Post Development Traffic Volumes with Northfield Connector

Post-development traffic volumes with the Northfield Connector are the sum of background traffic volumes and site trips with the Northfield Road Connector. Post-development traffic volumes with the Northfield Connector 2036 are illustrated in **Figure 26** and **Figure 27**, respectively.

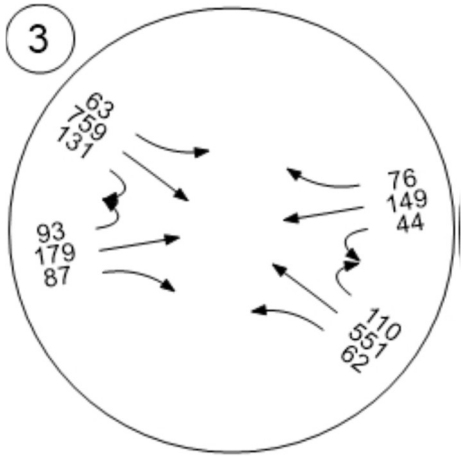
Average daily traffic (ADT) estimates for the *2036 post-development (with Northfield Connector) scenario* are provided in **Figure 28** for reference. These two-way ADT estimates are based on PM peak hour traffic counts in the area and assume a k-factor of 10.



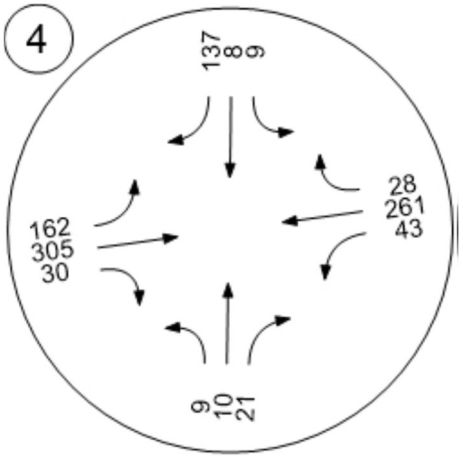
1. East Wellington Road / Westwood Road



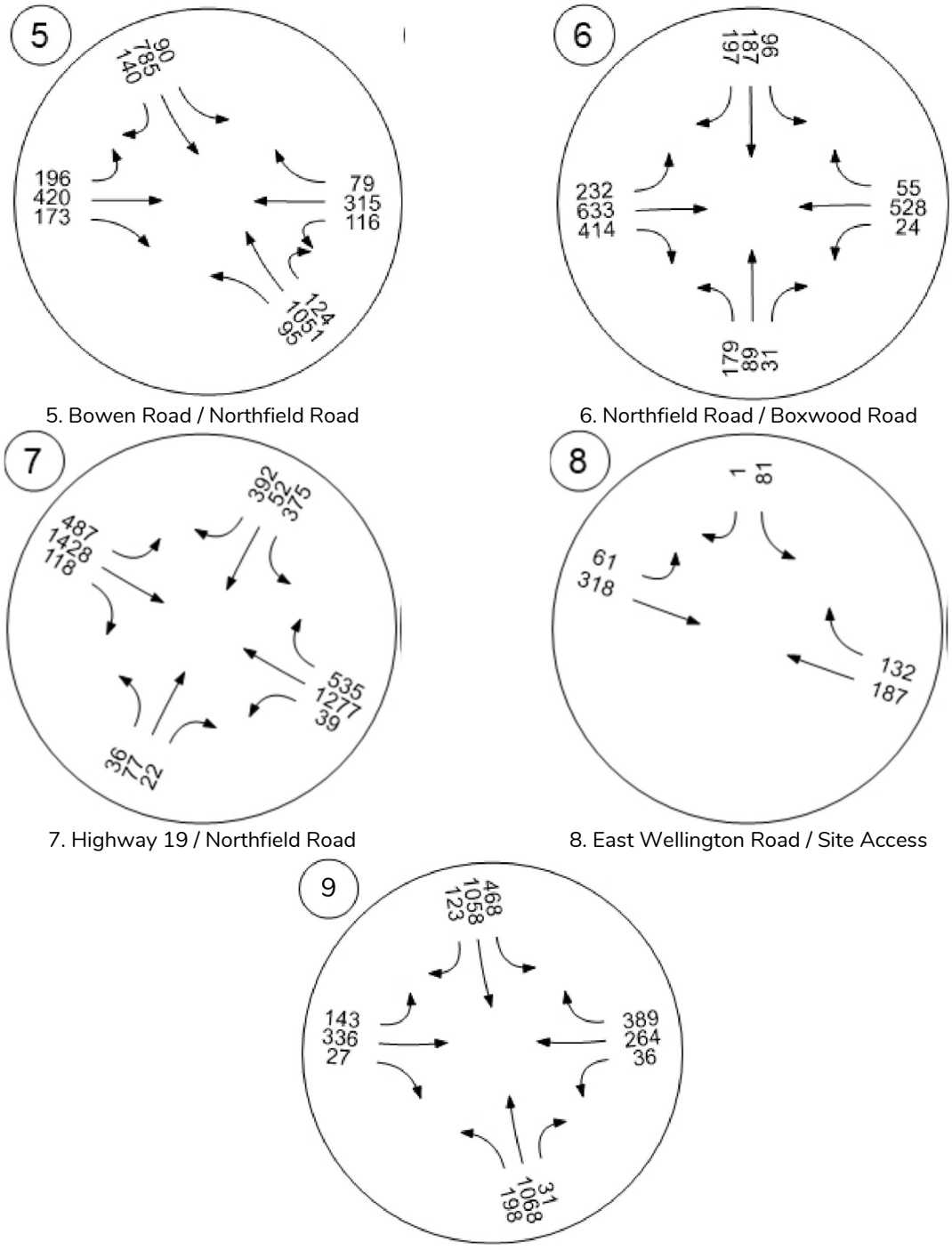
2. Jingle Pot Road / Westwood Road



3. Bowen Road / East Wellington Road



4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road

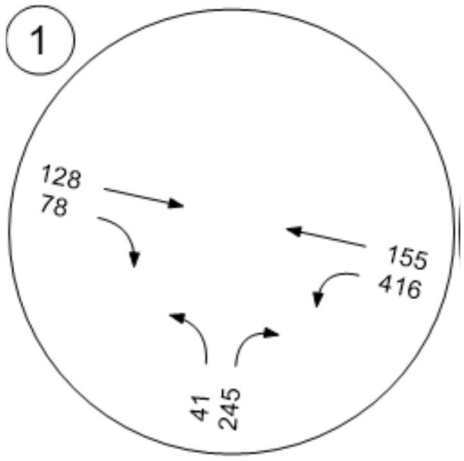
6. Northfield Road / Boxwood Road

7. Highway 19 / Northfield Road

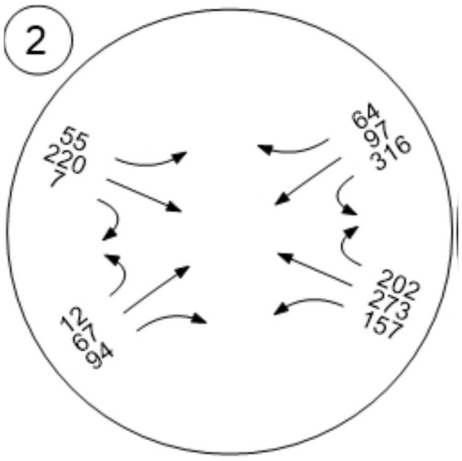
8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

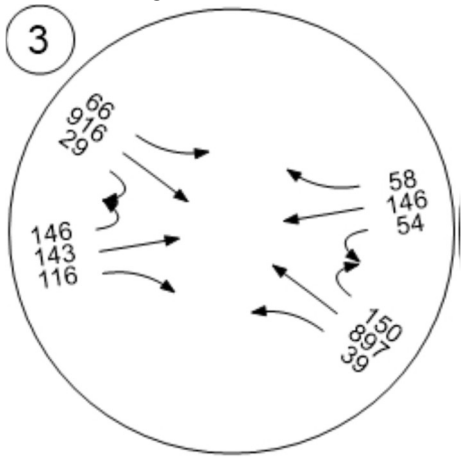
Figure 26 - 2036 Post-Development w/Northfield Connector Traffic Volumes – AM Peak Hour



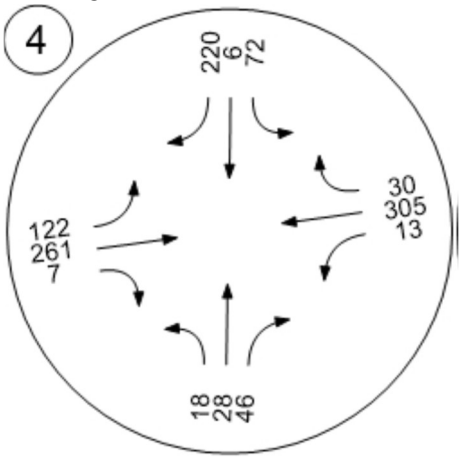
1. East Wellington Road / Westwood Road



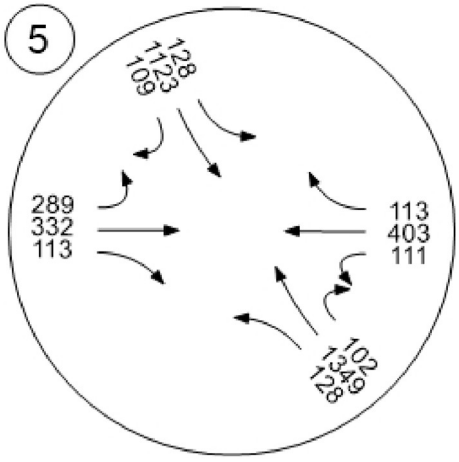
2. Jingle Pot Road / Westwood Road



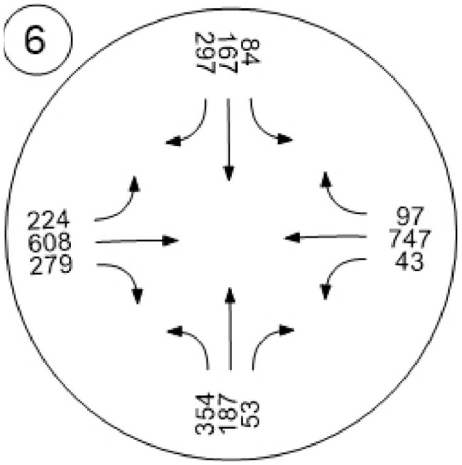
3. Bowen Road / East Wellington Road



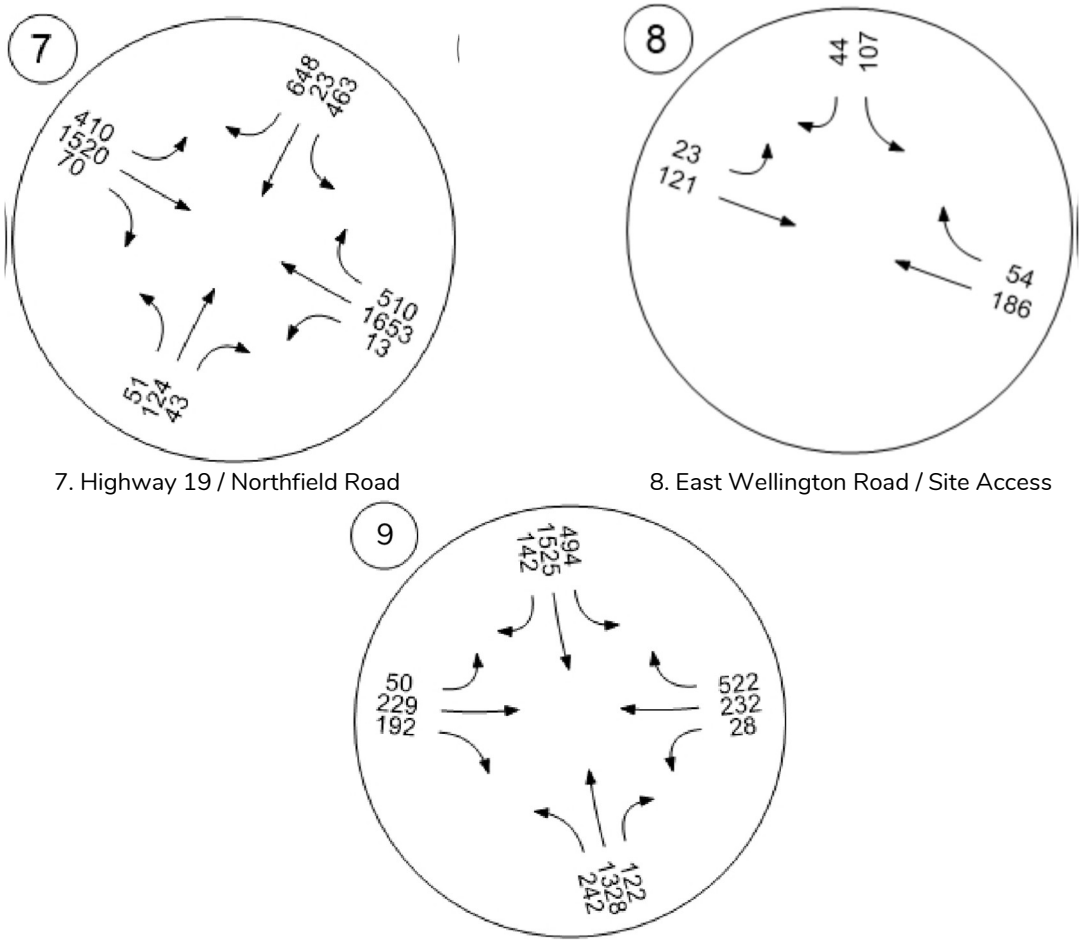
4. East Wellington Road / Boxwood Road / Madsen Road



5. Bowen Road / Northfield Road



6. Northfield Road / Boxwood Road



7. Highway 19 / Northfield Road

8. East Wellington Road / Site Access

9. Highway 19 / Jingle Pot Road

Figure 27 - 2036 Post-Development w/Northfield Connector Traffic Volumes – PM Peak Hour

Figure 28 - 2036 Post-Development ADT Estimates (With Connector)

The ADT volumes with the Northfield Connector are lower than without on the existing corridors; however, all of the corridors remain within their current road classification thresholds and expected type of traffic. Therefore no limitation to the density on the development site is required if the Northfield Connector is not constructed.

5.3.3 2036 Post Development Traffic Operations with Northfield Connector

Intersection analysis results for 2036 under post development conditions with the Northfield Connector are summarized in **Table 27** and **Table 28**. No changes to traffic control, laning, or signal timings were assumed.

Table 27 - Post Development Conditions w/Northfield Connector – 2036 – AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.42 (0.01)	44.7 (25.1)	-	94
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.14 (0.01)	3.5 (-0.5)	-	2
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.03 (-)	12.3 (0.7)	1	2/45
NBT/R	0.24 (0.01)	11.4 (0.6)	7	13
SBL	0.50 (0.03)	17.6 (1.3)	16	29/35
SBT/R	0.10 (-)	10.6 (0.5)	3	5
EBL	0.25 (0.02)	19.4 (1.8)	5	10/50
EBT/R	0.42 (-)	8.9 (0.4)	15	27
WBL	0.13 (-)	12.9 (0.6)	3	5/40
WBT/R	0.71 (0.03)	11.8 (1.2)	31	56
Bowen Road / East Wellington Road (Signalized)				
NBL	0.19 (0.04)	17.0 (0.9)	7	12/40
NBT	0.31 (-)	9.3 (0.2)	21	38
NBT/R	0.31(-)	9.3 (0.2)	21	37
SBL	0.15 (-)	14.0 (0.3)	6	11/50
SBT	0.41 (0.01)	10.4 (0.3)	32	57
SBT/R	0.41 (-)	10.4 (0.2)	31	55

EBL	0.24 (0.01)	26.4 (-)	12	22/60
EBT	0.60 (0.01)	36.2 (-0.1)	28	51
EBR	0.21 (0.01)	32.1 (-0.4)	8	13/20
WBL	0.11 (-)	24.5 (-0.2)	5	10/30
WBT/R	0.60 (0.09)	35.2 (1.0)	30	55
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.09 (0.01)	26.0 (2.4)	-	5
SB	0.21 (0.02)	15.4 (1.1)	-	10
EB	0.13 (0.01)	2.6 (-0.1)	-	2
WB	0.04 (-)	1.1 (-0.1)	-	1
Bowen Road / Northfield Road (Signalized)				
NBL	0.3 (0.01)	21.5 (0.6)	10	19/130
NBT	1.09 (-)	225.7 (-)	315	419
NBT/R	1.09 (-)	230.6 (-)	311	415
SBL	0.34 (-)	26.2 (-)	11	20/50
SBT	0.84 (0.04)	41.5 (3.4)	89	132
SBT/R	0.84 (0.04)	42 (3.7)	86	128
EBL	0.43 (0.03)	20.1 (0.43)	23	42/105
EBT/R	1.04 (-)	150.6 (-)	231	307
WBL	0.42 (-)	28 (-)	15	27/55
WBT	0.42 (-)	29.3 (-)	29	53
WBT/R	0.43 (-)	29.5 (-)	28	51
Northfield Road / Boxwood Road (Signalized)				
NBL	0.88 (-)	77.2 (0.1)	50	81/40
NBT/R	0.26 (-)	33.8 (0)	17	31
SBL	0.82 (-)	63.3 (-)	23	41/50
SBT	0.65 (-)	44.8 (0.1)	37	65
SBR	0.78 (-)	49.1 (0.1)	42	71/60
EBL	0.45 (0.02)	18.1 (0.5)	26	48/100
EBT	0.79 (0.01)	33.1 (1)	116	165
EBR	0 (-)	0 (-)	0	0/200
WBL	0.08 (0.01)	18.1 (0.3)	2	4/50
WBT	0.43 (0.04)	26.6 (0.7)	43	73

WBT/R	0.43 (0.03)	26.7 (0.7)	42	72/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.45 (0.36)	56.6 (0.4)	9	16/170
NBT	1.45 (-)	856.5 (8.5)	848	1205
NBR	0.4 (-)	34.5 (0.2)	27	49/140
SBL	0.89 (-)	47.5 (0.5)	104	150/220
SBT	0.79 (0.04)	22.7 (3.9)	102	147
SBR	0.05 (0.02)	10.6 (1.8)	3	5/150
EBL	0.3 (0.07)	50.2 (0.6)	8	14
EBT/R	0.55 (0.09)	56.2 (4.2)	20	35
WBL	1.01 (0.11)	185.8 (82.8)	107	154/70
WBLT	1.01 (0.11)	185.5 (82.2)	107	154
WBR	0.49 (-)	48.8 (0.2)	20	35/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	0.88 (0.01)	75.9 (6.3)	54	87/165
NBT	0.87 (0.02)	37.5 (3.3)	103	148
NBR	0.03 (-)	21.9 (1.2)	2	3/200
SBL	0.88 (0.01)	54.4 (3.6)	52	84/200
SBT	0.8 (0.01)	31.8 (2)	92	136
SBR	0.1 (-)	20.4 (1.2)	7	13/200
EBL	0.85 (0.01)	76.1 (6.1)	40	69/65
EBT	0.59 (-0.03)	45.3 (0.5)	35	61
EBR	0 (-)	0 (-)	0	0/15
WBL	0.12 (-)	32.7 (0.8)	6	11/45
WBT	0.75 (0.03)	55.1 (2)	30	54
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

Table 28 - Post Development Conditions w/Northfield Connector – 2036 – PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Westwood Road (Two-way Stop)				
NBL/R	0.29 (0.03)	21.4 (7.2)	-	29
EBT/R	0.00 (-)	0 (-)	-	0
WBL/T	0.31 (0.03)	6.1 (0.1)	-	6
Jingle Pot Road / Westwood Road (Signalized)				
NBL	0.02 (-)	9.8 (0.7)	1	1/45
NBT/R	0.18 (-0.01)	7.7 (0.1)	4	8
SBL	0.56 (0.08)	14.2 (1.9)	19	34/35
SBT/R	0.19 (-)	7.8 (0.2)	5	9
EBL	0.19 (0.02)	17.9 (2.6)	4	7/50
EBT/R	0.34 (0.01)	10.5 (1.4)	10	18
WBL	0.38 (0.03)	16.1 (2.4)	10	18/40
WBT/R	0.60 (0.03)	12.5 (1.8)	20	36
Bowen Road / East Wellington Road (Signalized)				
NBL	0.12 (0.02)	16.6 (0.8)	4	8/40
NBT	0.48 (0.01)	11.2 (0.2)	40	68
NBT/R	0.48 (0.01)	11.3 (0.3)	39	67
SBL	0.22 (-)	19.3 (0.4)	8	14/50
SBT	0.45 (-)	10.9 (0.3)	37	64
SBT/R	0.45 (-)	10.9 (0.3)	36	64
EBL	0.37 (-)	28.9 (-0.3)	21	37/60
EBT	0.50 (0.11)	35.4 (0.8)	22	40
EBR	0.28 (0.02)	33.3 (-0.2)	10	19/20
WBL	0.13 (0.01)	24.6 (-0.2)	7	12/30
WBT/R	0.58 (0.02)	35.1 (-0.2)	28	51
East Wellington Road / Boxwood Road / Madsen Road (Two-way Stop)				
NB	0.13 (0.01)	22.4 (2.2)	-	10
SB	0.37 (0.04)	33.2 (5.7)	-	50
EB	0.10 (-)	2.5 (-0.4)	-	2
WB	0.01 (-)	0.3 (-)	-	0

Bowen Road / Northfield Road (Signalized)				
NBL	0.47 (0.01)	26.1 (0.2)	15	27/130
NBT	1.08 (0.01)	201.9 (0.8)	379	493
NBT/R	1.08 (-)	214.9 (0.9)	390	508
SBL	0.52 (-)	33.5 (0.02)	18	33/50
SBT	0.91 (0.01)	58.1 (2.2)	158	215
SBT/R	0.92 (0.01)	60.4 (2.7)	158	215
EBL	0.74 (0.18)	39.4 (9.29)	55	89/105
EBT/R	0.94 (-)	76.5 (-0.4)	124	174
WBL	0.39 (-)	32.2 (0)	18	33/55
WBT	0.62 (-)	42.5 (0)	52	85
WBT/R	0.63 (-)	42.9 (0)	50	81
Northfield Road / Boxwood Road (Signalized)				
NBL	1.1 (-)	276.1 (-)	230	316/40
NBT/R	0.33 (-)	28.5 (-)	35	62
SBL	0.8 (-)	68.4 (0)	22	40/50
SBT	0.44 (-)	42.4 (-)	34	61
SBR	0.91 (-)	82.3 (-)	93	136/60
EBL	0.69 (0.01)	39.1 (0.7)	41	70/100
EBT	0.97 (0.11)	86.4 (33.76)	200	264
EBR	0 (-)	0 (-)	0	0/200
WBL	0.21 (0.03)	29.4 (2.89)	6	11/50
WBT	0.71 (0.01)	44.5 (0.6)	91	134
WBT/R	0.71 (0.01)	44.7 (0.6)	89	132/50
Highway 19 / Northfield Road (Signalized)				
NBL	0.23 (0.09)	52.5 (0.3)	3	5/170
NBT	1.69 (0.02)	1277.1 (24.8)	1376	2013
NBR	0.35 (-)	30 (0.5)	23	41/140
SBL	0.86 (-)	42.7 (0.6)	78	118/220
SBT	0.84 (0.02)	24.2 (1.9)	107	154
SBR	0.03 (0.01)	10.1 (0.7)	1	3/150
EBL	0.32 (0.21)	46.4 (1.6)	10	18

EBT/R	0.84 (0.45)	96.3 (49)	44	74
WBL	1.01 (0.03)	175.6 (32.7)	114	163/70
WBLT	1.01 (0.03)	174.2 (32.1)	114	164
WBR	0.9 (-)	101.8 (4.2)	64	100/60
Highway 19 / Jingle Pot Road (Signalized)				
NBL	1.01 (0.01)	158.5 (17.9)	103	149/165
NBT	0.88 (0.01)	29.3 (0.6)	107	153
NBR	0.09 (-)	15.7 (0.2)	6	10/200
SBL	1.14 (0.01)	301.8 (7.8)	159	230/200
SBT	1.02 (0.02)	85.7 (23.3)	216	288
SBR	0.11 (-)	16.3 (0.2)	7	13/200
EBL	0.72 (0.01)	70 (0.4)	13	23/65
EBT	0.64 (0.08)	48.3 (1.1)	23	42
EBR	0 (-)	0 (-)	0	0/15
WBL	0.1 (-)	35.2 (0)	5	8/45
WBT	0.72 (0.01)	51.2 (0)	24	44
WBR	0 (-)	0 (-)	0	0/375

(##) = Change from background conditions ## = Value exceeding threshold X/X – Queue/Storage

In the AM peak hour, the northbound left/right movement at East Wellington Road / Westwood Road exceeds the delay threshold with existing laning. As previously identified, the implementation of a separate left turn lane will help mitigate the issue.

The other two intersections along East Wellington Road continue to operate within acceptable thresholds with no queuing issues in both the AM and PM peak hour.

With the addition of the development traffic to the 2036 Background with the Northfield Connector conditions remain the same at the intersections along Northfield Road, with the development adding relatively minor changes in delay except for those movements already well over the threshold when minor changes in traffic creates exponential change in delay.

The intersection of Highway 19 / Jingle Pot Road continues to operate at a comparable level to the 2036 background scenario, with long delays for the northbound, southbound, and eastbound left turns, in addition to the southbound through movement. The addition of development traffic does not result in significant worsening

of operations or queuing at Highway 19 / Jingle Pot Road; therefore, no mitigations are required due to the development.

Intersection analysis results for the Site Access / East Wellington Road in 2036 with the Northfield Connector are summarized in **Table 29** and **Table 30**.

Table 29 - Site Access Conditions – 2036 - AM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.21	16.8	-	6
EBL/T	0.05	8.0	-	1
WBT/R	0.00	0	-	0

= Value exceeding threshold

Table 30 - Site Access Conditions - 2036 - PM Peak Hour

Movement	v/c	Delay (s)	50% Queue (m)	95% Queue (m)
East Wellington Road / Site Access (Two-way Stop)				
SBL/R	0.18	12.1	-	7
EBL/T	0.02	1.2	-	1
WBT/R	0.00	0	-	0

= Value exceeding threshold

The intersection of the site access / East Wellington Road will continue to operate well with stop control on the site access even with the addition of the connection to Northfield Road. Separate turn lanes are not required.

6.0 WARRANT ASSESSMENT

A TAC traffic signal warrant assessment was conducted at East Wellington Road / Boxwood Road / Madsen Road using the traffic volumes from the opening day 2026 Post Development scenario. A traffic signal at East Wellington Road / Boxwood Road / Madsen Road is warranted in the 2026 post-development scenario.

A traffic signal is recommended over a roundabout due to the lack of right-of-way (ROW) at the intersection. A roundabout with appropriate active transportation facilities would require at least a 45m diameter outside edge for a roundabout and there is approximately 29m which is significantly below the needs for heavy truck movements and active transportation. See **Appendix A** for the signal warrant analysis.

7.0 MITIGATION SUMMARY

The addition of post development traffic on opening day causes traffic operations issues for the northbound left/right movement at East Wellington / Westwood Road in the AM peak hour due to left turning vehicles headed to the site. The implementation of a left turn lane will mitigate this issue.

In the post development PM peak hour, the shared southbound left/through/right movement at East Wellington Road / Boxwood Road / Madsen Road will fail to achieve acceptable performance thresholds. The implementation of a traffic signal will mitigate the issue, as well as resolve any future delay issues in the 2036 horizon year. A TAC signal warrant was completed for this intersection and a signal is warranted.

A summary of suggested mitigations to alleviate delays caused by the development traffic is provided in **Table 31**.

Table 31 – Mitigation Measures

Intersection	Trigger	Mitigation
East Wellington Road / Westwood Road	Post Development 2026 AM	Separate Northbound Left Turn Lane
East Wellington Road / Boxwood Road / Madsen Road	Post Development 2026 PM	Signal

East Wellington Road / Site Access

The site access is expected to operate effectively as a two-way stop-controlled intersection from a traffic operations perspective; however, sightlines will be limited due to the horizontal curve in the roadway and the vertical grade to the west, as the access is located near the crest of a vertical curve. The implementation of a signal will mitigate the issue with sightlines for vehicles turning out of the access. Sufficient sightlines appear to be met for eastbound vehicles on East Wellington Road approaching the access signal, but this will need to be confirmed during the detailed design stage, and an assessment will be required to determine if advance warning flashers are required to warn drivers of an upcoming red light.

The City has identified a roundabout for the site access intersection at East Wellington Road as their preferred option and the developer will provide the land for a future roundabout option only and either construct or contribute the cost of a signal.

8.0 CONCLUSIONS

The intersections of East Wellington / Westwood Road, Jingle Pot Road / Westwood Road, Bowen Road / East Wellington Road, and East Wellington Road / Boxwood Road / Madsen Road all operate well under current and opening day background conditions. The intersections of Bowen Road / Northfield Road, and Northfield Road / Boxwood Road, in addition to both intersections along Highway 19 at Jingle Pot Road and at Northfield Road, all operate with one or more movements failing to achieve acceptable performance thresholds in the opening day background condition. The addition of the development traffic requires the implementation of a signal at East Wellington Road / Boxwood Road / Madsen Road and a northbound left turn at East Wellington / Westwood Road to mitigate anticipated traffic impacts from the proposed development.

The proposed site access will be on the frontage of 2160 East Wellington Road and can operate efficiently as a two-way stop without the need for a traffic control upgrade. However, a signal is recommended due to the vertical curve in the roadway, which limits sightlines for left-turning vehicles exiting the site from a stop. The City has requested right-of-way for a future roundabout, which will be provided by the developer. However, only the cost of a signal, either through construction or a contribution, is required to address the sightline challenges, as the intersection otherwise operates acceptably under two-way stop control. The 2036 post development ADT volumes on the surrounding network do not require any change in road classification nor limiting of the density on the site if the Northfield Connector is not constructed.

9.0 RECOMMENDATIONS

WATT makes the following recommendations to the developer of the site:

1. Construct internal road to meet the Industrial Collector in the City of Nanaimo *Complete Street Design Guide*
2. Provide a connection to the Parkway Trail from the site
3. Install a signal at East Wellington Road / Boxwood Road / Madsen Road by opening day
4. Install a northbound left turn lane at East Wellington Road / Westwood Road by opening day
5. Install a signal at East Wellington Road / Site Access by opening day (or provide a contribution to the City equivalent to the cost of the signal).
6. Provide right-of-way at East Wellington Road / Site Access for a potential future roundabout

APPENDIX A – SIGNAL WARRANTS

City of Nanaimo - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	E Wellington Rd	Direction (EW or NS)	EW
Side Street (name)	Boxwood Rd / Madsen Rd	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.

CHECK SHEET

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	City of Nanaimo
City:	Nanaimo
Analysis Date:	2024 May 17, Fri
Count Date:	2024 Feb 13, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
E Wellington Rd	WB				1				330	1	perm	y	y
E Wellington Rd	EB				1				2,000	1	perm	y	y
Boxwood Rd / Madsen Rd	NB				1				2,000	1	perm	y	y
Boxwood Rd / Madsen Rd	SB				1				2,000	1	perm	y	y

Is the Boxwood Rd / Madsen Rd NB right turns significantly impeded by through movements? (y/n)	y	
Is the Boxwood Rd / Madsen Rd SB right turns significantly impeded by through movements? (y/n)	y	
Are the E Wellington Rd WB right turns significantly impeded by through movements? (y/n)	n	
Are the E Wellington Rd EB right turns significantly impeded by through movements? (y/n)	n	

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

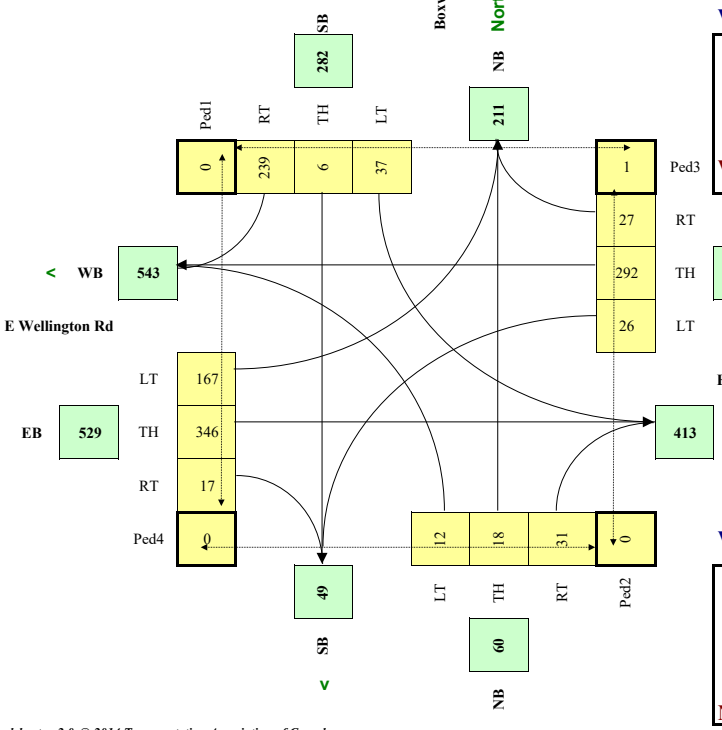
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,505
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
E Wellington Rd	EW	50	4.0%	n	0.0
Boxwood Rd / Madsen Rd	NS	0	10.0%	n	0.0

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:45 - 8:45	8	9	19	8	7	224	39	291	26	172	354	28			2	
	8	9	19	8	7	224	39	291	26	172	354	28				
	8	9	19	8	7	224	39	291	26	172	354	28				
	16	26	42	65	5	254	12	292	28	161	337	6			4	
	16	26	42	65	5	254	12	292	28	161	337	6				
	16	26	42	65	5	254	12	292	28	161	337	6				
Total (6-hour peak)	72	105	183	219	36	1,434	153	1,749	162	999	2,073	102	0	0	6	0
Average (6-hour peak)	12	18	31	37	6	239	26	292	27	167	346	17	0	0	1	0
Actual Pedestrian Crossing Distance (m)																

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$

W =	130	130	0
		Veh	Ped

Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 0

Not Warranted - Ped Vol<25(avg)

City of Nanaimo - Traffic Signal & Pedestrian Signal Head Warrant Analysis

Main Street (name)	E Wellington Rd	Direction (EW or NS)	EW
Side Street (name)	Westwood Rd	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.

CHECK SHEET

for Warrant Calculation Results, please hit 'Page Down'

Road Authority:	City of Nanaimo
City:	Nanaimo
Analysis Date:	2024 May 21, Tue
Count Date:	2024 Feb 13, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	RT Channelization (y/n)	UpStream Signal (m)	# of Thru Lanes	LT Phase Type	RTOR Allowed (y/n)	Actuated Thru Phase
E Wellington Rd	WB		1						700	1	perm	y	y
E Wellington Rd	EB					1		n	2,000	1	perm	y	y
Westwood Rd	NB				1				2,000	1	perm	y	y
Westwood Rd	SB									0	perm		

Saturation Flow Rates (if not default) (vphpl)		Default Saturation Flow Rates (vphpl)
Left Turn		1,650
Through		1,800
Right Turn		1,500

Are the Westwood Rd NB right turns significantly impeded by through movements? (y/n) n

Are the E Wellington Rd EB right turns significantly impeded by through movements? (y/n) y

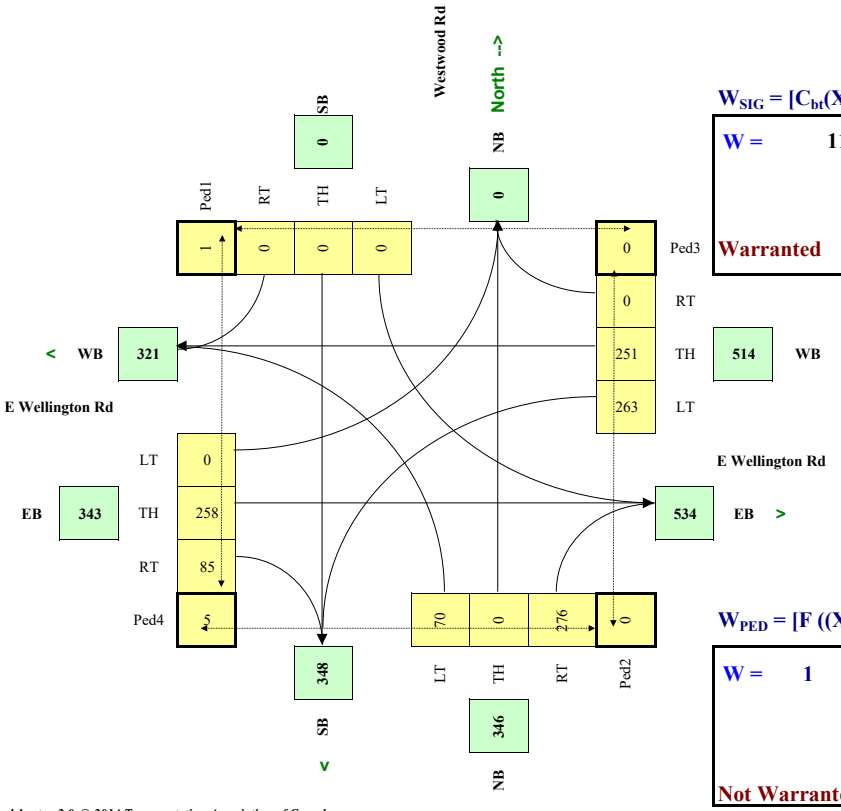
Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	90,505
Central Business District	(y/n)	n

Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
E Wellington Rd	EW	50	2.0%	n	0.0
Westwood Rd	NS	50	2.0%	n	0.0

Set Peak Hours

Traffic Input		NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
		LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
7:45 - 8:45		115		308				147	293			269	77	2			3
		115		308				147	293			269	77	2			3
		115		308				147	293			269	77	2			3
		25		244				378	209			246	93	0			6
		25		244				378	209			246	93	0			6
		25		244				378	209			246	93	0			6
Total (6-hour peak)		420	0	1,656	0	0	0	1,575	1,506	0	0	1,545	510	6	0	0	27
Average (6-hour peak)		70	0	276	0	0	0	263	251	0	0	258	85	1	0	0	5
														Actual Pedestrian Crossing Distance (m)			9.0			12.0

Average 6-hour Peak Turning Movements



$W_{SIG} = [C_{bt}(X_{v\text{-}v}) / K_1 + (F (X_{v\text{-}p}) L) / K_2] \times C_i$

W = 115 (Veh) 114 (Ped) 1

Warranted

RESET SHEET

$W_{PED} = [F ((Xped_m)d_m/K_2) + (Xped_s)d_s/K_3)]$

W = 1

Not Warranted - Ped Vol<25(avg)