Transportation Assessment Report

Bell Boulevard & North Front Street Corridor Study

City of Belleville

October 31, 2024

TYLin Contract # 10319

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1 Introduction

TYLin International Canada Inc. (TYLin), was retained by Fotenn Planning & Design to assist the City of Belleville (hereafter referred to as "the City") with a preparation of a Corridor Study for Bell Boulevard & North Front Street. Thirteen new development zones were proposed along the Bell Boulevard and North Front Street corridor study area.

The purpose of this study is to analyze the traffic impact of these sites on the study area roadway network for the weekday AM and PM peak hours for both existing and future 2038 horizon years, and subsequently identify infrastructure improvements and considerations required to support the proposed growth forecasts.

It is understood that this report will be utilised by both the City of Belleville and private partners in guiding future development along the study corridors into the future. The analysis and recommendations enclosed within this study provide a roadmap to advise on the need and timing of infrastructure improvements, based on the scale and typology of development along the study corridors across the horizon years. It is understood that the City of Belleville will continue to monitor the corridors and assess the impact of real developments with the projections and planning from the corridor study, to advance transportation network improvements accordingly.

1.1 Study Background

The City's Official Plan (November 2021), Section 3.9 shows the lands surrounding Bell Boulevard as one of four distinct areas of major commercial activity. Section 3.9.2 (a) of the Official Plan states that the corridor is zoned to serve regional and community commercial markets and is identified as a gateway to the community, emphasizing that it should have a high level of urban design, co-ordination of separate developments, landscaping, and efficient mobility to retain the character and function of the corridor. Section 3.9.2 (C) of the Official Plan stipulates that developments on specific lots should be coordinated to limit the number of accesses onto roadways to facilitate mobility operations.

Both study corridors, Bell Boulevard and North Front Street, are Major Arterials which, according to the Official Plan, are roads that typically carry high volumes of traffic (1,200+ vehicles per peak hour) linking to different areas or neighborhoods of the city or to the highways and expressways (as is the case here). The number of lanes is dependent on available space and the need to expand the right-of-way for sidewalks, utilities, or bike lanes.

Figure 1-1 and **Figure 1-2** visualize the planned improvements from the Transportation Master Plan (April 2014) that are directly related to both corridors, including:

- **Bell Boulevard:** Widen Bell Boulevard from 2 to 4 lanes between Sidney Street and Wallbridge Loyalist Road (2021-2026) to address capacity deficiencies along this corridor during the afternoon peak hour and improve access to adjacent properties that are slated for development between 2021 to 2026.
- **North Front Street:** Upgrade North Front Street between Bell Boulevard and College Street by adding either a two-way left turn lane or raised median between 2013 to 2021 to improve traffic operations and safety along the corridor.

Figure 1-1: Road Network Implementation Phasing in TMP

Figure 1-2: Preferred Road Network in TMP

After examining the study area road network, six natural and physical barriers to mobility within the area were identified, illustrated in **Figure 1-3**, which include:

1. **Bell Boulevard & North Front Street Intersection:** Due to the orientation of the network, this intersection creates a lynchpin that affects circulation throughout the network with limited physical space to expand it due to existing developments.
2. **Highway 401:** Limits the number of connections to Bell Boulevard and North Front Street from the north. Within the study area only three streets cross the highway – Wallbridge-Loyalist Road, Sidney Street, and North Front Street.
3. **North Front Street Impermeable Blocks:** Between Bell Boulevard and College Street the large impermeable blocks create a barrier to vehicular, transit, and active access from the surrounding residential areas.
4. **Bell Boulevard Impermeable Blocks:** No vehicular connections to adjacent residential areas forces trips to add volume to North Front Street or Sidney Street to access or exit properties along the corridor.
5. **Railway Corridor:** Like Highway 401, the CP railway line cuts the City of Belleville in half between north and south and funnels trips to North Front Street and Sidney Street. The CN railway line runs along the south end of the city.
6. **Moira River:** Only Bell Boulevard and College Street cross the river within the study area. This forces east-west demand looking to access North Front Street, to be added to Bell Boulevard or College Street to cross the river.

Figure 1-3: Mobility Barriers

2 Community Context

Belleville's location along Highway 401 and at the mouth of the Moira River and the Bay of Quinte has contributed to its role within provincial and regional trade. The municipality is a vibrant regional center that requires local and external needs to be balanced, particularly along the Bell Boulevard and North Front Street corridors whose commercial and industrial activity attract regional demand. The following sections discusses the existing land use and the demographic trends of Belleville which are key factors that affect the municipality's strategic thinking in developing mobility solutions.

2.1 Existing Land Use

There is limited variety in land use types on Bell Boulevard or North Front Street. Both corridors are predominantly zoned for commercial uses with some industrial uses on Bell Boulevard west of Sidney Street. **Figure 2-1** shows the land use for the City of Belleville. One major challenge is that commercial land uses generally generate higher numbers of trips per square foot than almost any other use. This is because they are designed for trips to visit and leave within a fairly short time in comparison to office or industrial lands which may see a trip only arrive in the morning and subsequently leave later during the afternoon/evening. Commercial uses tend to have their peak demand in the afternoon which coincides with commuter trips returning to home which can create more pronounced congestion levels resulting in worst-case traffic operations typically occurring during afternoon peak periods throughout commercial corridors.

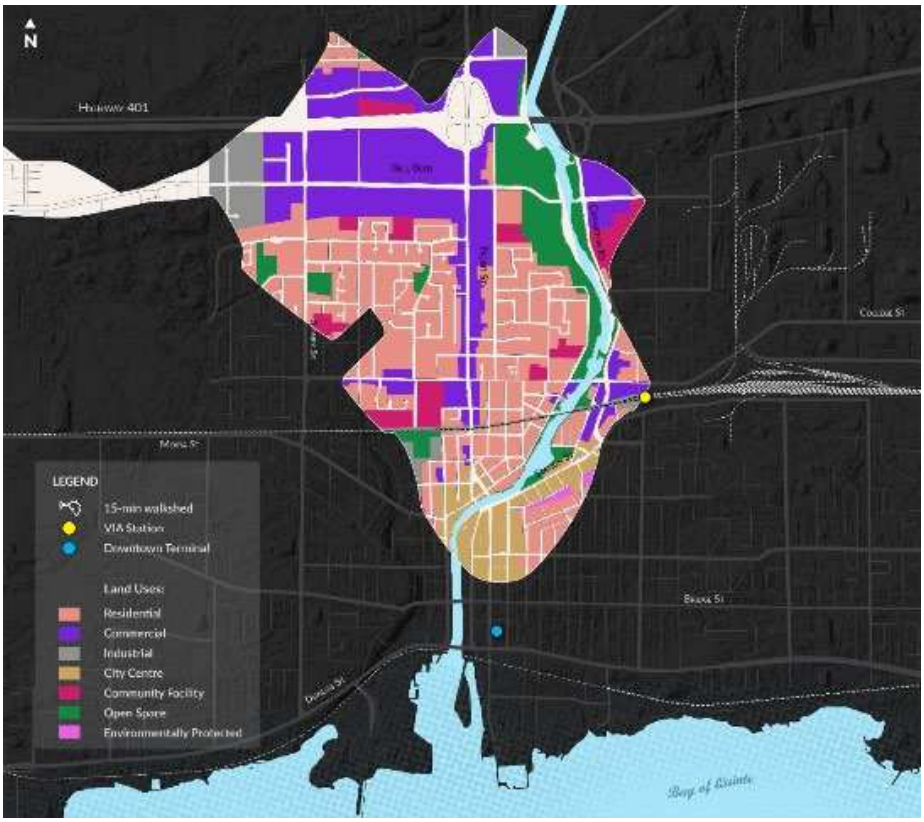

Figure 2-1: Land Use

A segregation of land uses throughout a municipality creates an environment where the average resident is further away from a business or service they want to access and thus are likely to require a vehicle to address their daily discretionary trips (such as groceries, visitation, or leisure). This can generally be improved with mixed-use zoning which would allow a portion of trips to businesses on Bell Boulevard or North Front Street to be accommodated locally on the corridor thus, limiting the creation of new vehicular trips and promoting more internal connectivity.

2.2 Population Density

Bell Boulevard: Due to the commercial and industrial land uses currently concentrated on Bell Boulevard, there are approximately 1-3 times fewer residents within walking distance of the corridor, in comparison to North Front Street, which has a larger residential catchment area.

North Front Street: The corridor is significantly denser than Bell Boulevard with the immediate 5-minute catchment presenting the highest densities and an environmental capable of growing into a transit-supportive corridor. Despite this, the current densities are lower than the Ontario Ministry of Transportation (MTO) suggested transit-oriented densities for basic transit service which are double existing levels.

Figure 2-2 illustrates the 5, 10, and 15-minute walk sheds which were assessed using GIS to quantify the existing potential transit and retail walk-in catchment populations surrounding each corridor:

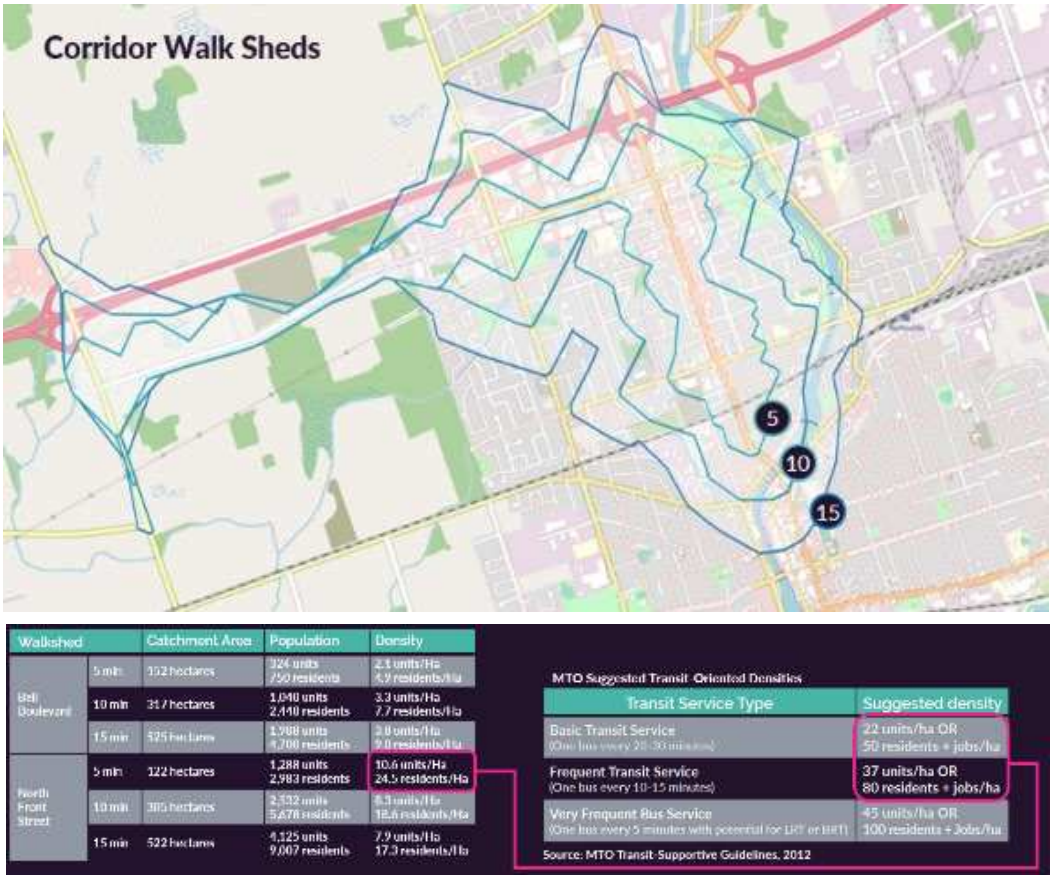

Figure 2-2: Corridor Walksheds

2.3 AGE DISTRIBUTION

Figure 2-3 below represents the demographic data from the 2016 Census representing age distribution along Bell Boulevard, North Front Street, and Belleville as a whole. This data was reviewed to identify general age distribution trends with the following conclusions:

- Front Street shares a similar trend to Bell Boulevard, however it has slightly more young adults living within walking distance accounting for about 7% of catchment population.
- The largest population cohorts are the age group between 50 and 54 years old or the group between 55 and 60 years old.
- Between 60% and 63% of the population are in the working age group between 15 to 64 years old, while between 14% and 16% make up the younger population which will be a part of labour force in the coming decades.
- The proportion of seniors (>65 years old) is between 21% and 22% of the population.
- The overall picture painted by the age distribution is that of an aging population, with the accompanying needs of an increased proportion of vulnerable road users on the transportation network.
- To note, the pandemic and resulting impacts to immigration and economic activity may have altered these trends.
- North Front Street, which offers a closer commercial-residential proximity demonstrates a greater concentration of population aged 20-30.

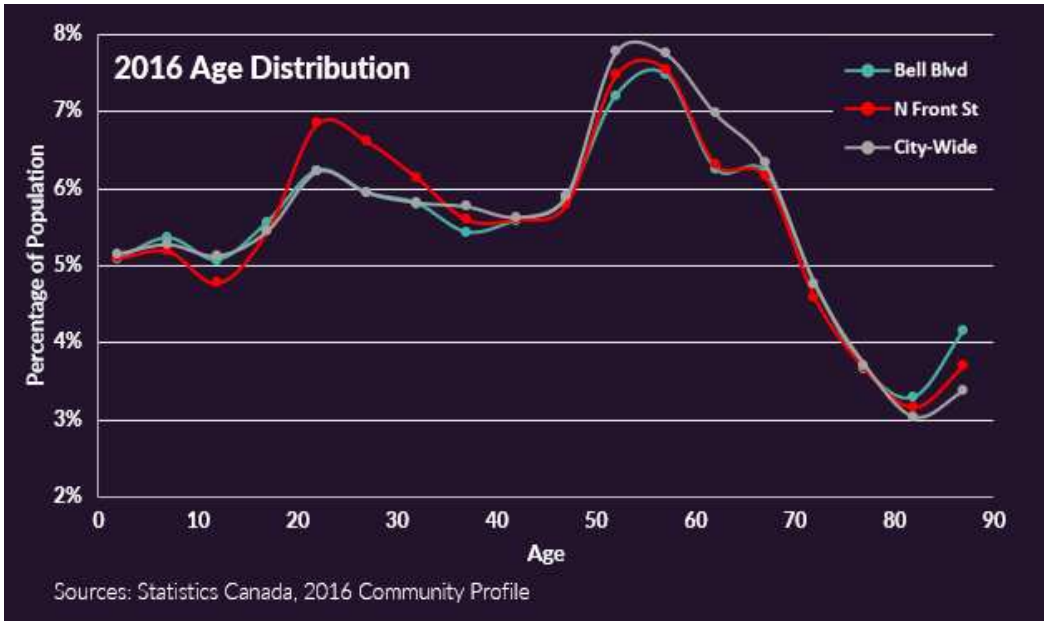

Figure 2-3: Age Distribution

2.4 Income Distribution

Income distribution was reviewed from the 2016 Census as per **Figure 2-4** and **Figure 2-5** below for the study area corridors, Belleville, and Canada as a whole as a baseline. Census data indicates that the North Front Street study area has a slightly higher proportion of low-income residents than the City of Belleville as a whole, while Bell Boulevard has a slightly lower proportion. The catchment area for North Front Street extends further into the census tracts south of the rail corridor, which feature a higher proportion of low-income residents.

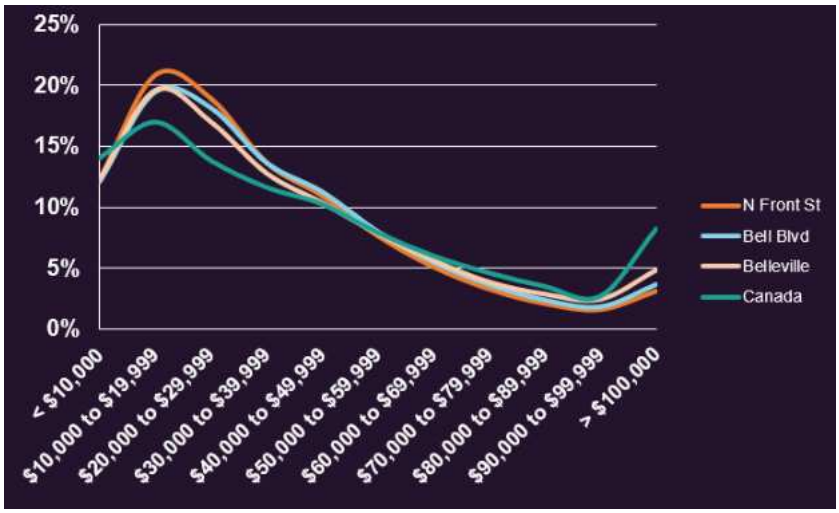

Figure 2-4: Income Distribution

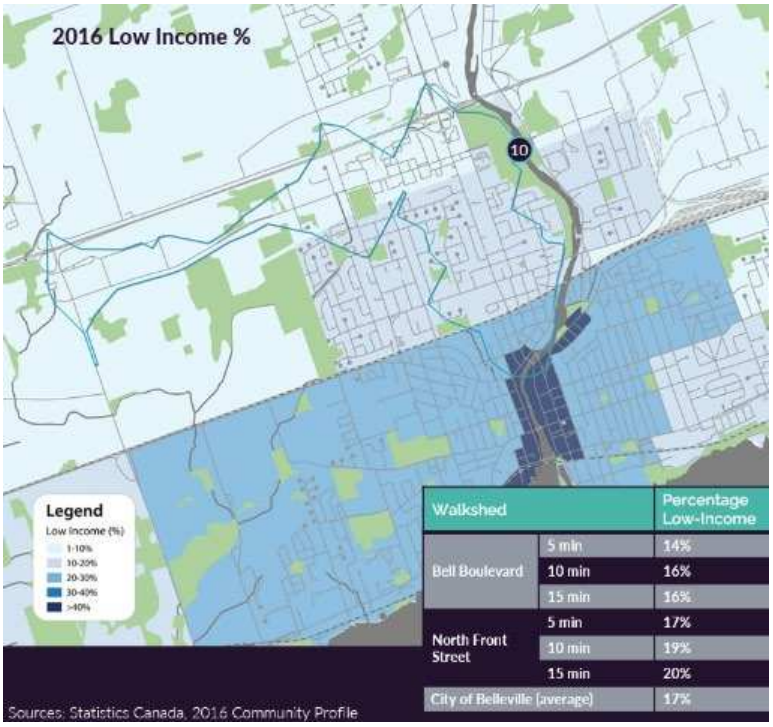

Figure 2-5: Community Profile

3 Existing Transportation Network

The study area road network comprises of arterial, collector and local roads within the jurisdiction of the City of Belleville. Three main corridors, namely, Bell Boulevard, North Front Street and Sidney Street are classified as arterial roads. These are the major roads serving a mobility function in the area, connecting to collector local roads that provide access to adjacent properties. Note that the western portion of Bell Boulevard is presently classified as a collector road by the City.

3.1 Study Intersections

The existing network was modelled using Synchro traffic simulation software and 19 intersections were analyzed to assess the existing traffic operations. **Figure 3-1**, **Figure 3-2** and **Table 3-1** below shows the intersections in the study area.

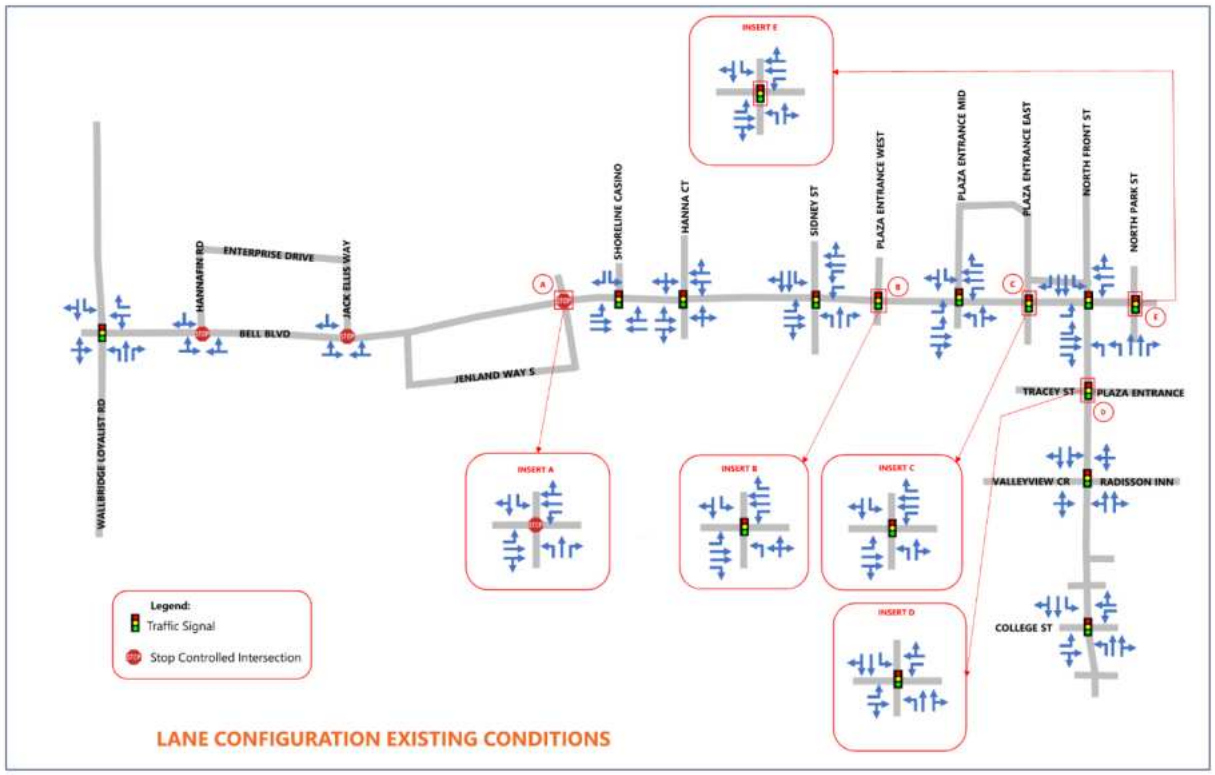

Figure 3-1: Existing Lane Configurations

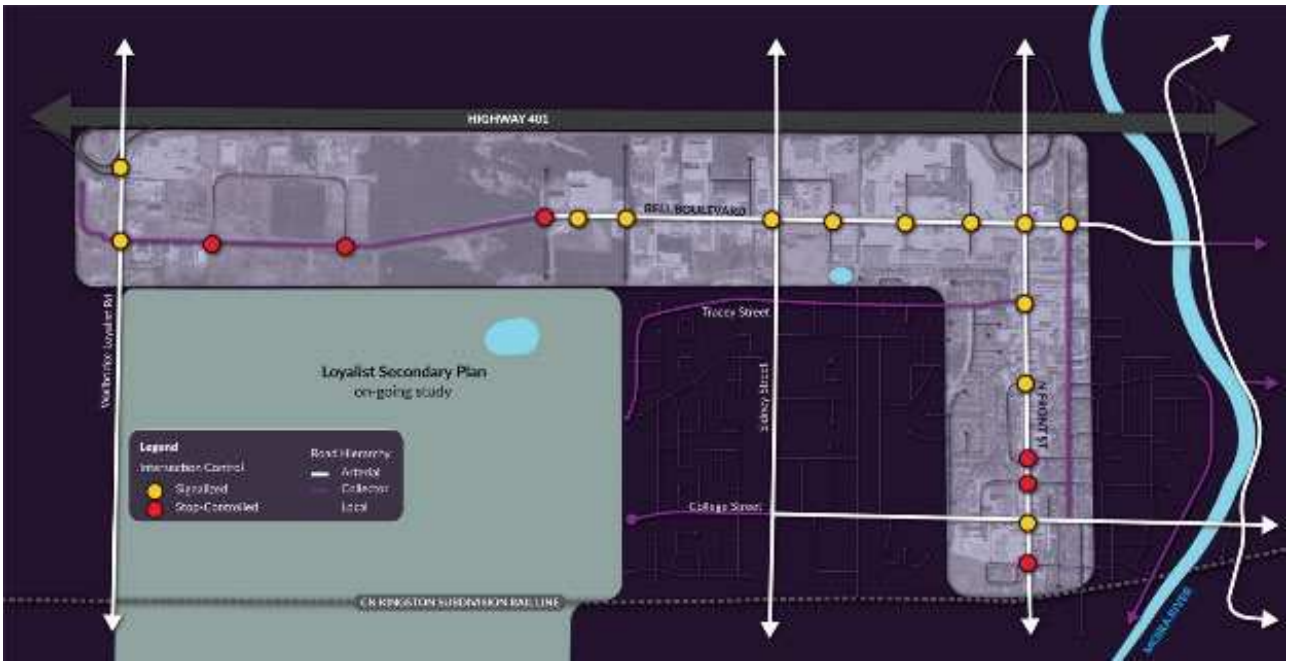

Figure 3-2: Existing Network

Table 3-1 : Existing Network

Intersection No.	Intersection	Intersection type
1	Wallbridge Loyalist Road & Bell Boulevard	Signalized
2	Bell Boulevard & Hannafin Road	Stop Control
3	Bell Boulevard & Shoreline Casino	Signalized
4	Bell Boulevard & Hanna Court	Signalized
5	Bell Boulevard & Davy Road	Stop control
6	Bell Boulevard & Sidney Street	Signalized
7	Bell Boulevard & Plaza Entrance West	Signalized
8	Bell Boulevard & Plaza Entrance Mid	Signalized
9	Bell Boulevard & Plaza Entrance East	Signalized
10	Bell Boulevard & North Front Street	Signalized
11	Bell Boulevard & North Park Street	Signalized
12	North Front Street & Tracey Street/Plaza Entrance	Signalized
13	North Front Street & Valleyview Cres/Radisson Country Inn	Signalized
14	North Front Street & Craig Street	Stop control
15	North Front Street & Donald Street	Stop control
16	North Front Street & College Street	Signalized
17	North Front Street & King George Sq/Evan Street	Stop control

3.1.1 Existing Operational Constraints

We understand from City staff that there are current concerns regarding the operational constraints that are affecting various intersections along the study corridors under existing conditions, and in particular for the identified unsignalized (stop controlled) intersections along North Front Street at Craig Street, Donald Street, and King George Street/Evan Street. Given these unsignalized intersections are operating along much busier arterial roads, it would be out recommendation that the City conduce site specific intersection control studies in order to evaluate and confirm any potential safety concerns with existing operations and to address any potential macro considerations related to the long-term growth and infrastructure improvements along these corridors.

3.2 ORIGIN/DESTINATION

Travel data, sourced through anonymized sources including applications, cell tower, and census data was collected using big data/data analytics. This data represents a sample of daily weekday trips collected in September 2019, prior to the pandemic. It is difficult to quantify what percentage of total trips they represent without first collecting counts across the City to validate and expand. However, it can still prove useful for assessing general distribution trends for the study corridors.

3.2.1 Bell Boulevard Trip Distribution

Low internal trip demand: 14% of daily weekday sample trips associated with the Bell Boulevard corridor are made internally within the corridor, implying that the majority of visitors arrive from external areas, since the corridor has little to no residential uses to provide more internal demand.

High external trip demand: 44% of trips to the Bell Boulevard corridor are external trips, with trips from Sidney Street in the west comprising the largest portion (13%).

A regional draw: The nearest major shopping retail centre outside of Belleville is over 70 kilometers west in Cobourg, or 70 kilometers east in Kingston. Between Belleville and Kingston there are few population centers apart from Napanee which is closer to (and likely drawn to) Kingston. To the west, the nearest population center is Trenton, which is closer to Belleville and likely adds to the demand coming from the west due to its proximity.

14% of trips associated with Bell Boulevard are within zones that would likely see trips using North Front Street to access the corridor (See **Figure 3-3** - Zone 1, 2, 3, 4, and 8).

Figure 3-3: Bell Boulevard Trip Distribution

3.2.2 North Front Street Trip Distribution

Low internal trip demand: 13% of daily weekday sample trips associated with the North Front Street corridor are made internally within the corridor. This is due to the limited mixes of uses on the corridor, as it is almost exclusively commercial (see **Figure 3-4**).

Serves local needs: North Front Street serves more of a local function as the bulk of trips are internal to Belleville, with 29% of trips associated with zones directly on or surrounding the corridor (Zones 2, 8, 9, 10). This indicates that nearly 1/3 of trips accessing North Front Street are within relatively short distances of the corridor itself.

A gateway to Belleville: 24% of demand is associated with trips that go beyond the City's borders (external) indicating that although the corridor serves a predominantly local need, it attracts some regional demand in tandem with trips that pass through the corridor to access the City's downtown.

Figure 3-4: North Front Street Trip Distribution

3.2.3 Travel Trends

Figure 3-5 illustrates the internal versus external trip distribution percentages. Several zones have high internal trip rates likely due to the types of land uses that promote intra-zonal trips, such as a mixed-use commercial area, or special attractors. The zones included are as follows:

- Zone 6 – Northeast Industrial Park (and resulting goods movement between facilities)
- Zone 14 – Loyalist College
- Zone 15 – Belleville Loyalist Market retail plaza and numerous schools/educational facilities
- Zone 17 – Bay View Mall, Belleville General Hospital, and retail plazas along Dundas Street E
- Zone 21 – Employment areas along North Front Street and Maitland Dr
- Zones 23 & 24 – Large zones representing entire municipalities outside Belleville (Quinte West and Prince Edward County, respectively.)
- Zones with Few Internal Trips: Typically, zones dominated by a single land use (Zones 1, 2, & 9), or zones featuring large tracts of open space/adjacent to rural areas (Zones 16 & 18).
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- Zones with Mostly External Trips: Generally, zones featuring retail or employment areas that attract trips from outside their immediate vicinity, or with special regional attractors:
- Zones 1 & 2 – Belleville's downtown core
- Zone 13 – Shorelines Casino on Bell Boulevard
- Zone 20 – Belleville Airport and Lafarge Belleville
- Zones 18 & 22 – Rural northeastern Belleville

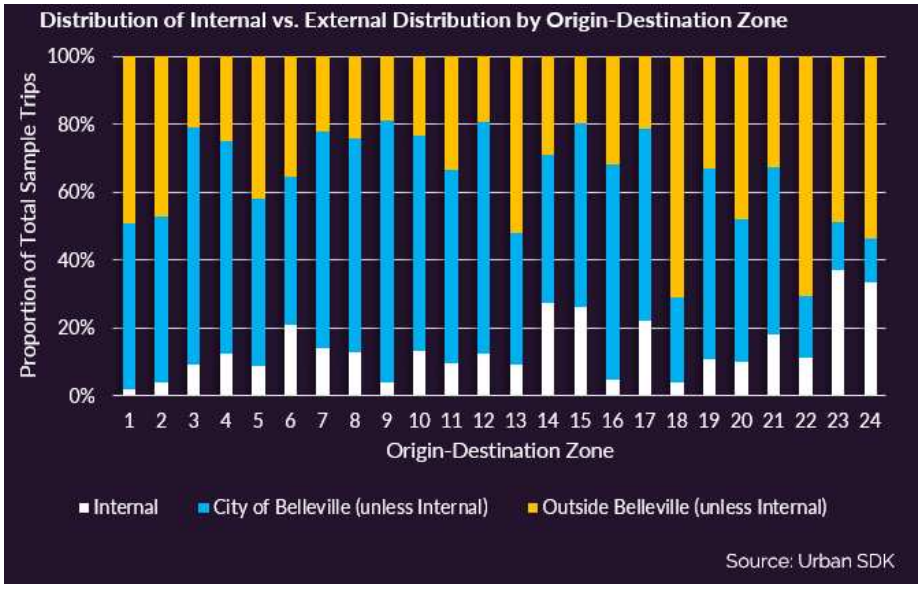

Figure 3-5: Internal Vs External Trip Distribution

3.3 EXISTING TRAFFIC OPERATIONS

3.3.1 Intersection Capacity

Bell Boulevard is a designated major arterial with a posted speed limit of 50-60 Km/h between North Front Street and Wallbridge Loyalist Road. The Street has a four-lane cross-section and a speed limit of 50 Km/h between North Front Street and 600 meters west of Jenland Way South, and a two-lane cross-section with a speed limit of 60 Km/h for the remainder of the corridor until Wallbridge Loyalist Road. North Front Street is a designated Major Arterial with a statutory speed limit of 50 Km/h and a four-lane cross-section between Bell Boulevard and the CP Railway overpass.

Bell Boulevard's east-west orientation presents a challenge for accommodating high volumes of traffic because it requires a signalized turn to enter or exit from any of the major crossing streets within the study area. The issue is further compounded by the fact that Bell Boulevard effectively ends in the east and west extent of the study area providing few outlets for trips to go beyond the currently constrained crossing corridors (see **Figure 3-6**). At the intersection of Bell Boulevard and North Park Street, there are over 500 trips during the PM Peak Hour that enter/exit the residential area.

North Front Street's north-south orientation provides travellers with few opportunities to connect with east-west corridors such as Bell Boulevard and College Street. This condition limits the number of locations with challenges related to turning movements, but concentrates volumes to a few intersections (see **Figure 3-7**). It is noted that left turns out of site access driveways and minor streets onto North Front Street may be challenging during peak hours which experience higher volumes of through-running traffic along the corridor.

Figure 3-6: Orientation and Extent

Figure 3-7: Link Capacity

An intersection analysis was completed for the existing traffic network in March 2022. Weekday AM and PM Peak hour counts were collected on Tuesday, December 14, 2021. Google's Covid-19 Community Mobility Reports for Hastings County combined with assumptions on trip purpose distribution from the 2016 Transportation Tomorrow Survey for similar-sized and situated municipalities, were used to assess whether the ongoing pandemic had decreased traffic from 2019 to 2021. Based on this review, it was determined that traffic had instead grown modestly from 2019 to 2021, and so no growth factor was applied to counts to account for the effects of the pandemic. Turning movement counts are attached in **Appendix B**. Signal timing plans used for the analysis are attached in **Appendix C**. Synchro and the Highway Capacity Manual (HCM) 2011 were used to assess intersection operations with the following metrics calculated for each intersection movements:

- Movement Delay (seconds)
- Movement Queues (meters)
- Volume-to-Capacity (ratio)

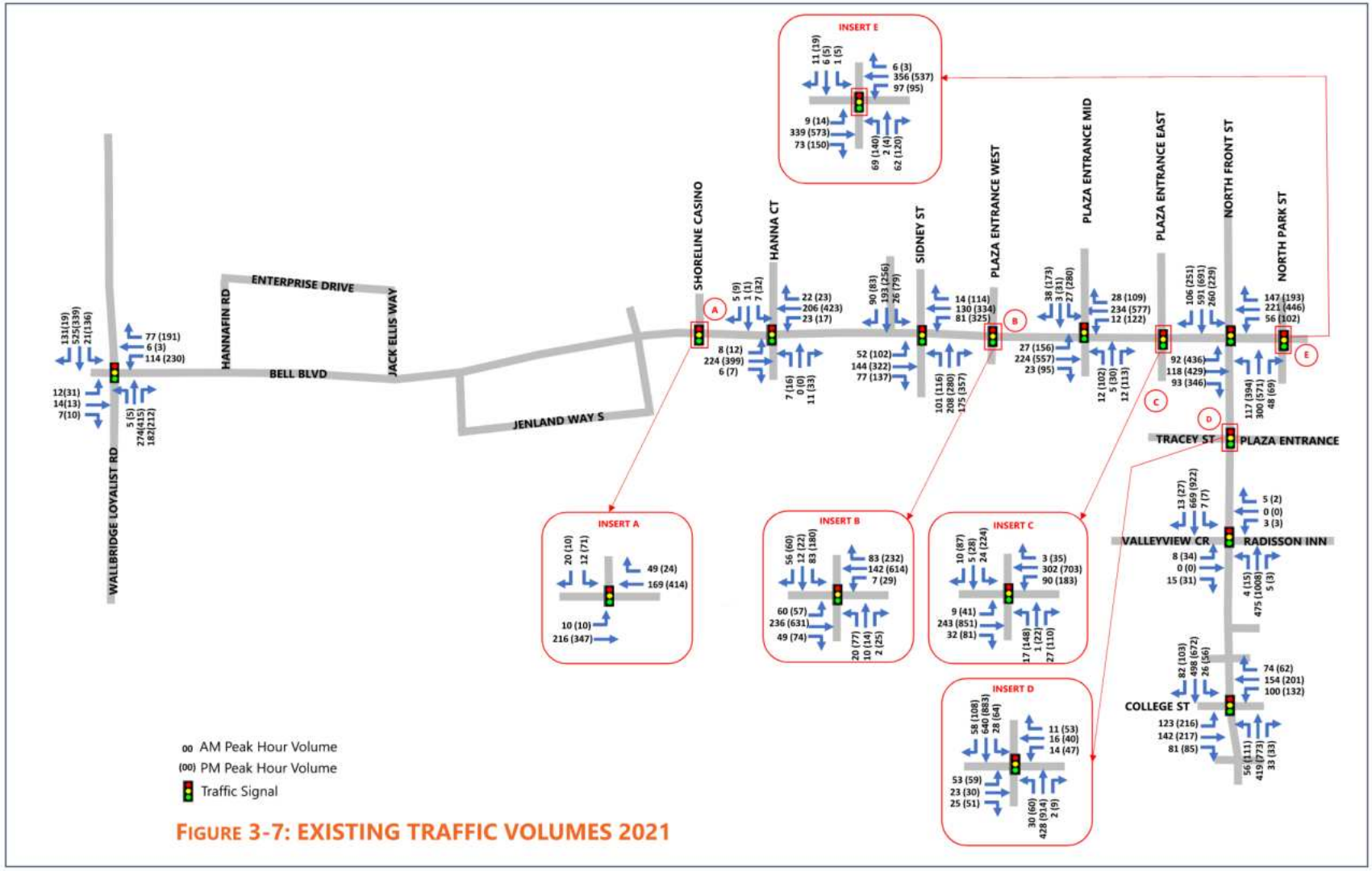

FIGURE 3-7: EXISTING TRAFFIC VOLUMES 2021

Figure 3-8: Existing Traffic Volumes 2021

Level-of-Service (LOS) reflects the movement or overall intersection delay (in seconds) and is meant to provide a high-level indication of congestion. The LOS level is dependent on the delay ranges provided by intersection control type, as summarized in **Table 3-2** Table below:

Table 3-2: Level-of-Service Rating by Control Type and Delay

Level of Service	Control delay per vehicle in seconds (d)		
	Signals	Roundabouts	Stop and Give-Way / Yield Signs
A	d ≤ 10	d ≤ 10	d ≤ 10
B	10 < d ≤ 20	10 < d ≤ 20	10 < d ≤ 15
C	20 < d ≤ 35	20 < d ≤ 35	15 < d ≤ 25
D	35 < d ≤ **55**	35 < d ≤ **50**	25 < d ≤ **35**
E	**55** < d ≤ 80	**50** < d ≤ 70	**35** < d ≤ 50
F	80 < d	70 < d	50 < d

D

Existing Weekday peak hour intersection operations are generally good with only three intersections experiencing a LOS worse than "B" as shown in **Figure 3-9**, **Figure 3-10**, **Table 3-3** and **Table 3-4**. Due to their location, they represent key junctions in the network:

1. Bell Boulevard & North Front Street
2. Tracey Street & North Front Street
3. Bell Boulevard & Quinte Mall Mid Entrance

Residents also raised concerns through public consultation and telephone interviews about congestion at the following intersections:

4. Bell Boulevard & North Park Street: Occasional issues when traffic queues at Bell Boulevard & North Front Street extend to block North Park Street.
5. North Front Street & Starbucks Entrance: due to high numbers of trips entering/exiting through a single unsignalized access.

Comments from the public mentioned underutilized right-in/right-out accesses into Quinte Mall and other commercial properties along Bell Boulevard and North Front Steet that could be consolidated to better manage traffic flow. Detailed Synchro reports are attached **Appendix D** for AM and **Appendix E** for PM traffic analysis.

Figure 3-9: Existing Weekday Peak Hour Intersection LOS (2021)

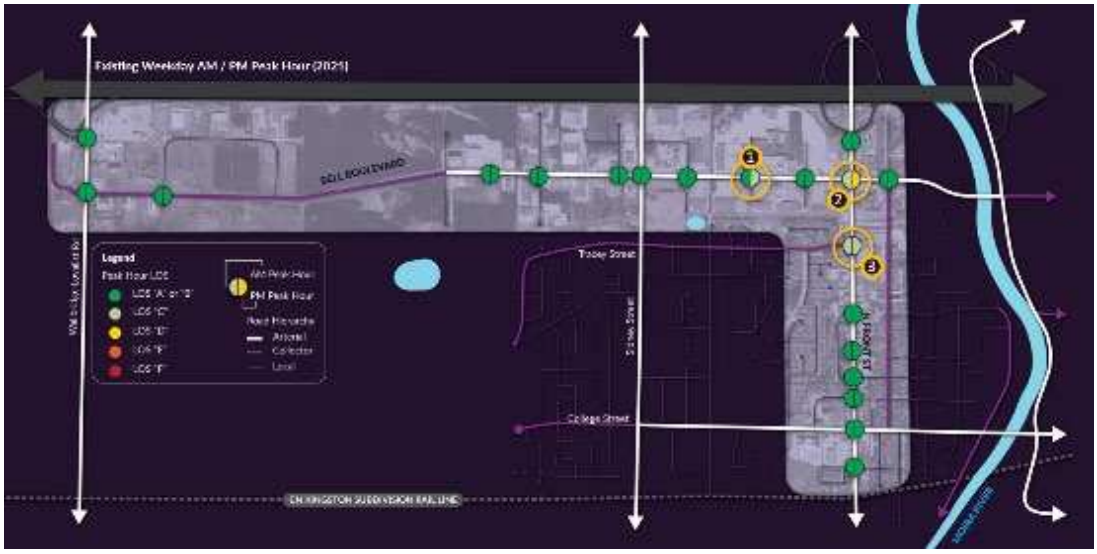

Figure 3-10: Existing Weekday AM / PM Peak Hour LOS (2021)

Table 3-3: Existing Conditions LOS Weekday (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.65	16.9	B	0.64	17.7	B
	EBLTR	0.11	20.0	B	0.12	14.4	B
	WBLT	0.42	24.9	C	0.62	23.2	C
	WBR	0.07	19.4	B	0.14	14.6	B
	NBL	0.03	10.1	B	0.02	10.9	B
	NBT	0.36	11.2	B	0.70	22.3	C
	NBR	0.14	9.1	A	0.1	13.3	B
	SBL	0.05	6.8	A	0.45	13.3	B
	SBTR	0.79	19.9	B	0.53	15.2	B
Bell Boulevard & Hannafin Road (Unsignalized)	*Overall*	-	0.4	A	-	0.1	A
	EBLT	0.01	0.3	A	0.00	0.0	A
	WBTR	0.12	0.0	-	0.31	0.0	-
	SBLR	0.01	10.0	B	0.01	12.4	B
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.12	10.4	B	0.29	12.3	B
	EBL	0.02	6.9	A	0.03	7.4	A
	EBT	0.14	7.3	A	0.23	8.1	A
	WBTR	0.19	13.3	B	0.44	15.7	B
	SBL	0.03	12.6	B	0.14	13.2	B
	SBR	0.02	12.6	B	0.01	12.2	B
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.15	9.6	A	0.25	10.4	B
	EBLTR	0.26	9.6	A	0.38	10.3	B
	WBLTR	0.28	9.7	A	0.43	10.8	B
	NBLTR	0.02	8.3	A	0.06	8.5	A
	SBLTR	0.03	8.3	A	0.07	8.6	A
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.34	19.6	B	0.55	27.4	C
	EBL	0.36	32.9	C	0.48	39.1	D
	EBTR	0.21	17.4	B	0.55	29.3	C
	WBL	0.33	31.6	C	0.59	34.7	C
	WBTR	0.18	18.4	B	0.47	25.5	C
	NBL	0.42	23.8	C	0.49	30.8	C
	NBT	0.47	22.6	C	0.60	30.1	C
	NBR	0.13	18.3	B	0.25	23.9	C
	SBL	0.20	31.2	C	0.43	39.8	D

	SBTR	0.20	12.2	B	0.22	14.3	B
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.24	13.2	B	0.49	16.2	B
	EBL	0.14	9.9	A	0.19	10.8	B
	EBT	0.27	13.9	B	0.60	17.4	B
	EBR	0.04	12.4	B	0.05	12.5	B
	WBL	0.02	9.2	A	0.10	10.1	B
	WBT	0.17	13.2	B	0.60	17.4	B
	WBR	0.06	12.7	B	0.17	13.6	B
	NBL	0.05	12.9	B	0.16	14.0	B
	NBLTR	0.04	12.7	B	0.09	13.2	B
	SBL	0.24	14.8	B	0.47	18.3	B
	SBTR	0.07	13.0	B	0.09	13.1	B
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.18	18.8	B	0.62	29.2	C
	EBL	0.12	28.9	C	0.50	43.7	D
	EBTR	0.32	18.8	B	0.69	31.9	C
	WBL	0.12	29.8	C	0.55	45.2	D
	WBT	0.29	18.5	B	0.54	26.3	C
	WBR	0.02	16.5	B	0.07	21.0	C
	NBL	0.03	13.8	B	0.30	27.2	C
	NBTR	0.02	17.2	B	0.18	30.5	C
	SBL	0.08	14.2	B	0.57	21.7	C
	SBTR	0.04	17.4	B	0.18	22.4	C
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.17	8.6	A	0.85	15.9	B
	EBL	0.03	8.4	A	0.13	6.4	A
	EBTR	0.25	9.4	A	0.50	8.3	A
	WBL	0.27	90	A	0.86	40.4	D
	WBT	0.28	7.9	A	0.38	7.3	A
	WBR	0.00	8.1	A	0.03	5.3	A
	NBL	0.04	8.3	A	0.50	26.7	C
	NBTR	0.02	8.2	A	0.14	19.9	B
	SBL	0.06	8.5	A	0.83	46.3	D
	SBTR	0.02	8.2	A	0.14	19.9	B
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.48	31.4	C	0.81	38.5	D
	EBL	0.41	50.5	D	0.82	48.5	D
	EBT	0.19	24.7	C	0.51	30.6	C
	EBR	0.07	100.8	F	0.24	27.8	C
	WBL	0.39	45.9	D	0.46	42.4	D
	WBTR	0.40	31.7	C	0.82	42.6	D
	NBL	0.43	43.3	D	0.78	47.0	D
	NBT	0.41	30.8	C	0.72	37.0	D
	NBR	0.03	26.8	C	0.05	26.8	C

	SBL	0.56	31.7	C	0.76	50.2	D
	SBT	0.41	18.4	B	0.77	36.1	D
	SBR	0.07	15.1	B	0.18	26.1	C
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.31	19.5	B	0.57	26.4	C
	EBL	0.03	13.5	B	0.06	14.0	B
	EBT	0.49	21.2	C	0.88	32.9	C
	WBL	032	16.1	B	0.47	21.1	C
	WBTR	0.43	20.0	C	0.67	23.8	C
	NBL	0.16	14.9	B	0.34	16.7	B
	NBTR	0.05	17.5	B	0.11	17.9	B
	SBL	0.00	13.6	B	0.01	13.7	B
	SBTR	0.03	17.2	B	0.03	17.2	B

Table 3-4: Existing Conditions LOS Weekday (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.39	23.7	C	0.50	21.0	C
	EBL	0.12	14.4	B	0.16	19.0	B
	EBTR	0.08	17.6	B	0.11	20.2	C
	WBL	0.03	13.8	B	0.13	18.8	B
	WBTR	0.08	17.8	B	0.13	20.5	C
	NBL	0.14	15.3	B	0.33	17.2	B
	NBTR	0.53	21.3	C	0.71	20.8	C
	SBL	0.10	14.0	B	0.33	16.5	B
	SBTR	0.79	27.4	C	0.76	21.9	C
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.35	12.7	B	0.53	12.7	B
	EBLTR	0.02	8.2	A	0.13	15.8	B
	WBLTR	0.01	8.1	A	0.00	14.7	B
	NBLTR	0.49	11.4	B	0.75	13.2	B
	SBLTR	0.67	13.8	B	0.69	11.9	B
North Front Street & College Street (Signalized)	*Overall*	0.46	16.2	B	0.63	19.2	B
	EBL	0.43	18.4	B	0.61	23.9	C
	EBTR	0.39	16.4	B	0.43	17.1	B
	WBL	0.35	17.0	B	0.41	18.7	B
	WBTR	0.39	16.3	B	0.37	16.2	B
	NBL	0.318	10.7	B	0.50	19.6	B
	NBTR	0.45	15.6	B	0.61	18.7	B
	SBL	0.07	9.5	A	0.30	17.4	B
	SBTR	0.56	16.9	B	0.63	20.5	C

3.3.2 Bell Boulevard & North Front Street Intersection Constraints

3.3.2.1 Traffic Operations

At the intersection of Bell Boulevard and North Front Street, weekday AM peak hour intersection operations are generally acceptable at a network level, however, during the PM Peak hour, critical movements at key intersections are approaching capacity (refer to **Figure 3-11**) and considered constrained under existing conditions:

1. **Westbound shared through-right:** During the PM Peak, 30% of the volume passing through this movement is making a turn. This would limit overall movement capacity as turning vehicles need to yield right-of-way and wait for a gap before proceeding. Because of this the movement was observed to be approaching capacity at 82%. A queuing analysis revealed that this movement experiences queues that may extend into the upstream intersection at Bell Boulevard / North Park Street which was supported by resident input provided through consultation.
2. **Eastbound dual-left:** the demand at this movement uses 82% of the available capacity. The function as a dual-left turn requires a dedicated signal phase and does not allow turns to be permitted during a through green phase even if there is a gap. Because of this function, it is difficult to increase the movement's capacity without taking away green time from another movement (thus reducing that movement's capacity). The high volume using this turn is likely associated with access to/from Highway 401 north of the intersection. A demand that will continue to increase as Bell Boulevard continues to develop in the west.
3. **Northbound dual-left:** the demand at this movement uses 78% of the available capacity. The function as a dual-left turn has the same issues as described for the eastbound dual-left above. The demand for this movement, however, is likely from local residential areas that are naturally funneled to the intersection due to limited north-south connections into Bell Boulevard and limited east-west road connections across North Front Street to deviate to Sidney Street (if accessing Bell west of Sidney).
4. **Southbound left:** the demand at this movement uses 76% of the available capacity and is likely a result of limited connections from North Front Street into the residential area east of the corridor. Many trips are likely required to make a left here then a right on North Park Street.

Note that the western portion of Bell Boulevard is presently classified as a collector road by the City.

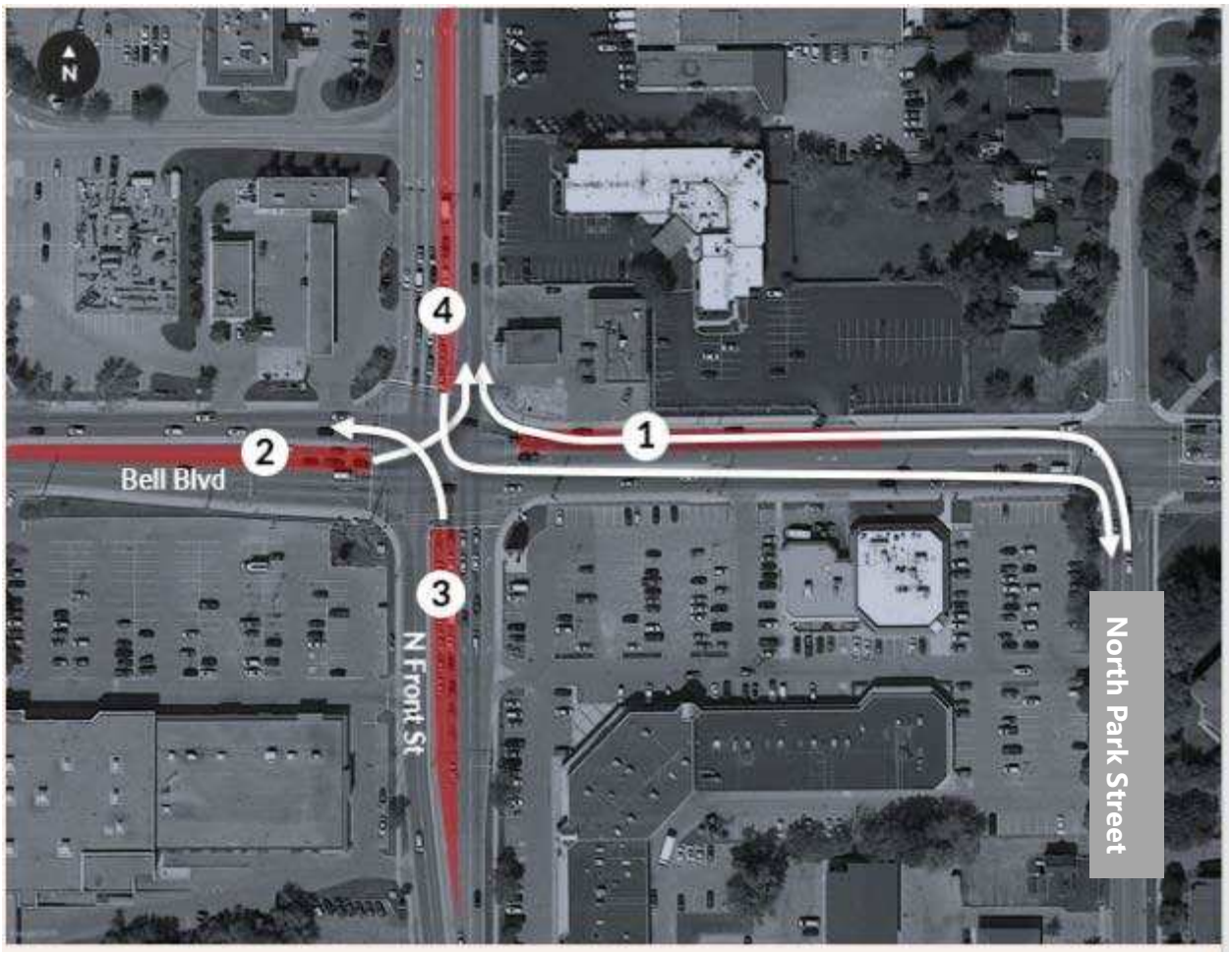

Figure 3-11: Bell Boulevard & North Front Street Configuration

3.3.3 Tracey Street & North Front Street Constraint

North-South through lanes: The north and south through lanes experience significant volumes of traffic between 880-920 vehicles per hour per direction. At the intersection of Tracey Street & North Front Street, north-south through movements operate at good levels of service but are using between 71-76% of their capacity because of the need to provide a signal phase for east-west movement.

3.3.4 Walking

The Belleville TMP highlights the value of encouraging walking as a mode of transportation through the provision of appropriate infrastructure, programs, and policies.

Sidewalks on the major pedestrian corridors within a 15-minute walkshed of Bell Boulevard and North Front Street are generally provided for travel parallel to the street. However, as these frequently feature long distances between protected crossings (signalized intersections and pedestrian signals), opportunities exist to provide closer-spaced protected crossings.

Pedestrians tend to 'jaywalk' when no proper pedestrian crossing exists within their sightline – given the 4-lane cross-sections along these corridors, this can pose a significant safety concern for pedestrians. The minimum distance between signalized intersections is 215 meters, which allows motorists to recognize and react to each device (OTM Book 12); consequently, there are opportunities within these corridors to provide midblock crossings to improve pedestrian safety.

Figure 3-12: Existing Pedestrian Crossing Distances (Major Streets)

On Bell Boulevard, the walking network is generally more connected and permeable than the cycling network, although the large blocks add additional travel time to pedestrian travel. There is almost no Active Mobility infrastructure in the western portion of the corridor, adjacent to the future Loyalist Secondary Plan Area. Between North Park Street and the Casino Entrance, there is an average protected crossing for pedestrians every 282 meters. Between the Casino and Wallbridge Loyalist Road there is over 2 Kilometers of road without a protected crossing. The gaps and opportunities for future pedestrian network improvements can be found on **Figure 3-13** below:

Figure 3-13: Bell Boulevard Pedestrian Network

Pedestrian LOS: Widening of Bell Boulevard west of Sidney Street brought enhanced pedestrian facilities with sidewalk/multi use Path. The commercial stretch of Bell Boulevard east of Sidney Street has poor pedestrian LOS due to limited pedestrian integration connecting to main roadways, making the walk from the street to destinations both uncomfortable and dangerous. North Front Street also experiences deteriorated pedestrian LOS between Tracey and College due to poor pedestrian integrations at minor approaches (refer to **Figure 3-14**). **Table 3-5** shows the methodology that York Region uses to analyse walking LOS.

Figure 3-14: Pedestrian LOS

Table 3-5: Pedestrian LOS Guidelines; Source: York Region, Transportation Mobility Plan Guidelines, (November 2016)

Level of Service	Segment	Intersection
A	≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path	▪ ≥2.0 m sidewalk with minimum 3.5 m buffer including planting and edge zone; or ≥3.0 m multi-use path ▪ Pedestrian signal head with sufficient pedestrian clearance time ▪ Clearly delineated cross-walk
B	≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path	▪ ≥1.5 m sidewalk with minimum 1.0 m buffer including edge zone; or <3.0 m multi-use path ▪ Pedestrian signal head with sufficient pedestrian clearance time ▪ Clearly delineated cross-walk
C	≥1.5 m curb-faced sidewalk (no buffer)	▪ ≥1.5 m curb-faced sidewalk (no buffer) ▪ Pedestrian signal head with sufficient pedestrian clearance time ▪ Clearly delineated cross-walk
D	<1.5 m sidewalk	▪ <1.5 m sidewalk ▪ Pedestrian signal head sufficient pedestrian clearance time ▪ No clearly delineated cross-walk
E	Paved shoulder or no sidewalk provision	▪ Paved shoulder or no sidewalk provision ▪ No pedestrian signal head ▪ No clearly delineated cross-walk
F	No sidewalk provision	▪ No sidewalk provision ▪ No pedestrian signal head ▪ Not clearly delineated cross-walk

Active Desire Lines: A review of aerial imagery (**Figure 3-15**) around Bell Boulevard identified four pedestrian desire lines that were created as a result of pedestrian flows to cut through large impermeable blocks to access commercial and employment lands from residential neighborhoods.

Figure 3-15: Bell Boulevard Active Desire Lines

On North Front Street, there are sidewalks on either side of the road, but there are few connections into the adjacent residential neighborhoods with only one connection east and only three connections west between Bell Boulevard and the rail tracks. There is no eastward sidewalk access into the adjacent residential neighborhood from North Front Street between Bell Boulevard and Donald Street which is 1,160 meters. North Front Street has an average protected crossing distance of 423 meters between Bell Boulevard and College Street which is larger than the protected crossing spacing provided in the built-up portion along Bell Boulevard (refer to **Figure 3-16**).

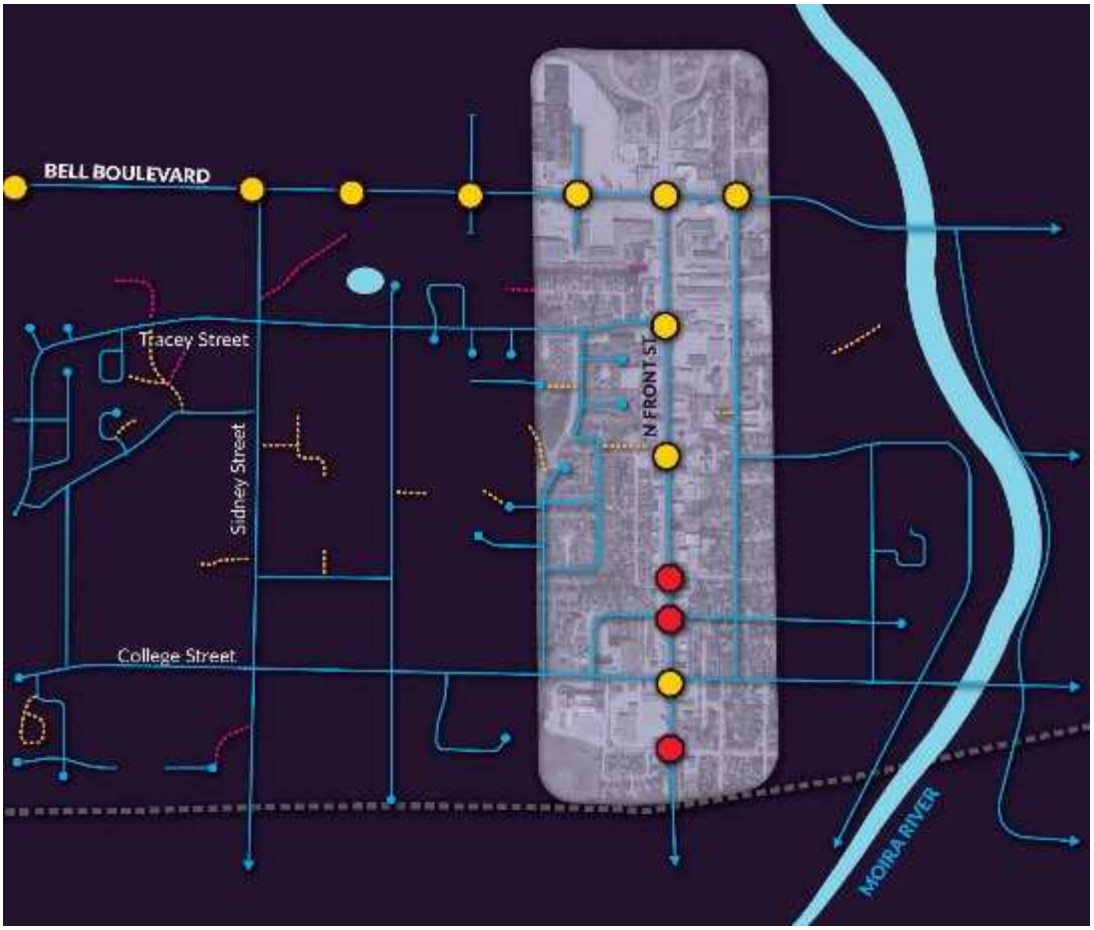

Figure 3-16: North Front Street Pedestrian Network

Active Desire Lines: A review of aerial imagery around North Front Street identified two additional pedestrian desire lines that were created as a result of pedestrian flows to cut through large impermeable blocks to access commercial corridors from residential neighborhoods.

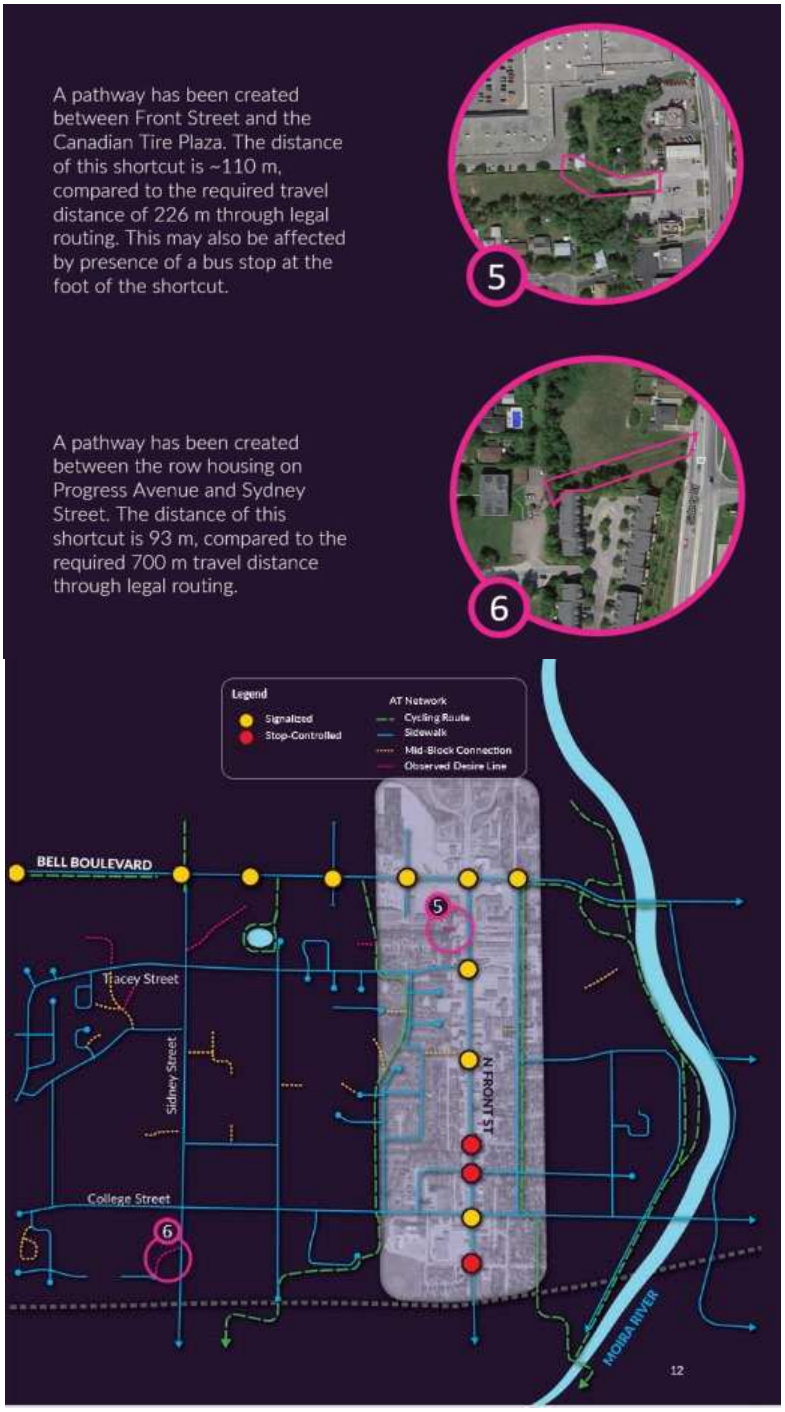

Figure 3-17: North Front Street Active Desire Lines

3.3.5 Bell Boulevard & Quinte Mall Mid Entrance Constraint

Refer to **Figure 3-18**:

1. **Eastbound dual-left:** High volumes of traffic utilize this dual left into Quinte Mall as the first access from the west. The movement experiences an LOS of 'D' indicating that motorists experience slightly longer delays proceeding through the movement. Like the other dual left turns, its function limits the ability to add additional throughput without limiting another movement's capacity. The eastbound dual left was observed to only be using 50% of its theoretical capacity, but only receives 8 seconds of green time where vehicles can proceed.
2. **Southbound left:** During the PM Peak hour, the southbound left turn experiences higher volumes than the eastbound dual-left. Because of the movement's single turn lane, it can safely provide both a protected and a shared green phase where it receives a net 39 seconds of green time. This results in the southbound left-turn operating at an LOS 'C'. Should changes be made to signal timing in the future the high volumes of traffic at this movement could create internal site issues.
3. **Adjacent Right-in/Right-Out:** Stakeholder comments revealed issues where some vehicles are making westbound left-turns at the adjacent right-in/right out access for the plaza on the south side of Bell Blvd, despite the presence of a pork-chop island (the design of which is intended to prevent left-turns). This prevents some trips exiting Quinte Mall from being able to use the access to proceed into the middle lane, which may be adding demand to the southbound left-turn at the signal.

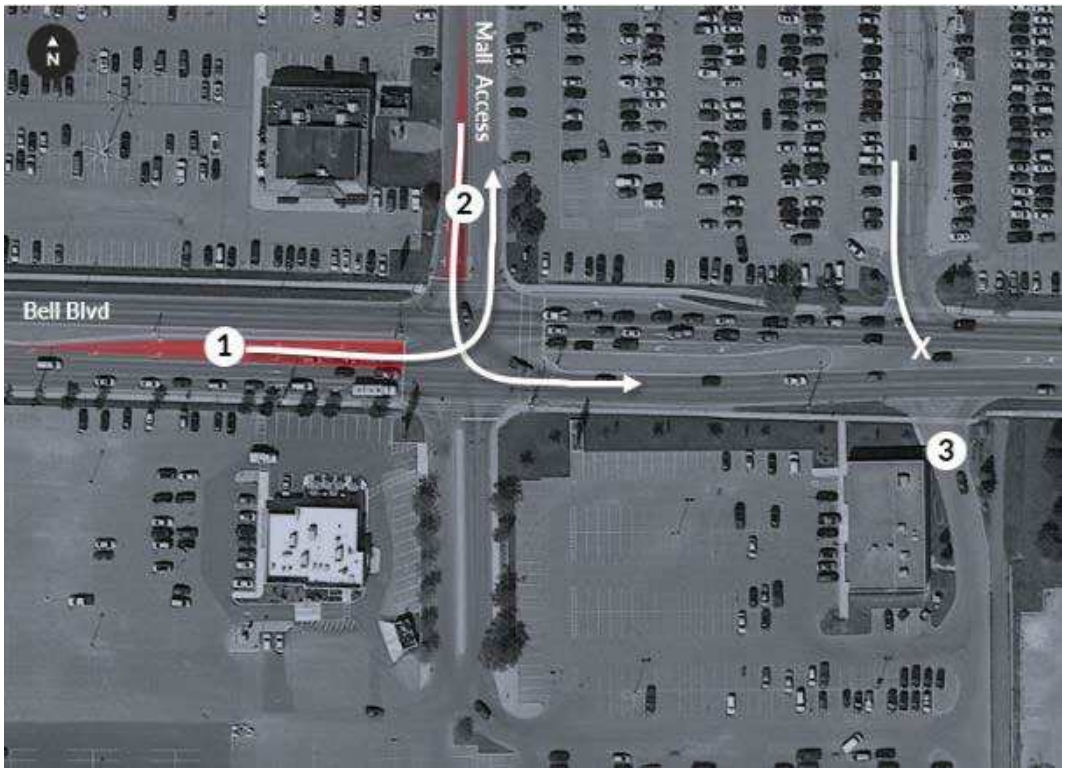

Figure 3-18: Bell Boulevard & Mall Access Configuration

3.3.6 Link Volume to Capacity

Weekday PM Peak Hour, which is the busiest observed period, sees varying utilization of Bell Boulevard with increased utilization between 50-69% around the Quinte Mall to 24-30% just west of Sidney Street. Alternatively, North Front Street remains at 54% utilized across the corridor with little deviation between corridor segments (refer to **Figure 3-19**).

The intersection of Bell Boulevard and North Front Street is critical for regulating the flow of traffic on both corridors, however high volumes of turning movements constrains capacity because of the need to provide increased dedicated turning phases which reduce throughput capacity.

Figure 3-19: Link Volume to Capacity

Based on property data for North Front Street and aerial imagery it is estimated that the North Front Street Right-of-Way (RoW) has a width of 20.6 m.

The cross-section comprises four travel lanes with sidewalks on both sides that distributes the space accordingly (Refer **Figure 3-20** and **Figure 3-21**):

4 Vehicle Lanes = 13.2 m or 64% of the RoW

2 Sidewalks = 3.0 m or 15% of the RoW

2 Boulevards = 4.4 m or 21% of the RoW

Potential for future configurations that prioritize non-vehicular traffic may be considered under further study in order to "reimagine" the overall corridor and its potential operations.

Figure 3-20: Existing Cross Section for North Front Street

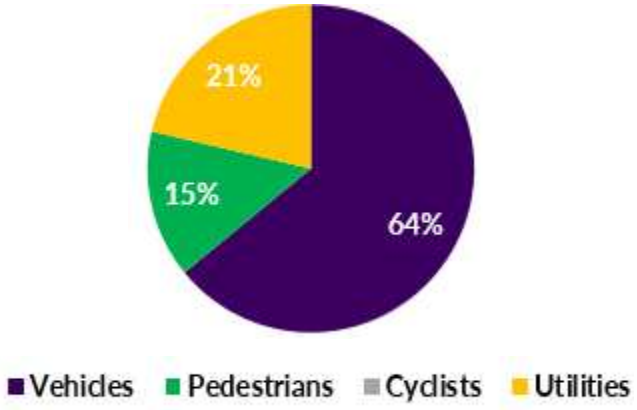

Figure 3-21: Existing ROW space distribution

3.4 TRANSIT INTEGRATION

Belleville Transit currently runs 10 primarily daytime bus routes and 2 primarily evening routes. All routes run at 30-minute frequencies and typically travel in unidirectional loops that connect the city core with its outlying areas. The existing municipal and intercity bus terminal is in the downtown area, at 165 Pinnacle Street.

The North Front Street corridor is well-served by Belleville Transit, with routes 4, 5, 8, and 31 servicing the segment between Bell Boulevard and the Moira River. Bell Boulevard itself is also well-served by transit between North Front Street and Sidney Street, with routes 3, 4, 5, 9, 10, and 101. However, only the four proceed west of Sidney, terminating at the Shorelines Casino. Quinte Mall acts as a secondary transit hub and major trip generator for the Bell Boulevard corridor.

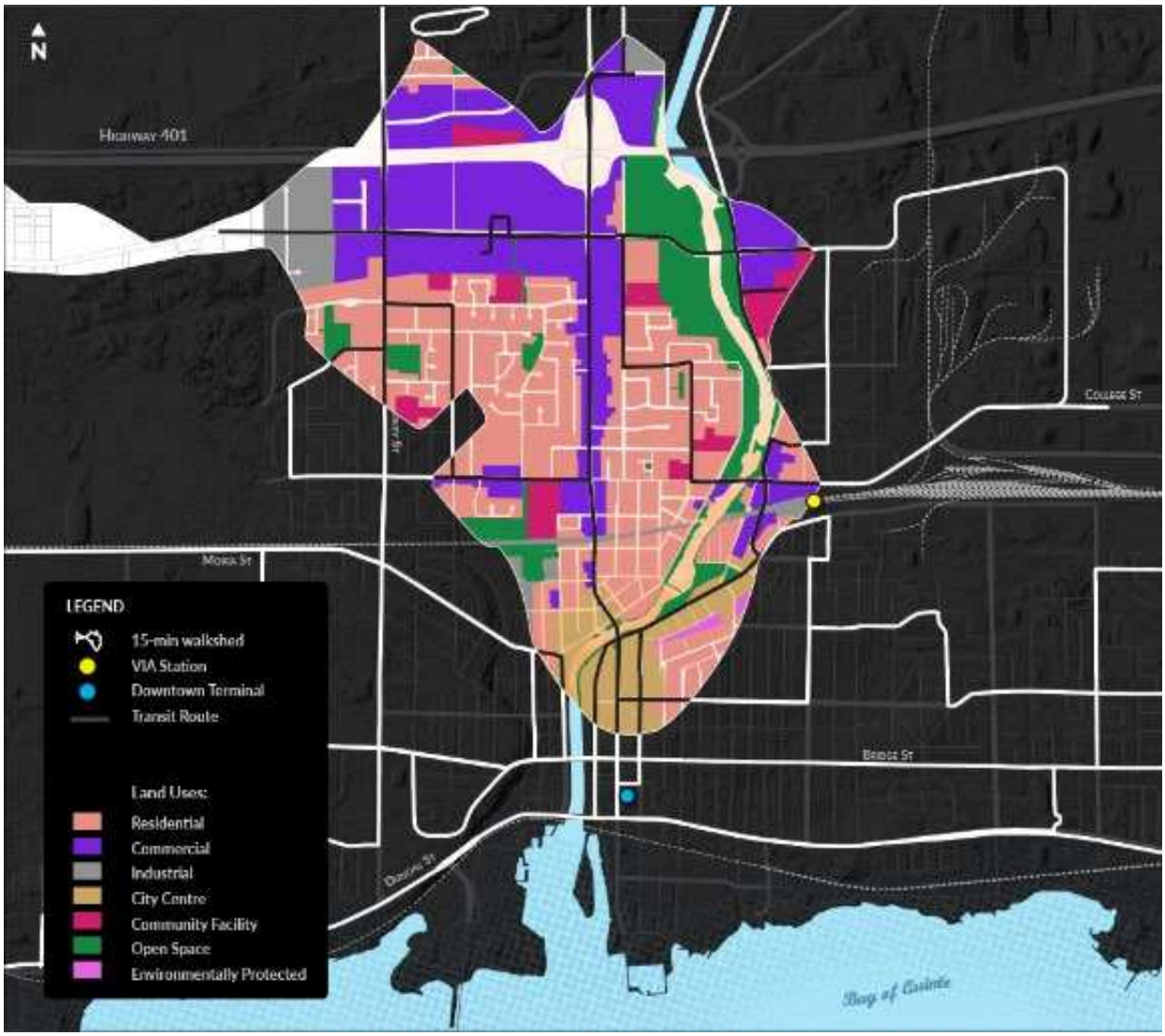

Figure 3-22: Transit Routes – Official Plan Schedule 'B' land Use Zoning

Bell Boulevard Existing Transit Network: Only one-third of the corridor has service coverage east of Sidney Street. This portion of the corridor has good transit coverage whereby virtually all properties are within a 10-minute walk to transit on Bell. The large blocks and road layout limit transit service to accessing the corridor via Sidney Street and North Front Street. The few multi-use paths connections between Bell Boulevard and the residential areas south create key first/last-mile connections to transit but could be improved. There is a future opportunity to extend the transit coverage west of Shorelines Casino to Wallbridge Loyalist and promote a better transit service for that area of the city.

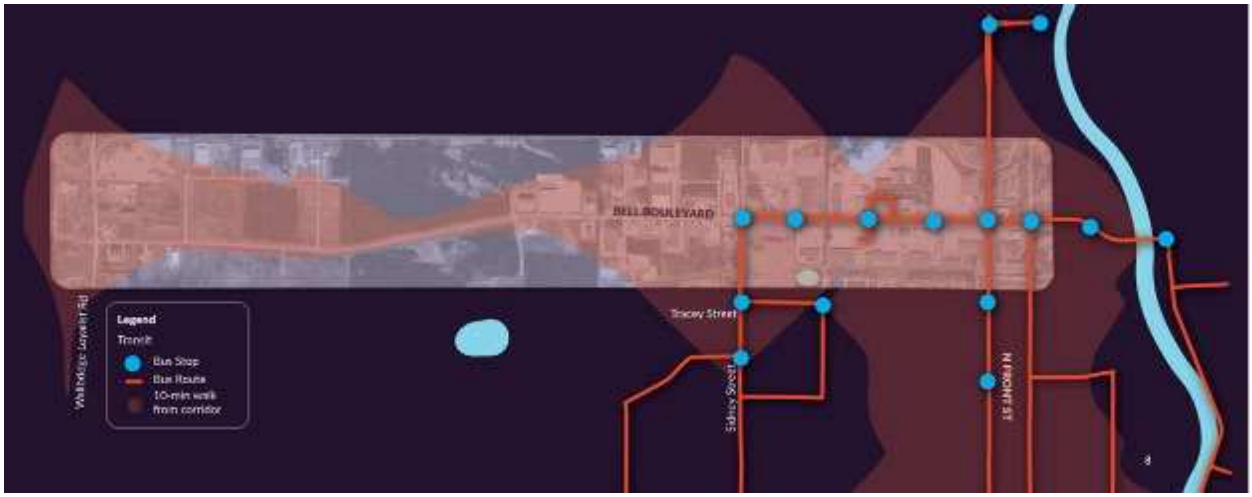

Figure 3-23: Bell Boulevard Transit Network

North Front Street Existing Transit Network: The orientation of the road network prohibits providing east-west service across North Front Street using other internal roads between Bell Boulevard and College Street. Sidney Street supplements service coverage to adjacent residential areas west of North Front Street as it runs parallel to North Front Street.

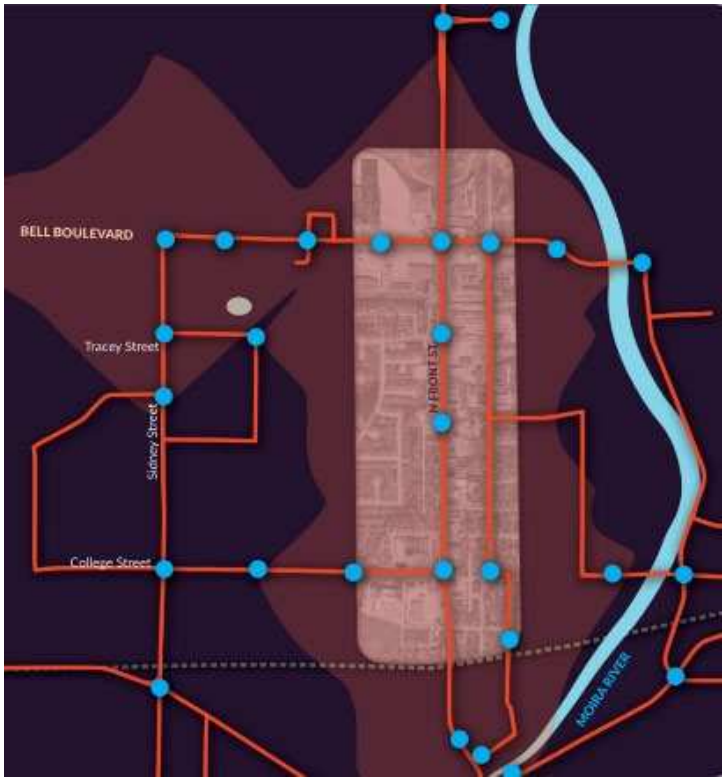

Figure 3-24: North Front Street Transit Network

It is noted that transit was not assessed from an operational perspective for existing conditions as these methodologies are not well defined. Transit operations are typically closely monitored by the transit operator with routes and frequencies adjusted regularly to best fit the needs of the area.

It is also understood that municipal transit conditions have recently changed as of the date of this report in 2024, as a result of recommendations from the city's Transit Master Plan. The existing conditions analysis enclosed within this report reflects transit conditions in 2021 in conjunction with the existing conditions horizon year considered for the corridor study as a whole. For more information on current transit routing and services, please visit the city's website at:

https://www.belleville.ca/en/walk-ride-and-drive/routes-and-schedules.aspx

3.5 ACTIVE TRANSPORTATION

There are limited widely accepted methodologies for analyzing active transportation from a traffic operations perspective with levels of service typically being highly subjective as active transportation can vary greatly based on the users. For the purposes of assessment the Multi-Modal Level of Service (MMLOS) criteria from York Region's Mobility Plan Guidelines were used to assess cycling and pedestrian level of service (refer to **Table 3-6**). The criteria for MMLOS are generally a mixture of spatial and qualitative assessments based on proximity and availability of a facility at an intersection including pedestrian treatments at intersection and cycling treatments at intersection. Based on discussions with York Region Staff, the purposes of the MMLOS is primarily to identify the deficiencies throughout their Regional network for considerations of improvements, and are not meant to be considered for approving or limiting development.

3.5.1 Cycling

Within the context of the existing cycling network in the vicinity of Bell Boulevard and North Front Street, frequent gaps in bike lanes and a general lack of dedicated cycling infrastructure make it difficult and dangerous for cyclists to connect from one place to another by bike.

As illustrated on **Figure 3-25** by the large spacing between blocks featuring planned and existing cycling infrastructure, room for improvement in cycling connectivity exists even with the ultimate planned cycling network identified in the Belleville TMP. While the planned cycling network does provide cycling connections on and between collector roads, there remain gaps throughout residential areas that are bounded by collector roads, from which a majority of trips originate.

Cyclists travelling on the road alongside mixed traffic does not directly correlate to increased travel times, but it may increase the risks of vulnerable cyclists conflicting with vehicles.

Figure 3-25: Existing and Planned Cycling Routes

Bell Boulevard: There is a multi-use pathway on the south side of Bell Boulevard between the Shorelines Casino and just west of Sidney Street, as well as between North Park Street and Cannifton Road. The corridor is intersected by two multi-use paths on the south side connecting to residential areas through large format retail lots. More details can be observed in **Figure 3-26**. There is no cycling or walking connections north across Highway 401.The City's 2014 Transportation Master Plan identifies several additional cycling network links related to Bell Boulevard including:

1. Hydro Corridor Multi-Use Path
2. North-South Multi-Use Path
3. Sidney Street Crossing of Highway 401
4. Lemoine Street Cycling Route
5. Riverside Park Trail Extension north
6. Cloverleaf Drive – Millennium Parkway Cycling Route

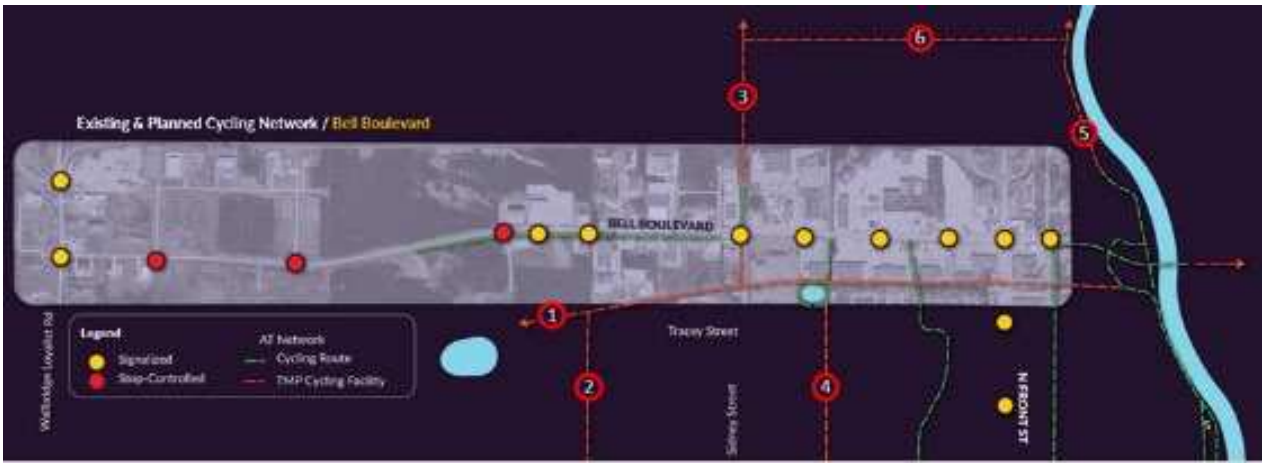

Figure 3-26: Existing Cycling Network Bell Boulevard

North Front Street: As seen on **Figure 3-27**, the existing cycling network surrounding Front Street is disconnected with no direct connections to the corridor. There are parallel cycling corridors along North Park Street (on the east), and Finch-Heartwood Drive (on the west). Further east there is another parallel corridor via the Riverside Park Trail. The City's 2014 Transportation Master Plan identified several cycling improvements related to the Front Street corridor including:

1. Hydro Corridor Multi-Use Path
2. Lemoine Street Cycling Route
3. College Street Cycling Route

Despite these planned additions, the anticipated distance between cycling routes is anticipated to be between 680 – 1,000 meters which is coarse given the population within the area and still leaves a large gap for connecting to North Front Street.

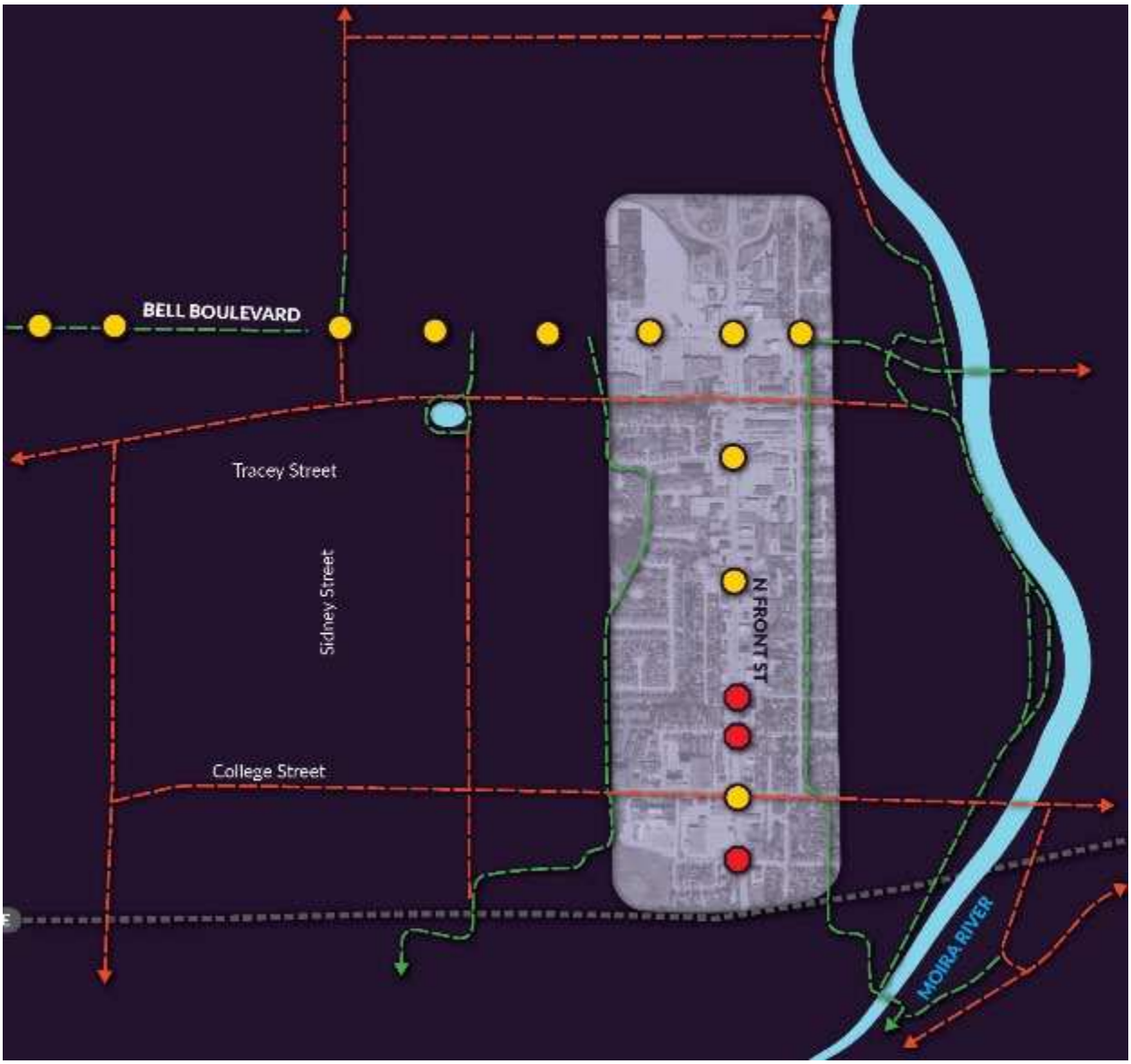

Figure 3-27: Existing Cycling Network North Front Street

Cycling LOS: Both corridors have poor cycling levels-of-service (LOS) with most intersections operating at an "F", primarily due to the lack of any cycling infrastructure, as illustrated on **Figure 3-28.** The newly widened portion of Bell Boulevard west of Sidney Street has improved the cycling LOS due to the new multi-use path on the south side of the road. However, cycling connections into properties or perpendicular corridors is either missing, or poorly integrated. **Table 3-5** shows the methodology that York Region uses to analyse cycling LOS.

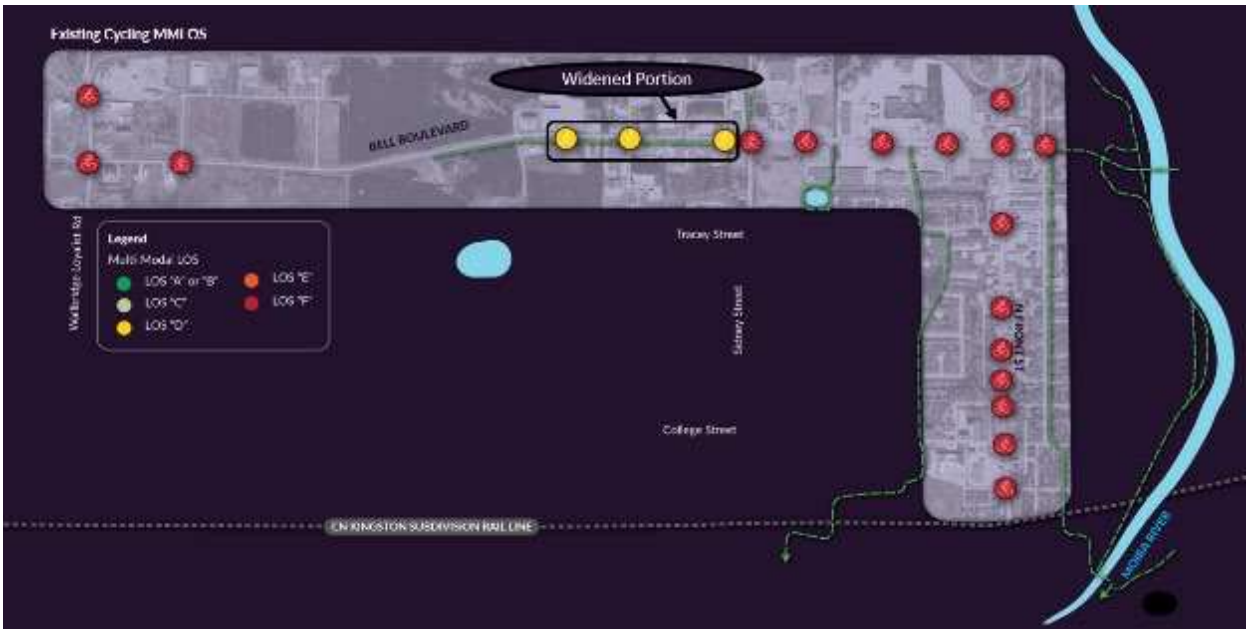

Figure 3-28: Cycling LOS

Table 3-6: Bicycle LOS Guidelines; Source: York Region, Transportation Mobility Plan Guidelines, (November 2016)

Level of Service	Segment	Intersection
A	Separated cycling facilities (e.g. cycle tracks, multi-use path)	Separated cycling facilities Bicycle box or clearly delineated bicycle treatment or bicycle signal head
B	≥1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer)	>1.8 m dedicated cycling facilities (e.g. bicycle lanes with and without buffer), Bicycle box, clearly delineated bicycle treatment or bicycle signal head
C	<1.8 m dedicated cycling facilities with no buffer	<1.8 m dedicated cycling facilities with no buffer, Bicycle box, clearly delineated bicycle treatment or bicycle signal head
D	≤1.5 m bicycle lane with no buffer	≤1.5 m bicycle lane and no buffer Bicycle treatment
E	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area)	Shared facilities (e.g. signed routes, sharrows or paved shoulder with minimum 1.2 m in constrained area) No clearly delineated bicycle treatment
F	No bicycle provision	No bicycle provision

3.6 Road Safety

The study area's 5-year historical collision data from 2017 to 2022, was reviewed and the associated collision rate and expected collision rate based on volume were calculated according to AASHTO's Highway Safety Manual (HSM).

Based on this analysis, the following intersections were flagged with elevated collision rates compared to their volumes (also see **Figure 3-29** and **Figure 3-30**):

1. **North Front Street / Bell Boulevard:** High volumes of traffic and elevated collisions involving injuries.
2. **North Front Street / Donald Street:** Unsignalized and on the top of a hill which further effect visibility issues, particularly for westbound through traffic.
3. **North Front Street / College Street:** A building on the south-west corner may be blocking sightlines.

Although their collision rates don't exceed typical levels based on volume, the following intersections were also identified by stakeholders as generally unsafe:

4. **North Front Street / Craig Street:** residents mentioned it is difficult to exit onto North Front Street and feels unsafe due to poor sightlines.
5. **Sidney Street / Bell Boulevard:** High volumes of turning movements and poor pedestrian design make it feel unsafe.

Figure 3-29: Collision Hot Spots

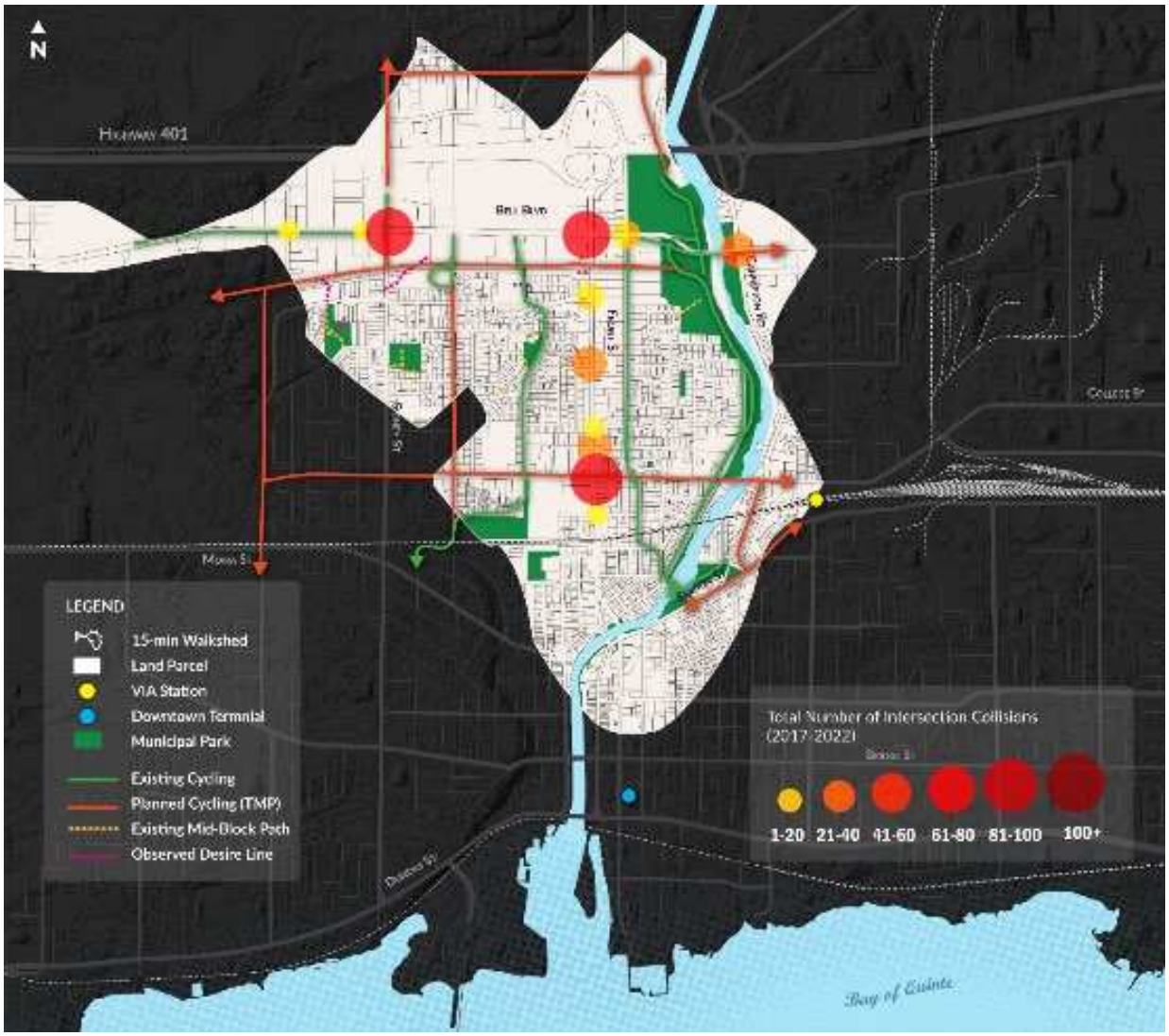

Figure 3-30: Collision History

4 Future Conditions

The Future Conditions analysis was conducted utilizing the corridor land use plan prepared by Fotenn. The transportation study analyzes three different scenarios in different horizon years. Each horizon year has different densities for each development block. In order to provide the City of Belleville with a basis for resilient planning and network preparedness, the site plans for the different phases implies in the developments being built in different stages, which would require individual smaller transportation studies to support their development. The three different modelling horizon years are 2031, 2041 and the ultimate scenario which assumes corridor growth reaches its effective limit and could extend in the future and is identified in this study as the 2041+ scenario.

The traffic analysis for the future conditions have been modelled using PTV Vistro software which utilizes similar HCM methodology as Synchro. The key reason for the shift in modelling is to incorporate the consideration of "internal network trips" that are expected to occur between the different land uses and zones of development rather than assuming that all trips for the new development lands would be originated/destinated outside the existing Belleville transportation network. This methodology better captures the mixed-use nature of the corridor development lands which may result in shorter trips for discretionary / commercial trips which would therefore reduce travel distances and subsequently reducing the impact to major pinch points such as Bell Boulevard and North Front Street. For the purposes of this study, only the major signalized intersections have been analyzed under the future conditions. Unsignalized full-move intersections are generally expected to experience high levels of delay along major arterial roads as through volumes increase.

4.1 FUTURE ROAD NETWORK

Hamilton Road is planned to be extended east of its existing termination at Wallbridge Loyalist Road and would continue east and eventually bend north towards Bell Boulevard at what is identified as Hamilton Road North. As such, the intersection of Hamilton Road and Wallbridge Loyalist Road, which is a current three-leg intersection, was included in the modelling as a future four-leg intersection. This intersection plays a fundamental role to the network and serves as an alternative route to and from the east side of the study area. It is important to mention that for the 2031 scenario, the Hamilton Road extension was used in the models but might not be feasible / necessary due to the low traffic expected in 2031, assuming that Area 4 will only be finalized by 2041 when the additional areas previously assigned to Area 2, would also be developed.

Enterprise Drive which is north of Bell Boulevard, is to be extended east to Hanna Court. There are five north-south connections to Bell Boulevard that are proposed in the future road network, including the existing Hannafin Road, Jack Ellis Way, and Hanna Court, however any unsignalized connections are subject to change based on future transportation studies. Hamilton Road North and Jenland Way South will be extended to the north to intersect Enterprise Drive.

It is noted that Enterprise Drive has the potential of being developed as a private roadway to service a potential large retail or commercial development, instead of a public roadway under future conditions. However, for the purposes of this, Enterprise Drive is considered to be a public roadway.

Similarly, a road network upgrade is to occur south of Bell Boulevard, west of Jenland Way South with Hamilton Road extending to the east intersecting Jenland Way and making a connection to an east-west collector road providing future connection to Sidney Street and North Front Street. The exact location and street for connectivity is to be determined by the City. For the purposes of this study, this future east-west collector connection has not been analyzed.

Additionally, there are four major north-south connections to Bell Boulevard, which are Hannafin Road, Jack Ellis Way, Hamilton Road North and the existing Jenland Way. Additionally, there are two three-leg intersections to Bell Boulevard from the south. These future roads were proposed service local access only and are known as Roads A and C. These unsignalized intersections at Road A and Road C have not been analyzed as their configuration and traffic control are to be determined based on future traffic and transportation studies for individual applications.

The intersection of Bell Boulevard and Hannafin Road, Jack Ellis Way, Hamilton Road North (future road), and Jenland Way South were assumed to be signalized. The future road network, developed in conjunction with Fotenn and the City, is outlined in the **Figure 4-0** below.

Figure 4.0: Site Plan

In the traffic model, Bell Boulevard west of the Casino Shorelines entrance to Wallbridge Loyalist Road has been widened from 2 lanes to 4 lanes. Additionally, Wallbridge Loyalist Road north of Hamilton Road to Highway 401 Eastbound off-ramp was also widened from 2 lanes to 4 lanes as per the City of Belleville West Belleville Secondary Plan.

The two study corridors were optimized and coordinated using two different signal groups, showcasing a better traffic performance and functionality for the through east-west movements on Bell Boulevard and for the through north-south movements on North Front Street. Thus, the modelling attempts to provide an efficient and harmonic traffic operation where possible in the two corridors, minimizing congestion and delays to the best of the corridors' capacity. The future road network, developed in conjunction with Fotenn and the City, is outlined in **Table 4-1**.

Table 4-1: Existing and Future Intersections

Intersection Name
Wallbridge Loyalist Road & Bell Boulevard
Bell Boulevard & Hannafin Road
Bell Boulevard & Jenland Way South
Bell Boulevard & Hanna Court
Bell Boulevard & Sidney Street
Bell Boulevard & Plaza Entrance West
Bell Boulevard & Plaza Entrance Mid
Bell Boulevard & Plaza Entrance East
Bell Boulevard & North Front Street
Bell Boulevard & North Park Street
North Front Street & Tracey Street/Plaza Entrance
North Front Street & Valleyview Cres/Radisson Country Inn
North Front Street & College Street
Wallbridge Loyalist Road & Hamilton Road
Jack Ellis Way & Bell Boulevard
Bell Boulevard and Shorelines Casino
Hamilton Road North and Bell Boulevard

It is noted that all roads illustrated within the Bell Boulevard and North Front Street land use plan are assumed to be public roadways under future conditions.

4.2 Future Site's Location

A complete Corridor Plan was provided by Fotenn and was used as a reference for this traffic study. The Bell Boulevard and North Front Street Corridor Plan is attached in **Appendix A** (Study Area) and **Appendix F** (Site Locations), respectively. As per the Corridor Plan, Area 1 will be located north of Bell Boulevard and west of Davy Road. Similarly, Area 2 will also be located west of Davy Road, north and south of Bell Boulevard. Area 4 will be located south of site 2. Area 3 will consist of sites surrounding the intersection of Bell Boulevard and Sidney Street. Areas 5 and 6 will be located north and south of Bell Boulevard respectively, just west of the North Front Street intersection. Area 7 will be located north and south of North Front Street between Bell Boulevard to College Street.

4.3 Study Horizon Year

The following study horizon years have been selected: phase one (2031), and phase two (2041) and phase three (2041+).

4.4 Background Corridor Growth

According to the Population, Housing, and Employment Growth Forecast Report from the City of Belleville, a 1% annual growth rate was applied to this study only to the east of Sidney Street and North Front Street. No growth volume was applied to the west side of Sidney Street due to the generated background traffic volume from the City of Belleville West Belleville Secondary Plan. These growth rate assumptions have been confirmed with the City.

4.5 Background Developments

The West Belleville Secondary Plan traffic volumes were considered in this transportation study based on traffic input provided by Dillon Consulting (the traffic consultant preparing the transportation study for the West Belleville Secondary Plan). The West Belleville Secondary Plan area consist of approximately 950 hectares of land located immediately west of the built-up area of Belleville, east of Wallbridge-Loyalist Road, south of Highway 401, and north of the Bay of Quinte, in what was formerly the Township of Sidney and the City of Quinte West.

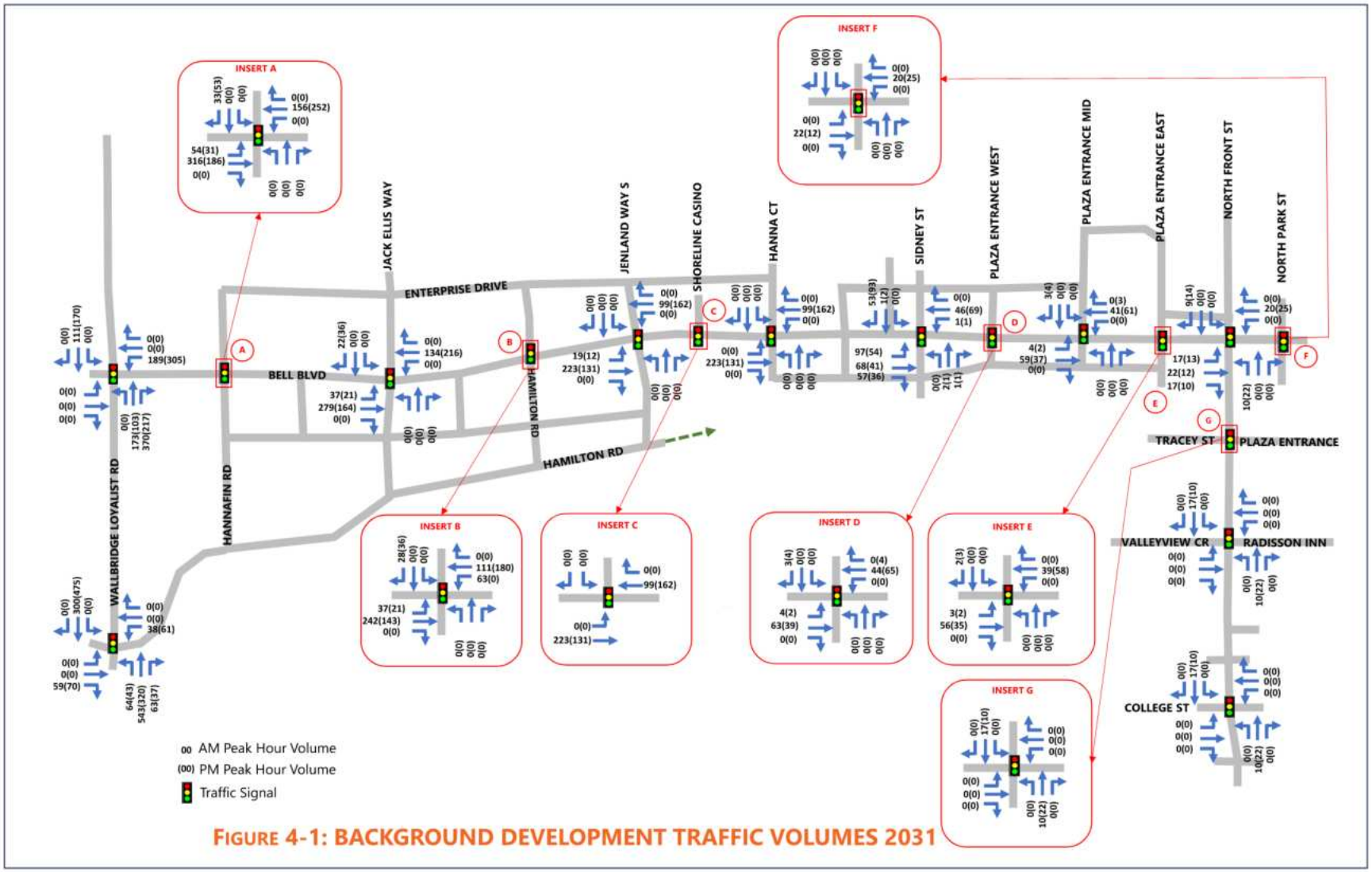

FIGURE 4-1: BACKGROUND DEVELOPMENT TRAFFIC VOLUMES 2031

Figure 4-1: Background Development Traffic Volumes 2031

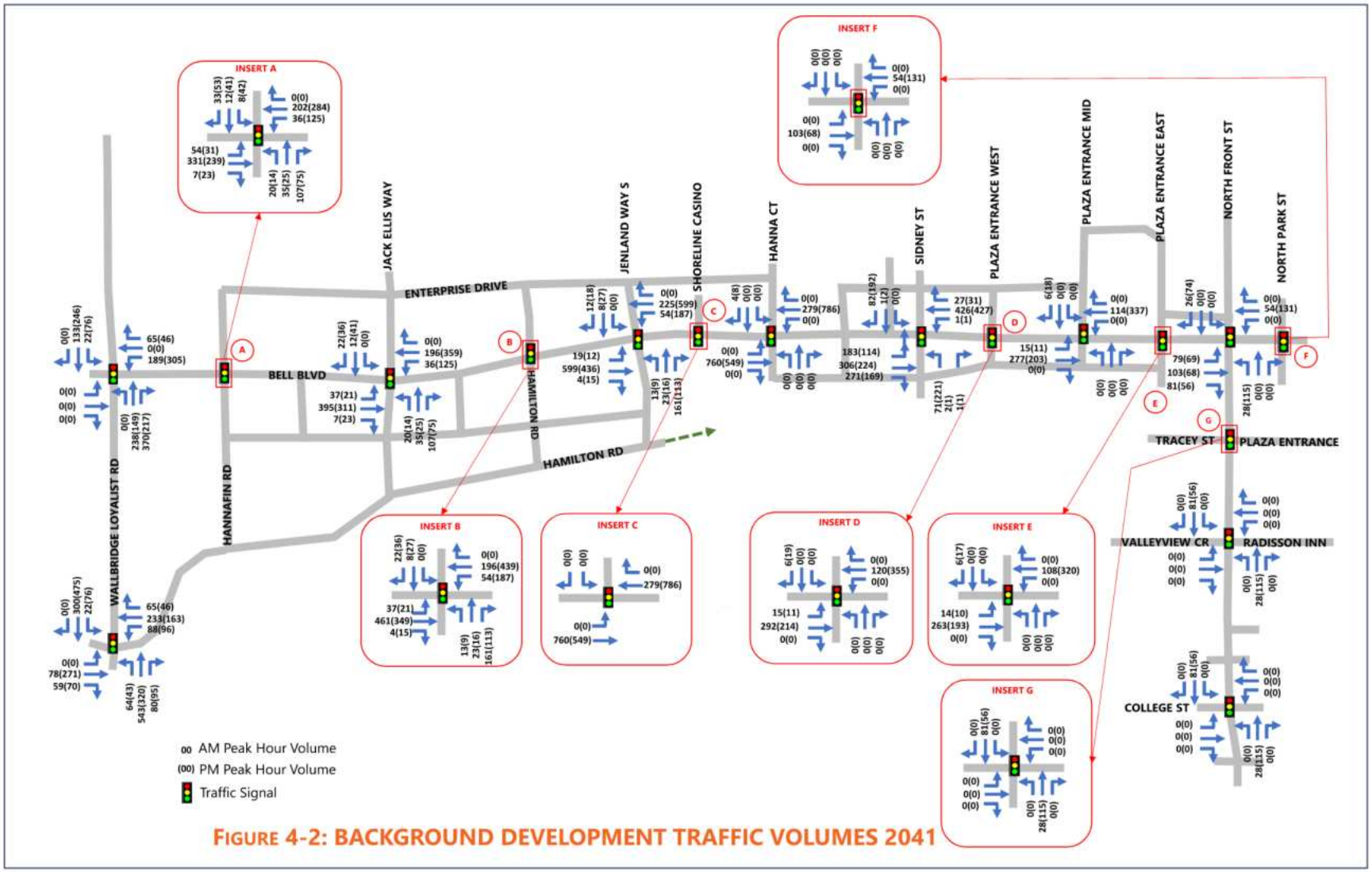

FIGURE 4-2: BACKGROUND DEVELOPMENT TRAFFIC VOLUMES 2041

Figure 4-2: Background Development Traffic Volumes 2041

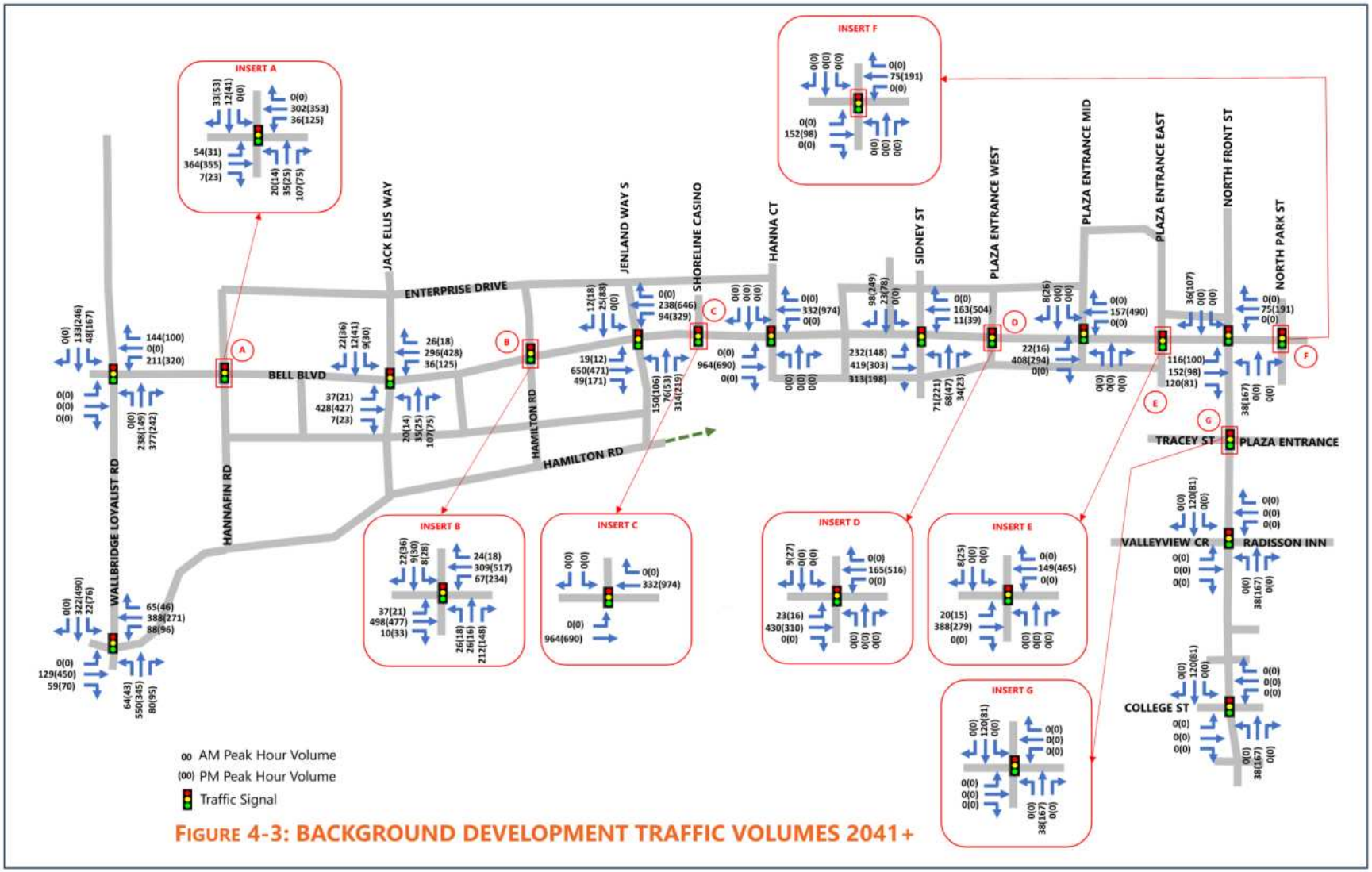

FIGURE 4-3: BACKGROUND DEVELOPMENT TRAFFIC VOLUMES 2041+

Figure 4-3: Background Development Traffic Volumes 2041+

4.6 SITE TRIP GENERATION

A trip generation exercise was conducted as part of the traffic analysis to determine the number of trips generated by the new proposed developments in the subject lands in the morning and afternoon peak periods based on their phasing in the three study horizon years. ITE Trip Generation 11th edition was utilized to obtain rates for the proposed land use types. To locate trip generators more accurately across the study area, the 7 major land use areas were evenly divided into smaller sub-areas which generate similar number of trips. These sub-areas can fragmentize large trip generation zones and assign the generated trips more evenly amongst multiple road intersections and driveways across the road network.

A total of seven new development areas have been proposed along the Bell Boulevard and North Front Street corridors. Additionally, Area 7 was further sub-divided into 7 residential sites based on discussions with Fotenn and the City. For the 2031, 2041, and 2041+ scenarios, the proposed corridor plan land uses and forecasted gross floor area (GFA) and number of units are summarized in **Table 4-2** and have been developed in coordination with Fotenn and the City. An illustration of the development areas is provided in **Appendix F**.

Table 4-2: Site Land Uses (2031 Scenario)

Area No.	Land Use Type	Number of Units / Gross Floor Area		
		2031 Scenario	2041 Scenario	2041+ Scenario
1	Light Industrial	0 sq m	180,485.45 sq m	180,485.45 sq m
2	Commercial	7,628 sq m	34,479 sq m	61,331 sq m
	Large Format	7,628 sq m	34,479 sq m	61,331 sq m
3	Residential Low Rise	0	0	1,569
	Residential Mid Rise	0	1,570	1,570
4	Residential Singles	0	0	581
	Residential Semi Attached	0	0	388
	Residential Townhouses	0	0	968
	Residential Low Rise	0	0	419
	Residential Mid-Rise	0	0	871
5	Commercial	11,576 sq m	11,576 sq m	11,576 sq m
	Large Format	11,576 sq m	11,576 sq m	11,576 sq m
6	Residential Low Rise	359	359	359
	Mid Rise Multifamily	0	0	360
7.1	High-rise	0	0	196
7.2	High-rise	821	821	821
7.3	Mid-rise multifamily	0	0	172
7.4	Mid-rise multifamily	349	349	349
7.5	Low-rise multifamily	0	0	50
7.6	Low-rise multifamily	0	0	205
7.7	Mid-rise multifamily	0	0	172

4.6.1 Future Modal Split Assumptions

Based on 2021 Census Data for the City of Belleville, a 9.8% non-auto mode split was found to currently exist for the City. A future mode split has been developed in conjunction with the City to assess a future shift in non-auto (transit / active transportation) travel modes. A 75% auto mode split (25% non-auto) was applied to the trip generation, with the remainder utilizing transit, cycling, and walking. The 25% non-auto mode split is based on reviews of other municipalities with similar characteristics to Belleville both in terms of existing mode split as well as transportation network operations (such as a lack of GO Rail Transit but having Bus Transit). **Table 4-3** below identifies the list of similar municipalities, as well as their projected mode splits.

Table 4-3: Comparable Municipality Mode Splits

Municipality	Year	Car	Public Transit	Walk	Cycle	Other
City of Kingston	Current (2021)[1]	90%	2%	5%	1%	2%
	Future (2034)[2]	65%	15%	20%		
City of Peterborough	Current (2021)[3]	88%	3%	6%	1%	2%
	Future (2051)[4]	65%	10%	25%		
Town of Tiny	Current (2021)[5]	95%	1%	2%	0.23%	2%
	Future (2032)[6]	80%	4%	7%		1%
Town of Midland	Current (2021)[7]	89%	1%	7%	1%	2%
	Future (2041)[8]	75%	6%	7%	4%	8%

[1] https://ehq-production-canada.s3.ca-central-1.amazonaws.com/992cb66993f739b6df6db221226fdad54823cf44/original/1685369089/e172f33fae4687f961af94d6c36cd435_Projects_NorthKingsTown__StrategiCorridorNeedsAnalysis.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA4KKNQAKIOR7VAOP4%2F20240607%2Fca-central-1%2Fs3%2Faws4_request&X-Amz-Date=20240607T201459Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=d5b737a57985b7aa7832a7b02b64e28d449f080a0138e6417183740169a6059d

[2] https://ehq-production-canada.s3.ca-central-1.amazonaws.com/992cb66993f739b6df6db221226fdad54823cf44/original/1685369089/e172f33fae4687f961af94d6c36cd435_Projects_NorthKingsTown__StrategiCorridorNeedsAnalysis.pdf?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIA4KKNQAKIOR7VAOP4%2F20240607%2Fca-central-1%2Fs3%2Faws4_request&X-Amz-Date=20240607T201459Z&X-Amz-Expires=300&X-Amz-SignedHeaders=host&X-Amz-Signature=d5b737a57985b7aa7832a7b02b64e28d449f080a0138e6417183740169a6059d

[3] Profile table, Census Profile, 2021 Census of Population - Peterborough--Kawartha [Federal electoral district (2013 Representation Order)], Ontario (statcan.gc.ca)

[4] 4d0998f0487877b18b89e52cf1ab0f6b_PTBO_Final_TMP_Summary.pdf (ehq-production-canada.s3.ca-central-1.amazonaws.com)

[5] Profile table, Census Profile, 2021 Census of Population - Tiny, Township (TP) [Census subdivision], Ontario (statcan.gc.ca)

[6] 2021-11-24-Tiny-draft-TMP.pdf (tinycottager.org)

[7] Profile table, Census Profile, 2021 Census of Population - Midland [Census agglomeration], Ontario (statcan.gc.ca)

[8] Transportation-Master-Plan-Nov.-2019.pdf (midland.ca)

As shown in the table above, many similar municipalities are targeting reductions in auto vehicle travel as general trends move towards encouraging non-auto modes of transportation. Therefore, based on discussions with the City, a non-auto mode split of 25% has been assumed for future development. Note that the analysis does not apply a non-auto mode shift for existing trips as a conservative assumption.

4.6.2 Land Use Codes

Based on the development site plan, ITE Land Use Code (LUC) **110** for "General Light Industrial" was used for the light industrial, LUC **820** for "Shopping Center" was used for the commercial/large format, LUC **210** for "Single-Family Detached Housing", LUC **215** for "Semi-attached", LUC **220** for "Multifamily Housing (Low-Rise)", LUC **221** for "Multifamily Housing (Mid-Rise)", LUC **222** for "Multifamily Housing (High-Rise)", was used for the residential.

4.6.3 Trip Generation Methodology

Some ITE land uses only generate vehicle trips. In order to apply a consistent methodology across the calculations, a number of person trips would have to be generated for all sites. The ITE Trip Generation Manual (3rd edition) on section 5.5.2, specifies a 1.05-person trip conversion rate. Application of this rate then represents 95% auto trips to those sites.

In addition, as per the ITE Trip Generation Handbook 11th Edition, 19% of the total trips for commercial land use sites between 300,000 and 900,000 square feet were assigned as "pass-by" trips. As per the ITE, the pass-by trips were only applied to the afternoon peak period. No pass-by rate was applied to the morning peak hour since pass-by trips for retail / commercial developments are not typically observed during a morning commute. Pass-by trips are a subset of generated trips which describes vehicles that stop at a subject location prior to proceeding toward the ultimate point of destination. A reduction of 19% was applied to the trip generation to account for the pass-by trips. Lastly, no multi-use reduction rate (internal capture) was applied in this project as connectivity between specific areas has not yet been fully determined. This methodology has been developed and confirmed with the City.

4.6.4 Trip Generation Summary

Trip Generation per Site (2031 Scenario)Table 4-4 and **Table 4-5** provide a summary of person, auto and non-auto trips generated per forecasted development site along both study corridors in the three project phases.

Table 4-4: Trip Generation per Site (2031 Scenario)

Site	Person-Trips				Auto-Trips				Non-Auto-Trips			
	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
Area-1												
Area-2	238	146	426	466	178	110	302	332	60	36	124	134
Area-3												
Area-4												
Area-5	270	166	572	628	202	124	404	446	68	42	168	182
Area-6	34	107	116	68	25	80	87	51	9	27	29	17
Area-7.1												
Area-7.2	54	155	154	95	40	116	115	71	14	39	39	24
Area-7.3												
Area-7.4	34	115	87	56	25	86	65	42	9	29	22	14
Area-7.5												
Area-7.6												
Area-7.7												
Total	**630**	**689**	**1355**	**1313**	**470**	**516**	**973**	**942**	**160**	**173**	**382**	**371**

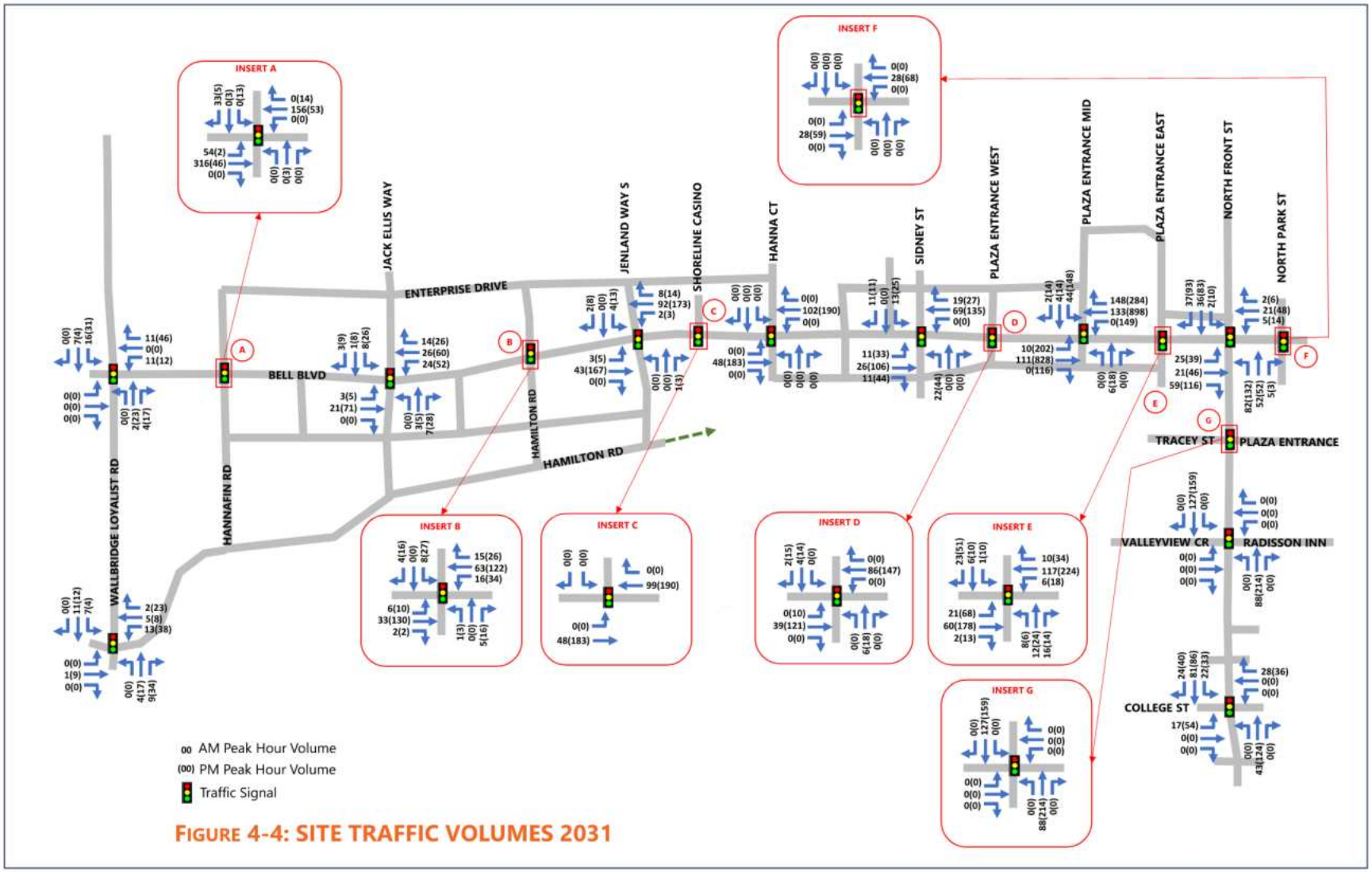

FIGURE 4-4: SITE TRAFFIC VOLUMES 2031

Figure 4-4: Site Traffic Volumes 2031

Table 4-5: Trip Generation per Site (2041 Scenario)

Site	Person-Trips				Auto-Trips				Non-Auto-Trips			
	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
Area-1	1228	167	50	309	921	125	37	232	307	42	13	77
Area-2	462	282	1256	1378	346	212	890	980	116	70	366	398
Area-3	164	551	393	252	123	413	295	189	41	138	98	63
Area-4												
Area-5	270	166	572	628	202	124	404	446	68	42	168	182
Area-6	34	107	116	68	25	80	87	51	9	27	29	17
Area-7.1												
Area-7.2	54	155	154	95	40	116	115	71	14	39	39	24
Area-7.3												
Area-7.4	34	115	87	56	25	86	65	42	9	29	22	14
Area-7.5												
Area-7.6												
Area-7.7												
Total	**2246**	**1543**	**2628**	**2786**	**1682**	**1156**	**1893**	**2011**	**564**	**387**	**735**	**775**

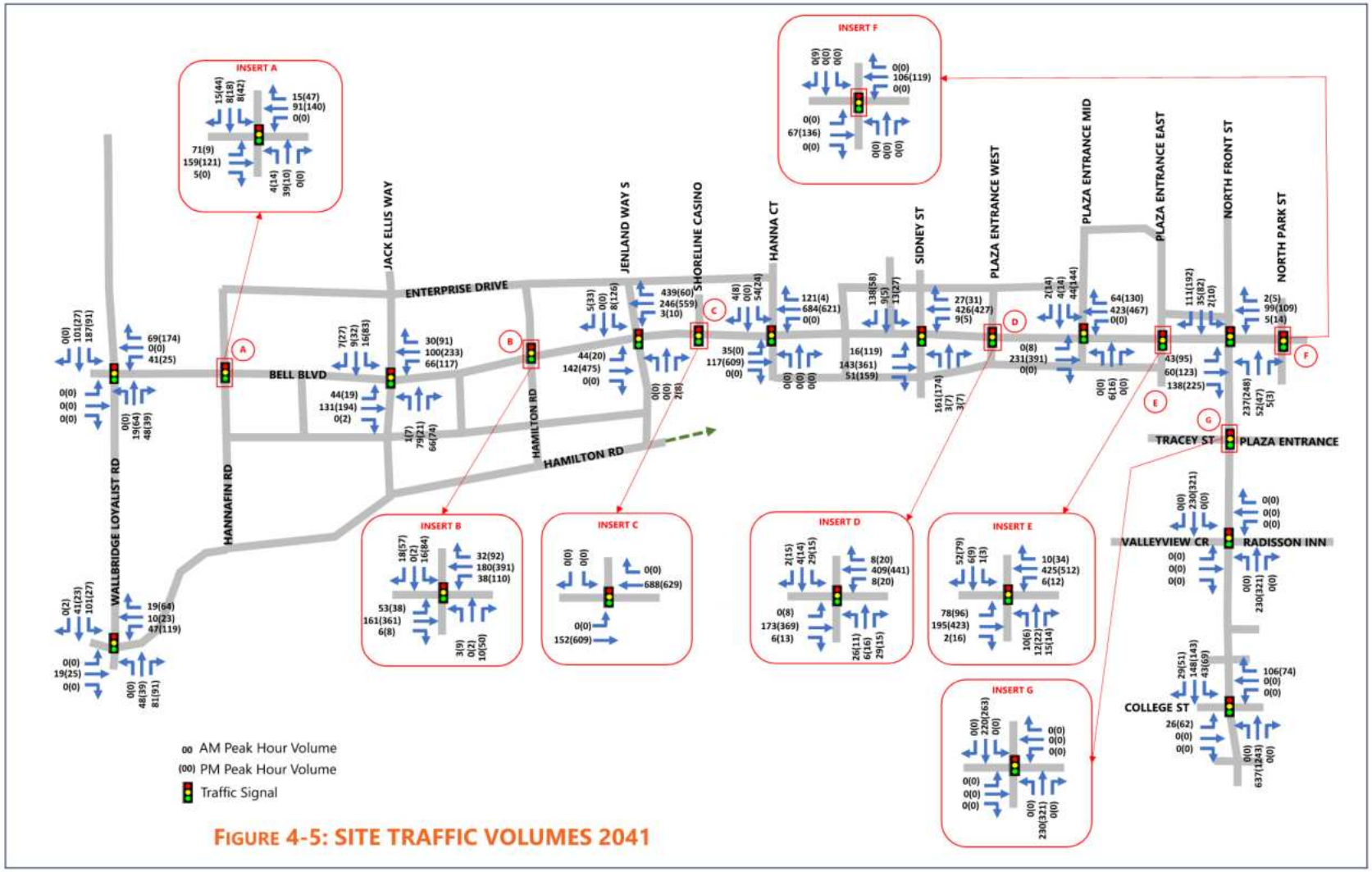

FIGURE 4-5: SITE TRAFFIC VOLUMES 2041

Figure 4-5: Site Traffic Volumes 2041

Table 4-6: Trip Generation per Site (2041+ Scenario)

Site	Person-Trips				Auto-Trips				Non-Auto-Trips			
	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)	AM (IN)	AM (OUT)	PM (IN)	PM (OUT)
Area-1	1228	167	50	309	921	125	37	232	307	42	13	77
Area-2	684	418	1904	2088	512	314	1348	1486	172	104	556	602
Area-3	293	958	854	523	220	718	641	392	73	240	213	131
Area-4	409	1263	1197	768	306	946	896	575	103	317	301	193
Area-5	270	166	572	628	202	124	404	446	68	42	168	182
Area-6	70	226	206	126	52	169	154	94	18	57	52	32
Area-7.1	17	48	48	30	13	36	36	22	4	12	12	8
Area-7.2	54	155	154	95	40	116	115	71	14	39	39	24
Area-7.3	15	52	43	28	11	39	32	21	4	13	11	7
Area-7.4	34	115	87	56	25	86	65	42	9	29	22	14
Area-7.5	10	30	28	16	7	22	21	12	3	8	7	4
Area-7.6	22	69	72	43	16	52	54	32	6	17	18	11
Area-7.7	15	52	43	28	11	39	32	21	4	13	11	7
Total	**3121**	**3719**	**5258**	**4738**	**2336**	**2786**	**3835**	**3446**	**785**	**933**	**1423**	**1292**

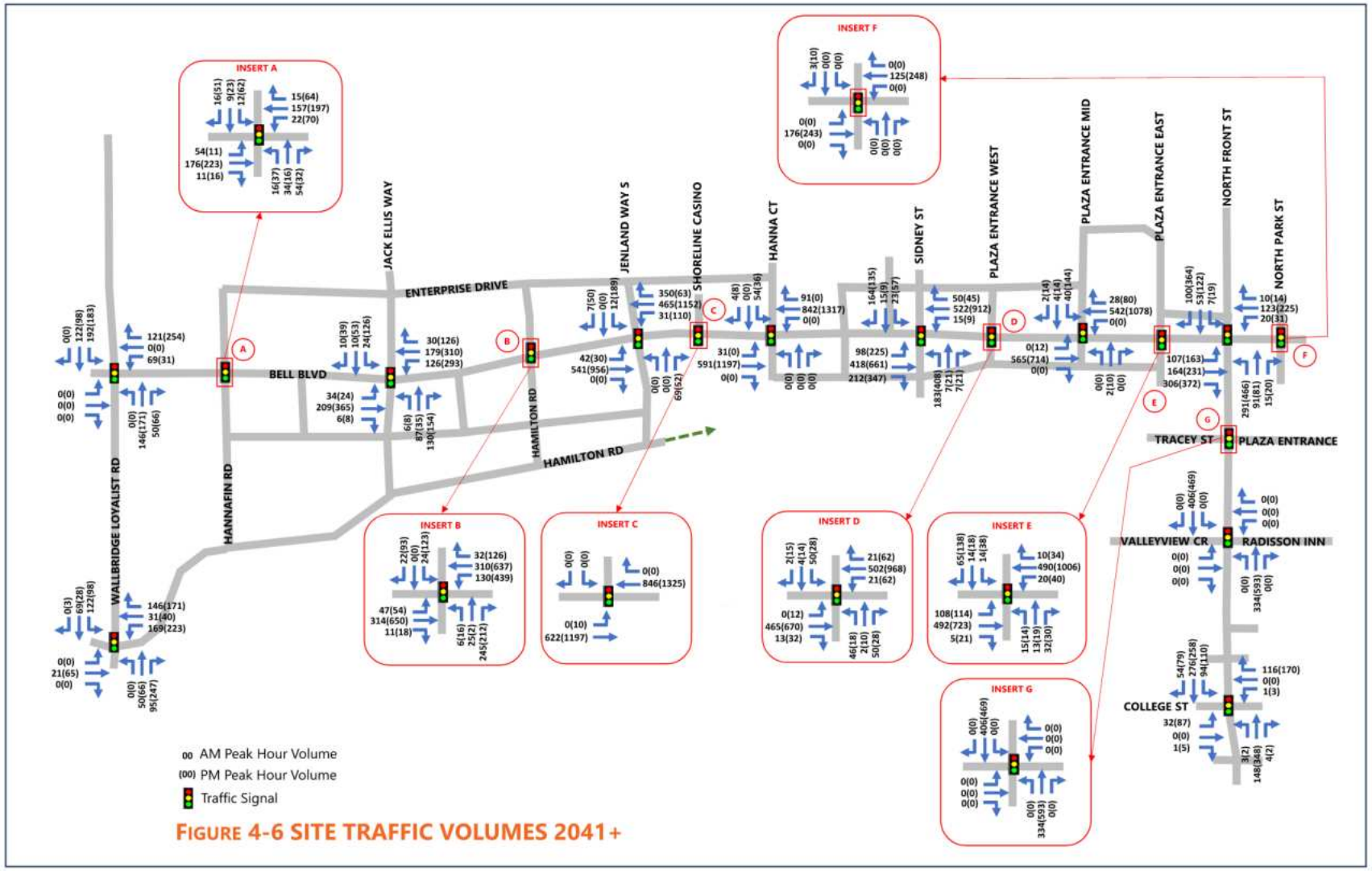

FIGURE 4-6 SITE TRAFFIC VOLUMES 2041+

Figure 4-6: Site Traffic Volumes 2041+

4.7 INTERNAL NETWORK CAPTURE

Internal network capture was considered in this transportation study. Internal network capture in this context describes trips that originate from and are destined within the study area. The following **Table 4-7** shows the internal network capture percentages applied to each trip type generated in the network, to create a realistic distribution of traffic within the corridor. The source of this information can be found in **Sections 3.2.1** and **3.2.2**.

Table 4-7: Internal Network Capture Percentages

15%	Residential to Commercial
14%	Commercial to Commercial
15%	Residential to Industrial
15%	Commercial to Residential
15%	Industrial to Residential

As depicted in the above **Table 4-7**, for the new site trips, the internal network capture distribution assumed trips being generated by residential land uses and destinated to commercial and industrial areas. Additionally, commercial areas will generate trips to other commercial areas and to residential areas as well. Lastly, industrial sites will generate trips to residential areas only.

Firstly, the goal of applying the internal network capture is to optimize the trip distribution across the study area and create a more realistic representation of the travel pattern expected in the study area. Secondly, the internal network capture method was applied to alleviate the unnecessary assignment of trips to and from the outside of the Bell Boulevard and North Front Street study area. It is important to note that the trip generation was not affected by the use of internal network capture in this study.

4.8 SITE TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of future site traffic and the existing road network travel patterns were derived from the 2021 turning movement counts (TMC's) in the study area for the AM and PM peak hours. In addition, a "gateway" was assigned to each main entry/exit point of the study area. Gateways in a Traffic Impact Study (TIS) context refer to entry/exit points of vehicular traffic into a study area. This is an important step of the traffic analysis because these points determine where traffic will mainly pass through when entering or exiting the network.

After the assessment of each gateway, trips were assigned from their respective origin to their respective destinations using PTV Vistro, an industry-standard software for traffic modelling which uses HCM methodology. The software assigns the shortest path for each generated trip between the origin and destination zones. The trip distribution percentages were customized to match the travel patterns for each area illustrated in the site plan and were further refined based on the context of the study area (such as the collector road nature of Hamilton Road North) and engineering judgement. Trips were assigned to the nearest gates that would direct them to their desired destination.

The trip distribution also considered the inclusion of the internal capture in the study. The internal capture trips were incorporated into the trip distribution percentages to better represent the travel patterns within the network.

A detailed trip distribution report for the future scenarios is attached in the **Appendix I** and **J**.

4.9 FUTURE TRAFFIC OPERATIONS

The future conditions traffic model was developed using PTV Vistro to analyze the future traffic operations along Bell Boulevard and North Front Street. The existing road network was modelled, and supplemented with future intersections as outlined in the site plan as shown in **Appendix A**.

The future conditions traffic modelling includes an AM and PM peak hour scenario. Three different horizon years were analyzed in this transportation study: A short-term (2031), a medium-term (2041) and an ultimate scenario (2041+). Future background and future total scenarios were analyzing totaling 24 scenarios in this transportation study. Existing signal timing plans were considered as baselines and then optimized ("Improved") for the future scenarios. As mentioned previously in this report, the two corridors were coordinated in all scenarios.

Other important parameters such as heavy vehicle percentage and pedestrian volume were applied as per the original turning movement counts. The heavy vehicle percentage was adjusted to reflect the addition of background traffic originated from the West Belleville Secondary Plan and the site traffic. The analysis period was set to one hour to capture the congestion that may not be captured in the 15-min analysis period. Therefore, as per the Highway Capacity Manual (HCM), the PHF were set to be 1.00 at the signalized intersections.

A traffic signal warrant analysis was conducted for two stop-controlled intersections along North Front Street. The intersections of North Front Street at Craig Street and at Donald Street were evaluated and it was shown that neither intersection warranted signalization according to Justification 7 of the Ontario Traffic Manual Book 7. Traffic signal warrant analysis for both intersections is provided in **Appendix K**.

Reader's note:

The following sub-sections present detailed results of all four future conditions traffic scenarios inclusive of Future Background Traffic Analysis and Future Total Traffic Analysis for Bell Boulevard and North Front Street, respectively. Each scenario is further divided into 3 horizon years (2031, 2041, and 2041+), and each horizon year is replicated as both a baseline and "improved" condition. Finally, each of the 24 traffic modelling conditions are modelled and presented for both A.M. and P.M. peak periods. In total, 48 traffic analysis summaries are presented below.

4.9.1 Future Background Scenarios – Bell Boulevard

As previously mentioned, this transportation study considered three future background scenarios. The future background scenarios consist of existing traffic volumes (2021) grown to the short-term horizon year of 2031, to the medium-term horizon years of 2041 and 2041+ (1% per year east of Sidney Street only). It also includes the background traffic volume originated by the West Belleville Secondary Plan. This section showcases the traffic analysis of the Bell Boulevard corridor. Additionally, **Figure 4-7** to **Figure 4-9** show the traffic volumes for the future background scenario. The future background scenarios contain the following infrastructure improvements:

- Buildout Hamilton Road extension with adjacent road network.
- Road widening on Bell Boulevard to 4 lanes of traffic (two in each direction) west of the casino until Wallbridge Loyalist as per the City of Belleville West Belleville Secondary Plan.
- Road widening on Wallbridge Loyalist to 4 lanes of traffic (two in each direction) from Loyalist College to Highway 401 as per the City of Belleville Transportation Master Plan.

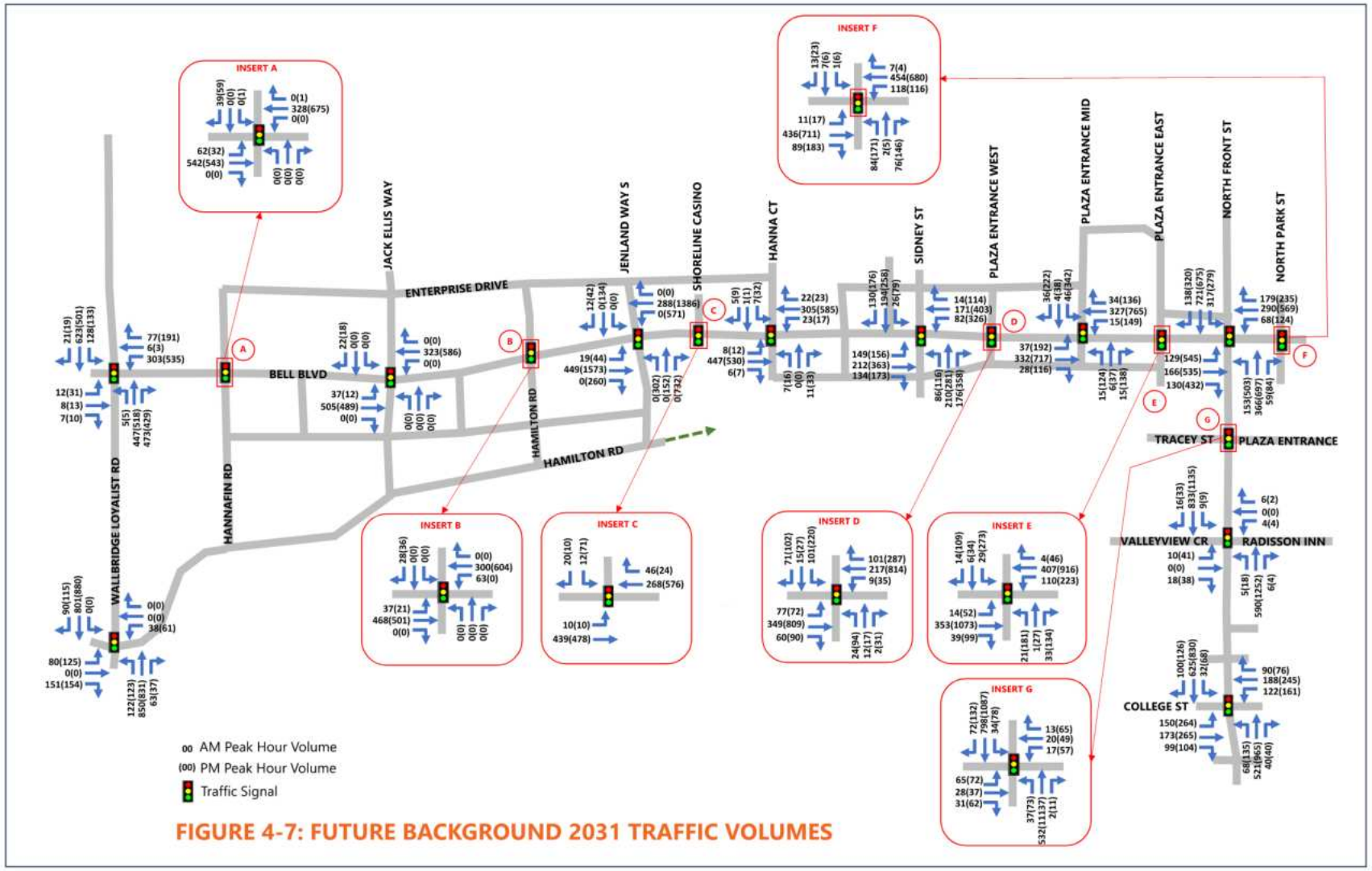

FIGURE 4-7: FUTURE BACKGROUND 2031 TRAFFIC VOLUMES

Figure 4-7: Future Background Traffic Volumes 2031

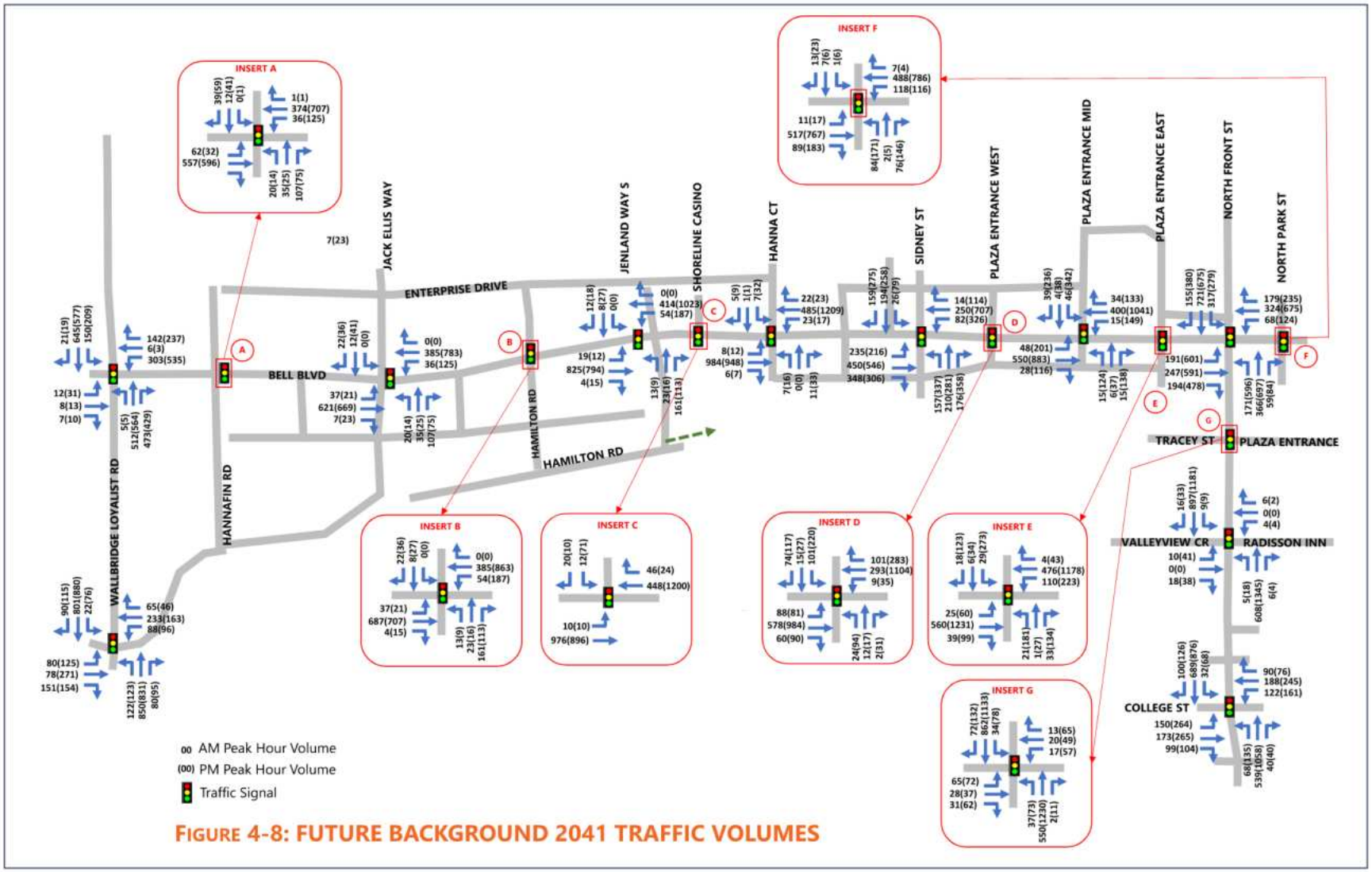

FIGURE 4-8: FUTURE BACKGROUND 2041 TRAFFIC VOLUMES

Figure 4-8: Future Background Traffic Volumes 2041

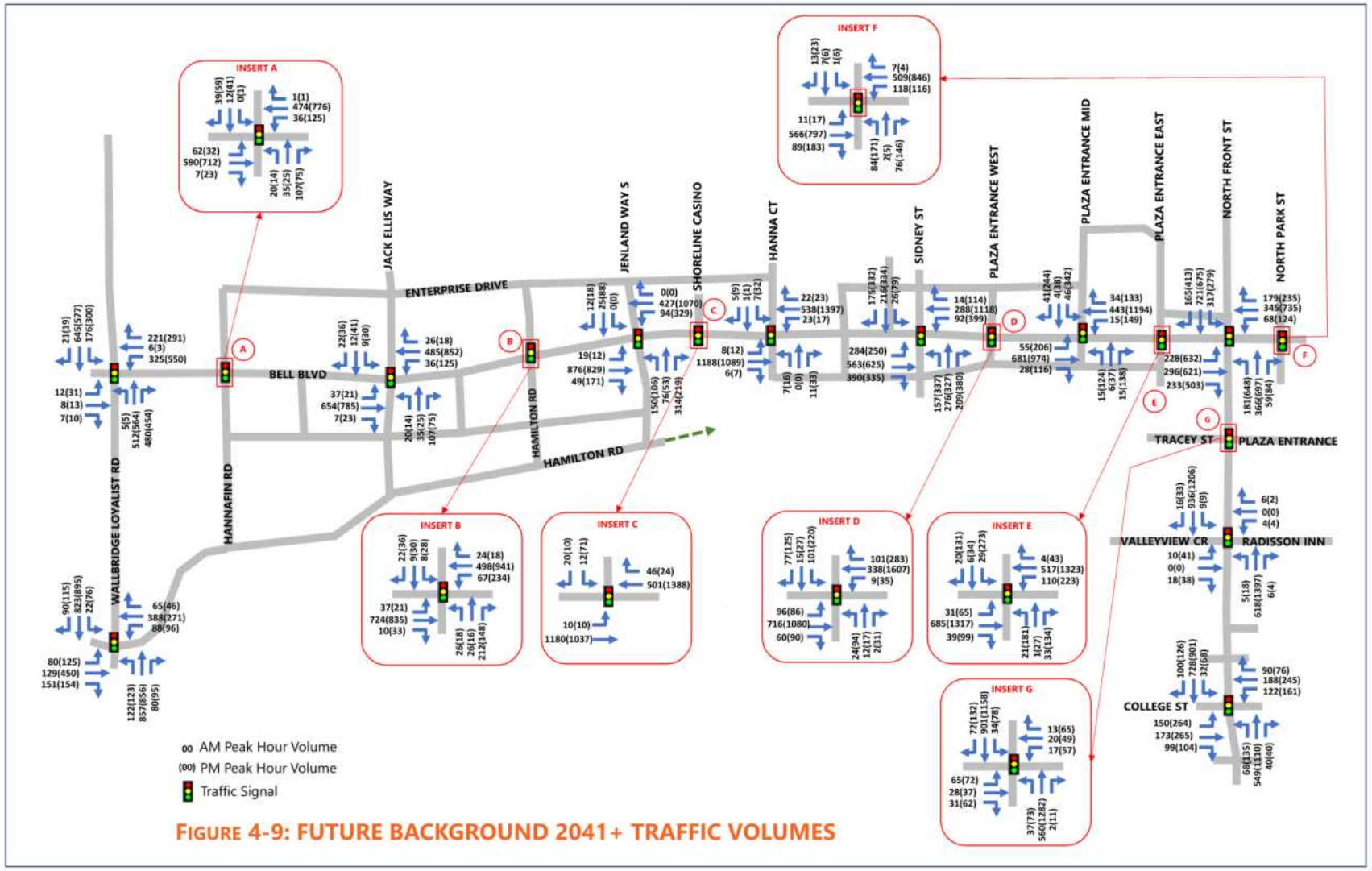

FIGURE 4-9: FUTURE BACKGROUND 2041+ TRAFFIC VOLUMES

Figure 4-9: Future Background Traffic Volumes 2041+

4.9.1.1 Future Background Traffic Analysis (2031)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2031 future background conditions are summarized in **Table 4-10**.

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-10** shows the level of service for the future background scenario for the weekday AM peak period.

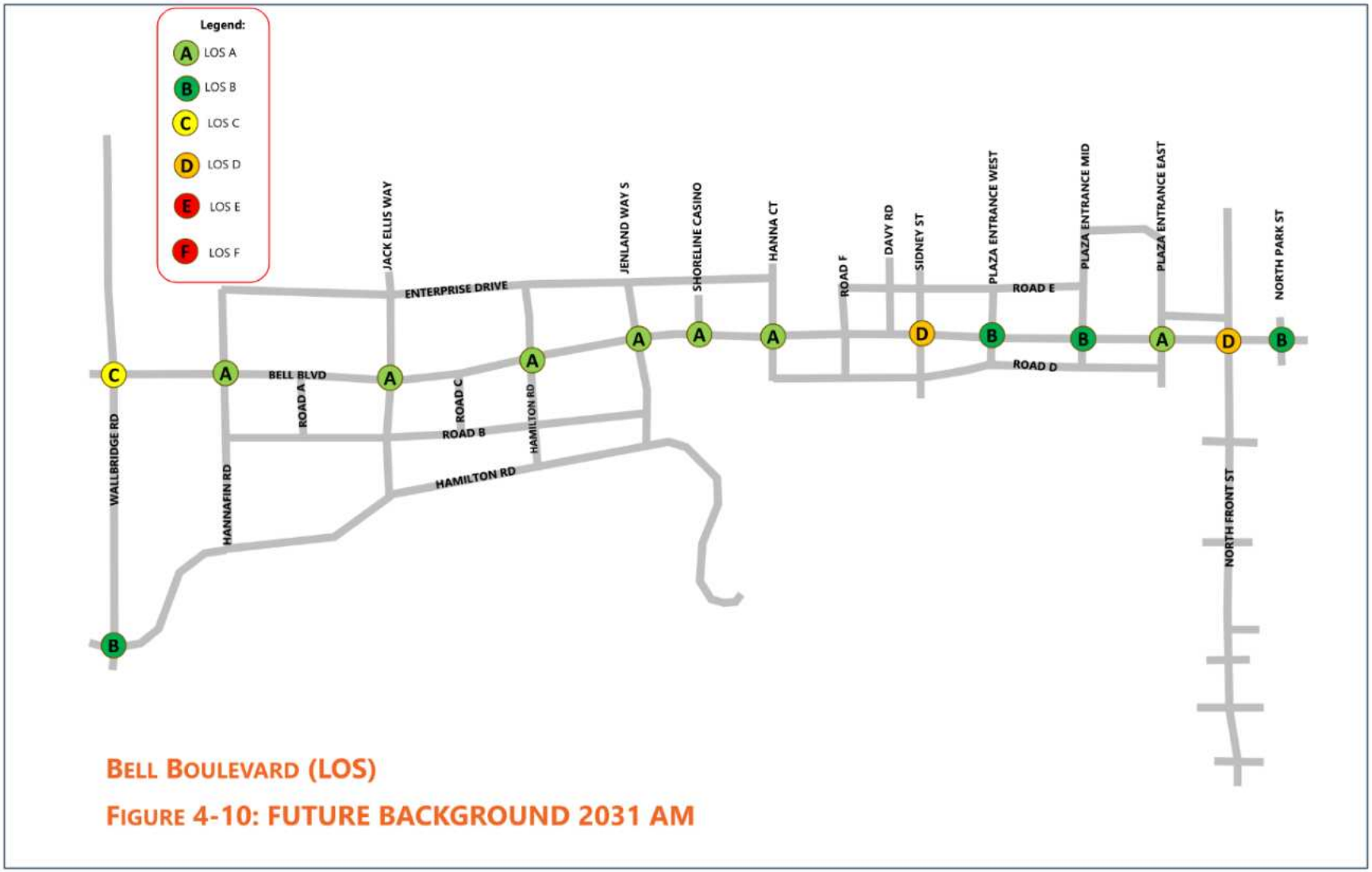

Figure 4-10: Future Background LOS AM 2031

Table 4-8: Future Background Traffic Performance - Scenario 2031 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.398	21.8	C	0.534	22.7	C
	EBL	0.13	38.9	D	0.15	35.5	D
	EBTR	0.17	39.27	D	0.11	35.27	D
	WBL	0.53	35.03	D	0.53	27.58	C
	WBT	0.35	34.09	C	0.01	23.1	C
	WBR	0.35	34.09	C	0.88	42.76	D
	NBL	0.02	21.9	C	0.02	20.24	C
	NBT	0.29	16.06	B	0.33	16.36	B
	NBR	0.66	20.78	C	0.6	19.72	B
	SBL	0.45	26	C	0.49	27.56	C
	SBT	0.39	17.15	B	0.31	16.35	B
	SBR	0.4	17.15	B	0.31	16.35	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.209	8.1	A	0.225	8.2	A
	EBL	0.26	6.96	A	0.21	5.09	A
	EBT	0.26	7.05	A	0.21	5.14	A
	EBR	0.26	7.11	A		5.18	A
	WBL	0.13	6.17	A	0.23	5.3	A
	WBT	0.13	6.18	A		5.33	A
	WBR	0.13	6.2	A	0.24	5.35	A
	NBL	0	0	A	0	0	A
	NBTR	0.209	8.1	A	0	0	A
	SBL	0.11	39.98	D	0.24	70.6	E
	SBTR	0.11	39.98	D	0.24	70.6	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.171	7.3	A	0.199	6.6	A
	EBL	0.22	6.71	A	0.19	4.51	A
	EBT	0.22	6.76	A	0.19	4.54	A
	EBR	0.22	6.81	A		4.57	A
	WBL	0.12	6.12	A	0.22	4.7	A
	WBT	0.12	6.13	A		4.72	A
	WBR	0.13	6.14	A	0.22	4.74	A
	NBLTR	0	0	A	0	0	A
	SBLTR	0.06	39.27	D	0.15	70.52	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.161	7.3	A	0.19	6.6	A
	EBLT	0.21	6.62	A	0.19	4.48	A
	EBTR	0.21	6.66	A	0.19	4.5	A
	WBLT	0.12	6.06	A	0.21	4.63	A
	WBTR	0.12	6.09	A	0.21	4.67	A

	NBLTR	0	0	A	0	0	A
	SBLTR	0.06	39.27	D	0.15	70.52	E
Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.126	6.8	A	0.166	5.5	A
	EBL	0.02	7.17	A	0.02	5.65	A
	EBT	0.17	6.4	A	0.16	4.36	A
	EBR	0.17	6.4	A	0.16	4.36	A
	WBL	0	0	A	0	0	A
	WBT	0.11	6.01	A	0.19	4.55	A
	WBR	0.11	6.01	A	0.19	4.55	A
	NBL	0	0	A	0	0	A
	NBT	0	0	A	0	0	A
	NBR	0	0	A	0	0	A
	SBL	0	0	A	0	0	A
	SBTR	0.04	38.9	D	0.08	69.12	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.136	7.6	A	0.199	10.8	B
	EBL	0.01	7.25	A	0.02	8.73	A
	EBT	0.18	6.31	A	0.18	6.64	A
	WBL	0.12	6.09	A	0.21	7.03	A
	WBT	0.12	6.12	A	0.21	7.05	A
	SBL	0.03	38.84	D	0.21	63.95	E
	SBR	0.06	39.27	D	0.03	60.62	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.141	7.6	A	0.209	9.4	A
	EBLT	0.18	6.49	A	0.19	4.52	A
	EBTR	0.18	6.52	A	0.19	4.55	A
	WBLT	0.15	6.24	A	0.22	4.69	A
	WBTR	0.15	6.3	A	0.22	4.76	A
	NBLTR	0.05	39.08	D	0.2	71.51	E
	SBLTR	0.04	38.87	D	0.18	71.32	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.263	35.8	D	0.497	57.2	E
	EBL	0.34	38.94	D	0.56	78.21	E
	EBT	0.27	27.71	C	0.4	57.64	E
	EBR	0.28	27.95	C	0.43	60.12	E
	WBL	0.32	55.79	E	0.56	72.84	E
	WBT	0.27	43.21	D	0.54	61.76	E
	WBR	0.27	43.27	D	0.55	62.01	E
	NBL	0.33	56.11	E	0.46	**86.37**	**F**
	NBT	0.35	32.36	C	0.38	40.23	D
	NBR	0.34	32.49	C	0.57	46.28	D
	SBL	0.22	57.12	E	0.57	**96.65**	**F**
	SBT	0.18	30.03	C	0.18	35.17	D
	SBR	0.26	31.81	C	0.27	37.43	D

Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.173	18.4	B	0.387	30.3	C
	EBL	0.15	20.19	C	0.31	44.79	D
	EBT	0.2	16.9	B	0.43	27.22	C
	EBR	0.07	15.76	B	0.11	22.01	C
	WBL	0.02	19.85	B	0.13	38.47	D
	WBT	0.12	16.15	B	0.43	27.31	C
	WBR	0.13	16.32	B	0.34	26.11	C
	NBL	0.06	22.99	C	0.27	42.03	D
	NBTR	0.173	18.4	B	0.27	42.03	D
	SBL	0.2	25.02	C	0.53	45.82	D
	SBTR	0.13	23.19	C	0.2	34.59	C
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.145	17.9	B	0.633	55.4	E
	EBL	0.16	54.26	D	0.39	70.66	E
	EBT	0.17	11.44	B	0.59	43.87	D
	EBR	0.17	11.45	B	0.6	43.98	D
	WBL	0.13	55.18	E	0.72	**96.32**	**F**
	WBT	0.16	11.18	B	0.6	45.34	D
	WBR	0.04	10.31	B	0.24	37.39	D
	NBL	0.05	42.81	D	0.42	47.24	D
	NBT	0.05	39.48	D	0.66	**81.47**	**F**
	NBR	0.07	39.48	D	0.66	**81.47**	**F**
	SBL	0.17	44.05	D	0.83	69.95	E
	SBT	0.17	40.12	D	0.63	63.83	E
	SBR	0.12	40.12	D	0.63	63.83	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.139	9.1	A	0.685	38.1	D
	EBL	0.02	5.88	A	0.16	28.39	C
	EBT	0.15	4.72	A	0.51	20.94	C
	EBR	0.15	4.73	A	0.51	20.98	C
	WBL	0.15	6.75	A	0.9	**103.61**	**F**
	WBT	0.16	4.66	A	0.41	18.34	B
	WBR	0	4.02	A	0.05	13.7	B
	NBL	0.09	46.61	D	0.52	66.06	E
	NBT	0.13	44.48	D	0.32	48.39	D
	NBR	0.13	44.48	D	0.32	48.39	D
	SBL	0.13	48.35	D	0.86	**101.17**	**F**
	SBTR	0.07	43.56	D	0.27	47.2	D
Bell Boulevard & North Front	*Overall*	0.466	41.6	D	0.733	69	E
	EBL	0.58	65.3	E	0.85	**86.24**	**F**
	EBT	0.18	34.3	C	0.47	50.03	D
	EBR	0.09	36.1	D	0.27	0.41	A
	WBL	0.58	75.03	E	0.52	**80.87**	**F**

Street (Signalized)	WBT	0.5	41.15	D	0.83	77.69	E
	WBR	0.52	41.92	D	0.83	78.92	E
	NBL	0.54	60.24	E	0.81	**82.72**	**F**
	NBT	0.46	41.41	D	0.86	79.29	E
	NBR	0.16	37.55	D	0.23	58.21	E
	SBL	0.73	52.02	D	0.81	**90.24**	**F**
	SBT	0.5	28.34	C	0.77	70.26	E
	SBR	0.11	43.47	D	0.24	74.42	E
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.212	13.8	B	0.371	23.8	C
	EBL	0.02	11.18	B	0.04	20.21	C
	EBT	0.23	9.52	A	0.39	17.6	B
	EBR	0.23	9.56	A	0.39	17.65	B
	WBL	0.22	14.25	B	0.33	30.72	C
	WBT	0.2	9.24	A	0.29	15.9	B
	WBR	0.2	9.24	A	0.29	15.9	B
	NBL	0.23	39.69	D	0.4	55.63	E
	NBTR	0.19	35.66	D	0.3	49.44	D
	SBL	0	38.04	D	0.02	54.67	D
	SBTR	0.08	34.21	C	0.06	44.38	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.341	14.7	B	0.364	14.6	B
	EBL	0.26	27.86	C	0.4	29.47	C
	EBTR	0.54	30.03	C	0.55	30.14	C
	WBL	0.2	32.54	C	0.33	34.47	C
	WBTR	0	0	A		0	A
	NBL	0.41	22.08	C	0.43	22.45	C
	NBT	0.49	11.98	B	0.44	10.71	B
	NBR	0.49	12	B	0.44	10.71	B
	SBL	0	0	A	0	0	A
	SBT	0.48	11.93	B	0.51	11.44	B
	SBR	0.48	11.95	B	0.51	11.46	B

During the AM peak period, all intersections along Bell Boulevard operate at acceptable conditions. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. During the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-11**.

Overall, all movements operate well in the Future Background 2031 scenario with all individual movements operating within capacity. Some movements were identified as a Level of Service of F primarily caused by delay. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

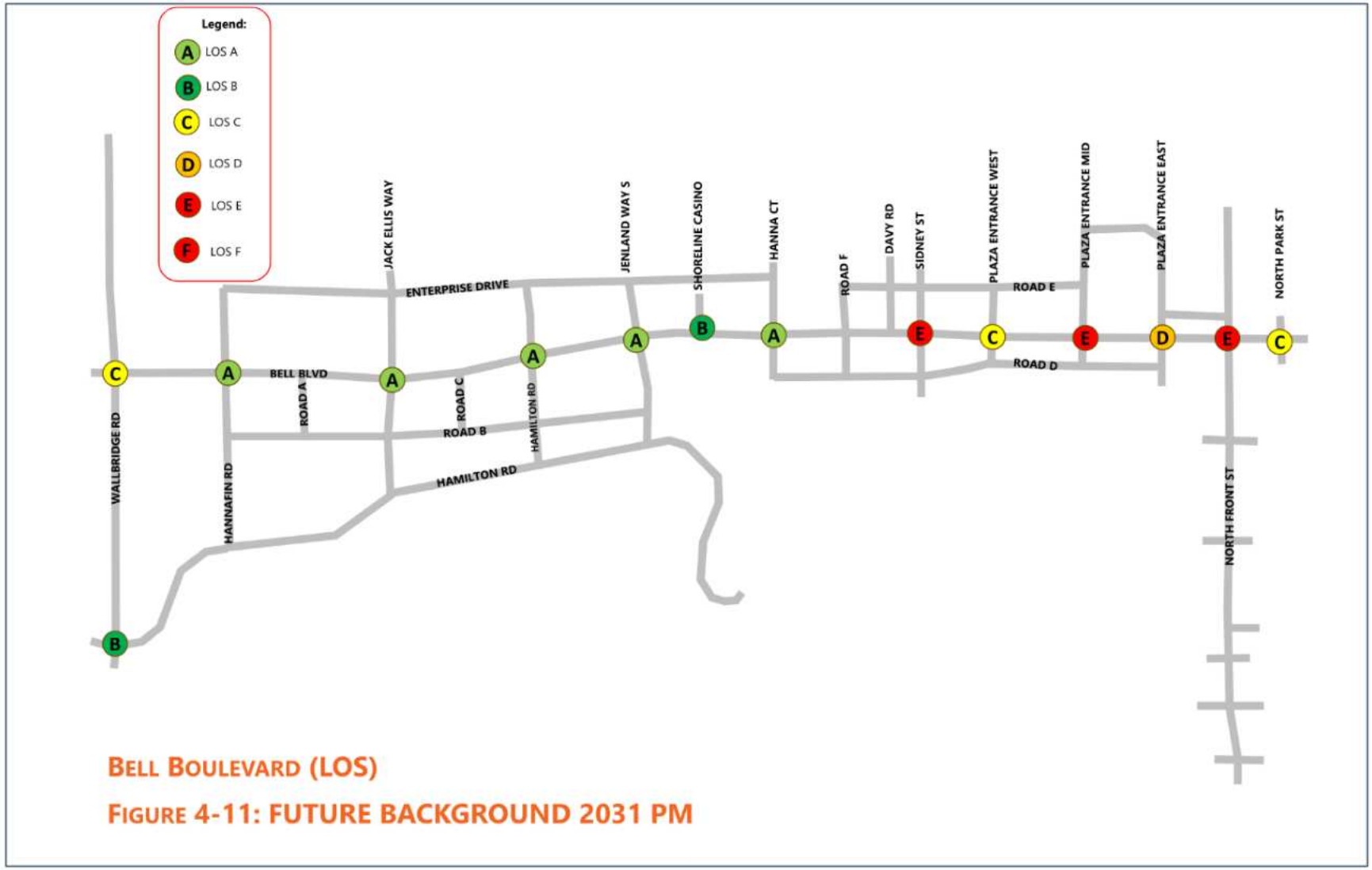

Figure 4-11: Future Background LOS PM 2031

The following list describes the most notable critical movements in the network during the PM peak period for the 2031 future background scenario.

- The NBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 87 seconds.
- The SBL movement on Bell Boulevard & Sidney Street has a LOS F
- with a delay of 97 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 97 seconds.
- The NBT movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 82 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 82 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 104 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 102 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 68 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 81 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 83 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 91 seconds.

4.9.1.2 Future Background Traffic Analysis (2031) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2031 Future Background scenario. **Figure 4-12** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2031 future background conditions are summarized in **Table 4-14.**

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

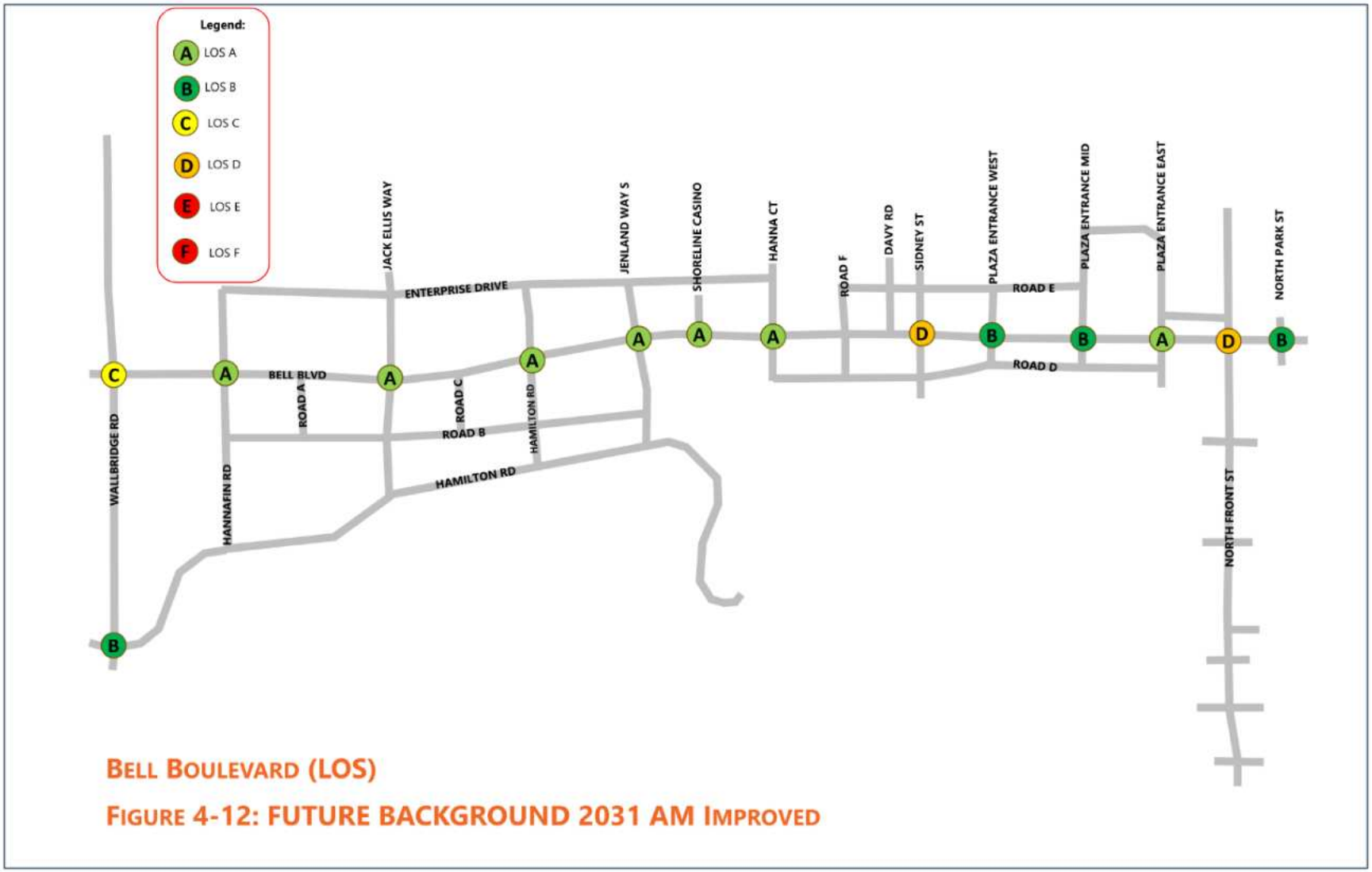

Figure 4-12: Future Background LOS AM 2031 Improved

Table 4-9: Future Background Traffic Performance - Scenario 2031 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.398	27.2	C	0.537	27.5	C
	EBL	0.14	43.47	D	0.15	40	D
	EBTR	0.18	43.88	D	0.12	39.75	D
	WBL	0.59	40.69	D	0.53	30.56	C
	WBTR	0.39	39.54	D	0.89	47.4	D
	NBL	0.02	27.45	C	0.02	26.03	C
	NBT	0.32	20.7	C	0.36	21.21	C
	NBR	0.74	27.07	C	0.66	25.71	C
	SBL	0.51	32.79	C	0.56	35.78	D
	SBT	0.44	22.12	C	0.35	21.2	C
	SBR	0.44	22.12	C	0.35	21.2	C
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.209	8.1	A	0.225	8	A
	EBL	0.26	6.96	A	0.21	4.84	A
	EBTR	0.26	7.05	A	0.21	4.89	A
	WBL	0.13	6.17	A	0.23	5.04	A
	WBTR	0.13	6.2	A	0.24	5.09	A
	NBLTR	0	0	A	0	0	A
	SBLTR	0.11	39.98	D	0.24	71.68	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.171	7.3	A	0.199	6.6	A
	EBL	0.22	6.71	A	0.19	4.51	A
	EBTR	0.22	6.76	A	0.19	4.54	A
	WBL	0.12	6.12	A	0.22	4.7	A
	WBTR	0.13	6.14	A	0.22	4.74	A
	NBLTR	0	0	A	0	0	A
	SBLTR	0.06	39.27	D	0.15	70.52	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.165	7.6	A	0.19	6.6	A
	EBLT	0.21	6.62	A	0.19	4.48	A
	EBTR	0.21	6.66	A	0.19	4.5	A
	WBLT	0.18	6.52	A	0.21	4.63	A
	WBTR	0.16	6.38	A	0.21	4.67	A
	NBLTR	0	0	A	0	0	A
	SBLTR	0.08	39.52	D	0.15	70.52	E
Bell Boulevard & Jenland	*Overall*	0.126	6.8	A	0.166	11	B
	EBL	0.02	7.17	A	0.02	12.68	B
	EBT	0.17	6.4	A	0.19	9.96	A

Way South (Signalized)	EBR	0.17	6.4	A	0.19	9.96	A
	WBLT	0.11	6.01	A	0.22	9.97	A
	WBTR	0.11	6.01	A	0.22	9.97	A
	NBLTR	0	0	A	0	0	A
	SBLTR	0.04	38.9	D	0.08	69.12	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.136	4.4	A	0.199	10.8	B
	EBL	0.01	3.04	A	0.02	8.73	A
	EBT	0.15	2.41	A	0.18	6.64	A
	WBT	0.10	2.33	A	0.21	7.02	A
	WBR	0.11	2.35	A	0.21	7.05	A
	SBL	0.08	51.25	D	0.21	63.95	E
	SBR	0.15	52.17	D	0.03	60.62	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.141	7.6	A	0.209	9.6	A
	EBLT	0.18	6.49	A	0.19	4.76	A
	EBTR	0.18	6.52	A	0.19	4.79	A
	WBLT	0.15	6.24	A	0.22	4.94	A
	WBTR	0.15	6.3	A	0.22	5.01	A
	NBLTR	0.05	39.08	D	0.2	70.48	E
	SBLTR	0.04	38.87	D	0.18	70.29	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.263	35.9	D	0.497	54.6	D
	EBL	0.41	44.39	D	0.44	68.03	E
	EBT	0.29	30.04	C	0.39	41.85	D
	EBR	0.3	30.32	C	0.39	42.06	D
	WBL	0.28	54.13	D	0.43	33.37	C
	WBT	0.23	40.22	D	0.61	68.19	E
	WBR	0.24	40.27	D	0.61	68.55	E
	NBL	0.3	54.38	D	0.22	68.28	E
	NBT	0.34	31.51	C	0.5	54.92	D
	NBR	0.33	31.63	C	0.75	67.68	E
	SBL	0.19	55.22	E	0.27	68.61	E
	SBT	0.17	29.29	C	0.23	46.48	D
	SBR	0.25	30.99	C	0.35	49.9	D
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.173	19.7	B	0.387	32.7	C
	EBL	0.16	22.9	C	0.34	51.64	D
	EBT	0.21	19.23	B	0.46	31.2	C
	EBR	0.08	17.93	B	0.11	25.19	C
	WBL	0.02	22.5	C	0.14	44.03	D
	WBT	0.13	18.37	B	0.46	31.3	C
	WBR	0.13	18.57	B	0.36	29.92	C
	NBLTR	0.06	20.38	C	0.24	37.29	D
	SBL	0.18	22.23	C	0.47	39.79	D

	SBTR	0.12	20.66	C	0.18	30.75	C
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.145	17.9	B	0.634	55.4	E
	EBL	0.16	54.26	D	0.68	**93.01**	**F**
	EBT	0.17	11.44	B	0.69	54.56	D
	EBR	0.17	11.45	B	0.69	54.74	D
	WBL	0.13	55.18	E	0.69	91.99	F
	WBT	0.16	11.18	B	0.58	42.71	D
	WBR	0.04	10.31	B	0.23	35.32	D
	NBL	0.05	42.81	D	0.34	39.21	D
	NBTR	0.07	39.48	D	0.68	**84.05**	**F**
	SBL	0.17	44.05	D	0.69	50.07	D
	SBTR	0.12	40.12	D	0.54	53.08	D
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.139	9.1	A	0.685	38	D
	EBL	0.02	5.88	A	0.16	27.58	C
	EBT	0.15	4.72	A	0.51	20.34	C
	EBR	0.15	4.73	A	0.51	20.38	C
	WBL	0.15	6.75	A	0.88	**96.92**	**F**
	WBT	0.16	4.66	A	0.41	17.82	B
	WBR	0	4.02	A	0.05	13.31	B
	NBL	0.09	46.61	D	0.54	67.44	E
	NBTR	0.13	44.48	D	0.32	49.23	D
	SBL	0.13	48.35	D	0.88	**108.17**	**F**
	SBTR	0.07	43.56	D	0.27	48	D
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.447	41.1	D	0.714	70.3	E
	EBL	0.51	60.94	E	0.76	75.03	E
	EBT	0.18	34.3	C	0.55	58.38	E
	EBR	0.31	37.06	D	0.28	65.28	E
	WBL	0.42	59.59	E	0.46	75.69	E
	WBT	0.29	34.36	C	0.73	71.93	E
	WBR	0.42	38.12	D	0.68	75.87	E
	NBL	0.54	60.24	E	0.72	73.68	E
	NBT	0.46	41.41	D	0.84	76.37	E
	NBR	0.16	37.55	D	0.23	57.32	E
	SBL	0.81	62.37	E	0.71	75.49	E
	SBT	0.54	30.92	C	0.74	67.03	E
	SBR	0.23	26.6	C	0.23	67.37	E
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.212	19.5	B	0.371	24.6	C
	EBL	0.02	20.59	C	0.04	22.02	C
	EBT	0.29	17.86	B	0.41	19.19	B
	EBR	0.29	17.92	B	0.41	19.25	B
	WBL	0.29	26.37	C	0.34	33.51	C

	WBT	0.25	17.32	B	0.3	17.34	B
	WBR	0.25	17.32	B	0.3	17.34	B
	NBL	0.15	26.56	C	0.38	52.81	D
	NBTR	0.12	23.72	C	0.29	46.98	D
	SBL	0	25.83	C	0.02	52.11	D
	SBTR	0.05	22.88	C	0.05	42.27	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.341	18.2	B	0.364	17.4	B
	EBL	0.3	33.42	C	0.46	36.06	D
	EBTR	0.62	37.3	D	0.63	37.57	D
	WBL	0.26	39.39	D	0.44	43.61	D
	WBTR	0	0	A	0	0	A
	NBL	0.45	27	C	0.48	28.05	C
	NBT	0.51	14.9	B	0.44	12.48	B
	NBR	0.51	14.92	B	0.44	12.48	B
	SBL	0	0	A	0	0	A
	SBT	0.5	14.84	B	0.51	13.31	B
	SBR	0.5	14.86	B	0.51	13.33	B

In the improved scenario, during the AM peak period, all intersections along Bell Boulevard are operating at acceptable conditions with LOS D or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

In the improved scenario, during the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-13**. The intersection of Bell Boulevard at North Front Street presents congested traffic flow with LOS E in all movements. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**. While some movements operate with an LOS of F due to delays, all movements are operating within capacity.

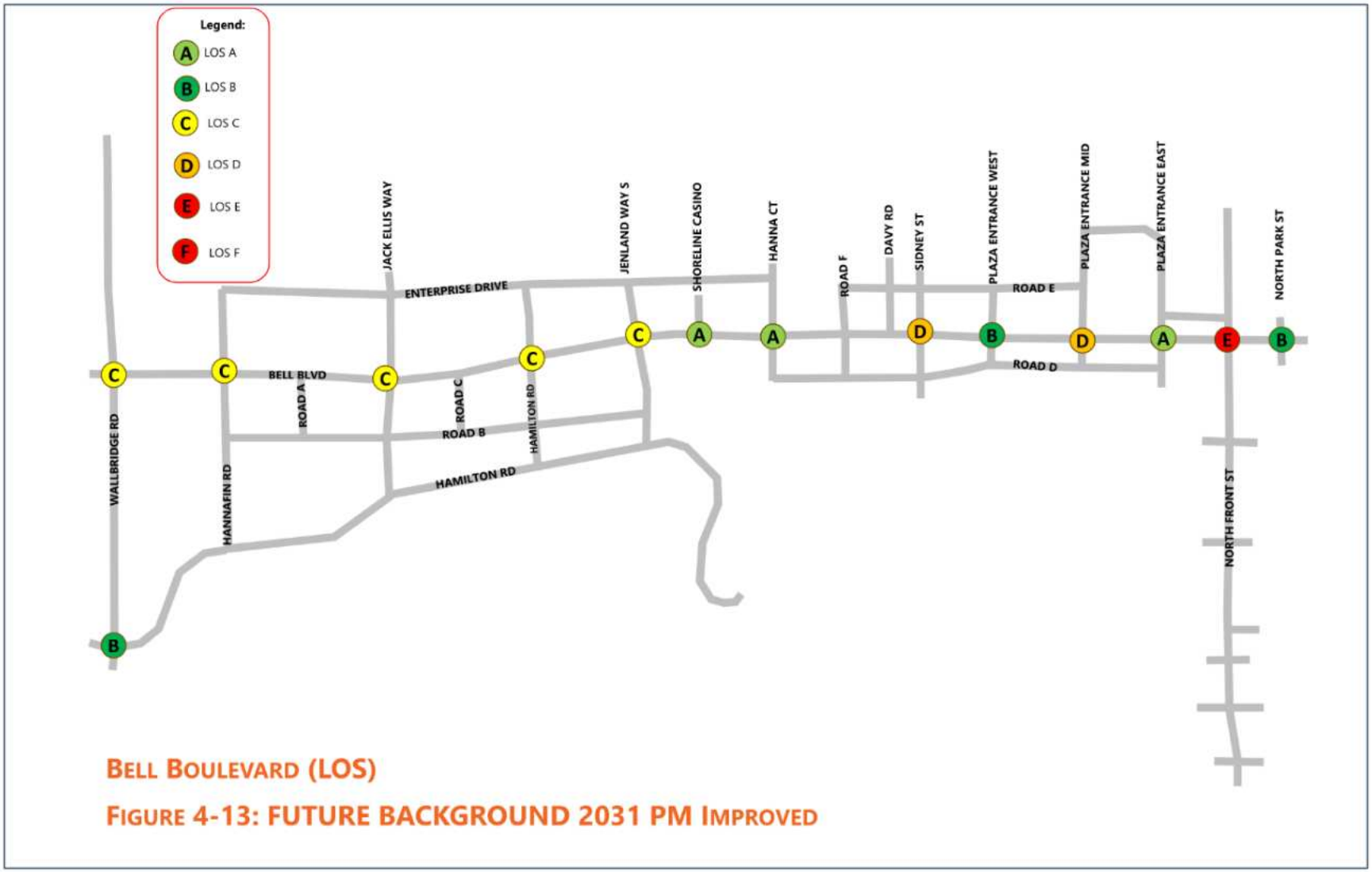

Figure 4-13: Future Background LOS PM 2031 Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2031 future background scenario.

- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 93 seconds.
- The NBTR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 84 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 97 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 108 seconds.

In addition to the corridor signal optimization, geometric improvements are recommended along Bell Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the existing lane configurations to the scenario being analyzed. To summarize the list of geometric improvements made in the 2031 future background improved scenario, **Table 4-10** is presented below:

Table 4-10: Future Background - Scenario 2031 - List of Geometric Improvements (Bell Boulevard Corridor)

Intersection	Improvements	Notes
Wallbridge Loyalist Road & Bell Boulevard	1 NBT lane, 1 SBT lane, and 1 WBL lane	Widening of Bell Boulevard and Wallbridge Loyalist is already anticipated in the TMP
Bell Boulevard & Hannafin Road	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the south leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Jenland Way South	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the north leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hanna Court	-	-
Bell Boulevard & Davy Road	-	-
Bell Boulevard & Sidney Street	-	-
Bell Boulevard & Plaza Entrance West	1 SBL lane	Probably only pavement marking improvements to separate traffic would be sufficient

Bell Boulevard & Plaza Entrance Mid	-	-
Bell Boulevard & Plaza Entrance East	-	-
Bell Boulevard & North Front Street	1 WBR lane	-
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the south leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Shorelines Casino	Widening of Bell Boulevard from 2 to 4 lanes.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hamilton Road North	Construction of Hamilton Road	-

4.9.1.3 Future Background Traffic Analysis (2041)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2031 future background conditions are summarized in **Table 4-11**.

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-14** shows the level of service for the future background scenario for the weekday AM peak period.

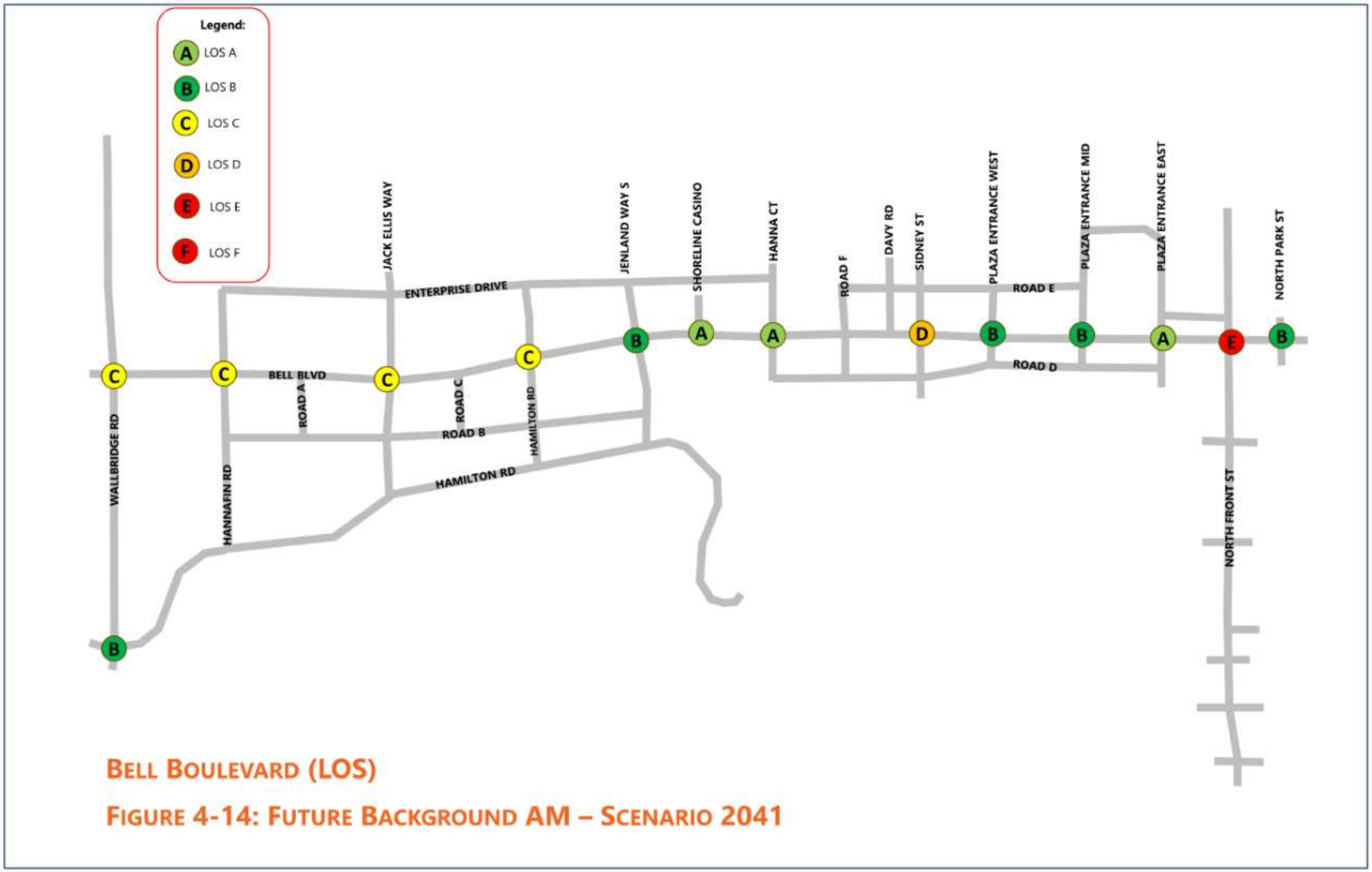

Figure 4-14: Future Background LOS AM 2041

Table 4-11: Future Background Traffic Performance - Scenario 2041 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.402	22.5	C	0.541	21.6	C
	EBL	0.13	38.9	D	0.15	35.52	D
	EBTR	0.17	39.27	D	0.11	35.3	D
	WBL	0.53	35.03	D	0.79	36.73	D
	WBT	0.02	31.4	C	0.02	29.46	C
	WBR	0.55	36.31	D	0.77	38.67	D
	NBL	0.02	22.21	C	0.02	15.91	B
	NBT	0.33	16.43	B	0.3	12.18	B
	NBR	0.66	20.78	C	0.51	14.34	B
	SBL	0.57	29.73	C	0.67	27.46	C
	SBT	0.41	17.29	B	0.3	12.29	B
	SBR	0.41	17.29	B	0.3	12.29	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.294	20.3	C	0.361	18.2	B
	EBL	0.29	14.57	B	0.28	10.46	B
	EBT	0.29	14.43	B	0.28	10.57	B
	EBR	0.29	14.32	B	0.361	18.2	B
	WBL	0.21	13.04	B	0.4	15.86	B
	WBT	0.21	13.06	B	0.4	13.46	B
	WBR	0.2	13.07	B	0.41	12.4	B
	NBL	0.33	52.9	D	0.28	58.41	E
	NBTR	0.33	52.9	D	0.28	58.41	E
	SBL	0.1	48.1	D	0.24	58.41	E
	SBTR	0.1	48.1	D	0.24	57.54	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.29	20.8	C	0.379	14.1	B
	EBL	0.3	16.32	B	0.26	6.23	A
	EBT	0.31	16.46	B	0.26	6.3	A
	EBR	0.31	16.6	B	0.26	6.36	A
	WBL	0.22	15.13	B	0.39	9.27	A
	WBT	0.21	15.17	B	0.4	8.16	A
	WBR	0.21	15.19	B	0.4	7.63	A
	NBLTR	0.3	48.65	D	0.39	71.9	E
	SBLTR	0.06	43.8	D	0.25	68.27	E
Bell Boulevard	*Overall*	0.329	33.3	C	0.473	15.1	B
	EBLT	0.42	31.41	C	0.27	6.32	A

& Hamilton Road North (Signalized)	EBTR	0.43	31.69	C	0.28	6.39	A
	WBLT	0.49	37.65	D	0.49	12.57	B
	WBTR	0.27	31.46	C	0.49	8.86	A
	NBLTR	0.31	41.53	D	0.48	74.91	E
	SBLTR	0.05	36.25	D	0.21	67.35	E
Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.329	19.7	B	0.343	13.7	B
	EBL	0.03	15.08	B	0.03	12.16	B
	EBT	0.35	14.72	B	0.3	7.82	A
	EBR	0	11.06	B	0.01	5.95	A
	WBL	0.14	21.87	C	0.38	16.45	B
	WBT	0.17	12.68	B	0.36	8.79	A
	WBR	0.17	12.68	B	0.36	8.79	A
	NBL	0.03	49.38	D	0.04	64.68	E
	NBT	0.04	46.94	D	0.04	59.95	E
	NBR	0.35	53.47	D	0.37	67.13	E
	SBL	0.329	19.7	B	0	0	A
	SBTR	0.04	46.93	D	0.13	61.58	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.287	6.3	A	0.364	8.20	A
	EBL	0.05	68.46	E	0.03	8.82	A
	EBT	0.09	69.35	E	0.31	5.1	A
	WBL	0.16	4.38	A	0.4	6.11	A
	WBT	0.17	4.41	A	0.41	6.14	A
	SBL	0.01	5.37	A	0.29	73.46	E
	SBR	0.34	5.29	A	0.05	68.45	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.291	6.5	A	0.384	8.9	A
	EBLT	0.34	5.61	A	0.34	5.78	A
	EBTR	0.35	5.65	A	0.34	5.85	A
	WBLT	0.2	4.55	A	0.44	6.73	A
	WBTR	0.2	4.64	A	0.44	6.93	A
	NBLTR	0.08	68.95	E	0.2	70.48	E
	SBLTR	0.05	68.53	E	0.18	70.29	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.379	38.6	D	0.623	57	E
	EBL	0.39	29.33	C	0.42	28.24	C
	EBT	0.42	24.43	C	0.68	55.9	E
	EBR	0.42	24.63	C	0.68	56.58	E
	WBL	0.26	37.6	D	0.69	39.61	D
	WBT	0.13	19.29	B	0.57	50.09	D
	WBR	0.02	18.01	B	0.21	42.56	D
	NBL	0.41	77.76	E	0.7	**82.61**	**F**
	NBT	0.36	49.86	D	0.48	52.97	D
	NBR	0.35	49.98	D	0.72	64.22	E

	SBL	0.32	**93.98**	**F**	0.66	**110.2**	**F**
	SBT	0.23	55.05	E	0.3	57.05	E
	SBR	0.41	60.42	E	0.72	74.36	E
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.238	19.6	B	0.468	25.7	C
	EBL	0.14	15.79	B	0.39	42.54	D
	EBT	0.25	13.45	B	0.45	19.39	B
	EBR	0.06	11.55	B	0.09	14.6	B
	WBL	0.02	16.87	B	0.12	29.65	C
	WBT	0.13	12.16	B	0.5	20.5	C
	WBR	0.1	11.94	B	0.29	17.25	B
	NBL	0.07	54.58	D	0.27	57.44	E
	NBTR	0.03	46.67	D	0.09	42.86	D
	SBL	0.25	53.72	D	0.5	57.88	E
	SBTR	0.19	49.75	D	0.28	46.77	D
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.202	19.8	B	0.609	48.7	D
	EBL	0.2	**81.46**	**F**	0.69	**93.36**	**F**
	EBT	0.22	9.46	A	0.55	37.43	D
	EBR	0.02	7.98	A	0.16	29.8	C
	WBL	0.2	**88.86**	**F**	0.67	**91.92**	**F**
	WBT	0.17	10.32	B	0.59	34.59	C
	WBR	0.03	9.29	A	0.17	26.08	C
	NBL	0.06	67.39	E	0.27	44.42	D
	NBT	0.1	66	E	0.61	78.54	E
	NBR	0.1	66	E	0.61	78.54	E
	SBL	0.22	72.89	E	0.79	67.01	E
	SBT	0.01	64.4	E	0.08	50.48	D
	SBR	0.2	68.37	E	0.57	63.43	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.187	9.5	A	0.76	34.7	C
	EBL	0.04	4.21	A	0.21	25.85	C
	EBT	0.2	3.49	A	0.52	15.57	B
	EBR	0.2	3.5	A	0.52	15.63	B
	WBL	0.16	5.41	A	0.9	**99.99**	**F**
	WBT	0.17	3.22	A	0.48	14.13	B
	WBR	0	2.68	A	0.04	9.34	A
	NBL	0.14	78.91	E	0.75	**95.53**	**F**
	NBT	0	72.09	E	0.06	51.63	D
	NBR	0.19	76.03	E	0.33	57.42	E
	SBL	0.18	77.96	E	0.87	**102.53**	**F**
	SBTR	0.14	74.64	E	0.38	58.48	E
Bell Boulevard	*Overall*	0.466	58.3	E	0.716	**80.1**	**F**
	EBL	0.57	**84.43**	**F**	0.72	68.44	E

& North Front Street (Signalized)	EBT	0.35	63.4	E	0.46	45.24	D
	EBR	0.14	59.4	E	0.29	0.44	A
	WBL	0.21	66.5	E	0.6	**88.08**	**F**
	WBT	0.35	54.37	D	0.79	71.93	E
	WBR	0.45	58.66	E	0.62	68.83	E
	NBL	0.57	**86.41**	**F**	0.73	72.54	E
	NBT	0.55	68.72	E	0.9	**87.66**	**F**
	NBR	0.19	62.03	E	0.25	60.04	E
	SBL	0.57	55.73	E	0.86	**101.33**	**F**
	SBT	0.48	38.72	D	1.03	**177.8**	**F**
	SBR	0.11	59.59	E	0.3	**84.86**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.234	17.3	B	0.386	23.2	C
	EBL	0.02	12.67	B	0.04	20.49	C
	EBT	0.25	10.99	B	0.41	17	B
	EBR	0.25	11.02	B	0.41	17.04	B
	WBL	0.22	16.75	B	0.34	30.74	C
	WBT	0.2	10.48	B	0.33	15.63	B
	WBR	0.2	10.48	B	0.33	15.63	B
	NBL	0.25	60.43	E	0.41	57.6	E
	NBTR	0.2	55.09	E	0.32	51.14	D
	SBL	0	58.36	E	0.02	56.42	E
	SBTR	0.08	53.01	D	0.06	45.83	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.416	15	B	0.506	18.4	B
	EBL	0.34	30.42	C	0.33	28.99	C
	EBTR	0.45	21.14	C	0.67	27.23	C
	WBL	0.3	28.02	C	0.44	40.06	D
	WBTR	0.54	22.29	C	0.32	21.74	C
	NBL	0.39	20.56	C	0.44	26.88	C
	NBT	0.48	11.38	B	0.46	13.45	B
	NBR	0.48	11.4	B	0.46	13.47	B
	SBL	0.07	16.09	B	0.25	21.72	C
	SBT	0.47	11.22	B	0.5	13.9	B
	SBR	0.47	11.24	B	0.5	13.92	B

During the AM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for the intersection of Bell Boulevard and North Front Street that has a LOS E. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

The following list describes the most notable critical movements in the network during the AM peak period for the 2041 future background scenario.

- The SBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 94 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 81 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 92 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 84 seconds.
- The NBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 86 seconds.

During the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions, except for the intersection of Bell Boulevard at North Front Street and at Sidney Street. The LOS for the PM peak period is presented on **Figure 4-15**.

The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

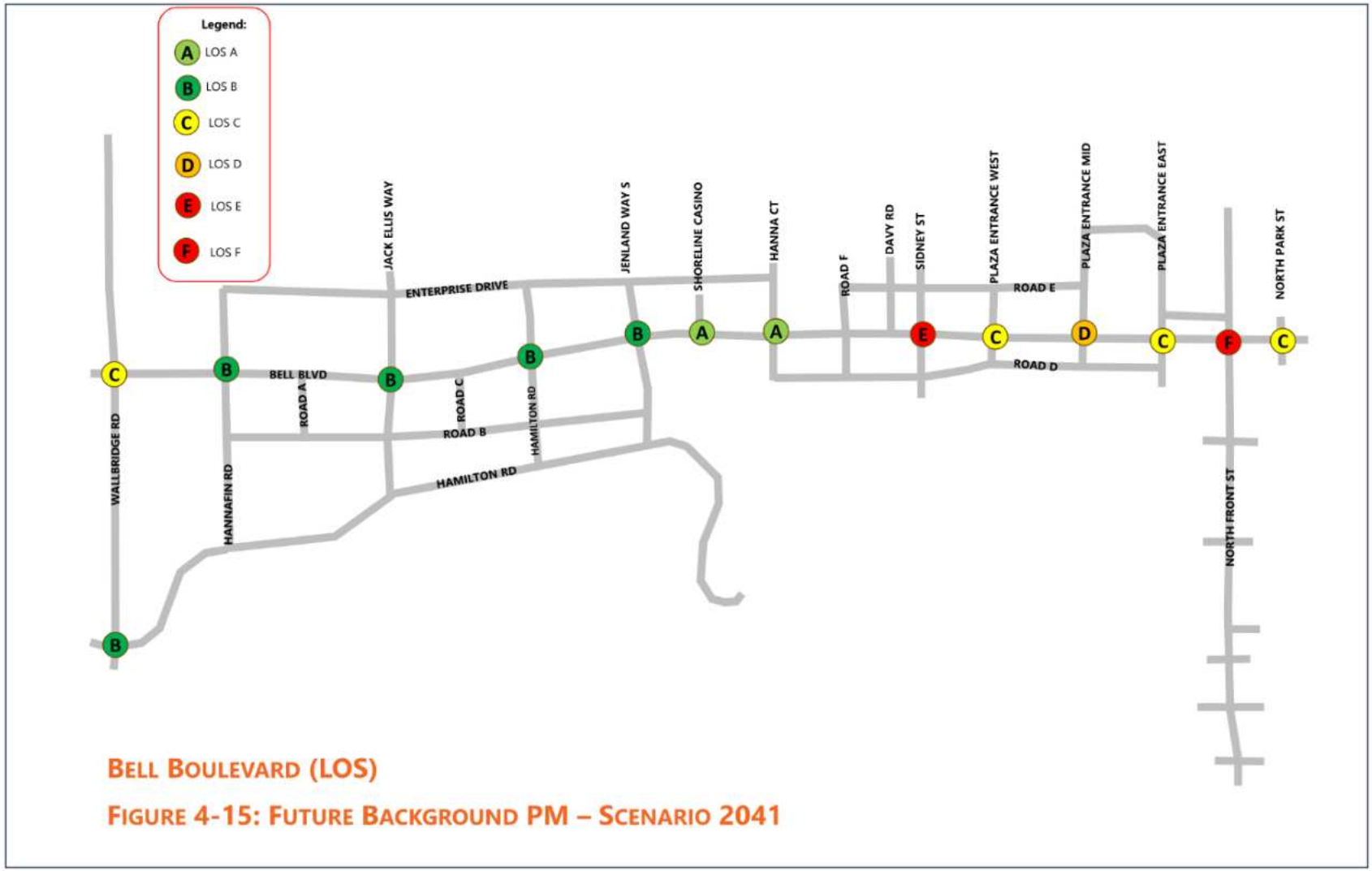

Figure 4-15: Future Background LOS PM 2041

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future background scenario.

- The NBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 82 seconds.
- The SBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 110 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 93 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 92 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 100 seconds.
- The NBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 95 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 102 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 88 seconds.
- The NBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 87 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 101 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 177 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 84 seconds.

4.9.1.4 Future Background Traffic Analysis (2041) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041 Future Background scenario. **Figure 4-16** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041 future background conditions are summarized in **Table 4-12**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

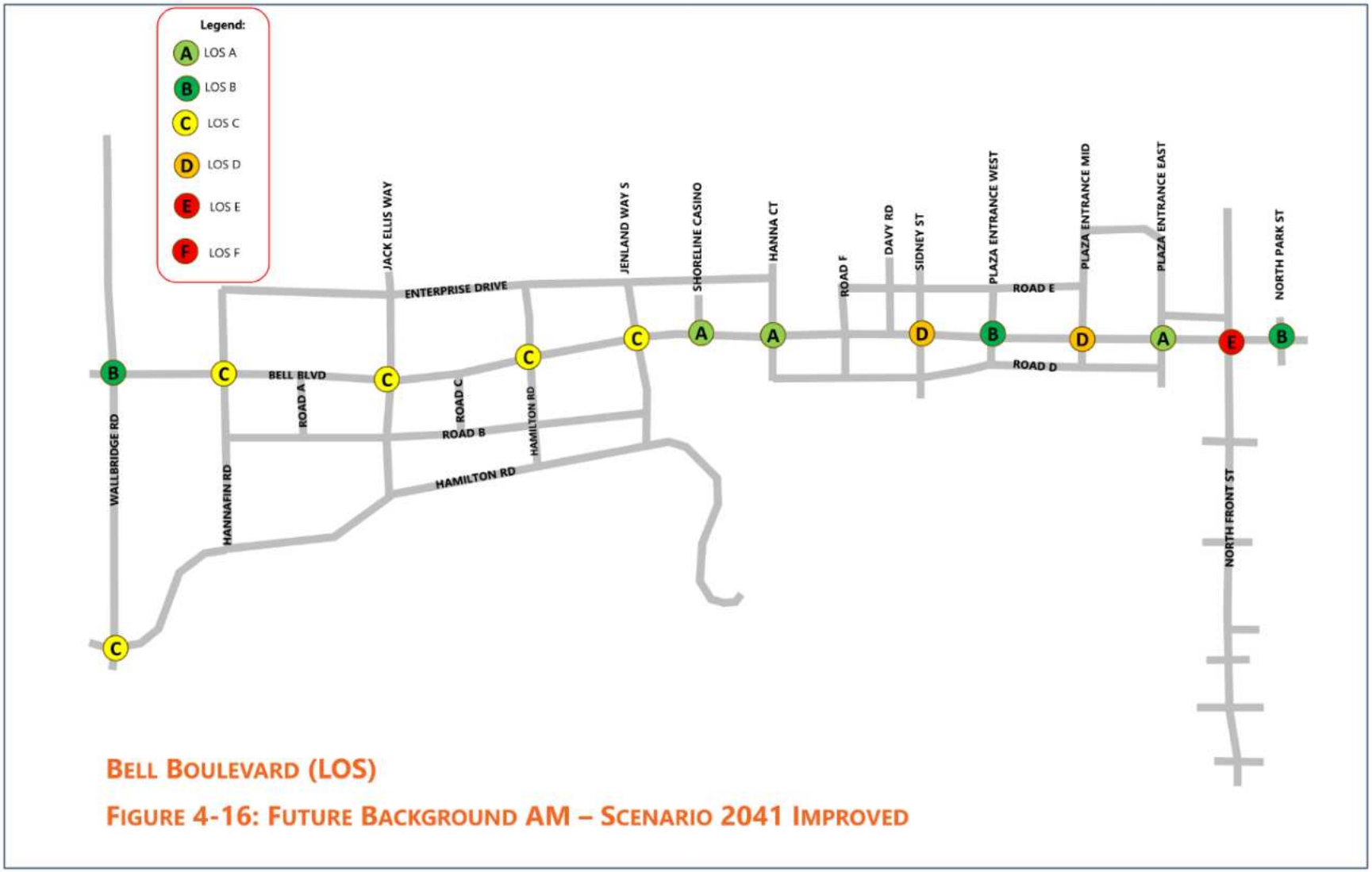

Figure 4-16: Future Background LOS AM 2041 Improved

Table 4-12: Future Background Traffic Performance - Scenario 2041 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.249	23.1	C	0.591	25.5	C
	EBL	0.14	48.18	D	0.16	44.75	D
	EBTR	0.18	48.64	D	0.13	44.47	D
	WBL	0.64	46.25	D	0.77	43.62	D
	WBT	0.03	41.05	D	0.02	35.55	D
	WBR	0.67	48.69	D	0.75	45.29	D
	NBL	0.249	23.1	C	0.31	64.85	E
	NBT	0.01	14.21	B	0.43	26.69	C
	NBR	0.41	26.38	C	0.26	0.08	A
	SBL	0.29	0.1	A	0.71	43.74	D
	SBT	0.4	16.28	B	0.26	10.18	B
	SBR	0.41	21.36	C	0.26	10.18	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.295	21.3	C	0.361	18.2	B
	EBL	0.31	16.63	B	0.28	10.46	B
	EBTR	0.31	16.38	B	0.28	10.57	B
	WBL	0.21	14.75	B	0.4	15.86	B
	WBTR	0.21	14.78	B	0.41	12.4	B
	NBLTR	0.31	49.49	D	0.28	58.41	E
	SBLTR	0.1	45.13	D	0.24	57.54	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.339	27.3	C	0.275	15.7	B
	EBL	0.04	26.43	C	0.04	13.71	B
	EBTR	0.41	26.35	C	0.26	10.03	B
	WBL	0.18	37.56	D	0.24	15.96	B
	WBT	0.21	22.48	C	0.29	10.38	B
	WBR	0.21	22.48	C	0.29	10.38	B
	NBLTR	0.29	37.85	D	0.29	59.33	E
	SBLTR	0.03	32.86	C	0.18	57.09	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.303	27.7	C	0.336	26	C
	EBL	0.07	28.47	C	0.07	30.89	C
	EBTR	0.35	26.74	C	0.34	21.76	C
	WBL	0.16	36.14	D	0.5	40.7	D
	WBTR	0.2	23.86	C	0.4	23.03	C
	NBLTR	0.28	35.74	D	0.22	40.2	D
	SBLTR	0.04	31.29	C	0.1	37.76	D
	Overall	0.339	27.3	C	0.357	25.3	C

Bell Boulevard & Jenland Way South (Signalized)	EBL	0.04	26.43	C	0.04	31.48	C
	EBT	0.41	26.35	C	0.37	20.84	C
	EBR	0.41	26.35	C	0.37	20.84	C
	WBL	0.18	37.56	D	0.53	41.96	D
	WBT	0.21	22.48	C	0.46	22.83	C
	WBR	0.21	22.48	C	0.46	22.83	C
	NBLTR	0.29	37.85	D	0.23	42.39	D
	SBLTR	0.03	32.86	C	0.07	39.23	D
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.287	6.34	A	0.364	8.17	A
	EBL	0.01	5.37	A	0.03	8.82	A
	EBT	0.34	5.29	A	0.31	5.10	A
	WBT	0.16	4.38	A	0.40	6.12	A
	WBTR	0.17	4.41	A	0.41	6.14	A
	SBL	0.05	68.46	E	0.29	73.46	E
	SBR	0.09	69.35	E	0.05	68.45	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.291	6.5	A	0.384	8.9	A
	EBL	0.34	5.61	A	0.34	5.78	A
	EBTR	0.35	5.65	A	0.34	5.85	A
	WBL	0.2	4.55	A	0.44	6.73	A
	WBTR	0.2	4.64	A	0.44	6.93	A
	NBLTR	0.08	68.95	E	0.2	70.48	E
	SBLTR	0.05	68.53	E	0.18	70.29	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.365	44.1	D	0.553	53.3	D
	EBL	0.48	43.35	D	0.74	63.36	E
	EBT	0.28	30.39	C	0.59	61.61	E
	EBR	0.47	35.63	D	0.34	21.88	C
	WBL	0.28	42.88	D	0.82	61.49	E
	WBT	0.16	28.36	C	0.59	51.96	D
	WBR	0.02	26.48	C	0.22	44.05	D
	NBL	0.365	44.1	D	0.35	53.02	D
	NBT	0.22	60.24	E	0.47	52.02	D
	NBR	0.44	59.13	E	0.71	62.65	E
	SBL	0.43	59.37	E	0.23	63.56	E
	SBT	0.07	59.66	E	0.31	58.81	E
	SBR	0.23	55.05	E	0.44	42.78	D
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.238	19.6	B	0.468	25.7	C
	EBL	0.14	15.79	B	0.39	42.54	D
	EBT	0.25	13.45	B	0.45	19.39	B
	EBR	0.06	11.55	B	0.09	14.6	B
	WBL	0.02	16.87	B	0.12	29.65	C
	WBT	0.13	12.16	B	0.5	20.5	C

	WBR	0.1	11.94	B	0.29	17.25	B
	NBL	0.07	54.58	D	0.27	57.44	E
	NBTR	0.03	46.67	D	0.09	42.86	D
	SBL	0.25	53.72	D	0.5	57.88	E
	SBTR	0.19	49.75	D	0.28	46.77	D
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.202	47.2	D	0.546	54.2	D
	EBL	0.05	48.43	D	0.3	63.98	E
	EBT	0.47	48.78	D	0.69	52.69	D
	EBR	0.05	40.89	D	0.2	41.06	D
	WBL	0.03	48.23	D	0.38	62.99	E
	WBT	0.34	45.88	D	0.76	52.19	D
	WBR	0.07	41.17	D	0.21	38.09	D
	NBL	0.03	46.35	D	0.27	44.42	D
	NBT	0.01	44.31	D	0.08	53.52	D
	NBR	0.03	44.7	D	0.36	59.69	E
	SBL	0.11	48.16	D	0.7	60.38	E
	SBT	0.01	44.22	D	0.08	50.48	D
	SBR	0.1	46.01	D	0.57	63.43	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.187	9.6	A	0.642	38.1	D
	EBL	0.04	4.46	A	0.18	20.15	C
	EBT	0.2	3.71	A	0.68	35.91	D
	EBR	0.2	3.71	A	0.69	36.04	D
	WBL	0.16	5.72	A	0.69	40.85	D
	WBT	0.17	3.42	A	0.61	29.96	C
	WBR	0	2.86	A	0.05	19.77	B
	NBL	0.12	75.84	E	0.45	56.15	E
	NBT	0	71.19	E	0.05	42.8	D
	NBR	0.18	74.85	E	0.26	47.08	D
	SBL	0.17	76.81	E	0.69	67.7	E
	SBT	0.03	71.59	E	0.06	42.97	D
	SBR	0.1	73.03	E	0.24	46.66	D
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.466	58.3	E	0.739	67.4	E
	EBL	0.57	**84.43**	**F**	0.81	78.02	E
	EBT	0.35	63.4	E	0.48	47.74	D
	EBR	0.14	59.4	E	0.3	0.47	A
	WBL	0.21	66.5	E	0.74	**107.65**	**F**
	WBT	0.35	54.37	D	0.83	76.34	E
	WBR	0.45	58.66	E	0.65	72.08	E
	NBL	0.57	**86.41**	**F**	0.83	79.96	E
	NBT	0.55	**68.72**	**E**	0.8	71.82	E
	NBR	0.19	62.03	E	0.22	55.56	E

	SBL	0.57	55.73	E	0.81	**90.24**	**F**
	SBT	0.48	38.72	D	0.81	74.19	E
	SBR	0.11	59.59	E	0.29	79.87	E
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.234	17.3	B	0.386	24.8	C
	EBL	0.02	12.67	B	0.04	23.68	C
	EBT	0.25	10.99	B	0.43	19.68	B
	EBR	0.25	11.02	B	0.43	19.73	B
	WBL	0.22	16.75	B	0.37	35.64	D
	WBT	0.2	10.48	B	0.35	18.1	B
	WBR	0.2	10.48	B	0.35	18.1	B
	NBL	0.25	60.43	E	0.38	52.81	D
	NBTR	0.2	55.09	E	0.29	46.98	D
	SBL	0	58.36	E	0.02	52.11	D
	SBTR	0.08	53.01	D	0.05	42.27	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.486	19.1	B	0.506	19.4	B
	EBL	0.39	40.46	D	0.33	29.08	C
	EBTR	0.36	20.99	C	0.64	25.59	C
	WBL	0.56	25.94	C	0.45	40.5	D
	WBTR	0.11	18.44	B	0.31	20.64	C
	NBL	0.46	29.32	C	0.47	28.88	C
	NBT	0.51	16.15	B	0.49	15.17	B
	NBR	0.51	16.17	B	0.49	15.18	B
	SBL	0.08	22.83	C	0.26	23.26	C
	SBT	0.49	15.93	B	0.53	15.68	B
	SBR	0.49	15.95	B	0.53	15.7	B

In the improved scenario, during the AM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for North Front Street and Bell Boulevard that has a LOS E. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041 future background scenario.

- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 84 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 86 seconds.
- The NBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 68 seconds.

In the improved scenario, during the PM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for North Front Street and Bell Boulevard that has a LOS E. The LOS for the PM peak period is presented on **Figure 4-17**.

The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**.

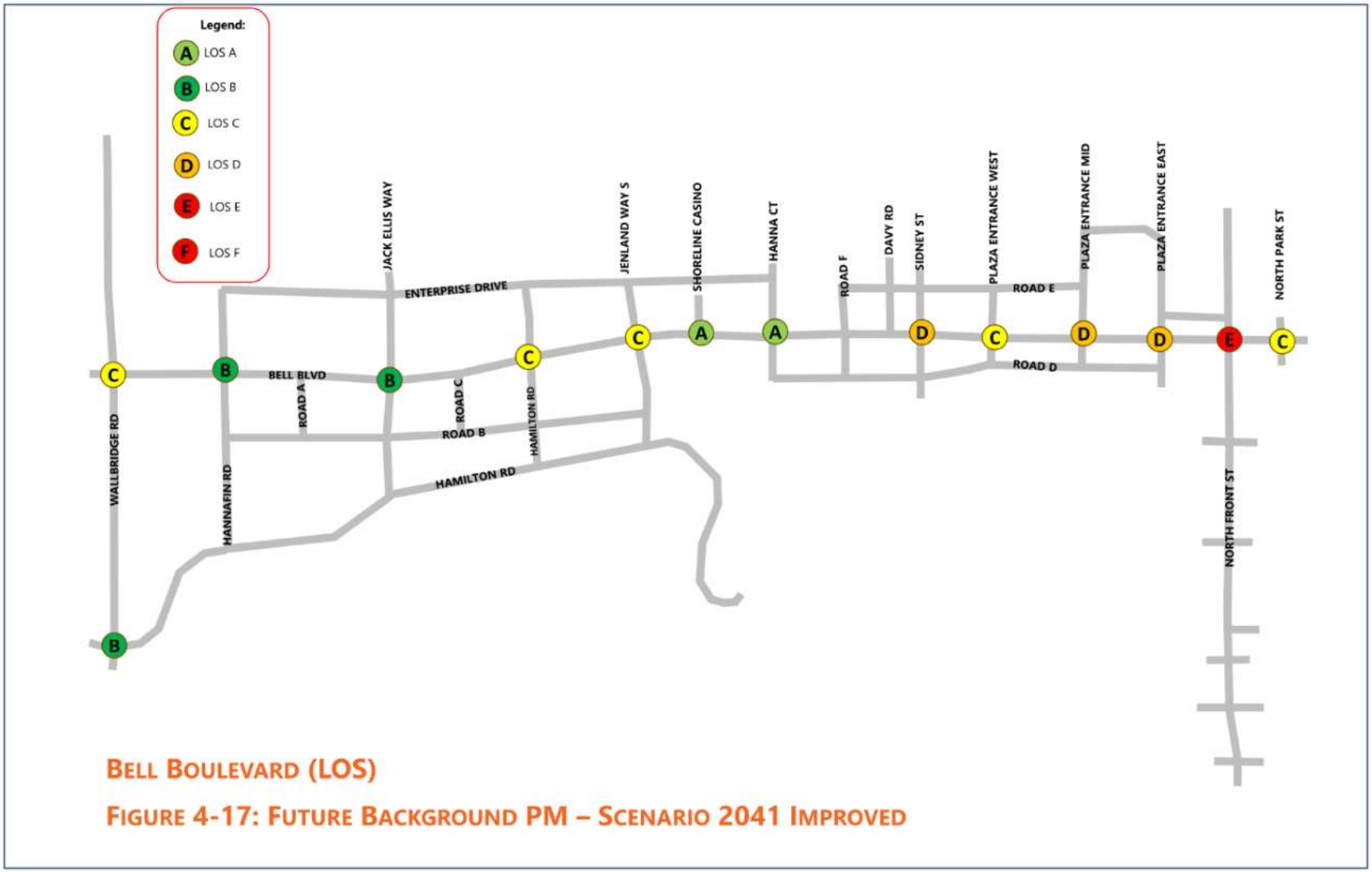

Figure 4-17: Future Background LOS PM 2041 Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future background scenario.

- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 107 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 90 seconds.

In addition to the corridor signal optimization, geometric improvements are recommended along Bell Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the previous 2031 future background scenario improved.

To summarize the list of geometric improvements made in the 2041 future background improved scenario, **Table 4-13** is presented below:

Table 4-13: Future Background - Scenario 2041 - List of Geometric Improvements (Bell Boulevard Corridor)

Intersection	Improvements	Notes
Wallbridge Loyalist Road & Bell Boulevard	1 WBR lane	Widening of Bell Boulevard and Wallbridge Loyalist is already anticipated in the TMP
Bell Boulevard & Hannafin Road	-	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Jenland Way South	-	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hanna Court	-	-
Bell Boulevard & Davy Road	-	-
Bell Boulevard & Sidney Street	1 EBR lane	-
Bell Boulevard & Plaza Entrance West	1 NBL lane	Probably only pavement marking improvements to separate traffic would be sufficient
Bell Boulevard & Plaza Entrance Mid	1 NBR lane and 1 SBR lane	-
Bell Boulevard & Plaza Entrance East	1 NBR lane and 1 SBR lane	-
Bell Boulevard & North Front Street	-	-
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	1 exclusive left lane in the WB and 1 exclusive left lane in the EB direction	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Shorelines Casino	-	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hamilton Road North	1 exclusive left lane in the WB and 1 exclusive left lane in the EB direction	Construction of Hamilton Road is anticipated

4.9.1.5 Future Background Traffic Analysis (2041+)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2041+ future background conditions are summarized in **Table 4-14.**

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-18** shows the level of service for the future background scenario for the weekday AM peak period.

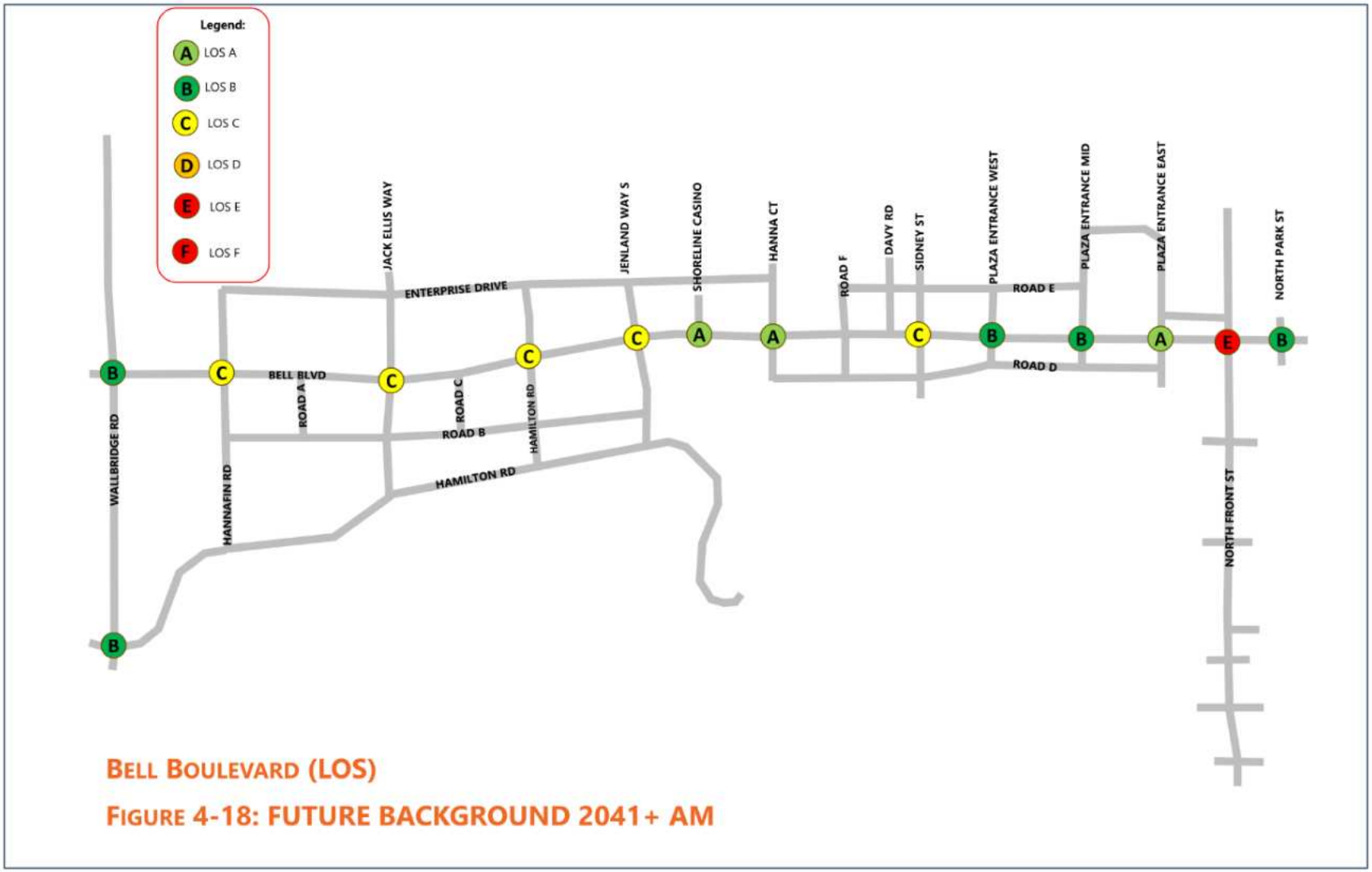

Figure 4-18: Future Background LOS AM 2041+

Table 4-14: Future Background Traffic Performance - Scenario 2041+ (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.48	18.5	B	0.84	30.7	C
	EBL	0.13	38.95	D	0.17	45.02	D
	EBTR	0.17	39.33	D	0.13	44.47	D
	WBL	0.49	32.87	C	0.41	25.48	C
	WBT	0.02	29.39	C	0.01	21.4	C
	WBR	0.74	37.9	D	0.5	**172.23**	**F**
	NBL	0.01	19.47	B	0.01	8.96	A
	NBT	0.31	14.56	B	0.43	26.69	C
	NBR	0.39	3.51	A	0.25	0.07	A
	SBL	0.61	28.23	C	0.30	4.25	A
	SBT	0.38	15.31	B	0.23	5.59	A
	SBR	0.38	15.31	B	0.23	5.59	A
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.31	20.6	C	0.39	17	B
	EBL	0.32	16.31	B	0.31	9.4	A
	EBTR	0.32	15.89	B	0.32	9.54	A
	WBL	0.25	14.34	B	0.43	15	B
	WBTR	0.25	14.53	B	0.44	11.32	B
	NBLTR	0.32	51.17	D	0.31	62.18	E
	SBLTR	0.10	46.6	D	0.26	61.18	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.27	21.4	C	0.30	15.4	B
	EBL	0.07	20.78	C	0.05	12.56	B
	EBT	0.29	17.59	B	0.29	9.03	A
	EBR	0.29	17.59	B	0.29	9.03	A
	WBL	0.08	22.9	C	0.26	15.37	B
	WBT	0.22	16.66	B	0.32	9.26	A
	WBR	0.22	16.67	B	0.32	9.26	A
	NBLTR	0.29	46.23	D	0.31	63.15	E
	SBLTR	0.08	41.97	D	0.30	62.68	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.36	28.9	C	0.47	17.6	B
	EBLT	0.09	31.21	C	0.05	13.44	B
	EBTR	0.38	27.21	C	0.32	9.28	A
	WBLT	0.21	38.42	D	0.52	23.04	C
	WBTR	0.27	25.11	C	0.35	9.65	A
	NBLTR	0.38	37.96	D	0.51	69.03	E
	SBLTR	0.06	31.51	C	0.30	62.85	E

Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.44	30.5	C	0.71	27	C
	EBL	0.04	25.42	C	0.03	16.56	B
	EBT	0.45	26.25	C	0.39	11.58	B
	EBR	0.45	26.26	C	0.39	11.62	B
	WBL	0.34	43.66	D	0.88	67.12	E
	WBT	0.21	21.52	C	0.40	11.78	B
	WBR	0.21	21.52	C	0.40	11.78	B
	NBL	0.27	41.28	D	0.39	70.1	E
	NBT	0.10	35.29	D	0.12	55.79	E
	NBR	0.50	44.58	D	0.60	69.22	E
	SBL	0	0	A	0	0	A
	SBT	0.03	34.14	C	0.20	57.34	E
	SBR	0.02	33.92	C	0.05	54.53	D
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.51	11.8	B	0.76	22.5	C
	EBL	0.04	15.46	B	0.16	68.39	E
	EBT	0.71	12.55	B	0.79	13.41	B
	WBL	0.53	10.10	B	0.92	28.02	C
	WBT	0.54	10.21	B	0.92	28.63	C
	SBL	0.03	38.84	D	0.26	70.03	E
	SBR	0.06	39.27	D	0.04	65.77	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.33	6.7	A	0.41	8.9	A
	EBLT	0.01	5.59	A	0.04	11.07	B
	EBTR	0.4	6.07	A	0.36	6.04	A
	WBLT	0.06	9.12	A	0.05	8.74	A
	WBTR	0.19	4.54	A	0.47	7.19	A
	NBLTR	0.08	68.95	E	0.2	70.48	E
	SBLTR	0.05	68.53	E	0.18	70.29	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.41	31.1	C	0.61	53.6	D
	EBL	0.45	26.13	C	0.52	33.05	C
	EBT	0.26	16.97	B	0.65	62	E
	EBR	0.4	19.8	B	0.43	31.41	C
	WBL	0.27	26.53	C	0.61	34.05	C
	WBT	0.14	15.4	B	0.7	55.66	E
	WBR	0.02	14.19	B	0.22	44.05	D
	NBL	0.28	53.18	D	0.52	68.53	E
	NBT	0.45	50.11	D	0.55	54.43	D
	NBR	0.4	49.06	D	0.75	65.65	E
	SBL	0.12	60.27	E	0.72	**122.55**	**F**
	SBT	0.19	43.74	D	0.49	67.8	E
	SBR	0.34	47.54	D	0.44	34.14	C
	Overall	0.28	17.6	B	0.51	24.9	C

Bell Boulevard & Plaza Entrance West (Signalized)	EBL	0.15	12.76	B	0.46	47.23	D
	EBT	0.29	10.84	B	0.47	17.46	B
	EBR	0.05	8.82	A	0.09	12.6	B
	WBL	0.02	14.26	B	0.13	27.92	C
	WBT	0.14	9.43	A	0.55	19.1	B
	WBR	0.09	9.12	A	0.28	14.9	B
	NBL	0.09	61.87	E	0.31	63.5	E
	NBTR	0.03	52.67	D	0.10	46.48	D
	SBL	0.29	61	E	0.55	63.66	E
	SBTR	0.23	56.58	E	0.32	51.32	D
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.24	18.1	B	0.64	50.8	D
	EBL	0.26	**83.48**	**F**	0.70	**94.54**	**F**
	EBT	0.26	8.19	A	0.63	41.57	D
	EBR	0.02	6.55	A	0.17	31.65	C
	WBL	0.20	**88.86**	**F**	0.67	**91.92**	**F**
	WBT	0.17	8.41	A	0.70	40.05	D
	WBR	0.03	7.44	A	0.17	27.82	C
	NBL	0.08	72.03	E	0.24	41.97	D
	NBT	0.03	68.99	E	0.15	71.16	E
	NBR	0.08	70.02	E	0.67	**92.51**	**F**
	SBL	0.25	76.69	E	0.59	51.48	D
	SBT	0.02	68.74	E	0.09	56.03	E
	SBR	0.25	74.37	E	0.69	75.57	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.22	9.1	A	0.58	32.5	C
	EBL	0.05	4.38	A	0.20	16.07	B
	EBT	0.24	3.71	A	0.61	23.12	C
	EBR	0.24	3.71	A	0.61	23.22	C
	WBL	0.18	6.06	A	0.73	37.39	D
	WBT	0.18	3.27	A	0.59	21.54	C
	WBR	0	2.68	A	0.04	13.28	B
	NBL	0.12	76.9	E	0.48	61.97	E
	NBT	0	72.09	E	0.08	62.25	E
	NBR	0.19	76.03	E	0.47	71.81	E
	SBL	0.18	77.96	E	0.72	74.79	E
	SBT	0.03	72.51	E	0.09	60.81	E
	SBR	0.12	74.31	E	0.43	69.02	E
Bell Boulevard & North Front	*Overall*	0.49	59.8	E	0.79	69.4	E
	EBL	0.58	**81.8**	**F**	0.88	**86.31**	**F**
	EBT	0.36	59.06	E	0.54	51.93	D
	EBR	0.16	57.46	E	0.31	0.51	A
	WBL	0.21	66.41	E	0.60	**88.08**	**F**

Street (Signalized)	WBT	0.35	52.26	D	0.88	**81.22**	**F**
	WBR	0.42	55.63	E	0.63	70.4	E
	NBL	0.60	**87.77**	**F**	0.85	**80.86**	**F**
	NBT	0.60	72.6	E	0.80	71.82	E
	NBR	0.21	64.87	E	0.13	35.31	D
	SBL	0.61	59.15	E	0.81	**90.24**	**F**
	SBT	0.52	43.5	D	0.85	79.46	E
	SBR	0.12	62.68	E	0.32	**81.14**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.25	16.7	B	0.39	22.9	C
	EBL	0.02	11.97	B	0.04	20.75	C
	EBTR	0.26	10.45	B	0.42	16.71	B
	EBR	0.26	10.47	B	0.42	16.76	B
	WBL	0.23	16.34	B	0.35	30.84	C
	WBT	0.21	9.84	A	0.35	15.55	B
	WBR	0.21	9.84	A	0.35	15.55	B
	NBL	0.26	62.35	E	0.42	58.6	E
	NBTR	0.21	56.81	E	0.32	52	D
	SBL	0	60.07	E	0.02	57.3	E
	SBTR	0.08	54.62	D	0.06	46.56	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.50	14.5	B	0.61	24.4	C
	EBL	0.36	31.06	C	0.35	33.7	C
	EBTR	0.45	18.06	B	0.76	32.12	C
	WBL	0.26	24.22	C	0.6	56.67	E
	WBTR	0.68	21.45	C	0.39	21.8	C
	NBL	0.39	20.23	C	0.52	38.03	D
	NBT	0.47	10.76	B	0.5	18.87	B
	NBR	0.47	10.77	B	0.500	18.89	B
	SBL	0.07	15.57	B	0.30	30.57	C
	SBT	0.47	10.69	B	0.54	19.4	B
	SBR	0.47	10.7	B	0.54	19.43	B

During the AM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for North Front Street and Bell Boulevard with LOS E. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041+ future background scenario.

- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 83 seconds.

- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 88 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 82 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 87 seconds.

During the PM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for North Front Street and Bell Boulevard with LOS E. The LOS for the PM peak period is presented on **Figure 4-19**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

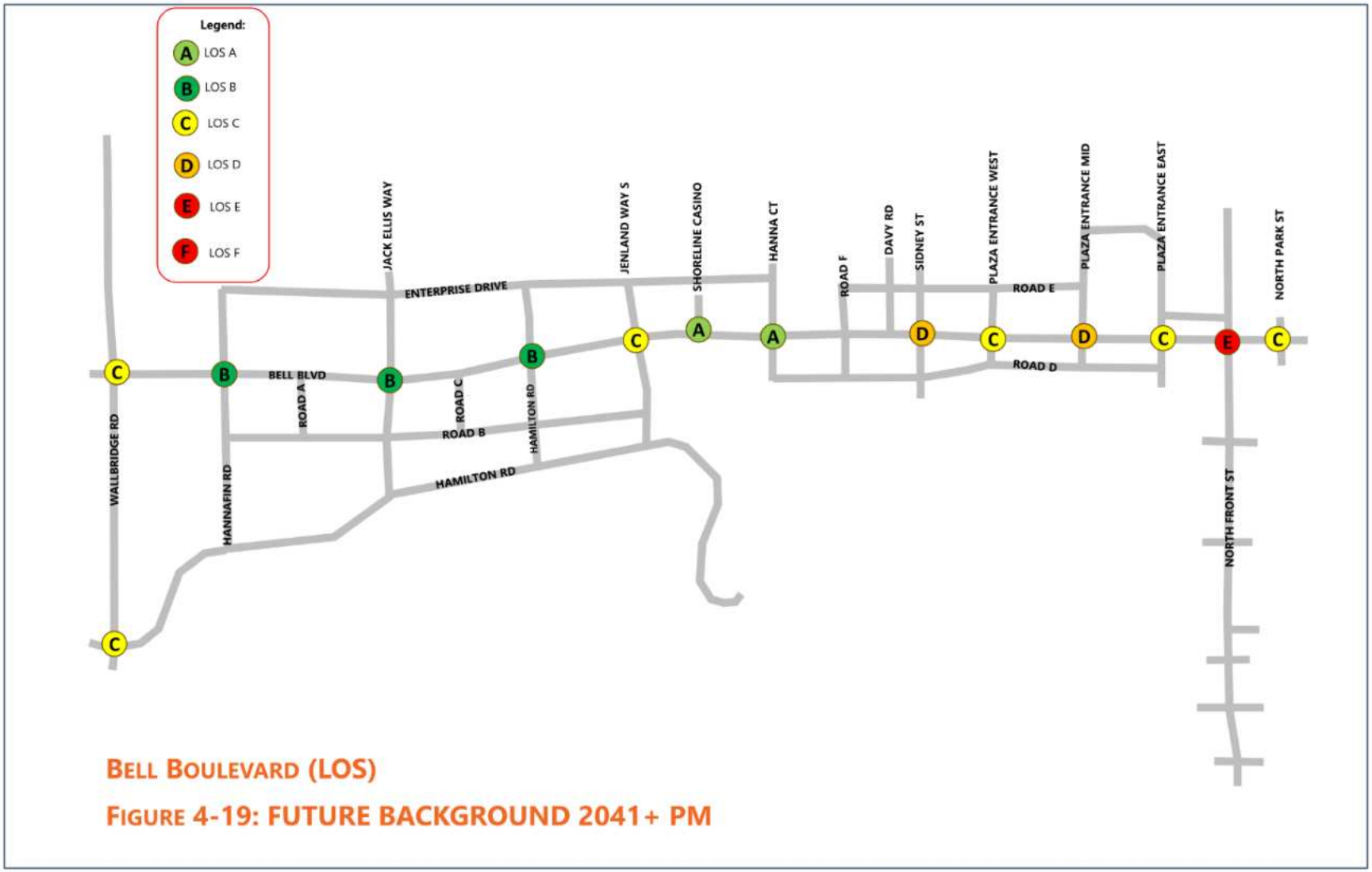

Figure 4-19: Future Background LOS PM 2041+

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future background scenario.

- The WBR movement on Bell Boulevard & Wallbridge Loyalist has a LOS F with a delay of 172 seconds.
- The SBL movement on Bell Boulevard & Wallbridge Loyalist has a LOS F with a delay of 122 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 94 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 92 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 92 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 86 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 80 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 88 seconds.
- The WBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 81 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 90 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 81 seconds.

4.9.1.6 Future Background Traffic Analysis (2041+) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041+ Future Background scenario. **Figure 4-20** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041+ future background conditions are summarized in **Table 4-15**. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

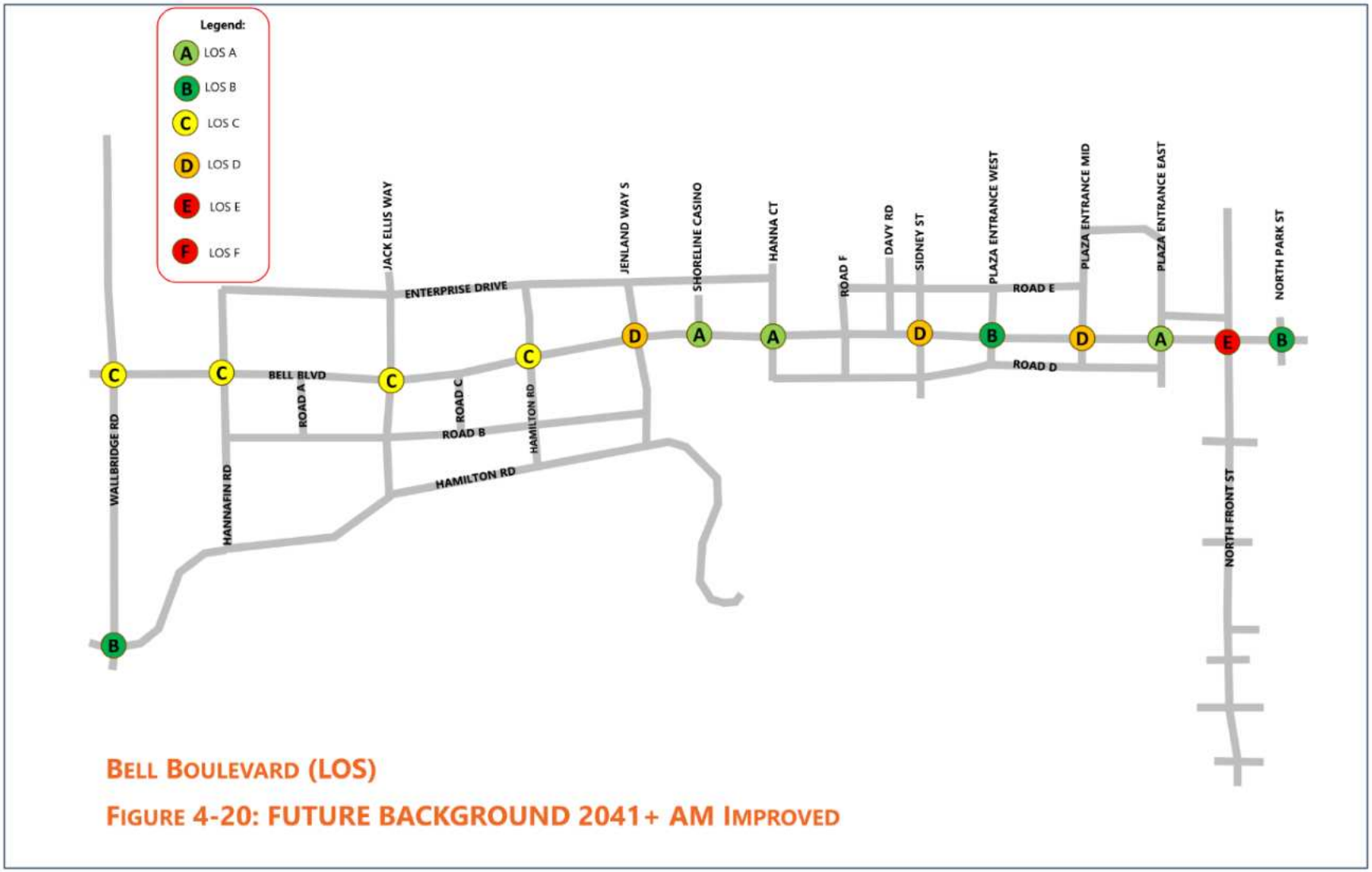

Figure 4-20: Future Background LOS AM 2041+ Improved

Table 4-15: Future Background Traffic Performance - Scenario 2041+ (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.471	28	C	0.654	37.5	D
	EBL	0.14	48.07	D	0.17	49.47	D
	EBTR	0.18	48.52	D	0.13	49.16	D
	WBL	0.55	42.42	D	0.44	29.85	C
	WBT	0.02	37.85	D	0.01	25.07	C
	WBR	0.83	51.26	D	0.44	**176.48**	**F**
	NBL	0.02	25.44	C	0.32	69.93	E
	NBT	0.32	18.95	B	0.47	31.97	C
	NBR	0.65	23.87	C	0.25	0.07	A
	SBL	0.67	37.14	D	0.78	41.53	D
	SBT	0.39	19.89	B	0.23	7.24	A
	SBR	0.39	19.89	B	0.23	7.24	A
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.309	20.6	C	0.386	14.9	B
	EBLT	0.32	16.31	B	0.29	6.41	A
	EBTR	0.32	15.89	B	0.29	6.5	A
	WBLT	0.25	14.34	B	0.4	9.81	A
	WBTR	0.25	14.53	B	0.41	7.73	A
	NBLTR	0.32	51.17	D	0.39	71.91	E
	SBLTR	0.1	46.6	D	0.34	70.38	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.272	21.4	C	0.299	15.4	B
	EBL	0.07	20.78	C	0.05	12.56	B
	EBT	0.29	17.59	B	0.29	9.03	A
	EBR	0.29	17.59	B	0.29	9.03	A
	WBL	0.08	22.90	C	0.26	15.37	B
	WBT	0.22	16.66	B	0.32	9.26	A
	WBR	0.22	16.67	B	0.32	9.26	A
	NBLTR	0.29	46.23	D	0.31	63.15	E
	SBLTR	0.08	41.97	D	0.3	62.68	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.391	28.2	C	0.610	19.0	B
	EBLT	0.40	23.84	C	0.33	7.09	A
	EBTR	0.41	24.34	C	0.33	7.18	A
	WBLT	0.38	30.21	C	0.62	20.96	C
	WBTR	0.38	23.62	C	0.61	11.43	B
	NBLTR	0.41	43.42	D	0.62	79.73	E
	SBLTR	0.07	35.87	D	0.38	70.95	E

Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.586	36.4	D	0.601	42.9	D
	EBL	0.04	29.85	C	0.03	13.14	B
	EBT	0.49	31.01	C	0.59	38.93	D
	EBR	0.49	31.03	C	0.59	39.05	D
	WBL	0.38	51.93	D	0.6	26.58	C
	WBT	0.22	25.35	C	0.47	20.9	C
	WBR	0.22	25.35	C	0.47	20.9	C
	NBLTR	0.76	52.41	D	0.96	**126.39**	**F**
	SBLTR	0.05	30.2	C	0.25	58.39	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.344	6.6	A	0.414	10.7	B
	EBL	0.01	5.54	A	0.03	5.99	A
	EBT	0.41	5.83	A	0.36	5.44	A
	WBT	0.18	4.47	A	0.5	11.06	B
	WBR	0.19	4.50	A	0.51	11.12	B
	SBL	0.05	68.46	E	0.29	73.46	E
	SBR	0.09	69.35	E	0.05	68.45	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.348	6.9	A	0.438	8.9	A
	EBLT	0.41	6.25	A	0.39	5.91	A
	EBTR	0.42	6.38	A	0.39	5.99	A
	WBLT	0.23	4.68	A	0.50	7.17	A
	WBTR	0.22	4.78	A	0.51	7.39	A
	NBLTR	0.05	68.95	E	0.20	71.51	E
	SBLTR	0.08	68.53	E	0.18	71.32	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.428	45.1	D	0.659	65	E
	EBL	0.59	47.5	D	0.67	75.82	E
	EBT	0.34	30.4	C	0.74	70.09	E
	EBR	0.52	35.75	D	0.25	72.74	E
	WBL	0.36	47.7	D	0.76	75.96	E
	WBT	0.17	27.56	C	0.86	72.77	E
	WBR	0.02	25.4	C	0.26	52.88	D
	NBL	0.23	62.01	E	0.53	69.6	E
	NBT	0.57	62.41	E	0.6	59.93	E
	NBR	0.5	60.83	E	0.82	76.99	E
	SBL	0.08	62.22	E	0.36	77.17	E
	SBT	0.25	55.52	E	0.41	60.66	E
	SBR	0.45	61.68	E	0.21	0.29	A
Bell Boulevard & Plaza Entrance	*Overall*	0.277	17.6	B	0.498	22.5	C
	EBL	0.15	12.76	B	0.42	37.38	D
	EBT	0.29	10.84	B	0.44	13.94	B
	EBR	0.05	8.82	A	0.08	10.04	B
	WBL	0.02	14.26	B	0.12	22.36	C

West (Signalized)	WBT	0.14	9.43	A	0.52	15.24	B
	WBR	0.09	9.12	A	0.26	11.91	B
	NBL	0.09	61.87	E	0.31	55.98	E
	NBTR	0.03	52.67	D	0.21	71.67	E
	SBL	0.29	61	E	0.52	61.44	E
	SBTR	0.23	56.58	E	0.49	70.02	E
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.239	46.9	D	0.595	60.1	E
	EBL	0.06	49.29	D	0.31	64.12	E
	EBT	0.55	48.97	D	0.81	63.44	E
	EBR	0.05	38.86	D	0.82	63.86	E
	WBL	0.03	48.97	D	0.39	64.04	E
	WBT	0.36	44.27	D	0.87	59.49	E
	WBR	0.06	39.12	D	0.21	38.09	D
	NBL	0.04	47.81	D	0.27	44.43	D
	NBT	0.01	45.73	D	0.08	53.52	D
	NBR	0.04	46.14	D	0.36	59.69	E
	SBL	0.12	49.7	D	0.7	60.38	E
	SBT	0.01	45.63	D	0.08	50.48	D
	SBR	0.11	47.61	D	0.59	64.23	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.221	9.12	A	0.581	32.5	C
	EBL	0.05	4.38	A	0.2	16.07	B
	EBT	0.24	3.71	A	0.61	23.12	C
	EBR	0.24	3.71	A	0.61	23.22	C
	WBL	0.18	6.06	A	0.73	37.39	D
	WBT	0.18	3.27	A	0.59	21.54	C
	WBR	0.00	2.68	A	0.04	13.28	B
	NBL	0.12	76.90	E	0.48	61.97	E
	NBT	0.00	72.09	E	0.08	62.25	E
	NBR	0.19	76.03	E	0.47	71.81	E
	SBL	0.18	77.96	E	0.72	74.79	E
	SBT	0.03	72.51	E	0.09	60.81	E
	SBR	0.12	74.31	E	0.43	69.02	E
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.477	55.92	E	0.787	70.0	E
	EBL	0.53	78.28	E	0.86	**82.19**	**F**
	EBT	0.32	54.64	D	0.52	50.11	D
	EBR	0.15	0.19	A	0.31	0.51	A
	WBL	0.44	86.51	F	0.6	**88.08**	**F**
	WBT	0.44	62.25	E	0.86	77.79	E
	WBR	0.54	68.15	E	0.62	68.83	E
	NBL	0.33	68.53	E	0.88	**84.68**	**F**
	NBT	0.55	68.72	E	0.8	71.82	E

	NBR	0.19	62.03	E	0.22	55.56	E
	SBL	0.55	52.59	D	0.86	**101.33**	**F**
	SBT	0.55	46.90	D	0.87	**83**	**F**
	SBR	0.13	68.31	E	0.32	**81.42**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.247	16.7	B	0.394	24.9	C
	EBL	0.02	11.97	B	0.05	24.71	C
	EBT	0.26	10.45	B	0.44	19.95	B
	EBR	0.26	10.47	B	0.44	20	C
	WBL	0.23	16.34	B	0.38	36.89	D
	WBT	0.21	9.84	A	0.37	18.56	B
	WBR	0.21	9.84	A	0.37	18.56	B
	NBL	0.26	62.35	E	0.38	52.81	D
	NBTR	0.21	56.81	E	0.29	46.98	D
	SBL	0.00	60.07	E	0.02	52.11	D
	SBTR	0.08	54.62	D	0.05	42.27	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.499	17.1	B	0.605	20.1	C
	EBL	0.38	35.18	D	0.16	17.49	B
	EBTR	0.44	20.29	C	0.77	28.43	C
	WBL	0.26	27.34	C	0.12	17.12	B
	WBTR	0.67	24.29	C	0.4	20.06	C
	NBL	0.43	24.57	C	0.5	33.27	C
	NBT	0.49	13.05	B	0.49	16.53	B
	NBR	0.49	13.07	B	0.5	16.54	B
	SBL	0.08	18.86	B	0.28	26.84	C
	SBT	0.48	12.96	B	0.53	17	B
	SBR	0.48	12.99	B	0.53	17.02	B

In the improved scenario, during the AM peak period, all intersections along Bell Boulevard are operating at acceptable level of service. The good traffic performance along Bell Boulevard in this scenario is due to a signal coordination in the corridor.

During the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-21**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**.

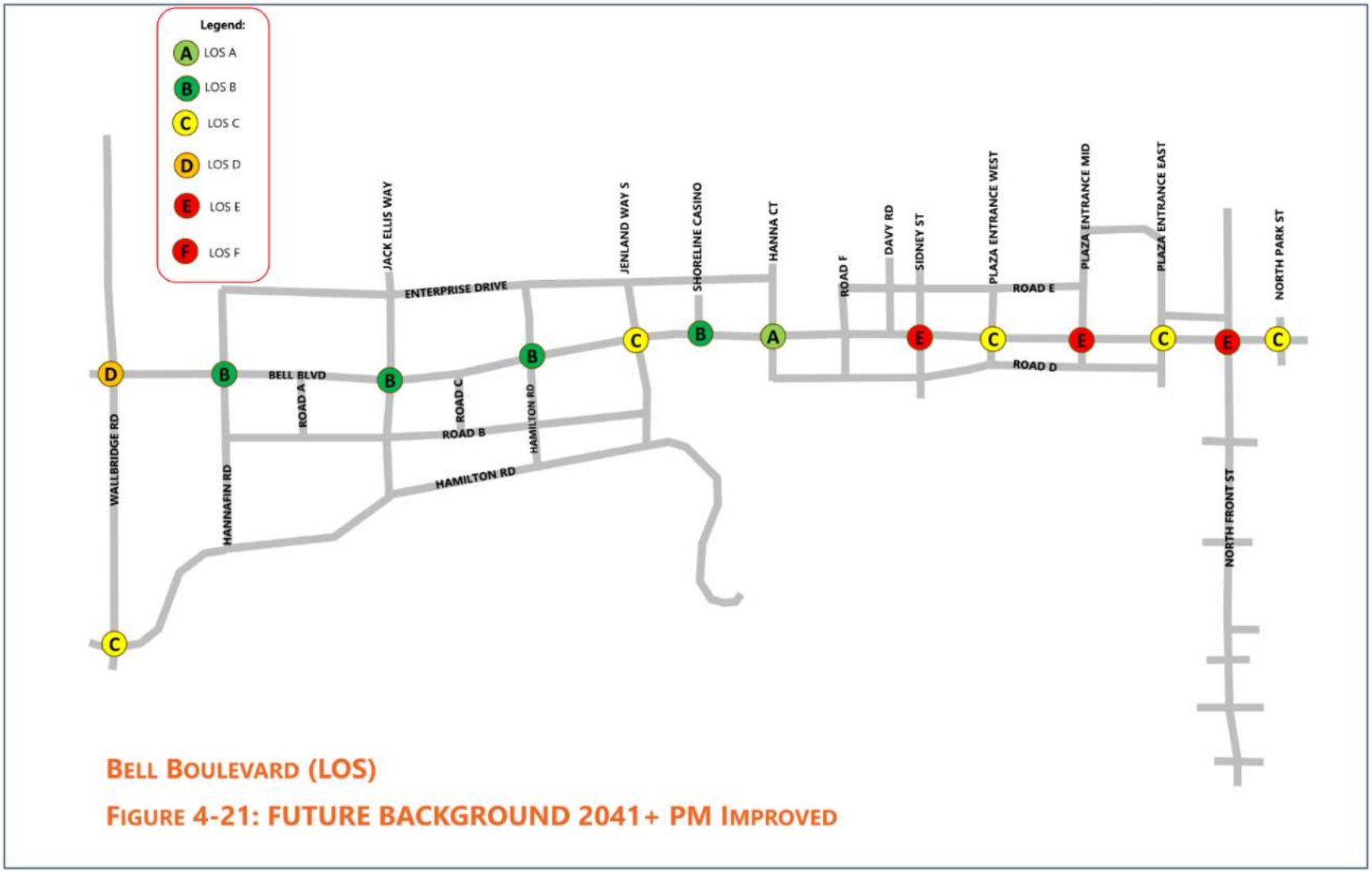

Figure 4-21: Future Background LOS PM 2041+ Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future background scenario.

- The WBR movement on Wallbridge Loyalist Road & Bell Boulevard has a LOS F with a delay of 177 seconds.
- The NBLTR movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 127 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 83 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 88 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 85 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 102 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 83 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 82 seconds.

4.9.2 Future Background Scenarios – North Front Street

As previously mentioned, this transportation study considered three future background scenarios. The future background scenarios consist of existing traffic volumes (2021) grown to the short-term horizon year of 2031, to the medium-term horizon years of 2041 and 2041+ (1% per year east of Sidney Street only). It also includes the background traffic volume originated by the West Belleville Secondary Plan. This section showcases the traffic analysis of the North Front Street corridor.

4.9.2.1 Future Background Traffic Analysis (2031)

The traffic modelling exercise provided traffic operation results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. Similarly, the traffic capacity analysis results for the study intersections under 2031 future background conditions are summarized in **Table 4-16.**

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-22** shows the level of service for the future background scenario for the weekday AM peak period.

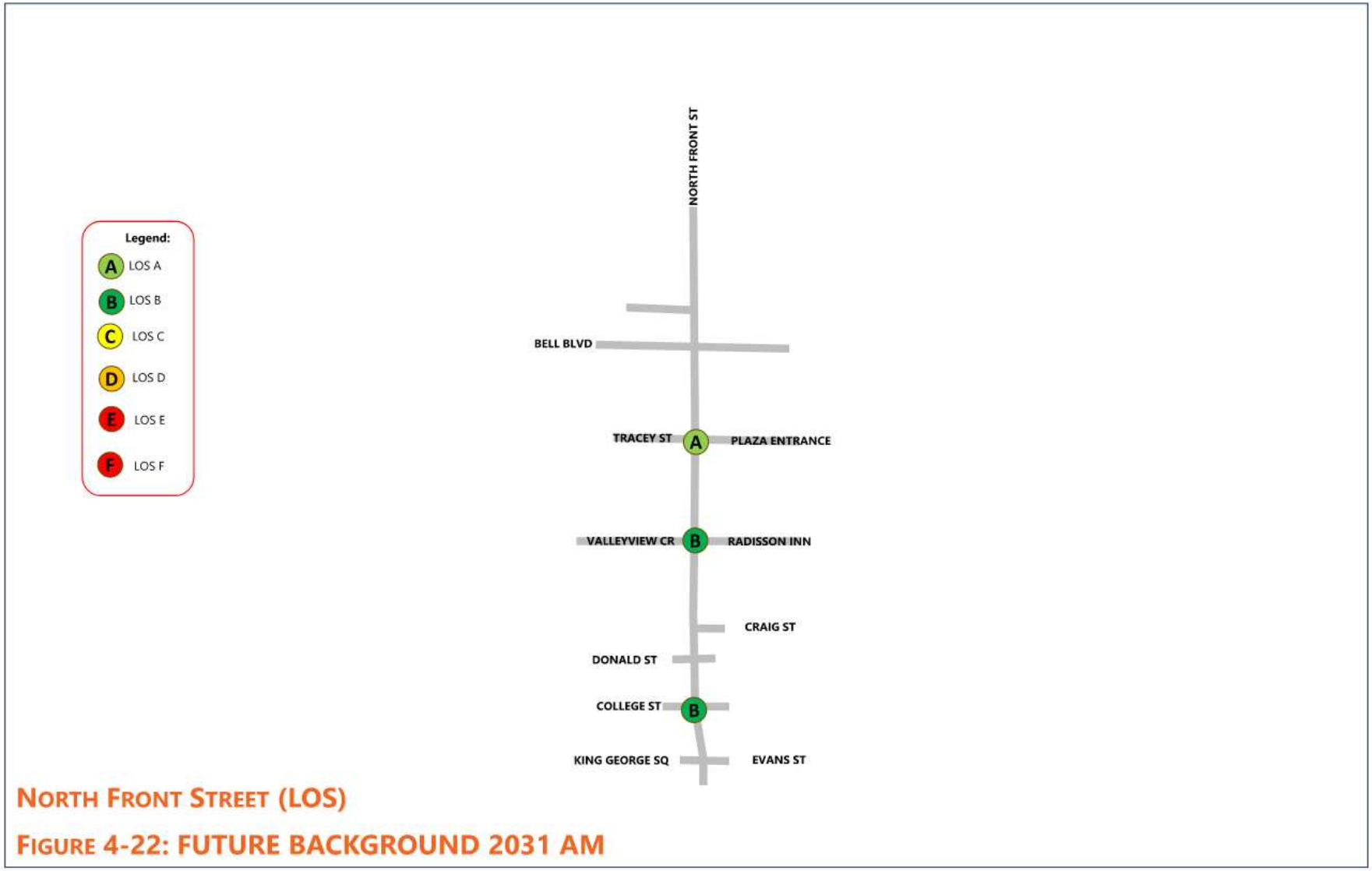

Figure 4-22: Future Background LOS AM 2031

Table 4-16: Future Background Traffic Performance - Scenario 2031 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.283	9	A	0.397	11.4	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR		27.5	C	0.36	31.49	C
	NBL	0.09	9.63	A	0.24	15.07	B
	NBT	0.22	5.78	A	0.46	7.78	A
	NBR	0.22	5.78	A	0.46	7.79	A
	SBL	0.06	7.56	A	0.23	14.01	B
	SBT	0.36	6.78	A	0.5	8.24	A
	SBR	0.36	6.79	A	0.5	8.29	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.26	12.9	B	0.412	17.2	B
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBLT	0.31	11.72	B	0.65	17.24	B
	NBTR	0.33	11.92	B	0.68	18.36	B
	SBLT	0.44	13.28	B	0.6	16.06	B
	SBTR	0.46	13.65	B	0.63	16.91	B
North Front Street & College Street (Signalized)	*Overall*	0.36	18.5	B	0.515	24.2	C
	EBL	0.41	29.67	C	0.68	37.78	D
	EBTR	0.41	19.8	B	0.49	18.88	B
	WBL	0.34	28.24	C	0.46	31.15	C
	WBTR	0.41	19.63	B	0.42	17.75	B
	NBL	0.22	23.01	C	0.65	49.11	D
	NBT	0.34	14.83	B	0.63	21.93	C
	NBR	0.34	14.86	B	0.63	21.96	C
	SBL	0.08	18.69	B	0.35	34.79	C
	SBT	0.43	16.05	B	0.61	21.43	C
	SBR	0.43	16.1	B	0.61	21.53	C

During the AM peak period, all intersections along North Front Street are operating at acceptable conditions. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each

corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

During the PM peak period, all intersections along North Front Street are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-23**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

Figure 4-23 Future Background LOS PM 2031

4.9.2.2 Future Background Traffic Analysis (2031) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2031 Future Background scenario. **Figure 4-24** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2031 future background conditions are summarized in **Table 4-17.**

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

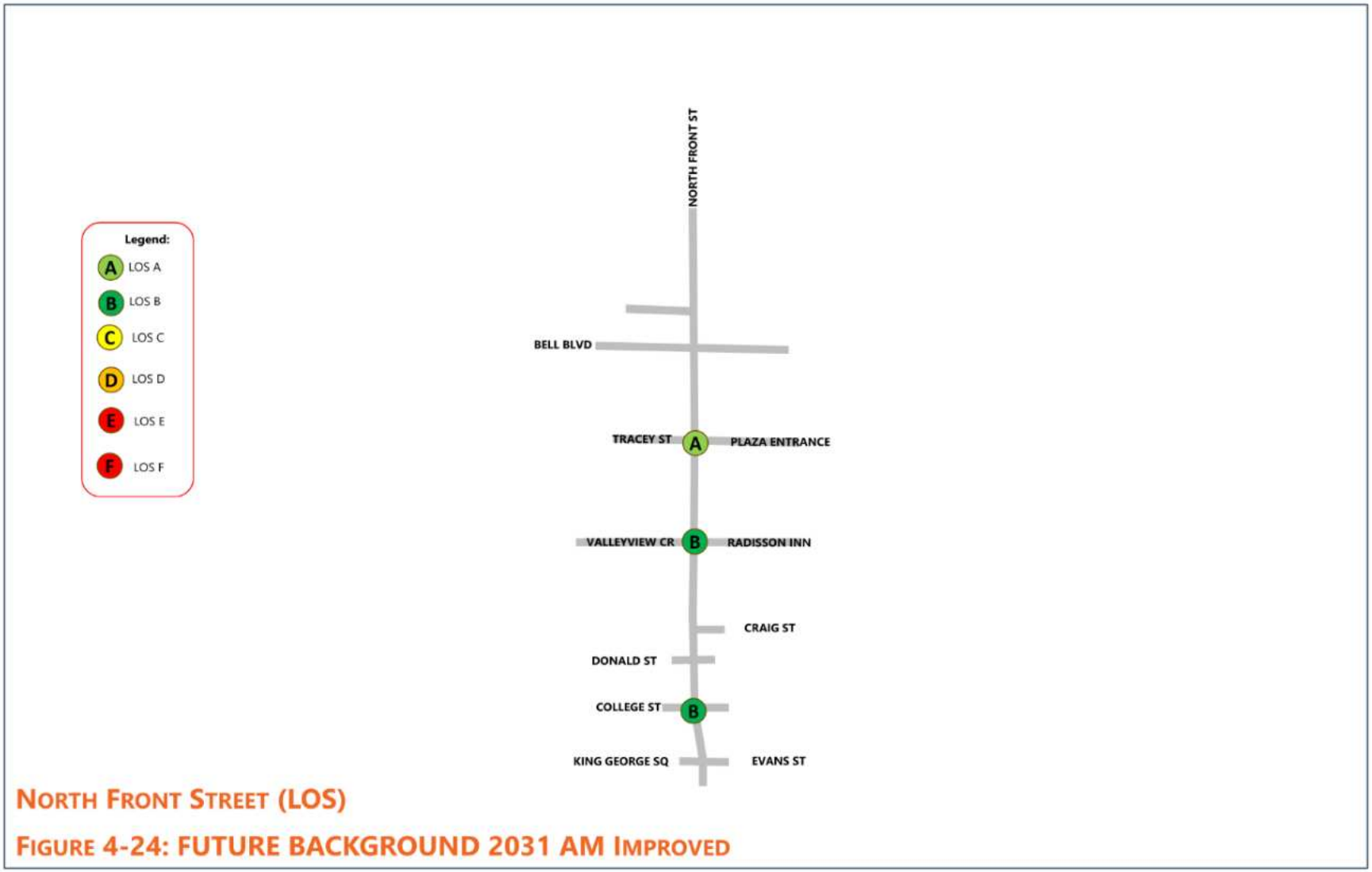

Figure 4-24: Future Background LOS AM 2031 Improved

Table 4-17: Future Background Traffic Performance - Scenario 2031 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.283	9	A	0.397	11.4	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.09	9.63	A	0.24	15.07	B
	NBT	0.22	5.78	A	0.46	7.78	A
	NBR	0.22	5.78	A	0.46	7.79	A
	SBL	0.06	7.56	A	0.23	14.01	B
	SBT	0.36	6.78	A	0.5	8.24	A
	SBR	0.36	6.79	A	0.5	8.29	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.26	12.9	B	0.412	17.2	B
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBLT	0.31	11.72	B	0.65	17.24	B
	NBTR	0.33	11.92	B	0.68	18.36	B
	SBLT	0.44	13.28	B	0.6	16.06	B
	SBTR	0.46	13.65	B	0.63	16.91	B
North Front Street & College Street (Signalized)	*Overall*	0.36	18.5	B	0.515	24.2	C
	EBL	0.41	29.67	C	0.68	37.78	D
	EBTR	0.41	19.8	B	0.49	18.88	B
	WBL	0.34	28.24	C	0.46	31.15	C
	WBTR	0.41	19.63	B	0.42	17.75	B
	NBL	0.22	23.01	C	0.65	49.11	D
	NBT	0.34	14.83	B	0.63	21.93	C
	NBR	0.34	14.86	B	0.63	21.96	C
	SBL	0.08	18.69	B	0.35	34.79	C
	SBT	0.43	16.05	B	0.61	21.43	C
	SBR	0.43	16.1	B	0.61	21.53	C

In the improved scenario, during the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front

Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

In the improved scenario, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS B or better. The LOS for the PM peak period is presented on **Figure 4-25** The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**.

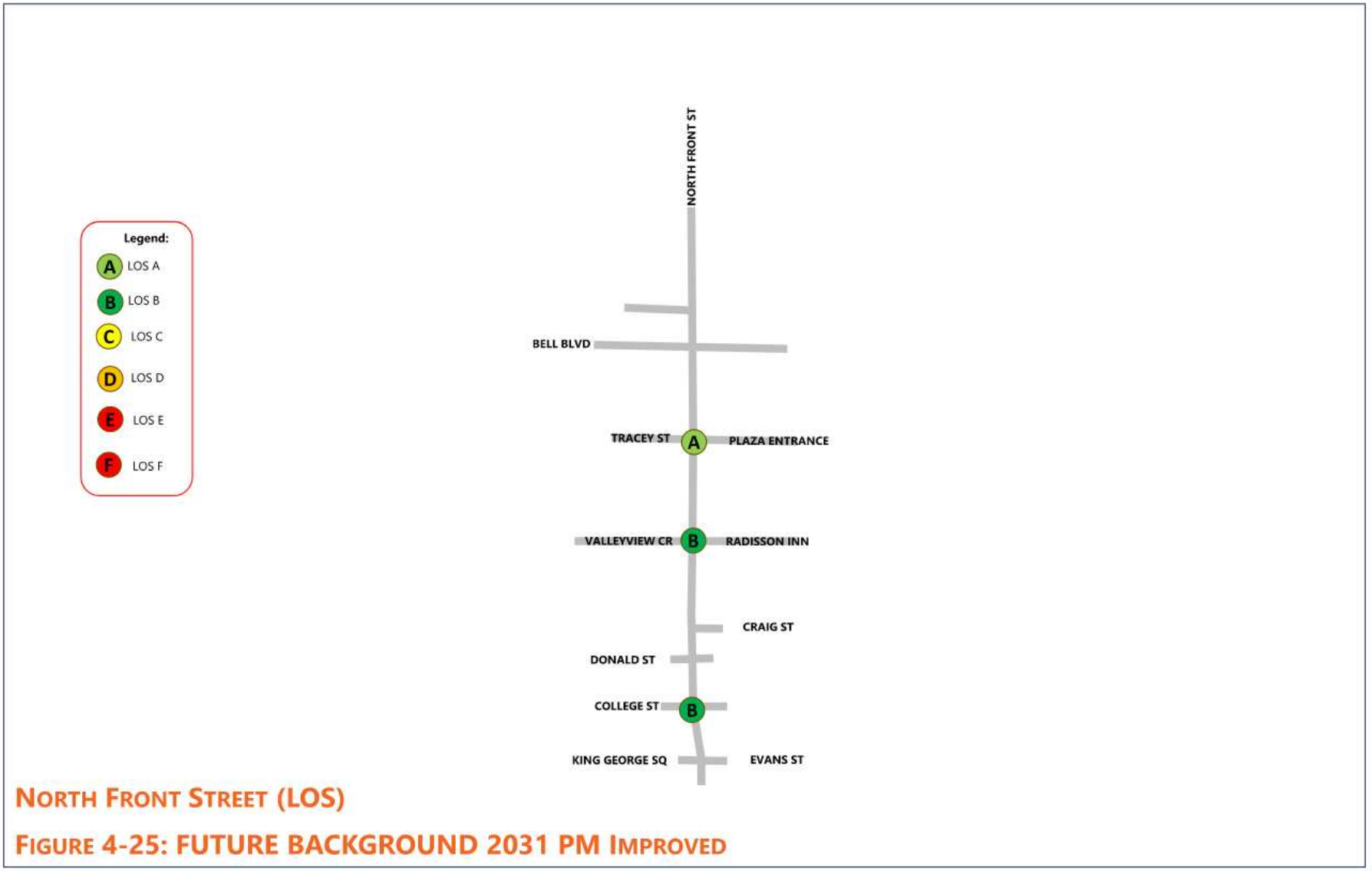

Figure 4-25: Future Background LOS PM 2031 Improved

4.9.2.3 Future Background Traffic Analysis (2041)

The traffic modelling exercise provided traffic operation results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. Similarly, the traffic capacity analysis results for the study intersections under 2041 future background conditions are summarized in **Table 4-18**.

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-26** shows the level of service for the future background scenario for the weekday AM peak period.

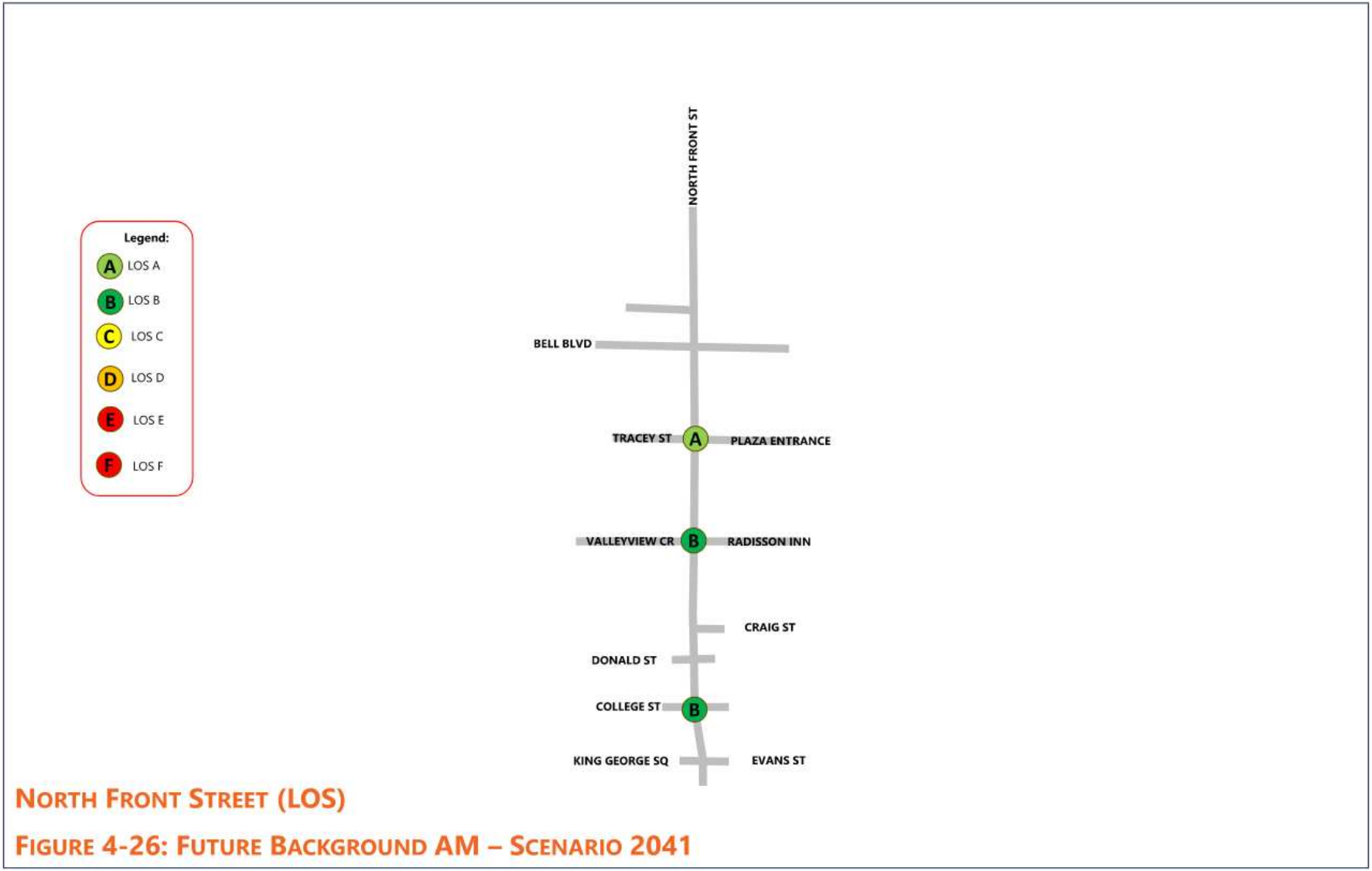

Figure 4-26: Future Background LOS AM 2041

Table 4-18: Future Background Traffic Performance - Scenario 2041 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.3	9	A	0.41	11.6	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBT	0.18	28.55	C	0.31	30.53	C
	EBR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.09	10.13	B	0.25	15.86	B
	NBT	0.23	5.83	A	0.5	8.22	A
	NBR	0.23	5.83	A	0.5	8.22	A
	SBL	0.06	7.65	A	0.26	15.51	B
	SBT	0.38	7.01	A	0.51	8.47	A
	SBR	0.38	7.03	A	0.52	8.53	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.278	13.3	B	0.438	18.3	B
	EBL	0.05	18.69	B	0.14	19.6	B
	EBT	0.278	13.3	B	0.14	19.6	B
	EBR	0.05	18.69	B	0.14	19.6	B
	WBL	0.02	18.39	B	0.01	18.32	B
	WBTR	0.02	18.39	B	0.01	18.32	B
	NBL	0.32	11.83	B	0.7	18.64	B
	NBT	0.32	11.93	B	0.7	19.35	B
	NBR	0.34	12.04	B	0.73	20.08	C
	SBL	0.47	13.76	B	0.63	16.59	B
	SBT	0.5	13.97	B	0.5	17.04	B
	SBR	0.5	14.2	B	0.65	17.56	B
North Front Street & College Street (Signalized)	*Overall*	0.377	18.5	B	0.54	25.1	C
	EBL	0.45	32.81	C	0.68	37.78	D
	EBT	0.44	21.68	C	0.49	18.88	B
	EBR		21.68	C	0.49	18.88	B
	WBL	0.38	31.02	C	0.46	31.15	C
	WBTR	0.44	21.48	C	0.42	17.75	B
	NBL	0.22	22.1	C	0.69	54.54	D
	NBT	0.33	13.57	B	0.69	23.68	C
	NBR	0.33	13.59	B	0.69	23.73	C
	SBL	0.08	17.26	B	0.39	39.11	D

	SBT	0.44	15.02	B	0.64	22.19	C
	SBR	0.44	15.07	B	0.64	22.29	C

During the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

Similarly, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-27**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

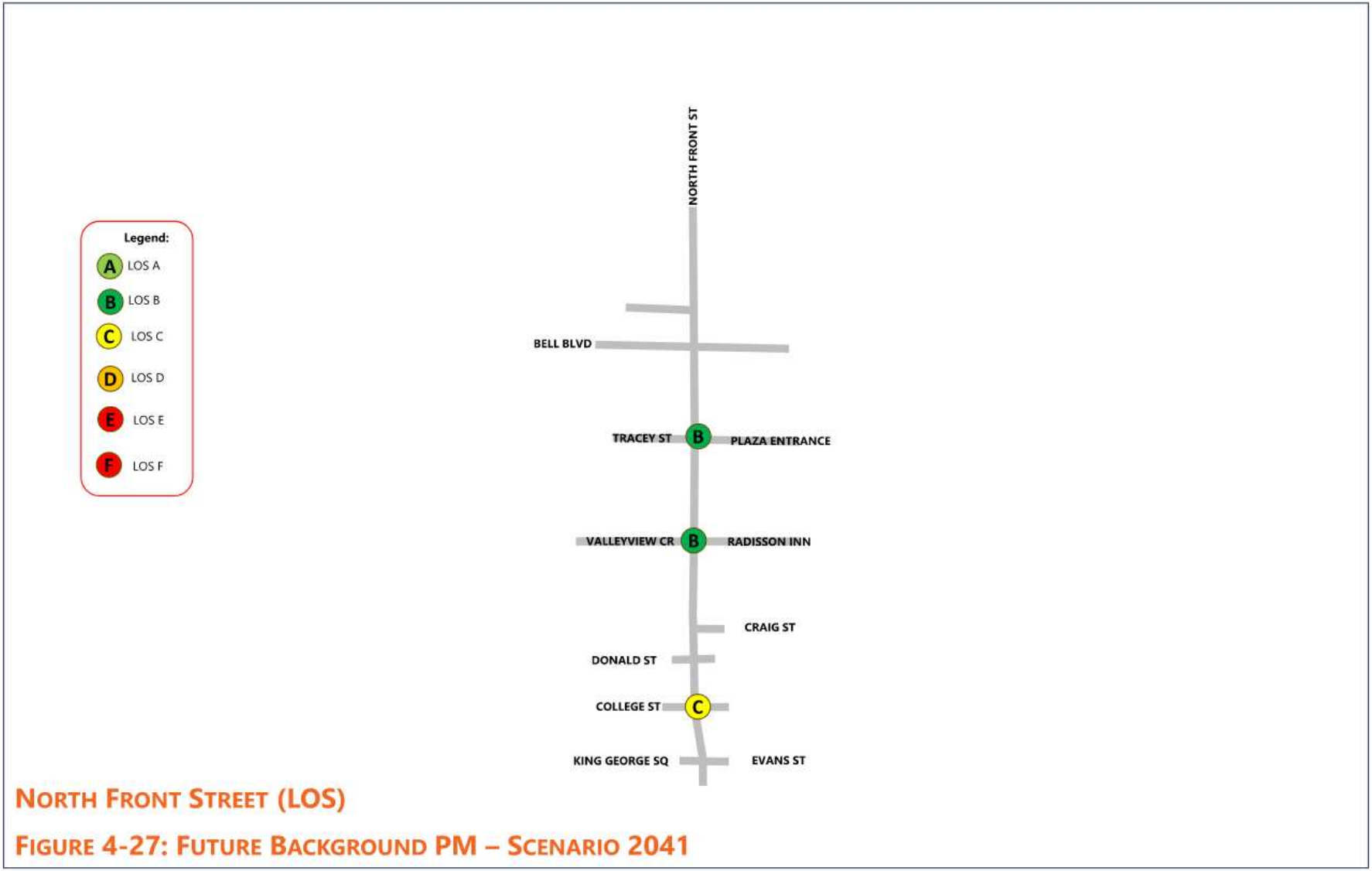

Figure 4-27: Future Background LOS PM 2041

4.9.2.4 Future Background Traffic Analysis (2041) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041 Future Background scenario. **Figure 4-28** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041 future background conditions are summarized in **Table 4-19.** The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

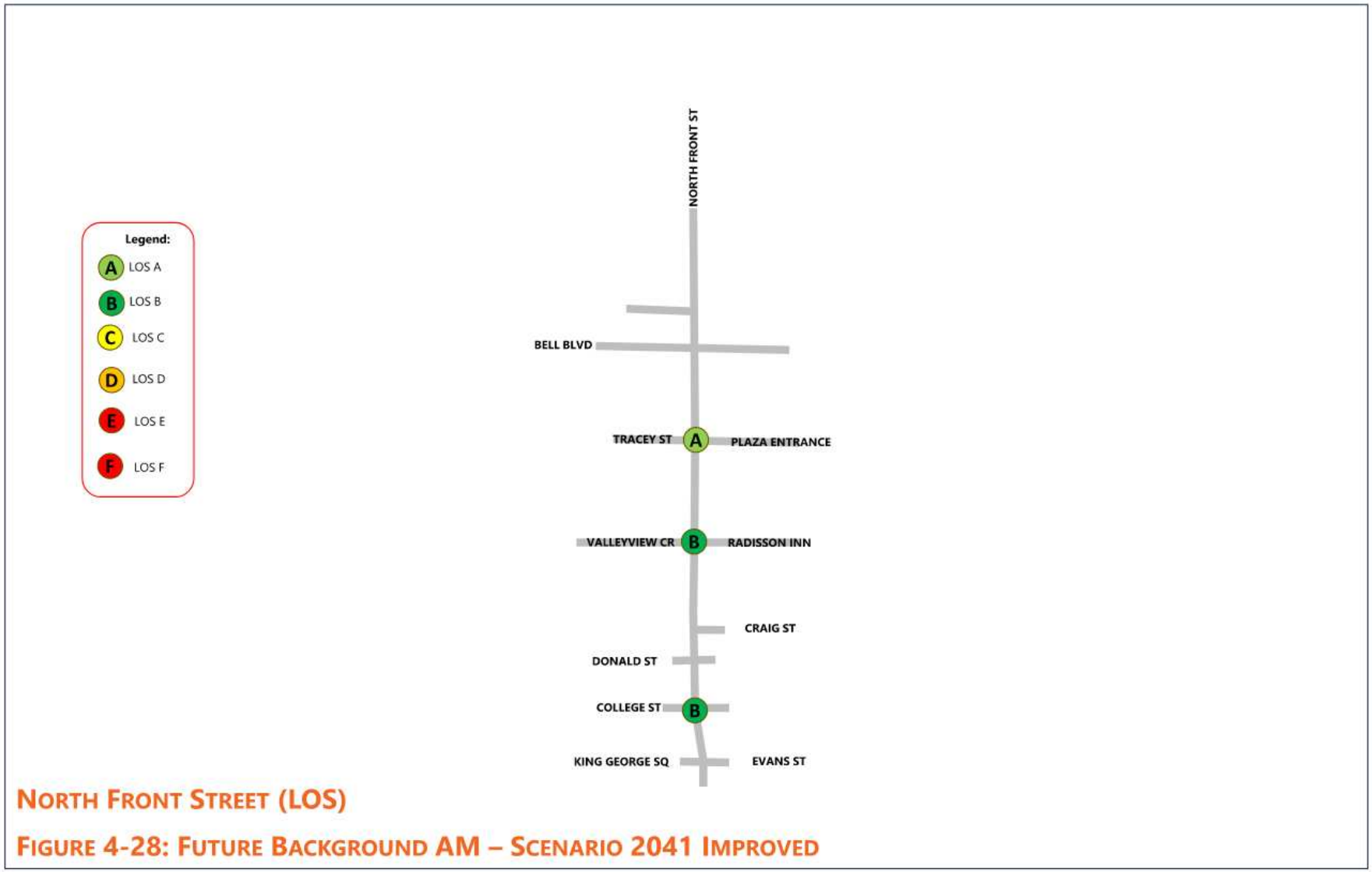

Figure 4-28: Future Background LOS AM 2041 Improved

Table 4-19: Future Background Traffic Performance - Scenario 2041 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.3	9	A	0.41	11.6	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.09	10.13	B	0.25	15.86	B
	NBT	0.23	5.83	A	0.5	8.22	A
	NBR	0.23	5.83	A	0.5	8.22	A
	SBL	0.06	7.65	A	0.26	15.51	B
	SBT	0.38	7.01	A	0.51	8.47	A
	SBR	0.38	7.03	A	0.52	8.53	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.278	13.3	B	0.438	18.3	B
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBL	0.32	11.83	B	0.7	18.64	B
	NBTR	0.34	12.04	B	0.73	20.08	C
	SBL	0.47	13.76	B	0.63	16.59	B
	SBTR	0.5	14.2	B	0.65	17.56	B
North Front Street & College Street (Signalized)	*Overall*	0.377	18.5	B	0.54	25.1	C
	EBL	0.45	32.81	C	0.68	37.78	D
	EBTR	0.44	21.68	C	0.49	18.88	B
	WBL	0.38	31.02	C	0.46	31.15	C
	WBTR	0.44	21.48	C	0.42	17.75	B
	NBL	0.22	22.1	C	0.69	54.54	D
	NBT	0.33	13.57	B	0.69	23.68	C
	NBR	0.33	13.59	B	0.69	23.73	C
	SBL	0.08	17.26	B	0.39	39.11	D
	SBT	0.44	15.02	B	0.64	22.19	C
	SBR	0.44	15.07	B	0.64	22.29	C

In the improved scenario, during the AM peak period, all intersections along North Front Street are operating at acceptable conditions, with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type,

as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041 future background scenario.

In the improved scenario, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The LOS for the PM peak period is presented on **Figure 4-29**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**.

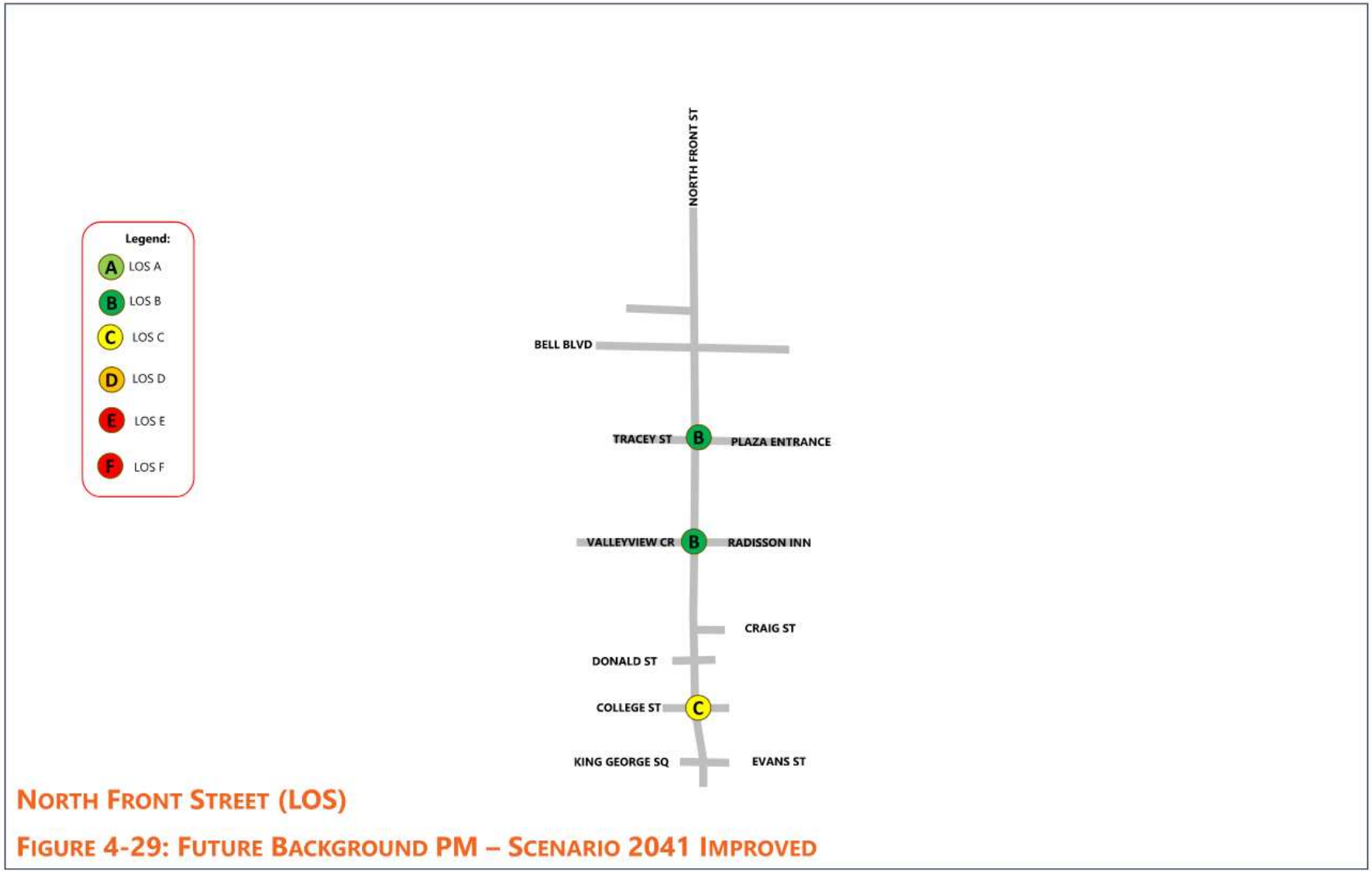

Figure 4-29: Future Background LOS PM 2041 Improved

4.9.2.5 Future Background Traffic Analysis (2041+)

The traffic modelling exercise provided traffic operation results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. Similarly, the traffic capacity analysis results for the study intersections under 2041 future background conditions are summarized in **Table 4-20**.

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix G**. **Figure 4-30** shows the level of service for the future background scenario for the weekday AM peak period.

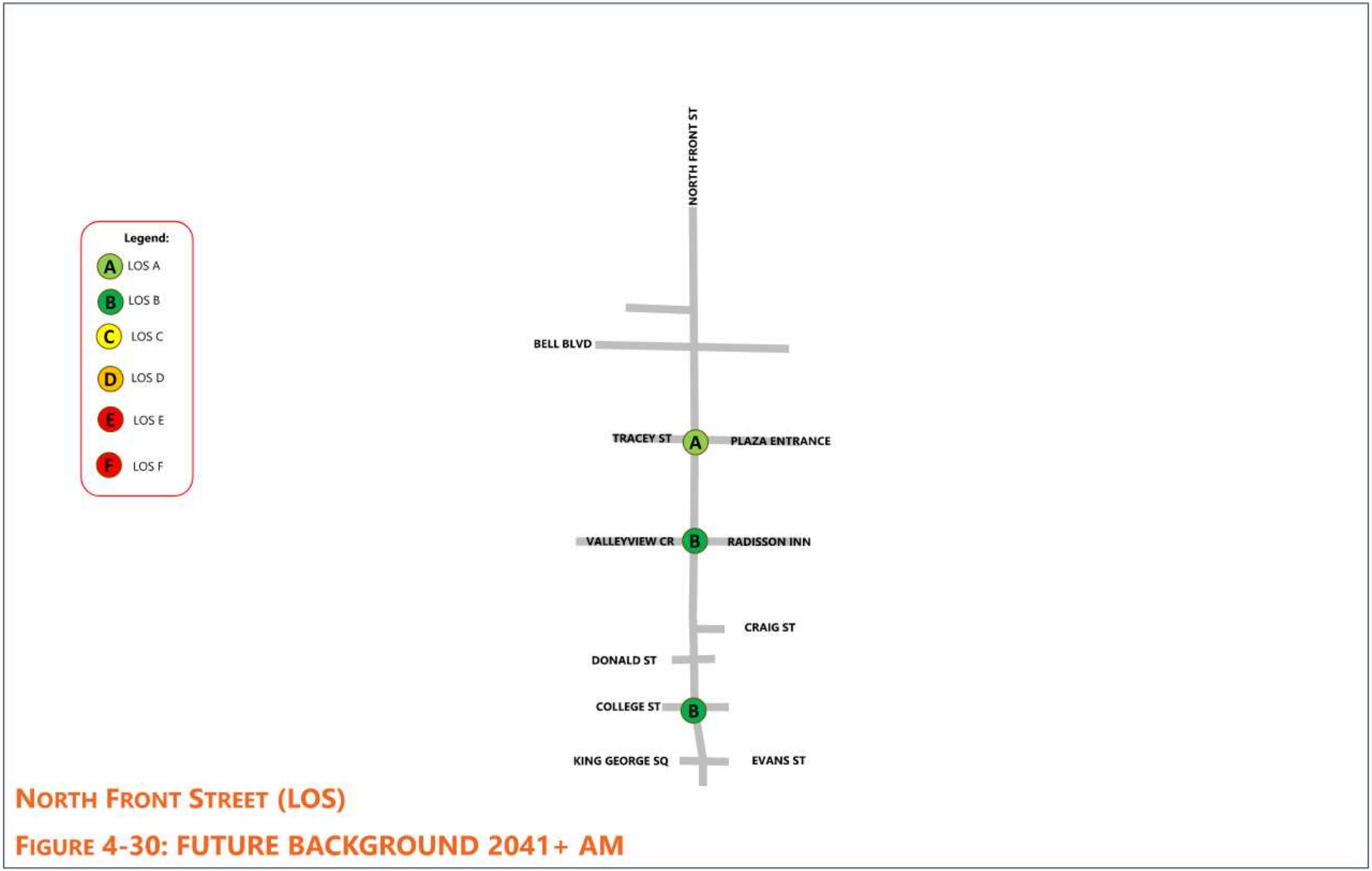

Figure 4-30: Future Background LOS AM 2041+

Table 4-20: Future Background Traffic Performance - Scenario 2041+ (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.31	9.1	A	0.417	11.7	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.09	10.45	B	0.25	16.32	B
	NBT	0.24	5.86	A	0.52	8.49	A
	NBR	0.24	5.86	A	0.52	8.49	A
	SBL	0.06	7.7	A	0.27	16.46	B
	SBT	0.4	7.16	A	0.52	8.61	A
	SBR	0.4	7.17	A	0.53	8.66	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.289	13.5	B	0.453	19	B
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBLT	0.33	11.89	B	0.73	19.58	B
	NBTR	0.34	12.1	B	0.76	21.25	C
	SBLT	0.49	14.08	B	0.64	16.91	B
	SBTR	0.52	14.55	B	0.67	17.94	B
North Front Street & College Street (Signalized)	*Overall*	0.387	18.5	B	0.587	27.2	C
	EBL	0.48	34.59	C	0.51	20.47	C
	EBTR	0.46	22.68	C	0.75	37.18	D
	WBL	0.4	32.56	C	0.34	18.16	B
	WBTR	0.45	22.47	C	0.65	32.07	C
	NBL	0.22	21.78	C	0.72	58.14	E
	NBT	0.33	12.97	B	0.72	24.88	C
	NBR	0.33	12.99	B	0.72	24.94	C
	SBL	0.08	16.57	B	0.42	42.04	D
	SBT	0.45	14.57	B	0.65	22.63	C
	SBR	0.45	14.61	B	0.65	22.75	C

During the AM peak period, all intersections along North Front Street are operating at acceptable conditions, with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length

for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041+ future background scenario.

Similarly, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-31**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix G**.

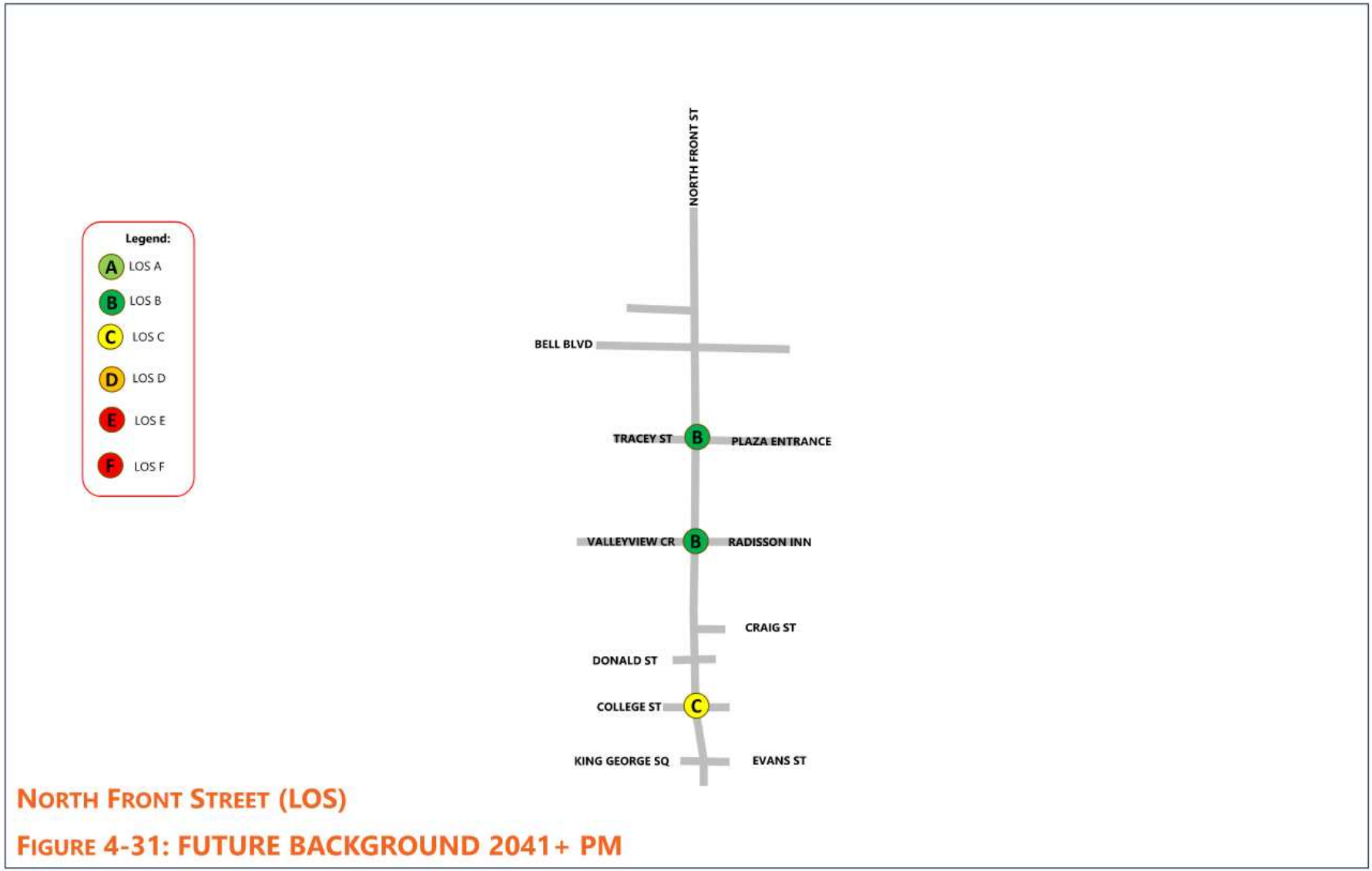

Figure 4-31: Future Background LOS PM 2041+

4.9.2.6 Future Background Traffic Analysis (2041+) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041+ Future Background scenario. **Figure 4-32** shows the level of service for the future background scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041+ future background conditions are summarized in **Table 4-21**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix H**.

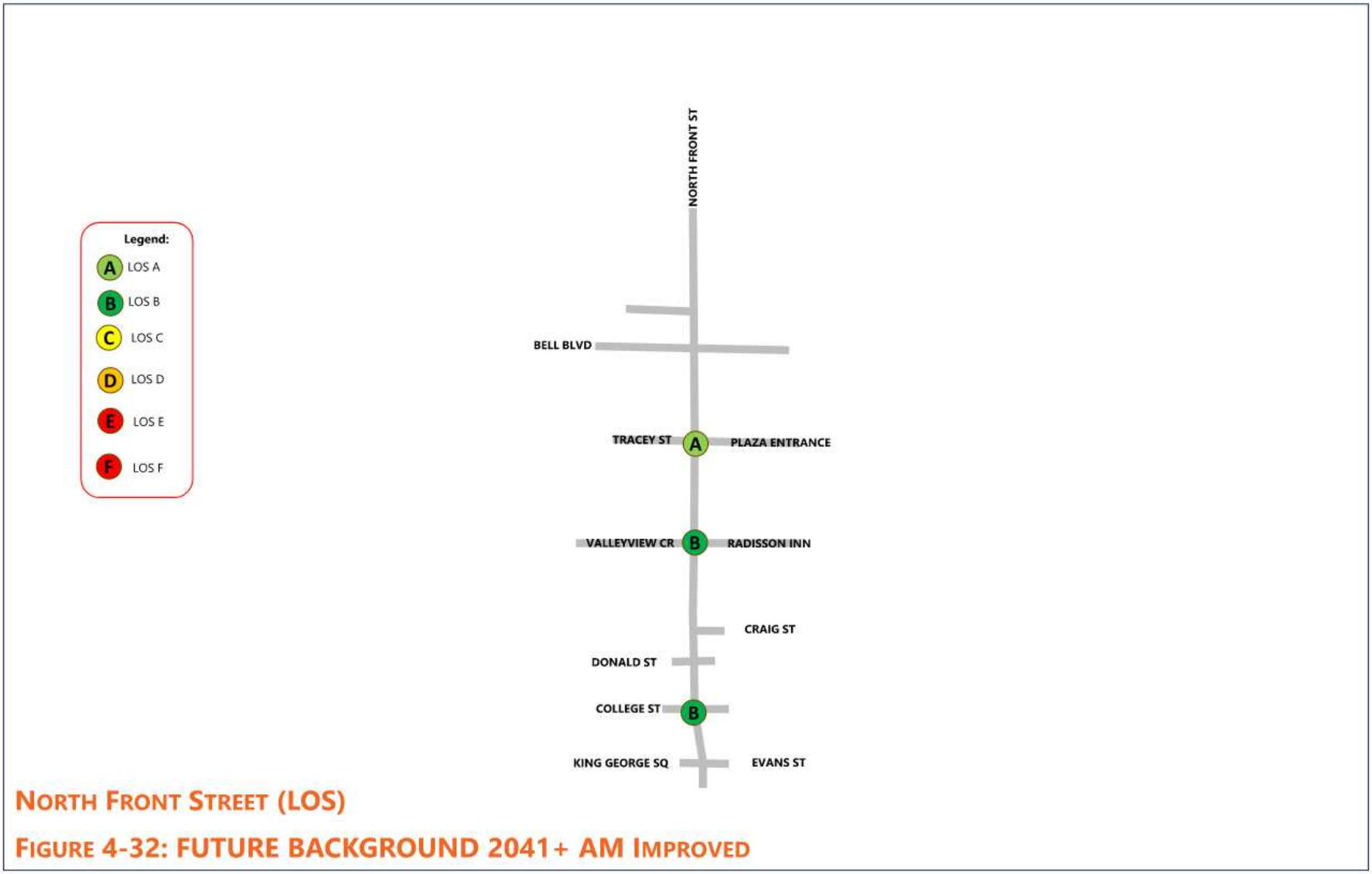

Figure 4-32 Future Background LOS AM 2041+ Improved

Table 4-21: Future Background Traffic Performance - Scenario 2041+ (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.31	9.1	A	0.417	11.7	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.09	10.45	B	0.25	16.32	B
	NBT	0.24	5.86	A	0.52	8.49	A
	NBR	0.24	5.86	A	0.52	8.49	A
	SBL	0.06	7.7	A	0.27	16.46	B
	SBT	0.4	7.16	A	0.52	8.61	A
	SBR	0.4	7.17	A	0.53	8.66	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.289	13.5	B	0.453	19	B
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBLT	0.33	11.89	B	0.73	19.58	B
	NBTR	0.34	12.1	B	0.76	21.25	C
	SBLT	0.49	14.08	B	0.64	16.91	B
	SBTR	0.52	14.55	B	0.67	17.94	B
North Front Street & College Street (Signalized)	*Overall*	0.366	18	B	0.553	25.2	C
	EBL	0.43	31.18	C	0.71	40.94	D
	EBTR	0.43	20.72	C	0.5	19.82	B
	WBL	0.36	29.59	C	0.49	32.94	C
	WBTR	0.42	20.53	C	0.43	18.6	B
	NBL	0.23	22.73	C	0.68	52.81	D
	NBT	0.35	14.33	B	0.7	23.37	C
	NBR	0.35	14.35	B	0.7	23.42	C
	SBL	0.08	18.21	B	0.4	39.55	D
	SBT	0.43	14.69	B	0.64	21.4	C
	SBR	0.14	12.18	B	0.64	21.5	C

In the improved scenario, during the AM peak period, all intersections along North Front Street are operating at acceptable level of service. The good traffic performance along North Front Street in this scenario is due to a signal coordination in the corridor. No critical movements were identified in this analysis.

In the improved scenario, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-33.** The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix H**.

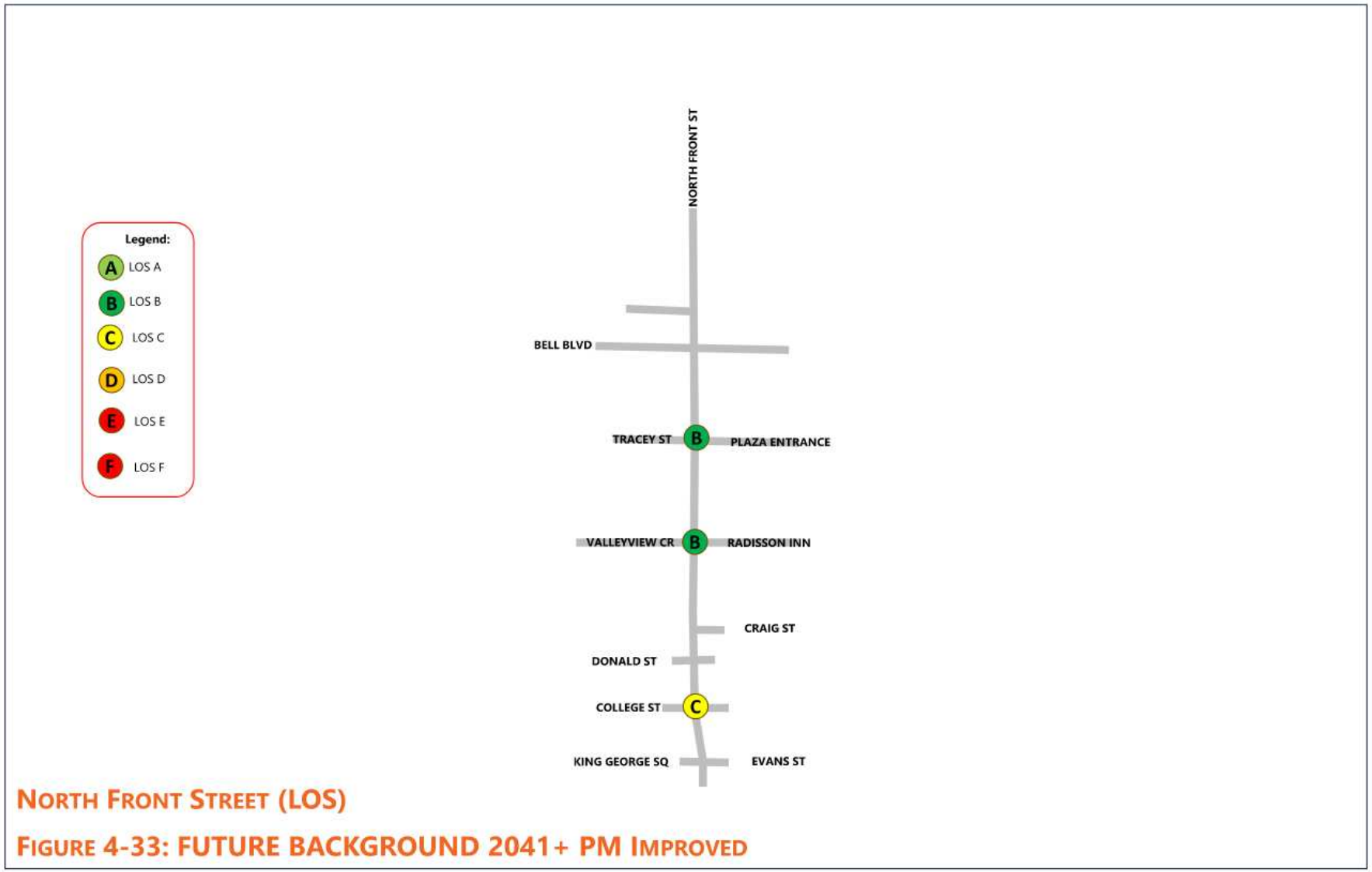

Figure 4-33: Future Background LOS PM 2041+ Improved

4.9.3 Future Total Scenarios – Bell Boulevard

The future total traffic volumes were derived by combining the future total and future site traffic volumes for both the AM and PM peak periods for the three scenarios (2031, 2041 and 2041+). The site traffic volumes were determined according to a trip generation assessment identified in **Section 4.6**.

Most of the existing signal timing plans were upgraded and optimized in the model with the intention of improving the signal timing, the vehicular capacity of the intersections and to provide a more efficient traffic flow for the main corridors. A coordinated traffic signal plan for Bell Boulevard was also implemented in the traffic model. **Figure 4-34** to **Figure 4-36** show the traffic volumes for the future total scenario.

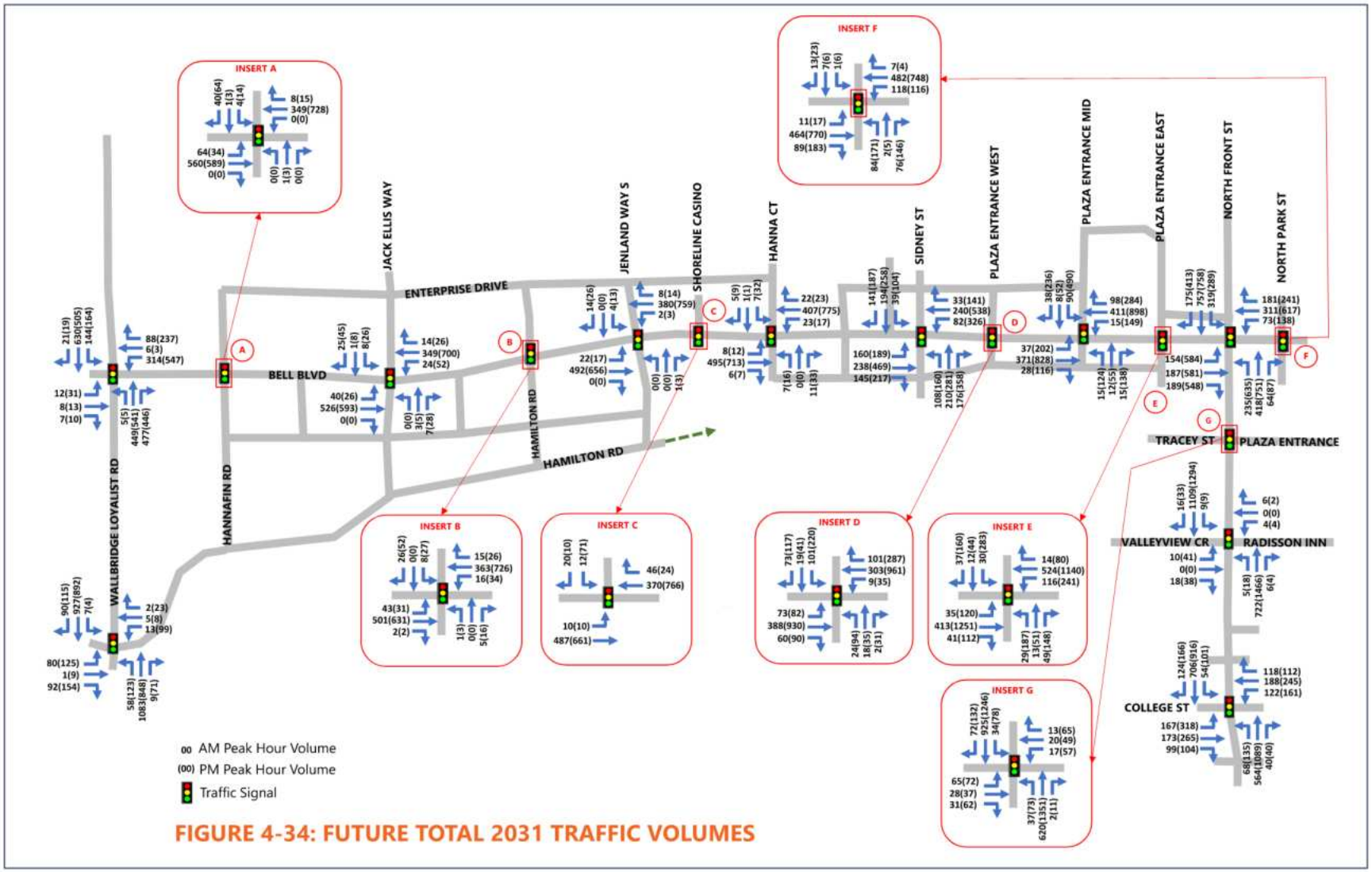

FIGURE 4-34: FUTURE TOTAL 2031 TRAFFIC VOLUMES

Figure 4-34: Future Total Traffic Volumes 2031

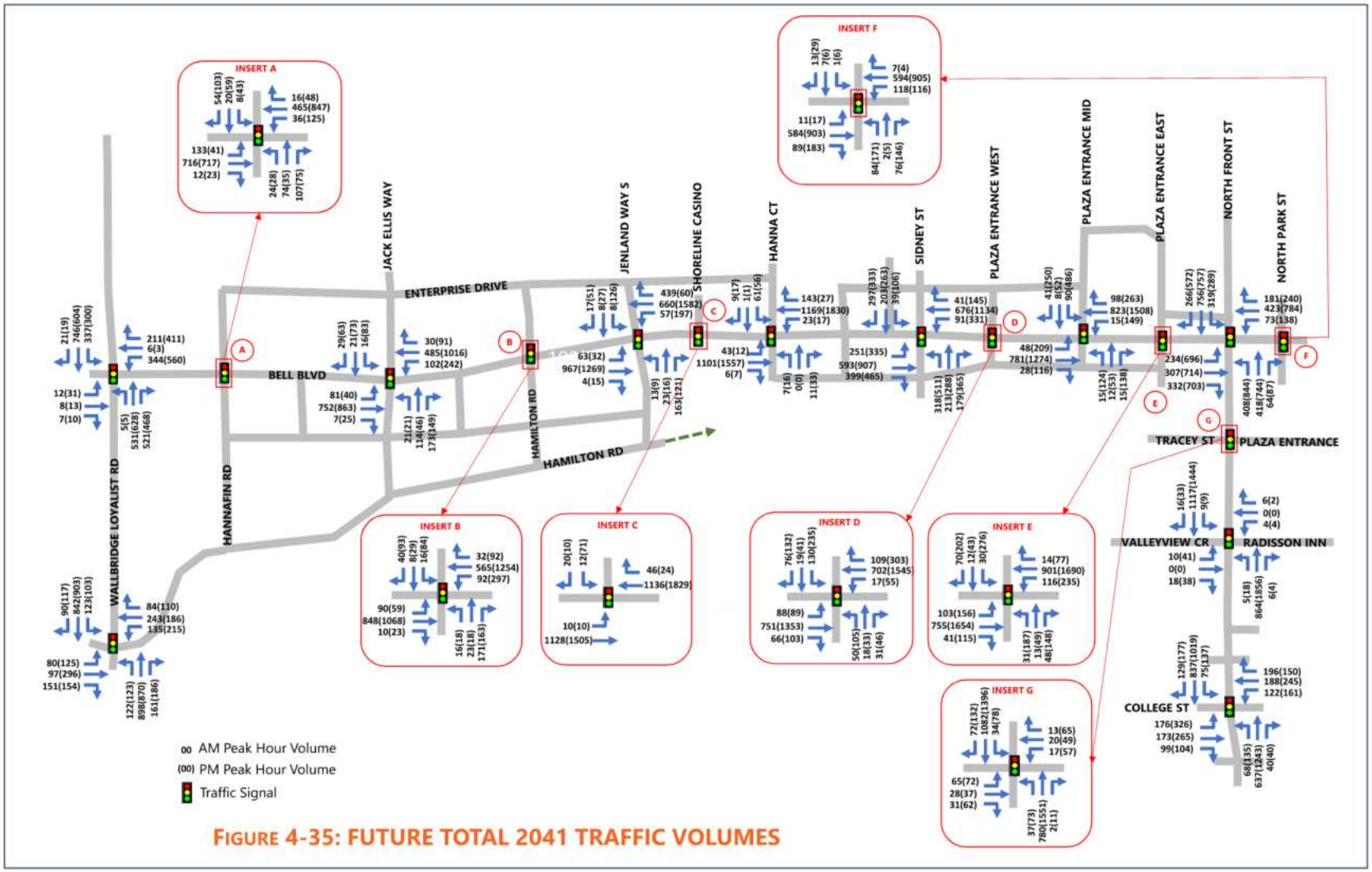

FIGURE 4-35: FUTURE TOTAL 2041 TRAFFIC VOLUMES

Figure 4-35: Future Total Traffic Volumes 2041

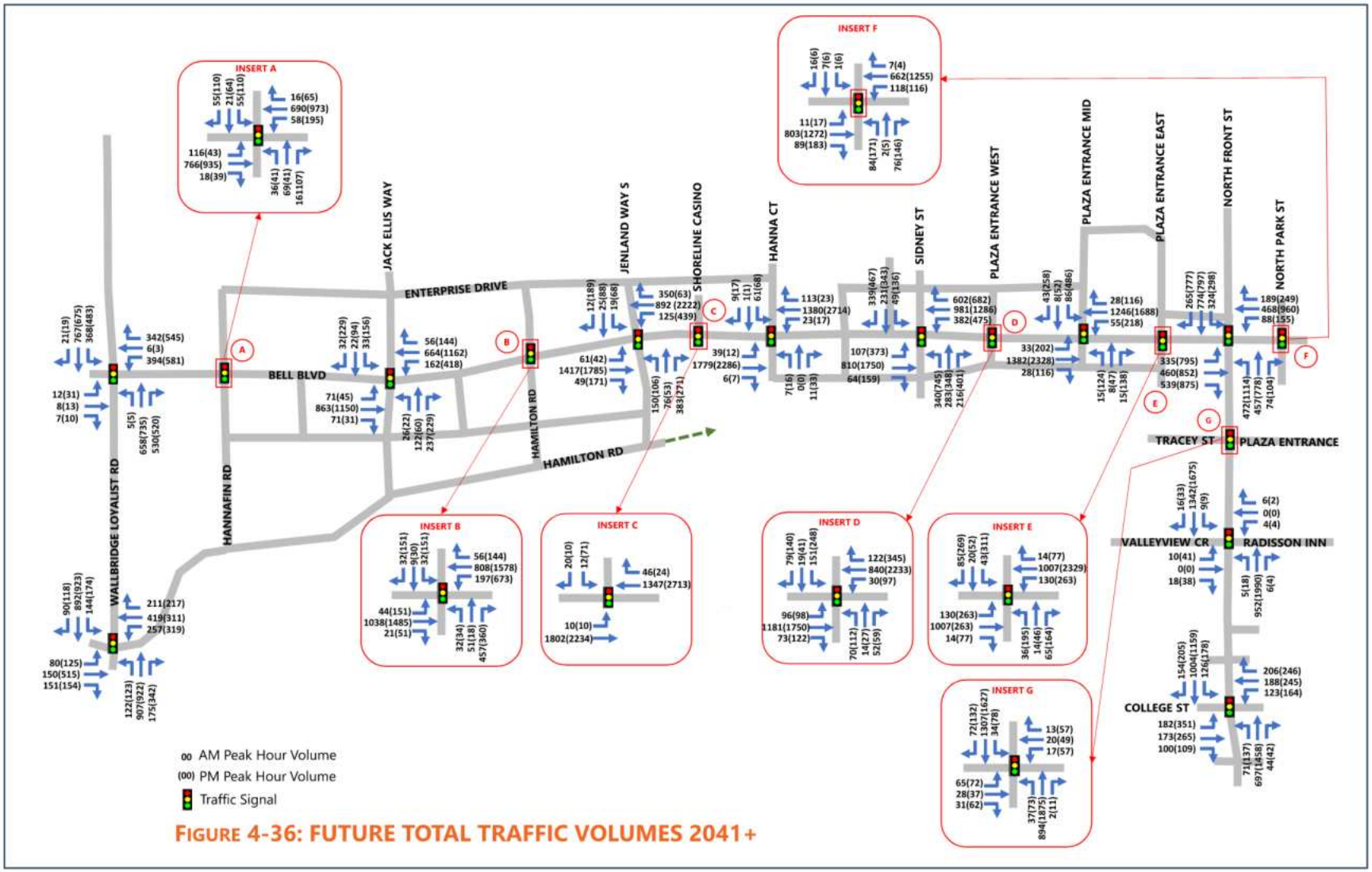

FIGURE 4-36: FUTURE TOTAL TRAFFIC VOLUMES 2041+

Figure 4-36: Future Total Traffic Volumes 2041+

4.9.3.1 Future Total Traffic Analysis (2031)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2031 future total conditions are summarized in **Table 4-22**.

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-37** shows the level of service for the future total scenario for the weekday AM peak period.

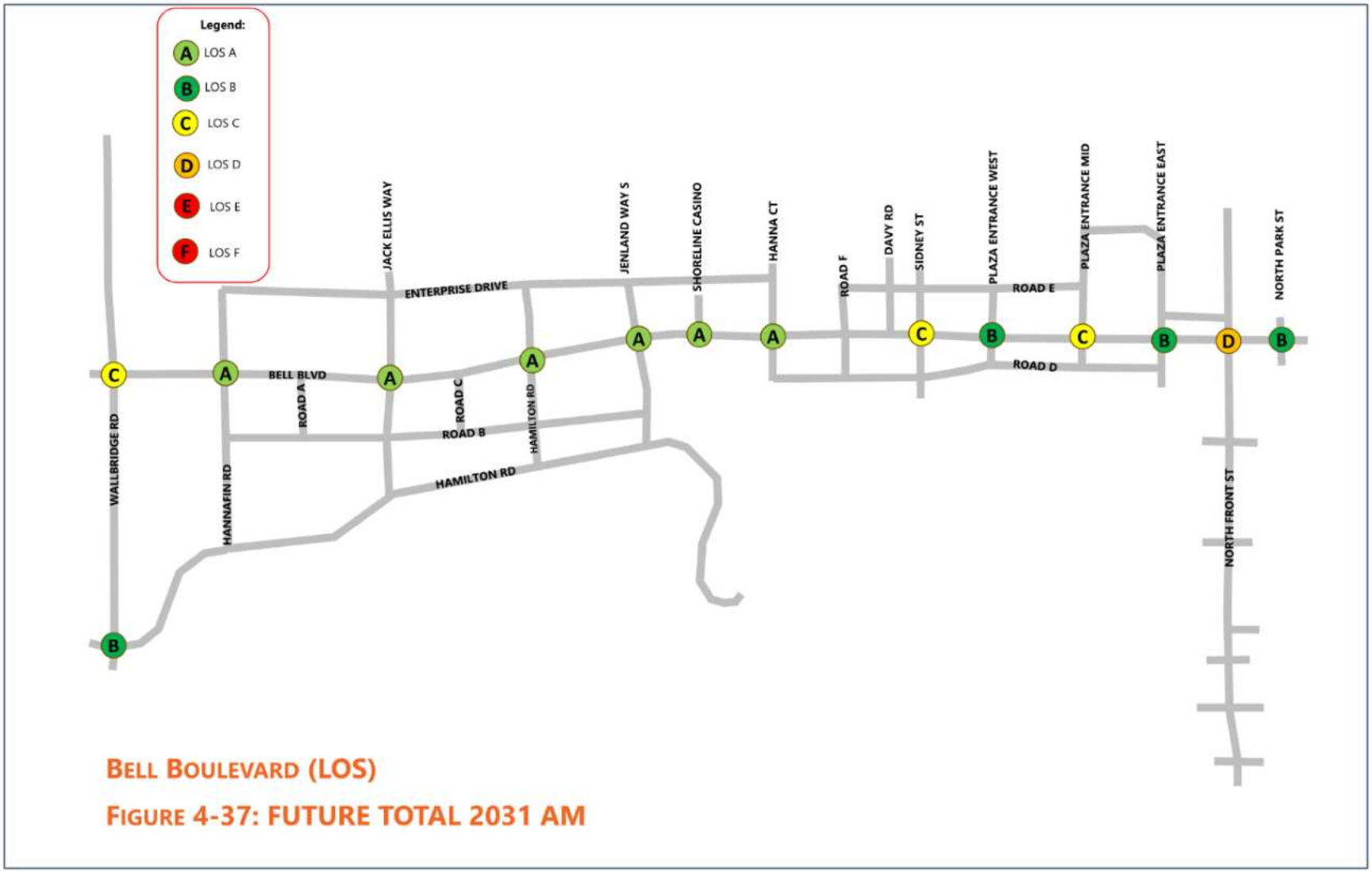

Figure 4-37: Future Total LOS AM 2031

Table 4-22: Future Total Traffic Performance - Scenario 2031 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.402	22.1	C	0.617	22.1	C
	EBL	0.13	38.9	D	0.15	35.52	D
	EBTR	0.17	39.27	D	0.11	35.29	D
	WBL	0.54	35.18	D	0.45	22.95	C
	WBTR	0.4	34.56	C	0.9	40.52	D
	NBL	0.02	21.92	C	0.02	20.27	C
	NBT	0.29	16.04	B	0.34	16.46	B
	NBR	0.67	20.85	C	0.62	20.05	C
	SBL	0.5	26.98	C	0.62	31.15	C
	SBT	0.4	17.15	B	0.32	16.34	B
	SBR	0.4	17.16	B	0.32	16.34	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.217	8.6	A	0.257	9.2	A
	EBL	0.27	7.64	A	0.26	6.97	A
	EBTR	0.27	7.74	A	0.26	7.06	A
	WBL	0.15	6.79	A	0.29	7.34	A
	WBTR	0.15	6.83	A	0.29	7.43	A
	NBLTR	0	33.65	C	0.01	38.49	D
	SBLTR	0.12	35.2	D	0.23	41.88	D
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.187	8.4	A	0.282	9.9	A
	EBL	0.24	7.41	A	0.25	6.95	A
	EBTR	0.24	7.47	A	0.25	7.01	A
	WBL	0.17	6.88	A	0.32	7.49	A
	WBTR	0.17	6.94	A	0.33	7.76	A
	NBLTR	0.02	33.93	C	0.09	39.69	D
	SBLTR	0.09	34.75	C	0.22	41.67	D
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.183	8.3	A	0.278	9.5	A
	EBL	0.23	7.35	A	0.27	7.09	A
	EBTR	0.23	7.41	A	0.27	7.18	A
	WBL	0.17	6.89	A	0.32	7.5	A
	WBTR	0.17	6.95	A	0.32	7.71	A
	NBLTR	0.02	33.81	C	0.05	39.13	D
	SBLTR	0.09	34.76	C	0.22	41.74	D
Bell Boulevard & Jenland	*Overall*	0.138	7.6	A	0.22	8.1	A
	EBL	0.03	8.33	A	0.03	9.66	A
	EBT	0.19	7.11	A	0.25	6.97	A

Way South (Signalized)	EBR	0.19	7.11	A	0.25	6.97	A
	WBL	0	8.58	A	0.01	8.69	A
	WBT	0.15	6.82	A	0.29	7.35	A
	WBR	0.15	6.82	A	0.29	7.35	A
	NBL	0	0	A	0	0	A
	NBT	0	0	A	0	0	A
	NBR	0	33.65	C	0.01	38.52	D
	SBL	0.01	35.36	D	0.04	40.63	D
	SBTR	0.04	34.12	C	0.08	39.52	D
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.148	7.90	A	0.25	8.9	A
	EBL	0.01	8.39	A	0.02	9.65	A
	EBT	0.2	7	A	0.26	6.86	A
	WBL	0.16	6.89	A	0.3	7.39	A
	WBTR	0.17	6.95	A	0.3	7.43	A
	SBL	0.03	33.99	C	0.2	41.18	D
	SBR	0.06	34.36	C	0.03	38.83	D
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.154	8	A	0.261	9.3	A
	EBLT	0.21	7.22	A	0.29	7.3	A
	EBTR	0.21	7.25	A	0.29	7.35	A
	WBLT	0.19	7.07	A	0.32	7.6	A
	WBTR	0.19	7.16	A	0.33	7.75	A
	NBLTR	0.05	34.2	C	0.14	40.35	D
	SBLTR	0.03	34.02	C	0.12	40.02	D
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.298	34.7	C	0.572	46.2	D
	EBL	0.38	37.85	D	0.7	63.37	E
	EBT	0.29	25.34	C	0.65	43.49	D
	EBR	0.3	25.56	C	0.66	44.07	D
	WBL	0.33	51.88	D	0.7	58.56	E
	WBT	0.35	39.69	D	0.68	46.03	D
	WBR	0.36	39.82	D	0.68	46.38	D
	NBL	0.38	51.66	D	0.5	57.45	E
	NBT	0.37	32.27	C	0.46	34.58	C
	NBR	0.37	32.46	C	0.69	42.81	D
	SBL	0.3	54.07	D	0.69	79.54	E
	SBT	0.19	29.71	C	0.23	30.64	C
	SBR	0.3	32	C	0.37	33.73	C
Bell Boulevard & Plaza Entrance	*Overall*	0.182	16.5	B	0.477	26.7	C
	EBL	0.15	18.38	B	0.52	56.16	E
	EBT	0.21	14.58	B	0.6	24.95	C
	EBR	0.07	13.43	B	0.13	18.02	B
	WBL	0.02	17.4	B	0.19	38.77	D

West (Signalized)	WBT	0.16	14.14	B	0.62	25.43	C
	WBR	0.12	13.92	B	0.42	22.49	C
	NBLTR	0.08	22.52	C	0.32	29.22	C
	SBL	0.21	25.37	C	0.61	36.11	D
	SBTR	0.15	23.41	C	0.25	23.17	C
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.192	20	C	0.668	44.9	D
	EBL	0.14	48.99	D	0.69	66.84	E
	EBT	0.21	15.94	B	0.8	49.76	D
	EBR	0.22	15.96	B	0.81	50.12	D
	WBL	0.12	49.75	D	0.76	79.34	E
	WBT	0.23	15.82	B	0.73	38.52	D
	WBR	0.12	14.99	B	0.51	35	C
	NBL	0.04	32.83	C	0.26	23.46	C
	NBTR	0.06	29.92	C	0.6	52.42	D
	SBL	0.23	35.31	D	0.79	38.61	D
	SBTR	0.1	30.37	C	0.57	39.63	D
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.184	10.4	B	0.687	33.1	C
	EBL	0.06	7.56	A	0.34	18.27	B
	EBT	0.17	5.6	A	0.75	31.32	C
	EBR	0.17	5.61	A	0.76	31.58	C
	WBL	0.17	8.24	A	0.75	38.94	D
	WBT	0.21	5.64	A	0.64	24.52	C
	WBR	0.01	4.71	A	0.1	16.57	B
	NBL	0.11	42.54	D	0.48	36.94	D
	NBTR	0.2	39.76	D	0.76	69.75	E
	SBL	0.13	43.53	D	0.7	44.38	D
	SBTR	0.16	39.06	D	0.54	46.72	D
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.469	49.5	D	0.795	**128**	**F**
	EBL	0.62	61.15	E	1.11	282.92	F
	EBT	0.18	29.58	C	0.61	41.43	D
	EBR	0.41	33.98	C	0.37	52.56	D
	WBL	0.57	67.19	E	0.4	46.02	D
	WBT	0.3	31.06	C	0.64	42.32	D
	WBR	0.41	34.35	C	0.57	43.59	D
	NBL	0.68	58.34	E	1.09	237.4	F
	NBT	0.47	36.6	D	0.9	62.29	E
	NBR	0.16	32.67	C	0.24	38.81	D
	SBL	1.01	**151.14**	**F**	0.98	134.58	F
	SBT	0.63	33.25	C	1.1	261.79	F
	SBR	0.33	28.81	C	0.32	55.15	E
	Overall	0.217	12.6	B	0.385	17.3	B

Bell Boulevard & North Park Street (Signalized)	EBL	0.02	10.23	B	0.04	15.29	B
	EBT	0.24	8.66	A	0.42	13.12	B
	EBTR	0.24	8.69	A	0.42	13.17	B
	WBL	0.22	13.2	B	0.34	24.18	C
	WBT	0.21	8.38	A	0.32	11.77	B
	WBTR	0.21	8.38	A	0.32	11.77	B
	NBL	0.24	37.99	D	0.41	41.17	D
	NBTR	0.2	34	C	0.33	35.89	D
	SBL	0	36.21	D	0.02	39.37	D
	SBTR	0.08	32.54	C	0.06	31.61	C
Wallbridge Road & Hamilton Road (Signalized)	*Overall*	0.345	14.7	B	0.372	13.6	B
	EBL	0.27	28.09	C	0.37	27.89	C
	EBTR	0.55	30.08	C	0.46	25.81	C
	WBL	0.27	33.47	C	0.44	33.86	C
	WBTR	0.02	24.15	C	0.08	22.04	C
	NBL	0.41	21.91	C	0.4	20.06	C
	NBT	0.49	11.87	B	0.44	9.78	A
	NBR	0.49	11.88	B	0.44	9.79	A
	SBL	0.02	16.27	B	0.01	13.44	B
	SBT	0.48	11.79	B	0.49	10.23	B
	SBTR	0.48	11.81	B	0.49	10.25	B

During the AM peak period, all intersections along Bell Boulevard operate at acceptable conditions with LOS D or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2031 future total scenario.

- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 151 seconds.

During the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions, except for Bell Boulevard and North Front Street with LOS F. The LOS for the PM peak period is presented on **Figure 4-38**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

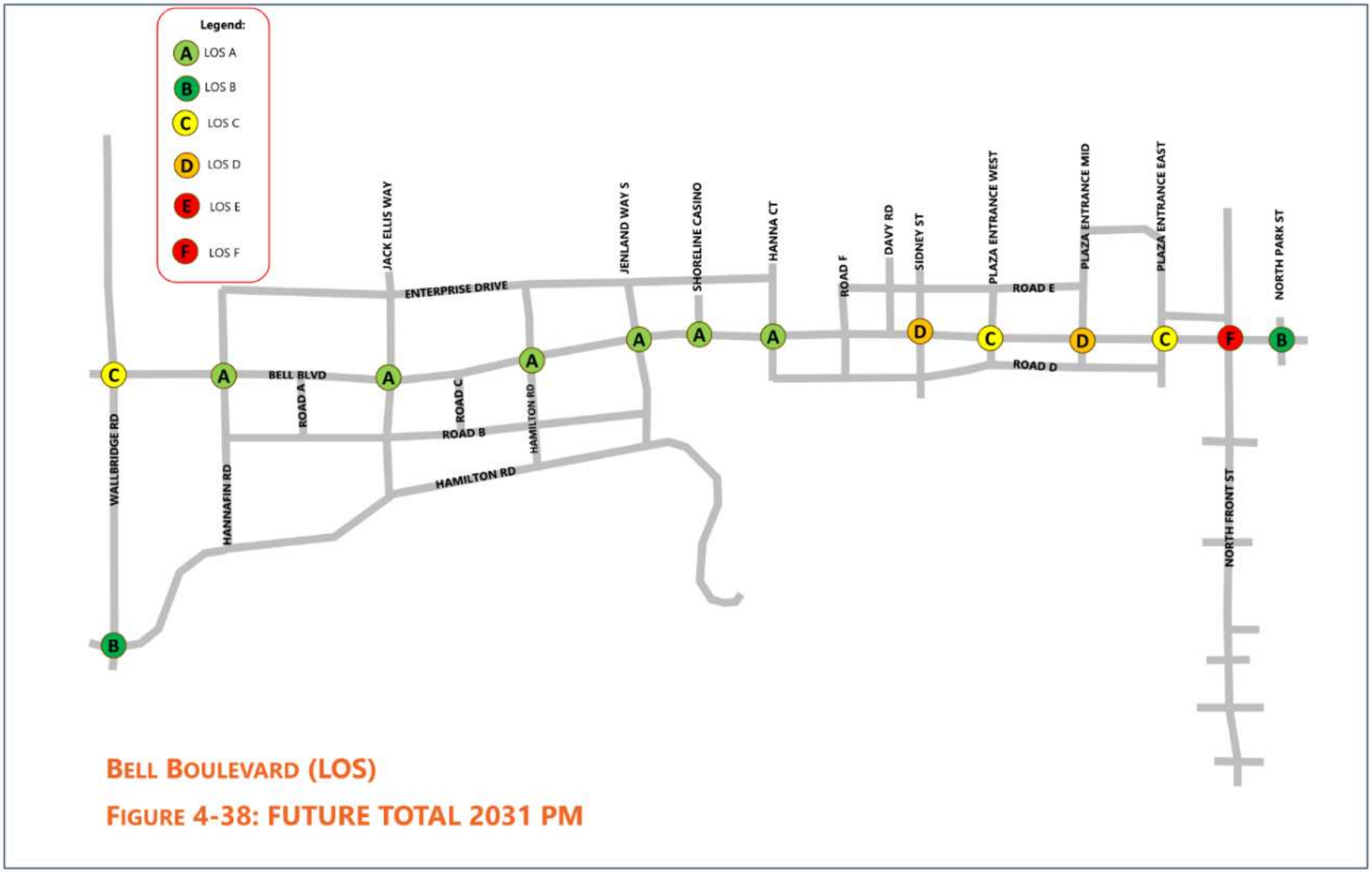

Figure 4-38 Future Total LOS PM 2031

The following list describes the most notable critical movements in the network during the PM peak period for the 2031 future total scenario.

- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 283 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 237 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 134 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 261 seconds.

4.9.3.2 Future Total Traffic Analysis (2031) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2031 Future Total scenario. **Figure 4-39** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2031 future total conditions are summarized in **Table 4-23.**

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

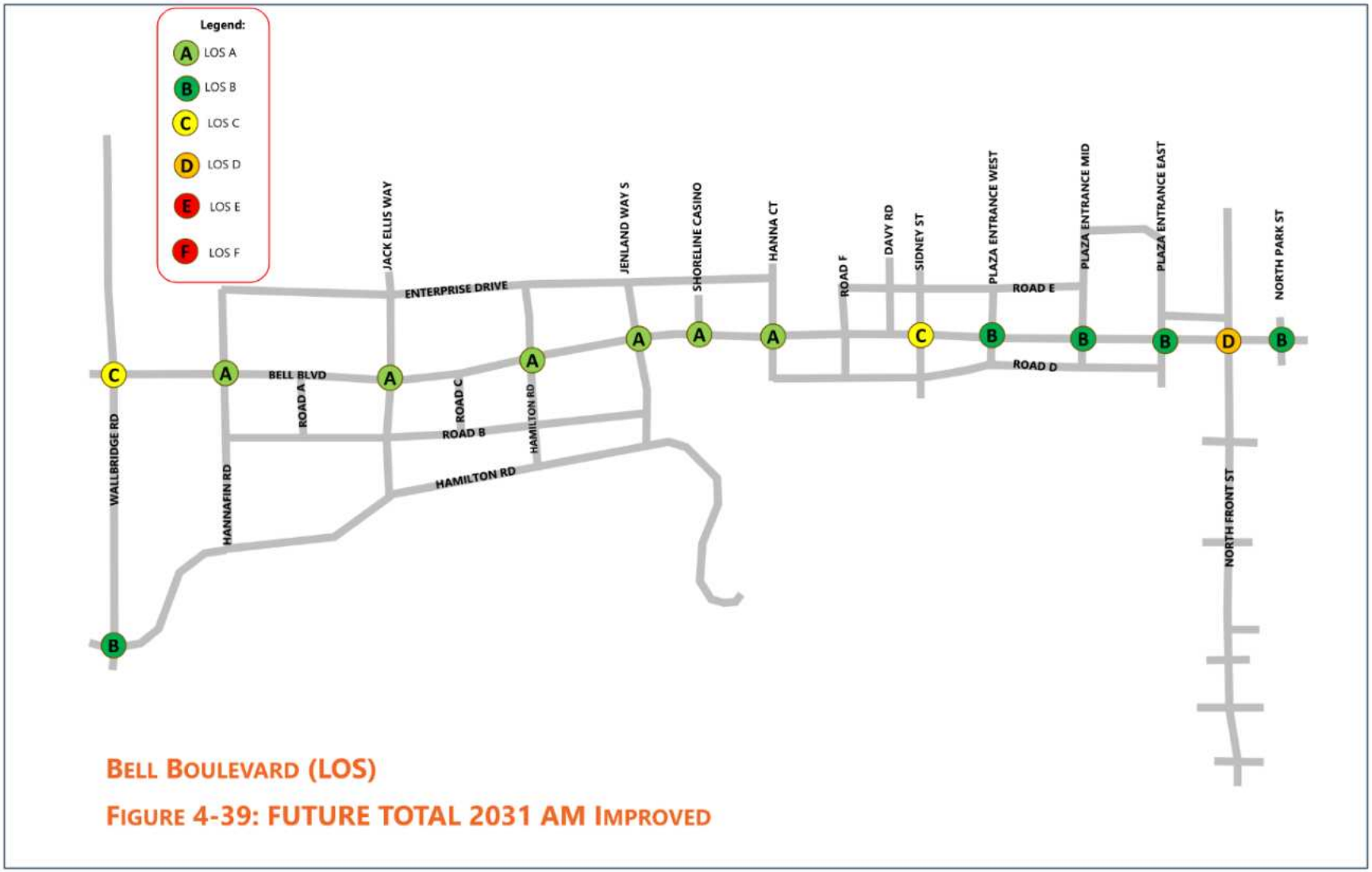

Figure 4-39 Future Total LOS AM 2031 Improved

Table 4-23: Future Total Traffic Performance - Scenario 2031 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.402	27.6	C	0.459	27.9	C
	EBL	0.14	43.38	D	0.15	40.1	D
	EBTR	0.17	43.78	D	0.12	39.85	D
	WBL	0.61	40.88	D	0.81	40.97	D
	WBT	0.02	36.3	D	0.02	32.72	C
	WBR	0.37	39.22	D	0.77	42.27	D
	NBL	0.02	27.8	C	0.02	22.84	C
	NBT	0.32	20.73	C	0.34	18.59	B
	NBR	0.74	27.27	C	0.63	22.57	C
	SBL	0.57	34.53	C	0.64	35.21	D
	SBT	0.44	22.18	C	0.32	18.44	B
	SBR	0.44	22.19	C	0.32	18.44	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.217	8.6	A	0.257	9	A
	EBTL	0.27	7.64	A	0.25	6.44	A
	EBTR	0.27	7.74	A	0.25	6.52	A
	WBTL	0.15	6.79	A	0.28	6.78	A
	WBTR	0.15	6.83	A	0.29	6.86	A
	NBLTR	0	33.65	C	0.01	43.32	D
	SBLTR	0.12	35.2	D	0.25	47.24	D
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.187	8.4	A	0.282	9.7	A
	EBTL	0.24	7.41	A	0.24	6.42	A
	EBTR	0.24	7.47	A	0.25	6.48	A
	WBTL	0.17	6.88	A	0.31	6.92	A
	WBTR	0.17	6.94	A	0.32	7.16	A
	NBLTR	0.02	33.93	C	0.1	44.69	D
	SBLTR	0.09	34.75	C	0.24	47.01	D
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.183	8.3	A	0.279	9.4	A
	EBLT	0.23	7.35	A	0.26	6.55	A
	EBTR	0.23	7.41	A	0.27	6.63	A
	WBLT	0.16	6.88	A	0.31	6.93	A
	WBTR	0.17	6.94	A	0.31	7.12	A
	NBLTR	0.02	33.81	C	0.06	44.05	D
	SBLTR	0.09	34.76	C	0.24	47.09	D
Bell Boulevard	*Overall*	0.158	7.7	A	0.24	7.8	A
	EBTL	0.21	7.23	A	0.26	6.56	A

& Jenland Way South (Signalized)	EBTR	0.21	7.27	A	0.26	6.61	A
	WBTL	0.16	6.86	A	0.29	6.88	A
	WBTR	0.16	6.9	A	0.3	6.96	A
	NBLTR	0	33.65	C	0.01	43.35	D
	SBLTR	0.05	34.21	C	0.12	44.97	D
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.148	7.9	A	0.25	8.70	A
	EBL	0.01	8.39	A	0.02	8.91	A
	EBT	0.02	7.0	A	0.25	6.34	A
	WBR	0.16	6.89	A	0.29	6.86	A
	WBT	0.17	6.95	A	0.29	6.82	A
	SBL	0.03	33.99	C	0.21	46.43	D
	SBR	0.06	34.36	C	0.03	43.71	D
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.154	8.0	A	0.261	9.1	A
	EBLT	0.21	7.22	A	0.28	6.74	A
	EBTR	0.21	7.25	A	0.28	6.79	A
	WBLT	0.19	7.07	A	0.31	7.02	A
	WBTR	0.19	7.16	A	0.32	7.16	A
	NBLTR	0.05	34.2	C	0.15	45.46	D
	SBLTR	0.03	34.02	C	0.13	45.12	D
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.298	34.7	C	0.654	51.1	D
	EBL	0.38	37.85	D	0.65	62.21	E
	EBT	0.29	25.34	C	0.75	56.12	E
	EBR	0.3	25.56	C	0.75	57.15	E
	WBL	0.33	51.88	D	0.79	62.2	E
	WBT	0.35	39.69	D	0.46	36.33	D
	WBR	0.36	39.82	D	0.27	34	C
	NBL	0.38	51.66	D	0.46	59.51	E
	NBT	0.37	32.27	C	0.52	42.72	D
	NBR	0.37	32.46	C	0.79	56.96	E
	SBL	0.3	54.07	D	**0.75**	**95.25**	**F**
	SBT	0.19	29.71	C	0.27	38.9	D
	SBR	0.3	32	C	0.44	43.5	D
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.182	15.8	B	0.477	22.6	C
	EBL	0.15	16.42	B	0.4	39.19	D
	EBT	0.2	12.98	B	0.51	18.54	B
	EBR	0.07	11.95	B	0.11	13.59	B
	WBL	0.02	15.55	B	0.14	28.97	C
	WBT	0.16	12.58	B	0.53	18.86	B
	WBR	0.11	12.39	B	0.35	16.78	B
	NBL	0.05	28.55	C	0.28	41.67	D
	NBTR	0.03	23.91	C	0.12	29.45	C

	SBL	0.2	28.3	C	0.52	43.23	D
	SBTR	0.16	25.53	C	0.31	32.68	C
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.192	19.8	B	0.641	44.5	D
	EBL	0.14	48.99	D	0.62	65.86	E
	EBT	0.21	15.61	B	0.71	42.45	D
	EBR	0.03	14.07	B	0.22	33.08	C
	WBL	0.12	49.75	D	0.71	76.09	E
	WBT	0.23	15.82	B	0.72	40.67	D
	WBR	0.12	14.99	B	0.51	37.03	D
	NBL	0.04	31.32	C	0.19	23.29	C
	NBTR	0.06	29.92	C	0.57	54.04	D
	SBL	0.23	35.31	D	0.81	42.76	D
	SBT	0.02	29.27	C	0.11	38.5	D
	SBR	0.11	30.54	C	0.6	50.32	D
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.177	10.1	B	0.675	34.8	C
	EBL	0.06	7.12	A	0.3	18.97	B
	EBT	0.17	5.27	A	0.74	31.96	C
	EBR	0.17	5.28	A	0.75	32.2	C
	WBL	0.17	7.77	A	0.75	40.08	D
	WBT	0.2	5.3	A	0.69	29.93	C
	WBR	0.01	4.43	A	0.11	20.12	C
	NBL	0.12	43.55	D	0.62	58.48	E
	NBT	0.04	38.13	D	0.09	31.62	C
	NBR	0.18	40.19	D	0.29	34.98	C
	SBL	0.12	41.71	D	0.74	57.36	E
	SBTR	0.17	40.04	D	0.39	36.87	D
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.469	50.2	D	0.81	70.5	E
	EBL	0.62	61.15	E	**0.94**	**88.58**	**F**
	EBT	0.18	29.58	C	0.66	48.01	D
	EBR	0.13	32.85	C	0.37	55.92	E
	WBL	0.57	67.19	E	0.46	53.58	D
	WBT	0.3	31.06	C	0.7	49.24	D
	WBR	0.41	34.35	C	0.62	50.84	D
	NBL	0.62	54.43	D	**0.94**	**84.51**	**F**
	NBT	0.47	36.6	D	**0.97**	**95.93**	**F**
	NBR	0.16	32.67	C	0.25	44.14	D
	SBL	1.01	**151.14**	**F**	0.85	77.23	E
	SBT	0.65	34.37	C	**0.95**	**81.19**	**F**
	SBR	0.14	42.39	D	0.31	57.84	E
Bell Boulevard	*Overall*	0.217	12.6	B	0.385	18.2	B
	EBL	0.02	10.23	B	0.04	15.94	B

& North Park Street (Signalized)	EBT	0.24	8.66	A	0.42	13.66	B
	EBR	0.24	8.69	A	0.42	13.71	B
	WBL	0.22	13.2	B	0.34	25.08	C
	WBT	0.21	8.38	A	0.32	12.28	B
	WBR	0.21	8.38	A	0.32	12.28	B
	NBL	0.24	37.99	D	0.42	44.08	D
	NBTR	0.2	34	C	0.33	38.57	D
	SBL	0	36.21	D	0.02	42.36	D
	SBTR	0.08	32.54	C	0.06	34.1	C
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.345	18.3	B	0.372	19.1	B
	EBL	0.31	33.73	C	0.39	35.28	D
	EBTR	0.62	37.39	D	0.47	33.14	C
	WBL	0.34	40.88	D	0.48	43.02	D
	WBTR	0.03	29.02	C	0.09	28.65	C
	NBL	0.45	26.88	C	0.47	28.97	C
	NBT	0.51	14.8	B	0.47	14.51	B
	NBR	0.51	14.82	B	0.47	14.52	B
	SBL	0.03	19.86	B	0.01	19.29	B
	SBT	0.5	14.7	B	0.52	15.15	B
	SBR	0.5	14.72	B	0.52	15.18	B

In the improved scenario, during the AM peak period, all intersections along Bell Boulevard operate at acceptable conditions with LOS D or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2031 future total scenario.

- The SBL movement on North Front Street & Bell Boulevard has a LOS F with a delay of 151 seconds.

In the improved scenario, during the PM peak period, all intersections along Bell Boulevard operate at acceptable conditions with LOS D or better. The LOS for the PM peak period is presented on **Figure 4-40** The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

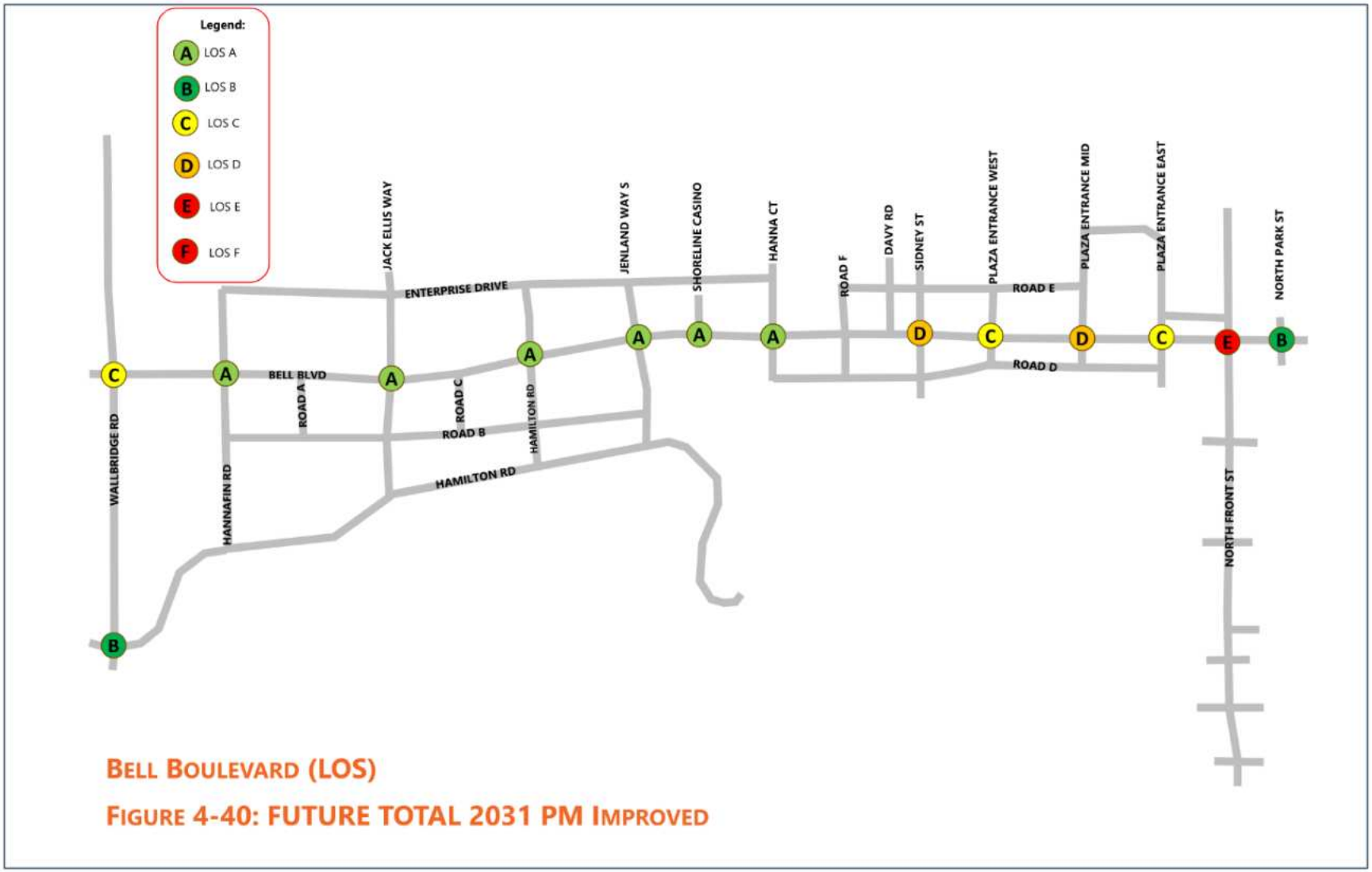

Figure 4-40: Future Total LOS PM 2031 Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2031 future total scenario.

- The SBL movement on Sidney Street & Bell Boulevard has a LOS F with a delay of 95 seconds.
- The EBL movement on North Front Street & Bell Boulevard has a LOS F with a delay of 88 seconds.
- The NBL movement on North Front Street & Bell Boulevard has a LOS F with a delay of 84 seconds.
- The NBT movement on North Front Street & Bell Boulevard has a LOS F with a delay of 95 seconds.
- The SBT movement on North Front Street & Bell Boulevard has a LOS F with a delay of 81 seconds.

Overall, the Future Total 2031 road network is expected to generally operate well within capacity. Similar to previous traffic scenarios in the future background conditions, some movements are expected to operate with a level of service of F, but the majority would be within capacity.

In addition to the corridor signal optimization, geometric improvements are recommended along Bell Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the existing lane configurations to the scenario being analyzed. To summarize the list of geometric improvements made in the 2031 future total improved scenario, **Table 4-24** is presented below:

Table 4-24: Future Total - Scenario 2031 - List of Geometric Improvements (Bell Boulevard Corridor)

Intersection	Improvements	Notes
Wallbridge Loyalist Road & Bell Boulevard	1 NBT lane, 1 SBT lane, 1 WBR and 1 WBL lane	Widening of Bell Boulevard and Wallbridge Loyalist is already anticipated in the TMP
Bell Boulevard & Hannafin Road	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the south leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Jenland Way South	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the north leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hanna Court	-	-
Bell Boulevard & Davy Road	-	-

Bell Boulevard & Sidney Street	-	-
Bell Boulevard & Plaza Entrance West	1 SBL lane and 1 NBL	Likely only pavement marking improvements to separate traffic would be sufficient, subject to further study and design
Bell Boulevard & Plaza Entrance Mid	1 EBR lane, 1 NBL lane and 1 SBR lane	-
Bell Boulevard & Plaza Entrance East	1 NBR lane	-
Bell Boulevard & North Front Street	1 WBR lane	-
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	Widening of Bell Boulevard from 2 to 4 lanes. Construction of the south leg of the intersection.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Shorelines Casino	Widening of Bell Boulevard from 2 to 4 lanes.	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hamilton Road North		-

4.9.3.3 Future Total Traffic Analysis (2041)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2041 future total conditions are summarized in **Table 4-25**.

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-41** shows the level of service for the future total scenario for the weekday AM peak period.

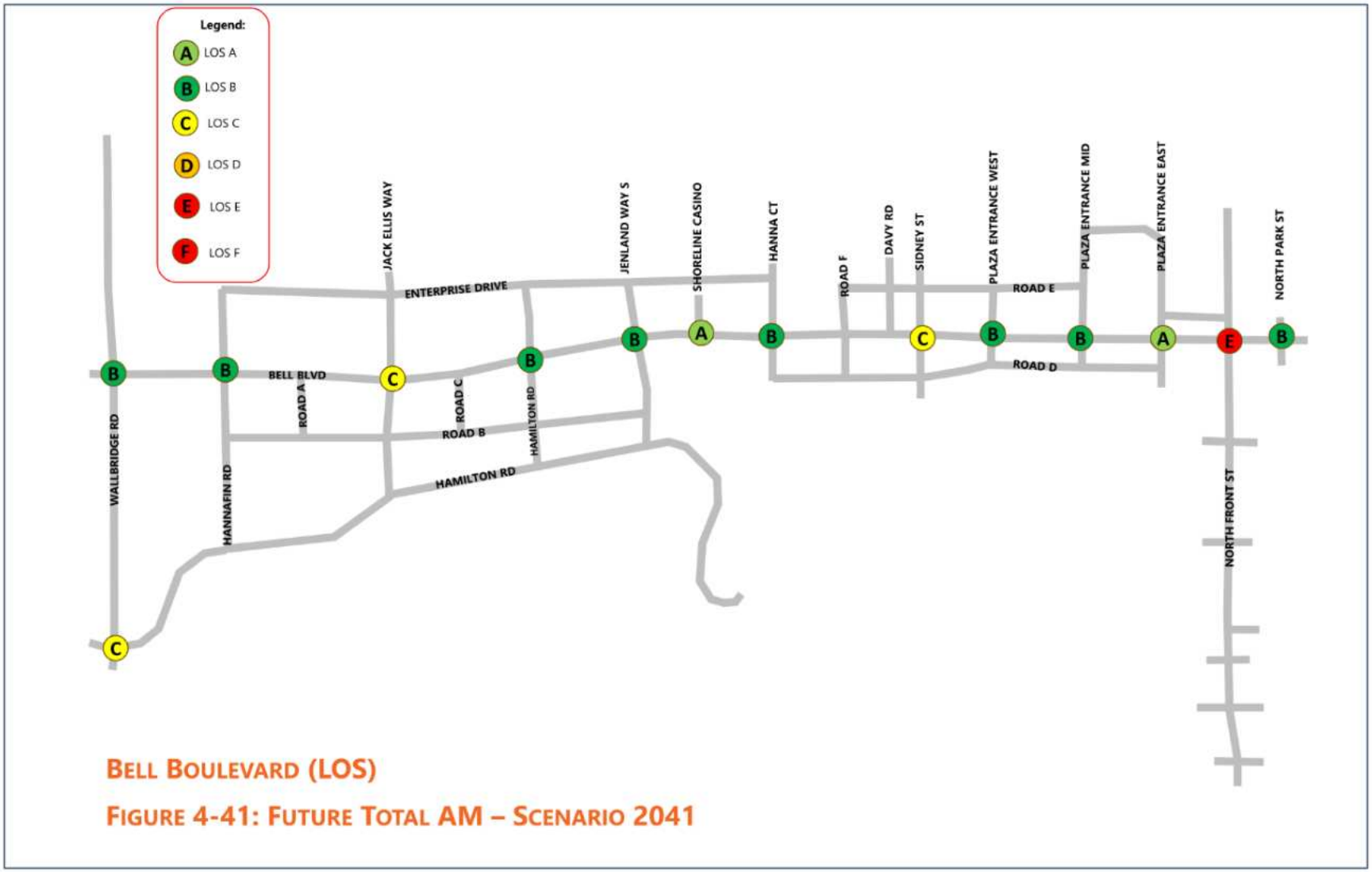

Figure 4-41 Future Total LOS AM 2041

Table 4-25: Future Total Traffic Performance - Scenario 2041 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.382	14.3	B	0.576	17.5	B
	EBL	0.15	52.83	D	0.23	44.18	D
	EBTR	0.19	53.32	D	0.18	43.77	D
	WBL	0.32	31.68	C	0.64	34.45	C
	WBT	0.01	28.49	C	0.01	28.4	C
	WBR	0.15	0.46	A	0.54	19.49	B
	NBL	0	0.46	A	0.01	5.52	A
	NBT	0.46	31.73	C	0.44	22.05	C
	NBR	0.24	0.05	A	0.35	1.06	A
	SBL	0.33	4.6	A	0.63	9.58	A
	SBT	0.33	10.95	B	0.28	10.1	B
	SBR	0.33	10.95	B	0.28	10.1	B
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.415	15.5	B	0.489	17	B
	EBL	0.44	13.3	B	0.35	9.41	A
	EBTR	0.45	12.13	B	0.36	9.44	A
	WBL	0.26	9.25	A	0.51	14.71	B
	WBTR	0.26	9.28	A	0.52	11.8	B
	NBLTR	0.44	37.71	D	0.3	44.24	D
	SBLTR	0.18	33.02	C	0.51	49.16	D
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.381	21.1	C	0.593	18.9	B
	EBL	0.2	24.24	C	0.12	15.84	B
	EBT	0.42	19.88	B	0.35	9.62	A
	EBR	0.42	19.88	B	0.35	9.63	A
	WBL	0.33	31.44	C	0.66	30.09	C
	WBT	0.28	17.91	B	0.41	10.44	B
	WBR	0.29	17.92	B	0.42	10.47	B
	NBLTR	0.42	25.14	C	0.49	47.94	D
	SBLTR	0.1	20.25	C	0.64	55.59	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.355	16.1	B	0.53	26	C
	EBL	0.19	17.29	B	0.16	11.66	B
	EBT	0.39	13.48	B	0.6	28	C
	EBR	0.39	13.48	B	0.6	28.01	C
	WBL	0.26	21.78	C	0.53	18.29	B
	WBT	0.27	12.05	B	0.59	18.93	B
	WBR	0.27	12.06	B	0.59	19.04	B

	NBLTR	0.39	32.14	C	0.48	47.63	D
	SBLTR	0.12	27.76	C	0.61	54.4	D
Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.412	12.5	B	0.551	15.4	B
	EBL	0.19	16.49	B	0.15	19.46	B
	EBT	0.38	8.79	A	0.47	8.69	A
	EBR	0.38	8.79	A	0.47	8.7	A
	WBL	0.15	13.6	B	0.65	33.15	C
	WBT	0.46	9.75	A	0.59	10.57	B
	WBR	0.46	9.94	A	0.59	10.64	B
	NBL	0.04	36.03	D	0.03	46.69	D
	NBT	0.06	34.29	C	0.05	43.83	D
	NBR	0.46	41.77	D	0.41	50.91	D
	SBL	0.03	36.45	D	0.49	57.25	E
	SBT	0.02	33.85	C	0.08	44.27	D
	SBR	0.05	34.23	C	0.17	45.87	D
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.329	9.9	A	0.52	11.8	B
	EBL	0.03	14.05	B	0.06	21	C
	EBT	0.46	9.21	A	0.58	9.49	A
	WBL	0.46	9.78	A	0.66	12.12	B
	WBT	0.47	9.88	A	0.67	12.21	B
	SBL	0.03	33.99	C	0.21	46.43	D
	SBR	0.06	34.36	C	0.03	43.71	D
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.434	11.8	B	0.575	13.5	B
	EBLT	0.51	10.04	B	0.6	10.79	B
	EBTR	0.52	10.41	B	0.61	10.97	B
	WBLT	0.56	11.17	B	0.71	13.38	B
	WBTR	0.57	11.77	B	0.71	13.73	B
	NBLTR	0.05	34.19	C	0.15	45.43	D
	SBLTR	0.18	36.03	D	0.23	46.82	D
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.618	31.7	C	0.742	43.7	D
	EBL	0.77	52.54	D	0.86	60.13	E
	EBT	0.34	17.62	B	0.7	38.52	D
	EBR	0.51	21.31	C	0.5	18.3	B
	WBL	0.33	29.07	C	0.81	43.54	D
	WBT	0.38	18.2	B	0.85	46.21	D
	WBR	0.05	14.77	B	0.25	30.2	C
	NBL	0.77	61.16	E	0.84	67.91	E
	NBT	0.39	33.33	C	0.58	46.87	D
	NBR	0.38	33.56	C	0.52	29.34	C
	SBL	0.3	54.07	D	0.64	75.54	E
	SBT	0.24	33.91	C	0.4	48.38	D

	SBR	0.76	52.19	D	0.56	37.29	D
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.307	14.5	B	0.599	21.7	C
	EBL	0.22	16.72	B	0.62	62	E
	EBT	0.34	10.57	B	0.59	15.34	B
	EBR	0.07	8.49	A	0.1	9.66	A
	WBL	0.04	14.39	B	0.27	31.41	C
	WBT	0.32	10.35	B	0.67	16.97	B
	WBR	0.11	8.82	A	0.3	11.67	B
	NBL	0.15	36.56	D	0.39	52.38	D
	NBTR	0.11	30.4	C	0.17	36.37	D
	SBL	0.34	38.28	D	0.66	56.6	E
	SBLTR	0.21	31.9	C	0.38	40.45	D
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.31	17.4	B	0.778	62.9	E
	EBL	0.19	49.57	D	0.86	**98.96**	**F**
	EBT	0.39	13.98	B	0.91	58.27	E
	EBR	0.03	10.72	B	0.92	60.06	E
	WBL	0.12	49.75	D	0.89	**124.73**	**F**
	WBT	0.41	14.2	B	0.96	56.56	E
	WBR	0.11	11.42	B	0.38	26.73	C
	NBL	0.05	36.97	D	0.22	28.75	C
	NBTR	0.08	35.55	D	0.64	60.25	E
	SBL	0.3	42.48	D	0.96	**95.77**	**F**
	SBT	0.02	34.64	C	0.12	40.14	D
	SBR	0.15	36.64	D	0.68	55.99	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.296	10	A	0.741	35.2	D
	EBL	0.24	11.57	B	0.53	31.17	C
	EBT	0.3	6.14	A	0.81	29.45	C
	EBR	0.3	6.15	A	0.83	30.21	C
	WBL	0.23	10.53	B	0.84	65.03	E
	WBT	0.35	6.22	A	0.79	24.16	C
	WBR	0.01	4.43	A	0.08	11.95	B
	NBL	0.12	41.65	D	0.49	47.22	D
	NBT	0.04	38.13	D	0.17	49.1	D
	NBR	0.17	40.13	D	0.6	61.75	E
	SBL	0.12	41.71	D	0.74	60.52	E
	SBT	0.04	38.09	D	0.15	48.68	D
	SBR	0.25	41.5	D	0.82	**82.87**	**F**
Bell Boulevard & North Front	*Overall*	0.574	55.3	E	0.742	**166.5**	**F**
	EBL	0.94	**121.1**	**F**	1.12	**300.5**	**F**
	EBT	0.3	31.02	C	0.66	43.08	D
	EBR	0.21	33.37	C	0.44	0.87	A

Street (Signalized)	WBL	0.57	67.19	E	0.53	59	E
	WBT	0.58	38.09	D	1.04	**176.68**	**F**
	WBR	0.59	38.61	D	1.04	**181.45**	**F**
	NBL	0.76	54.81	D	1.02	**136.4**	**F**
	NBT	0.47	36.6	D	0.97	**90.5**	**F**
	NBR	0.16	32.67	C	0.25	44.14	D
	SBL	1.01	**151.14**	**F**	0.96	**126.99**	**F**
	SBT	0.75	41.26	D	1.25	**517.93**	**F**
	SBR	0.23	48.89	D	0.47	**81.73**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.25	11.4	B	0.422	17.6	B
	EBL	0.02	8.93	A	0.04	15.7	B
	EBT	0.27	7.4	A	0.46	12.87	B
	EBR	0.27	7.42	A	0.46	12.93	B
	WBL	0.23	12.01	B	0.38	25.94	C
	WBT	0.24	7.12	A	0.37	11.6	B
	WBR	0.24	7.12	A	0.37	11.6	B
	NBL	0.28	42.19	D	0.46	48.21	D
	NBTR	0.23	37.73	D	0.36	41.42	D
	SBL	0	39.7	D	0.02	45.1	D
	SBTR	0.09	35.94	D	0.09	36.65	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.471	22.2	C	0.539	27.5	C
	EBL	0.4	43.88	D	0.34	35.96	D
	EBTR	0.48	29.98	C	0.6	29.68	C
	WBL	0.52	42.91	D	0.84	65.63	E
	WBTR	0.6	31.97	C	0.4	25.22	C
	NBL	0.44	29.12	C	0.54	41.95	D
	NBT	0.55	16.63	B	0.57	21.53	C
	NBR	0.55	16.68	B	0.57	21.6	C
	SBL	0.5	33.42	C	0.47	40.85	D
	SBT	0.48	15.63	B	0.54	21.06	C
	SBR	0.48	15.65	B	0.54	21.09	C

During the AM peak period, most intersections along Bell Boulevard operate at acceptable conditions except for Bell Boulevard & North Front Street with LOS E. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041 future total scenario.

- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 121 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 151 seconds.

During the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-42** The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

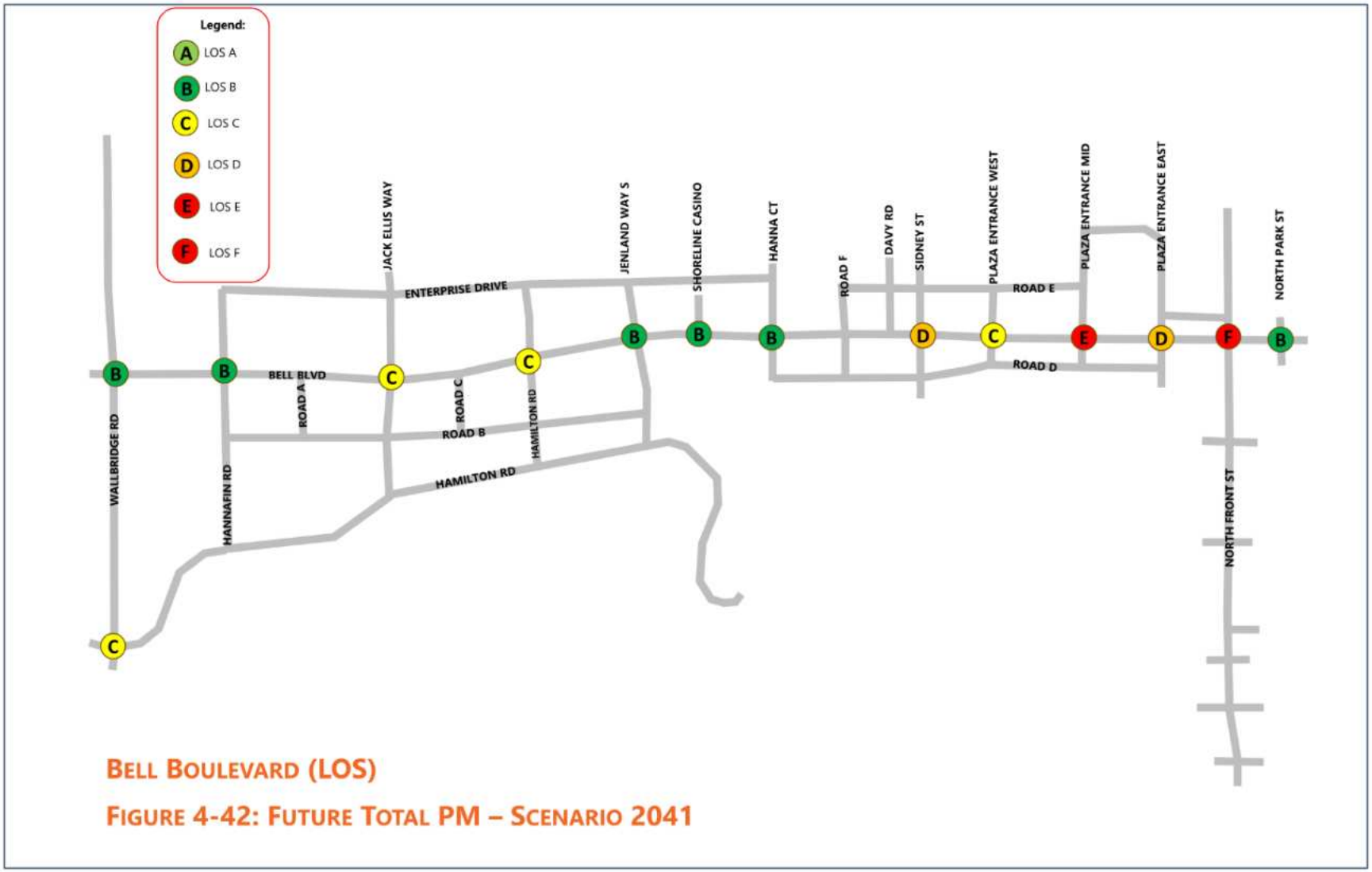

Figure 4-42 Future Total LOS PM 2041

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future total scenario.

- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 99 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 124 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 95 seconds.
- The SBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 82 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 300 seconds.
- The WBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 176 seconds.
- The WBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 181 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 136 seconds.
- The NBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 90 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 127 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 517 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 81 seconds.

4.9.3.4 Future Total Traffic Analysis (2041) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041 Future Total scenario. **Figure 4-43** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041 future total conditions are summarized in **Table 4-26**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

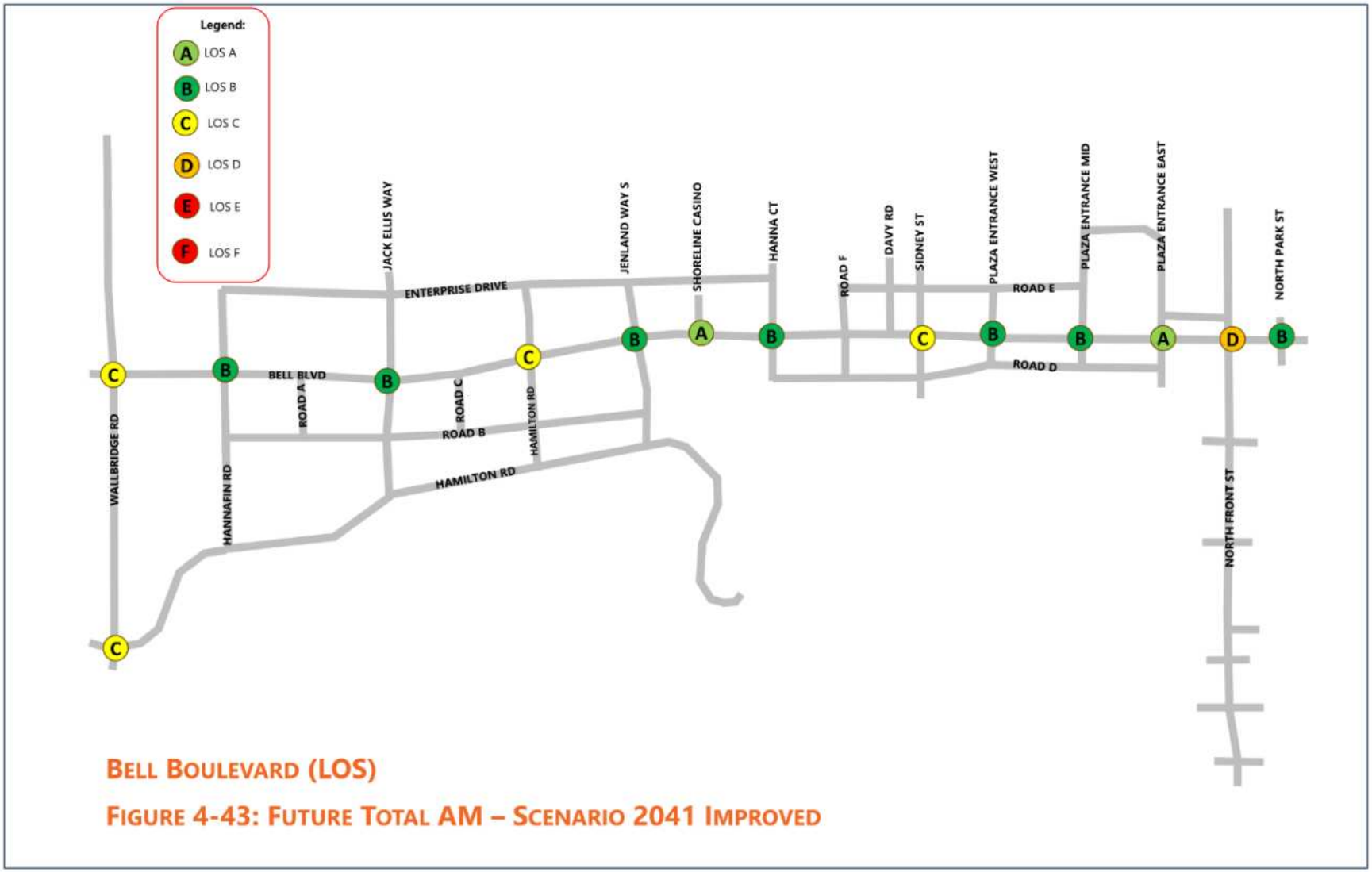

Figure 4-43 Future Total LOS AM 2041 Improved

Table 4-26: Future Total Traffic Performance - Scenario 2041 (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.504	20.6	C	0.751	16.5	B
	EBL	0.14	48.18	D	0.15	40.1	D
	EBTR	0.18	48.63	D	0.12	39.85	D
	WBL	0.65	42.93	D	0.52	28.89	C
	WBT	0.02	36.45	D	0.01	24.06	C
	WBR	0.18	2.67	A	0.83	36.04	D
	NBL	0	1.41	A	0.01	14.58	B
	NBT	0.4	24.74	C	0.44	22.05	C
	NBR	0.25	0.06	A	0.22	0.05	A
	SBL	0.59	12.84	B	0.61	8.35	A
	SBT	0.57	28.85	C	0.19	0.94	A
	SBR	0.57	28.86	C	0.19	0.94	A
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.415	15.5	B	0.486	19.1	B
	EBL	0.44	13.3	B	0.35	10.3	B
	EBTR	0.45	12.14	B	0.36	10.28	B
	WBL	0.26	9.26	A	0.5	16.28	B
	WBTR	0.26	9.28	A	0.51	12.58	B
	NBLTR	0.44	37.71	D	0.36	51.35	D
	SBLTR	0.18	33.02	C	0.51	55.56	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.44	19.7	B	0.549	21.3	C
	EBL	0.46	17.58	B	0.41	11.65	B
	EBTR	0.48	17.65	B	0.42	12	B
	WBL	0.32	29.01	C	0.63	34.45	C
	WBT	0.26	14.32	B	0.44	12.49	B
	WBR	0.26	14.33	B	0.44	12.53	B
	NBLTR	0.48	30.48	C	0.49	52.68	D
	SBLTR	0.12	24.22	C	0.62	60.19	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.268	23	C	0.535	26.6	C
	EBL	0.24	25.44	C	0.18	13.68	B
	EBTR	0.46	20.09	C	0.55	26.57	C
	WBL	0.33	32.52	C	0.59	21.24	C
	WBTR	0.32	17.88	B	0.59	19.81	B
	NBLTR	0.48	40.46	D	0.45	51.77	D
	SBLTR	0.16	35.01	D	0.59	59.08	E
	Overall	0.432	13.4	B	0.622	19.8	B

Bell Boulevard & Jenland Way South (Signalized)	EBL	0.2	18.29	B	0.17	26.96	C
	EBT	0.39	9.76	A	0.48	11.48	B
	EBR	0.39	9.76	A	0.48	11.49	B
	WBL	0.15	15.07	B	0.7	44.45	D
	WBT	0.47	10.82	B	0.62	14.19	B
	WBR	0.47	11.03	B	0.63	14.29	B
	NBLTR	0.47	40.19	D	0.36	52.62	D
	SBLTR	0.08	33.06	C	0.68	69.24	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.329	9.88	A	0.530	10.72	B
	EBL	0.03	14.05	B	0.06	18.92	B
	EBT	0.46	9.21	A	0.55	8.21	A
	WBT	0.46	9.78	A	0.64	10.67	B
	WBTR	0.47	9.88	A	0.65	10.75	B
	SBL	0.03	33.99	C	0.25	57.1	E
	SBR	0.06	34.36	C	0.04	53.54	D
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.434	11.8	B	0.588	12.4	B
	EBL	0.51	10.04	B	0.58	9.33	A
	EBTR	0.52	10.41	B	0.58	9.48	A
	WBL	0.56	11.17	B	0.69	11.83	B
	WBTR	0.57	11.77	B	0.69	12.05	B
	NBLTR	0.05	34.19	C	0.17	55.73	E
	SBLTR	0.18	36.03	D	0.27	57.84	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.592	25.9	C	0.747	49.5	D
	EBL	0.72	43.9	D	0.89	68.8	E
	EBT	0.32	15.77	B	0.62	37.24	D
	EBR	0.48	18.99	B	0.46	16.22	B
	WBL	0.31	25.98	C	0.83	48.04	D
	WBT	0.36	16.29	B	0.77	42.66	D
	WBR	0.05	13.23	B	0.22	29.85	C
	NBL	0.37	25.16	C	0.81	71.03	E
	NBT	0.43	36.42	D	0.57	52.32	D
	NBR	0.42	36.73	D	0.86	75.37	E
	SBL	0.09	23.01	C	0.8	**117.56**	**F**
	SBT	0.22	32.23	C	0.46	59.7	E
	SBR	0.7	46.56	D	0.65	50.02	D
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.307	14.5	B	0.605	23.9	C
	EBL	0.22	16.72	B	0.64	70.45	E
	EBT	0.34	10.57	B	0.59	16.66	B
	EBR	0.07	8.49	A	0.1	10.57	B
	WBL	0.04	14.39	B	0.27	34	C
	WBT	0.32	10.35	B	0.67	18.6	B

	WBR	0.11	8.82	A	0.29	12.7	B
	NBL	0.15	36.56	D	0.39	59.08	E
	NBTR	0.11	30.4	C	0.16	41.48	D
	SBL	0.34	38.28	D	0.66	63.15	E
	SBTR	0.21	31.9	C	0.38	45.85	D
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.31	17.3	B	0.744	49.5	D
	EBL	0.19	49.57	D	0.81	**96.19**	**F**
	EBT	0.39	13.98	B	0.79	39.72	D
	EBR	0.03	10.72	B	0.16	25.22	C
	WBL	0.12	49.75	D	0.77	**94.68**	**F**
	WBT	0.41	14.2	B	0.87	41.69	D
	WBR	0.11	11.42	B	0.34	25.42	C
	NBL	0.05	36.97	D	0.26	37.14	D
	NBT	0.03	34.84	C	0.18	56.68	E
	NBR	0.05	35.07	D	0.56	68.08	E
	SBL	0.29	41.44	D	0.9	74.19	E
	SBT	0.02	34.64	C	0.12	46.74	D
	SBR	0.15	36.64	D	0.69	64.36	E
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.296	10	A	0.771	44.6	D
	EBL	0.24	11.57	B	0.5	35.32	D
	EBT	0.3	6.14	A	0.86	40	D
	EBR	0.3	6.15	A	0.87	41.29	D
	WBL	0.23	10.53	B	0.8	66.42	E
	WBT	0.35	6.22	A	0.88	37.43	D
	WBR	0.01	4.43	A	0.09	17.36	B
	NBL	0.12	41.65	D	0.6	61.61	E
	NBT	0.04	38.13	D	0.1	42.6	D
	NBR	0.17	40.13	D	0.35	47.54	D
	SBL	0.12	41.71	D	0.88	**95.35**	**F**
	SBT	0.04	38.09	D	0.09	42.37	D
	SBR	0.25	41.5	D	0.48	50.97	D
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.569	53.7	D	1.048	97.9	F
	EBL	0.94	**121.1**	**F**	1.03	**160.98**	**F**
	EBT	0.29	30.2	C	0.68	50.39	D
	EBR	0.22	35.33	D	0.44	68.36	E
	WBL	0.57	67.19	E	0.68	**82.3**	**F**
	WBT	0.4	31.7	C	1.02	**147.72**	**F**
	WBR	0.4	33.32	C	0.71	67.23	E
	NBL	0.99	**129.92**	**F**	0.94	**81.98**	**F**
	NBT	0.47	36.6	D	0.84	64.32	E
	NBR	0.05	40.35	D	0.14	29.02	C

	SBL	0.82	66.63	E	0.81	78.25	E
	SBT	0.68	36.78	D	1.02	**150.69**	**F**
	SBR	0.54	35.72	D	0.45	**83**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.25	11.4	B	0.422	19.5	B
	EBL	0.02	8.93	A	0.04	17.31	B
	EBT	0.27	7.4	A	0.45	14.08	B
	EBR	0.27	7.42	A	0.46	14.13	B
	WBL	0.23	12.01	B	0.38	28.21	C
	WBT	0.24	7.12	A	0.37	12.75	B
	WBR	0.24	7.12	A	0.37	12.75	B
	NBL	0.28	42.19	D	0.46	54.05	D
	NBTR	0.23	37.73	D	0.35	46.69	D
	SBL	0	39.7	D	0.02	51.06	D
	SBTR	0.09	35.94	D	0.09	41.67	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.562	20.7	C	0.616	19.1	B
	EBL	0.56	54.27	D	0.14	15.12	B
	EBTR	0.36	21.76	C	0.84	38.19	D
	WBL	0.7	33.22	D	0.23	15.94	B
	WBTR	0.13	19.21	C	0.5	25.58	C
	NBL	0.46	30.71	C	0.46	27.54	C
	NBT	0.48	15.67	B	0.53	13.88	B
	NBR	0.19	12.9	B	0.53	13.92	B
	SBL	0.48	31.45	C	0.4	26.9	C
	SBT	0.49	16.13	B	0.5	13.56	B
	SBR	0.49	16.15	B	0.5	13.59	B

In the improved scenario, during the AM peak period, all intersections along Bell Boulevard operate at acceptable conditions with LOS D or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041 future total scenario.

- The EBL movement on Bell Blvd & North Front St has a LOS F with a delay of 121 seconds.
- The NBL movement on Bell Blvd & North Front St has a LOS F with a delay of 130 seconds.

In the improved scenario, during the PM peak period, most intersections along Bell Boulevard are operating at acceptable conditions except for Bell Boulevard and North Front Street that has a LOS F. The LOS for the PM peak period is presented on **Figure 4-44**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

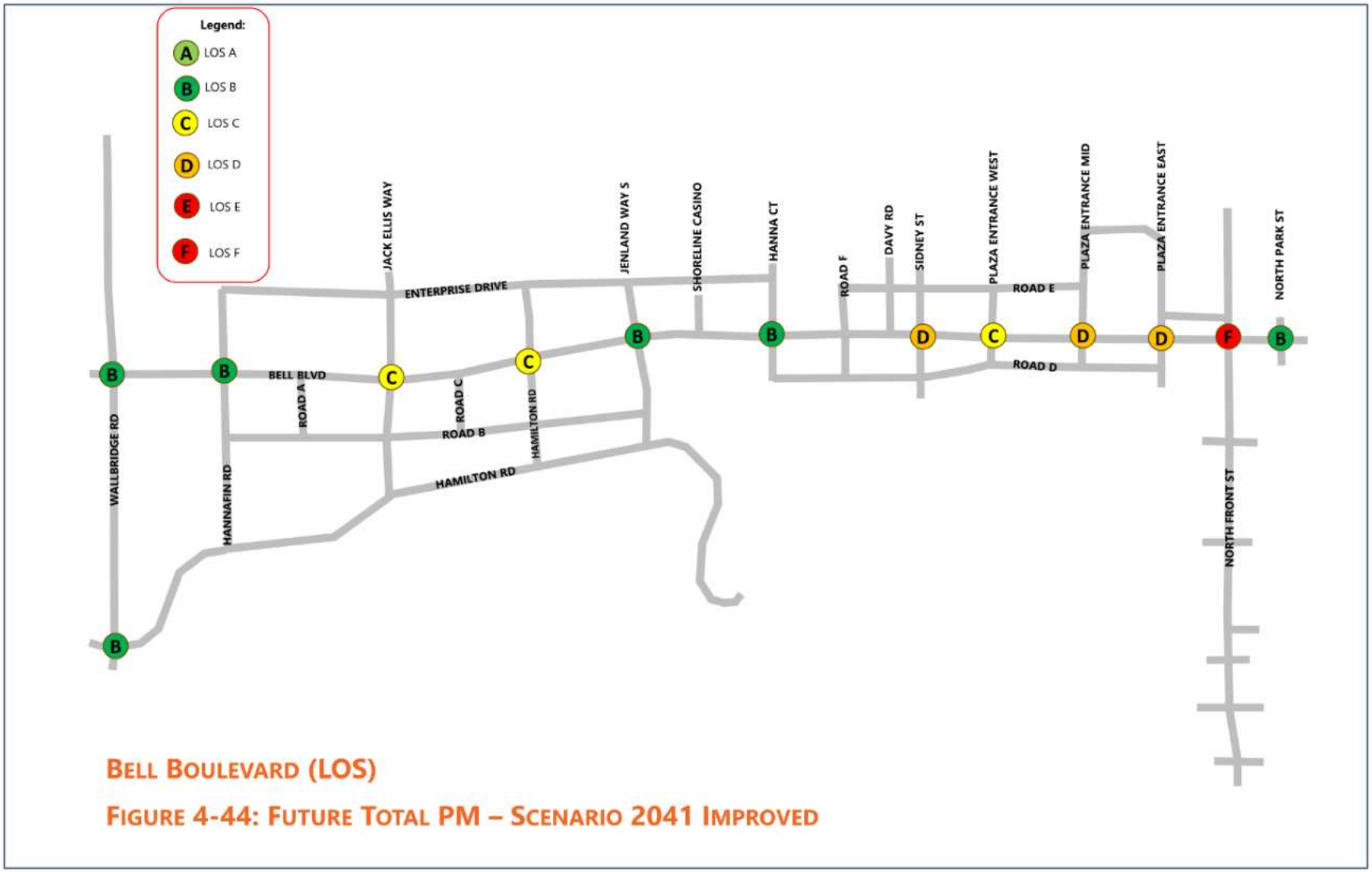

FIGURE 4-44: FUTURE TOTAL PM – SCENARIO 2041 IMPROVED

Figure 4-44: Future Total LOS PM 2041 Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future total scenario.

- The SBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 117 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 96 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 94 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 95 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 161 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 82 seconds.
- The WBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 147 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 82 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 150 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 83 seconds.

Overall, the Future Total 2041 road network is expected to generally operate well within capacity. Similar to previous traffic scenarios in the Future Total 2031 and Future Background 2041 scenarios, some movements are expected to operate with a level of service of F, but the majority would be within capacity. It is noted that certain movements along the existing Bell Boulevard & North Front Street commercial district are expected to operate slightly over capacity, but the majority of which are operating with movements within capacity. It is recommended that the City continue to monitor these movements in the future horizons to determine if further improvements are required, or if non-auto mode shifts are successful in deterring vehicular congestion.

In addition to the corridor signal optimization, geometric improvements are recommended along Bell Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the previous 2031 future background scenario improved. To summarize the list of geometric improvements made in the 2041 future background improved scenario **Table 4-27** is presented below:

Table 4-27: Future Total - Scenario 2041 - List of Geometric Improvements (Bell Boulevard Corridor)

Intersection	Improvements	Notes
Wallbridge Loyalist Road & Bell Boulevard	-	Widening of Bell Boulevard and Wallbridge Loyalist is already anticipated in the TMP
Bell Boulevard & Hannafin Road	-	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Jenland Way South	WBL lane and EBL lane	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hanna Court	-	-
Bell Boulevard & Davy Road	-	-
Bell Boulevard & Sidney Street	EBR lane	-
Bell Boulevard & Plaza Entrance West	-	Probably only pavement marking improvements to separate traffic would be sufficient
Bell Boulevard & Plaza Entrance Mid	NBR lane	-
Bell Boulevard & Plaza Entrance East	SBR lane	-
Bell Boulevard & North Front Street	Channelized EBR	Note that channelized turn lane should also provide a dedicated receiving lane to maintain freeflow of traffic
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	WBL lane	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Shorelines Casino	-	Widening of Bell Boulevard is already anticipated in the TMP
Bell Boulevard & Hamilton Road North		

4.9.3.5 Future Total Traffic Analysis (2041+)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2041+ future total conditions are summarized in **Table 4-28**.

The Bell Boulevard corridor is part of a coordinated signal groups which prioritize the movement of main corridor (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-45** shows the level of service for the future total scenario for the weekday AM peak period.

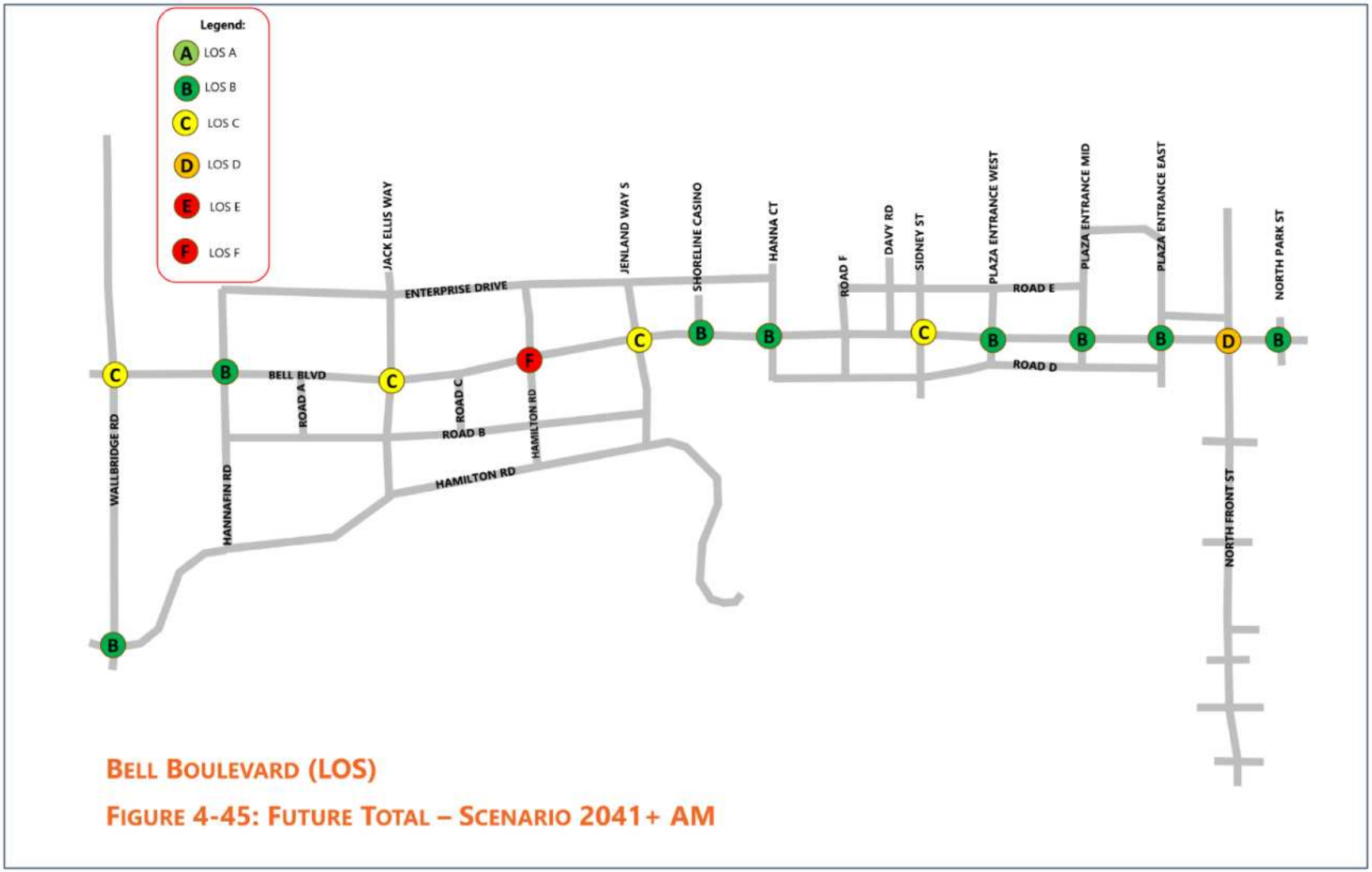

Figure 4-45 Future Total LOS AM 2041+

Table 4-28: Future Total Traffic Performance - Scenario 2041+ (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.482	31.9	C	0.664	61.2	E
	EBL	0.1	47.91	D	0.17	49.47	D
	EBTR	0.18	48.59	D	0.13	49.15	D
	WBL	0.69	44.9	D	0.75	45.02	D
	WBT	0.02	38.59	D	0.02	36.51	D
	WBR	0.49	**142.8**	**F**	0.72	**269.9**	**F**
	NBL	0.01	9.41	A	0.06	52.75	D
	NBT	0.52	27.77	C	0.62	34.09	C
	NBR	0.29	0.08	A	0.28	0.08	A
	SBL	0.82	23.64	C	0.85	33.19	C
	SBT	0.3	5.8	A	0.26	6.2	A
	SBR	0.3	5.8	A	0.26	6.2	A
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.49	19.8	B	0.722	29.4	C
	EBLT	0.51	20.05	B	0.50	17.85	B
	EBTR	0.53	15.51	B	0.51	13.40	B
	WBLT	0.4	14.56	B	0.73	39.44	D
	WBTR	0.41	13.45	B	0.72	19.17	B
	NBLTR	0.52	39.52	D	0.59	70.48	E
	SBLTR	0.17	32.51	C	0.72	79.59	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.49	24.1	C	0.78	55.3	E
	EBL	0.22	27.87	C	0.17	23.53	C
	EBT	0.46	20.46	C	0.85	66.89	E
	EBR	0.46	20.46	C	0.85	66.99	E
	WBL	0.58	43.3	D	0.86	70.02	E
	WBT	0.38	19.21	B	0.65	33.52	C
	WBR	0.38	19.23	B	0.66	33.93	C
	NBLTR	0.57	32.33	C	0.52	50.92	D
	SBLTR	0.18	24.18	C	0.86	**90.46**	**F**
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	**1.35**	**98.4**	**F**	**1.067**	**248.7**	**F**
	EBLT	0.76	44.52	D	**0.75**	**131.39**	**F**
	EBTR	0.81	27.78	C	**1.18**	**402.5**	**F**
	WBLT	**1.1**	**300.34**	**F**	**1.19**	**428.52**	**F**
	WBTR	0.82	24.69	C	0.77	31.64	C
	NBLTR	**1.13**	**299.86**	**F**	**1.16**	**398.86**	**F**
	SBLTR	0.36	37.53	D	**1.06**	**319.62**	**F**

Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.627	25.5	C	0.815	75.1	E
	EBL	0.29	33.59	C	0.25	38.8	D
	EBT	0.67	20.29	C	0.99	**102.39**	**F**
	EBR	0.67	20.35	C	**1.02**	**119.14**	**F**
	WBL	0.73	71.47	E	0.99	**143.84**	**F**
	WBT	0.59	18.33	B	0.88	32.09	C
	WBR	0.6	18.67	B	0.89	32.69	C
	NBL	0.32	35.7	D	0.48	79.54	E
	NBT	0.13	29.62	C	0.14	60.89	E
	NBR	0.75	46.99	D	0.86	**102.14**	**F**
	SBL	0.04	32.47	C	0.87	**125.31**	**F**
	SBTR	0.04	28.52	C	0.24	62.76	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.51	11.8	D	0.63	22.5	C
	EBL	0.03	38.84	D	0.16	68.39	E
	EBT	0.06	39.27	D	0.79	13.41	B
	WBL	0.04	15.46	B	0.92	28.02	C
	WBT	0.71	12.55	B	0.92	28.63	C
	SBL	0.53	10.15	B	0.79	13.41	B
	SBR	0.54	10.21	B	0.92	28.32	C
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.614	15.1	B	**1.134**	**400.7**	**F**
	EBLT	0.79	16.78	B	**1.03**	**149.87**	**F**
	EBTR	0.75	16.26	B	**1.06**	**146.18**	**F**
	WBLT	0.64	11.86	B	**1.3**	**608.5**	**F**
	WBTR	0.65	12.23	B	**1.34**	**639.23**	**F**
	NBLTR	0.05	39.07	D	0.2	71.43	E
	SBLTR	0.2	41.23	D	0.38	76.79	E
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.641	33.2	C	**1.024**	**244.8**	**F**
	EBL	0.75	30.65	C	**1.42**	**851.59**	**F**
	EBT	0.62	27.67	C	0.88	57.97	E
	EBR	0.36	0.61	A	0.36	0.53	A
	WBL	0.32	19.49	B	**1.07**	**241.56**	**F**
	WBT	0.62	33.39	C	**1.2**	**414.68**	**F**
	WBR	0.11	25.49	C	0.25	36.24	D
	NBL	0.72	61.43	E	**1.1**	**277.87**	**F**
	NBT	0.6	45.6	D	**0.81**	**82.63**	**F**
	NBR	0.54	44.29	D	**1.1**	**295.4**	**F**
	SBL	0.41	63.83	E	**0.65**	**91.41**	**F**
	SBT	0.33	42.42	D	**0.71**	**83.9**	**F**
	SBR	0.29	58.63	E	**0.43**	**120.5**	**F**
Bell Boulevard	*Overall*	0.445	15	B	0.802	44.4	D
	EBL	0.26	16.52	B	0.56	68.01	E

& Plaza Entrance West (Signalized)	EBT	0.5	10.71	B	0.77	26.08	C
	EBR	0.07	7.1	A	0.12	13.33	B
	WBL	0.11	17.82	B	0.4	30.73	C
	WBT	0.35	9.14	A	0.98	54.46	D
	WBR	0.11	7.43	A	0.34	16.3	B
	NBL	0.25	45.97	D	0.45	64.24	E
	NBTR	0.17	37.66	D	0.4	77.58	E
	SBL	0.49	50.71	D	0.72	78.39	E
	SBTR	0.25	39.04	D	0.74	**93**	**F**
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.422	17.9	B	0.923	**154.8**	**F**
	EBL	0.23	55.45	E	**1.02**	**222.62**	**F**
	EBT	0.58	15.92	B	0.88	51.01	D
	EBR	0.03	9.82	A	0.9	52.99	D
	WBL	0.13	55.18	E	0.87	**137.81**	**F**
	WBT	0.46	13.97	B	**1.1**	**229.4**	**F**
	WBR	0.07	10.13	B	0.23	19.55	B
	NBL	0.05	41.96	D	0.32	53.37	D
	NBT	0.02	39.54	D	0.19	71.98	E
	NBR	0.05	39.97	D	0.67	**92.51**	**F**
	SBL	0.3	46.64	D	**1.11**	**302.9**	**F**
	SBT	0.02	39.48	D	0.16	63.6	E
	SBR	0.17	41.98	D	0.91	**123.42**	**F**
Bell Boulevard & Plaza Entrance East (Signalized)	*Overall*	0.382	11.4	B	0.942	**164.4**	**F**
	EBL	0.34	13.72	B	**1.04**	**261.36**	**F**
	EBT	0.44	7.01	A	**1.03**	**139.37**	**F**
	EBR	0.44	7.02	A	**1.05**	**154.33**	**F**
	WBL	0.39	16.88	B	**1.04**	**233.3**	**F**
	WBT	0.38	6.01	A	**1.08**	**186.7**	**F**
	WBR	0.01	4.06	A	0.08	15.28	B
	NBL	0.15	47.81	D	0.51	59.92	E
	NBT	0.05	43.11	D	0.23	76.63	E
	NBR	0.3	47.66	D	0.96	**185.44**	**F**
	SBL	0.19	48.22	D	0.74	71.91	E
	SBT	0.07	43.38	D	0.18	67.28	E
	SBR	0.33	48.36	D	**1.08**	**279.44**	**F**
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.583	46.6	D	0.664	**252.5**	**F**
	EBL	0.91	**90.93**	**F**	**1.05**	**193.87**	**F**
	EBT	0.43	35.08	D	0.65	49.89	D
	EBR	0.35	0.61	A	0.52	1.18	A
	WBL	0.66	79.55	E	0.87	**133.52**	**F**
	WBT	0.5	39.04	D	**1.07**	**223.03**	**F**

	WBR	0.47	40.92	D	0.63	67.55	E
	NBL	0.78	57.5	E	**1.42**	**837.94**	**F**
	NBT	0.57	43.53	D	0.93	**92.28**	**F**
	NBR	0.2	38.18	D	0.28	58.52	E
	SBL	0.89	**80.62**	**F**	0.94	**133.59**	**F**
	SBT	0.81	49.1	D	**1.11**	**298.29**	**F**
	SBR	0.23	53.94	D	0.61	283.13	F
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.292	11.2	B	0.459	21.8	C
	EBL	0.02	7.96	A	0.05	20.56	C
	EBT	0.32	6.91	A	0.49	15.42	B
	EBR	0.32	6.92	A	0.49	15.49	B
	WBL	0.26	12.2	B	0.42	34.26	C
	WBT	0.24	6.29	A	0.43	14.27	B
	WBR	0.24	6.29	A	0.43	14.28	B
	NBL	0.32	49.79	D	0.49	66.83	E
	NBTR	0.26	44.19	D	0.36	57.47	E
	SBL	0	45.97	D	0.02	62.76	E
	SBTR	0.12	42.27	D	0.1	51.7	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.547	17.3	B	0.845	11.4	B
	EBL	0.1	14.5	B	0.1	6.99	A
	EBTR	0.73	33.62	C	0.85	27.23	C
	WBL	0.29	16.17	B	0.26	7.92	A
	WBTR	0.76	30.45	C	0.61	16.35	B
	NBL	0.4	20.57	C	0.32	11.29	B
	NBT	0.46	11.15	B	0.5	6.15	A
	NBR	0.2	9.22	A	0.5	6.25	A
	SBL	0.48	22.08	C	0.55	19.2	B
	SBT	0.49	11.75	B	0.4	5.42	A
	SBR	0.49	11.77	B	0.4	5.43	A

During the AM peak period, most intersections along Bell Boulevard operate at acceptable conditions, except for Bell Boulevard and Hamilton Road North. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041+ future total scenario.

- The WBR movement on Bell Boulevard & Wallbridge Loyalist has a LOS F with a delay of 143 seconds.

- The WBLT movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 300 seconds.
- The NBLTR movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 300 seconds.
- The EBL movement on Bell Boulevard & North front Street has a LOS F with a delay of 91 seconds.
- The SBL movement on Bell Boulevard & North front Street has a LOS F with a delay of 80 seconds.

During the PM peak period, most intersections along Bell Boulevard are operating with congestion. The LOS for the PM peak period is presented on **Figure 4-46**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

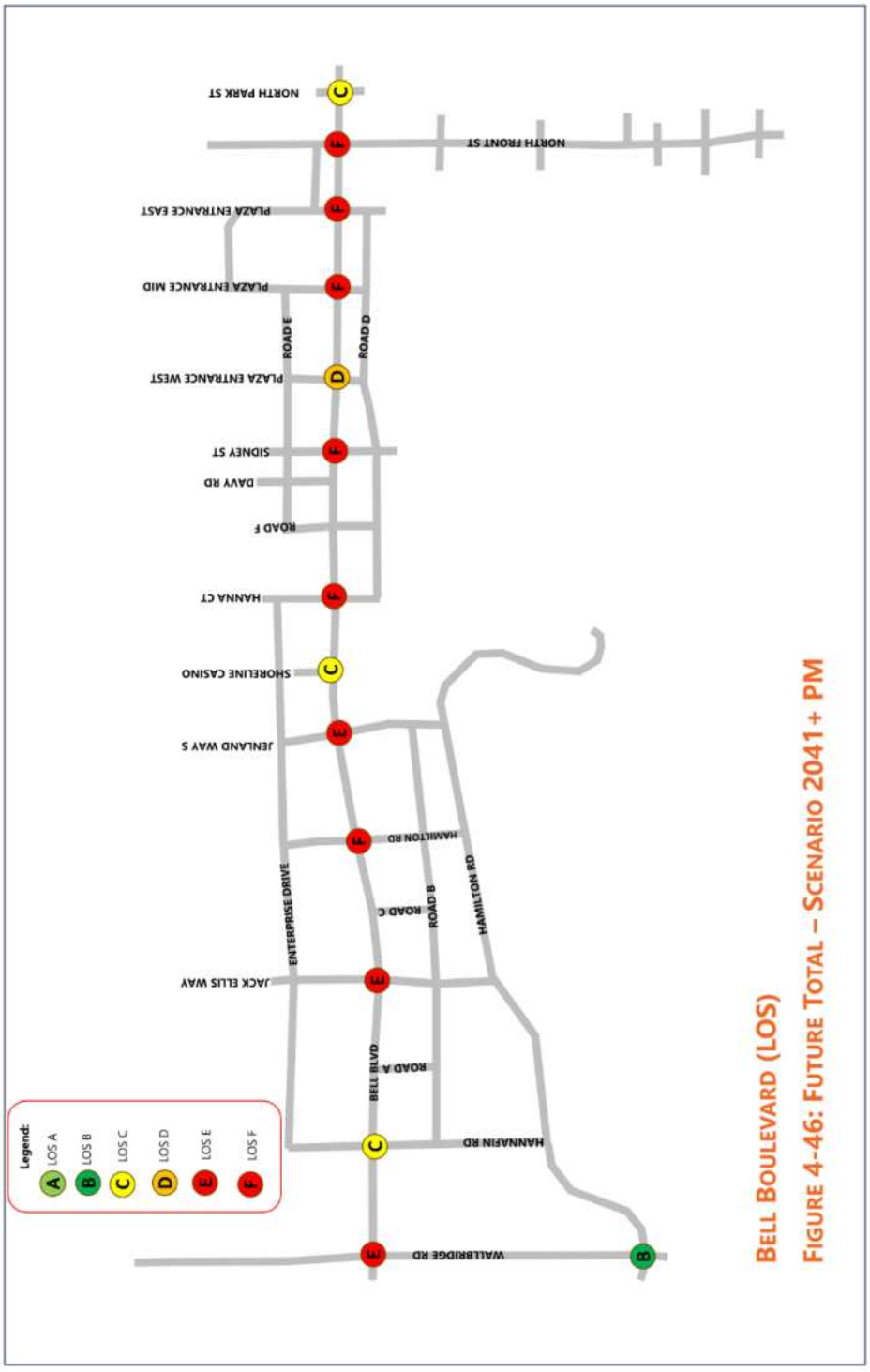

Figure 4-46 Future Total LOS PM 2041+

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future total scenario.

- The WBR movement on Bell Boulevard & Wallbridge Loyalist has a LOS F with a delay of 270 seconds.
- The SBLTR movement on Bell Boulevard & Jack Ellis Way has a LOS F with a delay of 90 seconds.
- The EBLT movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 132 seconds.
- The EBTR movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 403 seconds.
- The WBLT movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 429 seconds.
- The NBLTR movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 399 seconds.
- The SBLTR movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 320 seconds.
- The EBT movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 102 seconds.
- The EBR movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 119 seconds.
- The WBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 143 seconds.
- The NBR movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 102 seconds.
- The SBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 125 seconds.
- The EBLT movement on Bell Boulevard & Hanna Court has a LOS F with a delay of 150 seconds.
- The EBTR movement on Bell Boulevard & Hanna Court has a LOS F with a delay of 146 seconds.
- The WBLT movement on Bell Boulevard & Hanna Court has a LOS F with a delay of 608 seconds.
- The WBTR movement on Bell Boulevard & Hanna Court has a LOS F with a delay of 639 seconds.
- The EBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 851 seconds.

- The WBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 241 seconds.
- The WBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 414 seconds.
- The NBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 277 seconds.
- The NBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 82 seconds.
- The NBR movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 295 seconds.
- The SBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 91 seconds.
- The SBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 84 seconds.
- The SBR movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 120 seconds.
- The SBTR movement on Bell Boulevard & Plaza Entrance West has a LOS F with a delay of 93 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 222 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 137 seconds.
- The WBT movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 229 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 92 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 303 seconds.
- The SBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 123 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 261 seconds.
- The EBT movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 139 seconds.
- The EBR movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 154 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 233 seconds.

- The WBT movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 186 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 185 seconds.
- The SBR movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 279 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 194 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 133 seconds.
- The WBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 223 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 838 seconds.
- The NBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 92 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 133 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 298 seconds.

4.9.3.6 Future Total Traffic Analysis (2041+) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041+ Future Total scenario. **Figure 4-47** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041+ future total conditions are summarized in **Table 4-29**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

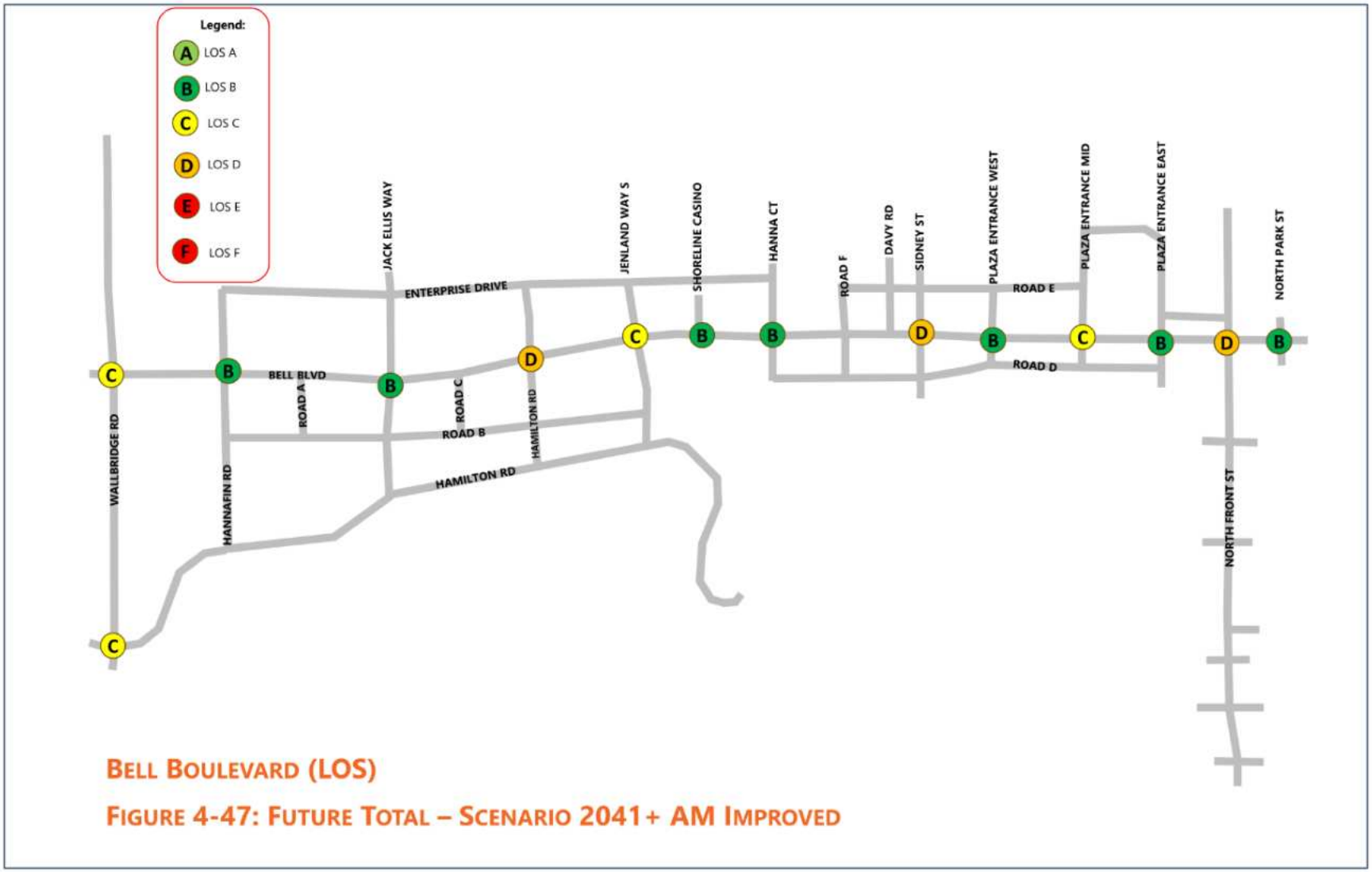

Figure 4-47: Future Total LOS AM 2041+ Improved

Table 4-29: Future Total Traffic Performance - Scenario 2041+ (Bell Boulevard Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Wallbridge Loyalist Road & Bell Boulevard (Signalized)	*Overall*	0.481	32.3	C	0.669	31.6	C
	EBL	0.14	48.17	D	0.15	40.09	D
	EBTR	0.18	48.63	D	0.12	39.84	D
	WBL	0.70	44.98	D	0.71	36.47	D
	WBT	0.02	38.64	D	0.01	29.58	C
	WBR	0.49	**142.89**	**F**	0.41	**132.38**	**F**
	NBL	0.05	49.29	D	0.05	42.90	D
	NBT	0.52	29.00	C	0.41	16.41	B
	NBR	0.29	0.39	A	0.25	0.07	A
	SBL	0.39	21.87	C	0.46	13.12	B
	SBT	0.30	6.27	A	0.19	0.22	A
	SBR	0.30	6.27	A	0.19	0.22	A
Bell Boulevard & Hannafin Road (Signalized)	*Overall*	0.347	19.7	B	0.435	21.0	C
	EBL	0.29	24.91	C	0.12	15.91	B
	EBT	0.39	17.06	B	0.36	10.10	B
	EBR	0.39	17.07	B	0.36	10.12	B
	WBL	0.17	24.35	C	0.49	24.34	C
	WBT	0.32	16.11	B	0.38	10.43	B
	WBR	0.32	16.12	B	0.38	10.45	B
	NBL	0.08	29.59	C	0.29	78.68	E
	NBTR	0.38	30.47	C	0.42	65.08	E
	SBL	0.04	35.22	D	0.32	77.12	E
	SBTR	0.13	26.34	C	0.49	67.20	E
Bell Boulevard & Jack Ellis Way (Signalized)	*Overall*	0.399	19.4	B	0.577	37.7	D
	EBL	0.17	19.75	B	0.13	11.35	B
	EBT	0.40	14.63	B	0.68	42.34	D
	EBR	0.40	14.64	B	0.68	42.40	D
	WBL	0.47	29.72	C	0.67	37.48	D
	WBT	0.33	13.70	B	0.53	17.42	B
	WBR	0.33	13.72	B	0.54	17.76	B
	NBL	0.06	30.89	C	0.09	65.60	E
	NBT	0.20	30.70	C	0.15	58.63	E
	NBR	0.46	35.87	D	0.67	75.87	E
	SBL	0.10	35.20	D	0.67	**86.68**	**F**
	SBT	0.04	28.46	C	0.23	60.30	E

	SBR	0.06	28.82	C	0.22	60.23	E
Bell Boulevard & Hamilton Road North (Signalized)	*Overall*	0.619	42.8	D	0.823	59.2	E
	EBL	0.28	46.00	D	0.75	**131.39**	**F**
	EBT	0.80	45.79	D	0.90	63.59	E
	EBR	0.80	45.88	D	0.91	64.74	E
	WBL	0.35	46.80	D	0.91	**90.34**	**F**
	WBT	0.67	39.47	D	0.75	30.28	C
	WBR	0.67	39.61	D	0.77	31.67	C
	NBL	0.06	27.10	C	0.11	55.96	E
	NBT	0.07	25.60	C	0.04	51.26	D
	NBR	0.79	45.79	D	0.89	**96.72**	**F**
	SBL	0.09	28.93	C	0.55	70.10	E
	SBT	0.01	24.86	C	0.06	51.69	D
	SBR	0.08	25.65	C	0.32	57.11	E
Bell Boulevard & Jenland Way South (Signalized)	*Overall*	0.617	28.0	C	0.835	54.6	D
	EBL	0.24	47.94	D	0.84	**214.35**	**F**
	EBT	0.68	22.02	C	0.89	45.82	D
	EBR	0.69	22.15	C	0.92	51.49	D
	WBL	0.36	53.21	D	0.90	**104.77**	**F**
	WBT	0.65	23.87	C	0.87	31.07	C
	WBR	0.66	24.54	C	0.88	32.19	C
	NBL	0.53	54.09	D	0.62	**95.32**	**F**
	NBT	0.20	41.18	D	0.14	60.89	E
	NBR	0.69	36.61	D	0.28	**104.19**	**F**
	SBL	0.06	44.47	D	0.90	**136.10**	**F**
	SBTR	0.12	40.11	D	0.45	68.42	E
Bell Boulevard & Shorelines Casino (Signalized)	*Overall*	0.512	11.8	B	0.763	17.8	B
	EBL	0.04	15.31	B	0.06	31.21	C
	EBT	0.71	12.55	B	0.72	6.46	A
	WBT	0.52	10.03	B	0.91	24.65	C
	WBTR	0.53	10.15	B	0.91	25.13	C
	SBL	0.03	38.84	D	0.50	**92.51**	**F**
	SBR	0.06	39.27	D	0.08	78.31	E
Bell Boulevard & Hanna Court (Signalized)	*Overall*	0.520	13.0	B	0.785	16.6	B
	EBL	0.17	19.78	B	0.16	48.13	D
	EBT	0.67	13.05	B	0.74	10.38	B
	EBTR	0.68	13.07	B	0.74	10.41	B
	WBL	0.14	24.28	C	0.15	24.85	C
	WBT	0.57	10.80	B	0.88	18.29	B
	WBTR	0.58	10.93	B	0.88	18.58	B
	NBLTR	0.05	39.07	D	0.23	75.77	E

	SBLTR	0.20	41.23	D	0.44	**83.06**	**F**
Bell Boulevard & Sidney Street (Signalized)	*Overall*	0.442	36.2	D	0.770	**178.7**	**F**
	EBL	0.63	50.94	D	**1.11**	**310.61**	**F**
	EBT	0.60	25.92	C	0.86	54.47	D
	EBR	0.35	0.56	A	0.35	0.51	A
	WBL	0.46	60.62	E	0.77	**86.68**	**F**
	WBT	0.65	35.35	D	**1.12**	**277.05**	**F**
	WBR	0.12	26.87	C	0.23	32.89	C
	NBL	0.62	53.46	D	**1.15**	**363.64**	**F**
	NBT	0.63	47.24	D	0.83	**86.25**	**F**
	NBR	0.56	45.76	D	**1.13**	**340.19**	**F**
	SBL	0.41	63.83	E	0.68	**95.54**	**F**
	SBT	0.42	47.89	D	0.71	**83.90**	**F**
	SBR	0.31	63.60	E	0.45	**130.85**	**F**
Bell Boulevard & Plaza Entrance West (Signalized)	*Overall*	0.445	15.0	B	0.802	44.4	D
	EBL	0.26	16.42	B	0.56	68.01	E
	EBT	0.50	10.71	B	0.77	26.08	C
	EBR	0.07	7.10	A	0.12	13.33	B
	WBL	0.11	17.82	B	0.40	30.73	C
	WBT	0.35	9.12	A	0.98	54.46	D
	WBR	0.11	7.43	A	0.34	16.30	B
	NBL	0.25	45.97	D	0.45	64.24	E
	NBTR	0.17	37.66	D	0.40	77.58	E
	SBL	0.49	50.71	D	0.72	78.39	E
	SBTR	0.25	39.04	D	0.74	**93.00**	**F**
Bell Boulevard & Plaza Entrance Mid (Signalized)	*Overall*	0.391	29.5	C	0.923	**147.6**	**F**
	EBL	0.23	55.45	E	**1.02**	**222.62**	**F**
	EBT	0.72	30.20	C	0.87	42.01	D
	EBR	0.72	30.27	C	0.13	20.93	C
	WBL	0.13	55.18	E	0.82	**120.52**	**F**
	WBT	0.58	24.23	C	**1.09**	**210.61**	**F**
	WBR	0.08	17.43	B	0.23	19.05	B
	NBL	0.12	54.82	D	0.95	**197.25**	**F**
	NBT	0.02	39.54	D	0.22	75.35	E
	NBR	0.05	39.97	D	0.77	**109.97**	**F**
	SBL	0.31	54.60	D	**1.09**	**286.98**	**F**
	SBT	0.02	37.86	D	0.17	65.45	E
	SBR	0.16	40.08	D	0.97	**163.22**	**F**
Bell Boulevard & Plaza	*Overall*	0.384	11.0	B	0.942	**148.9**	**F**
	EBL	0.34	13.61	B	**1.04**	**261.36**	**F**
	EBT	0.45	6.54	A	1.02	**101.45**	**F**

Entrance East (Signalized)	EBR	0.04	4.18	A	0.13	19.53	B
	WBL	0.39	16.96	B	**1.04**	**233.30**	**F**
	WBT	0.38	5.99	A	**1.08**	**186.70**	**F**
	WBR	0.01	4.06	A	0.08	15.28	B
	NBL	0.15	47.81	D	0.51	59.92	E
	NBT	0.05	43.11	D	0.23	76.63	E
	NBR	0.25	46.68	D	0.96	**185.44**	**F**
	SBL	0.18	48.17	D	0.74	71.91	E
	SBT	0.07	43.38	D	0.18	67.28	E
	SBR	0.33	48.36	D	**1.08**	**279.44**	**F**
Bell Boulevard & North Front Street (Signalized)	*Overall*	0.582	46.8	D	0.651	**255.1**	**F**
	EBL	0.91	**90.93**	**F**	**1.08**	**236.27**	**F**
	EBT	0.43	35.08	D	0.65	49.89	D
	EBR	0.34	0.57	A	0.53	1.22	A
	WBL	0.66	79.55	E	0.92	**159.00**	**F**
	WBT	0.49	39.02	D	**1.07**	**216.08**	**F**
	WBR	0.47	40.92	D	0.63	67.55	E
	NBL	0.77	57.18	E	**1.46**	**903.71**	**F**
	NBT	0.57	43.53	D	0.89	**81.09**	**F**
	NBR	0.20	38.18	D	0.27	56.69	E
	SBL	0.89	**80.62**	**F**	0.97	**155.70**	**F**
	SBT	0.81	49.10	D	**1.05**	**203.64**	**F**
	SBR	0.23	53.86	D	0.61	**274.82**	**F**
Bell Boulevard & North Park Street (Signalized)	*Overall*	0.292	11.2	B	0.459	21.7	C
	EBL	0.02	7.96	A	0.05	20.56	C
	EBT	0.32	6.90	A	0.49	15.38	B
	EBTR	0.32	6.92	A	0.49	15.49	B
	WBL	0.26	12.20	B	0.42	34.26	C
	WBT	0.24	6.28	A	0.43	14.27	B
	WBTR	0.24	6.29	A	0.43	14.28	B
	NBL	0.32	49.79	D	0.49	66.34	E
	NBTR	0.26	44.19	D	0.36	57.47	E
	SBL	0.00	45.97	D	0.02	62.76	E
	SBTR	0.12	42.27	D	0.09	51.52	D
Wallbridge Loyalist Road & Hamilton Road (Signalized)	*Overall*	0.507	22.4	C	0.773	16.4	B
	EBL	0.37	38.82	D	0.13	12.79	B
	EBT	0.21	19.58	B	0.89	45.95	D
	EBR	0.25	20.30	C	0.32	24.89	C
	WBL	0.63	35.93	D	0.32	14.48	B
	WBT	0.58	25.85	C	0.43	21.66	C
	WBR	0.35	21.60	C	0.35	20.82	C

	NBL	0.52	38.42	D	0.37	17.63	B
	NBT	0.52	16.90	B	0.40	7.85	A
	NBR	0.22	13.84	B	0.33	7.58	A
	SBL	0.61	42.99	D	0.58	23.12	C
	SBT	0.55	18.44	B	0.43	8.40	A
	SBTR	0.55	18.56	B	0.44	8.43	A

In the improved scenario, during the AM peak period, all signalized intersections along Bell Boulevard operate at acceptable conditions. The corridor is part of a signal coordination groups which prioritize the main movement flow (east-west for Bell Boulevard). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041+ future total scenario.

- The WBR movement on Wallbridge Loyalist Road & Bell Boulevard has a LOS F with a delay of 143 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 91 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 80 seconds.

In the improved scenario, during the PM peak period, most intersections along Bell Boulevard are generally operating at acceptable conditions, however some specific movements at the major arterial intersections would exceed capacity. These movements should continue to be monitored by the City for further improvements or other mitigation measures as detailed in this study. The LOS for the PM peak period is presented on **Figure 4-48**.

The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

Overall, the Future Total 2041+ road network is expected to generally operate well within capacity. Similar to previous traffic scenarios, some movements are expected to operate with a level of service of F, but the majority would be within capacity. It is noted that certain movements along the existing Bell Boulevard & North Front Street commercial district are expected to operate slightly over capacity. It is recommended that the City continue to monitor these movements in the future horizons to determine if further improvements are required, or if non-auto mode shifts are successful in deterring vehicular congestion.

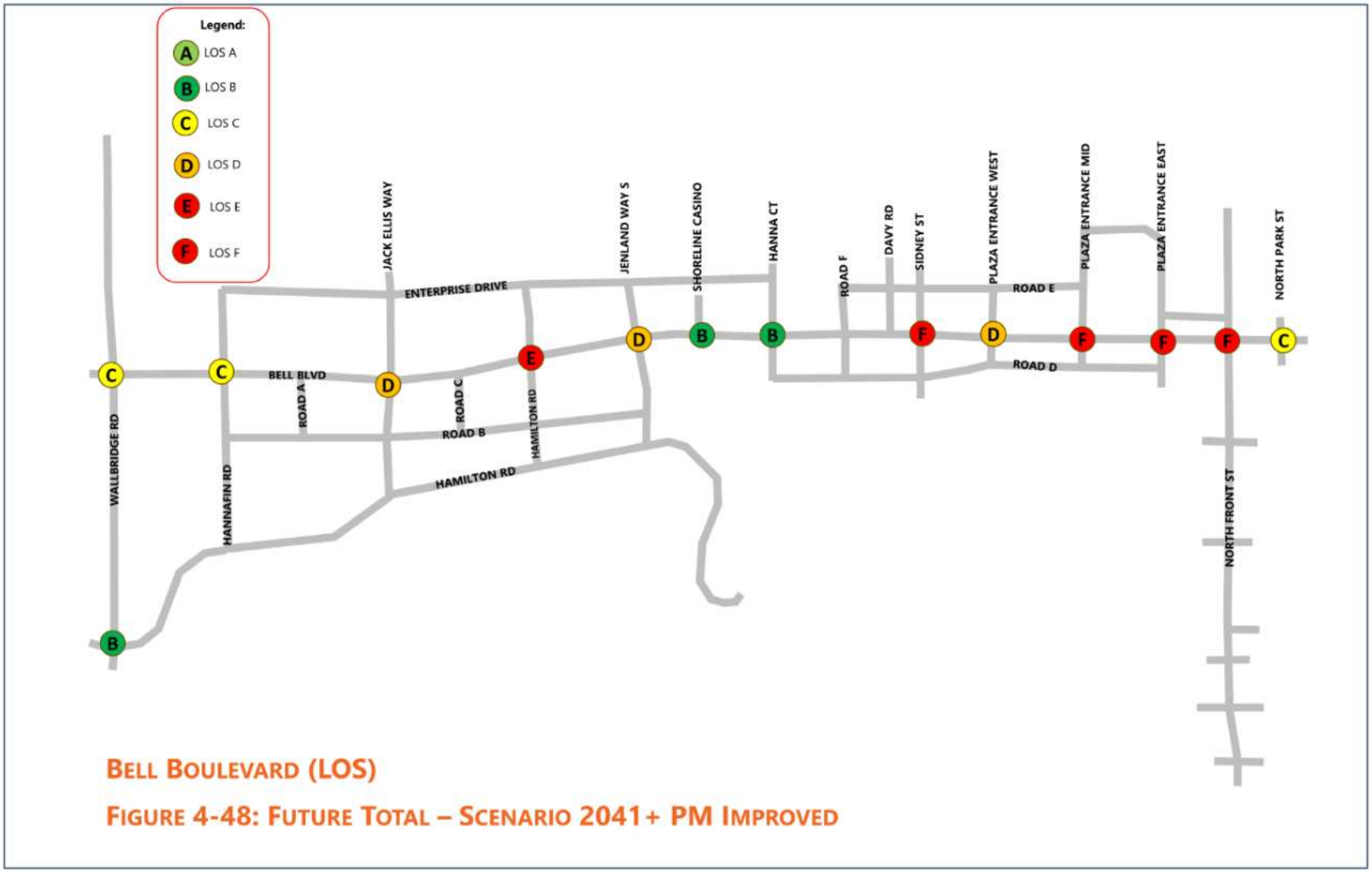

Figure 4-48: Future Total LOS PM 2041+ Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future total scenario.

- The WBR movement on Wallbridge Loyalist Road & Bell Boulevard has a LOS F with a delay of 132 seconds.
- The SBL movement on Jack Ellis Way & Bell Boulevard has a LOS F with a delay of 86 seconds.
- The EBL movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 131 seconds.
- The WBL movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 90 seconds.
- The NBL movement on Bell Boulevard & Hamilton Road North has a LOS F with a delay of 97 seconds.
- The EBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 214 seconds.
- The WBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 105 seconds.
- The NBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 95 seconds.
- The NBR movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 104 seconds.
- The SBL movement on Bell Boulevard & Jenland Way South has a LOS F with a delay of 136 seconds.
- The SBL movement on Bell Boulevard & Shorelines Casino has a LOS F with a delay of 92 seconds.
- The SB movement on Bell Boulevard & Hanna Court has a LOS F with a delay of 83 seconds.
- The EBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 310 seconds.
- The WBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 87 seconds.
- The WBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 277 seconds.
- The NBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 363 seconds.
- The NBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 86 seconds.
- The NBR movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 340 seconds.

- The SBL movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 95 seconds.
- The SBT movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 84 seconds.
- The SBR movement on Bell Boulevard & Sidney Street has a LOS F with a delay of 131 seconds.
- The SBTR movement on Bell Boulevard & Plaza Entrance West has a LOS F with a delay of 93 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 222 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 120 seconds.
- The WBT movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 210 seconds.
- The NBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 197 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 109 seconds.
- The SBL movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 287 seconds.
- The SBR movement on Bell Boulevard & Plaza Entrance Mid has a LOS F with a delay of 163 seconds.
- The EBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 261 seconds.
- The EBT movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 101 seconds.
- The WBL movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 233 seconds.
- The WBT movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 186 seconds.
- The NBR movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 185 seconds.
- The SBR movement on Bell Boulevard & Plaza Entrance East has a LOS F with a delay of 279 seconds.
- The EBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 236 seconds.
- The WBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 159 seconds.

- The WBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 216 seconds.
- The NBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 903 seconds.
- The NBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 81 seconds.
- The SBL movement on Bell Boulevard & North Front Street has a LOS F with a delay of 155 seconds.
- The SBT movement on Bell Boulevard & North Front Street has a LOS F with a delay of 203 seconds.
- The SBR movement on Bell Boulevard & North Front Street has a LOS F with a delay of 274 seconds.

In addition to the corridor signal optimization, geometric improvements are recommended along Bell Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the previous 2041 future total scenario improved. To summarize the list of geometric improvements made in the 2041+ future total background improved scenario in **Table 4-30** is presented below:

Table 4-30 - Future Total - Scenario 2041+ - List of Geometric Improvements (Bell Boulevard Corridor)

Intersection	Improvements	Notes
Wallbridge Loyalist Road & Bell Boulevard	SBL lane	-
Bell Boulevard & Hannafin Road	NBL lane, SBL lane, EBL lane and WBL lane	-
Bell Boulevard & Jenland Way South	WBL lane (dual), NBR lane, NBL lane and SBL lane	-
Bell Boulevard & Hanna Court	EBL lane and WBL lane	-
Bell Boulevard & Davy Road	-	-
Bell Boulevard & Sidney Street	Channelized EBR lane, EBL lane and WBT lane	Channelized turn lane should provide a dedicated receiving lane to ensure free flow.
Bell Boulevard & Plaza Entrance West	-	-
Bell Boulevard & Plaza Entrance Mid	SBL lane	-
Bell Boulevard & Plaza Entrance East	EBR lane	-
Bell Boulevard & North Front Street	Channelized SBR	Channelized turn lane should provide a dedicated receiving lane to ensure free flow.
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	EBL lane, NBL lane, NBR lane, SBL lane and SBR lane	-
Bell Boulevard & Shorelines Casino	-	-
Bell Boulevard & Hamilton Road North	WBL lane, NBL lane, NBR lane, SBL lane and SBR lane	-

4.9.4 Future Total Scenarios – North Front Street

The future total traffic volumes were derived by combining the future background and future site traffic volumes for both the AM and PM peak periods for the three scenarios (2031, 2041, and 2041+). The site traffic volumes were determined according to the trip generation assessment identified in **Section 4.6**.

Most of the existing signal timing plans were upgraded and optimized in the model with the intention of improving the signal timing, the vehicular capacity of the intersections and to provide a more efficient traffic flow for the main corridors. A coordinated traffic signal plan for North Front Street was also implemented in the traffic model.

4.9.4.1 Future Total Traffic Analysis (2031)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2031 future total conditions are summarized in **Table 4-31**.

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-49** shows the level of service for the future total scenario for the weekday AM peak period.

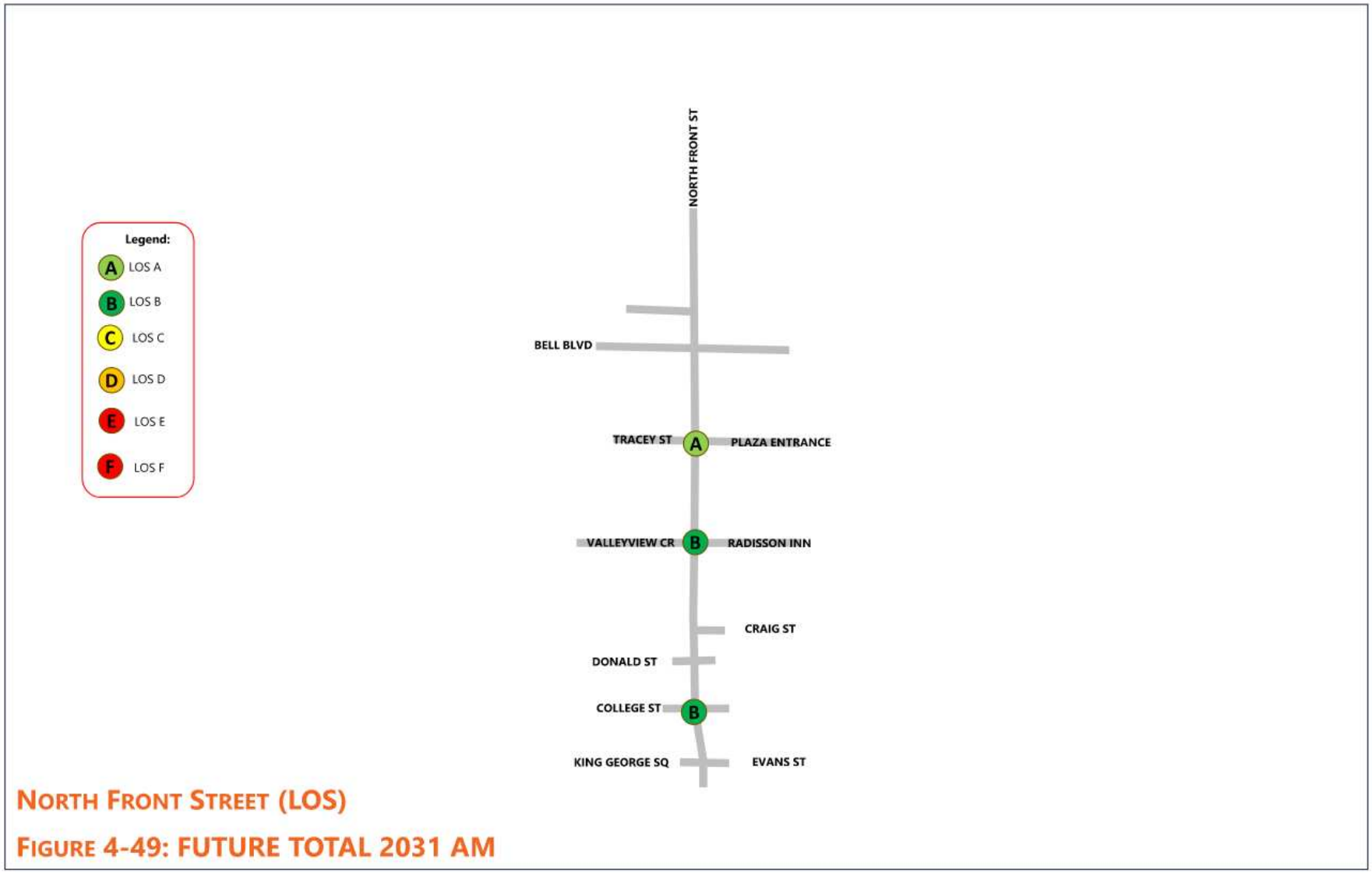

Figure 4-49: Future Total LOS AM 2031

Table 4-31: Future Total Traffic Performance - Scenario 2031 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.315	9	A	0.439	11.9	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.1	10.61	B	0.28	18.07	B
	NBT	0.25	5.97	A	0.54	8.84	A
	NBTR	0.25	5.97	A	0.54	8.85	A
	SBL	0.06	7.95	A	0.29	17.81	B
	SBT	0.41	7.22	A	0.56	9.08	A
	SBTR	0.41	7.24	A	0.56	9.16	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.294	13.7	B	0.48	20.9	C
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBL	0.35	12.16	B	0.78	21.52	C
	NBTR	0.37	12.39	B	0.81	23.91	C
	SBL	0.5	14.21	B	0.69	18.25	B
	SBTR	0.53	14.71	B	0.72	19.81	B
North Front Street & College Street (Signalized)	*Overall*	0.403	19.2	B	0.624	28.8	C
	EBL	0.49	32.95	C	0.66	24.98	C
	EBTR	0.41	19.8	B	0.75	37.18	D
	WBL	0.34	28.24	C	0.34	18.16	B
	WBTR	0.45	20.41	C	0.73	35.84	D
	NBL	0.25	25.3	C	0.78	69.53	E
	NBT	0.36	15.07	B	0.71	24.31	C
	NBTR	0.36	15.09	B	0.71	24.36	C
	SBL	0.15	20.07	C	0.61	51.5	D
	SBT	0.49	17	B	0.69	23.83	C
	SBR	0.49	17.07	B	0.69	24.03	C

During the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

During the PM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The LOS for the PM peak period is presented on **Figure 4-50**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

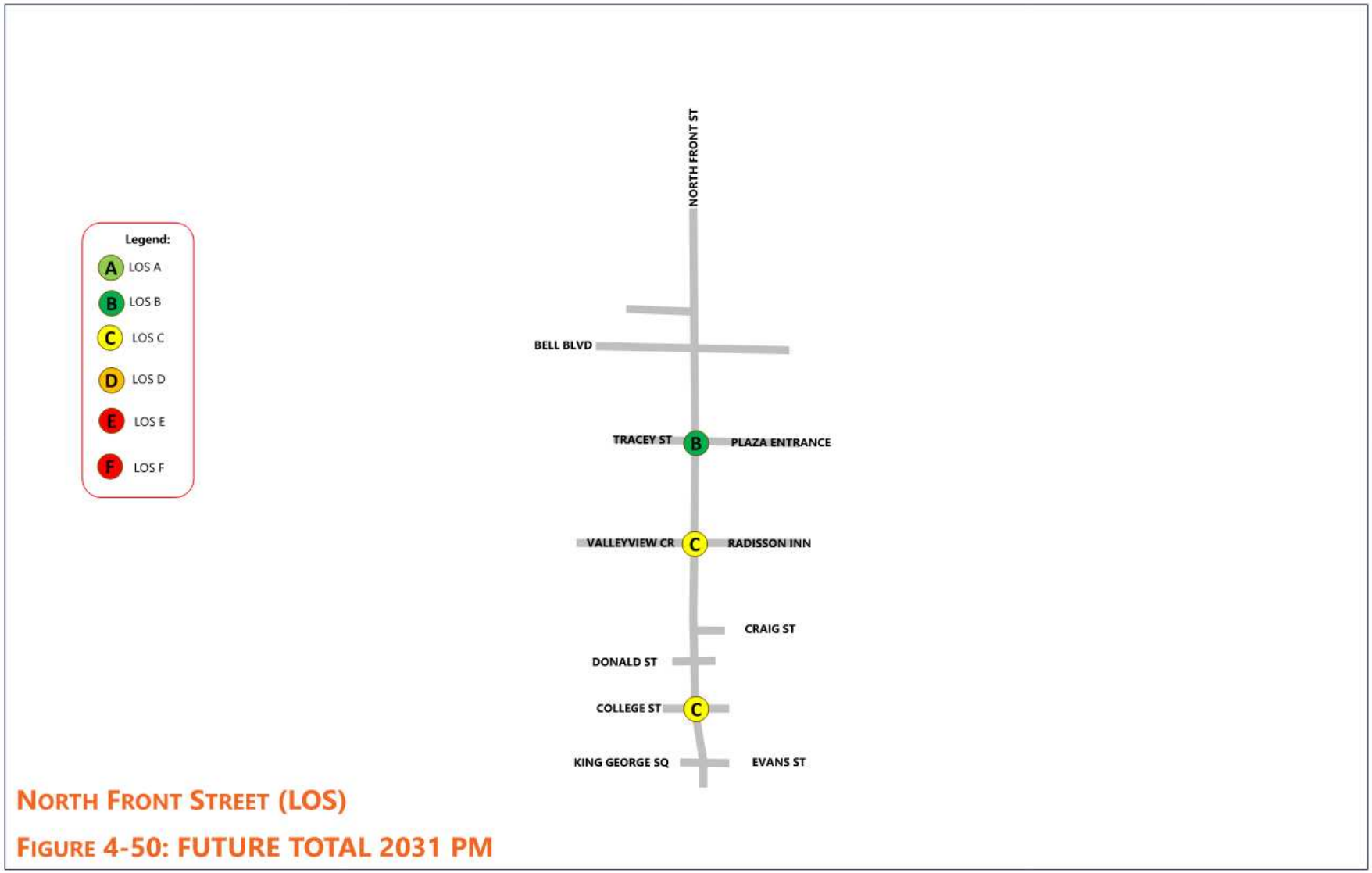

Figure 4-50: Future Total LOS PM 2031

4.9.4.2 Future Total Traffic Analysis (2031) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2031 Future Total scenario. **Figure 4-51** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2031 future total conditions are summarized in **Table 4-33**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

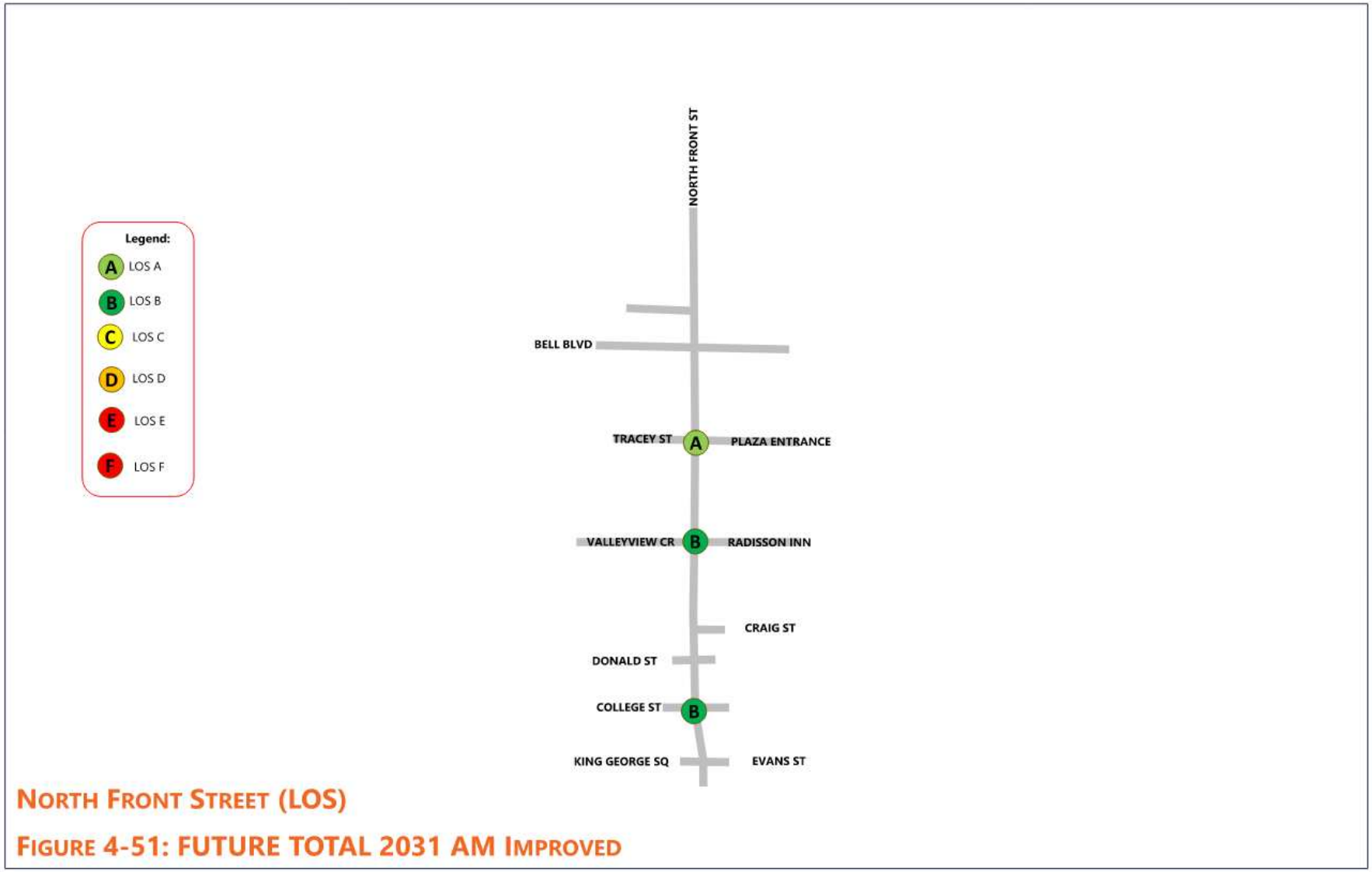

Figure 4-51: Future Total LOS AM 2031 Improved

Table 4-32: Future Total Traffic Performance - Scenario 2031 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.315	9	A	0.439	11.9	B
	EBL	0.22	32.23	C	0.32	37.77	D
	EBTR	0.18	28.55	C	0.31	30.53	C
	WBL	0.06	30.88	C	0.24	35.3	D
	WBTR	0.1	27.5	C	0.36	31.49	C
	NBL	0.1	10.61	B	0.28	18.07	B
	NBT	0.25	5.97	A	0.54	8.84	A
	NBR	0.25	5.97	A	0.54	8.85	A
	SBL	0.06	7.95	A	0.29	17.81	B
	SBT	0.41	7.22	A	0.56	9.08	A
	SBR	0.41	7.24	A	0.56	9.16	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.294	13.7	B	0.48	20.9	C
	EBLTR	0.05	18.69	B	0.14	19.6	B
	WBLTR	0.02	18.39	B	0.01	18.32	B
	NBLT	0.35	12.16	B	0.78	21.52	C
	NBTR	0.37	12.39	B	0.81	23.91	C
	SBLT	0.5	14.21	B	0.69	18.25	B
	SBTR	0.53	14.71	B	0.72	19.81	B
North Front Street & College Street (Signalized)	*Overall*	0.403	19.2	B	0.624	28.8	C
	EBL	0.49	32.95	C	0.66	24.98	C
	EBT	0.41	19.8	B	0.75	37.18	D
	WBL	0.34	28.24	C	0.34	18.16	B
	WBTR	0.45	20.41	C	0.73	35.84	D
	NBL	0.25	25.3	C	0.78	69.53	E
	NBT	0.36	15.07	B	0.71	24.31	C
	NBR	0.36	15.09	B	0.71	24.36	C
	SBL	0.15	20.07	C	0.61	51.5	D
	SBT	0.49	17	B	0.69	23.83	C
	SBR	0.49	17.07	B	0.69	24.03	C

In the improved scenario, during the AM peak period, all signalized intersections along North Front Street are operating at acceptable conditions with LOS B or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

In the improved scenario, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The LOS for the PM peak period is presented on **Figure 4-52**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

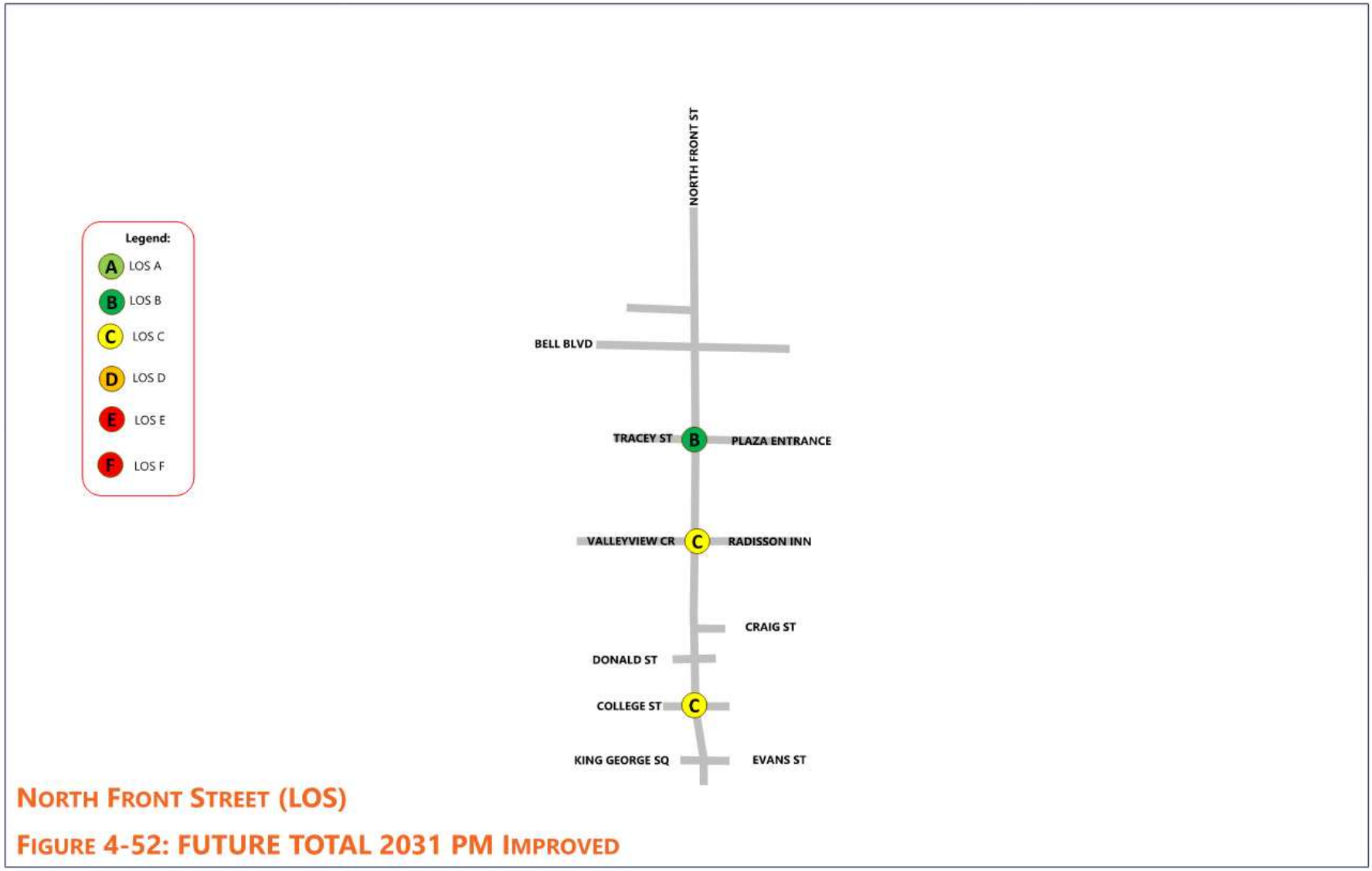

Figure 4-52: Future Total LOS PM 2031 Improved

4.9.4.3 Future Total Traffic Analysis (2041)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2041 future total conditions are summarized in **Table 4-33**.

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-53** shows the level of service for the future total scenario for the weekday AM peak period.

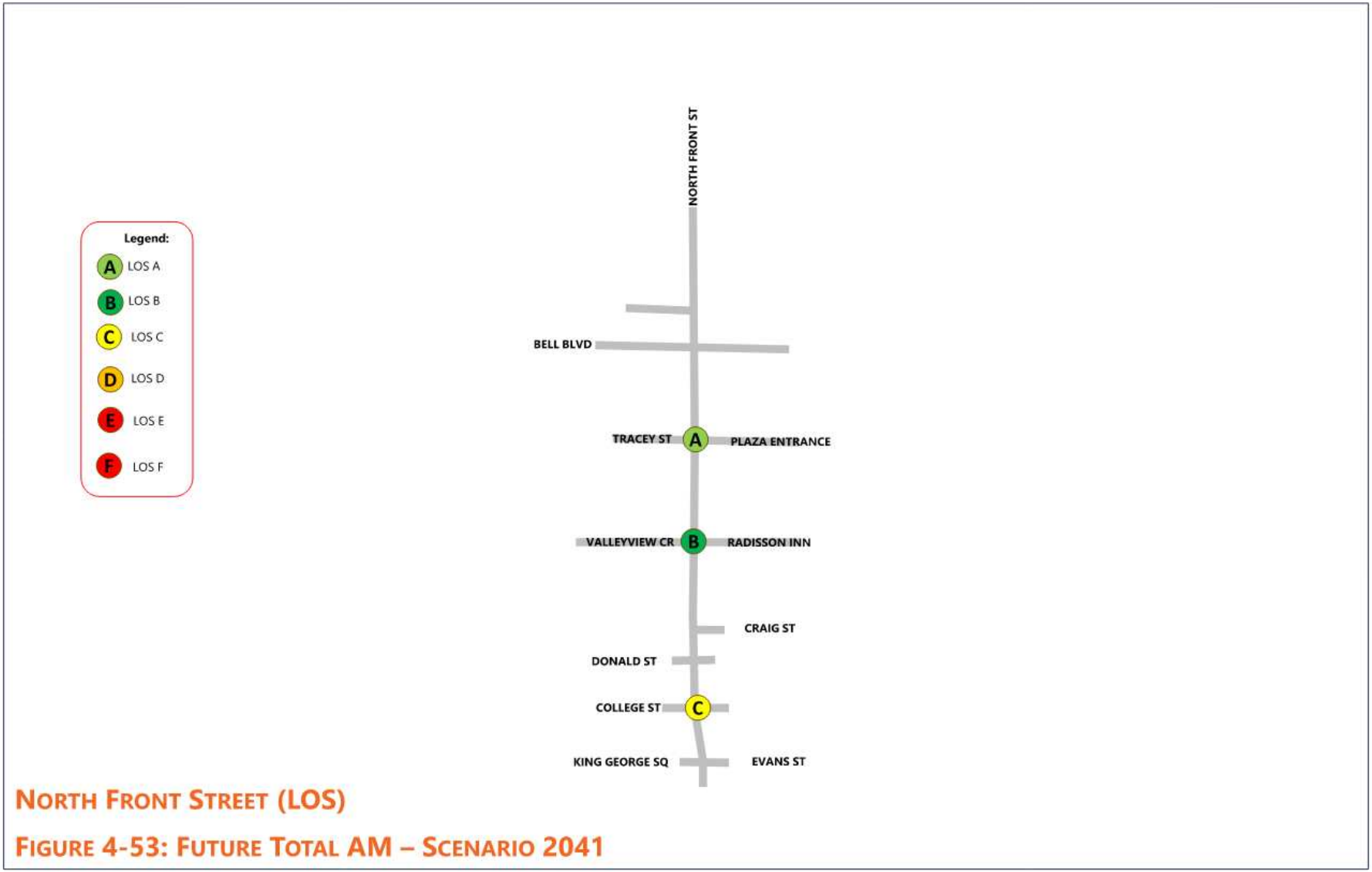

Figure 4-53: Future Total LOS AM 2041

Table 4-33: Future Total Traffic Performance - Scenario 2041 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.357	9.2	A	0.48	12.3	B
	EBL	0.22	32.23	C	0.38	45.75	D
	EBTR	0.18	28.55	C	0.35	36.52	D
	WBL	0.06	30.88	C	0.28	42.13	D
	WBTR	0.1	27.5	C	0.4	37.82	D
	NBL	0.11	12.13	B	0.3	19.43	B
	NBT	0.32	6.46	A	0.59	8.84	A
	NBR	0.32	6.46	A	0.59	8.85	A
	SBL	0.07	8.91	A	0.33	20.36	C
	SBT	0.47	7.89	A	0.58	8.81	A
	SBR	0.47	7.91	A	0.59	8.91	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.338	15	B	0.534	20.5	C
	EBLTR	0.05	18.69	B	0.16	24.5	C
	WBLTR	0.02	18.39	B	0.01	22.87	C
	NBL	0.44	13.21	B	0.8	21.64	C
	NBTR	0.46	13.57	B	0.82	23.32	C
	SBL	0.58	15.69	B	0.7	17.41	B
	SBTR	0.61	16.42	B	0.73	18.71	B
North Front Street & College Street (Signalized)	*Overall*	0.489	21.1	C	0.695	34.8	C
	EBL	0.6	40.17	D	0.85	50.08	D
	EBTR	0.4	18.92	B	0.81	47.13	D
	WBL	0.33	26.97	C	0.4	23.36	C
	WBTR	0.56	21.95	C	0.87	57.21	E
	NBL	0.31	30.53	C	0.77	70.59	E
	NBT	0.41	16.42	B	0.71	23.52	C
	NBR	0.41	16.44	B	0.71	23.58	C
	SBL	0.23	23.46	C	0.85	**93.01**	**F**
	SBT	0.59	19.51	B	0.68	22.45	C
	SBR	0.59	19.6	B	0.68	22.68	C

During the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

Similarly, during the PM peak period, all intersections along North Front Street are operating at acceptable conditions. The LOS for the PM peak period is presented on **Figure 4-54**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

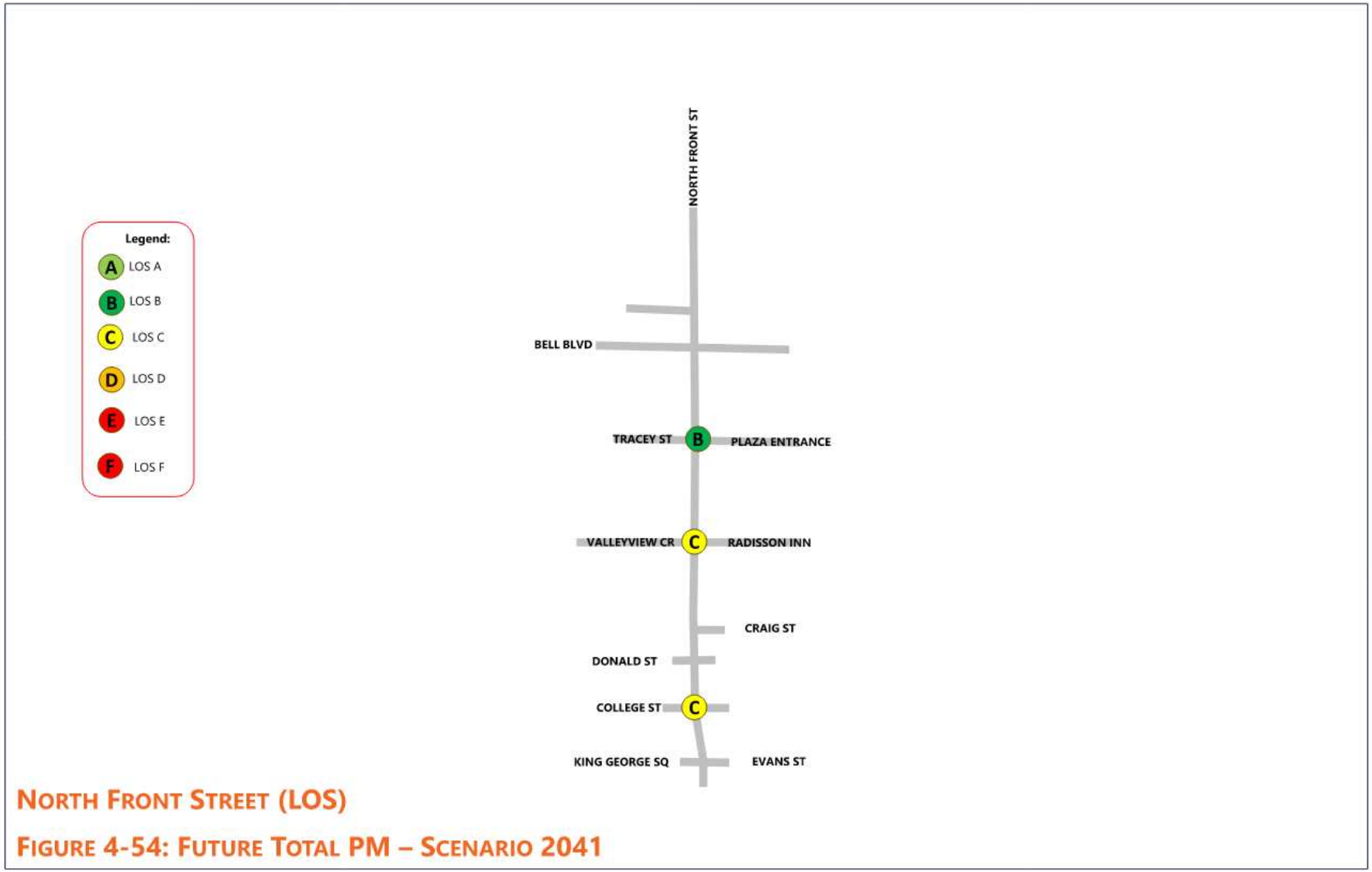

Figure 4-54: Future Total LOS PM 2041

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future total scenario.

- The SBL movement on College Street and North Front Street has a LOS F with a delay of 93 seconds.

4.9.4.4 Future Total Traffic Analysis (2041) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041 Future Total scenario. **Figure 4-55** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041 future total conditions are summarized in **Table 4-34.**

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

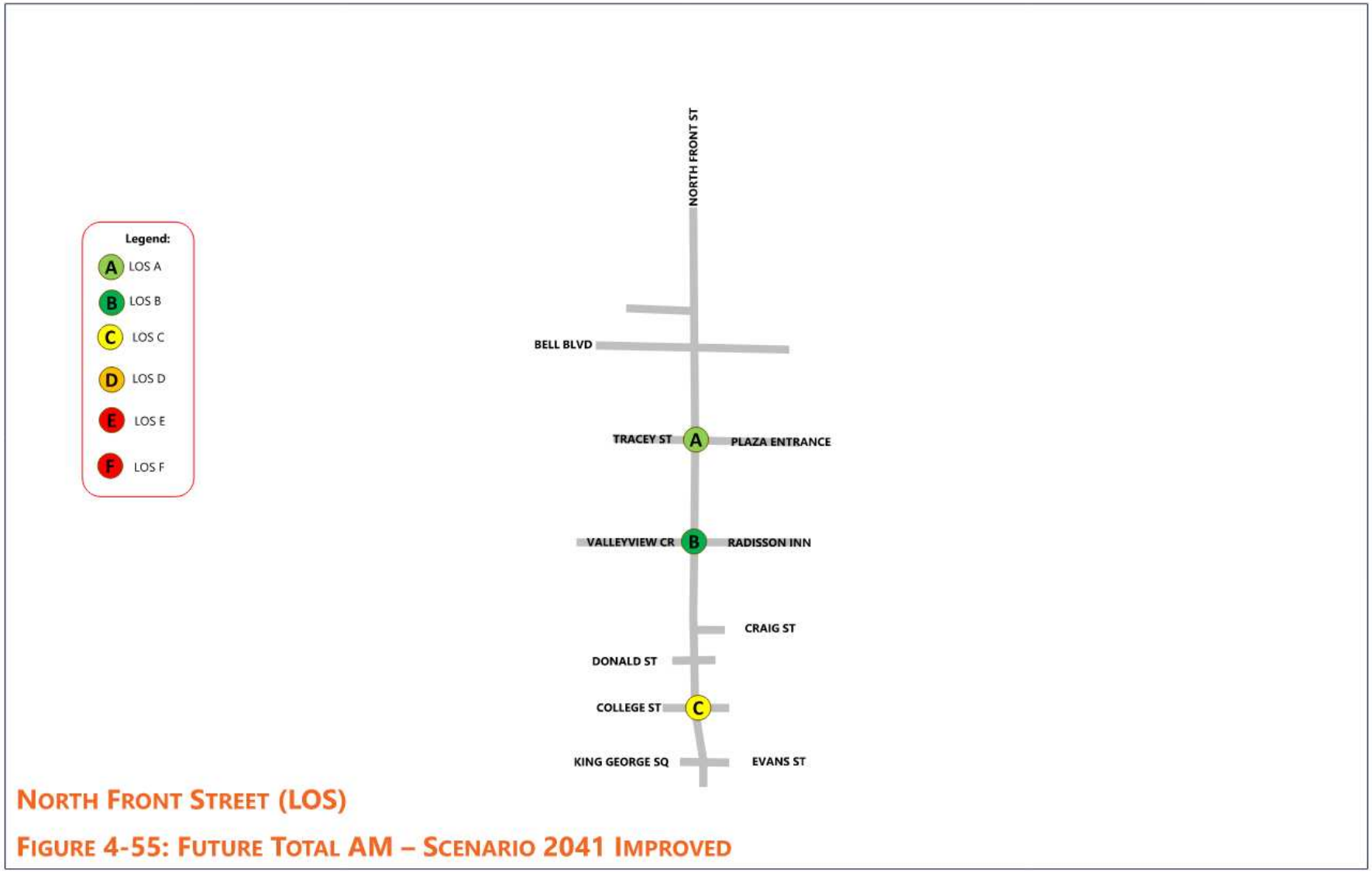

Figure 4-55: Future Total LOS AM 2041 Improved

Table 4-34: Future Total Traffic Performance - Scenario 2041 (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.357	9.2	A	0.481	12.3	B
	EBL	0.22	32.23	C	0.38	45.75	D
	EBTR	0.18	28.55	C	0.35	36.52	D
	WBL	0.06	30.88	C	0.28	42.13	D
	WBTR	0.1	27.5	C	0.4	37.82	D
	NBL	0.11	12.13	B	0.3	19.43	B
	NBT	0.32	6.46	A	0.59	8.86	A
	NBR	0.32	6.46	A	0.59	8.87	A
	SBL	0.07	8.91	A	0.33	20.48	C
	SBT	0.47	7.89	A	0.58	8.81	A
	SBR	0.47	7.91	A	0.59	8.91	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.338	15	B	0.536	20.6	C
	EBLTR	0.05	18.69	B	0.16	24.5	C
	WBLTR	0.02	18.39	B	0.01	22.87	C
	NBL	0.44	13.21	B	0.81	21.8	C
	NBTR	0.46	13.57	B	0.82	23.5	C
	SBL	0.58	15.69	B	0.71	17.44	B
	SBTR	0.61	16.42	B	0.73	18.77	B
North Front Street & College Street (Signalized)	*Overall*	0.489	21.1	C	0.696	34.9	C
	EBL	0.6	40.17	D	0.85	50.08	D
	EBTR	0.4	18.92	B	0.81	47.13	D
	WBL	0.33	26.97	C	0.4	23.36	C
	WBTR	0.56	21.95	C	0.87	57.21	E
	NBL	0.31	30.53	C	0.77	70.59	E
	NBT	0.41	16.42	B	0.71	23.6	C
	NBR	0.41	16.44	B	0.72	23.66	C
	SBL	0.23	23.46	C	0.85	**94.79**	**F**
	SBT	0.59	19.51	B	0.68	22.45	C
	SBR	0.59	19.6	B	0.68	22.68	C

In the improved scenario, during the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

In the improved scenario, during the PM peak period, multiple all along North Front Street are operating at acceptable conditions with LOS C or better. The LOS for the PM peak period is presented on **Figure 4-56**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

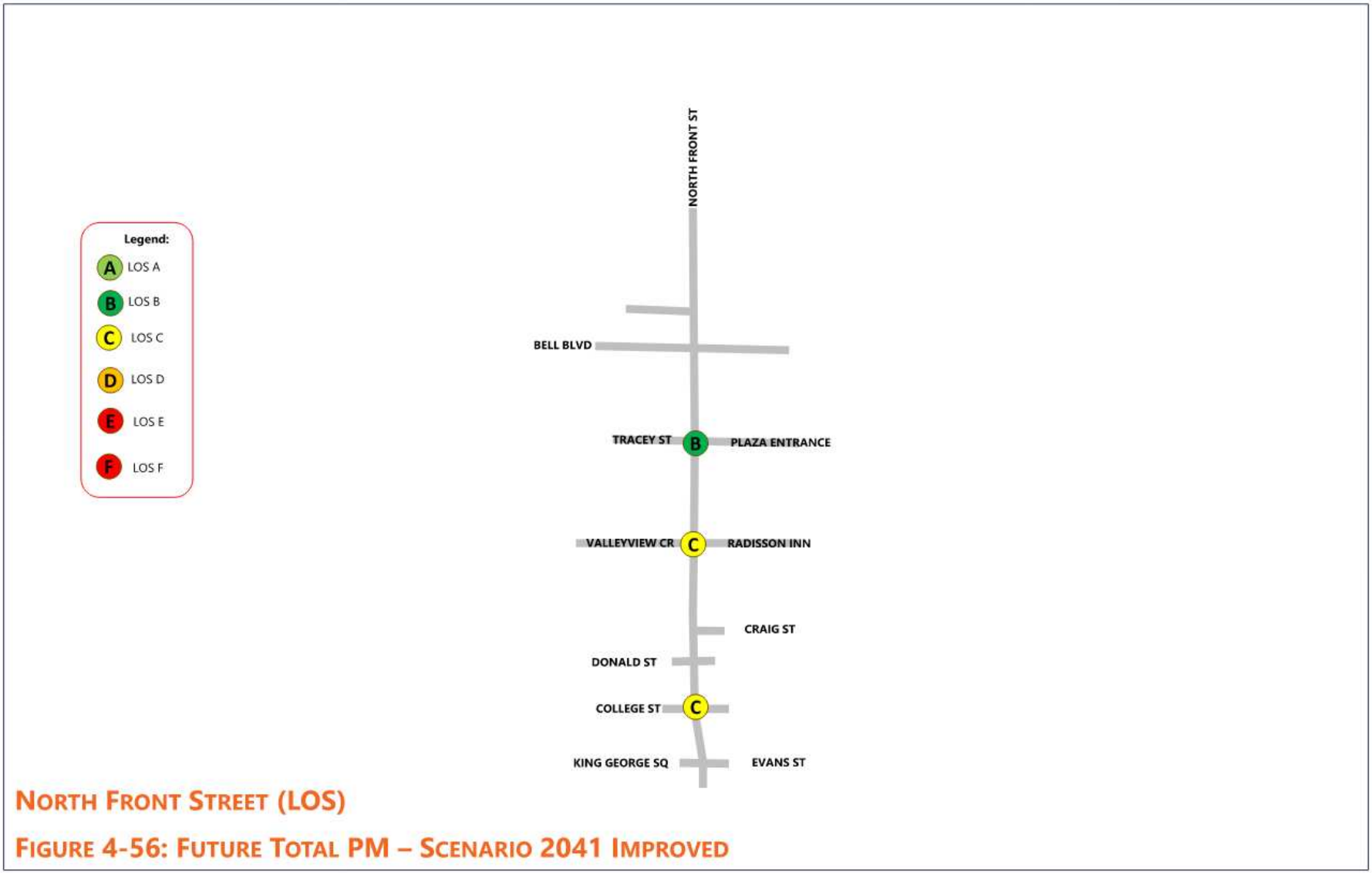

Figure 4-56: Future Total LOS PM 2041 Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041 future total scenario.

- The SBL movement on College Street & North Front Street has a LOS F with a delay of 94 seconds.

4.9.4.5 Future Total Traffic Analysis (2041+)

The traffic modelling exercise provided traffic performance results for the study intersections, including Level of Service (LOS) and volume/capacity ratios and delays for the weekday AM and PM peak periods. As a result, the traffic capacity analysis results for the study intersections under 2041+ future total conditions are summarized in **Table 4-35**.

The North Front Street corridor is part of a coordinated signal groups which prioritize the movement of main corridor (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible. The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix I**. **Figure 4-57** shows the level of service for the future total scenario for the weekday AM peak period.

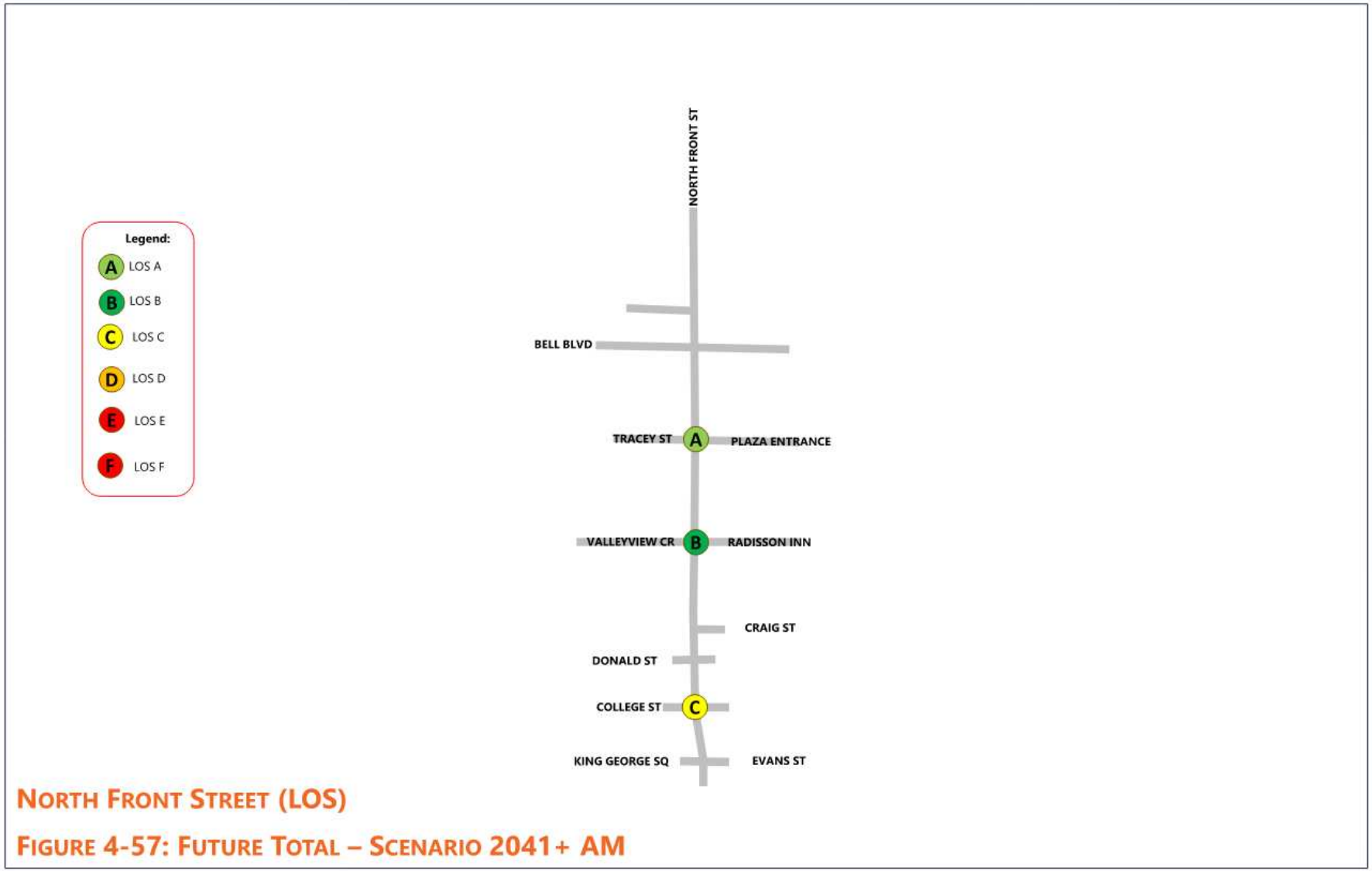

Figure 4-57: Future Total LOS AM 2041+

Table 4-35: Future Total Traffic Performance - Scenario 2041+ (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.427	9.9	A	0.567	13.2	B
	EBL	0.22	32.23	C	0.52	65.94	E
	EBTR	0.18	28.55	C	0.42	49.2	D
	WBL	0.06	30.88	C	0.38	57.4	E
	WBTR	0.1	27.5	C	0.49	51.54	D
	NBL	0.14	15.56	B	0.35	22.4	C
	NBT	0.37	6.86	A	0.66	9.07	A
	NBR	0.37	6.86	A	0.66	9.09	A
	SBL	0.08	9.73	A	0.42	27.89	C
	SBT	0.57	9.3	A	0.62	8.38	A
	SBR	0.57	9.34	A	0.63	8.54	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.412	17.7	B	0.636	21.4	C
	EBLTR	0.05	18.69	B	0.19	34.65	C
	WBLTR	0.02	18.39	B	0.01	32.25	C
	NBLT	0.5	14.12	B	0.87	24.51	C
	NBTR	0.52	14.59	B	0.86	24.29	C
	SBLT	0.72	19.23	B	0.74	16.6	B
	SBTR	0.75	20.83	C	0.75	17.81	B
North Front Street & College Street (Signalized)	*Overall*	0.559	23.1	C	0.905	131.4	F
	EBL	0.69	47.47	D	**1.19**	**420.39**	**F**
	EBTR	0.42	19.83	B	0.89	69.45	E
	WBL	0.34	28.36	C	0.52	34.77	C
	WBTR	0.6	23.58	C	**1.25**	**509.86**	**F**
	NBL	0.41	39.2	D	0.82	87	F
	NBT	0.44	16.21	B	0.73	23.64	C
	NBR	0.44	16.23	B	0.73	23.73	C
	SBL	0.41	27.74	C	**1.23**	**518.67**	**F**
	SBT	0.7	22.15	C	0.67	21.78	C
	SBR	0.71	22.37	C	0.69	22.13	C

During the AM peak period, multiple intersections along North Front Street are operating at acceptable conditions with LOS C or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle

length for the coordination to be made possible. The following list describes the most notable critical movements in the network during the AM peak period for the 2041+ future total scenario.

During the PM peak period, most intersections along North Front Street are operating at acceptable conditions, except for North Front Street and College Street. The LOS for the PM peak period is presented on **Figure 4-58**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix I**.

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future total scenario.

- The EBL movement on College Street & North Front Street has a LOS F with a delay of 420.39 seconds.
- The WBTR movement on College Street & North Front Street has a LOS F with a delay of 509 seconds.
- The SBL movement on College Street & North Front Street has a LOS F with a delay of 518 seconds.

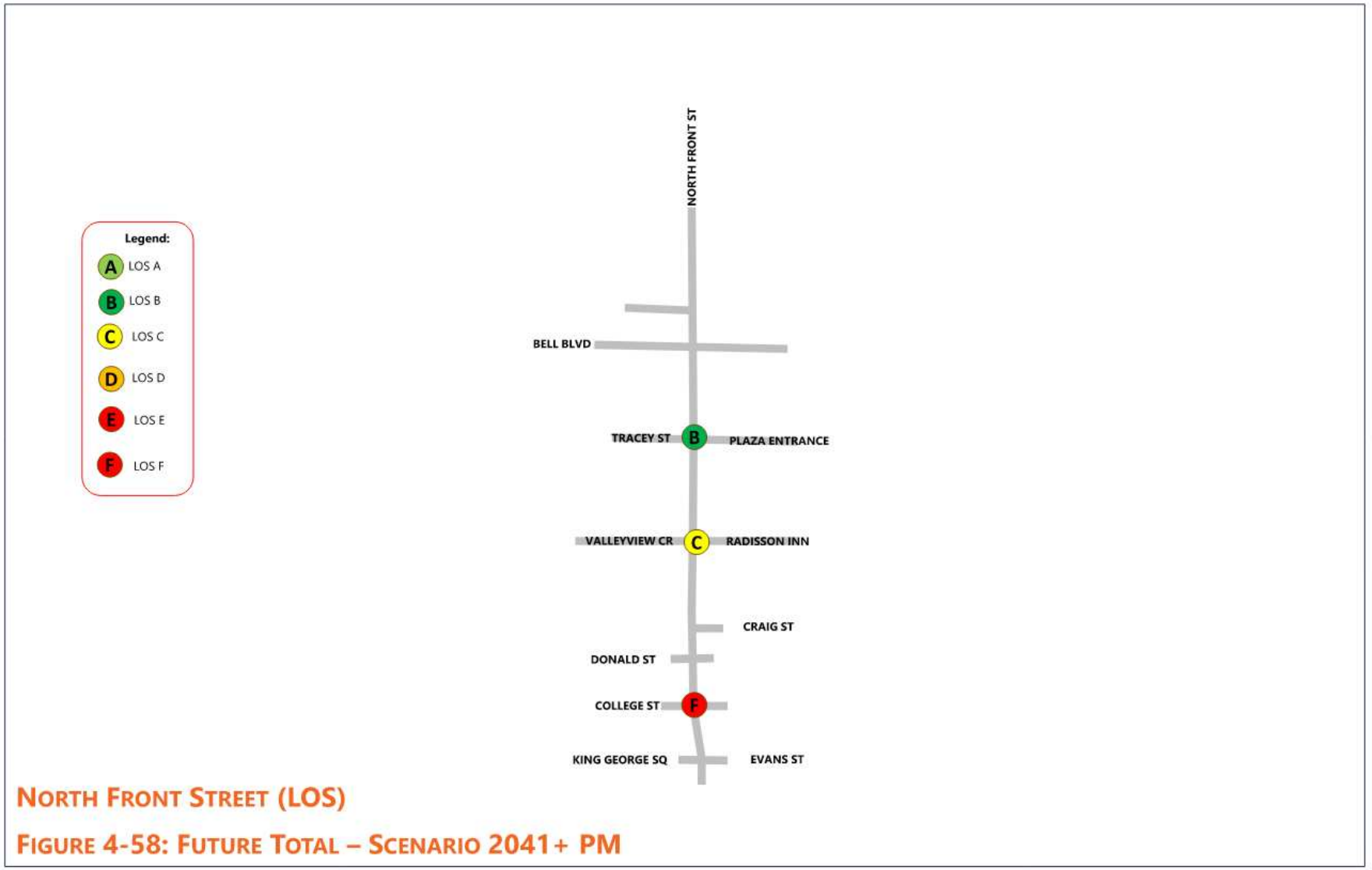

Figure 4-58: Future Total LOS PM 2041+

4.9.4.6 Future Total Traffic Analysis (2041+) Improved

An improved scenario was prepared to mitigate the capacity constraints of the 2041+ Future Total scenario. **Figure 4-59** shows the level of service for the future total scenario for the weekday morning peak hour. Similarly, the traffic capacity analysis results for the study intersections under 2041+ future total conditions are summarized in **Table 4-36**.

The detailed analysis and critical movements for each intersection is found below as well as in the intersection analysis summary attached in the **Appendix J**.

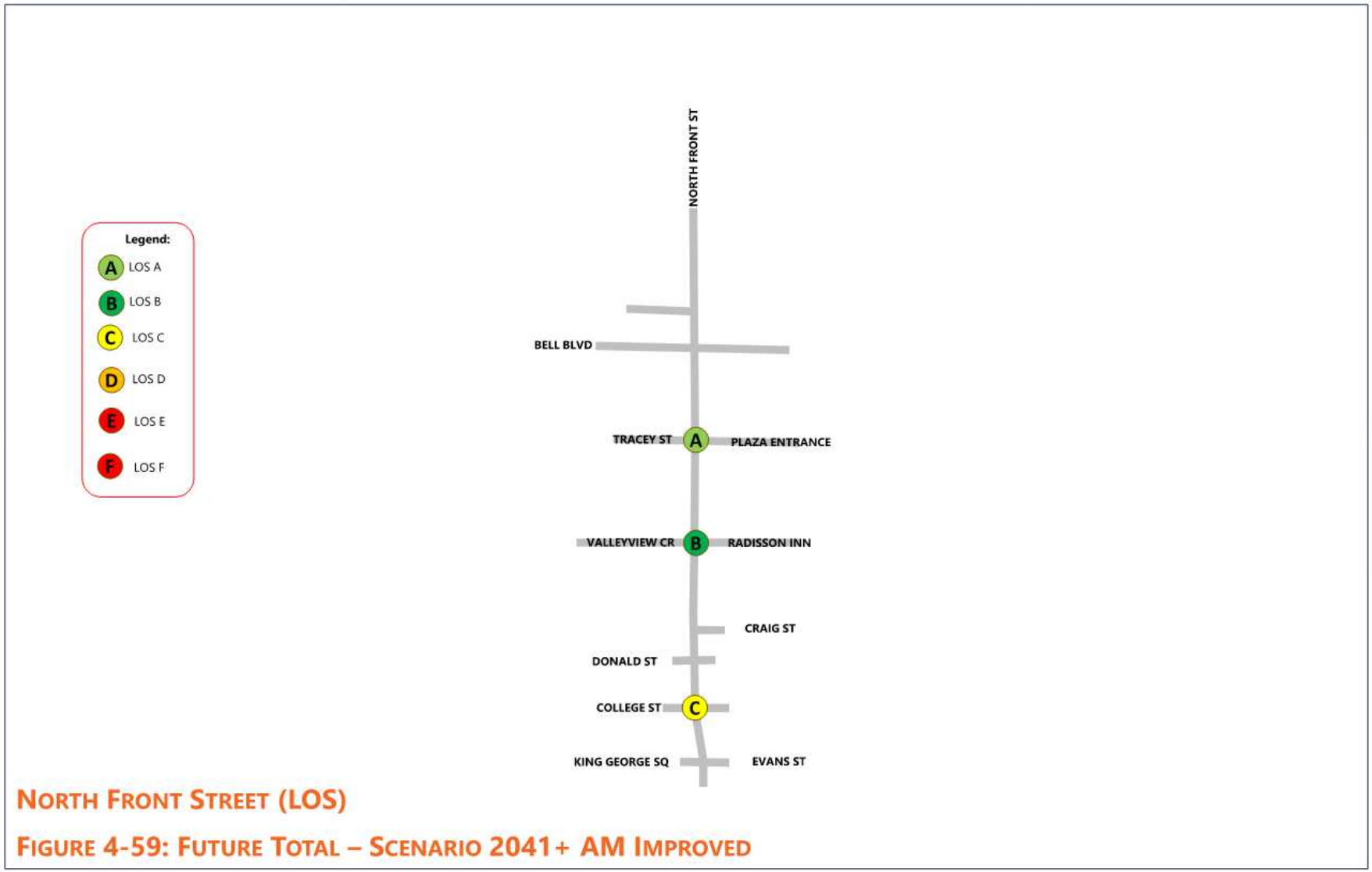

Figure 4-59: Future Total LOS AM 2041+ Improved

Table 4-36: Future Total Traffic Performance - Scenario 2041+ (North Front Street Corridor)

Intersection	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
North Front Street & Tracey Street/Plaza Entrance (Signalized)	*Overall*	0.417	9.8	A	0.567	16.0	B
	EBL	0.22	32.23	C	0.61	**107.76**	**F**
	EBTR	0.18	28.55	C	0.43	77.77	E
	WBL	0.06	30.88	C	0.44	**92.05**	**F**
	WBTR	0.10	27.50	C	0.51	**80.56**	**F**
	NBL	0.14	14.99	B	0.35	23.54	C
	NBT	0.36	6.85	A	0.62	9.14	A
	NBTR	0.36	6.85	A	0.62	9.17	A
	SBL	0.08	9.71	A	0.42	29.45	C
	SBT	0.56	9.04	A	0.58	8.41	A
	SBTR	0.56	9.11	A	0.60	8.67	A
North Front Street & Valleyview Cres/Radisson Country Inn (Signalized)	*Overall*	0.402	17.3	B	0.636	7.8	A
	EBLTR	0.05	18.69	B	0.52	**92.95**	**F**
	WBLTR	0.02	18.39	B	0.04	77.37	E
	NBLT	0.49	14.09	B	0.68	6.63	A
	NBTR	0.52	14.56	B	0.65	6.52	A
	SBLT	0.70	18.61	B	0.56	5.02	A
	SBTR	0.73	20.02	C	0.56	5.20	A
North Front Street & College Street (Signalized)	*Overall*	0.513	21.1	C	0.873	**97.4**	**F**
	EBL	0.64	42.87	D	1.01	**164.62**	**F**
	EBTR	0.40	18.95	B	0.99	**155.63**	**F**
	WBL	0.33	27.07	C	0.33	35.51	D
	WBTR	0.58	22.33	C	0.91	**88.65**	**F**
	NBL	0.37	34.74	C	0.63	51.52	D
	NBT	0.45	17.00	B	1.00	**114.81**	**F**
	NBTR	0.45	17.04	B	1.00	**119.41**	**F**
	SBL	0.42	29.22	C	0.97	**169.60**	**F**
	SBT	0.63	18.70	B	0.78	50.41	D
	SBR	0.22	14.11	B	0.31	36.96	D

In the improved scenario, during the AM peak period, all intersections along North Front Street are operating at acceptable conditions with LOS C or better. The corridor is part of a signal coordination groups which prioritize the main movement flow (north-south for North Front Street). Additionally, all signal controller in each corridor is set to have the same actuation type, as well as the same cycle length for the coordination to be made possible.

During the PM peak period, two signalized intersections along North Front Street are operating at acceptable conditions, except North Front Street and College Street that has a LOS F. The LOS for the PM peak period is presented on **Figure 4-60**. The detailed analysis and critical movements for each intersection is in the intersection analysis summary attached in the **Appendix J**.

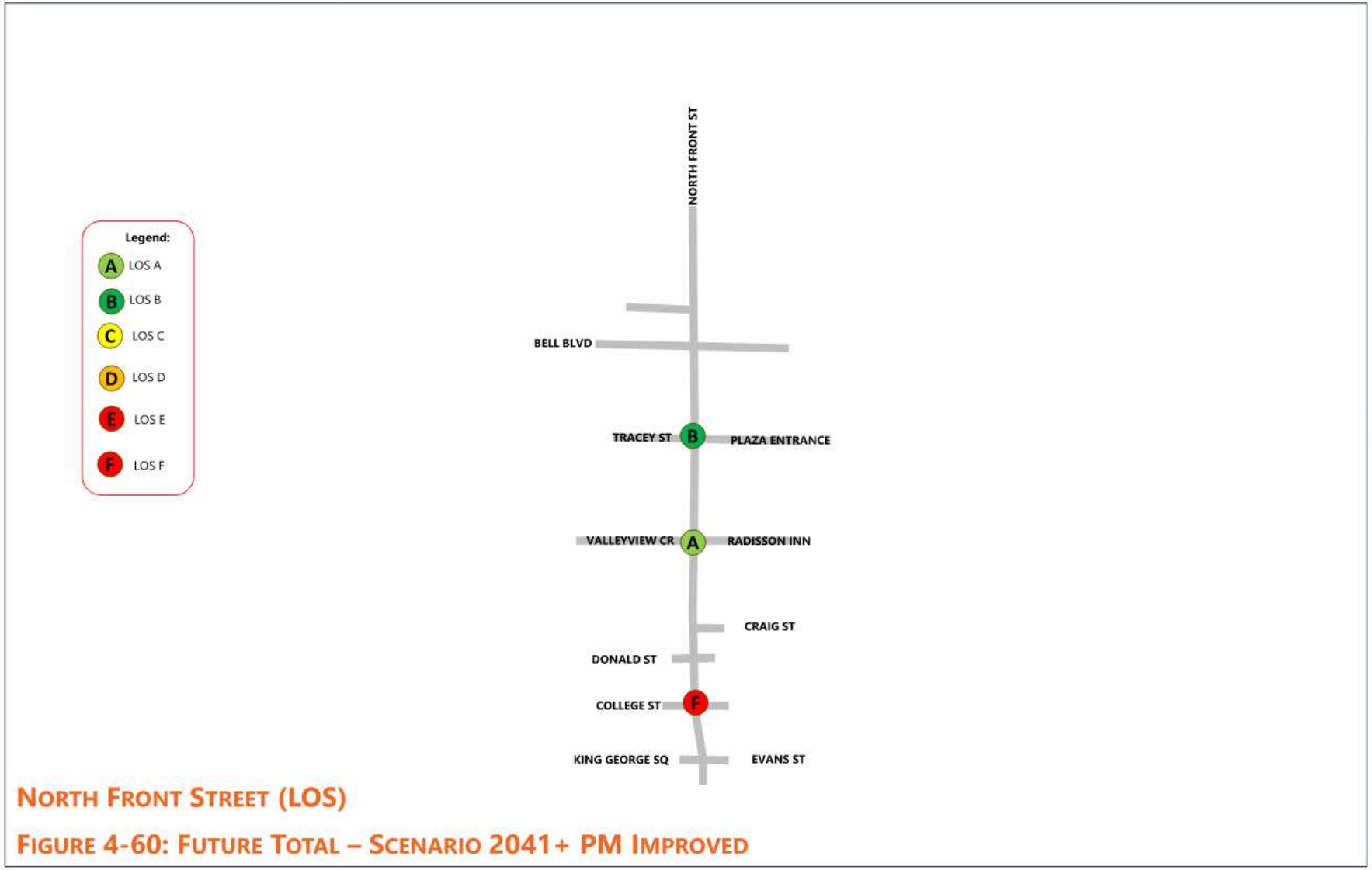

Figure 4-60: Future Total LOS PM 2041+ Improved

The following list describes the most notable critical movements in the network during the PM peak period for the 2041+ future total scenario.

- The EBL movement on North Front Street & Tracey Street/Plaza Entrance has a LOS F with a delay of 107 seconds.
- The WBL movement on North Front Street & Tracey Street/Plaza Entrance has a LOS F with a delay of 92 seconds.
- The WBTR movement on North Front Street & Tracey Street/Plaza Entrance has a LOS F with a delay of 80 seconds.
- The EB movement on North Front Street & Valleyview Cres/Radisson Country Inn has a LOS F with a delay of 93 seconds.
- The EBL movement on North Front Street & College Street has a LOS F with a delay of 164 seconds.
- The EBTR movement on North Front Street & College Street has a LOS F with a delay of 155 seconds.
- The WBTR movement on North Front Street & College Street has a LOS F with a delay of 88 seconds.
- The NBT movement on North Front Street & College Street has a LOS F with a delay of 114 seconds.
- The NBTR movement on North Front Street & College Street has a LOS F with a delay of 119 seconds.
- The SBL movement on North Front Street & College Street has a LOS F with a delay of 169 seconds.

In addition to the corridor signal optimization, geometric improvements are recommended along North Front Street Boulevard to improve the traffic conditions of the corridor. It is important to note that all improvement hereby mentioned compares the previous 2041 future total scenario improved. To summarize the list of geometric improvements made in the 2041+ future total background improved scenario, **Table 4-37** is presented below:

Table 4-37: Future Total - Scenario 2041+ - List of Geometric Improvements (North Front Street Corridor)

Intersection	Improvements	Notes
North Front Street & Tracey Street/Plaza Entrance	-	-
North Front Street & Valleyview Cres/Radisson Country Inn	-	-
North Front Street & College Street	SBR lane	-

4.10 Additional Considerations

4.10.1 Roundabout Feasibility at Bell Boulevard & North Front Street

Additional attention was given to the intersection of Bell Boulevard and North Front Street, due to the constraints experienced under existing traffic conditions, and the additional stress that may be added to the network at this location under future conditions. Specifically, the feasibility of a roundabout was assessed.

As a baseline, it is noted that the intersection of Bell Boulevard & North Front Street must accommodate heavy truck traffic due to its key location near Highway 401 and the commercial and industrial uses along Bell Blvd. In addition to accommodating heavy vehicles, it was observed that a potential roundabout configuration would require three lanes to match the number of approach lanes at the existing signalized intersection. The typical inscribed circle diameters for a multilane roundabout with heavy truck traffic is 46-91 meters as illustrated in **Figure 4-61**.

Looking for comparable examples of large-scale roundabouts accommodating heavy vehicle traffic in the province, the three-lane roundabout at Homer Watson Boulevard at Ottawa Street South in Waterloo, Ontario was studied. Including sidewalks and all crosswalks, the total inscribed right-of-way diameter is 105 meters. A spatial analysis was conducted by TYLin, overlaying a 105-meter diameter (52.5-meter radius) right-of-way circle over the Bell Boulevard & North Front Street intersection which indicated significant spatial impacts, including expropriation of large portions of the parking lots on the southeast and southwest corners, as well as demolition of the Shell and Pioneer gasoline bars. As such, a significant amount of additional space would be required at this location to include the required space for a 3-lane roundabout suitable for heavy vehicles with boulevards, crosswalks, sidewalks, and supporting infrastructure.

Additionally, the MTO would need to be involved in any re-design process or changes to this intersection, due to proximity to Highway 401. Other factors affecting the suitability of a roundabout at this intersection include heavy truck traffic, proximity to adjacent intersections and site accesses (including Highway 401), presence of gas stations on two sides and heavy traffic flows on all approaches.

A roundabout is therefore **not recommended** as a potential traffic mitigation solution for the intersection of Bell Boulevard at North Front Street.

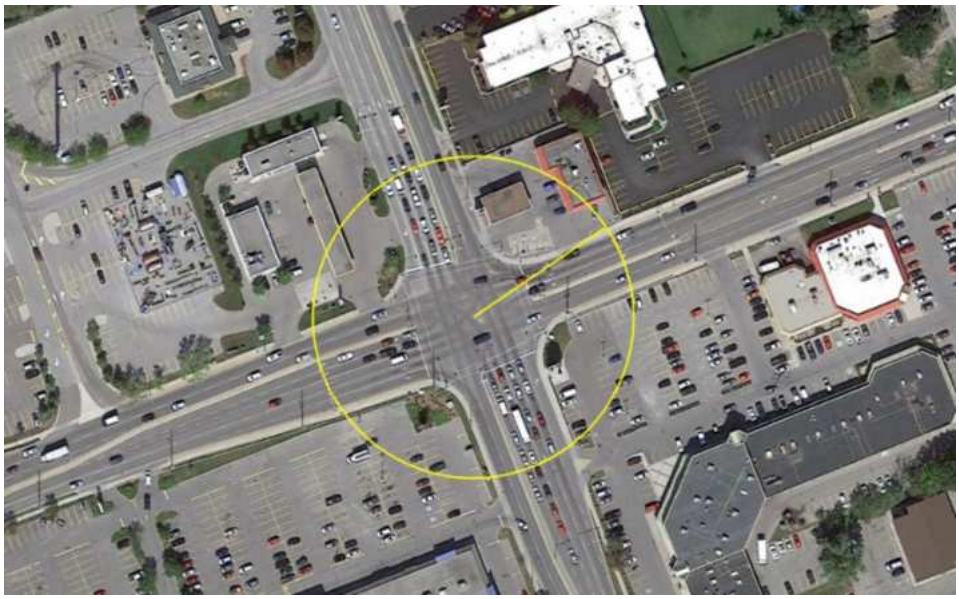

Figure 4-61: Roundabout Consideration at Bell Boulevard & North Front Street

4.10.2 East-West Collector Road Cut-through Traffic Mitigation Considerations

The future road network plan expects a road extension connecting Hamilton Road to the east towards an existing east-west collector road connecting towards Sidney Street and North Front Street.

TYLin offers the following traffic management suggestions for staff consideration that should be assessed further in future studies. These measures can be implemented in coordination with the future Tracey Park Drive extension, to help ensure traffic in the existing residential community flows at a neighborhood speed, potentially mitigating undue impacts of congestion and speeding for area residents.

- **Traffic Management:** The road network must be designed to give preference to local traffic only. While the Hamilton Road Extension connects Wallbridge Loyalist directly to Bell Boulevard, the east-west collector extension to the east should clearly delineate this as prioritizing local traffic, giving drivers the indication of a changing environment. This requires consideration for intersection treatments, right-of-way width, speed limits, and road geometry to ensure it is designed to function as a minor collector road.
- **Traffic Calming:** Speed control measures could be considered along this east-west collector road extension as needed, to help mitigate its usage as a potential route for cut-through traffic. Traffic calming measures may include physical interventions such as speed cushions, speed humps, chicanes, and speed display devices, or technological interventions including Automated Speed Enforcement (ASE). Example images of physical traffic calming interventions are provided in **Figure 4-62** to **Figure 4-64.** Note that traffic calming measures should not be implemented pre-emptively as means of traffic control, but should be monitored and implemented as needed by the City.

Figure 4-62: Example of a Speed Cushion
Source: City of Abbotsford

Figure 4-63: Example of a Speed Bump,
Source: City of Abbotsford

Figure 4-64: Chicane on a Residential Road
Source: NACTO (National Association of City Transportation Officials)

5 Recommendations

Following the analysis of the study area road network under 2031, 2041 and 2041+ future conditions, the projected growth will trigger critical traffic conditions at multiple intersections along the Bell Boulevard and North Front Street corridors, however the majority of intersections along the corridor are expected to operate within capacity with the recommended improvements. This is primarily focussed at existing congested corridors such as the commercial area surrounding Bell Boulevard and North Front Street and at the intersection of North Front Street and College Street. No further short-term intersection specific improvements have been identified for these intersections at this time due to other constraints such as road geometry, property boundaries, and network limitations.

As a result, the City of Belleville is advised to explore the feasibility of the broader, network-wide infrastructure investments, including non-auto alternatives such as transit expansion and first-mile/last-mile micro-mobility programs, to reduce the traffic impact along the study corridors. These investments should be pursuant to and building upon the findings from this study, likely through the preparation of an updated Transportation Master Plan with a macro-simulation traffic model for the City as a whole.

Proactively, TYLin recommends the following localized improvements in reference to a first principles understanding of their potential for improving traffic conditions when coupled with other macro network investments.

5.1 Geometric Recommendations

A detailed description of the geometric improvements suggested for this study can be found below. Based on the analysis of the AM and PM peak periods, the following recommendations may be considered as shown in **Table 5-1**.

Table 5-1: Short-Term Geometric Recommended Improvements

Future Background		
Intersection	Improvements	Implementation by
Wallbridge Loyalist Road & Bell Boulevard	1 NBT lane, 1 SBT lane, and 1 WBL lane	2031
	1 WBR lane	2041
Bell Boulevard & Hannafin Road	-	-
Bell Boulevard & Jenland Way South	-	-
Bell Boulevard & Hanna Court	-	-
Bell Boulevard & Davy Road	-	-
Bell Boulevard & Sidney Street	EBR lane	2041

Bell Boulevard & Plaza Entrance West	1 SBL lane	2031
	1 NBL lane	2041
Bell Boulevard & Plaza Entrance Mid	1 NBR lane and 1 SBR lane	2041
Bell Boulevard & Plaza Entrance East	1 NBR lane and 1 SBR lane	2041
Bell Boulevard & North Front Street	1 WBR lane	2031
Bell Boulevard & North Park Street	-	-
Bell Boulevard & Jack Ellis Way	1 WBL and 1 EBL lane	2041
Bell Boulevard & Shorelines Casino	-	-
Bell Boulevard & Hamilton Road North	1 WBL and 1 EBL lane	2041
Future Total		
Intersection	Improvements	Implementation by
Wallbridge Loyalist Road & Bell Boulevard	1 NBT lane, 1 SBT lane, 1 WBR and 1 WBL lane	2031
	SBL lane	2041+
Bell Boulevard & Hannafin Road	NBL lane, SBL lane, EBL lane and WBL lane	2041+
Bell Boulevard & Jenland Way South	WBL lane and EBL lane	2041
	WBL lane (dual), NBR lane, NBL lane and SBL lane	2041+
Bell Boulevard & Hanna Court	EBL lane and WBL lane	2041+
Bell Boulevard & Davy Road		
Bell Boulevard & Sidney Street	EBR lane	2041
	Channelized EBR lane, EBL lane and WBT lane	2041+
Bell Boulevard & Plaza Entrance West	1 SBL lane and 1 NBL	2031
Bell Boulevard & Plaza Entrance Mid	1 EBR lane, 1 NBL lane and 1 SBR lane	2031
	NBR lane	2041
	SBL lane	2041+
Bell Boulevard & Plaza Entrance East	1 NBR lane	2031
	SBR lane	2041
	EBR lane	2041+

Bell Boulevard & North Front Street	1 WBR lane	2031
	Channelized EBR	2041
	Channelized SBR	2041+
Bell Boulevard & North Park Street		
Bell Boulevard & Jack Ellis Way	WBL lane	2041
	EBL lane, NBL lane, NBR lane, SBL lane and SBR lane	2041+
Bell Boulevard & Shorelines Casino		
Bell Boulevard & Hamilton Road North	WBL lane and EBL lane	2041
	WBL lane, NBL lane, NBR lane, SBL lane and SBR lane	2041+

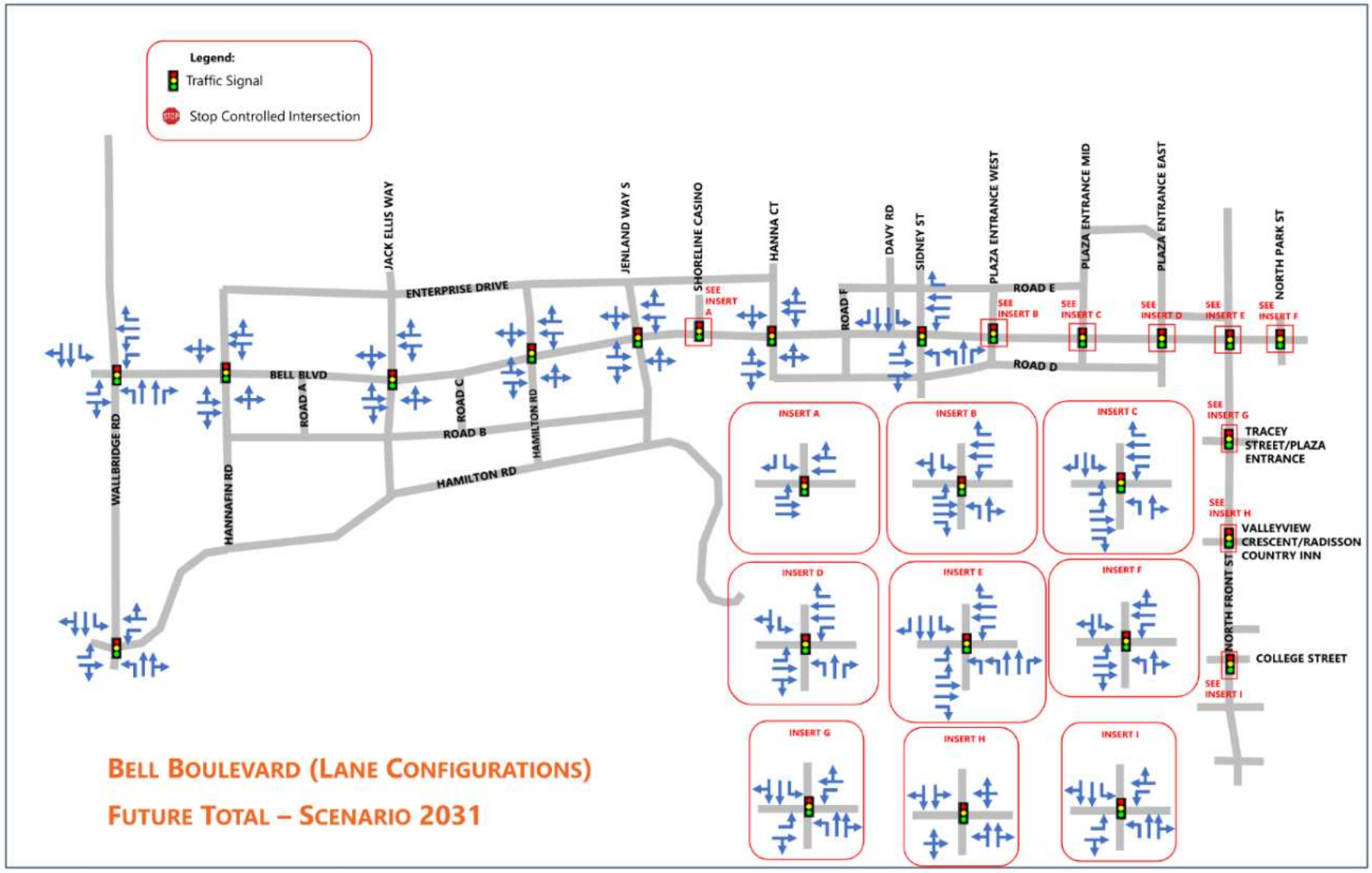

Figure 5-1: Scenario 2031 - Proposed Lane Configurations

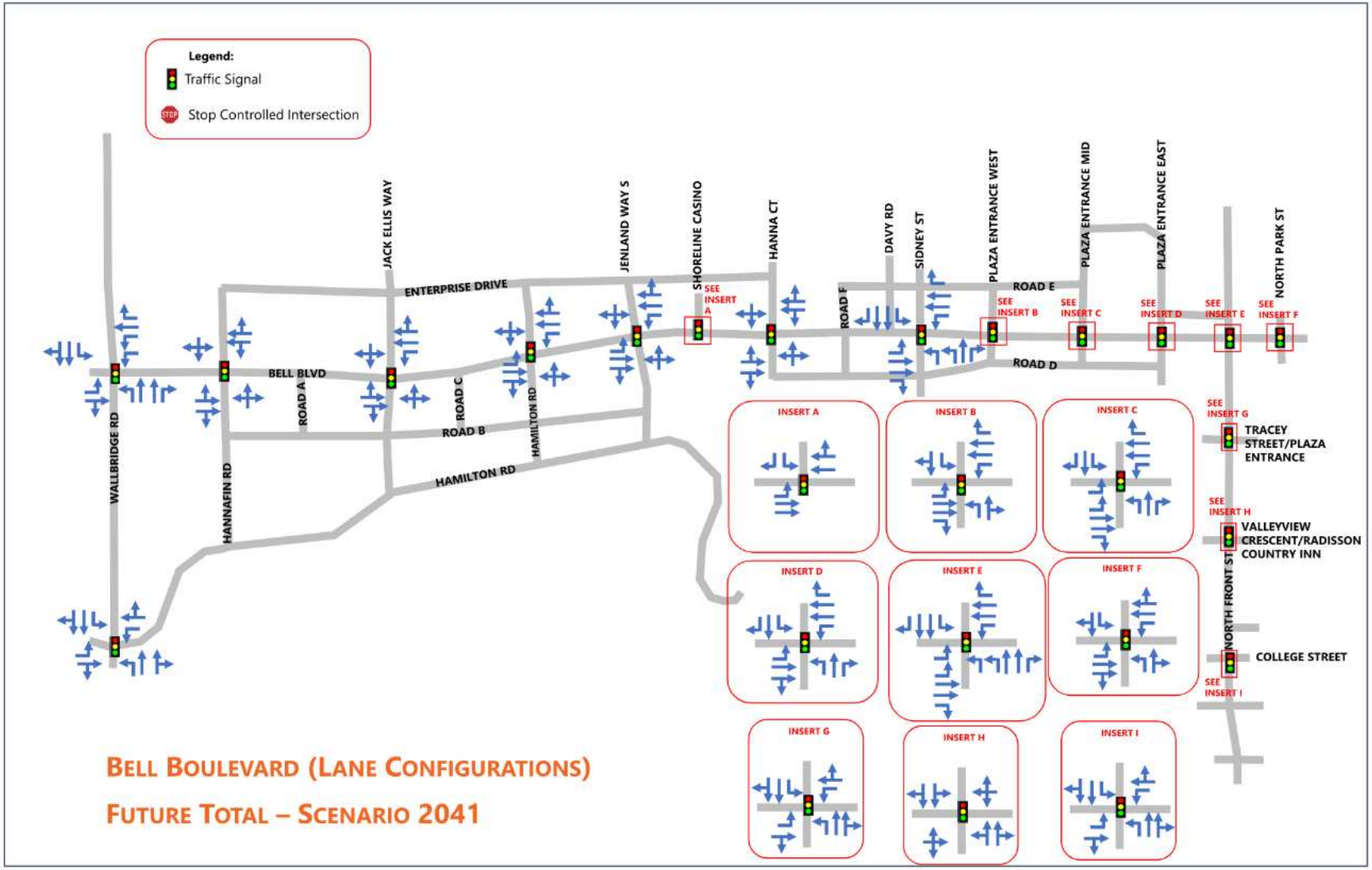

Figure 5-2: Scenario 2041 - Proposed Lane Configurations

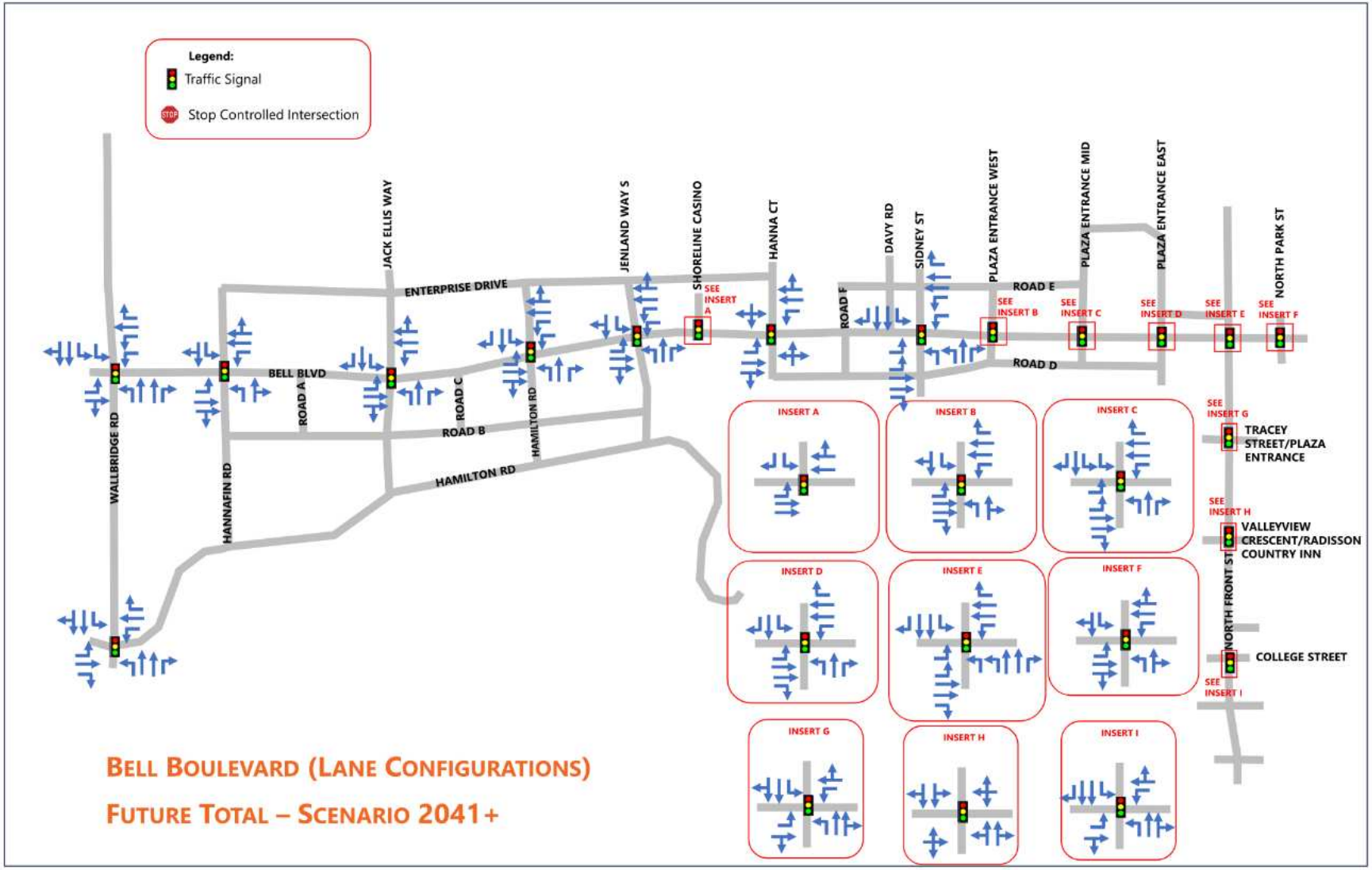

Figure 5-3: Scenario 2041+ - Proposed Lane Configurations

Further detail on specific improvements is provided in their respective horizon scenario of analysis in **Section 4.9**.

5.2 Active Transportation Recommendations

Although Belleville's planned Active Transportation (AT) network will provide additional cycling connections along arterial and collector roads, opportunities exist to provide further targeted enhancements to expand the accessibility and attractiveness of AT as a mode choice for commuting, shopping, and recreation.

It is important to note that by improving the current active transportation facilities along the study area, more people will opt for using this mode of transportation as their preferred way of traveling. This can result in a great change in the mode split for active transportation, decreasing the current auto usage.

Localized improvements are illustrated in **Figure 5-4** below and may include:

1. Dedicated cycling infrastructure on North Front Street, to mitigate risks posed by high traffic volumes and frequent driveways.
2. Connection of the Finch Drive multi-use path (MUP) to the north-south trail connecting to Bell Boulevard and the proposed hydro corridor MUP. The existing trail can also help connect Harris Cres to Georges Vanier School across the observed desire line.
3. Connecting North Park Street with Riverside Park trails and providing a safe path for pedestrians and cyclists to retail and employment areas across Highway 401.
4. Connecting local streets and existing mid-block paths into a seamless east-west AT path. Extensions could be provided to the Loyalist Secondary Plan area west of North Front Street.
5. Connecting local streets and existing mid-block paths into a seamless east-west AT path. Extensions could be provided east across the Moira River via an extended N Park Gardens.
6. Extending the existing north-south trail located next to the Former Quinte Secondary School via the proposed Heartwood Drive extension across the rail corridor.
7. Leveraging proposed road and driveway extensions into the Sidney Street / Bell Blvd area, an east-west active transportation route would improve accessibility and safety for pedestrians accessing retail nodes.
8. Leveraging proposed road and driveway extensions into the Sidney Street / Bell Blvd area, a north-south active transportation route would improve accessibility and safety for pedestrians crossing Highway 401.

Cycling also provides a convenient and reliable non-auto mode of travel between areas that are close by which blend with the mixed-use vision of this study area. Providing clear and well-maintained cycling facilities will continue to encourage cycling usage throughout all seasons.

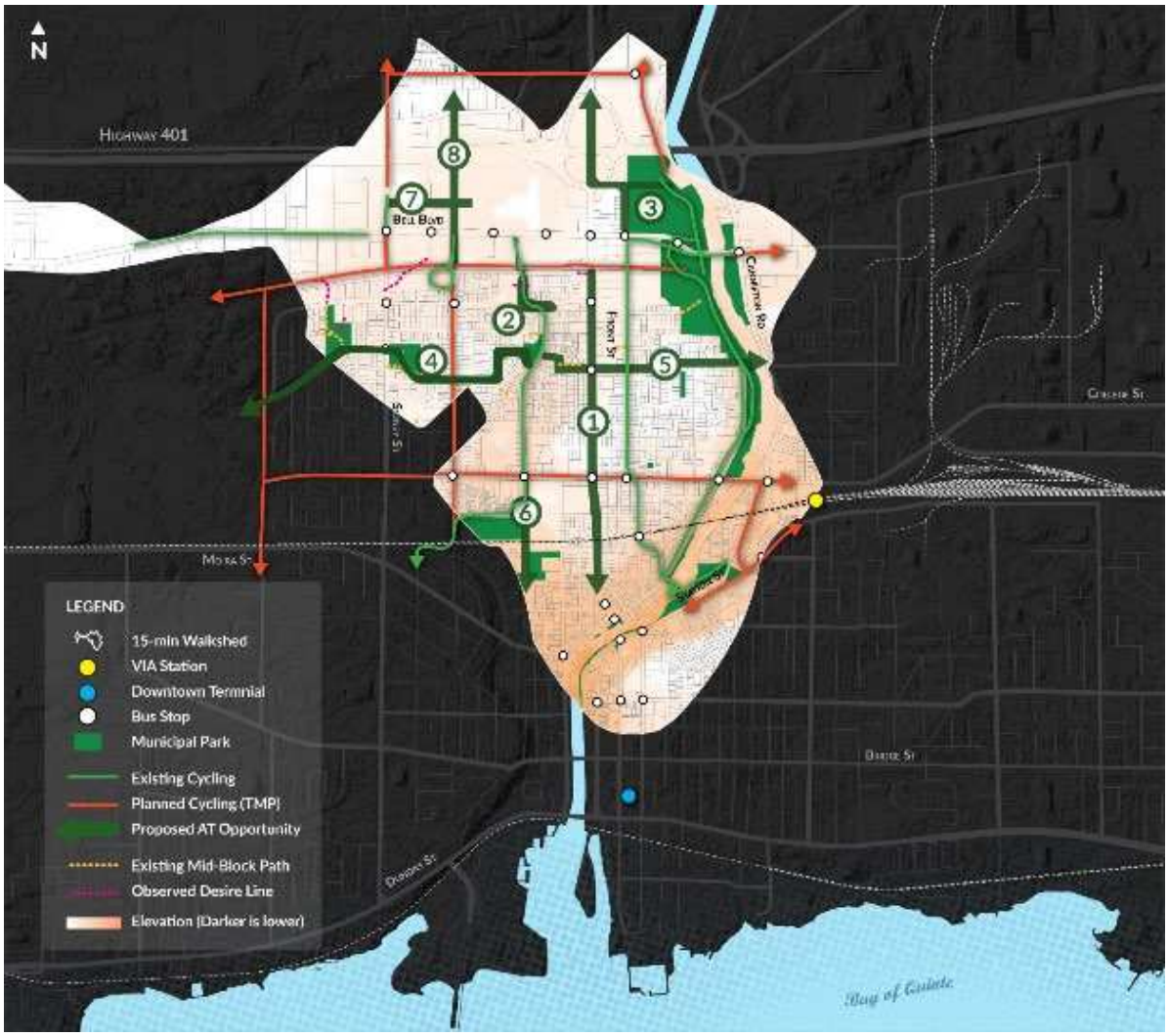

Figure 5-4: Active Transportation Improvement Opportunities

5.3 TRANSIT RECOMMENDATIONS

5.3.1 General Improvements

Improving the City's transit service can be one of the most effective recommendations for this transportation study. In addition to expanding active transportation facilities, improving transit can result in a broad shift of trips previously taken by automobiles onto sustainable transit.

An investment into fast, frequent, and reliable transit would greatly reduce the number of passenger cars in the road network, alleviating traffic along the studied corridors This would eventually see an increase in traffic performance, a reduction in projected congestion, and a reduced need for vehicle parking along the corridor's future developments. An effective transit system would need extensive planning, efficient scheduling, and a reliable frequency, but is possible and strongly recommended in consideration of the significant growth anticipated by the City throughout the study area.

At a high level, Belleville's existing transit network is structured as a series of looping routes centered around the downtown transit terminal, also known as a radial network. By focusing the transit service on the City's high-volume movement corridors and implementing a grid-based network, Belleville Transit can provide the following benefits:

- Improved ridership and vehicle occupancy
- Greater ease of transferring between routes and support for cross-town journeys by transit that do not pass through the core.
- More even dispersion of transit demand across the network and support for mixed-use development

A grid-based network as shown in **Figure 5-5** can easily provide service to Belleville's major trip generators within the Bell Boulevard and North Front Street study areas, such as the downtown area, Quinte Mall, Shorelines Casino, and the Quinte Sports and Wellness Centre.

Grid-based networks are also more easily extended and re-routed as transit demand changes. The proposed routes 2, 4, 5, and 8 in the image below can be extended into the Loyalist Secondary Plan area as development proceeds, while routes 1, 4, 6, and 8 could be easily re-routed to serve Belleville's northern core (marked as "Transit Opportunity – 9").

Figure 5-5: Transit Recommendations

5.3.2 HOV/Transit Lane

A dedicated high-occupancy vehicle/transit lane could be implemented mainly along Bell Boulevard in order to prioritize the circulation of transit vehicles and vehicles with two or more passengers. The goal of this recommendation would be to incentivize people to carpool and therefore increase the utilization of the vehicles. This alternative can markedly reduce the auto mode split if more people would use the same vehicle. It is important to note that this alternative was not modelled in this transportation study.

5.3.3 Bus Rapid Transit

A long-term alternative would be to consider a bus rapid transit (BRT) along Bell Boulevard. BRT is a high-capacity bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, accessible door-level platforms, and enhanced stations. It is recommended that the City conduct a technical business case

and feasibility study to determine the potential for this transit investment.

TYLin notes that new funding opportunities from the Federal Government's *Green Infrastructure Fund* may help to offset the cost of planning, design, and construction of such infrastructure.

5.3.4 Mini-Bus / Shuttle Bus Systems

One of the major hurdles to transit usage is solving the "last mile" between a person's origin / residence and the nearest transit stop. While transit usage is typically seen to be higher along the corridors and bus routes on which they operate, residential lands deeper within a subdivision can often be neglected and be deemed as "too far" to give up their vehicle dependency.

Implementing a mini-bus or shuttle bus system allows for smaller van-style vehicles to enter directly into residential neighborhoods and connect them to the major transit network. Smaller vehicles would be better suited geometrically to navigate through residential roads, are cheaper to obtain, and require fewer passengers for optimal efficiency.

Additionally, specific shuttle / express busses may be considered to bring transit users to specific high traffic areas such as the Quinte Mall (and surrounding commercial uses), the Shorelines Casino, or Loyalist College.

5.4 TRANSPORTATION NETWORK RECOMMENDATIONS

Based on the traffic operations analysis shown above, the Bell Boulevard and North Front Street corridors are expected to experience some levels of congestion, however the majority of delays will be focussed at the existing major arterial intersections at Bell Boulevard and Sidney Street and at Bell Boulevard and North Front Street.

It is noted that Sidney Street is planned for improvements north of Bell Boulevard, however this may not have a direct impact on the intersection operations.

It is recommended that the City continue to monitor these intersections for future improvements as needed subject to the success of future transit and active transportation strategies, as well as improved internal connectivity between the proposed mixed-use nodes.

Additionally, formalizing the extension of an east-west collector road (with Hamilton Road extension) eastward connecting to North Front Street may provide local traffic through these subdivisions with outlets and alternate routes.

It is also noted that all arterial roads currently operate with a maximum of 4 lanes (two through lanes in each direction) throughout the City. There may be opportunity for additional widening that could be implemented to provide an additional vehicle, HOV, or transit lane to improve overall transportation network capacity. Further study should be conducted by the City to determine an appropriate roadway for consideration, other constraints (such as environmental / property / utility), and the intent of the additional widening.

6 Conclusions

In conclusion, the projected growth proposed in the Bell Boulevard and North Front Street Corridor land use plan may be feasibly realized by the City of Belleville. However, further monitoring of the existing arterial intersections should be closely monitored by the City. Further macro-level network improvements such as new road connections and significant investment in non-auto infrastructure and mobility alternatives should also be considered. The technical analysis presented within this report presents three different horizon years (2031/2041 and 2041+) with the ultimate scenario the most conservative scenario, for the proposed horizon year of 2041, to provide the City with a conservative traffic condition, should the reliance on private automobiles be maintained for growth along the study corridors.

While manageable with proactive infrastructure planning, investments in sustainable alternatives, and ongoing monitoring of traffic conditions, it is concluded in this study that Bell Boulevard and North Front Street will experience increased levels of delays during the morning and afternoon peak periods. The proposed development areas are expected to attract a considerable amount of vehicular traffic to and from the network which would have a moderate impact traffic performance along both Bell Boulevard and North Front Street. It is recommended that the city monitor the traffic flow along the signalized intersections in the study area and update the signal timing plans as indicated in this study. The traffic analysis indicates that the majority of the development planned for the 2041 horizon can be accommodated with these short-term improvements in place and that further monitoring should be undertaken to assess the ongoing travel demand trends of the area that may be able to accommodate further development in the future 2041+ scenarios.

As detailed in the Recommendations section above, macro network improvements are recommended to be considered by the City to address potential traffic operation deficiencies at the major arterial intersections, and should be further studied / monitored by the City in larger scale studies such as the future Transportation Master Plan.

Short-term improvements have been identified in **Section 5.1** which include optimizations of signal timing plans as well as specific intersection improvements that may be required at each scenario. These would be necessary to accommodate the additional background and development traffic. Traffic signals along these major corridors are recommended for coordination to improve traffic flow.

Long-term alternatives include further study into widening for an arterial road to add either vehicle lanes, HOV lanes, or transit lanes. The future conditions' traffic analysis has shown that the segment between Sidney Street and North Front Street experiences a large through traffic volume based on both the existing traffic and limitations for improvements due to the existing properties and limitations.

Finally, it is strongly recommended that the City consider upgrading transit and active transportation infrastructure across Bell Boulevard and North Front Street. An advanced transit system can play an important role in the way people travel. As the existing transit service in the study area was assumed to be unchanged, investment in a reliable and frequent transit system can significantly reduce the number of auto trips in the two study corridors.