

APPENDIX B

Transportation Assessment



NIAGARA REGION

Detailed Transportation Assessment – Final Report

Detailed Transportation Assessment and for Livingston Avenue, in
the Town of Grimsby

Table of Contents

1.0	Introduction	1
1.1	Purpose	2
1.2	Background	2
1.3	Study Area	4
1.4	Existing Transportation Network	5
1.5	Traffic Data	9
1.6	Niagara GO Hub and Transit Stations Study	11
2.0	Approach	17
3.0	Methodology	18
3.1	Strategic Screenline Analysis.....	18
3.2	Microsimulation Analysis.....	19
4.0	Existing Conditions Analysis	21
4.1	Strategic Screenline Analysis.....	21
4.2	Operational Assessment.....	22
5.0	2041 Conditions Analysis	24
5.1	Base Road Network	24
5.2	Travel Demand Forecasts.....	26
5.3	Strategic Screenline Analysis.....	32
5.4	Road Network Alternatives.....	33
5.5	Operational Assessment.....	34
5.6	Active Transportation Assessment.....	53
6.0	Timing of Improvements	55
7.0	Conclusions and Recommendations	56

Figures

Figure 1: Grimsby GO Transit Station Conceptual Plan.....	3
Figure 2: Grimsby GO Transit Station Area.....	4
Figure 3: Study Area	5
Figure 4: Existing Road Network	8
Figure 5: Existing Traffic Volumes	10
Figure 6: Strategic Analysis Screenlines	18
Figure 7: 2018 PM Peak Hour Screenline Analysis.....	21
Figure 8: 2041 Lane Configuration and Traffic Control (Casablanca Boulevard Casablanca Boulevard and GO Station Access EA)	25
Figure 9: 2041 Traffic Volume Forecasts	28
Figure 10: 2041 Pedestrian Volume Forecasts	30
Figure 11: 2041 Cycling Volume Forecasts	31
Figure 12: 2041 Screenline Analysis – East-West Travel	32
Figure 13: Alternatives 1, 2, and 3 Changes	34
Figure 14: South Service Road – 2041 AM Peak Hour – Average Travel Speed	36
Figure 15: Livingston Avenue Peak Hour Turning Volume – No Extension	39
Figure 16: Livingston Avenue Peak Hour Turning Volume – Extension to Hunter Road.....	39
Figure 17: Livingston Avenue Peak Hour Turning Volume – Extension to Oakes Road North	40
Figure 18: Hunter Road – Alternate Routings.....	42
Figure 19: Planned Active Transportation Network.....	54
Figure 20: 2041 Recommended Lane Configuration and Traffic Control.....	57

Tables

Table 1: External Station CAGR by Station Area	11
Table 2: Trip Generation Rates	12
Table 3: Summary of Land Use Growth and Person Trip Generation	12
Table 4: Niagara GO Mode Share of Total Travel Demand	13
Table 5: Peak Hour and Peak Period Travel Demand for the Town of Grimsby GO Transit Station	14
Table 6: Mode Share and Walking Distance from Existing GO Transit Stations	15
Table 7: Niagara GO Transit Station Mode Share (High Ridership Scenario)	15
Table 8: VISSIM Model Calibration.....	20
Table 9: Existing Conditions Operational Assessment Results	23

Table 10: 2041 Background Growth.....	26
Table 11: GO Transit Station Auto Traffic Forecasts (2041)	27
Table 12: 2041 Livingston Avenue Extension Analysis Results	41
Table 13: 2041 South Service Road Analysis Results	45
Table 14: 2041 Main Street West Analysis Results	48
Table 15: 2041 Hunter Road and Oakes Road Results	51

Appendices

A	Existing Traffic Counts
B	Screenline Assessment
C	Vissim Results

1.0 Introduction

In 2018, The Regional Municipality of Niagara (the Region) retained Dillon Consulting Limited (Dillon) to provide consulting engineering services for the detailed transportation assessment and municipal class environmental assessment (EA) for Livingston Avenue, in the Town of Grimsby. Situated alongside the southern shores of Lake Ontario, the Town of Grimsby's population was approximately 27,000¹ while the Region's population was approximately 450,000², as estimated in the 2016 Census. The Region's employment was approximately 203,000 jobs².

In support of future population and employment growth within the Town of Grimsby, and the planned construction at the Grimsby GO Transit Station in the southwest quadrant of the intersection of Casablanca Boulevard and South Service Road, the adjacent transportation network was assessed in terms of traffic operations under existing and future conditions. The detailed transportation assessment is documented in this report and shall act in support of the Environmental Study Report (ESR) for the Livingston Avenue Extension EA.

While this report is focused on the needs of the Livingston Avenue corridor, it is noted that the transportation analysis completed for this project builds upon that completed for the Casablanca Boulevard and GO Station Access EA, as the two corridors intersect. The preceding study examined the transportation needs in the vicinity of Casablanca Boulevard in light of the forecasted development in the Town of Grimsby and the opening of a GO Transit Station to the west of the intersection of Casablanca Boulevard and South Service Road. The Casablanca Boulevard and GO Station Access EA found sufficient strategic and operational transportation issues resulting from the future development in the area to recommend widening of both Casablanca Boulevard (from South Service Road to Main Street West) and South Service Road (from Industrial Drive to Casablanca Boulevard).

The findings of the Casablanca Boulevard and GO Station Access EA form the foundations for analysis of the future transportation needs relative to the Livingston Avenue for this Study, namely:

- Opening of a GO Transit Station west of Casablanca Boulevard and south of South Service Road by 2021;
- Expansion of South Service Road to a cross-section of two lanes per direction, with additional auxiliary turning lanes at intersections and driveways as required;
- Expansion of Casablanca Boulevard, as follows:
 - Four-lane cross-section between North Service Road and South Service Road;
 - Five-lane cross-section including a two-way left-turn lane (TWLTL) from South Service Road to Livingston Avenue; and
 - Three-lane cross-section including a TWLTL from Livingston Avenue to Main Street West.
- Reconstruction of the interchange of the Queen Elizabeth Way (QEW) with Casablanca Boulevard to realign the ramp terminals and include traffic control signals;

¹ Statistics Canada, Census 2016, [Census Profile: Grimsby, ON](#)

² Statistics Canada, Census 2016, [Census Profile: Niagara Region, ON](#)

- Provision of signalized control at the intersection of Casablanca Boulevard and Livingston Avenue and remove the channelization of the westbound right turn; and
- Provision of signalized control at the intersection of South Service Road and the northern entrance to the GO Transit Station.

1.1 Purpose

The purpose of this analysis was to identify the transportation infrastructure requirements, timing, costs, and associated approvals to address the future extent and alignment of Livingston Avenue given the area's projected growth, changes to Casablanca Boulevard and South Service Road, and implementation of a GO Transit Station.

1.2 Background

Situated immediately south of the QEW, the Canadian National Railway (CNR) Grimsby Subdivision divides the Town of Grimsby from its waterfront communities, and its central business district and rural lands south of the Niagara Escarpment. As of today, the rail line currently services predominantly freight traffic; however, Metrolinx plans to extend the GO Train Commuter Rail (GO Rail) service as far as Niagara Falls from the existing terminus in Hamilton. As part of the extension, stations are being planned and designed for Grimsby, St. Catharines, and Niagara Falls with a potential fourth station to be situated in Beamsville, a community located within the Town of Lincoln.

The Grimsby GO Transit Station is to be located in the southwest quadrant of the intersection of Casablanca Boulevard and South Service Road; between the QEW and the CNR Grimsby Subdivision. The station is expected to interface with the local transportation network through the inclusion of active transportation facilities such as sidewalks and multi-use path connections, parking facilities, kiss-and-ride facilities, and connections to local transit services. **Figure 1** illustrates the initial conceptual site plan for the Grimsby GO Transit Station. It is noted that this conceptual plan is being refined by Metrolinx to incorporate property constraints and requirements for widening South Service Road as approved in the Casablanca Boulevard and GO Station Access EA.

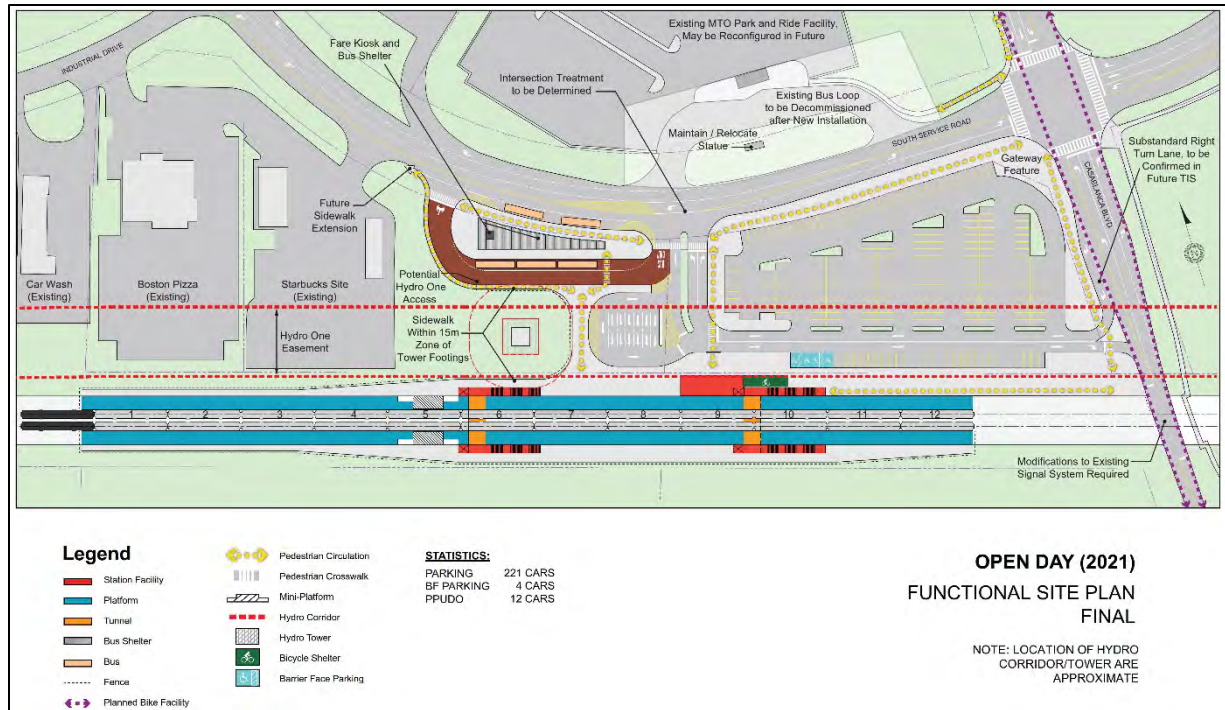


Figure 1: Grimsby GO Transit Station Conceptual Plan

In the longer term, there is potential for development of the land to the south of the proposed GO Transit Station and along the south side of the tracks, as indicated by the red shape in **Figure 2**. As identified in the Casablanca Boulevard and GO Station Access EA, improvements to Livingston Avenue would provide access to these lands. Expansion on the south side of the proposed GO Transit Station would allow for future expansion of parking, improved pedestrian connections to residential areas, and the creation of a regional transit hub at this location. The only access to these lands is provided via Livingston Avenue.



Figure 2: Grimsby GO Transit Station Area

The addition of the Grimsby GO Transit Station and associated connections to the local transportation network is expected to impact local travel patterns, including at the QEW / Casablanca Boulevard interchange. The interchange provides access to developing residential areas north of QEW, and also serves to connect those areas to the Town of Grimsby, via Casablanca Boulevard. The Town of Grimsby is expected to experience significant population and employment growth in the future, putting increased travel demand on study area roadways.

1.3 Study Area

To capture the impacts of development, the study area under assessment is bounded to the north by North Service Road, the east by Casablanca Boulevard, the south by Main Street West, and the west by Oakes Road. Contained within these lands are various land uses including, but not limited to, medium density residential north of the QEW, commercial and industrial south of the QEW, low to medium density residential in the southeast, and undeveloped lands with pockets of low density residential in the southwest. The study area and associated intersections explicitly assessed are presented within **Figure 3**.

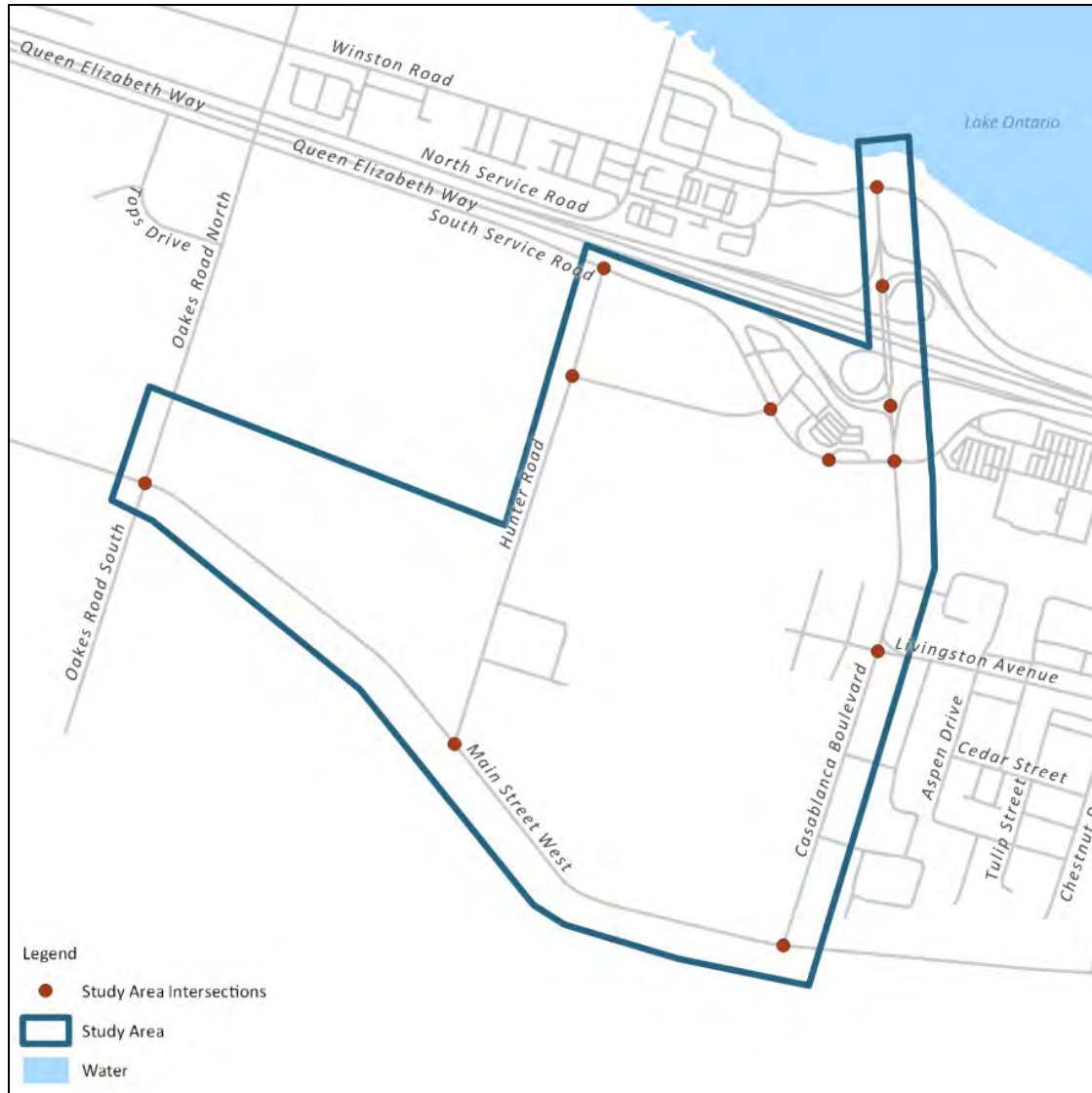


Figure 3: Study Area

1.4 Existing Transportation Network

Streets and roads in the study area include:

Livingston Avenue is a three-lane collector street running east-west from Casablanca Boulevard through Downtown Grimsby and continuing east as Main Street East. West of Casablanca Boulevard, Livingston Avenue is a two-lane local road extending approximately 200 m where it terminates just west of Emily Street. The annual average daily traffic (AADT) (2017) of Livingston Avenue is 9,100 to the east of Casablanca Boulevard. Livingston Avenue has a TWLTL lane and painted cycle lanes in both directions. The posted speed limit is 50 km/h. Sidewalks are provided on both sides of Livingston Avenue through the study area. Lands along Livingston Avenue are developed with fronting single family homes, many with driveway access to Livingston Avenue. Livingston Avenue is also known as Regional Road 512, but will be referred to simply as Livingston Avenue for the purposes of this report.

Casablanca Boulevard is a minor arterial street running north-south from Main Street West to North Service Road. The AADT (2017) for Casablanca Boulevard was 12,000 between South Service Road and Livingston Avenue and 5,400 between Livingston Avenue and Main Street West. Casablanca Boulevard is the only road in the study area that has an interchange with the QEW (Oakes Road crosses QEW at a flyover, but does not include ramps to access QEW). Casablanca Boulevard has a two lane cross-section, with added turning lanes at North Service Road, the QEW ramp terminals, South Service Road, and at Livingston Avenue. The posted speed limit is 60 km/h. A sidewalk is provided on the east side from Main Street West to the South Service Road continuing on the west side of the QEW interchange to North Service Road. The rail crossing at the CNR Grimsby Subdivision has crossing gates. South of the CNR Grimsby Subdivision the land along Casablanca Boulevard is developed with fronting single family homes with driveway access to Casablanca Boulevard. North of the CNR Grimsby Subdivision, large parcels are developed with industrial and commercial land uses. Casablanca Boulevard is also known as Regional Road 10, but will be referred to simply as Casablanca Boulevard for the purposes of this report.

Queen Elizabeth Way (QEW) is a six-lane divided freeway running east-west through the study area. The cross-section includes wide, paved shoulders, and a Jersey barrier median. The AADT (2016) for the QEW was 107,100 and 112,300 to the east and west of Casablanca Boulevard, respectively. Through the study area, the posted speed limit is 100 km/h although an on-going pilot program has increased the speed limit 110 km/h. The cross-section includes service roads on each side of QEW. The service roads allow for two-way traffic, with two-lane cross-sections and 50 km/h posted speed limits. Lands adjacent to the service roads are developed with a mix of industrial and commercial developments, with multi-family residential development in the northwest part of the study area.

Main Street West is a minor arterial street running east-west from Hamilton, through Downtown Grimsby and further east to St. Catharines. The AADT (2017) for Main Street West is 7,000 to the west of Casablanca Boulevard and 7,600 to the east of Casablanca Boulevard. Through the study area, Main Street West has a two-lane cross-section, with paved shoulders and a posted speed limit of 70 km/h between Oakes Road and Hunter Road, 60 km/h between Hunter Road and Casablanca Boulevard, and 50km/h to the east of Casablanca Boulevard. A sidewalk is provided on the north side through the study area. From Casablanca Boulevard to the east, Main Street West runs along the bottom of a steep slope. Lands along Main Street West are developed with backing single family homes on the north side and fronting single family homes on the south side. West of Casablanca Boulevard, Main Street West curves to the north, and development along the road is mostly sparse single family residential, with several parcels used for agriculture or industrial use. Main Street West is also known as Regional Road 81, but will be referred to simply as Main Street West for the purposes of this report.

North Service Road is a two-lane minor arterial street running east-west along the majority of the QEW in Niagara Region. AADT (2017) for North Service Road is 5,000 west of Casablanca Boulevard and 3,000 to the east. No sidewalk or cycling infrastructure is present along North Service Road within the bounds of the study area. To the east of Casablanca Boulevard, North Service Road provides occasional driveway access to commercial and residential properties and local roads. To the west of Casablanca Boulevard, North Service Road is quickly being developed to accommodate a range of commercial and residential development. A traffic control signal was recently installed at the intersection of North Service Road with Casablanca Boulevard.

South Service Road is a two-lane minor arterial road that provides access to a significant amount of big box commercial development (i.e., highway rest area, car dealers, grocery, home improvement, fast food) and light industrial / warehousing uses within the study area. AADT (2017) on South Service Road was 6,700 and 4,100 to the east and west of Casablanca Boulevard, respectively. As with North Service Road, South Service Road runs parallel to the QEW along essentially its whole length within the Niagara Region. Auxiliary turning lanes are provided in the vicinity of major commercial properties and at major intersections (e.g., Casablanca Boulevard). Within the study area, no sidewalks or cycling infrastructure are provided along South Service Road.

Oakes Road is a two-lane collector street running north-south from south of Main Street West to Winston Road, north of North Service Road. AADT (2017) for Oakes Road is 1,000 vehicles. A sidewalk is provided on the east side between Main Street West and the CNR Grimsby Subdivision. Several single family homes front onto Oakes Road between Main Street West and the CNR Grimsby Subdivision. Additionally, Smith Public School, a Kindergarten to Grade 8 School, fronts onto Oakes Road North just south of the rail line. The rail crossing at the CNR Grimsby Subdivision has crossing gates. North of the Grimsby Subdivision to the QEW, adjacent lands are largely undeveloped, with the exception of an industrial development south of the QEW. Oakes Road has a grade-separated crossing over the QEW, with multi-family residential development to the east on the north side of the QEW.

Hunter Road is a two-lane collector street running north-south from Main Street West to South Service Road. AADT (2017) for Hunter Road is 1,000 vehicles. There are no sidewalks, and ditches are present on both sides, leading pedestrians to walk on the pavement. Lands along Hunter Road are developed with fronting single family residential homes at the south towards Main Street West. Further north to the Grimsby Subdivision, adjacent lands are undeveloped. The rail crossing at the CNR Grimsby Subdivision has crossing gates. Lands north of the Grimsby Subdivision to South Service Road are developed with industrial and commercial land uses.

Figure 4 illustrates the existing road network, lane configurations at intersections, and traffic control at intersections under existing conditions.

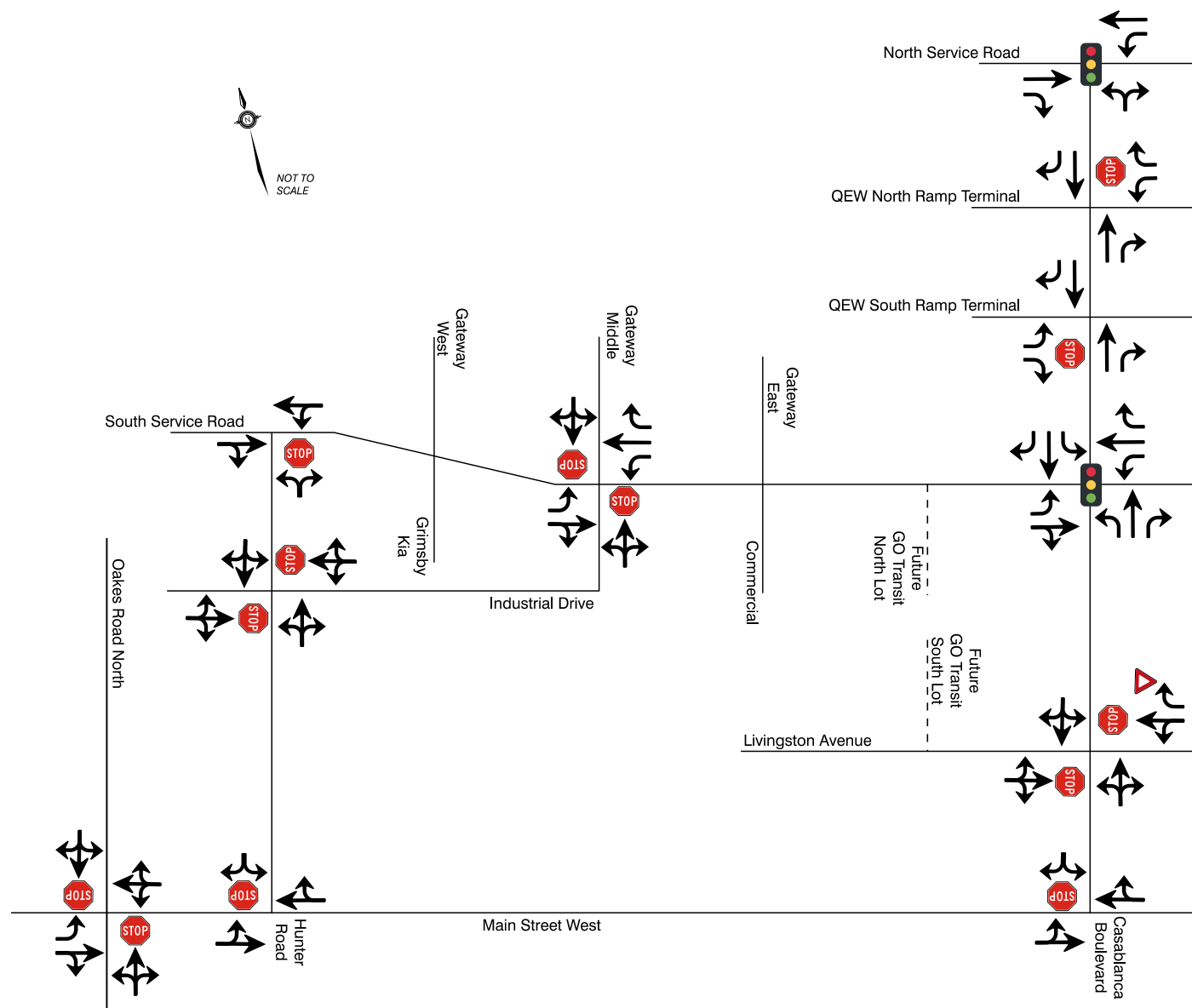


Figure 4: Existing Road Network

1.4.1 Active Transportation Infrastructure

The main walking infrastructure in the study area is the aforementioned sidewalks along the arterial and collector streets. Additionally, some local streets include sidewalks, and many neighborhoods include paths connecting streets across park space.

Dedicated cycling infrastructure in the study area is limited to the cycle lanes on Livingston Avenue east of Casablanca Boulevard. Main Street West has shoulders at least 1.0 m wide in all sections, with widths over 2.0 m in many sections. This provides some utility to cyclists, especially given the long extent of Main Street West, from Hamilton to the west to St. Catharines to the east.

The QEW interchange has several high-speed, free-flowing, or yield-controlled ramps which are intimidating for pedestrians and cyclists. The Casablanca Boulevard and Livingston Avenue intersection has a westbound right turn channel with two-way stop-control on Livingston Avenue; the westbound right turn channel can be intimidating for pedestrians and cyclists and the lack of a traffic signal prohibits pedestrians and cyclists from easily crossing Casablanca Boulevard. The Town of Grimsby has expressed a desire to improve active transportation connections at these locations.

1.4.2 Transit Service and Infrastructure

In the study area, GO Transit operates a park and ride, and bus Route 12 between Niagara Falls and Burlington where it connects to the GO Rail service. The park and ride is located on the northwest corner of the Casablanca Boulevard and South Service Road intersection. GO bus Route 12 operates on weekdays between 4:54 AM and 12:24 AM with service approximately every 30-45 minutes during peak periods. The route operates primarily along the QEW, and uses Casablanca Boulevard and South Service Road to access the park and ride lot. Buses use a bus loop to turn around and access the QEW / Casablanca Boulevard interchange.

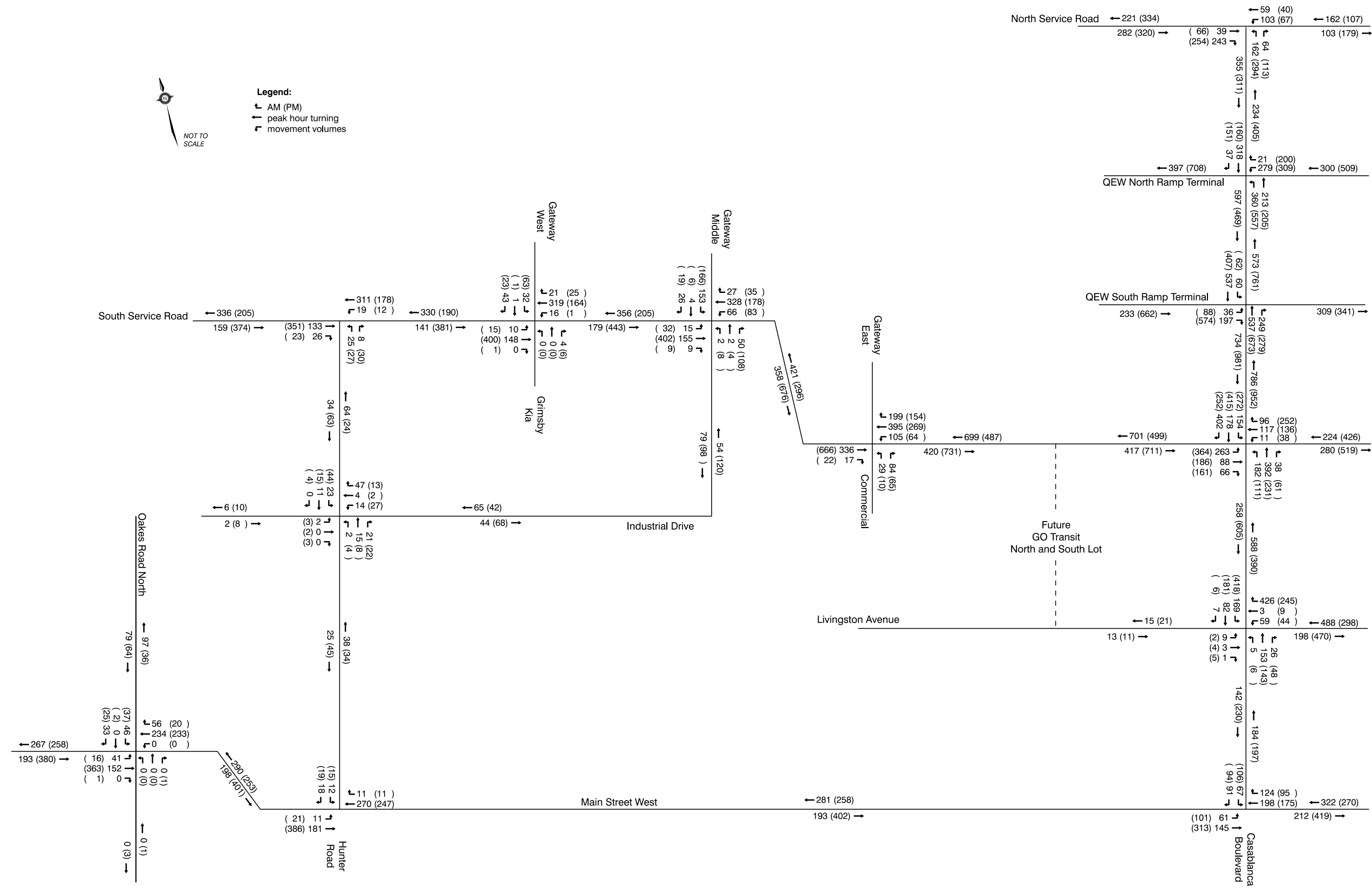
1.5 Traffic Data

Niagara Region provided traffic count data to use for the analysis in two forms:

- 8-hour turning movement counts (TMC) - all TMCs were collected on Wednesday, May 9, 2018; and
- 24-hour Automated Traffic Recorder data (ATR) – collected between May 5 and May 10, 2018.

Figure 5 illustrates the existing traffic volumes used for the analysis. **Appendix A** contains the full traffic counts.

In addition, traffic signal timing and phasing plans were received from Niagara Region for applicable intersections within the study area. Dillon's previous work in the area (Niagara GO Hub and Transit Stations Study, 2017) also included field visits in the study area, which informed the understanding of existing conditions and issues in the study area.



1.6 Niagara GO Hub and Transit Stations Study

The “Niagara GO Hub and Transit Stations Study”³ (herein referred to as NGHTSS) was completed by Dillon in 2018. It was an analysis of future GO Rail service and mobility hubs for Niagara Region. This study examined the expansion of GO Rail service through Niagara Region connecting Hamilton’s West Harbour GO Station to Niagara Falls. Four proposed stations were included in the study:

- Grimsby GO Transit Station (2021 projected opening);
- St. Catharines GO Transit Station (2023 projected opening);
- Niagara Falls GO Transit Station (2023 projected opening) ; and
- Beamsville GO Transit Station (No official timetable for opening).

This section summarises the inputs related to background regional growth, changes to local land use, and forecasted rail ridership presented in the preceding report. Consult Section 3 of the NGHTSS report for further details.

1.6.1 Background Growth

Background traffic growth in the model represents the change in external-to-external trips within the region traversing the study area. A targeted approach to background growth was implemented to capture adjacent or external study area regional growth not explicitly accounted for in the land use concepts internal to the study area.

Growth in regional traffic in the four individual station study areas was calculated through examination of outputs from Niagara Region’s EMME travel demand forecasting model. The external roadway links (i.e., those at the edges of the individual study areas) were examined to calculate a representative compound annual growth rate (CAGR) for movement *between external stations only* (i.e., trips travelling through the study area unrelated to local land use changes). **Table 1** below summarises the findings from Niagara Region’s model. Information for the Town of Grimsby is highlighted.

Table 1: External Station CAGR by Station Area

Station Study Area	AM Peak Hour	PM Peak Hour
Grimsby	2. 4%	1. 5%
Beamsville	1. 4%	1. 3%
St. Catharines	1. 3%	1. 3%
Niagara Falls	2. 1%	1. 0%

1.6.2 Local Land Use Growth

As part of the NGHTSS, Dillon developed land use concepts for the four station study areas in consultation with Niagara Region, the local municipalities, and the general public. The land use concepts specified the magnitude and distribution of population and employment growth to the 2041 horizon year in

³ Dillon Consulting Limited, Niagara GO Hub and Transit Stations Study (June 2017)

the vicinity of the four sub-area models. The land use concepts used the 2041 population and employment assumptions developed for the Region of Niagara's Transportation Master Plan model.

Trip generation rates were developed based on the outputs of Niagara Region's travel demand forecasting model to represent the changes in travel demand in the subarea models created for each of the four study areas. These allowed the forecasted changes in population and employment in the area to be used to project the growth in local traffic related to land use changes in the area. The trip generation rates are summarized in **Table 2**.

Table 2: Trip Generation Rates

Peak Hour	Trip Productions (from)		Trip Attractions (to)	
	Population	Employment	Population	Employment
AM	0. 1464	0. 0686	0. 0413	0. 2969
PM	0. 0646	0. 2856	0. 1373	0. 1384

The trip generation rates were applied to the forecasted growth in population and employment to project the growth in travel demand related to land use changes in each of the study areas. **Table 3** summarizes the growth in population, employment, and associated changes in person trips in each of the study areas. Information for the Town of Grimsby is highlighted.

Table 3: Summary of Land Use Growth and Person Trip Generation

Station Study Area	Land Use Growth (2011-2041)		AM Peak Hour		PM Peak Hour	
	Population	Employment	Production	Attraction	Production	Attraction
Grimsby	4,750	1,870	988	902	1,009	1,093
Beamsville	1,300	950	307	403	426	372
St. Catharines	1,900	2,300	523	914	936	695
Niagara Falls	2,450	560	477	321	382	497

The person-trips calculated through this process were applied to existing year travel demands to represent the change in local travel due to changes in land use.

1.6.3 GO Transit Station Ridership Forecasts

The final layer of demand representing the future condition were trips related to the implementation of GO Rail service in the four station areas. These trips were implemented and integrated with the other layers of travel demand accordingly.

The basis for the ridership forecasts stemmed from Metrolinx's "Niagara Region GO Expansion Study, Ridership Forecasts"⁴, completed in March 2015. The forecasts were developed using the 2031 horizon year for three GO Transit Stations – Grimsby, St. Catharines and Niagara Falls. These forecasts did not include a station at Beamsville, nor did it forecast the potential for intra-regional trips within the Region of Niagara (e.g., Grimsby to St. Catharines).

The Paradigm / MMM report developed Niagara GO mode share targets of total travel demand in both a low and high scenario. The "low" scenario assumed a "business as usual" condition with ridership primarily dependent on automobile access to the stations, with no major local transit service improvements. The "high" scenario assumed the implementation of Niagara Regional Council's approved transportation strategic priorities that included a commitment to strong transit supportive policies being in place. The "high" scenario was chosen for application in the ridership forecasts and mode share estimates, given the extended horizon year of 2041.

The mode share for regional rail trips as part of total travel demand determined as part of the Metrolinx study was examined for reasonableness with respect to the four station areas, given that the Metrolinx study did not consider intra-regional GO Rail trips (e.g., Grimsby to Niagara Falls) and that trips to and from Toronto would experience significant travel distance without direct service (e.g., especially from Niagara Falls), the mode share for trips to Toronto was disproportionately high. **Table 4** summarizes the modified mode shares of overall travel to regional centres from Urban and Outlying areas of Niagara Region.

Table 4: Niagara GO Mode Share of Total Travel Demand

Origin / Destination	Urban Niagara		Outlying Niagara	
	Peak Hour "Main" Direction	Peak Hour "Off" Direction	Peak Hour "Main" Direction	Peak Hour "Off" Direction
Hamilton	5. 2%	4. 2%	1. 3%	1. 0%
Burlington / Oakville	2. 6%	2. 1%	0. 3%	0. 3%
Mississauga	2. 6%	2. 1%	0. 3%	0. 3%
Toronto	8. 9%	7. 1%	2. 7%	2. 1%
Niagara Region	1. 0%	1. 0%	0. 1%	0. 1%

Two estimates for future ridership were forecasted for the four station areas: base and high. The base scenario represented a 'realistic' forecast of ridership for the new service. The high scenario expanded upon the base scenario to examine potential risks with the following additional assumptions:

- Utilized the Base Ridership Scenario numbers as the basis and doubled ridership to account for higher quality GO Rail service and other unknowns;
- Modified to a more auto-centric mode share to account for less realization of active mode and transit mode share targets to access / egress each GO Transit Station; and
- Increased Beamsville ridership due to likelihood of residents in northeast St. Catharines adjacent to QEW driving to Beamsville instead of the St. Catharines GO Transit Station (assumed approximately 27% of St. Catharine GO ridership).

⁴ Paradigm / MMM, *Niagara Region GO Expansion Study Ridership Forecasts, March 2015*

Table 5 summarizes the peak hour and peak period travel data arising from this process for the Town of Grimsby GO Transit Station.

Table 5: Peak Hour and Peak Period Travel Demand for the Town of Grimsby GO Transit Station

Direction to / from	Peak Hour Values				Peak Period Values			
	AM Peak Hour		PM Peak Hour		AM Peak Period		PM Peak Period	
	On	Off	On	Off	On	Off	On	Off
East	13	11	15	16	36	31	40	42
West	368	150	184	433	1,012	411	496	1,168
Total	381	161	199	449	1,048	442	536	1,210

1.6.3.1 Station Area Mode Share

Mode share estimates to / from each GO Transit Station where based on experience from other existing GO Transit Stations in the network, addressing the potential for active modes first, local transit connections second, and automobile traffic third. **Table 6** illustrates the existing mode share to a number of GO Transit Stations, along with the population within walking distance of each GO Transit Station.

Table 6: Mode Share and Walking Distance from Existing GO Transit Stations

	Bramalea	Port Credit	Burlington	Milton	Newmarket	Markham Centre	Downtown Brampton
AM Peak Period Departures	2,750	1,940	2,420	2,460	600	2,310	2,060
Pop. within 800 m walk	800	7,800	3,600	4,200	5,100	1,400	6,800
People per ha	4	41	18	21	26	7	34
Mode Share							
Walk	0%	26%	6%	2%	15%	1%	8%
Drive	66%	50%	70%	71%	50%	65%	53%
Drop Off	20%	10%	10%	18%	26%	17%	26%
Car Pool	2%	2%	2%	0%	0%	3%	2%
Public Transit	11%	11%	10%	9%	7%	14%	10%
Bike	1%	1%	2%	0%	2%	0%	1%
Total	100%	100%	100%	100%	100%	100%	100%
Trip per capita in 800 m buffer							
Walk	0.00	0.06	0.04	0.01	0.02	0.02	0.02

The characteristics for the existing stations were examined and compared to the four station study areas to create reasonable mode share estimates. **Table 7** shows the resulting mode share values for the four stations for the high ridership scenario.

Table 7: Niagara GO Transit Station Mode Share (High Ridership Scenario)

Travel Mode to Station	Grimsby	Beamsville	St. Catharines	Niagara Falls
Drive and Park	74%	71%	69%	67%
Walk	5%	8%	5%	7%
Kiss and Ride	15%	15%	15%	15%
Local Transit	5%	5%	10%	10%
Bicycle	1%	1%	1%	1%

1.6.3.2 Application of Ridership in Station Areas

The person trips generated by the ridership forecasts were applied to the station area models using the mode share distributions shown in **Table 7**. The overall level of trip-making was maintained in the model to avoid any incidence of double counting through subtraction of an equivalent number of trips for each mode from the background and land use growth forecasted travel demand, as necessary to represent the likely travel patterns for each mode, as follows:

- Trips originating / destined within an 800 m network walking distance based on existing pedestrian facilities were assumed to be primarily completed on foot;
- Bicycle and local transit trips were assumed to primarily travel to / from the area beyond the 800 m walking buffer, as they are conducive to longer trips; and
- Auto trips in the area (park, and pick up / drop off) were assumed to generally maintain existing longer distance trips within the study area (e.g., to / from QEW).

2.0 Approach

While it was important to understand the current performance of the transportation network under the existing conditions to set a benchmark for comparison, it was equally important to understand the performance at key milestones based on growth and development. The following planning horizons were selected:

- Existing Conditions Baseline (Base Year, 2018); and
- Full-Development of North Grimsby (Long Term Horizon, 2041).

The 2041 horizon was selected to reflect Niagara Region's intent to design for 2041 to accommodate all currently planned growth and development to ensure the long term needs for transportation are met.

Consideration of these years allowed for assessment of strategic and operational transportation needs to ensure that the transportation network is able to accommodate the planned growth. Therefore, the study was completed using the following approach:

- **Consider Existing Conditions** including street and road characteristics, active transportation infrastructure, and traffic volumes. Also assess and identify existing issues and solutions at the strategic level and at the operational level.
- **Plan for 2041 Conditions** considering continued GO Rail service to and through Town of Grimsby, and future population and employment growth in north Grimsby. Identify the base road network (based on findings from the existing assessment and recommendations from the Casablanca Boulevard and GO Station Access EA), forecast future travel demand, and assess and identify strategic and operational issues and solutions related to the movement of cars, transit, cyclists, and pedestrians.
- **Record Conclusions and Make Recommendations** on transportation infrastructure development for the 2041 horizon.

3.0 Methodology

Each horizon was examined from two perspectives to determine the transportation needs for the two analysis years:

- **Strategic Analysis:** The strategic analysis was conducted through examination of screenlines drawn across appropriate north-south locations in the study area. The purpose of the strategic analysis was to determine that the required *connections* and *capacity* are provided.
- **Operational Analysis:** The operational analysis was conducted using PTV Group's VISSIM transportation microsimulation software. Microsimulation models are used to model traffic operations where interaction between intersections and modes of travel is an important consideration. The purpose of operational analysis was to determine where *intersection-level improvements* may be required.

3.1 Strategic Screenline Analysis

A series of screenlines were developed to assess the capacity for vehicular movement east-west across appropriate locations in the study area, as shown in **Figure 6**.



Figure 6: Strategic Analysis Screenlines

Link capacities were assigned with a base capacity of 900 vehicles per hour per lane (vphpl). The base capacity of 900 vphpl stems from guidance provided by the Highway Capacity Manual (HCM) 2010, which

lists the saturation flow rate in a metropolitan area with population >250,000 as 1900 vphpl⁵. This assumes an idealised condition that: “represents the maximum rate of flow for a traffic lane as measured at the stop line during the green indication. The base saturation flow rate represents the saturation flow rate for a traffic lane that 12 ft. wide and has no heavy vehicles, a flat grade, no parking, no buses that stop at the intersection, even lane utilization, and no turning vehicles.” Assuming a general condition at most intersections where 50% of available green time (or all-way stop control) is given to each approaching corridor, it is reasonable to assume that the capacity of a roadway is generally half of the saturation flow rate, which results in a capacity of 950 vphpl. This should be further reduced by a nominal amount to account for the presence of heavy vehicles (trucks, buses), mid-block turning vehicles, interaction with active transportation users, and inefficiencies at traffic controls, all of which are specifically excluded from the HCM’s recommended saturation flow rate. Therefore, 900 vphpl is a reasonable assumption for a base capacity for this analysis. Professional judgement was subsequently applied to modify the base capacity for roads in the study area based on the roadway type, level and type traffic control, frequency of access, presence of on-street parking, and other factors that were considered to have an effect on lane capacity.

The existing and forecast volumes for the individual facilities across the screenline were subsequently compared to the available capacity via a simple ratio of volume to capacity (v/c), which provides an indication of the sufficiency of the capacity for movement across the screenline. Taken together, the facilities that cross the screenlines illustrate the overall ‘carrying capacity’ for movement across the screenline. They serve to illustrate where issues may be present for movement across the screenlines and for individual facilities.

3.2 Microsimulation Analysis

Transportation microsimulation models present a realistic representation of how various modes of travel will interact with each other, the roadway infrastructure, and traffic controls present in a transportation network. They focus on the calibration of behaviour of the various modes in these interactions to allow the individuals in the model to react realistically as they move through the network in a single connected environment. For this project, the VISSIM microsimulation software was applied.

Outputs from the microsimulation analysis for this work included the average vehicle delay, queuing (average and maximum), and resultant level of service for each turning movement in the study area. These were compared across a range of infrastructure alternatives to determine the necessary modifications to infrastructure, controls, or traffic signal timing that will maintain an adequate level of service in the study area.

3.2.1 Microsimulation Model Calibration

Prior to testing alternatives, the VISSIM model was developed and calibrated to existing conditions. The model was calibrated according to the guidance provided in Federal Highway Administration’s (FHWA) “Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software”⁶.

⁵ Transportation Research Board, Highway Capacity Manual 2010, p. 18-14, Exhibit 18-28

⁶ Federal Highway Administration, Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Software, (2004), p. 64, Table 4

Based on the data available from Niagara Region, the calibration involved the comparison of field-observed and modelled turning movement and link level volumes.

The industry-standard GEH statistic was applied along with percentage and absolute differences to compare counted traffic volumes to simulated traffic volumes present within the microsimulation model. For the model application in this assessment, the FHWA guidance that a GEH value of 5.0 or less be met for 85% or more of turning movement and link count locations was met. **Table 8** shows that this key criterion was met for the model in addition to five other model criteria tests.

Table 8: VISSIM Model Calibration

AM Peak Hour	LINKS	Passed 6 of 6							ON
	Criteria*	Flow Range		Criteria	Goal	Current	Count	Model	Pass/Fail
	Within 100 veh/h, for Flow < 700 veh/h > 85% of cases	0	700	100 veh	85%	97%	30	29	✓
	Within 15%, for 700 veh/h < Flow < 2700 > 85% of cases	700	2700	15 %	85%	100%	1	1	✓
	Within 400 veh/h, for Flow > 2700 veh/h > 85% of cases	2700		400 veh	85%	--	0	0	✓
	Sum of All Link Flows within 5% of sum of all link counts	Overall		5 %	5%	-3%	7209	7406	✓
	GEH < 5 for Individual Link Flows, > 85% of cases	Overall		5 GEH	85%	87%	31	27	✓
	GEH < 10 for individual link flows, 95% of cases	Overall		10 GEH	95%	100%	31	31	✓
	GEH < 4 for sum of all link counts	Overall		4 GEH	4.0	2.3	7209	7406	✓
	<small>*Source: FHWA Traffic Toolbox Vol 3 'Calibration of Microsimulation Models', Table 4 "Wisconsin DOT Freeway Model Calibration Criteria"</small>								
PM Peak Hour	LINKS	Passed 6 of 6							ON
	Criteria	Flow Range		Criteria	Goal	Current	Count	Model	Pass/Fail
	Within 50 veh/h, for Flow < 400 veh/h > 85% of cases	0	400	50 veh	85%	91%	76	69	✓
	Within 10%, for 400 veh/h < Flow < 1200 > 85% of cases	400	1200	10 %	85%	100%	2	2	✓
	Within 200 veh/h, for Flow > 1200 veh/h > 85% of cases	1200		200 veh	85%	--	0	0	✓
	Sum of all turn flows within 5% of sum of all turn counts	Overall		5 %	5%	-3%	7209	7406	✓
	GEH < 5 for Individual turn Flows > 85% of cases	Overall		5 GEH	85%	99%	79	78	✓
	GEH < 10 for individual turn flows, 95% of cases	Overall		10 GEH	95%	99%	79	78	✓
	GEH < 4 for sum of all turn counts	Overall		4 GEH	4.0	2.3	7209	7406	✓
	<small>*Source: FHWA Traffic Toolbox Vol 3 'Calibration of Microsimulation Models', Table 4 "Wisconsin DOT Freeway Model Calibration Criteria"</small>								
PM Peak Hour	LINKS	Passed 6 of 6							ON
	Criteria*	Flow Range		Criteria	Goal	Current	Count	Model	Pass/Fail
	Within 100 veh/h, for Flow < 700 veh/h > 85% of cases	0	700	100 veh	85%	91%	33	30	✓
	Within 15%, for 700 veh/h < Flow < 2700 > 85% of cases	700	2700	15 %	85%	100%	2	2	✓
	Within 400 veh/h, for Flow > 2700 veh/h > 85% of cases	2700		400 veh	85%	--	0	0	✓
	Sum of All Link Flows within 5% of sum of all link counts	Overall		5 %	5%	2%	9749	9518	✓
	GEH < 5 for Individual Link Flows, > 85% of cases	Overall		5 GEH	85%	86%	35	30	✓
	GEH < 10 for individual link flows, 95% of cases	Overall		10 GEH	95%	97%	35	34	✓
	GEH < 4 for sum of all link counts	Overall		4 GEH	4.0	2.4	9749	9518	✓
	<small>*Source: FHWA Traffic Toolbox Vol 3 'Calibration of Microsimulation Models', Table 4 "Wisconsin DOT Freeway Model Calibration Criteria"</small>								
PM Peak Hour	LINKS	Passed 5 of 6							ON
	Criteria	Flow Range		Criteria	Goal	Current	Count	Model	Pass/Fail
	Within 50 veh/h, for Flow < 400 veh/h > 85% of cases	0	400	50 veh	85%	85%	87	74	✓
	Within 10%, for 400 veh/h < Flow < 1200 > 85% of cases	400	1200	10 %	85%	67%	3	2	✗
	Within 200 veh/h, for Flow > 1200 veh/h > 85% of cases	1200		200 veh	85%	--	0	0	✓
	Sum of all turn flows within 5% of sum of all turn counts	Overall		5 %	5%	2%	9749	9518	✓
	GEH < 5 for Individual turn Flows > 85% of cases	Overall		5 GEH	85%	86%	91	78	✓
	GEH < 10 for individual turn flows, 95% of cases	Overall		10 GEH	95%	98%	91	89	✓
	GEH < 4 for sum of all turn counts	Overall		4 GEH	4.0	2.4	9749	9518	✓
	<small>*Source: FHWA Traffic Toolbox Vol 3 'Calibration of Microsimulation Models', Table 4 "Wisconsin DOT Freeway Model Calibration Criteria"</small>								

One exception to the calibration of the model is the category examining the percentage match of volume between 400 and 1200 turning vehicles, as shown in the PM Peak Hour table (**Table 8**), where one of the three records in this range did not match the criteria of less than 10% difference. It was determined that correction of the issue would not be possible without modification of the zone structure in the model, which would break the connection with modelling work done on the previous NGHTSS and make future transfers and comparisons of model data more difficult.

Further investigation of the problematic record showed that the difference between the modelled and observed values for this record was fewer than 100 vehicles (89) with a GEH of 4.6. This indicated that the difference for this record was not significant and that the overall calibration could be considered valid.

4.0 Existing Conditions Analysis

4.1 Strategic Screenline Analysis

Existing AM and PM peak hour traffic volumes were compared to the link capacities, and streets with volume nearing capacity were identified. In nearly all cases the PM peak hour v/c ratios were higher than those in the AM peak hour, so discussion herein is limited to the PM peak hour.

For the purposes of this analysis, a screenline or individual facility was deemed to be at a 'critical' v/c ratio, when it exceeded 0.85, which indicates that the roadway is operating at 85% of its available capacity or above and is providing a level of service (LOS) of E or F to the roadway users. Above this threshold of 0.85, operations along the road tend to degrade and become unstable, which can lead to fairly common (LOS E) or chronic (LOS F) congestion issues.

Figure 7 shows the results of the screenline analysis for eastbound travel in the existing PM peak hour. Icons show overall volume to capacity ratios at each of the screenlines, and colored arrows highlight particular streets that were nearing or over capacity. **Appendix B** contains the full screenline calculations.

2018 Existing Traffic - PM Peak Hour

Screenline Capacity Assessment – East-West Travel

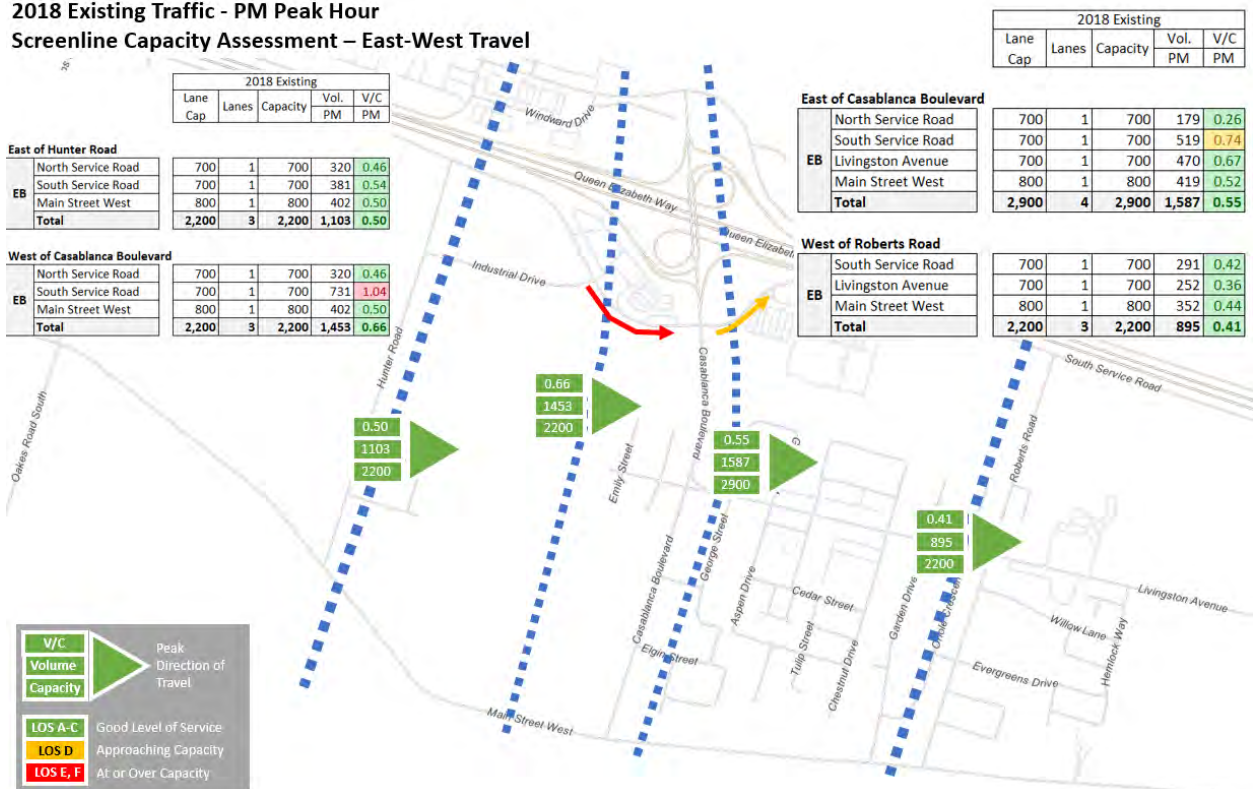


Figure 7: 2018 PM Peak Hour Screenline Analysis

The following points outline the findings for existing east-west travel in the PM peak hour:

- East of Hunter Road, overall capacity was sufficient, with each street having a v/c ratio of 0.54 or less.
- West of Casablanca Boulevard, overall capacity was sufficient, but imbalanced travel demand—weighted toward South Service Road—resulted in that road nearing capacity, with a v/c ratio of 1.04 eastbound.
- East of Casablanca Boulevard, overall capacity was sufficient with the screenline operating at an overall v/c ratio of 0.55. The individual facilities all have sufficient capacity. Livingston Avenue showed a v/c ratio of 0.67 just to the east of Casablanca Boulevard, which indicates that two-thirds of available capacity is currently being used during the PM peak hour.
- West of Roberts Road, overall capacity was sufficient, and each street had v/c ratios of 0.44 or less.

From the above analysis, overall east-west travel in the study area is well served by existing capacity. South Service Road does show that eastbound travel in the PM peak hour is nearing capacity, and that some operational issues may be present during the PM peak hour.

4.2 Operational Assessment

The purpose of the operational assessment was to identify issues with the existing road network that may not be evident as part of the strategic assessment. **Table 9** summarizes the results of the analysis. Detailed results are available in **Appendix C**.

The Casablanca Boulevard and south ramp terminal, and the Casablanca Boulevard and South Service Road intersections show long queues and poor level of service during the PM peak hour. The widening of Casablanca Boulevard to a four-lane cross-section between North Service Road and Livingston Avenue will assist in mitigating issues at South Service Road but this will not mitigate the issues with the south ramp terminal. From the Casablanca Boulevard and GO Station Access EA it was recommended that the north and south ramp terminals be signalized.

The strategic analysis showed that eastbound travel was approaching capacity in the eastbound direction during the PM peak hour, and that further operational issues were expected. The operational analysis confirms that the intersection of South Service Road and Casablanca Boulevard is approaching capacity, operating at LOS D with queue lengths over 115 m.

The PM peak hour operational analysis indicate that the intersections of Casablanca Boulevard / South Service Road and Casablanca Boulevard / South Ramp Terminal are approaching capacity and experience significant delays and queues for specific movements.

Table 9: Existing Conditions Operational Assessment Results**AM Peak Hour**

Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
			Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
Casablanca Blvd & North Service Rd	Sig.	670	5.6	39.5	16.5	12.5	NBR	80.5	30.0	B
Casablanca Blvd & North Ramp Terminal	TWSC	1,187	1.9	11.9	2.8	0.2	WBL	50.1	11.6	-
Casablanca Blvd & South Ramp Terminal	TWSC	1,558	0.0	0.4	0.6	0.1	EBL	15.7	13.6	-
Casablanca Blvd & S Service Rd	Sig.	1,948	58.8	125.2	38.0	30.1	NBR	267.2	42.3	D
Casablanca Blvd & Livingston	TWSC	876	6.4	37.6	10.2	6.6	WBR	56.4	18.6	-
Casablanca Blvd & Main St W	TWSC	756	0.5	11.2	2.4	0.3	SBR	38.2	9.8	-
S Service Rd & Industrial Dr	TWSC	757	0.6	12.2	3.2	0.2	SBT	40.1	9.8	-
S Service Rd & Hunter Rd	TWSC	540	0.1	3.1	1.2	0.1	NBL	18.6	7.3	-
Hunter Rd & Industrial Dr	TWSC	259	0.5	9.9	2.5	0.1	WBR	20.2	5.0	-
Hunter Rd & Livingston Ave	TWSC	128	0.0	0.0	0.0	0.0	None	0.0	0.0	-
Hunter Rd & Main St W	TWSC	688	0.1	7.6	0.9	0.1	EBL	19.8	2.3	-
Main St W & Oakes Rd N	TWSC	764	0.4	7.3	2.2	0.1	SBR	30.4	7.6	-

PM Peak Hour

Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
			Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
Casablanca Blvd & North Service Rd	Signalized	809	14.7	67.8	22.8	17.6	NBR	124.8	35.3	C
Casablanca Blvd & North Ramp Terminal	TWSC	1,529	1.8	13.9	2.8	0.3	WBL	52.6	11.1	-
Casablanca Blvd & South Ramp Terminal	TWSC	1,850	40.0	67.1	30.2	23.8	EBR	241.7	120.0	-
Casablanca Blvd & S Service Rd	Signalized	2,243	49.5	117.2	52.2	41.7	NBR	220.1	43.2	D
Casablanca Blvd & Livingston	TWSC	831	0.3	21.8	1.6	0.3	SBL	50.4	2.7	-
Casablanca Blvd & Main St W	TWSC	732	0.2	12.3	1.6	0.2	SBR	26.0	7.2	-
S Service Rd & Industrial Dr	TWSC	905	1.7	17.9	5.4	0.7	SBL	41.4	12.5	-
S Service Rd & Hunter Rd	TWSC	537	0.0	0.4	0.3	0.0	NBR	15.4	7.5	-
Hunter Rd & Industrial Dr	TWSC	285	0.2	10.0	2.6	0.2	WBR	19.7	4.4	-
Hunter Rd & Livingston Ave	TWSC	146	0.0	0.0	0.0	0.0	None	0.0	0.0	-
Hunter Rd & Main St W	TWSC	733	0.1	10.9	0.9	0.1	EBL	17.2	0.9	-
Main St W & Oakes Rd N	TWSC	783	0.2	3.2	1.1	0.1	SBR	28.5	7.2	-

*The maximum queue listed in the table may be related to a blocked condition at an adjacent movement

5.0 2041 Conditions Analysis

A 2041 scenario was developed to represent conditions with future population and employment growth in the Town of Grimsby, including continued GO Rail service to and through the Town of Grimsby for 2041.

Future travel demand was forecast to represent 2041 GO Rail ridership. This 2041 forecast demand was then compared to link capacity in the existing network. The road network analyses were then analyzed at an operational level and a preferred alternative was identified.

5.1 Base Road Network

The base road network for the future analysis features the existing year network with the addition of the recommendations from the Casablanca Boulevard EA Study. These study area improvements are as follows:

- Widen Casablanca Boulevard to a four-lane cross-section from North Service Road to South Service Road.
- Widen Casablanca Boulevard to a four-lane cross-section with TWLTL from South Service Road to Livingston Avenue.
- Widen Casablanca Boulevard to include a TWLTL from Livingston Avenue and Main Street West. With the volume increase on Casablanca Boulevard, mid-block turning movement conflicts will increase (access to private driveways on the east side of the road and midblock movements at collector roads). A TWLTL will mitigate these conflicts.
- Reconstruct the QEW and Casablanca interchange to include traffic control signals, and realignment of the ramp terminals.
- Install traffic control signals and remove the westbound right turn channelization at the intersection of Casablanca Boulevard and Livingston Avenue.
- Provide dual eastbound left turn lanes at the intersection of Casablanca Boulevard and South Service Road.
- At the GO Transit Station north access / South Service Road, provide a traffic control signal and either a westbound left turn lane or a right turn bus loop.
- Monitor the Casablanca Boulevard / Main Street intersection for potential need for signal control (as and when vehicle or active mode demands warrant).
- Widen South Service Road to a basic four-lane cross-section (plus required auxiliary lanes) between Casablanca Boulevard and Industrial Drive.

The above changes and resulting road network and controls are illustrated in **Figure 8**, below.

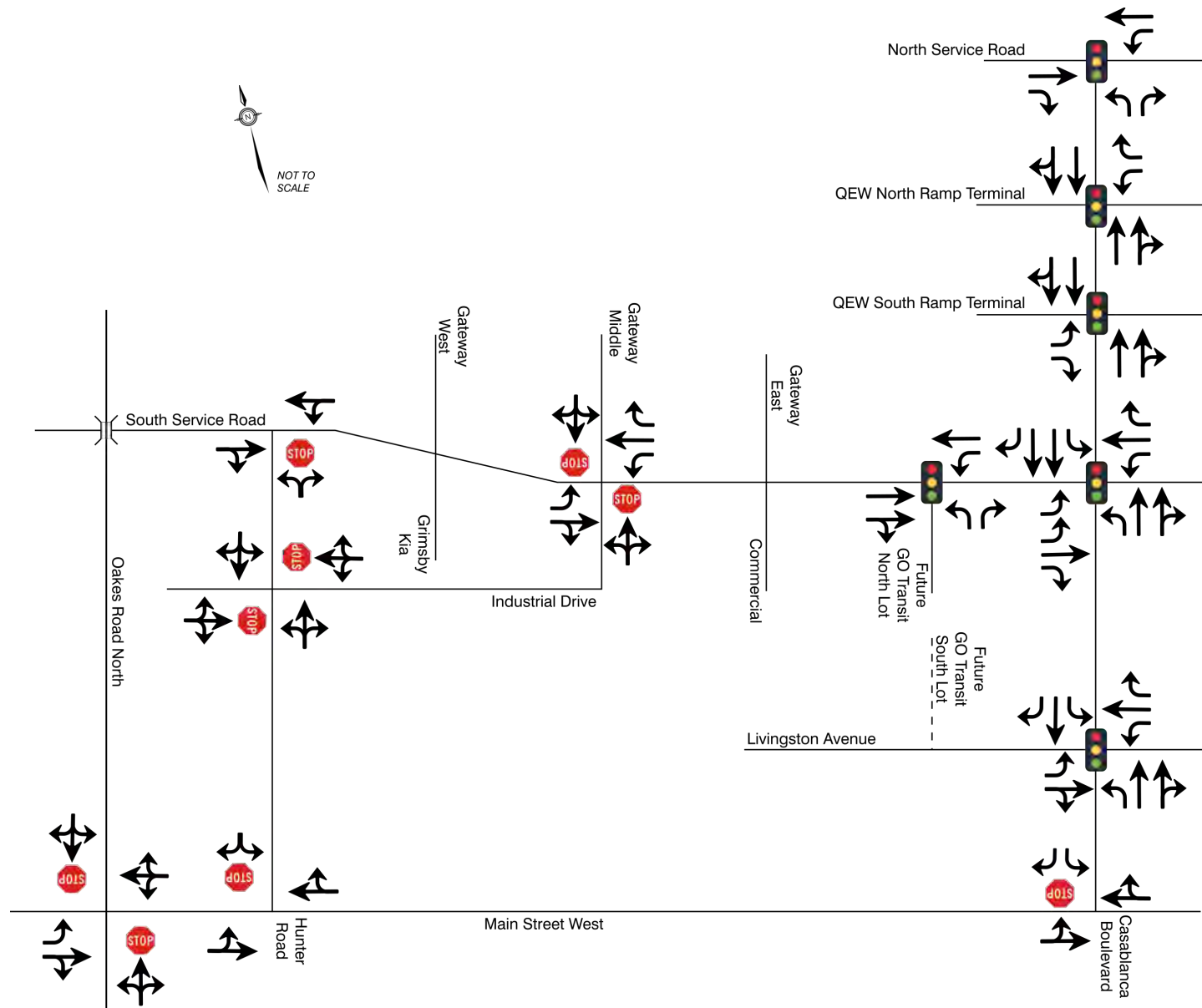


Figure 8: 2041 Lane Configuration and Traffic Control (Casablanca Boulevard Casablanca Boulevard and GO Station Access EA)

5.2 Travel Demand Forecasts

For this study, traffic growth rates were taken from the NGHTSS. The NGHTSS accounted for background growth in Niagara Region's EMME model, land use concepts in the vicinity of the GO Transit Station area, and GO Transit Station ridership forecasts. The only change to this work was to update the existing traffic volumes and the future background traffic volumes using traffic counts from May 2018.

5.2.1 Background Growth

Background traffic growth was forecasted by accounting for population and employment growth within the study area and regional growth outside the study area.

Within the study area, population and employment growth forecasts were based on land use concepts developed for 2041 as part of the NGHTSS. The population and employment forecasts were then converted to auto trips using auto trip generation factors. The auto trip generation factors were taken from Niagara Region's regional travel demand forecasting model.

To account for regional growth in areas surrounding the study area, Niagara Region's regional travel demand forecasting model was reviewed to determine an appropriate compound annual growth rate (CAGR) to apply to auto traffic travelling through the study area. The CAGR was applied to traffic on roadways crossing the study area boundary, such as North Service Road, South Service Road and Main Street West.

Table 10 summarizes the 2041 background growth assumptions and the resultant traffic volume growth.

Table 10: 2041 Background Growth

Type of Growth	Growth Assumptions	Traffic Volume Growth	
		AM Peak Hour	PM Peak Hour
Within study area	+4,750 population +1,870 employment	+899	+1,393
Regional growth	2. 4% CAGR (AM Peak Hour) 1. 5% CAGR (PM Peak Hour)	+1,448	+1,004
Total		+2,347	+2,397

5.2.2 GO Transit Station Traffic

In the NGHTSS, "low" and "high" ridership forecasts were developed for the 2041 horizon. The NGHTSS used the high ridership forecast since it was "beneficial as a sensitivity test to better assess the risks associated with unclear future influences with the potential increase to GO ridership". To be consistent with the NGHTSS, the high ridership forecast was applied for the 2041 horizon.

By 2041 it was assumed that a GO South Parking Lot would also be in operation along with the North Parking Lot. The north station access was assumed to be the primary access. For the AM peak hour, the North Parking Lot was assumed to be 85% filled before the South Parking Lot began to be used. For the PM peak hour, the North Parking Lot was assumed to empty before the South Parking Lot released vehicles. As the trip generation by the station reflects the peak hour for the a.m. and p.m., these assumptions were only used to establish the relative utilization of each lot.

Table 11 summarizes the assumed GO Transit Station auto traffic forecasts for the 2041 horizon.

Table 11: GO Transit Station Auto Traffic Forecasts (2041)

Station Access	2041 Horizon			
	AM Peak Hour		PM Peak Hour	
	Out	In	Out	In
North Station Access (South Service Road)	130	306	345	169
South Station Access (Livingston Avenue)	6	99	59	13
Total	136	405	404	182

5.2.3 Traffic Volumes

Figure 9 illustrates the 2041 forecasted traffic volumes for study area intersections assuming no new roads are constructed or extended beyond what was approved under the Casablanca Boulevard and GO Transit Station Access EA.

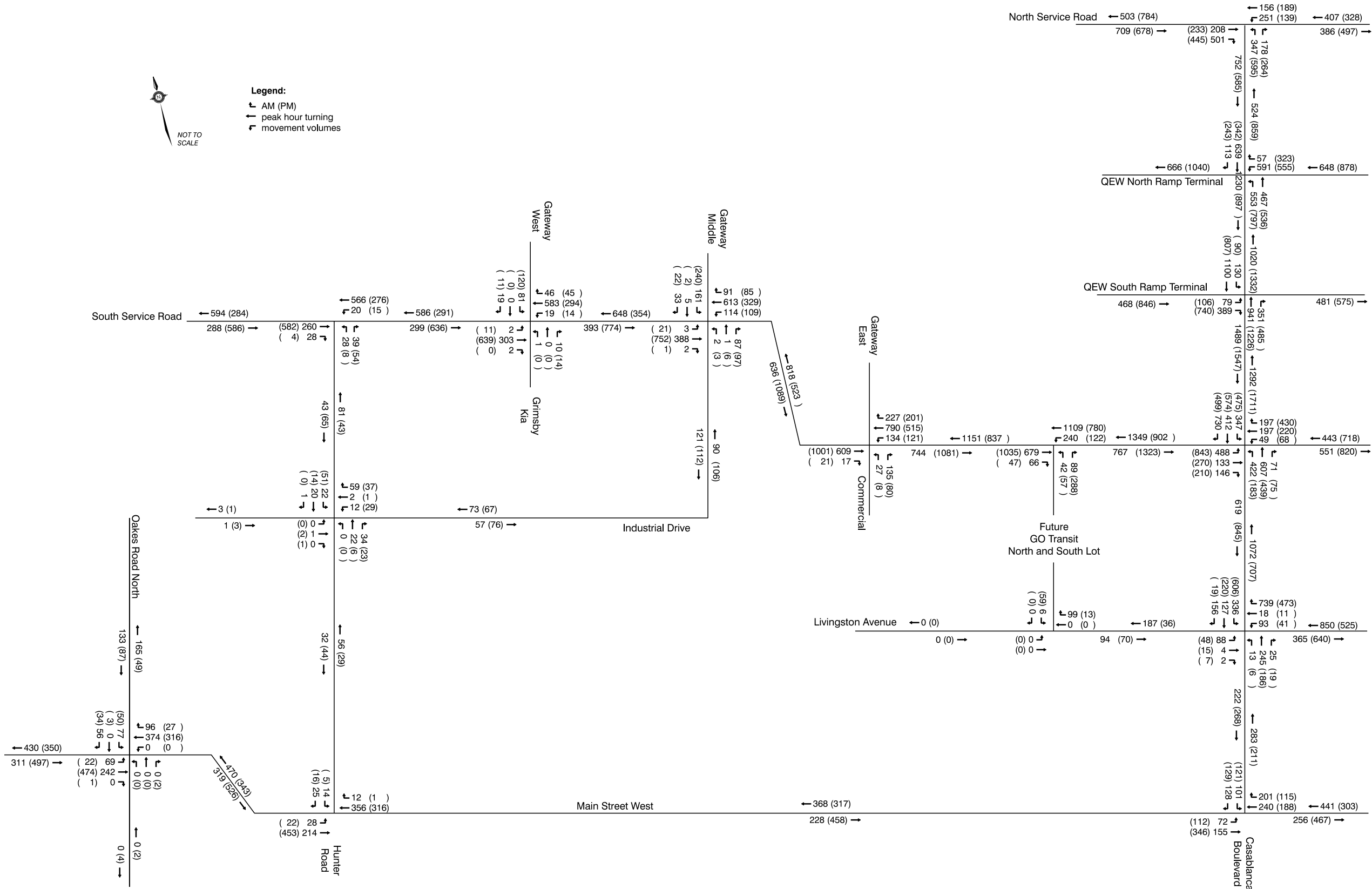


Figure 9: 2041 Traffic Volume Forecasts

5.2.4 Pedestrian and Cycling Volumes

Figure 10 and **Figure 11**, respectively, illustrate the 2041 pedestrian and cycling volume forecasts. These forecasts were developed using the 2041 auto traffic volume forecasts to estimate person volumes on roadways. The person volumes on the roadways were then converted to pedestrian and cycling volumes using the station area mode shares assumed in the NGHTSS for the High Ridership scenario (74% drive and park, 15% kiss and ride, 5% local transit, 5% walk, 1% bicycle). The pedestrian and cycling volumes were reviewed and rounded to the nearest five trips. Manual adjustments were also made in some cases since pedestrians and cyclists will not use the QEW.

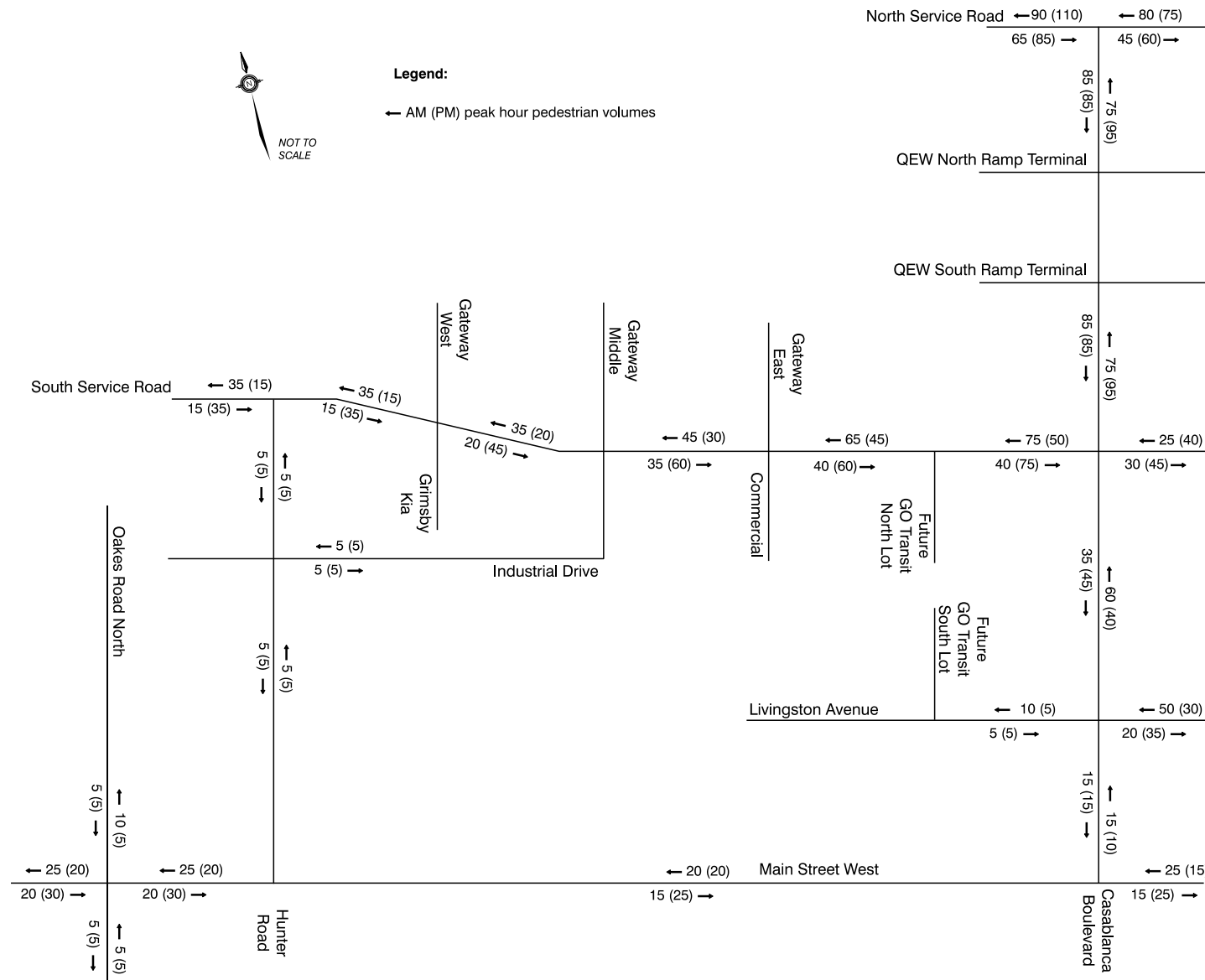


Figure 10: 2041 Pedestrian Volume Forecasts

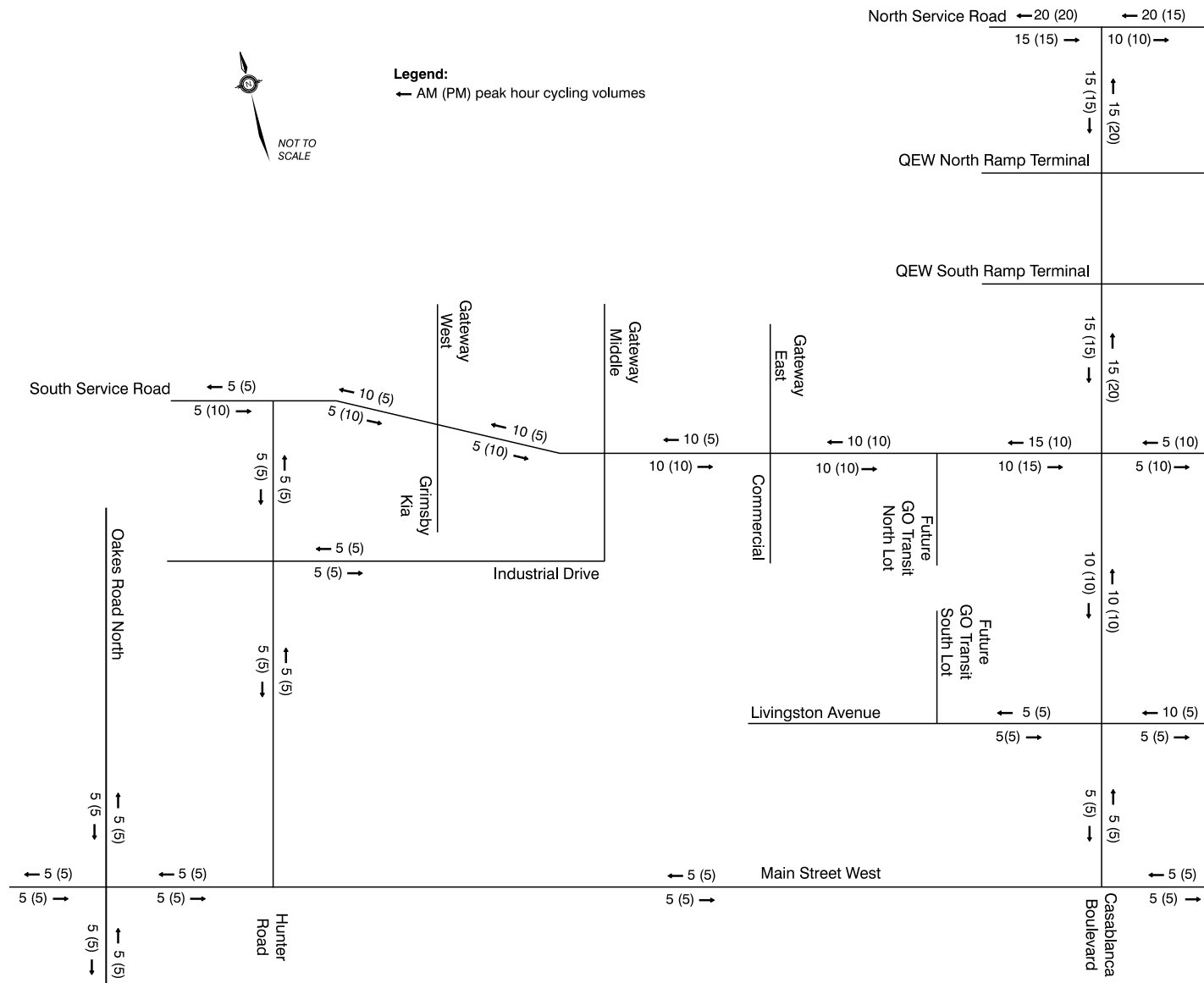


Figure 11: 2041 Cycling Volume Forecasts

5.3 Strategic Screenline Analysis

The 2041 strategic analysis considered v/c ratios at the link level at several screenlines, as in the 2018 strategic analysis.

Traffic volumes at the screenlines were taken from the forecast 2041 peak hour assignment to the future base road network. Link capacities were considered for the future base network, which included the recommendations from the Casablanca Boulevard and GO Station Access EA.

The following outlines the results of the 2041 Strategic Analysis with the base road network. Note that all streets encountered their highest v/c ratios in the PM peak hour, so the key findings discussed below are limited to the PM peak hour. **Appendix B** contains the full screenline calculations.

Figure 12 shows the results of the analysis for the screenlines, and associated east-west links, as they cross north-south streets.

2041 Base - PM Peak Hour

Screenline Capacity Assessment – East-West Travel

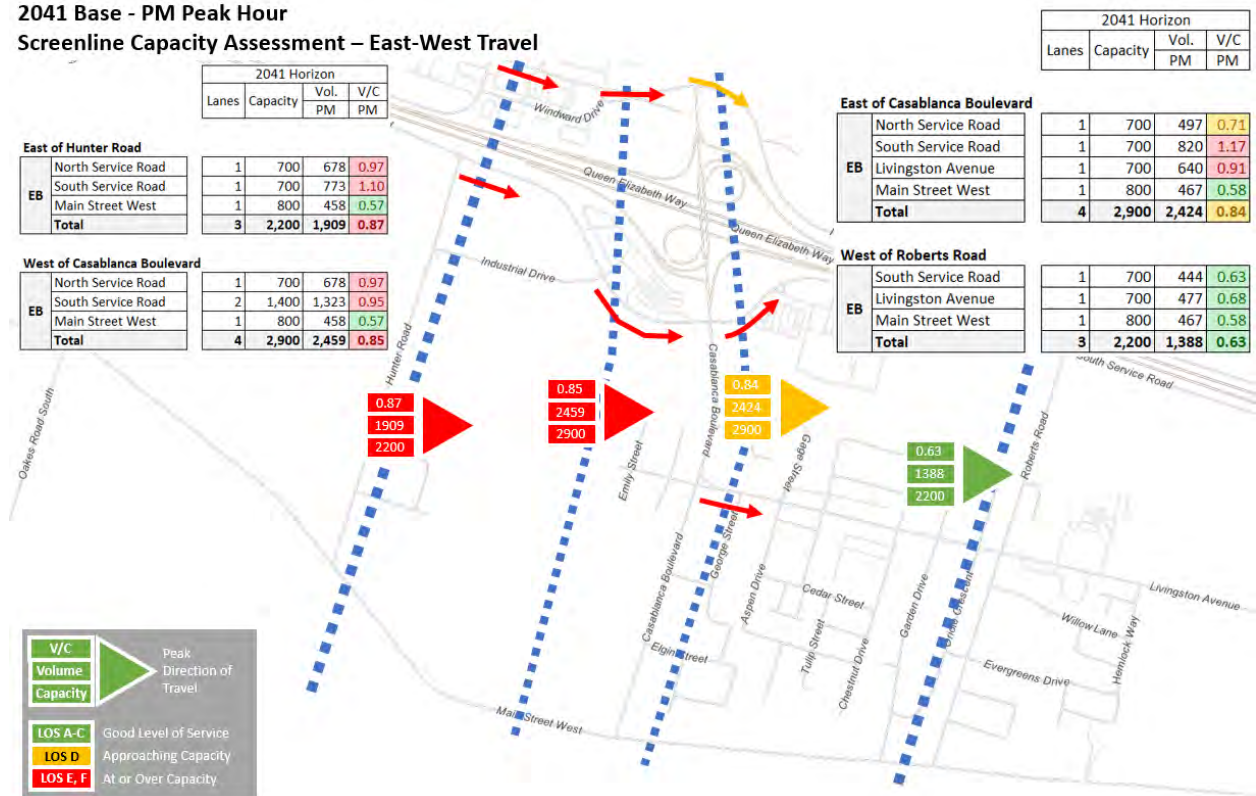


Figure 12: 2041 Screenline Analysis – East-West Travel

The following points outline the findings from the east-west streets:

- East of Hunter Road, the screenline is at capacity (v/c of 0.87), with the North Service Road and South Service Road operating with v/c ratios of 0.97 and 1.10, respectively;

- West of Casablanca Boulevard the screenline is operating at capacity (v/c of 0.85), and travel demand is weighted towards South Service Road and North Service Road with both facilities at their practical maximum capacity (v/c of 0.95 and 0.97, respectively);
- East of Casablanca Boulevard, the screenline was shown to be approaching capacity with a v/c ratio of 0.84 with South Service Road operating at over capacity conditions (v/c of 1.17); and
- West of Roberts Road the Screenline operates during the PM peak hour with a v/c of 0.63. It is noted that, during the AM peak hour, the westbound volume on Livingston Avenue was shown to exceed a v/c ratio of 1.0.

The screenlines east of Casablanca Boulevard are operating within capacity, with a couple of isolated issues. The screenlines west of Casablanca Boulevard are operating at capacity, with the South Service Road operating at or over capacity.

5.4 Road Network Alternatives

The alternatives described below were developed to address issues identified during the strategic assessment to address east-west capacity constraints:

- **Alternative 1** includes extending Livingston Avenue from the current termination to near Oakes Road North, where it intersects with Main Street West. This alternative also includes resurfacing Hunter Road (between the Livingston Avenue extension and South Service Road) and introducing signalization at the intersection with South Service Road. This is also known as Alternative 5 in the Environmental Study Report.
- **Alternative 2** extends the widening of South Service Road from Industrial Drive to west of Hunter Road. The intersection of South Service Road and Hunter Road was also signalized. This is also known as Alternative 4 in the Environmental Study Report.
- **Alternative 3** widens Main Street West from Oakes Road to Casablanca Boulevard. This is also known as Alternative 3 in the Environmental Study Report.

Figure 13 illustrates the changes for Alternatives 1, 2, and 3 when compared to the existing road network. The traffic signal at the GO North Parking Lot is present for all alternatives.

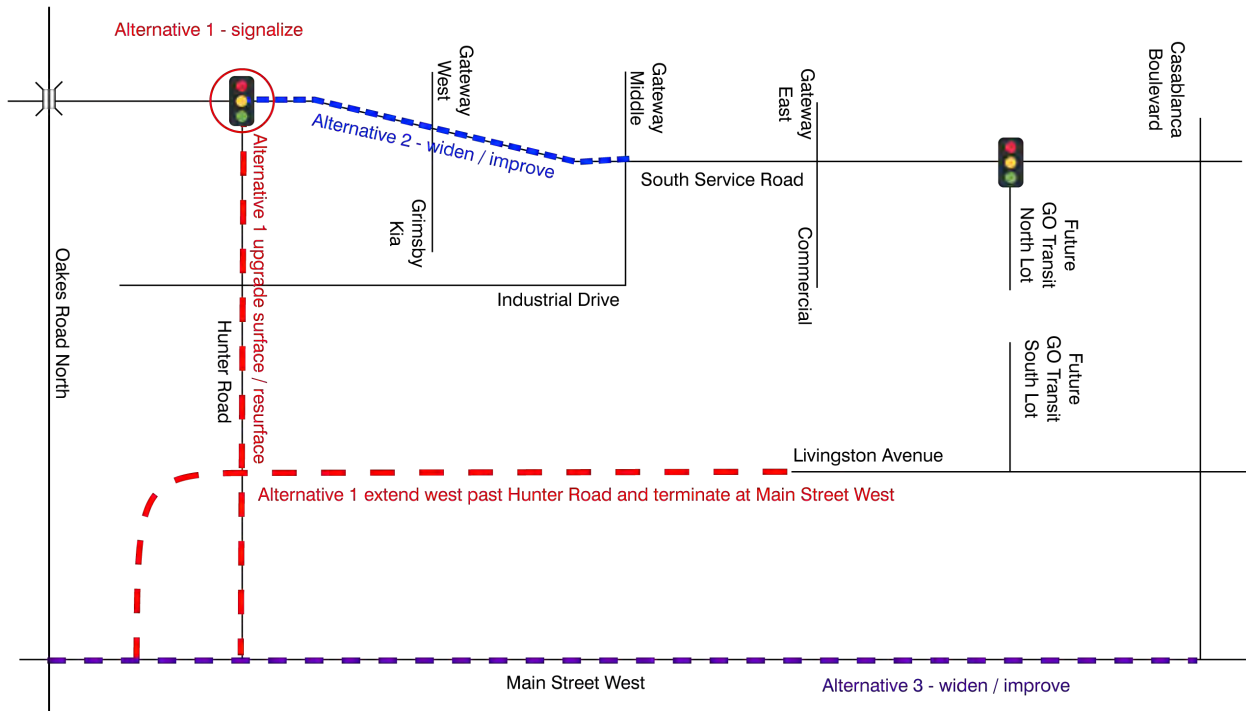


Figure 13: Alternatives 1, 2, and 3 Changes

5.5 Operational Assessment

An operational assessment was undertaken to understand the future intersection level of service under each of the alternative network scenarios. The results of the operational assessment are summarized and discussed in the following sections. **Appendix C** contains the full VISSIM results.

5.5.1 Livingston Avenue Extension Alternative

5.5.1.1 Roadway Demand

The Livingston Avenue extension has the potential to serve three different functions: access to the future south side GO Transit Station to / from the west; provide capacity for diverted volume from the South Service Road to the downtown and residential areas of Grimsby; and, provide capacity for diverted volume from Main Street West to the downtown and residential areas of Grimsby.

The future analysis tested two options for the extension of Livingston Avenue: a full westerly connection to Oakes Road / Main Street West; and, a partial extension to Hunter Road. The latter alternative was also considered as an interim stage during the construction of the full extension. For these alternatives, the intersections of the Livingston Avenue Extension with Hunter Road and Main Street West were analysed as stop-controlled intersections.

From the VISSIM model assignments, forecast volumes for the Livingston Extension were estimated as follows:

- Full westerly extension to Oakes Road / Main Street:

- P.M. Peak Hour east of Hunter Road:
 - Eastbound – 160 vehicles; and
 - Westbound – 113 vehicles.
- P.M. Peak Hour east of Oakes Road / Main Street:
 - Eastbound – 141 vehicles; and
 - Westbound – 132 vehicles.
- Partial westerly extension to Hunter Road:
 - P.M. Peak Hour east of Hunter Road:
 - Eastbound – 65 vehicles; and
 - Westbound – 25 vehicles.

These assignments showed that the extension further to Oakes Road increases the volume demand on the extension by an approximate factor of 2, as compared to the extension to Hunter Road. The Livingston Avenue Extension provides distance and time savings for vehicles traveling on South Service Road and on Main Street to / from points west of Oakes Road.

In considering the market for this broader travel through the study area, it is noted that the full potential of the extension may not be captured by the VISSIM model, as the study area and model terminate just to the east of Casablanca Boulevard. Vehicle demands in the model have fixed destinations of one of the exiting streets on the model's boundary or "gateways". As the model terminates just to the east of Casablanca Boulevard and does not include Downtown Grimsby, it restricts vehicles in the model to using routes that connect to the gateway they are assigned. In practical terms, these vehicles should have the opportunity to use routes that might effectively change the gateway by which they access the study area (divert in the network outside of the model coverage).

As a start to determining the potential market demand for the Livingston Avenue Extension, it is important to understand the benefit of the extension in terms of travel time and distance. From the VISSIM model, the introduction of the Livingston Avenue Extension was shown to improve travel speeds along South Service Road, as shown in **Figure 14**. Comparing the base and Alternative 1 network, the two diagrams show clear increases / improvements in travel speed along the length of South Service Road and Industrial Drive with the implementation of the Livingston Avenue Extension. On South Service Road, the increases to travel speed are seen from just west of Industrial Drive to the intersection with Casablanca Boulevard. The pink and red lines in the figures indicate travel speeds of 10-20 km/h on average through the peak hour. These are significantly improved with the implementation of the Livingston Avenue Extension. Travel speeds along Industrial Drive are also improved as a result, due to reduced queuing on South Service Road.

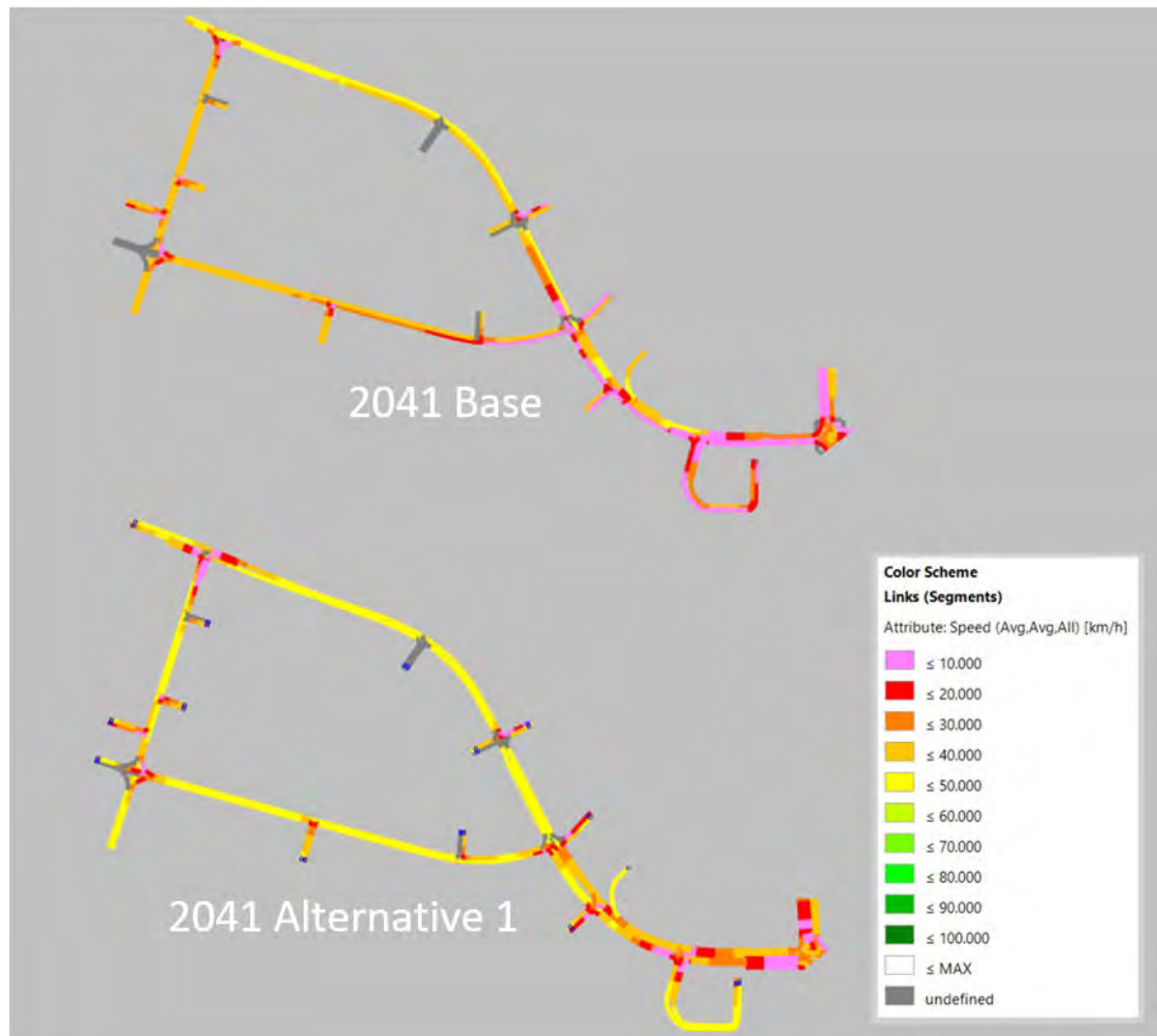


Figure 14: South Service Road – 2041 AM Peak Hour – Average Travel Speed

The cumulative effect of the slower travel speeds along South Service Road for vehicles passing through the area, primarily the segment between Industrial Drive and Casablanca Boulevard, contributes to a significantly slower travel time through the area, which makes the Livingston Avenue Extension more attractive for those not destined to the commercial uses along South Service Road or heading north to the QEW. This illustrates the utility of the Livingston Avenue Extension to function as a relief valve for congestion along South Service Road, where drivers not destined for the local businesses or to the interchange with QEW can choose a faster, more reliable route through the area.

The figure also shows that South Service Road to the west of Industrial Drive operates adequately in absence of the extension (though there are some benefits). The operational issues, as illustrated by the slower speeds, occur mainly to the east of Industrial Drive. The addition of a lane on South Service Road to the west of Industrial Drive would not provide any benefit to the observed issues. This would simply deliver more vehicles into the slower sections and exacerbate the issue. An extension of Livingston

Avenue, therefore, acts as an important option for drivers to avoid the problematic section of South Service Road between Industrial Drive and Casablanca Boulevard.

The effect of the changes in roadway speeds manifests itself on the network as improved travel times through the study area. **Figure 15** shows the average travel times across the major road segments in the study area in the 2041 PM Peak Hour.

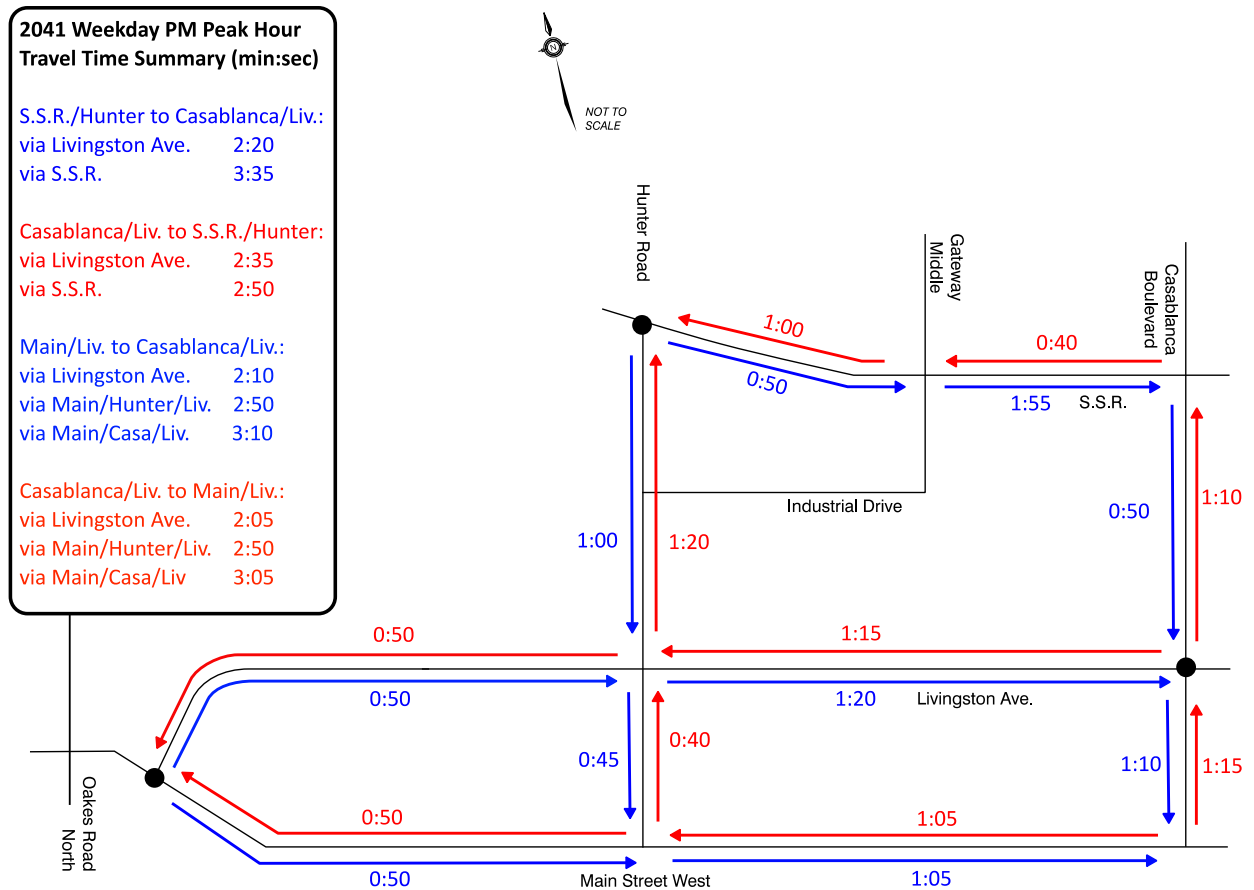


Figure 15 – Major Segment Travel Times – 2041 PM Peak Hour

For each individual traveller along these routes there is a travel time advantage of 75 seconds along the Livingston Avenue Extension between the two logical routing options when travelling from west to east from the Hunter Road / South Service Road intersection to the Casablanca Boulevard / Livingston Avenue intersection. This allows drivers wishing to pass through the study area (e.g., heading to Downtown Grimsby) to avoid the congestion on the section of South Service Road between Industrial Drive and Casablanca Boulevard. This also provides greater resiliency in the network if / when there are incidents causing significant congestion on South Service Road on this same section.

The orientation of the southern east / west roads (Main Street West, Livingston Avenue Extension) also provide advantages for drivers travelling eastbound through the study area with a destination of points to the east of the study area (e.g., Downtown Grimsby), as Main Street West travels much further south starting just east of Oakes Road. As shown in the figure, there are advantage of 45 seconds to a minute

when travelling between the intersections of Main Street / Livingston Extension and Casablanca Boulevard / Livingston Extension.

These travel time savings may seem small but to individuals they are significant as they occur on a daily basis and can be the equivalent of a full traffic signal cycle, and on an annual basis for all road users can add up to 1,000's of hours of travel time savings (an approximate estimate based on the hourly volume demand estimate for two peak hours, a.m. and p.m., forecast over a year would result in over 10,000 hours saved).

In consideration of the travel time and distance savings, a review of the broader volume flows was undertaken to understand the potential additional market for the Livingston Avenue extension. Calculations based on 2041 p.m. peak hour volume flows (**Figure 9**) were made as follows:

- South Service Road Diversion:
 - 270 eastbound throughs at Casablanca - 50% potential to divert destined for downtown / residential areas east of Casablanca / south of South Service Road – 135 vehicles;
 - 210 eastbound right turns at Casablanca – 20% potential to divert destined for downtown / residential areas east of Casablanca / south of South Service Road – 42 vehicles; and
 - Total eastbound volume from South Service Road 177 vehicles (30%) of the 586 volume from west of Hunter Road.
- Main Street Diversion:
 - 346 eastbound throughs at Casablanca - 50% potential to divert destined for downtown / residential areas east of Casablanca / south of South Service Road – 173 vehicles;
 - 112 eastbound left turns at Casablanca – 20% potential to divert destined for downtown / residential areas east of Casablanca / south of South Service Road – 22 vehicles; and
 - Total eastbound volume from South Service Road 195 vehicles (40%) of the 497 volume from west of Hunter Service Road.
- Total market for the Livingston extension therefore 372 vehicles, above and beyond the 65 to 160 vehicles (depending on the extension limits) from the VISSIM model; and
- Total potential demand for the Livingston Avenue Extension is therefore 440 to 530 vehicles.

Based on the forecasted volumes entering and exiting the study area to / from the west via South Service Road and Main Street West to the east of Casablanca Boulevard, there is a potential travel market of approximately 440-530 vehicles in the peak hours that could divert to Livingston Avenue.

Figures 16, 17, and 18 show the turning movement volumes in the vicinity of Livingston Avenue in three conditions: No extension, Extension to Hunter Road, and Extension to Oakes Road. (Note: the volumes in the figures differ from the potential maximum market as some vehicles are lost / gained during the model assignment routing process).

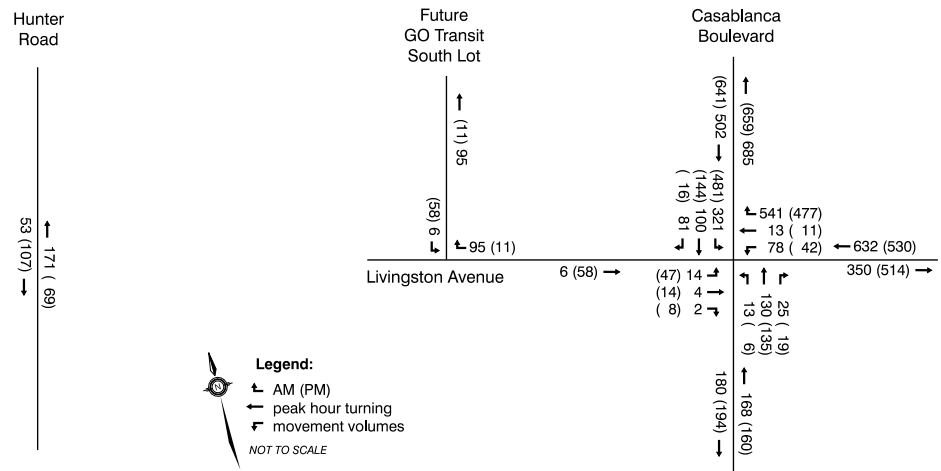


Figure 15: Livingston Avenue Peak Hour Turning Volume – No Extension

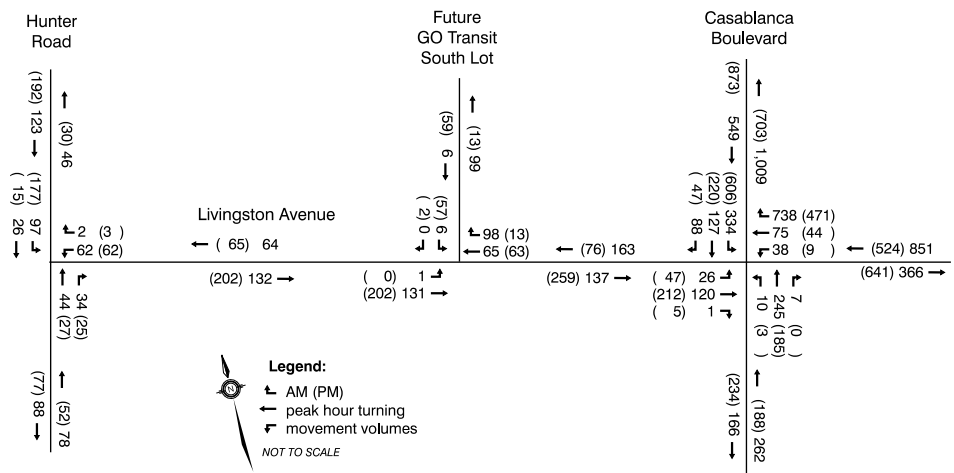


Figure 16: Livingston Avenue Peak Hour Turning Volume – Extension to Hunter Road

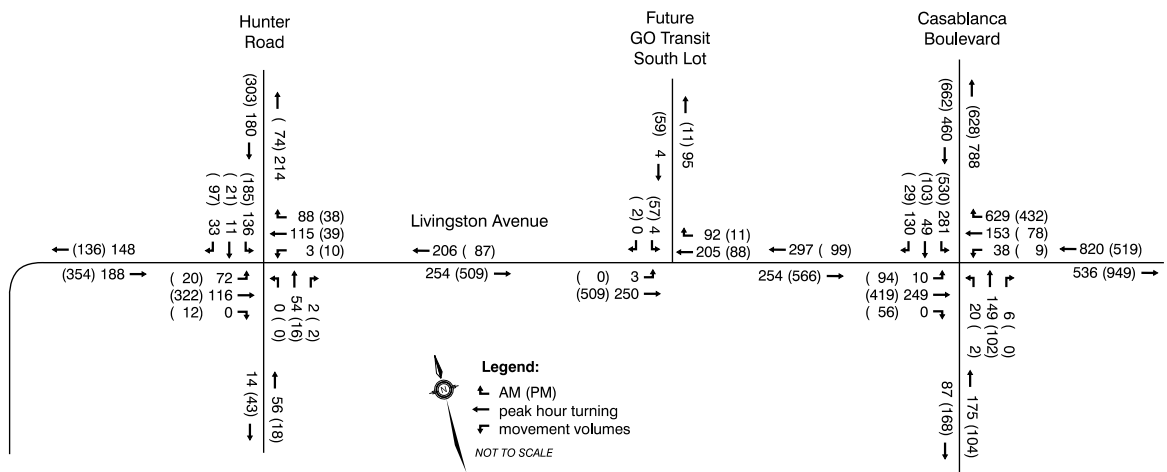


Figure 17: Livingston Avenue Peak Hour Turning Volume – Extension to Oakes Road North

5.5.1.2 Intersection Analysis

Error! Reference source not found. summarizes the results of the operational analysis for three 2041 conditions (Do Nothing, Base and Alt. 1). It can be seen in the tables that the extension of Livingston Avenue (2041 Alt. 1) will have a positive effect on operations at the Casablanca Boulevard / South Service Road and Casablanca Boulevard / Livingston Avenue intersections. Overall intersection LOS is improved for both locations during the AM peak hour and PM peak hour conditions, with reduced delays and queues at the Casablanca Boulevard / South Service Road intersection. The extension of Livingston Avenue, therefore performs an important operational role in the network by allowing those travelling east-west in the area to avoid congestion along South Service Road and provide a through function for those wishing to travel through the study area.

Table 12: 2041 Livingston Avenue Extension Analysis Results

AM Peak Hour	Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
				Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
	Casablanca Blvd & S Service Rd										
	2041 Do Nothing	Sig.	2724	104	144	66	48	NBR	267	50	E
	2041 Base	Sig.	3369	67	153	55	43	NBT	267	82	E
	2041 Alt 1	Sig.	3435	23	98	28	22	NBR	130	34	C
	Casablanca Blvd & Livingston Ave										
	2041 Do Nothing	TWSC	1077	13	50	22	14	SBL	65	3	-
	2041 Base	Sig.	1322	49	101	39	21	WBR	132	72	D
	2041 Alt 1	Sig.	1714	39	96	29	13	WBR	132	39	C
Hunter Rd & Livingston Ave											
2041 Do Nothing	TWSC	296	0	0	0	0	None	0	0	-	
2041 Base	TWSC	224	0	0	0	0	None	0	0	-	
2041 Alt 1	TWSC	630	2	28	8	1	WBT	44	14	-	
Oakes Rd & Livingston Ave											
2041 Alt 1	TWSC	635	0	5	3	0	WBL	23	8	-	

PM Peak Hour	Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
				Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
	Casablanca Blvd & S Service Rd										
	2041 Do Nothing	Sig.	2848	122	161	92	71	NBR	267	78	F
	2041 Base	Sig.	3765	52	126	47	37	SBR	162	6	D
	2041 Alt 1	Sig.	3505	41	122	36	27	SBT	179	40	D
	Casablanca Blvd & Livingston Ave										
	2041 Do Nothing	TWSC	942	14	79	34	24	SBL	117	8	-
	2041 Base	Sig.	1400	7	68	12	6	SBR	101	2	B
	2041 Alt 1	Sig.	1854	20	112	22	15	EBR	163	37	C
Hunter Rd & Livingston Ave											
2041 Do Nothing	TWSC	222	0	0	0	0	None	0	0	-	
2041 Base	TWSC	176	0	0	0	0	None	0	0	-	
2041 Alt 1	TWSC	762	9	50	14	2	EBT	96	28	-	
Oakes Rd & Livingston Ave											
2041 Alt 1	TWSC	597	0	14	3	0	WBL	27	9	-	

5.5.1.3 Impacts on Other Study Area Roads

The opening of the GO Transit Station and potential Livingston Avenue Extension is expected to have impacts beyond South Service Road and Livingston Road, the primary accesses. The resulting growth in volume and change in travel patterns in the study area will also have impacts on have impacts on Casablanca Boulevard, Industrial Drive, and Hunter Road.

As a result of the provision of an alternative route and the associated diversion of volume to that route, volumes on Casablanca Boulevard are expected to have a net decrease in traffic volume.

As discussed in Section 5.5.1.1, the diversion of volume from South Service Road will result in improved operating conditions along Industrial Drive. While volumes on Industrial will remain static between scenarios, less queuing and better operations on South Service Road as a result of volume diverting to the Livingston Avenue extension will improve the queuing and operating conditions on Industrial Drive.

The Livingston Road Extension, both full and partial, will result in increased volumes on Hunter Road. **Figure 19** shows the traffic routing potential for traffic to / from the west that will use Hunter Road in the future. With the implementation of the GO Transit Station but without Livingston Avenue Extension, the majority of trips originating from the west and travelling to and from the station will use Hunter Road to move between Main Street West and South Service Road to access the station, as illustrated by the red route in **Figure 19**.

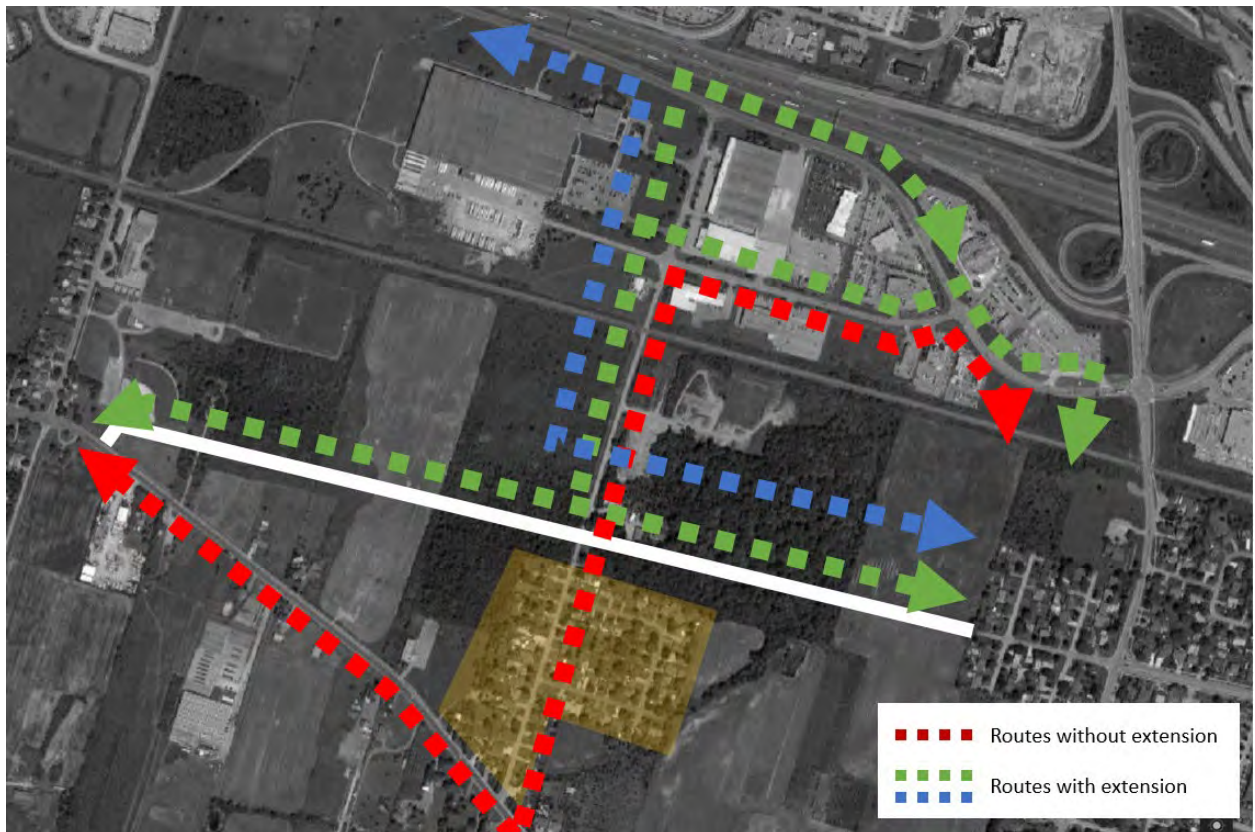


Figure 18: Hunter Road – Alternate Routings

With the full extension of Livingston Avenue Extension to Oakes Road / Main Street, diverted volume will occur at the access to Livingston Avenue near Oakes Road, providing more direct access to the southern entry point to the GO Transit Station and an alternate route to the northern entry point, as illustrated by the green route in **Figure 19**. Any vehicles still required to travel further north to South Service Road will therefore be on the section of Hunter Road between Livingston Avenue and South Service Road. As well, South Service Road volume that diverts to Livingston, not necessarily to the GO Transit Station, will also

result in increased volumes on Hunter Road, between Livingston Ave and South Service Road (blue route).

A full extension allows vehicles to avoid passing through the residential area on Hunter Road to the south of Livingston Avenue (the yellow area in **Figure 19**). A partial extension to Hunter will result in Main Street volumes returning to the original route (red).

As shown previously in **Figures 17 and 18**, the extension of Livingston Avenue will result in an increase in volume on Hunter Road during the peak hour between the Livingston Extension and the South Service Road. The remainder of traffic on the road is expected to be largely local traffic accessing the residences in the area.

5.5.1.4 Summary

With the above in mind, an extended Livingston Avenue in the network will serve three purposes:

- Serve east-west travel passing through the area to / from the west to Downtown Grimsby and residential areas to the east, as an alternate travel route through the area to avoid congestion and slower travel speeds on South Service Road in the vicinity of the GO Transit Station and Casablanca Boulevard;
- Provide access to and from the south side of the GO Transit Station; and
- Alternate path through the study area to / from the west to provide more direct access to the GO Transit Station and avoid increasing volume through the residential area on southern Hunter Road.

Based on the preceding transportation analysis, the Livingston Avenue Extension to Oakes Road North will provide relief to operations on South Service Road, particularly along the section between Industrial Drive and Casablanca Boulevard, as well as at its intersections with Casablanca Boulevard and Livingston Avenue. It also provides resiliency and flexibility in the network for Main Street West and South Service Road when the GO Transit Station is activity is at its peak or as an emergency detour route during incidents on the QEW. The extension also improves access options to a GO Transit Station South Parking Lot, while providing an attractive option for travel between the west and Downtown Grimsby.

5.5.2 South Service Road Alternative

5.5.2.1 Roadway Demands

Peak direction volumes on South Service Road vary from approximately 700 vehicles at Hunter Road to 1,325 at Casablanca Boulevard. The base demand conditions for 2041 show that an additional lane east-west capacity is needed for this distance in order to address strategic and operational needs.

As documented in the Casablanca Boulevard EA, the section of South Service Road is already planned to have a basic 4-lane section with provision of auxiliary lanes to accommodate the demands associated with the GO Transit Station demands. Provision of an additional basic lane eastbound and westbound is not feasible given the physical constraints of the corridor.

The section of South Service Road west of Industrial Drive could accommodate the required lane addition to address the identified demand. Provision of this capacity is not expected to result in an operating condition that would draw more volume to the corridor because of the congestion adjacent to the GO Transit Station.

The baseline forecasts from the VISSIM model were used in the assessment of the South Service Road assessment.

5.5.2.2 Intersection Analysis

Table 13 summarizes the 2041 operation analysis undertaken for South Service Road intersections in the study area, for the five 2041 scenarios modelled.

Table 13: 2041 South Service Road Analysis Results

AM Peak Hour

Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2041 Do Nothing	Sig.	2724	104	144	66	48	NBR	267	50	E
2041 Base	Sig.	3369	67	153	55	43	NBT	267	82	E
2041 Alt 1	Sig.	3435	23	98	28	22	NBR	130	34	C
2041 Alt 2	Sig.	3631	25	104	30	23	NBT	142	50	C
2041 Alt 3	Sig.	3381	31	120	29	23	NBT	140	44	C
S Service Rd & Industrial Dr										
2041 Do Nothing	TWSC	1107	7	53	21	11	NBR	81	52	-
2041 Base	TWSC	1343	2	32	6	1	WBL	44	5	-
2041 Alt 1	TWSC	1137	1	16	3	0	SBT	44	13	-
2041 Alt 2	TWSC	1415	2	22	4	0	SBT	45	15	-
2041 Alt 3	TWSC	1304	3	45	5	1	WBL	64	6	-
S Service Rd & Hunter Rd										
2041 Do Nothing	TWSC	804	0	6	2	0	NBL	29	9	-
2041 Base	TWSC	912	1	10	3	1	NBL	42	13	-
2041 Alt 1	Sig.	991	5	61	11	8	WBT	82	7	B
2041 Alt 2	TWSC	944	0	3	1	0	NBL	22	9	-
2041 Alt 3	TWSC	913	1	16	4	1	NBR	53	6	-
S Service Road & GO North Access										
2041 Do Nothing	Sig.	1792	22	106	17	12	EBT	119	29	B
2041 Base	Sig.	2173	36	129	18	11	WBT	149	13	B
2041 Alt 1	Sig.	2108	11	66	11	7	WBT	73	8	B
2041 Alt 2	Sig.	2362	11	87	12	7	WBT	96	8	B
2041 Alt 3	Sig.	2177	14	93	13	8	EBT	99	19	B

Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2041 Do Nothing	Sig.	2848	122	161	92	71	NBR	267	78	F
2041 Base	Sig.	3765	52	126	47	37	SBR	162	6	D
2041 Alt 1	Sig.	3505	41	122	36	27	SBT	179	40	D
2041 Alt 2	Sig.	3911	70	150	54	42	SBL	195	148	D
2041 Alt 3	Sig.	3916	66	145	51	40	SBT	195	46	D
S Service Rd & Industrial Dr										
2041 Do Nothing	TWSC	1128	33	79	70	41	EBT	127	50	-
2041 Base	TWSC	1211	38	96	70	37	EBT	128	127	-
2041 Alt 1	TWSC	800	3	22	6	0	SBL	41	13	-
2041 Alt 2	TWSC	1337	20	83	56	38	NBR	108	178	-
2041 Alt 3	TWSC	1338	20	95	40	23	EBT	121	43	-
S Service Rd & Hunter Rd										
2041 Do Nothing	TWSC	798	0	0	0	0	NBL	16	7	-
2041 Base	TWSC	854	1	12	3	2	EBR	18	2	-
2041 Alt 1	Sig.	460	3	37	10	7	WBT	52	12	A
2041 Alt 2	TWSC	864	0	0	0	0	NBL	10	8	-
2041 Alt 3	TWSC	866	0	0	0	0	NBL	11	9	-
S Service Road & GO North Access										
2041 Do Nothing	Sig.	1789	33	90	21	14	EBT	119	30	C
2041 Base	Sig.	2069	35	114	20	13	WBT	132	11	B
2041 Alt 1	Sig.	1705	6	52	9	5	WBT	58	8	A
2041 Alt 2	Sig.	2209	43	90	36	24	EBT	119	69	D
2041 Alt 3	Sig.	2202	42	100	32	22	EBT	118	59	C

It can be seen in the tables that there is little difference between the tested 2041 Alternatives (Alt. 1; Alt. 2 and Alt. 3) along South Service Road, though they all show significant improvement in the AM peak hour over the base condition. No significant variation in performance is observed in any of the three tested alternatives at South Service Road intersections.

5.5.2.3 Impact on Other Roadways

The South Service Road improvement alternative is not expected to result in significant changes in travel behaviour in the network, and therefore no additional impacts on the study area network are anticipated.

5.5.3 Main Street West Alternative

5.5.3.1 Roadway Demand

Peak direction volumes on Main Street vary from approximately 526 vehicles at Hunter Road to 458 at Casablanca Boulevard. The base demand conditions for 2041 show that the facility operates well within capacity. Adding a lane to this corridor would be to the benefit of the greater east-west travel corridor.

As identified in Section 5.5.1.1 in the assessment of travel times and distance, the provision of additional capacity in the Main Street corridor does not produce any time or distance savings in the network, and therefore does not result in any diversion of volume from the critical / constrained links in the network.

The baseline forecasts from the VISSIM model were used in the assessment of the Main Street assessment.

5.5.3.2 Intersection Analysis

Alternative 3 tested the widening of Main Street West to provide additional capacity for east-west travel in the study area. **Table 14** summarizes the results of the analysis.

From the results, widening of Main Street West does not provide meaningful improvement to operations in the study area, especially along the South Service Road where issues remain. Minor improvement was observed at the Casablanca Boulevard / Livingston Avenue intersection in the AM peak hour, but this is not significant. The intersections along Main Street West operate well in all tested scenarios and do not benefit from the expansion.

Table 14: 2041 Main Street West Analysis Results

Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2018 Existing	Sig.	1948	59	125	38	30	NBR	267	42	D
2041 Do Nothing	Sig.	2724	104	144	66	48	NBR	267	50	E
2041 Base	Sig.	3369	67	153	55	43	NBT	267	82	E
2041 Alt 3	Sig.	3381	31	120	29	23	NBT	140	44	C
Casablanca Blvd & Livingston Ave										
2018 Existing	TWSC	876	6	38	10	7	WBR	56	19	-
2041 Do Nothing	TWSC	1077	13	50	22	14	SBL	65	3	-
2041 Base	Sig.	1322	49	101	39	21	WBR	132	72	D
2041 Alt 3	Sig.	1296	63	115	31	11	WBR	132	50	C
Casablanca Blvd & Main St W										
2018 Existing	TWSC	756	0	11	2	0	SBR	38	10	-
2041 Do Nothing	TWSC	990	1	20	4	1	SBR	53	14	-
2041 Base	TWSC	997	1	17	3	0	SBR	33	9	-
2041 Alt 3	TWSC	976	0	4	2	0	SBL	27	3	-
S Service Rd & Industrial Dr										
2018 Existing	TWSC	757	1	12	3	0	SBT	40	10	-
2041 Do Nothing	TWSC	1107	7	53	21	11	NBR	81	52	-
2041 Base	TWSC	1343	2	32	6	1	WBL	44	5	-
2041 Alt 3	TWSC	1304	3	45	5	1	WBL	64	6	-
S Service Rd & Hunter Rd										
2018 Existing	TWSC	540	0	3	1	0	NBL	19	7	-
2041 Do Nothing	TWSC	804	0	6	2	0	NBL	29	9	-
2041 Base	TWSC	912	1	10	3	1	NBL	42	13	-
2041 Alt 3	TWSC	913	1	16	4	1	NBR	53	6	-
Hunter Rd & Main St W										
2018 Existing	TWSC	688	0	8	1	0	EBL	20	2	-
2041 Do Nothing	TWSC	911	0	11	2	0	EBL	28	4	-
2041 Base	TWSC	881	0	9	1	0	EBL	25	3	-
2041 Alt 3	TWSC	856	0	2	1	0	SBR	18	6	-
Main St W & Oakes Rd N										
2018 Existing	TWSC	764	0	7	2	0	SBR	30	8	-
2041 Do Nothing	TWSC	882	0	10	2	0	SBR	33	8	-
2041 Base	TWSC	905	0	10	2	0	SBR	33	8	-
2041 Alt 3	TWSC	904	0	11	2	0	SBL	30	9	-
S Service Road & GO North Access										
2041 Do Nothing	Sig.	1792	22	106	17	12	EBT	119	29	B
2041 Base	Sig.	2173	36	129	18	11	WBT	149	13	B
2041 Alt 3	Sig.	2177	14	93	13	8	EBT	99	19	B

Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2018 Existing	Sig.	2243	49	117	52	42	NBR	220	43	D
2041 Do Nothing	Sig.	2848	122	161	92	71	NBR	267	78	F
2041 Base	Sig.	3765	52	126	47	37	SBR	162	6	D
2041 Alt 3	Sig.	3916	66	145	51	40	SBT	195	46	D
Casablanca Blvd & Livingston Ave										
2018 Existing	TWSC	831	0	22	2	0	SBL	50	3	-
2041 Do Nothing	TWSC	942	14	79	34	24	SBL	117	8	-
2041 Base	Sig.	1400	7	68	12	6	SBR	101	2	B
2041 Alt 3	Sig.	1423	8	82	13	7	SBR	124	3	B
Casablanca Blvd & Main St W										
2018 Existing	TWSC	732	0	12	2	0	SBR	26	7	-
2041 Do Nothing	TWSC	944	1	30	3	1	EBL	54	4	-
2041 Base	TWSC	1021	1	27	3	1	EBL	50	4	-
2041 Alt 3	TWSC	971	0	4	1	0	SBL	22	4	-
S Service Rd & Industrial Dr										
2018 Existing	TWSC	905	2	18	5	1	SBL	41	13	-
2041 Do Nothing	TWSC	1128	33	79	70	41	EBT	127	50	-
2041 Base	TWSC	1211	38	96	70	37	EBT	128	127	-
2041 Alt 3	TWSC	1338	20	95	40	23	EBT	121	43	-
S Service Rd & Hunter Rd										
2018 Existing	TWSC	537	0	0	0	0	NBR	15	8	-
2041 Do Nothing	TWSC	798	0	0	0	0	NBL	16	7	-
2041 Base	TWSC	854	1	12	3	2	EBR	18	2	-
2041 Alt 3	TWSC	866	0	0	0	0	NBL	11	9	-
Hunter Rd & Main St W										
2018 Existing	TWSC	733	0	11	1	0	EBL	17	1	-
2041 Do Nothing	TWSC	903	0	19	2	0	EBL	30	2	-
2041 Base	TWSC	923	0	17	1	0	EBL	30	2	-
2041 Alt 3	TWSC	907	0	3	1	0	SBL	22	8	-
Main St W & Oakes Rd N										
2018 Existing	TWSC	783	0	3	1	0	SBR	29	7	-
2041 Do Nothing	TWSC	881	0	3	1	0	SBR	27	7	-
2041 Base	TWSC	941	0	3	1	0	SBR	27	7	-
2041 Alt 3	TWSC	939	0	5	1	0	SBT	23	12	-
S Service Road & GO North Access										
2041 Do Nothing	Sig.	1789	33	90	21	14	EBT	119	30	C
2041 Base	Sig.	2069	35	114	20	13	WBT	132	11	B
2041 Alt 3	Sig.	2202	42	100	32	22	EBT	118	59	C

5.5.3.3 Impact on Other Roadways

The Main Street improvement alternative is not expected to result in significant changes in travel behaviour in the network, and therefore no additional impacts on the study area network are anticipated.

5.5.4 Hunter Road / Oakes Road

As two north / south connections in the western portion of the study area, Hunter Road and Oakes Road provide access between Main Street West and South Service Road. The extension of Livingston Avenue will potentially change their roles in the local network. **Table 15** shows the results at intersections on Hunter Road and Oakes Road from the microsimulation model.

The changes across the various alternatives were shown to change the level of volume on the links and processed by the studied intersections. In general, the intersections were shown to process 15-25% more volume than the 2041 Do Nothing condition, though it should be noted that these volumes were still relatively low. As such, no operational issues were shown in the microsimulation results for any intersection or movement along the Hunter Road and Oakes Road corridors. While the volume change as a percentage is significant, the additional volume is also not expected to impact the safe operation of the at-rail grade crossing of both facilities. No change to control type for either crossing is expected to be necessary and delays at the crossings will not meaningfully increase.

Care will need to be taken in establishing any design or control changes in the vicinity of the extension of Livingston Avenue that respects the nearby residential land uses. Introducing a new east / west through street in the area will need to consider impacts to the residences, Smith Public School, and other recreational uses in the area.

While no increases in capacity will be required on either facility, it is anticipated that in the long-term Hunter Road will have to be resurfaced to accommodate its increased role in network and its intersection with South Service Road should be monitored for potential signalization.

Table 15: 2041 Hunter Road and Oakes Road Results

AM Peak Hour	Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
				Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
	S Service Rd & Hunter Rd										
	2041 Do Nothing	TWSC	804	0	6	2	0	NBL	29	9	-
	2041 Base	TWSC	912	1	10	3	1	NBL	42	13	-
	2041 Alt 1	Sig.	991	5	61	11	8	WBT	82	7	B
	2041 Alt 2	TWSC	944	0	3	1	0	NBL	22	9	-
	2041 Alt 3	TWSC	913	1	16	4	1	NBR	53	6	-
	Hunter Rd & Industrial Dr										
	2041 Do Nothing	TWSC	489	0	11	2	0	WBR	25	5	-
2041 Base	TWSC	522	1	18	3	0	WBR	33	6	-	
2041 Alt 1	TWSC	624	0	9	2	0	WBR	25	6	-	
2041 Alt 2	TWSC	469	1	14	3	0	WBR	25	5	-	
2041 Alt 3	TWSC	573	2	27	4	0	WBR	44	7	-	
Hunter Rd & Livingston Ave											
2041 Do Nothing	TWSC	296	0	0	0	0	None	0	0	-	
2041 Base	TWSC	224	0	0	0	0	None	0	0	-	
2041 Alt 1	TWSC	630	2	28	8	1	WBT	44	14	-	
2041 Alt 2	TWSC	235	0	0	0	0	None	0	0	-	
2041 Alt 3	TWSC	207	0	0	0	0	None	0	0	-	
Hunter Rd & Main St W											
2041 Do Nothing	TWSC	911	0	11	2	0	EBL	28	4	-	
2041 Base	TWSC	881	0	9	1	0	EBL	25	3	-	
2041 Alt 1	TWSC	516	0	0	1	0	SBR	10	4	-	
2041 Alt 2	TWSC	853	0	10	2	0	EBL	21	3	-	
2041 Alt 3	TWSC	856	0	2	1	0	SBR	18	6	-	
Main St W & Oakes Rd N											
2041 Do Nothing	TWSC	882	0	10	2	0	SBR	33	8	-	
2041 Base	TWSC	905	0	10	2	0	SBR	33	8	-	
2041 Alt 1	Sig.	915	5	49	12	6	SBR	75	19	B	
2041 Alt 2	TWSC	914	0	10	2	0	SBR	33	8	-	
2041 Alt 3	TWSC	904	0	11	2	0	SBL	30	9	-	
Oakes Rd & Livingston Ave											
2041 Alt 1	TWSC	635	0	5	3	0	WBL	23	8	-	

PM Peak Hour

Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
S Service Rd & Hunter Rd										
2041 Do Nothing	TWSC	798	0	0	0	0	NBL	16	7	-
2041 Base	TWSC	854	1	12	3	2	EBR	18	2	-
2041 Alt 1	Sig.	460	3	37	10	7	WBT	52	12	A
2041 Alt 2	TWSC	864	0	0	0	0	NBL	10	8	-
2041 Alt 3	TWSC	866	0	0	0	0	NBL	11	9	-
Hunter Rd & Industrial Dr										
2041 Do Nothing	TWSC	369	6	55	13	8	NBR	112	12	-
2041 Base	TWSC	452	0	10	3	0	WBT	30	10	-
2041 Alt 1	TWSC	472	1	12	3	0	WBR	42	5	-
2041 Alt 2	TWSC	398	1	20	5	0	WBR	48	4	-
2041 Alt 3	TWSC	484	1	14	4	0	WBR	38	4	-
Hunter Rd & Livingston Ave										
2041 Do Nothing	TWSC	222	0	0	0	0	None	0	0	-
2041 Base	TWSC	176	0	0	0	0	None	0	0	-
2041 Alt 1	TWSC	762	9	50	14	2	EBT	96	28	-
2041 Alt 2	TWSC	220	0	0	0	0	None	0	0	-
2041 Alt 3	TWSC	206	0	0	0	0	None	0	0	-
Hunter Rd & Main St W										
2041 Do Nothing	TWSC	903	0	19	2	0	EBL	30	2	-
2041 Base	TWSC	923	0	17	1	0	EBL	30	2	-
2041 Alt 1	TWSC	425	0	0	0	0	SBR	8	5	-
2041 Alt 2	TWSC	903	0	19	1	0	EBL	28	2	-
2041 Alt 3	TWSC	907	0	3	1	0	SBL	22	8	-
Main St W & Oakes Rd N										
2041 Do Nothing	TWSC	881	0	3	1	0	SBR	27	7	-
2041 Base	TWSC	941	0	3	1	0	SBR	27	7	-
2041 Alt 1	Sig.	914	3	46	7	2	EBT	55	4	A
2041 Alt 2	TWSC	940	0	3	1	0	SBR	27	7	-
2041 Alt 3	TWSC	939	0	5	1	0	SBT	23	12	-
Oakes Rd & Livingston Ave										
2041 Alt 1	TWSC	597	0	14	3	0	WBL	27	9	-

5.6 Active Transportation Assessment

The following discusses active transportation considerations in the vicinity of Livingston Avenue. For discussion of active transportation issues along Casablanca Boulevard, refer to the Casablanca Boulevard and GO Station Access EA.

Figure 10 and **Figure 11**, presented earlier, present the forecasted pedestrian and cyclist activity relative to areas with high auto activity. Based on these forecasts, a basic understanding of the potential for active transportation demand was examined.

The Town of Grimsby has set policy goals for increasing the mode share for active transportation users as the area develops. To achieve these goals, it will be necessary that the Town of Grimsby, Niagara Region, Metrolinx and Ontario Ministry of Transportation collaborate as necessary to provide a considered, safe and efficient network of sidewalks, cycling infrastructure and multi-use pathways integrated with the station and the community to enable an increase in active transportation mode share. The Grimsby GO Transit Station Secondary Plan presents a network of on-road cycling infrastructure and multi-use pathways that can be used to accomplish this goal and provide significant improvements to the overall comfort, safety, and continuity of active transportation infrastructure in the station area, as shown in **Figure 19**⁷.

The Livingston Avenue Extension design will provide for both pedestrian and cycling facilities linking Casablanca Boulevard and Main Street West and as such will be one portion of a travel demand management (TDM) plan for the station area, which should also include local transit improvements and other incentives to curb single-occupant automobile travel. TDM will be a significant factor in reducing the growth in automobile travel and assist in slowing the rate of investment in automobile infrastructure, which is costly both to build and maintain in the long term.

Following approval of the Livingston Avenue EA, it is recommended that the Grimsby GO Transit Station Secondary Plan Active Transportation schedule be updated.

⁷ Dillon Consulting Limited, Grimsby GO Transit Station Secondary Plan, October 2017, p. 50

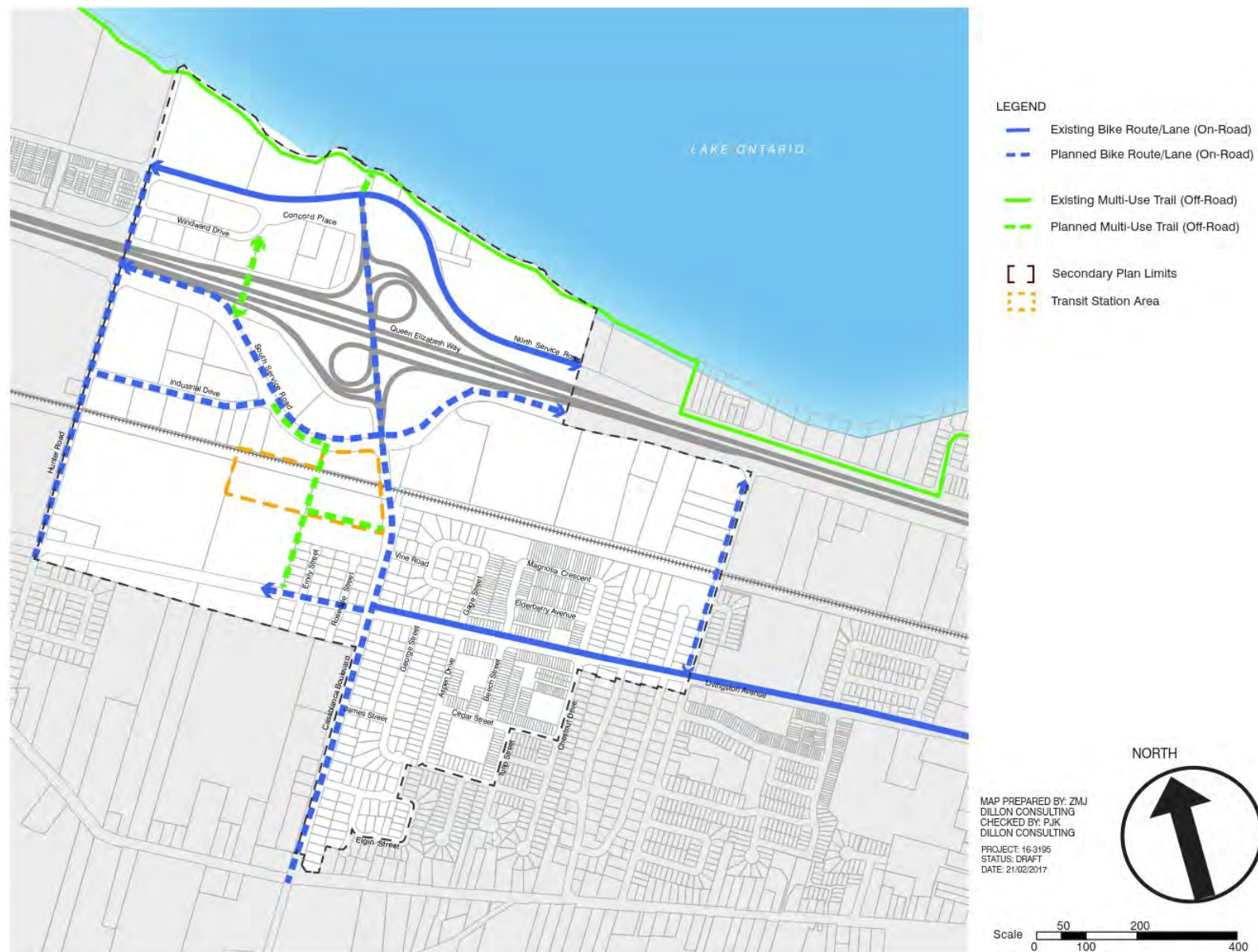


Figure 19: Planned Active Transportation Network

6.0 Timing of Improvements

As the Town of Grimsby and the surrounding area develop and major projects are completed (e.g., opening of the GO Transit Station) there will be breakpoints where deficiencies in the transportation network will manifest and become clear. Given this, there are three clear stages over which the transportation network must be improved to ensure that mobility is maintained within the study area. These are described briefly below:

Opening of the Grimsby GO Transit Station – 2021

The opening of the GO Transit Station will have significant and immediate effects on the operation of the local road network, resulting in significant changes in daily travel patterns and time of travel decisions by local residents and others that find value in the new rail service. Resolution of these future issues requires immediate attention. This will involve the execution of the recommendations in the Municipal Class Environmental Assessment for Casablanca Boulevard (2018). As discussed earlier in this document, these improvements were assumed to be part of the base roadway network for this analysis.

Livingston Avenue Extension – 2031

With a functioning GO Transit Station and continued development of the area, congestion issues on South Service Road will become more pronounced by 2031. To address the forecast traffic demands, the Livingston Avenue extension corridor capacity will be need to be constructed by 2031 to address capacity, mobility needs and operating issues in the broader east-west corridor.

7.0 Conclusions and Recommendations

The Town of Grimsby is currently experiencing rapid population and employment growth and is forecast to continue to grow to 2041. This growth will be catalyzed by the expansion of GO Rail service east to Grimsby, Beamsville, St. Catherine's, and Niagara Falls which is scheduled to open in 2021.

Within the study area, the existing conditions strategic analysis and microsimulation analysis identified that traffic movement along South Service Road was approaching capacity.

Planned growth in land use and introduction of GO Rail service, with GO Transit Station accesses on both the South Service Road and Livingston Avenue will increase pressure on east-west travel in the area.

The 2041 analysis assumed that the recommendations from the Casablanca Boulevard and GO Station Access EA were implemented in the study area network. The strategic Screenline analysis identified east-west system capacity issues west of Casablanca Boulevard. The North Service Road and South Service Road corridors, in particular, showed capacity issues along their length.

To address the capacity issues for east-west movement to the west of Casablanca Boulevard, three alternatives were tested:

- Livingston Avenue was extended to Oakes Road;
- South Service Road was widened to four lanes between Hunter Road and Industrial Drive; and
- Main Street West was widened to four lanes between Casablanca Boulevard and Oakes Road.

Operational analysis of the future network alternatives demonstrated that extension of Livingston Avenue to the vicinity of Oakes Road will improve operations along Casablanca Boulevard at the South Service Road and Livingston Avenue intersections. By the 2031 horizon, it is recommended, from a transportation perspective, to extend Livingston Avenue to Oakes Road.

The above roadway recommendations consider future transportation needs that will form part of the evaluation of alternatives.

Figure 20 illustrates the 2031 recommended lane configuration and traffic control.

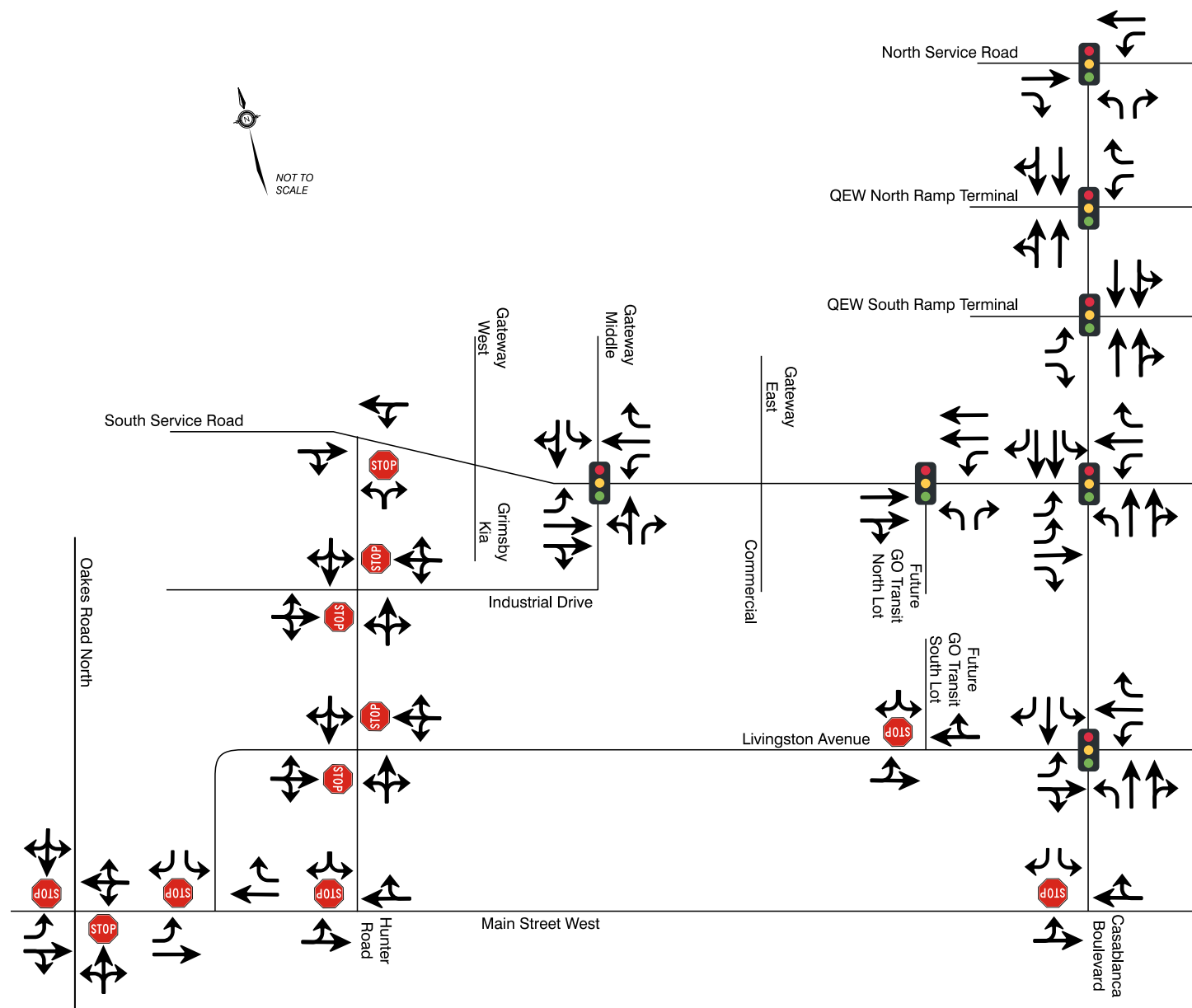


Figure 20: 2041 Recommended Lane Configuration and Traffic Control

Appendix A

Existing Traffic Counts

Appendix B

Screenline Assessment

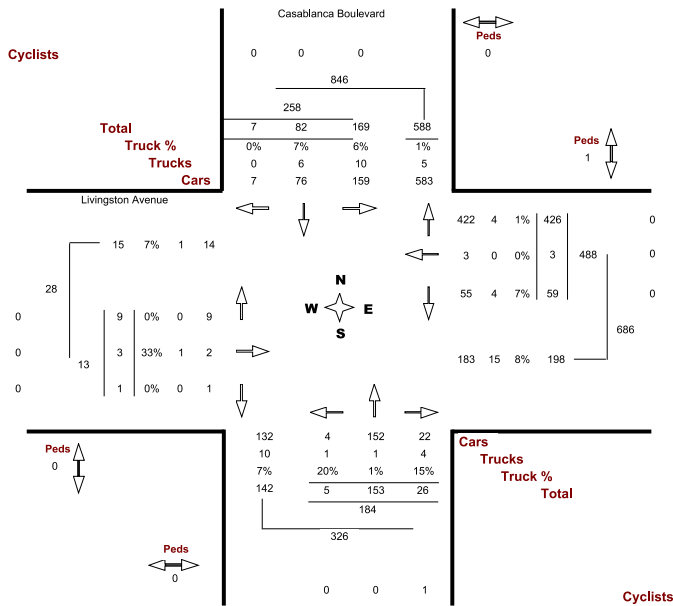
Appendix C

Vissim Results

Appendix A

Existing Traffic Counts

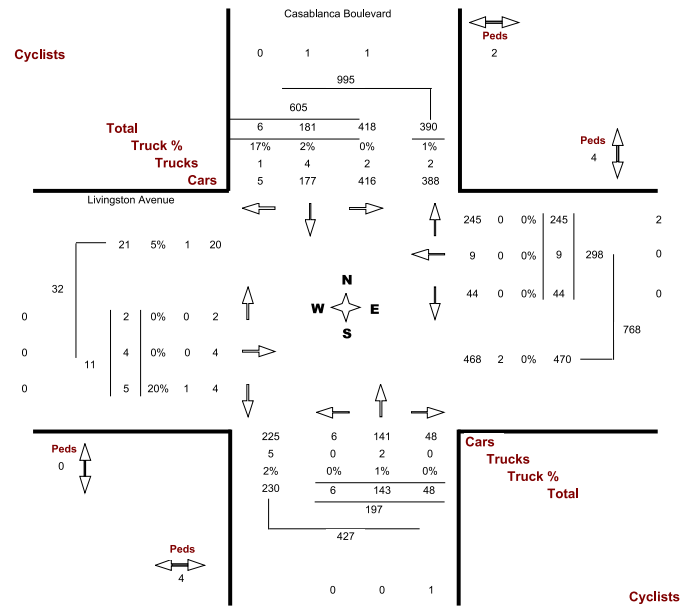
Location..... Casablanca Boulevard @ Livingston Avenue GeoID..... 01189
 Municipality. GRIMSBY Count Date. Wednesday, 09 May, 2018
 Traffic Cont. Stop sign Count Time. 07:00 AM — 09:00 AM
 Major Dir..... None Peak Hour.. 07:45 AM — 08:45 AM



Monday, May 28, 2018

Page 1 of 1

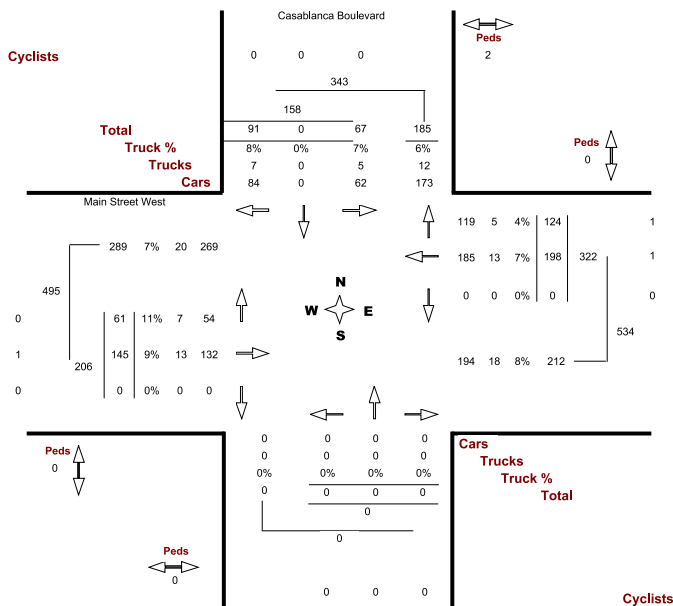
Location..... Casablanca Boulevard @ Livingston Avenue GeoID..... 01189
 Municipality. GRIMSBY Count Date. Wednesday, 09 May, 2018
 Traffic Cont. Stop sign Count Time. 03:00 PM — 06:00 PM
 Major Dir..... None Peak Hour.. 04:15 PM — 05:15 PM



Monday, May 28, 2018

Page 1 of 1

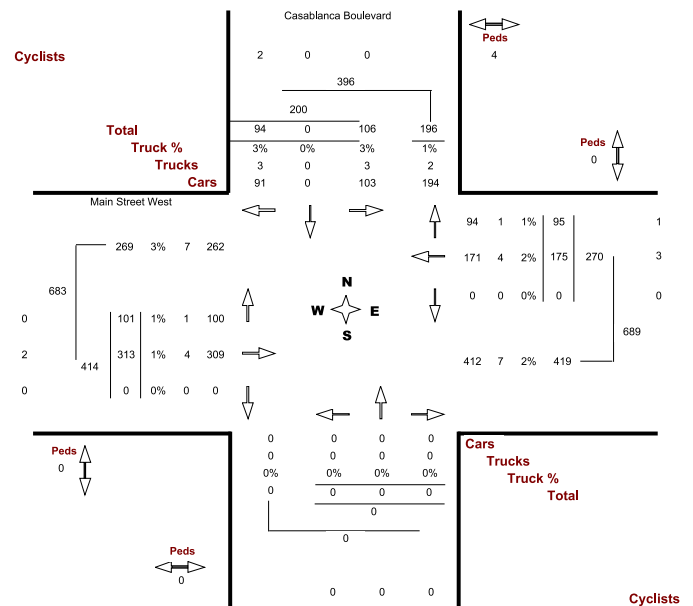
Location..... Casablanca Boulevard @ Main Street West GeoID..... 01185
 Municipality. GRIMSBY Count Date. Wednesday, 09 May, 2018
 Traffic Cont. Stop sign Count Time. 07:00 AM — 09:00 AM
 Major Dir..... None Peak Hour.. 08:00 AM — 09:00 AM



Monday, May 28, 2018

Page 1 of 1

Location..... Casablanca Boulevard @ Main Street West GeoID..... 01185
 Municipality. GRIMSBY Count Date. Wednesday, 09 May, 2018
 Traffic Cont. Stop sign Count Time. 03:00 PM — 06:00 PM
 Major Dir..... None Peak Hour.. 04:15 PM — 05:15 PM

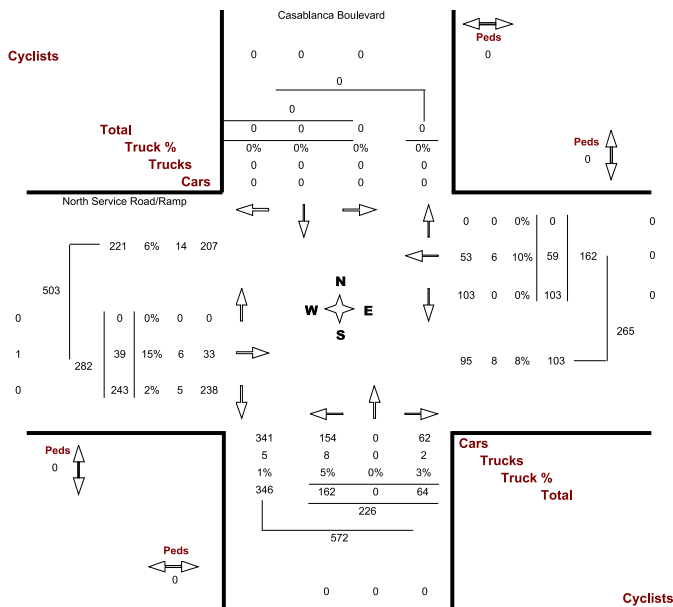


Monday, May 28, 2018

Page 1 of 1

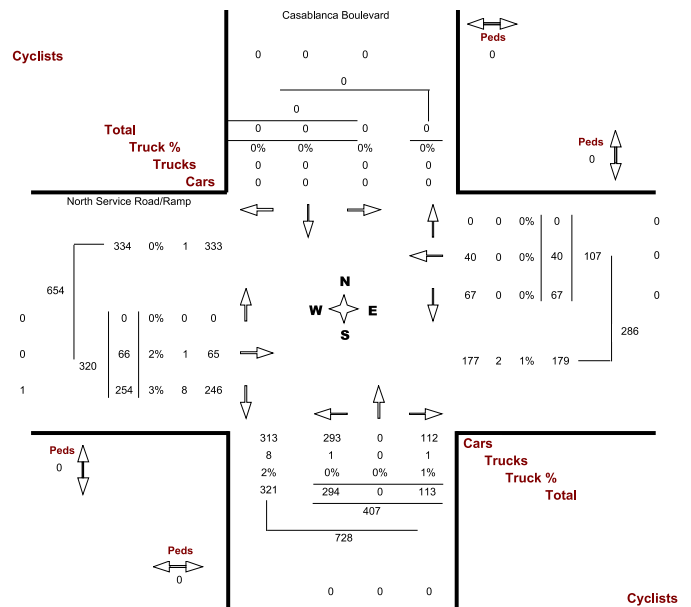
Location..... Casablanca Boulevard @ North Service Road/Ramp
 Municipality: GRIMSBY
 Traffic Cont. All-way Stop
 Major Dir..... North south

GeoID..... 00143
 Count Date. Wednesday, 09 May, 2018
 Count Time. 07:00 AM — 09:00 AM
 Peak Hour.. 07:45 AM — 08:45 AM



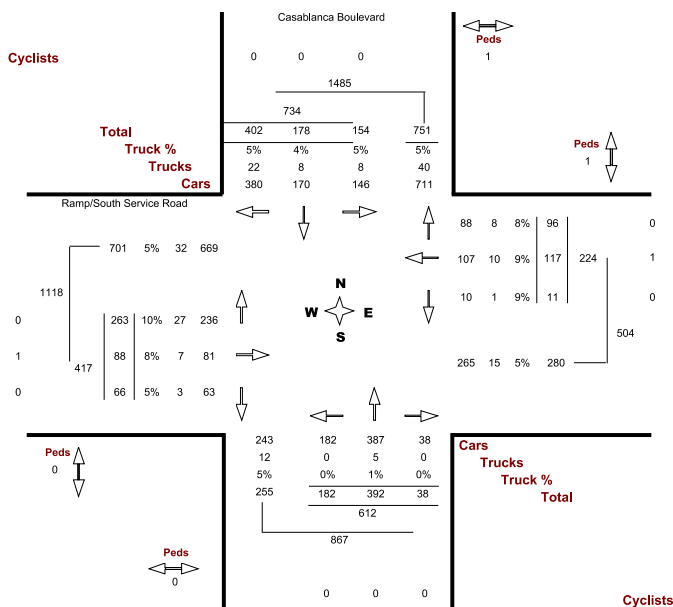
Location..... Casablanca Boulevard @ North Service Road/Ramp
 Municipality: GRIMSBY
 Traffic Cont. All-way Stop
 Major Dir..... North south

GeoID..... 00143
 Count Date. Wednesday, 09 May, 2018
 Count Time. 03:00 PM — 06:00 PM
 Peak Hour.. 04:45 PM — 05:45 PM



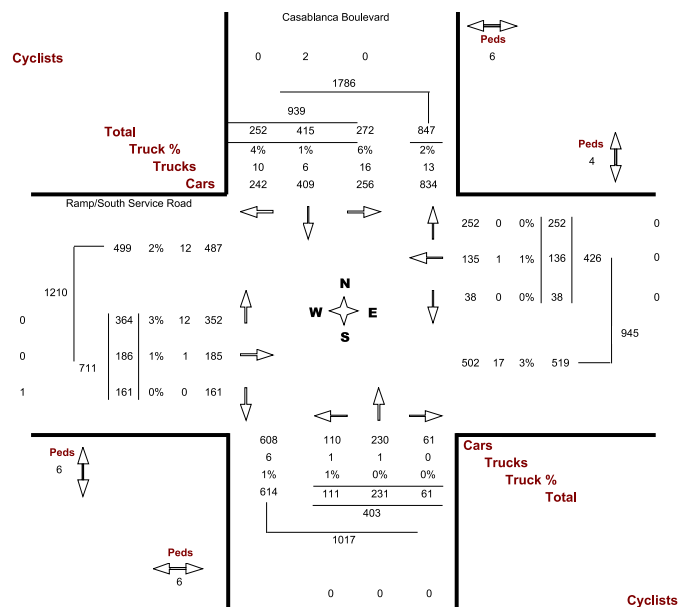
Location..... Casablanca Boulevard @ Ramp/South Service Road
 Municipality: GRIMSBY
 Traffic Cont. Traffic signal
 Major Dir..... None

GeoID..... 01191
 Count Date. Wednesday, 09 May, 2018
 Count Time. 07:00 AM — 09:00 AM
 Peak Hour.. 07:45 AM — 08:45 AM



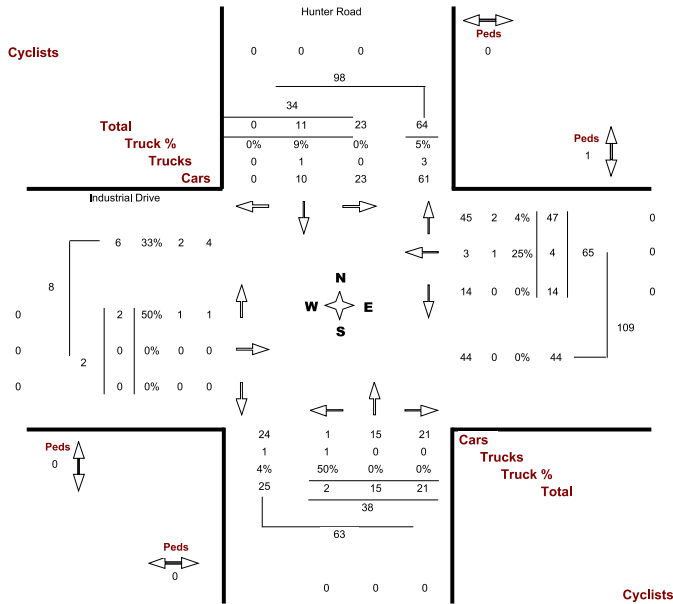
Location..... Casablanca Boulevard @ Ramp/South Service Road
 Municipality: GRIMSBY
 Traffic Cont. Traffic signal
 Major Dir..... None

GeoID..... 01191
 Count Date. Wednesday, 09 May, 2018
 Count Time. 03:00 PM — 06:00 PM
 Peak Hour.. 04:15 PM — 05:15 PM



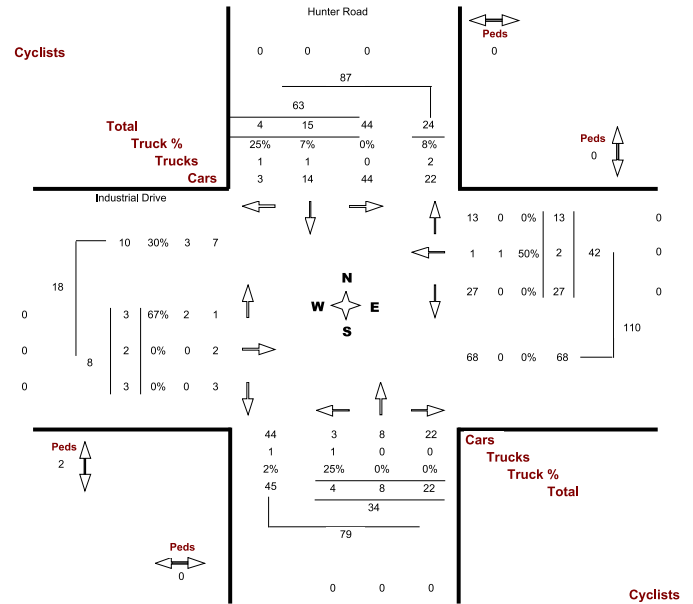
Location..... Hunter Road @ Industrial Drive
 Municipality. GRIMSBY
 Traffic Cont. None
 Major Dir..... None

GeoID..... 02176
 Count Date. Wednesday, 09 May, 2018
 Count Time. 07:00 AM — 09:00 AM
 Peak Hour.. 07:00 AM — 08:00 AM



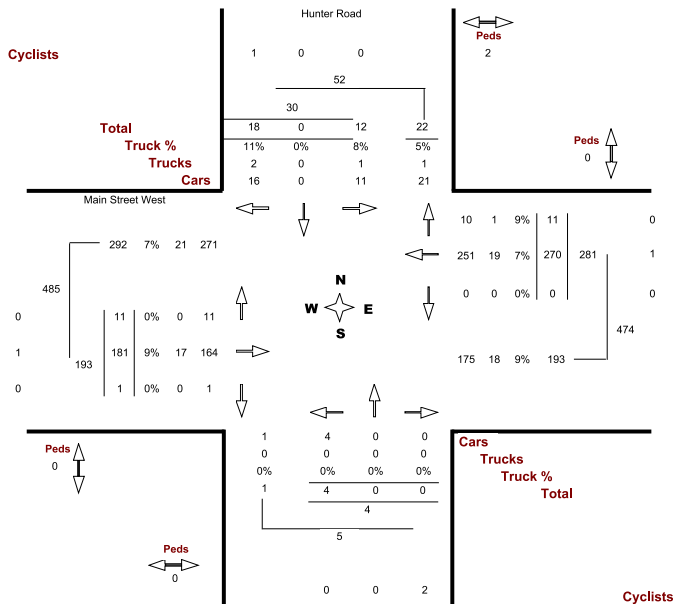
Location..... Hunter Road @ Industrial Drive
 Municipality. GRIMSBY
 Traffic Cont. None
 Major Dir..... None

GeoID..... 02176
 Count Date. Wednesday, 09 May, 2018
 Count Time. 03:00 PM — 06:00 PM
 Peak Hour.. 04:15 PM — 05:15 PM



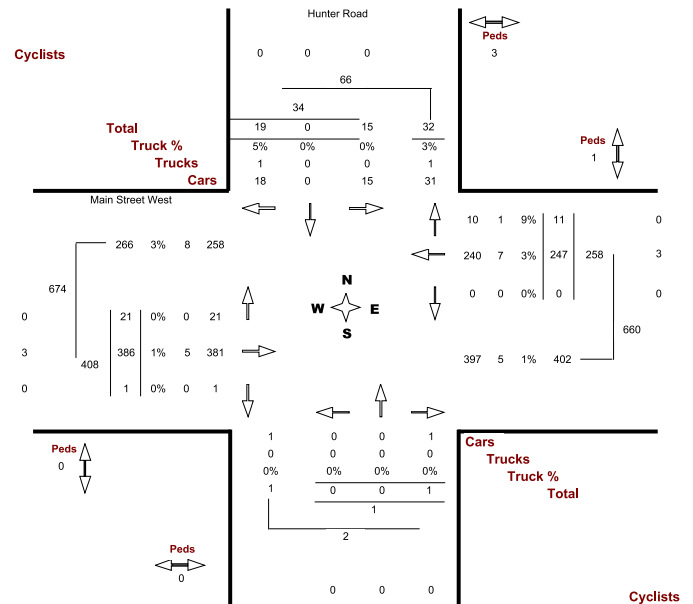
Location..... Hunter Road @ Main Street West
 Municipality. GRIMSBY
 Traffic Cont. Stop sign
 Major Dir..... None

GeoID..... 01285
 Count Date. Wednesday, 09 May, 2018
 Count Time. 07:00 AM — 09:00 AM
 Peak Hour.. 08:00 AM — 09:00 AM

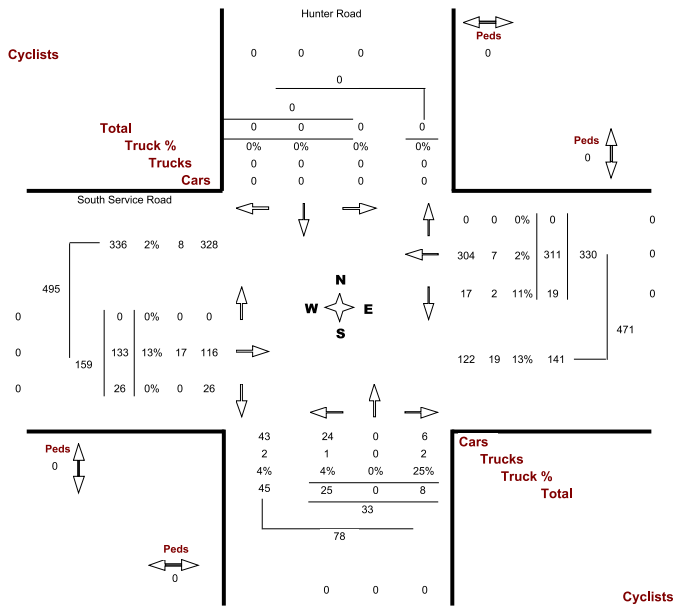


Location..... Hunter Road @ Main Street West
 Municipality. GRIMSBY
 Traffic Cont. Stop sign
 Major Dir..... None

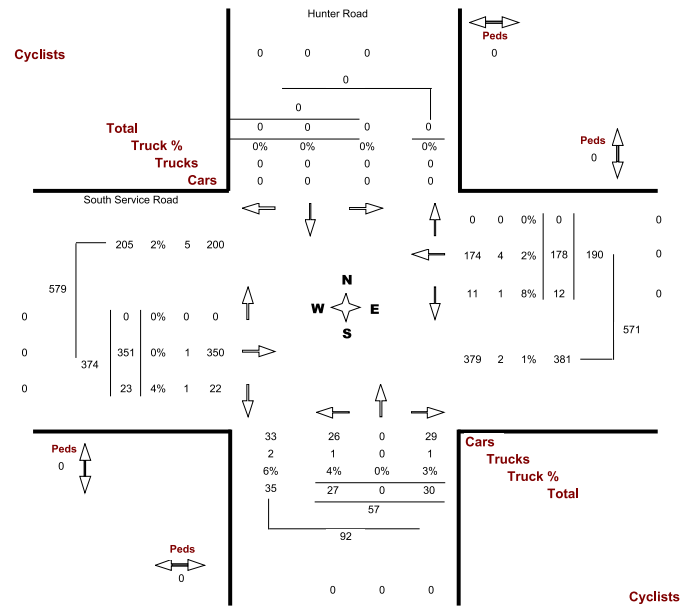
GeoID..... 01285
 Count Date. Wednesday, 09 May, 2018
 Count Time. 03:00 PM — 06:00 PM
 Peak Hour.. 04:15 PM — 05:15 PM



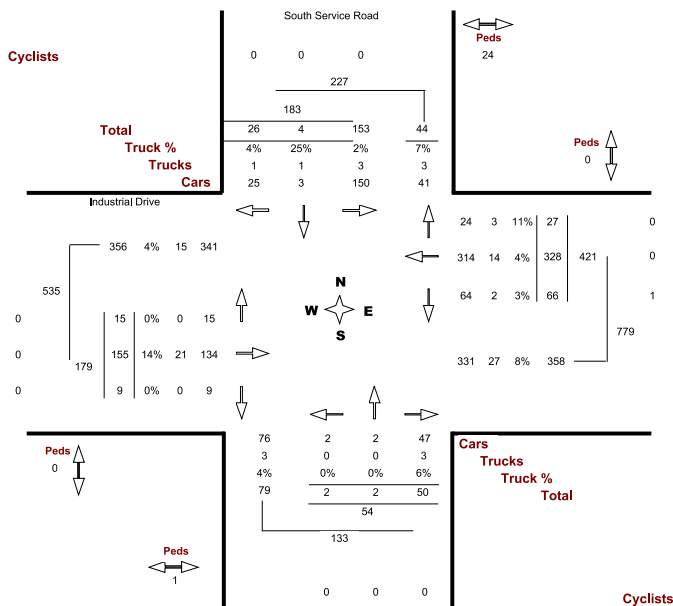
Location..... Hunter Road @ South Service Road **GeoID.....** 01283
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 07:30 AM — 08:30 AM



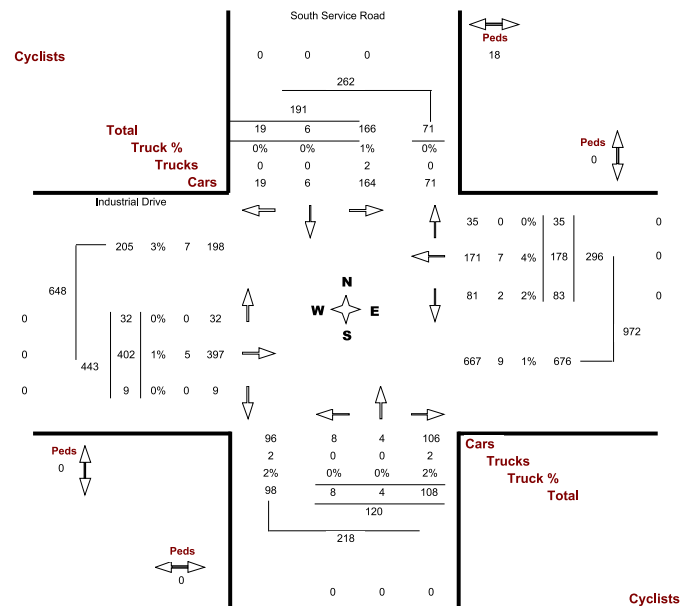
Location..... Hunter Road @ South Service Road **GeoID.....** 01283
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:30 PM — 05:30 PM



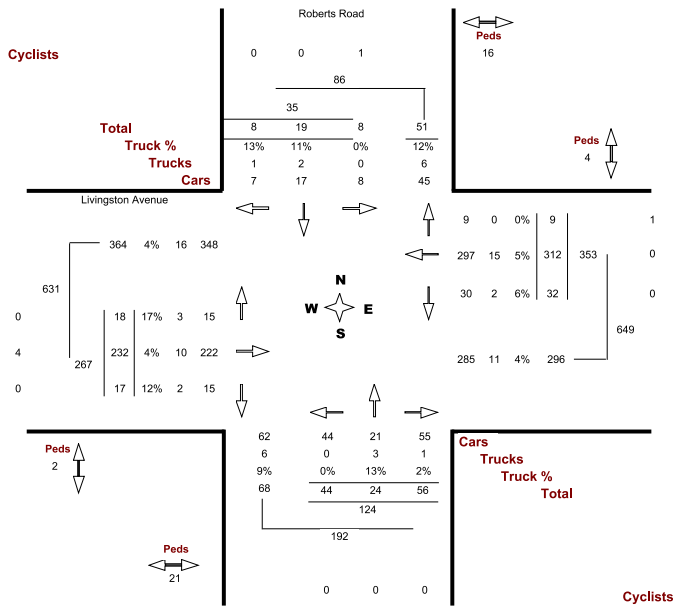
Location..... Industrial Drive @ South Service Road **GeoID.....** 01284
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 07:45 AM — 08:45 AM



Location..... Industrial Drive @ South Service Road **GeoID.....** 01284
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:15 PM — 05:15 PM



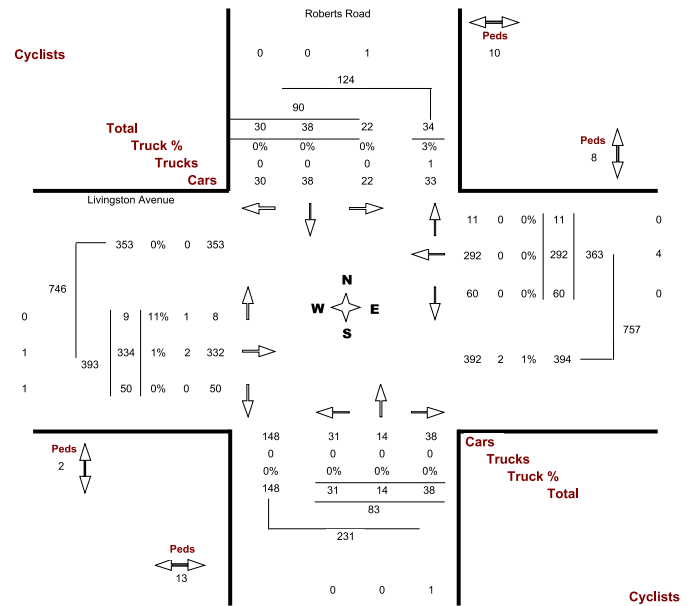
Location..... Livingston Avenue @ Roberts Road **GeoID.....** 01179
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Traffic signal **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 07:45 AM — 08:45 AM



Monday, May 28, 2018

Page 1 of 1

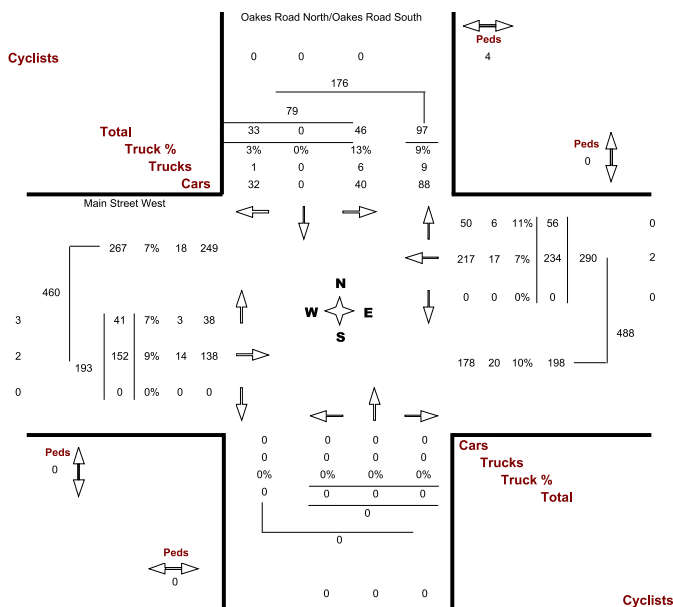
Location..... Livingston Avenue @ Roberts Road **GeoID.....** 01179
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Traffic signal **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:15 PM — 05:15 PM



Monday, May 28, 2018

Page 1 of 1

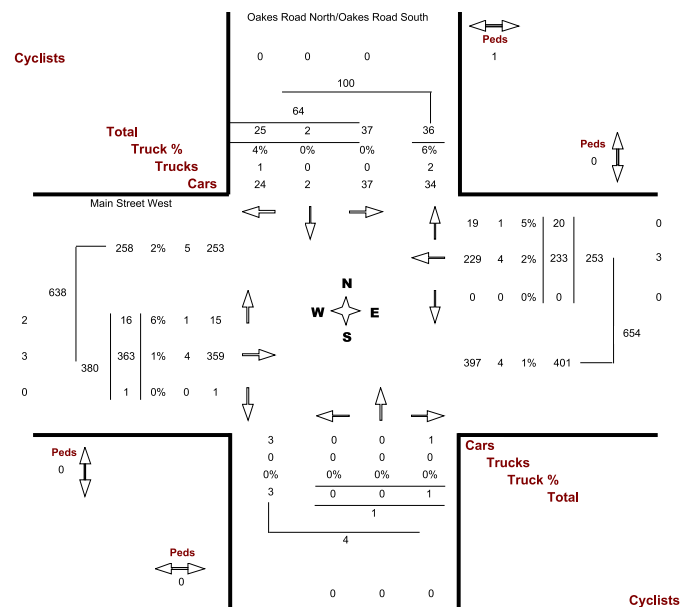
Location..... Main Street West @ Oakes Road North/Oakes Road South **GeoID.....** 01293
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 08:00 AM — 09:00 AM



Monday, May 28, 2018

Page 1 of 1

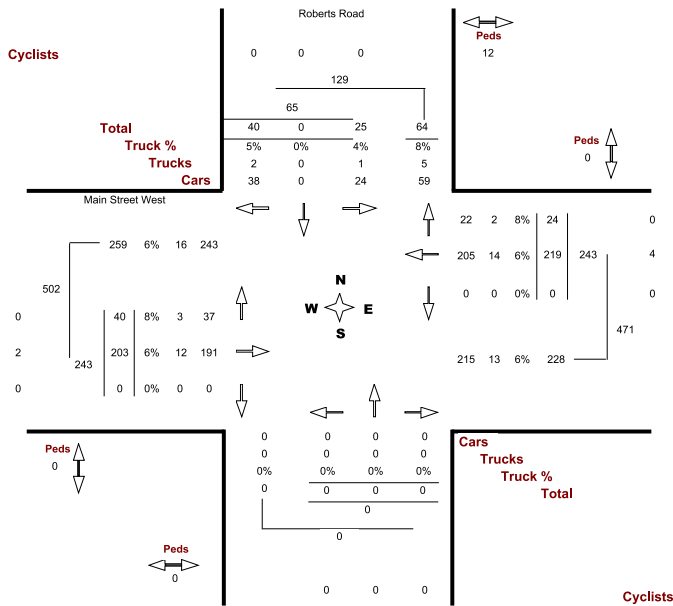
Location..... Main Street West @ Oakes Road North/Oakes Road South **GeoID.....** 01293
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:30 PM — 05:30 PM



Monday, May 28, 2018

Page 1 of 1

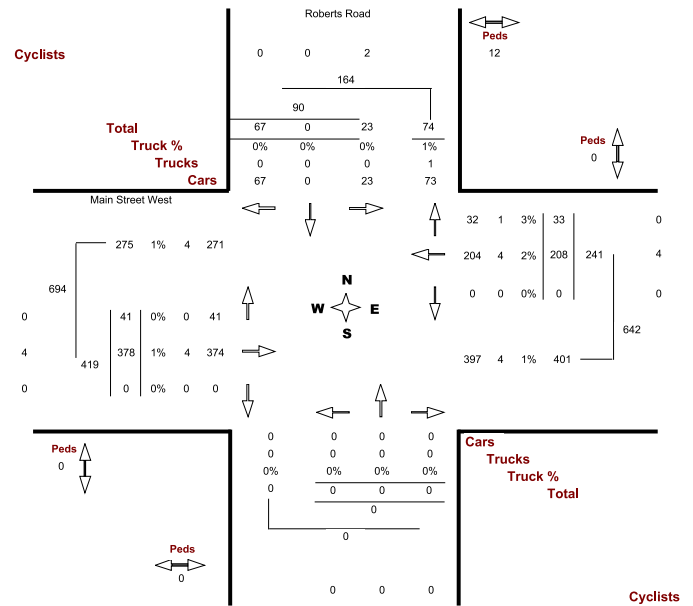
Location..... Main Street West @ Roberts Road **GeoID.....** 01182
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 08:00 AM — 09:00 AM



Monday, May 28, 2018

Page 1 of 1

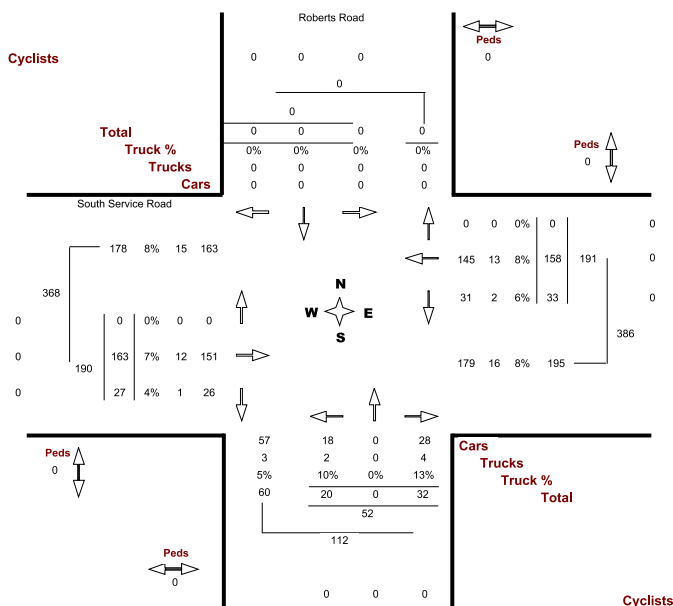
Location..... Main Street West @ Roberts Road **GeoID.....** 01182
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:30 PM — 05:30 PM



Monday, May 28, 2018

Page 1 of 1

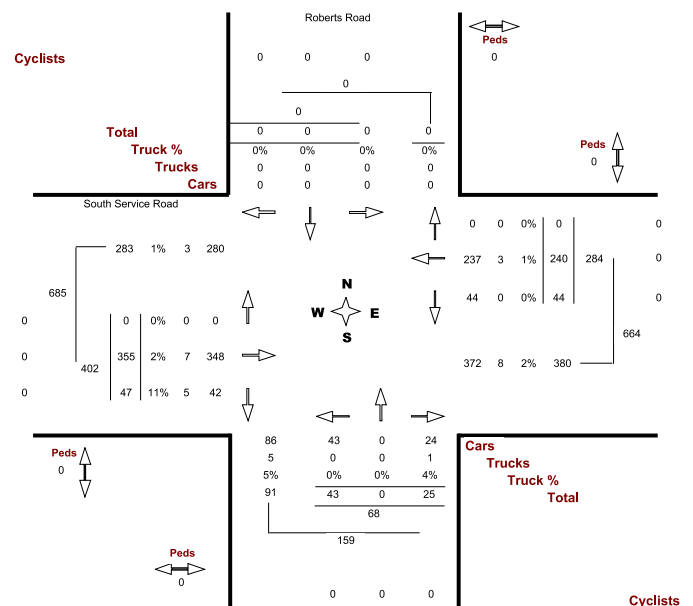
Location..... Roberts Road @ South Service Road **GeoID.....** 01132
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 07:00 AM — 09:00 AM
Major Dir..... None **Peak Hour..** 07:45 AM — 08:45 AM



Monday, May 28, 2018

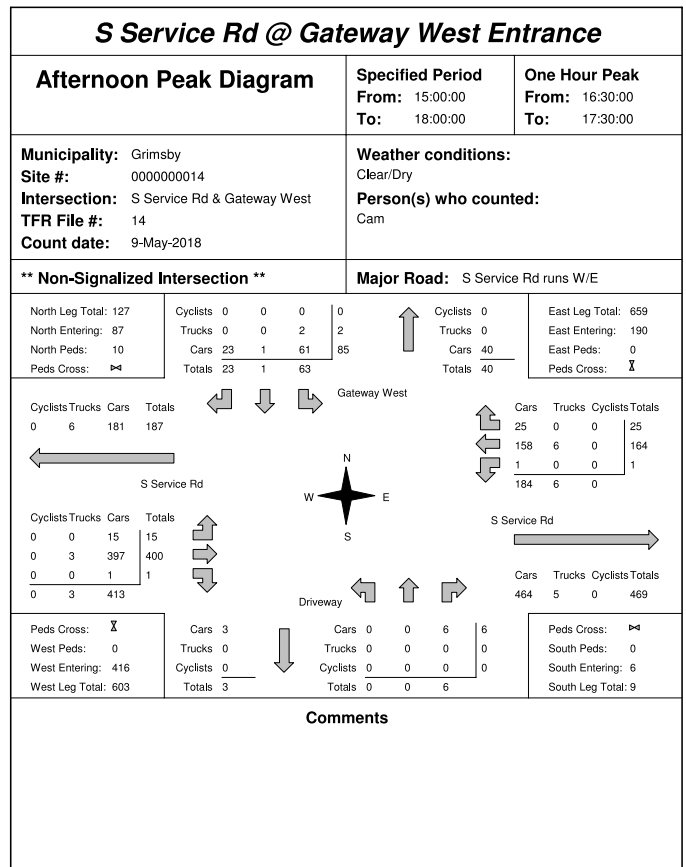
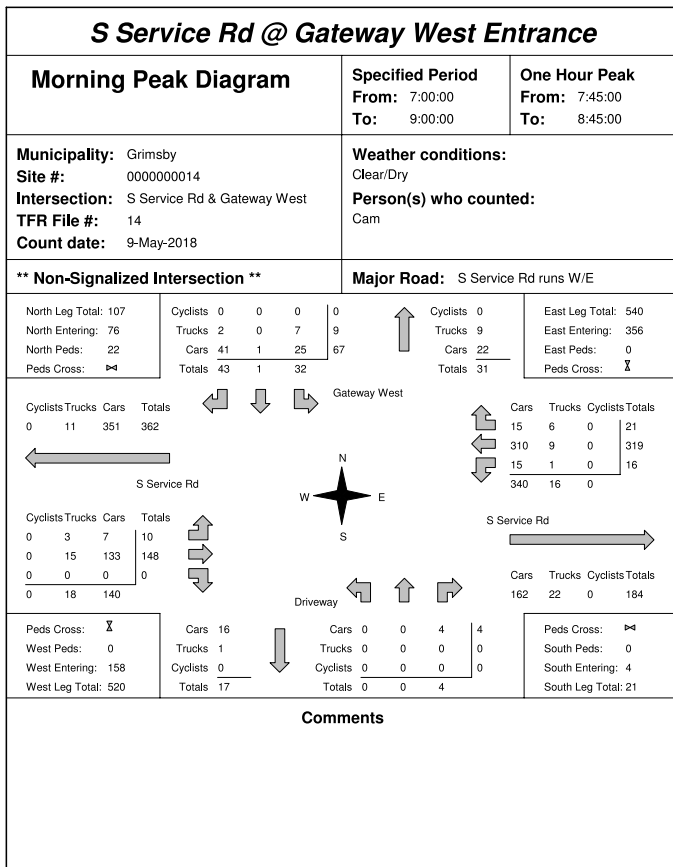
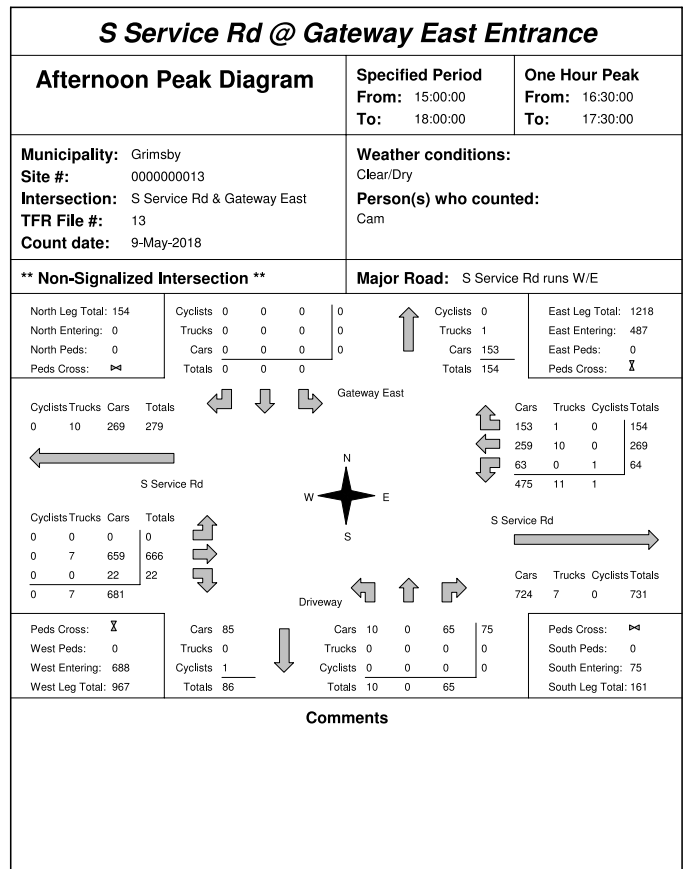
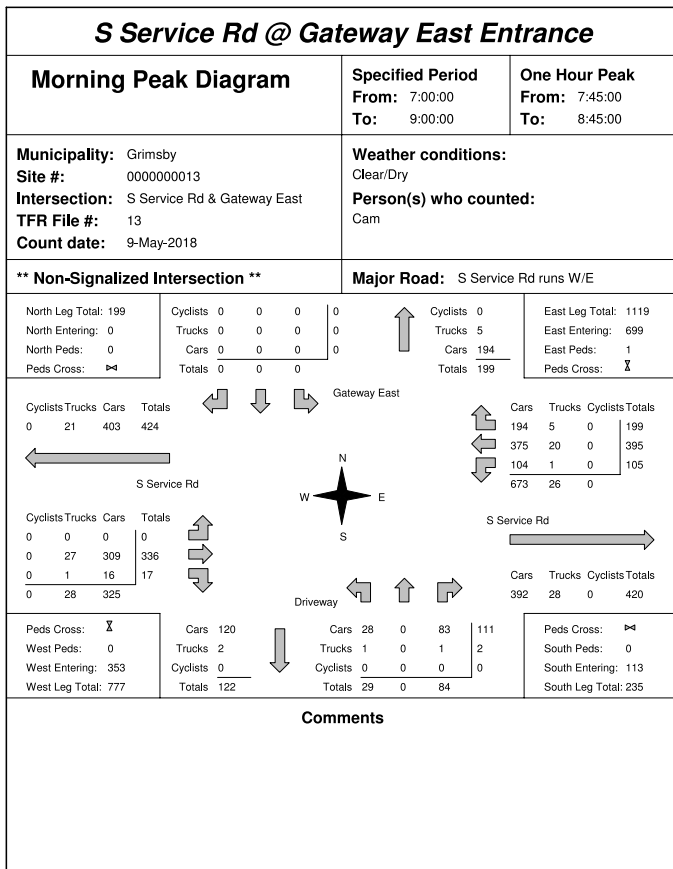
Page 1 of 1

Location..... Roberts Road @ South Service Road **GeoID.....** 01132
Municipality. GRIMSBY **Count Date.** Wednesday, 09 May, 2018
Traffic Cont. Stop sign **Count Time.** 03:00 PM — 06:00 PM
Major Dir..... None **Peak Hour..** 04:30 PM — 05:30 PM



Monday, May 28, 2018

Page 1 of 1



Appendix B

Screenline Assessment

Livingston Avenue EA and Detail Design

Screenline Assessment

2020-03-10



2018 Existing					
Lanes	Capacity	Vol.		V/C	
		AM	PM	AM	PM

2041 Horizon					
Lanes	Capacity	Vol.		V/C	
		AM	PM	AM	PM

East of Hunter Road

WB	North Service Road	1	700	221	334	0.32	0.48
	South Service Road	1	700	330	190	0.47	0.27
	Main Street West	1	800	281	258	0.35	0.32
	Total	3	2,200	832	782	0.38	0.36

1	700	503	784	0.72	1.12
1	700	647	354	0.92	0.51
1	800	368	317	0.46	0.40
3	2,200	1,518	1,455	0.69	0.66

EB	North Service Road	1	700	282	320	0.40	0.46
	South Service Road	1	700	141	381	0.20	0.54
	Main Street West	1	800	193	402	0.24	0.50
	Total	3	2,200	616	1,103	0.28	0.50

1	700	709	678	1.01	0.97
1	700	393	773	0.56	1.10
1	800	228	458	0.29	0.57
3	2,200	1,330	1,909	0.60	0.87

West of Casablanca Boulevard

WB	North Service Road	1	700	221	334	0.32	0.48
	South Service Road	1	700	699	487	1.00	0.70
	Main Street West	1	800	281	258	0.35	0.32
	Total	3	2,200	1,201	1,079	0.55	0.49

1	700	503	784	0.72	1.12
2	1,400	1,349	902	0.96	0.64
1	800	368	317	0.46	0.40
4	2,900	2,220	2,003	0.77	0.69

EB	North Service Road	1	700	282	320	0.40	0.46
	South Service Road	1	700	420	731	0.60	1.04
	Main Street West	1	800	193	402	0.24	0.50
	Total	3	2,200	895	1,453	0.41	0.66

1	700	709	678	1.01	0.97
2	1,400	767	1,323	0.55	0.95
1	800	228	458	0.29	0.57
4	2,900	1,704	2,459	0.59	0.85

East of Casablanca Boulevard

WB	North Service Road	1	700	162	107	0.23	0.15
	South Service Road	1	700	224	426	0.32	0.61
	Livingston Avenue	1	600	488	298	0.81	0.50
	Main Street West	1	800	322	270	0.40	0.34
	Total	4	2,800	1,196	1,101	0.43	0.39

1	700	407	328	0.58	0.47
1	700	444	718	0.63	1.03
1	600	850	525	1.42	0.88
1	800	441	304	0.55	0.38
4	2,800	2,142	1,875	0.77	0.67

EB	North Service Road	1	700	103	179	0.15	0.26
	South Service Road	1	700	280	519	0.40	0.74
	Livingston Avenue	1	700	198	470	0.28	0.67
	Main Street West	1	800	212	419	0.27	0.52
	Total	4	2,900	793	1,587	0.27	0.55

1	700	385	497	0.55	0.71
1	700	551	820	0.79	1.17
1	700	366	640	0.52	0.91
1	800	256	467	0.32	0.58
4	2,900	1,558	2,424	0.54	0.84

West of Roberts Road

WB	North Service Road	1	800	109	51	0.14	0.06
	South Service Road	1	700	143	192	0.20	0.27
	Livingston Avenue	1	600	361	237	0.60	0.40
	Main Street West	1	800	294	228	0.37	0.29
	Total	4	2,900	907	708	0.31	0.24

1	800	222	138	0.28	0.17
1	700	249	327	0.36	0.47
1	600	658	403	1.10	0.67
1	800	441	304	0.55	0.38
4	2,900	1,570	1,172	0.54	0.40

EB	South Service Road	1	700	137	291	0.20	0.42
	Livingston Avenue	1	700	169	252	0.24	0.36
	Main Street West	1	800	198	352	0.25	0.44
	Total	3	2,200	504	895	0.23	0.41

1	700	253	444	0.36	0.63
1	700	337	477	0.48	0.68
1	800	256	467	0.32	0.58
3	2,200	846	1,388	0.38	0.63

Appendix C

Vissim Results

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday AM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & North Service Rd										
2018 Existing	Sig.	670	6	39	17	12	NBR	81	30	B
2021 Do Nothing	Sig.	1235	15	66	22	16	NBR	123	41	C
2021 Base	Sig.	1257	7	50	12	7	NBR	86	10	B
2041 Do Nothing	Sig.	1446	32	119	46	34	WBT	202	69	D
2041 Base	Sig.	1563	7	57	12	7	NBR	95	11	B
2041 Alt 1	Sig.	1609	9	64	15	9	NBR	109	16	B
2041 Alt 2	Sig.	1603	9	62	14	9	NBR	102	14	B
2041 Alt 3	Sig.	1537	12	87	14	9	NBR	102	15	B
Casablanca Blvd & North Ramp Terminal										
2018 Existing	TWSC	1187	2	12	3	0	WBL	50	12	-
2021 Do Nothing	TWSC	1577	2	14	4	1	WBL	59	17	-
2021 Base	Sig.	1614	4	29	10	7	WBL	68	22	A
2041 Do Nothing	TWSC	1657	55	100	48	33	WBL	505	377	-
2041 Base	Sig.	2269	11	67	13	10	WBL	149	26	B
2041 Alt 1	Sig.	2376	5	75	8	4	WBL	119	9	A
2041 Alt 2	Sig.	2354	5	78	8	4	WBL	123	8	A
2041 Alt 3	Sig.	2216	13	114	8	4	WBL	194	9	A
Casablanca Blvd & South Ramp Terminal										
2018 Existing	TWSC	1558	0	0	1	0	EBL	16	14	-
2021 Do Nothing	TWSC	1720	0	2	1	0	EBL	32	18	-
2021 Base	Sig.	1778	2	33	5	3	SBT	44	3	A
2041 Do Nothing	TWSC	2206	20	49	19	11	SBL	201	0	-
2041 Base	Sig.	2812	6	57	8	4	EBR	91	33	A
2041 Alt 1	Sig.	2937	19	129	18	11	NBT	172	22	B
2041 Alt 2	Sig.	2918	18	114	17	11	NBT	146	21	B
2041 Alt 3	Sig.	2730	27	150	17	11	NBT	191	22	B

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday AM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2018 Existing	Sig.	1948	59	125	38	30	NBR	267	42	D
2021 Do Nothing	Sig.	2062	61	134	38	30	NBR	267	45	D
2021 Base	Sig.	2176	12	69	20	15	NBT	94	24	C
2041 Do Nothing	Sig.	2724	104	144	66	48	NBR	267	50	E
2041 Base	Sig.	3369	67	153	55	43	NBT	267	82	E
2041 Alt 1	Sig.	3541	23	98	29	22	EBR	138	5	C
2041 Alt 2	Sig.	3631	25	104	30	23	NBT	142	50	C
2041 Alt 3	Sig.	3381	31	120	29	23	NBT	140	44	C
Casablanca Blvd & Livingston Ave										
2018 Existing	TWSC	876	6	38	10	7	WBR	56	19	-
2021 Do Nothing	Sig.	944	10	40	14	9	WBR	56	27	B
2021 Base	Sig.	1022	8	71	13	5	WBR	93	14	B
2041 Do Nothing	TWSC	1077	13	50	22	14	SBL	65	3	-
2041 Base	Sig.	1322	49	101	39	21	WBR	132	72	D
2041 Alt 1	Sig.	1542	46	95	30	12	WBR	132	42	C
2041 Alt 2	Sig.	1437	54	103	31	12	WBR	137	50	C
2041 Alt 3	Sig.	1296	63	115	31	11	WBR	132	50	C
Casablanca Blvd & Main St W										
2018 Existing	TWSC	756	0	11	2	0	SBR	38	10	-
2021 Do Nothing	TWSC	711	1	12	3	0	SBR	41	9	-
2021 Base	TWSC	707	0	9	2	0	SBR	27	7	-
2041 Do Nothing	TWSC	990	1	20	4	1	SBR	53	14	-
2041 Base	TWSC	997	1	17	3	0	SBR	33	9	-
2041 Alt 1	TWSC	867	0	2	2	0	SBR	28	6	-
2041 Alt 2	TWSC	954	0	10	3	0	SBR	30	8	-
2041 Alt 3	TWSC	976	0	4	2	0	SBL	27	3	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday AM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
S Service Rd & Industrial Dr										
2018 Existing	TWSC	757	1	12	3	0	SBT	40	10	-
2021 Do Nothing	TWSC	779	1	10	3	0	SBT	32	10	-
2021 Base	TWSC	804	0	12	3	0	SBT	38	10	-
2041 Do Nothing	TWSC	1107	7	53	21	11	NBR	81	52	-
2041 Base	TWSC	1343	2	32	6	1	WBL	44	5	-
2041 Alt 1	TWSC	1236	1	16	4	0	SBT	44	15	-
2041 Alt 2	TWSC	1415	2	22	4	0	SBT	45	15	-
2041 Alt 3	TWSC	1304	3	45	5	1	WBL	64	6	-
S Service Rd & Hunter Rd										
2018 Existing	TWSC	540	0	3	1	0	NBL	19	7	-
2021 Do Nothing	TWSC	570	0	3	1	0	NBL	20	8	-
2021 Base	TWSC	578	0	2	1	0	NBL	16	8	-
2041 Do Nothing	TWSC	804	0	6	2	0	NBL	29	9	-
2041 Base	TWSC	912	1	10	3	1	NBL	42	13	-
2041 Alt 1	Sig.	945	6	66	13	9	WBT	86	7	B
2041 Alt 2	TWSC	944	0	3	1	0	NBL	22	9	-
2041 Alt 3	TWSC	913	1	16	4	1	NBR	53	6	-
Hunter Rd & Industrial Dr										
2018 Existing	TWSC	259	0	10	2	0	WBR	20	5	-
2021 Do Nothing	TWSC	273	0	13	2	0	WBR	25	5	-
2021 Base	TWSC	274	0	10	3	0	WBR	20	4	-
2041 Do Nothing	TWSC	489	0	11	2	0	WBR	25	5	-
2041 Base	TWSC	522	1	18	3	0	WBR	33	6	-
2041 Alt 1	TWSC	545	0	10	2	0	WBR	23	6	-
2041 Alt 2	TWSC	469	1	14	3	0	WBR	25	5	-
2041 Alt 3	TWSC	573	2	27	4	0	WBR	44	7	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday AM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Hunter Rd & Livingston Ave										
2018 Existing	TWSC	128	0	0	0	0	None	0	0	-
2021 Do Nothing	TWSC	147	0	0	0	0	None	0	0	-
2021 Base	TWSC	146	0	0	0	0	None	0	0	-
2041 Do Nothing	TWSC	296	0	0	0	0	None	0	0	-
2041 Base	TWSC	224	0	0	0	0	None	0	0	-
2041 Alt 1	TWSC	456	2	25	8	0	WBT	45	14	-
2041 Alt 2	TWSC	235	0	0	0	0	None	0	0	-
2041 Alt 3	TWSC	207	0	0	0	0	None	0	0	-
Hunter Rd & Main St W										
2018 Existing	TWSC	688	0	8	1	0	EBL	20	2	-
2021 Do Nothing	TWSC	637	0	7	1	0	EBL	18	2	-
2021 Base	TWSC	630	0	7	1	0	EBL	18	2	-
2041 Do Nothing	TWSC	911	0	11	2	0	EBL	28	4	-
2041 Base	TWSC	881	0	9	1	0	EBL	25	3	-
2041 Alt 1	TWSC	609	0	0	1	0	SBR	9	5	-
2041 Alt 2	TWSC	853	0	10	2	0	EBL	21	3	-
2041 Alt 3	TWSC	856	0	2	1	0	SBR	18	6	-
Main St W & Oakes Rd N										
2018 Existing	TWSC	764	0	7	2	0	SBR	30	8	-
2021 Do Nothing	TWSC	658	0	4	1	0	SBR	25	7	-
2021 Base	TWSC	662	0	4	1	0	SBR	25	7	-
2041 Do Nothing	TWSC	882	0	10	2	0	SBR	33	8	-
2041 Base	TWSC	905	0	10	2	0	SBR	33	8	-
2041 Alt 1	Sig.	916	4	47	10	5	SBR	76	18	B
2041 Alt 2	TWSC	914	0	10	2	0	SBR	33	8	-
2041 Alt 3	TWSC	904	0	11	2	0	SBL	30	9	-
Oakes Rd & Livingston Ave										
2041 Alt 1	TWSC	544	1	7	3	0	WBL	25	9	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday AM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
S Service Road & GO North Access										
2021 Do Nothing	Sig.	1279	1	37	2	1	WBL	70	8	A
2021 Base	Sig.	1334	8	95	9	5	WBT	118	8	A
2041 Do Nothing	Sig.	1792	22	106	17	12	EBT	119	29	B
2041 Base	Sig.	2173	36	129	18	11	WBT	149	13	B
2041 Alt 1	Sig.	2205	11	75	13	7	WBT	83	8	B
2041 Alt 2	Sig.	2362	11	87	12	7	WBT	96	8	B
2041 Alt 3	Sig.	2177	14	93	13	8	EBT	99	19	B
Livingston Avenue & GO South Access										
2041 Do Nothing	TWSC	80	0	1	1	0	SBL	9	5	-
2041 Base	TWSC	101	0	1	1	0	SBL	9	5	-
2041 Alt 1	TWSC	374	0	0	1	0	SBL	11	6	-
2041 Alt 2	TWSC	104	0	0	1	0	SBL	8	5	-
2041 Alt 3	TWSC	94	0	1	1	0	SBL	10	6	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday PM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & North Service Rd										
2018 Existing	Sig.	809	15	68	23	18	NBR	125	35	C
2021 Do Nothing	Sig.	1356	37	73	35	26	NBR	126	62	D
2021 Base	Sig.	1493	14	64	18	11	NBR	102	15	B
2041 Do Nothing	Sig.	1554	30	73	29	22	NBR	126	57	C
2041 Base	Sig.	1790	18	80	20	13	NBR	115	17	C
2041 Alt 1	Sig.	1816	19	101	18	12	NBR	154	12	B
2041 Alt 2	Sig.	1810	20	97	19	12	NBR	148	14	B
2041 Alt 3	Sig.	1811	20	102	19	12	NBR	162	15	B
Casablanca Blvd & North Ramp Terminal										
2018 Existing	TWSC	1529	2	14	3	0	WBL	53	11	-
2021 Do Nothing	TWSC	1809	57	131	48	37	WBR	505	269	-
2021 Base	Sig.	2078	3	33	7	5	WBL	75	23	A
2041 Do Nothing	TWSC	1893	84	138	57	42	WBL	505	241	-
2041 Base	Sig.	2653	6	59	9	6	WBL	145	25	A
2041 Alt 1	Sig.	2685	3	70	6	2	NBT	94	10	A
2041 Alt 2	Sig.	2671	4	86	6	2	WBL	123	7	A
2041 Alt 3	Sig.	2658	3	74	6	2	NBT	99	10	A
Casablanca Blvd & South Ramp Terminal										
2018 Existing	TWSC	1850	40	67	30	24	EBR	242	120	-
2021 Do Nothing	TWSC	2028	42	67	35	28	EBR	242	145	-
2021 Base	Sig.	2330	6	49	9	4	EBR	84	19	A
2041 Do Nothing	TWSC	2276	50	59	36	27	EBR	242	161	-
2041 Base	Sig.	3025	76	146	30	15	EBR	505	135	C
2041 Alt 1	Sig.	3202	66	230	37	25	EBR	449	70	D
2041 Alt 2	Sig.	3183	62	232	36	24	EBR	446	71	D
2041 Alt 3	Sig.	3169	66	232	36	25	EBR	436	66	D

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday PM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Casablanca Blvd & S Service Rd										
2018 Existing	Sig.	2243	49	117	52	42	NBR	220	43	D
2021 Do Nothing	Sig.	2373	67	135	59	48	NBR	267	72	E
2021 Base	Sig.	2694	17	80	24	18	EBR	125	14	C
2041 Do Nothing	Sig.	2848	122	161	92	71	NBR	267	78	F
2041 Base	Sig.	3765	52	126	47	37	SBR	162	6	D
2041 Alt 1	Sig.	3900	65	144	51	40	SBT	195	47	D
2041 Alt 2	Sig.	3911	70	150	54	42	SBL	195	148	D
2041 Alt 3	Sig.	3916	66	145	51	40	SBT	195	46	D
Casablanca Blvd & Livingston Ave										
2018 Existing	TWSC	831	0	22	2	0	SBL	50	3	-
2021 Do Nothing	Sig.	922	5	49	11	7	SBL	61	3	B
2021 Base	Sig.	1041	5	60	11	6	SBR	89	2	B
2041 Do Nothing	TWSC	942	14	79	34	24	SBL	117	8	-
2041 Base	Sig.	1400	7	68	12	6	SBR	101	2	B
2041 Alt 1	Sig.	1511	9	87	14	8	SBR	134	3	B
2041 Alt 2	Sig.	1408	8	91	13	6	SBR	146	2	B
2041 Alt 3	Sig.	1423	8	82	13	7	SBR	124	3	B
Casablanca Blvd & Main St W										
2018 Existing	TWSC	732	0	12	2	0	SBR	26	7	-
2021 Do Nothing	TWSC	751	0	15	2	0	SBR	30	8	-
2021 Base	TWSC	756	0	14	2	0	EBL	29	2	-
2041 Do Nothing	TWSC	944	1	30	3	1	EBL	54	4	-
2041 Base	TWSC	1021	1	27	3	1	EBL	50	4	-
2041 Alt 1	TWSC	838	0	4	2	0	SBL	26	12	-
2041 Alt 2	TWSC	948	1	25	3	0	EBL	50	4	-
2041 Alt 3	TWSC	971	0	4	1	0	SBL	22	4	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday PM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
S Service Rd & Industrial Dr										
2018 Existing	TWSC	905	2	18	5	1	SBL	41	13	-
2021 Do Nothing	TWSC	963	2	17	5	1	SBL	41	13	-
2021 Base	TWSC	1004	1	17	4	0	SBL	41	11	-
2041 Do Nothing	TWSC	1128	33	79	70	41	EBT	127	50	-
2041 Base	TWSC	1211	38	96	70	37	EBT	128	127	-
2041 Alt 1	TWSC	1279	16	84	33	19	WBL	107	21	-
2041 Alt 2	TWSC	1337	20	83	56	38	NBR	108	178	-
2041 Alt 3	TWSC	1338	20	95	40	23	EBT	121	43	-
S Service Rd & Hunter Rd										
2018 Existing	TWSC	537	0	0	0	0	NBR	15	8	-
2021 Do Nothing	TWSC	598	0	0	0	0	NBL	14	7	-
2021 Base	TWSC	602	0	0	0	0	NBL	7	8	-
2041 Do Nothing	TWSC	798	0	0	0	0	NBL	16	7	-
2041 Base	TWSC	854	1	12	3	2	EBR	18	2	-
2041 Alt 1	Sig.	867	8	74	13	9	EBR	79	6	B
2041 Alt 2	TWSC	864	0	0	0	0	NBL	10	8	-
2041 Alt 3	TWSC	866	0	0	0	0	NBL	11	9	-
Hunter Rd & Industrial Dr										
2018 Existing	TWSC	285	0	10	3	0	WBR	20	4	-
2021 Do Nothing	TWSC	284	0	8	2	0	WBL	17	7	-
2021 Base	TWSC	325	0	11	4	0	WBT	27	10	-
2041 Do Nothing	TWSC	369	6	55	13	8	NBR	112	12	-
2041 Base	TWSC	452	0	10	3	0	WBT	30	10	-
2041 Alt 1	TWSC	503	1	16	4	0	WBR	47	9	-
2041 Alt 2	TWSC	398	1	20	5	0	WBR	48	4	-
2041 Alt 3	TWSC	484	1	14	4	0	WBR	38	4	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday PM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
Hunter Rd & Livingston Ave										
2018 Existing	TWSC	146	0	0	0	0	None	0	0	-
2021 Do Nothing	TWSC	152	0	0	0	0	EBL	7	7	-
2021 Base	TWSC	172	0	0	0	0	EBL	7	7	-
2041 Do Nothing	TWSC	222	0	0	0	0	None	0	0	-
2041 Base	TWSC	176	0	0	0	0	None	0	0	-
2041 Alt 1	TWSC	421	1	16	6	0	WBT	30	11	-
2041 Alt 2	TWSC	220	0	0	0	0	None	0	0	-
2041 Alt 3	TWSC	206	0	0	0	0	None	0	0	-
Hunter Rd & Main St W										
2018 Existing	TWSC	733	0	11	1	0	EBL	17	1	-
2021 Do Nothing	TWSC	704	0	8	1	0	EBL	13	1	-
2021 Base	TWSC	720	0	12	1	0	EBL	19	1	-
2041 Do Nothing	TWSC	903	0	19	2	0	EBL	30	2	-
2041 Base	TWSC	923	0	17	1	0	EBL	30	2	-
2041 Alt 1	TWSC	614	0	0	0	0	SBR	10	5	-
2041 Alt 2	TWSC	903	0	19	1	0	EBL	28	2	-
2041 Alt 3	TWSC	907	0	3	1	0	SBL	22	8	-
Main St W & Oakes Rd N										
2018 Existing	TWSC	783	0	3	1	0	SBR	29	7	-
2021 Do Nothing	TWSC	734	0	4	1	0	SBR	24	6	-
2021 Base	TWSC	753	0	3	1	0	SBR	24	7	-
2041 Do Nothing	TWSC	881	0	3	1	0	SBR	27	7	-
2041 Base	TWSC	941	0	3	1	0	SBR	27	7	-
2041 Alt 1	Sig.	911	2	39	6	2	SBR	44	7	A
2041 Alt 2	TWSC	940	0	3	1	0	SBR	27	7	-
2041 Alt 3	TWSC	939	0	5	1	0	SBT	23	12	-
Oakes Rd & Livingston Ave										
2041 Alt 1	TWSC	403	1	11	3	0	WBL	29	8	-

Livingston EA and Detail Design

Transportation Assessment

Measures of Effectiveness Summary - Weekday PM Peak Hour
2018-10-20



Alt	Control Type	# Veh. Entering Int.	Int. Avg. (Weighted by Mvmt. and Vol.)				Critical Movement			Overall Int. LOS
			Avg. Queue (m)	Max Queue (m)	Total Delay (sec)	Stopping Delay (sec)	Mvmt	Max Queue (m)	Avg. Delay (s)	
S Service Road & GO North Access										
2021 Do Nothing	Sig.	1325	1	23	2	1	WBL	58	12	A
2021 Base	Sig.	1422	8	92	10	5	EBT	109	11	A
2041 Do Nothing	Sig.	1789	33	90	21	14	EBT	119	30	C
2041 Base	Sig.	2069	35	114	20	13	WBT	132	11	B
2041 Alt 1	Sig.	2146	41	96	31	21	EBT	118	58	C
2041 Alt 2	Sig.	2209	43	90	36	24	EBT	119	69	D
2041 Alt 3	Sig.	2202	42	100	32	22	EBT	118	59	C
Livingston Avenue & GO South Access										
2041 Do Nothing	TWSC	65	0	14	5	0	SBL	15	5	-
2041 Base	TWSC	69	0	13	5	0	SBL	15	5	-
2041 Alt 1	TWSC	314	0	4	1	0	SBR	20	4	-
2041 Alt 2	TWSC	69	0	14	5	0	SBL	17	6	-
2041 Alt 3	TWSC	69	0	15	5	0	SBL	18	6	-

Livingston EA and Detail Design

2018 Existing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	55	0.8	22.2	1.6	3.5	A	46.5	D	16.5	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	105	0.8	22.2	3.7	8.3	A						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	63	17.3	80.5	23.8	30.0	C						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	158	15.1	75.6	39.6	46.5	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	250	0.6	20.4	0.2	2.5	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	39	0.6	20.4	1.9	4.1	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	37	0.0	0.0	0.0	0.1	A	11.6	B	2.8		A	A
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	316	0.0	0.0	0.0	0.1	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	20	0.0	4.9	0.2	1.1	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	281	7.8	50.1	0.9	11.6	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	198	0.0	0.0	0.0	0.1	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	335	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	536	0.0	0.0	0.0	0.1	A	13.6	B	0.6		A	A
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	60	0.0	0.0	0.0	0.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	233	0.0	0.0	0.0	1.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	497	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	195	0.0	0.0	0.0	0.7	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	37	0.7	15.7	4.3	13.6	B						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	405	14.0	71.7	2.5	13.4	B	85.7	F	38.0	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	172	14.0	71.7	23.5	30.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	152	14.0	71.7	19.0	25.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	95	6.5	46.4	3.7	7.2	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	107	7.4	45.2	36.7	42.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	12	7.4	45.2	33.8	38.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	32	180.5	267.2	33.1	42.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	308	180.1	266.7	76.7	85.7	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	186	179.8	266.5	63.4	74.4	E						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	61	23.1	97.9	8.9	13.5	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	91	15.9	85.5	20.8	26.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	327	15.8	85.2	21.8	27.9	C						
5	Casablanca Blvd & Livingston	TWSC	SBR	5	0.1	21.5	0.0	0.7	A	18.6	C	10.2		B	B
5	Casablanca Blvd & Livingston	TWSC	SBT	72	0.1	21.5	0.0	0.8	A						
5	Casablanca Blvd & Livingston	TWSC	SBL	169	0.3	30.0	0.2	1.8	A						
5	Casablanca Blvd & Livingston	TWSC	WBR	441	12.4	56.4	12.8	18.6	C						
5	Casablanca Blvd & Livingston	TWSC	WBT	2	0.3	20.0	1.3	5.1	A						
5	Casablanca Blvd & Livingston	TWSC	WBL	55	0.4	19.0	1.2	3.4	A						
5	Casablanca Blvd & Livingston	TWSC	NBR	18	0.0	4.9	0.0	0.7	A						
5	Casablanca Blvd & Livingston	TWSC	NBT	95	0.0	0.0	0.4	0.9	A						
5	Casablanca Blvd & Livingston	TWSC	NBL	5	0.0	4.1	0.0	0.6	A						
5	Casablanca Blvd & Livingston	TWSC	EBR	1	0.1	12.2	0.4	4.6	A						
5	Casablanca Blvd & Livingston	TWSC	EBT	4	0.1	12.4	0.8	7.3	A						
5	Casablanca Blvd & Livingston	TWSC	EBL	9	0.1	12.2	1.0	7.3	A						

Livingston EA and Detail Design

2018 Existing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	80	3.0	38.2	1.0	9.8	A	11.4	B	2.4		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	57	1.9	32.4	1.8	11.4	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	87	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	300	0.0	0.0	0.0	0.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	214	0.1	14.9	0.1	0.4	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	18	0.1	20.1	1.3	4.0	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	3.0	42.8	-	-	-	9.9	A	3.2		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	5	2.6	40.1	0.2	9.8	A						
7	S Service Rd & Industrial Dr	TWSC	SBL	156	2.3	37.9	0.5	9.9	A						
7	S Service Rd & Industrial Dr	TWSC	WBR	2	0.0	0.0	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	225	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	126	0.2	13.5	0.2	1.9	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	77	0.9	17.8	0.9	7.1	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	2	0.6	16.0	0.4	6.9	A						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	0.7	16.2	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	164	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	267	0.0	0.0	0.0	0.1	A	7.3	A	1.2		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	40	0.6	15.8	0.2	5.3	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	57	0.8	18.6	0.6	7.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	37	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	139	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	5.8	A	2.5		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	16	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	35	0.0	1.5	0.0	0.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	96	1.2	20.2	0.2	5.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.1	12.8	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	17	0.1	12.6	0.2	5.8	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	59	0.0	6.1	0.1	0.9	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	36	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2018 Existing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	33	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	95	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	22	0.3	12.1	0.5	5.6	A	7.7	A	0.9		A	A
11	Hunter Rd & Main St W	TWSC	SBL	17	0.3	11.9	1.4	7.7	A						
11	Hunter Rd & Main St W	TWSC	WBR	28	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	WBT	353	0.0	0.0	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBT	216	0.1	17.2	0.1	0.5	A						
11	Hunter Rd & Main St W	TWSC	EBL	52	0.2	19.8	0.6	2.3	A						
12	Main St W & Oakes Rd N	TWSC	SBR	55	2.6	30.4	0.4	7.6	A	9.4	A	2.2		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.4	29.3	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	76	2.1	27.2	0.7	9.4	A						
12	Main St W & Oakes Rd N	TWSC	WBR	93	0.0	0.0	0.0	1.0	A						
12	Main St W & Oakes Rd N	TWSC	WBT	277	0.0	0.0	0.0	1.0	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	4.6	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	193	0.0	4.6	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	70	0.2	13.1	0.5	2.5	A						

Livingston EA and Detail Design

2018 Existing - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	670	5.6	39.5	16.5	12.5	NBR	80.5	30.0	B
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,187	1.9	11.9	2.8	0.2	WBL	50.1	11.6	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	1,558	0.0	0.4	0.6	0.1	EBL	15.7	13.6	-
4	Casablanca Blvd & S Service Rd	Signalized	1,948	58.8	125.2	38.0	30.1	NBR	267.2	42.3	D
5	Casablanca Blvd & Livingston	TWSC	876	6.4	37.6	10.2	6.6	WBR	56.4	18.6	-
6	Casablanca Blvd & Main St W	TWSC	756	0.5	11.2	2.4	0.3	SBR	38.2	9.8	-
7	S Service Rd & Industrial Dr	TWSC	757	0.6	12.2	3.2	0.2	SBT	40.1	9.8	-
8	S Service Rd & Hunter Rd	TWSC	540	0.1	3.1	1.2	0.1	NBL	18.6	7.3	-
9	Hunter Rd & Industrial Dr	TWSC	259	0.5	9.9	2.5	0.1	WBR	20.2	5.0	-
10	Hunter Rd & Livingston Ave	TWSC	128	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	688	0.1	7.6	0.9	0.1	EBL	19.8	2.3	-
12	Main St W & Oakes Rd N	TWSC	764	0.4	7.3	2.2	0.1	SBR	30.4	7.6	-

Livingston EA and Detail Design

2018 Existing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	44	0.6	14.0	3.5	5.7	A	45.4	D	22.8	C		C
1	Casablanca Blvd & North Service Rd	Signalized	WBL	56	0.6	14.0	5.0	10.0	A						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	95	32.3	124.8	28.2	35.3	D						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	287	29.3	119.8	37.7	45.4	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	250	1.0	22.1	0.2	3.0	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	77	1.0	22.1	3.6	6.5	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	149	0.0	0.0	0.0	0.1	A	11.1	B	2.8		A	A
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	157	0.0	0.0	0.0	0.0	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	198	0.4	19.0	1.1	2.7	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	306	8.6	52.6	0.6	11.1	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	181	0.0	8.2	0.8	1.3	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	538	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	396	6.6	56.2	12.7	16.4	C	120.0	F	30.2		D	D
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	61	2.8	55.7	0.0	0.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	275	0.0	0.0	0.0	1.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	652	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	398	178.8	241.7	96.9	120.0	F						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	68	2.0	33.6	6.5	17.8	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	252	81.9	106.3	47.9	68.0	E	97.2	F	52.2	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	297	81.9	106.3	69.5	86.4	F						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	231	81.9	106.3	65.7	79.8	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	258	10.2	63.1	6.9	13.7	B						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	137	10.7	61.9	33.5	38.7	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	35	10.7	61.9	31.7	37.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	45	81.6	220.1	33.1	43.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	220	81.3	219.6	87.1	97.2	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	116	81.1	219.4	71.4	83.2	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	44	24.1	118.0	7.3	11.3	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	157	17.4	105.7	10.9	14.8	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	451	17.4	105.4	16.0	22.2	C						
5	Casablanca Blvd & Livingston	TWSC	SBR	7	0.4	40.5	0.0	1.5	A	10.1	B	1.6		A	A
5	Casablanca Blvd & Livingston	TWSC	SBT	53	0.4	40.5	0.0	1.5	A						
5	Casablanca Blvd & Livingston	TWSC	SBL	289	0.8	50.4	0.2	2.7	A						
5	Casablanca Blvd & Livingston	TWSC	WBR	315	0.0	0.0	0.0	0.4	A						
5	Casablanca Blvd & Livingston	TWSC	WBT	12	0.5	21.0	3.0	6.4	A						
5	Casablanca Blvd & Livingston	TWSC	WBL	35	0.5	19.9	2.9	5.8	A						
5	Casablanca Blvd & Livingston	TWSC	NBR	13	0.0	0.0	0.0	0.7	A						
5	Casablanca Blvd & Livingston	TWSC	NBT	90	0.0	0.0	0.0	0.0	A						
5	Casablanca Blvd & Livingston	TWSC	NBL	5	0.0	1.6	0.7	1.6	A						
5	Casablanca Blvd & Livingston	TWSC	EBR	3	0.1	12.1	0.4	4.0	A						
5	Casablanca Blvd & Livingston	TWSC	EBT	5	0.1	12.3	2.1	10.1	B						
5	Casablanca Blvd & Livingston	TWSC	EBL	4	0.1	12.1	2.3	8.9	A						

Livingston EA and Detail Design

2018 Existing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	28	1.2	26.0	0.6	7.2	A	9.6	A	1.6		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	46	0.8	20.2	1.4	9.6	A						
6	Casablanca Blvd & Main St W	TWSC	WBR	63	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	193	0.0	0.0	0.0	0.3	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	339	0.1	17.1	0.1	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	63	0.3	25.1	0.6	2.9	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	6.1	46.2	-	-	-	12.5	B	5.4		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	0	5.3	43.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	SBL	233	4.8	41.4	1.1	12.5	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	25	0.0	0.8	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	155	0.0	0.8	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	100	0.2	14.7	0.5	2.6	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	129	2.7	32.5	2.4	11.1	B						
7	S Service Rd & Industrial Dr	TWSC	NBT	16	2.0	30.7	1.9	11.2	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	2.0	31.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	1.2	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	247	0.0	1.2	0.0	0.3	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	9.3	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	178	0.0	0.0	0.0	0.1	A	7.5	A	0.3		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	3	0.1	15.4	1.4	7.5	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	11	0.2	14.9	0.8	7.5	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	20	0.0	0.0	0.0	0.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	325	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	7.1	A	2.6		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	17	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	123	0.0	6.2	0.0	0.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	15	0.2	19.7	0.2	4.4	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.6	18.5	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	79	0.7	18.3	0.6	7.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	42	0.0	8.4	0.2	1.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	9	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2018 Existing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	96	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	50	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	69	0.6	16.6	0.4	5.5	A	7.7	A	0.9		A	A
11	Hunter Rd & Main St W	TWSC	SBL	9	0.5	16.4	1.3	7.7	A						
11	Hunter Rd & Main St W	TWSC	WBR	5	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	WBT	215	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBT	394	0.0	15.1	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBL	41	0.0	17.2	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.5	28.5	0.4	7.2	A	13.1	B	1.1		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.4	27.4	1.2	13.1	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.2	25.3	0.4	8.2	A						
12	Main St W & Oakes Rd N	TWSC	WBR	28	0.0	0.0	0.0	0.7	A						
12	Main St W & Oakes Rd N	TWSC	WBT	256	0.0	0.0	0.0	0.3	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.6	0.5	7.6	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.6	-	-	-			10.6			
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	2	0.0	0.0	0.0	1.2	A						
12	Main St W & Oakes Rd N	TWSC	EBT	386	0.0	0.0	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.0	8.8	0.2	1.7	A						

Livingston EA and Detail Design

2018 Existing - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	809	14.7	67.8	22.8	17.6	NBR	124.8	35.3	C
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,529	1.8	13.9	2.8	0.3	WBL	52.6	11.1	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	1,850	40.0	67.1	30.2	23.8	EBR	241.7	120.0	-
4	Casablanca Blvd & S Service Rd	Signalized	2,243	49.5	117.2	52.2	41.7	NBR	220.1	43.2	D
5	Casablanca Blvd & Livingston	TWSC	831	0.3	21.8	1.6	0.3	SBL	50.4	2.7	-
6	Casablanca Blvd & Main St W	TWSC	732	0.2	12.3	1.6	0.2	SBR	26.0	7.2	-
7	S Service Rd & Industrial Dr	TWSC	905	1.7	17.9	5.4	0.7	SBL	41.4	12.5	-
8	S Service Rd & Hunter Rd	TWSC	537	0.0	0.4	0.3	0.0	NBR	15.4	7.5	-
9	Hunter Rd & Industrial Dr	TWSC	285	0.2	10.0	2.6	0.2	WBR	19.7	4.4	-
10	Hunter Rd & Livingston Ave	TWSC	146	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	733	0.1	10.9	0.9	0.1	EBL	17.2	0.9	-
12	Main St W & Oakes Rd N	TWSC	783	0.2	3.2	1.1	0.1	SBR	28.5	7.2	-

Livingston EA and Detail Design

2021 Do Nothing AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	95	5.9	41.4	5.9	9.3	A	48.1	D	22.5	C		C
1	Casablanca Blvd & North Service Rd	Signalized	WBL	229	5.9	41.4	13.2	22.6	C						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	174	38.4	122.6	32.3	41.0	D						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	255	35.2	117.7	39.1	48.1	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	380	2.1	35.7	0.3	3.8	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	102	2.1	35.7	4.9	8.2	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	158	0.0	0.0	0.0	0.2	A	16.7	C	3.7		A	A
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	451	0.0	0.0	0.0	0.1	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	96	0.4	16.0	2.4	4.7	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	283	10.2	59.4	3.3	16.7	C						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	333	0.1	12.6	0.9	1.6	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	256	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	632	0.0	0.0	0.0	0.1	A	18.1	C	1.2		A	A
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	102	0.0	0.0	0.0	0.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	233	0.0	0.0	0.0	1.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	502	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	162	0.0	0.0	0.0	0.8	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	89	2.5	31.5	7.5	18.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	423	17.9	89.7	2.9	15.2	B	84.9	F	38.4	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	221	17.9	89.7	26.2	33.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	153	17.9	89.7	20.6	26.9	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	98	8.4	47.2	3.6	7.1	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	120	9.0	46.0	39.8	45.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	12	9.0	46.0	36.3	41.7	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	34	187.4	267.2	35.5	45.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	302	187.0	266.7	75.3	84.9	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	200	186.8	266.5	62.0	74.3	E						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	69	23.7	113.6	6.7	11.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	97	16.3	101.2	18.3	23.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	333	16.2	100.9	22.1	28.3	C						
5	Casablanca Blvd & Livingston	Signalized	SBR	5	0.1	26.6	0.0	1.3	A	27.0	C	14.1	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	83	0.1	26.6	0.0	1.1	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	217	0.3	36.1	0.1	2.0	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	453	19.9	56.5	19.0	27.0	C						
5	Casablanca Blvd & Livingston	Signalized	WBT	2	0.5	20.7	3.8	7.6	A						
5	Casablanca Blvd & Livingston	Signalized	WBL	55	0.6	19.7	2.1	5.0	A						
5	Casablanca Blvd & Livingston	Signalized	NBR	18	0.0	15.8	0.0	0.6	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	92	0.0	2.0	1.0	1.8	A						
5	Casablanca Blvd & Livingston	Signalized	NBL	5	0.1	12.7	0.3	1.6	A						
5	Casablanca Blvd & Livingston	Signalized	EBR	2	0.1	12.2	0.4	4.9	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	3	0.1	12.4	2.7	9.7	A						
5	Casablanca Blvd & Livingston	Signalized	EBL	9	0.2	12.2	2.8	9.4	A						

Livingston EA and Detail Design

2021 Do Nothing AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	83	3.2	40.7	0.7	9.3	A	11.3	B	2.7		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	67	2.1	34.9	1.2	11.3	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	90	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	270	0.0	0.0	0.0	0.6	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	182	0.1	12.4	0.1	0.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	19	0.1	17.4	1.0	3.7	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	2.7	34.7	-	-	-	10.5	B	3.1		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	5	2.3	32.0	0.5	10.5	B						
7	S Service Rd & Industrial Dr	TWSC	SBL	147	2.1	29.9	0.6	9.8	A						
7	S Service Rd & Industrial Dr	TWSC	WBR	2	0.0	0.0	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	241	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	121	0.1	12.7	0.1	1.8	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	82	1.1	22.1	1.0	7.6	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	2	0.7	20.3	0.8	8.1	A						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	0.7	20.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	179	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	2.6	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	283	0.0	0.0	0.0	0.1	A	7.5	A	1.2		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	39	0.6	15.8	0.3	5.2	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	58	0.8	19.9	0.6	7.5	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	37	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	153	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	5.6	A	2.4		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	17	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	33	0.0	1.6	0.0	0.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	93	1.2	25.5	0.3	5.2	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.1	21.2	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	18	0.1	21.1	0.2	5.6	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	75	0.0	8.5	0.0	0.8	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	37	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2021 Do Nothing AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	34	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	113	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	25	0.3	13.1	0.4	5.4	A	7.9	A	0.9		A	A
11	Hunter Rd & Main St W	TWSC	SBL	17	0.3	13.0	1.5	7.9	A						
11	Hunter Rd & Main St W	TWSC	WBR	38	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	WBT	314	0.0	0.0	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBT	184	0.1	15.7	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	EBL	59	0.1	18.2	0.2	1.7	A						
12	Main St W & Oakes Rd N	TWSC	SBR	33	1.4	24.9	0.5	7.0	A	8.4	A	1.4		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	1.3	23.8	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	46	1.1	21.6	0.4	8.4	A						
12	Main St W & Oakes Rd N	TWSC	WBR	56	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	285	0.0	0.0	0.0	0.5	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	2.5	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	197	0.0	2.5	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	41	0.1	11.1	0.4	2.3	A						
14	South Service Road & GO North Access	Signalized	WBT	666	1.7	61.4	0.6	2.1	A	13.8	B	2.0	A		A
14	South Service Road & GO North Access	Signalized	WBL	76	2.6	70.3	2.8	7.8	A						
14	South Service Road & GO North Access	Signalized	NBR	29	0.6	15.6	0.7	6.2	A						
14	South Service Road & GO North Access	Signalized	NBL	20	0.7	14.9	5.2	13.8	B						
14	South Service Road & GO North Access	Signalized	EBR	18	0.0	0.0	0.0	0.9	A						
14	South Service Road & GO North Access	Signalized	EBT	470	0.0	0.0	0.0	0.1	A						

Livingston EA and Detail Design

2021 Do Nothing AM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,235	15.0	66.3	22.5	16.0	NBR	122.6	41.0	C
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,577	1.9	14.3	3.7	0.9	WBL	59.4	16.7	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	1,720	0.1	1.6	1.2	0.4	EBL	31.5	18.1	-
4	Casablanca Blvd & S Service Rd	Signalized	2,062	60.7	134.0	38.4	29.9	NBR	267.2	45.2	D
5	Casablanca Blvd & Livingston	Signalized	944	9.6	39.8	14.1	9.4	WBR	56.5	27.0	B
6	Casablanca Blvd & Main St W	TWSC	711	0.6	11.7	2.7	0.2	SBR	40.7	9.3	-
7	S Service Rd & Industrial Dr	TWSC	779	0.5	10.2	3.1	0.2	SBT	32.0	10.5	-
8	S Service Rd & Hunter Rd	TWSC	570	0.1	3.1	1.2	0.1	NBL	19.9	7.5	-
9	Hunter Rd & Industrial Dr	TWSC	273	0.4	12.6	2.4	0.1	WBR	25.5	5.2	-
10	Hunter Rd & Livingston Ave	TWSC	147	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	637	0.0	7.1	0.9	0.1	EBL	18.2	1.7	-
12	Main St W & Oakes Rd N	TWSC	658	0.2	4.2	1.4	0.1	SBR	24.9	7.0	-
14	South Service Road & GO North Access	Signalized	1,279	1.1	36.8	2.0	0.6	WBL	70.3	7.8	A

Livingston EA and Detail Design

2021 Do Nothing PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	102	6.1	39.1	8.8	13.5	B	70.4	E	35.0	D		D
1	Casablanca Blvd & North Service Rd	Signalized	WBL	182	6.1	39.1	16.9	27.6	C						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	217	86.7	125.7	49.7	62.4	E						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	350	82.5	120.8	57.2	70.4	E						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	367	2.8	36.0	0.3	3.7	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	138	2.8	36.0	7.6	11.7	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	201	0.1	17.0	0.0	0.3	A	269.2	F	47.7		E	E
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	347	4.1	69.4	10.6	15.0	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	180	358.7	504.7	228.2	269.2	F						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	207	150.6	338.8	62.6	100.0	F						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	387	15.8	104.1	25.0	30.5	D						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	487	0.5	17.7	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	415	30.1	57.7	33.7	40.6	E	145.0	F	34.7		D	D
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	117	87.0	189.8	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	274	0.0	0.0	0.0	1.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	756	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	345	177.3	241.8	118.8	145.0	F						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	121	5.2	58.2	10.5	25.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	215	84.7	106.4	51.5	70.4	E	131.5	F	59.3	E		E
4	Casablanca Blvd & S Service Rd	Signalized	SBT	331	84.7	106.4	74.6	92.2	F						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	205	84.7	106.4	70.2	85.0	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	266	13.6	69.5	11.5	21.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	150	13.8	68.3	37.0	42.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	34	13.8	68.3	40.0	46.1	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	38	181.9	267.2	58.5	71.8	E						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	228	181.5	266.7	117.6	131.5	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	109	181.3	266.5	102.0	117.7	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	80	32.9	147.9	8.3	13.4	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	180	25.5	135.5	13.5	18.8	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	537	25.4	135.2	18.8	26.4	C						
5	Casablanca Blvd & Livingston	Signalized	SBR	7	0.4	50.9	0.4	2.2	A	25.6	C	10.9	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	73	0.4	50.9	0.1	1.8	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	344	0.8	60.8	0.2	2.8	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	324	13.3	56.4	18.7	25.6	C						
5	Casablanca Blvd & Livingston	Signalized	WBT	11	0.6	19.7	2.6	5.9	A						
5	Casablanca Blvd & Livingston	Signalized	WBL	33	0.6	18.7	3.2	6.5	A						
5	Casablanca Blvd & Livingston	Signalized	NBR	13	0.1	15.4	1.1	2.1	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	101	0.0	3.4	1.5	2.3	A						
5	Casablanca Blvd & Livingston	Signalized	NBL	5	0.2	16.4	0.3	1.9	A						
5	Casablanca Blvd & Livingston	Signalized	EBR	3	0.1	12.1	0.2	4.3	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	4	0.1	12.3	0.5	6.0	A						
5	Casablanca Blvd & Livingston	Signalized	EBL	4	0.1	12.2	2.3	9.4	A						

Livingston EA and Detail Design

2021 Do Nothing PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Delay (s)	Intersection		
					Ave	Max				Delay (s)	LOS		Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	28	1.9	29.6	0.7	8.3	A	10.2	B	2.0		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	73	1.3	23.8	1.4	10.2	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	75	0.0	0.0	0.0	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	186	0.0	0.0	0.0	0.4	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	322	0.1	20.8	0.1	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	67	0.3	25.8	0.6	2.5	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	6.3	46.3	-	-	-	13.1	B	5.4		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	0	5.4	43.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	SBL	229	5.0	41.4	1.3	13.1	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	26	0.0	2.2	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	164	0.0	2.2	0.0	0.2	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	88	0.3	16.5	0.9	3.4	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	131	2.9	30.6	2.8	11.8	B						
7	S Service Rd & Industrial Dr	TWSC	NBT	19	2.2	28.8	1.5	10.7	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	2.2	29.1	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	306	0.0	0.0	0.0	0.3	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	9.3	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	186	0.0	0.0	0.0	0.1	A	7.3	A	0.2		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	11	0.2	13.7	0.6	7.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	19	0.0	0.0	0.0	0.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	382	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	7.1	A	2.4		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	23	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	120	0.0	4.7	0.0	0.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	12	0.1	14.8	0.2	4.3	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.6	17.2	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	72	0.6	17.0	0.5	7.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	48	0.0	7.4	0.1	1.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	9	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2021 Do Nothing PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	11	0.0	0.0	0.0	0.4	A	7.4	A	0.2		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	84	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	54	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	7.1	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	7.2	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	3	0.0	7.0	0.2	7.4	A						
11	Hunter Rd & Main St W	TWSC	SBR	55	0.5	12.9	0.4	5.2	A	8.1	A	0.8		A	A
11	Hunter Rd & Main St W	TWSC	SBL	14	0.4	12.7	1.6	8.1	A						
11	Hunter Rd & Main St W	TWSC	WBR	6	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	WBT	206	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBT	378	0.0	10.5	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBL	45	0.0	13.1	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	SBR	26	1.1	23.7	0.2	6.4	A	11.2	B	0.9		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	2	1.0	22.6	0.7	11.2	B						
12	Main St W & Oakes Rd N	TWSC	SBL	37	0.9	20.4	0.4	8.4	A						
12	Main St W & Oakes Rd N	TWSC	WBR	20	0.0	0.0	0.0	0.7	A						
12	Main St W & Oakes Rd N	TWSC	WBT	244	0.0	0.0	0.0	0.2	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	1	0.0	8.2	0.7	7.3	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.2	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	3.6	0.0	1.0	A						
12	Main St W & Oakes Rd N	TWSC	EBT	387	0.0	3.6	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	16	0.0	11.9	0.1	1.9	A						
14	South Service Road & GO North Access	Signalized	WBT	435	1.3	49.4	1.0	2.3	A	11.7	B	2.2	A		A
14	South Service Road & GO North Access	Signalized	WBL	39	2.2	58.3	6.7	11.7	B						
14	South Service Road & GO North Access	Signalized	NBR	112	2.0	22.9	1.1	7.9	A						
14	South Service Road & GO North Access	Signalized	NBL	31	1.8	22.1	3.7	11.7	B						
14	South Service Road & GO North Access	Signalized	EBR	21	0.0	4.5	0.0	0.9	A						
14	South Service Road & GO North Access	Signalized	EBT	687	0.0	4.5	0.1	0.3	A						

Livingston EA and Detail Design

2021 Do Nothing PM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,356	37.5	72.9	35.0	26.5	NBR	125.7	62.4	D
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,809	57.2	131.2	47.7	37.3	WBR	504.7	269.2	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	2,028	41.7	67.4	34.7	27.7	EBR	241.8	145.0	-
4	Casablanca Blvd & S Service Rd	Signalized	2,373	66.9	134.7	59.3	47.8	NBR	267.2	71.8	E
5	Casablanca Blvd & Livingston	Signalized	922	5.1	48.6	10.9	7.0	SBL	60.8	2.8	B
6	Casablanca Blvd & Main St W	TWSC	751	0.3	14.7	2.0	0.3	SBR	29.6	8.3	-
7	S Service Rd & Industrial Dr	TWSC	963	1.7	16.5	5.4	0.8	SBL	41.4	13.1	-
8	S Service Rd & Hunter Rd	TWSC	598	0.0	0.3	0.2	0.0	NBL	13.7	7.3	-
9	Hunter Rd & Industrial Dr	TWSC	284	0.2	8.2	2.4	0.1	WBL	17.0	7.1	-
10	Hunter Rd & Livingston Ave	TWSC	152	0.0	0.1	0.2	0.0	EBL	7.0	7.4	-
11	Hunter Rd & Main St W	TWSC	704	0.1	7.7	0.8	0.1	EBL	13.1	0.9	-
12	Main St W & Oakes Rd N	TWSC	734	0.1	4.1	0.9	0.0	SBR	23.7	6.4	-
14	South Service Road & GO North Access	Signalized	1,325	0.7	22.8	2.2	0.7	WBL	58.3	11.7	A

Livingston EA and Detail Design

2021 Recommended AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	95	2.4	28.4	2.7	5.6	A	34.1	C	12.3	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	230	2.4	28.4	4.0	8.0	A						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	181	15.6	85.9	1.7	10.0	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	269	15.6	85.9	27.4	34.1	C						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	380	0.7	29.6	0.2	3.9	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	102	1.6	35.1	3.0	6.4	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	158	0.0	0.0	0.0	0.3	A	22.1	C	9.6	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	448	8.5	52.1	14.7	19.3	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	96	0.0	8.4	0.2	1.1	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	284	9.8	68.1	16.4	22.1	C						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	353	0.0	0.0	0.1	0.8	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	275	0.1	13.6	0.1	0.5	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	631	1.8	44.1	1.5	3.3	A	42.7	D	5.1	A		A
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	102	0.0	0.0	0.0	0.2	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	250	0.0	4.7	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	544	1.4	37.5	1.4	3.0	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	162	6.5	40.0	1.7	9.5	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	89	6.5	40.0	36.1	42.7	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	427	13.0	60.0	0.4	2.8	A	38.9	D	20.3	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	214	7.8	45.5	21.7	27.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	151	7.8	45.5	11.3	17.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	98	6.6	44.7	1.4	3.5	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	122	7.6	44.8	32.9	38.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	10	6.6	44.7	28.3	33.5	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	40	11.6	90.9	15.9	21.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	360	13.7	93.6	18.5	24.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	251	13.4	93.4	15.3	23.5	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	70	18.3	81.9	7.5	12.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	98	12.5	72.6	14.3	19.4	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	335	12.5	72.6	25.5	32.2	C						
5	Casablanca Blvd & Livingston	Signalized	SBR	5	2.4	56.3	0.1	2.1	A	38.1	D	13.2	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	74	2.5	49.8	4.2	6.9	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	220	2.5	49.8	4.5	8.1	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	537	12.1	92.9	2.7	13.9	B						
5	Casablanca Blvd & Livingston	Signalized	WBT	3	12.1	92.9	29.1	38.1	D						
5	Casablanca Blvd & Livingston	Signalized	WBL	62	12.1	92.9	20.8	25.6	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	18	1.6	21.7	0.1	3.3	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	86	2.1	16.7	13.6	17.9	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	4	2.1	16.7	11.7	15.0	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	1	0.3	13.4	2.4	5.7	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	3	0.5	10.1	17.3	21.6	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	9	0.5	10.1	23.7	28.9	C						

Livingston EA and Detail Design

2021 Recommended AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	78	2.4	27.0	0.4	7.5	A	9.8	A	2.4		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	69	1.3	19.7	1.3	9.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBR	98	0.0	0.0	0.0	0.9	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	262	0.0	0.0	0.0	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	182	0.0	12.0	0.1	0.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	18	0.1	21.7	1.2	3.9	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	2.6	40.2	-	-	-	10.2	B	2.8		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	5	2.2	37.6	0.9	10.2	B						
7	S Service Rd & Industrial Dr	TWSC	SBL	147	1.9	35.3	0.5	9.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBR	2	0.0	5.5	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	253	0.0	5.5	0.0	0.2	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	129	0.2	17.3	0.4	2.3	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	83	0.0	9.0	0.2	5.3	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	6	0.7	19.0	0.8	8.3	A						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	0.8	19.3	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	179	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	295	0.0	0.0	0.0	0.1	A	8.1	A	1.2		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	36	0.3	9.2	0.3	4.6	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	57	0.5	16.3	1.3	8.1	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	37	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	153	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	7.6	A	2.8		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	17	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	36	0.0	4.5	0.0	0.7	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	58	0.7	19.9	0.2	4.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	35	0.4	16.9	0.2	7.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	25	0.4	16.7	0.2	6.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	68	0.0	7.5	0.0	0.9	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	25	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	10	0.0	1.6	0.0	0.5	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2021 Recommended AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	42	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	104	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	32	0.4	13.7	0.6	5.6	A	8.4	A	0.9		A	A
11	Hunter Rd & Main St W	TWSC	SBL	17	0.4	13.5	1.5	8.4	A						
11	Hunter Rd & Main St W	TWSC	WBR	28	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	WBT	310	0.0	0.0	0.0	0.2	A						
11	Hunter Rd & Main St W	TWSC	EBT	184	0.0	15.7	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	EBL	59	0.1	18.3	0.2	1.6	A						
12	Main St W & Oakes Rd N	TWSC	SBR	33	1.4	24.8	0.4	7.1	A	8.3	A	1.4		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	1.3	23.8	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	46	1.1	21.6	0.4	8.3	A						
12	Main St W & Oakes Rd N	TWSC	WBR	56	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	289	0.0	0.0	0.0	0.6	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	1.2	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	197	0.0	1.2	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	41	0.1	10.0	0.3	2.2	A						
14	South Service Road & GO North Access	Signalized	WBT	716	9.7	117.6	4.0	8.0	A	20.5	C	8.8	A		A
14	South Service Road & GO North Access	Signalized	WBL	81	9.7	117.6	5.3	10.6	B						
14	South Service Road & GO North Access	Signalized	NBR	29	0.6	14.0	0.4	4.5	A						
14	South Service Road & GO North Access	Signalized	NBL	20	0.6	14.0	15.6	20.5	C						
14	South Service Road & GO North Access	Signalized	EBR	18	3.6	62.9	3.1	6.7	A						
14	South Service Road & GO North Access	Signalized	EBT	470	5.2	66.1	5.5	9.6	A						

Livingston EA and Detail Design

2021 Recommended AM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,257	6.5	49.9	12.3	7.3	NBR	85.9	10.0	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	1,614	4.1	29.3	9.6	7.0	WBL	68.1	22.1	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	1,778	2.0	33.4	5.1	2.9	SBT	44.1	3.3	A
4	Casablanca Blvd & S Service Rd	Signalized	2,176	11.7	69.1	20.3	15.0	NBT	93.6	24.3	C
5	Casablanca Blvd & Livingston	Signalized	1,022	8.1	71.3	13.2	5.5	WBR	92.9	13.9	B
6	Casablanca Blvd & Main St W	TWSC	707	0.4	8.5	2.4	0.2	SBR	27.0	7.5	-
7	S Service Rd & Industrial Dr	TWSC	804	0.4	12.3	2.8	0.2	SBT	37.6	10.2	-
8	S Service Rd & Hunter Rd	TWSC	578	0.1	2.2	1.2	0.1	NBL	16.3	8.1	-
9	Hunter Rd & Industrial Dr	TWSC	274	0.2	10.4	2.8	0.1	WBR	19.9	4.5	-
10	Hunter Rd & Livingston Ave	TWSC	146	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	630	0.0	7.4	0.9	0.1	EBL	18.3	1.6	-
12	Main St W & Oakes Rd N	TWSC	662	0.2	3.7	1.4	0.1	SBR	24.8	7.1	-
14	South Service Road & GO North Access	Signalized	1,334	7.7	94.9	8.8	4.7	WBT	117.6	8.0	A

Livingston EA and Detail Design

2021 Recommended PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	101	3.3	30.3	5.8	9.8	A	36.0	D	17.6	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	182	3.3	30.3	7.3	12.1	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	251	27.1	101.8	4.4	15.3	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	454	27.1	101.8	27.9	36.0	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	367	1.1	27.9	0.2	4.2	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	138	2.5	33.3	5.9	9.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	201	0.0	1.6	0.0	0.2	A	22.5	C	7.2	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	346	6.4	47.3	14.2	18.7	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	291	0.5	29.4	0.6	2.4	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	303	10.7	74.6	16.6	22.5	C						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	417	0.0	1.6	0.1	0.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	520	0.4	39.2	0.2	1.2	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	531	1.6	37.7	1.7	3.7	A	45.8	D	8.6	A		A
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	118	0.0	5.5	0.0	0.3	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	275	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	801	2.5	55.0	1.7	3.6	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	464	18.9	83.6	2.5	18.9	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	141	18.9	83.6	38.1	45.8	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	288	23.4	80.5	0.6	2.6	A	36.5	D	24.1	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	419	15.5	64.6	19.6	25.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	285	15.5	64.6	19.4	26.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	266	8.4	57.6	3.0	6.5	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	149	9.2	57.7	30.4	36.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	34	8.4	57.6	29.8	35.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	47	9.1	57.1	15.6	21.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	275	11.4	59.8	26.0	32.5	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	129	10.9	59.7	18.2	26.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	85	30.5	125.3	9.0	13.9	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	181	23.8	115.9	15.2	20.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	536	23.8	115.9	28.8	36.5	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	7	6.4	89.2	0.1	2.4	A	28.9	C	11.0	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	89	7.2	83.5	4.2	7.2	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	416	7.2	83.5	6.6	11.9	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	364	4.4	43.7	1.0	7.2	A						
5	Casablanca Blvd & Livingston	Signalized	WBT	11	4.4	43.7	19.2	25.1	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	36	4.4	43.7	24.1	28.9	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	14	1.3	22.2	0.7	4.0	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	89	2.0	17.2	14.0	18.3	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	5	2.0	17.2	18.0	22.0	C						
5	Casablanca Blvd & Livingston	Signalized	EBR	3	0.3	11.0	0.1	4.0	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	4	0.2	7.7	14.4	18.8	B						
5	Casablanca Blvd & Livingston	Signalized	EBL	3	0.2	7.7	15.6	21.5	C						

Livingston EA and Detail Design

2021 Recommended PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	29	2.3	28.4	0.3	7.1	A	11.7	B	2.2		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	82	1.5	21.2	2.1	11.7	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	75	0.0	0.0	0.0	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	186	0.0	0.0	0.0	0.4	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	322	0.1	19.6	0.1	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	62	0.2	28.7	0.5	2.3	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	5.4	46.1	-	-	-	11.2	B	4.1		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	0	4.7	43.5	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	SBL	229	4.1	41.2	0.8	11.2	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	26	0.0	10.0	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	170	0.0	10.0	0.0	0.2	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	119	0.4	22.4	0.6	3.2	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	147	0.1	16.4	0.3	6.0	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	19	1.7	26.3	1.2	10.4	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	1.7	26.7	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	294	0.0	0.0	0.0	0.3	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	190	0.0	0.0	0.0	0.1	A	7.8	A	0.2		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	11	0.1	7.0	1.5	7.8	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	32	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	369	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	9.9	A	3.7		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	18	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	137	0.0	1.5	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	0	0.1	24.2	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBT	17	1.3	27.2	0.6	9.9	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	96	1.4	27.1	0.8	9.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	48	0.0	9.0	0.2	1.5	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	8	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	0.0	0.0	1.1	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2021 Recommended PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	11	0.0	0.0	0.0	0.4	A	7.4	A	0.2		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	104	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	54	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	7.1	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	7.2	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	3	0.0	7.0	0.2	7.4	A						
11	Hunter Rd & Main St W	TWSC	SBR	74	0.7	17.2	0.4	5.7	A	8.6	A	1.0		A	A
11	Hunter Rd & Main St W	TWSC	SBL	10	0.6	17.1	1.4	8.6	A						
11	Hunter Rd & Main St W	TWSC	WBR	5	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	WBT	208	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBT	378	0.0	16.9	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	EBL	45	0.1	19.5	0.1	1.0	A						
12	Main St W & Oakes Rd N	TWSC	SBR	26	1.1	23.7	0.3	6.7	A	13.3	B	0.9		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	2	1.0	22.6	2.2	13.3	B						
12	Main St W & Oakes Rd N	TWSC	SBL	37	0.9	20.5	0.4	8.3	A						
12	Main St W & Oakes Rd N	TWSC	WBR	20	0.0	0.0	0.0	0.7	A						
12	Main St W & Oakes Rd N	TWSC	WBT	263	0.0	0.0	0.0	0.3	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	1	0.0	8.2	0.7	7.3	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.2	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	2.4	0.0	1.2	A						
12	Main St W & Oakes Rd N	TWSC	EBT	387	0.0	2.4	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	16	0.0	11.0	0.1	1.8	A						
14	South Service Road & GO North Access	Signalized	WBT	523	6.7	87.4	4.4	8.2	A	16.8	B	9.7	A		A
14	South Service Road & GO North Access	Signalized	WBL	42	6.7	87.4	8.6	14.1	B						
14	South Service Road & GO North Access	Signalized	NBR	113	1.2	23.2	1.1	6.4	A						
14	South Service Road & GO North Access	Signalized	NBL	31	1.2	23.2	12.2	16.8	B						
14	South Service Road & GO North Access	Signalized	EBR	21	8.3	105.7	3.1	7.2	A						
14	South Service Road & GO North Access	Signalized	EBT	692	10.0	108.9	5.9	10.9	B						

Livingston EA and Detail Design

2021 Recommended PM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,493	13.9	63.7	17.6	11.1	NBR	101.8	15.3	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,078	2.8	33.2	7.2	4.9	WBL	74.6	22.5	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,330	6.1	49.5	8.6	3.8	EBR	83.6	18.9	A
4	Casablanca Blvd & S Service Rd	Signalized	2,694	17.1	79.9	24.1	18.4	EBR	125.3	13.9	C
5	Casablanca Blvd & Livingston	Signalized	1,041	5.5	60.3	11.0	5.8	SBR	89.2	2.4	B
6	Casablanca Blvd & Main St W	TWSC	756	0.3	14.1	2.2	0.3	EBL	28.7	2.3	-
7	S Service Rd & Industrial Dr	TWSC	1,004	1.0	16.9	4.1	0.3	SBL	41.2	11.2	-
8	S Service Rd & Hunter Rd	TWSC	602	0.0	0.1	0.2	0.0	NBL	7.0	7.8	-
9	Hunter Rd & Industrial Dr	TWSC	325	0.5	11.4	3.7	0.3	WBT	27.2	9.9	-
10	Hunter Rd & Livingston Ave	TWSC	172	0.0	0.1	0.2	0.0	EBL	7.0	7.4	-
11	Hunter Rd & Main St W	TWSC	720	0.1	12.1	1.0	0.1	EBL	19.5	1.0	-
12	Main St W & Oakes Rd N	TWSC	753	0.1	3.4	0.9	0.0	SBR	23.7	6.7	-
14	South Service Road & GO North Access	Signalized	1,422	7.8	91.6	9.7	5.1	EBT	108.9	10.9	A

Livingston EA and Detail Design

Do Nothing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	140	79.1	201.6	54.5	68.9	E	140.6	F	46.0	D		D
1	Casablanca Blvd & North Service Rd	Signalized	WBL	214	79.1	201.6	106.9	140.6	F						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	130	38.1	124.7	32.7	41.2	D						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	261	33.7	118.5	43.3	51.8	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	495	7.4	75.8	4.1	10.6	B						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	206	7.4	75.8	7.6	12.8	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	104	25.4	110.6	5.5	9.2	A	376.7	F	47.8		E	E
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	593	37.8	98.1	20.5	33.6	D						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	17	0.1	9.5	1.3	3.5	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	153	427.4	504.7	271.2	376.7	F						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	372	0.3	29.2	0.8	1.4	A						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	418	0.1	17.7	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	643	32.6	57.7	16.9	26.7	D	60.8	F	19.1		C	C
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	82	142.6	201.2	0.0	0.0	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	312	0.0	0.0	0.0	1.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	716	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	375	29.8	139.8	31.3	60.8	F						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	78	2.6	24.3	11.3	21.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	557	85.9	106.4	21.1	57.4	E	94.7	F	65.8	E		E
4	Casablanca Blvd & S Service Rd	Signalized	SBT	248	85.9	106.4	44.8	68.0	E						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	207	85.9	106.4	33.0	45.1	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	196	21.9	92.5	11.4	19.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	198	21.9	91.3	51.1	58.5	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	48	21.9	91.3	41.3	47.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	44	228.2	267.2	40.4	50.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	323	227.7	266.7	85.6	94.7	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	158	227.5	266.5	70.5	83.0	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	110	99.9	150.8	34.6	46.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	126	88.8	138.4	39.0	51.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	509	88.6	138.1	72.6	90.4	F						
5	Casablanca Blvd & Livingston	TWSC	SBR	62	0.6	54.9	0.2	2.4	A	54.7	F	21.5		C	C
5	Casablanca Blvd & Livingston	TWSC	SBT	58	0.6	54.9	0.1	1.8	A						
5	Casablanca Blvd & Livingston	TWSC	SBL	284	1.0	64.8	0.3	3.2	A						
5	Casablanca Blvd & Livingston	TWSC	WBR	369	36.0	56.5	39.0	54.7	F						
5	Casablanca Blvd & Livingston	TWSC	WBT	9	1.9	42.9	3.7	8.0	A						
5	Casablanca Blvd & Livingston	TWSC	WBL	108	2.0	41.8	3.9	8.4	A						
5	Casablanca Blvd & Livingston	TWSC	NBR	25	0.3	38.2	0.5	1.7	A						
5	Casablanca Blvd & Livingston	TWSC	NBT	132	0.1	11.0	2.1	4.3	A						
5	Casablanca Blvd & Livingston	TWSC	NBL	12	0.6	33.2	1.2	2.8	A						
5	Casablanca Blvd & Livingston	TWSC	EBR	2	0.1	12.1	1.2	5.2	A						
5	Casablanca Blvd & Livingston	TWSC	EBT	3	0.2	12.3	1.0	10.5	B						
5	Casablanca Blvd & Livingston	TWSC	EBL	13	0.2	12.1	4.0	11.4	B						

Livingston EA and Detail Design

Do Nothing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	116	5.4	52.7	2.0	13.5	B	14.8	B	3.5		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	69	3.7	46.9	3.3	14.8	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	142	0.0	3.6	0.0	1.0	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	394	0.0	3.6	0.0	1.0	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	244	0.3	29.8	0.3	0.9	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	25	0.4	34.8	2.9	6.1	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	17.8	46.3	-	-	-	59.1	F	20.6		C	C
7	S Service Rd & Industrial Dr	TWSC	SBT	6	16.2	43.6	7.9	26.8	D						
7	S Service Rd & Industrial Dr	TWSC	SBL	223	15.2	41.5	16.8	37.4	E						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	1.2	46.9	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	284	1.2	46.9	0.8	1.3	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	158	2.5	61.6	4.4	7.8	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	148	18.6	81.1	28.3	52.1	F						
7	S Service Rd & Industrial Dr	TWSC	NBT	19	17.4	79.3	34.1	59.1	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	17.5	79.5	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	3.4	48.4	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	268	3.4	48.4	9.0	14.4	B						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	5.9	63.4	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	334	0.0	0.0	0.0	0.1	A	9.1	A	2.0		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	44	0.7	26.2	0.5	6.3	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	138	2.5	28.5	1.1	9.1	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	51	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	237	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	6.7	A	2.2		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	29	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	95	0.0	7.9	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	97	1.3	24.5	0.4	5.4	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.3	21.5	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	48	0.4	21.3	0.6	6.7	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	110	0.1	13.1	0.1	1.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	110	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Do Nothing - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.1	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	76	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	220	0.0	0.0	0.0	0.1	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	56	0.8	17.8	1.3	6.9	A	10.4	B	1.9		A	A
11	Hunter Rd & Main St W	TWSC	SBL	28	0.8	17.6	2.8	10.4	B						
11	Hunter Rd & Main St W	TWSC	WBR	128	0.0	0.0	0.0	0.8	A						
11	Hunter Rd & Main St W	TWSC	WBT	380	0.0	0.0	0.0	0.9	A						
11	Hunter Rd & Main St W	TWSC	EBT	243	0.4	25.2	0.3	1.2	A						
11	Hunter Rd & Main St W	TWSC	EBL	76	0.7	27.8	1.6	4.4	A						
12	Main St W & Oakes Rd N	TWSC	SBR	56	2.7	33.3	0.6	8.1	A	9.7	A	2.1		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.5	32.2	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	77	2.2	30.0	0.8	9.7	A						
12	Main St W & Oakes Rd N	TWSC	WBR	96	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	342	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	12.9	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	242	0.0	12.9	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	69	0.3	20.9	1.0	3.5	A						
14	South Service Road & GO North Access	Signalized	WBT	750	8.8	107.8	2.3	4.5	A	32.9	C	17.5	B		B
14	South Service Road & GO North Access	Signalized	WBL	165	8.8	107.8	18.0	26.6	C						
14	South Service Road & GO North Access	Signalized	NBR	84	2.6	21.6	5.0	11.2	B						
14	South Service Road & GO North Access	Signalized	NBL	47	2.6	21.6	26.9	32.9	C						
14	South Service Road & GO North Access	Signalized	EBR	63	38.7	114.7	16.6	23.7	C						
14	South Service Road & GO North Access	Signalized	EBT	683	41.5	118.8	21.0	28.6	C						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.0	9.0	-	-	-	5.1	A	1.0		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.0	8.7	0.2	5.1	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	74	0.0	0.0	0.0	0.7	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Do Nothing - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,446	32.5	118.7	46.0	34.3	WBT	201.6	68.9	D
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,657	54.7	99.8	47.8	32.9	WBL	504.7	376.7	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	2,206	19.9	48.9	19.1	10.7	SBL	201.2	0.0	-
4	Casablanca Blvd & S Service Rd	Signalized	2,724	104.0	144.1	65.8	47.8	NBR	267.2	50.0	E
5	Casablanca Blvd & Livingston	TWSC	1,077	12.9	49.9	21.5	14.2	SBL	64.8	3.2	-
6	Casablanca Blvd & Main St W	TWSC	990	1.0	19.6	3.5	0.6	SBR	52.7	13.5	-
7	S Service Rd & Industrial Dr	TWSC	1,107	7.4	53.4	20.6	10.8	NBR	81.1	52.1	-
8	S Service Rd & Hunter Rd	TWSC	804	0.5	6.3	2.0	0.2	NBL	28.5	9.1	-
9	Hunter Rd & Industrial Dr	TWSC	489	0.3	11.4	2.2	0.2	WBR	24.5	5.4	-
10	Hunter Rd & Livingston Ave	TWSC	296	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	911	0.2	10.7	1.9	0.4	EBL	27.8	4.4	-
12	Main St W & Oakes Rd N	TWSC	882	0.4	9.9	2.1	0.2	SBR	33.3	8.1	-
14	South Service Road & GO North Access	Signalized	1,792	21.8	105.9	17.5	12.2	EBT	118.8	28.6	B
16	Livingston Avenue & GO South Access	TWSC	80	0.0	0.7	1.0	0.0	SBL	8.7	5.1	-

Livingston EA and Detail Design

Do Nothing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	187	5.7	42.9	7.4	11.5	B	64.1	E	29.2	C		C
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	5.7	42.9	20.9	31.9	C						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	169	77.9	126.2	47.2	57.4	E						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	384	72.8	120.0	53.8	64.1	E						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	445	4.5	48.4	0.5	4.6	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	230	4.5	48.4	6.5	10.9	B						
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBR	242	0.0	1.2	0.0	0.2	A	240.7	F	57.1		F	F
2	Casablanca Blvd & North Ramp Terminal	TWSC	SBT	341	5.6	79.0	19.8	27.5	D						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBR	147	374.6	504.7	200.3	232.5	F						
2	Casablanca Blvd & North Ramp Terminal	TWSC	WBL	224	428.1	504.8	152.2	240.7	F						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBT	402	14.6	103.9	21.6	26.2	D						
2	Casablanca Blvd & North Ramp Terminal	TWSC	NBL	537	0.0	9.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBT	472	39.1	57.7	36.0	45.1	E	161.3	F	35.6		E	E
3	Casablanca Blvd & South Ramp Terminal	TWSC	SBL	90	147.2	201.2	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBR	422	0.0	0.0	0.0	1.2	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	NBT	881	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBR	360	225.8	241.8	125.0	161.3	F						
3	Casablanca Blvd & South Ramp Terminal	TWSC	EBL	51	1.9	32.3	10.3	23.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	333	88.8	106.4	44.5	68.9	E	244.1	F	92.1	F		F
4	Casablanca Blvd & S Service Rd	Signalized	SBT	261	88.8	106.4	66.9	86.3	F						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	238	88.8	106.4	68.0	83.6	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	322	170.9	216.4	99.4	139.6	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	149	169.8	215.2	200.6	244.1	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	47	169.8	215.2	165.5	196.1	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	48	239.1	267.2	65.0	78.4	E						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	246	238.7	266.8	128.4	141.9	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	91	238.4	266.5	116.0	132.2	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	146	93.7	150.8	20.7	32.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	232	83.5	138.4	23.5	35.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	735	83.3	138.1	41.4	57.9	E						
5	Casablanca Blvd & Livingston	TWSC	SBR	11	4.8	107.5	2.0	4.2	A	88.9	F	34.4		D	D
5	Casablanca Blvd & Livingston	TWSC	SBT	72	4.8	107.5	3.1	5.5	A						
5	Casablanca Blvd & Livingston	TWSC	SBL	348	5.9	117.4	3.9	7.6	A						
5	Casablanca Blvd & Livingston	TWSC	WBR	256	40.2	56.5	64.5	88.9	F						
5	Casablanca Blvd & Livingston	TWSC	WBT	8	0.8	20.6	7.3	12.1	B						
5	Casablanca Blvd & Livingston	TWSC	WBL	27	0.8	19.5	6.8	10.7	B						
5	Casablanca Blvd & Livingston	TWSC	NBR	34	3.5	67.5	7.0	9.9	A						
5	Casablanca Blvd & Livingston	TWSC	NBT	110	1.7	39.1	23.7	31.3	D						
5	Casablanca Blvd & Livingston	TWSC	NBL	6	4.9	62.1	6.8	10.4	B						
5	Casablanca Blvd & Livingston	TWSC	EBR	8	2.4	30.6	5.8	11.7	B						
5	Casablanca Blvd & Livingston	TWSC	EBT	14	2.5	30.8	12.8	22.1	C						
5	Casablanca Blvd & Livingston	TWSC	EBL	48	2.8	30.7	27.8	40.1	E						

Livingston EA and Detail Design

Do Nothing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	29	2.1	27.9	1.2	9.1	A	11.9	B	2.6		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	76	1.5	22.1	2.6	11.9	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	84	0.0	0.0	0.0	0.7	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	245	0.0	0.0	0.0	0.4	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	418	0.8	49.2	0.3	1.7	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	92	1.2	54.1	1.4	4.4	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	38.1	46.3	-	-	-	281.1	F	70.1		F	F
7	S Service Rd & Industrial Dr	TWSC	SBT	12	35.4	43.6	28.8	65.4	F						
7	S Service Rd & Industrial Dr	TWSC	SBL	240	33.4	41.5	33.3	71.0	F						
7	S Service Rd & Industrial Dr	TWSC	WBR	19	0.4	15.7	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	166	0.4	15.7	0.5	0.9	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	106	2.9	30.5	12.0	17.4	C						
7	S Service Rd & Industrial Dr	TWSC	NBR	110	81.9	108.0	183.7	281.1	F						
7	S Service Rd & Industrial Dr	TWSC	NBT	21	80.1	106.2	177.6	274.4	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	80.4	106.4	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	38.0	127.5	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	454	38.0	127.5	28.1	49.6	E						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	47.4	142.5	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	190	0.0	0.0	0.0	0.1	A	7.4	A	0.3		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	23	0.3	16.0	0.6	7.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	44	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	541	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	5.1	50.6	-	-	-	19.4	C	13.1		B	B
9	Hunter Rd & Industrial Dr	TWSC	SBT	44	2.9	33.0	8.7	11.2	B						
9	Hunter Rd & Industrial Dr	TWSC	SBL	150	5.6	50.8	13.6	19.4	C						
9	Hunter Rd & Industrial Dr	TWSC	WBR	15	0.2	19.9	0.2	4.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	0	0.7	21.6	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	WBL	74	0.8	21.4	0.6	7.8	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	65	12.5	111.9	9.2	11.9	B						
9	Hunter Rd & Industrial Dr	TWSC	NBT	21	9.3	92.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	0	11.8	111.2	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Do Nothing - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	119	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	103	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	60	1.2	27.2	1.0	7.1	A	11.2	B	1.6		A	A
11	Hunter Rd & Main St W	TWSC	SBL	48	1.3	27.1	2.9	11.2	B						
11	Hunter Rd & Main St W	TWSC	WBR	40	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	WBT	233	0.0	0.0	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBT	464	0.1	27.1	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	EBL	58	0.2	29.6	0.3	1.8	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.5	26.7	0.3	7.0	A	11.8	B	1.0		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.4	25.6	0.7	11.8	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.3	23.5	0.5	8.8	A						
12	Main St W & Oakes Rd N	TWSC	WBR	27	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	WBT	268	0.0	0.0	0.0	0.3	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.6	0.2	6.8	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.6	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	EBT	474	0.0	0.0	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.0	9.0	0.4	2.2	A						
14	South Service Road & GO North Access	Signalized	WBT	482	5.3	64.6	3.2	6.1	A	29.7	C	21.0	C		C
14	South Service Road & GO North Access	Signalized	WBL	88	5.3	64.6	15.9	22.3	C						
14	South Service Road & GO North Access	Signalized	NBR	289	8.2	60.2	9.4	19.3	B						
14	South Service Road & GO North Access	Signalized	NBL	58	8.2	60.2	18.1	24.3	C						
14	South Service Road & GO North Access	Signalized	EBR	42	57.8	115.1	17.6	24.9	C						
14	South Service Road & GO North Access	Signalized	EBT	830	61.1	119.2	21.0	29.7	C						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.5	15.8	-	-	-	5.3	A	4.8		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	58	0.5	15.5	0.2	5.3	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	7	0.0	0.0	0.0	0.6	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Do Nothing - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,554	29.6	73.4	29.2	22.3	NBR	126.2	57.4	C
2	Casablanca Blvd & North Ramp Terminal	TWSC	1,893	83.9	137.9	57.1	41.7	WBL	504.8	240.7	-
3	Casablanca Blvd & South Ramp Terminal	TWSC	2,276	49.7	58.9	35.6	27.5	EBR	241.8	161.3	-
4	Casablanca Blvd & S Service Rd	Signalized	2,848	122.3	161.1	92.1	71.0	NBR	267.2	78.4	F
5	Casablanca Blvd & Livingston	TWSC	942	14.1	78.6	34.4	24.2	SBL	117.4	7.6	-
6	Casablanca Blvd & Main St W	TWSC	944	0.7	29.7	2.6	0.5	EBL	54.1	4.4	-
7	S Service Rd & Industrial Dr	TWSC	1,128	32.6	78.5	70.1	41.1	EBT	127.5	49.6	-
8	S Service Rd & Hunter Rd	TWSC	798	0.0	0.5	0.3	0.0	NBL	16.0	7.4	-
9	Hunter Rd & Industrial Dr	TWSC	369	5.5	54.6	13.1	8.3	NBR	111.9	11.9	-
10	Hunter Rd & Livingston Ave	TWSC	222	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	903	0.2	19.1	1.6	0.3	EBL	29.6	1.8	-
12	Main St W & Oakes Rd N	TWSC	881	0.1	2.7	1.0	0.1	SBR	26.7	7.0	-
14	South Service Road & GO North Access	Signalized	1,789	33.0	90.3	21.0	13.9	EBT	119.2	29.7	C
16	Livingston Avenue & GO South Access	TWSC	65	0.4	13.8	4.8	0.2	SBL	15.5	5.3	-

Livingston EA and Detail Design

2041 Base AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	155	3.6	43.8	3.4	6.9	A	34.1	C	12.5	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	248	3.6	43.8	5.3	10.8	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	152	17.5	94.9	3.7	11.5	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	301	17.5	94.9	27.3	34.1	C						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	500	1.6	38.3	0.2	4.7	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	207	3.0	43.7	3.3	6.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	112	0.0	0.0	0.0	0.3	A	26.2	C	13.2	B		B
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	637	13.3	73.8	16.3	21.6	C						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	57	0.1	10.7	0.5	1.8	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	588	28.8	148.8	18.9	26.2	C						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	396	0.0	0.0	0.1	0.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	479	0.3	34.8	0.1	0.8	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	1099	3.7	68.3	1.5	3.8	A	47.6	D	8.2	A		A
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	128	0.0	11.4	0.0	0.2	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	329	0.0	0.0	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	800	2.3	54.1	1.4	3.2	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	380	22.0	90.9	11.7	33.1	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	76	22.0	90.9	40.4	47.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	794	47.4	133.2	8.1	24.0	C	263.1	F	55.5	E		E
4	Casablanca Blvd & S Service Rd	Signalized	SBT	333	37.1	117.3	31.0	38.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	342	37.1	117.3	24.1	32.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	196	25.2	113.4	6.5	10.5	B						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	196	25.5	113.5	62.7	72.7	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	49	25.2	113.4	42.0	47.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	48	190.8	264.7	55.2	68.1	E						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	348	193.4	267.4	68.1	82.0	F						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	218	193.3	267.2	217.1	263.1	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	124	45.2	147.4	14.5	20.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	136	37.9	138.1	19.8	25.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	585	37.9	138.1	42.6	51.5	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	81	4.9	96.1	0.1	3.2	A	83.1	F	39.1	D		D
5	Casablanca Blvd & Livingston	Signalized	SBT	100	5.1	89.8	3.9	6.7	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	321	5.1	89.8	5.6	10.2	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	541	96.8	131.8	34.4	71.9	E						
5	Casablanca Blvd & Livingston	Signalized	WBT	13	96.8	131.8	50.2	83.1	F						
5	Casablanca Blvd & Livingston	Signalized	WBL	78	96.8	131.8	28.0	34.1	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	25	3.9	30.1	5.1	9.0	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	130	3.7	25.2	23.2	29.3	C						
5	Casablanca Blvd & Livingston	Signalized	NBL	13	3.7	25.2	13.9	17.9	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	2	0.4	15.6	0.1	3.4	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	4	0.6	12.3	25.2	31.3	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	14	0.6	12.3	31.8	38.0	D						

Livingston EA and Detail Design

2041 Base AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	111	3.9	33.4	0.8	9.2	A	13.0	B	3.1		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	86	2.4	26.1	3.1	13.0	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	142	0.0	9.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	394	0.0	9.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	239	0.1	22.7	0.2	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	25	0.4	31.1	2.9	6.3	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	8.2	46.2	-	-	-	16.4	C	5.9		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	6	7.2	43.6	1.3	16.4	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	240	6.6	41.2	2.5	15.7	C						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	0.5	32.0	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	352	0.5	32.0	0.2	1.0	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	265	2.0	43.7	1.6	5.4	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	157	0.3	20.3	1.1	7.9	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	22	2.4	30.3	5.3	15.6	C						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	2.4	30.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.3	22.2	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	300	0.3	22.2	0.8	2.2	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.6	32.3	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	400	0.0	0.0	0.0	0.1	A	13.3	B	2.8		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	72	1.2	37.2	0.5	6.0	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	152	3.0	41.9	3.4	13.3	B						
8	S Service Rd & Hunter Rd	TWSC	EBR	51	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	237	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	8.1	A	3.2		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	29	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	97	0.0	4.4	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	162	2.5	33.1	0.3	6.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	38	0.7	31.4	0.3	8.1	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	25	0.6	31.2	0.3	7.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	110	0.1	13.5	0.1	1.5	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	51	0.0	1.4	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	10	0.0	7.9	0.1	0.9	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2041 Base AM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	53	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	171	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	37	0.5	15.6	1.1	6.4	A	11.1	B	1.4		A	A
11	Hunter Rd & Main St W	TWSC	SBL	23	0.6	15.4	3.9	11.1	B						
11	Hunter Rd & Main St W	TWSC	WBR	79	0.0	0.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	WBT	423	0.0	0.0	0.0	0.6	A						
11	Hunter Rd & Main St W	TWSC	EBT	243	0.2	22.6	0.1	0.9	A						
11	Hunter Rd & Main St W	TWSC	EBL	76	0.4	25.2	1.0	3.3	A						
12	Main St W & Oakes Rd N	TWSC	SBR	56	2.7	33.0	0.5	8.2	A	9.9	A	2.2		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.5	31.9	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	77	2.2	29.7	0.9	9.9	A						
12	Main St W & Oakes Rd N	TWSC	WBR	96	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	365	0.0	0.0	0.0	1.0	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.1	14.3	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	242	0.1	14.3	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	69	0.3	22.3	1.0	3.7	A						
14	South Service Road & GO North Access	Signalized	WBT	1013	35.0	148.6	7.2	12.8	B	25.9	C	17.7	B		B
14	South Service Road & GO North Access	Signalized	WBL	193	35.0	148.6	16.7	25.9	C						
14	South Service Road & GO North Access	Signalized	NBR	84	1.6	19.3	1.9	7.1	A						
14	South Service Road & GO North Access	Signalized	NBL	47	1.6	19.3	14.7	20.0	B						
14	South Service Road & GO North Access	Signalized	EBR	66	39.3	115.6	13.1	19.6	B						
14	South Service Road & GO North Access	Signalized	EBT	770	42.0	118.8	15.8	23.0	C						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.0	8.4	-	-	-	5.1	A	1.0		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.0	8.7	0.2	5.1	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	95	0.0	0.0	0.0	0.7	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2041 Base AM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,563	6.9	56.9	12.5	7.3	NBR	94.9	11.5	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,269	11.3	66.9	13.2	9.5	WBL	148.8	26.2	B
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,812	5.7	57.3	8.2	3.7	EBR	90.9	33.1	A
4	Casablanca Blvd & S Service Rd	Signalized	3,369	66.9	153.4	55.5	42.6	NBT	267.4	82.0	E
5	Casablanca Blvd & Livingston	Signalized	1,322	48.7	100.9	39.1	20.8	WBR	131.8	71.9	D
6	Casablanca Blvd & Main St W	TWSC	997	0.7	17.0	3.1	0.5	SBR	33.4	9.2	-
7	S Service Rd & Industrial Dr	TWSC	1,343	1.9	32.4	5.9	1.2	WBL	43.7	5.4	-
8	S Service Rd & Hunter Rd	TWSC	912	0.6	9.9	2.8	0.6	NBL	41.9	13.3	-
9	Hunter Rd & Industrial Dr	TWSC	522	0.9	18.0	3.2	0.2	WBR	33.1	6.0	-
10	Hunter Rd & Livingston Ave	TWSC	224	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	881	0.1	9.5	1.4	0.3	EBL	25.2	3.3	-
12	Main St W & Oakes Rd N	TWSC	905	0.4	10.1	2.2	0.2	SBR	33.0	8.2	-
14	South Service Road & GO North Access	Signalized	2,173	35.6	129.2	17.7	11.2	WBT	148.6	12.8	B
16	Livingston Avenue & GO South Access	TWSC	101	0.0	0.5	1.0	0.0	SBL	8.7	5.1	-

Livingston EA and Detail Design

2041 Base PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	186	5.5	46.4	9.2	14.1	B	36.8	D	20.1	C		C
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	5.5	46.4	12.1	18.9	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	216	34.3	114.8	5.9	17.0	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	574	34.3	114.8	27.7	36.8	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	446	3.8	52.5	0.3	6.2	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	229	5.9	58.0	8.8	13.7	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	242	0.0	0.0	0.0	0.2	A	25.3	C	9.2	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	342	6.5	42.1	15.3	19.6	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	321	0.7	35.5	0.9	3.3	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	552	24.9	144.7	18.1	25.3	C						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	467	0.0	2.6	0.8	2.1	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	729	1.2	68.4	0.4	2.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	800	4.6	68.0	4.0	7.5	A	134.6	F	29.9	C		C
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	91	0.1	13.0	0.0	0.3	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	415	0.0	5.3	0.0	0.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	1120	5.4	73.6	2.6	4.8	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	524	365.9	504.8	62.2	134.6	F						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	75	365.9	504.8	76.8	114.8	F						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	492	76.2	161.7	1.6	5.8	A	130.2	F	47.5	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	433	64.8	145.8	31.0	40.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	380	64.8	145.8	102.3	130.2	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	424	18.4	78.7	7.5	13.5	B						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	217	18.7	78.8	36.3	43.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	68	18.4	78.7	32.8	40.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	74	27.1	94.7	29.6	37.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	419	29.7	97.4	36.6	45.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	157	29.4	97.2	65.6	84.9	F						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	169	75.4	149.7	18.3	25.8	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	236	66.9	140.3	20.3	27.9	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	696	66.9	140.3	53.2	64.7	E						
5	Casablanca Blvd & Livingston	Signalized	SBR	16	6.9	100.5	0.0	2.2	A	30.4	C	12.2	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	144	8.2	94.3	3.6	6.6	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	481	8.2	94.3	5.9	11.3	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	477	7.6	56.9	2.1	10.3	B						
5	Casablanca Blvd & Livingston	Signalized	WBT	11	7.6	56.9	21.8	30.4	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	42	7.6	56.9	21.6	26.8	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	19	2.6	25.9	1.7	5.5	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	135	2.9	21.0	13.4	17.8	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	6	2.9	21.0	9.2	13.2	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	8	2.0	24.8	0.5	5.0	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	14	2.2	21.4	20.8	25.8	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	47	2.2	21.4	22.4	28.2	C						

Livingston EA and Detail Design

2041 Base PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	87	4.0	37.1	0.5	8.1	A	14.1	B	3.5		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	101	2.6	29.9	3.4	14.1	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	98	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	232	0.0	0.0	0.0	0.6	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	405	0.7	41.6	0.4	2.0	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	98	1.2	50.0	1.3	4.3	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	37.4	46.2	-	-	-	126.8	F	70.4		F	F
7	S Service Rd & Industrial Dr	TWSC	SBT	2	35.0	43.6	28.8	64.7	F						
7	S Service Rd & Industrial Dr	TWSC	SBL	218	32.8	41.3	43.9	82.0	F						
7	S Service Rd & Industrial Dr	TWSC	WBR	20	5.8	95.5	0.1	0.9	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	226	5.8	95.5	3.7	5.4	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	161	10.3	107.2	18.4	27.1	D						
7	S Service Rd & Industrial Dr	TWSC	NBR	244	33.1	94.3	36.5	78.5	F						
7	S Service Rd & Industrial Dr	TWSC	NBT	20	41.1	104.3	50.5	95.6	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	41.3	104.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	82.6	128.4	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	320	82.6	128.4	65.4	126.8	F						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	93.9	141.7	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	255	0.0	0.0	0.0	0.1	A	8.7	A	3.5		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	26	0.3	11.5	1.8	8.7	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	129	1.3	18.0	0.8	1.9	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	444	1.3	18.0	3.0	5.6	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	10.3	B	2.8		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	30	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	254	0.0	4.7	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	1	0.1	30.3	0.2	4.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	22	1.2	30.4	0.8	10.3	B						
9	Hunter Rd & Industrial Dr	TWSC	WBL	76	1.3	30.3	1.1	9.9	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	45	0.1	7.7	0.6	2.6	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	23	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	1.5	0.1	1.2	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2041 Base PM

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	107	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	69	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	64	0.7	17.6	0.7	6.1	A	10.3	B	1.0		A	A
11	Hunter Rd & Main St W	TWSC	SBL	20	0.7	17.4	2.7	10.3	B						
11	Hunter Rd & Main St W	TWSC	WBR	26	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	WBT	291	0.0	0.0	0.0	0.3	A						
11	Hunter Rd & Main St W	TWSC	EBT	484	0.1	27.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	EBL	38	0.2	29.6	0.2	1.9	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.6	26.7	0.5	7.5	A	12.8	B	1.1		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.4	25.6	1.5	12.8	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.3	23.4	0.8	9.2	A						
12	Main St W & Oakes Rd N	TWSC	WBR	27	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	WBT	328	0.0	0.0	0.0	0.4	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.6	0.2	6.6	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.6	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	0.0	0.0	0.6	A						
12	Main St W & Oakes Rd N	TWSC	EBT	474	0.0	0.0	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.1	9.0	0.7	2.7	A						
14	South Service Road & GO North Access	Signalized	WBT	746	16.0	132.2	6.1	10.6	B	29.6	C	19.8	B		B
14	South Service Road & GO North Access	Signalized	WBL	117	16.0	132.2	16.3	24.1	C						
14	South Service Road & GO North Access	Signalized	NBR	289	5.3	55.4	4.7	12.9	B						
14	South Service Road & GO North Access	Signalized	NBL	58	5.3	55.4	14.6	20.5	C						
14	South Service Road & GO North Access	Signalized	EBR	41	64.1	115.8	17.2	25.0	C						
14	South Service Road & GO North Access	Signalized	EBT	818	67.1	119.0	20.8	29.6	C						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.4	15.1	-	-	-	5.4	A	4.6		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	58	0.5	15.5	0.2	5.4	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	11	0.0	0.0	0.0	0.6	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

2041 Base PM

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,790	17.8	79.6	20.1	12.7	NBR	114.8	17.0	C
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,653	6.4	59.1	9.2	6.1	WBL	144.7	25.3	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	3,025	75.7	146.3	29.9	14.7	EBR	504.8	134.6	C
4	Casablanca Blvd & S Service Rd	Signalized	3,765	52.4	125.6	47.5	37.0	SBR	161.7	5.8	D
5	Casablanca Blvd & Livingston	Signalized	1,400	7.1	68.3	12.2	6.2	SBR	100.5	2.2	B
6	Casablanca Blvd & Main St W	TWSC	1,021	1.0	27.4	3.5	0.7	EBL	50.0	4.3	-
7	S Service Rd & Industrial Dr	TWSC	1,211	37.7	95.8	70.4	36.6	EBT	128.4	126.8	-
8	S Service Rd & Hunter Rd	TWSC	854	0.9	12.4	3.5	1.7	EBR	18.0	1.9	-
9	Hunter Rd & Industrial Dr	TWSC	452	0.3	10.0	2.8	0.3	WBT	30.4	10.3	-
10	Hunter Rd & Livingston Ave	TWSC	176	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	923	0.1	17.0	1.0	0.1	EBL	29.6	1.9	-
12	Main St W & Oakes Rd N	TWSC	941	0.1	2.5	1.1	0.1	SBR	26.7	7.5	-
14	South Service Road & GO North Access	Signalized	2,069	35.4	113.8	19.8	12.7	WBT	132.2	10.6	B
16	Livingston Avenue & GO South Access	TWSC	69	0.4	13.0	4.6	0.1	SBL	15.5	5.4	-

Livingston EA and Detail Design

Alternative 1 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	155	3.7	38.3	3.2	6.8	A	39.4	D	14.3	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	249	3.7	38.3	5.9	11.7	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	170	22.1	111.7	4.0	13.2	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	329	22.1	111.7	31.8	39.4	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	500	3.3	48.3	0.2	4.7	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	207	3.3	48.3	3.7	7.5	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	112	0.2	22.9	0.2	1.1	A	11.3	B	7.9	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	634	6.0	55.5	6.0	10.4	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	57	2.3	75.7	0.0	0.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	589	9.1	113.2	2.6	8.8	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	445	5.5	96.6	6.5	11.3	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	533	0.9	60.5	0.5	3.2	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	1091	22.4	112.8	13.2	20.0	B	22.1	C	17.3	B		B
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	128	8.2	87.7	4.9	8.8	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	349	11.0	147.1	3.9	8.3	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	904	26.8	180.7	14.8	22.1	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	387	6.8	78.9	5.5	11.4	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	78	0.6	17.9	3.9	6.6	A						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	797	18.6	94.2	0.4	3.3	A	55.4	E	29.7	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	338	26.3	81.5	27.0	33.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	342	24.7	79.7	30.4	38.8	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	196	19.7	99.7	5.7	9.6	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	194	19.7	99.7	48.8	55.4	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	51	19.7	99.7	45.1	51.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	63	24.1	122.7	30.3	38.1	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	462	26.5	125.4	35.6	44.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	279	26.2	125.3	20.9	29.1	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	87	29.2	134.8	0.6	5.1	A						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	137	29.2	134.8	18.3	22.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	602	29.2	134.8	38.8	47.8	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	136	4.0	78.2	0.6	4.5	A	59.2	E	29.7	C		C
5	Casablanca Blvd & Livingston	Signalized	SBT	49	3.7	71.7	3.2	6.0	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	289	3.7	71.7	4.7	8.8	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	625	85.0	131.9	10.9	41.9	D						
5	Casablanca Blvd & Livingston	Signalized	WBT	157	85.0	131.9	33.3	59.2	E						
5	Casablanca Blvd & Livingston	Signalized	WBL	36	85.0	131.9	29.4	37.5	D						
5	Casablanca Blvd & Livingston	Signalized	NBR	7	3.4	27.5	0.6	4.3	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	149	3.4	22.6	14.1	18.6	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	10	3.4	22.6	15.4	19.3	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	1	3.2	26.8	12.0	16.1	B						
5	Casablanca Blvd & Livingston	Signalized	EBT	57	2.7	23.4	24.1	29.1	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	12	2.7	23.4	25.3	33.0	C						

Livingston EA and Detail Design

Alternative 1 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	8	2.2	28.5	0.4	7.0	A	12.5	B	2.1		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	91	1.7	21.2	2.8	12.5	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	170	0.0	0.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	366	0.0	0.0	0.0	1.0	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	239	0.0	0.0	0.0	0.2	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	2	0.0	7.5	2.0	5.2	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	6.9	46.2	-	-	-	14.0	B	4.1		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	6	6.0	43.6	1.0	14.0	B						
7	S Service Rd & Industrial Dr	TWSC	SBL	241	5.4	41.2	1.3	12.8	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	0.1	24.7	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	360	0.1	24.7	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	206	0.8	36.4	0.8	3.8	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	151	0.1	13.7	0.2	5.5	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	5	1.4	23.7	0.9	9.4	A						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	1.5	24.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	268	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	WBT	406	4.9	85.4	4.7	7.4	A	34.8	C	12.3	B		B
8	S Service Rd & Hunter Rd	Signalized	WBL	0	4.9	85.4	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBR	73	11.2	73.2	5.4	11.9	B						
8	S Service Rd & Hunter Rd	Signalized	NBL	176	11.2	73.2	29.2	34.8	C						
8	S Service Rd & Hunter Rd	Signalized	EBR	84	1.9	40.5	0.1	2.8	A						
8	S Service Rd & Hunter Rd	Signalized	EBT	205	1.9	40.5	4.0	6.7	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	8.3	A	2.5		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	67	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	91	0.0	10.4	0.0	0.9	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	107	1.5	24.2	0.4	5.8	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	38	0.5	22.2	0.4	8.3	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	20	0.4	22.0	0.6	7.6	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	81	0.1	21.0	0.1	1.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	132	0.0	8.0	0.1	0.3	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	11	0.1	14.8	0.4	2.2	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 1 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	5.1	-	-	-	14.3	B	6.1		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	47	0.0	5.1	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	39	0.0	8.0	0.1	0.9	A						
10	Hunter Rd & Livingston Ave	TWSC	WBR	90	4.7	46.7	0.8	11.5	B						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	4.7	46.8	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	112	4.7	46.6	1.3	14.3	B						
10	Hunter Rd & Livingston Ave	TWSC	NBR	23	0.0	0.0	0.0	0.4	A						
10	Hunter Rd & Livingston Ave	TWSC	NBT	134	0.0	0.0	0.0	0.1	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	143	1.8	24.3	1.0	7.6	A	10.5	B	2.2		A	A
11	Hunter Rd & Main St W	TWSC	SBL	21	1.6	24.1	2.3	10.5	B						
11	Hunter Rd & Main St W	TWSC	WBR	43	0.0	0.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	WBT	329	0.0	0.0	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	EBT	222	0.0	10.0	0.1	0.8	A						
11	Hunter Rd & Main St W	TWSC	EBL	97	0.3	21.5	0.6	2.5	A						
12	Main St W & Oakes Rd N	TWSC	SBR	56	2.7	33.9	0.6	8.5	A	10.1	B	2.1		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.5	32.8	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	77	2.3	30.7	0.9	10.1	B						
12	Main St W & Oakes Rd N	TWSC	WBR	96	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	377	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	11.5	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	242	0.0	11.5	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	69	0.3	19.5	0.9	3.6	A						
14	South Service Road & GO North Access	Signalized	WBT	1039	10.0	78.5	4.1	8.1	A	17.6	B	12.1	B		B
14	South Service Road & GO North Access	Signalized	WBL	229	10.0	78.5	11.1	17.3	B						
14	South Service Road & GO North Access	Signalized	NBR	84	1.4	17.5	1.0	6.0	A						
14	South Service Road & GO North Access	Signalized	NBL	47	1.4	17.5	12.8	17.6	B						
14	South Service Road & GO North Access	Signalized	EBR	66	12.5	70.5	5.4	10.4	B						
14	South Service Road & GO North Access	Signalized	EBT	739	14.6	73.7	10.4	16.7	B						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.1	9.8	-	-	-	7.2	A	0.1		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.1	9.9	0.5	7.2	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	95	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	201	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	EBT	58	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	EBL	4	0.0	1.6	0.0	0.2	A						

Livingston EA and Detail Design

Alternative 1 - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,610	9.2	65.4	14.3	8.7	NBR	111.7	13.2	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,370	5.2	77.6	7.9	3.6	WBL	113.2	8.8	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,937	19.2	129.7	17.3	11.0	NBT	180.7	22.1	B
4	Casablanca Blvd & S Service Rd	Signalized	3,548	24.2	108.7	29.7	23.3	EBR	134.8	5.1	C
5	Casablanca Blvd & Livingston	Signalized	1,528	47.2	97.0	29.7	12.2	WBR	131.9	41.9	C
6	Casablanca Blvd & Main St W	TWSC	876	0.2	2.5	2.1	0.3	SBR	28.5	7.0	-
7	S Service Rd & Industrial Dr	TWSC	1,238	1.3	23.3	4.1	0.4	SBT	43.6	14.0	-
8	S Service Rd & Hunter Rd	Signalized	944	5.6	68.4	12.3	8.8	WBT	85.4	7.4	B
9	Hunter Rd & Industrial Dr	TWSC	547	0.4	14.1	2.5	0.2	WBR	24.2	5.8	-
10	Hunter Rd & Livingston Ave	TWSC	445	2.1	22.4	6.1	0.5	WBR	46.7	11.5	-
11	Hunter Rd & Main St W	TWSC	855	0.4	9.7	2.2	0.3	SBR	24.3	7.6	-
12	Main St W & Oakes Rd N	TWSC	917	0.4	9.1	2.1	0.2	SBR	33.9	8.5	-
14	South Service Road & GO North Access	Signalized	2,204	11.1	73.0	12.1	7.1	WBT	78.5	8.1	B
16	Livingston Avenue & GO South Access	TWSC	364	0.0	0.2	0.1	0.0	SBL	9.9	7.2	-

Livingston EA and Detail Design

Alternative 1 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	186	5.0	45.3	7.9	12.7	B	35.5	D	19.1	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	5.0	45.3	12.7	19.5	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	221	37.7	145.1	4.9	14.0	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	571	37.7	145.1	27.9	35.5	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	446	5.8	64.4	0.4	6.5	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	229	5.8	64.4	7.5	12.5	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	241	0.0	7.1	0.0	0.6	A	12.3	B	7.5	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	342	3.4	38.2	7.2	12.3	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	321	8.2	99.3	0.1	0.5	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	551	14.3	136.8	6.1	12.0	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	468	4.8	95.1	4.4	10.1	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	719	2.0	90.3	0.3	5.4	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	784	35.4	137.6	36.6	51.0	D	99.9	F	50.4	D		D
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	90	17.5	109.4	15.1	21.4	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	428	46.1	178.4	13.8	20.6	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	1107	70.9	212.0	27.8	37.9	D						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	559	240.3	504.7	73.0	99.9	F						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	81	91.8	415.6	46.4	62.8	E						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	523	126.5	209.3	0.9	3.3	A	181.4	F	61.9	E		E
4	Casablanca Blvd & S Service Rd	Signalized	SBT	403	116.1	194.6	42.0	53.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	376	114.4	192.9	146.2	181.4	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	397	55.7	173.6	33.8	47.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	199	55.7	173.6	62.2	76.1	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	70	55.7	173.6	46.8	56.6	E						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	75	21.9	100.5	31.9	40.8	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	433	24.3	103.2	38.5	47.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	132	24.0	103.1	28.8	37.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	156	81.1	138.1	6.9	14.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	245	81.1	138.1	28.4	36.7	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	718	81.1	138.1	68.8	85.4	F						
5	Casablanca Blvd & Livingston	Signalized	SBR	33	8.0	124.3	0.1	2.9	A	35.6	D	14.3	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	98	9.2	127.8	3.6	6.4	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	478	9.2	127.8	6.0	11.6	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	450	8.2	58.9	1.6	9.7	A						
5	Casablanca Blvd & Livingston	Signalized	WBT	80	8.2	58.9	22.0	28.9	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	10	8.2	58.9	24.8	30.3	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	0	2.0	23.3	-	-	-						
5	Casablanca Blvd & Livingston	Signalized	NBT	103	2.4	18.4	14.0	18.3	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	2	2.4	18.4	9.2	13.2	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	26	7.2	41.4	5.1	9.4	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	49	6.4	38.1	22.1	27.5	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	103	6.4	38.1	26.4	35.6	D						

Livingston EA and Detail Design

Alternative 1 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	0	3.0	32.2	-	-	-	13.3	B	2.5		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	116	2.2	24.9	3.1	13.3	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	104	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	225	0.0	0.0	0.0	0.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	390	0.2	28.0	0.2	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	30	0.4	40.2	1.3	4.0	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	30.3	46.2	-	-	-	57.1	F	37.4		E	E
7	S Service Rd & Industrial Dr	TWSC	SBT	0	28.1	43.6	0.5	18.7	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	261	26.2	41.3	28.4	54.3	F						
7	S Service Rd & Industrial Dr	TWSC	WBR	20	7.9	98.3	0.0	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	183	7.9	98.3	6.1	8.0	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	183	12.0	110.0	19.0	26.1	D						
7	S Service Rd & Industrial Dr	TWSC	NBR	198	10.5	64.5	21.4	39.0	E						
7	S Service Rd & Industrial Dr	TWSC	NBT	20	15.2	74.5	34.6	57.1	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	15.3	74.8	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	31.3	128.6	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	375	31.3	128.6	29.4	45.7	E						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	37.4	141.8	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	WBT	211	4.7	68.0	10.6	13.7	B	23.5	C	13.0	B		B
8	S Service Rd & Hunter Rd	Signalized	WBL	0	4.7	68.0	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBR	0	2.0	22.4	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBL	58	2.0	22.4	19.4	23.5	C						
8	S Service Rd & Hunter Rd	Signalized	EBR	114	11.1	75.0	1.3	5.3	A						
8	S Service Rd & Hunter Rd	Signalized	EBT	469	11.1	75.0	9.2	13.2	B						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	12.1	B	3.6		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	49	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	222	0.0	7.9	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	1	0.2	31.4	0.1	4.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	22	2.1	30.7	0.9	11.5	B						
9	Hunter Rd & Industrial Dr	TWSC	WBL	101	2.2	30.5	1.6	12.1	B						
9	Hunter Rd & Industrial Dr	TWSC	NBR	21	0.0	6.3	0.4	2.5	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	55	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	0.0	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 1 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	7.1	-	-	-	10.0	A	2.4		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	114	0.0	7.1	0.0	0.1	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	37	0.1	10.2	0.2	1.2	A						
10	Hunter Rd & Livingston Ave	TWSC	WBR	40	1.1	26.8	0.6	7.0	A						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	1.1	26.9	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	50	1.2	26.7	1.1	10.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBR	82	0.0	0.0	0.0	0.5	A						
10	Hunter Rd & Livingston Ave	TWSC	NBT	37	0.0	0.0	0.0	0.3	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	140	1.2	21.9	0.5	6.4	A	6.4	A	1.6		A	A
11	Hunter Rd & Main St W	TWSC	SBL	0	1.1	21.7	-	-	-						
11	Hunter Rd & Main St W	TWSC	WBR	11	0.0	0.0	0.0	0.6	A						
11	Hunter Rd & Main St W	TWSC	WBT	213	0.0	0.0	0.0	0.2	A						
11	Hunter Rd & Main St W	TWSC	EBT	421	0.0	16.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	EBL	102	0.2	27.0	0.1	1.4	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.5	26.7	0.4	7.3	A	14.6	B	1.0		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.4	25.6	3.1	14.6	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.3	23.4	0.7	9.0	A						
12	Main St W & Oakes Rd N	TWSC	WBR	27	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	WBT	325	0.0	0.0	0.0	0.3	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.6	0.2	6.6	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.6	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	EBT	474	0.0	0.0	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.1	9.0	0.6	2.5	A						
14	South Service Road & GO North Access	Signalized	WBT	741	6.8	67.2	4.7	8.9	A	59.8	E	32.9	C		C
14	South Service Road & GO North Access	Signalized	WBL	113	6.8	67.2	12.3	18.0	B						
14	South Service Road & GO North Access	Signalized	NBR	288	10.9	96.2	10.5	21.6	C						
14	South Service Road & GO North Access	Signalized	NBL	58	10.9	96.2	17.1	24.6	C						
14	South Service Road & GO North Access	Signalized	EBR	42	83.6	115.3	33.3	45.5	D						
14	South Service Road & GO North Access	Signalized	EBT	839	86.6	118.5	43.2	59.8	E						
16	Livingston Avenue & GO South Access	TWSC	SBR	2	0.5	16.6	0.2	5.8	A	7.0	A	1.5		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	57	0.6	16.6	0.3	7.0	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	11	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	90	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	EBT	117	0.0	0.0	0.0	0.0	A						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	0.0	0.0	A						

Livingston EA and Detail Design

Alternative 1 - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,792	19.7	96.6	19.1	12.3	NBR	145.1	14.0	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,642	5.8	87.6	7.5	3.1	WBL	136.8	12.0	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	3,049	88.3	244.2	50.4	36.5	EBR	504.7	99.9	D
4	Casablanca Blvd & S Service Rd	Signalized	3,727	80.2	160.0	61.9	48.7	SBR	209.3	3.3	E
5	Casablanca Blvd & Livingston	Signalized	1,432	8.0	82.6	14.3	7.9	SBT	127.8	6.4	B
6	Casablanca Blvd & Main St W	TWSC	865	0.4	17.4	2.5	0.5	EBL	40.2	4.0	-
7	S Service Rd & Industrial Dr	TWSC	1,240	20.0	91.4	37.4	22.5	EBT	128.6	45.7	-
8	S Service Rd & Hunter Rd	Signalized	852	8.9	69.7	13.0	9.2	EBR	75.0	5.3	B
9	Hunter Rd & Industrial Dr	TWSC	472	0.6	12.0	3.6	0.4	WBR	31.4	4.0	-
10	Hunter Rd & Livingston Ave	TWSC	360	0.3	10.0	2.4	0.2	WBR	26.8	7.0	-
11	Hunter Rd & Main St W	TWSC	887	0.2	14.1	1.6	0.1	EBL	27.0	1.4	-
12	Main St W & Oakes Rd N	TWSC	938	0.1	2.5	1.0	0.1	SBR	26.7	7.3	-
14	South Service Road & GO North Access	Signalized	2,081	41.2	93.7	32.9	22.4	EBT	118.5	59.8	C
16	Livingston Avenue & GO South Access	TWSC	277	0.1	3.5	1.5	0.1	SBL	16.6	7.0	-

Livingston EA and Detail Design

Alternative 2 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	155	3.5	40.6	2.9	6.4	A	40.0	D	14.5	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	248	3.5	40.6	5.6	10.7	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	170	22.3	109.2	5.6	15.6	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	329	22.3	109.2	32.2	40.0	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	500	3.3	44.7	0.2	4.8	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	207	3.3	44.7	3.5	7.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	112	0.2	23.8	0.4	1.3	A	12.1	B	7.9	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	636	5.8	56.3	5.8	10.2	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	57	2.0	81.8	0.0	0.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	589	8.8	119.3	2.4	8.5	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	447	5.8	86.2	7.0	12.1	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	535	0.8	50.1	0.4	3.0	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	1092	23.5	123.4	13.7	20.6	C	22.1	C	17.5	B		B
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	127	9.1	95.2	5.8	9.9	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	346	10.1	138.2	3.7	8.0	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	907	25.9	171.8	15.1	22.1	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	387	6.1	66.9	5.3	10.8	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	78	0.7	20.3	5.0	7.9	A						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	795	18.4	71.0	0.3	3.0	A	50.8	D	28.6	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	335	22.2	76.0	26.6	32.5	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	342	20.5	74.3	24.1	31.8	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	196	17.6	89.2	5.4	9.3	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	194	17.6	89.2	44.3	50.7	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	51	17.6	89.2	40.5	46.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	63	30.8	115.9	26.0	32.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	466	24.7	106.9	34.7	42.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	280	24.5	106.8	19.5	27.0	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	87	31.5	137.7	0.4	4.8	A						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	137	31.5	137.7	18.2	22.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	595	31.5	137.7	41.2	50.8	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	137	4.1	74.4	0.6	4.7	A	59.6	E	29.5	C		C
5	Casablanca Blvd & Livingston	Signalized	SBT	49	3.9	67.9	3.5	6.1	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	289	3.9	67.9	5.0	9.3	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	625	83.0	131.7	11.1	41.7	D						
5	Casablanca Blvd & Livingston	Signalized	WBT	155	83.0	131.7	33.6	59.6	E						
5	Casablanca Blvd & Livingston	Signalized	WBL	36	83.0	131.7	30.0	37.8	D						
5	Casablanca Blvd & Livingston	Signalized	NBR	7	3.5	27.5	0.6	4.3	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	150	3.5	22.6	14.1	18.6	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	20	3.5	22.6	13.0	16.5	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	1	3.2	30.2	4.8	8.6	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	60	2.8	26.9	23.3	28.2	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	13	2.8	26.9	25.1	32.5	C						

Livingston EA and Detail Design

Alternative 2 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	1	2.3	28.5	0.2	6.1	A	12.5	B	2.0		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	91	1.6	21.3	2.8	12.5	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	170	0.0	0.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	366	0.0	0.0	0.0	1.0	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	239	0.0	0.0	0.0	0.1	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	7.1	46.2	-	-	-	15.2	C	4.1		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	6	6.2	43.5	2.0	15.2	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	241	5.6	41.2	1.5	13.2	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	0.0	9.1	0.0	0.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	360	0.0	9.1	0.0	0.5	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	206	0.7	21.6	0.7	3.4	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	150	0.0	11.2	0.2	5.4	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	4	1.4	21.1	2.4	11.5	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	1.4	21.5	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	268	0.0	0.0	0.0	0.2	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	WBT	407	4.9	85.6	4.7	7.5	A	36.3	D	12.5	B		B
8	S Service Rd & Hunter Rd	Signalized	WBL	0	4.9	85.6	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBR	74	11.7	65.9	5.7	12.0	B						
8	S Service Rd & Hunter Rd	Signalized	NBL	176	11.7	65.9	30.6	36.3	D						
8	S Service Rd & Hunter Rd	Signalized	EBR	84	1.7	37.9	0.1	2.7	A						
8	S Service Rd & Hunter Rd	Signalized	EBT	204	1.7	37.9	3.7	6.3	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	8.5	A	2.3		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	67	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	91	0.0	10.5	0.1	0.9	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	107	1.4	23.3	0.4	5.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	37	0.4	21.0	0.6	8.5	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	20	0.4	20.8	0.7	7.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	80	0.1	9.8	0.1	1.3	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	132	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	11	0.0	4.7	0.1	1.3	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 2 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	34	0.0	0.0	0.0	0.5	A	14.0	B	7.9		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	14	0.0	0.0	0.0	0.2	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	39	0.0	4.8	0.0	0.5	A						
10	Hunter Rd & Livingston Ave	TWSC	WBR	89	4.5	44.8	0.6	11.4	B						
10	Hunter Rd & Livingston Ave	TWSC	WBT	114	4.6	44.8	0.8	14.0	B						
10	Hunter Rd & Livingston Ave	TWSC	WBL	6	4.4	44.7	0.7	11.4	B						
10	Hunter Rd & Livingston Ave	TWSC	NBR	3	0.0	0.0	0.0	0.6	A						
10	Hunter Rd & Livingston Ave	TWSC	NBT	58	0.0	0.0	0.0	0.1	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.9	20.8	0.1	4.2	A						
10	Hunter Rd & Livingston Ave	TWSC	EBT	23	0.9	20.9	0.4	10.1	B						
10	Hunter Rd & Livingston Ave	TWSC	EBL	76	1.0	20.7	0.8	8.7	A						
11	Hunter Rd & Main St W	TWSC	SBR	3	0.2	9.4	0.7	5.4	A	8.2	A	0.6		A	A
11	Hunter Rd & Main St W	TWSC	SBL	21	0.2	9.3	1.4	8.2	A						
11	Hunter Rd & Main St W	TWSC	WBR	43	0.0	0.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	WBT	322	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	EBT	220	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	SBR	202	10.5	75.5	9.0	17.6	B	32.6	C	10.4	B		B
12	Main St W & Oakes Rd N	Signalized	SBT	0	9.5	73.4	-	-	-						
12	Main St W & Oakes Rd N	Signalized	SBL	77	9.5	73.4	22.5	32.6	C						
12	Main St W & Oakes Rd N	Signalized	WBR	96	1.7	40.1	0.6	3.0	A						
12	Main St W & Oakes Rd N	Signalized	WBT	230	1.3	37.5	1.6	5.2	A						
12	Main St W & Oakes Rd N	Signalized	WBL	0	1.3	37.5	-	-	-						
12	Main St W & Oakes Rd N	Signalized	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	EBR	0	0.7	27.7	-	-	-						
12	Main St W & Oakes Rd N	Signalized	EBT	143	1.8	32.5	1.4	4.0	A						
12	Main St W & Oakes Rd N	Signalized	EBL	168	1.8	32.5	3.3	8.5	A						

Livingston EA and Detail Design

Alternative 2 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
13	Oakes Rd. and Livingston Ave	TWSC	SBT	133	0.0	0.0	0.0	0.1	A	9.1	A	2.8		A	A
13	Oakes Rd. and Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
13	Oakes Rd. and Livingston Ave	TWSC	WBR	0	1.6	25.3	-	-	-						
13	Oakes Rd. and Livingston Ave	TWSC	WBL	147	1.9	25.5	0.9	9.1	A						
13	Oakes Rd. and Livingston Ave	TWSC	NBR	100	0.0	0.0	0.0	0.9	A						
13	Oakes Rd. and Livingston Ave	TWSC	NBT	164	0.0	0.0	0.0	0.7	A						
14	South Service Road & GO North Access	Signalized	WBT	1039	10.2	83.1	4.4	8.5	A	18.6	B	12.7	B		B
14	South Service Road & GO North Access	Signalized	WBL	230	10.2	83.1	11.0	17.4	B						
14	South Service Road & GO North Access	Signalized	NBR	84	1.4	17.6	1.3	6.5	A						
14	South Service Road & GO North Access	Signalized	NBL	47	1.4	17.6	13.3	18.6	B						
14	South Service Road & GO North Access	Signalized	EBR	65	12.8	68.9	5.9	10.7	B						
14	South Service Road & GO North Access	Signalized	EBT	740	15.0	72.1	11.2	17.7	B						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.1	11.1	-	-	-	6.3	A	0.6		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.1	11.2	0.7	6.3	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	95	0.0	0.0	0.0	0.7	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	209	0.0	0.0	0.0	0.5	A						
16	Livingston Avenue & GO South Access	TWSC	EBT	60	0.0	0.0	0.0	0.1	A						
16	Livingston Avenue & GO South Access	TWSC	EBL	4	0.0	5.3	1.0	2.1	A						

Livingston EA and Detail Design

Alternative 2 - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,609	9.2	63.7	14.5	8.8	NBR	109.2	15.6	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,376	5.1	75.2	7.9	3.6	WBL	119.3	8.5	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,937	19.1	128.7	17.5	11.3	NBT	171.8	22.1	B
4	Casablanca Blvd & S Service Rd	Signalized	3,541	23.4	97.8	28.6	22.4	EBR	137.7	4.8	C
5	Casablanca Blvd & Livingston	Signalized	1,542	45.7	95.1	29.5	12.3	WBR	131.7	41.7	C
6	Casablanca Blvd & Main St W	TWSC	867	0.2	2.3	2.0	0.3	SBR	28.5	6.1	-
7	S Service Rd & Industrial Dr	TWSC	1,236	1.3	15.9	4.1	0.4	SBT	43.5	15.2	-
8	S Service Rd & Hunter Rd	Signalized	945	5.7	65.8	12.5	9.0	WBT	85.6	7.5	B
9	Hunter Rd & Industrial Dr	TWSC	545	0.3	10.0	2.3	0.2	WBR	23.3	5.6	-
10	Hunter Rd & Livingston Ave	TWSC	456	2.3	25.5	7.9	0.5	WBT	44.8	14.0	-
11	Hunter Rd & Main St W	TWSC	609	0.0	0.4	0.6	0.1	SBR	9.4	5.4	-
12	Main St W & Oakes Rd N	Signalized	916	4.2	47.4	10.4	5.2	SBR	75.5	17.6	B
13	Oakes Rd. and Livingston Ave	TWSC	544	0.5	6.9	2.8	0.3	WBL	25.5	9.1	-
14	South Service Road & GO North Access	Signalized	2,205	11.3	75.1	12.7	7.5	WBT	83.1	8.5	B
16	Livingston Avenue & GO South Access	TWSC	374	0.0	0.2	0.6	0.0	SBL	11.2	6.3	-

Livingston EA and Detail Design

Alternative 2 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	187	4.8	39.7	8.5	13.2	B	34.0	C	18.3	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	4.8	39.7	10.5	16.9	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	239	36.2	154.2	4.0	12.5	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	576	36.2	154.2	26.3	34.0	C						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	446	6.1	67.2	0.7	6.5	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	229	6.1	67.2	7.9	12.8	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	241	0.0	1.3	0.0	0.6	A	11.3	B	5.9	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	342	3.5	32.3	6.5	11.3	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	321	1.4	50.3	0.0	0.3	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	551	4.5	87.8	1.5	5.1	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	490	4.7	94.4	4.3	10.1	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	740	2.2	89.1	0.3	5.5	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	790	23.6	118.3	24.0	34.4	C	69.9	E	37.0	D		D
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	90	8.5	90.1	7.6	11.9	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	438	32.7	173.1	8.2	14.7	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	1141	55.3	206.7	20.7	29.9	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	649	166.5	449.4	46.8	69.9	E						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	94	77.9	348.1	30.3	45.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	548	90.2	189.5	0.7	3.0	A	143.4	F	51.5	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	444	95.0	194.5	37.1	47.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	418	93.3	192.8	110.4	143.4	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	422	22.1	104.1	13.0	21.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	213	22.1	104.1	36.8	44.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	72	22.1	104.1	31.3	37.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	74	27.8	93.9	25.3	31.9	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	432	21.2	84.9	33.4	41.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	132	20.9	84.8	23.3	31.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	159	82.6	140.2	5.7	13.1	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	249	82.6	140.2	25.2	33.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	737	82.6	140.2	67.6	84.5	F						
5	Casablanca Blvd & Livingston	Signalized	SBR	35	8.7	133.7	0.1	2.8	A	34.9	C	14.2	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	102	10.6	131.5	3.9	7.0	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	517	10.6	131.5	6.2	12.1	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	449	8.2	66.3	1.6	9.7	A						
5	Casablanca Blvd & Livingston	Signalized	WBT	80	8.2	66.3	22.2	29.2	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	10	8.2	66.3	25.6	31.2	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	0	2.0	23.4	-	-	-						
5	Casablanca Blvd & Livingston	Signalized	NBT	103	2.4	18.4	13.7	18.0	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	2	2.4	18.4	9.3	13.0	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	61	7.3	40.7	6.0	10.7	B						
5	Casablanca Blvd & Livingston	Signalized	EBT	49	6.5	37.4	21.2	26.8	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	103	6.5	37.4	26.1	34.9	C						

Livingston EA and Detail Design

Alternative 2 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	0	3.2	33.7	-	-	-	12.4	B	2.2		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	124	2.2	26.4	2.3	12.4	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	104	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	225	0.0	0.0	0.0	0.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	385	0.0	0.0	0.0	0.2	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	29.8	46.2	-	-	-	49.6	E	32.6		D	D
7	S Service Rd & Industrial Dr	TWSC	SBT	1	27.7	43.6	1.6	28.7	D						
7	S Service Rd & Industrial Dr	TWSC	SBL	280	25.8	41.3	23.6	49.6	E						
7	S Service Rd & Industrial Dr	TWSC	WBR	20	6.6	95.5	0.1	0.8	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	194	6.6	95.5	6.6	8.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	188	10.1	107.2	14.9	21.1	C						
7	S Service Rd & Industrial Dr	TWSC	NBR	227	11.3	71.6	19.7	37.0	E						
7	S Service Rd & Industrial Dr	TWSC	NBT	20	16.4	81.6	26.7	48.4	E						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	16.5	82.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	21.4	106.7	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	349	21.4	106.7	23.0	36.5	E						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	26.2	119.9	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	WBT	224	4.5	75.3	9.0	12.3	B	25.3	C	12.5	B		B
8	S Service Rd & Hunter Rd	Signalized	WBL	0	4.5	75.3	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBR	0	2.2	23.5	-	-	-						
8	S Service Rd & Hunter Rd	Signalized	NBL	58	2.2	23.5	21.2	25.3	C						
8	S Service Rd & Hunter Rd	Signalized	EBR	144	10.5	78.9	1.4	5.7	A						
8	S Service Rd & Hunter Rd	Signalized	EBT	441	10.5	78.9	9.3	13.2	B						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	13.4	B	3.6		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	49	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	251	0.0	8.9	0.0	0.7	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	1	0.7	46.6	0.3	8.7	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	22	2.3	45.2	1.4	13.4	B						
9	Hunter Rd & Industrial Dr	TWSC	WBL	103	2.4	45.1	1.4	12.4	B						
9	Hunter Rd & Industrial Dr	TWSC	NBR	21	0.0	7.1	0.4	2.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	55	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	1.4	0.0	3.6	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 2 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	97	0.0	1.3	0.0	0.7	A	10.7	B	5.9		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	28	0.0	1.3	0.0	0.2	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	27	0.0	5.3	0.0	0.6	A						
10	Hunter Rd & Livingston Ave	TWSC	WBR	40	1.0	29.8	0.3	6.7	A						
10	Hunter Rd & Livingston Ave	TWSC	WBT	42	1.1	29.9	0.5	10.6	B						
10	Hunter Rd & Livingston Ave	TWSC	WBL	9	1.0	29.7	0.6	8.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBR	3	0.0	0.0	0.0	0.6	A						
10	Hunter Rd & Livingston Ave	TWSC	NBT	16	0.0	0.0	0.0	0.1	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	14	1.6	24.2	0.5	7.3	A						
10	Hunter Rd & Livingston Ave	TWSC	EBT	124	1.7	24.3	0.5	10.7	B						
10	Hunter Rd & Livingston Ave	TWSC	EBL	21	1.6	24.2	0.4	8.9	A						
11	Hunter Rd & Main St W	TWSC	SBR	3	0.2	10.4	0.6	5.3	A	7.1	A	0.4		A	A
11	Hunter Rd & Main St W	TWSC	SBL	23	0.2	10.3	0.8	7.1	A						
11	Hunter Rd & Main St W	TWSC	WBR	11	0.0	0.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	WBT	213	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBT	364	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	SBR	171	2.9	44.5	2.0	7.4	A	24.6	C	5.8	A		A
12	Main St W & Oakes Rd N	Signalized	SBT	3	2.1	42.4	15.7	24.6	C						
12	Main St W & Oakes Rd N	Signalized	SBL	23	2.1	42.4	16.3	24.0	C						
12	Main St W & Oakes Rd N	Signalized	WBR	27	1.2	39.3	0.4	2.6	A						
12	Main St W & Oakes Rd N	Signalized	WBT	189	0.9	36.7	1.6	4.7	A						
12	Main St W & Oakes Rd N	Signalized	WBL	0	0.9	36.7	-	-	-						
12	Main St W & Oakes Rd N	Signalized	NBR	2	0.0	6.9	0.3	4.5	A						
12	Main St W & Oakes Rd N	Signalized	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	Signalized	EBR	1	1.0	32.7	4.2	7.9	A						
12	Main St W & Oakes Rd N	Signalized	EBT	342	2.1	37.4	1.4	4.1	A						
12	Main St W & Oakes Rd N	Signalized	EBL	153	2.1	37.4	2.6	6.5	A						

Livingston EA and Detail Design

Alternative 2 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
13	Oakes Rd. and Livingston Ave	TWSC	SBT	60	0.0	2.8	0.0	0.1	A	8.5	A	3.4		A	A
13	Oakes Rd. and Livingston Ave	TWSC	SBL	26	0.0	8.4	0.2	1.5	A						
13	Oakes Rd. and Livingston Ave	TWSC	WBR	0	1.5	29.2	-	-	-						
13	Oakes Rd. and Livingston Ave	TWSC	WBL	137	1.7	29.4	0.5	8.5	A						
13	Oakes Rd. and Livingston Ave	TWSC	NBR	131	0.0	0.0	0.0	1.0	A						
13	Oakes Rd. and Livingston Ave	TWSC	NBT	49	0.0	0.0	0.0	0.6	A						
14	Casablanca Blvd & GO North Access	Signalized	WBT	774	7.3	77.6	4.5	8.3	A	58.1	E	31.2	C		C
14	Casablanca Blvd & GO North Access	Signalized	WBL	119	7.3	77.6	15.7	21.7	C						
14	Casablanca Blvd & GO North Access	Signalized	NBR	288	7.6	86.2	6.7	16.1	B						
14	Casablanca Blvd & GO North Access	Signalized	NBL	58	7.6	86.2	15.0	21.7	C						
14	Casablanca Blvd & GO North Access	Signalized	EBR	43	84.6	115.3	29.3	41.0	D						
14	Casablanca Blvd & GO North Access	Signalized	EBT	864	87.6	118.5	40.8	58.1	E						
16	Casablanca Blvd & GO South Access	TWSC	SBR	2	0.6	19.8	0.2	4.5	A	6.8	A	1.3		A	A
16	Casablanca Blvd & GO South Access	TWSC	SBL	57	0.7	19.6	0.6	6.8	A						
16	Casablanca Blvd & GO South Access	TWSC	WBR	11	0.0	0.0	0.0	0.5	A						
16	Casablanca Blvd & GO South Access	TWSC	WBT	91	0.0	0.0	0.0	0.1	A						
16	Casablanca Blvd & GO South Access	TWSC	EBT	153	0.0	0.0	0.0	0.0	A						
16	Casablanca Blvd & GO South Access	TWSC	EBL	0	0.0	0.0	0.0	0.6	A						

Livingston EA and Detail Design

Alternative 2 - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,816	19.4	101.3	18.3	11.7	NBR	154.2	12.5	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,685	3.0	70.0	5.9	2.0	NBT	94.4	10.1	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	3,202	66.3	230.4	37.0	25.0	EBR	449.4	69.9	D
4	Casablanca Blvd & S Service Rd	Signalized	3,900	65.3	143.5	51.5	39.7	SBT	194.5	47.3	D
5	Casablanca Blvd & Livingston	Signalized	1,511	8.6	87.3	14.2	7.9	SBR	133.7	2.8	B
6	Casablanca Blvd & Main St W	TWSC	838	0.3	3.9	2.2	0.3	SBL	26.4	12.4	-
7	S Service Rd & Industrial Dr	TWSC	1,279	16.3	83.9	32.6	18.5	WBL	107.2	21.1	-
8	S Service Rd & Hunter Rd	Signalized	867	8.4	74.3	12.5	8.7	EBR	78.9	5.7	B
9	Hunter Rd & Industrial Dr	TWSC	503	0.6	16.0	3.6	0.4	WBR	46.6	8.7	-
10	Hunter Rd & Livingston Ave	TWSC	421	0.9	16.3	5.9	0.3	WBT	29.9	10.6	-
11	Hunter Rd & Main St W	TWSC	614	0.0	0.4	0.4	0.0	SBR	10.4	5.3	-
12	Main St W & Oakes Rd N	Signalized	911	2.0	38.7	5.8	2.2	SBR	44.5	7.4	A
13	Oakes Rd. and Livingston Ave	TWSC	403	0.6	10.9	3.4	0.2	WBL	29.4	8.5	-
14	Casablanca Blvd & GO North Access	Signalized	2,146	41.2	96.2	31.2	20.8	EBT	118.5	58.1	C
16	Casablanca Blvd & GO South Access	TWSC	314	0.1	3.7	1.3	0.1	SBR	19.8	4.5	-

Livingston EA and Detail Design

Alternative 3 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	155	3.8	39.7	3.6	7.4	A	39.5	D	14.4	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	248	3.8	39.7	5.7	11.0	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	168	21.9	102.0	5.0	14.4	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	326	21.9	102.0	31.9	39.5	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	500	3.2	47.4	0.2	4.9	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	206	3.2	47.4	3.3	6.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	112	0.2	20.5	0.2	1.0	A	12.4	B	7.9	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	635	5.9	52.8	5.8	10.3	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	57	1.8	85.3	0.0	0.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	588	8.4	122.8	2.4	8.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	438	6.1	92.4	7.2	12.4	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	524	1.1	56.4	0.7	3.4	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	1101	22.8	115.3	13.4	20.3	C	21.1	C	17.2	B		B
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	128	8.6	87.1	5.5	9.6	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	347	9.6	112.7	4.4	9.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	880	24.4	146.3	14.1	21.1	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	384	6.8	62.2	5.9	11.7	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	78	0.8	24.8	5.3	8.3	A						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	846	18.8	69.9	0.3	3.6	A	54.0	D	29.9	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	289	22.0	74.2	24.0	29.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	343	21.5	73.6	26.7	34.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	196	19.8	93.6	6.1	10.0	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	201	19.8	93.6	47.3	54.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	45	19.8	93.6	41.0	47.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	60	28.7	139.6	32.1	40.8	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	445	31.2	142.3	41.0	50.4	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	349	30.9	142.2	22.5	32.5	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	125	30.8	129.0	0.5	5.2	A						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	138	30.8	129.0	20.5	25.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	594	30.7	128.9	40.6	50.3	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	82	3.9	87.8	0.2	3.3	A	66.2	E	31.1	C		C
5	Casablanca Blvd & Livingston	Signalized	SBT	54	4.2	81.3	3.5	6.1	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	322	4.2	81.3	4.8	9.0	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	671	97.8	137.2	14.2	50.1	D						
5	Casablanca Blvd & Livingston	Signalized	WBT	16	97.8	137.2	33.6	66.2	E						
5	Casablanca Blvd & Livingston	Signalized	WBL	86	97.8	137.2	27.3	33.0	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	25	3.5	27.6	1.4	5.1	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	149	3.4	22.7	14.0	18.6	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	12	3.4	22.7	14.4	18.4	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	2	0.5	15.6	0.1	3.5	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	4	0.6	12.3	25.5	31.6	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	14	0.6	12.3	21.3	26.6	C						

Livingston EA and Detail Design

Alternative 3 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	64	3.2	30.0	0.5	8.3	A	13.6	B	2.8		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	90	2.1	22.8	3.5	13.6	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	170	0.0	1.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	366	0.0	1.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	239	0.1	18.0	0.2	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	25	0.4	26.5	3.3	6.8	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	6.0	44.1	-	-	-	15.4	C	3.6		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	6	6.3	44.7	2.1	15.4	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	241	6.6	44.6	1.8	13.6	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	0.1	16.6	0.0	1.5	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	451	0.1	16.6	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	253	0.5	30.4	0.4	2.6	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	158	2.1	26.4	0.3	6.3	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	3	1.7	24.9	1.5	10.3	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	1.7	24.7	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	302	0.0	0.0	0.0	0.1	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	499	0.0	0.0	0.0	0.3	A	9.1	A	1.1		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	8.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	75	0.0	8.0	0.0	0.8	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	81	0.9	21.8	1.5	9.1	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	51	0.0	0.0	0.0	0.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	238	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	8.3	A	3.4		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	28	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	95	0.0	6.3	0.0	0.7	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	99	1.3	24.6	0.2	5.2	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	39	1.0	23.8	0.3	8.3	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	74	1.0	23.7	0.5	8.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	81	0.1	7.6	0.1	1.4	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	44	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	9	0.0	1.5	0.1	0.8	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 3 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	101	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	134	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	84	1.1	19.3	1.0	6.9	A	10.7	B	1.6		A	A
11	Hunter Rd & Main St W	TWSC	SBL	23	1.0	19.1	3.2	10.7	B						
11	Hunter Rd & Main St W	TWSC	WBR	43	0.0	0.0	0.0	0.6	A						
11	Hunter Rd & Main St W	TWSC	WBT	384	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	EBT	243	0.1	18.9	0.1	0.7	A						
11	Hunter Rd & Main St W	TWSC	EBL	76	0.3	21.4	0.6	2.6	A						
12	Main St W & Oakes Rd N	TWSC	SBR	56	2.8	33.0	0.8	8.5	A	10.2	B	2.2		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.5	31.9	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	77	2.3	29.8	1.1	10.2	B						
12	Main St W & Oakes Rd N	TWSC	WBR	96	0.0	0.0	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	374	0.0	0.0	0.0	1.0	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	13.1	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	242	0.0	13.1	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	69	0.3	21.0	1.1	3.7	A						
14	South Service Road & GO North Access	Signalized	WBT	1163	10.0	96.5	4.1	8.0	A	18.4	B	12.1	B		B
14	South Service Road & GO North Access	Signalized	WBL	224	10.0	96.5	8.8	15.2	B						
14	South Service Road & GO North Access	Signalized	NBR	84	1.5	20.2	1.4	6.7	A						
14	South Service Road & GO North Access	Signalized	NBL	47	1.5	20.2	13.4	18.4	B						
14	South Service Road & GO North Access	Signalized	EBR	66	12.5	77.2	6.4	11.8	B						
14	South Service Road & GO North Access	Signalized	EBT	778	15.5	82.0	11.0	17.7	B						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.0	9.2	-	-	-	5.4	A	1.0		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.0	8.1	0.2	5.4	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	98	0.0	0.0	0.0	0.7	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 3 - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,603	9.1	62.3	14.4	8.7	NBR	102.0	14.4	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,354	5.1	77.7	7.9	3.7	WBL	122.8	8.2	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,918	18.4	113.7	17.2	11.0	NBT	146.3	21.1	B
4	Casablanca Blvd & S Service Rd	Signalized	3,631	25.1	104.4	29.9	23.1	NBT	142.3	50.4	C
5	Casablanca Blvd & Livingston	Signalized	1,437	54.4	103.3	31.1	11.7	WBR	137.2	50.1	C
6	Casablanca Blvd & Main St W	TWSC	954	0.4	10.0	2.8	0.5	SBR	30.0	8.3	-
7	S Service Rd & Industrial Dr	TWSC	1,415	1.5	21.5	3.6	0.4	SBT	44.7	15.4	-
8	S Service Rd & Hunter Rd	TWSC	944	0.1	2.5	1.1	0.1	NBL	21.8	9.1	-
9	Hunter Rd & Industrial Dr	TWSC	469	0.5	13.5	3.4	0.2	WBR	24.6	5.2	-
10	Hunter Rd & Livingston Ave	TWSC	235	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	853	0.2	9.7	1.6	0.3	EBL	21.4	2.6	-
12	Main St W & Oakes Rd N	TWSC	914	0.4	9.6	2.2	0.2	SBR	33.0	8.5	-
14	South Service Road & GO North Access	Signalized	2,362	11.4	86.9	12.1	7.0	WBT	96.5	8.0	B
16	Livingston Avenue & GO South Access	TWSC	104	0.0	0.5	1.0	0.0	SBL	8.1	5.4	-

Livingston EA and Detail Design

Alternative 3 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	187	5.4	43.7	8.3	13.3	B	34.5	C	18.8	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	5.4	43.7	12.6	19.3	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	236	36.8	147.6	4.9	14.1	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	571	36.8	147.6	26.8	34.5	C						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	446	5.8	61.2	0.4	6.6	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	231	5.8	61.2	7.5	12.2	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	242	0.0	9.6	0.0	0.7	A	11.9	B	6.4	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	342	3.6	42.3	6.9	11.9	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	321	2.2	86.0	0.0	0.3	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	551	6.2	123.5	2.5	6.6	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	484	5.2	110.7	4.8	10.6	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	731	2.3	88.5	0.4	5.4	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	789	26.3	126.4	25.7	36.8	D	70.8	E	36.2	D		D
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	90	10.5	98.2	8.5	12.9	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	432	23.3	167.6	6.4	12.6	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	1125	44.0	201.2	17.7	26.3	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	651	165.8	445.8	46.0	70.8	E						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	96	96.0	431.7	26.7	41.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	553	93.0	190.2	0.6	2.7	A	148.0	F	53.8	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	442	97.1	194.5	36.7	46.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	415	97.3	194.6	114.8	148.0	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	421	40.8	130.6	19.5	29.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	219	40.8	130.6	51.6	62.3	E						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	61	40.8	130.6	42.1	51.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	70	19.3	95.4	26.4	34.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	403	21.7	98.1	34.4	42.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	173	21.4	97.9	27.5	37.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	178	83.5	140.1	6.3	14.2	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	237	83.5	140.1	25.5	34.2	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	739	83.4	140.0	66.0	82.7	F						
5	Casablanca Blvd & Livingston	Signalized	SBR	17	9.1	145.5	0.1	2.3	A	31.0	C	13.0	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	106	10.8	139.0	3.9	7.0	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	529	10.8	139.0	6.3	12.8	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	485	7.9	62.0	2.2	10.6	B						
5	Casablanca Blvd & Livingston	Signalized	WBT	11	7.9	62.0	23.0	31.0	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	42	7.9	62.0	21.0	26.0	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	19	2.3	24.5	1.8	5.6	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	123	2.7	19.5	13.7	18.0	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	6	2.7	19.5	9.3	13.1	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	8	2.1	24.9	0.4	4.4	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	14	2.2	21.6	19.8	24.7	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	48	2.2	21.6	22.7	28.6	C						

Livingston EA and Detail Design

Alternative 3 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	34	2.8	31.0	0.4	7.5	A	12.3	B	2.8		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	105	1.9	23.8	2.3	12.3	B						
6	Casablanca Blvd & Main St W	TWSC	WBR	104	0.0	0.0	0.0	0.8	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	225	0.0	0.0	0.0	0.6	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	405	0.4	40.6	0.3	1.5	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	75	0.8	49.5	1.2	4.1	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	28.9	44.2	-	-	-	177.6	F	55.9		F	F
7	S Service Rd & Industrial Dr	TWSC	SBT	0	29.4	44.8	1.1	17.8	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	271	29.3	44.6	35.3	61.0	F						
7	S Service Rd & Industrial Dr	TWSC	WBR	19	5.1	66.7	0.9	3.6	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	230	5.1	66.7	0.3	0.7	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	203	9.7	80.5	24.5	32.3	D						
7	S Service Rd & Industrial Dr	TWSC	NBR	131	56.6	107.8	125.5	177.6	F						
7	S Service Rd & Industrial Dr	TWSC	NBT	15	55.4	106.2	123.5	176.4	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	55.3	106.1	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	14.6	106.4	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	468	14.6	106.4	39.5	54.5	F						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	20.4	118.2	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	261	0.0	0.0	0.0	0.2	A	8.2	A	0.3		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	5.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	18	0.2	9.7	1.0	8.2	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	26	0.0	0.0	0.0	0.3	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	559	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	12.0	B	4.6		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	26	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	156	0.0	4.9	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	1	0.6	48.3	0.2	4.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	22	2.4	47.3	0.7	12.0	B						
9	Hunter Rd & Industrial Dr	TWSC	WBL	119	2.4	47.1	0.9	11.2	B						
9	Hunter Rd & Industrial Dr	TWSC	NBR	58	0.1	11.1	0.3	1.8	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	15	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	0.0	0.0	0.7	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 3 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	146	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	74	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	107	1.2	26.6	0.7	6.6	A	10.8	B	1.4		A	A
11	Hunter Rd & Main St W	TWSC	SBL	16	1.1	26.5	2.5	10.8	B						
11	Hunter Rd & Main St W	TWSC	WBR	11	0.0	0.0	0.0	0.4	A						
11	Hunter Rd & Main St W	TWSC	WBT	247	0.0	0.0	0.0	0.2	A						
11	Hunter Rd & Main St W	TWSC	EBT	464	0.1	25.7	0.0	0.5	A						
11	Hunter Rd & Main St W	TWSC	EBL	58	0.1	28.2	0.2	1.5	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.5	26.7	0.4	7.0	A	12.8	B	1.0		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.4	25.6	1.5	12.8	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.3	23.5	0.7	9.0	A						
12	Main St W & Oakes Rd N	TWSC	WBR	27	0.0	0.0	0.0	0.8	A						
12	Main St W & Oakes Rd N	TWSC	WBT	327	0.0	0.0	0.0	0.4	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.6	0.2	6.8	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.6	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	1.3	0.0	0.6	A						
12	Main St W & Oakes Rd N	TWSC	EBT	474	0.0	1.3	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.1	9.9	0.5	2.6	A						
14	South Service Road & GO North Access	Signalized	WBT	826	7.3	69.6	4.6	8.6	A	69.4	E	35.5	D		D
14	South Service Road & GO North Access	Signalized	WBL	117	7.3	69.6	10.8	17.2	B						
14	South Service Road & GO North Access	Signalized	NBR	288	7.3	72.8	7.7	17.2	B						
14	South Service Road & GO North Access	Signalized	NBL	58	7.3	72.8	15.1	21.7	C						
14	South Service Road & GO North Access	Signalized	EBR	42	87.8	113.9	38.2	53.4	D						
14	South Service Road & GO North Access	Signalized	EBT	878	92.4	118.6	49.3	69.4	E						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.5	17.8	-	-	-	5.8	A	5.0		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	58	0.4	16.8	0.2	5.8	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	11	0.0	0.0	0.0	0.6	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 3 - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,810	19.6	96.6	18.8	12.0	NBR	147.6	14.1	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,671	3.6	86.4	6.4	2.4	WBL	123.5	6.6	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	3,183	62.3	232.2	36.2	23.9	EBR	445.8	70.8	D
4	Casablanca Blvd & S Service Rd	Signalized	3,911	69.9	150.4	53.8	41.6	SBL	194.6	148.0	D
5	Casablanca Blvd & Livingston	Signalized	1,408	8.4	91.3	13.0	6.4	SBR	145.5	2.3	B
6	Casablanca Blvd & Main St W	TWSC	948	0.5	25.0	2.8	0.5	EBL	49.5	4.1	-
7	S Service Rd & Industrial Dr	TWSC	1,337	19.7	82.7	55.9	38.4	NBR	107.8	177.6	-
8	S Service Rd & Hunter Rd	TWSC	864	0.0	0.2	0.3	0.0	NBL	9.7	8.2	-
9	Hunter Rd & Industrial Dr	TWSC	398	0.9	20.3	4.6	0.4	WBR	48.3	4.0	-
10	Hunter Rd & Livingston Ave	TWSC	220	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	903	0.2	18.6	1.4	0.1	EBL	28.2	1.5	-
12	Main St W & Oakes Rd N	TWSC	940	0.1	3.2	1.0	0.1	SBR	26.7	7.0	-
14	South Service Road & GO North Access	Signalized	2,209	42.6	90.4	35.5	24.0	EBT	118.6	69.4	D
16	Livingston Avenue & GO South Access	TWSC	69	0.4	14.1	5.0	0.1	SBL	16.8	5.8	-

Livingston EA and Detail Design

Alternative 4 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	150	8.1	80.9	3.4	6.8	A	40.9	D	14.4	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	240	8.1	80.9	5.6	10.6	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	156	21.1	102.4	5.7	15.2	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	307	21.1	102.4	33.3	40.9	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	484	6.4	76.5	0.2	4.5	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	200	8.8	85.9	3.6	7.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	105	8.4	57.3	0.0	0.8	A	12.5	B	7.9	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	602	15.1	90.0	5.4	9.7	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	55	18.3	162.8	0.0	0.2	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	555	26.3	193.5	2.7	8.9	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	410	5.6	103.5	7.4	12.5	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	489	1.0	67.5	0.6	3.3	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	1027	30.4	127.4	12.7	19.6	B	21.9	C	17.0	B		B
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	120	15.4	99.2	4.8	9.1	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	325	17.1	157.8	3.4	7.6	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	822	33.6	191.4	15.0	21.9	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	362	21.4	154.8	5.4	11.4	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	74	0.6	19.9	4.5	7.1	A						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	755	30.2	97.7	0.3	3.0	A	51.5	D	29.4	C		C
4	Casablanca Blvd & S Service Rd	Signalized	SBT	303	33.6	101.9	28.4	34.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	321	32.0	100.2	23.5	31.6	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	189	24.0	119.2	5.6	9.2	A						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	193	24.0	119.2	44.9	51.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	42	24.0	119.2	42.7	48.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	56	23.8	136.9	27.0	34.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	406	26.1	139.7	35.7	44.3	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	304	26.0	139.6	25.5	35.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	115	38.0	138.7	0.7	5.5	A						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	129	38.0	138.7	19.5	24.3	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	568	38.0	138.7	40.8	50.0	D						
5	Casablanca Blvd & Livingston	Signalized	SBR	73	26.7	114.9	0.1	3.5	A	61.4	E	31.1	C		C
5	Casablanca Blvd & Livingston	Signalized	SBT	84	25.8	108.4	3.5	6.7	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	270	25.8	108.4	4.9	9.5	A						
5	Casablanca Blvd & Livingston	Signalized	WBR	607	96.8	131.8	13.3	50.2	D						
5	Casablanca Blvd & Livingston	Signalized	WBT	15	96.8	131.8	27.8	61.4	E						
5	Casablanca Blvd & Livingston	Signalized	WBL	75	96.8	131.8	27.9	33.8	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	20	22.1	71.6	1.0	4.6	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	123	21.4	66.7	13.6	18.2	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	11	21.4	66.7	14.5	18.9	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	1	1.5	16.2	0.1	3.3	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	3	1.3	12.8	24.0	29.0	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	14	1.3	12.8	21.3	26.7	C						

Livingston EA and Detail Design

Alternative 4 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	97	0.1	16.7	0.2	6.7	A	6.7	A	1.6		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	79	0.9	26.7	0.7	3.3	A						
6	Casablanca Blvd & Main St W	TWSC	WBR	159	0.0	0.0	0.0	1.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	377	0.0	0.0	0.0	1.0	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	239	0.0	0.0	0.0	0.1	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	25	0.1	10.0	2.0	4.8	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	9.3	46.2	-	-	-	17.5	C	5.2		A	A
7	S Service Rd & Industrial Dr	TWSC	SBT	6	8.3	43.6	1.9	17.5	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	231	7.6	41.2	1.9	14.8	B						
7	S Service Rd & Industrial Dr	TWSC	WBR	1	1.0	52.3	0.0	0.8	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	286	1.0	52.3	0.2	1.2	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	334	3.2	64.0	1.4	5.7	A						
7	S Service Rd & Industrial Dr	TWSC	NBR	151	2.7	29.5	0.3	5.8	A						
7	S Service Rd & Industrial Dr	TWSC	NBT	5	4.5	39.5	4.8	13.9	B						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	4.6	39.8	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	3.2	25.4	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	290	3.2	25.4	0.0	0.2	A						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	3.7	33.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	334	0.0	0.0	0.0	0.1	A	14.2	B	4.0		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	69	1.7	52.6	0.5	6.2	A						
8	S Service Rd & Hunter Rd	TWSC	NBL	221	5.1	50.8	2.8	14.2	B						
8	S Service Rd & Hunter Rd	TWSC	EBR	51	0.0	0.0	0.0	0.4	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	238	0.0	0.0	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	4.1	-	-	-	9.0	A	4.4		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	28	0.0	1.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	97	0.0	10.3	0.0	0.7	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	231	4.6	44.2	0.4	7.4	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	37	1.6	42.5	0.4	9.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBL	31	1.6	42.3	0.7	8.3	A						
9	Hunter Rd & Industrial Dr	TWSC	NBR	93	0.1	13.9	0.1	1.6	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	47	0.0	1.4	0.0	0.1	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	9	0.0	6.4	0.4	1.8	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 4 - Weekday AM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	58	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	149	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	42	0.7	17.7	0.3	5.6	A	8.2	A	0.8		A	A
11	Hunter Rd & Main St W	TWSC	SBL	23	0.7	17.6	0.8	8.2	A						
11	Hunter Rd & Main St W	TWSC	WBR	57	0.0	0.0	0.0	0.8	A						
11	Hunter Rd & Main St W	TWSC	WBT	415	0.0	0.0	0.0	0.1	A						
11	Hunter Rd & Main St W	TWSC	EBT	243	0.0	0.0	0.0	0.0	A						
11	Hunter Rd & Main St W	TWSC	EBL	76	0.1	11.5	0.4	2.3	A						
12	Main St W & Oakes Rd N	TWSC	SBR	56	2.1	29.5	0.6	7.7	A	9.1	A	1.9		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	0	2.2	30.2	-	-	-						
12	Main St W & Oakes Rd N	TWSC	SBL	77	2.1	29.5	0.6	9.1	A						
12	Main St W & Oakes Rd N	TWSC	WBR	96	0.0	6.8	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBT	363	0.0	6.8	0.0	0.9	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	14.3	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	0.0	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	0	0.0	6.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBT	242	0.0	6.4	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	70	0.3	22.6	0.5	2.7	A						
14	South Service Road & GO North Access	Signalized	WBT	1042	10.6	94.0	4.6	8.8	A	19.1	B	13.4	B		B
14	South Service Road & GO North Access	Signalized	WBL	208	10.6	94.0	12.0	18.8	B						
14	South Service Road & GO North Access	Signalized	NBR	79	6.9	47.7	1.2	6.4	A						
14	South Service Road & GO North Access	Signalized	NBL	45	6.9	47.7	13.7	19.1	B						
14	South Service Road & GO North Access	Signalized	EBR	62	19.3	95.9	8.3	13.3	B						
14	South Service Road & GO North Access	Signalized	EBT	741	21.4	99.1	11.7	18.6	B						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.0	9.3	-	-	-	5.6	A	0.9		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	6	0.1	9.5	0.2	5.6	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	88	0.0	0.0	0.0	0.6	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 4 - Weekday AM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,537	11.6	86.6	14.4	9.0	NBR	102.4	15.2	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,216	12.8	113.7	7.9	3.6	WBL	193.5	8.9	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	2,730	27.1	149.8	17.0	10.8	NBT	191.4	21.9	B
4	Casablanca Blvd & S Service Rd	Signalized	3,381	30.8	120.3	29.4	22.9	NBT	139.7	44.3	C
5	Casablanca Blvd & Livingston	Signalized	1,296	63.2	115.1	31.1	11.1	WBR	131.8	50.2	C
6	Casablanca Blvd & Main St W	TWSC	976	0.1	4.1	1.6	0.1	SBL	26.7	3.3	-
7	S Service Rd & Industrial Dr	TWSC	1,304	3.4	44.6	5.2	0.8	WBL	64.0	5.7	-
8	S Service Rd & Hunter Rd	TWSC	913	1.4	16.3	4.0	0.7	NBR	52.6	6.2	-
9	Hunter Rd & Industrial Dr	TWSC	573	2.0	27.1	4.4	0.2	WBR	44.2	7.4	-
10	Hunter Rd & Livingston Ave	TWSC	207	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	856	0.1	2.4	0.8	0.1	SBR	17.7	5.6	-
12	Main St W & Oakes Rd N	TWSC	904	0.3	11.3	1.9	0.1	SBL	29.5	9.1	-
14	South Service Road & GO North Access	Signalized	2,177	14.3	93.1	13.4	7.9	EBT	99.1	18.6	B
16	Livingston Avenue & GO South Access	TWSC	94	0.0	0.6	0.9	0.0	SBL	9.5	5.6	-

Livingston EA and Detail Design

Alternative 4 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
1	Casablanca Blvd & North Service Rd	Signalized	WBT	187	5.2	48.4	9.0	13.8	B	36.1	D	19.2	B		B
1	Casablanca Blvd & North Service Rd	Signalized	WBL	139	5.2	48.4	10.8	17.0	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBR	238	38.6	161.8	5.0	14.7	B						
1	Casablanca Blvd & North Service Rd	Signalized	NBL	572	38.6	161.8	28.2	36.1	D						
1	Casablanca Blvd & North Service Rd	Signalized	EBR	446	2.7	51.8	0.4	6.3	A						
1	Casablanca Blvd & North Service Rd	Signalized	EBT	229	5.9	61.2	8.0	13.0	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBR	241	0.0	1.3	0.0	0.6	A	10.7	B	6.1	A		A
2	Casablanca Blvd & North Ramp Terminal	Signalized	SBT	342	3.3	30.4	6.2	10.7	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBR	321	1.2	57.0	0.0	0.3	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	WBL	550	4.8	94.5	2.2	6.0	A						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBT	485	5.3	98.9	4.6	10.4	B						
2	Casablanca Blvd & North Ramp Terminal	Signalized	NBL	719	2.2	93.5	0.4	5.5	A						
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBT	785	26.7	126.4	26.9	37.9	D	65.6	E	36.4	D		D
3	Casablanca Blvd & South Ramp Terminal	Signalized	SBL	90	10.9	98.2	8.4	12.6	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBR	432	28.6	171.2	7.5	13.5	B						
3	Casablanca Blvd & South Ramp Terminal	Signalized	NBT	1110	50.3	204.8	19.5	28.3	C						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBR	655	166.0	436.5	43.3	65.6	E						
3	Casablanca Blvd & South Ramp Terminal	Signalized	EBL	97	119.5	413.0	28.9	42.9	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBR	554	92.6	190.4	0.9	3.3	A	143.7	F	51.2	D		D
4	Casablanca Blvd & S Service Rd	Signalized	SBT	439	96.6	194.6	35.6	45.6	D						
4	Casablanca Blvd & S Service Rd	Signalized	SBL	415	94.9	192.9	111.3	143.7	F						
4	Casablanca Blvd & S Service Rd	Signalized	WBR	420	24.1	111.1	12.7	20.9	C						
4	Casablanca Blvd & S Service Rd	Signalized	WBT	224	24.1	111.1	40.6	48.5	D						
4	Casablanca Blvd & S Service Rd	Signalized	WBL	61	24.1	111.1	32.1	39.0	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBR	74	19.5	85.9	23.2	30.7	C						
4	Casablanca Blvd & S Service Rd	Signalized	NBT	417	22.1	88.8	32.2	40.1	D						
4	Casablanca Blvd & S Service Rd	Signalized	NBL	173	21.8	88.6	31.0	41.2	D						
4	Casablanca Blvd & S Service Rd	Signalized	EBR	173	81.3	139.1	6.4	13.3	B						
4	Casablanca Blvd & S Service Rd	Signalized	EBT	244	81.3	139.1	26.2	34.4	C						
4	Casablanca Blvd & S Service Rd	Signalized	EBL	722	81.3	139.1	67.3	83.0	F						
5	Casablanca Blvd & Livingston	Signalized	SBR	17	9.1	124.0	0.1	3.1	A	28.4	C	13.1	B		B
5	Casablanca Blvd & Livingston	Signalized	SBT	103	11.0	121.6	3.7	6.6	A						
5	Casablanca Blvd & Livingston	Signalized	SBL	529	11.0	121.6	6.5	12.8	B						
5	Casablanca Blvd & Livingston	Signalized	WBR	484	8.0	61.7	2.1	10.7	B						
5	Casablanca Blvd & Livingston	Signalized	WBT	11	8.0	61.7	21.0	28.4	C						
5	Casablanca Blvd & Livingston	Signalized	WBL	42	8.0	61.7	21.3	26.4	C						
5	Casablanca Blvd & Livingston	Signalized	NBR	19	2.7	26.3	1.7	5.2	A						
5	Casablanca Blvd & Livingston	Signalized	NBT	142	3.0	21.4	13.7	18.1	B						
5	Casablanca Blvd & Livingston	Signalized	NBL	6	3.0	21.4	11.2	14.8	B						
5	Casablanca Blvd & Livingston	Signalized	EBR	8	2.1	24.9	0.8	4.9	A						
5	Casablanca Blvd & Livingston	Signalized	EBT	14	2.2	21.6	21.6	26.6	C						
5	Casablanca Blvd & Livingston	Signalized	EBL	48	2.2	21.6	22.5	28.4	C						

Livingston EA and Detail Design

Alternative 4 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
6	Casablanca Blvd & Main St W	TWSC	SBR	35	0.0	12.5	0.2	5.8	A	5.8	A	1.3		A	A
6	Casablanca Blvd & Main St W	TWSC	SBL	104	0.6	22.5	1.0	4.1	A						
6	Casablanca Blvd & Main St W	TWSC	WBR	104	0.0	0.0	0.0	0.9	A						
6	Casablanca Blvd & Main St W	TWSC	WBT	225	0.0	0.0	0.0	0.6	A						
6	Casablanca Blvd & Main St W	TWSC	EBT	405	0.0	0.0	0.0	0.2	A						
6	Casablanca Blvd & Main St W	TWSC	EBL	98	0.2	15.1	0.8	3.1	A						
7	S Service Rd & Industrial Dr	TWSC	SBR	0	33.0	46.2	-	-	-	72.6	F	39.8		E	E
7	S Service Rd & Industrial Dr	TWSC	SBT	0	30.7	43.6	1.8	20.5	C						
7	S Service Rd & Industrial Dr	TWSC	SBL	250	28.7	41.3	32.8	62.1	F						
7	S Service Rd & Industrial Dr	TWSC	WBR	19	10.7	98.4	0.9	1.9	A						
7	S Service Rd & Industrial Dr	TWSC	WBT	232	10.7	98.4	6.9	9.1	A						
7	S Service Rd & Industrial Dr	TWSC	WBL	204	14.9	110.1	19.6	27.3	D						
7	S Service Rd & Industrial Dr	TWSC	NBR	242	19.3	92.7	27.6	51.9	F						
7	S Service Rd & Industrial Dr	TWSC	NBT	20	25.7	102.7	44.1	72.6	F						
7	S Service Rd & Industrial Dr	TWSC	NBL	0	25.9	103.1	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBR	0	23.1	121.5	-	-	-						
7	S Service Rd & Industrial Dr	TWSC	EBT	371	23.1	121.5	26.0	43.2	E						
7	S Service Rd & Industrial Dr	TWSC	EBL	0	29.5	134.7	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	WBT	264	0.0	0.0	0.0	0.1	A	8.5	A	0.4		A	A
8	S Service Rd & Hunter Rd	TWSC	WBL	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBR	0	0.0	0.0	-	-	-						
8	S Service Rd & Hunter Rd	TWSC	NBL	18	0.2	11.2	1.8	8.5	A						
8	S Service Rd & Hunter Rd	TWSC	EBR	131	0.0	0.0	0.0	0.6	A						
8	S Service Rd & Hunter Rd	TWSC	EBT	453	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBR	0	0.0	0.0	-	-	-	12.9	B	4.0		A	A
9	Hunter Rd & Industrial Dr	TWSC	SBT	30	0.0	0.0	0.0	0.2	A						
9	Hunter Rd & Industrial Dr	TWSC	SBL	257	0.0	4.7	0.0	0.6	A						
9	Hunter Rd & Industrial Dr	TWSC	WBR	1	0.4	37.7	0.1	4.0	A						
9	Hunter Rd & Industrial Dr	TWSC	WBT	22	2.5	36.5	1.0	12.9	B						
9	Hunter Rd & Industrial Dr	TWSC	WBL	120	2.6	36.3	1.3	11.8	B						
9	Hunter Rd & Industrial Dr	TWSC	NBR	38	0.1	10.9	0.6	2.9	A						
9	Hunter Rd & Industrial Dr	TWSC	NBT	15	0.0	0.0	0.0	0.0	A						
9	Hunter Rd & Industrial Dr	TWSC	NBL	1	0.0	3.1	0.1	1.7	A						
9	Hunter Rd & Industrial Dr	TWSC	EBR	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBT	0	0.0	0.0	-	-	-						
9	Hunter Rd & Industrial Dr	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 4 - Weekday PM Peak Hour

Measures of Effectiveness Details



Node	Location	Control Type	Movement	Volume (All)	Modeled Queue (m)		Stop Delay (s)	Delay (s)	LOS	Critical Mvmt		Intersection			
					Ave	Max				Delay (s)	LOS	Delay (s)	Signal LOS	Unsignal LOS	LOS
10	Hunter Rd & Livingston Ave	TWSC	SBR	0	0.0	0.0	-	-	-	0.0	A	0.0		A	A
10	Hunter Rd & Livingston Ave	TWSC	SBT	151	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	SBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	WBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	NBT	55	0.0	0.0	0.0	0.0	A						
10	Hunter Rd & Livingston Ave	TWSC	NBL	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBR	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBT	0	0.0	0.0	-	-	-						
10	Hunter Rd & Livingston Ave	TWSC	EBL	0	0.0	0.0	-	-	-						
11	Hunter Rd & Main St W	TWSC	SBR	107	1.6	21.8	0.2	6.1	A	8.3	A	1.0		A	A
11	Hunter Rd & Main St W	TWSC	SBL	20	1.5	21.9	0.4	8.3	A						
11	Hunter Rd & Main St W	TWSC	WBR	11	0.0	0.0	0.0	0.7	A						
11	Hunter Rd & Main St W	TWSC	WBT	247	0.0	0.0	0.0	0.0	A						
11	Hunter Rd & Main St W	TWSC	EBT	484	0.0	0.0	0.0	0.0	A						
11	Hunter Rd & Main St W	TWSC	EBL	38	0.0	7.4	0.1	1.3	A						
12	Main St W & Oakes Rd N	TWSC	SBR	34	1.2	22.8	0.4	6.8	A	11.6	B	1.0		A	A
12	Main St W & Oakes Rd N	TWSC	SBT	3	1.2	23.5	0.8	11.6	B						
12	Main St W & Oakes Rd N	TWSC	SBL	50	1.2	22.8	0.4	7.8	A						
12	Main St W & Oakes Rd N	TWSC	WBR	27	0.0	2.9	0.0	0.7	A						
12	Main St W & Oakes Rd N	TWSC	WBT	326	0.0	2.9	0.0	0.4	A						
12	Main St W & Oakes Rd N	TWSC	WBL	0	0.0	7.9	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBR	2	0.0	8.1	0.2	7.0	A						
12	Main St W & Oakes Rd N	TWSC	NBT	0	0.0	10.4	-	-	-						
12	Main St W & Oakes Rd N	TWSC	NBL	0	0.0	10.3	-	-	-						
12	Main St W & Oakes Rd N	TWSC	EBR	1	0.0	2.2	0.0	0.7	A						
12	Main St W & Oakes Rd N	TWSC	EBT	474	0.0	2.2	0.0	0.1	A						
12	Main St W & Oakes Rd N	TWSC	EBL	22	0.1	18.1	0.2	1.6	A						
14	South Service Road & GO North Access	Signalized	WBT	831	10.0	96.2	6.7	11.4	B	59.1	E	32.1	C		C
14	South Service Road & GO North Access	Signalized	WBL	118	10.0	96.2	14.1	20.0	C						
14	South Service Road & GO North Access	Signalized	NBR	289	7.0	61.3	6.8	15.9	B						
14	South Service Road & GO North Access	Signalized	NBL	58	7.0	61.3	19.0	25.7	C						
14	South Service Road & GO North Access	Signalized	EBR	41	87.1	115.3	30.6	42.7	D						
14	South Service Road & GO North Access	Signalized	EBT	865	90.2	118.5	41.9	59.1	E						
16	Livingston Avenue & GO South Access	TWSC	SBR	0	0.5	17.8	-	-	-	5.8	A	4.9		A	A
16	Livingston Avenue & GO South Access	TWSC	SBL	58	0.5	18.0	0.2	5.8	A						
16	Livingston Avenue & GO South Access	TWSC	WBR	11	0.0	0.0	0.0	0.5	A						
16	Livingston Avenue & GO South Access	TWSC	WBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBT	0	0.0	0.0	-	-	-						
16	Livingston Avenue & GO South Access	TWSC	EBL	0	0.0	0.0	-	-	-						

Livingston EA and Detail Design

Alternative 4 - Weekday PM Peak Hour

Measures of Effectiveness Summary



ID	Intersection Name	Control Type	# Vehicles Entering Intersection	Intersection Average (Weighted by Movement and Volume)				Critical Movement			Overall Intersection LOS
				Average Queue Length (m)	Max Queue Length (m)	Total Delay (sec)	Stopping Delay (sec)	Movement	Max Queue Length (m)	Average Delay (s)	
1	Casablanca Blvd & North Service Rd	Signalized	1,811	19.6	101.6	19.2	12.4	NBR	161.8	14.7	B
2	Casablanca Blvd & North Ramp Terminal	Signalized	2,658	3.1	73.8	6.1	2.2	NBT	98.9	10.4	A
3	Casablanca Blvd & South Ramp Terminal	Signalized	3,169	66.4	232.0	36.4	24.6	EBR	436.5	65.6	D
4	Casablanca Blvd & S Service Rd	Signalized	3,916	65.6	144.6	51.2	39.6	SBT	194.6	45.6	D
5	Casablanca Blvd & Livingston	Signalized	1,423	8.4	82.4	13.1	6.6	SBR	124.0	3.1	B
6	Casablanca Blvd & Main St W	TWSC	971	0.1	4.4	1.3	0.2	SBL	22.5	4.1	-
7	S Service Rd & Industrial Dr	TWSC	1,338	19.9	94.9	39.8	23.2	EBT	121.5	43.2	-
8	S Service Rd & Hunter Rd	TWSC	866	0.0	0.2	0.4	0.0	NBL	11.2	8.5	-
9	Hunter Rd & Industrial Dr	TWSC	484	0.8	14.1	4.0	0.4	WBR	37.7	4.0	-
10	Hunter Rd & Livingston Ave	TWSC	206	0.0	0.0	0.0	0.0	None	0.0	0.0	-
11	Hunter Rd & Main St W	TWSC	907	0.2	3.4	1.0	0.0	SBL	21.9	8.3	-
12	Main St W & Oakes Rd N	TWSC	939	0.1	4.8	1.0	0.0	SBT	23.5	11.6	-
14	South Service Road & GO North Access	Signalized	2,202	42.5	99.8	32.1	21.7	EBT	118.5	59.1	C
16	Livingston Avenue & GO South Access	TWSC	69	0.4	15.1	4.9	0.1	SBL	18.0	5.8	-