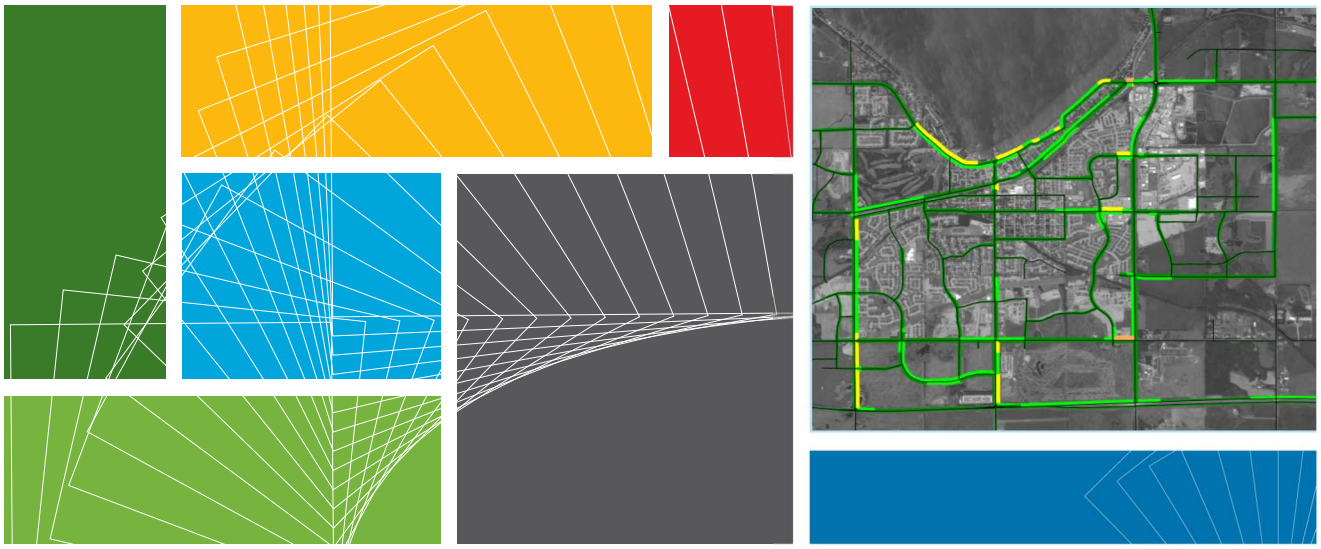

Town of Sylvan Lake

Transportation Master Plan
Final Report

April 2022

ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, and land projects.

Corporate Authorization

This document entitled “Town of Sylvan Lake Transportation Master Plan” has been prepared by ISL Engineering and Land Services Ltd. (ISL) for the use of the Town of Sylvan Lake. The information and data provided herein represent ISL’s professional judgment at the time of preparation. ISL denies any liability whatsoever to any other parties who may obtain this report and use it, or any of its contents, without prior written consent from ISL.

Alexander Ho, P.Eng., PTOE Project Manager	Barkley Law, P.Eng. Travel Demand Model / Traffic Analyst

Permit to Practice

ISL Engineering and Land Services Ltd.

RM Signature: _____

RM APEGA ID: 71664

Date: 2022-04-22

Permit Number P4741

The Association of Professional Engineers and Geoscientists of Alberta

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1.0 Introduction

The Town of Sylvan Lake (Sylvan Lake) retained ISL Engineering and Land Services Ltd. (ISL) to update the Town of Sylvan Lake Transportation Master Plan (TMP), previously prepared in 2016.

For this TMP Update, Sylvan Lake's first travel demand model was developed. The model provides a more comprehensive tool for evaluation and assessment of the road network, now and in the future. The ultimate goal of the TMP is to provide a framework for Council and Administration to assess the capability of the road network to accommodate new development in the short- and long-term. This information is also useful for carrying out short- and long-term planning and budgeting, including the update of off-site levies.

This report summarizes the development and findings and recommendations built from the existing and future 5-, 10-, 20- and 25-year horizon travel demand models.

1.1 Background

Sylvan Lake is located near the junction of Highway 11 and Highway 20 in central Alberta, approximately 24 km west of Red Deer. Sylvan Lake has a population of 17,200 according to the Town's 2019 Community Profile. Sylvan Lake is also a major tourist destination, and the Town hosts around 760,000 visitors each summer. The Town is bisected by the CN spur line between Rocky Mountain House and Blackfalds / Red Deer; the track runs adjacent to the downtown area. This updated TMP contemplates further potential growth of the Town, with approximately 20 additional quarter sections of development anticipated in the east, south and west directions.

1.2 Purpose of Study

The primary objectives of this TMP update are to:

- Develop an existing PM peak travel demand model of the Town using existing land uses, population (17,200) and jobs. The existing scenario model is calibrated to existing summer weekday traffic counts to account for the increased visitor population within the Town;
- Undertake roadway capacity and intersection analysis of major roadways and intersections at the existing horizon and determine any improvements that may be warranted;
- A future travel demand model is developed for the 30,000 (15-year) and 38,000 (25-year) population horizons to assess future growth of the town;
- Compile the future land uses, population and jobs for the 30,000 and 38,000 population horizons;
- The traffic volumes of the 22,000 (5-year), 26,000 (10-year), and 34,000 (20-year) population horizons are estimated by interpolating the traffic volumes of the existing, 30,000 and 38,000 population travel demand models;
- Undertake roadway capacity and intersection analysis of major roadways and intersections at all future horizons and determine the potential timing of any improvements that may be warranted;
- Provide updated Class 5 cost estimates for existing road upgrades and future road construction for the purposes of updating the Town's transportation off-site levies;
- Determine the ultimate options for public transit; and
- Provide a best practices review of different traffic calming measures in other municipalities.

2.0 Land Use and Modelling

Long-term forecasting for the TMP Update was completed with a travel demand model that ties directly to existing and future land use for Sylvan Lake and provides a rational basis on which to assess future transportation requirements. The travel demand model developed for the TMP will also provide an effective foundation for Sylvan Lake's ongoing use including evolution of land use plans, infrastructure planning, supporting development applications, and other design purposes. The following sections provide a summary of the land use assumptions that form the basis for recommendations in this report.

2.1 Existing Land Use and Modelling

In Sylvan Lake, the majority of the developed area is located west of Highway 20 and north of Memorial Trail with the downtown core established along Lakeshore Drive. Most commercial land uses are found in the downtown area and along 47 Avenue near Highway 20. Industrial land uses are primarily located east of Highway 20.

2.1.1 Existing Zone Setup

For modelling purposes, Sylvan Lake and the surrounding area were subdivided into various transportation zones, as shown in Exhibit 2.1. The zone boundaries generally follow road boundaries and reflect natural and man-made divisions such as major roads, the railway tracks, section lines, and separate land use types. Generally, the zone system provides a good breakout of the areas within Sylvan Lake's boundaries, and provides a reasonably fine definition of land uses and zone connections to the road network for transportation modelling. The existing model for Sylvan Lake consists of 54 internal zones, with 49 zones within Sylvan Lake (100 series zones in red in Exhibit 2.1) and 5 zones within Red Deer County, adjacent to Sylvan Lake (the 200 series zones in green).

Located within Red Deer County and along the Highway 11, Highway 11A and Highway 20 corridors, Sylvan Lake services many external trips (external to internal, internal to external, and external to external). With the external trips, the interaction between residential and employment zones within Sylvan Lake and the external municipalities is a key consideration. To provide a reasonable snapshot of transportation requirements and their impact on roadways within Sylvan Lake, the transportation demand model was developed with 11 external zones (1000 series zone in white in Exhibit 2.1) to account for the external trips. External zones are used in the model to represent traffic passing into and out of Sylvan Lake's transportation system from regional destinations (Table 2.1).

Table 2.1: External Zones

External Zone	Roadway	External Zone	Roadway
1001	Highway 11 (East)	1007	Township Rd 390 (West)
1002	Range Rd12 (South)	1008	Highway 20 (North)
1003	Range Rd 13 (South)	1009	Range Rd 12 (North)
1004	Highway 781 (South)	1010	Range Rd 11 (North)
1005	Highway 11 (West)	1011	Highway 11A (East)
1006	Township Rd 385 (West)		

2.1.2 Existing Population and Employment

Existing population data by neighborhood area was derived from the 2016 Federal Census and the Town's 2019 Community Profile. The existing population data was further divided into smaller zones by ISL for the travel demand model. General employment data at the town level was obtained from the Town's 2019 Community Profile and from Statistics Canada. The employment data by zone and employment categories was estimated and confirmed with the Town prior to use in the model. There are five employment categories:

- Retail Employment – employment at retail / higher-turnover businesses
- Non-Retail Employment – employment at non-retail / lower-turnover businesses including offices
- Industrial Employment – employment at auto shops / industrial sites
- School Employment – employment at elementary / secondary schools
- Lake Employment – employment at waterfront / tourist-oriented retail

In 2019, the Town had an approximate population of 17,200 people, with 7,300 households and 2,900 jobs. From the 2016 Federal census, two-thirds of those employed in Sylvan lake are local residents, while the remaining one-third reside outside the town. In addition, 38% of local residents work in town, 37% work in Red Deer and 25% work elsewhere outside of Sylvan Lake.

The population and employment data are summarized in Appendix A and is shown graphically in Exhibits 2.2 and 2.3.

2.1.3 Existing Roadway Classification

For modelling purposes, the existing road classifications and related roadway capacities were based on the practical function of each roadway, while considering the local context. The modelled road classifications for Sylvan Lake's transportation network are shown in Exhibit 2.4.

2.2 Future Land Use and Modelling

In this TMP update, future horizons with 30,000 and 38,000 populations were modelled. The future land use was based on approved Area Structure Plans (ASPs), Outline Plans (OPs) and Area Redevelopment Plans (ARPs) within the Town. The locations of these planning areas are summarized in Table 2.2 and shown in Appendix A. Four ASPs, twelve OPs and two ARPs were referenced in the future model.

Table 2.2: Referenced ASP, ARP and OP

ASP / ARP	OP	External Zone	38,000 Population	30,000 Population
NE Gateway ASP	-	147, 148, 149	Included	147 - Included 148 – 50% Included 149 – 15% included
North East ASP	-	108	Included	Included
-	Ryders Ridge	126, 127	Included	Included
South ASP (Zones 126, 127 and 130-141)	Lakeway Landing	130, 131	Included	Included
	Beacon Hill	132, 133	Included	Included
	Crestview	134, 135	Included	Included

ASP / ARP	OP	External Zone	38,000 Population	30,000 Population
	Vista @ Ryders Ridge	136, 137	Included	Included
	-	138, 139	Included	50% Included
	Meadowlands Resort	140	Included	50% Included
	-	141	Included	50% Included
West ASP (Zones 142 to 146)	-	142	Included	Not Included
	Tripp Lands	143	Included	50% Included
	-	144	Included	50% Included
	Waterford	145	Included	75% Included
	Pogadl Park	146	Included	75% Included
-	Hewiett Park	114	Included	Included
-	Norell Business Park	121	Included	75% Included
-	Lighthouse Point South	129	Included	Not Included
-	Iron Gate	128	Included	60% Included
50 Street ARP	-	110, 112, 123-125	Included	Included
Waterfront ARP	-	102, 104-107 and 111	Included	Included

2.2.1 Future Population and Employment

The future population and household information was extracted from the available ASPs and OPs. For Zone 129, where only half of the area has land use from the Lighthouse Point South OP, the total land use in Zone 129 is assumed to be double that of the OP. Following similar methodologies as the existing employment estimation, employment figures were estimated within the ASP and OP areas where commercial, industrial, and school land uses were identified. Retail employment is primarily located in Zones 138 and 139, while industrial employment is focussed in Zones 147,148 and 149. In addition, the non-retail and school jobs are spread out within the Town's residential areas. For the ARP areas, a modest 10% growth factor above the existing land use (population, households and employment) were assumed to reflect modest future densification.

Using the available ASP, ARP and OP information it was estimated that, for the two modeled future study horizons, the following overall population and employment figures can be used:

- Population will increase from 17,200 (existing) to 30,000 by 2035, and to 38,000 by 2045;
- Households will increase from 7,300 (existing) to 12,500 by 2035, and to 16,000 by 2045; and
- Locally-based employment will increase from 2,900 (existing) to 5,200 by 2035, and to 6,700 by 2045.

The overall future population and employment levels and build-out assumptions for each zone were reviewed and confirmed by the Town. The 38,000 population and employment data are shown in Exhibits 2.5 and 2.6, and summarized in Appendix A. The 30,000 population and employment data are shown in Exhibits 2.7 and 2.8, and summarized in Appendix A.

The “build out” population of 38,000 is expected to be reached by 2045 (25 years). Using the existing population of 17,200 in 2019 and assuming a linear population growth, the various interim population horizons are estimated as follows:

- 22,000 population by 2025 (5-Year);
- 26,000 population by 2030 (10-Year);
- 30,000 population by 2035 (15-Year);
- 34,000 population by 2040 (20-Year);

2.2.2 Future Roadway Classification

For modelling purposes, the future road classifications and related capacities were based on the road classifications as proposed in the ASPs. The road classifications for Sylvan Lake’s future transportation network are shown in Exhibit 2.9.

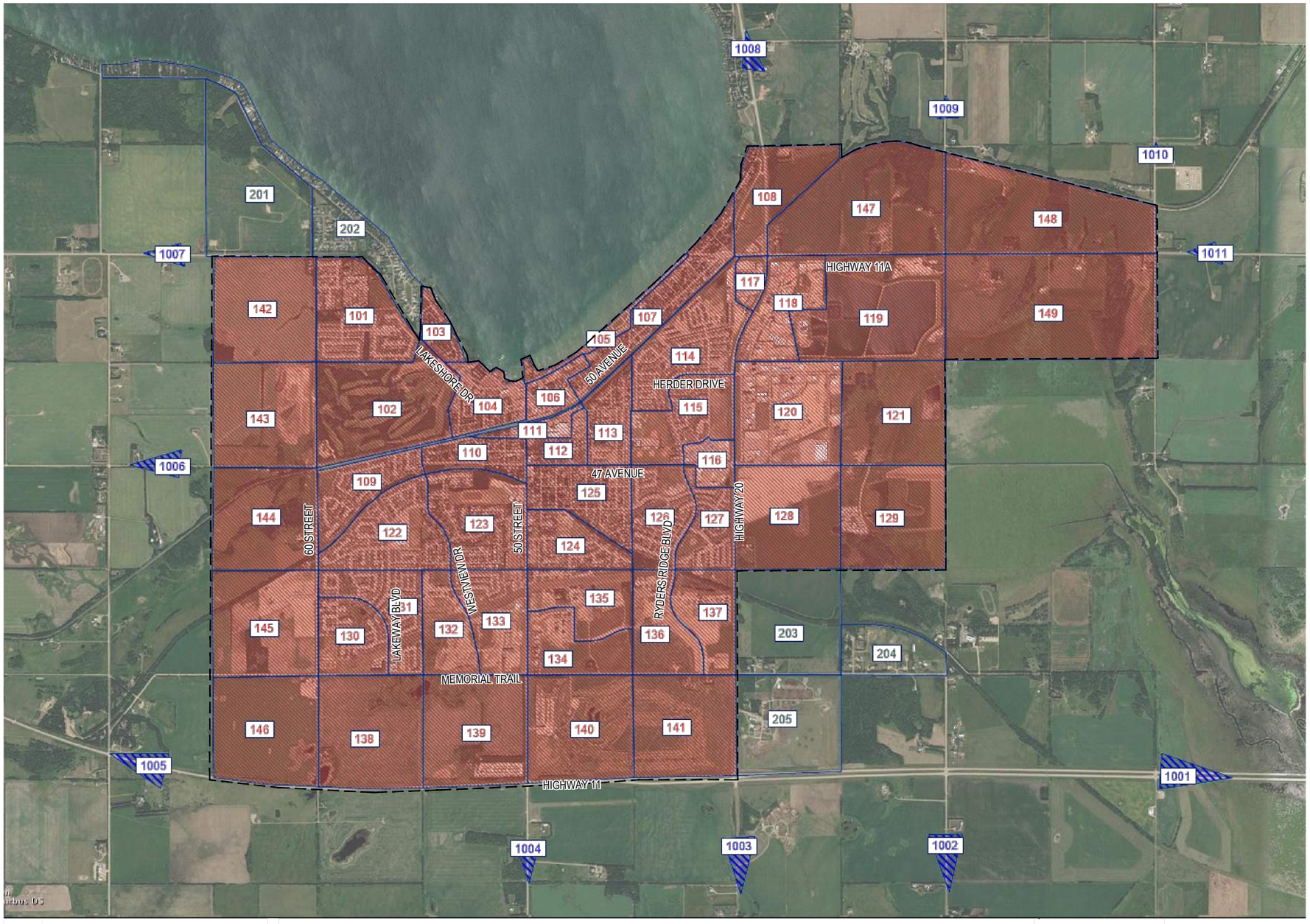
2.2.3 Future Background Traffic Growth

At the two modeled future 30,000 and 38,000 population horizons, traffic to/from the external gates will also change. The future external to external trips were calculated based on historic highway growth patterns. Using Average Annual Daily Traffic (AADT) data from Alberta Transportation (AT) (2002-2019), the linear highway annual growth rates for the external gates are summarized in Table 2.3.

Table 2.3: Historic Highway Linear Growth Rates

External Zone	Roadway	Growth Rate / Year
1001	Highway 11 (East)	3.0%
1002	Range Rd 12 (South)	3.0%
1003	Range Rd 13 (South)	3.0%
1004	Highway 781 (South)	4.4%
1005	Highway 11 (West)	3.0%
1006	Township Rd 385 (West)	3.0%
1007	Township Rd 390 (West)	3.0%
1008	Highway 20 (North)	4.7%
1009	Range Rd 12 (North)	2.9%
1010	Range Rd 11 (North)	2.9%
1011	Highway 11A (East)	2.9%

For the future external to internal and internal to external trips, a uniform 5% linear annual growth rate was applied. This is consistent with the projected 5% population and employment growth rate for the overall Town.



Legend:

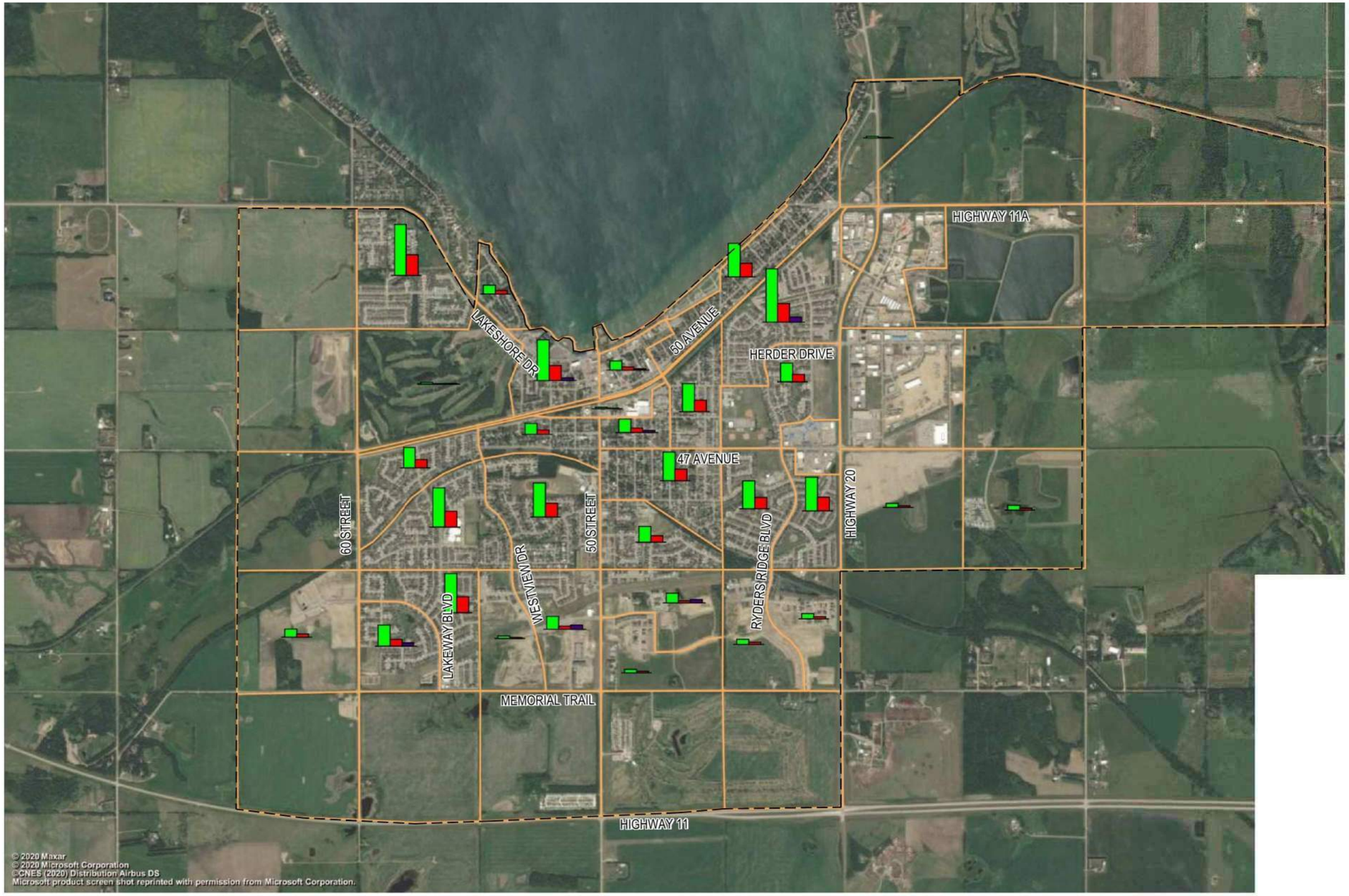
EXTERNAL ZONE — – – TOWN BOUNDARY

INTERNAL ZONE

SYLVAN LAKE TMP

TRANSPORTATION ZONES

EXHIBIT 2.1
Feb 2022



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ISL Sylvan Lake

Scaling
2000
1000
500
0

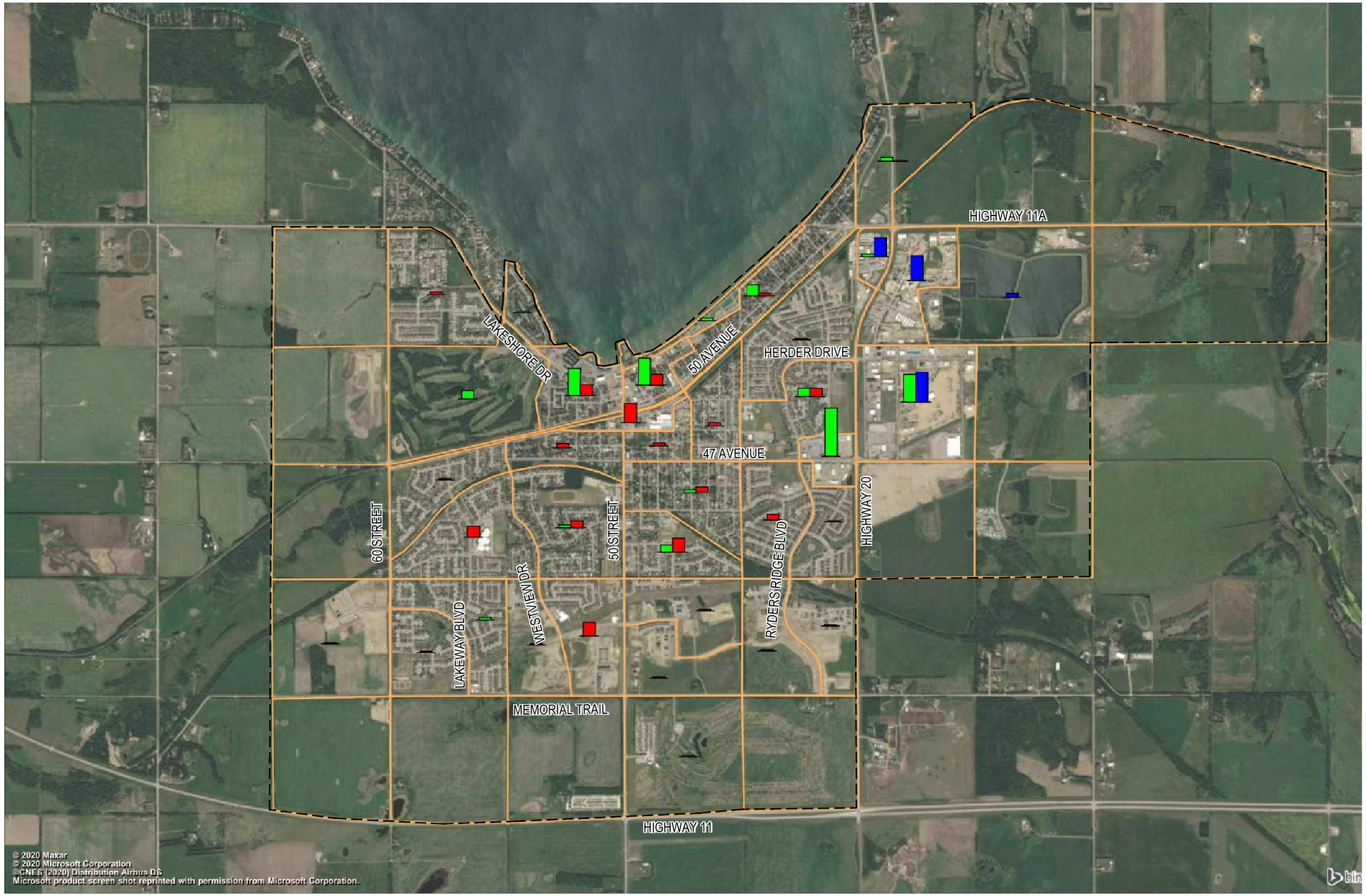
ZONE BOUNDARY
POP POPULATION
HH_SF HOUSEHOLD SINGLE-FAMILY
HH_MF HOUSEHOLD MULTI-FAMILY
TOWN BOUNDARY

SYLVAN LAKE TMP

EXISTING POPULATION

EXHIBIT 2.2

Feb 2022



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ISL Sylvan Lake

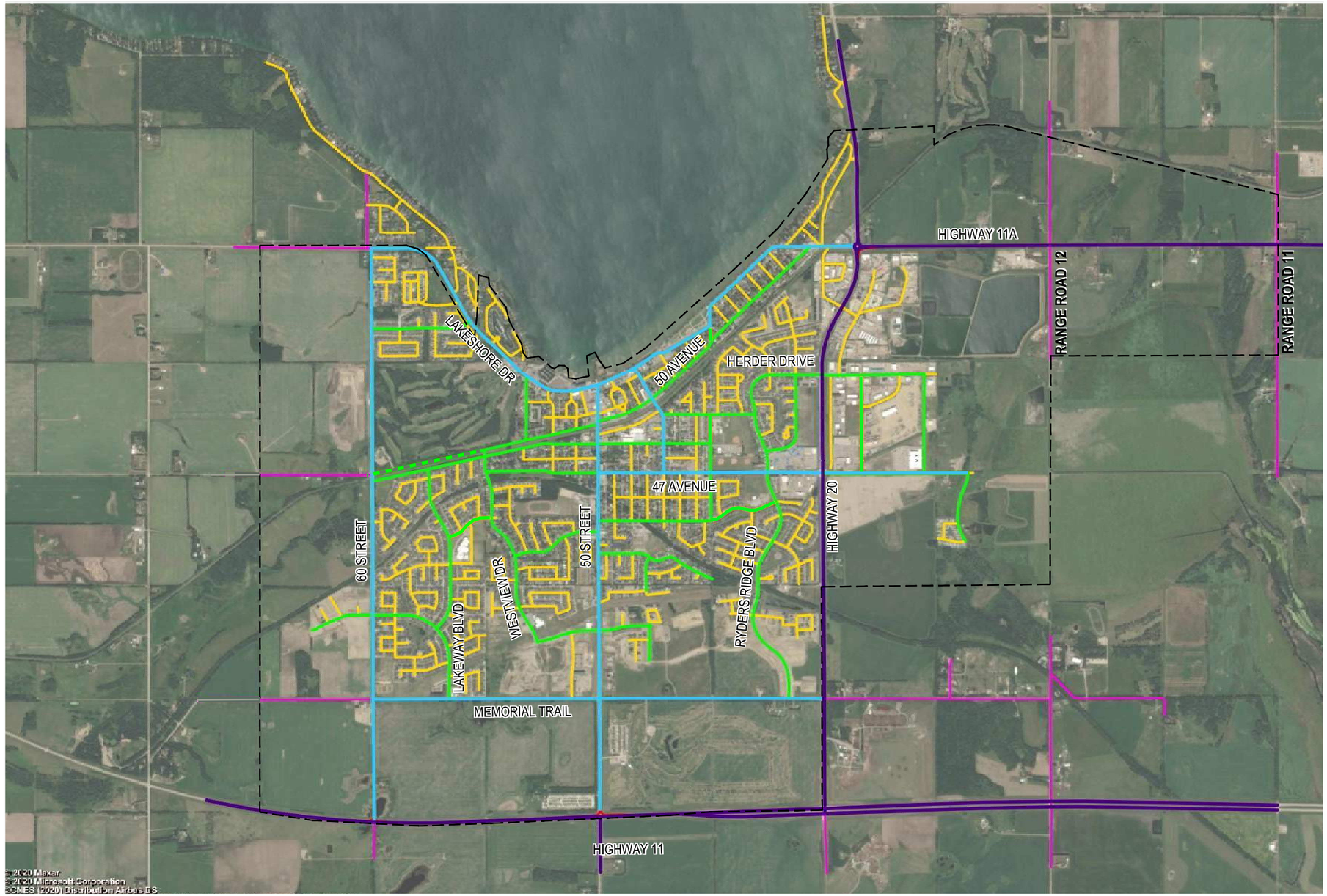
Scaling
500
250
125
0

ZONE BOUNDARY
RETAIL
NON-RETAIL
INDUSTRIAL
TOWN BOUNDARY

SYLVAN LAKE TMP

EXISTING EMPLOYMENT

EXHIBIT 2.3
Feb 2022



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ISL Sylvan Lake

HIGHWAY
ARTERIAL
COLLECTOR
COLLECTOR (GRAVEL)
LOCAL
RURAL
RAMP
TOWN BOUNDARY

SYLVAN LAKE TMP

EXISTING ROAD CLASSIFICATION

EXHIBIT 2.4
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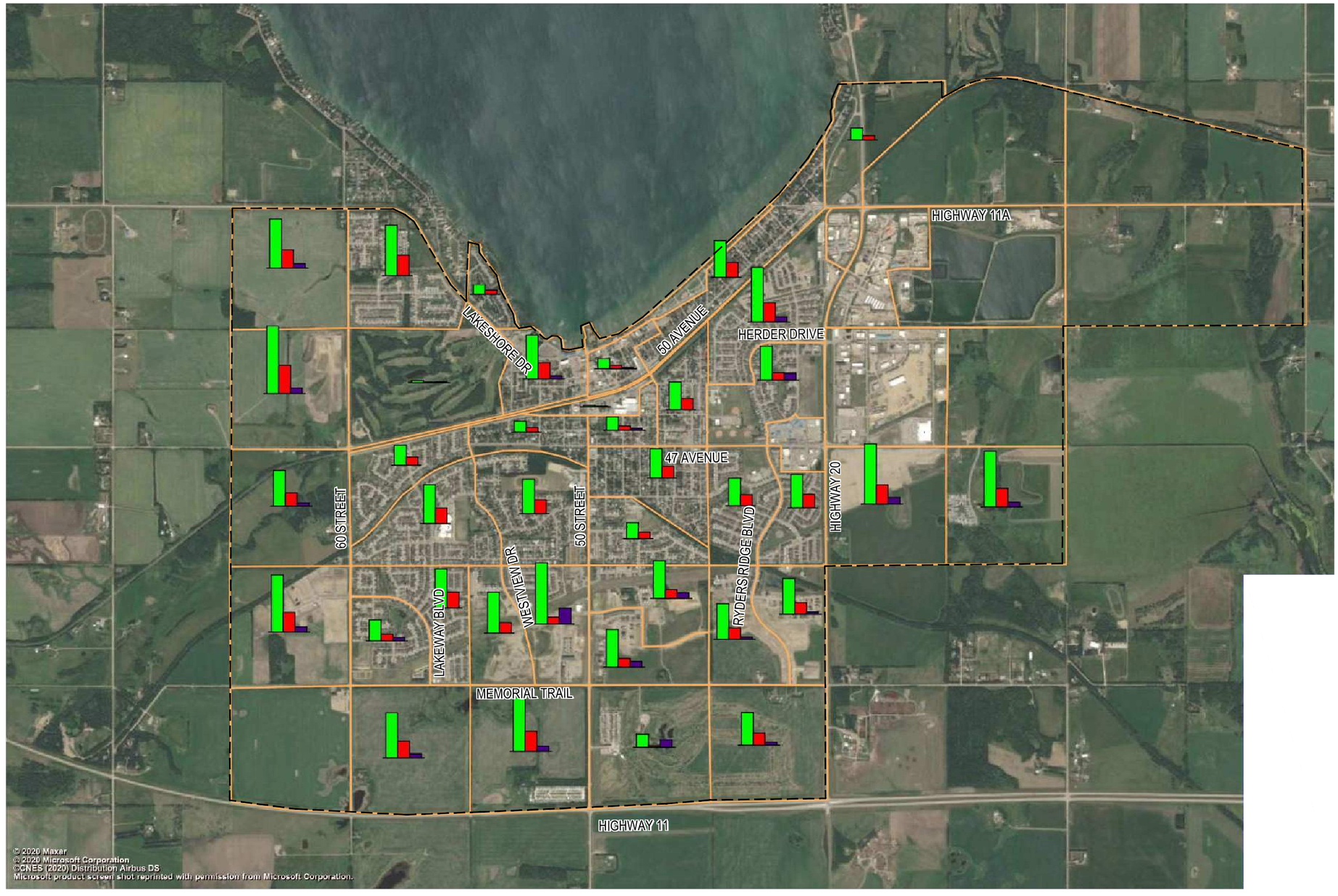

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ISL Sylvan Lake

Scaling
2000
1000
500
0

POP
HH_SF
HH_MF

ZONE BOUNDARY

POPULATION

HOUSEHOLD SINGLE-FAMILY

HOUSEHOLD MULTI-FAMILY

TOWN BOUNDARY

SYLVAN LAKE TMP

38,000 POPULATION - POPULATION AND HOUSEHOLD

EXHIBIT 2.5
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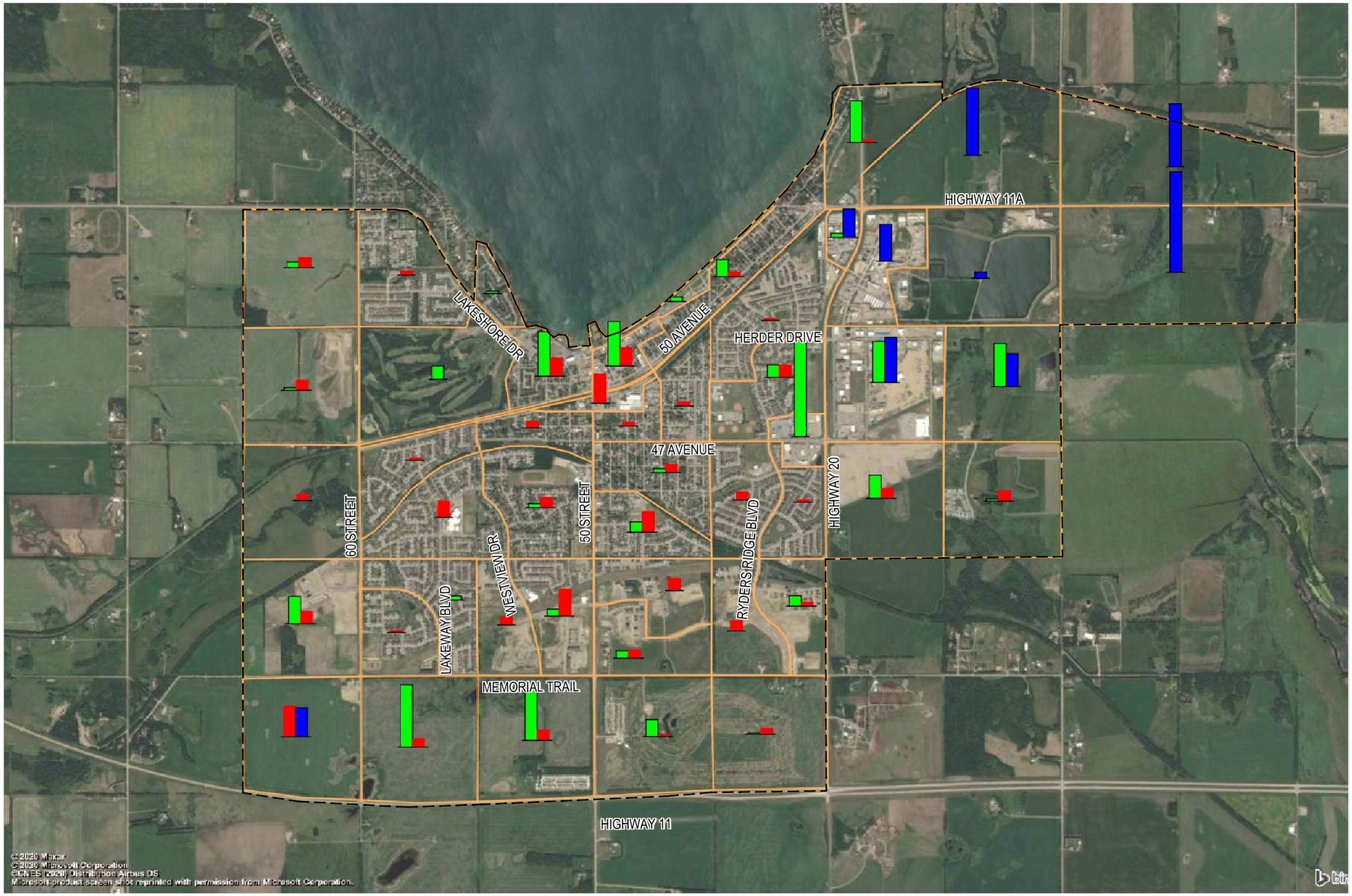

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ISL Sylvan Lake

Scaling

RETAIL

NON-RETAIL

INDUSTRIAL

500

250

125

0

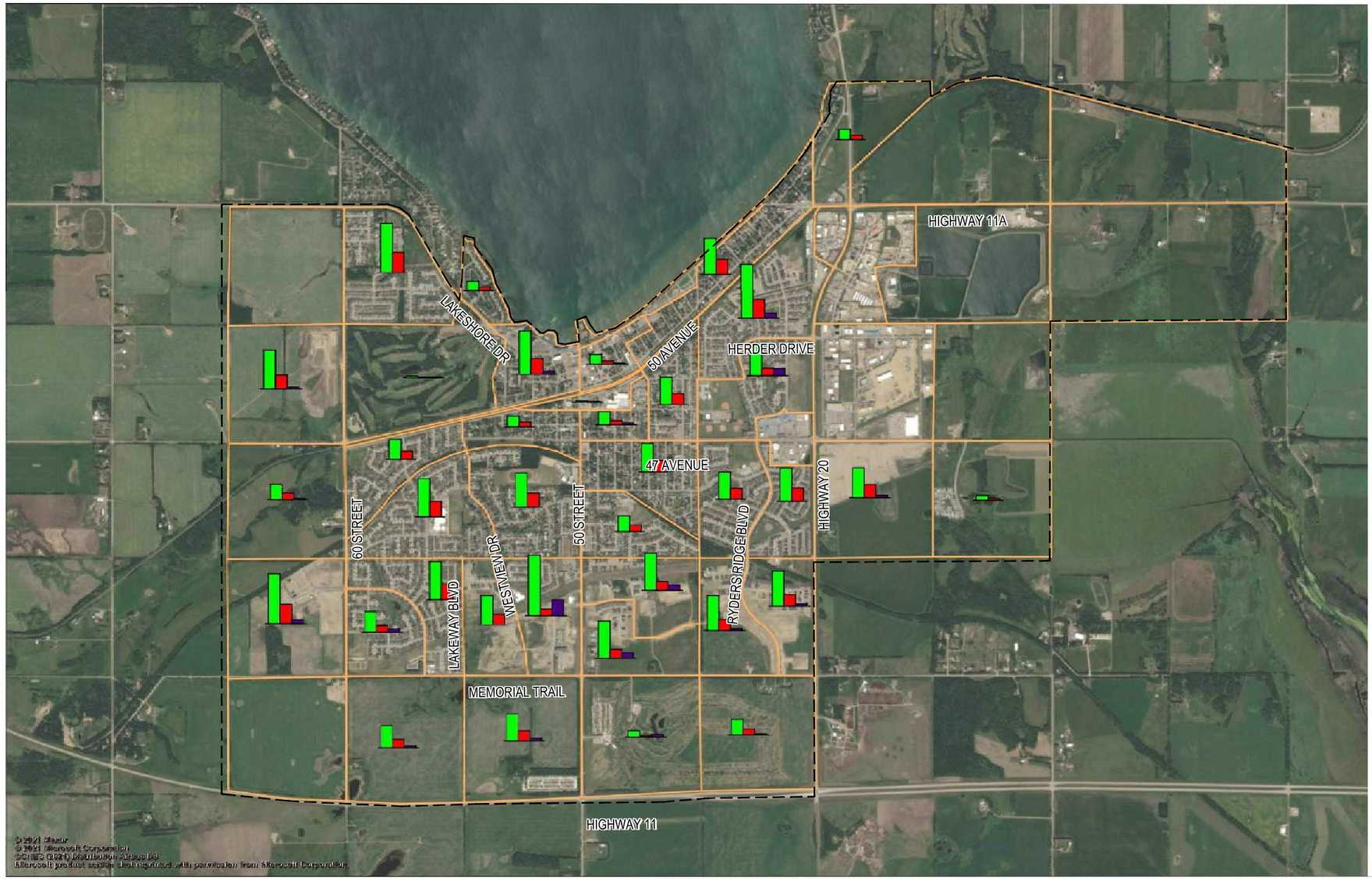
– – – TOWN BOUNDARY

SYLVAN LAKE TMP

38,000 POPULATION - EMPLOYMENT

EXHIBIT 2.6

Feb 2022



ZONE BOUNDARY

Scaling
2000
1000
500
0

POP
HH_SF
HH_MF

POPULATION

HOUSEHOLD SINGLE-FAMILY

HOUSEHOLD MULTI-FAMILY

TOWN BOUNDARY

ISL Sylvan Lake

SYLVAN LAKE TMP

30,000 POPULATION - POPULATION AND HOUSEHOLD

EXHIBIT 2.7
Feb 2022

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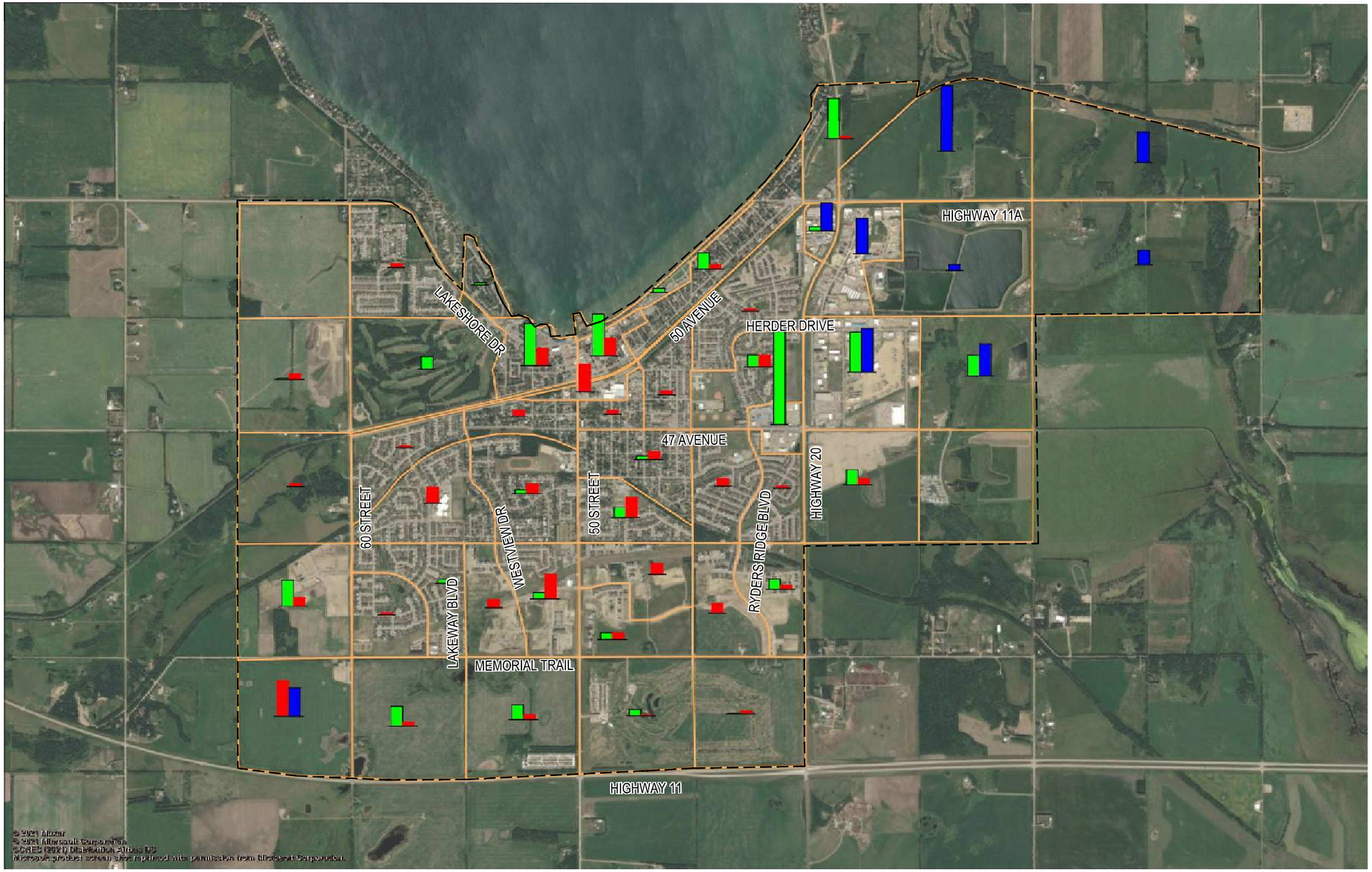

Scaling

RETAIL

NON-RETAIL

INDUSTRIAL

500

250

125

0

– – – TOWN BOUNDARY

ISL Sylvan Lake

SYLVAN LAKE TMP

30,000 POPULATION - EMPLOYMENT

EXHIBIT 2.8

Feb 2022

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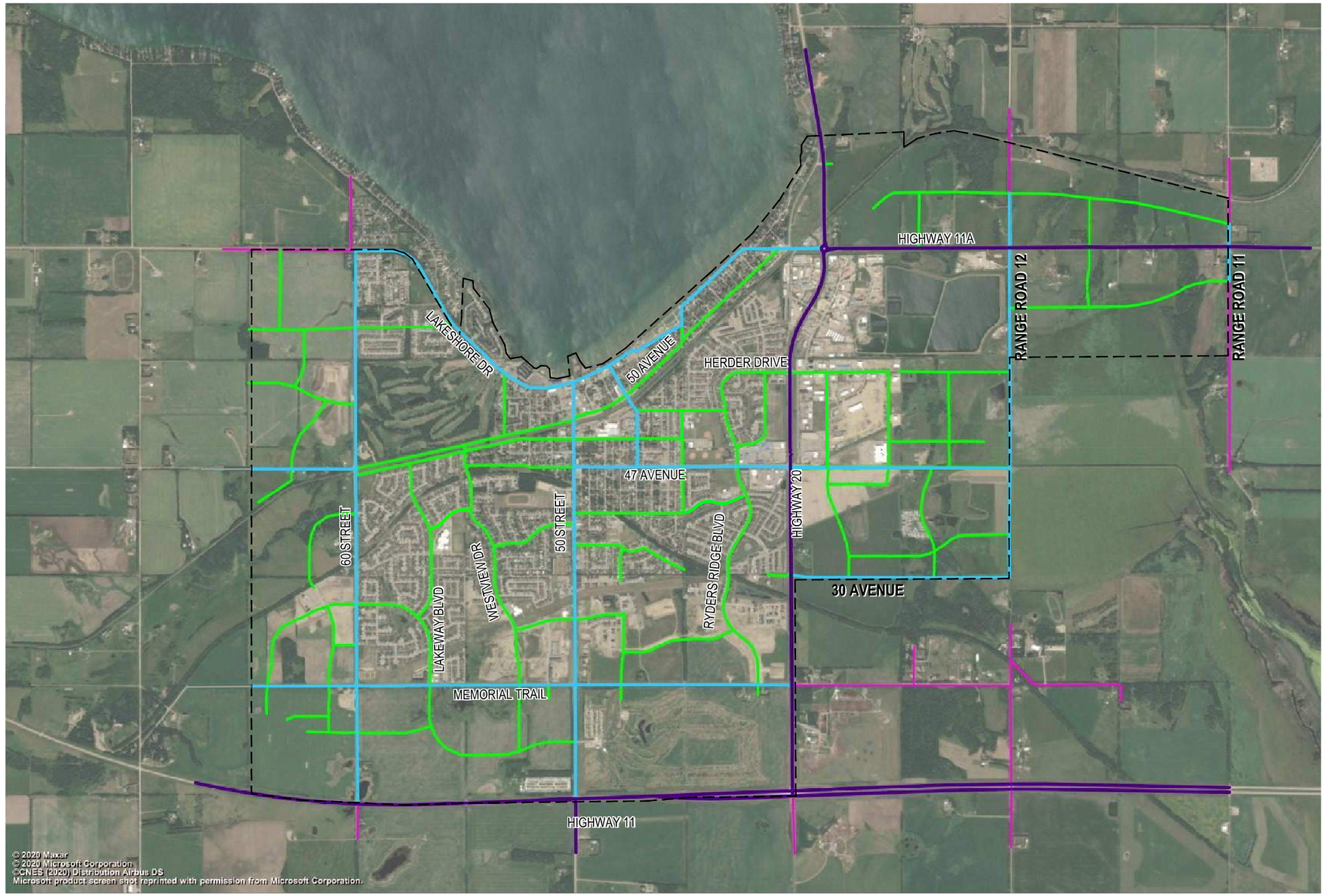


HIGHWAY
ARTERIAL
COLLECTOR
LOCAL
RURAL
RAMP
TOWN BOUNDARY

SYLVAN LAKE TMP

38,000 POPULATION - ROAD CLASSIFICATION

EXHIBIT 2.9
Feb 2022

3.0 Travel Demand Model and Calibration

The development of a travel demand model for the Transportation Master Plan provides significant benefits as it evaluates travel pattern changes as they relate to changes in land use and regional and local transportation network links. This is valuable to Sylvan Lake as any potential changes to the road network including provincial projects on Highway 11, Highway 20 and Highway 11A could significantly alter traffic patterns within Sylvan Lake, and it is helpful to understand what transportation infrastructure may be required to accommodate these changes in addition to the normal outward expansion of the roadway network through planned future development areas.

3.1 Travel Demand Modelling Process

The travel demand model development and the analysis undertaken in this study used the VISUM 20 transportation planning software suite developed by PTV Group. This GIS-based travel forecasting model is a state-of-the-art transportation planning tool that can efficiently estimate changes in travel patterns and utilization of transportation systems in response to changes in land use, population, employment, and transportation infrastructure. It integrates mapping, land use planning, development projections, future traffic demand, and transportation networks to produce realistic traffic forecasts that can be interpreted easily and presented in effective visual format. It is also a commonly-used modelling platform for municipalities of Sylvan Lake's size in Alberta.

The traditional four-step travel demand modelling process was used for this study, as shown in Figure 3.1 and summarized as follows:

- **Trip Generation** – residential, commercial, and industrial land uses are used to determine the number of peak hour trips being generated for the study area;
- **Trip Distribution** – zone-to-zone trip distribution is based on the road network impedance (i.e., travel time) and travel pattern data from StreetLight Data (refer to Section 3.1.1 on StreetLight Data). From the trip distribution, a zone-to-zone origin-destination (OD) trip estimation matrix is developed;
- **Mode Split** – the OD trip matrix is split into various travel modes, such as driving, walking, and transit. For this study, 100% of trips were assumed to be by passenger vehicle, with no additional mode split analysis;
- **Trip Assignment** – the estimated OD trip matrix is assigned onto the established road network to derive link volumes for the existing and future traffic scenarios;

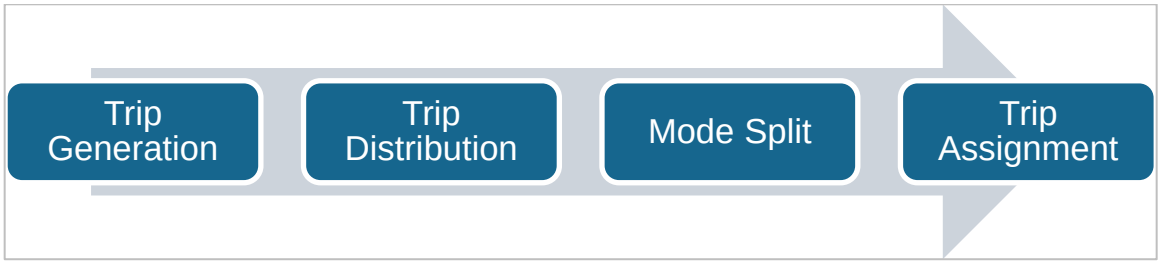


Figure 3.1: Traditional Four-Step Travel Demand Modelling Process

The existing travel demand model captures the existing travel patterns, including trip generation, trip distribution, trip assignment, and pass-by traffic through Sylvan Lake. With a model calibrated to existing conditions (further discussed in Section 3.3), these characteristics can then be applied to the growth areas of Sylvan Lake to forecast the future traffic volumes. The future transportation demand model provides Sylvan Lake with a scalable, flexible platform that can be readily adapted over time to include additional scenarios or transportation complexity as Sylvan Lake grows. The flow chart in Figure 3.2 is a general representation of the four-step travel demand modelling process implemented for this study.

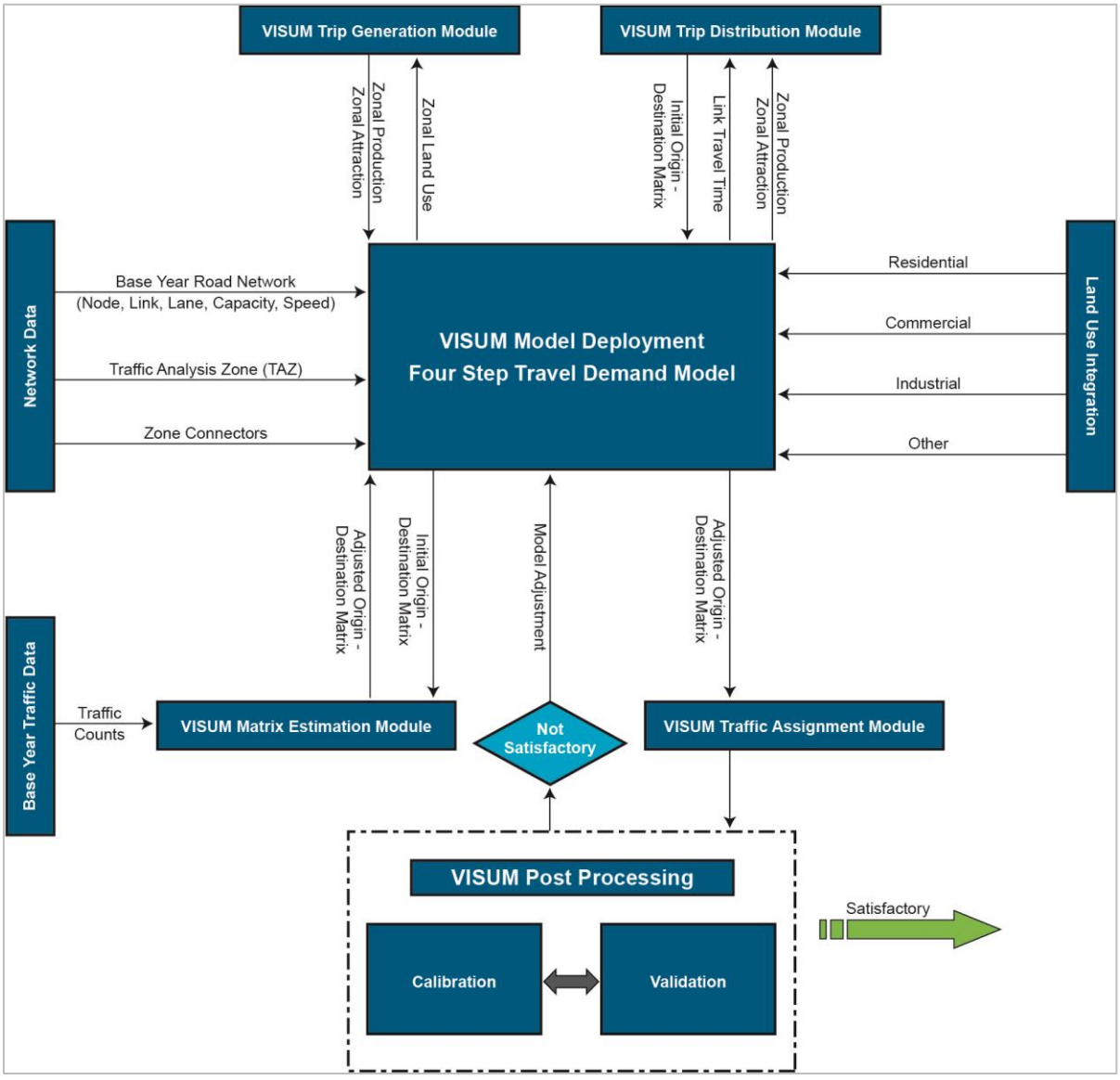


Figure 3.2: General Representation of Base Year Model Development

3.1.1 StreetLight Data

Traditionally when developing a new travel demand model, a household travel survey is conducted to understand the existing travel patterns of a representative sample of Town residents. The data is then used for the trip distribution component of the travel demand model.

Instead of undertaking an extensive household travel survey, which is costly and time-consuming, ISL utilized travel pattern data from StreetLight Data in this TMP. StreetLight Data is a data analysis company that processes mobility data from smart phones and navigation devices (Big Data) to generate aggregated travel pattern analytics. This approach has become more common in recent years and is generally replacing the traditional travel surveys as the technology becomes more fine-grained.

We note the other constraint on completing a household travel survey at this is time is that the results would have been affected by the ongoing COVID-19 pandemic. Typical travel patterns from March 2020 through the time of this report have been altered by the pandemic due to increased work-from-home activity, periodic school closures, and disruption of typical tourist and business activity. A travel survey completed within this timeframe would not have provided a valid data set to calibrate with pre-COVID traffic volumes, and would not be reflective of likely post-COVID conditions (which in the context of Sylvan Lake, are expected to largely return to the pre-pandemic “norm”).

For this TMP, StreetLight Data’s pre-COVID external-to-external traffic demand on Highway 11, Highway 11A and Highway 20, and internal-to-external / external-to-internal traffic demand were used for the development and calibration of the travel demand model. These data are important for VISUM model building and differentiating future traffic growth related to the Town and highway background traffic growth.

As this TMP is undertaken using pre-COVID data, the recommendations of this TMP and the TMP model may need to be updated if daily routines during the COVID-19 pandemic become the normal daily routines and there is less traffic on the roads. These include more residents or out of town employees working from home, less trips to retailers due to online shopping, online schooling, etc.

3.2 Roadway Capacity

Roadway capacities within the VISUM model are based on their functional classification, shown in Exhibit 2.4. Link capacities used in the TMP model are summarized in Table 3.1. The link capacities are generally conservative, in that they are based on the capacity of a single traffic lane, multiplied out to the total number of lanes on the road in a given scenario. There were additional variations in the model not noted here, such as reduced speed and capacity on roadways with lower speed limits to allow for an appropriate travel time penalty on such routes.

Table 3.1: Link Capacities

Road Classification	Capacity, veh/hr/lane	Speed, km/h
Freeway (Free Flow)	1,800-2,100	100-110
Highway	1,000-1,200	60-80
Arterial	700-900	40-60
Collector	500-800	30-60
Local	350-450	30-50
Rural	900-1,100	60-80

Model outputs for scenario planning are based on the volume-to-capacity (v/c) ratio of each roadway, with ranges defined in Table 3.2. Given the conservative ranges for the link capacities, the macro-level planning is targeted toward achieving a capacity band ranging from 95% to 105% of link capacity. For example, the link capacities do not provide for channelized turn bays at intersections, which in practice will increase total capacity through a traffic signal on an arterial. The acceptance of certain higher-volume links in some cases has either been proven via more detailed micro-level analysis or is considered to be an acceptable level of congestion given the existing constraints and limitations of the specific roadway.

Table 3.2: Volume-to-Capacity Ratio Ranges

Colour	v/c Ratio	Notes
Dark Green	<0.60	Effective operations with light traffic
Light Green	0.60 – 0.80	Effective operations with normal traffic
Yellow	0.80 – 0.95	Normal operations, urban traffic conditions
Orange	0.95 – 1.05	At or near capacity
Red	>1.05	Above capacity

3.3 Existing Horizon Calibration

A 2020 baseline model was developed for the transportation network, using existing land use and traffic counts within Sylvan Lake to develop and calibrate the travel demand model. Pre-COVID (2015 to 2019) summer traffic count data at 10 locations was obtained from Alberta Transportation's website and was also provided by the Town. The traffic counts were balanced to higher intersection volumes as traffic counts were undertaken on different days and the balanced summer PM peak traffic volumes are shown in Appendix B.

We note that approximately 50 of the counts provided by the Town were combined two-way counts (e.g. northbound + southbound traffic together) on a segment of roadway. For the calibration process, bi-directional counts (e.g. northbound and southbound with separate counts) are required. To convert the combined two-way counts to bi-directional values, AT's bi-directional PM peak hour traffic counts on Highway 20 and Highway 11 were referenced. From AT's counts, the following conversion factors were noted in the PM peak, and were applied to split the Town's combined two-way counts to bi-directional values, with directionality noted relative to Red Deer:

- 60% "inbound" traffic (northbound or westbound)
- 40% "outbound" traffic (southbound or eastbound)

The calibration plot of the existing network model for PM peak is provided in Appendix C. A regression value (R^2) of 0.96 was obtained for the network in the PM peak. This value represents strong convergence with the existing traffic data; the typical R^2 value for acceptance is 0.75 for a TMP in a small to medium size municipality.

The v/c ratio plot for Sylvan Lake's existing network in the PM peak is provided in Exhibit 3.1. The v/c ratio plot indicates that all existing roadways within Sylvan Lake show good operations with moderate volumes in the PM peak period, and it does not indicate any major network congestion locations or bottlenecks.

3.4 Existing Detailed Intersection Analysis

Detailed traffic operation analysis was also completed at all intersections with available traffic count data in either Synchro (for unsignalized and signalized intersections) or Sidra (for roundabouts). The purpose of the detailed analysis was to verify the findings of the macro-level analysis from VISUM.

3.4.1 Synchro

Synchro 10 was used to analyze the traffic operations at the intersections. The Level of Service (LOS) A represents the highest LOS or generally free flowing conditions, while LOS F generally represents a breakdown or gridlock condition in vehicular flow. There are varying degrees of delay and LOS at the intermediate LOS B, C, D and E levels. LOS D is representative of normal peak hour congestion, while LOS E is representative of an intersection nearing its capacity. Typically, LOS D or better is the accepted standard for peak hour operations in smaller urban centres. LOS criteria for intersections are based on average delay per vehicle and are summarized in Table 3.3. Synchro also calculates each movement's volume-to-capacity ratio (v/c ratio). A v/c ratio of 1.00 represents an intersection or movement at full capacity. Typically, a v/c ratio of 0.90 or lower for all intersection movements is the accepted standard for peak hour operations in smaller urban centres.

Table 3.3: Level of Service Criteria

LOS		A	B	C	D	E	F
Signalized	**Average Delay per Vehicle (s/veh)**	< 10	10 – 20	20 – 35	35 – 55	55 – 80	> 80
Unsignalized		< 10	10 – 15	15 – 25	25 – 35	35 – 50	> 50

The Synchro analyses show that the majority of the analyzed intersections operated at an acceptable level (LOS D or better and v/c <0.90) with existing traffic controls and lane configurations. Several movements at Herder Drive / Highway 20, 47 Avenue / Highway 20 and Memorial Trail / Highway 20 intersections operated at LOS E and/or v/c >0.90, which is nearing their respective capacities but still within acceptable ranges. Therefore, no traffic lane changes or traffic control revisions are presently recommended at any of the analyzed intersections.

Note: At the intersection of Highway 20 / Herder Drive, the 2020 lane reconfiguration (eastbound left turn bay and shared eastbound through / right turn) of the intersection was analyzed.

3.4.2 Sidra

Sidra was used to analyze the roundabouts at Highway 20 / Highway 11A and Highway 20 / Erickson Drive. Roundabout analyses were completed using Sidra 8.0. Sidra is a roundabout analysis software that considers traffic operations in addition to geometric factors, environmental factors, and human behavior factors. Sidra also calculates the traffic operations of the roundabout based on Level of Service (LOS), volume to capacity (v/c) ratio and queue length.
The acceptable performance criteria are LOS D or better with v/c ratios of 0.90 or less for each movement at the intersection. In the analysis, the default Sidra LOS standard is shown in Table 3.4 below and is between the LOS standards for signalized and unsignalized intersections.

Table 3.4: Sidra LOS Criteria

LOS	A	B	C	D	E	F
Average Delay per Vehicle (s/veh)	< 10	10 – 20	20 – 35	30 – 50	50 – 70	> 70

Sidra analysis was completed for the single-lane roundabouts at both the Highway 20 / Highway 11A and Highway 20 / Erickson Drive. Analysis confirms that both single-lane roundabouts operate effectively in the existing condition. It is noted that the v/c ratios of the westbound and southbound approaches at the Highway 20 / Highway 11A roundabout are at 0.85 and 0.87, respectively, which is indicative that the roundabout would be approaching capacity with continued near-term traffic growth.

3.5 Existing Railway Crossing Assessment

Sylvan Lake currently has six at-grade railway crossings located, from east to west, on Highway 20, Lakeshore Drive, 46 Street, 50 Street, Westview Drive and 60 Street.

The CN at-grade crossing data was obtained from CN and traffic volumes were calculated using existing traffic counts to conduct at-grade crossing warrant analysis per *Section 9, Part C of Transport Canada Grade Crossings Standard (January 1, 2019)*. The standard has several criteria to determine the warrants for a warning system with or without gates, which includes the forecast cross-product, railway operating speed, number of tracks, etc. Note that the cross-product is defined as the product of the average annual daily railway movements and the average annual daily traffic of vehicles on the road that crosses the grade crossing.

Table 3.5 summarizes the warning system warrant based on the criteria listed above, particularly the cross-product. According to the standard, a warning system without gates is required at a public grade crossing if the forecast cross-product is 2,000 or more, and a warning system with gates is required if the forecast cross-product is 50,000 or more. The different railway crossing warning systems listed in the *Transport Canada Grade Crossing Standards* are shown in Figure 3.3. The warrant analysis confirms that the existing warning systems installed at all crossings meet or exceed the warrants per the federal standard.

Table 3.5: Existing Railway Crossing Assessment

CN Mile	Location	Train Daily Volume	Traffic AADT	Cross Product	Warrant	Existing	Standard
50.38	Highway 20	4	8,280	33,120	Without Gate	Active – FLB	Meet
50.58	Lakeshore Dr	4	6,010	24,040	Without Gate	Active – FLB	Meet
51.61	46 Street	4	4,240	16,960	Without Gate	Active – FLB	Meet
51.90	50 Street	4	5,950	23,800	Without Gate	Active – FLBG	Exceed
52.42	Westview Drive	4	1,670	6,680	Without Gate	Active – FLBG	Exceed
52.98	60 Street	4	1,860	7,440	Without Gate	Active – FLBG	Exceed

Note: FLB means Flashing Light Units & Bells and FLBG means Flashing Light Units, Bells & Gates

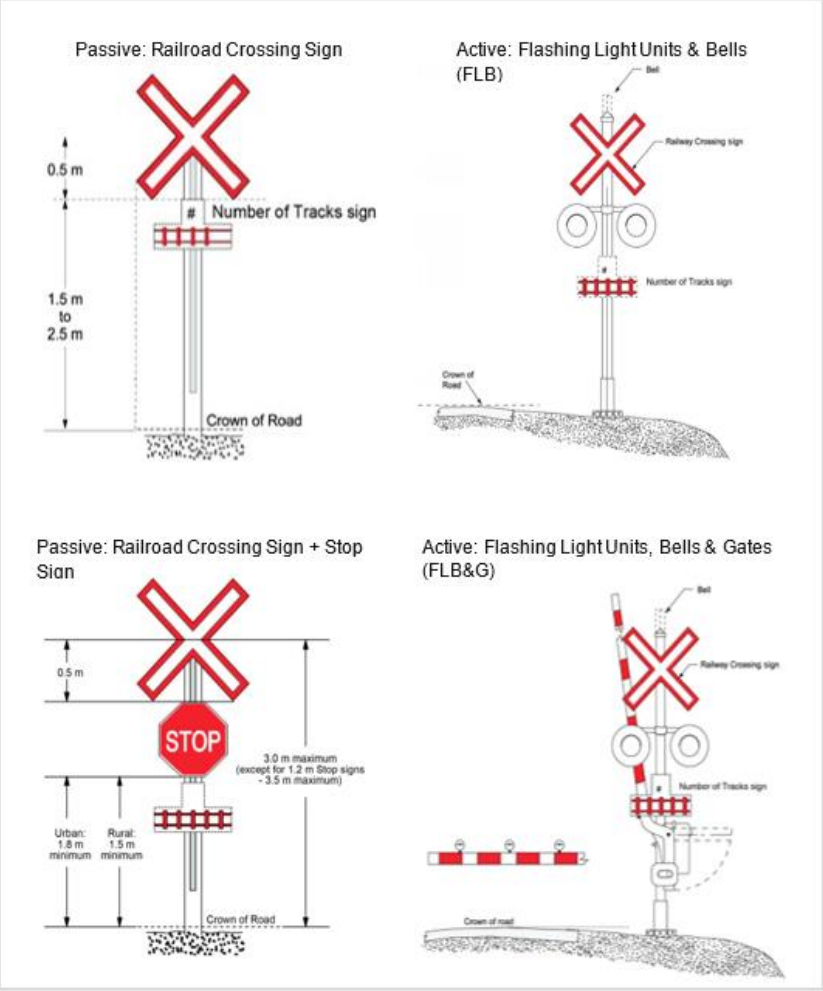
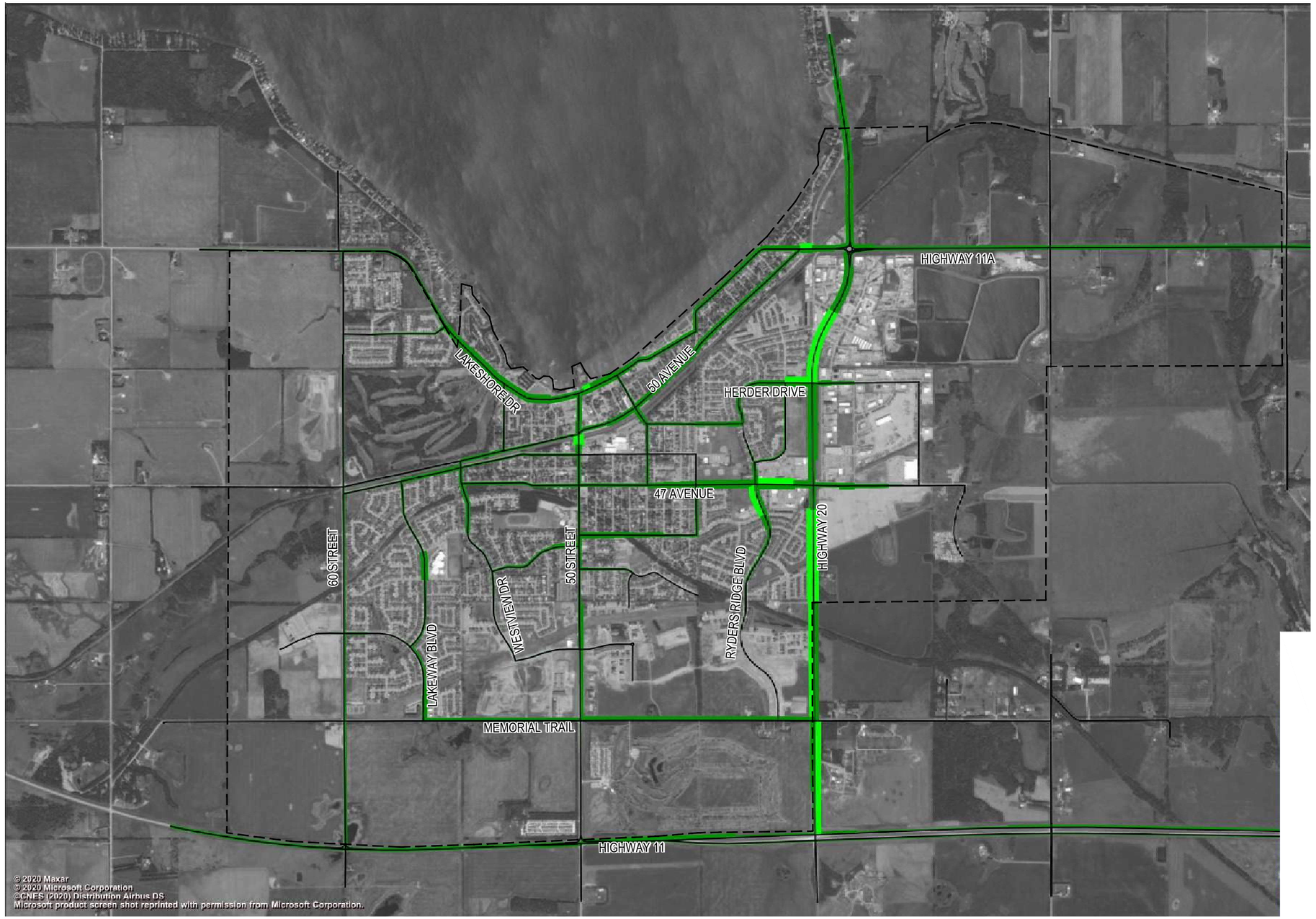


Figure 3.3: Railway Crossing Warning Systems



PM Peak Hour Congestion Existing
Link bars
Volume capacity ratio PrT (AP)

- 0-60%
- 60-80%
- 80-95%
- 95-105%
- >105%
- – – – TOWN BOUNDARY

SYLVAN LAKE TMP

EXISTING PM V/C RATIO

EXHIBIT 3.1
Feb 2022

4.0 Future Scenario Road Network and Analysis

A travel demand model for the 38,000 population horizon (25-year) was initially developed with the existing road network in place. From the model, the ultimate roadway and intersection improvements needed for this level of build-out can be identified. With both the existing and ultimate networks, the timing of roadway improvements can then be sequentially identified at the interim 22,000 (5-year), 26,000 (10-year), 30,000 (15-year) and 34,000 (20-year) population horizons.

4.1 38,000 Population Scenario

To develop the travel demand model for the future 38,000 population (25-Year) horizon, the trip generation for future residential, retail, non-retail, industrial and lake employment land uses were added to the respective zones in the future growth areas. Background traffic growth for Highway 11, Highway 20, Highway 11A and other external gates was also added as outlined in Section 2.2.

4.2 38,000 Population VISUM Model

The future 38,000 population horizon (25-Year) was analyzed with at-grade intersections on Highway 11. In the analysis, Highway 11 / 50 Avenue intersection (currently right-in right-out) was an all-turns intersection. The v/c ratio plot for the 38,000 population scenario on the existing road network in the PM peak is shown in Exhibit 4.1. The results indicate that there are capacity constraints on Highway 11 (from Highway 20 to 50 Street), Highway 20 (from Highway 11 to Reynolds Road / 30 Avenue, and from Erickson Road to Jarvis Bay Drive) and Highway 11A (from 50 Avenue to just east of Highway 20). To improve operations, twinning of these highways along with new or upgrade of rural roads to arterial / collector road standards in growth areas (i.e. Reynolds Road / 30 Avenue from Highway 20 to Range Road 12, Range Road 11 between the first collector road north of Highway 11 and 30 Avenue, Range Road 12 between the first collector road north and south of Highway 11, Twp Rd 385 (50 Avenue) and Twp Rd 384 (Memorial Tr) between 60 Street and Town boundary, etc.) would be warranted. With the twinning of Highway 11, Highway 20 and Highway 11A, the future roadway capacity can accommodate the 38,000 population travel demand of the Town. The v/c plot with the Highway 11, 11A and 20 each twinned is shown in Exhibit 4.2. The 38,000 PM peak traffic volumes are shown in Appendix D.

4.2.1 38,000 Population Detailed Intersection Analysis

Detailed traffic operation analysis was completed at major intersections for the future 38,000 population (25-Year) horizon in Synchro and Sidra. The initial analysis found that several intersections operated beyond typical criteria, with some intersection improvements being warranted. At many intersections, a new traffic signal is recommended; alternately, a roundabout could be implemented. The recommended improvements are summarized in Table 4.1 below and shown in Exhibit 4.3. It is cautioned that intersection turning volumes from a travel demand model are generated at a lower level of accuracy than corridor volumes, but do provide an adequate basis for considering future transportation network improvements provided that designers apply good judgment and ensure that any designs incorporate flexibility to accommodate variable local traffic patterns. Local-level analysis through Transportation Impact Assessments (TIAs) should continue to be used as part of the development approval process as new growth areas come online, so that they can inform specific roadway design needs.

Sidra roundabout analysis was undertaken at the planned dual-lane roundabouts along Highway 11, Highway 11A and Highway 20. Analyzed intersections include: Highway 11 at 60 Street, 50 Street and Highway 20; Highway 20 at Reynolds Road / 30 Avenue, Erickson Drive, Highway 11A and Jarvis Bay Drive; Highway 11A at Range Road 11, Range Road 12 and the two new north-south roads. From the analysis, a standard dual-lane roundabout operated well in the future 38,000 population horizon at all analyzed intersections, with the exception of the following:

- Highway 11 / Highway 20: a right turn bypass lane is needed for the westbound and southbound approaches (we note that this location is also planned by Alberta Transportation to be a future interchange, but this is assumed to be beyond the future 38,000 population horizon);
- Highway 11 / 50 Street: a right turn bypass lane is needed for the westbound approach.

Sidra roundabout analysis was also undertaken on Memorial Trail. From the results, all intersections operate well with 2 lanes on Memorial Trail and single lane roundabouts, with the exception of the following 3 intersections.

- Memorial Trail / 60 Street: Single lane roundabout with northbound and westbound right turn lane
- Memorial Trail / 50 Street: Single lane roundabout with northbound and westbound right turn lane
- Memorial Trail / Highway 20: dual lane roundabout

With the exception of the above intersections, the 38,000 population (25-Year) results on Memorial Trail also corresponds to the medium-term design in the “Memorial Trail Functional Planning Study (FPS)” Draft Report dated November 2021 by ISL. The medium-term design includes 2 urbanized lanes on Memorial Trail with a pathway (north of Memorial Trail) and single lane roundabouts.

Table 4.1: 38,000 Population Scenario Road Improvement Recommendations

ID	Road / Intersection	Improvement Description
Highways		
H1	Highway 11 (Highway 20 to 60 Street)	Twinning to 4 lanes
H2	Highway 11 / Highway 20	Dual lane roundabout with southbound and westbound right bypass lane
H3	Highway 11 / 50 Street	Dual lane roundabout with southbound right bypass lane
H4	Highway 11 / 60 Street	Dual lane roundabout
H5	Highway 20 (Highway 11 to North Town limit)	Twinning to 4 lanes
H6	Highway 20 / Jarvis Bay Drive	Dual lane roundabout or signalization with NBL and SBL turn bays
H7	Highway 20 / Highway 11A	Upgrade the existing single lane roundabout to dual lane roundabout
H8	Highway 20 / Erickson Road	Upgrade the existing single lane roundabout to dual lane roundabout
H9	Highway 20 / Herder Drive / Cuendet Industrial Way	Signal retiming with twinning of Highway 20
H10	Highway 20 / 47 Avenue	Convert the single WBL turn bay to dual WBL turn bays
H11	Highway 20 / Reynolds Road / 30 Avenue	Dual lane roundabout or signalization with left-turn bays on all approaches and EBR turn bay
H12	Highway 20 / Memorial Trail	Dual lane roundabout

ID	Road / Intersection	Improvement Description
H13	Highway 11A (Erickson Drive to East Town limit at RR 11)	Twinning to 4 lanes
H14	Highway 11A / New North-South Access (between Hwy 20 and RR 12)	Dual lane roundabout or traffic signalization
H15	Highway 11A / Range Road 12	Dual lane roundabout or signalization with EBL and WBL turn bays
H16	Highway 11A / New North-South Access (between RR 12 and RR 11)	Dual lane roundabout or traffic signalization
H17	Highway 11A / Range Road 11	Dual lane roundabout or signalization with EBL and WBL turn bays
Northwest Part of Town		
NW1	Township Road 385 (50 Avenue)	Upgrade to Arterial (2 lanes) west of 60 Street
NW2	60 Street / 50 Avenue	Single lane roundabout or traffic signalization
NW3	50 Street / 50 Avenue	Traffic signalization
NW4	50 Ave (between 60 St and Westview Dr)	Paving existing gravel road
Northeast Part of Town		
NE1	Range Road 11	Upgrade to Arterial (2 lanes)
NE2	Range Road 12	Upgrade to Arterial (2 lanes)
NE3	47 Avenue / Thevenaz Industrial Trail	Traffic signalization
NE4	47 Avenue / Range Road 12	Add all-way stop control
NE5	47 Avenue (Charles Industrial Way to Range Road 12)	Upgrade to Arterial (2 lanes)
Southwest Part of Town		
SW1	Memorial Tr at Springfield Blvd and Station Dr, Memorial Tr west of 60 Street	Single land roundabouts, Memorial Trail upgrade to Arterial (2 lanes)
SW2	60 Street / Lakeway Boulevard	Traffic signalization
SW3	60 Street / Memorial Trail	Single lane roundabout with westbound and northbound right turn lane.
SW4	60 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout or signalization with NBL and SBL turn bays and SBR turn bay
SW5	50 Street / Memorial Trail	Single lane roundabout with westbound and northbound right turn lane.
SW6	50 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout or signalization with NBL and SBL turn bays
SW7	Memorial Trail / Lakeway Boulevard	Single lane roundabout.
SW8	Memorial Trail / Brookstone Drive	
SW9	Memorial Trail (west Town boundary to Highway 20)	Urbanize per medium-term design of Memorial Trail FPS
Southeast Part of Town		
SE1	30 Avenue (east of Hwy 20)	New arterial road (2 lanes)
SE2	Memorial Trail / Crestview Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE3	Memorial Trail / Ryders Ridge Boulevard	
Railway (see Section 4.2.2 below)		
R1	Highway 20 at CN Railway	Railway Crossing Improvement (FLB&G)

4.2.2 38,000 Population Railway Crossing Assessment

Railway crossing assessments were conducted at the six at-grade railway crossings per *Section 9, Part C of Transport Canada Grade Crossings Standard (January 1, 2019)* for the future 38,000 population (25-Year) horizon. 38,000 population traffic volumes were obtained from the VISUM model and the existing train volumes were used for the warrant calculation.
It is noted that CN does not offer train volume forecasts due to many variables, such as the economy, unknown customer plans, and fluctuations in commodity demand. Table 4.2 summarizes the warning system warrant calculations. For more detailed information on the railway crossing warrant, please refer to Section 3.5.

Table 4.2: 38,000 Population Railway Crossing Assessment

CN Mile	Location	Train Daily Volume	Traffic AADT	Cross Product	Warrant	Existing Treatment	Standard
50.38	Highway 20	4	17,780	71,120	With Gate	Active – FLB	Below
50.58	33 Street	4	10,730	42,920	Without Gate	Active – FLB	Meet
51.61	46 Street	4	6,900	27,600	Without Gate	Active - FLB	Meet
51.9	50 Street	4	8,813	35,252	Without Gate	Active - FLBG	Exceed
52.42	Westview Drive	4	3,880	15,520	Without Gate	Active - FLBG	Exceed
52.98	60 Street	4	12,053	48,214	Without Gate	Active - FLBG	Exceed

From the warrant review, the railway crossing at Highway 20 will be required to be upgraded to an active crossing with flashing light units, bells and gates (FLB&G) in the 5-year horizon when the cross product is estimated to be 50,000. Also from the warrant review, no improvements are required to the other railway crossings by the 38,000 population horizon.

In the Grade Separation Guidelines published by Transportation Safety Board of Canada in 2018, it is stated that Transport Canada does not provide a guideline for when grade separation should be considered; however, in comparison, the United States Department of Transportation Federal Highway Administration Railroad-Highway Grade Crossing Handbook (3rd Edition) states that highway-rail grade crossings should be considered for grade separation across the railroad right-of-way whenever the cost of grade separation can be economically justified based on fully allocated life-cycle costs and one or more of the following conditions exist, which are not met at the Highway 20 crossing location:

- Freight train crossing exposure (the product of the number of trains per day and AADT [average annual daily traffic]) exceeds 900,000 in urban areas or 600,000 in rural areas; or
- Passenger train crossing exposure (the product of the number of passenger trains per day and AADT) exceeds 2,250,000 in urban areas or 600,000 in rural areas.

4.2.3 38,000 Population Sensitivity Test

A sensitivity test was undertaken to determine the impacts on the roadway network if Highway 11 / 50 Street remains as a right-in / right-out intersection. To assess the effect of this change, a difference plot was prepared for the network showing the variation in traffic patterns between the two scenarios (all-turns access versus right-in / right-out only). The difference plot with Highway 11 / 50 Street as a right-in right-out intersection is shown in Exhibit 4.4; in the exhibit, red represents a decrease in traffic and green represents an increase in traffic.

With Highway 11 / 50 Street as a right-in right-out intersection, vehicles that had previously made the southbound left movement at Highway 11 / 50 Street were rerouted to the southbound left movement at Highway 11 / Highway 20, primarily via Memorial Trail. This created an increase in traffic on eastbound Memorial Trail (between 50 Street and Highway 20) and on southbound Highway 20 (between Highway 11 and Memorial Trail).
Additional analyses were undertaken to determine the impacts of the Highway 11 / 50 Street right-in right-out. From the analysis, the recommendations in Table 4.1 could still accommodate the traffic changes on Memorial Trail and Highway 20.

4.3 Interim Horizon Timeline of Improvements

As no operational issues were identified in the existing roadway network, the improvements identified in the future network are mainly development-driven by the build-out of the ASP, OP and ARP areas. The timeline of the improvements will primarily correlate with the progress of the build-out based on size and type of development, staging of development, and location of development.

When new developments are planned, it is recommended that a local-area TIA be undertaken to determine the timeline of specific improvements associated with the proposed development, tied to the proposed development phasing plans. Off-site levy collection for roadway improvements is a valuable tool to spread the cost of certain infrastructure improvements that benefit multiple growth areas fairly among the benefitting development cells, and to ensure the collection of money for future upgrades based on cumulative impacts to the transportation network, even if a specific short-term development does not by itself trigger a specific improvement.

To provide an initial basis for infrastructure staging and budgeting, four interim horizons were considered at the 22,000 (5-year), 26,000 (10-year), 30,000 (15-year) and 34,000 (20-year) population levels. As outlined in Section 2.2.1, the future population of 38,000 is expected to be reached by 2045 (25 years). Using the existing population of 17,200 in 2019 and assuming a linear population growth, the various interim population horizons are estimated as follows:

- 22,000 population by 2025 (5-Year);
- 26,000 population by 2030 (10-Year);
- 30,000 population by 2035 (15-Year);
- 34,000 population by 2040 (20-Year);

For the 30,000 population horizon, an additional travel demand model was built based on the land uses in Table 2.2 (see population an employment plots in Exhibits 2.7 and 2.8); from the model, the 30,000 traffic volumes (see Appendix E) were developed. The v/c plot of the 30,000 model is shown in Exhibit 4.5. The traffic volumes of the remaining three interim horizons were developed through interpolation of intersection turning volumes between the modelled 17,200 population (existing), 30,000 population and 38,000 population horizons, respectively. The turning volumes of the four interim study horizons were analyzed in Synchro and Sidra. The timeline of improvements are summarized in the following subsections.

4.3.1 22,000 Population

The 22,000 population (5-Year) improvements are shown in Exhibit 4.6 and summarized in Table 4.3. From Table 4.3, the main improvements are the twinning and roundabouts on Highway 11 and new roundabouts / existing roundabout improvements at several intersections on Highway 20.

Note:

- 50 Ave between 60 Street and Westview Drive was assumed to be paved in this horizon.
- 50 Avenue / 50 Street: No improvement is required from the 5-Year traffic analysis while a signal is required from the 10-Year traffic analysis. However, the east and west legs of the existing intersection is offset and presents a sightline issue, thus improvements to the intersection is recommended in the 5-Year horizon.

Table 4.3: 22,000 Population Recommended Improvements

ID	Corridor / Intersection	Improvement Description
H1	Highway 11 (Highway 20 to 60 Street)	Twinning to 4 lanes
H2	Highway 11 / Highway 20	Dual lane roundabout
H3	Highway 11 / 50 Street	Dual lane roundabout
H7	Highway 20 / Highway 11A	Add dual lane approaches to the westbound (right turn lane added) and southbound (right turn lane added) approach of the existing roundabout
H11	Highway 20 / Reynolds Road / 30 Avenue	Single lane roundabout or signalization with left-turn bays on all approaches, EBR turn bay, and two through lanes at the northbound and southbound approaches.
H12	Highway 20 / Memorial Trail	Single lane roundabout with dual lane approaches for the southbound (right turn lane added) and northbound (northbound left turn added) approach
NW3	50 Street / 50 Avenue	Traffic signalization
NW4	50 Ave (between 60 St and Westview Dr)	Paving existing gravel road
SW5	Memorial Trail / 50 Street	Single lane roundabout with westbound and northbound right turn lane. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE1	Reynolds Road / 30 Avenue (east of Hwy 20)	New Arterial road (up to first Collector)
R1	Highway 20 at CN Railway	Railway Crossing Improvement (FLB&G)

4.3.2 26,000 Population

The 26,000 population (10-Year) improvements are shown in Exhibit 4.7 and summarized in Table 4.4. From Table 4.4, the main improvements are the twinning and new roundabouts / existing roundabout improvements on Highway 20.

Table 4.4: 26,000 Population Recommended Improvements

ID	Corridor / Intersection	Improvement Description
H5	Highway 20	Twinning to 4 lanes
H7	Highway 20 / Highway 11A	Upgrade the existing single lane roundabout to dual lane roundabout
H8	Highway 20 / Erickson Road	Upgrade the existing single lane roundabout to dual lane roundabout
H9	Highway 20 / Herder Drive / Cuendet Industrial Way	Signal retiming with twinned Hwy 20

ID	Corridor / Intersection	Improvement Description
H11	Highway 20 / Reynolds Road / 30 Avenue	Upgrade the single lane roundabout to dual lane roundabout
H12	Highway 20 / Memorial Trail	Upgrade the single lane roundabout to dual lane roundabout
NW1	Township Road 385 (50 Avenue)	Upgrade to Arterial west of 60 Street (2 lanes)
NE1	Range Road 12	Upgrade to Arterial (2 lanes)
NE4	47 Avenue / Range Road 12	Add all-way stop control
NE5	47 Avenue (Charles Industrial Way to Range Road 12)	Upgrade to Arterial (2 lanes)
SW1	Memorial Tr at Springfield Blvd and Station Dr, Memorial Tr west of 60 Street	Single land roundabouts, Memorial Trail upgrade to Arterial (2 lanes)
SW4	60 Street / New East-West Access (south of Memorial Tr)	Unsignalized with NBL, SBL and NBR turn bays
SW6	50 Street / New East-West Access (south of Memorial Tr)	Unsignalized with NBL and SBL turn bays
SE1	30 Avenue (east of Hwy 20)	New Arterial road to Range Road 12

4.3.3 30,000 Population

The 30,000 population (15-Year) improvements are shown in Exhibit 4.8 and summarized in Table 4.5. From Table 4.5, the main improvements are the twinning and new roundabouts / existing roundabout improvements on Highway 11A.

Table 4.5: 30,000 Population Recommended Improvements

ID	Corridor / Intersection	Improvement Description
H4	Highway 11 / 60 Street	Dual lane roundabout
H6	Highway 20 / Jarvis Bay Drive	Dual lane roundabout or signalization with an additional NBL and SBL turn bays
H13	Highway 11A (Erickson Drive to the East Town limit at RR 11)	Twinning to 4 lanes
H15	Highway 11A / Range Road 12	Dual lane roundabout or signalization with an additional EBL and WBL turn bays
NE2	Range Road 11	Upgrade to Arterial (2 lanes)
NE3	47 Avenue / Thevenaz Industrial Trail	Traffic signalization
SW2	60 Street / Lakeway Boulevard	Traffic signalization
SW3	Memorial Trail / 60 Street	Single lane roundabout with westbound and northbound right turn lane. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE3	Memorial Trail / Ryders Ridge Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.

4.3.4 34,000 Population

The 34,000 population (20-Year) improvements are shown in Exhibit 4.9 and summarized in Table 4.6.

Table 4.6: 34,000 Population Recommended Improvements

ID	Corridor / Intersection	Improvement Description
H10	Highway 20 / 47 Avenue	Add dual WBL turn bays
NW2	60 Street / 50 Avenue	Single lane roundabout or traffic signalization
SW4	60 Street / New East-West Access (south of Memorial Tr)	Single lane roundabout or signalization with NBL and SBL turn bays, provide NBR turn bay
SW7	Memorial Trail / Lakeway Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE2	Memorial Trail / Crestview Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.

4.3.5 38,000 Population

The 38,000 population (25-Year) improvements are shown in Exhibit 4.10 and summarized in Table 4.7. From

Table 4.7: 38,000 Population Recommended Improvements

ID	Corridor / Intersection	Improvement Description
H14	Highway 11A / New North-South Access (between Hwy 20 and RR 12)	Dual lane roundabout or traffic signalization
H16	Highway 11A / New North-South Access (between RR 12 and RR 11)	Dual lane roundabout or traffic signalization
H17	Highway 11A / Range Road 11	Dual lane roundabout or traffic signalization
SW6	50 Street / New East-West Access (south of Memorial Tr)	Single lane roundabout or signalization with NBL and SBL turn bays
SW8	Memorial Trail / Brookstone Drive	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.

4.3.6 Interim Overall

The combined horizon-by-horizon improvements are shown in Exhibit 4.11.

Additional notes are provided for the following corridors and intersections:

- The timing of all highway twinning projects below corresponds to the projected twinning timelines as provided by Alberta Transportation:
  - Highway 11: AT estimate of 5 years, TMP model 5-Year horizon;
  - Highway 20: AT estimate of 10 years, TMP model 10-Year horizon;
  - Highway 11A: AT estimate of 10 to 15 years, TMP model 15-Year horizon

- Highway 11 / Highway 20 Interchange: This study concludes that the dual-lane roundabout would operate well in the 38,000 population (25-Year) horizon. Per McElhanney's Highway 11 Functional Planning Study in 2013, an interchange was planned at the location and might be needed beyond the 38,000 population (25-Year) horizon. However, it is noted that decision will also be driven by regional and provincial network considerations, and not just local requirement at Sylvan Lake. Further study by AT will be required to determine the exact timeline of the interchange upgrade, however the TMP information is useful in providing assurance that short-term investment in the roundabout will have significant benefit by accommodating operational needs along the highway for an appreciable period of time.
- Highway 11 / 50 Street Intersection: With AT's construction of the roundabout by the 22,000 population (5-Year) horizon (currently right-in right-out north of Highway 11), there will be less traffic demand / pressure on Highway 20.
- Highway 11 / 60 Street Intersection: This study concludes that the dual-lane roundabout would operate well in the 38,000 population (25-Year) horizon. Per McElhanney's Highway 11 Functional Planning Study in 2013, an interchange was planned at the location and might be needed beyond the 38,000 population (25-Year) horizon. Further study by AT will be required to determine the exact timeline of the interchange upgrade.
- Highway 20 / Memorial Trail, Highway 20 / Reynolds Road / 30 Avenue: If roundabout is chosen to be implemented at these locations, a staged roundabout (staging from single lane to dual lane) is recommended to minimize throwaway costs.
- Highway 20 / 47 Avenue Intersection: At the interim 34,000 population (20-Year) horizon, it is recommended to convert the single westbound left turn bay to dual left turn bays. Detailed design along with truck turning templates should be undertaken to confirm feasibility and exact intersection configuration.

4.4 Opinion of Probable Cost

Class 5 (order of magnitude) opinions of probable cost were prepared to provide an estimate order of magnitude for potential future transportation infrastructure costs. The Class 5 cost estimates can be used to update and coordinate with other infrastructure budgeting tools to assist in planning budgets on a Town-wide scale for future transportation studies, designs, and capital construction projects. Future transportation studies and designs would provide the more detailed estimates required to continually review and update the off-site levy bylaw, or to budget and implement individual projects.

The assumptions used in the development of the opinion of probable cost are as follows:

- Costs in 2021 dollars;
- Includes urban design with storm systems;
- Excludes land acquisition (assumes that land will be dedicated to the Town through the development process);
- Class 5 "order of magnitude" estimates with an accuracy of +75% to -40%, contingency of 15% and engineering / administration allowance of 15%;
- The suggested improvement horizon is estimated and will be subject to change due to development pattern changes and background traffic growth;
- All improvements to Highway 11 (highway twinning and roundabouts) are assumed to be fully funded by AT;

- On Highway 20, the initial cost to construct a single lane roundabout is assumed to be the responsibility of the Town. The twinning of Highway 20 along with the subsequent dual-lane roundabout, intersection widening, signalization and signal retiming is assumed to be fully funded by AT;
- On Highway 11A, the twinning of the highway is assumed to be fully funded by AT. From the analysis, the intersection upgrade (signalization or roundabout) on the intersections east of Highway 20 are required after the twinning of Highway 11A. For the cost estimate, it is assumed that the Town's contribution is equivalent to the cost of a single lane roundabout;
- As indicated in Section 4.2.1, the Memorial Trail recommendations in the TMP closely resembles the medium-term design (2-lane urbanization of Memorial Trail and single-lane roundabout) of the Memorial Trail FPS, thus the FPS' medium-term cost estimate was referenced. The FPS provided a maximum and minimum cost estimate; in this TMP, the average of the maximum and minimum cost estimate is referenced.
- On Memorial Trail, west of 60 Street, the roundabouts at Springfield Blvd and Station Dr were assumed to be constructed at the same time of the paving and urbanizing of Memorial Trail.
- The paving of 50 Ave between 60 Street and Westview Drive was assumed to be in the 5-year horizon. The cost estimate assumes the existing rural standard is maintained and includes pavement and minor ditch rehabilitation work only (i.e. no curbs, streetlight, etc.);
- Unless noted below, the unit costs used were taken from typical rates for Class 5 cost estimates on Southern Alberta area projects:
  - New green field 2-lane arterial (undivided) with pathways on both sides: $3.2 Million per km;
  - New traffic Signal (Municipal intersection): $500,000;
  - New single lane roundabout: $3.6 Million. The cost estimate is from the Memorial Trail FPS and is the average of the maximum and minimum cost estimate of the Memorial Trail / Station Drive (Segment 3) single lane roundabout in the medium-term. It is noted that 80m of Memorial Trail east and west of the roundabout is also included in the cost. Note: The cost estimates of other segments and roundabouts from the Memorial Trail FPS were not referenced as these cost estimates includes longer sections of Memorial Trail;
- Railway pre-emption cost does not include any infrastructure upgrades to the railway crossing system, and any labour and equipment cost that might be incurred by CN;
- The cost of the internal Collector roads of lower classification within the ASP and OP areas were assumed to be the responsibility of the developer as part of their respective subdivision development agreements;

4.4.1 Future Improvement Summary for Capital Improvements

The cost estimate of the recommended improvements in each horizon is summarized in Table 4.4.

Table 4.4: Recommended Improvements Staging, Horizon and Cost

ID	Corridor / Intersection	Improvement Description	Class 5 Cost Estimate
Improvements by 22,000 Population (5-Year)			
H1	Highway 11 (Highway 20 to 60 Street)	Twinning to 4 lanes	$0[A]
H2	Highway 11 / Highway 20	Dual lanes roundabout	$0[A]
H3	Highway 11 / 50 Street	Dual lanes roundabout	$0[A]

ID	Corridor / Intersection	Improvement Description	Class 5 Cost Estimate
H7	Highway 20 / Highway 11A	Add dual lane approaches to the westbound (right turn lane added) and southbound (right turn lane added) approach of the existing roundabout	$490,000
H11	Highway 20 / Reynolds Road / 30 Avenue	Single lane roundabout	$3,600,000 [B]
H12	Highway 20 / Memorial Trail (Segment 12 in FPS)	Single lane roundabout with dual lane approaches for the southbound (right turn lane added) and northbound (northbound left turn added) approach	$8,800,000 [C]
NW3	50 Street / 50 Avenue	Traffic signalization	$500,000
NW4	50 Ave (between 60 St and Westview Dr)	Paving existing gravel road	$3,000,000
SW5	Memorial Trail / 50 Street (Segment 8 in FPS)	Single lane roundabout	$7,750,000 [C]
SE1	30 Avenue (east of Highway 20)	New Arterial road (up to first collector)	$1,280,000
R1	Highway 20 at CN Railway	Railway Crossing Improvement (FLB&G)	$460,000
		Total (Rounded)	**$25,880,000**
Improvements by 26,000 Population (10-Year)			
H5	Highway 20	Twinning to 4 lanes	$0[A]
H7	Highway 20 / Highway 11A	Upgrade the existing single lane roundabout to dual lanes roundabout	$0[A]
H8	Highway 20 / Erickson Road	Upgrade the existing single lane roundabout to dual lanes roundabout	$0[A]
H9	Highway 20 / Herder Drive / Cuendet Industrial Way	Twinning Highway 20 to 4 lanes and Signal retiming	$0[A]
H11	Highway 20 / Reynolds Road / 30 Avenue	Upgrade the single lane roundabout to dual lane roundabout	$0[A]
H12	Highway 20 / Memorial Trail	Upgrade the single lane roundabout to dual lane roundabout	$0[A]
NW1	Township Road 385 (50 Avenue)	Upgrade to Arterial west of 60 Street	$2,560,000
NE1	Range Road 12	Upgrade to Arterial (2 lanes)	$8,960,000
NE4	47 Avenue / Range Road 12	Add all-way stop control	$6,000
NE5	47 Avenue (Charles Industrial Way to Range Road 12)	Upgrade to Arterial (2 lanes)	$3,200,000
SW1	Memorial Tr at Springfield Blvd and Station Dr, Memorial Tr west of 60 Street (Segments 1 to 3 in FPS)	Single land roundabouts, Memorial Trail upgrade to Arterial (2 lanes)	$13,100,000 [C]
SW4	60 Street / New East-West Access (south of Memorial Trail)	New unsignalized intersection with NBL, SBL and NBR turn bays	$900,000

ID	Corridor / Intersection	Improvement Description	Class 5 Cost Estimate
SE1	Reynolds Road / 30 Avenue (east of Hwy 20)	New Arterial road to Range Road 12	$3,840,000
SW6	50 Street / New East-West Access (south of Memorial Trail)	New unsignalized intersection with NBL and SBL turn bays	$900,000
		Total (Rounded)	**$33,466,000**
Improvements by 30,000 Population (15-Year)			
H4	Highway 11 / 60 Street	Dual lane roundabout	$0[A]
H6	Highway 20 / Jarvis Bay Drive	Dual lane roundabout	$3,600,000 [D]
H13	Highway 11A (Erickson Drive to the East Town limit at RR 11)	Twinning to 4 lanes	$0[A]
H15	Highway 11A / Range Road 12	Dual lane roundabout	$3,600,000 [D]
NE2	Range Road 11	Upgrade to Arterial	$1,600,000
NE3	47 Avenue / Thevenaz Industrial Trail	Traffic signalization	$500,000
SW2	60 Street / Lakeway Boulevard	Traffic signalization	$500,000
SW3	60 Street / Memorial Trail (Segment 4 in FPS)	Roundabout	$7,400,000 [C]
SE3	Memorial Trail / Ryders Ridge Boulevard (Segments 9+10 in FPS)	Single lane roundabout	$6,650,000 [C]
		Total (Rounded)	**$23,850,000**
Improvements by 34,000 Population (20-Year)			
H10	Highway 20 / 47 Avenue	Add dual WBL (change WB from 1 WBL / 2 WBT to 2 WBL / 1 WBT)	$275,000
NW2	60 Street / 50 Avenue	Single lane roundabout	$3,600,000 [B]
SW4	60 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout	$3,600,000 [B]
SW7	Memorial Trail / Lakeway Boulevard (Segment 5 in FPS)	Single lane roundabout	$5,850,000 [C]
SE2	Memorial Trail / Crestview Boulevard (Segment 12 in FPS)	Single lane roundabout	$9,500,000 [C]
		Total (Rounded)	**$22,825,000**
Improvements by 38,000 Population (25-Year)			
H17	Highway 11A / Range Road 11	Dual lane roundabout	$3,600,000 [D]
H14	Highway 11A / New North-South Access (between Hwy 20 and RR 12)	Dual lane roundabout	$3,600,000 [D]

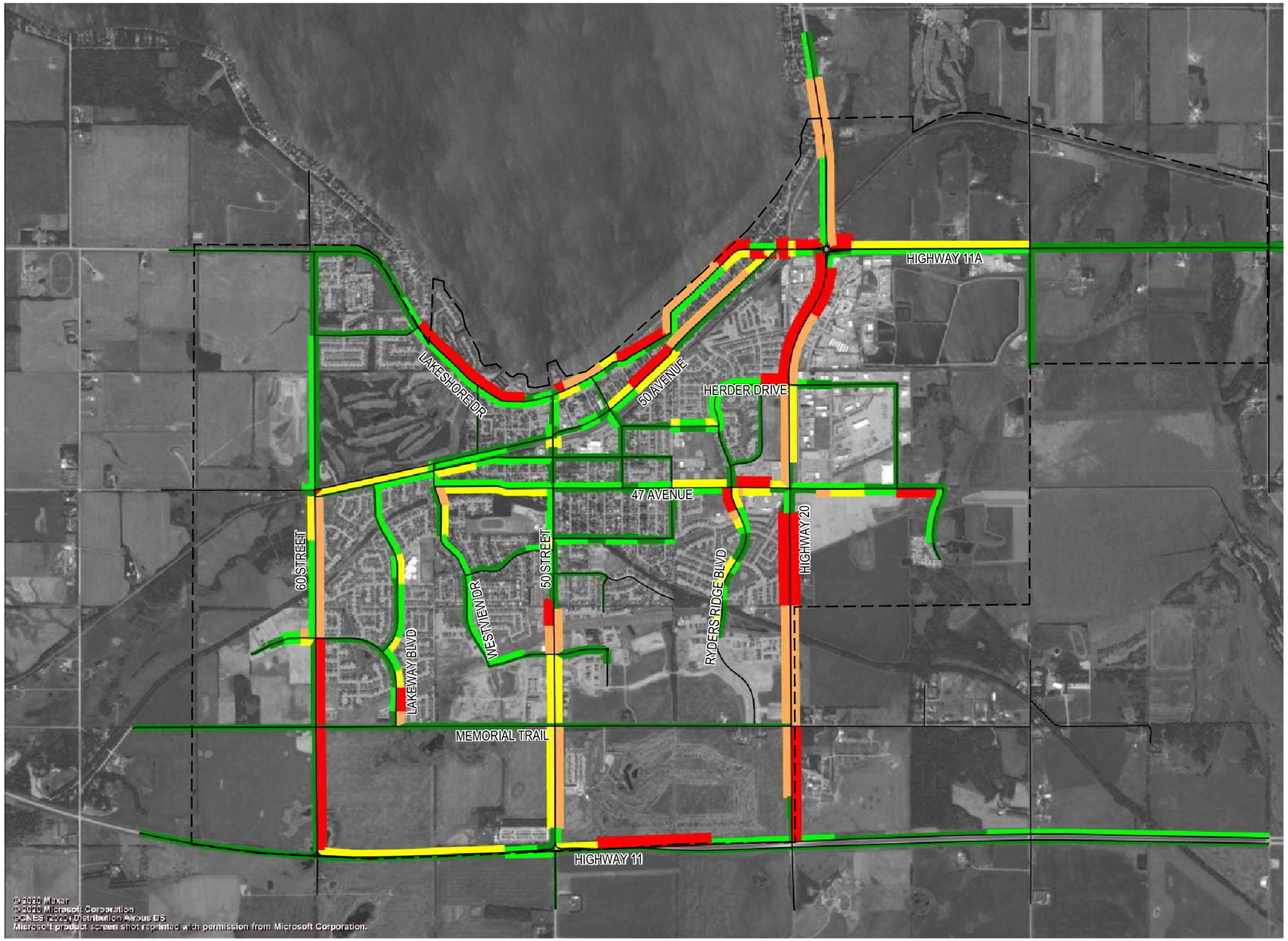
ID	Corridor / Intersection	Improvement Description	Class 5 Cost Estimate
H16	Highway 11A / New North-South Access (between RR 12 and RR 11)	Dual lane roundabout	$3,600,000 [D]
SW6	50 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout	$3,600,000 [B]
SW8	Memorial Trail / Brookstone Drive (Segments 6+7 in FPS)	Single lane roundabout	$7,750,000 [C]
		Total (Rounded)	**$22,150,000**
		Grand Total All Improvements in All Horizons (Rounded)	**$128,200,000**

[A] Assumed to be Alberta Transportation project

[B] Cost estimate is for a roundabout. The other optional improvement is signalization with turn bay / channelized right and the cost estimate is not provided.

[C] Cost estimate is from the medium-term design in the Memorial Trail FPS. The cost includes the single-lane roundabout and urbanizing the segment of Memorial Trail adjacent to the roundabout.

[D] Assumed the Town's contribution is equivalent to the cost of a single lane roundabout.



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PM Peak Hour Congestion Future Do Nothing Scenario
Link bars
Volume capacity ratio PrT (AP)

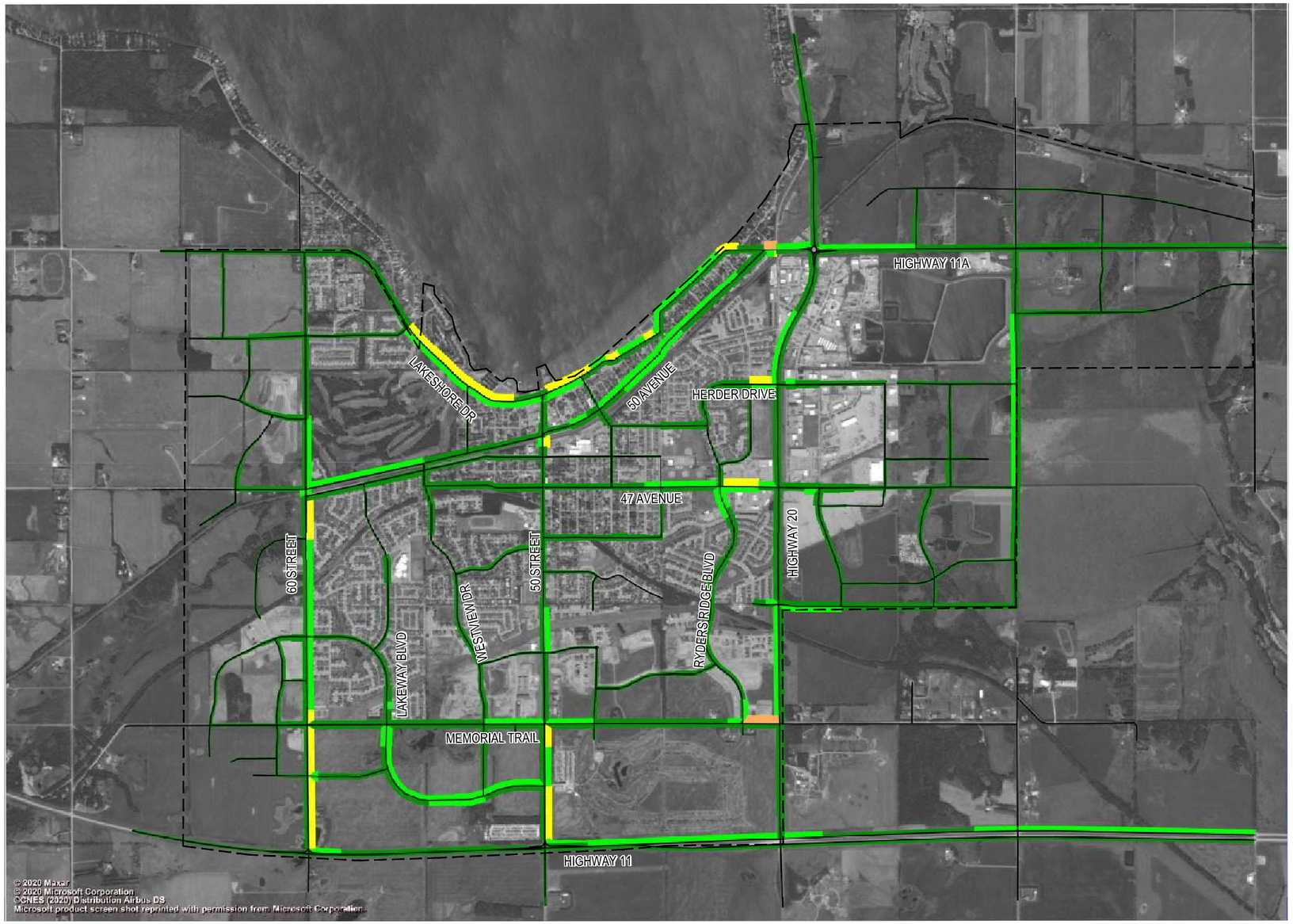
- 0-60%
- 60-80%
- 80-95%
- 95-105%
- >105%
- – – – TOWN BOUNDARY

ISL Sylvan Lake

SYLVAN LAKE TMP

38,000 POPULATION - PM V/C RATIO DO NOTHING SCENARIO

EXHIBIT 4.1
Feb 2022



PM Peak Hour
Link bars
Volume capacity ratio PrT (AP)

- 0-60%
- 60-80%
- 80-95%
- 95-105%
- >105%

– – – TOWN BOUNDARY

ISL Sylvan Lake

SYLVAN LAKE TMP

38,000 POPULATION - PM V/C RATIO WITH IMPROVEMENTS SCENARIO

EXHIBIT 4.2
Feb 2022

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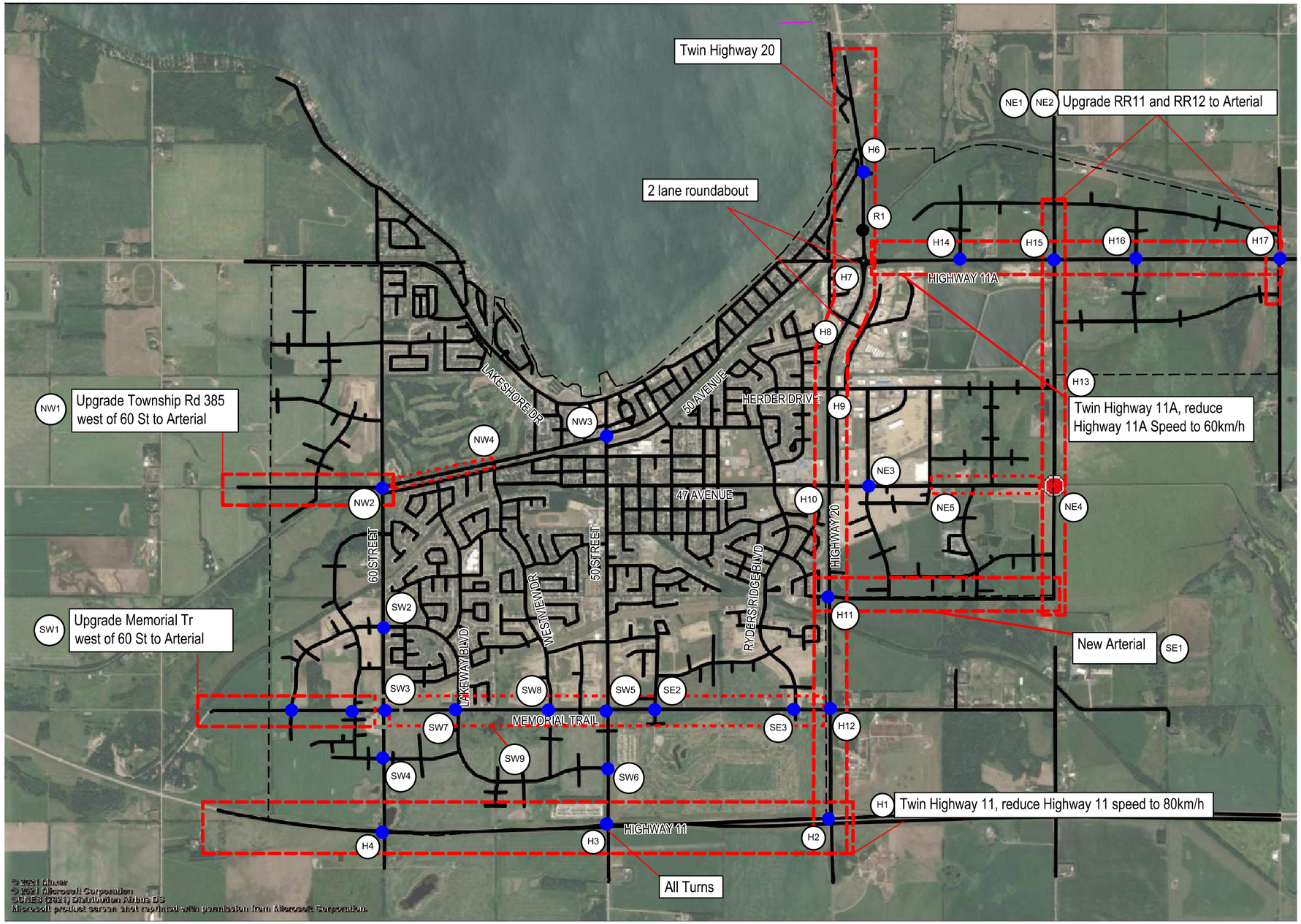

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ISL Sylvan Lake

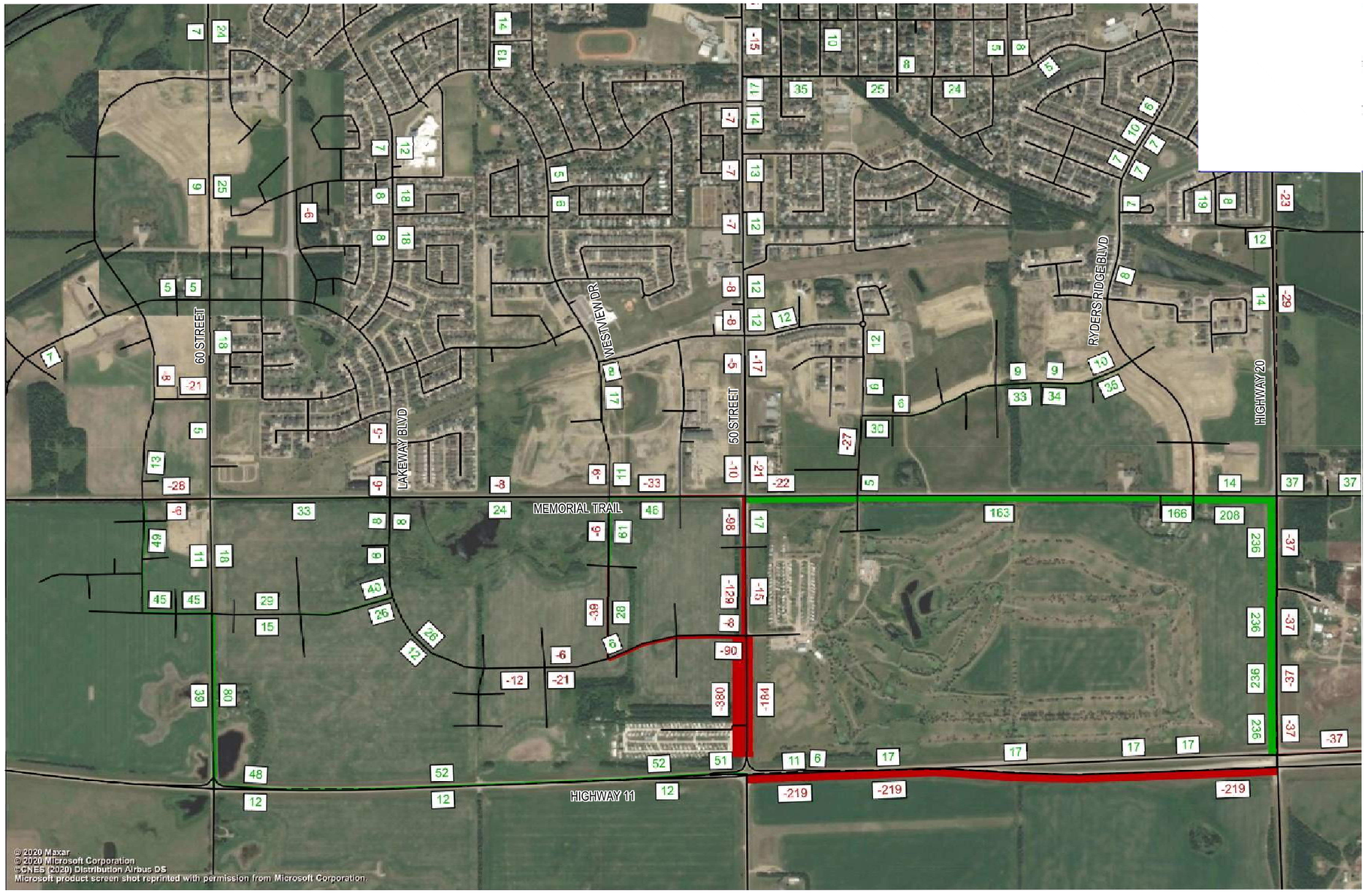
- New Signalized Intersection or Roundabout
- New All-way Stop
- Railway Crossing Improvement
- Town Boundary

SYLVAN LAKE TMP

38,000 POPULATION - ROAD UPGRADES

EXHIBIT 4.3

Feb 2022



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ISL Sylvan Lake

– – – TOWN BOUNDARY

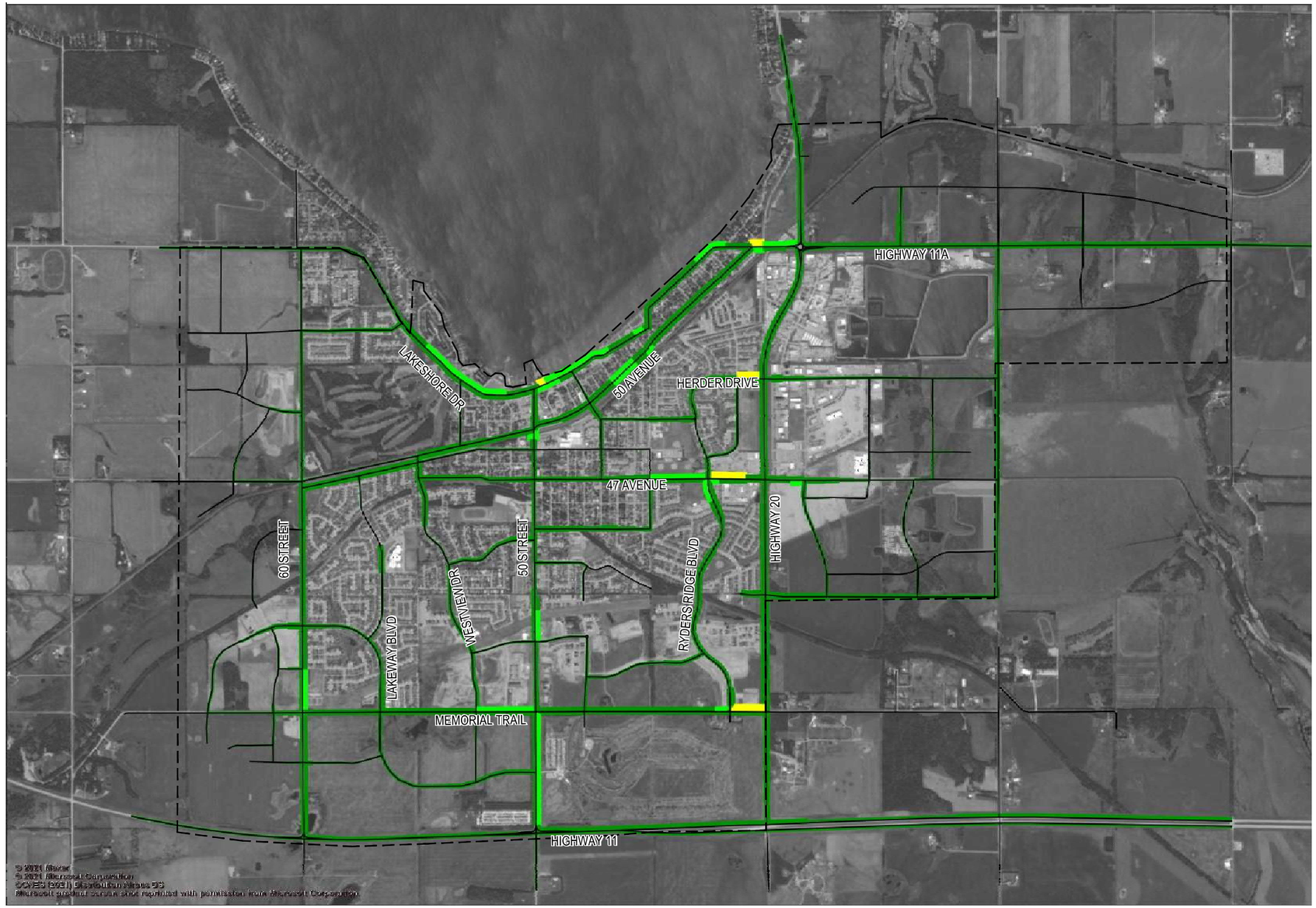
REDUCTION OF TRAFFIC

ADDITION OF TRAFFIC

SYLVAN LAKE TMP

38,000 POPULATION - VOLUME COMPARISON
RIRO MINUS ALL TURNS AT HIGHWAY 11 / 50 STREET

EXHIBIT 4.4
Feb 2022



PM Peak Hour Congestion 15 Year With Improvements Scenario

Link bars

Volume capacity ratio PrT (AP)

- 0-60%
- 60-80%
- 80-95%
- 95-105%
- >105%

– — – TOWN BOUNDARY

SYLVAN LAKE TMP

30,000 POPULATION - PM V/C RATIO WITH IMPROVEMENTS SCENARIO

EXHIBIT 4.5

Feb 2022

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22,000 Population

22,000: Add dual lane approach on SB and WB for right turn lane

R1

H7

HIGHWAY 11A

RANGE ROAD 12

RANGE ROAD 11

NW4

Paving

LAKESHORE DR

50 AVENUE

HERDER DRIVE

NW3

47 AVENUE

60 STREET

50 STREET

WESTVIEW DR

LAKEWAY BLVD

RYDERS RIDGE BLVD

HIGHWAY 20

H11

30 AVENUE

New Arterial

SE1

SW5

MEMORIAL TRAIL

H12

22,000: Single Lane Roundabout

H1

Twin Highway 11, reduce Highway 11 speed to 80km/h

H3

HIGHWAY 11

H2

All Turns

ISL Sylvan Lake

New Signalized or Roundabout

New All-way Stop

Railway Crossing

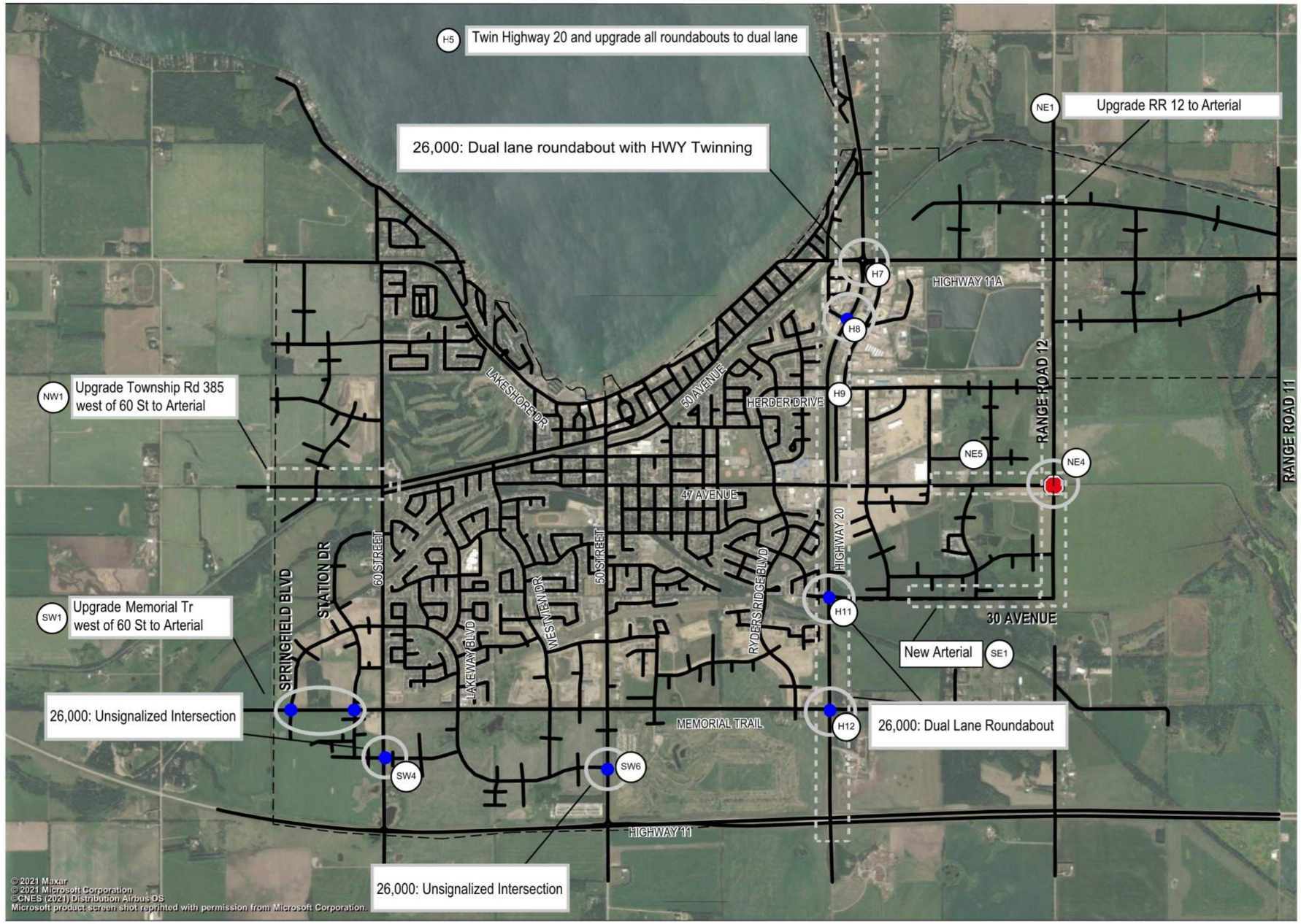
Town Boundary

SYLVAN LAKE TMP

22,000 ROAD UPGRADES

EXHIBIT 4.6

Jan 2022



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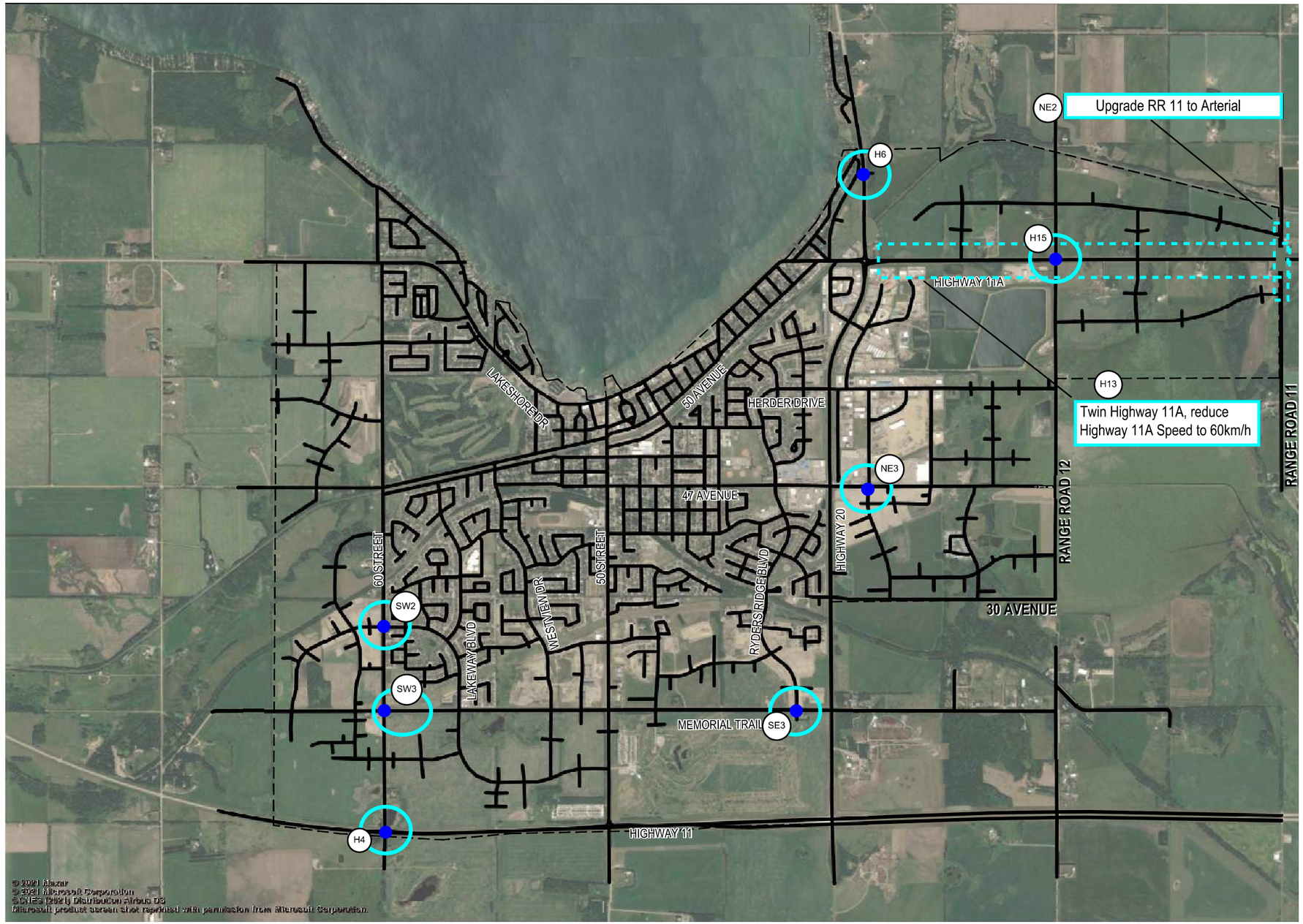
ISL Sylvan Lake

- New Signalized or Roundabout
- New All-way Stop
- Railway Crossing
- Town Boundary

SYLVAN LAKE TMP

26,000 ROAD UPGRADES

EXHIBIT 4.7
Jan 2022



30,000 Population

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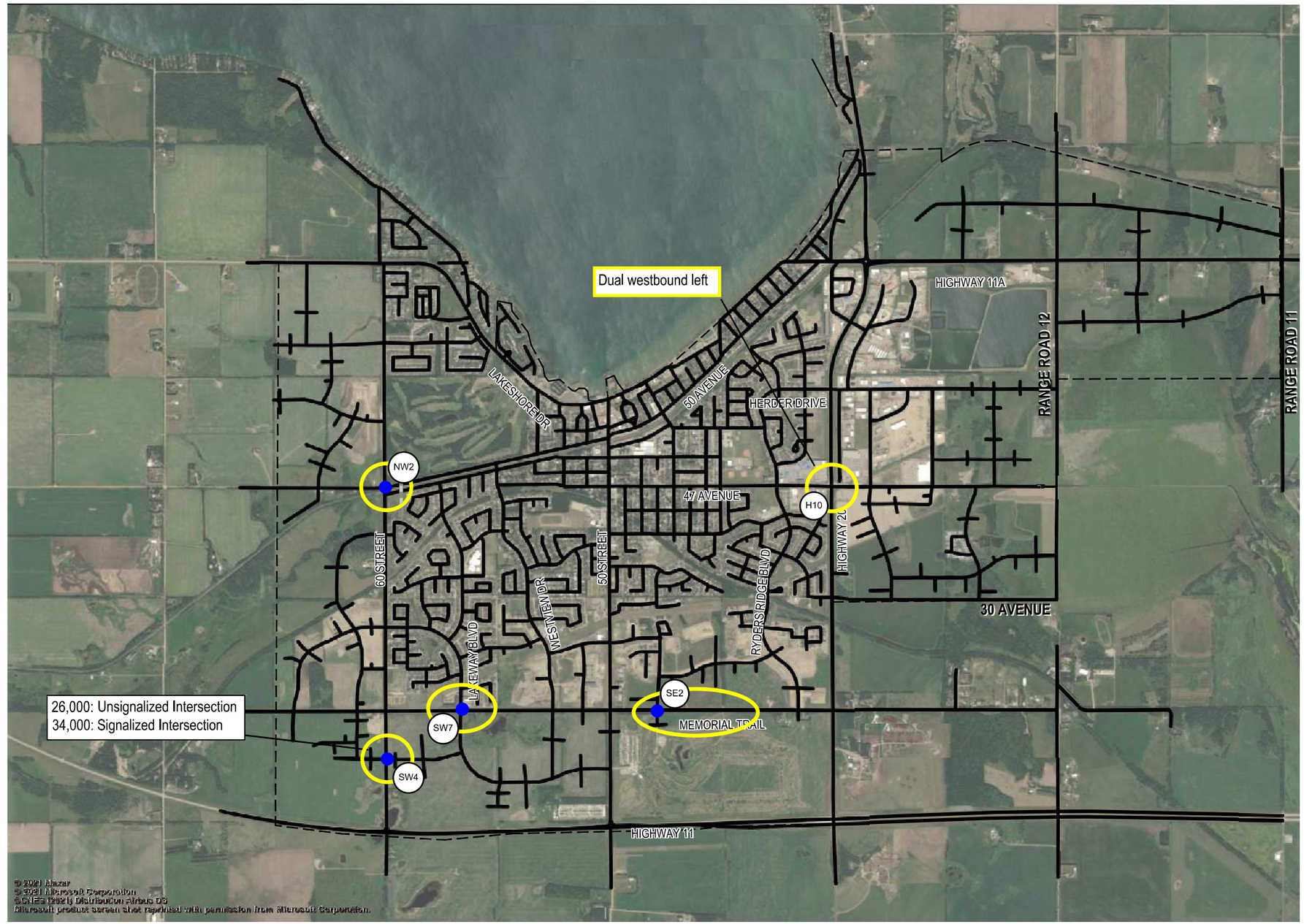
ISL Sylvan Lake

- New Signalized or Roundabout
- New All-way Stop
- Railway Crossing
- Town Boundary

SYLVAN LAKE TMP

30,000 ROAD UPGRADES

EXHIBIT 4.8
Feb 2022



34,000 Population

New Signalized or Roundabout

New All-way Stop

Railway Crossing

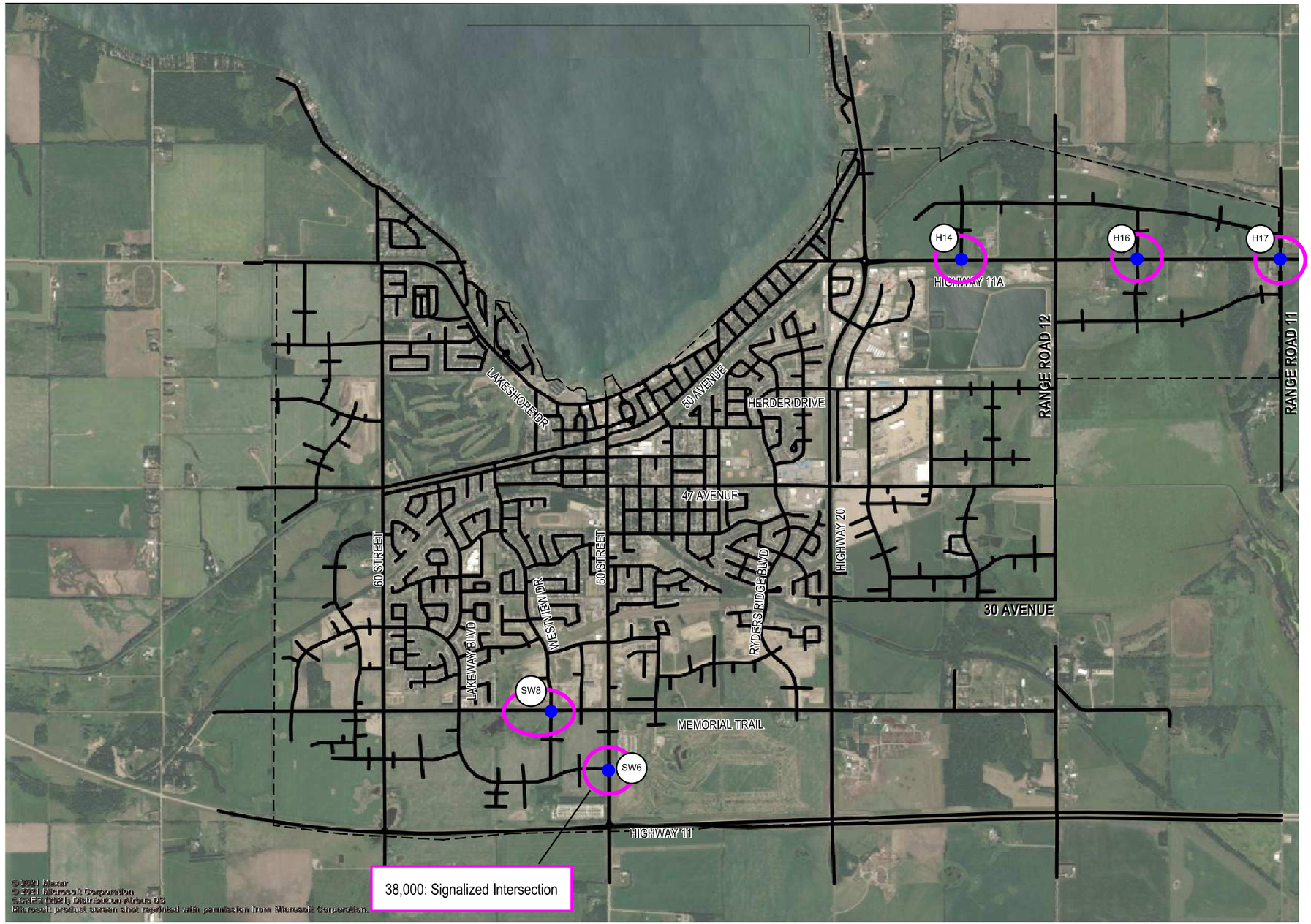
Town Boundary

SYLVAN LAKE TMP

34,000 ROAD UPGRADES

EXHIBIT 4.9

Feb 2022



38,000 Population

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ISL Sylvan Lake

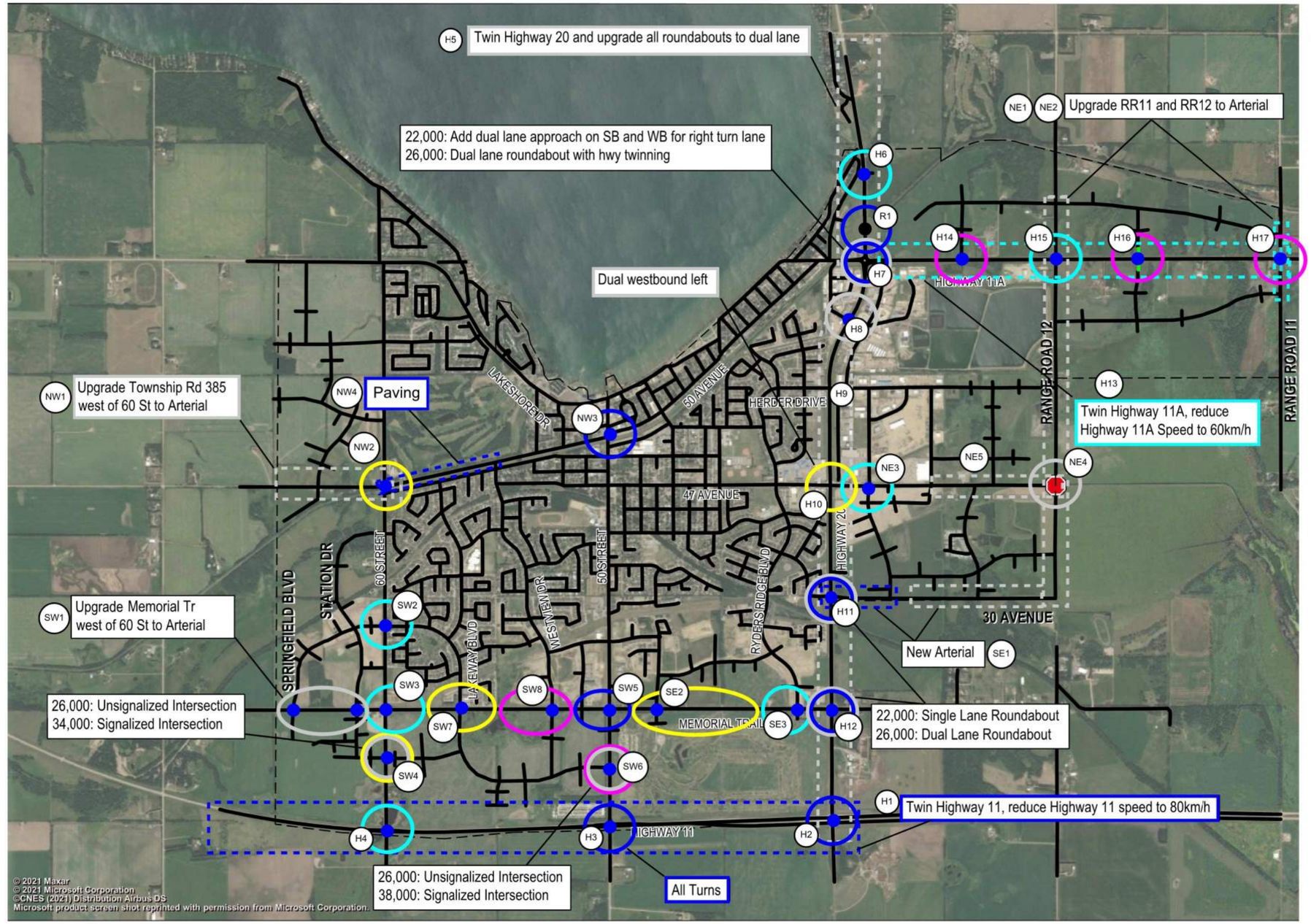
- New Signalized or Roundabout
- New All-way Stop
- Railway Crossing
- Town Boundary

SYLVAN LAKE TMP

38,000 ROAD UPGRADES

EXHIBIT 4.10

Feb 2022



22,000 Population

26,000 Population

30,000 Population

34,000 Population

38,000 Population

New Signalized or Roundabout

New All-way Stop

Railway Crossing

Town Boundary

ISL Sylvan Lake

SYLVAN LAKE TMP

ROAD UPGRADES TIMELINE

EXHIBIT 4.11
Jan 2022

5.0 Transit

The following section discusses the potential local transit travel routes for the future 38,000 population horizon.

5.1 2016 TMP

The 2016 TMP reviewed and summarized local and regional transit plans from other municipalities in Alberta and assessed the feasibility for these services for the Town of Sylvan Lake. The 2016 TMP reached the following conclusions with respect to potential local and regional transit services:

- **Local Transit Services:** Fixed route, local transit services were not recommended in the short term due to the large number of residents working outside of town. The plan recognizes that future developments should plan for accommodating local routes, ensuring roadways networks provide higher levels of connectivity and land use plans identify potential future local transit routes. The short term local transit is recommended to be focused on providing transportation for seniors and persons with disabilities and different services are discussed for offering special transit including, handi-bus, accessible taxis (with subsidized fares) and dial-a-ride.
- **Regional Transit Services:** Proposed regional transit service plans include routes connecting between the industrial, commercial and residential land uses inside the town and major destinations in Red Deer, including Red Deer Polytechnic and Red Deer Regional Hospital Centre. The proposed plan includes options for administering and funding regional transit services, including potential purchase of busses or applying the BOLT Regional Transit Service model which the City of Red Deer uses for providing regional transit services with the City of Lacombe (although we note service stopped in August 2020 due to low demand during the COVID-19 pandemic) and Town of Blackfalds. In the 2016 TMP, a regional park and ride was recommended near the intersection of Memorial Trail and Highway 20.

5.2 Benefits and Challenges of Local Transit

As concluded in the 2016 TMP, local transit is not recommended for the town in the short term. For the future 38,000 population (25-year) horizon, both a local transit and regional transit could be considered. Local transit includes the operation between residential areas and major destinations within town, and regional transit considers operation between Sylvan Lake and Red Deer.

The following sources were reviewed to identify the benefits and challenges of offering local transit:

- Design and Implementation of Transit Services in Small Communities, Transportation Association of Canada (2016)
- Developing Sustainable Transit Options for Small Communities (2013)
- Improving Travel Options in Small and Rural Communities, Transport Canada (2009)
- Journey to Work. Canada Federal Census, StatsCan, (2016)

5.2.1 Benefits

Benefits of providing local transit services are as follows:

- **Providing an Optional or Necessary Alternative Mode of Transportation:**
  - Offering an alternative mode of transportation for those that normally choose to drive;
  - Providing a mobility service for people who do not drive a vehicle by choice;
  - Providing mobility for low-income families, where vehicle ownership is not feasible; and
  - Offering a mobility service for people who do not drive by necessity, including persons with disabilities that would not normally require specialized transit.
- **Transportation Demand Management Tool:**
  - Reducing private vehicle transportation;
  - Reducing parking demand for major destinations, particularly along the lakefront where parking supply is limited;
  - Offering a transportation demand management service to limit reliance on vehicle modes of transportation for festivals and/or events where road closures are planned and/or parking is limited, including potential park/ride service to/from event grounds; and
  - Reducing vehicle demand and traffic congestion, potentially deferring the timing and cost of road network projects.
- **Supporting Businesses:**
  - Supporting local businesses by providing a low-cost transportation mode for entry level employees where vehicle ownership is not mandatory by the employer and the cost of vehicle owner is not practical for the employee; and
  - Providing an additional mode of travel for residents and visitors to access key destinations and business areas.

5.2.2 Challenges

Challenges of offering local transit services are as follows.

- **Servicing Demand:**
  - Land use patterns are generally not transit supportive, requiring longer transit routes, covering larger areas, increasing operational costs and reducing frequency of transit;
  - Building transit ridership as an alternative mode of transportation is challenging due to longer travel times (compared to driving), limited roadway congestion and lack of parking issues; and
  - Transit routing, frequency and operating hours capturing the largest transit demand is challenging for new transit systems.
- **Costs:** Shortfall costs for operating transit (fare revenue vs. operation costs) are typically covered by the municipality in the order of 40-80%, depending on ridership and transit service levels. Transit funding shortfalls compete with other basic community needs for funds.
- **Resilience:** Smaller systems generally have limited resources for research, development, data collection and overall management and may be less adaptable to change.

5.3 Proposed 38,000 Population Transit Plans

The following discusses the transit demand, anticipated travel routes for providing transit in the for the future 38,000 population horizon, with a population growth from 17,200 (existing) to 38,000 (25-Year). The proposed plans are focused on local transit routes and connection points to the regional transit routes as proposed in the 2016 TMP. Local transit is focused on connecting local residents with major retail and employment destinations in the Town.

5.3.1 Potential Transit Demand

Existing

From the journey to work statistics published by StatsCan, 36% of residents commute within the Town of Sylvan Lake and 64% of residents commute outside of the Town for employment, and there are approximately 6,000 to 7,000 trips in the peak hour, of which approximately 2,000 to 2,500 trips originate and are destined to remain within the Town. Transit mode share for local transit trips is anticipated to fall around 2 to 5% of trips, based on transit mode splits of 2.2 to 6.8% for various small municipalities in Canada with a size of 50,000 – 100,000 people, equaling approximately 40 to 100 local transit trips during the peak hour, and approximately 10,000 to 25,000 local transit trips annually. This is comparable to other small sized municipalities in Alberta, such as the Town of Hinton (population 10,000) with approximately 25,000 annual rides (2013) and the Town of Peace River (population 6,000) with approximately 10,000 annual rides. Regional transit ridership potentially may be higher with almost twice as many residents commuting outside of town, however the ultimate destinations within Red Deer or the regional area are likely quite dispersed.

38,000 Population Horizon

The 38,000 population horizon potential local transit demand is estimated by using the same projection method as the existing population. The 38,000 population transit mode share is expected to be to approximately 4 to 6%, falling into the higher range of transit mode shares of 2.2 to 6.8% for small communities in Canada. The number of local transit trips expected are approximately 180 to 335 trips during the peak hours and approximately 45,000 to 84,000 local transit annual trips, based on population growth and increase in transit mode share. The number of trips estimated is comparable to other small sized municipalities as indicated in the previous paragraph. Similar to existing, regional transit ridership potentially may be higher with almost twice as many residents commuting outside of town.

5.3.2 Potential Service Areas

Anticipated travel routes for transit planning purposes are focused on connecting residential, retail and employment areas and apply the following principles:

- **Highest Employment Areas:** Figure 5.1 depicts areas with the highest levels of employment including the downtown, east industrial park, commercial areas along 47 Avenue and expanded employment areas in the southwest and northeast.
- **Densely Populated Areas:** In addition, connecting transit between high employment areas and areas with the highest population density focused on providing routes with the greatest potential to capture the highest number of riders in a community. People living in multi-family housing typically rely more on non-vehicle means of transportation compared to people living in single-family homes. Connecting to areas that have a higher number of multi-family units focuses on providing transit services where there is a potentially higher demand. Figure 5.2 depicts relatively more densely populated areas.

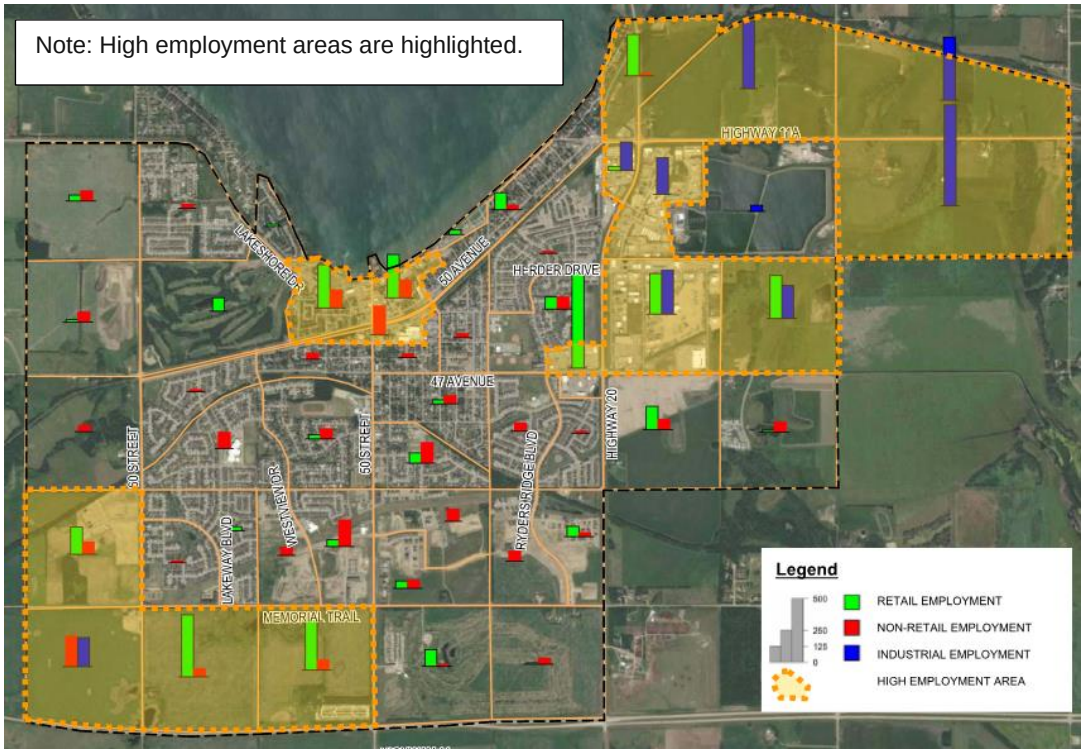


Figure 5.1: Future Employment Areas

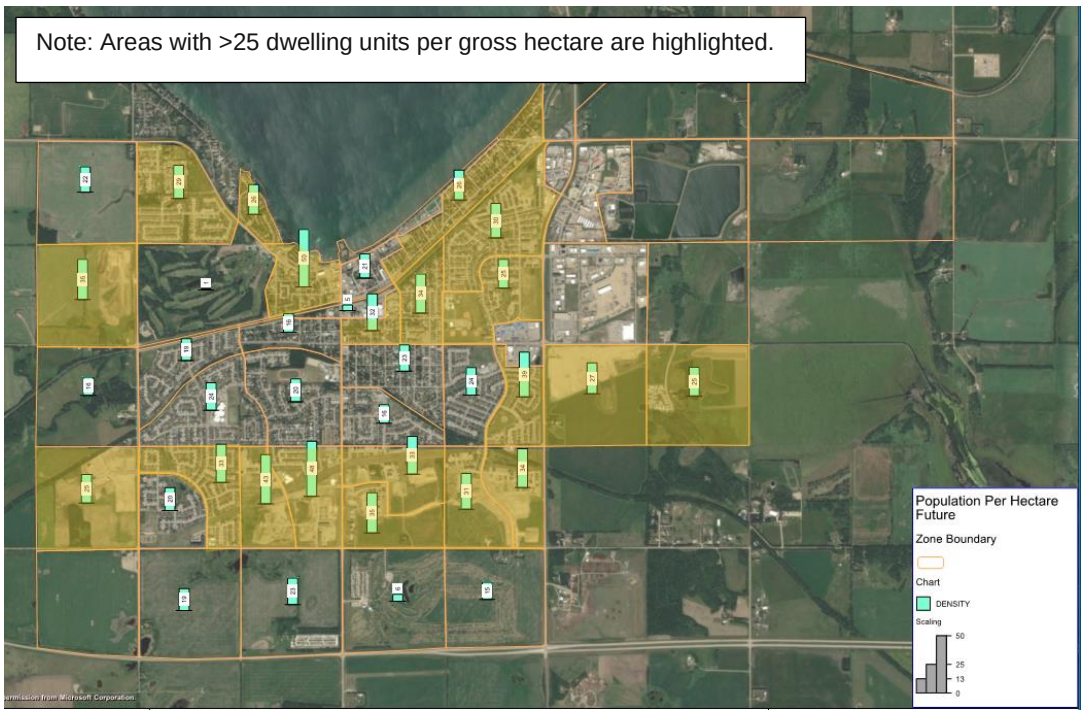


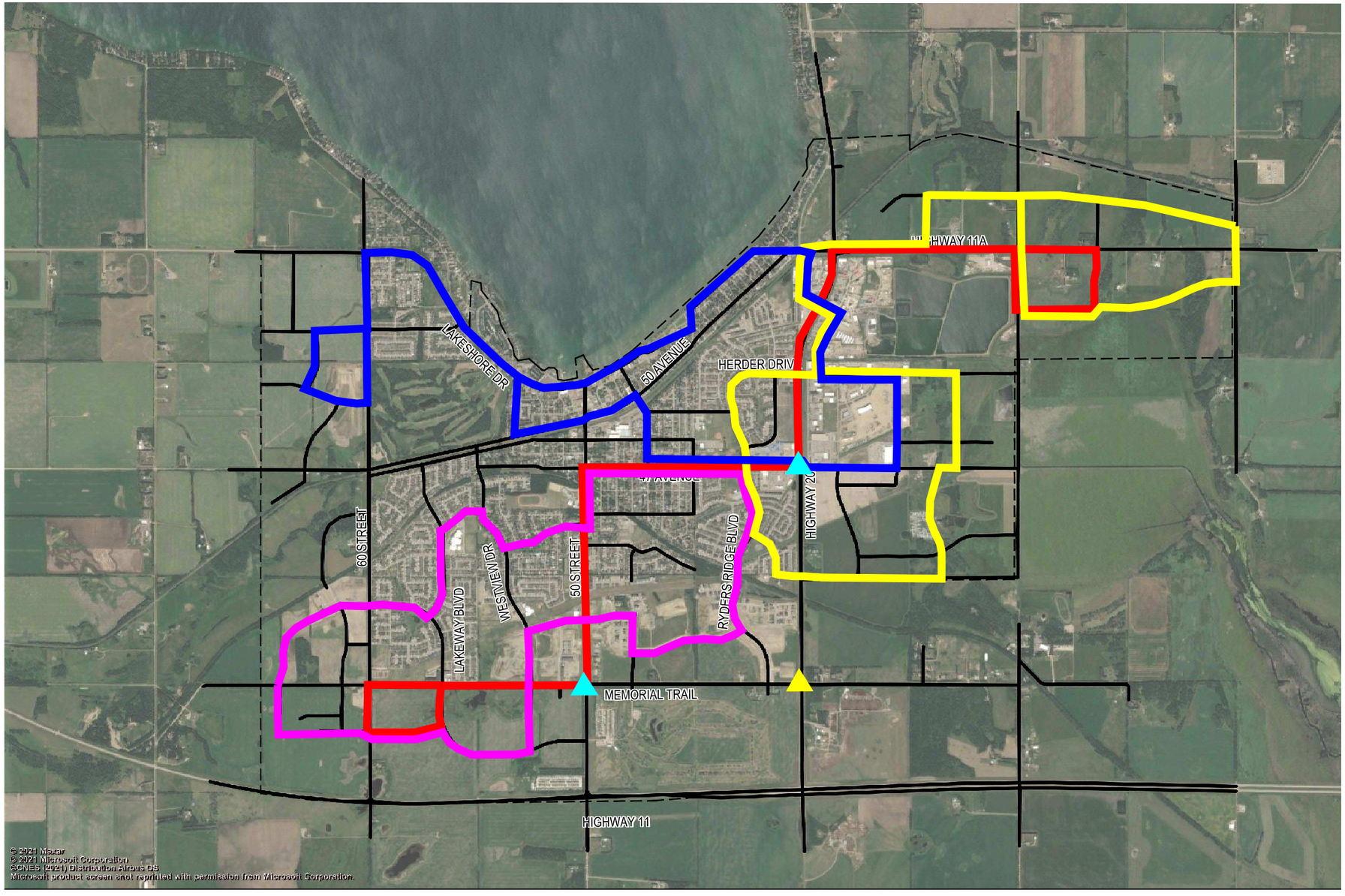
Figure 5.2: Future Population Per Hectare

5.3.3 38,000 Population Transit Routes

Transit routes include three local / neighbourhood routes that follow collector roads and provide access to all areas of the town. The three local routes are complemented by an express route that travels along arterial roadways, from the southwest to the northeast across the town. A total of four buses are needed to offer the service. In addition to the 2016 TMP's recommended regional connection point near the intersection of Memorial Trail / Highway 20, a second regional connection point is provided at Memorial Trail / 50 Street in the future 38,000 population transit plans. Suggested routes are provided on Exhibit 5.1 and should be considered when planning local road networks in each development area.

5.4 Active Modes and Sidewalks

Each transit trip begins and ends with a walking trip and to support future transit service the Town should consider reviewing the connectivity of their sidewalk and trails network to ensure potential riders have a safe and convenient place to walk and access the transit network from their origin to their ultimate destinations. The Town may want to leverage / access grant funding for new sidewalks and trails through Canada's National Active Transportation Strategy, providing $400 Million over the next five years. In addition, funding for transit services may be available through the provincial Green Transit initiative.



REGIONAL PARK AND RIDE

REGIONAL CONNECTION POINT (NO PARKING)

LOCAL TRANSIT ROUTE (EXPRESS)

LOCAL TRANSIT ROUTE

LOCAL TRANSIT ROUTE

LOCAL TRANSIT ROUTE

TOWN BOUNDARY

ISL Sylvan Lake

SYLVAN LAKE TMP

38,000 POPULATION PROPOSED TRANSIT ROUTE

EXHIBIT 5.1

Feb 2022

6.0 Traffic Calming

Traffic calming is an important tool for municipalities to reinforce the intended use of a roadway, promote good driver behavior, and improve conditions for all users through physical and non-physical measures.

This section is intended to provide broad discussion and recommendations that could serve as the basis for developing a potential future Traffic Calming Policy for the Town of Sylvan Lake and includes the following:

- A best practice review of different traffic calming measures in other municipalities;
- A review of the Canadian Guide to Neighbourhood Traffic Calming published by the Transportation Association of Canada (TAC);
- Traffic calming related responses from public engagement; and
- Recommended traffic calming policy, including methods for deciding whether an area requires traffic calming and potential measures.

This document focuses on the types of traffic calming measures and the way the measures could be applied to different roadways.

6.1 Current Practices Review

Currently, the Town of Sylvan lake does not have a defined traffic calming policy and reviews opportunities for traffic calming on an as-requested basis. Several examples of traffic calming measures are already in place along Lakeshore Drive including curb extensions and textured pavement.

The Town's Traffic Safety Bylaw states that the default speed limit within the Town is 40 km/h. While a default posted speed of 40 km/h is becoming more common in municipalities, often the roadway network was designed for a higher intended speed limit (typically 50 km/h). As a result, some roadways within the Town may include design features that makes it "easy" or "safe" for drivers to exceed the 40 km/h speed limit. In addition to other benefits such as reducing short cutting and increasing safety for vulnerable road users, traffic calming is a tool for municipalities to lower the perceived "comfortable" travel speed and implement specific design features to align with the desired vehicle speed (and posted speed limit).

6.2 Best Practices Review

A best practice review of other municipalities' traffic calming policy was conducted. This was completed to understand other municipalities' approaches to traffic calming and identify any common practices that could be applied for the Town of Sylvan Lake. The TAC Traffic Calming Guide was also reviewed. Municipalities reviewed include:

- Town of Canmore
- Strathcona County
- City of White Rock, BC
- District of West Kelowna, BC
- City of Lloydminster

The level of detail of each municipality's traffic calming documents varied greatly, with some focusing more on the procedures put in place following a request for traffic calming and others going into detail on the types of measures and what roadway type would be most appropriate. A detailed review of each municipality's traffic calming policy documents as well as the TAC Traffic Calming Guide is provided below.

6.2.1 Town of Canmore

The Town of Canmore is located in the Bow Valley west of Calgary and, like Sylvan Lake, is a popular tourist destination. The Town has a population of approximately 14,000 permanent residents and an additional 4,000 non-permanent residents based on the Town's 2018 Integrated Transportation Plan Update. The tourist season from mid-June to mid-September sees a significant increase in demand in the Town's roadway network.

The Town's 2018 Integrated Transportation Plan Update is a long-range strategic plan that guides transportation decisions. Section 6 of the plan outlines Canmore's traffic calming strategy.
A toolbox of potential traffic calming measures identified as suitable for implementation in Canmore is provided within the plan. The toolbox includes two broad categories: Social/cultural measures and physical measures. Social/cultural measures include enforcement and educational programs, while physical measures prevent or reduce movement by physically changing the road configuration. Types of traffic calming measures within the toolbox include:

- **Social/ cultural measures:** educational programs and enforcement.
- **Horizontal or vertical defection**
  - These types of measures interrupt the linearity of the street and encourage drivers to slow down either for a bump (vertical) or sharp turn (horizontal).
  - This can also include less comfortable driving surfaces such as different pavement types or rumble strips to stimulate lower driving speeds.
  - Road narrowing is also an effective method as it enhances alertness and reduces driver speed by reducing maneuverability.
- **Shared Streets, Street Closures**
  - Making use of "sharrows" to indicate the roadway use is shared between drivers and cyclists. The plan notes that shared streets are not a safe solution on streets with a speed limit higher than 30 km/h.
  - Introduction of interaction and conflicts including creating a shared space between different users to increase the number of conflicts on the road. This shared environment encourages increased caution from all users.
  - Closures of streets to car traffic, either by time of day, by season, or year-round.
- **Signage**: noted as less effective than physical measures and only to be used when warranted.
- **Complete streets** application.

The plan does not specifically recommend any measure for a specific circumstance, however, states a preference for physical measures that make it difficult to drive fast (self-enforcing) rather than social / cultural measures.

6.2.2 Strathcona County

Strathcona County is a municipality east of Edmonton. The County has a total population of 98,700 based on the 2018 municipal census, of which approximately 71,300 live in the urban service area of Sherwood Park, a contiguous suburb of Edmonton.

The Guide to Traffic Calming in Strathcona County is a policy document that establishes a framework for the implementation of traffic calming in the municipality. Traffic calming measures are to be designed in accordance with Strathcona County Design and Construction Standards (2011), guidelines from the Canadian Guide to Neighbourhood Traffic Calming published by the Transportation Association of Canada (TAC), engineering judgement, and staff experience. The County's standards include the following on traffic calming:

- Traffic calming measures are required on straight or near straight lengths greater than 215 m.
- It will be considered normal practice to implement traffic calming measures in new residential developments.
- Traffic calming on collector roadways is required, with portions of the cross sections dedicated to parking or traffic calming measures.

No specific traffic calming measures are listed in the County's documents, however self-enforcing measures that align geometric design features with desired speeds are preferred. Priority for traffic calming will be given where there are identified speed, volume, shortcutting and/or collision issues, particularly in areas of higher pedestrian volumes.

6.2.3 City of White Rock, BC

The City of White Rock is in Metro Vancouver, with a population of 19,952 as of the 2016 censes. The City has a large retirement community, is considered a local tourist destination, and is more of a suburb or exurb and not in the core Metro area.

The City of White Rock Traffic Calming Policy and Procedures document provides a procedure with which to receive and review requests for traffic calming. The document provides a list of criteria to be used to identify whether traffic calming should be considered, summarized in the table below.

Table 6.1: City of White Rock Traffic Calming Consideration Criteria

Road Classification	Threshold Limits
Local	• Average weekday or weekend traffic volume >1,000 vehicles per day, OR • Short cutting >30% of the total traffic volume, OR • 85th percentile vehicle speed >7 km/h over the posted speed limit
Collector	• Average weekday or weekend traffic volume >3,000 vehicles per day, OR • 85th percentile vehicle speed >7 km/h over the posted speed limit
Lanes	• Average weekday or weekend traffic volume >300 vehicles per day, OR • Short cutting >30% of the total traffic volume

The policy states self-enforcing measures that force drivers to slow down are generally preferred over signage or methods that require active enforcement to be effective.

The City has compiled a list of appropriate traffic calming measures if other mitigation efforts are not successful. The list includes measures from the TAC's Canadian Guide to Neighbourhood Traffic Calming deemed appropriate for use within the City. The table below is from the City of White Rock (City of White Rock's Traffic Calming Policy and Procedures – Table 1) and lists the possible traffic calming measures and which roadway types they may be applied to.

	Road Classification			Other Considerations	
	Lanes	Local Roads	Neighbourhood Collector Roads	Emergency Response Routes	Transit Routes
Vertical Deflection					
• Speed Hump	✓	✓	✓	X	X
• Raised Crosswalk	X	✓	✓	X	X
• Sidewalk Extension	X	✓	X	X	✓
• Textured Crosswalk	X	✓	✓	✓	✓
Horizontal Deflection					
• Curb Extension	X	✓	✓	✓	✓
• Curb Radius Reduction	X	✓	X	X	X
• On-Street Parking	X	✓	✓	✓	✓
• Raised Median Island	X	✓	✓	✓	✓
• Traffic Circle	X	✓	✓	X	X
• Road Diets	X	✓	✓	✓	✓
Obstruction					
• Directional Closure	X	✓	X	X	X
• Diverter	X	✓	X	X	X
• Raised Median Through Intersection	✓	✓	✓	✓	✓
• Right-In/Right-Out Island	✓	✓	X	X	X
Signage					
• Traffic Calmed Neighbourhood	X	✓	✓	✓	✓
Key					
✓ - applicable			X – not applicable		

Figure 6.1: City of White Rock Traffic Calming Measures

6.2.4 District of West Kelowna, BC

The District of West Kelowna is located in the Central Okanagan region of British Colombia. The District has an approximate population of 32,700 as of the 2016 census, and is a suburb of Kelowna across Lake Okanagan. The district is also a regional tourist destination (with wineries, recreation, etc.)

The District's Traffic Calming Policy is intended to provide direction of the administration, planning, design, and implementation of traffic calming. The policy lists five general categories of traffic calming features:

- Obstructions
- Vertical Deflections
- Horizontal Deflections
- Signage
- Technology

The policy identifies the roadway classifications within the District and the corresponding traffic calming measures, as follows:

- **Expressways:** Expressways are intended to provide continuous vehicle travel at higher speeds within and beyond the District boundaries.
  - Vehicle movement is a priority for this class of roadway and as such only technological traffic calming is acceptable.
- **Arterials:** Arterial roads are intended to provide continuous vehicle travel at higher speeds but only within the District boundary and are typically access controlled.
  - Only technological and signage controls are appropriate traffic calming measures for arterial roads.
- **Collectors:** Collector roads link local roads with arterial roads and include opportunities for access.
  - Technological, signage, and horizontal solutions are appropriate traffic calming measures on collector roads.
- **Locals:** Local roads are intended to provide local access to adjacent properties and are not intended for continuous travel or higher speeds.
  - Local roads most often have traffic calming measures which may include technological, horizontal/vertical deflections, obstructions, signage, or a combination of the measures.

The policy includes an evaluation matrix of threshold considerations to determine where traffic calming measures may be warranted, summarized below.

Table 6.2: District of West Kelowna Traffic Calming Evaluation Matrix

Road Classification	Threshold Limits	Applicable Traffic Calming Measures
Local	• Traffic Volume: >1,000 vehicles per day • Operating Speed (85th percentile): >10 km/h over the posted speed limit • Short Cutting: >25% of vehicles are not destined to or originating from the specified area	• Technological • Horizontal deflections • Vertical deflections • Obstructions • Signage
Collector	• Traffic Volume: >5,000 vehicles per day • Operating Speed (85th percentile): >10 km/h over the posted speed limit	• Technological • Horizontal deflections • Signage
Arterial	Typically assessed on a community planning level in consultation with the road authority	• Technological • Signage
Expressway	Typically assessed on a community planning level in consultation with the road authority	• Technological

The policy also includes several examples of the five traffic calming categories and indicates the features' effectiveness in addressing speed, volume, and conflict related issues.
The types are sourced from the Canadian Guide to Neighbourhood Traffic Calming and users of the plan are directed to refer to the Manual of Uniform Traffic Control Devices to confirm design details prior to any implementation. The plan recommends using self-enforcing measures where possible.

6.2.5 City of Lloydminster

The City of Lloydminster is located on the border of Alberta and Saskatchewan, on Highway 16 between Edmonton and Saskatoon. Lloydminster is incorporated by both provinces as a single city with a population of 31,410 based on the 2016 census.

The City's Traffic Calming Policy and Procedures document was created to provide rational for warranting a traffic calming study and provide procedure for completing the study if one is warranted. A list of traffic calming categories that may be applied is provided, as follows:

- Obstructions
- Vertical Deflection
- Horizontal Deflection
- Signage
- Technology

Generally, traffic calming measures are intended for local and collector roadways. Arterials are intended to provide efficient circulation throughout Lloydminster, with higher speeds and traffic volumes. As such, traffic calming measures are generally not appropriate on arterial roadways. The table below lists the thresholds to determine whether traffic calming is warranted. It is noted that these thresholds should be used in conjunction with a larger traffic calming study completed by a licensed engineer.

Table 6.3: Thresholds for Warranting Traffic Calming (City of Lloydminster)

Road Classification	Threshold Limits
Local	• Traffic Volume ≥ 1,000 Average Annual Daily Traffic (AADT), OR • Short Cutting Traffic ≥ 25% of AADT, OR • 85th Percentile Operating Speed: ≥ 5 km/h over the posted speed limit
Collector	• Traffic Volume ≥ 5,000 Average Annual Daily Traffic (AADT), OR • Short Cutting Traffic ≥ 30% of AADT, OR • 85th Percentile Operating Speed: ≥ 5 km/h over the posted speed limit

No specific traffic calming measures are recommended based on the roadway type.

6.2.6 Traffic Calming Guide (TAC)

The Transportation Association of Canada's Traffic Calming Guide was created to provide information and guidance on the planning, design, installation, operation, and maintenance of traffic calming measures within Canada on local, collector, and arterial roads.

The Guide recommends municipalities screen incoming traffic calming requests. This is to assess the merit of proceeding with potential traffic calming solutions. Details of the screening process are up to the individual municipalities; however, an example is provided and is summarized below:

Initial Screening (TAC example): A request should be explored further if:

- A serious collision on the roadway involving a vulnerable street user has occurred within the last three years. OR,
- At least one Context Criteria and two of the Traffic Criteria have been met.
  - Context Criteria could be the presence of vulnerable street users, adjacent residential or pedestrian oriented retail, or pedestrian activity levels are not adequately served by facilities.
  - Traffic Criteria include:
    - 85th or 95th percentile speeds
    - Vehicle traffic volumes: > 1,000 vehicles per day or 120 vehicles per peak hour on local roadways; >2,500 vehicles per day or 300 vehicles per peak hour on collector roadways; >5,000 vehicles per day or 600 vehicles per peak hour on major collector roadways.
    - > 20% short cutting traffic.
    - Above average collision rate when compared to similar roadways.

The TAC Guide provides a detailed list of potential traffic calming measures in Chapter 3 and are categorized as follows:

- Vertical deflection
- Horizontal deflection
- Roadway narrowing
- Surface treatments
- Pavement markings
- Access restrictions
- Gateways
- Enforcement
- Education
- Shared space
- Emerging technologies

Table 3.2 of the TAC Guide lists the traffic calming measures by category and indicates each measure's suitability for different roadway classifications. The table below provides a summary of the traffic calming categories appropriate for different roadway classifications.

Table 6.4: Appropriate Traffic Calming Measures for Roadway Classifications (TAC Guide)

Traffic Calming Measure Category	Applicable Measure (✓) / Applicable with Caution (▲) / Not Applicable (✗)		
	Neighbourhood Local / Collector	Urban Arterial	Rural Arterial
Vertical deflection	✓	✗	✗
Horizontal deflection	✓	▲ ✗	▲ ✗
Roadway narrowing	✓	✓ ▲ ✗	✓ ✗
Surface treatments	✓ ▲	▲ ✗	✓ ✗
Pavement markings	✓	✓ ▲	✓
Access restrictions	✓	▲ ✗	✗
Gateways	✓	✓	✓
Enforcement	✓ ✗	✓ ✗	✓ ✗
Education	✓	✓ ▲ ✗	✓ ▲ ✗
Shared space	✓	▲	✗
Emerging technologies	▲	▲	▲

Note: the above table is a consolidation of Table 3.2 of the TAC Guide. Each category includes several different measures with differing applicability to the roadway classification. As such, multiple symbols for applicability are listed for some categories.

Table 3.3 of the TAC Guide provides an overview of the potential benefits and impacts of the measures. Potential benefit categories include speed reduction, volume reduction, collision reduction, and environment. Potential disbenefit categories include local access, emergency response, active transportation, enforcement, parking, and maintenance.

6.2.7 Summary of Best Practices

The level of detail in the different types of traffic calming measures and application varies in each of the five reviewed municipalities. However, there some trends as noted below:

- Four of the five municipalities stated a preference for self-enforcing traffic calming measures (physical / engineering measures) rather than other measures that require active enforcement;
- Three of the five municipalities referred to the TAC Guide;
- Three of the five municipalities and the TAC Guide included/recommended thresholds for traffic calming based on the roadway classification. The criteria included shortcutting, daily volume, and vehicle speeds; and
- Three of the five municipalities indicated traffic calming measures are generally to be applied to local and collector roadways primarily as arterials are intended for efficient movement, while the remaining two did not discuss appropriate measures based on roadway classification.

6.2.8 Recommended Practices

The following is recommended for Sylvan Lake's traffic calming policy based on the best practices review:

- Include thresholds for installing traffic calming based on shortcutting, volume, and speed similar to the City of White Rock, District of West Kelowna, the City of Lloydminster, and/or the example in the TAC Guide;
- Specify appropriate measures based on the roadway classification;
- Favour self-enforcing (physical) measures over social or enforcement-based measures; and
- Refer to the TAC Guide for standards for examples and design specifications.

6.3 Engagement Summary

As part of the TMP, an online survey was undertaken in October 2020 asking residents to identify various types of transportation concerns, experiences or ideas they had.
Participants used a social mapping tool to place pins with notes (organized by category) and responded to two additional questions seeking input specifically on the intersections of 50 Street / 50 Avenue and at 50 Street / Memorial Trail. The survey is discussed in more detail in Section 7.0.

Of the 335 comments received, 131 (approximately 40%) of the responses were related to traffic safety / calming, the most common of the five comment categories identified. An overview of key themes by comment is provided in Figure 6.2 below.

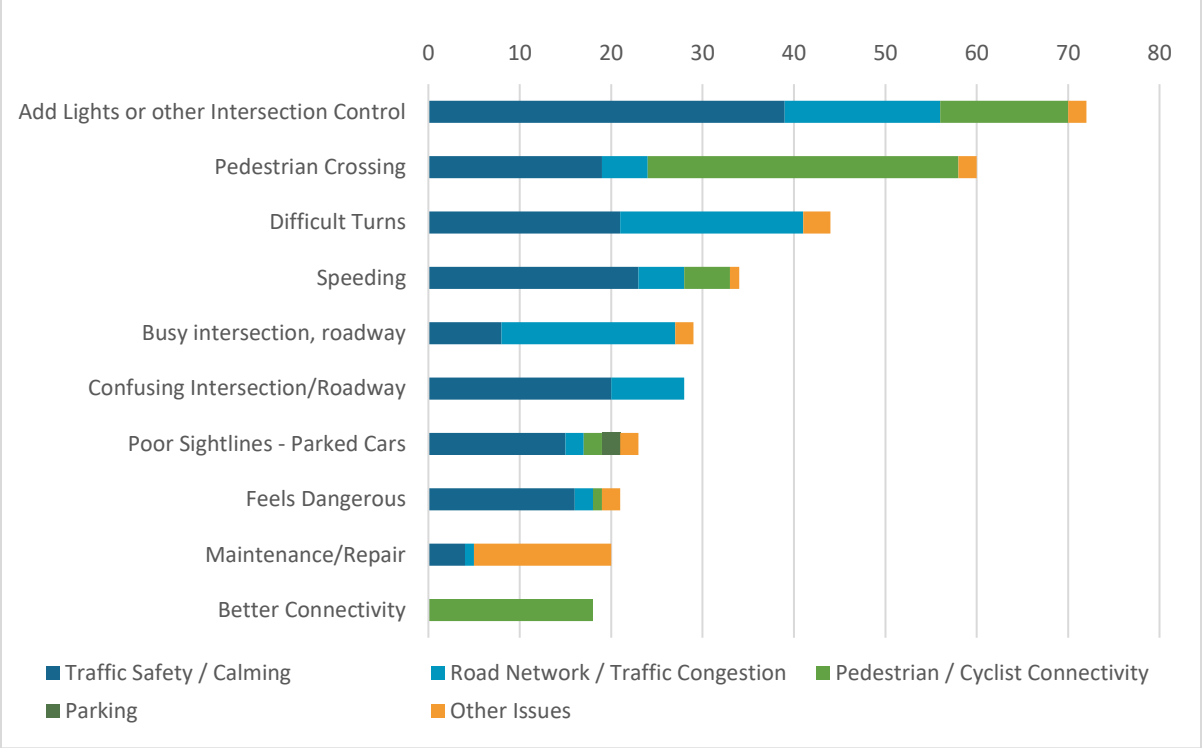


Figure 6.2: Engagement Results by Key Themes

Highlights of comments relating specifically to traffic calming include:

- Suggesting traffic calming to reduce the number of lanes along a playground zone on 43 St at 48 Avenue (roadway narrowing and/or horizontal deflection);
- Suggesting speed bumps (vertical deflection) at the playground zone on 43 St at 48 Avenue;
- Several comments relating to speeding, particularly at playground zones or areas of reduced posted speeds. Areas where speeding is a concern may benefit from traffic calming;
- Request for traffic calming to reduce short cutting through residential areas;
- Suggesting for speed bumps (vertical deflection) along the Hunter Road alley as it is often used by pedestrians and there is high traffic flow traveling at high speeds; and
- Several suggestions for one-way traffic along certain corridors during the peak summer / tourist months.

Based on a review of the survey responses, there seems to be some support from the community for traffic calming to address safety concerns and shortcutting within Sylvan Lake's transportation network. Speed bumps (vertical deflection) were the most common type of traffic calming measure mentioned by the respondents; however this could be because it is generally one of the most well-known traffic calming types among the public.

6.4 Traffic Calming Policy

Recommendations for a traffic calming policy have been developed based on the best practices review and the survey results and are discussed in the following sub-sections. The TAC Guide should be used for reference and for specific design criteria for the measures.

6.4.1 Traffic Calming Initial Screening Requirements

Initial screening requirements for considering traffic calming have been developed for the Town based on the common best practices review, TAC Guide, and public feedback. The requirements were created for specific roadway classifications, as follows:

- **Local Roads:** Local roads are intended to provide direct access to adjacent properties and are not intended for continuous traffic flow.
- **Collector:** Intended to connect local roadways to arterial roadways. Direct access to adjacent properties permitted.
- **Lanes:** often providing rear access for commercial and residential properties. Engagement comments indicate that lanes are often used by pedestrians and cyclists.
- **Low Speed Zones:** Segments of roadways with a lower posted speed than what is typical for the roadway classification. This is different than a playground zone and typically occurs in high pedestrian / tourist areas. Currently the only example of this is Lakeshore Drive, where the majority of the road has a reduced speed limit of 30 km/h.
- **Playground / School Zones:** Areas of 30 km/h posted speed adjacent to designated playgrounds and/or schools.
- **Arterials:** Arterial roadways are intended to efficiently move people and goods across the town with limited or no direct access. The primary purpose of an arterial is the efficient movement of vehicles and goods, as such, traffic calming is typically not recommended on arterial roadways. Traffic calming on arterial roadways should be limited, however engineering judgment may be used.

The Table below describes the recommended thresholds for considering traffic calming measures.

Table 6.5: Recommended Traffic Calming Thresholds for Sylvan Lake

Road Classification	Threshold Limits	Applicable Traffic Calming Measures
Local	• Traffic Volume: >1,000 vehicles per day, OR • Operating Speed (85 percentile): >10 km/h over the posted speed limit, OR • Short Cutting: >25% of vehicles are not destined to or originating from the specified area	• Technological • Horizontal deflections • Vertical deflections • Obstructions • Signage
Collector	• Traffic Volume: >3,000 vehicles per day, OR • Operating Speed (85th percentile): >10 km/h over the posted speed limit	• Technological • Horizontal deflections • Signage
Lanes	• Traffic Volume: >200 vehicles per day, OR • Short cutting >25% of the total traffic volume	• Vertical deflections • Signage

Road Classification	Threshold Limits	Applicable Traffic Calming Measures
Low Speed Zones	• Operating Speed (85th percentile): >10 km/h over the posted speed limit	• Technological • Horizontal deflections • Signage
Playground Zone	• Operating Speed (85th percentile): >10 km/h over the posted speed limit • Short Cutting: >25% of vehicles are not destined to or originating from the specified area	• Technological • Horizontal deflections • Vertical deflections • Obstructions • Signage

Additional considerations: In addition to the matrix above, traffic calming should be considered in the following cases:

- In areas where a collision involving a vulnerable road user has occurred
- In areas where there are increased numbers of vulnerable road users

6.4.2 Traffic Calming Measures

Self-enforcing traffic calming measures that require drivers to reduce speeds due to the geometric characteristics of the road are recommended over methods that require enforcement such as signage. The traffic calming measures in the TAC Guide were reviewed and a list of measures appropriate for Sylvan Lake was developed. Potential traffic calming measures and the corresponding roadways are provided in the Table 6.6. High level costs are assigned to each measure, with cost categories as follows:

- Low: < $10,000
- Medium: $10,000 – $50,000
- High: > $50,000

It should be noted that the cost ranges were assigned without considering drainage. Site specific drainage requirements may significantly increase the cost of installing some traffic calming measures. A review of the drainage requirements is recommended when considering viable traffic calming measures.

Table 6.6: Recommended Traffic Calming Measures for Sylvan Lake

Measure	Local	Collector	Lanes	Low Speed Zones	Playground / School Zones	Urban Arterial	Cost Range
Vertical Deflection							
Raised Crosswalk	✓	✓	×	▲	✓	×	Low - Medium
Speed Cushion	✓	✓	▲	▲	✓	×	Low
Speed Hump / Table	✓	✓	▲				
Sidewalk Extension / Textured Crosswalk	✓	✓	×				
Textured Pavement	✓	✓	✓				
Horizontal Deflection							
Traffic Circle / Traffic Button/ Mini Roundabout	✓	✓	×	✓	✓	▲	Medium – High
Curb Radius Reduction	✓	✓	▲	✓	✓	▲	Low – Medium
Curb Extension/ Neckdown/ Choker	✓	✓	×	✓	✓	▲	Medium – High
Obstructions							
Directional Closure	✓	✓	✓	×	✓	×	Low – High
Intersection Channelization	✓	✓	×	×	✓	▲	Low – Medium
Raised Median	▲	▲	×	✓	▲	✓	Low – Medium *Dependent on the length of application
Right-In / Right-Out Island	✓	✓	×	▲	✓	▲	Low - Medium
Gateways	✓	✓	×	✓	✓	✓	Medium
Lane Narrowing	✓	✓	×	▲	✓	▲	Low - Medium
On-Street Parking	✓	✓	×	✓	✓	▲	Low - Medium
Signage / Pavement Markings							
Traffic Calmed Neighborhood	✓	▲	×	▲	✓	×	Low
Local Traffic Only	✓	▲	×	×	✓	×	Low
Sharrows	✓	✓	×	✓	✓	▲	Low

Note 1– ✓ = Applicable ▲ = May be considered × = Not Applicable
Note 2–The contents of this table are based on the Transportation Association of Canada's Traffic Calming Guide, modified to suit the needs of the Town of Sylvan Lake

Additional discussion: Sharrows (Shared Lane Markings) are road markings used to indicate that a lane is intended to be shared between bicycles and vehicles. These lane markings both legitimize bicycle traffic on the street and inform drivers of the shared nature of the lane. While sharrows are not a replacement for dedicated cycling infrastructure, it may have the dual function of supporting the Town's bike network while also helping with traffic calming. The National Association of City Transportation Officials (NACTO) advises that sharrows are generally not appropriate on roadways with a posted speed of 35 mph (56 km/h) or greater. With a default speed limit of 40 km/h, sharrows should be appropriate on the majority of the Town's roadway network, but are not recommended for any streets posted above 56 km/h.

6.4.3 Seasonal Traffic Calming

The Town of Sylvan Lake experiences a significant increase in traffic volumes during the summer months due to non-local visitors. Additional temporary traffic calming measures may be considered to address this increase in traffic and ensure resident and visitor safety. Potential seasonal traffic calming measures include:

- Restricting select roadways to one-way traffic only (i.e. segments of Lakeshore Drive);
- Removeable curb extensions at key intersections and mid-block crossings for increased pedestrian visibility. Curb extensions narrow the roadway which makes drivers feel less comfortable typically resulting in lower travel speeds as well as reduce crossing distances for pedestrians; and
- Temporary / removeable rubber speed humps, particularly along Lakeshore Drive and near busy pedestrian crossings.

6.5 Areas of Further Study

A detailed study is needed for applying traffic calming measures to specific areas. This document serves as a guideline or starting point for applying traffic calming measures and preparing a formal policy document. Future traffic calming reviews should include:

- Public consultation to confirm appropriate traffic calming solution;
- Consulting with first responders as some measures may affect response times; and
- A review of maintenance requirements, particularly winter maintenance (snow clearing).

7.0 Public Engagement

7.1 Online Survey

Due to public health orders in place during the COVID-19 pandemic, in-person engagement could not be held while the TMP was being prepared. Instead, an online survey was undertaken from October 1 to 16, 2020. The online survey asked residents to identify various types of transportation concerns, experiences or ideas they had. Participants used a social mapping tool to place a pin where they see a concern in the following five categories: Traffic Safety and Calming, Road Network/Traffic Congestion, Pedestrian and Cyclist Connectivity, Parking and Other Issues. In addition, two additional questions seeking input specifically on the intersections of 50 Street / 50 Avenue and 50 Street / Memorial Trail were asked. In total, 335 comments were received with the most comments (131 responses or 40% of the total) being related to traffic safety / calming.

The full What We Heard Report is attached in Appendix F and the findings in each of the categories are summarized below:

- Traffic Safety and Calming:
  - Lakeshore Drive: Speeding and difficulties in the summer months
  - Highway 20 / 47 Avenue: Difficulties turning and merging
  - School: Safety, congestion and parking during school drop-off and pick-up times
  - Speeding on Ryders Ridge Blvd and Old Boomer Road
- Road Network / Traffic Congestion:
  - Congestion on:
    - Highway 11 at 50 Street and 60 Street
    - Memorial Trail at 50 Street and Highway 20
    - 47 Avenue at Highway 20, Ryders Ridge Blvd and between 43 Street and 46 Street
    - Lakeshore Drive
    - 50 Street at 50 Avenue and 48 Avenue
  - Suggestions include the addition of traffic signals or improved timing of signals at several locations, and/or removing on-street parking for added lanes during peak hours to improve traffic flow.
- Pedestrian and Cyclist Connectivity:
  - Suggested pathways connections: North-south connections from the lakeshore to Memorial Trail on the east and west sides of Town; east-west connection on the south side of town
  - Safer crossing of railway tracks
  - More formal pedestrian crossings at busy intersections and near schools
  - Missing sidewalks on Cuendet Industrial Way
  - Pedestrian safety on Lakeshore Drive. Also to close off Lakeshore Drive for pedestrian-only use more regularly as was done during the weekends in the summer of 2020.
- Parking:
  - There is a need for more paid parking downtown.
- Other Issues

- Maintenance needed to fix potholes or heaving on 47 Avenue / Highway 20 and 50 Street / 45 Avenue
- 50 Street / 50 Avenue: Concerns of the intersection as a confusing and unsafe intersection. Suggestions included adding traffic signals or a roundabout, pedestrian crossings, and using the parking lot space to realign the intersection.
- Memorial Trail / 50 Street: Some congestion, need pedestrian crossing

7.2 Engagement Recommendations

Based on the engagement feedback, ISL recommends the following studies to be undertaken in the future:

- Prepare a Lakeshore Drive Transportation, Active Modes and Parking Study.
- Develop traffic calming policies and conduct and apply traffic calming measures to specific areas, including schools and higher-speed areas. Work with RCMP to monitor and enforce speed where needed.
- Conduct detailed traffic studies at congested areas:
  - Highway 11 at 50 Street and 60 Street
  - Memorial Trail at 50 Street and Highway 20
  - 47 Avenue at Highway 20, Ryders Ridge Blvd and between 43 Street and 46 Street
  - Lakeshore Drive
  - 50 Street at 50 Avenue and 48 Avenue.
  - It is noted that several studies have already been commenced by AT or the Town, these include: Highway 11 twinning by AT, Memorial Trail functional study by the Town and 50 Avenue / 50 Street intersection concept review by the Town.
- Prepare a Trail and Sidewalk Master Plan to determine a town wide trail network, identify missing trail / sidewalk links, and enhance the connection / experience at central areas such as the lakeshore.

8.0 Conclusions

8.1 Traffic Analysis Summary

The Town of Sylvan Lake Transportation Master Plan Update provides a framework for Council and Administration to assess the capability of the road network to accommodate new development in the short- and long-term, and to carry out short- and long-term planning. The study provides the steps, methodologies and model inputs used to develop the existing, interim and future 38,000 population (25-Year) travel demand models. The analysis, outcomes and recommendations from the existing and five future horizons are summarized below:

8.1.1 Existing (2020)

The traditional four-step (trip generation, trip distribution, mode split, trip assignment) travel demand modelling process was used to develop the existing travel demand model. The trip distribution was developed using StreetLight Data's travel pattern data from smart phones and navigation devices, and used pre-COVID travel data. The existing assumed a population of 17,200, 7,300 households and 2,900 jobs (retail, non-retail, industrial, lake, school).

The travel demand model (VISUM) was calibrated to 66 existing summer PM peak traffic counts. From the travel demand model and intersection operation analysis (Synchro and Sidra), no immediate improvements are required to support the existing roadway network. Also no improvements are required to the railway crossings.

8.1.2 Future Horizons

Five future horizons were developed in the TMP based on the future land use, population and employment (retail, non-retail, industrial, lake, school) growth based on the Town's approved planning policy and documents (ASPs, OPs, ARPs). To develop the future travel demand model, existing trip generation rates were projected onto the future growth areas to estimate each future horizon's intersection traffic volumes. In is noted that a travel demand model was developed for the 30,000 (15-Year) and 38,000 population (25-Year) horizon; the traffic volumes of the remaining three interim horizons were developed through interpolation of intersection turning volumes between the modelled existing horizon (17,200 population (existing), 30,000 population and 38,000 population.

The population, households and jobs of the future horizons are as follows:

- 22,000 population, 9,040 households and 3,670 jobs (retail, non-retail, industrial, lake, school);
- 26,000 population, 10,800 households and 4,450 jobs;
- 30,000 population, 12,560 households and 5,210 jobs;
- 34,000 population, 14,300 households and 5,970 jobs;
- 38,000 population, 16,100 household and 6,700 jobs;

From the VISUM, Synchro and Sidra analysis, the recommended road improvements in each horizon are shown in Exhibits 4.6 to 4.11 and summarized in Table 8.1.

Table 8.1: Recommended Improvements Staging, Horizon and Cost

ID	Corridor / Intersection	Improvement Description
Improvements by 22,000 Population (5-Year) – $25,880,000		
H1	Highway 11 (Highway 20 to 60 Street)	Twinning to 4 lanes
H2	Highway 11 / Highway 20	Dual lanes roundabout
H3	Highway 11 / 50 Street	Dual lanes roundabout
H7	Highway 20 / Highway 11A	Add dual lane approaches to the westbound (right turn lane added) and southbound (right turn lane added) approach of the existing roundabout
H11	Highway 20 / Reynolds Road / 30 Avenue	Single lane roundabout
H12	Highway 20 / Memorial Trail	Single lane roundabout with dual lane approaches for the southbound (right turn lane added) and northbound (northbound left turn added) approach
NW3	50 Street / 50 Avenue	Traffic signalization
NW4	50 Ave (between 60 St and Westview Dr)	Paving existing gravel road
SW5	Memorial Trail / 50 Street	Single lane roundabout with westbound and northbound right turn lane. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE1	30 Avenue (east of Highway 20)	New Arterial road (up to first collector)
R1	Highway 20 at CN Railway	Railway Crossing Improvement (FLB&G)
Improvements by 26,000 Population (10-Year) – $33,466,000		
H5	Highway 20	Twinning to 4 lanes
H7	Highway 20 / Highway 11A	Upgrade the existing single lane roundabout to dual lanes roundabout
H8	Highway 20 / Erickson Road	Upgrade the existing single lane roundabout to dual lanes roundabout
H9	Highway 20 / Herder Drive / Cuendet Industrial Way	Twinning Highway 20 to 4 lanes and Signal retiming
H11	Highway 20 / Reynolds Road / 30 Avenue	Upgrade the single lane roundabout to dual lane roundabout
H12	Highway 20 / Memorial Trail	Upgrade the single lane roundabout to dual lane roundabout
NW1	Township Road 385 (50 Avenue)	Upgrade to Arterial west of 60 Street
NE1	Range Road 12	Upgrade to Arterial (2 lanes)
NE4	47 Avenue / Range Road 12	Add all-way stop control
NE5	47 Avenue (Charles Industrial Way to Range Road 12)	Upgrade to Arterial (2 lanes)
SW1	Memorial Tr at Springfield Blvd and Station Dr, Memorial Tr west of 60 Street	Single land roundabouts, Memorial Trail upgrade to Arterial (2 lanes).
SW4	60 Street / New East-West Access (south of Memorial Trail)	New unsignalized intersection with NBL, SBL and NBR turn bays
SW6	50 Street / New East-West Access (south of Memorial Trail)	New unsignalized intersection with NBL and SBL turn bays
SE1	Reynolds Road / 30 Avenue (east of Hwy 20)	New Arterial road to Range Road 12

ID	Corridor / Intersection	Improvement Description
Improvements by 30,000 Population (15-Year) – $23,850,000		
H4	Highway 11 / 60 Street	Dual lane roundabout
H6	Highway 20 / Jarvis Bay Drive	Dual lane roundabout
H13	Highway 11A (Erickson Drive to the East Town limit at RR 11)	Twinning to 4 lanes
H15	Highway 11A / Range Road 12	Dual lane roundabout
NE2	Range Road 11	Upgrade to Arterial
NE3	47 Avenue / Thevenaz Industrial Trail	Traffic signalization
SW2	60 Street / Lakeway Boulevard	Traffic signalization
SW3	60 Street / Memorial Trail	Single lane roundabout with westbound and northbound right turn lane. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE3	Memorial Trail / Ryders Ridge Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
Improvements by 34,000 Population (20-Year) – $22,825,000		
H10	Highway 20 / 47 Avenue	Add dual WBL (change WB from 1 WBL / 2 WBT to 2 WBL / 1 WBT)
NW2	60 Street / 50 Avenue	Single lane roundabout
SW4	60 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout
SW7	Memorial Trail / Lakeway Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
SE2	Memorial Trail / Crestview Boulevard	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
Improvements by 38,000 Population (25-Year) – $22,150,000		
H14	Highway 11A / New North-South Access (between Hwy 20 and RR 12)	Dual lane roundabout
H16	Highway 11A / New North-South Access (between RR 12 and RR 11)	Dual lane roundabout
H17	Highway 11A / Range Road 11	Dual lane roundabout
SW6	50 Street / New East-West Access (south of Memorial Trail)	Single lane roundabout
SW8	Memorial Trail / Brookstone Drive	Single lane roundabout. Urbanize the segment of Memorial Trail adjacent to the intersection.
Total (All Improvements in All Horizons)		**$128,200,000**

8.2 38,000 Population Transit Summary and Recommendations

The proposed plan is focused on local transit routes and connection points to the regional transit routes as proposed in the 2016 TMP. Local transit is focused on connecting local residents with major retail and employment destinations in the Town.

The 38,000 population (25-Year) transit routes include a fixed route service, covering most of the Town, with three local / neighbourhood routes that follow collector roads and provide access to all areas of the town. Three local routes are complemented by an express route that travels along arterial roadways, from the southwest to the northeast across the Town. A total of four buses are needed to offer the service. The recommended 38,000 population routes are provided on Exhibit 5.1.

The demand for local transit services in the 38,000 population is expected to be comparable to other small sized municipalities, with approximately 180 to 335 trips per peak hour and approximately 45,000 to 84,000 local transit trips annually, based on the anticipated mode share. The regional transit ridership potentially may be higher with almost twice as many residents commuting outside of town.

8.3 Traffic Calming Measures Summary

The following is recommended for Sylvan Lake's traffic calming policy based on the best practices review:

- Include thresholds for installing traffic calming based on shortcutting, volume, and speed similar to the City of White Rock, District of West Kelowna, the City of Lloydminster, and/or the example in the TAC Guide.
- Specify appropriate measures based on the roadway classification (see Table 8.2).
- Favour self-enforcing (physical) measures over enforcement-based measures.
- Refer to the TAC Guide for standards for examples and design specifications.

Table 8.2: Recommended Traffic Calming Thresholds for Sylvan Lake

Road Classification	Threshold Limits	Applicable Traffic Calming Measures
Local	• Traffic Volume: >1,000 vehicles per day, OR • Operating Speed: >10 km/h over the posted speed limit, OR • Short Cutting: >25% of vehicles are not destined to or originating from the specified area	• Technological • Horizontal deflections • Vertical deflections • Obstructions • Signage
Collector	• Traffic Volume: >3,000 vehicles per day, OR • Operating Speed: >10 km/h over the posted speed limit	• Technological • Horizontal deflections • Signage
Lanes	• Traffic Volume: >200 vehicles per day, OR • Short cutting >25% of the total traffic volume	• Vertical deflections • Signage
Low Speed Zones	• Operating Speed: >10 km/h over the posted speed limit	• Technological • Horizontal deflections • Signage
Playground Zone	• Operating Speed: >10 km/h over the posted speed limit • Short Cutting: >25% of vehicles are not destined to or originating from the specified area	• Technological • Horizontal deflections • Vertical deflections • Obstructions • Signage

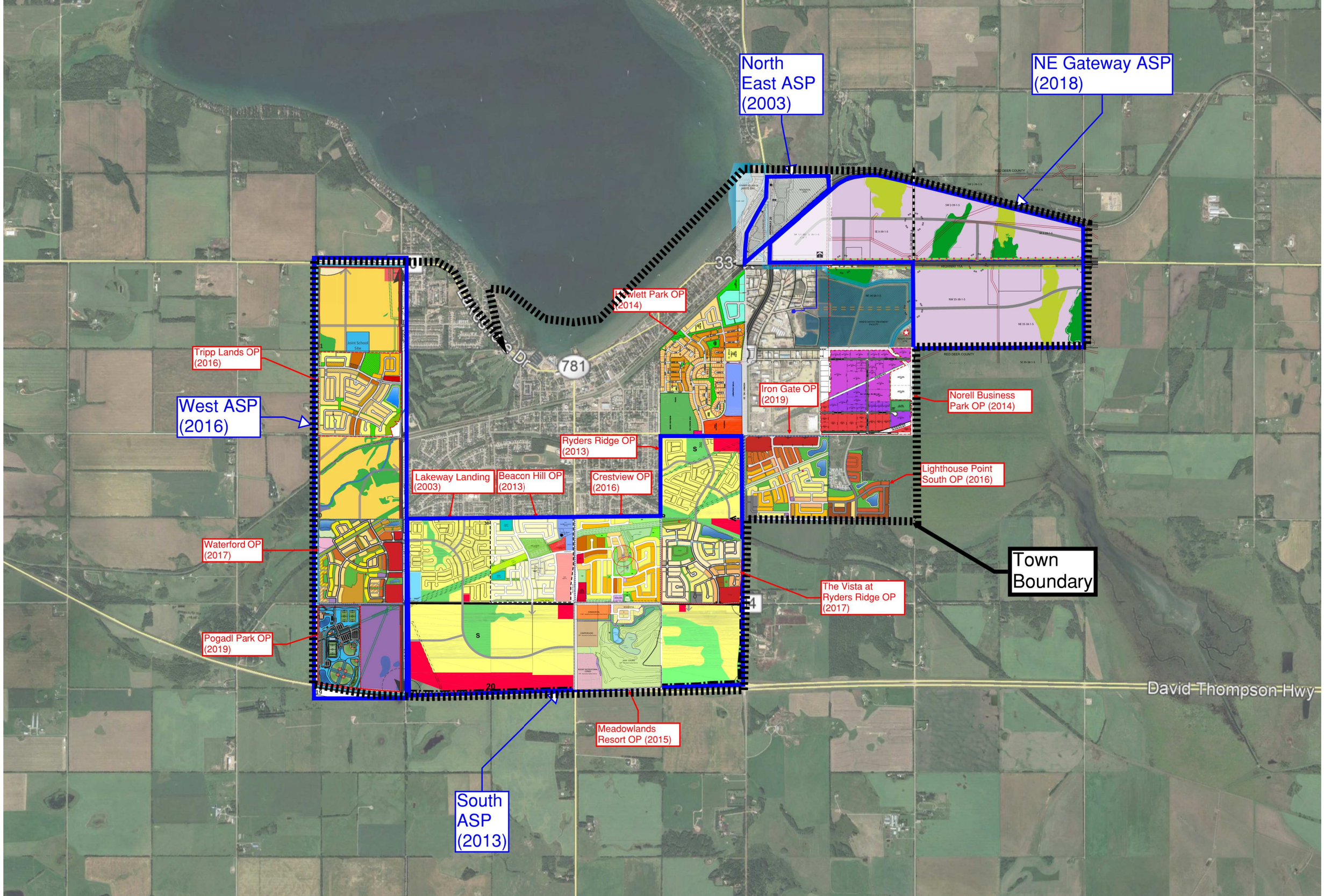
8.4 Engagement

An online survey was undertaken in October 2020 and asked residents to identify various types of transportation concerns, experiences or ideas they had. From feedback, the following recommendations were made:

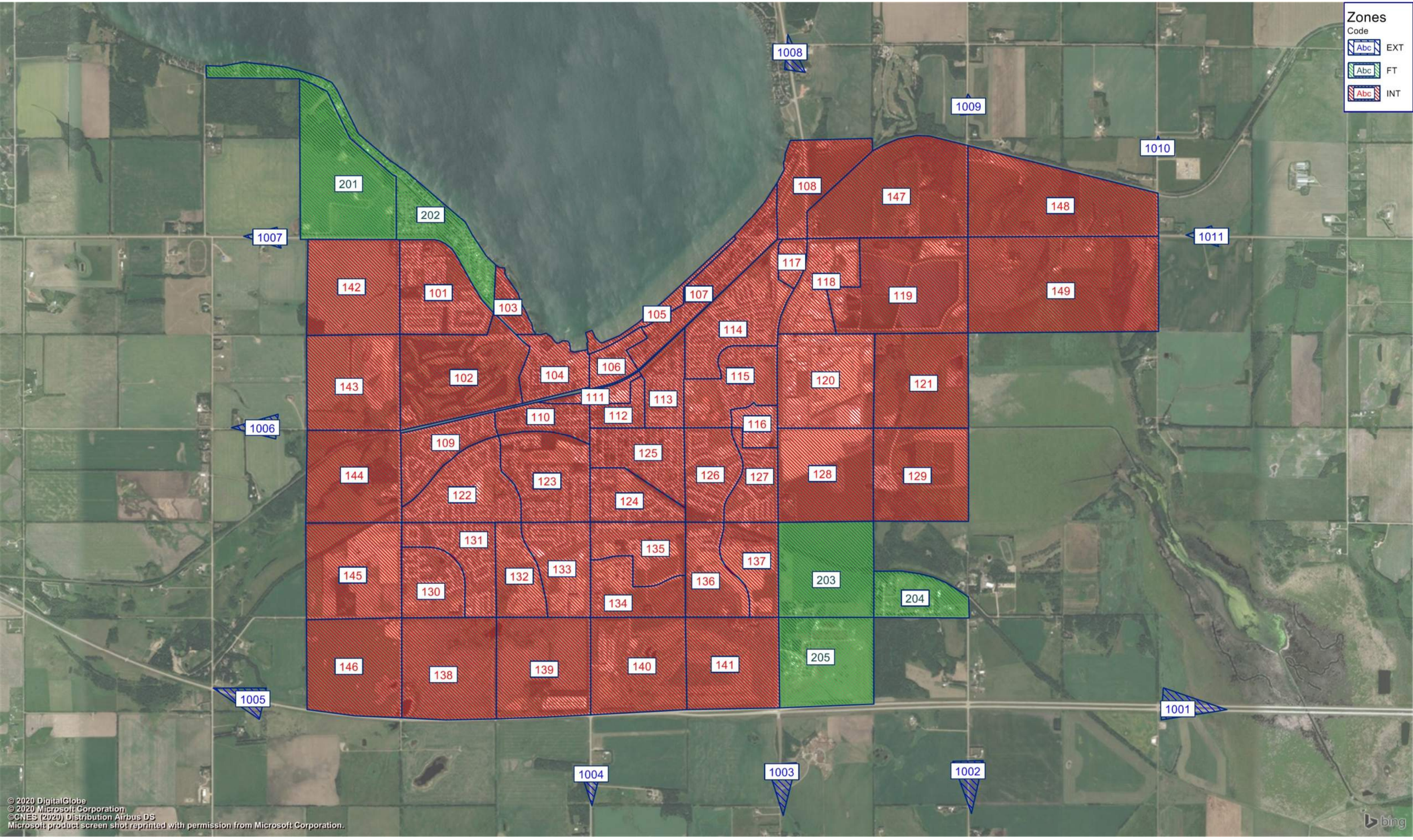
- Prepare a Lakeshore Drive Transportation, Active Modes and Parking Study.
- Develop traffic calming policies and conduct and apply traffic calming measures to specific areas, including schools and higher-speed areas. Work with RCMP to monitor and enforce speed where needed.
- Conduct detailed traffic studies at congested area:
  - Highway 11 at 50 Street and 60 Street
  - Memorial Trail at 50 Street and Highway 20
  - 47 Avenue at Highway 20, Ryders Ridge Blvd and between 43 Street and 46 Street
  - Lakeshore Drive
  - 50 Street at 50 Avenue and 48 Avenue.
  - It is noted that several studies have already been commenced by AT or the Town, these include: Highway 11 twinning by AT, Memorial Trail functional study by the Town and 50 Avenue / 50 Street intersection concept review by the Town.
- Conduct a Trail and Sidewalk Master Plan to determine a town wide trail network, identify missing trail / sidewalk links, and enhance the connection / experience at central areas such as the lakeshore.

APPENDIX A

Existing and Future Population and Employment Data by Zone


North East ASP (2003)
NE Gateway ASP (2018)
Tripp Lands OP (2016)
West ASP (2016)
Hewlett Park OP (2014)
Iron Gate OP (2019)
Norell Business Park OP (2014)
Ryders Ridge OP (2013)
Lighthouse Point South OP (2016)
Lakeway Landing (2003)
Beacon Hill OP (2013)
Crestview OP (2016)
Waterford OP (2017)
Town Boundary
The Vista at Ryders Ridge OP (2017)
Pogadl Park OP (2019)
David Thompson Hwy
Meadowlands Resort OP (2015)
South ASP (2013)
781
33
20
4

38,000 Population



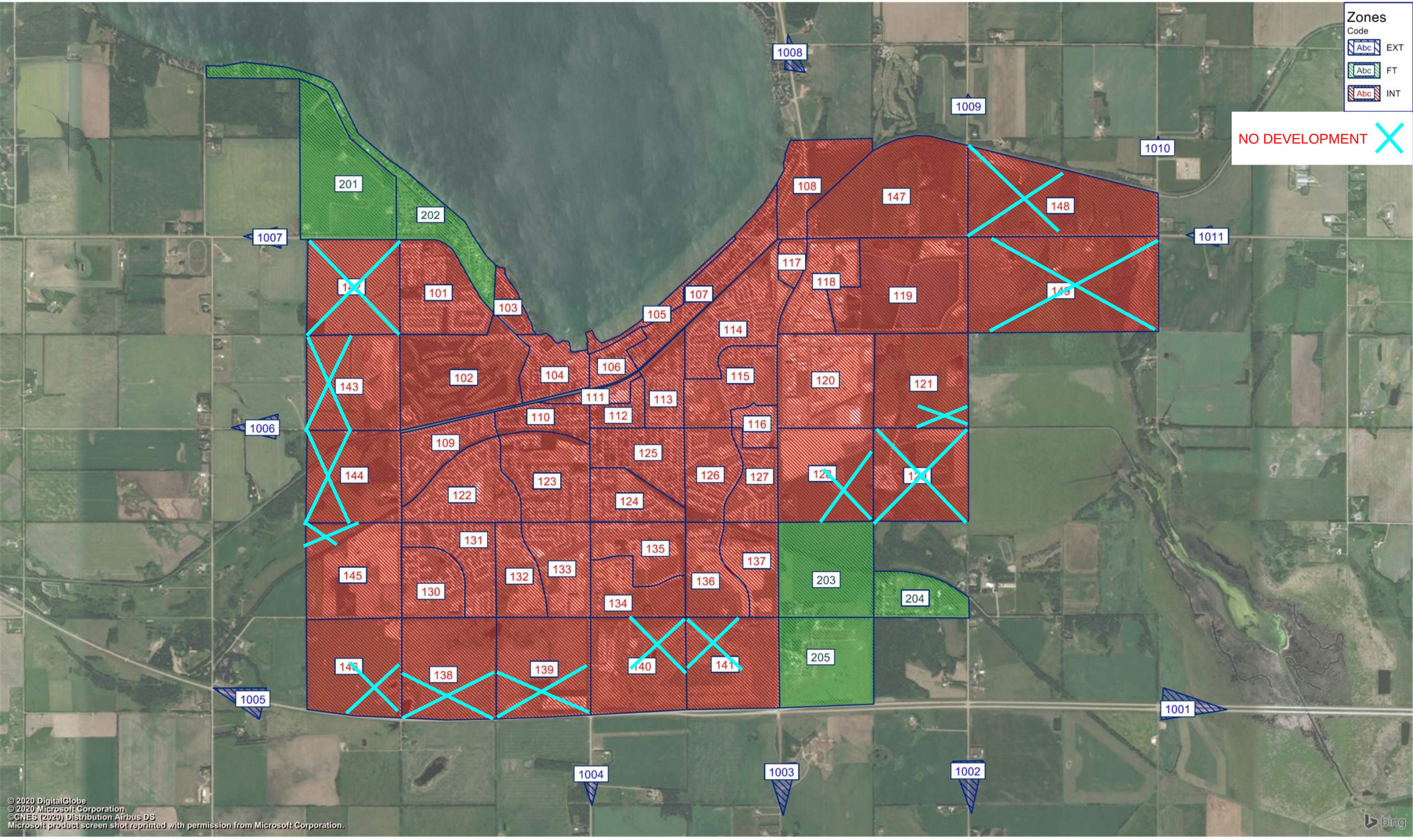
38,000 Population

Population

	Existing Population				Additional Population				Existing + Additional Population			
Zone	SF Units	MF Units	Households	Population	SF Units	MF Units	Households	Population	SF Units	MF Units	Households	Population
101	604	0	604	1491	0	0	0	0	604	0	604	1491
102	12	18	30	54	1	2	3	5	13	20	33	60
103	105	0	105	259	11	0	11	26	116	0	116	285
104	435	81	516	1186	44	8	52	119	479	89	568	1305
105	0	0	0	0	0	0	0	0	0	0	0	0
106	87	35	122	263	9	4	12	26	96	39	134	289
107	399	0	399	985	40	0	40	99	439	0	439	1084
108	20	0	20	49	110	0	110	308	130	0	130	357
109	241	0	241	595	0	0	0	0	241	0	241	595
110	129	0	129	319	3	0	3	6	132	0	132	325
111	16	0	16	40	0	0	0	0	16	0	16	40
112	124	59	183	388	2	1	4	8	126	60	187	395
113	333	0	333	822	0	0	0	0	333	0	333	822
114	548	151	699	1562	16	0	16	47	564	151	715	1608
115	220	0	220	543	0	203	203	466	220	203	423	1009
116	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0	0
122	465	0	465	1148	0	0	0	0	465	0	465	1148
123	403	0	403	995	8	0	8	20	411	0	411	1015
124	188	0	188	464	4	0	4	9	192	0	192	473
125	340	0	340	839	7	0	7	17	347	0	347	856
126	331	0	331	817	0	0	0	0	331	0	331	817
127	400	0	400	988	0	0	0	0	400	0	400	988
128	47	0	47	116	528	200	728	1671	575	200	775	1787
129	55	0	55	136	496	134	630	1510	551	134	685	1646
130	195	99	294	618	0	0	0	0	195	99	294	618
131	465	0	465	1148	0	0	0	0	465	0	465	1148
132	30	0	30	71	280	0	280	1142	310	0	310	1212
133	90	125	215	377	116	350	466	1440	206	475	681	1818
134	42	0	42	99	219	168	387	1014	261	168	429	1113
135	65	98	163	283	196	70	266	830	261	168	429	1113
136	63	0	63	149	277	65	342	905	340	65	405	1053
137	63	0	63	149	276	65	341	905	339	65	404	1053
138	0	0	0	0	496	124	620	1334	496	124	620	1334
139	0	0	0	0	589	147	736	1584	589	147	736	1584
140	0	0	0	0	36	228	264	386	36	228	264	386
141	0	0	0	0	360	90	450	968	360	90	450	968
142	0	0	0	0	541	135	676	1455	541	135	676	1455
143	0	0	0	0	836	171	1007	2314	836	171	1007	2314
144	0	0	0	0	394	98	492	1059	394	98	492	1059
145	96	0	96	237	486	156	642	1455	582	156	738	1692
146	0	0	0	0	0	0	0	0	0	0	0	0
147	0	0	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0	0
Town Total	**6,611**	**666**	**7,277**	**17,191**	**6,380**	**2,416**	**8,796**	**21,127**	**12,991**	**3,082**	**16,073**	**38,318**

Employment

	Existing Employment					Additional Employment					Existing + Additional Employment				
Zone	School	Lake	Retail	Non Retail	Industrial Jobs	School	Lake	Retail	Non Retail	Industrial Jobs	School	Lake	Retail	Non Retail	Industrial Jobs
101	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
102	0	60	0	0	0	0	6	0	0	0	0	66	0	0	0
103	0	10	0	0	0	0	1	0	0	0	0	11	0	0	0
104	0	200	0	80	0	0	20	0	8	0	0	220	0	88	0
105	0	20	0	0	0	0	2	0	0	0	0	22	0	0	0
106	0	200	0	80	0	0	20	0	8	0	0	220	0	88	0
107	0	30	50	20	0	0	3	0	2	0	0	33	50	22	0
108	0	0	30	10	0	0	0	173	1	0	0	0	203	11	0
109	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
110	0	0	0	30	0	0	0	0	1	0	0	0	0	31	0
111	0	0	0	140	0	0	0	0	3	0	0	0	0	143	0
112	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
113	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
114	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
115	20	0	60	40	0	0	0	0	0	0	20	0	60	40	0
116	0	0	350	0	0	0	0	121	0	0	0	0	471	0	0
117	0	0	20	0	140	0	0	0	0	0	0	0	20	0	140
118	0	0	0	0	180	0	0	0	0	0	0	0	0	0	180
119	0	0	0	0	30	0	0	0	0	0	0	0	0	0	30
120	0	0	200	0	220	0	0	0	0	0	0	0	200	0	220
121	0	0	0	0	0	0	0	212	0	163	0	0	212	0	163
122	40	0	0	40	0	0	0	0	0	0	40	0	0	40	0
123	40	0	20	10	0	0	0	0	0	0	40	0	20	10	0
124	20	0	50	80	0	0	0	1	2	0	20	0	51	82	0
125	0	0	20	40	0	0	0	0	1	0	0	0	20	41	0
126	20	0	0	20	0	0	0	0	0	0	20	0	0	20	0
127	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
128	0	0	0	0	0	20	0	115	30	0	20	0	115	30	0
129	0	0	0	0	0	20	0	10	30	0	20	0	10	30	0
130	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
131	0	0	20	0	0	0	0	0	0	0	0	0	20	0	0
132	0	0	0	10	0	0	0	0	30	0	0	0	0	40	0
133	20	0	0	80	0	0	0	33	30	0	20	0	33	110	0
134	0	0	0	10	0	0	0	36	30	0	0	0	36	40	0
135	0	0	0	10	0	20	0	0	30	0	20	0	0	40	0
136	0	0	0	10	0	20	0	0	20	0	20	0	0	30	0
137	0	0	0	10	0	0	0	51	10	0	0	0	51	20	0
138	0	0	0	0	0	20	0	306	20	0	20	0	306	20	0
139	0	0	0	0	0	20	0	250	30	0	20	0	250	30	0
140	0	0	10	0	0	0	0	72	10	0	0	0	82	10	0
141	0	0	0	0	0	0	0	7	30	0	0	0	7	30	0
142	0	0	0	0	0	20	0	29	30	0	20	0	29	30	0
143	0	0	0	0	0	20	0	13	30	0	20	0	13	30	0
144	0	0	0	0	0	0	0	0	30	0	0	0	0	30	0
145	0	0	0	10	0	20	0	134	30	0	20	0	134	40	0
146	0	0	0	0	0	0	0	0	200	143	0	0	0	200	143
147	0	0	0	0	0	0	0	0	0	330	0	0	0	0	330
148	0	0	0	0	0	0	0	0	0	310	0	0	0	0	310
149	0	0	0	0	0	0	0	0	0	494	0	0	0	0	494
Town Total	**160**	**520**	**830**	**830**	**570**	**180**	**52**	**1,565**	**645**	**1,439**	**340**	**572**	**2,395**	**1,475**	**2,009**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Abc FT
Abc INT
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30,000 Population

Population

	Existing Population				Additional Population				Existing + Additional Population			
Zone	SF Units	MF Units	Households	Population	SF Units	MF Units	Households	Population	SF Units	MF Units	Households	Population
101	604	0	604	1491	0	0	0	0	604	0	604	1491
102	12	18	30	54	1	2	3	5	13	20	33	60
103	105	0	105	259	11	0	11	26	116	0	116	285
104	435	81	516	1186	44	8	52	119	479	89	568	1305
105	0	0	0	0	0	0	0	0	0	0	0	0
106	87	35	122	263	9	4	12	26	96	39	134	289
107	399	0	399	985	40	0	40	99	439	0	439	1084
108	20	0	20	49	110	0	110	258	130	0	130	307
109	241	0	241	595	0	0	0	0	241	0	241	595
110	129	0	129	319	3	0	3	6	132	0	132	325
111	16	0	16	40	0	0	0	1	16	0	16	40
112	124	59	183	388	2	1	4	8	126	60	187	395
113	333	0	333	822	0	0	0	0	333	0	333	822
114	548	151	699	1562	16	0	16	47	564	151	715	1608
115	220	0	220	543	0	203	203	366	220	203	423	909
116	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0
121	0	0	0	0	0	0	0	0	0	0	0	0
122	465	0	465	1148	0	0	0	0	465	0	465	1148
123	403	0	403	995	8	0	8	20	411	0	411	1015
124	188	0	188	464	4	0	4	9	192	0	192	473
125	340	0	340	839	7	0	7	17	347	0	347	856
126	331	0	331	817	0	0	0	0	331	0	331	817
127	400	0	400	988	0	0	0	0	400	0	400	988
128	47	0	47	116	352	67	419	784	399	67	466	900
129	55	0	55	136	0	0	0	0	55	0	55	136
130	195	99	294	618	0	0	0	0	195	99	294	618
131	465	0	465	1148	0	0	0	0	465	0	465	1148
132	30	0	30	71	280	0	280	810	310	0	310	880
133	90	125	215	377	116	350	466	1440	206	475	681	1818
134	42	0	42	99	219	168	387	1014	261	168	429	1113
135	65	98	163	283	196	70	266	830	261	168	429	1113
136	63	0	63	149	277	65	342	905	340	65	405	1053
137	63	0	63	149	276	65	341	905	339	65	404	1053
138	0	0	0	0	248	62	310	667	248	62	310	667
139	0	0	0	0	294.5	74	368	792	295	74	368	792
140	0	0	0	0	36	76	112	185	36	76	112	185
141	0	0	0	0	180	30	210	464	180	30	210	464
142	0	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	418	57	475	1157	418	57	475	1157
144	0	0	0	0	197	33	230	458	197	33	230	458
145	96	0	96	237	486	119	605	1255	582	119	701	1492
146	0	0	0	0	0	0	0	0	0	0	0	0
147	0	0	0	0	0	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0	0	0	0	0	0
201	0	0	0	0	0	0	0	0	0	0	0	0
202	155	0	155	383	0	0	0	0	155	0	155	383
203	2	0	2	6	0	0	0	0	2	0	2	6
204	6	0	6	18	0	0	0	0	6	0	6	18
205	0	0	0	0	0	0	0	0	0	0	0	0
Town Total	**6,611**	**666**	**7,277**	**17,191**	**3,829**	**1,450**	**5,279**	**12,672**	**10,440**	**2,116**	**12,556**	**29,863**

Employment

	Existing Employment					Additional Employment					Existing + Additional Employment				
Zone	School	Lake	Retail	Non Retail	Industrial Jobs	School	Lake	Retail	Non Retail	Industrial Jobs	School	Lake	Retail	Non Retail	Industrial Jobs
101	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
102	0	60	0	0	0	0	4	0	0	0	0	64	0	0	0
103	0	10	0	0	0	0	1	0	0	0	0	11	0	0	0
104	0	200	0	80	0	0	12	0	8	0	0	212	0	88	0
105	0	20	0	0	0	0	1	0	0	0	0	21	0	0	0
106	0	200	0	80	0	0	12	0	8	0	0	212	0	88	0
107	0	30	50	20	0	0	2	0	2	0	0	32	50	22	0
108	0	0	30	10	0	0	0	173	1	0	0	0	203	11	0
109	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
110	0	0	0	30	0	0	0	0	0	0	0	0	0	30	0
111	0	0	0	140	0	0	0	0	0	0	0	0	0	140	0
112	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
113	0	0	0	20	0	0	0	0	0	0	0	0	0	20	0
114	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
115	20	0	60	40	0	0	0	0	0	0	20	0	60	40	0
116	0	0	350	0	0	0	0	121	0	0	0	0	471	0	0
117	0	0	20	0	140	0	0	0	0	0	0	0	20	0	140
118	0	0	0	0	180	0	0	0	0	0	0	0	0	0	180
119	0	0	0	0	30	0	0	0	0	0	0	0	0	0	30
120	0	0	200	0	220	0	0	0	0	0	0	0	200	0	220
121	0	0	0	0	0	0	0	106	0	163	0	0	106	0	163
122	40	0	0	40	0	0	0	0	0	0	40	0	0	40	0
123	40	0	20	10	0	0	0	0	0	0	40	0	20	10	0
124	20	0	50	80	0	0	0	1	2	0	20	0	51	82	0
125	0	0	20	40	0	0	0	0	1	0	0	0	20	41	0
126	20	0	0	20	0	0	0	0	0	0	20	0	0	20	0
127	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
128	0	0	0	0	0	13	0	77	20	0	13	0	77	20	0
129	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
131	0	0	20	0	0	0	0	0	0	0	0	0	20	0	0
132	0	0	0	10	0	0	0	0	30	0	0	0	0	40	0
133	20	0	0	80	0	0	0	33	25	0	20	0	33	105	0
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135	0	0	0	10	0	20	0	0	25	0	20	0	0	35	0
136	0	0	0	10	0	20	0	0	20	0	20	0	0	30	0
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138	0	0	0	0	0	10	0	100	10	0	10	0	100	10	0
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140	0	0	10	0	0	0	0	22	5	0	0	0	32	5	0
141	0	0	0	0	0	0	0	3	15	0	0	0	3	15	0
142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
143	0	0	0	0	0	15	0	7	15	0	15	0	7	15	0
144	0	0	0	0	0	0	0	0	15	0	0	0	0	15	0
145	0	0	0	10	0	20	0	134	15	0	20	0	134	25	0
146	0	0	0	0	0	0	0	0	90	143	0	0	0	90	143
147	0	0	0	0	0	0	0	0	0	330	0	0	0	0	330
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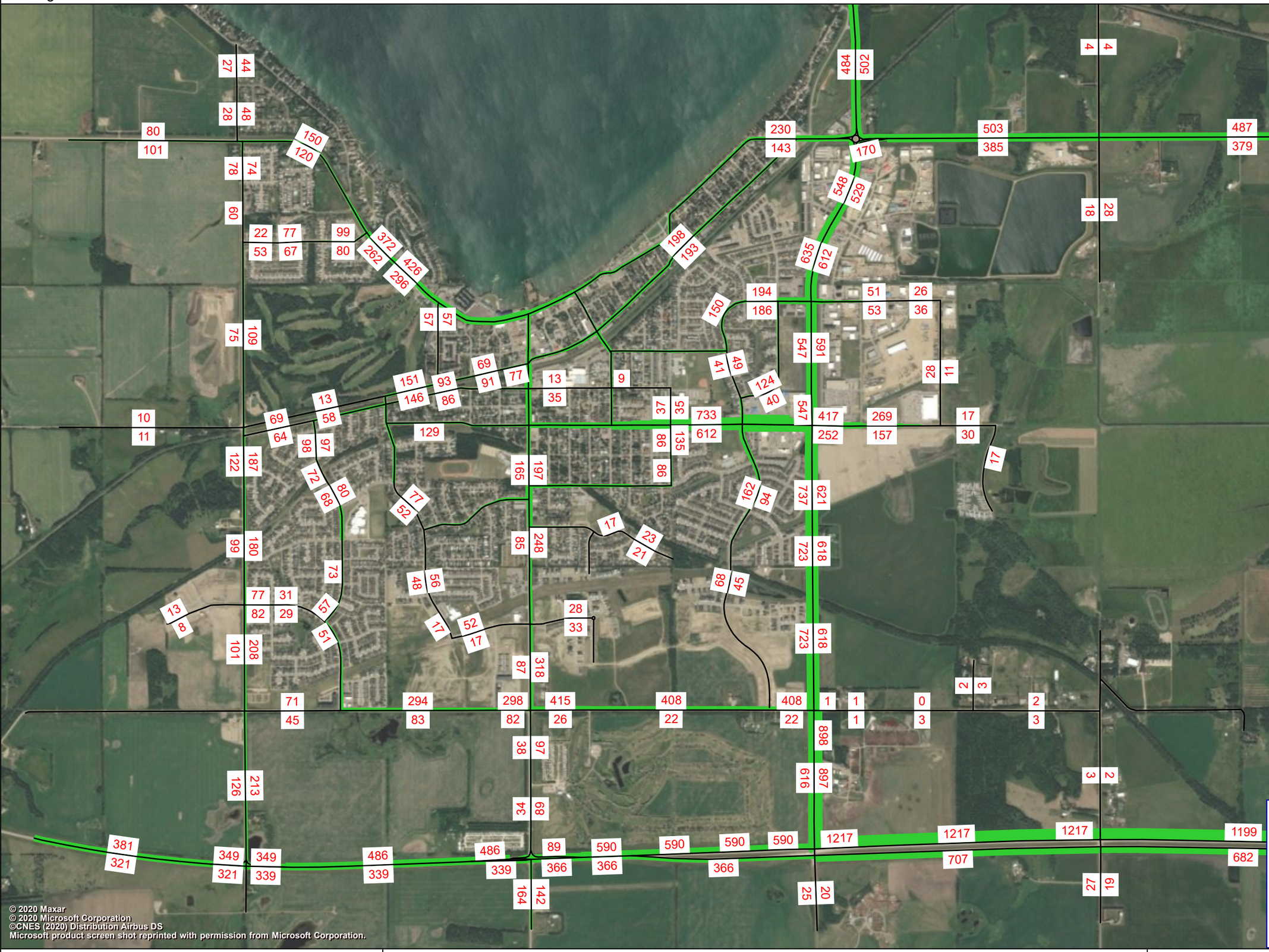
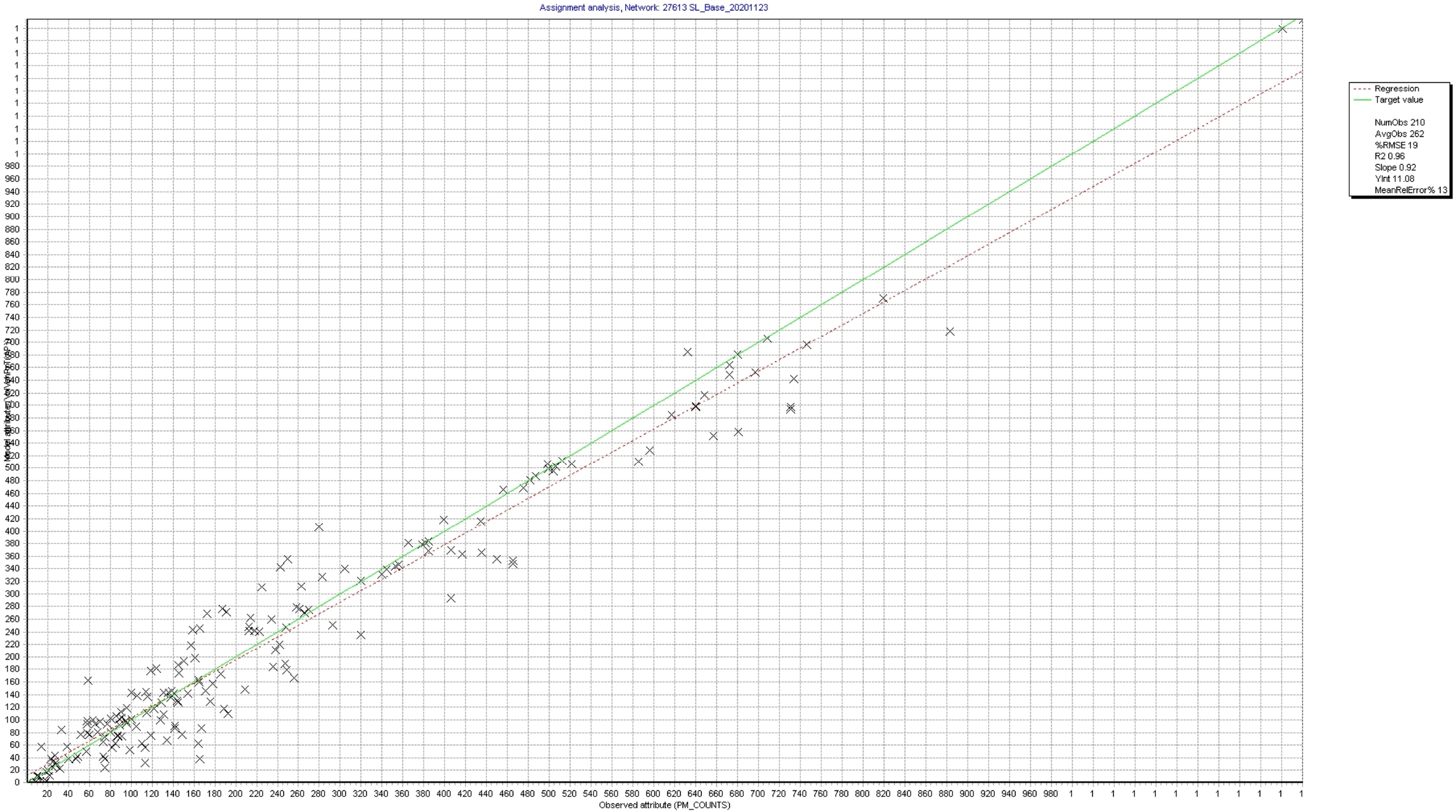
149	0	0	0	0	0	0	0	0	0	73	0	0	0	0	73
201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
202	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
204	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
205	0	0	0	10	0	0	0	0	0	0	0	0	0	10	0
Town Total	**160**	**520**	**830**	**830**	**570**	**108**	**31**	**939**	**357**	**863**	**268**	**551**	**1,769**	**1,187**	**1,433**

APPENDIX B
Existing Summer PM Peak Volumes

Existing PM Peak Hour Traffic Volumes

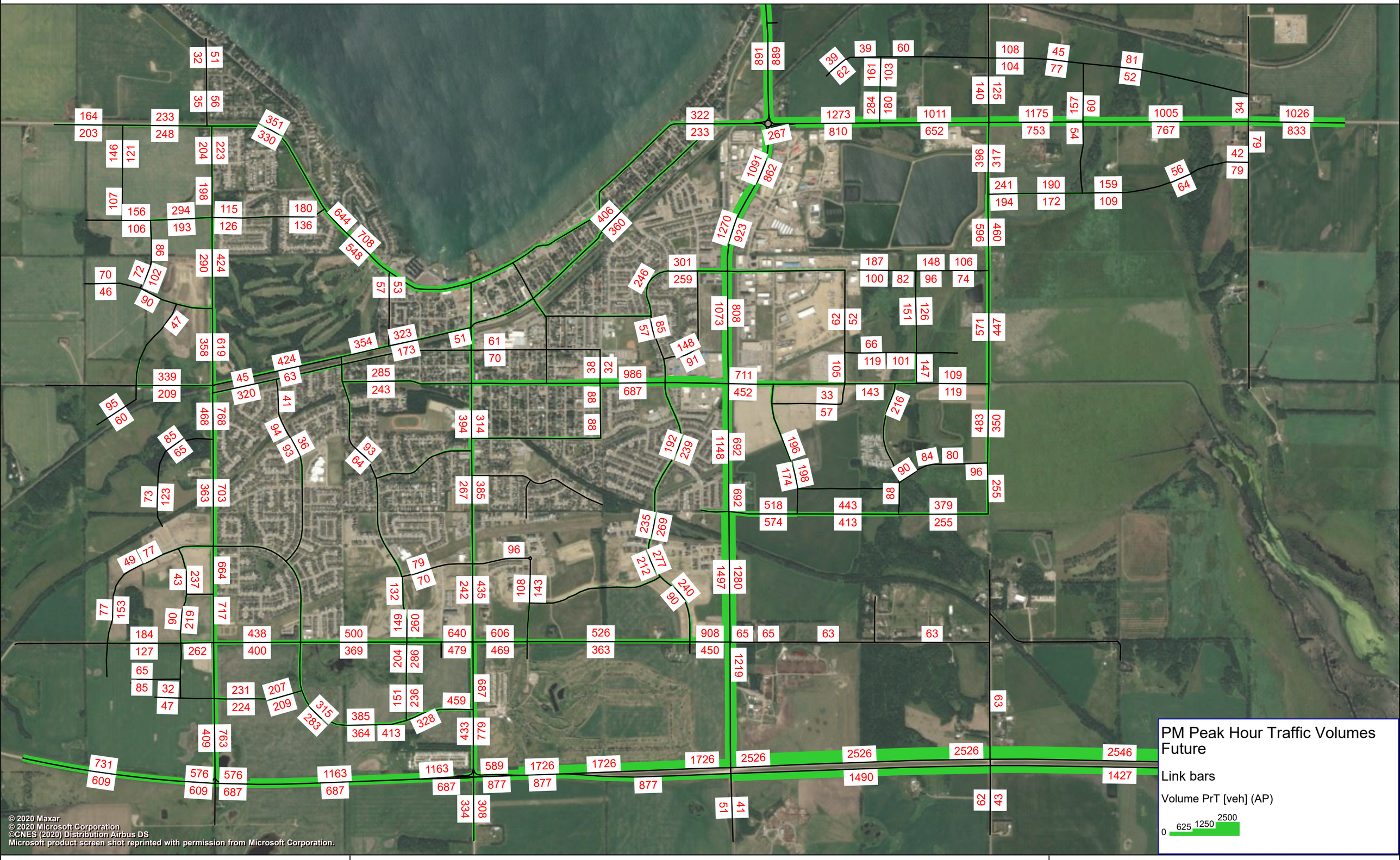


APPENDIX C
Existing Summer PM Model Calibration Plots


Assignment analysis, Network: 27613 SL_Base_20201123
Regression
Target value
NumObs 210
AvgObs 262
%RMSE 19
R2 0.96
Slope 0.92
YInt 11.08
MeanRelError% 13
Observed attribute (PM_COUNTS)

APPENDIX D
38,000 Population Summer PM Peak Volumes

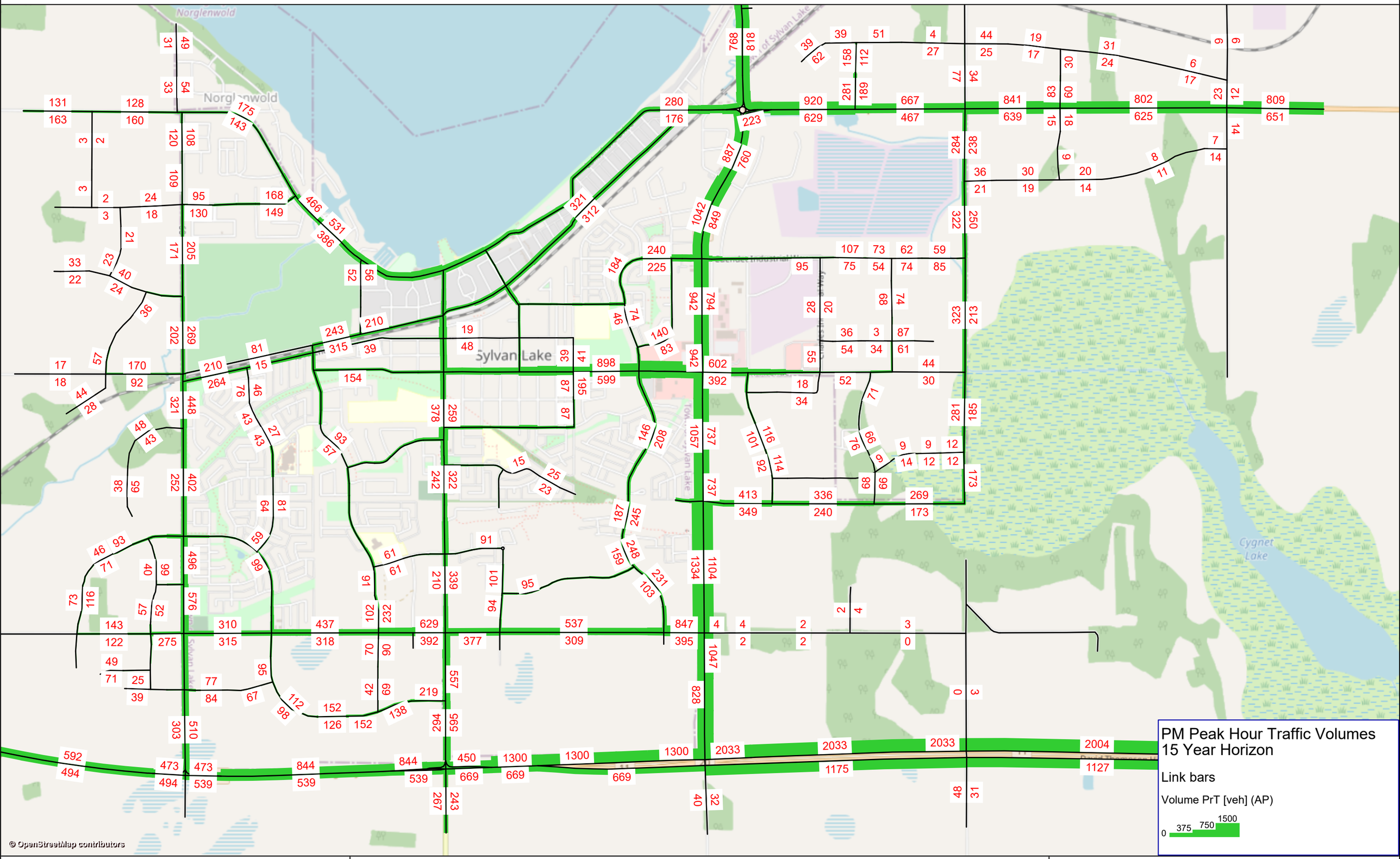
Ultimate Peak Hour Traffic Volumes



VISUM 20.01 PTV AG	ISL Engineering	Date: 22.12.2020

APPENDIX E
30,000 Population Summer PM Peak Volumes

15 Year Horizon Peak Hour Traffic Volumes



APPENDIX F
October Survey – What We Heard Report

TRANSPORTATION STUDY

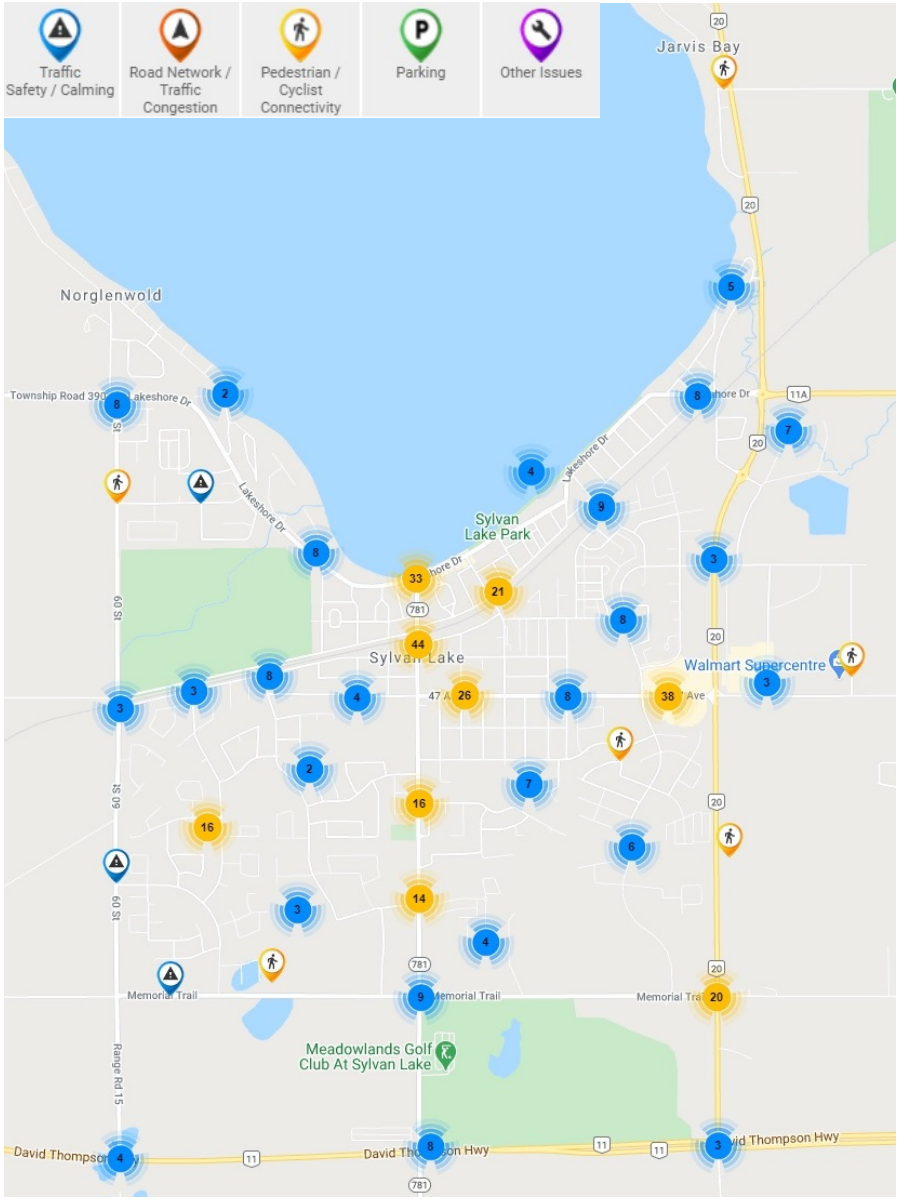
Online Public Survey Results Summary

December 2020

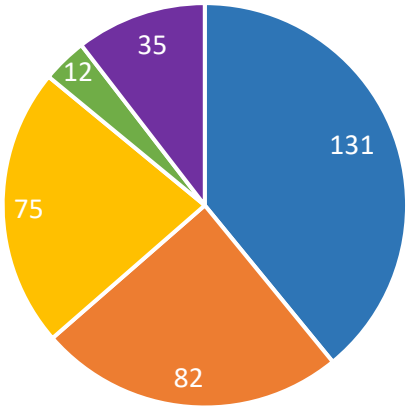
SURVEY OVERVIEW

In October 2020 the Town posted an online survey asking residents to identify various types of transportation concerns, experiences or ideas they had. Participants could using a social mapping tool to place a pin (organized by category) as well as respond to two additional questions seeking input specifically on the intersections of 50 Street at 50 Avenue and at Memorial Trail.

This report contains a summary of the feedback received through the survey.

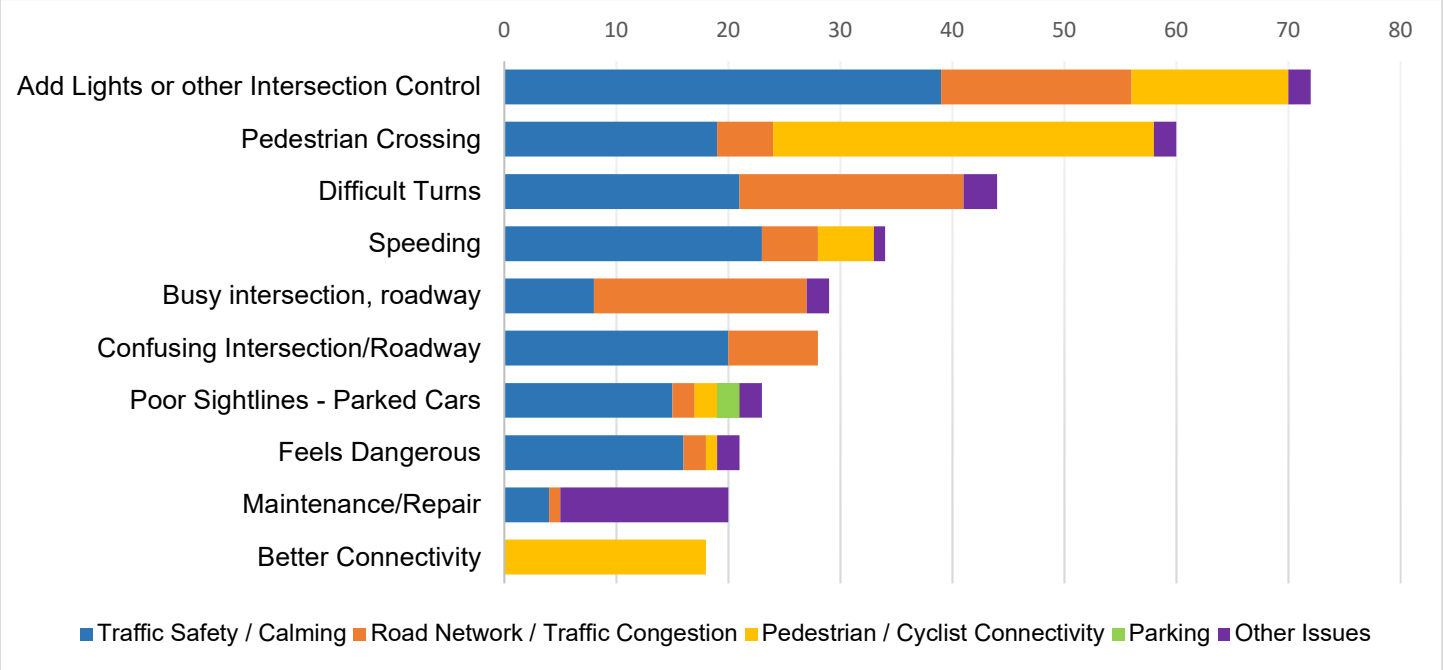


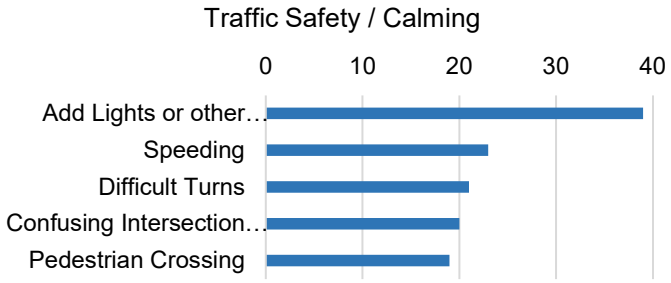
Comments Received

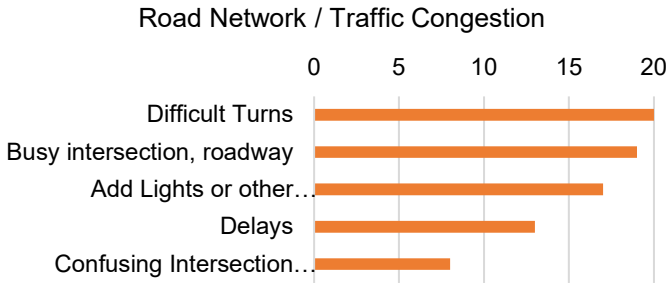


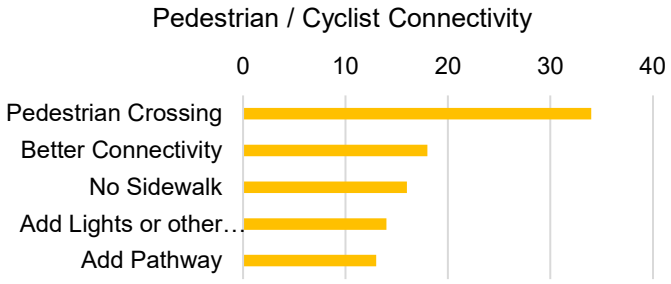
- Traffic Safety / Calming
- Road Network / Congestion
- Pedestrian / Cyclist Connectivity
- Parking
- Other Issues

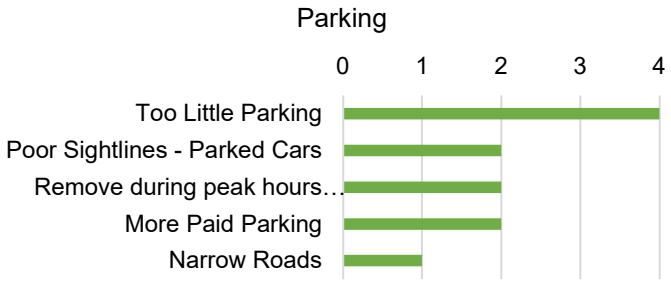
Mapping Comments – Overview of Key Themes by Pin Category

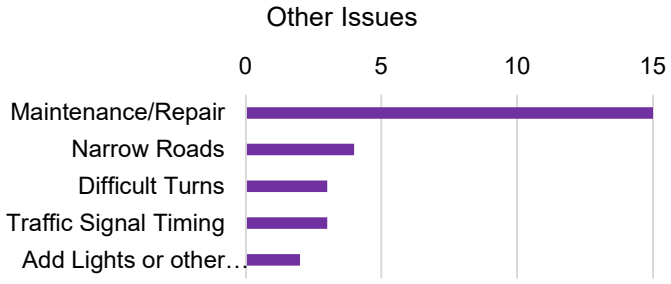




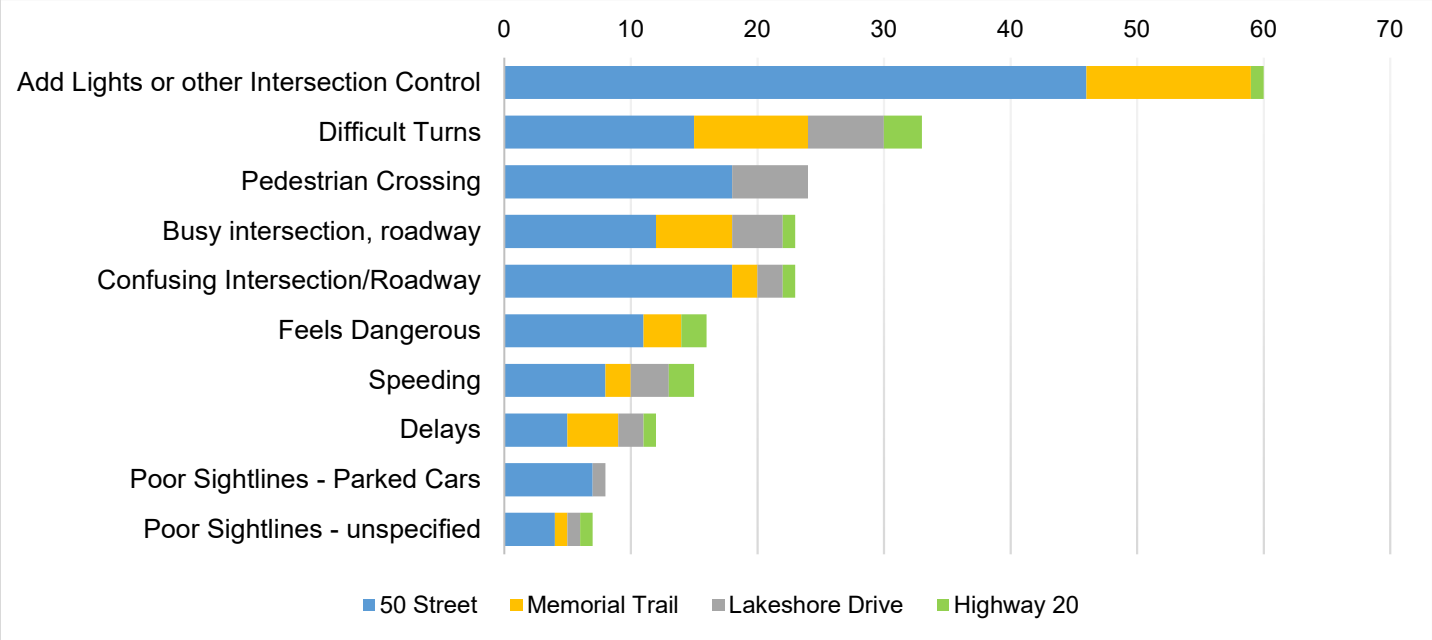


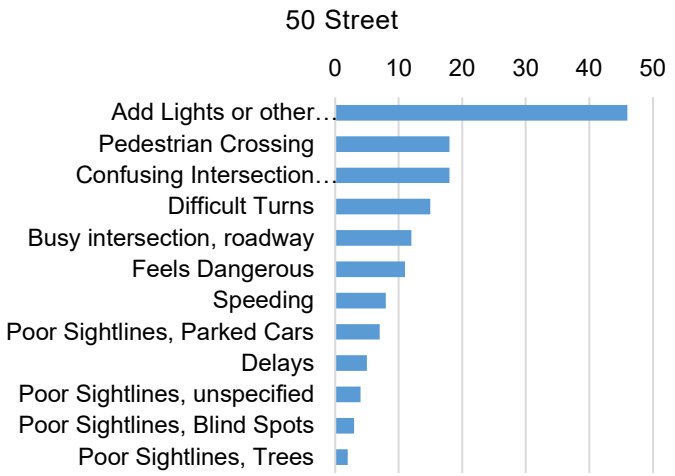


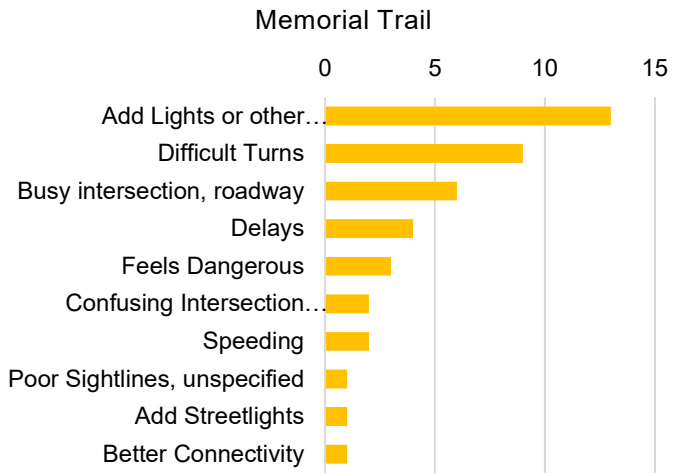


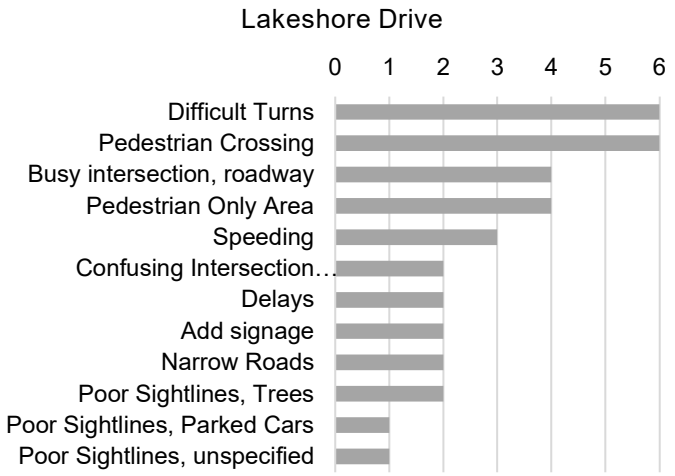


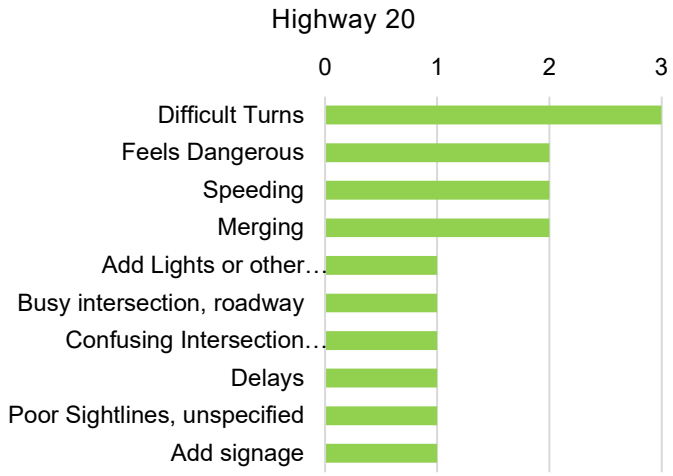
Mapping Comments – Overview of Key Themes by Major Road Location (as identified by participants)









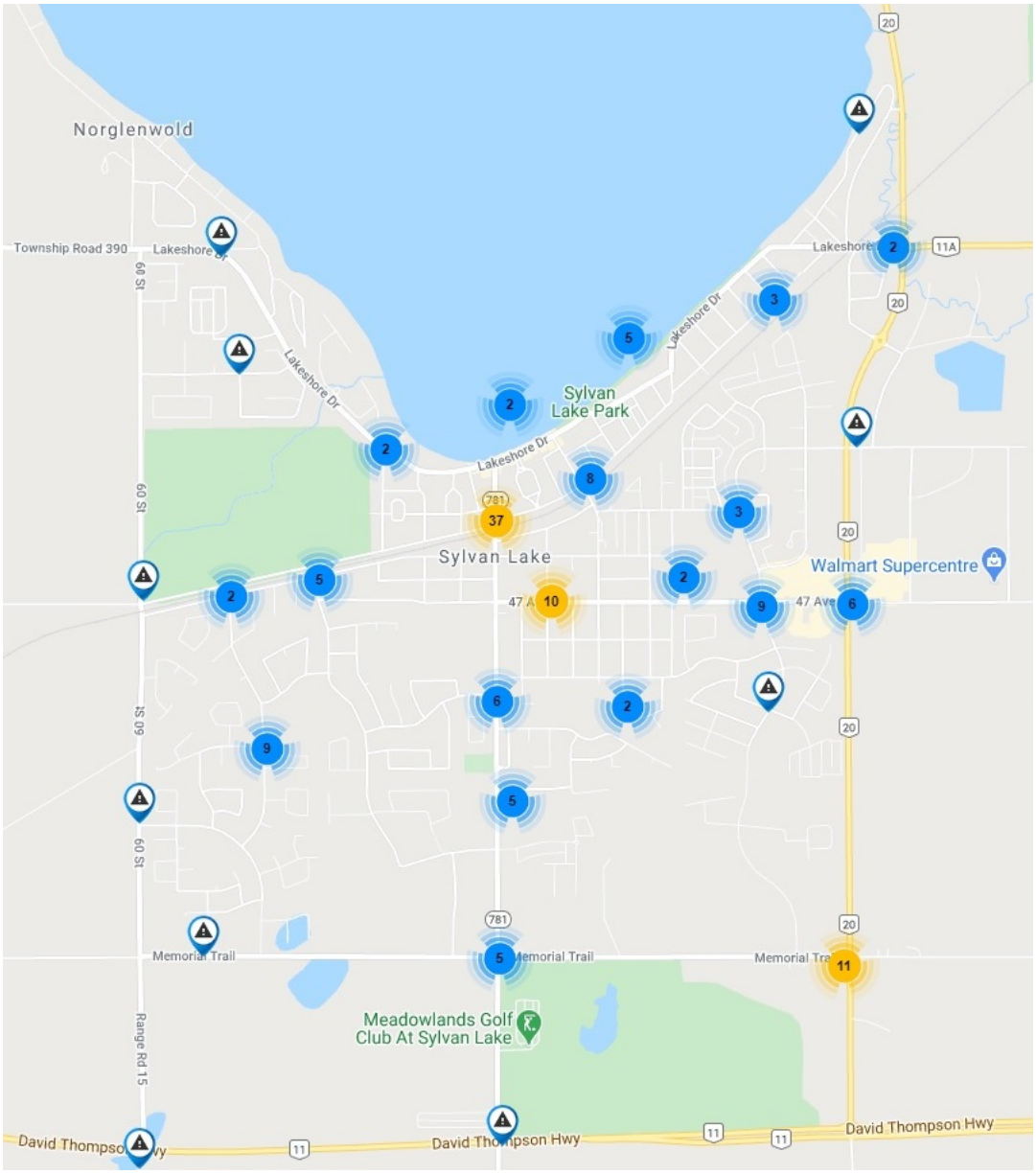


SURVEY SUMMARY OF RESULTS

Traffic Safety and Calming

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Respondents expressed a great deal of concern about the intersection of 50 Street and 50 Avenue as a confusing and unsafe intersection. Suggestions included adding traffic signals or a roundabout, pedestrian crossings, and using the parking lot space to realign the intersection.
- Other areas of concerns included speeding and difficulties using Lakeshore Drive in the summer months, turns and merging at Highway 20 and 47 Avenue, and concerns about safety, congestion and parking during school drop-off and pick-up times



Summary of Feedback – Traffic Safety and Calming

50 Street (Highway 781)

- The intersection at 50 Avenue is confusing and busy – suggestions to use traffic signals or a roundabout to control traffic, or to re-align the intersection using the adjacent park space
- Poor visibility at the intersection of 50 Avenue – suggestions to trim back the trees
- Concerns about visibility and pedestrian crossing near 45 Avenue and Sylvan Drive
- Suggestions for streetlights near Beacon Hill Drive
- Desire for traffic signals and safer crossing for school children near Memorial Trail

Highway 20

- Concerns about left turning and merge lanes at 47 Avenue and Herder Drive
- Suggestions for lane signage at traffic circle at Lakeshore Drive at Erickson Drive
- Concerns about paving maintenance near 47 Avenue
- Busy intersection at Memorial Trail needs traffic signals

Lakeshore Drive

- Concerns about vehicle and pedestrian congestion at 45 Street, and turning left onto Lakeshore Drive in the summer from Hwy 20
- Shrubs impede driver sightlines at 44 Street
- Speeding westbound traffic after 53 Street

Memorial Trail

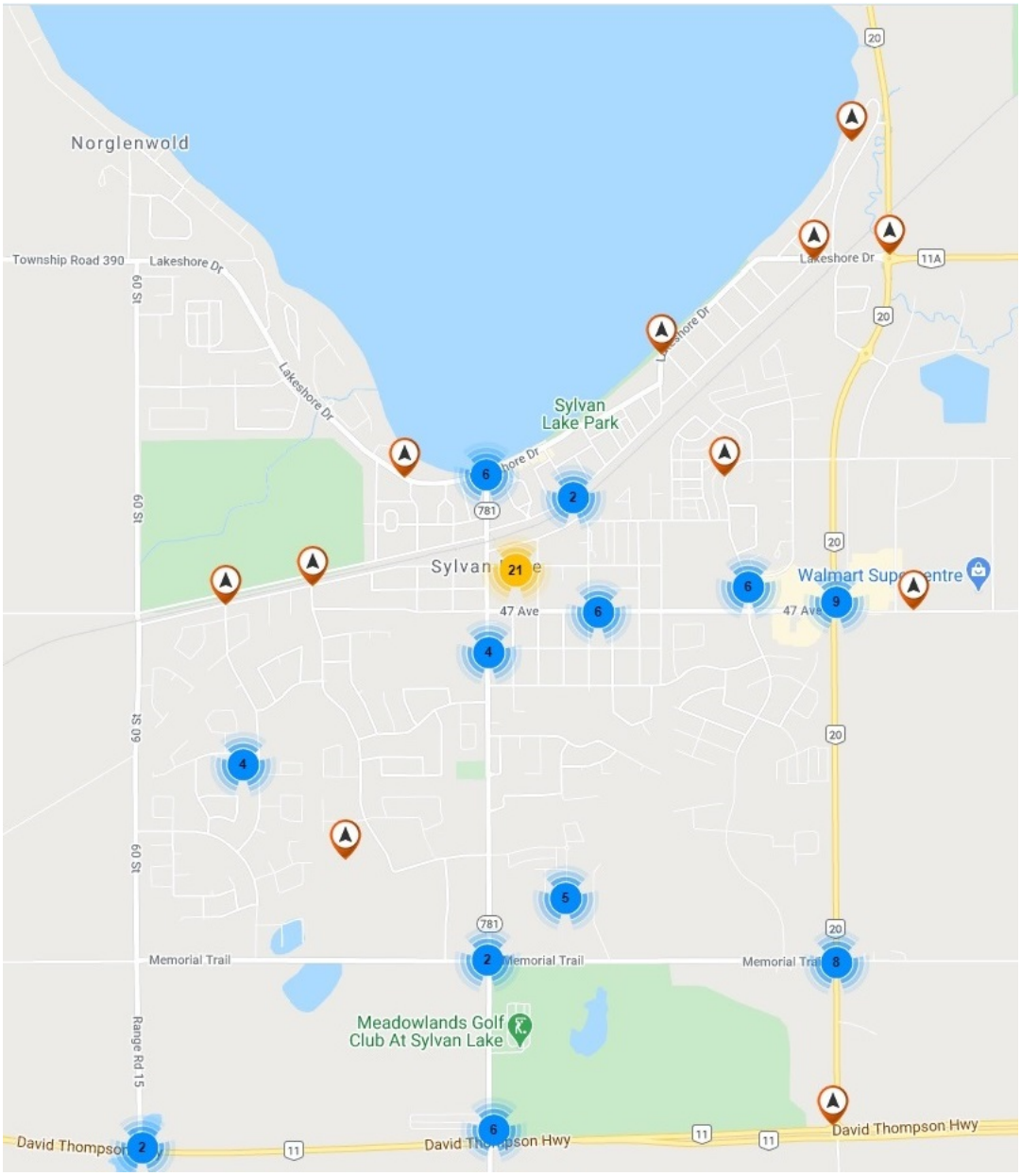
- Concerns about driver sightlines and congestion at the intersections of 50 Street and Highway 20

NW Quadrant *North of 47 Avenue, West of 50 Street* • The playground zone near 48 Avenue and 50 Street is often ignored • Concerns about driver sightlines being compromised by trees, signage or grade changes near 48 Avenue, 60 Street and Fox Run signage at 48 Ave / Old Boomer Rd • Suggestion to extend 30 km/h speed limit past the mini-golf course near Marina Bay Court as many children play at the course	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Concerns about drivers running stop signs near 50 Avenue and 46 Street
SW Quadrant *South of 47 Avenue, West of 50 Street* • Suggestion for traffic signals at the David Thompson Highway; additional playground zone signage on Lakeway Blvd south of Laurel Close; and 4-way stop at Old Boomer Road and Firdale Dr • Concerns about parked cars on Old Boomer Road compromising driver sightlines • Concerns about speed on Old Boomer Road	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Difficult left turns near Ryders Ridge Boulevard at Reynolds road • Concerns about speeding on Ryders Ridge Boulevard and Cole Way

Road Network/Traffic Congestion

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Respondents higlighted area of congestion along 50 Street at Lakeshore, 50 Avenue and Memorial Trail, and along Highway 20 at Memorial Trail and 47 Avenue
- Suggestions included the addition of traffic signals or improved timing of signals at several locations and to consider removing on-street parking during peak hours to improve traffic flow and driver sightlines



Summary of Feedback – Road Network/ Traffic Congestion

50 Street (Highway 781)

- Needs lights, roundabout or other intersection controls at 50 Avenue
- Difficult vehicle turning onto 50 Street at 45, 48 and 50 Avenues

Highway 20

- The merge lane in the double turning lane from 47 Avenue is too short and is confusing to drivers
- The lanes on the east and west sides of the intersection at 47 Avenue don't align, the right through lane travelling east ends to quickly
- The traffic circle at Lakeshore Drive is experiencing congestion for longer periods

Lakeshore Drive

- Suggestion for pedestrian only area between 50 Street and 46 Street during the summer months as the area is congested with both vehicle and pedestrian traffic
- Turning is difficult and dangerous for vehicles and pedestrians due to speed and congestion
- Suggestion to create truck route on Lakeshore west of 50 Street to alleviate heavy truck traffic at 50 Ave and 50 Street intersection

Memorial Trail

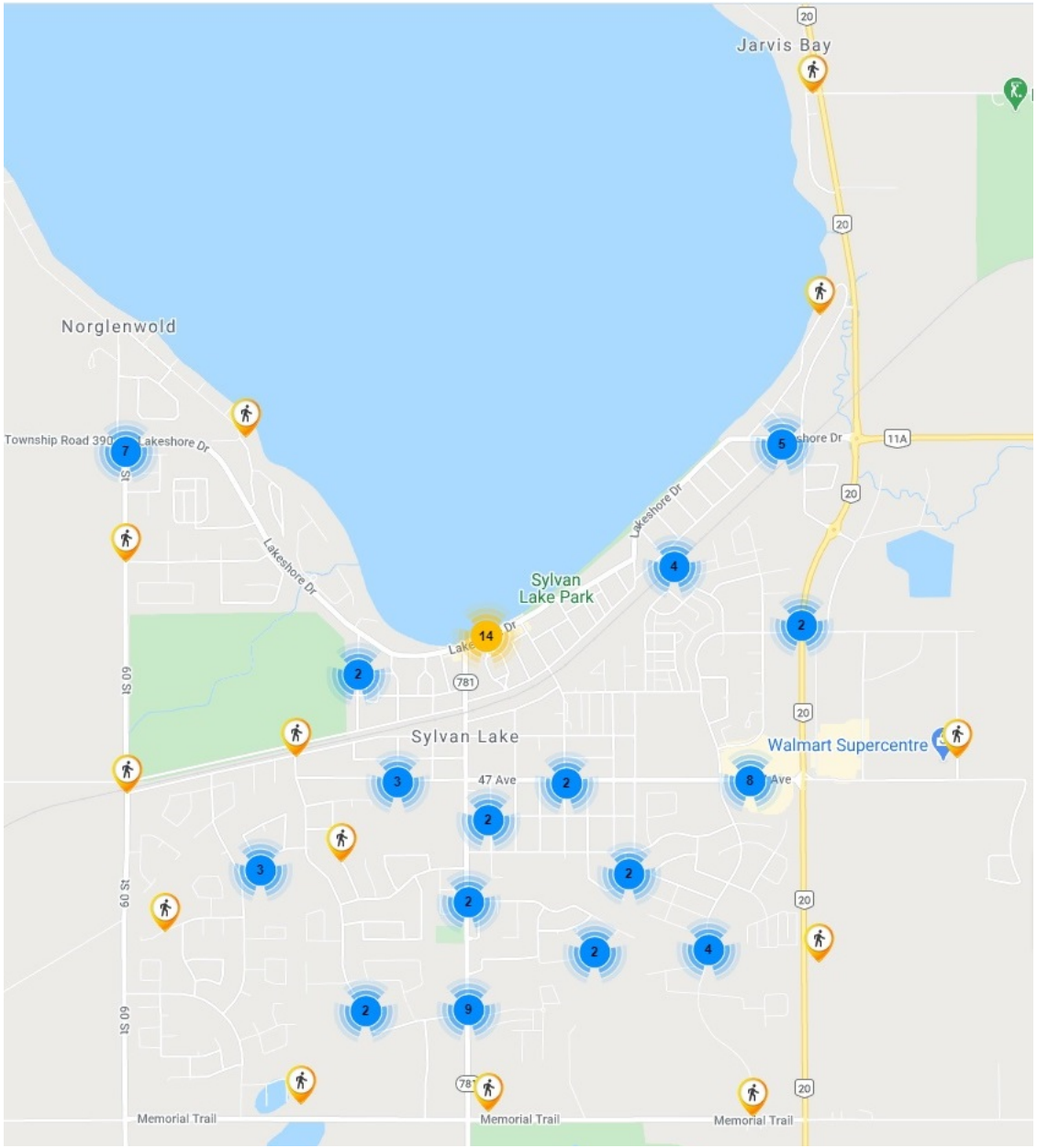
- Intersection at 50th street is very busy, congested, and suggestions for a controlled intersection
- Intersection at Highway 20 is very difficult to turn north, becomes congested, and suggestions for a controlled intersection
- Suggestion for speed limit to be 80km/hr

NW Quadrant *North of 47 Avenue, West of 50 Street* • Difficulty turning left at Fern Crescent • Poor driver visibility on 48 Avenue near Westview Drive	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Concern about excessive speeding on Herder Dr • Congestion and narrow intersection at Hewlett Park Landing • Long wait times at the four-way stop at 46 Street • Congestion and difficulty turning left along 47 Avenue between 43 and 46 Streets, suggestion to remove on-street parking during peak hours
SW Quadrant *South of 47 Avenue, West of 50 Street* • Congestion near Fox Run and Ecole Mother Teresa School during high traffic hours • Suggestion for a path or sidewalk through the field to access the school • Suggestion for traffic signals at 60 Street and Highway 11	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Concern about incomplete roads in the Crestwood neighbourhood • Desired for improvements to traffic signal timing at Ryders Ridge Boulevard and 47 Avenue

Pedestrian and Cyclist Connectivity

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Suggestions for pathways connections included connecting from the lake to Memorial Trail on both the east and west sides of town as well as adding an east-west connection on the south side of town. There is also a desire for safer crossing of railway tracks.
- There is a desire for more formal pedestrian crossings in a number of areas including busy intersections and near schools. Missing sidewalks were noted on Ryders Ridge Boulevard and in the area near Cuendet Ind. Way.



Summary of Feedback – Pedestrian and Cyclist Connectivity

50 Street (Highway 781)

- Difficult to cross the CP Rail Trail near 50 Avenue
- Consider a bike route connecting to Lakeshore from around 42 Avenue
- Sidewalks on both sides of the street south of 50 Avenue, especially to the library
- Add pedestrian lights near Perry Drive
- Crossing safety concerns near Beacon Hill Drive

Highway 20

- Concerns about crossing the railway, and missing sidewalks near 47 Avenue
- Suggestion to build a bike trail all the way around the lake

Lakeshore Drive

- Need pedestrian crossing lights near 47 and 44 Streets as parked cars obscure pedestrians trying to cross
- Extend the shared pathway to Erickson Drive
- Parked cars often block the crosswalk near and entrance to the library
- Need separate pathways for pedestrians and cyclists along Lakeshore

Memorial Trail

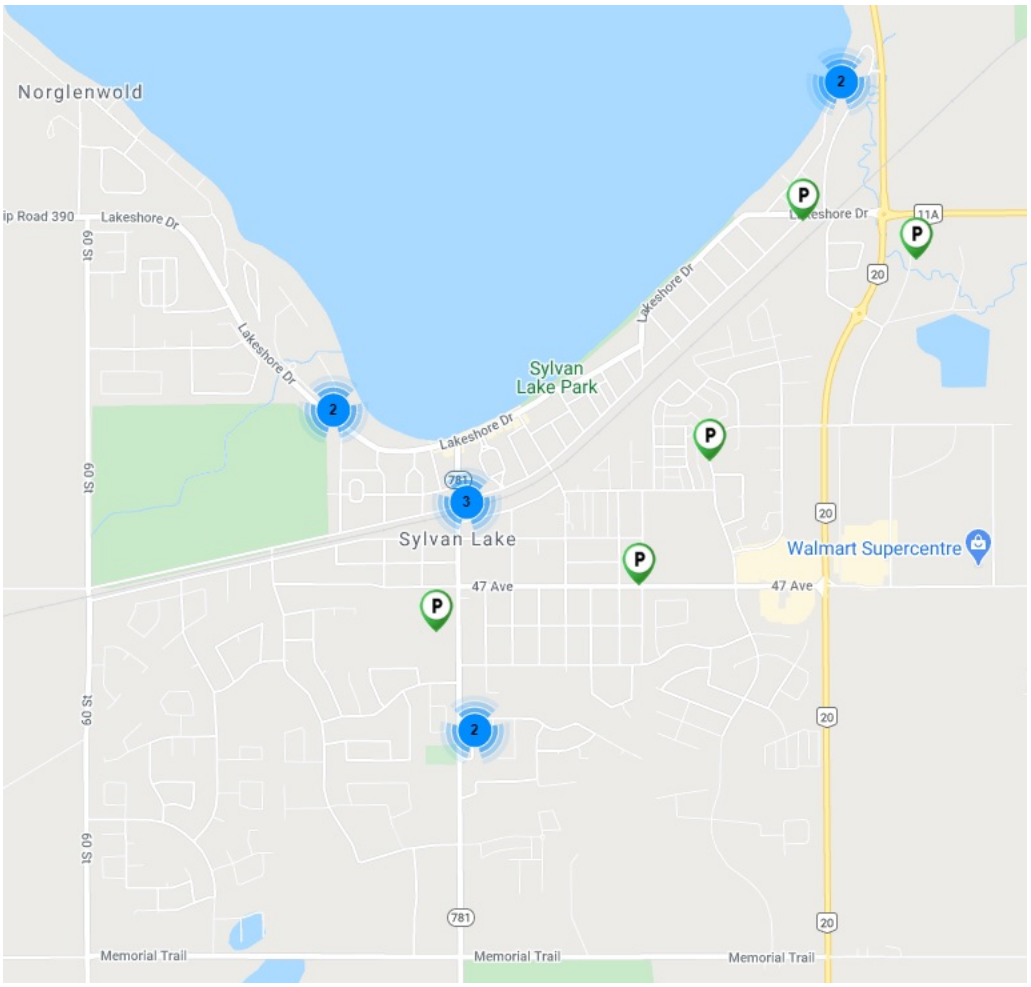
- Consider a pathway along memorial connecting Ryders Ridge and the Vista to the dog park

NW Quadrant *North of 47 Avenue, West of 50 Street* • It would be nice to see a trail connect between the lake and Highway 11 near 52 Street • Sidewalk needed from end of walking trail to north end of 60th. • Difficult for pedestrians to cross near Westwood Crescent at 60 Street	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Need sidewalks connecting the Hewlett Park and Ryders Ridge shopping areas • There are many employees along Cuendet Ind. Way who walk/cycle to work and on their breaks but there is no sidewalk • Difficult for pedestrians to cross 50 Avenue between 39 and 47 Streets
SW Quadrant *South of 47 Avenue, West of 50 Street* • Need crossing lights at 52 Street and 47 Avenue • An east-west bike path connection on the south side of town connecting Leader Park to Crestview • Need a better pedestrian railway crossing at 60 Street and 48 Avenue	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Need crosswalks on 45 Avenue and Regatta Way near Reynolds Road • Missing or inconsistent sidewalks on Ryders Ridge Boulevard

Parking

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- There is a need for more paid parking downtown
- In a number of places on-street parking was identified as obstructing driver sightlines



Summary of Feedback – Parking

50 Street (Highway 781)

- Student and street parking is an issue near 45 Avenue
- On-street parking causes issues with traffic flow

Lakeshore Drive

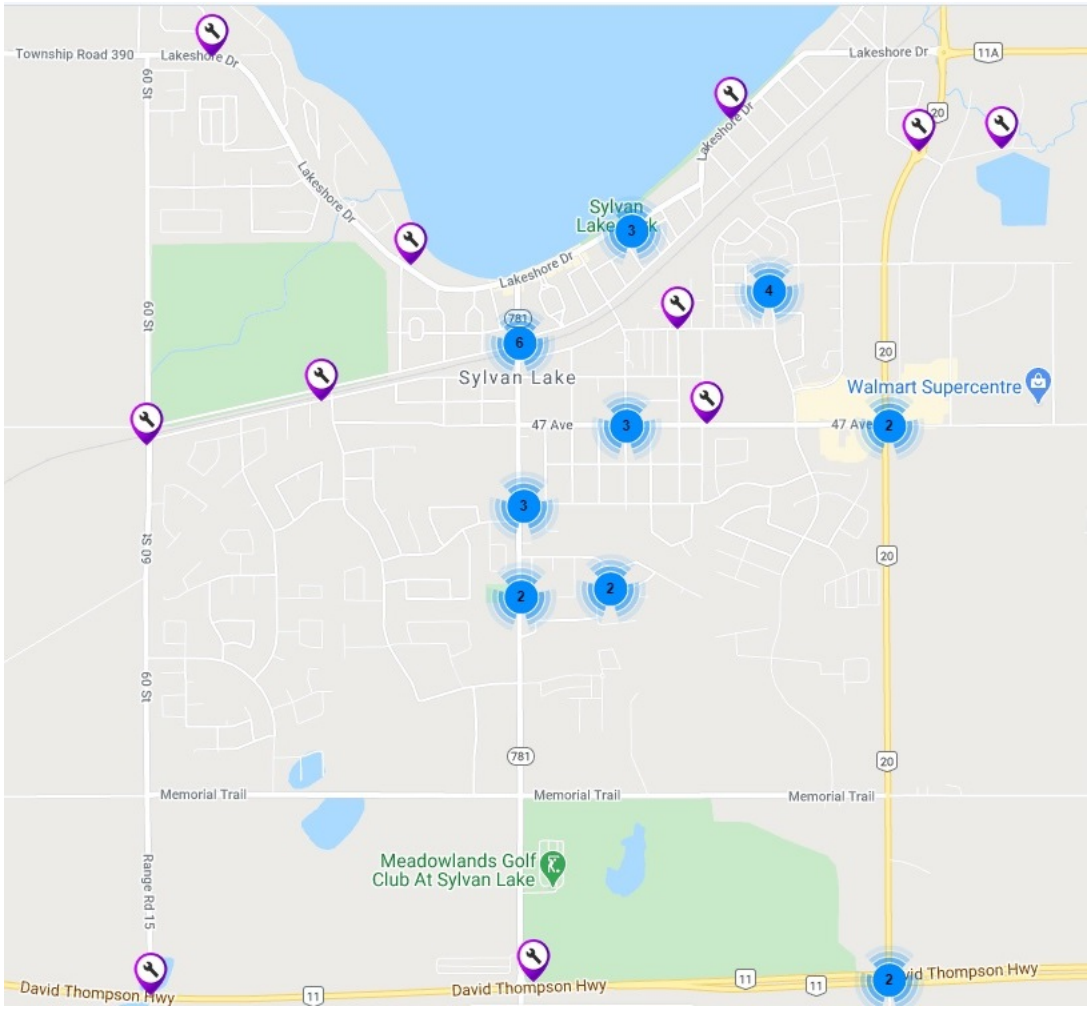
- Need more parking near restaurants
- Need more paid parking
- Large parked vehicles or trailers causes issues with visibility near 53 Street

NW Quadrant *North of 47 Avenue, West of 50 Street* • Need more paid parking near 50 Avenue	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Parking on Herder Dr compromising visibility, suggestion for driveway or laneway parking
	SE Quadrant *South of 47 Avenue, East of 50 Street* • On street parking on Pelican Place narrows the road too much, particularly during winter • More parking is required near Pelican Place to access businesses

Other Issues

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- There were some notes about maintenance needed to fix potholes or heaving in areas such at 47 Avenue and Highway 20, and 50 Street and 45 Avenue
- There is a concern about pedestrian safety on Lakeshore Drive, and a suggestion to close off Lakeshore Drive to pedestrians more regularly as was done during the weekends this past summer



Summary of Feedback – Other Issues

50 Street (Highway 781)

- It is difficult to turn onto 50 Street at 50, 47, and 44 Avenues, particularly at peak hours
- Road maintenance required at 45 Avenue
- Needs consistent posted speed limit, currently it changes

Highway 20

- Merge lane at 47 Avenue is too short
- Lifting manhole cover at 47 Avenue
- Turn Signal at David Thompson Highway sometimes does not turn on

Lakeshore Drive

- Concern about pedestrian safety during farmers' market
- Narrow streets at 49 Avenue
- Raised crosswalks causes trailers to bottom out
- Needs a street light on Lakeshore Drive between Rustic Road and Range Road 15
- It created a nice environment to close off lakeshore on weekends during the summer

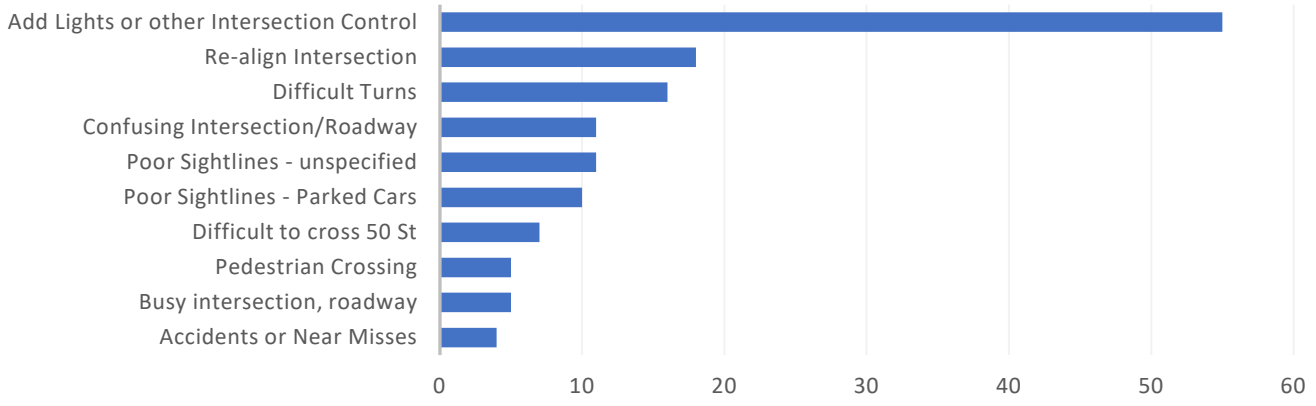
NW Quadrant *North of 47 Avenue, West of 50 Street* • 48 Ave between 60 St and Westview Drive speed limit could be increased to 50 km/hour • Poor drainage in the area	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Requires road maintenance to address potholes and cracking or unfinished pavement at Herder Drive • Poor visibility and pedestrian crossings at 44 Street and 49 Avenue
SW Quadrant *South of 47 Avenue, West of 50 Street* • Stop sign needs to be moved closer to the intersection to improve visibility on 60 Street	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Manholes are higher than the pavement • Requires slow down signs by Cole Way and 50 Street due to children playing

Additional Questions

Participants were asked to describe their concerns, experiences and ideas for the instersections of 50 Street with 50 Avenue and with Memorial Trail. Key themes from the feedback included:

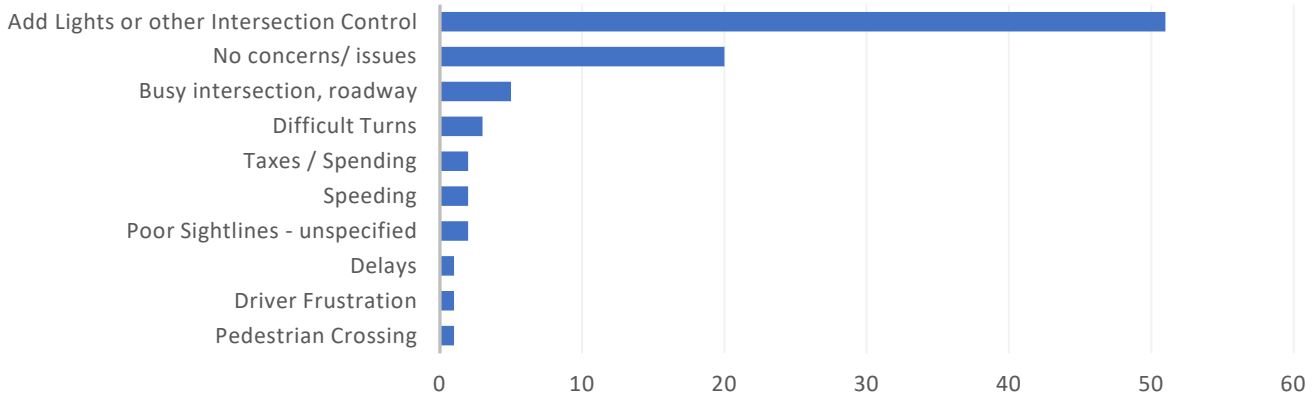
50 Avenue and 50 Street

- The intersection was described as difficult and confusing to navigate
- Suggestion for a pedestrian crossing light as it feels unsafe to navigate the intersection on foot
- Comments described drivers using the intersection improperly, which causes safety concerns
- There is difficulty turning left from 50 Avenue onto 50 Street due to blind spots and busy traffic
- Suggestions to add traffic signals, a roundabout, or a 4-way stop
- Suggestion to allow right turns only at the intersection
- Suggestion to remove or move the parking lot or the park adajcent to 50 Avenue to realign the intersection



Memorial Trail and 50 Street

- Some congestion is experienced at this intersection during peak hours
- It can be difficult to make left turns
- Speeding is a concern
- Does not feel safe to cross as a pedestrian
- Many suggestions to add a roundabout or set of traffic signals



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