SPRINGBANK – AREA STRUCTURE PLAN

Network Analysis

PERMIT TO PRACTICE
WATT CONSULTING GROUP LTD.
Signature _____
Date October 26, 2020
PERMIT NUMBER: P 3818
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

October 26, 2020

Prepared for:	Rocky View County
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Our File:	3633.T01
Date:	October 26, 2020

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1.0 INTRODUCTION

1.1 STUDY BACKGROUND

Rocky View County (RVC) is currently reviewing its plans related to the existing and future development in the Springbank area and has retained WATT Consulting Group to complete a network analysis in support of this Area Structure Plan (ASP).

Springbank denotes an area abutting the City of Calgary along its western boundary, centered on the TransCanada Highway (Hwy 1) and extending between the Bow and Elbow Rivers. This area is currently partially developed. The existing development includes country residential acreages, light industrial and commercial development and an amusement park (Callaway Park) along Hwy 1 in the vicinity of Highway 1/RR 33 interchange as well as Springbank Airport just west of RR 33 and north of Hwy 1. The Harmony development, a nodal type residential development is under construction just west of the airport and west of RR 33. The total ASP area consists 23,595 acres of land.

RVC has developed long-term land use scenarios and would like to understand the impacts of the planned development on the transportation network and identify the improvements that are required to support the proposed land uses. It is noted that the land use concept does not include the area for the proposed water flood retention (SR1).

The main objective of this study is to review the capacity and operational conditions on the existing network and to identify the future traffic volumes and related network improvements required to support the proposed land uses within the Springbank ASP. In addition, a sensitivity analysis was carried out to ascertain the potential impacts of a new interchange along Hwy. 1 at either RR 40 or RR 35. The ASP study area is shown in **Figure 1**.

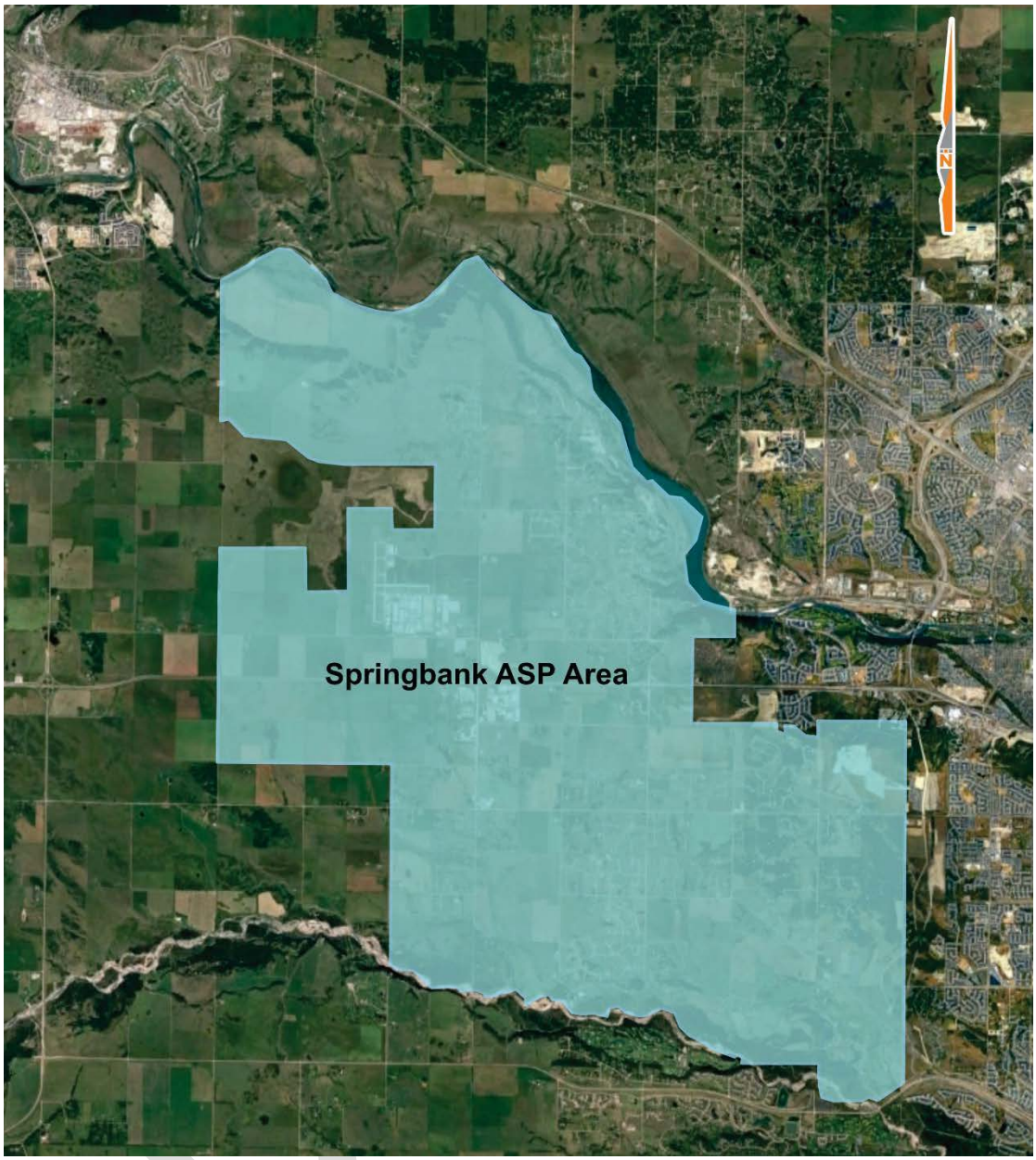

Figure 1: Site Context

1.2 SCOPE OF WORK

The following scope of work was identified by RVC staff members:

Springbank ASP Project –Scope of Work (Transportation)

- Review the existing plans for the Springbank Area (Springbank Functional Plan) and other background documents including the following:
    - Highway 1 / Old Banff Coach Road interchange (Castleglenn)
    - Highway 1 / Range Road 33 interchange (Castleglenn)
    - Highway 1 / Highway 22 interchange (Stantec, SR-1)
    - Highway 22 Functional Planning Study (ISL, north of Highway 1)
    - Highway 22 Functional Planning Study (Stantec, SR-1, south of Highway 1)
    - Highway 8 Functional Planning / Access Management Study (McElhanney)
    - Automated Traffic Recorder locations on Highway 1 east of Range Road 31 & west of Highway 22 (rather than using 100th highest hour estimates)
    - Connecting Cochrane, TMP
- Review the existing network for capacity and operational conditions for the 5, 10 and 20-year horizons based on land use scenarios developed by RVC (for a total of 2 scenarios based on different build-out time frames). The map included in **Appendix A** shows the assumed approximate timelines for the build-out of the ASP area.
- Capacity analysis of key interchanges and intersections as well as the determination of traffic controls, number of lanes and ultimate right-of-way requirements for key roadways within the ASP area.
- Preparation and submission of draft and final report.

2.0 TRANSPORTATION NETWORK

2.1 EXISTING ROAD NETWORK

The ASP area is located in the western part of Rocky View County, along the west boundary of the City of Calgary.

A brief description of each of the major roads that form the transportation network surrounding and servicing the ASP area is provided below.

It should be noted that the study area includes/bordering facilities located in three different jurisdictions: Rocky View County, The Province of Alberta (Alberta Transportation) and the City of Calgary.

- **Highway 1** (under jurisdiction management and control of Alberta Transportation) is a four-lane east-west paved divided provincial freeway and is the National Highway System. It has a posted speed limit of 110 km/h.
- **Highway 8** (under jurisdiction management and control of Alberta Transportation) is a two-lane east-west paved provincial expressway with posted speed limit of 100 km/h. It is planned as a future freeway.
- **Highway 22** (under jurisdiction management and control of Alberta Transportation) is a two-lane north-south paved provincial expressway with posted speed limit of 100 km/h and located west of the ASP area. It is planned as a future freeway.
- **Highway 563** (Old Banff Coach Road and under jurisdiction management and control of Alberta Transportation**)** a two-lane paved major arterial roadway with a posted speed limit of 50 km/h.
- **Township Road 250** (under jurisdiction management and control of Rocky View County) to the north of Highway 1 is a two-lane east-west paved roadway servicing predominantly agricultural land uses and the residential pockets and has a posted speed limit of 80 km/h.
- **Springbank Road, Lower Springbank Road and Range Road 31 and 40** are two-lane paved roads under the jurisdiction of RVC. They are posted at 80 km/h.
- **Range Road 33** has been upgraded to a four-lane undivided paved roadway between Highway 1 and Springbank Road and is posted at 50 km/h and 80 km/h. Its remaining sections north of Highway 1 and south of Springbank Road are constructed to a two-lane rural paved standard.

The regional road network with the existing lane geometry is shown in **Figure 2.** All intersections within the ASP area operate currently as either STOP controlled or uncontrolled intersections.

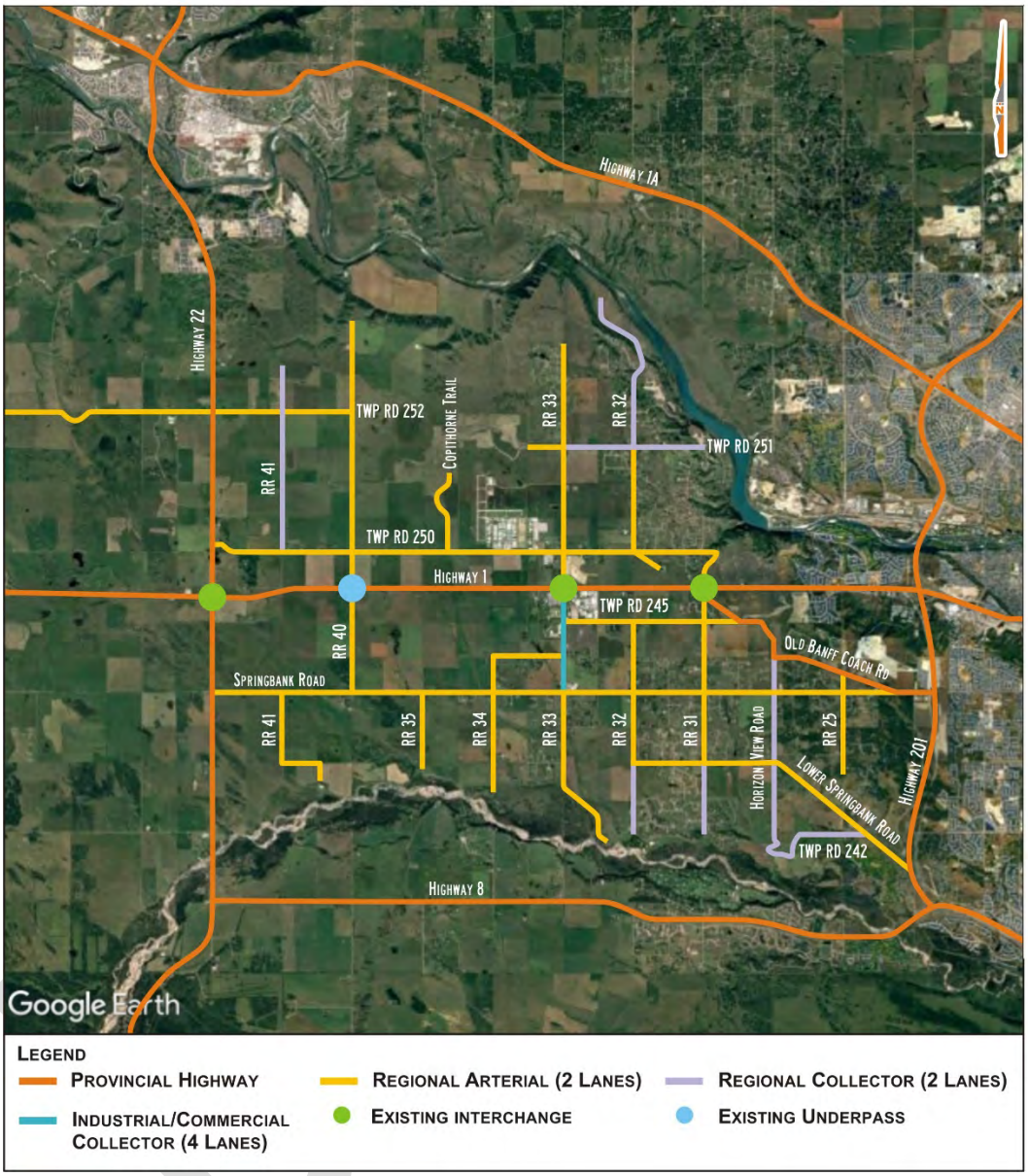

Figure 2: Existing Road Network

2.2 FUTURE ROAD NETWORK

For the purpose of this analysis it has been assumed that the Calgary Ring Road will be completed and open to traffic at the 2025-year horizon. Three interchanges will connect the Rocky View County road network to the Ring Road. It should also be noted that Alberta Transportation (AT) plans to upgrade Hwy 1 to a six-lane cross-section and Hwy 22 to a four-lane divided cross-section within the 20-year planning horizon. Separate scenarios/sensitivity analysis were carried out including a potential new interchange along Highway 1 at either Range Road 40 or Range Road 35 (**Figure 3)**.

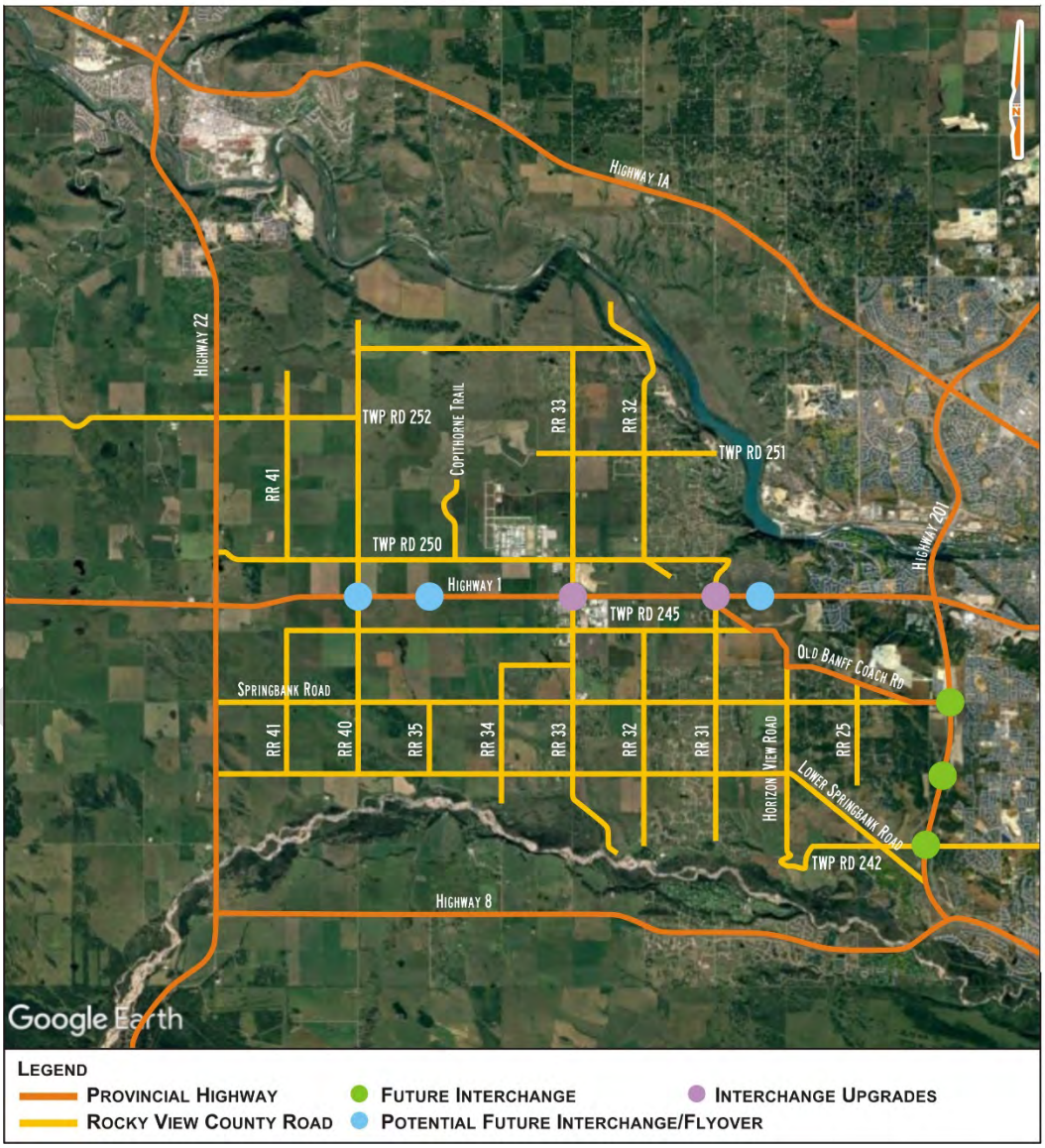

Figure 3: Proposed 2040 Base Road Network

3.0 EXISTING CONDITIONS

The analysis of the existing conditions included the key RVC intersections as well as the Alberta Transportation interchanges at:

- Highway 1 and Range Road 33, and
- Highway 1 and Range Road 31.

The results of the analysis are summarized in the subsequent sections of this report.

3.1 EXISTING TRAFFIC VOLUMES

The existing PM peak hour volumes were obtained from Alberta Transportation for the following interchanges:

- Highway 1 and Range Road 31 (Old Banff Coach Road), and
- Highway 1 and Range Road 33.

It should be noted that three traffic peaks are typically observed on the transportation network during any 24-hour period: AM (morning peak), mid-day and PM (afternoon peak). The PM peak typically represents the highest traffic volumes during the day and therefore, the traffic analysis for this study only included the PM peak hour traffic analysis.

Raw data for the traffic counts are included in **Appendix A.** The traffic volumes are summarized in **Figure 4 and 5.**

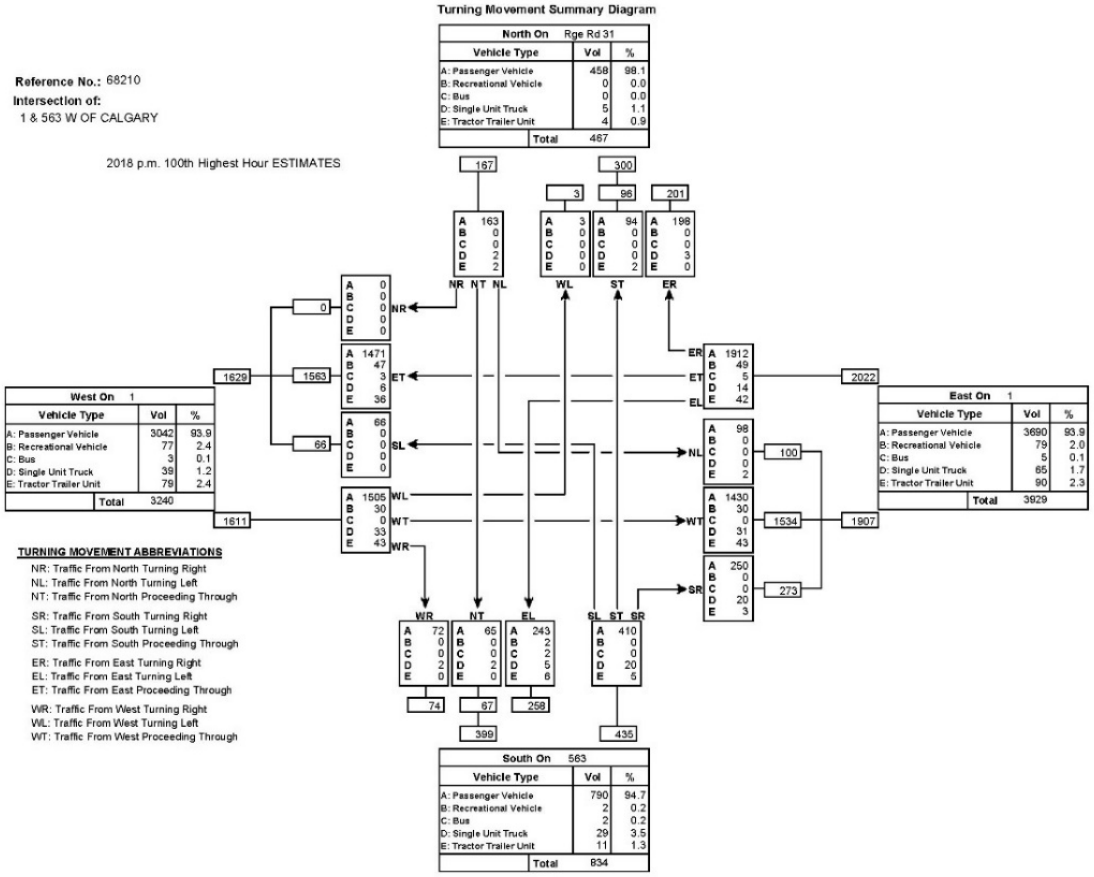

Figure 4: Existing PM Peak Traffic Volumes Highway 1 and RR 31

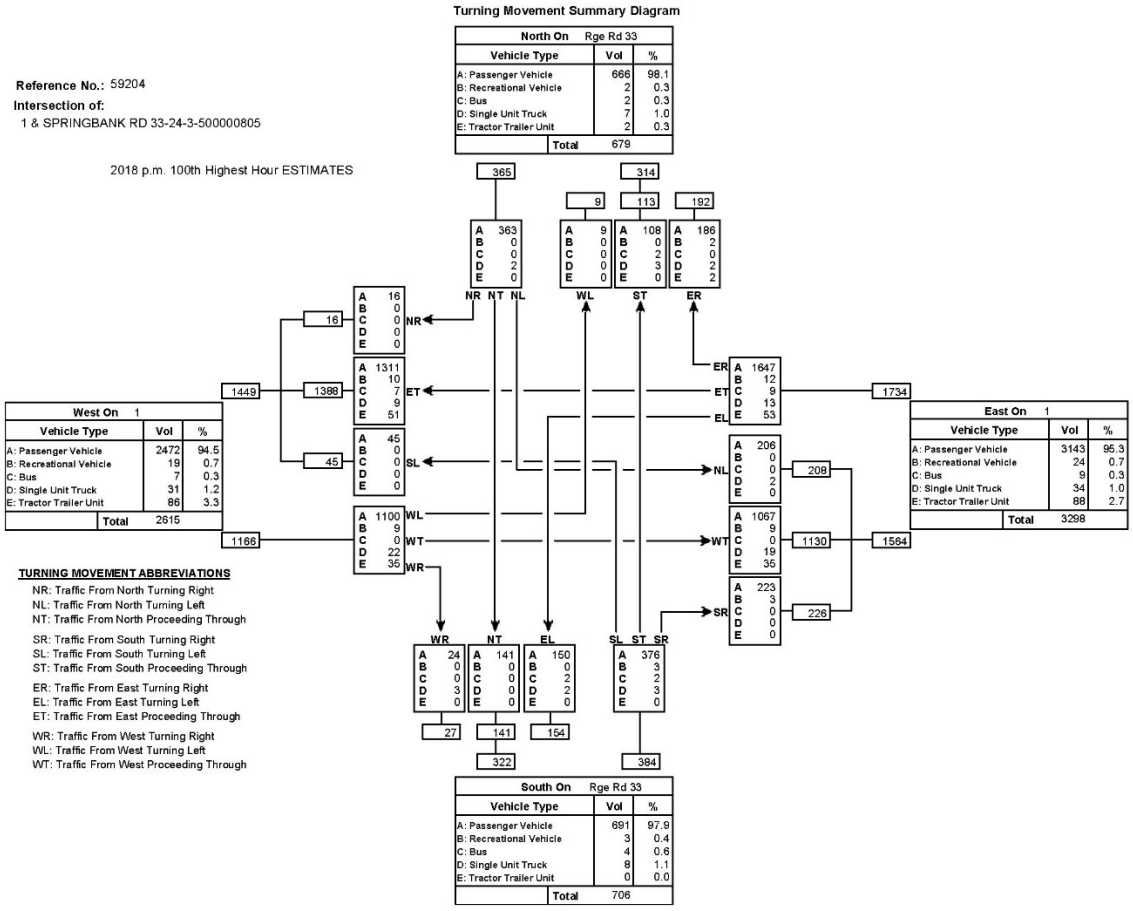

Figure 5: Existing PM Peak Traffic Volumes Highway 1 and RR 33

3.2 INTERSECTION PERFORMANCE EVALUATION

Capacity analysis was carried out for the PM peak hour at the studied intersections using the Synchro and VISUM software packages, which are based on the Highway Capacity Manual (HCM 2010) evaluation methodology.

For un-signalized (stop-controlled) intersections, the Level-of-Service (LOS) is based on the computed delays on each of the critical movements. LOS 'A' represents minimal delays for minor-street traffic movements, and LOS 'F' represents a scenario with an insufficient number of gaps on the major street for minor street motorists to complete their movements without significant delays.

For signalized intersections, the methodology considers the intersection geometry, traffic volumes, traffic signal phasing/timing plan, and also pedestrian volumes. The average delay for each lane group is calculated, as well as the delay for the overall intersection. The operating conditions can also be expressed in terms of volume to capacity (v/c) ratios. LOS criteria for both unsignalized and signalized intersections, as summarized in the Highway Capacity Manual, are illustrated in **Table 1**.

TABLE 1: LOS CRITERIA FOR INTERSECTIONS

Level of Service (LOS)	Average Delay for UNSIGNALIZED Intersection Movements	Average Delay for SIGNALIZED Intersection Movements
A	0 – 10 seconds per vehicle	0 – 10 seconds per vehicle
B	> 10 – 15 seconds per vehicle	> 10 – 20 seconds per vehicle
C	> 15 – 25 seconds per vehicle	> 20 – 35 seconds per vehicle
D	> 25 – 35 seconds per vehicle	> 35 – 55 seconds per vehicle
E	> 35 – 50 seconds per vehicle	> 55 – 80 seconds per vehicle
F	> 50 seconds per vehicle	> 80 seconds per vehicle

INTERSECTION IMPROVEMENT CRITERIA

Since Highway 1 is under the jurisdiction, management and control of Alberta Transportation (AT), AT Standards and criteria for acceptable LOS operations were followed in the analysis as summarized below for the Highway:

1. A maximum v/c ratio of 0.9 with a minimum LOS of C is acceptable for developments within rural areas.
2. A maximum v/c ratio of 0.9 with a minimum LOS of D is acceptable for developments within urban areas.

For Rocky View County roads, the following criteria were used:

1. For developments that are predominately urban in nature and are in close proximity to the City of Calgary the accepted v/c ratio is 1.0 with a minimum LOS of E.
2. For developments that are predominately rural in nature the accepted v/c ratio is 0.9 with a minimum LOS of D.

3.3 EXISTING OPERATING CONDITIONS

The stop-controlled intersection inside the ASP area were analyzed using the existing lane configuration and the existing traffic controls as well volumes established by the traffic forecasting model where there are no available intersection counts. The overall LOS for the unsignalized intersections is shown in **Figure 6.**

It should be noted that **Figure 6** reflects the capacity analysis using the VISUM software. This information was subsequently used to identify which intersections require improvements. The identified intersections were then analyzed using Synchro software to determine the extent of the required improvements and their effectiveness. Capacity analysis results are summarized in subsequent sections of this report. If the Visum model results indicated that improvements were not required for a specific intersection, it was eliminated from further analysis at the given horizon year.

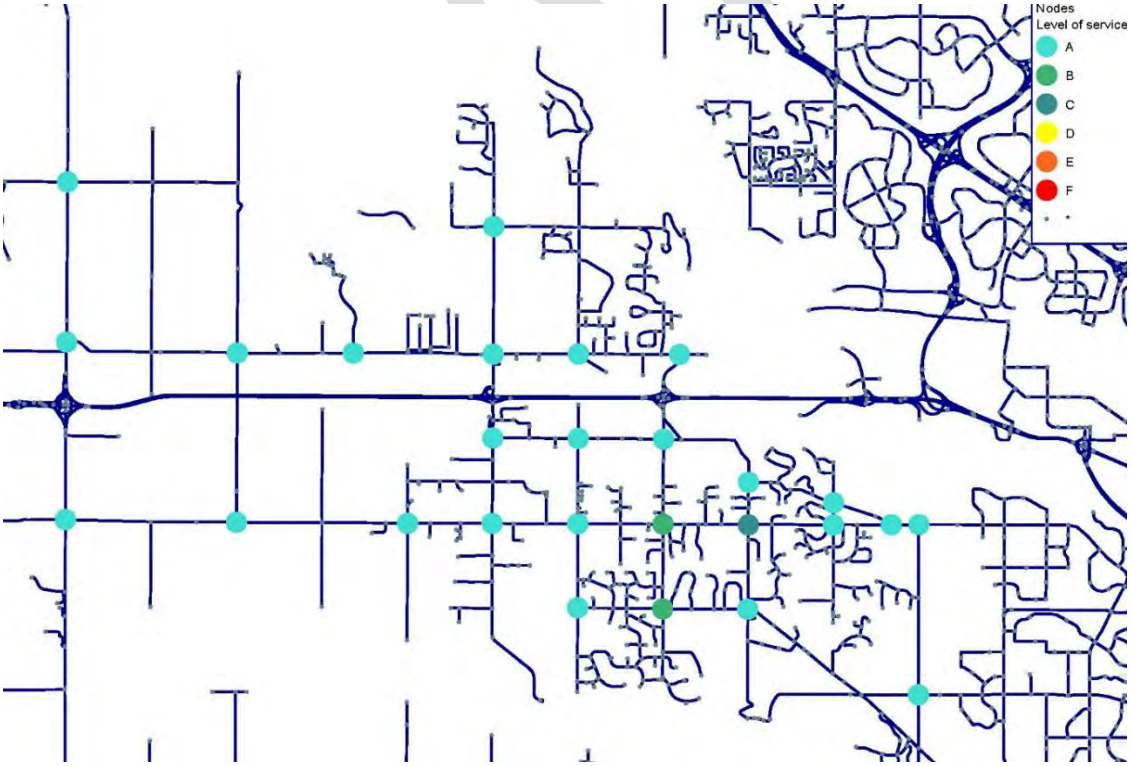

Figure 6: LOS of Existing Intersections

The results for the analysis of the intersections at the Highway 1 interchanges at Range Road 31 and Range Road 33

are summarized in **Table 2** while the detailed capacity analysis output results for these two locations are included in **Appendix B**.

TABLE 2: EXISTING CONDITIONS

Existing HWY 1 / RR 31 (Interchange)						
INTERSECTION / MOVEMENT			**PM PEAK HOUR**			
			v/c Ratio	**LOS**	**Delay (s)**	**Queue (m)**
HWY 1 / RR 31 South Terminal (Stop Controlled)	EB	Left	0.01	B	12.1	0.1
	NB	Through	0.10	A	0.0	0.0
	SB	Through	0.21	A	0.0	0.0
	Intersection Summary		-	**A**	**0.1**	-
HWY 1 / RR 31 North Terminal (Stop Controlled)	WB	Left	0.4	B	13.5	14.6
	NB	Through	0.06	A	0.0	0.0
	SB	Through	0.11	A	0.0	0.0
	Intersection Summary		-	**A**	**6.6**	-

Existing HWY 1 / RR 33 (Interchange)						
INTERSECTION / MOVEMENT			**PM PEAK HOUR**			
			v/c Ratio	**LOS**	**Delay (s)**	**Queue (m)**
HWY 1 / RR 33 South Terminal (Stop Controlled)	EB	Left	0.05	C	22.8	1.1
	NB	Through	0.10	A	0.0	0.0
		Right	0.14	A	0.0	0.0
	SB	Left / Through	0.16	A	4.3	4.4
	Intersection Summary		-	**A**	**2.6**	-
HWY 1 / RR 33 North Terminal (Stop Controlled)	EB	Left	0.43	C	17.8	16.1
	NB	Left	0.04	A	0.4	1.0
		Through	0.11	A	0.0	0.0
	SB	Through	0.22	A	0.0	0.0
	Intersection Summary		-	**A**	**4.8**	-

The results of the analysis indicate that the existing interchange is operating at an acceptable LOS A or better with max v/c ratio of 0.43. The VISUM model results indicate that all other intersections within the ASP area are currently operating at an acceptable level of service.

4.0 BACKGROUND DEVELOPMENT

4.1 TRAFFIC FORECAST MODEL AND GROWTH ASSUMPTIONS

The Rocky View County traffic-forecasting model was used to estimate the traffic volumes on the network for the PM peak hour at the 2025, 2030 and 2040 horizon years. The base RVC traffic model includes updated land use and trip generation information related to all approved developments in the Springbank area. This included developments such as Harmony and Bingham Crossing.

ROCKY VIEW COUNTY - POPULATION GROWTH

The most recent information pertaining to the proposed residential development and employment numbers were provided by RVC and introduced into the RVC model. The employment numbers in Rocky View County were grown by an annual rate of approximately 3% per year. This includes development within RVC but outside the Springbank ASP area.

It was assumed that all the population growth will occur within the developments located inside the various Area Structure Plans to reach a projected 2040 RVC population between “86,000 – 100,000”; depending on the actual number of people per unit.

Detailed information included in Transportation Impact Assessments (TIA) for future developments or Area Structure Plans (ASP) was also incorporated into the model where such information was available. A list of all the ASP’s and TIA’s referenced in the analysis is provided in **Appendix C**.

CITY OF CALGARY GROWTH

The City of Calgary information with respect to forecast model zones and corresponding land use information for the future horizon years was combined into several “super-zones” and used as an input to the RVC traffic forecasting model. The term “super-zone” is used to describe a number of smaller City of Calgary transportation zones used for traffic modelling purposes that are combined into one larger zone for use in the RVC model. This is used to simplify the modelling process where detailed traffic data is not required for a given area. An overview of the super-zones, together with their estimated population, and employment numbers are shown in **Appendix C**. The anticipated growth within the City of Calgary was consistent with the City’s assumptions that have been incorporated into their own traffic model.

In addition, information related to the development of the West View ASP area was incorporated into the traffic model. All results of the analysis in the following chapters account for this area.

GROWTH IN SURROUNDING AREAS

Census data available for Airdrie and Cochrane has indicated that the population growth has varied between 5 to 25% over the last couple of years. As such a high growth rate is not considered sustainable, a decision was made in consultation with Rocky View County staff to incorporate an annual growth rate of 2% per year for population and for employment in those areas to be in line with previous assumptions for other ASP's.

5.0 FUTURE DEVELOPMENT

5.1 PROPOSED LAND USE

Two land use scenarios were considered in this analysis; the proposed land use concepts for the area are shown in **Tables 3** and **4**. The planned ASP area is to include Country Residential Infill, Business Commercial, Business Industrial, Public Service and Cluster Residential Development. Land Use Concept Scenario 1 reflects the most likely land use scenario whereas Land Use Concept Scenario 2 displays the additional special planning areas and expansion areas that would require a future ASP amendment prior to proceeding with development. Again, it is noted that the traffic model has already incorporated developments that are approved but not yet constructed.

TABLE 3: LAND USE CONCEPT SCENARIO 1 (NORTH AND SOUTH)

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area
A	**Country Residential Infill**	1299 acres	909 acres	455 lots x 2.7 = 1229
B	**Mixed Use** 50% Business Commercial 50% Residential with average of 1.5 UPA.	Total Acres - 303 Business Acres – 151.5 Residential Acres – 151.5	Total Acres – 212.1 Business Acres – 106.05 Residential Acres – 106.05	159.1 lots x 2.7 = 429.57
D	**Business Industrial/Commercial**	491 acres	343.7 acres	-
E	**Business Transition**	77 acres	53.90 acres	-
F	**Public Services**	191 acres	133.7 acres	-
G	**Business Commercial**	1326 acres	928.2 acres	-
H	**Cluster Residential Development** 70% Residential with average of 1.5 UPA	4023 acres – 30% Open acres Residential	1971.2 acres Residential	2956.8 lots x 2.7 = 7983.36

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area
A	**Country Residential Infill**	3868 acres	2708 acres	1354 lots x 2.7 = 3656
F	**Public Services**	722 acres	505.4 acres	-
H	**Cluster Residential Development** 70% Residential with average of 1.5 UPA	3535 acres – 30% Open acres Residential	1732.15 acres Residential	2598.23 lots x 2.7 = 7016

TABLE 4: LAND USE CONCEPT SCENARIO 2

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area
C	**Future Expansion Area**	Total: 2,621 acres Business: 2,294 acres Residential: 326 acres	Total: 1,831 acres Business: 1,605.80 acres Residential: 225.40 acres	1,481 lots x 2.7 = 2,432
I-1	Predominantly urban residential development (8 UPA) with some Business Commercial uses.	Total: 617acres Business: 104.59 acres Residential: 505 acres	Total: 426.71 acres Business: 73.21 acres Residential: 353.5 acres	2,828 lots x 2.7 = 7,635
I-2	Business Commercial on northern portion of parcel and urban residential development (8 UPA) on southern portion.	Total: 169 acres Business: 60.41 acres Residential: 107.59 acres	Total: 117.6 acres Business: 42.29 acres Residential: 75.31 acres	602 lots x 2.7 = 1,625
I-3	Urban residential development (8 UPA).	489 acres	341.73 acres	2,733 lots x 2.7 = 7,379
I-4	Urban residential development (8 UPA).	70 acres	47.6 acres	376 lots x 2.7 = 1,015

5.2 VEHICLE TRIP GENERATION

The trip generation for the proposed land uses within the study area was based on ITE trip generation rates for different commercial land uses, business parks and light industrial land uses.
It should be noted that the land use “Business Industrial/Commercial” was split into one half Business Commercial and one-half Light Industrial while Business Transition reflects Business Commercial and Public Service reflects the Business Park land use designation.

- The **Business Commercial** component of the area was calculated using the ITE Land use for **Office Park**. An office park is usually a suburban subdivision or planned unit development containing general office buildings and support services, such as banks, restaurants, and service stations, arranged in a park- or campus-like atmosphere. A trip generation rate of 1.07 vehicle trips per 1000 ft^2 was applied in the PM peak hour.

- The **Public Service** component of the area was calculated using the ITE Land use for **Business Park**. A business park consists of a group of flex-type or incubator one or two-story buildings served by a common roadway system. The tenant space is flexible and lends itself to a variety of uses; the rear side of the building is usually served by a garage door. Tenants may be start-up companies or small mature companies that require a variety of space. The space may include offices, retail and wholesale stores, restaurants,

recreational areas and warehousing, manufacturing, light industrial, or scientific research functions. The average mix is 20 to 30 percent office/commercial and 70 to 80 percent industrial/warehousing. A trip generation rate of 0.42 vehicle trips per 1000 ft^2 was applied in the PM peak hour (46% inbound and 54% outbound).

- The **Light Industrial** component of the area was evaluated using a trip generation rate of 7.26 vehicle trips per acre was applied in the PM peak hour (22% inbound and 78% outbound).

- The **Commercial** component of the area was evaluated using the ITE Land use for Shopping Centre with a trip generation rate of 3.81 vehicle trips per 1000 ft^2 was applied in the PM peak hour (48% inbound and 52% outbound). A shopping center is an integrated group of commercial establishments that is planned, developed, owned, and managed as a unit. A shopping center also provides on-site parking facilities sufficient to serve its own parking demands. Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices.

For the purpose of this analysis, the area was divided into development cells, as shown in **Figure 7** and **Figure 8.**

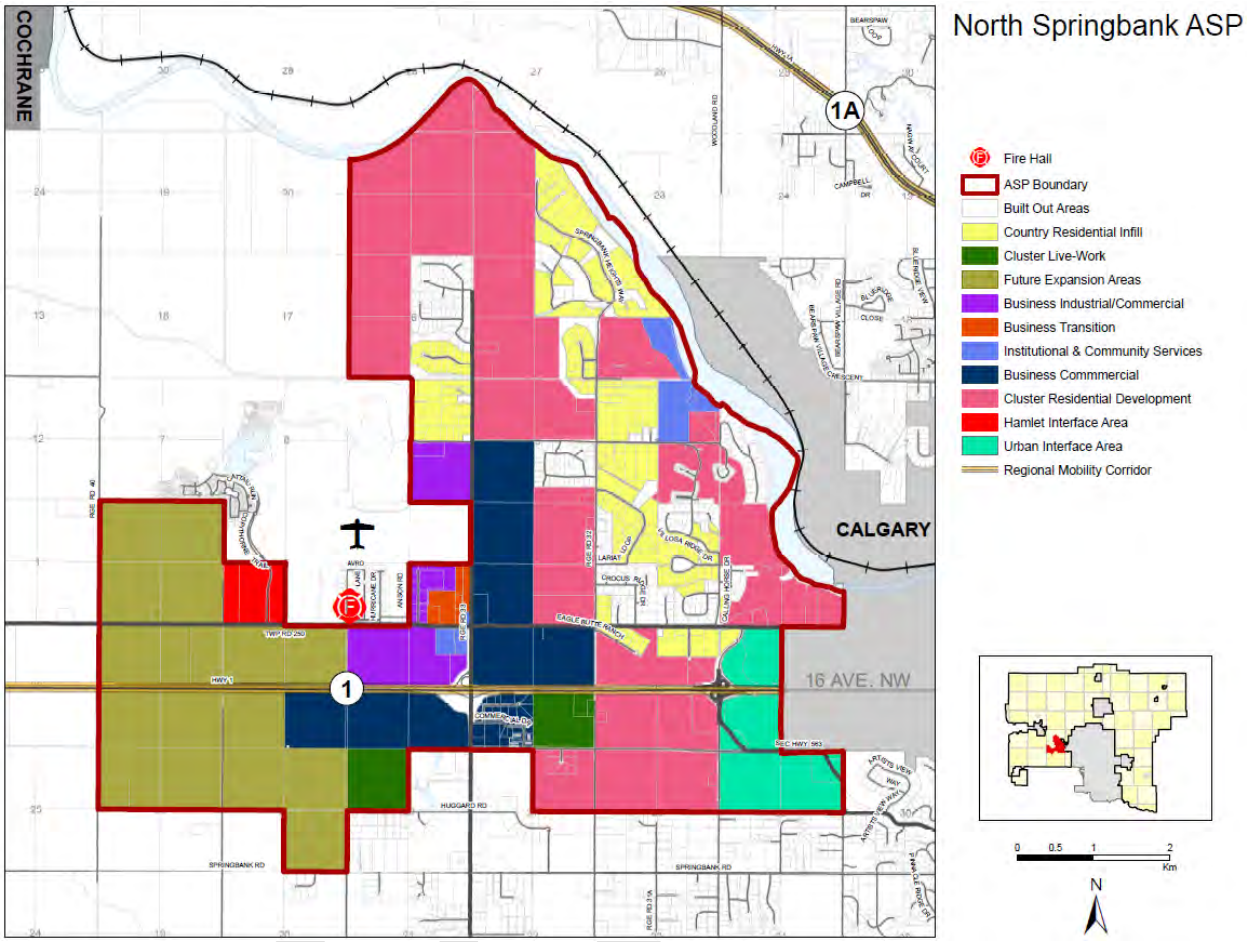

Figure 7: Development Cells Used in the Analysis

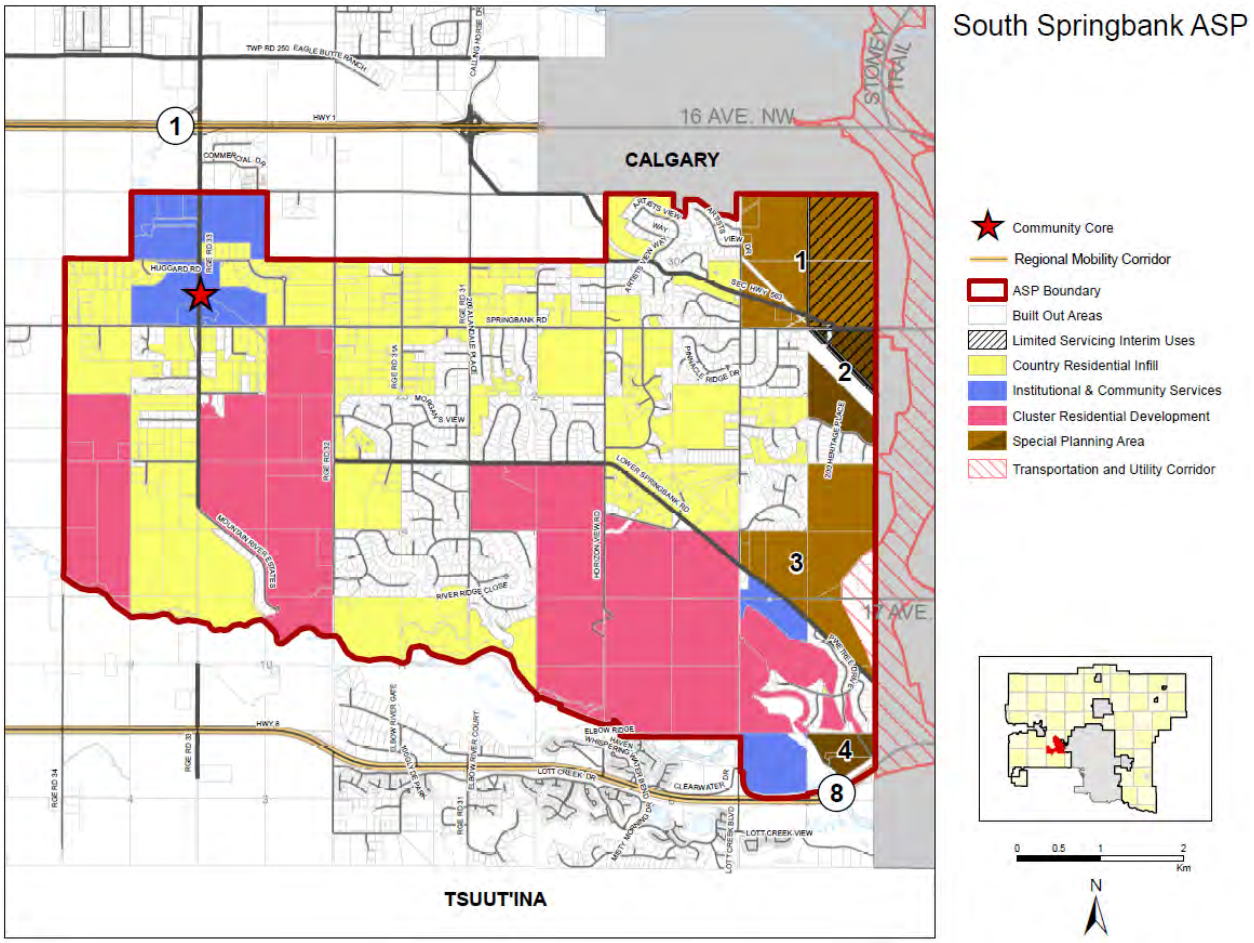

Figure 8: Development Cells Used in the Analysis

Different floor area ratios (FAR) were applied to the parcels for the different land use types. For the Business commercial aspect in Cell B, D and E an FAR of 0.2 was used because of the close proximity to the highway and the potential to generate denser development, whereas for Cell C, F and I1-I6 an FAR of 0.10 was used. The Light Industrial land use was calculated using appropriate acres in accordance with the ITE trip generation manual. Due to the partial development in Cell G a FAR of 0.15 was used. These FAR assumptions are consistent with development that has already been built within the Springbank ASP area. It is noted that the Bingham Crossing development is proposed to have a higher FAR and all of the traffic anticipated from this development has been included in the background traffic. The above assumptions are for developments that have not yet been approved in the Springbank ASP area.

The intensity of the full-build-out of the development per cell for each scenario, along with the corresponding resulting trip generations, are summarized in **Table 5 and 6**.

TABLE 5: FULL BUILD-OUT TRIP GENERATION SCENARIO 1 (NORTH & SOUTH)

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area	acres/units	sqft	FAR	Net dev. Area	PM			PM		
									Trip/unit	IN	OUT	Trip/unit	IN	OUT
A	**Country Residential Infill**	1299 acres	909 acres	455 lots x 2.7 = 1229	1229				0.22	0.7	0.3	270	189	81
B	**Mixed Use**	Total	Total	159.1 lots x 2.7 = 429.57										
	50% Business Commercial	Acres - 303	Acres – 212.1		430				0.22	70%	30%	95	66	28
	50% Residential with average of 1.5 UPA.	Business Acres – 151.5	Business Acres – 106.05											
		Residential Acres – 151.5	Residential Acres – 106.05		106	4,617,360	0.2	923,472	1.07	7%	93%	988	69	919
D	**Business Industrial/Commercial**	491 acres	343.7 acres	-	115	5,009,400	0.2	1,001,880	1.07	7%	93%	1072	75	997
					115				7.26	22%	78%	835	184	651
					115				2.16	22%	78%	248	55	194
E	**Business Transition**	77 acres	53.90 acres	-	54	2,347,884	0.2	469,577	1.07	7%	93%	502	35	467
F	**Public Services**	191 acres	133.7 acres	-	134	5,837,040	0.1	583,704	0.42	46%	54%	245	113	132
G	**Business Commercial**	1326 acres	928.2 acres	-	928	40,423,680	0.15	6,063,552	1.07	7%	93%	6488	454	6034
H	**Cluster Residential Development**	4023 acres – 30% Open												
	70% Residential with average of 1.5 UPA	acres	1971.2 acres Residential	2956.8 lots x 2.7 = 7983.36	7984				0.22	70%	30%	1756	1230	527
		Residential												
											TOTALS:	**12,500**	**2,470**	**10,031**

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area	acres/units	sqft	FAR	Net dev. Area	PM			PM		
									Trip/unit	IN	OUT	Trip/unit	IN	OUT
A	**Country Residential Infill**	3868 acres	2708 acres	1354 lots x 2.7 = 3656	3656				0.22	0.7	0.3	804	563	241
F	**Public Services**	722 acres	505.4 acres	-	505	22,015,224	0.1	2,201,522	0.42	46%	54%	925	425	499
H	**Cluster Residential Development**	3535 acres – 30% Open												
	70% Residential with average of 1.5 UPA	acres	1732.15 acres Residential	2598.23 lots x 2.7 = 7016	7016				0.22	70%	30%	1544	1080	463
		Residential												
											TOTALS:	**3,272**	**2,069**	**1,204**

TABLE 6: FULL BUILD-OUT TRIP GENERATION SCENARIO 2 (ADDITIONAL TRIPS)

Land Use Block	Scenario	Developable Area	Developable Area -30% roads/ infrastructure	Population of developable area	acres/units	sqft	FAR	Net dev. Area	PM			PM		
									Trip/unit	IN	OUT	Trip/unit	IN	OUT
C	**Future Expansion Area**	Total: 2,621 acres	Total: 1,831 acres	1,481 lots x 2.7 = 2,432	2432				0.22	70%	30%	535	375	161
		Business: 2,294 acres	Business: 1,605.80 acres		1606	69,948,648	0.1	6,994,865	1.07	7%	93%	7485	524	6961
		Residential: 326 acres	Residential: 225.40 acres											
I-1	Predominantly urban residential development (8 UPA) with some Business Commercial uses.	Total: 617acres	Total: 426.71 acres	2,828 lots x 2.7 = 7,635	7635				0.22	70%	30%	1680	1176	504
		Business: 104.59 acres	Business: 73.21 acres		73	3,189,028	0.1	318,903	1.07	7%	93%	341	24	317
		Residential: 505 acres	Residential: 353.5 acres											
I-2	Business Commercial on northern portion of parcel and urban residential development (8 UPA) on southern portion.	Total: 169 acres	Total: 117.6 acres	602 lots x 2.7 = 1,625	1625				0.22	70%	30%	358	250	107
		Business: 60.41 acres	Business: 42.29 acres		42	1,842,152	0.1	184,215	1.07	7%	93%	197	14	183
		Residential: 107.59 acres	Residential: 75.31 acres											
I-3	Urban residential development (8 UPA).	489 acres	341.73 acres	2,733 lots x 2.7 = 7,379	7379				0.22	70%	30%	1623	1136	487
I-4	Urban residential development (8 UPA).	70 acres	47.6 acres	376 lots x 2.7 = 1,015	1015				0.22	70%	30%	223	156	67
											TOTALS:	**12,442**	**3,655**	**8,787**

5.3 DEVELOPMENT PHASING

Based on guidance from RVC administration, it was assumed that the Springbank ASP area would be fully developed at the 2040 horizon year. The assumed staging for both scenarios is summarized below:

Land Use Scenario 1:

- 2025 horizon year – 25% of the development
- 2030 horizon year – 50% of the development
- 2040 horizon year - 100% of the development

Land Use Scenario 2:

- 2025 horizon year – 25% of the development plus 25% build out of Cell C and I1-I6.
- 2030 horizon year – 50% of the development plus 50% build out of Cell C and I1-I6.
- 2040 horizon year - 100% of the development included in Scenario 1 plus full build out of Cell C and I1-I6.

It should be noted that for Land Use Scenario 2, only the 2040 horizon year analysis is shown in the report, however printouts of the model results can be found in **Appendix D**.

6.0 ANALYSIS

The methodology adopted for this study included a two-part analysis:

1. traffic forecast and
2. capacity analysis of the key intersections.

Capacity analysis was carried out using Synchro software based on HCM methodology. The traffic forecasting was carried out using the updated Rocky View County traffic model using the VISUM software traffic modelling platform. The traffic forecasting model was updated to reflect the latest traffic counts in the area. The subsequent sections summarize results of the analysis.

6.1 VEHICULAR TRIP ASSIGNMENT

The traffic generated by the development cells within the study area was assigned to the adjacent road network for each analyzed horizon using the algorithms from the VISUM traffic model software. A summary of cell by cell assignment is attached in **Appendix D**.

It should be underlined that the RVC model does not account for alternative modes of transportation and therefore its results should be considered conservative as they do not reflect reductions associated with regional transit, bicycle and pedestrian trips.

6.2 EVALUATION PROCESS

The current intersection configurations shown in **Figure 8** were used to evaluate the 2025 horizon year intersection capacity. Intersections that needed improvement were identified and assumed to be upgraded. This upgraded network was then used as the base network for the 2030 horizon. This methodology was carried out for all horizon years.

It should be noted that for the purpose of this analysis, the ultimate cross-section considered for Highway 1 was assumed to be a six-lane divided roadway.

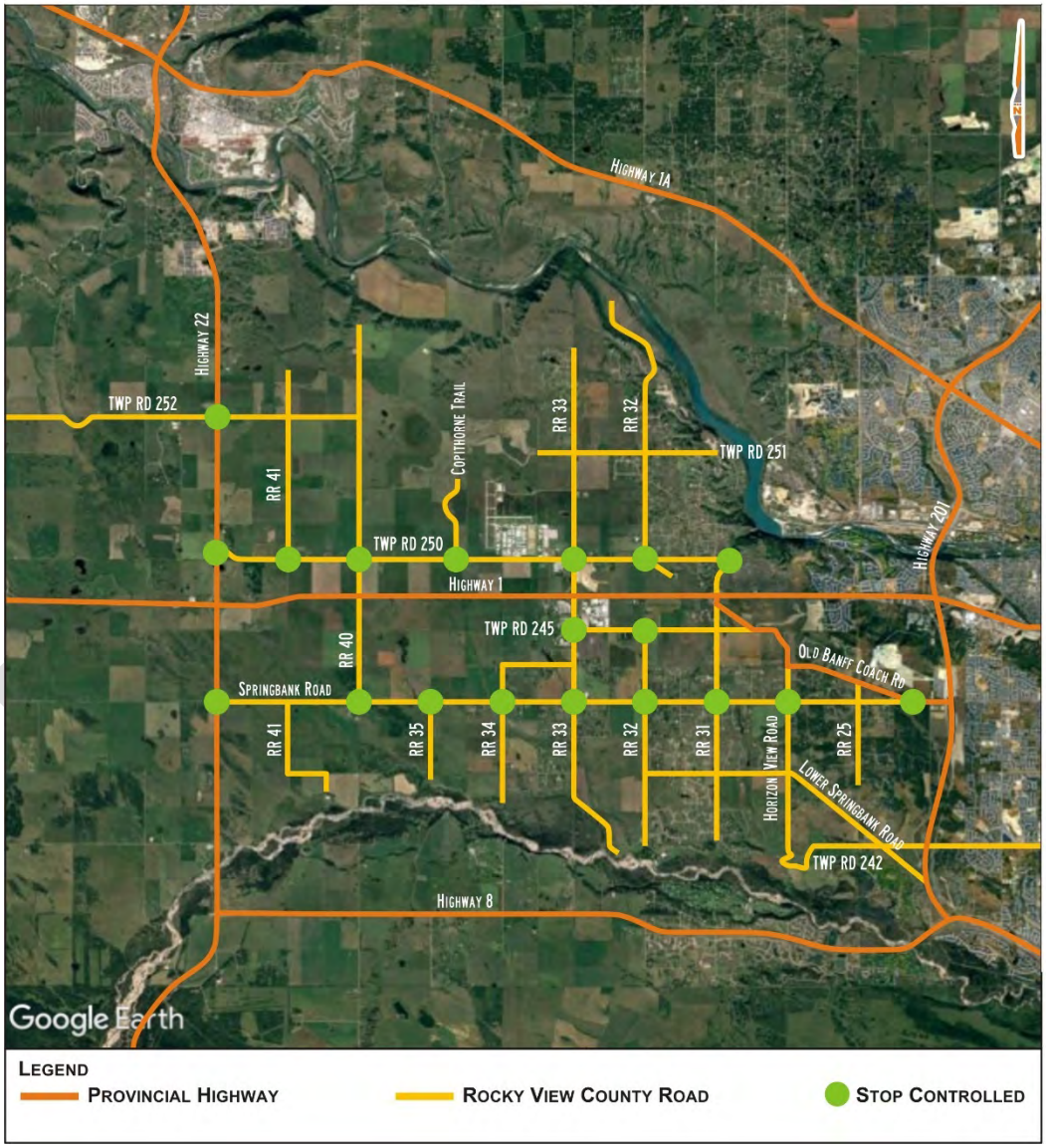

Figure 8: Existing Intersection Control

7.0 ANALYSIS OF THE POST DEVELOPMENT CONDITIONS

7.1 POST DEVELOPMENT OPERATIONAL CONDITIONS - LAND USE SCENARIO 1

Post-development operating conditions were analyzed for both Scenario 1 and Scenario 2 as identified in Section 5. The following sections summarize the results of the analysis.

2025 POST-DEVELOPMENT NETWORK SCENARIO 1

The PM peak traffic volumes are summarized in **Figure 9** and a more detailed printout is shown in **Appendix D**.

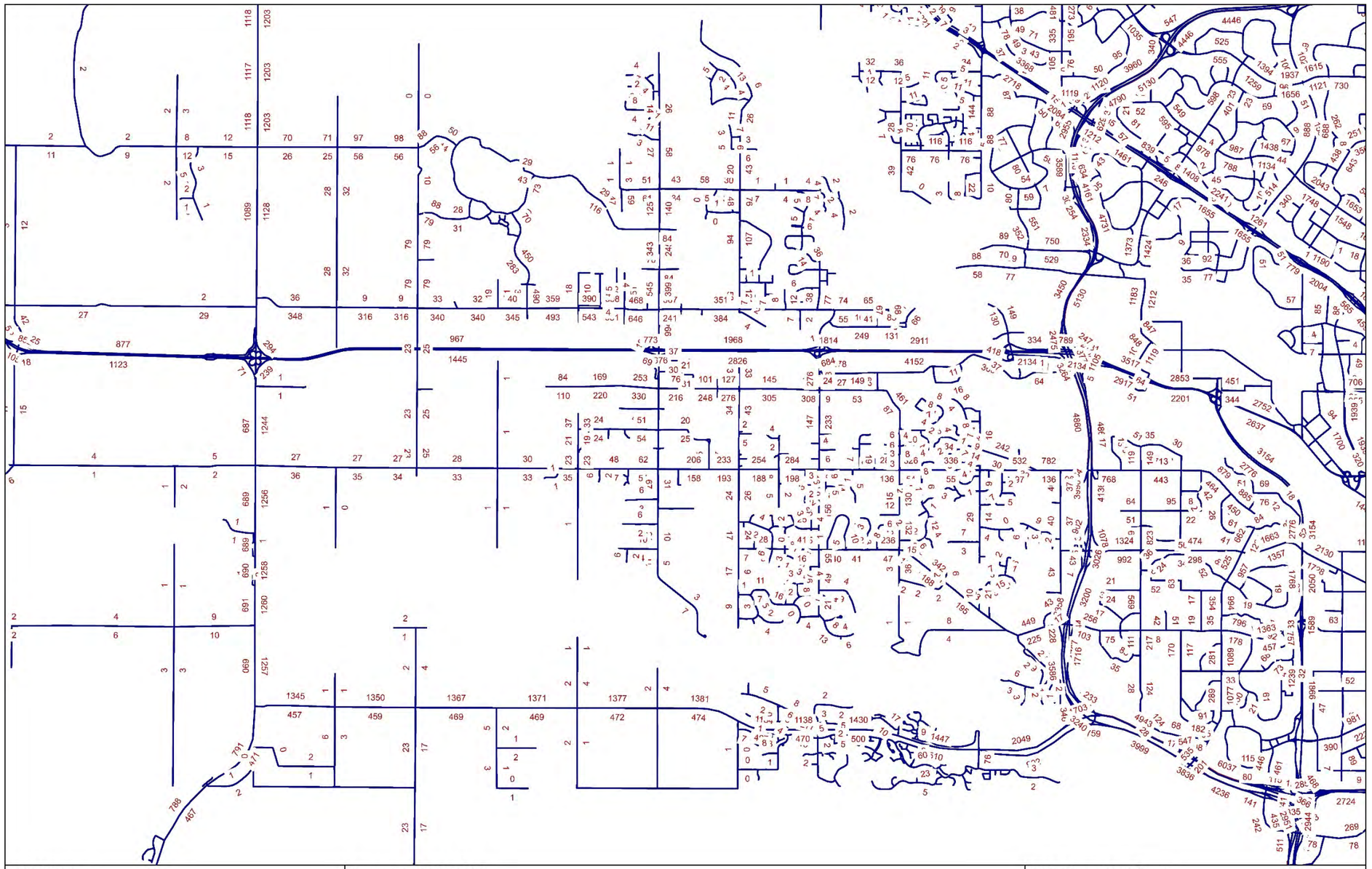

Figure 9: 2025 PM Peak Traffic Volumes

Using the existing intersection configuration and the forecasted post-development 2025 traffic volumes, capacity analysis was carried out for the study intersections and the results are shown in **Figure 10**. The capacity analysis results are summarized in subsequent sections of this report. If the VISUM results did not suggest that improvements are required for a specific intersection, this intersection was eliminated from further analysis at the given horizon year.

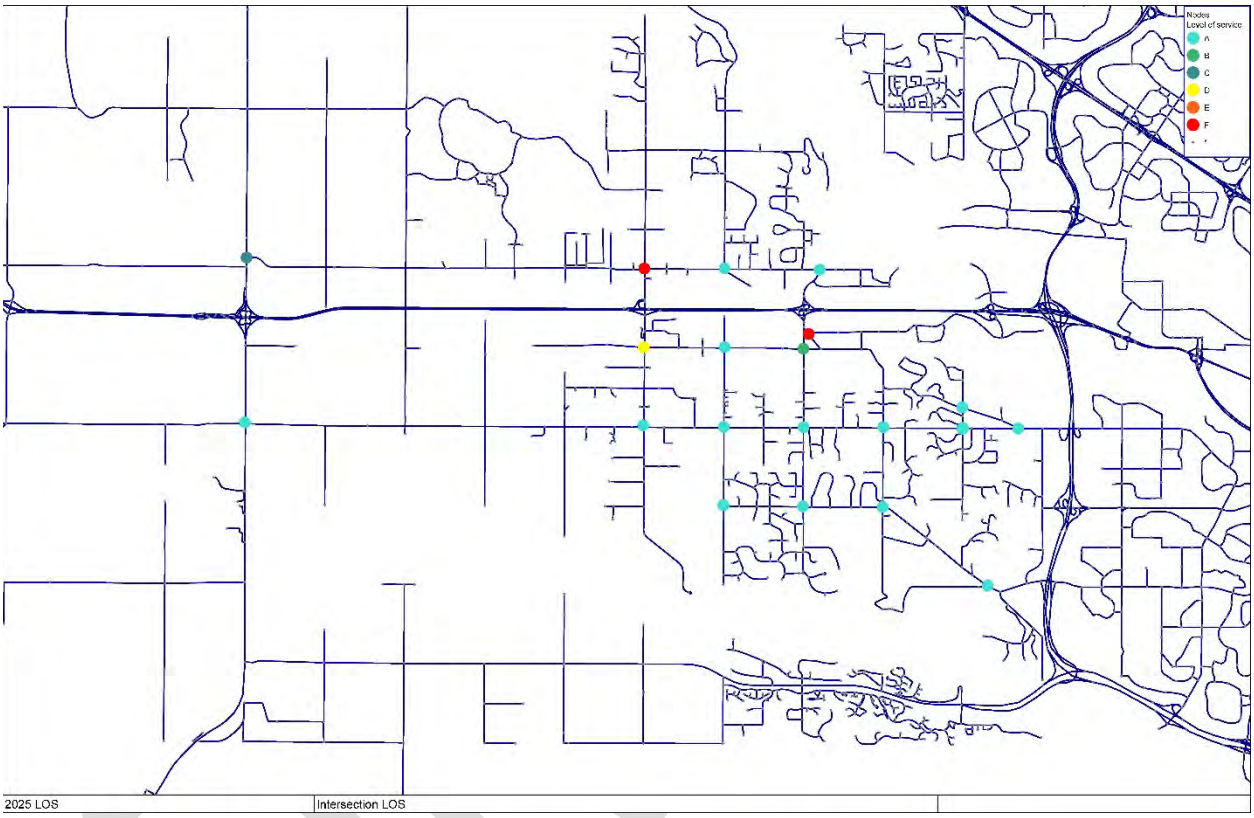

Figure 10: LOS 2025 PM Peak

The results of the analysis led to following conclusions:

All Intersections are expected to operate at an acceptable LOS for the primary traffic movement except the intersection of Old Banff Coach Road / RR 31 and TWP250/RR 33 as shown with the red dot in **Figure 10**. These two unsignalized intersections are anticipated to operate at an overall LOS of F as shown in **Figure 10**.

In addition, the interchanges at Range Road 31/Hwy 1 and Range Road 33/Hwy 1 have been analyzed and the results are shown in **Table 7.** It is acknowledged that there are plans to upgrade both of these interchanges however for this study, the existing road network was assumed to be in place for the future horizons to be conservative.

TABLE 7: 2025 PM PEAK CONDITIONS – EXISTING LANING

2025 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Stop Controlled)	EB	Left	0.21	D	30.2	5.7
	NB	Through	0.41	A	0.0	0.0
	SB	Through	0.25	A	0.0	0.0
	Intersection Summary		-	**A**	**0.8**	-
HWY 1 / RR 31 North Terminal (Stop Controlled)	WB	Left	1.49	F	261.0	219.2
	NB	Through	0.40	A	0.0	0.0
	SB	Through	0.32	A	0.0	0.0
	Intersection Summary		-	**F**	**105.6**	-

2025 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Stop Controlled)	EB	Left	0.09	F	352.4	1.9
	NB	Through	0.03	A	0.0	0.0
		Right	0.21	A	0.0	0.0
	SB	Left / Through	0.70	B	12.3	48.1
	Intersection Summary		-	**A**	**9.4**	-
HWY 1 / RR 33 North Terminal (Stop Controlled)	EB	Left	5.47	F	Error*	Error*
	NB	Left	0.04	A	1.4	1.0
		Through	0.03	A	0.0	0.0
	SB	Through	0.66	A	0.0	0.0
	Intersection Summary		-	**F**	**4892.0**	-
	* Note: Error denotes value beyond software capability					

Proposed Improvements:

Based on the results of the analysis the following improvements were adopted to achieve acceptable operating conditions at these intersections. The results of the Synchro analysis are summarized in **Table 8** (RVC intersections) and **Table 9** (Alberta Transportation Interchanges):

- Intersection 1 – Old Banff Coach Road / RR 31
  It is recommended to signalize this intersection. However, it should be noted that this improvement is likely triggered by the Westview development and should not be necessary if the Westview partial interchange is constructed by this horizon. Following the improvements this intersection is expected to operate at an overall LOS of B. It is acknowledged that the ultimate plan for the Hwy.1 / RR 31 interchange includes closure of a portion of Old Banff Coach Rd which would eliminate this intersection and hence the need for the signal. The purpose of this exercise is to demonstrate that if development proceeds

as planned in Springbank, this intersection will need to be upgraded or other improvements would be needed to address the anticipated congestion.

- Intersection 2 – Range Road 33 / TWP 250
  It is acknowledged that there are plans that include a possible two-lane roundabout at this location as part of the Bingham development. The purpose of this exercise is to demonstrate that if development proceeds as planned in Springbank, this intersection will need to be upgraded or other improvements would be needed to address the anticipated congestion. The analysis below shows that the installation of traffic signals and additional turn lanes would address the anticipated congestion.

TABLE 8: 2025 PM PEAK CONDITIONS – IMPROVED

2025 Conditions With Improvements

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
Old Banff Coach Rd / RR 33 (Signalized)	NB	Through	0.57	B	16	61
	SB	Through	0.25	B	12	26
	EB	Left / Right	0.8	C	23	73
	Intersection Summary		-	**B**	**19**	-
RR 33 / TWP. RD. 250 (Signalized)	EB	Left / Through	0.46	D	36	42
		Right	0.97	D	44	108
	WB	Left	0.83	D	50	73
		Through / Right	0.27	C	21	32
	NB	Left	0.9	D	38	81
		Through / Right	0.38	B	11	53
	SB	Left / Through / Right	0.81	C	32	144
	Intersection Summary		-	**C**	**34**	-

TABLE 9: 2025 PM PEAK CONDITIONS INTERCHANGES – IMPROVED

2025 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Stop Controlled)	EB	Left	0.21	D	30.2	5.7
	NB	Through	0.41	A	0.0	0.0
	SB	Through	0.25	A	0.0	0.0
	Intersection Summary		-	**A**	**0.8**	-
HWY 1 / RR 31 North Terminal (Signalized)	WB	Left	0.76	C	21.0	#78.8
	NB	Through	0.32	B	11.2	25.9
	SB	Through	0.75	B	19.7	#70.0
	Intersection Summary		-	**B**	**18.7**	-

2025 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Stop Controlled)	EB	Left	0.09	F	352.4	1.9
	NB	Through	0.03	A	0.0	0.0
		Right	0.21	A	0.0	0.0
	SB	Left / Through	0.70	B	12.3	48.1
	Intersection Summary		-	**A**	**9.4**	-
HWY 1 / RR 33 North Terminal (Signalized)	EB	Left	0.75	C	24.8	76.3
	NB	Left	0.04	A	1.4	1.0
		Through	0.07	B	15.9	5.2
	SB	Through	0.70	C	22.9	73.9
	Intersection Summary		-	**C**	**23.6**	-

The analysis indicates that the proposed improvements will result in the intersections operating at acceptable LOS level C or better.

Table 10 contains a summary of improvements that are expected to be required at the 2025 horizon year and were used in further analysis.

TABLE 10: 2025 PM PEAK CONDITIONS – REQUIRED IMPROVEMENTS

	Horizon Year/Improvements
Intersection	**2025**
Old Banff Coach Road / RR 31	Traffic Signal (May not be required if the Westview partial interchange is constructed by this horizon.)
RR 33 / TWP. RD. 250	Traffic Signal (or Roundabout) Geometric Improvements
RR 31 / HWY 1 (North Terminal)	Traffic Signal (May not be required if the Westview partial interchange is constructed by this horizon.)
RR 33 / HWY 1 (North Terminal)	Traffic Signal Two northbound & southbound through lanes Dual EBL
RR 33 / HWY 1 (South Terminal)	Traffic Signal

Figure 11 shows the recommended intersection controls for the 2025 horizon year.

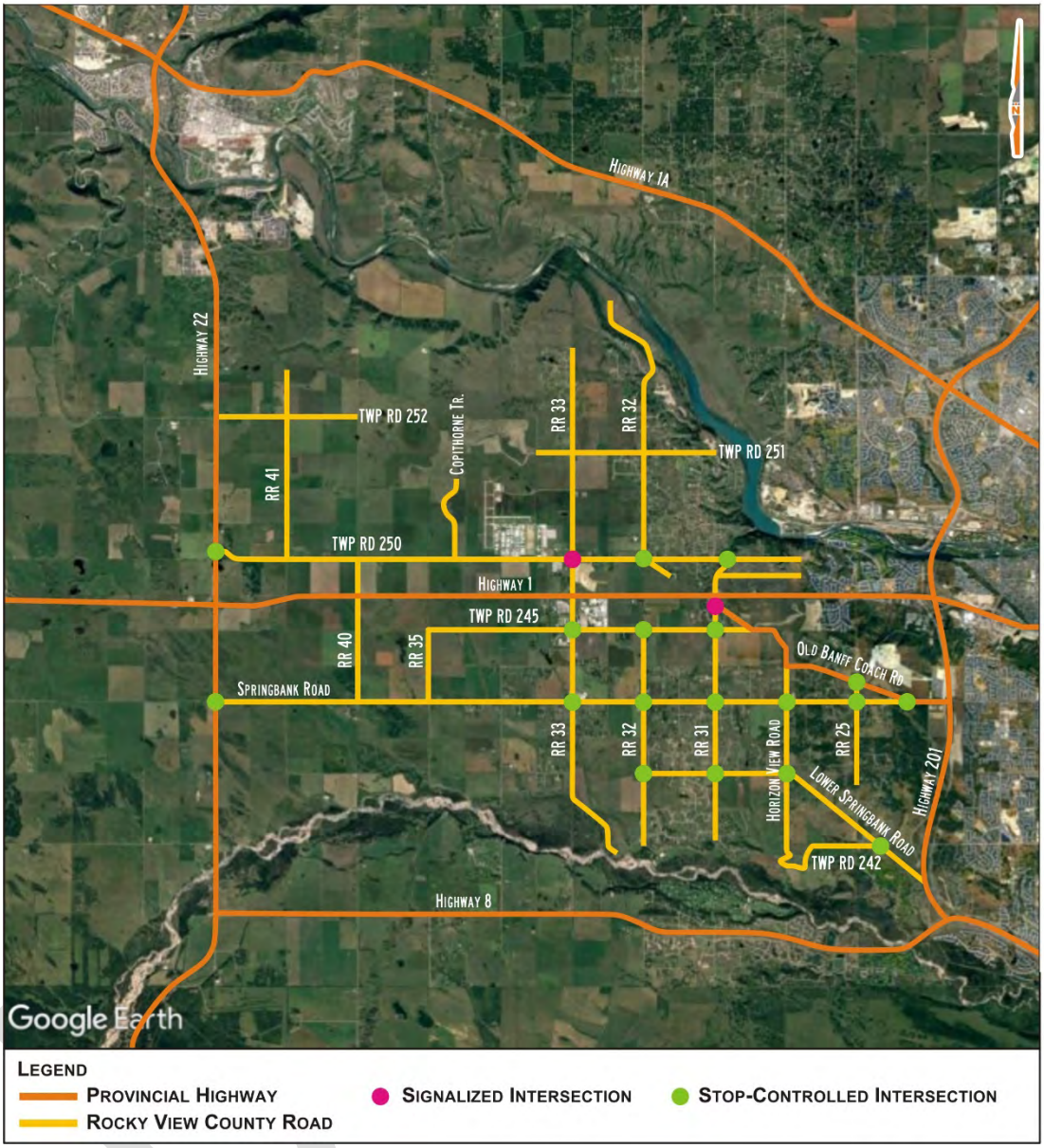

Figure 11: 2025 Intersection Control

2030 POST-DEVELOPMENT NETWORK SCENARIO 1

Figure 12 shows the 2030 PM peak traffic volume, a more detailed printout is shown in **Appendix D**.

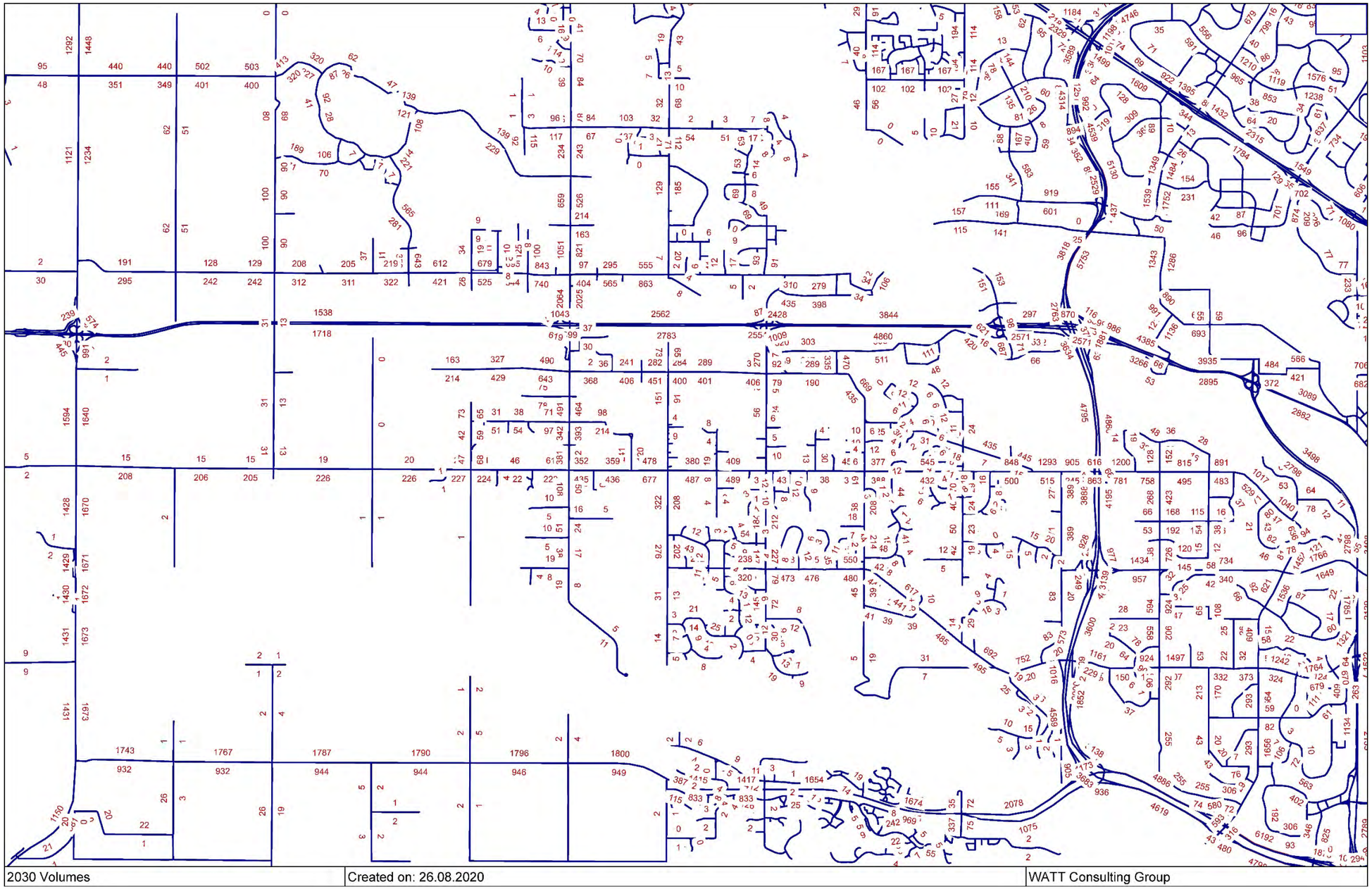

Figure 12: 2030 PM Peak Traffic Volumes

Figure 13 summarizes LOS level information for analyzed intersections generated by VISUM model. In addition, the interchanges at Range Road 31/Hwy 1 and Range Road 33/Hwy 1 have been analyzed and the results are shown in **Table 11.**

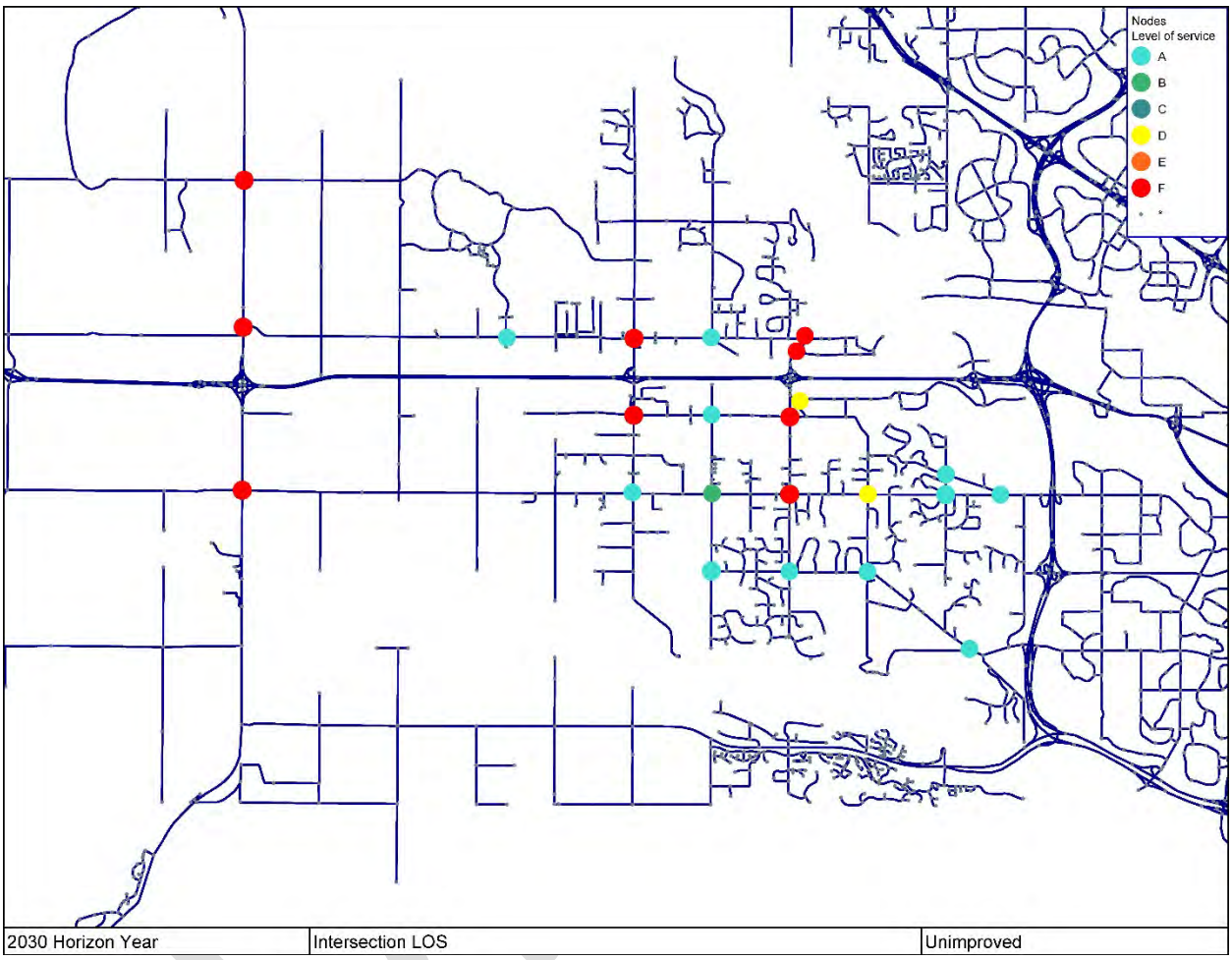

Figure 13: LOS 2030 PM Peak Unimproved

TABLE 11: 2030 PM PEAK CONDITIONS - INTERCHANGES

2030 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Stop Controlled)	EB	Left	1.66	F	505.5	60.5
	NB	Through	0.59	A	0.0	0.0
	SB	Through	0.51	A	0.0	0.0
	Intersection Summary		-	**C**	**21.1**	-
HWY 1 / RR 31 North Terminal (Signalized)	WB	Left	0.84	D	35.3	#85.0
	NB	Through	0.38	A	9.5	39.8
	SB	Through	0.76	B	17.8	#127.0
	Intersection Summary		-	**C**	**20.6**	-

2030 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Stop Controlled)	EB	Left	2.91	F	2050.4	25.2
	NB	Through	0.04	A	0.0	0.0
		Right	0.23	A	0.0	0.0
	SB	Left / Through	0.77	B	14.7	64.7
	Intersection Summary		-	**D**	**28.6**	-
HWY 1 / RR 33 North Terminal (Signalized)	EB	Left	0.84	C	33.4	200.5
	NB	Left	0.01	A	1.0	0.3
		Through	0.09	C	21.3	23.7
	SB	Through	0.80	C	33.4	200.4
	Intersection Summary		-	**C**	**33.1**	-

The results of the analysis indicate that many of the unsignalized intersections begin to fail at the 2030 horizon with the planned development within the Springbank ASP. some intersections are still expected to operate at an acceptable LOS for the primary movements except the intersections shown in above **Figure 13**.

Proposed Improvements:

Based on the results of the analysis the suggested improvements adopted at this stage of analysis are summarized in **Table 12**. The results of the Synchro analysis are summarized in **Table 13** (Intersections) and **Table 14** (Interchanges):

TABLE 12: 2030 RECOMMENDED IMPROVEMENTS

	Horizon Year/Improvements
Intersection	**2030**
Hwy 22 / TWP. RD. 252	Traffic Signal
Hwy 22 / TWP. RD. 250	Traffic Signal
Hwy 22 / TWP. RD. 244	Traffic Signal 4 Lane Cross Section on Hwy 22 south of Hwy 1
RR 33 / TWP. RD. 250	Minor Geometric Improvements
RR 33 / TWP. RD. 245	Traffic Signal
RR 31 / TWP. RD. 250	Traffic Signal
RR 31 / TWP. RD. 245	Traffic Signal
RR 31 / Springbank Rd	Traffic Signal
RR 31 / Old Banff Coach Road	Minor Geometric Improvements (May not be required if the Westview partial interchange is constructed by this horizon.)
RR 33 / HWY 1 (Interchange)	RR 33 4 Lane Bridge Deck
RR 31 / HWY 1 (Interchange)	RR 31 4 Lane Bridge Deck

TABLE 13: 2030 PM PEAK CONDITIONS– IMPROVED

2030 Improved Revised

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
RR31 / Old Banff Coach Rd (Signalized)	NB	Through	0.34	A	9.3	25.3
	SB	Through	0.24	A	8.6	17.3
	EB	Left	0.76	B	18.8	51.5
	Intersection Summary			**B**	**13.8**	
RR31 / Springbank Rd (Signalized)	EB	Left	0.69	B	18.7	#34.2
		Through/Right	0.22	A	3.3	10.4
	WB	Left	0.07	B	15.5	5.7
		Through	0.73	C	28.3	56.7
		Right	0.12	A	1.9	2.8
	NB	Left/Through/Right	0.37	B	17.1	33.5
	SB	Left/Through/Right	0.05	B	12.9	6.9
	Intersection Summary			**B**	**17.7**	
HWY 22 / TWP Rd 244 (Signalized)	EB	Left/Through/Right	0.02	A	0.5	0.5
	WB	Left/Through/Right	0.19	D	42.3	10.1
	NB	Left/Through	0.55	A	1.7	55.6
		Right	0.02	A	0.4	1.2
	SB	Left	0.87	D	44.3	#43.2
		Through/Right	0.45	A	1.3	40.4
	Intersection Summary			**A**	**4.0**	
RR 33 / TWP Rd 245 (Signalized)	EB	Left/Through/Right	0.87	C	26.6	#102.3
	WB	Left/Through/Right	0.00	A	7.0	0.9
	NB	Left/Through/Right	0.61	B	17.3	32.4
	SB	Left/Through/Right	0.47	A	8.9	23.7
	Intersection Summary			**B**	**17.9**	
RR 31 / TWP Rd 245 (Signalized)	EB	Left/Through/Right	0.83	C	30.1	#71.0
	WB	Left/Through/Right	0.13	A	9.7	11.5
	NB	Left/Through/Right	0.67	B	18.7	#83.6
	SB	Left/Through/Right	0.33	A	4.7	15.5
	Intersection Summary			**C**	**18.7**	

RR 33 / TWP Rd 250 (Signalized)	EB	Left/Through	0.56	E	72.7	39.8
		Right	0.47	A	1.0	0.0
	WB	Left	0.51	E	76.5	26.1
		Through/Right	0.29	D	50.6	21.7
	NB	Left	0.93	E	64.6	#159.1
		Through/Right	0.73	B	13.2	202.1
	SB	Left	0.35	B	10.7	13.1
		Through/Right	0.93	D	46.3	#332.1
	Intersection Summary			**C**	**32.9**	
RR 31 / TWP Rd 250 (Signalized)	EB	Through	0.27	C	32.2	27.0
		Right	0.90	B	14.0	#96.6
	WB	Left/Through	0.47	C	27.9	35.9
	NB	Left	0.85	C	22.9	#200.3
		Right	0.10	A	2.0	5.4
	Intersection Summary			**B**	**18.4**	
HWY 22 / TWP Rd 250 (Signalized)	WB	Left	0.66	E	58.2	50.3
		Right	0.22	B	12.9	10.9
	NB	Through	0.95	C	32.2	#373.4
		Right	0.23	A	5.5	27.6
	SB	Left	0.33	B	10.9	7.3
		Through	0.79	B	12.3	209.1
	Intersection Summary			**C**	**22.6**	
HWY 22 / TWP RD 252 (Signalized)	EB	Left/Through/Right	0.26	B	12.1	9.1
	WB	Left/Through	0.65	E	60.0	44.3
		Right	0.88	D	42.0	#76.8
	NB	Left/Through	0.96	D	37.9	#337.8
		Right	0.16	A	5.4	16.4
	SB	Left	0.98	F	84.3	#79.1
		Through	0.75	B	11.2	170.9
		Right	0.17	A	2.8	13.6
	Intersection Summary			**C**	**29.3**	

TABLE 14: 2030 PM PEAK CONDITIONS INTERCHANGES - IMPROVED

2030 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Signalized)	EB	Left	0.32	C	29.2	20.4
	NB	Through	0.69	A	8.5	114.1
	SB	Through	0.59	A	6.6	81.2
	Intersection Summary		-	**A**	**8.5**	-
HWY 1 / RR 31 North Terminal (Signalized)	WB	Left	0.84	D	35.3	#85.0
	NB	Through	0.38	A	9.5	39.8
	SB	Through	0.76	B	17.8	#127.0
	Intersection Summary		-	**C**	**20.6**	-

2030 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Signalized)	EB	Left	0.2	E	73.8	13.2
	NB	Through	0.03	A	0.7	3.1
		Right	0.25	A	0.5	2.8
	SB	Left	0.92	B	19.0	#448.3
		Through	0.1	A	0.7	7.5
	Intersection Summary		-	**B**	**13.2**	-
HWY 1 / RR 33 North Terminal (Signalized)	EB	Left	0.84	C	33.4	200.5
	NB	Left	0.01	A	1.0	0.3
		Through	0.09	C	21.3	23.7
	SB	Through	0.80	C	33.4	200.4
	Intersection Summary		-	**C**	**33.1**	-

Figure 15 shows the recommended intersection control for the 2030 horizon year.

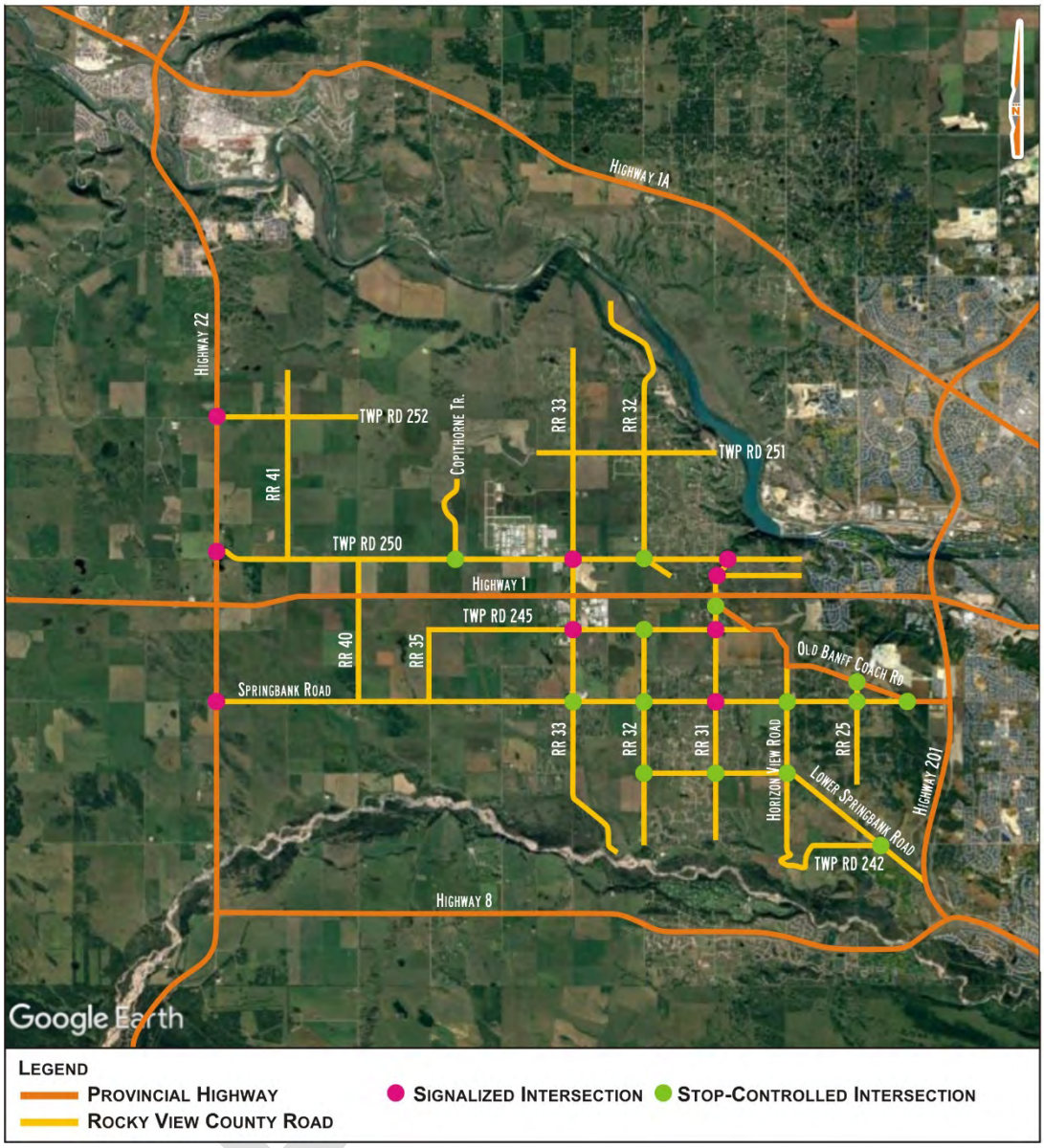

Figure 15: 2030 Intersection Control

2040 POST-DEVELOPMENT NETWORK SCENARIO 1

Figure 16 shows the PM peak traffic volume, a more detailed printout is shown in **Appendix D**.

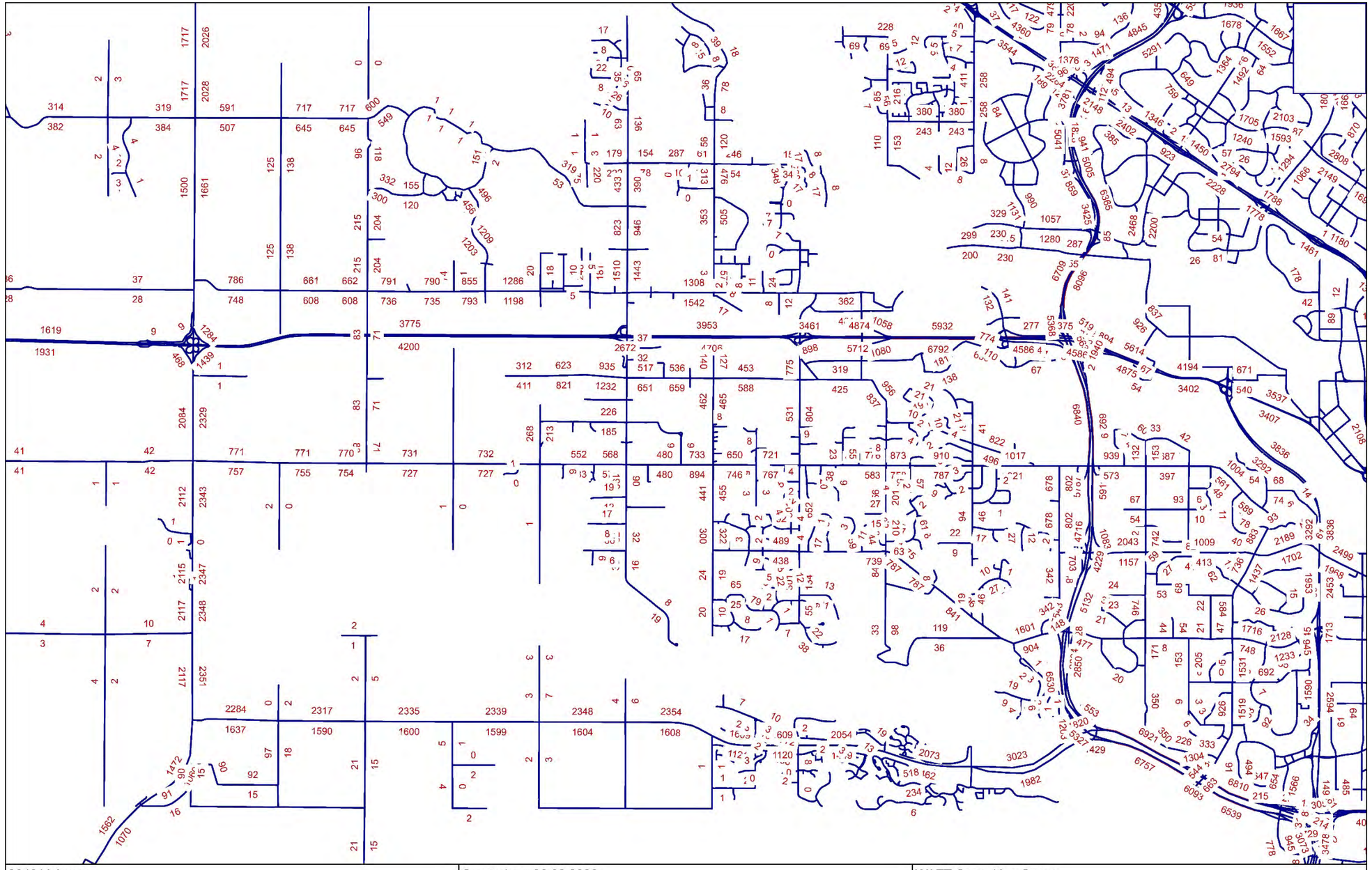

Figure 16: 2040 PM Peak Traffic Volumes

Figure 17 shows the expected LOS levels for analyzed intersections corresponding to 2040 improved network based on the VISUM generated traffic movements.

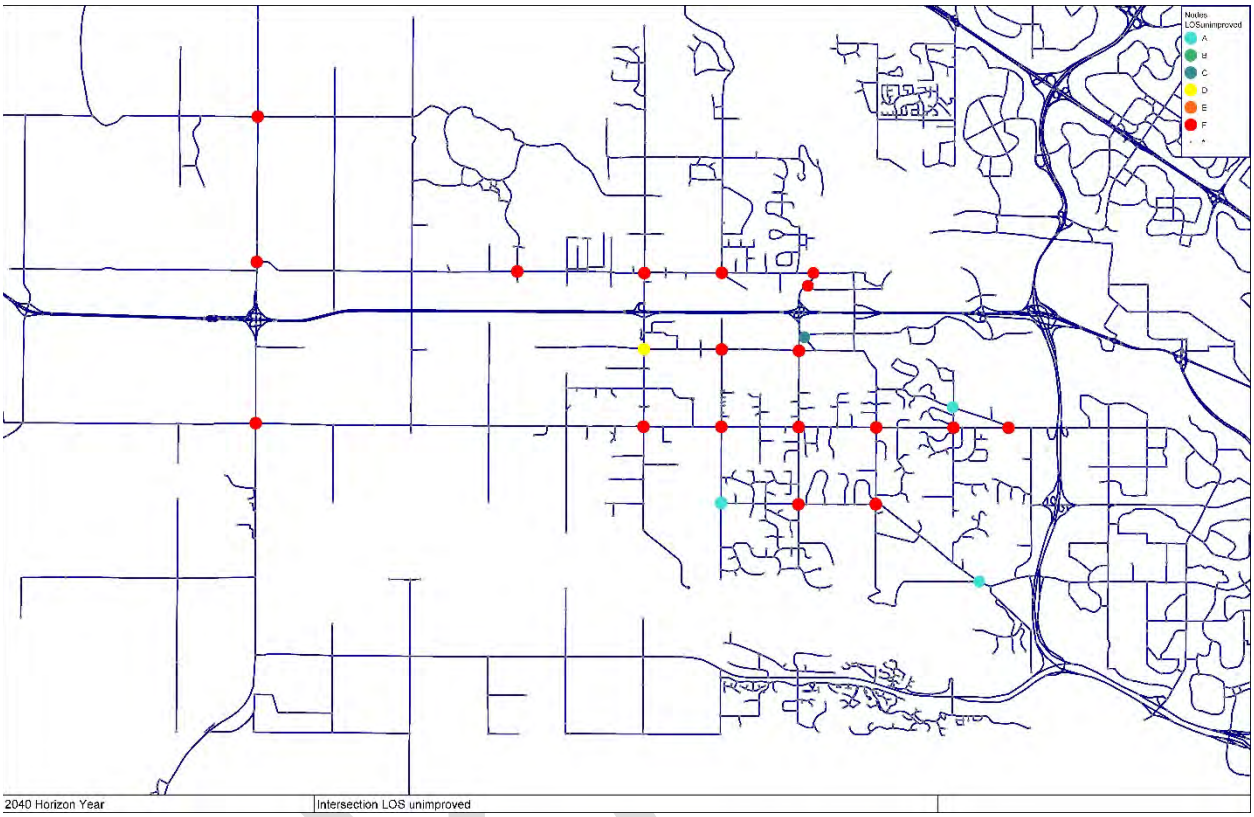

Figure 17: 2040 LOS

TABLE 15: 2040 PM PEAK CONDITIONS INTERCHANGES

2040 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Signalized)	EB	Left	0.73	D	53.2	58.5
	NB	Through	0.94	C	27.4	#305.2
	SB	Through	0.35	A	5.6	41.8
	Intersection Summary		-	**C**	**25.1**	-
HWY 1 / RR 31 North Terminal (Signalized)	WB	Left	0.71	B	20.0	#56.7
	NB	Through	0.49	B	11.5	40.0
	SB	Through	0.74	B	17.3	69.6
	Intersection Summary		-	**B**	**16.5**	-

2040 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Signalized)	EB	Left	0.43	E	74.2	28.2
	NB	Through	0.08	A	1.5	7.7
		Right	0.27	A	0.6	3.9
	SB	Left	1.47	F	234.3	#752.4
		Through	0.05	A	1.5	5.4
	Intersection Summary		-	**F**	**169.4**	-
HWY 1 / RR 33 North Terminal (Signalized)	EB	Left	1.63	F	312.8	#838.9
	NB	Left	0.01	A	0.0	0.1
		Through	0.29	D	38.9	60.7
	SB	Through	1.48	F	255.6	#416.5
	Intersection Summary		-	**F**	**272.4**	-

Proposed Improvements:

Based on the results of the analysis the improvements summarized in **Table 16** were introduced to improve operating conditions at the intersections. The results of the Synchro analysis are summarized in **Table 17** (Intersections) and **Table 18** (Interchanges).

At the intersection of RR 33 and TWP Road 250, a two-lane roundabout was also considered as a potential improvement. After analysis with the SIDRA roundabout software this roundabout operated at LOS F on all movements.

TABLE 16: 2040 REQUIRED IMPROVEMENTS

	Horizon Year/Improvements
Intersection	**2040**
Hwy 22 / TWP. RD. 252	Geometric Improvements 4 Lane Cross Section on Hwy 22 North of Hwy 1
Hwy 22 / TWP. RD. 250	Geometric Improvements 4 Lane Cross Section on Hwy 22 North of Hwy 1
Hwy 22 / Springbank Road	Geometric Improvements
Copithorne Trail / TWP. RD. 250	Traffic Signal
RR 33 / TWP. RD. 250	Geometric Improvements 4 Lane Cross Section on both TWP 250 and RR 33
RR 33 / TWP. RD. 245	Geometric Improvements
RR 33 / Springbank Rd	Traffic Signal
RR 32 / TWP. RD. 250	Traffic Signal 4 Lane Cross Section on TWP 250
RR 32 / TWP. RD. 245	Traffic Signal
RR 32 / Springbank Rd	Traffic Signal
RR 31 / TWP. RD. 250	4 Lane Cross Section on RR 31 and TWP 250
RR 31 / TWP. RD. 245	Minor Geometric Improvements
RR 31 / Springbank Rd	Minor Geometric Improvements
RR 31 / TWP. RD. 243	Traffic Signal
Horizon View Rd / Springbank Rd	Traffic Signal
Horizon View Rd / TWP. RD. 243	Traffic Signal
West Bluff Rd / Springbank Rd	Traffic Signal
Old Banff Coach Rd / Springbank Rd	Traffic Signal
RR 33 / HWY 1	North Terminal – dual EBL South Terminal – dual SBL & EBL

TABLE 17: 2040 PM PEAK CONDITIONS – IMPROVED

2040 Improved Revised

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
RR 33 / Springbank Rd (Signalized)	EB	Left/Through/Right	0.95	D	45.9	#142.8
	WB	Left/Through	0.27	B	12.3	25.8
		Right	0.32	A	2.4	10.7
	NB	Left/Through/Right	0.15	A	9.4	12.6
	SB	Left/Through	0.81	D	37.3	#104.0
		Right	0.52	A	4.3	17.5
	Intersection Summary			**C**	**23.7**	
RR 31 / Springbank Rd (Signalized)	EB	Left	0.86	D	46.7	#52.5
		Through/Right	0.76	C	28.5	#115.8
	WB	Left	0.32	B	13.4	12.8
		Through	0.93	D	47.4	#135.6
		Right	0.10	A	2.6	4.3
	NB	Left	0.44	C	25.3	24.7
		Through/Right	0.80	C	31.5	#120.2
	SB	Left	0.61	D	43.0	#29.6
		Through/Right	0.62	C	23.3	76.1
	Intersection Summary			**C**	**33.2**	
Springbank Rd / Old Banff Coach Rd (Signalized)	EB	Left/Through	0.78	C	20.8	148.7
	WB	Through	0.96	D	39.9	#246.7
		Right	0.54	A	1.3	0.0
	SB	Left/Right	0.90	D	50.3	#141.0
	Intersection Summary			**C**	**26.5**	
HWY 22 / TWP RD 244 (Signalized)	EB	Left/Through/Right	0.27	A	3.9	0.0
	WB	Left	1.01	F	105.5	#97.0
		Through	0.03	D	45.6	7.9
		Right	0.25	A	0.4	0.0
	NB	Left	0.52	F	91.5	#24.7
		Through	1.01	D	49.7	#364.4
		Right	0.24	A	0.3	0.0
	SB	Left	0.99	F	98.0	#97.6
		Through/Right	0.73	B	15.9	189.1
	Intersection Summary			**D**	**40.0**	
RR 32 / Springbank Rd (Signalized)	EB	Left/Through	0.96	D	44.8	#134.6
		Right	0.24	A	3.0	9.5
	WB	Left/Through	0.57	B	15.9	59.8
		Right	0.26	A	6.2	15.5
	NB	Left/Through/Right	0.96	D	54.5	#100.1
	SB	Left/Through/Right	0.70	C	21.6	#66.6
	Intersection Summary			**C**	**30.7**	

RR 33 / TWP RD 245 (Signalized)	EB	Left	0.64	C	26.2	#34.0
		Through	0.85	D	41.6	#119.2
		Right	0.71	B	12.4	51.5
	WB	Left	0.43	C	21.1	15.8
		Through	0.66	C	33.0	66.4
		Right	0.21	A	1.0	0.8
	NB	Left	0.81	C	29.9	#94.7
		Through/Right	0.21	A	9.3	17.5
	SB	Left	0.08	B	13.6	6.9
		Through/Right	0.52	B	18.6	27.4
	Intersection Summary			**C**	**23.3**	
RR 31 / TWP RD 245 (Signalized)	EB	Left	0.82	D	41.2	#60.3
		Through/Right	0.17	B	19.6	20.6
	WB	Left	0.36	D	36.9	18.5
		Through/Right	0.57	C	33.3	38.9
	NB	Left/Through	0.78	C	25.8	#136.0
		Right	0.20	A	3.4	9.8
	SB	Left/Through	0.58	B	18.4	80.1
		Right	0.34	A	3.1	12.9
	Intersection Summary			**C**	**23.9**	
RR 33 / TWP RD 250 (Signailized)	EB	Left	0.73	E	71.3	#38.4
		Through	0.98	F	81.3	#113.4
		Right	0.51	A	1.2	0.0
	WB	Left	0.99	F	89.6	#96.7
		Through	0.67	D	44.6	85.0
		Right	0.13	A	0.2	0.0
	NB	Left	1.00	F	89.1	#101.1
		Through	0.74	C	28.9	143.3
		Right	0.38	A	0.7	0.0
	SB	Left	0.66	F	80.5	#39.4
		Through	0.98	D	54.8	#185.0
		Right	0.01	A	0.0	0.0
	Intersection Summary			**D**	**44.2**	
RR 32 / TWP RD 250 (Signailized)	EB	Left	0.81	D	47.3	#52.6
		Through	0.85	C	32.1	#110.8
		Right	0.16	A	2.2	5.0
	WB	Left	0.77	E	57.4	#56.4
		Through	0.90	D	36.7	#115.9
		Right	0.16	A	2.0	4.2
	NB	Left	0.19	B	19.0	17.4
		Through	0.18	C	25.7	20.6
		Right	0.44	A	6.3	16.9
	SB	Left	0.19	B	18.8	16.6
		Through	0.11	C	24.8	14.2
		Right	0.35	A	6.4	14.4
	Intersection Summary			**C**	**30.8**	

RR 31 / TWP RD 250 (Signalized)	WB	Right	0.80	C	30.4	#69.4
	NB	Left	0.81	B	16.3	#90.7
		Right	0.02	A	3.8	2.1
	SB	Left	0.39	B	15.6	24.4
		Right	0.81	A	5.3	13.2
	Intersection Summary			**B**	**13.1**	
RR 31 / Lower Springbank Rd (Signalized)	EB	Left/Through/Right	0.86	D	40.9	#95.3
	WB	Left	0.60	C	22.1	#24.0
		Through	0.64	B	19.3	68.1
		Right	0.62	A	5.5	23.0
	NB	Left/Through	0.15	B	18.4	16.7
		Right	0.11	A	0.4	0.0
	SB	Left	0.51	B	16.6	36.6
		Through/Right	0.22	B	11.8	24.2
	Intersection Summary			**B**	**18.7**	
Horizon View Rd / Lower Springbank Rd (Signalized)	EB	Left/Through	0.63	B	11.8	77.2
		Right	0.09	A	1.6	4.2
	WB	Left/Through	0.92	C	26.5	#201.0
		Right	0.24	A	1.5	7.3
	NB	Left/Through/Right	0.55	C	31.5	42.3
	SB	Left/Through/Right	0.44	C	28.3	34.2
	Intersection Summary			**B**	**19.3**	
Horizon View Rd / Springbank Rd (Signalized)	EB	Left/Through/Right	0.65	B	15.6	78.9
	WB	Left/Through/Right	0.95	D	37.5	#175.3
	NB	Left/Through/Right	0.43	C	20.5	36.9
	SB	Left/Through/Right	0.82	D	39.2	#83.8
	Intersection Summary			**C**	**29.7**	
Westbluff Rd / Springbank Rd (Signalized)	EB	Left/Through/Right	0.87	C	24.9	#131.2
	WB	Left/Through/Right	0.89	C	27.7	#130.0
	NB	Left/Through/Right	0.57	C	22.2	42.8
	SB	Left/Through/Right	0.23	B	10.4	14.9
	Intersection Summary			**C**	**24.7**	
HWY 22 / TWP RD 250 (Signalized)	WB	Left	0.82	D	37.1	#68.9
		Right	0.39	A	9.7	19.7
	NB	Through	0.88	C	23.8	#151.7
		Right	0.39	A	0.7	0.0
	SB	Left	0.79	D	36.2	#40.9
		Through	0.63	A	9.5	75.3
	Intersection Summary			**B**	**18.1**	

TWP RD 250 / Copithorne Trail (Signalized)	EB	Left	0.63	C	28.0	#30.9
		Through	0.49	B	11.4	45.1
	WB	Through	0.64	C	25.9	45.3
		Right	0.64	A	2.1	0.0
	SB	Left	0.65	B	19.2	54.1
		Right	0.63	A	5.3	18.7
	Intersection Summary			**B**	**12.3**	
HWY 22 / TWP RD 252 (Signalized)	EB	Left	0.36	D	43.9	#56.2
		Through/Right	0.64	E	67.9	52.1
	WB	Left	0.94	F	85.5	#85.0
		Through	0.01	D	52.0	2.0
		Right	0.15	A	0.2	0.0
	NB	Left	0.02	B	18.2	2.6
		Through	0.96	D	44.9	#275.1
		Right	0.08	A	0.1	0.0
	SB	Left	0.99	F	88.6	#122.0
		Through	0.52	B	12.3	101.8
		Right	0.21	A	0.3	0.0
	Intersection Summary			**D**	**36.6**	
RR 31 / Access Rd (Signalized)	WB	Left/Right	0.81	C	34.6	65.8
	NB	Through	0.54	A	8.3	59.2
		Right	0.35	A	1.6	8.6
	SB	Left/Through	0.84	B	16.3	138.0
	Intersection Summary			**B**	**13.6**	

TABLE 18: 2040 PM PEAK CONDITIONS INTERCHANGES - IMPROVED

2040 HWY 1 / RR 31 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 31 South Terminal (Signalized)	EB	Left	0.55	C	23.9	39.7
	NB	Through	0.60	A	8.4	62.2
	SB	Through	0.22	A	5.5	18.4
	Intersection		-	**A**	**9.5**	-
HWY 1 / RR 31 North Terminal (Signalized)	WB	Left	0.65	B	14.3	46.2
	NB	Through	0.31	A	9.5	17.8
	SB	Through	0.48	B	10.7	27.2
	Intersection		-	**B**	**11.5**	-

2040 HWY 1 / RR 33 (Interchange)

INTERSECTION / MOVEMENT			PM PEAK HOUR			
			v/c Ratio	LOS	Delay (s)	Queue (m)
HWY 1 / RR 33 South Terminal (Signalized)	EB	Left	0.29	D	43.0	20.0
	NB	Through	0.08	A	1.8	7.5
		Right	0.27	A	0.7	4.6
	SB	Left	0.77	A	7.7	119.6
		Through	0.05	A	1.8	5.3
	Intersection		-	**A**	**6.8**	-
HWY 1 / RR 33 North Terminal (Signalized)	EB	Left	1.08	F	81.8	#303.9
	NB	Left	0.01	A	0.0	0.1
		Through	0.11	C	20.4	20.8
	SB	Through	1.07	E	76.4	#301.6
	Intersection		-	**E**	**76.2**	-

Table 18 above reflects the operating conditions with the current interchange configuration. It is acknowledged that if the Highway 1 / Range Road 33 interchange is upgraded as per the Castleglenn plan, the interchange terminals will operate at a better level of service.

Figure 19 shows the recommended intersection control for the 2040 horizon year.

It is also assumed that Highway 1 will be upgraded to a 6-lane cross-section at the 2040 horizon year.

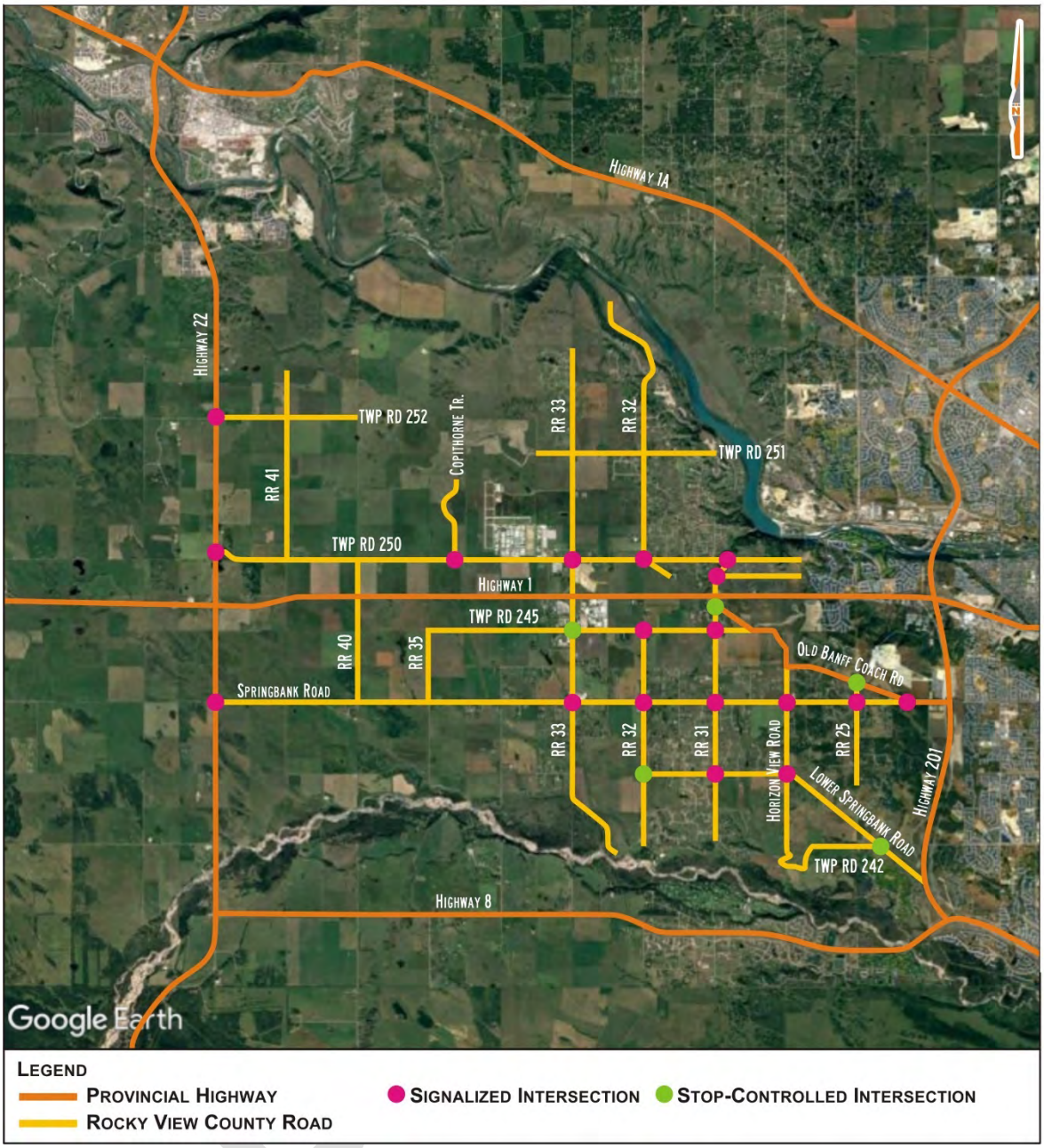

Figure 19: 2040 Intersection Control

RECOMMENDATIONS LAND USE SCENARIO 1

A summary of intersectional improvements for specific horizon years is included in the **Table 19** below.

TABLE 19: LAND USE SCENARIO 1 TRAFFIC RECOMMENDED IMPROVEMENTS

	Horizon Years/Improvements		
Intersection	**2025**	**2030**	**2040**
Hwy 22 / TWP. RD. 252		Traffic Signal	Geometric Improvements 4 Lane Cross Section on Hwy 22 North of Hwy 1
Hwy 22 / TWP. RD. 250		Traffic Signal	Geometric Improvements 4 Lane Cross Section on Hwy 22 North of Hwy 1
Hwy 22 / TWP. RD. 244		Traffic Signal 4 Lane Cross Section on Hwy 22 south of Hwy	Geometric Improvments
Copithorne Trail / TWP. RD. 250			Traffic Signal
RR 33 / TWP. RD. 250	Traffic Signal (or Roundabout) Geometric Improvements	Geometric Improvements	Geometric Improvements 4 Lane Cross Section on both TWP 250 and RR 33
RR 33 / TWP. RD. 245		Traffic Signal	Geometric Improvements
RR 33 / Springbank Rd			Traffic Signal
RR 32 / TWP. RD. 250			Traffic Signal 4 Lane Cross Section on TWP 250
RR 32 / TWP. RD. 245			Traffic Signal

	Horizon Years/Improvements		
Intersection	**2025**	**2030**	**2040**
RR 32 / Springbank Rd			Traffic Signal
RR 31 / TWP 250		Traffic Signal	4 Lane Cross Section on RR 31 and TWP 250
RR 31 / Old Banff Coach Rd	Traffic Signal	Geometric Improvements	
RR 31 / TWP. RD. 245		Traffic Signal	Geometric Improvments
RR 31 / Springbank Rd		Traffic Signal	Geometric Improvments
RR 31 / TWP. RD. 243			Traffic Signal
Horizon View Rd / Springbank Rd			Traffic Signal
Horizon View Rd / TWP. RD. 243			Traffic Signal
West Bluff Rd / Springbank Rd			Traffic Signal
Old Banff Coach Rd / Springbank Rd			Traffic Signal
RR 31 / HWY 1 (North Intersection)	Traffic Signal	4 Lane Bridge Deck	
RR 31 / HWY 1 (South Intersection)		4 Lane Bridge Deck	
RR 33 / HWY 1 (Middle Intersection)	Traffic Signal Two northbound & southbound through lanes Dual EBL	4 Lane Bridge Deck	Dual EBL
RR 33 / HWY 1 (south Intersection)	Traffic Signal	4 Lane Bridge Deck	Dual SBL & EBL

7.2 POST DEVELOPMENT OPERATIONAL CONDITIONS - LAND USE SCENARIO 2

2040 POST-DEVELOPMENT NETWORK SCENARIO 2

Figure 20 shows the PM peak traffic volume, a more detailed printout is shown in **Appendix D**.

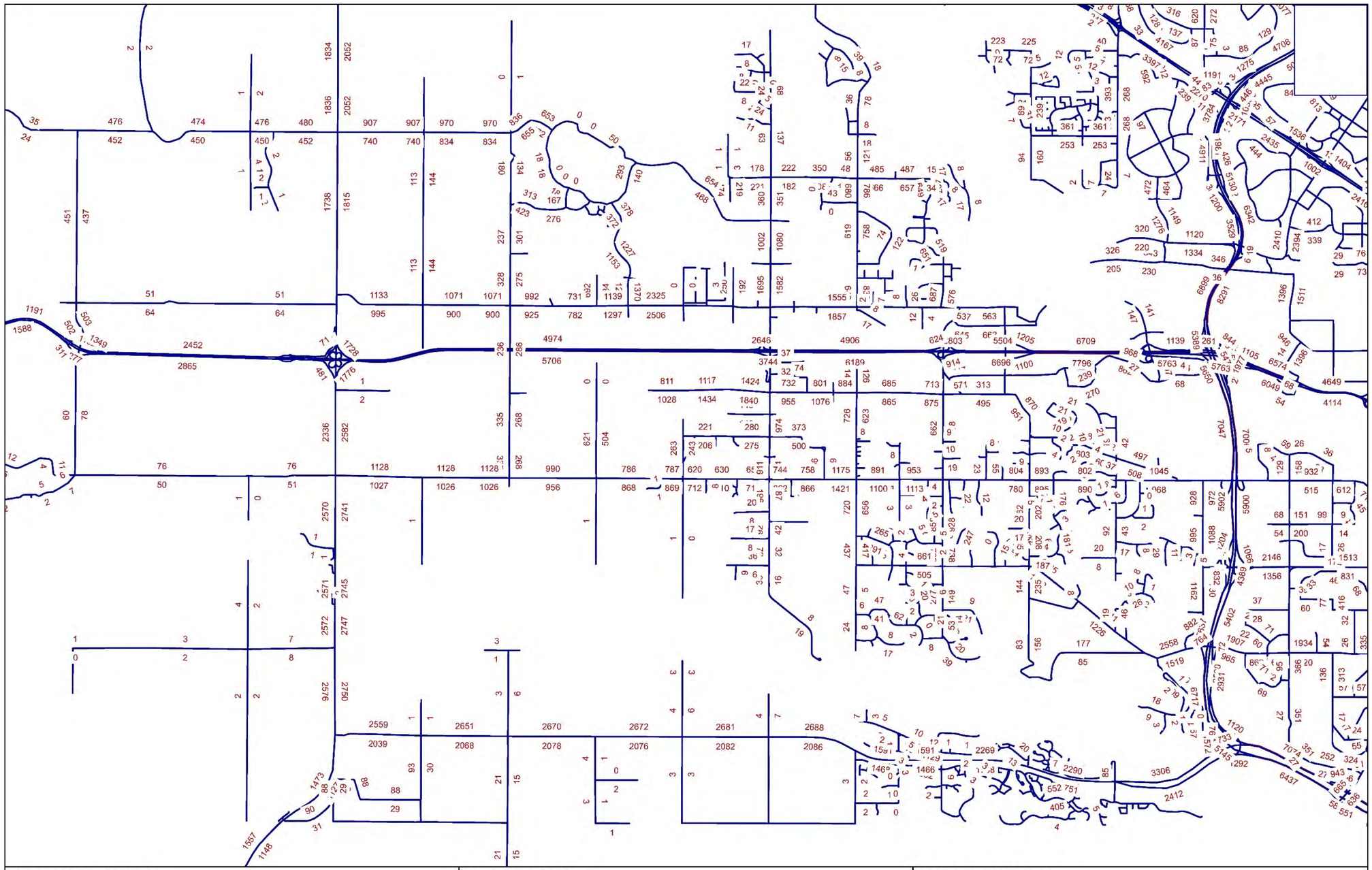

Figure 20: 2040 PM Peak Traffic Volumes – Land Use Scenario 2

Scenario 2 represents a land use scenario that includes more intensive development than that planned in Scenario 1 resulting in higher traffic volumes.

For this analysis, the intersections improvement for the 2040 horizon year Scenario 1 have been assumed to be in place.

Based on the improvements from Scenario 1 summarized in **Table 19**, the results of the Synchro analysis are summarized in **Appendix B.**

8.0 DAILY TRAFFIC VOLUMES

The anticipated daily traffic volumes on roads in the study area were calculated using a factor of 10 to multiply the PM peak hour volumes to achieve daily traffic volumes. This methodology was adopted per the accepted industry standard used for the purpose of similar analysis.

The roads within RVC's jurisdiction were classified based on RVC standards and the corresponding daily volumes

Based on these daily volumes the recommended road system concept was developed and is shown in **Figure 21**. This recommended roadway classification is applicable for both land use Scenario 1 and Scenario 2. The ultimate rights of way should be protected as per **Figures 21**. Verification of the right-of-way requirements should be carried out as more accurate information related proposed developments becomes available. Right-of-way requirements on the approaches to intersections should be verified based on the current RVC criteria at the time of network improvements**.**

The recommended right-of-way requirements and lane recommendations for the different sensitivity land use scenarios can be found in **Appendix D**.

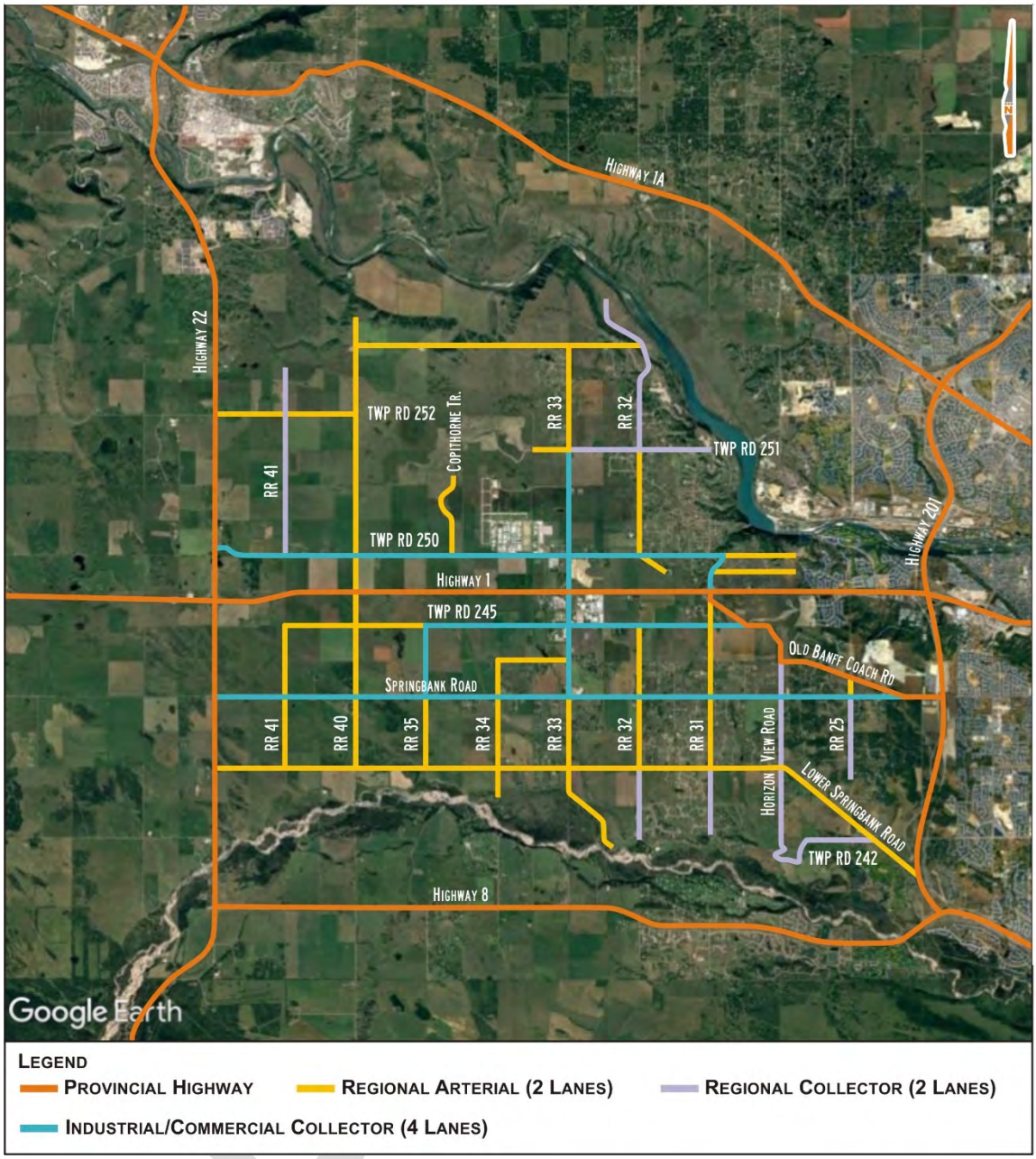

Figure 21: Recommended Roadway Classification (Scenario 1 and Scenario 2)

9.0 SENSITIVITY ANALYSIS – ADDITIONAL FUTURE INTERCHANGE HWY 1

Three additional scenarios have been analyzed to provide understanding of the impact of:

Scenario 1: Upgraded flyover at RR 40,
Scenario 2: interchange at Range Road 40,
Scenario 3: interchange at Range Road 35.

on the ultimate road network. This analysis was carried out to evaluate the long term (2040-horizon year) performance of the network using the above scenarios.

Figure 22 shows the PM peak traffic volume for the scenario with the upgraded flyover at RR 40, **Figure 23** for the scenario with an interchange at Range Road 40 and **Figure 24** for the scenario with an interchange at Range Road 35. A more detailed printout of the PM peak and the AADT figures are included in **Appendix D**. The PM peak traffic volumes for the additional sensitivity analysis scenarios for land use Scenario 2 are also available in **Appendix D**.

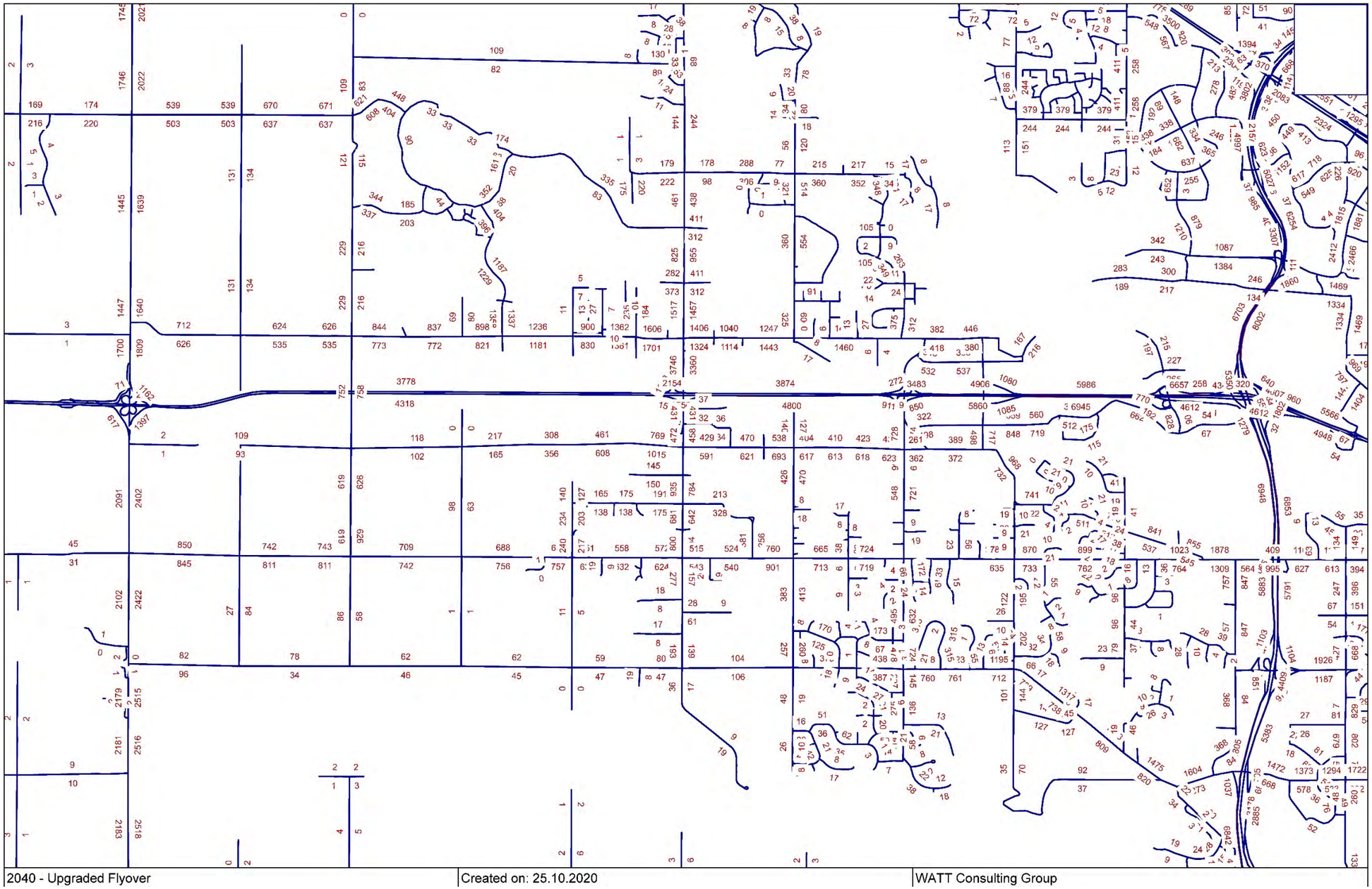

Figure 22: 2040 PM Peak Traffic Volumes –Flyover

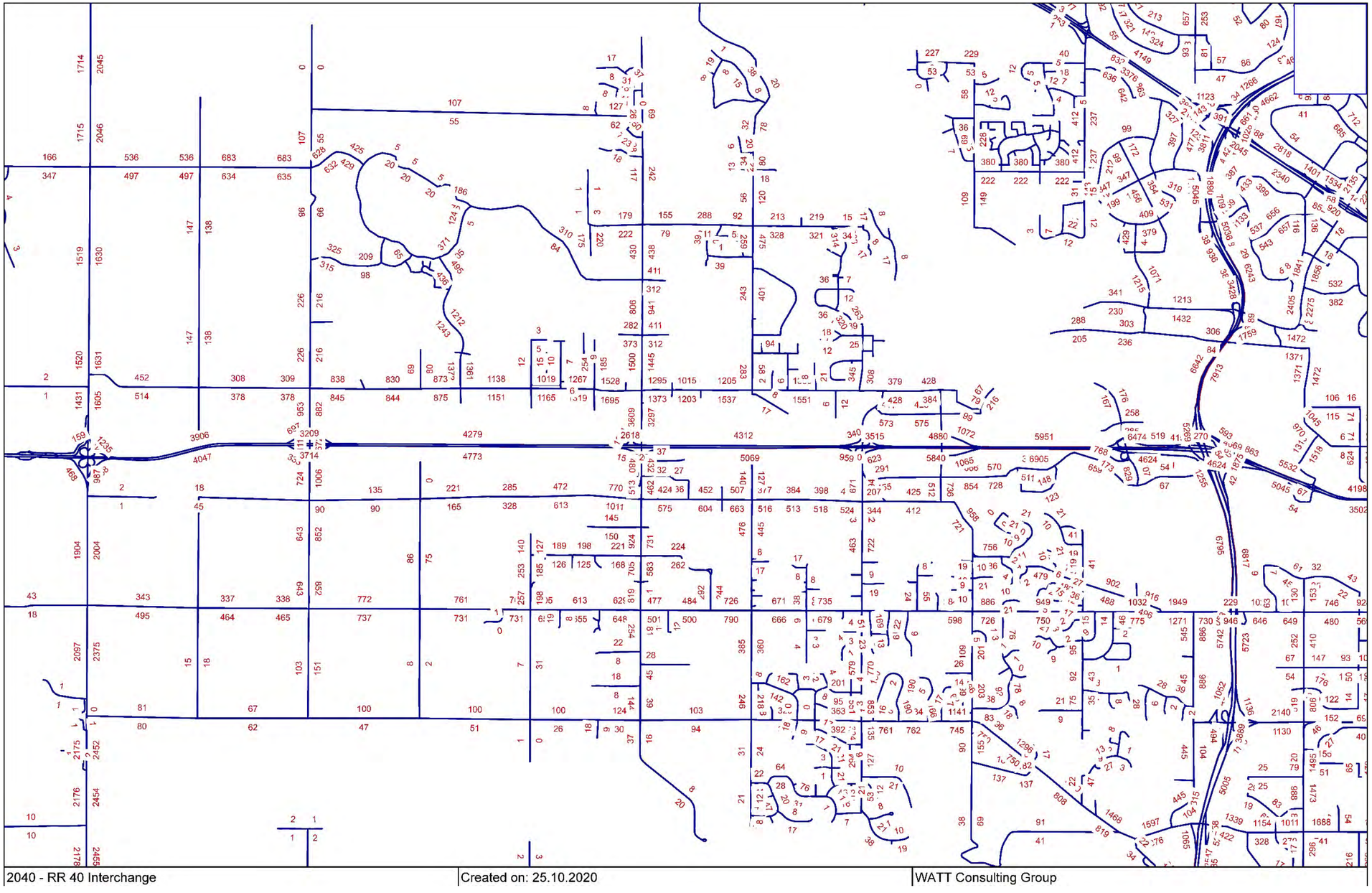

Figure 23: 2040 PM Peak Traffic Volumes – Interchange at Range Road 40

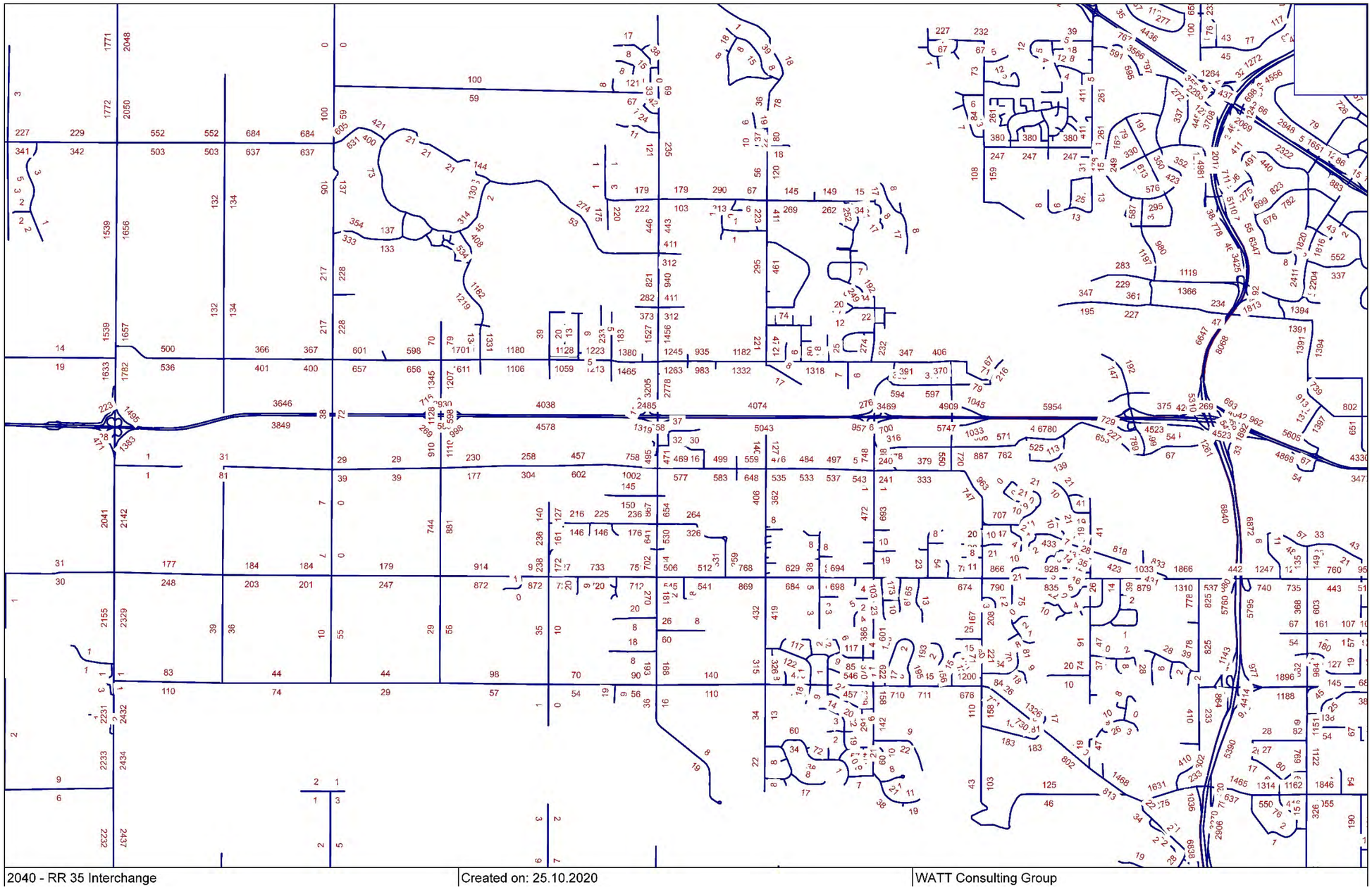

Figure 24: 2040 PM Peak Traffic Volumes – Interchange at Range Road 35

A comparison of the daily traffic volumes for the different scenarios versus the status quo scenario is included in the **Table 20** below.

To evaluate the improvement options, the expected daily traffic volumes were assigned a rating from 1 to 4 with 1 representing the lowest traffic volume and signifying the best traffic distribution. Subsequently, the overall rating for the scenario was established as a sum of points and scenarios with the lowest number of points were rated highest as they represent the best traffic distribution on the network. Where traffic is more evenly distributed along the core road segments. This rating system was used in the evaluation of both analyzed scenarios.

TABLE 20: LAND USE SCENARIO 1 DAILY TRAFFIC VOLUMES - ANALYZED IMPROVEMENTS

ROAD SEGMENT	IMPROVEMENTS AND RATING							
	Status Quo		Flyover RR 40		I/C RR 40		I/C RR 35	
	VPD	Rating	VPD	Rating	VPD	Rating	VPD	Rating
TWP 250 between Hwy 22 and RR 40	15340	4	13380	3	9660	1	10360	2
TWP 250 between RR 40 and RR 33	24840	4	24170	3	22890	2	22860	1
Springbank Road between Hwy 22 and RR 40	15280	3	16950	4	8380	2	4250	1
Springbank Road between RR 40 and RR 33	14590	2	14510	1	15090	3	17860	4
RR 40	1540	2	15100	3	17890	4	1100	1
RR 35 (north of Hwy 1)	1490	1	1490	1	1490	1	25520	2
TWP 252	10980	4	10420	2	10330	1	10550	3
Overall Rating		20		17		14		14
Overall Ranking		**4**		**3**		**1/2**		**1/2**

Based on the results, the analysis suggests that construction of an interchange at RR 40 or RR 35 should be considered for implementation from a traffic perspective as interchanges at those two locations result in the best traffic distribution on the analyzed links. Construction of an upgraded flyover at RR 40 will result in the substantially less effective traffic distribution on the network.
Construction of the overpass at RR 40 will not be as effective as construction of the interchange at RR 40 or RR 35.

10.0 WEST VIEW ASP

The City of Calgary is planning to develop lands immediately east of the boundary with the Rocky View County as shown in **Figure 25**. Access to this development will be through Rocky View County Roads and through a new partial interchange that will accommodate traffic movements to and from the east (**Figure 26).**

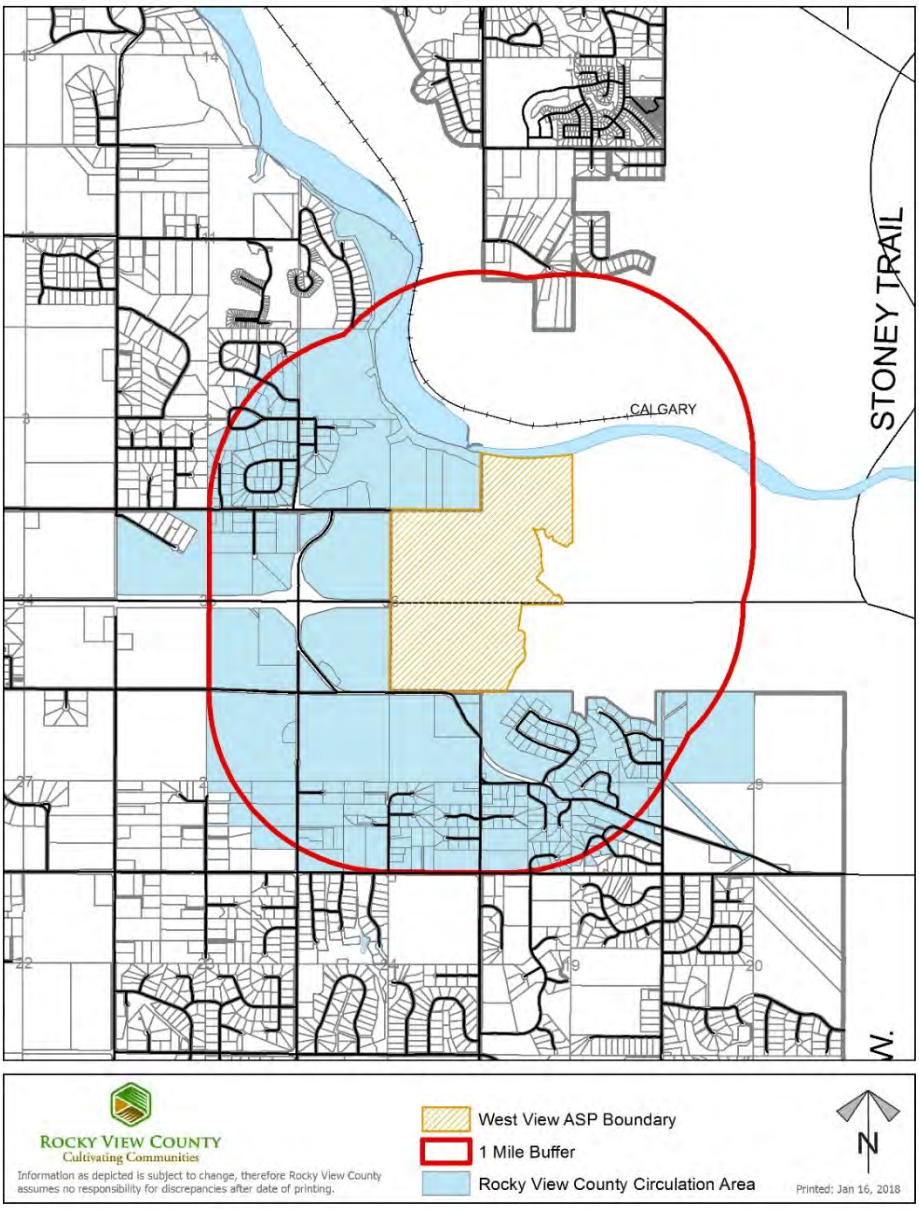

Figure 25 West View ASP area location

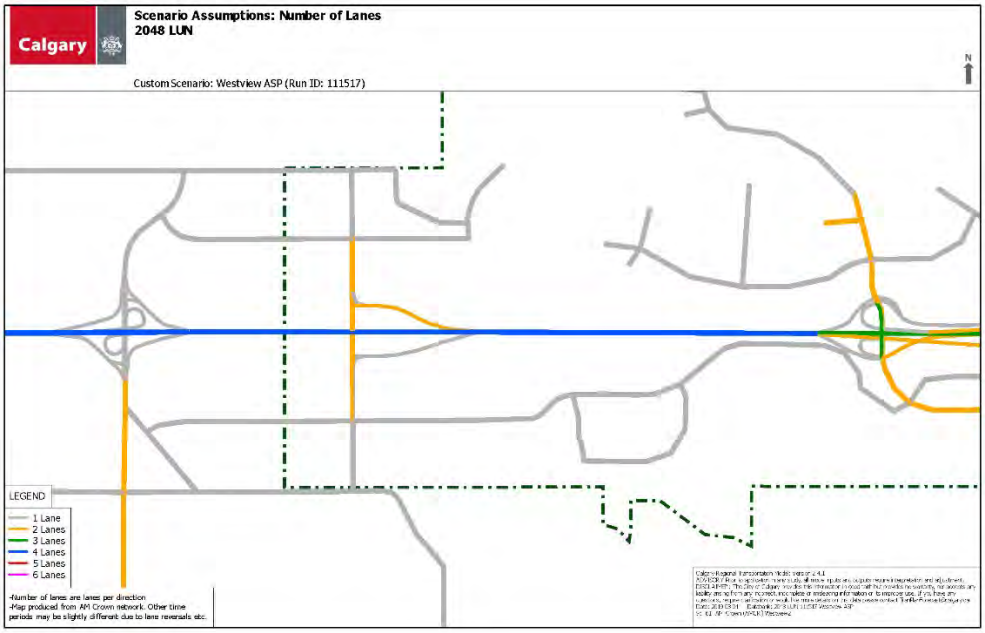

Figure 26 New Partial Interchange at West View

Table 26 shows the proposed development densities planned in West View ASP that were incorporated into the RVC model.

TABLE 21: LAND USE WEST VIEW ASP

Area	Estimated Housing Units at Full Build-Out	Estimated Population at Full Build-Out	Estimated Jobs at Full Build-Out	Estimated Density at Full Build-Out	Estimated Intensity at Full Build-Out
Neighbourhood A (North)	**2,000**	**6,000**	**500**		
Neighbourhood Residential	1,900 (1,250 SF/650 MR)	5,800	220		
Neighbourhood Activity Centre	100 (All MR)	200	200		
Joint Use Site	-	-	80		
Neighbourhood B (South)	**1,500**	**4,400**	**800**		
Neighbourhood Residential	1,400 (900 SF/500 MR)	4,200	140		
Neighbourhood Activity Centre	100 (All MR)	200	280		
Joint Use Site	-	-	80		
Community Association Site /Regional Recreation/ Library	-	-	300		
Total Plan Area	**3,500**	**10,400**	**1,300**	**21 units per Gross Residential Ha (8.4 per acre)**	**61 People and Jobs per GDHa**

The information related to this development was incorporated into the Rocky View County traffic forecasting model; the traffic directly attributed to the West View ASP is shown in **Figure 27** for Scenario 1 and in **Figure 28** for Scenario 2. Detailed output of the traffic model results can be found in **Appendix D**.

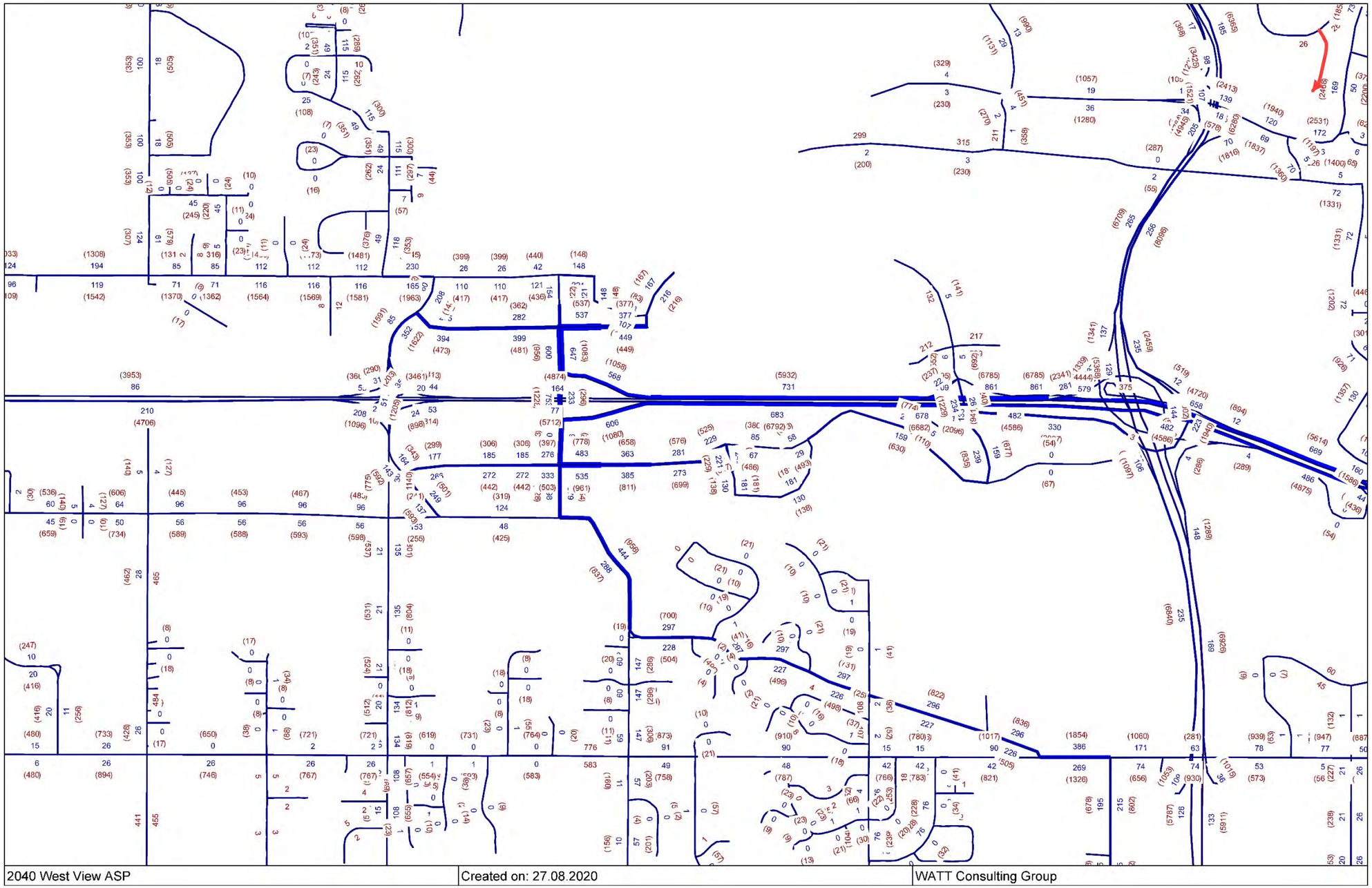

Figure 27 West View ASP Traffic on the Network (Scenario 1)

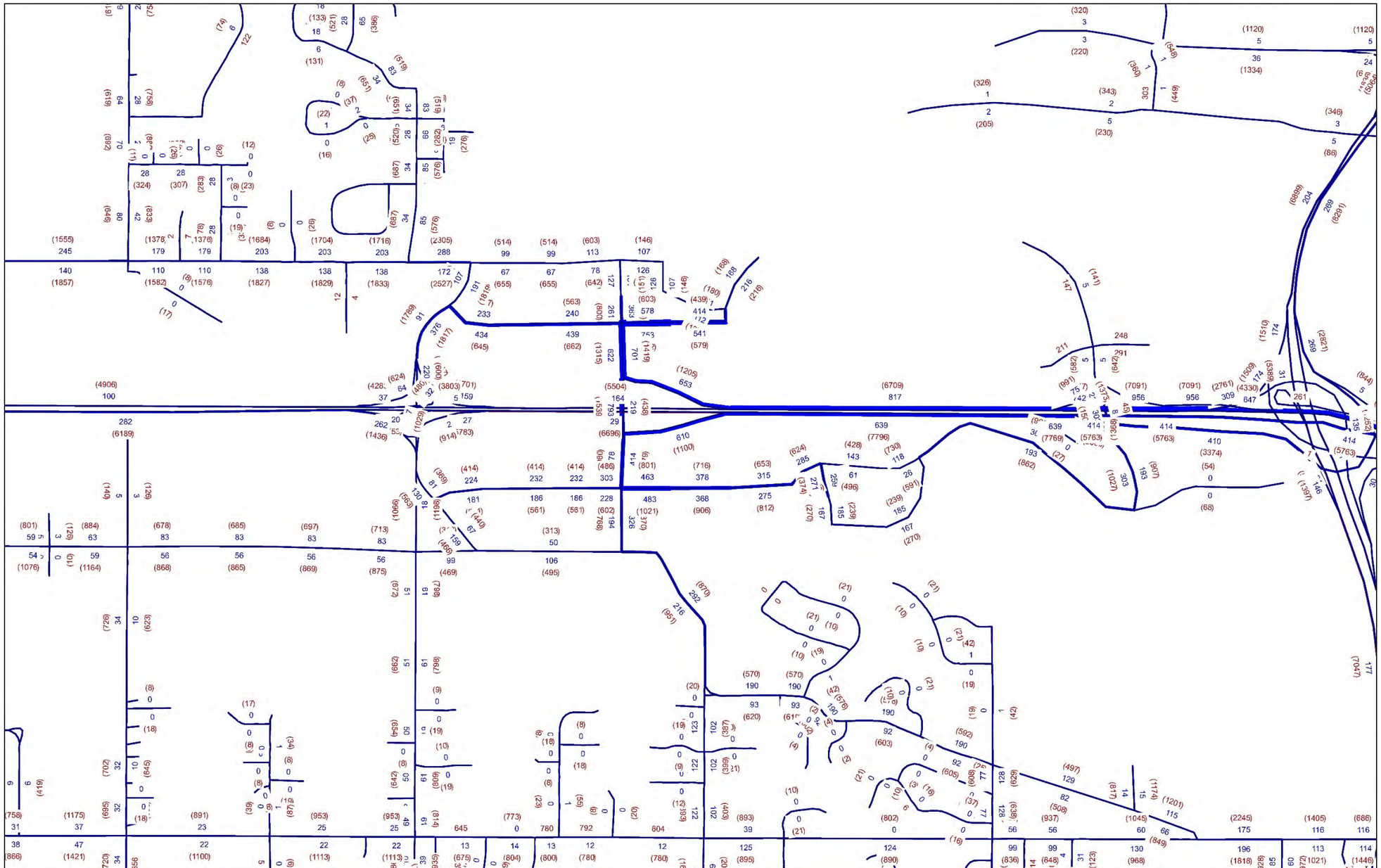

Figure 28 West View ASP Traffic on the Network (Scenario 2)

Additional upgrades of the Rocky View County network required to support the West View ASP development include:

- A signalized intersection north of Highway 1 on RR 31 (first access to the West View ASP development north of Hwy 1)
- A traffic signal at the intersection of TWP 250 and RR 31 (second access to the City development)
- Intersection of TWP 245 and RR 31 – additional NB right turn lane
- Signalized intersection south of Highway 1 along Old Banff Coach Road

It should be noted that the results of this analysis account for the future partial interchange east of Range Road 31. If this interchange is not constructed the traffic impact on the Rocky View County road network will be much higher than shown. It also should be noted that a portion of traffic originated/destined to the Springbank area will be displaced and use other routes as traffic to and from the West View ASP needs to be accommodated. A more detailed analysis will be required once the development progresses to ascertain the actual impact of the development on the Rocky View County road network. Based on the analysis presented in this report, the West View ASP should include the partial interchange at Highway 1 as part of the first Tentative Plan approval process to limit the traffic impacts to RVC roads.

11.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis led to the following conclusions/recommendations:

- Recommended road classifications should be adopted as shown in **Figure 21** and Rocky View County should protect the ultimate right of way as recommended for the 2040 horizon year. The recommended roadway classifications are applicable for both land use Scenario 1 and Scenario 2.
- Based on the results of the analysis, improvements to the network are expected to be required for Scenario 1 as summarized in **Table 16**. It should be noted that the recommended improvements will have to be implemented by appropriate road authorities and coordination will be required to provide for timely implementation reflecting the actual progression of the development.
- Construction of a new interchange along Highway 1 at either RR 40 or RR 35 should be considered for implementation from a traffic and access perspective.
- the West View ASP should include the partial interchange at Highway 1 as part of the first Tentative Plan approval process to limit the traffic impacts to RVC roads.
- Dimensions of the right-of-way in the intersection areas should be confirmed at the preliminary design stage.
- A traffic monitoring program should be initiated at the key intersections to provide up-to-date information on operational conditions throughout the development progression to ensure that the required improvements are introduced in a timely fashion.
- A periodic review of the network performance should be undertaken, including the impact of the network modifications, to verify improvement priorities and to ensure that future network upgrades are introduced in a timely fashion.
- The actual network improvements should be based on the actual traffic volumes related to the development progression in the area.
- Regional transit opportunities should be evaluated at the subsequent stages of the development planning and the future transit network should be identified in cooperation with Calgary Transit and other municipalities in the vicinity.

APPENDIX A: TRAFFIC DATA AND PLANNED DEVELOPMENT PROGRESSION

APPENDIX B: SYNCHRO OUTPUT

APPENDIX C: TRAFFIC MODEL INPUT

APPENDIX D: TRAFFIC MODEL OUTPUT