Town of Okotoks Transportation Master Plan Update

Final Report

Volume 1 Report

Date September 14th, 2016

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Town of Okotoks Transportation Master Plan Update

Final Report

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September 14, 2016

PERMIT TO PRACTICE
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Signature
Date September 14, 2016
PERMIT NUMBER: P 3818
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Prepared for: **Town of Okotoks**

Prepared by: **Watt Consulting Group**

Our File: **3352.T01**

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Executive Summary

E1 Introduction

The Town of Okotoks (Town) is currently in the process of annexation to acquire land accommodating the planned 60 year of growth (**Figure E 1**). The previous Transportation Master Plan (TMP), completed in 2008, was carried out in accordance with the limited growth model that Okotoks was following at the time. The 2013 Growth Management Study and an update to the 2008 model identified potential transportation impacts related to annexation. As the Growth Management Study concentrated on anticipated large-scale transportation network improvements, specific impacts within the existing road network were not assessed. Consequently, the Town of Okotoks required a complete TMP update which considers the Growth Management Study, anticipated development plans, the Active Transportation Strategy, the 2008 TMP update, the Northridge Drive / 338th Avenue Functional Study, the Downtown Parking Study, the CRP Calgary Regional Transit Plan and the Calgary Metropolitan Plan.

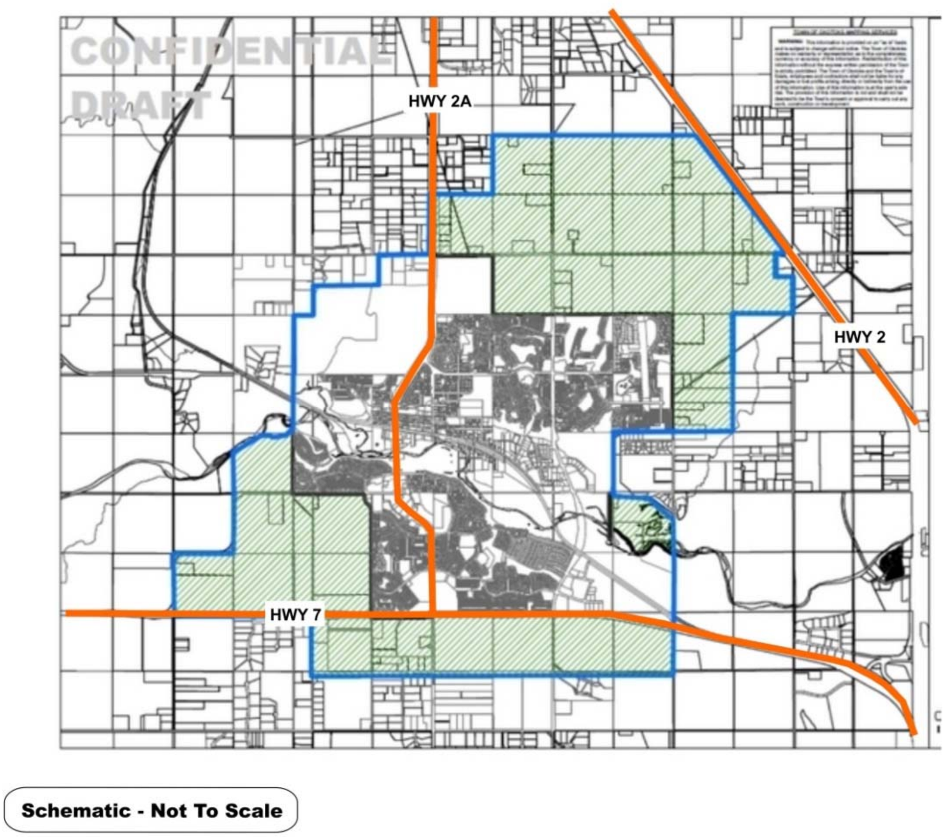


Figure E 1 Town of Okotoks – Annexation Area

Purpose and Objectives of the Study

The purpose of this study is to identify a long-term improvement strategy for the transportation network accounting for the Okotoks and regional growth plans and the current transportation trends.

The objective of this study is to define the transportation network for the Town of Okotoks within its new boundaries following the annexation and to identify improvements required to accommodate future development and the timing of those improvements, as well as to address such aspects as transit, traffic calming and multimodal approaches to transportation.

Study Scope

The scope requirements for the TMP update were defined as follows:

- Collection and review of the background data (including current and future growth data within the existing corporate limits and future growth in the proposed annexation areas)
- Review of existing traffic data
- Review and confirmation of existing transportation road network
- Identification of the existing / emerging transportation conditions
- Assessment of the existing conditions
- Review of Active Modes (through to development of the proposed options including recommendations to enhance the network)
- Traffic Forecasting Model development and traffic forecasts for the 10-year, 20-year, and 30-year planning horizons, including lands within the current boundaries and proposed annexation area
- Analysis of the future road requirements and improvements for the short-term (10 year), medium-term (20 year), and long-term (30 year) planning horizons.
- Development of a staging program that identifies development corridors and areas in the order in which those corridors and areas should be developed
- Assessment of Future Truck Routing
- Development of an improvement schedule and cost estimates
- Preparation of the draft report summarizing findings

E2 Input Information and Tools

This section summarizes information used in the study and tools used in the study process.

Land Use Scenarios

Land use scenarios and progression of the development were identified by the Town staff and this information was used in the study. **Figure E 2.1** shows the assumed schedule and progression of the development.

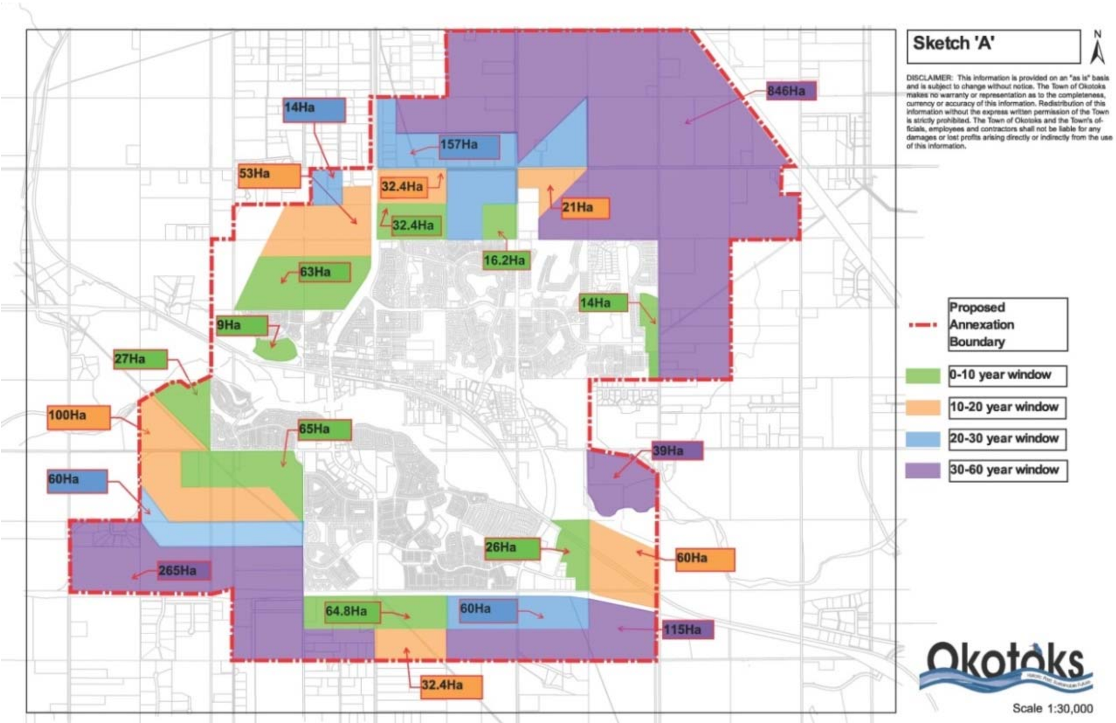


Figure E 2.1 Anticipated Progression of the Development

Traffic Data

The existing traffic data was provided by the Town and the count locations are shown in **Figure E 2.2** while the existing traffic volumes are summarized on **Figure E 2.3**.

Figure E 2.2 Traffic Count Locations

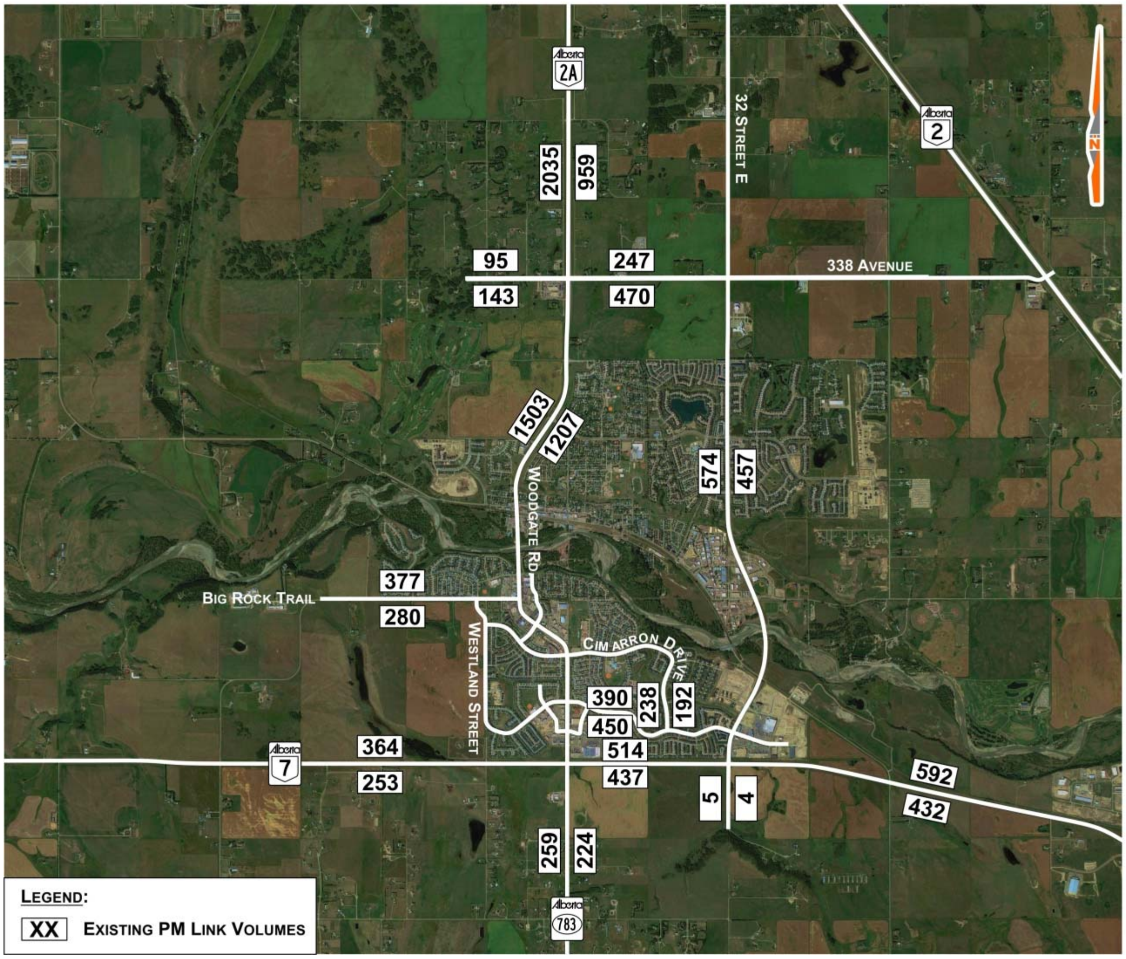


Figure E 2.3 Existing PM Peak Traffic Volumes

Traffic Forecasting Model

The traffic model developed for the MD of Foothills to represent p.m. peak hour volumes was used in this study. The model was based on the City of Calgary Regional Model and it was intended as a multimodal transportation demand forecasting tool to support the MD's short and long-term goals, policies and objectives as related to management of land use and the transportation network. It incorporates the Town of Okotoks, the City of Calgary, the MD of Foothills, High River and all the other Hamlets inside the MD of Foothills. Incorporating the data for the MD of Foothills and the City of Calgary with the Town of Okotoks data permits an assessment that accounts for the close relationship between the locales in terms of origin and destination of the vehicular trips.

The traffic forecasting model was developed based on existing traffic volumes and land use data.

Network Assumptions - Links, nodes, zones and connectors form the basic skeletal structure of the VISUM model:

- Links represent the roads,
- Nodes represent the intersections, and
- Zones represent the different land use/traffic generators broken down by area.

In total there are 638 traffic zones defined within the model area – 157 of which are zones for the Town of Okotoks and the future Areas (**Figure E 2.4**).

Existing Population and Employment

Population - The existing population and land use zoning data for the traffic model was provided by the Town of Okotoks.

Surrounding Areas

The following information obtained by WATT was introduced in to the model:

- The City of Calgary – Super-zones (combined the Transportation zones to larger super-zones) and their land use information for the different horizons.
- MD of Foothills – The 2015 traffic model was used
- High River - The 2011 traffic model for High River provided by ISL Engineering was incorporated into the model

Model Structure

The model uses the traditional four-step demand modelling approach:

- Trip generation
- Trip distribution
- Mode split
- Trip assignment

It should be noted that the model accounts for both internal and external trips in the area.

Table E 2.1 summarizes the trip generation rates and the directional distribution for the land uses and trip purposes that were used in the model.

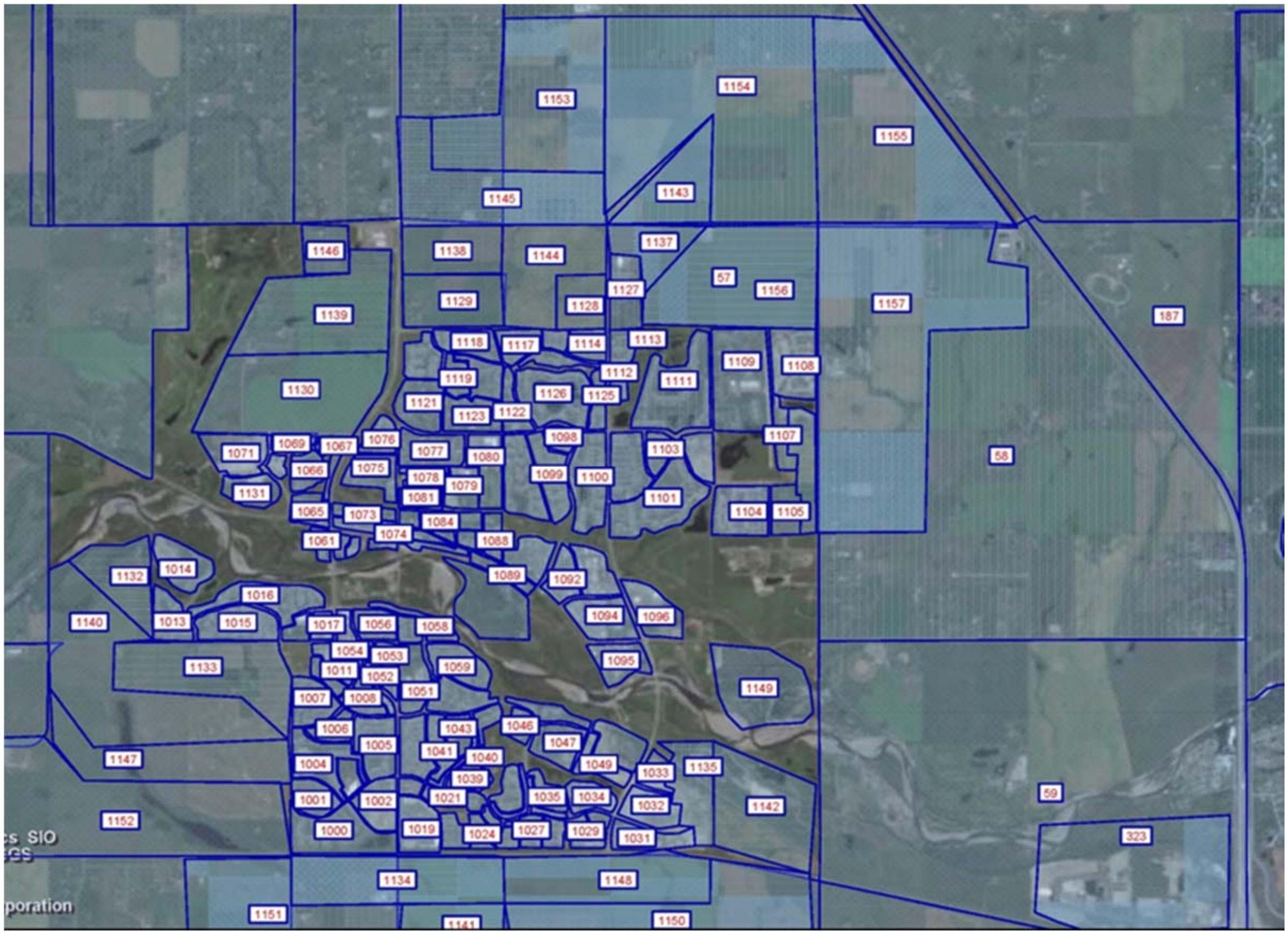


Figure E 2.4 Town of Okotoks Traffic Zones

TABLE E 2.1 TRIP GENERATION RATES

Land Use	Unit	Generation Rate	Split		Trip Type Split			Trip Generation Rates					
								HBW		HBO		NHB	
			In	Out	HBW	HBO	NHB	In	Out	In	Out	In	Out
Population	Population	0.25	75%	25%	40%	60%	0%	0.07500	0.02500	0.11250	0.03750	0.00000	0.00000
Population_okotoks	Population	0.34	75%	25%	40%	60%	0%	0.10200	0.03400	0.15300	0.05100	0.00000	0.00000
Agriculture	Employees	0.045	21%	79%	40%	30%	30%	0.00378	0.01422	0.00284	0.01067	0.00284	0.01067
Industrial	Employees	0.18	44%	56%	40%	30%	30%	0.03168	0.04032	0.02376	0.03024	0.02376	0.03024
Retail	Employees	1.5	50%	50%	30%	30%	40%	0.22500	0.22500	0.22500	0.22500	0.30000	0.30000
Office	Employees	0.23	17%	83%	40%	40%	20%	0.01564	0.07636	0.01564	0.07636	0.00782	0.03818
Educational	Employees	0.27	46%	53%	25%	65%	15%	0.03105	0.03578	0.08073	0.09302	0.01863	0.02147
Mining	Employees	0.045	21%	79%	40%	30%	30%	0.00378	0.01422	0.00284	0.01067	0.00284	0.01067
Government	Employees	0.23	17%	83%	40%	30%	30%	0.01564	0.07636	0.01173	0.05727	0.01173	0.05727
Hospital	Employees	0.145	71%	29%	35%	55%	10%	0.03603	0.01472	0.05662	0.02313	0.01030	0.00421
Other Service	Employees	0.23	17%	83%	35%	55%	10%	0.01369	0.06682	0.02151	0.10500	0.00391	0.01909
Transpo warehouse	Employees	0.295	35%	65%	40%	30%	30%	0.04130	0.07670	0.03098	0.05753	0.03098	0.05753
Wholesale	Employees	1	50%	50%	40%	30%	30%	0.20000	0.20000	0.15000	0.15000	0.15000	0.15000
Entertainment	Employees	0.75	50%	50%	40%	30%	30%	0.15000	0.15000	0.11250	0.11250	0.11250	0.11250

To check if the model was calibrated well, a regression method was utilized. Models with an **R^2 of 0.8** or higher are considered good. Overall a total of 849 locations were used for the model calibration and 248 locations for the Town of Okotoks alone. The regression analysis calibration results in an **R^2 of 0.91**.

Existing Network

The existing skeletal network was analyzed in terms of capacity and operation based on the current traffic volumes provided by the Town. **Figure E 2.5** shows the locations of the analyzed intersections while **Figure E 2.6** summarizes the level of service at these intersections based on the area traffic counts.

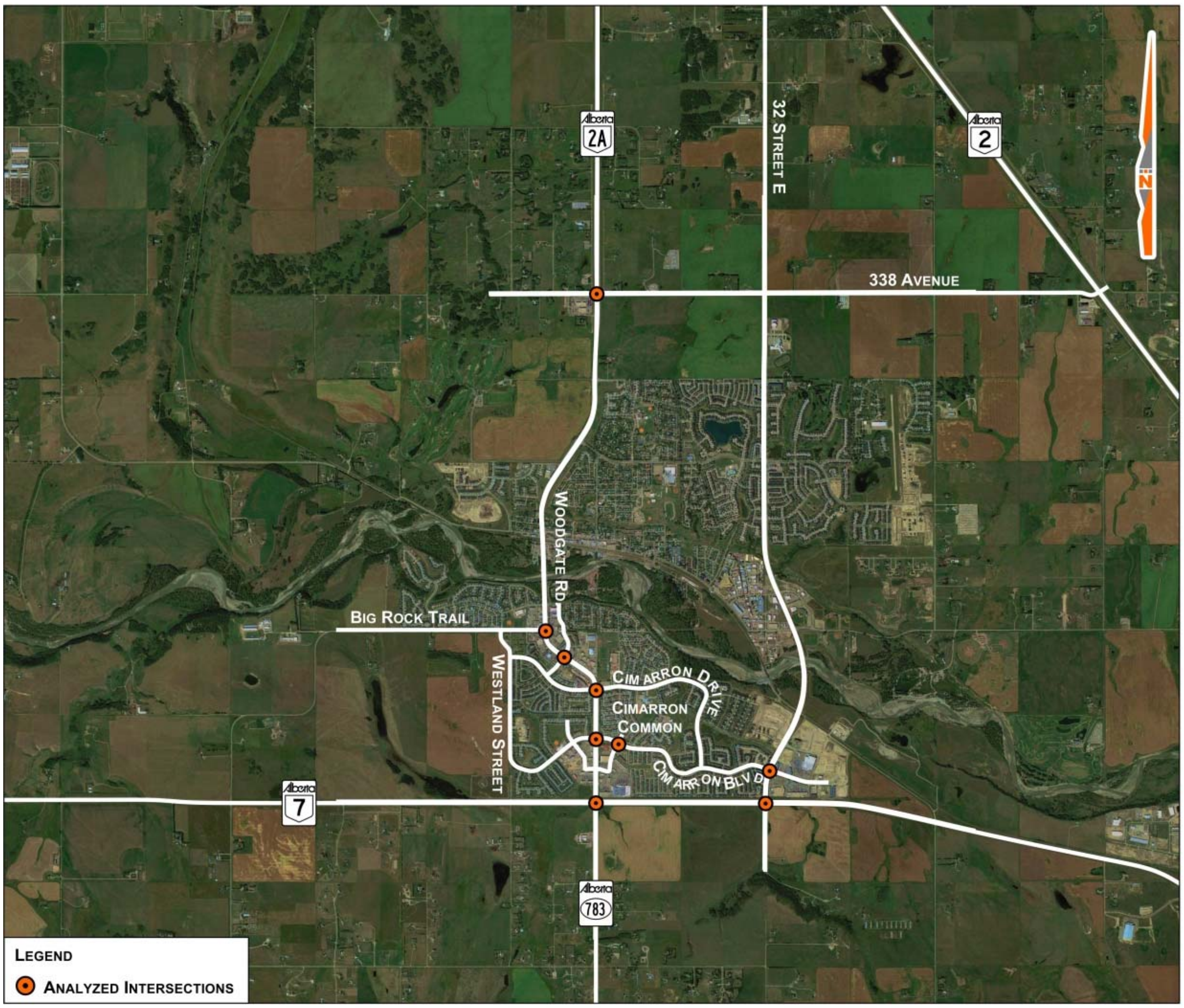


Figure E 2.5 Analyzed Intersections

Figure E 2.6 Existing Operational Conditions

Operation and Level of Service

According to the results of the analysis, all analyzed intersections operate at a Level of Service (LOS) C or better and do not require improvements at this time.

E3 Results of the Analysis

The summary of results of the future capacity and operational conditions on the network as well as a summary of assumptions including population and employment in the specific section of the Town are included in subsequent sections.

Future Land Use

Figure E 3.1 summarizes progression of land use development for the analyzed scenarios.

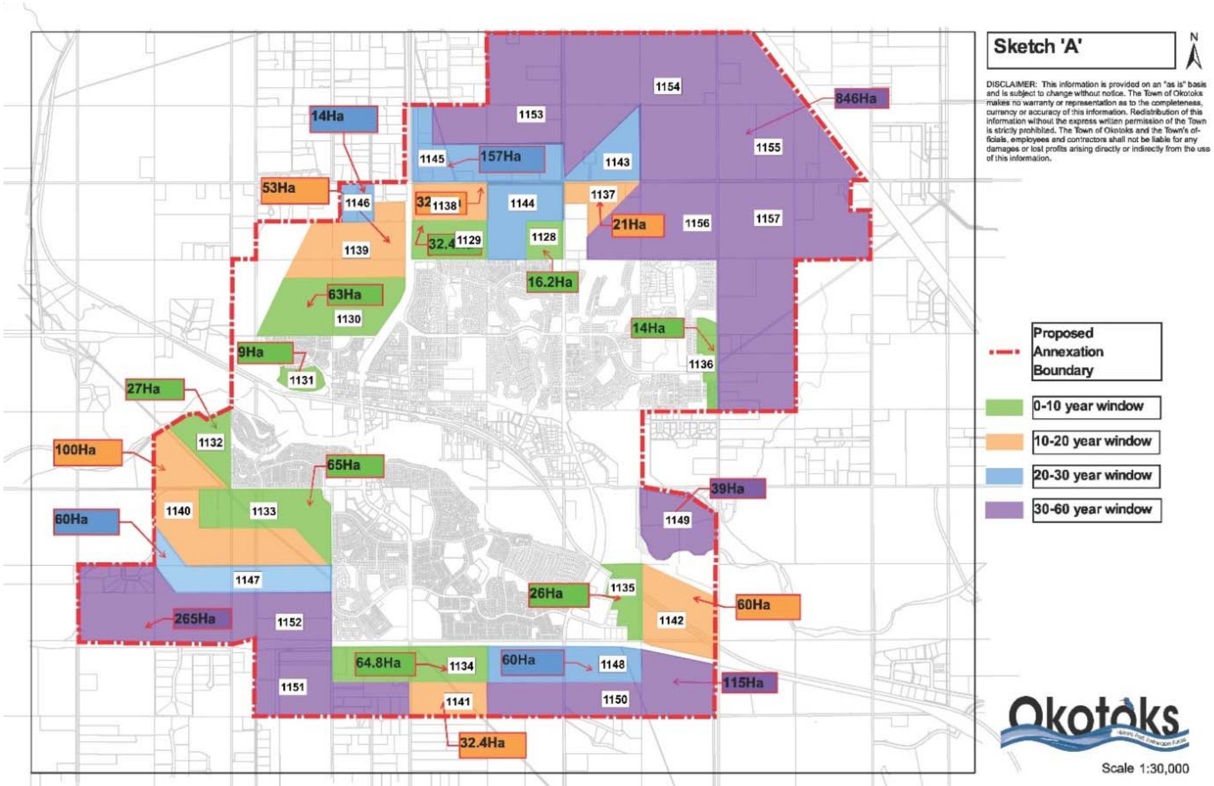


Figure E 3.1 Future Land Use Development

Table E 3.1 includes summary of land use information for analyzed land use scenarios.

TABLE E 3.1 ANALYZED LAND USE SCENARIOS

0 - 10 year horizon				10 - 20 year horizon			
Zone	ha	units	Land use	Zone	ha	units	Land use
1128	16.2		School, Rec Centre	1137	21	415	Residential
1129	32.4	647	Residential	1138	32.4	647	Residential
1130	63	1081	Residential			10.16 acres	Commercial
1131	9	148	Residential	1139	53	1081	Residential
1132	27	534	Residential			10 acres	Commercial
1133	65	1285	Residential	1140	100	1977	Residential
1134	64.8	40150	Commercial/Industrial	1141	32.4	40150	Commercial/Industrial
		229	Residential			229	Residential
1135	26		Commercial/Industrial	1142	60		Commercial/Industrial
1136	14	290	Residential				
20 - 30 year horizon				**30 - 60 year horizon**			
Zone	ha	units	Land use	Zone	ha	units	Land use
1143	157	2512	Residential	1149	39	771	Residential
1144			Residential	1150	115		Commercial/Industrial
1145			Commercial	1151	93.5		Commercial/Industrial
1146	14	277	Residential	1152	171.5	3390	Residential
				1153	846	16724	Residential
1147	60	1186	Residential	1154			
				1155			
1148	60		Commercial/Industrial	1156			
				1157			

Growth in Surrounding Areas

MD of Foothills - Per information provided by the MD of Foothills, population and employment numbers have been incorporated into the model for the horizon years 2020, 2025, and 2030. For the horizon years 2035 and 2040 the employment and population numbers were grown by an annual rate of 3% per year.

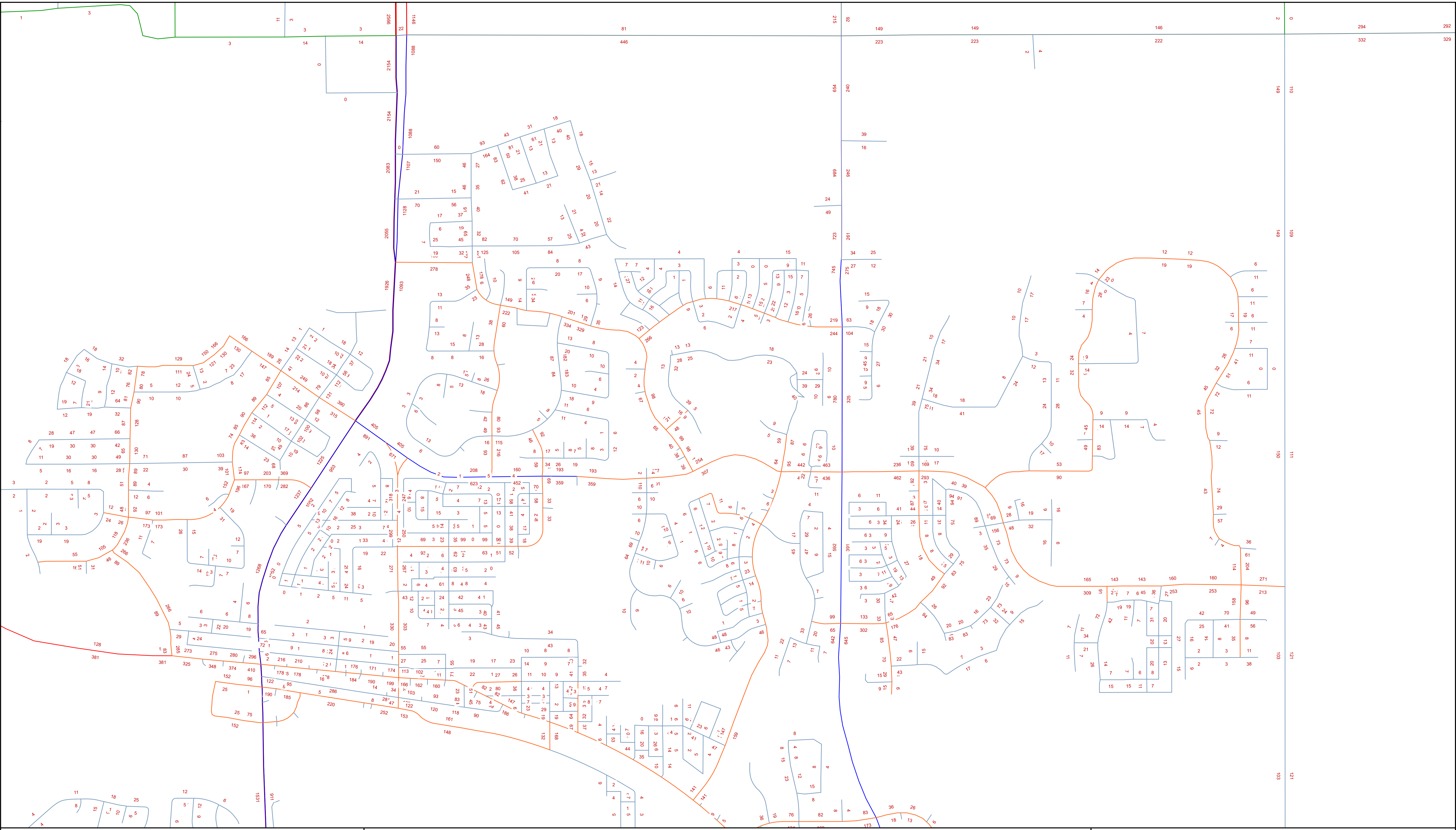
City of Calgary - The City of Calgary provided super-zones and their land use information for the future horizons.

High River - According to the latest growth trends in this area, the employment and population numbers were grown by an annual rate of 3% per year.

Black Diamond and Turner Valley - According to the latest growth trends in this area, the employment and population numbers were grown by an annual rate of 3% per year.

Traffic Forecast

Traffic forecast calculations were carried out for the 2025, 2035 and 2045 horizon years as identified by the Town's staff. **Figures E 3.2** to **E 3.7** shows the model printout of the forecasted traffic volumes.



VISUM 15.00 PTV AG	2025 PM Peak Volumes - North Section	

Figure E 3.2 2025 PM Peak Volumes North Section

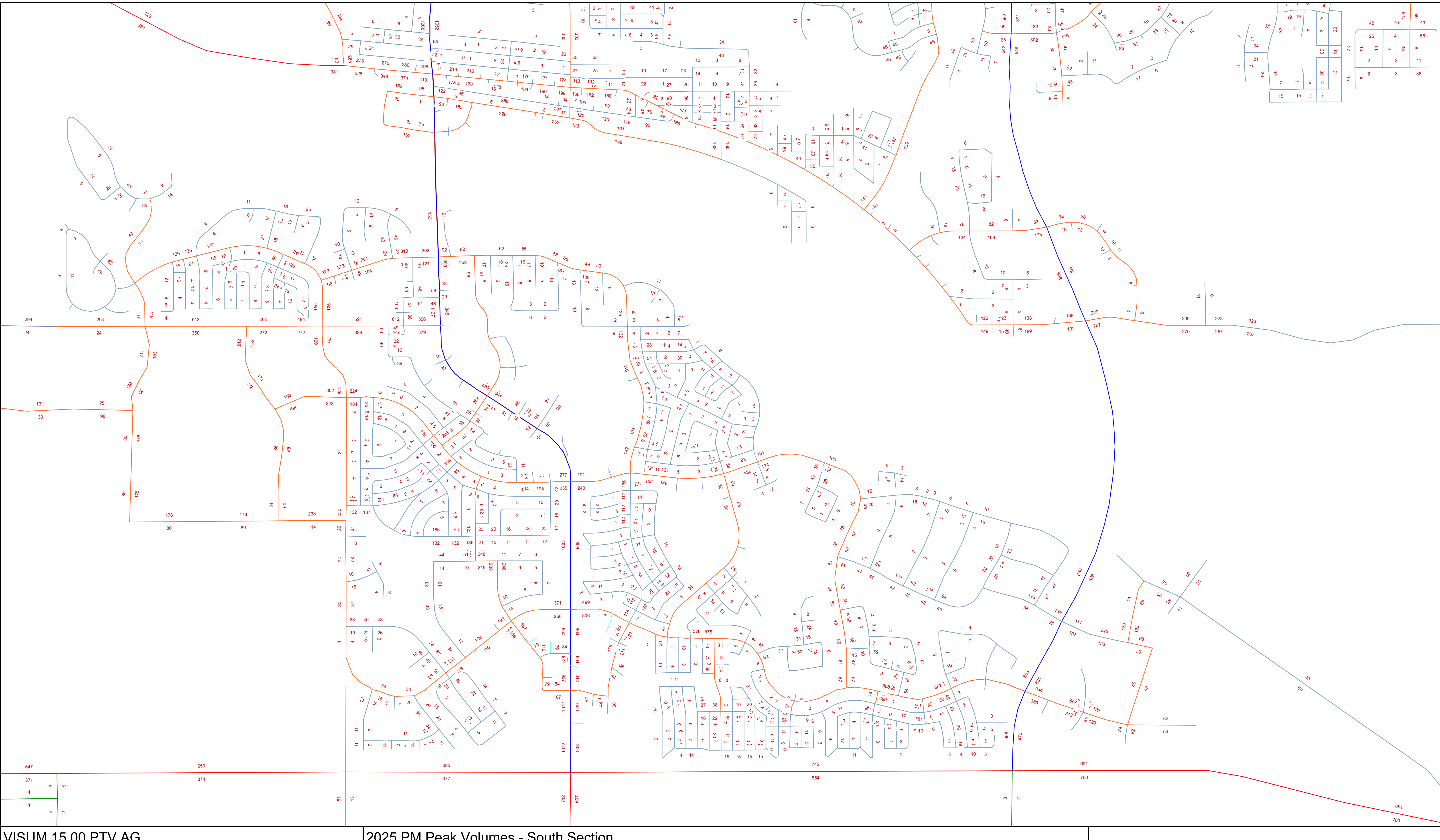


Figure E 3.3 2025 PM Peak Volumes South Section

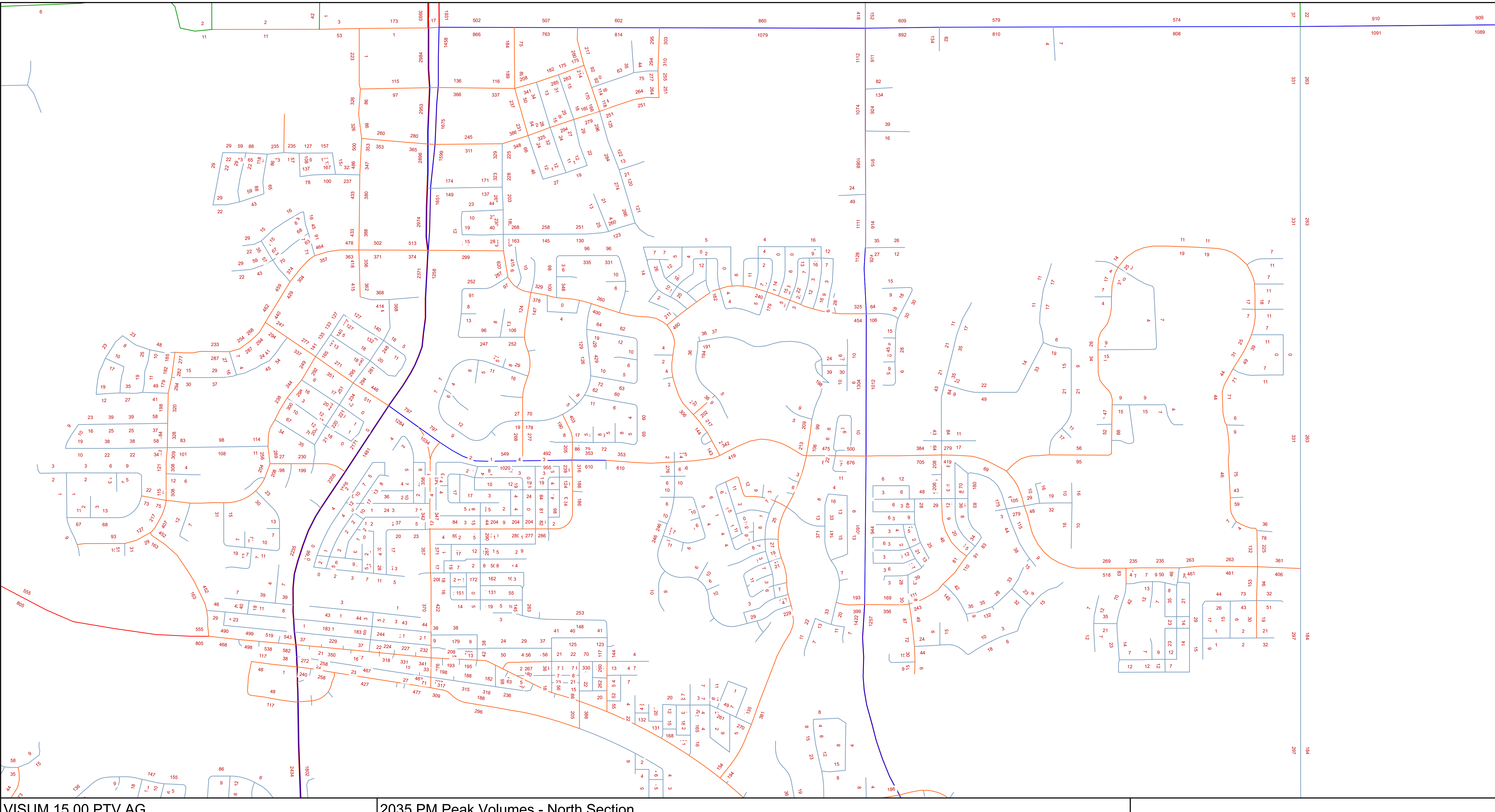


Figure E 3.4 2035 PM Peak Volumes North Section

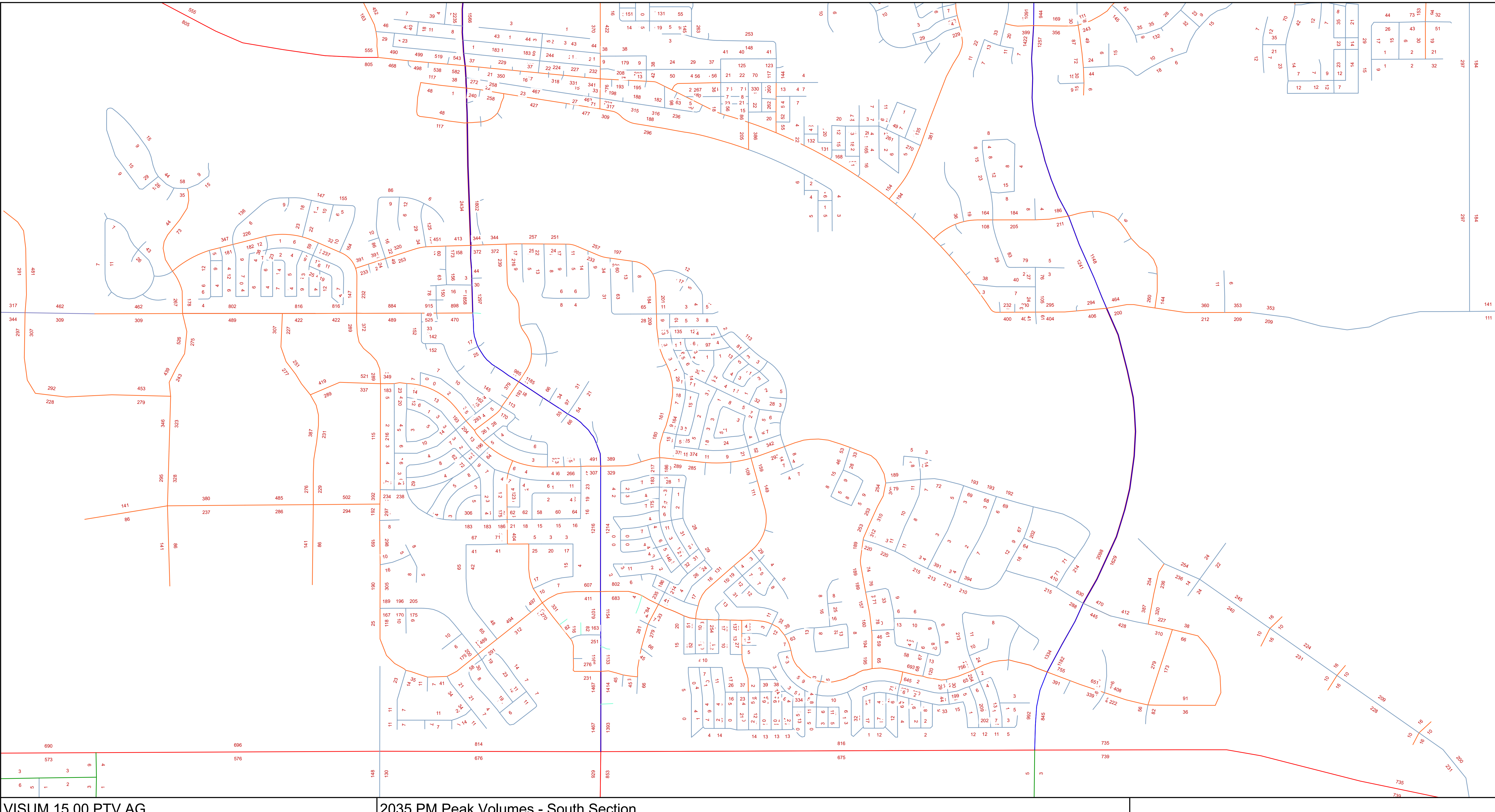


Figure E 3.5 2035 PM Peak Volumes South Section

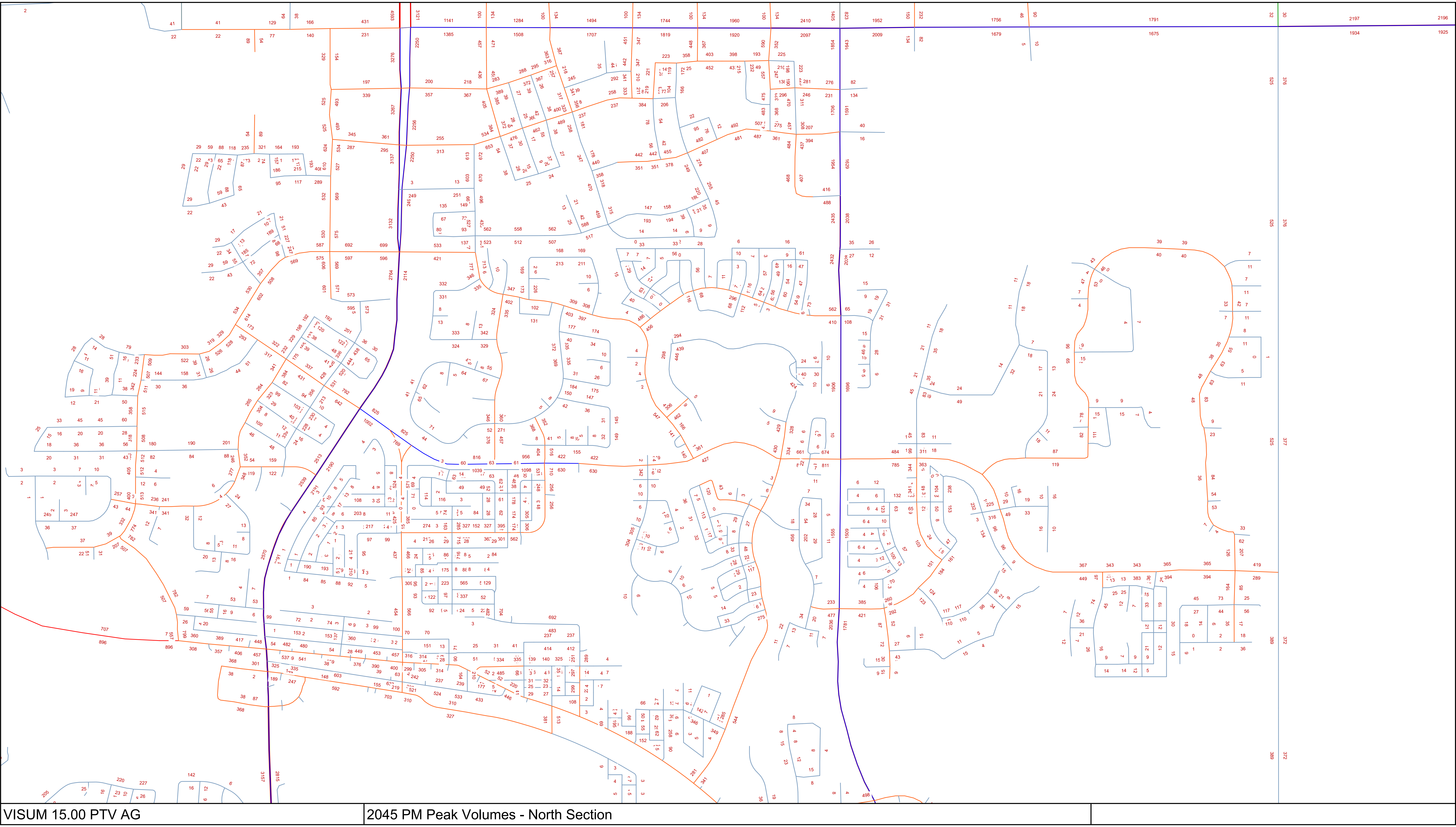


Figure E 3.6 2045 PM Peak Volumes North Section

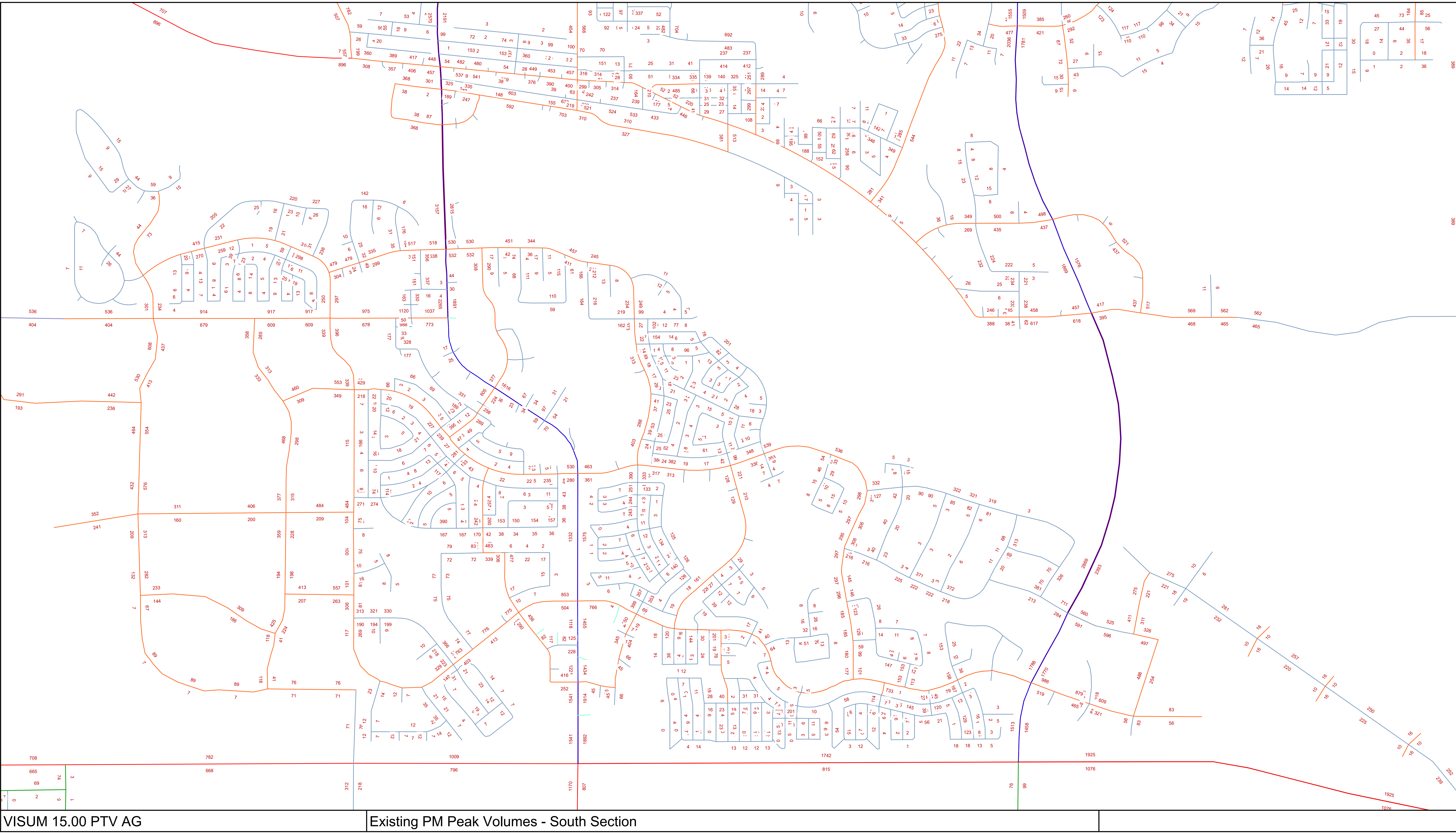


Figure E 3.7 2045 PM Peak Volumes South Section

Network Improvements

Network improvements were identified following capacity and operational analysis at the intersections and a review of the forecasted traffic volumes on links.

The analyzed intersections included all signalized sites as well as those which may require signalization.

Estimated construction costs of the required improvements were identified in **Section 3.5** of this report. Detailed information pertaining to construction cost estimates is included in **Appendix II**.

Improvement Criteria

Two improvement criteria were used to identify the required improvements:

1. Capacity and operational conditions at the intersections defined by Level of Service (LOS), where LOS E was identified as criterion for intersectional improvements to be initiated.
2. Environmental capacity as related to functional road classification.

2025 Horizon

Figures E 3.8a and E 3.8b summarize the Level of Service and delays at the analyzed intersections.

Intersection Improvements are shown in **Figure E 3.9**.

Figure E 3.8 a 2025 Operational Conditions – North Okotoks

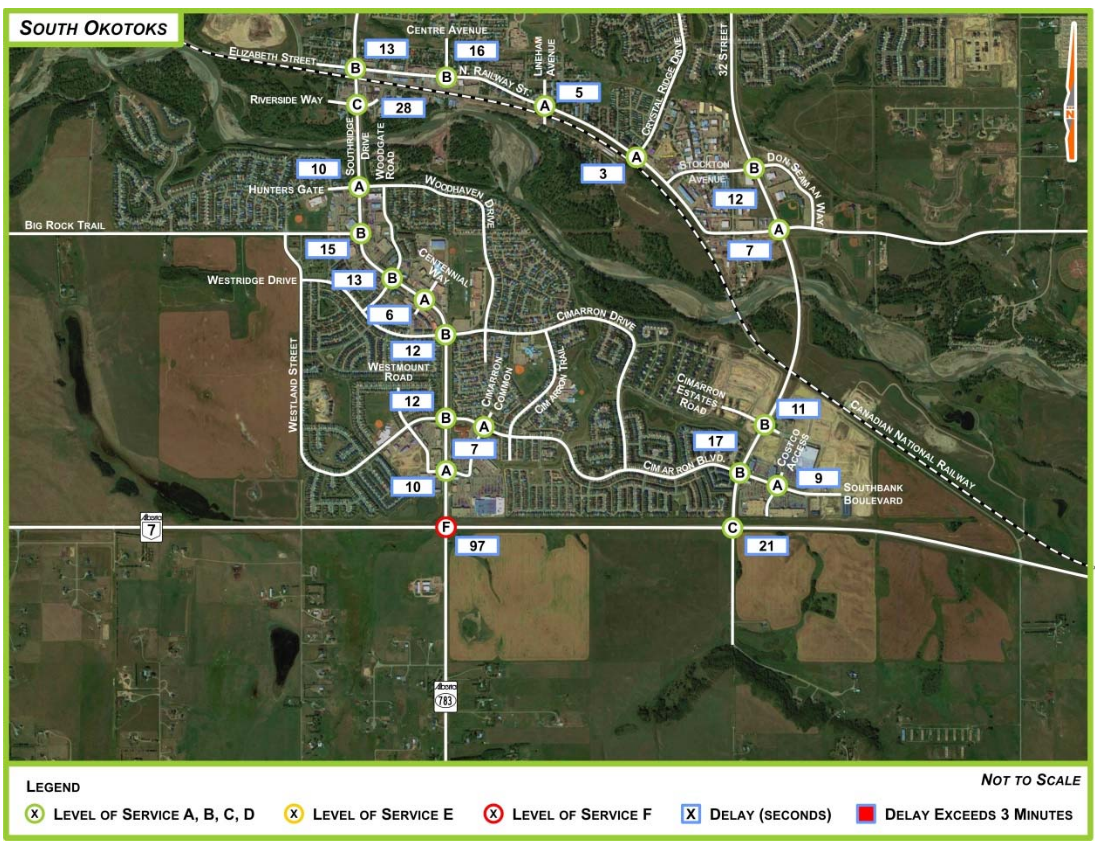


Figure E 3.8 b 2025 Operational Conditions – South Okotoks

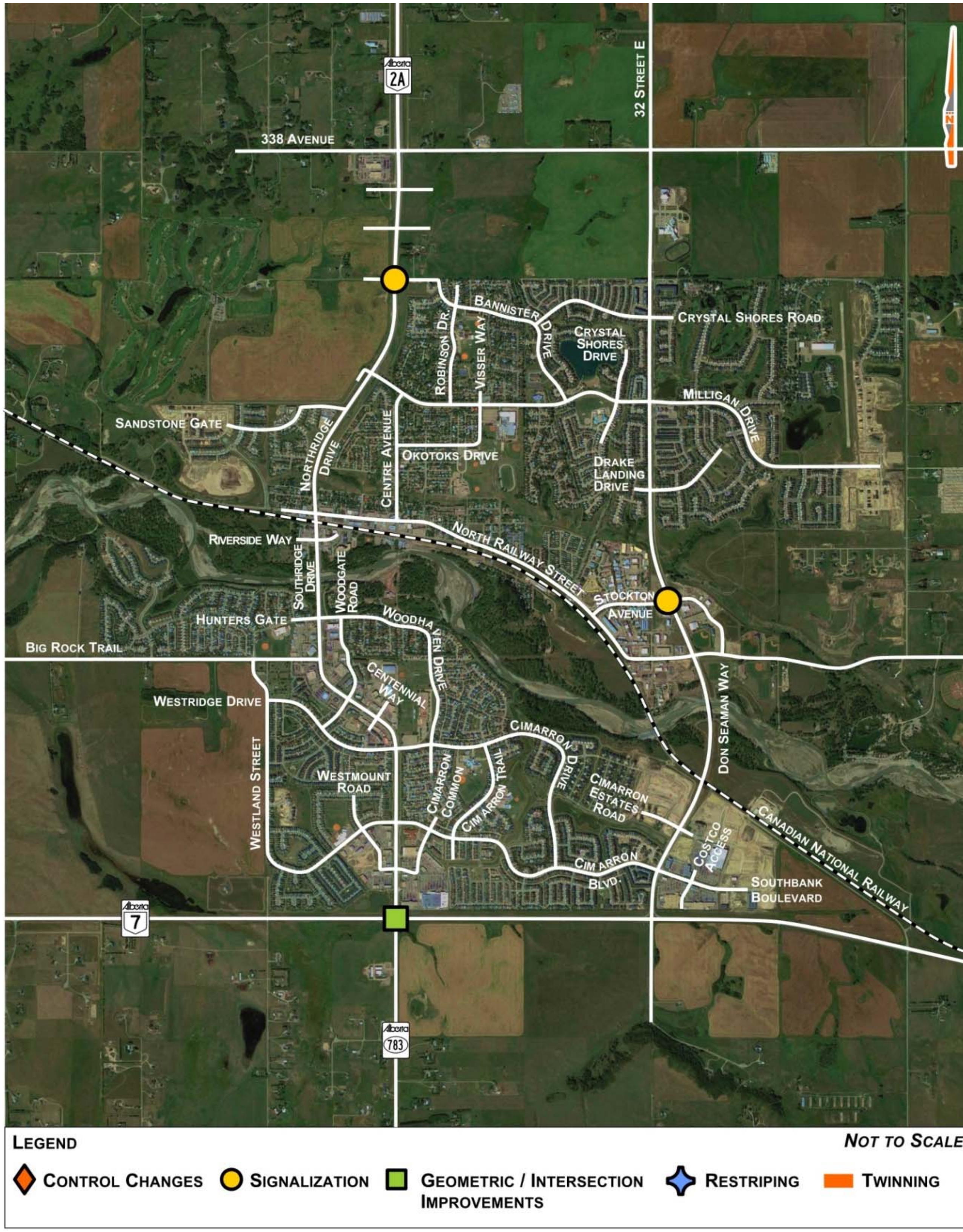


Figure E 3.9 2025 Improvements

As shown in **Figure 3.9**, only two intersections, Banister Gate / Southridge Drive and Stockton Avenue / 32 Street, will require signal controls by the 2025 horizon year, while geometric improvements will be required at Highway 7/Southridge Drive Intersection.

2035 Horizon

Figures 3.10a and **3.10b** summarize the level of service at analyzed intersections. Intersection improvements are shown in **Figure E 3.11**

Figure E 3.10 a 2035 Operational Conditions – North Okotoks

Figure E 3.10 b 2035 Operational Conditions – South Okotoks

Figure E 3.11 2035 Improvements

It is expected that by the 2035 horizon year the following improvements will be required:

Signals	Geometric improvements
• Northgate Circle / Northridge Drive • Intersection south of Northgate Circle / Northridge Drive • Milligan Drive / Veterans Way • Milligan Drive / Robinson Drive • Milligan Drive / Okotoks Drive • Cimarron Blvd / Cimarron Trail • 32 Street / 338 Avenue	• Highway 7 / Southridge Drive • Sandstone Gate / Northridge Drive • Elizabeth Street / Northridge Drive • 338 Avenue / Northridge Drive • Highway 7 / 32 Street • Northridge Drive / Banister Drive
Lane restriping	**Four-laning**
• Woodhaven Drive / Southridge Drive • Westmount Commercial Access / Southridge Drive • Riverside Gate / Northridge Drive • Southbank Boulevard / 32 Street • Southbank Road / 32 Street • North Railway Street / 32 Street	• 338 Avenue between Northridge Drive and 32 Street • 32 Street between 338 Avenue and Cimarron Estates Road • Highway 7 between Northridge Drive and 32 Street

2045 Horizon

Figures E 3.12a and **E 3.12b** summarize the Level of Service at the analyzed intersections, with intersection improvements shown in **Figure E 3.13**.

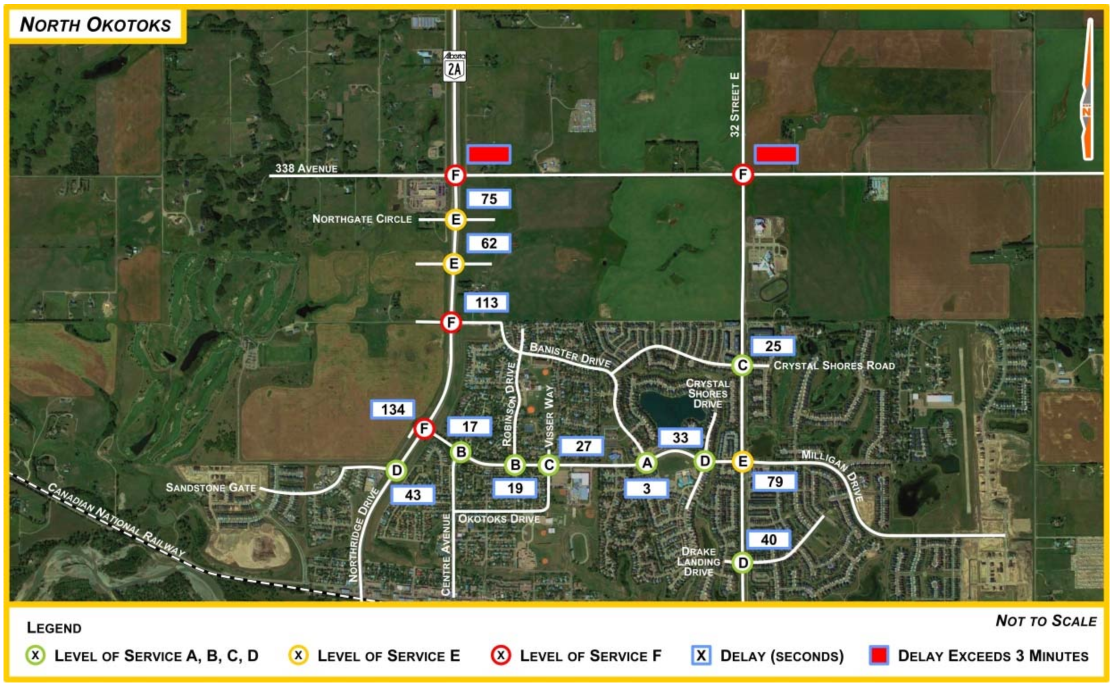


Figure E 3.12 a 2045 Operational Conditions – North Okotoks

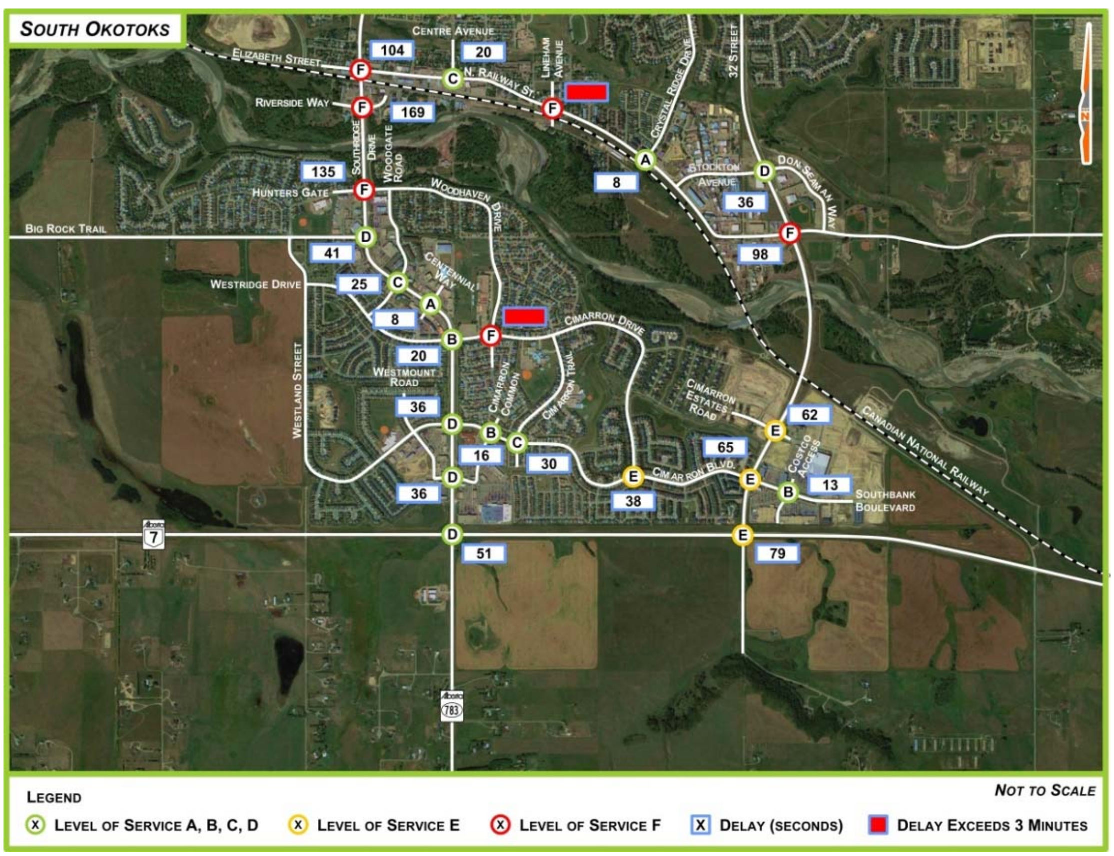


Figure E 3.12 b 2045 Operational Conditions – South Okotoks

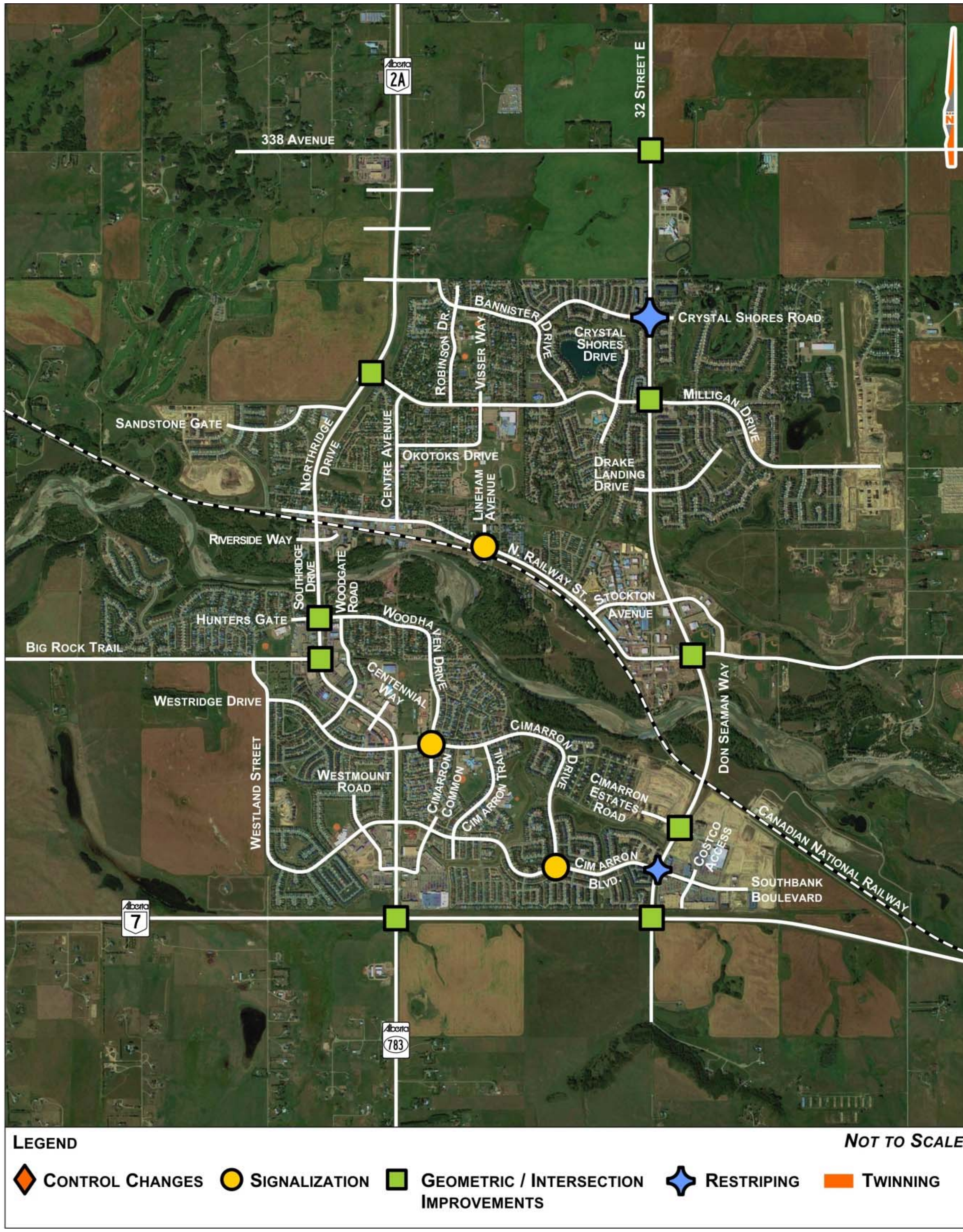


Figure E 3.13 2045 Improvements

As shown in **Figure E 3.13,** it should be expected that the following improvements will be required by the 2045 horizon year:

Signals	Geometric improvements
• Cimarron Drive / Cimarron Boulevard • Cimarron Drive / Woodhaven Drive • North Railway Street / Lineham Avenue	• Highway 7 / Southridge Drive • Big Rock Trail / Southridge Drive • Woodhaven Drive / Southridge Drive • Milligan Drive / Northridge Drive • 338 Avenue / 32 Street • Milligan Drive / 32 Street • North Railway Street / 32 Street • Southbank Road / 32 Street • Highway 7 / 32 Street
All Way Stop Control (AWSC)	**Restriping approaches**
None	• Crystal Shores Road / 32 Street • Southbank Boulevard / 32 Street

2045 6-Laning of Northridge Drive

To improve intersection operations along Northridge Drive between the intersections of Riverside Gate and 338 Avenue, consideration might be given to upgrading of Northridge Drive to a 6 lane cross-section. These improvements may not be required before 2045 horizon year.

Widening Northridge Drive may need additional right-of-way. This will lead to an additional cost to acquire more land. Location and construction cost of the improved section of Northridge Drive is shown in **Figure E 3.14** and **Table E 3.3**, respectively. The estimated cost reflects only construction and does not account for land acquisition.

Figure E 3.14 2045 6-Laning at Northridge Drive

TABLE E 3.2 COST OF NORTHRIDGE DRIVE 6-LANING - SUMMARY

Year	Type of Improvements	Estimated Cost
2045	Roadway 6-laning	$ 9,730,000
	Bridge 6-laning	$ 13,200,000
	Total Cost of Northridge 6-Laning	**$ 22,930,000**

***Cost in 2016 dollars**

Improvement Cost Estimates

Details of the cost estimates are included in **Appendix II**.

Tables E 3.2 to **E 3.4** contain summaries of improvement costs for each of the analyzed horizon years. For a detailed cost breakdown, refer to **Section 3.5** and **Appendix II.**

TABLE E 3.3 COST OF IMPROVEMENTS - SUMMARY

Year	Type of Improvements	Estimated Cost
2025	Intersection Improvements	$ 1,230,000
	Horizon Total	**$ 1,230,000**
2035	Network Improvements	$ 48,830,000
	Intersection Improvements	$ 10,195,000
	Restriping and Signal Timing Phase Adjustments	No new construction
	Horizon Total	**$ 59,025,000**
2045	Intersection Improvements	$ 5,160,000
	Restriping and Signal Timing Phase Adjustments	No new construction
	Northridge Drive Roadway 6-laning	$ 9,730,000
	Northridge Drive Bridge 6-Laning	$ 13,200,000
	Horizon Total	**$ 28,090,000**

***Cost in 2016 dollars**

Roundabouts

Roundabouts were analyzed as a potential option for the intersections of Milligan Drive / Veterans Way and Cimarron Drive / Woodhaven Drive. The purpose of this analysis was strictly to determine whether a roundabout is feasible based on the anticipated traffic volumes in the long term. As shown in **Figure E 3.15,** a one lane roundabout at Milligan Drive / Veterans Way with a slip lane for the northbound right turning movement is expected to operate at LOS A. Also, a one lane roundabout at Cimarron Drive / Woodhaven Drive is expected to operate at a LOS A at the 2045 horizon.

Figure E 3.15 2045 Roundabout Operations

E4 Truck Routes

The existing truck routes are shown in **Figure E 4.1.** They were identified by the Town to provide easy access for trucks traveling within the Town's boundaries. They provide good connectivity to the regional network system, specifically to provincial highways such as Highways 2, 2A, 7, and 549. It is not expected that this system has to be augmented, although in the future an additional connection between Southridge Drive and 32 Street may be required. Such a connection might be developed either via Railway Avenue or Milligan Drive (**Figure E 4.1**). While both of these routes present challenges, they could be considered as long-term options if a connection becomes necessary.

Long term truck routes in the annexed areas will have to be developed once more detailed plans are developed for those areas.

Figure E 4.1 Truck Routes

E5 Railway Crossings

There are four main at-grade railway crossings within the Town of Okotoks boundary of the CP rail line: Northridge Drive, Veterans Way, Lineham Avenue and the pedestrian crossing between Northridge Drive and Veterans Way. While additional at-grade crossing points do exist, they are private access crossings (e.g., at Southbank Crescent in southwest Okotoks). It should be noted that the existing private crossings are expected to be relocated in the future and become public as the development progresses in their vicinity.

All of the crossings specified above were reviewed in consideration of Transport Canada's Grade Crossing Standards (GCS, July 2014) as well as in consideration of other traffic control manuals as appropriate (Transportation Association of Canada Manual of Uniform Traffic Control Devices and Alberta Transportation). The intent of the review was to assess crossing characteristics and conditions to establish if the mitigation is appropriate and, if required, identify any near and long-term improvements to rail crossing safety. For details see **Appendix III.**

Northridge Drive Crossing

Northridge Drive is a four-lane divided urban arterial road at the rail crossing. At the crossing the current daily traffic is approximately 25,000 vehicles/day. There are a number of roads and accesses that intersect Northridge Drive in the vicinity of the CP Rail line, however the raised median ensures right-in/right-out operation at all intersection and access points between Elizabeth Street and Riverside Gate / Riverside Way. In the northbound direction, the roadway widens to four lanes, crossing the rail line to facilitate a left-turn lane and a right-turn lane at Elizabeth Street. **Figure E 5.1** shows the crossing location.

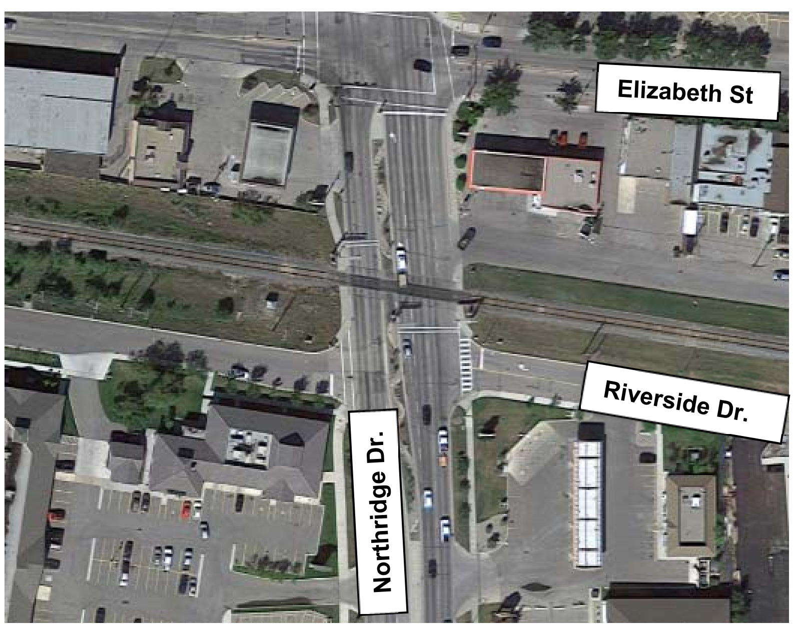


Figure E 5.1 Northridge Drive Rail Crossing

The rail crossing itself is controlled by gates (two in the northbound direction to account for all four approach lanes, one in the southbound direction), warning signal flashing lights (site and overhead mounted), bells and rail crossing signs in both the median and edge of road (both directions). This also includes additional lights for pedestrians in both directions on both sides of the road and lights that are oriented towards westbound right-turning traffic from Riverside Drive onto Northridge Drive There is a *Railway Crossing Ahead* warning sign in the northbound direction, just north of Riverside Gate.

The results of the review of the GCS indicate that the crossing treatments currently in place are generally appropriate for the site in terms of gates, signals, and signs. However, to address the current and longer term 95th percentile northbound and southbound queues along Northridge Drive from the intersections with Elizabeth Street and Riverside Gate, a *Do Not Stop on Tracks* sign on each direction of approach is recommended.

Veterans Way Crossing

Veterans Way is a two-lane road at the rail crossing. It terminates 20m to the south of the rail line at Riverside Drive, and continues north for 900m up to the intersection with Milligan Drive. The current daily traffic at the crossing is approximately 4,000 vehicles/day. Riverside Drive has *STOP* signs at Veterans Way in both directions. The southbound through traffic is almost never impeded; the northbound direction queues will not spill back to the rail line from Elizabeth Street in the near or long-term (2045 horizon year). **Figure E 5.2** shows the crossing location.

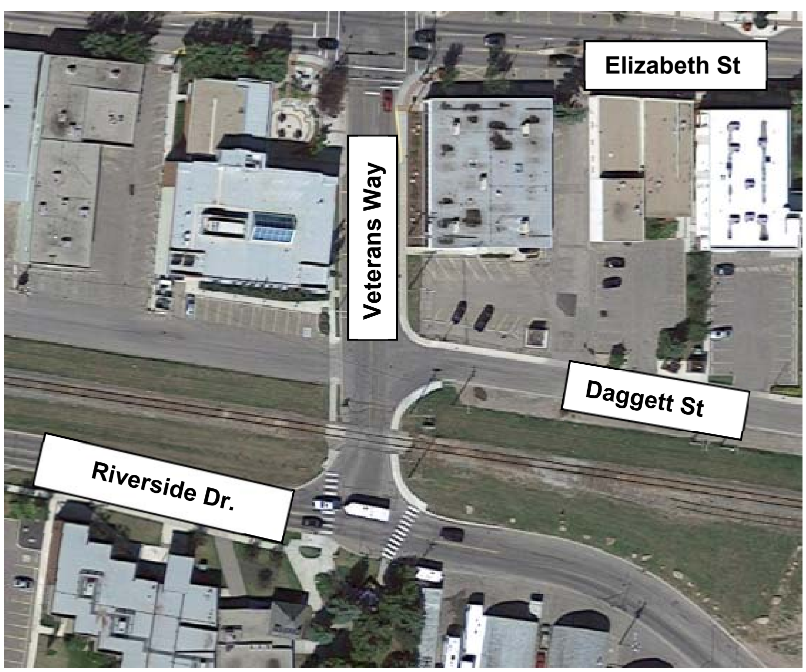


Figure E 5.2 Veterans Way Rail Crossing

The crossing itself consists of *Railway Crossing* signage and flashing lights and bells, with the signals oriented to southbound Veterans Way, eastbound and westbound Riverside Drive, northbound Veterans Way (for pedestrians), and westbound Daggett Street.

The results of the review of the GCS indicate that the crossing treatment currently in place is appropriate for the site in the near and long-term with future growth.

Lineham Avenue Crossing

Lineham Avenue is a two-lane road at the rail crossing. This location includes two sets of tracks. **Figure E 5.3** shows the crossing location.

The crossing includes *Railway Crossing* signage, *Number of Tracks* signs, gates installed after 2012 and flashing lights and bells (side mounted). There are actually two signal poles on the east side of Lineham Avenue, one just south of each rail line (with signals facing both north/south directions) as well as additional signals oriented towards eastbound South Railway Street traffic.

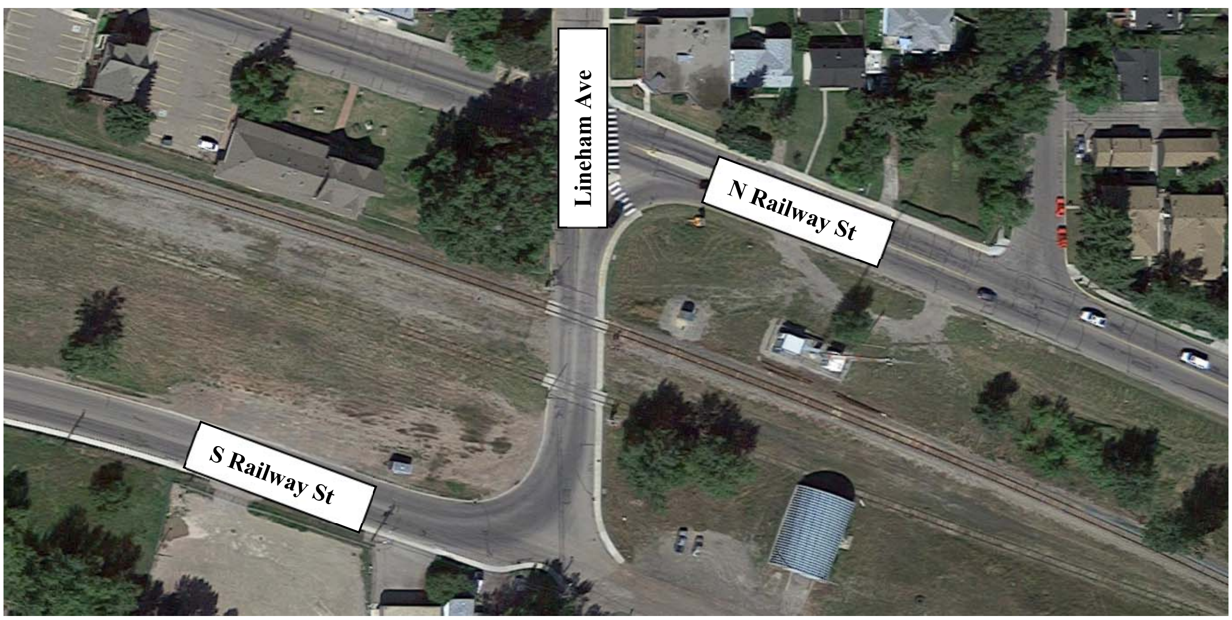


Figure E 5.3 Lineham Avenue Rail Crossing

This crossing is well-controlled from a safety perspective. Although gates are not required from a volume perspective, they are beneficial due to the somewhat awkward roadway curvature and close proximity of the intersections with both North Railway Street and South Railway Street.

The review of the GCS found that the crossing treatment currently in place is appropriate for the site.

Pedestrian Crossing (between Northridge Drive and Veterans Way)

There is a pedestrian rail crossing approximately midway between Northridge Drive and Veterans Way. This crossing provides some local connectivity to/from the commercial land uses along Elizabeth Street and south of the rail line, where the rail line is otherwise fenced off for 500m between intersections (**Figures E 5.4**).

Figure E 5.4 Pedestrian Rail Crossing between Northridge Drive and Veterans Way

The crossing features consist of *Railway Crossing* signs, *Railway Warning* signs (with Pedestrian tabs), and custom warning signs indicating to pedestrians to look both ways. There is also an alignment offset on both pathway approaches, which requires pedestrians and cyclists to slow down in advance of the tracks, which is beneficial for ensuring slow speeds and appropriate alignment when looking for, and reacting to, any approaching trains.

The relatively low volume of pedestrians and rail characteristics and operations do not trigger a need for gates or rail signals. The combination of warning and regulatory signage and physical devices that require slow approaching pedestrian and cyclist speeds are appropriate for this location.

Railway Crossing Review - Conclusions

The results of the railway crossing reviews for Northridge Drive, Veterans Way, Lineham Avenue and the pedestrian crossing indicate that the current control measures are generally appropriate for all road users at all locations, in both the near-term and the 2045 horizon year.

As an additional mitigation, installation of TAC RB-59 *Do Not Stop on Tracks* signs is recommended on Northridge Drive (below each railway signal, four signs in total) to ensure that potential peak volume queues in both directions will not block railway tracks.

E6 Active Transportation

Active Transportation offers economic, social, health, and environmental benefits. As a transportation strategy and viable mode of transport, active transportation also meets a number of community and transportation planning objectives set out by the Town of Okotoks. Active transportation, and pathways more specifically, have been shown to provide a number of diverse benefits, in terms of:[1,2]

- Public Health / Safety
- Environment
- Economic / Financial savings
- Quality of Life
- Transportation Connectivity

Recognizing the value and wide-ranging benefits of active transportation, the Town of Okotoks adopted an Active Transportation Strategy in 2015 with the long-term goal of "transforming a vehicle-reliant community into a place where all citizens – including walkers, motorists, cyclists and other users – share a common vision and goal for future transportation needs".[3] The strategy contains a number of planning goals and objectives related to an active transportation system. Some of the goals are more specific to improving the community's pathways, such as the following:

- Improve active transportation in existing neighborhoods and commercial areas
- Identify, implement and maintain a system of safe routes throughout Okotoks for all active transportation users
- Improve maintenance of active transportation network

Existing Pathway Network

Okotoks currently contains over 49 km of community pathways[4] that connect residents to parks, schools, community centres, shopping and employment areas. The system is organized as eight (8) specified Pathway Routes and a series of smaller Pathway Connections that connect Routes with localized destinations (**Table E 6.1)**.

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[1] Town of Okotoks. (2015). Active Transportation Strategy (Draft).
[2] Federation of Canadian Municipalities. (2011). Active Transportation in Canada: a resource and planning guide. Available online at: https://www.fcm.ca/Documents/tools/GMF/Transport_Canada/ActiveTranspoGuide_EN.pdf
[3] Town of Okotoks. (2015). Active Transportation Strategy (Draft); pg. 5.
[4] Per information provided in the "Okotoks Pathway" map

TABLE E 6.1 SUMMARY OF EXISTING PATHWAY ROUTES[5]

Pathway Route		Approximate Distance
32nd Street Pathway	Parallels 32nd Street from Crystal Green Lane (north) to Southbank Boulevard (south)	3.9 km
Cimarron Parkway Pathway	Connects the Sheep River path southwest through the Cimarron neighborhood	1.3 km
Cimarron Storm Pond Pathway	Circles the Cimarron Storm Pond, with connections to the 32nd Street path	1.8 km
Crystalridge Pathway	Circle route around Crystals Shores Lake and nearby residential areas	3.7 km
Drake Landing Pathway	Circle route within the Drake Landing neighborhood	1.0 km
Max Bell Parkway Pathway	Extends west of Hemus Parkway / Northridge Drive via the Sheep River south bank	1.1 km
Sheep River Valley Pathway	Circle pathway on the north and south bank of Sheep River, with crossings via Hemus Parkway / Northridge Drive and 32nd Street	7.7 km
Westmount Pathway	Circular route through the Westmount neighborhood, connecting to Westmount School	1.9 km

Activity and Challenges

Pedestrian / cyclist volumes were collected using automated counters as part of the 2013-2014 active traffic counts on key pathways (**Table E 6.2**.).

Through public consultation as part of the development of the Active Transportation Strategy, a number of broad issues were identified with the existing pathway network:

- The stair locations on the Town's main pathways are difficult for some residents due to the steep escarpment;
- Snow is not cleared on all connecting pathways;
- There is a lack of bridges in some areas of the Town; and
- Directional and informational signage on pathways is lacking.

[5] Based on identified "Sample Routes" on the Okotoks Pathways map

TABLE E 6.2 SUMMARY OF ACTIVITY ON KEY PATHWAY CORRIDORS[6]

	Average Trips (approx.)	
	Daily	Annual
Woodbend Pathway (Sheep River Valley Pathway)	210	77,000
McAlpine Crossing (Sheep River, 32nd Street Pathways)	90	33,000
LDS North Pathway (Crystalridge Pathway)	90	34,000
Crystalridge (Crystalridge Pathway)	90	32,000
Veterans Way (Connector Pathway)	440	160,000
Laurie Boyd Bridge (Connector Pathway)	130	47,000
Hemus Parkway (Connector Pathway)	40	15,000

Results from the Town's 2013 Community Household Survey provided insight on the strengths and weaknesses of the existing pathway network.

- Approximately 59% of survey respondents either strongly agreed or agreed that wider sidewalks / pathways would encourage them to walk or cycle more often;
- Approximately 54% of survey respondents either strongly agreed or agreed that improved sidewalk and pathway maintenance would encourage them to walk or cycle more often; and
- Approximately 66% either strongly agreed or agreed that more connections to key destinations (i.e., shopping centres, schools, downtown) would encourage them to walk or cycle more often.

Future Pathway Network

A series of priority pathway improvements identified in the Active Transportation Strategy are shown on **Table E 6.3** and. **Figure E. 6.1.**

[6] Count data based on "Active Traffic Counts, 2013-2014" findings, from Active Transportation Strategy – Background Research Documents 4: Pathway Counter Data, pg 58.

TABLE E 6.3 SUMMARY OF PATHWAY NETWORK IMPROVEMENTS

1.	**Crystalridge South Pathway -** Pathway between 32nd Street / Stockton Avenue intersection and southeast corner of Wylie Athletic Centre site via existing Pathway Connections, with new connection to south end of Crystalridge Pathway.
2.	**Clark Stairs to Ecole Okotoks Connection -** Pathway connection from Clark Stairs to Ecole Okotoks Junior High School and extending to Percy Pegler Elementary School.
3.	**Foothills School Pathway -** Pathway on the west side of Foothills Composite High School and Howard Park to connect Southridge Drive sidewalk to North Howard Park pathways.
4.	**Ecole Good Shepherd Pathway -** Develop pathway system from Waldron Ave / Visser Way intersection through Tower Hill Park to Ecole Good Shepherd Elementary School.
5.	**Milligan Drive Connection -** Short pathway connecting sidewalks on Milligan Drive to the Crystalridge Pathway via the Fire Hall site.
6.	**St. Mary's School Connection -** Pedestrian bridge and pathway to connect Cimarron pathway to the east side of St. Mary's Elementary School.
7.	**Cornerstone Pathway -** Pedestrian corridor through Cornerstone (large-scale retail site) to connect a pathway to the south and west businesses.
8.	**Big Rock School Pathway -** Pathway along the east side of the Big Rock School site connecting Big Rock Trail to Hunters Gate.
9.	**Railway Pedestrian Crossing Improvement -** Wider pedestrian crossing and direct pedestrian connection through to Elizabeth Street.

Future Growth Areas

The Town has identified "Priority Growth Areas" where new development will be compact, mixed-use and walkable[7]. Many of these growth areas are located in the northwestern, northern, and northeastern areas of the Town, both within and beyond current Town boundaries. See **Figure E 6.2**.

Developing a connected and well-designed pathway system will be important in realizing the sustainable and walkable development objectives of the Town in new growth areas. The Town should consider the following provisions for pathway development in the design of future development areas.

1. All new households (single-family or multi-family residential) should be within 200m walking distance[8] of a pathway to afford reasonable access to pathways.

[7] Town of Okotoks. (2014). Town of Okotoks Growth Study and Financial Analysis. Available online at: http://www.okotoks.ca/sites/default/files/pdfs/publications/3736_FULL_REPORT_-_Town_of_Okotoks_Growth_Study_and_Financial_Analysis_-_20140218_0.pdf

[8] Walking distance is measured as the actual distance an individual walks using a dedicated walking facility, and is not necessarily a straight line (i.e. not "as the crow flies").

2. Any existing pathways leading to the edge of a future development site should be extended into that site once development occurs to create continuity in the pathway network.
3. Dead ends (or cul-de-sacs) should be avoided as they increase trip length and reduce route options. No new dead ends are to be developed without a pathway allowing for a non-motorized connection.
4. Coordinate pathway routes and future bus stop locations to provide for walking and cycling access to/from public transit.
5. Pathways should be considered adjacent natural features (i.e., rivers, lakes, slopes) where integrated into subdivision layout, as these routes provide an opportunity for access to nature and continuous off-road pathway routes.
6. All future pathways should be designed to a high-quality, with surface finishing that is appropriate for the context, width that is reflective of intended user type and volume, and supporting amenities as appropriate.

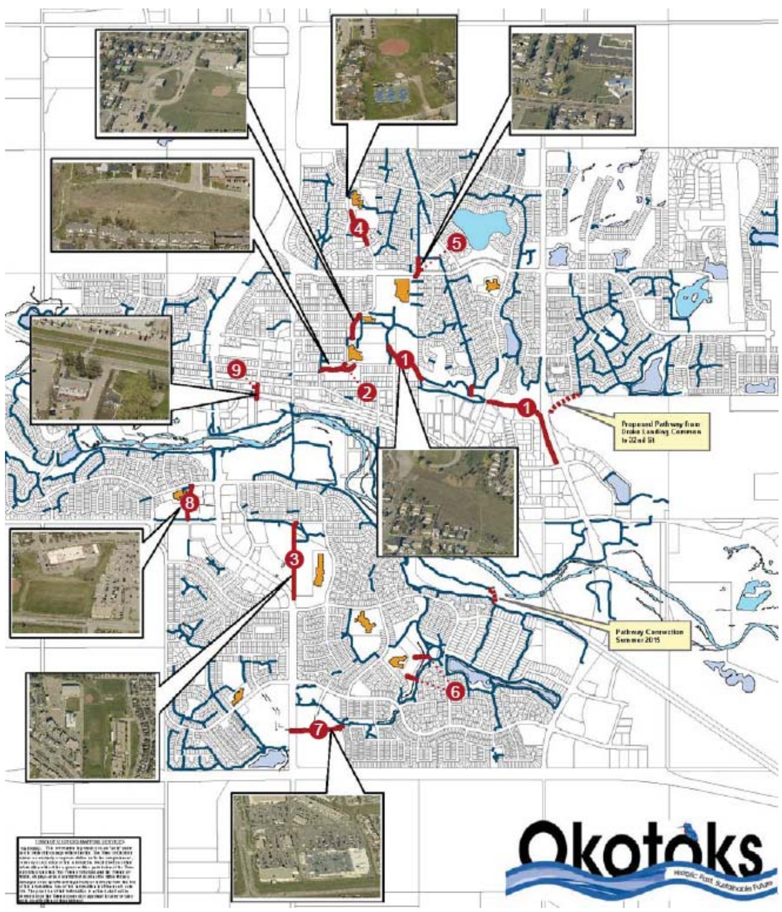


Figure E 6.1 Priority Pathway Connections + Improvements[9]

[9] Okotoks Active Transportation Strategy, pg 31.

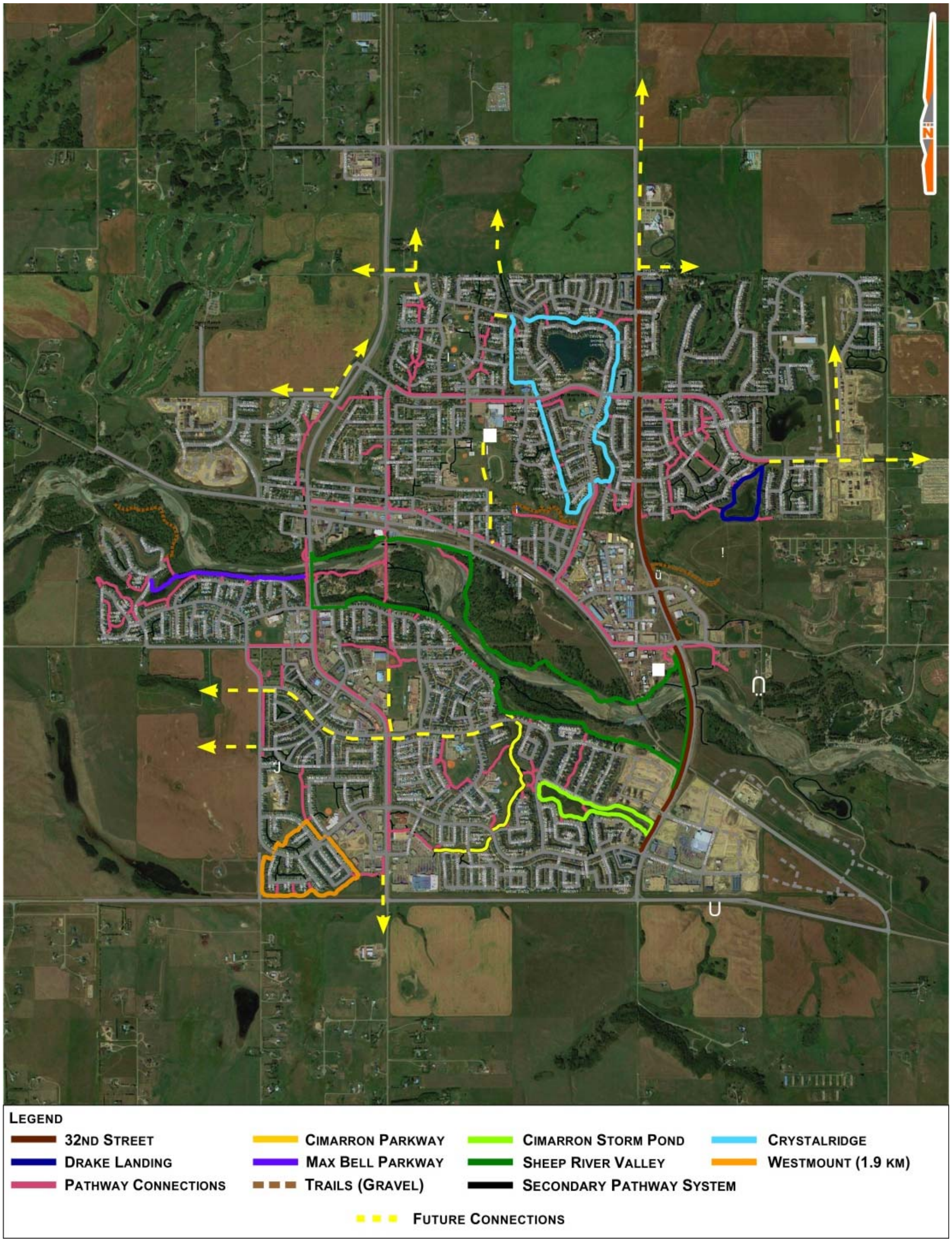


Figure E 6.2 Future Pathway Connections to Annexed Areas

E7 Traffic Calming

The *Canadian Guide to Neighbourhood Traffic Calming* recognizes traffic calming features in four (4) categories - obstructions, vertical deflections, horizontal deflections and signs.

TABLE E 7.1 RECOMMENDED TRAFFIC CALMING FEATURES

A. Obstructions	
A1. Full Closure	A4. Intersection Channelization
A2. Directional Closure	A5. Raised Median Through Intersection
A3. Diverter	A6. Right-in, Right-out Island
B. Vertical Deflections	
B1. Raised Intersection	B4. Rumble Strips
B2. Raised Crosswalk	B5. Sidewalk Extension
B3. Speed Hump	B6. Textured Crosswalk
C. Horizontal Deflections	
C1. Chicane	C4. On-Street Parking
C2. Curb Extension	C5. Raised Median Island
C3. Curb Radius Reduction	C6. Traffic Circle
D. Signs	
D1. Traffic Calmed Neighbourhood Sign	D3. Turn Prohibited Sign
D2. Through Traffic Prohibited Sign	
E. Technology	
E1. Radar Message Sign	E2. In-Ground Lights

Applications

Traffic calming features could be used separately or in groupings. Introduction of the traffic calming features should include consideration for the potential benefits of each in the categories of speed reduction, volume reduction and conflict reduction. Each of the traffic calming features has a specific function:

- **Obstructions -** These features obstruct specific vehicle movements. They discourage short-cutting to varying degrees depending on the type and number of features applied, reduce conflicts, and enhance the neighbourhood environment. They are typically used at intersections, but can also be applied mid-block.
- **Vertical Deflections -** Vertical deflections require a motorist to slow to avoid unpleasant sensations due to a variation in surface level. Vertical deflections have the primary benefit of reduced vehicle speeds, but also result in decreased volumes, reduced conflicts and enhanced pedestrian conditions.
- **Horizontal Deflections -** Horizontal deflections require a motorist to alter their direction or choose an entirely different route. Horizontal deflections can be applied to reduce neighbourhood short-cutting to reduce vehicle speeds or to reduce conflicts.
- **Signage -** Signage features regulate traffic movements within a neighbourhood and in many cases may be replaced with physical features that do not require enforcement.
- **Technology -** Certain technologies exist that may be used as traffic calming to communicate a message to motorists about the intended use of a street (i.e., radar message signs, in-ground lights).

E8 Transit

Public transit is a viable mode of transportation that is crucial to the livability of any town, city, or region. Its benefits are extensive as it helps contribute to public health, the environment, access and mobility, economic savings and quality of life. More specifically, public transit has been shown to provide benefits in the following areas: [10,11]

- Public Health / Safety.[12]
- Environmental Sustainability[13]
- Improved Mobility
- Economic / Financial

[10] Public Transport Victoria. (2013). Benefits of public transport. Available online at: http://ptv.vic.gov.au/about-ptv/media-centre/student-media-enquiries/benefits-of-public-transport/

[11] American Public Transportation Association. (2016). Public Transportation Benefits. Available online at: http://www.apta.com/mediacenter/ptbenefits/Pages/default.aspx

[12] Transport Canada. (2014). Canadian Motor Vehicle Traffic Collision Statistics 2014. Available online at: https://www.tc.gc.ca/media/documents/roadsafety/cmvtcs2014_eng.pdf

[13] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report.

There are several other public transit benefits that are specific to the Town of Okotoks including its potential ability to support retail businesses by providing additional clientele, helping make the downtown more of a travel destination and supporting employment mobility, particularly for service-based industries and larger employers in the Town.[14]

Transit Feasibility Study for the Town of Okotoks

In 2010, Calgary Transit conducted a *Transit Feasibility Study* for the Town of Okotoks that included an assessment of the potential market for transit, the diverse benefits associated with transit and estimates for the capital and operating costs that would be required for a local and regional transit system. The study concluded that public transit is viable in the Town and that the provided service would have sufficient demand to support round trips connecting with the LRT network in Calgary every 30 minutes in the AM and PM peak periods.

Service Standards

The following service standards describing the conditions the new transit system is seeking to achieve were developed for the *Transit Feasibility Study* and should be used to guide transit implementation in future.

- **Service Coverage** - Maximize the number of dwellings within 400-600m walking distance of public transit.
- **Service Frequency** – Minimum 30-minute service frequency for regional and local services.
- **Span of Service** – Focus on weekday AM and PM peak periods, then expand to weekday mid-day and weekend service.
- **Timed Transfer** - Orient routes and schedules to provide efficient transfers between routes.
- **Vehicle Loading** - Seated loads, except for a portion of trips on local service in peak periods
- **Accessibility** - 100% low floor accessible vehicles, sidewalk connections to bus zones and wheelchair curb cuts at adjacent intersections.
- **Comfort** - Prioritization of shelters at bus stops and review of customer amenities on regional buses.
- **Ridership Targets** - Initial targets of 35 passenger per trip in the peak direction and 8 passengers per trip in the reverse flow on regional service, and 5-10 passengers per operating hour on local service.

Pilot Service

The Town is one of five communities involved in the **On-It** regional transit system, an initiative of the Calgary Regional Partnership beginning in fall 2016. The two-year pilot service will include a **Regional** transit service to Calgary and a **Local** service connecting neighborhoods within Okotoks. The service is intended to provide residents of Okotoks and surrounding communities

[14] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report.

the chance to commute into Calgary without having to be reliant on their vehicles. More information is provided in the following sections.

Regional Routes

The regional transit route will provide residents of Okotoks with an express bus service to the Somerset-Bridlewood LRT station in Calgary.[15] The buses will start service from the community of High River and Turner Valley and proceed through Okotoks before heading to Somerset-Bridlewood LRT station. **Figure E 8.1** shows the proposed regional transit route through Okotoks (connection to Turner Valley and Black Diamond via Highway 7 not included).

Based on the proposed transit schedule, the service will stop at the two proposed park-and-ride locations in Okotoks:

1) Okotoks Recreation Centre (north park-and-ride located on Milligan Drive and Visser Way) and
2) Centennial Arena (south park-and-ride located on Community Way).

According to the transit schedule, there will be fifteen buses daily servicing regional routes (**Figure E 8.1**) that stop at the Centennial Arena park-and-ride before heading to the Somerset-Bridlewood LRT station in Calgary. Fifteen bus stops servicing regional routes will be constructed. Buses departing the Somerset-Bridlewood LRT station to the southern communities are scheduled to stop at the Centennial Arena park-and-ride eight times per day. Buses will operate at 15-30 minute headways during peak times.

[15] Campbell, B. (2016). Transit coming to Okotoks in 2016. *Okotoks Western Wheel*. Available online at: http://www.westernwheel.com/Transit-coming-to-Okotoks-in-2016-20150924

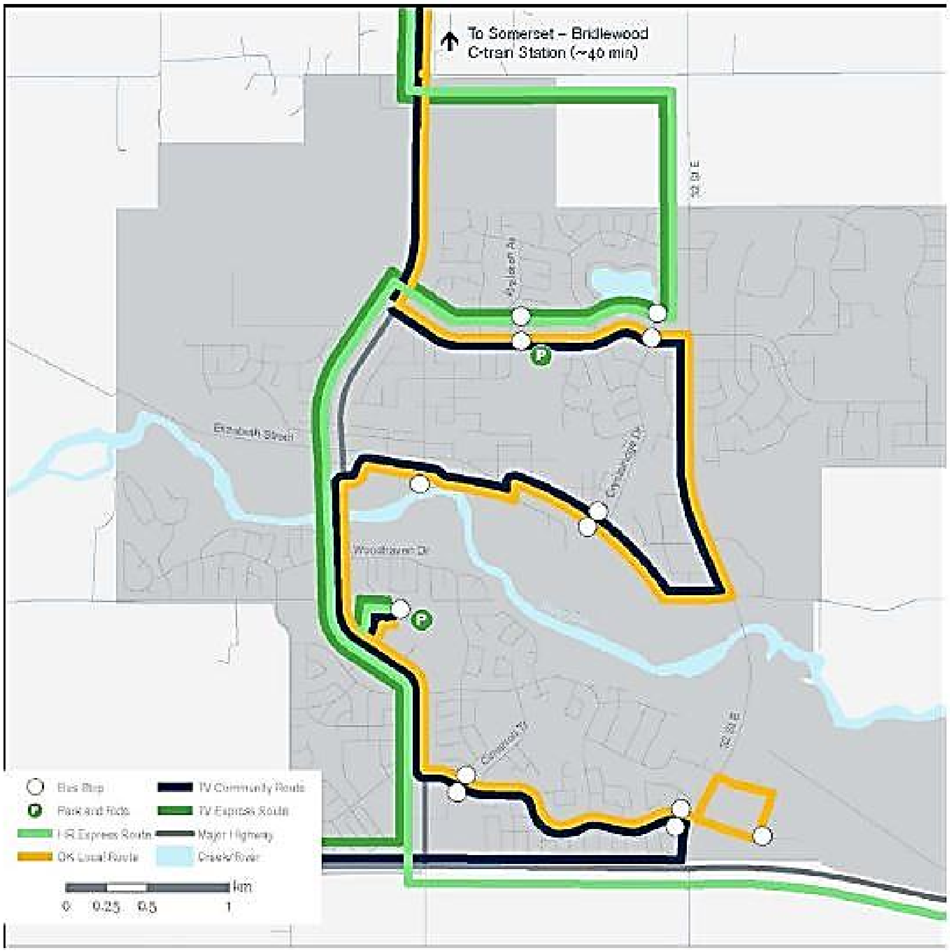


Figure E 8.1 Regional Transit Route (Okotoks only)[16]

Local Routes

Three local routes are identified as part of the pilot service. It is expected that 33 bus stops will service the local bus routes. Local routes will provide service to a number of important destinations in the Town, including the Okotoks Recreation Centre, Centennial Arena, and the Okotoks Health & Wellness Centre, though no bus stops are shown in the downtown area which may limit service for downtown employees and businesses.

The local rotes are not finalized. Further studies are expected to review routing following pilot project before the original routes could be finalized.

[16] Figure provided by the client.

Infrastructure

Bus Stops

A total of 33 bus stops are considered part of the pilot service in Okotoks. However, no information was available about the bus stop infrastructure (e.g., basic bus stop versus enhanced bus stop). As well, no information was available pertaining to the spacing of the bus stops. **Section 8.3** provides more information about the type of bus stop Okotoks may want to consider if the pilot becomes permanent.

Park-and-Rides

Park-and-rides will be provided in two locations - Okotoks Recreation Centre and Centennial Arena. These locations are appropriate due to their large, publicly-held parking supplies, adjacency to key transit trip generators and compatibility with proposed bus routes. [17]

Future Transit Plan

At the end of the two-year pilot service (Fall 2018), a decision will be made as to whether to continue the service in its "pilot" form, continue the service in an altered form, or discontinue the service altogether. Monitoring and performance measures in the *Transit Feasibility Study* will be used to assess the extent to which the pilot service has met the defined Service Standards and how to proceed with public transit in Okotoks.

Network / Route Consideration

Local and Regional routes are planned and operated by Calgary Regional Partnership. The Town, as a stakeholder in the transit service and representing the local ridership base, will advise Calgary Transit on local transit matters. The pilot Local and Regional bus routes will be evaluated once the two-year pilot project duration is completed. Although the suitability and effectiveness of those routes cannot be meaningfully evaluated until that time, the following network / route considerations should be kept in mind when reviewing the pilot service and considering permanent transit service:

- Extension of route coverage into the Air Ranch neighborhood,
- Extension of route coverage into the Southbank Business Park,
- Extension of route coverage into Priority Growth Areas defined in the Town's *Growth Study and Financial Analysis,*
- Extension of route coverage into areas with a higher concentration of commercial, service, office, and residential land uses,
- Consideration of providing higher frequency service in the Town's downtown area,
- Extension of route coverage into the Westridge neighborhood.

[17] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report. Pg.21.

Transit Infrastructure

The bus stop and park-and-ride locations used during the pilot service may initially be used for the permanent service; however, permanent, purpose-designed transit infrastructure will be required.

Bus Stops

Location - A bus stop placed in the right location can make a big difference for transit users. A number of organizations have published criteria on where to locate bus stops accounting for:

- Locations Close to Key Destinations
- Far-Side vs. Near-Side Configuration
- Visibility of Locations
- Serving Multiple Routes.[18]

Bus stop spacing is an important consideration. The goal is to balance the competing objectives of access / convenience and limiting bus travel time.

Preferred bus stop spacing criteria are identified in **Table E 8.1.**

TABLE E 8.1 BUS STOP SPACING CRITERIA[19]

	Typical Spacing	Spacing Range
Downtown / Central Business District	200m	200 - 300m
Urban Area	230m	200 - 365m
Suburban Area	300m	200 - 760m
Rural Area	380m	200 - 800m

Bus Stop Design / Layout

Bus stops should be designed so they are safe, accessible and comfortable. This involves careful consideration of the layout of the bus stop site, passenger amenities, and the walking routes and pedestrian environment nearby.

The Town should consider developing a standardized bus stop layout and design that meets universal accessibility criteria.

Bus Stop Improvement Program - The Town should pursue a bus stop improvement program to build-out permanent bus stop infrastructure if a permanent transit service is implemented. The Town should aim to install basic bus stops at all system bus stops within the first five years

[18] Washington Metropolitan Area Transit Authority. (2009). Guidelines for the Design and Placement of Transit Stops for the Washington Metropolitan Area Transit Authority. Availability online at: https://www.wmata.com/pdfs/planning/WMATA%20Guidelines-Design%20and%20Placement%20of%20Transit%20Stops.pdf

[19] Recommended bus stop spacing criteria based on BC Transit Infrastructure Design Guidelines. Table 3.1, pg. 15. Available online at: http://bctransit.com/servlet/documents/1403640670226

of the permanent service and ultimately plan to upgrade enhanced bus stops at 50% of the stops within twenty years.

Planning for Park-and-Rides - The intent of providing park-and-rides in Okotoks is for local residents to park their vehicles in order to access the Regional service into Calgary. The pilot system will include park-and-rides at the Okotoks Recreation Centre and Centennial Arena. These locations are appropriate due to their large, publicly-held parking supplies, adjacency to key transit trip generators, and compatibility with proposed bus routes.

Permanent park-and-ride locations should be established if a permanent transit system is pursued. This will involve determining if the pilot locations are appropriate long-term sites. Park-and-Ride utilization should be monitored during the pilot phase to determine the number of park-and-ride vehicles utilizing each site. A study at the end of the two-year pilot should be conducted to determine if each site can accommodate the Park-and-Ride demand as part of the long-term utilization of the site.

Monitoring and a follow-up study at the end of the pilot service will help project the parking capacity needs of future park-and-ride locations.

REPORT

REPORT

Introduction

The Town of Okotoks (Town) is currently in the process of annexation to acquire enough land for 60 years of growth (**Figure 1.1**). The previous TMP, completed in 2008, was completed with the previous (limited) growth model that Okotoks was following at the time. With the Growth Management Study (completed in 2013), an update to the 2008 model was completed to identify potential transportation impacts related to annexation at the 30 and 60-year planning horizons. The Growth Management Study concentrated on anticipated large-scale transportation network improvements; specific impacts within the existing road network were not assessed. Consequently, The Town of Okotoks needed a complete TMP update which took in to consideration the Growth Management Study, anticipated development plans, the Active Transportation Strategy, the 2008 TMP update, the Northridge Drive / 338th Avenue Functional Study, the Downtown Parking Study, the CRP Calgary Regional Transit Plan and the Calgary Metropolitan Plan.

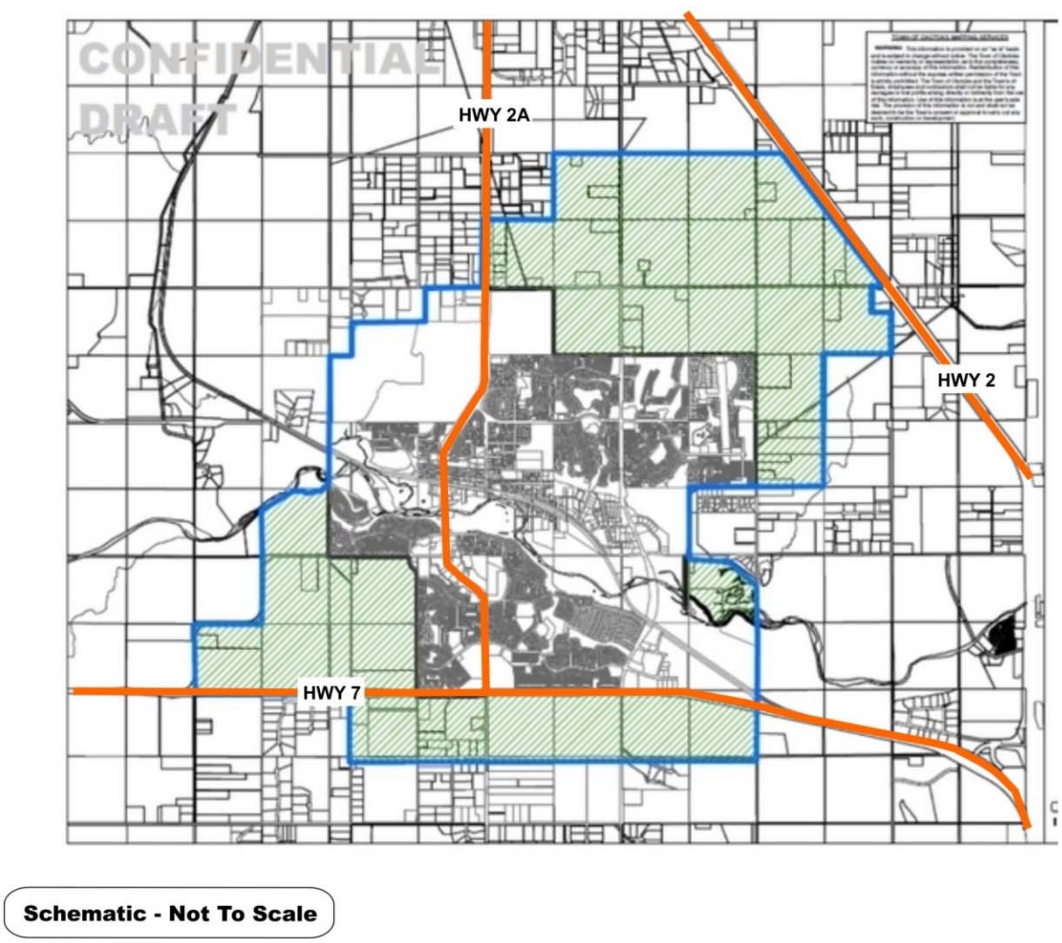


Figure 1.1 Town of Okotoks – Annexation Area

Purpose of the Study

The purpose of this study is to identify a long-term improvement strategy for the transportation network accounting for the Okotoks and regional growth plans and the current transportation trends.

2.2 Study Objectives

The objective of this study was to define the transportation network for the Town of Okotoks within its new boundaries following annexation, to identify improvements required to accommodate future development and the timing of those improvements, and to address such aspects as transit, traffic calming and a multimodal approach to transportation.

2.3 Study Scope

The scope requirements for the TMP update were defined as follows:

- Collection and review the background data including
  - Current data within the existing corporate limits
  - Future growth within the existing corporate limits
  - Future growth in the proposed annexation areas
- Review of existing traffic data
- Review and confirmation of existing transportation road network base mapping
- Review and confirmation of existing traffic control and lane arrangements
- Identification of the existing / emerging transportation conditions
- Review of the available documentation and base mapping
- Assessment of the existing conditions (intersection capacity analysis, link analysis, railway crossing assessments)
- Identification of emerging issues
- Active Modes
  - Review of the existing network
  - Assess the walking and cycle networks
  - Development of the proposed options including recommendation to enhance the network.
- Traffic Forecasting Model Development
  - Development of the VISUM-based Traffic Forecast Model
  - Recalibration to the current traffic levels
  - Development of the traffic forecasts for the 10-year, 20-year and 30-year planning horizons that include lands both within the current Town boundary and in proposed lands for annexation.
  - Provision of traffic forecast for the long-range annexation planning horizon
  - Assessment of future traffic conditions

- Analysis of the future road requirements for the short-term (10 year), medium-term (20 year), long-term (30 year) planning horizons.
- Identification of the road infrastructure expansions or upgrades required for the short term (10 year),medium term (20 year) and long term (30 year) timelines
- Development of a staging program that identifies development corridors and areas, in the order in which those corridors and areas should be developed.

* Assessment of Future Truck Routing
* Development of improvement schedule and cost estimates
* Preparation of the draft report summarizing findings
* Presentation results of the study to Administration and Council

Input Information and Tools

This section of the report summarizes information used in the study and tools used in the study process.

2.1 Land Use Scenarios

Land use scenarios and progression of the associated development were identified by the Town staff and this information was used in the study. **Figure 2.1** shows the assumed schedule and progression of the development.

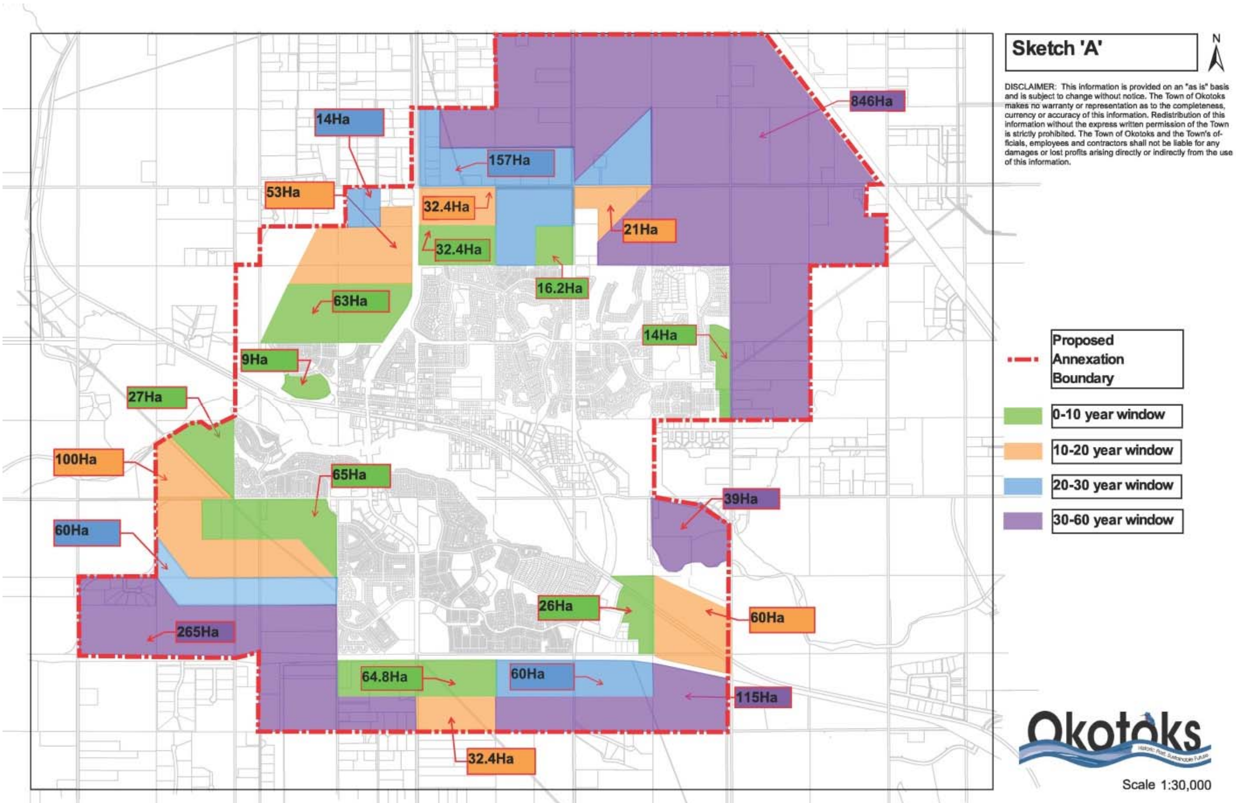


Figure 2.1 Anticipated Progression of the Development

2.2 Traffic Data

The existing traffic data was provided by the Town and the count locations are shown in **Figure 2.2** while the existing traffic volumes are summarized in **Figure 2.3**.

Figure 2.2 Existing Traffic Count Locations

Figure 2.3 Existing PM Peak Traffic Volumes

2.3 Traffic Forecasting Model

For this study the traffic model developed for the MD of Foothills representing p.m. peak hour volumes was used. It was based on the City of Calgary Regional Model and it was intended as a multimodal transportation demand forecasting tool to support the MD's short and long-term goals, policies and objectives as related to management of land use and the transportation network. It incorporates the Town of Okotoks, the City of Calgary, the MD of Foothills, High River and all of the other Hamlets inside the MD of Foothills.

Incorporating the data from the MD of Foothills and the City of Calgary with the Town of Okotoks data permits an assessment that accounts for the close relationship between the locales in terms of origin and destination of the vehicular trips.

The traffic forecasting model was developed based on existing traffic volumes and land use data. It should be noted that the analysis carried out with the help of the model is fully dependent on the accuracy of the data entered into the model.

2.3.1 Network Assumptions

Links, nodes, zones and connectors form the basic skeletal structure of the VISUM model. Links represent the roads, nodes the intersections and zones represent the different land use / traffic generators broken down by area.

Links - Links connect nodes and consequently represent and describe the road infrastructure. Each link has a particular direction, and each link has several attributes assigned to it – i.e., link number, length, speed, link type (road classification), capacity, and number of lanes.

The speed attribute on links reflects the actual posted speed of each road segment. The link capacity is defined by the link type and road classification. The road classifications inside the Town of Okotoks was based on their road classification, outside their boundaries it was based on the MD of Foothills and the City of Calgary's road classifications; however, in a few cases, road parameters in the model needed to be adjusted to reflect their function in the field rather than their actual classification.

Nodes - Nodes are objects which define the position of intersections in the network. Each node has different attributes such as node number, node type and traffic control at the intersections (signalized, 2-way stop, unsignalized, roundabout). Nodes are also the start and end points of links.

Zones - Zones, also called traffic cells, describe areas with a particular set of land uses and their location in the network (e.g., residential areas, commercial areas, shopping centres, industrial areas, hospitals and schools). They are the origin and destination of trips within the network and represent areas of traffic production and attraction.

The zone system is used to disaggregate the study area into small areas and grouping regions with similar demographic and economic land uses. Zone borders are often defined by natural boundaries (main roads, highways, etc.).

In total there are 638 traffic zones defined within the model area – 157 Zones for the Town of Okotoks and the future areas. **Figure 2.4** shows the assumed zone system and their boundaries. A detailed zone map can be found in **Appendix I**

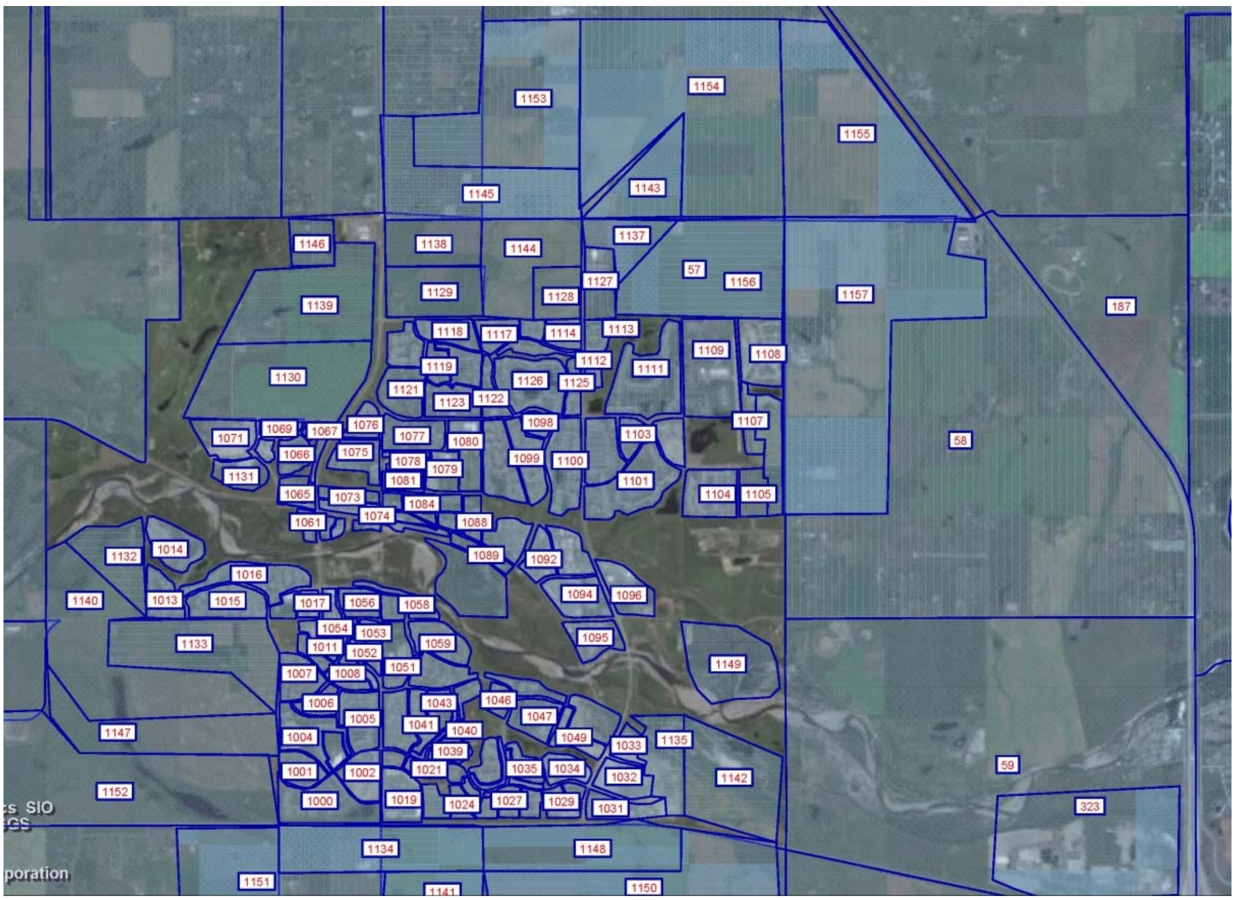


Figure 2.4 Town of Okotoks Traffic Zone

Connectors - Connectors connect zones to the link network; they represent the access and egress points between the zone's center of gravity and the road network. Each zone can have numerous connectors that disperse traffic to several points on to the links. The amount of traffic that uses each individual connector can be changed based on observed distributions / desire lines within a community.

2.3.2 Existing Population and Employment

Population - The existing population and land use zoning data for the traffic model was provided by the Town of Okotoks. The data was disaggregated into following categories:

- Residential Population
- Agricultural Employment
- Mining and Oil & Gas Extraction, Processing, and Support
- Manufacturing, Utilities, and Construction
- Education Services
- Government (Public Administration)
- Health Care and Social Assistance
- Other Services including management, information, repair
- Professional, Scientific, and Technical Services
- Retail, Trade
- Transportation and Warehousing
- Wholesale Trade
- Entertainment, Arts, Recreation, Hotel and Food Services

Surrounding Areas

The following information obtained by WATT was introduced in to the model:

- The City of Calgary – Super-zones (combined the Transportation zones to larger super-zones) and their land use information for the different horizons.
- MD of Foothills – The 2015 traffic model was used
- High River - The 2011 traffic model of High River provided by ISL Engineering was incorporated into the model

Model Structure

The model uses the traditional four-step demand modelling approach:

- Trip generation
- Trip distribution
- Mode split
- Trip assignment

Trip Generation

The traffic model is designed to predict the p.m. peak hour volumes. The trips taken during the p.m. peak hour can be divided into three basic trip types.

- **Home-Based Work (HBW)** - During the p.m. peak hour, these trips (home to work and work to home) are primarily generated by the employment areas and attracted to the residential areas and reversed.

- **Home-Based Other (HBO)** - During the p.m. peak hour, these trips (home to others and others to home) are normally attracted to retail areas and generated by the residential areas and reversed.
- **Non-Home Based (NHB)** - During the p.m. peak hour, these trips are mainly generated by the employment areas and attracted to the retail areas.

Each of these trip types has different characteristics and therefore produces different travel patterns.

External-external trips are through trips. They are trips that originate in and are destined to external zones.

Table 2.1 summarizes the trip generation rates and the directional distribution for the land uses and the trip purposes that were used in the model.

TABLE 2.1 TRIP GENERATION RATES

Land Use	Unit	Generation Rate	Split		Trip Type Split			Trip Generation Rates					
								HBW		HBO		NHB	
			In	Out	HBW	HBO	NHB	In	Out	In	Out	In	Out
Population	Population	0.25	75%	25%	40%	60%	0%	0.07500	0.02500	0.11250	0.03750	0.00000	0.00000
Population_okotoks	Population	0.34	75%	25%	40%	60%	0%	0.10200	0.03400	0.15300	0.05100	0.00000	0.00000
Agriculture	Employees	0.045	21%	79%	40%	30%	30%	0.00378	0.01422	0.00284	0.01067	0.00284	0.01067
Industrial	Employees	0.18	44%	56%	40%	30%	30%	0.03168	0.04032	0.02376	0.03024	0.02376	0.03024
Retail	Employees	1.5	50%	50%	30%	30%	40%	0.22500	0.22500	0.22500	0.22500	0.30000	0.30000
Office	Employees	0.23	17%	83%	40%	40%	20%	0.01564	0.07636	0.01564	0.07636	0.00782	0.03818
Educational	Employees	0.27	46%	53%	25%	65%	15%	0.03105	0.03578	0.08073	0.09302	0.01863	0.02147
Mining	Employees	0.045	21%	79%	40%	30%	30%	0.00378	0.01422	0.00284	0.01067	0.00284	0.01067
Government	Employees	0.23	17%	83%	40%	30%	30%	0.01564	0.07636	0.01173	0.05727	0.01173	0.05727
Hospital	Employees	0.145	71%	29%	35%	55%	10%	0.03603	0.01472	0.05662	0.02313	0.01030	0.00421
Other Service	Employees	0.23	17%	83%	35%	55%	10%	0.01369	0.06682	0.02151	0.10500	0.00391	0.01909
Transpo warehouse	Employees	0.295	35%	65%	40%	30%	30%	0.04130	0.07670	0.03098	0.05753	0.03098	0.05753
Wholesale	Employees	1	50%	50%	40%	30%	30%	0.20000	0.20000	0.15000	0.15000	0.15000	0.15000
Entertainment	Employees	0.75	50%	50%	40%	30%	30%	0.15000	0.15000	0.11250	0.11250	0.11250	0.11250

Trip Distribution - After the trip generation is established for each zone, the trips are distributed amongst the network in origin-destination pairs. Each trip originates in one zone and has a destination in another zone. The distribution is conducted as a function of the zonal land uses, the established origin-destination travel patterns and the characteristics of the transportation network.

Mode Split - The mode split is the proportion of people using a certain type of transportation – e.g., walking and car, or heavy vehicle and light vehicle.

Given that the traffic model represents a more conservative approach as there is limited use of the transit system, it was assumed that 100% of trips were passenger vehicle traffic. This could be modified to represent additional traffic modes if desired at a later date.

Trip Assignment - The resulting origin-destination pairs are then assigned to the transportation network using an "equilibrium assignment." This process allocates traffic to links so as to minimize the cost of travel for the vehicle between the origin and destination zones. The cost is defined as travel time with a monetary cost expressed in terms of value of time. The model runs multiple iterations to create the "equilibrium assignment."

Model Calibration - Model calibration is an iterative process that involves changing the existing model attributes to adjust the travel patterns to match the counted turning movements at the intersections and screen lines.

A regression model was used to verify if the model was calibrated well. Models with an **R^2 of 0.8** or higher are considered good. Some exceptions should be noted – e.g., low volume roads which are difficult to calibrate accurately as small shifts in volume can improve or worsen the results.

Overall a total of 849 locations were used for the model calibration and 248 locations specifically for the Town of Okotoks.

As shown, the regression analysis calibration results in an **R^2 of 0.91**. The calibration has resulted in a good correlation between observed volumes and predicted volumes.

Figure 2.5 illustrates the overall network calibration results.

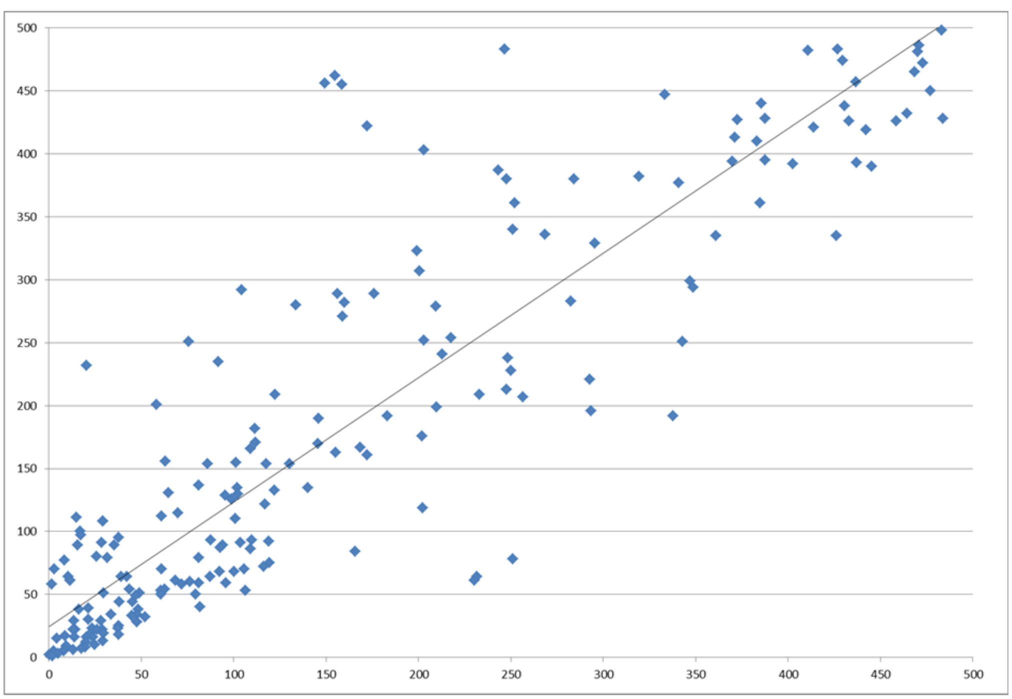


Figure 2.5 Calibration Result – Counted Volumes – Modeled Volumes

2.4 Existing Network

The existing skeletal network was analyzed in terms of capacity and operation based on the most recent traffic count results supplied by the Town. **Figure 2.6** shows locations of the analyzed intersections while **Figure 2.7** summarizes level of service at these intersections.

It should be noted that the Level of Service (LOS) is expressed as a letter between A and F, where conditions with a LOS D or better may not necessarily require improvements. Level of Service is also related to delays at the intersections. For more detailed information see **Appendix II**.

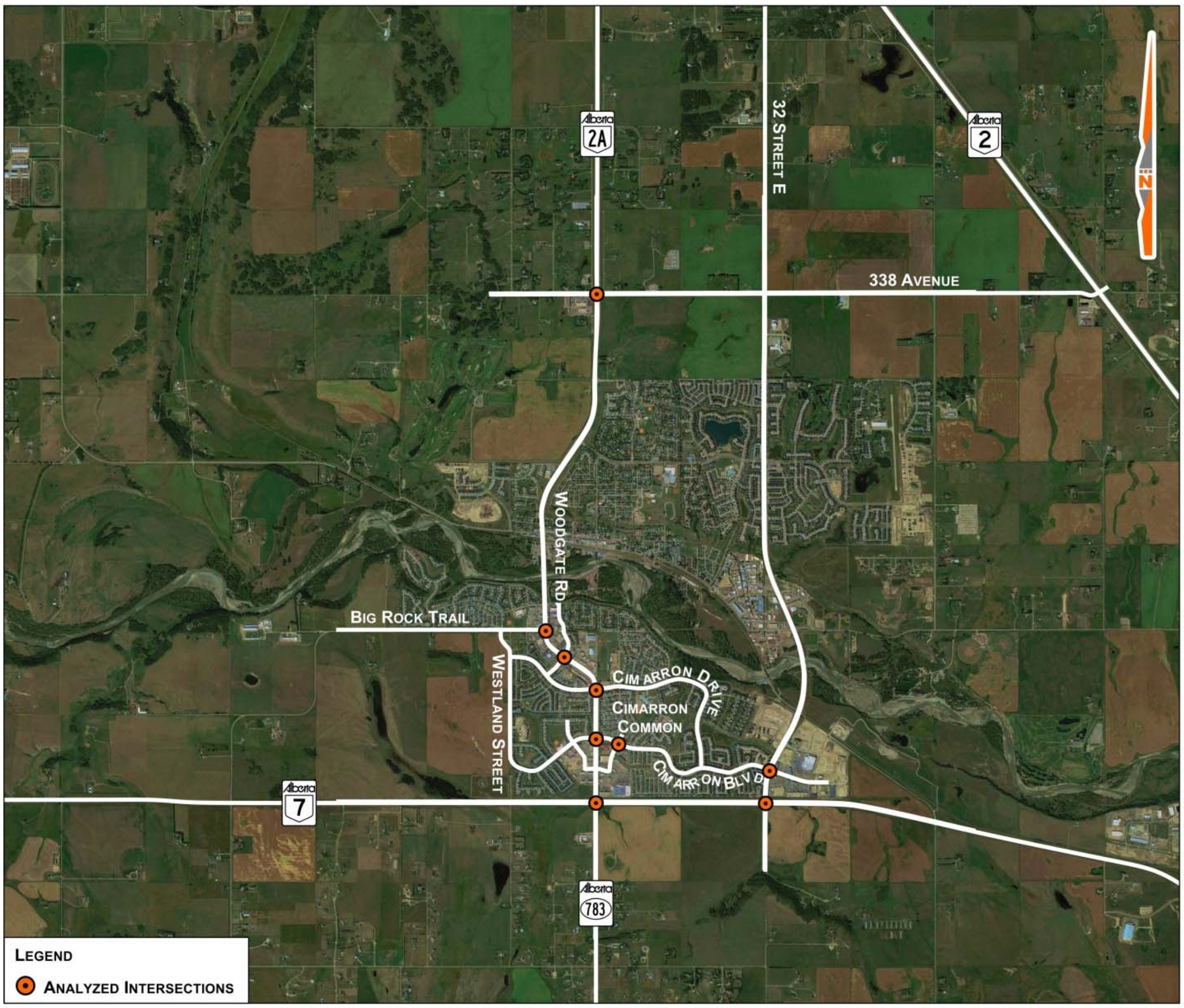


Figure 2.6 Analyzed Intersections

Figure 2.7 Existing Operational Conditions

2.4.1 Operation and Level of Service

According to results of the analysis, all analyzed intersections operate at a LOS C or better and do not require improvements at this time.

Analysis

This section summarizes results of the analysis of the impact of the future development on the skeletal transportation network.

Results of the Analysis

The summary of impact results of the future capacity and operational conditions on the network as well as summary of assumptions including population and employment in the specific section of the Town are included in subsequent sections.

Future Land Use

Figure 3.1 and Table 3.1 summarizes progression of land use development for the analyzed scenarios.

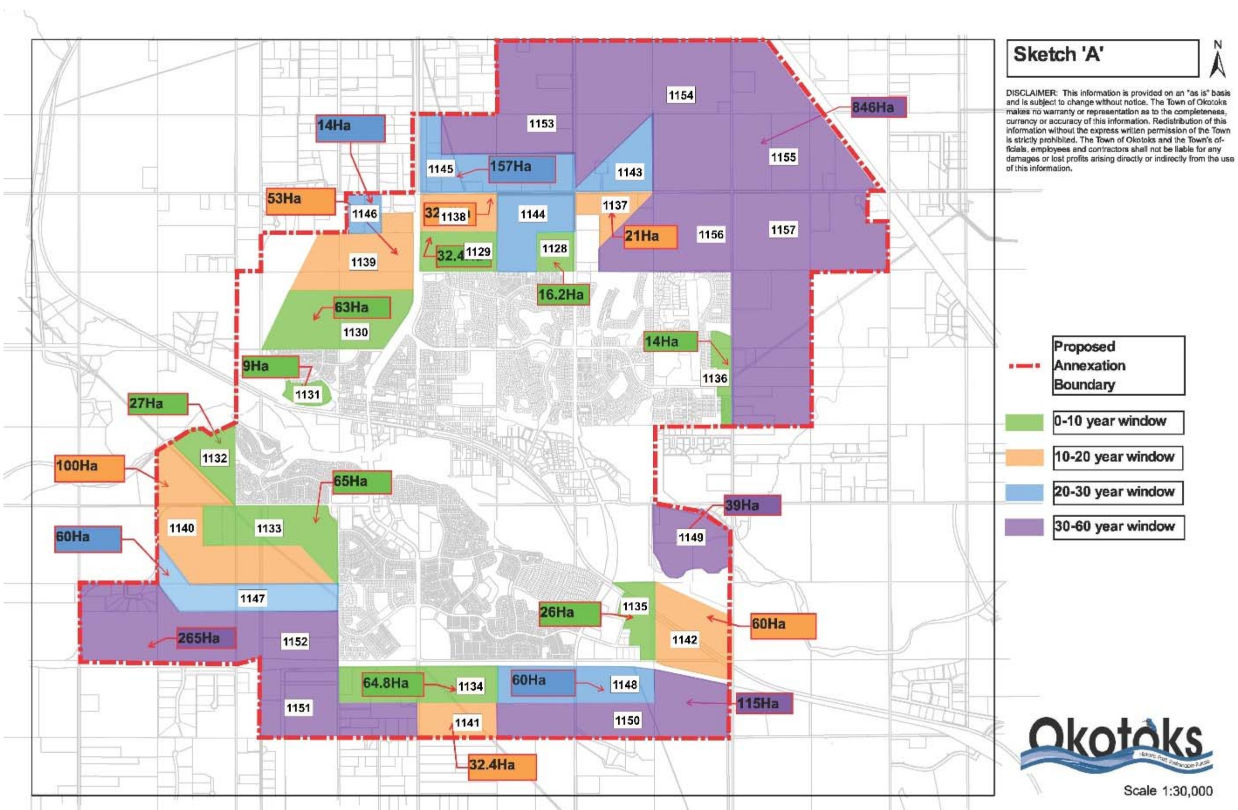


Figure 3.1 Future Land Use Development

Table 3.1 includes a summary of land use information for analyzed land use scenarios.

TABLE 3.1 ANALYZED LAND USE SCENARIOS

<table>
<tr><th colspan="4">0 - 10 year horizon</th><th colspan="4">10 - 20 year horizon</th></tr>
<tr><th>Zone</th><th>ha</th><th>units</th><th>Land use</th><th>Zone</th><th>ha</th><th>units</th><th>Land use</th></tr>
<tr><td>1128</td><td>16.2</td><td></td><td>School, Rec Centre</td><td>1137</td><td>21</td><td>415</td><td>Residential</td></tr>
<tr><td>1129</td><td>32.4</td><td>647</td><td>Residential</td><td rowspan="2">1138</td><td>32.4</td><td>647</td><td>Residential</td></tr>
<tr><td>1130</td><td>63</td><td>1081</td><td>Residential</td><td></td><td>10.16 acres</td><td>Commercial</td></tr>
<tr><td>1131</td><td>9</td><td>148</td><td>Residential</td><td rowspan="2">1139</td><td>53</td><td>1081</td><td>Residential</td></tr>
<tr><td>1132</td><td>27</td><td>534</td><td>Residential</td><td></td><td>10 acres</td><td>Commercial</td></tr>
<tr><td>1133</td><td>65</td><td>1285</td><td>Residential</td><td>1140</td><td>100</td><td>1977</td><td>Residential</td></tr>
<tr><td rowspan="2">1134</td><td rowspan="2">64.8</td><td>40150</td><td>Commercial/Industrial</td><td rowspan="2">1141</td><td rowspan="2">32.4</td><td>40150</td><td>Commercial/Industrial</td></tr>
<tr><td>229</td><td>Residential</td><td>229</td><td>Residential</td></tr>
<tr><td>1135</td><td>26</td><td></td><td>Commercial/Industrial</td><td rowspan="2">1142</td><td rowspan="2">60</td><td rowspan="2"></td><td rowspan="2">Commercial/Industrial</td></tr>
<tr><td>1136</td><td>14</td><td>290</td><td>Residential</td></tr>
<tr><th colspan="4">20 - 30 year horizon</th><th colspan="4">30 - 60 year horizon</th></tr>
<tr><th>Zone</th><th>ha</th><th>units</th><th>Land use</th><th>Zone</th><th>ha</th><th>units</th><th>Land use</th></tr>
<tr><td>1143</td><td rowspan="3">157</td><td rowspan="3">2512</td><td>Residential</td><td>1149</td><td>39</td><td>771</td><td>Residential</td></tr>
<tr><td>1144</td><td>Residential</td><td>1150</td><td>115</td><td></td><td>Commercial/Industrial</td></tr>
<tr><td>1145</td><td>Commercial</td><td>1151</td><td>93.5</td><td></td><td>Commercial/Industrial</td></tr>
<tr><td rowspan="2">1146</td><td rowspan="2">14</td><td rowspan="2">277</td><td rowspan="2">Residential</td><td>1152</td><td>171.5</td><td>3390</td><td>Residential</td></tr>
<tr><td>1153</td><td rowspan="5">846</td><td rowspan="5">16724</td><td rowspan="5">Residential</td></tr>
<tr><td rowspan="2">1147</td><td rowspan="2">60</td><td rowspan="2">1186</td><td rowspan="2">Residential</td><td>1154</td></tr>
<tr><td>1155</td></tr>
<tr><td rowspan="2">1148</td><td rowspan="2">60</td><td rowspan="2"></td><td rowspan="2">Commercial/Industrial</td><td>1156</td></tr>
<tr><td>1157</td></tr>
</table>

Growth in Surrounding Areas

MD of Foothills

Per information provided by the MD of Foothills, population and employment numbers have been incorporated into the model for the horizon years 2020, 2025 and 2030.

For the horizon years 2035 and 2040, the employment and population numbers were grown by an annual rate of 3% per year.

City of Calgary

The City of Calgary provided super-zones and their land use information for the future horizons.

High River

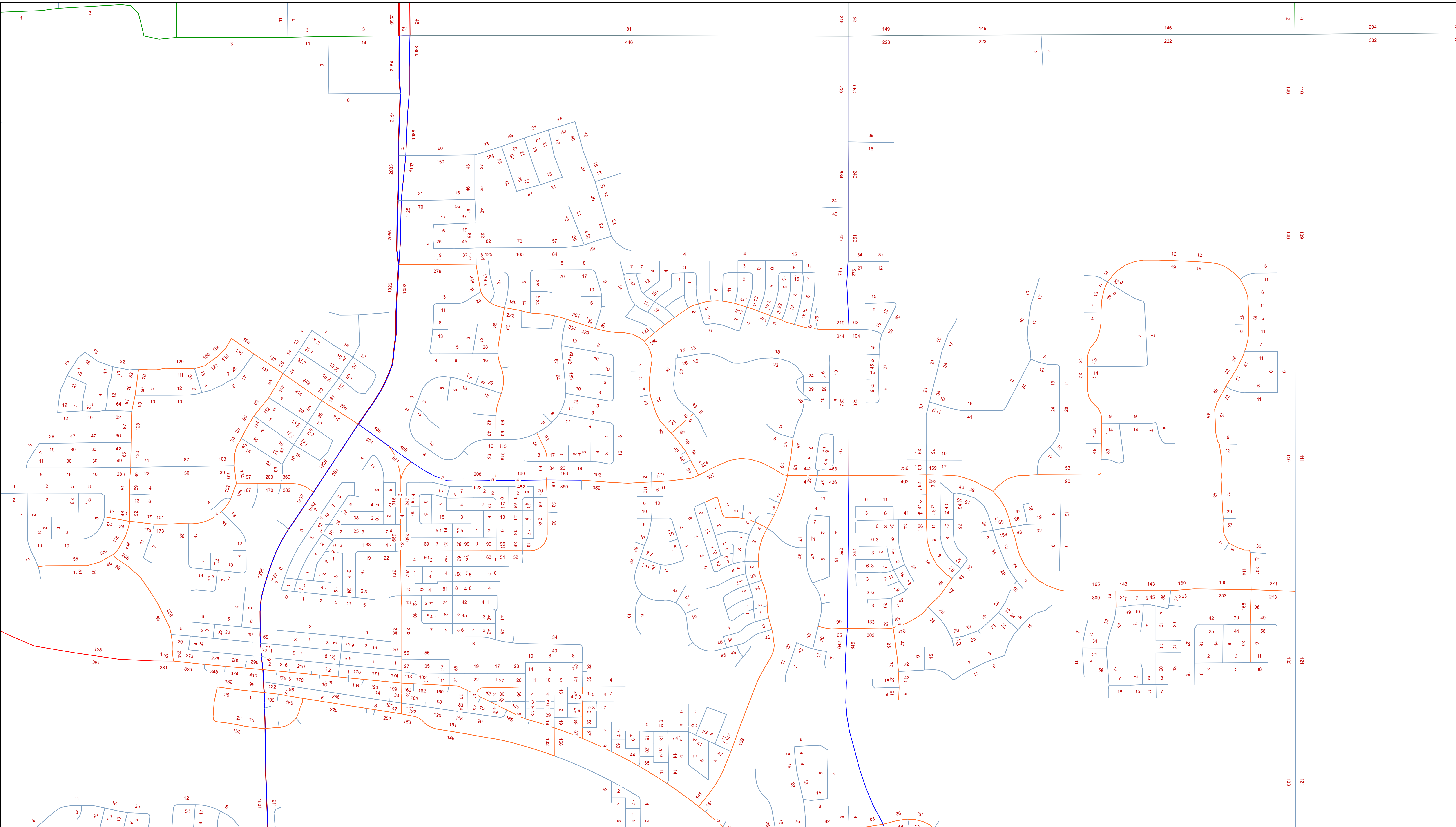
According to the latest growth trends in this area, the employment and population numbers were grown by an annual rate of 3% per year.

Black Diamond and Turner Valley

According to the latest growth trends in this area, the employment and population numbers were grown by an annual rate of 3% per year.

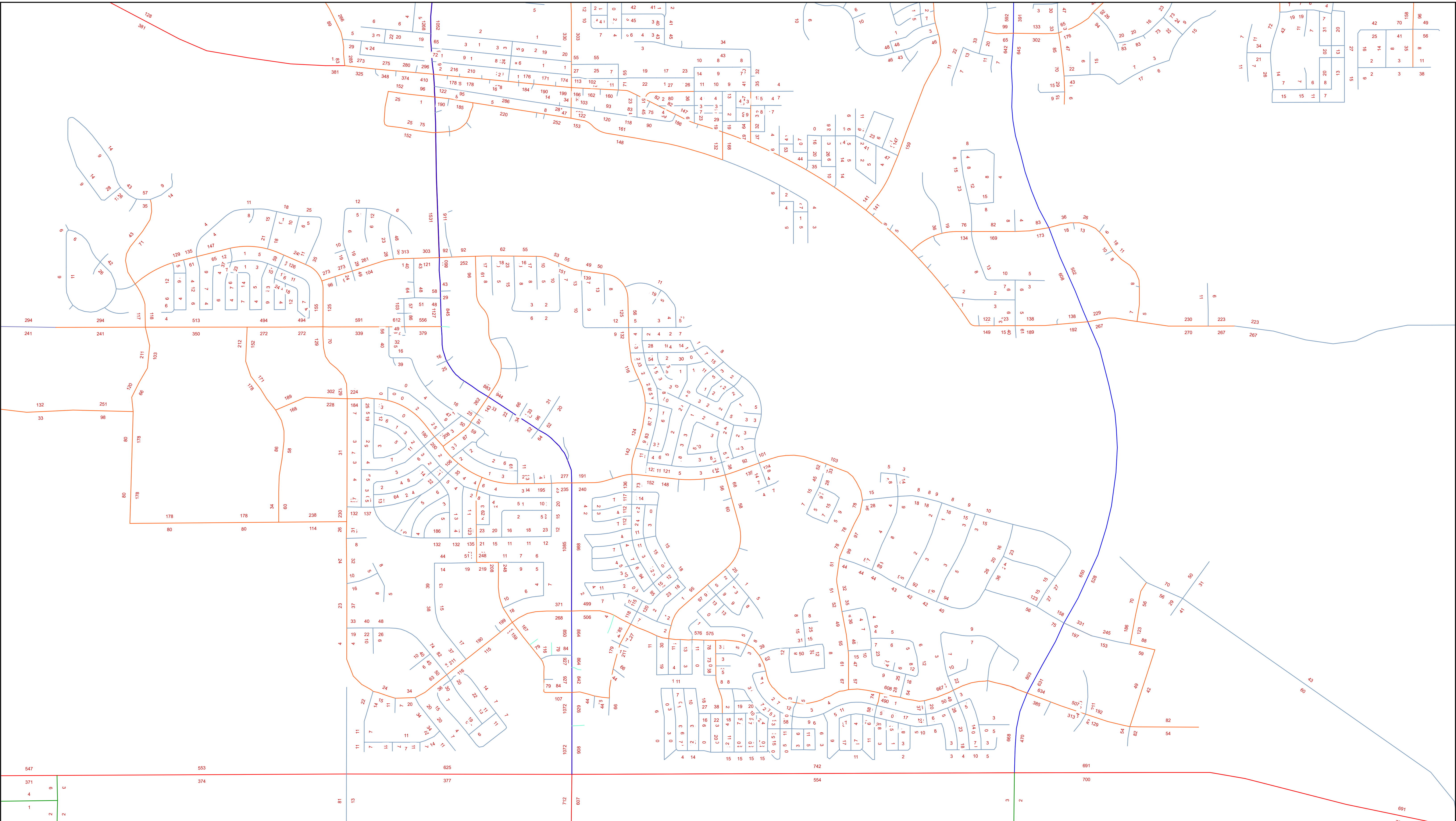
Traffic Forecast

Traffic forecasting was carried out for the 2025, 2035 and 2045 horizon years as identified by the Town's staff. **Figures 3.2** to **3.7** show the forecasted traffic volumes.



VISUM 15.00 PTV AG	2025 PM Peak Volumes - North Section	

Figure 3.2 2025 PM Peak Volumes North Section



VISUM 15.00 PTV AG	2025 PM Peak Volumes - South Section	

Figure 3.3 2025 PM Peak Volumes South Section

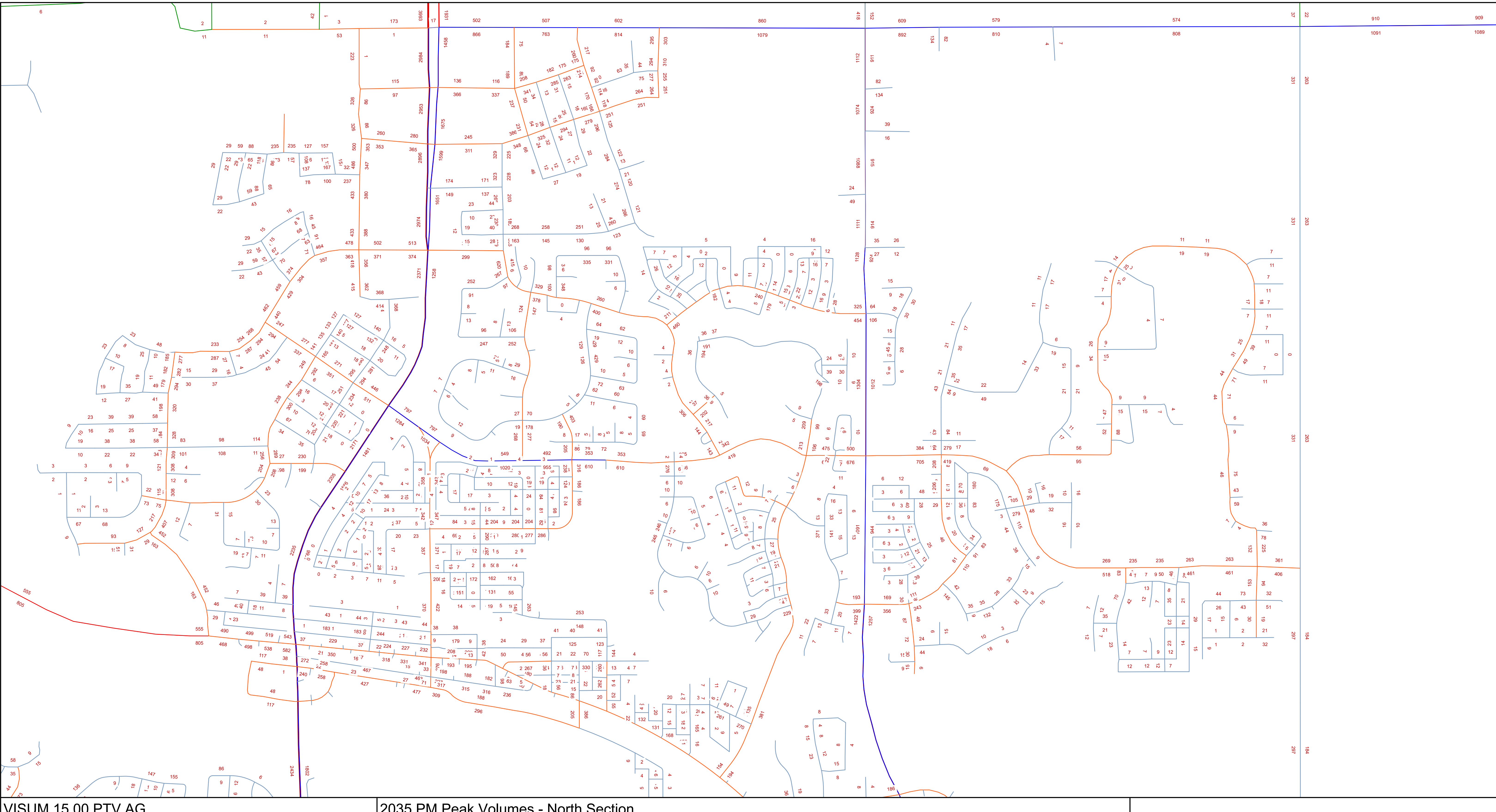


Figure 3.4 2035 PM Peak Volumes North Section

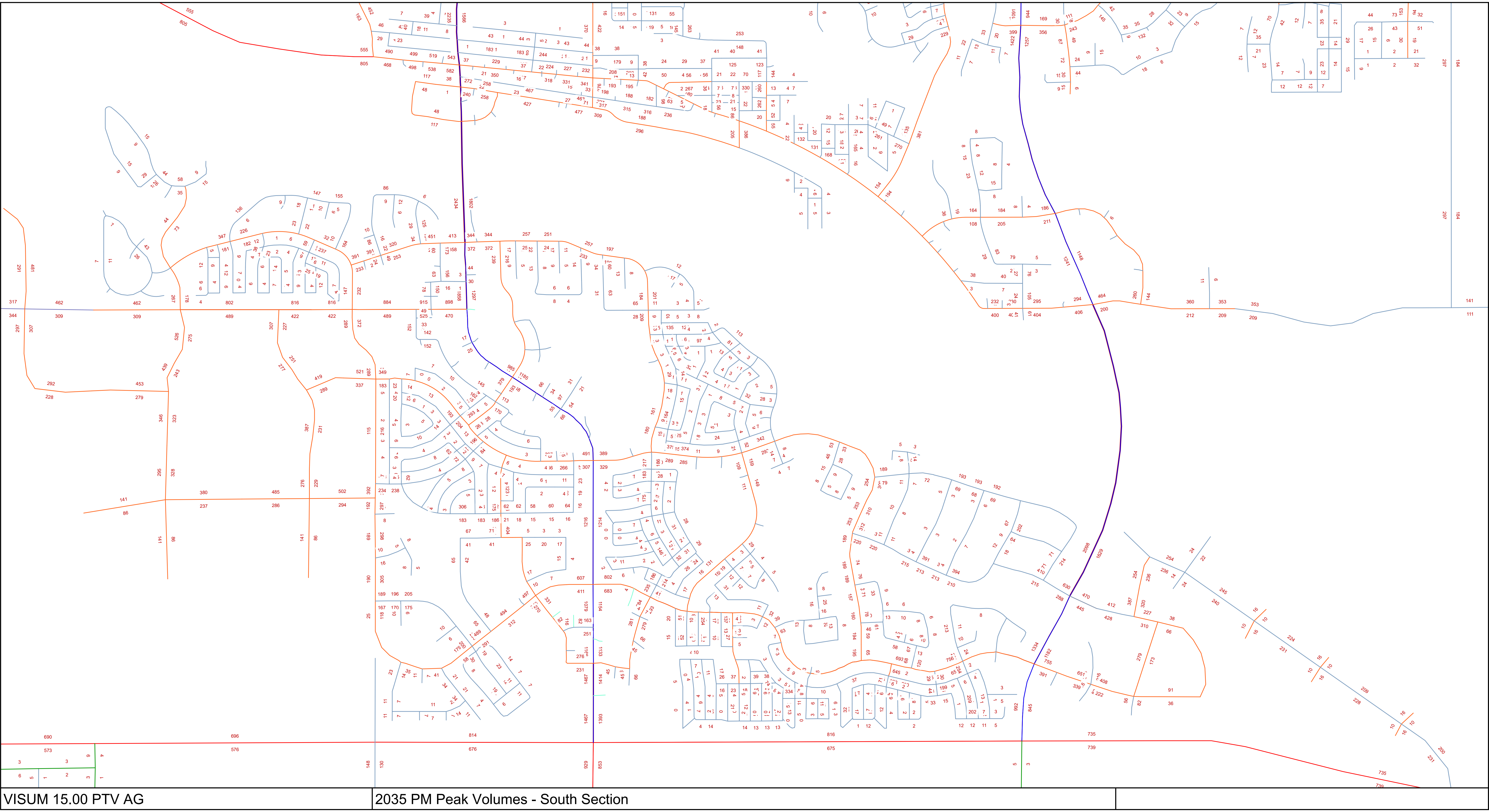


Figure 3.5 2035 PM Peak Volumes South Section

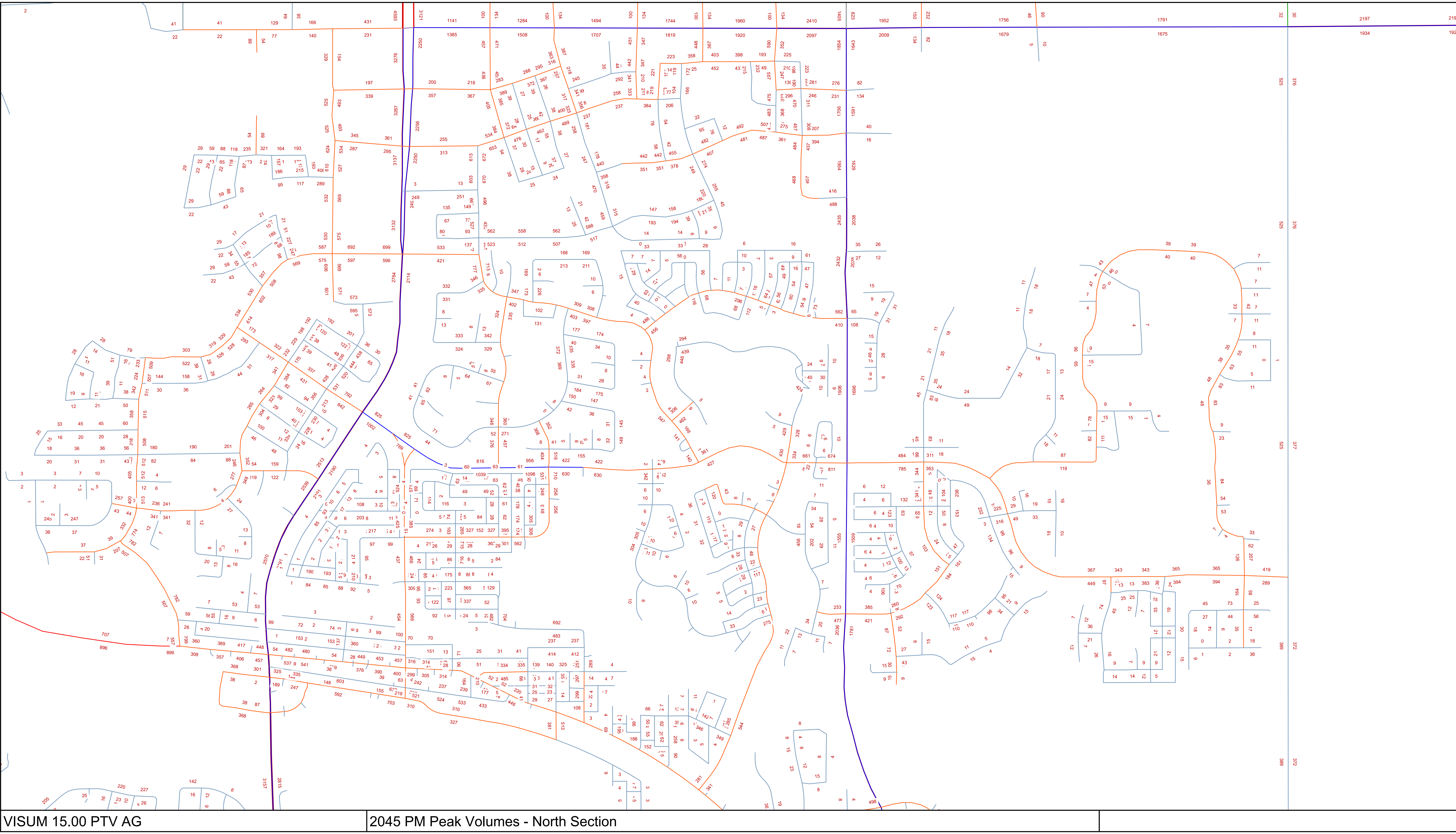


Figure 3.6 2045 PM Peak Volumes North Section

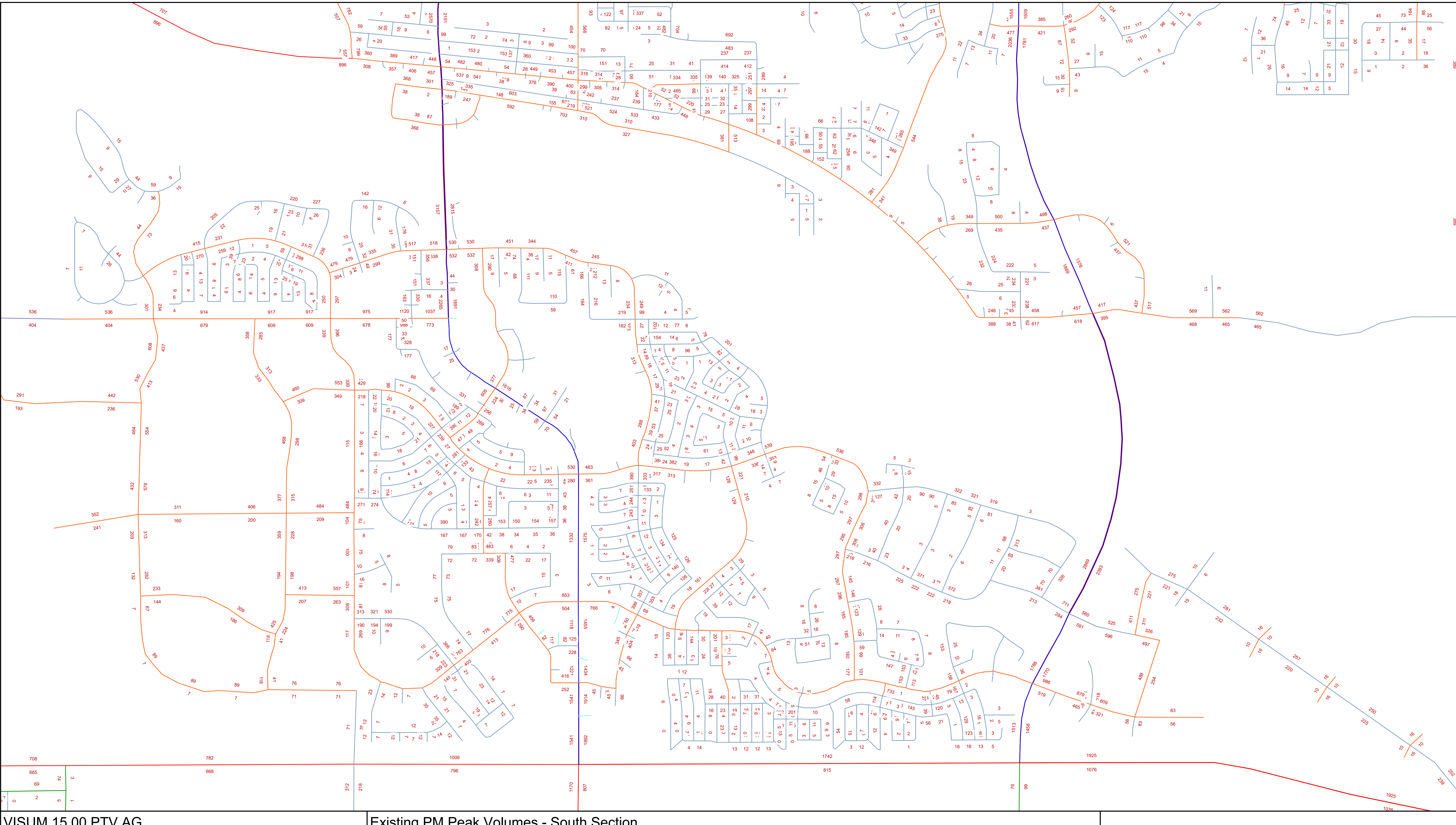


Figure 3.7 2045 PM Peak Volumes South Section

Network Improvements

Network improvements were identified following capacity and operational analysis at the intersections and review of the forecasted traffic volumes on links.

The intersections analyzed included those shown in **Figures 2.6** as well as those which may require signalization. Results of the traffic analysis and identified improvements are summarized in the following sections. Details of operational conditions can be found in **Appendix II**.

Estimated construction costs of the required improvements were identified in **Section 3.6** of this report. Detailed information pertaining to construction cost estimates is included in **Appendix II**.

3.5.1 Improvement Criteria

The capacity of the intersections and operational conditions at the intersections are defined by Level of Service (LOS) indicated by a letter, with A reflecting minimum delays and F corresponding to a high level of congestion. **Table 3.2** lists LOS numbers for signalized and unsignalized intersections. More detailed information is included in **Appendix II**. LOS E was identified as the criterion at which intersectional improvements are initiated.

TABLE 3.2 LEVEL OF SERVICE AND CORRESPONDING DELAYS

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

The technical link capacity is defined by the number of lanes and measured in vehicles per hour, however road authorities use environmental capacity expressed in vehicles per day to define improvement thresholds as those thresholds are related to the functional road classification. **Table 3.3** lists road classification and corresponding environmental capacities and number of lanes. Environmental capacity was used in identification of timing for link improvements.

TABLE 3.3 ROAD CLASSIFICATION AND ENVIRONMENTAL CAPACITY

Road Classification		Daily Traffic Volume(vehicles/day)	Number of Lanes
Skeletal Road (Expressway/Freeway)		>30,000	4, 6 or 8
Arterial		20,000 - 35,000	4 or 6
Collector	Primary	8,000 - 15,000	2 or 4
	Collector	2,000 - 8,000	2
Residential		<2,000	2

3.5.2 2025 Horizon

Figure 3.8 shows the locations of the analyzed intersections for the 2025 year horizon while **Figures 3.9a and 3.9b** summarize the level of service and delays at those intersections.

Intersection Improvements are shown in **Figure 3.10**. Expected LOS and delays at the analyzed intersections following implementation of improvements are shown in **Figure 3.11**.

Figure 3.8 Analyzed Intersections – 2025

Figure 3.9 a 2025 Operational Conditions – North Okotoks

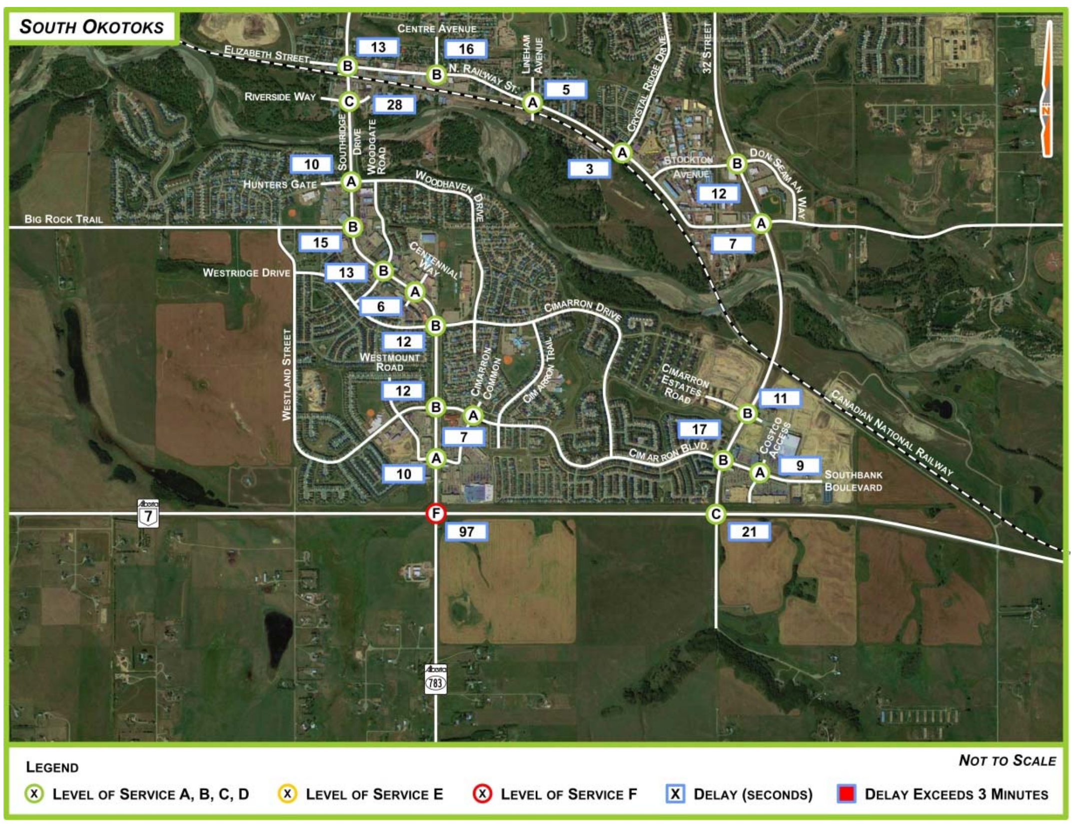


Figure 3.9 b 2025 Operational Conditions – South Okotoks

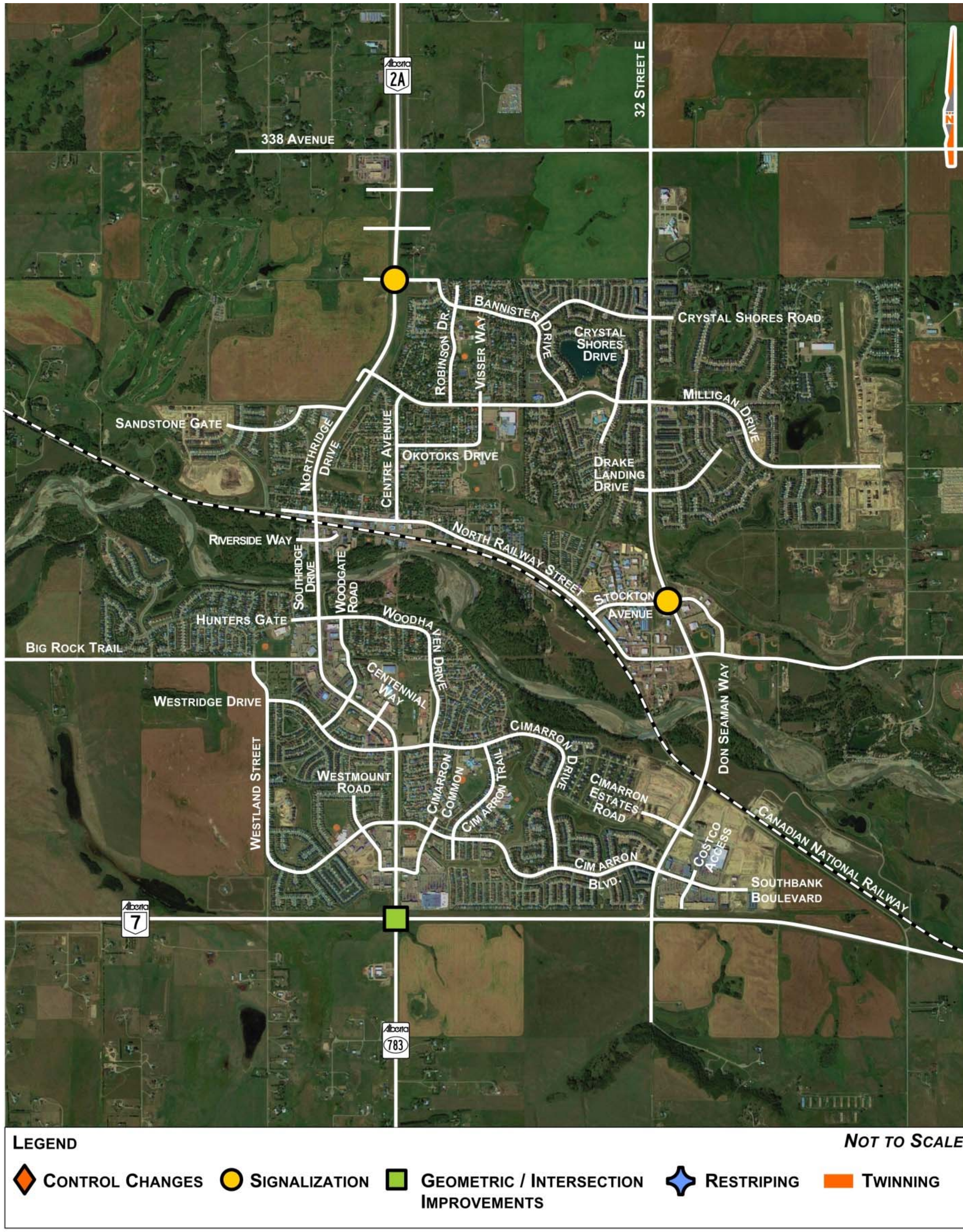


Figure 3.10 2025 Improvements

As shown on **Figure 3.10**, by the 2025 horizon year only two intersections, Banister Gate / Southridge Drive and Stockton Avenue / 32 Street, will require signal controls, while geometric improvements will be required at Highway 7 / Southridge Drive Intersection.

Figure 3.11 a 2025 Improved Intersections Operational Conditions – North Okotoks

Figure 3.11 b 2025 Improved Intersections Operational Conditions – South Okotoks

As shown on **Figures 3.11a** and **3.11b** improved intersections are expected to operate at a satisfactory level of service.

3.5.2 2035 Horizon

Figure 3.12 shows the locations of the analyzed intersections for the 2035 horizon year. Analyzed intersections included all signalized intersections as well as those which may require signals. **Figures 3.13a** and **3.13b** summarize the level of service at these intersections. Details pertaining to operational conditions per movements can be found in **Appendix II**. Intersection improvements are shown in **Figure 3.14**

Figure 3.12 Analyzed Intersections – 2035

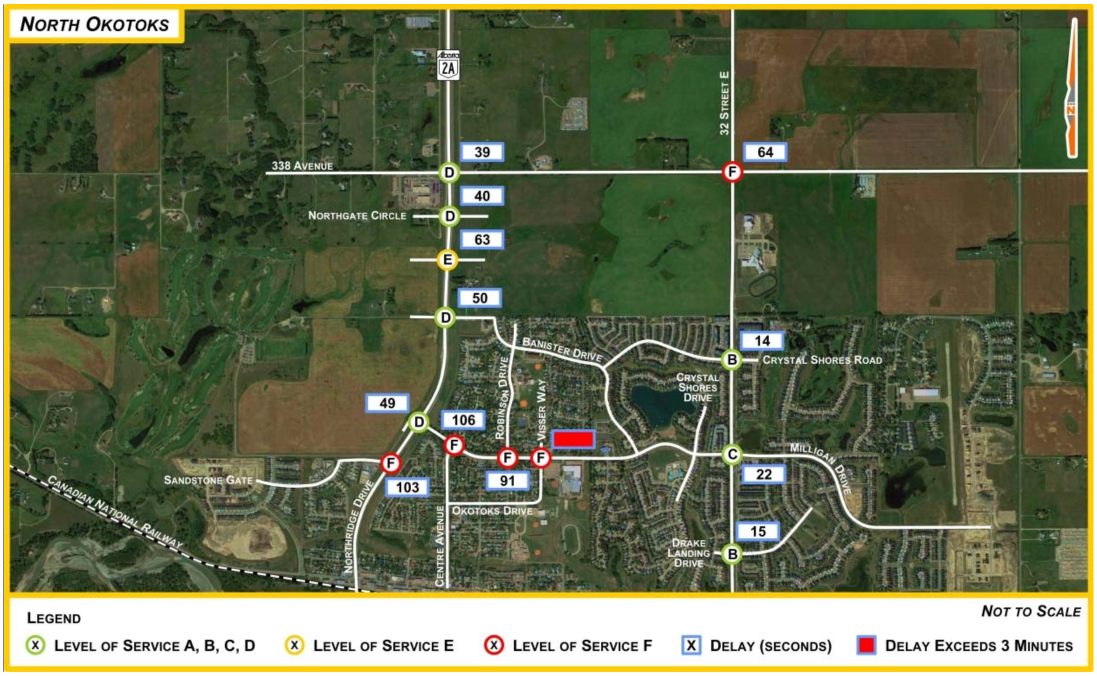


Figure 3.13 a 2035 Operational Conditions – North Okotoks

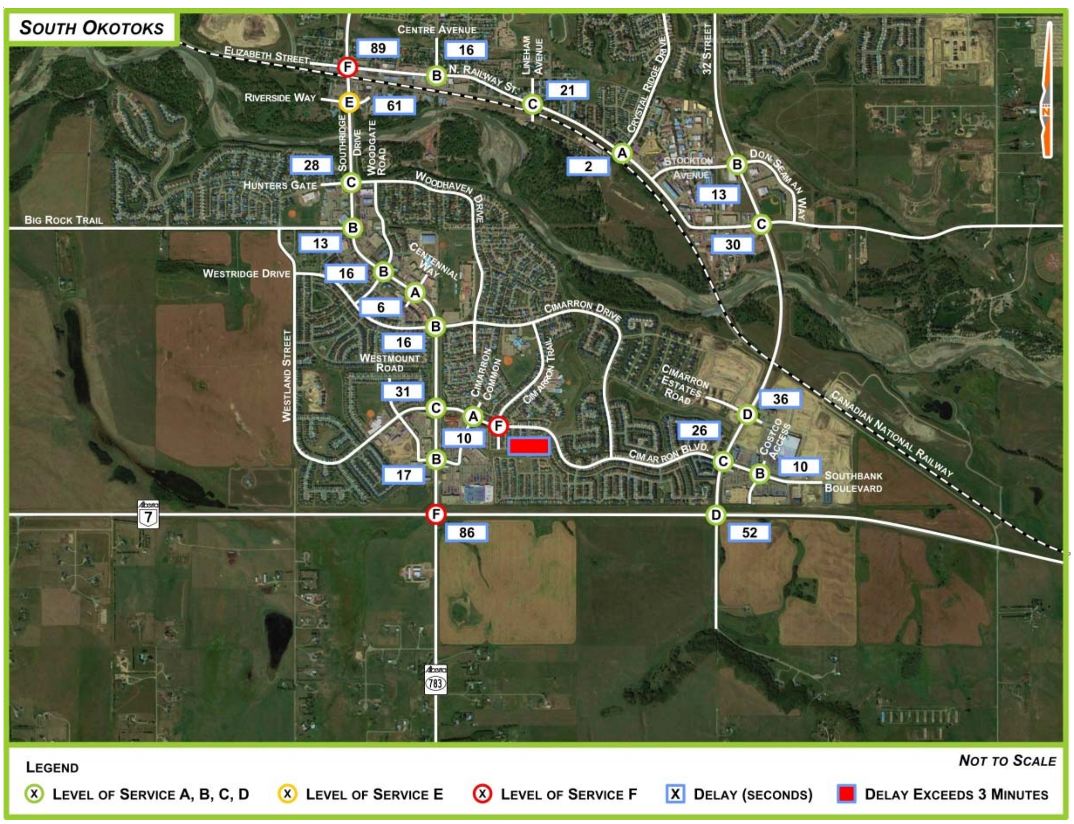


Figure 3.13 b 2035 Operational Conditions – South Okotoks

Figure 3.14 2035 Improvements

It is expected that by the 2035 horizon year the following improvements will be required:

Signals	Geometric improvements
• Northgate Circle / Northridge Drive • Intersection south of Northgate Circle / Northridge Drive • Milligan Drive / Veterans Way • Milligan Drive / Robinson Drive • Milligan Drive / Okotoks Drive • Cimarron Blvd / Cimarron Trail • 32 Street / 338 Avenue	• Highway 7 / Southridge Drive • Sandstone Gate / Northridge Drive • Elizabeth Street / Northridge Drive • 338 Avenue / Northridge Drive • Highway 7 / 32 Street • Northridge Drive / Banister Drive
Lane restriping	**Four-laning**
• Woodhaven Drive / Southridge Drive • Westmount Commercial Access / Southridge Drive • Riverside Gate / Northridge Drive • Southbank Boulevard / 32 Street • Southbank Road / 32 Street • North Railway Street / 32 Street	• 338 Avenue between Northridge Drive and 32 Street • 32 Street between 338 Avenue and Cimarron Estates Road • Highway 7 between Northridge Drive and 32 Street

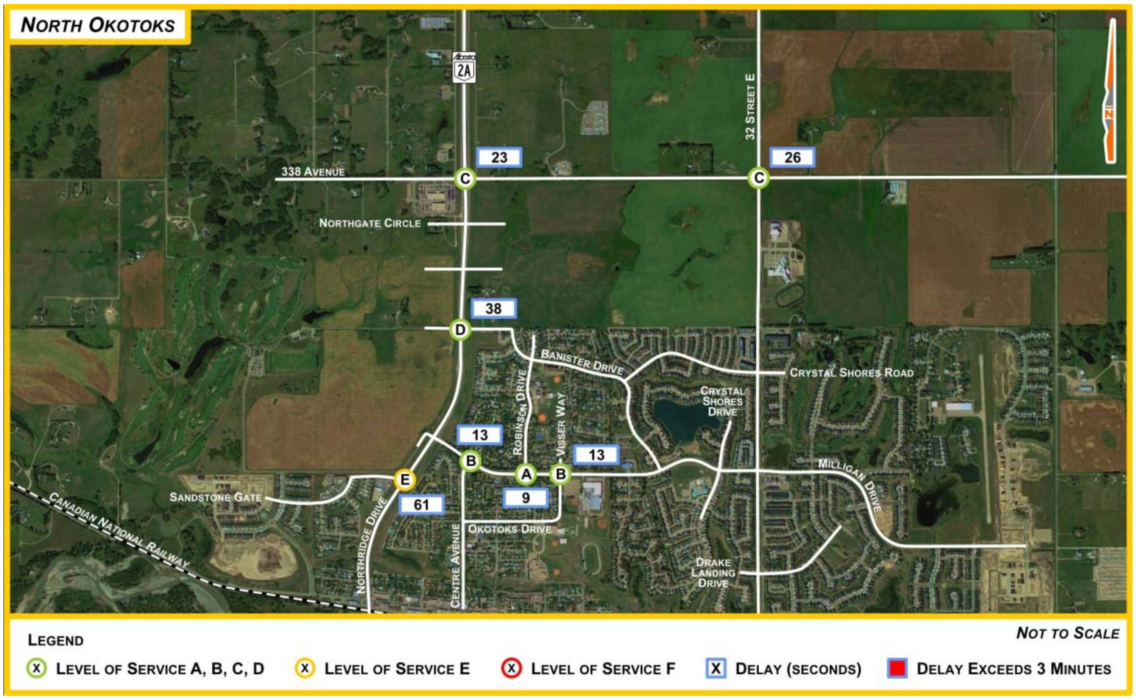


Figure 3.15 a 2035 Improved Intersections Operational Conditions – North Okotoks

Figure 3.15 b 2035 Improved Intersections Operational Conditions – South Okotoks

Results of the analysis (**Figures 3.15a** and **3.15b)** indicate that once considered improvements are in place, all analyzed intersections and road segments will operate at the appropriate LOS.

3.5.3 2045 Horizon

All signalized intersections and all intersections that may require signalization were analyzed for the 2045 horizon. **Figure 3.16** shows the locations of the analyzed intersections while **Figures 3.17a** and **3.17b** summarize the level of service at these intersections. Details on operational conditions per movements can be found in **Appendix II**.

Intersection Improvements are shown in **Figure 3.18**. Expected operational conditions at the improved locations are shown in **Figure 3.19**. The estimated construction cost of the proposed improvements is included in **Section 3.5** and **Appendix II**.

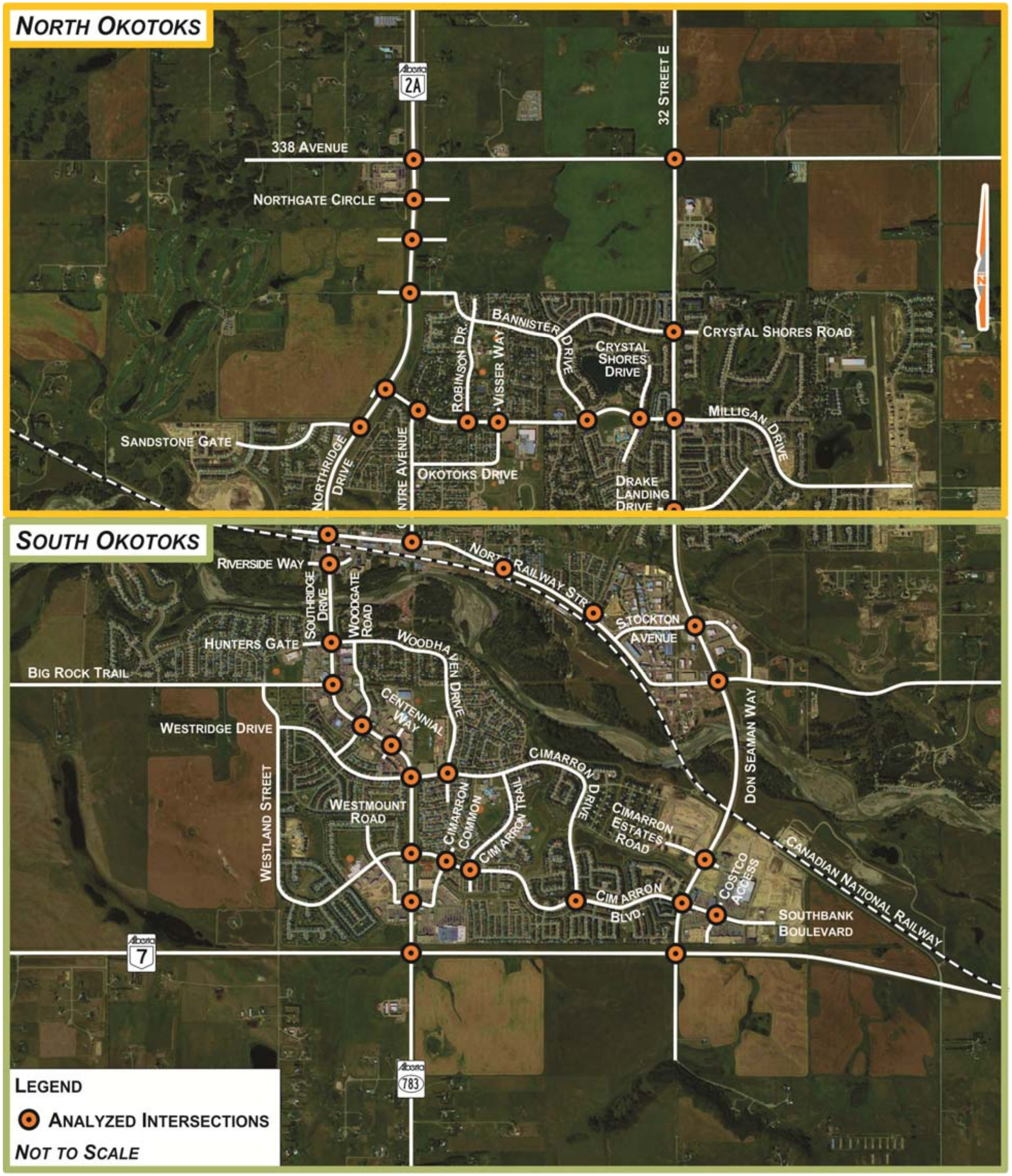


Figure 3.16 Analyzed Intersections – 2045

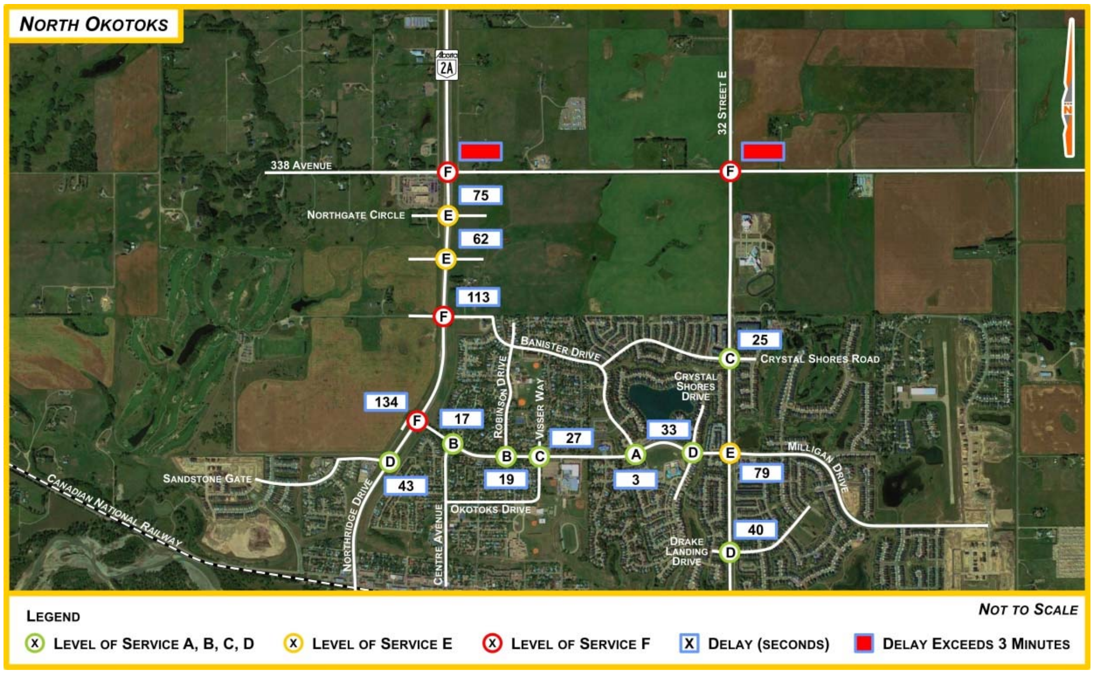


Figure 3.17 a 2045 Operational Conditions – North Okotoks

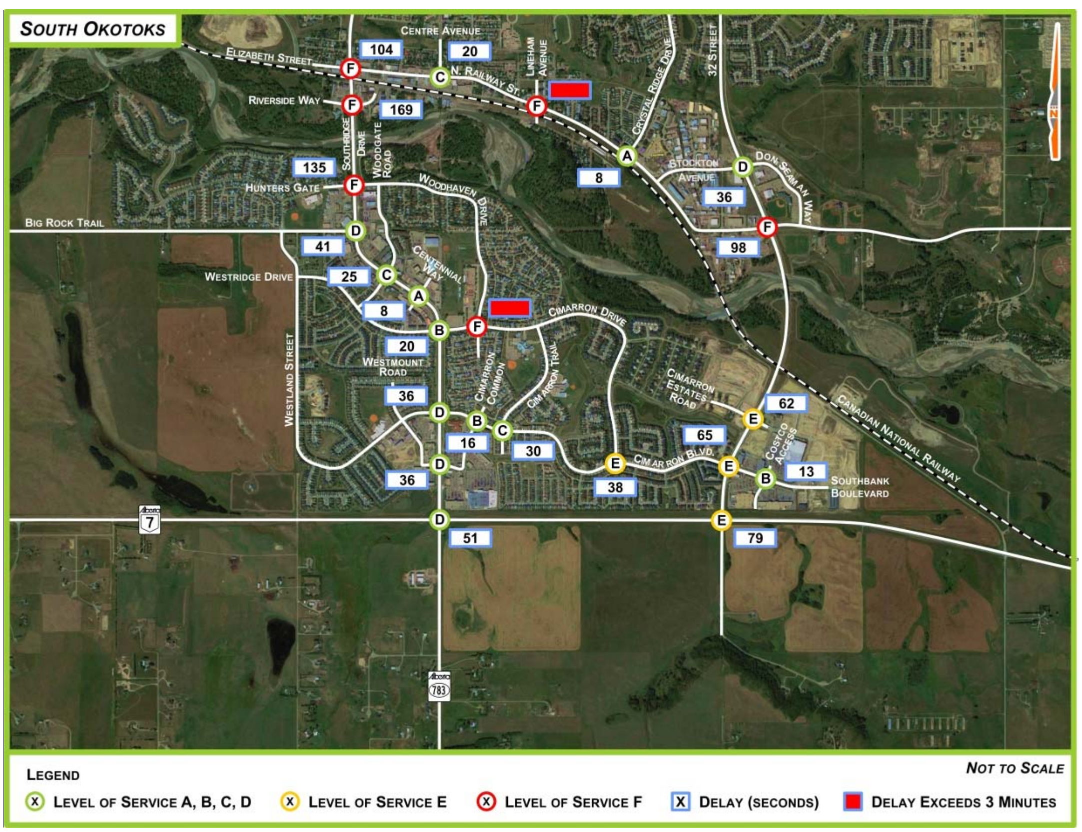


Figure 3.17 b 2045 Operational Conditions – South Okotoks

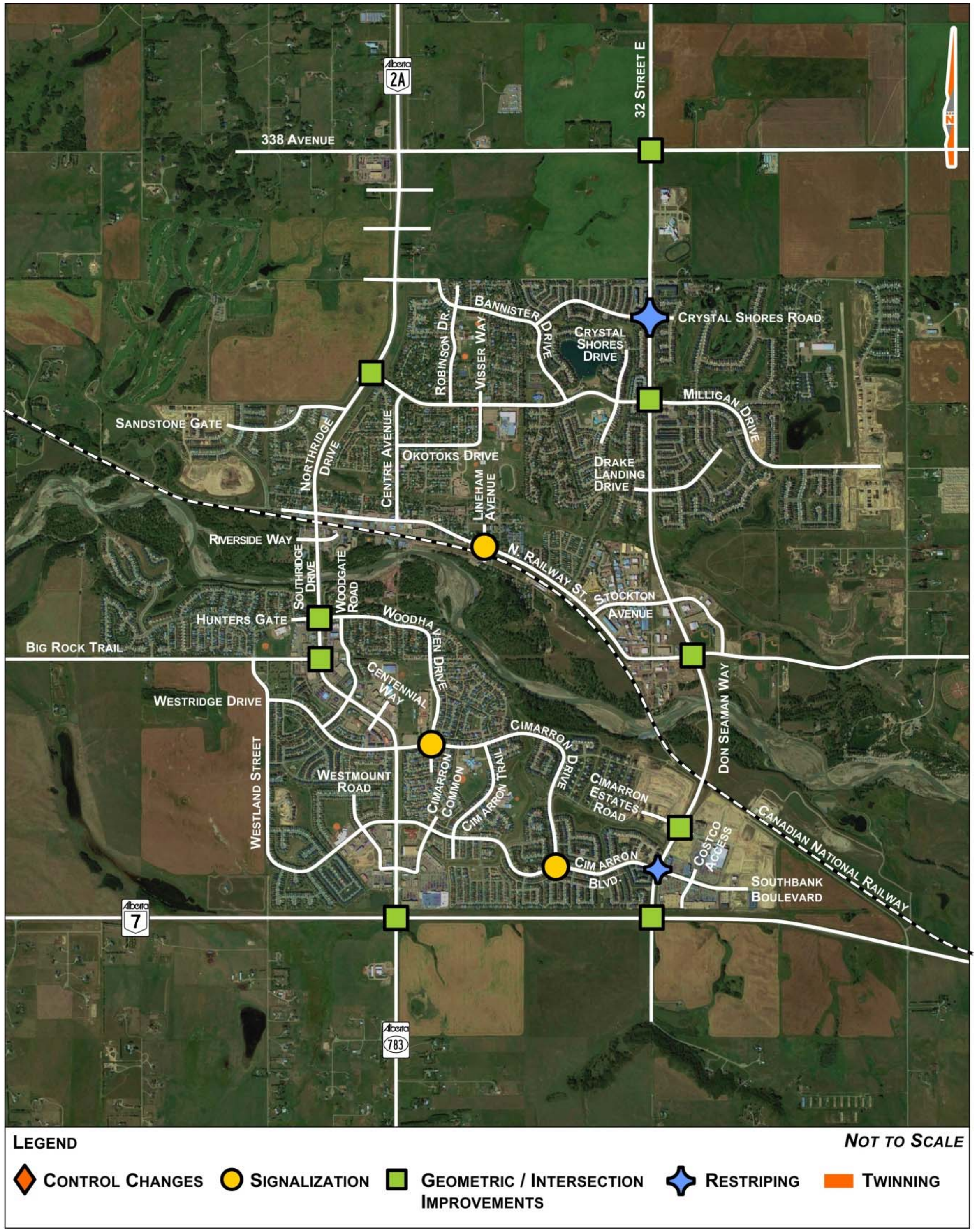


Figure 3.18 2045 Improvements

As shown in **Figure 3.18,** the following improvements will be required by 2045 horizon year:

Signals	Geometric improvements
• Cimarron Drive / Cimarron Boulevard • Cimarron Drive / Woodhaven Drive • North Railway Street / Lineham Avenue	• Highway 7 / Southridge Drive • Big Rock Trail / Southridge Drive • Woodhaven Drive / Southridge Drive • Milligan Drive / Northridge Drive • 338 Avenue / 32 Street • Milligan Drive / 32 Street • North Railway Street / 32 Street • Southbank Road / 32 Street • Highway 7 / 32 Street
All Way Stop Control (AWSC)	**Restriping approaches**
	• Crystal Shores Road/ 32 Street • Southbank Boulevard / 32 Street

As shown in **Figures 3.19a** and **3.19b**, improved intersections are expected to operate at a satisfactory level of service.

Figure 3.19 a 2045 Improved Intersections Operational Conditions – North Okotoks

Figure 3.19 b 2045 Improved Intersections Operational Conditions – South Okotoks

Improvement Cost Estimates

As stated in **Section 3.5**, details of the cost estimates are included in **Appendix II**.

Tables 3.4 to **3.6** contain summaries of improvement costs for each of the analyzed horizon years. Costs are in 2016 dollars and a 25% contingency was included in the estimates as they represent order of magnitude construction costs.

TABLE 3.4 2025 IMPROVEMENTS

Year	Intersection	Improvements	Estimated Cost*
2025	**Intersection Improvements**		
	Hwy 7 / Southridge Dr.	1 SBL turn lane and 1 WBL turn lane	**$ 230,000**
	Banister Drive / Northridge Dr.	Signal Installation	**$ 500,000**
	Stockton Avenue / 32 Street	Signal Installation	**$ 500,000**
Total cost of 2025 improvements			**$ 1,230,000**

*** Cost in 2016 dollars**

TABLE 3.5 2035 IMPROVEMENTS

Year	Improvements	Improvements	Estimated cost
2035	**Network Improvements**		
	4 lane cross section on 338 Avenue between Northridge Drive and 32 Street	From 2-lane to 4-lane 4800 metres	$ 13,005,000
	4 lane cross section on 32 street between Southbank Road and North Railway Street	From 2-lane to 4-lane 550 metres + 2 bridges	$ 19,970,000
	4 lane cross section on 32 Street between Southbank Road and Railway Street	From 2-lane to 4-lane 2850 metres	$ 7,725,000
	4 lane cross section on Hwy 7 between Southridge Drive and 32 Street	From 2-lane to 4-lane 3000 metres	$ 8,130,000
	Intersection Improvements		
	Highway 7 / Southridge Drive	1 EBT lane, 1 WBT lane, 1 NBT lane and 1 SBT lane inbound and outbound	$ 2,480,000
	Sandstone Gate / Northridge Drive	1 EBL turn lane + 1 NBL turn lane	$ 230,000
	Elizabeth Street / Northridge Drive*	WBT lane in addition to restriping and signal timing changes	$ 210,000
	338 Avenue / Northridge Drive	Additional SBL turn lane + 1 through lane east and west bound	$ 975,000
	Highway 7 / 32 Street	Additional EBT and WBT lanes (in and out) + one SBL left turn bay + one WBL turn lane	$ 1,090,000

Year	Improvements	Improvements	Estimated cost
2035	Northridge Drive / Banister Drive	Building west leg to a 4-lane cross section	$ 200,000
	Northridge Drive / Northgate Circle (New Intersection)	Signal Installation + NBL turn lane, SBL turn lane + NBR lane + SBR lane + building EB and WB to a 4-lane cross section	$ 1,255,000
	Northridge Drive / New Intersection (south of Northgate Circle)	Signal Installation + NBL turn lane, SBL turn lane + NBR lane + SBR lane + building EB and WB to a 4-lane cross section	$ 1,255,000
	Milligan Drive / Veterans Way	Signal installation (no changes to existing configuration)	$ 500,000
	Milligan Drive / Robinson Drive	Signal installation (no changes to existing configuration)	$ 500,000
	Milligan Drive / Okotoks Drive	Signal installation (no changes to existing configuration)	$ 500,000
	Cimarron Boulevard / Cimarron Trail	Signal installation (no changes to existing configuration)	$ 500,000
	32 Street / 338 Avenue	Signal Installation (additional lanes covered by twinning)	$ 500,000
	Restriping and Signal Phase Adjustments		
	Woodhaven Drive / Southridge Drive	Restriping EB to one left turn lane + one all turns lane+ signal timing plan changes	No new construction
	Westmount Common / Southridge Drive	Restriping WB to one left turn lane + one shared through / right lane+ signal timing plan changes	No new construction
	Riverside Gate / Northridge Drive*	Restriping WB to one left turn lane + one shared through / right lane+ signal timing plan changes	No new construction
	Southbank Boulevard / 32 Street	Restriping EB to one left turn lane + one shared through / right lane+ signal timing plan changes	No new construction
	Southbank Road / 32 Street	Restriping EB to one left turn lane + one shared through / right lane+ signal timing plan changes	No new construction
	Railway Street / 32 Street	Restriping EB to one shared left / through lane and one right turn lane + WB to one left turn lane + one shared through / right lane+ signal timing plan changes	No new construction
Total cost of 2035 improvements			**$ 59,025,000**

*** Limited improvements due to R/O/W restrictions**
**** Cost in 2016 dollars**

2045 6-Laning of Northridge Drive

To improve intersection operations along Northridge Drive between the intersections of Riverside Gate and 338 Avenue, consideration might be given to the upgrading of Northridge Drive to a 6 lane cross-section. These improvements may not be required before the 2045 horizon year.

Widening Northridge Drive may need additional right-of-way. This will lead to an additional cost to acquire more land. Location and construction cost of the improved section of Northridge Drive is shown in **Figure 3.20**. The estimated cost reflects only construction including bridge widening and does not account for land acquisition costs.

Figure 3.20 2045 6-Laning at Northridge Drive

TABLE 3.6 COST OF NORTHRIDGE DRIVE 6-LANING - SUMMARY

Year	Type of Improvements	Estimated Cost*
2045	Roadway 6-laning	$ 9,730,000
	Bridge 6-Laning	$ 13,200,000
	Total Cost of Northridge 6-Laning	**$ 22,930,000**

***Cost in 2016 dollars**

As shown in **Figures 3.21 a** and **b**, the intersections along the widened 6-lane cross-section are expected to operate at a satisfactory level of service.

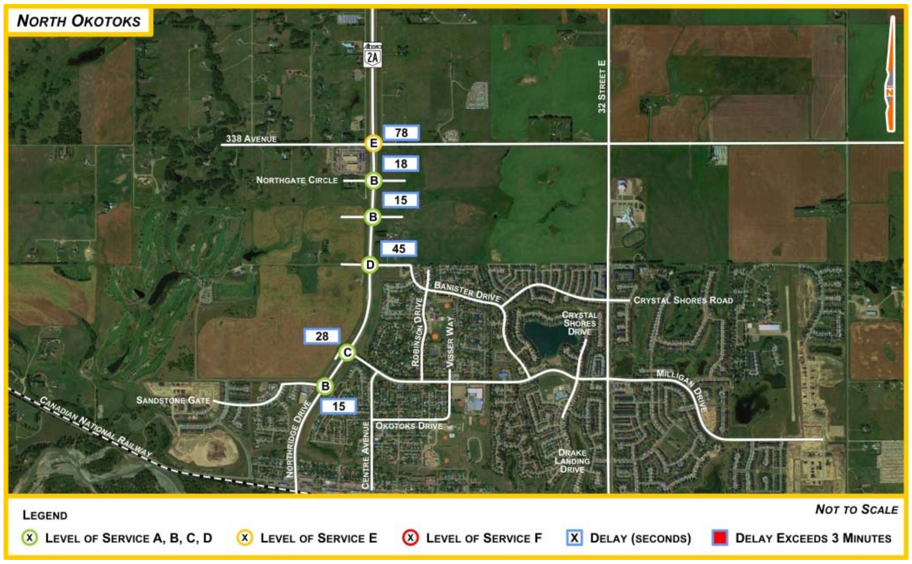


Figure 3.21 a 2045 6-laning Intersections Operational Conditions – North Okotoks

Figure 3.22 b 2045 6-laning Intersections Operational Conditions – South Okotoks

TABLE 3.7 2045 IMPROVEMENTS

Year	Location	Improvements	Estimated cost**
2045	**Network Improvements**		
	No improvements	--	--
	Intersections Improvements		
	Highway 7 / Southridge Drive	1 Left turn bay at EB approach + 1 Left turn bay at SB + acceleration lane for WB free right turn	$ 475,000
	Big Rock Trail / Southridge Drive	1 left turn bay at EB approach	$ 115,000
	Woodhaven Drive / Southridge Drive*	Adding 1 left turn at WB and adding acceleration lane for WB free right turn + restriping EB to 2 left turn lanes + one shared through / right lane. Restriping WB to one shared left / through lane + one free right turn	$ 365,000
	Milligan Drive / Northridge Drive**	adding one through lane to the eastbound approach	$ 110,000
	338 Avenue / 32 Street	Adding one right turn bay at each approach + Adding one left turn at EB, WB, and SB approaches + dual left at NB Approach + acceleration lane for NB and EB free right turns	$ 1,325,000
	Milligan Drive / 32 Street*	Adding one SBL turn lane + one EBR turn lane	$ 180,000
	North Railway Street / 32 Street*	Adding one NBL turn lane + one WBL turn lane + acceleration lane for free EB right turn movement	$ 475,000
	Southbank Road / 32 Street*	Adding one SBL turn lane + acceleration lane for free WB right turn	$ 365,000
	Highway 7 / 32 Street	Adding acceleration lane for free SB right turn + restriping SB approach from one left + one shared left / through + one right to one left turn lane + one through lane + one right turn lane	$ 250,000
	Cimarron Drive / Cimarron Boulevard	Signal Installation	$ 500,000
	Cimarron Drive / Woodhaven Drive	Signal Installation	$ 500,000

Year	Location	Improvements	Estimated cost**
2045	N Railway Street / Lineham Avenue	Signal Installation	$ 500,000
	Northridge Drive / Riverside Gate to 338 Avenue	Roadway 6-laning	$ 9,730,000
	Northridge Drive / Riverside Gate and 338 Avenue	Bridge 6-Laning	$ 13,200,000
	Restriping and Unsignalized Controls and Signal Timing Plan Adjustments		
	Crystal Shores / 32 Street	Restriping EB approach from 1 shared left / through + 1 shared through right to one left turn lane + one shared through / right lane	No new construction
	Southbank Boulevard / 32 Street	Restriping WB approach from one left + two through + one right to 2 left + one through + one right lanes. In addition, changing SB right from yield to free and construction curb accordingly	No new construction
		Total cost of 2045 improvements**	**$ 28,090,000**

*** R/O/W verification is required prior to implementation of proposed improvements**
**** Cost in 2016 dollars**

Roundabouts

Roundabouts were analyzed as a potential option for the intersections of Milligan Drive / Veterans Way and Cimarron Drive / Woodhaven Drive. The purpose of this analysis was strictly to determine whether a roundabout is feasible based on the anticipated traffic volumes in the long term. As shown in **Figure 3.23,** a one lane roundabout at Milligan Drive / Veterans Way with a slip lane for the northbound right turning movement is expected to operate at LOS A. Also, a one lane roundabout at Cimarron Drive / Woodhaven Drive is expected to operate at LOS A at the 2045 horizon.

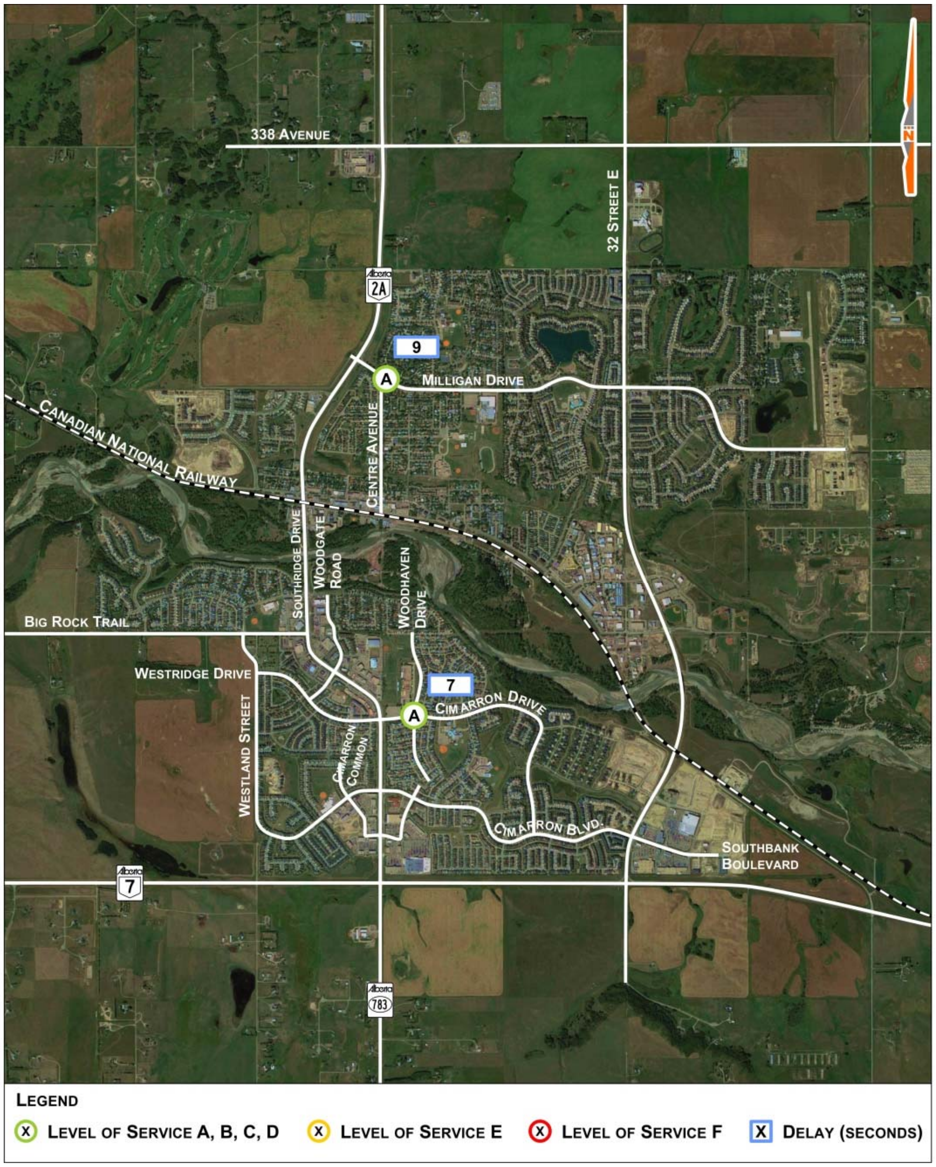


Figure 3.23 2045 Roundabout Operations

Truck Routes

The existing truck routes are shown in **Figure 4.1.** They were identified by the Town to provide easy access for trucks traveling within the Town's boundaries. They provide good connectivity to the regional network system specifically to provincial highways such as Highways 2, 2A, 7, and 549. Although it is not expected that this system will need to be augmented in the future, an additional connection between Southridge Drive and 32 Street may be required. If required, long-term options for such a connection might be via either Railway Avenue or Milligan Drive, although both of these present challenges (**Figure 4.1**). Long term truck routes in the annexed areas will have to be established once more detailed plans are developed for those areas.

Figure 4.1 Truck Routes

Railway Crossings

There are four main at-grade railway crossings within the Town Okotoks boundary of the CP rail line: Northridge Drive, Veterans Way, Lineham Avenue, and the pedestrian crossing between Northridge Drive and Veterans Way. Additional at-grade crossing points do exist, however they are private access crossings (e.g., at Southbank Crescent in southwest Okotoks). It should be noted the existing private crossings are expected to be relocated in the future and become public as the development progresses in the area.

All the specified crossings above were reviewed in consideration of Transport Canada's Grade Crossing Standards (GCS, July 2014) as well as consideration of other traffic control manuals as appropriate (Transportation Association of Canada Manual of Uniform Traffic Control Devices for Canada and Alberta Transportation). The intent of the review was to assess crossing characteristics and conditions to establish if the mitigations are appropriate and to identify any near and long-term improvements to rail crossing safety that may be required. For details of the assessment refer to **Appendix III**.

5.1 Northridge Drive Crossing

Northridge Drive is a four-lane divided urban arterial road at the rail crossing. At the crossing, the current daily traffic is approximately 25,000 vehicles/day. There are a number of roads and accesses that intersect Northridge Drive in the vicinity of the CP Rail line, however the raised median ensures right-in/right-out operation at all intersection and access points between Elizabeth Street and Riverside Gate/Riverside Way. In the northbound direction, the roadway widens to four lanes crossing the rail line to facilitate a left-turn lane and a right-turn lane at Elizabeth Street. **Figure 5.1** shows the crossing location.

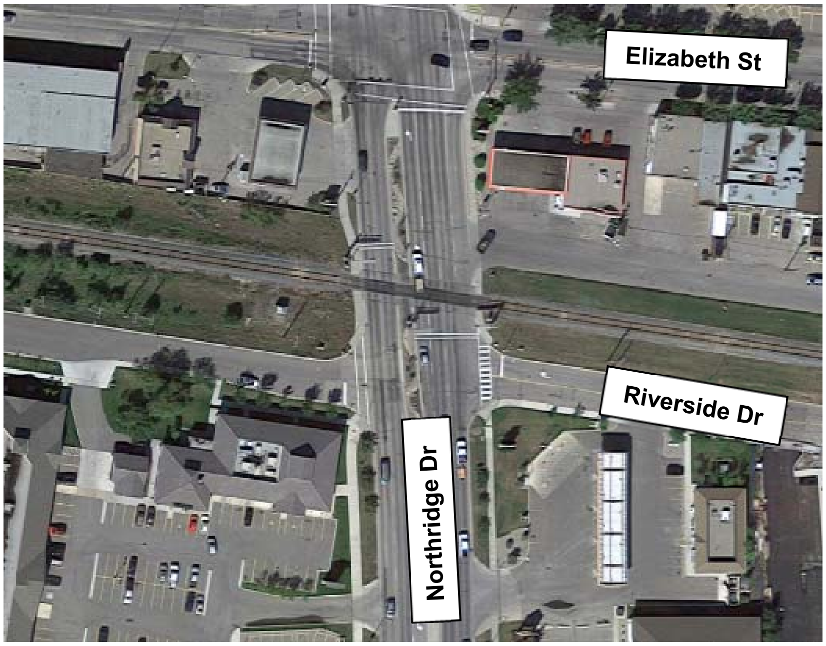


Figure 5.1 Northridge Drive Rail Crossing

The rail crossing itself is controlled by gates (two in the northbound direction to account for all four approach lanes, one in the southbound direction), warning signal flashing lights (site and overhead mounted) and bells, and rail crossing signs, in both the median and edge of road (both directions). This also includes additional lights for pedestrians in both directions on both sides of the road, and lights that are oriented towards westbound right-turning traffic from Riverside Drive onto Northridge Drive. There is a Railway Crossing Ahead warning sign in the northbound direction, just north of Riverside Gate. (**Figures 5.2 to 5.4**)

Figure 5.2 Gates and Signals, Northbound Northridge Drive Approach

Figure 5.3 Gates and Signals, Southbound Northridge Drive Approach

Figure 5.4 Supplemental Signals, Westbound Riverside Drive Approach

The review of the GCS found that the crossing treatments currently in place are generally appropriate for the site, in terms of gates, signals, and signs. Although current and longer term 95th percentile northbound and southbound queues along Northridge Drive from the intersections with Elizabeth Street and Riverside Gate extend across the rail line, the signal operations of adjacent intersections are such that vehicles will have time to clear in advance of an approaching train. Nonetheless, queues are a potential concern. Therefore a *Do Not Stop on*

Tracks sign in each approach direction is recommended, installed below the signals on the right side of the road and the median in each direction (four signs in total, **Figure 5.5**).

Figure 5.5 TAC RB-59, Do Not Stop on Tracks Sign

Aside from this issue, there are no additional capacity or road widening issues identified across the rail line in the long term 2045 horizon year that would trigger additional crossing control requirements at this location.

5.2 Veterans Way Crossing

Veterans Way is a two-lane road at the rail crossing. It terminates 20m to the south of the rail line at Riverside Drive, and continues north for 900m up to the intersection with Milligan Drive. At the crossing, the current daily traffic is approximately 4,000 vehicles/day. Riverside Drive has stop signs at Veterans Way in both directions (with southbound Veterans Way traffic having the right of way with the exception of the marked and signed crosswalks across Riverside Drive). The result is that southbound through traffic is almost never impeded (thus minimizing queue spillback concerns onto the rail line). In the northbound direction queues will not spill back to the rail line from Elizabeth Street in the near or long term (2045 horizon year). **Figure 5.6** shows the crossing location.

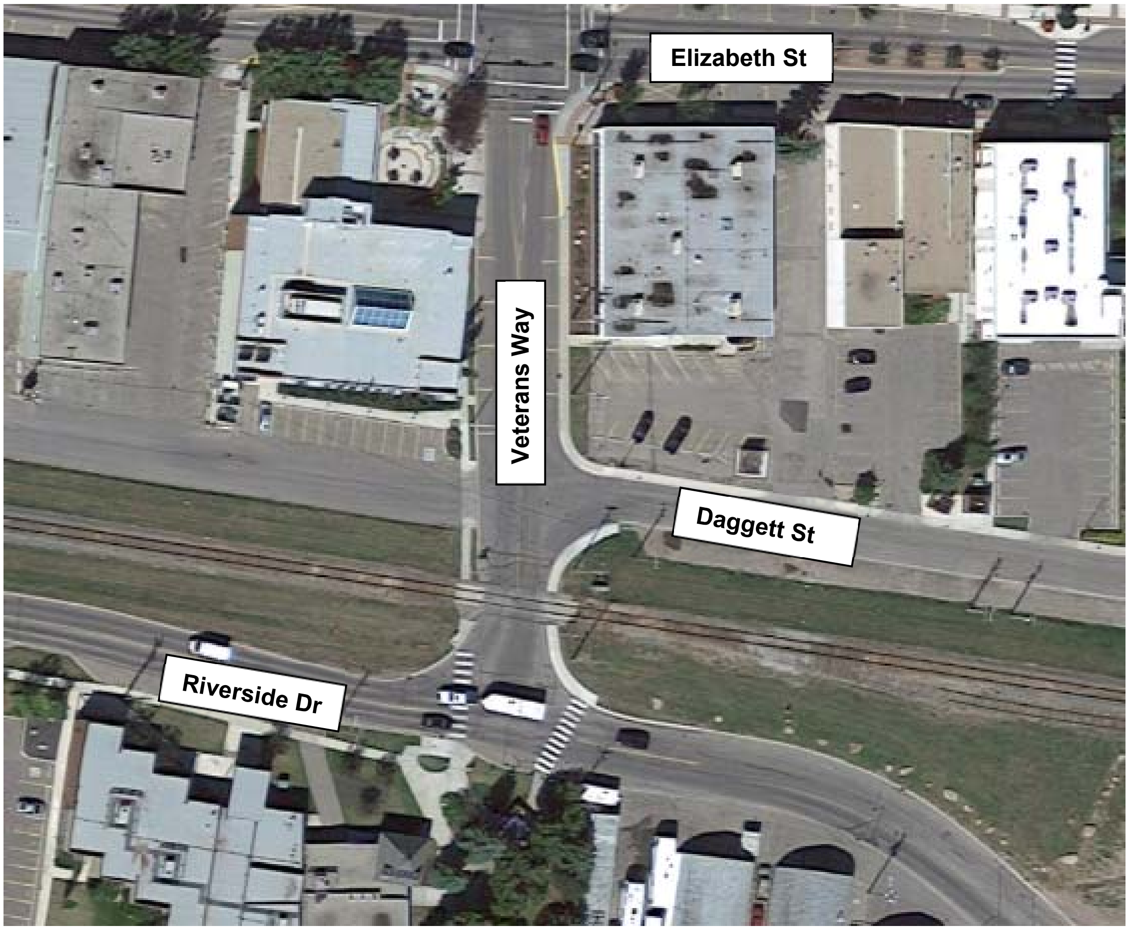


Figure 5.6 Veterans Way Rail Crossing

The crossing itself consists of Railway Crossing signage and flashing lights and bells, with the signals oriented to southbound Veterans Way, eastbound and westbound Riverside Drive, northbound Veterans Way (for pedestrians), and westbound Daggett Street. There are no signals oriented towards eastbound Daggett Street but there is visibility of the southbound rail signal displays.

The stop controls on Riverside Drive approaches to Veterans Way (as well as Daggett Street) are beneficial to rail crossing safety as they ensure a controlled approach to this rail crossing location, where any approaching and stopped drivers are appropriately made aware of approaching trains via the rail signal system. This mitigates sight line concerns, as these vehicles are approaching parallel to the rail line and thus, if there were no signals, the drivers would need to turn and immediately stop to look both ways to see if a train was approaching.

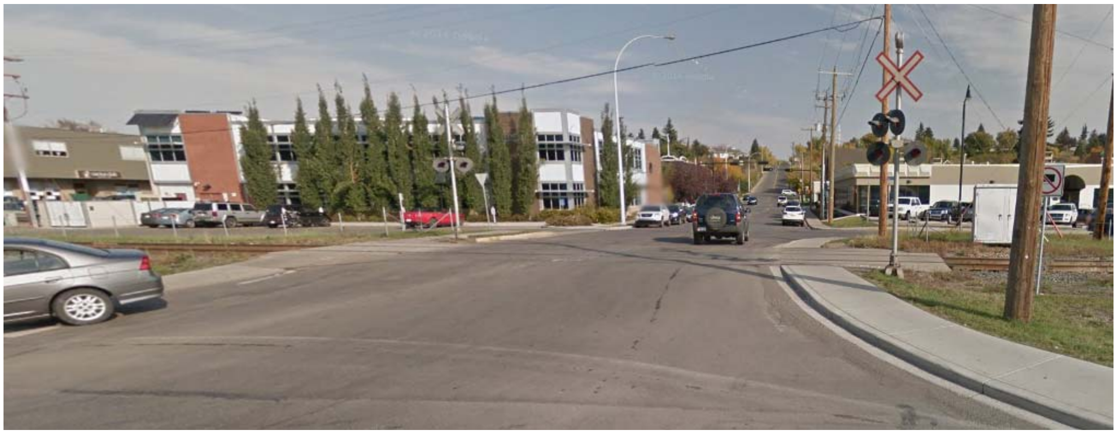


Figure 5.7 Signage and Signals, Northbound Veterans Way
(Note orientation of signals to all approaches)

Figure 5.8 Signage and Signals, Southbound Veterans Way
(Note orientation of signals to all approaches)

Figure 5.9 View of Rail Line and Signals, Eastbound Daggett Street

The review of the GCS found that the crossing treatment currently in place is appropriate for the site in the near and long-term with future growth.

5.3 Lineham Avenue Crossing

Lineham Avenue is a two-lane road at the rail crossing. At this location there are two rail lines at the crossing. It terminates 30m to the south of the rail line at South Railway Street, where the west and north legs constitute the through-movement, and the east leg of South Railway Street is stop-controlled (and is a low volume gravel road). Approximately 45m to the north of the rail line, Lineham Avenue intersects with North Railway Street, with a stop control on Lineham Ave (and a northbound right turn channelized island with yield control). Lineham Ave is considered as operating as a collector road in the near and long-term. **Figure 5.10** shows the crossing location.

The crossing itself consists of *Railway Crossing* signage, *Number of Tracks* signs, gates, and flashing lights and bells (side mounted). The gates were installed after 2012. There are actually two signal poles on the east side of Lineham Ave, one just south of each rail line (with signals facing both north/south directions as well as additional signals oriented towards eastbound S Railway Street traffic).

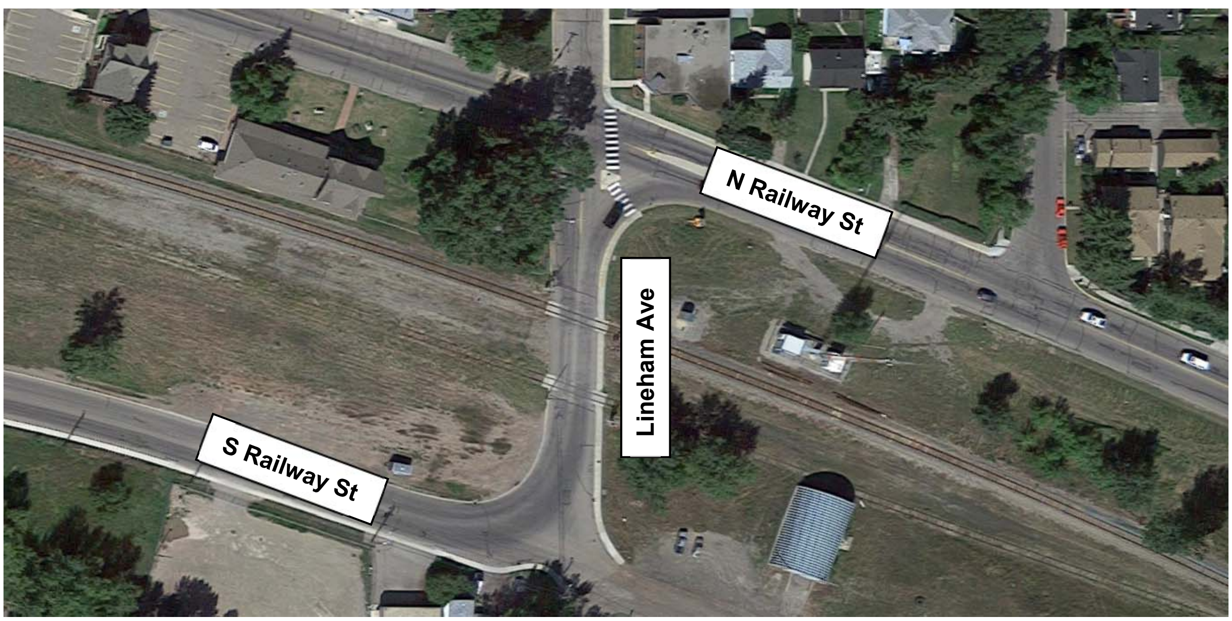


Figure 5.10 Lineham Avenue Rail Crossing

Figure 5.11 Gates, Signals, and Signage, Northbound Lineham Avenue
(Note orientation of signals to northbound and to eastbound South Railway Street traffic)

Figure 5.12 Gates, Signals, and Signage, Southbound Lineham Avenue

With the gates, this crossing is well-controlled from a safety perspective. Gates are not required from a volume perspective but are beneficial due to the somewhat awkward roadway curvature and close proximity of the intersections with both North Railway Street and South Railway Street. The review of the GCS found that the crossing treatment currently in place is appropriate for the site.

5.4 Pedestrian Crossing (between Northridge Drive and Veterans Way)

There is a pedestrian rail crossing approximately midway between Northridge Drive and Veterans Way. This crossing provides some local connectivity to/from the commercial land uses along Elizabeth Street and south of the rail line, where the rail line is otherwise fenced off for 500m between intersections (**Figures 5.13 to 5.15**).

Figure 5.13 Pedestrian Rail Crossing between Northridge Drive and Veterans Way

The crossing features consist of *Railway Crossing* signs, *Railway Warning* signs (with Pedestrian tabs), and custom warning signs indicating that pedestrians need to look both ways. There is also an alignment offset on both pathway approaches, which requires pedestrians and cyclists to slow down in advance of the tracks, which is beneficial for ensuring slow speeds and appropriate alignment when looking for, and reacting to, any approaching trains.

Figure 5.14 Signage, Northbound Pedestrian Crossing

Figure 5.15 Signage, Southbound Pedestrian Crossing

The relatively low volume of pedestrians and rail characteristics and operations do not trigger a need for gates or rail signals. The combination of warning and regulatory signage and physical devices that require slow approaching pedestrian and cyclist speeds are appropriate for this location.

5.5 Railway Crossing Review Conclusion

The railway crossing reviews for Northridge Drive, Veterans Way, Lineham Ave and the pedestrian crossing found that the current control measures are generally appropriate for all road users at all locations, in both the near-term and 2045 horizon year. In terms of additional mitigation, installing TAC RB-59 *Do Not Stop on Tracks* signs at Northridge Drive (below each railway signal, four signs in total) is recommended to ensure potential peak queues in both directions do not block railway tracks.

Active Transportation

Active Transportation offers economic, social, health and environmental benefits. As a transportation strategy and viable mode of transport, active transportation also meets a number of community and transportation planning objectives set out by the Town of Okotoks. Active transportation, and pathways more specifically, have been shown to provide a number of diverse benefits, summarized as follows:[20,21]

- **PUBLIC HEALTH / SAFETY -** Moving on feet or by bicycle results in increased physical activity, resulting in lower stress levels and reduced risk of chronic illnesses. A well-designed and connected pathways network encourages walking and cycling.

- **ENVIRONMENTAL SUSTAINABILITY -** A well-utilized network of pathways can result in lower air pollution and greenhouse gas emissions from the transportation sector. Pathways can also increase the amount of green space with reduced vehicle parking / roadway requirements.

- **ECONOMIC / FINANCIAL** - Studies have shown that the development and maintenance costs of pathways, and active transportation infrastructure more broadly, are lower than other transportation infrastructure based on overall costs and on a per capita basis. Active transportation has also been found to have positive local economic development impacts and proven cost savings for households.

- **QUALITY OF LIFE** - Quality of life is subjective and often hard to quantify; however, a well-developed pathway network increases opportunities for social interaction and community cohesion, increases overall accessibility for those who cannot drive due to mobility or financial constraints, and contributes to a positive community identity.

- **TRANSPORTATION CONNECTIVITY -** One of the most valuable benefits of a robust pathway network is an improvement in overall connections to and between community destinations. In addition, many public transit trips begin or end with a form of active transportation and as such, a strong pathway network can contribute positively to a community's transit ridership.

[20] Town of Okotoks. (2015). Active Transportation Strategy (Draft).
[21] Federation of Canadian Municipalities. (2011). Active Transportation in Canada: a resource and planning guide. Available online at: https://www.fcm.ca/Documents/tools/GMF/Transport_Canada/ActiveTranspoGuide_EN.pdf

WHAT IS ACTIVE TRANSPORTATION?

The Public Health Agency of Canada defines active transportation as *"any form of human-powered transportation. It is any trip made for the purposes of getting yourself, or others, to a particular destination - to work, to school, to the store or to visit friends. As long as it is "active," you can choose the mode - walking, cycling, wheeling, in-line skating, skateboarding."*

Recognizing the value and wide-ranging benefits of active transportation, the Town of Okotoks adopted an Active Transportation Strategy in 2015 with the long-term goal of "transforming a vehicle-reliant community into a place where all citizens – including walkers, motorists, cyclists and other users – share a common vision and goal for future transportation needs".[22] The strategy contains a number of planning goals and objectives pertaining to an improved active transportation system. Some of the goals are more specific to improving the community's pathways, as follows:

- **Improve active transportation in existing neighborhoods and commercial areas.** This goal acknowledges that gaps in the pathways network exist and need to be addressed.

- **Identify, implement and maintain a system of safe routes throughout Okotoks for all Active Transportation users**. Children rely on their parents to be driven to school. Not all households have good access to pathways to travel to school, or face safety concerns due to a low quality pathway. Pathways for children are therefore required to be designated as "safe routes" and be located closer to their homes to increase overall access.

- **Improve maintenance of active transportation network.** Pathways are only beneficial if they are accessible, safe, and maintained. Maintenance of the pathway network is an important component of improving Okotoks' overall Active Transportation network.

[22] Town of Okotoks. (2015). Active Transportation Strategy (Draft); pg. 5.

6.1 Existing Pathway Network

Okotoks currently contains over 49 km of community pathways[23] that connect residents to parks, schools, community centres and shopping and employment areas. The system is organized as eight (8) specified Pathway Routes and a series of smaller Pathway Connections that connect Routes with localized destinations (see **Table 6.1)**. Crossings of the Sheep River are provided at Hemus Parkway / Northridge Drive, Veterans Way and 32nd Street and are important links in the overall network connectivity.

The existing pathway network map has been included as **Appendix IV.**

TABLE 6.1 SUMMARY OF EXISTING PATHWAY ROUTES[24]

Pathway Route		Approximate Distance
32nd Street Pathway	Parallels 32nd Street from Crystal Green Lane (north) to Southbank Boulevard (south)	3.9 km
Cimarron Parkway Pathway	Connects the Sheep River path southwest through the Cimarron neighborhood	1.3 km
Cimarron Storm Pond Pathway	Circles the Cimarron Storm Pond, with connections to 32nd Street path	1.8 km
Crystalridge Pathway	Circle route around Crystals Shores Lake and nearby residential areas	3.7 km
Drake Landing Pathway	Circle route within the Drake Landing neighborhood	1.0 km
Max Bell Parkway Pathway	Extends west of Hemus Parkway / Northridge Drive via the Sheep River south bank	1.1 km
Sheep River Valley Pathway	Circle pathway on the north and south bank of Sheep River, with crossings via Hemus Parkway / Northridge Drive and 32nd Street	7.7 km
Westmount Pathway	Circular route through the Westmount neighborhood, connecting to Westmount School	1.9 km

[23] Per information provided in the "Okotoks Pathway" map
[24] Based on identified "Sample Routes" on the Okotoks Pathways map

Photos from the Cimarron Pathway (left) and Sheep River Valley Pathway (right)[25].

6.1.1 Activity

Pedestrian / cyclist volumes were collected using automated counters as part of the 2013-2014 active traffic counts on key pathways (**Table 6.2**).

TABLE 6.2 SUMMARY OF ACTIVITY ON KEY PATHWAY CORRIDORS[26]

	Average Trips (approx.)	
	Daily	Annual
Woodbend Pathway (Sheep River Valley Pathway)	210	77,000
McAlpine Crossing (Sheep River, 32nd Street Pathways)	90	33,000
LDS North Pathway (Crystalridge Pathway)	90	34,000
Crystalridge (Crystalridge Pathway)	90	32,000
Veterans Way (Connector Pathway)	440	160,000
Laurie Boyd Bridge (Connector Pathway)	130	47,000
Hemus Parkway (Connector Pathway)	40	15,000

[25] Image source Tristar Communities, www.cimarronliving.com/green-spaces-pathways-okotoks (left); Off the Beaten Path, www.bigdoer.com/14679/hikes-and-summits/okotoks-pathways-sheep-river-valley-loop (right)

[26] Count data based on "Active Traffic Counts, 2013-2014" findings, from Active Transportation Strategy – Background Research Documents 4: Pathway Counter Data, pg 58.

6.1.2 Issues / Challenges

Through public consultation as part of the development of the Active Transportation Strategy, a number of broad issues were identified with the existing pathway network, as follows:

- The stair locations on the Town's main pathways are difficult for some residents due to the steep escarpment
- Snow is not cleared on all connecting pathways
- There is a lack of bridges in some areas of the Town
- Directional and informational signage on pathways is lacking

Results from the Town's 2013 Community Household Survey provide insight on the strengths and weaknesses of the existing pathway network. Survey results pertaining to pathways are as follows:

- Approximately 59% of survey respondents either strongly agreed or agreed that wider sidewalks / pathways would encourage them to walk or cycle more often;
- Approximately 54% of survey respondents either strongly agreed or agreed that improved sidewalk and pathway maintenance would encourage them to walk or cycle more often; and
- Approximately 66% of survey respondents either strongly agreed or agreed that more connections to key destinations (e.g., shopping centres, schools, downtown) would encourage them to walk or cycle more often.

6.2 Future Pathway Network

6.2.1 Long-Term Network

A series of priority pathway improvements are identified in the Active Transportation Strategy (**Figure 6.1**). These improvements should be the Town's focus on capital investments in the Pathway Network for the next ten years.

6.2.2 Priority Network Improvements

A series of priority pathway network improvements are identified in the Active Transportation Strategy. See **Table 6.3**. These improvements should be the Town's focus on capital investments in the Pathway Network for the next ten years.

TABLE 6.3 SUMMARY OF PATHWAY NETWORK IMPROVEMENTS

1.	**Crystalridge South Pathway -** Pathway between 32nd Avenue / Stockton Avenue intersection and southeast corner of Wylie Athletic Centre site via existing Pathway Connections, with new connection to south end of Crystalridge Pathway.
2.	**Clark Stairs to Ecole Okotoks Connection -** Pathway connection from Clark Stairs to Ecole Okotoks Junior High School and extending to Percy Pegler Elementary School.
3.	**Foothills School Pathway -** Pathway on the west side of Foothills Composite High School and Howard Park to connect Southridge Drive sidewalk to North Howard Park pathways.
4.	**Ecole Good Shepherd Pathway -** Develop pathway system from Waldron Ave / Visser Way intersection through Tower Hill Park to Ecole Good Shepherd Elementary School.
5.	**Milligan Drive Connection -** Short pathway connecting sidewalks on Milligan Drive to the Crystalridge Pathway via the Fire Hall site.
6.	**St. Mary's School Connection -** Pedestrian bridge and pathway to connect Cimarron pathway to the east side of St. Mary's Elementary School.
7.	**Cornerstone Pathway -** Pedestrian corridor through Cornerstone (large-scale retail site) to connect a pathway to the south and west businesses.
8.	**Big Rock School Pathway -** Pathway along the east side of the Big Rock School site connecting Big Rock Trail to Hunters Gate.
9.	**Railway Pedestrian Crossing Improvement -** Wider pedestrian crossing and direct pedestrian connection through to Elizabeth Street.

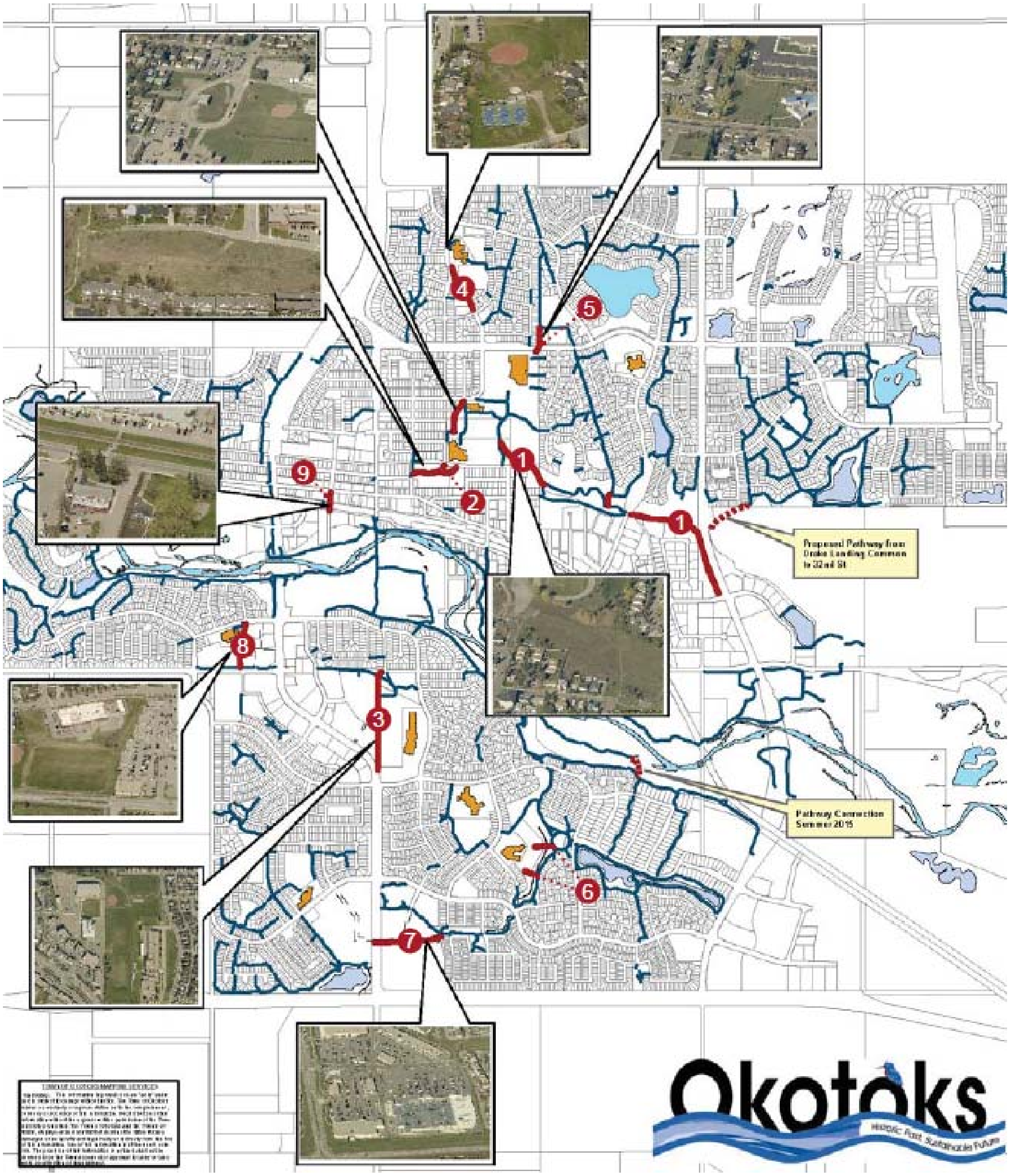


Figure 6.1 Priority Pathway Connections + Improvements[27]

[27] Okotoks Active Transportation Strategy, pg 31.

6.3 Future Growth Areas

The Town has identified "Priority Growth Areas" where new development will be compact, mixed-use and walkable[28]. Many of these growth areas are located in the northwestern, northern, and northeastern areas of the Town, both within and beyond current Town boundaries. See **Figure 6.2**.

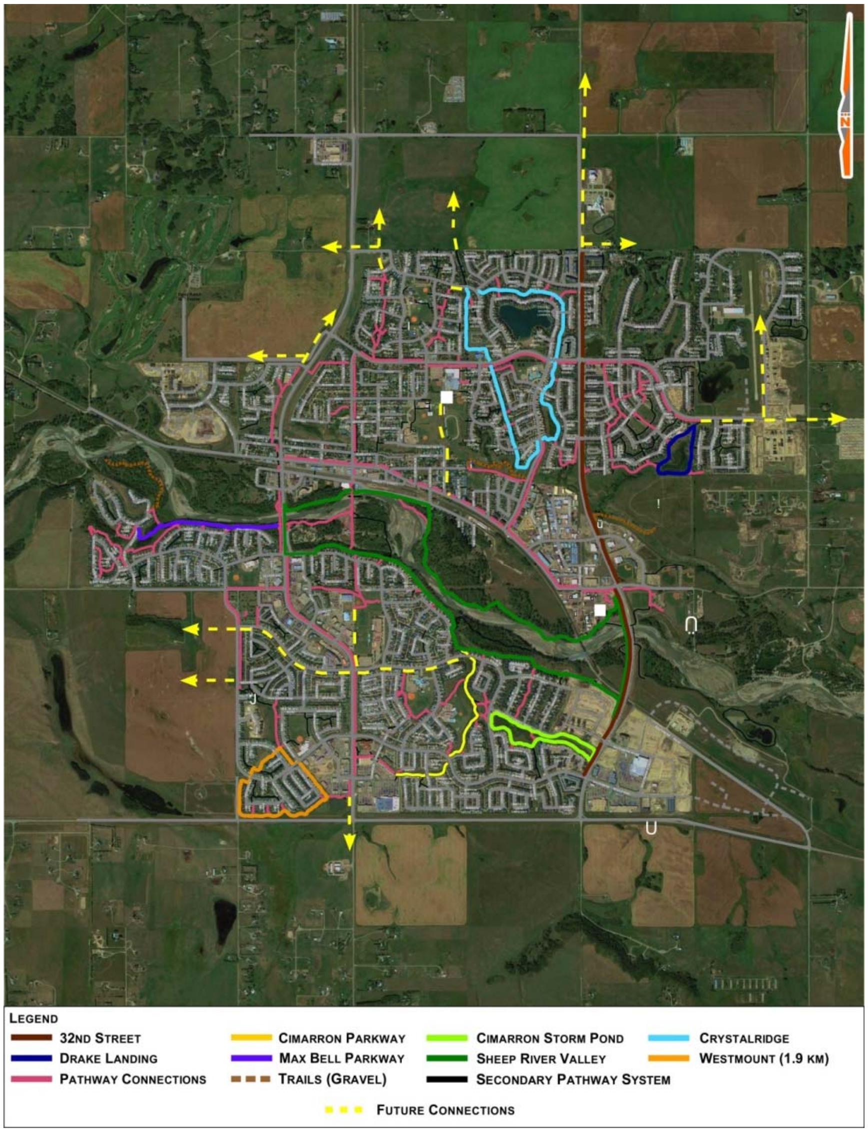


Figure 6.2 Future Pathway Connections to Annexed Areas

[28] Town of Okotoks. (2014). Town of Okotoks Growth Study and Financial Analysis. Available online at: http://www.okotoks.ca/sites/default/files/pdfs/publications/3736_FULL_REPORT_-_Town_of_Okotoks_Growth_Study_and_Financial_Analysis_-_20140218_0.pdf

Developing a connected and well-designed pathway system will be important in realizing the sustainable and walkable development objectives of the Town in new growth areas. The Town should consider the following provisions for pathway development in the design of future development areas.

1. All new households (single-family or multi-family residential) should be within 200m walking distance[29] of a pathway to afford reasonable access to pathways.
2. Any existing pathways leading to the edge of a future development site should be extended into that site once development occurs to create continuity in the pathway network.
3. Dead ends (or cul-de-sacs) should be avoided as they increase trip length and reduce route options. No new dead ends are to be developed without a pathway allowing for a non-motorized connection.
4. Coordination of pathway routes and future bus stop locations to provide for walking and cycling access to/from public transit.
5. Pathways should be considered adjacent natural features (e.g., rivers, lakes, slopes) where integrated into subdivision layout, as these routes provide opportunity for access to nature and continuous off-road pathway routes.
6. All future pathways should be designed to a high-quality, with surface finishing that is appropriate for the context, width that is reflective of intended user type and volume, and supporting amenities as appropriate.

[29] Walking distance is measured as the actual distance an individual walks using a dedicated walking facility, and is not necessarily a straight line (i.e. not “as the crow flies”).

Traffic Calming

7.1 Devices

The *Canadian Guide to Neighbourhood Traffic Calming* recognizes traffic calming features in four (4) categories - obstructions, vertical deflections, horizontal deflections and signs. Related technologies have also been included. See **Table 7.1**.

TABLE 7.1 RECOMMENDED TRAFFIC CALMING FEATURES

A. Obstructions	
A1. Full Closure	A4. Intersection Channelization
A2. Directional Closure	A5. Raised Median Through Intersection
A3. Diverter	A6. Right-in, Right-out Island
B. Vertical Deflections	
B1. Raised Intersection	B4. Rumble Strips
B2. Raised Crosswalk	B5. Sidewalk Extension
B3. Speed Hump	B6. Textured Crosswalk
C. Horizontal Deflections	
C1. Chicane	C4. On-Street Parking
C2. Curb Extension	C5. Raised Median Island
C3. Curb Radius Reduction	C6. Traffic Circle
D. Signs	
D1. Traffic Calmed Neighbourhood Sign	D3. Turn Prohibited Sign
D2. Through Traffic Prohibited Sign	
E. Technology	
E1. Radar Message Sign	E2. In-Ground Lights

7.2 Applications

The following descriptions of traffic calming features include consideration for the potential benefits of each in the categories of speed reduction, volume reduction, and conflict reduction. See **Table 7.2**.

TABLE 7.2 LEGEND OF EFECTIVNESS SYMBOLS

Impact	Speed Reduction	Volume Reduction	Conflict Reduction
Yes	●	●	●
Somewhat	◐	◐	◐
No	○	○	○

7.3 Obstructions

These features obstruct specific vehicle movements. They discourage short-cutting to varying degrees (depending on the type and number of features applied), reduce conflicts, and enhance the neighbourhood environment. They are typically used at intersections, but can also be applied mid-block.

A1. Full Closure

A barrier extending across the entire width of a roadway, which obstructs all motor vehicle traffic movements from continuing along the roadway.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.3, pp 4-23.

A2. Directional Closure

A curb extension or vehicle barrier extending to approximately the centerline of a roadway, effectively prohibiting traffic entering or exiting a particular road.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.1, pp 4-19.

A3. Diverter

A raised barrier placed diagonally across an intersection forcing vehicles to turn, preventing straight movements through the intersection.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.2, pp 4-19.

A4. Intersection Channelization

Raised islands located in an intersection, used to obstruct specific traffic movements and physically direct traffic through an intersection.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.4, pp 4-23.

A5. Raised Median Through Intersection

An elevated median located on the centerline of a two-way roadway through an intersection, which prevents left turns and through movements to and from the intersecting roadway.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.5, pp 4-26.

A6. Right-in, Right-out Island

A raised triangular island at an intersection approach which obstructs left turns and through movements to and from the intersection street or driveway.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.6, pp 4-26.

7.4 Vertical Deflections

Vertical deflections require a motorist to slow to avoid unpleasant sensations due to a variation in surface level. Vertical deflections have the primary benefit of reduced vehicle speeds, but also result in decreased volumes, reduced conflicts and enhanced pedestrian conditions.

B1. Raised Intersection

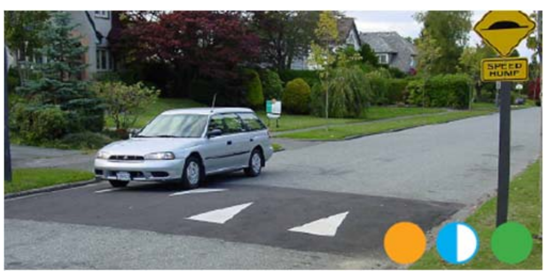
An intersection – including crosswalks – constructed at a higher elevation than the adjacent roadway.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.4.2, pp 4-3.

B2. Raised Crosswalk

A marked pedestrian crosswalk constructed at a higher elevation than the adjacent roadway. This feature may be located at an intersection or mid-block location.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.2.1, pp 4-3.



B3. Speed Hump

A raised area of a roadway, which deflects both the wheels and frame of a traversing vehicle.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.2.4, pp 4-6.

B4. Rumble Strips

Raised buttons, bars or grooves closely spaced at regular intervals on the roadway that create both noise and vibration in a moving vehicle. Local road application is typically on steep slopes and/or as a centre line application on narrow roadways.

<u>Design</u>: n/a

B5. Sidewalk Extension

A sidewalk is continued across a local street intersection. For a 'raised' sidewalk extension, it is continued at its original elevation, with the local roadway raised to the level of the sidewalk at the intersection. For an 'unraised' sidewalk extension, the sidewalk is lowered to the level of the roadway.

Design: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.2.3, pp 4-6.

B6. Textured Crosswalk

A crosswalk incorporating a textured and/or patterned surface which contrasts with the adjacent roadway. Texture helps alert motorists of the pedestrian crossing area.

Design: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.2.5, pp 4-9.

7.5 Horizontal Deflections

Horizontal deflections require motorists to alter their direction or choose an entirely different route. Horizontal deflections can be applied to reduce neighbourhood short-cutting, to reduce vehicle speeds, or to reduce conflicts.

C1. Chicane

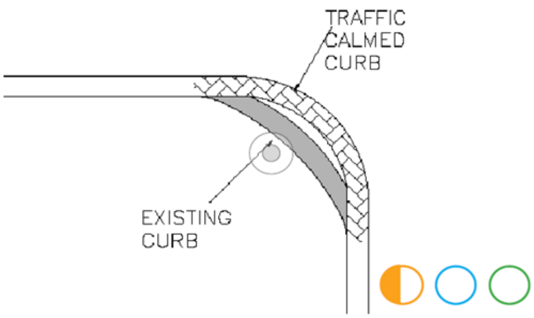
A series of curb extensions on alternating sides of a roadway, which narrow the roadway and require drivers to steer from one side of the roadway to the other to travel through the chicane. Typically, a series of at least three curb extensions is used.

Design: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.1, pp 4-9.

C2. Curb Extension

A horizontal intrusion of the curb into the roadway resulting in a narrower section of roadway. Typically applied at an intersection, but may also occur mid-block.

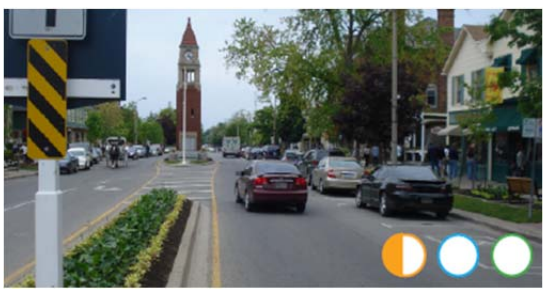
<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.2, pp 4-11.



C3. Curb Radius Reduction

The reconstruction of an intersection corner using a smaller radius, usually in the 3.0m to 5.0m range. Small curb radii require vehicles to slow when making a right turn and result in a shorter road crossing distance for pedestrians.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.3, pp 4-11.



C4. On-Street Parking

The reduction of the roadway width available for vehicle movement by allowing motor vehicles to park adjacent and parallel to the curb.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.4, pp 4-14.

C5. Raised Median Island

An elevated median constructed on the centerline of a two-way roadway to reduce the overall width of the adjacent travel lanes. Medians also provide opportunities to increase landscaping and improve the streetscape.

<u>Design</u>: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.5, pp 4-14.

C6. Traffic Circle

A raised island located in the centre of an intersection, which requires vehicles to travel through the intersection in a counter-clockwise direction around the island.

Design: Canadian Guide to Neighbourhood Traffic Calming, Sec 4.3.6, pp 4-17.

TRAFFIC CIRCLES vs. ROUNDABOUTS

Traffic circles and roundabouts are often confused. A traffic circle is a traffic calming device intended to slow vehicle speeds and discourage neighborhood short-cutting. A roundabout is a traffic control device that replaces the need for a traffic signal in certain situations. A roundabout is not a traffic calming feature.

7.6 Signage

Signage features regulate traffic movements within a neighbourhood and in many cases may be replaced with physical features that do not require enforcement.

D1. Traffic Calmed Neighbourhood Sign

A sign indicating to drivers that traffic calming measures are in place within a neighbourhood, and through increased driver awareness, discourage short-cutting and speeding.

Design: Manual of Uniform Traffic Control Devices of Canada, Sec A4.6.6 (ID-32).

D2. Through Traffic Prohibited Sign

A sign indicating to drivers that they are not permitted to proceed straight ahead. When used as a traffic calming measure it discourages through traffic from short-cutting along a street.

Design: Manual of Uniform Traffic Control Devices of Canada, Sec A2.4.1 (RB-10).

D3. Turn Prohibited Sign

A sign indicating to drivers that they are not permitted to make a particular turn (either left or right). When used as a traffic calming measure it prevents through traffic from short-cutting along a street.

Design: Manual of Uniform Traffic Control Devices of Canada, Sec A2.4.3 / A2.4.4 / A2.4.5.

OTHER SIGNS

The *Canadian Guide to Neighborhood Traffic Calming* also lists stop, yield, one-way, and maximum speed signs as traffic calming measures. However, recent studies have shown that their application as a traffic calming measure decreases their effectiveness in situations where they are warranted. It is suggested that these signs are used as traffic calming measures only where they meet technical warrants.

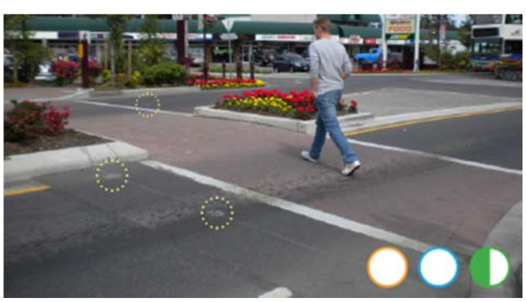
7.7 Technology

Certain technologies exist that may be used as traffic calming to communicate a message to motorists about the intended use of a street.

E1. Radar Message Sign

A radar device and message sign that sits at the roadside. The device measures a vehicle speed and indicates it on the variable message sign, providing real-time feedback to motorists as to whether they are driving within the posted speed limit.

Design: n/a



E2. In-Ground Lights

In-ground lights provide illumination within the road surface that more clearly communicates paint marking in key locations, including at crosswalks and lane guide lines in high-conflict intersections.

Design: n/a

Transit

Public transit is a viable mode of transportation that is crucial to the livability of any town, city, or region. Its benefits are extensive as it helps contribute to public health, the environment, access and mobility, economic savings, and quality of life. More specifically, public transit has been shown to provide the following benefits:[30,31]

- **PUBLIC HEALTH / SAFETY** - It can encourage people to have a more healthy and active lifestyle, especially if transit users walk or cycle to their station or stop. Public transit can also help reduce injuries and fatalities caused by car accidents.[32]

- **ENVIRONMENTAL SUSTAINABILITY** - As transit ridership increases in a jurisdiction, fewer cars end up on the road. This can help reduce air pollution, greenhouse gas emissions, and road congestion. The Town of Okotoks has identified that one 40-foot low-floor bus can take 41 vehicles off the road based on a 1.2 automobile passenger occupancy.[33]

- **IMPROVED MOBILITY** - Not everyone can afford a private vehicle. Access to a transit system can provide a viable alternative mode of transportation for low income residents, youth, seniors, and post-secondary students – all of whom are less likely to own a vehicle.

- **ECONOMIC / FINANCIAL** - It is no surprise that travel by public transit is cheaper than owning and operating a car. The American Public Transportation Association has identified that a two-person household can save, on average, more than $10,000 per year by downsizing to one car and using other forms of transportation such as public transit.

There are several other public transit benefits that are specific to the Town of Okotoks, including its potential ability to support retail businesses by transporting in additional clientele, helping make the downtown more of a travel destination, and supporting employment mobility particularly for service-based industries and larger employers in the Town.[34]

[30] Public Transport Victoria. (2013). Benefits of public transport. Available online at: http://ptv.vic.gov.au/about-ptv/media-centre/student-media-enquiries/benefits-of-public-transport/

[31] American Public Transportation Association. (2016). Public Transportation Benefits. Available online at: http://www.apta.com/mediacenter/ptbenefits/Pages/default.aspx

[32] Transport Canada. (2014). Canadian Motor Vehicle Traffic Collision Statistics 2014. Available online at: https://www.tc.gc.ca/media/documents/roadsafety/cmvtcs2014_eng.pdf

[33] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report.

[34] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report.

8.1 Transit Feasibility study for the Town of Okotoks

In 2010, Calgary Transit conducted a *Transit Feasibility Study* for the Town of Okotoks that included an assessment of the potential market for transit, the diverse benefits associated with transit, and estimates for the capital and operating costs that would be required for a local and regional transit system. The study concluded that public transit is viable in the Town and that the provided service would have sufficient demand to support round trips connecting with the LRT network in Calgary every 30 minutes in the AM and PM peak periods.

Service Standards

Service standards describe the conditions that the new transit system is seeking to achieve. The following service standards were developed for the *Transit Feasibility Study* and should be used to guide transit implementation in future.

- **Service Coverage** - Maximize the number of dwellings within 400-600m walking distance of public transit.
- **Service Frequency** – Minimum 30-minute service frequency for regional and local services.
- **Span of Service** – Focus on weekday AM and PM peak periods, then expand to weekday mid-day and weekend service.
- **Timed Transfer** - Orient routes and schedules to provide efficient transfers between routes.
- **Vehicle Loading** - Seated loads, except for a portion of trips on local service in peak periods
- **Accessibility** - 100% low floor accessible vehicles, sidewalk connections to bus zones and wheelchair curb cuts at adjacent intersections.
- **Comfort** - Prioritization of shelters at bus stops and review of customer amenities on regional buses.
- **Ridership Targets** - Initial targets of 35 passenger per trip in the peak direction and 8 passengers per trip in the reverse flow on regional service, and 5-10 passengers per operating hour on local service.

8.2 Pilot Service

The Town is one of five communities involved in the **On-it** regional transit system, an initiative of the Calgary Regional Partnership beginning in the fall of 2016. The two-year pilot service will include a <u>Regional</u> transit service to Calgary and a <u>Local</u> service connecting neighbourhoods within Okotoks. The service is intended to provide residents of Okotoks and surrounding communities the chance to commute into Calgary without having to be reliant on their vehicles. More information is provided in the following sections.

8.2.1 Regional Route

The regional transit route will provide residents of Okotoks with an express bus service to the Somerset-Bridlewood LRT station in Calgary.[35] The buses will start service from the community of High River and eventually through Okotoks before heading to Somerset-Bridlewood LRT station. **Figure 8.1** shows the proposed regional transit route through Okotoks. Based on the proposed transit schedule (**Appendix V – Regional Transit Schedule**), the service will stop at the two proposed park-and-ride locations in Okotoks:

3) Okotoks Recreation Centre (north park-and-ride located on Milligan Drive and Visser Way) and
4) Centennial Arena (south park-and-ride located on Community Way).

According to the transit schedule, there will be 15 buses servicing regional routes (**Figure 8.1**) daily that stop at the Centennial Arena park-and-ride before heading to the Somerset-Bridlewood LRT station in Calgary. Ten bus stops will be constructed to service regional routes. Buses departing the Somerset-Bridlewood LRT station to the southern communities are scheduled to stop at the Centennial Arena park-and-ride eight times per day. Buses will operate at 15-30 minute headways during peak times. For more information about the regional transit schedule, see **Appendix V**.

[35] Stark, E. (2015). Transit project rolls out new opportunities for Okotoks. *Calgary Herald*. Available online at: http://calgaryherald.com/life/homes/new-homes/transit-project-rolls-out-new-opportunities-for-okotoks

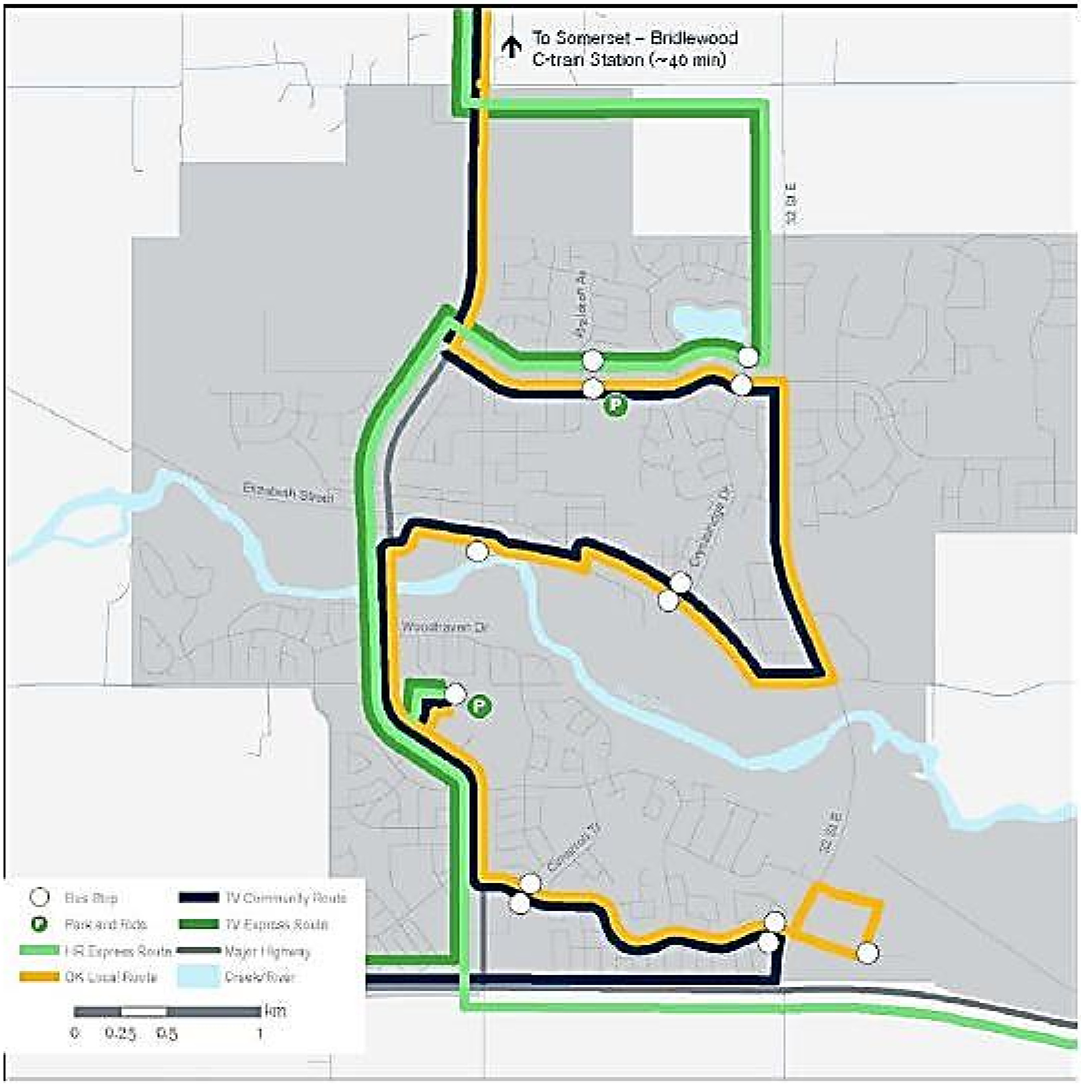


Figure 8.1 Regional Transit Route (Okotoks only)[36]

[36] Figure provided by the client.

8.2.2 Local Routes

Three local routes are identified as part of the pilot service. It is expected that 33 bus stops will service the local bus routes. Local routes will provide service to a number of important destinations in the Town, including the Okotoks Recreation Centre, Centennial Arena, and the Okotoks Health & Wellness Centre, though no bus stops are shown in the downtown area which may limit service for downtown employees and businesses.

The local routes are not finalized. Further studies are expected to review routing following the pilot project before the original routes could be finalized.

8.3 Infrastructure

8.3.1 Bus Stops

Based on the information presented in **Figure 8.2**, up to 48 bus stops could be part of the pilot service in Okotoks. However, at the time of completing this plan, no information was available about the bus stop infrastructure (e.g., basic bus stop versus enhanced bus stop). Moreover, no information was obtainable about the spacing of the bus stops, which is an important consideration when planning a transit system. Section 8.4.1 provides more information about the type of bus stop Okotoks may want to consider if the pilot becomes permanent.

Park-and-Rides

Park-and-rides will be provided in two locations - Okotoks Recreation Centre and Centennial Arena. These locations are appropriate due to their large, publicly-held parking supplies, adjacency to key transit trip generators, and compatibility with proposed bus routes. The Transit Feasibility Study estimated that approximately 125 park-and-ride stalls will be required to be shared between the two sites.[37]

Future Transit Plan

At the end of the two-year pilot service (Fall 2018), a decision will be required as to whether to continue the service in its “pilot” form, continue the service in an altered form, or discontinue the service altogether. Monitoring and performance measures in the *Transit Feasibility Study* will be used to assess the extent to which the pilot service has met the defined Service Standards, and how to proceed with public transit in Okotoks.

A future transit plan has been developed if the service continues beyond the initial two-year pilot service, with consideration for future bus routing (provided by Calgary Transit) and permanent infrastructure (provided by the Town).

[37] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report. Pg.21.

8.3.2 Network / Route Consideration

Local and Regional routes are planned and operated by Calgary Regional Partnership. The Town, as a stakeholder in the transit service and representing the local ridership base, will advise Calgary Transit on local transit matters.

The pilot Local and Regional bus routes will be evaluated once the two-year pilot project duration is completed. The suitability and effectiveness of those routes cannot be meaningfully evaluated until that time. The following network / route considerations should be evaluated when reviewing the pilot service and considering permanent transit service:

- Extension of route coverage into the Air Ranch neighborhood
- Extension of route coverage into the Southbank Business Park
- Extension of route coverage into Priority Growth Areas defined in the Town's *Growth Study and Financial Analysis* (if residential and employment densities warrant service) - refer to **Figure 8.2.**
- Extension of route coverage into areas with a higher concentration of commercial, service, office, and residential land uses
- Provision of higher frequency service in the Town's downtown area
- Extension of route coverage into the Westridge neighborhood.

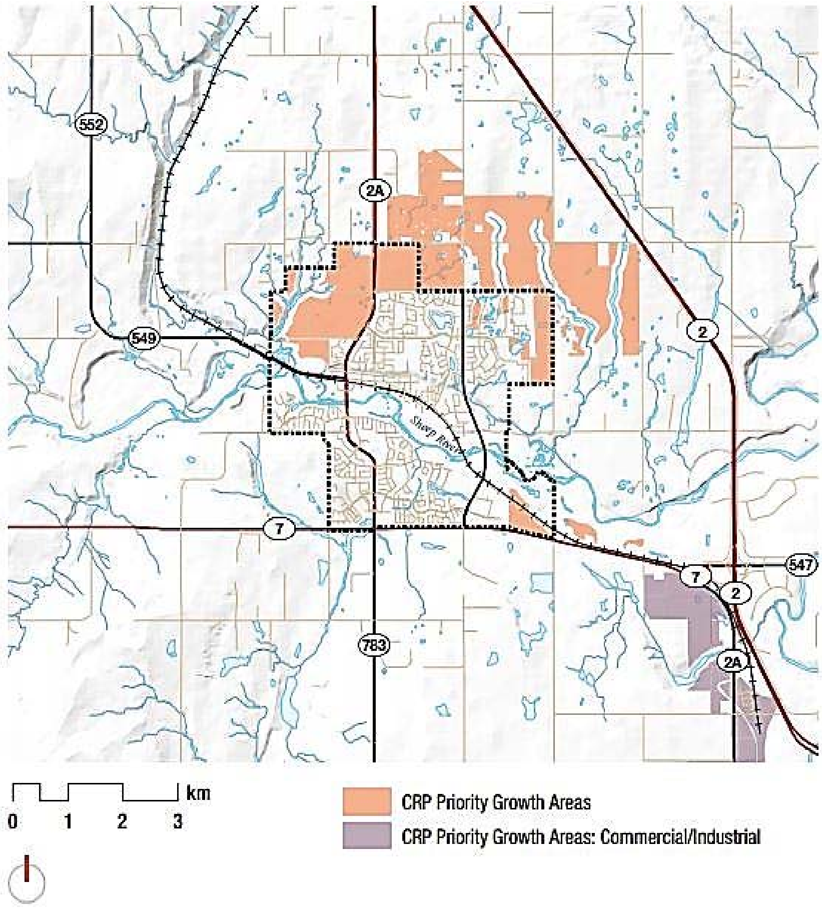


Figure 8.2 Okotoks Priority Growth Areas[38]

8.4 Transit Infrastructure

The bus stop and park-and-ride locations used during the pilot service may initially be used for the permanent service; however, if the transit program persists, a permanent, purpose-designed transit infrastructure will be required. The following section guides the installation of permanent transit infrastructure as part of a permanent transit service.

[38] Town of Okotoks. (2014). Town of Okotoks Growth Study and Financial Analysis. Pg. 12. Available online at: http://www.okotoks.ca/sites/default/files/pdfs/publications/3736_FULL_REPORT_-_Town_of_Okotoks_Growth_Study_and_Financial_Analysis_-_20140218_0.pdf

8.4.1 Bus Stops

Bus Stop Location

A bus stop placed in the right location can make a big difference for transit users. A number of organizations have published criteria on where to locate bus stops. Below is a summary of the most important criteria for consideration for the Town following the pilot service:

- **Close to Key Destinations** – Destinations such as downtown areas, schools, shopping areas, public buildings, and medical facilities are typically the largest trip generators. Bus stops must be located in proximity to key destinations in the Town to maximize ridership potential.
- **Far-Side vs. Near-Side Configuration** – There are a number of advantages and disadvantages associated with far-side and near-side bus stop configuration. However, both BC Transit and the Transportation Research Board have concluded that far-side placement is more desirable. In summary:[39,40,41]
  - Buses parked in a far-side position minimize the potential for buses to limit the view of intersection traffic controls (e.g., STOP sign) and pedestrians for traffic travelling in the same direction
  - A near-side bus stop configuration can result in conflicts with right-turning vehicles, potential delays to the bus service as it attempts to re-enter the travel lane, and obstruction of traffic control devices and pedestrian activity
- **Visible Locations** – Bus stops should be located in highly visible locations along well-travelled routes to maximize pedestrian safety and comfort
- **Serving Multiple Routes** – Stops should be located where they serve multiple routes to minimize or protect street crossings for passengers making transfers between routes.[42]

Bus stop spacing is an important consideration. The goal is to balance the competing objectives of access / convenience and limiting bus travel time. Stops spaced too far apart increase walking distance to access bus stops, while stops spaced too closely cause increased bus stopping and therefore increase bus travel time. Bus stops are generally spaced more closely in downtown and urban areas with concentrated activities that generate higher ridership, whereas rural spacing is greater as a result of fewer destinations and generally lower ridership.

Preferred bus stop spacing criteria are identified in **Table 8.1.**

[39] BC Transit. (2010). BC Transit Infrastructure Design Guidelines. Available online at: http://bctransit.com/servlet/documents/1403640670226

[40] Transit Cooperative Research Program. (1996). Guidelines for the Location and Design of Bus Stops. Available online at: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-a.pdf

[41] A recent study published in the Transportation Research Record examined the impact of bus stop location on bus stop time and stop time variation. The study found that stop times occurring on the nearside of intersections are on average 4.2 to 5.0 slower than stop times occurring on the far-side of intersections, with no impact on stop time variation. More information about the study can be found online at: http://trrjournalonline.trb.org/doi/abs/10.3141/2538-01

[42] Washington Metropolitan Area Transit Authority. (2009). Guidelines for the Design and Placement of Transit Stops for the Washington Metropolitan Area Transit Authority. Availability online at: https://www.wmata.com/pdfs/planning/WMATA%20Guidelines-Design%20and%20Placement%20of%20Transit%20Stops.pdf

TABLE 8.1 BUS STOP SPACING CRITERIA[43]

	Typical Spacing	Spacing Range
Downtown / Central Business District	200m	200 - 300m
Urban Area	230m	200 - 365m
Suburban Area	300m	200 - 760m
Rural Area	380m	200 - 800m

Bus Stop Design / Layout

Bus stops should be designed so they are safe, accessible, and comfortable. This involves careful consideration of the layout of the bus stop site, passenger amenities, and the walking routes and pedestrian environment nearby (**Figure 8.3**).

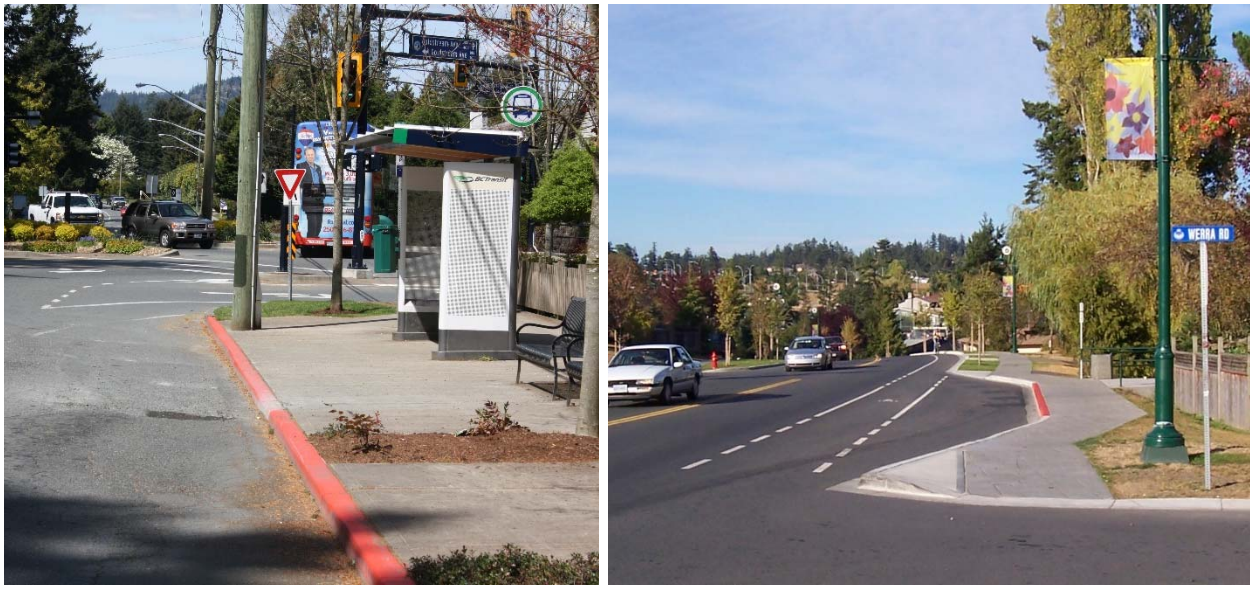
The Town should consider developing a standardized bus stop layout and design that meets universal accessibility criteria.

Due to cost limitations and a desire to install basic bus stop infrastructure throughout the system, bus stops with varied levels of amenities may be installed as follows:

1. A Basic Bus Stop should consist of the mandatory elements of an accessible bus stop, including identification markings (bus stop pole, identification sign, painted curb), landing pad and accessible routes leading to/from the bus stop. Basic stops should be designed to be compatible with the amenities of an enhanced stop so they may be upgraded in future.

2. An Enhanced Bus Stop addresses the same criteria as a Basic stop, but includes extra passenger amenities to improve the transit experience such as seating, lighting and shelters.

[43] Recommended bus stop spacing criteria based on BC Transit Infrastructure Design Guidelines. Table 3.1, p. 15. Available online at: http://bctransit.com/servlet/documents/1403640670226



Example bus stops where buses stop at the curb (left) and in a bus bay (right).

Figure 8.3 Examples of Bus STOP Layouts

Example of a basic bus stop (left) and enhanced bus stop (right).

Figure 8.4 Examples of Bus STOP Amenities

Bus stop amenities for each bus stop type are identified in **Table 8.2**.

TABLE 8.2 BUS STOP AMENITIES, BY STOP TYPE

	Regular Stop	Enhanced Stop
Identification Markers (pole, identification sign, painted curb)	X	X
Passenger Landing Pad	X	X
Garbage bin		X
Seating		X
Shelter		X
Lighting		X

Bus Stop Improvement Program

The Town should pursue a bus stop improvement program to build-out permanent bus stop infrastructure if a permanent transit service is implemented. The Town should aim to install Basic bus stops in at all system bus stops within the first five years of the permanent service and to upgrade to Enhanced bus stops at 50% of stops within twenty years.

The cost of a Basic bus stop is $10,000 and the system will consist of approximately 15 bus stops (based on pilot service routing). The cost to construct Basic bus stops at all stop locations within the first five years of the service will be approximately $120,000, or about $24,000 annually.

Upgrading half of the system's stops (highest ridership locations) to Enhanced bus stop standards (i.e., shelter, bench, lighting, etc.) can range in cost from $20,000 to $60,000, depending on the amenities of the bus shelter.[44] For the purposes of this plan, it is estimated at $50,000 per bus stop. Assuming six of the twelve bus stops are upgraded to an Enhanced bus stop standard, the cost over a twenty year time period is estimated at $300,000, or about $15,000 annually.

The costs above are based on the number of bus stops during the pilot service (12 in total). If ridership targets are being met or exceeded during two-year pilot, strong consideration should be given to adding new bus stops in higher demand areas with bus stop spacing in the range of 200-300 m. Investments in bus stop infrastructure should be prioritized based on the number of boardings and alightings. It is recommended that the Town and/or Calgary Transit conduct boarding/alighting counts during the pilot service to establish a baseline.

[44] Town of Okotoks. (2011). Transit Feasibility Study: Phase 1 – Report; pg. 29.

Planning for Park-and-Rides

The intent of providing park-and-rides in Okotoks is for local residents to park their vehicle in order to access the Regional service into Calgary. The pilot system will include park-and-rides at the Okotoks Recreation Centre and Centennial Arena. These locations are appropriate due to their large, publicly-held parking supplies, adjacency to key transit trip generators, and compatibility with proposed bus routes.

Permanent park-and-ride locations should be established if a permanent transit system is pursued. This will involve determining if the pilot locations are appropriate long-term sites. Park-and-ride utilization should be monitored during the pilot phase to determine the number of park-and-ride vehicles utilizing each site. A study at the end of the two-year pilot should be conducted to determine if each site can accommodate the park-and-ride demand as part of the long-term utilization of the site.

If the pilot sites are deemed inappropriate for permanent park-and-ride locations, the Town should pursue alternate locations. Candidate locations should address the following criteria:

- Sites should be on Regional transit routes or in a location that the Regional route may be reasonably altered without significantly impacting the service or trip time;
- Sites should have good visibility and may be integrated with or adjacent to a major transit trip generator (e.g., downtown, shopping, post-secondary institution, etc.);
- Sites should be convenient to concentrations of commuters that are not (or are poorly) served by transit; and
- Sites should provide direct and efficient access to a highway and/or major roadway.[45]

In consideration of these criteria, the following general areas are identified as targeted future park-and-ride locations:

1. Near the Highways 7 / 783 intersection (adjacent to the Cornerstone commercial site), which would appeal to rural commuter originating south of Okotoks, and particularly to residents of High River and Turner Valley / Black Diamond if permanent transit service is not implemented to these communities.
2. Near the Highway 2A / 338 Avenue East intersection as residential and employment population increases to the north and northeast of Okotoks (in Priority Growth Areas).
3. Near the Highway 2 / 338 Avenue E intersection if service were provided along Highway 2, and as the residential and employment population increases to the northeast of Okotoks (in Priority Growth Areas) and to more conveniently serve residents of High River and communities southeast of Okotoks.

Monitoring and follow-up study at the end of the pilot service will help project the parking capacity needs of future park-and-ride locations.

[45] Park-and-ride location criteria based on City of Edmonton. (2009). Park and Ride: Transportation Planning Branch Position Paper. Available online at: http://webdocs.edmonton.ca/occtopusdocs/Public/Complete/Reports/CC/CSAM/2009-10-28/2009TD7864%20Att.%202.pdf