Travel Demand Model

Development Report

August 9, 2018

Prepared for:

The City of Red Deer

Prepared by:

Stantec Consulting Ltd.

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Sign-Off Sheet

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Prepared by _____

(signature)

Wilson Yip, MEng

Reviewed by _____

(signature)

Joseph Story, AICP

Approved by _____

(signature)

François Tomeo, P.Eng. # 255483 (APEGA)

Permit to Practice Number #P0258

August 30, 2018

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1.0 INTRODUCTION

Stantec was retained by the City of Red Deer to update the City's travel demand model. A model was initially developed as part of the 2003/2004 Transportation Plan Update, and subsequent changes were made. However, given the exponential growth that the City has experienced in the last 15 years, both in terms of demographics and in geographic coverage, it was determined that the previous model was out of date and that the development of a new version was required using the latest state-of-the-art techniques and tools.

The travel demand model developed for the City of Red Deer is intended to provide a tool to forecast traffic at a macroscopic level for the City and the surrounding areas. The updated model will be capable of analyzing transportation impacts, including but not limited to the following scenarios:

- Building of new transportation infrastructure;
- Road closures;
- Development or economy-induced population and employment growth; and
- Any policy scheme that would result in these changes.

Ultimately, the model is a quantitative tool that will aid in policy and planning decisions involving large-scale infrastructure and developments. It can also be used to forecast traffic in small areas within the City and surrounding areas. However, applying it in this way would require refinements to better represent unique localized conditions such as land uses, driveway locations and signal operations. This model is structured to simulate a typical weekday AM peak hour travel demand.

2.0 MODEL BASICS

2.1 MODEL STRUCTURE AND GEOGRAPHIC COVERAGE

The updated travel demand model follows the conventional four-stage modelling structure – trip generation, distribution, mode choice and assignment. No mode choice model is included. The updated model is focused on automobile traffic, supplemented by observed commercial vehicle traffic as a background generator. **Figure 2.1** provides an overview of the model structure implemented.

The model analysis time frame is in the AM Peak Period, from 7-9 AM, on an average weekday between November 15th and November 30th, 2016. The time period coincides with the data collection period in the Red Deer Household Travel Survey (HTS), which took place from November 14th to December 20th, 2016. The model was developed on Version 16 of the PTV VISUM software platform.

The location of origin and destination governs the demand estimation process implemented for the trip. The three origin and destination types and the corresponding trip estimation process are as follows:

1. **Internal (I):** Areas of the model within the City of Red Deer (i.e. Superzone 1-13). Trip demand is estimated under the trip generation/distribution model (**4-Stage**);

2. **External (X):** Areas of the model outside the City of Red Deer (i.e. Superzone 21-27). Jurisdictions covered include the Town of Blackfalds and parts of the Red Deer County surrounding the City, which includes Gasoline Alley, Springbrook/Red Deer Airport, etc. Trip demand is estimated under the trip generation/distribution model (**4-Stage**);

3. **Gateway (G):** Zones for travel demand that originates or destined for areas outside of the model network (Superzone 31-34). Trip demand matrix are inferred from a combination of Alberta Transportation (AT) automated traffic recorder (or ATR) counts and Cellint origin-destination distribution provided by AT (**AT-Cellint**).

A lot of traffic is coming from or going to outside of the model area (i.e., gateways). Travel demand for gateways was estimated using observed traffic volume at designated Alberta Transportation (AT) ATR locations, distributed to origins and destinations using mobility summaries created from locational cellular data (known as Cellint). This method can be replicated in future model updates as long as the two listed data sources are available.

Table 2.1 provides a summary of demand estimation treatment to each permutation of the origin-destination types.

Figure 2.1 - Model Architecture

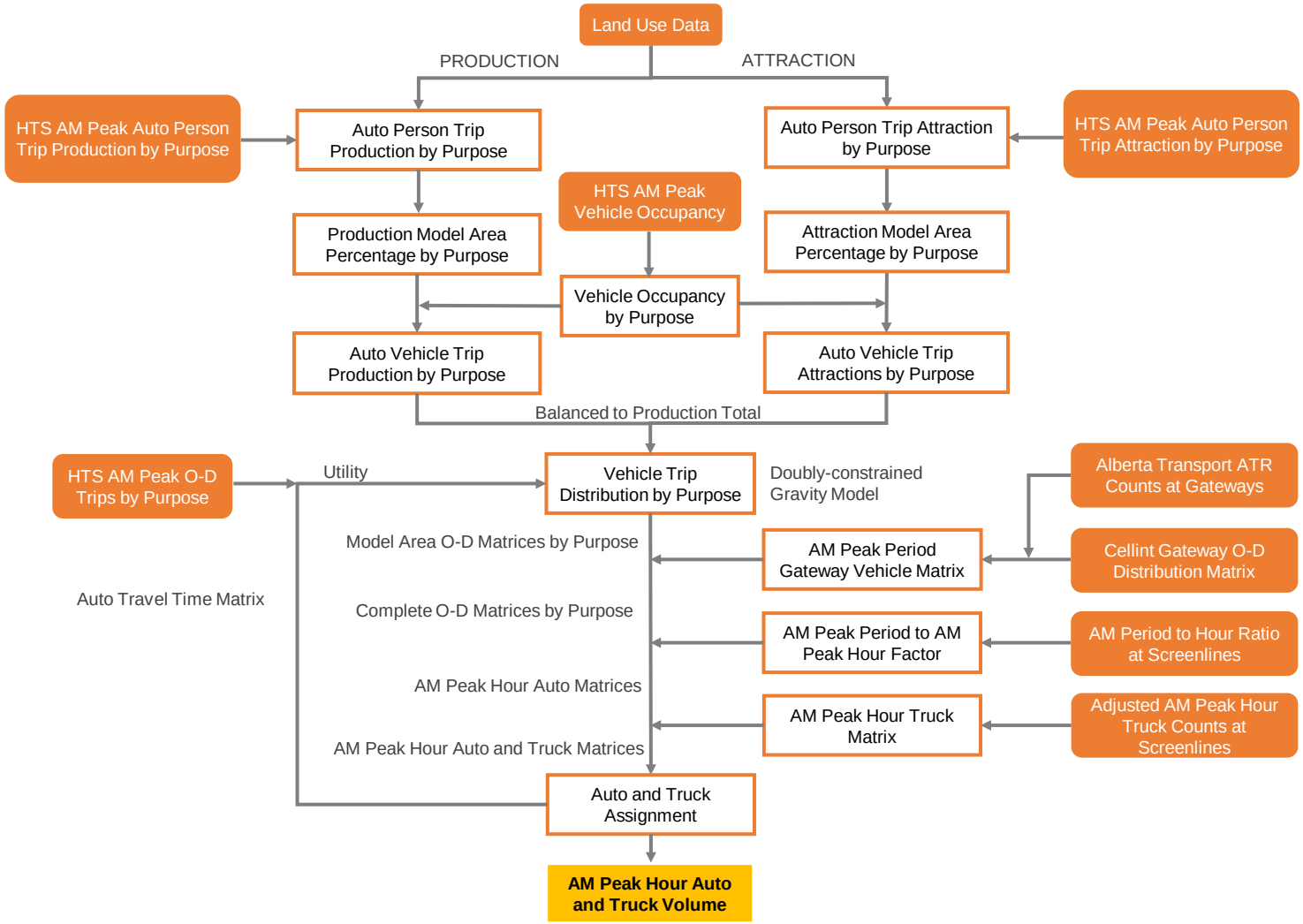


Table 2.1 – Demand Estimation Treatment by Origin-Destination Type

Origin / Destination	Internal (I)	External (X)	Gateway (G)
Internal (I)	4-Stage	4-Stage	AT-Cellint
External (X)	4-Stage	4-Stage	AT-Cellint
Gateway (G)	AT-Cellint	AT-Cellint	AT-Cellint

The 4-stage model component is estimated based on the following trip types:

- **Home-based Work (HBW):** A trip between work (either part-time or full-time) and home is defined as HBW if one end of the trip is at home (**Production**) and the other end of the trip is at work (**Attraction**), regardless of which end is the origin or destination;
- **Home-based School (HBS):** A trip between school (including college) and home is defined as HBS if one end of the trip is at home (**Production**) and the other end of the trip is at school (**Attraction**), regardless of which end is the origin or destination;
- **Home-based Other (HBO):** Trip is defined as HBO if one end of the trip is at Home (**Production**) and the other end of the trip is at location types other than work or school (**Attraction**), regardless of which end is the origin or destination;
- **Non Home-based (NHB):** Trip is defined as NHB if neither end of the trip is at Home. For these trips, the origin is taken as production and the destination is taken as attraction.

Trip productions and attractions are important outputs at the trip generation stage of the model. Trips are usually produced by population and households, hence a trip production is defined as the home-end of a trip. Conversely, trips are usually attracted to non-households (e.g. offices, shopping centres, schools), hence a trip attraction is defined as the non home-end of a trip and can be reflected using information at the non-home end such as employment data and student enrollment data. More details on trip generation in the model can be found in **Section 4.0**.

Figure 2.2 provides a geographic breakdown of the three origin-destination types and the corresponding traffic zone numbers assigned. **Figure 2.3** illustrates the traffic zones attributed to each of the superzones assigned in the model.

Figure 2.2 – Internal, External and Gateway Traffic Zones (TAZs)

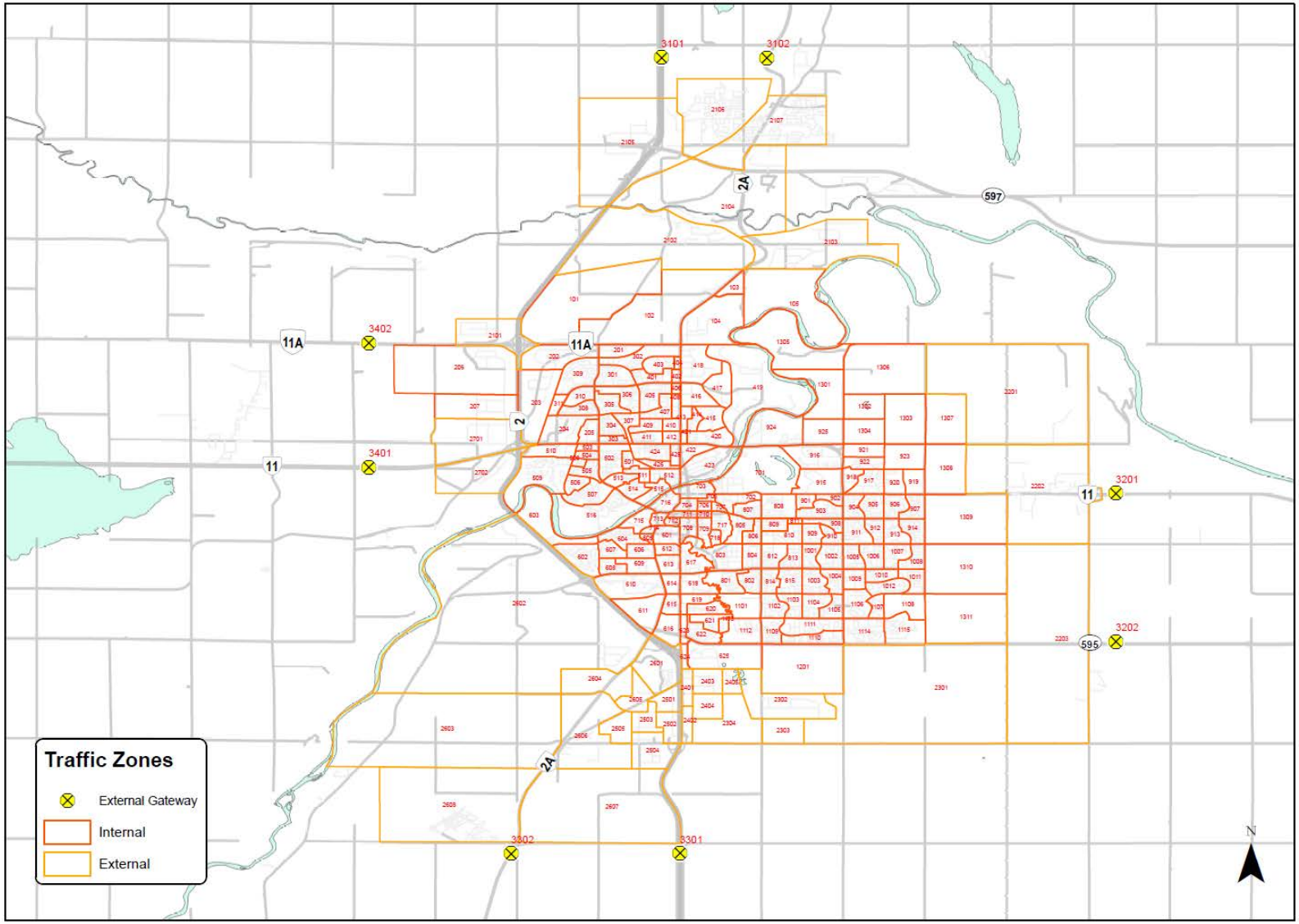
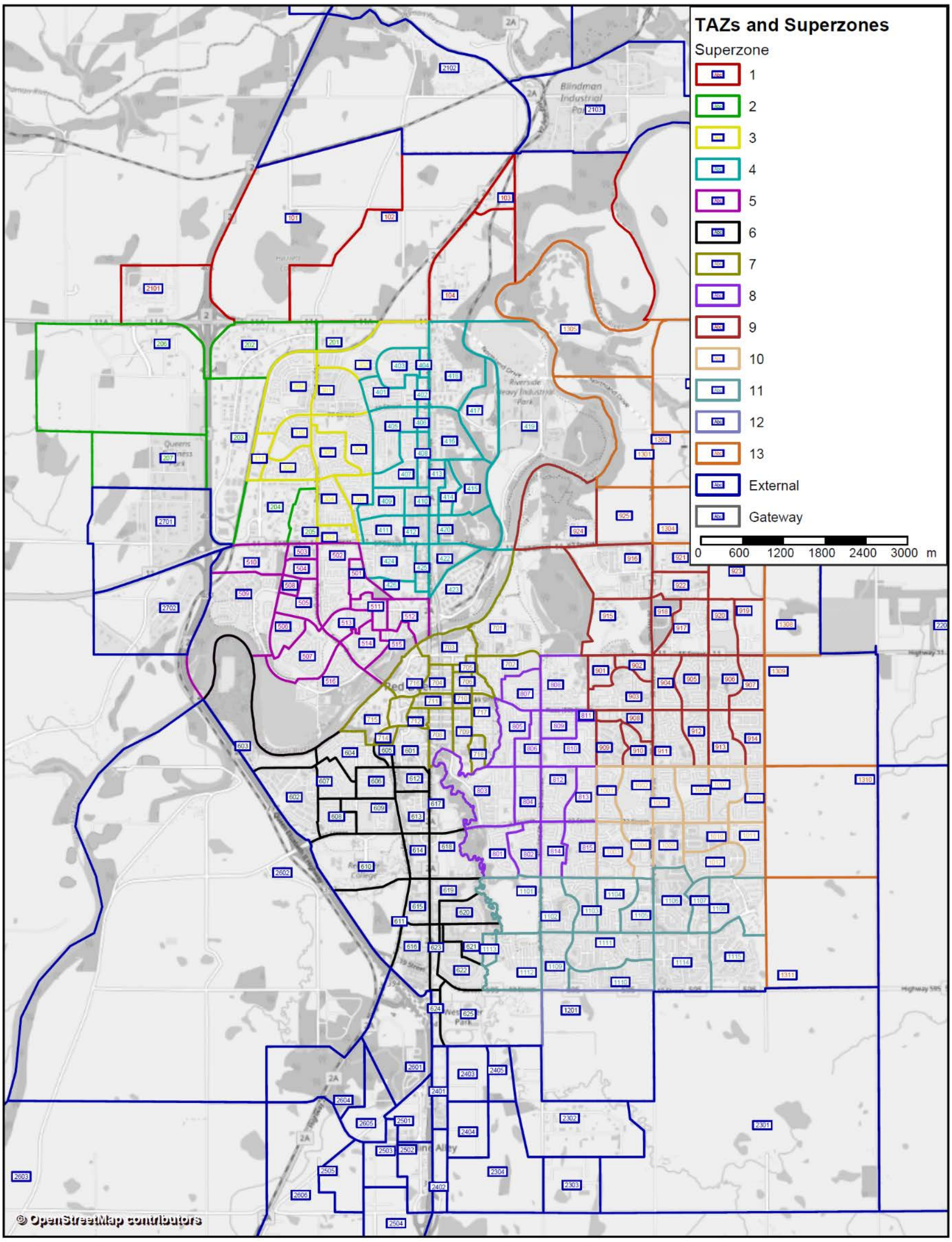


Figure 2.3 - Traffic Zone System and Assigned Superzones in the City of Red Deer



2.2 ROAD NETWORK

The internal model road network was developed by merging three separate GIS files provided by the City of Red Deer, containing functional road class, number of lanes and posted speed for each of those files. The external model network was developed based on the National Road Network GIS file, available publicly through Province of Alberta's Open Data, which contains attributes such as the functional road class and number of lanes. Adjustments to attribute values were made to various links based on visual and logical inspections, both at the GIS layer level and within the VISUM platform once the GIS layers were imported.

The following is a summary of the contributing network GIS inputs:

- **City of Red Deer Functional Road Class Network:** Contains municipal road classification and related information for road links within the City;
- **City of Red Deer Lanes Network:** Contains number of lanes and lane capacity for road links within the City;
- **City of Red Deer Posted Speed Network:** Contains posted speed limits for road links within the City;
- **Province of Alberta National Road Network:** Contains non-speed network attributes. Posted speed was assigned through manual inspection of network roads in Google Street View.

In addition to merging the four network geographies and their corresponding link attributes, the following work was performed to prepare the network for trip assignment:

- **Network Checks**: A series of network consistency checks were performed to ensure that the network is properly coded. For example, all links and nodes with no assigned volume, isolated nodes, unconnected zones and dead-end links were reviewed and revised if necessary.
- **Assignment of *Area* Attribute:** The *Area* attribute was used to determine the appropriate lane capacity and speed delays to be applied to a road segment. The lane capacity and speed delay on a road segment is influenced by speed impedance factors such as the condition of the roadway, intersection spacing, intersection delay, likelihood of traffic control at intersections, density of access points, etc, which are typically categorized from the level of urban development in the vicinity. For the Red Deer model area, this categorization was derived from the jurisdiction boundaries – non-freeway and non-expressway links within the City were categorized as "Urban", while links outside of the City were categorized as "Rural" – with a few exceptions – most notably for the roads in the currently undeveloped parts of the City, including the North of Highway 11A Major Area Structure Plan (MASP) area and parts of the East Hill MASP area, both of which were classified as "Rural" in the base year and subsequently upgraded to "Urban" in future horizons;
- **Assignment of Posted Speed Limits:** The posted speed is the basis for development free-flow speed and subsequently, modelled speed;
- **Coding of Future Road Network:** The future road network was coded accordingly to the Major Area Structure Plan (MASP) shapefile provided by the City in preparation for projected horizon analysis.

Road type number and the corresponding lane capacity and speed adjustment factors were assigned according to .

Speed adjustment factor was applied to posted speed to generate free-flow speed. The adoption of speed adjustment factors was based on Transportation Research Board's (TRB) *Highway Capacity Manual*. For controlled-access roadways and rural roadways, speed adjustment factors were based on the *Weight In Motion Report* undertaken by Alberta Transportation (AT) in 2014, which recorded travel speeds on QE2 south of Red Deer (serves as the basis for adjustment on controlled-access roadways and ramps) and on Highway 2A, south of Leduc (serves as the basis for adjustment on rural roads of all classes). For urban roadways, factors were set at 0.9 for all sub-highway classifications (arterial, collector and local) to account for speed impedance factors present at these roadways ; factors were set at 1 for highway class urban roadways to account for its relative attractiveness compared to sub-highway class roads. Speed adjustment factors were found to improve the validation of traffic among roadways of different classifications in the model.

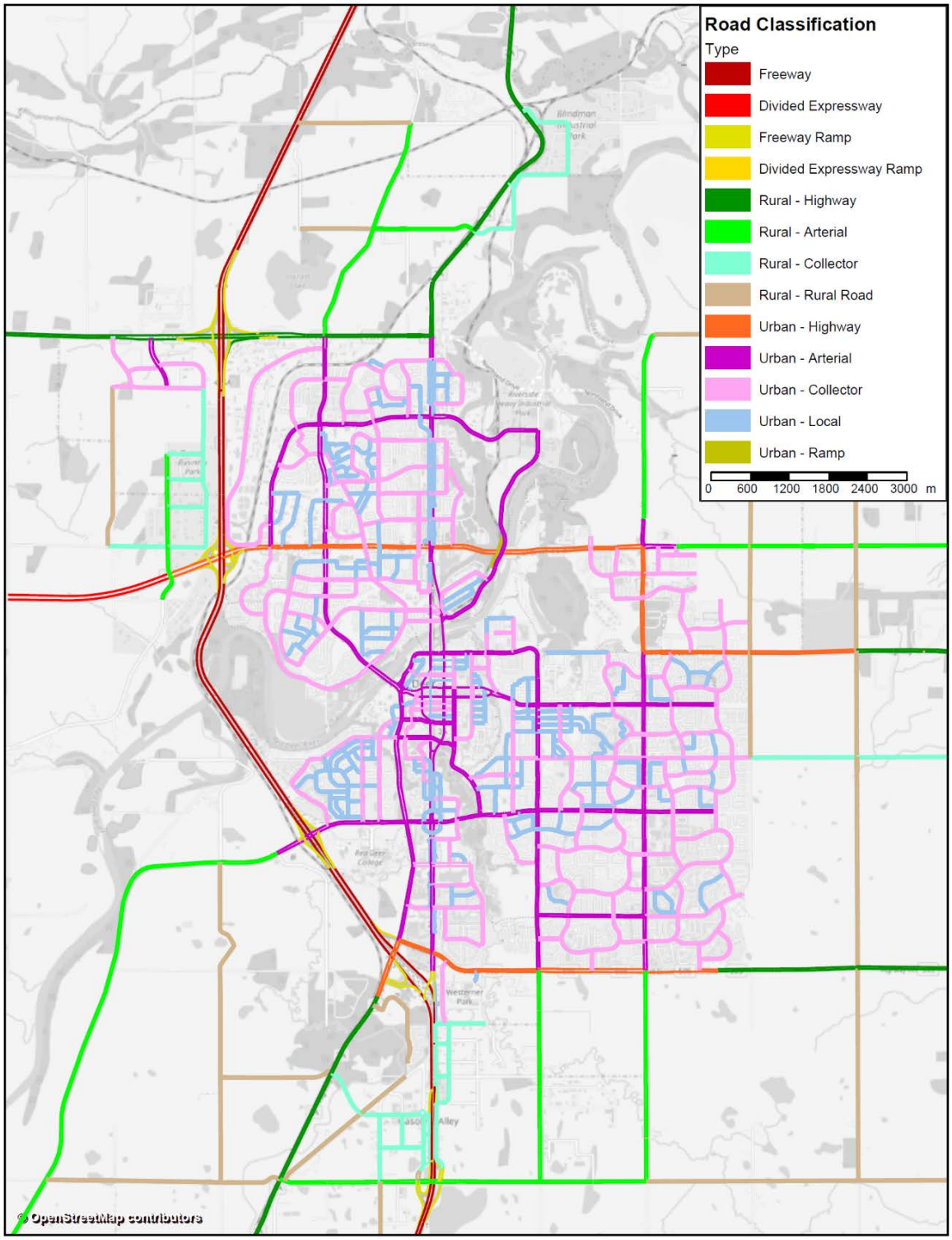
The geographic distribution of network links by road classification is shown in **Figure 2.4**. It should be noted that the road network does not include all local roadways; the local street network was partially retained to facilitate the access and egress of travel demand between the zonal centroids and the road network.

Table 2.2 - Model Network Road Classification

Area	Road Classification	Type No	Lane Capacity (PCU/hr)[1]	Speed Adjust. Factor	Example
N/A	Freeway	11	1,800	1.05	Highway 2
	Divided Expressway	12	1,800	1.05	Highway 11, west of Burnt Lake Trail
	Freeway Ramp	15	1,400	1.05	
	Divided Expressway Ramp	16	1,400	1.05	
Rural	Highway	20	1,000	1	Highway 11, east of the City limits
	Arterial	21	800	1	C&E Trail, outside of the City limits
	Collector	22	500	1	Gasoline Alley road network
	Rural Road	23	800	1	Range Road 270
Urban	Highway	25	1,200	1	Highway 11, within the City limits
	Arterial	31	900	0.9	Gaetz Avenue, Taylor Drive
	Collector	32	700	0.9	Edgar Industrial Drive
	Local	33	500	0.9	Local road network for centroid connections
	Ramp	34	800	0.9	67 Street Access Ramp to Riverside Drive

[1] The lane capacities for each area and road type derived from Table 4.5 of the *GTHA 2016 Emme Network Coding Standard*, developed by University of Toronto's Travel Modelling Group (Miller & Yusuf, 2017)

Figure 2.4 - Network Links by Road Classification



2.3 SCREENLINES

The screenline system was developed along jurisdiction boundaries and across major physical and geographical constraints within the model area (e.g. Red Deer River, Piper Creek, Waskasoo Creek). The established screenlines create cordons in which modelled traffic volumes are compared to counts to assess the robustness of the model.

The Red Deer model screenline system is listed in **Table 2.3** and graphically illustrated in **Figure 2.5**.

2.4 ZONE SYSTEM

The building blocks of a travel model are the assumptions surrounding the land uses for small areas, defined through a series of traffic analysis zones, described as zones in this document. The zone system for the updated model is initiated from the municipal census boundaries for the City of Red Deer, which are the geographic basis of the internal demographic input. The initial iteration of the zone system follows the boundaries of the municipal subzones. Further modifications of the zone system generally follow the design hierarchy below:

- **Compatibility with major geographical features:** Major geographic features (e.g. rivers, creeks) have a significant influence on land use and travel patterns. Geographic features physically separate communities and act as a major barrier as road infrastructure cannot maintain the same level of capacity for travel across these features;
- **Compatibility with Federal Census Dissemination Areas/Blocks:** Demographic and labour information from the Federal Census are provided at the dissemination area and dissemination block level. It is desirable for the traffic zones to be as compatible as possible with these federal boundaries so that model results and assumptions can be efficiently transferred to neighbouring jurisdictions, and provincial and federal partners;
- **Lane use homogeneity:** A homogenous land use facilitates land use forecasting in future horizons. It also helps with model calibration as illogical trip generation results are easier to detect. The distribution zonal land use is exhibited in **Figure 3.1**.
- **Future development plans:** Future development plans were considered in the zone definition of undeveloped areas that will be developed in the projection horizons (e.g. East Hill MASP) or areas that have existing land use but will be redeveloped in the future (e.g. Riverlands). More disaggregate in zonal definition was implemented for these areas.

Figure 2.3 depicts the internal traffic zone system established based on these design considerations**. Figure 2.6** also includes the external traffic zones that were established as part of the model area.

Table 2.3 - Model Screenlines

Screenline Code	Count Source	Site Description	Direction	Count Date	Count Day of Week
Screenline 1 - Piper Creek/Waskasoo Creek					
1a	City	19 Street - West of 40 Avenue	EB, WB	6/11/2015	Thu
1b	City	32 Street - West of Spruce Drive	EB, WB	8/27/2015	Thu
1c	City	Spruce Drive - North of 37 Street	EB, WB	6/14/2016	Tue
1d	City	49 Street - Coronation Park	EB	6/23/2016	Thu
1e	City	50 Street - Coronation Park	WB	6/23/2016	Thu
1f	Stantec	53 Street - Waskasoo Creek	EB, WB	1/18/2017	Wed
1g	City	55 Street - East of 45 Avenue	EB, WB	9/22/2015	Tue
Screenline 2 - Red Deer River					
2a	AT	Highway 2 - South of Highway 11	NB, SB	6/9/2011	Thu
2b	City	54 Avenue - North of Taylor Drive	NB, SB	9/30/2015	Wed
2c	Stantec	50 Avenue - Red Deer River	SB	1/18/2017	Wed
2d	City	49 Avenue - North of 55 Street	NB	9/29/2014	Mon
2e	City	67 Avenue - West of Carrington Drive	EB, WB	9/24/2015	Thu
Screenline 11 - North City Boundary					
11a	AT	Highway 2 - North of Highway 11A	NB, SB	5/23/2013	Thu
11b	AT	Highway 11A - Gaetz Avenue	NB, SB	5/22/2014	Thu
Screenline 12 - South City Boundary					
12a	City	32 Street - West of Highway 2 Interchange	NB, SB	5/22/2013	Wed
12b	AT	Highway 2A - West of Highway 2 Interchange	NB, SB	5/16/2011	Mon
12c	AT	Highway 2 - South of Exit 394	NB, SB	5/16/2011	Mon
12d	City/AT	Gasoline Alley - North of Spruce Street	NB	-	-
12e	City	19 Street - South of 49 Avenue	NB, SB	8/13/2015	Thu
12f	City	19 Street - South of Westerner Access	NB, SB	7/8/2014	Tue
12g	City	19 Street - South of 40 Avenue	NB, SB	6/11/2015	Thu
12h	City	19 Street - South of 30 Avenue	NB, SB	8/5/2015	Wed
Screenline 13 - East City Boundary					
13a	City	19 Street - East of Vermont Avenue	EB, WB	6/29/2016	Wed
13b	City	39 Street - West of 10 Avenue	EB, WB	7/23/2015	Thu
13c	AT	55 Street - East of 20 Avenue	EB, WB	6/10/2014	Tue
Screenline 14 - West City Boundary					
14a	AT	Highway 11 - West of Highway 2 Interchange	EB, WB	5/7/2012	Mon
14b	City	Highway 11A - East of 75 Avenue	EB, WB	10/1/2015	Thu

Figure 2.5 - Model Screenlines

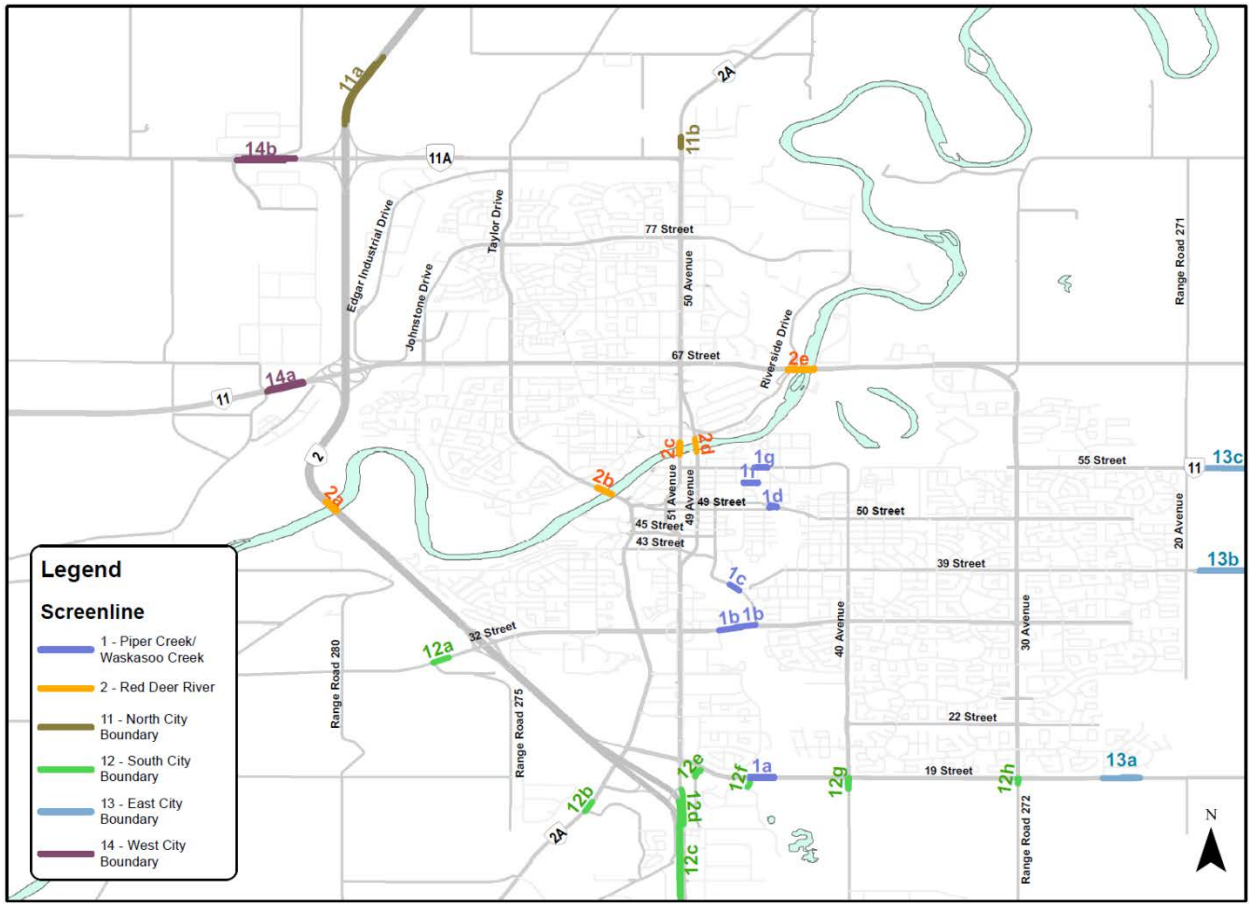
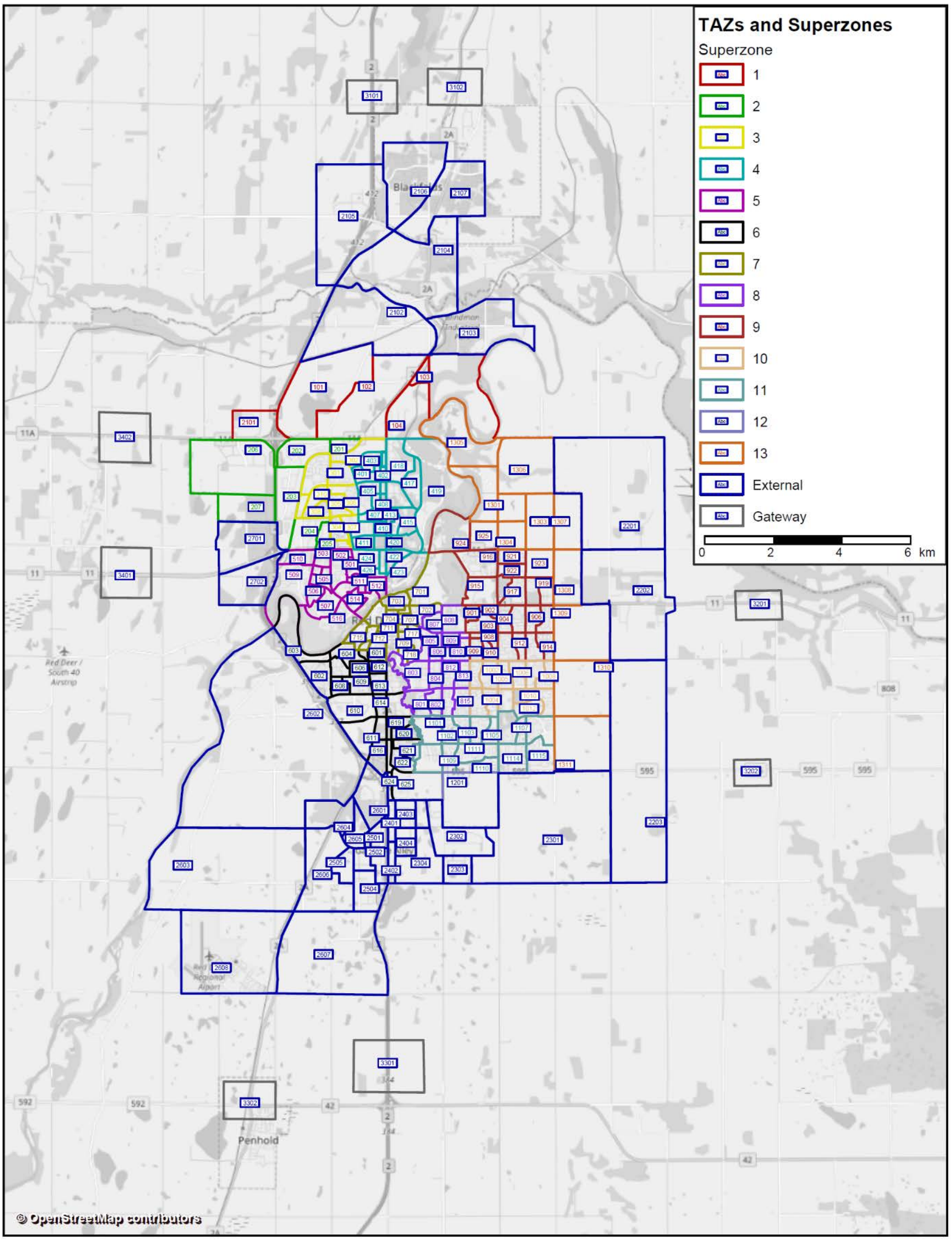


Figure 2.6 – External Traffic Zones and Gateway Zones



2.4.1 Gateway Zones

The gateways must be structured in the model to be zones. They are important as significant volumes of traffic enter and leave the study area in the morning peak. The model should appropriately account for how these interact with the local land uses – and how through traffic occurs between two gateways. The gateway zones in this model are chosen for locations where a significant amount of traffic enters or leaves the study area, as described in **Table 2.4** and shown in **Figure 2.6**.

Table 2.4 - Gateway Zone Summary

TAZ	Roadway	Description
North		
3101	Queen Elizabeth Highway North	North of the Town of Blackfalds
3102	Highway 2A North	
South		
3301	Queen Elizabeth Highway South	South of McKenzie Road (Township Road 374)
3302	Highway 2A South	South of Airport Drive
East		
3201	David Thompson Highway East	East of Range Road 265
3202	Highway 595 East	
West		
3401	David Thompson Highway West	East of Range Road 282
3402	Highway 11A West	

2.4.2 Centroids and Centroid Connectors

Demand assumptions for a travel model are determined based on zone data and loaded into the model with connectors to the roadway system; the locations where zone activity are assumed are the centroids. A full review of zone centroids was carried out for all zones within the model area to determine the placement of the zone centroid corresponding to the development center of each zone. Zone centroids were reviewed and adjusted under OpenStreetMap (OSM) aerial imagery to accurately reflect the average access/egress time to/from each zone.

Centroid connectors are created to mimic access to the zone centroid using the general rules as follows:

- Most connectors were linked to a node in the mid-block to avoid interference with turning movements at intersection nodes;
- Connectors were not to cross physical barriers such as rivers, parkland and rail lines;
- No freeway nodes are to be used as connector node.

3.0 BASE YEAR DATA

3.1 LAND USE

A significant component in projecting travel demand is understanding its relationship with land use. **Figure 3.1** shows the land use types and sizes as recorded by the City of Red Deer. This information helps guide the modelling process to ensure travel demand results are logical and consistent with what is expected given the allocation exhibited. Because population and employment are the two main land use inputs for model development, land use information must be converted to these demographic variables, as summarized in the subsections below.

3.1.1 Population

The following data sources were used for the population input:

- **City of Red Deer Municipal Census (2016):** Population by traffic zone (TAZ) and by age group;
- **Town of Blackfalds Municipal Census (2016):** Population by municipal districts and by age group;
- **Canada Federal Census (2016)**: Population by dissemination blocks (DB) and by age group for jurisdictions outside of the City (except Blackfalds).

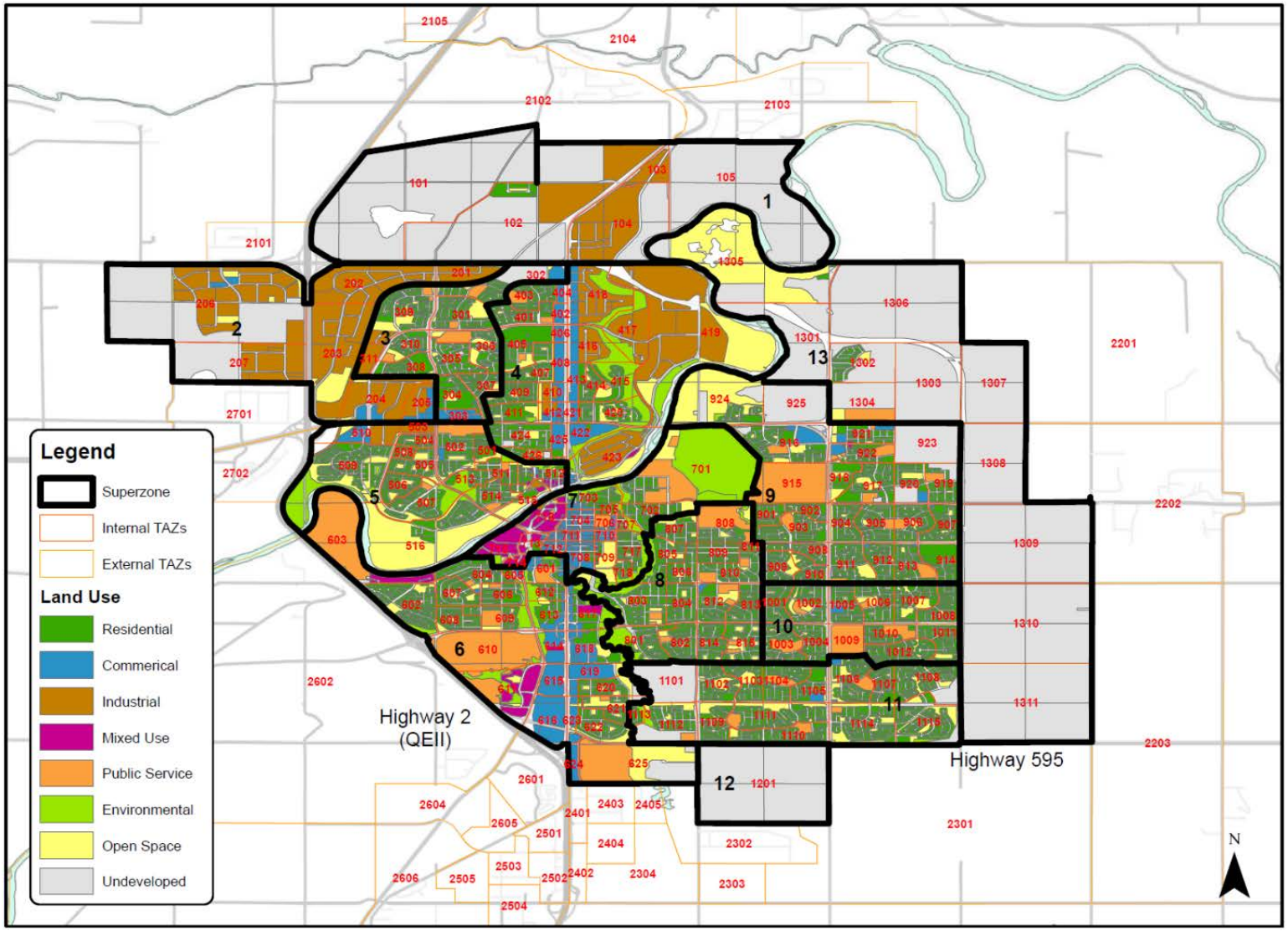
The geographic unit for population input outside of the City of Red Deer (Blackfalds – municipal districts; County of Red Deer – dissemination blocks) aligns with the external traffic zones established for the model.

Table 3.1 shows the population summary by superzone in the 4-stage model area. Please refer to **Appendix B.1** for a complete breakdown of population by age group and TAZ that was used for model input.

Table 3.1 - Population Summary by Superzone

Superzone	Area	Description	Population
1	North Industrial	North Outer Edge	131
2	North Industrial	North West Outer Edge	6
3	North	North West Outer Edge	10,282
4	North Gaetz	North	9,468
5	North	West	11,302
6	South Gaetz	South West	10,968
7	Downtown	Downtown	4,596
8	South East	South Central	9,630
9	South East	East	16,391
10	South East	South East	10,809
11	South East	South	15,767
12	South East	South Outer Edge	0
13	East	North East/East Outer Edge	107
CITY OF RED DEER TOTAL			99,457
21	RD County North	RD County North and Blackfalds	9,877
22	East	RD County East	438
23	RD County South	Clearview and McKenzie Industrial	14
24	RD County South	Gasoline Alley East	97
25	RD County South	Gasoline Alley West	0
26	RD County South	RD County South and Springbrook	3,227
27	Burnt Lake Industrial	Burnt Lake (RD County) and Belich Industrial	0
EXTERNAL MODEL AREA TOTAL			13,652

Figure 3.1 – Existing Land Use in the City of Red Deer



3.1.2 Employment and Students

An extensive amount of data sources were used for the model employment input, to better incorporate the many types of employment that exist. The sources used are the following:

- **Canada Federal Census (2016)**: Number of employees by place of work, used as control totals for employment estimation in the City of Red Deer and the Town of Blackfalds;
- **Gross Floor Area (GFA) by City of Red Deer Taxroll Assessment Code and TAZs:** GFA by taxroll inventory location, assigned to the corresponding TAZ;
- **City of Red Deer Employee Summary:** Number of employees recorded at each City-operated facilities, assigned to TAZs;
- **Alberta Health Services (AHS) Employee Summary:** Number of employees recorded at each AHS facility within the City;
- **Red Deer Public School District (RDPSD):** Number of students attending and number of staff members working at each RDPSD school;
- **Red Deer Catholic School District (RDCSD):** Number of students attending and number of staff members working at each RDCSD school;
- **Others:** Telephone interviews were conducted to obtain the number of staff members working at the Red Deer College, Red Deer Public Library, and Tourism Red Deer.

The City's tax roll GFA inventory represents a large percentage of total employment data, as illustrated in **Table 3.2**.

Table 3.2 - Base Year Employment Estimate Summary vs Census Total

Data Category	Employee	% Total
Gross Floor Area	35,524	82.7%
Staff at City-operated Facilities	1,595	3.7%
Red Deer Public School District	941	2.2%
Red Deer Catholic School District	676	1.6%
Other Schools	94	0.2%
Red Deer College	900	2.1%
Alberta Health Services	2,881	6.7%
Other	328	0.8%
TOTAL	**42,939**	**100%**
2016 Census Place of Work in CoRD	**43,030**	**100.2%**

Given the state of practice for travel demand models, which typically uses employees as model employment input, and for consistency with other employment data sources, the available GFAs were converted to employees using the following formula:

$$GFA\ (sqft) \times \frac{Employee}{GFA} \times Occupancy\ Rate$$

where $Occupancy\ Rate = 1 - Vacancy\ Rate$

The employment density (Employee / GFA) would be ideally obtained locally through a study done by the City that correlates employee and GFA. However, since this information is not available, the employment density was estimated based on based on publicly-available data from cities of similar urban/suburban markup to the City of Red Deer. The following studies and documents were investigated to determine the employment density:

- Snohomish County, Business and Industrial Land Survey (1987);
- ITE Trip Generation Manual, 5th Edition (1991);
- Puget Sound Regional Council, Industrial Land Supply and Demand in Central Puget Sound Region (1997);
- City of Kent, Business Licence Data (2002);
- Snohomish County, Employment Density Study (2007).

Appendix B.2 provides the conversion rates extracted for each document, adjusted to the City's assessment code categories, as well as the conversion rate that was used for this study.

People working under different employment categories can exhibit vastly different travel behaviour, hence trips between distinct categories must be estimated separately. For that reason, the estimated employees were grouped to the following categories:

- Office
- Retail
- Industrial
- Institutional
- School
- Other

A breakdown of the employment category that were assigned to each assessment code category is provided in **Appendix B.2.**

The consultant and City staff coordinated to develop employment assumptions and made adjustments for each zone, involving a series of data exchanges and communications. **Table 3.3** shows the employment summary by superzone in the 4-stage model area. Please refer to **Appendix B.3** for a complete breakdown of employees by employment category and TAZ that was used for model input.

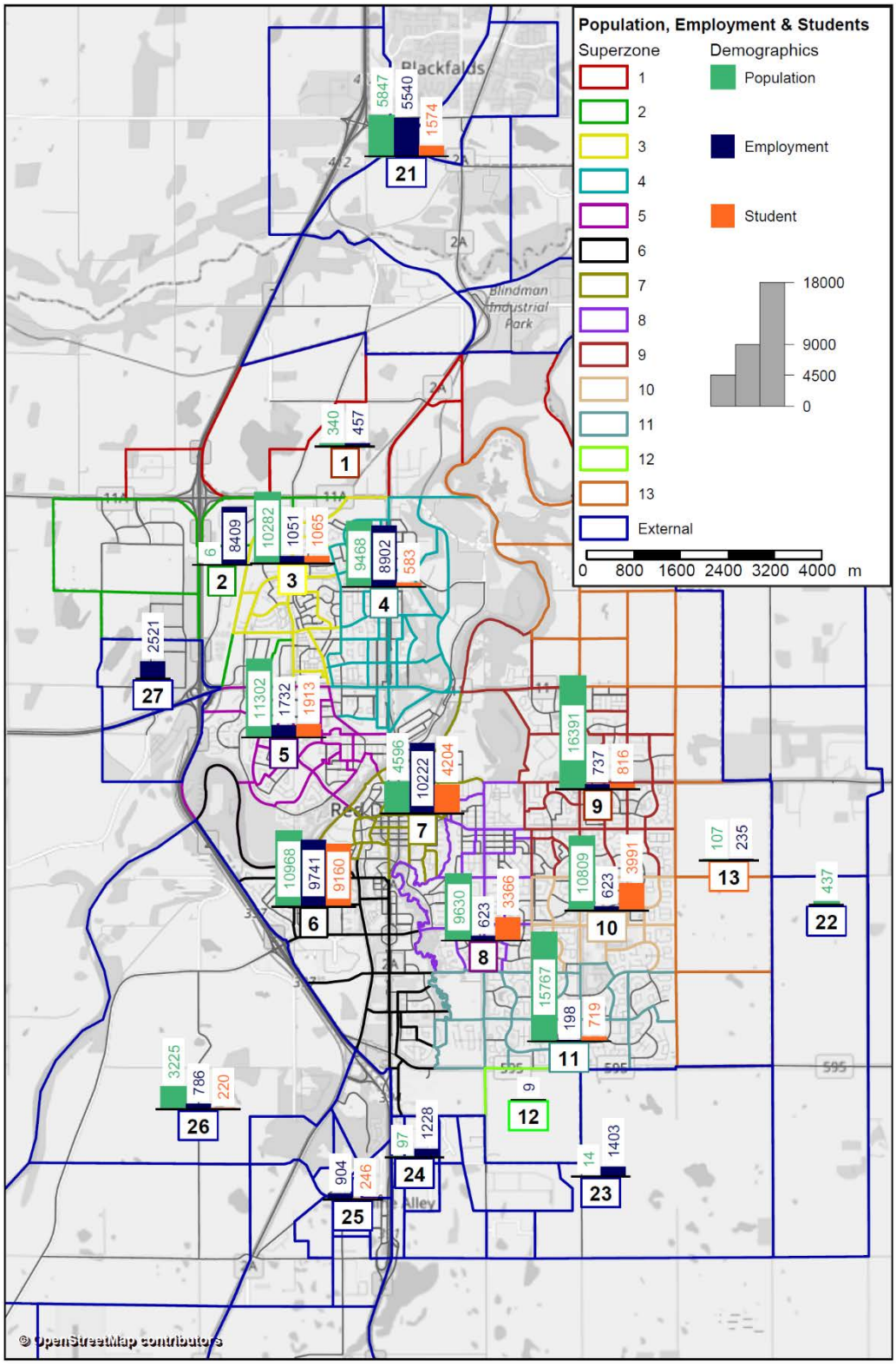
Table 3.3 - Employment and Student Enrollment Summary by Superzone

Superzone	Area	Description	Employee	Students
1	North Industrial	North Outer Edge	457	0
2	North Industrial	North West Outer Edge	8,409	0
3	North	North West Outer Edge	1,051	1,065
4	North Gaetz	North	8,902	583
5	North	West	1,732	1,913
6	South Gaetz	South West	9,741	9,160
7	Downtown	Downtown	10,222	4,204
8	South East	South Central	623	3,366
9	South East	East	737	816
10	South East	South East	623	3,991
11	South East	South	198	719
12	South East	South Outer Edge	9	0
13	East	North East/East Outer Edge	235	0
CITY OF RED DEER TOTAL			**42,939**	**25,816**
21	RD County North	RD County North and Blackfalds	5,539	1,574
22	East	RD County East	0	0
23	RD County South	Clearview and McKenzie Industrial	1,403	0
24	RD County South	Gasoline Alley East	1,228	0
25	RD County South	Gasoline Alley West	903	246
26	RD County South	RD County South and Springbrook	786	220
27	Burnt Lake Industrial	Burnt Lake (RD County) and Belich Industrial	2,521	0
EXTERNAL MODEL AREA TOTAL			**12,380**	**2,040**

The efforts to identify and generate school-based employment (staff) were also applied in the assembly of student enrollment at major schools across the Region. **Table 3.3** shows the student enrollment summary by superzone in the 4-stage model area. Please refer to **Appendix C** for the breakdown of students by TAZ.

Figure 3.2 presents a graphical representation of the population, employment and student totals by superzone in the model area.

Figure 3.2 - Population, Employment and Student Totals by Superzone



3.2 HOUSEHOLD TRAVEL SURVEY

One important input to the model development process is localized information about travel behavior within households. As part of this development, the Red Deer Household Travel Survey (HTS) was conducted by R.A. Malatest & Associates Ltd. (Malatest), in collaboration with Stantec and with the guidance of the City of Red Deer. The survey was conducted in the fall of 2016 and involved the collection of daily household travel data from a sample of residents of the City on their previous weekday travel activities. Each trip captured in the survey consisted of travel for a particular purpose between origin and destination. Data collection for the HTS took place from November 14th, 2016 to December 20th, 2016. A total of 877 valid surveys was obtained, representing 2.2 percent of all households in Red Deer.

The survey results provide key inputs for development of the transportation model, including but not limited to a reference of trip generation rates, transportation mode shares, trip purposes and origin-destination distribution for City residents.

For more information on the execution and detailed analysis of the survey, please refer to the *Red Deer 2016 Household Travel Survey - Survey Report*.

3.3 TRAFFIC COUNTS

A collection of traffic counts from 2014 to 2016 were provided by the City in support of model development. The counts are an important reference tool to verify that the base year model estimation is appropriately simulating actual traffic conditions. The available municipal counts are depicted in **Figure 3.3**.

The most important counts to consider are those that demonstrate how many vehicles are crossing various travel boundaries across the study area, combined to create a “screenline” – described in **Section 2.3**. Raw traffic counts at screenline stations were adjusted to the average weekday AM peak period – Tuesday, Wednesday and Thursday from 7-9 AM – between November 15th and November 30th from the date of count using continuous hourly ATR counts provided by Alberta Transportation (AT) at the locations illustrated in **.** The ATR station used as the adjustment basis depends upon the location of the screenline station. If available, the ATR station on the roadway in the direction of the approach is used; otherwise, the adjustment factor to translate a specific count to average weekday conditions is generated from all stations indicated in **Figure 3.4.**

The adjustment factor applied to the raw observed counts at each screenline station is listed in **Table 3.4**. Adjustment factors below 1 can be attributed to seasonality as well as slower economic activity in the Red Deer Region between the observed count date and the general base year.

Figure 3.3 - Available Municipal Traffic Count Locations

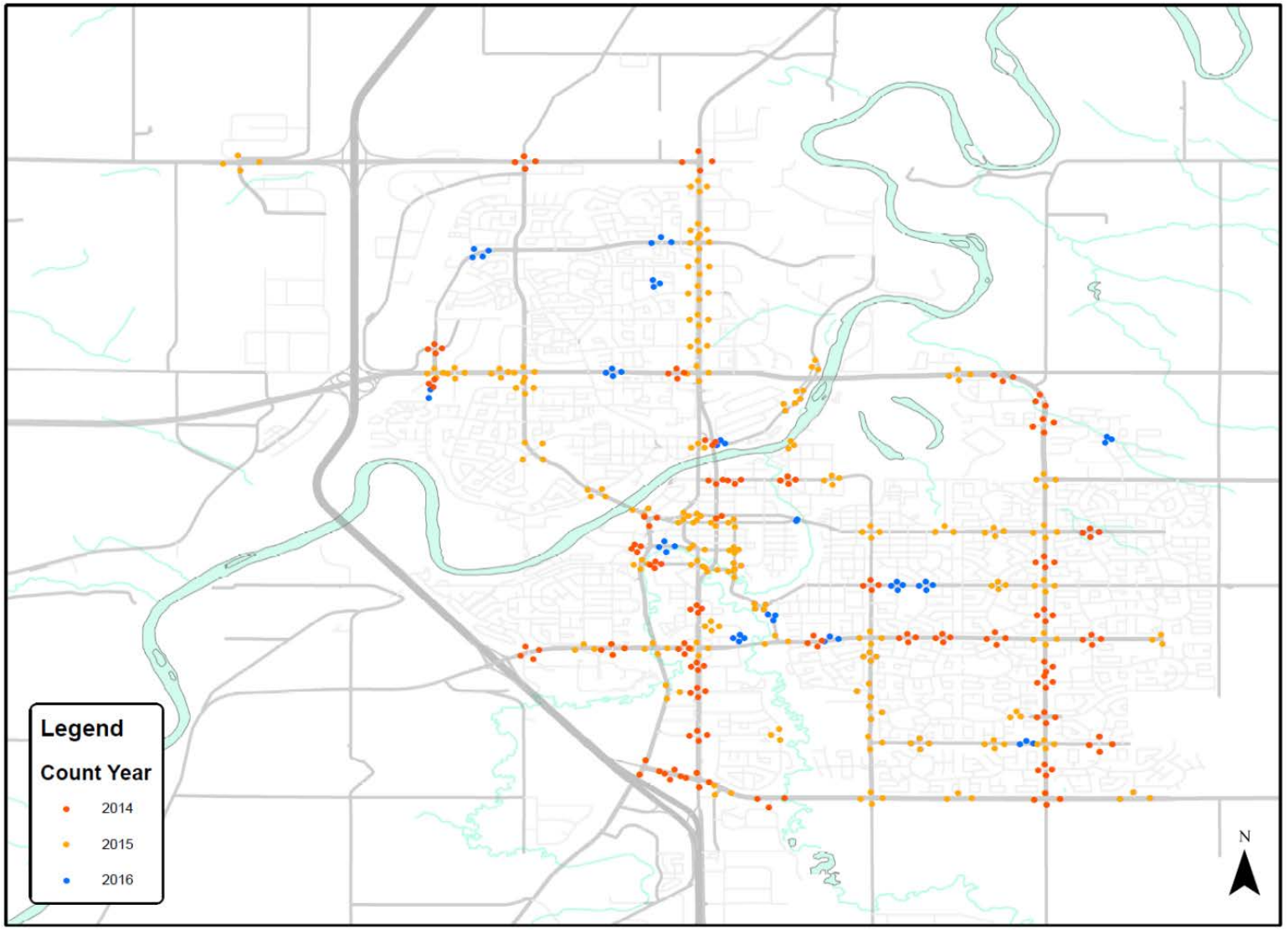


Figure 3.4 - Alberta Transportation ATR Count Locations

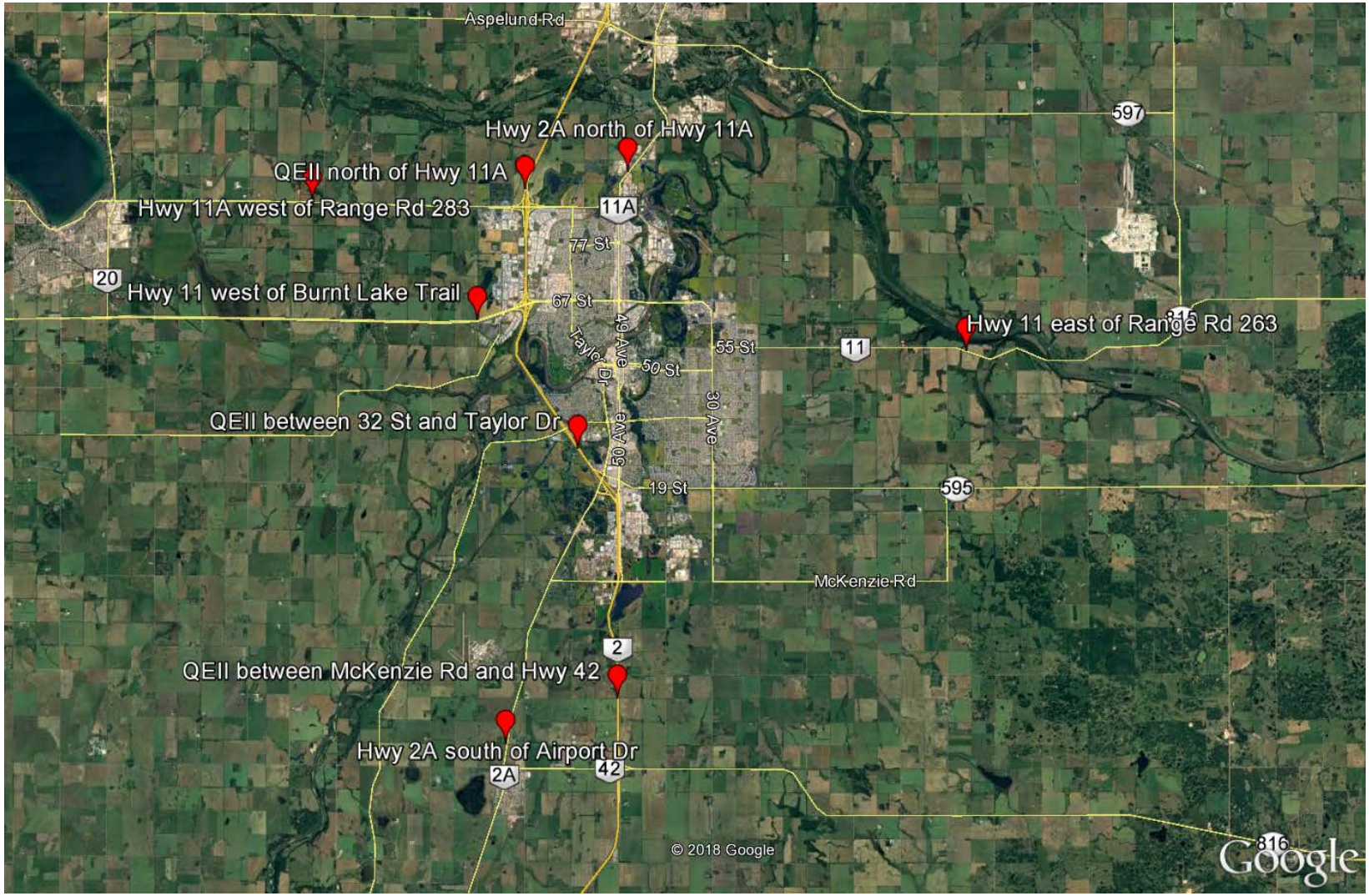


Table 3.4 – Traffic Counts and Adjustment Factors by Screenline Station

Screenline Station	Direction	Count Date	Observed Counts		Adjustment Factor	Adjusted Counts	
			AM Peak Period	AM Peak Hour		AM Peak Period	AM Peak Hour
Screenline 1 – Piper Creek/Waskasoo Creek							
1a	EB	7/8/2014	921	511	1.02	938	521
	WB	7/8/2014	2215	1249	1.02	2257	1272
1b	EB	8/27/2015	682	381	0.98	666	372
	WB	8/27/2015	1949	1136	0.98	1904	1110
1c	EB	6/14/2016	435	300	0.93	404	278
	WB	6/14/2016	1746	1025	0.93	1620	951
1d	EB	6/23/2016	674	430	0.93	630	402
1e	WB	6/23/2016	1961	1169	0.93	1832	1092
1f	EB	1/18/2017	63	49	1.00	63	49
	WB	1/18/2017	63	43	1.00	63	43
1g	EB	9/22/2015	1096	579	0.93	1017	537
	WB	9/22/2015	759	715	0.93	704	663
Screenline 2 – Red Deer River							
2a	NB	6/9/2011	3164	1935	1.11	3521	2154
	SB	6/9/2011	2991	1641	1.06	3162	1735
2b	NB	9/30/2015	1473	796	0.90	1327	717
	SB	9/30/2015	2344	1323	0.90	2112	1192
2c	SB	1/18/2017	2532	1589	1.00	2532	1589
2d	NB	9/29/2014	2489	1366	0.88	2191	1202
2e	EB	9/24/2015	1310	802	0.92	1211	741
	WB	9/24/2015	3037	1765	0.92	2807	1631
Screenline 11 – North City Boundary							
11a	NB	5/23/2013	2280	1290	0.95	2176	1231
	SB	5/23/2013	2854	1694	0.95	2715	1612
11b	NB	5/22/2014	1365	800	0.70	951	558
	SB	5/22/2014	1460	874	0.97	1419	850
Screenline 12 – South City Boundary							
12a	NB	5/22/2013	323	201	0.93	299	186
	SB	5/22/2013	219	138	1.06	233	147
12b	NB	5/16/2011	1066	570	1.05	1124	601
	SB	5/16/2011	338	239	1.23	414	293
12c	NB	5/16/2011	2111	1147	0.97	2038	1107
	SB	5/16/2011	1901	1013	0.95	1810	965
12d	NB	6/9/2014	336	178	0.81	272	144
12e	NB	8/13/2015	171	104	1.02	174	106
	SB	8/13/2015	564	356	0.90	508	320
12f	NB	7/8/2014	50	29	0.95	48	28
	SB	7/8/2014	76	51	0.87	66	44
12g	NB	7/8/2014	319	199	1.02	325	203
	SB	7/8/2014	706	393	0.79	556	309
12h	NB	8/5/2015	147	83	1.02	151	85
	SB	8/5/2015	299	189	0.90	269	170
Screenline 13 – East City Boundary							
13a	EB	6/29/2016	333	170	1.03	343	175
	WB	6/29/2016	390	207	1.01	394	209
13b	EB	7/23/2015	160	98	1.00	159	98
	WB	7/23/2015	75	41	1.23	92	50

Screenline Station	Direction	Count Date	Observed Counts		Adjustment Factor	Adjusted Counts	
			AM Peak Period	AM Peak Hour		AM Peak Period	AM Peak Hour
13c	EB	6/10/2014	446	321	0.83	369	265
	WB	6/10/2014	319	186	0.90	287	167
Screenline 14 – West City Boundary							
14a	EB	5/7/2012	2418	1381	0.96	2325	1328
	WB	5/7/2012	2264	1343	0.88	1986	1178
14b	EB	10/1/2015	1021	625	0.94	963	590
	WB	10/1/2015	830	502	0.83	689	417

A final set of ATR counts were also used to assemble the gateway trip matrix at the boundaries of the 4-stage model. More details about their use are provided in **Section 3.5**.

3.4 CORRIDOR TRAVEL TIME

While the primary function of a travel demand model is to forecast volumes, the reasonableness of a model can be compared to real travel times. A corridor travel time study was conducted by the City in 2015 that allows for a comparison. Vehicular speeds were recorded along each defined road corridor at various times within a time period (AM peak, midday or PM peak) for one day, collecting information that were used to derive the average travel times along these corridors, rounded to the nearest minute for analysis in this study. A summary of the study is provided in **Figure 3.5**.

The results from the travel time study was used (a) to inform the road network speed attributes (free-flow speed, speed adjustment factor, etc.) and (b) to provide the basis for validating modelled travel time on the road network following trip assignment (see **Section 6.5.3** for travel time validation results).

3.5 CELLINT ORIGIN-DESTINATION SURVEY

The Alberta Transportation automated traffic recorder (or ATR) counts were the source for the total amount of traffic demand accessing and departing a gateway zone. These count locations are depicted in **Figure 3.4**. The distribution of this traffic demand to each origin-destination traffic zone pairs is aided by the availability of two Cellint preliminary cellular survey outputs provided through Alberta Transportation (AT) as part of the Highway 2 Corridor Improvement Study:

- Projected Daily Traffic Volume Distribution Summary with hypothetical Red Deer Bypass;
- AM Peak Period (6-9 AM) Non-Through Traffic Percent Distribution Matrix.

To produce the resulting gateway vehicle distribution matrix involves a three-step process as demonstrated in the subsections below.

Figure 3.5 - City of Red Deer Corridor Travel Time Study (2015)

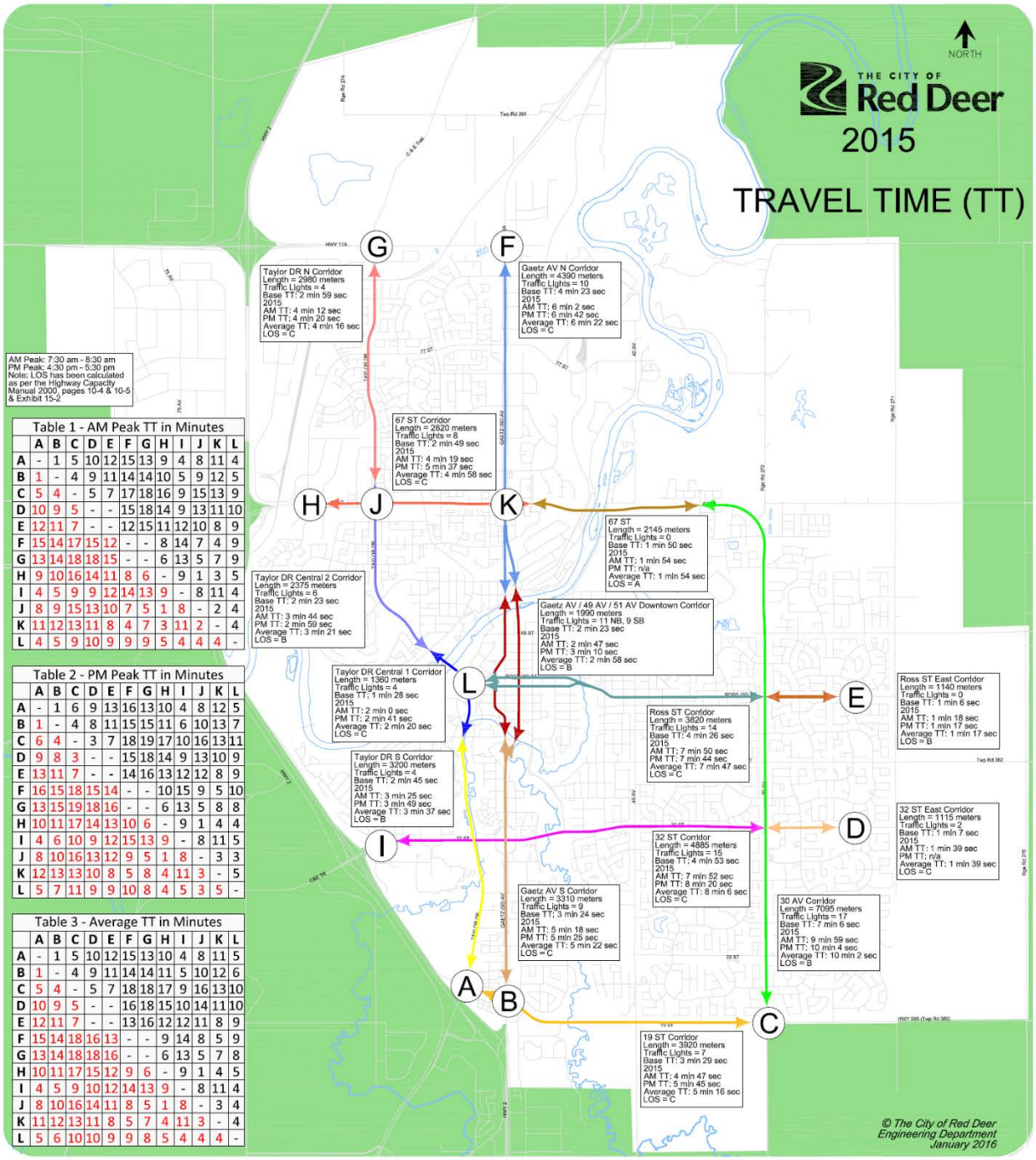


Table 1 - AM Peak TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	5	10	12	15	13	9	4	8	11	4
B	1	-	4	9	11	14	14	10	5	9	12	5
C	5	4	-	5	7	17	18	16	9	15	13	9
D	10	9	5	-	-	15	18	14	9	13	11	10
E	12	11	7	-	-	12	15	11	12	10	8	9
F	15	14	17	15	12	-	-	8	14	7	4	9
G	13	14	18	18	15	-	-	6	13	5	7	9
H	9	10	16	14	11	8	6	-	9	1	3	5
I	4	5	9	9	12	14	13	9	-	8	11	4
J	8	9	15	13	10	7	5	1	8	-	2	4
K	11	12	13	11	8	4	7	3	11	2	-	4
L	4	5	9	10	9	9	9	5	4	4	4	-

Table 2 - PM Peak TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	6	9	13	16	13	10	4	8	12	5
B	1	-	4	8	11	15	15	11	6	10	13	7
C	6	4	-	3	7	18	19	17	10	16	13	11
D	9	8	3	-	-	15	18	14	9	13	10	9
E	13	11	7	-	-	14	16	13	12	12	8	9
F	16	15	18	15	14	-	-	10	15	9	5	10
G	13	15	19	18	16	-	-	6	13	5	8	8
H	10	11	17	14	13	10	6	-	9	1	4	4
I	4	6	10	9	12	15	13	9	-	8	11	5
J	8	10	16	13	12	9	5	1	8	-	3	3
K	12	13	13	10	8	5	8	4	11	3	-	5
L	5	7	11	9	9	10	8	4	5	3	5	-

Table 3 - Average TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	5	10	12	15	13	10	4	8	11	5
B	1	-	4	9	11	14	14	11	5	10	12	6
C	5	4	-	5	7	18	18	17	9	16	13	10
D	10	9	5	-	-	16	18	15	10	14	11	10
E	12	11	7	-	-	13	16	12	12	11	8	9
F	15	14	18	16	13	-	-	9	14	8	5	9
G	13	14	18	18	16	-	-	6	13	5	7	8
H	10	11	17	15	12	9	6	-	9	1	4	5
I	4	5	9	10	12	14	13	9	-	8	11	4
J	8	10	16	14	11	8	5	1	8	-	3	4
K	11	12	13	11	8	5	7	4	11	3	-	4
L	5	6	10	10	9	9	8	5	4	4	4	-

3.5.1 Gateway-to-Gateway Vehicle Demand

The proportion of gateway-gateway (G-G) vehicle demand was estimated using the Cellint traffic volume summary, which shows the projected traffic volume distribution between QE2 and a hypothetical Red Deer Bypass that would extend from QE2 just south of Highway 42 and merging back to the QE2 just north of the City of Lacombe. The Cellint traffic volume summary, depicted in **Figure 3.6**, is based on a cellular data survey conducted on behalf of Alberta Transportation (AT) between September 3rd and December 4th, 2016, which aligns with the model base year.

The distribution of vehicles that uses the QE2 and vehicles that uses the hypothetical Red Deer Bypass, depicted in **Figure 3.6,** was used to inform the distribution of through traffic (G-G) compared to the number of non-through traffic (I/X-G and G-I/X) for North-South gateway travel in the model area. Although the distribution of through to non-through traffic was only available on a daily basis, it was deemed sufficient for our analysis of the AM peak, as inter-regional travel (e.g. Edmonton to Red Deer, Edmonton to Calgary) typically do not exhibit the same inbound-to-outbound fluctuations over the course of a day as intra-regional travel (within the Red Deer model area).

No data was available as a reliable source for generating East-West gateway travel. A nominal gateway-to-gateway proportion of 10 percent was attributed from the understanding that the demand for such travel is non-trivial but limited during the AM peak.

A summary of the distribution proportions implemented is provided in **Table 3.5**.

Figure 3.6 - Cellint Origin-Destination Survey Daily Traffic Volume Summary

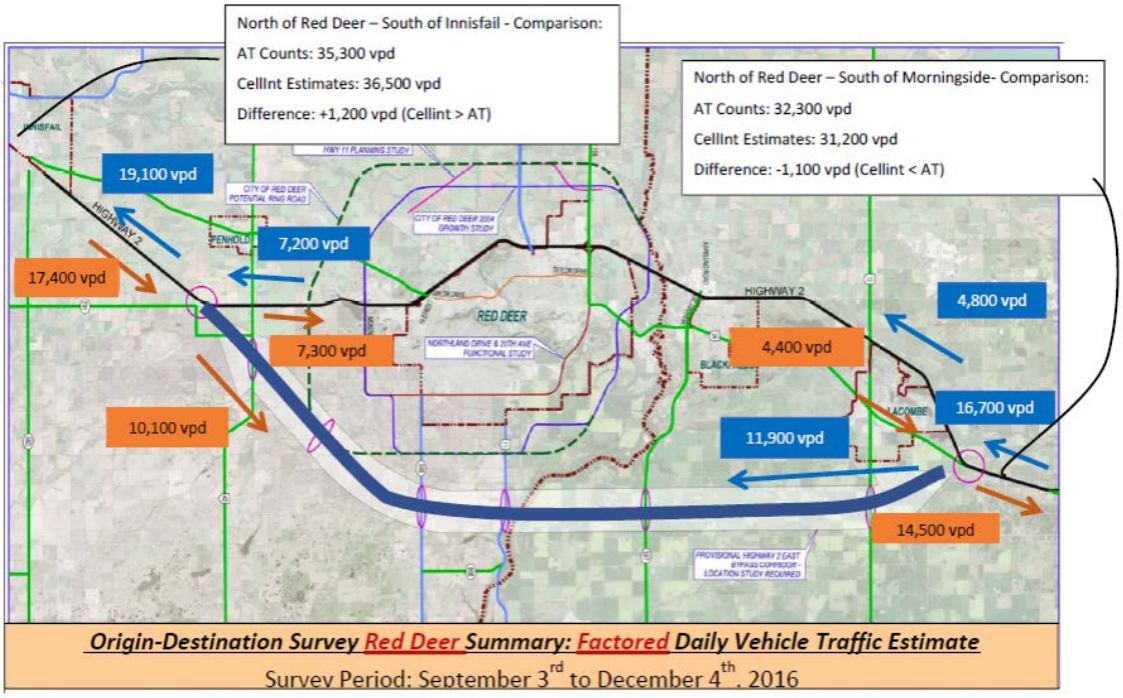


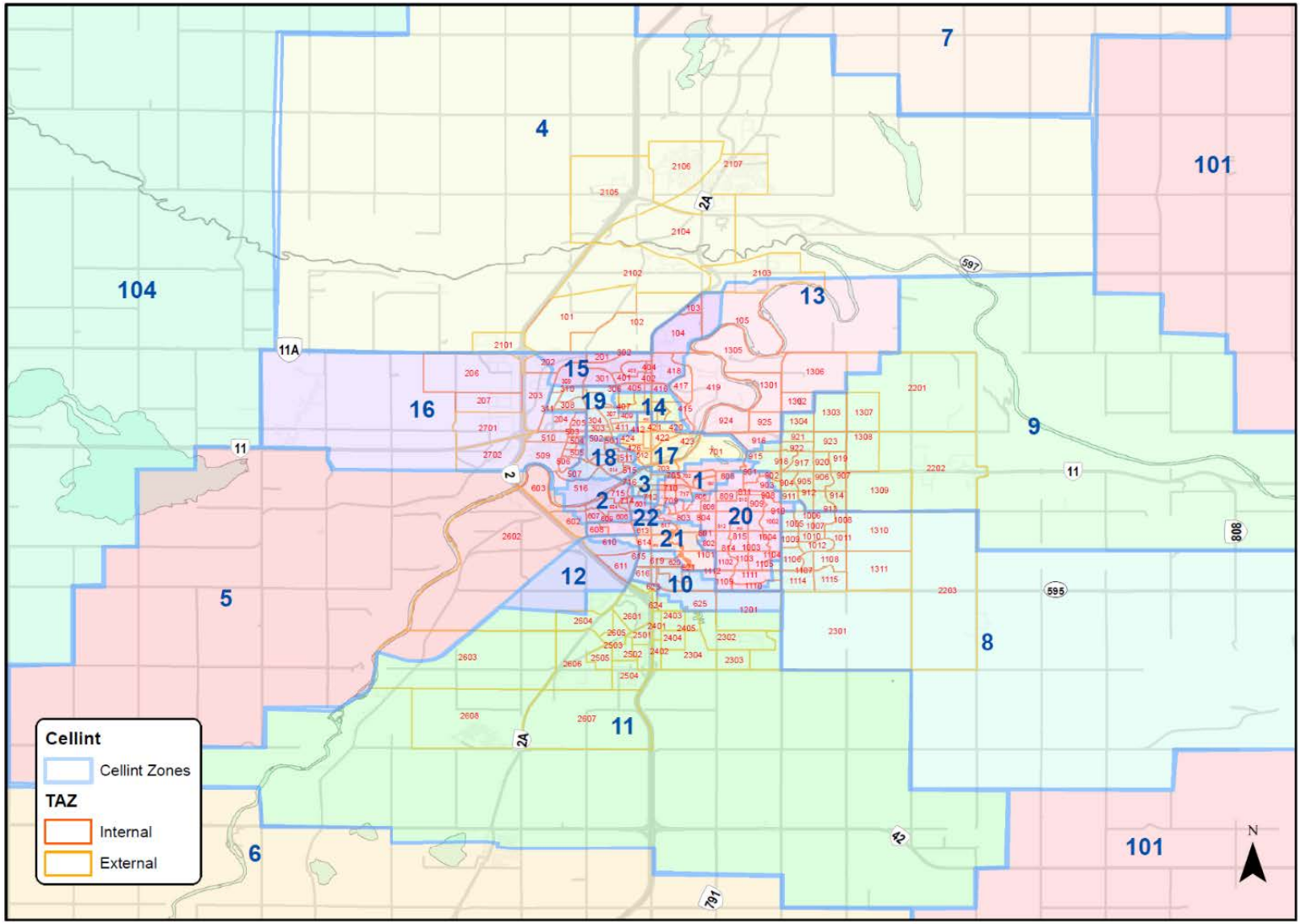
Table 3.5 – Total Gateway Volumes and Distribution of Gateway-to-Gateway Demand

TAZ	Superzone	Description	Direction	Vehicle Demand – AM Peak Period	O-D Vehicle Distribution	
					G-G	I/X-G or G-I/X
3101	31	North Gateway - QE2	NB	1,484	70%	30%
			SB	1,580	71%	29%
3102	31	North Gateway - Highway 2A	NB	0	70%	30%
			SB	0	71%	29%
3201	32	East Gateway - Highway 11	EB	385	10%	90%
			WB	280	10%	90%
3202	32	East Gateway - Highway 595	EB	252	10%	90%
			WB	292	10%	90%
3301	33	South Gateway - QE2	NB	2,284	58%	42%
			SB	1,586	62%	38%
3302	33	South Gateway - Highway 2A	NB	0	58%	42%
			SB	0	62%	38%
3401	34	West Gateway - Highway 11	EB	2,270	10%	90%
			WB	1,052	10%	90%
3402	34	West Gateway - Highway 11A	EB	623	10%	90%
			WB	217	10%	90%

3.5.2 Vehicle Demand between Gateway and Model Area

Trips designated as Gateway-to-Model Area (G-I/X) and vice versa (I/X-G) in **Table** 3.5 were distributed first to Cellint's study zone system, illustrated in **Figure 3.7,** according to the percentages in the provided AM Peak Period (6-9 AM) Non-Through Traffic Percent Distribution Matrix. Trips were further distributed from Cellint zones to our traffic zone system (TAZs) based on the proportion of built area within each Cellint zone that is part of a TAZ.

Figure 3.7 - Cellint Zone System vs Red Deer Model TAZ System



4.0 TRIP GENERATION

4.1 ESTIMATION

The process of model estimation involves using many of the data sources listed in the report, and using them to guide the basic demand estimates from the model. It includes how many trips are estimated to and from each zone (trip generation) as well as how these trips are distributed (trip distribution).

4.1.1 Household Travel Survey

The Red Deer Household Travel Survey (HTS) was the main data source for generating trip rates. The Red Deer HTS contains weighted trips between origins and destinations, with trip purpose and location purpose identified. HTS-generated rates were used as a guideline and to initiate the trip rate estimation process. This process was undertaken based on 2.2 percent sample size, at the superzone level. The representation of the HTS-generated rates is further diluted due to disaggregation of trip totals among separate trip purposes (HBW, HBS, HBO and NHB) and categories (age group, nature of employment). Hence, selected trip rates were adjusted in order to generate logical transportation outputs during the model calibration process.

4.1.2 Productions

Trip productions for home-based trips are the primary method by which demand is estimated. The observed HTS data was used to set the trip projection rates for the various age groups. These trip productions were estimated from the number of trips reported at the production zone by age group and trip purpose. Where the age group was unknown in the data (group 7), an average trip rate was assumed.

Table 4.1 - Trip Production Rates - Observed HTS and Model – HBW/HBS/HBO

Age Group	Description	Observed HTS and Model		
		HBW	HBS	HBO
1	0 - 14 years	0.01	0.23	0.05
2	15 - 24 years	0.10	0.22	0.03
3	25 - 34 years	0.22	0.03	0.13
4	35 - 44 years	0.26	0.15	0.11
5	45 - 64 years	0.22	0.05	0.09
6	65+ years	0.03	0.01	0.07
7	Unknown	0.15	0.11	0.08

Table 4.1 shows the average modelled trip productions rates, by age group and by purpose. The modelled rates for all internal traffic zones are taken as the rates as generated by the HTS, either at the average for the age group or at the rate for the specific age group/superzone combination. The complete list of trip production rates extracted from the HTS are available in **Appendix D.1.** The complete list of modelled trip production rates is provided **Appendix E.1**. Note that areas that are projected to add significant population (superzones 1 and 13) have adopted city-wide average production rates by age group, reducing the likelihood of under- or over-estimated trips at the future horizons.

HBW trip production rates at external areas were estimated as follows:

- **Red Deer County North and Blackfalds (Superzone 21):** Model productions are estimated at 60% above the average trip production rates within the City of Red Deer. Traffic counts across Screenline 11 – North City Boundary along QE2 and Highway 2A – were underestimated with the City's average trip rates adopted for Superzone 21. Since trips from the North Gateways are pre-established, trip production rates in Superzone 21 were adjusted higher to address the underestimate. This adjustment is supported by a higher labour participation rate in the Town of Blackfalds (81%[2]), which suggests that there would be higher AM Peak travel demand and hence a higher trip production rate compared to the City of Red Deer (73%[3]);
- **Other External TAZs:** Model productions are estimated at 95% of the average trip production rates within the City of Red Deer.

The model does not account for HBS travel demand produced and attracted by external traffic zones.

4.1.3 Attractions

Attractions are the non-home ends of trips (except for non-home-based trips). Similar to trip productions, trips reported at the attraction traffic zone were categorized by the same employment categories. By using the HTS data, the baseline model can create observed HBW attraction rates based on the number of employees, and the observed HBS attraction rates can be estimated by the number of students. Because the HTS rates for attractions are not as directly surveyed as productions, the total resulting trip attraction described here are slightly adjusted to match trip production rates prior to the trip distribution step.

4.1.3.1 Home-Based Work (HBW)

Table 4.2 shows the average modelled trip attraction rates by employment category. The modelled rates for most traffic zones are taken as the rates as generated by the HTS, either at the average for the employment category or at the rate for the specific employment/attraction superzone combination. The complete list of trip attraction rates extracted from the HTS are available in **Appendix D.3.1.** The complete list of modelled trip attraction rates is also provided **Appendix E.3.1**. Note that areas that are projected to add significant employment (superzones 1, 2 and 13) have adopted city-wide average attractions rates by employment categories, reducing the likelihood of under- or over-estimated trips at the future horizons.

Table 4.2 – Average Trip Attraction Rate per Employee - Observed HTS and Model - HBW

Employment Category	Description	Observed HTS and Model
1	Office	0.58
2	Retail	0.12
3	Industrial	0.39
4	Institutional	0.23
5	School	0.50
6	Other	0.33

[2] Census Profile – Red Deer (CY), Statistics Canada, 2016
[3] Census Profile – Blackfalds (T), Statistics Canada, 2016

The average HTS rates were mostly retained to produce the modelled HBW trip attraction rates. Exceptions are listed as follows due to more concentrated employment density:

- **South East Area (Superzones 8, 9 and 10) (Retail):** Model HBW trip attraction rates for retail employment (0.50 per employee) are estimated at 4 times the average city-wide HBW trip rate for the category. The area contains a high concentration of fast-food establishments (e.g. Tim Hortons, McDonald's, Starbucks in Clearview Market) and grocery stores (e.g. Co-Op in Deer Park, Sinnott's Independent in Clearview, IGA in Morrisroe) relative to a small base of total retail employment – these types of establishments commonly deploy a higher percentage of the total employment during the AM Peak Period compared to other forms of retail (e.g. shopping centres).

- **South East Area (Superzones 8, 9 and 10) (Institutional):** Model HBW trip attraction rates for institutional employment (0.90 - 0.94 per employee) are estimated at the HTS trip rate for school employment in the area. Institutional employment in the area is dominated by recreational centres (e.g. Collicutt Centre, Kinsmen Arena, Michener Aquatic Centre), which deploys a higher percentage of its total employment during the AM Peak Period compared to other forms of institutional employment such as hospitals and health centres. These healthcare institutions, which represent a significant portion of the overall institutional employment in the City, exhibit lower trip demand due to irregular shift times falling outside of the AM peak period.

- **North Gaetz Area (Superzone 4) (Industrial):** Model HBW trip attraction rate for industrial employment (0.56 per employee) is estimated at 43 percent above the average trip production rates within the City of Red Deer. The City of Red Deer Civic Yard constitutes a major percentage of employment and are likely to have a higher AM Peak Period start work time than typical industrial employment uses.

- **Clearview and McKenzie Industrial (Superzone 23):** Model HBW trip attraction rate is estimated at 21 percent above the average trip attraction rates within the City of Red Deer.

- **Gasoline Alley, west of QE2 (Superzone 25):** Model HBW trip attraction rate is estimated at 21 percent above the average trip attraction rates within the City of Red Deer.

4.1.3.2 Home-Based School (HBS)

Table 4.3 shows a comparison of the trip attraction rate extracted from HTS and the general rates used for the model by student enrollment. Modelled rates in **bold** denotes the use of average city-wide HTS rate due to the lack or low survey samples for the particular superzone. The complete list of trip attraction rates extracted from the HTS are available in **Appendix D.3.2.** The complete list of modelled trip attraction rates is provided **Appendix E.3.2**. Note that areas that are projected to have significant increase in student enrollment (superzones 1 and 13) have adopted city-wide average attractions rates, reducing the likelihood of under- or over-estimated trips at the future horizons.

A relatively high trip attraction rate was observed in Superzone 3 compared to other areas in the City. This is the highest auto mode share observed in the HTS for HBS trips across all superzones in the City – 88% during AM Peak Period. In comparison, the average auto mode share for HBS school destinations city-wide is 61%, hence the observed trip rate is adopted. This rate shall be revisited if there is evidence that school bus service will be improved or better utilized in the future.

Table 4.3 – Average Trip Attraction Rate per Student - Observed HTS vs Model - HBS

Superzone	Observed HTS	Model
1	0.00	**0.56**
2	0.00	**0.56**
3	1.32	1.32
4	0.70	**0.56**
5	0.16	0.16
6	0.30	0.30
7	0.75	0.75
8	0.48	**0.56**
9	0.07	0.07
10	0.54	0.54
11	0.72	**0.56**
12	0.00	**0.56**
13	0.00	**0.56**
City-wide	**0.56**	

The HBS attraction rate for Red Deer College (RDC) is treated separately from other students in the K-12 range, estimated at 0.08 per student compared to 0.30 per student that was attracted for K-12 students in Superzone 6. This is due to the small number of class sessions conducted on campus during the AM Peak Period.

Although external school-based employment was used as part of trip rate generation, the student-induced external home-based school (HBS) trips would not be part of the model, as no cross-jurisdiction HBS trips were observed in the Red Deer HTS.

4.1.3.3 Home-Based Other (HBO)

The HTS does not collect information regarding the amount of employment or any other quantitative information on the attraction end of a home-based other (HBO) trip. However, the HTS provides the total number of HBO trips attracted to each superzone, and combined with the total number of employment, helped estimate the aggregated total trip rate for each superzone. The aggregated total trip rate can be found in **Appendix D.3.3**.

As there are significant differences in how various employment categories attract HBO trips, efforts were made to disaggregate the total trip rate. Establishments that belong to the following three (3) employment categories were assumed to attract HBO trips: Office, Retail and Institutional. The rate disaggregation process was initiated from values generated from a series of iterative computations that seeks to match total attractions at each superzone as derived from the HTS, adjusted and aggregated to groups of superzones that share similar land use and discretionary trip-generating characteristics during the AM Peak. Some of the characteristics include:

- The type and range of establishments within each employment category;
- The ease of travel between residential areas and attraction establishments within each superzone, which reflects the propensity for intrazonal trips.

Superzones were grouped into one of the following four (4) discretionary trip-generating land use categories:

1. Industrial;
2. Mixed office and retail;
3. Residential;
4. Mixed residential and retail.

For each identified land-use category, the corresponding attraction rate was applied as indicated in **Table 4.4**.

Table 4.4 - Home-based Other (HBO) Trip Attraction Rates

HBO Rate Category	Superzones	Employment Category		
		Office	Retail	Institutional
Industrial	1-3	0.25	0.56	0.38
Mixed Office and Retail	4, 6, 7	0.13	0.28	0.19
Residential	5, 8, 10-13	1.37	0.56	3.16
Mixed Residential and Retail	9	0.25	0.56	0.38

4.1.4 Non-Home-Based Productions and Attractions

The Non-home-based (NHB) trip estimation methodology is adopted from the *Travel Demand Forecasting – Parametres and Techniques*, published by TRB's National Cooperative Highway Research Program (NCHRP) Report 716 (Transportation Research Board, 2012). NHB trips were generated using the following three-step procedure:

1. Trips were generated by population age group and by household superzone, calibrated using corresponding HTS results, using the following formula:

$$T_{NHB} = \sum [Population\ Age\ Group \times Trip\ Rate\ Age\ Group\ \&\ Household\ Superzone]$$

where T_{NHB} = Total NHB trip demand

2. Trips were then distributed to production superzones using the distribution of adjusted employment trips using the following employment categories: retail, school, institutional and other. The distribution percentage, $(\%p_{NHB})_x$, is calculated as follows:

$D_{P-NHB} = \sum (d_{P-NHB})_x$

$d_{P-NHB} = Employment\ Category \times Adjusted\ Trip\ Production\ Rate\ Category \times Global\ Adjustment\ Factor$

$(\%p_{NHB})_x = (d_{P-NHB})_x / D_{P-NHB}$

where D_{P-NHB} = Total adjusted employment trips for distribution of NHB trip productions

$(d_{P-NHB})_x$ = Adjusted employment trips in TAZ x

$(\%p_{NHB})_x$ = Percent of total NHB trips (T_{NHB}) to be distributed to TAZ x

Employment at Red Deer Regional Hospital and at Red Deer College are excluded from the calculations above due to the lack of trips that originate from these two locations during the AM Peak Period according to HTS.

An additional adjustment factor specific to retail employment, $Factorhotel$, was added to the calculation above to exclude accommodation-based retail employment from the calculations due to the lack of trips that originate from hotels/motels during the AM Peak Period.

The distribution is then calibrated using HTS NHB trips by production (origin) superzone.

3. Trips were distributed to attraction superzones using the distribution of adjusted employment trips using the following employment categories: office, retail, industrial, school and institutional. The distribution percentage, $(\%a_{NHB})_x$, is calculated as follows:

$$D_{A-NHB} = \sum (d_{A-NHB})_x$$

$$d_{A-NHB} = Employment\ Category \times Adjusted\ Trip\ Production\ Rate\ Category \times Global\ Adjustment\ Factor$$

$$(\%a_{NHB})_x = (d_{A-NHB})_x / D_{A-NHB}$$

where D_{A-NHB} = Total adjusted employment trips for distribution of NHB trip productions

$(d_{A-NHB})_x$ = Adjusted employment trips in TAZ x

$(\%a_{NHB})_x$ = Percent of total NHB trips (T_{NHB}) to be distributed to TAZ x

The distribution is then calibrated using HTS NHB trips by attraction (destination) superzone.

Because the HTS for non-home based (NHB) trips are not as robust as home-based trips and because there are no other reliable sources to use, NHB trip generation was developed by beginning with employment trips. To distribute these NHB trip totals, global adjustment factors were applied based on observed local activity patterns to allocate them to production and attraction superzones. For productions, the central business district (Superzone 7) was increased by 25 percent because the close concentration of schools, government offices and other destinations was not adequately estimating NHB activity in this area. Attraction rates also vary by superzone. The adjustment factors applied can be found in **Appendix E.2.2** and **E.2.3.**

4.1.5 Model Gateway Adjustment

Model area percentages were applied to the estimated trip rates in **Section 4.1**. As described in **Section 3.5**, gateway trips are supplied by the gateway trip matrix, assembled using distributed observed ATR counts. However, the HTS trip rates incorporate gateway trips that were produced by Red Deer households. Hence, a percentage pertaining to trips that traverse in the 4-stage model area (Internal and External) needs to be applied to the estimated trip rates to avoid double-counting gateway-internal/external (G-I/X) and internal/external-gateway (I/X-G) trips. The model area percentages listed in **Table 4.5** were applied to estimated trip production rates and estimated trip attraction rates, respectively. The table shows some slight adjustments were needed to rectify differences between count data and other sources.

Table 4.5 - Model Area Percentage at Production and at Attraction Superzone

Superzone	Percentage by Production Trip Type				Percentage by Attraction Trip Type			
	HBW	HBS	HBO	NHB	HBW	HBS	HBO	NHB
Internal								
1	100%	100%	100%	80%	100%	100%	100%	80%
2	100%	100%	100%	80%	100%	100%	100%	80%
3	87%	100%	96%	70%	100%	100%	100%	70%
4	76%	100%	97%	80%	100%	100%	100%	80%
5	86%	100%	69%	60%	100%	100%	100%	60%
6	96%	100%	99%	80%	100%	100%	100%	80%
7	100%	100%	100%	80%	100%	100%	100%	80%
8	93%	100%	100%	90%	100%	100%	100%	90%
9	91%	100%	87%	80%	100%	100%	100%	80%
10	86%	100%	76%	50%	100%	100%	100%	50%
11	81%	100%	97%	80%	100%	100%	100%	80%
12	100%	100%	100%	80%	100%	100%	100%	80%
13	100%	100%	100%	80%	100%	100%	100%	80%
External								
21	95%	N/A	95%	80%	60%	N/A	100%	80%
22	95%	N/A	95%	80%	100%	N/A	100%	80%
23	95%	N/A	95%	80%	60%	N/A	100%	80%
24	95%	N/A	95%	80%	80%	N/A	100%	80%
25	95%	N/A	95%	80%	70%	N/A	100%	80%
26	95%	N/A	95%	80%	70%	N/A	100%	80%
27	95%	N/A	95%	80%	100%	N/A	100%	80%

Note that since no gateway HBS trips were exhibited in the HTS results, it was assumed that no HBS trip demand goes beyond the 4-stage model area. Although residents of Northern and Southern Alberta account for 29% of RDC's student body in the 2015/2016 academic year, students from outside the model area are much more likely to enroll in class times outside of the AM Peak Period and in online classes. Thus, HBS model percentage is set at 100% for both trip productions and attractions.

Trip attraction rates for HBW were generated from HTS results, which do not account for trips produced at households outside of the surveyed area (e.g. Red Deer County, Blackfalds). The estimated attraction rates for internal zones do not account for gateway travel demand, hence model area percentage for internal zones is set at 100%. However, using the same rate for external HBW attractions would not be appropriate as the potential production end are more likely to be coming outside of the model area; hence a model area percentage was inferred at external attraction zones.

Trip attraction rates for HBO were generated with the assumption that trip generated travel within the model area, hence the model area percentage is set at 100%.

Figure 4.1 and **Figure 4.2** present the graphical representations of the vehicle trip production totals and the vehicle trip attraction totals by superzone in the model area, respectively.

Figure 4.1 - Vehicle Trip Production Totals by Superzone

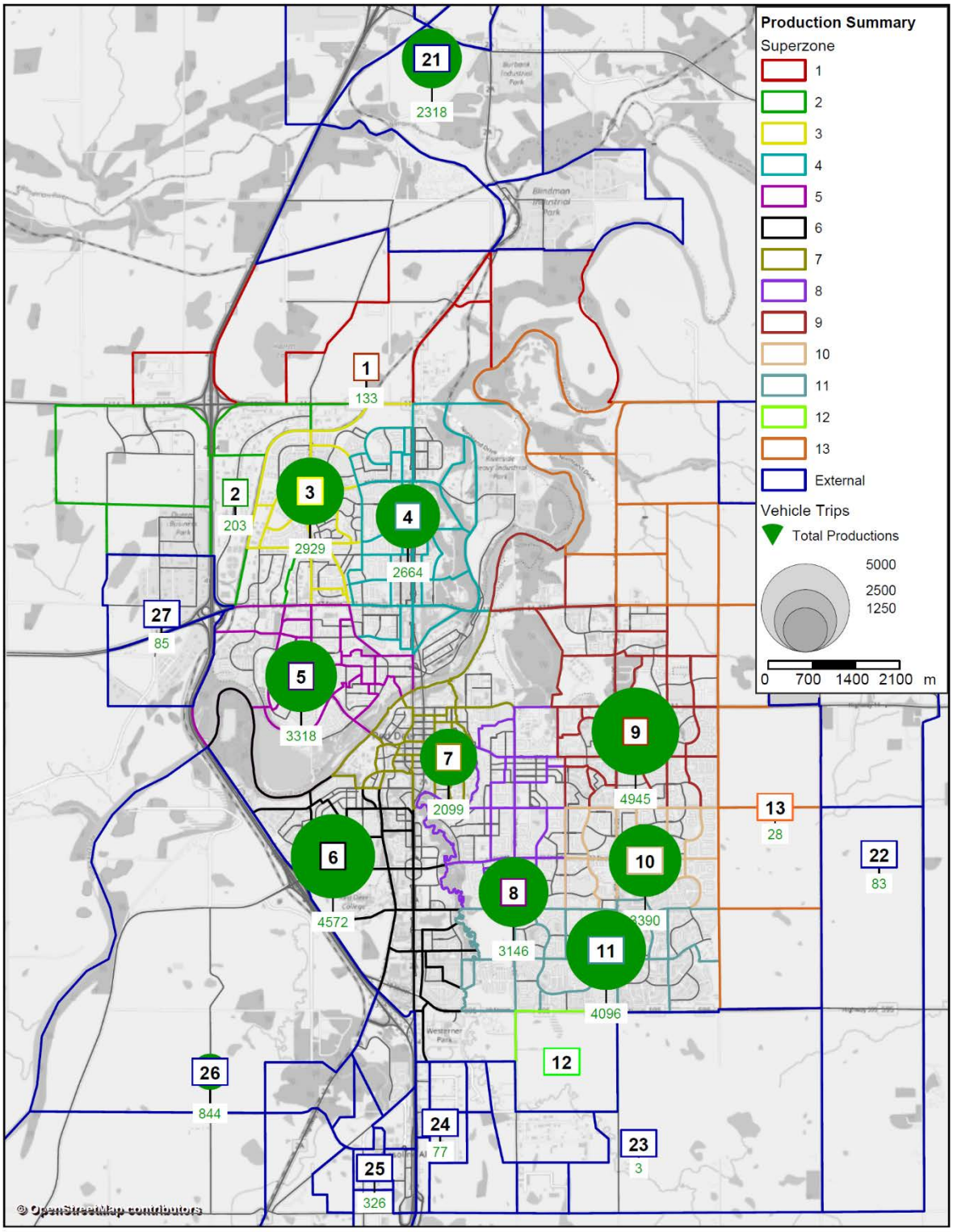
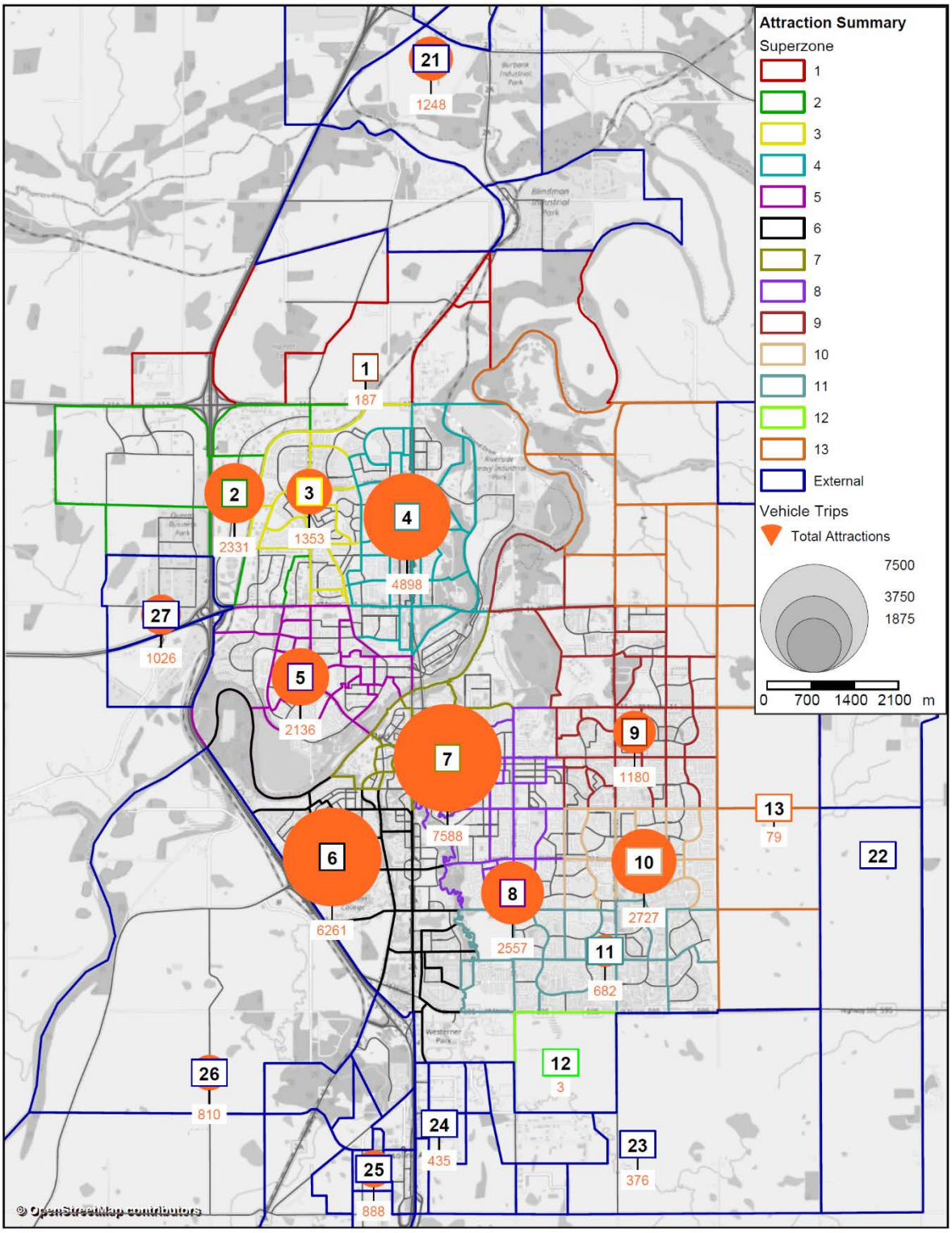


Figure 4.2 - Vehicle Trip Attraction Totals by Superzone



4.2 CALIBRATION

The subsections below present the calibration checks performed on the estimated trip generation data to the HTS data. One method used to examine comparisons is known as the GEH statistic, named for the mathematician in the transportation planning industry who developed the method. The GEH is calculated as follows:

$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$, where M = modelled hourly volume, C = observed hourly counts

Generally, a GEH performance below 10 is considered a reasonable fit and a GEH performance below 5 is considered an excellent fit. Although the GEH is not commonly used as a calibration criterion at the trip generation stage, the trip estimation efforts were able to achieve a very robust match on the statistic.

The trip generation models for the four trip purposes are able to simulate the total trip productions and attractions with a high degree of accuracy, with GEHs below 5 for most major developed areas. Most were an excellent fit, with only three superzones on the production end and three superzones on the attraction end were found with GEHs between 5 and 10, and only one superzone on the production end above a GEH of 10; these were generally superzones with only a few trips so the HTS sample is small and hence less reliable as a calibration tool in these areas.

Table 4.6 - Trip Generation Calibration Summary for All Trips

Superzone	Production Trips			Attraction Trips		
	Modelled	HTS	GEH	Modelled	HTS	GEH
1	43	0	9.28	27	342	23.18
2	71	132	6.06	1,545	1,473	1.85
3	4,146	4,145	0.02	2,019	2,171	3.32
4	3,581	3,296	4.85	4,833	4,762	1.03
5	4,370	4,502	1.98	1,250	938	9.43
6	4,761	4,819	0.84	6,133	6,300	2.12
7	2,595	2,471	2.47	9,743	9,438	3.11
8	4,253	3,990	4.11	3,657	3,768	1.82
9	6,269	5,965	3.89	957	833	4.15
10	4,838	4,485	5.17	3,827	3,705	2.00
11	5,721	6,099	4.91	645	812	6.20
12	0	0	N/A	4	0	2.72
13	35	0	8.40	97	162	5.76
TOTAL	**40,684**	**39,903**	**3.89**	**34,737**	**34,705**	**0.17**

A full summary of trips from the trip generation process has also been summarized by trip purpose. It is shown in the following **Table 4.7** through **Table 4.10**. As the tables show, the total trip productions for each trip purpose was generally able to be successfully set to within three percent of the HTS. Also note that the model normalizes to trip productions once the total number of trips is determined.

Table 4.7 - Trip Generation Calibration Summary for Home-Based Trip Productions

Trip Type	Home-Based Work (HBW)				Home-Based School (HBS)				Home-Based Other (HBO)			
SZ	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH
1	19	0	N/A	6.18	12	0	N/A	4.98	11	0	N/A	4.66
2	1	0	N/A	1.09	0	0	N/A	0.69	0	0	N/A	0.99
3	1,027	1,050	-2%	0.72	2,023	2,013	1%	0.22	855	785	9%	2.45
4	961	958	0%	0.11	939	810	16%	4.38	901	909	-1%	0.27
5	1,804	1,890	-5%	2.02	1,058	1,101	-4%	1.33	1,202	1,206	0%	0.11
6	2,323	2,353	-1%	0.62	111	116	-4%	0.43	1,078	1,260	-14%	5.32
7	322	98	230%	15.5	387	383	1%	0.21	381	316	20%	3.45
8	1,005	779	29%	7.56	1,410	1,276	11%	3.66	791	671	18%	4.43
9	3,183	3,091	3%	1.64	1,569	1,490	5%	2.02	1,105	1,044	6%	1.87
10	1,610	1,798	-10%	4.57	1,679	1,740	-4%	1.48	565	276	105%	14.1
11	2,379	2,443	-3%	1.29	1,741	1,705	2%	0.85	1,499	1,776	-16%	6.85
12	0	0	N/A	N/A	0	0	N/A	N/A	0	0	N/A	N/A
13	17	0	N/A	5.77	10	0	N/A	4.38	9	0	N/A	4.24
TOTAL	**14,651**	**14,461**	**1%**	**1.58**	**10,939**	**10,633**	**3%**	**2.94**	**8,397**	**8,243**	**2%**	**1.69**

Table 4.8 - Trip Generation Calibration Summary for Non-Home-Based Trip Productions

Calibration Basis	Trips by Household Superzone				Trips by Production Superzone			
SZ	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH
1	10	0	N/A	4.43	1	0	N/A	1.20
2	0	0	N/A	0.87	70	132	-47%	6.21
3	653	624	5%	1.16	242	297	-19%	3.40
4	644	676	-5%	1.22	779	619	26%	6.04
5	594	561	6%	1.35	307	305	1%	0.14
6	848	940	-10%	3.09	1,249	1,090	15%	4.64
7	344	326	6%	1.01	1,505	1,674	-10%	4.23
8	980	1,081	-9%	3.15	1,047	1,263	-17%	6.35
9	1,054	1,037	2%	0.54	411	340	21%	3.70
10	430	293	46%	7.17	985	671	47%	10.89
11	1,288	1,480	-13%	5.16	103	175	-41%	6.15
12	0	0	N/A	N/A	0	0	N/A	N/A
13	8	0	N/A	4.06	0	0	N/A	N/A
TOTAL	**6,854**	**7,018**	**-2%**	**1.98**	**6,698**	**6,566**	**2%**	**1.62**

Table 4.9 - Trip Generation Calibration Summary for Home-Based Trip Attractions

Trip Type	Home-Based Work (HBW)				Home-Based School (HBS)				Home-Based Other (HBO)			
SZ	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH
1	18	11	64%	1.85	0	0	N/A	N/A	2	149	-99%	17.0
2	1,184	1,108	7%	2.23	0	0	N/A	N/A	271	314	-14%	2.48
3	315	331	-5%	0.89	1,407	1,525	-8%	3.09	249	288	-14%	2.41
4	2,533	2,491	2%	0.84	329	285	15%	2.52	914	1,035	-12%	3.87
5	147	112	31%	3.05	314	219	43%	5.80	702	558	26%	5.75
6	2,136	2,290	-7%	3.28	994	833	19%	5.32	1,559	1,479	5%	2.03
7	3,169	3,122	2%	0.84	3,169	2,993	6%	3.16	1,551	1,581	-2%	0.74
8	547	556	-2%	0.41	1,901	1,946	-2%	1.02	764	900	-15%	4.71
9	433	370	17%	3.16	55	58	-4%	0.32	256	252	2%	0.26
10	526	543	-3%	0.77	2,172	2,232	-3%	1.29	492	382	29%	5.29
11	54	0	N/A	10.4	406	542	-25%	6.22	58	74	-21%	1.94
12	4	0	N/A	2.67	0	0	N/A	N/A	0	0	N/A	N/A
13	93	162	-43%	6.17	0	0	N/A	N/A	0	0	N/A	N/A
TOTAL	**11,157**	**11,097**	**1%**	**0.57**	**10,747**	**10,633**	**1%**	**1.10**	**6,818**	**7,011**	**-3%**	**2.32**

Table 4.10 - Trip Generation Calibration Summary for Non-Home-Based Trip Attractions

Calibration Basis	Trips by Household Superzone				Trips by Attraction Superzone			
SZ	Model	HTS	% Diff	GEH	Model	HTS	% Diff	GEH
1	10	0	N/A	4.43	8	182	-96%	17.93
2	0	0	N/A	0.87	90	51	75%	4.60
3	653	624	5%	1.16	48	27	82%	3.54
4	644	676	-5%	1.22	1,057	951	11%	3.34
5	594	561	6%	1.35	87	49	78%	4.60
6	848	940	-10%	3.09	1,444	1,697	-15%	6.37
7	344	326	6%	1.01	1,854	1,742	6%	2.63
8	980	1,081	-9%	3.15	445	366	22%	3.92
9	1,054	1,037	2%	0.54	213	153	39%	4.37
10	430	293	46%	7.17	638	548	16%	3.71
11	1,288	1,480	-13%	5.16	127	197	-35%	5.48
12	0	0	N/A	N/A	0	0	N/A	N/A
13	8	0	N/A	4.06	4	0	N/A	N/A
TOTAL	**6,854**	**7,018**	**-2%**	**1.98**	**6,015**	**5,963**	**1%**	**0.66**

4.3 VEHICLE OCCUPANCY

Generated person-trips are converted to vehicle-trips prior to trip balancing. The vehicle occupancy factors for each trip type were derived from the average vehicle occupancies exhibited in the Household Travel Survey (HTS). The vehicle occupancy factors are exhibited in **Table 4.11**.

Table 4.11 - Vehicle Occupancy Summary

Trip Type	HTS and Model	
	Trip Productions	Trip Attractions
HBW	1.06	1.06
HBS	1.85	1.85
HBO	1.34	1.34
NHB	1.27	1.27

5.0 DISTRIBUTION

Origin-Destination (O-D) matrices for each of the four trip purposes were estimated using calibrated trip distribution model parameters. Matrices for all four purposes were calculated using doubly constrained gravity model, with the initial matrices balanced to the trip production totals.

5.1 ESTIMATION

The distribution models synthesize matrices that connects each trip production to each trip attraction. The gravity model is the basis for the distribution models for all trip purposes. The gravity model is based on the notion that the number of linkages between two zones is in proportion to the number of productions in the origin zone and attractions in the destination zone, and proportional to variables that define the degree of separation between them, usually expressed in a utility function.

The gravity model formula for the trip distribution model is as follows:

$$F_{ij} = Q_i \cdot Z_j \cdot f(U_{ij})$$

where the Utility function $f(U_{ij})$ is calculated as follows:

$$f(U_{ij}) = a \cdot (k_{ij} \cdot U_{ij})^b \cdot e^{(c \times k_{ij} \times U_{ij})}$$

and F_{ij} = Trips between origin i and destination j,
Q_i = Trips originating at i,
Z_i = Trips destined for j, and
k_{ij} = Scaling factor between origin i and destination j

The utility used U_{ij} and the estimated gravitional parametres for the distribution model are summarized in **Table 5.1.**

Table 5.1 - Utility and Model Distribution Parameters

Trip Type	Utility (U_{ij})	Gravitational Parameters		
		a	b	c
HBW	HTS Person-Trips / Free-Flow Travel Time	6.33E-04	1.418	-0.014
HBS		1.29E-03	0.398	0.003
HBO		3.04E-06	3.026	-0.030
NHB	HTS Person-Trips x Free-Flow Travel Time	2.08E-23	8.083	-0.006

Table 5.2 shows the scaling factor applied for the respective origin-destination combination.

Table 5.2 - Scaling Factor Applied in Distribution Model

Origin-Destination (O-D)	Scaling Factor (k_{ij})
Internal-Internal	1.2
Intrazonal	0.5
All Other O-Ds	1

The distribution models for HBW, HBS and HBO adopt a utility function that is proportional to the number of observed person-trips obtained from the HTS between an origin zone and a destination zone, and inversely proportional to the free-flow travel time between them. The utility function for the NHB distribution model is also proportional to HTS trips, but has a positive relationship with free-flow travel time.

5.2 CALIBRATION CHECKS

The distribution model results are calibrated with the expanded HTS vehicle trips on two levels:

1. Trip Frequency by Travel Time
2. Origin-Destination Matrix by Area

The calibration is performed on the internal-internal/external (I-I/X) vehicle trip level due to the geographic scope of the HTS survey – only City of Red Deer households were interviewed. Trips that originate outside of the City are not captured and no reliable source for observed external trip origins are available.

5.2.1 Trip Frequency by Travel Time

A key element in calibrating trip distribution is the verification that the model is estimating travel times between zones in a reasonable way. **Figure 5.1** to **Figure 5.5** provide a comparison of modelled vehicle trips against observed HTS vehicle trips in terms of trip length distributions for all trips, home-based work (HBW), home-based school (HBS), home-based other (HBO) and non home-based trips (NHB). In general, trip length distributions for all four models show a great fit.

Coincidence ratio provides an additional quantitative measure of fit between the two sets of trip frequencies. The coincidence ratio is calculated as follows:

$$CR = \left\{ \frac{\sum_T [min(PM_T, PO_T)]}{\sum_T [max(PM_T, PO_T)]} \right\}$$

Where CR = Coincidence Ratio
PMT = Proportion of modelled distribution in interval T
POT = Proportion of modelled distribution in interval T
T = Histogram interval

The coincidence ratio lies between 0 and 1.0, where a ratio of 1.0 indicates identical distributions. It is preferable for the coincidence ratio for each trip purpose to be at least 70 percent. However, the 70 percent guideline can be relaxed in situations where the trip purposes have relatively few trips that were sampled, resulting in the observed data not reaching a statistically significant confidence level.

The coincidence ratio shows a great fit for HBW and HBO distribution models (>= 70%), while HBS and NHB models provides a reasonable fit (60-70%). The coincidence ratio for all combined trips shows an excellent fit (83%).

Figure 5.1 - Trip Frequency by Travel Time for All Combined Trips

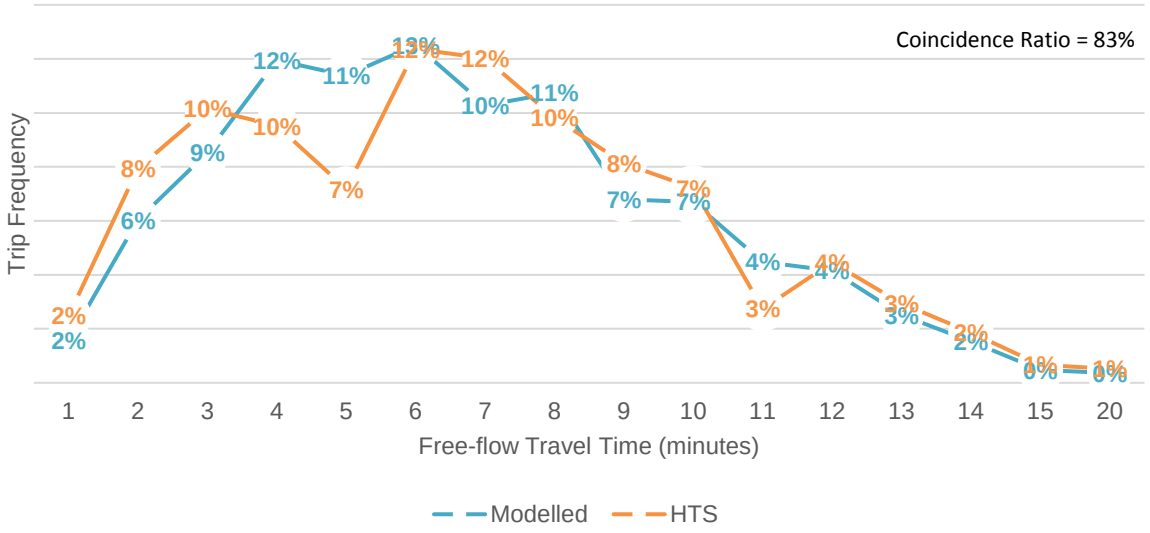


Figure 5.2 - Trip Frequency by Travel Time for Home-based Work (HBW) Trips

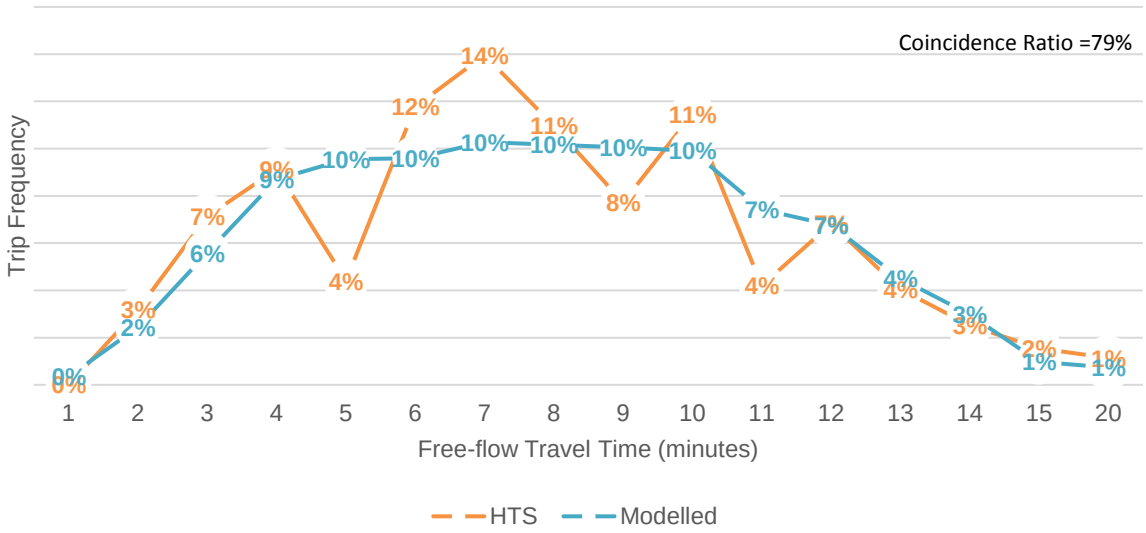


Figure 5.3 - Trip Frequency by Travel Time for Home-based School (HBS) Trips

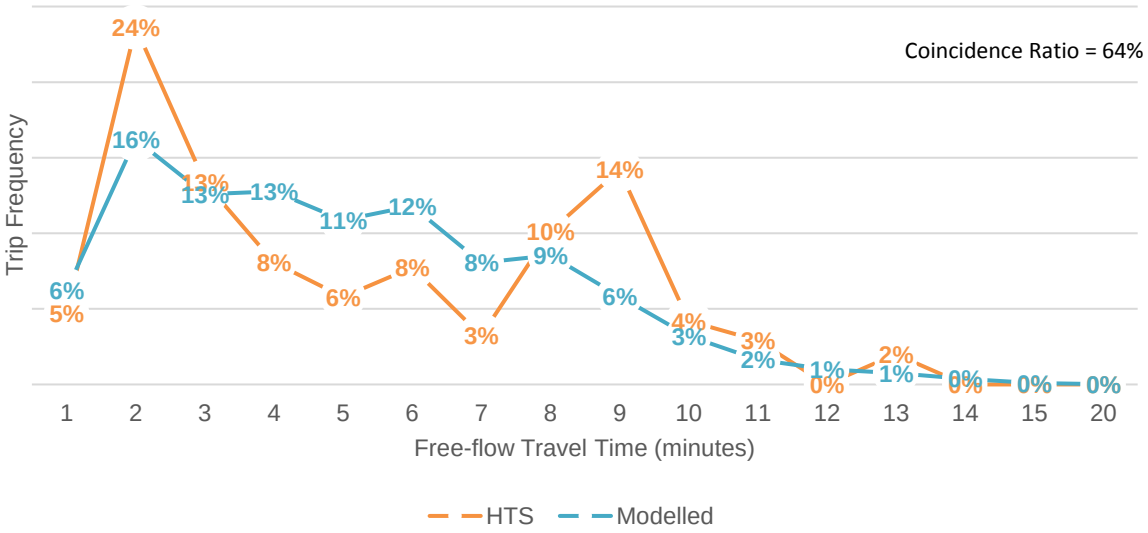


Figure 5.4 - Trip Frequency by Travel Time for Home-based Other (HBO) Trips

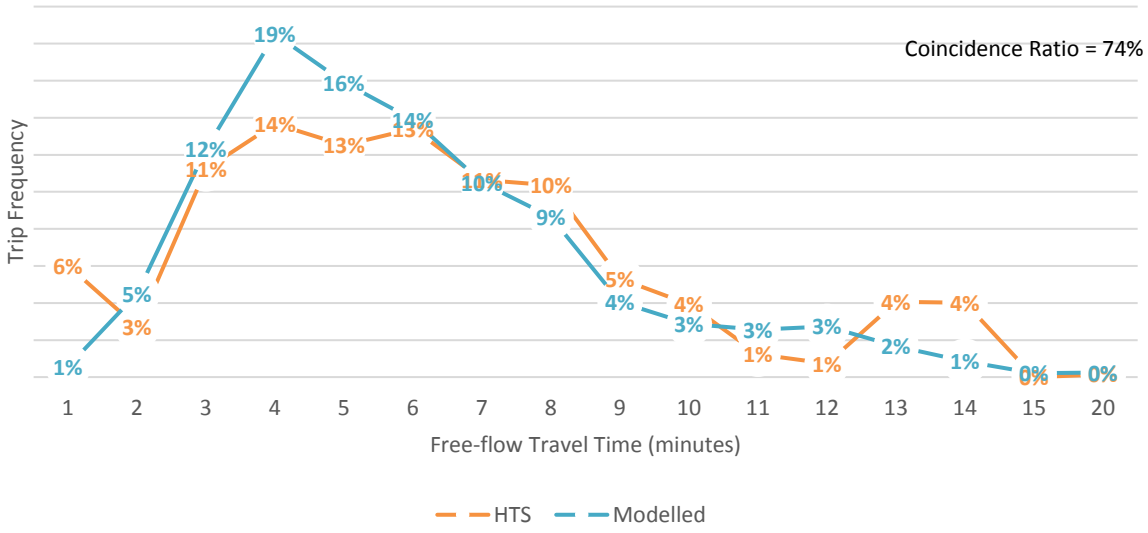
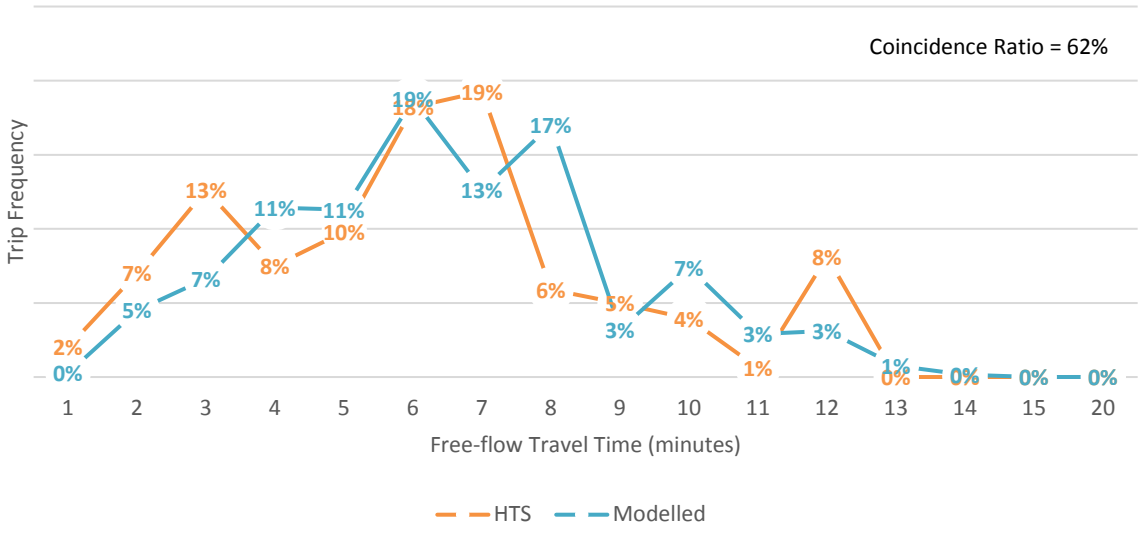


Figure 5.5 - Trip Frequency by Travel Time for Non Home-based (NHB) Trips



5.2.2 Origin-Destination Matrix

Superzones were aggregated to reduce the effect of low sampling in the HTS to the model calibration process. The area-to-superzone relationship is defined in **Table 3.1**.

The observed HTS and modelled vehicle trip matrices are displayed in **Table 5.3** and **Table 5.4**. A comparison based on absolute volume difference, as well as the GEH, are provided in **Table 5.5** and **Table 5.6**. The GEH statistic is not commonly used as a calibration check for trip distribution results. The statistic is presented here for informational purpose due to its ability to capture both the margin of error and the magnitude of traffic flow within a value. Details on how the GEH statistic is calculated is provided in **Section 4.2**.

It is important to note that the HTS results carry an effective margin of error between 6 percent and 56 percent for trip-level data on the superzone level; hence, it is suggested that the origin-destination trip differences are to be rounded down to the nearest hundred to closer resemble the accuracy of the data.

The modelled O-D calibration summaries exhibit a reasonable resemblance to the HTS data for O-D pairs with significant travel between them. This implies that the estimated distribution models are able to effectively recreate observed trip quantities for between model traffic zones.

Table 5.3 - HTS Origin-Destination Vehicle Trip Matrix by Area

Origin / Destination	North Industrial	North	North Gaetz	South Gaetz	Downtown	South East	East	RD County North	RD County South	Burnt Lake Industrial	TOTAL
North Industrial	0	0	0	0	27	0	0	6	0	0	**33**
North	714	1,444	1,303	190	1,069	361	0	401	203	125	**5,809**
North Gaetz	57	183	515	92	700	380	0	0	116	0	**2,043**
South Gaetz	30	285	203	928	935	883	162	0	27	33	**3,487**
Downtown	182	12	237	487	768	371	0	0	105	0	**2,161**
South East	838	174	1,773	3,375	3,523	3,766	0	119	381	544	**14,494**
East	0	0	0	0	0	0	0	0	0	0	**0**
County South	0	0	216	62	0	0	0	0	0	0	**278**
TOTAL	**1,822**	**2,098**	**4,247**	**5,133**	**7,020**	**5,761**	**162**	**526**	**832**	**702**	**28,304**

Table 5.4 - Modelled Origin-Destination Vehicle Trip Matrix by Area

Origin / Destination	North Industrial	North	North Gaetz	South Gaetz	Downtown	South East	East	RD County North	RD County South	Burnt Lake Industrial	TOTAL
North Industrial	19	13	1	2	27	25	0	53	6	0	**146**
North	733	1,412	789	128	1,012	276	0	898	240	135	**5,622**
North Gaetz	73	282	669	95	841	211	0	0	274	0	**2,445**
South Gaetz	10	464	635	1,268	502	915	72	0	10	39	**3,915**
Downtown	6	10	426	371	540	187	0	0	409	0	**1,949**
South East	1,245	100	1,710	3,190	3,511	3,796	0	113	523	672	**14,859**
East	7	2	0	1	1	4	2	0	9	0	**28**
County South	0	0	0	0	0	0	0	0	0	0	**0**
TOTAL	**2,092**	**2,283**	**4,231**	**5,055**	**6,435**	**5,415**	**74**	**1,065**	**1,470**	**845**	**28,965**

Table 5.5 - Difference between Modelled and Observed Vehicle Trip Matrix by Area

Origin / Destination	North Industrial	North	North Gaetz	South Gaetz	Downtown	South East	East	RD County North	RD County South	Burnt Lake Industrial	TOTAL
North Industrial	19	13	1	2	0	25	0	47	6	0	**113**
North	19	-31	-514	-62	-57	-85	0	497	36	10	**-187**
North Gaetz	16	99	154	3	142	-169	0	0	158	0	**402**
South Gaetz	-20	180	433	340	-433	32	-90	0	-17	6	**429**
Downtown	-176	-3	189	-116	-227	-183	0	0	304	0	**-212**
South East	406	-74	-63	-185	-12	30	0	-6	142	127	**365**
East	7	2	0	1	1	4	2	0	9	0	**28**
County South	0	0	-216	-62	0	0	0	0	0	0	**-278**
TOTAL	**270**	**185**	**-16**	**-78**	**-586**	**-346**	**-88**	**539**	**638**	**143**	**661**

Table 5.6 - GEH between Modelled and Observed Vehicle Trip Matrix by Area

Origin / Destination	North Industrial	North	North Gaetz	South Gaetz	Downtown	South East	East	RD County North	RD County South	Burnt Lake Industrial	TOTAL
North Industrial	6.20	5.06	1.13	1.89	0.02	7.09	0.07	8.66	3.54	0.36	**11.98**
North	0.70	0.83	15.89	4.90	1.77	4.74	0.02	19.51	2.43	0.85	**2.47**
North Gaetz	1.93	6.47	6.33	0.33	5.11	9.80	0.01	0.49	11.29	0.02	**8.50**
South Gaetz	4.48	9.28	21.13	10.26	16.15	1.05	8.32	0.38	4.05	0.93	**7.04**
Downtown	18.14	0.80	10.40	5.58	8.89	10.98	0.02	0.27	18.99	0.04	**4.67**
South East	12.58	6.36	1.51	3.23	0.20	0.49	0.03	0.59	6.70	5.17	**3.02**
East	3.61	2.19	0.93	1.66	1.62	2.88	2.04	0.97	4.20	0.45	**7.43**
County South	0.00	0.00	20.78	11.10	0.00	0.00	0.00	0.00	0.00	0.00	**23.56**
TOTAL	**6.10**	**3.95**	**0.24**	**1.09**	**7.14**	**4.63**	**8.09**	**19.10**	**18.80**	**5.14**	**3.91**

6.0 ASSIGNMENT

Once distribution has been calibrated, the model proceeds through several steps designed to create AM peak hour vehicle trip tables. These includes the incorporation of gateway trips and applying the background commercial truck trips.

6.1 VOLUME-DELAY FUNCTION

The assignment process uses a standard volume-delay function (VDF). The function defined in this model follows the industry-standard Bureau of Public Roads (BPR) function with the parameters set to reflect how congestion slows traffic:

$$t_i = t_{0i} \cdot (1 + a \cdot \left(\frac{V_i}{C_i}\right)^b)$$

Where t_i = congested travel time on link i
t_{0i} = free-flow travel time on link i
V_i = modelled vehicle volume on link i
C_i = vehicle capacity on link i

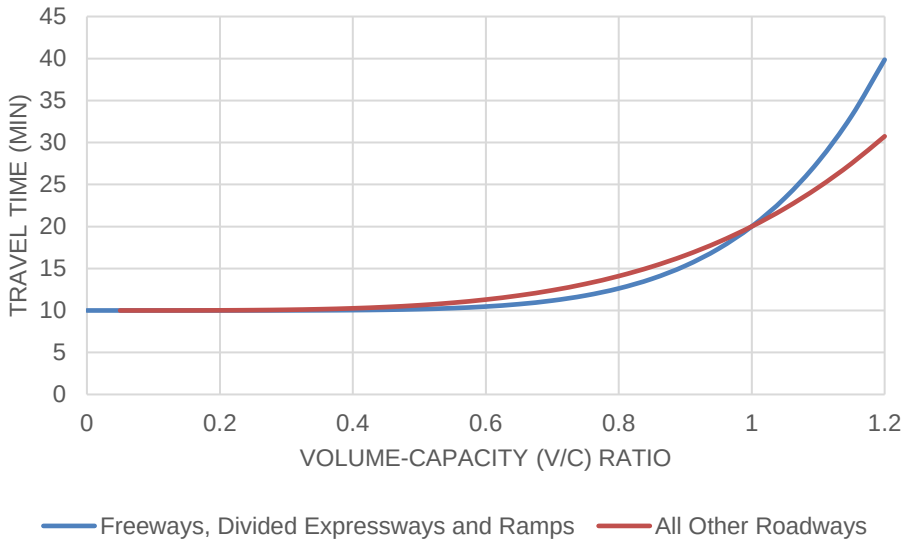
Table 6.1 shows the parameters by road classification that was applied to the model. These parameters are indicative of AM peak hour route diversion behaviour and are sensible for application in the Red Deer model road network. These parameters have also been used in other models, including the 2011 Greater Toronto and Hamilton Area (GTHA) Model developed by the University of Toronto Travel Modelling Group.

Table 6.1 – BPR Function Parameter by Road Classification

Road Classification	*a*	*b*
Freeways	1	6
Divided Expressways	1	6
Freeway Ramps	1	6
Divided Expressway Ramps	1	6
All Other Roadways	1	4

The impact of increasing volumes on travel time, and consequently route assignment is illustrated in **Figure 6.1** – a trip with a free-flow time of 10 minutes is used as an example to illustrate the relationship between the volume-to-capacity (V/C) ratio and modelled travel time.

Figure 6.1 - Impact of BPR Function on Travel Time



6.2 HOUR FACTOR

Most model inputs are generated under the two-hour AM peak period (7-9 AM) conditions. Assignment of volumes on a period basis would result in the loss of peaking behaviour and underrepresent congested conditions. To generate AM peak hour assignments, the hour factor matrix is applied to the distributed origin-destination matrices and adjusted gateway matrices to produce AM peak hour demand to be assigned to the model road network.

The hour factor for each traffic zone O-D is derived based on proportion of observed counts in the peak hour versus peak period and adjusted based on the theory that long-distance trips are less inclined to travel during the peak of peak traffic conditions, hence a lower hour factor is attributed to origin-destination combinations that carries significant non-peak traffic.

Table 6.2 summarizes the hour factor attributed to each O-D permutation.

Table 6.2 - Hour Factor Summary

Origin	Destination	Roadway Used	Hour Factor
Default			0.6
Internal/External	Internal/External	Local	0.6 - 0.7
Internal/External	Internal/External	Highway	0.5 - 0.7
Internal/External	Gateway	All	0.6 - 0.7
Gateway	Internal/External	All	0.6 - 0.7

6.3 GATEWAY TRIPS

Using the gateway trip synthesis process as described in **Section 3.5**, the AM peak hour total gateway trip matrix was generated. The total gateway trip matrix, by origin-destination superzones, is exhibited in **Table 6.3** through **Table 6.5**.

Table 6.3 – Model Area-to-Gateway (I/X-G) Trips

Origin Superzone	Destination Superzone				
	31	32	33	34	TOTAL
1	9	10	6	15	**41**
2	32	19	20	78	**149**
3	43	37	34	82	**196**
4	50	38	36	94	**218**
5	50	43	77	260	**429**
6	81	103	140	333	**657**
7	25	40	26	59	**150**
8	18	27	26	39	**111**
9	32	167	47	85	**331**
10	9	30	37	26	**103**
11	17	51	57	48	**173**
12	0	0	0	0	**0**
13	0	0	0	0	**0**
21	1	0	1	1	**2**
22	0	0	0	0	**0**
23	0	0	0	0	**0**
24	0	0	0	0	**0**
25	0	0	0	0	**0**
26	0	0	0	0	**0**
27	15	7	12	50	**85**
TOTAL	**381**	**574**	**520**	**1,170**	**2,645**

Table 6.4 – Gateway-to-Model Area (G-I/X) Trips

Destination Superzone	Origin Superzone				
	31	32	33	34	TOTAL
1	3	8	13	9	**34**
2	43	15	54	180	**292**
3	0	25	47	1	**74**
4	28	38	52	96	**214**
5	55	46	142	498	**741**
6	98	44	208	759	**1,109**
7	68	28	33	347	**476**
8	15	22	32	78	**148**
9	41	161	78	159	**439**
10	10	36	63	67	**175**
11	18	49	89	110	**266**
12	0	0	0	0	**0**
13	0	0	0	0	**0**
21	1	1	1	1	**3**
22	0	0	0	0	**0**
23	0	0	0	0	**0**
24	0	0	0	0	**0**
25	0	0	0	0	**0**
26	0	0	0	0	**0**
27	24	7	31	119	**180**
TOTAL	**405**	**479**	**842**	**2,425**	**4,151**

Table 6.5 – Gateway-to-Gateway (G-G)Trips

Origin Superzone	Destination Superzone				
	31	32	33	34	TOTAL
31	0	0	1,003	0	**1,003**
32	0	0	0	53	**53**
33	1,165	0	0	0	**1,165**
34	0	269	0	0	**269**
TOTAL	**1,165**	**269**	**1,003**	**53**	**2,491**

Gateway trips were further broken down to individual trip purposes under the following distribution:

- 40% Home-based Work (HBW)
- 40% Home-based Other (HBO)
- 20% Non-Home-based Work (NHB)

The lone exception are gateway trips accessing the Red Deer Airport (YQF) traffic zone (TAZ 2608), which are broken down to the following distribution:

- 10% Home-based Work (HBW)
- 80% Home-based Other (HBO)
- 10% Non-Home-based Work (NHB)

The distribution to trip purposes does not influence the assignment results of the model in the base year, as gateway trip matrices are directly coded at the trip assignment stage. However, the disaggregation allows for a different growth factor to be applied to separate trip purposes as needed in any future projection or improvement scenario.

6.4 COMMERCIAL VEHICLE TRIPS

A commercial vehicle matrix was synthesized to replicate the background commercial vehicle traffic during the AM Peak Hour. An iterative procedure was applied to infer the origins and destinations of commercial vehicle trips to match adjusted AM Peak Hour commercial vehicle counts at all screenline locations. These commercial vehicle counts were extracted from classified turning movement counts at screenline locations. The resulting matrix by superzone that was incorporated in the model assignment is provided in **Appendix F**.

6.5 VALIDATION

Because observed count data vary significantly from one weekday to the next, the ability to validate to raw or actual traffic counts is not meant to be exact. Most of the counts used for this work were collected on a singular day, making the data susceptible to factors that influence travel behaviour and traffic volumes on a daily basis – even weather, minor events (such as special meetings) and traffic incidents can cause significant deviations from the average condition. Efforts were made to adjust observed counts to the model period, as noted in **Section 3.3**; however, adjustment factors were generated based on difference in provincial highway counts and might not be truly representative of conditions outside of the roadway segments where those counts were available.

6.5.1 Assignment Algorithm

The model uses the standard equilibrium traffic assignment procedure available for VISUM. The equilibrium assignment distributes vehicle demand according to Wardrop's first principle, which is a user-optimum principle that minimizes the travel impedance – travel time for this model – for each individual road user. The equilibrium assignment procedure is considered the state of practice in transportation modelling. The algorithm operates under the following premises:

- Every road user is fully informed about the state of the road network and determines their route based on that information;
- Road users will remain on the route that has been assigned if and only if they are unable to improve their travel impedances by switching to another route.

Figure 6.2 shows the assigned AM peak hour traffic volume at base year as a result of model validation efforts, while **Figure 6.3** provides the volume-to-capacity (V/C) ratios in the road network at base year.

Figure 6.2 - Assigned Traffic Volume at Base Year

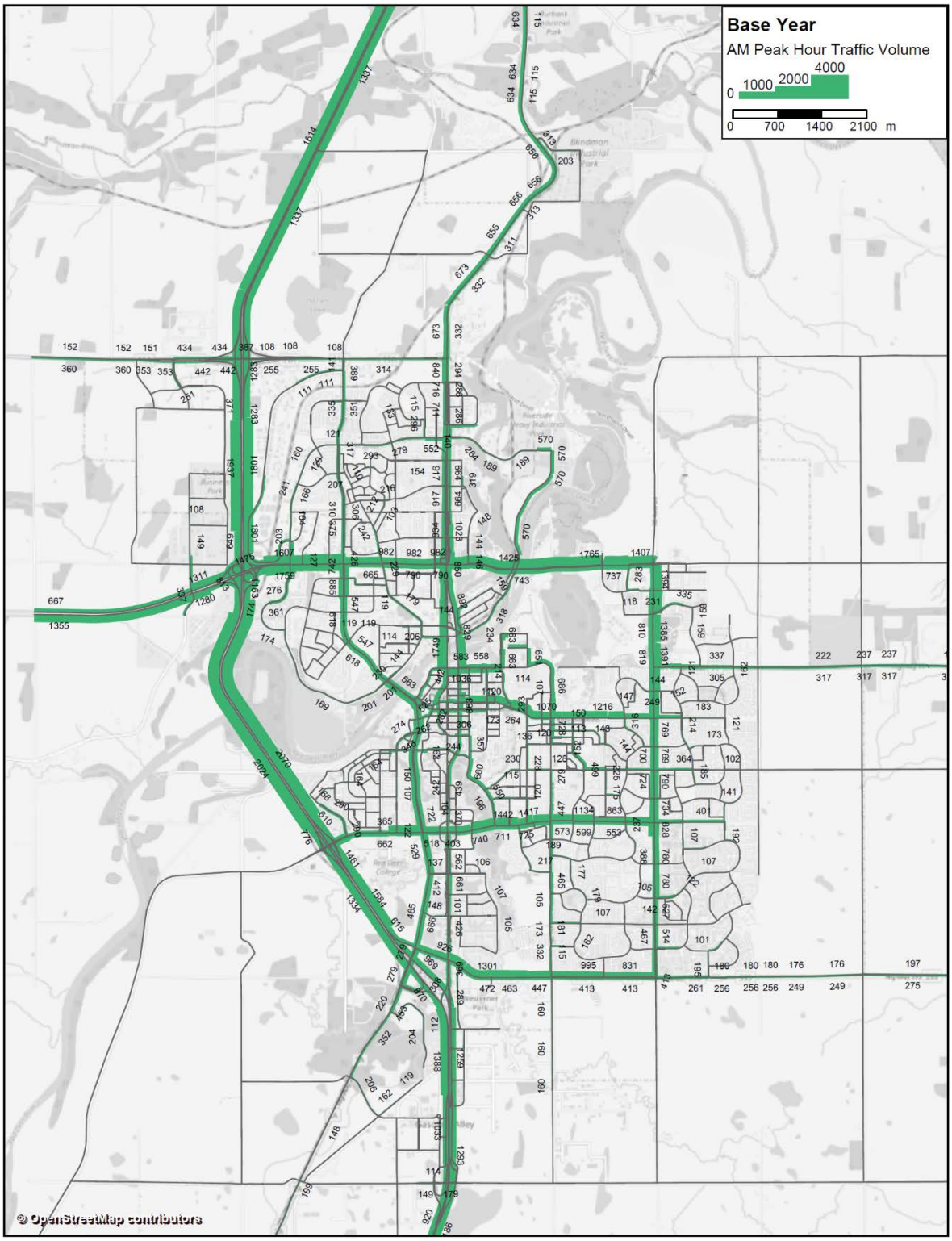
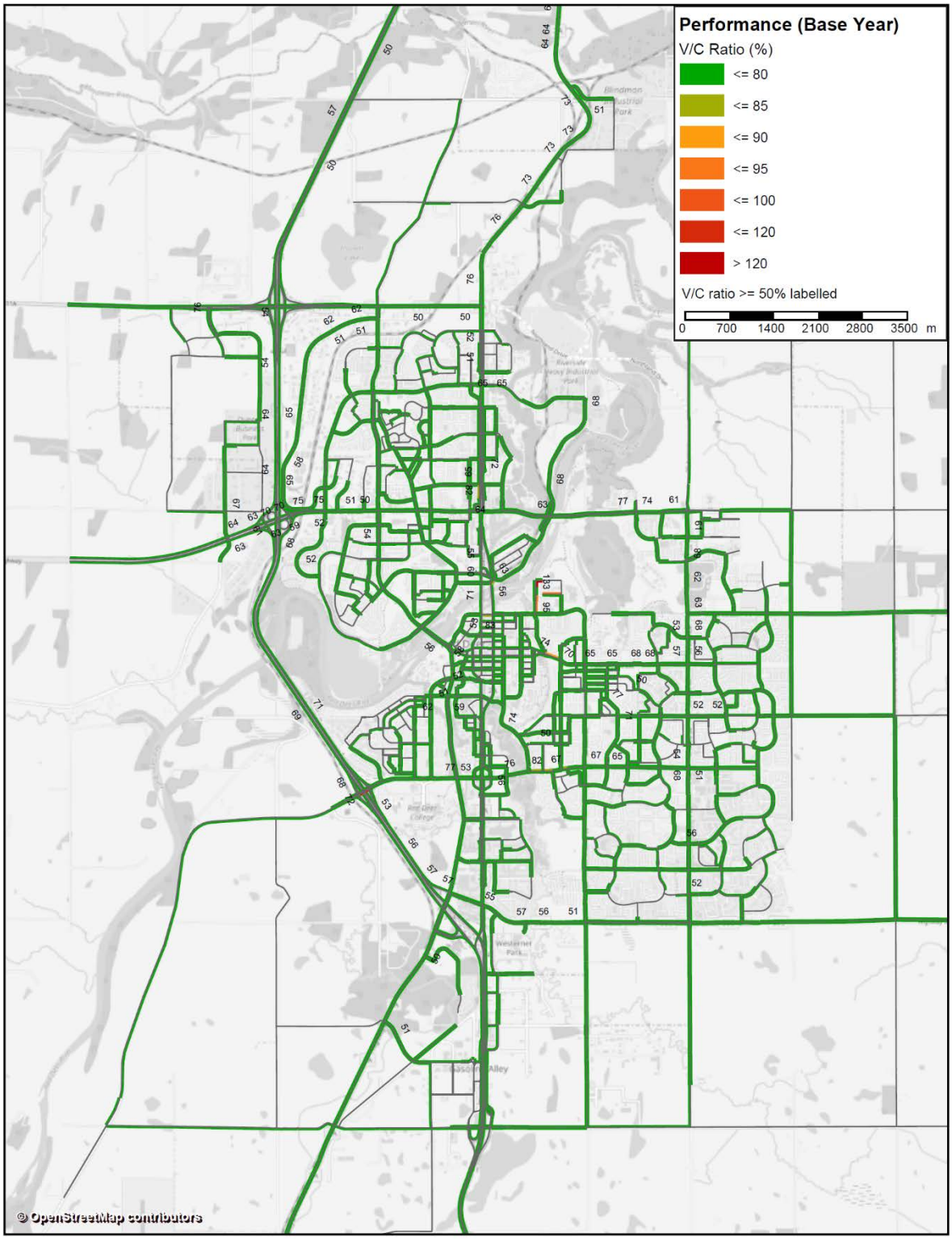


Figure 6.3 - Volume-to-Capacity (V/C) Ratio at Base Year



6.5.2 Screenline Volume

The model-assigned vehicle volume is validated against the adjusted traffic count data obtained from the City and from Alberta Transportation (AT) on pre-defined screenlines, as exhibited in **Table 6.6**. Full validation tables of modelled volumes against observed and adjusted traffic counts are provided in **Appendix G**. The GEH statistic is shown alongside the observed and modelled volumes. Details on how the GEH statistic is calculated is provided in **Section 4.2**.

The GEH statistic is not commonly used as a validation criterion for travel demand models. However, model validation efforts were able to achieve an excellent match on the GEH statistic on the screenline level, which reaffirms the reasonableness of the underlying model. At the screenline level, all locations generate a GEH within an excellent range (less than 5) – this shows that the model can provide reliable traffic volume forecasts at the screenline level.

Table 6.6 - Modelled vs Observed Vehicle Volume at Screenlines

Screenline	Dir	Observed Counts	Adjusted Counts	Model Assigned Volume	GEH
1	WB	5,337	5,131	5,237	1.47
	EB	2,250	2,159	2,282	2.62
2	SB	5,355	5,257	5,431	2.38
	NB	5,862	5,704	5,868	2.15
11	SB	2,568	2,461	2,291	3.49
	NB	2,090	1,789	1,733	1.32
12	SB	2,379	2,249	2,177	1.52
	NB	2,511	2,459	2,304	3.18
13	EB	589	538	604	2.74
	WB	434	426	438	0.54
14	EB	2,006	1,918	1,722	4.58
	WB	1,845	1,595	1,745	3.68
TOTAL		**33,226**	**31,687**	**31,833**	**0.82**

6.5.3 Travel Time

Travel times from the City's Corridor Travel Time Study, detailed in **Section 3.4**, were used as observed data to validate travel times estimated by the model. The exception is with observed travel times on QE2, which was obtained from Google Maps using typical traffic between 8 and 9 am on a Tuesday, Wednesday and Thursday.

Road segments with modelled travel time within 1 minute of observed are considered an excellent modelled fit. **Table 6.7** illustrates the comparison between the observed and the modelled travel times at the designated road segments – 86% (19 out of 22) of road segments in the model network satisfy the travel time validation targets. Road segments that did not satisfy this target are still considered reasonable (difference under 2 minutes) and represent a small percentage of the total corridors. The travel times confirm that the model is well-validated and provides an adequate representation of real-world performance.

Note that the travel times collected in the City's study captures the observed performance on a single day for each road segment, hence the travel time results can be subjected to significant variance.

Table 6.7 - Modelled vs Observed Travel Time along Major Corridors

Corridors	Description	Direction	Travel Time (min)		Target
			Observed	Modelled	
Highway 2 (QE2)	Township Rd 400 (Blackfalds) - Highway 42 (RD County)	NB	17	18	Good
		SB	17	18	Good
Taylor Drive	Highway 11A - 19 Street	NB	13	11	Reasonable
		SB	12	12	Good
Gaetz Ave North	Highway 11A - 67 Street	NB	5	4	Good
		SB	4	4	Good
Gaetz Ave South	43 Street - Highway 595/19 Street	NB	5	4	Good
		SB	6	4	Reasonable
30 Avenue	Highway 11/55 Street - Highway 595/19 Street	NB	7	6	Good
		SB	7	6	Good
67 Street	Garden Gate/Carrington Drive - Johnston Drive/Orr Drive	EB	5	5	Good
		WB	7	6	Good
Ross Street	30 Avenue - 50a Street	EB	4	3	Good
		WB	4	4	Good
32 Street	30 Avenue - Webster Drive/College Circle	EB	8	6	Reasonable
		WB	8	7	Good
19 Street	30 Avenue - Taylor Drive	EB	5	4	Good
		WB	5	4	Good
Downtown					
49 Avenue	43 Street - 67 Street	NB	4	4	Good
50 Avenue	67 Street - 43 Street	SB	4	5	Good
49 Street	Taylor Drive - 50a Street	EB	3	2	Good
50 Street	50a Street - Taylor Drive	WB	4	3	Good

7.0 FUTURE BASELINE PROJECTIONS

Two future baseline horizons were identified by the City in this study. Through coordination with City staff, the Consultant was able to generate assumptions for two different scenarios. They are:

1. Interim, also known as the 130K Horizon
2. Ultimate Built-Out, also known as the 188K Horizon

7.1 LAND USE FORECAST

Stantec and the City jointly developed the population and employment projections through a series of data exchanges and communications. The resulting estimates were deemed suitable for adoption in the future horizon analysis.

The population and employment forecast for traffic zones within the City limits were largely based on Major Area Structural Plans (MASPs) and Area Redevelopment Plans (ARPs) as identified and approved by the City. Projections from the following MASPs and ARPs were incorporated in our future baseline model:

- North of 11A MASP;
- East Hill MASP;
- West QE2 MASP;
- Northwest MASP;
- Riverlands ARP.

Other neighbourhoods that anticipate future growth and are incorporated in the future baseline model include the South Point Junction and the Westpark Extension.

Portions of the North 11A MASP and the East Hill MASP are estimated to be developed by the 130k horizon. The population, employment and student projections are detailed in the following subsections.

7.1.1 Population Forecast in City Traffic Zones

An estimated population forecast for areas within the City were provided in quarter sections and development phases. Working interactively with City staff, these forecasts were distributed to the model traffic zone system, and anticipated development phases were aligned to the two model projection horizons.

Table 7.1 provides the summary of the anticipated population growth in the City incorporated in the respective projection horizons in the model.

Table 7.1 - Additional Forecasted Population in 130K and 188K Horizons

Superzone	Description	Population Increase from Base Year	
		130K Horizon	188K Horizon
1	North Outer Edge	3,878	16,265
2	North West Outer Edge	0	0
3	North West Outer Edge	0	0
4	North	0	0
5	West	0	0
6	South West	0	1,631
7	Downtown	0	5,189
8	South Central	0	58
9	East	5,051	9,088
10	South East	0	0
11	South	0	2,686
12	South Outer Edge	0	0
13	North East/East Outer Edge	9,109	48,317
CITY OF RED DEER TOTAL		**18,038**	**83,234**
21	RD County North and Blackfalds	2,121	6,046
22	RD County East	94	268
23	Clearview and McKenzie Industrial	3	8
24	Gasoline Alley East	21	59
25	Gasoline Alley West	0	0
26	RD County South and Springbrook	693	1,976
27	Burnt Lake (RD County) and Belich Industrial	0	0
EXTERNAL MODEL AREA TOTAL		**2,932**	**8,357**

7.1.2 Employment and Student Enrollment Forecast in City Traffic Zones

Population and employment growth are interrelated in a healthy urban region. Therefore, additional employment assumptions for the future must be made to correspond to the anticipated growth delineated in **Table 7.1**.

Estimated employment forecast for areas within the City were provided in commercial, industrial and institutional land areas, delineated in quarter sections and development phases. The following assumptions were used to convert the land area projections to gross employee projections:

- 25 percent site coverage for commercial and industrial lands;
- 1 employee for every 350 square feet of office space;
- 1 employee for every 700 square feet of retail space;
- 13.1 employees per acre of industrial lands;
- 124 students per acre of school lands, and 10 employed staff for every 100 students.

Similar to the base year employment estimate, a vacancy rate was also applied for estimates at the horizon years. The vacancy rates were taken from 2014, which was recognized as a healthy economic period and representative of the long-term employment conditions in the City of Red Deer. Hence, the following healthy market vacancy rates were applied:

- Office: 10.22 percent
- Retail: 5.06 percent

Efforts were made to distribute the resulting estimates, which were provided in development sections, to the model traffic zone system, and also to align development phases to the two model projection horizons.

In addition, the base year (2016) was identified as an economically depressed period in the Region, with employment estimated based on significant vacancies that are expected to recover to a healthy employment environment at the two future horizons. Therefore, an occupancy uptake component was incorporated in the future employment forecast, estimated using the following formula:

$$Occupancy\ Uptake = Base\ Year\ GFA - based\ Employee\ Estimate \times Vacancy\ Difference\ (\%)$$

where $Vacancy\ Difference\ (\%) = \max\ \{2016 -\ 2014\ Vacancy\ Rate,\ 2015 -\ 2014\ Vacancy\ Rate, 0\}$

Areas that experienced significant vacancies at the model base year (e.g. Johnston Industrial, Northlands Industrial) are assigned with the most employment increase through occupancy uptake.

The employment forecast used for the horizon years are summarized by superzone in **Table 7.2**. As shown in the table, additional employment from occupancy of vacant parcels will be augmented from planned developments.

Table 7.2 - Additional Forecasted Employees in 130K and 188K Horizons

Superzone	Description	Employees from Development		Employees from Occupancy Uptake
		130K Horizon	188K Horizon	
1	North Outer Edge	1,955	5,302	59
2	North West Outer Edge	0	1,566	568
3	North West Outer Edge	0	222	65
4	North	0	0	609
5	West	0	0	92
6	South West	0	891	305
7	Downtown	0	8,466	357
8	South Central	0	0	3
9	East	108	647	12
10	South East	0	0	6
11	South	0	598	9
12	South Outer Edge	0	0	0
13	North East/East Outer Edge	400	1,789	0
CITY OF RED DEER TOTAL		**2,463**	**19,481**	**2,085**
21	RD County North and Blackfalds	897	2,467	0
22	RD County East	0	0	0
23	Clearview and McKenzie Industrial	227	625	0
24	Gasoline Alley East	199	547	0
25	Gasoline Alley West	146	402	0
26	RD County South and Springbrook	127	350	0
27	Burnt Lake and Belich Industrial	408	1,123	0
EXTERNAL MODEL AREA TOTAL		**2,004**	**5,514**	**0**

The horizon year student enrollment forecasts are also summarized in **Table 7.3**. The distribution of additional students corresponds with the distribution of additional population.

Table 7.3 - Additional Forecasted Student Enrollment in 130K and 188K Horizons

Superzone	Description	Additional Students	
		130K Horizon	188K Horizon
1	North Outer Edge	0	994
9	East	500	497
13	North East/East Outer Edge	2,680	7,146
CITY OF RED DEER TOTAL		**3,180**	**8,637**
21	RD County North and Blackfalds	262	722
25	Gasoline Alley West	398	1,096
26	RD County South and Springbrook	356	980
EXTERNAL MODEL AREA TOTAL		**1,017**	**2,797**

7.1.3 External and Gateway Population and Employment Forecast

The forecast of population and employment values for external and gateway zones were estimated using the following sources:

- **Red Deer County Economic Development Strategy (2017, m+a globalnomics):** Population growth in the Red Deer County is estimated to increase by 70 percent between 2011 and 2041 – The population growth rate were interpolated to 1.78 percent per annum and applied between base year (2016) and the two projected horizon years for all external traffic zones including in the Town of Blackfalds, which was assumed to experience population growth in line with Red Deer County;
- **Alberta Occupational Demand and Supply Outlook 2015-2025 (2015, Alberta Labour):** Province of Alberta's labour supply is projected to grow from 2.408 million in 2015 to 2.76 million in 2025 – the employment growth rate was interpolated to 1.37 percent per annum and applied between base year (2016) and the two projected horizon years for all external traffic zones. The change in gateway travel demand were also estimated to resemble the growth rate of labour supply, estimated at 1.37 percent per annum and applied to both horizons.

The interim and ultimate built-out horizons were set at the year 2027 and year 2043, respectively, for applying the estimated growth rates. **Table 7.4** provides the summary of changes as described.

Table 7.4 - Growth Applied to External and Gateway Travel Demand

Growth (%)	Annual	130k Horizon	188k Horizon
External Zones			
Population Growth	1.78%	21%	61%
Employment Growth	1.37%	16%	45%
Gateway Zones			
Traffic Volume Growth	1.37%	16%	45%

7.2 ROAD IMPROVEMENTS

The City of Red Deer has a comprehensive road improvement program in place in anticipation of the projected population and employment growth detailed in **Section 7.1**. Some of the major road infrastructure improvements incorporated in the City road network are as follows:

- **130k Horizon:** 20 Avenue (2 lanes, new), connections to 20 Avenue with extensions to 22 Street, 32 Street and 50 Street (2 lanes and 4 lanes, new), North Highway Connector to 40 Avenue connection (2 lanes, new);
- **188k Horizon:** Ring Road widening south of 55 Street (6 lanes, existing), Ring Road extension to Highway 2 south of 19 Street (4 lanes, new), connections to 10 Avenue with extensions to 22 Street, 32 Street and 50 Street (4 lanes, new), Taylor Drive extension and widening north of Highway 11A (4 lanes, new and existing).

The planned Alberta Transportation (AT) improvements in the Red Deer model area were incorporated to the model to ensure that future baseline modelled conditions accurately reflect what will be expected in the future horizons and that the projected increase in traffic demand would not overwhelm the City road network unexpectedly. Some of the major road infrastructure improvements that are assumed to be incorporated in the provincial road network are as follows:

- **130k Horizon:** North Highway Connector / Ring Road (2 lanes, new), Highway 11A twinning east of Highway 2 (4 lanes, existing), Highway 2A twinning north of Highway 11A (4 lanes, existing), Highway 2 / Gaetz Avenue Interchange Reconfiguration, Highway 2 widening between McKenzie Rd and Highway 597 (6 lanes, existing);
- **188k Horizon:** North Highway Connector / Ring Road (6 lanes, new), Highway 11 East Realignment east of 30 Avenue (4 lanes, new), Highway 2 widening (8 lanes, existing), Highway 11 upgrade to freeway standard west of Highway 2, Highway 2A twinning south of Highway 2 (4 lanes, existing).

Figure 7.1 and **Figure 7.2** illustrate the resulting road classifications for the model network at the 130k and at the 188k projection horizons, while **Figure 7.3** and **Figure 7.4** show specifically the road improvement programs at each respective horizon.

A detailed list is provided in **Appendix J**.

Figure 7.1 - Road Classification at the 130K Horizon

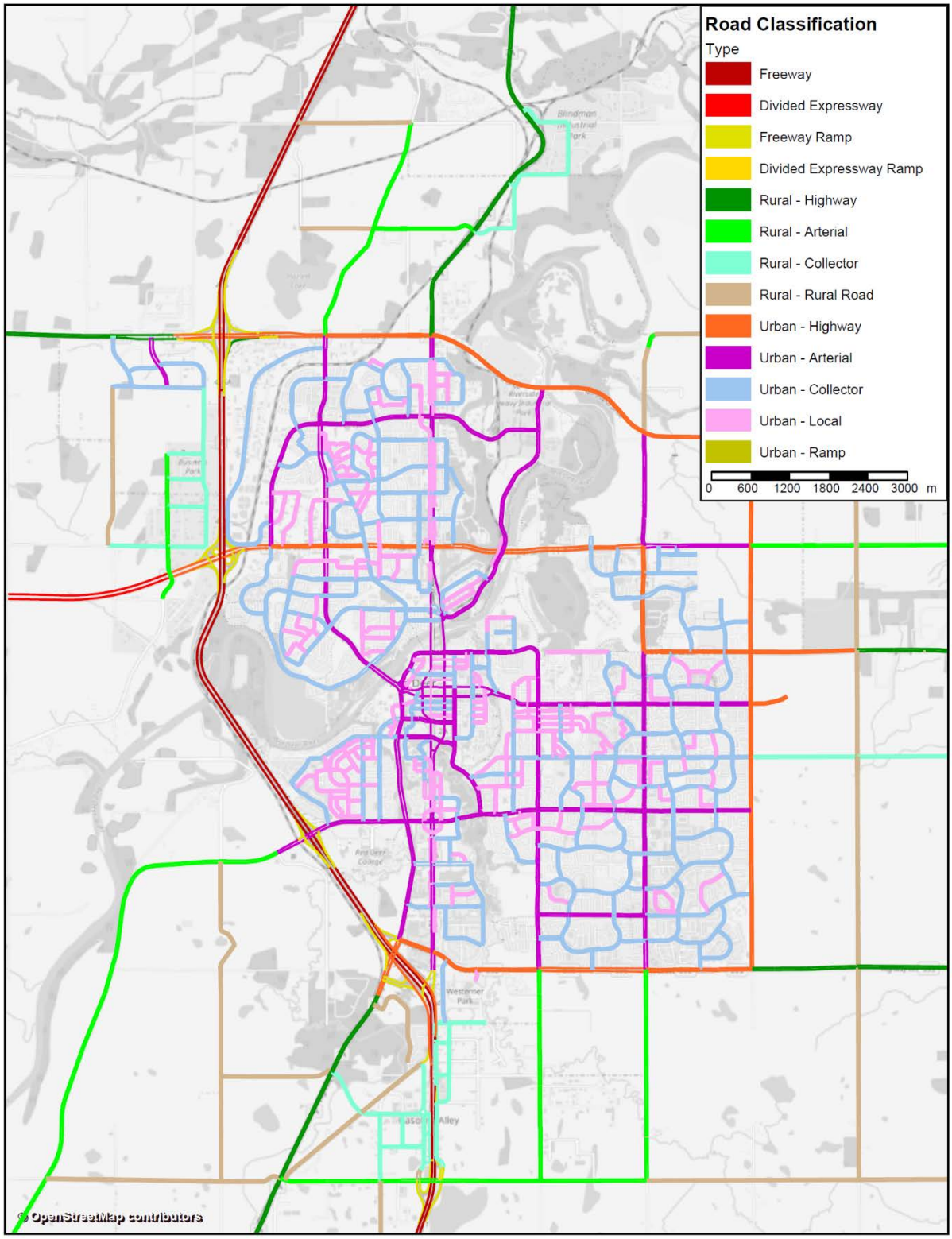


Figure 7.2 - Road Classification at 188K Horizon

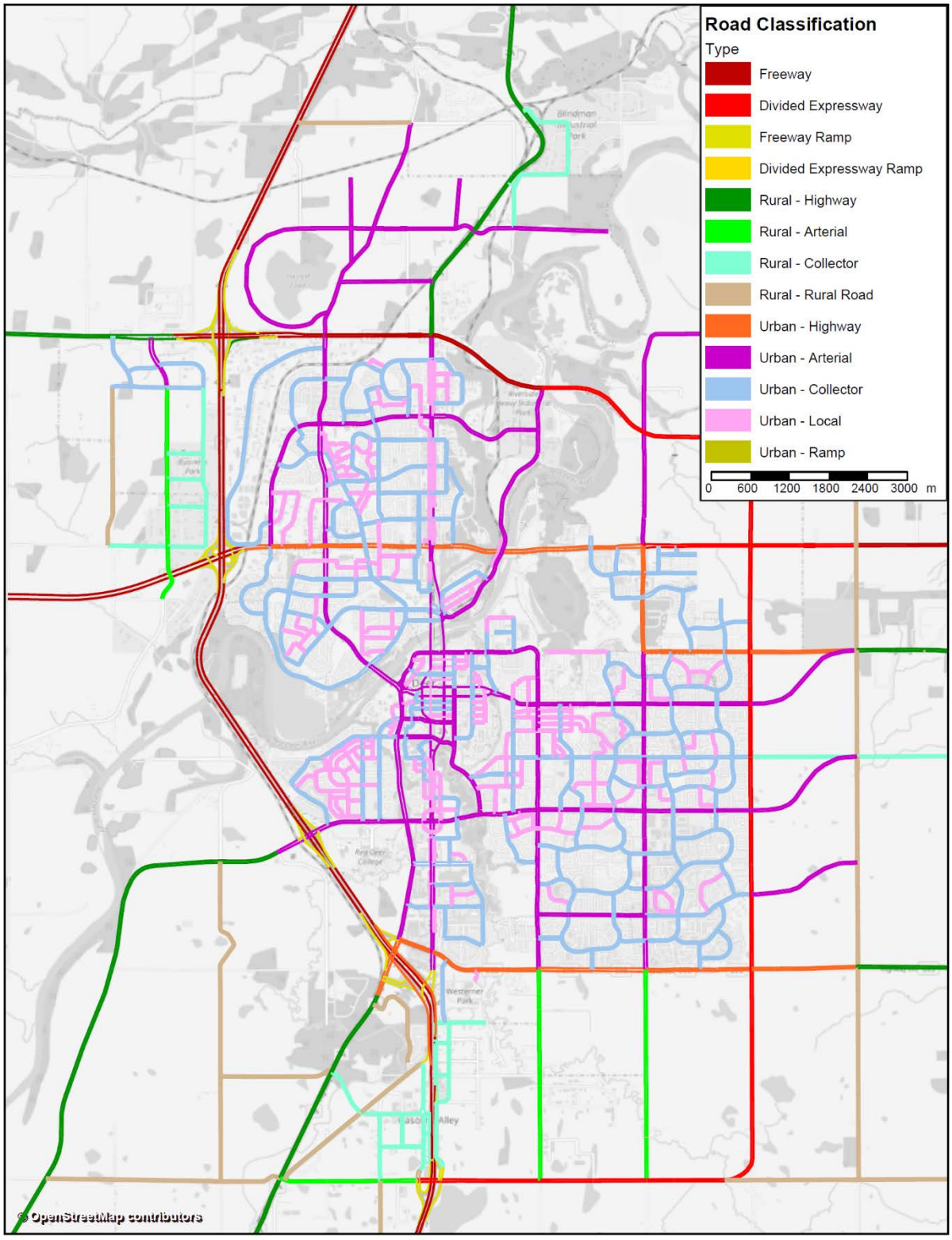


Figure 7.3 – Road Improvements Between Base Year and 130k Horizon

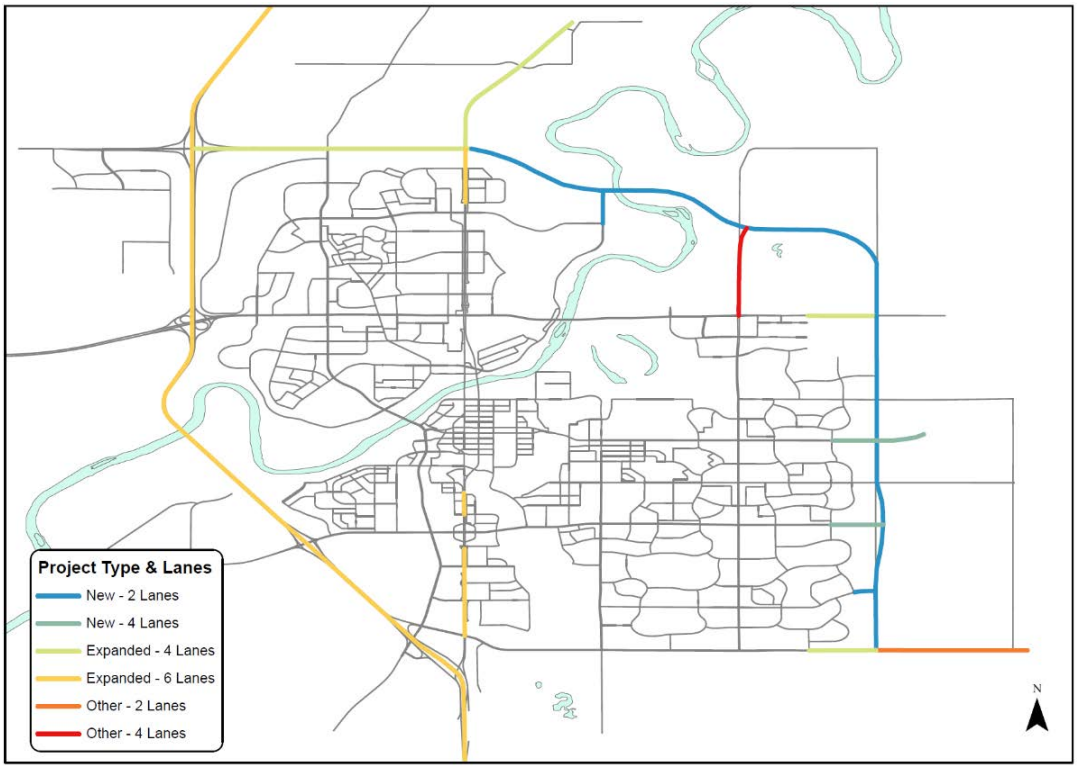
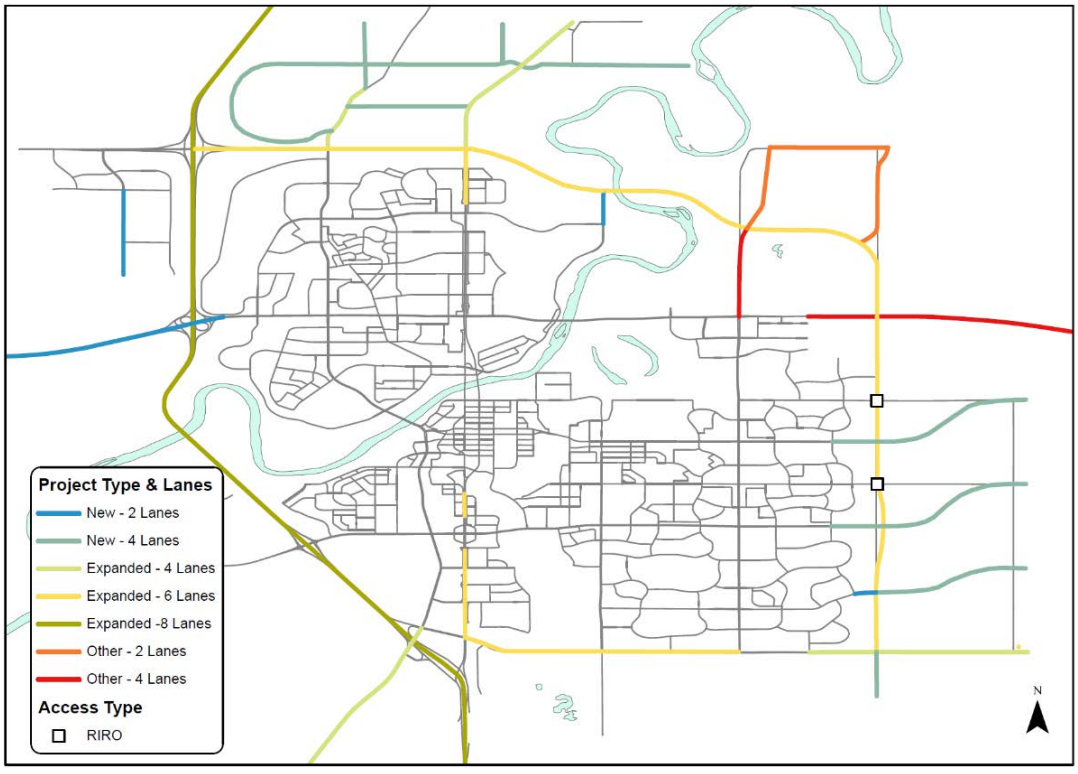


Figure 7.4 – Road Improvements Between Base Year and 188k Horizons



7.3 FUTURE PROJECTIONS ANALYSIS

The projected growth and anticipated roadway improvements were assumed in future year scenarios to test the model results, and to provide an initial look at where traffic volumes and congestion points may be in the future. These initial assessments are detailed in the subsections below.

7.3.1 Interim (Scenario 130k)

The results of the interim horizon scenario are shown in **Figure 7.5** (future segment volumes), (changes in segment traffic volumes from the base year) and **Figure 7.7** (generalized V/C ratios by segment) to verify the reasonableness of the model results. As expected, much of the traffic growth in this scenario is projected to be associated with traffic to and from the developing areas on the outer edges of Red Deer and Superzone 13 in particular. The following are some additional observations on the model results as related to the AM peak hour traffic conditions:

- As the only other major east-west corridor across the northern part of the City, the new 2-lane North Highway Connector (NHC) and Ring Road is projected to be well-used (westbound V/C ratio at 89 percent) and be able to divert traffic away from the somewhat congested 67 Street Bridge (westbound V/C ratio at 86 percent);
- Modest traffic reduction is observed when compared to the base year on the northbound 30 Avenue between 19 Street and 67 Street, as well as the eastbound traffic across the 67 Street Bridge. These reductions are in large part due to the presence of the 2-lane NHC and Ring Road, diverting traffic away from 30 Avenue and 67 Street across the Red Deer River;
- The westbound Ross Street across Coronation Park enroute to Downtown continues to experience similarly congested conditions compared to the base year (V/C at 93 percent);

Figure 7.5 - Assigned Traffic Volume at 130k Horizon

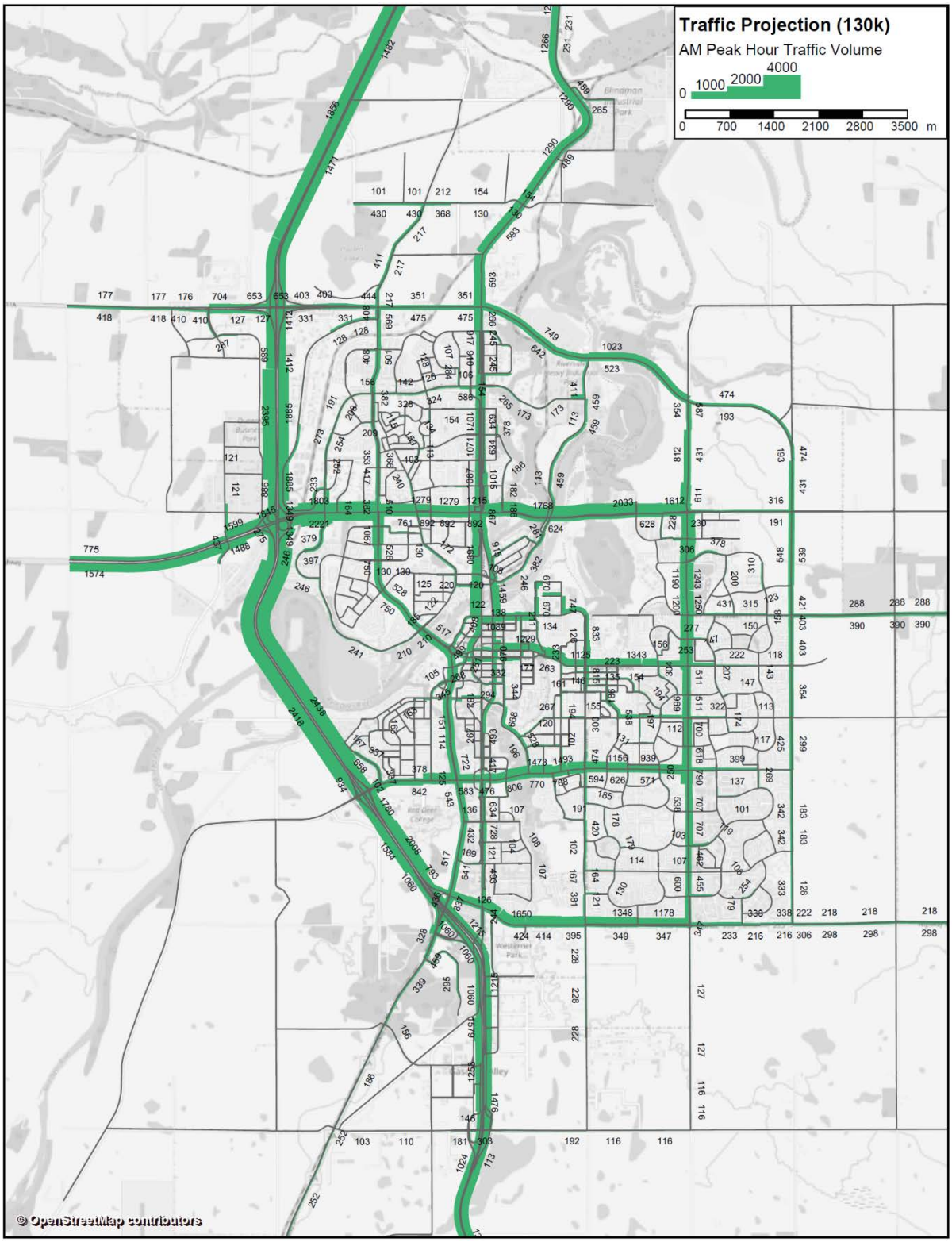
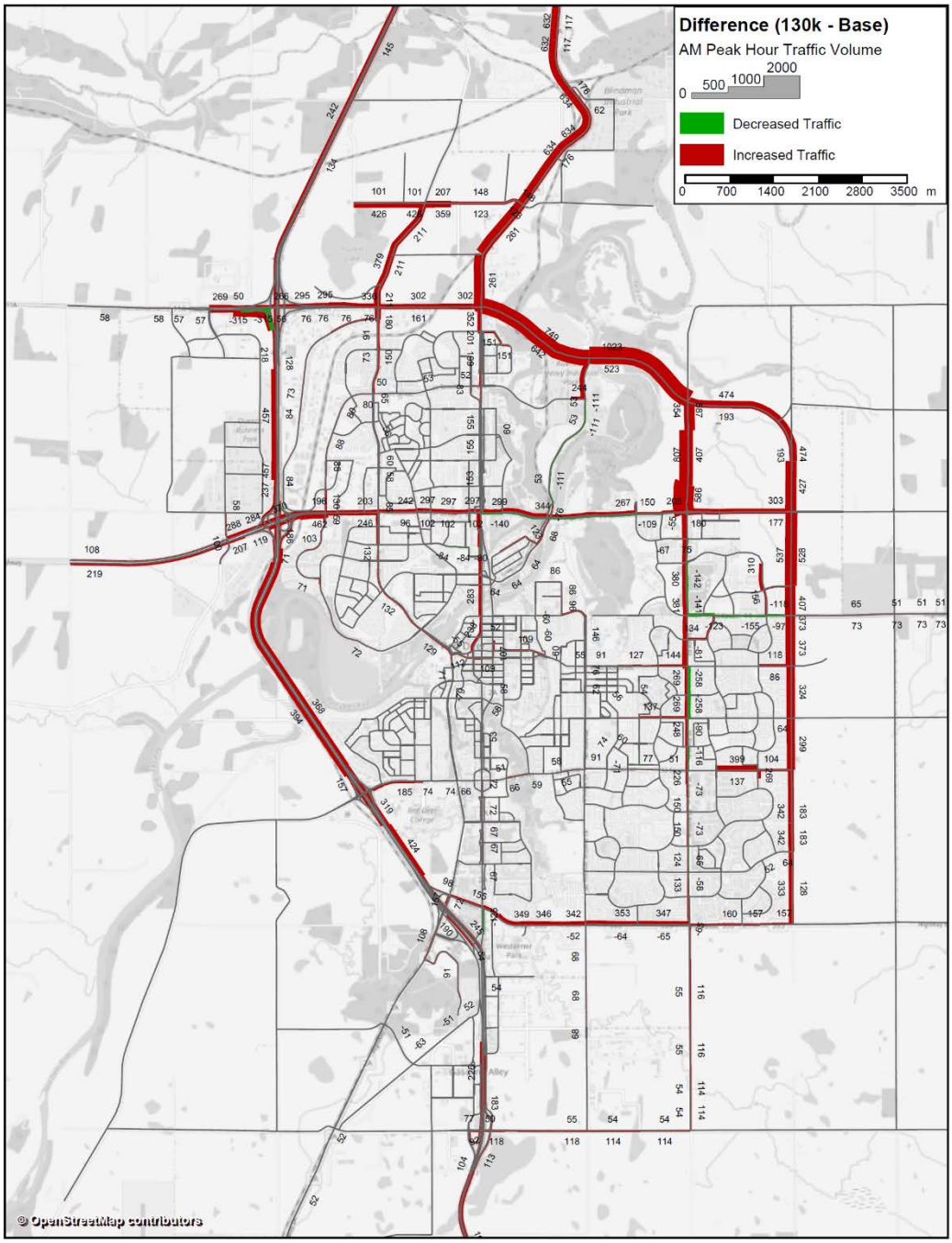
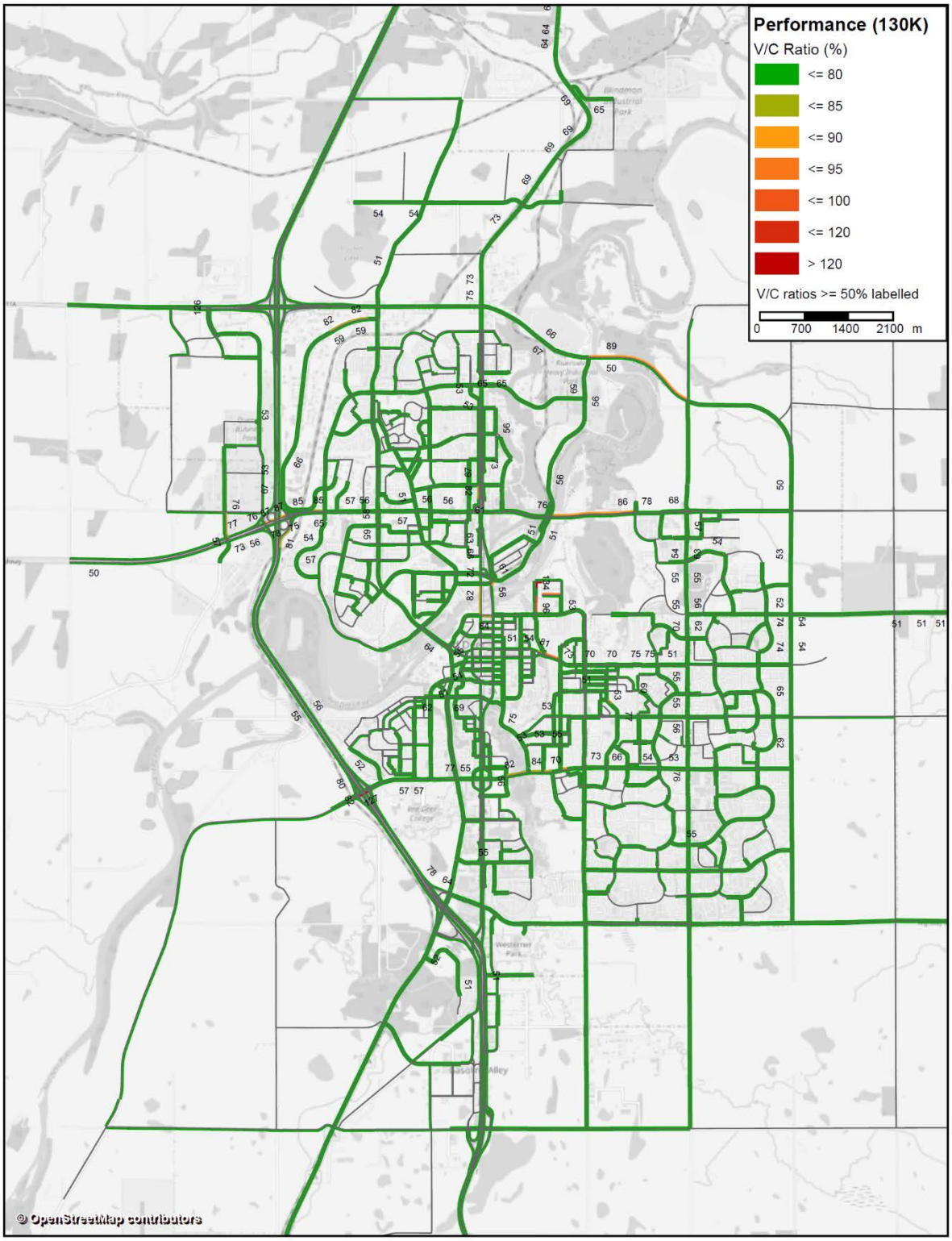


Figure 7.6 - Change in Assigned Traffic between Base Year and 130k Horizon[4]



[4] Note that the Highway 2 / Gaetz Avenue Interchange has been reconfigured from the base year network, with traffic volumes assigned to newly-coded links. The change in assigned traffic for network links in the interchange area is therefore not representative of actual traffic volume change projected. Hence this information in the interchange area was removed to avoid confusion for the reader.

Figure 7.7 – Volume-to-Capacity (V/C) Ratio at 130K Horizon



7.3.2 Ultimate Built-out (Scenario 188k)

The results of the ultimate built-out horizon scenario are shown in **Figure 7.8** (future segment volumes), **Figure 7.9** (changes in segment traffic volumes from the base year scenario) and **Figure 7.10** (generalized V/C ratios by segment) to again verify the reasonableness of the model results. Similar to the interim scenario, much of the traffic growth in this scenario is forecasted to be associated with traffic to and from the developing areas on the outer edges of Red Deer. Other general observations on the AM peak hour model results include:

- Conditions described in the interim scenario continue, with the following V/C ratios now observed at the indicated corridors:
    - **Somewhat congested (V/C ratio between 90 and 100 percent):** Westbound 67 Street Bridge
    - **Congested (V/C ratio above 100 percent):** Westbound Ross Street across Coronation Park, southbound Highway 2A at the northern City boundary
- Traffic conditions improved on the westbound NHC across the Red Deer River in the ultimate built-out scenario (V/C ratio at 68 percent) compared to the interim due to the increased road capacity provided (6 lanes);
- Most westbound roadways across the Waskasoo Creek and Piper Creek (Ross Street, Spruce Drive and 32 Street) have reached congested levels (V/C ratios at approximately 100 percent);
- Southbound Gaetz Avenue and Taylor Drive across Red Deer River to Downtown are at somewhat congested levels (V/C ratios at 100 percent on Gaetz Avenue and 85 percent on Taylor Drive);
- Congested conditions are observed along roadways at the southern boundary of the proposed Riverlands developments;
- Modest traffic reduction is observed along 55 Street between 30 Avenue and the East City limits, due in large part to the Highway 11 East realignment that has shifted most gateway trips to and from locations east of the City of Red Deer away from 55 Street. The limits of a right-in-right-out design at the Ring Road and 55 Street interchange also contributes to the reduction.

Figure 7.8 - Assigned Traffic Volume at 188k Horizon

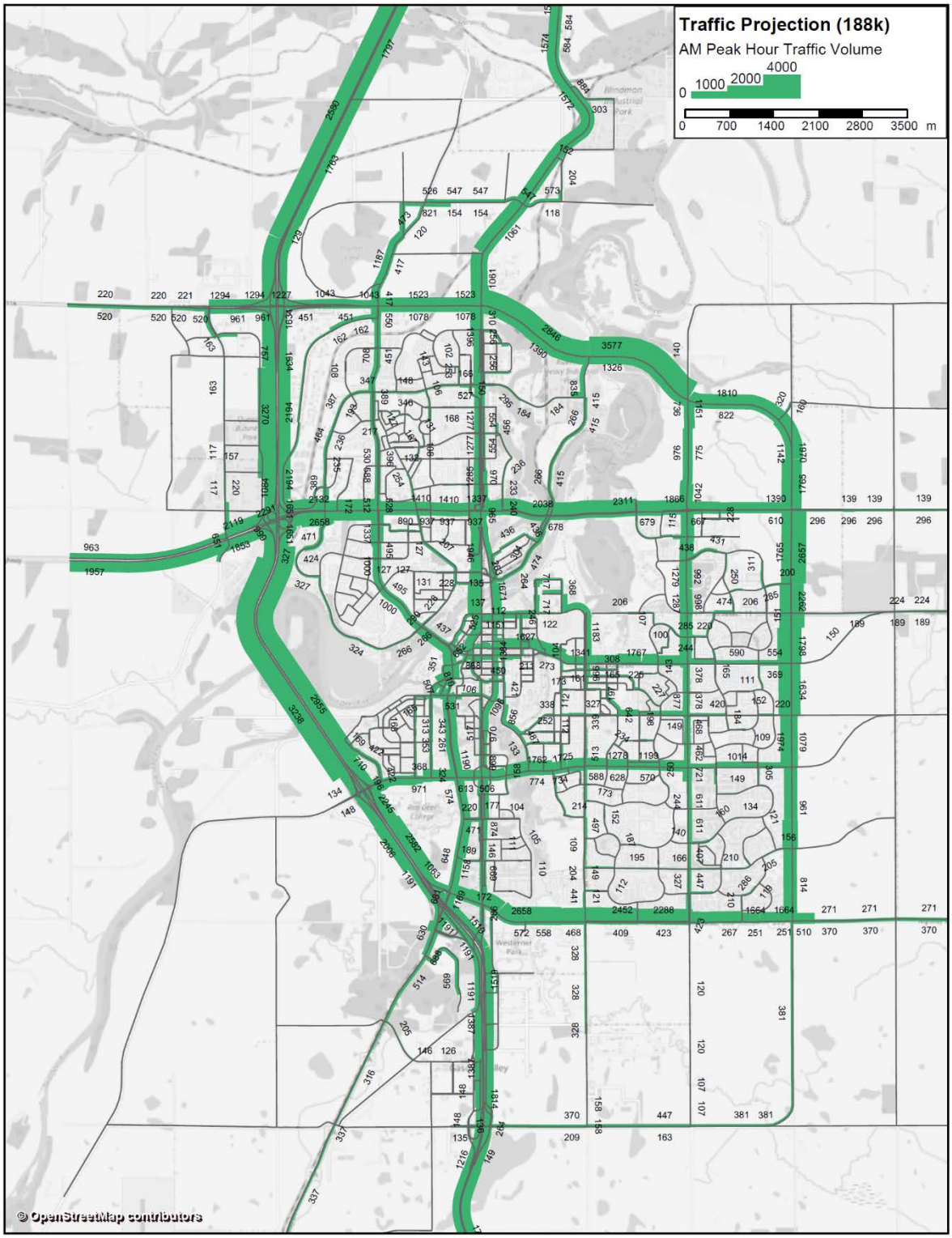
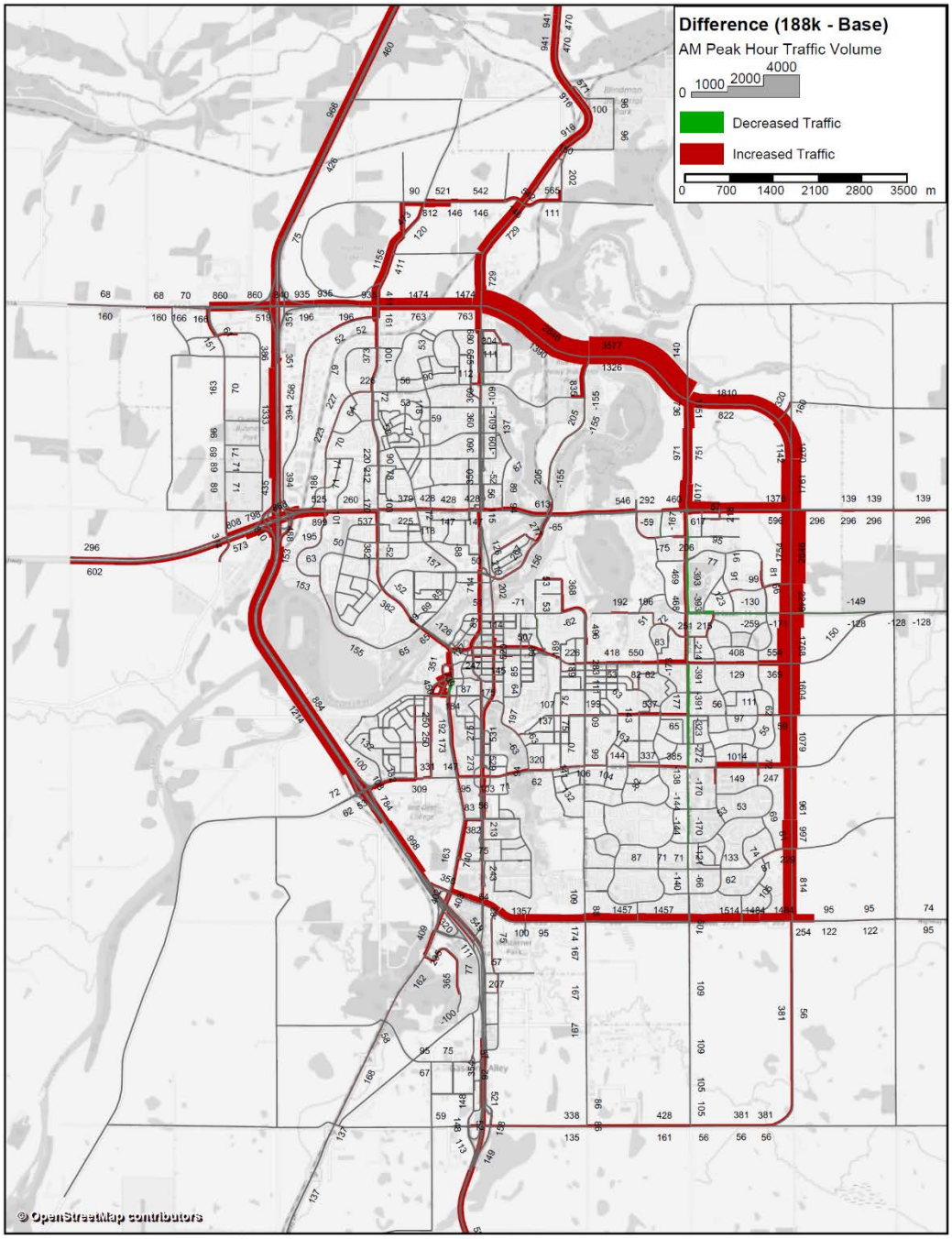
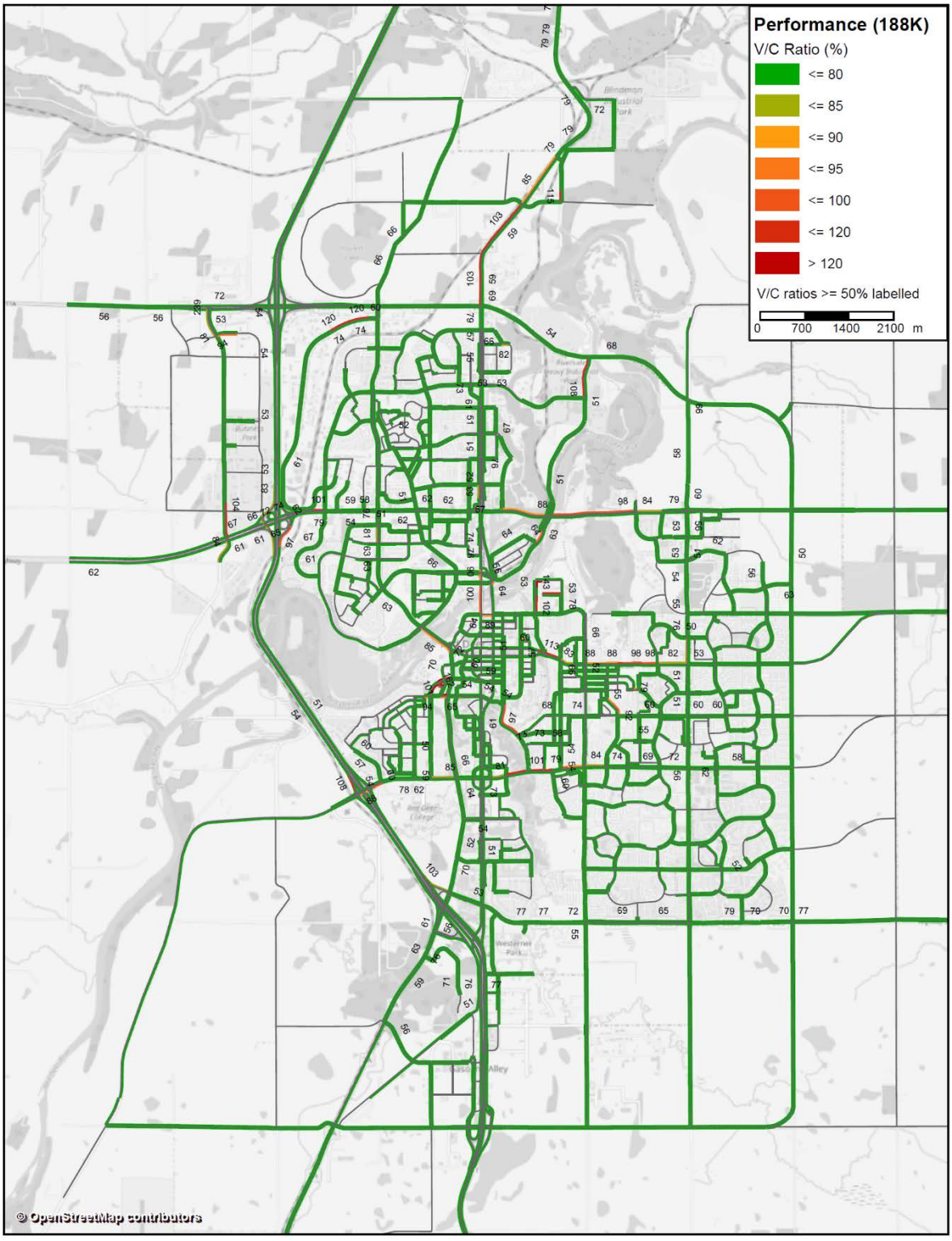


Figure 7.9 - Change in Assigned Traffic Volume Between Base Year and 188k Horizon[5]



[5] Note that the Highway 2 / Gaetz Avenue Interchange has been reconfigured from the base year network, with traffic volumes assigned to newly-coded links. The change in assigned traffic for network links in the interchange area is therefore not representative of actual traffic volume change projected. Hence this information in the interchange area was removed to avoid confusion for the reader

Figure 7.10 – Volume-to-Capacity (V/C) Ratio at 188K Horizon



7.4 REASONABLENESS OF MODEL

The quality of a travel demand model is determined by its ability to provide a reliable traffic forecast given the changes applied to model inputs like new developments and roadway projects. The future projection results provide an important assessment in determining the reasonableness of the model.

As shown in this chapter, most areas surrounding Red Deer are projected to show increased traffic volumes. In most cases the volumes are not going to create many delays significant enough to encourage drivers to seek alternative routes. This is because a set of major roadway projects are also planned throughout the study area to accommodate the population and employment growths.

For this reason, the base model results presented in this report appear to be reasonably reliable to test future roadway projects and development proposals for future years.

GLOSSARY

GLOSSARY OF ACRONYMS

Acronym	Description
AHS	Alberta Health Services
ARP	Area Redevelopment Plan
AT	Alberta Transportation
ATR	Automatic Traffic Recorder (Traffic Counts)
BPR	Bureau of Public Roads
EB	Eastbound
G	Gateway (Traffic Zone/Superzone/Model Area)
GFA	Gross Floor Area
GIS	Geographic Information System
GTHA	Greater Toronto and Hamilton Area
HBO	Home-based Other (Trips)
HBS	Home-based School (Trips)
HBW	Home-based Work (Trips)
HTS	Household Travel Survey
I	Internal (Traffic Zone/Superzone/Model Area)
ITE	Institute of Transportation Engineers
MASP	Major Area Structural Plan
N/A	Not Applicable
NHB	Non Home-based (Trips)
NHC	North Highway Connector
O-D	Origin-Destination
OSM	OpenStreetMap
QE2	Queen Elizabeth II (Highway)
RD County	Red Deer County
RDC	Red Deer College

Acronym	Description
RDCSD	Red Deer Catholic School District
RDPSD	Red Deer Public School District
SZ	Superzone
TAZ	Traffic (Analysis) Zones
TRB	Transportation Research Board
V/C	Volume-to-Capacity
VDF	Volume-Delay Function
WB	Westbound
X	External (Traffic Zone/Superzone/Model Area)

APPENDICES

Appendix A MODEL DATA DICTIONARY

A.1 MODEL DATA DICTIONARY - ZONE

Attribute	Description	Formula (if applicable)
Number	TAZ number	
A	Vehicle attractions for model area	
AREA	Location of zone: Internal (City of Red Deer Census Area) or External	
A_GATE	Vehicle attractions from gateway trips	[MATCOLSUM(205)]
A_HBO_I-I	HBO Trip Attractions Internal-Internal Proportion	
A_HBO_INSTIT	HBO Trip Attraction Rate for Institutional Employment	
A_HBO_OFFICE	HBO Trip Attraction Rate for Office Employment	
A_HBO_RETAIL	HBO Trip Attraction Rate for Retail Employment	
A_HBO_SPECIAL_TRIPGEN	HBO Vehicle Trips Generated from Non-Employee-Based Sources	
A_HBO_VEH_OCCUP	HBO Trip Attractions Vehicle Occupancy	
A_HBO_X-I	HBO Trip Attractions External-Internal Proportion	
A_HBS_I-I	HBS Trip Attractions Internal-Internal Proportion	
A_HBS_STUDENT	HBS Trip Attraction Rate for Students	
A_HBS_VEH_OCCUP	HBS Trip Attractions Vehicle Occupancy	
A_HBS_X-I	HBS Trip Attractions External-Internal Proportion	
A_HBW_I-I	HBW Trip Attractions Internal-Internal Proportion	
A_HBW_INDUSTRIAL	HBW Trip Attraction Rate for Industrial Employment	
A_HBW_INSTIT	HBW Trip Attraction Rate for Institutional Employment	

A.1 Model Data Dictionary
August 9, 2018

Attribute	Description	Formula (if applicable)
A_HBW_OFFICE	HBW Trip Attraction Rate for Office Employment	
A_HBW_OTHER	HBW Trip Attraction Rate for Unknown Employment	
A_HBW_RETAIL	HBW Trip Attraction Rate for Retail Employment	
A_HBW_SCHOOL	HBW Trip Attraction Rate for School Employment	
A_HBW_SPECIAL_TRIPGEN	HBW Vehicle Trips Generated from Non-Employee-Based Sources	
A_HBW_VEH_OCCUP	HBW Trip Attractions Vehicle Occupancy	
A_HBW_X-I	HBW Trip Attractions External-Internal Proportion	
A_NHB_FORNHBTRIPDIST_A	HBW Trips Attracted for distributing Total NHB Trips by Attraction Superzone	([EMP_OFFICE]*[A_NHB_TRIPDIST_OFFICE]+[EMP_RETAIL]*[A_NHB_TRIPDIST_RETAIL]+[EMP_INDUSTRIAL]*[A_NHB_TRIPDIST_INDUSTRIAL]+[EMP_INSTIT]*[A_NHB_TRIPDIST_INSTIT]+[EMP_SCHOOL]*[A_NHB_TRIPDIST_SCHOOL]+[EMP_OTHER]*[A_NHB_TRIPDIST_OTHER])*(1+[A_NHB_TRIPADJUSTFACTOR])
A_NHB_TRIPADJUSTFACTOR	NHB Trip Production Distribution by Production Superzone Adjustment Factor	
A_NHB_TRIPDIST	Distribution Percentage to Attraction TAZs from NHB Trip Total	[A_NHB_FORNHBTRIPDIST_A]/ [NETWORK\SUM:ZONES\A_NHB_FORNHBTRIPDIST_A]
A_NHB_TRIPDIST_INDUSTRIAL	NHB Trip Attraction Distribution Rates by Attraction Superzone - Industrial Employment	
A_NHB_TRIPDIST_INSTIT	NHB Trip Attraction Distribution Rates by Attraction Superzone - Institutional Employment	
A_NHB_TRIPDIST_OFFICE	NHB Trip Attraction Distribution Rates by Attraction Superzone - Office Employment	
A_NHB_TRIPDIST_OTHER	NHB Trip Attraction Distribution Rates by Attraction Superzone - Other Employment	

A.1 Model Data Dictionary
August 9, 2018

Attribute	Description	Formula (if applicable)
A_NHB_TRIPDIST_RETAIL	NHB Trip Attraction Distribution Rates by Attraction Superzone - Retail Employment	
A_NHB_TRIPDIST_SCHOOL	NHB Trip Attraction Distribution Rates by Attraction Superzone - School Employment	
A_NHB_VEH_OCCUP	Vehicle Occupancy for NHB Trip Attractions	
A_TOT	Vehicle Attraction Totals from Trip Generation and Gateway Matrix	[A]+[A_GATE]
EMPLOYMENT	Total Estimated Employees 2016	[EMP_OFFICE]+[EMP_RETAIL]+[EMP_INDUSTRIAL]+[EMP_INSTIT]+[EMP_SCHOOL]+[EMP_OTHER]
EMP_INDUSTRIAL	Number of Employees in Industrial Employment Category	
EMP_INSTIT	Number of Employees in Institutional Employment Category	
EMP_OFFICE	Number of Employees in Office Employment Category	
EMP_OTHER	Number of Employees in Other Employment Category	
EMP_RETAIL	Number of Employees in Retail Employment Category	
EMP_SCHOOL	Number of Employees in School Employment Category	
P	Vehicle Productions for Model Area	
POPULATION	Total Population 2016	[POP_0-14]+[POP_15-24]+[POP_25-34]+[POP_35-44]+[POP_45-64]+[POP_65]+[POP_NOAGE]
POP_0-14	Zone Population for Age 0-14	
POP_15-24	Zone Population for Age 15-24	
POP_25-34	Zone Population for Age 25-34	
POP_35-44	Zone Population for Age 35-44	
POP_45-64	Zone Population for Age 45-64	
POP_65	Zone Population for Age 65 and Up	
POP_NOAGE	Zone Population for Unknown Age	

A.1 Model Data Dictionary
August 9, 2018

Attribute	Description	Formula (if applicable)
P_GATE	Vehicle productions from gateway trips	[MATROWSUM(205)]
P_HBO_0-14	HBO Trip Production Rate for Age 0-14	
P_HBO_15-24	HBO Trip Production Rate for Age 15-24	
P_HBO_25-34	HBO Trip Production Rate for Age 25-34	
P_HBO_35-44	HBO Trip Production Rate for Age 35-44	
P_HBO_45-64	HBO Trip Production Rate for Age 45-64	
P_HBO_65	HBO Trip Production Rate for Age 65 And Up	
P_HBO_NOAGE	HBO Trip Production Rate for Unknown Age	
P_HBO_NON_GATE	Proportion of Non-Gateway HBO Trips	
P_HBO_VEH_OCCUP	Vehicle Occupancy for HBO Trip Productions	
P_HBS_0-14	HBS Trip Production Rate for Age 0-14	
P_HBS_15-24	HBS Trip Production Rate for Age 15-24	
P_HBS_25-34	HBS Trip Production Rate for Age 25-34	
P_HBS_35-44	HBS Trip Production Rate for Age 35-44	
P_HBS_45-64	HBS Trip Production Rate for Age 45-64	
P_HBS_65	HBS Trip Production Rate for Age 65 And Up	
P_HBS_NOAGE	HBS Trip Production Rate for Unknown Age	
P_HBS_NON_GATE	Proportion of Non-Gateway HBS Trips	
P_HBS_VEH_OCCUP	Vehicle Occupancy for HBS Trips	
P_HBW_0-14	HBW Trip Production Rate for Age 0-14	

Attribute	Description	Formula (if applicable)
P_HBW_15-24	HBW Trip Production Rate for Age 15-24	
P_HBW_25-34	HBW Trip Production Rate for Age 25-34	
P_HBW_35-44	HBW Trip Production Rate for Age 35-44	
P_HBW_45-64	HBW Trip Production Rate for Age 44-64	
P_HBW_65	HBW Trip Production Rate for Age 65 and Up	
P_HBW_NOAGE	HBW Trip Production Rate for Unknown Age	
P_HBW_NON_GATE	Proportion of Non-Gateway HBW Trips	
P_HBW_VEH_OCCUP	Vehicle Occupancy for HBW Trips	
P_NHB_0-14	NHB Trip Production Rate for Age 0-14 by Household Superzone	
P_NHB_15-24	NHB Trip Production Rate for Age 15-24 by Household Superzone	
P_NHB_25-34	NHB Trip Production Rate for Age 25-34 by Household Superzone	
P_NHB_35-44	NHB Trip Production Rate for Age 35-44 by Household Superzone	
P_NHB_45-64	NHB Trip Production Rate for Age 45-64 by Household Superzone	
P_NHB_65	NHB Trip Production Rate for Age 65 and Up by Household Superzone	
P_NHB_FORNHBTRIPDIST_P	HBW Trips Attracted for distributing Total NHB Trips by Production Superzone	([EMP_OFFICE]*[P_NHB_TRIPDIST_OFFICE]+[EMP_RETAIL]*[P_NHB_TRIPDIST_RETAIL] *(1-[P_NHB_HOTELADJUSTFACTOR]) +[EMP_INDUSTRIAL]*[P_NHB_TRIPDIST_INDUSTRIAL]+[EMP_INSTIT]*[P_NHB_TRIPDIST _INSTIT]+[EMP_SCHOOL]*[P_NHB_TRIPDIST_SCHOOL]+[EMP_OTHER]*[P_NHB_TRIP DIST_OTHER])*(1+[P_NHB_TRIPADJUSTFACTOR])
P_NHB_HOTELADJUSTFACT OR	NHB Trip Production Distribution by Production Superzone Hotel Adjustment Factor	

Attribute	Description	Formula (if applicable)
P_NHB_NOAGE	NHB Trip Production Rate for Unknown Age by Household Superzone	
P_NHB_TOTAL	NHB Total Trips Generated by Household Superzone	[POP_0-14]*[P_NHB_0-14]+[POP_15-24]*[P_NHB_15-24]+[POP_25-34]*[P_NHB_25-34]+[POP_35-44]*[P_NHB_35-44]+[POP_45-64]*[P_NHB_45-64]+[POP_65]*[P_NHB_65]+[POP_NOAGE]*[P_NHB_NOAGE]
P_NHB_TRIPADJUSTFACTOR	NHB Trip Production Distribution by Production Superzone Trip Adjustment Factor	
P_NHB_TRIPDIST	Distribution Percentage to Production TAZs from NHB Trip Total	[P_NHB_FORNHBTRIPDIST_P]/[NETWORK\SUM:ZONES\P_NHB_FORNHBTRIPDIST_P]
P_NHB_TRIPDIST_INDUSTRIAL	NHB Trip Production Distribution Rates by Production Superzone - Industrial Employment	
P_NHB_TRIPDIST_INSTIT	NHB Trip Production Distribution Rates by Production Superzone - Institutional Employment	
P_NHB_TRIPDIST_OFFICE	NHB Trip Production Distribution Rates by Production Superzone - Office Employment	
P_NHB_TRIPDIST_OTHER	NHB Trip Production Distribution Rates by Production Superzone - Other Employment	
P_NHB_TRIPDIST_RETAIL	NHB Trip Production Distribution Rates by Production Superzone - Retail Employment	
P_NHB_TRIPDIST_SCHOOL	NHB Trip Production Distribution Rates by Production Superzone - School Employment	
P_NHB_VEH_OCCUP	Vehicle Occupancy for NHB Trip Productions	
P_TOT	Vehicle Production Totals from Trip Generation and Gateway Matrix	[P]+[P_GATE]
STUDENT	Number of Students in 2016	

A.2 MODEL DATA DICTIONARY – LINKS

Attribute	Description	Formula (if applicable)
Number	Link number	
From node number	Node number at the start of the link	
To node number	Node number at the end of the link	
Type number	Link type. Refer to Link (Type) table for attributes associated with each link type.	
TSys set	Transportation modes allowed on the link (e.g. C-Car, W-Walk)	
Length	Link length in kilometres	
Number of lanes	Number of lanes, direction-specific	
Capacity PrT	Total private vehicle capacity (PCU/hour)	
v0 PrT	Free-flow speed of private vehicles (kilometres/hour)	
Volume PrT [veh] (AP)	Link volume of private vehicles during the AM Peak Period	
Volume PuT [Pers] (AP)	Link transit ridership during the AM Peak Period	
ADJCOUNT	Adjusted AM Peak Period observed traffic count on average weekday of modelling period	[COUNT]*[COUNTADJUSTMENTFACTOR]
ADJCOUNT_CV	Adjusted Commercial Vehicle Traffic Count during AM Peak Period	[CV_COUNT]*[COUNTADJUSTMENTFACTOR]
ADJCOUNT_CV_HR	AM Peak Hour Adjusted Truck Counts	[ADJCOUNT_CV]*[HOURFACTOR]
ADJCOUNT_HR	AM Peak Hour Adjusted Counts	[COUNT_HR]*[COUNTADJUSTMENTFACTOR]
AMPEAKTRAVELTIME	Observed travel time from the City's travel time survey in the AM Peak Period (minutes)	[LENGTH]/[AMSPEED]*60
AMSPEED	Observed speed from the City's travel time survey in the Analysis Period (kilometres/hour)	
AMSPEEDSEG	Road segment number on which AMSPEED occurs	
AREA	Area type: Urban, Rural or N/A	
COUNT	Observed vehicle count on screenline count date during the AM Peak Period	
COUNTADJUSTMENT FACTOR	Factor applied to adjust raw observed volume on screenline count date to average weekday of model period	

A.2 Model Data Dictionary
August 9, 2018

Attribute	Description	Formula (if applicable)
COUNTDATE	Date of conducted screenline count	
COUNT_CV_HR	AM Peak Hour raw truck counts	
COUNT_HR	AM Peak Hour raw counts	
CV_COUNT	Raw truck counts	
FUTURE	Value of "1" indicates a future/planned roadway	
HOURFACTOR	Factor to convert AM Peak Period to AM Peak Hour	
HRCAP	Hourly capacity (PCU/hour)	
LANECAP	Lane capacity (PCU/hour)	
LINKSOURCE	The source of link attribute information: CRD (City of Red Deer) or AT (Alberta Transportation)	
LRS_STREE1	Street name of the intersecting street at the beginning of the LRS_STREET segment	
LRS_STREE2	Street name of the intersecting street at the end of the LRS_STREET segment	
LRS_STREET	Street name from the length shapefile provided by the City of Red Deer	
MODELID	ID of the link from original GIS file (value of "0" indicates a new link). Refer to LINKSOURCE for GIS file source.	
POSTSPEED	Posted speed (kilometres/hour)	
RDL_ID	ID of the lane shapefile provided by the City of Red Deer - City only	
RDSP_ID	ID of the speed shapefile provided by the City of Red Deer - City only	
ROADCLASS	Road class: Arterial Plus, Arterial, Collector, Expressway, Expressway Ramp, Highway, Local, Transit, Ramp, or Rural Road	
SL	Screenline number	
SL_CODE	Screenline code, including direction	
STREET_ALI	Alternative street name - City only	
TT_SEGMENT	Tagged link segments for generating travel time summary	

A.3 MODEL DATA DICTIONARY – ZONE-LEVEL MATRICES

Matrix No.	Name	Description	Formula (if applicable)
1	HTS Car - Vehicles	Household Travel Survey OD Matrix - Total	
2	HTS Car - Vehicles - HBW	Household Travel Survey OD Matrix - HBW	
3	HTS Car - Vehicles - HBS	Household Travel Survey OD Matrix - HBS	
4	HTS Car - Vehicles - HBO	Household Travel Survey OD Matrix - HBO	
5	HTS Car - Vehicles - NHB	Household Travel Survey OD Matrix - NHB	
6	HTS Car - Vehicles - HBW I-(I/X)	Household Travel Survey OD Matrix - HBW - Internal to Internal/External	Matrix([NO]=2)*IF(FROM[NO]>=2000:0:1)*IF(TO[NO]>=3000:0:1)
7	HTS Car - Vehicles - HBS I-(I/X)	Household Travel Survey OD Matrix - HBS - Internal to Internal/External	Matrix([NO]=3)*IF(FROM[NO]>=2000:0:1)*IF(TO[NO]>=3000:0:1)
8	HTS Car - Vehicles - HBO I-(I/X)	Household Travel Survey OD Matrix - HBO - Internal to Internal/External	Matrix([NO]=4)*IF(FROM[NO]>=2000:0:1)*IF(TO[NO]>=3000:0:1)
9	HTS Car - Vehicles - NHB I-(I/X)	Household Travel Survey OD Matrix - NHB - Internal to Internal/External	Matrix([NO]=5)*IF(FROM[NO]>=2000:0:1)*IF(TO[NO]>=3000:0:1)
10	HTS Car - Vehicles - TOTAL I-(I/X)	Household Travel Survey OD Matrix - Total - Internal to Internal/External	Matrix([NO] = 6)+Matrix([NO] = 7)+Matrix([NO] = 8)+Matrix([NO] = 9)
101	Distribution - HBW	Modelled Trip Distribution - HBW	
102	Distribution - HBS	Modelled Trip Distribution - HBS	
103	Distribution - HBO	Modelled Trip Distribution - HBO	
104	Distribution - NHB	Modelled Trip Distribution - NHB	
105	Distribution - ALL	Modelled Trip Distribution - Total	Matrix([NO] = 101)+Matrix([NO] = 102)+Matrix([NO] = 103)+Matrix([NO] = 104)
106	Distribution - HBW I-(I/X)	Modelled Trip Distribution - HBW - Internal to Internal/External	Matrix([NO] = 101)*IF(FROM[NO]>=2000:0:1)
107	Distribution - HBS I-(I/X)	Modelled Trip Distribution - HBS - Internal to Internal/External	Matrix([NO] = 102)*IF(FROM[NO]>=2000:0:1)
108	Distribution - HBO I-(I/X)	Modelled Trip Distribution - HBO - Internal to Internal/External	Matrix([NO] = 103)*IF(FROM[NO]>=2000:0:1)

Matrix No.	Name	Description	Formula (if applicable)
109	Distribution - NHB I-(I/X)	Modelled Trip Distribution - NHB - Internal to Internal/External	Matrix([NO] = 104)*IF(FROM[NO]>=2000:0:1)
110	Distribution - ALL I-(I/X)	Modelled Trip Distribution - Total - Internal to Internal/External	Matrix([NO] = 106)+Matrix([NO] = 107)+Matrix([NO] = 108)+Matrix([NO] = 109)
201	Gateway Car - HBW	Trips Involving Gateway Zones - HBW	
202	Gateway Car - HBS	Trips Involving Gateway Zones - HBS	
203	Gateway Car - HBO	Trips Involving Gateway Zones - HBO	
204	Gateway Car - NHB	Trips Involving Gateway Zones - NHB	
205	Gateway Car - Vehicles	Trips Involving Gateway Zones - Total	Matrix([NO] = 201)+Matrix([NO] = 202)+Matrix([NO] = 203)+Matrix([NO] = 204)
301	Car - HBW	Total Car Trips - HBW	Matrix([NO] = 101)+Matrix([NO] = 201)
302	Car - HBS	Total Car Trips - HBS	Matrix([NO] = 102)+Matrix([NO] = 202)
303	Car - HBO	Total Car Trips - HBO	Matrix([NO] = 103)+Matrix([NO] = 203)
304	Car - NHB	Total Car Trips - NHB	Matrix([NO] = 104)+Matrix([NO] = 204)
305	Car - TOTAL	Total Car Trips	Matrix([NO] = 301)+Matrix([NO] = 302)+Matrix([NO] = 303)+Matrix([NO] = 304)
306	AM Peak Hour Total Car	Total Car Trips in AM Peak Hour	Matrix([NO] = 305)*Matrix([NO] = 501)\ \n
406	AM Peak Hour Total Truck	Total Truck Trips in AM Peak Hour	
501	AM Hour Factor	Conversion Factors from AM Peak Period to AM Peak Hour	
601	RDC Adjustment	Utility Adjustment Factor Matrix for Trips Between City of Red Deer Zones & Intra-Zonal Trips	
607	t0 C	Free-Flow Travel Time	
608	tCur C	Modelled Travel Time	
612	Trip distance C	Modelled Trip Distance	
614	HTS HBW Person Trips	Household Travel Survey OD Matrix - Person-Trips - HBW	

Matrix No.	Name	Description	Formula (if applicable)
615	HTS HBS Person Trips	Household Travel Survey OD Matrix - Person-Trips - HBS	
616	HTS HBO Person Trips	Household Travel Survey OD Matrix - Person-Trips - HBO	
617	HTS NHB Person Trips	Household Travel Survey OD Matrix - Person-Trips - NHB	
618	Utility for HBW Trips	Utility Matrix for HBW Trips	Matrix([NO] = 614)/Matrix([NO] = 607)*Matrix([NO] = 601)
619	Utility for HBS Trips	Utility Matrix for HBS Trips	Matrix([NO] = 615)/Matrix([NO] = 607)*Matrix([NO] = 601)
620	Utility for HBO Trips	Utility Matrix for HBO Trips	Matrix([NO] = 616)/Matrix([NO] = 607)*Matrix([NO] = 601)
621	Utility for NHB Trips	Utility Matrix for NHB Trips	Matrix([NO] = 617)*Matrix([NO] = 607)*Matrix([NO] = 601)

A.4 MODEL DATA DICTIONARY – SUPERZONE-LEVEL MATRICES

Matrix No.	Name	Description	Formula (if applicable)
11	HTS Car - Vehicles	Household Travel Survey OD Matrix - Total	
12	HTS Car - Vehicles - HBW	Household Travel Survey OD Matrix - HBW	
13	HTS Car - Vehicles - HBS	Household Travel Survey OD Matrix - HBS	
14	HTS Car - Vehicles - HBO	Household Travel Survey OD Matrix - HBO	
15	HTS Car - Vehicles - NHB	Household Travel Survey OD Matrix - NHB	
111	Distribution - HBW	Modelled Trip Distribution - HBW	
112	Distribution - HBS	Modelled Trip Distribution - HBS	
113	Distribution - HBO	Modelled Trip Distribution - HBO	
114	Distribution - NHB	Modelled Trip Distribution - NHB	
115	Distribution - ALL	Modelled Trip Distribution - Total	Matrix([NO] = 111)+Matrix([NO] = 112)+Matrix([NO] = 113)+Matrix([NO] = 114)

Matrix No.	Name	Description	Formula (if applicable)
116	Distribution - HBW I-(I/X)	Modelled Trip Distribution - HBW - Internal to Internal/External	Matrix([NO] = 111)*IF(FROM[NO]>=20:0:1)
117	Distribution - HBS I-(I/X)	Modelled Trip Distribution - HBS - Internal to Internal/External	Matrix([NO] = 112)*IF(FROM[NO]>=20:0:1)
118	Distribution - HBO I-(I/X)	Modelled Trip Distribution - HBO - Internal to Internal/External	Matrix([NO] = 113)*IF(FROM[NO]>=20:0:1)
119	Distribution - NHB I-(I/X)	Modelled Trip Distribution - NHB - Internal to Internal/External	Matrix([NO] = 114)*IF(FROM[NO]>=20:0:1)
120	Distribution - ALL I-(I/X)	Modelled Trip Distribution - Total - Internal to Internal/External	Matrix([NO] = 116)+Matrix([NO] = 117)+Matrix([NO] = 118)+Matrix([NO] = 119)
211	Gateway Car - HBW	Trips Involving Gateway Zones - HBW	
212	Gateway Car - HBS	Trips Involving Gateway Zones - HBS	
213	Gateway Car - HBO	Trips Involving Gateway Zones - HBO	
214	Gateway Car - NHB	Trips Involving Gateway Zones - NHB	
215	Gateway Car - Total	Trips Involving Gateway Zones - Total	Matrix([NO] = 211)+Matrix([NO] = 212)+Matrix([NO] = 213)+Matrix([NO] = 214)

A.5 MODEL DATA DICTIONARY – SCREENLINES

Attribute	Description	Formula (if applicable)
Number	Number automatically assigned to screenline by VISUM	
Code	Screenline station code	
Name	Direction of the screenline	
GEH_STAT	GEH between Adjusted Count Volume and Modelled Volume	GEH([SUM:FORWARDLINKS\ADJCOUNT_HR],[SUM:FORWARDLINKS\VOLVEHPRT(AP)])
SL	Screenline number	

Appendix B BASE YEAR POPULATION AND EMPLOYMENT INPUTS

B.1 POPULATION BY AGE GROUP AND TRAFFIC ZONE

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
101	1	2	2	0	2	16	3	0	25
102	1	15	8	10	10	27	17	11	98
104	1	0	0	0	0	0	0	0	2
105	1	2	0	0	0	4	2	0	8
206	2	0	0	0	1	1	0	0	2
207	2	0	0	0	0	0	4	0	4
301	3	215	164	197	158	296	59	85	1174
302	3	191	183	194	106	207	27	88	996
304	3	124	101	115	90	251	103	181	965
305	3	232	165	189	148	293	71	222	1320
306	3	184	149	164	106	205	48	253	1109
307	3	141	88	133	99	163	46	221	891
308	3	89	94	160	89	208	184	122	946
309	3	384	405	451	220	340	39	139	1979
310	3	168	163	170	118	166	16	102	903
401	4	205	143	160	122	217	81	150	1078
403	4	202	120	174	154	203	39	123	1015
405	4	144	158	147	122	305	94	262	1232
407	4	121	85	97	81	184	90	229	887
408	4	0	0	0	0	0	0	7	7
409	4	151	123	102	89	201	60	88	814
411	4	80	71	62	59	143	116	54	585

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
413	4	38	89	46	25	47	15	111	371
414	4	36	42	42	29	89	62	79	379
415	4	46	45	42	42	112	179	54	520
418	4	0	0	0	0	2	0	0	2
420	4	43	33	23	30	116	75	53	373
422	4	0	0	1	2	10	53	7	73
424	4	246	164	187	193	298	118	314	1520
425	4	0	26	22	21	52	52	69	242
426	4	40	34	34	30	84	114	34	370
501	5	143	128	159	87	184	39	72	812
502	5	180	120	150	103	255	90	77	975
504	5	68	38	46	41	93	25	108	419
505	5	64	68	66	60	134	90	223	705
506	5	118	72	84	72	164	86	27	623
507	5	85	47	64	59	157	119	95	697
508	5	77	75	78	44	69	15	194	552
509	5	420	298	432	320	538	122	118	2248
511	5	110	106	105	73	147	38	135	714
512	5	84	98	74	63	145	117	191	772
513	5	123	109	118	81	111	24	136	702
514	5	97	102	94	65	157	42	116	673
515	5	103	128	129	77	146	42	146	771
516	5	45	62	44	40	144	193	182	710
601	6	15	33	28	31	55	41	182	385

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
602	6	332	188	313	262	411	97	207	1810
603	6	11	7	4	8	12	13	10	65
604	6	101	85	108	66	188	153	202	903
605	6	27	12	16	14	11	0	153	233
606	6	104	136	84	68	132	52	139	715
607	6	79	87	79	47	116	82	131	621
608	6	71	81	78	43	121	96	94	584
609	6	42	86	45	33	104	84	100	494
610	6	11	25	12	12	26	181	5	272
612	6	30	133	92	57	153	88	201	754
613	6	40	124	99	58	139	78	182	720
614	6	3	12	22	12	28	17	9	103
617	6	31	63	68	27	107	323	259	879
618	6	52	39	65	44	78	109	38	425
620	6	51	110	101	61	147	102	203	775
621	6	50	74	56	34	88	71	127	500
622	6	82	63	68	51	181	106	127	678
625	6	0	0	0	0	0	0	53	53
701	7	64	69	71	61	121	41	46	473
702	7	48	57	65	58	169	92	64	553
703	7	102	176	174	103	212	160	121	1048
704	7	4	14	14	11	22	6	115	186
705	7	24	20	29	12	34	39	174	332
707	7	12	9	10	2	16	6	13	68

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
708	7	15	24	41	14	61	117	69	341
709	7	0	24	15	5	44	64	57	209
710	7	1	17	23	8	26	18	31	124
711	7	3	11	20	20	29	9	47	139
712	7	1	1	1	0	2	0	0	5
713	7	0	0	1	1	37	213	33	285
715	7	0	0	0	1	19	22	5	47
717	7	72	58	73	56	118	58	114	549
718	7	1	4	3	7	25	177	20	237
801	8	74	56	74	73	163	107	89	636
802	8	100	129	104	69	194	99	78	773
803	8	136	116	102	92	227	129	34	836
804	8	108	99	104	84	191	92	36	714
805	8	67	56	42	46	114	53	75	453
806	8	73	72	78	40	115	42	70	490
807	8	35	47	49	37	115	47	157	487
808	8	33	34	50	38	176	481	172	984
809	8	74	89	95	58	144	53	159	672
810	8	95	85	84	69	183	108	102	726
811	8	36	37	35	25	55	10	57	255
812	8	99	76	89	55	139	78	53	589
813	8	110	66	85	60	188	106	70	685
814	8	84	76	63	68	151	101	67	610
815	8	135	68	74	95	182	108	58	720

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
901	9	80	73	83	70	172	40	104	622
902	9	105	100	100	61	137	64	94	661
903	9	187	143	151	116	287	220	160	1264
904	9	135	93	95	84	225	76	92	800
905	9	133	77	94	91	261	121	121	898
906	9	124	48	64	94	255	144	128	857
907	9	121	71	83	106	223	106	121	831
908	9	115	72	117	58	149	93	149	753
909	9	127	133	93	94	274	106	53	880
910	9	140	107	129	84	208	47	107	822
911	9	157	85	102	108	261	107	132	952
912	9	142	53	56	98	230	155	70	804
913	9	153	57	124	119	212	83	197	945
914	9	88	108	83	98	165	291	186	1019
916	9	268	255	355	174	299	133	221	1705
917	9	228	134	256	151	185	25	75	1054
918	9	11	2	6	5	20	8	0	52
919	9	3	0	2	2	1	0	0	8
920	9	86	35	87	67	67	10	22	374
921	9	2	1	2	0	0	0	0	5
922	9	99	167	142	92	101	25	80	706
924	9	74	36	85	37	98	19	30	379
1001	10	100	67	80	57	192	72	194	762
1002	10	100	82	76	70	228	92	233	881

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
1003	10	126	72	48	91	265	166	72	840
1004	10	125	69	70	80	214	72	167	797
1005	10	160	100	105	91	256	95	60	867
1006	10	148	95	74	107	268	120	71	883
1007	10	196	92	158	168	301	124	85	1124
1008	10	239	96	202	171	253	46	105	1112
1010	10	98	70	65	78	169	57	36	573
1011	10	294	236	258	214	252	54	117	1425
1012	10	313	112	182	213	280	57	388	1545
1101	11	0	0	0	0	0	2	0	2
1102	11	115	63	56	95	261	128	69	787
1103	11	165	55	105	102	259	66	77	829
1104	11	226	114	143	186	314	72	55	1110
1105	11	169	132	145	137	260	252	63	1158
1106	11	244	112	90	190	316	82	120	1154
1107	11	198	116	137	167	193	41	83	935
1108	11	106	131	129	69	111	18	145	709
1109	11	200	181	209	150	221	75	176	1212
1110	11	233	201	278	192	268	53	205	1430
1111	11	321	130	210	276	358	148	249	1692
1112	11	247	92	199	190	214	47	62	1051
1113	11	6	6	4	6	35	9	2	68
1114	11	332	171	299	231	320	60	379	1792
1115	11	313	275	344	189	284	63	370	1838

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
1301	13	0	0	0	0	6	1	1	8
1302	13	0	0	0	0	2	0	0	2
1303	13	3	2	0	2	4	2	0	13
1304	13	0	0	0	0	2	0	0	2
1305	13	1	2	2	2	8	3	0	18
1306	13	0	2	0	1	3	3	0	9
1307	13	0	0	0	0	2	0	4	6
1308	13	0	1	0	1	1	0	0	3
1309	13	4	1	2	2	5	4	0	18
1310	13	0	0	0	0	1	1	0	2
1311	13	2	4	6	3	7	4	0	26
2101	21	34	26	19	25	82	23	0	209
2102	21	30	22	11	20	62	12	0	157
2103	21	0	0	0	0	0	0	0	0
2105	21	0	0	0	0	0	0	0	0
2106	21	1499	648	1253	824	862	164	294	5544
2107	21	1072	464	897	590	616	117	210	3966
2202	22	87	60	34	49	166	41	0	438
2302	23	0	0	0	0	0	0	0	0
2303	23	0	0	0	0	0	0	0	0
2304	23	2	2	1	2	5	2	0	14
2403	24	13	13	10	13	33	15	0	97
2404	24	0	0	0	0	0	0	0	0
2601	26	0	0	0	0	0	0	0	0

B.1 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Age Group							
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	TOTAL
2602	26	65	35	33	49	156	94	1	434
2603	26	23	16	9	13	44	11	0	115
2603	26	105	72	92	69	151	42	0	530
2604	26	8	5	4	7	29	27	0	80
2605	26	47	30	27	40	175	161	0	480
2606	26	12	12	10	8	31	13	0	86
2608	26	362	201	371	220	284	64	0	1502
2701	27	0	0	0	0	0	0	0	0
2702	27	0	0	0	0	0	0	0	0

B.2 GFA-TO-EMPLOYEE CONVERSION

Assess Code	Description	Employment Category	Conversion Rate (sq.ft./employee)					
			BILS_1987[6]	ITE_1991[7]	ILSD_1997[8]	BLR_2002[9]	EDS_2007[10]	Model
27	Public School	Institutional	300	N/A	325	300	300	300
30	Church	Institutional	0	0	0	0	0	0
31	County of Red Deer	Institutional	300	300	300	300	300	300
32	Red Deer College	Institutional	300	300	300	300	300	300
34	Warehouses Condominium	Industrial	300	781	1121	833	1000	800
47	Office Building - City	Office	300	300	300	300	300	300
59	Industrial - City	Industrial	500	500	500	500	500	500
81	Provincial Government	Office	300	300	300	300	300	300
83	Federal Government Warehouse	Industrial	300	781	1121	833	1000	800
84	Federal Government	Office	300	300	300	300	300	300
86	Municipal Levy Restaurant	Retail	200	200	200	200	200	200
98	Provincial Government Building	Office	300	300	300	300	300	300
99	Provincial Government Warehouse	Industrial	300	781	1121	833	1000	800
105	Apartment	Other	0	0	0	0	0	0
200	Vacant Commercial Land	Vacant	0	0	0	0	0	0
201	Shopping Centre	Retail	700	700	700	700	700	700
202	Stores Sales	Retail	700	700	700	700	700	700
203	Financial Institution	Retail	300	262	325	395	350	350
204	Office	Office	400	400	400	400	400	400

[6] BILS_1987 = Snohomish County, Business and Industrial Land Survey (1987)
[7] ITE_1991 = ITE Trip Generation Manual, 5th Edition (1991)
[8] ILSD_1997 = Puget Sound Regional Council, Industrial Land Supply and Demand in Central Puget Sound Region (1997)
[9] BLR_2002 = City of Kent, Business Licence Data (2002)
[10] EDS_2007 = Snohomish County, Employment Density Study (2007)

Assess Code	Description	Employment Category	Conversion Rate (sq.ft./employee)					
			BILS_1987[6]	ITE_1991[7]	ILSD_1997[8]	BLR_2002[9]	EDS_2007[10]	Model
205	Auto/RV Dealership	Retail	600	N/A	1742	600	700	700
206	Special Trades	Retail	1000	1000	1000	1000	1000	1000
207	Hotel/Motel	Retail	400	400	400	400	400	400
208	Restaurant Drive-In	Retail	200	200	200	200	200	200
209	Auto Service Station	Retail	600	1064	325	395	400	400
211	Retail Strip	Retail	700	700	700	700	700	700
214	Parking Lot	Other	0	0	0	0	0	0
217	Used Commercial Residential	Other	0	0	0	0	0	0
218	Office Building Condominium	Office	400	400	400	400	400	400
400	Vacant Industrial	Vacant	0	0	0	0	0	0
401	Meat Packing Plant	Industrial	775	535	587	500	500	500
403	Warehouse	Industrial	300	781	1121	833	1000	800
404	Warehouse Condominium	Industrial	300	781	1121	833	1000	800
406	Manufacturing	Industrial	500	500	500	500	500	500
407	Service Station/Bulk	Industrial	1000	535	587	500	500	500
502	CPR	Other	0	0	0	0	0	0
601	Utility Regulation Station	Other	1000	1000	1000	1000	1000	1000
606	Oil Well Site	Industrial	1000	535	587	500	500	500
612	Linear	Other	N/A	N/A	N/A	N/A	N/A	N/A
701	Improved Telecom	Other	1000	1000	1000	1000	1000	1000
706	S362 Exemption, Leased Space	Institutional	500	870	500	395	400	400
713	Non-Profit Exemptions (S3621N)	Other	0	0	0	0	0	0
714	Non-Profit Exemptions Reg 281	Office	400	400	400	400	400	400
808	Annexation Farmland	N/A	0	0	0	0	0	0

B.3 EMPLOYEE BY EMPLOYMENT CATEGORY AND TRAFFIC ZONE

TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
102	1	0	0	87	0	0	0	87
103	1	0	0	31	0	0	0	31
104	1	0	3	336	0	0	0	339
201	2	0	0	239	0	0	0	239
202	2	0	0	1424	0	0	0	1424
203	2	15	0	2757	0	0	0	2772
204	2	0	88	1072	25	0	0	1185
205	2	0	331	409	0	0	0	740
206	2	0	31	1423	0	0	0	1454
207	2	0	27	558	10	0	0	595
302	3	0	9	0	0	0	0	9
303	3	92	300	35	0	0	0	427
304	3	0	3	0	0	0	0	3
306	3	0	9	0	0	83	0	92
307	3	0	0	0	0	24	0	24
309	3	0	0	192	136	0	0	328
310	3	0	10	0	0	0	0	10
311	3	0	0	158	0	0	0	158
402	4	0	139	0	0	0	0	139
404	4	0	16	0	0	0	0	16
405	4	0	0	0	0	44	0	44
406	4	55	52	33	0	0	0	140

B.3 Base Year Population and Employment Inputs
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TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
408	4	0	455	0	0	0	0	455
410	4	0	174	215	0	0	0	389
412	4	0	300	155	0	0	0	455
413	4	0	234	0	0	0	0	234
415	4	0	0	0	0	18	0	18
416	4	120	271	610	0	0	0	1001
417	4	29	0	256	0	0	0	285
418	4	107	320	1146	0	0	0	1573
419	4	0	0	1582	0	0	0	1582
421	4	0	186	0	0	0	0	186
422	4	0	612	0	0	0	0	612
423	4	174	46	1142	0	0	0	1362
424	4	0	0	0	49	0	0	49
425	4	0	362	0	0	0	0	362
502	5	62	22	0	92	110	0	286
503	5	0	0	230	0	0	0	230
507	5	0	0	0	0	40	0	40
510	5	43	725	180	0	0	0	948
511	5	0	0	0	0	31	0	31
512	5	60	95	0	0	0	0	155
514	5	0	0	0	0	25	0	25
515	5	0	12	0	0	0	0	12
516	5	0	3	0	2	0	0	5
601	6	500	73	0	2256	0	0	2829

B.3 Base Year Population and Employment Inputs
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TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
603	6	0	0	0	5	0	0	5
604	6	0	0	0	0	27	0	27
605	6	0	95	0	0	0	0	95
606	6	0	0	0	0	35	0	35
609	6	0	0	0	0	40	0	40
610	6	0	0	0	0	900	0	900
612	6	43	14	0	0	0	0	57
613	6	0	503	0	0	0	0	503
614	6	0	309	0	0	0	0	309
615	6	0	665	0	0	0	0	665
616	6	50	1292	0	0	0	0	1342
617	6	23	215	0	115	23	0	376
618	6	283	734	0	244	0	0	1261
619	6	0	859	0	0	0	0	859
623	6	0	266	0	0	0	0	266
624	6	0	171	0	0	0	1	172
701	7	0	2	0	0	298	0	300
703	7	246	28	0	0	0	0	274
704	7	2068	297	0	37	0	64	2466
706	7	103	138	0	0	67	0	308
708	7	1057	648	0	45	0	0	1750
709	7	117	0	0	107	0	0	224
710	7	468	84	0	299	0	0	851
711	7	1196	366	0	108	0	0	1670

B.3 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
712	7	160	311	0	102	0	0	573
713	7	93	72	0	0	0	0	165
714	7	194	38	15	0	0	0	247
715	7	413	101	70	4	5	0	593
716	7	230	391	180	0	0	0	801
801	8	0	4	0	0	0	0	4
802	8	0	0	0	0	34	0	34
803	8	0	0	0	31	38	0	69
804	8	0	6	0	0	0	0	6
805	8	0	0	0	0	28	0	28
808	8	0	0	0	172	0	0	172
809	8	0	5	0	0	0	0	5
810	8	0	0	0	0	82	0	82
812	8	0	50	0	27	111	0	188
815	8	0	0	0	0	35	0	35
907	9	0	10	0	0	0	0	10
908	9	0	10	0	0	0	0	10
912	9	0	16	0	0	0	0	16
913	9	90	0	0	0	0	0	90
916	9	0	243	0	0	32	0	275
921	9	104	0	0	0	0	0	104
922	9	183	0	0	10	39	0	232
1003	10	20	0	0	0	0	0	20
1005	10	0	77	0	0	0	0	77

B.3 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
1006	10	0	0	0	46	47	0	93
1009	10	0	0	0	115	281	0	396
1010	10	0	0	0	0	37	0	37
1105	11	0	99	0	0	0	0	99
1106	11	0	12	0	0	77	0	89
1109	11	0	10	0	0	0	0	10
1201	12	0	0	9	0	0	0	9
1301	13	0	0	20	0	0	0	20
1302	13	0	0	5	0	0	0	5
1303	13	0	0	15	0	0	0	15
1304	13	0	0	5	0	0	0	5
1305	13	0	0	75	0	0	0	75
1306	13	0	0	25	0	0	0	25
1307	13	0	0	5	0	0	0	5
1308	13	0	0	5	0	0	0	5
1309	13	0	0	20	0	0	0	20
1310	13	0	0	25	0	0	0	25
1311	13	0	0	35	0	0	0	35
2101	21	0	0	0	0	0	0	0
2102	21	0	0	0	0	0	0	0
2103	21	0	0	1716	0	0	0	1716
2104	21	0	0	709	0	0	0	709
2105	21	0	0	1314	0	0	0	1314
2106	21	69	88	271	50	57	95	630

B.3 Base Year Population and Employment Inputs
August 9, 2018

TAZ	Superzone	Employment Category						
		Office	Retail	Industrial	Institutional	School	Other	TOTAL
2107	21	129	164	503	94	105	176	1170
2201	22	0	0	0	0	0	0	0
2202	22	0	0	0	0	0	0	0
2302	23	0	0	1002	0	0	0	1002
2303	23	0	0	401	0	0	0	401
2304	23	0	0	0	0	0	0	0
2403	24	0	0	760	0	0	0	760
2404	24	0	0	149	0	0	0	149
2501	25	0	0	0	0	190	0	190
2504	25	0	0	0	0	56	0	56
2601	26	0	0	0	0	220	0	220
2602	26	108	9	107	6	0	0	230
2603	26	0	6	105	0	0	0	111
2604	26	0	0	0	0	0	0	0
2605	26	0	0	0	0	0	0	0
2606	26	0	0	0	0	0	0	0
2608	26	0	90	0	135	0	0	225
2701	27	0	0	1123	0	0	0	1123
2702	27	0	0	1398	0	0	0	1398

Appendix C SCHOOL ENROLLMENT AND STAFF INPUTS

C.1 STUDENT ENROLLMENT AND STAFF BY SCHOOL AND TRAFFIC ZONE

School	Region	TAZ	Category[11]	Students	Staff
Glendale	Red Deer	306	RDPSD	434	35
St. Teresa	Red Deer	306	RDCSD	445	48
Aspen Heights	Red Deer	307	RDPSD	186	24
Normandeau	Red Deer	405	RDPSD	416	44
Escuela Pines	Red Deer	415	RDPSD	167	18
GH Dawe	Red Deer	502	RDPSD	377	38
St. Patrick	Red Deer	502	RDCSD	673	72
Oriole Park	Red Deer	507	RDPSD	413	40
Koinoia Christian School	Red Deer	511	Other	230	31
Fairview	Red Deer	514	RDPSD	220	25
St. Martin	Red Deer	604	RDCSD	250	27
West Park	Red Deer	606	RDPSD	335	35
Westpark	Red Deer	609	RDPSD	435	40
Red Deer College	Red Deer	610	RDC	8000	900
Ecole La Prairie	Red Deer	617	Other	140	23
Gateway Christian	Red Deer	701	RDPSD	687	55
Lindsay Thurber	Red Deer	701	RDPSD	1701	139
Ecole Camille	Red Deer	701	RDCSD	686	74
Parkland School	Red Deer	701	Other	35	30
Central	Red Deer	706	RDPSD	495	40
Alternative School Centre	Red Deer	706	RDPSD	500	22
The Growing Tree Montessori	Red Deer	706	Other	50	5

[11] RDPSD = Red Deer Public School District, RDCSD = Red Deer Catholic School District, RDC = Red Deer College

C.1 School Enrollment and Staff Inputs
August 9, 2018

School	Region	TAZ	Category[11]	Students	Staff
Red Deer Montessori	Red Deer	715	Other	50	5
GW Smith	Red Deer	802	RDPSD	323	34
Mountview	Red Deer	803	RDPSD	406	38
Grandview	Red Deer	805	RDPSD	259	28
Joseph Welsh	Red Deer	810	RDPSD	360	35
Eastview	Red Deer	810	RDPSD	615	47
Annie L Gaetz	Red Deer	812	RDPSD	296	27
Maryview	Red Deer	812	RDCSD	226	24
St. Thomas	Red Deer	812	RDCSD	554	60
St. Elizabeth	Red Deer	815	RDCSD	327	35
Fr. Henri Voisin	Red Deer	916	RDCSD	295	32
Barrie Wilson	Red Deer	922	RDPSD	521	39
Holy Family	Red Deer	1006	RDCSD	442	47
Hunting Hills	Red Deer	1009	RDPSD	1450	101
Notre Dame	Red Deer	1009	RDCSD	1673	180
Mattie McCullough	Red Deer	1010	RDPSD	426	37
St. Francis	Red Deer	1106	RDCSD	719	77
Iron Ridge Junior Campus	Blackfalds	2106	Other	243	19
St. Gregory the Great Catholic School	Blackfalds	2107	Other	500	41
Iron Ridge Elementary Campus	Blackfalds	2107	Other	500	48
Iron Ridge Intermediate Campus	Blackfalds	2107	Other	331	27
Gasoline Alley Career High School	Red Deer County	2501	Other	190	10
South Side Christian School	Red Deer County	2504	Other	56	7
Destiny Christian School	Red Deer County	2601	Other	220	25

Appendix D OBSERVED TRIP GENERATION RATES

TRAVEL DEMAND MODEL DEVELOPMENT REPORT

Observed Trip Generation Rates

August 9, 2018

D.1 HTS TRIP PRODUCTION RATES BY PRODUCTION SUPERZONE

D.1.1 Home-Based Work (HBW) by Age Group

Age Group	Description	Internal Superzone													Average
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	0 - 14 years	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2	15 - 24 years	0.00	0.00	0.00	0.00	0.13	0.20	0.00	0.17	0.10	0.13	0.00	0.00	0.00	0.10
3	25 - 34 years	0.00	0.00	0.15	0.08	0.20	0.29	0.00	0.00	0.36	0.15	0.38	0.00	0.00	0.22
4	35 - 44 years	0.00	0.00	0.24	0.14	0.27	0.42	0.09	0.16	0.35	0.32	0.23	0.00	0.00	0.26
5	45 - 64 years	0.00	0.00	0.05	0.20	0.23	0.34	0.03	0.18	0.27	0.30	0.20	0.00	0.00	0.22
6	65+ years	0.00	0.00	0.17	0.02	0.05	0.01	0.01	0.00	0.03	0.01	0.01	0.00	0.00	0.03
Average				0.10	0.10	0.16	0.23	0.02	0.08	0.19	0.18	0.16			0.15

D.1.2 Home-Based School (HBS) by Age Group

Age Group	Description	Internal Superzone													Average
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	0 - 14 years	0.00	0.00	0.23	0.29	0.20	0.05	0.31	0.36	0.19	0.34	0.23	0.00	0.00	0.23
2	15 - 24 years	0.00	0.00	0.39	0.58	0.37	0.00	0.18	0.23	0.22	0.16	0.17	0.00	0.00	0.22
3	25 - 34 years	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.07	0.02	0.00	0.02	0.00	0.00	0.03
4	35 - 44 years	0.00	0.00	0.35	0.00	0.01	0.03	0.20	0.17	0.14	0.32	0.16	0.00	0.00	0.15
5	45 - 64 years	0.00	0.00	0.10	0.00	0.06	0.00	0.02	0.08	0.04	0.06	0.05	0.00	0.00	0.05
6	65+ years	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.00	0.00	0.00	0.00	0.01
Average				0.19	0.08	0.10	0.01	0.09	0.14	0.09	0.17	0.11			0.11

D.1.3 Home-Based Other (HBO) by Age Group

Age Group	Description	Internal Superzone													Average
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	0 - 14 years	0.00	0.00	0.00	0.00	0.09	0.34	0.00	0.01	0.00	0.00	0.07	0.00	0.00	0.05
2	15 - 24 years	0.00	0.00	0.15	0.00	0.00	0.10	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.03
3	25 - 34 years	0.00	0.00	0.22	0.15	0.06	0.02	0.00	0.00	0.17	0.07	0.21	0.00	0.00	0.13
4	35 - 44 years	0.00	0.00	0.02	0.16	0.21	0.24	0.29	0.29	0.03	0.00	0.06	0.00	0.00	0.11
5	45 - 64 years	0.00	0.00	0.11	0.05	0.09	0.06	0.06	0.14	0.08	0.03	0.18	0.00	0.00	0.09
6	65+ years	0.00	0.00	0.01	0.17	0.13	0.04	0.06	0.06	0.06	0.08	0.03	0.00	0.00	0.07
Average				0.07	0.09	0.10	0.12	0.07	0.07	0.06	0.03	0.12			0.08

D.2 HTS TRIP GENERATION RATES BY HOUSEHOLD SUPERZONE

D.2.1 Non Home-Based (NHB) by Age Group

Age Group	Description	Internal Superzone													Average
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	0 - 14 years	0.00	0.00	0.00	0.00	0.09	0.34	0.00	0.01	0.00	0.00	0.07	0.00	0.00	0.05
2	15 - 24 years	0.00	0.00	0.15	0.00	0.00	0.10	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.03
3	25 - 34 years	0.00	0.00	0.22	0.15	0.06	0.02	0.00	0.00	0.17	0.07	0.21	0.00	0.00	0.13
4	35 - 44 years	0.00	0.00	0.02	0.16	0.21	0.24	0.29	0.29	0.03	0.00	0.06	0.00	0.00	0.11
5	45 - 64 years	0.00	0.00	0.11	0.05	0.09	0.06	0.06	0.14	0.08	0.03	0.18	0.00	0.00	0.09
6	65+ years	0.00	0.00	0.01	0.17	0.13	0.04	0.06	0.06	0.06	0.08	0.03	0.00	0.00	0.07
Average				0.07	0.09	0.10	0.12	0.07	0.07	0.06	0.03	0.12			0.08

D.3 HTS TRIP ATTRACTION RATES BY ATTRACTION SUPERZONE

D.3.1 Home-Based Work (HBW) by Employment Category

Employment Category	Description	Internal Superzone													Average
		1	2	3	4	5	6	7	8	9	10	11	12	13	
1	Office	0.00	0.82	0.95	0.62	0.76	0.60	0.40	0.50	0.00	0.00	0.00	0.00	0.00	0.58
2	Retail	0.00	0.44	0.07	0.14	0.00	0.10	0.09	0.09	0.05	0.00	0.00	0.00	0.00	0.12
3	Industrial	0.02	0.26	0.08	0.43	0.00	0.29	0.22	0.00	0.00	0.00	0.00	0.00	0.93	0.39
4	Institutional	0.00	0.00	0.00	0.45	0.00	0.26	0.14	0.14	0.00	0.14	0.00	0.00	0.00	0.23
5	School	0.00	0.00	0.39	0.20	0.63	0.18	0.53	0.65	0.94	0.90	0.00	0.00	0.00	0.50
6	Other	0.00	0.00	0.00	0.39	0.68	0.25	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.33

D.3.2 Home-Based School (HBS) by Student

Internal Superzone													Average
1	2	3	4	5	6	7	8	9	10	11	12	13	
0.00	0.00	1.32	0.70	0.16	0.30	0.75	0.48	0.07	0.54	0.72	0.00	0.00	0.56

D.3.3 Home-Based Other (HBO) by Total Employment

Internal Superzones													Average
1	2	3	4	5	6	7	8	9	10	11	12	13	
0.33	0.04	0.27	0.12	0.32	0.15	0.15	1.44	0.34	0.61	0.37	0.00	0.00	0.16

Appendix E MODELLED TRIP GENERATION RATES

E.1 MODEL TRIP PRODUCTION RATES BY PRODUCTION SUPERZONE

E.1.1 Home-Based Work (HBW) by Age Group

Age Group	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	0 - 14 years	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2	15 - 24 years	0.10	0.10	0.10	0.10	0.13	0.20	0.10	0.17	0.10	0.10	0.10	0.10	0.10
3	25 - 34 years	0.22	0.22	0.15	0.08	0.22	0.29	0.22	0.08	0.36	0.22	0.22	0.22	0.22
4	35 - 44 years	0.26	0.26	0.24	0.14	0.27	0.42	0.26	0.16	0.35	0.26	0.26	0.26	0.26
5	45 - 64 years	0.22	0.22	0.05	0.20	0.23	0.34	0.03	0.18	0.27	0.22	0.22	0.22	0.22
6	65+ years	0.03	0.03	0.03	0.02	0.05	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.03
7	Unknown	0.15	0.15	0.15	0.10	0.16	0.23	0.02	0.08	0.19	0.15	0.15	0.15	0.15

E.1.2 Home-Based School (HBS) by Age Group

Age Group	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	0 - 14 years	0.23	0.23	0.23	0.23	0.23	0.05	0.31	0.36	0.19	0.34	0.23	0.23	0.23
2	15 - 24 years	0.22	0.22	0.39	0.22	0.22	0.00	0.18	0.23	0.22	0.16	0.17	0.22	0.22
3	25 - 34 years	0.03	0.03	0.08	0.03	0.00	0.00	0.03	0.07	0.02	0.00	0.02	0.03	0.03
4	35 - 44 years	0.15	0.15	0.35	0.15	0.01	0.03	0.20	0.15	0.14	0.32	0.16	0.15	0.15
5	45 - 64 years	0.05	0.05	0.10	0.00	0.06	0.00	0.02	0.08	0.04	0.06	0.05	0.05	0.05
6	65+ years	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.07	0.01	0.00	0.00	0.01	0.01
7	Unknown	0.11	0.11	0.19	0.11	0.10	0.01	0.09	0.14	0.09	0.17	0.11	0.11	0.11

E.1.3 Home-Based Other (HBO) by Age Group

Age Group	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	0 - 14 years	0.05	0.05	0.05	0.05	0.09	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05
2	15 - 24 years	0.03	0.03	0.03	0.03	0.03	0.10	0.03	0.03	0.03	0.03	0.06	0.03	0.03
3	25 - 34 years	0.13	0.13	0.13	0.15	0.13	0.13	0.13	0.13	0.13	0.07	0.13	0.13	0.13
4	35 - 44 years	0.11	0.11	0.11	0.16	0.21	0.11	0.11	0.11	0.03	0.11	0.11	0.11	0.11
5	45 - 64 years	0.09	0.09	0.09	0.05	0.09	0.09	0.09	0.09	0.08	0.03	0.09	0.09	0.09
6	65+ years	0.07	0.07	0.07	0.17	0.13	0.07	0.07	0.07	0.06	0.07	0.07	0.07	0.07
7	Unknown	0.08	0.08	0.08	0.09	0.10	0.12	0.08	0.08	0.06	0.03	0.12	0.08	0.08

E.2 MODEL TRIP GENERATION RATES BY HOUSEHOLD SUPERZONE

E.2.1 Non Home-Based (NHB) by Age Group

Age Group	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	0 - 14 years	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.05	0.04	0.03	0.04	0.04	0.04
2	15 - 24 years	0.07	0.07	0.06	0.07	0.05	0.07	0.07	0.07	0.07	0.02	0.07	0.07	0.07
3	25 - 34 years	0.09	0.09	0.08	0.09	0.07	0.09	0.09	0.10	0.09	0.06	0.09	0.09	0.09
4	35 - 44 years	0.15	0.15	0.07	0.15	0.05	0.15	0.15	0.17	0.15	0.10	0.15	0.15	0.15
5	45 - 64 years	0.08	0.08	0.07	0.05	0.06	0.08	0.08	0.11	0.04	0.04	0.08	0.08	0.08
6	65+ years	0.04	0.04	0.03	0.01	0.03	0.04	0.04	0.11	0.01	0.01	0.04	0.04	0.04
7	Unknown	0.09	0.09	0.08	0.09	0.07	0.09	0.09	0.10	0.07	0.03	0.09	0.09	0.09

E.2.2 Global Adjustment Factors for Generating Adjusted Employment Trips for NHB Trip Total Distribution

Superzone	Adjustment Factor	
	Production	Attraction
Internal		
1	1.00	1.00
2	1.00	1.00
3	1.00	1.00
4	1.00	6.32
5	1.00	1.00
6	1.00	3.41
7	1.25	7.74
8	1.00	2.03
9	1.00	3.58
10	1.00	2.69
11	1.00	4.63
12	1.00	1.00
13	1.00	1.05
External		
21	1.00	1.04
22	1.00	1.00
23	1.00	1.01
24	1.00	9.00
25	1.00	9.00
26	1.00	9.00
27	1.00	1.07

E.2.3 Adjustment Factor for Hotel Employment for NHB Production Distribution

TAZ	Adjustment Factor Production - Retail
205	-0.76
408	-0.53
510	-0.79
601	-0.44
613	-0.91
614	-0.44
616	-0.14
618	-0.57
708	-0.59

E.3 MODEL TRIP ATTRACTION RATES BY ATTRACTION SUPERZONE

E.3.1 Home-Based Work (HBW) by Employment Category

Employment Category	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Office	0.58	0.58	0.58	0.58	0.58	0.60	0.40	0.58	0.58	0.58	0.58	0.58	0.58
2	Retail	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.50	0.50	0.50	0.12	0.12	0.12
3	Industrial	0.39	0.26	0.39	0.56	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
4	Institutional	0.23	0.23	0.23	0.23	0.23	0.26	0.23	0.92	0.94	0.90	0.23	0.23	0.23
5	School	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.92	0.94	0.90	0.50	0.50	0.50
6	Other	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33

E.3.2 Home-Based School (HBS) by Student

Internal Superzone													Red Deer College*
1	2	3	4	5	6*	7	8	9	10	11	12	13	
0.56	0.56	1.32	0.56	0.16	0.30	0.75	0.56	0.07	0.54	0.56	0.56	0.56	0.08

*A separate trip attraction rate is applied to Red Deer College (RDC) students

E.3.3 Home-Based Other (HBO) by Employment Category

Employment Category	Description	Internal Superzone												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Office	0.25	0.25	0.25	0.13	1.37	0.13	0.13	1.37	0.25	1.37	1.37	1.37	1.37
2	Retail	0.56	0.56	0.56	0.28	0.56	0.28	0.28	0.56	0.56	0.56	0.56	0.56	0.56
4	Institutional	0.38	0.38	0.38	0.19	3.16	0.19	0.19	3.16	0.38	3.16	3.16	3.16	3.16

Appendix F COMMERCIAL VEHICLE TRAVEL DEMAND

F.1 AM PEAK HOUR COMMERCIAL VEHICLE MATRIX BY SUPERZONE

Origin / Destination	1	2	3	4	5	6	7	8	9	10	11	12	13	21	22	23	24	25	26	27	31	32	33	34	TOTAL
1	0	0	0	6	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	3	**18**
2	0	0	0	61	17	35	0	0	11	0	0	0	0	0	0	0	0	0	0	30	23	0	0	6	**182**
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
4	0	21	0	14	0	0	47	0	21	0	0	0	0	0	0	0	0	0	0	0	0	5	0	34	**141**
5	12	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	10	0	0	**28**
6	0	26	0	0	0	0	0	0	0	15	0	17	0	0	0	0	0	0	17	0	35	12	0	0	**122**
7	0	0	0	14	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**19**
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
9	0	6	0	8	0	0	0	0	0	0	0	5	0	0	0	6	0	0	0	0	0	34	0	0	**59**
10	0	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**5**
11	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
12	0	0	0	0	0	25	0	0	5	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**31**
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
21	0	0	0	8	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	**28**
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
23	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	**18**
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	14	0	0	30	**57**
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	**20**
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	**13**
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	**9**
31	0	39	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	115	0	**174**
32	4	0	0	0	0	10	0	0	18	0	0	0	0	6	0	6	0	0	0	0	0	0	0	6	**51**

Origin / Destination	1	2	3	4	5	6	7	8	9	10	11	12	13	21	22	23	24	25	26	27	31	32	33	34	TOTAL
33	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	**120**
34	0	0	0	29	0	50	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	**89**
TOTAL	**16**	**92**	**0**	**141**	**17**	**180**	**67**	**0**	**63**	**21**	**1**	**23**	**0**	**22**	**0**	**12**	**0**	**0**	**30**	**30**	**189**	**74**	**128**	**79**	**1,185**

Appendix G SCREENLINE VALIDATION

G.1 MODELLED VS OBSERVED VEHICLE VOLUME BY SCREENLINE STATION

Screenline Station	Dir	Observed Counts	Adjusted Counts	Model Assigned Volume	GEH
1a	EB	511	521	463	2.60
1a	WB	1,249	1,272	1,274	0.03
1b	EB	381	372	740	15.58
1b	WB	1,136	1,110	1,352	6.90
1c	EB	300	278	60	16.82
1c	WB	1,025	951	660	10.26
1d	EB	430	402	194	12.05
1e	WB	1,169	1,092	1,323	6.66
1f	EB	49	49	4	8.77
1f	WB	43	43	0	9.27
1g	EB	579	537	823	10.95
1g	WB	715	663	629	1.35
2a	NB	1,935	2,154	2,070	1.81
2a	SB	1,641	1,735	2,024	6.67
2b	NB	796	717	563	6.09
2b	SB	1,323	1,192	915	8.55
2c	SB	1,589	1,589	1,749	3.91
2d	NB	1,366	1,202	1,469	7.29
2e	NB	1,765	1,631	1,765	3.26
2e	SB	802	741	743	0.08
11a	NB	1,290	1,231	1,337	2.95
11a	SB	1,694	1,612	1,614	0.05
11b	NB	800	558	396	7.39
11b	SB	874	850	677	6.24

G.1 Screenline Validation
August 9, 2018

Screenline Station	Dir	Observed Counts	Adjusted Counts	Model Assigned Volume	GEH
12a	NB	201	186	86	8.60
12a	SB	138	147	62	8.35
12b	NB	570	601	766	6.31
12b	SB	239	293	279	0.82
12c	NB	1,147	1,107	1,259	4.40
12c	SB	1,013	965	1,388	12.35
12d	NB	178	144	79	6.11
12e	NB	104	106	31	8.98
12e	SB	356	320	222	6.00
12f	NB	29	28	42	2.46
12f	SB	51	44	23	3.67
12g	NB	199	203	30	15.99
12g	SB	393	309	179	8.33
12h	NB	83	85	11	10.71
12h	SB	189	170	25	14.74
13a	EB	170	175	256	5.48
13a	WB	207	209	180	2.06
13b	EB	98	98	31	8.26
13b	WB	41	50	35	2.34
13c	EB	321	265	317	3.01
13c	WB	186	167	222	3.96
14a	EB	1,381	1,328	1,280	1.32
14a	WB	1,343	1,178	1,311	3.76
14b	EB	625	590	442	6.50
14b	WB	502	417	434	0.86

Appendix H POPULATION AND EMPLOYMENT ESTIMATE – 130K HORIZON

TRAVEL DEMAND MODEL DEVELOPMENT REPORT

Population and Employment Estimate – 130K Horizon

August 9, 2018

H.1 ADDITIONAL POPULATION BY AGE GROUP FROM DEVELOPMENT – 130K HORIZON

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
101	1	406	321	369	296	600	302	415	2,710
102	1	175	138	159	128	258	130	179	1,168
103	1	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0
105	1	0	0	0	0	0	0	0	0
201	2	0	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0	0
206	2	0	0	0	0	0	0	0	0
207	2	0	0	0	0	0	0	0	0
301	3	0	0	0	0	0	0	0	0
302	3	0	0	0	0	0	0	0	0
303	3	0	0	0	0	0	0	0	0
304	3	0	0	0	0	0	0	0	0
305	3	0	0	0	0	0	0	0	0
306	3	0	0	0	0	0	0	0	0
307	3	0	0	0	0	0	0	0	0
308	3	0	0	0	0	0	0	0	0
309	3	0	0	0	0	0	0	0	0
310	3	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
311	3	0	0	0	0	0	0	0	0
401	4	0	0	0	0	0	0	0	0
402	4	0	0	0	0	0	0	0	0
403	4	0	0	0	0	0	0	0	0
404	4	0	0	0	0	0	0	0	0
405	4	0	0	0	0	0	0	0	0
406	4	0	0	0	0	0	0	0	0
407	4	0	0	0	0	0	0	0	0
408	4	0	0	0	0	0	0	0	0
409	4	0	0	0	0	0	0	0	0
410	4	0	0	0	0	0	0	0	0
411	4	0	0	0	0	0	0	0	0
412	4	0	0	0	0	0	0	0	0
413	4	0	0	0	0	0	0	0	0
414	4	0	0	0	0	0	0	0	0
415	4	0	0	0	0	0	0	0	0
416	4	0	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0	0
418	4	0	0	0	0	0	0	0	0
419	4	0	0	0	0	0	0	0	0
420	4	0	0	0	0	0	0	0	0
421	4	0	0	0	0	0	0	0	0
422	4	0	0	0	0	0	0	0	0
423	4	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
424	4	0	0	0	0	0	0	0	0
425	4	0	0	0	0	0	0	0	0
426	4	0	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0	0
502	5	0	0	0	0	0	0	0	0
503	5	0	0	0	0	0	0	0	0
504	5	0	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0	0
507	5	0	0	0	0	0	0	0	0
508	5	0	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0	0
510	5	0	0	0	0	0	0	0	0
511	5	0	0	0	0	0	0	0	0
512	5	0	0	0	0	0	0	0	0
513	5	0	0	0	0	0	0	0	0
514	5	0	0	0	0	0	0	0	0
515	5	0	0	0	0	0	0	0	0
516	5	0	0	0	0	0	0	0	0
601	6	0	0	0	0	0	0	0	0
602	6	0	0	0	0	0	0	0	0
603	6	0	0	0	0	0	0	0	0
604	6	0	0	0	0	0	0	0	0
605	6	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
606	6	0	0	0	0	0	0	0	0
607	6	0	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0	0
609	6	0	0	0	0	0	0	0	0
610	6	0	0	0	0	0	0	0	0
611	6	0	0	0	0	0	0	0	0
612	6	0	0	0	0	0	0	0	0
613	6	0	0	0	0	0	0	0	0
614	6	0	0	0	0	0	0	0	0
615	6	0	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0	0
617	6	0	0	0	0	0	0	0	0
618	6	0	0	0	0	0	0	0	0
619	6	0	0	0	0	0	0	0	0
620	6	0	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0	0
623	6	0	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	0	0
701	7	0	0	0	0	0	0	0	0
702	7	0	0	0	0	0	0	0	0
703	7	0	0	0	0	0	0	0	0
704	7	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
705	7	0	0	0	0	0	0	0	0
706	7	0	0	0	0	0	0	0	0
707	7	0	0	0	0	0	0	0	0
708	7	0	0	0	0	0	0	0	0
709	7	0	0	0	0	0	0	0	0
710	7	0	0	0	0	0	0	0	0
711	7	0	0	0	0	0	0	0	0
712	7	0	0	0	0	0	0	0	0
713	7	0	0	0	0	0	0	0	0
714	7	0	0	0	0	0	0	0	0
715	7	0	0	0	0	0	0	0	0
716	7	0	0	0	0	0	0	0	0
717	7	0	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0	0
801	8	0	0	0	0	0	0	0	0
802	8	0	0	0	0	0	0	0	0
803	8	0	0	0	0	0	0	0	0
804	8	0	0	0	0	0	0	0	0
805	8	0	0	0	0	0	0	0	0
806	8	0	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0	0
808	8	0	0	0	0	0	0	0	0
809	8	0	0	0	0	0	0	0	0
810	8	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
811	8	0	0	0	0	0	0	0	0
812	8	0	0	0	0	0	0	0	0
813	8	0	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0	0
815	8	0	0	0	0	0	0	0	0
901	9	0	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0	0
907	9	0	0	0	0	0	0	0	0
908	9	0	0	0	0	0	0	0	0
909	9	0	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0	0
911	9	0	0	0	0	0	0	0	0
912	9	0	0	0	0	0	0	0	0
913	9	0	0	0	0	0	0	0	0
914	9	0	0	0	0	0	0	0	0
915	9	0	0	0	0	0	0	0	0
916	9	0	0	0	0	0	0	0	0
917	9	0	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
920	9	0	0	0	0	0	0	0	0
921	9	0	0	0	0	0	0	0	0
922	9	0	0	0	0	0	0	0	0
923	9	294	211	264	206	437	214	245	1,871
924	9	113	81	101	79	168	82	94	719
925	9	387	278	347	272	575	281	322	2,461
1001	10	0	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0	0
1003	10	0	0	0	0	0	0	0	0
1004	10	0	0	0	0	0	0	0	0
1005	10	0	0	0	0	0	0	0	0
1006	10	0	0	0	0	0	0	0	0
1007	10	0	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0	0
1009	10	0	0	0	0	0	0	0	0
1010	10	0	0	0	0	0	0	0	0
1011	10	0	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0	0
1101	11	0	0	0	0	0	0	0	0
1102	11	0	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0	0
1105	11	0	0	0	0	0	0	0	0
1106	11	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
1107	11	0	0	0	0	0	0	0	0
1108	11	0	0	0	0	0	0	0	0
1109	11	0	0	0	0	0	0	0	0
1110	11	0	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0	0
1112	11	0	0	0	0	0	0	0	0
1113	11	0	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0	0
1201	12	0	0	0	0	0	0	0	0
1301	13	302	239	275	220	446	225	308	2,016
1302	13	304	240	276	221	448	226	310	2,025
1303	13	520	411	473	379	768	387	531	3,470
1304	13	240	189	218	175	354	178	244	1,598
1305	13	0	0	0	0	0	0	0	0
1306	13	0	0	0	0	0	0	0	0
1307	13	0	0	0	0	0	0	0	0
1308	13	0	0	0	0	0	0	0	0
1309	13	0	0	0	0	0	0	0	0
1310	13	0	0	0	0	0	0	0	0
1311	13	0	0	0	0	0	0	0	0
2101	21	7	6	4	5	18	5	0	45
2102	21	6	5	2	4	13	3	0	34
2103	21	0	0	0	0	0	0	0	0

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2104	21	0	0	0	0	0	0	0	0
2105	21	0	0	0	0	0	0	0	0
2106	21	322	139	269	177	185	35	63	1,191
2107	21	230	100	193	127	132	25	45	852
2201	22	0	0	0	0	0	0	0	0
2202	22	19	13	7	11	36	9	0	94
2203	22	0	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0	0
2302	23	0	0	0	0	0	0	0	0
2303	23	0	0	0	0	0	0	0	0
2304	23	0	0	0	0	1	0	0	3
2401	24	0	0	0	0	0	0	0	0
2402	24	0	0	0	0	0	0	0	0
2403	24	3	3	2	3	7	3	0	21
2404	24	0	0	0	0	0	0	0	0
2405	24	0	0	0	0	0	0	0	0
2501	25	0	0	0	0	0	0	0	0
2502	25	0	0	0	0	0	0	0	0
2503	25	0	0	0	0	0	0	0	0
2504	25	0	0	0	0	0	0	0	0
2505	25	0	0	0	0	0	0	0	0
2601	26	0	0	0	0	0	0	0	0
2602	26	14	8	7	11	34	20	0	93
2603	26	27	19	22	18	42	11	0	138

H.1 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2604	26	2	1	1	1	6	6	0	17
2605	26	10	6	6	9	37	35	0	103
2606	26	3	3	2	2	7	3	0	19
2607	26	0	0	0	0	0	0	0	0
2608	26	78	43	80	47	61	14	0	323
2701	27	0	0	0	0	0	0	0	0
2702	27	0	0	0	0	0	0	0	0
3101	31	0	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0	0
INTERNAL		**2,742**	**2,109**	**2,482**	**1,976**	**4,055**	**2,027**	**2,647**	**18,038**
EXTERNAL		**721**	**345**	**595**	**414**	**579**	**169**	**108**	**2,932**
TOTAL		**3,463**	**2,454**	**3,077**	**2,391**	**4,634**	**2,196**	**2,755**	**20,970**

H.2 FORECASTED POPULATION BY AGE GROUP – 130K HORIZON

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
101	1	408	323	369	298	616	305	415	2,735
102	1	190	146	169	138	285	147	190	1,266
103	1	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0
105	1	2	0	0	0	4	2	0	8
201	2	0	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0	0
206	2	0	0	0	1	1	0	0	2
207	2	0	0	0	0	0	4	0	4
301	3	215	164	197	158	296	59	85	1,174
302	3	191	183	194	106	207	27	88	996
303	3	0	0	0	0	0	0	0	0
304	3	124	101	115	90	251	103	181	965
305	3	232	165	189	148	293	71	222	1,320
306	3	184	149	164	106	205	48	253	1,109
307	3	141	88	133	99	163	46	221	891
308	3	89	94	160	89	208	184	122	946
309	3	384	405	451	220	340	39	139	1,978
310	3	168	163	170	118	166	16	102	903

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
311	3	0	0	0	0	0	0	0	0
401	4	205	143	160	122	217	81	150	1,078
402	4	0	0	0	0	0	0	0	0
403	4	202	120	174	154	203	39	123	1,015
404	4	0	0	0	0	0	0	0	0
405	4	144	158	147	122	305	94	262	1,232
406	4	0	0	0	0	0	0	0	0
407	4	121	85	97	81	184	90	229	887
408	4	0	0	0	0	0	0	7	7
409	4	151	123	102	89	201	60	88	814
410	4	0	0	0	0	0	0	0	0
411	4	80	71	62	59	143	116	54	585
412	4	0	0	0	0	0	0	0	0
413	4	38	89	46	25	47	15	111	371
414	4	36	42	42	29	89	62	79	379
415	4	46	45	42	42	112	179	54	520
416	4	0	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0	0
418	4	0	0	0	0	2	0	0	2
419	4	0	0	0	0	0	0	0	0
420	4	43	33	23	30	116	75	53	373
421	4	0	0	0	0	0	0	0	0
422	4	0	0	1	2	10	53	7	73
423	4	0	0	0	0	0	0	0	0

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
424	4	246	164	187	193	298	118	314	1,520
425	4	0	26	22	21	52	52	69	242
426	4	40	34	34	30	84	114	34	370
501	5	143	128	159	87	184	39	72	812
502	5	180	120	150	103	255	90	77	975
503	5	0	0	0	0	0	0	0	0
504	5	68	38	46	41	93	25	108	419
505	5	64	68	66	60	134	90	223	705
506	5	118	72	84	72	164	86	27	623
507	5	85	47	64	59	157	119	95	626
508	5	77	75	78	44	69	15	194	552
509	5	420	298	432	320	538	122	118	2,248
510	5	0	0	0	0	0	0	0	0
511	5	110	106	105	73	147	38	135	714
512	5	84	98	74	63	145	117	191	772
513	5	123	109	118	81	111	24	136	702
514	5	97	102	94	65	157	42	116	673
515	5	103	128	129	77	146	42	146	771
516	5	45	62	44	40	144	193	182	710
601	6	15	33	28	31	55	41	182	385
602	6	332	188	313	262	411	97	207	1,810
603	6	11	7	4	8	12	13	10	65
604	6	101	85	108	66	188	153	202	903
605	6	27	12	16	14	11	0	153	233

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
606	6	104	136	84	68	132	52	139	715
607	6	79	87	79	47	116	82	131	621
608	6	71	81	78	43	121	96	94	584
609	6	42	86	45	33	104	84	100	494
610	6	11	25	12	12	26	181	5	272
611	6	0	0	0	0	0	0	0	0
612	6	30	133	92	57	153	88	201	754
613	6	40	124	99	58	139	78	182	720
614	6	3	12	22	12	28	17	9	103
615	6	0	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0	0
617	6	31	63	68	27	107	323	259	878
618	6	52	39	65	44	78	109	38	425
619	6	0	0	0	0	0	0	0	0
620	6	51	110	101	61	147	102	203	775
621	6	50	74	56	34	88	71	127	500
622	6	82	63	68	51	181	106	127	678
623	6	0	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	53	53
701	7	64	69	71	61	121	41	46	473
702	7	48	57	65	58	169	92	64	553
703	7	102	176	174	103	212	160	121	1,048
704	7	4	14	14	11	22	6	115	186

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
705	7	24	20	29	12	34	39	174	332
706	7	0	0	0	0	0	0	0	0
707	7	12	9	10	2	16	6	13	68
708	7	15	24	41	14	61	117	69	341
709	7	0	24	15	5	44	64	57	209
710	7	1	17	23	8	26	18	31	124
711	7	3	11	20	20	29	9	47	139
712	7	1	1	1	0	2	0	0	5
713	7	0	0	1	1	37	213	33	285
714	7	0	0	0	0	0	0	0	0
715	7	0	0	0	1	19	22	5	47
716	7	0	0	0	0	0	0	0	0
717	7	72	58	73	56	118	58	114	549
718	7	1	4	3	7	25	177	20	237
801	8	74	56	74	73	163	107	89	636
802	8	100	129	104	69	194	99	78	773
803	8	136	116	102	92	227	129	34	836
804	8	108	99	104	84	191	92	36	714
805	8	67	56	42	46	114	53	75	453
806	8	73	72	78	40	115	42	70	490
807	8	35	47	49	37	115	47	157	487
808	8	33	34	50	38	176	481	172	984
809	8	74	89	95	58	144	53	159	672
810	8	95	85	84	69	183	108	102	726

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
811	8	36	37	35	25	55	10	57	255
812	8	99	76	89	55	139	78	53	589
813	8	110	66	85	60	188	106	70	685
814	8	84	76	63	68	151	101	67	610
815	8	135	68	74	95	182	108	58	720
901	9	80	73	83	70	172	40	104	622
902	9	105	100	100	61	137	64	94	661
903	9	187	143	151	116	287	220	160	1,264
904	9	135	93	95	84	225	76	92	800
905	9	133	77	94	91	261	121	121	898
906	9	124	48	64	94	255	144	128	857
907	9	121	71	83	106	223	106	121	831
908	9	115	72	117	58	149	93	149	753
909	9	127	133	93	94	274	106	53	880
910	9	140	107	129	84	208	47	107	822
911	9	157	85	102	108	261	107	132	952
912	9	142	53	56	98	230	155	70	804
913	9	153	57	124	119	212	83	197	945
914	9	88	108	83	98	165	291	186	1,019
915	9	0	0	0	0	0	0	0	0
916	9	268	255	355	174	299	133	221	1,705
917	9	228	134	256	151	185	25	75	1,054
918	9	11	2	6	5	20	8	0	52
919	9	3	0	2	2	1	0	0	8

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
920	9	86	35	87	67	67	10	22	374
921	9	2	1	2	0	0	0	0	5
922	9	99	167	142	92	101	25	80	706
923	9	294	211	264	206	437	214	245	1,871
924	9	187	117	186	116	266	101	124	1,098
925	9	387	278	347	272	575	281	322	2,461
1001	10	100	67	80	57	192	72	194	762
1002	10	100	82	76	70	228	92	233	881
1003	10	126	72	48	91	265	166	72	840
1004	10	125	69	70	80	214	72	167	797
1005	10	160	100	105	91	256	95	60	867
1006	10	148	95	74	107	268	120	71	883
1007	10	196	92	158	168	301	124	85	1,124
1008	10	239	96	202	171	253	46	105	1,112
1009	10	0	0	0	0	0	0	0	0
1010	10	98	70	65	78	169	57	36	573
1011	10	294	236	258	214	252	54	117	1,425
1012	10	313	112	182	213	280	57	388	1,545
1101	11	0	0	0	0	0	2	0	2
1102	11	115	63	56	95	261	128	69	787
1103	11	165	55	105	102	259	66	77	829
1104	11	226	114	143	186	314	72	55	1,110
1105	11	169	132	145	137	260	252	63	1,158
1106	11	244	112	90	190	316	82	120	1,154

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
1107	11	198	116	137	167	193	41	83	935
1108	11	106	131	129	69	111	18	145	709
1109	11	200	181	209	150	221	75	176	1,212
1110	11	233	201	278	192	268	53	205	1,430
1111	11	321	130	210	276	358	148	249	1,692
1112	11	247	92	199	190	214	47	62	1,051
1113	11	6	6	4	6	35	9	2	68
1114	11	332	171	299	231	320	60	379	1,792
1115	11	313	275	344	189	284	63	370	1,838
1201	12	0	0	0	0	0	0	0	0
1301	13	302	239	275	220	452	226	309	2,024
1302	13	304	240	276	221	450	226	310	2,027
1303	13	523	413	473	381	772	389	531	3,483
1304	13	240	189	218	175	356	178	244	1,600
1305	13	1	2	2	2	8	3	0	18
1306	13	0	2	0	1	3	3	0	9
1307	13	0	0	0	0	2	0	4	6
1308	13	0	1	0	1	1	0	0	3
1309	13	4	1	2	2	5	4	0	18
1310	13	0	0	0	0	1	1	0	2
1311	13	2	4	6	3	7	4	0	26
2101	21	41	32	23	30	100	28	0	254
2102	21	36	26	13	25	76	15	0	191
2103	21	0	0	0	0	0	0	0	0

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2104	21	0	0	0	0	0	0	0	0
2105	21	0	0	0	0	0	0	0	0
2106	21	1,821	788	1,523	1,001	1,047	199	357	6,735
2107	21	1,302	563	1,089	716	749	142	255	4,817
2201	22	0	0	0	0	0	0	0	0
2202	22	105	73	41	60	202	50	0	532
2203	22	0	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0	0
2302	23	0	0	0	0	0	0	0	0
2303	23	0	0	0	0	0	0	0	0
2304	23	2	2	2	2	6	3	0	17
2401	24	0	0	0	0	0	0	0	0
2402	24	0	0	0	0	0	0	0	0
2403	24	16	16	12	16	41	18	0	118
2404	24	0	0	0	0	0	0	0	0
2405	24	0	0	0	0	0	0	0	0
2501	25	0	0	0	0	0	0	0	0
2502	25	0	0	0	0	0	0	0	0
2503	25	0	0	0	0	0	0	0	0
2504	25	0	0	0	0	0	0	0	0
2505	25	0	0	0	0	0	0	0	0
2601	26	0	0	0	0	0	0	0	0
2602	26	80	43	40	59	190	114	1	527
2603	26	155	107	123	99	236	64	0	783

H.2 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2604	26	10	6	5	8	35	33	0	98
2605	26	57	37	33	49	212	196	0	583
2606	26	15	15	12	9	38	16	0	105
2607	26	0	0	0	0	0	0	0	0
2608	26	439	245	451	267	345	78	0	1,825
2701	27	0	0	0	0	0	0	0	0
2702	27	0	0	0	0	0	0	0	0
3101	31	0	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0	0
INTERNAL		**17,658**	**13,895**	**16,038**	**12,843**	**26,071**	**13,127**	**17,863**	**117,495**
EXTERNAL		**4,079**	**1,953**	**3,366**	**2,342**	**3,275**	**956**	**613**	**16,585**
TOTAL		**21,737**	**15,848**	**19,404**	**15,186**	**29,346**	**14,082**	**18,476**	**134,079**

H.3 ADDITIONAL EMPLOYEES BY EMPLOYMENT CATEGORY FROM DEVELOPMENT – 130K HORIZON

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
101	1	54	285	0	85	0	0	424
102	1	88	1,381	61	0	0	0	1,531
103	1	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0
105	1	0	0	0	0	0	0	0
201	2	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0
206	2	0	0	0	0	0	0	0
207	2	0	0	0	0	0	0	0
301	3	0	0	0	0	0	0	0
302	3	0	0	0	0	0	0	0
303	3	0	0	0	0	0	0	0
304	3	0	0	0	0	0	0	0
305	3	0	0	0	0	0	0	0
306	3	0	0	0	0	0	0	0
307	3	0	0	0	0	0	0	0
308	3	0	0	0	0	0	0	0
309	3	0	0	0	0	0	0	0
310	3	0	0	0	0	0	0	0
311	3	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
401	4	0	0	0	0	0	0	0
402	4	0	0	0	0	0	0	0
403	4	0	0	0	0	0	0	0
404	4	0	0	0	0	0	0	0
405	4	0	0	0	0	0	0	0
406	4	0	0	0	0	0	0	0
407	4	0	0	0	0	0	0	0
408	4	0	0	0	0	0	0	0
409	4	0	0	0	0	0	0	0
410	4	0	0	0	0	0	0	0
411	4	0	0	0	0	0	0	0
412	4	0	0	0	0	0	0	0
413	4	0	0	0	0	0	0	0
414	4	0	0	0	0	0	0	0
415	4	0	0	0	0	0	0	0
416	4	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0
418	4	0	0	0	0	0	0	0
419	4	0	0	0	0	0	0	0
420	4	0	0	0	0	0	0	0
421	4	0	0	0	0	0	0	0
422	4	0	0	0	0	0	0	0
423	4	0	0	0	0	0	0	0
424	4	0	0	0	0	0	0	0
425	4	0	0	0	0	0	0	0
426	4	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
502	5	0	0	0	0	0	0	0
503	5	0	0	0	0	0	0	0
504	5	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0
507	5	0	0	0	0	0	0	0
508	5	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0
510	5	0	0	0	0	0	0	0
511	5	0	0	0	0	0	0	0
512	5	0	0	0	0	0	0	0
513	5	0	0	0	0	0	0	0
514	5	0	0	0	0	0	0	0
515	5	0	0	0	0	0	0	0
516	5	0	0	0	0	0	0	0
601	6	0	0	0	0	0	0	0
602	6	0	0	0	0	0	0	0
603	6	0	0	0	0	0	0	0
604	6	0	0	0	0	0	0	0
605	6	0	0	0	0	0	0	0
606	6	0	0	0	0	0	0	0
607	6	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0
609	6	0	0	0	0	0	0	0
610	6	0	0	0	0	0	0	0
611	6	0	0	0	0	0	0	0
612	6	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
613	6	0	0	0	0	0	0	0
614	6	0	0	0	0	0	0	0
615	6	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0
617	6	0	0	0	0	0	0	0
618	6	0	0	0	0	0	0	0
619	6	0	0	0	0	0	0	0
620	6	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0
623	6	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	0
701	7	0	0	0	0	0	0	0
702	7	0	0	0	0	0	0	0
703	7	0	0	0	0	0	0	0
704	7	0	0	0	0	0	0	0
705	7	0	0	0	0	0	0	0
706	7	0	0	0	0	0	0	0
707	7	0	0	0	0	0	0	0
708	7	0	0	0	0	0	0	0
709	7	0	0	0	0	0	0	0
710	7	0	0	0	0	0	0	0
711	7	0	0	0	0	0	0	0
712	7	0	0	0	0	0	0	0
713	7	0	0	0	0	0	0	0
714	7	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
715	7	0	0	0	0	0	0	0
716	7	0	0	0	0	0	0	0
717	7	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0
801	8	0	0	0	0	0	0	0
802	8	0	0	0	0	0	0	0
803	8	0	0	0	0	0	0	0
804	8	0	0	0	0	0	0	0
805	8	0	0	0	0	0	0	0
806	8	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0
808	8	0	0	0	0	0	0	0
809	8	0	0	0	0	0	0	0
810	8	0	0	0	0	0	0	0
811	8	0	0	0	0	0	0	0
812	8	0	0	0	0	0	0	0
813	8	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0
815	8	0	0	0	0	0	0	0
901	9	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0
907	9	0	0	0	0	0	0	0
908	9	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
909	9	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0
911	9	0	0	0	0	0	0	0
912	9	0	0	0	0	0	0	0
913	9	0	0	0	0	0	0	0
914	9	0	0	0	0	0	0	0
915	9	0	0	0	0	0	0	0
916	9	0	0	0	0	0	0	0
917	9	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0
920	9	0	0	0	0	0	0	0
921	9	0	0	0	0	0	0	0
922	9	0	0	0	0	0	0	0
923	9	0	19	0	0	0	0	19
924	9	0	19	0	0	0	0	19
925	9	0	19	0	0	50	0	69
1001	10	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0
1003	10	0	0	0	0	0	0	0
1004	10	0	0	0	0	0	0	0
1005	10	0	0	0	0	0	0	0
1006	10	0	0	0	0	0	0	0
1007	10	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0
1009	10	0	0	0	0	0	0	0
1010	10	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1011	10	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0
1101	11	0	0	0	0	0	0	0
1102	11	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0
1105	11	0	0	0	0	0	0	0
1106	11	0	0	0	0	0	0	0
1107	11	0	0	0	0	0	0	0
1108	11	0	0	0	0	0	0	0
1109	11	0	0	0	0	0	0	0
1110	11	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0
1112	11	0	0	0	0	0	0	0
1113	11	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0
1201	12	0	0	0	0	0	0	0
1301	13	0	39	0	0	0	0	39
1302	13	0	13	0	0	0	0	13
1303	13	11	70	0	0	50	0	131
1304	13	0	0	0	0	218	0	218
1305	13	0	0	0	0	0	0	0
1306	13	0	0	0	0	0	0	0
1307	13	0	0	0	0	0	0	0
1308	13	0	0	0	0	0	0	0
1309	13	0	0	0	0	0	0	0

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1310	13	0	0	0	0	0	0	0
1311	13	0	0	0	0	0	0	0
2101	21	0	0	0	0	0	0	0
2102	21	0	0	0	0	0	0	0
2103	21	0	0	278	0	0	0	278
2104	21	0	0	115	0	0	0	115
2105	21	0	0	213	0	0	0	213
2106	21	11	14	44	8	9	15	102
2107	21	21	27	81	15	17	28	189
2201	22	0	0	0	0	0	0	0
2202	22	0	0	0	0	0	0	0
2203	22	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0
2302	23	0	0	162	0	0	0	162
2303	23	0	0	65	0	0	0	65
2304	23	0	0	0	0	0	0	0
2401	24	0	38	0	0	0	0	38
2402	24	0	7	0	0	0	0	7
2403	24	0	0	123	0	0	0	123
2404	24	0	0	24	0	0	0	24
2405	24	0	7	0	0	0	0	7
2501	25	0	35	0	0	31	0	66
2502	25	0	33	0	0	0	0	33
2503	25	0	14	0	0	0	0	14
2504	25	0	24	0	0	9	0	33
2505	25	0	0	0	0	0	0	0
2601	26	0	0	0	0	36	0	36

H.3 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2602	26	17	1	17	1	0	0	37
2603	26	0	1	17	0	0	0	18
2604	26	0	0	0	0	0	0	0
2605	26	0	0	0	0	0	0	0
2606	26	0	0	0	0	0	0	0
2607	26	0	0	0	0	0	0	0
2608	26	0	15	0	22	0	0	36
2701	27	0	0	182	0	0	0	182
2702	27	0	0	226	0	0	0	226
3101	31	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0
INTERNAL		**153**	**1,846**	**61**	**85**	**318**	**0**	**2,463**
EXTERNAL		**50**	**216**	**1,548**	**46**	**102**	**44**	**2,005**
TOTAL		**203**	**2,062**	**1,609**	**131**	**420**	**44**	**4,468**

H.4 ADDITIONAL EMPLOYEES BY EMPLOYMENT CATEGORY FROM OCCUPANCY UPTAKE – 130K HORIZON

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
101	1	0	0	0	0	0	0	0
102	1	0	0	14	0	0	0	14
103	1	0	0	1	0	0	0	1
104	1	0	0	44	0	0	0	44
105	1	0	0	0	0	0	0	0
201	2	0	0	24	0	0	0	24
202	2	0	0	148	0	0	0	148
203	2	0	0	274	0	0	0	274
204	2	0	6	63	0	0	0	69
205	2	0	25	24	0	0	0	49
206	2	0	2	0	0	0	0	2
207	2	0	2	0	0	0	0	2
301	3	0	0	0	0	0	0	0
302	3	0	1	0	0	0	0	1
303	3	1	22	2	0	0	0	25
304	3	0	0	0	0	0	0	0
305	3	0	0	0	0	0	0	0
306	3	0	1	0	0	0	0	1
307	3	0	0	0	0	0	0	0
308	3	0	0	0	0	0	0	0
309	3	0	0	19	0	0	0	19
310	3	0	1	0	0	0	0	1
311	3	0	0	18	0	0	0	18
401	4	0	0	0	0	0	0	0
402	4	0	10	0	0	0	0	10

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
403	4	0	0	0	0	0	0	0
404	4	0	2	0	0	0	0	2
405	4	0	0	0	0	0	0	0
406	4	0	5	5	0	0	0	10
407	4	0	0	0	0	0	0	0
408	4	0	32	0	0	0	0	32
409	4	0	0	0	0	0	0	0
410	4	0	14	3	0	0	0	17
411	4	0	0	0	0	0	0	0
412	4	0	23	2	0	0	0	25
413	4	0	17	0	0	0	0	17
414	4	0	0	0	0	0	0	0
415	4	0	0	0	0	0	0	0
416	4	0	20	49	0	0	0	69
417	4	1	0	37	0	0	0	38
418	4	1	23	110	0	0	0	134
419	4	0	0	150	0	0	0	150
420	4	0	0	0	0	0	0	0
421	4	0	14	0	0	0	0	14
422	4	0	44	0	0	0	0	44
423	4	5	4	32	0	0	0	41
424	4	0	0	0	0	0	0	0
425	4	0	6	0	0	0	0	6
426	4	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0
502	5	1	2	0	0	0	0	3
503	5	0	0	16	0	0	0	16
504	5	0	0	0	0	0	0	0

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
505	5	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0
507	5	0	0	0	0	0	0	0
508	5	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0
510	5	1	52	13	0	0	0	66
511	5	0	0	0	0	0	0	0
512	5	1	5	0	0	0	0	6
513	5	0	0	0	0	0	0	0
514	5	0	0	0	0	0	0	0
515	5	0	1	0	0	0	0	1
516	5	0	0	0	0	0	0	0
601	6	13	5	0	0	0	0	18
602	6	0	0	0	0	0	0	0
603	6	0	0	0	0	0	0	0
604	6	0	0	0	0	0	0	0
605	6	0	8	0	0	0	0	8
606	6	0	0	0	0	0	0	0
607	6	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0
609	6	0	0	0	0	0	0	0
610	6	0	0	0	0	0	0	0
611	6	0	0	0	0	0	0	0
612	6	0	1	0	0	0	0	1
613	6	0	34	0	0	0	0	34
614	6	0	22	0	0	0	0	22
615	6	0	23	0	0	0	0	23
616	6	2	30	0	0	0	0	32

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
617	6	0	16	0	0	0	0	16
618	6	6	52	0	0	0	0	58
619	6	0	62	0	0	0	0	62
620	6	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0
623	6	0	19	0	0	0	0	19
624	6	0	12	0	0	0	0	12
625	6	0	0	0	0	0	0	0
701	7	0	0	0	0	0	0	0
702	7	0	0	0	0	0	0	0
703	7	4	2	0	0	0	0	6
704	7	49	23	0	0	0	0	72
705	7	0	0	0	0	0	0	0
706	7	3	10	0	0	0	0	13
707	7	0	0	0	0	0	0	0
708	7	24	45	0	0	0	0	69
709	7	3	0	0	0	0	0	3
710	7	13	6	0	0	0	0	19
711	7	26	26	0	0	0	0	52
712	7	4	23	0	0	0	0	27
713	7	0	5	0	0	0	0	5
714	7	5	3	2	0	0	0	10
715	7	6	8	11	0	0	0	25
716	7	3	28	25	0	0	0	56
717	7	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0
801	8	0	0	0	0	0	0	0

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
802	8	0	0	0	0	0	0	0
803	8	0	0	0	0	0	0	0
804	8	0	0	0	0	0	0	0
805	8	0	0	0	0	0	0	0
806	8	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0
808	8	0	0	0	0	0	0	0
809	8	0	0	0	0	0	0	0
810	8	0	0	0	0	0	0	0
811	8	0	0	0	0	0	0	0
812	8	0	3	0	0	0	0	3
813	8	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0
815	8	0	0	0	0	0	0	0
901	9	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0
907	9	0	1	0	0	0	0	1
908	9	0	1	0	0	0	0	1
909	9	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0
911	9	0	0	0	0	0	0	0
912	9	0	1	0	0	0	0	1
913	9	0	0	0	0	0	0	0
914	9	0	0	0	0	0	0	0

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
915	9	0	0	0	0	0	0	0
916	9	0	6	0	0	0	0	6
917	9	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0
920	9	0	0	0	0	0	0	0
921	9	1	0	0	0	0	0	1
922	9	2	0	0	0	0	0	2
923	9	0	0	0	0	0	0	0
924	9	0	0	0	0	0	0	0
925	9	0	0	0	0	0	0	0
1001	10	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0
1003	10	0	0	0	0	0	0	0
1004	10	0	0	0	0	0	0	0
1005	10	0	6	0	0	0	0	6
1006	10	0	0	0	0	0	0	0
1007	10	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0
1009	10	0	0	0	0	0	0	0
1010	10	0	0	0	0	0	0	0
1011	10	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0
1101	11	0	0	0	0	0	0	0
1102	11	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0
1105	11	0	7	0	0	0	0	7

H.4 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1106	11	0	1	0	0	0	0	1
1107	11	0	0	0	0	0	0	0
1108	11	0	0	0	0	0	0	0
1109	11	0	1	0	0	0	0	1
1110	11	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0
1112	11	0	0	0	0	0	0	0
1113	11	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0
1201	12	0	0	0	0	0	0	0
1301	13	0	0	0	0	0	0	0
1302	13	0	0	0	0	0	0	0
1303	13	0	0	0	0	0	0	0
1304	13	0	0	0	0	0	0	0
1305	13	0	0	0	0	0	0	0
1306	13	0	0	0	0	0	0	0
1307	13	0	0	0	0	0	0	0
1308	13	0	0	0	0	0	0	0
1309	13	0	0	0	0	0	0	0
1310	13	0	0	0	0	0	0	0
1311	13	0	0	0	0	0	0	0
INTERNAL		**175**	**824**	**1,086**	**0**	**0**	**0**	**2,085**
TOTAL		**175**	**824**	**1,086**	**0**	**0**	**0**	**2,085**

H.5 FORECASTED EMPLOYEES BY EMPLOYMENT CATEGORY – 130K HORIZON

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
101	1	54	285	0	85	0	0	424
102	1	88	1,381	162	0	0	0	1,632
103	1	0	0	32	0	0	0	32
104	1	0	3	380	0	0	0	383
105	1	0	0	0	0	0	0	0
201	2	0	0	263	0	0	0	263
202	2	0	0	1,572	0	0	0	1,572
203	2	15	0	3,031	0	0	0	3,046
204	2	0	94	1,135	25	0	0	1,254
205	2	0	356	433	0	0	0	789
206	2	0	33	1,423	0	0	0	1,456
207	2	0	29	558	10	0	0	597
301	3	0	0	0	0	0	0	0
302	3	0	10	0	0	0	0	10
303	3	93	322	37	0	0	0	452
304	3	0	3	0	0	0	0	3
305	3	0	0	0	0	0	0	0
306	3	0	10	0	0	83	0	93
307	3	0	0	0	0	24	0	24
308	3	0	0	0	0	0	0	0
309	3	0	0	211	136	0	0	347
310	3	0	11	0	0	0	0	11
311	3	0	0	176	0	0	0	176
401	4	0	0	0	0	0	0	0
402	4	0	149	0	0	0	0	149

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
403	4	0	0	0	0	0	0	0
404	4	0	18	0	0	0	0	18
405	4	0	0	0	0	44	0	44
406	4	55	57	38	0	0	0	150
407	4	0	0	0	0	0	0	0
408	4	0	487	0	0	0	0	487
409	4	0	0	0	0	0	0	0
410	4	0	188	218	0	0	0	406
411	4	0	0	0	0	0	0	0
412	4	0	323	157	0	0	0	480
413	4	0	251	0	0	0	0	251
414	4	0	0	0	0	0	0	0
415	4	0	0	0	0	18	0	18
416	4	120	291	659	0	0	0	1,070
417	4	30	0	293	0	0	0	323
418	4	108	343	1,256	0	0	0	1,707
419	4	0	0	1,732	0	0	0	1,732
420	4	0	0	0	0	0	0	0
421	4	0	200	0	0	0	0	200
422	4	0	656	0	0	0	0	656
423	4	179	50	1,174	0	0	0	1,403
424	4	0	0	0	49	0	0	49
425	4	0	368	0	0	0	0	368
426	4	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0
502	5	63	24	0	92	110	0	289
503	5	0	0	246	0	0	0	246

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
504	5	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0
507	5	0	0	0	0	40	0	40
508	5	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0
510	5	44	777	193	0	0	0	1,014
511	5	0	0	0	0	31	0	31
512	5	61	100	0	0	0	0	161
513	5	0	0	0	0	0	0	0
514	5	0	0	0	0	25	0	25
515	5	0	13	0	0	0	0	13
516	5	0	3	0	2	0	0	5
601	6	513	78	0	2,256	0	0	2,847
602	6	0	0	0	0	0	0	0
603	6	0	0	0	5	0	0	5
604	6	0	0	0	0	27	0	27
605	6	0	103	0	0	0	0	103
606	6	0	0	0	0	35	0	35
607	6	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0
609	6	0	0	0	0	40	0	40
610	6	0	0	0	0	900	0	900
611	6	0	0	0	0	0	0	0
612	6	43	15	0	0	0	0	58
613	6	0	537	0	0	0	0	537
614	6	0	331	0	0	0	0	331

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
615	6	0	688	0	0	0	0	688
616	6	52	1,322	0	0	0	0	1,374
617	6	23	231	0	115	23	0	392
618	6	289	786	0	244	0	0	1,319
619	6	0	921	0	0	0	0	921
620	6	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0
623	6	0	285	0	0	0	0	285
624	6	0	183	0	0	0	1	184
625	6	0	0	0	0	0	0	0
701	7	0	2	0	0	298	0	300
702	7	0	0	0	0	0	0	0
703	7	250	30	0	0	0	0	280
704	7	2,117	320	0	37	0	64	2,538
705	7	0	0	0	0	0	0	0
706	7	106	148	0	0	67	0	321
707	7	0	0	0	0	0	0	0
708	7	1,081	693	0	45	0	0	1,819
709	7	120	0	0	107	0	0	227
710	7	481	90	0	299	0	0	870
711	7	1,222	392	0	108	0	0	1,722
712	7	164	334	0	102	0	0	600
713	7	93	77	0	0	0	0	170
714	7	199	41	17	0	0	0	257
715	7	419	109	81	4	5	0	618
716	7	233	419	205	0	0	0	857

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
717	7	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0
801	8	0	4	0	0	0	0	4
802	8	0	0	0	0	34	0	34
803	8	0	0	0	31	38	0	69
804	8	0	6	0	0	0	0	6
805	8	0	0	0	0	28	0	28
806	8	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0
808	8	0	0	0	172	0	0	172
809	8	0	5	0	0	0	0	5
810	8	0	0	0	0	82	0	82
811	8	0	0	0	0	0	0	0
812	8	0	53	0	27	111	0	191
813	8	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0
815	8	0	0	0	0	35	0	35
901	9	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0
907	9	0	11	0	0	0	0	11
908	9	0	11	0	0	0	0	11
909	9	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
911	9	0	0	0	0	0	0	0
912	9	0	17	0	0	0	0	17
913	9	90	0	0	0	0	0	90
914	9	0	0	0	0	0	0	0
915	9	0	0	0	0	0	0	0
916	9	0	249	0	0	32	0	281
917	9	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0
920	9	0	0	0	0	0	0	0
921	9	105	0	0	0	0	0	105
922	9	185	0	0	10	39	0	234
923	9	0	19	0	0	0	0	19
924	9	0	19	0	0	0	0	19
925	9	0	19	0	0	50	0	69
1001	10	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0
1003	10	20	0	0	0	0	0	20
1004	10	0	0	0	0	0	0	0
1005	10	0	83	0	0	0	0	83
1006	10	0	0	0	46	47	0	93
1007	10	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0
1009	10	0	0	0	115	281	0	396
1010	10	0	0	0	0	37	0	37
1011	10	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1101	11	0	0	0	0	0	0	0
1102	11	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0
1105	11	0	106	0	0	0	0	106
1106	11	0	13	0	0	77	0	90
1107	11	0	0	0	0	0	0	0
1108	11	0	0	0	0	0	0	0
1109	11	0	11	0	0	0	0	11
1110	11	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0
1112	11	0	0	0	0	0	0	0
1113	11	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0
1201	12	0	0	9	0	0	0	9
1301	13	0	39	20	0	0	0	59
1302	13	0	13	5	0	0	0	18
1303	13	11	70	15	0	50	0	146
1304	13	0	0	5	0	218	0	223
1305	13	0	0	75	0	0	0	75
1306	13	0	0	25	0	0	0	25
1307	13	0	0	5	0	0	0	5
1308	13	0	0	5	0	0	0	5
1309	13	0	0	20	0	0	0	20
1310	13	0	0	25	0	0	0	25
1311	13	0	0	35	0	0	0	35

H.5 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2101	21	0	0	0	0	0	0	0
2102	21	0	0	0	0	0	0	0
2103	21	0	0	1,994	0	0	0	1,994
2104	21	0	0	824	0	0	0	824
2105	21	0	0	1,527	0	0	0	1,527
2106	21	81	102	315	59	66	110	732
2107	21	150	190	585	109	122	204	1,359
2201	22	0	0	0	0	0	0	0
2202	22	0	0	0	0	0	0	0
2203	22	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0
2302	23	0	0	1,164	0	0	0	1,164
2303	23	0	0	466	0	0	0	466
2304	23	0	0	0	0	0	0	0
2401	24	0	275	0	0	0	0	275
2402	24	0	47	0	0	0	0	47
2403	24	0	0	883	0	0	0	883
2404	24	0	0	173	0	0	0	173
2405	24	0	48	0	0	0	0	48
2501	25	0	251	0	0	221	0	472
2502	25	0	239	0	0	0	0	239
2503	25	0	101	0	0	0	0	101
2504	25	0	173	0	0	65	0	238
2505	25	0	0	0	0	0	0	0
2601	26	0	0	0	0	256	0	256
2602	26	125	10	124	7	0	0	267
2603	26	0	7	122	0	0	0	129

0 Population and Employment Estimate – 130K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2604	26	0	0	0	0	0	0	0
2605	26	0	0	0	0	0	0	0
2606	26	0	0	0	0	0	0	0
2607	26	0	0	0	0	0	0	0
2608	26	0	105	0	157	0	0	261
2701	27	0	0	1,305	0	0	0	1,305
2702	27	0	0	1,624	0	0	0	1,624
3101	31	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0
INTERNAL		**8,726**	**15,719**	**15,926**	**4,122**	**2,929**	**65**	**47,488**
EXTERNAL		**356**	**1,549**	**11,106**	**331**	**730**	**314**	**14,385**
TOTAL		**9,082**	**17,268**	**27,032**	**4,453**	**3,659**	**379**	**61,872**

Appendix I POPULATION AND EMPLOYMENT ESTIMATE – 188K HORIZON

I.1 ADDITIONAL POPULATION BY AGE GROUP FROM DEVELOPMENT – 188K HORIZON

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
101	1	1,491	1,178	1,355	1,087	2,201	1,110	1,521	9,944
102	1	208	165	189	152	307	155	213	1,389
103	1	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0
105	1	740	584	672	539	1,092	550	755	4,932
201	2	0	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0	0
206	2	0	0	0	0	0	0	0	0
207	2	0	0	0	0	0	0	0	0
301	3	0	0	0	0	0	0	0	0
302	3	0	0	0	0	0	0	0	0
303	3	0	0	0	0	0	0	0	0
304	3	0	0	0	0	0	0	0	0
305	3	0	0	0	0	0	0	0	0
306	3	0	0	0	0	0	0	0	0
307	3	0	0	0	0	0	0	0	0
308	3	0	0	0	0	0	0	0	0
309	3	0	0	0	0	0	0	0	0
310	3	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
311	3	0	0	0	0	0	0	0	0
401	4	0	0	0	0	0	0	0	0
402	4	0	0	0	0	0	0	0	0
403	4	0	0	0	0	0	0	0	0
404	4	0	0	0	0	0	0	0	0
405	4	0	0	0	0	0	0	0	0
406	4	0	0	0	0	0	0	0	0
407	4	0	0	0	0	0	0	0	0
408	4	0	0	0	0	0	0	0	0
409	4	0	0	0	0	0	0	0	0
410	4	0	0	0	0	0	0	0	0
411	4	0	0	0	0	0	0	0	0
412	4	0	0	0	0	0	0	0	0
413	4	0	0	0	0	0	0	0	0
414	4	0	0	0	0	0	0	0	0
415	4	0	0	0	0	0	0	0	0
416	4	0	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0	0
418	4	0	0	0	0	0	0	0	0
419	4	0	0	0	0	0	0	0	0
420	4	0	0	0	0	0	0	0	0
421	4	0	0	0	0	0	0	0	0
422	4	0	0	0	0	0	0	0	0
423	4	0	0	0	0	0	0	0	0
424	4	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
425	4	0	0	0	0	0	0	0	0
426	4	0	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0	0
502	5	0	0	0	0	0	0	0	0
503	5	0	0	0	0	0	0	0	0
504	5	0	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0	0
507	5	0	0	0	0	0	0	0	0
508	5	0	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0	0
510	5	0	0	0	0	0	0	0	0
511	5	0	0	0	0	0	0	0	0
512	5	0	0	0	0	0	0	0	0
513	5	0	0	0	0	0	0	0	0
514	5	0	0	0	0	0	0	0	0
515	5	0	0	0	0	0	0	0	0
516	5	0	0	0	0	0	0	0	0
601	6	0	0	0	0	0	0	0	0
602	6	0	0	0	0	0	0	0	0
603	6	0	0	0	0	0	0	0	0
604	6	0	0	0	0	0	0	0	0
605	6	0	0	0	0	0	0	0	0
606	6	0	0	0	0	0	0	0	0
607	6	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
608	6	0	0	0	0	0	0	0	0
609	6	0	0	0	0	0	0	0	0
610	6	0	0	0	0	0	0	0	0
611	6	168	202	199	138	312	252	360	1,631
612	6	0	0	0	0	0	0	0	0
613	6	0	0	0	0	0	0	0	0
614	6	0	0	0	0	0	0	0	0
615	6	0	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0	0
617	6	0	0	0	0	0	0	0	0
618	6	0	0	0	0	0	0	0	0
619	6	0	0	0	0	0	0	0	0
620	6	0	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0	0
623	6	0	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	0	0
701	7	0	0	0	0	0	0	0	0
702	7	0	0	0	0	0	0	0	0
703	7	0	0	0	0	0	0	0	0
704	7	0	0	0	0	0	0	0	0
705	7	0	0	0	0	0	0	0	0
706	7	0	0	0	0	0	0	0	0
707	7	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
708	7	0	0	0	0	0	0	0	0
709	7	0	0	0	0	0	0	0	0
710	7	0	0	0	0	0	0	0	0
711	7	0	0	0	0	0	0	0	0
712	7	0	0	0	0	0	0	0	0
713	7	0	0	0	0	0	0	0	0
714	7	0	0	0	0	0	0	0	0
715	7	392	546	610	405	1,056	1,154	1,026	5,189
716	7	0	0	0	0	0	0	0	0
717	7	0	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0	0
801	8	0	0	0	0	0	0	0	0
802	8	0	0	0	0	0	0	0	0
803	8	0	0	0	0	0	0	0	0
804	8	0	0	0	0	0	0	0	0
805	8	0	0	0	0	0	0	0	0
806	8	0	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0	0
808	8	8	7	7	5	14	10	8	58
809	8	0	0	0	0	0	0	0	0
810	8	0	0	0	0	0	0	0	0
811	8	0	0	0	0	0	0	0	0
812	8	0	0	0	0	0	0	0	0
813	8	0	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
815	8	0	0	0	0	0	0	0	0
901	9	0	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0	0
907	9	0	0	0	0	0	0	0	0
908	9	0	0	0	0	0	0	0	0
909	9	0	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0	0
911	9	0	0	0	0	0	0	0	0
912	9	0	0	0	0	0	0	0	0
913	9	0	0	0	0	0	0	0	0
914	9	0	0	0	0	0	0	0	0
915	9	94	68	85	66	140	69	78	600
916	9	113	81	101	79	168	82	94	719
917	9	46	33	41	32	68	33	38	291
918	9	0	0	0	0	0	0	0	0
919	9	138	99	123	97	204	100	114	875
920	9	138	99	123	97	204	100	114	875
921	9	220	158	197	154	326	160	182	1,396
922	9	0	0	0	0	0	0	0	0
923	9	294	211	264	206	437	214	245	1,871
924	9	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
925	9	387	278	347	272	575	281	322	2,461
1001	10	0	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0	0
1003	10	0	0	0	0	0	0	0	0
1004	10	0	0	0	0	0	0	0	0
1005	10	0	0	0	0	0	0	0	0
1006	10	0	0	0	0	0	0	0	0
1007	10	0	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0	0
1009	10	0	0	0	0	0	0	0	0
1010	10	0	0	0	0	0	0	0	0
1011	10	0	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0	0
1101	11	185	115	151	140	220	72	132	1,015
1102	11	0	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0	0
1105	11	0	0	0	0	0	0	0	0
1106	11	0	0	0	0	0	0	0	0
1107	11	0	0	0	0	0	0	0	0
1108	11	184	114	150	139	218	71	131	1,007
1109	11	0	0	0	0	0	0	0	0
1110	11	0	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0	0
1112	11	2	1	1	1	2	1	1	9

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
1113	11	0	0	0	0	0	0	0	0
1114	11	41	25	33	31	49	16	29	224
1115	11	79	49	64	60	93	31	56	431
1201	12	0	0	0	0	0	0	0	0
1301	13	302	239	275	220	446	225	308	2,016
1302	13	304	240	276	221	448	226	310	2,025
1303	13	556	439	505	405	820	414	567	3,705
1304	13	240	189	218	175	354	178	244	1,598
1305	13	149	118	135	109	220	111	152	994
1306	13	1,194	944	1,085	870	1,763	889	1,218	7,964
1307	13	549	433	499	400	810	408	560	3,658
1308	13	526	416	478	383	776	391	537	3,507
1309	13	1,233	974	1,121	898	1,820	918	1,258	8,223
1310	13	1,045	826	950	761	1,542	778	1,066	6,968
1311	13	1,149	908	1,044	837	1,695	855	1,172	7,659
2101	21	21	16	11	15	50	14	0	128
2102	21	18	13	7	12	38	8	0	96
2103	21	0	0	0	0	0	0	0	0
2104	21	0	0	0	0	0	0	0	0
2105	21	0	0	0	0	0	0	0	0
2106	21	918	397	767	505	527	100	180	3,394
2107	21	656	284	549	361	377	72	129	2,427
2201	22	0	0	0	0	0	0	0	0
2202	22	53	37	21	30	102	25	0	268
2203	22	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2301	23	0	0	0	0	0	0	0	0
2302	23	0	0	0	0	0	0	0	0
2303	23	0	0	0	0	0	0	0	0
2304	23	1	1	1	1	3	1	0	8
2401	24	0	0	0	0	0	0	0	0
2402	24	0	0	0	0	0	0	0	0
2403	24	8	8	6	8	20	9	0	59
2404	24	0	0	0	0	0	0	0	0
2405	24	0	0	0	0	0	0	0	0
2501	25	0	0	0	0	0	0	0	0
2502	25	0	0	0	0	0	0	0	0
2503	25	0	0	0	0	0	0	0	0
2504	25	0	0	0	0	0	0	0	0
2505	25	0	0	0	0	0	0	0	0
2601	26	0	0	0	0	0	0	0	0
2602	26	40	22	20	30	96	57	1	266
2603	26	78	54	62	50	119	32	0	395
2604	26	5	3	3	4	18	17	0	49
2605	26	29	18	16	25	107	99	0	294
2606	26	7	7	6	5	19	8	0	53
2607	26	0	0	0	0	0	0	0	0
2608	26	221	123	227	135	174	39	0	919
2701	27	0	0	0	0	0	0	0	0
2702	27	0	0	0	0	0	0	0	0
3101	31	0	0	0	0	0	0	0	0

I.1 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
3102	31	0	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0	0
INTERNAL		**12,172**	**9,737**	**11,298**	**8,980**	**18,383**	**9,852**	**12,812**	**83,234**
EXTERNAL		**2,055**	**984**	**1,696**	**1,180**	**1,650**	**482**	**309**	**8,357**
TOTAL		**14,228**	**10,721**	**12,995**	**10,160**	**20,033**	**10,333**	**13,121**	**91,591**

I.2 FORECASTED POPULATION BY AGE GROUP – 188K HORIZON

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
101	1	1,493	1,180	1,355	1,089	2,217	1,113	1,521	9,969
102	1	223	173	199	162	334	172	224	1,487
103	1	0	0	0	0	0	0	0	0
104	1	0	0	0	0	0	0	0	0
105	1	742	584	672	539	1,096	552	755	4,940
201	2	0	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0	0
206	2	0	0	0	1	1	0	0	2
207	2	0	0	0	0	0	4	0	4
301	3	215	164	197	158	296	59	85	1,174
302	3	191	183	194	106	207	27	88	996
303	3	0	0	0	0	0	0	0	0
304	3	124	101	115	90	251	103	181	965
305	3	232	165	189	148	293	71	222	1,320
306	3	184	149	164	106	205	48	253	1,109
307	3	141	88	133	99	163	46	221	891
308	3	89	94	160	89	208	184	122	946
309	3	384	405	451	220	340	39	139	1,978
310	3	168	163	170	118	166	16	102	903
311	3	0	0	0	0	0	0	0	0

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
401	4	205	143	160	122	217	81	150	1,078
402	4	0	0	0	0	0	0	0	0
403	4	202	120	174	154	203	39	123	1,015
404	4	0	0	0	0	0	0	0	0
405	4	144	158	147	122	305	94	262	1,232
406	4	0	0	0	0	0	0	0	0
407	4	121	85	97	81	184	90	229	887
408	4	0	0	0	0	0	0	7	7
409	4	151	123	102	89	201	60	88	814
410	4	0	0	0	0	0	0	0	0
411	4	80	71	62	59	143	116	54	585
412	4	0	0	0	0	0	0	0	0
413	4	38	89	46	25	47	15	111	371
414	4	36	42	42	29	89	62	79	379
415	4	46	45	42	42	112	179	54	520
416	4	0	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0	0
418	4	0	0	0	0	2	0	0	2
419	4	0	0	0	0	0	0	0	0
420	4	43	33	23	30	116	75	53	373
421	4	0	0	0	0	0	0	0	0
422	4	0	0	1	2	10	53	7	73
423	4	0	0	0	0	0	0	0	0
424	4	246	164	187	193	298	118	314	1,520
425	4	0	26	22	21	52	52	69	242

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
426	4	40	34	34	30	84	114	34	370
501	5	143	128	159	87	184	39	72	812
502	5	180	120	150	103	255	90	77	975
503	5	0	0	0	0	0	0	0	0
504	5	68	38	46	41	93	25	108	419
505	5	64	68	66	60	134	90	223	705
506	5	118	72	84	72	164	86	27	623
507	5	85	47	64	59	157	119	95	626
508	5	77	75	78	44	69	15	194	552
509	5	420	298	432	320	538	122	118	2,248
510	5	0	0	0	0	0	0	0	0
511	5	110	106	105	73	147	38	135	714
512	5	84	98	74	63	145	117	191	772
513	5	123	109	118	81	111	24	136	702
514	5	97	102	94	65	157	42	116	673
515	5	103	128	129	77	146	42	146	771
516	5	45	62	44	40	144	193	182	710
601	6	15	33	28	31	55	41	182	385
602	6	332	188	313	262	411	97	207	1,810
603	6	11	7	4	8	12	13	10	65
604	6	101	85	108	66	188	153	202	903
605	6	27	12	16	14	11	0	153	233
606	6	104	136	84	68	132	52	139	715
607	6	79	87	79	47	116	82	131	621
608	6	71	81	78	43	121	96	94	584

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
609	6	42	86	45	33	104	84	100	494
610	6	11	25	12	12	26	181	5	272
611	6	168	202	199	138	312	252	360	1,631
612	6	30	133	92	57	153	88	201	754
613	6	40	124	99	58	139	78	182	720
614	6	3	12	22	12	28	17	9	103
615	6	0	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0	0
617	6	31	63	68	27	107	323	259	878
618	6	52	39	65	44	78	109	38	425
619	6	0	0	0	0	0	0	0	0
620	6	51	110	101	61	147	102	203	775
621	6	50	74	56	34	88	71	127	500
622	6	82	63	68	51	181	106	127	678
623	6	0	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	53	53
701	7	64	69	71	61	121	41	46	473
702	7	48	57	65	58	169	92	64	553
703	7	102	176	174	103	212	160	121	1,048
704	7	4	14	14	11	22	6	115	186
705	7	24	20	29	12	34	39	174	332
706	7	0	0	0	0	0	0	0	0
707	7	12	9	10	2	16	6	13	68
708	7	15	24	41	14	61	117	69	341

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
709	7	0	24	15	5	44	64	57	209
710	7	1	17	23	8	26	18	31	124
711	7	3	11	20	20	29	9	47	139
712	7	1	1	1	0	2	0	0	5
713	7	0	0	1	1	37	213	33	285
714	7	0	0	0	0	0	0	0	0
715	7	392	546	610	406	1,075	1,176	1,031	5,236
716	7	0	0	0	0	0	0	0	0
717	7	72	58	73	56	118	58	114	549
718	7	1	4	3	7	25	177	20	237
801	8	74	56	74	73	163	107	89	636
802	8	100	129	104	69	194	99	78	773
803	8	136	116	102	92	227	129	34	836
804	8	108	99	104	84	191	92	36	714
805	8	67	56	42	46	114	53	75	453
806	8	73	72	78	40	115	42	70	490
807	8	35	47	49	37	115	47	157	487
808	8	41	41	57	43	190	491	180	1,042
809	8	74	89	95	58	144	53	159	672
810	8	95	85	84	69	183	108	102	726
811	8	36	37	35	25	55	10	57	255
812	8	99	76	89	55	139	78	53	589
813	8	110	66	85	60	188	106	70	685
814	8	84	76	63	68	151	101	67	610
815	8	135	68	74	95	182	108	58	720

I.2 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
901	9	80	73	83	70	172	40	104	622
902	9	105	100	100	61	137	64	94	661
903	9	187	143	151	116	287	220	160	1,264
904	9	135	93	95	84	225	76	92	800
905	9	133	77	94	91	261	121	121	898
906	9	124	48	64	94	255	144	128	857
907	9	121	71	83	106	223	106	121	831
908	9	115	72	117	58	149	93	149	753
909	9	127	133	93	94	274	106	53	880
910	9	140	107	129	84	208	47	107	822
911	9	157	85	102	108	261	107	132	952
912	9	142	53	56	98	230	155	70	804
913	9	153	57	124	119	212	83	197	945
914	9	88	108	83	98	165	291	186	1,019
915	9	94	68	85	66	140	69	78	600
916	9	381	336	456	253	467	215	315	2,424
917	9	274	167	297	183	253	58	113	1,345
918	9	11	2	6	5	20	8	0	52
919	9	141	99	125	99	205	100	114	883
920	9	224	134	210	164	271	110	136	1,249
921	9	222	159	199	154	326	160	182	1,401
922	9	99	167	142	92	101	25	80	706
923	9	294	211	264	206	437	214	245	1,871
924	9	74	36	85	37	98	19	30	379
925	9	387	278	347	272	575	281	322	2,461

I.2 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
1001	10	100	67	80	57	192	72	194	762
1002	10	100	82	76	70	228	92	233	881
1003	10	126	72	48	91	265	166	72	840
1004	10	125	69	70	80	214	72	167	797
1005	10	160	100	105	91	256	95	60	867
1006	10	148	95	74	107	268	120	71	883
1007	10	196	92	158	168	301	124	85	1,124
1008	10	239	96	202	171	253	46	105	1,112
1009	10	0	0	0	0	0	0	0	0
1010	10	98	70	65	78	169	57	36	573
1011	10	294	236	258	214	252	54	117	1,425
1012	10	313	112	182	213	280	57	388	1,545
1101	11	185	115	151	140	220	74	132	1,017
1102	11	115	63	56	95	261	128	69	787
1103	11	165	55	105	102	259	66	77	829
1104	11	226	114	143	186	314	72	55	1,110
1105	11	169	132	145	137	260	252	63	1,158
1106	11	244	112	90	190	316	82	120	1,154
1107	11	198	116	137	167	193	41	83	935
1108	11	290	245	279	208	329	89	276	1,716
1109	11	200	181	209	150	221	75	176	1,212
1110	11	233	201	278	192	268	53	205	1,430
1111	11	321	130	210	276	358	148	249	1,692
1112	11	249	93	200	191	216	48	63	1,060
1113	11	6	6	4	6	35	9	2	68

I.2 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
1114	11	373	196	332	262	369	76	408	2,016
1115	11	392	324	408	249	377	94	426	2,269
1201	12	0	0	0	0	0	0	0	0
1301	13	302	239	275	220	452	226	309	2,024
1302	13	304	240	276	221	450	226	310	2,027
1303	13	559	441	505	407	824	416	567	3,718
1304	13	240	189	218	175	356	178	244	1,600
1305	13	150	120	137	111	228	114	152	1,012
1306	13	1,194	946	1,085	871	1,766	892	1,218	7,973
1307	13	549	433	499	400	812	408	564	3,664
1308	13	526	417	478	384	777	391	537	3,510
1309	13	1,237	975	1,123	900	1,825	922	1,258	8,241
1310	13	1,045	826	950	761	1,543	779	1,066	6,970
1311	13	1,151	912	1,050	840	1,702	859	1,172	7,685
2101	21	55	42	30	40	132	37	0	337
2102	21	48	35	18	33	100	20	0	254
2103	21	0	0	0	0	0	0	0	0
2104	21	0	0	0	0	0	0	0	0
2105	21	0	0	0	0	0	0	0	0
2106	21	2,416	1,045	2,021	1,329	1,389	264	474	8,939
2107	21	1,728	748	1,445	951	994	189	339	6,393
2201	22	0	0	0	0	0	0	0	0
2202	22	140	97	55	79	268	67	0	706
2203	22	0	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0	0

I.2 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
2302	23	0	0	0	0	0	0	0	0
2303	23	0	0	0	0	0	0	0	0
2304	23	3	3	2	3	8	3	0	22
2401	24	0	0	0	0	0	0	0	0
2402	24	0	0	0	0	0	0	0	0
2403	24	21	21	16	21	54	24	0	157
2404	24	0	0	0	0	0	0	0	0
2405	24	0	0	0	0	0	0	0	0
2501	25	0	0	0	0	0	0	0	0
2502	25	0	0	0	0	0	0	0	0
2503	25	0	0	0	0	0	0	0	0
2504	25	0	0	0	0	0	0	0	0
2505	25	0	0	0	0	0	0	0	0
2601	26	0	0	0	0	0	0	0	0
2602	26	106	57	54	79	252	151	2	700
2603	26	205	142	163	132	313	84	0	1,039
2604	26	13	8	7	11	47	43	0	130
2605	26	76	49	43	65	281	260	0	774
2606	26	20	20	16	13	50	21	0	139
2607	26	0	0	0	0	0	0	0	0
2608	26	583	325	598	354	458	103	0	2,421
2701	27	0	0	0	0	0	0	0	0
2702	27	0	0	0	0	0	0	0	0
3101	31	0	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0	0

I.2 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Population by Age Range							Total
		0 - 14	15 - 24	25 - 34	35 - 44	45 - 64	65+	Unknown	
3201	32	0	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0	0
INTERNAL		**27,088**	**21,523**	**24,854**	**19,847**	**40,399**	**20,952**	**28,028**	**182,691**
EXTERNAL		**5,413**	**2,592**	**4,467**	**3,108**	**4,346**	**1,269**	**814**	**22,009**
TOTAL		**32,502**	**24,115**	**29,322**	**22,955**	**44,745**	**22,220**	**28,842**	**204,700**

I.3 ADDITIONAL EMPLOYEES BY EMPLOYMENT CATEGORY FROM DEVELOPMENT – 188K HORIZON

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
101	1	100	514	188	85	99	0	986
102	1	88	2,490	868	0	0	0	3,446
103	1	0	0	0	0	0	0	0
104	1	0	0	460	0	0	0	460
105	1	0	409	0	0	0	0	409
201	2	0	0	0	0	0	0	0
202	2	0	0	0	0	0	0	0
203	2	0	0	0	0	0	0	0
204	2	0	0	0	0	0	0	0
205	2	0	0	0	0	0	0	0
206	2	0	0	1,262	0	0	0	1,262
207	2	0	0	304	0	0	0	304
301	3	0	0	0	0	0	0	0
302	3	39	184	0	0	0	0	222
303	3	0	0	0	0	0	0	0
304	3	0	0	0	0	0	0	0
305	3	0	0	0	0	0	0	0
306	3	0	0	0	0	0	0	0
307	3	0	0	0	0	0	0	0
308	3	0	0	0	0	0	0	0
309	3	0	0	0	0	0	0	0
310	3	0	0	0	0	0	0	0
311	3	0	0	0	0	0	0	0
401	4	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
402	4	0	0	0	0	0	0	0
403	4	0	0	0	0	0	0	0
404	4	0	0	0	0	0	0	0
405	4	0	0	0	0	0	0	0
406	4	0	0	0	0	0	0	0
407	4	0	0	0	0	0	0	0
408	4	0	0	0	0	0	0	0
409	4	0	0	0	0	0	0	0
410	4	0	0	0	0	0	0	0
411	4	0	0	0	0	0	0	0
412	4	0	0	0	0	0	0	0
413	4	0	0	0	0	0	0	0
414	4	0	0	0	0	0	0	0
415	4	0	0	0	0	0	0	0
416	4	0	0	0	0	0	0	0
417	4	0	0	0	0	0	0	0
418	4	0	0	0	0	0	0	0
419	4	0	0	0	0	0	0	0
420	4	0	0	0	0	0	0	0
421	4	0	0	0	0	0	0	0
422	4	0	0	0	0	0	0	0
423	4	0	0	0	0	0	0	0
424	4	0	0	0	0	0	0	0
425	4	0	0	0	0	0	0	0
426	4	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0
502	5	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
503	5	0	0	0	0	0	0	0
504	5	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0
507	5	0	0	0	0	0	0	0
508	5	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0
510	5	0	0	0	0	0	0	0
511	5	0	0	0	0	0	0	0
512	5	0	0	0	0	0	0	0
513	5	0	0	0	0	0	0	0
514	5	0	0	0	0	0	0	0
515	5	0	0	0	0	0	0	0
516	5	0	0	0	0	0	0	0
601	6	0	0	0	0	0	0	0
602	6	0	0	0	0	0	0	0
603	6	0	0	0	0	0	0	0
604	6	0	0	0	0	0	0	0
605	6	0	0	0	0	0	0	0
606	6	0	0	0	0	0	0	0
607	6	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0
609	6	0	0	0	0	0	0	0
610	6	0	0	0	0	0	0	0
611	6	122	583	0	186	0	0	891
612	6	0	0	0	0	0	0	0
613	6	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
614	6	0	0	0	0	0	0	0
615	6	0	0	0	0	0	0	0
616	6	0	0	0	0	0	0	0
617	6	0	0	0	0	0	0	0
618	6	0	0	0	0	0	0	0
619	6	0	0	0	0	0	0	0
620	6	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0
623	6	0	0	0	0	0	0	0
624	6	0	0	0	0	0	0	0
625	6	0	0	0	0	0	0	0
701	7	0	0	0	0	0	0	0
702	7	0	0	0	0	0	0	0
703	7	0	0	0	0	0	0	0
704	7	0	0	0	0	0	0	0
705	7	0	0	0	0	0	0	0
706	7	0	0	0	0	0	0	0
707	7	0	0	0	0	0	0	0
708	7	0	0	0	0	0	0	0
709	7	0	0	0	0	0	0	0
710	7	0	0	0	0	0	0	0
711	7	0	0	0	0	0	0	0
712	7	0	0	0	0	0	0	0
713	7	0	0	0	0	0	0	0
714	7	0	0	0	0	0	0	0
715	7	2,540	5,926	0	0	0	0	8,466

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
716	7	0	0	0	0	0	0	0
717	7	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0
801	8	0	0	0	0	0	0	0
802	8	0	0	0	0	0	0	0
803	8	0	0	0	0	0	0	0
804	8	0	0	0	0	0	0	0
805	8	0	0	0	0	0	0	0
806	8	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0
808	8	0	0	0	0	0	0	0
809	8	0	0	0	0	0	0	0
810	8	0	0	0	0	0	0	0
811	8	0	0	0	0	0	0	0
812	8	0	0	0	0	0	0	0
813	8	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0
815	8	0	0	0	0	0	0	0
901	9	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0
907	9	0	0	0	0	0	0	0
908	9	0	0	0	0	0	0	0
909	9	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
910	9	0	0	0	0	0	0	0
911	9	0	0	0	0	0	0	0
912	9	0	0	0	0	0	0	0
913	9	0	0	0	0	0	0	0
914	9	0	0	0	0	0	0	0
915	9	0	0	0	0	0	0	0
916	9	29	159	0	0	0	0	189
917	9	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0
920	9	18	85	0	0	0	0	103
921	9	23	108	0	0	0	0	130
922	9	24	112	0	0	0	0	136
923	9	0	19	0	0	0	0	19
924	9	0	0	0	0	0	0	0
925	9	0	19	0	0	50	0	69
1001	10	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0
1003	10	0	0	0	0	0	0	0
1004	10	0	0	0	0	0	0	0
1005	10	0	0	0	0	0	0	0
1006	10	0	0	0	0	0	0	0
1007	10	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0
1009	10	0	0	0	0	0	0	0
1010	10	0	0	0	0	0	0	0
1011	10	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1012	10	0	0	0	0	0	0	0
1101	11	0	19	0	0	0	0	19
1102	11	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0
1105	11	0	0	0	0	0	0	0
1106	11	0	0	0	0	0	0	0
1107	11	0	0	0	0	0	0	0
1108	11	23	108	0	0	0	0	131
1109	11	0	0	0	0	0	0	0
1110	11	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0
1112	11	0	447	0	0	0	0	447
1113	11	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0
1201	12	0	0	0	0	0	0	0
1301	13	0	39	0	0	0	0	39
1302	13	0	13	0	0	0	0	13
1303	13	12	77	0	0	50	0	139
1304	13	0	0	0	0	218	0	218
1305	13	0	19	0	0	0	0	19
1306	13	33	371	0	0	99	0	503
1307	13	0	39	0	0	50	0	88
1308	13	0	39	0	0	50	0	88
1309	13	42	236	0	0	99	0	377
1310	13	0	77	0	0	99	0	177

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1311	13	0	77	0	0	50	0	127
2101	21	0	0	0	0	0	0	0
2102	21	0	0	0	0	0	0	0
2103	21	0	0	764	0	0	0	764
2104	21	0	0	316	0	0	0	316
2105	21	0	0	585	0	0	0	585
2106	21	31	39	121	22	25	42	281
2107	21	57	73	224	42	47	78	521
2201	22	0	0	0	0	0	0	0
2202	22	0	0	0	0	0	0	0
2203	22	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0
2302	23	0	0	446	0	0	0	446
2303	23	0	0	179	0	0	0	179
2304	23	0	0	0	0	0	0	0
2401	24	0	105	0	0	0	0	105
2402	24	0	18	0	0	0	0	18
2403	24	0	0	338	0	0	0	338
2404	24	0	0	66	0	0	0	66
2405	24	0	18	0	0	0	0	18
2501	25	0	96	0	0	85	0	181
2502	25	0	92	0	0	0	0	92
2503	25	0	39	0	0	0	0	39
2504	25	0	66	0	0	25	0	91
2505	25	0	0	0	0	0	0	0
2601	26	0	0	0	0	98	0	98
2602	26	48	4	48	3	0	0	102

I.3 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2603	26	0	3	47	0	0	0	49
2604	26	0	0	0	0	0	0	0
2605	26	0	0	0	0	0	0	0
2606	26	0	0	0	0	0	0	0
2607	26	0	0	0	0	0	0	0
2608	26	0	40	0	60	0	0	100
2701	27	0	0	500	0	0	0	500
2702	27	0	0	623	0	0	0	623
3101	31	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0
INTERNAL		**3,093**	**12,171**	**3,082**	**271**	**864**	**0**	**19,480**
EXTERNAL		**442**	**594**	**4,257**	**127**	**280**	**120**	**5,514**
TOTAL		**3,535**	**12,765**	**7,339**	**398**	**1,143**	**120**	**24,994**

I.4 FORECASTED EMPLOYEES BY EMPLOYMENT CATEGORY – 188K HORIZON

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
101	1	100	514	188	85	99	0	986
102	1	88	2,490	969	0	0	0	3,547
103	1	0	0	32	0	0	0	32
104	1	0	3	840	0	0	0	843
105	1	0	409	0	0	0	0	409
201	2	0	0	263	0	0	0	263
202	2	0	0	1,572	0	0	0	1,572
203	2	15	0	3,031	0	0	0	3,046
204	2	0	94	1,135	25	0	0	1,254
205	2	0	356	433	0	0	0	789
206	2	0	33	2,685	0	0	0	2,718
207	2	0	29	862	10	0	0	901
301	3	0	0	0	0	0	0	0
302	3	39	194	0	0	0	0	232
303	3	93	322	37	0	0	0	452
304	3	0	3	0	0	0	0	3
305	3	0	0	0	0	0	0	0
306	3	0	10	0	0	83	0	93
307	3	0	0	0	0	24	0	24
308	3	0	0	0	0	0	0	0
309	3	0	0	211	136	0	0	347
310	3	0	11	0	0	0	0	11
311	3	0	0	176	0	0	0	176
401	4	0	0	0	0	0	0	0
402	4	0	149	0	0	0	0	149

I.4 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
403	4	0	0	0	0	0	0	0
404	4	0	18	0	0	0	0	18
405	4	0	0	0	0	44	0	44
406	4	55	57	38	0	0	0	150
407	4	0	0	0	0	0	0	0
408	4	0	487	0	0	0	0	487
409	4	0	0	0	0	0	0	0
410	4	0	188	218	0	0	0	406
411	4	0	0	0	0	0	0	0
412	4	0	323	157	0	0	0	480
413	4	0	251	0	0	0	0	251
414	4	0	0	0	0	0	0	0
415	4	0	0	0	0	18	0	18
416	4	120	291	659	0	0	0	1,070
417	4	30	0	293	0	0	0	323
418	4	108	343	1,256	0	0	0	1,707
419	4	0	0	1,732	0	0	0	1,732
420	4	0	0	0	0	0	0	0
421	4	0	200	0	0	0	0	200
422	4	0	656	0	0	0	0	656
423	4	179	50	1,174	0	0	0	1,403
424	4	0	0	0	49	0	0	49
425	4	0	368	0	0	0	0	368
426	4	0	0	0	0	0	0	0
501	5	0	0	0	0	0	0	0
502	5	63	24	0	92	110	0	289
503	5	0	0	246	0	0	0	246

I.4 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
504	5	0	0	0	0	0	0	0
505	5	0	0	0	0	0	0	0
506	5	0	0	0	0	0	0	0
507	5	0	0	0	0	40	0	40
508	5	0	0	0	0	0	0	0
509	5	0	0	0	0	0	0	0
510	5	44	777	193	0	0	0	1,014
511	5	0	0	0	0	31	0	31
512	5	61	100	0	0	0	0	161
513	5	0	0	0	0	0	0	0
514	5	0	0	0	0	25	0	25
515	5	0	13	0	0	0	0	13
516	5	0	3	0	2	0	0	5
601	6	513	78	0	2,256	0	0	2,847
602	6	0	0	0	0	0	0	0
603	6	0	0	0	5	0	0	5
604	6	0	0	0	0	27	0	27
605	6	0	103	0	0	0	0	103
606	6	0	0	0	0	35	0	35
607	6	0	0	0	0	0	0	0
608	6	0	0	0	0	0	0	0
609	6	0	0	0	0	40	0	40
610	6	0	0	0	0	900	0	900
611	6	122	583	0	186	0	0	891
612	6	43	15	0	0	0	0	58
613	6	0	537	0	0	0	0	537
614	6	0	331	0	0	0	0	331

I.4 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
615	6	0	688	0	0	0	0	688
616	6	52	1,322	0	0	0	0	1,374
617	6	23	231	0	115	23	0	392
618	6	289	786	0	244	0	0	1,319
619	6	0	921	0	0	0	0	921
620	6	0	0	0	0	0	0	0
621	6	0	0	0	0	0	0	0
622	6	0	0	0	0	0	0	0
623	6	0	285	0	0	0	0	285
624	6	0	183	0	0	0	1	184
625	6	0	0	0	0	0	0	0
701	7	0	2	0	0	298	0	300
702	7	0	0	0	0	0	0	0
703	7	250	30	0	0	0	0	280
704	7	2,117	320	0	37	0	64	2,538
705	7	0	0	0	0	0	0	0
706	7	106	148	0	0	67	0	321
707	7	0	0	0	0	0	0	0
708	7	1,081	693	0	45	0	0	1,819
709	7	120	0	0	107	0	0	227
710	7	481	90	0	299	0	0	870
711	7	1,222	392	0	108	0	0	1,722
712	7	164	334	0	102	0	0	600
713	7	93	77	0	0	0	0	170
714	7	199	41	17	0	0	0	257
715	7	2,959	6,035	81	4	5	0	9,084
716	7	233	419	205	0	0	0	857

I.4 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
717	7	0	0	0	0	0	0	0
718	7	0	0	0	0	0	0	0
801	8	0	4	0	0	0	0	4
802	8	0	0	0	0	34	0	34
803	8	0	0	0	31	38	0	69
804	8	0	6	0	0	0	0	6
805	8	0	0	0	0	28	0	28
806	8	0	0	0	0	0	0	0
807	8	0	0	0	0	0	0	0
808	8	0	0	0	172	0	0	172
809	8	0	5	0	0	0	0	5
810	8	0	0	0	0	82	0	82
811	8	0	0	0	0	0	0	0
812	8	0	53	0	27	111	0	191
813	8	0	0	0	0	0	0	0
814	8	0	0	0	0	0	0	0
815	8	0	0	0	0	35	0	35
901	9	0	0	0	0	0	0	0
902	9	0	0	0	0	0	0	0
903	9	0	0	0	0	0	0	0
904	9	0	0	0	0	0	0	0
905	9	0	0	0	0	0	0	0
906	9	0	0	0	0	0	0	0
907	9	0	11	0	0	0	0	11
908	9	0	11	0	0	0	0	11
909	9	0	0	0	0	0	0	0
910	9	0	0	0	0	0	0	0

I.4 Population and Employment Estimate – 188K Horizon
August 9, 2018

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
911	9	0	0	0	0	0	0	0
912	9	0	17	0	0	0	0	17
913	9	90	0	0	0	0	0	90
914	9	0	0	0	0	0	0	0
915	9	0	0	0	0	0	0	0
916	9	29	408	0	0	32	0	470
917	9	0	0	0	0	0	0	0
918	9	0	0	0	0	0	0	0
919	9	0	0	0	0	0	0	0
920	9	18	85	0	0	0	0	103
921	9	128	108	0	0	0	0	235
922	9	209	112	0	10	39	0	370
923	9	0	19	0	0	0	0	19
924	9	0	0	0	0	0	0	0
925	9	0	19	0	0	50	0	69
1001	10	0	0	0	0	0	0	0
1002	10	0	0	0	0	0	0	0
1003	10	20	0	0	0	0	0	20
1004	10	0	0	0	0	0	0	0
1005	10	0	83	0	0	0	0	83
1006	10	0	0	0	46	47	0	93
1007	10	0	0	0	0	0	0	0
1008	10	0	0	0	0	0	0	0
1009	10	0	0	0	115	281	0	396
1010	10	0	0	0	0	37	0	37
1011	10	0	0	0	0	0	0	0
1012	10	0	0	0	0	0	0	0

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
1101	11	0	19	0	0	0	0	19
1102	11	0	0	0	0	0	0	0
1103	11	0	0	0	0	0	0	0
1104	11	0	0	0	0	0	0	0
1105	11	0	106	0	0	0	0	106
1106	11	0	13	0	0	77	0	90
1107	11	0	0	0	0	0	0	0
1108	11	23	108	0	0	0	0	131
1109	11	0	11	0	0	0	0	11
1110	11	0	0	0	0	0	0	0
1111	11	0	0	0	0	0	0	0
1112	11	0	447	0	0	0	0	447
1113	11	0	0	0	0	0	0	0
1114	11	0	0	0	0	0	0	0
1115	11	0	0	0	0	0	0	0
1201	12	0	0	9	0	0	0	9
1301	13	0	39	20	0	0	0	59
1302	13	0	13	5	0	0	0	18
1303	13	12	77	15	0	50	0	154
1304	13	0	0	5	0	218	0	223
1305	13	0	19	75	0	0	0	94
1306	13	33	371	25	0	99	0	528
1307	13	0	39	5	0	50	0	93
1308	13	0	39	5	0	50	0	93
1309	13	42	236	20	0	99	0	397
1310	13	0	77	25	0	99	0	202
1311	13	0	77	35	0	50	0	162

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2101	21	0	0	0	0	0	0	0
2102	21	0	0	0	0	0	0	0
2103	21	0	0	2,480	0	0	0	2,480
2104	21	0	0	1,025	0	0	0	1,025
2105	21	0	0	1,899	0	0	0	1,899
2106	21	100	127	392	73	82	137	911
2107	21	186	237	727	135	152	254	1,691
2201	22	0	0	0	0	0	0	0
2202	22	0	0	0	0	0	0	0
2203	22	0	0	0	0	0	0	0
2301	23	0	0	0	0	0	0	0
2302	23	0	0	1,448	0	0	0	1,448
2303	23	0	0	580	0	0	0	580
2304	23	0	0	0	0	0	0	0
2401	24	0	342	0	0	0	0	342
2402	24	0	59	0	0	0	0	59
2403	24	0	0	1,098	0	0	0	1,098
2404	24	0	0	215	0	0	0	215
2405	24	0	60	0	0	0	0	60
2501	25	0	312	0	0	275	0	587
2502	25	0	297	0	0	0	0	297
2503	25	0	126	0	0	0	0	126
2504	25	0	215	0	0	81	0	296
2505	25	0	0	0	0	0	0	0
2601	26	0	0	0	0	318	0	318
2602	26	156	13	155	9	0	0	332
2603	26	0	9	152	0	0	0	160

TAZ	Superzone	Employees by Employment Categories						Total
		Office	Retail	Industrial	Institutional	School	Other	
2604	26	0	0	0	0	0	0	0
2605	26	0	0	0	0	0	0	0
2606	26	0	0	0	0	0	0	0
2607	26	0	0	0	0	0	0	0
2608	26	0	130	0	195	0	0	325
2701	27	0	0	1,623	0	0	0	1,623
2702	27	0	0	2,021	0	0	0	2,021
3101	31	0	0	0	0	0	0	0
3102	31	0	0	0	0	0	0	0
3201	32	0	0	0	0	0	0	0
3202	32	0	0	0	0	0	0	0
3301	33	0	0	0	0	0	0	0
3302	33	0	0	0	0	0	0	0
3401	34	0	0	0	0	0	0	0
3402	34	0	0	0	0	0	0	0
INTERNAL		**11,666**	**26,044**	**18,947**	**4,308**	**3,475**	**65**	**64,504**
EXTERNAL		**442**	**1,927**	**13,815**	**412**	**908**	**390**	**17,894**
TOTAL		**12,108**	**27,971**	**32,762**	**4,720**	**4,382**	**455**	**82,398**

Appendix J PROJECTED FUTURE ROAD IMPROVEMENTS

J.1 LIST OF CITY ROAD IMPROVEMENTS AT 130K HORIZON

Roadway	Improvement Description	Segment Description	Road Classification	Posted Speed
19 St	Expansion to 4-Lane Road	From Ring Road (20 Ave) to Vermont Ave	Urban Highway	70
22 St	Extension as 2-Lane Road	From Ring Road (20 Ave) to Lindman Ave	Urban Collector	50
32 St	Extension as 4-Lane Road	From Ring Road (20 Ave) to Daines Ave/Lawford Ave	Urban Arterial	60
50 St	Extension as 4-Lane Road	From Ring Road (20 Ave) to Rideout Ave/Donlevy Ave	Urban Arterial	60
50 St	Extension as 4-Lane Road	From Ring Road (20 Ave) to 580m East	Urban Arterial	60
67 St	Expansion to 4-Lane Road	From Ring Road (20 Ave) to Threefall Gate	Urban Arterial	60
Highway 11A	Twinning to 4-Lane Road	From Highway 2 to Gaetz Ave/Ring Road (Northland Dr)	Urban Highway	70
30 Ave	Expansion to 4-Lane Road	From 67 St to Ring Road (Northland Dr)	Urban Arterial	60
Gaetz (50) Ave	Expansion to 6-Lane Road	From 19 St to 30 St and 34 St to 37 St	Urban Arterial	60
Gaetz (50) Ave	Expansion to 6-Lane Road	From 78 St to Highway 11A	Urban Arterial	60
North Highway Connector/Ring Road	Construction as 2-Lane Road	As Northland Dr/20 Ave, north and west from 19 St to Gaetz Ave/Highway 11A	Urban Highway (north of 55 St) Urban Arterial (south of 55 St)	70
40 Ave	Connection to Riverside Drive as 2-Lane Road	From North Highway Connector to Riverside Dr	Urban Arterial	60

J.2 LIST OF PROVINCIAL ROAD IMPROVEMENTS AT 130K HORIZON

Roadway	Improvement Description	Segment Description	Road Classification	Posted Speed
Highway 2	Expansion to 6-Lane Freeway	From McKenzie Rd to Highway 597	Freeway	110
Highway 2	Interchange Reconstruction	At Highway 2 / Taylor Dr / Gaetz Ave Interchange	Freeway & Freeway Ramp	110 (Freeway) Various (Ramps)
Highway 2	Construction of Collector-Distribution Roads	At Highway 2 / Taylor Dr / Gaetz Ave Interchange	Urban Arterial	70
Highway 2A	Twinning to 4-Lane Road	From Highway 11A to north of the Town of Blackfalds	Rural Highway	100

J.3 LIST OF CITY ROAD IMPROVEMENTS AT 188K HORIZON

Roadway	Improvement Description	Segment Description	Road Classification	Posted Speed
19 St	Expansion to 4-Lane Road	From Ring Road (20 Ave) to Range Road 270 (10 Ave)	Urban Highway	70
19 St	Expansion to 6-Lane Road	From 30 Ave to 50 Ave	Urban Highway	70
22 St	Extension as 4-Lane Road	From Ring Road (20 Ave) to Range Road 270 (10 Ave)	Urban Arterial	60
32 St	Extension as 4-Lane Road	From Ring Road (20 Ave) to Range Road 270 (10 Ave)	Urban Arterial	60
50 St	Extension as 4-Lane Road	From 580m East of Ring Road (20 Ave) to Range Road 270 (10 Ave)	Urban Arterial	60
Highway 11A	Expansion to 6-Lane Road	From Highway 2 to Gaetz Ave/Ring Road (Northland Dr) - Interchange at Taylor Dr	Freeway	80
Highway 11 (East)	Realignment	From 67 St / 30 Ave Intersection to 10 Ave	Divided Expressway	80
Highway 11 (East)	Realignment	From 10 Ave to tie-in at Range Road 260	Freeway	100
30 Ave (Range Road 272) / Township Rd 390	Urbanization as 2-Lane Road	From Ring Road (Northland Dr) to Range Road 271	Urban Arterial	60
20 Ave (Range Road 271)	Urbanization as 2-Lane Road	From Ring Road (Northland Dr) to Township Road 390	Urban Arterial	60
Ring Road	Extension as 4-Lane Road	As MacKenzie Trail, south and west from 19 St to Highway 2/Township Road 374	Divided Expressway	80
Ring Road	Expansion to 6-Lane Road and Intersection Upgrades	As Northland Dr/20 Ave, north and west from 19 St to Gaetz Ave/Highway 11A - Signalized Intersections at 30 Ave/Range Road 272, Range Road 271, Teasdale Dr, 50 St, and 22 St - Right-In Right-Out at 55 St and 39 St - Interchanges at Gaetz (50) Ave, 40 Ave, 67 St, 32 St, and 19 St	Freeway (Gaetz to 40 Ave) Divided Expressway (40 Ave to 19 St)	80
Taylor Dr	Extension as 4-Lane Road	From Highway 11A north to the regional network (North of 11A MASP area)	Urban Arterial	60
Taylor Dr	Arterial Road Network along Taylor Dr Extension as 4-Lane Road	North of 11A MASP area	Urban Arterial	60

J.4 LIST OF PROVINCIAL ROAD IMPROVEMENTS AT 188K HORIZON

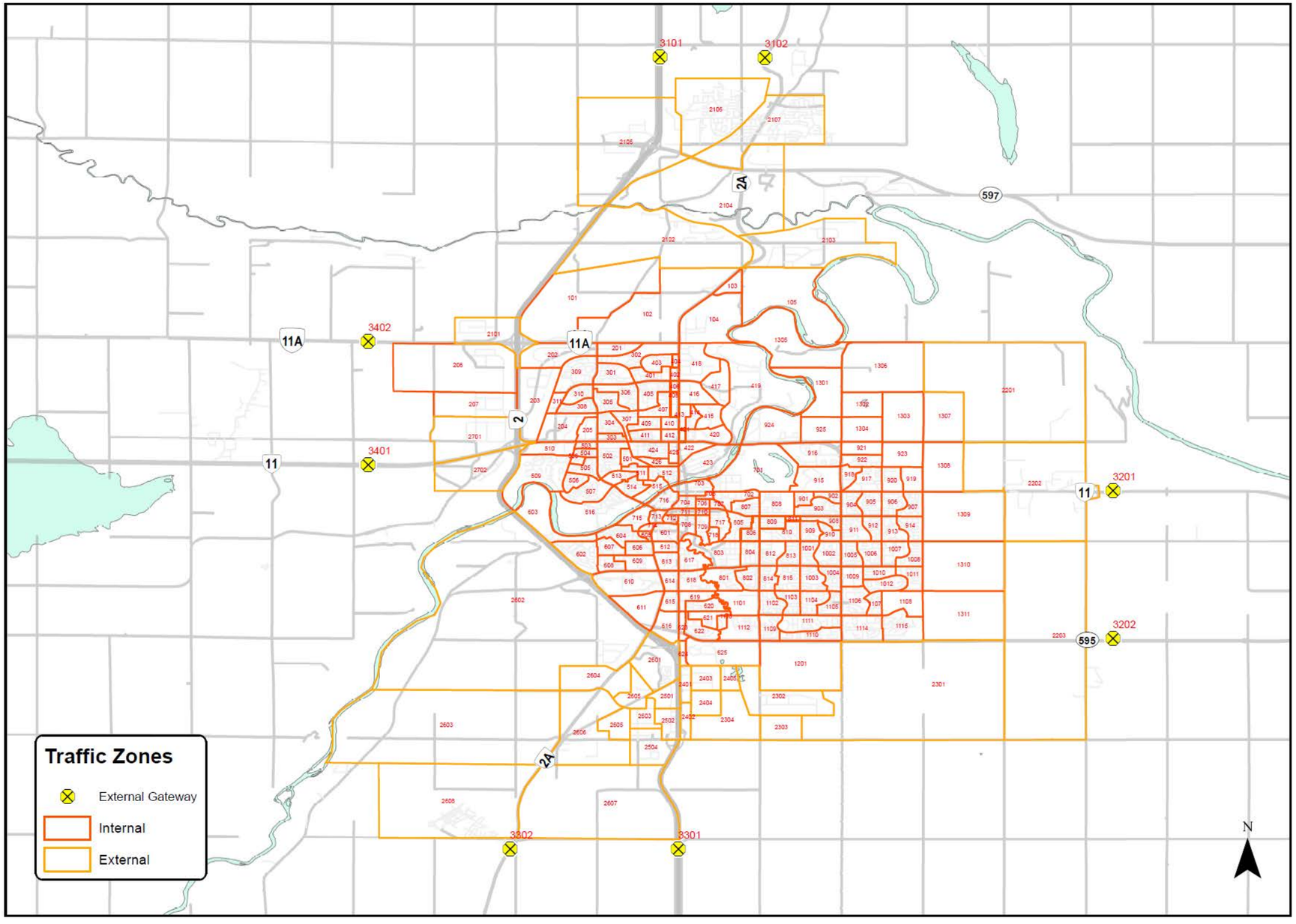
Roadway	Improvement Description	Segment Description	Road Classification	Posted Speed
Highway 2	Expansion to 8-Lane Freeway	From Highway 42 to Highway 597 (assumed to be in place by 188K horizon)	Freeway	110
Highway 2A	Twinning to 4-Lane Road	From Highway 42 to Highway 2	Rural Highway	100
Highway 11	Roadway Classification Upgrade	Upgrade to freeway standard between Highway 2 and Highway 20 (assumed to be in place by 188K horizon)	Freeway	110

TRAVEL DEMAND MODEL DEVELOPMENT REPORT

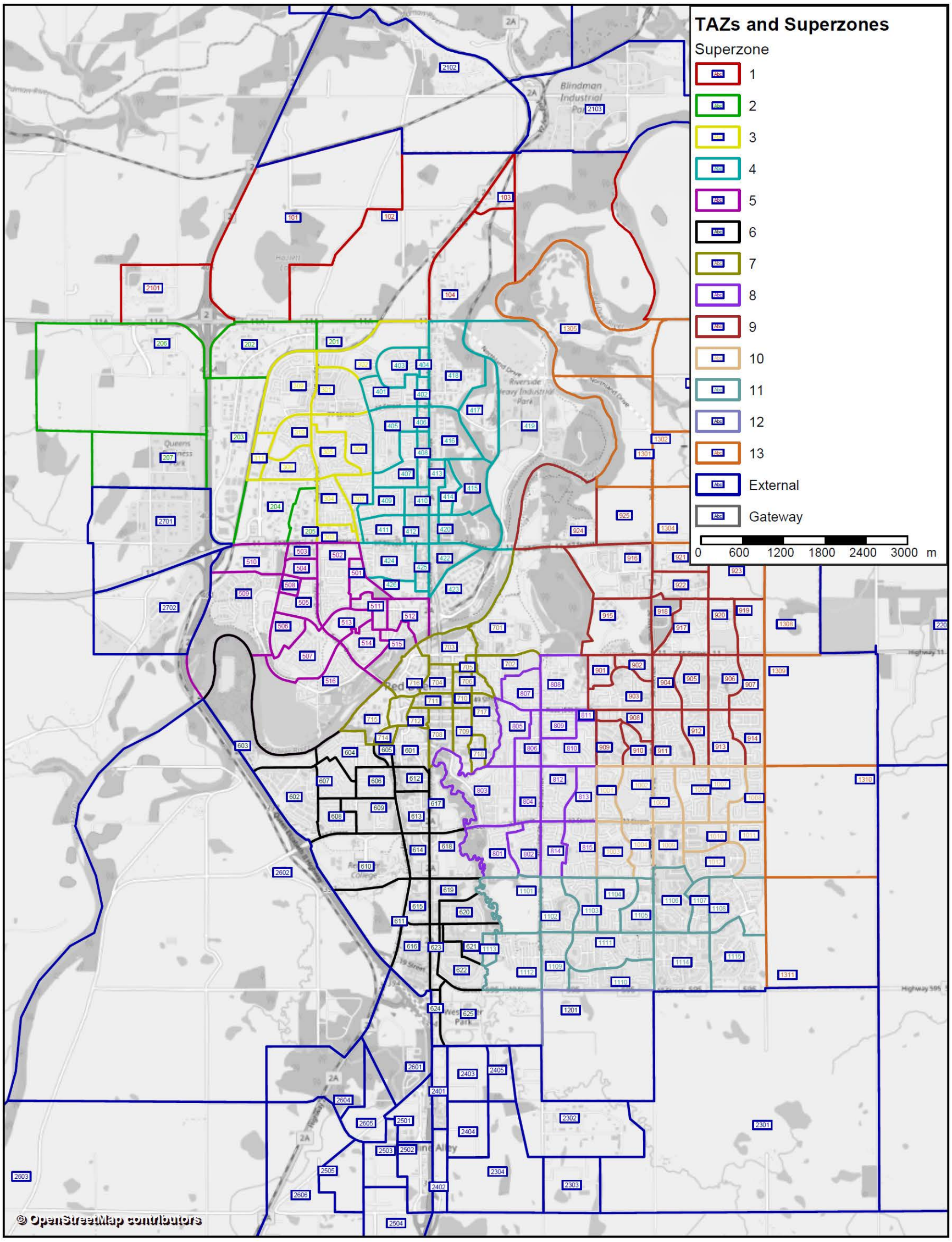
Projected Future Road Improvements
August 9, 2018

Appendix K ADDITIONAL FIGURES

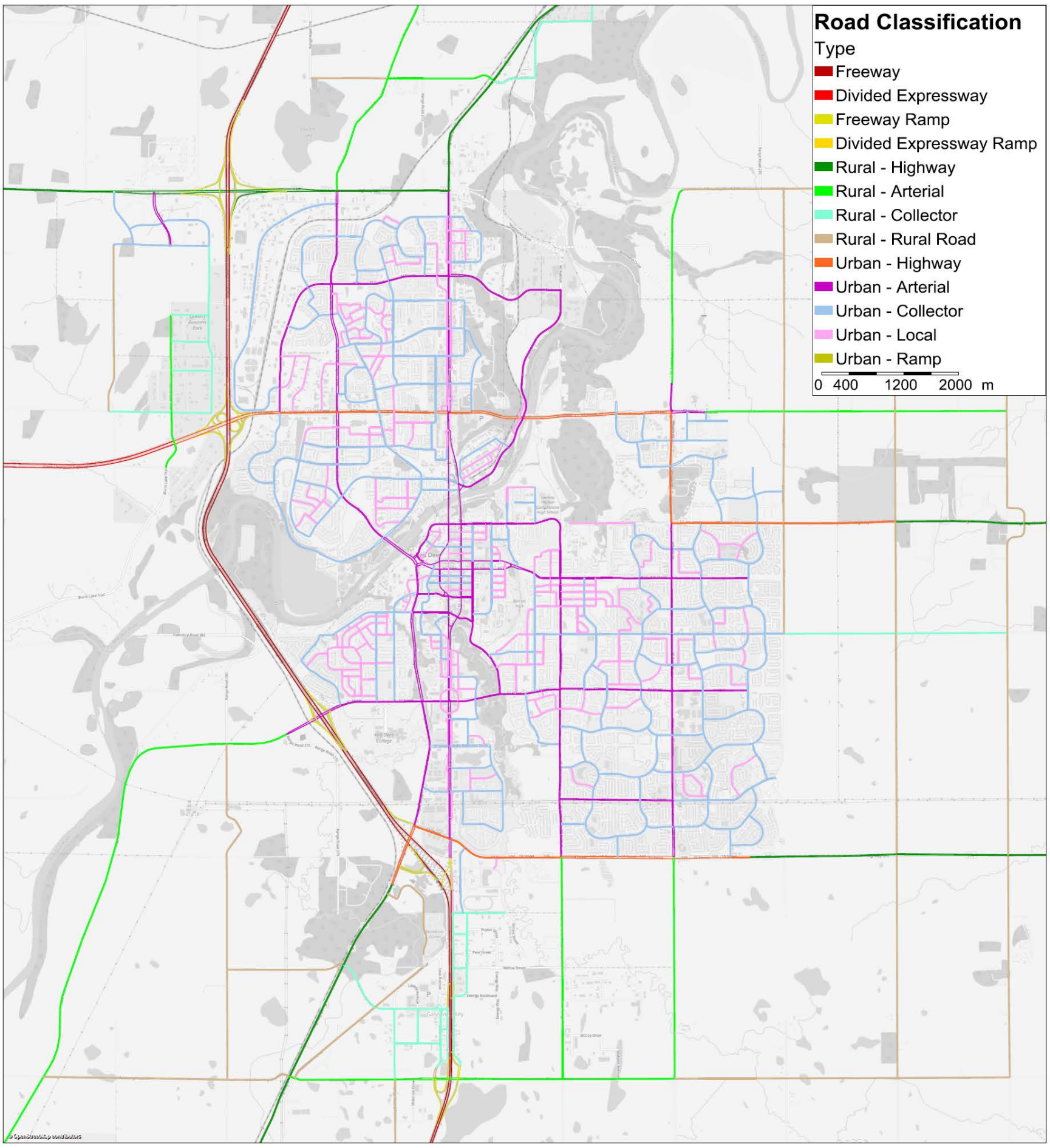
K.1 - Internal, External and Gateway Traffic Zones (TAZs)



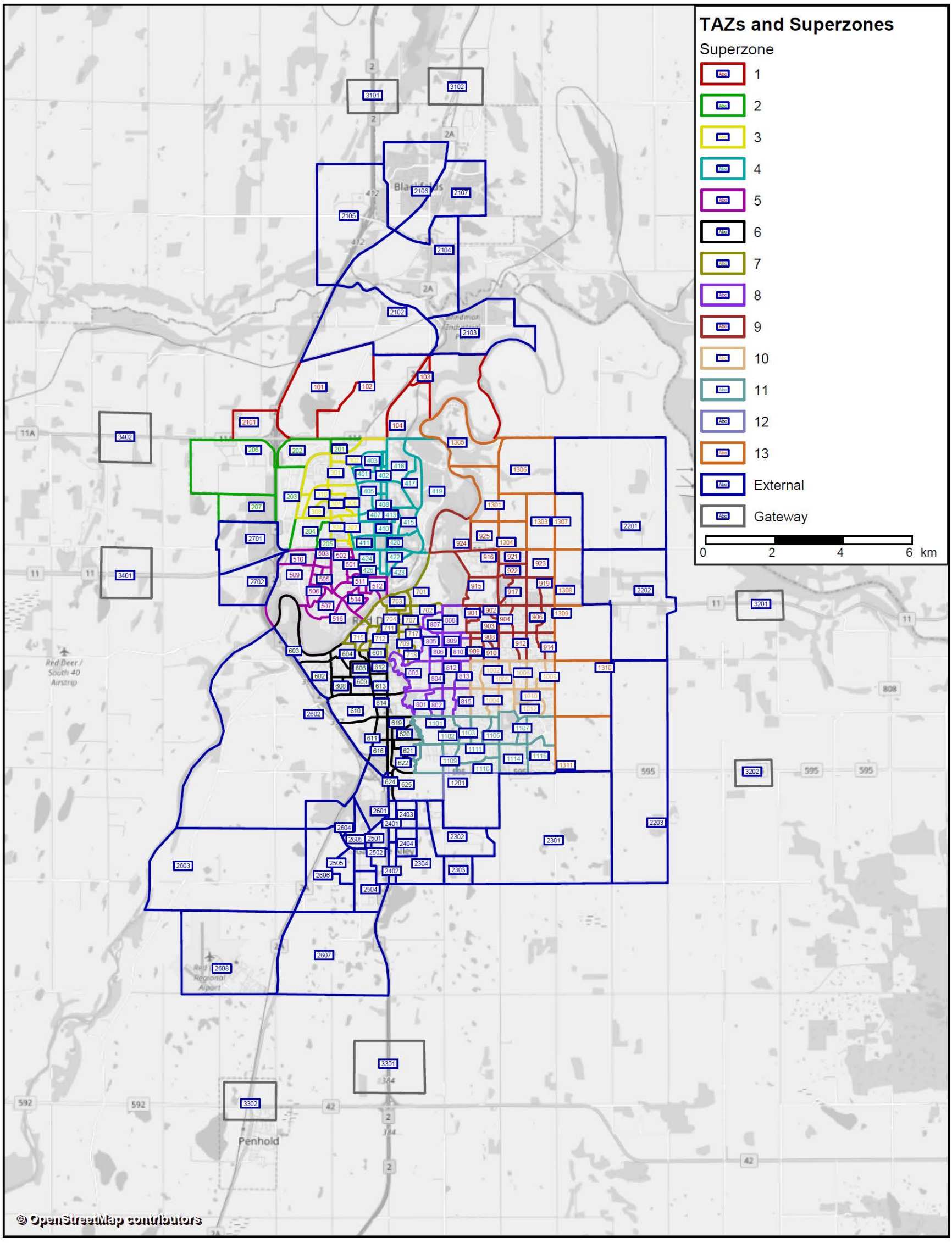
K.2 - Traffic Zone System and Assigned Superzones in the City of Red Deer



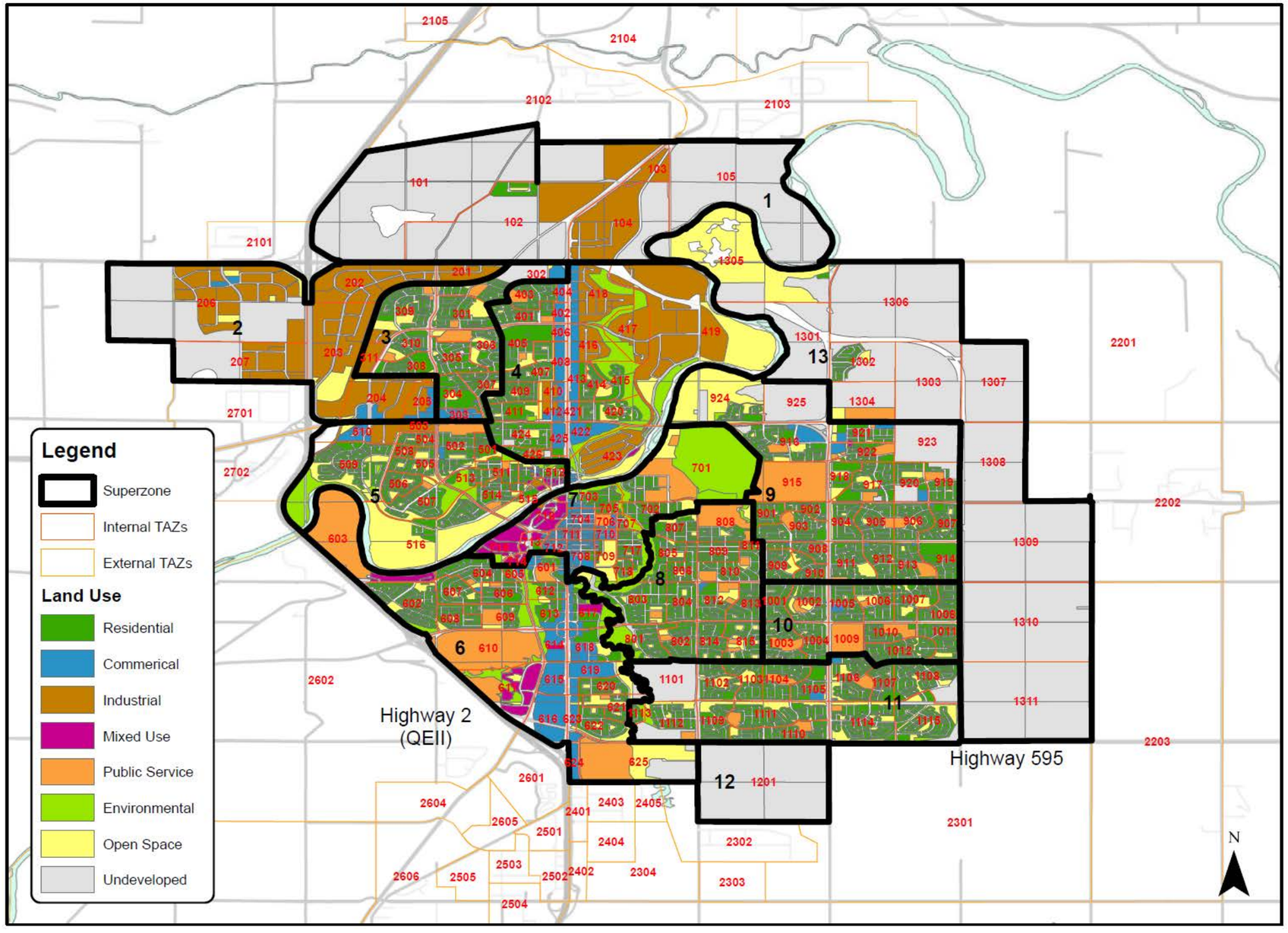
K.3 - Network Links by Road Classification



K.4 - External Traffic Zones and Gateway Zones



K.5 - Existing Land Use in the City of Red Deer



K.6 - City of Red Deer Corridor Travel Time Study (2015)

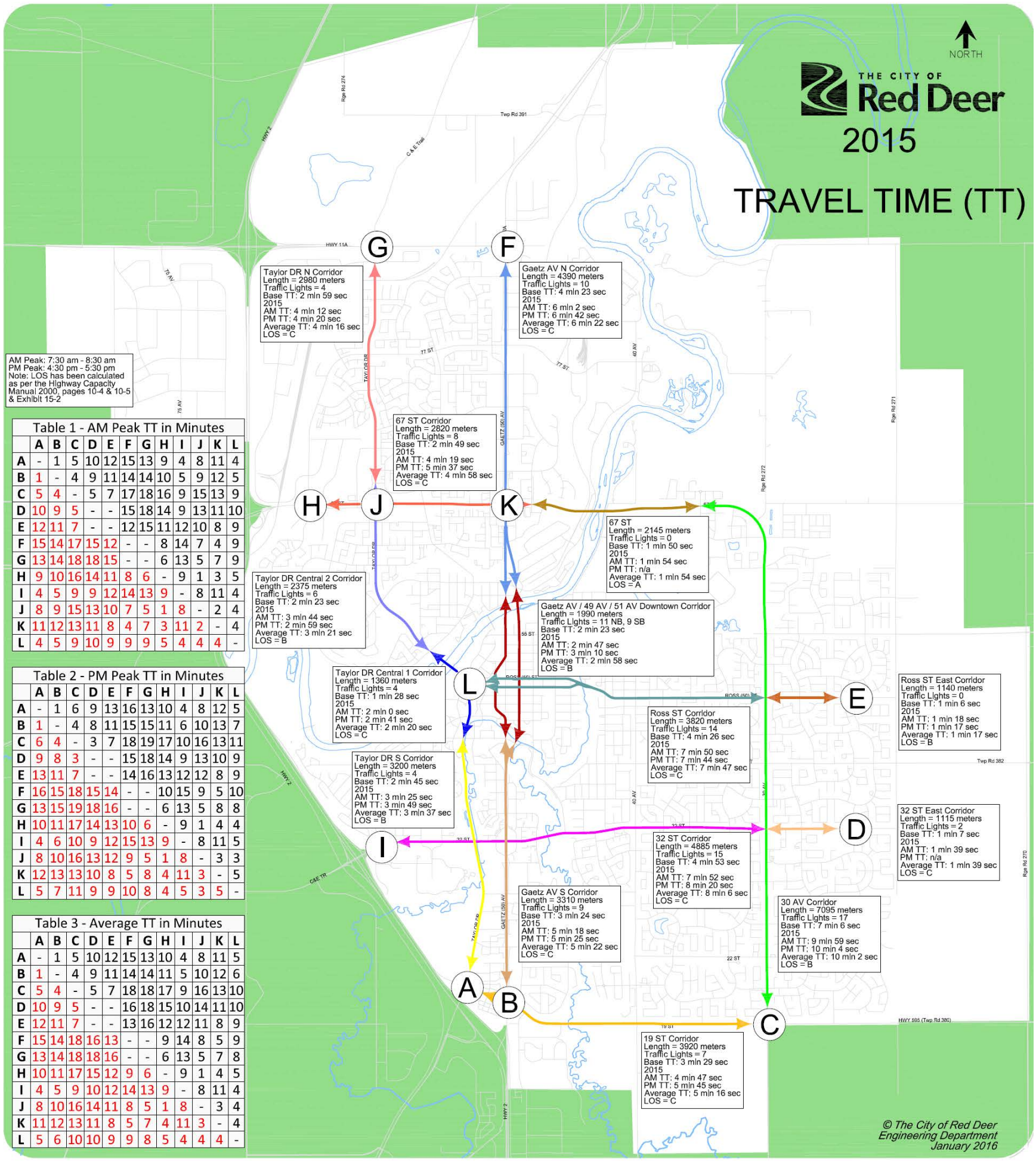


Table 1 - AM Peak TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	5	10	12	15	13	9	4	8	11	4
B	1	-	4	9	11	14	14	10	5	9	12	5
C	5	4	-	5	7	17	18	16	9	15	13	9
D	10	9	5	-	-	15	18	14	9	13	11	10
E	12	11	7	-	-	12	15	11	12	10	8	9
F	15	14	17	15	12	-	-	8	14	7	4	9
G	13	14	18	18	15	-	-	6	13	5	7	9
H	9	10	16	14	11	8	6	-	9	1	3	5
I	4	5	9	9	12	14	13	9	-	8	11	4
J	8	9	15	13	10	7	5	1	8	-	2	4
K	11	12	13	11	8	4	7	3	11	2	-	4
L	4	5	9	10	9	9	9	5	4	4	4	-

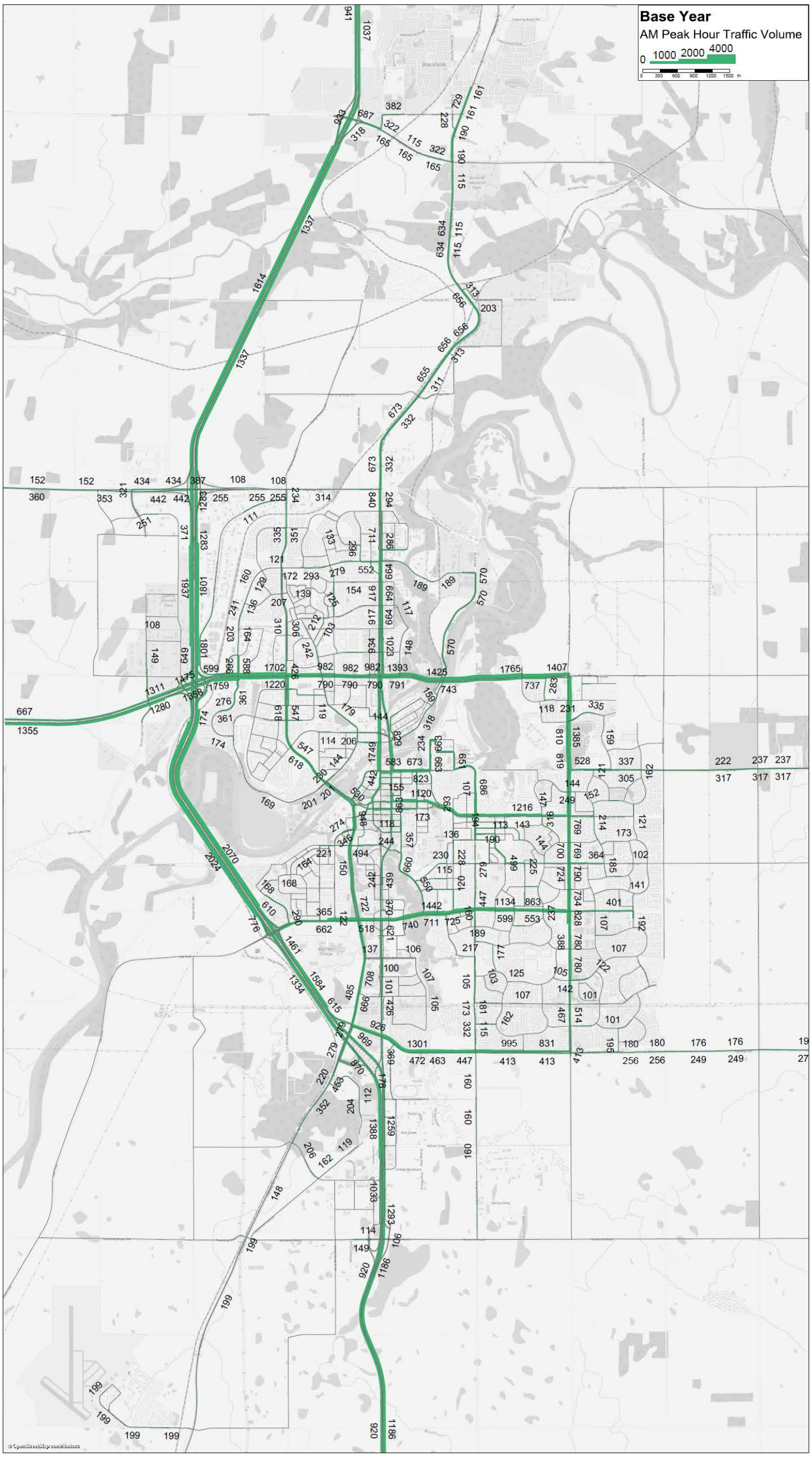
Table 2 - PM Peak TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	6	9	13	16	13	10	4	8	12	5
B	1	-	4	8	11	15	15	11	6	10	13	7
C	6	4	-	3	7	18	19	17	10	16	13	11
D	9	8	3	-	-	15	18	14	9	13	10	9
E	13	11	7	-	-	14	16	13	12	12	8	9
F	16	15	18	15	14	-	-	10	15	9	5	10
G	13	15	19	18	16	-	-	6	13	5	8	8
H	10	11	17	14	13	10	6	-	9	1	4	4
I	4	6	10	9	12	15	13	9	-	8	11	5
J	8	10	16	13	12	9	5	1	8	-	3	3
K	12	13	13	10	8	5	8	4	11	3	-	5
L	5	7	11	9	9	10	8	4	5	3	5	-

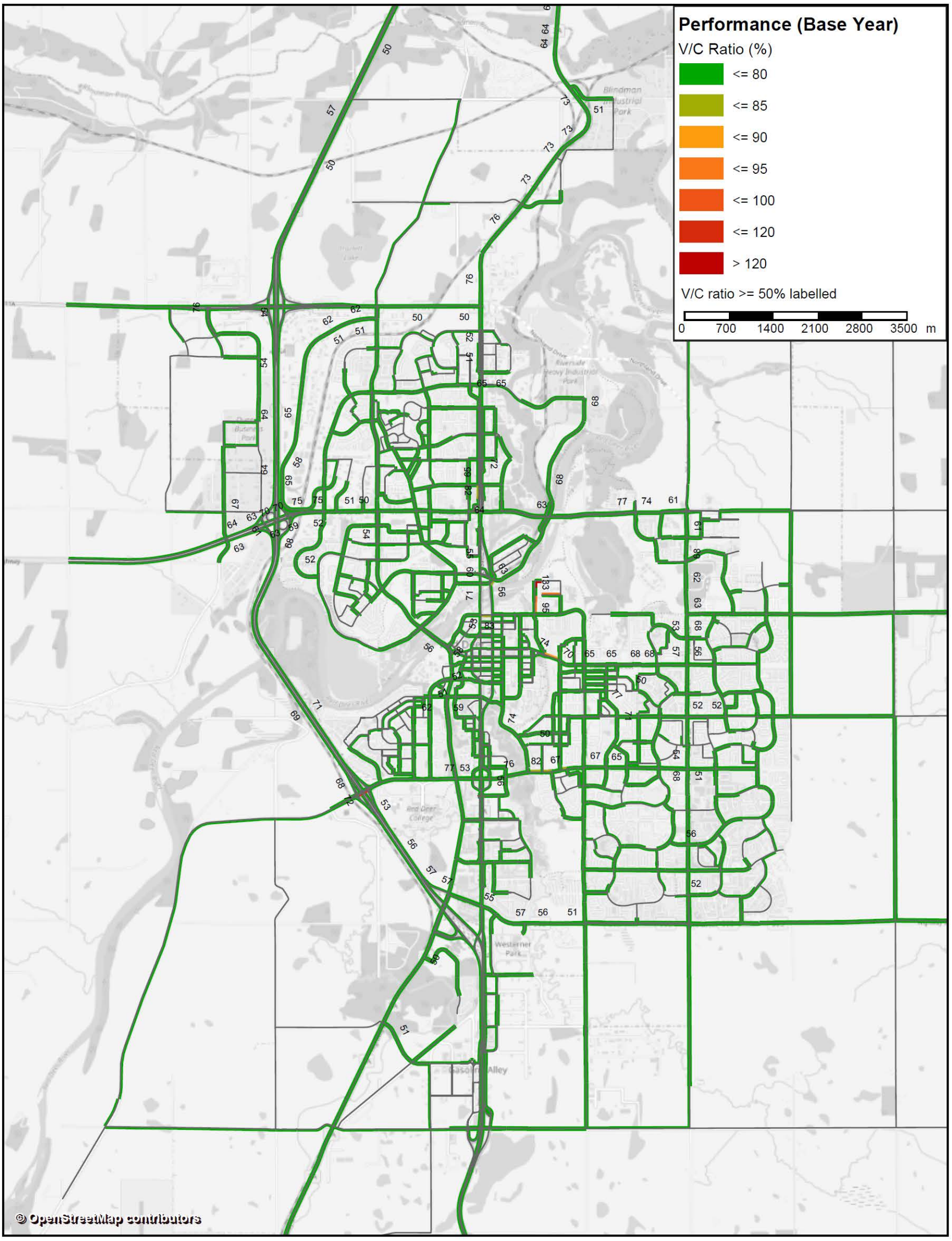
Table 3 - Average TT in Minutes

	A	B	C	D	E	F	G	H	I	J	K	L
A	-	1	5	10	12	15	13	10	4	8	11	5
B	1	-	4	9	11	14	14	11	5	10	12	6
C	5	4	-	5	7	18	18	17	9	16	13	10
D	10	9	5	-	-	16	18	15	10	14	11	10
E	12	11	7	-	-	13	16	12	12	11	8	9
F	15	14	18	16	13	-	-	9	14	8	5	9
G	13	14	18	18	16	-	-	6	13	5	7	8
H	10	11	17	15	12	9	6	-	9	1	4	5
I	4	5	9	10	12	14	13	9	-	8	11	4
J	8	10	16	14	11	8	5	1	8	-	3	4
K	11	12	13	11	8	5	7	4	11	3	-	4
L	5	6	10	10	9	9	8	5	4	4	4	-

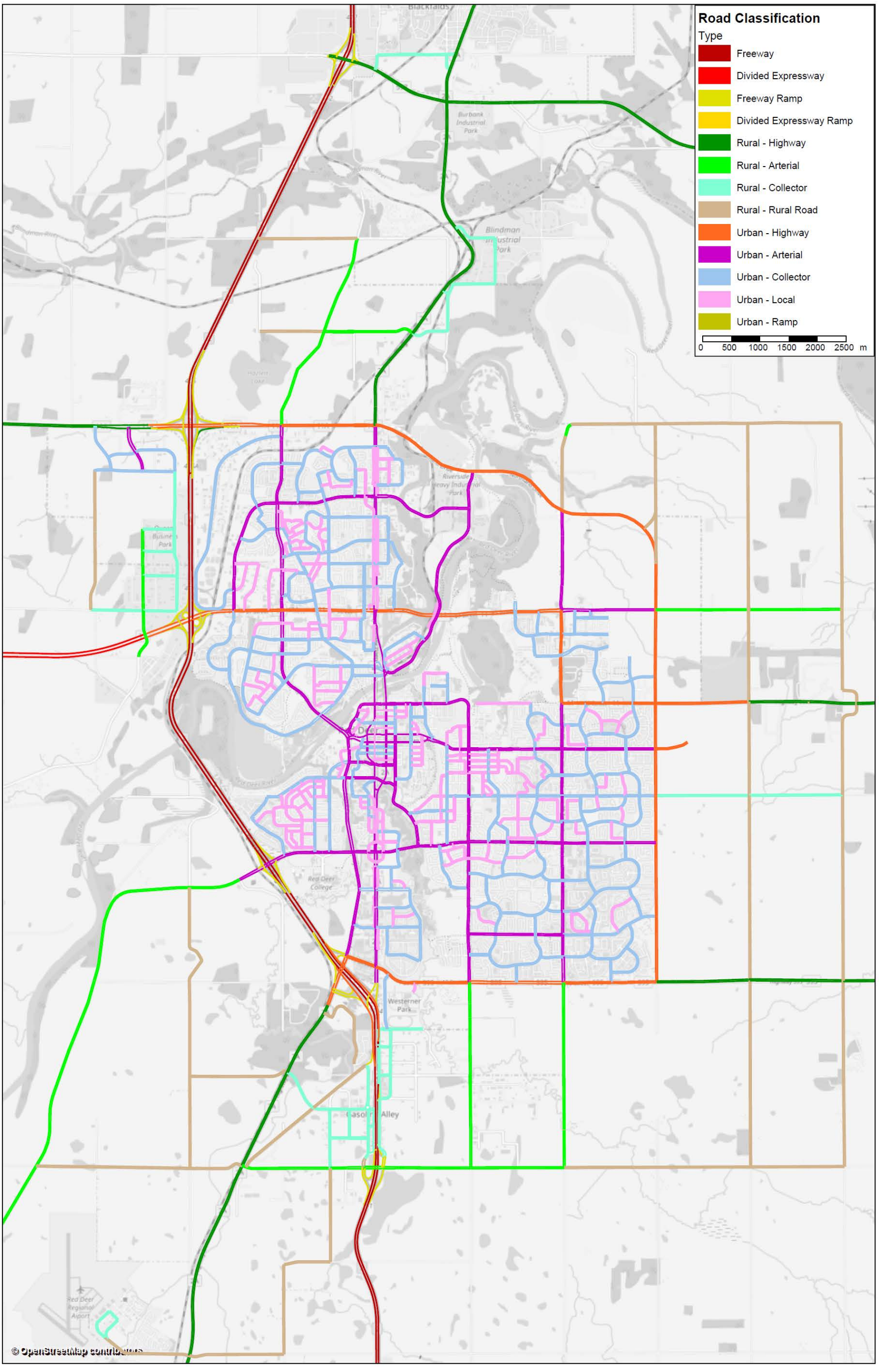
K.7 - Assigned Traffic Volume at Base Year



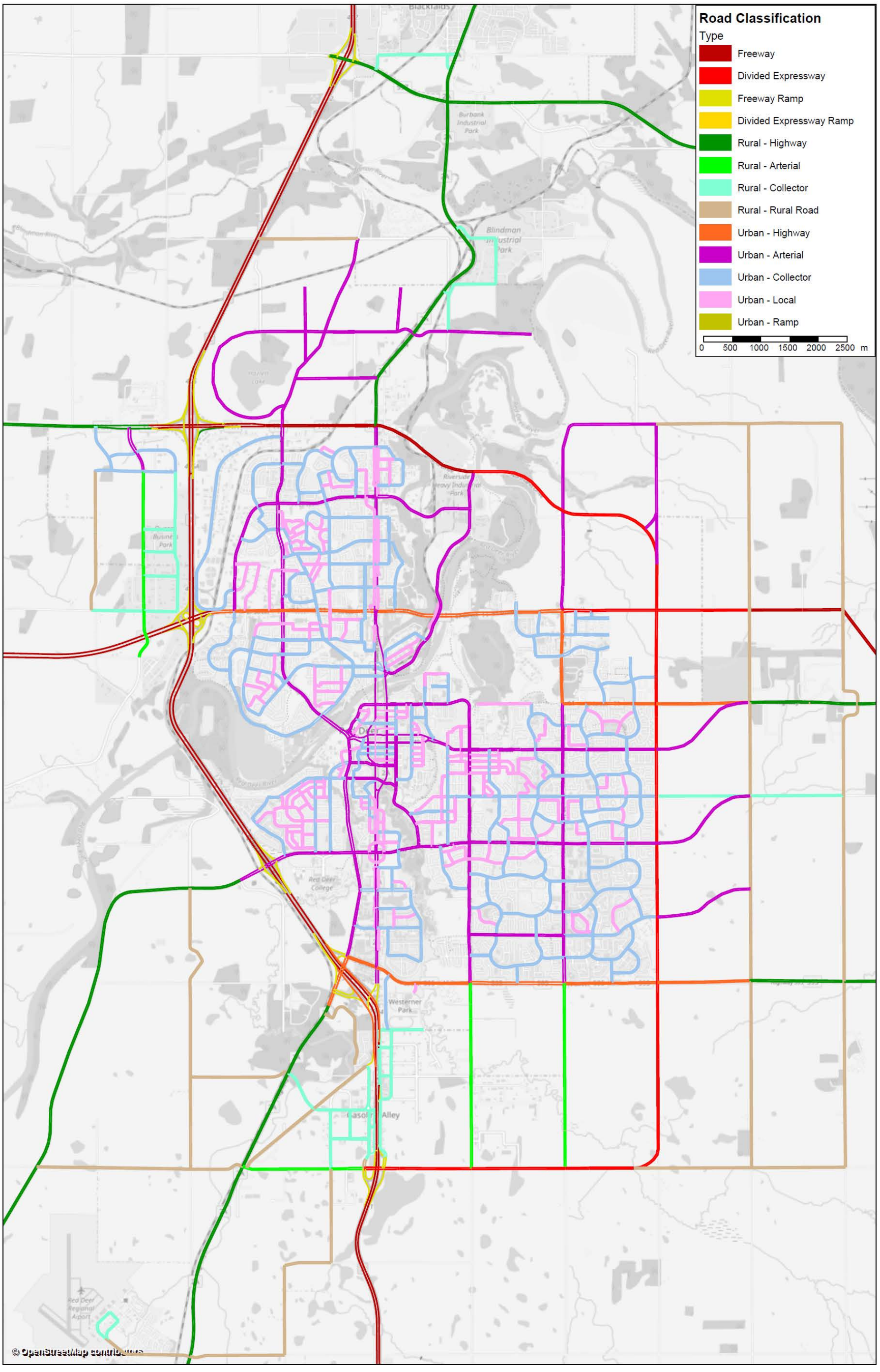
K.8 - Volume-to-Capacity (V/C) Ratio at Base Year



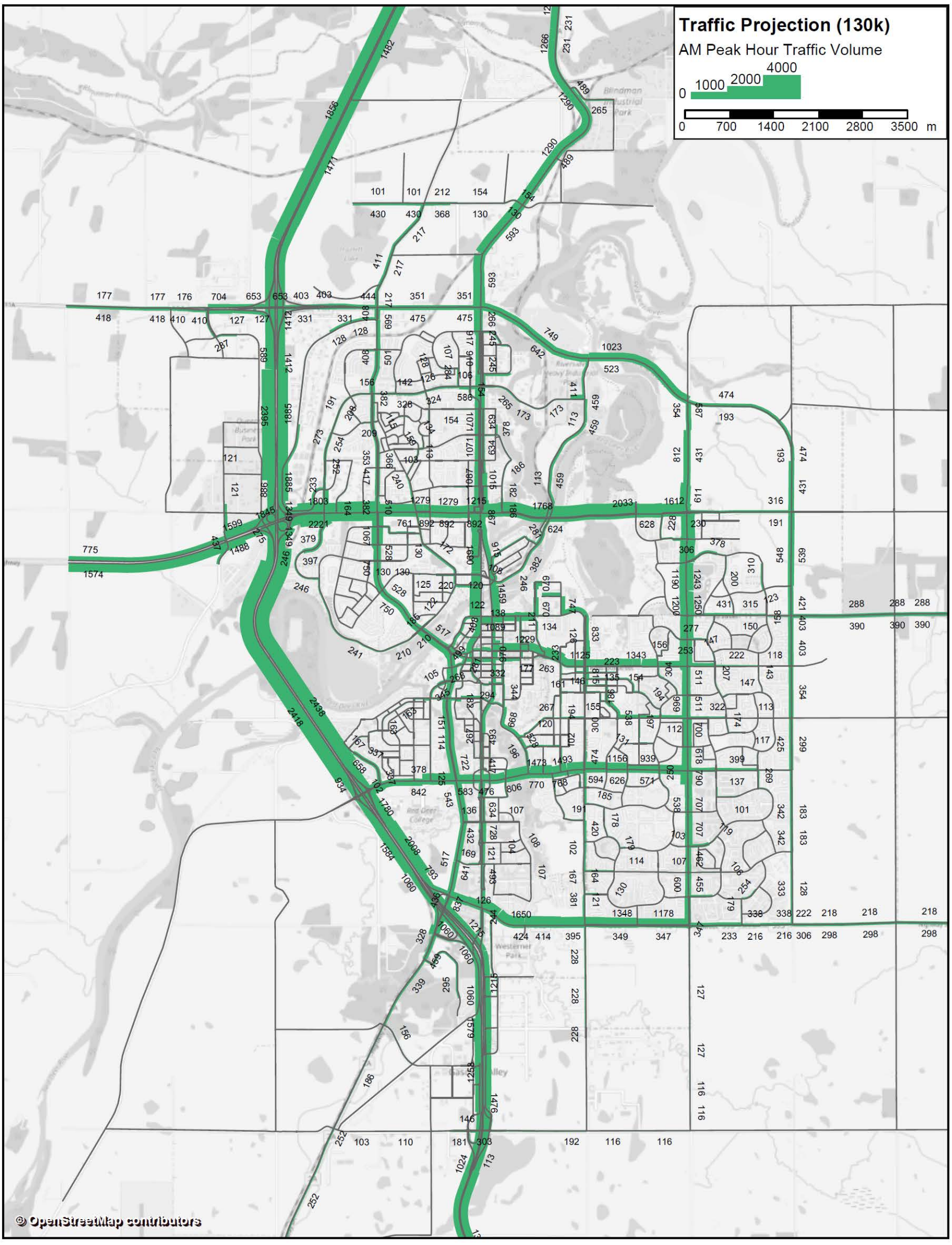
K.9 - Road Classification at 130K Horizon



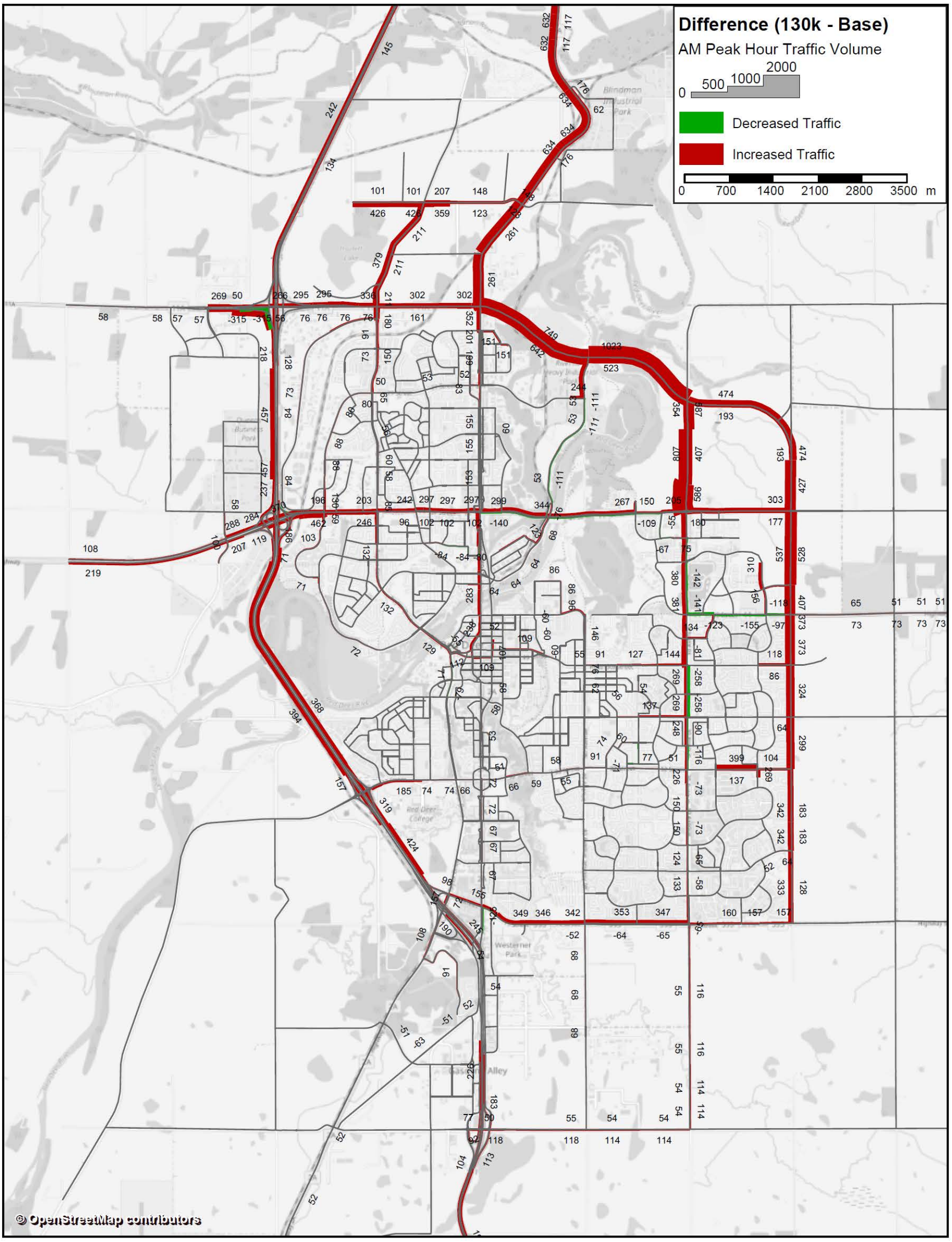
K.10 - Road Classification at 188K Horizon



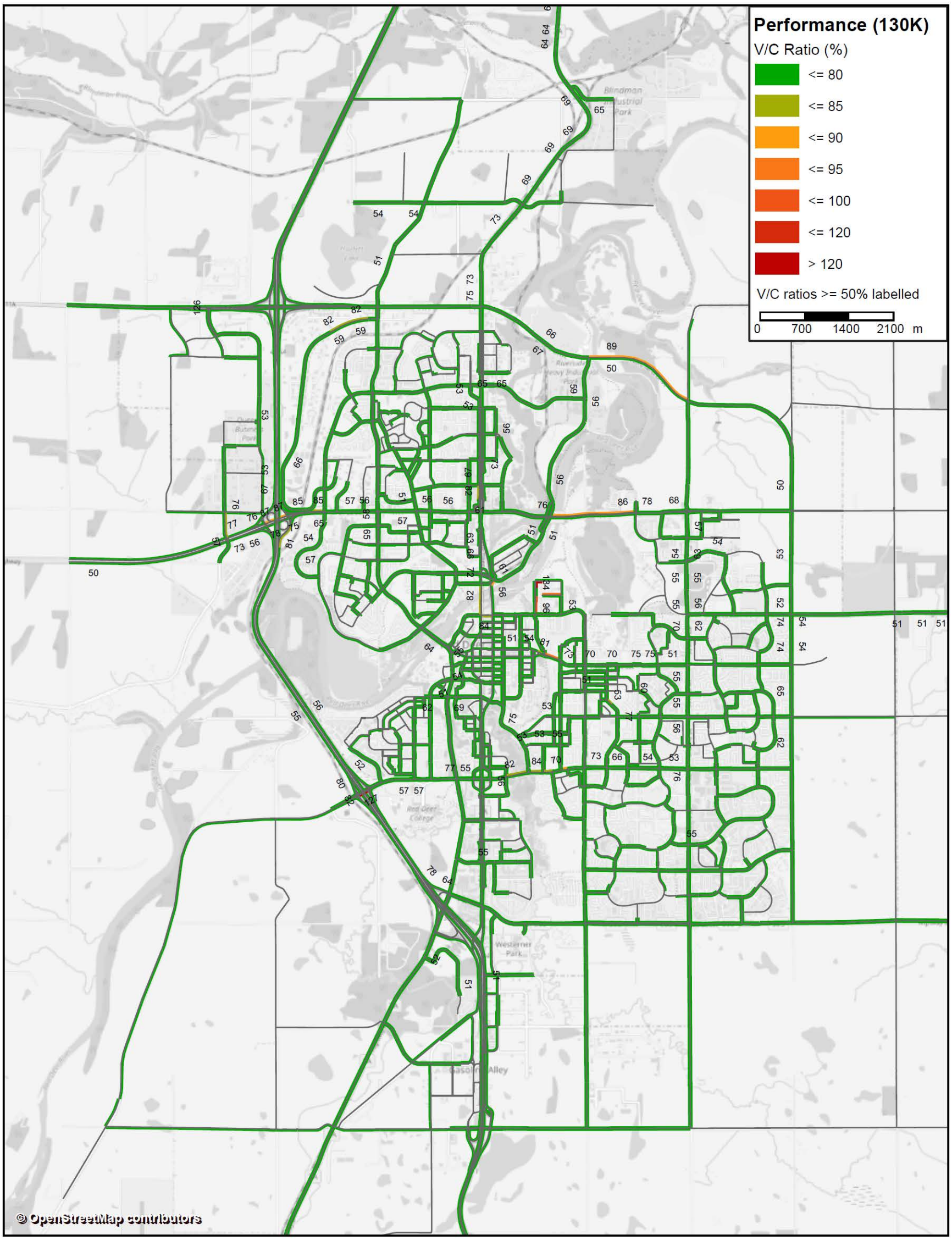
K.11 - Assigned Traffic Volume at 130K Horizon



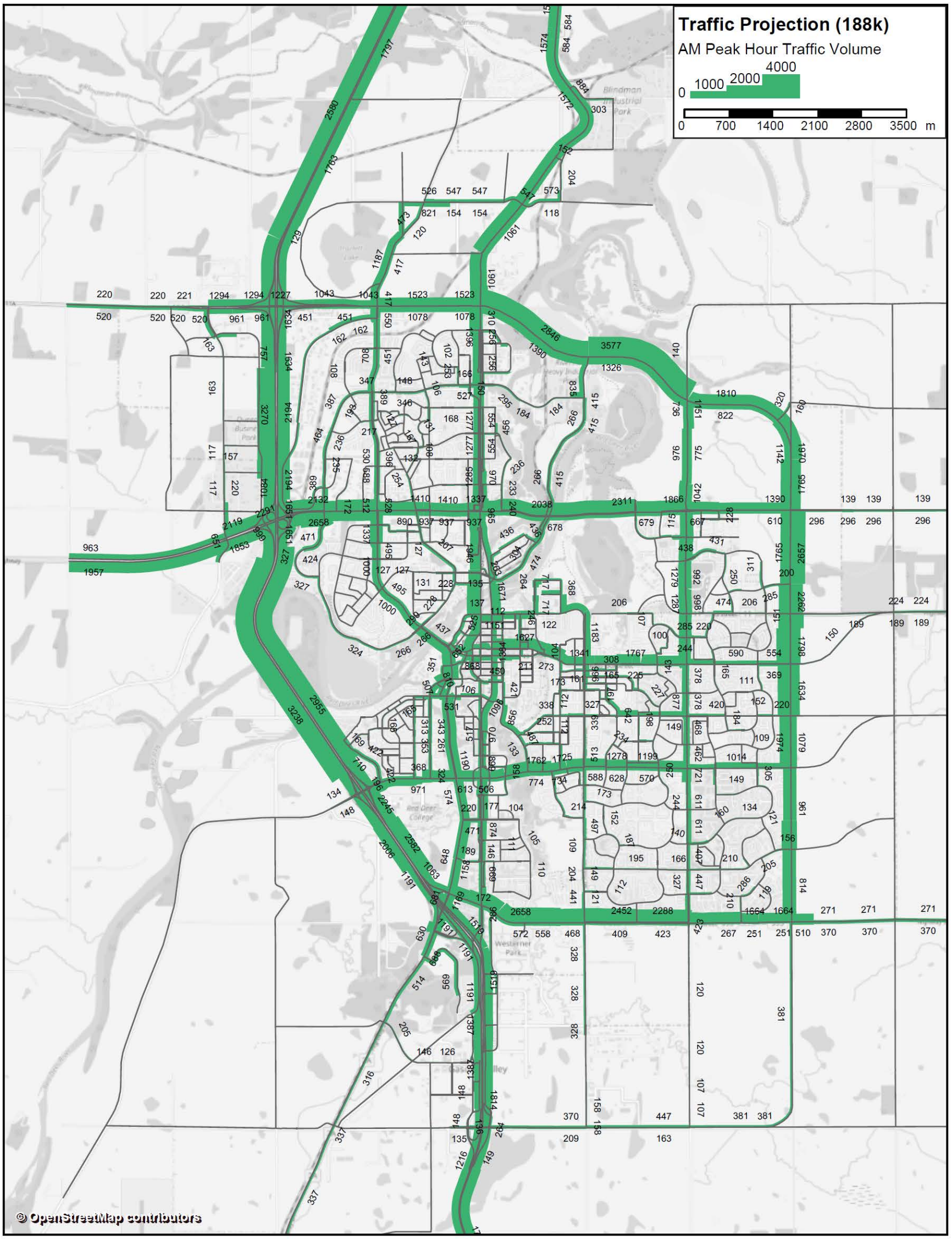
K.12 - Change in Assigned Traffic Volume Between Base Year and 130K Horizon



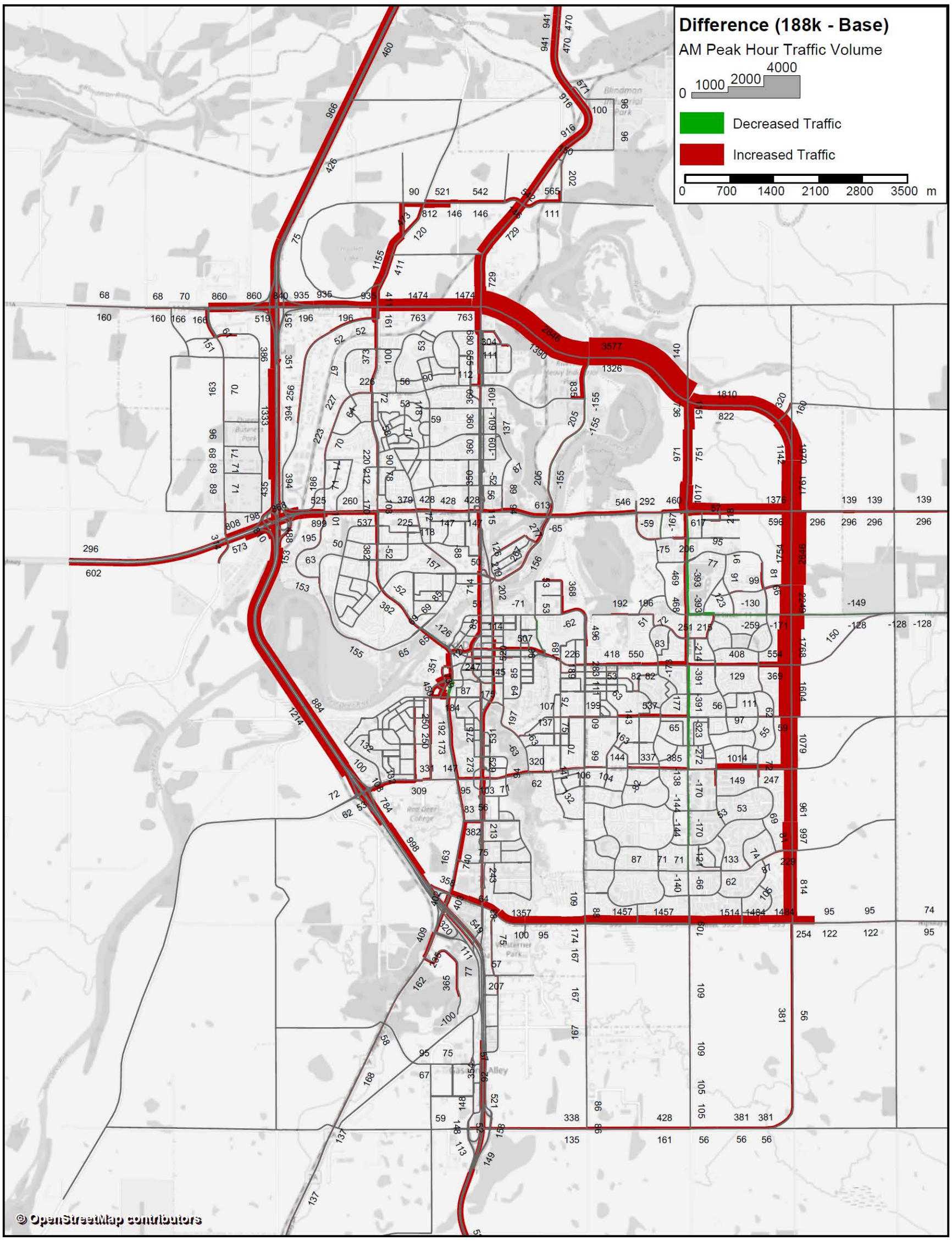
K.13 - Volume-to-Capacity (V/C) Ratio at 130K Horizon



K.14 - Assigned Traffic Volume at 188K Horizon



K.15 - Change in Assigned Traffic Volume Between Base Year and 188K Horizon



K.16 - Volume-to-Capacity (V/C) Ratio at 188K Horizon