Appendix A
Data Review and Requirements

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Memorandum

Date:	January 31, 2008
To:	Wayne Tuck, City of Whitehorse
From:	Leah Libsekal
Subject:	Porter Creek Bench Transportation Network Impact Study Data Review and Requirements

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Distribution: B Jenkins, File

The purpose of this memorandum is to record the procedures followed and material collected during the Project Familiarization phase of the Porter Creek Bench Transport Network Impact Study. It constitutes all of the deliverables for Tasks 2.1.2, and the partial completion of deliverables for 2.1.5. This, in turn, will act as a useful reference document when completing Phase 2 (Transportation Modelling and Analysis) and Phase 3 (Report Preparation) of the Study.

Prior to the project Start-up Meeting, the City was provided with a list of preliminary data and report requirements. Some of this material was readily available, while other information was to be subsequently provided. The items included:

- various relevant reports
- digital mapping, including graphics of recent planning initiatives
- as-built drawings for key locations
- aerial photography
- current zoning plans
- traffic count data and traffic signal timing plans
- current design standards
- T-Model files for the 1992 model

Following the commencement of the formal data collection process during the Start-up Meeting (November 14, 2007), preliminary traffic data provided by the City was examined to identify any gaps in information including outdated or missing traffic data.

Traffic count data provided by the City included:

- Intersection turn counts. At some of these locations, vehicle classification information was also collected, which will be used to determine the percentage of trucks on key corridors.
- Twenty-four hour loop counts, at various locations in the downtown and on Alaska Highway.

A working spreadsheet (Appendix A) was prepared that illustrated both the locations for which this existing data was available as well as the locations where additional data was required. This information was forward to the City for data collection during the fall of 2007.

NEW DATA REQUIREMENTS

Having identified the modelling objectives, and the data currently available, the purpose of this task was to determine what additional data needed to be collected. A particular focus was placed on travel and land use data requirements.

Based on what was currently available, the travel data requirements included:

- turning movement traffic counts at certain key intersections
- survey of travel times in selected corridors
- survey of origin-destination patterns

In addition transit ridership data was requested and received from Whitehorse Transit, which provided total transit ridership figures for the year of 2006. Additional information has been requested to clarify:

- the PM peak hour ridership/boarding/alighting info for each transit line.
- Standing capacities by bus types
- Classification of bus types associated with each transit line
- Future transit information

Land use data requirements included:

- population by location
- employment by location and type of job

2006 Census demographic and employment information is to be provided by City planning staff in a format conducive to input in the model. A working spreadsheet (Appendix B) was developed and forwarded to City planning staff which identifies the required land use information by traffic zone[1]. The model traffic zones were built by disaggregating StatsCan dissemination areas into smaller constituent parts representing reasonably homogenous areas.

Future year land use data by zone will be developed in junction with the project team for input in to the model following the calibration and validation processes.

[1] It is our understanding that the employment information (current and future) is to be provided by Luigi Zanasi at the dissemination area level, with input from City Planning staff to disaggregate the information into model traffic zone areas.

TRAVEL DATA

During October and November 2007, travel data was collected by the City of Whitehorse. The information collected included:

1. Turning Movement Counts. As indicated on the working spreadsheets where coverage of the municipal road network was sparse or outdated, peak hour intersection counts were collected at selected key intersections:

   - Alaska Highway at: Hillcrest Drive, Roundel Road, Burns Road, Range Road, and North Klondike Hwy (Mayo Road), Miles Canyon Road (before Mt. Sima Road), and south of Azure Road
   - Two Mile Hill at: Hamilton Blvd, and Range Road
   - Fourth Ave at: Second Avenue
   - Alsek Road at: Nitsulin Drive.
   - Hamilton Blvd at: Thompson Road/ Lazulite Drive, Falcon Drive, Thompson Road/ Heron Drive, and Sumanik Drive.

2. **Survey of Travel Times.** The fact that a model is well calibrated does not mean that it accurately reflects travel times. It is therefore important to calibrate the model on the basis of travel time in order to provide more accurate calculations for the travel time benefits associated with particular road improvements. This data is to be collected through a “moving car” survey, in which a surveyor drives along key routes and notes the time at which each major intersection is reached. Travel time/speed studies are to be conducted on the following roads as illustrated in Figure 1 within the next few weeks:

   - Alaska Highway
   - Mountainview/ Range Road/ Hickory Street/ Clyde Wann Road
   - Robert Service Way
   - Second Avenue
   - Hamilton Boulevard

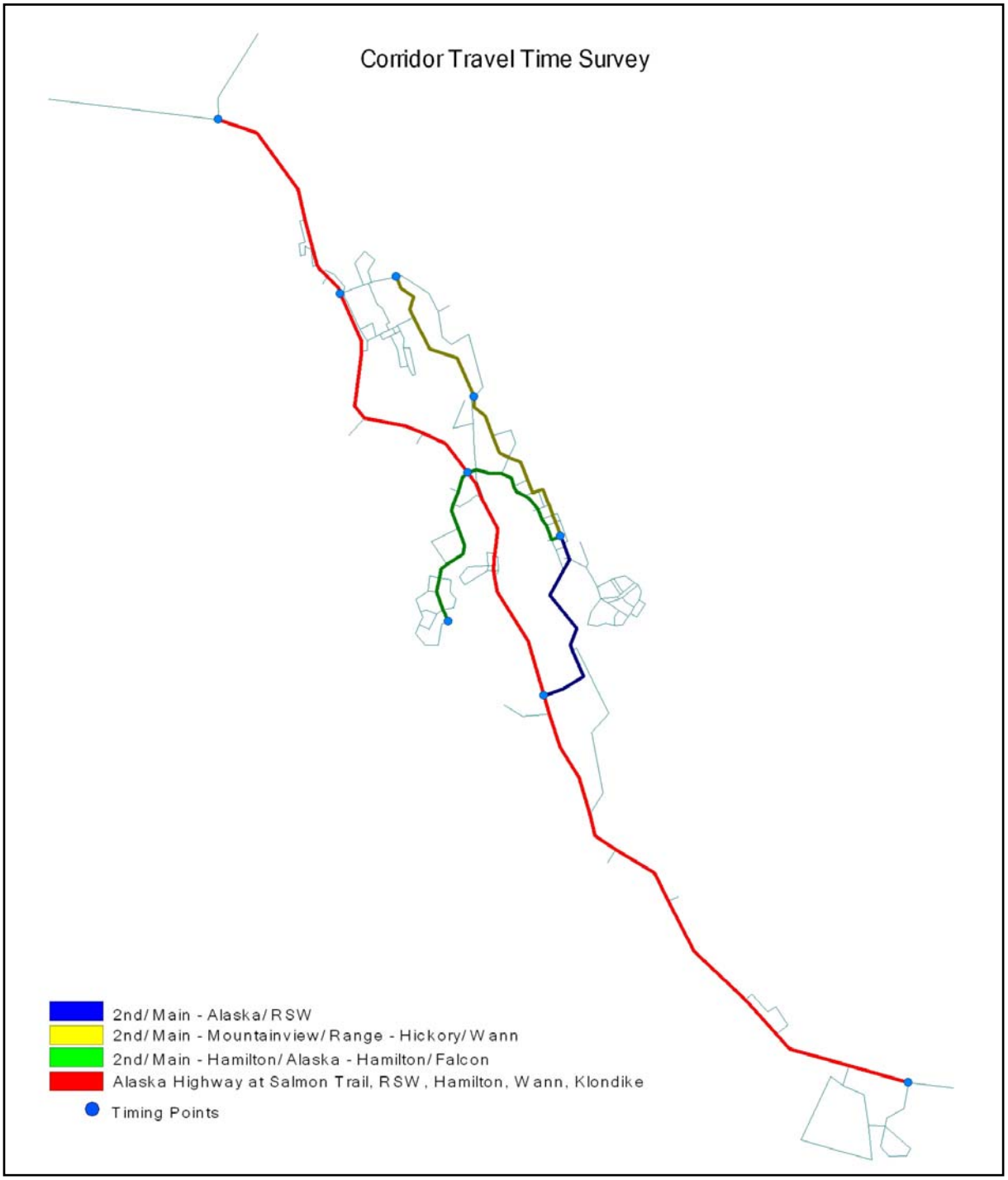
Altogether, the travel data from all sources will be reviewed by UMA and adjusted for incorporation into the subsequent model calibration process. Available data from earlier years will be factored up to represent the base year, and may also be adjusted for monthly variations.

DATA LIMITATIONS AND CONSTRAINTS

The availability of land use information in a timely manner poses a challenge to the schedule. Indeed the schedule was developed with the assumption that data would be available at the onset of the project.

The unavailability of employment information from the 2006 Census until well into 2008 is a concern. To address this issue, the City is expected to provide appropriate employment data for use in the model development process.

Figure 1


Corridor Travel Time Survey
2nd/Main - Alaska/RSW
2nd/Main - Mountainview/Range - Hickory/Wann
2nd/Main - Hamilton/Alaska - Hamilton/Falcon
Alaska Highway at Salmon Trail, RSW, Hamilton, Wann, Klondike
Timing Points

Appendix A
Traffic Count Locations

		Community	2004	2005	2006	2006 Done	Counts Required
	Alaska Highway						
Alaska Highway	Salmon Trail	Cowley Creel/Mary Lake					√
	Fireweed Drive/Englemann Drive	Mary Lake					√
	Castle Drive	Wolf Creek/ Pineridge					√
	Nansen Drive	Wolf Creek/ Pineridge					√
	Robert Service Way	Downtown		Y			
	Hillcrest Drive	Downtown/Hillcrest					√
	Roundel Road	Downtown/Hillcrest					√
	Burns Road	Downtown/Hillcrest					√
	Range Road	Valleyview					√
	Two Mile Hill/Hamilton Blvd						√
	Arnhem Road	Takhini					√
	Prospector Road	Takhini				yes	√
	Fish Lake Road					yes	√
	Centennial Street	Porter Creek			Y	yes	
	Clyde Wann Road	Porter Creek		Y			
	MacDonald Road	Porter Creek		Y			
	Azure Road	Crestview					√
	North Klondike Hwy (Mayo Road)	Hidden Valley/ MacPherson					√
	Downtown/Riverdale						
Downtown/Riverdale	Alsek Rd & Nitsulin Drive	Riverdale					√
	Nitsulin Drive & Lewes Blvd	Riverdale			Y	yes	
	Alsek Rd & Lewes Blvd	Riverdale		Y			
	Lewes Blvd & Hospital Road	Riverdale	Y	Y	Y	yes	
	Lewes Blvd & RSW	Riverdale					√
	Fourth Ave & RSW	Downtown	Y	Y	Y	yes	
	Fourth Ave & Hanson Street	Downtown		Y			
	Fourth & Main Street	Downtown	Y		Y	yes	
	Fourth & Black Street	Downtown	Y		Y	yes	
	Fourth & Ogilvie Street	Downtown		Y			
	Fourth & Baxter Street	Downtown	Y		Y	yes	
	Fourth & Second Ave	Downtown					√
	Second Ave & RSW	Downtown	Y		Y	yes	
	Second Ave & Hanson Street	Downtown		Y			
	Second Ave & Lambert Street	Downtown		Y			
	Second & Main Street	Downtown			Y	yes	
	Second & Ogilvie Street	Downtown	Y	Y	Y	yes	
	Second & Quartz Road	Downtown	Y				
	Chilkoot Way & Two Mile Hill	Marwell	Y	Y	Y	yes	
	Chilkoot Way & Quartz Raod	Marwell	Y	Y	Y	yes	
	Industrial Road & Quartz Raod	Marwell		Y			
	Range Road & Two Mile Hill						√
	Range Road & College Access Road	Marwell/Takhini				yes	√
	Mountainview & Range Road	Takhini		Y			
	Mountainview & 12th	Porter Creek				yes	√
	Hickory Street & Clyde Wann Road	Porter Creek	Y			yes	
	Range Road & Normandy	Marwell/Takhini				yes	
	Hamilton Blvd						
Hamilton Blvd	Thompson Rd/Lazulite Dr	Granger					√
	Falcon Drive	Logan					√
	Thompson Rd/Heron Dr	Granger/Arkell					√
	McIntyre Rd N	McIntyre	Y		Y	yes	
	McIntyre Rd S	McIntyre			Y		
	Sumanik Drive	Valleyview					√

City of Whitehorse
Porter Creek Bench Transportation Network Impact Study
Traffic Count Locations
(Deliverable 2.1.5)

Wayne Tuck, City of Whitehorse
January 31, 2008

Appendix B
Required Land Use Data by Zone

Wayne Tuck, City of Whitehorse
January 31, 2008

Required Land Use Data by Zone

StatsCan Dissemination Area	Model Zone	Age 0-4yrs	Age 5-12 yrs	Age 13-17 yrs	Age 18-24 yrs	Age 25-44 yrs	Age 45-64 yrs	Age 65+	Total Employed Age 15+
010142	1420 1421 1422 1423								
010143	1430								
010144	1440								
010145	1450								
010146	1460								
010147	1470								
010148	1480 1481								
010149	1490								
010150	1500								
010151	1510 1511 1512								
010152	1520 1521 1522 1523 1524								
010153	1530								
010154	1540 1541								
010155	1550 1551 1552 1553 1554 1555								
010156	1560 1561								
010157	1570								
010158	1580								
010159	1590								
010160	1600								
010161	1610								
010162	1620								
010163	1630								
010164	1640								
010165	1650 1651								
010166	1660								
010167	1670								
010168	1680								
010169	1690 1691 1710								
010170	1700 1701								
010171	1710								
010172	1720								
010173	1730								
010174	1740								
010175	1750 1710								
010176	1760 1761								
010177	1770								
010178	1780								
010179	1790								

Appendix B
Future Demographics Validation

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Memorandum

Date:	June 19, 2008
To:	Christine Benedek, City of Whitehorse
From:	Billy Kwok, E.I.T., UMA
Subject:	**Whitehorse Transportation Model** **Future Demographics Validation**

Distribution:	Wayne Tuck, City of Whitehorse Bill Jenkins, UMA Leah Libsekal, UMA

1.0 Introduction

As input into the development of the 2006 base year model, existing demographic and land use data for each traffic zone within the City of Whitehorse was created based on 2006 Census data. As the model is intended to be used to forecast future horizon years (2016 and 2026), the next step was the development of requisite future demographics and land use data by horizon year. This memo describes the methodology, assumptions and process engaged to establish the future inputs.

A teleconference call (May 2, 2008) was convened to determine an approved method by which to develop future inputs from existing demographics and land use. The process and results are contained herein, and are provided to the City for confirmation and validation.

1.1 Horizon Years

The initial project intent is the modelling of two horizon years (2016 and 2026). A new horizon year (2036) was added purely to examine different build-out scenarios for the Porter Creek Bench development. The selection of this horizon year (2036) is not intended to represent demographic and traffic conditions for the specific year, but is rather a tool to identify the need for network improvements in the long-term beyond 2026, due to development in the Porter Creek Bench area. Based on discussions during the teleconference call, we have developed the following approach and assumptions for each model horizon year.

The 2016 model can be interpreted as follows:

- In the next 5 years, a 2% per annum growth in population, employment and enrolment within the City, followed by 5 years of growth at 1% per annum.

The 2026 model can be interpreted as follows:

- The next 10 years (post 2016) at 0.5% per annum growth in population, employment and enrolment.

The 2036 model can be defined as follows:

- The next 10 years of population growth (post 2026) assigned specifically to Porter Creek Bench to satisfy 50% build-out of the area, and the corresponding growth in employment and enrolment. This demographic scenario is called 2036a throughout this document.
- The next 10 years of population growth (post 2026) assigned specifically to Porter Creek Bench to satisfy full build-out of the area, and the corresponding growth in employment and enrolment (identified as scenario 2036b).

1.2 Methodology and Assumptions

A multi-stage approach was employed in developing the demographic inputs. The first stage involved building the population growth. Six empty traffic zones were assigned to four new residential developments according to development zoning and phasing in available neighbourhood plans, such that each new zone consists of a sizable population:

- 3 zones for Porter Creek Bench
- 1 zone for Takhini North
- 1 zone for Arkell
- 1 zone for Whitehorse Copper

Targets were set for the increase in population based on the annual growth rate mentioned above. In 2016, the target was calculated from a growth in population of 2% and 1% per annum. In 2026, the target was calculated with an additional 10 years of population growth at 0.5% per annum.

In 2016, the increase in population of 3,283 persons was allocated as follows:

1. Greenfield Development:

    a. 75% of the expected lot absorption rate of 90 lots per annum (based on current rates) in 10 years (1,620) was attributed to new YTG developments.

    b. 25% of the expected lot absorption rate of 90 lots per annum (based on current rates) in 10 years (540) was attributed to other new development areas.

2. Infill Development:

    a. infill in developed areas totalling 1,123 persons.

In 2026, the additional increase in population of 1,215 was allocated as follows:

1. Greenfield Development:

    a. 75% of a low-growth lot absorption rate (based on a factor of the current rates) in 10 years (911) was attributed to new YTG developments.

    b. 25% of a low-growth lot absorption rate (based on a factor of the current rates) in 10 years (304) was attributed to other new development areas.

2. Infill Development:
    a. no expected infill in developed areas

Next, the increase in population was further distributed to individual developments. Population capacities in each new residential development were calculated based on available lots per the development plans. The increase in population containable in new YTG developments (1,620 and 911 in 2016 and 2026 respectively) was distributed among new residential developments with priorities assigned to Stan McCowan, Takhini North, Arkell, and Whitehorse Copper until population capacities were reached. The remainder of the population growth was assigned to Porter Creek Bench. The increase in population targeted for other new residential developments (540 and 304 in 2016 and 2026 respectively) was distributed with Ta'an Mayo Road Subdivision Development reaching its capacity (60/60) and preference weights applied to the following areas:

- Porter Creek "D" (10%)
- Tank Farm (20%)
- Downtown (50%)
- Hillcrest (20%).

The preference weighting was used to prioritize the likely order of development and absorption of new areas. In 2036a, the increase in population was assigned specifically to Porter Creek Bench to satisfy 50% build-out with population in all other areas remaining static at 2026 conditions. Similarly, in 2036b, the increase in population was assigned specifically to Porter Creek Bench to satisfy full build-out with population in all other areas remaining static at 2026 conditions.

The increase in population was further distribution to individual zones. Zones that relate to new residential developments were identified. The increase in population was applied to existing zones in a greenfield development based on current population apportioning. This is to say that the increase in population in Downtown was distributed to its associated zones based on current population-zone distribution in Downtown. The increase in population was applied to new zones in a greenfield development based on development phasing. This is to say that the increase in population in Porter Creek Bench is applied with a priority assigned to the zones which are closer to Wann Road. For infill development, the increase in population (1,123) was applied as a general growth factor to all Whitehorse population in the base year.

Following the development of population forecasts, the next stage involved building the employment growth. Targets for the increase in employment were set using the same rates as population growth for 2016, 2026, 2036a, and 2036b. Therefore if there is an increase in population of X%, there is a corresponding X% increase in employment, as summarized in Table 1.

Table 1 – New Population and Employment

Year	New Pop	New Job
2016	3283	1776
2026	4498	2434
2036a	8943	4839
2036b	13443	7273
Total	**30168**	**16322**

The increase in employment was distributed to employment in commercial areas of new residential developments and increases in employment throughout the City:

1. Commercial in New Residential Development:
    a. The increase in employment in the Greater Porter Creek Area, comprised of Porter Creek and Porter Creek Bench, was based on a 0.1 employment to population ratio derived from the existing ratio in Porter Creek as a reference. Thus, an increase in population in the Greater Porter Creek Area corresponds to increase in employment as follows:

Table 2 – New Population and Employment in Greater Porter Creek Area

Year	New Pop	New Job
2016	466	47
2026	1408	141
2036a	5853	585
2036b	10353	1035

The increase in employment in the Greater Porter Creek Area (47/141/585/1,035) was allocated with a 50%/50% split in Porter Creek and Porter Creek Bench.

2. New Employment Development:
    a. The remaining increase in employment by horizon (1,730/2,293/4,253/6,238) was applied to new employment developments. In 2016, 1,730 new jobs were distributed with the following preference weighting:

- Whitehorse Copper (10%)
- Hillcrest (0%)
- Marwell (10%)
- Airport (20%)
- Downtown (60%).

In 2026, 2036a, and 2036b, the increase in employment (2,293/4,253/6,238) was distributed with the following preference weighting:

- Whitehorse Copper (10%)
- Hillcrest (5%)
- Marwell (10%)
- Airport (20%)
- Downtown (55%).

Similarly to the population distribution methodology, the increase in employment was further allocated to individual zones. The increase in employment in existing areas was applied by zone based on current employment apportioning. For example, the increase in employment in the Downtown core was distributed to its concommital zones based on current employment-zone distribution in the same area. The increase in employment in new areas was applied based on the location of the new commercial development per neighborhood plans. Therefore the increase in employment in Porter Creek Bench is applied to the zone in which the commercial development is proposed to be located.

The third stage involved calculating school enrolment. Targets for the increase in enrolment in each category were set using the same rates as population growth in 2016, 2026, 2036a, and 2036b such that for an increase in population of X%, there is a corresponding X% increase in enrolment.

In 2016, the increase in enrolment (748) was distributed based on current enrolment distributions in Whitehorse. In 2026, the increase in enrolment (1,025) was distributed in a similar manner, except for the elementary enrolment in Porter Creek Bench (103), which was applied to the proposed new elementary school in the new neighbourhood. With the 50% and full build-out of Porter Creek Bench, the associated increase in school enrolment was distributed as follows:

- Elementary Enrolment: the additional 433 and 872 students were applied to the Porter Creek Bench Elementary
- Secondary Enrolment: the additional 406 and 816 students were applied to the existing Porter Creek Secondary
- Post Secondary Enrolment: the additional 174 and 349 students were applied to existing Yukon College.

The fourth and final stage involved iterating through the previous steps, re-adjusting the above assumptions on growth rates and distribution rates such that the final totals satisfied the control targets.

Appendix C
Model Validation Summary

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Memorandum

Date:	April 18, 2008
To:	Wayne Tuck, P.Eng.
From:	Billy Kwok, E.I.T.
Subject:	Porter Creek Bench Transportation Network Impact Study Model Validation

Distribution:	Christine Benedek, P.Eng, City of Whitehorse
	Bill Jenkins, UMA
	Leah Libsekal, UMA
	Edwin Hull, Edwin Hull Associates

1.0 Model Validation

One of the main objectives of the Whitehorse Transportation Model (WTM) is to generate reliable forecasts at the local level, including intersection turning volumes and transit passenger volumes. The reliability of a forecasting model is determined heavily by how well the model is calibrated in the base year, in this case 2006. The objective of this memorandum is to present how well the model compares to reality, as a measure of its reliability. The first part of the memorandum provides general background information on the data collection and post processing. The latter part of the memorandum describes the validation of the model to intersection turn volumes, travel time, transit ridership and trip time.

1.1 Data Collection and Processing

The WTM was validated to reconciled turn counts at 44 intersections within the city boundary, as shown in Figure 1. Current summer weekday road and intersection turning traffic count data was provided by the City of Whitehorse. Roadway or link data consisted of 24-hour loop counts were summarized at 15-minute intervals in the PM peak period. Intersection counts were “one-day” manual counts also summarized into 15-minute intervals in the PM peak period.

Because the counts were undertaken over several years, with no common survey day of the week or common month, there were internal inconsistencies between count locations. To address the inconsistencies, which would have hampered the development of a validated base year traffic demand, an annual growth factor was applied to historical count data. Further refinements (including manual adjustments and averaging the count date) were made until the dataset was reconciled, particularly for adjacent intersections.

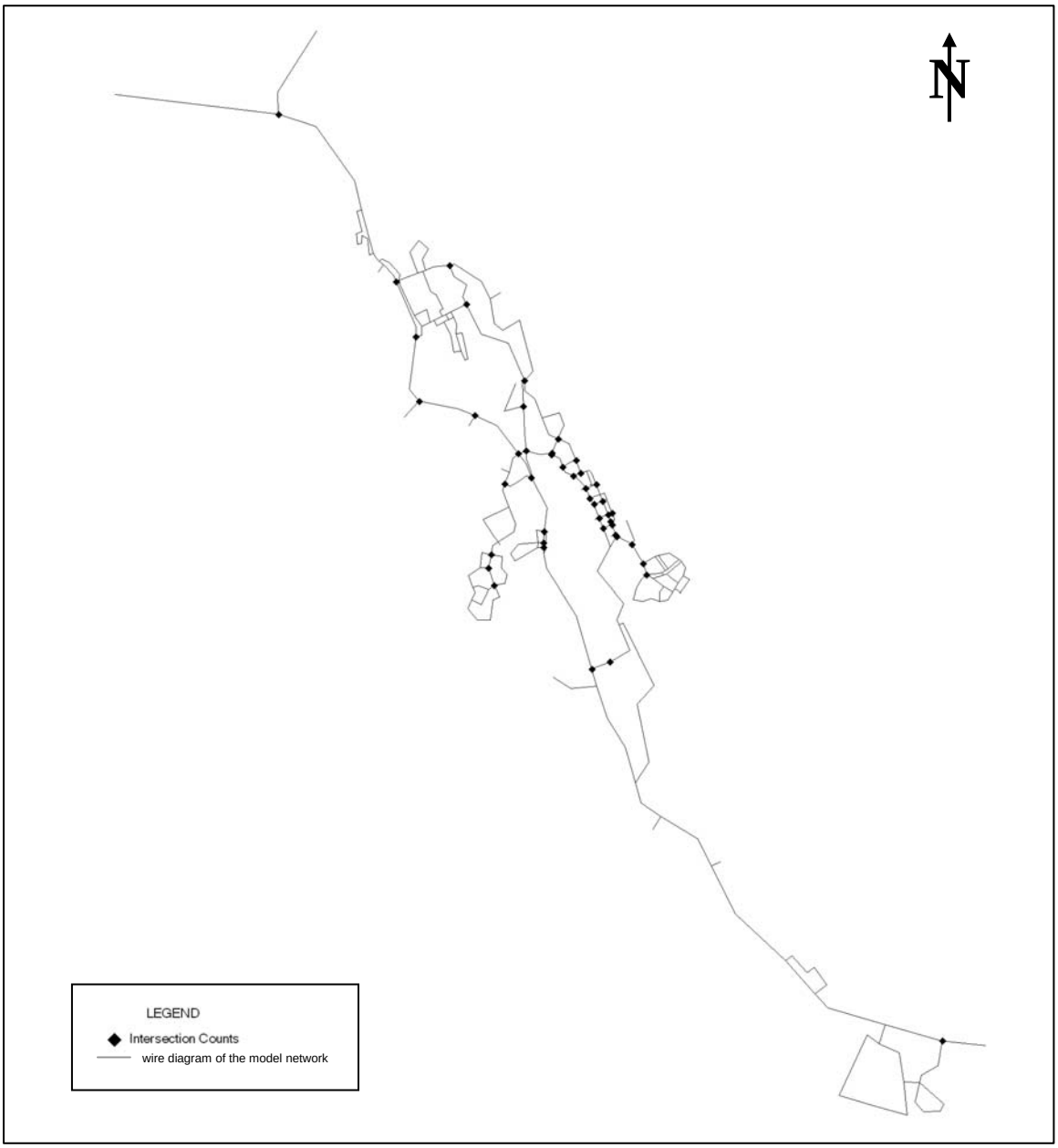


Figure 1 - Location of Traffic Counts

1.2 Intersection Turn Volumes

In light of the project's objective of developing accurate forecasts at both links and intersections, a critical model validation statistic is the closeness of fit between the reconciled intersection turning counts and 2006 model volumes. A comparison of the base model volumes versus the reconciled counts at all 44 intersections is illustrated in Figure 2 and detailed in Appendix A.

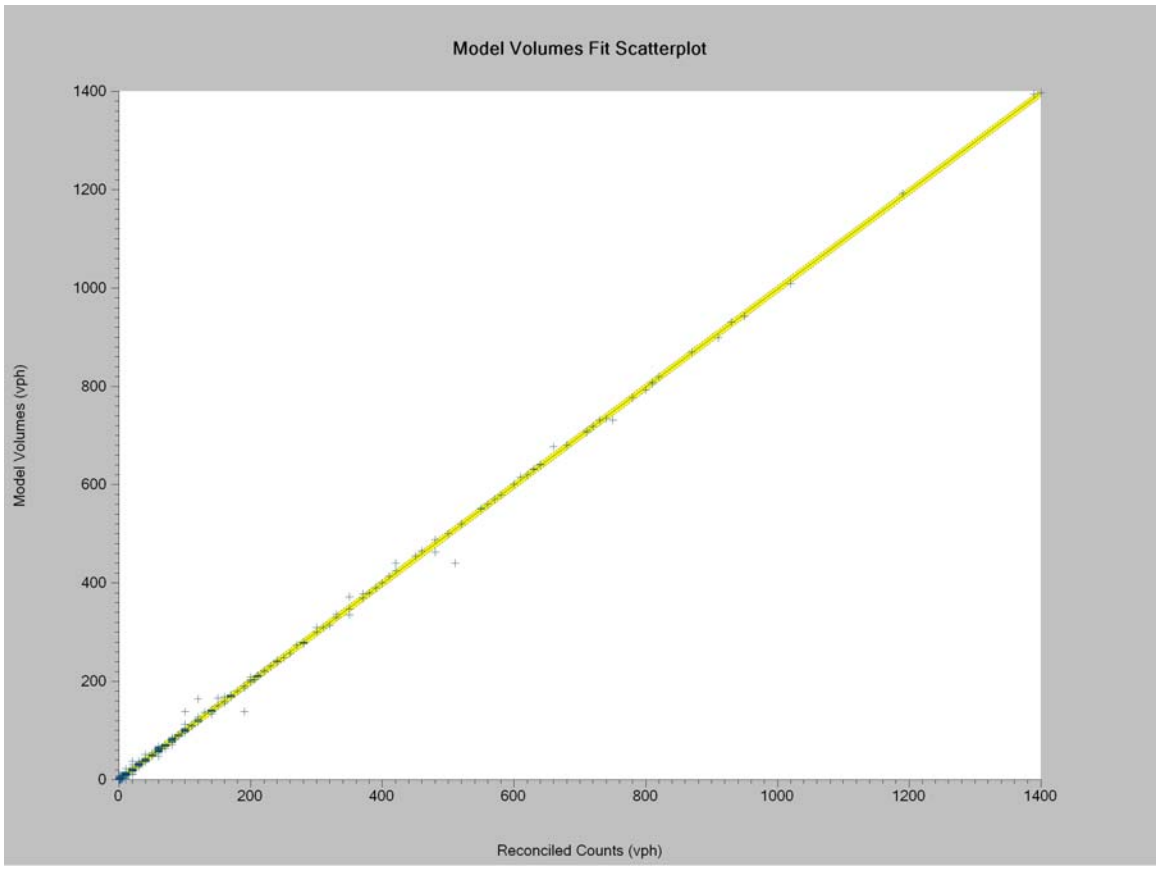


Figure 2 – Model Volumes Fit Scatterplot

As the scatterplot indicates, there is a strong relationship between modelled and reconciled volumes. A measure of the correlation between the two data sets is the R^2 statistic, which is commonly used as an indicator of the goodness of fit between two sets of data. The R^2 for the intersection data is an extremely satisfactory 0.9998.

A second useful measure of the goodness-of-fit of the forecasting model is the "GEH" statistic. Named after transportation planner Geoffrey E. Havers, the formula was explicitly developed as a meaningful measure of the reliability of traffic forecasting procedures. The GEH statistic is designed to reflect the level of difference associated with the magnitude of the count being analyzed. The GEH statistic is used in comparing two different values of volume flow, V_1 and V_2 and takes the form:

$$GEH = \sqrt{\frac{(V_1 - V_2)^2}{0.5 * (V_1 + V_2)}}$$

This statistic is provided as a means of measuring the difference in individual traffic counts. It is a more meaningful measure than either the absolute or relative difference when a wide variety of flows are analyzed. For example, for an observed volume of 1000 vehicles-per-hour (vph), an absolute difference of 50 vph would be less significant than a similar difference when the observed volume is 100 vph. Alternatively a 20% difference for an observed volume of 1000 vph would be of greater concern than a 20% difference for an observed volume of 100 vph. The GEH provides a balanced statistic in that the magnitude of the difference is weighted by the significance of the observed and modelled volumes.

For transportation planning models, a GEH statistic for total traffic volume across major regional screenlines of less than 10 is considered satisfactory, while a value of 15 or less is acceptable for individual screenline links. Few studies attempt to set targets for GEH statistics for turning traffic volumes as in most cases any meaningful target would be unachievable with standard modelling techniques.

The adoption of the explicit representation of intersection turning capacities and delays, combined with validation to base matrices adjusted to fit reconciled counts has allowed the GEH statistic of 4.5 or less to be realized across all 44 intersections for which reconciled count data was available. The range of model differences is an over-prediction of 14 vehicles per hour to an under-prediction of 22 vehicles per hour. The mean of the absolute difference is 1.7 vehicles per hour and the mean absolute percentage difference is 1.0%.

1.3 Travel Time

Another measure of model validity is the comparison of surveyed and modelled auto travel times. The auto travel time is an important validation measure because it is most often the basis of drivers' decisions on the selection of routes and travel mode. As no comprehensive travel time data is available for the City of Whitehorse, a moving car travel time survey was completed for three selected corridors over several days. Travel times by direction were documented during the PM peak hour, from February 13 to 15, 2008. Average travel times were compared against 2006 model travel times, and are presented in Table 1.

Table 1 – Actual and Base Model Auto Travel Time by Route (mm:ss)

Route	Segment	Actual		Model		Diff		% Diff	
		SB	NB	SB	NB	SB	NB	SB	NB
1. Alaska Hwy	1	04:09	03:53	03:54	03:54	-00:15	00:01	-6%	0%
	2	05:06	04:59	04:48	05:18	-00:18	00:19	-6%	6%
	3	04:52	05:18	05:12	04:48	00:20	-00:30	7%	-10%
	4	09:52	09:32	09:18	09:18	-00:34	-00:14	-6%	-3%
	Total	***23:58***	***23:43***	***23:12***	***23:18***	***-00:46***	***-00:25***	***-3%***	***-2%***
2. RSW-2nd-Quartz-Hickory	1	03:47	03:52	03:42	04:00	-00:05	00:08	-2%	3%
	2	06:40	05:56	06:00	05:30	-00:40	-00:26	-10%	-7%
	3	05:20	05:54	05:30	05:42	00:10	-00:12	3%	-3%
	Total	***15:46***	***15:42***	***15:12***	***15:12***	***-00:34***	***-00:30***	***-4%***	***-3%***
3. Main-4th-2Mile-Hamilton	1	04:26	04:35	04:12	04:54	-00:14	00:19	-5%	7%
	2	06:23	06:01	05:16	05:43	-01:07	-00:19	-18%	-5%
	Total	***10:49***	***10:36***	***09:28***	***10:37***	***-01:21***	***00:01***	***-13%***	***0%***
Abs Mean						***00:32***	***00:17***	***6.4%***	***3.4%***

The percentage differences between actual and model travel times range from -20% to 7%. The mean of the absolute differences are 17 seconds in the northbound direction and 34 seconds in the southbound direction and the mean absolute percentage differences are 3.4% and 6.6% respectively. This is considered a good fit to the survey travel times as given that the model cannot exactly replicate reality, as noted in the following differences: the point during the signal cycle that the survey vehicle arrived and travelled through the intersection to the end of the link segment versus the model travel time which excludes the turning movement delay at the end of a segment; and the simplified representation of roads as straight line links versus actual roads which include curves and slopes. While the model is a simplified representation of the reality, it is well calibrated to provide estimates of travel time in line with actual results.

1.4 Transit Ridership and Trip Time

The City of Whitehorse has a total of 6 bus routes serviced by Whitehorse Transit. Transit fares, routes and schedules were obtained on October 31, 2007, from the City's website (http://www.city.whitehorse.yk.ca). Information on bus vehicle model types and seating capacities, afternoon total boardings and transfers was provided by Whitehorse Transit. As total boarding and transfer information was only available as a yearly total, factors[1] were applied to ridership data to produce a best estimate of the PM peak hour total boardings and transfers. The factors were derived using similar methods as the conversion of annual daily traffic volumes to peak hour traffic volumes, but also included weekday and weekend operating hours as additional influencing factors. Information on PM peak hour boardings and transfers by individual transit lines was not available as input to the model development.

The model was validated to total transit ridership to achieve the best possible fit between 2006 transit ridership and modelled transit ridership. A comparison of validated model output and actual transit ridership for the PM peak hour is summarized in Table 2 below.

Table 2 – Actual and Base Model Transit Ridership (passengers)

	Actual	Model	Diff	% Diff
Total Passenger	570	577	7	1%
Total Transfer	67	69	2	3%
Total Boardings	***637***	***646***	***-9***	***-1%***
Abs Mean			***4.5***	***1.4%***

The percentage differences were 3% to 4% for total passenger and transfers respectively. The mean of the absolute difference is 9.0 passengers and the mean absolute percentage difference is 2.8%. However, it should be noted that without better information, the errors in deriving the

[1] (Feb19, 09) The conversion factors are:

a) Weekday afternoon peak hour ridership to weekday afternoon ridership:
2 (consider 4-hours of transit operation in the afternoon)
b) Weekday afternoon ridership to weekly afternoon ridership:
5.5 (consider no operations on Sunday and half of weekday ridership on Saturday)
c) Weekly afternoon ridership to annual afternoon ridership:
52 (consider 52 weeks in a year)

So, if 1000 is the annual afternoon total ridership, then 1000/2/5.5/52 is assumed for the weekday afternoon peak hour.

actual peak hour transit ridership numbers are likely to be greater than the model errors. This only shows that the actual numbers can be modelled with high precision.

As the model was not validated to individual transit line ridership due to the lack of data, it has limited potential to estimate ridership or address issues associated with individual transit lines. It is, however, an important strategic tool to be able to analyze total transit ridership across the City. It is recommended that Whitehorse Transit collect this information as part of the regular data collection effort for future model refinements, as well as general information on boarding and alightings at all stops.

The model was also validated to transit trip times to achieve the best possible fit between transit trip times and modelled transit trip times. The transit trip time is an important validation measure because it is the basis of people's decisions on the selection of transit lines and travel mode. A comparison of validated model output and actual transit trip times for the PM peak hour is summarized in Table 3 below.

Table 3 – Actual and Base Model Transit Trip Times by Route (min)

Line	Route	Actual	Model	Diff	% Diff
1	Riverdale	24	24	0	-1%
2	Airpt-Hillcst-Lobird	25	26	1	5%
3	Porter Crk-Crestview	30	30	0	0%
4	McIntyre-Logan-Grang	25	25	0	0%
5	Takhini-College	26	24	-2	-6%
6	Porter Crk-Ponderosa	29	27	-2	-7%
	Abs Mean			***0.9***	***3.5%***

The percentage differences range from -6% to 5% for total passenger and transfers respectively. The mean of the absolute difference is 0.8 minutes and the mean absolute percentage difference is 3.2%. Since the obtained transit schedules are in minutes, the model values are also rounded to the nearest minute; however, the percentage differences were calculated without rounding of the model values.

1.5 Summary

The validation of the base model to intersection turn volumes, travel time, transit ridership and trip time was achieved. With the base model established and future horizons defined, the model can be utilized to run various "pictures' or scenarios of conditions, to test the effect of land use, economic or network options.

Appendix A - Actual Counts and Base Model Volumes (vph)

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Alaska Hwy	North Klondike Hwy	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	64	64	0	0%	0
		NBR	212	212	0	0%	0
		SBL	7	7	0	0%	0
		SBT	32	32	0	0%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	84	84	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	5	5	0	0%	0
Alaska Hwy	Clyde Wann Road	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	380	380	0	0%	0
		NBR	140	140	0	0%	0
		SBL	60	57	-3	-5%	0
		SBT	190	187	-3	-2%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	60	57	-3	-5%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	80	80	0	0%	0
Alaska Hwy	Centennial Street	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	520	520	0	0%	0
		NBR	200	201	1	1%	0
		SBL	4	0	-4	-100%	3
		SBT	240	243	3	1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	80	80	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	1	0	-1	-100%	1
Alaska Hwy	Fish Lake Road	NBL	10	10	0	0%	0
		NBT	630	631	1	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	300	300	0	0%	0
		SBR	4	4	0	0%	0
		EBL	10	10	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	20	20	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Alaska Hwy	Prospector Road	NBL	70	70	0	0%	0
		NBT	630	631	1	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	310	310	0	0%	0
		SBR	10	10	0	0%	0
		EBL	10	10	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	50	50	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	20	21	1	5%	0
		NBT	100	100	0	0%	0
		NBR	80	81	1	1%	0
		SBL	230	231	1	0%	0
		SBT	80	79	-1	-1%	0
		SBR	50	50	0	0%	0
		EBL	50	50	0	0%	0
		EBT	330	330	0	0%	0
		EBR	10	9	-1	-10%	0
		WBL	120	120	0	0%	0
		WBT	640	640	0	0%	0
		WBR	550	551	1	0%	0
Alaska Hwy	Range Rd	NBL	70	70	0	0%	0
		NBT	170	169	-1	-1%	0
		NBR	100	100	0	0%	0
		SBL	3	4	1	33%	0
		SBT	200	200	0	0%	0
		SBR	4	5	1	25%	1
		EBL	3	3	0	0%	0
		EBT	20	20	0	0%	0
		EBR	40	39	-1	-3%	0
		WBL	110	109	-1	-1%	0
		WBT	30	30	0	0%	0
		WBR	30	29	-1	-3%	0
Alaska Hwy	Burns Rd	NBL	10	9	-1	-10%	0
		NBT	280	279	-1	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	320	316	-4	-1%	0
		SBR	30	31	1	3%	0
		EBL	60	60	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	20	14	-6	-30%	1
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Alaska Hwy	Roundel Rd	NBL	10	10	0	-4%	0
		NBT	200	200	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	300	305	5	2%	0
		SBR	30	36	6	20%	1
		EBL	40	41	1	3%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	10	9	-1	-10%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Alaska Hwy	Hillcrest Dr/Airport Access	NBL	20	19	-1	-5%	0
		NBT	170	169	-1	-1%	0
		NBR	2	0	-2	-100%	2
		SBL	20	22	2	8%	0
		SBT	250	250	0	0%	0
		SBR	40	41	1	3%	0
		EBL	20	20	0	0%	0
		EBT	10	8	-2	-20%	1
		EBR	4	4	0	-10%	0
		WBL	1	0	-1	-100%	1
		WBT	0	0	0	#N/A	#N/A
		WBR	20	20	0	-2%	0
Alaska Hwy	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	110	111	1	1%	0
		NBR	100	102	2	2%	0
		SBL	60	63	3	5%	0
		SBT	190	192	2	1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	270	271	1	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	80	82	2	3%	0
Alaska Hwy	Salmon Trail	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	95	95	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	206	206	0	0%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Industrial Rd	Two Mile Hill	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	#N/A	#N/A	#N/A	#N/A	#N/A
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	60	63	3	5%	0
		SBT	#N/A	#N/A	#N/A	#N/A	#N/A
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	60	60	0	-1%	0
		EBT	640	642	2	0%	0
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	1390	1390	0	0%	0
		WBR	160	159	-1	-1%	0
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	1400	1409	9	1%	0
		NBR	40	42	2	5%	0
		SBL	90	87	-3	-3%	0
		SBT	610	617	7	1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	20	16	-4	-20%	1
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	150	141	-9	-6%	1
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	1020	1018	-2	0%	0
		NBR	170	156	-14	-8%	1
		SBL	210	216	6	3%	0
		SBT	420	418	-2	-1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	190	174	-16	-8%	1
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	420	433	13	3%	1
4th Ave	Ogilvie St	NBL	10	10	0	0%	0
		NBT	600	602	2	0%	0
		NBR	100	102	2	2%	0
		SBL	60	61	1	1%	0
		SBT	410	408	-2	0%	0
		SBR	90	91	1	1%	0
		EBL	210	211	1	0%	0
		EBT	140	138	-2	-1%	0
		EBR	10	12	2	20%	1
		WBL	80	81	1	1%	0
		WBT	50	50	0	0%	0
		WBR	140	141	1	0%	0

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	820	821	1	0%	0
		NBR	10	10	0	0%	0
		SBL	10	8	-2	-20%	0
		SBT	450	447	-3	-1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	4	4	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	90	90	0	0%	0
4th Ave	Strickland St	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	810	811	1	0%	0
		NBR	10	11	1	10%	0
		SBL	20	20	0	0%	0
		SBT	460	458	-2	-1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	2	4	2	100%	1
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	70	70	0	0%	0
4th Ave	Main St	NBL	30	33	3	10%	1
		NBT	380	381	1	0%	0
		NBR	50	50	0	0%	0
		SBL	140	141	1	1%	0
		SBT	330	327	-3	-1%	0
		SBR	20	20	0	0%	0
		EBL	40	40	0	0%	0
		EBT	70	70	0	0%	0
		EBR	40	40	0	0%	0
		WBL	70	70	0	0%	0
		WBT	50	50	0	0%	0
		WBR	170	171	1	0%	0
4th Ave	Hanson St	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	200	201	1	0%	0
		NBR	10	9	-1	-10%	0
		SBL	60	61	1	2%	0
		SBT	370	367	-3	-1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	20	18	-2	-10%	1
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	50	52	2	4%	0

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Industrial Rd	Quartz Rd	NBL	170	170	0	0%	0
		NBT	60	60	0	0%	0
		NBR	80	87	7	8%	1
		SBL	120	116	-4	-3%	0
		SBT	80	82	2	3%	0
		SBR	60	58	-2	-3%	0
		EBL	10	10	0	0%	0
		EBT	280	275	-5	-2%	0
		EBR	80	85	5	6%	1
		WBL	40	40	0	-1%	0
		WBT	280	278	-2	-1%	0
		WBR	60	59	-1	-2%	0
Quartz Rd	Chilkoot Way	NBL	120	107	-13	-11%	1
		NBT	350	354	4	1%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	480	477	-3	-1%	0
		SBR	50	51	1	2%	0
		EBL	30	29	-1	-3%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	100	101	1	1%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Quartz Rd	2nd Ave	NBL	110	105	-5	-5%	0
		NBT	110	104	-6	-5%	1
		NBR	20	18	-2	-10%	0
		SBL	400	401	1	0%	0
		SBT	90	87	-3	-3%	0
		SBR	90	90	0	0%	0
		EBL	80	88	8	10%	1
		EBT	260	252	-8	-3%	1
		EBR	40	33	-7	-18%	1
		WBL	10	5	-5	-50%	2
		WBT	410	412	2	0%	0
		WBR	280	269	-11	-4%	1
2nd Ave	Ogilvie St	NBL	100	99	-1	-1%	0
		NBT	710	708	-2	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	710	713	3	0%	0
		SBR	20	20	0	-2%	0
		EBL	60	61	1	2%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	130	130	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
2nd Ave	Strickland St	NBL	20	20	0	0%	0
		NBT	730	729	-1	0%	0
		NBR	4	2	-2	-50%	1
		SBL	10	0	-10	-100%	4
		SBT	740	743	3	0%	0
		SBR	70	70	0	0%	0
		EBL	20	20	0	0%	0
		EBT	1	2	1	100%	1
		EBR	70	70	0	0%	0
		WBL	0	2	2	#N/A	#N/A
		WBT	0	2	2	#N/A	#N/A
		WBR	10	0	-10	-100%	4
2nd Ave	Main St	NBL	20	34	14	70%	3
		NBT	660	673	13	2%	1
		NBR	10	21	11	110%	3
		SBL	20	17	-3	-15%	1
		SBT	780	783	3	0%	0
		SBR	120	120	0	0%	0
		EBL	140	139	-1	-1%	0
		EBT	60	58	-2	-3%	0
		EBR	60	61	1	2%	0
		WBL	80	82	2	3%	0
		WBT	60	61	1	2%	0
		WBR	40	38	-2	-5%	0
2nd Ave	Lambert St	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	750	728	-22	-3%	1
		NBR	3	1	-2	-67%	1
		SBL	10	10	0	0%	0
		SBT	910	905	-5	-1%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	10	5	-5	-50%	2
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	10	1	-9	-90%	4
2nd Ave	Hanson St	NBL	10	6	-4	-40%	1
		NBT	600	606	6	1%	0
		NBR	10	8	-2	-20%	1
		SBL	10	18	8	80%	2
		SBT	850	858	8	1%	0
		SBR	30	37	7	23%	1
		EBL	40	47	7	18%	1
		EBT	10	11	1	10%	0
		EBR	70	69	-1	-1%	0
		WBL	60	58	-2	-3%	0
		WBT	30	21	-9	-30%	2
		WBR	70	77	7	10%	1

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
2nd Ave	Lowe St	NBL	20	20	0	0%	0
		NBT	620	620	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	950	954	4	0%	0
		SBR	30	31	1	3%	0
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
2nd Ave	Robert Service Way	NBL	100	100	0	0%	0
		NBT	570	570	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	800	804	4	1%	0
		SBR	180	180	0	0%	0
		EBL	70	70	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	200	196	-4	-2%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Lewes Blvd	Hospital Rd	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	560	560	0	0%	0
		NBR	10	10	0	-4%	0
		SBL	70	70	0	0%	0
		SBT	930	930	0	0%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	30	30	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	110	110	0	0%	0
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	400	400	0	0%	0
		NBR	10	10	0	0%	0
		SBL	240	240	0	0%	0
		SBT	680	680	0	0%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	10	10	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	160	160	0	0%	0

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Lewes Blvd	Teslin Rd	NBL	10	10	0	0%	0
		NBT	310	310	0	0%	0
		NBR	20	20	0	0%	0
		SBL	40	40	0	0%	0
		SBT	500	500	0	0%	0
		SBR	150	150	0	0%	0
		EBL	80	80	0	0%	0
		EBT	10	10	0	0%	0
		EBR	10	9	-1	-10%	0
		WBL	3	3	0	0%	0
		WBT	4	4	0	0%	0
		WBR	20	20	0	0%	0
1st Ave	Main St	NBL	40	42	2	5%	0
		NBT	40	40	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	20	20	0	0%	0
		SBR	140	139	-1	-1%	0
		EBL	50	53	3	6%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	40	43	3	8%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	#N/A	#N/A	#N/A	#N/A	#N/A
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	#N/A	#N/A	#N/A	#N/A	#N/A
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	160	159	-1	-1%	0
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	350	349	-1	0%	0
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	#N/A
		NBT	390	390	0	0%	0
		NBR	10	10	0	0%	0
		SBL	50	50	0	0%	0
		SBT	870	870	0	0%	0
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	#N/A	#N/A	#N/A	#N/A	#N/A
		WBL	30	30	0	0%	0
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	70	70	0	0%	0

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Hamilton Blvd	Thompson Rd/Heron Dr	NBL	1	1	0	0%	0
		NBT	280	280	0	0%	0
		NBR	10	10	0	0%	0
		SBL	100	100	0	0%	0
		SBT	720	719	-1	0%	0
		SBR	60	60	0	-1%	0
		EBL	30	30	0	0%	0
		EBT	0	1	1	#N/A	#N/A
		EBR	0	1	1	#N/A	#N/A
		WBL	0	1	1	#N/A	#N/A
		WBT	1	1	0	0%	0
		WBR	40	40	0	-1%	0
Hamilton Blvd	Thompson Rd/Lazulite Dr	NBL	20	20	0	0%	0
		NBT	210	210	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	550	550	0	0%	0
		SBR	170	170	0	0%	0
		EBL	80	80	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	20	20	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Hamilton Blvd	Falcon Dr	NBL	30	30	0	0%	0
		NBT	140	140	0	0%	0
		NBR	10	10	0	-4%	0
		SBL	170	170	0	0%	0
		SBT	240	240	0	0%	0
		SBR	160	160	0	0%	0
		EBL	50	50	0	0%	0
		EBT	10	10	0	0%	0
		EBR	2	2	0	0%	0
		WBL	20	20	0	0%	0
		WBT	10	10	0	0%	0
		WBR	40	40	0	0%	0
Hickory St	Clyde Wann Rd	NBL	180	180	0	0%	0
		NBT	#N/A	#N/A	#N/A	#N/A	#N/A
		NBR	10	10	0	0%	0
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	#N/A	#N/A	#N/A	#N/A	#N/A
		SBR	#N/A	#N/A	#N/A	#N/A	#N/A
		EBL	#N/A	#N/A	#N/A	#N/A	#N/A
		EBT	30	30	0	0%	0
		EBR	90	90	0	0%	0
		WBL	4	4	0	0%	0
		WBT	30	30	0	0%	0
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A

NS Street	EW Street	Dir	Actual	Model	Diff	%Diff	GEH
Mountainview Rd	12th Ave	NBL	220	219	-1	-1%	0
		NBT	240	240	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	90	90	0	0%	0
		SBR	30	30	0	0%	0
		EBL	40	40	0	0%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	90	90	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Mountainview Rd	Range Rd	NBL	20	19	-1	-5%	0
		NBT	370	369	-1	0%	0
		NBR	140	140	0	0%	0
		SBL	10	10	0	0%	0
		SBT	140	140	0	0%	0
		SBR	30	31	1	3%	0
		EBL	80	80	0	0%	0
		EBT	70	70	0	-1%	0
		EBR	20	20	0	0%	0
		WBL	60	60	0	-1%	0
		WBT	30	31	1	3%	0
		WBR	10	10	0	0%	0
Range Rd	College Access Rd	NBL	30	30	0	-1%	0
		NBT	100	100	0	0%	0
		NBR	#N/A	#N/A	#N/A	#N/A	#N/A
		SBL	#N/A	#N/A	#N/A	#N/A	#N/A
		SBT	60	59	-1	-2%	0
		SBR	20	21	1	5%	0
		EBL	70	70	0	-1%	0
		EBT	#N/A	#N/A	#N/A	#N/A	#N/A
		EBR	110	110	0	0%	0
		WBL	#N/A	#N/A	#N/A	#N/A	#N/A
		WBT	#N/A	#N/A	#N/A	#N/A	#N/A
		WBR	#N/A	#N/A	#N/A	#N/A	#N/A
Range Rd	Two Mile Hill	NBL	0	1	1	#N/A	#N/A
		NBT	100	100	0	0%	0
		NBR	120	120	0	0%	0
		SBL	0	2	2	#N/A	#N/A
		SBT	60	60	0	0%	0
		SBR	120	120	0	0%	0
		EBL	60	60	0	0%	0
		EBT	580	580	0	0%	0
		EBR	0	2	2	#N/A	#N/A
		WBL	100	100	0	0%	0
		WBT	1190	1191	1	0%	0
		WBR	220	220	0	0%	0
		Abs Mean			***1.7***	***1.0%***	***0.2***
		Max					***4***
		R^2					***0.9998***

Appendix D
Traffic Operations Summary

2006 (20,000 pop) Base Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	21	0.1	25	C	15.1	B
		NBT	100	0.2	25	C		
		NBR	81	0.1	5	A		
		SBL	231	0.4	27	C		
		SBT	79	0.1	25	C		
		SBR	50	0.1	6	A		
		EBL	50	0.2	17	B		
		EBT	330	0.3	18	B		
		EBR	9	0.0	25	C		
		WBL	120	0.3	16	B		
		WBT	641	0.5	20	C		
		WBR	551	0.3	1	A		
Range Rd	Two Mile Hill	NBL	1	0.0	31	C	14.3	B
		NBT	100	0.6	34	C		
		NBR	120	0.6	34	C		
		SBL	2	0.0	35	D		
		SBT	60	0.1	25	C		
		SBR	120	0.2	16	B		
		EBL	60	0.4	32	C		
		EBT	580	0.3	5	A		
		EBR	2	0.0	5	A		
		WBL	100	0.2	16	B		
		WBT	1191	0.5	14	B		
		WBR	220	0.3	11	B		
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	11.3	B
		NBT	1409	0.6	13	B		
		NBR	42	0.0	1	A		
		SBL	87	0.5	23	C		
		SBT	617	0.3	5	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	16	0.1	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	141	0.3	16	B		
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	13.1	B
		NBT	1018	0.5	13	B		
		NBR	156	0.1	0	A		
		SBL	216	0.8	27	C		
		SBT	418	0.2	4	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	174	0.5	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	433	0.6	15	B		
4th Ave	Ogilvie St	NBL	10	0.0	13	B	15.3	B
		NBT	602	0.2	7	A		
		NBR	101	0.1	6	A		
		SBL	61	0.2	14	B		
		SBT	408	0.2	6	A		
		SBR	91	0.1	6	A		
		EBL	211	0.9	57	E		
		EBT	138	0.3	18	B		
		EBR	12	0.2	18	B		
		WBL	81	0.3	25	C		
		WBT	50	0.4	19	B		
		WBR	141	0.4	19	B		
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	21.5	C
		NBT	821	0.8	31	C		
		NBR	10	0.1	4	A		
		SBL	8	0.0	20	C		
		SBT	447	0.4	5	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	4	0.0	18	B		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	90	0.4	19	B		

2006 (20,000 pop) Base Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
4th Ave	Main St	NBL	33	0.1	20	C	17.0	B
		NBT	381	0.7	25	C		
		NBR	50	0.7	25	C		
		SBL	141	0.4	8	A		
		SBT	327	0.4	8	A		
		SBR	20	0.2	7	A		
		EBL	40	0.2	24	C		
		EBT	70	0.2	17	B		
		EBR	40	0.2	17	B		
		WBL	70	0.2	23	C		
		WBT	50	0.4	18	B		
		WBR	171	0.4	18	B		
Mountainview Dr	Range Rd	NBL	19	0.0	12	B	8.5	A
		NBT	369	0.5	9	A		
		NBR	140	0.1	2	A		
		SBL	10	0.0	14	B		
		SBT	140	0.2	7	A		
		SBR	31	0.0	2	A		
		EBL	80	0.2	15	B		
		EBT	70	0.1	10	B		
		EBR	20	0.0	5	A		
		WBL	60	0.2	16	B		
		WBT	31	0.0	10	B		
		WBR	10	0.0	10	B		
Quartz Rd	Chilkoot Way	NBL	107	0.3	14	B	8.3	A
		NBT	354	0.3	5	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	477	0.5	7	A		
		SBR	51	0.4	7	A		
		EBL	29	0.1	25	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	101	0.2	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Quartz Rd	2nd Ave	NBL	105	0.3	28	C	18.1	B
		NBT	104	0.3	28	C		
		NBR	18	0.3	28	C		
		SBL	401	0.4	23	C		
		SBT	87	0.1	21	C		
		SBR	90	0.1	5	A		
		EBL	88	0.3	28	C		
		EBT	252	0.2	19	B		
		EBR	33	0.1	19	B		
		WBL	5	0.0	27	C		
		WBT	412	0.2	19	B		
		WBR	269	0.2	0	A		
2nd Ave	Ogilvie St	NBL	99	0.3	14	B	7.9	A
		NBT	709	0.3	6	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	713	0.4	7	A		
		SBR	20	0.0	6	A		
		EBL	61	0.2	15	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	130	0.3	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Main St	NBL	34	0.1	19	B	12.3	B
		NBT	673	0.3	10	B		
		NBR	21	0.0	10	B		
		SBL	17	0.1	18	B		
		SBT	783	0.3	10	B		
		SBR	120	0.2	10	B		
		EBL	139	0.4	24	C		
		EBT	58	0.2	16	B		
		EBR	61	0.2	16	B		
		WBL	82	0.3	23	C		
		WBT	61	0.2	16	B		
		WBR	38	0.2	16	B		

2006 (20,000 pop) Base Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
2nd Ave	Hanson St	NBL	6	0.0	15	B	10.3	B
		NBT	606	0.2	7	A		
		NBR	8	0.0	7	A		
		SBL	18	0.0	14	B		
		SBT	858	0.3	7	A		
		SBR	37	0.0	7	A		
		EBL	47	0.2	32	C		
		EBT	11	0.1	25	C		
		EBR	69	0.2	25	C		
		WBL	59	0.2	32	C		
		WBT	21	0.2	25	C		
		WBR	77	0.2	25	C		
2nd Ave	Lowe St	NBL	20	0.1	9	A	3.7	A
		NBT	620	0.2	0	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	954	0.4	6	A		
		SBR	31	0.0	4	A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Robert Service Way	NBL	100	0.2	18	B	8.4	A
		NBT	570	0.4	14	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	804	0.4	6	A		
		SBR	180	0.1	0	A		
		EBL	70	0.2	23	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	196	0.1	0	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	10.0	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	159	0.2	10	B		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	349	0.3	10	B		
		WBR	#N/A	#N/A	#N/A	#N/A		
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	9.3	A
		NBT	400	0.4	9	A		
		NBR	10	0.0	0	A		
		SBL	240	0.5	7	A		
		SBT	680	0.6	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	10	0.0	24	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	160	0.2	10	B		
Hamilton Blvd	Multiplex Access	NBL	71	0.2	14	B	8.0	A
		NBT	389	0.2	6	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	777	0.5	9	A		
		SBR	15	0.0	0	A		
		EBL	18	0.0	13	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	143	0.2	5	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

2006 (20,000 pop) Base Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	9.4	A
		NBT	390	0.2	6	A		
		NBR	10	0.0	6	A		
		SBL	50	0.1	12	B		
		SBT	870	0.5	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	30	0.2	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	70	0.2	13	B		

Short-term (24,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	23	0.1	25	C	15.6	B
		NBT	122	0.2	25	C		
		NBR	88	0.1	5	A		
		SBL	253	0.5	28	C		
		SBT	92	0.2	25	C		
		SBR	55	0.1	6	A		
		EBL	66	0.2	17	B		
		EBT	441	0.4	20	C		
		EBR	11	0.1	25	C		
		WBL	144	0.4	16	B		
		WBT	596	0.5	19	B		
		WBR	555	0.4	1	A		
Alaska Hwy	Robert Service Way	NBL	18	0.1	18	B	14.5	B
		NBT	118	0.2	11	B		
		NBR	110	0.1	0	A		
		SBL	65	0.2	18	B		
		SBT	205	0.3	12	B		
		SBR	21	0.0	0	A		
		EBL	12	0.0	18	B		
		EBT	28	0.0	11	B		
		EBR	14	0.0	0	A		
		WBL	295	0.7	30	C		
		WBT	135	0.2	11	B		
		WBR	90	0.1	0	A		
Range Rd	Two Mile Hill	NBL	1	0.0	31	C	15.5	B
		NBT	178	0.3	25	C		
		NBR	152	0.5	28	C		
		SBL	2	0.0	35	D		
		SBT	77	0.1	25	C		
		SBR	141	0.3	16	B		
		EBL	92	0.6	37	D		
		EBT	689	0.3	5	A		
		EBR	2	0.0	5	A		
		WBL	125	0.3	16	B		
		WBT	1153	0.6	16	B		
		WBR	431	0.6	16	B		
Industrial Rd	Two Mile Hill	NBL	#N/A	#N/A	#N/A	#N/A	11.9	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	157	0.6	28	C		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	71	0.4	19	B		
		EBT	772	0.3	4	A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	1569	0.7	15	B		
		WBR	151	0.1	0	A		
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	13.1	B
		NBT	1511	0.7	15	B		
		NBR	44	0.0	0	A		
		SBL	120	0.7	33	C		
		SBT	810	0.4	6	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	18	0.1	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	210	0.4	17	B		
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	15.6	B
		NBT	1129	0.6	16	B		
		NBR	189	0.1	0	A		
		SBL	242	0.9	48	D		
		SBT	586	0.3	5	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	147	0.4	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	426	0.6	15	B		

Short-term (24,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
4th Ave	Ogilvie St	NBL	12	0.1	25	C	16.8	B
		NBT	644	0.3	11	B		
		NBR	106	0.2	11	B		
		SBL	81	0.3	20	C		
		SBT	491	0.3	12	B		
		SBR	110	0.2	11	B		
		EBL	259	0.8	36	D		
		EBT	146	0.2	13	B		
		EBR	23	0.2	13	B		
		WBL	92	0.3	26	C		
		WBT	54	0.5	25	C		
		WBR	142	0.5	26	C		
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	27.2	C
		NBT	886	0.9	41	D		
		NBR	19	0.2	4	A		
		SBL	11	0.1	21	C		
		SBT	538	0.5	7	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	7	0.0	18	B		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	99	0.4	20	C		
4th Ave	Main St	NBL	48	0.1	20	C	18.6	B
		NBT	407	0.7	29	C		
		NBR	56	0.7	29	C		
		SBL	172	0.5	10	B		
		SBT	386	0.4	9	A		
		SBR	24	0.2	7	A		
		EBL	47	0.2	25	C		
		EBT	84	0.2	17	B		
		EBR	45	0.2	17	B		
		WBL	86	0.3	24	C		
		WBT	48	0.4	19	B		
		WBR	199	0.5	19	B		
Mountainview Dr	Range Rd	NBL	23	0.1	12	B	10.0	B
		NBT	465	0.6	13	B		
		NBR	170	0.2	2	A		
		SBL	10	0.0	17	B		
		SBT	166	0.2	7	A		
		SBR	40	0.0	2	A		
		EBL	87	0.2	15	B		
		EBT	92	0.1	10	B		
		EBR	19	0.0	5	A		
		WBL	69	0.2	16	B		
		WBT	39	0.1	10	B		
		WBR	11	0.0	5	A		
Industrial Rd	Quartz Rd	NBL	184	0.5	19	B	12.4	B
		NBT	64	0.2	9	A		
		NBR	83	0.2	9	A		
		SBL	95	0.2	15	B		
		SBT	119	0.2	9	A		
		SBR	61	0.2	10	B		
		EBL	10	0.1	27	C		
		EBT	273	0.2	11	B		
		EBR	147	0.2	11	B		
		WBL	53	0.2	18	B		
		WBT	398	0.4	12	B		
		WBR	64	0.1	11	B		
Quartz Rd	Chilkoot Way	NBL	181	0.5	16	B	9.4	A
		NBT	472	0.4	6	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	457	0.4	7	A		
		SBR	56	0.5	7	A		
		EBL	49	0.2	25	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	126	0.2	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Short-term (24,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Quartz Rd	2nd Ave	NBL	127	0.4	29	C	18.1	B
		NBT	122	0.4	29	C		
		NBR	20	0.4	29	C		
		SBL	447	0.5	24	C		
		SBT	104	0.2	21	C		
		SBR	33	0.0	5	A		
		EBL	108	0.4	29	C		
		EBT	285	0.3	20	C		
		EBR	38	0.1	19	B		
		WBL	6	0.0	28	C		
		WBT	413	0.2	19	B		
		WBR	423	0.3	0	A		
2nd Ave	Ogilvie St	NBL	122	0.3	14	B	8.8	A
		NBT	826	0.4	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	801	0.4	8	A		
		SBR	17	0.0	6	A		
		EBL	90	0.2	16	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	136	0.3	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Main St	NBL	23	0.1	25	C	12.7	B
		NBT	703	0.3	10	B		
		NBR	24	0.0	10	B		
		SBL	21	0.1	18	B		
		SBT	847	0.4	10	B		
		SBR	141	0.2	10	B		
		EBL	172	0.5	27	C		
		EBT	71	0.2	16	B		
		EBR	66	0.2	16	B		
		WBL	92	0.3	23	C		
		WBT	74	0.2	16	B		
		WBR	45	0.2	16	B		
2nd Ave	Hanson St	NBL	18	0.1	16	B	11.2	B
		NBT	598	0.2	7	A		
		NBR	8	0.0	7	A		
		SBL	17	0.0	14	B		
		SBT	929	0.3	8	A		
		SBR	45	0.1	7	A		
		EBL	77	0.3	33	C		
		EBT	12	0.1	25	C		
		EBR	87	0.2	25	C		
		WBL	60	0.2	32	C		
		WBT	21	0.2	25	C		
		WBR	76	0.2	25	C		
2nd Ave	Lowe St	NBL	22	0.1	9	A	4.4	A
		NBT	624	0.2	0	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	1038	0.5	7	A		
		SBR	38	0.0	4	A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Robert Service Way	NBL	168	0.4	20	C	8.6	A
		NBT	567	0.4	14	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	848	0.4	6	A		
		SBR	226	0.1	0	A		
		EBL	80	0.2	23	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	227	0.1	0	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Short-term (24,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	10.0	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	197	0.3	10	B		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	514	0.4	10	B		
		WBR	#N/A	#N/A	#N/A	#N/A		
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	10.6	B
		NBT	438	0.5	10	B		
		NBR	9	0.0	0	A		
		SBL	255	0.5	8	A		
		SBT	729	0.6	12	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	9	0.0	24	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	175	0.2	10	B		
Hamilton Blvd	Multiplex Access	NBL	82	0.2	13	B	7.6	A
		NBT	518	0.3	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	748	0.4	8	A		
		SBR	15	0.0	0	A		
		EBL	20	0.1	13	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	160	0.2	5	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	9.4	A
		NBT	523	0.3	7	A		
		NBR	8	0.0	6	A		
		SBL	56	0.1	13	B		
		SBT	851	0.5	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	20	0.1	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	78	0.2	13	B		

Medium-term (25,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	26	0.1	25	C	15.9	B
		NBT	147	0.3	26	C		
		NBR	101	0.1	5	A		
		SBL	307	0.6	31	C		
		SBT	111	0.2	25	C		
		SBR	59	0.1	6	A		
		EBL	67	0.2	17	B		
		EBT	461	0.5	20	C		
		EBR	12	0.1	25	C		
		WBL	163	0.4	17	B		
		WBT	574	0.5	19	B		
		WBR	745	0.5	3	A		
Alaska Hwy	Robert Service Way	NBL	20	0.1	19	B	16.5	B
		NBT	134	0.2	11	B		
		NBR	124	0.1	0	A		
		SBL	66	0.2	18	B		
		SBT	231	0.3	12	B		
		SBR	20	0.0	0	A		
		EBL	12	0.0	18	B		
		EBT	29	0.0	11	B		
		EBR	15	0.0	0	A		
		WBL	328	0.8	37	D		
		WBT	148	0.2	12	B		
		WBR	105	0.1	0	A		
Range Rd	Two Mile Hill	NBL	15	0.1	31	C	17.4	B
		NBT	226	0.4	26	C		
		NBR	155	0.5	29	C		
		SBL	2	0.0	36	D		
		SBT	72	0.1	25	C		
		SBR	150	0.3	17	B		
		EBL	104	0.6	40	D		
		EBT	764	0.3	5	A		
		EBR	2	0.0	5	A		
		WBL	126	0.3	17	B		
		WBT	1317	0.6	20	C		
		WBR	428	0.6	16	B		
Industrial Rd	Two Mile Hill	NBL	#N/A	#N/A	#N/A	#N/A	13.6	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	149	0.6	27	C		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	81	0.4	21	C		
		EBT	840	0.4	4	A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	1673	0.7	18	B		
		WBR	137	0.1	0	A		
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	14.4	B
		NBT	1572	0.7	17	B		
		NBR	45	0.0	0	A		
		SBL	124	0.7	37	D		
		SBT	865	0.4	6	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	19	0.1	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	238	0.4	18	B		
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	17.0	B
		NBT	1181	0.6	17	B		
		NBR	190	0.1	0	A		
		SBL	250	1.0	59	E		
		SBT	633	0.3	5	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	139	0.4	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	436	0.6	16	B		

Medium-term (25,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
4th Ave	Ogilvie St	NBL	13	0.1	27	C	18.3	B
		NBT	655	0.3	11	B		
		NBR	111	0.2	11	B		
		SBL	104	0.4	20	C		
		SBT	501	0.4	13	B		
		SBR	116	0.2	11	B		
		EBL	277	0.9	45	D		
		EBT	151	0.3	13	B		
		EBR	24	0.3	13	B		
		WBL	94	0.3	26	C		
		WBT	58	0.5	26	C		
		WBR	146	0.5	27	C		
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	29.9	C
		NBT	907	0.9	45	D		
		NBR	20	0.2	4	A		
		SBL	11	0.1	22	C		
		SBT	551	0.5	8	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	7	0.0	18	B		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	103	0.5	20	C		
4th Ave	Main St	NBL	50	0.1	20	C	19.3	B
		NBT	418	0.7	30	C		
		NBR	59	0.7	31	C		
		SBL	180	0.5	11	B		
		SBT	390	0.4	9	A		
		SBR	25	0.3	7	A		
		EBL	51	0.2	25	C		
		EBT	89	0.2	17	B		
		EBR	48	0.3	17	B		
		WBL	95	0.3	24	C		
		WBT	50	0.4	19	B		
		WBR	202	0.5	20	C		
Mountainview Dr	Range Rd	NBL	22	0.1	12	B	17.2	B
		NBT	595	0.7	24	C		
		NBR	39	0.0	2	A		
		SBL	14	0.1	19	B		
		SBT	206	0.3	7	A		
		SBR	72	0.1	2	A		
		EBL	216	0.5	19	B		
		EBT	24	0.1	10	B		
		EBR	19	0.0	5	A		
		WBL	15	0.1	22	C		
		WBT	9	0.0	10	B		
		WBR	16	0.0	5	A		
Industrial Rd	Quartz Rd	NBL	174	0.5	18	B	13.4	B
		NBT	65	0.2	9	A		
		NBR	90	0.2	9	A		
		SBL	92	0.2	15	B		
		SBT	127	0.3	10	B		
		SBR	62	0.3	10	B		
		EBL	10	0.1	28	C		
		EBT	264	0.2	11	B		
		EBR	154	0.3	11	B		
		WBL	80	0.3	18	B		
		WBT	407	0.5	16	B		
		WBR	64	0.1	11	B		
Quartz Rd	Chilkoot Way	NBL	206	0.5	18	B	10.1	B
		NBT	495	0.4	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	451	0.4	7	A		
		SBR	56	0.4	7	A		
		EBL	54	0.2	25	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	124	0.2	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Medium-term (25,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Quartz Rd	2nd Ave	NBL	145	0.5	30	C	18.1	B
		NBT	123	0.4	29	C		
		NBR	19	0.4	29	C		
		SBL	448	0.5	25	C		
		SBT	99	0.2	21	C		
		SBR	27	0.0	5	A		
		EBL	110	0.4	29	C		
		EBT	279	0.3	20	C		
		EBR	51	0.1	19	B		
		WBL	5	0.0	28	C		
		WBT	403	0.2	19	B		
		WBR	469	0.3	0	A		
2nd Ave	Ogilvie St	NBL	126	0.3	15	B	8.9	A
		NBT	855	0.4	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	816	0.4	8	A		
		SBR	17	0.0	6	A		
		EBL	99	0.2	16	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	142	0.3	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Main St	NBL	24	0.1	25	C	13.3	B
		NBT	711	0.3	10	B		
		NBR	24	0.0	10	B		
		SBL	22	0.1	18	B		
		SBT	871	0.4	11	B		
		SBR	141	0.2	10	B		
		EBL	182	0.6	29	C		
		EBT	74	0.2	16	B		
		EBR	65	0.2	16	B		
		WBL	95	0.3	23	C		
		WBT	78	0.2	16	B		
		WBR	47	0.2	16	B		
2nd Ave	Hanson St	NBL	19	0.1	16	B	11.3	B
		NBT	597	0.2	7	A		
		NBR	8	0.0	7	A		
		SBL	17	0.0	14	B		
		SBT	952	0.3	8	A		
		SBR	47	0.1	7	A		
		EBL	87	0.3	33	C		
		EBT	12	0.1	25	C		
		EBR	91	0.2	25	C		
		WBL	61	0.2	32	C		
		WBT	22	0.2	25	C		
		WBR	75	0.2	25	C		
2nd Ave	Lowe St	NBL	23	0.1	9	A	4.5	A
		NBT	623	0.2	0	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	1065	0.5	7	A		
		SBR	40	0.0	4	A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Robert Service Way	NBL	187	0.5	21	C	8.7	A
		NBT	563	0.4	14	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	856	0.4	6	A		
		SBR	247	0.2	0	A		
		EBL	84	0.3	23	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	222	0.1	0	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Medium-term (25,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	10.7	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	213	0.3	10	B		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	576	0.4	11	B		
		WBR	#N/A	#N/A	#N/A	#N/A		
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	10.6	B
		NBT	446	0.5	10	B		
		NBR	9	0.0	0	A		
		SBL	255	0.5	8	A		
		SBT	731	0.6	12	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	9	0.0	24	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	178	0.2	10	B		
Hamilton Blvd	Multiplex Access	NBL	85	0.2	13	B	7.6	A
		NBT	538	0.3	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	733	0.4	8	A		
		SBR	17	0.0	0	A		
		EBL	21	0.1	13	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	168	0.2	5	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	9.4	A
		NBT	542	0.3	7	A		
		NBR	9	0.0	6	A		
		SBL	62	0.2	13	B		
		SBT	839	0.5	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	25	0.2	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	81	0.2	13	B		

Whistle Bend 50% Build-out (30,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	27	0.1	25	C	16.7	B
		NBT	256	0.5	29	C		
		NBR	145	0.2	5	A		
		SBL	261	0.5	30	C		
		SBT	108	0.2	25	C		
		SBR	51	0.1	6	A		
		EBL	180	0.6	27	C		
		EBT	439	0.4	20	C		
		EBR	14	0.1	25	C		
		WBL	195	0.5	18	B		
		WBT	598	0.5	19	B		
		WBR	827	0.5	4	A		
Alaska Hwy	Robert Service Way	NBL	21	0.1	19	B	21.8	C
		NBT	172	0.2	12	B		
		NBR	146	0.1	0	A		
		SBL	62	0.2	18	B		
		SBT	248	0.3	12	B		
		SBR	19	0.0	0	A		
		EBL	13	0.1	25	C		
		EBT	25	0.1	18	B		
		EBR	15	0.0	0	A		
		WBL	393	0.9	51	D		
		WBT	150	0.3	18	B		
		WBR	117	0.1	0	A		
Range Rd	Two Mile Hill	NBL	25	0.1	31	C	20.1	C
		NBT	351	0.6	34	C		
		NBR	162	0.5	29	C		
		SBL	5	0.1	39	D		
		SBT	89	0.1	25	C		
		SBR	168	0.3	17	B		
		EBL	60	0.4	32	C		
		EBT	783	0.3	6	A		
		EBR	2	0.0	5	A		
		WBL	147	0.3	17	B		
		WBT	1427	0.7	24	C		
		WBR	439	0.6	17	B		
Industrial Rd	Two Mile Hill	NBL	#N/A	#N/A	#N/A	#N/A	16.1	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	156	0.6	28	C		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	88	0.5	24	C		
		EBT	862	0.4	4	A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	1795	0.8	22	C		
		WBR	175	0.1	0	A		
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	18.0	B
		NBT	1725	0.7	23	C		
		NBR	48	0.0	0	A		
		SBL	120	0.8	43	D		
		SBT	897	0.4	6	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	20	0.1	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	245	0.4	18	B		
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	21.5	C
		NBT	1285	0.8	28	C		
		NBR	233	0.2	0	A		
		SBL	289	1.0	57	E		
		SBT	629	0.3	5	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	128	0.4	22	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	488	0.6	15	B		

Whistle Bend 50% Build-out (30,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
4th Ave	Ogilvie St	NBL	15	0.1	28	C	18.6	B
		NBT	718	0.4	13	B		
		NBR	163	0.3	12	B		
		SBL	84	0.5	30	C		
		SBT	497	0.5	14	B		
		SBR	113	0.2	12	B		
		EBL	282	0.8	36	D		
		EBT	178	0.3	13	B		
		EBR	37	0.3	13	B		
		WBL	101	0.3	27	C		
		WBT	64	0.6	29	C		
		WBR	156	0.6	30	C		
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	35.5	D
		NBT	1044	1.0	54	D		
		NBR	46	0.0	1	A		
		SBL	13	0.1	23	C		
		SBT	573	0.5	8	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	8	0.0	18	B		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	112	0.5	21	C		
4th Ave	Main St	NBL	48	0.1	20	C	18.6	B
		NBT	462	0.7	29	C		
		NBR	86	0.1	7	A		
		SBL	203	0.6	13	B		
		SBT	392	0.4	9	A		
		SBR	24	0.0	3	A		
		EBL	57	0.3	25	C		
		EBT	96	0.3	17	B		
		EBR	48	0.3	17	B		
		WBL	107	0.4	25	C		
		WBT	55	0.5	20	C		
		WBR	224	0.5	21	C		
Mountainview Dr	Whistle Bend Connector	NBL	#N/A	#N/A	#N/A	#N/A	21.3	C
		NBT	240	0.5	21	C		
		NBR	1175	0.7	18	B		
		SBL	108	0.5	29	C		
		SBT	108	0.2	18	B		
		SBR	8	0.0	3	A		
		EBL	22	0.1	22	C		
		EBT	309	0.7	29	C		
		EBR	0	0.0	18	B		
		WBL	355	0.5	26	C		
		WBT	42	0.3	18	B		
		WBR	88	0.3	18	B		
Mountainview Dr	Range Rd	NBL	25	0.1	13	B	17.9	B
		NBT	1101	0.7	21	C		
		NBR	36	0.1	7	A		
		SBL	16	0.1	18	B		
		SBT	313	0.4	8	A		
		SBR	134	0.1	2	A		
		EBL	289	0.7	29	C		
		EBT	30	0.2	10	B		
		EBR	21	0.0	5	A		
		WBL	15	0.1	22	C		
		WBT	9	0.0	10	B		
		WBR	24	0.0	5	A		
Industrial Rd	Quartz Rd	NBL	248	0.7	26	C	14.4	B
		NBT	63	0.2	9	A		
		NBR	82	0.2	9	A		
		SBL	86	0.2	15	B		
		SBT	119	0.2	10	B		
		SBR	65	0.3	10	B		
		EBL	10	0.1	24	C		
		EBT	343	0.2	11	B		
		EBR	192	0.3	11	B		
		WBL	74	0.2	17	B		
		WBT	788	0.5	15	B		
		WBR	64	0.1	11	B		

Whistle Bend 50% Build-out (30,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Quartz Rd	Chilkoot Way	NBL	217	0.6	21	C	15.9	B
		NBT	805	0.7	19	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	493	0.5	8	A		
		SBR	70	0.5	8	A		
		EBL	84	0.3	25	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	119	0.2	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Quartz Rd	2nd Ave	NBL	128	0.4	29	C	18.9	B
		NBT	200	0.6	36	D		
		NBR	15	0.4	29	C		
		SBL	462	0.5	25	C		
		SBT	125	0.2	21	C		
		SBR	24	0.0	5	A		
		EBL	156	0.6	38	D		
		EBT	319	0.4	21	C		
		EBR	47	0.1	19	B		
		WBL	5	0.0	33	C		
		WBT	464	0.3	19	B		
		WBR	667	0.4	2	A		
2nd Ave	Ogilvie St	NBL	145	0.4	16	B	10.7	B
		NBT	1014	0.5	9	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	879	0.5	9	A		
		SBR	20	0.0	6	A		
		EBL	212	0.5	19	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	130	0.3	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Main St	NBL	26	0.2	26	C	15.6	B
		NBT	784	0.3	10	B		
		NBR	21	0.0	10	B		
		SBL	27	0.1	24	C		
		SBT	928	0.4	11	B		
		SBR	167	0.2	10	B		
		EBL	255	0.8	48	D		
		EBT	101	0.3	16	B		
		EBR	63	0.3	16	B		
		WBL	108	0.4	24	C		
		WBT	91	0.2	16	B		
		WBR	54	0.2	16	B		
2nd Ave	Hanson St	NBL	18	0.1	16	B	11.4	B
		NBT	649	0.2	7	A		
		NBR	7	0.0	7	A		
		SBL	17	0.0	15	B		
		SBT	1016	0.3	8	A		
		SBR	50	0.1	7	A		
		EBL	104	0.4	34	C		
		EBT	11	0.1	25	C		
		EBR	90	0.2	25	C		
		WBL	60	0.2	32	C		
		WBT	22	0.2	25	C		
		WBR	80	0.2	25	C		
2nd Ave	Lowe St	NBL	23	0.1	10	B	5.0	A
		NBT	674	0.2	0	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	1124	0.5	8	A		
		SBR	42	0.0	4	A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Whistle Bend 50% Build-out (30,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
2nd Ave	Robert Service Way	NBL	192	0.5	21	C	8.8	A
		NBT	602	0.4	14	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	871	0.4	6	A		
		SBR	294	0.2	0	A		
		EBL	94	0.3	23	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	207	0.1	0	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	11.5	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	227	0.3	10	B		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	654	0.5	12	B		
		WBR	#N/A	#N/A	#N/A	#N/A		
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	11.0	B
		NBT	471	0.5	11	B		
		NBR	8	0.0	0	A		
		SBL	255	0.5	9	A		
		SBT	728	0.6	12	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	8	0.0	24	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	189	0.3	10	B		
Hamilton Blvd	Multiplex Access	NBL	82	0.2	13	B	7.6	A
		NBT	619	0.4	7	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	745	0.4	8	A		
		SBR	19	0.0	0	A		
		EBL	25	0.1	13	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	168	0.2	5	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	9.3	A
		NBT	622	0.4	7	A		
		NBR	9	0.0	6	A		
		SBL	66	0.2	13	B		
		SBT	847	0.5	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	28	0.2	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	78	0.2	13	B		

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Alaska Hwy	Prospector Road	NBL	68	0	11	B	14.0	B
		NBT	791	1	20	C		
		NBR	513	0	1	A		
		SBL	27	0	25	C		
		SBT	258	0	6	A		
		SBR	4	0	6	A		
		EBL	5	0	34	C		
		EBT	31	0	35	D		
		EBR	42	1	39	D		
		WBL	61	0	32	C		
		WBT	24	0	32	C		
		WBR	29	0	32	C		
Alaska Hwy	Two Mile Hill/Hamilton Blvd	NBL	27	0.1	25	C	19.4	B
		NBT	331	0.6	35	D		
		NBR	167	0.2	5	A		
		SBL	225	0.5	30	C		
		SBT	94	0.2	25	C		
		SBR	42	0.1	6	A		
		EBL	241	0.9	48	D		
		EBT	454	0.5	20	C		
		EBR	14	0.1	25	C		
		WBL	215	0.5	20	C		
		WBT	608	0.5	19	B		
		WBR	800	0.5	4	A		
Alaska Hwy	Robert Service Way	NBL	20	0.1	22	C	19.0	B
		NBT	196	0.3	15	B		
		NBR	153	0.1	0	A		
		SBL	57	0.2	22	C		
		SBT	237	0.4	16	B		
		SBR	18	0.0	0	A		
		EBL	15	0.1	25	C		
		EBT	26	0.1	18	B		
		EBR	14	0.0	0	A		
		WBL	421	0.7	36	D		
		WBT	182	0.4	19	B		
		WBR	127	0.1	0	A		
Range Rd	Two Mile Hill	NBL	33	0.2	31	C	23.6	C
		NBT	488	0.8	45	D		
		NBR	172	0.5	27	C		
		SBL	7	0.2	40	D		
		SBT	109	0.2	24	C		
		SBR	187	0.3	16	B		
		EBL	69	0.4	34	C		
		EBT	775	0.4	7	A		
		EBR	2	0.0	6	A		
		WBL	175	0.4	20	C		
		WBT	1402	0.7	27	C		
		WBR	436	0.6	19	B		
Industrial Rd	Two Mile Hill	NBL	#N/A	#N/A	#N/A	#N/A	16.6	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	156	0.6	28	C		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	90	0.5	25	C		
		EBT	864	0.4	4	A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	1817	0.8	23	C		
		WBR	205	0.1	0	A		
Two Mile Hill	Chilkoot Way	NBL	#N/A	#N/A	#N/A	#N/A	18.9	B
		NBT	1754	0.8	24	C		
		NBR	44	0.0	0	A		
		SBL	122	0.8	46	D		
		SBT	899	0.4	6	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	22	0.1	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	268	0.5	19	B		

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
4th Ave	2nd Ave	NBL	#N/A	#N/A	#N/A	#N/A	25.7	C
		NBT	1342	0.8	38	D		
		NBR	281	0.2	0	A		
		SBL	317	0.9	50	D		
		SBT	604	0.3	6	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	140	0.4	25	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	456	0.6	15	B		
4th Ave	Ogilvie St	NBL	17	0.1	26	C	18.7	B
		NBT	758	0.4	13	B		
		NBR	195	0.3	12	B		
		SBL	72	0.5	30	C		
		SBT	489	0.4	13	B		
		SBR	112	0.2	12	B		
		EBL	281	0.8	37	D		
		EBT	216	0.4	14	B		
		EBR	40	0.4	14	B		
		WBL	106	0.4	28	C		
		WBT	70	0.6	32	C		
		WBR	166	0.7	33	C		
4th Ave	Black St	NBL	#N/A	#N/A	#N/A	#N/A	36.5	D
		NBT	1121	1.0	55	E		
		NBR	69	0.1	0	A		
		SBL	13	0.1	26	C		
		SBT	575	0.5	7	A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	8	0.0	21	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	125	0.6	29	C		
4th Ave	Main St	NBL	45	0.1	20	C	20.4	C
		NBT	497	0.8	34	C		
		NBR	109	0.1	7	A		
		SBL	212	0.6	14	B		
		SBT	402	0.4	9	A		
		SBR	23	0.0	3	A		
		EBL	62	0.4	30	C		
		EBT	103	0.3	17	B		
		EBR	50	0.3	17	B		
		WBL	117	0.4	25	C		
		WBT	61	0.5	21	C		
		WBR	236	0.6	22	C		
Mountainview Dr	Whistle Bend Connector	NBL	#N/A	#N/A	#N/A	#N/A	38.8	D
		NBT	256	0.5	22	C		
		NBR	1855	0.8	34	C		
		SBL	133	0.9	63	E		
		SBT	113	0.2	19	B		
		SBR	8	0.0	19	B		
		EBL	30	0.1	24	C		
		EBT	479	1.0	68	E		
		EBR	0	0.0	18	B		
		WBL	488	0.8	44	D		
		WBT	62	0.3	19	B		
		WBR	124	0.3	19	B		
Mountainview Dr	Range Rd	NBL	29	0.1	14	B	35.4	D
		NBT	1636	0.9	40	D		
		NBR	36	0.0	8	A		
		SBL	20	0.2	30	C		
		SBT	401	0.2	8	A		
		SBR	180	0.2	8	A		
		EBL	446	0.9	60	E		
		EBT	31	0.1	17	B		
		EBR	22	0.1	17	B		
		WBL	16	0.1	35	D		
		WBT	7	0.1	34	C		
		WBR	29	0.4	35	D		

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Industrial Rd	Quartz Rd	NBL	357	0.9	47	D	30.9	C
		NBT	61	0.2	9	A		
		NBR	66	0.2	9	A		
		SBL	82	0.2	19	B		
		SBT	105	0.4	17	B		
		SBR	75	0.4	17	B		
		EBL	11	0.1	28	C		
		EBT	429	0.2	10	B		
		EBR	202	0.3	11	B		
		WBL	97	0.3	18	B		
		WBT	1158	0.9	45	D		
		WBR	69	0.1	10	B		
Quartz Rd	Chilkoot Way	NBL	249	0.5	16	B	9.9	A
		NBT	1150	0.5	9	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	543	0.3	5	A		
		SBR	81	0.1	5	A		
		EBL	113	0.4	26	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	116	0.2	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Quartz Rd	2nd Ave	NBL	123	0.4	29	C	22.7	C
		NBT	258	0.8	51	D		
		NBR	13	0.4	28	C		
		SBL	476	0.5	26	C		
		SBT	146	0.3	22	C		
		SBR	36	0.0	5	A		
		EBL	202	0.8	53	D		
		EBT	349	0.5	24	C		
		EBR	47	0.1	19	B		
		WBL	4	0.0	34	C		
		WBT	436	0.3	19	B		
		WBR	939	0.6	8	A		
2nd Ave	Ogilvie St	NBL	153	0.5	17	B	14.0	B
		NBT	1197	0.6	13	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	942	0.5	10	B		
		SBR	24	0.0	6	A		
		EBL	288	0.7	29	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	135	0.3	16	B		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Main St	NBL	28	0.2	28	C	18.7	B
		NBT	847	0.4	11	B		
		NBR	23	0.0	10	B		
		SBL	32	0.2	25	C		
		SBT	972	0.5	12	B		
		SBR	197	0.3	10	B		
		EBL	333	0.9	58	E		
		EBT	110	0.3	17	B		
		EBR	64	0.3	17	B		
		WBL	101	0.3	30	C		
		WBT	95	0.3	24	C		
		WBR	3	0.1	24	C		
2nd Ave	Hanson St	NBL	17	0.1	23	C	11.6	B
		NBT	691	0.2	7	A		
		NBR	7	0.0	7	A		
		SBL	17	0.0	15	B		
		SBT	1063	0.3	8	A		
		SBR	67	0.1	7	A		
		EBL	125	0.5	36	D		
		EBT	11	0.1	25	C		
		EBR	90	0.2	25	C		
		WBL	59	0.2	32	C		
		WBT	21	0.2	25	C		
		WBR	83	0.2	25	C		

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
2nd Ave	Lowe St	NBL	22	0.1	16	B	5.1	A
		NBT	715	0.2	0	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	1167	0.5	8	A		
		SBR	45	0.0	4	A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
2nd Ave	Robert Service Way	NBL	193	0.5	22	C	9.2	A
		NBT	636	0.4	15	B		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	881	0.4	6	A		
		SBR	332	0.2	0	A		
		EBL	101	0.3	24	C		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	200	0.1	0	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Ear Lake Rd	Robert Service Way	NBL	#N/A	#N/A	#N/A	#N/A	13.0	B
		NBT	#N/A	#N/A	#N/A	#N/A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	#N/A	#N/A	#N/A	#N/A		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	231	0.3	10	B		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	724	0.5	14	B		
		WBR	#N/A	#N/A	#N/A	#N/A		
Lewes Blvd	Alsek Rd	NBL	#N/A	#N/A	#N/A	#N/A	12.7	B
		NBT	491	0.5	12	B		
		NBR	8	0.0	0	A		
		SBL	255	0.7	18	B		
		SBT	728	0.6	12	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	8	0.0	24	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	196	0.3	10	B		
Hamilton Blvd	Multiplex Access	NBL	80	0.2	13	B	7.9	A
		NBT	685	0.4	8	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	743	0.4	8	A		
		SBR	20	0.0	0	A		
		EBL	29	0.1	13	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	167	0.2	5	A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		
Hamilton Blvd	Sumanik Dr	NBL	#N/A	#N/A	#N/A	#N/A	9.7	A
		NBT	688	0.4	8	A		
		NBR	10	0.0	6	A		
		SBL	67	0.2	13	B		
		SBT	843	0.5	10	B		
		SBR	#N/A	#N/A	#N/A	#N/A		
		EBL	#N/A	#N/A	#N/A	#N/A		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	30	0.2	23	C		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	77	0.2	13	B		

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Signalized Intersection Summary

NS Street	EW Street	Dir	Volume	v/c	Delay (s)	LOS	Int Delay (s)	Int LOS
Hamilton Blvd	Arkell Access	NBL	0	0	13	B	7.7	A
		NBT	410	0	6	A		
		NBR	#N/A	#N/A	#N/A	#N/A		
		SBL	#N/A	#N/A	#N/A	#N/A		
		SBT	682	0	7	A		
		SBR	157	0	6	A		
		EBL	192	0	15	B		
		EBT	#N/A	#N/A	#N/A	#N/A		
		EBR	#N/A	#N/A	#N/A	#N/A		
		WBL	#N/A	#N/A	#N/A	#N/A		
		WBT	#N/A	#N/A	#N/A	#N/A		
		WBR	#N/A	#N/A	#N/A	#N/A		

Appendix E
Automobile Travel Times

Short-term (24,000 pop) Recommended Network Automobile Travel Times

From \ To	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo
	Scenario 1601						Scenario 1602						Scenario 1603					
Porter Creek "D"			11.7	14.2	12.9	10.8			9.5	10.7	9.0	10.8			11.6	14.2	12.9	10.8
Whistle Bend			12.7	15.2	14.0	10.8			12.7	15.2	14.0	10.8			12.7	15.2	13.9	10.8
2nd/Main	11.3	12.1					10.3	12.1					11.3	12.1				
Alaksa/RSW	13.2	15.0					10.2	14.9					13.2	14.8				
Hamilton/Falcon	12.0	14.1					9.0	14.1					12.0	14.0				
Alaska/Mayo	10.2	10.6					10.2	10.6					10.2	10.6				
							Scenario 1602 - 1601						Scenario 1603 - 1601					
Porter Creek "D"									-2.2	-3.5	-3.9	0.0			-0.1	0.0	0.0	0.0
Whistle Bend									0.0	0.0	0.0	0.0			0.0	0.0	-0.1	0.0
2nd/Main							-1.0	0.0					0.0	0.0				
Alaksa/RSW							-3.0	-0.1					0.0	-0.2				
Hamilton/Falcon							-3.0	0.0					0.0	-0.1				
Alaska/Mayo							0.0	0.0					0.0	0.0				

Medium-term (25,000 pop) Recommended Network Automobile Travel Times

From \ To	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo
	Scenario 2601						Scenario 2602						Scenario 2603					
Porter Creek "D"			9.5	10.5	8.9	10.8			9.6	10.7	9.0	10.8			9.5	10.5	8.9	10.8
Whistle Bend			12.8	15.2	13.9	10.8			11.9	14.5	13.2	10.8			11.9	14.5	13.2	10.8
2nd/Main	10.5	12.2					10.7	11.7					10.5	11.7				
Alaksa/RSW	10.0	14.8					10.2	14.1					10.0	14.2				
Hamilton/Falcon	8.8	14.1					9.0	13.0					8.8	13.4				
Alaska/Mayo	10.2	10.6					10.2	10.6					10.2	10.6				
							Scenario 2602 - 2601						Scenario 2603 - 2601					
Porter Creek "D"									-2.1	-3.5	-3.9	0.0			-2.2	-3.7	-4.0	0.0
Whistle Bend									-0.8	-0.7	-0.8	0.0			-0.8	-0.7	-0.8	0.0
2nd/Main							-0.6	-0.4					-0.8	-0.4				
Alaksa/RSW							-3.0	-0.9					-3.2	-0.8				
Hamilton/Falcon							-3.0	-1.1					-3.2	-0.7				
Alaska/Mayo							0.0	0.0					0.0	0.0				

Whistle Bend 50% Build-out (30,000 pop) Recommended Network Automobile Travel Times

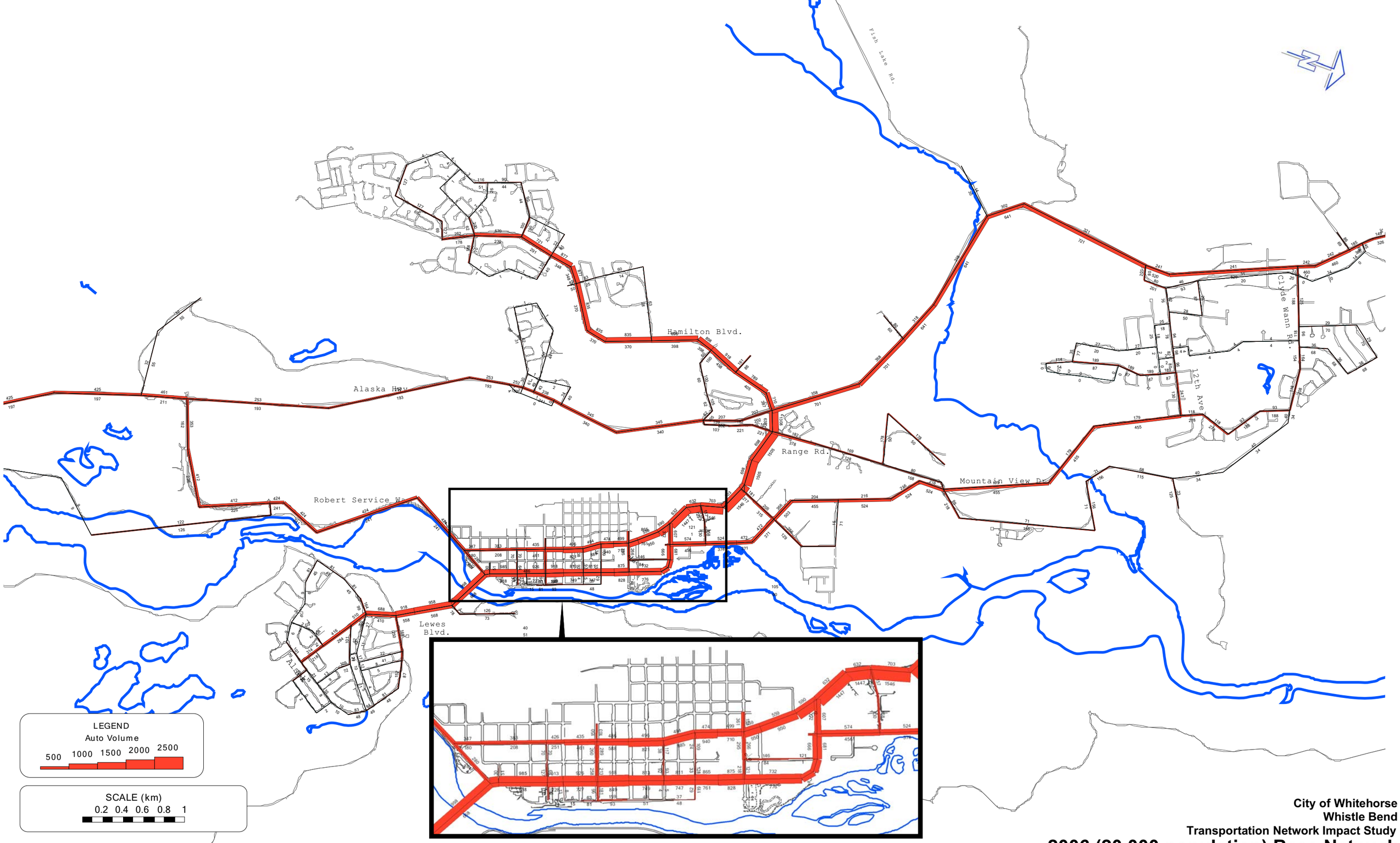
From \ To	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo
	Scenario 3601						Scenario 3602						Scenario 3603					
Porter Creek "D"			9.8	10.7	9.0	10.8			9.8	10.7	9.0	10.8			9.7	10.7	9.0	10.8
Whistle Bend			12.4	14.9	13.6	10.8			12.4	14.9	13.6	10.8			11.5	14.1	12.8	10.8
2nd/Main	11.7	15.6					11.8	15.6					11.5	12.9				
Alaksa/RSW	10.4	15.2					10.4	15.2					10.4	14.4				
Hamilton/Falcon	9.2	14.0					9.3	14.0					9.3	13.4				
Alaska/Mayo	10.2	10.7					10.2	10.7					10.2	10.7				
							Scenario 3602 - 3601						Scenario 3603 - 3601					
Porter Creek "D"									-1.9	-3.5	-3.9	0.0			-2.0	-3.5	-3.9	0.0
Whistle Bend									-0.3	-0.3	-0.4	0.0			-1.2	-1.1	-1.2	0.0
2nd/Main							0.5	3.5					0.2	0.8				
Alaksa/RSW							-2.8	0.2					-2.8	-0.6				
Hamilton/Falcon							-2.7	-0.1					-2.7	-0.7				
Alaska/Mayo							0.0	0.1					0.0	0.1				

Whistle Bend 100% Build-out (35,000 pop) Recommended Network Automobile Travel Times

From \ To	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo	Porter Creek "D"	Whistle Bend	2nd/Main	Alaska/RSW	Hamilton/Falcon	Alaska/Mayo
	Scenario 3651						Scenario 3652						Scenario 3653						Scenario 3654					
Porter Creek "D"			9.9	10.8	9.1	10.8			10.1	11.1	9.4	10.8			10.1	11.1	9.4	10.8			10.1	11.1	9.5	10.8
Whistle Bend			11.8	14.2	12.9	10.8			11.7	14.5	13.1	10.8			11.7	14.5	13.1	10.0			11.7	14.5	13.3	10.8
2nd/Main	12.8	16.4					12.0	14.4					12.0	14.4					11.8	13.8				
Alaksa/RSW	11.2	17.6					10.7	15.4					10.7	15.4					10.6	15.3				
Hamilton/Falcon	9.9	16.3					9.8	14.5					9.8	14.5					9.9	14.7				
Alaska/Mayo	10.2	10.9					10.2	10.9					10.2	10.4					10.2	10.9				
							Scenario 3652 - 3651						Scenario 3653 - 3651						Scenario 3654 - 3651					
Porter Creek "D"									-1.6	-3.1	-3.5	0.0			-1.6	-3.1	-3.5	0.0			-1.6	-3.1	-3.4	0.0
Whistle Bend									-1.0	-0.7	-0.9	0.0			-1.0	-0.7	-0.9	-0.8			-1.0	-0.7	-0.7	0.0
2nd/Main							0.7	2.3					0.7	2.3					0.5	1.7				
Alaksa/RSW							-2.5	0.4					-2.5	0.4					-2.6	0.3				
Hamilton/Falcon							-2.2	0.4					-2.2	0.4					-2.1	0.6				
Alaska/Mayo							0.0	0.3					0.0	-0.2					0.0	0.3				

Appendix F
Afternoon Peak Hour Volumes

Horizon	Network	Scenario
2006 (20,000 pop)	Base	601
2006 (20,000 pop)	Prime	602
Short-term (24,000 pop)	Recommended	1603
Medium-term (25,000 pop)	Recommended	2603
Whistle Bend 50% Build-out (30,000 pop)	Recommended	3603
Whistle Bend 75% Build-out (32,500 pop)	Sensitivity	3623
Whistle Bend 100% Build-out (35,000 pop)	Recommended	3654



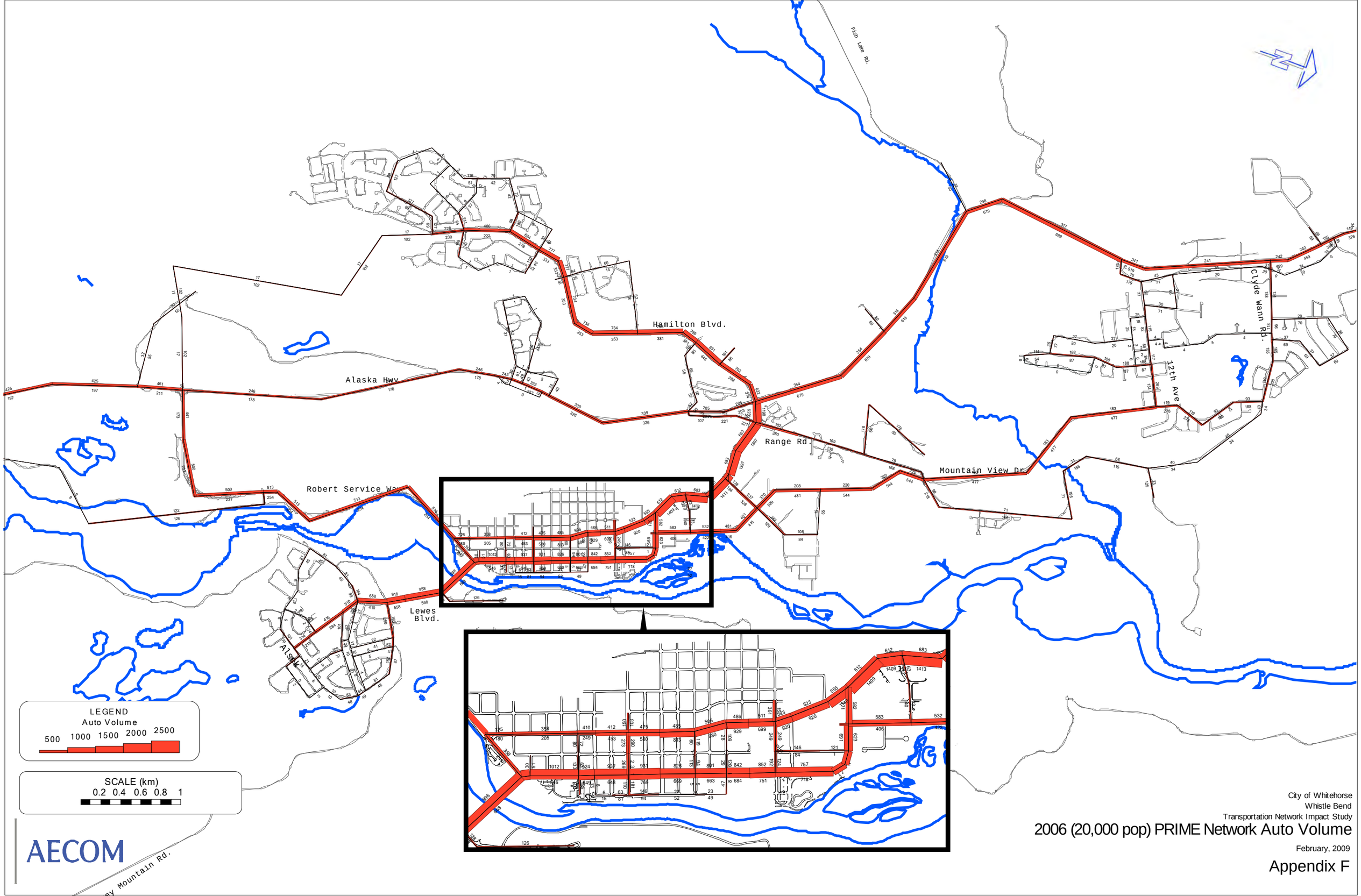
AECOM

City of Whitehorse
Whistle Bend
Transportation Network Impact Study

2006 (20 000 population) Base Network Auto Volume

September 2008

Appendix F

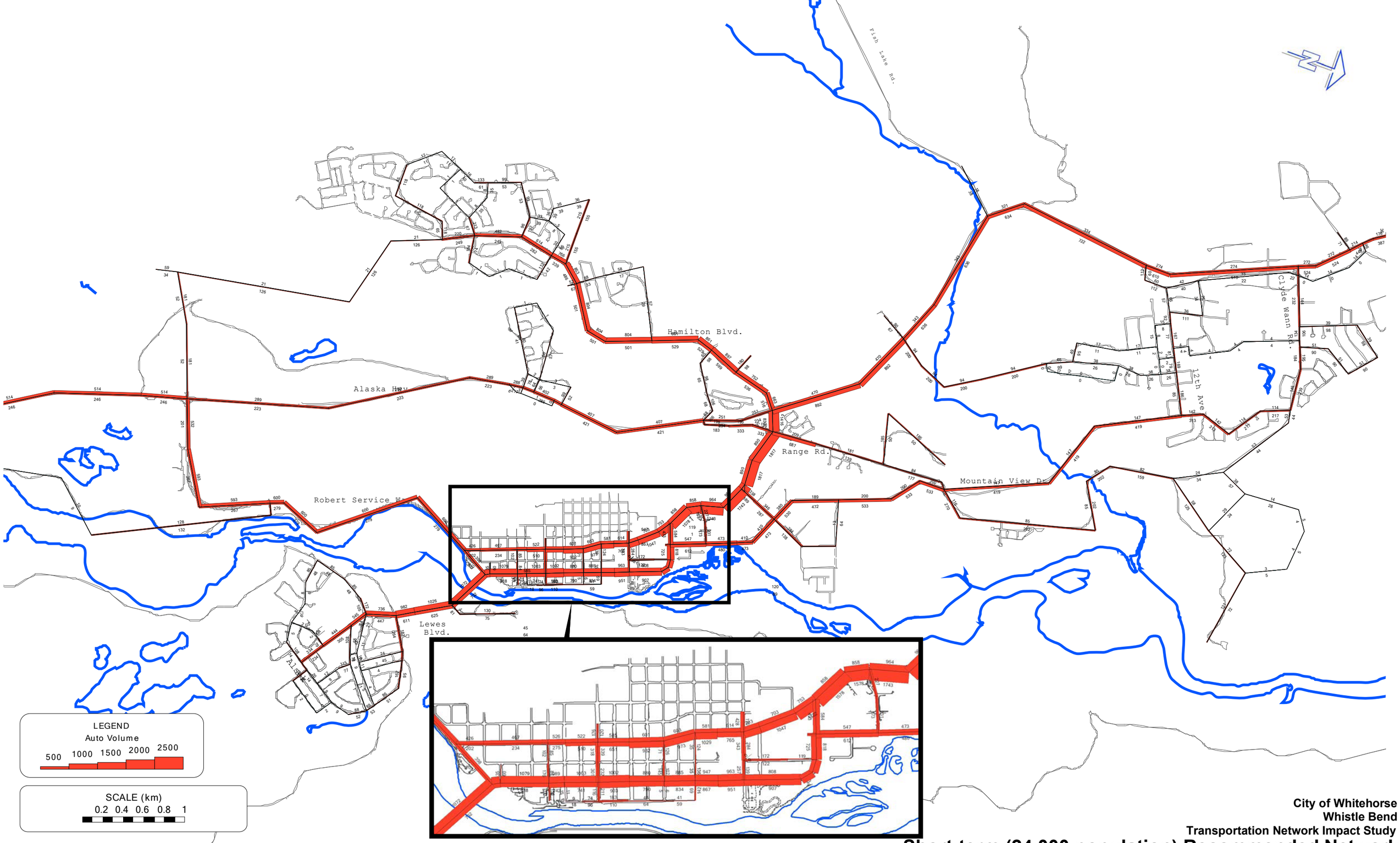


City of Whitehorse
Whistle Bend
Transportation Network Impact Study

2006 (20,000 pop) PRIME Network Auto Volume

February, 2009

Appendix F



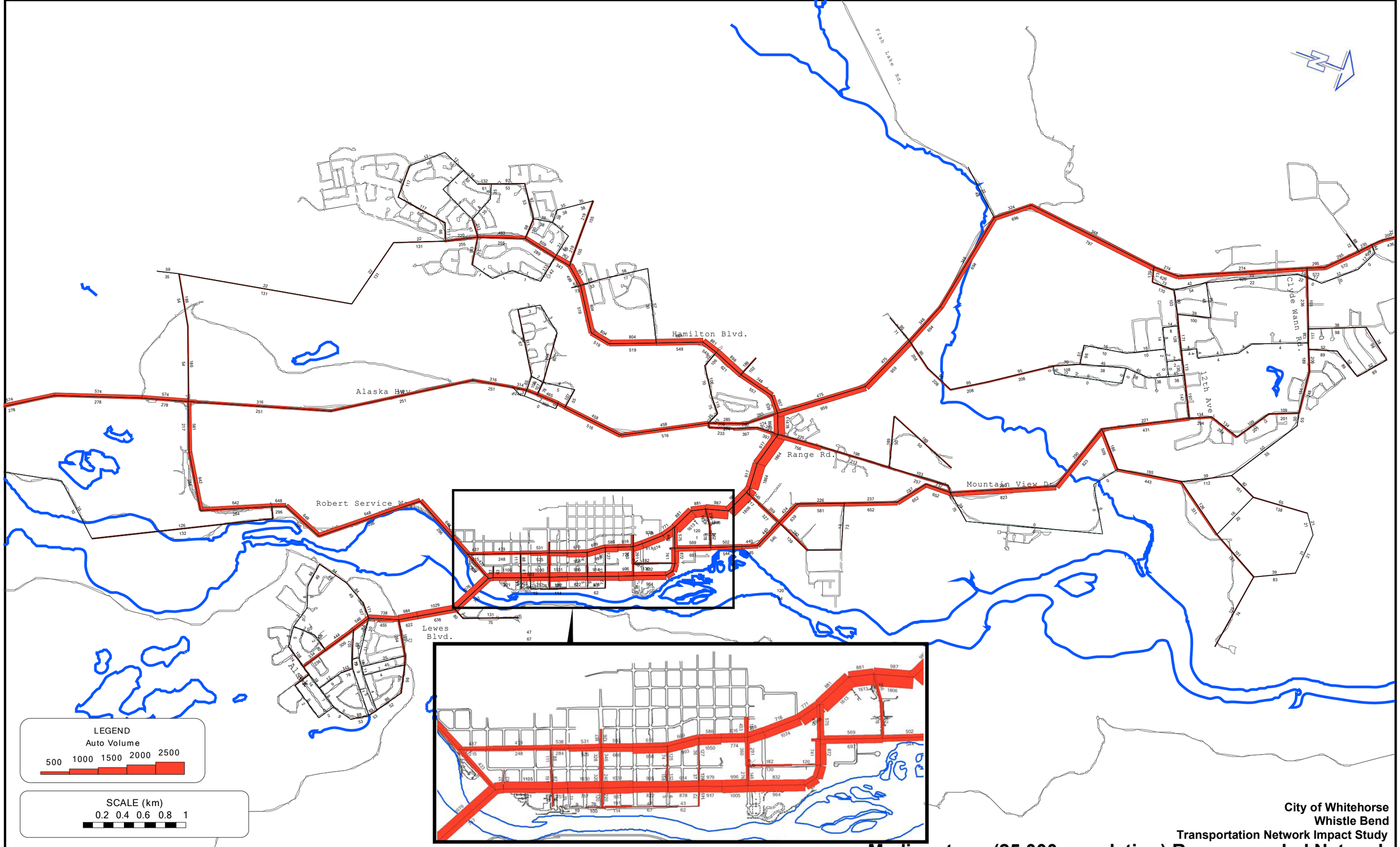
AECOM

City of Whitehorse
Whistle Bend
Transportation Network Impact Study

Short-term (24 000 population) Recommended Network Auto Volume

September 2008

Appendix F



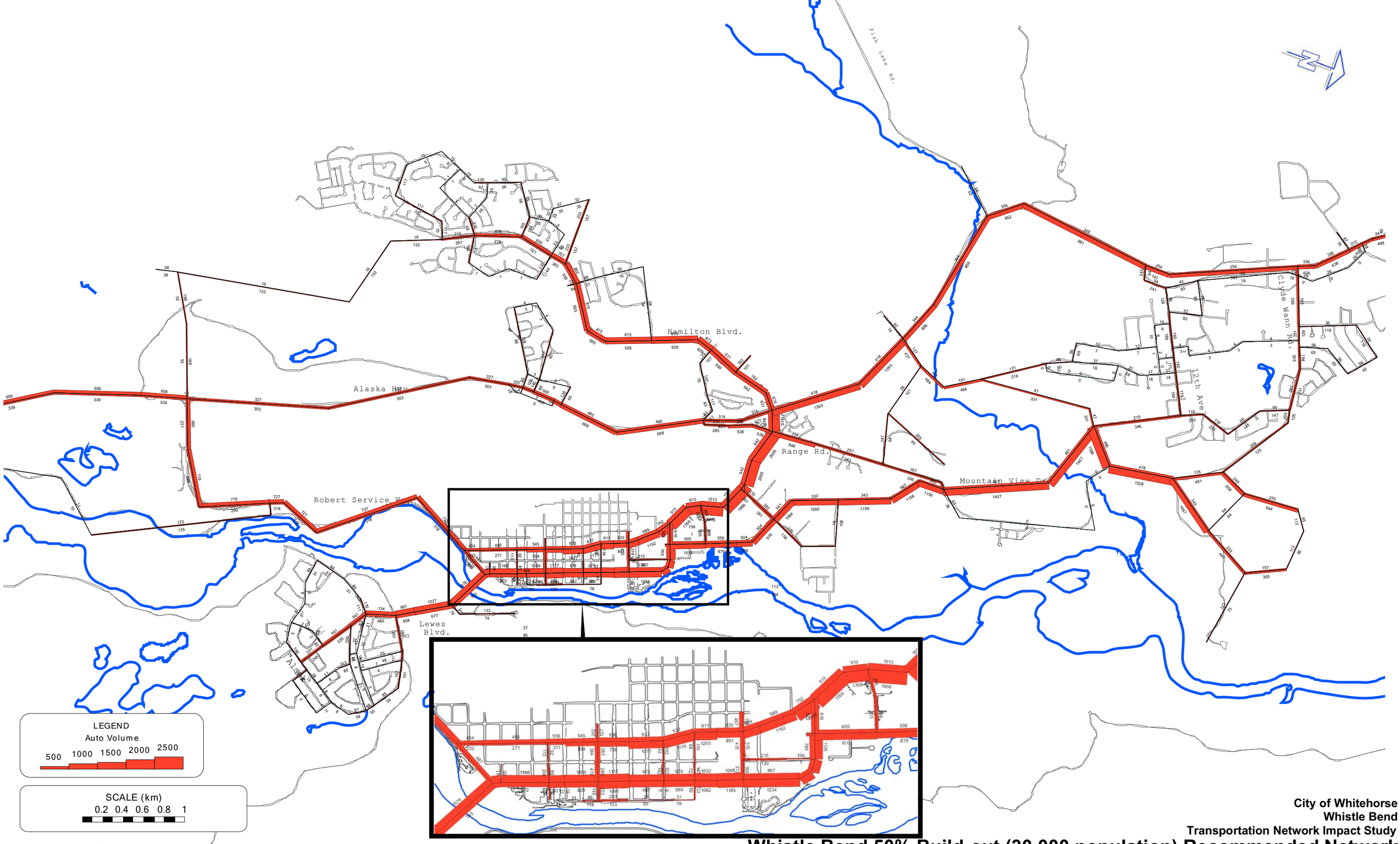
AECOM

City of Whitehorse
Whistle Bend
Transportation Network Impact Study

Medium-term (25 000 population) Recommended Network
Auto Volume

September 2008

Appendix F



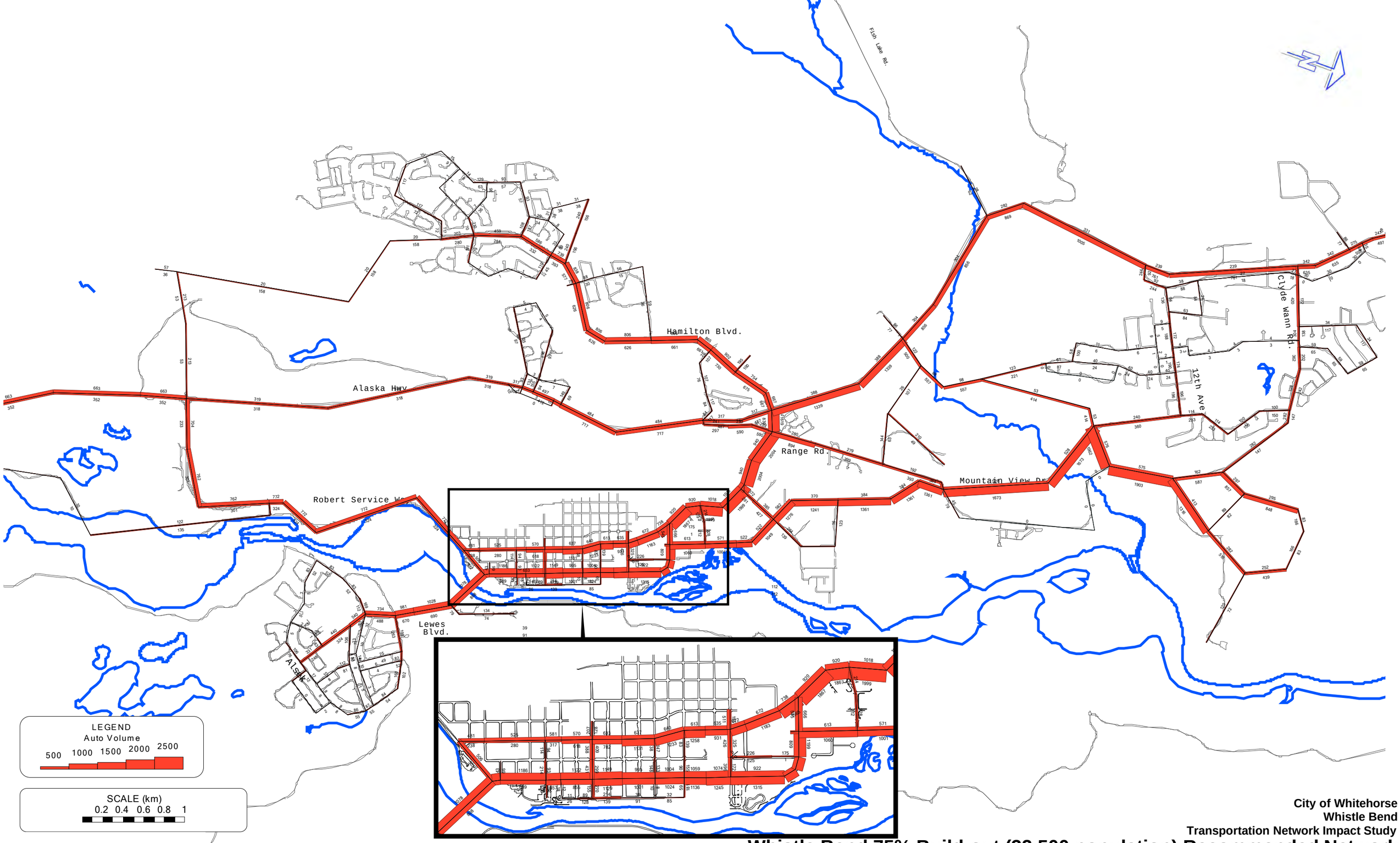
AECOM

City of Whitehorse
Whistle Bend
Transportation Network Impact Study

Whistle Bend 50% Build-out (30 000 population) Recommended Network Auto Volume

September 2008

Appendix F



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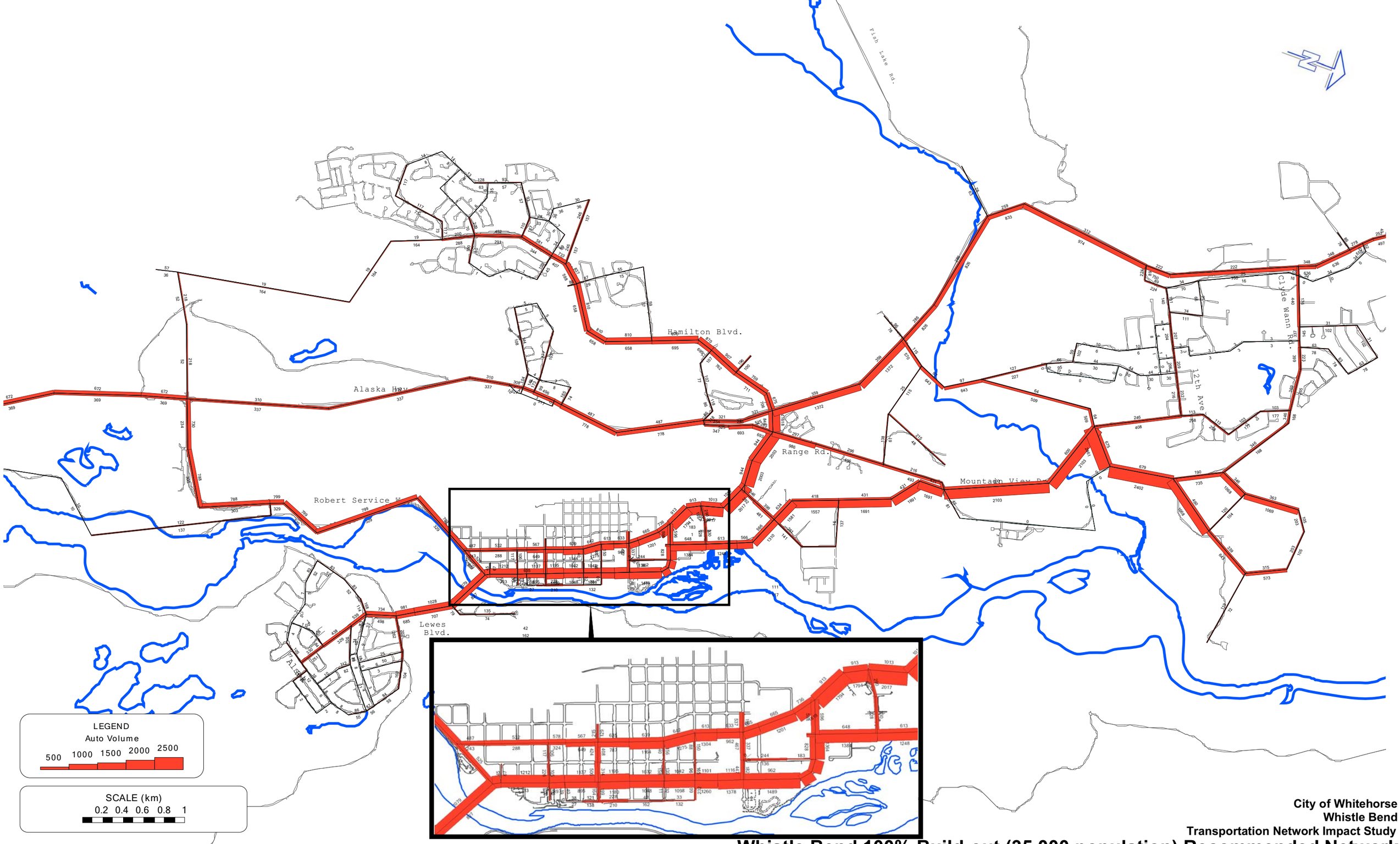
City of Whitehorse
Whistle Bend
Transportation Network Impact Study

Whistle Bend 75% Build-out (32 500 population) Recommended Network
Auto Volume

February 2009

Appendix F



AECOM

City of Whitehorse
Whistle Bend
Transportation Network Impact Study

Whistle Bend 100% Build-out (35 000 population) Recommended Network
Auto Volume

September 2008

Appendix F

Appendix G
Order of Magnitude Cost Estimates

City Wide Development - New Surface Works Infrastruture

Development Assumptions

Major Collector roadway is 15 m wide, 4 - 3.75 lanes, rural or urban section, 3 m shoulder on rural section, curb/gutter on urban section. R of W is 60 m width.
Auxilliary Lane widths are 3.5 m, with 1.5 m shoulder for rural section, or curb/gutter for urban section.
For urban section, subgrade width is to 0.3 behind concrete curb.
For rural section, subgrade width is to toe of embankment or bottom of ditch, 3/1 sideslope, 1 m ditch or backslope

For new roadway, with 60 m r/w, rural section, 21 m surface with shoulders.

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
	Major Collector / 60 m r/w, 21 m surface.				
1	Clearing	60	Sq.m.	$1.00	$60
2	Grubbing and Stripping, 250 mm depth	60	Sq.m.	$2.00	$120
3	Common Excavation, assumed 1 m average depth	27	cu.m.	$20.00	$540
4	Subgrade Preparation (200 mm Depth)	27	Sq.m.	$2.50	$68
5	Sub-Base (80 mm, 150 Depth)	23.5	Sq.m.	$8.00	$188
6	Base (20 mm, 150 Depth)	21.5	Sq.m.	$10.00	$215
7	100 mm AC Surface	21	Sq.m.	$45.00	$945
8	Boulevard Restoration	33	Sq.m.	$15.00	$495
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	0	l.m.	$100.00	$0
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$2,736**
	Contingency @ 25%				**$684**
	Engineering @ 15%				**$410**
	Total Cost / Lineal Meter				**$3,830**

For new roadway, with 60 m r/w, urban section, 15 m surface with curb/gutter each side

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
	Major Collector / 60 m r/w, 15 m surface.				
1	Clearing	60	Sq.m.	$1.00	$60
2	Grubbing and Stripping, 250 mm depth	60	Sq.m.	$2.00	$120
3	Common Excavation, assumed 1 m average depth	17	cu.m.	$20.00	$340
4	Subgrade Preparation (200 mm Depth)	17	Sq.m.	$2.50	$43
5	Sub-Base (80 mm, 150 Depth)	17	Sq.m.	$8.00	$136
6	Base (20 mm, 150 Depth)	15	Sq.m.	$10.00	$150
7	100 mm AC Surface	15	Sq.m.	$45.00	$675
8	Boulevard Restoration	43	Sq.m.	$15.00	$645
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	2	l.m.	$100.00	$200
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$2,474**
	Contingency @ 25%				**$618**
	Engineering @ 15%				**$371**
	Total Cost / Lineal Meter				**$3,463**

Reconstruct existing roadway, with 60 m r/w, rural section, 21 m surface with shoulders.

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
	Major Collector / 60 m r/w, 21 m surface.				
1	Clearing	0	Sq.m.	$1.00	$0
2	Grubbing and Stripping, 250 mm depth	0	Sq.m.	$2.00	$0
3	Common Excavation, assumed 1 m average depth	27	cu.m.	$20.00	$540
4	Subgrade Preparation (200 mm Depth)	27	Sq.m.	$2.50	$68

5	Sub-Base (80 mm, 150 Depth)	23.5	Sq.m.	$8.00	$188
6	Base (20 mm, 150 Depth)	21.5	Sq.m.	$10.00	$215
7	100 mm AC Surface	21	Sq.m.	$45.00	$945
8	Boulevard Restoration	0	Sq.m.	$15.00	$0
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	0	l.m.	$100.00	$0
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$2,061**
	Contingency @ 25%				**$515**
	Engineering @ 15%				**$309**
	Total Cost / Lineal Meter				**$2,885**

Reconstruct existing roadway, with 60 m r/w, urban section, 15 m surface with curb/gutter each side

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
	Major Collector / 60 m r/w, 15 m surface.				
1	Clearing	0	Sq.m.	$1.00	$0
2	Grubbing and Stripping, 250 mm depth	0	Sq.m.	$2.00	$0
3	Common Excavation, assumed 1 m average depth	17	cu.m.	$20.00	$340
4	Subgrade Preparation (200 mm Depth)	17	Sq.m.	$2.50	$43
5	Sub-Base (80 mm, 150 Depth)	17	Sq.m.	$8.00	$136
6	Base (20 mm, 150 Depth)	15	Sq.m.	$10.00	$150
7	100 mm AC Surface	15	Sq.m.	$45.00	$675
8	Boulevard Restoration	0	Sq.m.	$15.00	$0
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	2	l.m.	$100.00	$200
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$1,649**
	Contingency @ 25%				**$412**
	Engineering @ 15%				**$247**
	Total Cost / Lineal Meter				**$2,308**

Auxialliary Lane Construction, 3.5 m lane width, 1.5 m shoulder, rural section, 3/1 sideslope, 1 m ditch depth

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
1	Clearing	0	Sq.m.	$1.00	$0
2	Grubbing and Stripping, 250 mm depth	0	Sq.m.	$2.00	$0
3	Common Excavation, assumed 1 m average depth	8	cu.m.	$20.00	$160
4	Subgrade Preparation (200 mm Depth)	8	Sq.m.	$2.50	$20
5	Sub-Base (80 mm, 150 Depth)	6.5	Sq.m.	$8.00	$52
6	Base (20 mm, 150 Depth)	6	Sq.m.	$10.00	$60
7	100 mm AC Surface	5	Sq.m.	$45.00	$225
8	Boulevard Restoration	0	Sq.m.	$15.00	$0
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	0	l.m.	$100.00	$0
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$622**
	Contingency @ 25%				**$156**
	Engineering @ 15%				**$93**
	Total Cost / Lineal Meter				**$871**

Auxialliary Lane Construction, 3.5 m lane width, urban section, with curb/gutter

Item	Description	Quantity	Unit	Unit Price	Cost per Lineal Meter
1	Clearing	0	Sq.m.	$1.00	$0
2	Grubbing and Stripping, 250 mm depth	0	Sq.m.	$2.00	$0
3	Common Excavation, assumed 1 m average depth	4.5	cu.m.	$20.00	$90
4	Subgrade Preparation (200 mm Depth)	4.5	Sq.m.	$2.50	$11
5	Sub-Base (80 mm, 150 Depth)	4.5	Sq.m.	$8.00	$36
6	Base (20 mm, 150 Depth)	3.5	Sq.m.	$10.00	$35
7	100 mm AC Surface	3.5	Sq.m.	$45.00	$158
8	Boulevard Restoration	0	Sq.m.	$15.00	$0
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	1	l.m.	$100.00	$100
11	Street Lights	0.02	each	$5,000.00	$100
12	Signs and Posts	0.01	each	$500.00	$5
	Subtotal				**$535**
	Contingency @ 25%				**$134**
	Engineering @ 15%				**$80**
	Total Cost / Lineal Meter				**$749**

Roundabout Construction, 45 m central circle, 7.5 m circular roadway, truck apron and curbs

Item	Description	Quantity	Unit	Unit Price	Total Cost
1	Clearing	0	Sq.m.	$1.00	$0
2	Grubbing and Stripping, 250 mm depth	0	Sq.m.	$2.00	$0
3	Common Excavation, assumed 1 m average depth	1600	cu.m.	$20.00	$32,000
4	Subgrade Preparation (200 mm Depth)	1600	Sq.m.	$2.50	$4,000
5	Sub-Base (80 mm, 150 Depth)	1600	Sq.m.	$8.00	$12,800
6	Base (20 mm, 150 Depth)	1200	Sq.m.	$10.00	$12,000
7	100 mm AC Surface	1200	Sq.m.	$45.00	$54,000
8	Boulevard Restoration	0	Sq.m.	$15.00	$0
9	Separate Sidewalk	0	l.m.	$225.00	$0
10	Curb/gutter	500	l.m.	$100.00	$50,000
11	Street Lights	4.00	each	$5,000.00	$20,000
12	Signs and Posts	12.00	each	$500.00	$6,000
	Subtotal				**$190,800**
	Contingency @ 25%				**$47,700**
	Engineering @ 15%				**$28,620**
	Total Cost				**$267,120**

Signalized Intersection Construction (Highway), 4 way intersection, with detector loops, ped.or cyclist activation

1	Complete intersection equipment and installation	1	Lump sum	$250,000.00	$250,000
	Subtotal				**$250,000**
	Contingency @ 25%				**$62,500**
	Engineering @ 15%				**$37,500**
	Total Cost				**$350,000**

Signalized Intersection Construction (Other), 4 way intersection, with detector loops, ped.or cyclist activation

1	Complete intersection equipment and installation	1	Lump sum	$178,570.00	$178,570
	Subtotal				**$178,570**
	Contingency @ 25%				**$44,643**
	Engineering @ 15%				**$26,786**
	Total Cost				**$250,000**