Seward Highway to Glenn Highway Connection

Travel Model Documentation

Alaska Department of
Transportation & Public Facilities
P.O. Box 196900
Anchorage, AK 99519-6900

Federal Project No: NH-000S(588)
AKSAS Project No. 58544

September 2010

Seward Highway to Glenn Highway
CONNECTION

ANC/GS132/102100004
TBG072710184349ANC

Table of Contents

ABBREVIATIONS VI

1.0 INTRODUCTION 1

2.0 DESCRIPTION OF ENHANCEMENTS AND MODIFICATIONS 3

Purpose 1: Improve and Expand Representation of Transit 3
Purpose 2: Expand the Study Area 3
Purpose 3: Provide Facilities to Model Impacts of Road User Charges 3
Purpose 4: Address the Long-term Horizon Year for the Project 4
Purpose 5: Support Generation of Detailed Simulations of Traffic Movements 4
Purpose 6: Enhance the Underlying Base Calibration 4

3.0 IMPLEMENTATION 5

Purpose 1: Improve and Expand Representation of Transit 5
Purpose 2: Expand the Study Area 6
Purpose 4: Address the Long-term Horizon Year for the Project 8
Purpose 5: Support Generation of Detailed Simulations of Traffic Movements 9
Purpose 6: Enhance the Underlying Base Calibration 9

4.0 2035 H2H TRAVEL FORECASTS 15

4.1 2035 H2H No Action Scenario Travel 15
4.2 2035 No Action Scenario Regional Travel Mode Shares 16
4.3 Assignment of 2035 Vehicle Trips to the H2H No Action Road Network 16
4.4 2035 Travel Forecast for H2H Reasonable Alternatives 19

5.0 REFERENCES 20

List of Tables

Table 3-1 Assumed Park-n-rides and Service Radii 5
Table 3-2 Assumed Values of Time (In 2002 dollars) 8
Table 4-1 2007 and 2035 H2H No Action Scenario Trips by Trip Purpose 15
Table 4-2 2035 H2H No Action Scenario Trips by Mode 16
Table 4-3 2007, 2027, and 2035 No Action Volumes – Selected Road Links and Screenline Summaries 17

List of Figures

Figure 3-1 AMATS Model Expansion 7
Figure 3-2 H2H Micro-Simulation Network 10
Figure 3-3 Comparison of AM Peak Period Auto Volumes Compared with Counts 11
Figure 3-4 Comparison of PM Peak Period Auto Volumes with Counts 11
Figure 3-5 Comparison of Off-peak Period Auto Volumes with Counts 12
Figure 3-6 Comparison of Truck Daily Volumes with Counts (truck validation) 12
Figure 3-7 2007 Comparison of Screenline Daily Model Volumes with ADOT&PF Traffic Counts 13
Figure 3-8 2007 Comparison of Roadway Link Model Volumes with ADOT&PF Traffic Counts 14

Appendices

Appendix A Anchorage and Matanuska-Susitna Borough 2035 Land Use Allocation and Forecast
Appendix B Traffic Count Development Methodology
Appendix C Travel Model Notes Summary
Appendix D Diagrams

ABBREVIATIONS

ADOT&PF	Alaska Department of Transportation & Public Facilities
AMATS	Anchorage Metropolitan Area Transportation Solutions
FHWA	U.S. Department of Transportation, Federal Highway Administration
HOV	high-occupancy vehicle
ISER	University of Alaska Anchorage, Institute for Socioeconomic Research
KABATA	Knik Arm Bridge and Toll Authority
KAC	Knik Arm Crossing
LRTP	Long-Range Transportation Plan
MASCOT	Mat-Su Community Transit
MSB	Matanuska-Susitna Borough
NEPA	National Environmental Policy Act
WSA	Wilber Smith Associates

1.0 INTRODUCTION

In support of development of environmental documentation for the Seward Highway to Glenn Highway Connection (H2H) corridor project in Anchorage, Alaska, the existing regional travel model was expanded and modified to better address questions and issues associated with the corridor. In 2005, the base model was developed by the Municipality of Anchorage (MOA), Anchorage Metropolitan Area Transportation Solutions (AMATS), the regional planning organization for the Anchorage area. AMATS updated and revalidated the model in 2007. This model is a multimodal regional travel demand model incorporating highway, transit, and non-motorized modes; time-of-day trip estimation; feedback of congestion impacts to trip distribution; land use and demographic submodels to take account of urban form and population characteristic data; and an extensive set of analysis and reporting post-processors.

Based on an evaluation of available Anchorage area modeling platforms, travel modeling for the H2H project focused on improving the capabilities of the AMATS model. The AMATS model was chosen because of its multimodal structure, as well as the fact that it had been developed and calibrated using local survey data. To better support specific questions and analyses associated with planning and design options for the H2H corridor, a set of extensions and enhancements to the AMATS model were proposed. The process of evaluating available models and the rationale for developing model extensions and enhancements is fully documented in the project working paper – a technical memorandum titled "Seward Highway to Glenn Highway Connection Traffic Forecasting Methodology" (CH2M HILL, 2008).

The purposes of these enhancements are to:

- Improve and expand representation of transit
- Expand the study area to allow impacts of development immediately north of AMATS, the Matanuska-Susitna Borough (MSB) to be accounted for
- Provide ability to model impacts of road user charges on travel patterns and traffic volumes
- Address the long-term horizon year (2035) for the project
- Support generation of detailed simulations of traffic movements in the project area
- Enhance the underlying base calibration

This list of enhancements was based on likely forecasting requirements associated with the H2H project and the demands of focused modeling in a specific corridor. For corridor-level modeling, particularly when leading up to specific recommendations for facility and operational improvements, travel models typically are refined and revalidated to demonstrate the ability to better represent existing conditions in the vicinity of the corridor under study.

The model enhancements discussed in this document result in a refined and revalidated existing conditions network in the vicinity of the H2H project, including the expanded study area of the MSB.

2.0 DESCRIPTION OF ENHANCEMENTS AND MODIFICATIONS

This section describes the model enhancements made to the AMATS travel model for use in the H2H project. The implementation of these enhancements is discussed in Section 3.0.

Purpose 1: Improve and Expand Representation of Transit

Adoption of policies and practices that support expanded use of transit in the Anchorage area is considered a substantial community planning objective. Refinements were made to a number of the travel model input assumptions, and a supplemental model was added to predict use of park-n-ride facilities and to improve the prediction of public transit and non-motorized travel mode usage. These changes were incorporated into the base year H2H model and were applied to all alternative evaluations.

Purpose 2: Expand the Study Area

Design and operation in the H2H corridor could be affected by both proposed new transportation facilities, specifically a bridge crossing (the Knik Arm Crossing or KAC) which would connect Anchorage to the MSB and support expected accelerated land use growth in the MSB. To account for the potential effect the original AMATS study area was expanded to include the MSB. The basis of expansion was adding zones, network and other related information from the MSB to the AMATS model. However, these data (available from other area modeling platforms) were expanded and refined to directly support all AMATS model data input requirements.

To support the more detailed needs of the H2H analysis, the assumptions and level of detail for networks and the traffic analysis zone system were reviewed and modified as needed. This process included adding local network links, adjusting access locations, and refining and expanding the local zone system to better represent network access characteristics.

Purpose 3: Provide Facilities to Model Impacts of Road User Charges

A major consideration for this project and a limitation in the existing AMATS model is the ability to address trip and traffic diversion impacts of road user fees. Both in terms of future H2H facility design and in terms of the proposed KAC, tolls and other similar options are potentially under consideration. To allow the model to address the impact of user fees, the basic process of the AMATS model was modified to describe network impedances as generalized cost rather than travel time. This modification allows proposed road user fees to be represented as equivalent travel times using a calculated traveler **value of time**. As part of this effort, the model was further refined to expand the use of household income group ranges from being used only for trip generation to applying them throughout the model chain, including for trip assignment. This application allows trip distribution, mode choice, and route choice to reflect the values of time specific to each tertile. In this way, assumed road user charges differentially affect travel behavior for each income stratum.

Updates to the model process also involved assigning multiple occupant vehicles to the network separately to allow evaluation of managed lane and high-occupancy vehicle (HOV) strategies.

Purpose 4: Address the Long-term Horizon Year for the Project

While previous modeling efforts have been focused on shorter time frames (the most recent *Long Range Transportation Plan* update using the AMATS model used 2027 as a horizon [AMATS LRTP] [AMATS, 2007]), the H2H project requires forecasts for the year 2035. To develop these forecasts, both network and assumed land use and socioeconomic conditions for the entire AMATS and MSB regions were forecast and used to update travel model assumptions. The basis and development of these forecasts is discussed and detailed in the technical memorandum titled "Anchorage and Matanuska-Susitna Borough 2035 Land Use Allocation and Forecast" (CH2M HILL, 2010), which is included as Appendix A.

Purpose 5: Support Generation of Detailed Simulations of Traffic Movements

To support a more detailed evaluation of the traffic operational impacts of corridor design alternatives, a micro-simulation model was used to post-process the data from the H2H travel model. Functionality was added to the travel model to generate a subarea origin-destination trip pattern dataset. This dataset includes subarea trip tables by time period and vehicle class that detail the origins and destinations by vehicle type for all traffic in the project study area.

Purpose 6: Enhance the Underlying Base Calibration

Recommendations for studies conducted under the National Environmental Policy Act (NEPA) include using a model base condition projection adjustment process to ensure better consistency with existing condition data. In addition, an implication of using model forecasts for this type of analysis is that some design, operational, and environmental analyses will rely on time-of-day model outputs. Typically, most regional travel models are validated only to acceptably match weekday daily travel forecasts for all types of vehicles (sometimes validation considers truck traffic separately).

One goal of the model enhancement was to use automated techniques to improve the match with observed time period (a.m., p.m., and off-peak) traffic volumes. This enhancement was achieved by developing a base trip distribution using a specialized calibration technique called "adaptive assignment." Adaptive assignment as a refinement approach is specifically mentioned in NEPA travel forecasting guidance (FHWA, 2010) and is defined and discussed below.

The adaptive assignment entailed development of an optional **growth factoring** model that estimates future travel patterns based on combining a base (in this case 2008) trip table with estimated future growth. In this way, the calibrated trip patterns developed through the adaptive assignment process were used directly in forecasting future traffic volumes. This type of factoring is considered an industry standard practice and is commonly used in project and corridor studies.

The processes used for processing and verifying count data to be used in the modeling process for this project is described in technical memorandum titled "Traffic Count Development Methodology," which is included as Appendix B.

3.0 IMPLEMENTATION

This section discusses how each of the previously discussed enhancements were specifically implemented in the model, any required additional parameters and data and, where applicable, results and findings from their application.

In the process of enhancing the model, a "notes" function was developed to capture operational updates and enhancements to the travel demand model used for the H2H study. This function was designed to help the model user navigate the model application process. Current reference notes are in Appendix C.

Purpose 1: Improve and Expand Representation of Transit

Transit network and path building now includes support for description of park-n-ride facilities. Park-n-rides are described by adding two fields to the highway description: the maximum automobile travel distance to the park-n-ride service area from the origin zone and the name of the facility. Traffic analysis zones within this radius are assumed to have park-n-ride access. A maximum auto access travel time of 30 minutes was assumed, with an additional 5 minutes added for parking and walking at the park-n-ride facility. Transit paths are built separately for walk and drive access to be applied when estimating the number of transit riders. The assumed park-n-ride locations and radii are shown in Table 3-1.

Table 3-1. Assumed Park-n-rides and Service Radii

Park-n-ride Location (approximate location)	Service Radius (miles)
O'Malley Road Town Center (northeast quadrant of O'Malley Road and Old Seward Highway)	1.5
Huffman Road Town Center (Huffman Road between Old Seward Highway and Seward Highway)	1.5
Eagle River Transit Center (located on Business Boulevard)	4.0
South Birchwood Park-N-Ride (South Birchwood Road just west of Glenn Highway)	4.0
North Birchwood Park-N-Ride (North Birchwood Road just west of Glenn Highway)	6.0
Trunk Road Park-N-Ride (Trunk Road just north of Parks Highway)	10.0

Model transit networks were extensively reviewed and then updated as necessary. The basic updates that were made to the transit service descriptions consist of the following:

- Adding Mat-Su Community Transit (MASCOT) routes between Palmer and Wasilla and Anchorage
- Adding park-n-ride locations
- Revising Route 76, which serves the Mat-Su Senior Center

- Adding bus rapid transit modes for future scenarios to have bus lane (HOV lane) access
- Revised local access to routes in the Fairview/Downtown areas due to updated networks and zone splits in the H2H corridor

Purpose 2: Expand the Study Area

Expansion of the study area involved expanding the current AMATS model study area to include the urbanized and planned urbanized portions of the MSB. The basic description was taken from other transportation demand models (the MSB model developed for the *Mat-Su Borough Long-Range Transportation Plan* [MSB LRTP, HDR, 2007] and the Knik Arm Bridge and Toll Authority [KABATA] model developed for Appendix B of *Knik Arm Crossing Land Use and Transportation Forecasting* [HDR, 2006]), and some enhancements to that description were made. Adding the MSB involved expanding the highway and transit networks and adding traffic analysis zones and defining the accesses for those zones to the network; traffic count information was also added to support adaptive assignment and the resulting model validation. A total of 168 traffic analysis zones, 525 highway links (including 212 centroid links), and 8 transit routes were added to represent the MSB. Figure 3-1 shows shaded areas representing the original AMATS model and the area added for the expanded H2H model. Network and zone attributes were added and updated to support all AMATS model functions.

Purpose 3: Provide Facilities to Model Impacts of Road User Charges

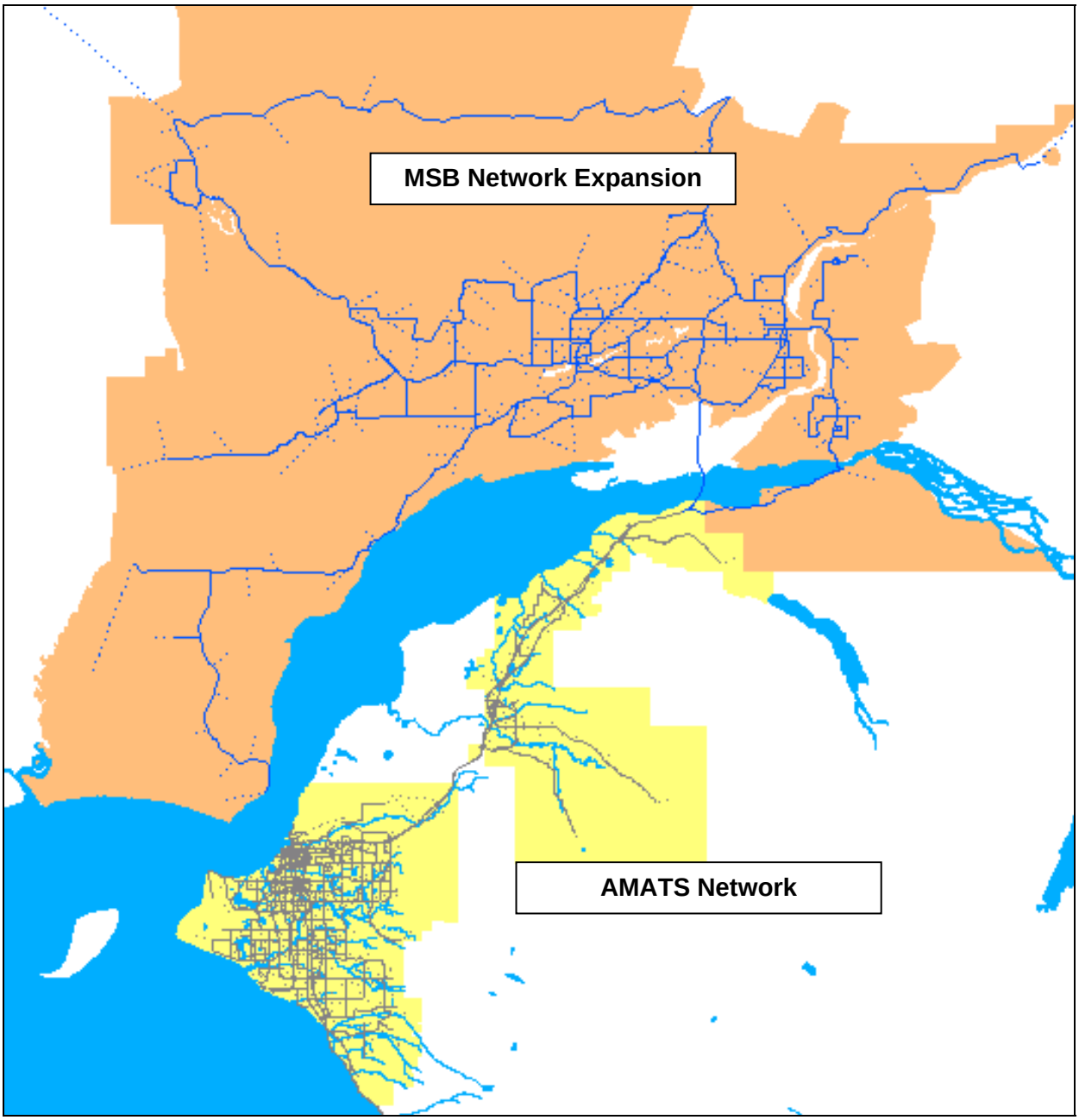
A new model was developed to incorporate road user charges into model assumptions used for destination, mode, and route choice. This model was based on national research and on Anchorage area surveys describing local road users' perceived values of time. These surveys were conducted in support of the KAC evaluation. Documentation of this work is included in *Proposed Knik Arm Bridge – Final Traffic and Toll Revenue Forecast*, a report prepared for KABATA (Wilber Smith Associates [WSA], 2007).

Two primary sources were used to develop the values of time. First, local area and income-stratified values were interpolated from *Proposed Knik Arm Bridge, Final Traffic and Toll Revenue Forecast* (WSA, 2007). These values were further refined using findings from the 2009 report *Synthesis of Research on Value of Time and Value of Reliability* (University of South Florida, National Center for Transit Research. 2009). Using those findings, two refinements were made to local survey data. First, all personal travel time for all purposes was valued the same. Second, commercial vehicle time (paid driver) was valued at 2 times the weighted average of all personal time (2.07 times the medium income value).

Table 3-2 shows the values of time applied for the three income classes and commercial traffic used in the H2H model.

In the original KAC toll study (which did not separate income class) for personal, work-related trips, the assumed value was $14.49 per hour. Adjusted for inflation, for the H2H model, the comparable value is $14.53 per hour, based on the personal time average and inflation of 2.5 percent compounded annually. Both the KAC toll study and the H2H model report toll costs in 2007 dollars.

Figure 3-1. AMATS Model Expansion



AMATS = Anchorage Metropolitan Area Transportation Solutions
MSB = Matanuska-Susitna Borough

Table 3-2. Assumed Values of Time (in 2002 dollars)

Group	Value of Time Conversion Factors		
	minutes per $	$ per hour	$ per minute
Low	5.00	12.00	0.200
Medium	4.75	12.63	0.211
High	4.32	13.89	0.232
Commercial	2.29	26.15	0.436
Personal Time Average		**12.84**	**0.214**

These values of time were used to generate separate sets of highway network paths, which were used in turn to generate separate trip distributions for each of the home-based trip purposes used in the H2H model. Paths represent the travel route in a transportation network that has the shortest travel time or cost for a given traveler. For mode choice, procedures were modified to calculate mode shares for each income class-trip purpose distribution. Again, stratified by income class, trip tables were assigned to the highway network, recognizing the differential values of time and then summarizing that output to provide total link loads by time period. (Use of value of time was limited to road user charges. Actual network travel times were used directly, without incorporating auto operating costs.)

Although not directly related to road user charges, as part of this procedure update, the mode choice and traffic assignment models were also modified to generate separate tables of drive alone and multiple vehicle occupant trips to facilitate use of the model in evaluating the performance of carpool lanes or other HOV strategies. Coding was added to highway links to specify HOV-only operation.

Purpose 4: Address the Long-term Horizon Year for the Project

To support the H2H modeling, two needs arose in updating the AMATS model to the project horizon year. First, transportation plans (for both highway and transit) for area agencies needed to be reviewed to ensure that all projects scheduled between the original AMATS model year (2027) and the H2H horizon year (2035) were added. The forecast year for the H2H project is 2035, the forecast year for the AMATS model is 2027, and the forecast year for the MSB model is 2030. It was decided that no projects would be added to the AMATS model for the period 2027 through 2035. It was also decided that no projects would be added to the MSB model for the period 2030 through 2035.

The AMATS region project list through 2027 can be found in the AMATS LRTP. The MSB region project list through 2030 is included in the draft MSB LRTP.

Substantial projects for the AMATS model include the Knik Arm Bridge, Glenn Highway HOV, and Ingra/Gambell Extension to Knik Arm Bridge. Substantial projects in the MSB model include Trunk Road Reconstruction, Crusey Street Expansion, Rainier Street Reconstruction, and Wasilla Bypass.

Second, new socioeconomic forecasts were commissioned from the Institute for Socioeconomic Research (ISER) of the University of Alaska Anchorage, reflecting the latest thinking about statewide and regional growth trends and updating ISER's previous 2030 forecasts to 2035. The previous ISER forecast is summarized in "Memorandum on the Economic and Demographic Impacts of a Knik Arm Bridge," which was prepared as input to the KABATA Environmental Impact Statement of September 2005. The new ISER economic forecast is summarized in the report *Economic and Demographic Projections for Alaska and Greater Anchorage 2010-2035*(ISER, 2009). This topic is discussed separately in the CH2M HILL technical memorandum included as Appendix A.

Purpose 5: Support Generation of Detailed Simulations of Traffic Movements

Operationally, an additional need for the H2H forecasting process was to export forecasts produced by the H2H travel model to a separate and more detailed traffic simulation process using VISSIM traffic modeling software. The need to export to micro-simulation required subarea trip tables to be developed and indexed as necessary to support input to the simulation software. Subarea trip tables were created by adding a function to the H2H model, which, based on the boundaries of a user-supplied polygon, exports trip table by a range of vehicle classes (drive-alone auto, multiple-occupant vehicle and truck) representing the internal traffic analysis zones and the internal-external (cordon) flows and external-external flows into and out of the simulation model's defined subarea. Creation of the subarea trip tables also involved a process to adjust subarea boundaries for different corridor alternatives based on changes in the cordon configuration.

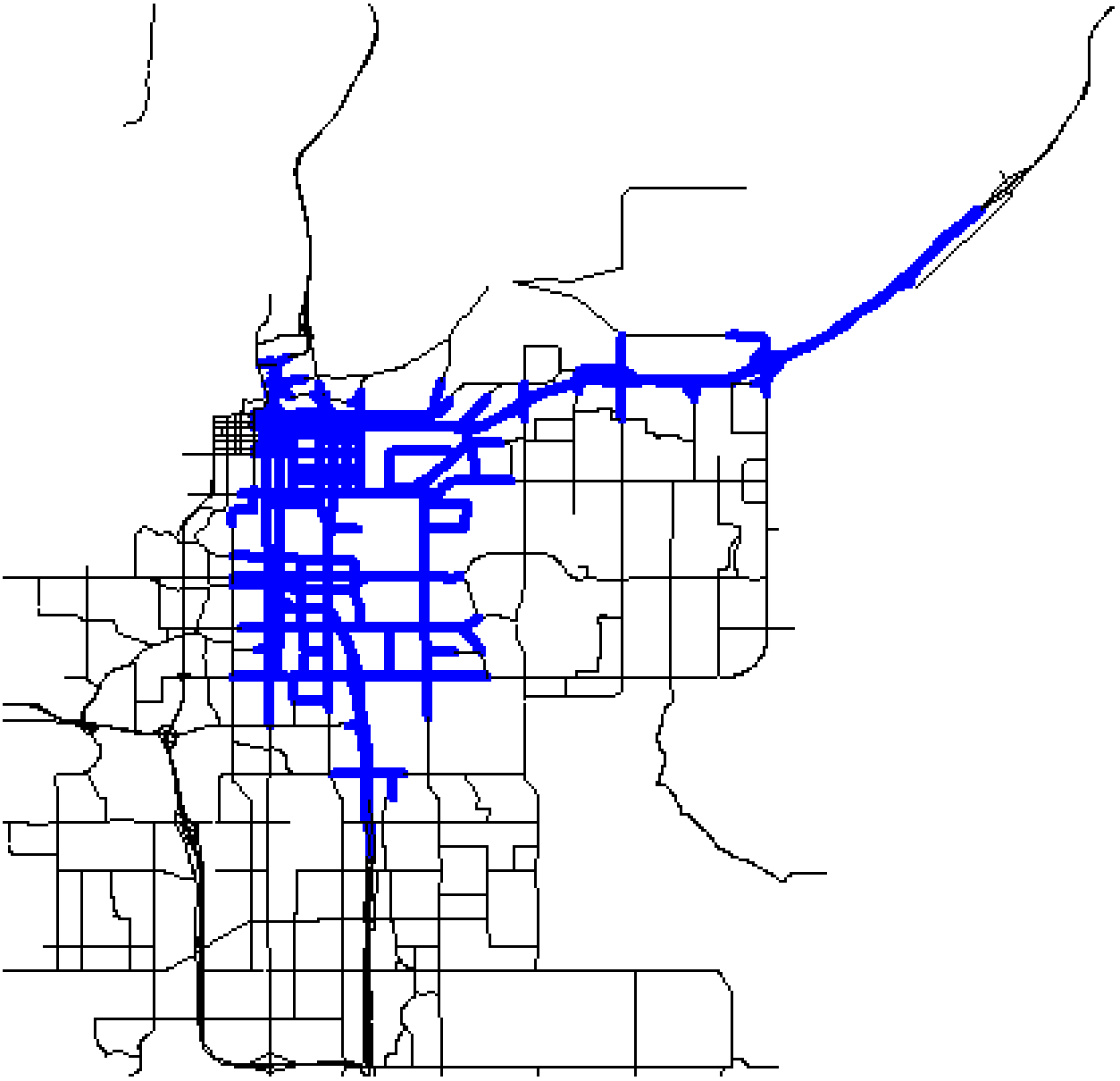
Figure 3-2 shows the subarea of the H2H project in relation to the Anchorage Bowl (the bold links represent the subarea used as input to the VISSIM traffic simulation model). This subarea is roughly bounded by C Street on the west, Dowling Road on the south, Lake Otis Parkway on the east, and Elmendorf Air Force Base on the North. Along the Glenn Highway it extends from Downtown Anchorage to Artillery Road, and on the Seward Highway it extends from the north terminus to south of Dowling Road.

Purpose 6: Enhance the Underlying Base Calibration

Adaptive assignment was used to supplement more traditional model calibration and validation methods to achieve better correspondence with existing traffic counts, particularly for specific time periods. The resulting trip tables were then used directly in a growth factoring process to take account of both trip distributions synthesized through adaptive assignment and estimates of trip-making growth based on forecast socioeconomic data and the planned transportation network. This section presents the comparative results of using the adaptive assignment process to existing time-of day traffic counts (validation) and describes how the adaptive assignment output was incorporated into future forecasting.

Adaptive assignment is a mathematical model based on maximum likelihood that is used to adjust a table of origin-destination trips to best match a set of input link volumes. In short, adaptive assignment attempts to produce a modified table that best matches known conditions.

Figure 3-2. H2H Micro-simulation Network



The process consists of supplying a seed table (typically "raw" output from the travel model) and then iteratively assigning that table while adjusting the table to achieve the best match with independently supplied traffic counts. Methods and application of adaptive assignment procedures are well established, well documented, and specifically cited as a potential approach in NEPA guidance documents. The major advantage of adaptive assignment over more traditional approaches is the ability to refine estimates of traffic based on specific categories and trip types. In the case of the H2H model, input traffic counts were stratified into time-of-day and auto-only trips to improve validation of these categories.

Figures 3-3, 3-4, and 3-5 compare adaptive assignment generated traffic volumes and associated ground counts for weekday traffic for a.m., p.m., and off-peak periods, respectively. Figure 3-6 illustrates the daily track travel ground counts for weekdays compared to daily model counts.

Figure 3-3. Comparison of A.M. Peak Period Auto Volumes Compared with Counts

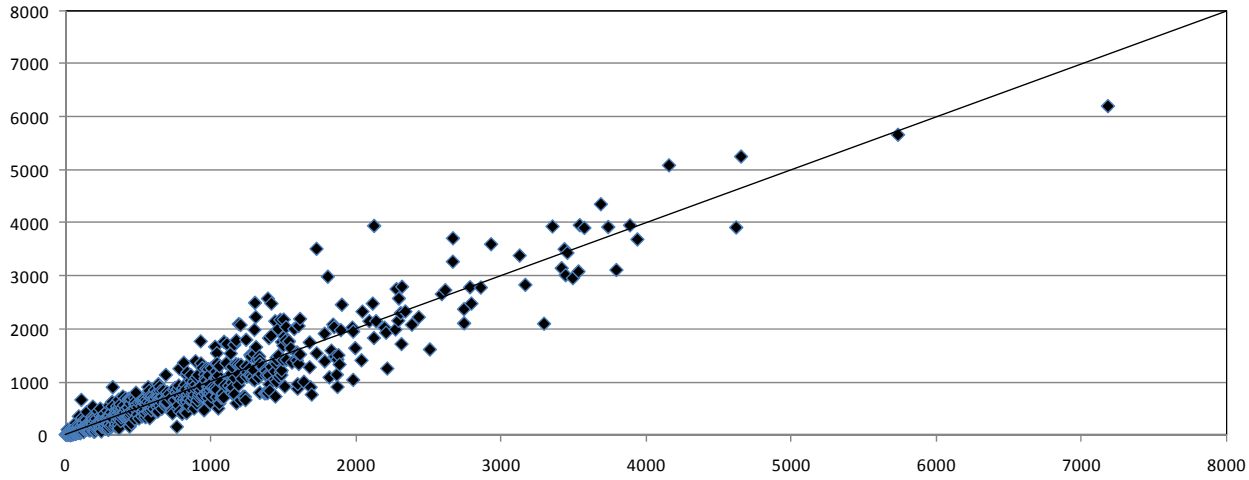


Figure 3-4. Comparison of P.M. Peak Period Auto Volumes with Counts

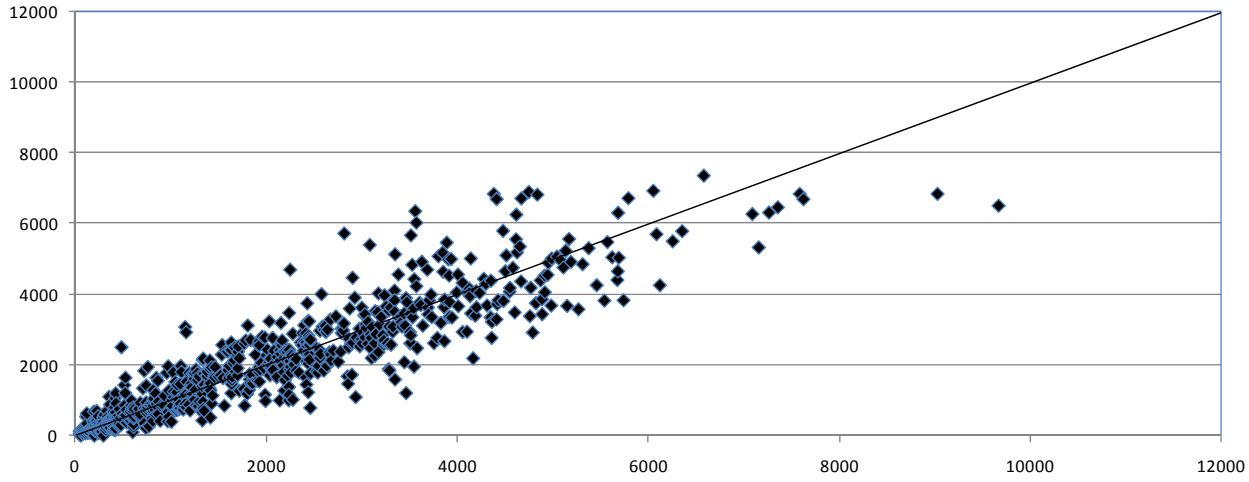


Figure 3-5. Comparison of Off-peak Period Auto Volumes with Counts

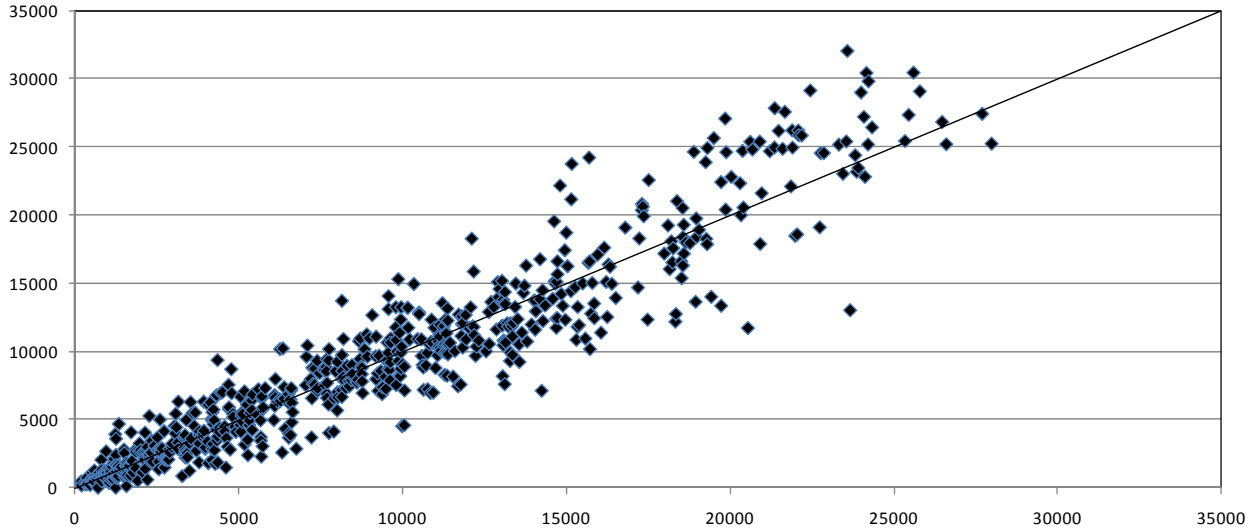
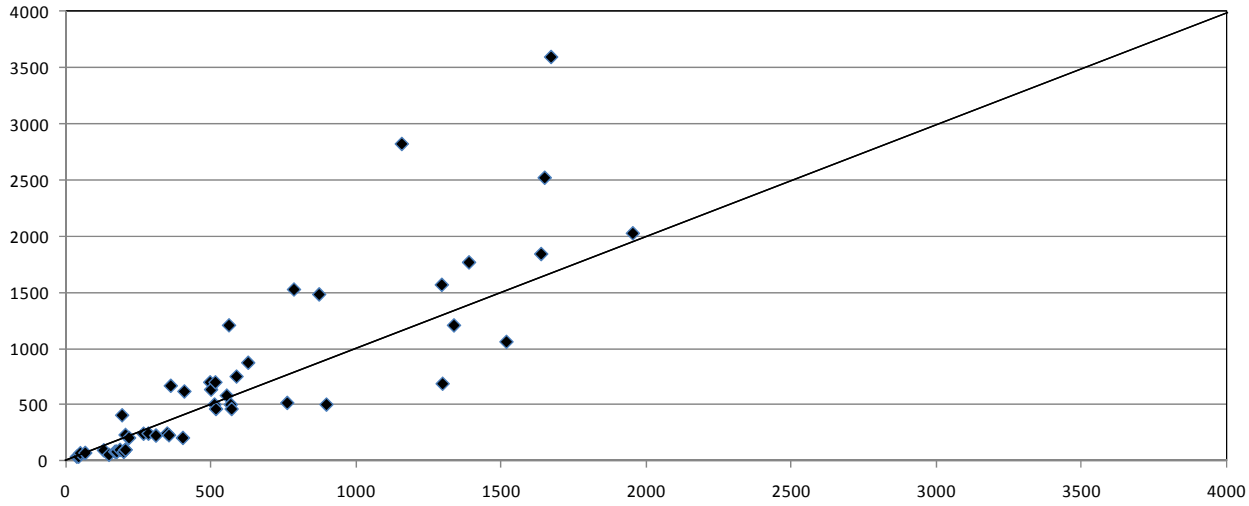
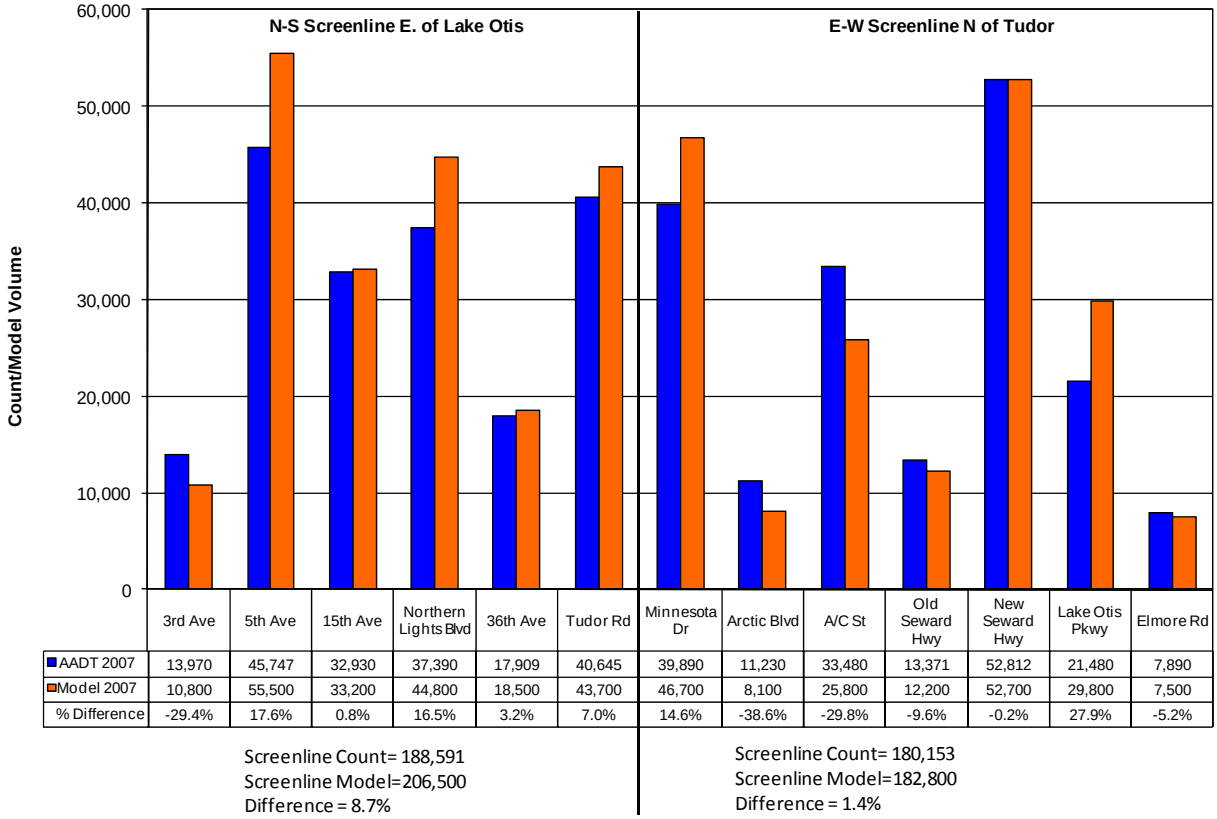


Figure 3-6. Comparison of Truck Daily Volumes with Counts (truck validation)



H2H model results by time of day were summed across 28 screenlines throughout the region for comparison with Alaska Department of Transportation & Public Facilities (ADOT&PF) ground counts. Figure 3-7 displays comparison of model volumes with ground counts for two screenlines near the H2H project area. It is a recommended target to meet observed counts and estimated volumes along screenlines between 5 and 10 percent (Barton-Aschman Associates, Inc., and Cambridge Systematics, Inc., 1997). Both of the screenlines in Figure 3-7 meet these criteria: the north-south screenline east of Lake Otis Parkway has a difference of 8.7 percent, and the east-west screenline north of Tudor Road has a difference of 1.4 percent.

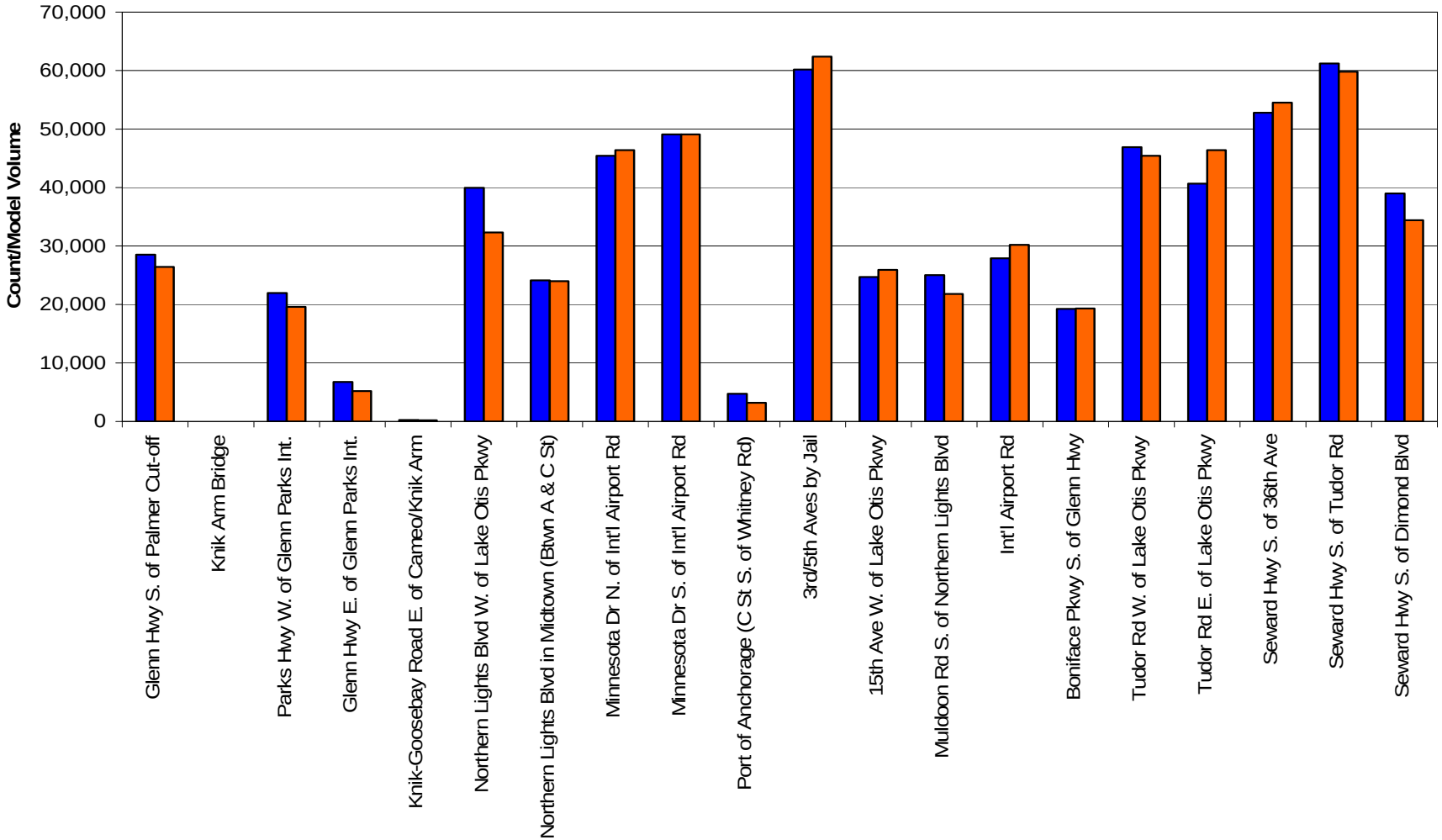
Figure 3-7. 2007 Comparison of Screenline Daily Model Volumes with ADOT&PF Traffic Count



	3rd Ave	5th Ave	15th Ave	Northern Lights Blvd	36th Ave	Tudor Rd	Minnesota Dr	Arctic Blvd	A/C St	Old Seward Hwy	New Seward Hwy	Lake Otis Pkwy	Elmore Rd
AADT 2007	13,970	45,747	32,930	37,390	17,909	40,645	39,890	11,230	33,480	13,371	52,812	21,480	7,890
Model 2007	10,800	55,500	33,200	44,800	18,500	43,700	46,700	8,100	25,800	12,200	52,700	29,800	7,500
% Difference	-29.4%	17.6%	0.8%	16.5%	3.2%	7.0%	14.6%	-38.6%	-29.8%	-9.6%	-0.2%	27.9%	-5.2%

Figure 3-8 compares model volumes to corresponding ground counts for a sample of roadway links across the region. Comparing observed versus forecast volumes on links where counts are available is a way of checking the reasonableness of the model forecasts, often done using the coefficient of determination, also referred to as "R^2" or "R-squared." In this calculation, R^2 is a measure of how well model auto volumes correlate with the existing counts. An R^2 value higher than 0.88 represents a good correlation (Barton-Aschman Associates, Inc., and Cambridge Systematics, Inc., 1997). The R^2 value for Figure 3-8 is 0.95.

Figure 3.8. 2007 Comparison of Roadway Link Model Volumes with ADOT&PF Traffic Counts



4.0 2035 H2H TRAVEL FORECASTS

The H2H travel model was used to assign vehicle trips by three time-of-day periods: 7:00 to 9:00 a.m., 3:00 to 6:00 p.m., and off -peak (all other hours) to estimate 2035 travel demand. Model runs were prepared for a "No Action" alternative and three build alternatives. The No Action scenario is defined as the adopted LRTP transportation plans for AMATS and the MSB without an H2H improvement project.

Routing of vehicle trips over the road network was determined by time and cost impedance measures. The three time-of-day assignments also were combined to produce total 24-hour daily traffic on each link of the regional roadway network. H2H build forecasts were run for the alternatives:

- An Ingra-Gambell corridor alignment
- An Orca corridor alignment
- A 15th Avenue corridor alignment

4.1 2035 H2H No Action Scenario Travel

The initial application of the 2035 model evaluated the 2035 H2H No Action alternative. The No Action scenario is defined as the adopted LRTPs for AMATS and the MSB without an H2H improvement project. The traffic analysis zone socioeconomic variables and corresponding household attributes were input into the H2H travel model. The H2H travel modeling process was executed with the 2035 No Action transportation network to develop estimated 2035 trips by trip purpose, time-of-day, and mode.

Table 4-1 compares estimated trips by trip purpose for the base year 2007 with the corresponding 2035 trips for the No Action scenario.

Table 4-1. 2007 and 2035 H2H No Action Scenario Trips by Trip Purpose

Trip Purpose	2007	2035
Home-based work	186,924	288,428
Home-based shop	116,039	157,735
Home-based other	502,314	594,016
Home-based school (public and private schools)	118,039	190,616
Non-home-based work	143,735	200,333
Non-home-based non-work	321,897	460,038
Trucks	65,274	90,578
Total	**1,454,222**	**1,981,744**

4.2 2035 No Action Scenario Regional Travel Mode Shares

Table 4-2 summarizes estimated trips by mode for the 2035 H2H No Action alternative.

Table 4-2. 2035 H2H No Action Scenario Trips by Mode

Trip Mode	Number of Trips	Percent
Drive alone	913,711	48.3%
Drive with passenger	341,958	18.1%
Vehicle passenger	446,049	23.6%
School bus	41,774	2.2%
Transit	20,675	1.1%
Walk	112,387	5.9%
Bike	14,611	0.8%
Total	**1,891,166**	**100.0%**

4.3 Assignment of 2035 Vehicle Trips to the H2H No Action Road Network

The H2H travel model also was used to assign vehicle trips by three time-of-day periods: 7:00 to 9:00 a.m., 3:00 to 6:00 p.m., and off -peak (all other hours) to the 2035 No Action road network. Routing of vehicle trips over the road network was determined by time and cost impedance measures. The three time-of-day assignments also were combined to produce total 24-hour daily traffic on each link of the regional roadway network.

Plots showing the peak-period traffic volumes for 7:00 to 9:00 a.m. and 3:00 to 6:00 p.m. under the No Action alternative are in Appendix D.

Daily traffic comparisons for 2007, 2027, and the 2035 No Action alternative model run are tabulated in Table 4-3. The 2007 and 2035 model volumes were obtained using the enhanced H2H travel model and the updated ISER projections for 2035. The 2027 model volumes were obtained using earlier H2H project analyses and were modeled using the AMATS adopted travel demand model, without any enhancements and with an earlier version of ISER projections for 2027. In many cases, the 2027 and 2035 No Action volumes differ very modestly, partially due to the different model platforms, but also due to a change in ISER forecast, indicating a slight slowing of growth in population and employment when compared to previous estimates. The change in growth projections, despite additional years, results in similar forecast volumes for 2035, when compared to the previous 2027 estimates.

Table 4-3. 2007, 2027, and 2035 No Action Volumes – Selected Road Links

Location	AADT 2007	Model 2007	Percent Difference	2027 No Action	Change from 2007	Percent Change from 2007	2035 No Action	Change from 2007	Percent Change from 2007
Glenn Highway south of Palmer Cut-off	28,506	27,800	-2.5%	44,900	17,100	61.5%	51,600	23,800	85.6%
Knik Arm Bridge	NA	NA	NA	NA	NA	NA	37,000	NA	NA
Parks Highway west of Glenn Parks Interchange	21,950	24,200	9.3%	NA	NA	NA	44,100	19,900	82.2%
Glenn Highway east of Glenn Parks Interchange	6,758	9,500	28.9%	NA	NA	NA	17,200	7,700	81.1%
Knik-Goose Bay Road east of Cameo/Knik Arm	230	200	-15.0%	NA	NA	NA	11,800	11,600	5,800.0%
Northern Lights Boulevard west of Lake Otis Parkway	39,957	33,700	-18.6%	37,700	4,000	11.9%	45,600	11,900	35.3%
Northern Lights Boulevard in Midtown (Between A & C Streets)	24,100	28,800	16.3%	21,400	-7,400	-25.7%	27,800	-1,000	-3.5%
Minnesota Drive north of International Airport Road	45,404	49,500	8.3%	55,700	6,200	12.5%	41,600	-7,900	-16.0%
Minnesota Drive south of International Airport Road	49,089	52,800	7.0%	55,400	2,600	4.9%	44,500	-8,300	-15.7%
Port of Anchorage (C Street south of Whitney Road)	4,730	3,800	-24.5%	4,500	700	18.4%	4,000	200	5.3%
3rd Avenue by jail	12,460	6,200	-101.0%	15,300	9,100	146.8%	9,300	3,100	50.0%
5th Avenue by jail	47,720	54,600	12.6%	52,900	-1,700	-3.1%	45,100	-9,500	-17.4%
15th Avenue west of Lake Otis Parkway	24,711	20,400	-21.1%	28,900	8,500	41.7%	31,700	11,300	55.4%
Muldoon Road south of Northern Lights Boulevard	25,010	19,000	-31.6%	22,400	3,400	17.9%	23,900	4,900	25.8%
International Airport Road	27,913	29,800	6.3%	56,100	26,300	88.3%	28,800	-1,000	-3.4%
Boniface Parkway south of Glenn Highway	19,229	17,500	-9.9%	25,100	7,600	43.4%	20,900	3,400	19.4%

Table 4-3. 2007, 2027, and 2035 No Action Volumes – Selected Road Links

Location	AADT 2007	Model 2007	Percent Difference	2027 No Action	Change from 2007	Percent Change from 2007	2035 No Action	Change from 2007	Percent Change from 2007
Tudor Road west of Lake Otis Parkway	46,918	41,400	-13.3%	51,000	9,600	23.2%	49,900	8,500	20.5%
Tudor Road east of Lake Otis Parkway	40,645	43,700	7.0%	44,300	600	1.4%	39,300	-4,400	-10.1%
Seward Highway south of 36th Avenue	52,812	52,700	-0.2%	75,100	22,400	42.5%	79,600	26,900	51.0%
Seward Highway south of Tudor Road	61,219	58,200	-5.2%	91,000	32,800	56.4%	93,200	35,000	60.1%
Seward Highway south of Dimond Boulevard	38,966	38,700	-0.7%	53,700	15,000	38.8%	55,700	17,000	43.9%
3rd Avenue	13,970	10,800	-29.4%	15,300	4,500	41.7%	12,700	1,900	17.6%
5th Avenue	45,747	55,500	17.6%	52,900	-2,600	-4.7%	51,800	-3,700	-6.7%
15th Avenue	32,930	33,200	0.8%	24,000	-9,200	-27.7%	28,100	-5,100	-15.4%
Northern Lights Boulevard	37,390	44,800	16.5%	51,500	6,700	15.0%	44,000	-800	-1.8%
36th Avenue	17,909	18,500	3.2%	23,300	4,800	25.9%	11,000	-7,500	-40.5%
Tudor Road	40,645	43,700	7.0%	44,300	600	1.4%	39,300	-4,400	-10.1%
Minnesota Drive	39,890	46,700	14.6%	51,000	4,300	9.2%	41,500	-5,200	-11.1%
Arctic Boulevard	11,230	8,100	-38.6%	10,900	2,800	34.6%	14,300	6,200	76.5%
A/C Street	33,480	25,800	-29.8%	31,800	6,000	23.3%	28,700	2,900	11.2%
Old Seward Highway	13,371	12,200	-9.6%	6,100	-6,100	-50%	11,100	-1,100	-9.0%
New Seward Highway	52,812	52,700	-0.2%	75,100	22,400	42.5%	79,600	26,900	51.0%
Lake Otis Parkway	21,480	29,800	27.9%	33,400	3,600	12.1%	36,400	6,600	22.1%
Elmore Road	7,890	7,500	-5.2%	13,700	6,200	82.7%	13,100	5,600	74.7%

AADT= average annual daily traffic
KAC = Knik Arm Crossing
NA = not applicable

4.4 2035 Travel Forecast for H2H Reasonable Alternatives

Initial screening evaluations of alternatives for the H2H project determined three reasonable alternatives for more refined analysis:

- An Ingra-Gambell corridor alignment
- An Orca corridor alignment
- A 15th Avenue corridor alignment

Single-line diagrams of each H2H alternative are in Appendix D. Each of these alternatives was coded into the travel model network, and 2035 travel model runs were executed.

5.0 REFERENCES

Barton-Aschman Associates, Inc., and Cambridge Systematics, Inc. *Model Validation and Reasonableness Checking Manual*. 1997. Prepared for Travel Model Improvement Program Federal Highway Administration. February.

CH2M HILL. 2010. Anchorage and Matanuska-Susitna Borough 2035 Land Use Allocation and Forecast. Technical memorandum prepared for HDR Engineering, Inc. July.

CH2M HILL. 2010. Seward Highway to Glenn Highway Connection Traffic Count Development Methodology. Technical memorandum prepared for HDR Engineering, Inc. July.

CH2M HILL. 2008. Seward Highway to Glenn Highway Connection Traffic Forecasting Methodology. Technical memorandum prepared for HDR Engineering, Inc. December.

HDR Alaska, Inc. (HDR). 2007. *Mat-Su Borough Long-Range Transportation Plan* (draft). Prepared for the Matanuska-Susitna Borough. June.

HDR Alaska, Inc. (HDR). 2006. *Knik Arm Crossing Land Use and Transportation Forecasting.* March.

Municipality of Anchorage, Anchorage Metropolitan Area Transportation Solutions (AMATS). 2007. *Anchorage Bowl 2025 Long-Range Transportation Plan with 2027 Revisions*. April.

University of Alaska Anchorage, Institute of Social and Economic Research (ISER). 2009. *Economic and Demographic Projections for Alaska and Greater Anchorage 2010-2035.* December.

University of Alaska Anchorage, Institute of Social and Economic Research (ISER). 2005. Memorandum on the Economic and Demographic Impacts of a Knik Arm Bridge. September.

University of South Florida, National Center for Transit Research. 2009. Synthesis *of Research on Value of Time and Value of Reliability.* Prepared for the Florida Department of Transportation. January.

U.S. Department of Transportation, Federal Highway Administration (FHWA). 2010. *Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA.* March.

Wilber Smith Associates (WSA). 2007. *Proposed Knik Arm Bridge, Final Traffic and Toll Revenue Forecast.* Prepared for the Knik Arm Bridge and Toll Authority. September.