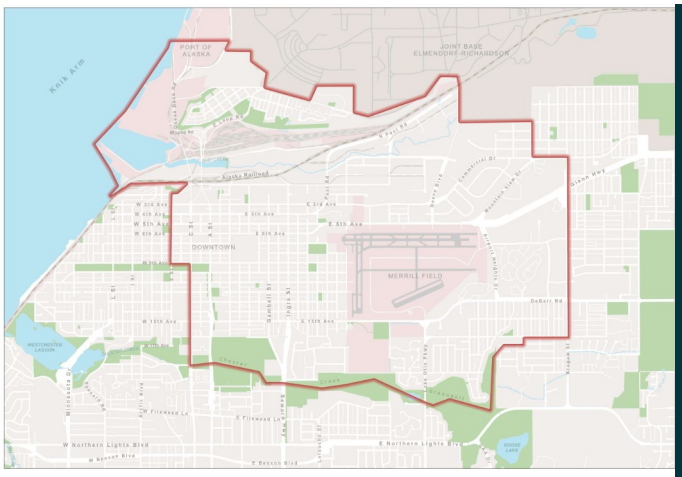

AMATS: Seward Highway to Glenn Highway Connection Planning & Environmental Linkage Study
State Project No.: CFHWY00550
Federal Project No.: 0001653

Travel Demand Modeling Memo

August 31, 2021

This planning document may be adopted in a subsequent environmental review process in accordance with 23 USC 168 Integration of Planning and Environmental Review.

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017, and executed by FHWA and DOT&PF.

Prepared for:

Alaska Department of Transportation and Public Facilities

Prepared by:

RSG
1515 SW 5th Avenue, Suite 1030
Portland, OR 97201

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1.0 Introduction and Model Overview

This document outlines the steps that will be taken for the travel demand modeling sub-task of the Seward Highway to Glenn Highway Connection Planning and Environmental Linkage Study project (SG PEL or “the project”).

RSG will use the Anchorage Metropolitan Area Transportation Study (AMATS) Travel Demand Model for this study. RSG will update and enhance the model in the following ways:

- RSG will update land-use data and networks from the current 2013 base-year to 2019. These updates will be performed for the entire region, with particular attention in the study area.
- RSG will update the networks to incorporate actual intersection configuration (number of turn lanes by direction) in the study area.
- RSG will consider using a scenario manager to update the model networks but may choose to perform manual editing and tracking if the latter is more cost-effective.
- RSG will process and expand a passive location-based services (LBS) dataset as part of an Origin-Destination Study (ODS) and use it to calibrate the 2019 base-year model.
- RSG will develop future 2030, 2040, and 2050 land-use data and "Existing plus Committed" (E+C) networks to be used as baselines for comparison to build alternatives.
- RSG will code, run, and summarize up to three build alternatives.

The following document describes the existing AMATS travel model and its limitations, the data to be used in updating the travel demand model, the updates to be made to the model, and the forecasts to be prepared.

1.1 AMATS Model Overview

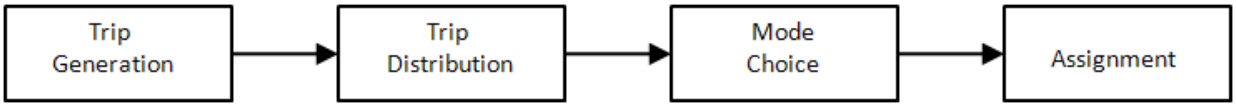
RSG previously updated the modeling system in 2016. The model was calibrated to match observed travel patterns from recently collected household and transit on-board survey data plus Bluetooth survey data, and it used a 2013 base year for calibration. The enhancements included:

- A more refined Transportation Analysis Zone (TAZ) system covering the Municipality of Anchorage (MOA), Chugiak-Eagle River (CER), and the Matanuska-Susitna Borough (MSB).
- Updated TAZ data inputs including NAICS-based employment categories.
- Updated socio-economic distributions and household sub-models based on recent census data and using more disaggregate income categories for greater sensitivity to cost variables.
- A set of continuous buffered density measures used in various model components to represent accessibilities to activities of different types by different modes.

- Replacement of traditional ‘gravity’ formulation for trip distribution with logit-based destination choice models to better reflect sensitivity to various travel modes (including non-motorized) on trip length and to better differentiate travel patterns for residents of the Municipality of Anchorage versus residents of outlying areas of the region.
- Development of a segmented and nested logit mode choice model with auto travel modes by occupancy, walk and bike modes, and transit walk and drive access. The model utilizes auto sufficiency as the primary method of segmentation to better represent “choice” versus “captive” transit riders and four income bins for improved cost sensitivities to toll facilities.
- Implementation of a new method for treatment of non-home-based trips that represents a partial move towards tour-based modeling.
- Development of a set of commercial vehicle models including a freight model based upon ATRI data and a state-of-the-practice non-goods movement commercial vehicle model.
- Implementation using the TransCAD software platform: all model steps are implemented in the TransCAD scripting language GISDK. The graphical model user interface (GUI) is also coded in GISDK, and the model produces summaries useful for comparing scenario results.

The AMATS model is based on a four-step modeling process: trip generation, trip distribution, mode choice and vehicle assignment (Figure 1).

Figure 1: 4-Step Model Workflow

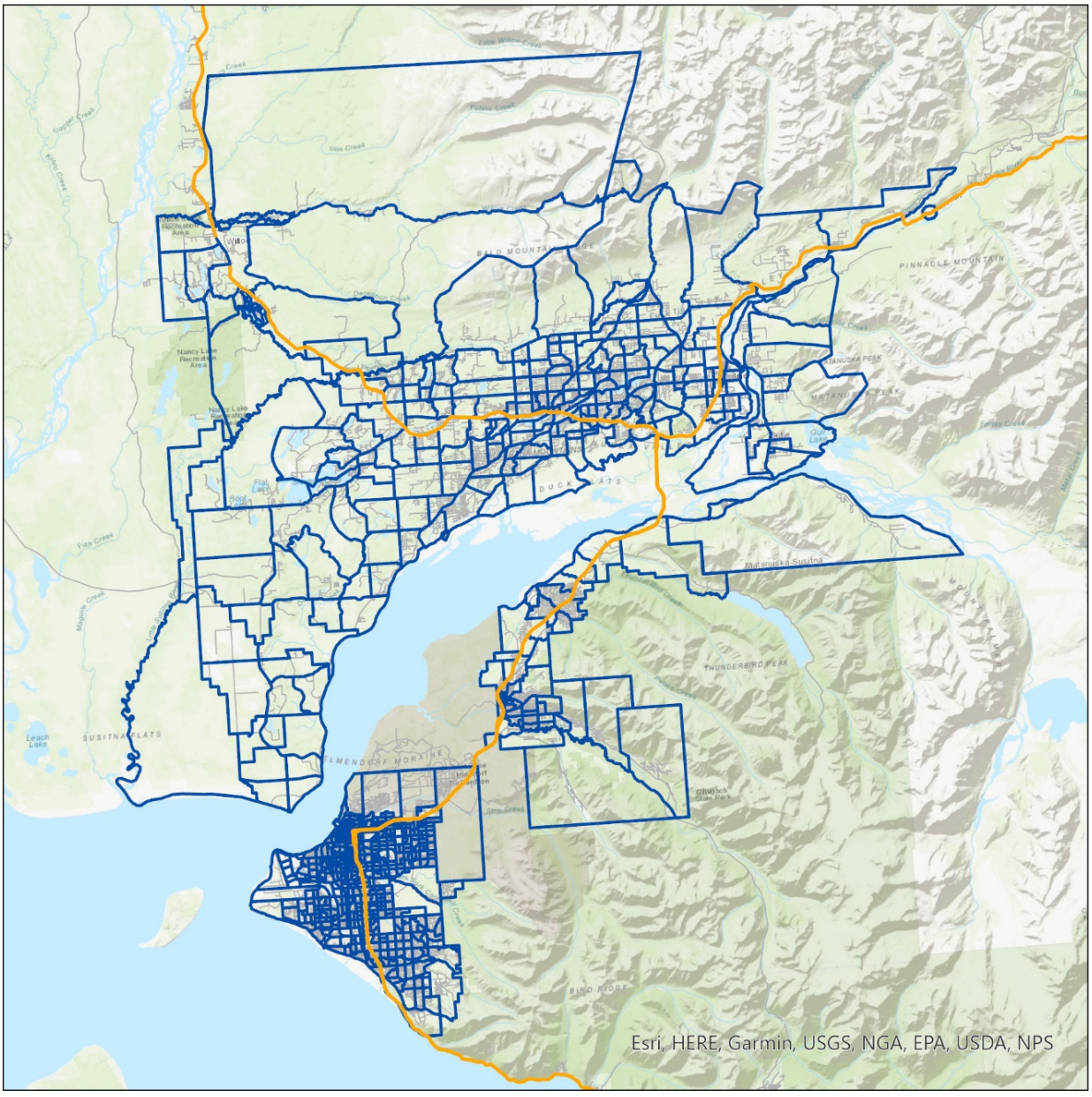


1.1.1 Model Geography

As shown in Figure 2, the AMATS model currently encompasses the MOA and the Anchorage Bowl, CER, and most of the MSB. Three “external stations” handle travel in, out, or through the modeled region:

- Seward Highway south of Anchorage
- Glenn Highway east of Palmer
- Parks Highway north of Wasilla

Figure 2: The AMATS Model Region Showing TAZ Boundaries



1.1.2 Trip Generation

The trip generation step predicts the number of total daily home-based trip productions for each TAZ in the region. It also computes non-home-based trip productions by an innovative non-home-based travel submodel. Home-based productions use a cross-classification method that multiplies the number of households categorized by socio-economic variables by the trip rate for each household segment and trip purpose. Trip generation produces quantities of productions and attractions by purpose and by TAZ.

1.1.3 Trip Distribution

The trip distribution step predicts the destination choice of the trips estimated by the trip generation step.

The AMATS model uses utilities from its mode choice submodel plus distance as accessibility measures for home-based destination choice. Non-home based (NHB) trips use the mode choice utility from the separate NHB submodel for destination choice.

The trip distribution step produces matrices of trips by purpose from origin TAZs to destination TAZs by time of day.

1.1.4 Mode Choice

The mode choice step predicts the mode for each trip based upon trip purpose, traveler characteristics, travel times and costs by mode, and land-use characteristics of the destination. The mode choice sub-model considers the following modes:

- Drive-alone
- Shared 2
- Shared 3+
- Walk
- Bike
- Walk-Transit (Walk access transit)
- PNR-Transit (Park and Ride access transit)
- KNR-Transit (Kiss and Ride or drop-off access transit)
- School bus (Home-Based School trips only)

The mode choice step produces matrices of trips by mode from origin to destination TAZ.

1.1.5 Vehicle Assignment

The assignment step simulates transportation system performance by placing vehicles in the transportation network. The four steps illustrated in Figure 1iterate to ensure that the model finds a solution as optimal as possible for each traveler, given congestion in the system and other effects of the scenario under analysis.

The AMATS model assigns trip tables by income for each mode type as shown in Table 1. The model estimates travel in three “typical weekday” time periods:

- AM Peak – 7 AM to 9 AM
- PM Peak – 3 PM to 6 PM
- Off-Peak – 6 PM to 7 AM plus 9 AM to 3 PM

Assignment uses generalized cost impedances accounting for both time and direct costs of travel to enable sensitivity to road pricing. The value-of-time (VOT) used for each person-based

mode assumes a wage rate at one-half of the mid-point of each modeled income range; for trucks, the VOTs are based on a literature review performed for Oregon Department of Transportation (ODOT).[1] The data in the ODOT truck VOT review are based on more than a decade of publicly available national data and provide a reasonable basis for choosing truck VOT in cases where a local study is not available. Direct costs account for vehicle occupancy at 1/1.8 for shared 2 vehicles and 1/2.3 for shared 3+ vehicles.

Table 1: Vehicle Classes, Value of Time (VOT) and Trip Tables Used in Forecasts

Mode	VOT Bin	Link Exclusions	VOT ($/hour)
Drive-alone	Low VOT (income < $25k)	HOV2 and HOV3+ lanes	$3.11
Drive-alone	Medium-low VOT ($25k< income <$50k)	HOV2 and HOV3+ lanes	$7.88
Drive-alone	Medium-high VOT ($50k< income <$100k)	HOV2 and HOV3+ lanes	$15.38
Drive-alone	High VOT ($100k+)	HOV2 and HOV3+ lanes	$35.34
Shared 2	Low VOT (income < $25k)	HOV 3+ lanes	$3.11
Shared 2	Medium-low VOT ($25k< income <$50k)	HOV 3+ lanes	$7.88
Shared 2	Medium-high VOT ($50k< income <$100k)	HOV 3+ lanes	$15.38
Shared 2	High VOT ($100k+)	HOV 3+ lanes	$35.34
Shared 3+	Low VOT (income < $25k)	None	$3.11
Shared 3+	Medium-low VOT ($25k< income <$50k)	None	$7.88
Shared 3+	Medium-high VOT ($50k< income <$100k)	None	$15.38
Shared 3+	High VOT ($100k+)	None	$35.34
Light trucks	All	None	$25.00
Heavy trucks	All	None	$36.00

The final output of the assignment step is a database of network link volumes by time period and by vehicle class for all network links. The assignments can be visualized using the spatial representation of the network in the model software itself or other geospatial software.

1.1.6 Model Validation

RSG thoroughly validated the 2013 base year AMATS model to traffic counts and transit boardings. The validation process involved adjustments to trip generation rates, trip distribution parameters, auto assignment parameters, and signal progression factors. It also involved reviewing and updating network characteristics (e.g., adding traffic signals and correcting network connectivity). For more detailed information regarding the model see the *Travel Demand Model Development Report*.[2]

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[1] Commercial Travel (CT) section of the Oregon Transportation Land Use Modeling Integration Program. Oregon Department of Transportation. https://github.com/tlumip/tlumip/wiki/CT Accessed 6/30/2021.

[2] *Travel Demand Model Update – Travel Model Development Report*. For Anchorage Metropolitan Area Transportation System by RSG Inc. with R&M Consultants, Solstice Advertising, and Jon Spring. 2016. http://www.muni.org/Departments/OCPD/Planning/AMATS/Travel%20Demand%20Model/2016/2016_Travel_Demand_Model%20_Development_Report.pdf

1.2 Model Limitations

Project stakeholders should be aware that the AMATS model has certain limitations.

The traffic assignment model uses aggregate, static methods meaning that it assigns all flows simultaneously within each time period. The model thus does not explicitly represent vehicle queuing and spillbacks.

The current version of the model can impute (infer) intersection characteristics (number of turn lanes by direction) and signal timing (cycle length and green-time-per-cycle ratio by approach) from facility type and number of lanes at each intersection. This eliminates the need to manually update the model with intersection detail. However, in addition to mid-block capacity the model can explicitly represent intersection control type and the presence of turn lanes. For the SG PEL forecasts, RSG will explicitly code intersection data for links and nodes within the project area so the model will be sensitive to intersection signal type and turn lane presence in the project alternatives. The RSG team plans to retain intersection characteristic imputation for the geography outside the project area. Stakeholders should also note that even with this additional sensitivity to intersection design features, the model is not micro-simulating the alternatives so care should be taken in evaluating model findings. RSG will support SG PEL discussions during alternatives analysis to ensure that the project team meaningfully communicates the results to the stakeholders.

The model does not consider Transportation Network Companies (TNC) or mobility as a service (MaaS) such as Uber, Lyft, bicycle sharing, scooter sharing, and so forth. The 2019 base year recalibration will ensure that overall volume and flow estimates will remain robust, but any project treatment of TNC and MaaS effects will need to be done off-model.

The model does not forecast pollutant emissions. It also does not represent safety improvements, sidewalks, bicycle lanes, pedestrian crossings, and non-capacity enhancements or policies. Impacts of such improvements will need to be assessed with tools other than the model, although model outputs such as volumes can be helpful to such assessments.

Finally, project development processes are dynamic. The SG PEL process *may* produce factors and alternatives that reveal additional, as-yet-unidentified model limitations. RSG will discuss any such occurrences with the Alaska Department of Transportation and Public Facilities (ADOT&PF) and HDR project managers (together, “the PMs”) should they arise, with the intent of working together to find helpful solutions.

2.0 Data Collection & Model Preparation

2.1 Traffic and Transit Data

The current base year of the AMATS model is 2013. RSG will update the base year to 2019 for this project; this will avoid the need to make any adjustments regarding COVID-19 impacts, assuming that there will be no lingering pandemic effects on travel in the Anchorage region.

Traffic count data is essential to the base year update and to the success of the ODS. RSG will contact all relevant jurisdictions, including ADOT&PF for available traffic counts in 2019 and prior years, corresponding geographic files with count station coordinates within the region, and monthly seasonal factors.

Counts need to be sufficient in geographic coverage to properly inform the ODS. The ODS work will serve as a key quality control on the count data. RSG will need counts on screenlines/cut lines, all external stations in the model, and counts in sufficient number on roadways of all functional classifications. After contacting the agencies described above, RSG may need to discuss the need for some additional counts with the PMs.

RSG will summarize and adjust the vehicle count data to represent 24-hour counts of average weekday flows during the September-October time period. Counts may be further summarized to peak and off-peak model time periods for vehicles. The summarized count data will be stored in the model network database by link direction.

Transit utilization data is also important for model base year calibration, so RSG will also obtain 2019 and prior year ridership data from the MOA Public Transportation Department to support the project.

RSG will need support and cooperation from the various public agencies in the region—especially ADOT&PF, MOA, and AMATS—to ensure an adequate amount of traffic count and transit data for model calibration.

2.2 Origin-Destination Study

The ODS depends on the traffic counts for success. After creating the ODS data and findings RSG will use them, along with updated socioeconomic data and 2019 traffic counts, to create a 2019 base year for the travel model, validate the model, and recalibrate the model as needed. The ODS may inform several aspects of the model, including but not limited to trip generation, trip distribution, and trip length distribution. See the *Seward Highway to Glenn Highway Connection Planning & Environmental Linkage Study Origin-Destination Survey Memo* for more detail on the ODS.

2.3 Socioeconomic Data

Updating the travel model to 2019 will require updating socio-economic input data (“SE data”) including households, population, and employment for 2019 to correspond with the updated traffic counts. It will also require reviewing and potentially adjusting existing future-year SE data for forecast years 2030 and 2040, and extrapolating 2050 SE data from those existing projections. RSG will store the 2019, 2030, 2040, and 2050 SE data as attributes in the model’s TAZ database and in separate files.

2.3.1 Household and Population Estimates

The current model base-year (2013) required updating 2010 U.S. Census data to take into account population and household growth that occurred between 2010 and 2013.[3] For SG PEL, RSG plans to apply much the same methodology to update the 2013 household and population data to 2019. This will ensure consistent allocations across the full modeled region.

To implement this method RSG will contact local jurisdictions to obtain building permit and assessor data for the period 2013-2019, plus the American Community Survey (ACS) five-year data product ending in 2019 and the Alaska Department of Labor (ADOL) 2019 population estimates. The permit data will be used to locate MOA new households while assessor data will be used to locate new MSB households. The ACS data will supply the distribution of households by size and by income category. Finally, the ADOL household and population estimates will be used to control the total households and population in each of MOA and MSB. In summary, this method ensures that total population and households matches the ADOL estimates while providing location information from the permit and assessor data. The use of permit and assessor data is widely used to help identify the location of new households, for example by Portland Metro and the Puget Sound Regional Council. In summary, the ADOL estimates set the total household and population counts with the permit and assessor data showing where change from 2013 has occurred.

2.3.2 Employment Estimates

For the current model, the development of 2013 employment data by TAZ used detailed information regarding the location, number of employees, and employment category of each employee in the MOA and CER. As before, the 2019 employment will be summarized by one or more North American Industrial Classification System (NAICS) categories, which is the standard employment classification system developed by and used by the U.S. Department of Labor. For detailed information on this process see the *Socio-economic Projections and Land Use Allocation Report*[4] created for the previous model update.

For the SG PEL update to a 2019 base year, RSG will again use building permit and assessor data to spatially allocate jobs to appropriate zones, plus ADOL estimates based on employment data supplemented with Bureau of Economic Analysis (BEA) data to understand the number of self-employed persons who do not appear in the ADOL estimates. Similar to the population data, in summary the ADOL estimates (with the addition of self-employment from BEA data) set the amount of 2019 employment while the permit and assessor data provide location information for where new job locations appeared in the region.

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[3] *Socioeconomic Projections and Land Use Allocation Report*. For Anchorage Metropolitan Area Transportation System by RSG Inc. with The McDowell Group. 2016. http://www.muni.org/Departments/OCPD/Planning/AMATS/Travel%20Demand%20Model/2016/2016_Socioeconomic_Projections.pdf

[4] *Ibid*.

2.3.3 SE Data Extrapolation to 2050

The SG PEL project intends to use the existing socioeconomic projections (SE projections) adopted by AMATS. At the same time, SG PEL desires a 2050 horizon year. Since the current AMATS SE projections only go out to 2040, SG PEL needs to produce SE projections for 2050.

RSG proposes to use a linear projection based on the new 2019 base year data and the extant 2030 and 2040 projections to create the necessary 2050 estimates. This “straight line” method is simple, defensible, and can be cross-checked with the 2045 projections from ADOL for quality control purposes.

3.0 Model Updates and Calibration

For the AMATS model to provide meaningful findings for SG PEL, RSG will make other updates to the model addition to the new 2019 base year. The network links will be updated to reflect 2019 roadway conditions regionwide plus intersection approach information within the project area. Network nodes within the project area will be updated to reflect 2019 intersection controls, such as all-way stop, signalized, roundabout, etc. Once model inputs have been updated, the model will be calibrated to the base year of 2019.

3.1 Update Model Networks

RSG will assess the need to use the AMATS model network manager tool for this effort once the alternatives’ designs become clear. The network manager requires a master network that contains all projects associated with every alternative plus all Existing+Committed improvements on other parts of the transport system. The network manager organizes all projects related to each alternative into text files containing a list all projects, links and nodes that correspond to each alternative. The network manager would be integrated with the AMATS model and accessed through the model software. However, certain network configurations are difficult for the network manager to automate, so RSG may choose to manually code the model networks if manual editing and tracking would be more cost-effective. This decision will be made after the project defines its preliminary alternatives.

3.1.1 Base Year Network Updates

RSG will use the AMATS 2030 Existing Plus Committed network (2030 E+C), aerial imagery, OpenStreetMap (OSM) data, and consultation with local agencies, if needed, to update the model base network from 2013 to year 2019. The goal is to have accurate and adequate representation of the study area network. As Figure 4 illustrates, some existing roadway facilities within downtown Anchorage and the surrounding neighborhoods are not present in the 2013 model network; based on a preliminary understanding of likely Evaluation Criteria from the PMs and discussion with ADOT&PF staff on August 19, 2021, RSG does not recommend adding the currently omitted facilities to the 2019 network. This recommendation is based on the understanding that this is a Planning and Environmental Linkages Study and that detailed, street- and intersection-level findings would be the subject of later design studies in which microsimulation techniques would be applied.

RSG will update selected network nodes within the project area, shown in Figure 3, with explicitly coded intersection attributes to enable the project alternatives to test aggregate impacts of changes in signal type and addition/removal of turn lanes.

Figure 3: Project Area (Red) and Existing Model Network (Blue)

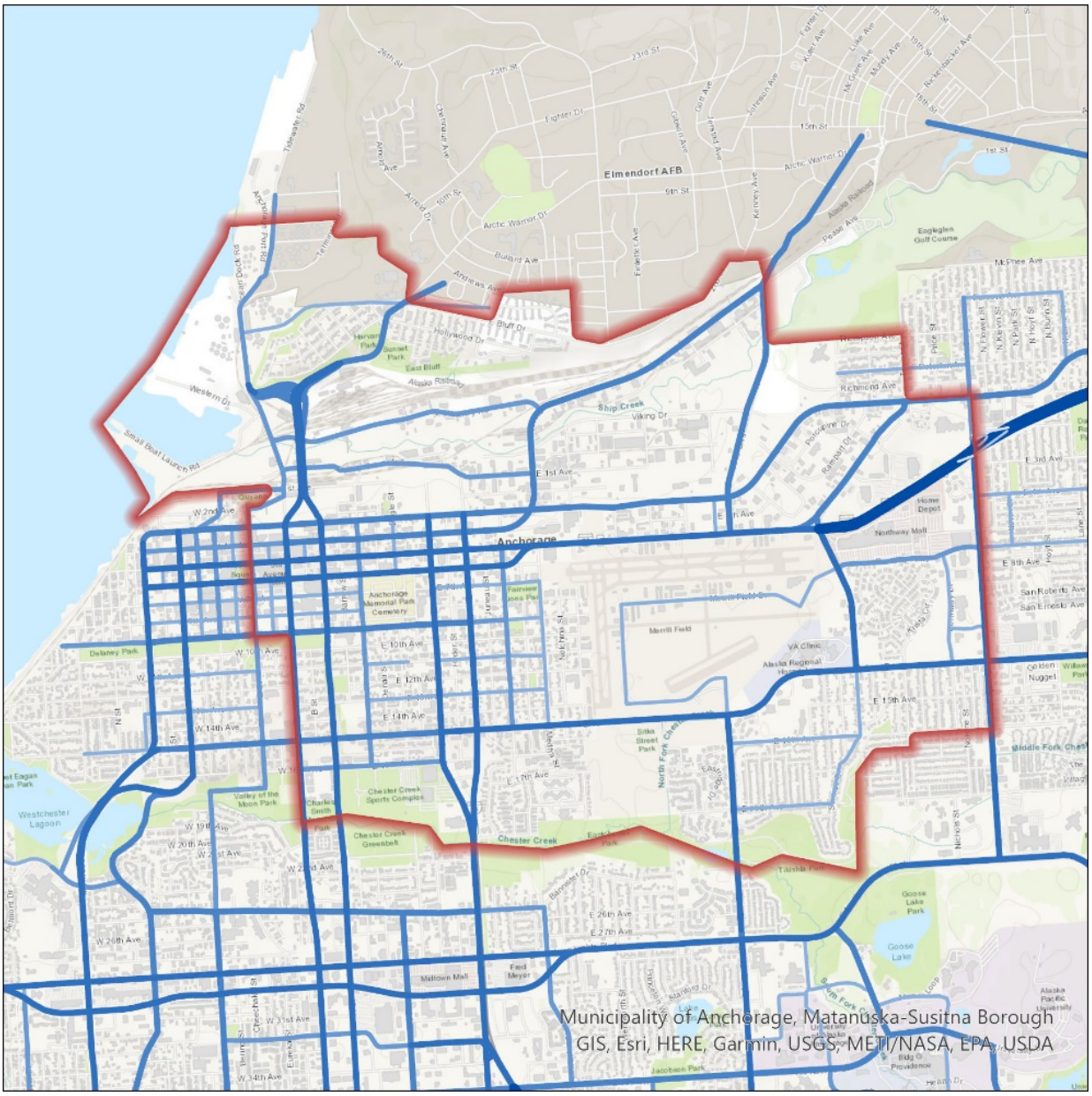
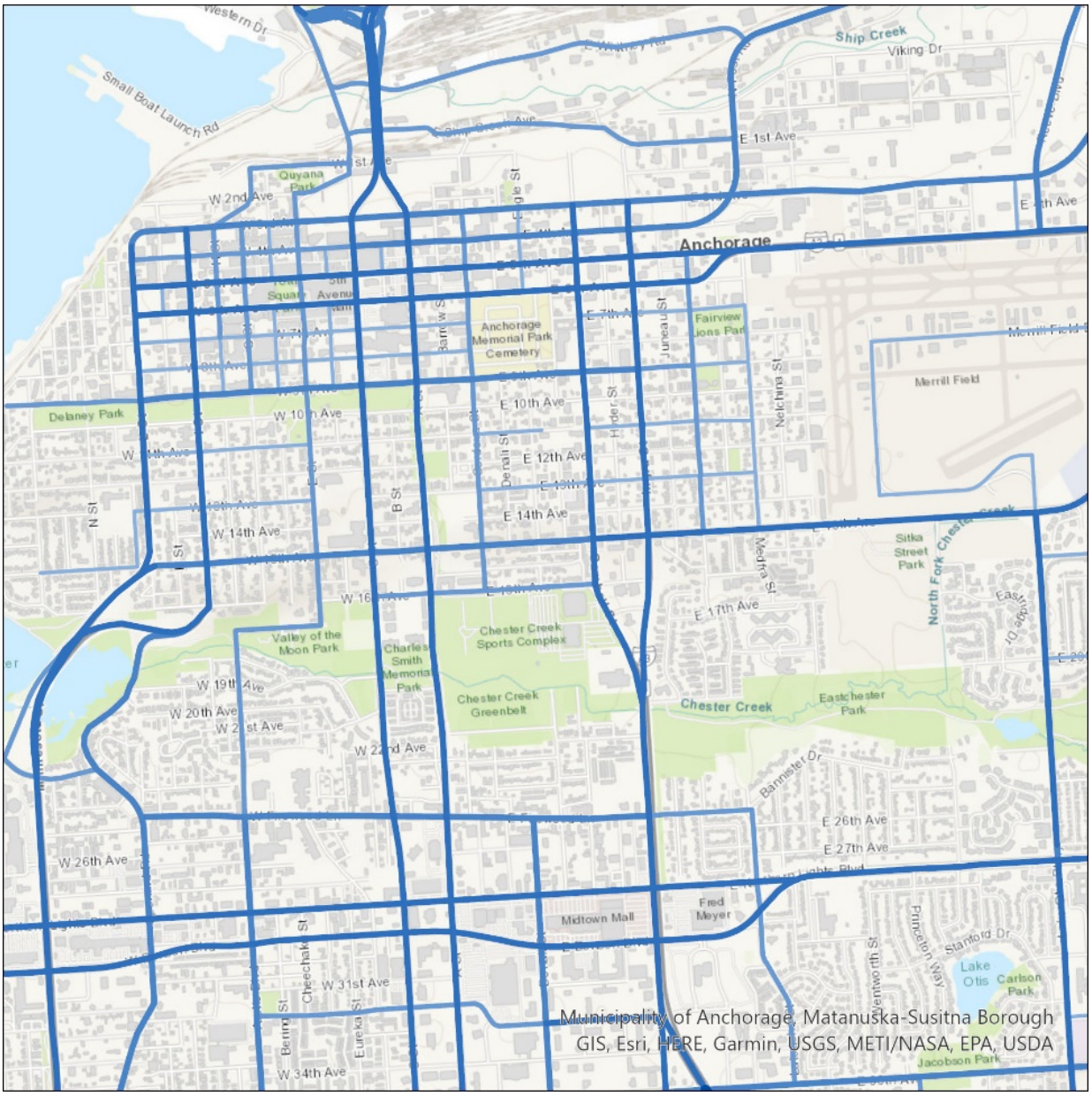


Figure 4: Detail Map Showing Downtown and Surroundings



3.1.2 Development of Future Networks

RSG will coordinate with the PMs to verify the timing of investments in the E+C networks, then code the 2030, 2040, and 2050 No-build alternatives. Other members of the project team will need to specify and communicate to RSG the configuration and timing of the investments in the Build alternatives.

Information necessary for Build network coding typically includes the alignment and number of lanes of any new or modified roadways; the location of intersection controls, the type of control (signal, roundabout, or stop sign), and the number of turn lanes and through lanes by direction. The model will continue to impute g\c ratio and cycle length. If needed by the alternatives

development process, the model can also consider the location and price for any roadway tolling and vehicle prohibitions. Transit route changes can also be tested.

3.1.3 Network Development Coordination among the Project Team

In addition to forming a preliminary understanding of potential Evaluation Criteria, RSG modeling staff will need to verify the future investments that belong in the 2030 No-build prior to beginning network coding and will need clear specifications of the changes made to the transport system in each future build alternative as per the list of attributes above. The SG PEL process will create various committees to inform project decisions. RSG will work with the PMs to devise a responsive and effective means of consulting with the appropriate reviewers on the project team to ensure that they can swiftly review future network assumptions, vet the draft networks, and supply RSG modeling staff with clear information for preparing the future build alternative networks. Upon receiving future build specifications, RSG will code the future year build alternative networks including any new network links, nodes, and project attributes. The network files or visuals made from them will be made available to the reviewers.

3.2 Model Calibration

RSG will calibrate the model to the base year (2019) using the newly acquired count data and the new ODS. Calibration will include running the future no-build in at least the 2050 horizon year to test model sensitivity and reasonableness. Calibration may require further adjustments to the model network links and nodes and may require slight adjustments to other model elements and parameters. All such modifications will be documented in the Travel Demand Modeling Report, as will calibration results in the form of modeled volume variances from observed volumes in the context of nationally recognized validation objectives.

RSG will keep the PMs apprised of the status of the travel model preparation. RSG also customarily briefs stakeholders on the model's capabilities, validity, and limitations. At the PM's discretion RSG staff can be present in meetings to do so or prepare the PMs to convey the information. RSG will coordinate with the PMs on whether and how to conduct this outreach, and about any other findings that model preparation and calibration produce that are relevant to the project and its stakeholders.

4.0 Forecasting Project Alternatives Impacts

4.1 Traffic Forecasts Support Alternatives Analysis

As mentioned in Section 1.0 *Introduction and Model Overview*, the updated AMATS Travel Demand Model will be used to produce traffic forecasts in support of the overall SG PEL effort. Taken together, the base year model outputs and the forecasts of transport system performance in the future No-build and future Build alternatives will assist the project team in refining the project's Purpose and Need, devising project alternatives, and understanding the positive and negative impacts of those alternatives.

RSG will produce forecast model outputs for the 2019 Base Year plus four future scenarios: No-build and three Build alternatives. Table 2 shows the different sets of outputs that will result from this work.

Table 2: SG PEL Model Output Data Sets by Run

Scenario/Year	2019	2030	2040	2050
Base Year	X	n/a	n/a	n/a
No-build	n/a	X	X	X
Alternative 1	n/a	X	X	X
Alternative 2	n/a	X	X	X
Alternative 3	n/a	X	X	X

n/a = not applicable

The future No-build findings provide an important point of comparison for alternatives evaluation; for this reason, the No-build's precise specification is vital and should be discussed and clearly agreed to by the project team and stakeholders. It is useful to reiterate that the Existing + Committed investments in the current regional and state transportation plans from AMATS and ADOT&PF will provide the base from which additional projects will be added/subtracted in formulating the No-build and other alternatives. As mentioned in Section 3.1 *Update Model Networks*, RSG will need designated members of the project team to provide in a timely way information clearly describing each alternative, including sufficient detail to be modeled.

RSG will run the model for each alternative and summarize the model results to compare each alternative side by side.

4.2 Forecasting and Data Assumptions

While the AMATS model is a powerful tool informed by copious real-world data observations, it is a *representation* of reality based on several assumptions. Likewise, modeling future transport system scenarios requires additional assumptions. The current *Travel Demand Model Development Report*[5] describes the structural and human behavior assumptions made in the basic model. The final SG PEL *Travel Demand Modeling Report* will describe assumptions critical to a solid understanding of the forecast results and their relevance to the project alternatives analysis.

A few important assumptions bear remarking in this memo:

- Future population and employment numbers and locations will mostly be derived from the currently adopted socioeconomic projections in the AMATS Metropolitan Transportation Plan 2040 and model, with some adjustments given observed development between 2013 and 2019. The project team does not plan to test different future land use scenarios.

[5] *Op. Cit.*

- The project team assumes that the location-based data, and traffic counts used to expand the location-based observations to represent all daily travel within the region, used to develop the new ODS are a reasonably accurate reflection of 2019 travel behavior and a reasonable basis for analyzing future travel.
- Future traveler behavior for both passenger vehicles and freight vehicles will largely be motivated by existing behavioral patterns. The model forecasts cannot account for "paradigm shifts," for example wholesale future changes in where people work or where residents and businesses obtain goods and services.

4.3 Interpreting the Implications of the Traffic Forecasts

Given the geographic and population size of the Anchorage region, the traffic forecasts will contain an immense amount of data across the five scenarios described above. Deriving meaning from this wealth of information requires good judgment and care. To ensure that the project team and stakeholders realize the greatest benefit from the traffic forecasts, RSG will supply in the Draft and Final *Travel Demand Modeling Report* a narrative section that interprets the forecasts and explains the meaning and implications of the forecasts regarding the project alternatives vis a vis the Alternatives Selection Criteria. This narrative will provide a starting point for discussing the findings with stakeholders and completing other project documentation. RSG will discuss with the PMs what assistance may be needed from RSG staff in stakeholder communications outside creating the Final Travel Demand Modeling Report.

The next section describes in more detail the specific forecast outputs that will be available for use on the project.

5.0 Model Output and Formats

5.1 Model Metrics in the Traffic Forecasts

The model creates standard reports documenting results for each model run. The term "run" refers to one scenario forecast for one desired forecast year. As shown in Table 2, the SG PEL will produce more than a dozen individual model runs multiplying scenarios (five) by desired years (four), allowing for the fact that not all scenarios will be run in every year.

Briefly, the model summaries provide the following output metrics for each forecasted scenario:

- Average travel time and cost for all trips, home-based-work trips, and trips generated by low-income households.
- Vehicle assignment regionwide summaries of Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), Vehicle Hours of Delay (VHD), and Centerline Miles by Facility Type.
- Trips by mode and mode share for all modes.
- Percentage of all households, low-income households, and jobs with transit accessibility by time-to-access categories.

In discussion with ADOT&PF staff on August 21, 2021, the consultant team identified several questions or data needs the client hopes the SG PEL study will address, including:

- Reporting cutline volumes of traffic using the existing downtown couplet (or its future replacement in the build alternatives) versus other paths through and around downtown, which may require a second ring of cutlines to help identify if diversion is occurring.
- Summaries of benefits (e.g., delay reductions) regionwide from the various build scenarios that would assist with a comprehensive understanding of project alternatives' benefits and impacts.
- Data extracts from the travel demand model that would assist with subsequent studies' further analysis of traffic flows, for example as link volumes on the paths commuters use into and out of town along the "diagonal" routes to residential areas southeast of the downtown area.

5.2 Other Traffic Forecast Outputs useful to Alternatives Analysis

The model also stores complete assignment results on all links in the network for each run. This data will be made available in both tabular and cartographic form. Link volumes on any facilities created or modified by proposed alternatives will be useful to other members of the project team, for example. RSG will deliver tabular and geospatial (shapefile) data files for each model run. These data enable facility volume visualizations such as the example in Figure 5.

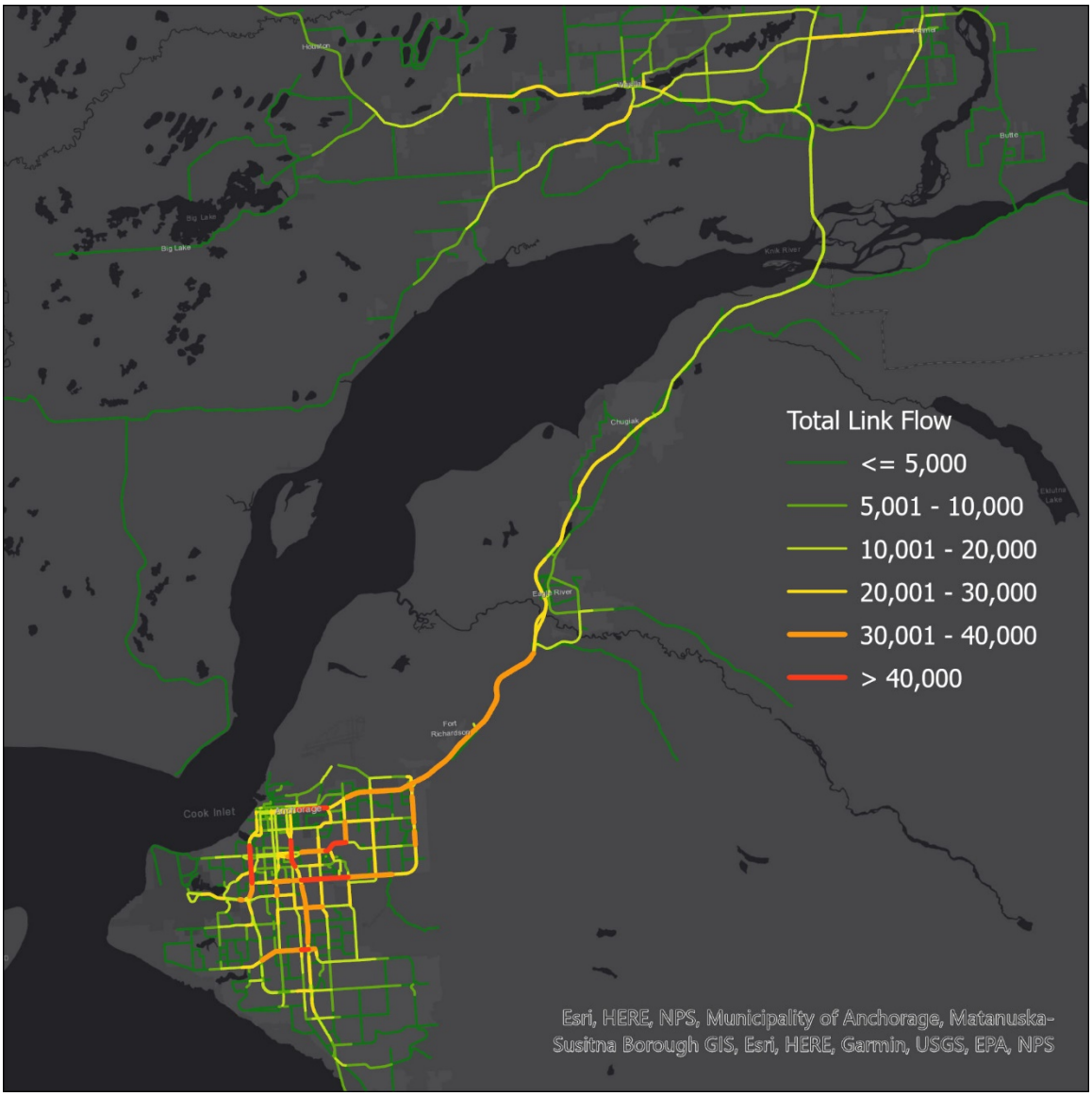
RSG will discuss with the PMs whether other findings from the model would be useful.

5.3 Model Outputs do not cover some potential Evaluation Criteria

As mentioned in the Model Limitations section above, the model does not produce outputs on some topics that may be of interest to SG PEL stakeholders. It does not deal with safety improvements and thus produces no findings on crashes; nor does it by itself estimate mobile source air pollutant emissions. If the stakeholders want to evaluate safety and air quality impacts for the alternatives, then other means will need to be found, and additional discussion among project team members may be necessary.

Also, the model does not currently explicitly estimate what portion of workers will telework on a given day. However, if stakeholders wish to know the potential effects of increasing telework, the SG PEL study could choose to take a scenario planning approach during the alternatives development step of the process. If stakeholders identify an increased-telecommute scenario they want to test (in terms of the worker proportion that would work remotely), RSG could adjust the model's trip generation accordingly and use the model to estimate the resulting impacts in the project area.

Figure 5: Example Thematic Map of Forecast Traffic Volumes



6.0 Summary of Model Deliverables and Coordination Touchpoints

6.1 Planned model-related deliverables

The key deliverables from RSG from the travel forecasting work include:

- Model networks for the 2019 base year plus 2030, 2040, and 2050 networks for the future No-build and three build alternatives.

- Model summary reports and assigned network volume shapefiles for the 2019 base year traffic forecast ("run") plus the same materials for the 2030, 2040, and 2050 runs for the future No-build and three Build alternatives.
- Draft and Final *Travel Demand Model Report* which will include a narrative interpretation of the traffic forecast findings plus tabulations of new traffic counts, new SE data, validation findings, and a description of any adjustments made during model calibration.

6.2 Project team touchpoints on key model topics

Travel model validity and the project impacts of traffic forecasts produced by the model are naturally of great interest to the project team and the project stakeholders. RSG will coordinate carefully with the PMs and the rest of the project team to ensure clarity, efficiency, and effective information exchange. RSG assumes that the team will have regular meetings, and RSG will stay in touch with the PMs via email and other channels as needed between such meetings. In addition, RSG will need explicit confirmation or data at key points in the model preparation and deployment process. Major touchpoints on key model topics include:

- Written permission to RSG to commence the modeling tasks
- Preliminary understanding of potential Evaluation Criteria sufficient to inform network coding details
- Project team approval of the socioeconomic data to be used as model inputs
- RSG staff will work directly with ADOT&PF staff while processing the traffic count data and applying it to model calibration and the ODS
- Project team approval of the 2019 base year network and existing-plus-committed projects to be included in all future build networks
- Project team familiarity with the model calibration results and consensus on forecast data and formats that the team expects
- Clear build alternative transport system configuration specifications from the project team to RSG
- Project team review of forecast findings and draft *Travel Demand Model Report* before finalizing the final report
- Communicating forecast findings and final *Travel Demand Model Report* to stakeholders