COMPASS
COMMUNITY PLANNING ASSOCIATION
of Southwest Idaho

Working together to plan for the future

Regional Travel Demand Forecast Model Calibration and Validation Report for Ada and Canyon County, Idaho

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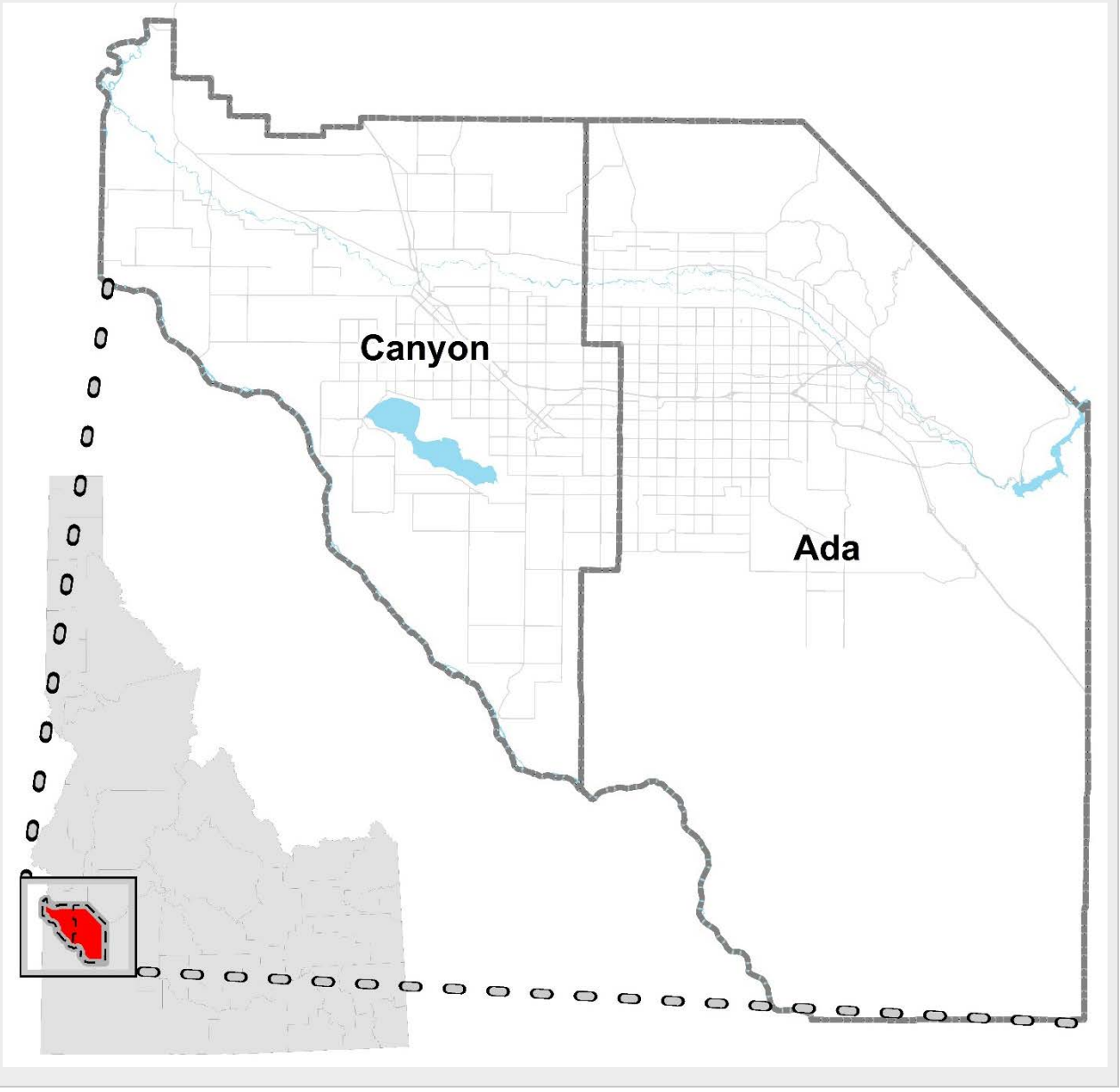
Overview

The Community Planning Association of Southwest Idaho (COMPASS)[1] serves as the metropolitan planning organization, or MPO, for Ada and Canyon Counties. Over 37% of Idaho's population and jobs reside in these two counties.

Table 1: 2010 Population and Employment Data

	Ada County	Canyon County	Idaho
2010 census population[2]	392,365	188,923	1,567,582
2010 labor force statistics[3]	180,662	75,188	692,826



[1] http://www.compassidaho.org/
[2] https://www.census.gov/prod/cen2010/cph-2-14.pdf
[3] http://lmi.idaho.gov/region

COMPASS is responsible for the maintenance and application of the regional travel demand forecast model covering Ada and Canyon Counties. The model was calibrated and validated to 2012 conditions, as documented by this report. Below are a few highlights about the area and the regional model:

- Two-county area with a 2010 population of 581,288 (2010 Census)
- 2,062 Transportation Analysis Zones (TAZs) ranging in size from a few acres to several thousand acres.
    - Smallest TAZ is 1.2 acres in downtown Boise
    - Largest TAZ is 125,490 acres in south Ada County and is home to sage brush and wildlife
- 1,870 centerline miles are represented in the model network of which 10% are one-way roads and 90% are two-way roads
    - 161 miles of interstate
    - 335 miles of state and locally owned principal arterials and highways
    - 753 miles of minor arterials including higher speed rural roadways
    - 622 miles of collectors and locals. Some local streets are included for circulation purposes, but make up a very small portion of the network.
- Four-step trip-based travel demand model
- Three time periods – average weekday, 4pm to 5pm, and 5pm to 6pm. Calibration of a fourth time period, 7am to 8am, is underway.
- Guidance and oversight provided by the Transportation Model Advisory Committee (TMAC)

Household Travel Survey Data

Summary

In fall 2011 and spring 2012, a regional household travel survey was conducted. Below are key highlights from this effort for all trips and all modes:

- 3,350 households and 8,773 persons participated in the regional household survey, resulting in 32,114 total person trips
- 10.55 average number of person trips per household per weekday
- 360 households participated in the passive GPS survey
- 10% Under-reporting rate of discretionary trips
- 2.27 average number of vehicles available per household
- 3.62 average household size
- Over 15 minutes average travel time
    - 20 minute average travel time for work and work-related trips
    - 13 minute average travel time for shopping trips

A full copy of the *2012 COMPASS Regional Household Travel Survey* (Report No. 05-2013) is available on the COMPASS website[4].

[4] http://www.compassidaho.org/reports.htm

Demographics

This section of the report addresses socioeconomic data and the TAZs used for the trip generation step of the travel demand model.

In 2008, COMPASS staff delineated the previous set of TAZs, increasing the number of zones from 534 to 2,062. This refinement better serves COMPASS member agencies, allows for a more detailed model network, more effectively addresses anticipated "green field" development, improves the mode choice component and transit assignment steps of the model, and will provide a consistent set of geographies useable for data comparison for several years to come.

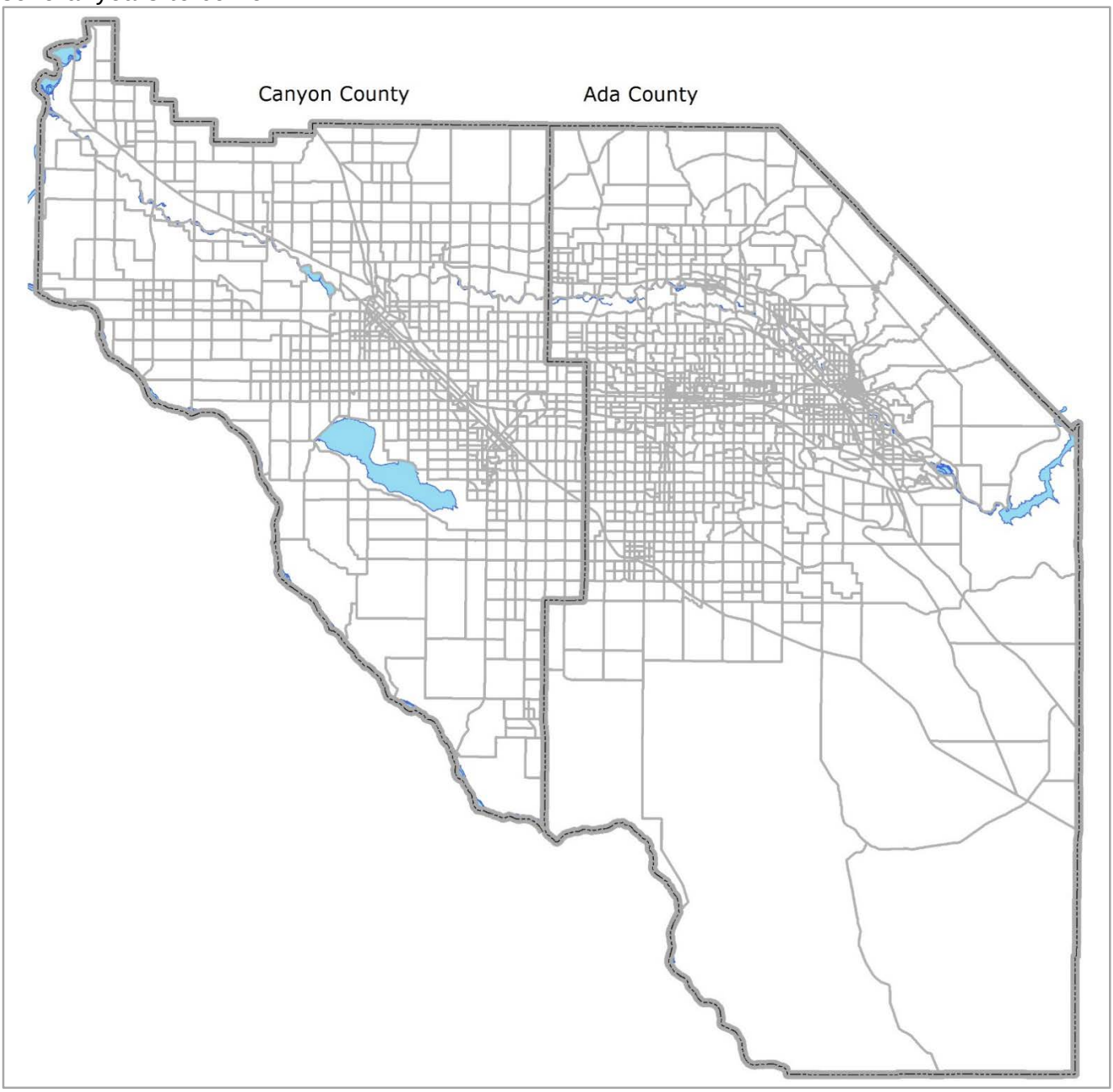


Figure 1: Transportation Analysis Zones (TAZs) for Ada and Canyon Counties[5]

[5] Ada County TAZs and Canyon County TAZs

Table 2 summarizes the demographics by county by category used in the regional travel demand model.

Table 2: 2012 Population, Households, Vehicles, and Employment by County

	Ada County	Canyon County	Regional Total
Population[a]	391,636	188,514	580,150
Households	150,821	64,334	215,155
Vehicles	299,143	127,456	426,599
Employment			
Retail	38,828	12,289	51,117
Office	136,081	29,501	165,582
Industrial	34,668	14,371	49,039
Government	15,290	3,252	18,542
Agriculture	1,161	2,951	4,112
Education	11,468	5,324	16,792
Total Jobs	237,496	67,688	305,184

a. Represents non-group quarters population

COMPASS staff estimate current year population and households annually (except for decennial census years). Staff have been estimating current year population and households for the past several decades. Oversight of this process is provided by the Demographic Advisory Committee (recently renamed the Demographic Advisory Workgroup. The resulting population and household estimates are provided to the COMPASS Board of Directors for acceptance. COMPASS has been collecting and reporting building permit activity for all cities and both counties in the region since 1996. The residential unit data are used to develop both household and population estimates. Units are converted to households using the 2010 census block-level data on household occupancy and persons per household. These rates are allocated to TAZs and used to convert new residential units into households and applied to households to estimate population. Vehicles per household rates are from the regional household travel survey data.

Employment data are obtained from the Idaho Department of Labor and InfoUSA. Two sources are necessary given the employment data from the Idaho Department of Labor includes only unemployment insurance-covered employment. COMPASS staff goes through a data "mashing" process to clean up the addresses for geo-coding, merge non-duplicate records, and conduct a final review prior to assigning the employment records to TAZs. Staff also compare current year to previous year's employment data at the TAZ-level as another method to review the data.

The trip generation step of the regional model uses two school-related input files that contain enrollment by school by category by TAZ for public and private schools. Enrollment data[6] by grade by building are available from the Idaho State Department of Education which allow the development of the public school enrollment file. Charter and alternative school enrollment data are also available from the Idaho State Department of Education website. Developing the private school enrollment file requires looking on individual private

[6] http://www.sde.idaho.gov/finance/ and http://enrollmentservices.boisestate.edu/enrollment-data/

school websites for enrollment data and/or directly contacting the schools. To help with the development and maintenance of this data set, COMPASS maintains a GIS file with the location of all schools in Ada and Canyon Counties. Therefore, attributing each school to its proper TAZ is efficient. Table 3 summarizes total enrollment by school level.

Table 3: Summary of Student Enrollment by School Level, 2011-2012 Fall Enrollment

	Public Schools	Private Schools
Elementary	47,217	9,628
Middle/Junior High School	21,931	3,377
Senior High School	24,339	4,818
University/College	24,174	3,587
Total	117,661	21,482

Trip Generation

This section of the report addresses the trip generation elements of the regional model, such as trip production rates, trip attraction rates, and the trip generation results.

Trip Production Rates

The regional model uses a two-dimensional cross-classification model with household size and number of vehicles as variables for each county. Tables 4 and 5 show the final cross-classification rates for Ada and Canyon Counties by trip purpose by category of household size and vehicle availability. The trip rates from the 2009 National Household Travel Survey (NHTS 2009) are provided for comparison purposes only.

These rates were developed using data collected as part of the regional household travel survey. Even though travel data were collected from more than 3,100 households, not all classifications (160 for each county) had data available.

Table 4: Ada County Cross-Classification Rates (All Person Trips and All Trip Purposes)

Household Size	Vehicles	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Total	*NHTS 2009*
1	0	0.42	0.65	0.31	0.13	0.90	1.03	3.44	*2.3*
	1	0.56	0.82	0.50	0.44	1.09	1.38	4.79	*3.9*
	2	0.82	1.02	0.45	0.82	1.12	1.54	5.77	*4.7*
	3	1.05	1.02	0.47	0.97	1.29	1.54	6.34	*5.0*
	4+	1.18	1.11	0.67	1.18	1.54	1.56	7.24	
2	0	0.70	0.95	0.62	0.69	1.49	1.64	6.09	*6.2*
	1	0.90	1.06	0.70	0.95	1.88	1.91	7.40	*7.0*
	2	1.33	1.23	0.78	1.45	1.89	2.07	8.75	*7.9*
	3	1.38	1.45	0.89	1.57	1.95	2.10	9.34	*8.1*
	4+	1.60	1.65	0.91	1.60	1.95	2.24	9.95	
3	0	1.46	1.06	0.78	1.38	1.51	2.00	8.19	*8.6*
	1	1.80	1.20	1.01	1.69	1.71	2.34	9.75	*11.2*
	2	2.44	1.29	1.20	2.79	1.88	2.38	11.98	*12.4*
	3	2.96	1.50	1.30	2.79	1.97	3.20	13.72	*14.4*
	4+	2.96	1.77	1.30	2.84	1.97	3.20	14.04	
4+	0	1.74	1.17	1.32	3.58	1.94	2.61	12.36	*12.2*
	1	2.04	1.38	1.80	4.89	1.99	2.96	15.06	*14.6*
	2	2.58	1.70	2.00	5.82	2.32	4.37	18.79	*18.5*
	3	3.48	1.70	2.53	5.82	3.04	4.62	21.19	*19.7*
	4+	3.83	1.85	2.82	6.02	3.09	5.35	22.96	

Table 5: Canyon County Cross-Classification Rates (All Person Trips and All Trip Purposes)

Household Size	Vehicles	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Total	*NHTS 2009*
1	0	0.33	0.81	0.19	0.11	0.51	0.51	2.46	*2.3*
	1	0.38	0.85	0.42	0.14	0.86	1.33	3.98	*3.9*
	2	0.63	0.91	0.53	0.24	0.94	1.45	4.70	*4.7*
	3	0.95	1.02	0.50	0.24	1.04	1.68	5.43	*5.0*
	4+	1.09	1.07	0.70	0.24	1.09	1.71	5.90	
2	0	0.68	0.95	0.37	0.14	0.94	1.38	4.46	*6.2*
	1	1.00	1.22	0.42	0.17	1.28	1.73	5.82	*7.0*
	2	1.24	1.44	0.78	0.24	1.63	1.97	7.30	*7.9*
	3	1.51	1.65	0.78	0.24	1.63	2.32	8.13	*8.1*
	4+	1.51	1.67	0.80	0.24	1.68	2.47	8.37	
3	0	1.00	1.04	0.64	1.01	0.99	1.46	6.14	*8.6*
	1	1.20	1.33	1.00	1.35	1.56	2.21	8.65	*11.2*
	2	2.00	1.43	1.00	1.68	1.66	2.35	10.12	*12.4*
	3	2.69	1.76	1.11	1.77	1.73	2.54	11.60	*14.4*
	4+	2.69	1.80	1.19	1.89	1.85	2.72	12.14	
4+	0	1.00	1.17	1.08	3.02	1.70	2.30	10.27	*12.2*
	1	1.87	1.57	1.17	3.29	1.99	2.49	12.38	*14.6*
	2	2.64	1.79	1.65	4.63	1.99	3.52	16.22	*18.5*
	3	3.28	1.90	1.75	4.71	2.41	3.61	17.66	*19.7*
	4+	3.43	2.49	1.93	4.71	2.51	3.71	18.78	

Additional details can be found in Appendix A, including tables showing raw person-trip data collected, data expansion method and results, and the development of trip rates look up tables used to establish the final cross-classification rates.

Trip Attraction Rates

Table 6 shows the trip attraction rates used in the regional model. Attraction rates are established for three areas - downtown Boise as the central business district, the rest of Ada County, and Canyon County.

Table 6: Trip Attraction Rates by Area by Trip Purpose

	Total Employment	Retail	Office	Industrial	Government	Agriculture	Household
Central Business District TAZs (downtown Boise)[a]							
Home Base Work	1.2	*Not applicable*					
Home Base Shop	*Not applicable*	1.1	*Not applicable*				
Home Base Social	*Not applicable*		0.9	*Not applicable*	0.3	*Not applicable*	0.3
Home Base Other	*Not applicable*	0.7	0.8	1.0	1.0	1.0	0.5
Non-Home Base	*Not applicable*	1.4	1.2	1.0	1.0	1.0	0.5
Ada County TAZs (outside of downtown Boise)[b]							
Home Base Work	1.2	*Not applicable*					
Home Base Shop	*Not applicable*	5.4	*Not applicable*				
Home Base Social	*Not applicable*		0.9		0.5		0.3
Home Base Other	*Not applicable*	3.0	0.7	0.3	0.3	0.3	0.5
Non-Home Base	*Not applicable*	4.7	1.2	0.7	0.7	0.7	0.4
Canyon County (TAZs)[c]							
Home Base Work	1.2	*Not applicable*					
Home Base Shop	*Not applicable*	6.5	*Not applicable*				
Home Base Social	*Not applicable*		1.5	*Not applicable*	0.5	*Not applicable*	0.3
Home Base Other	*Not applicable*	2.0	1.1	0.3	0.3	0.3	0.5
Non-Home Base	*Not applicable*	4.7	1.2	0.7	0.7	0.7	0.4

Note: Trip attraction rates provided in NCHRP 716 Table 4.4[7] were used as a guide to establishing the rates above. Rates for the central business district were derived for the regional model in 2002 using NCHRP 365[8].

	Elementary	Middle/Junior High	Senior High	University (Public)	University (Private College)
Home Base School[d]	2.41	3.03	3.20	3.4 (Ada) 2.9 (Canyon)	2.3

a. Downtown Boise includes TAZs 1 – 75; however, TAZ 51 is on the fringe of downtown and includes two large grocery stores, and thus uses the trip attraction rates for "Ada County."
b. Ada County includes TAZs 51, 76 – 1311.
c. Canyon County includes TAZs 2001 – 2754 (TAZs 1312 – 2000 are "in reserve" and not currently used).
d. See Table 7 for how home base school person trip rates were estimated.

[7] NCHRP Report 716 Travel Demand Forecasting: Parameters and Techniques
[8] NCHRP Report 365 Travel Estimation Techniques for Urban Planning

As described above on pages 11 and 12 the regional model uses two school-related input files that contain enrollment by school by category by TAZ for public and private schools to generate home base school (HBSc) trips. Table 7 shows the data used to develop HBSc person trip attraction rates for the regional model. The HBSc person trip attraction rates were estimated by multiplying the average vehicle trip end by the average HBSc auto occupancy of 1.87. The auto occupancy rate was derived from the regional household travel survey data.

Table 7: School Trip Attraction Rates and Estimation

	Average Vehicle Trip End: Student[9]	Range of Rates[7]	Estimated Person Trip Attraction Rate per Student
Elementary School: Students: Weekday	1.29	0.45 to 2.45	2.41
Middle/Jr High School: Students: Weekday	1.62	0.72 to 2.81	3.03
High School: Students: Weekday	1.71	0.71 to 3.96	3.20
Junior/Community College: Students: Weekday	1.23	0.93 to 2.16	2.30
University/College: Students: Weekday[a]	1.71	1.25 to 3.31	3.20

a. See Table 6 for final trip attraction rate used.

Table 8 provides person trip fractions for trips with Ada or Canyon County as an origin, but destined outside the "modeling area" and the reverse – those trips with an origin outside the modeling area but destined to Ada or Canyon County.

Table 8: Internal-External, External-Internal Trip Fractions by County by Trip Purpose

	Internal-External (I-X)		External-Internal (X-I)	
	Ada County	*Canyon County*	*Ada County*	*Canyon County*
Home Base Work[a]	0.0150	0.0310	0.0360	0.0544
Home Base Shop	0.0010	0.0095	0.0280	0.0260
Home Base Social	0.0095	0.0099	0.0210	0.0180
Home Base School	0.0030	0.0030	0.0050	0.0010
Home Base Other	0.0173	0.0169	0.0390	0.0300
Non-Home Base	0.0260	0.0330	0.0960	0.0860

a. Home base work I-X and X-I fractions are developed using U.S. Census Bureau, American Community Survey 2006-2010 Five-year estimates. Special Tabulation: Census Transportation Planning.

[9] Trip Generation Manual, 9th ed – Institute of Transportation Engineers

Trip Generation Results

Table 9 shows additional comparisons of person trips by purpose by county between the expanded regional household travel survey data and model estimates to ensure the county-level results were reasonable. These are for information purposes only.

Table 9: Comparison of Average Weekday Person Trips by Purpose by County between the Expanded Regional Household Travel Data and the Model Estimates

	Targets (expanded household travel data)		Model Estimates[a] (unbalanced productions)		Difference	
	Ada	*Canyon*	*Ada*	*Canyon*	*Ada*	*Canyon*
Home Base Work	243,308	94,518	242,144	92,857	(1,164)	(1,661)
Home Base Shop	200,877	92,990	198,350	93,066	(2,527)	76
Home Base Social	160,189	63,039	161,730	64,016	1,541	977
Home Base School	287,653	98,597	287,714	97,631	61	(966)
Home Base Other	303,205	105,933	300,572	106,785	(2,633)	852
Non-Home Base	370,535	146,896	367,247	147,750	(3,288)	854
Total Internal	*1,565,769*	*601,973*	*1,557,757*	*602,105*	*(8,012)*	*132*
Actual Households, 2012	150,170	62,309	Used to calculate the average person trips per household			
Person Trips per Household by County	**10.43**	**9.66**	**10.37**	**9.66**		
Person Trips per Household, Regional	**10.20**		**10.17**			

a. "Model Estimates" reported above are a summation of person trips by purpose by county by TAZ. Therefore, the total two-county trips will be slightly different in this table compared to Table 11 due to rounding.

Table 10 shows unbalanced productions and attraction person trips by purpose. The "within 5%" target was achieved overall and for all purposes except home base shop (HBS) with a difference of 6%.

Table 10: Unbalanced Person Trip Productions and Attractions by Trip Purpose – All Modes

	Productions	Attractions	Difference	Percent Difference
Home Base Work	334,991	332,235	2,756	1%
Home Base Shop	291,448	272,938	18,510	6%
Home Base Social	225,721	234,117	(8,396)	-4%
Home Base School	385,312	389,116	(3,804)	-1%
Home Base Other	407,362	385,719	21,643	5%
Non-Home Base	515,001	517,298	(2,297)	0%
Internal-External (I-X)	31,047	37,913		
External-Internal (X–I)	38,570	96,011		
Internal Only	*2,159,835*	*2,131,423*	28,412	1%
Total	*2,229,452*	*2,265,347*	(35,895)	-2%

Table 11 provides the final balanced person trip productions and attractions for the base year model.

Table 11: Balanced Person Trip Productions and Attractions by Trip Purpose – All Modes

	Productions	Attractions	Model	Targets
Home Base Work	334,991	334,991	15.5%	15.6%
Home Base Shop	291,448	291,448	13.5%	13.6%
Home Base Social	225,721	225,721	10.4%	10.3%
Home Base School	389,116	389,116	18.0%	17.8%
Home Base Other	407,362	407,362	18.8%	18.9%
Non-Home Base	517,298	517,298	23.9%	23.9%
Internal-External (I-X)	31,047	31,047		
External-Internal (X–I)	96,011	96,011		
Internal Only (I-I)	*2,165,936*	*2,165,936*	**10.1** person trips/household	
Total	*2,292,994*	*2,292,994*	**10.7** person trips/household	

Note: Home base school and non-home base balance to attractions.
County-level under-reporting rate is accounted for in trip generation.
The regional model does not use special generators.

The two-county person trip rate is 3.9 (2,292,994 total person trips divided by 580,150 2012 population) compares well to the national rate of 4.09 as reported in the 2009 National Household Travel Survey (NHTS)[10] report.

Based on the comparison of model results to the regional household travel survey data and information provided from the 2009 NHTS the conclusion is that the trip generation inputs are reasonable and the results are acceptable.

[10] http://nhts.ornl.gov/2009/pub/stt.pdf

Trip Distribution

This section of the report addresses network characteristics, turn penalties, terminal times, external trips, friction factors and trip distribution results.

In the trip distribution step, the trips calculated in the trip generation step for each TAZ are distributed among all other TAZs using a gravity model. A gravity trip distribution model, which derives from the Newton's law of gravity principles, assumes the attraction (gravity) of trips between two TAZs is proportional to the trip production at the origin TAZ and the trip attraction at the destination TAZ (the masses of two objects) and inversely proportional to travel time between the two TAZs (distance between two objects).

Network Characteristics

Figure 2 shows the regional model network, which includes all roads functionally classified as a collector or higher. Some local roadways are included for connectivity purposes, but also are necessary due to the number and size of region's TAZs.

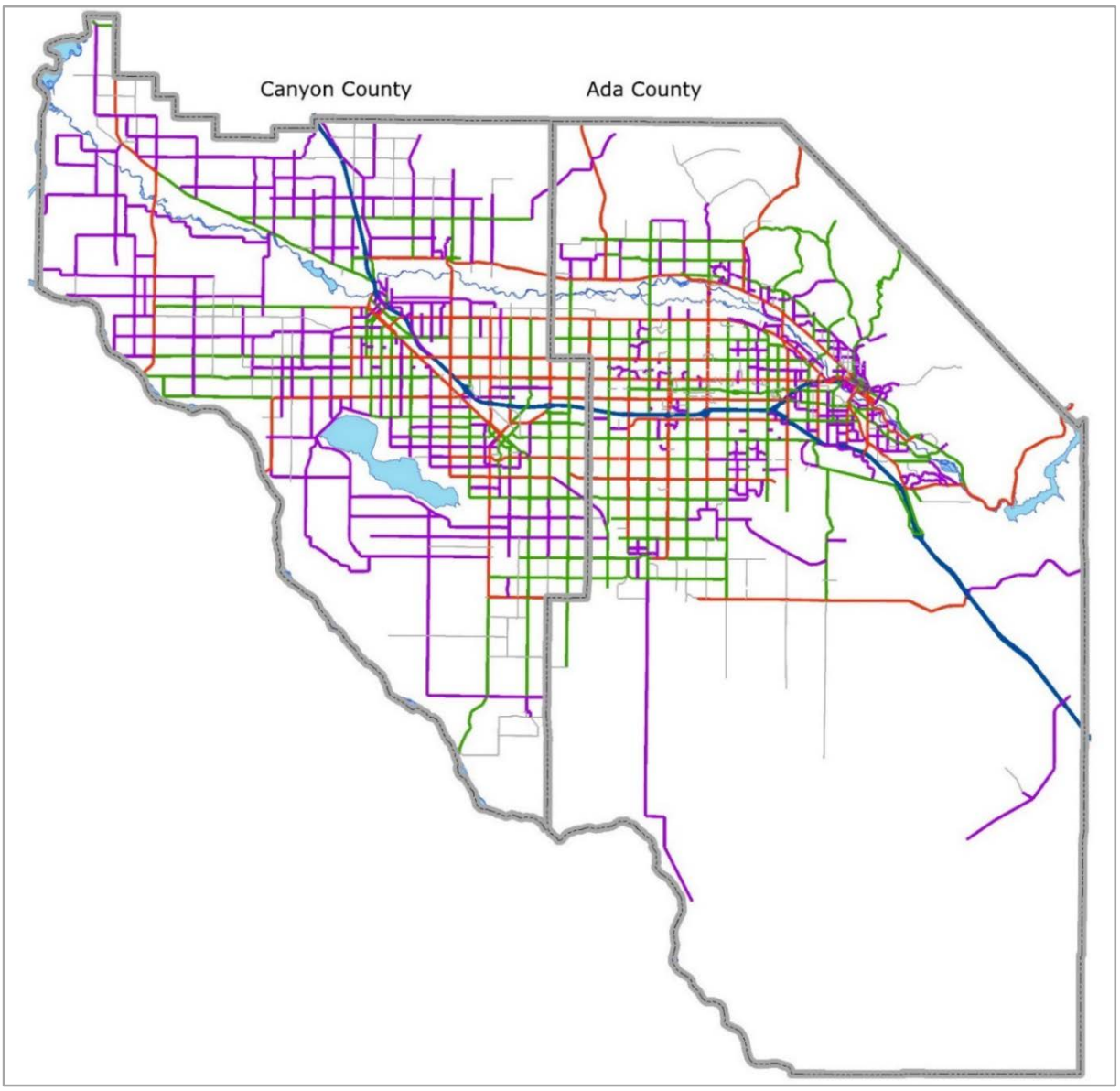
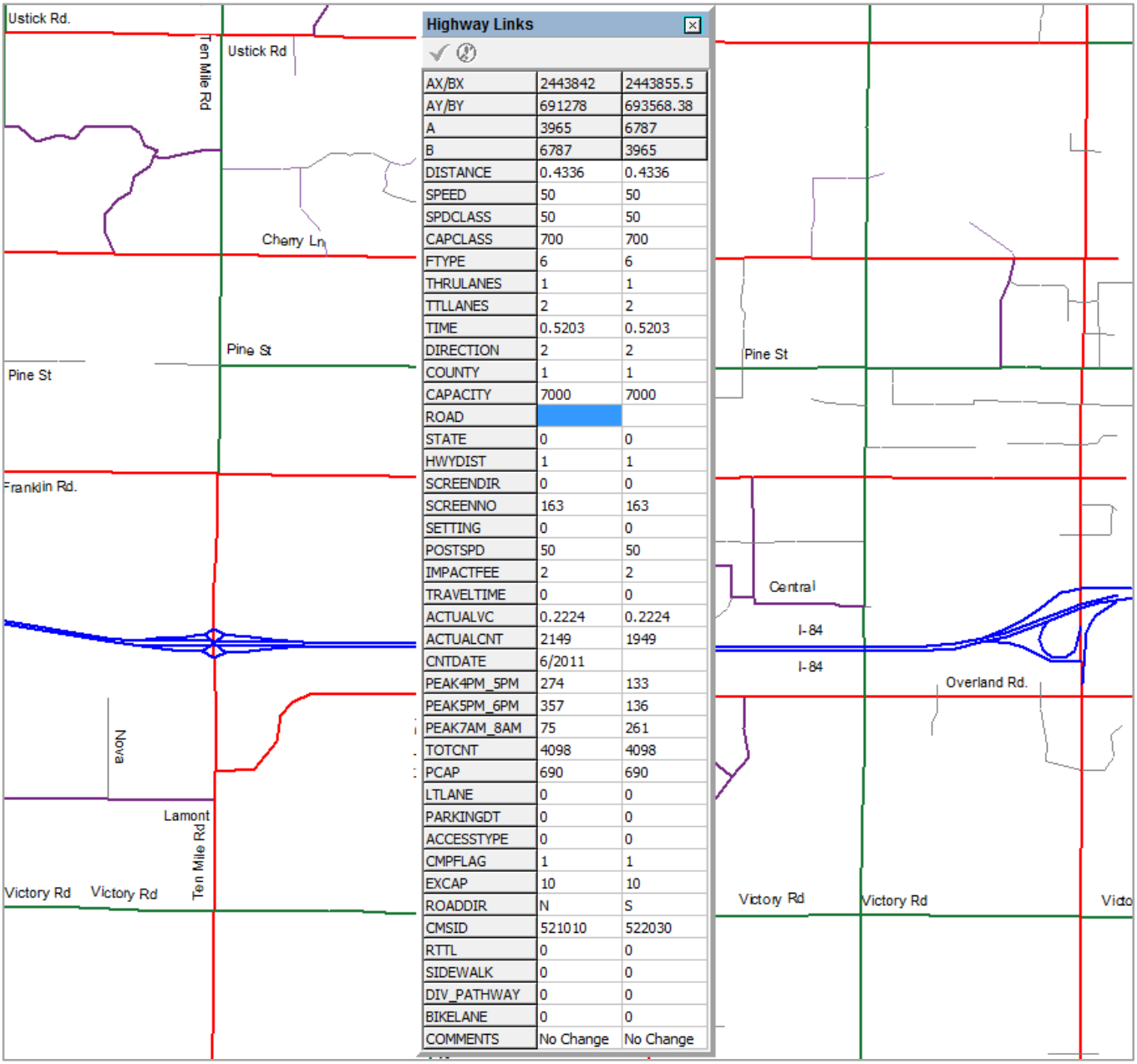


Figure 2: Regional Model Network

Figure 3 and Table 12 provide a close up view of the model network and the link network attributes with brief descriptions.



Highway Links

AX/BX	2443842	2443855.5
AY/BY	691278	693568.38
A	3965	6787
B	6787	3965
DISTANCE	0.4336	0.4336
SPEED	50	50
SPDCLASS	50	50
CAPCLASS	700	700
FTYPE	6	6
THRULANES	1	1
TTLLANES	2	2
TIME	0.5203	0.5203
DIRECTION	2	2
COUNTY	1	1
CAPACITY	7000	7000
ROAD		
STATE	0	0
HWYDIST	1	1
SCREENDIR	0	0
SCREENNO	163	163
SETTING	0	0
POSTSPD	50	50
IMPACTFEE	2	2
TRAVELTIME	0	0
ACTUALVC	0.2224	0.2224
ACTUALCNT	2149	1949
CNTDATE	6/2011	
PEAK4PM_5PM	274	133
PEAK5PM_6PM	357	136
PEAK7AM_8AM	75	261
TOTCNT	4098	4098
PCAP	690	690
LTLANE	0	0
PARKINGDT	0	0
ACCESSTYPE	0	0
CMPFLAG	1	1
EXCAP	10	10
ROADDIR	N	S
CMSID	521010	522030
RTTL	0	0
SIDEWALK	0	0
DIV_PATHWAY	0	0
BIKELANE	0	0
COMMENTS	No Change	No Change

Figure 3: Close Up View of Model Network and Attribute Table

Table 12: Model Network Link Attribute Table and Descriptions

Link Codes	Definition
A	A node number
B	B node number
DISTANCE	Distance of link (calculated based on actual length of the link - miles)
SPEED	Speed (in miles per hour) – typically at or near posted speed for calibration year
SPDCLASS	Speed classification – same as SPEED
CAPCLASS	Capacity vehicle/ln/hr for daily model
FTYPE	Facility Type - base year network 1- Interstate (I-84 and I-184) and 19 Interstate ramps 2- HOV, RESERVED NOT IN USE 4- Expressway with strict access control, RESERVED NOT IN USE 3, 5, 6- Principal arterials urban central business district (CBD), urban area and rural areas 7, 8, 9, 10- Minor arterials in CBD, urban areas, rural areas 11- High speed arterials/collectors – typically outside cities 12, 13, 14, 15- Collectors in the CBD, urban areas, rural areas 16, 17, 18- Local roads added for circulation 20- Centroid connectors
THRULANES	Number of through lanes for road
TTLLANES	Number of total lanes for road
TIME	Freeflow travel time along a link
DIRECTION	One-way (1) or two-way (2)
COUNTY	County (Ada = 1, Canyon = 2)
CAPACITY	Daily capacity calculated using capclass and expansion factor
ROAD	Road name – for reference only, not on all links
STATE	State road code (0=Local road, 1=State road)
HWYDIST	Highway district name indicating jurisdiction – FOR INFORMATION ONLY 1 = Ada County Highway District 2 = Canyon Highway District 3 = Golden Gate Highway District 4 = Idaho Transportation Department 5 = Nampa Highway District 6 = Notus-Parma Highway District 7 = City (use city limits as a guide, generalized, staff reviews periodically)
SCREENDIR	Screen line direction (north/south/east/west) – for calibration purposes only
SCREENNO	Screen line number – for calibration purposes only
SETTING	pre-MOVES setting for air quality conformity purposes only, no longer used
POSTSPD	Comprehensive inventory was completed in 2002, updated annually as notified by transportation agencies of speed limit changes
IMPACTFEE	ACHD specific: pre-2012 Capital Improvement Plan
ACTUALVC	Actual traffic count / capacity where counts are available
ACTUALCNT	Directional total count
CNTDATE	Month/yr of count
PEAK4PM_5PM	Peak hour traffic count for 4pm to 4:59pm
PEAK5PM_6PM	Peak hour traffic count for 5pm to 5:59pm
PEAK7AM_8AM	Peak hour traffic count for 7am to 7:59am
TOTCNT	Total count
PCAP	Peak hour per lane per vehicle capacity provided by ACHD, based on FDOT Quality Level of Service Handbook.
LTLANE	Left turn lane 1=yes, 0=no, for reference only, reflects 2012 conditions
PARKINGDT	Used in downtown Boise only, used for reference for capclass and pcap
EXCAP	Expansion factor for capclass conversion to daily capacity
ROADDIR	Direction of travel for every link – N, S, E and W
CMSID	Unique ID code relates to annual travel time data collection congestion management process
RTTL	RESERVED, NOT IN USE - Right turn lane present
SIDEWALK	RESERVED, NOT IN USE – Sidewalk present
DIV_PATHWAY	RESERVED, NOT IN USE – Divide pathway along roadway
BIKELANE	RESERVED, NOT IN USE – Bike lane present
AREATYPE	Air Quality Conformity Purposes necessary for MOVES– DO NOT CHANGE OR ADJUST

Turn Penalties

The regional model uses turn penalties for links with actual turn restrictions due to lane configurations. These are typically found on interchange overpasses and roadways with medians, but included in the turn penalty file for only those connections represented in the model. This is not intended to be nor should be interpreted as a complete list of all restrictions in place on the transportation system. Figure 4 and the following list provides the location of turn restrictions represented in the model and applicable in 2011/2012.

- 10th Ave northbound: restrict the left-turn onto the westbound ramp therefore, northbound must use loop on-ramp.
- Karcher Rd interchange ramps and overpass
    - eastbound on ramp, must use "free right"
    - eastbound off ramp, must use "free right"
    - westbound off ramp restrict left turn to southbound Midland Blvd
    - loop ramp to southbound Karcher restrict left turn to northbound
- Caldwell-Nampa Blvd southeast: restrict access to Old Karcher Rd (one-way access point)
- Davis Ave and Yale St
    - restrict left turn from Davis Ave to Northside Blvd/Yale St
    - restrict left turn from Yale St to Davis Ave
- 9th St southbound: no U turn permitted to northbound Capitol Blvd (U-turns are were allowed in 2015; therefore, this was removed after calibration
- Capitol Blvd northbound: west one lane connection to Jefferson, restrict left turn to northbound 8th
- Boise Ave
    - one-lane connections: restrict left-turn to southbound Capitol Blvd
    - restrict left turn from Boise Ave to University Dr
- Capitol Blvd northbound: restrict left turn to Boise Ave “one-lane connections”
- Capitol Blvd southbound: restrict left turn to Eastover Terrace
- Federal Way northwest: restrict turn on to southbound Vista Ave
- Main St westbound ramp to Chinden Blvd: restrict turn eastbound to the connector
- State St eastbound: restrict left turn to north on 28th St (must use 26th/27th - added 2 small sections of local road to accommodate)
- Broadway Ave and Federal Way “arterial” interchange: turn penalties were used to ensure use of the correct ramps depending on direction of travel to/from Broadway Ave
- Cole/Overland Interchange
    - restrict left turn to westbound Overland Rd from the “first” East Overland Rd off ramp (50B)
    - restrict left turn to eastbound Overland Rd from “second” East Overland Rd off ramp (50B)
    - restrict left turn onto Entertainment Dr from “first” eastbound off ramp
- McDermott Rd and US 20/26: right in / right out (due to the SH 16 river crossing completed in August 2014)
- Eagle Rd Interchange Overpass: northbound restricted from using the eastbound on loop ramp (must use other on ramp)
- Eagle Rd Interchange Overpass: southbound restricted from using the eastbound on ramp (must use loop ramp)
- Eagle Rd turn restrictions: 2012 network to 2040
    - Louise Dr: right-in/right-out only at Eagle Rd and

- Lanark St: no left turn out and no through
- Commercial St: right in/ right out only
- Presidential Dr: no left turn out and no through
- Meridian Crossroads Mall/Florence St: no left turn out and no through (northbound left in allowed to Florence St)
- Baldcypress St: no left turn out and no through
- Sedona St: no left turn out and no through

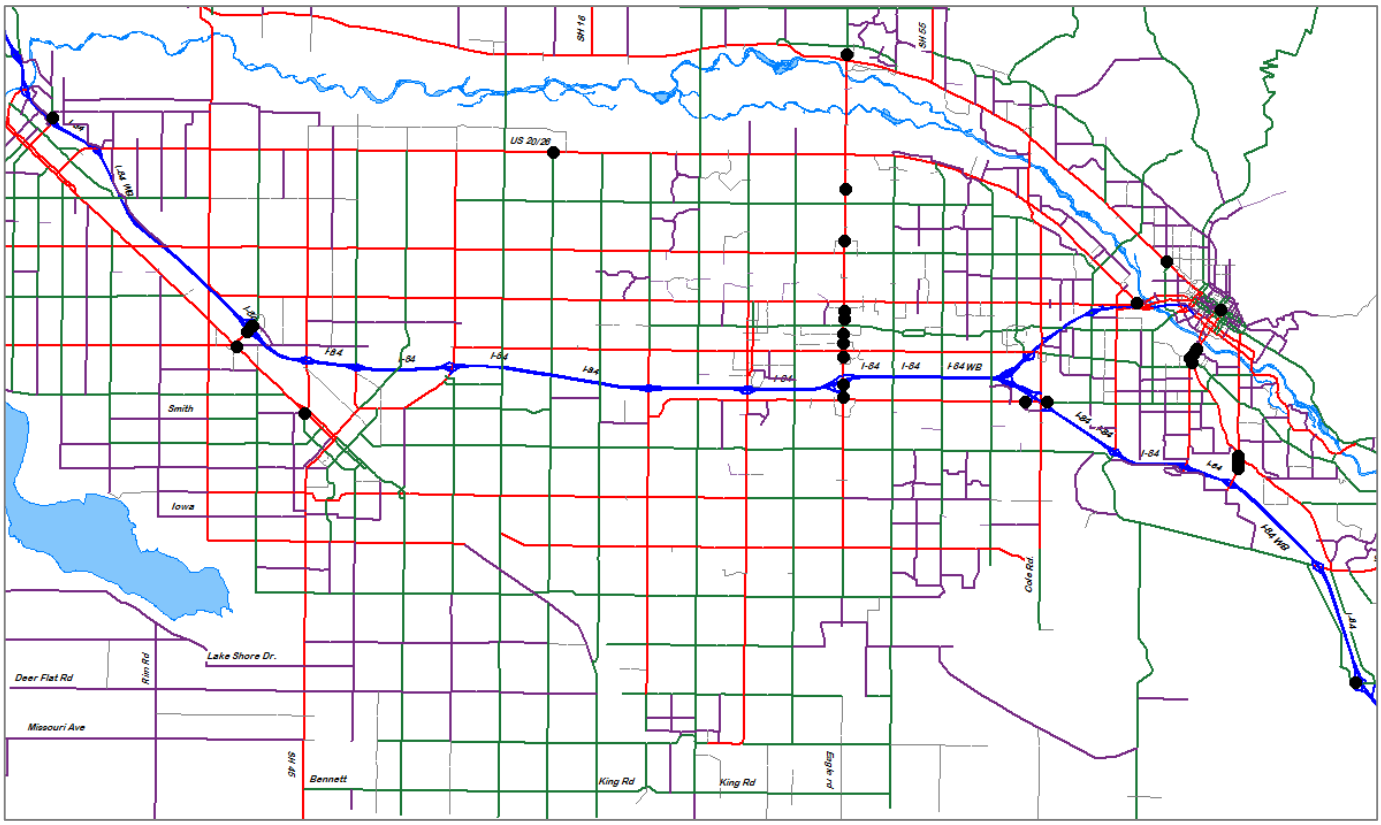


Figure 4: Map of Turn Penalty Locations

Terminal Times

Terminal times are estimates of the time it takes to park and walk to the final destination at each termini of the trip. To help estimate terminal times in specific areas where using parking garage or a remote lot is more common such as in downtowns, airport and universities the survey included a question on use of “remote lot.”

Less than 800 trips reported “yes” to parking in a “remote lot” and also provided walk time. Table 13 provides the average walk time for select locations based on some of the responses.

Table 13: Sample of Average Walk Times for Select Areas

Demographic Areas	Sample Size	Average Walk Time from Remote Lot	Example Destinations
Downtown Caldwell	2	0.50	
Eagle-Central	22	1.27	
Center Meridian	55	1.45	
North Nampa	40	1.80	College of Western Idaho
Downtown Nampa	9	2.11	
Central Caldwell	8	2.25	
Downtown Boise	208	2.89	
Airport	34	3.62	Boise Airport
Southeast Boise	145	4.05	Boise State University

Table 14 shows the final terminal times that are applied to the TAZs within each area – rural, suburban, urban, central business district (CBD), and Boise State University (near downtown Boise) - based on data from the 2012 household survey. Figure 5 is a map showing each of the areas listed below.

Table 14: Terminal Times

Area Type	Time Origin (min)	Time Destination (min)
Rural	1	1
Suburban	1.5 to 2.5	1.5 to 2.5
Urban	2	2
CBD fringe	2.5	2.5
CBD	3	3
CBD parking garage	4	4
Boise State CBD fringe	5	5

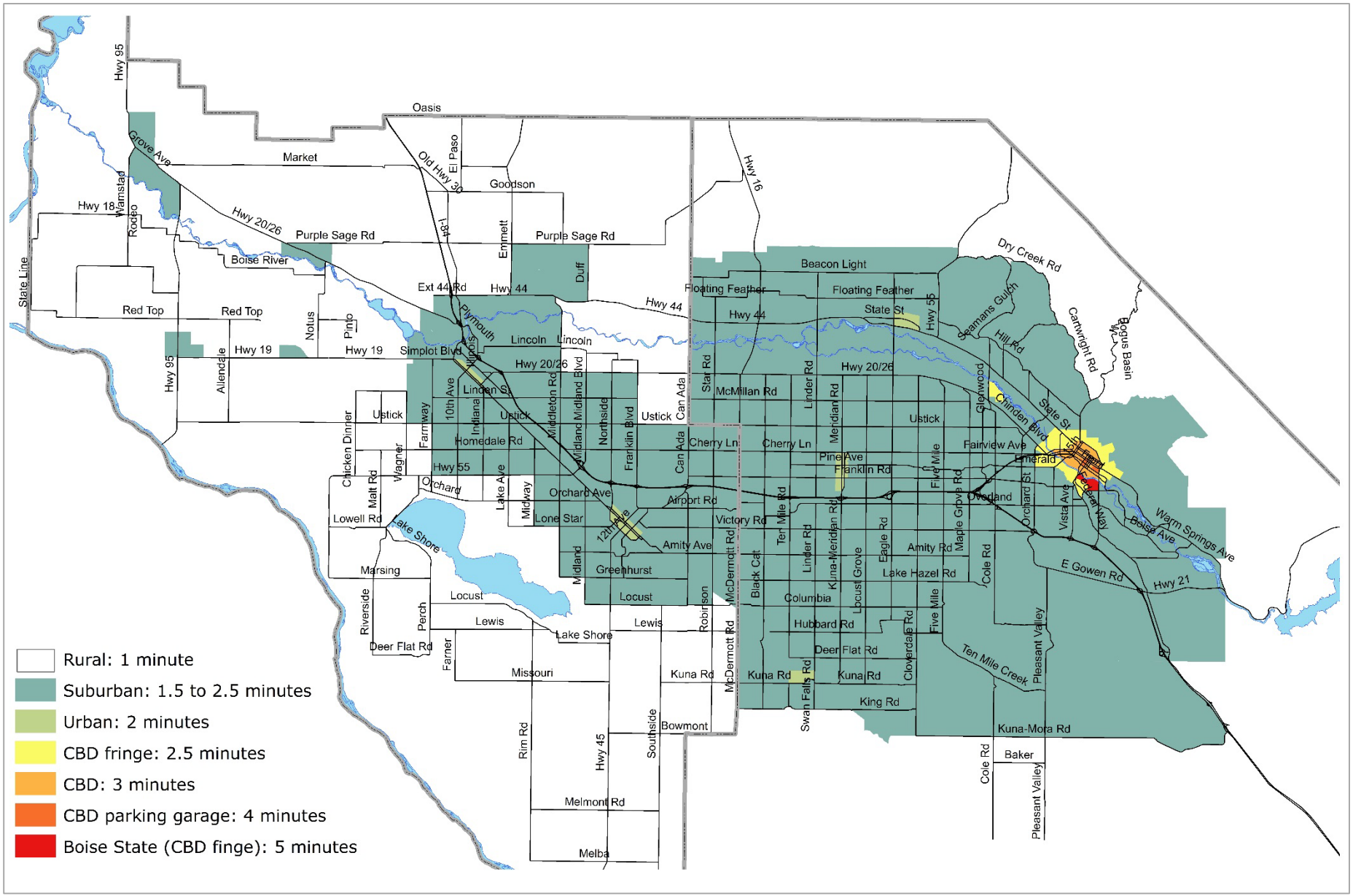


Figure 5: Terminal Times by Area

External Trips

External trips – those starting, ending, or passing through Ada and Canyon Counties – make up a small portion of the trips in the modeling domain. This is due to the rural nature and low populations of the surrounding counties compared to Ada and Canyon Counties, as shown in Table 15.

Table 15: Census Populations for Counties Surrounding Ada and Canyon Counties

County	1990	2000	2010	
Ada	205,775	300,904	392,365	**87%**
Canyon	90,076	131,441	188,923	
Boise	3,509	6,670	7,028	**13%**
Elmore	21,205	29,130	27,038	
Gem	11,844	15,181	16,719	
Owyhee	8,392	10,644	11,526	
Payette	16,434	20,578	22,623	
	359,225	**516,548**	**668,232**	

Figure 6 identifies each external station associated with the model network.

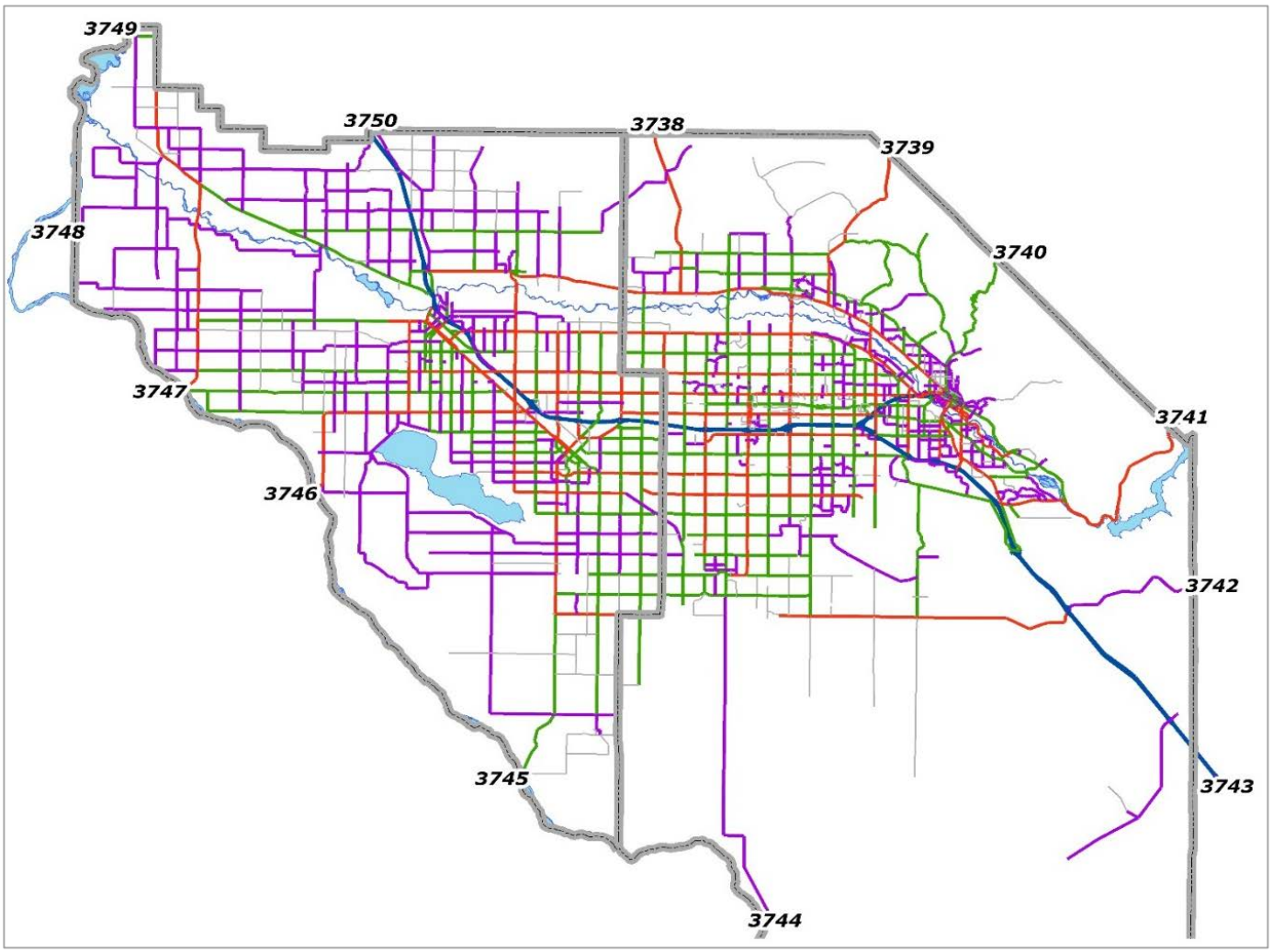


Figure 6: External Stations

External to external trips (Tables 16 and 17) were estimated using historic traffic count data from the Idaho Transportation Department's permanent traffic count locations (ATRs) located near the regional model's external nodes (gateways). A growth rate was applied to the 2008 external trips, which were collected as part of the Treasure Valley Truck Freight[11] video license plate external station survey, to estimate the 2012 external trips.

Table 16: External Station Counts by Direction and External to External Trips, Daily Model

External Node Number	Road Name	Base Year Volume (Inbound)	Base Year Volume (Outbound)	External to External Trips (Inbound)	External to External Trips (Outbound)
3738	SH 16	4,182	4,173	*20*	*21*
3739	SH 55 North	2,900	2,816	*20*	*17*
3740	*Bogus Basin Rd*[a]	*500*	*500*	*5*	*5*
3741	SH 21	1,356	1,232	*7*	*14*
3742	*Blacks Creek Rd*[a]	*100*	*100*	*1*	*1*
3743	I84 East	9,776	9,936	*438*	*735*
3744	*Swan Falls Rd*[a]	*100*	*100*	*2*	*2*
3745	SH 45	1,759	1,760	*15*	*9*
3746	SH 55 South	3,555	3,311	*19*	*20*
3747	US 95 South	2,700	2,700	*138*	*202*
3748	*Hwy 18*[a]	*100*	*100*	*1*	*1*
3749	US 95 North	2,001	2,059	*197*	*122*
3750	I84 West	9,816	9,659	*718*	*429*
Total		38,845	38,446	*1,581*	*1,578*
Average regional peak hour factor				**3.9%**	

a. Four external stations are located on low volume roadways where little or no data are available. The volumes above are estimates.

See the Forecast Elements section and Appendix B for more information on external trip rate forecasting and estimation.

Table 17: External Station Counts by Direction and External Trip Rates, Peak Hour Models

External Node Number	Road Name	Peak Hour1: 5pm to 6pm Outbound	Peak Hour1: 5pm to 6pm Inbound	Peak Hour2: 4pm to 5pm Outbound	Peak Hour2: 4pm to 5pm Inbound
3738	SH 16	0.135	0.053	0.116	0.055
3739	SH 55 North	0.098	0.071	0.092	0.079
3740	*Bogus Basin Rd*[a]	0.081	0.081	0.079	0.079
3741	SH 21	0.134	0.047	0.102	0.052
3742	*Blacks Creek Rd*[a]	0.081	0.081	0.079	0.079
3743	I84 East	0.071	0.078	0.076	0.079
3744	*Swan Falls Rd*[a]	0.081	0.081	0.079	0.079
3745	SH 45	0.078	0.079	0.073	0.069
3746	SH 55 South	0.086	0.083	0.084	0.082
3747	US 95 South	0.087	0.078	0.089	0.065
3748	*Hwy 18*[a]	0.081	0.081	0.079	0.079
3749	US 95 North[b]	0.070	0.070	0.070	0.070
3750	I84 West	0.092	0.070	0.084	0.069

a. No count data available; applied the average regional peak hour factor
b. Reduced from original peak hour factor of ~0.08 to achieve better match between the model estimate and actual volume.

[11] Commercial Vehicle Intercept Survey and Video External Station Survey Final Report

Friction Factors

Friction factors are used to represent the effect travel times have on travel between TAZs and are often specified as a friction factor curve. The friction factor curves are calibrated based on the travel time distribution from a household travel survey. Each trip purpose has a distinct friction factor curve up to 90 minutes which is long enough to accommodate trip lengths (time) from one end of the modeling domain to the other for future scenarios for home base and non-home base trip purposes. Currently, it takes about 45 minutes to traverse I-84 through the two-county area (41 miles long with posted speed limits of 75 and 65 mph).

During the refinement and testing of friction factors staff determined weighting of the friction factors up to a certain time point (e.g., threshold). Typically, the "threshold" represents the time duration in which most trips occur. For example, about 90% of home base work (HBW) trips are completed within 30 minutes. Therefore, 30 minutes was the threshold where the "weighted" friction factors stopped and other methods used to estimate friction factors began. Staff ran several sensitivity tests to calibrate the friction factors for each of the home base trip purposes in order to achieve a better match of model estimated and actual county to county flows.

Appendix C contains the table of the final friction factors by trip purpose used to calibrate the model, as well as worksheets and charts used for development.

School Trip Distribution

Home base school trips are classified into two groups: 85% for public elementary, middle/junior high, and senior high schools and the remaining 15% for all private schools, colleges, and universities. An "accessible zone list" was defined for each public school. For the public school trips, trip distribution is limited to only those public schools that are accessible to each TAZ. The remaining 15% comprising private and college/university school trips are distributed normally using the HBSc friction factor.

Figures 7 and 8 provide an example of the accessible TAZ list implemented in trip distribution.

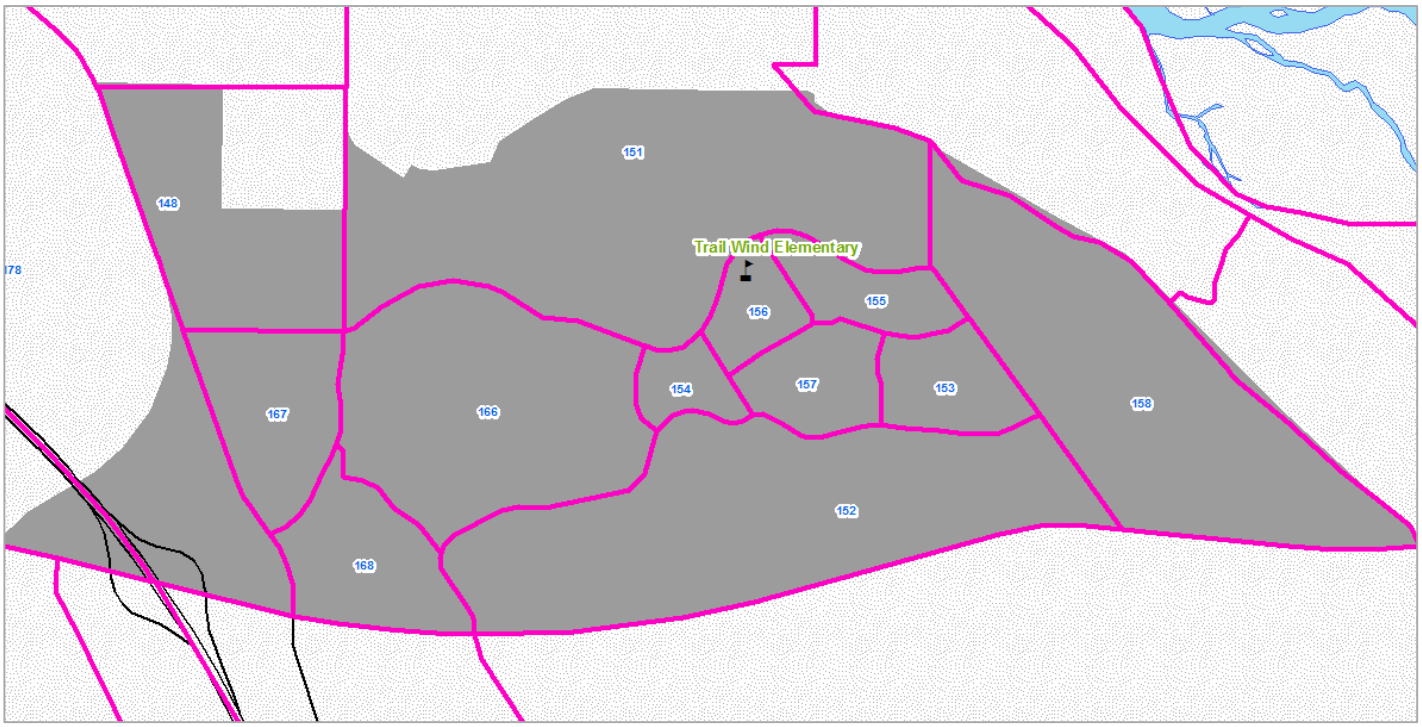


Figure 7: Trail Wind Elementary School Enrollment Boundary with TAZs

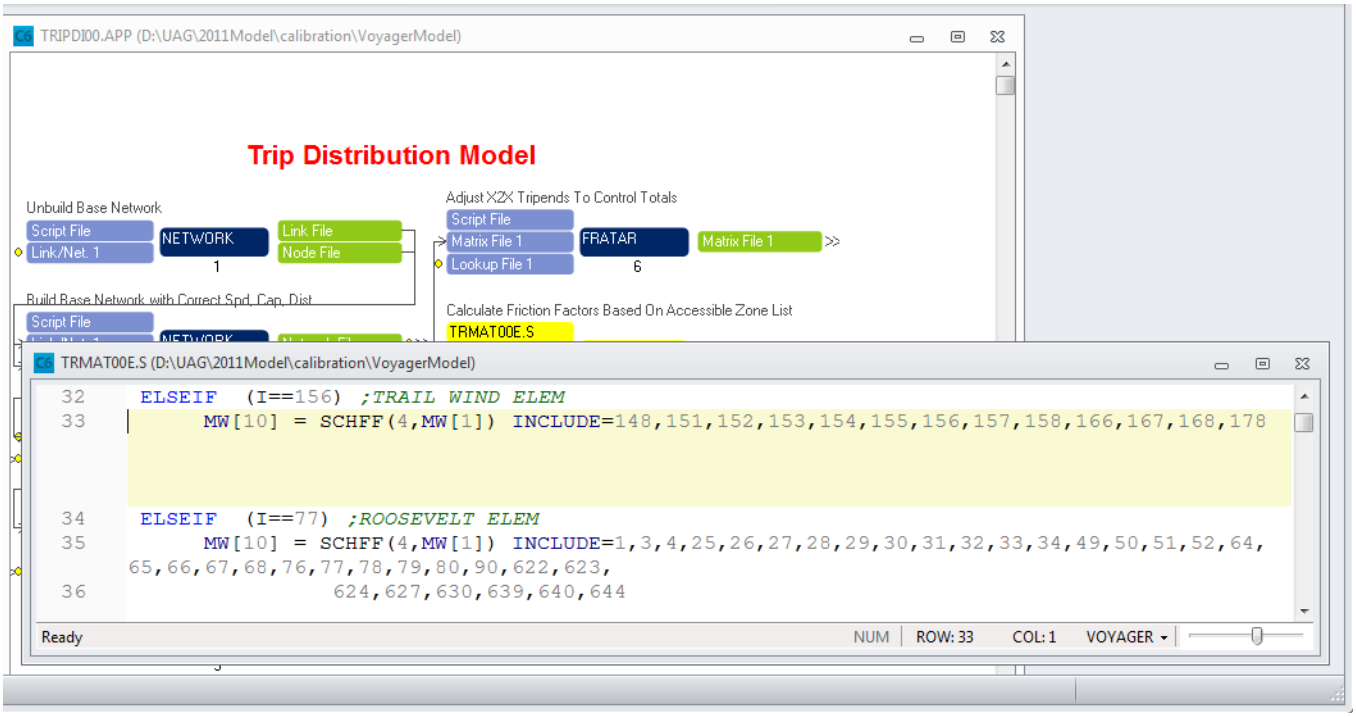


Figure 8: Accessible TAZ List for Trail Wind Elementary Model Statements

Trip Distribution Results

Figures 9 - 13 compare trip length frequency by trip purpose (e.g., percent of trips by travel time increments) between the regional household survey and estimated by the model per the final friction factors. Below these figures are additional trip distribution results summarizing county to county flows by purpose.

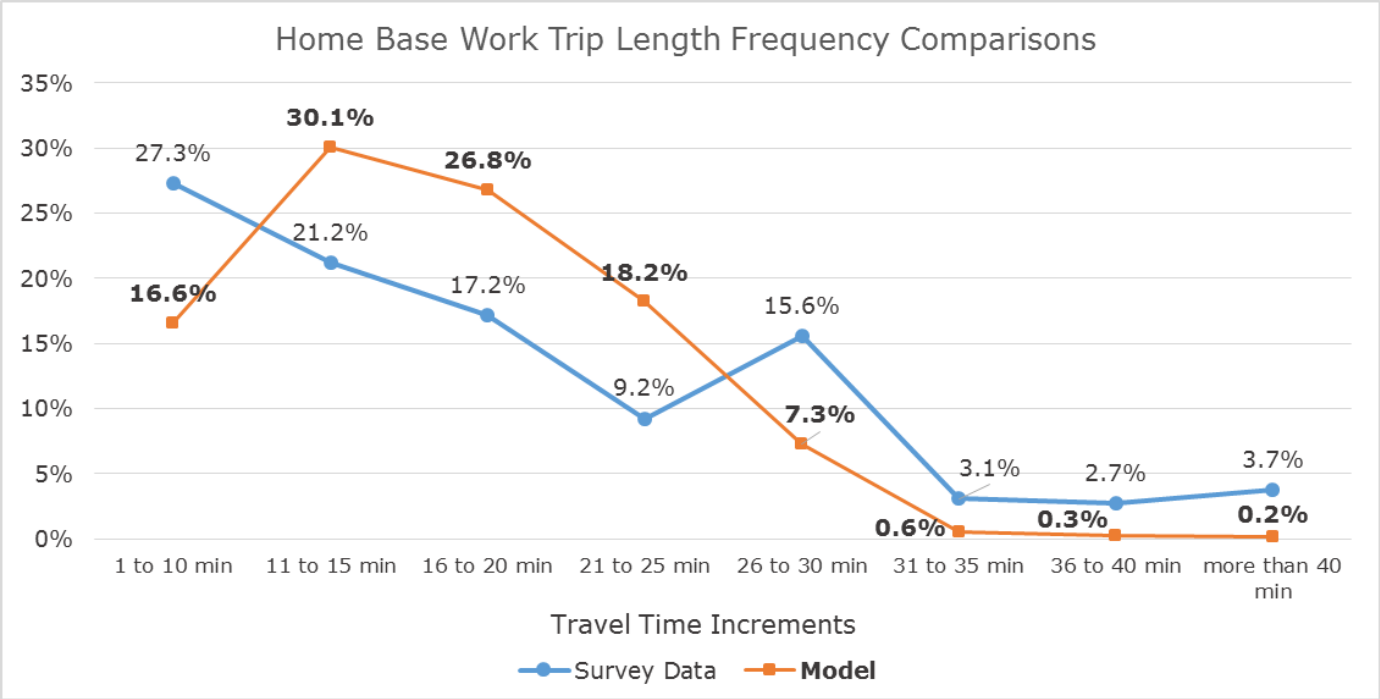


Figure 9: Home Base Work Trip Length Frequency Curve Comparisons

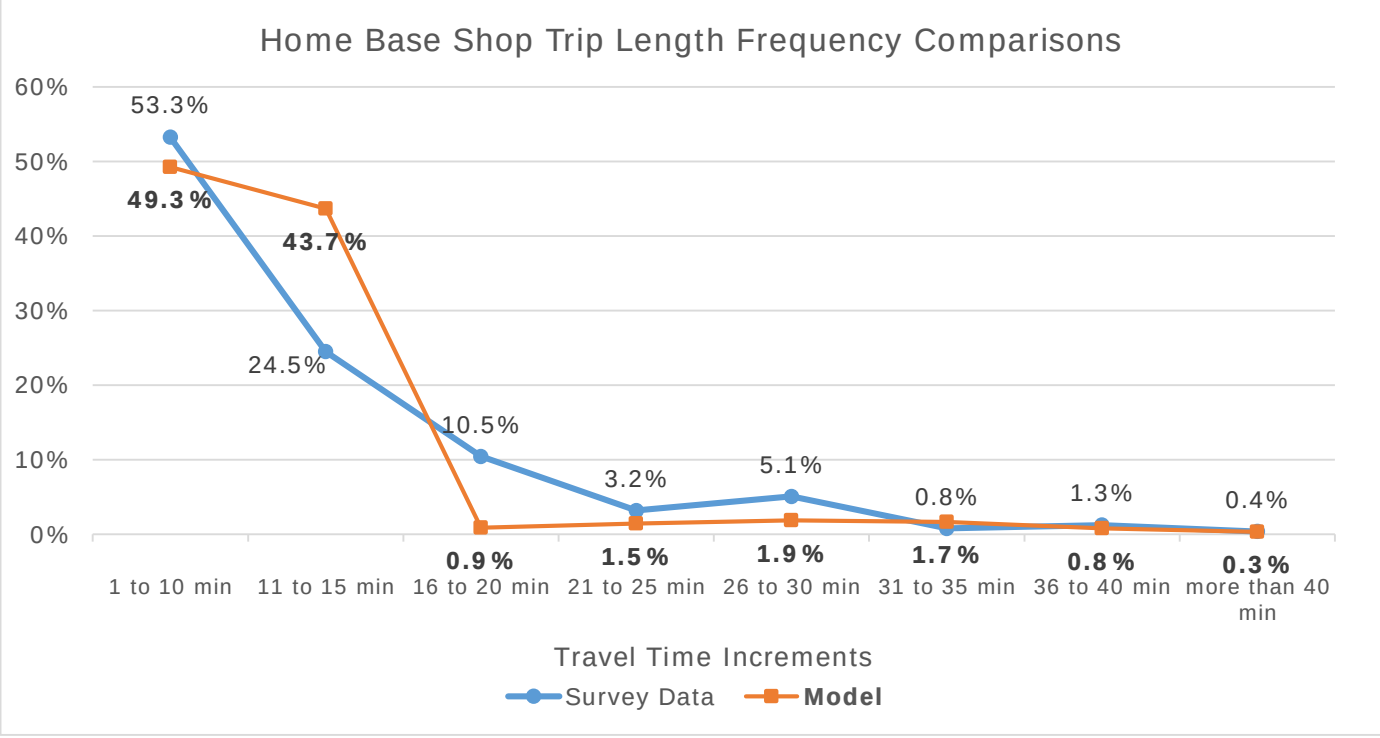


Figure 10: Home Base Shop Trip Length Frequency Curve Comparisons

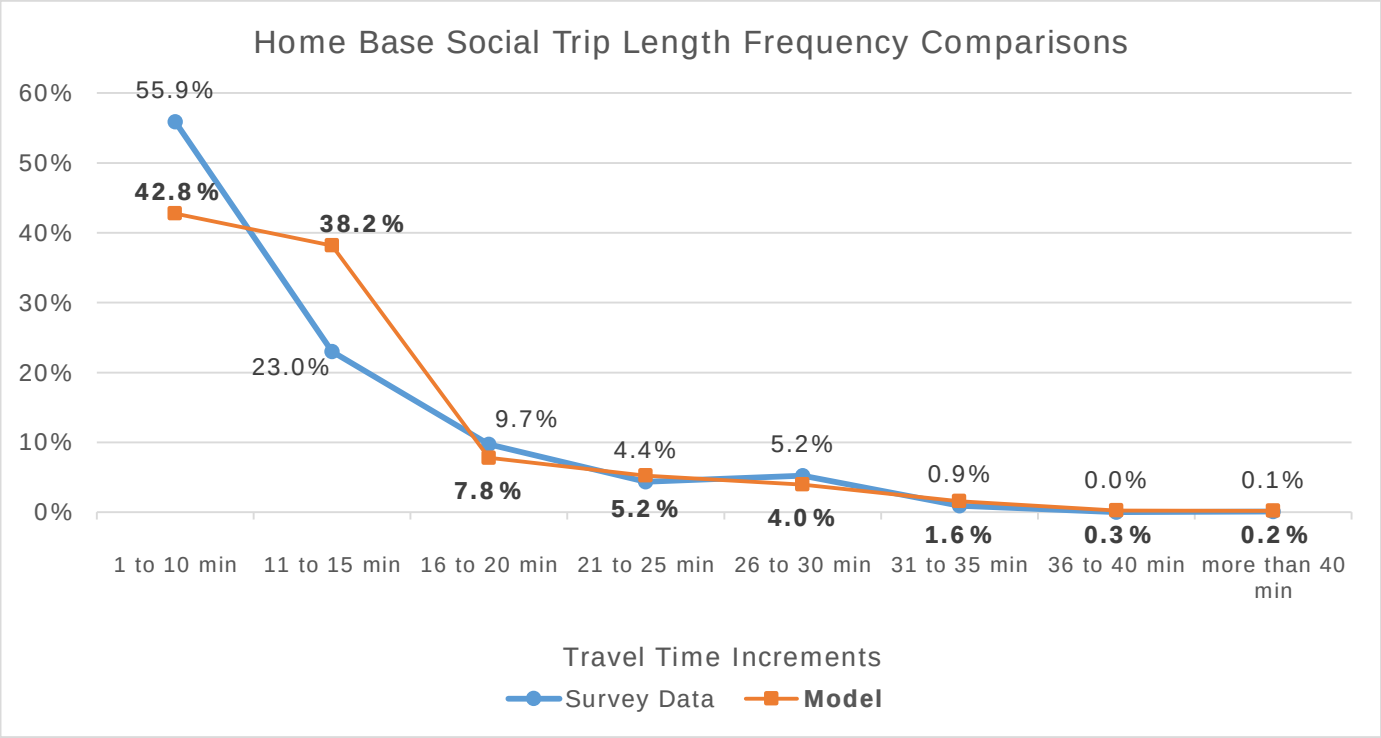


Figure 11: Home Base Social Trip Length Frequency Curve Comparisons

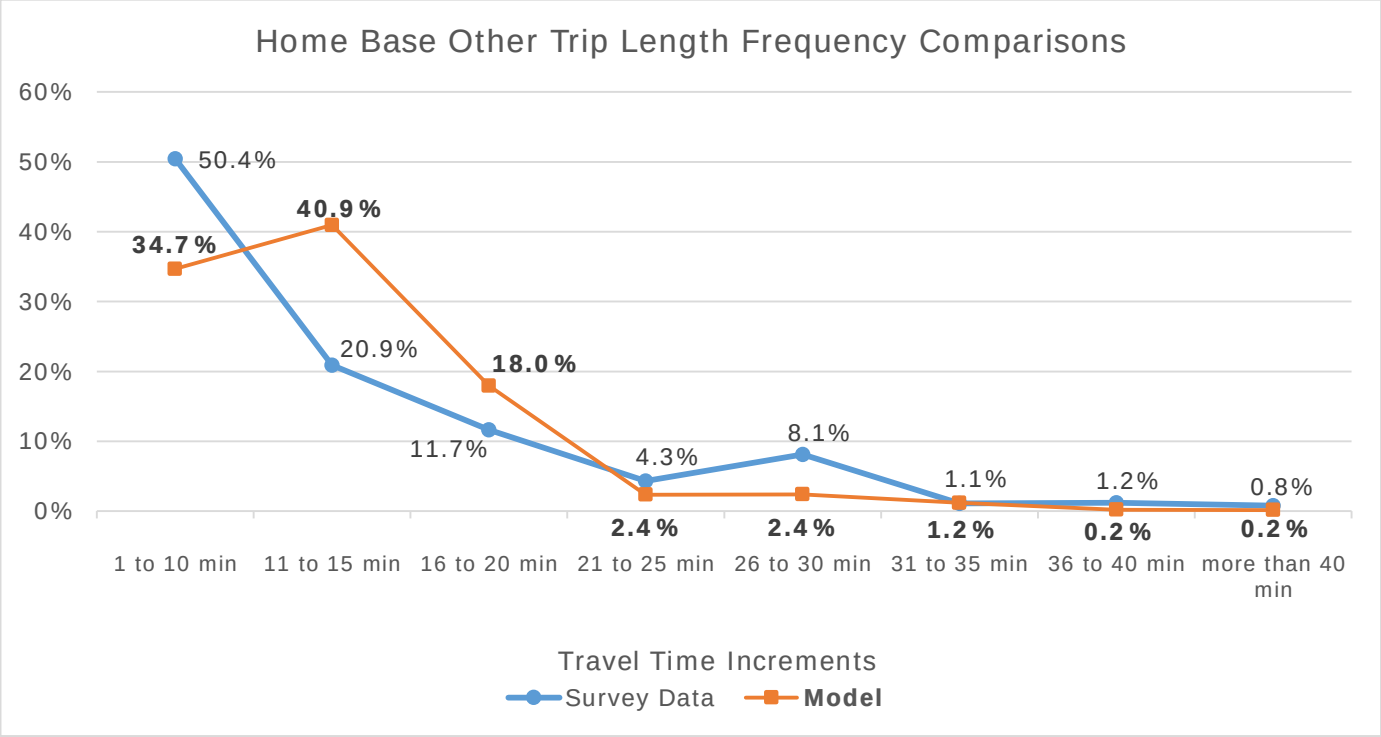


Figure 12: Home Base Other Trip Length Frequency Curve Comparisons

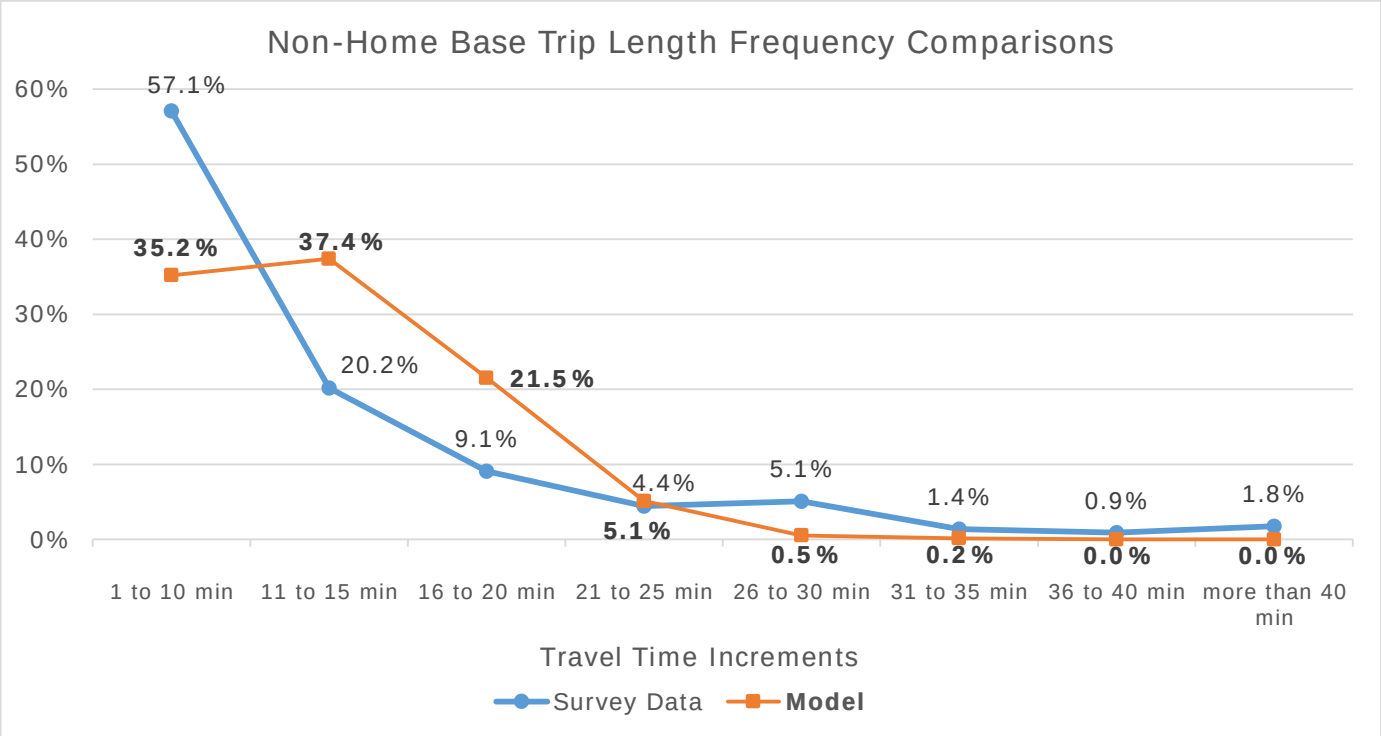


Figure 13: Non-Home Base Trip Length Frequency Curve Comparisons

In the past, the model over-estimated the number of trips from Canyon County to Ada County, mainly due to the size of the job market in Ada County and an uncongested transportation system. The sensitivity tests conducted to refine the friction factors by trip purpose was crucial in improving the model estimates of the county to county flows for the region. Tables 18 and 19 summarize the percent of trips between Ada and Canyon Counties by trip purpose from the household survey data and estimated by the model for all person trips and auto-person trips.

Table 18: County to County Flows: All Person Trips by Trip Purpose

Canyon County to Ada County	Model Estimates	Survey Data	Difference
Home Base Work	38.6%	37.5%	1.1%
Home Base Shop	12.6%	9.0%	3.6%
Home Base Social	13.4%	7.1%	6.3%
Home Base School	3.9%	6.4%	-2.4%
Home Base Other	16.7%	15.0%	1.7%
Non-Home Base	15.2%	17.7%	-2.5%
Internal Only (I-I) Total	*16.7%*	*17.6%*	*-0.9%*
Ada County to Canyon County	**Model Estimates**	**Survey Data**	**Difference**
Home Base Work	5.9%	5.5%	0.4%
Home Base Shop	0.9%	3.3%	-2.3%
Home Base Social	3.9%	2.2%	1.7%
Home Base School	2.2%	2.0%	0.1%
Home Base Other	2.9%	1.5%	1.4%
Non-Home Base	4.7%	3.3%	1.4%
Internal Only (I-I) Total	*3.5%*	*3.1%*	*0.4%*

Table 19: County to County Flows: Auto-Person Trips by Trip Purpose

Canyon County to Ada County	Model Estimates	Survey Data	Difference
Home Base Work	39.2%	39.0%	0.2%
Home Base Shop	14.1%	11.7%	2.4%
Home Base Social	15.0%	9.5%	5.5%
Home Base School	4.4%	9.9%	-5.5%
Home Base Other	16.9%	17.0%	-0.2%
Non-Home Base	15.6%	8.5%	7.1%
Internal Only (I-I) Total	*18.1%*	*14.6%*	*3.5%*
Ada County to Canyon County	**Model Estimates**	**Survey Data**	**Difference**
Home Base Work	6.1%	6.0%	0.0%
Home Base Shop	1.0%	3.4%	-2.3%
Home Base Social	4.3%	2.3%	2.0%
Home Base School	2.5%	2.6%	-0.1%
Home Base Other	3.0%	1.7%	1.3%
Non-Home Base	4.8%	3.2%	1.6%
Internal Only (I-I) Total	*3.8%*	*3.1%*	*0.7%*

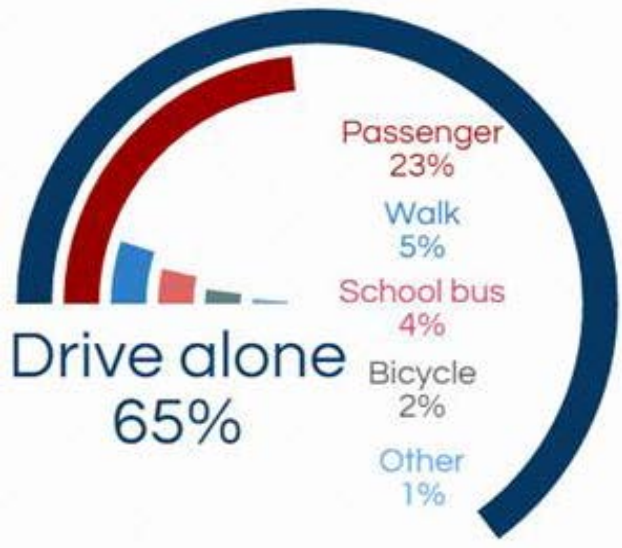
Table 20 summarizes the HBW trip purpose only, but includes an additional source of data from the U.S. Census Bureau.

Table 20: County to County Flow Comparison for Work Trip Purpose Only

	Percent of Trips from Canyon County to Ada County	Percent of Trips from Ada County to Canyon County
Model Estimates	38.6%	5.9%
Survey Data	37.5%	5.5%
Commuting (Journey to Work)	33.7%	4.7%
Source: U.S. Census Bureau, 2006-2010 American Community Survey		

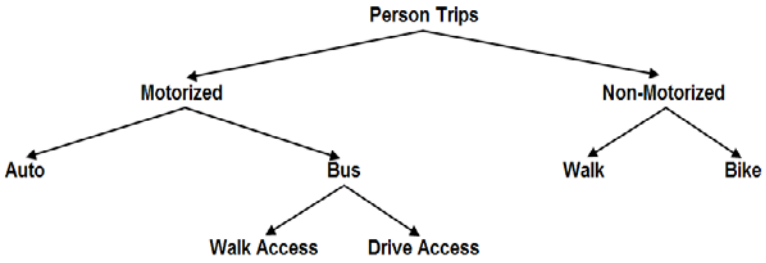
Based on the comparison of model results to the regional household travel survey data and information provided from the U.S. Census Bureau for work trips, trip distribution inputs appear to be reasonable and the results are acceptable.

Mode Choice



The COMPASS mode choice model uses a nested logit structure with five alternatives. The upper level nest splits motorized from non-motorized travel. The non-motorized nest includes walk and bicycle modes, while the motorized nest includes auto and bus modes.

Bus is further split with a lower-level nest that includes walk and drive access modes to transit.



The mode choice model update was completed in 2014 implementing recommendations following a Federal Transit Administration review. The recommendations from this review are outlined in two memos, which are included in Appendix D:

Mode Choice Model Development Evaluation Memos

The following describes the existing transit system and sensitivity tests of the mode choice model conducted by staff.

Transit System Characteristics

Valley Regional Transit is the regional transit authority and oversees the public bus and paratransit services provided in Ada and Canyon Counties. In 2011, ValleyRide (the bus system operated by Valley Regional Transit) operated 23 bus routes between 5:15am and 6:45pm on weekdays. Below is a summary of the ValleyRide's bus service:

- 14 local routes (including two express routes) serving the City of Boise, with headways between 30 and 60 minutes.
- 5 inter-county routes connecting Ada and Canyon Counties, with headways up to 30 minutes during peak hours and between 2 and 3 hours during off-peak periods.
- 4 local Canyon County routes (including one flex route) serving the Cities of Caldwell and Nampa, with headways up to 60 minutes.
- 1 Boise State University shuttle operated by Boise State University (not in the travel demand model)
- 4 main transfer points – two in each county
- Average weekday ridership (boardings) ranges from 5,500 to 6,000, and remains steady.

Since 2011, ValleyRide has extended service hours for some of the better performing routes and added local routes in both counties. More than 20 park and ride lots exist in the two counties; 11 of them are bus stop locations.

Figure 14 shows the transit network (.lin file) as represented in the travel demand model for calibration. Bus stop park and ride locations are also coded into the mode choice model.

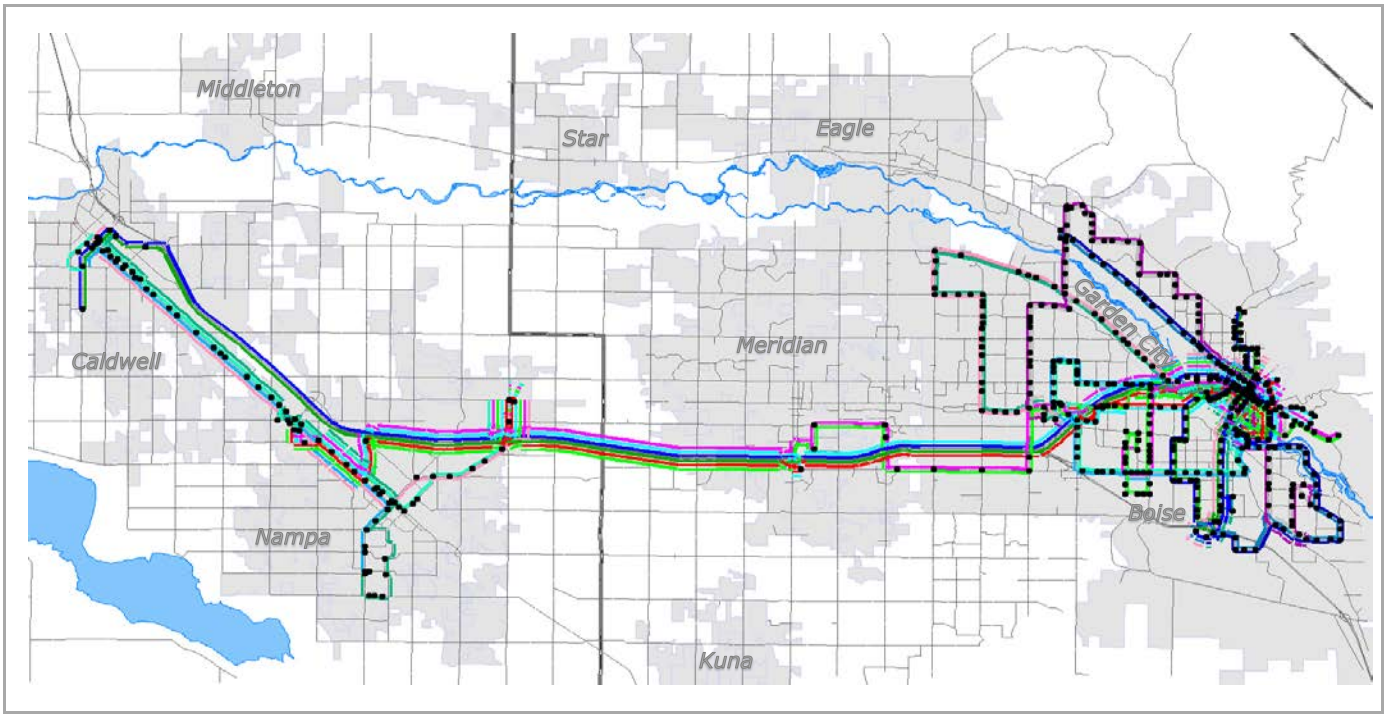


Figure 14: Existing Transit System

Figure 15 displays the characteristics included in the transit .lin file in the model. The transit travel time used the congested highway network speeds from the assignment step for calibration and through 2015.

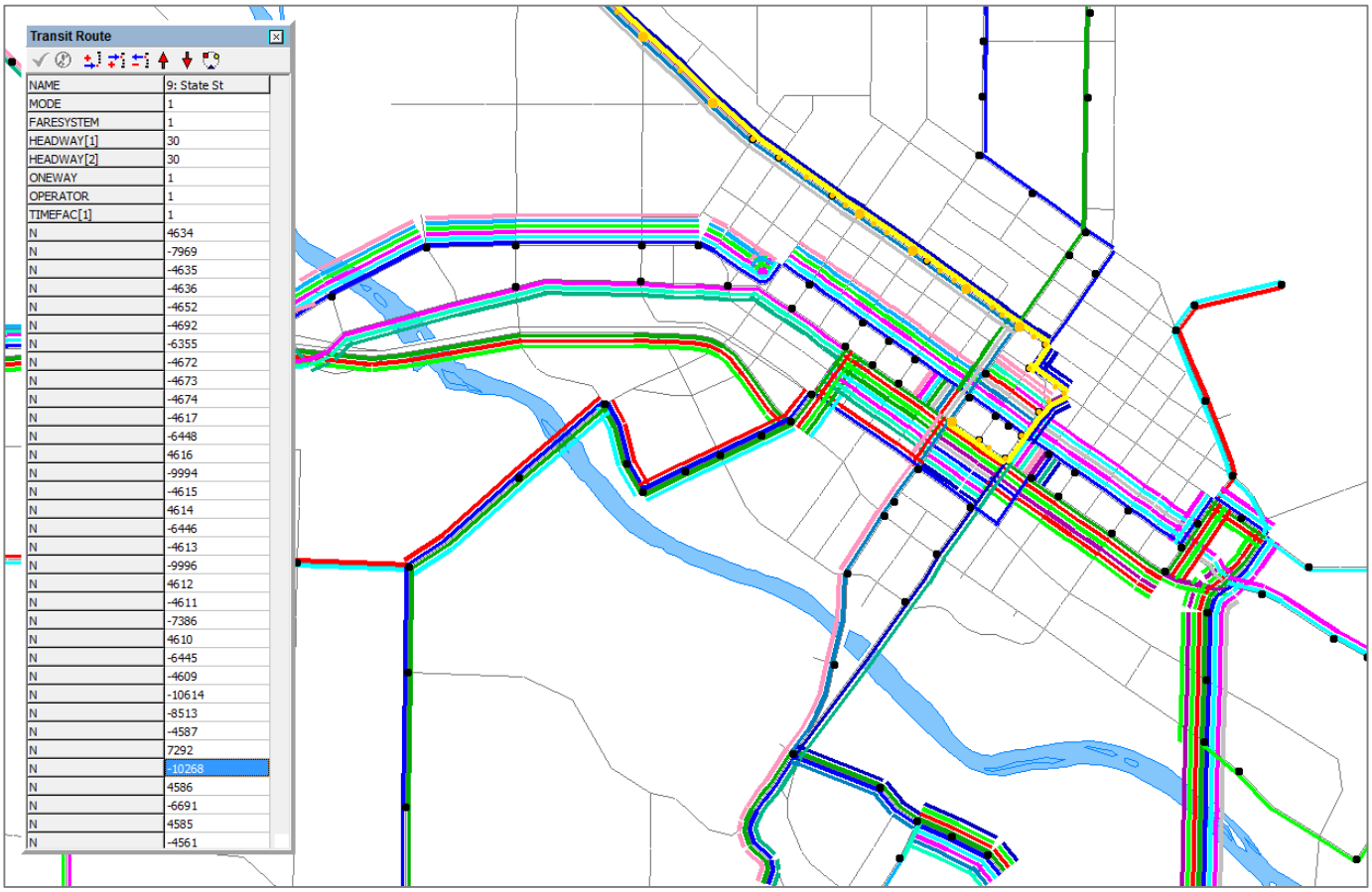


Figure 15: Existing Transit System in Downtown Boise and Route Attributes

In 2016, staff added runtime to each of the routes using the actual bus schedules. The ridership demand estimated by the model decreased and is closer to actual ridership data. However, given the size of the transit system, these changes in ridership had no noticeable impact on highway assignment results.

In 2010, COMPASS commissioned on on-board transit survey to collect data on rider trip characteristics, travel behavior, and demographic characteristics. These survey results were used primarily to develop the mode choice component of the regional travel demand model. These data are also useful in long-range and area wide planning, route planning and scheduling, service design, marketing, and customer communications. Table 21 shows the route-level data provided to the consultant conducting the survey. It is included in this report for informational purposes only.

Table 21: 2010 On-Board Survey Information on Ridership, Goals, and Response Rates

Route	Route Name	Bus Service	2009 Average Weekday Ridership	25% Sample Goal	30% Sample Goal	2010 Survey Responses	No. of Buses Surveyed
1	Parkcenter	Boise/Garden City	344	86	103	140	4
2	Broadway	Boise/Garden City	199	50	60	61	2
3	Vista	Boise/Garden City	285	71	86	78	4
4	Roosevelt	Boise/Garden City	262	66	79	70	4
5	Emerald	Boise/Garden City	380	95	114	130	4
6	Orchard	Boise/Garden City	336	84	101	104	4
7	Fairview	Boise/Garden City	629	157	189	204	4
8	Chinden/Five Mile	Boise/Garden City	386	97	116	87	7
9	State St	Boise/Garden City	794	199	238	240	6
10	Hill/Maple Grove	Boise/Garden City	385	96	116	105	4
14	Hyde Park	Boise/Garden City	162	41	49	32	2
16	VA Hospital	Boise/Garden City	88	22	26	22	2
17	Warm Springs	Boise/Garden City	56	14	17	16	2
29	Overland	Boise/Garden City	293	73	88	159	4
40	Nampa EX	Inter-county	236	59	71	87	3
42	Nampa Ltd	Inter-county	166	42	50	53	3
43	Caldwell EX	Inter-county	45	11	14	17	2
44	Route 44 Express	Inter-county	28	7	8	32	2
45	Route 45 Express	Inter-county	42	11	13	35	3
51	Nampa S. 12th Ave	Nampa/Caldwell	61	15	18	29	3
52	Caldwell South	Nampa/Caldwell	70	18	21	38	3
53	Nampa Garrity	Nampa/Caldwell	77	19	23	37	3
54	Caldwell North	Nampa/Caldwell	72	18	22	22	3
Total			**5,396**	**1,349**	**1,619**	**1,798**	**78**

Mode Choice Model Parameters, Constants and Coefficients

Tables 22 and 23 provide the parameters, constants, and coefficients used in the mode choice model.

Table 22: Mode Choice Model Global Parameters

Model Parameter Name	Value	Description
Walk Speed	2.5	miles per hour
Bike Speed	10	miles per hour
Walk Access Coefficient Cut off	24	walk access time coefficient cut off
Walk Access Cut off	15	walk access time cut off
Drive Access Cut off	5	drive access time cut off
Walk Distance Cut off	3	walk distance cut off
BIKE_DIST_CUTOFF	6	bike distance cut off

Table 23: Alternative Specific Constants and Coefficients

Alternative Specific Constants	Home Base Work[a]	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base
Motorized	0.0	0.0	0.0	0.0	0.0	0.0
Non-motorized	-0.5	0.2	0.2	0.2	-3.0	-1.4
Auto	0.0	0.0	0.0	0.0	0.0	0.0
Transit	-4.0	-5.0	-4.0	-4.0	-5.0	-4.0
Walk Access	0.0	0.0	0.0	0.0	0.0	0.0
Drive Access	-0.7183*2	-1.2512*2	-1.2512*2	-2.0863*2	-1.2512*2	-3.2096*2
Walk	0.0	0.0	0.0	0.0	0.0	0.0
Bike	-3.0	-3.0	-3.0	-4.0	-3.0	-3.0
Coefficients	**Home Base Work**	**Home Base Shop**	**Home Base Social**	**Home Base School**	**Home Base Other**	**Non-Home Base**
In-Vehicle Time (IVT)	-0.0221	-0.0107	-0.0107	-0.0221	-0.0107	-0.0233
First Wait Time (INITWAIT)	-0.0427	-0.0206	-0.0206	-0.0427	-0.0206	-0.0442
Transfer Wait (XFERWAIT)	-0.0500	-0.0247	-0.0247	-0.0500	-0.0247	-0.0663
Walk Time Within First Mile (WALK _1[b])	-0.0656	-0.0400	-0.0400	-0.0656	-0.0400	-0.0425
Walk Time After First Mile (WALK _GT_1[b])	-0.0656	-0.0400	-0.0400	-0.0656	-0.0400	-0.0425
Drive Access Time (DRIVE)	-0.0541	-0.0268	-0.0268	-0.0541	-0.0268	-0.0583
Bike Time (BIKE)	-0.0500	-0.0321	-0.0321	-0.0500	-0.0321	-0.0514
Cost (COST)	-0.0061	-0.0054	-0.0054	-0.0099	-0.0054	-0.0049
Parking Cost (PARKCOST)	-0.0061	-0.0054	-0.0054	-0.0099	-0.0054	-0.0389
Transit Transfers (TRANSFERS)	-0.2000	-0.2000	-0.2000	-0.2000	-0.2000	-0.2000

a. The model structure includes constants and coefficients for home base work by vehicle categories 0, 1, 2, and 3+.
b. Use average coefficient to eliminate non-logit decision rules

The coefficients and constants are within Federal Transit Administration guidelines, and therefore, are deemed reasonable.

Sensitivity Tests and Results

To test the sensitivity of the bus mode in the mode choice model, routes were added and deleted, and headways were improved. The model responded as expected in each test. Below summarizes the basic sensitivity tests completed.

One route was added in the City of Meridian to test for sensitivity (Figure 16). NOTE: This is not an actual route and added for testing purposes only.

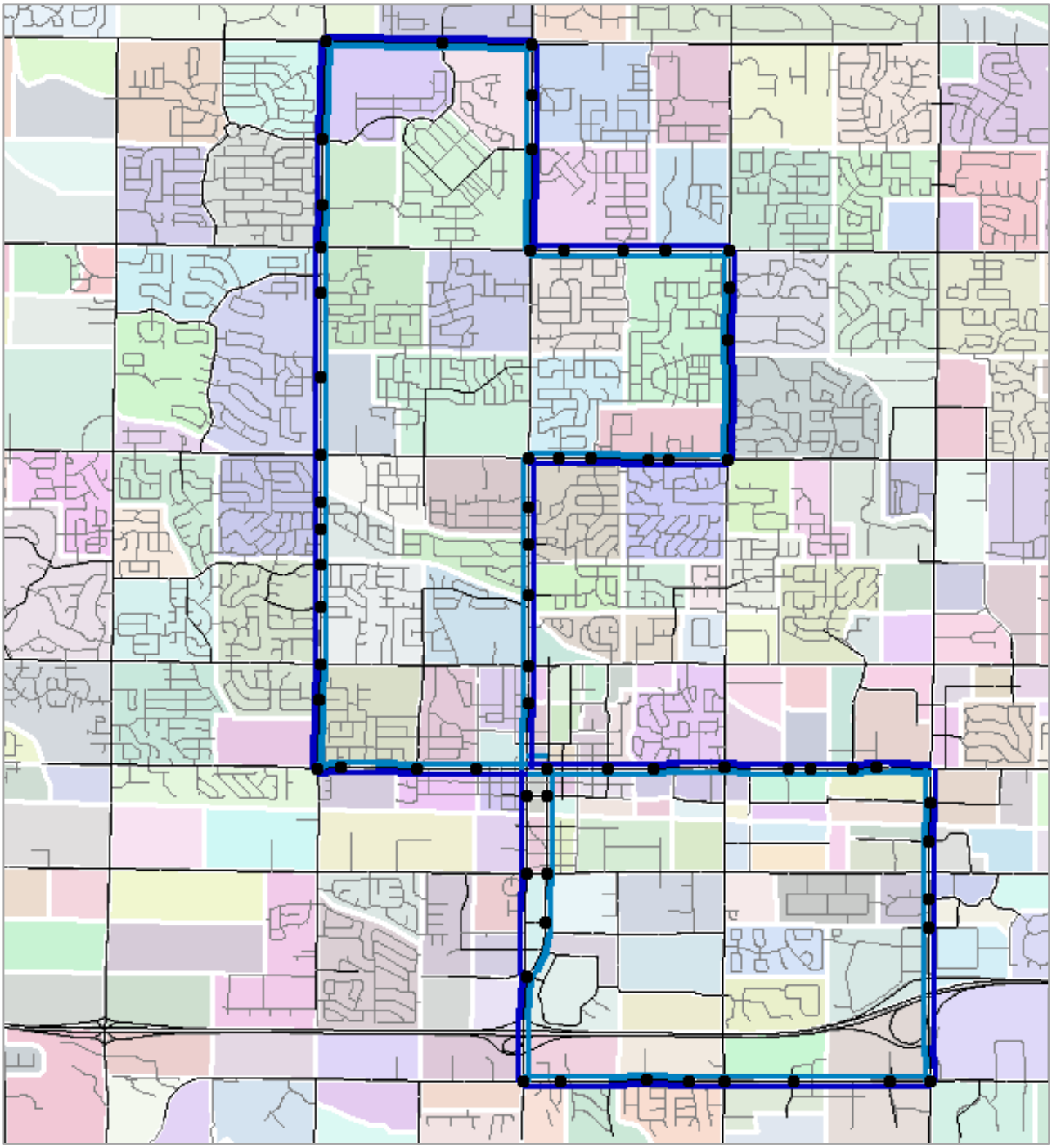


Figure 16: Route Addition in the City of Meridian Used for Sensitivity Testing.

Two routes were removed to test for sensitivity (Figure 17). Both routes (Route 9: State Street and Route 10: Hill Road/Maple Grove Road) are considered good performing routes in terms of average weekday ridership – nearly 700 and 500 respectively for April 2015.

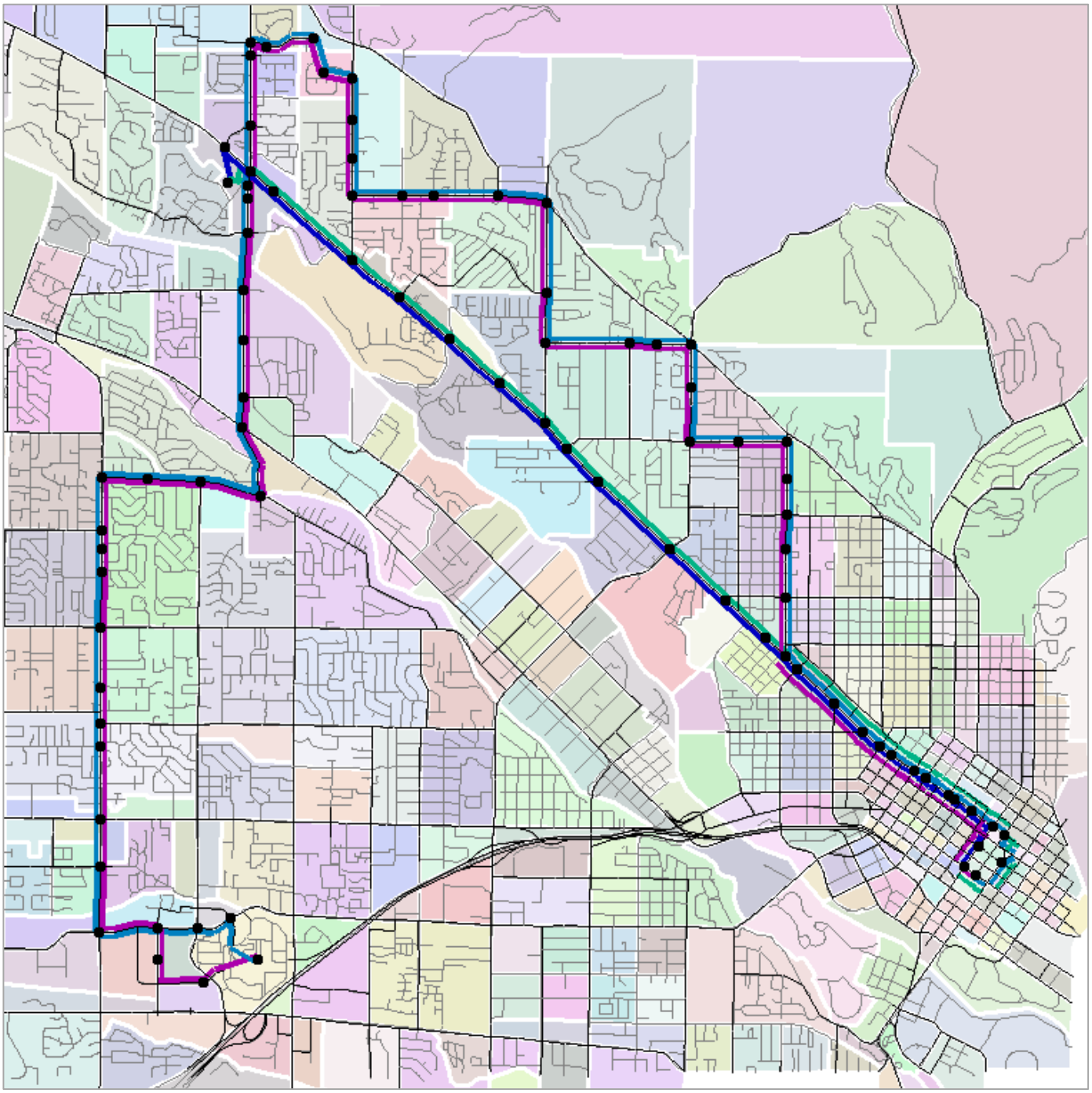


Figure 17: Route Deletions in Boise City Used for Sensitivity Testing.

Finally, sensitivity was tested by decreasing headways by 50%. Nine routes with headways of 30 minutes were tested at 15 minutes and the remaining routes with 60 minutes headways were tested at 30 minutes.

Figure 18 summarizes the percent change in walk and drive access trips and ridership estimated by the model for each of the different testing scenarios that are described above compared to the "official" scenario. As noted above, the model responded as expected to each test – ridership increased with an additional route, decreased when routes were removed, and increased with the change in headways.

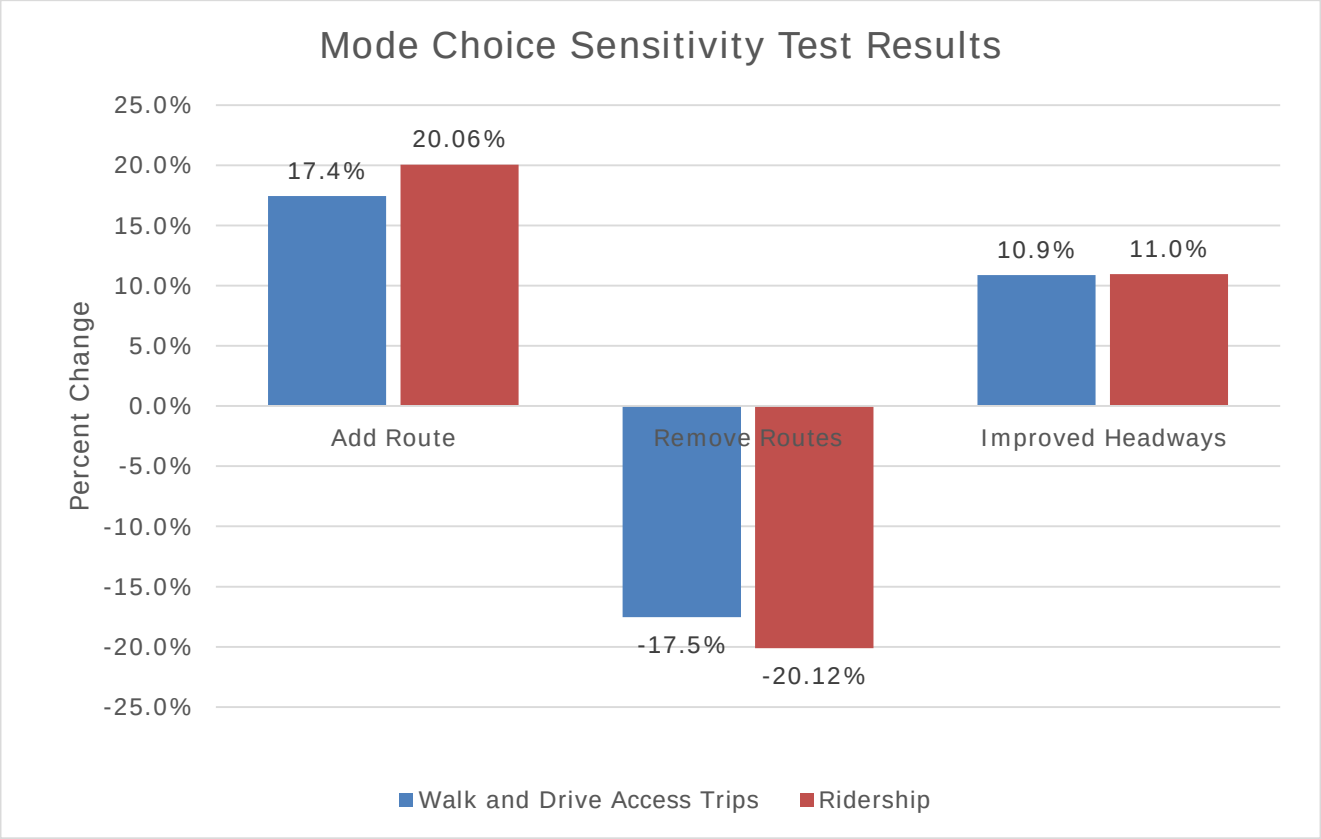
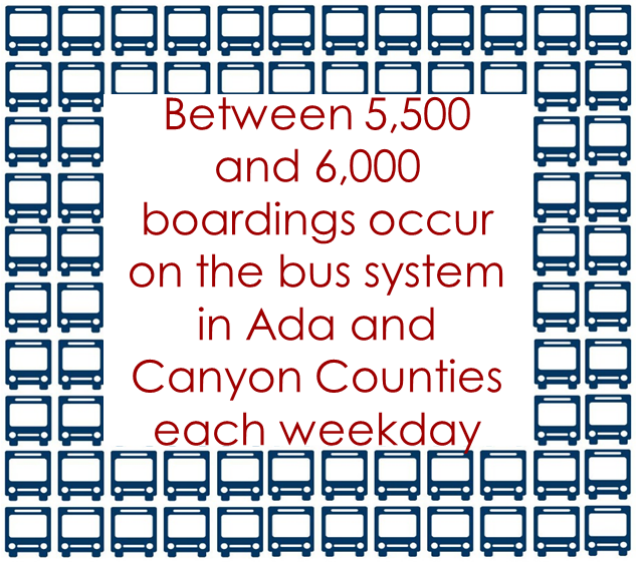


Figure 18: Percent Change in Walk and Drive Access Trips and Ridership, Sensitivity Test Results

Daily Model

Transit Assignment



The mode choice step produces 36 tables representing TAZ by TAZ person trips by trip type by trip purpose. The walk access to transit and drive access to transit by trip purpose are used in the transit assignment step of the model which is multi-path. The "probability of use" for each of the enumerated routes between TAZ pairs is calculated during the route evaluation process. Origin-destination trips are then assigned to the route based on the "probability of use." Validation of the transit assignment step occurs at the system-wide level and involves checking the overall ridership estimated by the model compared to actual ridership data.

As noted above in the Mode Choice section of this report, the area has only 23 bus routes with total average daily ridership ranging between 5,500 and 6,000. Trips by transit make up only 0.3% of all trips in the two county region. The model estimates 5,370 transit trips, equating to an average of about 8,000 daily riders. Most riders, 81%, access the bus by walk-mode. The current bus system does not have automatic passenger counters; therefore, actual ridership data are scarce and are often estimated.

Auto Occupancy Factors

Prior to assigning vehicle trips to the roadway network the TAZ by TAZ auto-person trips by purpose are converted to vehicle trips. The auto-person trips are first multiplied by the percent of trips that are single occupant vehicle, then these "remaining" person trips are divided by the non-single occupant vehicle factor. These rates – single occupant vehicle and non-single occupant vehicle – are from the regional household travel survey data.

Table 24: Auto Occupancy Factors for Daily Model

	Single Occupant Vehicle Rate	Non-Single Occupant Vehicle Factor
Home Base Work	97%	2.00
Home Base Shop	79%	2.28
Home Base Social	50%	2.47
Home Base Other	44%	2.42
Home Base School	25%	2.61
Non-Home Base	43%	2.05
Other Mode[a]	n/a	2.62
School Bus Mode[b]	n/a	22
Internal-External	n/a	1.75

a. Person trips by motorcycle, taxi, and "other" are not among the mode alternatives in the mode choice step of the model and are added back into the auto-person trip matrix prior to converting the auto-person trips to vehicle trips.
b. Idaho State Department of Education - School Transportation Directory[12] reports number of buses and average daily ridership by school district.

Highway Assignment

This highway assignment step uses an algorithm is used to find a solution and the solution corresponds to a set of link flows.

A user equilibrium algorithm was implemented for the regional model. The algorithm is iterated until a convergence is reached, at which point the changes in the solutions between two iterations is less than a pre-determined criterion. The solution yielded is a user equilibrium solution.

The regional model uses a relative gap of 0.0001, with maximum iterations set to 200. The daily base year model converges in 42 iterations and has 1.1% intra-zonal trips (total vehicle trips are 1,547,909 and total intra-zonal trips are 17,289). This low percentage of intra-zonal trips is mainly due to the size and number of TAZs.

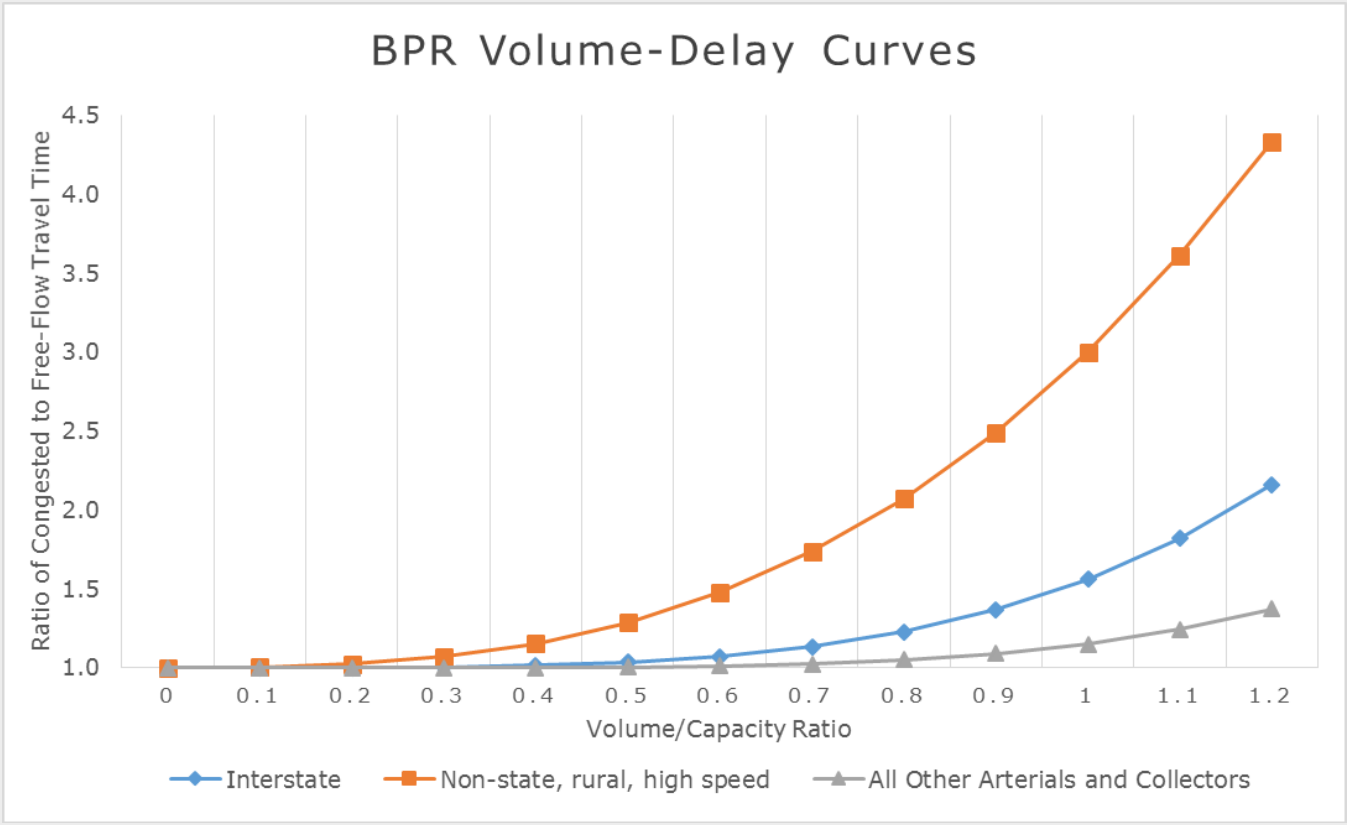
[12] http://sde.idaho.gov/student-transportation/index.html

A key element of a user equilibrium algorithm is the link volume-delay function (VDF). The VDF is used to determine the congested travel time based on the congestion level. The parameter for a VDF is the volume-to-capacity (V/C) ratio, which represents the level of congestion of a link.

The most widely used VDFs are the BPR functions (Bureau of Public Roads, a predecessor of Federal Highway Administration). BPR functions have a simple form and work well when congestion is not severe (V/C < 1.2), which is the case in the region. BPR functions are used in the regional model daily assignment step.

Table 25: BPR Volume-Delay Functions for the Daily Model

	Interstate	Other Arterials and Collectors	Non-State, Rural, High Speed Facilities
α	0.56	0.15	2.00
β	4	5	2.8



However, the BPR functions sometimes do not perform as well under more congested conditions such as during the peak hour. Many new types of volume-delay functions, such as Akcelik, Exponential, and Conical, have been proposed to better match the observed volume and speed data under more congested conditions. The Conical VDF was implemented in the regional model peak hour assignment because the V/C ratio can be much higher during the peak hours (see the Peak Hour Model section of this report).

Daily Assignment Validation Results

Tables 26 and 27 summarize validation targets (max deviation) and results produced by the daily regional model. These validation targets have been used since 2002, and were reviewed and agreed upon by the Transportation Model Advisory Committee. The daily and peak hour models use the same validation targets.

Table 26: Daily Model Validation Targets and Results

		All Links with Actual Count		All Links with Actual Count >100		All Links with Screenline[b]	
Facility Type	*Max Deviation*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*
Interstate and Ramps	< 40%	15.3%	PASS	15.3%	PASS	9.6%	PASS
Principal Arterials	< 40%	25.1%	PASS	25.1%	PASS	25.1%	PASS
Minor Arterials	< 40%	39.7%	PASS	39.6%	PASS	36.5%	PASS
Collectors	< 40%	67.9%		66.1%		76.6%	
Locals	< 40%	76.0%		73.7%		71.9%	
Overall	< 40%	35.2%	PASS	34.8%	PASS	27.8%	PASS
Without Locals	< 40%	34.2%	PASS	33.9%	PASS	27.3%	PASS
Without Collectors and Locals	< 40%	29.4%	PASS	29.4%	PASS	23.9%	PASS
Facility Type	*Max Deviation*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*
Interstate and Ramps	< 7%	4.2%	PASS	4.2%	PASS	5.1%	PASS
Principal Arterials	< 10%	-3.3%	PASS	-3.3%	PASS	-1.9%	PASS
Minor Arterials	< 15%	-9.9%	PASS	-10.0%	PASS	-7.3%	PASS
Collectors	< 25%	-17.3%	PASS	-17.6%	PASS	-23.4%	PASS
Locals	< 25%	-1.4%	PASS	-1.1%	PASS	-16.0%	PASS
Overall		-5.7%		-5.7%		-1.9%	
R-Squared		93%		93%		99%	85% screenlines "pass"
Correlation Coefficient		97%		97%		97%	
Sample size (n)		3,312		3,236		684 links covered by 173 screenlines	

[a] Root Mean Square Error (RMSE)
b See **Appendix E** for Screenline Maps and **Results, Daily Model** results for the daily model

Table 27: Additional Statistical Results by Daily Directional Volume Thresholds

Direction Volume Threshold	R-Squared	Correlation Coefficient	Sample Size (n)	Types of Facilities Included in the Sample Size
Greater than 1,000	92%	96%	2,405	All facility types
Greater than 5,000	90%	95%	1,097	All facility types
Greater than 10,000	91%	95%	387	No collectors or locals
Greater than 20,000	92%	96%	69	No minor arterials, collectors, or locals
Greater than 30,000	86%	95%	34	No minor arterials, collectors, or locals

Note: Highest directional average weekday volumes are ~60,900 and ~60,700 on Interstate 84. Only 1% of the regions facilities are over 30,000 average weekday volume.

Figure 19 shows the vehicles miles of travel (VMT) comparisons between the 2011 Highway Performance Monitoring System (HPMS) based VMT[13] and the travel demand model VMT estimate. The model VMT estimate is 6.7% lower than the HPMS based VMT. This is an acceptable difference given how VMT on local roads is estimated by both the model and HPMS.

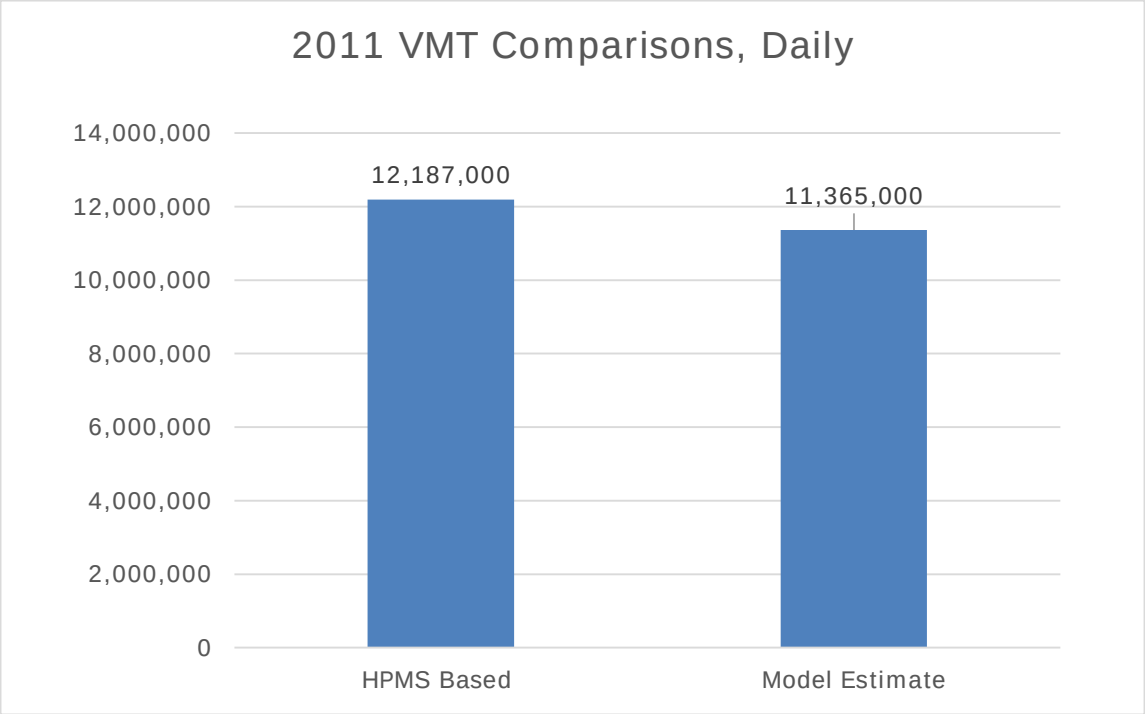


Figure 19: Comparisons between HPMS Based VMT and Model Estimated VMT

Based on the results provided in the tables above, the daily regional model is performing in a reasonable and acceptable manner.

[13] The HPMS based VMT estimates were completed by Idaho Department of Environmental Quality, Technical Services Division for the State of Idaho 2011 Periodic Emissions Inventory.

Peak Hour Models

Peak Hour 1: 5:00pm – 6:00pm

This section covers the estimation of peak hour factors by purpose, auto occupancy rates used to convert auto-person trips to vehicle trips, and the VDF for the development of peak hour model 1, which covers 5:00pm to 6:00pm.

Table 28: All Auto-Person Trips with a Departure Time Reported of 5:00pm to 5:59pm

	Person Trips (daily)	Person Trips (5:00pm to 5:59pm)	Home Origin	Not Home Origin	Peak Hour Factors (departure)	Peak Hour Factors (return)
Home Base Work (includes Non-Home Base Work)	4,710	551	24	527	0.5%	11.2%
Home Base Shop	4,157	323	102	221	2.5%	5.3%
Home Base Social	3,038	298	73	225	2.4%	7.4%
Home Base School (includes drop off/pickup)	3,899	271	122	149	3.1%	3.8%
Home Base Other	5,463	478	293	185	5.4%	3.4%
Non-Home Base	6,974	441	n/a	n/a	3.2%	3.2%
Total Trips	28,241	2,362	8.4% of all auto-person trips depart between 5:00pm and 5:59pm			

The peak hour models start with the final TAZ to TAZ auto-person trips by trip purpose matrices produced by the mode choice step. The 5:00pm to 6:00pm peak hour departure and return factors shown below (Table 29) are applied to these ”daily” auto-person trips by trip purpose which yields the peak hour auto-person trip by trip purpose matrices.

Table 29: Final Regional Peak Hour Factors

	Peak Hour Factors (departure)	Peak Hour Factors (return)
Home Base Work (includes Non-Home Base Work)	0.51	11.19
Home Base Shop	2.45	5.32
Home Base Social	2.40	7.41
Home Base School (includes drop off/pickup)	3.13	3.82
Home Base Other	5.36	3.39
Non-Home Base	3.16	3.16

Next, the peak hour auto-person trips by trip purpose are converted to vehicle trips for the peak hour highway assignment process.

Table 30: Auto Occupancy Factors for Peak Hour 1

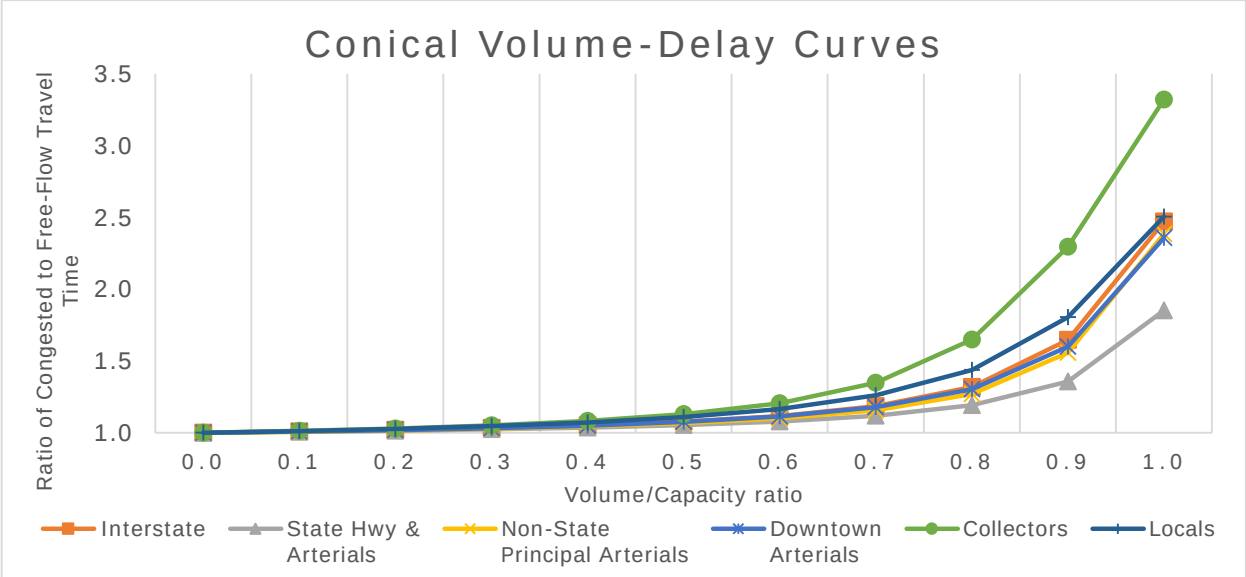
	Single Occupant Vehicle Rate	Non-Single Occupant Vehicle Factor
Home Base Work	0.94	2.66
Home Base Shop	0.74	2.55
Home Base Social	0.59	2.63
Home Base School	0.41	2.49
Home Base Other	0.52	2.43
Non-Home Base	0.54	2.53
Other Mode[a]	n/a	2.62
School Bus Mode[a]	n/a	22
Internal-External	n/a	1.75

a. Person trips by school bus, motorcycle, taxi, and "other" are not among the mode alternatives in the mode choice step of the model and are added back into the auto-person trip matrix prior to converting to the auto-person trips to vehicle trips.

As stated earlier, the daily model uses BPR volume-delay functions because assignment is more about route choice than congestion. Since congestion is a more critical component for the peak hour Conical VDFs are used. The following table and chart provide the Conical VDFs used in the peak hour models.

Table 31: Conical Volume-Delay Functions for Peak Hour Models

	Interstate	State Highways and Arterials	Non-State Principal Arterials	Downtown Principal Arterials and Minor Arterials	Collectors	Locals
×	1.05	0.984	1.037	1.039	1.16	1.071
α	8	10	9	8	6	6
β	1.071	1.055	1.0625	1.071	1.1	1.1



Tables 32 and 33 summarize validation targets (max deviation) and results produced by the peak hour 1. These validation targets have been used since 2002, and were reviewed and agreed upon by the Transportation Model Advisory Committee.

Table 32: Peak Hour 1 (5:00pm - 6:00pm) Validation Targets and Results

		All Links with Actual Count		All Links with Actual Count >100		All Links with Screenline	
Facility Type	*Max Deviation*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*
Interstate and Ramps	< 40%	18.3%	PASS	18.0%	PASS	12.0%	PASS
Principal Arterials	< 40%	29.0%	PASS	28.4%	PASS	27.8%	PASS
Minor Arterials	< 40%	41.8%		37.6%	PASS	36.9%	PASS
Collectors	< 40%	71.7%		54.7%		75.2%	
Locals	< 40%	68.6%		43.4%		70.5%	
Overall	< 40%	39.1%	PASS	33.2%	PASS	30.7%	PASS
Without Locals	< 40%	38.0%	PASS	33.0%	PASS	30.2%	PASS
Without Collectors and Locals	< 40%	32.9%	PASS	30.7%	PASS	26.7%	PASS
Facility Type	*Max Deviation*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*
Interstate and Ramps	< 7%	0.9%	PASS	0.9%	PASS	-0.5%	PASS
Principal Arterials	< 10%	-3.3%	PASS	-3.5%	PASS	-2.3%	PASS
Minor Arterials	< 15%	-9.2%	PASS	-10.6%	PASS	-6.9%	PASS
Collectors	< 25%	-17.9%	PASS	-21.9%	PASS	-22.0%	PASS
Locals	< 25%	-7.9%	PASS	-13.7%	PASS	-14.0%	PASS
Overall		-6.1%		-6.8%		-3.7%	
R-Squared		91%		90%		96%	84% screenlines "pass"
Correlation Coefficient		96%		95%		98%	
Sample size (n)		3,287		2,288		678 links covered by 172 screenlines (1 with total volume only)	

[a] Root Mean Square Error (RMSE)

Table 33: Additional Statistical Results by Peak Hour 1 (5:00pm - 6:00pm) Directional Volume Thresholds

Direction Volume Threshold	R-Squared	Correlation Coefficient	Sample Size (n)	Types of Facilities Included in the Sample Size
Greater than 10	91%	96%	3,139	All facility types
Greater than 100	90%	95%	2,288	All facility types
Greater than 500	87%	94%	888	All facility types
Greater than 1,000	89%	94%	289	No locals
Greater than 2,000	92%	97%	47	No minor arterials, collectors or locals
Greater than 3,000	90%	98%	23	No minor arterials, collectors or locals
Note: Highest directional 5:00pm – 6:00pm weekday volumes are ~6,800 and ~6,000 on Interstate 84.				

Based on the results provided in the tables above, the peak hour 1 model covering 5:00pm to 6:00pm is performing in a reasonable and acceptable manner.

Peak Hour 2: 4:00pm – 5:00pm

This section covers the estimation of peak hour factors by purpose, auto occupancy rates used to convert auto-person trips to vehicle trips, and the VDF for the development of peak hour model 2, which covers 4:00pm to 5:00pm.

Table 34: All Auto-Person Trips with a Departure Time Reported of 4:00pm to 4:59pm

	Person Trips (daily)	Person Trips (4:00pm to 4:59pm)	Home Origin	Not Home Origin	Peak Hour Factors (departure)	Peak Hour Factors (return)
Home Base Work (includes Non-Home Base Work)	4,710	478	33	445	0.70%	9.45%
Home Base Shop	4,157	382	99	283	2.38%	6.81%
Home Base Social	3,038	225	34	191	1.12%	6.29%
Home Base School (includes drop off/pickup)	3,899	190	49	141	1.26%	3.62%
Home Base Other	5,463	474	269	205	4.92%	3.75%
Non-Home Base	6,974	545	n/a	n/a	3.91%	3.91%
Total Trips	28,241	2,294	8.1% of all auto-person trips depart between 4:00pm and 4:59pm			

The peak hour models start with the final TAZ to TAZ auto-person trips by trip purpose matrices produced by the mode choice step. The 4:00pm to 5:00pm peak hour departure and return factors shown in Table 35 are applied to these "daily" auto-person trips by trip purpose, which yields the peak hour auto-person trip by trip purpose matrices.

Table 35: Final Regional Peak Hour Factors for Peak Hour 2

	Peak Hour Factors (departure)	Peak Hour Factors (return)
Home Base Work (includes Non-Home Base Work)	0.70	*9.00
Home Base Shop	2.38	*6.00
Home Base Social	1.12	6.29
Home Base School (includes drop off/pickup)	1.26	3.62
Home Base Other	4.92	3.75
Non-Home Base	3.91	3.91
*Note: Two return trip factors were slightly decreased during calibration of peak hour model 2		

Next, the peak hour auto-person trips by trip purpose are converted to vehicle trips for the highway assignment process.

Table 36: Auto Occupancy Factors for Peak Hour 2

	Single Occupant Vehicle Rate	Non-Single Occupant Vehicle Factor
Home Base Work	0.93	2.42
Home Base Shop	0.73	2.36
Home Base Social	0.63	2.80
Home Base School	0.45	2.29
Home Base Other	0.55	2.48
Non-Home Base	0.56	2.53
Other Mode[a]	n/a	2.62
School Bus Mode[a]	n/a	22
Internal-External	n/a	1.75

a. Person trips by school bus, motorcycle, taxi, and "other" are not among the mode alternatives in the mode choice step of the model and are added back into the auto-person trip matrix prior to converting to the auto-person trips to vehicle trips.

Tables 37 and 38 summarize validation targets (max deviation) and results produced by the daily regional model. These validation targets have been used since 2002, and were reviewed and agreed upon by the Transportation Model Advisory Committee.

Table 37: Peak Hour 2 (4:00pm - 5:00pm) Validation Targets and Results

		All Links with Actual Count		All Links with Actual Count >100		All Links with Screenline	
Facility Type	*Max Deviation*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*	*%RMSE[a]*	*Result*
Interstate and Ramps	< 40%	16.7%	PASS	16.0%	PASS	17.8%	PASS
Principal Arterials	< 40%	29.5%	PASS	29.0%	PASS	34.6%	PASS
Minor Arterials	< 40%	44.5%		36.8%	PASS	43.5%	
Collectors	< 40%	64.5%		52.7%		68.9%	
Locals	< 40%	74.1%		49.3%		70.1%	
Overall	< 40%	38.9%	PASS	32.7%	PASS	39.0%	PASS
Without Locals	< 40%	37.8%	PASS	32.4%	PASS	38.4%	PASS
Without Collectors and Locals	< 40%	34.4%	PASS	30.5%	PASS	36.0%	PASS
Facility Type	*Max Deviation*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*	*V/C % Difference*	*Result*
Interstate and Ramps	< 7%	1.9%	PASS	1.9%	PASS	3.9%	PASS
Principal Arterials	< 10%	-2.3%	PASS	-2.4%	PASS	0.6%	PASS
Minor Arterials	< 15%	-8.5%	PASS	-10.3%	PASS	-6.2%	PASS
Collectors	< 25%	-16.0%	PASS	-19.8%	PASS	-19.4%	PASS
Locals	< 25%	-4.0%	PASS	-8.8%	PASS	-14.6%	PASS
Overall		-5.0%		-5.7%		-1.7%	
R-Squared		92%		91%		96%	84% screenlines "pass"
Correlation Coefficient		96%		95%		98%	
Sample size (n)		3,287		2,224		678 links covered by 172 screenlines (1 with total volume only)	

[a] Root Mean Square Error (RMSE)

Table 38: Additional Statistical Results by Peak Hour 2 (4:00pm - 5:00pm) Directional Volume Thresholds

Direction Volume Threshold	R-Squared	Correlation Coefficient	Sample Size (n)	Types of Facilities Included in the sample Size
Greater than 10	92%	96%	3,124	All facility types
Greater than 100	91%	95%	2,224	All facility types
Greater than 500	88%	94%	813	All facility types
Greater than 1,000	90%	95%	262	No locals
Greater than 2,000	92%	96%	37	No minor arterials, collectors, or locals
Greater than 3,000	90%	97%	21	No minor arterials, collectors, or locals
*Note: Highest directional 4:00pm to 5:00pm weekday volumes are ~5,900 and ~6,700 on Interstate 84.				

Based on the results provided in the tables above, the peak hour 2 model covering 4:00pm to 5:00pm is performing in a reasonable and acceptable manner.

Forecast Elements

The information provided below describe the input data developed for future years in order for the model to "forecast" travel demand within the region.

Demographics – Population and Jobs

Annually, COMPASS works with its member agencies to reconcile the demographic forecasts based on the past year of development approvals (Table 39). Staff identifies TAZs where the 2040 household forecast is less than the current year plus "entitlements." This process is completed in the spring to ensure the demographics are ready for air quality conformity demonstration which COMPASS completes every summer using the best available planning assumptions. Although this process adjusts the individual TAZs forecasts, it honors the overall vision (preferred growth scenario) adopted by the COMPASS Board in October 2012.

Table 39: Demographic Data Set Reconcile 1 (official as of April 2015)

Ada County	2012	2015	2020	2025	2030	2035	2040
Population	391,636	415,864	454,999	499,014	536,571	605,915	676,020
Households	150,821	159,200	176,274	192,577	212,698	240,650	276,542
Vehicles	299,143	316,790	352,967	386,844	428,233	485,576	558,919
Retail	38,828	40,773	46,850	52,132	60,648	72,532	87,626
Office	136,081	138,688	146,835	153,887	165,288	181,285	201,687
Industrial	34,668	35,503	38,095	40,357	43,982	49,035	55,469
Government	15,290	15,520	16,218	16,820	17,792	19,155	20,857
Agriculture	1,161	1,157	1,139	1,124	1,094	1,054	1,006
Education	11,468	11,728	12,535	13,245	14,390	15,988	18,055
Total Jobs	237,496	243,369	261,672	277,565	303,194	339,049	384,700
Canyon County	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Population	188,514	195,621	210,094	238,283	265,243	304,312	344,572
Households	64,334	66,711	73,431	83,276	95,118	109,354	127,338
Vehicles	127,456	132,328	145,976	165,872	189,841	218,603	254,955
Retail	12,289	12,910	14,842	16,523	19,215	22,988	27,771
Office	29,501	30,371	33,107	35,478	39,305	44,673	51,582
Industrial	14,371	14,852	16,351	17,657	19,750	22,672	26,379
Government	3,252	3,339	3,598	3,818	4,180	4,679	5,302
Agriculture	2,951	2,944	2,913	2,888	2,845	2,784	2,707
Education	5,324	5,489	6,004	6,451	7,174	8,179	9,471
Total Jobs	67,688	69,905	76,815	82,815	92,469	105,975	123,212
Regional	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Population	580,150	611,485	665,093	737,297	801,814	910,227	1,020,592
Households	215,155	225,911	249,705	275,853	307,816	350,004	403,880
Vehicles	426,599	449,118	498,943	552,716	618,074	704,179	813,874
Retail	51,117	53,683	61,692	68,655	79,863	95,520	115,397
Office	165,582	169,059	179,942	189,365	204,593	225,958	253,269
Industrial	49,039	50,355	54,446	58,014	63,732	71,707	81,848
Government	18,542	18,859	19,816	20,638	21,972	23,834	26,159
Agriculture	4,112	4,101	4,052	4,012	3,939	3,838	3,713
Education	16,792	17,217	18,539	19,696	21,564	24,167	27,526
Total Jobs	305,184	313,274	338,487	360,380	395,663	445,024	507,912

In 2014, COMPASS completed a six-month effort to build the first comprehensive employment (job) data set using employment from the Idaho Department of Labor and purchased address-level employment data from InfoUSA (Table 40). The Idaho Department of Labor only tracks and provides employment covered with unemployment insurance; therefore, some small business and sole-proprietor jobs are "missing." The InfoUSA data set includes all known employment.

Table 40: Comparison of Employment by Source

	Idaho Department of Labor	InfoUSA	Difference
Number of Records (establishments)	19,800	29,700	9,900
Employment total	260,700	308,600	47,900
Final 2013 employment total[a]	**305,180**		
a. Data were reviewed and corrected for duplicates and other anomalies			

The 2013 employment data had a significant impact on the demographic reconciliation process because it included 44,000 jobs that had not been accounted for in previous data sets. Reconciling the demographic data sets for 2015 through 2040 was completed in summer 2014.

These more accurate employment numbers, along with using the NAICS codes to classify jobs into the general model categories (as shown above in Table 39), yielded better trip generation results.

Future Schools and Enrollment Forecasts

The regional travel demand model uses school enrollment by type by location to estimate and forecast HBSc person trips. Current enrollment data for each public school are obtained from the Idaho State Department of Education website. Staff also gathered information from the local school districts on school building capacity and near-term new schools, such as location, type, opening date, anticipated opening enrollment, and the level of enrollment from existing schools that would likely shift to the new school. Staff also used parcel-level GIS data to identify parcels owned by the local school districts and "placed" new schools in those TAZs for the forecast years. Based on these data, 19 new schools were added to the model between 2011 and 2040.

To help determine the number of new schools the area may need by 2040, staff used information from a cohort analysis that was completed by COMPASS in January 2015. This cohort analysis provided population by age group by gender for each county (see Table 43 and Table 44).

Using the available five-year increment cohort analysis, COMPASS was able to forecast the number of new schools needed and enrollment levels by type. Enrollment was increased in existing schools based on building capacity, historical average, or recent maximum. For example, if the cohort group for elementary schools increased in population between 2011 and 2015, then the enrollment in some elementary schools were increased or a "new" school was added. Otherwise, enrollment remained the same as the previous forecast year.

This method estimated the area may need up to 21 new public schools given prevailing building capacity by school type – 600 students for elementary, 1000 students for

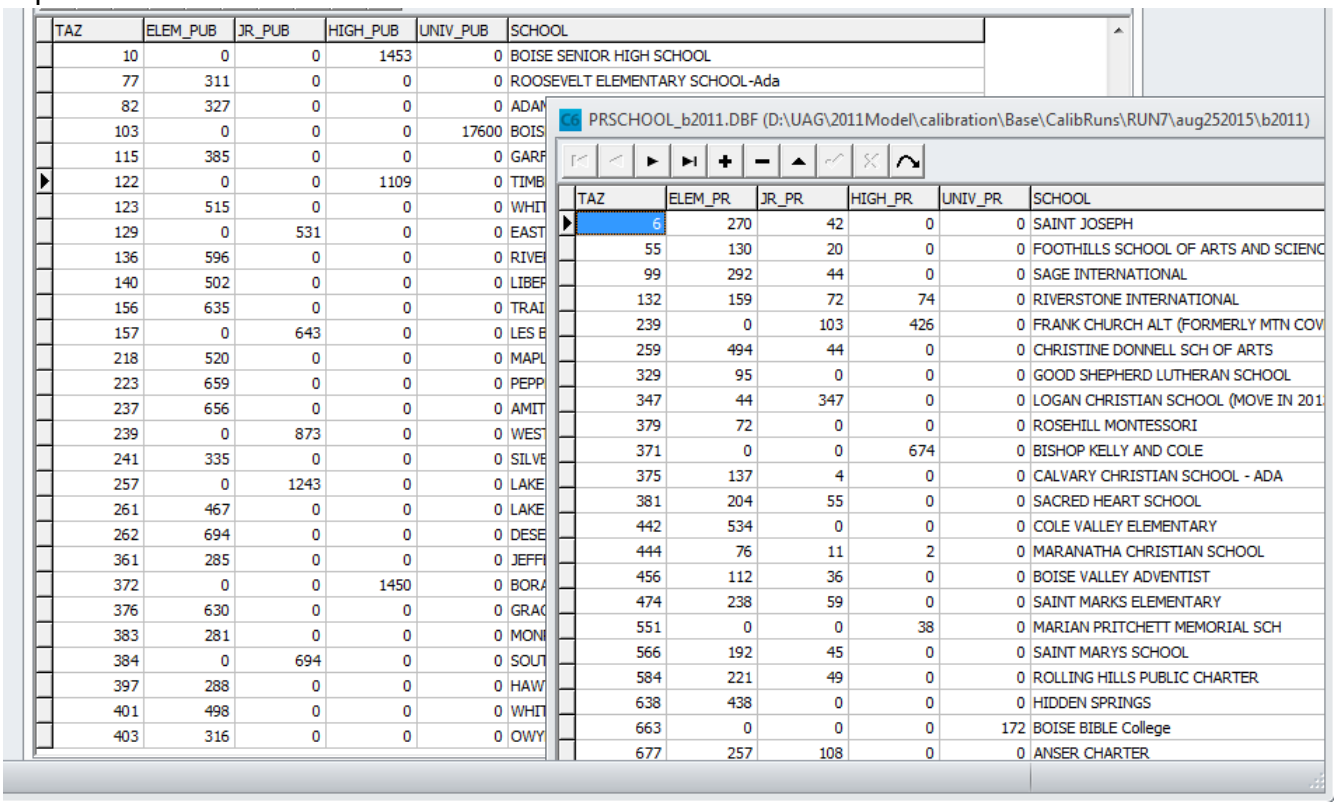
middle/junior high, and 2000 students for senior high schools COMPASS does not prescribe the location or timing of new schools. Both methods provided similar results.

Modest increases in private school and college/university enrollment were assumed based on historic enrollment data.

One challenge was that the age groups do not align perfectly with school-type age groups. For example, elementary schools in the model cover 1st to 5th grade, which is typically 6 to 10 years old. Therefore, adjustments were made to the "cohort" groups for the purposes of forecasting public school and enrollment for modeling purposes.

Another challenge is identifying and removing the virtual school and online class enrollment in the data provided. Otherwise, it produces a HBSc "person trip," even though a person is not traveling to school. This is particularly challenging with how universities report enrollment.

The model uses school enrollment by type for each TAZ that contains or will contain a school (Figure 20). Given the number of schools (over 200) only summaries are provided in this report.



TAZ	ELEM_PUB	JR_PUB	HIGH_PUB	UNIV_PUB	SCHOOL
10	0	0	1453	0	BOISE SENIOR HIGH SCHOOL
77	311	0	0	0	ROOSEVELT ELEMENTARY SCHOOL-Ada
82	327	0	0	0	ADAM
103	0	0	0	17600	BOIS
115	385	0	0	0	GARF
122	0	0	1109	0	TIMB
123	515	0	0	0	WHIT
129	0	531	0	0	EAST
136	596	0	0	0	RIVE
140	502	0	0	0	LIBE
156	635	0	0	0	TRAI
157	0	643	0	0	LES E
218	520	0	0	0	MAPL
223	659	0	0	0	PEPP
237	656	0	0	0	AMIT
239	0	873	0	0	WEST
241	335	0	0	0	SILVE
257	0	1243	0	0	LAKE
261	467	0	0	0	LAKE
262	694	0	0	0	DESE
361	285	0	0	0	JEFF
372	0	0	1450	0	BORA
376	630	0	0	0	GRAC
383	281	0	0	0	MONI
384	0	694	0	0	SOUT
397	288	0	0	0	HAW
401	498	0	0	0	WHIT
403	316	0	0	0	OWY

TAZ	ELEM_PR	JR_PR	HIGH_PR	UNIV_PR	SCHOOL
6	270	42	0	0	SAINT JOSEPH
55	130	20	0	0	FOOTHILLS SCHOOL OF ARTS AND SCIENC
99	292	44	0	0	SAGE INTERNATIONAL
132	159	72	74	0	RIVERSTONE INTERNATIONAL
239	0	103	426	0	FRANK CHURCH ALT (FORMERLY MTN COV
259	494	44	0	0	CHRISTINE DONNELL SCH OF ARTS
329	95	0	0	0	GOOD SHEPHERD LUTHERAN SCHOOL
347	44	347	0	0	LOGAN CHRISTIAN SCHOOL (MOVE IN 201
379	72	0	0	0	ROSEHILL MONTESSORI
371	0	0	674	0	BISHOP KELLY AND COLE
375	137	4	0	0	CALVARY CHRISTIAN SCHOOL - ADA
381	204	55	0	0	SACRED HEART SCHOOL
442	534	0	0	0	COLE VALLEY ELEMENTARY
444	76	11	2	0	MARANATHA CHRISTIAN SCHOOL
456	112	36	0	0	BOISE VALLEY ADVENTIST
474	238	59	0	0	SAINT MARKS ELEMENTARY
551	0	0	38	0	MARIAN PRITCHETT MEMORIAL SCH
566	192	45	0	0	SAINT MARYS SCHOOL
584	221	49	0	0	ROLLING HILLS PUBLIC CHARTER
638	438	0	0	0	HIDDEN SPRINGS
663	0	0	0	172	BOISE BIBLE College
677	257	108	0	0	ANSER CHARTER

Figure 20: Screenshot of School Enrollment Data Structure

Tables 41 and 42 summarize the enrollment by county, by type for the base year and forecast years for both public and private schools.

Table 41: Public School Enrollment, Base Year (2012) and Forecasts

Ada County	2012	2015	2020	2025	2030	2035	2040
Elementary	30,613	31,447	32,123	32,833	34,831	35,948	36,846
Middle / Junior High School	14,278	14,568	15,768	16,262	17,957	19,344	19,850
Senior High School	15,717	16,552	17,746	18,020	18,928	19,847	20,690
University / College	17,600	17,600	18,100	18,600	19,100	19,600	20,600
Total	78,208	80,167	83,737	85,715	90,816	94,739	97,986
Canyon County	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Elementary	16,604	17,216	17,640	18,656	19,072	19,488	20,312
Middle / Junior High School	7,653	8,088	8,306	8,526	9,742	11,958	12,380
Senior High School	8,622	9,249	10,353	11,066	13,379	14,192	14,930
University / College	6,574	6,574	6,807	7,040	7,273	7,506	7,975
Total	39,453	41,127	43,106	45,288	49,466	53,144	55,597
Regional	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Elementary	47,217	48,663	49,763	51,489	53,903	55,436	57,158
Middle / Junior High School	21,931	22,656	24,074	24,788	27,699	31,302	32,230
Senior High School	24,339	25,801	28,099	29,086	32,307	34,039	35,620
University / College	24,174	24,174	24,907	25,640	26,373	27,106	28,575
Total	117,661	121,294	126,843	131,003	140,282	147,883	153,583

Table 42: Private School Enrollment, Base Year (2012) and Forecasts

Ada County	2012	2015	2020	2025	2030	2035	2040
Elementary	6,749	7,836	7,836	7,836	7,931	8,309	8,311
Middle/Junior High School	2,279	2,452	2,452	2,452	2,577	2,654	2,654
Senior High School	3,045	3,120	3,174	3,174	3,174	3,228	3,388
University / College	695	697	699	701	703	705	710
Total	12,768	14,105	14,161	14,163	14,385	14,896	15,063
Canyon County	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Elementary	2,879	2,907	2,935	2,963	2,991	3,019	3,055
Middle/Junior High School	1,098	1,116	1,134	1,134	1,154	1,171	1,205
Senior High School	1,773	1,904	1,960	2,016	2,072	2,125	2,215
University / College	2,892	2,960	3,028	3,096	3,164	3,232	3,300
Total	8,642	8,887	9,057	9,209	9,381	9,547	9,775
Regional	**2012**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Elementary	9,628	10,743	10,771	10,799	10,922	11,328	11,366
Middle/Junior High School	3,377	3,568	3,586	3,586	3,731	3,825	3,859
Senior High School	4,818	5,024	5,134	5,190	5,246	5,353	5,603
University / College	3,587	3,657	3,727	3,797	3,867	3,937	4,010
Total	21,410	22,992	23,218	23,372	23,766	24,443	24,838

Adjustments to the school information are done on an as-needed basis. New schools are added into the input databases used in trip generation. Typically, enrollment is estimated based on the reported capacity or anticipated opening enrollment levels for these new schools. Enrollment data are reviewed the following year when the actual numbers are available from the Idaho State Department of Education. The TAZ in which the new school resides is added to the “accessible” TAZ list. This is addressed in the trip distribution section of this report. Periodically, staff conduct a thorough review of enrollment boundaries changed, added, or revised by the districts and modify the model scripts accordingly.

Table 43: Ada County Cohort Analysis

	2010		2015		2020		2025		2030		2035		2040	
Age	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*
0 to 4	14,450	13,907	13,404	12,128	13,721	12,414	14,662	13,266	14,875	13,457	14,606	13,215	13,628	12,329
5 to 9	15,288	14,776	14,743	14,387	13,731	12,597	14,578	13,373	15,931	14,616	16,666	15,288	15,864	14,554
10 to 14	14,711	14,135	15,725	15,296	15,226	14,954	14,707	13,579	15,969	14,743	17,994	16,616	18,249	16,848
15 to 19	13,710	12,793	15,227	14,632	16,342	15,899	16,411	16,119	16,212	14,970	18,151	16,759	19,828	18,311
20 to 24	12,974	12,738	14,150	13,230	15,780	15,193	17,563	17,121	18,039	17,753	18,374	17,000	19,944	18,451
25 to 29	15,144	14,078	13,348	13,164	14,617	13,728	16,905	16,349	19,244	18,843	20,381	20,146	20,124	18,702
30 to 34	14,523	13,868	15,579	14,540	13,787	13,651	15,658	14,763	18,521	17,982	21,740	21,371	22,320	22,150
35 to 39	14,563	13,679	14,932	14,311	16,082	15,066	14,760	14,668	17,145	16,225	20,911	20,378	23,795	23,478
40 to 44	14,073	13,510	14,948	14,096	15,389	14,807	17,189	16,167	16,135	16,098	19,326	18,361	22,849	22,356
45 to 49	14,251	13,944	14,386	13,880	15,343	14,541	16,380	15,841	18,713	17,690	18,113	18,163	21,032	20,081
50 to 54	13,319	13,567	14,465	14,257	14,661	14,250	16,216	15,483	17,705	17,250	20,857	19,863	19,571	19,770
55 to 59	11,621	11,995	13,364	13,786	14,572	14,546	15,318	15,078	17,328	16,755	19,508	19,249	22,279	21,487
60 to 64	9,788	9,912	11,498	12,103	13,275	13,967	15,013	15,283	16,140	16,203	18,828	18,565	20,548	20,677
65 to 69	6,491	7,028	9,509	9,864	11,216	12,093	13,430	14,473	15,533	16,196	17,220	17,707	19,473	19,668
70 to 74	4,327	4,943	6,104	6,878	8,979	9,693	10,983	12,324	13,450	15,084	16,041	17,406	17,239	18,447
75 to 79	2,972	3,886	3,864	4,628	5,473	6,465	8,350	9,449	10,446	12,286	13,191	15,508	15,251	17,347
80 to 84	2,299	3,257	2,429	3,409	3,172	4,076	4,658	5,904	7,268	8,826	9,376	11,833	11,477	14,480
85 plus	1,997	3,848	2,673	4,975	3,138	5,827	4,053	7,146	5,772	9,719	8,965	14,315	12,073	19,466

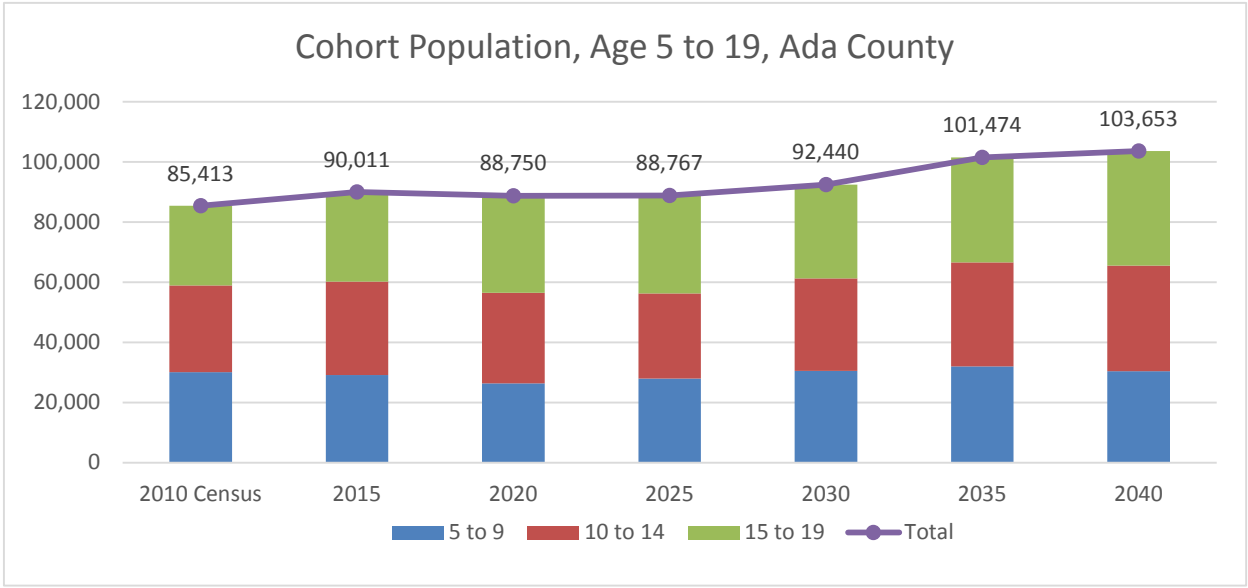
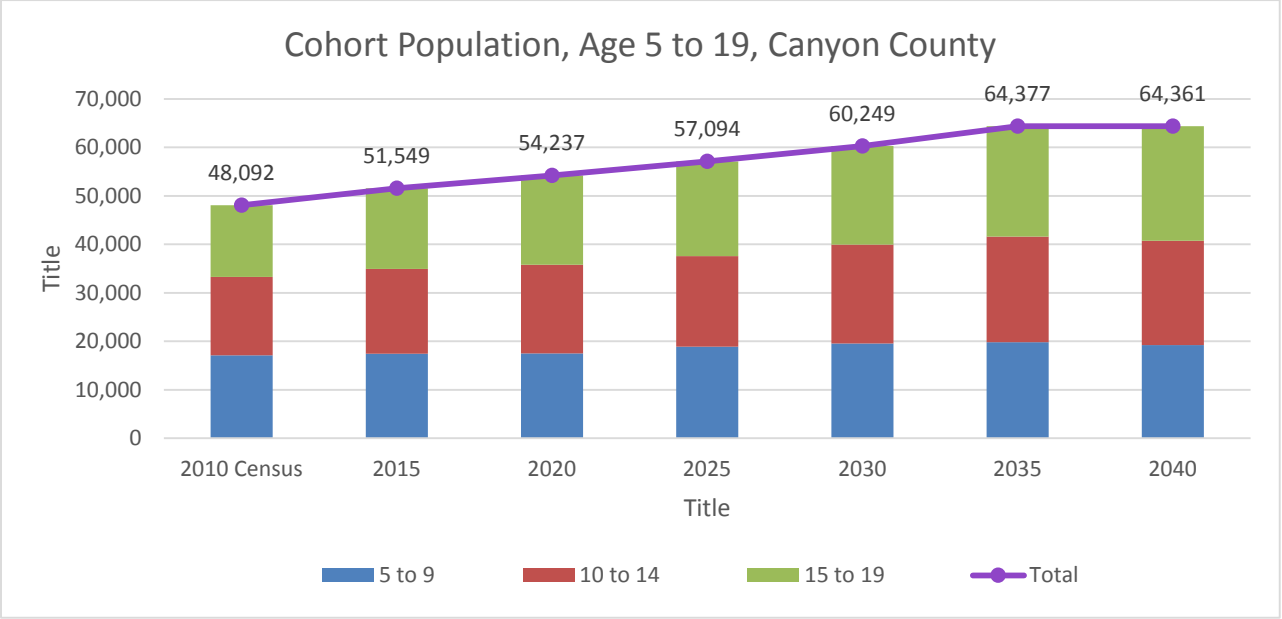


Table 44: Canyon County Cohort Analysis

	2010		2015		2020		2025		2030		2035		2040	
Age	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*	*Males*	*Females*
0 to 4	8,768	8,375	8,505	8,302	9,016	8,801	9,183	8,965	9,064	8,849	9,016	8,801	8,604	8,399
5 to 9	8,740	8,401	8,863	8,584	8,813	8,722	9,493	9,396	9,823	9,724	9,968	9,868	9,662	9,563
10 to 14	8,289	7,878	8,906	8,616	9,259	9,024	9,355	9,318	10,238	10,198	10,891	10,849	10,770	10,729
15 to 19	7,550	7,234	8,500	8,080	9,362	9,058	9,890	9,641	10,153	10,113	11,422	11,378	11,840	11,797
20 to 24	5,908	6,049	7,720	7,412	8,909	8,485	9,972	9,667	10,702	10,453	11,295	11,274	12,383	12,360
25 to 29	6,275	6,543	6,022	6,193	8,066	7,779	9,460	9,050	10,757	10,473	11,867	11,643	12,206	12,237
30 to 34	6,677	6,751	6,395	6,695	6,291	6,495	8,563	8,291	10,204	9,800	11,928	11,659	12,824	12,631
35 to 39	6,292	6,357	6,802	6,902	6,677	7,016	6,676	6,917	9,231	8,970	11,307	10,900	12,881	12,638
40 to 44	6,006	5,684	6,398	6,491	7,090	7,223	7,073	7,461	7,185	7,473	10,212	9,963	12,191	11,798
45 to 49	5,691	5,902	6,082	5,786	6,643	6,772	7,479	7,659	7,581	8,037	7,916	8,276	10,964	10,751
50 to 54	5,315	5,478	5,723	5,979	6,269	6,007	6,958	7,146	7,959	8,211	8,294	8,858	8,439	8,889
55 to 59	4,775	5,004	5,284	5,515	5,832	6,169	6,492	6,299	7,319	7,614	8,608	8,993	8,741	9,454
60 to 64	4,095	4,490	4,680	5,003	5,309	5,651	5,955	6,424	6,734	6,664	7,806	8,280	8,945	9,530
65 to 69	3,295	3,555	3,942	4,427	4,618	5,055	5,322	5,803	6,066	6,702	7,051	7,148	7,966	8,655
70 to 74	2,249	2,476	3,070	3,447	3,765	4,400	4,481	5,106	5,247	5,954	6,148	7,070	6,965	7,348
75 to 79	1,566	1,906	1,990	2,297	2,784	3,277	3,470	4,251	4,196	5,012	5,051	6,009	5,767	6,952
80 to 84	1,062	1,535	1,268	1,656	1,651	2,046	2,348	2,966	2,973	3,909	3,696	4,738	4,337	5,536
85 plus	953	1,799	1,240	2,314	1,573	2,798	2,058	3,473	2,873	4,729	3,894	6,512	4,897	8,208



Transportation Network

Annually, COMPASS staff reviews the roadway network for each of the forecast years as part of the air quality conformity demonstration for the Regional Transportation Improvement Program update. Changes to the roadway network are based on programmed and planned-funded transportation projects listed in official programs and plans at that time. The source of this information is documented in air quality conformity demonstration reports available on the COMPASS website[14]. Transportation agencies inform COMPASS staff of speed limit changes, which are updated in the network on an as-needed basis. Currently, no additional funding is available for transit, so the changes to this system are minimal. Periodically, COMPASS staff reviews the bus routes, headways, and other information to keep it reflective of "today's" conditions.

External Trips

External to external trips were estimated using historical traffic count data from the Idaho Transportation Department's permanent traffic count locations (ATRs) located near the regional model's external nodes (gateways) (see Figure 6). A simple trend analysis was used to forecast daily volumes in five-year increments.

These "forecasted" daily external volumes were used to calculate a growth rate for external trips. Then, the growth rate was applied to the 2008 external trips (Table 45), which were derived from data collected as part of the Treasure Valley Truck Freight[15] video license plate external station survey. See Appendix B for more details.

Table 45: External to External Trips per Station and Final Rates, Daily Model

External Node Number	Road Name	2008		2012		2015		2020	
		In	*Out*	*In*	*Out*	*In*	*Out*	*In*	*Out*
3738	SH 16	19	20	*20*	*21*	20	21	24	26
3739	SH 55 North	18	16	*20*	*17*	21	19	26	23
3740	*Bogus Basin Rd*	5	5	*5*	*5*	5	5	7	7
3741	SH 21	7	13	*7*	*14*	8	15	9	17
3742	*Blacks Creek Rd*	1	1	*1*	*1*	1	1	1	1
3743	I84 East	422	709	*438*	*735*	453	761	501	841
3744	*Swan Falls Rd*	2	2	*2*	*2*	2	2	2	2
3745	SH 45	15	9	*15*	*9*	15	9	17	10
3746	SH 55 South	18	19	*19*	*20*	19	20	22	23
3747	US 95 South	135	198	*138*	*202*	141	206	155	228
3748	*Hwy 18*[a]	1	1	*1*	*1*	1	1	1	1
3749	US 95 North	193	119	*197*	*122*	202	124	216	133
3750	I84 West	685	409	*718*	*429*	752	449	885	528
		1,521	1,521	*1,581*	*1,578*	1,641	1,635	1,866	1,840
X – X Growth Rates		n/a		**3.9%**		**7.9%**		**22.7%**	
External Node Number	**Road Name**	**2025**		**2030**		**2035**		**2040**	
		In	*Out*	*In*	*Out*	*In*	*Out*	*In*	*Out*
3738	SH 16	27	28	28	30	30	32	32	34
3739	SH 55 North	27	24	28	25	29	26	30	27
3740	*Bogus Basin Rd*	7	7	8	8	9	9	9	9

[14] http://www.compassidaho.org/prodserv/aq-demo.htm
[15] Commercial Vehicle Intercept Survey and Video External Station Survey Final Report

3741	SH 21	9	17	9	17	9	18	10	18
3742	*Blacks Creek Rd*	1	1	1	1	2	2	2	2
3743	I84 East	514	864	527	886	540	908	553	929
3744	*Swan Falls Rd*	3	3	3	3	3	3	3	3
3745	SH 45	17	10	18	11	19	11	19	12
3746	SH 55 South	23	25	25	26	26	28	27	29
3747	US 95 South	164	240	172	252	179	262	186	273
3748	*Hwy 18*[a]	1	1	1	1	2	2	2	2
3749	US 95 North	220	136	225	139	229	141	233	144
3750	I84 West	941	562	993	593	1,041	622	1,087	649
		1,955	1,918	2,039	1,992	2,118	2,062	2,192	2,128
X – X Growth Rates		**28.5%**		**34.0%**		**39.2%**		**44.1%**	

Appendix F includes diagrams of the regional travel demand model steps and the entire model script.

Conclusion

Based upon the documentation and statistical results provided above on pages 10 to 52 it is concluded that the regional travel demand model covering Ada and Canyon County, Idaho, is calibrated and validated.

Appendix A: Household Travel Survey Data and Results

Household Travel Survey Data Expansion Process

The raw regional household travel survey data were expanded to represent the two county population using the American Community Survey (ACS) five-year estimates (2008 – 2012) of household size by vehicles available (Table 46).[16]

Table 46: Household Data Comparisons – COMPASS Estimates vs ACS 5-year Estimates

	Households (COMPASS Estimate)		Households (ACS 5-year)		Households Surveyed	
Ada County	150,821	70.1%	149,884	70.4%	2,258	72.7%
Canyon County	64,334	29.9%	63,012	29.6%	846	27.3%
Regional Total	**215,155**		**212,896**		**3,104**	

Table 47 shows the number of households by vehicle availability. These data were used to expand the household travel survey data by area.

Table 47: ACS 5-Year (2008-2012) Household Size by Vehicles Available

Household Size	Vehicles	Ada County Households	Canyon County Total Households	Regional Households	Boise City and Garden City	Eagle	Meridian	Kuna, Star, and Rural Ada County	Nampa	Caldwell	Middleton, Small Cities, and Rural Canyon County
1	0	4,454	1,791	6,245	3,764	139	446	105	796	687	308
	1	26,168	8,145	34,313	19,923	805	3,203	2,237	3,985	2,282	1,878
	2	5,327	2,597	7,924	3,362	245	839	881	952	626	1,019
	3	915	327	1,242	614	103	50	148	94	16	217
	4+	217	83	300	139	0	26	52	13	0	70
2	0	1,376	512	1,888	1,090	43	204	39	252	130	130
	1	10,536	4,159	14,695	6,810	416	2,003	1,307	2,023	1,263	873
	2	30,618	10,686	41,304	18,784	1,724	5,273	4,837	4,360	2,397	3,929
	3	8,273	4,068	12,341	4,643	417	1,206	2,007	1,353	615	2,100
	4+	1,940	1,579	3,519	1,014	150	192	584	342	164	1,073
3	0	286	245	531	247	0	13	26	103	109	33
	1	4,396	2,146	6,542	2,743	326	694	633	1,229	598	319
	2	10,213	3,322	13,535	5,820	388	1,809	2,196	1,680	884	758
	3	7,198	2,763	9,961	4,495	309	1,037	1,357	1,023	735	1,005
	4+	1,829	1,115	2,944	900	11	403	515	314	232	569
4+	0	738	292	1,030	547	40	112	39	229	41	22
	1	3,781	2,468	6,249	2,353	57	544	827	1,259	713	496
	2	18,399	8,466	26,865	7,933	1,020	5,114	4,332	3,951	2,299	2,216
	3	8,540	5,031	13,571	3,787	746	1,894	2,113	2,010	1,123	1,898
	4+	4,680	3,217	7,897	2,160	243	919	1,358	1,107	467	1,643

[16] While the *2012 COMPASS Household Travel Survey Report* included expansion rates, a separate expansion process was completed by COMPASS using the ACS five-year estimates, as the ACS data provided a closer match to the number of households in the two-county area than the data used by the consultant conducting the survey.

Table 48: Number of Households Surveyed

Household Size	Vehicles	Ada County Households	Canyon County Total Households	Regional Households	Boise City and Garden City	Eagle	Meridian	Kuna, Star, and Rural Ada County	Nampa	Caldwell	Middleton, Small Cities, and Rural Canyon County
1	0	34	15	49	27	3	2	2	6	4	5
	1	341	103	444	238	27	34	42	48	31	24
	2	82	36	118	51	8	12	11	15	10	11
	3	17	6	23	13	1	2	1	2	2	2
	4+	1	1	2	0	0	0	1	0	0	1
2	0	5	7	12	3	1	1	0	5	2	0
	1	155	65	220	109	3	29	14	31	17	17
	2	555	153	708	328	44	98	85	74	26	53
	3	207	55	262	100	10	41	56	16	14	25
	4+	14	11	25	8	1	4	1	4	1	6
3	0	0	1	1	0	0	0	0	0	1	0
	1	23	22	45	16	4	1	2	11	6	5
	2	132	55	187	68	27	23	14	26	13	16
	3	128	43	171	72	14	21	21	20	6	17
	4+	14	8	22	6	1	3	4	1	2	5
4+	0	1	0	1	1	0	0	0	0	0	0
	1	25	31	56	16	5	1	3	15	11	5
	2	284	125	409	125	26	78	55	62	29	34
	3	217	85	302	97	15	50	55	38	17	30
	4+	23	24	47	11	1	4	7	3	5	16

In order to expand the household travel survey data to represent the two-county region, the ACS “number of households by category” were divided by the “surveyed” number of households by category (Table 49). For categories with no data staff elected to use “nearest neighbor”; therefore, the 3 or 4+ person households with no vehicle available received the same expansion factor as calculated for the 1-vehicle category.

Table 49: Final Expansion Rates by Area, Rounded to the Nearest Hundredth

Household Size	Vehicles	Boise City and Garden City	Eagle	Meridian	Kuna, Star, and Rural Ada County	Nampa	Caldwell	Middleton, Small Cities, and Rural Canyon County
1	0	139.41	46.33	223.00	52.50	132.67	171.75	61.60
	1	83.71	29.81	94.21	53.26	83.02	73.61	78.25
	2	65.92	30.63	69.92	80.09	63.47	62.60	92.64
	3	57.92	103.00	38.00	100.00	53.50	8.00	95.67
	4+	57.92	103.00	38.00	100.00	53.50	8.00	95.67
2	0	363.33	43.00	204.00	96.14	50.40	65.00	59.00
	1	62.48	138.67	69.07	96.14	65.26	74.29	59.00
	2	57.27	39.18	53.81	56.91	58.92	92.19	74.13
	3	46.43	41.70	29.41	35.84	84.56	43.93	84.00
	4+	126.75	150.00	48.00	584.00	85.50	164.00	178.83
3	0	186.88	81.50	707.00	329.50	121.09	101.00	70.40
	1	186.88	81.50	707.00	329.50	121.09	101.00	70.40
	2	85.59	14.37	78.65	156.86	64.62	68.00	47.38
	3	62.43	22.07	49.38	64.62	51.15	122.50	59.12
	4+	150.00	11.00	134.33	128.75	314.00	116.00	113.80
4+	0	170.59	19.40	656.00	288.67	99.20	68.55	103.60
	1	170.59	19.40	656.00	288.67	99.20	68.55	103.60
	2	63.46	39.23	65.56	78.76	63.73	79.28	65.18
	3	39.04	49.73	37.88	38.42	52.89	66.06	63.27
	4+	196.36	243.00	229.75	194.00	369.00	93.40	102.69

According to the 2008-2012 ACS estimates, only 4.5% of households in the two-county area have no vehicle available. The 1-person households make up a majority of this category (estimated at 64%); therefore, little or no survey data for 3 or 4+ person households with 0 vehicles is expected. The lowest average household size and vehicles per household are 1.5 and 0.97, respectively. These low rates are contained within the downtown Boise area where about 1% of the region's households exist.

The expansion rates by area were applied to the raw trip-level household travel survey data based on "home" TAZ. For example, if a two-person two-vehicle household was located in Meridian, then each trip was expanded by 53.81. The expanded person trips by cross-classification by trip purpose are summarized in tables 50 (Ada County) and 51 (Canyon County).

Table 50: Expanded Person Trips by Purpose, Ada County

Household Size	Vehicles	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Total Person Trips	Ada County Households	Average Person Trips per Household
1	0	279	4,284	1,362	139	4,823	4,591	15,478	4,454	3.48
	1	14,533	21,374	13,044	3,582	29,325	36,094	117,953	26,168	4.51
	2	4,382	5,438	2,399	1,253	7,851	8,198	29,521	5,327	5.54
	3	1,085	867	489	0	1,340	1,383	5,163	1,032	5.00
	4+	90	200	300	0	100	0	690	100	6.90
2	0	0	770	2,951	1,817	2,586	6,832	14,956	1,337	11.19
	1	8,383	15,564	7,419	5,063	19,923	18,513	74,867	10,575	7.08
	2	40,666	47,638	24,615	7,254	56,443	63,031	239,647	30,618	7.83
	3	13,807	10,038	5,439	1,381	14,461	16,554	61,680	8,273	7.46
	4+	2,727	3,193	651	1,295	2,332	4,340	14,537	1,940	7.49
3	0	0	0	0	0	0	0	0	286	0.00
	1	4,648	6,619	3,244	15,183	7,471	8,585	45,750	4,682	9.77
	2	22,185	13,328	9,692	21,172	19,744	23,232	109,353	10,213	10.71
	3	21,312	8,686	7,533	9,095	11,849	16,574	75,049	7,198	10.43
	4+	5,309	2,477	1,603	1,862	2,574	4,776	18,601	1,829	10.17
4+	0	0	1,024	0	0	0	0	1,024	171	6.00
	1	8,887	4,046	7,825	21,268	18,465	12,853	73,344	4,348	16.87
	2	47,398	32,131	36,779	119,409	65,213	80,474	381,404	18,399	20.73
	3	29,677	14,539	21,643	49,714	25,983	39,460	181,016	8,540	21.20
	4+	17,941	8,661	13,201	28,168	12,722	25,044	105,736	4,680	22.59
Total Ada County Person Trips								**1,565,769**		
Total Ada County Households									**150,170**	
Average Ada County Person Trips per Household										**10.43**

Table 51: Expanded Person Trips by Purpose, Canyon County

Household Size	Vehicles	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Total Person Trips	Canyon County Households	Average Person Trips per Household
1	0	265	1,683	920	0	1,393	1,305	5,567	796	6.99
	1	3,118	6,928	5,068	74	7,032	10,837	33,056	8,145	4.06
	2	745	1,913	1,380	63	2,445	4,456	11,004	2,597	4.24
	3	0	486	107	0	373	528	1,494	314	4.75
	4+	191	0	0	0	0	0	191	96	2.00
2	0	130	634	50	302	281	332	1,730	382	4.53
	1	2,098	5,249	1,806	1,443	6,808	6,892	24,296	4,289	5.66
	2	13,223	16,343	8,376	2,153	17,395	26,857	84,345	10,686	7.89
	3	6,132	6,906	3,739	216	5,553	9,423	31,969	4,068	7.86
	4+	1,493	2,634	1,073	0	614	2,248	8,062	1,579	5.11
3	0	0	404	0	0	202	0	606	101	6.00
	1	2,581	1,754	2,926	4,368	4,288	5,665	21,583	2,290	9.43
	2	6,090	3,791	1,733	4,143	4,567	5,513	25,837	3,322	7.78
	3	7,423	4,873	2,916	2,515	4,365	6,850	28,941	2,763	10.47
	4+	2,178	2,002	683	1,311	2,346	2,622	11,141	1,115	9.99
4+	0	0	0	0	0	0	0	0	292	0.00
	1	3,421	4,328	2,171	9,482	6,717	6,860	32,979	2,760	11.95
	2	19,124	13,695	15,109	44,427	21,379	28,864	142,597	8,466	16.84
	3	16,521	9,534	8,790	21,032	12,114	18,185	86,177	5,031	17.13
	4+	9,786	9,831	6,193	7,068	8,063	9,458	50,399	3,217	15.67
Total Canyon County Person Trips								**601,937**		
Total Canyon County Households									**62,309**	
Average Canyon County Person Trips per Household										**9.66**

Simplified Person Trip Rate Look-Up Tables

The information below documents the development of look-up tables by household size and vehicles using raw survey data to fill in or refine the person trip rates developed by COMPASS staff. This two-step process first calculates the percent of trips by purpose for either the household category or the vehicle category (Tables 52 – 54), and then applies this percent to the total number of person trips for each category.

The "source" column in Table 55 and 56 identifies which "total person trip" number was used. These simplified look-up tables were instrumental in filling in cross-classification cells that did not have data (typically the 0-vehicle category) or that had trip rates that were out of range. In most cases, the estimated trip rates for the household category were used versus the values for vehicles – more data were available and they appeared more reasonable.

Table 52: Person Trips by Trip Purpose by Household Size Category

County	Household Size	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Total Person Trips (raw)
Ada	1	266	408	233	68	566	659	2,200
Ada	2	1,216	1,355	708	250	1,719	1,888	7,136
Ada	3	712	383	282	501	547	694	3,119
Ada	4+	1,631	939	1,236	3,361	1,823	2,452	11,442
Canyon	1	53	140	92	2	143	223	653
Canyon	2	311	437	206	63	432	636	2,085
Canyon	3	261	168	108	159	195	286	1,177
Canyon	4+	674	458	422	1,183	665	900	4,302

Table 53: Percent of Person Trips by Trip Purpose by Household Size

County	Household Size	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base
Ada	1	12.1%	18.5%	10.6%	3.1%	25.7%	30.0%
Ada	2	17.0%	19.0%	9.9%	3.5%	24.1%	26.5%
Ada	3	22.8%	12.3%	9.0%	16.1%	17.5%	22.3%
Ada	4+	14.3%	8.2%	10.8%	29.4%	15.9%	21.4%
Canyon	1	8.1%	21.4%	14.1%	0.3%	21.9%	34.2%
Canyon	2	14.9%	21.0%	9.9%	3.0%	20.7%	30.5%
Canyon	3	22.2%	14.3%	9.2%	13.5%	16.6%	24.3%
Canyon	4+	15.7%	10.6%	9.8%	27.5%	15.5%	20.9%

Table 54: Percent of Person Trips by Trip Purpose by Vehicles

County	Vehicles	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base
Ada	0	1.2%	22.9%	13.3%	3.6%	26.5%	32.5%
Ada	1	11.6%	17.3%	10.3%	9.8%	24.1%	27.0%
Ada	2	14.9%	13.3%	9.7%	18.5%	20.2%	23.3%
Ada	3	19.7%	10.4%	11.0%	19.4%	16.7%	22.9%
Ada	4+	19.7%	9.7%	11.2%	19.7%	13.7%	25.9%
Canyon	0	4.7%	35.3%	8.2%	7.1%	22.4%	22.4%
Canyon	1	9.9%	16.8%	10.3%	12.6%	22.6%	27.7%
Canyon	2	14.8%	13.6%	10.1%	19.4%	17.1%	25.0%
Canyon	3	19.9%	14.1%	10.6%	16.9%	15.0%	23.5%
Canyon	4+	21.9%	15.9%	7.2%	14.7%	16.7%	23.7%
Note: The 0 vehicle and 4+ vehicle categories had fewer than 100 samples each.							

The percentages found in Table 53 were calculated from the data in Table 52. The number of trips by purpose by household size was divided by the total person trips to determine the percent of trips by trip purpose by household size.

For example, the following shows the calculation of the percent of home base work trips in Ada County for a household size of 1:

> Home base work trips for a 1 person household in Ada County = 266
>
> Total person trips for a 1 person household in Ada County = 2,200
>
> 266 / 2,200 = 0.121 (or 12.1%) = percent of home base work trips

Similarly, the estimated number of person trips found in Table 55 were calculated from the data in Tables 50 and 53. The percent of trips by purpose from Table 53 were multiplied by the average person trips by classification from Table 50.

For example, the following shows the calculation of estimated number of home base work person trips in Ada County for a household size of 1 with 0 vehicles:

> Percent of home base work trips from Table 53 = 0.121
>
> Average person trip rate for a 1 person household with 0 vehicles in Ada County from Table 50 = 3.48

0.121 x 3.48 = 0.42 home base work person trips

Table 55: Ada County Trip Rate Look Up Tables

Category	Total Person Trips	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Source
1-person	3.48	0.42	0.65	0.37	0.11	0.90	1.04	HH survey
0-vehicle		0.04	0.80	0.46	0.13	0.92	1.13	
1-person	4.51	0.55	0.84	0.48	0.14	1.16	1.35	
1-vehicle		0.52	0.78	0.46	0.44	1.09	1.22	
1-person	5.54	0.67	1.03	0.59	0.17	1.43	1.66	
2-vehicle		0.83	0.74	0.54	1.02	1.12	1.29	
1-person	5.00	0.60	0.93	0.53	0.15	1.29	1.50	
3-vehicle		0.98	0.52	0.55	0.97	0.83	1.14	
1-person	6.00	0.73	1.11	0.64	0.19	1.54	1.80	
4+vehicle		1.18	0.58	0.67	1.18	0.82	1.56	
2-person	6.20	1.06	1.18	0.62	0.22	1.49	1.64	NHTS 2009[a]
0-vehicle		0.07	1.42	0.82	0.22	1.64	2.02	
2-person	7.08	1.21	1.34	0.70	0.25	1.71	1.87	NHTS 2009[a]
1-vehicle		0.82	1.23	0.73	0.69	1.71	1.91	
2-person	7.83	1.33	1.49	0.78	0.27	1.89	2.07	HH survey (NHTS 2009[a] = 7.7)
2-vehicle		1.17	1.04	0.76	1.45	1.58	1.82	
2-person	8.10	1.38	1.54	0.80	0.28	1.95	2.14	NHTS 2009[a]
3-vehicle		1.59	0.85	0.89	1.57	1.35	1.85	
4+ vehicle		1.60	0.78	0.91	1.60	1.11	2.10	
3-person	8.60	1.96	1.06	0.78	1.38	1.51	1.91	NHTS 2009[a]
0-vehicle		0.10	1.97	1.14	0.31	2.28	2.80	
3-person	9.77	2.23	1.20	0.88	1.57	1.71	2.17	HH survey
1-vehicle		1.13	1.69	1.01	0.95	2.36	2.64	
3-person	10.71	2.44	1.32	0.97	1.72	1.88	2.38	HH survey
2-vehicle		1.60	1.42	1.04	1.98	2.17	2.50	
3-person	14.40	3.29	1.77	1.30	2.31	2.53	3.20	NHTS 2009[a]
3-vehicle		2.83	1.50	1.58	2.79	2.40	3.29	
3-person	10.43	2.38	1.28	0.94	1.68	1.83	2.32	HH survey
3-vehicle		2.05	1.09	1.15	2.02	1.74	2.38	
3-person	14.40	3.29	1.77	1.30	2.31	2.53	3.20	NHTS 2009[a]
4+vehicle		2.84	1.39	1.62	2.84	1.97	3.73	
3-person	10.17	2.32	1.25	0.92	1.63	1.78	2.26	HH survey
4+vehicle		2.01	0.98	1.14	2.01	1.39	2.64	
4+ person	12.20	1.74	1.00	1.32	3.58	1.94	2.61	NHTS 2009[a]
0-vehicle		0.15	2.79	1.62	0.44	3.23	3.97	
4+ person	16.87	2.40	1.38	1.82	4.96	2.69	3.62	HH survey
1-vehicle		1.95	2.92	1.74	1.65	4.07	4.55	
4+ person	20.73	2.95	1.70	2.24	6.09	3.30	4.44	HH survey
2-vehicle		3.09	2.76	2.02	3.84	4.19	4.83	
4+ person	21.19	4.84	2.60	1.92	3.40	3.72	4.71	HH survey
3-vehicle		4.16	2.21	2.33	4.10	3.54	4.84	
4+ person	22.59	3.22	1.85	2.44	6.64	3.60	4.84	HH survey
4+vehicle		4.46	2.19	2.54	4.46	3.09	5.86	

[a]NCHRP Report 716 Travel Demand Forecasting: Parameters and Techniques, Appendix C: Transferrable Parameters.

Table 56: Canyon County Trip Rate Look Up Tables

Vehicles	Total Person Trips	Home Base Work	Home Base Shop	Home Base Social	Home Base School	Home Base Other	Non-Home Base	Source
1-person	2.30	0.19	0.49	0.32	0.01	0.50	0.79	NHTS 2009[a]
0-vehicle		0.11	0.81	0.19	0.16	0.51	0.51	
1-person	4.06	0.33	0.87	0.57	0.01	0.89	1.39	HH survey
1-vehicle		0.40	0.68	0.42	0.51	0.92	1.12	
1-person	4.24	0.34	0.91	0.60	0.01	0.93	1.45	
2-vehicle		0.63	0.58	0.43	0.82	0.73	1.06	
1-person	4.75	0.39	1.02	0.67	0.01	1.04	1.62	
3-vehicle		0.95	0.67	0.50	0.80	0.71	1.11	
1-person	5.00	0.41	1.07	0.70	0.02	1.09	1.71	NHTS 2009[a]
4+vehicle		1.09	0.79	0.36	0.73	0.83	1.18	
2-person	4.53	0.68	0.95	0.45	0.14	0.94	1.38	HH survey
0-vehicle		0.21	1.60	0.37	0.32	1.01	1.01	
2-person	5.66	0.84	1.19	0.56	0.17	1.17	1.73	
1-vehicle		0.56	0.95	0.58	0.72	1.28	1.57	
2-person	7.89	1.18	1.65	0.78	0.24	1.63	2.41	
2-vehicle		1.17	1.08	0.79	1.53	1.35	1.97	
2-person	7.86	1.17	1.65	0.78	0.24	1.63	2.40	
3-vehicle		1.57	1.11	0.84	1.33	1.18	1.84	
4+ vehicle	8.10	1.21	1.70	0.80	0.24	1.68	2.47	NHTS 2009[a]
3-person	6.00	1.33	0.86	0.55	0.81	0.99	1.46	HH survey
0-vehicle		1.20	0.84	0.64	1.01	0.90	1.41	
3-person	9.43	2.09	1.35	0.87	1.27	1.56	2.29	
1-vehicle		1.88	1.33	1.00	1.59	1.41	2.21	
3-person	10.00	2.22	1.43	0.92	1.35	1.66	2.43	HH raw survey=10 trips
2-vehicle		1.99	1.41	1.06	1.69	1.50	2.35	
3-person	7.78	1.73	1.11	0.71	1.05	1.29	1.89	HH survey
2-vehicle		1.55	1.09	0.83	1.31	1.17	1.83	
3-person	10.47	2.32	1.49	0.96	1.41	1.73	2.54	HH survey
3-vehicle		2.09	1.47	1.11	1.77	1.57	2.46	
3-person	11.18	2.48	1.60	1.03	1.51	1.85	2.72	11.18 trips prior to recalculating
4+vehicle		2.23	1.57	1.19	1.89	1.68	2.62	
3-person	9.99	2.22	1.43	0.92	1.35	1.66	2.43	HH survey
4+vehicle		1.99	1.40	1.06	1.69	1.50	2.34	
4+ person	11.00	1.72	1.17	1.08	3.02	1.70	2.30	HH raw survey = 12.10, NHTS 2009[a] = 12.2, both too high.
0-vehicle		2.41	1.74	0.80	1.61	1.83	2.61	
4+ person	11.95	1.87	1.27	1.17	3.29	1.85	2.50	HH survey
1-vehicle		2.62	1.90	0.86	1.75	1.99	2.83	
4+ person	16.84	2.64	1.79	1.65	4.63	2.60	3.52	HH survey
2-vehicle		3.69	2.67	1.22	2.47	2.81	3.99	
4+ person	17.13	2.68	1.82	1.68	4.71	2.65	3.58	HH survey
3-vehicle		3.75	2.72	1.24	2.51	2.86	4.06	
4+ person	15.67	2.46	1.67	1.54	4.31	2.42	3.28	HH survey
4+vehicle		3.43	2.49	1.13	2.30	2.61	3.71	

[a]NCHRP Report 716 Travel Demand Forecasting: Parameters and Techniques, Appendix C: Transferrable Parameters.

Ada County Person Trip Rate Comparisons

The following tables provide person trip rates for Ada County for each trip purpose by household size (HH1, HH2, etc.) from three sources: raw data from the regional household survey, expanded survey data, and the final trip rates by cross-classification as used in the model. The charts compare the rates from the just the raw and final data. The trip rates are provided as information only but demonstrate the integrity of the data collected as part of the survey.

Table 57: Home Base Work Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.06	no data	no data	no data
	1	0.52	0.79	1.13	2.12
	2	0.78	1.30	2.05	2.59
	3	1.06	1.64	2.90	3.44
	4+	no data	1.64	2.79	3.83
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	0.06	no data	no data	no data
	1	0.56	0.79	0.99	2.04
	2	0.82	1.33	2.17	2.58
	3	1.05	1.67	2.96	3.48
	4+	0.90	1.41	2.90	3.83
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.42	0.70	1.46	1.74
	1	0.56	0.90	1.80	2.04
	2	0.82	1.33	2.44	2.58
	3	1.05	1.38	2.96	3.48
	4+	1.18	1.60	2.96	3.83

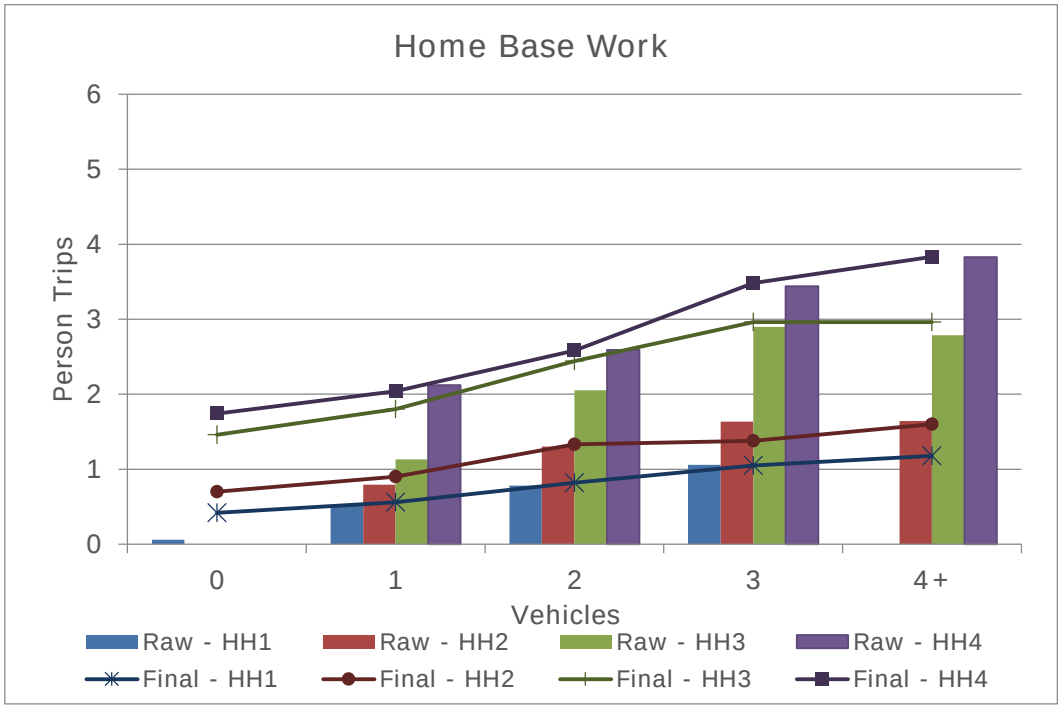


Table 58: Home Base Shop Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.85	0.60	no data	6.00
	1	0.82	1.51	1.43	1.24
	2	1.00	1.55	1.34	1.75
	3	0.94	1.21	1.20	1.68
	4+	2.00	0.86	1.36	1.83
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	0.96	0.58	no data	6.00
	1	0.82	1.47	1.41	0.93
	2	1.02	1.56	1.31	1.75
	3	0.84	1.21	1.21	1.70
	4+	2.00	1.65	1.35	1.85
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.65	0.95	1.06	1.17
	1	0.82	1.06	1.20	1.38
	2	1.02	1.23	1.29	1.70
	3	1.02	1.45	1.50	1.70
	4+	1.11	1.65	1.77	1.85

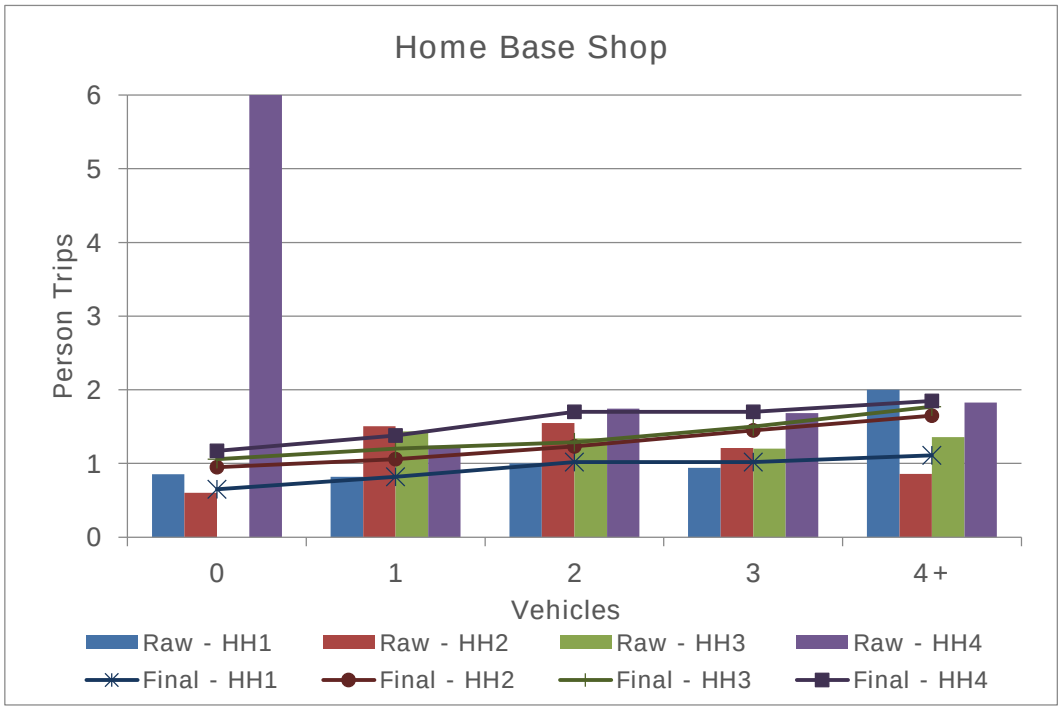


Table 59: Home Base Social Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.38	1.80	no data	no data
	1	0.50	0.68	0.70	2.04
	2	0.45	0.81	0.92	2.01
	3	0.47	0.66	1.02	2.51
	4+	2.00	0.50	0.86	2.83
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	0.31	2.21	no data	no data
	1	0.50	0.70	0.69	1.80
	2	0.45	0.80	0.95	2.00
	3	0.47	0.66	1.05	2.53
	4+	3.00	0.34	0.88	2.82
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.31	0.62	0.78	1.32
	1	0.50	0.70	1.01	1.80
	2	0.45	0.78	1.20	2.00
	3	0.47	0.89	1.30	2.53
	4+	0.67	0.91	1.30	2.82

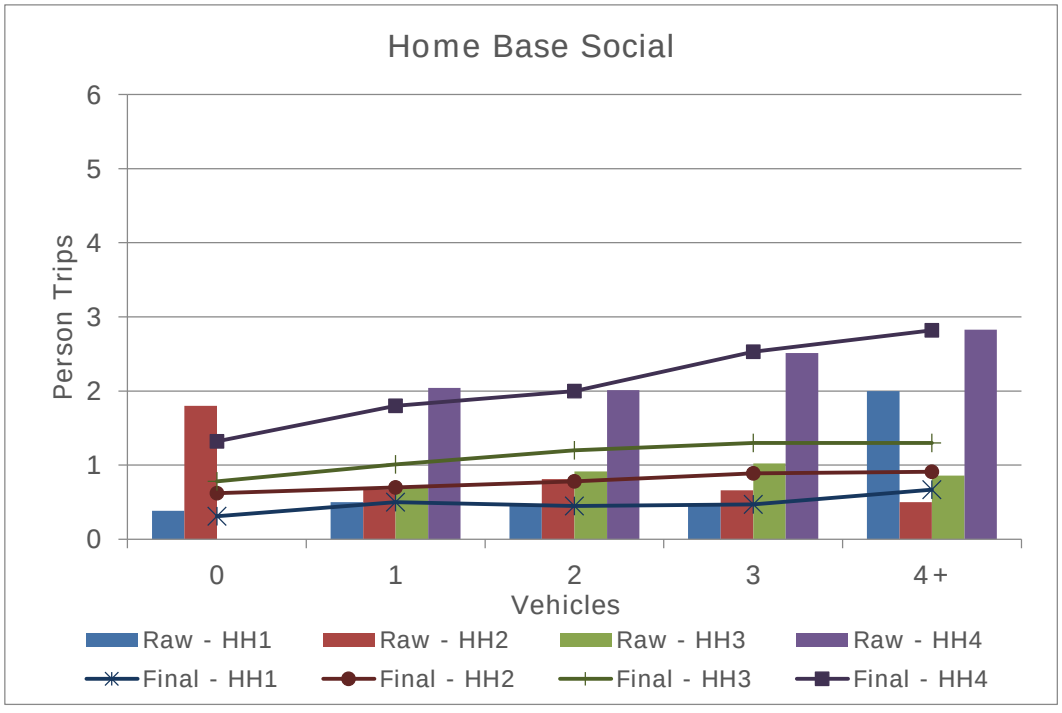


Table 60: Home Base School Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.03	1.00	no data	no data
	1	0.14	0.49	2.65	5.56
	2	0.23	0.24	1.98	6.46
	3	no data	0.17	1.27	5.80
	4+	no data	0.21	1.07	5.87
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	0.03	1.36	no data	no data
	1	0.14	0.48	3.24	4.89
	2	0.24	0.24	2.07	6.49
	3	no data	0.17	1.26	5.82
	4+	no data	0.67	1.02	6.02
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.13	0.69	1.38	3.58
	1	0.44	0.95	1.69	4.89
	2	0.82	1.45	2.79	5.82
	3	0.97	1.57	2.79	5.82
	4+	1.18	1.60	2.84	6.02

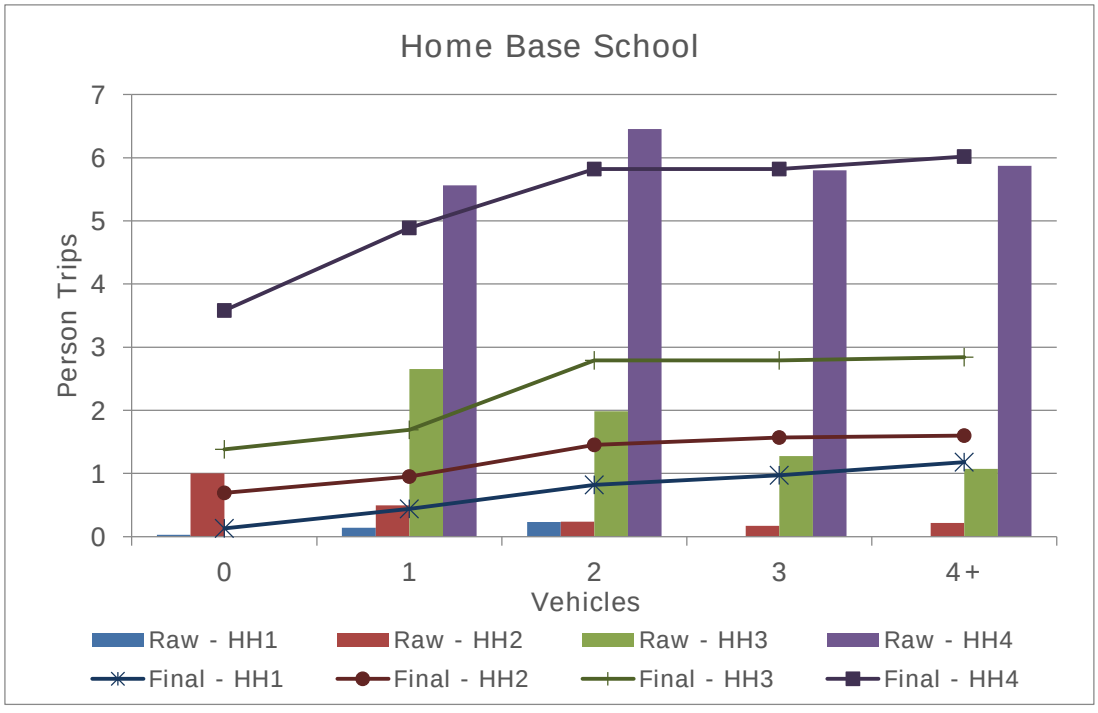


Table 61: Home Base Other Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	1.06	1.60	no data	no data
	1	1.11	1.90	1.57	3.48
	2	1.52	1.84	2.08	3.57
	3	1.29	1.74	1.65	3.02
	4+	1.00	1.64	1.50	2.65
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	1.08	1.93	no data	no data
	1	1.12	1.88	1.60	4.25
	2	1.47	1.84	1.93	3.54
	3	1.30	1.75	1.65	3.04
	4+	1.00	1.20	1.41	2.72
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.90	1.49	1.51	1.94
	1	1.09	1.88	1.71	1.99
	2	1.12	1.89	1.88	2.32
	3	1.29	1.95	1.97	3.04
	4+	1.54	1.95	1.97	3.09

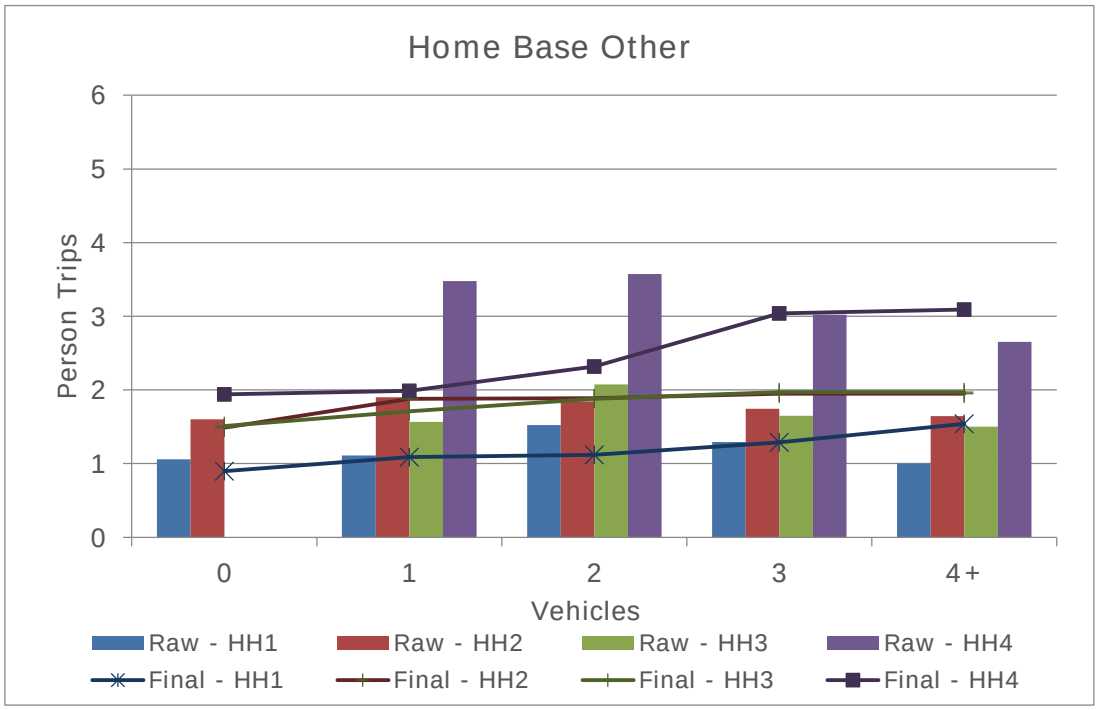


Table 62: Non-Home Base Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.97	4.20	no data	no data
	1	1.39	1.77	2.09	3.56
	2	1.50	2.02	2.45	4.33
	3	1.29	1.94	2.16	4.60
	4+	no data	3.00	2.57	5.22
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	1.03	5.11	no data	no data
	1	1.38	1.75	1.83	2.96
	2	1.54	2.06	2.27	4.37
	3	1.34	2.00	2.30	4.62
	4+	no data	2.24	2.61	5.35
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	1.03	1.64	2.00	2.61
	1	1.38	1.91	2.34	2.96
	2	1.54	2.07	2.38	4.37
	3	1.54	2.10	3.20	4.62
	4+	1.56	2.24	3.20	5.35

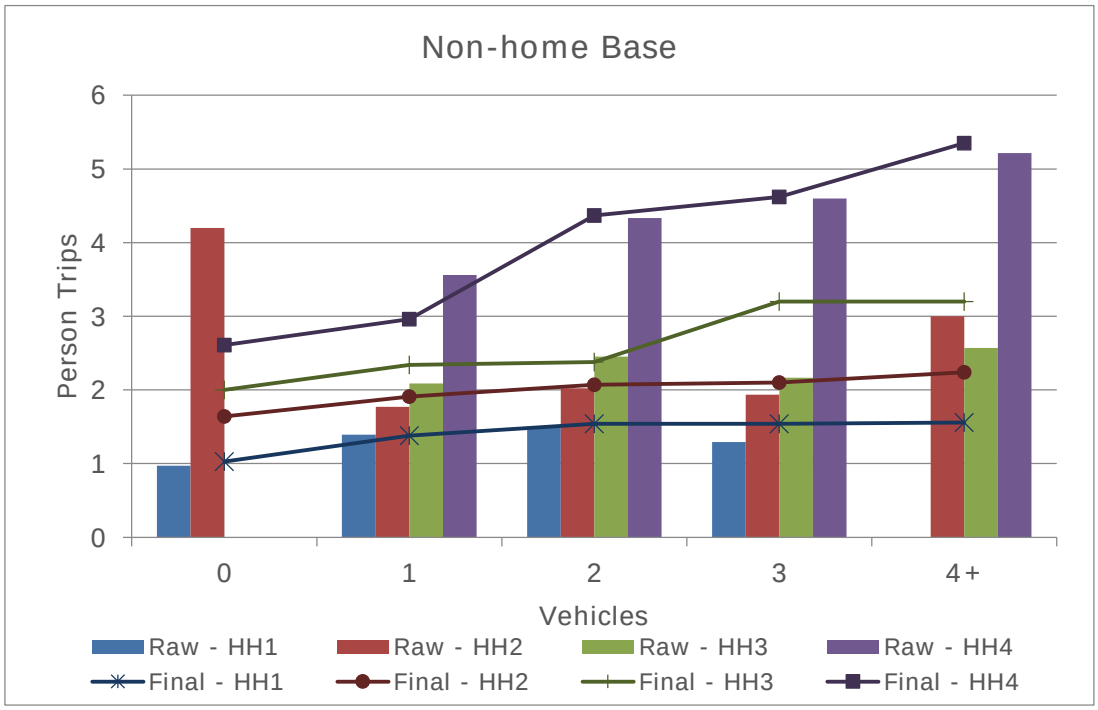
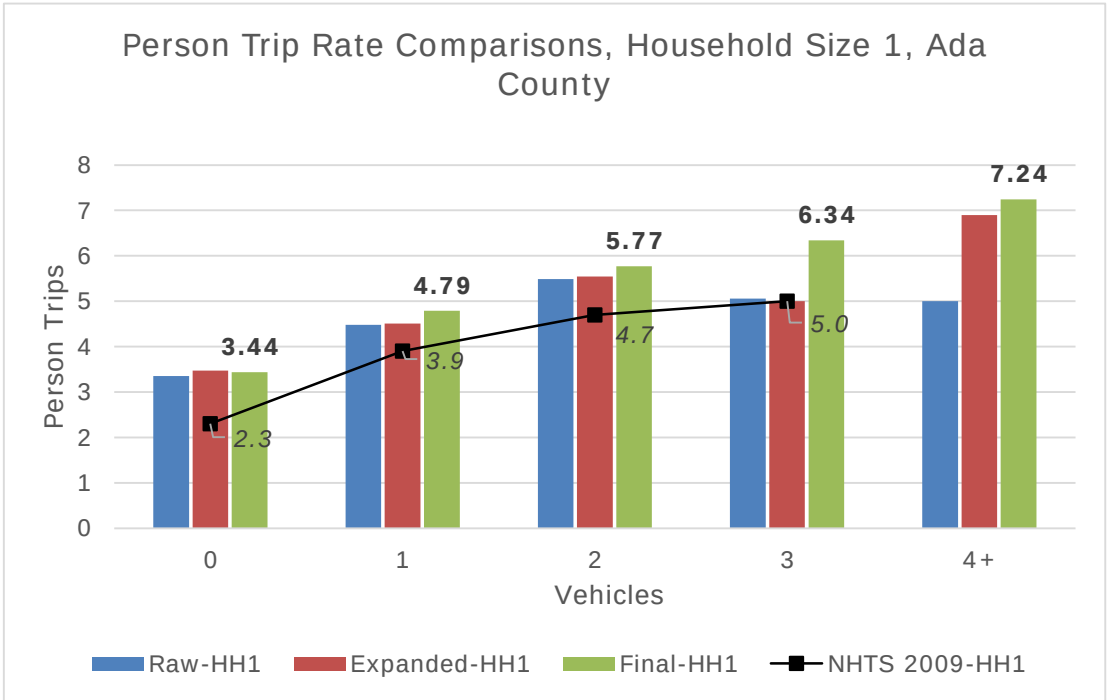
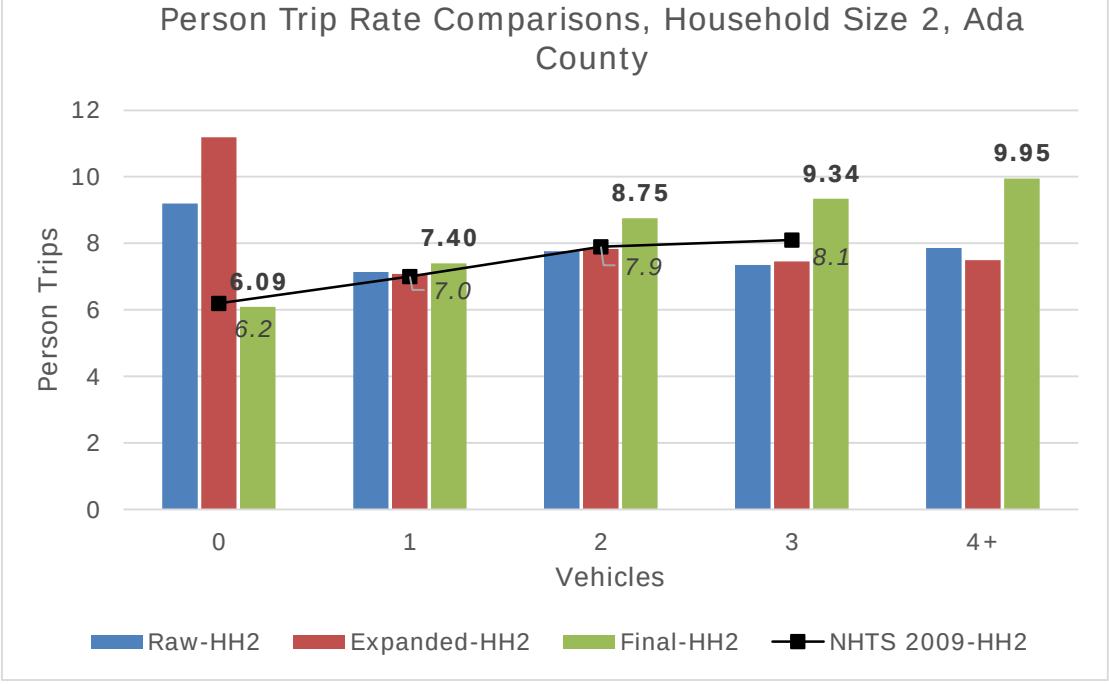
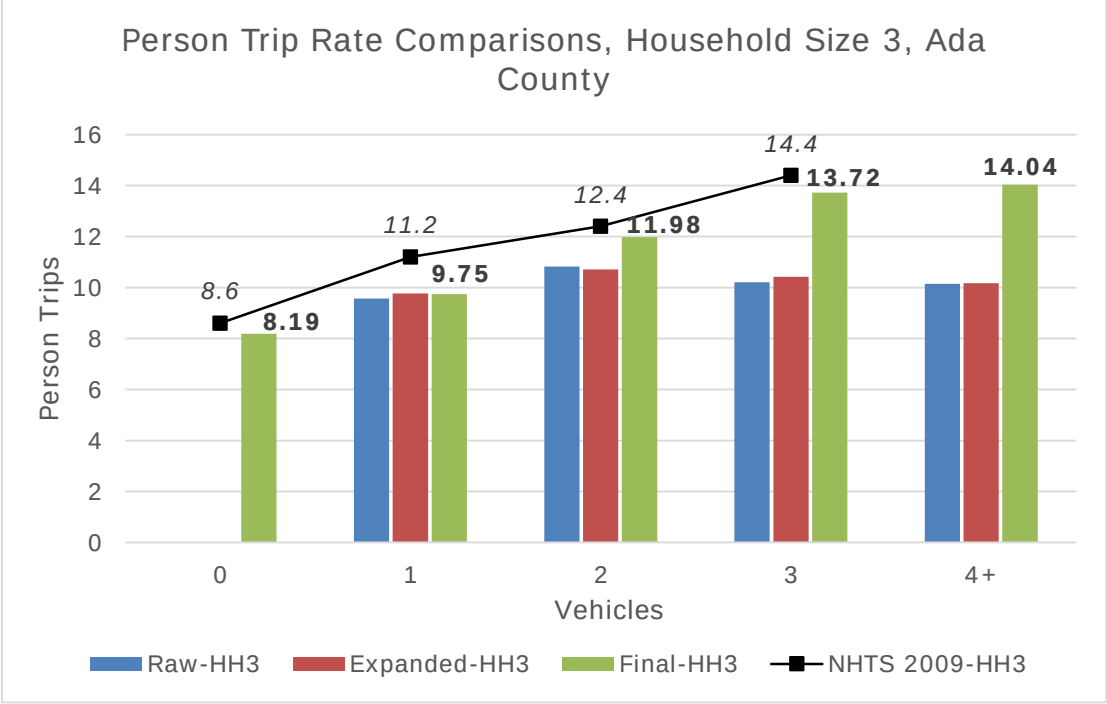


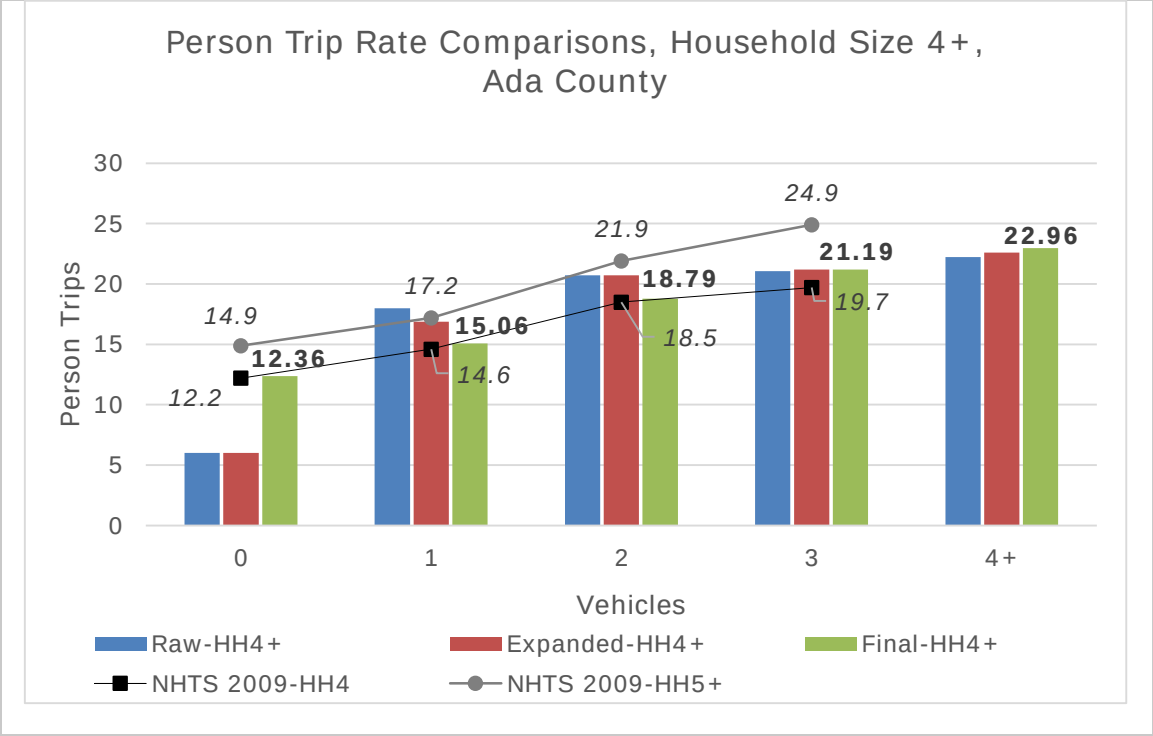
Table 63: Total Person Trip Rate Comparisons, Ada County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	3.35	9.20	no data	6.00
	1	4.48	7.14	9.57	18.00
	2	5.49	7.77	10.83	20.71
	3	5.06	7.35	10.21	21.06
	4+	5.00	7.86	10.14	22.22
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	3.48	11.19	no data	6.00
	1	4.51	7.08	9.77	16.87
	2	5.54	7.83	10.71	20.73
	3	5.00	7.46	10.43	21.20
	4+	6.90	7.49	10.17	22.59
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	3.44	6.09	8.19	12.36
	1	4.79	7.40	9.75	15.06
	2	5.77	8.75	11.98	18.79
	3	6.34	9.34	13.72	21.19
	4+	7.24	9.95	14.04	22.96




Person Trip Rate Comparisons, Household Size 2, Ada County
Person Trips
12
10
8
6
4
2
0
6.09
6.2
7.40
7.0
8.75
7.9
9.34
8.1
9.95
0
1
2
3
4+
Vehicles
Raw-HH2
Expanded-HH2
Final-HH2
NHTS 2009-HH2


Person Trip Rate Comparisons, Household Size 3, Ada County
Person Trips
16
14
12
10
8
6
4
2
0
8.6
8.19
11.2
9.75
12.4
11.98
14.4
13.72
14.04
0
1
2
3
4+
Vehicles
Raw-HH3
Expanded-HH3
Final-HH3
NHTS 2009-HH3


Person Trip Rate Comparisons, Household Size 4+, Ada County
Person Trips
30
25
20
15
10
5
0
14.9
12.2
12.36
17.2
15.06
14.6
21.9
18.79
18.5
24.9
21.19
19.7
22.96
0
1
2
3
4+
Vehicles
Raw-HH4+
Expanded-HH4+
Final-HH4+
NHTS 2009-HH4
NHTS 2009-HH5+

Canyon County Person Trip Rate Comparisons

The following tables provide person trip rates for Ada County for each trip purpose by household size (HH1, HH2, etc.) from three sources: raw data from the regional household survey, expanded survey data, and the final trip rates by cross-classification as used in the model. The charts compare the rates from the just the raw and final data. The trip rates are provided as information only but demonstrate the integrity of the data collected as part of the survey.

Table 64: Home Base Work Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.13	0.29	no data	no data
	1	0.39	0.46	1.18	1.19
	2	1.72	1.19	1.78	2.22
	3	no data	1.45	2.58	3.19
	4+	0.17	1.00	2.38	3.04
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	0.33	0.34	no data	no data
	1	0.38	0.49	1.13	1.24
	2	0.29	1.24	1.83	2.26
	3	no data	1.51	2.69	3.28
	4+	2.00	0.95	1.95	3.04
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.33	0.68	1.00	1.00
	1	0.38	1.00	1.20	1.87
	2	0.63	1.24	2.00	2.64
	3	0.95	1.51	2.69	3.28
	4+	1.09	1.51	2.69	3.43

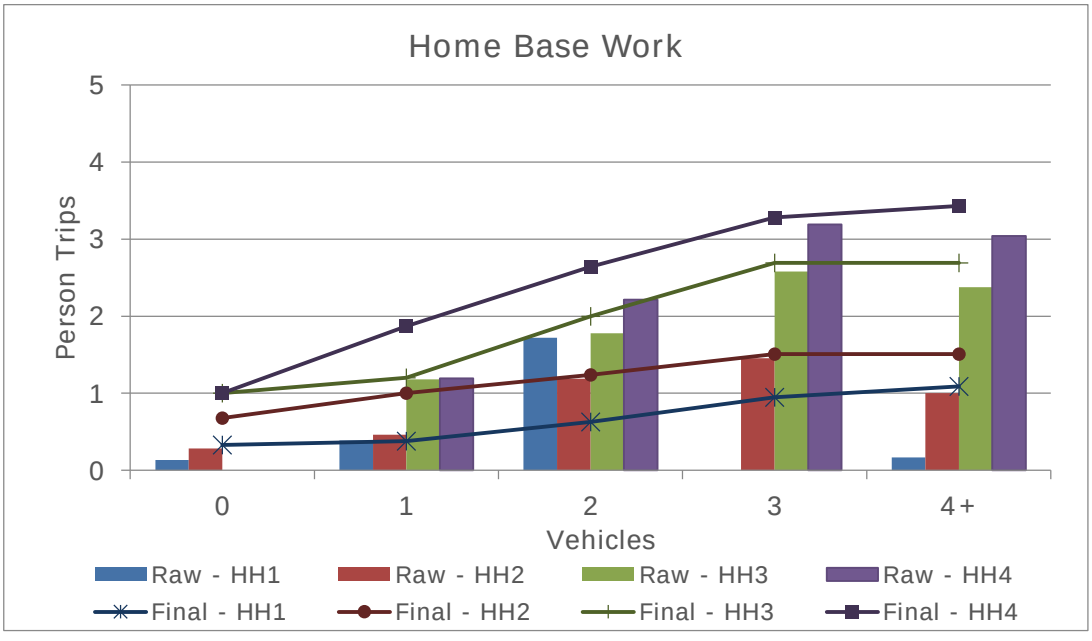


Table 65: Home Base Shop Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.93	1.71	no data	no data
	1	0.85	1.18	0.77	1.45
	2	0.78	1.55	1.15	1.62
	3	1.67	1.60	1.58	1.87
	4+	no data	1.64	1.75	1.96
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	2.11	1.66	4.00	no data
	1	0.85	1.22	0.77	1.57
	2	0.74	1.53	1.14	1.62
	3	1.55	1.70	1.76	1.90
	4+	no data	1.67	1.80	3.06
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.81	0.95	1.04	1.17
	1	0.85	1.22	1.33	1.57
	2	0.91	1.44	1.43	1.79
	3	1.02	1.65	1.76	1.90
	4+	1.07	1.67	1.80	2.49

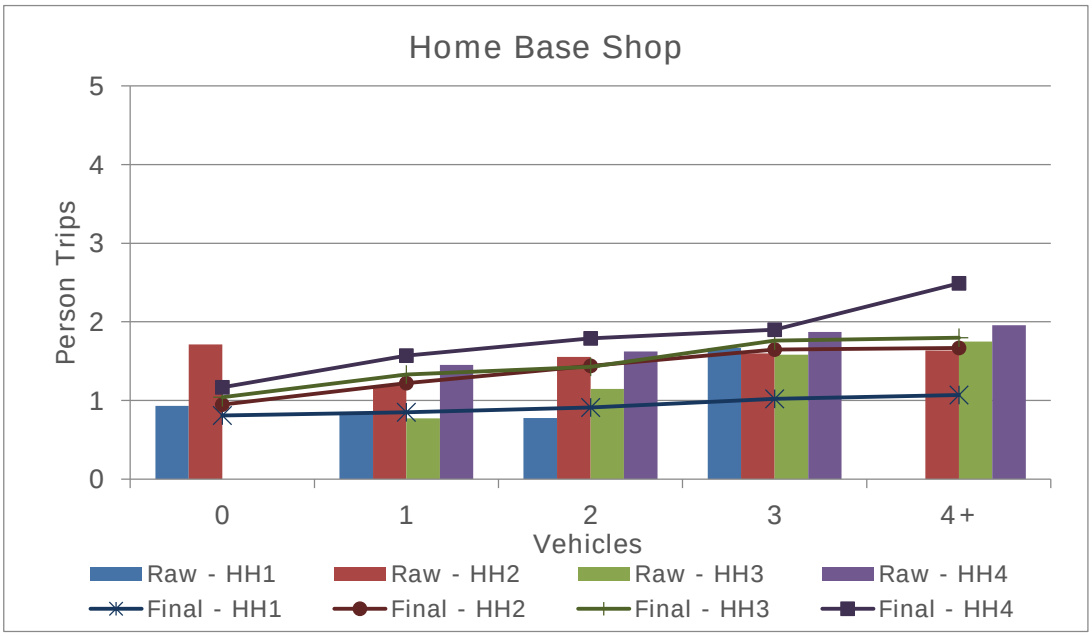


Table 66: Home Base Social Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.40	0.14	no data	no data
	1	0.62	0.42	1.18	0.77
	2	0.56	0.78	0.52	1.79
	3	0.33	0.95	1.12	1.73
	4+	no data	0.36	0.75	1.00
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	1.16	0.13	no data	no data
	1	0.62	0.42	1.28	0.79
	2	0.53	0.78	0.52	1.78
	3	0.34	0.92	1.06	1.75
	4+	no data	0.68	0.61	1.93
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.19	0.37	0.64	1.08
	1	0.42	0.42	1.00	1.17
	2	0.53	0.78	1.00	1.65
	3	0.50	0.78	1.11	1.75
	4+	0.70	0.80	1.19	1.93

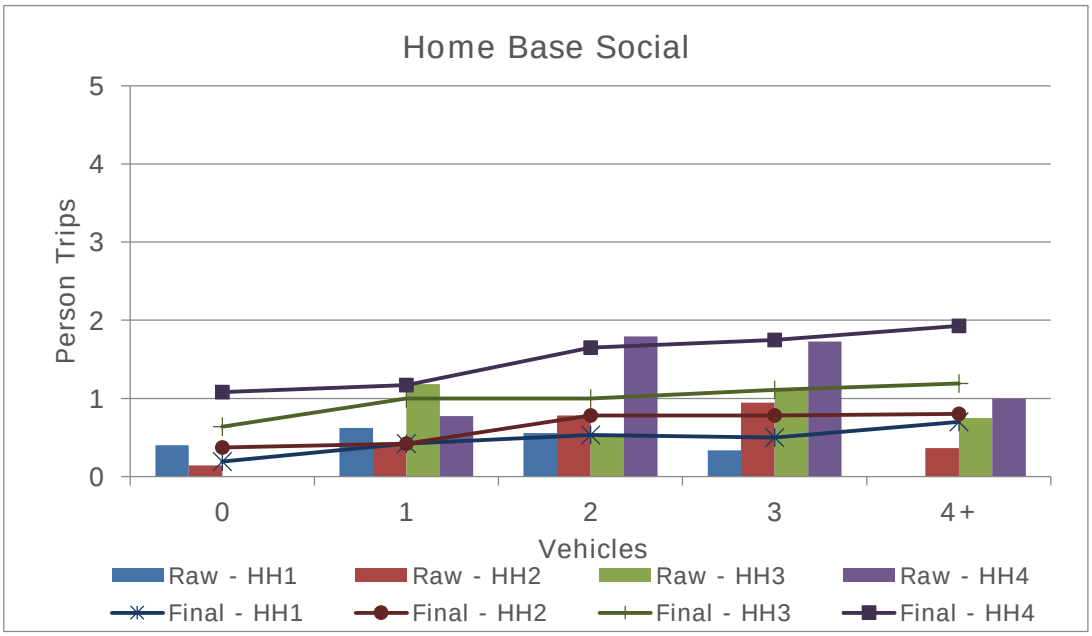


Table 67: Home Base School Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.93	0.86	no data	no data
	1	0.22	0.32	1.91	3.52
	2	0.22	0.21	1.22	5.23
	3	no data	0.07	0.93	4.14
	4+	no data	no data	1.00	2.71
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	no data	0.79	no data	no data
	1	0.01	0.34	1.91	3.44
	2	0.02	0.20	1.25	5.25
	3	no data	0.05	0.91	4.18
	4+	no data	no data	1.18	2.20
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.11	0.14	1.01	3.02
	1	0.14	0.17	1.35	3.29
	2	0.24	0.24	1.68	4.63
	3	0.24	0.24	1.77	4.71
	4+	0.24	0.24	1.89	4.71

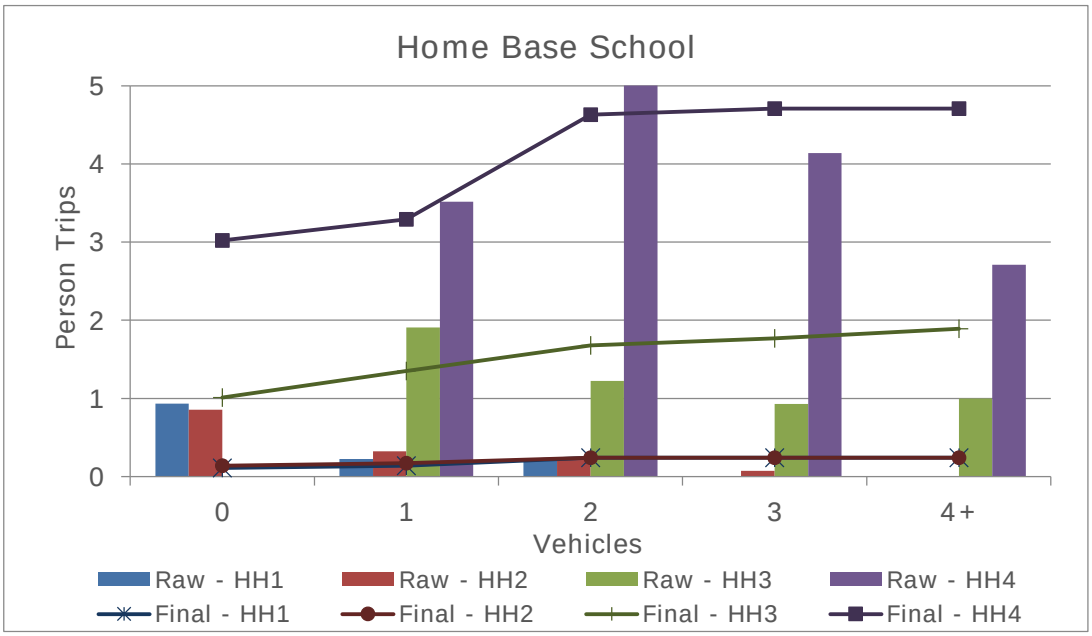


Table 68: Home Base Other Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.80	0.71	2.00	no data
	1	0.84	1.57	1.77	2.61
	2	0.94	1.60	1.33	2.50
	3	1.33	1.36	1.47	2.41
	4+	no data	0.45	2.13	2.50
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	1.75	0.74	2.00	no data
	1	0.86	1.59	1.87	2.43
	2	0.94	1.63	1.37	2.53
	3	1.19	1.36	1.58	2.41
	4+	no data	0.39	2.10	2.51
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.51	0.94	0.99	1.70
	1	0.86	1.28	1.56	1.99
	2	0.94	1.63	1.66	1.99
	3	1.04	1.63	1.73	2.41
	4+	1.09	1.68	1.85	2.51

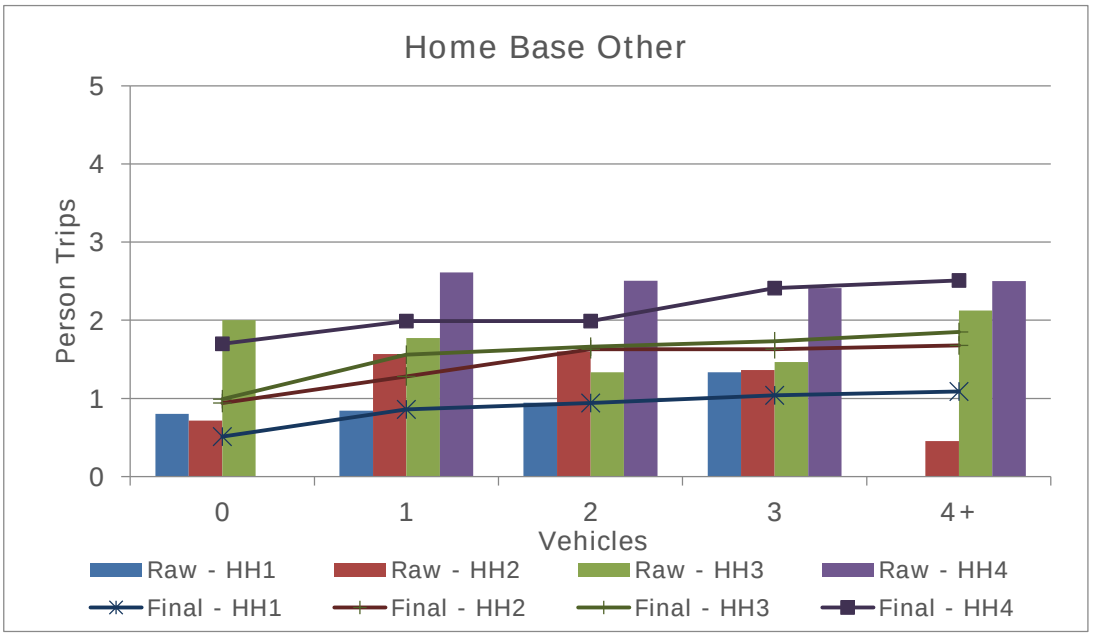


Table 69: Non-Home Base Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	0.87	0.86	no data	no data
	1	0.17	1.58	2.64	2.55
	2	no data	2.45	1.61	3.44
	3	1.67	2.07	2.65	3.40
	4+	no data	1.55	2.00	3.08
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	1.64	0.87	no data	no data
	1	1.33	1.61	2.47	2.49
	2	1.72	2.51	1.66	3.41
	3	1.68	2.32	2.48	3.61
	4+	no data	1.42	2.35	2.94
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	0.51	1.38	1.46	2.30
	1	1.33	1.73	2.21	2.49
	2	1.45	1.97	2.35	3.52
	3	1.68	2.32	2.54	3.61
	4+	1.71	2.47	2.72	3.71

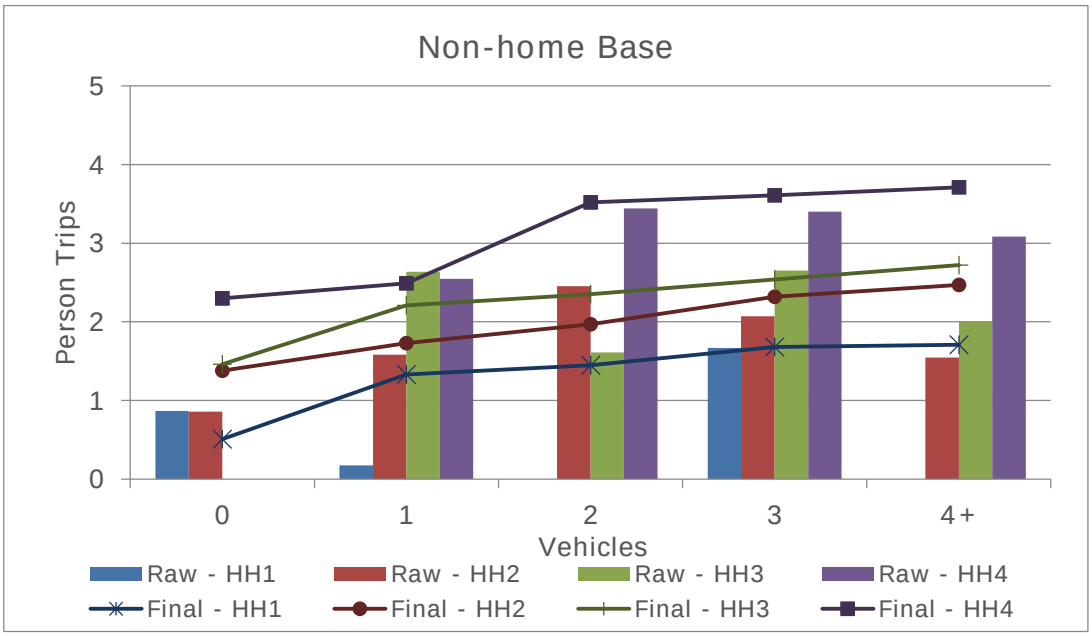
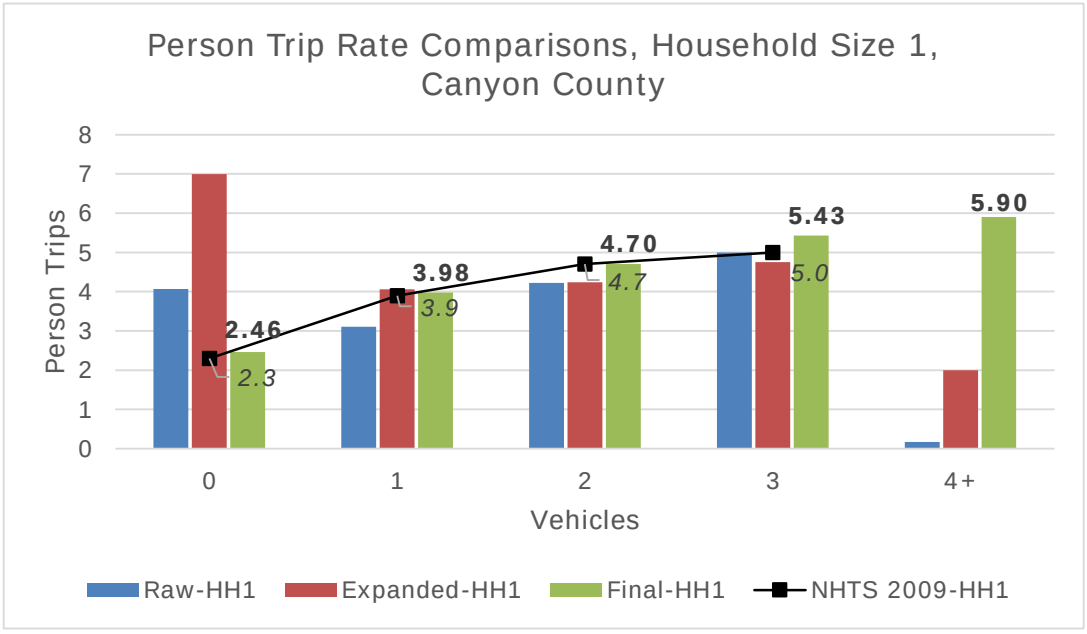
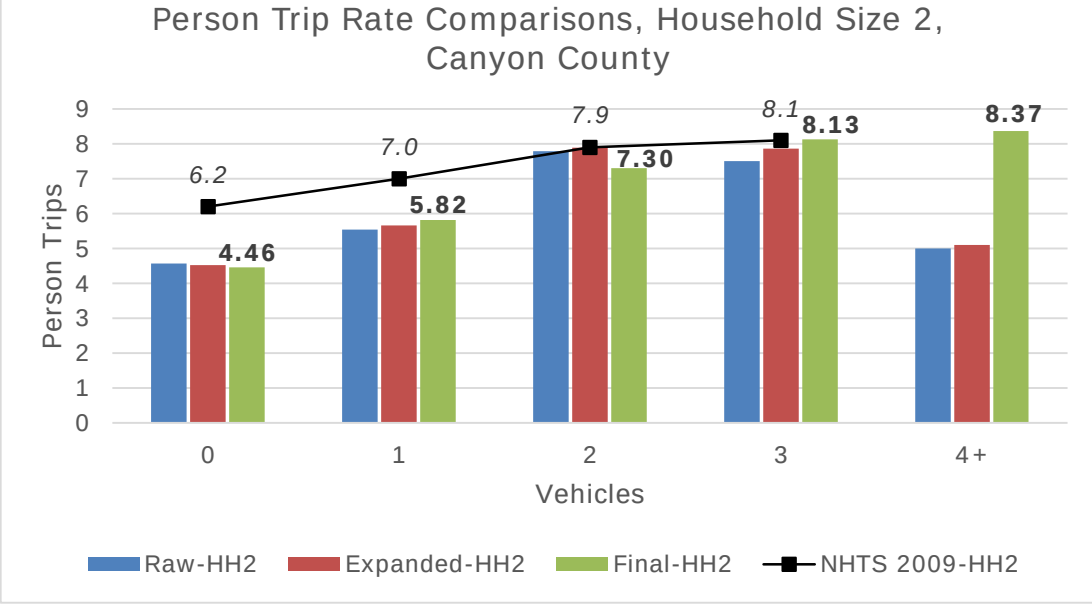
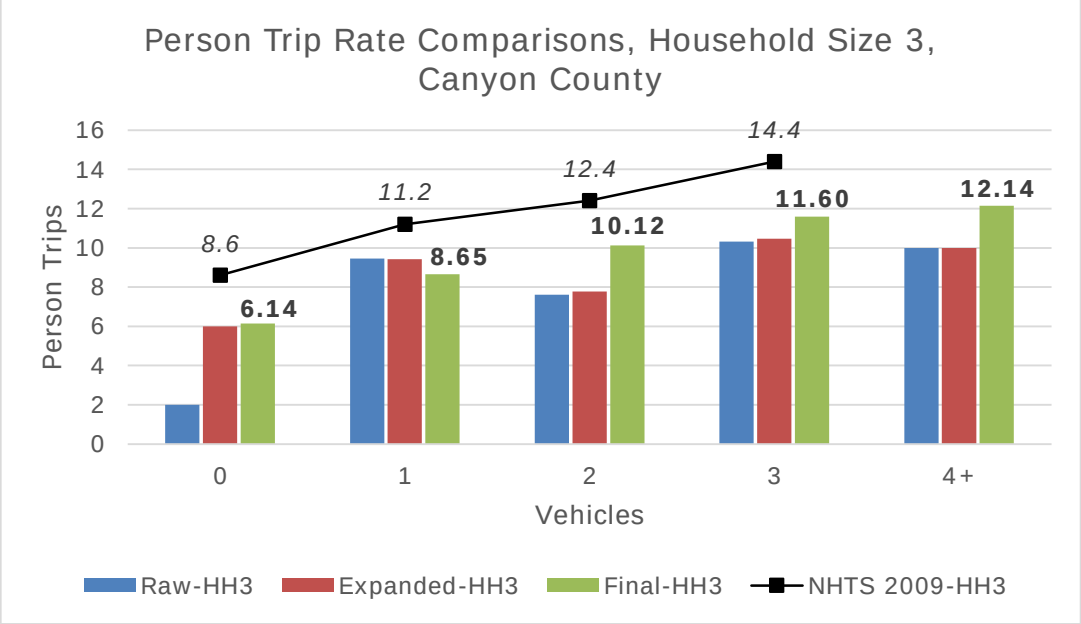


Table 70: Total Person Trip Rate Comparisons, Canyon County

	Vehicles	Raw - HH1	Raw - HH2	Raw - HH3	Raw - HH4
Raw Data from Survey	0	4.07	4.57	2.00	no data
	1	3.11	5.54	9.45	12.10
	2	4.22	7.79	7.61	16.81
	3	5.00	7.51	10.33	16.74
	4+	0.17	5.00	10.00	14.29
	Vehicles	**Expanded - HH1**	**Expanded - HH2**	**Expanded - HH3**	**Expanded - HH4**
Expanded Survey Data	0	6.99	4.53	6.00	no data
	1	4.06	5.66	9.43	11.95
	2	4.24	7.89	7.78	16.84
	3	4.75	7.86	10.47	17.13
	4+	2.00	5.11	9.99	15.67
	Vehicles	**Final - HH1**	**Final - HH2**	**Final - HH3**	**Final - HH4**
Final Data for Model	0	2.46	4.46	6.14	10.27
	1	3.98	5.82	8.65	12.38
	2	4.70	7.30	10.12	16.22
	3	5.43	8.13	11.60	17.66
	4+	5.90	8.37	12.14	18.78




Person Trip Rate Comparisons, Household Size 2, Canyon County
Person Trips
Vehicles
0
1
2
3
4+
6.2
7.0
7.9
8.1
4.46
5.82
7.30
8.13
8.37
Raw-HH2
Expanded-HH2
Final-HH2
NHTS 2009-HH2


Person Trip Rate Comparisons, Household Size 3, Canyon County
Person Trips
Vehicles
0
1
2
3
4+
8.6
11.2
12.4
14.4
6.14
8.65
10.12
11.60
12.14
Raw-HH3
Expanded-HH3
Final-HH3
NHTS 2009-HH3

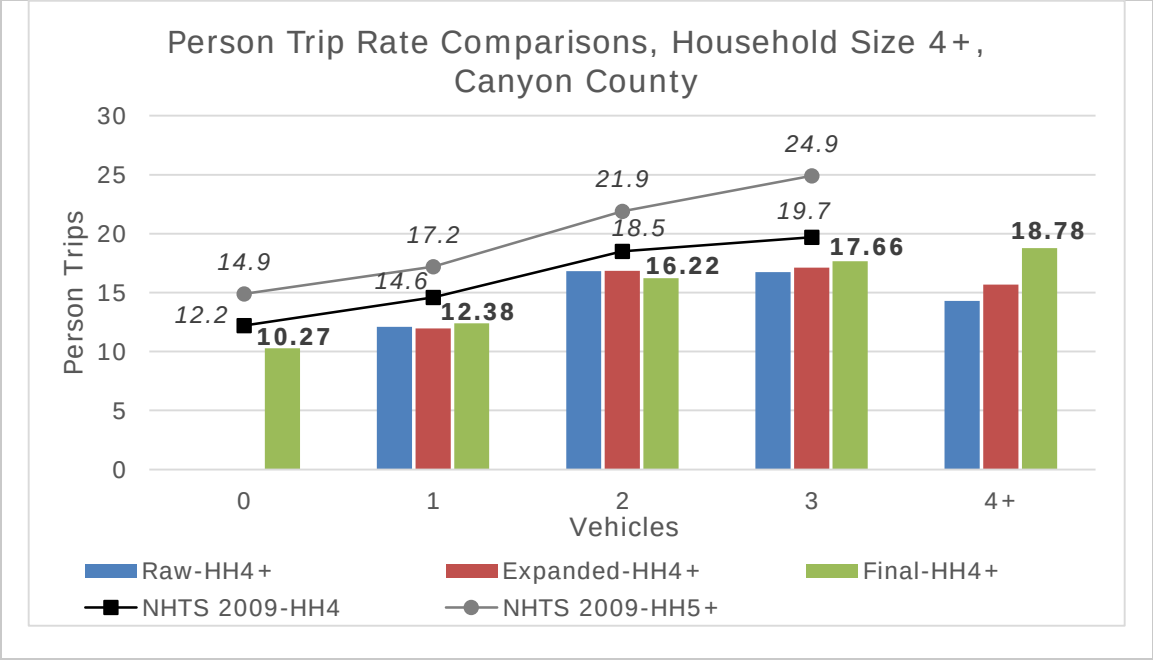

Person Trip Rate Comparisons, Household Size 4+, Canyon County
Person Trips
30
25
20
15
10
5
0
0
1
2
3
4+
Vehicles
14.9
12.2
10.27
17.2
14.6
12.38
21.9
18.5
16.22
24.9
19.7
17.66
18.78
Raw-HH4+
Expanded-HH4+
Final-HH4+
NHTS 2009-HH4
NHTS 2009-HH5+

Table 71 compares data on persons and vehicles per household at the demographic area level collected through different data collection efforts. These differences are provided as informational and comparison purposes only. A map of the demographic areas is provided in Figure 21.

Table 71: Person per Household and Vehicle per Household Comparisons

Demographic Area	2011 Household Travel Survey			2010 Census	2002 Household Travel Survey	Comparison of Vehicles per HH (2011 Survey vs 2002 Survey)	Comparison of Persons per HH (2011 Survey vs Census)
	Sample Size	Persons per HH[a]	Vehicles per HH	Persons per HH	Vehicles per HH		
Ada-Blacks Creek Rural[b]	0	n/a	*2.22	2.67	n/a	n/a	n/a
Ada-Northwest Rural	23	2.91	2.22	3.12	2.30	-4%	-7%
Ada-Southeast Rural	3	2.33	2.00	2.74	1.85	8%	-15%
Ada-Southwest Rural	6	2.00	1.83	3.09	2.74	-33%	-35%
Ada-Ten Mile Creek Rural	18	2.22	2.50	2.75	2.37	5%	-19%
Ada-West Foothills	27	2.56	2.52	3.05	2.09	21%	-16%
Boise-Airport	6	2.17	1.67	2.14	1.99	-16%	1%
Boise-Central Bench	255	2.17	1.89	2.17	1.78	6%	0%
Boise-Downtown	345	1.44	0.97	1.56	0.94	3%	-3%
Boise-East End	67	2.40	1.99	2.08	1.83	9%	16%
Boise-East Foothills	5	3.00	2.20	2.43	2.09	5%	23%
Boise-Foothills	79	2.28	2.10	2.55	2.09	1%	-11%
Boise-North End	111	2.11	1.63	2.13	2.13	-23%	-1%
Boise-Northwest	83	2.42	1.86	2.33	2.09	-11%	4%
Boise-Southeast	190	2.28	1.93	2.24	1.85	4%	2%
Boise-Southeast, Barber Valley	8	2.88	1.88	2.50	1.85	1%	15%
Boise-Southwest	218	2.81	2.22	2.81	2.37	-7%	0%
Boise-West Bench	398	2.63	2.00	2.65	2.13	-6%	-1%
Eagle/Star	4	2.25	2.50	2.63	2.30	9%	-15%
Eagle-Central	74	2.57	1.81	2.32	2.18	-17%	11%
Eagle-Floating Feather	54	3.06	2.04	2.32	2.18	-7%	32%
Eagle-Island	10	2.20	2.00	3.37	2.18	-8%	-35%
Eagle-South River	31	2.61	2.26	2.67	2.18	4%	-2%
Eagle-State Corridor	27	2.48	1.89	3.08	2.18	-13%	-19%
Foothills Rural	56	2.66	1.95	2.76	2.74	-29%	-4%
Garden City	68	2.07	1.54	2.25	1.92	-20%	-8%
Kuna	64	3.16	2.34	2.96	2.41	-3%	7%
Meridian-Center	209	2.62	2.01	2.60	2.20	-8%	1%
Meridian-North	119	3.33	2.26	3.34	2.20	3%	0%
Meridian-South	108	3.07	2.28	3.00	2.20	4%	2%
Star	60	2.52	1.87	2.88	2.39	-22%	-13%
Caldwell-Central	66	2.47	1.82	2.68	1.84	-1%	-8%

Demographic Area	2011 Household Travel Survey			2010 Census	2002 Household Travel Survey	Comparison of Vehicles per HH (2011 Survey vs 2002 Survey)	Comparison of Persons per HH (2011 Survey vs Census)
	Sample Size	Persons per HH[a]	Vehicles per HH	Persons per HH	Vehicles per HH		
Caldwell-Downtown	16	2.63	1.38	2.69	1.84	-25%	-2%
Caldwell-Northeast	57	2.88	2.04	2.96	1.84	11%	-3%
Caldwell-South	57	2.98	2.00	2.93	1.84	9%	2%
Caldwell-West	43	2.37	1.74	2.78	1.84	-5%	-15%
Canyon-Northeast Rural	50	2.66	2.14	2.84	2.62	-18%	-6%
Canyon-Northwest Rural	18	2.22	1.83	2.83	2.62	-30%	-22%
Canyon-South Rural	66	2.94	2.27	3.07	2.62	-13%	-4%
Canyon-West Rural	47	2.38	2.32	2.81	2.62	-11%	-15%
Greenleaf	8	2.38	2.75	2.84	2.62	5%	-16%
Melba	8	3.25	2.75	2.96	2.62	5%	10%
Middleton	32	3.41	2.22	2.96	2.05	8%	15%
Nampa-Downtown	26	2.19	1.62	2.47	2.04	-21%	-11%
Nampa-East	86	2.91	2.00	2.90	2.04	-2%	0%
Nampa-North	50	3.16	2.12	2.71	2.04	4%	17%
Nampa-Southeast	121	2.79	1.81	2.88	2.04	-11%	-3%
Nampa-West	163	2.80	1.94	2.84	2.08	-6%	-1%
Notus	1	2.00	3.00	3.16	2.62	15%	-37%
Parma	10	2.30	1.80	2.69	2.62	-31%	-14%
Wilder	3	4.67	2.00	2.89	2.62	-24%	62%
Regional Average	**3,654**	**2.59**	**2.01**	**2.70**	**2.17**	**-7%**	**-4%**

[a.] Person per household rates are subject to refinement based on updated or better information made available. These rates are reviewed periodically in coordination with the demographic reconciliation process.
[b.] Assumes Black's Creek Area will have similar characteristics as Southwest Boise.

Large scale demographic area maps are available on the COMPASS website: Ada County and Canyon County.

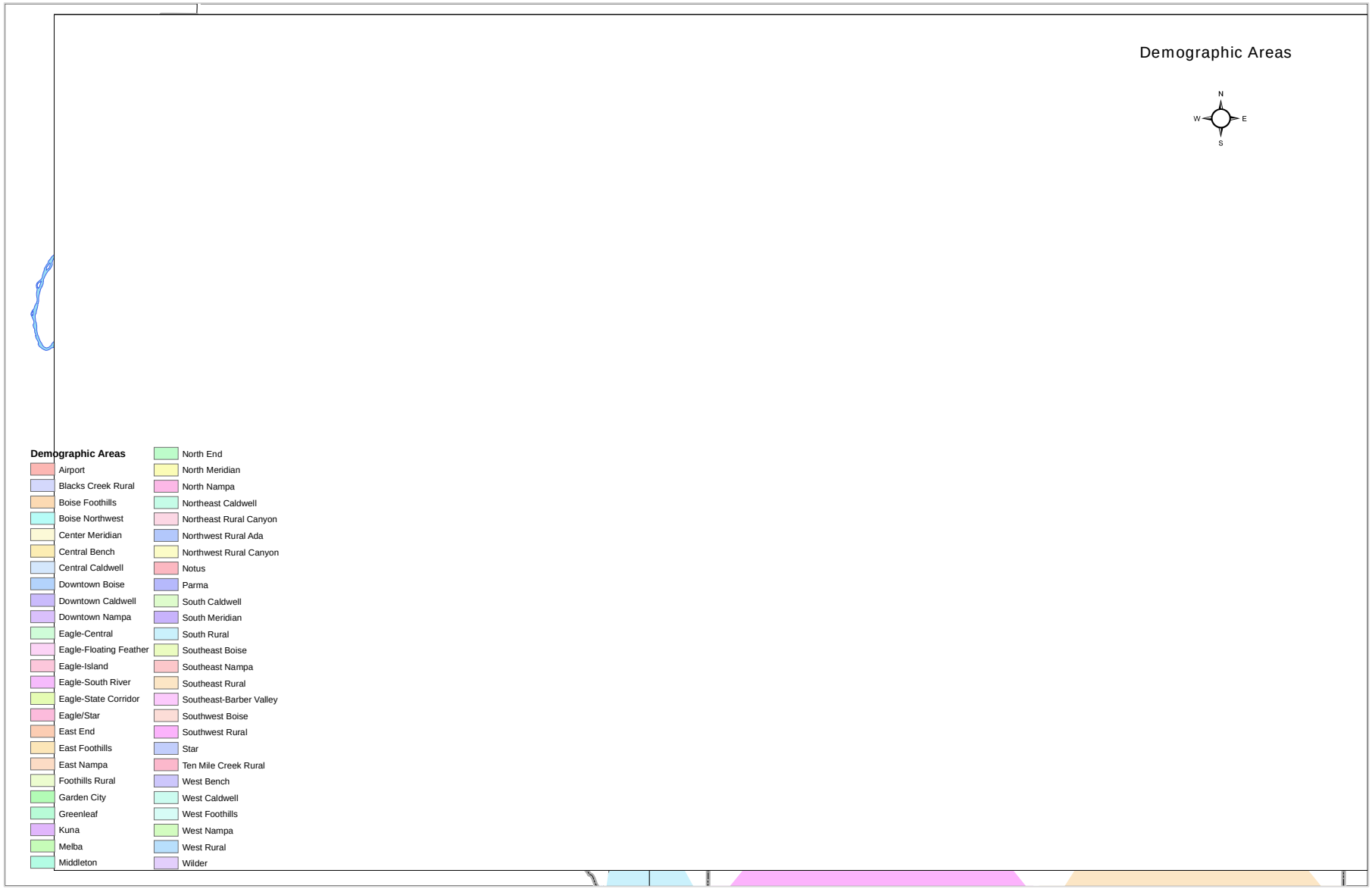


Figure 21: Demographic Area Map[17]

17 Ada County Demographic Area Map and Canyon County Demographic Area Map

Appendix B

Additional External Trip Information

Table 72 shows the traffic count history from ITD's automatic traffic recorders (ATR) for the locations that correspond to the model's external stations. Staff applied a simple trend function to the historical data to "forecast" volumes to 2040. Staff used these trend-based "forecasts" to compare to the model's forecast at the externals. This was a method to confirm that the internal-external, external-internal trip fractions by county by trip purpose in Table 8 are reasonable.

Table 72: External Station Counts and Trends

Counter #274 - SH 16, Firebird

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
2012	7,071	7,438	7,729	8,174	8,370	8,603	8,055	8,324	7,676	7,738	7,528	7,338	7,837	
2013	6,332	7,397	7,884	8,409	8,208	8,682	8,118	8,307	8,174	8,330	7,674	7,251		*Avg of short term trend*
2014	7,026	7,351	8,019	8,643	8,424	8,819	8,284	8,753	8,466	8,713	7,524	7,836		
2015	*6,765*	*7,308*	*8,167*	*8,878*	*8,388*	*8,917*	*8,381*	*8,890*	*8,895*	*9,235*	*9,235*	*7,973*	*8,419*	***7.43%***
2020	*6,652*	*7,091*	*8,892*	*10,050*	*8,523*	*9,457*	*8,954*	*9,963*	*10,870*	*11,673*	*11,673*	*9,218*	*9,418*	***11.86%***
2025	*6,540*	*6,873*	*9,617*	*11,223*	*8,658*	*9,997*	*9,526*	*11,035*	*12,845*	*14,110*	*14,110*	*10,463*	*10,417*	***10.60%***
2030	*6,427*	*6,656*	*10,342*	*12,395*	*8,793*	*10,537*	*10,099*	*12,108*	*14,820*	*16,548*	*16,548*	*11,708*	*11,415*	***9.59%***
2035	*6,315*	*6,438*	*11,067*	*13,568*	*8,928*	*11,077*	*10,671*	*13,180*	*16,795*	*18,985*	*18,985*	*12,953*	*12,414*	***8.75%***
2040	*6,202*	*6,221*	*11,792*	*14,740*	*9,063*	*11,617*	*11,244*	*14,253*	*18,770*	*21,423*	*21,423*	*14,198*	*13,412*	***8.04%***

The SH 16 ATR has existed since 2005 however, between 2005 and 2011 volumes on this road declined slightly. For example, the annual average volume was 10% lower in 2011 than in 2005. When using the historic data back to 2005 the trend analysis resulted in a "forecasted" volumes lower than 2014 volumes. This is contrary to more recent traffic volumes which have shown modest increases from 2012 to 2015. Therefore, a short term growth rate was applied to the external to external (X-X) trips.

Counter #10 - SH 55 north of Dry Creek

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
1990	2,496	2,624	3,066	3,634	4,690	5,240	6,207	5,783	5,000	4,251	3,321	2,507	4,077	
1991	2,297	3,348	3,162	3,577	4,610	5,471	6,619	6,421	5,380	5,050	3,547	3,267	4,403	
1992	3,031	3,646	4,010	4,387	5,993	6,101	7,002	6,944	5,513	5,533	3,952	3,067	4,951	
1993	2,982	3,517	3,519	4,273	5,980	6,223	7,859	7,414	6,467	6,011	4,503	3,948	5,237	
1994	3,829	3,578	4,123	4,864	5,671	6,777	8,655	7,554	6,794	6,386	4,194	3,872	5,539	
1995	3,778	4,423	4,261	4,877	6,195	7,123	8,691	7,872	6,407	6,226	4,742	3,822	5,701	
1996	3,439	4,303	4,426	4,875	6,039	7,145	8,813	8,317	6,742	6,142	4,629	3,578	5,704	
1997	2,639	4,375	4,173	*4,972*						*6,307*				
1998	3,847	4,387	4,449	5,069	6,114	7,371	9,192	8,741	7,393	6,471	5,280	4,323	6,053	
1999	4,188	4,124	4,600	5,175	6,470	7,609	9,439	8,705	7,427	6,684	5,397	4,444	6,189	
2000	4,049	4,745	4,867	5,558	6,421	8,093	9,626	8,770	7,312	6,569	5,035	4,520	6,297	
2001	4,287	4,620	4,986	5,518	7,413	8,320	9,668	9,184	7,346	6,919	5,660	4,506	6,536	
2002	4,437	4,901	4,877	5,531	7,317	8,579	10,027	9,734	7,816	7,129	5,780	5,079	6,767	
2003	4,794	5,263	5,225	5,685	7,526	8,941	10,327	9,864	7,962	7,529	5,766	5,141	7,002	
2004	4,407	5,113	5,574	6,359	7,718	9,105	10,729	9,403	8,523	7,671	6,122	5,558	7,190	
2005	5,252	5,870	6,004	6,407	7,884	9,076	11,052	10,093	8,337	7,600	6,238	5,464	7,440	
2006	5,178	5,720	5,728	6,227	7,604	9,225	11,022	10,048	8,648	8,045	6,555	5,802	7,484	
2007	5,666	5,950	6,297	6,790	8,403	9,671	10,910	10,052	8,179	7,847	6,636	5,743	7,679	
2008	4,998	5,403	5,519	5,934	7,079	8,105		9,580	7,588	6,826	5,709	4,821		
2009	4,893	5,469	5,101	5,717	7,453	8,412	10,434	9,389	7,850	6,598	5,484	4,826	6,802	
2010	4,854	5,147	5,194	5,564	6,666	8,209	10,447	9,430	7,507	6,754	4,980	4,623	6,615	
2011	4,715	4,936	4,857	5,091	6,409	7,981	9,933	9,138	7,670	6,701	5,284	5,200	6,493	
2012	5,005	5,379	5,158	5,767	6,975	8,633	10,421	8,907	7,839	6,886	5,599	5,359	6,827	*5 YR Incremental Growth*
2013	4,814	5,521	5,838	6,161	7,771	9,303	11,024	10,181	7,871	7,472	6,007	5,413	7,281	
2014	5,831	5,621	6,101	6,617	8,223	9,799	10,898	9,714	8,103	7,708	5,989	5,922		
2015				*6,609*						*7,863*				***17.35%***
2020				*7,080*						*8,314*				***5.73%***
2025				*7,551*						*8,764*				***5.42%***
2030				*8,022*						*9,214*				***5.14%***
2035				*8,492*						*9,665*				***4.89%***
2040				*8,963*						*10,115*				***4.66%***

Counter #53 - SH 21, Robie Creek

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
1990	1,416	1,578	1,703	2,338	2,437	3,014	3,145	2,857	2,673	2,527	1,803	1,331	2,238	
1991	1,411	1,503	1,595	1,726	2,228	2,796	2,978	2,748	2,504	2,578	1,724	1,608	2,121	
1992	1,600	1,601	1,854	1,973	2,584	2,729	3,015	2,649	2,554	2,758	1,874	1,734	2,253	
1993	1,663	1,633	1,764	2,046	2,748	3,054	3,563	3,376	2,965	3,220	2,189	2,048	2,529	
1994	1,863	1,714	1,827	2,329	2,669	3,307	3,368	3,139	2,885	2,911	2,362	2,083	2,543	
1995	2,090	2,129	2,198	2,531	3,067	3,479	3,748	3,643	3,470	3,427	2,580	2,236	2,883	
1996	2,203	2,246	2,328	2,641	3,156	3,541	3,610	3,496	3,145	3,232	2,572	2,168	2,862	
1997	2,202	2,440	2,434	2,671	3,269	3,675	4,338	3,970	3,567	3,529	2,843	2,597	3,128	
1998	2,365	2,455	2,556	2,858	3,198	3,742	4,016	3,831	3,509	3,451	2,662	2,517	3,097	
1999	2,449	2,320	2,477	2,841	3,135	3,509	3,806	3,735	3,526	3,495	2,763	2,609	3,055	
2000	2,368	2,452	2,466	2,835	3,430	3,860	3,963	3,637	3,379	3,483	2,663	2,741	3,106	
2001	2,624	2,593	2,747	3,074	3,668	3,935	4,126	3,809	3,547	3,582	2,795	2,581	3,257	
2002	2,506	2,531	2,515	3,024	3,539	3,860	3,930	3,809	3,523	3,570	2,891	2,656	3,196	
2003	2,629	2,557	2,598	2,880	3,142	3,853	3,908	3,646	3,491	3,595	2,768	2,650	3,143	
2004	2,437	2,486	2,637	3,062	3,346	3,755	3,889	3,758	3,523	3,479	2,837	2,673	3,157	
2005	2,616	2,638	2,722	2,945	3,454	3,746	3,941	3,754	3,354	3,391	2,825	2,454	3,153	
2006	2,546	2,632	2,586	2,948	3,497	3,892	4,166	3,878	3,718	3,628	2,966	2,731	3,266	
2007	2,586	2,579	2,720	3,068	3,450	3,733	3,848	3,705	3,584	3,421	2,903	2,572	3,181	
2008	2,382	2,414	2,383	2,607	3,113	3,256	3,530	3,478	3,100	3,050	2,588	2,239	2,845	
2009	2,294	2,293	2,232	2,611	3,269	3,357	3,664	3,454	3,341	2,978	2,493	2,251	2,853	
2010	2,188	2,279	2,357	2,526	2,888	3,323	3,597	3,362	3,131	2,931	2,285	2,103	2,748	
2011	2,108	2,082	2,059	2,318	2,701	3,235	3,536	3,372	3,037	2,835	2,259	2,115	2,638	
2012	2,038	2,060	2,036	2,466	2,879	3,274	3,351	3,138	2,948	2,809	2,339	2,152	2,624	***5 YR Incremental Growth***
2013	1,937	2,126	2,312	2,581	3,066	3,322	3,402	3,134	2,985	2,950	2,464	2,177	2,705	
2014	2,315	2,146	2,384	2,630	3,268	3,462	3,552	3,352	3,256			2,276		
2015				*2,873*					*3,412*	*3,260*				***12.34%***
2020				*2,969*					*3,482*	*3,282*				***2.06%***
2025				*3,066*					*3,552*	*3,304*				***2.02%***
2030				*3,163*					*3,623*	*3,326*				***1.98%***
2035				*3,259*					*3,693*	*3,347*				***1.94%***
2040				*3,356*					*3,764*	*3,369*				***1.91%***

Counter #87 - I-84 Blacks Creek

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
1996		14,881	16,286	17,081	18,873	19,854		21,123		17,652	17,824	15,858		
1998	14,663	16,365	18,312	19,428		22,292	21,679	22,475	20,437	19,703	18,172	16,604		
1999	15,894	16,241	19,319	19,404	19,993	22,917	22,938	23,706	21,318	20,221	18,521	17,047	19,793	
2000	15,491	17,694	19,812	19,956	21,114	22,876	23,610	25,022	21,291	20,548	19,047	16,734	20,266	
2001	15,796	17,533	20,202	20,134	20,781	23,011	23,272	23,848	21,392	20,495	19,373	16,706	20,212	
2002	15,959	18,571	20,225	20,226	21,971	23,628	23,646	24,251	20,416	20,784	20,230	17,725	20,636	
2003	16,858	17,871	19,635	19,612	21,200	23,479	23,674	24,302	21,073	20,917	19,124	17,666	20,451	
2004	15,803	17,484	20,771	20,571	21,450	23,307	23,686	22,345	20,978	20,345	19,222	18,425		
2005	16,199	18,320	20,574	20,420	20,909	23,135	23,698	23,232	21,151	20,368	19,361	17,700	20,422	
2008	16,152	17,134	21,070	19,766	20,931	21,731	21,834	22,537	19,965	19,648	18,788	16,084		
2009	15,580	17,460	19,490	19,996	21,317	22,240	23,170	22,852	21,051	20,097	19,194	16,880	19,944	
2010	15,936	17,662	19,865	20,200	21,055	22,590	23,627	23,602	21,653	20,765	18,360	16,928	20,187	
2011	16,206	17,475	19,369	19,412	20,689	22,298	23,031	22,838	21,251	20,340	18,472	18,094	19,956	
2012	15,977	17,776	19,495	19,825	21,156	22,917	23,610	24,263	22,004	21,555	20,265	17,599	20,537	***5 YR Incremental Growth***
2013		18,383	21,075	20,769	22,418	24,427	24,413			*22,146*		18,194		
2014	17,502	18,292	21,644	21,832	23,126	24,777	25,192	25,435	23,153	22,737	20,158	19,692		
2015				*20,917*		*23,729*	*24,110*			*21,837*				***7.36%***
2020				*21,434*		*23,694*	*24,253*			*22,517*				***3.11%***
2025				*21,951*		*23,823*	*24,466*			*23,197*				***3.02%***
2030				*22,468*		*24,032*	*24,803*			*23,877*				***2.93%***
2035				*22,985*		*24,232*	*25,091*			*24,557*				***2.85%***
2040				*23,502*		*24,450*	*25,443*			*25,237*				***2.77%***

Counter #229 - SH 45 near Bowmont

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
2011			3,662	3,936	3,982	4,115	4,148	3,826	3,897	4,169	3,620	3,662		
2012	3,447	3,698	3,724	3,977	3,991	4,000	4,010	3,845	3,888	4,099	3,695	3,603	3,832	***5 YR Incremental Growth***
2013	3,225	3,578	3,884	3,931	4,109	4,078	4,084	3,877	3,932	4,116	3,733	3,460	3,834	
2014	3,440	3,559	3,876	4,085	4,179	4,122	4,176	4,064	4,006	4,195	3,615	3,729	3,921	
2015				*4,083*					*4,024*	*4,169*				***3.25%***
2020				*4,283*					*4,209*	*4,216*				***4.61%***
2025				*4,484*					*4,395*	*4,264*				***4.41%***
2030				*4,684*					*4,580*	*4,311*				***4.22%***
2035				*4,885*					*4,766*	*4,359*				***4.05%***
2040				*5,085*					*4,951*	*4,406*				***3.89%***

Counter #238 - SH 55 Sunnyslope

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
2011			5,026	5,418	5,741	6,205	6,341	5,912	5,769	5,681	5,149	4,937		
2012	4,634	4,989	5,089	5,532	5,910	6,130	6,127	6,015	5,835	5,675	4,998	4,788	5,478	***5 YR Incremental Growth***
2013	4,377	4,970	5,516	5,599	5,987	6,250	6,128	5,984	5,737	5,692	5,194	5,052	5,541	
2014	4,661	4,891	5,501	5,783	6,137	6,364	6,354	6,250	6,060	6,024	5,218	5,108	5,696	
2015				*5,874*					*6,044*	*6,030*				***4.77%***
2020				*6,455*					*6,432*	*6,553*				***6.41%***
2025				*7,036*					*6,819*	*7,076*				***6.03%***
2030				*7,617*					*7,207*	*7,599*				***5.68%***
2035				*8,198*					*7,594*	*8,122*				***5.38%***
2040				*8,779*					*7,982*	*8,645*				***5.10%***

Counter #187 - Homedale US-95 1.34 Mi. S of Jct SH-19

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
2006								5,946	5,924	5,927	5,440	4,982		
2007	4,788	4,911	5,531	5,653	5,784	5,687	5,406	5,809	5,755	5,576	5,031	4,594	5,377	
2008	4,411	4,879	5,218	5,431	5,557	5,256	5,164	5,342	5,282	5,328	4,722	*4,479*		
2009	4,377	4,594	4,718	4,889	4,939	5,257	5,156	5,349	5,412	5,079	4,600	4,363	4,894	
2010	4,205	4,614	4,998	5,269	5,239	5,281	5,190	5,280	5,475	5,272	4,754	4,385	4,997	
2011	4,407	4,678	4,809	5,200	5,265	5,369	5,170	5,435	5,477	5,312	4,812	4,487	5,035	
2012	4,484	4,699	4,856	5,300	5,187	5,014	5,106	5,402	5,388	5,183	4,792	4,578	4,999	***5 YR Incremental Growth***
2013	4,319	4,740	5,105	5,406	5,461	5,192	5,086	5,312	5,397	5,397	4,837	4,463	5,060	
2014	4,318	4,752	5,217	5,515	5,622	5,463	5,322	5,534	5,566	5,515	4,951	4,725	5,208	
2015	*4,364*	*4,798*	*5,237*	*5,627*	*5,686*	*5,303*	*5,217*	*5,484*	*5,497*	*5,536*	*4,989*	*4,714*	*5,204*	***0.37%***
2020	*4,382*	*4,968*	*5,646*	*6,147*	*6,258*	*5,362*	*5,282*	*5,625*	*5,561*	*5,882*	*5,273*	*5,019*	*5,450*	***1.16%***
2025	*4,399*	*5,138*	*6,055*	*6,668*	*6,830*	*5,420*	*5,347*	*5,766*	*5,625*	*6,229*	*5,556*	*5,324*	*5,696*	***1.15%***
2030	*4,417*	*5,308*	*6,464*	*7,188*	*7,401*	*5,478*	*5,412*	*5,908*	*5,689*	*6,575*	*5,840*	*5,629*	*5,942*	***1.14%***
2035	*4,435*	*5,478*	*6,873*	*7,708*	*7,973*	*5,537*	*5,476*	*6,049*	*5,753*	*6,922*	*6,123*	*5,934*	*6,188*	***1.12%***
2040	*4,453*	*5,648*	*7,282*	*8,228*	*8,545*	*5,595*	*5,541*	*6,190*	*5,816*	*7,268*	*6,407*	*6,239*	*6,434*	***1.11%***

Calculated 5-year growth rates using September data from 2009 to 2014.

Counter #189 - US 20, 0.1 miles west of Apple Valley

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
2011		3,521	3,666	3,875	3,794	3,995	3,857	4,041	4,304	4,157	3,698	3,566		
2012	3,429	3,579	3,648	3,932	4,009	3,974	3,956	4,203	4,506	4,064	3,750	3,493	3,879	***5 YR Incremental Growth***
2013	3,255	3,577	3,819	4,009	4,013	4,041	3,974	4,095	4,467	4,366	3,732	3,471	3,902	
2014	3,286	3,571	3,927	4,073	4,039	4,228	4,008	4,255	4,551	4,335	3,674	3,626	3,964	
2015				*4,140*					*4,633*	*4,440*				***7.63%***
2020				*4,476*					*4,984*	*4,858*				***7.58%***
2025				*4,811*					*5,335*	*5,276*				***7.04%***
2030				*5,147*					*5,686*	*5,694*				***6.58%***
2035				*5,482*					*6,037*	*6,112*				***6.17%***
2040				*5,818*					*6,388*	*6,530*				***5.81%***

Counter #25 - I-84 Sand Hollow

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual 24-hr Avg.	
1990	8,422	9,065	10,657	11,267	12,007	13,384	13,582	14,216	12,563	11,429	10,727	8,880	11,362	
1991	8,421	9,707	11,273	11,332	12,181	13,626	13,990	14,854	13,072	12,215	10,918	10,604	11,863	
1992	9,655	10,761	12,285	12,590	13,483	14,850	15,520	15,132	13,901	12,932	11,613	10,251	12,788	
1993	8,869	10,127	11,996	13,293	13,853	15,180	15,968	16,157	14,814	13,855	12,560	11,838	13,226	
1994	10,304	11,019	12,938	13,229	13,877	15,249	15,637	15,810	14,628	13,506	11,912	11,703	13,332	
1995	11,098	11,803	13,431	13,742	14,505	15,812	16,231	16,618	15,369	14,439	13,477	12,245	14,064	
1996	10,810	11,858	14,039	14,386	14,974	16,104	16,561	16,646	15,227	14,362	13,585	12,206	14,230	
1997	11,836	12,623	14,519	14,334	14,972	15,961	16,337	16,531	14,828	14,740	14,031	13,312	14,502	
1998	11,823	13,428	14,812	15,475	15,927	17,283	17,689	18,525	16,724	15,582	14,854	13,864	15,499	
1999	13,230	13,997	16,276	16,736	17,420	19,073	19,356	19,355	18,271	17,565	16,660	14,879	16,902	
2000	13,597	15,316	16,762	16,968	17,660	18,956	19,204	19,877	18,261	17,374	15,983	14,866	17,069	
2001	13,502	14,757	17,161	17,583	18,244	19,377	19,668	20,245	18,830	17,614	16,452	14,685	17,343	
2002	14,105	15,801	17,370	18,043	18,808	20,332	20,539	20,692	18,845	18,503	17,112	16,126	18,023	
2003	14,970	15,535	17,362	17,942	19,076	20,487	20,716	21,096	18,393	17,618	16,593	15,925	17,976	
2004	13,414	15,308	17,812	18,253	18,448	19,476	20,148	20,094	18,829	18,179	16,942	16,139	17,754	
2005	14,350	16,091	18,012	18,115	18,463	20,122	20,432	20,370	18,451	17,803	17,193	16,008	17,951	
2006	14,972	16,354	18,043	18,520	19,099	20,932	20,852	20,973	19,717	19,101	18,171	16,719	18,621	
2007	15,523	16,857	19,020	19,404	19,600	20,311	*20,174*			*18,531*		15,745		
2008	13,720	15,467	18,017	18,215	19,156	19,512	19,495	19,301	18,039	17,961	17,285	15,374	17,629	
2009	14,428	15,929	17,861	18,537	19,427	20,798	21,289	19,101	17,270	19,221	17,938	14,026	17,985	
2010	12,690		18,349	18,656		20,884	21,724	21,737	20,509	19,658	17,907	16,161		
2011	15,667	16,500	18,362	18,949	19,405	20,959	21,513	21,472	19,904	19,390	17,949	17,120	18,933	
2012	15,471	16,659	17,828	18,895	19,853	21,444	21,541	22,028	19,963	19,356	18,504	16,890	19,036	***5 YR Incremental Growth***
2013	14,536	16,379	18,829	19,021	20,124	21,777	21,855	21,606	20,527	19,709	18,412	16,939	19,143	
2014	15,733	16,417	19,566	19,778	20,664	22,345	22,070	21,984	20,877	20,370	18,380	17,936		
2015				*20,983*		*23,142*	*23,266*			*21,275*				***9.72%***
2020				*22,695*		*24,775*	*24,787*			*22,980*				***8.02%***
2025				*24,407*		*26,295*	*26,196*			*24,686*				***7.42%***
2030				*26,120*		*27,863*	*27,691*			*26,391*				***6.91%***
2035				*27,832*		*29,401*	*29,185*			*28,097*				***6.46%***
2040				*29,545*		*30,882*	*30,581*			*29,802*				***6.07%***

The 5-year growth rates for each count location are directly applied to forecast external to external trips. First, the growth factors shown above in the "5 YR Incremental Growth" column are added to the predetermined starting year of 2010 (see Table 73) represented by 1.00. For example, if the "trend" growth rate for external station 3750: I-84 west (corresponds with counter #25) is 9.72% between 2010 and 2015, the growth rate is 1.00 + 0.972 = 1.10. The external station growth factors are shown in Table 73.

Table 73: External Station Growth Factors

Final Factors (Traffic Trend Method)		2010		2015		2020		2025		2030		2035		2040	
		In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)
3738	**SH 16**	1.00	1.00	1.07	1.07	1.19	1.19	1.30	1.30	1.39	1.39	1.48	1.48	1.56	1.56
3739	**SH 55 N**	1.00	1.00	1.17	1.17	1.23	1.23	1.28	1.28	1.34	1.34	1.39	1.39	1.43	1.43
3740	**Bogus Basin[a]**	1.00	1.00	1.10	1.10	1.21	1.21	1.32	1.32	1.44	1.44	1.57	1.57	1.57	1.57
3741	**SH 21**	1.00	1.00	1.12	1.12	1.14	1.14	1.16	1.16	1.18	1.18	1.20	1.20	1.22	1.22
3742	**Blacks Creek[b]**	1.00	1.00	1.07	1.07	1.15	1.15	1.24	1.24	1.33	1.33	1.42	1.42	1.42	1.42
3743	**I84 East**	1.00	1.00	1.07	1.07	1.10	1.10	1.13	1.13	1.16	1.16	1.19	1.19	1.22	1.22
3744	**Swan Falls[c]**	1.00	1.00	1.06	1.06	1.13	1.13	1.20	1.20	1.26	1.26	1.34	1.34	1.34	1.34
3745	**SH 45**	1.00	1.00	1.03	1.03	1.08	1.08	1.12	1.12	1.16	1.16	1.21	1.21	1.24	1.24
3746	**SH 55 S**	1.00	1.00	1.06	1.06	1.15	1.15	1.23	1.23	1.30	1.30	1.37	1.37	1.44	1.44
3747	**US 95 S**	1.00	1.00	1.04	1.04	1.10	1.10	1.16	1.16	1.22	1.22	1.27	1.27	1.32	1.32
3748	**Hwy 18[d]**	1.00	1.00	1.08	1.08	1.17	1.17	1.25	1.25	1.32	1.32	1.41	1.41	1.41	1.41
3749	**US 95 N**	1.00	1.00	1.05	1.05	1.07	1.07	1.09	1.09	1.11	1.11	1.13	1.13	1.16	1.16
3750	**I84 West**	1.00	1.00	1.10	1.10	1.18	1.18	1.25	1.25	1.32	1.32	1.39	1.39	1.45	1.45

a. to d. Historical traffic count data are not available; used population growth method for surrounding counties, county-level forecasts.
a. Results in 8 X-X vehicle trips
b. Results in 2 X-X vehicle trips
c. Results in 2 X-X vehicle trips
d. Results in 2 X-X vehicle trips
These external stations (Bogus Basin Rd, Blacks Creek Rd, Swan Falls Rd, and Hwy 18) provide little to no value to the external to external trips calculations. Staff may consider removing these external stations from the model in the future.

The external station growth factors shown above are applied to the actual external trip volumes collected as part of the Treasure Valley Truck Freight video license plate external station survey[18]. After the final external trips by station were calculated for forecast years, an overall external to external trip rate was calculated. Based on staff testing and presentation of the results to the Transportation Model Advisory Committee, the decision to use one rate was the determined to yield more reasonable results.

[18] Commercial Vehicle Intercept Survey and Video External Station Survey Final Report

Table 74: External Station Trip Forecast and Final Overall Growth Factor

Final Factors (Traffic Trend Method)		2010		2015		2020		2025		2030		2035		2040	
		In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)	In Trips (X-X)	Out Trips (X-X)
3738	**SH 16**	19	20	20	21	24	26	27	28	28	30	30	32	32	34
3739	**SH 55 N**	18	16	21	19	26	23	27	24	28	25	29	26	30	27
3740	**Bogus Basin[a]**	5	5	5	5	7	7	7	7	8	8	9	9	9	9
3741	**SH 21**	7	13	8	15	9	17	9	17	9	17	9	18	10	18
3742	**Blacks Creek**	1	1	1	1	1	1	1	1	1	1	2	2	2	2
3743	**I84 East**	422	709	453	761	501	841	514	864	527	886	540	908	553	929
3744	**Swan Falls**	2	2	2	2	2	2	3	3	3	3	3	3	3	3
3745	**SH 45**	15	9	15	9	17	10	17	10	18	11	19	11	19	12
3746	**SH 55 S**	18	19	19	20	22	23	23	25	25	26	26	28	27	29
3747	**US 95 S**	135	198	141	206	155	228	164	240	172	252	179	262	186	273
3748	**Hwy 18[d]**	1	1	1	1	1	1	1	1	1	1	2	2	2	2
3749	**US 95 N**	193	119	202	124	216	133	220	136	225	139	229	141	233	144
3750	**I84 West**	685	409	752	449	885	528	941	562	993	593	1,041	622	1,087	649
Total		*1,521*	*1,521*	*1,641*	*1,635*	*1,866*	*1,840*	*1,955*	*1,918*	*2,039*	*1,992*	*2,118*	*2,062*	*2,192*	*2,128*
Overall Growth		**0.0%**		**7.9%**		**22.7%**		**28.5%**		**34.0%**		**39.2%**		**44.1%**	

Tables 75 and 76 provide the historic and forecasted population of the surrounding counties. This information is included to help illustrate why external trips are a small portion of all trips in, out, and through the two-county region.

Table 75: Population Estimates and Projections, Surrounding Counties[19]

County	Boise	Elmore	Gem	Owyhee	Payette	Malheur (Oregon)
1990	3,509	21,205	11,844	8,392	16,434	26,038
2000	6,670	29,130	15,181	10,644	20,578	31,615
2010	7,028	27,038	16,719	11,526	22,623	31,313
2015	7,458	26,711	17,303	11,670	23,288	31,410
2020	8,023	27,131	18,105	11,949	24,107	31,792
2025	8,606	27,475	18,889	12,197	24,880	32,083
2030	9,196	27,718	19,631	12,403	25,580	32,253
2035	9,790	27,857	20,326	12,565	26,201	32,302
2040	10,390	27,915	20,982	12,691	26,757	32,255

Table 76: Growth Rates, Surrounding Counties

County	Boise	Elmore	Gem	Owyhee	Payette	Malheur (Oregon)
1990 - 2000	90.10%	37.40%	28.20%	26.80%	25.20%	21.40%
2000 - 2010	5.40%	-7.20%	10.10%	8.30%	9.90%	-1.00%
2010 - 2015	6.10%	-1.20%	3.50%	1.20%	2.90%	0.30%
2015 - 2020	7.60%	1.60%	4.60%	2.40%	3.50%	1.20%
2020 - 2025	7.30%	1.30%	4.30%	2.10%	3.20%	0.90%
2025 - 2030	6.90%	0.90%	3.90%	1.70%	2.80%	0.50%
2030 - 2035	6.50%	0.50%	3.50%	1.30%	2.40%	0.20%
2035 - 2040	6.10%	0.20%	3.20%	1.00%	2.10%	-0.10%

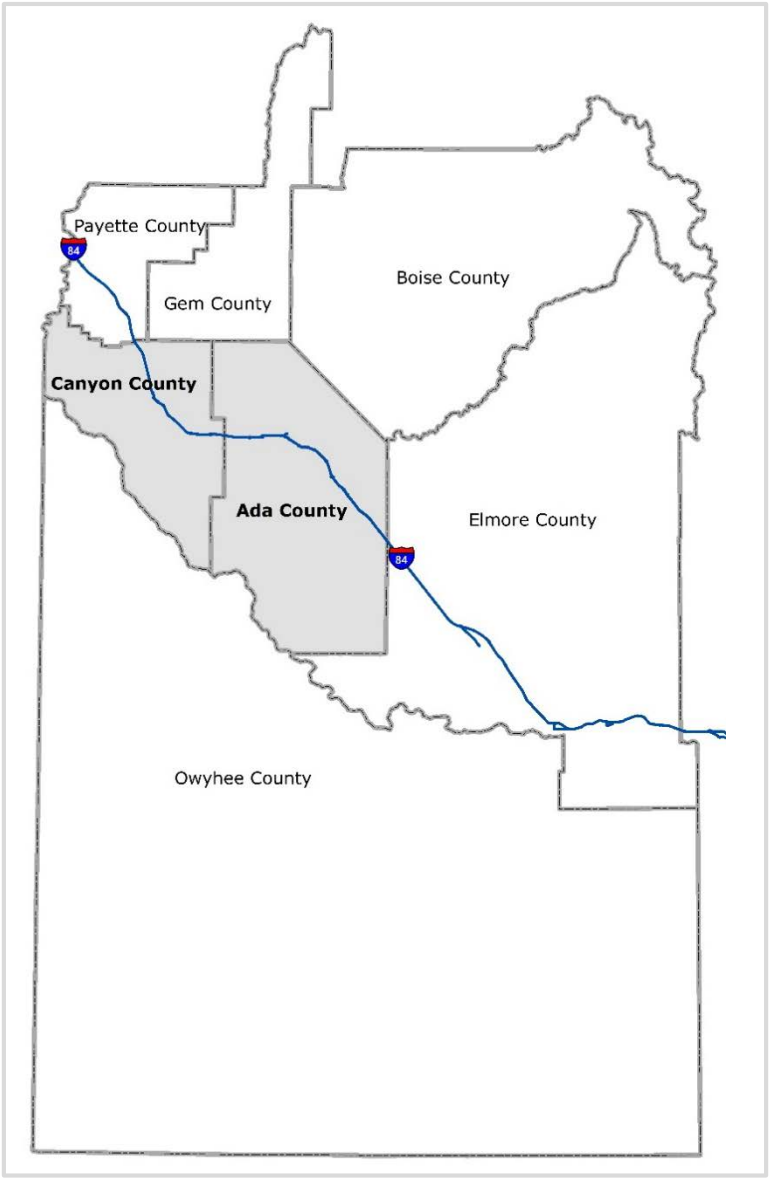


Figure 22: Southwest Idaho County Map (Malheur County, OR, not shown)

Table 77 shows the data and information used to develop rates to calculate the peak hour models' external trips (internal to external, external to internal, and external to external). These peak hour rates do not change for future years, but are applied to the future daily model's internal to external, external to internal, and external to external trips. The daily model's external trips are assumed to increase over time. The daily internal to external and external to internal trips are calculated in trip generation using the assumed demographic changes within the two-county region. Also, the daily external to external trips are grown using the method discussed above.

Table 77: Peak Hour Models External Trip Data, Methods, and Factors

											outbound	inbound	outbound	inbound
Actual Count	Peak2: 4pm to 5pm	Peak1: 5pm to 6pm	station no	depIX	retIX	depXi	RetXI	Peak2: 4pm to 5pm	Peak1: 5pm to 6pm	station no	Peak2: 4pm to 5pm		Peak1: 5pm to 6pm	
4182	228	221	3738		piax	xsta		5.5%	5.3%	3738	0.000	0.055	0.000	0.053
4173	482	563	3738	piax			xsta	11.6%	13.5%	3738	0.116	0.000	0.135	0.000
2900	228	207	3739		piax	xsta		7.9%	7.1%	3739	0.000	0.079	0.000	0.071
2816	259	276	3739	piax			xsta	9.2%	9.8%	3739	0.092	0.000	0.098	0.000
1356	70	64	3741		piax	xsta		5.2%	4.7%	3741	0.000	0.052	0.000	0.047
1232	126	165	3741	piax			xsta	10.2%	13.4%	3741	0.102	0.000	0.134	0.000
9776	776	767	3743		piax	xsta		7.9%	7.8%	3743	0.000	0.079	0.000	0.078
9936	751	707	3743	piax			xsta	7.6%	7.1%	3743	0.076	0.000	0.071	0.000
1759	121	139	3745		piax	xsta		6.9%	7.9%	3745	0.000	0.069	0.000	0.079
1760	129	137	3745	piax			xsta	7.3%	7.8%	3745	0.073	0.000	0.078	0.000
3555	272	278	3746		piax	xsta		7.7%	7.8%	3746	0.000	0.077	0.000	0.078
3311	279	284	3746	piax			xsta	8.4%	8.6%	3746	0.084	0.000	0.086	0.000
1416	92	111	3747		piax	xsta		6.5%	7.8%	3747	0.000	0.065	0.000	0.078
1477	132	128	3747	piax			xsta	8.9%	8.7%	3747	0.089	0.000	0.087	0.000
2001	165	168	3749		piax	xsta		8.2%	8.4%	3749	0.000	0.082	0.000	0.084
2059	170	172	3749	piax			xsta	8.3%	8.4%	3749	0.083	0.000	0.084	0.000
9816	680	688	3750		piax	xsta		6.9%	7.0%	3750	0.000	0.069	0.000	0.070
9659	809	888	3750	piax			xsta	8.4%	9.2%	3750	0.084	0.000	0.092	0.000

station no	outbound 4pm	inbound 4pm	outbound 5pm	inbound 5pm
3738	0.116	0.055	0.135	0.053
3739	0.092	0.079	0.098	0.071
3740	0.079	0.079	0.081	0.081
3741	0.102	0.052	0.134	0.047
3742	0.079	0.079	0.081	0.081
3743	0.076	0.079	0.071	0.078
3744	0.079	0.079	0.081	0.081
3745	0.073	0.069	0.078	0.079
3746	0.084	0.077	0.086	0.078
3747	0.089	0.065	0.087	0.078
3748	0.079	0.079	0.081	0.081
3749	0.083	0.082	0.084	0.084
3750	0.084	0.069	0.092	0.070
Gateways without counts --> use regional average PHF of 0.081				

[19] 2014 State Profile, State and County Projections to 2040, Woods and Poole Economics, Inc.

Appendix C

Friction Factors

Tables 78 - 84 shows the final friction factors and worksheets by trip purpose used in the regional model.

Table 78: Friction Factors by Trip Purpose

Time (minutes)	Home Base Work	Home Base Shop	Home Base Social	Home Base School[a]	Home Base Other	Non-Home Base	Internal - External	External - Internal
1	1500	40160	1800	1500	1800	3000	500	700
2	1197	29881	1350	1194	1384	2346	418	586
3	1020	23868	1087	1015	1140	1963	371	519
4	894	19601	900	889	967	1691	337	472
5	797	16292	755	790	833	1481	311	435
6	717	13588	637	710	723	1309	289	405
7	650	11302	537	642	631	1163	271	379
8	592	9322	450	583	551	1037	255	357
9	540	7575	374	531	480	926	241	338
10	494	6013	305	485	416	826	229	321
11	453	4600	243	442	359	736	218	305
12	415	3309	187	404	307	654	208	291
13	380	2122	135	369	259	579	198	277
14	347	1023	87	336	214	509	189	265
15	317	19	42	306	173	444	181	254
16	289	18	17.9	277	134	383	174	243
17	262	16	15.4	250	98	326	167	233
18	237	15	12.9	225	63	272	160	224
19	214	13	10.4	201	31	221	153	215
20	191	12	7.9	179	8.3	172	147	206
21	170	10	7.6	157	8.2	126	142	198
22	150	9.6	7.3	137	8.1	82	136	191
23	130	9.1	6.9	117	8.1	40	131	183
24	112	8.7	6.6	98	8	10.5	126	176
25	94	8.3	6.3	80	7.9	9.6	121	170
26	77	7.9	6	63	7.8	8.7	117	163
27	60	7.4	5.7	46	7.7	7.8	112	157
28	44	7	5.3	30	7.7	6.9	108	151
29	29	7	5	15	7.6	6	104	145
30	14	5	4.7	5.7	7.5	5.1	100	140
31	3.1	4.5	3.9	4.6	6.2	4.2	96	134
32	3.1	4	3.1	3.5	4.9	3.3	92	129
33	3.1	3.5	2.2	2.4	3.7	2.3	89	124
34	3.1	3	1.4	1.3	2.4	1.4	85	119
35	3.1	2.6	0.6	1.3	1.1	1.4	82	114

Time (minutes)	Home Base Work	Home Base Shop	Home Base Social	Home Base School[a]	Home Base Other	Non-Home Base	Internal - External	External - Internal
36	2.7	2.1	0.6	1.3	1.1	1.3	78	110
37	2.7	1.7	0.6	1.3	1	1.2	75	105
38	2.7	1.2	0.6	1.3	1	1	72	101
39	2.7	0.8	0.6	1.3	1	0.9	69	96
40	2.7	0.7	0.6	1.2	1	0.9	66	92
41	2.2	0.6	0.6	1.1	0.9	0.9	63	88
42	2.2	0.5	0.6	1.1	0.9	0.9	60	84
43	2.2	0.4	0.6	1	0.9	0.9	57	80
44	2.2	0.2	0.6	1	0.8	0.9	55	77
45	2.2	0	0.1	1	0.8	0.9	52	73
46	0.5	0	0.1	0.9	0.7	0.9	49	69
47	0.5	0	0.1	0.8	0.6	0.9	47	66
48	0.5	0	0.1	0.6	0.4	0.9	44	62
49	0.5	0	0.1	0.5	0.3	0.9	42	59
50	0.5	0	0.1	0.4	0.2	0.1	40	55
51	0.3	0	0.1	0.4	0	0.1	37	52
52	0.3	0	0.1	0.4	0	0.1	35	49
53	0.3	0	0.1	0.3	0	0.1	33	46
54	0.3	0	0.1	0.3	0	0.1	31	43
55	0.3	0	0.1	0.2	0	0.1	28	40
56	0.2	0	0.1	0	0	0.1	26	37
57	0.2	0	0.1	0	0	0.1	24	34
58	0.2	0	0.1	0	0	0.1	22	31
59	0.2	0	0.1	0	0	0.1	20	28
60	0.2	0	0.1	0	0	0.1	18	25
61	0.2	0	0.1	0	0	0.1	16	23
62	0.2	0	0.1	0	0	0.1	14	20
63	0.2	0	0.1	0	0	0.1	12	17
64	0.1	0	0.1	0	0	0.1	11	15
65	0.1	0	0.1	0	0	0.1	10	10
66	0.1	0	0.1	0	0	0.1	10	10
67	0.1	0	0.1	0	0	0.1	10	10
68	0.1	0	0.1	0	0	0.1	10	10
69	0.1	0	0.1	0	0	0.1	9	9
70	0.1	0	0.1	0	0	0.1	9	9
71	0.1	0	0.1	0	0	0.1	9	9
72	0.1	0	0.1	0	0	0.1	9	9
73	0.1	0	0.1	0	0	0.1	8	9
74	0.1	0	0.1	0	0	0.1	8	8
75	0.1	0	0.1	0	0	0.1	8	8
76	0.1	0	0.1	0	0	0.1	8	8

Time (minutes)	Home Base Work	Home Base Shop	Home Base Social	Home Base School[a]	Home Base Other	Non-Home Base	Internal - External	External - Internal
77	0.1	0	0.1	0	0	0.1	8	8
78	0.1	0	0.1	0	0	0.1	8	8
79	0.1	0	0.1	0	0	0.1	7	7
80	0.1	0	0.1	0	0	0.1	7	7
81	0.1	0	0.1	0	0	0.1	7	7
82	0.1	0	0.1	0	0	0.1	7	7
83	0.1	0	0.1	0	0	0.1	7	7
84	0.1	0	0.1	0	0	0.1	6	7
85	0.1	0	0.1	0	0	0.1	6	6
86	0.1	0	0.1	0	0	0	6	6
87	0.1	0	0.1	0	0	0	6	6
88	0.1	0	0.1	0	0	0	6	6
89	0.1	0	0.1	0	0	0	6	6
90	0.1	0	0.1	0	0	0	5	6
91	0	0	0	0	0	0	5	5
92	0	0	0	0	0	0	5	5
93	0	0	0	0	0	0	5	5
94	0	0	0	0	0	0	5	5
95	0	0	0	0	0	0	5	5
96	0	0	0	0	0	0	4	5
97	0	0	0	0	0	0	4	5
98	0	0	0	0	0	0	4	4
99	0	0	0	0	0	0	4	4
100	0	0	0	0	0	0	4	4
101	0	0	0	0	0	0	4	4
102	0	0	0	0	0	0	4	4
103	0	0	0	0	0	0	3	4
104	0	0	0	0	0	0	3	4
105	0	0	0	0	0	0	3	3
106	0	0	0	0	0	0	3	3
107	0	0	0	0	0	0	3	3
108	0	0	0	0	0	0	3	3
109	0	0	0	0	0	0	3	3
110	0	0	0	0	0	0	3	3
111	0	0	0	0	0	0	2	3
112	0	0	0	0	0	0	2	3
113	0	0	0	0	0	0	2	2
114	0	0	0	0	0	0	2	2
115	0	0	0	0	0	0	2	2
116	0	0	0	0	0	0	2	2
117	0	0	0	0	0	0	2	2

Time (minutes)	Home Base Work	Home Base Shop	Home Base Social	Home Base School[a]	Home Base Other	Non-Home Base	Internal - External	External - Internal
118	0	0	0	0	0	0	1	2
119	0	0	0	0	0	0	1	2
120	0	0	0	0	0	0	1	2
121	0	0	0	0	0	0	1	1
122	0	0	0	0	0	0	1	1
123	0	0	0	0	0	0	1	1
124	0	0	0	0	0	0	1	1
125	0	0	0	0	0	0	1	1
126	0	0	0	0	0	0	1	1
127	0	0	0	0	0	0	0	1
128	0	0	0	0	0	0	0	1
129	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0

a. Home base school trips for public schools use the specified TAZs within each enrollment boundary, not the friction factors. Given the amount of data in the script file (over 700 lines of code) a sample was provided below (Figure 23). Private and college/university school trips make up about 15% of school trips and are distributed normally using the HBSc friction factor.

Figure 23 provides an example of the "accessible" zone list for public elementary, middle, and senior high schools.

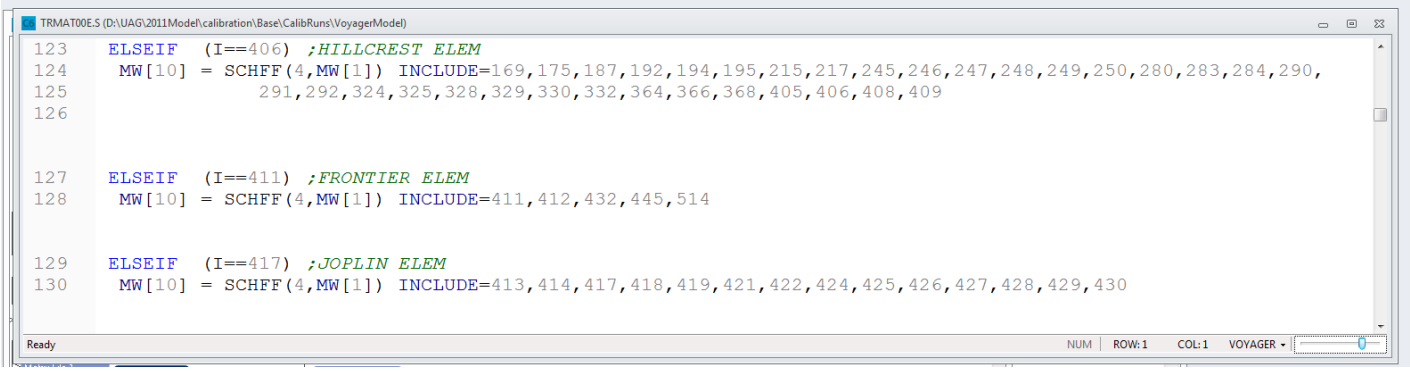


Figure 23: Screenshot of the public school specific "friction factors"

Table 79: Home Base Work Friction Factor Worksheets and Chart

Trip Duration (min)	No of Trips	HBW/NHBW		
0	0	0	0.0%	
1	7	7	0.4%	
2	17	17	0.9%	
3	17	17	0.9%	
4	6	6	0.3%	
5	126	126	6.5%	
6	22	22	1.1%	
7	35	35	1.8%	
8	35	35	1.8%	
9	15	15	0.8%	
10	252	252	12.9%	
11	18	18	0.9%	
12	25	25	1.3%	
13	28	28	1.4%	
14	16	16	0.8%	
15	327	327	16.8%	
16	12	12	0.6%	
17	21	21	1.1%	
18	15	15	0.8%	
19	12	12	0.6%	
20	275	275	14.1%	
21	19	19	1.0%	
22	17	17	0.9%	
23	10	10	0.5%	
24	13	13	0.7%	
25	121	121	6.2%	
26	10	10	0.5%	
27	7	7	0.4%	
28	12	12	0.6%	
29	2	2	0.1%	
30	273	273	14.0%	
31	3	3	0.2%	
32	3	3	0.2%	
33	3	3	0.2%	
34	3	3	0.2%	
35	48	48	2.5%	3.1%
36	2	2	0.1%	
37	3	3	0.2%	
38	1	1	0.1%	
39	2	2	0.1%	
40	45	45	2.3%	2.7%
45	42	42	2.2%	2.2%
46	1	1	0.1%	
47	1	1	0.1%	
48	1	1	0.1%	
50	6	6	0.3%	0.5%
53	1	1	0.1%	
54	1	1	0.1%	
55	4	4	0.2%	0.3%
57	1	1	0.1%	
60	10	10	0.5%	
63	1	1	0.1%	
75	1	1	0.1%	
80	1	1	0.1%	
85	1	1	0.1%	
90	1	1	0.1%	

m=	-182.3		-182		
b=	777.19		777.2		
Calculated HBW FF Curve					
Table Scaled to match				unweighted	weighted
Min	HBW FF	1500		1500	Final HBW FF
1	777	1500	777	1500	1500
2	651	1197	651	1256	1197
3	577	1020	577	1113	1020
4	524	894	524	1012	894
5	484	797	484	934	797
6	451	717	451	870	717
7	422	650	422	815	650
8	398	592	398	768	592
9	377	540	377	727	540
10	357	494	357	690	494
11	340	453	340	656	453
12	324	415	324	626	415
13	310	380	310	598	380
14	296	347	296	571	347
15	284	317	284	547	317
16	272	289	272	524	289
17	261	262	261	503	262
18	250	237	250	483	237
19	240	214	240	464	214
20	231	191	231	446	191
21	222	170	222	429	170
22	214	150	214	412	150
23	206	130	206	397	130
24	198	112	198	382	112
25	190	94	190	367	94
26	183	77	183	354	77
27	176	60	176	340	60
28	170	44	170	328	44
29	163	29	163	315	29
30	157	14	157	303	14
31	**151**	**0**	**151**	**292**	**3.1**
32	145	-14	145	281	3.1
33	140	-27	140	270	3.1
34	134	-40	134	259	3.1
35	129	-53	129	249	3.1
36	124	-65	124	239	2.7
37	119	-77	119	230	2.7
38	114	-89	114	220	2.7
39	109	-100	109	211	2.7
40	105	-111	105	202	2.7
41	100	-122	100	193	2.2
42	96	-133	96	185	2.2
43	92	-143	92	177	2.2
44	87	-153	87	169	2.2
45	83	-163	83	161	2.2
46	79	-172	79	153	0.5
47	75	-182	75	145	0.5
48	71	-191	71	138	0.5
49	68	-200	68	131	0.5
50	64	-209	64	124	0.5
51	60	-217	60	117	0.3
52	57	-226	57	110	0.3
53	53	-234	53	103	0.3
54	50	-242	50	96	0.3
55	47	-250	47	90	0.3
56	43	-258	43	84	0.2
57	40	-266	40	77	0.2
58	37	-274	37	71	0.2
59	34	-281	34	65	0.2
60	31	-288	31	59	0.2
61	28	-296	28	54	0.2
62	25	-303	25	48	0.2
63	22	-310	22	42	0.2
64	19	-317	19	37	0.1
65	16	-323	16	31	0.1
66	13	-330	13	26	0.1
67	11	-337	11	21	0.1
68	8	-343	8	15	0.1
69	5	-350	5	10	0.1
70	3	-356	3	5	0.1
71	**0**	**-362**	**0**	**0**	**0.1**

Weight FF from 1 to 30 minutes. Used percent of trips reported per 5 minute intervals up to 71 minutes.

0.1 rate for 71 to 90 minutes

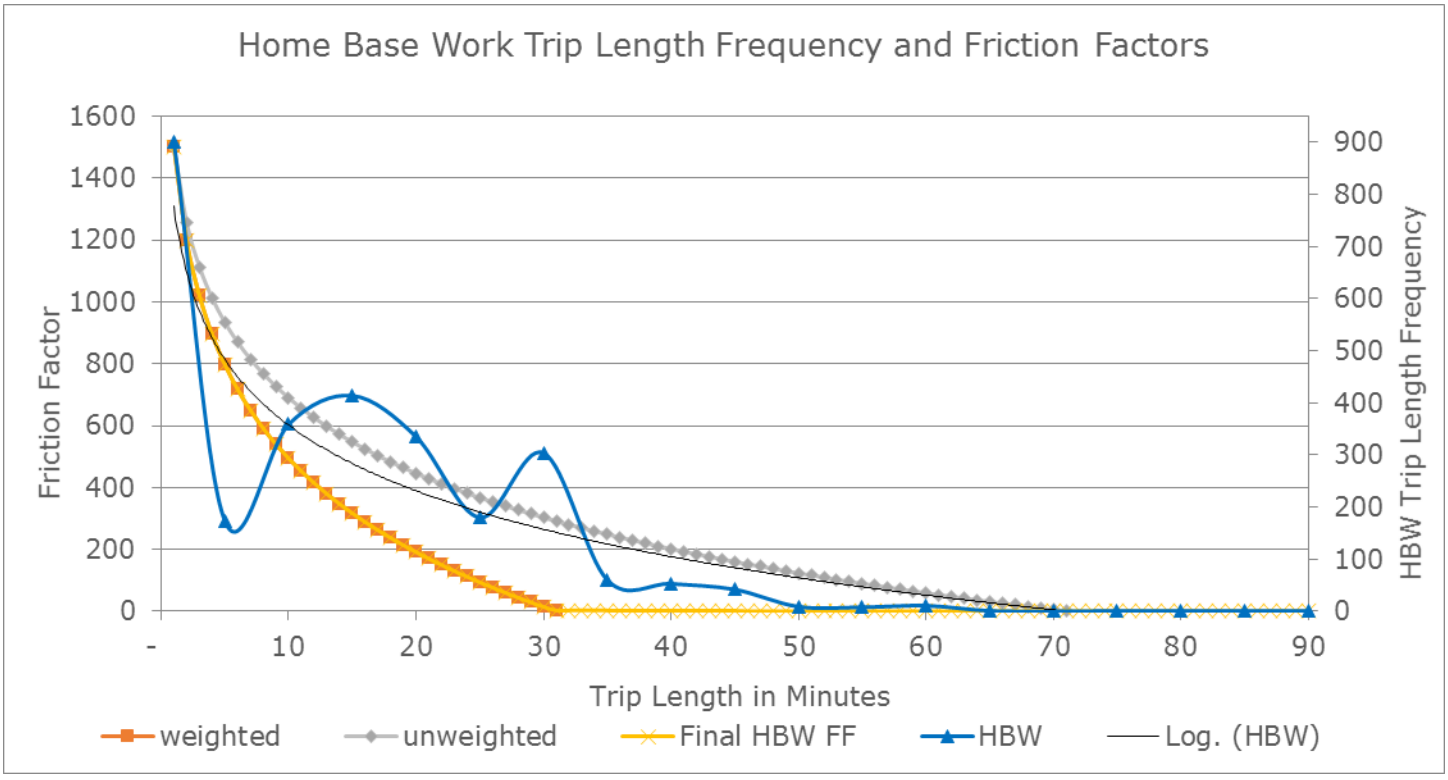

Home Base Work Trip Length Frequency and Friction Factors
Friction Factor
HBW Trip Length Frequency
Trip Length in Minutes
1600
1400
1200
1000
800
600
400
200
0
900
800
700
600
500
400
300
200
100
0
-
10
20
30
40
50
60
70
80
90
weighted
unweighted
Final HBW FF
HBW
Log. (HBW)

Table 80: Home Base Shop Friction Factor Worksheets

Trip Duration (min)	No of Trips		
0		0.0%	
1	6	0.3%	
2	47	2.7%	
3	31	1.8%	
4	33	1.9%	
5	301	17.2%	23.9%
6	46	2.6%	
7	49	2.8%	
8	47	2.7%	
9	20	1.1%	
10	352	20.1%	53.3%
11	17	1.0%	
12	45	2.6%	
13	26	1.5%	
14	13	0.7%	
15	328	18.7%	77.8%
16	6	0.3%	
17	13	0.7%	
18	6	0.3%	
19	4	0.2%	
20	154	8.8%	88.2%
21	7	0.4%	
22	4	0.2%	
23	6	0.3%	
24	9	0.5%	10.3%
25	30	1.7%	
26	0	0.1%	
27	1	0.5%	
28	9	0.1%	
29	1	4.5%	6.8%
30	78	0.1%	
31	1	0.2%	
32	3	0.6%	
33	0	1.3%	
34	0	0.4%	2.5%
35	10	0.2%	
36	0	0.2%	
37	0	0.1%	
38	0	0.2%	
39	0	0.1%	0.8%
40	22	0.1%	
41	0	0.1%	
42	0	0.1%	
43	0	0.0%	
44	0	0.0%	0.2%
45	7	0.0%	
46	0	0.0%	
47	0	0.0%	
48	0	0.0%	
49	0	0.0%	0.0%
50	4	0.0%	
51	0	0.0%	
52	0	0.0%	
53	0	0.0%	
54	0	0.0%	0.0%
55	4	0.0%	

m=	-1594		-1594		
b=	6043.3		6043.3		
Calculated HBS FF Curve Table				unweighted	weighted
Scaled to match Friction13.txt					Final HBS FF
Min	HBS FF	40160	HBS FF	40160	40160
1	6043	40160	6043	40160	40160
2	4938	29881	4938	32818	29881
3	4292	23868	4292	28523	23868
4	3834	19601	3834	25475	19601
5	3478	16292	3478	23112	16292
6	3187	13588	3187	21180	13588
7	2942	11302	2942	19548	11302
8	2729	9322	2729	18133	9322
9	2541	7575	2541	16885	7575
10	2373	6013	2373	15769	6013
11	2221	4600	2221	14760	4600
12	2082	3309	2082	13838	3309
13	1955	2122	1955	12990	2122
14	**1837**	**1023**	**1837**	**12205**	**1023**
15	1727	0	1727	11474	19
16	1624	-957	1624	10791	18
17	1527	-1856	1527	10149	16
18	1436	-2704	1436	9543	15
19	1350	-3506	1350	8970	13
20	1268	-4266	1268	8427	12
21	1190	-654	1190	7910	10
22	1116	-614	1116	7417	9.6
23	1045	-1200	1045	6947	9.1
24	977	-1761	977	6496	8.7
25	912	-2991	912	6063	8.3
26	850	-3517	850	5648	7.9
27	790	-4023	790	5248	7.4
28	732	-4511	732	4863	7.0
29	676	-4981	676	4491	7
30	622	-5436	622	4132	5
31	570	-5875		3785	4.5
32	519	-6301	519	3448	4.0
33	470	-6713	470	3122	3.5
34	422	-7113	422	2806	3
35	376	-7502	376	2499	2.6
36	331	-7880	331	2201	2.1
37	287	-8247	287	1911	1.7
38	245	-8605	245	1628	1.2
39	204	-8953	204	1353	0.8
40	163	-9292	163	1085	0.7
41	124	-9623	124	823	0.6
42	85	-9946	85	568	0.5
43	48	-10262	48	319	0.4
44	11	-10570	11	75	0.2
45	**-25**	**-10871**	**-25**	**-163**	**0.0**

Weight FF from 1 to 14 minutes. Used actual percent of trips to estimate friction factors up to 44 minutes.

0.0 rate for 45 to 90 minutes

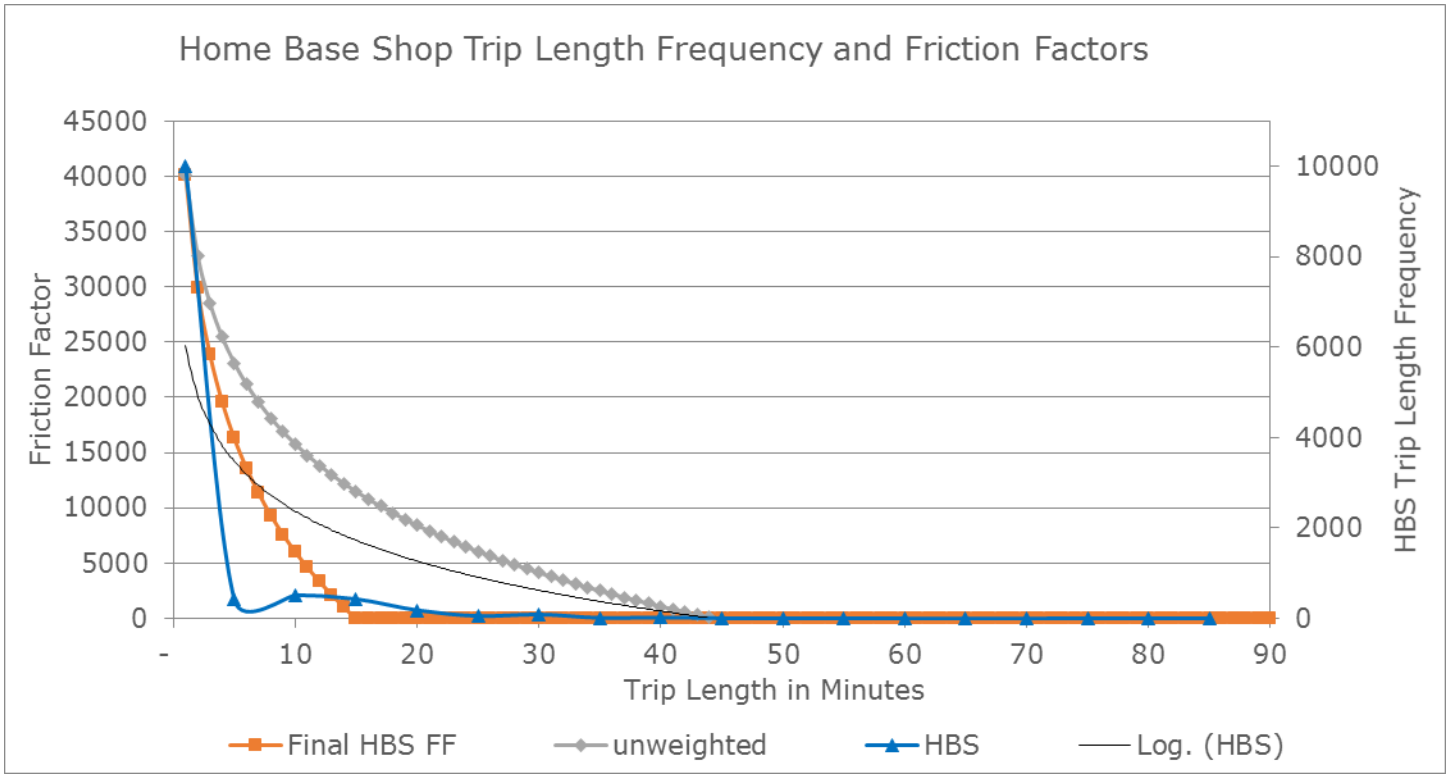

Home Base Shop Trip Length Frequency and Friction Factors
Friction Factor
HBS Trip Length Frequency
Trip Length in Minutes
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
10000
8000
6000
4000
2000
0
-
10
20
30
40
50
60
70
80
90
Final HBS FF
unweighted
HBS
Log. (HBS)

Table 81: Home Base Social Friction Factor Worksheets

Trip Duration (min)	No of Trips		
1	24	2.8%	
2	29	3.4%	
3	42	5.0%	
4	8	0.9%	
5	137	16.3%	28.5%
6	11	1.3%	
7	25	3.0%	
8	20	2.4%	
9	6	0.7%	
10	169	20.0%	55.9%
11	8	0.9%	
12	18	2.1%	
13	10	1.2%	
14	7	0.8%	
15	151	17.9%	78.9%
16	7	0.8%	
17	3	0.4%	
18	4	0.5%	
19	1	0.1%	
20	67	7.9%	88.6%
21	4	0.5%	
22	7	0.8%	
23	3	0.4%	
24	5	0.6%	10.2%
25	18	2.1%	93.0%
26	3	0.4%	
27	1	0.1%	
28	0	0.0%	
29	0	0.0%	2.6%
30	40	4.7%	
31	0	0.0%	
32	3	0.4%	
33	0	0.0%	
34	0	0.0%	
35	5	0.6%	
36	0	0.0%	
37	0	0.0%	
38	0	0.0%	
39	0	0.0%	0.6%
40	0	0.0%	
41	0	0.0%	
42	0	0.0%	
43	0	0.0%	
44	0	0.0%	0.0%
45	1	0.1%	
46	0	0.0%	
47	0	0.0%	
48	0	0.0%	
49	0	0.0%	
50	1	0.1%	
51	0	0.0%	
52	1	0.1%	
53	1	0.1%	
54	0	0.0%	
55	0	0.0%	
56	0	0.0%	
57	0	0.0%	
58	0	0.0%	
59	0	0.0%	
60	0	0.0%	
69	1	0.1%	
80	1	0.1%	
150	1	0.1%	

m=	-113.6		-113.6		
b=	458.71		458.71		
Calculated HBSO FF Curve Table					
Scaled to match Friction13.txt			1800	weighted	weighted
Min	HBSo FF	weighted		1800	Final HBSo FF
1	459	1800	459	1800	1800
2	380	1350	380	1491	1350
3	334	1087	334	1310	1087
4	301	900	301	1182	900
5	276	755	276	1083	755
6	255	637	255	1001	637
7	238	537	238	933	537
8	222	450	222	873	450
9	209	374	209	821	374
10	197	305	197	774	305
11	186	243	186	731	243
12	176	187	176	692	187
13	167	135	167	657	135
14	159	87	159	624	87
15	**151**	**42**	**151**	**593**	**42**
16	144	0	144	564	17.9
17	137	-39	137	537	15.4
18	130	-76	130	512	12.9
19	124	-112	124	487	10.4
20	118	-145	118	465	7.9
21	113	-177	113	443	7.6
22	108	-207	108	422	7.3
23	103	-236	103	402	6.9
24	98	-263	98	383	6.6
25	93	-290	93	365	6.3
26	89	-315	89	348	6.0
27	84	-340	84	331	5.7
28	80	-363	80	315	5.3
29	76	-386	76	299	5.0
30	72	-408	72	284	4.7
31	69	-429	69	269	3.9
32	65	-450	65	255	3.1
33	62	-470	62	241	2.2
34	58	-489	58	228	1.4
35	55	-508	55	215	0.6
36	52	-526	52	203	0.6
37	49	-544	49	190	0.6
38	45	-562	45	178	0.6
39	43	-578	43	167	0.6
40	40	-595	40	156	0.6
41	37	-611	37	145	0.6
42	34	-627	34	134	0.6
43	31	-642	31	123	0.6
44	29	-657	29	113	0.6
45	**26**	**-671**	**26**	**103**	**0.1**

Weight FF from 1 to 15 minutes. Used actual percent of trips to estimate friction factors up to 44 minutes.

0.1 rate for 45 to 90 minutes

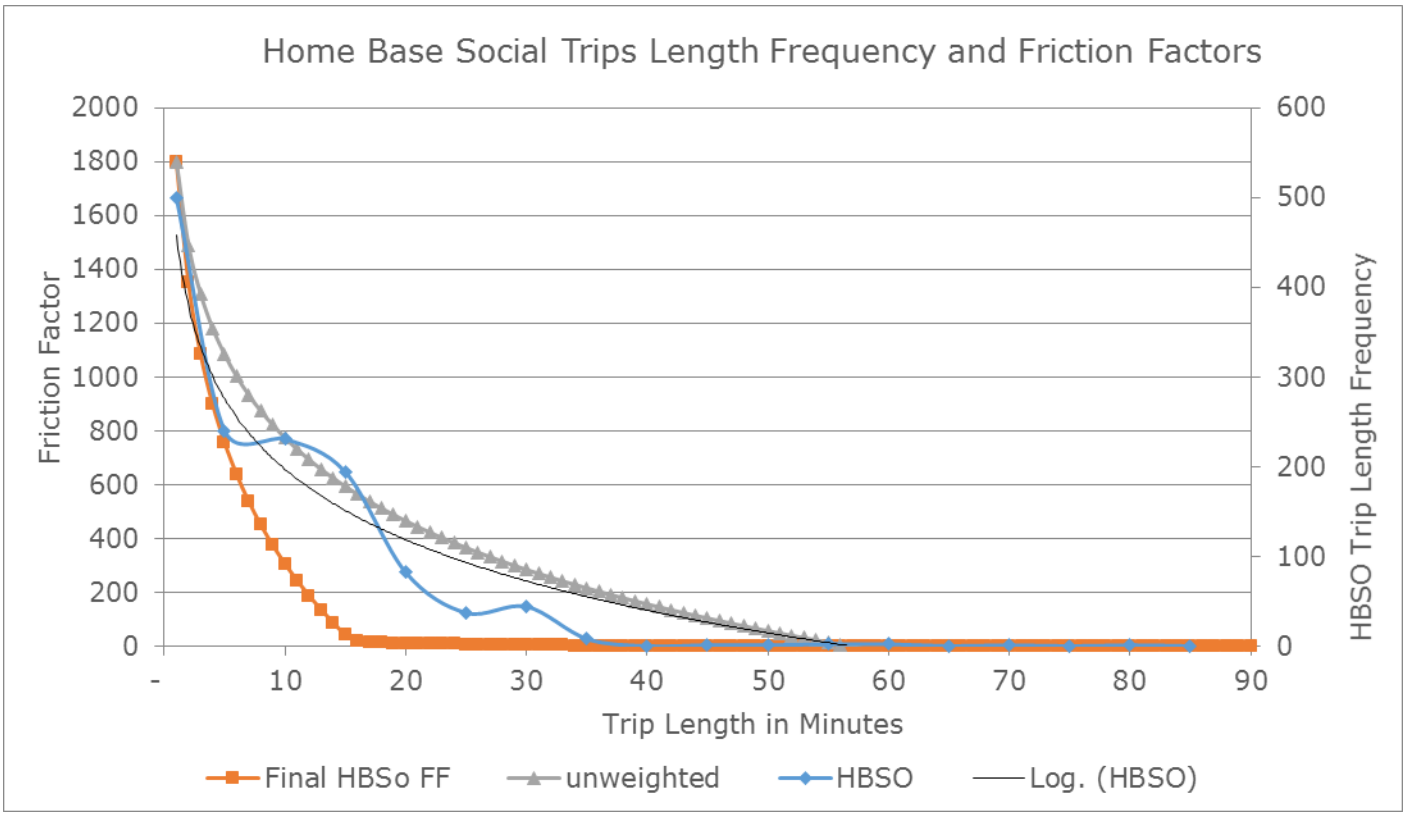

Home Base Social Trips Length Frequency and Friction Factors
Friction Factor
HBSO Trip Length Frequency
Trip Length in Minutes
2000
1800
1600
1400
1200
1000
800
600
400
200
0
600
500
400
300
200
100
0
-
10
20
30
40
50
60
70
80
90
Final HBSo FF
unweighted
HBSO
Log. (HBSO)

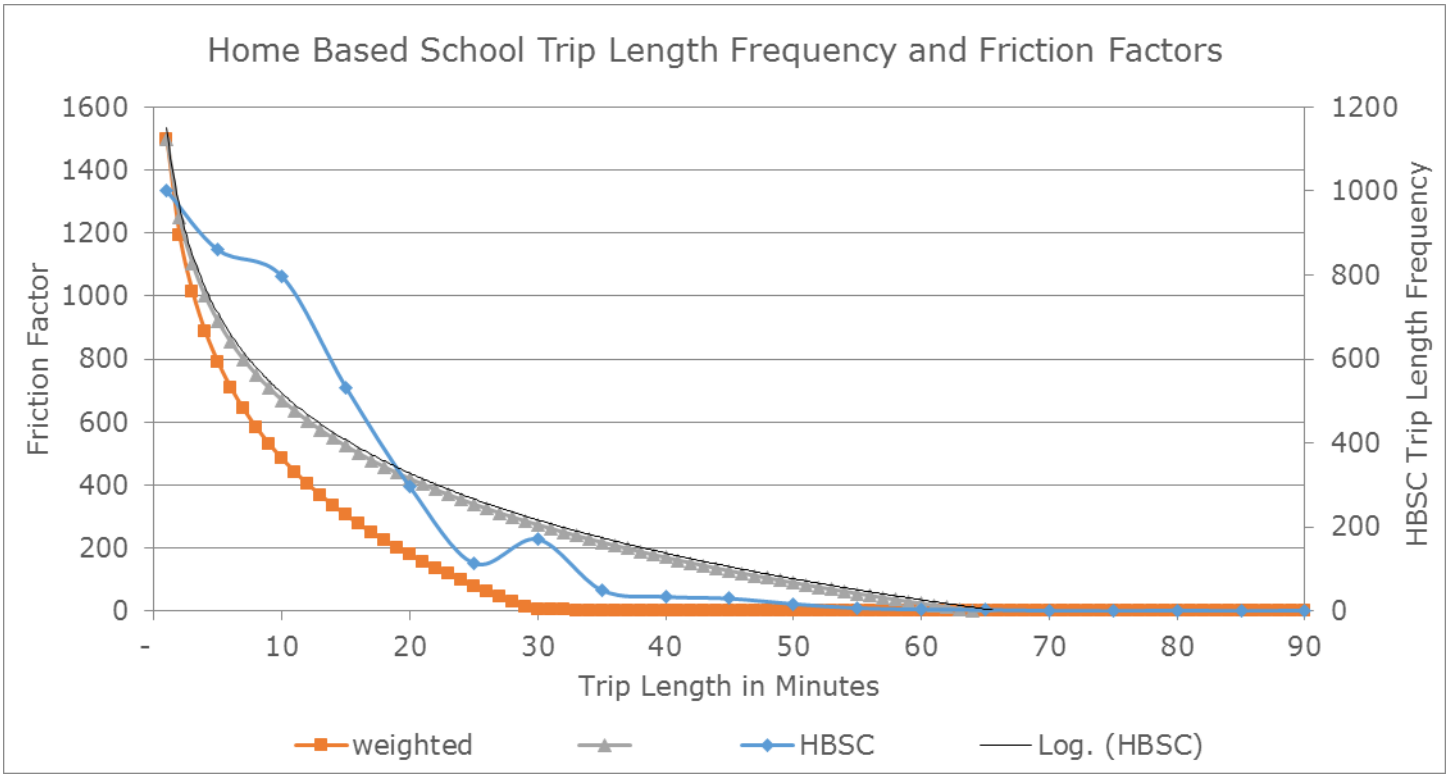
Table 82: Home Base School Friction Factor Worksheets

Trip Duration (min)	No of Trips		
1	30	1.0%	
2	115	3.9%	
3	77	2.6%	
4	56	1.9%	
5	582	19.9%	29.4%
6	47	1.6%	
7	92	3.1%	
8	56	1.9%	
9	36	1.2%	
10	566	19.4%	56.7%
11	18	0.6%	
12	51	1.7%	
13	46	1.6%	
14	20	0.7%	
15	398	13.6%	74.9%
16	17	0.6%	
17	7	0.2%	
18	9	0.3%	
19	13	0.4%	
20	250	8.6%	85.1%
21	8	0.3%	
22	5	0.2%	
23	12	0.4%	
24	3	0.1%	
25	86	2.9%	89.0%
26	8	0.3%	
27	4	0.1%	
28	2	0.1%	
29	4	0.1%	
30	153	5.2%	5.7%
31	3	0.1%	
32	5	0.2%	
33	3	0.1%	
34	3	0.1%	
35	36	1.2%	1.3%
36	1	0.0%	
0	0	0.0%	
0	0	0.0%	
39	1	0.0%	
40	32	1.1%	1.2%
41	1	0.0%	
42	1	0.0%	
43	0	0.0%	
44	0	0.0%	
45	28	1.0%	1.1%
0	0	0.0%	
0	0	0.0%	
48	2	0.1%	
49	2	0.1%	
50	13	0.4%	0.5%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
54	1	0.0%	
55	6	0.2%	0.2%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
60	4	0.1%	0.3%
65	3	0.1%	
69	1	0.0%	
70	1	0.0%	
76	1	0.0%	
80	1	0.0%	
100	1	0.0%	
105	1	0.0%	

m=	-278.8		-278.8		
b=	1160.5	weighted	1160.5		
Calculated HBSC FF Curve Table				unweighted	weighted
Scaled to match Friction13.txt					HBSC FF
Min	HBS FF	1500		1500	
1	1161	1500	1161	1500	1500
2	967	1194	967	1250	1194
3	854	1015	854	1104	1015
4	774	889	774	1000	889
5	712	790	712	920	790
6	661	710	661	854	710
7	618	642	618	799	642
8	581	583	581	751	583
9	548	531	548	708	531
10	519	485	519	670	485
11	492	442	492	636	442
12	468	404	468	605	404
13	445	369	445	576	369
14	425	336	425	549	336
15	405	306	405	524	306
16	388	277	388	501	277
17	371	250	371	479	250
18	355	225	355	458	225
19	340	201	340	439	201
20	325	179	325	420	179
21	312	157	312	403	157
22	299	137	299	386	137
23	286	117	286	370	117
24	274	98	274	355	98
25	263	80	263	340	80
26	252	63	252	326	63
27	242	46	242	312	46
28	231	30	231	299	30
29	222	15	222	287	15
30	**212**	**0**	**212**	**274**	**5.7**
31	203	-14	203	263	4.6
32	194	-28	194	251	3.5
33	186	-42	186	240	2.4
34	177	-55	177	229	1.3
35	169	-68	169	219	1.3
36	161	-80	161	209	1.3
37	154	-92	154	199	1.3
38	146	-104	146	189	1.3
39	139	-116	139	180	1.3
40	132	-127	132	171	1.2
41	125	-10	125	162	1.1
42	118	-20	118	153	1.1
43	112	-29	112	145	1.0
44	105	-39	105	136	1.0
45	99	-48	99	128	1.0
46	93	-57	93	120	0.9
47	87	-66	87	113	0.8
48	81	-74	81	105	0.6
49	75	-83	75	98	0.5
50	70	-91	70	90	0.4
51	64	-99	64	83	0.4
52	59	-107	59	76	0.4
53	54	-114	54	69	0.3
54	48	-122	48	63	0.3
55	43	-129	43	56	0.2

Weight FF from 1 to 30 minutes. Used the actual percent of trips and trend line up to 55 minutes.

0.0 rate for 56 to 90 minutes



The HBSc friction factors were developed using all “school trip” data but are applied to only 15% of HBSc trips as explained on page 28.

Table 83: Home Base Other Friction Factor Worksheets

Trip Duration (min)	No of Trips		
1	102	2.8%	
2	130	3.5%	
3	135	3.7%	
4	61	1.6%	
5	488	13.2%	24.8%
6	71	1.9%	
7	87	2.4%	
8	89	2.4%	
9	48	1.3%	
10	653	17.7%	50.4%
11	40	1.1%	
12	70	1.9%	
13	46	1.2%	
14	39	1.1%	
15	578	15.6%	71.3%
16	36	1.0%	
17	42	1.1%	
18	27	0.7%	
19	18	0.5%	
20	308	8.3%	83.0%
21	14	0.4%	
22	19	0.5%	
23	12	0.3%	
24	6	0.2%	
25	109	2.9%	87.3%
26	1	0.0%	
27	15	0.4%	
28	2	0.1%	
29	6	0.2%	
30	277	7.5%	8.1%
31	9	0.2%	
32	4	0.1%	
33	4	0.1%	
34	2	0.1%	
35	23	0.6%	1.1%
36	1	0.0%	
37	1	0.0%	
38	2	0.1%	
39	2	0.1%	
40	39	1.1%	1.2%
41	1	0.0%	
42	1	0.0%	
0	0	0.0%	
0	0	0.0%	
45	27	0.7%	0.8%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
50	9	0.2%	0.2%
51	1	0.0%	
0	0	0.0%	
0	0	0.0%	
54	2	0.1%	
55	4	0.1%	0.2%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
60	19	0.5%	0.5%
70	1	0.0%	
75	2	0.1%	
78	2	0.1%	
80	2	0.1%	
86	1	0.0%	
90	4	0.1%	
100	2	0.1%	
105	1	0.0%	
120	2	0.1%	

m=	-296.4		-296.4		
b=	1266.5		1266.5		
Calculated HBO FF Curve					
Table Scaled to match				unweighted	weighted
Min	HBO FF	weighted		1800	Final HBO FF
1	1267	1800	1267	1800	1800
2	1061	1384	1061	1508	1384
3	941	1140	941	1337	1140
4	856	967	856	1216	967
5	789	833	789	1122	833
6	735	723	735	1045	723
7	690	631	690	980	631
8	650	551	650	924	551
9	615	480	615	874	480
10	584	416	584	830	416
11	556	359	556	790	359
12	530	307	530	753	307
13	506	259	506	720	259
14	484	214	484	688	214
15	464	173	464	659	173
16	445	134	445	632	134
17	427	98	427	606	98
18	410	63	410	582	63
19	394	31	394	560	31
20	**379**	**0**	**379**	**538**	**8.3**
21	364	-29	364	517	8.2
22	350	-57	350	498	8.1
23	337	-84	337	479	8.1
24	325	-110	325	461	8.0
25	312	-134	312	444	7.9
26	301	-158	301	428	7.8
27	290	-180	290	412	7.7
28	279	-202	279	396	7.7
29	268	-223	268	382	7.6
30	258	-244	258	367	7.5
31	249	-263	249	353	6.2
32	239	-282	239	340	4.9
33	230	-301	230	327	3.7
34	221	-319	221	315	2.4
35	**213**	**-336**	**213**	**302**	**1.1**
36	204	-353	204	290	1.1
37	196	-370	196	279	1.0
38	188	-386	188	268	1.0
39	181	-401	181	257	1.0
40	173	-416	173	246	1.0
41	166	-431	166	236	0.9
42	159	-446	159	225	0.9
43	152	-460	152	216	0.9
44	145	-474	145	206	0.8
45	138	-487	138	196	0.8
46	132	-500	132	187	0.7
47	125	-513	125	178	0.6
48	119	-526	119	169	0.4
49	113	-538	113	161	0.3
50	**107**	**-551**	**107**	**152**	**0.2**

Weight FF from 1 to 20 minutes. Used actual percent of trips to estimate friction factors up to 50 minutes.

0.0 rate for 51 to 90 minutes

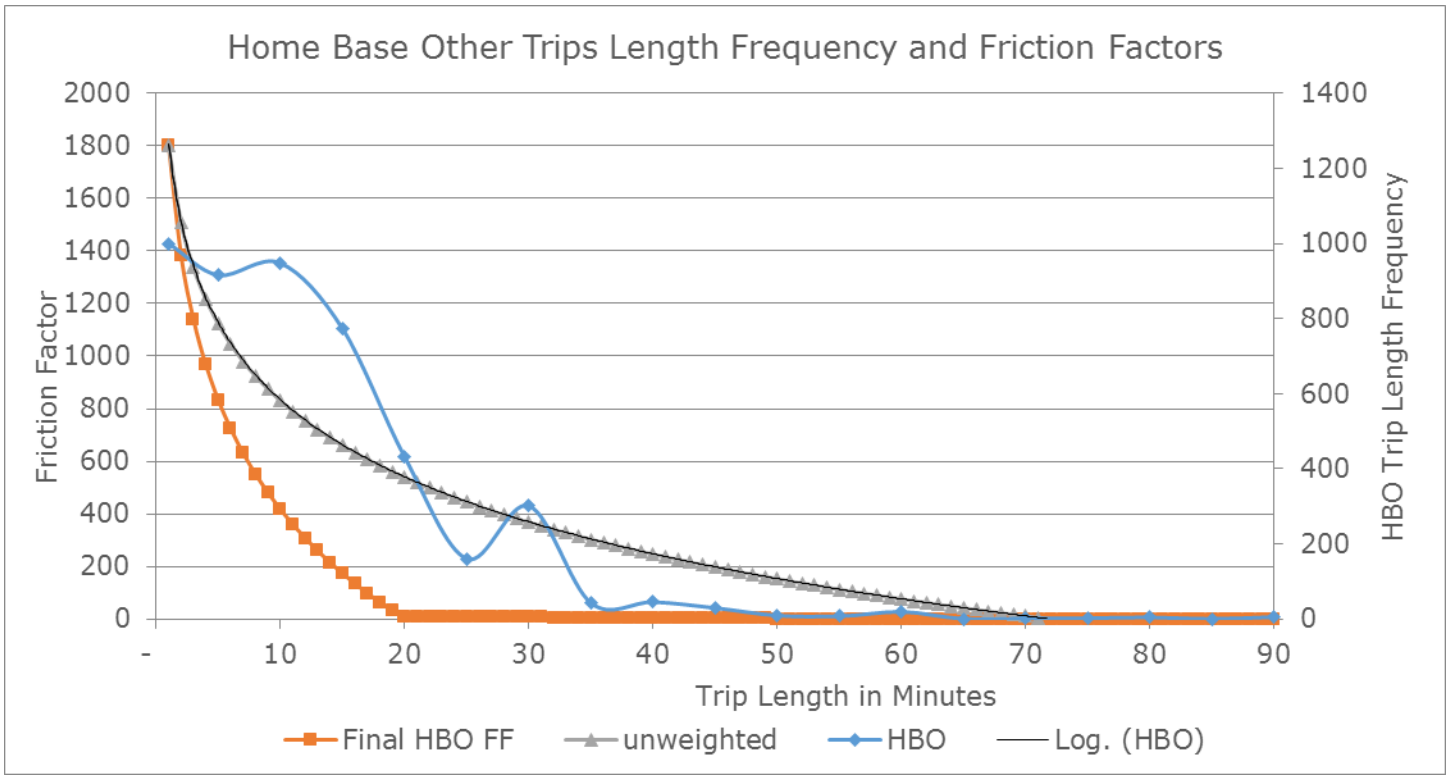

Home Base Other Trips Length Frequency and Friction Factors
Friction Factor
HBO Trip Length Frequency
Trip Length in Minutes
2000
1800
1600
1400
1200
1000
800
600
400
200
0
1400
1200
1000
800
600
400
200
0
-
10
20
30
40
50
60
70
80
90
Final HBO FF
unweighted
HBO
Log. (HBO)

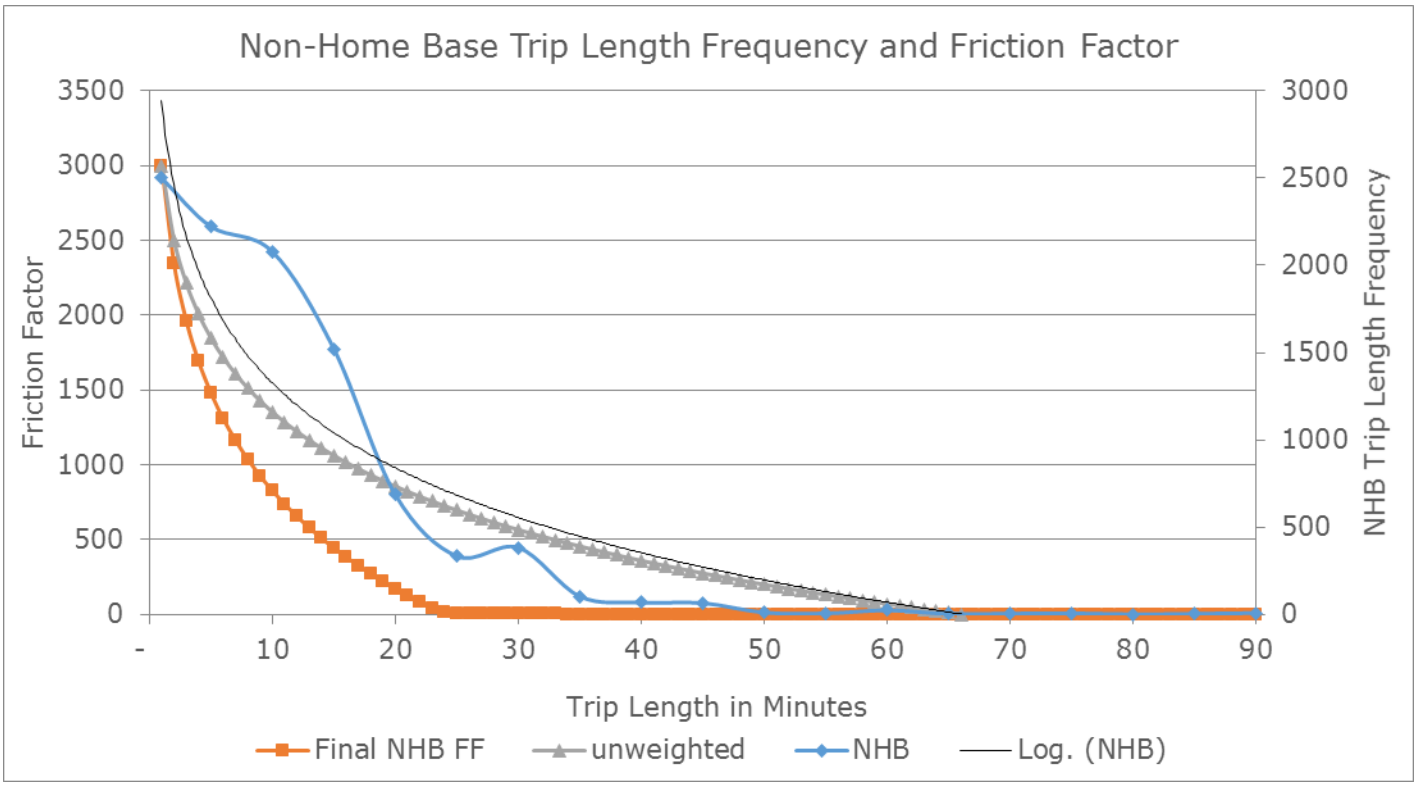
Table 84: Non-Home Base Friction Factor Worksheets

Trip Duration (min)	No of Trips		
1	252	3.3%	
2	281	3.7%	
3	260	3.5%	
4	224	3.0%	
5	1205	16.0%	29.5%
6	219	2.9%	
7	224	3.0%	
8	201	2.7%	
9	184	2.4%	
10	1250	16.6%	57.1%
11	117	1.6%	
12	148	2.0%	
13	128	1.7%	
14	109	1.4%	
15	1019	13.5%	77.3%
16	50	0.7%	
17	55	0.7%	
18	54	0.7%	
19	69	0.9%	
20	457	6.1%	86.4%
21	38	0.5%	
22	41	0.5%	
23	37	0.5%	
24	24	0.3%	
25	194	2.6%	90.9%
26	20	0.3%	
27	26	0.3%	
28	28	0.4%	
29	34	0.5%	
30	275	3.7%	95.9%
31	14	0.2%	
32	9	0.1%	
33	11	0.1%	
34	9	0.1%	
35	60	0.8%	
36	8	0.1%	
37	8	0.1%	
38	3	0.0%	
39	3	0.0%	
40	46	0.6%	0.9%
41	5	0.1%	
42	1	0.0%	
43	5	0.1%	
44	1	0.0%	
45	53	0.7%	0.9%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
49	1	0.0%	
50	10	0.1%	0.1%
0	0	0.0%	
0	0	0.0%	
53	1	0.0%	
0	0	0.0%	
55	5	0.1%	0.1%
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
0	0	0.0%	
60	24	0.3%	0.3%
64	1	0.0%	
65	2	0.0%	
70	4	0.1%	
72	1	0.0%	
75	7	0.1%	
80	1	0.0%	
85	4	0.1%	
90	2	0.0%	
95	1	0.0%	
100	2	0.0%	
105	3	0.0%	

m=	-701.8		-701.8		
b=	2942		2942		
Calculated NHB FF Curve Table				unweighted	weighted
Scaled to match Friction13.txt					Final NHB FF
Min	NHB FF	3000		3000	3000
1	2942	3000	2942	3000	3000
2	2456	2346	2456	2504	2346
3	2171	1963	2171	2214	1963
4	1969	1691	1969	2008	1691
5	1812	1481	1812	1848	1481
6	1685	1309	1685	1718	1309
7	1576	1163	1576	1607	1163
8	1483	1037	1483	1512	1037
9	1400	926	1400	1428	926
10	1326	826	1326	1352	826
11	1259	736	1259	1284	736
12	1198	654	1198	1222	654
13	1142	579	1142	1164	579
14	1090	509	1090	1111	509
15	1041	444	1041	1062	444
16	996	383	996	1016	383
17	954	326	954	972	326
18	914	272	914	932	272
19	876	221	876	893	221
20	840	172	840	856	172
21	805	126	805	821	126
22	773	82	773	788	82
23	742	40	742	756	40
24	**712**	**0**	**712**	**726**	**10.5**
25	683	-39	683	696	9.6
26	655	-76	655	668	8.7
27	629	-111	629	641	7.8
28	603	-146	603	615	6.9
29	579	-179	579	590	6.0
30	555	-211	555	566	5.1
31	532	-242	532	543	4.2
32	510	-272	510	520	3.3
33	488	-301	488	498	2.3
34	467	-329	467	476	1.4
35	**447**	**-356**	**447**	**456**	**1.4**
36	427	-383	427	436	1.3
37	408	-409	408	416	1.2
38	389	-434	389	397	1.0
39	371	-458	371	378	0.9
40	**353**	**-482**	**353**	**360**	**0.9**
41	336	-506	336	342	0.9
42	319	-528	319	325	0.9
43	302	-550	302	308	0.9
44	286	-572	286	292	0.9
45	270	-593	270	276	0.9
46	255	-614	255	260	0.9
47	240	-634	240	245	0.9
48	225	-654	225	230	0.9
49	211	-674	211	215	0.9
50	**197**	**-693**	**197**	**200**	**0.1**

Weight FF from 1 to 23 minutes. Used actual percent of trips to estimate friction factors up to 49 minutes.

0.1 rate for 50 to 90 minutes


Non-Home Base Trip Length Frequency and Friction Factor
Friction Factor
NHB Trip Length Frequency
Trip Length in Minutes
3500
3000
2500
2000
1500
1000
500
0
3000
2500
2000
1500
1000
500
0
-
10
20
30
40
50
60
70
80
90
Final NHB FF
unweighted
NHB
Log. (NHB)

Appendix D:

Mode Choice Model Development Evaluation Memos

Memorandum

TO: MaryAnn Waldinger, COMPASS

FROM: Lawrence Liao, CS; Laurie Hussey, CS

CC: Ken Cervenka, FTA; James Garland, FTA

DATE: July 8, 2010

RE: COMPASS Mode Choice Model Evaluation for FTA Technical Guidance

1.0 Introduction

This technical memorandum transmits a set of enhancements recommended for the COMPASS Mode Choice Model. The public transit mode share in the region is 0.30%, which corresponds to about 5,300 transit trips, based on COMPASS' 2002 Household Travel Survey. These enhancements are targeted to improve the travel forecasting methods and provide a basis for both New Starts and Small Starts funding.

The body of this technical memorandum is organized into the following sections:

- **Section 2.0 –** Overview of the COMPASS Mode Choice Model;
- **Section 3.0 –** FTA Guidelines on Mode Choice Modeling;
- **Section 4.0 –** Assessment and Recommended Enhancements; and
- **Section 5.0 –** Additional FTA Guidelines on Calibration and Validation.

2.0 COMPASS Mode Choice Model Overview

COMPASS' current travel demand forecast model was originally calibrated and validated for automobile travel for 2002 conditions. It was calibrated using data from a household travel characteristics study performed and completed in 2002. This survey obtained information about the number of trips, travel time, and trip purpose by mode and time of day from more than 2,600 Treasure Valley households. It was validated against traffic count data collected in 2002 and 2003. COMPASS' Transportation Model Advisory Committee (TMAC) approved the use of the 2002 calibrated travel demand model on June 29, 2004.

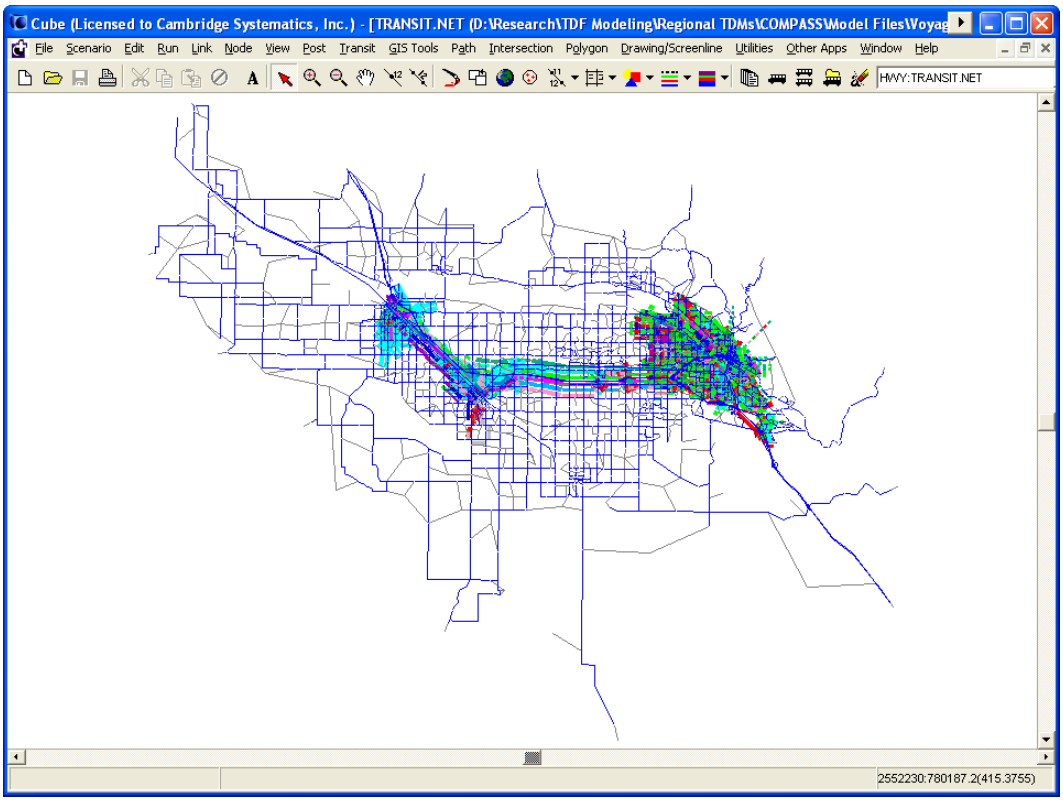
Shortly after the 2002 model was developed, COMPASS began developing a mode choice model for inclusion into the overall four-step travel demand model. The main purpose for the development of this tool was to support the transit-planning component of Communities in Motion, the new long-range transportation plan for a six-county area, including Ada and Canyon Counties. The COMPASS transit network is shown in Figure 2.1. The transit assignment model could not be validated to the same level as highway assignment model for 2002 because there were no up-to-date boarding/alighting counts or on-board survey data available for that timeframe. However, modeled transit mode share was consistent on a regional basis with actual transit mode share data from the 2002 household travel survey. The 2002 model, with the inclusion of the mode choice tool, was approved for use by TMAC in 2006. It is this 2006 version of the COMPASS model that was reviewed in this memorandum.

When the mode choice model was developed in 2005, the objectives were:

1. Adapt a mode choice model from a region of similar size and demographic characteristics. The regions considered included Sacramento, California; Fresno, California; and Salt Lake City, Utah.
2. Match the mode shares in 2002 Survey and the 2000 Census.
3. Maintain validation results in highway assignment.

After reviewing the mode choice models in those regions, it was determined that the Wasatch Front Regional Council (WFRC), the metropolitan planning organization (MPO) for the Salt Lake City region, model was most applicable. The WFRC model was chosen because it had a fully-tested, four-step travel model and its region was most comparable to the COMPASS region, both geographically and demographically.

Figure 0.1 COMPASS Transit Network



The WFRC mode choice model consists of four individual submodels addressing the following trip purposes:

1. Home-Based Work (HBW),
2. Home-Based College (HBC),
3. Home-Based Other (HBO), and
4. Non-Home-Based (NHB).

These four submodels have different model structures and specifications. Due to time and data constraints, it was decided that the COMPASS mode choice model would adapt only the nested logit structure of the HBW submodel in WFRC mode choice model for all trip purposes.

2.1 MODE SPECIFICATIONS

The COMPASS mode choice model has a nested logit structure with five alternatives:

1. Auto;
2. Bus, Walk Access;

3. Bus, Drive Access (Park-and-Ride);
4. Walk; and
5. Bike.

A nested logit model is characterized by grouping (or nesting) subsets of alternatives that are more similar to each other with respect to excluded characteristics than they are to other alternatives. Alternatives in a common nest exhibit a higher degree of similarity and competitiveness than alternatives in different nests. This level of competitiveness, represented by crosselasticities between pairs of alternatives (the impact of a change in one mode on the probability of another mode) is identical for all pairs of alternatives in the nest. The structure of the COMPASS mode choice model is shown in Figure 2.2.

While a nested logit structure implies a top-down decision process, the utilities are calculated in the reverse direction. The utilities of the alternatives at the lowest tier, in this case the Walk and Drive Access for the Bus mode, are calculated first. These utilities are then combined to form the composite, or logsum, utility for their parent mode, the Bus mode, at the next higher tier. When calculating the composite utility, the utilities of the alternatives at the subtier are first factored by their logsum coefficients. The same process is applied until the top tier is reached. Then the probability of choosing an alternative at each tier is calculated, based on the composite utilities, in a top-down fashion.

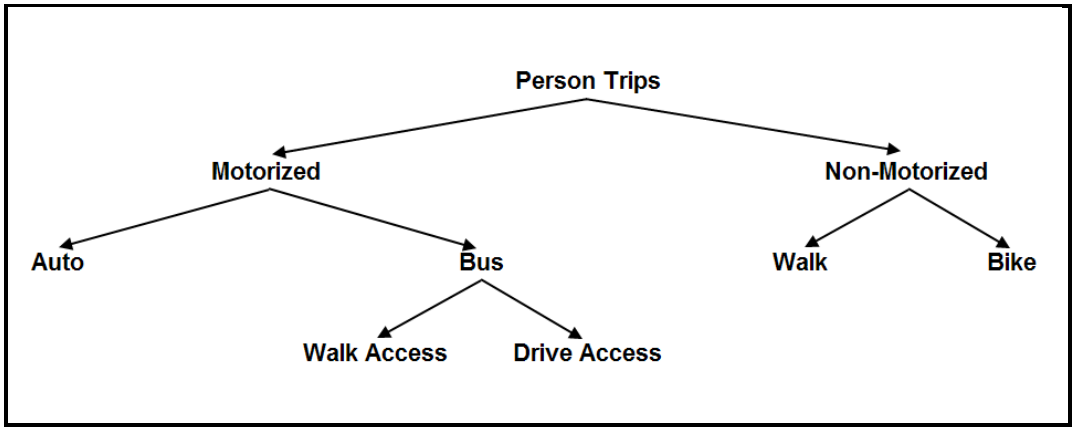


Figure 0.2 COMPASS Mode Choice Model Nested Logit Structure

There are six trip purposes in the COMPASS travel demand model:

1. Home-Based Work (HBW),
2. Home-Based School (HBSC),
3. Home-Based Shop (HBS),
4. Home-Based Social (HBSO),

5. Home-Based Other (HBO), and
6. Non-Home-Based (NHB).

All six trip purposes share the same nested logit structure; however, the independent variables and coefficients have been specified and the constant terms have been calibrated for each trip purpose independently. The coefficients for the WFRC HBO trip purpose have been used for HBS and HBSO trip purposes, which are not available in the WFRC Model. For the other trip purposes, the variables and coefficients from WFRC mode choice models have been used for the comparable COMPASS trip purposes.

The independent variables and their coefficients used in the mode choice model are the following:

- In-Vehicle Time (IVT_COEF),
- Initial Wait Time (INITWAIT_COEF),
- Transfer Wait Time (XFERWAIT_COEF),
- Walk Time – Within First Mile (WALK_COEF_1),
- Walk Time – After First Mile (WALK_COEF_GT_1),
- Drive Access Time (DRIVE_COEF),
- Bike Time (BIKE_COEF),
- Bus Fare (COST_COEF),
- Parking Cost (PARKCOST_COEF), and
- Number of Transfers (TRANSFERS_COEF).

The coefficients for those independent variables are shown in Table 2.1. All time are in minutes are generated by the model. All of the independent variables, except Bus Fare and Parking Cost, are generated by the model; for example, in-vehicle travel time is based on highway network speeds, and transfer wait time is calculated as one-half the transit headway up to a maximum of 15 minutes (thus effectively presuming access to a transit schedule). The local and intercounty bus services use flat fees of $0.50 and $2.00, respectively. These are the fares for initial boarding, and transfers are free of charge.

Table 0.1 Independent Variable Coefficients

	HBW	HBSC	HBS	HBSO	HBO	NHB
IVT_COEF	-0.0221	-0.0221	-0.0107	-0.0107	-0.0107	-0.0233
INITWAIT_COEF	-0.0427	-0.0427	-0.0206	-0.0206	-0.0206	-0.0442
XFERWAIT_COEF	-0.0500	-0.0500	-0.0247	-0.0247	-0.0247	-0.0663
WALK_COEF_1	-0.0462	-0.0462	-0.0268	-0.0268	-0.0268	-0.0425
WALK_COEF_GT_1	-0.0850	-0.0850	-0.0531	-0.0531	-0.0531	-0.0425
DRIVE_COEF	-0.0541	-0.0541	-0.0268	-0.0268	-0.0268	-0.0583
BIKE_COEF	-0.0500	-0.0500	-0.0321	-0.0321	-0.0321	-0.0514
COST_COEF	-0.0061	-0.0099	-0.0054	-0.0054	-0.0054	-0.0049
PARKCOST_COEF	-0.0061	-0.0099	-0.0054	-0.0054	-0.0054	-0.0389
TRANSFERS_COEF	-0.2000	-0.2000	-0.2000	-0.2000	-0.2000	-0.2000

The following parking costs were assumed for the model:

- Downtown Boise – $3.20;
- Boise State University – $2.20; and
- Boise Airport – $9.00.

The parking cost in Downtown Boise was calculated by dividing the monthly Temporary Parking Permit fee of $80.00 (City Code Section 10-11-19) by 25 workdays. The cost of $2.20 for a General Parking Permit was used for the park cost at Boise State University. To be consistent with the other parking costs, the daily parking cost of $9.00 in the Airport Garage was used as the parking cost at the Boise Airport. This assumption for airport parking cost can be changed when better information becomes available.

The alternative specific constants by trip purpose are shown in Table 2.2.

Table 0.2 Alternative specific constants

1.0	HBW	HBSC	HBS	HBSO	HBO	NHB
ASC_MOTOR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASC_NONMOTOR	-0.5000	0.2008	0.2008	0.2008	-3.0000	-1.4000
ASC_AUTO	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASC_TRANSIT	-4.0000	-4.0000	-5.0000	-4.0000	-5.0000	-4.0000
ASC_WALKACC	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASC_DRIVEACC	-0.7183	-2.0863	-1.2512	-1.2512	-1.2512	-3.2096
ASC_WALK	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ASC_BIKE	-3.0000	-4.0000	-3.0000	-3.0000	-3.0000	-3.0000

Both the transit level-of-service skimming and transit trip assignment were based on paths built using free-flow highway travel time.

A comparison of mode shares from the model and the 2002 survey is shown in Table 2.3.

Table 0.3 Mode Share Comparison

	Trips		Mode Share (%)	
Mode	Model	Survey*	Model	Survey*
Auto	1,706,766	24,652	94.16%	93.94%
Bus	5,343	74	0.29%	0.28%
Walk	80,464	1,215	4.44%	4.64%
Bike	20,043	300	1.11%	1.14%
Total	*1,812,616*	*26,241*	*100.00%*	*100.00%*
Motor	1,712,109	24,726	94.46%	94.23%
Nonmotorized	100,507	1,515	5.54%	5.77%
Total	*1,812,616*	*26,241*	*100.00%*	*100.00%*
Auto	1,706,766	24,652	99.69%	99.70%
Transit	5,343	74	0.31%	0.30%
Total	*1,712,109*	*24,726*	*100.00%*	*100.00%*
Walk	80,464	1,215	80.06%	80.20%
Bike	20,043	300	19.94%	19.80%
Total	*100,507*	*1,515*	*100.00%*	*100.00%*

*Data from "COMPASS Survey Mode Share Summary.xls," April 4, 2005.

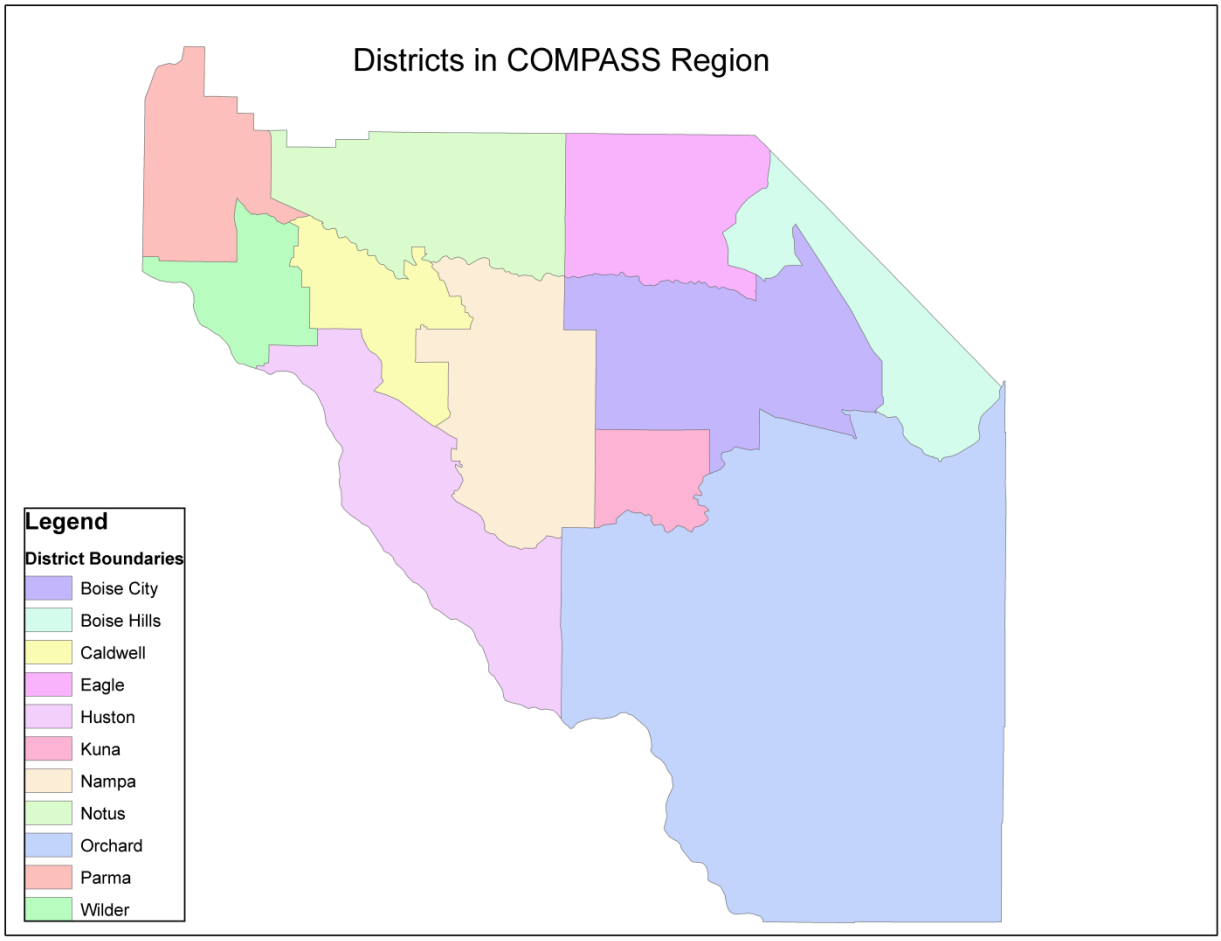
2.2 MODE CHOICE MODEL REASONABLENESS CHECKS

The COMPASS mode choice result was compared to Journey-To-Work flow data from 2000 Census Transportation Planning Package (CTPP), and 2002 COMPASS Household Travel Survey data in this section. The data was aggregated into 11 districts. The definitions of the districts are shown in Table 2.4. The map of the districts is illustrated in Figure 2.3. All comparisons are done at the district-to-district level. These comparisons serve as reasonableness checks for the mode choice results.

Table 0.4 District Definition

District	NAME
1	Parma
2	Eagle
3	Notus
4	Boise Hills
5	Wilder
6	Caldwell
7	Boise City
8	Nampa
9	Huston
10	Orchard
11	Kuna

Figure 0.3 District Map



Work Trip Comparison

The district-to-district peak work trips from 2000 CTPP and total HBW trips from the model are summarized in Tables 2.5 and 2.6. The percentages of total work trips produced by and attracted to districts are very similar between those two tables. Consequently, the overall work trip flow from the mode choice model seems reasonable at district level.

Table 0.5 2000 CTPP Peak Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	472	0	39	0	84	281	134	325	3	35	3	1376	1%
2	2	1451	11	0	0	180	7059	354	0	700	2	9759	5%
3	50	126	567	4	32	1028	1747	1404	32	381	0	5371	3%
4	0	12	0	28	0	15	677	34	0	121	0	887	0%
5	70	1	16	0	203	392	142	336	53	48	10	1271	1%
6	130	100	207	0	123	4439	2235	3852	149	562	28	11825	6%
7	34	1891	193	151	45	976	95476	4391	94	15608	215	119074	62%
8	112	370	121	47	95	2745	8885	15301	212	2256	155	30299	16%
9	19	4	39	0	8	365	306	666	287	102	20	1816	1%
10	0	66	0	10	0	30	4180	233	16	1720	97	6352	3%
11	8	46	9	16	5	52	2417	374	20	566	343	3856	2%
Total	897	4067	1202	256	595	10503	123258	27270	866	22099	873	191886	100%
	0%	2%	1%	0%	0%	5%	64%	14%	0%	12%	0%	100%	

Table 0.6 Modeled Daily HBW Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	304	18	72	1	26	617	469	625	45	12	4	2193	1%
2	3	722	9	63	1	65	15855	140	4	960	96	17918	6%
3	175	71	352	5	25	2261	1586	3010	123	101	13	7722	2%
4	0	78	1	19	0	6	2719	16	0	257	13	3109	1%
5	168	22	80	1	38	839	565	873	80	27	6	2699	1%
6	323	119	498	11	67	5996	3911	7227	368	248	34	18802	6%
7	15	3773	44	548	3	444	162976	1212	32	13115	963	183125	57%
8	582	335	1158	36	117	12216	13548	35445	1218	1077	158	65890	20%
9	71	23	84	3	19	1076	1053	2465	222	78	18	5112	2%
10	0	106	1	31	0	13	6430	45	1	939	48	7614	2%
11	1	150	3	20	0	29	6586	93	4	599	142	7627	2%
Total	1642	5417	2302	738	296	23562	215698	51151	2097	17413	1495	321811	100%
	1%	2%	1%	0%	0%	7%	67%	16%	1%	5%	0%	100%	

District-to-district Total Transit Trip Comparison

The district-to-district total transit trips from 2002 HH Survey, and the model are summarized in Tables 2.7, and 2.8. With only 74 transit trips reported in the 2002 HH Survey, many low-volume interchanges are likely not represented. Thus, the district-to-district transit trip table from 2002 HH Survey does not represent a complete picture of the transit trip flows. From Table 2.7, however, we see that most transit trips are generated by District 7 and 8, which are Boise City and Nampa, respectively. Boise City and Nampa are the two most populated cities in the region. Those two cities also generate most transit trips in the model, as seen in Table 2.8.

Table 0.7 2002 HH Survey Transit Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	--	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	1	--	--	--	--	1	1%
3	--	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	1	2	--	--	--	3	4%
7	--	1	--	--	--	1	36	4	--	1	--	43	58%
8	--	--	--	--	--	1	5	20	--	--	--	26	35%
9	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	1	--	--	--	--	1	1%
11	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	1	--	--	--	2	44	26	--	1	--	74	100%
	--	1%	--	--	--	3%	60%	35%	--	1%	--	100%	

Table 0.8 Total Modeled Transit Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	--	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	24	--	--	1	--	25	0%
3	--	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	370	55	96	--	2	--	523	10%
7	--	5	--	--	--	7	3548	42	--	102	--	3704	69%
8	--	--	--	--	--	274	173	600	--	5	--	1052	20%
9	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	56	--	--	10	--	66	1%
11	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	5	--	--	--	651	3856	738	--	120	--	5370	100%
	--	0%	--	--	--	12%	72%	14%	--	2%	--	100%	

District-to-district HBW Transit Trip Comparison

The district-to-district HBW transit trips from 2000 CTPP and the model are summarized in Tables 2.9 and 2.10. Comparing to 2000 CTPP, the model seems to overestimate transit work trips from District 6 and 8; while underestimating trips from District 2 and 3 to District 7.

Table 0.9 2000 CTPP Peak Transit Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	--	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	27	--	--	--	--	27	3%
3	--	--	--	--	--	--	28	--	--	--	--	28	3%
4	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	2	--	--	--	2	0%
6	--	--	--	--	--	13	--	7	--	--	--	20	2%
7	--	--	--	--	--	--	771	4	--	52	--	827	86%
8	--	--	--	--	--	--	18	23	--	--	--	41	4%
9	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	10	--	--	3	--	13	1%
11	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	13	854	36	--	55	--	958	100%
	--	--	--	--	--	1%	89%	4%	--	6%	--	100%	

Table 0.10 Modeled HBW Transit Trips

District	1	2	3	4	5	6	7	8	9	10	11	Total	
1	--	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	9	--	--	1	--	10	1%
3	--	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	47	18	20	--	1	--	87	6%
7	--	--	--	--	--	--	891	--	--	61	--	952	69%
8	--	--	--	--	--	95	61	149	--	4	--	309	23%
9	--	--	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	13	--	--	3	--	15	1%
11	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	0	--	--	--	142	992	170	--	69	--	1373	100%
	--	0%	--	--	--	10%	72%	12%	--	5%	--	100%	

Modeled vs. Observed auto and transit travel times

The district-to-district auto and transit travel times from 2002 HH Survey, 2000 CTPP and daily transit trips from the model are summarized in Tables 2.10 to 2.14. These district-to-district travel times are weighted average by trips. So, they represent the average travel time experienced by an average traveler from one district to another. Overall, the model tends to underestimate transit travel times. But, the auto travel times seems more reasonable. The discrepancies between modeled and observed travel times, for both auto and transit, are likely due to the fact that the modeled travel times are extracted based on free-flow conditions.

Table 0.10 2002 HH Survey Transit Travel Time (Minutes)

District	1	2	3	4	5	6	7	8	9	10	11
1	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	54.0	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--
6	--	--	--	--	--	--	45.0	38.5	--	--	--
7	--	55.0	--	--	--	99.0	28.3	46.8	--	15.0	--
8	--	--	--	--	--	20.0	50.6	49.7	--	--	--
9	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	35.0	--	--	--	--
11	--	--	--	--	--	--	--	--	--	--	--

Table 0.11 CTPP Peak Transit Time (Minutes)

District	1	2	3	4	5	6	7	8	9	10	11
1	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	37.8	--	--	--	--
3	--	--	--	--	--	--	83.8	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	5.0	--	--	--
6	--	--	--	--	--	10.0	--	90.0	--	--	--
7	--	--	--	--	--	--	35.6	60.0	--	29.7	--
8	--	--	--	--	--	--	63.9	16.1	--	--	--
9	--	--	--	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	51.0	--	--	5.0	--
11	--	--	--	--	--	--	--	--	--	--	--

Table 0.12 Modeled Transit Travel Time (Minutes)

District	1	2	3	4	5	6	7	8	9	10	11
1	11.2	48.3	28.1	57.2	16.2	28.0	49.5	36.7	33.7	55.6	51.4
2	48.0	10.6	26.2	22.3	42.3	28.4	18.6	26.3	42.8	29.3	27.6
3	29.9	27.1	13.7	41.2	27.2	17.0	34.6	23.1	33.8	43.0	38.0
4	54.4	17.2	35.9	12.7	46.5	36.5	19.0	32.7	48.9	19.3	31.4
5	20.9	45.0	27.8	55.5	10.6	22.3	46.1	32.2	25.1	50.5	47.2
6	29.4	30.1	17.0	40.8	19.8	9.2	31.6	17.2	22.3	38.5	33.3
7	48.5	17.0	32.4	20.9	43.6	29.7	13.7	24.0	39.8	19.8	22.3
8	39.5	28.6	23.5	36.2	31.7	18.0	26.5	11.2	24.6	32.7	23.3
9	35.9	43.4	34.9	51.2	26.5	27.3	41.4	24.4	18.1	44.9	30.3
10	55.2	28.7	42.2	17.1	49.0	38.3	19.5	31.8	42.9	14.0	24.9
11	53.2	27.5	36.8	33.7	45.4	32.1	23.6	23.0	31.6	28.1	10.6

Table 0.13 CTPP Peak Auto Time (Minutes)

District	1	2	3	4	5	6	7	8	9	10	11
1	11.1	--	15.4	--	14.2	22.1	64.0	35.4	20.0	48.4	45.0
2	--	12.6	11.5	--	--	27.1	22.4	27.3	--	30.2	25.0
3	13.6	25.7	15.8	30.0	22.8	16.8	39.5	23.3	46.1	40.5	--
4	--	10.0	--	26.8	--	35.0	20.1	96.5	--	27.4	--
5	10.8	45.0	11.8	--	10.9	19.5	47.7	27.6	21.3	38.7	35.0
6	27.7	30.8	13.4	--	19.1	11.3	35.3	19.9	17.5	40.5	35.8
7	52.8	21.3	33.3	19.4	41.9	30.6	17.6	26.5	28.2	20.8	22.9
8	26.6	39.9	18.6	31.5	43.3	18.6	30.9	14.0	20.8	32.7	23.7
9	20.0	45.0	20.5	--	25.0	21.0	42.5	25.8	12.0	41.0	30.8
10	--	20.1	--	6.0	--	32.3	19.2	31.0	11.9	12.0	18.3
11	55.0	31.6	25.0	40.0	10.0	30.0	27.0	23.4	25.5	29.4	20.4

Table 0.14 Modeled Auto Travel Time (Minutes)

District	1	2	3	4	5	6	7	8	9	10	11
1	6.6	45.4	24.0	56.7	15.0	25.7	47.7	34.8	32.3	55.4	50.3
2	43.8	6.9	20.6	13.5	40.4	24.4	14.3	22.5	40.0	28.6	24.4
3	25.2	22.4	9.5	36.3	25.3	13.5	32.2	20.2	33.0	41.6	36.0
4	56.3	11.7	34.5	4.6	52.5	34.6	14.6	31.0	49.2	11.5	28.9
5	16.6	42.0	25.4	53.0	6.7	18.9	43.6	29.8	22.1	51.5	45.2
6	25.8	25.6	13.2	36.5	16.1	5.4	28.3	12.8	20.6	37.2	30.0
7	47.0	12.4	30.2	15.4	42.1	26.1	8.7	19.1	36.9	15.0	16.8
8	35.8	23.9	19.9	33.3	29.3	13.0	21.9	7.2	20.0	32.3	18.4
9	32.8	41.1	33.8	49.9	21.0	23.3	38.9	20.7	10.3	44.8	25.8
10	57.4	26.5	43.3	11.4	53.4	37.5	14.2	29.7	38.4	7.4	17.9
11	51.0	24.6	34.9	31.0	45.2	29.2	19.1	18.8	24.1	22.3	5.8

3.0 FTA Model Choice Modeling Guidelines

The FTA's guidance suggests that there must be a reasonable and valid interpretation of the "story told by the model" about traveler behavior. This relates to transit network coding and path-building, as well as the mode choice models. This helps to ensure that the various parameters, constants, network coding conventions, and other decision rules in the models "tell a coherent story" about travel behavior.

In general, the following factors are considered as major contributors to most encountered anomalies and inaccuracies in mode choice models:

- Incorrect representation of travel markets in person-trip tables;
- Inconsistencies between transit path-builder and the mode choice model;
- Inaccurate auto and bus network speeds and travel times;
- Unusual coefficients throughout the model;
- Use of "non-logit decision rules" in the mode choice model;
- Over-specified alternative-specific constants;
- Nature of alternative-specific constants for future modes; and
- Inadequate and non-rigorous calibration and validation procedures.

The following are highlights of the FTA's recommendations with respect to some of the above issues:

- **Network Development –** Transit and highway skims (level-of-service matrices) should be consistent with the actual baseline conditions for bus running times and highway network speeds.
- **Transit Path-Builder and the Mode Choice Model –** It is important to have consistency between the transit path-builder and the mode choice model with respect to modes in model application. Transit path-builder must be checked by comparing model predicted paths against paths from surveys – if existing. While this is not required for model estimation, the settings for model estimation should be close to those used for application, or else the models may need to be re-estimated.
- **Mode Choice Models –** These should be developed in a way that the introduction of a new mode would not require modification of the application code. They should be transparent and not over-specified; too many nests can result in illogical constants. They should conform to the following guidelines:

- Coefficient of In-Vehicle Time (C_{IVT}) should be -0.03 <C_{IVT} < -0.02 and use the same coefficient for all choices; there should be no variations by mode (e.g. coefficient of transit mode less negative than that for the auto mode; C_{IVT} for commuter rail less negative than that of other transit modes). The FTA has recently allowed C_{IVT} to be slightly lower in absolute value for certain premium modes.
- Coefficient of Out-of-Vehicle Time (C_{OVT}) should be 2.0 < C_{OVT}/ C_{IVT} < 3.0 and use the same coefficient for all alternatives.
- Implicit Value of Time (VOT= C_{IVT} / C_{Cost}), where C_{Cost} is the Coefficient of cost, should be Average wage/4 < VOT < Average wage/3.

- **Use of "Non-Logit Decision Rules" in the Mode Choice Model –** These rules and assumptions established to ensure reasonableness of forecasts by eliminating unlikely transit trips (e.g., requiring that transit IVT be greater than drive access time for auto-access transit choice, assuming a minimum IVT to qualify a transit trip) should be avoided. Such arbitrary rules can result in zero-percent transit mode shares and negative benefits when an alternative exhibits service improvements. Some level of model inaccuracy should be tolerated in lieu of over-defined model specifications.
- **Alternative-Specific Constants** should have no geographic basis with potential exception of CBD bound travel.

The above recommendations are not rules. However, deviations from the above recommendations should have logical explanations and, hopefully, be based on observed behavior.

4.0 Assessment and Recommended Enhancements

After reviewing and testing various aspects of the COMPASS Mode Choice Model, the following enhancements are recommended to prepare the model for New Starts and Small Starts applications.

4.1 MODEL NESTING STRUCTURE

Assessment

The FTA modeling guidelines caution against over specifying the nesting structure in mode choice models. The COMPASS Mode Choice model structure was adapted from the WFRC HBW Mode Choice submodel without market segmentation. The submodels for other trip purposes also share the same nesting structure as HBW trips. The adapted nesting structure does not appear to exhibit over specification problems.

Recommended Enhancements

The FTA guidelines states that models used for New Starts should account for transit markets defined by trip purpose, socioeconomic class, production / attraction locations, and transit access modes. Consequently, it is recommended that the COMPASS HBW Mode Choice Model be expanded to include market segmentation (e.g. by auto ownership), for HBW trips.

4.2 ALTERNATIVE-SPECIFIC CONSTANTS

Assessment

The FTA modeling guidelines also caution against overspecifying the alternative-specific constants in mode choice models. The alternative-specific constants in the COMPASS Mode Choice model were calibrated with independent variable coefficients borrowed from the WFRC model. Consequently, some of the alternative-specific constants may be too large and render the model insensitive to variations in level of service.

Recommended Enhancements

The alternative-specific constants should be recalibrated to reflect existing local conditions once the new survey data becomes available.

4.3 MODE SPECIFIC IN-VEHICLE TIME COEFFICIENTS

Assessment

The FTA modeling guidelines caution against mode specific In-Vehicle Time Coefficients. The auto In-Vehicle Time Coefficients in the COMPASS Mode Choice model are about twice the values of the transit In-Vehicle Time Coefficient for all trip purposes, see Table 4.1 below.

Table 4.1 In-Vehicle Time Coefficients

	HBW	HBSC	HBS	HBSO	HBO	NHB
IVT_COEF	-0.0221	-0.0221	-0.0107	-0.0107	-0.0107	-0.0233
DRIVE_COEF	-0.0541	-0.0541	-0.0268	-0.0268	-0.0268	-0.0583

Recommended Enhancements

The auto In-Vehicle Time Coefficients should be set to the same values as the transit In-Vehicle Time Coefficient for all trip purposes.

4.4 COEFFICIENTS OF TRANSIT TRAVEL TIME, AND IMPLICIT VALUE OF TIME

Assessment

The COMPASS Mode Choice model distinguishes between initial and transfer wait times. The Out-of-Vehicle Time coefficient is calculated as the average of the coefficients of the initial and transfer wait times. The ratios of the adapted In-Vehicle Time and Out-of-Vehicle Time coefficients all conform to the FTA guidelines. However, the coefficient of In-Vehicle Time for the HBS, HBSO, and HBO trip purposes are beyond the FTA recommended range.

Also, the coefficient of Cost seems too high, such that, the ratio between the Implicit Value of Time and average hourly wage is slightly too low. As an example, the coefficients of the HBW trips and the FTA recommended ranges are shown in Table 4.2. The coefficients of other trip purposes are shown in Tables 4.3 to 4.5.

Table 0.2 HBW Coefficients

Coefficient	COMPASS	FTA Guidelines	
		Low	High
In-Vehicle Time (C_{IVT})	-0.0221	-0.03	-0.02
Out-of-Vehicle-Time (C_{OVT})	-0.0464		
C_{OVT}/ C_{IVT}	2.1	2	3
Cost	-0.0061		
Implied Value of Time (C_{IVT}/ C_{cost})	$3.62		
Average Hourly Wage	$18.89*		
Value of Time / Average Wage	0.19	0.25	0.33

*: Idaho Occupational Employment & Wage Survey 2009, Boise City-Nampa Metropolitan Statistical Area

Table 0.3 HBSC Coefficients

Coefficient	COMPASS	FTA Guidelines	
		Low	High
In-Vehicle Time (C_{IVT})	-0.0221	-0.03	-0.02
Out-of-Vehicle-Time (C_{OVT})	-0.0464		
C_{OVT}/ C_{IVT}	2.1	2	3

Table 0.4 HBS, HBSO, HBO Coefficients

Coefficient	COMPASS	FTA Guidelines	
		Low	High
In-Vehicle Time (C_{IVT})	-0.0107	-0.03	-0.02
Out-of-Vehicle-Time (C_{OVT})	-0.0227		
C_{OVT}/ C_{IVT}	2.12	2	3

Table 0.5 NHB Coefficients

Coefficient	COMPASS HBW	FTA Guidelines	
		Low	High
In-Vehicle Time (C_{IVT})	-0.0223	-0.03	-0.02
Out-of-Vehicle-Time (C_{OVT})	-0.0553		
C_{OVT}/ C_{IVT}	2.47	2	3

Recommended Enhancements

The coefficients of In-Vehicle Time and Out-of-Vehicle Time for the HBS, HBSO, and HBO trip purposes should be adjusted to be within the FTA recommended range. The HBW coefficients can be used as a reasonable starting point for those trip purposes.

The implied value of time seems too low compared to average hourly wage. The coefficient of Cost should be adjusted such that the ratio between the Implicit Value of Time and average hourly wage is within the FTA recommended range.

4.5 TRANSIT NETWORK DEVELOPMENT

Assessment

The transit level of service (LOS) used in the COMPASS Mode Choice model was based on a daily network. The transit service frequencies in the current model represent the average daily condition, hence, not specific to a peak or off-peak period. In addition, the transit paths are based on the best path using either walk or drive access. Therefore, although the overall transit mode share matches 2002 HH Travel Survey, the transit mode share by access mode cannot be distinguished.

Recommended Enhancements

Transit networks by access mode should be constructed separately so that the skimming and assignment of transit trips by access mode will be based on the transit network for the particular access mode. For example, the paths for drive-access trips should all begin with one drive-access link and end with one walk-egress link. Consequently, the transit network for drive-access trip skimming and assignment should not include any walk-access links. In addition, the time of day for the skimmed LOS should be appropriate for the trip purpose. For example, HBW and HBC mode choice models should be based on AM peak auto and transit travel times, and level of transit services. Consequently, an AM peak network and an off-peak network must be developed for this purpose.

4.6 HIGHWAY AND BUS SPEEDS

Assessment

Transit travel times need to account for buses operating in mixed traffic, stops, delays, etc. So, the true comparison should be against scheduled transit times or true O-D transit travel times. The current transit LOS skimming was based on free-flow highway speeds. Since the bus runtime is obtained from the background highway network, the bus speeds were also set to free-flow speeds. Therefore, the transit paths selected may not be consistent with those from the congested peak hours.

Recommended Enhancements

Transit speeds for buses operating in mixed-flow should be based on congested auto speeds.

4.7 SUMMARY OF RECOMMENDED ENHANCEMENTS

In summary, the following are the recommended enhancements to the COMPASS model:

- **Refine Transit Network Coding**:
  - Code transit lines los by time-of-day;
  - Use congested auto speeds to determine bus speeds.
- **Refine Transit LOS skimming:**
  - Skim access-mode-specific LOS; and
  - Skim LOS by time of day.
- **Mode Choice Model:**
  - Add market segmentation, by auto ownership, to HBW model;
  - Include Auto Operating Costs as independent variable; and
  - Use FTA approved coefficients and adjust constants based on new on-board OD survey data.

5.0 Additional FTA Guidelines on Calibration and Validation

The following discussion on model calibration procedures, adopted from *FSUTMS-Cube Framework Phase II: Model Calibration and Validation Standards, Final Report, Florida Department of Transportation Systems Planning Office, 2008*, is applicable to calibration efforts for models used in forecasting transit use, but is especially relevant for the FTA New Starts projects.

5.1 TRANSIT PATH-BUILDING

The FTA has noted that certain common practices in transit path-building can have undesired impacts on ridership forecasts. Minimum and maximum values of time and distance used to determine valid transit paths and modal availability can have unexpected effects. It is recommended to use continuous functions, instead of such "either/or" tests. It also is important that transit access coding conventions are consistent among transit modes. Path-building parameters and settings should remain the same for all steps of the model (skimming, assignment).

The FTA recommends evaluating the transit skims by comparing the skim settings to the range of experience in on-board surveys. Settings to check include maximum access distances, travel times, and transfers. Another FTA recommendation is the assignment of "observed" transit trip tables, derived from the expanded transit rider survey, to the coded transit networks. This will provide an opportunity to examine transit network and path-building without the influence of errors in the trip distribution and mode choice models.

5.2 TRIP DISTRIBUTION MODEL CHECKS

The FTA recommends a detailed inspection of the person-trip tables that are the outputs of trip distribution. Checking trip length frequency distributions is insufficient. Since information on observed travel patterns is seldom available at a zone level, this must be a district-level summary. The motivation behind this recommendation is that if demand in a corridor is significantly overestimated or underestimated, it will be difficult to produce accurate ridership forecasts for a proposed transit project in the corridor. The implication is that recent household survey data are needed to perform this comparison. In the absence of household survey data, comparisons should at least be made between CTPP/JTW data and model-estimated home-based work trip tables at the planning district or sector level. The FTA has not specified any standards for this check either.

5.3 MODE CHOICE ESTIMATION DATA

The model estimation data will be a combination of the household survey, transit on-board surveys, skim data, and land use data from the model. The survey data for each trip needs to be supplemented by information about the travel time and cost between the origin and destination areas. The travel time and cost data, referred to as level of service data, are obtained by skimming the model system's highway and transit networks for the given origin and destination of each trip. The level of service data for transit modes will include wait, transfer, walk access, auto access, and egress times; number of transfers; in-vehicle times by transit mode; and transit fares. The level of service data for highway modes will include in-vehicle times, out-of-vehicle times, and distances. The survey, zonal, and level of service data will then be merged to provide estimation data sets for each trip purpose. These data sets will consist of the survey trip records, extended to include household and person variables from the surveys; zonal data for the zones of trip origin, destination, production, and attraction (as appropriate); and level of service data for all modes available between the trip end zones.

5.4 MODE CHOICE MODEL CALIBRATION PROCEDURES

After the mode choice model is applied, the results by market segment are compared to a calibration target matrix. Aggregate model calibration and validation ensure agreement between the estimated and observed data at the aggregate level through the adjustment of mode-specific constants. The primary role of the constants is to capture the effects of those variables affecting mode choice that cannot be modeled, such as safety, security, and reliability. Constants are included to "explain" which existing specifications of the model (i.e., model structure, variables, and coefficients) cannot be addressed adequately. The concerns with the use of constant terms, in lieu of explanatory variables, lie in the application of the model in the forecasting mode, since changes in variables affecting modal use, but not included in the model, are held constant over time. The ideal situation is a robust model with a strong explanatory power and constants that are of relatively small magnitude. It is not acceptable simply to adjust constants without consideration to the reasons for the differences between model results and observed data. When large adjustments are needed, this usually indicates problems with the model that need to be corrected before validation can continue.

It is important to recognize the relationship between the magnitudes of alternative-specific constants and the other model parameters. For example, if the difference between the constants for two modes is 3.0, and the in-vehicle time coefficient is -0.02, this implies that (all other things being equal) a traveler would be indifferent between spending 30 minutes on the mode with the lower constant and spending three hours on the higher-constant mode. This may be reasonable if the higher-constant mode is an auto mode and the lower constant

mode is a transit or nonmotorized mode, when issues such as vehicle availability, parking availability, and transit/nonmotorized mode captivity are not explicitly considered in the model. (Then again, this may indicate that the ways in which these issues are treated in the model need to be reconsidered.) However, if the two modes are either transit modes or both auto modes, it is likely there are other issues in the model that need to be corrected. In the case of two transit modes, it is likely that the FTA would deem this difference to be a case of "bizarre" alternative-specific constants.

One of the most significant problems that may occur in traditional model development is a calibration effort that results in adjustments necessary to match current data that are no more than correction factors for errors made elsewhere in the model set. The "calibration" of alternative-specific constants is meaningful only when the person-trip tables, highway and transit networks, and observed patterns are sufficiently accurate.

To summarize, the initial response to the identification of discrepancies between the model results and the calibration targets is to examine the potential reasons for the discrepancies in the model itself, and to correct any model problems that are identified. After all such issues have been addressed, it would be acceptable to make relatively small adjustments to modal constants to provide a better fit between modeled and observed mode shares.

The FTA has noted that simply matching regional targets by mode is insufficient. Besides segmentation by trip purpose, socioeconomic class (such as auto ownership level), and transit access mode/submode, checks for individual geographic markets must also be performed. The FTA asks, "Do our models grasp adequately the characteristics of our key transit ridership markets?" The FTA contends that a model is not sufficiently validated unless it accurately represents transit demand in key markets. (This requires good validation of both trip distribution and mode choice.)

5.5 TRANSIT ASSIGNMENT CHECKS

The transit assignment process is often overlooked during the process of regional model and Long-Range Transportation Plan (LRTP) development. The FTA has recommended specific checks on the transit assignment process for projects requiring New Starts funding. The first of these is to assign a trip table from an expanded on-board survey, and compare the results against a model estimated transit assignment. Checks should be conducted on individual transit lines (or groups of lines in the case of local buses), guideway facilities, stations, and park-and-ride lots, and between station pairs, if the data are available.

The FTA specifically recommends performing modeling for future baseline ("Transportation System Management (TSM)" in the case of New Starts projects) and build alternatives. Future baseline results should be compared to base year results, and future build results should be compared to future baseline results. This is a reasonableness check.

The FTA developed a software tool, known as Summit, for analyzing travel demand forecasts. Summit also computes and reports transportation system user benefits, which can be used in mobility and cost-effectiveness measures for New Starts reporting. Summit requires software changes to regional travel forecasting models to export files required by Summit for the calculation of user benefits. The FTA recommends using the Summit program as a diagnostic check for unusual or anomalous transit assignment results. Summit analyses are performed based on comparisons between future baseline and future build results.

Since the New Starts program focuses on project evaluation, it is also necessary to demonstrate that future changes in the transportation (especially transit) system produce reasonable model results. Tests of the sensitivity to changes must be done through model application in full production mode. Simple elasticity tests are insufficient because they do not exercise the full range of model components, particularly network coding conventions and transit path-building parameters that are central to the transit-related properties of a model set.

5.8 RIDERSHIP FORECAST CHECKS

Starting in 2008, New Starts applications will require the following standard ridership forecasts, analyses, and summary reports. These analyses are intended to provide detailed information regarding the sensitivity of the travel models and the sources for forecast changes in transit ridership.

- Future No-Build alternative versus "today";
- Future TSM alternative versus No-Build alternative;
- Future Build alternative versus TSM alternative;
- Opening year Build alternative versus today; and
- Detailed analysis of transit user benefits accruing from changes in in-vehicle travel times resulting from a proposed project.

Memorandum

TO: MaryAnn Waldinger

FROM: Lawrence Liao and Ron West

DATE: January 17, 2014

RE: Revised Mode Choice Model Update Status

Overview

This memo examines the COMPASS mode choice (MC) model update task. The enhanced MC models were developed to meet future regional transportation planning needs, including meeting Federal Transit Administration (FTA) New/Small Starts modeling requirements. This update effort was developed using the available on-board transit survey data.

Examined here are the following elements:

- Current COMPASS MC models
- Key results from household and transit on-board surveys
- Summary of MC model update results

The MC model updates have been designed to meet FTA's modeling requirements, as specified in the "2010 FTA Technical Guidance Memo." These model updates include:

- Refine transit network coding
    - Code transit lines headways and availability by peak and off-peak periods
    - Use congested auto speeds to determine bus speeds
- Refine transit levels-of-service (LOS) skimming
    - Skim access-mode-specific LOS
    - Skim transit LOS by peak and off-peak periods
- Mode choice mode

555 12th Street, Suite 1600
Oakland, CA 94607
tel 510-873-8700 www.camsys.com fax 510-873-8701

- Add market segmentation, by auto ownership, to the home-based work model
- Include auto operating costs as an independent variable
- Apply peak period transit LOS in mode choice models for home-based work, home-based school; and apply off-peak transit LOS in mode choice models for other trip purposes

Mode Choice Models

This section covers the existing MC models, as well as a summary of the new transit on-board survey data.

Current COMPASS MC Model

The COMPASS MC model uses a nested logit structure with five alternatives. The upper level nest splits motorized from non-motorized travel. The non-motorized nest includes walk and bicycle modes. Under the motorized nest, auto and bus modes are available. Transit is further split with a lower level nest that includes walk and drive access modes to transit. Figure 1 shows the existing MC model nested logit structure.

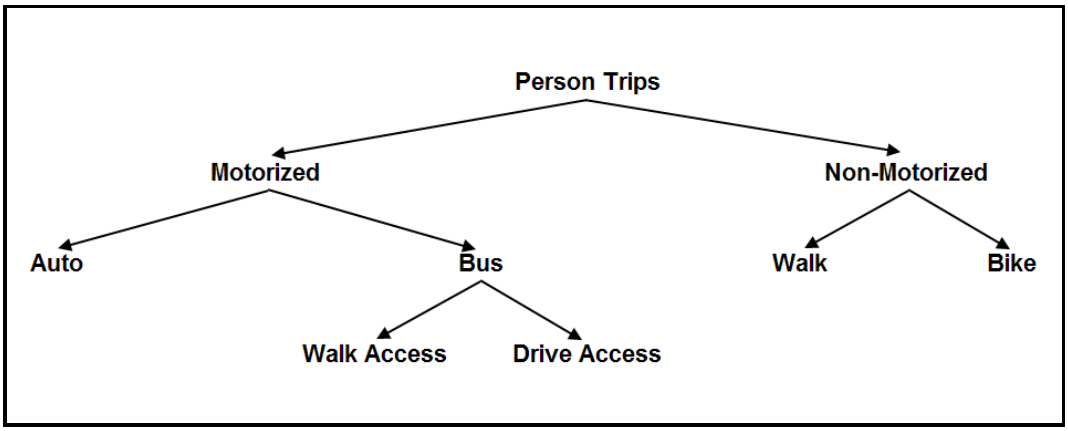


Figure 1: COMPASS Mode Choice Model Nested Logit Structure

There are six unique MC models – one for each trip purpose in the COMPASS MC model structure:

- Home-Based Work (HBW)
- Home-Based School (HBSC)
- Home-Based Shop (HBS)
- Home-Based Social (HBSO)
- Home-Based Other (HBO)
- Non Home-Based (NHB)

All six trip purposes share the same nested logit structure; however, the independent variables, coefficients and constants are calibrated for each trip purpose independently. The coefficients for the HBO trip purpose are used for HBS and HBSO trip purposes.

The independent variables and their coefficients (in parentheses) used in the six unique MC models are shown below:

- In-Vehicle Time (IVT_COEF)
- Initial Wait Time (INITWAIT_COEF)
- Transfer Wait Time (XFERWAIT_COEF)
- Walk Time – Within First Mile (WALK_COEF_1)
- Walk Time – After First Mile (WALK_COEF_GT_1)
- Drive Access Time (DRIVE_COEF)
- Bike Time (BIKE_COEF)
- Bus Fare (COST_COEF)
- Parking Cost (PARKCOST_COEF)
- Number of Transfers (TRANSFERS_COEF)

Household and Transit On-Board Survey Results

The 2012 COMPASS Regional Household Travel Survey was completed in early 2012, and summarized in a May 16, 2012, memorandum from Parsons Brinkerhoff. The household travel survey was comprised of 3,350 household records, 8,773 person records, and 40,891 trip records. Since the previous memorandum summarized the survey results, a full summary of that effort is not included here. The key element for discussion here is a table of trips by mode (Table 18, from the May 16, 2012, memo). As would be generally expected, trips by public bus were very low and the number records collected are not sufficient to re-estimate MC models. Table 1, below shows the number of person trip records by travel mode (raw survey results were not available for the May 16, 2012, memo).

Table 1 – Household Survey Trips by Travel Mode

Mode	Weighted Observations	Percent
Drove Private Vehicle	1,216,367	63%
Passenger	486,095	25%
Bicycle	28,973	1%
School Bus	93,688	5%
Public Bus	4,518	0%
Walked	89,542	5%
Taxi	1,670	0%
Motorcycle	2,927	0%
Other	14,366	1%
Total	1,938,146	100%

The transit on-board survey was developed to augment the 2002 household travel survey in order to include sufficient transit ridership surveys to estimate transit modes, including the walk/drive and local/express bus sub-modes. Data from the on-board survey were obtained from a NuStats memoradum, dated April 4, 2011, along with a series of cross tabs documenting survey results. The goal of the on-board survey was to collect roughly 1,500 complete and usable records, which is a sample rate between 25% and 30% of total ridership.

Tables 2 and 3 show the breakdown by access and egress modes for local (Ada County and Canyon County) versus inter-county bus service. Drive access for MC models are comprised of drive alone, drop off/pick up, carpool and taxi. Walk access includes bicycle.

The differences between access/egress modes for local routes versus inter-county routes are of note. The local bus routes were dominated by walk access/egress (range from 84.7% to 90.2%); while inter-county routes had much higher drive access/egress trips (over 26.8% to 41.7%).

Table 2 – On-Board Survey Access Mode Percent of Total, by Service Area

	Service Area			
Access Mode	Ada County	Inter County	Canyon County	Total
Walked/ Wheel Chair	84.7%	54.8%	88.9%	82.1%
Dropped Off	4.4%	13.1%	3.4%	5.2%
Drove Alone	2.1%	26.3%	0.6%	4.4%
Carpooled	0.4%	2.3%	0.0%	0.5%
Bicycled	8.4%	3.5%	7.1%	7.8%
Taxi	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Table 3 – On-Board Survey Egress Mode Percent of Total, by Service Area

Egress Mode	Service Area			
	Ada County	Inter County	Canyon County	Total
Walk/ Wheel Chair	86.7%	66.2%	90.2%	84.9%
Picked Up	0.6%	2.6%	0.0%	0.8%
Drove Alone	1.7%	21.5%	0.6%	3.5%
Carpooled	8.4%	2.7%	6.8%	7.7%
Bicycled	2.6%	6.9%	2.4%	3.0%
Taxi	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Mode Choice Model Development Update

A number of COMPASS MC model improvements have been completed. These improvements are summarized below.

Enhancements to MC Models

The option of splitting the bus mode into two sub-modes, namely, local bus and inter-county bus, was carefully evaluated and deemed unwarranted because the two bus sub-modes could not be clearly distinguished in the model. Consequently, the number of alternatives in the MC models will remain unchanged.

As recommended by the Transportation Model Improvement Program (TMIP) Peer Review Panel, auto ownership has been added as a further market segmentation to the HBW MC model. The new HBW MC model structure has been split into four submodels by auto ownership (0, 1, 2, and 3+). The four HBW submodels use the same constants and coefficients as the original HBW MC model.

When combined, the four new HBW MC results will be consistent with that the original HBW MC model. Since the existing HBW person trips were not classified by auto ownership, HBW person trips were split using the regional auto ownership percentages from the fully expanded 2011/12 household travel survey.

The enhanced HBW MC models split by auto ownership are now ready to be calibrated when the trip generation (TG) model is modified to generate HBW trips by auto ownership level, and when the validation targets are available.

Another enhancement included adding auto operating (AO) costs as an independent variable. AO cost was added to the utility function for the auto mode. The AO cost was calculated as $0.11 x distance. The coefficient was estimated by using the AO value in the North Central Texas Council of Governments (NCTCOG) MC, after correcting for constant dollars to account for the differences between the NCTCOG model using 2005 dollars, and the COMPASS model using 1990 dollars.

One of the guidelines from FTA was to eliminate non-logit decision rules, such as the threshold for walk time. This rule was eliminated by setting WALK_COEF_GT_1=WALK_COEF_1. However, the Walk mode share increased significantly after the change. So, an additional test was evaluated that averaged the

coefficients ((WALK_COEF_GT_1+WALK_COEF_1)/2). With this test, the mode shares have returned to the previous level. The mode shares summaries before and after those changes are shown in Table 3.

Table 3 Person Trip Generation Targets and Mode Shares for Walk Time Threshold for 2035

Mode/Mode Shares	Pre Change	Post Change	Average Coefficient
Total_Auto	3,563,513.1	3,540,612.0	3,569,128.6
Total_Bus_Walk	6,485.8	6,405.3	6,092.5
Total_Bus_Auto	1,746.2	1,714.9	1,771.4
Total_Walk	99,509.4	124,363.8	94,011.2
Total_Bike	31,671.9	29,830.4	31,922.7
Total All	3,703,926.4	3,703,926.4	3,703,926.4
MS_Auto	96.20957	95.59128	96.36118
MS_Bus_Walk	0.17511	0.17293	0.16449
MS_Bus_Auto	0.00471	0.04630	0.04783
MS_Walk	2.68661	3.35791	2.53816
MS_Bike	0.85509	0.80538	0.86187

Re-Calibration of Mode Choice Model Constants and Coefficients

FTA staff suggested using asserted coefficients, which meet the FTA guidelines, instead of re-estimating them using the 2011/12 household travel survey data. The existing coefficients were reviewed and found consistent with FTA guidelines. Alternative specific constants were re-calibrated to match the mode shares by access mode derived from the transit on-board survey.

Enhance MC Model Coding

Based on a recommendation from Citilabls, the new XCHOICE command replaced CHOICE command for logit model implementation. The XCHOICE was used in the MC model script. The model result remains the same as that from CHOICE command, with the benefit of reduced run times.

Transit Path Building, Skimming and Assignment

The purpose of this task was to ensure consistency between transit path building, skimming and assignment processes. The transit assignment steps use the same route files used in the skimming steps for path building. Thus, the transit path building assumptions/parameters are guaranteed to be consistent between the transit skimming and assignment processes. In addition, the following enhancements were made to the model:

- Coded transit line headways and availability by peak/off-peak periods
- Added the ability to test rail mode
- Modified the script to use congested auto speeds to determine bus speeds
- Skimmed access-mode-specific LOS.

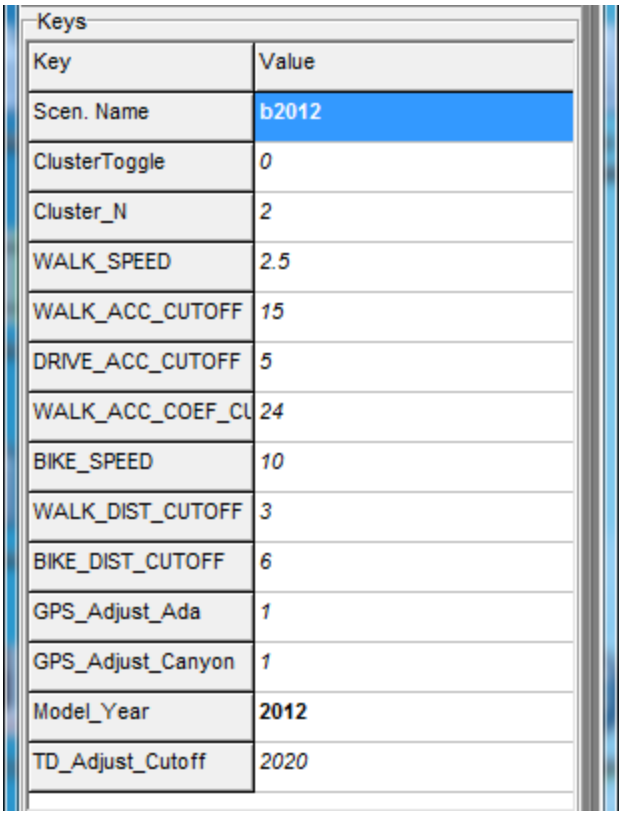
- Skimmed transit LOS by peak/off-peak periods.
- Evaluated multi-path vs best-path route enumeration methods-best-path route enumeration method was chosen because it allows explicit control of maximum number of transfers allowed
- Added a transit assignment by access mode
- Created post-processing script to summarize transit ridership by access mode.
- Added post-processing module to the transit assignment model to summarize transit ridership by access mode. A b2010 ridership by access mode summary is shown below as an example:

```
SCENARIO b2010 RIDERSHIP

TOTAL  WALK-ACC TRIPS SELECTED:       6,230.36
TOTAL  WALK-ACC RIDERSHIP     :       9,581.00

TOTAL DRIVE-ACC TRIPS SELECTED:       1,235.64
TOTAL DRIVE-ACC RIDERSHIP     :       1,522.34
```

- Completed validation by route and region wide. A re-validation of the MC model against the new on-board survey data was completed. The ridership by access mode was modified to match the result from the transit on-board survey.
- Modified the Cube application to include a cutoff year (default to 2020) to trip distribution (TD) adjustments. The application of TD adjustments will be determined by the TD_Adjust_Cutoff key. The key is default to 2015. So, the TD adjustments will be applied only to scenario years <=2020.
- Added the GPS Adjustment Factors by County to Trip Generation (TG) model. The GPS adjustment factors by county were added to TG model to enable the correction of under-reporting identified in the GPS survey study (conducted as part of the 2011/12 household travel survey). The current values for those factors are set to 1, so no adjustments will be made. Adjustments can be introduced by setting the GPS adjustment factors to appropriate values. For example, the GPS adjustment factor should be set to 1.1 if 10% of under-reporting was determined. The following example below shows how the GPS adjustment as well as the cutoff year was applied.



- Parameters, such as walk speed and bike speed, which were defined as tokens in a pilot step in the beginning of the MC model, were moved to scenario keys. So, the individual transit skimming steps can be executed without worrying about tokens not defined.

Appendix E

Screenline Maps and Results, Daily Model

Additional assignment validation methods include using screenlines to compare actual traffic volumes to model estimated volumes. Below maps are provided to show where screenlines were established, locations of the screenlines that “pass” and a table providing details about all 173 screelines.

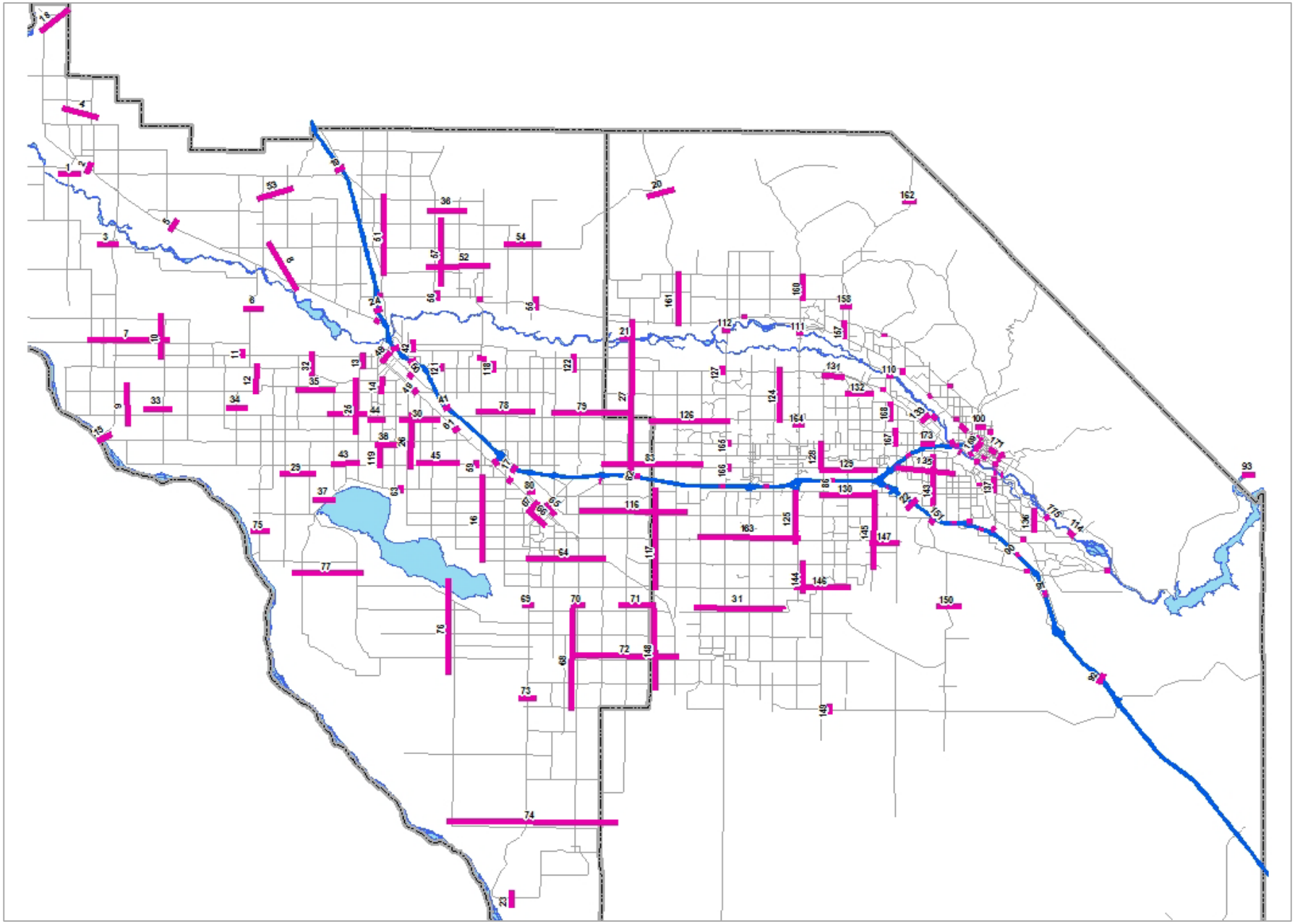


Figure 25: Screenline Locations

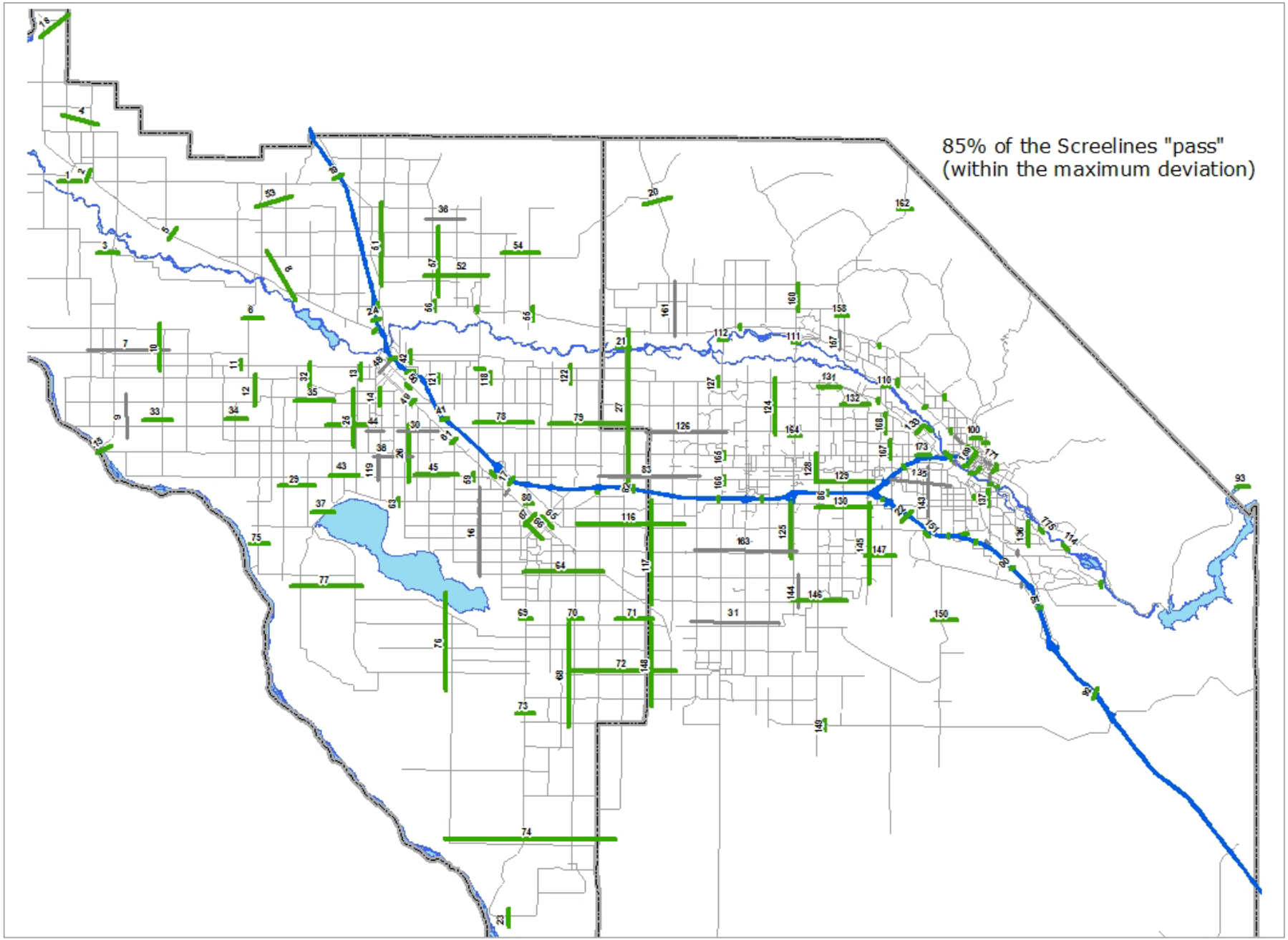


Figure 26: Screenlines Within Maximum Deviation, Daily

Table 85: Screenline Result Details, Daily

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
1	Canyon	N/S	s/o Hexon Rd	Warmstad Rd	1,582	856	(726)	-46%	+/- 62%	Pass	+/- 64%	Pass
2	Canyon	E/W	w/o Parma Rd	US 95	6,901	9,640	2,739	40%	+/- 42%	Pass	+/- 59%	Pass
3	Canyon	N/S	s/o Boise River Rd	US 95	3,675	2,492	(1,183)	-32%	+/- 52%	Pass	+/- 62%	Pass
4	Canyon	N/S	n/o Klahr Rd	US 95, Parma Rd	6,991	7,275	284	4%	+/- 42%	Pass	+/- 59%	Pass
5	Canyon	E/W	e/o Gotsch Rd	US 20/26	6,051	8,225	2,174	36%	+/- 45%	Pass	+/- 60%	Pass
6	Canyon	N/S	s/o river crossing	Notus Rd	1,139	1,063	(76)	-7%	+/- 63%	Pass	+/- 64%	Pass
7	Canyon	N/S	n/o Peckham Rd	Fargo Rd, Batt Corner, US 95, Allendale Rd	7,719	3,451	(4,268)	-55%	+/- 40%		+/- 58%	Pass
8	Canyon	E/W	e/o Conway Rd	Purple Sage Rd, US 20/26	6,320	10,256	3,936	62%	+/- 44%	Pass	+/- 60%	Pass
9	Canyon	E/W	e/o US 95	Ustick Rd	282	463	181	64%	+/- 67%		+/- 65%	Pass
10	Canyon	E/W	w/o Allendale Rd	SH 19, Peckham Rd, Red Top Rd	7,265	6,586	(679)	-9%	+/- 42%	Pass	+/- 59%	Pass
11	Canyon	E/W	w/o Notus Rd	SH 19	8,276	7,657	(619)	-7%	+/- 39%	Pass	+/- 58%	Pass
12	Canyon	E/W	e/o Notus Rd	Lower Pleasant Ridge Rd, Upper Pleasant Ridge Rd	772	561	(211)	-27%	+/- 65%	Pass	+/- 64%	Pass
13	Canyon	E/W	e/o Kit Ave	SH19, Laurel St	13,875	13,081	(794)	-6%	+/- 31%	Pass	+/- 52%	Pass
14	Canyon	E/W	w/o 10th Ave	E Linden St, Logan St	10,340	10,197	(143)	-1%	+/- 35%	Pass	+/- 56%	Pass
15	Canyon	N/S	s/o US 95	Homedale Rd	2,893	3,835	942	33%	+/- 56%	Pass	+/- 63%	Pass
16	Canyon	E/W	e/o Middleton Rd	Flamingo Ave, Orchard Ave, Smith Ave, Lone Star Rd, Roosevelt Ave, Lake Lowell Ave, Iowa Ave, Greenhurst Rd	28,681	18,627	(10,054)	-35%	+/- 24%		+/- 41%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
17	Canyon	E/W	Between Karcher IC and Northside IC	I-84	61,837	65,220	3,383	5%	+/- 18%	Pass	+/- 30%	Pass
18	Canyon	E/W, N/S	w/o US 95	US 20/26, Apple Valley Rd	4,806	4,943	137	3%	+/- 48%	Pass	+/- 61%	Pass
19	Canyon	N/S	s/o Sand Hollow IC	I-84	19,475	19,537	62	0%	+/- 28%	Pass	+/- 46%	Pass
20	Ada	N/S	n/o Beacon Light Rd	SH 16	8,355	8,810	455	5%	+/- 39%	Pass	+/- 58%	Pass
21	Ada	N/S	s/o State St	Star Rd	11,463	12,794	1,331	12%	+/- 34%	Pass	+/- 55%	Pass
22	Ada	E/W	w/o Orchard St IC	I-84	79,325	75,736	(3,589)	-5%	+/- 15%	Pass	+/- 26%	Pass
23	Canyon	E/W	w/o Hill Rd	Ferry Rd	565	328	(237)	-42%	+/- 66%	Pass	+/- 65%	Pass
24	Canyon	N/S	s/o SH 44 IC (Exit 25)	I-84	28,832	31,006	2,174	8%	+/- 24%	Pass	+/- 40%	Pass
25	Canyon	E/W	w/o Farmway Rd	Logan St, Linden St, Ustick Rd, Lonkey Ln	3,863	3,548	(315)	-8%	+/- 52%	Pass	+/- 62%	Pass
26	Canyon	E/W	e/o Indiana Ave	Ustick Rd, Homedale Rd, Karcher Rd	26,145	27,158	1,013	4%	+/- 25%	Pass	+/- 42%	Pass
27	Canyon, Ada	E/W	e/o Star Rd river crossing	SH 44, US 20/26, McMillan Rd, Ustick Rd, Cherry Ln, Franklin Rd	41,103	42,066	963	2%	+/- 22%	Pass	+/- 36%	Pass
28	Canyon	N/S	n/o Ustick Rd	Wagner Rd, Farmway Rd	4,998	6,419	1,421	28%	+/- 48%	Pass	+/- 61%	Pass
29	Canyon	N/S	s/o Karcher Rd	Chicken Dinner Rd, Malt Rd	746	343	(403)	-54%	+/- 65%	Pass	+/- 65%	Pass
30	Canyon	N/S	s/o Ustick Rd	Indiana Ave, Florida Ave, Lake Ave	12,197	7,302	(4,895)	-40%	+/- 33%		+/- 54%	Pass
31	Ada	N/S	n/o Hubbard Rd	Ten Mile Rd, Linder Rd, Meridian Rd, Locust Grove Rd	23,345	34,663	11,318	48%	+/- 26%		+/- 43%	

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
32	Canyon	E/W	e/o Weitz Rd	SH19, Lower Pleasant Ridge Rd	9,837	10,650	813	8%	+/- 36%	Pass	+/- 56%	Pass
33	Canyon	N/S	n/o Ustick Rd	Allendale Rd	369	389	20	5%	+/- 67%	Pass	+/- 65%	Pass
34	Canyon	N/S	n/o Ustick Rd	Plum Rd	245	136	(109)	-44%	+/- 67%	Pass	+/- 65%	Pass
35	Canyon	N/S	s/o Upper Pleasant Ridge Rd	Weitz Rd, Wagner Rd	805	351	(454)	-56%	+/- 65%	Pass	+/- 64%	Pass
36	Canyon	N/S	n/o Galloway Rd	Emmett Rd, Cemetery Rd	1,585	570	(1,015)	-64%	+/- 62%		+/- 64%	Pass
37	Canyon	N/S	n/o Lowell Rd	Riverside Dr	3,178	3,358	180	6%	+/- 55%	Pass	+/- 63%	Pass
38	Canyon	N/S	s/o Homedale Rd	10th Ave, Montana Ave, Indiana Ave	13,891	6,951	(6,940)	-50%	+/- 31%		+/- 52%	Pass
39	Canyon	N/S	s/o Centennial Way IC	I-84	37,781	45,875	8,094	21%	+/- 22%	Pass	+/- 37%	Pass
40	Canyon	E/W	s/o 10th Ave IC	I-84	43,741	50,733	6,992	16%	+/- 21%	Pass	+/- 35%	Pass
41	Canyon	N/S	s/o Franklin Rd IC (Exit 29)	I-84	45,910	49,672	3,762	8%	+/- 21%	Pass	+/- 34%	Pass
42	Canyon	E/W	e/o Indiana Ave	Lincoln St, Marble Front Rd	4,636	2,660	(1,976)	-43%	+/- 49%	Pass	+/- 61%	Pass
43	Canyon	N/S	n/o Karcher Rd	Wagner Rd, Farmway Rd	4,386	5,756	1,370	31%	+/- 50%	Pass	+/- 62%	Pass
44	Canyon	N/S	s/o Ustick Rd	Bear Ln, S 10th Ave	7,043	3,429	(3,614)	-51%	+/- 42%		+/- 59%	Pass
45	Canyon	N/S	n/o Karcher Rd	Florida Ave, Lake Ave, Midway Ave	5,735	4,706	(1,029)	-18%	+/- 45%	Pass	+/- 60%	Pass
46	Canyon	N/S	n/o SH 19	Centennial Way	13,111	12,153	(958)	-7%	+/- 32%	Pass	+/- 53%	Pass
47	Canyon	E/W	w/o I-84	US 20/26	9,819	11,805	1,986	20%	+/- 36%	Pass	+/- 56%	Pass
48	Canyon	E/W	n/o 5th Ave	Cleveland Blvd, Blaine St, Chicago St	9,607	5,565	(4,042)	-42%	+/- 37%		+/- 56%	Pass
49	Canyon	E/W	n/w Linden St	Cleveland Blvd	18,099	13,561	(4,538)	-25%	+/- 28%	Pass	+/- 48%	Pass
50	Canyon	E/W	w/o Chicago St	21st Ave	11,749	8,804	(2,945)	-25%	+/- 33%	Pass	+/- 54%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
51	Canyon	E/W	e/o Old Hwy 30	Goodson Rd, Galloway Rd, Purple Sage Rd, Willis Rd	3,503	4,719	1,216	35%	+/- 53%	Pass	+/- 62%	Pass
52	Canyon	N/S	s/o Purple Sage Rd	Emmett Rd, Cemetery Rd, Middleton Rd	3,999	3,294	(705)	-18%	+/- 51%	Pass	+/- 62%	Pass
53	Canyon	N/S	n/o Goodson Rd	Hop Rd, Conway Rd	422	373	(49)	-12%	+/- 67%	Pass	+/- 65%	Pass
54	Canyon	N/S	n/o Purple Sage Rd	Duff Ln, Lansing Ln	1,106	1,274	168	15%	+/- 64%	Pass	+/- 64%	Pass
55	Canyon	E/W	e/o Lansing Ln	SH 44	6,826	9,607	2,781	41%	+/- 43%	Pass	+/- 59%	Pass
56	Canyon	E/W	e/o Emmett Rd	SH 44	7,777	8,641	864	11%	+/- 40%	Pass	+/- 58%	Pass
57	Canyon	E/W	e/o Emmett Rd	Galloway Rd, Purple Sage Rd, Willis Rd	2,450	1,722	(728)	-30%	+/- 58%	Pass	+/- 63%	Pass
58	Canyon	E/W	e/o I-84	SH 44	12,759	15,075	2,316	18%	+/- 32%	Pass	+/- 53%	Pass
59	Canyon	E/W	w/o I-84	Karcher Rd	19,967	17,131	(2,836)	-14%	+/- 28%	Pass	+/- 46%	Pass
60	Canyon	E/W	w/o Middleton Rd	Karcher Rd	38,053	36,557	(1,496)	-4%	+/- 22%	Pass	+/- 37%	Pass
61	Canyon	E/W	w/o Midway Rd	Nampa-Caldwell Blvd	21,860	19,657	(2,203)	-10%	+/- 27%	Pass	+/- 45%	Pass
62	Canyon	N/S	e/o Midland Blvd	Nampa-Caldwell Blvd	24,389	16,600	(7,789)	-32%	+/- 26%		+/- 42%	Pass
63	Canyon	E/W	w/o Indiana Ave	Orchard Ave	3,145	2,904	(241)	-8%	+/- 55%	Pass	+/- 63%	Pass
64	Canyon	N/S	n/o Greenhurst Rd	12th Ave Rd, Sunnyridge Rd, Powerline Rd, Southside Blvd, Happy Valley Rd	43,548	40,633	(2,915)	-7%	+/- 21%	Pass	+/- 35%	Pass
65	Canyon	E/W	n/o Nampa-Caldwell Blvd	11th Ave, 16th Ave	40,006	40,937	931	2%	+/- 22%	Pass	+/- 36%	Pass
66	Canyon	E/W	s/o Nampa-Caldwell Blvd	7th Ave, 11th Ave, 12th Ave, 16th Ave	38,927	42,091	3,164	8%	+/- 22%	Pass	+/- 36%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
67	Canyon	N/S	e/o Yale St	2nd St, 3rd St, 7th St	32,345	28,977	(3,368)	-10%	+/- 24%	Pass	+/- 39%	Pass
68	Canyon	E/W	w/o Southside Blvd	Bowmont Rd, Bennett Rd, Kuna Rd, Deer Flat Rd, Lewis Ln	3,733	3,876	143	4%	+/- 52%	Pass	+/- 62%	Pass
69	Canyon	N/S	n/o Lewis Ln	SH 45	9,509	11,594	2,085	22%	+/- 37%	Pass	+/- 56%	Pass
70	Canyon	N/S	n/o Lewis Ln	Southside Blvd	2,594	2,228	(366)	-14%	+/- 57%	Pass	+/- 63%	Pass
71	Canyon, Ada	N/S	n/o Lewis Ln	Robinson Blvd, McDermott Rd	2,166	1,862	(304)	-14%	+/- 59%	Pass	+/- 64%	Pass
72	Canyon, Ada	N/S	n/o Kuna Rd	Black Cat Rd, McDermott Rd, Robinson Rd, Happy Valley Rd, Southside Blvd,	6,881	7,023	142	2%	+/- 42%	Pass	+/- 59%	Pass
73	Canyon	N/S	s/o Bennett Rd	SH 45	3,910	4,839	929	24%	+/- 51%	Pass	+/- 62%	Pass
74	Canyon, Ada	N/S	n/o Melba Rd	Rim Rd, SH 45, Southside Blvd, Can Ada Rd	6,143	5,042	(1,101)	-18%	+/- 44%	Pass	+/- 60%	Pass
75	Canyon	N/S	s/o Lowell Rd	SH 55	6,866	6,476	(390)	-6%	+/- 43%	Pass	+/- 59%	Pass
76	Canyon	E/W	w/o Rim Rd	Lake Shore Dr, Lewis Ln, Deer Flat Rd, Missouri Ave,	3,231	3,637	406	13%	+/- 54%	Pass	+/- 63%	Pass
77	Canyon	N/S	s/o Marsing Rd	Riverside Rd, Perch Rd	1,589	2,024	435	27%	+/- 62%	Pass	+/- 64%	Pass
78	Canyon	N/S	n/o Ustick Rd	Middleton Rd, Midland Rd, Northside Blvd	12,818	11,447	(1,371)	-11%	+/- 32%	Pass	+/- 53%	Pass
79	Canyon, Ada	N/S	n/o Ustick Rd	Franklin Blvd, 11th Ave, Can Ada Rd, Star Rd	13,704	9,458	(4,246)	-31%	+/- 31%	Pass	+/- 52%	Pass
80	Canyon	N/S	n/o 2nd St	Northside Blvd	21,267	20,415	(852)	-4%	+/- 27%	Pass	+/- 45%	Pass
81	Canyon	N/S	s/o I-84 EB ramps	Garrity Blvd	37,560	34,571	(2,989)	-8%	+/- 22%	Pass	+/- 37%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
82	Canyon	E/W	e/o Garrity Blvd IC	I-84	88,793	93,212	4,419	5%	+/- 14%	Pass	+/- 25%	Pass
83	Canyon, Ada	N/S	n/o Franklin Rd	Idaho Center Blvd, Star Rd, McDermott Rd, Black Cat Rd, Ten Mile Rd	48,791	38,356	(10,435)	-21%	+/- 20%		+/- 32%	Pass
84	Ada	E/W	e/o Ten Mile Rd IC	I-84	94,746	101,839	7,093	7%	+/- 14%	Pass	+/- 24%	Pass
85	Ada	E/W	e/o Meridian Rd	I-84	108,372	113,269	4,897	5%	+/- 13%	Pass	+/- 23%	Pass
86	Ada	E/W	e/o Eagle Rd IC	I-84	121,699	132,089	10,390	9%	+/- 13%	Pass	+/- 22%	Pass
87	Ada	E/W	between Wye IC and Cole-Overland IC	I-84	79,499	67,979	(11,520)	-14%	+/- 15%	Pass	+/- 26%	Pass
88	Ada	E/W	w/o Vista Ave IC	I-84	82,115	87,382	5,267	6%	+/- 14%	Pass	+/- 26%	Pass
89	Ada	E/W	w/o Broadway Ave IC	I-84	63,681	67,563	3,882	6%	+/- 17%	Pass	+/- 29%	Pass
90	Ada	E/W	n/o Gowen Rd IC	I-84	40,558	47,643	7,085	17%	+/- 22%	Pass	+/- 36%	Pass
91	Ada	N/S	n/o Eisenmann IC	I-84	20,072	19,831	(241)	-1%	+/- 27%	Pass	+/- 46%	Pass
92	Ada	N/S	n/o Blacks Creek Rd IC	I-84	19,712	19,930	218	1%	+/- 28%	Pass	+/- 46%	Pass
93	Ada	N/S	n/o Spring Shores Rd	SH 21	2,588	2,517	(71)	-3%	+/- 57%	Pass	+/- 63%	Pass
94	Ada	E/W	w/o River St Exit	I-184	76,399	80,961	4,562	6%	+/- 15%	Pass	+/- 27%	Pass
95	Ada	E/W	w/o Curtis Rd IC	I-184	79,842	84,176	4,334	5%	+/- 15%	Pass	+/- 26%	Pass
96	Ada	E/W	e/o Garden St	Main St, Fairview Ave river crossings	30,031	31,472	1,441	5%	+/- 24%	Pass	+/- 40%	Pass
97	Ada	E/W	w/o 27th St	Americana Blvd river crossing	12,442	6,939	(5,503)	-44%	+/- 33%		+/- 54%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
98	Ada	N/S	s/o Main St	Broadway Ave river crossing	26,719	24,611	(2,108)	-8%	+/- 25%	Pass	+/- 41%	Pass
99	Ada	N/S	s/o Park Blvd	West ParkCenter Blvd river crossing	23,787	25,841	2,054	9%	+/- 26%	Pass	+/- 43%	Pass
100	Ada	N/S	s/o Brumback St	Harrison Blvd, 15th St, 13th St	23,121	21,159	(1,962)	-8%	+/- 26%	Pass	+/- 44%	Pass
101	Ada	N/S	s/o River St	9th St, Capitol Blvd river crossings	41,004	37,998	(3,006)	-7%	+/- 22%	Pass	+/- 36%	Pass
102	Ada	E/W	w/o 18th St	State St	24,879	20,478	(4,401)	-18%	+/- 26%	Pass	+/- 42%	Pass
103	Ada	E/W	e/o Fort St	Reserve St, McKinley St	9,513	6,336	(3,177)	-33%	+/- 37%	Pass	+/- 56%	Pass
104	Ada	E/W	e/o N Avenue B	Warm Springs Ave	13,126	8,367	(4,759)	-36%	+/- 32%	Pass	+/- 53%	Pass
105	Ada	N/S	s/o Sherman St	9th St, 8th St	5,869	4,638	(1,231)	-21%	+/- 45%	Pass	+/- 60%	Pass
106	Ada	E/W	w/o Broadway Ave	Front St, Myrtle St	47,497	36,707	(10,790)	-23%	+/- 20%		+/- 33%	Pass
107	Ada	N/S	s/o State St	23rd St, 27th St	11,300	19,725	8,425	75%	+/- 34%		+/- 55%	
108	Ada	N/S	s/o 13th St	River St	13,289	9,137	(4,152)	-31%	+/- 32%	Pass	+/- 53%	Pass
109	Ada	N/S	n/o Adams St	Veteran's Memorial Parkway river crossing	26,682	25,860	(822)	-3%	+/- 25%	Pass	+/- 41%	Pass
110	Ada	N/S	n/o Marigold St	Glenwood St river crossing	37,835	38,498	663	2%	+/- 22%	Pass	+/- 37%	Pass
111	Ada	N/S	s/o SH 44	Eagle Rd river crossing	37,777	41,552	3,775	10%	+/- 22%	Pass	+/- 37%	Pass
112	Ada	N/S	s/o SH 44	Linder Rd river crossing	8,517	8,072	(445)	-5%	+/- 39%	Pass	+/- 57%	Pass
113	Ada	E/W	w/o Warm Springs Ave	SH 21 river crossing	4,803	4,124	(679)	-14%	+/- 48%	Pass	+/- 61%	Pass
114	Ada	E/W	e/o Boise Ave	Eckert Rd river crossing	3,216	2,195	(1,021)	-32%	+/- 54%	Pass	+/- 63%	Pass
115	Ada	E/W	e/o Bown Way	East ParkCenter Blvd river crossing	4,772	4,483	(289)	-6%	+/- 48%	Pass	+/- 61%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
116	Canyon, Ada	N/S	n/o Victory Rd	Happy Valley Rd, Robinson Rd, McDermott Rd, Black Cat Rd	12,017	11,562	(455)	-4%	+/- 33%	Pass	+/- 54%	Pass
117	Ada	E/W	e/o McDermott Rd	Columbia Rd, Lake Hazel Rd, Amity Rd, Victory Rd, Overland Rd	12,721	10,790	(1,931)	-15%	+/- 32%	Pass	+/- 53%	Pass
118	Canyon	E/W	e/o Middleton Rd	US 20/26	12,911	12,489	(422)	-3%	+/- 32%	Pass	+/- 53%	Pass
119	Canyon	E/W	w/o 10th Ave	Homedale Rd, Karcher Rd	20,931	14,928	(6,003)	-29%	+/- 27%		+/- 45%	Pass
120	Canyon	N/S	n/o US 20/26	Middleton Rd	9,744	6,443	(3,301)	-34%	+/- 36%	Pass	+/- 56%	Pass
121	Canyon	E/W	e/o Aviation Way	US 20/26	12,288	13,694	1,406	11%	+/- 33%	Pass	+/- 54%	Pass
122	Canyon	E/W	w/o 11th Ave	Joplin Rd, US 20/26	11,255	13,044	1,789	16%	+/- 34%	Pass	+/- 55%	Pass
123	Canyon	E/W	w/o Middleton Rd	SH 44	9,486	8,863	(623)	-7%	+/- 37%	Pass	+/- 57%	Pass
124	Ada	E/W	e/o Locust Grove	Ustick Rd, McMillan Rd, US 20/26	50,826	46,037	(4,789)	-9%	+/- 20%	Pass	+/- 32%	Pass
125	Ada	E/W	w/o Eagle Rd	Overland Rd, Victory Rd, Amity Rd	34,997	38,111	3,114	9%	+/- 23%	Pass	+/- 38%	Pass
126	Canyon, Ada	N/S	s/o Ustick Rd	McDermott Rd, Black Cat Rd, Ten Mile Rd, Linder Rd	19,622	26,071	6,449	33%	+/- 28%		+/- 46%	Pass
127	Ada	E/W	w/o Linder Rd	US 20/26	15,794	19,288	3,494	22%	+/- 30%	Pass	+/- 50%	Pass
128	Ada	E/W	w/o Cloverdale Rd	Franklin Rd, Executive Dr, Fairview Ave,	54,279	54,936	657	1%	+/- 19%	Pass	+/- 31%	Pass
129	Ada	N/S	s/o Franklin Rd	Cloverdale Rd, Five Mile Rd, Maple Grove Rd	48,496	52,468	3,972	8%	+/- 20%	Pass	+/- 33%	Pass

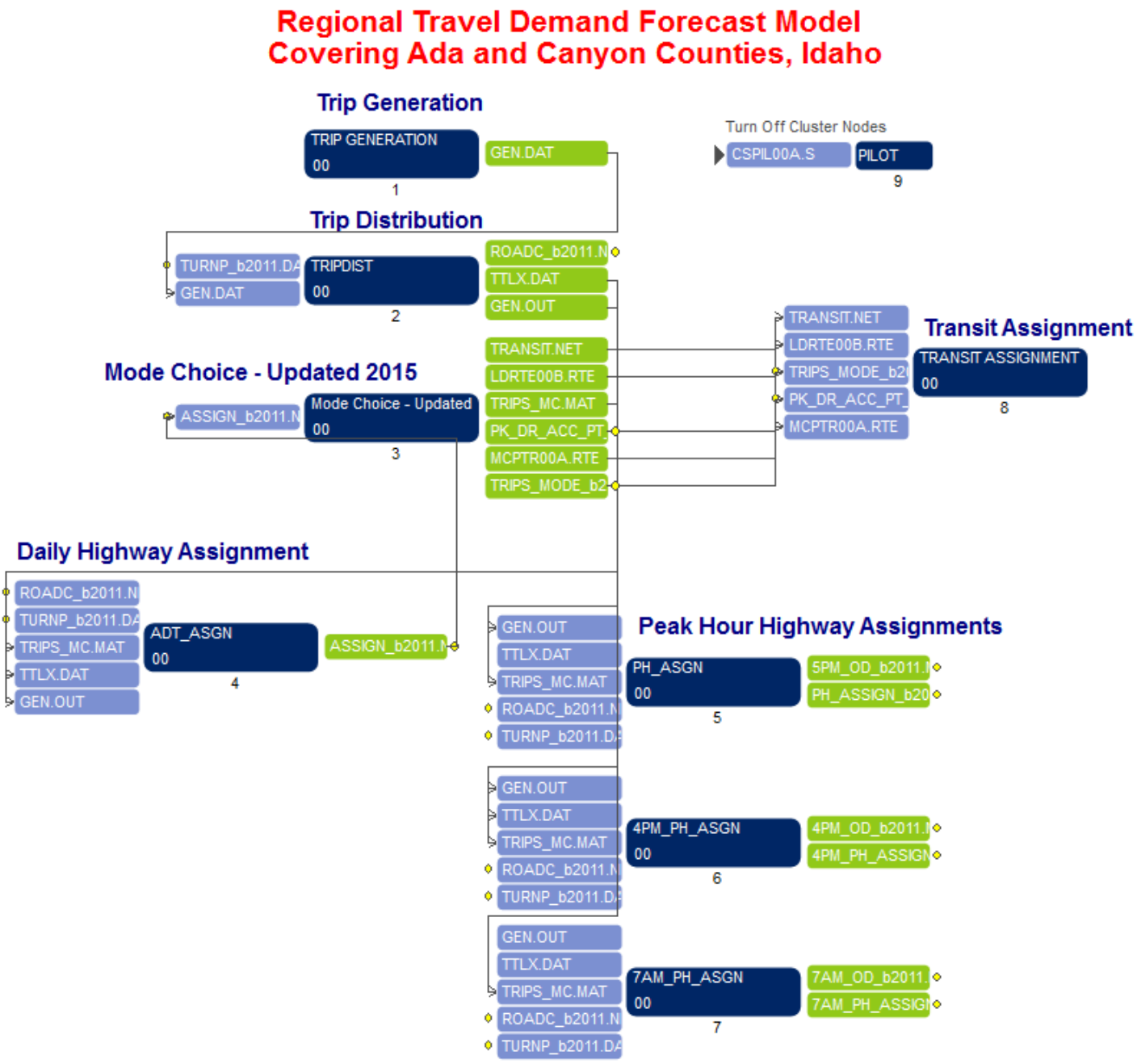
Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
130	Ada	N/S	s/o Overland Rd	Cloverdale Rd, Five Mile Rd, Maple Grove Rd	47,141	42,541	(4,600)	-10%	+/- 20%	Pass	+/- 33%	Pass
131	Ada	N/S	n/o US 20/26	Five Mile Rd, Cloverdale Rd	17,083	13,944	(3,139)	-18%	+/- 29%	Pass	+/- 48%	Pass
132	Ada	N/S	n/o McMillan Rd	Maple Grove Rd, Mitchell St, Five Mile Rd	19,320	17,638	(1,682)	-9%	+/- 28%	Pass	+/- 47%	Pass
133	Ada	E/W	s/o 44th St	US 20/26, Adams St	37,590	32,387	(5,203)	-14%	+/- 22%	Pass	+/- 37%	Pass
134	Ada	E/W	w/o Coffey St	US 20/26	26,766	21,744	(5,022)	-19%	+/- 25%	Pass	+/- 41%	Pass
135	Ada	N/S	n/o Franklin Rd	Latah St, Roosevelt St, Orchard St, Phillippi St, Curtis Rd, Liberty St, Allumbaugh St, Cole Rd	77,329	60,998	(16,331)	-21%	+/- 15%		+/- 27%	Pass
136	Ada	E/W	e/o Law Ave	ParkCenter Blvd, Boise Ave, Bergeson St	15,297	12,201	(3,096)	-20%	+/- 30%	Pass	+/- 51%	Pass
137	Ada	E/W	w/o Broadway Ave	Beacon St, Boise Ave	18,214	15,855	(2,359)	-13%	+/- 28%	Pass	+/- 47%	Pass
138	Ada	N/S	n/o Amity Rd	Federal Way	12,843	19,238	6,395	50%	+/- 32%		+/- 53%	Pass
139	Ada	N/S	n/o Kootenai Rd	Federal Way	9,449	9,198	(251)	-3%	+/- 37%	Pass	+/- 57%	Pass
140	Ada	E/W	w/o of Eisenmann Rd	Gowen Rd	7,331	3,610	(3,721)	-51%	+/- 41%		+/- 59%	Pass
141	Ada	N/S	n/o I-84 EB ramps	Broadway Ave	21,760	33,151	11,391	52%	+/- 27%		+/- 45%	
142	Ada	N/S	n/o I-84 EB ramps	Vista Ave	20,674	25,046	4,372	21%	+/- 27%	Pass	+/- 45%	Pass
143	Ada	E/W	w/o Orchard St	Targee St, Overland Rd, Kootenai St, Cassia St, Franklin Rd, Emerald St	50,049	35,947	(14,102)	-28%	+/- 20%		+/- 32%	Pass

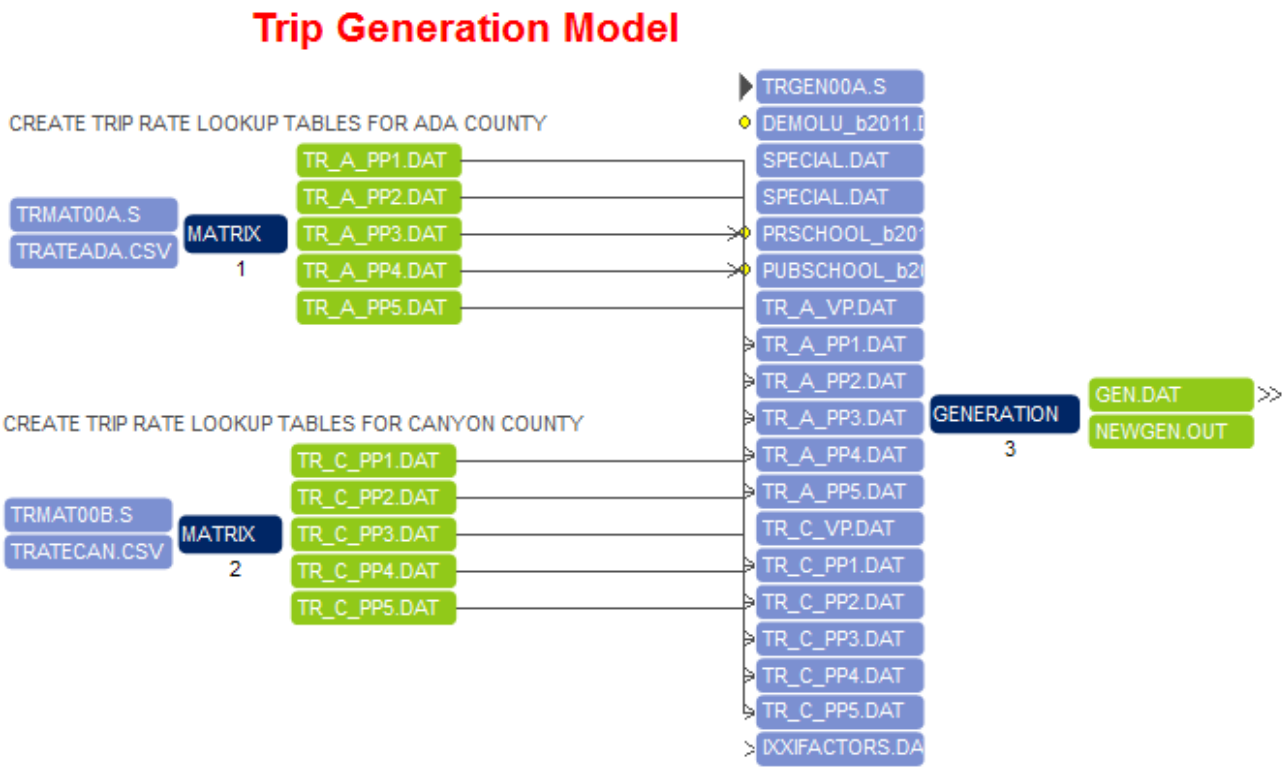
Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
144	Ada	E/W	e/o Eagle Rd	Lake Hazel, Columbia Rd	8,431	12,347	3,916	46%	+/- 39%		+/- 58%	Pass
145	Ada	E/W	e/o Maple Grove Rd	Lake Hazel Rd, Desert Ave, Amity Rd, Victory Rd, Overland Rd	59,897	49,912	(9,985)	-17%	+/- 18%	Pass	+/- 30%	Pass
146	Ada	N/S	s/o Lake Hazel Rd	Eagle Rd, Cloverdale Rd, Five Mile Rd	7,709	6,857	(852)	-11%	+/- 40%	Pass	+/- 58%	Pass
147	Ada	N/S	s/o Amity Rd	Maple Grove Rd, Cole Rd	18,975	19,479	504	3%	+/- 28%	Pass	+/- 47%	Pass
148	Ada	E/W	e/o McDermott Rd	Lewis Ln, Deer Flat Rd, Kuna Rd, King Rd	4,128	4,589	461	11%	+/- 51%	Pass	+/- 62%	Pass
149	Ada	E/W	e/o Cloverdale Rd	Kuna Mora Rd	1,934	2,120	186	10%	+/- 60%	Pass	+/- 64%	Pass
150	Ada	N/S	s/o Gowen Rd	Pleasant Valley Rd	3,874	4,081	207	5%	+/- 52%	Pass	+/- 62%	Pass
151	Ada	N/S	s/o I-84	Orchard St	14,083	10,873	(3,210)	-23%	+/- 31%	Pass	+/- 52%	Pass
152	Ada	E/W	w/o 28th St	State St	30,654	30,942	288	1%	+/- 24%	Pass	+/- 40%	Pass
153	Ada	E/W	e/o Collister Dr	State St	38,120	35,138	(2,982)	-8%	+/- 22%	Pass	+/- 37%	Pass
154	Ada	E/W	e/o 36th St	Hill Rd	6,898	5,583	(1,315)	-19%	+/- 42%	Pass	+/- 59%	Pass
155	Ada	E/W	w/o Pierce Park Ln	State St	35,760	31,759	(4,001)	-11%	+/- 23%	Pass	+/- 38%	Pass
156	Ada	E/W	e/o Bogart Ln	Hill Rd Pkwy	6,314	3,770	(2,544)	-40%	+/- 44%	Pass	+/- 60%	Pass
157	Ada	E/W	e/o Hoseshoebend Rd	SH 44, Hill Rd	32,834	40,559	7,725	24%	+/- 23%		+/- 39%	Pass
158	Ada	N/S	s/o Floating Feather Rd	SH 55, Horseshoebend Rd	16,870	19,747	2,877	17%	+/- 29%	Pass	+/- 49%	Pass
159	Ada	E/W	e/o Linder Rd	SH 44	19,762	20,794	1,032	5%	+/- 28%	Pass	+/- 46%	Pass
160	Ada	E/W	e/o Eagle Rd	Beacon Light Rd, Floating Feather Rd	8,509	8,745	236	3%	+/- 39%	Pass	+/- 57%	Pass

Screenline No.	County	Direction of Travel	Location of Screenline	Roadway(s) Included in Screenline	Actual Count (24-hour weekday)	Model Estimate (Daily)	Difference	Percent Difference	Max Deviation	Result	Max Deviation FHWA	Result FHWA
161	Ada	E/W	e/o SH 16	Beacon Light Rd, Floating Feather Rd, SH 44	16,122	21,283	5,161	32%	+/- 29%		+/- 49%	Pass
162	Ada	N/S	n/o Dry Creek Rd	SH 55	5,716	5,720	4	0%	+/- 45%	Pass	+/- 60%	Pass
163	Ada	N/S	n/o Amity Rd	Ten Mile Rd, Linder Rd, Meridian Rd, Locust Grove Rd, Eagle Rd	36,277	53,561	17,284	48%	+/- 23%		+/- 37%	
164	Ada	N/S	s/o Ustick Rd	Eagle Rd	49,763	44,182	(5,581)	-11%	+/- 20%	Pass	+/- 32%	Pass
165	Ada	E/W	e/o Linder Rd	Cherry Ln	18,718	20,948	2,230	12%	+/- 28%	Pass	+/- 47%	Pass
166	Ada	E/W	e/o Linder Rd	Franklin Rd	22,200	17,288	(4,912)	-22%	+/- 27%	Pass	+/- 44%	Pass
167	Ada	E/W	w/o Cole Rd	Northview St, Fairview Ave	35,517	29,393	(6,124)	-17%	+/- 23%	Pass	+/- 38%	Pass
168	Ada	E/W	w/o Cole Rd	Mountain View Rd, Ustick Rd	31,712	29,275	(2,437)	-8%	+/- 24%	Pass	+/- 39%	Pass
169	Ada	E/W	e/o 13th St	Myrtle St, Front St, Grove St, Main St, Idaho St, Bannock St, Jefferson St, State St,	114,880	115,494	614	1%	+/- 13%	Pass	+/- 23%	Pass
170	Ada	E/W	w/o 5th St	Front St, Myrtle St	53,475	46,977	(6,498)	-12%	+/- 19%	Pass	+/- 31%	Pass
171	Ada	N/S	s/o State St	2nd St, 3rd St, 4th St, 5th St, 6th St, 6th St, 8th St, 9th St, 10th St, 11th St, 12th St,	34,347	20,013	(14,334)	-42%	+/- 23%		+/- 38%	
172	Ada	N/S	n/o State St	13th St, 14th St, 15th St, 16th St	20,799	19,882	(917)	-4%	+/- 27%	Pass	+/- 45%	Pass
173	Ada	N/S	n/o Fairview Ave	Orchard St, Curtis Rd	42,748	40,891	(1,857)	-4%	+/- 21%	Pass	+/- 35%	Pass

Appendix F

Regional Travel Demand Model Diagrams and Scripts






```
; Script for program MATRIX in file
"D:\UAG\2011Model\calibration\Base\CalibRuns\VOYAGERMODEL\TRMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='CREATE TRIP RATE LOOKUP TABLES FOR ADA COUNTY'
;
; CREATE TRIP RATE LOOKUP TABLES FOR ADA COUNTY
;

FILEI RECI  = "D:\...\VOYAGERMODEL\TRATEADA.CSV",
         VEH=1,PER=2,HBW=3,HBSH=4,HBSO=5,HBSC=6,HBO=7,NHB=8

FILEO PRINTO[1] = "D:\...\VOYAGERMODEL\TR_A_PP1.DAT"
FILEO PRINTO[2] = "D:\...\VOYAGERMODEL\TR_A_PP2.DAT"
FILEO PRINTO[3] = "D:\...\VOYAGERMODEL\TR_A_PP3.DAT"
FILEO PRINTO[4] = "D:\...\VOYAGERMODEL\TR_A_PP4.DAT"
FILEO PRINTO[5] = "D:\...\VOYAGERMODEL\TR_A_PP5.DAT"

   _CNT=_CNT+1

   IF (_CNT==1)
      PRINT LIST='; TRIP RATES BY PPHH TABLE 1 ( 0  VEH) FOR ADA COUNTY', PRINTO=1
      PRINT LIST='; TRIP RATES BY PPHH TABLE 2 ( 1  VEH) FOR ADA COUNTY', PRINTO=2
      PRINT LIST='; TRIP RATES BY PPHH TABLE 3 ( 2  VEH) FOR ADA COUNTY', PRINTO=3
      PRINT LIST='; TRIP RATES BY PPHH TABLE 4 ( 3  VEH) FOR ADA COUNTY', PRINTO=4
      PRINT LIST='; TRIP RATES BY PPHH TABLE 5 ( 4+ VEH) FOR ADA COUNTY', PRINTO=5
   ENDIF

   IF    (RI.VEH==0)
         PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=1
   ELSEIF (RI.VEH==1)
```

```
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=2
   ELSEIF (RI.VEH==2)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=3
   ELSEIF (RI.VEH==3)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=4
   ELSEIF (RI.VEH==4)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=5
   ENDIF

ENDRUN
; Script for program MATRIX in file "D:\...\VOYAGERMODEL\TRMAT00B.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='CREATE TRIP RATE LOOKUP TABLES FOR CANYON COUNTY'
; CREATE TRIP RATE LOOKUP TABLES FOR CANYON COUNTY
FILEI RECI = "D:\...\VOYAGERMODEL\TRATECAN.CSV",
 VEH=1,PER=2,HBW=3,HBSH=4,HBSO=5,HBSC=6,HBO=7,NHB=8

FILEO PRINTO[1] = "D:\...\VOYAGERMODEL\TR_C_PP1.DAT"
FILEO PRINTO[2] = "D:\...\VOYAGERMODEL\TR_C_PP2.DAT"
FILEO PRINTO[3] = "D:\...\VOYAGERMODEL\TR_C_PP3.DAT"
FILEO PRINTO[4] = "D:\...\VOYAGERMODEL\TR_C_PP4.DAT"
FILEO PRINTO[5] = "D:\...\VOYAGERMODEL\TR_C_PP5.DAT"

   _CNT=_CNT+1

   IF (_CNT==1)
      PRINT LIST='; TRIP RATES BY PPHH TABLE 1 ( 0  VEH) FOR CAN COUNTY', PRINTO=1
      PRINT LIST='; TRIP RATES BY PPHH TABLE 2 ( 1  VEH) FOR CAN COUNTY', PRINTO=2
      PRINT LIST='; TRIP RATES BY PPHH TABLE 3 ( 2  VEH) FOR CAN COUNTY', PRINTO=3
      PRINT LIST='; TRIP RATES BY PPHH TABLE 4 ( 3  VEH) FOR CAN COUNTY', PRINTO=4
      PRINT LIST='; TRIP RATES BY PPHH TABLE 5 ( 4+ VEH) FOR CAN COUNTY', PRINTO=5
   ENDIF

   IF    (RI.VEH==0)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=1
   ELSEIF (RI.VEH==1)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=2
   ELSEIF (RI.VEH==2)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=3
   ELSEIF (RI.VEH==3)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=4
   ELSEIF (RI.VEH==4)
      PRINT
LIST=RI.PER(8.2),RI.HBW(8.2),RI.HBSH(8.2),RI.HBSO(8.2),RI.HBSC(8.2),RI.HBO(8.2),RI.NHB(8.2), PRINTO=5
   ENDIF

ENDRUN
```

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; Script for program GENERATION in file "D:\...\VOYAGERMODEL\TRGEN00A.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=GENERATION

FILEI ZDATI[1] = "D:\...\...\DEMOLU_b2011.DBF",
              Z=TAZ

FILEI ZDATI[4] = "D:\...\...\PRSCHOOL_b2011.DBF",
              Z=TAZ  ; PRIVATE SCHOOLS ENROLLMENT
FILEI ZDATI[5] = "D:\...\...\PUBSCHOOL_b2011.DBF",
              Z=TAZ  ; PUBLIC SCHOOLS ENROLLMENT
FILEI LOOKUPI[1] = "D:\...\VOYAGERMODEL\TR_A_VP.DAT"
FILEI LOOKUPI[2] = "D:\...\VOYAGERMODEL\TR_A_PP1.DAT"
FILEI LOOKUPI[3] = "D:\...\VOYAGERMODEL\TR_A_PP2.DAT"
FILEI LOOKUPI[4] = "D:\...\VOYAGERMODEL\TR_A_PP3.DAT"
FILEI LOOKUPI[5] = "D:\...\VOYAGERMODEL\TR_A_PP4.DAT"
FILEI LOOKUPI[6] = "D:\...\VOYAGERMODEL\TR_A_PP5.DAT"
FILEI LOOKUPI[7] = "D:\...\VOYAGERMODEL\TR_C_VP.DAT"
FILEI LOOKUPI[8] = "D:\...\VOYAGERMODEL\TR_C_PP1.DAT"
FILEI LOOKUPI[9] = "D:\...\VOYAGERMODEL\TR_C_PP2.DAT"
FILEI LOOKUPI[10] = "D:\...\VOYAGERMODEL\TR_C_PP3.DAT"
FILEI LOOKUPI[11] = "D:\...\VOYAGERMODEL\TR_C_PP4.DAT"
FILEI LOOKUPI[12] = "D:\...\VOYAGERMODEL\TR_C_PP5.DAT"
FILEI LOOKUPI[13] = "D:\...\VoyagerModel\IXXIFACTORS.DAT"

FILEO PAO[1] = "D:\...\VOYAGERMODEL\GEN.DAT",
              FORM=9.0, LIST = Z(7),   ; output file
              P[1], P[2], P[3], P[4], P[5], P[6], P[7], P[8],
              A[1], A[2], A[3], A[4], A[5], A[6], A[7], A[8]
   ;          PURPOSE 1: HBWORK
   ;          PURPOSE 2: HBSHOP
   ;          PURPOSE 3: HBSOCIAL
   ;          PURPOSE 4: HBSCHOOL
   ;          PURPOSE 5: HBOTHER
   ;          PURPOSE 6: NHB
   ;          PURPOSE 7: EXTERNAL PIAX TRIPS
   ;          PURPOSE 8: EXTERNAL STATION TRIPS

FILEO PRINTO[1] = "D:\...\VOYAGERMODEL\NEWGEN.OUT"

   ZONES=3750  ; LL, Feb 09

   ; IX XI factor lookup
   LOOKUP, NAME=IXXIFAC, LOOKUP[1]=1, RESULT=2, LOOKUPI=13, SETUPPER=T, LIST=T
   ;
   ; IX fractions by trip purposes and county from the 2002 household survey
   ;
   AX_HBW  = IXXIFAC(1,1)   ; HBW      trips from ADA    county to External       0.004 ;
   AX_HBSH = IXXIFAC(1,2)   ; HBSHOP   trips from ADA    county to External       0.001 ;
   AX_HBSO = IXXIFAC(1,3)   ; HBSOCIAL trips from ADA    county to External       0.006 ;
   AX_HBSC = IXXIFAC(1,4)   ; HBSCHOOL trips from ADA    county to External       0.000 ;
   AX_HBO  = IXXIFAC(1,5)   ; HBOTHER  trips from ADA    county to External       0.005 ;
   AX_NHB  = IXXIFAC(1,6)   ; NHB      trips from ADA    county to External       0.008 ;
   CX_HBW  = IXXIFAC(1,7)   ; HBW      trips from CANYON county to External       0.023 ;
   CX_HBSH = IXXIFAC(1,8)   ; HBSHOP   trips from CANYON county to External       0.004 ;
   CX_HBSO = IXXIFAC(1,9)   ; HBSOCIAL trips from CANYON county to External       0.018 ;
   CX_HBSC = IXXIFAC(1,10)  ; HBSCHOOL trips from CANYON county to External       0.011 ;
   CX_HBO  = IXXIFAC(1,11)  ; HBOTHER  trips from CANYON county to External       0.006 ;
   CX_NHB  = IXXIFAC(1,12)  ; NHB      trips from CANYON county to External       0.022 ;
   ;
   ; XI fractions by trip purposes and county from 2000 CTPP data County work flows
```

```
   ;
   XA_HBW  = IXXIFAC(1,13) ; HBW      trips from External to ADA    county
   XA_HBSH = IXXIFAC(1,14) ; HBSHOP   trips from External to ADA    county
   XA_HBSO = IXXIFAC(1,15) ; HBSOCIAL trips from External to ADA    county
   XA_HBSC = IXXIFAC(1,16) ; HBSCHOOL trips from External to ADA    county
   XA_HBO  = IXXIFAC(1,17) ; HBOTHER  trips from External to ADA    county
   XA_NHB  = IXXIFAC(1,18) ; NHB      trips from External to ADA    county
   XC_HBW  = IXXIFAC(1,19) ; HBW      trips from External to CANYON county
   XC_HBSH = IXXIFAC(1,20) ; HBSHOP   trips from External to CANYON county
   XC_HBSO = IXXIFAC(1,21) ; HBSOCIAL trips from External to CANYON county
   XC_HBSC = IXXIFAC(1,22) ; HBSCHOOL trips from External to CANYON county
   XC_HBO  = IXXIFAC(1,23) ; HBOTHER  trips from External to CANYON county
   XC_NHB  = IXXIFAC(1,24) ; NHB      trips from External to CANYON county

   TOTEMP = RET+OFF+IND+GOVT+AGRI  ; TOTAL EMPLOYMENT

   ; TOTAL ENROLLMENT
   ELEM    = ELEM_PR + ELEM_PUB
   MIDSCH  = JR_PR   + JR_PUB
   HIGHSCH = HIGH_PR + HIGH_PUB
   UNIVPR  = UNIV_PR
   UNIVPUB = UNIV_PUB
;UNIV    = UNIV_PR + UNIV_PUB

   IF (HH>0)
      PPHH = POP / HH
      VPHH = VEH / HH
   ELSE
      PPHH = 0.0
      VPHH = 0.0
   ENDIF

   IF (VPHH>=0.5 && VPHH<1) VPHH=1.00 ; IN DOWNTOWN BOISE VPHH = 0.94, TREAT AS ONE VEH HH

   ; ********************************************************************************************
   ; LOOKUP TAZ TRIP RATES (A = ADA COUNTY; C = CANYON COUNTY)
   ;
   ; THE ORIGINAL TRIP RATE FILES ARE BROKEN INTO NINE TRIP RATE TABLES
   ;   -- ONE FOR EACH VPHH AND PPHH RANGE COMBINATION
   ;
   ; ********************************************************************************************
   ; PPHH TRIP RATE TABLE # BY VPHH FOR ADA COUNTY
   LOOKUP, NAME=PP_A, LOOKUP[1]=1, RESULT=2, LOOKUPI=1, SETUPPER=T, LIST=T
   ; TRIP RATES BY PPHH TABLE 1 FOR ADA COUNTY
   LOOKUP, NAME=TR1_A,
         LOOKUP[1]=1, RESULT=2,
         LOOKUP[2]=1, RESULT=3,
         LOOKUP[3]=1, RESULT=4,
         LOOKUP[4]=1, RESULT=5,
         LOOKUP[5]=1, RESULT=6,
         LOOKUP[6]=1, RESULT=7,
         LOOKUPI=2, INTERPOLATE=T, LIST=T
   ; TRIP RATES BY PPHH TABLE 2 FOR ADA COUNTY
   LOOKUP, NAME=TR2_A,
         LOOKUP[1]=1, RESULT=2,
         LOOKUP[2]=1, RESULT=3,
         LOOKUP[3]=1, RESULT=4,
         LOOKUP[4]=1, RESULT=5,
         LOOKUP[5]=1, RESULT=6,
         LOOKUP[6]=1, RESULT=7,
         LOOKUPI=3, INTERPOLATE=T, LIST=T
   ; TRIP RATES BY PPHH TABLE 3 FOR ADA COUNTY
   LOOKUP, NAME=TR3_A,
```

```
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=4, INTERPOLATE=T, LIST=T
; TRIP RATES BY PPHH TABLE 4 FOR ADA COUNTY
LOOKUP, NAME=TR4_A,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=5, INTERPOLATE=T, LIST=T
; TRIP RATES BY PPHH TABLE 5 FOR ADA COUNTY
LOOKUP, NAME=TR5_A,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=6, INTERPOLATE=T, LIST=T
; PPHH TRIP RATE TABLE # BY VPHH FOR CANYON COUNTY
LOOKUP, NAME=PP_C, LOOKUP[1]=1, RESULT=2, LOOKUPI=7, SETUPPER=T, LIST=T
; TRIP RATES BY PPHH TABLE 1 FOR CANYON COUNTY
LOOKUP, NAME=TR1_C,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=8, INTERPOLATE=T, LIST=T
; TRIP RATES BY PPHH TABLE 2 FOR CANYON COUNTY
LOOKUP, NAME=TR2_C,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=9, INTERPOLATE=T, LIST=T
; TRIP RATES BY PPHH TABLE 3 FOR CANYON COUNTY
LOOKUP, NAME=TR3_C,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=10, INTERPOLATE=T, LIST=T
; TRIP RATES BY PPHH TABLE 4 FOR CANYON COUNTY
LOOKUP, NAME=TR4_C,
      LOOKUP[1]=1, RESULT=2,
      LOOKUP[2]=1, RESULT=3,
      LOOKUP[3]=1, RESULT=4,
      LOOKUP[4]=1, RESULT=5,
      LOOKUP[5]=1, RESULT=6,
      LOOKUP[6]=1, RESULT=7,
      LOOKUPI=11, INTERPOLATE=T, LIST=T
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```
; TRIP RATES BY PPHH TABLE 5 FOR CANYON COUNTY
LOOKUP, NAME=TR5_C,
       LOOKUP[1]=1, RESULT=2,
       LOOKUP[2]=1, RESULT=3,
       LOOKUP[3]=1, RESULT=4,
       LOOKUP[4]=1, RESULT=5,
       LOOKUP[5]=1, RESULT=6,
       LOOKUP[6]=1, RESULT=7,
       LOOKUPI=12, INTERPOLATE=T, LIST=T

IF (I < 2001) ; ADA COUNTY
   TR_TBL = PP_A(1,VPHH)
    IF (TR_TBL==1)     ; TRATE TABLE 1
      TRHBW=TR1_A(1,PPHH)
      TRHBS=TR1_A(2,PPHH)
      TRHBSO=TR1_A(3,PPHH)
      TRHBSC=TR1_A(4,PPHH)
      TRHBO=TR1_A(5,PPHH)
      TRNHB=TR1_A(6,PPHH)
    ELSEIF (TR_TBL==2) ; TRATE TABLE 2
      TRHBW=TR2_A(1,PPHH)
      TRHBS=TR2_A(2,PPHH)
      TRHBSO=TR2_A(3,PPHH)
      TRHBSC=TR2_A(4,PPHH)
      TRHBO=TR2_A(5,PPHH)
      TRNHB=TR2_A(6,PPHH)
    ELSEIF (TR_TBL==3) ; TRATE TABLE 3
      TRHBW=TR3_A(1,PPHH)
      TRHBS=TR3_A(2,PPHH)
      TRHBSO=TR3_A(3,PPHH)
      TRHBSC=TR3_A(4,PPHH)
      TRHBO=TR3_A(5,PPHH)
      TRNHB=TR3_A(6,PPHH)
    ELSEIF (TR_TBL==4)    ; TRATE TABLE 4
      TRHBW=TR4_A(1,PPHH)
      TRHBS=TR4_A(2,PPHH)
      TRHBSO=TR4_A(3,PPHH)
      TRHBSC=TR4_A(4,PPHH)
      TRHBO=TR4_A(5,PPHH)
      TRNHB=TR4_A(6,PPHH)
    ELSEIF (TR_TBL==5)     ; TRATE TABLE 5
      TRHBW=TR5_A(1,PPHH)
      TRHBS=TR5_A(2,PPHH)
      TRHBSO=TR5_A(3,PPHH)
      TRHBSC=TR5_A(4,PPHH)
      TRHBO=TR5_A(5,PPHH)
      TRNHB=TR5_A(6,PPHH)
    ENDIF
ELSE        ; CANYON COUNTY
   TR_TBL = PP_C(1,VPHH)
    IF (TR_TBL==1)     ; TRATE TABLE 1
      TRHBW=TR1_C(1,PPHH)
      TRHBS=TR1_C(2,PPHH)
      TRHBSO=TR1_C(3,PPHH)
      TRHBSC=TR1_C(4,PPHH)
      TRHBO=TR1_C(5,PPHH)
      TRNHB=TR1_C(6,PPHH)
    ELSEIF (TR_TBL==2) ; TRATE TABLE 2
      TRHBW=TR2_C(1,PPHH)
      TRHBS=TR2_C(2,PPHH)
      TRHBSO=TR2_C(3,PPHH)
      TRHBSC=TR2_C(4,PPHH)
      TRHBO=TR2_C(5,PPHH)
```

```
        TRNHB=TR2_C(6,PPHH)
      ELSEIF (TR_TBL==3) ; TRATE TABLE 3
        TRHBW=TR3_C(1,PPHH)
        TRHBS=TR3_C(2,PPHH)
        TRHBSO=TR3_C(3,PPHH)
        TRHBSC=TR3_C(4,PPHH)
        TRHBO=TR3_C(5,PPHH)
        TRNHB=TR3_C(6,PPHH)
      ELSEIF (TR_TBL==4)  ; TRATE TABLE 4
        TRHBW=TR4_C(1,PPHH)
        TRHBS=TR4_C(2,PPHH)
        TRHBSO=TR4_C(3,PPHH)
        TRHBSC=TR4_C(4,PPHH)
        TRHBO=TR4_C(5,PPHH)
        TRNHB=TR4_C(6,PPHH)
      ELSEIF (TR_TBL==5)  ; TRATE TABLE 5
        TRHBW=TR5_C(1,PPHH)
        TRHBS=TR5_C(2,PPHH)
        TRHBSO=TR5_C(3,PPHH)
        TRHBSC=TR5_C(4,PPHH)
        TRHBO=TR5_C(5,PPHH)
        TRNHB=TR5_C(6,PPHH)
      ENDIF
   ENDIF

   IF (PPHH==0 && VPHH==0)
      TRHBW=0
      TRHBS=0
      TRHBSO=0
      TRHBSC=0
      TRHBO=0
      TRNHB=0
   ENDIF
   IF (I==1-3000) ;TRATEADJ=1.00 for region
      P[1] = (HH * TRHBW)  * 1.00
      P[2] = (HH * TRHBS)  * 1.00
      P[3] = (HH * TRHBSO) * 1.00
      P[4] = (HH * TRHBSC) * 1.00
      P[5] = (HH * TRHBO)  * 1.00
      P[6] = (HH * TRNHB)  * 1.00
   ENDIF

   ALLEMP = (RET + OFF + IND + GOVT + AGRI)


IF (I==1-50,52-75) ; DOWNTOWN ZONES increased attraction rates for DT zones
      A[1] = 1.20 * ALLEMP
      A[2] = (1.10 * RET)
      A[3] = (0.90 * OFF) + (0.25 * GOVT)+ (0.30 * HH)
      A[4] = (2.41 * ELEM) + (3.03 * MIDSCH) + (3.20 * HIGHSCH) + (2.30 * UNIVPR)+ (3.40 * UNIVPUB)
      A[5] = (0.70 * RET) + (0.80 * OFF) + (1.00 * (IND + GOVT + AGRI)) + (0.50 * HH)
      A[6] = (1.40 * RET) + (1.20 * OFF) + (1.00 * (IND + GOVT + AGRI)) + (0.50 * HH)
   ELSEIF (I==51,76-2000) ;TAZ 51 is at the fringe of DT and contains Winco and Whole Foods
      A[1] = 1.20 * ALLEMP
      A[2] = (5.40 * RET) ; using retail rates 8.4 NCHRP 716
      A[4] = (2.41 * ELEM) + (3.03 * MIDSCH) + (3.20 * HIGHSCH) + (2.30 * UNIVPR)+ (3.40 * UNIVPUB)
      A[3] = (0.90 * OFF) + (0.50 * GOVT)+ (0.30 * HH)
      A[5] = (3.00 * RET) + (0.70 * OFF) + (0.30 * (IND + GOVT + AGRI)) + (0.50 * HH)
      A[6] = (4.70 * RET) + (1.20 * OFF) + (0.70 * (IND + GOVT + AGRI)) + (0.40 * HH)
   ELSEIF (I==2001-3000)
      A[1] = 1.20 * ALLEMP
      A[2] = (6.50 * RET) ;over the retail rates 8.4 NCHRP 716
```

```
    A[3] = (1.50 * OFF) + (0.50 * GOVT)+ (0.30 * HH) ;higher than Ada given county-level job dist and too
many C to A HBSo trips
    A[4] = (2.41 * ELEM) + (3.03 * MIDSCH) + (3.20 * HIGHSCH) + (2.30 * UNIVPR)+ (2.90 * UNIVPUB)
    A[5] = (2.00 * RET) + (1.10 * OFF) + (0.30 * (IND + GOVT + AGRI)) + (0.50 * HH)
    A[6] = (4.70 * RET) + (1.20 * OFF) + (0.70 * (IND + GOVT + AGRI)) + (0.40 * HH)
ENDIF

  ;***** CALCULATE P[7] (IX TRIPS) *****
  P7_A = 0, P7_C = 0
  IF (I=1-2000)     ; ADA county
    P7_A = P[1] * AX_HBW  +
         P[2] * AX_HBSH +
         P[3] * AX_HBSO +
         P[4] * AX_HBSC +
         P[5] * AX_HBO  +
         P[6] * AX_NHB
  ELSEIF (I=2001-3000) ; CANYON county
    P7_C = P[1] * CX_HBW  +
         P[2] * CX_HBSH +
         P[3] * CX_HBSO +
         P[4] * CX_HBSC +
         P[5] * CX_HBO  +
         P[6] * CX_NHB
  ENDIF

  P[7] = P7_A + P7_C

  ;***** DEDUCT P[7] FROM P[1-6] *****
  P1_A = 0, P2_A = 0, P3_A = 0, P4_A = 0, P5_A = 0, P6_A = 0
  P1_C = 0, P2_C = 0, P3_C = 0, P4_C = 0, P5_C = 0, P6_C = 0

  IF (I=1-2000)     ; ADA county
    P1_A = P[1] * (1 - AX_HBW )
    P2_A = P[2] * (1 - AX_HBSH)
    P3_A = P[3] * (1 - AX_HBSO)
    P4_A = P[4] * (1 - AX_HBSC)
    P5_A = P[5] * (1 - AX_HBO )
    P6_A = P[6] * (1 - AX_NHB )
  ELSEIF (I=2001-3000) ; CANYON county
    P1_C = P[1] * (1 - CX_HBW )
    P2_C = P[2] * (1 - CX_HBSH)
    P3_C = P[3] * (1 - CX_HBSO)
    P4_C = P[4] * (1 - CX_HBSC)
    P5_C = P[5] * (1 - CX_HBO )
    P6_C = P[6] * (1 - CX_NHB )
  ENDIF

  P[1] = P1_A + P1_C
  P[2] = P2_A + P2_C
  P[3] = P3_A + P3_C
  P[4] = P4_A + P4_C
  P[5] = P5_A + P5_C
  P[6] = P6_A + P6_C

  ;***** CALCULATE A[8] (XI TRIPS) *****
  A8_A = 0, A8_C = 0
  IF (I=1-2000)     ; ADA county
    A8_A = A[1] * XA_HBW  +
         A[2] * XA_HBSH +
         A[3] * XA_HBSO +
         A[4] * XA_HBSC +
         A[5] * XA_HBO  +
         A[6] * XA_NHB
```

```
ELSEIF (I=2001-3000) ; CANYON county
   A8_C = A[1] * XC_HBW  +
        A[2] * XC_HBSH +
        A[3] * XC_HBSO +
        A[4] * XC_HBSC +
        A[5] * XC_HBO  +
        A[6] * XC_NHB
ENDIF

A[8] = A8_A + A8_C

;***** DEDUCT A[8] FROM A[1-6] *****
A1_A = 0, A2_A = 0, A3_A = 0, A4_A = 0, A5_A = 0, A6_A = 0
A1_C = 0, A2_C = 0, A3_C = 0, A4_C = 0, A5_C = 0, A6_C = 0

IF  (I=1-2000)     ; ADA county
   A1_A = A[1] * (1 - XA_HBW )
   A2_A = A[2] * (1 - XA_HBSH)
   A3_A = A[3] * (1 - XA_HBSO)
   A4_A = A[4] * (1 - XA_HBSC)
   A5_A = A[5] * (1 - XA_HBO )
   A6_A = A[6] * (1 - XA_NHB )
ELSEIF (I=2001-3000) ; CANYON county
   A1_C = A[1] * (1 - XC_HBW )
   A2_C = A[2] * (1 - XC_HBSH)
   A3_C = A[3] * (1 - XC_HBSO)
   A4_C = A[4] * (1 - XC_HBSC)
   A5_C = A[5] * (1 - XC_HBO )
   A6_C = A[6] * (1 - XC_NHB )
ENDIF

A[1] = A1_A + A1_C
A[2] = A2_A + A2_C
A[3] = A3_A + A3_C
A[4] = A4_A + A4_C
A[5] = A5_A + A5_C
A[6] = A6_A + A6_C

;***** READ IN A[7] AND P[8] FROM LU DATA *****
A[7] = RPIAX
P[8] = RPXAI

; APPLY GPS ADJUSTMENT TO NON-MANDATORY PURPOSES BY COUNTY, by CLL, 8/31/12
IF (I < 2001) ; ADA COUNTY
   P[2]=P[2] * 1.104 ; HBSH
   P[3]=P[3] * 1.104 ; HBSO
   P[5]=P[5] * 1.104 ; HBO
   P[6]=P[6] * 1.104 ; NHB
ELSE        ; CANYON COUNTY
   P[2]=P[2] * 1.055 ; HBSH
   P[3]=P[3] * 1.055 ; HBSO
   P[5]=P[5] * 1.055 ; HBO
   P[6]=P[6] * 1.055 ; NHB
ENDIF

PRINT FORM=8.0,
   LIST =I   ,',',
        P[1],',',
        P[2],',',
        P[3],',',
        P[4],',',
        P[5],',',
        P[6],',',
```

```
          P[7],',',
          P[8],',',
          A[1],',',
          A[2],',',
          A[3],',',
          A[4],',',
          A[5],',',
          A[6],',',
          A[7],',',
          A[8],',',
 FILE = "D:\...\VOYAGERMODEL\RAW_PA.DAT"


    PHASE=ADJUST
       ; BALANCING
       A[1] = P[1][0] / A[1][0] * A[1]
       A[2] = P[2][0] / A[2][0] * A[2]
       A[3] = P[3][0] / A[3][0] * A[3]
       P[4] = A[4][0] / P[4][0] * P[4] ; BALANCE HBSC TRIP TO ATTRACTION
       A[5] = P[5][0] / A[5][0] * A[5]
       P[6] = A[6]                ; SET PRODUCTIONS EQUAL TO FINAL NHB ATTRACTIONS (CONTROL TOTAL)
       A[7] = P[7][0] / A[7][0] * A[7] ; FINAL FXSTATA (EXTERNAL STATION ATTRACTIONS)
       P[8] = A[8][0] / P[8][0] * P[8] ; FINAL FXSTATP (EXTERNAL STATION PRODUCTIONS)

       ;
*********************************************************************************************
       ; THE FOLLOWING STATEMENTS ARE OPTIONAL
       ; THEY CREATE A NEWGEN.DAT FILE WHICH CAN BE USED TO COMPARE WITH OLD RESULTS
       ;
*********************************************************************************************
       ; SUM TOTAL PRODUCTIONS

       TOTALHBWPROD=PTOT(1)
       TOTALHBSPROD=PTOT(2)
       TOTALHBSOPROD=PTOT(3)
       TOTALHBSCPROD=PTOT(4)
       TOTALHBOPROD=PTOT(5)
       TOTALNHBPROD=PTOT(6)
       TOTALPIAXP  =PTOT(7)
       TOTALPXAIP  =PTOT(8)

       ; SUM TOTAL ATTRACTIONS
       TOTALHBWATT=ATOT(1)
       TOTALHBSATT=ATOT(2)
       TOTALHBSOATT=ATOT(3)
       TOTALHBSCATT=ATOT(4)
       TOTALHBOATT=ATOT(5)
       TOTALNHBATT=ATOT(6)
       TOTALPIAXA =ATOT(7)
       TOTALPXAIA =ATOT(8)

       ; SUM UP & PRINT OUT TOTALS

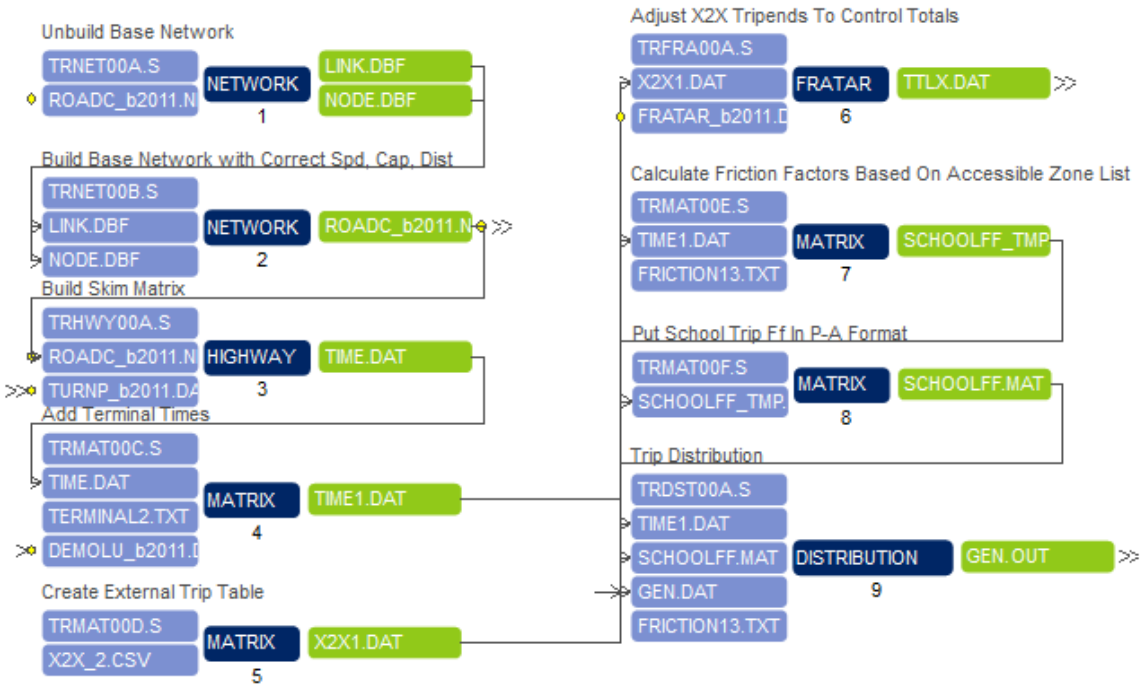
       TOTALPROD = TOTALHBWPROD + TOTALHBSPROD + TOTALHBSOPROD + TOTALHBSCPROD +
                TOTALHBOPROD + TOTALNHBPROD + TOTALPIAXP + TOTALPXAIP
       TOTALATT =  TOTALHBWATT + TOTALHBSATT + TOTALHBSOATT + TOTALHBSCATT +
                TOTALHBOATT + TOTALNHBATT + TOTALPIAXA + TOTALPXAIA


       PRINT FORM=8.0, PRINTO=1,
         LIST = 'TOTAL PRODUCTIONS: ','    ',TOTALPROD,'\n',
              '   ','TOTAL HBW PRODUCTIONS: ',TOTALHBWPROD,'\n',
              '   ','TOTAL HBS PRODUCTIONS: ',TOTALHBSPROD,'\n',
```

```
'   ','TOTAL HBSO PRODUCTIONS: ',TOTALHBSOPROD,'\n',
'   ','TOTAL HBSC PRODUCTIONS: ',TOTALHBSCPROD,'\n',   ;renamed to TOTALHBSCPROD
'   ','TOTAL HBO PRODUCTIONS: ',TOTALHBOPROD,'\n',
'   ','TOTAL NHB PRODUCTIONS: ',TOTALNHBPROD,'\n',
'   ','TOTAL IAXP: ',TOTALPIAXP,'\n','\n',
'   ','TOTAL XAIP: ',TOTALPXAIP,'\n','\n',
'TOTAL ATTRACTIONS: ','   ',TOTALATT,'\n',
'   ','TOTAL HBW ATTRACTIONS: ',TOTALHBWATT,'\n',
'   ','TOTAL HBS ATTRACTIONS: ',TOTALHBSATT,'\n',
'   ','TOTAL HBSO ATTRACTIONS: ',TOTALHBSOATT,'\n',
'   ','TOTAL HBSC ATTRACTIONS: ',TOTALHBSCATT,'\n',    ;renamed to TOTALHBSCATT
'   ','TOTAL HBO ATTRACTIONS: ',TOTALHBOATT,'\n',
'   ','TOTAL NHB ATTRACTIONS: ',TOTALNHBATT,'\n',
'   ','TOTAL IAXA: ',TOTALPIAXA,'\n','\n',
'   ','TOTAL XAIA: ',TOTALPXAIA,'\n','\n'              ;deleted comma at end of line

   ENDPHASE
ENDRUN
```

Trip Distribution Model




```
; Script for program NETWORK in file "D:\...\VoyagerModel\TRNET00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Unbuild Base Network'

FILEI LINKI[1] = "D:\...\...\ROADC_b2011.NET"

FILEO LINKO = "D:\...\VOYAGERMODEL\DBF\LINK.DBF",
          FORMAT="DBF"    ; OUTPUT LINKS TO DBASE FORMAT
FILEO NODEO = "D:\...\VOYAGERMODEL\DBF\NODE.DBF",
          FORMAT="DBF"    ; OUTPUT NODES TO DBASE FORMAT

ZONES=3750                          ; NODES 1-750 ARE CONSIDERED ZONES

ENDRUN

; Script for program NETWORK in file "D:\...\VoyagerModel\TRNET00B.S"
```

```
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Build Base Network with Correct Spd, Cap, Dist'
FILEI LINKI[1] = "D:\...\VOYAGERMODEL\DBF\LINK.DBF"
FILEI NODEI[1] = "D:\...\VOYAGERMODEL\DBF\NODE.DBF"

FILEO NETO = "D:\...\...\ROADC_b2011.NET"
;
; This script reads node and link data store in dBase files and builds a TP+
; network file.
;
ZONES=3750                          ; NODES 1-750 ARE CONSIDERED ZONES
   SPEED= SPEEDFOR(THRULANES,SPDCLASS)    ; LOOKUP SPEED
   TIME= (DISTANCE/SPEED)*60            ; RECALCULATE TIMES
   CAPACITY=(THRULANES*CAPCLASS*EXCAP)   ; EXCAP FOR FUTURE YEARS EXCAP IN .NET
   REPORT SPEED=YES
   REPORT CAPACITY=YES

ENDRUN

; Script for program HIGHWAY in file "D:\...\VoyagerModel\TRHWY00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=HIGHWAY MSG='Build Skim Matrix'
;
; BUILD SKIM MATRIX -- DEVELOPS SHORTEST TIME
;                  PATHS BETWEEN EACH AND EVERY ZONE

FILEI NETI = "D:\...\...\ROADC_b2011.NET"
FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"
FILEO MATO[1] = "D:\...\VoyagerModel\TIME.DAT",
            MO=1,               ; WRITE MW[1] TO TABLE 1
            NAME= TIME            ; NAME TABLE 1 "TIME"


   PHASE=ILOOP
      ; LOOP THROUGH ALL ZONES & CALCULATE SHORTEST PATH
      PATHLOAD PATH=TIME, PENI=1, MW[1]=PATHTRACE(TIME)
      ; CALCULATE INTRAZONAL TRAVEL TIME (50% TIME TO THE NEAREST ZONE)
      COMP MW[1][I] = LOWEST(1,1,0.01,999,I)/2
   ENDPHASE
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\TRMAT00C.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Add Terminal Times'
FILEI ZDATI[2] = "D:\...\...\DEMOLU_b2011.DBF"
   ;
   ; ADD TERMINAL TIMES TO THE SHORTEST PATH MATRIX
   ;
FILEI MATI[1] = "D:\...\VoyagerModel\TIME.DAT"
FILEI ZDATI[1] = "D:\...\VoyagerModel\TERMINAL2.TXT",
                Z=#1, OTERM=#2, DTERM=#3
FILEO MATO[1] = "D:\...\VoyagerModel\TIME1.DAT",
                MO=1, NAME=TIME

   IF (ZI.2.ZONE_ON[I]==1)
       MW[1]=1000000
   ELSE
      JLOOP
         ; SET ALL PATHS TO DUMMY ZONES TO 1000000 (CAN'T GET THERE)
```

```
        IF   (ZI.2.ZONE_ON[J]==1)
            MW[1]=1000000
        ELSE  ; TERMINAL TIMES (ADDED AT EACH END OF THE TRIP
            MW[1] = MI.1.1 + ZI.1.OTERM[I] + ZI.1.DTERM[J]
        ENDIF
      ENDJLOOP
   ENDIF
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\TRMAT00D.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Create External Trip Table'
;
; THIS SCRIPT READS THE EXTERNAL DATA AND CREATES AN
;   EXTERNAL TRIP TABLE (EXTERNAL-TO-EXTERNAL)
;

FILEI MATI[1] = "D:\...\VoyagerModel\X2X_2.CSV",
            PATTERN=IJ:V, FIELDS=#1-3 ; FIELDS=#1-3 MEANS READ IN 3 FIELDS BEFORE EOL
FILEO MATO[1] = "D:\...\VoyagerModel\X2X1.DAT",
            MO=1, NAME=XX

   ZONES = 3750

   MW[1] = MI.1.1
ENDRUN


; Script for program FRATAR in file "D:\...\VoyagerModel\TRFRA00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=FRATAR MSG='Adjust X2X Tripends To Control Totals'
;
; FRATAR -- ADJUST X2X TRIPENDS TO CONTROL TOTALS
;

FILEI MATI[1] = "D:\...\VoyagerModel\X2X1.DAT"
FILEO MATO[1] = "D:\...\VoyagerModel\TTLX.DAT",
           MO=1, NAME=X2X
FILEI LOOKUPI[1] = "D:\...\...\FRATAR_b2011.DAT"

   ZONES=3750
   MAXRMSE=0.01
   MAXITERS=500

   ; look up growth factors (GF)
   ; The final totals are obtained by multiplying the growth factors by the initial input matrix totals.
   ; growth factors are 1 for base year (2008)
   LOOKUP,
      FAIL=0,0, NAME=GF,
      LOOKUP[1]=1,RESULT=2,
      LOOKUP[2]=1,RESULT=3,
      LOOKUPI=1, LIST=T

   SETPA,
      PGF[1]=GF(2,J) AGF[1]=GF(1,J),
      MW[1]=MAX(0.01,MI.1.1),
      CONTROL=PA,
      INCLUDE=3738-3750

   ACOMP=1, PCOMP=1
```

```
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\TRMAT00E.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Friction Factors Based On Accessible Zone List'
FILEI MATI[1] = "D:\...\VoyagerModel\TIME1.DAT"
;
; CALCULATE FRICTION FACTORS BASED ON ACCESSIBLE ZONE LIST
;
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\FRICTION13.TXT"

FILEO MATO[1] = "D:\...\VoyagerModel\SCHOOLFF_TMP.MAT",
            MO=10  ; SCHOOL TRIP FF IN A-P FORMAT

   LOOKUP LOOKUPI=1, INTERPOLATE=Y,
      FAIL=0,0,
      NAME=SCHFF,                  ; FRICTION FACTOR FILE
      LOOKUP[4]=1, RESULT=5            ; FF: HBSC

   MW[1]=MI.1.1.T                  ; GET DEST TO ORIG TRAVEL TIME
   MW[10] = 0                     ; MW[104] IS THE SCHOOL FRICTION FACTOR MATRIX

  IF  (I==10) ;BOISE SR HI
     MW[10] = SCHFF(4,MW[1])
INCLUDE=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,
31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,
66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,335,351,352,539,540,541,542,
543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,
568,569,570,571,572,573,574,575,576,583,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,
616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,633,634,637,638,639,640,644,645,646,647,
648,649,650,651,679,680,683,684,685,686,687,696

 ELSEIF  (I==156) ;TRAIL WIND ELEM
     MW[10] = SCHFF(4,MW[1]) INCLUDE=148,151,152,153,154,155,156,157,158,166,167,168,178

ELSEIF  (I==77) ;ROOSEVELT ELEM
     MW[10] = SCHFF(4,MW[1])
INCLUDE=1,3,4,25,26,27,28,29,30,31,32,33,34,49,50,51,52,64,65,66,67,68,76,77,78,79,80,90,622,623,
624,627,630,639,640,644

ELSEIF  (I==82) ;ADAMS ELEM AND NEW
     MW[10] = SCHFF(4,MW[1])
INCLUDE=50,80,81,82,83,84,85,86,87,88,89,126,127,128,129,130,132,161,623,639,641,642,643,1299

ELSEIF  (I==129) ;I==87 2008 LOCATION. New location of east jr high taz 129 in 2009.
     MW[10] = SCHFF(4,MW[1])
INCLUDE=91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,107,108,109,110,111,112,113,114,115,125,
126,127,128,129,130,131,132,133,134,135,136,150,159,163,164,165,623,639,641,
642,643

ELSEIF  (I==115) ;GARFIELD ELEM
     MW[10] = SCHFF(4,MW[1])
INCLUDE=48,53,54,55,56,57,58,59,60,61,62,69,70,71,72,91,92,93,94,99,100,101,103,104,105,107,108,109,
110,111,112,113,114,115,163,335,351,352,391,393

ELSEIF  (I==122)  ;TIMBERLINE SR HI
     MW[10] = SCHFF(4,MW[1])
INCLUDE=80,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,108,109,110,111,112,113,114,115,116,11
7,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142
```

```
,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,
168,170,171,172,176,177,178,179,180,181,182,183,184,185,186,188,189,190,191,193,196,197,198,199,200,
201,202,203,623,639,641,642,643,1288,1299,1300,1301,1302,1303,1305,1306,1307,1308,1309,1310,1311

 ELSEIF  (I==123)  ;WHITE PINE ELEM
     MW[10] = SCHFF(4,MW[1])
INCLUDE=114,116,117,118,119,120,121,122,123,124,139,160,161,162,170,171,176,177,184,188,189,190,191
,196,197,198,199,1288,1299,1300,1301,1302,1303,1305,1306,1307,1308,1309,1310,1311

 ELSEIF  (I==136) ;RIVERSIDE ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=95,96,97,98,102,125,130,131,133,134,135,136,141,150,159,161,164,165,1299

 ELSEIF  (I==140) ;LIBERTY ELEM
 MW[10] = SCHFF(4,MW[1]) INCLUDE=137,138,139,140,141,142,143,144,145,146,147,148,149,150,151

 ELSEIF  (I==157) ;LES BOIS JR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=114,116,117,118,119,120,121,122,123,124,137,138,139,140,141,142,143,144,145,146,147,148,149
,150,151,152,153,154,155,156,157,158,160,161,162,166,167,168,170,171,172,176,177,178,179,180,181,182,
183,184,185,186,188,189,190,191,193,194,196,197,198,199,200,201,202,203,1288,1299,1300,1301,1302,
1303,1305,1306,1307,1308,1309,1310,1311

ELSEIF  (I==218) ;MAPLE GROVE ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=204,205,206,218,219,220,221,234,238,239,240,244

ELSEIF  (I==223) ;PEPPER RIDGE ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=207,208,223,224,227,229,264,265,266,267,268,269,270,279,1061,1063,1064,1066,1067,1070,1147,
1148


ELSEIF  (I==237) ;AMITY ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=222,225,226,230,231,232,233,234,235,236,237,238,242

ELSEIF  (I==239) ;WEST JR HI
  MW[10] = SCHFF(4,MW[1])
INCLUDE=169,175,187,192,194,195,204,205,206,207,209,210,211,212,213,214,215,216,217,218,219,220,221
,222,225,226,230,231,232,233,234,235,236,237,238,239,240,242,244,245,246,247,248,249,250,280,283,284,
290,291,324,325,369,370,371,372,373,374,375,376,410,491,493,495,496,497,500,509,520,534

 ELSEIF  (I==241) ;SILVER SAGE ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=172,173,174,175,176,241,243,281,282,283,284,288,289,290,292,293,299,300,312,313,315,
1288,1300,1302,1303,1304,1305,1306,1309

ELSEIF  (I==257,1075) ;LAKE HAZEL MIDD
  MW[10] = SCHFF(4,MW[1])
INCLUDE=172,173,174,175,176,228,229,241,243,251,252,253,254,255,256,257,258,259,260,261,262,263,270
,272,274,275,276,277,278,279,281,282,283,284,285,286,287,288,289,290,292,293,294,299,300,301,303,305,
307,309,310,311,312,313,315,1054,1057,1058,1060,1062,1065,1068,1069,1070,1071,1072,1073,1076,1078,
1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,1089,1090,1095,1096, 1098, 1099,1100,1104,
1106,1107,1108,1109,1110,1111,1112,1113,1114,1115,1116,1117,1118,1119,1120,1121,1122,1123,1124,
1125,1126,1127,1128,1129,1130,1131,1132,1133,1134,1135,1136,1137,1138,1139,1140,1141,1142,1143,
1144,1145,1146,1155,1156,1164,1168,1211,1214,1216,1288,1300,1302,1303,1304,1305,1306,1309

 ELSEIF  (I==261,278) ;LAKE HAZEL ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=228,229,255,257,259,260,261,270,272,274,275,276,277,278,279,285,286,287,301,303,
305,307,309,310,311,1145,1146,1155,1156

ELSEIF  (I==262) ;DESERT SAGE ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=251,252,253,254,255,256,258,259,262,263,286,294
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ELSEIF  (I==361) ;JEFFERSON ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=333,334,336,337,342,343,344,345,346,347,348,349,350,355,356,357,358,359,360,361,362,363,365
,367,377,379

ELSEIF  (I==372) ;BORAH SR HI
  MW[10] = SCHFF(4,MW[1])
INCLUDE=106,107,169,175,187,192,194,195,204,205,206,207,209,210,211,212,213,214,215,216,217,218,219
,220,221,222,225,226,230,231,232,233,234,235,236,237,238,239,240,242,244,245,246,247,248,249,250,280,
283,284,291,324,325,328,329,330,331,332,333,334,336,337,342,343,344,345,346,347,348,349,350,353,354,
355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,
380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,
405,406,407,408,409,410,491,495,496,497,509,520,534

ELSEIF  (I==376) ;GRACE JORDAN ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=216,369,370,371,372,373,374,375,376,410

ELSEIF  (I==383) ;MONROE ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=353,354,358,360,377,378,380,381,382,383,384,385,386,387,389

ELSEIF  (I==384) ;SOUTH JR HI
  MW[10] = SCHFF(4,MW[1])
INCLUDE=106,107,328,329,330,331,332,333,334,336,337,342,343,344,345,346,347,348,349,350,353,354,355
,356,357,358,359,360,361,362,363,364,365,366,367,368,377,378,379,380,381,382,383,384,385,386,387,388,
389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409

ELSEIF  (I==397) ;HAWTHORNE ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=106,107,388,389,390,391,392,393,394,395,396,397,398,399

ELSEIF  (I==401) ;WHITNEY ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=331,400,401,402

ELSEIF  (I==403) ;OWYHEE HARBOR ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=145,178,179,180,181,182,183,185,186,193,194,200,201,202,203,398,403,404,407

ELSEIF  (I==406) ;HILLCREST ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=169,175,187,192,194,195,215,217,245,246,247,248,249,250,280,283,284,290,291,292,324,325,328
,329,330,332,364,366,368,405,406,408,409

 ELSEIF  (I==411) ;FRONTIER ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=411,412,432,445,514

ELSEIF  (I==417) ;JOPLIN ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=413,414,417,418,419,421,422,424,425,426,427,428,429,430

ELSEIF  (I==420) ;ANDRUS ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=420,423,424,658,659,660,661,662,663,664,665,688,689,692,706,738,744,745,746,747,749,750,751
,752,837,838,841,842

ELSEIF  (I==422) ;LOWELL SCOTT MIDD
  MW[10] = SCHFF(4,MW[1])
INCLUDE=411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433
,434,435,443,445,468,469,510,511,514,656,658

ELSEIF  (I==425) ;CENTENNIAL HI
  MW[10] = SCHFF(4,MW[1])
INCLUDE=411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433
,434,435,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,
466,467,468,469,510,511,514,515,516,517,518,519,520,535,536,537,538,656,658,661
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 ELSEIF  (I==431) ;GATEWAY ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=414,415,416,431,433,434,443,468,469,658

ELSEIF  (I==435) ;VALLEY VIEW ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=435,436,437,438,442,513,521

ELSEIF  (I==438) ;CAPITAL HI
  MW[10] = SCHFF(4,MW[1])
INCLUDE=326,327,338,339,340,341,435,436,437,438,439,440,441,442,464,468,469,470,471,472,473,474,475
,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,492,493,494,508,512,513,519,521,522,523,
524,525,526,527,528,529,530,531,532,533,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,
592,593,594,595,596,597,598,599,600,602,605,610,611,631,632,636,654,655,656,657,667,668,669,670,671,
672,673,674,675,676,677,678,681,682,688,689,690,691,693,694,695,724,726,736,753,754

ELSEIF  (I==439) ;MOUNTAIN VIEW ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=437,439,440,655,656,657,669,671,672,673,675,676,678,682,691

ELSEIF  (I==451,502) ;USTICK ELEM AND SPALDING ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=430,444,445,446,447,448,449,450,451,452,453,454,456,457,458,459,460,461,462,463,464,
465,466,467,497,498,499,500,501,502,503,504,505,506,507,514,515,516,517,518,519,520,535

ELSEIF  (I==454,958) ;LEWIS CLARK MIDD AND CROSSROADS ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=207,208,223,224,227,229,264,265,266,267,268,269,270,279,444,445,446,447,448,449,450,451,452
,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,497,498,499,500,501,502,503,504,505,506,
507,514,515,516,517,518,519,520,535,536,537,538,941,942,943,944,945,946,947,948,949,950,951,952,953,
954,955,956,957,958,959,960,961,962,963,964,965,966,967,1034,1035,1037,1038,1039,1040,1052,1053,106
1,1063,1064,1066,1067,1070,1147,1148

 ELSEIF  (I==474) ;FAIRMONT JR AND MORLEY NELSON ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=326,327,338,339,340,341,435,436,437,438,439,440,441,442,464,468,469,470,471,472,473,
474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,492,493,494,508,
512,513,519,521,522,523,524,525,526,527,528,529,530,531,532,533

ELSEIF  (I==510) ;SUMMERWIND ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=434,435,443,510,511,656

ELSEIF  (I==523) ;KOELSCH ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=440,475,476,477,478,479,480,481,512,523,524,525

ELSEIF  (I==530) ;HORIZON ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=207,209,210,211,212,213,214,464,482,483,485,486,487,488,489,490,491,495,496,497,500,509,
519,520,529,530,531,532,533,534

ELSEIF  (I==539) ;TAFT ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=539,540,541,542,543,544,546,547,574,583,608,619,620,676

 ELSEIF  (I==548) ;LOWELL ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=16,542,545,546,547,548,549,550,551,552,553,554,564,565,566,571,572,574,575,576

ELSEIF  (I==560) ;LONGFELLOW ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=2,5,6,7,8,9,10,11,12,20,21,22,23,24,25,26,33,35,36,37,38,39,44,46,47,558,559,560,
561,621,626,627,644,645

ELSEIF  (I==562) ;NORTH JR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,
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36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,
71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,335,351,352,542,545,546,547,548,549,550,551
,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,
614,618,619,621,622,624,625,626,627,628,629,630,639,640,644,645,646,647,679,680,683,684,685,686,687,
696

ELSEIF  (I==563) ;WASHINGTON ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=13,14,15,553,554,555,556,557,562,563,564,619,620

ELSEIF  (I==573) ;WITTIER ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=17,18,19,40,41,42,43,45,63,73,74,75,567,568,569,570,571,572,573,670,671,677,
678,679,680,681,682,683,684,685,686,687,696

ELSEIF  (I==588) ;SHADOW HILLS ELEM, RIVERGLEN JR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=437,439,540,541,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595
,596,597,598,599,600,602,605,610,611,631,632,634,636,654,655,656,657,667,668,669,670,671,672,673,674,
675,676,677,678,681,682,688,689,690,691,693,694,695,724,726,733,736,738,753,754

ELSEIF  (I==594) ;PIRCE PARK ELEM
 MW[10] = SCHFF(4,MW[1])
INCLUDE=583,594,595,596,597,598,599,600,602,605,610,654,657,667,668,669,673,674,688,689,
690,691,693,694,695

 ELSEIF  (I==601) ;CYNTHIA MANN ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=601,602,603,604,605,609,610,611,612,613,615,637

ELSEIF  (I==607) ;COLLISTER ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=543,606,607,608,614,616,617,620

ELSEIF  (I==617) ;HILLSIDE JR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=539,540,541,542,543,544,547,574,583,601,602,603,604,605,606,607,608,609,610,611,612,613,614
,615,616,617,620,628,633,634,637,638,646,647,648,649,650,651,676,678

ELSEIF  (I==629) ;HIGHLAND ELEM
  MW[10] = SCHFF(4,MW[1]) INCLUDE=613,614,617,618,619,621,625,626,628,629,645,646,647

ELSEIF  (I==702,814) ;EAGLE HI AND NEW WEST ADA DIST HIGH SCHOOL IN OUT YEAR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=633,634,635,648,650,652,659,660,661,662,663,664,665,688,689,692,697,698,699,700,701,702,703
,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,725,727,728,729,730,
731,732,733,734,735,737,738,739,740,741,742,743,744,749,751,752,753,755,756,757,758,759,760,761,762,
763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,
788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,
810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,
830,831,832,833,834,835,836,839,840,2091,2102,2123

 ELSEIF  (I==710,793,797,829) ;EAGLE MIDD, NEW MIDD/JR IN M3,NEW K-8 IN M3, NEW WEST ADA MIDD/JR
IN OUT YEAR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=633,634,635,648,650,652,659,660,661,662,663,664,665,688,689,692,697,698,699,700,701,702,703
,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,725,727,728,729,730,
731,732,733,734,735,737,738,739,740,741,742,743,744,745,749,751,752,753,755,756,757,758,759,760,761,
762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,
787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,
812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,
837,839,840,841,2123

 ELSEIF  (I=719,755,797) ;EAGLE HILLS ELEM, SEVEN OAKS SEE COMMENT ABOVE
  MW[10] = SCHFF(4,MW[1])
INCLUDE=633,634,635,648,650,652,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713
```

,714,715,716,717,718,719,720,721,722,723,725,727,728,729,730,731,732,733,734,735,737,739,740,741,742,
743,753,755,756,774,775,776,777,778,779,780,781,782,783,784,785,786,788,790,796,797,798,799,800,
801,802

ELSEIF (I==824,789) ;STAR ELEM AND NEW ELEM IN M3 IN OUT YEAR
MW[10] = SCHFF(4,MW[1])
INCLUDE=757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,787,789,791,792,793,794
,795,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,
827,828,829,830,831,832,833,834,835,836,839,840,2091,2102,2123

ELSEIF (I==843) ;DISCOVER ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=843,844,845,846,902,904,906

ELSEIF (I==850) ;SAWTOOTH MIDD
MW[10] = SCHFF(4,MW[1])
INCLUDE=847,848,849,850,872,882,883,884,885,886,887,888,889,910,912,916,918,919,920,921,922

ELSEIF (I==887,848) ;HUNTER ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=847,848,849,850,886,887,888,889

ELSEIF (I==890,883) ;PARAMOUNT ELEM AND WILLOW CREEK
MW[10] = SCHFF(4,MW[1]) INCLUDE=746,748,882,883,884,885,890,891,892,893

ELSEIF (I==892) ;ROCKY MTN HI
MW[10] = SCHFF(4,MW[1])
INCLUDE=745,746,747,748,750,837,838,841,842,843,844,845,846,847,848,849,850,872,882,883,884,885,886
,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,910,912,916,918,919,
920,921,922

ELSEIF (I==894) ;HERITAGE MIDD
MW[10] = SCHFF(4,MW[1])
INCLUDE=745,746,747,748,750,837,838,841,842,843,844,845,846,890,891,892,893,894,895,896,897,898,899
,900,901,902,903,904,905,906

ELSEIF (I==898) ;PROSPECT ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=894,895,896,897,898,899,900,901

ELSEIF (I==919,872) ;PONDEROSA ELEM AND NEW ELEM IN WEST ADA DIST IN OUT YEAR
MW[10] = SCHFF(4,MW[1])
INCLUDE=851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873
,874,875,876,877,878,879,880,881,910,911,912,913,916,917,918,919,920,
921,922,923,925,2397,2398,2403,2404

ELSEIF (I==924) ;LINDER ELEM - CHANGED TO MAGNENT SCHOOL BARBARA MORGAN STEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=921,922,923,924,927,929,931

ELSEIF (I==934) ;CHIEF JOSEPH ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=926,928,930,932,933,934,935,936,937,938,939,940

ELSEIF (I==941) ;RIVER VALLEY ELEM
MW[10] = SCHFF(4,MW[1])
INCLUDE=455,535,536,537,538,903,905,941,942,943,944,945,946,947,948,949,950,951,953,954,955,956,
1052,1053

ELSEIF (I==990) ;MERIDIAN ELEM
MW[10] = SCHFF(4,MW[1])
INCLUDE=921,922,923,924,927,929,931,952,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971
,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,1027,1028,
1029,1030,1032,1033,1034,1035,1037,1038,1039,1040,1041,1042,1043,1044,1045,1046,1047,1048,1049,
1051

ELSEIF (I==997) ;MERIDIAN HI

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 MW[10] = SCHFF(4,MW[1])
INCLUDE=851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873
,874,875,876,877,878,879,880,881,907,908,909,910,911,912,913,914,915,916,917,921,922,923,924,925,926,
927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,
952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,
977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,
1001,1002,1003,1004,1005,1006,1007,1008,1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,
1020,1021,1022,1023,1024,1025,1026,1027,1028,1029,1030,1031,1032,1033,1041,1042,1043,1044,1045,
1046,1047,1048,1049,1051,1052,1053,1055,1056,1058,1059,1060,1074,1075,1077,1087,1088,1090,2397,
2398,2400,2403,2404,2420,2421

 ELSEIF  (I==1017,998,1059) ;PEREGRINE ELEM AND CHAPARRAL ELEM AND NEW ELEM IN WEST ADA IN OUT
YEAR
 MW[10] = SCHFF(4,MW[1])
INCLUDE=907,908,909,914,915,994,995,996,997,998,999,1000,1001,1002,1003,1004,1005,1006,1007,1008,
1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,1020,1021,1022,1023,1024,1025,1026,1031,
1055,1056, 1058,1059,1060,1074,1075,1077,1087,1088,1090,2400,2420,2421

 ELSEIF  (I==1043,859) ;MERIDIAN MIDD AND NEW MIDD/JR IN OUT YEAR
 MW[10] = SCHFF(4,MW[1])
INCLUDE=851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873
,874,875,876,877,878,879,880,881,907,908,909,910,911,912,913,914,915,916,917,921,922,923,924,925,926,
927,928,929,930,931,932, 933,934,935,936,937,938,939,940,968,969,970,971,972,973,974,975,976,977,
978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,1001,
1002,1003,1004,1005,1006,1007,1008,1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,1020,
1021,1022,1023,1024,1025,1026,1027,1028,1029,1030,1031,1032,1033,1041,1042,1043,1044,1045,1046,
1047,1048,1049,1051,1055,1056,1058,1059,1060,1074,1075,1077,1087,1088,1090,2397,2398,2400,2403,
2404,2420,2421

 ELSEIF  (I==1064,1107) ;MOUNTAIN VIEW HI NEW HIGH IN WEST ADA IN OUT YEAR
 MW[10] = SCHFF(4,MW[1])
INCLUDE=172,173,174,175,176,207,208,223,224,227,228,229,241,243,251,252,253,254,255,256,257,258,259
,260,261,262,263,264,265,266,267,268,269,270,272,274,275,276,277,278,279,281,282,283,284,285,286,287,
288,289,290,292,293,294,299,300,301,303,305,307,309,310,311,312,313,315,497,498,499,500,501,502,503,
504,505,506,507,1034,1035,1037,1038,1039,1040,1054,1057,1058,1060,1061,1062,1063,1064,1065,1066,
1067,1068,1069,1070,1071,1072,1073,1076,1078,1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,
1089,1090,1095,1096,1098,1099,1100,1104,1106,1107,1108,1109,1110,1111,1112,1113,1114,1115,1116,
1117,1118,1119,1120,1121,1122,1123,1124,1125,1126,1127,1128,1129,1130,1131,1132,1133,1134,1135,
1136,1137,1138,1139,1140,1141,1142,1143,1144,1145,1146,1147,1148,1155,1156,1164,1168,1211,1214,
1216,1288,1300,1302,1303,1304,1305,1306, 1309

 ELSEIF  (I==1118) ;MARY MCPHERSON ELEM
 MW[10] = SCHFF(4,MW[1])
INCLUDE=1054,1057,1058,1060,1062,1068,1069,1070,1071,1072,1073,1076,1078,1079,1080,1081,1082,1083
,1084,1085,1086,1087,1088,1089,1090,1095,1096,1098,1099,1100,1104,1106,1107,1108,1109,1110,1111,
1112,1113,1114,1115,1116,1117,1118,1119,1120,1121,1122,1123,1124,1125,1126,1130,1131,1132,1133,
1134,1135,1136,1137,1138,1139,1140,1141,1142,1143,1144,1164,1168,1211,1214,1216

 ELSEIF  (I==1127) ;SIENNA ELEM AND MAGNET
 MW[10] = SCHFF(4,MW[1]) INCLUDE=270,1065,1111,1127,1128,1129

 ELSEIF  (I==1204) ;CRIMSON PT ELEM
 MW[10] = SCHFF(4,MW[1])
INCLUDE=1193,1197,1202,1203,1204,1205,1206,1207,1208,1209,1210,1278,1279,2677,2678,2679,2681,2682
,2684,2699

ELSEIF  (I==1221,1218) ;INDIAN CREEK, ROSS ELEM
 MW[10] = SCHFF(4,MW[1])
INCLUDE=1202,1203,1218,1219,1220,1221,1222,1223,1256,1257,1258,1259,1260,1261,1262,1263,1264,1265
,1266,1267,1272,1273,1274,1275,1276,1282,1283,1284,2697,2698,2700,2701,2702,2703,2704,2705,2706,
2728,2730,2731,2732,2733,2734

 ELSEIF  (I==1227,1225) ;HUBBARD - TEED ELEM
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 MW[10] = SCHFF(4,MW[1]) INCLUDE=298,299,302,304,306,308,314,316,319,321,322,323,1172,1177,1178,
1179,1180,1185,1186,1187,1224,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1235,1236,1237,
1238,1239,1240,1241,1242,1243,1244,1245,1255,1259,1280,1281,1287,1288,1289,1290,1291,1292,1293,
1294, 1295,1296,1297,1298,1302,1304

ELSEIF  (I==1228) ;KUNA HI
 MW[10] = SCHFF(4,MW[1])
INCLUDE=271,273,286,295,296,297,298,299,302,304,306,308,314,316,317,318,319,
320,321,322,323,1036,1050,1091,1092,1093,1094,1097,1101,1102,1103,1105,1149,1150,1151,1152,1153,115
4,1157,1158,1159,1160,1161,1162,1163,1164,1165,1166,1167,1168,1169,1170,1171,1172,1173,1174,1175,
1176,1177,1178,1179,1180,1181,1182,1183,1184,1185,1186,1187,1188,1189,1190,1191,1192,1193,1194,
1195,1196,1197,1198,1199,1200,1201,1202,1203,1204,1205,1206,1207,1208,1209,1210,1212,1213,1215,
1217,1218,1219,1220,1221,1222,1223,1224,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1235,
1236,1237,1238,1239,1240,1241,1242,1243,1244,1245,1246,1247,1248,1250,1251,1252,1253,1254,1255,
1256,1257,1258,1259,1260,1261,1262,1263,1264,1265,1266,1267,1268,1269,1270,1271,1272,1273,1274,
1275,1276,1277,1278,1279,1280,1281,1282,1283,1284,1287,1288,1289,1290,1291,1292,1293,1294,1295,
1296,1297,1298,1302,1304,2364,2366,2387,2677,2678,2679,2681,2682,2684,2691,2697,2698,2699,2700,
2701,2702,2703,2704,2705,2706,2727,2728,2730,2731,2732,2733,2734

 ELSEIF  (I==1246) ;SILVER TRAIL ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=271,273,286,295,296,297,317,318,320,321,1036,1050,1091,1092,
1093,1094,1097,1101,1102,1103,1105,1149,1150,1151,1152,1153,1154,1157,1158,1159,1160,1161,1162,
1163,1164,1165,1166,1167,1169,1170,1171,1173,1174,1175,1176,1181,1182,1183,1184,1168,1188,1189,
1190,1191,1192,1195,1196,1198,1199,1200,1201,1206,1212,1213,1215,1217,1246,1247,1248,1250,1251,
1252,1253,1254,1269,1271,2364,2366,2387

 ELSEIF  (I==1270) ;REED ELEM
 MW[10] = SCHFF(4,MW[1]) INCLUDE=1194,1268,1270,1277

ELSEIF  (I==1275) ;KUNA MID
 MW[10] = SCHFF(4,MW[1])
INCLUDE=271,273,286,295,296,297,298,299,302,304,306,308,314,316,317,318,319,320,321,322,323,1036,
1050,1091,1092,1093,1094,1097,1101,1102,1103,1105,1149,1150,1151,1152,1153,1154,1157,1158,1159,
1160,1161,1162,1163,1164,1165,1166,1167,1168,1169,1170,1171,1172,1173,1174,1175,1176,1177,1178,
1179,1180,1181,1182,1183,1184,1185,1186,1187,1188,1189,1190,1191,1192,1193,1194,1195,1196,1197,
1198,1199,1200,1201,1202,1203,1204,1205,1206,1207,1208,1209,1210,1212,1213,1215,1217,1218,1219,
1220,1221,1222,1223,1224,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1235,1236,1237,1238,
1239,1240,1241,1242,1243,1244,1245,1246,1247,1248,1250,1251,1252,1253,1254,1255,1256,1257,1258,
1259,1260,1261,1262,1263,1264,1265,1266,1267,1268,1269,1270,1271,1272,1273,1274,1275,1276,1277,
1278,1279,1280,1281,1282,1283,1284,1287,1288,1289,1290,1291,1292,1293,1294,1295,1296,1297,1298,
1302,1304,2364,2366,2387,2677,2678,2679,2681,2682,2684,2697,2698,2699,2700,2701,2702,2703,2704,
2705,2706,2728,2730,2731,2732,2733,2734

 ELSEIF  (I==2009) ;PARMA MIDD, HI
 MW[10] = SCHFF(4,MW[1])
INCLUDE=2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2015,2017,2019,2020,2021
,2022,2023,2024,2025,2026,2028,2050,2051,2052,2053,2054,2055,2056,2058,2059,2060,2061,2062,2063,
2064,2065,2066,2067,2068,2069,2070,2074,2075,2076,2570,2613,2634,2635,2636,2637,2638,2641

 ELSEIF  (I==2009) ;MAXINE JOHNSON (PARMA ELEMENTARY)
 MW[10] = SCHFF(4,MW[1])
INCLUDE=2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2015,2017,2019,2020,2021
,2022,2023,2024,2025,2026,2028,2050,2051,2052,2053,2054,2055,2056,2058,2059,2060,2061,2062,2063,
2064,2065,2066,2067,2068,2069,2070,2074,2075,2076,2570,2613,2634,2635,2636,2637,2638,2641

ELSEIF  (I==2009) ;PARMA HIGH
 MW[10] = SCHFF(4,MW[1])
INCLUDE=2001,2002,2003,2004,2005,2006,2007,2008,2009,2010,2011,2012,2013,2015,2017,2019,2020,2021
,2022,2023,2024,2025,2026,2028,2050,2051,2052,2053,2054,2055,2056,2058,2059,2060,2061,2062,2063,
2064,2065,2066,2067,2068,2069,2070,2074,2075,2076,2570,2613,2634,2635,2636,2637,2638,2641

 ELSEIF  (I==2018,2057) ;NOTUS ELEM, MIDD, HI
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 MW[10] = SCHFF(4,MW[1])
INCLUDE=2013,2016,2017,2018,2019,2027,2028,2031,2032,2033,2034,2035,2037,2038,2039,2040,2041,2042
,2043,2044,2045,2046,2047,2048,2049,2057,2068,2069,2071,2072,2073,2074,2300,2550,2569,2570,2585,
2586,2611,2643

 ELSEIF  (I==2097) ;PURPLE SAGE ELEM
  MW[10] = SCHFF(4,MW[1])
INCLUDE=2014,2029,2030,2032,2035,2036,2037,2040,2042,2043,2077,2080,2082,2083,2084,2085,2086,2087
,2088,2089,2090,2094,2095,2096,2097,2107,2108,2109,2110,2111,2112,2113,2114,2115,2116,2120,2122,
2190,2220,2300,2302,2314,2318,2319,2331,2575

 ELSEIF  (I==2128,2129,2145) ;MIDDLETON MIDD, IN 2013 MIDDLETON JR MOVED INTO OLD HI SCHOOL
BLDG, NEW MIDD/JR IN OUT YEAR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=2014,2029,2030,2032,2035,2036,2037,2040,2042,2043,2077,2079,2080,2081,2082,2083,2084,2085
,2086,2087,2088,2089,2090,2091,2092,2093,2094,2095,2096,2097,2098,2099,2100,2101,2102,2103,2104,
2105,2106,2107,2108,2109,2110,2111,2112,2113,2114,2115,2116,2117,2118,2119,2120,2121,2122,2123,
2124,2126,2127,2128,2129,2130,2131,2132,2133,2134,2135,2136,2137,2138,2139,2140,2141,2142,2143,
2144,2145,2220,2318,2319

 ELSEIF  (I==2129,2134) ;MIDDLETON HI NEW LOCATION IS 2134, MIDD JR MOVED INTO OLD HI, ATLAS
MOVED INTO OLD JR
  MW[10] = SCHFF(4,MW[1])
INCLUDE=2014,2029,2030,2032,2035,2036,2037,2040,2042,2043,2077,2080,2081,2082,2083,2084,2085,2086
,2087,2088,2089,2090,2091,2092,2093,2094,2095,2096,2097,2098,2099,2100,2101,2102,2103,2104,2106,
2107,2108,2109,2110,2111,2112,2113,2114,2115,2116,2117,2118,2119,2120,2121,2122,2123,2124,2126,
2127,2128,2129,2130,2131,2132,2133,2134,2135,2136,2137,2138,2139,2140,2141,2142,2143,2144,2145,
2220,2227,2318,2319

 ELSEIF  (I==2133,2126) ;MIDDLETON HEIGHTS ELEM AND NEW ELEM IN OUT YEAR
     MW[10] = SCHFF(4,MW[1]) INCLUDE=2077,2093,2098,2099,2101,2106,2120,2126,2127,2128,2129,2131,
2132,2133,2134,2138,2140,2141,2143,2144

ELSEIF  (I==2135) ;MIDDLETON MILL CREEK ELEM
     MW[10] = SCHFF(4,MW[1]) INCLUDE=2081,2091,2092,2093,2100,2102,2103,2104,2117,2118,2119,2121,
2123,2124,2130,2135,2136,2137,2139,2142,2145

ELSEIF  (I==2158) ;CALDWELL HI
     MW[10] = SCHFF(4,MW[1])
INCLUDE=2014,2043,2078,2122,2146,2147,2148,2149,2150,2151,2152,2153,2154,2155,2156,2157,2158,2159
,2160,2161,2162,2163,2164,2165,2166,2167,2168,2169,2170,2171,2172,2173,2174,2175,2176,2177,2178,
2179,2180,2181,2182,2183,2184,2185,2186,2187,2188,2189,2190,2191,2192,2194,2195,2197,2199,2203,
2204,2217,2218,2220,2221,2222,2223,2224,2225,2226,2228,2229,2230,2231,2232,2233,2234,2242,2265,
2266,2267,2274,2275,2280,2281,2282,2300,2301,2302,2303,2304,2305,2306,2307,2308,2309,2310,2311,
2312,2313,2314,2315,2316,2317,2318,2319,2320,2321,2322,2323,2324,2325,2326,2327,2328,2329,2330,
2331,2332,2333,2334,2559,2560,2575,2595,2619,2621,2622,2623,2627

 ELSEIF  (I==2161) ;SYRINGA MIDD
     MW[10] = SCHFF(4,MW[1])
INCLUDE=2077,2078,2122,2146,2149,2150,2151,2152,2153,2156,2157,2158,2159,2160,2161,2162,2165,2166
,2168,2182,2183,2190,2199,2217,2218,2220,2221,2224,2225,2226,2265,2266,2267,2274,2275,2280,2281,
2282,2316,2559,2560,2595,2619,2621,2622,2623,2627

 ELSEIF  (I==2162) ;JEFFERSON MIDD
     MW[10] = SCHFF(4,MW[1])
INCLUDE=2014,2043,2147,2148,2149,2150,2154,2155,2161,2162,2163,2164,2167,2168,2169,2170,2171,2172
,2173,2174,2175,2176,2177,2178,2179,2180,2181,2183,2184,2185,2186,2187,2188,2189,2191,2192,2194,
2195,2197,2203,2204,2218,2222,2223,2228,2229,2230,2231,2232,2233,2234,2242,2300,2301,2302,2303,
2304,2305,2306,2307,2308,2309,2310,2311,2312,2313,2314,2315,2316,2317,2318,2319,2320,2321,2322,
2323,2324,2325,2326,2327,2328,2329,2330,2331,2332,2333,2334,2575

 ELSEIF  (I==2163) ;WILSON ELEM (WOODROW WILSON IN THE POINT FILE)
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    MW[10] = SCHFF(4,MW[1])
INCLUDE=2147,2148,2149,2150,2161,2162,2163,2164,2167,2177,2301,2303,2304,2305,2307,2310,2311,2320
,2321,2322,2323,2324,2325,2326,2329,2330,2332,2333,2334

 ELSEIF  (I==2161) ;WASHINGTON ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2156,2157,2158,2159,2160,2161,2165,2192,2228,2229,2230, 2234

ELSEIF  (I==2183) ;LINCOLN ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2146,2149,2150,2151,2152,2153,2170,2172,2174,2175,2176,2177,
2178,2179,2180,2181,2182,2183,2187,2188,2300,2308,2309,2310,2311,2312,2313,2315,2327,2328

 ELSEIF  (I==2199);VAN BUREN ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2154,2155,2173,2178,2180,2184,2185,2186,2189,2191,2194,2195,
2197,2199,2203,2204,2222,2223,2230,2231,2232,2233,2234,2242

 ELSEIF  (I==2226);SACAJAWEA ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2078,2122,2168,2169,2171,2190,2199,2217,2218,2220,2221,2224,
2225,2226,2306,2314,2316,2317

 ELSEIF  (I==2248); DESERT SPRINGS ELEM
    MW[10] = SCHFF(4,MW[1])
INCLUDE=2192,2193,2205,2206,2207,2208,2213,2219,2234,2247,2248,2249,2252,2253,2276,2277,2434,2435
,2437,2443,2444,2446,2485,2487,2490,2502,2509,2510,2511,2512,2513,2525,2526,2527,2528,2529,2538

ELSEIF  (I==2248); SAGE VALLEY MIDD
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2077,2079,2091,2092,2105,2125,2138,2192,2193,2196,2198,2200,
2201,2202,2205,2206,2207,2208,2209,2210,2211,2212,2213,2214,2215,2216,2219,2227,2234,2235,2236,
2237,2238,2239,2240,2241,2242,2243,2244,2245,2246,2247,2248,2249,2250,2251,2252,2253,2254,2255,
2256,2276,2277,2395,2396,2399,2401,2402,2405,2406,2407,2408,2409,2410,2411,2412,2413,2414,2415,
2416,2417,2418,2422,2423,2424,2425,2434,2435,2436,2437,2438,2439,2441,2443,2444,2445,2446,2447,
2448,2450,2451,2452,2453,2454,2485,2486,2487,2490,2491,2492,2502,2509,2510,2511,2512,2513,2514,
2515,2516,2525,2526,2527,2528,2529,2530,2537,2538,2542,2543

ELSEIF  (I==2262,2292) ;VALLIVUE MIDD AND NEW MIDD/JR IN OUT YEAR
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2069,2257,2258,2259,2260,2261,2262,2263,2264,2267,2268,2269,
2270,2271,2272,2273,2276,2278,2282,2283,2284,2285,2286,2287,2288,2289,2290,2291,2292,2293,2294,
2295,2296,2297,2298,2299,2540,2541,2549,2550,2551,2555,2557,2558,2561,2562,2563,2565,2566,2567,
2568,2569,2571,2572,2573,2574,2575,2576,2579,2581,2582,2583,2585,2587,2588,2589,2590,2591,2592,
2593,2594,2596,2597,2598,2599,2600,2601,2602,2603,2604,2605,2606,2607,2608,2609,2610,2612,2620,
2624,2625,2626,2628,2629,2630,2631,2632,2633,2642,2643,2644,2645,2646,2647,2648,2649,2664,2685,
2686,2687,2688,2689,2715,2716,2718,2724,2737,2738,2739,2740,2741, 2745

ELSEIF  (I==2266) ;LEWIS CLARK ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2162,2166,2265,2266,2267,2274,2275,2280,2281,2282,2559,2560,
2595,2619,2621,2622,2623,2627

 ELSEIF  (I==2271) ;CENTRAL CAN ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2257,2267,2268,2269,2270,2271,2276,2278,2282,2283,2284,2288,
2289,2290,2291,2292,2485,2527

 ELSEIF  (I==2299) ;LAKEVUE ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2259,2260,2263,2264,2272,2273,2295,2296,2297,2298,2299,2486,
2491,2492,2513,2514,2515,2516,2525,2530,2537,2538,2540,2541,2542,2543

 ELSEIF  (I==2282,2409) ;VALLIVIE HI AND NEW RIDGEVUE HI OPEN IN 2016
    MW[10] = SCHFF(4,MW[1]) INCLUDE=2069,2079,2091,2092,2105,2125,2138,2192,2193,2196,2198,2200,
2201,2202,2205,2206,2207,2208,2209,2210,2211,2212,2213,2214,2215,2216,2219,2227,2234,2235,2236,
2237,2238,2239,2240,2241,2242,2243,2244,2245,2246,2247,2248,2249,2250,2251,2252,2253,2254,2255,
2256,2257,2258,2259,2260,2261,2262,2263,2264,2267,2268,2269,2270,2271,2272,2273,2276,2277,2278,
2282,2283,2284,2285,2286,2287,2288,2289,2290,2291,2292,2293,2294,2295,2296,2297,2298,2299,2395,
2396,2399,2401,2402,2405,2406,2407,2408,2409,2410,2411,2412,2413,2414,2415,2416,2417,2418,2422,
2423,2424,2425,2434,2435,2436,2437,2438,2439,2441,2443,2444,2445,2446,2447,2448,2450,2451,2452,
2453,2454,2485,2486,2487,2490,2491,2492,2509,2510,2511,2512,2513,2514,2515,2516,2525,2526,2527,
```

2528,2529,2530,2537,2538,2540,2541,2542,2543,2549,2550,2551,2555,2557,2558,2561,2562,2563,2565,
2566,2567,2568,2569,2571,2572,2573,2574,2575,2576,2579,2581,2582,2583,2585,2587,2588,2589,2590,
2591,2592,2593,2594,2596,2597,2598,2599,2600,2601,2602,2603,2604,2605,2606,2607,2608,2609,2610,
2612,2620,2624,2625,2626,2628,2629,2630,2631,2632,2633,2642,2643,2644,2645,2646,2647,2648,2649,
2664,2685,2686,2687,2688,2689,2715,2716,2724,2737,2738,2739,2740,2741,2745

ELSEIF (I==2342) ;CENTRAL ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2335,2336,2337,2338,2339,2340,2341,2342,2343,2344,2345,2346,
2347,2348,2349,2350,2351,2353,2373,2374,2502,2503,2504,2505,2539,2547,2548

ELSEIF (I==2361) ;ENDEAVOR ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2358,2359,2361,2362,2363,2364,2365,2367,2368,2372,2377,2380,
2381,2382,2383,2385,2386,2387,2389,2419,2440

ELSEIF (I==2375,2372) ;COLUMBIA HI AND NEW HIGH SCHOOL IN NAMPA DIST IN OUT YEAR
MW[10] = SCHFF(4,MW[1]) INCLUDE=2354,2355,2356,2357,2358,2359,2360,2361,2362,2363,2364,2365,
2367,2369,2370,2371,2372,2373,2374,2375,2376,2377,2378,2379,2380,2381,2382,2383,2384,2385,2386,
2387,2388,2389,2390,2391,2392,2393,2394,2401,2402,2419,2423,2426,2427,2428,2429,2430,2431,2432,
2433,2440,2441,2442,2449,2457,2459,2461,2468,2470,2472,2474,2475,2483,2484,2487,2672,2676,2677,
2680,2681,2683,2699,2713,2714,2746

ELSEIF (I==2376) ; PARK RIDGE ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2368,2369,2370,2371,2375,2376,2377,2390,2391

ELSEIF (I==2379,2402) ;SNAKE RIVER ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2354,2355,2356,2357,2360,2373,2378,2379,2384,2388,2401,2402,
2423,2426,2427,2428,2429,2430,2431,2432,2433,2441,2442,2449,2487

ELSEIF (I==2410) ;EAST CANYON ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2079,2091,2092,2105,2125,2138,2196,2198,2200,2201,2202,2209,
2210,2211,2212,2214,2215,2216,2227,2235,2236,2237,2238,2239,2240,2241,2242,2243,2244,2245,2246,225
0,2251,2254,2255,2256,2395,2396,2405,2406,2407,2408,2409,2410,2411,2412,2413,2414,2415,2416,2417,24
35,2436,2437,2438,2444,2445,2446,2447,2448, 2452,2453,2454

ELSEIF (I==2451) ;BIRCH ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2399,2401,2402,2418,2422,2423,2424,2425,2439,2441,2450,2451

ELSEIF (I==2461) ;GREENHURST ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2461,2463,2468,2469,2484

ELSEIF (I==2464) ;SKYVIEW HI
MW[10] = SCHFF(4,MW[1]) INCLUDE=2341,2342,2343,2344,2347,2349,2350,2361,2367,2368,2373,2374,
2377,2456,2458,2459,2460,2462,2463,2464,2465,2466,2469,2471,2473,2476,2477,2478,2479,2480,2481,249
8,2499,2501,2517,2518,2519,2520,2521,2522,2524,2664,2671,2672,2673,2674,2675,2687,2688,2689,2698,26
99,2707,2708,2709,2710,2711,2712,2714,2715,2718,2719,2720,2721,2722,2723,2724

ELSEIF (I==2473) ;SHERMAN ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2343,2344,2346,2347,2349,2455,2456,2458,2459,2460,2462,2467,
2470,2471,2472,2473,2478,2479,2482,2483

ELSEIF (I==2475) ;RONALD REAGAN ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2392,2393,2394,2457,2468,2474,2475,2672,2676,2677,2680,2681,
2683,2699,2713,2714,2746

ELSEIF (I==2676) ;EAST VALLEY MID
MW[10] = SCHFF(4,MW[1]) INCLUDE=2354,2355,2356,2357,2358,2359,2360,2361,2362,2363,2364,2365,
2367,2368,2369,2370,2371,2372,2373,2375,2376,2377,2378,2379,2380,2381,2382,2383,2384,2385,2386,
2387,2388,2389,2390,2391,2392,2393,2394,2401,2402,2419,2423,2427,2428,2429,2430,2431,2432,2433,
2440,2441,2442,2449,2457,2468,2474,2475,2672,2676,2677,2680,2681,2683,2699,2713,2746

ELSEIF (I==2489) ;WEST MIDD
MW[10] = SCHFF(4,MW[1]) INCLUDE=2335,2336,2337,2338,2339,2340,2341,2342,2343,2344,2345,2346,

2347,2348,2349,2350,2351,2352,2353,2354,2373,2374,2426,2455,2456,2458,2459,2460,2462,2467,2470,2471,2472,2473,2478,2479,2482,2483,2487,2489,2497,2498,2502,2503,2504,2505,2506,2507,2508,2523,2524,2531,2532,2533,2535,2536,2539,2547,2548

ELSEIF (I==2497) ;FD ROOSEVELT ELEM (CANYON CO)
MW[10] = SCHFF(4,MW[1]) INCLUDE=2279,2493,2494,2496,2497,2535,2536,2544,2545,2664,2665,2666,2667,2668,2669,2735,2736,2742,2743,2744

ELSEIF (I==2498) ;IOWA ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2458,2464,2465,2466,2476,2477,2478,2479,2480,2481,2498,2499,2522,2524

ELSEIF (I==2500) ;OWYHEE ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2500,2501,2664,2668,2670,2671

ELSEIF (I==2508) ;CENTENNIAL ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2335,2352,2353,2489,2498,2505,2506,2507,2508,2523,2524,2531,2532,2533,2547,2548

ELSEIF (I==2518) ;SOUTH MIDD
MW[10] = SCHFF(4,MW[1]) INCLUDE=2458,2461,2463,2464,2465,2466,2468,2469,2476,2477,2478,2479,2480,2481,2484,2498,2499,2517,2518,2519,2520,2521,2522,2523,2524,2664,2672,2673,2674,2675,2687,2688,2689,2698,2699,2707,2708,2709,2710,2711,2712,2714,2718,2719,2720,2721,2722,2723,2724

ELSEIF (I==2523,2666) ;NAMPA HI AND NEW HIGH SCHOOL IN OUT YEAR
MW[10] = SCHFF(4,MW[1]) INCLUDE=2279,2335,2336,2337,2338,2339,2340,2341,2342,2345,2346,2348,2350,2351,2352,2353,2455,2456,2458,2460,2467,2478,2479,2482,2488,2489,2493,2494,2495,2496,2497,2498,2500,2502,2503,2504,2505,2506,2507,2508,2523,2524,2531,2532,2533,2534,2535,2536,2539,2544,2545,2546,2547,2548,2664,2665,2666,2667,2668,2669,2670,2735,2736,2742,2743,2744

ELSEIF (I==2488) ;WILLOWCREEK ELEM (NAMPA)
MW[10] = SCHFF(4,MW[1]) INCLUDE=2488,2495,2503,2534,2539,2546,2548

ELSEIF (I==2562) ;WEST CANYON ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2069,2258,2260,2261,2262,2285,2286,2287,2293,2294,2549,2550,2551,2555,2557,2558,2561,2562,2563,2565,2566,2567,2568,2569,2571,2572,2573,2574,2575,2576,2579,2581,2582,2583,2585,2587,2588,2589,2590,2591,2592,2593,2594,2596,2597,2598,2599,2600,2601,2602,2603,2604,2605,2606,2607,2608,2609,2610,2612,2620,2624,2625,2626,2628,2629,2630,2631,2632,2633,2642,2643, 2644, 2645,2646,2647,2648,2649,2664,2685,2686,2687,2688,2689, 2715,2716,2724,2737,2738,2739,2740,2741,2745

ELSEIF (I==2660) ;WILDER ELEM
MW[10] = SCHFF(4,MW[1]) INCLUDE=2552,2553,2564,2566,2568,2569,2570,2577,2578,2579,2580,2583,2584,2613,2614,2615,2616,2618,2635,2636,2637,2638,2639,2640,2641,2644,2650,2651,2652,2653,2654,2655,2656,2657,2658,2659, 2660,2661,2662,2663

ELSEIF (I==2660) ;WILDER MID
MW[10] = SCHFF(4,MW[1]) INCLUDE=2552,2553,2564,2566,2568,2569,2570,2577,2578,2579,2580,2583,2584,2613,2614,2615,2616,2618,2635,2636,2637,2638,2639,2640,2641,2644,2650,2651,2652,2653,2654,2655,2656,2657,2658,2659,2660,2661,2662,2663

ELSEIF (I==2660) ;WILDER HI
MW[10] = SCHFF(4,MW[1]) INCLUDE=2552,2553,2564,2566,2568,2569,2570,2577,2578,2579,2580,2583,2584,2613,2614,2615,2616,2618,2635,2636,2637,2638,2639,2640,2641,2644,2650,2651,2652,2653,2654,2655,2656,2657,2658,2659,2660,2661,2662,2663

ELSEIF (I==2666,2743) ;LONE STAR MIDDLE AND NEW MIDD/JR IN OUT YEAR
MW[10] = SCHFF(4,MW[1]) INCLUDE=2279,2488,2493,2494,2495,2496,2497,2500,2501,2503,2534,2535,2536,2539,2544,2545,2546,2548,2664,2665,2666,2667,2668,2669,2670,2671,2735,2736,2742,2743,2744

ELSEIF (I==2664,2722) ;LAKE RIDGE (FORMERLY SUNNYRIDGE ELEM - CLOSED 3/18/2013 LAKE RIDGE ABSORBED)
MW[10] = SCHFF(4,MW[1]) INCLUDE=2466,2517,2518,2519,2520,2521,2664,2672,2673,2674,2675,2687,

```
2688,2689,2698,2699,2707,2708,2709,2710,2711,2712,2714,2715,2718,2719,2720,2721,2722,2723,2724


ELSEIF  (I==2750) ;MELBA ELEM
    MW[10] = SCHFF(4,MW[1]) INCLUDE=1282,1283,1284,1285,1286,1287,1288,1294,2690,2691,2692,2693,
2694,2695,2696,2717,2718,2725,2726,2727,2728,2729,2733,2734,2747,2748,2749,2750,2751,2752,2753,
2754

ELSEIF  (I==2750) ;MELBA MIDD, HI
    MW[10] = SCHFF(4,MW[1]) INCLUDE=1282,1283,1284,1285,1286,1287,1288,1294,2690,2691,2692,2693,
2694,2695,2696,2717,2718,2725,2726,2727,2728,2729,2733,2734,2747,2748,2749,2750,2751,2752,2753,
2754

ENDIF
ENDRUN

; Script for program MATRIX in file "D:\...\VoyagerModel\TRMAT00F.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Put School Trip Ff In P-A Format'
;
; PUT SCHOOL TRIP FF IN P-A FORMAT
;
FILEI MATI[1] = "D:\...\VoyagerModel\SCHOOLFF_TMP.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\SCHOOLFF.MAT",
            MO=1, NAME=SCHOOLFF  ; SCHOOL TRIP FF IN P-A FORMAT

  MW[1]=MI.1.1.T

ENDRUN

; Script for program DISTRIBUTION in file "D:\...\VoyagerModel\TRDST00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=DISTRIBUTION MSG='Trip Distribution'
FILEI MATI[1] = "D:\...\VoyagerModel\TIME1.DAT"
;
; PERFORMS THE GRAVITY MODEL TRIP DISTRIBUTION
;
FILEI ZDATI[1] = "D:\...\VoyagerModel\GEN.DAT",
             Z=#1, HBWP=#2, HBSP=#3, HBSOP=#4, HBSCP=#5, HBOP=#6, NHBP=#7, PIAX=#8, XSTAP=#9,
             HBWA=#10, HBSA=#11, HBSOA=#12, HBSCA=#13, HBOA=#14, NHBA=#15, PXAI=#16,
XSTAA=#17
FILEI MATI[2] = "D:\...\VoyagerModel\SCHOOLFF.MAT"
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\FRICTION13.TXT"

FILEO MATO[1] = "D:\...\VoyagerModel\GEN.OUT",
            MO=1-8,DEC=8*D,  ; OUTPUT MATRIX FILE
            NAME=HBW, HBS, HBSO, HBSC, HBO, NHB, PIAX, XSTA

  LOOKUP LOOKUPI=1, INTERPOLATE=Y, FAIL=0,0,
    NAME=FF,    ; FRICTION FACTOR FILE
    LOOKUP[1]=1, RESULT=2,                    ; FF: HBW
    LOOKUP[2]=1, RESULT=3,                    ; FF: HBS
    LOOKUP[3]=1, RESULT=4,                    ; FF: HBSO
    LOOKUP[4]=1, RESULT=5,                    ; FF: HBSC
    LOOKUP[5]=1, RESULT=6,                    ; FF: HBO
    LOOKUP[6]=1, RESULT=7,                    ; FF: NHB
    LOOKUP[7]=1, RESULT=8,                    ; FF: PIAX
    LOOKUP[8]=1, RESULT=9                     ; FF: XSTA

  SETPA INCLUDE=1-3750, ; INTERNAL ZONES+ EXTERNAL ZONES
```

```
    P[1]=HBWP P[2]=HBSP P[3]=HBSOP P[4]=HBSCP P[5]=HBOP P[6]=NHBP P[7]=PIAX P[8]=XSTAP,
    A[1]=HBWA A[2]=HBSA A[3]=HBSOA A[4]=HBSCA A[5]=HBOA A[6]=NHBA A[7]=PXAI A[8]=XSTAA

MAXITERS=50, MAXRMSE=.5                    ; SET MAX ITERATIONS AND CLOSURE CRITERIA
;REPORT  ACOMP=1, ITERATIONS=1,50
MW[11]=MI.1.TIME                           ; USE TRAVEL TIME FOR MATRIX CALCULATIONS


GRAVITY PURPOSE=1, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[12]   ; HB-WORK
GRAVITY PURPOSE=2, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[13]   ; HB-SHOP
GRAVITY PURPOSE=3, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[14]   ; HB-SOCREC
GRAVITY PURPOSE=4, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[15]   ; HB-SCHOOL
GRAVITY PURPOSE=5, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[16]   ; HB-OTHER
GRAVITY PURPOSE=6, LOS=MW[11], FFACTORS=FF;, KFACTORS=MW[17]   ; NON-HOME BASED
GRAVITY PURPOSE=7, LOS=MW[11], FFACTORS=FF                     ; INTERNAL-EXTERNAL
GRAVITY PURPOSE=8, LOS=MW[11], FFACTORS=FF                     ; EXTERNAL-INTERNAL

; HBW TD_ADJUST statements removed, by LL 030315
MW[1] = A[1] * FF(1,MW[11])
RSUM1=ROWSUM(1)
IF (RSUM1>0)
   PAF=P[1]/RSUM1
ELSE
   PAF=0
ENDIF
MW[1]=PAF * MW[1]

; HBSO TD_ADJUST statements removed, by LL 030315
MW[3] = A[3] * FF(3,MW[11])
RSUM3=ROWSUM(3)
IF (RSUM3>0)
   PAF=P[3]/RSUM3
ELSE
   PAF=0
ENDIF
MW[3]=PAF * MW[3]


; SCHOOL TRIP DISTRIBUTION
MW[104] = MI.2.SCHOOLFF     ; SCHOOL TRIP FF FOR ACCESSIBLE ZONES ONLY
; SPLIT SCHOOL TRIPS INTO 85% PUBLIC AND 15% ALL OTHERS (PVT, UNIV, ALT)BASED ON ENROLLMENT
MW[115]=P[4] * 0.85  ; 85% PUBLIC
MW[125]=P[4] * 0.15  ; 15% ALL OTHERS (PVT, UNIV, ALT)

MW[114] = A[4] * MW[104]      ; USE FF FOR ACCESSIBLE ZONES ONLY
RSUM114=ROWSUM(114)
IF (RSUM114>0)
   PAF=MW[115]/RSUM114
ELSE
   PAF=0
ENDIF
MW[114]=PAF * MW[114]

MW[124] = A[4] * FF(4,MW[11]) ; USE NORMAL FF FOR ALL ZONES
RSUM124=ROWSUM(124)
IF (RSUM124>0)
   PAF=MW[125]/RSUM124
ELSE
   PAF=0
ENDIF
MW[124]=PAF * MW[124]

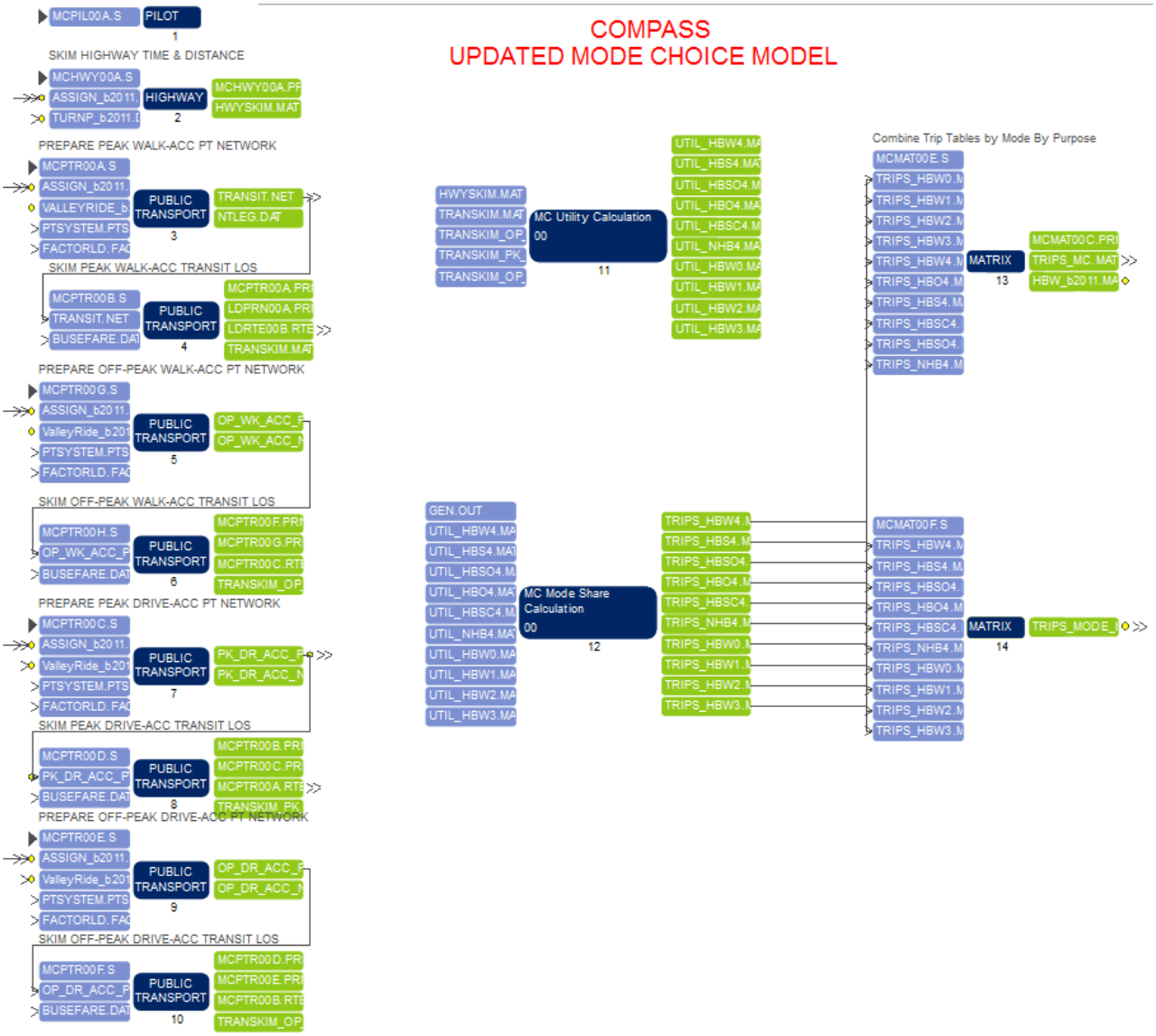
MW[4]=MW[114]+MW[124]        ; GET TOTAL SCHOOL TRIPS
```

```
   ; HBO TD_ADJUST statements removed, by LL 030315
   MW[5] = A[5] * FF(5,MW[11])
   RSUM5=ROWSUM(5)
   IF (RSUM5>0)
      PAF=P[5]/RSUM5
   ELSE
      PAF=0
   ENDIF
   MW[5]=PAF * MW[5]

  ; TRIP LENGTH FREQUENCY REPORT
   FREQUENCY VALUEMW=1, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=2, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=3, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=4, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=5, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=6, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=7, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION
   FREQUENCY VALUEMW=8, BASEMW=11, RANGE=1-80       ; FREQUENCY DISTRIBUTION

   ;REPORT ZDAT=Y
   ;REPORT ACOMP=1-8, ITERATIONS=99                 ; REPORT COMPARISON ON LAST ITERATION

ENDRUN
```




```
;
; SET GLOBAL PARAMETERS
;
;WALKSPEED           = 2.5 ;MILES PER HOUR
;BIKESPEED           = 10  ;MILES PER HOUR
;WALK_ACC_COEF_CUTOFF = 24  ;WALK ACC TIME COEF CUT OFF
;WALK_ACC_CUTOFF      = 15  ;WALK ACC TIME  CUT OFF
;DRIVE_ACC_CUTOFF     = 5   ;DRIVE ACC TIME  CUT OFF
;WALK_DIST_CUTOFF     = 3   ;WALK DIST CUT OFF
;BIKE_DIST_CUTOFF     = 6   ;BIKE DIST CUT OFF
;
; SKIM HIGHWAY TIME AND DISTANCE MATRICES
;
; start Cluster nodes, LL, 2/17/15
*Cluster.EXE D:\UAG\2011Model\calibration\VoyagerModel\Cluster\COMPASS 2-8 Start Exit
DISTRIBUTE INTRASTEP=T MULTISTEP=T


; End of PILOT Script

; Script for program HIGHWAY in file "D:\...\VoyagerModel\MODE CHOICE\MCHWY00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
```

```
RUN PGM=HIGHWAY PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCHWY00A.PRN" MSG='SKIM HIGHWAY
TIME & DISTANCE'
FILEI NETI = "D:\...\...\ASSIGN_b2011.NET"
FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT",
          MO=1-3,NAME= AUTOTIME, HWYDIST, PHTIME

; invoke Cluster, LL, 2/17/15
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8, COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   PHASE=LINKREAD
      LW.CTIME=LI.DISTANCE/LI.CSPD_1*60 ; USE CONGESTED SPEED FROM PH ASGN, CLL, 4/12/12
   ENDPHASE

   PHASE=ILOOP
      PATHLOAD PATH=TIME, PENI=1,
         MW[1]=PATHTRACE(TIME), NOACCESS=0,
         MW[2]=PATHTRACE(LI.DISTANCE), NOACCESS=0

      PATHLOAD PATH=LW.CTIME, PENI=1,
         MW[3]=PATHTRACE(LW.CTIME), NOACCESS=0

      ; CALCULATE INTRAZONAL TRAVEL TIME (50% TO THE NEAREST ZONE)
      MW[1][I] = LOWEST(1,1,0.01,999,I)/2
      MW[2][I] = LOWEST(2,1,0.01,999,I)/2
      MW[3][I] = LOWEST(3,1,0.01,999,I)/2
   ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00A.S"
;
; PREPARE PUBLIC TRANSPORT NETWORK
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT MSG='PREPARE PEAK WALK-ACC PT NETWORK'
FILEI NETI = "D:\...\...\ASSIGN_b2011.NET"
FILEI SYSTEMI = "D:\...\VoyagerModel\MODE CHOICE\TRANSIT\PTSYSTEM.PTS"
FILEI FACTORI[1] = "D:\...\VoyagerModel\MODE CHOICE\TRANSIT\FACTORLD.FAC"
FILEI LINEI[1] = "D:\...\...\VALLEYRIDE_b2011.LIN"

;    FILEO REPORTO = TRANSIT\LDPRN00A.PRN
FILEO NTLEGO = "D:\...\VoyagerModel\MODE CHOICE\TRANSIT\NTLEG.DAT",
          XN=Y
FILEO NETO = "D:\...\VoyagerModel\TRANSIT.NET"

   PHASE=LINKREAD
      LW.HWYTIME = LI.DISTANCE*60/LI.CSPD_1 ; USE PEAK CONGESTED HWY TIME, 4/15/12
;       LW.HWYTIME = LI.DISTANCE*60/LI.SPEED
      LW.WALKTIME = LI.DISTANCE*60/2.5 ; ASSUME WALK SPEED = 2.5 MPH
   ENDPHASE

   ;GLOBALS
   PARAMETERS TRANTIME=LW.HWYTIME

   PHASE=DATAPREP
      ;GENERATE WALK ACCESS/EGRESS LINKS
      GENERATE,
         COST=LW.WALKTIME,
         MAXCOST[1]=3*15,
         NTLEGMODE=101,
```

```
        ONEWAY=F,
        INCLUDELINK = LW.WALKTIME>0,
        FROMNODE=1-3750, TONODE=3751-13000, DIRECTION=3

      ;GENERATE XFER NON-TRANSIT LEGS
      GENERATE,
        COST=LW.WALKTIME,
        MAXCOST[1]=3*20,
        NTLEGMODE = 103,
        ONEWAY=F,
        INCLUDELINK = LW.WALKTIME>0,
        FROMNODE=3751-10250, TONODE=3751-13000, DIRECTION=3
   ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00B.S"
;
; SKIM TRANSIT LOS
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCPTR00A.PRN" MSG='SKIM
PEAK WALK-ACC TRANSIT LOS'
FILEI NETI = "D:\...\VoyagerModel\TRANSIT.NET"
FILEI FAREI = "D:\...\VoyagerModel\MODE CHOICE\TRANSIT\BUSEFARE.DAT"

FILEO ROUTEO[1] = "D:\...\VoyagerModel\LDRTE00B.RTE",
              TRACEI=85, TRACEJ=2458
FILEO REPORTO = "D:\...\VoyagerModel\MODE CHOICE\LDPRN00A.PRN"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT",
              MO=1-9,
              NAME=IWAITA, XWAITA, IVT, WALK, DRIVE, XFER, FARE, TIME, XFERPEN

;    FARE=T

   PHASE=SKIMIJ
     MW[1]  = IWAITA(0)          ; INITIAL WAIT TIME -- initial wait time
     MW[2]  = XWAITA(0)          ; TRANSFER WAIT TIME  -- transfer wait time
     MW[3]  = TIMEA(0,TMODES)     ; IN-VEHICLE TIME (IVT) -- total in-vehicle time of all transit modes
     MW[4]  = TIMEA(0,101,103)    ; TOTAL WALK TIME  -- total walk time (access+egress+transfer)
     MW[5]  = TIMEA(0,102)        ; DRIVE ACCESS TIME drive access time  to nearest park-n-ride
     MW[6]  = MAX(BRDINGS(0,TMODES)-1,0)   ; NUMBER OF BOARDINGS
     MW[7]  = FAREA(0,TMODES)     ; FARES -- sum of fares for all transit modes
     MW[8]  = MW[1]+MW[2]+MW[3]+MW[4]+MW[5]                ; TOTAL TRAVEL TIME
     MW[9]  = XFERPENA(0,TMODES)  ; Transfer penalty
   ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00G.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT MSG='PREPARE OFF-PEAK WALK-ACC PT NETWORK'
FILEI NETI = "D:\...\...\ASSIGN_b2011.NET"
FILEO NTLEGO = "D:\...\VoyagerModel\Mode Choice\transit\OP_WK_ACC_NTLegs.DAT",
          XN=Y
FILEO NETO = "D:\...\VoyagerModel\Mode Choice\transit\OP_WK_ACC_PT.NET"
FILEI FACTORI[1] = "D:\...\VoyagerModel\Mode Choice\transit\FACTORLD.FAC"
FILEI SYSTEMI = "D:\...\VoyagerModel\Mode Choice\transit\PTSYSTEM.PTS"
FILEI LINEI[1] = "D:\...\...\ValleyRide_b2011.lin"

   PHASE=LINKREAD
```

```
;       LW.HWYTIME = LI.DISTANCE*60/LI.CSPD_1 ; USE PEAK CONGESTED HWY TIME, 4/15/12
        LW.HWYTIME = LI.DISTANCE*60/LI.SPEED
        LW.WALKTIME = LI.DISTANCE*60/2.5 ; ASSUME WALK SPEED = 2.5 MPH
    ENDPHASE

    ;GLOBALS
    PARAMETERS TRANTIME=LW.HWYTIME

    PHASE=DATAPREP
        ;GENERATE WALK ACCESS/EGRESS LINKS
        GENERATE,
            COST=LW.WALKTIME,
            MAXCOST[1]=3*15,
            NTLEGMODE=101,
            ONEWAY=F,
            INCLUDELINK = LW.WALKTIME>0,
            FROMNODE=1-3750, TONODE=3751-13000, DIRECTION=3

        ;GENERATE XFER NON-TRANSIT LEGS
        GENERATE,
            COST=LW.WALKTIME,
            MAXCOST[1]=3*20,
            NTLEGMODE = 103,
            ONEWAY=F,
            INCLUDELINK = LW.WALKTIME>0,
            FROMNODE=3751-10250, TONODE=3751-13000, DIRECTION=3
    ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00H.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCPTR00F.PRN" MSG='SKIM OFF-
PEAK WALK-ACC TRANSIT LOS'
FILEO MATO[1] = "D:\...\VoyagerModel\Mode Choice\TRANSKIM_OP_WK.MAT",
                MO=1-9,
                NAME=IWAITA, XWAITA, IVT, WALK, DRIVE, XFER, FARE, TIME, XFERPEN
FILEO ROUTEO[1] = "D:\...\VoyagerModel\MODE CHOICE\MCPTR00C.RTE"
FILEO REPORTO = "D:\...\VoyagerModel\MODE CHOICE\MCPTR00G.PRN"
FILEI FAREI = "D:\...\VoyagerModel\Mode Choice\transit\BUSEFARE.DAT"
FILEI NETI = "D:\...\VoyagerModel\Mode Choice\transit\OP_WK_ACC_PT.NET"

;    FARE=T

    PHASE=SKIMIJ
      MW[1]  = IWAITA(0)          ; INITIAL WAIT TIME -- initial wait time
      MW[2]  = XWAITA(0)          ; TRANSFER WAIT TIME  -- transfer wait time
      MW[3]  = TIMEA(0,TMODES)    ; IN-VEHICLE TIME (IVT) -- total in-vehicle time of all transit modes
      MW[4]  = TIMEA(0,101,103)   ; TOTAL WALK TIME  -- total walk time (access+egress+transfer)
      MW[5]  = TIMEA(0,102)       ; DRIVE ACCESS TIME drive access time  to nearest park-n-ride
      MW[6]  = MAX(BRDINGS(0,TMODES)-1,0)   ; NUMBER OF BOARDINGS
      MW[7]  = FAREA(0,TMODES)    ; FARES -- sum of fares for all transit modes
      MW[8]  = MW[1]+MW[2]+MW[3]+MW[4]+MW[5]                ; TOTAL TRAVEL TIME
      MW[9]  = XFERPENA(0,TMODES)  ; Transfer penalty
    ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00C.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT MSG='PREPARE PEAK DRIVE-ACC PT NETWORK'
```

```
FILEI NETI = "D:\...\...\ASSIGN_b2011.NET"
FILEO NTLEGO = "D:\...\VoyagerModel\Mode Choice\transit\PK_DR_ACC_NTLegs.DAT",
          XN=Y
FILEO NETO = "D:\...\...\PK_DR_ACC_PT_b2011.NET"
FILEI FACTORI[1] = "D:\...\VoyagerModel\Mode Choice\transit\FACTORLD.FAC"
FILEI SYSTEMI = "D:\...\VoyagerModel\Mode Choice\transit\PTSYSTEM.PTS"
FILEI LINEI[1] = "D:\...\...\ValleyRide_b2011.lin"

   PHASE=LINKREAD
      LW.HWYTIME = LI.DISTANCE*60/LI.CSPD_1 ; USE PEAK CONGESTED HWY TIME, 4/15/12
;      LW.HWYTIME = LI.DISTANCE*60/LI.SPEED
      LW.WALKTIME = LI.DISTANCE*60/2.5 ; ASSUME WALK SPEED = 2.5 MPH
   ENDPHASE

   ;GLOBALS
   PARAMETERS TRANTIME=LW.HWYTIME

   PHASE=DATAPREP
      ;GENERATE WALK EGRESS LINKS
      GENERATE,
         COST=LW.WALKTIME,
         MAXCOST[1]=3*15,
         NTLEGMODE=101,
         ONEWAY=T,
         INCLUDELINK = LW.WALKTIME>0,
         FROMNODE=3751-13000, TONODE=1-3750, DIRECTION=1

      ;GENERATE DRIVE ACCESS (PARK AND RIDE) LINKS FOR RAIL ALTERNATIVES add 2 minutes from pnr to
rail stop
      GENERATE,
         COST=LW.HWYTIME,
         MAXCOST[1]=3*5,
         NTLEGMODE=102,
         ONEWAY=T,
         INCLUDELINK = LW.HWYTIME>0,
         FROMNODE=1-3750,
         ACCESSLINK=8808,12000,2,
                  9320,12001,2, ;comment out for commuter rail
                 10606,12002,2,
                  9614,12003,2,
                 10604,12015,2,
                  7398,12016,2,
                 10608,12017,2,
                  6750,12018,2,
                  4157,12019,2,
                  5996,12023,2

      ;GENERATE DRIVE ACCESS/EGRESS (PARK AND RIDE) LINKS
      GENERATE,
         COST=LW.HWYTIME,
         MAXCOST[1]=3*5,
         NTLEGMODE=102,
         ONEWAY=T,
         INCLUDELINK = LW.HWYTIME>0,
         FROMNODE=1-3750, TONODE=6964,7571,9465,10194,8060,8181,4389,494, ; PNR NODES
         DIRECTION=1    ; GENERATE DRIVE ACCESS LINKS ONLY (NO INBOUND LINKS), CLL, 9/1/12
;         FROMNODE=1-3750, TONODE=4699,6964,5663,8210,5507,8060,8181,158,4389,9232 ; PNR NODES

      ;GENERATE XFER NON-TRANSIT LEGS
      GENERATE,
         COST=LW.WALKTIME,
         MAXCOST[1]=3*20,
         NTLEGMODE = 103,
```

```
        ONEWAY=F,
        INCLUDELINK = LW.WALKTIME>0,
        FROMNODE=3751-13000, TONODE=3751-13000, DIRECTION=3
  ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00D.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCPTR00B.PRN" MSG='SKIM
PEAK DRIVE-ACC TRANSIT LOS'
FILEO MATO[1] = "D:\...\VoyagerModel\Mode Choice\TRANSKIM_PK_DR.MAT",
              MO=1-9,
              NAME=IWAITA, XWAITA, IVT, WALK, DRIVE, XFER, FARE, TIME, XFERPEN


FILEO ROUTEO[1] = "D:\...\VoyagerModel\MCPTR00A.RTE"
FILEO REPORTO = "D:\...\VoyagerModel\MODE CHOICE\MCPTR00C.PRN"
FILEI FAREI = "D:\...\VoyagerModel\Mode Choice\transit\BUSEFARE.DAT"
FILEI NETI = "D:\...\...\PK_DR_ACC_PT_b2011.NET"


;    FARE=T

   PHASE=SKIMIJ
     MW[1]  = IWAITA(0)          ; INITIAL WAIT TIME -- initial wait time
     MW[2]  = XWAITA(0)          ; TRANSFER WAIT TIME  -- transfer wait time
     MW[3]  = TIMEA(0,TMODES)     ; IN-VEHICLE TIME (IVT) -- total in-vehicle time of all transit modes
     MW[4]  = TIMEA(0,101,103)    ; TOTAL WALK TIME  -- total walk time (access+egress+transfer)
     MW[5]  = TIMEA(0,102)       ; DRIVE ACCESS TIME drive access time  to nearest park-n-ride
     MW[6]  = MAX(BRDINGS(0,TMODES)-1,0)   ; NUMBER OF BOARDINGS
     MW[7]  = FAREA(0,TMODES)     ; FARES -- sum of fares for all transit modes
     MW[8]  = MW[1]+MW[2]+MW[3]+MW[4]+MW[5]                ; TOTAL TRAVEL TIME
     MW[9]  = XFERPENA(0,TMODES)  ; Transfer penalty
   ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00E.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT MSG='PREPARE OFF-PEAK DRIVE-ACC PT NETWORK'
FILEI NETI = "D:\...\...\ASSIGN_b2011.NET"
FILEO NTLEGO = "D:\...\VoyagerModel\Mode Choice\transit\OP_DR_ACC_NTLegs.DAT",
           XN=Y
FILEO NETO = "D:\...\VoyagerModel\Mode Choice\transit\OP_DR_ACC_PT.NET"
FILEI FACTORI[1] = "D:\...\VoyagerModel\Mode Choice\transit\FACTORLD.FAC"
FILEI SYSTEMI = "D:\...\VoyagerModel\Mode Choice\transit\PTSYSTEM.PTS"
FILEI LINEI[1] = "D:\...\...\ValleyRide_b2011.lin"

   PHASE=LINKREAD
;       LW.HWYTIME = LI.DISTANCE*60/LI.CSPD_1 ; USE PEAK CONGESTED HWY TIME, 4/15/12
      LW.HWYTIME = LI.DISTANCE*60/LI.SPEED   ; OFF-PEAK USE FREEFLOW TIME, 5/18/12
      LW.WALKTIME = LI.DISTANCE*60/2.5 ; ASSUME WALK SPEED = 2.5 MPH
   ENDPHASE

   ;GLOBALS
   PARAMETERS TRANTIME=LW.HWYTIME

   PHASE=DATAPREP
      ;GENERATE WALK EGRESS LINKS
      GENERATE,
```

```
         COST=LW.WALKTIME,
         MAXCOST[1]=3*15,
         NTLEGMODE=101,
         ONEWAY=T,
         INCLUDELINK = LW.WALKTIME>0,
         FROMNODE=3751-13000, TONODE=1-3750, DIRECTION=1

      ;GENERATE DRIVE ACCESS (PARK AND RIDE) LINKS FOR RAIL ALTERNATIVES add 2 minutes from pnr to
rail stop
      GENERATE,
         COST=LW.HWYTIME,
         MAXCOST[1]=3*5,
         NTLEGMODE=102,
         ONEWAY=T,
         INCLUDELINK = LW.HWYTIME>0,
         FROMNODE=1-3750,
         ACCESSLINK=8808,12000,2,

      ;GENERATE DRIVE ACCESS/EGRESS (PARK AND RIDE) LINKS
      GENERATE,
         COST=LW.HWYTIME,
         MAXCOST[1]=3*5,
         NTLEGMODE=102,
         ONEWAY=T,
         INCLUDELINK = LW.HWYTIME>0,
         FROMNODE=1-3750, TONODE=6964,7571,9465,10194,8060,8181,4389,494, ; PNR NODES
         DIRECTION=1    ; GENERATE DRIVE ACCESS LINKS ONLY (NO INBOUND LINKS), CLL, 9/1/12
;         FROMNODE=1-3750, TONODE=4699,6964,5663,8210,5507,8060,8181,158,4389,9232 ; PNR NODES

      ;GENERATE XFER NON-TRANSIT LEGS
      GENERATE,
         COST=LW.WALKTIME,
         MAXCOST[1]=3*20,
         NTLEGMODE = 103,
         ONEWAY=F,
         INCLUDELINK = LW.WALKTIME>0,
         FROMNODE=3751-13000, TONODE=3751-13000, DIRECTION=3
   ENDPHASE
ENDRUN


; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\MODE CHOICE\MCPTR00F.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCPTR00D.PRN" MSG='SKIM
OFF-PEAK DRIVE-ACC TRANSIT LOS'
FILEO ROUTEO[1] = "D:\...\VoyagerModel\MODE CHOICE\MCPTR00B.RTE"
FILEO REPORTO = "D:\...\VoyagerModel\MODE CHOICE\MCPTR00E.PRN"
FILEO MATO[1] = "D:\...\VoyagerModel\Mode Choice\TRANSKIM_OP_DR.MAT",
               MO=1-9,
               NAME=IWAITA, XWAITA, IVT, WALK, DRIVE, XFER, FARE, TIME, XFERPEN


FILEI FAREI = "D:\...\VoyagerModel\Mode Choice\transit\BUSEFARE.DAT"
FILEI NETI = "D:\...\VoyagerModel\Mode Choice\transit\OP_DR_ACC_PT.NET"


;    FARE=T

   PHASE=SKIMIJ
     MW[1]  = IWAITA(0)          ; INITIAL WAIT TIME -- initial wait time
     MW[2]  = XWAITA(0)          ; TRANSFER WAIT TIME  -- transfer wait time
     MW[3]  = TIMEA(0,TMODES)     ; IN-VEHICLE TIME (IVT) -- total in-vehicle time of all transit modes
```

```
    MW[4]  = TIMEA(0,101,103)    ; TOTAL WALK TIME  -- total walk time (access+egress+transfer)
    MW[5]  = TIMEA(0,102)        ; DRIVE ACCESS TIME drive access time  to nearest park-n-ride
    MW[6]  = MAX(BRDINGS(0,TMODES)-1,0)   ; NUMBER OF BOARDINGS
    MW[7]  = FAREA(0,TMODES)     ; FARES -- sum of fares for all transit modes
    MW[8]  = MW[1]+MW[2]+MW[3]+MW[4]+MW[5]                ; TOTAL TRAVEL TIME
    MW[9]  = XFERPENA(0,TMODES)  ; Transfer penalty
  ENDPHASE
ENDRUN
```


```
; SET GLOBAL PARAMETERS
;
  WALK_SPEED          = 2.5
  BIKE_SPEED          = 10
  WALK_ACC_COEF_CUTOFF = 24
  WALK_ACC_CUTOFF      = 15
  DRIVE_ACC_CUTOFF     = 5
  WALK_DIST_CUTOFF     = 3
  BIKE_DIST_CUTOFF     = 6


;Purpose_1
; End of PILOT Script
; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW Total Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW4.MAT",
            MO=101-105,DEC=5*D,
            NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster
```

```
Purpose=1

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

     JLOOP
        ; PARKING COST
        IF (J==1-27)    ; DOWNTOWN BOISE
           MW[10]=3.2
        ELSEIF (J==40)  ; BSU
           MW[10]=2.2
        ELSEIF (J==72)  ; Airport
           MW[10]=9.00 ; updated by LL, 062705

        ENDIF

        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
           MW[101] = ASC_AUTO + ASC_MOTOR +
                 IVT_COEF*MW[1] +
                 PARKCOST_COEF*(MW[10]+0.11*mw[2]) ; include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
        ELSE
           MW[101]=-99
        ENDIF
        ; UTILITY FOR BUS_WALK
        IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
           MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                 IVT_COEF*MW[3] +
                 INITWAIT_COEF*MW[4] +
                 XFERWAIT_COEF*MW[5] +
                 WALK_COEF_1*MW[21] +
                 WALK_COEF_GT_1*MW[22] +
                 TRANSFERS_COEF*MW[8] +
                 COST_COEF*MW[9]
        ELSE
           MW[102]=-99
        ENDIF
        ; UTILITY FOR BUS_AUTO
        IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
           MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                 IVT_COEF*MW[13] +
                 INITWAIT_COEF*MW[14] +
                 XFERWAIT_COEF*MW[15] +
                 DRIVE_COEF*MW[17] +
                 TRANSFERS_COEF*MW[18] +
                 PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                 COST_COEF*MW[19]
        ELSE
           MW[103]=-99
        ENDIF
        ; UTILITY FOR WALK
```

```
      IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
         MW[104] = ASC_WALK + ASC_NONMOTOR +
                WALK_COEF_1*MW[25] +
                WALK_COEF_GT_1*MW[26]
      ELSE
         MW[104]=-99
      ENDIF
      ; UTILITY FOR BIKE
      IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
         MW[105] = ASC_BIKE + ASC_NONMOTOR +
                BIKE_COEF*MW[23]
      ELSE
         MW[105]=-99
      ENDIF
   ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00B.S"
;Purpose_2

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBS Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBS4.MAT",
         MO=101-105,DEC=5*D,
         NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

   ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=2

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

   MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
   MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
   MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
   MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
   MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
   MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES


READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

   JLOOP
      ; PARKING COST
      IF (J==1-27)    ; DOWNTOWN BOISE
         MW[10]=3.2
      ELSEIF (J==40)  ; BSU
         MW[10]=2.2
      ELSEIF (J==72)  ; Airport
         MW[10]=9.00 ; updated by LL, 062705

      ENDIF
```

```
        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
           MW[101] = ASC_AUTO + ASC_MOTOR +
                 IVT_COEF*MW[1] +
                 PARKCOST_COEF*(MW[10]+0.11*mw[2]) ; include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
        ELSE
           MW[101]=-99
        ENDIF
        ; UTILITY FOR BUS_WALK
        IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
           MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                 IVT_COEF*MW[3] +
                 INITWAIT_COEF*MW[4] +
                 XFERWAIT_COEF*MW[5] +
                 WALK_COEF_1*MW[21] +
                 WALK_COEF_GT_1*MW[22] +
                 TRANSFERS_COEF*MW[8] +
                 COST_COEF*MW[9]
        ELSE
           MW[102]=-99
        ENDIF
        ; UTILITY FOR BUS_AUTO
        IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
           MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                 IVT_COEF*MW[13] +
                 INITWAIT_COEF*MW[14] +
                 XFERWAIT_COEF*MW[15] +
                 DRIVE_COEF*MW[17] +
                 TRANSFERS_COEF*MW[18] +
                 PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                 COST_COEF*MW[19]
        ELSE
           MW[103]=-99
        ENDIF
        ; UTILITY FOR WALK
        IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
           MW[104] = ASC_WALK + ASC_NONMOTOR +
                 WALK_COEF_1*MW[25] +
                 WALK_COEF_GT_1*MW[26]
        ELSE
           MW[104]=-99
        ENDIF
        ; UTILITY FOR BIKE
        IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
           MW[105] = ASC_BIKE + ASC_NONMOTOR +
                 BIKE_COEF*MW[23]
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00C.S"

;Purpose_3

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBSO Utilities'
```

```
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBSO4.MAT",
          MO=101-105,DEC=5*D,
          NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=3

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

     JLOOP
       ; PARKING COST
       IF (J==1-27)    ; DOWNTOWN BOISE
          MW[10]=3.2
       ELSEIF (J==40)  ; BSU
          MW[10]=2.2
       ELSEIF (J==72)  ; Airport
          MW[10]=9.00 ; updated by LL, 062705

       ENDIF

       ; UTILITY FOR AUTO
       IF (MW[1]>0) THEN ; PATH EXISTS
          MW[101] = ASC_AUTO + ASC_MOTOR +
                IVT_COEF*MW[1] +
              PARKCOST_COEF*(MW[10]+0.11*mw[2])  ; include AUTO OPERATING COST = $0.11*DISTANCE,
CLL
       ELSE
          MW[101]=-99
       ENDIF
       ; UTILITY FOR BUS_WALK
       IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
          MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                IVT_COEF*MW[3] +
                INITWAIT_COEF*MW[4] +
                XFERWAIT_COEF*MW[5] +
                WALK_COEF_1*MW[21] +
                WALK_COEF_GT_1*MW[22] +
                TRANSFERS_COEF*MW[8] +
                COST_COEF*MW[9]
       ELSE
          MW[102]=-99
       ENDIF
       ; UTILITY FOR BUS_AUTO
       IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
          MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
```

```
                IVT_COEF*MW[13] +
                INITWAIT_COEF*MW[14] +
                XFERWAIT_COEF*MW[15] +
                DRIVE_COEF*MW[17] +
                TRANSFERS_COEF*MW[18] +
                PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                COST_COEF*MW[19]
        ELSE
           MW[103]=-99
        ENDIF
        ; UTILITY FOR WALK
        IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
           MW[104] = ASC_WALK + ASC_NONMOTOR +
                WALK_COEF_1*MW[25] +
                WALK_COEF_GT_1*MW[26]
        ELSE
           MW[104]=-99
        ENDIF
        ; UTILITY FOR BIKE
        IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
           MW[105] = ASC_BIKE + ASC_NONMOTOR +
                BIKE_COEF*MW[23]
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00D.S"

;Purpose_4

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBO Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBO4.MAT",
           MO=101-105,DEC=5*D,
           NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

                        ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=4

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

    MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
    MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES

    MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME

    MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
    MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
    MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES
```

```
READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

        JLOOP
          ; PARKING COST
          IF (J==1-27)    ; DOWNTOWN BOISE
             MW[10]=3.2
          ELSEIF (J==40)  ; BSU
             MW[10]=2.2
          ELSEIF (J==72)  ; Airport
             MW[10]=9.00 ; updated 06/27/05

          ENDIF

          ; UTILITY FOR AUTO
          IF (MW[1]>0) THEN ; PATH EXISTS
             MW[101] = ASC_AUTO + ASC_MOTOR +
                    IVT_COEF*MW[1] +
                 PARKCOST_COEF*(MW[10]+0.11*mw[2])  ; include AUTO OPERATING COST = $0.11*DISTANCE,
CLL
;
          ELSE
             MW[101]=-99
          ENDIF
          ; UTILITY FOR BUS_WALK
          IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
             MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                    IVT_COEF*MW[3] +
                    INITWAIT_COEF*MW[4] +
                    XFERWAIT_COEF*MW[5] +
                    WALK_COEF_1*MW[21] +
                    WALK_COEF_GT_1*MW[22] +
                    TRANSFERS_COEF*MW[8] +
                    COST_COEF*MW[9]
          ELSE
             MW[102]=-99
          ENDIF
          ; UTILITY FOR BUS_AUTO
          IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
             MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                    IVT_COEF*MW[13] +
                    INITWAIT_COEF*MW[14] +
                    XFERWAIT_COEF*MW[15] +
                    DRIVE_COEF*MW[17] +
                    TRANSFERS_COEF*MW[18] +
                    PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                    COST_COEF*MW[19]
          ELSE
             MW[103]=-99
          ENDIF
          ; UTILITY FOR WALK
          IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
             MW[104] = ASC_WALK + ASC_NONMOTOR +
                    WALK_COEF_1*MW[25] +
                    WALK_COEF_GT_1*MW[26]
          ELSE
             MW[104]=-99
          ENDIF
          ; UTILITY FOR BIKE
          IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
             MW[105] = ASC_BIKE + ASC_NONMOTOR +
```

```
                BIKE_COEF*MW[23]
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00E.S"
;Purpose_5
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBSC Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBSC4.MAT",
           MO=101-105,DEC=5*D,
           NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

                        ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=5

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES

     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME

     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)      ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0)  ; HIGHWAY WALK TIME - SECOND 24
MINUTES



READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"
     JLOOP
        ; PARKING COST
        IF (J==1-27)    ; DOWNTOWN BOISE
           MW[10]=3.2
        ELSEIF (J==40)  ; BSU
           MW[10]=2.2
        ELSEIF (J==72)  ; Airport
           MW[10]=9.00 ; updated by LL, 062705

        ENDIF

        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
           MW[101] = ASC_AUTO + ASC_MOTOR +
                  IVT_COEF*MW[1] +
                  PARKCOST_COEF*(MW[10]+0.11*mw[2]) ;include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
;                  PARKCOST_COEF*MW[10]
        ELSE
```

```
            MW[101]=-99
         ENDIF
         ; UTILITY FOR BUS_WALK
         IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
            MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[3] +
                  INITWAIT_COEF*MW[4] +
                  XFERWAIT_COEF*MW[5] +
                  WALK_COEF_1*MW[21] +
                  WALK_COEF_GT_1*MW[22] +
                  TRANSFERS_COEF*MW[8] +
                  COST_COEF*MW[9]
         ELSE
            MW[102]=-99
         ENDIF
         ; UTILITY FOR BUS_AUTO
         IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
            MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[13] +
                  INITWAIT_COEF*MW[14] +
                  XFERWAIT_COEF*MW[15] +
                  DRIVE_COEF*MW[17] +
                  TRANSFERS_COEF*MW[18] +
                  PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                  COST_COEF*MW[19]
         ELSE
            MW[103]=-99
         ENDIF
         ; UTILITY FOR WALK
         IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
            MW[104] = ASC_WALK + ASC_NONMOTOR +
                  WALK_COEF_1*MW[25] +
                  WALK_COEF_GT_1*MW[26]
         ELSE
            MW[104]=-99
         ENDIF
         ; UTILITY FOR BIKE
         IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
            MW[105] = ASC_BIKE + ASC_NONMOTOR +
                  BIKE_COEF*MW[23]
         ELSE
            MW[105]=-99
         ENDIF
      ENDJLOOP
ENDRUN

; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00F.S"

;Purpose_6

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode NHB Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_NHB4.MAT",
            MO=101-105,DEC=5*D,
            NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE
```

```
                    ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=6

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES

     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME

     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

      JLOOP
        ; PARKING COST
        IF (J==1-27)    ; DOWNTOWN BOISE
          MW[10]=3.2
        ELSEIF (J==40)  ; BSU
          MW[10]=2.2
        ELSEIF (J==72)  ; Airport
          MW[10]=9.00 ; updated by LL, 062705

        ENDIF

        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
          MW[101] = ASC_AUTO + ASC_MOTOR +
                IVT_COEF*MW[1] +
                PARKCOST_COEF*(MW[10]+0.11*mw[2])  ;include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
;                PARKCOST_COEF*MW[10]
        ELSE
          MW[101]=-99
        ENDIF
        ; UTILITY FOR BUS_WALK
        IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
          MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                IVT_COEF*MW[3] +
                INITWAIT_COEF*MW[4] +
                XFERWAIT_COEF*MW[5] +
                WALK_COEF_1*MW[21] +
                WALK_COEF_GT_1*MW[22] +
                TRANSFERS_COEF*MW[8] +
                COST_COEF*MW[9]
        ELSE
          MW[102]=-99
        ENDIF
        ; UTILITY FOR BUS_AUTO
        IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
          MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                IVT_COEF*MW[13] +
                INITWAIT_COEF*MW[14] +
                XFERWAIT_COEF*MW[15] +
                DRIVE_COEF*MW[17] +
```

```
                TRANSFERS_COEF*MW[18] +
                PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                COST_COEF*MW[19]
        ELSE
           MW[103]=-99
        ENDIF
        ; UTILITY FOR WALK
        IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
           MW[104] = ASC_WALK + ASC_NONMOTOR +
                WALK_COEF_1*MW[25] +
                WALK_COEF_GT_1*MW[26]
        ELSE
           MW[104]=-99
        ENDIF
        ; UTILITY FOR BIKE
        IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
           MW[105] = ASC_BIKE + ASC_NONMOTOR +
                BIKE_COEF*MW[23]
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00G.S"

;Purpose_7

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 0 Auto Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW0.MAT",
           MO=101-105,DEC=5*D,
           NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

                        ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=7

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES



READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"
```

```
      JLOOP
         ; PARKING COST
         IF (J==1-27)    ; DOWNTOWN BOISE
            MW[10]=3.2
         ELSEIF (J==40)  ; BSU
            MW[10]=2.2
         ELSEIF (J==72)  ; Airport
            MW[10]=9.00 ; updated by LL, 062705

         ENDIF

         ; UTILITY FOR AUTO
         IF (MW[1]>0) THEN ; PATH EXISTS
            MW[101] = ASC_AUTO + ASC_MOTOR +
                  IVT_COEF*MW[1] +
;                  WALK_COEF_1*MW[21] +
;                  WALK_COEF_GT_1*MW[22] +
;                  COST_COEF*MW[9] +
                  PARKCOST_COEF*(MW[10]+0.11*mw[2]) ; include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
;                  PARKCOST_COEF*MW[10]
         ELSE
            MW[101]=-99
         ENDIF
         ; UTILITY FOR BUS_WALK
         IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
            MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[3] +
                  INITWAIT_COEF*MW[4] +
                  XFERWAIT_COEF*MW[5] +
                  WALK_COEF_1*MW[21] +
                  WALK_COEF_GT_1*MW[22] +
                  TRANSFERS_COEF*MW[8] +
                  COST_COEF*MW[9]
         ELSE
            MW[102]=-99
         ENDIF
         ; UTILITY FOR BUS_AUTO
         IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
            MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[13] +
                  INITWAIT_COEF*MW[14] +
                  XFERWAIT_COEF*MW[15] +
                  DRIVE_COEF*MW[17] +
                  TRANSFERS_COEF*MW[18] +
                  PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                  COST_COEF*MW[19]
         ELSE
            MW[103]=-99
         ENDIF
         ; UTILITY FOR WALK
         IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
            MW[104] = ASC_WALK + ASC_NONMOTOR +
                  WALK_COEF_1*MW[25] +
                  WALK_COEF_GT_1*MW[26]
         ELSE
            MW[104]=-99
         ENDIF
         ; UTILITY FOR BIKE
         IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
            MW[105] = ASC_BIKE + ASC_NONMOTOR +
                  BIKE_COEF*MW[23]
```

```
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00H.S"

;Purpose_8

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 1 Auto Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW1.MAT",
           MO=101-105,DEC=5*D,
           NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE

                        ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=8

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

    MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
    MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
    MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
    MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
    MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
    MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES



READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"


     JLOOP
        ; PARKING COST
        IF (J==1-27)    ; DOWNTOWN BOISE
           MW[10]=3.2
        ELSEIF (J==40)  ; BSU
           MW[10]=2.2
        ELSEIF (J==72)  ; Airport
           MW[10]=9.00 ; updated by LL, 062705

        ENDIF

        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
           MW[101] = ASC_AUTO + ASC_MOTOR +
                  IVT_COEF*MW[1] +
                  PARKCOST_COEF*(MW[10]+0.11*mw[2])  ;include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
        ELSE
```

```
         MW[101]=-99
      ENDIF
      ; UTILITY FOR BUS_WALK
      IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
         MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
               IVT_COEF*MW[3] +
               INITWAIT_COEF*MW[4] +
               XFERWAIT_COEF*MW[5] +
               WALK_COEF_1*MW[21] +
               WALK_COEF_GT_1*MW[22] +
               TRANSFERS_COEF*MW[8] +
               COST_COEF*MW[9]
      ELSE
         MW[102]=-99
      ENDIF
      ; UTILITY FOR BUS_AUTO
      IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
         MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
               IVT_COEF*MW[13] +
               INITWAIT_COEF*MW[14] +
               XFERWAIT_COEF*MW[15] +
               DRIVE_COEF*MW[17] +
               TRANSFERS_COEF*MW[18] +
               PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
               COST_COEF*MW[19]
      ELSE
         MW[103]=-99
      ENDIF
      ; UTILITY FOR WALK
      IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
         MW[104] = ASC_WALK + ASC_NONMOTOR +
               WALK_COEF_1*MW[25] +
               WALK_COEF_GT_1*MW[26]
      ELSE
         MW[104]=-99
      ENDIF
      ; UTILITY FOR BIKE
      IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
         MW[105] = ASC_BIKE + ASC_NONMOTOR +
               BIKE_COEF*MW[23]
      ELSE
         MW[105]=-99
      ENDIF
   ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00I.S"

;Purpose_9

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 2 Auto Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW2.MAT",
         MO=101-105,DEC=5*D,
         NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE
```

```
DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=9

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)  ; TRANSIT WALK TIME - SECOND 24 MINUTES
     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME
     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)     ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0) ; HIGHWAY WALK TIME - SECOND 24
MINUTES

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"

      JLOOP
        ; PARKING COST
        IF (J==1-27)    ; DOWNTOWN BOISE
           MW[10]=3.2
        ELSEIF (J==40)  ; BSU
           MW[10]=2.2
        ELSEIF (J==72)  ; Airport
           MW[10]=9.00 ; updated by LL, 062705

        ENDIF

        ; UTILITY FOR AUTO
        IF (MW[1]>0) THEN ; PATH EXISTS
           MW[101] = ASC_AUTO + ASC_MOTOR +
                  IVT_COEF*MW[1] +
                  PARKCOST_COEF*(MW[10]+0.11*mw[2])  ;include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
;                  PARKCOST_COEF*MW[10]
        ELSE
           MW[101]=-99
        ENDIF
        ; UTILITY FOR BUS_WALK
        IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
;         IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@ &&       ; PATH EXISTS & WALK ACC TIME <
CUTOFF
;            MW[3]<=40 &&                        ; IVT TIME < 40 MIN
;            MW[8] <=3) THEN                      ; NO MORE THAN 3 TRANSFERS
           MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[3] +
                  INITWAIT_COEF*MW[4] +
                  XFERWAIT_COEF*MW[5] +
                  WALK_COEF_1*MW[21] +
                  WALK_COEF_GT_1*MW[22] +
;                  DRIVE_COEF*MW[7] +
                  TRANSFERS_COEF*MW[8] +
                  COST_COEF*MW[9]
        ELSE
           MW[102]=-99
        ENDIF
        ; UTILITY FOR BUS_AUTO
        IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
;         IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@ &&     ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
```

```
;            MW[13]<=40 &&                        ; IVT TIME < 40 MIN
;            MW[18]<=3) THEN                      ; NO MORE THAN 3 TRANSFERS
           MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[13] +
                  INITWAIT_COEF*MW[14] +
                  XFERWAIT_COEF*MW[15] +
;                  WALK_COEF_1*MW[21] +
;                  WALK_COEF_GT_1*MW[22] +
                  DRIVE_COEF*MW[17] +
                  TRANSFERS_COEF*MW[18] +
                  PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                  COST_COEF*MW[19]
        ELSE
           MW[103]=-99
        ENDIF
        ; UTILITY FOR WALK
        IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
           MW[104] = ASC_WALK + ASC_NONMOTOR +
                  WALK_COEF_1*MW[25] +
                  WALK_COEF_GT_1*MW[26]
        ELSE
           MW[104]=-99
        ENDIF
        ; UTILITY FOR BIKE
        IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
           MW[105] = ASC_BIKE + ASC_NONMOTOR +
                  BIKE_COEF*MW[23]
        ELSE
           MW[105]=-99
        ENDIF
     ENDJLOOP
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\UTMAT00J.S"


;Purpose_10

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 3 Auto Utilities'
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_DR.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_PK_DR.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM_OP_WK.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\HWYSKIM.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRANSKIM.MAT"
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW3.MAT",
           MO=101-105,DEC=5*D,
           NAME=U_AUTO, U_BUS_WALK, U_BUS_AUTO, U_WALK, U_BIKE


                        ; SET PK/OP LOS BASED ON TRIP PURPOSE, LL, 6/6/12

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

Purpose=10

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\LOS.INC"

     MW[21] = MIN(MW[6],@WALK_ACC_COEF_CUTOFF@)      ; TRANSIT WALK TIME - FIRST 24 MINUTES
     MW[22] = MAX((MW[6]-@WALK_ACC_COEF_CUTOFF@),0)   ; TRANSIT WALK TIME - SECOND 24 MINUTES
```

```
     MW[23] = MW[2]*60/@BIKE_SPEED@   ; BIKE TRAVEL TIME

     MW[24] = MW[2]*60/@WALK_SPEED@   ; HIGHWAY WALK TIME
     MW[25] = MIN(MW[24],@WALK_ACC_COEF_CUTOFF@)      ; HIGHWAY WALK TIME - FIRST 24 MINUTES
     MW[26] = MAX((MW[24]-@WALK_ACC_COEF_CUTOFF@),0)  ; HIGHWAY WALK TIME - SECOND 24
MINUTES

READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\COEFFICENTS.INC"
      JLOOP
         ; PARKING COST
         IF (J==1-27)    ; DOWNTOWN BOISE
            MW[10]=3.2
         ELSEIF (J==40)  ; BSU
            MW[10]=2.2
         ELSEIF (J==72)  ; Airport
            MW[10]=9.00 ; updated by LL, 062705

         ENDIF

         ; UTILITY FOR AUTO
         IF (MW[1]>0) THEN ; PATH EXISTS
            MW[101] = ASC_AUTO + ASC_MOTOR +
                  IVT_COEF*MW[1] +
                  PARKCOST_COEF*(MW[10]+0.11*mw[2])  ;include AUTO OPERATING COST =
$0.11*DISTANCE, CLL
         ELSE
            MW[101]=-99
         ENDIF
         ; UTILITY FOR BUS_WALK
         IF (MW[3]>0 && MW[6]<@WALK_ACC_CUTOFF@) THEN ; PATH EXISTS & WALK ACC TIME < CUTOFF
            MW[102] = ASC_WALKACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[3] +
                  INITWAIT_COEF*MW[4] +
                  XFERWAIT_COEF*MW[5] +
                  WALK_COEF_1*MW[21] +
                  WALK_COEF_GT_1*MW[22] +
;                  DRIVE_COEF*MW[7] +
                  TRANSFERS_COEF*MW[8] +
                  COST_COEF*MW[9]
         ELSE
            MW[102]=-99
         ENDIF
         ; UTILITY FOR BUS_AUTO
         IF (MW[13]>0 && MW[17]<@DRIVE_ACC_CUTOFF@) THEN ; PATH EXISTS & DRIVE ACC TIME <
CUTOFF
            MW[103] = ASC_DRIVEACC + ASC_TRANSIT + ASC_MOTOR +
                  IVT_COEF*MW[13] +
                  INITWAIT_COEF*MW[14] +
                  XFERWAIT_COEF*MW[15] +
                  DRIVE_COEF*MW[17] +
                  TRANSFERS_COEF*MW[18] +
                  PARKCOST_COEF*0.11*mw[2]+  ; include AUTO OPERATING COST = $0.11*DISTANCE, CLL
                  COST_COEF*MW[19]
         ELSE
            MW[103]=-99
         ENDIF
         ; UTILITY FOR WALK
         IF (MW[2]>0 && MW[2]<=@WALK_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 3 MILES
            MW[104] = ASC_WALK + ASC_NONMOTOR +
                  WALK_COEF_1*MW[25] +
                  WALK_COEF_GT_1*MW[26]
         ELSE
```

```
         MW[104]=-99
      ENDIF
      ; UTILITY FOR BIKE
      IF (MW[2]>0 && MW[2]<=@BIKE_DIST_CUTOFF@) THEN ; PATH EXISTS & LESS THAN 6 MILES
         MW[105] = ASC_BIKE + ASC_NONMOTOR +
                   BIKE_COEF*MW[23]
      ELSE
         MW[105]=-99
      ENDIF
   ENDJLOOP
ENDRUN
```


```
; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW Total Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=1

   MW[1]=MI.1.HBW

   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"
```

```
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00B.S"
;Purpose_2
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBS Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBS4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBS4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=2
   MW[1]=MI.1.HBS
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00C.S"
;Purpose_3
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBSO Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBSO4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSO4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

   Purpose=3
   MW[1]=MI.1.HBSO
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00D.S"
;Purpose_4
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBO Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBO4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBO4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=4
   MW[1]=MI.1.HBO
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"
```

```
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00E.S"
;Purpose_5
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBSC Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBSC4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSC4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=5
   MW[1]=MI.1.HBSC
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"
ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00F.S"
;Purpose_6
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode NHB Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_NHB4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_NHB4.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=6

   MW[1]=MI.1.NHB

   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00G.S"
;Purpose_7
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 0 Auto Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW0.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW0.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL
```

```
DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=7
   MW[1]=MI.1.HBW
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN

; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00H.S"
;Purpose_8
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 1 Auto Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW1.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW1.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=8
   MW[1]=MI.1.HBW
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00I.S"
;Purpose_9
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 2 Auto Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW2.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW2.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=9
   MW[1]=MI.1.HBW
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MSMAT00J.S"
;Purpose_10
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Mode HBW 3 Auto Shares'
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\UTIL_HBW3.MAT"
```

```
FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW3.MAT",
                MO=21-26, DEC=6*D,
                NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL

DistributeINTRASTEP ProcessID='COMPASS',ProcessList=2-8,
COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   Purpose=10
   MW[1]=MI.1.HBW
   READ FILE = "D:\...\VOYAGERMODEL\MODE CHOICE\XCHOICE.INC"


ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MCMAT00E.S"
;ENDLOOP ; END OF PURP LOOP
;
; COMBINE TRIP TABLES
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX PRNFILE="D:\...\VoyagerModel\MODE CHOICE\MCMAT00C.PRN" MSG='Combine Trip Tables
by Mode By Purpose'
FILEI MATI[10] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_NHB4.MAT"
FILEI MATI[9] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSO4.MAT"
FILEI MATI[8] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSC4.MAT"
FILEI MATI[7] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBS4.MAT"

FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW0.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW1.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW2.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW3.MAT"
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW4.MAT"
FILEI MATI[6] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBO4.MAT"

FILEO MATO[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_MC.MAT",
       MO=11-16,21-26,31-36,41-46,51-56,61-66,DEC=36*D,
       NAME=AUTO_HBW , BUS_WALK_HBW , BUS_AUTO_HBW , WALK_HBW , BIKE_HBW , TOTAL_HBW ,
           AUTO_HBS , BUS_WALK_HBS , BUS_AUTO_HBS , WALK_HBS , BIKE_HBS , TOTAL_HBS ,
           AUTO_HBSO, BUS_WALK_HBSO, BUS_AUTO_HBSO, WALK_HBSO, BIKE_HBSO, TOTAL_HBSO,
           AUTO_HBSC, BUS_WALK_HBSC, BUS_AUTO_HBSC, WALK_HBSC, BIKE_HBSC, TOTAL_HBSC,
           AUTO_HBO , BUS_WALK_HBO , BUS_AUTO_HBO , WALK_HBO , BIKE_HBO , TOTAL_HBO ,
           AUTO_NHB , BUS_WALK_NHB , BUS_AUTO_NHB , WALK_NHB , BIKE_NHB , TOTAL_NHB

FILEO MATO[2] = "D:\...\...\HBW_b2011.MAT",
       MO=11-16,
       NAME=AUTO_HBW , BUS_WALK_HBW , BUS_AUTO_HBW , WALK_HBW , BIKE_HBW , TOTAL_HBW

   FILLMW MW[111]=MI.1.AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBW 0 AUTO OWNERSHIP
TRIPS BY MODE
   FILLMW MW[121]=MI.2.AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBW 1 AUTO OWNERSHIP
TRIPS BY MODE
   FILLMW MW[131]=MI.3.AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBW 2 AUTO OWNERSHIP
TRIPS BY MODE
   FILLMW MW[141]=MI.4.AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBW 3 AUTO OWNERSHIP
TRIPS BY MODE

   MW[11]=MW[111]+MW[121]+MW[131]+MW[141] ; HBW AUTO TRIPS
   MW[12]=MW[112]+MW[122]+MW[132]+MW[142] ; HBW BUS_WALK TRIPS
   MW[13]=MW[113]+MW[123]+MW[133]+MW[143] ; HBW BUS_AUTO TRIPS
   MW[14]=MW[114]+MW[124]+MW[134]+MW[144] ; HBW WALK TRIPS
```

```
   MW[15]=MW[115]+MW[125]+MW[135]+MW[145] ; HBW BIKE TRIPS
   MW[16]=MW[116]+MW[126]+MW[136]+MW[146] ; HBW TOTAL TRIPS

   FILLMW MW[21]=MI.7.AUTO , BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBS  TRIPS BY MODE
   FILLMW MW[31]=MI.9.AUTO , BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBSO TRIPS BY MODE
   FILLMW MW[41]=MI.8.AUTO , BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBSC TRIPS BY MODE
   FILLMW MW[51]=MI.6.AUTO , BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; HBO  TRIPS BY MODE
   FILLMW MW[61]=MI.10.AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL ; NHB  TRIPS BY MODE

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\MODE CHOICE\MCMAT00F.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX
FILEO MATO[1] = "D:\...\...\TRIPS_MODE_b2011.MAT",
            MO=21-26,
            NAME=AUTO, BUS_WALK, BUS_AUTO, WALK, BIKE, TOTAL
FILEI MATI[10] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW3.MAT"
FILEI MATI[9] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW2.MAT"
FILEI MATI[8] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW1.MAT"
FILEI MATI[7] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW0.MAT"
FILEI MATI[6] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_NHB4.MAT"
FILEI MATI[5] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSC4.MAT"
FILEI MATI[4] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBO4.MAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBSO4.MAT"
FILEI MATI[2] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBS4.MAT"
FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_HBW4.MAT"


   ; SUM HBW by AO
   MW[21]=(MI.7.1+MI.8.1+MI.9.1+MI.10.1)+MI.2.1+MI.3.1+MI.4.1+MI.5.1+MI.6.1
   MW[22]=(MI.7.2+MI.8.2+MI.9.2+MI.10.2)+MI.2.2+MI.3.2+MI.4.2+MI.5.2+MI.6.2
   MW[23]=(MI.7.3+MI.8.3+MI.9.3+MI.10.3)+MI.2.3+MI.3.3+MI.4.3+MI.5.3+MI.6.3
   MW[24]=(MI.7.4+MI.8.4+MI.9.4+MI.10.4)+MI.2.4+MI.3.4+MI.4.4+MI.5.4+MI.6.4
   MW[25]=(MI.7.5+MI.8.5+MI.9.5+MI.10.5)+MI.2.5+MI.3.5+MI.4.5+MI.5.5+MI.6.5
   MW[26]=(MI.7.6+MI.8.6+MI.9.6+MI.10.6)+MI.2.6+MI.3.6+MI.4.6+MI.5.6+MI.6.6

   TOT_AUTO     = TOT_AUTO     + ROWSUM(21)
   TOT_BUS_WALK = TOT_BUS_WALK + ROWSUM(22)
   TOT_BUS_AUTO = TOT_BUS_AUTO + ROWSUM(23)
   TOT_WALK     = TOT_WALK     + ROWSUM(24)
   TOT_BIKE     = TOT_BIKE     + ROWSUM(25)
   TOT_TOTAL    = TOT_TOTAL    + ROWSUM(26)

   IF (I==3750)
      MS_AUTO     = (TOT_AUTO     / TOT_TOTAL)*100
      MS_BUS_WALK = (TOT_BUS_WALK / TOT_TOTAL)*100
      MS_BUS_AUTO = (TOT_BUS_AUTO / TOT_TOTAL)*100
      MS_WALK     = (TOT_WALK     / TOT_TOTAL)*100
      MS_BIKE     = (TOT_BIKE     / TOT_TOTAL)*100
   ENDIF

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\ADMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX PRNFILE="D:\...\VOYAGERMODEL\ADMAT00A.PRN"

FILEI MATI[1] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_MC.MAT"
```

```
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[3] = "D:\...\VoyagerModel\GEN.OUT"

FILEO MATO[1] = "D:\...\...\TTFIN_b2011.DAT",
            MO=1-10,DEC=8*D,
            NAME=HBW,HBS,HBSO,HBSC,HBO,NHB,I2X,X2I,X2X,TOTAL  ; HBSC, HBO order switched, by LL
1/18/15

   ; Updated by CLL 12/12/13

   SOV_PCT_HBW  = 0.97
   HOV_ACC_HBW  = 2.00
   SOV_PCT_HBS  = 0.79
   HOV_ACC_HBS  = 2.28
   SOV_PCT_HBSO = 0.50
   HOV_ACC_HBSO = 2.47
   SOV_PCT_HBO  = 0.44
   HOV_ACC_HBO  = 2.42
   SOV_PCT_HBSC = 0.25
   HOV_ACC_HBSC = 2.61
   Other_Mode_Occ = 2.62  ;taxi, motorcycle and other not among mode alt in MC, add back in
   School_Bus_Occ = 22    ;HBSC person trips by school bus are not among mode alt in MC, add back in
   SOV_PCT_NHB  = 0.43
   HOV_ACC_NHB  = 2.05
   IX_OCC       = 1.75


   ; CONVERT AUTO PERSON TRIPS TO VEHICLE TRIPS, NEW FORMULA AUTO

   MW[101] = ((MI.1.AUTO_HBW +MI.1.AUTO_HBW.T)*.5)
   MW[1]= MW[101]* (SOV_PCT_HBW+(1-SOV_PCT_HBW)/HOV_ACC_HBW)

   MW[102] = ((MI.1.AUTO_HBS +MI.1.AUTO_HBS.T)*.5)
   MW[2]= MW[102]* (SOV_PCT_HBS+(1- SOV_PCT_HBS)/HOV_ACC_HBS)

   MW[103] = ((MI.1.AUTO_HBSO +MI.1.AUTO_HBSO.T)*.5)
   MW[3]= MW[103]* (SOV_PCT_HBSO+(1- SOV_PCT_HBSO)/HOV_ACC_HBSO)

   MW[104] = ((MI.1.AUTO_HBSC +MI.1.AUTO_HBSC.T)*.5)
   MW[4]= MW[104]* (SOV_PCT_HBSC+(1- SOV_PCT_HBSC)/HOV_ACC_HBSC)+
(((MI.3.HBSC+MI.3.HBSC.T)*0.17)*.5)/School_Bus_Occ

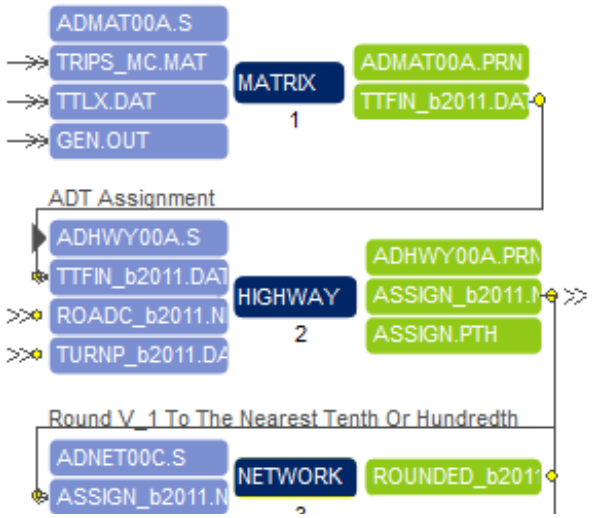
   MW[105] = ((MI.1.AUTO_HBO +MI.1.AUTO_HBO.T)*.5)
   MW[5]= MW[105]* (SOV_PCT_HBO+(1- SOV_PCT_HBO)/HOV_ACC_HBO)+
(((MI.3.HBO+MI.3.HBO.T)*0.006)*.5)/Other_Mode_Occ

   MW[106] = ((MI.1.AUTO_NHB +MI.1.AUTO_NHB.T)*.5)
   MW[6]= MW[106]* (SOV_PCT_NHB+(1- SOV_PCT_NHB)/HOV_ACC_NHB)
   MW[7]= (MI.3.PIAX+MI.3.PIAX.T)*.5/IX_OCC   ; IX
   MW[8]= (MI.3.XSTA+MI.3.XSTA.T)*.5/IX_OCC ; XI
   MW[9]= MI.2.X2X                          ; XX


   MW[10]=MW[1]+MW[2]+MW[3]+MW[4]+MW[5]+MW[6]+MW[7]+MW[8]+MW[9]

ENDRUN
```

Average Weekday Highway Assignment Model




```
; Script for program HIGHWAY in file "D:\...\VoyagerModel\ADHWY00A.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=HIGHWAY PRNFILE="D:\...\VOYAGERMODEL\ADHWY00A.PRN" MSG='ADT Assignment'
FILEO PATHO[1] = "D:\...\VOYAGERMODEL\BASE\OPTIMAL_ROAD\ASSIGN.PTH"
FILEI NETI = "D:\...\...\ROADC_b2011.NET"
FILEI MATI[1] = "D:\...\...\TTFIN_b2011.DAT"
;
; THIS SCRIPT LOADS THE TRIPS DEVELOPED IN THE PREVIOUS TASK ONTO THE NETWORK
; AND WRITES A LOADED NETWORK.  THE PATHS ARE BUILT BASED UPON TIME.
; (GOOD EXAMPLE OF HOW TO INCLUDE TURN PENALTIES AND PROHIBITIONS)
;

FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"

FILEO NETO = "D:\...\...\ASSIGN_b2011.NET"

; invoke Cluster, LL, 2/17/15
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8, COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   PARAMETERS COMBINE=EQUI                  ; EQUILIBRIUM LOAD
   PARAMETERS RELATIVEGAP = 0.0001,         ; CLOSURE RELATIVE GAP, BY LL, 3/18/09
         GAP=0.00000000000000000001,        ; make other criteria non-binding, by LL, 2/23/11
         AAD=0.00000000000000000001,        ; make other criteria non-binding, by LL, 2/23/11
         RAAD=0.000000000000000000001,      ; make other criteria non-binding, by LL, 2/23/11
         RMSE=0.00000000000000000001        ; make other criteria non-binding, by LL, 2/23/11
   PARAMETERS MAXITERS = 200                ; MAXIMUM NUMBER OF ITERATIONS


    ; BEGIN MULTI-FUNCTIONS FOR BPR EXPONENT
   FUNCTION {
      TC[1] = T0 * (1 + 0.56 * (V/C)^4)          ; INTERSTATE CONGESTED SPEED CALCULATION FOR ADA
      TC[7] = T0 * (1 + 0.56 * (V/C)^4)          ; INTERSTATE CONGESTED SPEED CALCULATION FOR
CANYON
      TC[2] = T0 * (1 + 0.15 * (V/C)^5)          ; CBD ARTERIALS
      TC[3] = T0 * (1 + 0.15 * (V/C)^5)          ; URBAN ARTERIALS
      TC[8] = T0 * (1 + 2.00 * (V/C)^2.8)
```

```
     TC[9] = T0 * (1 + 0.15 * (V/C)^5)          ; STATE RURAL SPEED CALCULATION
     TC[4] = T0 * (1 + 0.15 * (V/C)^5)          ; COLLECTOR CONGESTED SPEED CALCULATION
     TC[5] = T0 * (1 + 0.15 * (V/C)^5)          ; LOCAL CONGESTED SPEED CALCULATION
     TC[6] = T0                  ; CENTROID CONGESTED SPEED CALCULATION (no capacity constraint on
centroids)
      V=VOL[1]                   ; SET EQUI CONSTRAINT VOLUME SET
     }


   PHASE=LINKREAD
     SPEED= SPEEDFOR(LI.THRULANES,LI.SPDCLASS)          ; LOOKUP SPEED
     T0= (LI.DISTANCE/SPEED)*60                  ; RECALCULATE TIMES
;      ; adj capacity based on fractions
     IF (LI.DIRECTION==2)
       CAPACITY=CAPACITYFOR(LI.THRULANES,LI.CAPCLASS) ;2-WAY STREETS, DIFFERENT FROM ADT
ASSIGNMENT
     ELSEIF (LI.DIRECTION==1)
       CAPACITY=CAPACITYFOR(LI.THRULANES,LI.CAPCLASS) ;1-WAY STREETS, DIFFERENT FROM ADT
ASSIGNMENT      ENDIF

     IF (LI.FTYPE==1 || LI.FTYPE==19)
       IF (LI.COUNTY=1)
         LINKCLASS = 1                  ; INTERSTATE AND RAMPS FOR ADA COUNTY
       ELSE
         LINKCLASS = 7
       ENDIF
     ENDIF
;      IF (LI.FTYPE==2)
;        LINKCLASS = 1                  ; (FTYPE=2 RESERVED FOR HOV ON INTERSTATE)
;      ENDIF
;      IF (LI.FTYPE==4)
;        LINKCLASS = 1                  ; (FTYPE=4 RESERVED FOR GRADE SEPARATED EXPRESSWAYS)
;      ENDIF

     IF (LI.FTYPE=3 || LI.FTYPE=7 || LI.FTYPE=12)
       LINKCLASS = 2                    ; CBD ARTERIALS AND COLLECTORS
     ENDIF
     IF (LI.FTYPE=5 || LI.FTYPE=8 ||LI.FTYPE=9)
       LINKCLASS = 3                    ; URBAN ARTERIALS
     ENDIF
     IF (LI.FTYPE=6 || LI.FTYPE=10 || LI.FTYPE=11 || LI.FTYPE=18)
       IF (LI.STATE=0)
         LINKCLASS = 8                  ; NON-STATE RURAL ARTERIALS, COLLECTORS AND LOCALS, HIGH
SPEED
       ELSE
         LINKCLASS = 9                  ;STATE RURAL HIGH SPEED ARTERIALS
       ENDIF
     ENDIF

     IF (LI.FTYPE=13 || LI.FTYPE=14 || LI.FTYPE=17)
         LINKCLASS = 4                  ; URBAN COLLECTORS AND LOCALS WITH CONNECTIVITY
     ENDIF
     IF (LI.FTYPE=15 && LI.FTYPE=16)
         LINKCLASS = 5                  ; COLLECTORS LOCALS ADDED TO ACCESS NETWORK
     ENDIF
     IF (LI.FTYPE==20)
         LINKCLASS = 6                  ; CENTROID CONNECTORS
     ENDIF
   ENDPHASE

   PHASE=ILOOP                          ; MAIN LOOP FOR LOADING TRIPS (MULTIPLE PURPOSES)
     PATHLOAD PATH = TIME, PENI=1,
       VOL[1]=MI.1.1+MI.1.2+MI.1.3+MI.1.4+MI.1.5+MI.1.6+MI.1.7+MI.1.8+MI.1.9,
```

```
         VOL[2]=MI.1.HBW,
         VOL[3]=MI.1.HBS,
         VOL[4]=MI.1.HBSO,
         VOL[5]=MI.1.HBSC,
         VOL[6]=MI.1.HBO,
         VOL[7]=MI.1.NHB,
         VOL[8]=MI.1.I2X+MI.1.X2I+MI.1.X2X,        ; TOTAL EXTERNAL TRIPS
         VOL[9]=MI.1.HBW+MI.1.HBS+MI.1.HBSO+MI.1.HBSC+MI.1.HBO+MI.1.NHB ;TOTAL INTERNAL TRIPS
   ENDPHASE

   ;REPORT CAPACITY=YES,
   ;      SPEED=YES

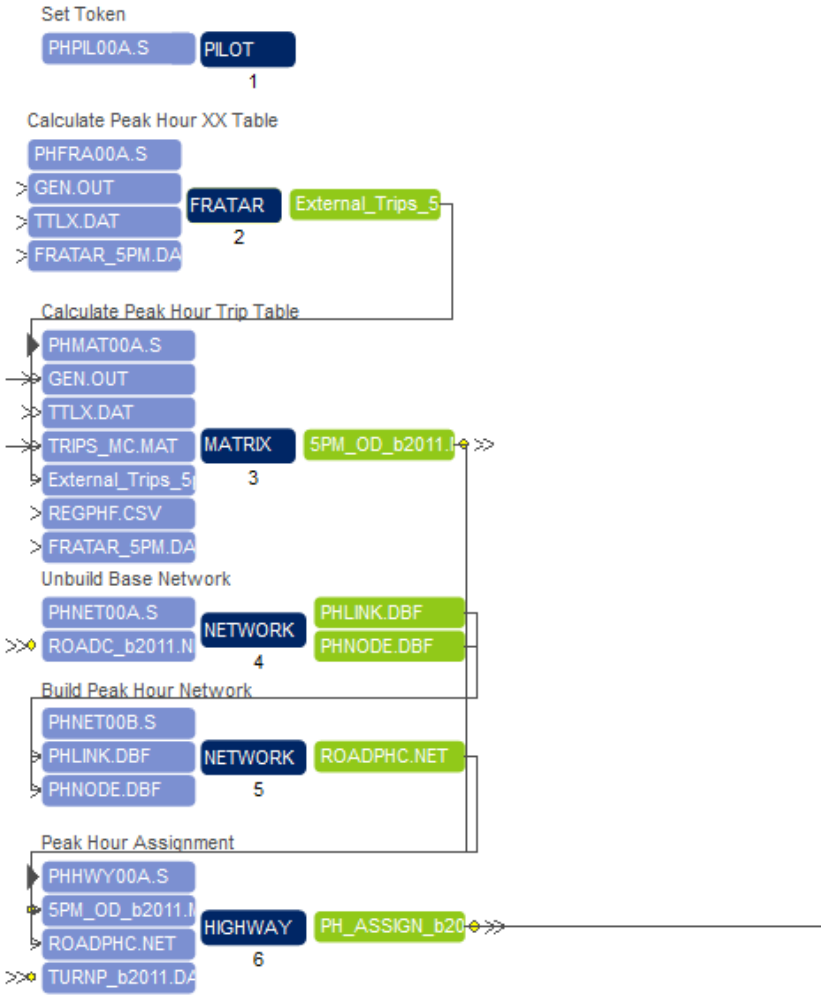
ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\ADNET00C.S"
;
; THIS SCRIPT WILL ROUND V_1 TO THE NEAREST TENTH OR HUNDREDTH
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Round V_1 To The Nearest Tenth Or Hundredth'
FILEI LINKI[1] = "D:\...\...\ASSIGN_b2011.NET"
FILEO NETO = "D:\...\...\ROUNDED_b2011.NET"

   IF (V_1>=1000)
      V_1=ROUND(V_1/100)*100
   ELSE
      V_1=ROUND(V_1/10)*10
   ENDIF

ENDRUN
```

5 p.m. to 6 p.m. Peak Hour Highway Assignment Model




```
; PILOT Script
;
; SET THE PEAK HOUR TO CALCULATE
;
PEAKHOUR = 17    ; THIS SHOULD BE A SCENARIO KEY

; End of PILOT Script

; Script for program FRATAR in file "D:\...\VoyagerModel\PHFRA00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=FRATAR MSG='Calculate Peak Hour XX Table'
FILEO MATO[1] = "D:\...\VoyagerModel\peak\External_Trips_5pm.dat",
            MO=1, NAME=X2X
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\peak\FRATAR_5PM.DAT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"

   ZONES=3750
   MAXRMSE=0.01
   MAXITERS=500

   ; look up Gateway PHF
   LOOKUP,
      FAIL=0,0, NAME=GF,
```

```
      LOOKUP[1]=1,RESULT=2,
      LOOKUP[2]=1,RESULT=3,
      LOOKUPI=1, LIST=T

   SETPA,
      PGF[1]=GF(1,J) AGF[1]=GF(2,J),
      MW[1]=MAX(0.01,MI.2.X2X),
      CONTROL=PA,
      INCLUDE=3738-3750

   ACOMP=1, PCOMP=1

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\PHMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Peak Hour Trip Table'
FILEI LOOKUPI[2] = "D:\...\VoyagerModel\peak\FRATAR_5PM.DAT"
FILEI MATI[4] = "D:\...\VoyagerModel\peak\External_Trips_5pm.dat"

FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_MC.MAT"
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\PEAK\REGPHF.CSV"

FILEO MATO[1] = "D:\...\...\5PM_OD_b2011.MAT",
              MO=1-10,DEC=8*D,          ; NEED TO OUTPUT TRIP TABLES FOR ALL PURPOSES
              NAME=HBW,HBS,HBSO,HBSC,HBO,NHB,PIAX,XSTA,X2X,5PMTRIPS

; invoke Cluster, CLL, 3/5/12
;IF ({ClusterToggle}=1)
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8
;ENDIF

   LOOKUP,                    ; PEAK HOUR FACTOR LOOKUP
      LOOKUPI=1,
      NAME=PHFAC,
      LOOKUP[1] =1, RESULT= 2,      ; DEP_HBW
      LOOKUP[2] =1, RESULT= 3,      ; RET_HBW
      LOOKUP[3] =1, RESULT= 4,      ; DEP_HBS
      LOOKUP[4] =1, RESULT= 5,      ; RET_HBS
      LOOKUP[5] =1, RESULT= 6,      ; DEP_HBSO
      LOOKUP[6] =1, RESULT= 7,      ; RET_HBSO
      LOOKUP[7] =1, RESULT= 8,      ; DEP_HBSC
      LOOKUP[8] =1, RESULT= 9,      ; RET_HBSC
      LOOKUP[9] =1, RESULT=10,      ; DEP_HBO
      LOOKUP[10]=1, RESULT=11,      ; RET_HBO
      LOOKUP[11]=1, RESULT=12,      ; DEP_NHB
      LOOKUP[12]=1, RESULT=13,      ; RET_NHB
      LOOKUP[13]=1, RESULT=14,      ; DEP_IX
      LOOKUP[14]=1, RESULT=15,      ; RET_IX
      LOOKUP[15]=1, RESULT=16,      ; DEP_XI
      LOOKUP[16]=1, RESULT=17,      ; RET_XI
      LOOKUP[17]=1, RESULT=18,      ; DEP_XX
      LOOKUP[18]=1, RESULT=19       ; RET_XX
   ;-----------------------------------------------------------------------------
   ;
   ;  PEAK HOUR TRIPS
   ;
```

```
   MW[1]=MI.3.AUTO_HBW  *PHFAC( 1,@PEAKHOUR@)/100+MI.3.AUTO_HBW.T  *PHFAC(
2,@PEAKHOUR@)/100  ; Home-Work
   MW[2]=MI.3.AUTO_HBS  *PHFAC( 3,@PEAKHOUR@)/100+MI.3.AUTO_HBS.T  *PHFAC( 4,@PEAKHOUR@)/100
; Home-Shop
   MW[3]=MI.3.AUTO_HBSO *PHFAC( 5,@PEAKHOUR@)/100+MI.3.AUTO_HBSO.T *PHFAC(
6,@PEAKHOUR@)/100  ; Home-Social
   MW[4]=(MI.3.AUTO_HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.3.AUTO_HBSC.T) *PHFAC(
8,@PEAKHOUR@)/100  ; Home-School
   MW[5]=(MI.3.AUTO_HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.3.AUTO_HBO.T)
*PHFAC(10,@PEAKHOUR@)/100  ; Home-Other
   MW[6]=MI.3.AUTO_NHB  *PHFAC(11,@PEAKHOUR@)/100+MI.3.AUTO_NHB.T
*PHFAC(12,@PEAKHOUR@)/100  ; NonHome Base
   MW[7]=(MI.1.PIAX+MI.1.PIAX.T)/2    ; balanced daily Int-Ext person trips/15
   MW[8]=(MI.1.XSTA+MI.1.XSTA.T)/2    ; balanced daily Ext-Int person trips
   MW[9]=MI.4.X2X                     ; Peak Hour Ext-Ext veh trips
   MW[14]=(MI.1.HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.1.HBSC.T) *PHFAC( 8,@PEAKHOUR@)/100  ;
peak hour School Bus Trips
   MW[15]=(MI.1.HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.1.HBO.T)  *PHFAC(10,@PEAKHOUR@)/100  ; peak
hour Other Modes trips
   ; look up Gateway PHF
   LOOKUP,
      FAIL=0,0, NAME=GF,
      LOOKUP[1]=1,RESULT=2, ; outbound Gateway PHF
      LOOKUP[2]=1,RESULT=3, ; inbound  Gateway PHF
      LOOKUPI=2, LIST=T

   IF (I==3738-3750)     ; outbound
      MW[7]=MW[7]*GF(2,I)
      MW[8]=MW[8]*GF(2,I)
   ELSE                  ; inbound
      JLOOP
         IF (J==3738-3750)
            MW[7]=MW[7]*GF(1,J)
            MW[8]=MW[8]*GF(1,J)
         ENDIF
      ENDJLOOP
   ENDIF

   ; CONVERT AUTO PERSON TRIPS TO VEHICLE TRIPS

   SOV_PCT_HBW   = 0.94
   HOV_ACC_HBW   = 2.66
   SOV_PCT_HBS    = 0.74
   HOV_ACC_HBS   = 2.55
   SOV_PCT_HBSO  = 0.59
   HOV_ACC_HBSO = 2.63
   SOV_PCT_HBSC  = 0.41
   HOV_ACC_HBSC = 2.49
   SOV_PCT_HBO   = 0.52
   HOV_ACC_HBO  = 2.43
   Other_Mode_Occ= 2.62  ;taxi, motorcycle and other not among mode alt in MC, add back in
   School_Bus_Occ = 22    ;HBSC person trips by school bus are not among mode alt in MC, add back in
   SOV_PCT_NHB   = 0.54
   HOV_ACC_NHB   = 2.53
   IX_OCC          = 1.75

   ; CONVERT AUTO PERSON TRIPS TO VEHICLE TRIPS, NEW FORMULA AUTO


MW[1]= MW[1]*SOV_PCT_HBW + ((MW[1]-(MW[1]*SOV_PCT_HBW))/HOV_ACC_HBW)
MW[2]= MW[2]*SOV_PCT_HBS + ((MW[2]-(MW[2]*SOV_PCT_HBS))/HOV_ACC_HBS)
MW[3]= MW[3]*SOV_PCT_HBSO + ((MW[3]-(MW[3]*SOV_PCT_HBSO))/HOV_ACC_HBSO)
MW[4]= MW[4]*SOV_PCT_HBSC + ((MW[4]-(MW[4]*SOV_PCT_HBSC))/HOV_ACC_HBSC) +
```

```
     ((MW[14]*0.17)/School_Bus_Occ)
MW[5]= MW[5]*SOV_PCT_HBO + ((MW[5]-(MW[5]*SOV_PCT_HBO))/HOV_ACC_HBO) +
     ((MW[15]*0.006)/Other_Mode_Occ)
MW[6]= MW[6]*SOV_PCT_NHB + ((MW[6]-(MW[6]*SOV_PCT_NHB))/HOV_ACC_NHB)
MW[7]= MW[7]/IX_OCC
MW[8]= MW[8]/IX_OCC


  MW[10]=MW[1]+MW[2]+MW[3]+MW[4]+MW[5]+MW[6]+MW[7]+MW[8]+MW[9] ; Total vehicle trips


ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00A.S"
;
; ********************************************************************************************
;                       PEAK HOUR TRIP ASSIGNMENT
; ********************************************************************************************
;;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Unbuild Base Network'
FILEI LINKI[1] = "D:\...\...\ROADC_b2011.NET"

  ZONES=3750                          ; nodes 1-750 are considered zones

FILEO LINKO = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF",
          FORMAT="DBF"    ; OUTPUT LINKS TO DBASE FORMAT, UPDATED BY LL, 07/30/04
FILEO NODEO = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF",
          FORMAT="DBF"    ; OUTPUT NODES TO DBASE FORMAT, UPDATED BY LL, 07/30/04

ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00B.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Build Peak Hour Network'

FILEI NODEI[1] = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF"
FILEI LINKI[1] = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF"

FILEO NETO = "D:\...\VOYAGERMODEL\PEAK\ROADPHC.NET"

  ZONES=3750

  SPEED= SPEEDFOR(THRULANES,SPDCLASS)      ; LOOKUP SPEED

  TIME= (DISTANCE/SPEED)*60              ; RECALCULATE TIMES

  ; *** Calculate CAPACITY based on PCAP, mod by LL, 4/6/11
  ;
  IF (DIRECTION==2)
    CAPACITY=(THRULANES*PCAP)          ; 2-WAY STREETS
  ELSEIF (DIRECTION==1)
    CAPACITY=(THRULANES*PCAP)          ; 1-WAY STREETS
  ENDIF

  ;REPORT SPEED=YES
  ;REPORT CAPACITY=YES
```

```
ENDRUN


; Script for program HIGHWAY in file "D:\...\VoyagerModel\PHHWY00A.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=HIGHWAY MSG='Peak Hour Assignment'

FILEI MATI[1] = "D:\...\...\5PM_OD_b2011.MAT"
FILEI NETI = "D:\...\VoyagerModel\PEAK\ROADPHC.NET"
FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"
FILEO NETO = "D:\...\...\PH_ASSIGN_b2011.NET"

; *** apply V/D curves and linkclasses defined in "PHHWYOOA.s", by LL, 12/7/10

; invoke Cluster, LL, 2/17/15
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8, COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   PARAMETERS COMBINE=EQUI                    ; EQUILIBRIUM LOAD
   PARAMETERS RELATIVEGAP = 0.0001,             ; CLOSURE RELATIVE GAP , BY LL, 3/18/09
          GAP=0.00000000000000000001,          ; make other criteria non-binding, by LL, 2/23/11
          AAD=0.00000000000000000001,          ; make other criteria non-binding, by LL, 2/23/11
          RAAD=0.00000000000000000001,          ; make other criteria non-binding, by LL, 2/23/11
          RMSE=0.00000000000000000001           ; make other criteria non-binding, by LL, 2/23/11
   PARAMETERS MAXITERS = 200                  ; MAXIMUM NUMBER OF ITERATIONS,    by LL, 2/23/11


   ;;;;; BEGIN MULTI-FUNCTIONS FOR CONICS
    FUNCTION {
      TC[1]= T0*(2 + ((64 *((1-1.05 *(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.05*(V/C)) - 1.071)    ;INTERSTATE
      TC[2]= T0*(2 + ((100*((1-0.984*(V/C))^2)+(1.055)^2)^0.5) - 10*(1-0.984*(V/C))- 1.055)  ;STATE
ARTERIALS
      TC[3]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)   ;DOWNTOWN
ARTERIALS
      TC[4]= T0*(2 + ((81 *((1-1.037*(V/C))^2)+(1.0625)^2)^0.5) -9 *(1-1.037*(V/C))- 1.0625) ;PRINCIPAL
ARTERIALS (NON-STATE)
      TC[5]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)  ;MINOR
ARTERIALS(NON-STATE)
      TC[6]= T0*(2 + ((36 *((1-1.071*(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.071 *(V/C))- 1.1)  ;LOCALS
      TC[7]= T0*(2 + ((36 *((1-1.16 *(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.16 *(V/C)) - 1.1)    ;COLLECTORS
      TC[8]= T0                          ;CENTROID CONNECTORS

      V=VOL[1]                           ; SET EQUI CONSTRAINT VOLUME SET
      }

   PHASE=LINKREAD
      SPEED= SPEEDFOR(LI.THRULANES,LI.SPDCLASS)  ; LOOKUP SPEED
      T0= (LI.DISTANCE/SPEED)*60                 ; RECALCULATE TIMES

      IF (LI.DIRECTION==2)
         CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP) ;2-WAY STREETS DIFFERENT FROM ADT
ASSIGNMENT
      ELSEIF (LI.DIRECTION==1)
         CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP)  ;1-WAY STREET DIFFERENT FROM ADT ASSIGNMENT
      ENDIF

      IF (LI.FTYPE==1||LI.FTYPE=19)
          LINKCLASS = 1                  ; LINKCLASS FOR INTERSTATE AND RAMPS
      ENDIF

     IF ((LI.FTYPE>=5&&LI.FTYPE<=10)&&LI.PCAP=1050)
```

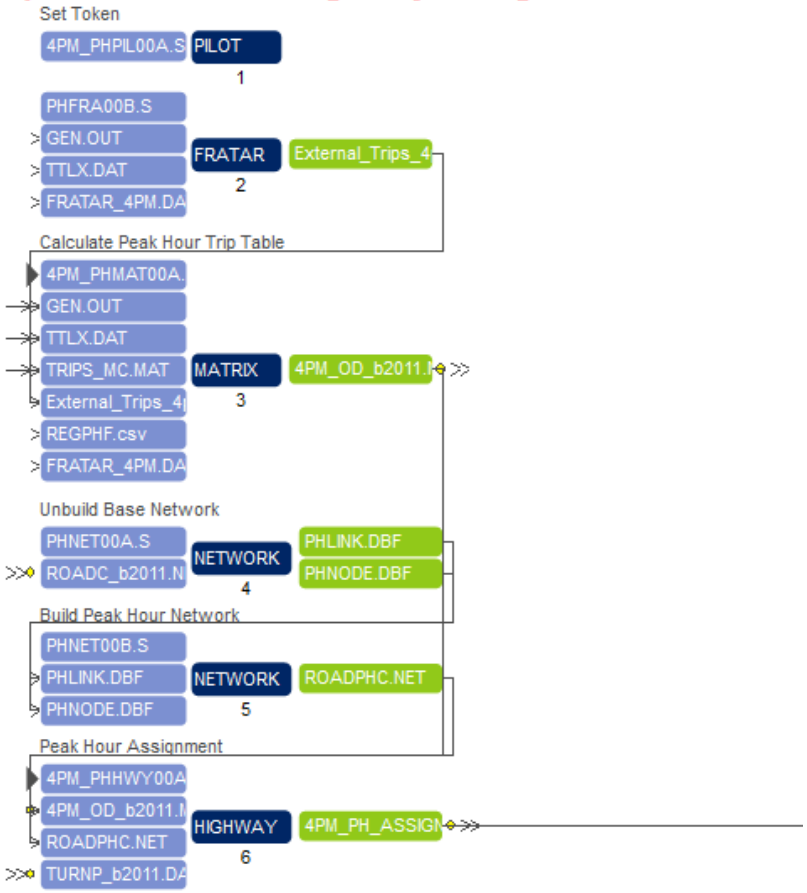
```
        LINKCLASS=2                     ;LINKCLASS FOR STATE ARTERIALS
    ELSEIF (LI.FTYPE>2&&LI.FTYPE<5)
        LINKCLASS=3                     ;LINKCLASS FOR DOWNTOWN ARTERIALS
    ELSEIF ((LI.FTYPE>=5&&LI.FTYPE<=7)&&LI.PCAP<1000)
        LINKCLASS=4                     ;LINKCLASS FOR PRINCIPAL ARTERIALS (NON-STATE)
    ELSEIF ((LI.FTYPE>7&&LI.FTYPE<=10)&&LI.PCAP<1000)
        LINKCLASS=5                     ;LINKCLASS FOR MINOR ARTERIALS(NON-STATE)
    ELSEIF ((LI.FTYPE>10&&LI.FTYPE<=15))
        LINKCLASS=6                     ;LINKCLASS FOR COLLECTORS
    ELSEIF ((LI.FTYPE>16&&LI.FTYPE<=18))
        LINKCLASS=7                     ;LINKCLASS FOR LOCALS
    ELSEIF (LI.FTYPE=20)
        LINKCLASS=8                     ;LINKCLASS FOR CENTROID CONNECTORS
    ENDIF

  ENDPHASE

  PHASE=ILOOP
    MW[1]=MI.1.5pmtrips                 ; 5PM MATRIX
    PATHLOAD PATH = TIME, VOL[1]=MW[1] , PENI=1
  ENDPHASE

ENDRUN
```

4 p.m. to 5 p.m. Peak Hour Highway Assignment Model




```
; PILOT Script
;
; SET THE PEAK HOUR TO CALCULATE
;
PEAKHOUR = 16    ; 4PM

; End of PILOT Script

; Script for program FRATAR in file "D:\...\VOYAGERMODEL\PHFRA00B.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=FRATAR
FILEO MATO[1] = "D:\...\VoyagerModel\peak\External_Trips_4pm.dat",
          MO=1, NAME=X2X
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\peak\FRATAR_4PM.DAT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"

ZONES=3750
   MAXRMSE=0.01
   MAXITERS=500

   ; look up Gateway PHF
   LOOKUP,
      FAIL=0,0, NAME=GF,
      LOOKUP[1]=1,RESULT=2,
      LOOKUP[2]=1,RESULT=3,
      LOOKUPI=1, LIST=T
```

```
   SETPA,
      PGF[1]=GF(1,J) AGF[1]=GF(2,J),
      MW[1]=MAX(0.01,MI.2.X2X),
      CONTROL=PA,
      INCLUDE=3738-3750

   ACOMP=1, PCOMP=1

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\4PM_PHMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Peak Hour Trip Table'
FILEI LOOKUPI[2] = "D:\...\VoyagerModel\peak\FRATAR_4PM.DAT"
FILEI MATI[4] = "D:\...\VoyagerModel\peak\External_Trips_4pm.dat"

FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_MC.MAT"
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\peak\REGPHF.csv"

FILEO MATO[1] = "D:\...\...\4PM_OD_b2011.MAT",
               MO=1-10,DEC=8*D,          ; NEED TO OUTPUT TRIP TABLES FOR ALL PURPOSES
               NAME=HBW,HBS,HBSO,HBSC,HBO,NHB,PIAX,XSTA,X2X,4PMTRIPS

; invoke Cluster, CLL, 3/5/12
;IF ({ClusterToggle}=1)
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8
;ENDIF

   LOOKUP,                        ; PEAK HOUR FACTOR LOOKUP
      LOOKUPI=1,
      NAME=PHFAC,
      LOOKUP[1] =1, RESULT= 2,       ; DEP_HBW
      LOOKUP[2] =1, RESULT= 3,       ; RET_HBW
      LOOKUP[3] =1, RESULT= 4,       ; DEP_HBS
      LOOKUP[4] =1, RESULT= 5,       ; RET_HBS
      LOOKUP[5] =1, RESULT= 6,       ; DEP_HBSO
      LOOKUP[6] =1, RESULT= 7,       ; RET_HBSO
      LOOKUP[7] =1, RESULT= 8,       ; DEP_HBSC
      LOOKUP[8] =1, RESULT= 9,       ; RET_HBSC
      LOOKUP[9] =1, RESULT=10,       ; DEP_HBO
      LOOKUP[10]=1, RESULT=11,       ; RET_HBO
      LOOKUP[11]=1, RESULT=12,       ; DEP_NHB
      LOOKUP[12]=1, RESULT=13,       ; RET_NHB
      LOOKUP[13]=1, RESULT=14,       ; DEP_IX
      LOOKUP[14]=1, RESULT=15,       ; RET_IX
      LOOKUP[15]=1, RESULT=16,       ; DEP_XI
      LOOKUP[16]=1, RESULT=17,       ; RET_XI
      LOOKUP[17]=1, RESULT=18,       ; DEP_XX
      LOOKUP[18]=1, RESULT=19        ; RET_XX
   ;-----------------------------------------------------------------------------
   ;
   ;  PEAK HOUR TRIPS
   ;
   MW[1]=MI.3.AUTO_HBW  *PHFAC( 1,@PEAKHOUR@)/100+MI.3.AUTO_HBW.T  *PHFAC(
2,@PEAKHOUR@)/100  ; Home-Work
   MW[2]=MI.3.AUTO_HBS  *PHFAC( 3,@PEAKHOUR@)/100+MI.3.AUTO_HBS.T  *PHFAC( 4,@PEAKHOUR@)/100
; Home-Shop
```

```
   MW[3]=MI.3.AUTO_HBSO *PHFAC( 5,@PEAKHOUR@)/100+MI.3.AUTO_HBSO.T *PHFAC(
6,@PEAKHOUR@)/100  ; Home-Social
   MW[4]=(MI.3.AUTO_HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.3.AUTO_HBSC.T) *PHFAC(
8,@PEAKHOUR@)/100  ; Home-School
   MW[5]=(MI.3.AUTO_HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.3.AUTO_HBO.T)
*PHFAC(10,@PEAKHOUR@)/100  ; Home-Other
   MW[6]=MI.3.AUTO_NHB  *PHFAC(11,@PEAKHOUR@)/100+MI.3.AUTO_NHB.T
*PHFAC(12,@PEAKHOUR@)/100  ; NonHome Base
   MW[7]=(MI.1.PIAX+MI.1.PIAX.T)/2    ; balanced daily Int-Ext person trips
   MW[8]=(MI.1.XSTA+MI.1.XSTA.T)/2    ; balanced daily Ext-Int person trips
   MW[9]=MI.4.X2X                     ; Peak Hour Ext-Ext veh trips
   MW[14]=(MI.1.HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.1.HBSC.T) *PHFAC( 8,@PEAKHOUR@)/100  ;
peak hour School Bus Trips
   MW[15]=(MI.1.HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.1.HBO.T)  *PHFAC(10,@PEAKHOUR@)/100  ; peak
hour Other Modes trips

    LOOKUP,
      FAIL=0,0, NAME=GF,
      LOOKUP[1]=1,RESULT=2, ; outbound Gateway PHF
      LOOKUP[2]=1,RESULT=3, ; inbound  Gateway PHF
      LOOKUPI=2, LIST=T

   IF (I==3738-3750)     ; outbound
      MW[7]=MW[7]*GF(2,I)
      MW[8]=MW[8]*GF(2,I)
   ELSE                  ; inbound
      JLOOP
         IF (J==3738-3750)
            MW[7]=MW[7]*GF(1,J)
            MW[8]=MW[8]*GF(1,J)
         ENDIF
      ENDJLOOP
   ENDIF


   ; CONVERT AUTO PERSON TRIPS TO VEHICLE TRIPS, by CLL 12/12/13

   SOV_PCT_HBW   = 0.93
   HOV_ACC_HBW   = 2.42
   SOV_PCT_HBS   = 0.73
   HOV_ACC_HBS   = 2.36
   SOV_PCT_HBSO = 0.63
   HOV_ACC_HBSO = 2.80
   SOV_PCT_HBSC = 0.45
   HOV_ACC_HBSC = 2.29
   SOV_PCT_HBO   = 0.55
   HOV_ACC_HBO   = 2.48
   Other_Mode_Occ = 2.62  ;taxi, motorcycle and other not among mode alt in MC, add back in
   School_Bus_Occ = 22    ;HBSC person trips by school bus are not among mode alt in MC, add back in
   SOV_PCT_NHB   = 0.56
   HOV_ACC_NHB   = 2.53
   IX_OCC        = 1.75

MW[1]= MW[1]*SOV_PCT_HBW + ((MW[1]-(MW[1]*SOV_PCT_HBW))/HOV_ACC_HBW)
MW[2]= MW[2]*SOV_PCT_HBS + ((MW[2]-(MW[2]*SOV_PCT_HBS))/HOV_ACC_HBS)
MW[3]= MW[3]*SOV_PCT_HBSO + ((MW[3]-(MW[3]*SOV_PCT_HBSO))/HOV_ACC_HBSO)
MW[4]= MW[4]*SOV_PCT_HBSC + ((MW[4]-(MW[4]*SOV_PCT_HBSC))/HOV_ACC_HBSC) +
     ((MW[14]*0.17)/School_Bus_Occ)
MW[5]= MW[5]*SOV_PCT_HBO + ((MW[5]-(MW[5]*SOV_PCT_HBO))/HOV_ACC_HBO) +
     ((MW[15]*0.006)/Other_Mode_Occ)
MW[6]= MW[6]*SOV_PCT_NHB + ((MW[6]-(MW[6]*SOV_PCT_NHB))/HOV_ACC_NHB)
MW[7]= MW[7]/IX_OCC
MW[8]= MW[8]/IX_OCC
```

```
   MW[10]=MW[1]+MW[2]+MW[3]+MW[4]+MW[5]+MW[6]+MW[7]+MW[8]+MW[9] ; Total vehicle trips

ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00A.S"

;
; ********************************************************************************
;                        PEAK HOUR TRIP ASSIGNMENT
; ********************************************************************************
;
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Unbuild Base Network'
FILEI LINKI[1] = "D:\...\...\ROADC_b2011.NET"

   ZONES=3750                          ; nodes 1-750 are considered zones

FILEO LINKO = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF",
          FORMAT="DBF"    ; OUTPUT LINKS TO DBASE FORMAT, UPDATED BY LL, 07/30/04
FILEO NODEO = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF",
          FORMAT="DBF"    ; OUTPUT NODES TO DBASE FORMAT, UPDATED BY LL, 07/30/04

ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00B.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Build Peak Hour Network'

FILEI NODEI[1] = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF"
FILEI LINKI[1] = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF"

FILEO NETO = "D:\...\VOYAGERMODEL\PEAK\ROADPHC.NET"

   ZONES=3750

   SPEED= SPEEDFOR(THRULANES,SPDCLASS)      ; LOOKUP SPEED

   TIME= (DISTANCE/SPEED)*60               ; RECALCULATE TIMES

   ; *** Calculate CAPACITY based on PCAP, mod by LL, 4/6/11
   ;
   IF (DIRECTION==2)
     CAPACITY=(THRULANES*PCAP)           ; 2-WAY STREETS
   ELSEIF (DIRECTION==1)
     CAPACITY=(THRULANES*PCAP)           ; 1-WAY STREETS
   ENDIF

   ;REPORT SPEED=YES
   ;REPORT CAPACITY=YES

ENDRUN


; Script for program HIGHWAY in file "D:\...\VoyagerModel\4PM_PHHWY00A.S"
```

```
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=HIGHWAY MSG='Peak Hour Assignment'

FILEI MATI[1] = "D:\...\...\4PM_OD_b2011.MAT"
FILEI NETI = "D:\...\VOYAGERMODEL\PEAK\ROADPHC.NET"
FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"
FILEO NETO = "D:\...\...\4PM_PH_ASSIGN_b2011.NET"

; invoke Cluster, LL, 2/17/15
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8, COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster
   ;
   ; *** apply V/D curves and linkclasses defined in "PHHWYOOA.s", by LL, 12/7/10
    PARAMETERS COMBINE=EQUI                          ; EQUILIBRIUM LOAD
   PARAMETERS RELATIVEGAP = 0.0001,                   ; CLOSURE RELATIVE GAP, BY LL, 3/18/09
           GAP=0.00000000000000000001,               ; make other criteria non-binding, by LL, 2/23/11
           AAD=0.00000000000000000001,               ; make other criteria non-binding, by LL, 2/23/11
           RAAD=0.00000000000000000001,              ; make other criteria non-binding, by LL, 2/23/11
           RMSE=0.00000000000000000001               ; make other criteria non-binding, by LL, 2/23/11
   PARAMETERS MAXITERS = 200                        ; MAXIMUM NUMBER OF ITERATIONS,
   ; EQUILIBRIUM LOAD


   ;;;;; BEGIN MULTI-FUNCTIONS FOR CONICS
   FUNCTION {
     TC[1]= T0*(2 + ((64 *((1-1.05 *(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.05*(V/C)) - 1.071)
;INTERSTATE
     TC[2]= T0*(2 + ((100*((1-0.984*(V/C))^2)+(1.055)^2)^0.5) - 10*(1-0.984*(V/C))- 1.055)   ;STATE
ARTERIALS
     TC[3]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)
;DOWNTOWN ARTERIALS
     TC[4]= T0*(2 + ((81 *((1-1.037*(V/C))^2)+(1.0625)^2)^0.5) -9 *(1-1.037*(V/C))- 1.0625)  ;PRINCIPAL
ARTERIALS (NON-STATE)
     TC[5]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)   ;MINOR
ARTERIALS(NON-STATE)
     TC[6]= T0*(2 + ((36 *((1-1.071*(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.071 *(V/C))- 1.1)    ;LOCALS
     TC[7]= T0*(2 + ((36 *((1-1.16 *(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.16 *(V/C)) - 1.1)    ;COLLECTORS
     TC[8]= T0                                                    ;CENTROID CONNECTORS

     V=VOL[1]                          ; SET EQUI CONSTRAINT VOLUME SET
     }

   PHASE=LINKREAD
     SPEED= SPEEDFOR(LI.THRULANES,LI.SPDCLASS)            ; LOOKUP SPEED
     T0= (LI.DISTANCE/SPEED)*60                      ; RECALCULATE TIMES

     IF (LI.DIRECTION==2)
       CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP)      ; 2-WAY STREETS DIFFERENT FROM ADT
ASSIGNMENT
     ELSEIF (LI.DIRECTION==1)
       CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP)      ; 1-WAY STREETS DIFFERENT FROM ADT
ASSIGNMENT
     ENDIF


    IF (LI.FTYPE==1||LI.FTYPE=19)
       LINKCLASS = 1                        ; LINKCLASS FOR INTERSTATE AND RAMPS
    ENDIF

     IF ((LI.FTYPE>=5&&LI.FTYPE<=10)&&LI.PCAP=1050)
       LINKCLASS=2                          ;LINKCLASS FOR STATE ARTERIALS
     ELSEIF (LI.FTYPE>2&&LI.FTYPE<5)
```

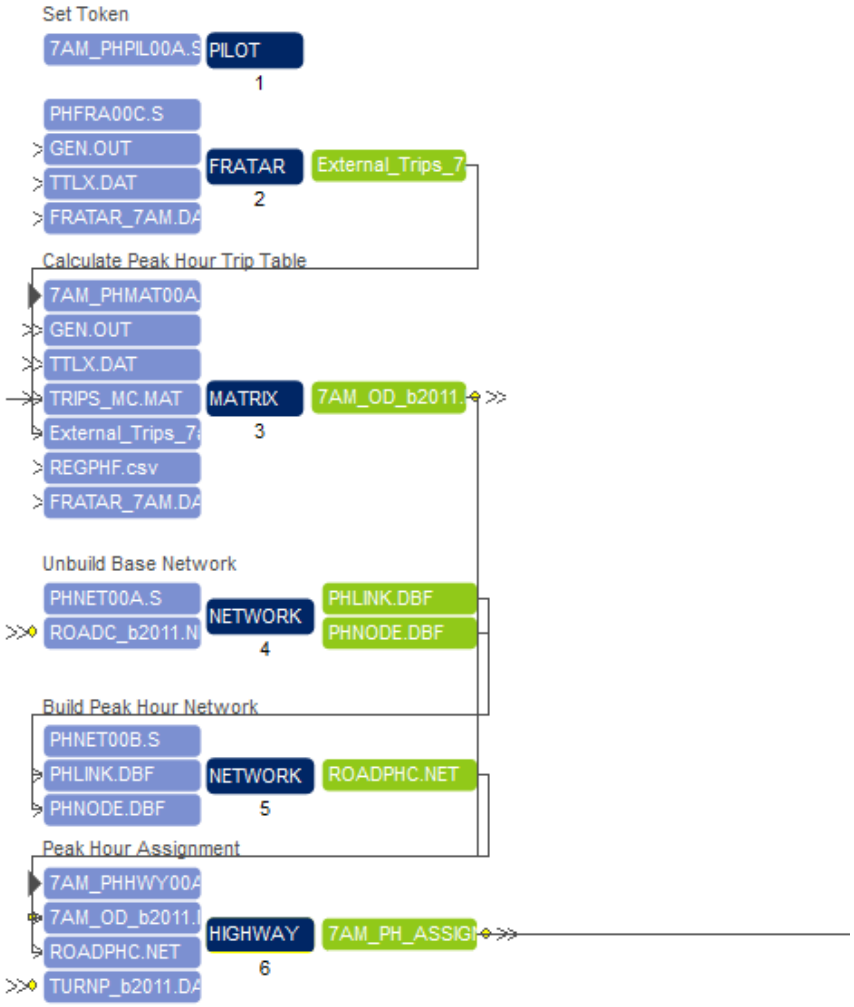
```
        LINKCLASS=3                     ;LINKCLASS FOR DOWNTOWN ARTERIALS
    ELSEIF ((LI.FTYPE>=5&&LI.FTYPE<=7)&&LI.PCAP<1000)
        LINKCLASS=4                     ;LINKCLASS FOR PRINCIPAL ARTERIALS (NON-STATE)
    ELSEIF ((LI.FTYPE>7&&LI.FTYPE<=10)&&LI.PCAP<1000)
        LINKCLASS=5                     ;LINKCLASS FOR MINOR ARTERIALS(NON-STATE)
    ELSEIF ((LI.FTYPE>10&&LI.FTYPE<=15))
        LINKCLASS=6                     ;LINKCLASS FOR COLLECTORS
    ELSEIF ((LI.FTYPE>16&&LI.FTYPE<=18))
        LINKCLASS=7                     ;LINKCLASS FOR LOCALS
    ELSEIF (LI.FTYPE=20)
        LINKCLASS=8                     ;LINKCLASS FOR CENTROID CONNECTORS
    ENDIF

  ENDPHASE

  PHASE=ILOOP
    MW[1]=MI.1.4pmtrips                 ; <=== DIFFERENT FROM ADT ASSIGNMENT
    PATHLOAD PATH = TIME, VOL[1]=MW[1] , PENI=1
  ENDPHASE

ENDRUN
```

7 a.m. to 8 a.m. Peak Hour Highway Assignment Model




```
; PILOT Script
;
; SET THE PEAK HOUR TO CALCULATE
;
PEAKHOUR = 7    ; THIS SHOULD BE A SCENARIO KEY

; End of PILOT Script

; Script for program FRATAR in file "D:\...\VOYAGERMODEL\PHFRA00C.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=FRATAR
FILEO MATO[1] = "D:\...\VoyagerModel\peak\External_Trips_7am.dat",
          MO=1, NAME=X2X
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\peak\FRATAR_7AM.DAT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"

   ZONES=3750
   MAXRMSE=0.01
   MAXITERS=500

   ; look up Gateway PHF
   LOOKUP,
      FAIL=0,0, NAME=GF,
```

```
      LOOKUP[1]=1,RESULT=2,
      LOOKUP[2]=1,RESULT=3,
      LOOKUPI=1, LIST=T

   SETPA,
      PGF[1]=GF(1,J) AGF[1]=GF(2,J),
      MW[1]=MAX(0.01,MI.2.X2X),
      CONTROL=PA,
      INCLUDE=3738-3750

   ACOMP=1, PCOMP=1

ENDRUN


; Script for program MATRIX in file "D:\...\VoyagerModel\7AM_PHMAT00A.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='Calculate Peak Hour Trip Table'
FILEI LOOKUPI[2] = "D:\...\VoyagerModel\peak\FRATAR_7AM.DAT"
FILEI MATI[4] = "D:\...\VoyagerModel\peak\External_Trips_7am.dat"

FILEI MATI[1] = "D:\...\VoyagerModel\GEN.OUT"
FILEI MATI[2] = "D:\...\VoyagerModel\TTLX.DAT"
FILEI MATI[3] = "D:\...\VoyagerModel\MODE CHOICE\TRIPS_MC.MAT"
FILEI LOOKUPI[1] = "D:\...\VoyagerModel\peak\REGPHF.csv"

FILEO MATO[1] = "D:\...\...\7AM_OD_b2011.MAT",
               MO=1-10,DEC=8*D,          ; NEED TO OUTPUT TRIP TABLES FOR ALL PURPOSES
               NAME=HBW,HBS,HBSO,HBSC,HBO,NHB,PIAX,XSTA,X2X,7AMTRIPS

; invoke Cluster, CLL, 3/5/12
;IF ({ClusterToggle}=1)
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8
;ENDIF

   LOOKUP,                      ; PEAK HOUR FACTOR LOOKUP
      LOOKUPI=1,
      NAME=PHFAC,
      LOOKUP[1] =1, RESULT= 2,       ; DEP_HBW
      LOOKUP[2] =1, RESULT= 3,       ; RET_HBW
      LOOKUP[3] =1, RESULT= 4,       ; DEP_HBS
      LOOKUP[4] =1, RESULT= 5,       ; RET_HBS
      LOOKUP[5] =1, RESULT= 6,       ; DEP_HBSO
      LOOKUP[6] =1, RESULT= 7,       ; RET_HBSO
      LOOKUP[7] =1, RESULT= 8,       ; DEP_HBSC
      LOOKUP[8] =1, RESULT= 9,       ; RET_HBSC
      LOOKUP[9] =1, RESULT=10,       ; DEP_HBO
      LOOKUP[10]=1, RESULT=11,       ; RET_HBO
      LOOKUP[11]=1, RESULT=12,       ; DEP_NHB
      LOOKUP[12]=1, RESULT=13,       ; RET_NHB
      LOOKUP[13]=1, RESULT=14,       ; DEP_IX
      LOOKUP[14]=1, RESULT=15,       ; RET_IX
      LOOKUP[15]=1, RESULT=16,       ; DEP_XI
      LOOKUP[16]=1, RESULT=17,       ; RET_XI
      LOOKUP[17]=1, RESULT=18,       ; DEP_XX
      LOOKUP[18]=1, RESULT=19        ; RET_XX
   ;-----------------------------------------------------------------------------
   ;
   ;  PEAK HOUR TRIPS
   ;
```

```
   MW[1]=MI.3.AUTO_HBW  *PHFAC( 1,@PEAKHOUR@)/100+MI.3.AUTO_HBW.T  *PHFAC(
2,@PEAKHOUR@)/100  ; Home-Work
   MW[2]=MI.3.AUTO_HBS  *PHFAC( 3,@PEAKHOUR@)/100+MI.3.AUTO_HBS.T  *PHFAC( 4,@PEAKHOUR@)/100
; Home-Shop
   MW[3]=MI.3.AUTO_HBSO *PHFAC( 5,@PEAKHOUR@)/100+MI.3.AUTO_HBSO.T *PHFAC(
6,@PEAKHOUR@)/100  ; Home-Social
   MW[4]=(MI.3.AUTO_HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.3.AUTO_HBSC.T) *PHFAC(
8,@PEAKHOUR@)/100  ; Home-School
   MW[5]=(MI.3.AUTO_HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.3.AUTO_HBO.T)
*PHFAC(10,@PEAKHOUR@)/100  ; Home-Other
   MW[6]=MI.3.AUTO_NHB  *PHFAC(11,@PEAKHOUR@)/100+MI.3.AUTO_NHB.T
*PHFAC(12,@PEAKHOUR@)/100  ; NonHome Base
   MW[7]=(MI.1.PIAX+MI.1.PIAX.T)/2    ; balanced daily Int-Ext person trips, by LL, 1/27/15
   MW[8]=(MI.1.XSTA+MI.1.XSTA.T)/2    ; balanced daily Ext-Int person trips, by LL, 1/27/15
   MW[9]=MI.4.X2X                ; Peak Hour Ext-Ext     veh trips   , by LL, 1/27/15
   MW[14]=(MI.1.HBSC) *PHFAC( 7,@PEAKHOUR@)/100+(MI.1.HBSC.T) *PHFAC( 8,@PEAKHOUR@)/100  ;
peak hour School Bus Trips  , by LL
   MW[15]=(MI.1.HBO)  *PHFAC( 9,@PEAKHOUR@)/100+(MI.1.HBO.T)  *PHFAC(10,@PEAKHOUR@)/100  ; peak
hour Other Modes trips , by LL

  ; look up Gateway PHF
   LOOKUP,
      FAIL=0,0, NAME=GF,
      LOOKUP[1]=1,RESULT=2, ; outbound Gateway PHF
      LOOKUP[2]=1,RESULT=3, ; inbound  Gateway PHF
      LOOKUPI=2, LIST=T

   IF (I==3738-3750)     ; outbound
      MW[7]=MW[7]*GF(2,I)
      MW[8]=MW[8]*GF(2,I)
   ELSE                  ; inbound
      JLOOP
         IF (J==3738-3750)
            MW[7]=MW[7]*GF(1,J)
            MW[8]=MW[8]*GF(1,J)
         ENDIF
      ENDJLOOP
   ENDIF

   ; CONVERT AUTO PERSON TRIPS TO VEHICLE TRIPS, by CLL 12/12/13

   SOV_PCT_HBW  = 0.93
   HOV_ACC_HBW  = 2.41
   SOV_PCT_HBS  = 0.77
   HOV_ACC_HBS  = 2.25
   SOV_PCT_HBSO = 0.53
   HOV_ACC_HBSO = 2.43
   SOV_PCT_HBO  = 0.49
   HOV_ACC_HBO  = 2.44
   SOV_PCT_HBSC = 0.20
   HOV_ACC_HBSC = 2.58
   Other_Mode_Occ = 2.62  ;taxi, motorcycle and other not among mode alt in MC, add back in
   School_Bus_Occ = 22    ;HBSC person trips by school bus are not among mode alt in MC, add back in
   SOV_PCT_NHB  = 0.36
   HOV_ACC_NHB  = 2.60
   IX_OCC       = 1.75    ;1.67

 MW[1]= MW[1]*SOV_PCT_HBW + ((MW[1]-(MW[1]*SOV_PCT_HBW))/HOV_ACC_HBW)
 MW[2]= MW[2]*SOV_PCT_HBS + ((MW[2]-(MW[2]*SOV_PCT_HBS))/HOV_ACC_HBS)
 MW[3]= MW[3]*SOV_PCT_HBSO + ((MW[3]-(MW[3]*SOV_PCT_HBSO))/HOV_ACC_HBSO)
 MW[4]= MW[4]*SOV_PCT_HBSC + ((MW[4]-(MW[4]*SOV_PCT_HBSC))/HOV_ACC_HBSC) +
      ((MW[14]*0.17)/School_Bus_Occ)
MW[5]= MW[5]*SOV_PCT_HBO + ((MW[5]-(MW[5]*SOV_PCT_HBO))/HOV_ACC_HBO) +
```

```
      ((MW[15]*0.006)/Other_Mode_Occ)
 MW[6]= MW[6]*SOV_PCT_NHB + ((MW[6]-(MW[6]*SOV_PCT_NHB))/HOV_ACC_NHB)
 MW[7]= MW[7]/IX_OCC
 MW[8]= MW[8]/IX_OCC

   MW[10]=MW[1]+MW[2]+MW[3]+MW[4]+MW[5]+MW[6]+MW[7]+MW[8]+MW[9] ; Total vehicle trips

ENDRUN

; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00A.S"

;
; ********************************************************************************
;                        PEAK HOUR TRIP ASSIGNMENT
; ********************************************************************************
;
;
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Unbuild Base Network'
FILEI LINKI[1] = "D:\...\...\ROADC_b2011.NET"

   ZONES=3750                          ; nodes 1-750 are considered zones

FILEO LINKO = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF",
          FORMAT="DBF"    ; OUTPUT LINKS TO DBASE FORMAT, UPDATED BY LL, 07/30/04
FILEO NODEO = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF",
          FORMAT="DBF"    ; OUTPUT NODES TO DBASE FORMAT, UPDATED BY LL, 07/30/04

ENDRUN


; Script for program NETWORK in file "D:\...\VoyagerModel\PHNET00B.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=NETWORK MSG='Build Peak Hour Network'

FILEI NODEI[1] = "D:\...\VOYAGERMODEL\DBF\PHNODE.DBF"
FILEI LINKI[1] = "D:\...\VOYAGERMODEL\DBF\PHLINK.DBF"

FILEO NETO = "D:\...\VOYAGERMODEL\PEAK\ROADPHC.NET"

   ZONES=3750

   SPEED= SPEEDFOR(THRULANES,SPDCLASS)      ; LOOKUP SPEED

   TIME= (DISTANCE/SPEED)*60              ; RECALCULATE TIMES

   ; *** Calculate CAPACITY based on PCAP, mod by LL, 4/6/11
   ;
   IF (DIRECTION==2)
     CAPACITY=(THRULANES*PCAP)          ; 2-WAY STREETS
   ELSEIF (DIRECTION==1)
     CAPACITY=(THRULANES*PCAP)          ; 1-WAY STREETS
   ENDIF

   ;REPORT SPEED=YES
   ;REPORT CAPACITY=YES

ENDRUN
```

```
; Script for program HIGHWAY in file "D:\...\VoyagerModel\7AM_PHHWY00A.S"

; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=HIGHWAY MSG='Peak Hour Assignment'

FILEI MATI[1] = "D:\...\...\7AM_OD_b2011.MAT"
FILEI NETI = "D:\...\VOYAGERMODEL\PEAK\ROADPHC.NET"
FILEI TURNPENI = "D:\...\...\TURNP_b2011.DAT"
FILEO NETO = "D:\...\...\7AM_PH_ASSIGN_b2011.NET"

; invoke Cluster, LL, 2/17/15
DistributeINTRASTEP ProcessID='COMPASS',
ProcessList=2-8, COMMPATH=D:\UAG\2011Model\calibration\VoyagerModel\Cluster

   ;
   ; *** apply V/D curves and linkclasses defined in "PHHWYOOA.s", by LL, 12/7/10
    PARAMETERS COMBINE=EQUI                          ; EQUILIBRIUM LOAD
   PARAMETERS RELATIVEGAP = 0.0001,                   ; CLOSURE RELATIVE GAP , BY LL, 3/18/09
           GAP=0.00000000000000000001,               ; make other criteria non-binding, by LL, 2/23/11
           AAD=0.00000000000000000001,               ; make other criteria non-binding, by LL, 2/23/11
           RAAD=0.00000000000000000001,              ; make other criteria non-binding, by LL, 2/23/11
           RMSE=0.00000000000000000001               ; make other criteria non-binding, by LL, 2/23/11
   PARAMETERS MAXITERS = 200                        ; MAXIMUM NUMBER OF ITERATIONS,    by LL, 2/23/11
; EQUILIBRIUM LOAD

   ;USE THE SAME BPR'S FROM REGIONAL 24?

   ;;;;; BEGIN MULTI-FUNCTIONS FOR BPR EXPONENT
  FUNCTION {
      TC[1]= T0*(2 + ((64 *((1-1.05 *(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.05*(V/C)) - 1.071)   ;INTERSTATE
      TC[2]= T0*(2 + ((100*((1-0.984*(V/C))^2)+(1.055)^2)^0.5) - 10*(1-0.984*(V/C))- 1.055)   ;STATE
ARTERIALS
      TC[3]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)   ;DOWNTOWN
ARTERIALS
      TC[4]= T0*(2 + ((81 *((1-1.037*(V/C))^2)+(1.0625)^2)^0.5) -9 *(1-1.037*(V/C))- 1.0625)  ;PRINCIPAL
ARTERIALS (NON-STATE)
      TC[5]= T0*(2 + ((64 *((1-1.039*(V/C))^2)+(1.071)^2)^0.5) - 8 *(1-1.039*(V/C))- 1.071)   ;MINOR
ARTERIALS(NON-STATE)
      TC[6]= T0*(2 + ((36 *((1-1.071*(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.071 *(V/C))- 1.1)     ;LOCALS
      TC[7]= T0*(2 + ((36 *((1-1.16 *(V/C))^2)+(1.1)^2)^0.5) - 6 * (1-1.16 *(V/C)) - 1.1)     ;COLLECTORS
      TC[8]= T0                                                                    ;CENTROID CONNECTORS

      V=VOL[1]                              ; SET EQUI CONSTRAINT VOLUME SET
      }

   PHASE=LINKREAD
      SPEED= SPEEDFOR(LI.THRULANES,LI.SPDCLASS)            ; LOOKUP SPEED
      T0= (LI.DISTANCE/SPEED)*60                        ; RECALCULATE TIMES

      IF (LI.DIRECTION==2)
         CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP)      ; 2-WAY STREETS DIFFERENT FROM ADT
ASSIGNMENT
      ELSEIF (LI.DIRECTION==1)
         CAPACITY=CAPACITYFOR(LI.THRULANES,LI.PCAP)      ; 1-WAY STREETS DIFFERENT FROM ADT
ASSIGNMENT
      ENDIF

    IF (LI.FTYPE==1||LI.FTYPE=19)
         LINKCLASS = 1                          ; LINKCLASS FOR INTERSTATE AND RAMPS
    ENDIF
```

```
      IF ((LI.FTYPE>=5&&LI.FTYPE<=10)&&LI.PCAP=1050)
           LINKCLASS=2                    ;LINKCLASS FOR STATE ARTERIALS
      ELSEIF (LI.FTYPE>2&&LI.FTYPE<5)
           LINKCLASS=3                    ;LINKCLASS FOR DOWNTOWN ARTERIALS
      ELSEIF ((LI.FTYPE>=5&&LI.FTYPE<=7)&&LI.PCAP<1000)
           LINKCLASS=4                    ;LINKCLASS FOR PRINCIPAL ARTERIALS (NON-STATE)
      ELSEIF ((LI.FTYPE>7&&LI.FTYPE<=10)&&LI.PCAP<1000)
           LINKCLASS=5                    ;LINKCLASS FOR MINOR ARTERIALS(NON-STATE)
      ELSEIF ((LI.FTYPE>10&&LI.FTYPE<=15))
           LINKCLASS=6                    ;LINKCLASS FOR COLLECTORS
      ELSEIF ((LI.FTYPE>16&&LI.FTYPE<=18))
           LINKCLASS=7                    ;LINKCLASS FOR LOCALS
      ELSEIF (LI.FTYPE=20)
           LINKCLASS=8                    ;LINKCLASS FOR CENTROID CONNECTORS
      ENDIF

   ENDPHASE

   PHASE=ILOOP
      MW[1]=MI.1.7AMtrips                 ; <=== DIFFERENT FROM ADT ASSIGNMENT
      PATHLOAD PATH = TIME, VOL[1]=MW[1] , PENI=1
   ENDPHASE
ENDRUN

; Script for program MATRIX in file "D:\...\VOYAGERMODEL\TAMAT00B.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='BALANCE TRIPS'
FILEI MATI[1] = "D:\...\...\TRIPS_MODE_b2011.MAT"
FILEO MATO[1] = "D:\...\...\TRIPS_MODE_BAL_b2011.MAT",
            MO=101,102,
            NAME=BUS_WALK,BUS_AUTO

   FILLMW MW[1]=MI.1.2,3
   FILLMW MW[11]=MI.1.2.T,MI.1.3.T

   MW[101]=(MW[1]+MW[11])/2
   MW[102]=(MW[2]+MW[12])/2

ENDRUN

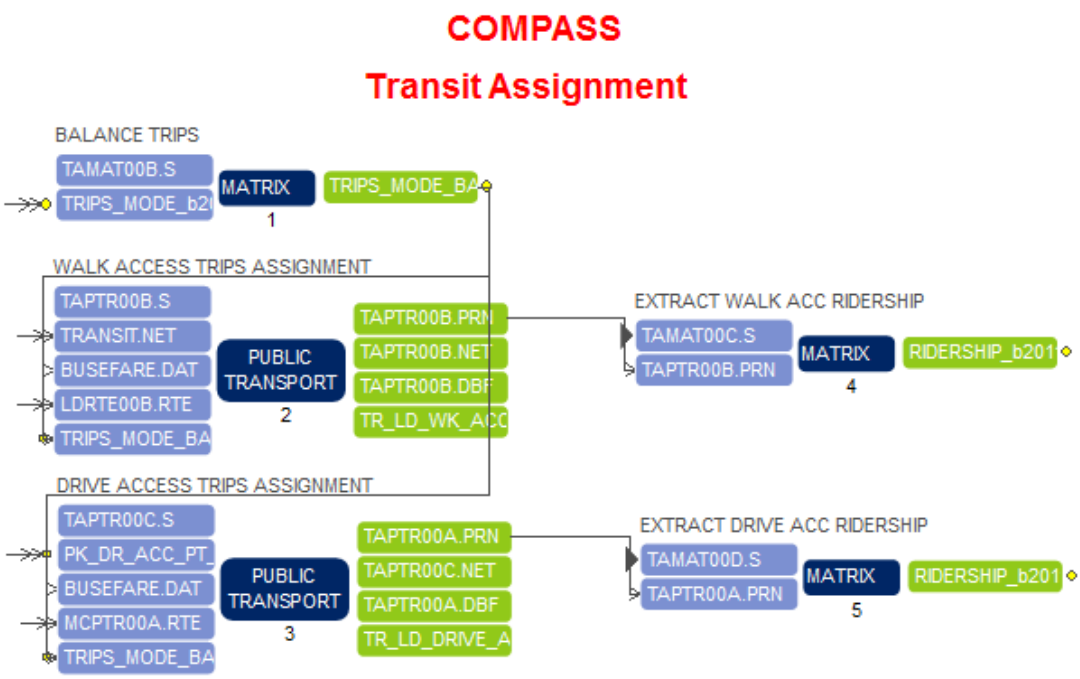

; Script for program PUBLIC TRANSPORT in file "D:\...\VoyagerModel\TAPTR00B.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\TAPTR00B.PRN" MSG='WALK ACCESS TRIPS
ASSIGNMENT'
FILEO REPORTO = "D:\...\VoyagerModel\TR_LD_WK_ACC.PRN"
FILEI ROUTEI[1] = "D:\...\VoyagerModel\LDRTE00B.RTE"
FILEI MATI[1] = "D:\...\...\TRIPS_MODE_BAL_b2011.MAT"
FILEI FAREI = "D:\...\VOYAGERMODEL\MODE CHOICE\TRANSIT\BUSEFARE.DAT"
FILEI NETI = "D:\...\VoyagerModel\TRANSIT.NET"

FILEO LINKO = "D:\...\VoyagerModel\TAPTR00B.DBF"
FILEO NETO = "D:\...\VoyagerModel\TAPTR00B.NET"

   ;Globals this invokes Loading
   PARAMETERS  TRIPSIJ[1] = MI.1.1 ;+MI.1.2
   NOROUTEERRS=5000


   ;Selection of Loading Reports
   REPORT LINES=T, SORT=MODE,
```

```
   REPORT   LINEVOLS=T, STOPSONLY=T, SKIP0=T
ENDRUN
```




```
; Script for program PUBLIC TRANSPORT in file "D:\...\VOYAGERMODEL\TAPTR00C.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=PUBLIC TRANSPORT PRNFILE="D:\...\VoyagerModel\TAPTR00A.PRN" MSG='DRIVE ACCESS TRIPS
ASSIGNMENT'
FILEI ROUTEI[1] = "D:\...\VoyagerModel\MCPTR00A.RTE"
FILEI NETI = "D:\...\...\PK_DR_ACC_PT_b2011.NET"
FILEI MATI[1] = "D:\...\...\TRIPS_MODE_BAL_b2011.MAT"
FILEO REPORTO = "D:\...\VoyagerModel\TR_LD_DRIVE_ACC.PRN"
FILEO LINKO[1] = "D:\...\VoyagerModel\TAPTR00A.DBF"
FILEO NETO = "D:\...\VoyagerModel\TAPTR00C.NET"
FILEI FAREI = "D:\...\VoyagerModel\Mode Choice\transit\BUSEFARE.DAT"

;WALKSPEED           = 2.5 ;MILES PER HOUR           (WFRC)
;BIKESPEED           = 10  ;MILES PER HOUR           (WFRC)
;WALK_ACC_COEF_CUTOFF = 24  ;WALK ACC TIME COEF CUT OFF (WFRC)
;WALK_ACC_CUTOFF      = 15  ;WALK ACC TIME  CUT OFF     (EST.)
;DRIVE_ACC_CUTOFF     = 5   ;DRIVE ACC TIME  CUT OFF    (EST.)
;WALK_DIST_CUTOFF     = 3   ;WALK DIST CUT OFF         (WFRC)
;BIKE_DIST_CUTOFF     = 6   ;BIKE DIST CUT OFF         (WFRC)
   ;Globals this invokes Loading
   PARAMETERS  TRIPSIJ[1] = MI.1.2 ; DRIVE ACC TRIPS
   NOROUTEERRS=5000

   ;Selection of Loading Reports
   REPORT LINES=T, SORT=MODE,
   REPORT   LINEVOLS=T, STOPSONLY=T, SKIP0=T
ENDRUN


; Script for program MATRIX in file "D:\...\VOYAGERMODEL\TAMAT00C.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='EXTRACT WALK ACC RIDERSHIP'
```

```
FILEO PRINTO[1] = "D:\...\...\RIDERSHIP_b2011.PRN"
FILEI RECI = "D:\...\VoyagerModel\TAPTR00B.PRN"

;
;  EXTRACT WALK-ACCESS TRIPS SELECTED FOR ASSIGNMENT AND TOTAL RIDERSHIP
;
   _COUNTER=_COUNTER+1
   IF (_COUNTER==1) RPT_FLAG=0 ; INITIALIZE RPT_FLAG

   IF (STRPOS('Selected for Assignment',RECI)>0) ; FOUND TRIPS SELECTED FOR ASSIGNMENT
      TEMP_STR = SUBSTR(RECI,8,13)
      ; EXTRACT TRIPS SELECTED
      POS = STRPOS(',',TEMP_STR)              ; FIND POSITION OF ','
      TEMP_STR2 = SUBSTR(TEMP_STR,1,POS-1) + SUBSTR(TEMP_STR,POS+1,STRLEN(TEMP_STR)-POS) ;
REMOVE ','

      TOT_TRIPS = VAL(TEMP_STR2)
      PRINT FORM=13.2C,
           LIST='SCENARIO b2011 RIDERSHIP','\n\n',
               'TOTAL  WALK-ACC TRIPS SELECTED:',TOT_TRIPS,PRINTO=1
   ENDIF

   IF (STRPOS('LINES  UserClass=Total',RECI)>0) ; FOUND LINE REPORT
      RPT_FLAG=1
   ENDIF

   IF (RPT_FLAG==1)                ; AFTER FINDING LINE REPORT
      IF (SUBSTR(RECI,1,5)=='Total')  ; FOUND RECORD WITH TOTAL RIDERSHIP

         ; EXTRACT TOTAL RIDERSHIP
         TEMP_STR = SUBSTR(RECI,48,STRLEN(RECI)-48) ; REMOVE DATA BEFORE TOTAL RIDERSHIP
         POS = STRPOS(',',TEMP_STR)              ; FIND POSITION OF ','
         TEMP_STR2 = SUBSTR(TEMP_STR,1,POS-1) + SUBSTR(TEMP_STR,POS+1,STRLEN(TEMP_STR)-POS) ;
REMOVE ','
         TEMP_STR3 = LTRIM(TEMP_STR2)
         POS = STRPOS(' ',TEMP_STR3)             ; FIND FIRST POSITION OF ' ', WHICH IS END OF TOTAL
RIDERSHIP
         TEMP_STR4 = SUBSTR(TEMP_STR3,1,POS-1)

         TOT_RIDERSHIP = VAL(TEMP_STR4)
         PRINT FORM=13.2C,
              LIST='TOTAL  WALK-ACC RIDERSHIP     :',TOT_RIDERSHIP,PRINTO=1
         RPT_FLAG=0 ; RESET RPT_FLAG
      ENDIF
   ENDIF
ENDRUN


; Script for program MATRIX in file "D:\...\VOYAGERMODEL\TAMAT00D.S"
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.
RUN PGM=MATRIX MSG='EXTRACT DRIVE ACC RIDERSHIP'
FILEO PRINTO[1] = "D:\...\...\RIDERSHIP_b2011.PRN"
FILEI RECI = "D:\...\VoyagerModel\TAPTR00A.PRN"

;
;  EXTRACT DRIVE-ACCESS TRIPS SELECTED FOR ASSIGNMENT AND TOTAL RIDERSHIP
;
   _COUNTER=_COUNTER+1
   IF (_COUNTER==1) RPT_FLAG=0 ; INITIALIZE RPT_FLAG

   IF (STRPOS('Selected for Assignment',RECI)>0) ; FOUND TRIPS SELECTED FOR ASSIGNMENT
      TEMP_STR = SUBSTR(RECI,8,13)
```

```
      ; EXTRACT TRIPS SELECTED
      POS = STRPOS(',',TEMP_STR)              ; FIND POSITION OF ','
      TEMP_STR2 = SUBSTR(TEMP_STR,1,POS-1) + SUBSTR(TEMP_STR,POS+1,STRLEN(TEMP_STR)-POS) ;
REMOVE ','

      TOT_TRIPS = VAL(TEMP_STR2)
      PRINT FORM=13.2C,
           LIST='\n\n',
                'TOTAL DRIVE-ACC TRIPS SELECTED:',TOT_TRIPS,
 FILE = "D:\...\...\RIDERSHIP_b2011.PRN",
 APPEND=Y
   ENDIF

   IF (STRPOS('LINES  UserClass=Total',RECI)>0) ; FOUND LINE REPORT
      RPT_FLAG=1
   ENDIF

   IF (RPT_FLAG==1)                ; AFTER FINDING LINE REPORT
      IF (SUBSTR(RECI,1,5)=='Total')  ; FOUND RECORD WITH TOTAL RIDERSHIP

         ; EXTRACT TOTAL RIDERSHIP
         TEMP_STR = SUBSTR(RECI,48,STRLEN(RECI)-48) ; REMOVE DATA BEFORE TOTAL RIDERSHIP
         POS = STRPOS(',',TEMP_STR)              ; FIND POSITION OF ','
         TEMP_STR2 = SUBSTR(TEMP_STR,1,POS-1) + SUBSTR(TEMP_STR,POS+1,STRLEN(TEMP_STR)-POS) ;
REMOVE ','
         TEMP_STR3 = LTRIM(TEMP_STR2)
         POS = STRPOS(' ',TEMP_STR3)             ; FIND FIRST POSITION OF ' ', WHICH IS END OF TOTAL
RIDERSHIP
         TEMP_STR4 = SUBSTR(TEMP_STR3,1,POS-1)

         TOT_RIDERSHIP = VAL(TEMP_STR4)
         PRINT FORM=13.2C,
              LIST='TOTAL DRIVE-ACC RIDERSHIP     :',TOT_RIDERSHIP,
 FILE = "D:\...\...\RIDERSHIP_b2011.PRN",
 APPEND=Y
         RPT_FLAG=0 ; RESET RPT_FLAG
      ENDIF
   ENDIF

ENDRUN


; PILOT Script
; Do not change filenames or add or remove FILEI/FILEO statements using an editor. Use Cube/Application
Manager.

IF (1=1)
*Cluster.EXE D:\UAG\2011Model\calibration\VoyagerModel\Cluster\COMPASS 2-8 Close Exit
ENDIF
; End of PILOT Script
```