BCAG
BUTTE COUNTY ASSOCIATION
OF GOVERNMENTS

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April 7, 2016

Karen Magliano, Division Chief
Air Quality Planning and Science Division
California Air Resources Board
1001 I Street
Sacramento, CA 95812

Re: Butte County Association of Governments (BCAG) Sustainable Communities Strategy Technical Methodology

Dear Ms. Magliano:

The purpose of this letter is to present BCAG's "technical methodology" to be used in the development of the 2016 Regional Transportation Plan / Sustainable Communities Strategy.

As required by the Sustainable Communities and Climate Protection Act of 2008, BCAG has prepared the attached document describing the technical methodology it intends to use for the purpose of estimating greenhouse gas emissions from its 2016 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS).

As you may be aware, BCAG is currently in the process of developing the 2016 RTP/SCS and updating its regional models. Therefore, we anticipate the methodology contained in this document to evolve as the RTP/SCS and regional models are finalized.

We look forward to working with ARB in order to insure that the methods presented will yield accurate measures of greenhouse gas emissions.

If you have any questions about the BCAG Technical Methodology, please feel free to contact myself or Brian Lasagna of my staff at (530) 809-4616.

Sincerely,

Jon A. Clark
Executive Director

Attachment: Technical Methodology for Estimating Greenhouse Gas Emissions

Butte County Association of Governments
2016 Regional Transportation Plan
Sustainable Communities Strategy

Technical Methodology for Estimating Greenhouse Gas Emissions

BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

April 7th, 2016

Purpose

As required by the Sustainable Communities and Climate Protection Act of 2008, BCAG has prepared this document describing the technical methodology it intends to use in estimating greenhouse gas emissions from its 2016 Regional Transportation Plan (RTP) and (SCS) Sustainable Communities Strategy. This is intended to be a working document as BCAG, in coordination with the California Air Resources Board (ARB), navigates the development and final acceptance of the 2016 RTP/SCS quantification of greenhouse gas emissions.

SB 375 Background

In September 2008, Senate Bill 375 (SB 375), also known as the Sustainable Communities and Climate Protection Act of 2008, was enacted by the state of California. SB 375 prompts regions to reduce greenhouse gas (GHG) emissions from passenger vehicles through the coordinated planning of long range transportation plans. The legislation requires all Metropolitan Planning Organizations (MPO) in California to develop a Sustainable Communities Strategy, which meets regional passenger vehicle GHG emissions targets, as an additional element of their regional transportation plans. BCAG's 2016 RTP/SCS update is to be completed by December 2016.

As described in SB 375, the SCS will be an integrated transportation and land use plan which is intended to meet the regional GHG target for the years 2020 and 2035 while also accommodating the region's forecasted growth. If the SCS is unable to meet the regional GHG target within the required state and federal constraints for RTP development, then an Alternative Planning Strategy (APS) must be prepared. The APS would identify how GHG targets would be achieved through alternative development patterns, infrastructure, or additional transportation measures or policies.

In 2011, ARB set GHG targets for the BCAG region from passenger vehicles as a 1% increase from 2005 emissions levels by 2020 and a 1% increase from 2005 emissions levels by 2035. The targets are currently proposed to be updated in 2016 and would apply to BCAG's 2020 RTP/SCS. These targets apply to the BCAG region as a whole for passenger vehicle emissions, and not to individual cities or sub-regions. The metric used for reporting will be GHG emissions per capita.

BCAG's 2012 RTP/SCS achieved a 2% reduction in per capita GHG emissions for the years 2020 and 2035. In order to achieve these reductions, BCAG focused its 2012 efforts towards land use by bringing together the recently completed general plans and laying out a pattern of development which balanced housing and employment growth within specified growth areas while protecting habitat and open space via consistency with the Butte Regional Conservation Plan.

Approach

The focus of the 2016 RTP/SCS will be to expand on the efforts of the 2012 plan by integrating the new Long-Range Transit and Non-Motorized Plan and incorporating the latest regional growth forecasts. This approach will include an update of the preferred "balanced" land use scenario included in the 2012 SCS.

In terms of modeling, BCAG will look to expand on the 2012 models improvements by updating socio-economic data, applying the revised growth forecasts to the land use and transportation networks, implementing a cost of travel sensitivity, improving the application of occupancy adjustments, incorporating state estimates of school enrollment, and revising the trip generation and distribution components.

This approach would be considered a minor update of the 2012 SCS, given the extensive amount of work completed for that effort. With the lower than anticipated housing and population growth realized over the past four years, an ongoing focus towards the implementation of the land use strategy developed in 2012, and minimal changes made to the local land use plans, this has become the clearest approach at this time.

Planning Process and Public Outreach

The planning and public outreach process was crucial in developing the 2012 RTP/SCS and will continue with the 2016 plan. BCAG will be utilizing the adopted Public Participation Plan as required by federal transportation planning regulations and SB 375.

Early Outreach (2014)

Prior to development of the 2016 RTP/SCS, BCAG conducted early outreach in mid-2014 with the BCAG Board of Directors, BCAGs various committee's and an early round of public workshops in an effort to inform the public regarding the plan and projects and to solicit early input. Coordination with local agencies also began in 2014 with a review of local development and identification of any anticipated changes to what had been included with 2012 RTP/SCS.

Data Development, Modeling, Preliminary Analysis, and Continued Outreach (2015)

In 2015, BCAG worked with its planning and transportation committee's to revise the regional growth forecasts (Attachment #1), review transportation project priorities, identify a regional road network, and develop a set of preferred performance measures. Land use and travel models were also updated with the latest available data and planning assumptions. A second round of public workshops were conducted in September to review the project to-date and the scoping of the environmental analysis.

Alternatives and Draft RTP/SCS (Early 2016)

Going into 2016, BCAG staff will be working with project consultants to prepare the draft model outputs and analysis for the alternatives to be included in the draft 2016

RTP/SCS Environmental Impact Report (EIR). Upon completion of a preliminary public draft document, BCAG will be conducting a third round of workshops for the purpose of receiving public input and reviewing proposed policies included with the plan. Based on input received on the preliminary public draft, a complete Draft RTP/SCS and EIR will be developed and released in spring 2016.

Final RTP/SCS (December 2016)
Upon release of the Draft RTP/SCS and EIR, BCAG will be conducting a final round of public workshops and the required public hearings. BCAG anticipates presenting the Final RTP/SCS and EIR, to the BCAG Board of Director's, for consideration of adoption at the December 2016 meeting.

Modeling the 2016 SCS

As with the 2012 SCS, BCAG intends to use 3 main models in preparing the 2016 RTP/SCS and estimating the GHG emissions: (1) Regional Land Use Allocation Model, (2) Regional Travel Demand Model (a three-step transportation forecasting model), and (3) the emission factors (EMFAC) model from ARB.

BCAG will also look at the potential of adding off-model tools to quantify other GHG emission reductions strategies such as changes in transit ridership and plug-in electrical vehicle usage.

Regional Land Use Allocation Model

The BCAG Land Use Allocation Model was developed by a team of project consultants from the University of California Davis – Information Center for the Environment (ICE), California State University, Chico – Geographical Information Center (GIC), and Fehr & Peers. The model utilizes the UPlan software platform, which has been implemented broadly across the state for various Blueprint planning efforts. UPlan is a rule based model which allocates future residential and employment growth while considering the region's existing land use plans, growth forecasts, and development attractions (e.g. transportation and infrastructure) and discouragements (e.g. resource areas, farmland, and floodplains).

The model was initially funded by grants from the California Strategic Growth Council (SGC) for the development of the 2012 RTP/SCS.

In preparing the 2016 RTP/SCS, the land use allocation model base year will be updated to 2014, to coincide with the latest validated travel model and existing land use datasets. Land use allocations will then be developed for the years 2005, 2020, 2035 and 2040. The forecasted allocation years of 2020, 2035, and 2040 will be based on minor revisions of the adopted 2012 RTP/SCS allocations with adjustments made for the revised regional growth forecasts. Residential and non-residential occupancy adjustments will also be incorporated into the model, a procedure which was previously

contained in the travel model. New assumptions regarding school enrollment will also be incorporated into the land use allocations.

A copy of the draft land use model documentation has been included as Attachment #2. The final documentation will be released in fall 2016 along with the final 2016 RTP/SCS.

Regional Travel Demand Model

The BCAG Regional Travel Demand Model will be used to forecast travel activity based on inputs of the forecasted allocation of housing and non-residential land uses from the land use allocation model and forecasts of the regional road network. Inputs will be prepared for the emissions analysis year of 2005, the model base year (2014), the GHG target years of 2020 and 2035, and the 2016 RTP horizon year of 2040.

The regional travel model was used in preparing the 2012 RTP/SCS and at that time received various upgrades to meet the analysis and reporting requirements of SB 375, with grant funding from the SGC and Caltrans. These upgrades included the following:

- Increased sensitivities for age of head of household, number of workers, household income and household size.
- Added multiple time periods (daily, AM peak period, AM peak hour, PM peak period, PM peak hour, mid-day period, and evening period conditions)
- Implemented the 4D's (density, diversity, design, and destination accessibility)
- Added an off-model transit forecasting component.
- Added a residential and non-residential occupancy component.

Presently, the model is undergoing minor updates and modifications for the 2016 RTP/SCS. Revisions to the model include the following:

- Incorporate latest information from American Community Survey and the California Household Travel Survey to re-estimate and calibrate models trip generation and distribution components.
- Implementation of a cost of travel sensitivity.
- Review and revise smart growth and cost of travel sensitivities based on latest research.
- Re-estimate transit ridership based on BCAG's Long-Range Transit and Non-Motorized Plan.
- Re-align land use and regional road network to updated growth forecasts.

A copy of the draft travel demand model documentation has been included as Attachment #3. The final documentation will be released in fall 2016 along with the final 2016 RTP/SCS.

EMFAC

BCAG will model vehicle emissions as prescribed in the *Methodology to Calculate CO2 Adjustment to EMFAC Output for SB 375*, provided by ARB. A copy of the ARB methodology has been included as Attachment #4.

ARB's latest federally approved emissions factor model (EMFAC 2014) will be used to calculate the carbon dioxide (CO2) emissions output based on the provided VMT and speed bin classification from the travel model and post-processor. BCAG will utilized the annual option for CO2 output as suggested by the RTAC report.

Once all trips are ran in EMFAC, BCAG will extract the total VMT and CO2 emissions for LDA, LDT1, LDT2, and MDV vehicle types. This ensures that only passenger vehicle (cars and light trucks) types will be included in the emissions analysis.

Modeling Interregional Trips

For the purpose of preparing the GHG emissions analysis for 2016 RTP/SCS, BCAG will subtract all emissions from through trips (X-X trips). In addition, the portion of VMT from trips that either begin or end within the region but travel to/from neighboring regions (X-I, I-X trips) will be included for all portions of the trip within the BCAG region, this is consistent with the method used in preparing BCAG's recommendation to ARB for targets which were approved in 2010 and those applied to the 2012 RTP/SCS.

The percentage of VMT by through trip type (X-X) will be calculated for the years 2005, 2020, and 2035.

ATTACHMENT 1

Butte County Long-Term Regional Growth Forecasts 2014-2040

Attachment #1

Draft

Butte County Long-Term Regional Growth Forecasts 2014 – 2040

Prepared by:
Butte County Association of Governments
November 25th, 2014

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This document is available online at www.bcag.org. Please direct any questions or comments to Mr. Brian Lasagna, BCAG Senior Planner by phone or email at blasagna@bcag.org.

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APPENDICES

INTRODUCTION

Approximately every four years, the Butte County Association of Governments (BCAG) prepares long-term regional growth forecasts of housing, population, and employment for the Butte County area. Once prepared, the forecasts are utilized in developing BCAG's Metropolitan Transportation Plan (MTP), Sustainable Communities Strategy (SCS), Air Quality Conformity Determination, and Regional Housing Needs Plan and provides data support for BCAG's regional Travel Demand Model. Local land use planning agencies may also elect to utilize the forecasts for preparing district plans or city and county long range plans.

As in the past, the forecasts have been developed by BCAG in consultation with its Planning Directors Group which consists of representatives from each of BCAG's local jurisdiction members and the Butte Local Agency Formation Commission. Each of the local jurisdictions provided valuable input regarding the anticipated amount of growth within their respective planning areas.

A low, medium, and high scenario has been developed for each forecast of housing, population, and employment. The use of these scenarios provides for increased flexibility when utilizing the forecast for long-term planning and alleviates some of the uncertainty inherent in long range projections.

The regional growth forecasts will be updated again during the 2018/19 fiscal year in preparation for BCAG's 2020 MTP/SCS and to ensure that any unexpected trends will be integrated into the forecasts.

APPROACH

The growth forecasts presented in this document represent a revision of the 2010-2035 forecasts developed during the 2010/11 fiscal year and utilized in preparing the 2016 MTP/SCS. This revision approach has been taken given the extensive amount of effort put forth by BCAG and the local agencies in developing the 2010-2035 forecasts, the lack of available grant funding to assist with its development, and minimal changes in local land use plans. As revised, the forecasts meet both state and federal transportation planning requirements.

REGIONAL FORECASTS

In comparison to the regional forecasts prepared by BCAG in 2010, the 2014 forecasts present a similar growth trend with each of the first three projection periods (2020, 2025, and 2030) showing increased population growth over the previous. Between the years 2014 and 2030, the forecasts show a compound annual growth rate (CAGR) of 1.54% for the medium scenario. However, unlike the 2010 forecasts, the 2014 forecasts capture a greater return to the slower growth anticipated statewide for the 10 year period from 2030 to 2040. Between the years 2030 and 2040, the forecasts show a CAGR of 1.11% for the medium scenario.

As previously observed in BCAG's 2006 and 2010 growth forecasts, jurisdictions in the southern portions of the region are projected to absorb a greater percentage of the regional growth then achieved in past growth trends. The cities of Biggs and Gridley are forecasted to, at a minimum, double in population by the year 2040 and the City of Oroville is projected to see between 77% and 109% increases over the next 26 years. While the greatest amount of growth will continue to be occurring in the Chico area with a forecasted range of 13,507 – 19,099 new housing units by the year 2040.

Employment is on track with forecasts prepared in 2010. The 2014 jobs to housing unit ratio met the forecasts of 0.76, an increase from 0.74 year 2010 levels. The rebound is projected to continue with a return to historic long term levels 0.78 jobs per housing unit in 2020 and into the horizon year of 2040.

Table 1: Housing Forecasts 2014-2040

Low Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	613	738	925	1,071	1,214	1,304	691	113%	2.95%
Chico	38,146	40,018	42,501	46,103	49,531	51,653	13,507	35%	1.17%
Gridley	2,482	3,026	3,689	4,211	4,734	5,019	2,537	102%	2.75%
Oroville	6,408	7,306	8,504	10,060	10,859	11,357	4,949	77%	2.23%
Paradise	13,023	13,472	13,930	14,450	14,915	15,197	2,174	17%	0.60%
Unincorporated^^	36,707	39,263	41,501	43,851	45,982	47,238	10,531	29%	0.97%
Total County	97,379	103,823	111,050	119,745	127,235	131,768	34,389	35%	**1.17%**

Medium Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	613	763	988	1,163	1,335	1,444	831	136%	3.35%
Chico	38,146	40,396	43,381	47,711	51,831	54,382	16,236	43%	1.37%
Gridley	2,482	3,136	3,933	4,560	5,189	5,532	3,050	123%	3.13%
Oroville	6,408	7,488	8,928	10,798	11,758	12,357	5,949	93%	2.56%
Paradise	13,023	13,563	14,113	14,738	15,298	15,636	2,613	20%	0.71%
Unincorporated^^	36,707	39,779	42,469	45,294	47,856	49,365	12,658	34%	1.15%
Total County	97,379	105,125	113,812	124,264	133,266	138,716	41,337	42%	**1.37%**

High Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	613	789	1,054	1,260	1,463	1,590	977	159%	3.73%
Chico	38,146	40,793	44,304	49,398	54,244	57,245	19,099	50%	1.57%
Gridley	2,482	3,251	4,189	4,926	5,666	6,070	3,588	145%	3.50%
Oroville	6,408	7,678	9,372	11,572	12,701	13,406	6,998	109%	2.88%
Paradise	13,023	13,658	14,305	15,040	15,699	16,097	3,074	24%	0.82%
Unincorporated^^	36,707	40,321	43,485	46,808	49,821	51,597	14,890	41%	1.32%
Total County	97,379	106,491	116,710	129,005	139,594	146,005	48,626	50%	**1.57%**

* Source: *State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2010-2014, with 2010 Benchmark. Sacramento, California, May 2014.*

Notes:
^ Jurisdictional figures reflect anticipated new growth within the anticipated boundaries of each jurisdiction and do not reflect future annexation of existing units or as-yet-unbuilt new units in unincorporated areas to the respective cities. Assumptions about future boundaries are not intended by BCAG to be interpreted as factors limiting such jurisdictions' future boundaries.

^^ Unincorporated Butte County figures exclude forecasted growth identified in the Butte County General Plan 2030 - Environmental Impact Report as Bell Muir/Chico Area, Doe Mill/Honey Run Specific Plan, Thermolito Afterbay, Biggs Area, and Gridley Area and includes shared growth (50%) of Thermalito, Southern Oroville and Eastern Oroville.

Table 2: Population Forecasts 2014-2040

Low Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	1,684	2,027	2,541	2,941	3,335	3,583	1,899	113%	2.9%
Chico	88,389	92,726	98,480	106,827	114,769	119,686	31,297	35%	1.2%
Gridley	6,739	8,216	10,017	11,433	12,853	13,628	6,889	102%	2.7%
Oroville	15,980	18,221	21,208	25,088	27,079	28,322	12,342	77%	2.2%
Paradise	26,109	27,010	27,927	28,969	29,903	30,467	4,358	17%	0.6%
Unincorporated^^	83,415	89,224	94,310	99,651	104,494	107,348	23,933	29%	1.0%
Total County	222,316	237,424	254,483	274,909	292,433	303,034	80,718	36%	**1.2%**

Medium Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	1,684	2,096	2,714	3,195	3,668	3,967	2,283	136%	3.4%
Chico	88,389	93,603	100,519	110,552	120,099	126,009	37,620	43%	1.4%
Gridley	6,739	8,515	10,679	12,381	14,088	15,020	8,281	123%	3.1%
Oroville	15,980	18,673	22,264	26,928	29,322	30,816	14,836	93%	2.6%
Paradise	26,109	27,192	28,294	29,547	30,669	31,347	5,238	20%	0.7%
Unincorporated^^	83,415	90,398	96,511	102,931	108,752	112,183	28,768	34%	1.1%
Total County	222,316	240,476	260,981	285,534	306,598	319,342	97,026	44%	**1.4%**

High Scenario

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	1,684	2,169	2,896	3,461	4,018	4,369	2,685	159%	3.7%
Chico	88,389	94,522	102,658	114,460	125,691	132,643	44,254	50%	1.6%
Gridley	6,739	8,828	11,373	13,376	15,384	16,481	9,742	145%	3.5%
Oroville	15,980	19,148	23,372	28,858	31,674	33,432	17,452	109%	2.9%
Paradise	26,109	27,383	28,680	30,154	31,473	32,271	6,162	24%	0.8%
Unincorporated^^	83,415	91,629	98,820	106,371	113,219	117,255	33,840	41%	1.3%
Total County	222,316	243,678	267,799	296,681	321,459	336,450	114,134	51%	**1.6%**

* Source: *State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2010-2014, with 2010 Benchmark. Sacramento, California, May 2014.*

Notes:
^Jurisdictional figures reflect anticipated new growth within the anticipated boundaries of each jurisdiction and do not reflect future annexation of existing units or as-yet-unbuilt new units in unincorporated areas to the respective cities. Assumptions about future boundaries are not intended by BCAG to be interpreted as factors limiting such jurisdictions' future boundaries.

^^ Unincorporated Butte County figures exclude forecasted growth identified in the Butte County General Plan 2030 - Environmental Impact Report as Bell Muir/Chico Area, Doe Mill/Honey Run Specific Plan, Thermolito Afterbay, Biggs Area, and Gridley Area and includes shared growth (50%) of Thermalito, Southern Oroville and Eastern Oroville.

Table 3: Employment Forecasts 2014-2040

Low Scenario

Jurisdiction	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040
Butte County	74,100	80,982	86,619	93,401	99,243	102,779	28,679	39%

Medium Scenario

Jurisdiction	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040
Butte County	74,100	81,998	88,773	96,926	103,948	108,198	34,098	46%

High Scenario

Jurisdiction	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040
Butte County	74,100	83,063	91,033	100,624	108,883	113,884	39,784	54%

Table 4: Jobs (Non-Farm) to Housing Unit Ratios 2014-2040

Factor	2014*	2020	2025	2030	2035	2040
Jobs/Housing Unit	0.76	0.78	0.78	0.78	0.78	0.78

* Source: *State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2010-2014, with 2010 Benchmark. Sacramento, California, May 2014. California Employment Development Department, Industry Employment & Labor Force - by Annual Average, September 2013 Benchmark, for Butte County (Chico MSA).*

FORECAST METHODOLOGY

BCAG has prepared the forecasts using professionally accepted methodologies for long-range forecasting. Utilizing a "top down" approach, long-term projections prepared by the State of California were consulted for Butte County and used to re-establish control totals for the region. Additionally, a variety of data sources, including input from local jurisdiction staff, were reviewed and carried over from the 2010 forecasts and inserted at the local jurisdiction level, therefore incorporating a "bottom up" approach. Forecasts were then allocated into five year increments until the year 2040. Lastly, low, medium, and high scenarios were prepared for each forecasted category.

HOUSING

The latest California Department of Finance (DOF) long range population and housing projections, as of June 2014, were analyzed for the period 2015-2040 for the Butte County region. These projections determine that the Butte County region will grow at a Compound Annual Growth Rate (CAGR) of 1.4%. This information was used to establish the control total for BCAG's medium forecast scenario.

BCAG then prepared a revise of the 2010 BCAG growth forecasts utilizing 2014 base line data and the long range forecasts from DOF. A "carry-over" of the forecasted growth from the 2010-2035 forecasts to the new 2014-2040 range was applied. An adjustment to the 2035 and 2040 forecast periods was then made to mirror the trend of the DOF forecasts at the Butte County level. Appendix #1 provides details regarding the county level adjustments. The information was then reviewed by local agency planning staff.

A similar approach was then applied at the jurisdiction level, taking into consideration the latest DOF information for each. Once compiled for all jurisdictions, the housing forecasts showed a regional CAGR of 1.37%. This information was used to represent the medium forecast scenario. Appendix #2 provides details regarding the local level adjustments. The information was then reviewed by local agency planning staff.

Based on a 0.2 percent incremental change between the established high and medium scenarios, a low and high housing scenario were developed using a CAGR of 1.17% and 1.57%. This incremental change is identical to that included with the 2010 forecasts.

POPULATION

Population forecasts were prepared by applying average persons per housing unit to the housing unit forecasts. This method allows for the capture of variations in household for each jurisdiction. The average person per housing unit was prepared by dividing the 2014 DOF preliminary population estimates by the preliminary housing estimates for each jurisdiction. This method was applied to all scenarios.

EMPLOYMENT

Employment forecasts were prepared at the regional/county level only and are based on a ratio of jobs per housing unit.

Baseline 2014 employment data was obtained from the California Employment Development Department (EDD) for the year 2013 – an annual average for 2014 was not available at the time the BCAG regional forecasts were prepared. The 2013 EDD data provide a total of all non-farm jobs for the region. This information was then used in conjunction with 2014 DOF preliminary housing unit estimates to calculate a ratio of 0.76 jobs per housing unit.

In 2010, historic employment information was obtained from the EDD for the period 1990-2009 and averaged to calculate a long range jobs to housing unit ratio of 0.78. This information was updated to include 2013 data and the ratio of 0.78 was unchanged. The ratio was applied to the years 2020-2040 based on the anticipated continued recovery of employment rates and the long term historical average.

Lastly, the jobs to housing unit ratio developed for each 5 year period was applied to all scenarios.

BCAG 2014-2040 REGIONAL GROWTH FORECASTS – PRELIMINARY COUNTY LEVEL UPDATES (08/22/14)

Purpose: Every four years BCAG prepares long range growth forecasts of housing, population, and jobs in order to inform the development of the region's long range Metropolitan Transportation Plan (MTP) and Sustainable Communities Strategy (SCS), as required by federal regulations. Local land use planning agencies may also utilize the forecasts in preparing their long range plans.

Approach: Given the extensive amount of effort put forth by BCAG and local agencies in developing the forecasts for the 2012 MTP/SCS, lack of available grant funding and minimal changes in local land use plans, the latest forecasts will undergo a minor revision for the purpose of realigning with the state forecasts and meeting federal requirements.

CA Department of Finance – Long Range Forecasts: The long range forecasts produced by the state provide the Butte County region with a control total for population at the county level. In January of 2013, the CA Dept. of Finance (DOF) released the latest available long range forecasts for the state and Butte County region. The forecasts estimate a 0.83% compound annual growth rate (CAGR) for the state over the 25 year period from 2015 to 2040.

Table 1.

DOF Estimate for California 2015-2040		
Year	**Projected Population**	**CAGR**
2015	38,801,063	-
2020	40,643,643	0.93%
2025	42,451,760	0.87%
2030	44,279,354	0.85%
2035	46,083,482	0.80%
2040	47,690,186	0.69%
	2015-2040 CAGR	**0.83%**

The same forecasts estimate a 1.39% CAGR for Butte County over the same period with the greatest growth (1.79% CAGR) occurring between 2025-2030 years and tapering downward to the slowest growth (0.82% CAGR) between the 2035 and 2040 years.

Table 2.

DOF Estimate for Butte County 2015-2040		
Year	**Projected Population**	**CAGR**
2015	224,955	-
2020	241,521	1.43%
2025	259,926	1.48%
2030	284,082	1.79%
2035	305,039	1.43%
2040	317,718	0.82%
	2015-2040 CAGR	**1.39%**

Carry-over Previous BCAG Forecast to New Period (2014-2040): A carry-over of the forecasted growth from the BCAG 2010-2035 forecasts to the new 2014-2040 range. The results of this carry-over are included in Table 3. A similar trend is seen when comparing the DOF forecasts of Butte County with the Carry-over Estimates, the steady rise of the CAGR over the first three 5-year periods (2014/15-2030). However, there is a significant difference for the 2030-2040 periods.

Table 3.

Carry-over Estimate for Butte County 2014-2040		
Year	**Projected Population**	**CAGR**
2014	222,316	-
2020	240,476	1.32%
2025	260,981	1.65%
2030	285,534	1.81%
2035	309,997	1.66%
2040	336,377	1.65%
	2014-2040 CAGR	**1.61%**

2035 and 2040 CAGR Adjustment: Given the significant difference in the trends for the 2030-2040 periods, the growth rates of the state forecasts were applied to the BCAG carry-over. The results, see Table 4, show similar growth rates of 1.4% (BCAG adjusted) and 1.39% (state) for the entire planning period (2014/15-2040). The countywide population totals are within the +/- 3% allowed by the state.

Table 4.

Adjusted Carry-over Estimate for Butte County 2014-2040		
Year	**Projected Population**	**CAGR**
2014	222,316	-
2020	240,476	1.32%
2025	260,981	1.65%
2030	285,534	1.81%
2035	306,598	1.43%
2040	319,342	0.82%
	2015-2040 CAGR	**1.40%**

BCAG 2014-2040 REGIONAL GROWTH FORECASTS – PRELIMINARY JURISDICTION LEVEL UPDATES (10/14/14)

Based on the approach and adjustments developed for the county level forecasts, BCAG prepared preliminary jurisdiction level forecasts for the 2014-2040 period. These forecasts reflect growth, by jurisdiction, for each 5 year period. Base years (2014) numbers for housing, population, and jobs are taken from the latest CA Department of Finance and CA Employment Development Department estimates.

Table 1. Housing Forecasts

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	613	763	988	1,163	1,335	1,444	831	136%	3.35%
Chico	38,146	40,396	43,381	47,711	51,831	54,382	16,236	43%	1.37%
Gridley	2,482	3,136	3,933	4,560	5,189	5,532	3,050	123%	3.13%
Oroville	6,408	7,488	8,928	10,798	11,758	12,357	5,949	93%	2.56%
Paradise	13,023	13,563	14,113	14,738	15,298	15,636	2,613	20%	0.71%
Unincorporated^^	36,707	39,779	42,469	45,294	47,856	49,365	12,658	34%	1.15%
Total County	97,379	105,125	113,812	124,264	133,266	138,716	41,337	42%	1.37%

Table 2. Population Forecasts

Jurisdiction^	2014*	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040	Compound Annual Growth Rate (CAGR) 2014-2040
Biggs	1,684	2,096	2,714	3,195	3,668	3,967	2,283	136%	3.35%
Chico	88,389	93,603	100,519	110,552	120,099	126,009	37,620	43%	1.37%
Gridley	6,739	8,515	10,679	12,381	14,088	15,020	8,281	123%	3.13%
Oroville	15,980	18,673	22,264	26,928	29,322	30,816	14,836	93%	2.56%
Paradise	26,109	27,192	28,294	29,547	30,669	31,347	5,238	20%	0.71%
Unincorporated^^	83,415	90,398	96,511	102,931	108,752	112,183	28,768	34%	1.15%
Total County	222,316	240,476	260,981	285,534	306,598	319,342	97,026	44%	1.40%

Table 3. Employment Forecasts

Jurisdiction	2014	2020	2025	2030	2035	2040	Total Increase 2014-2040	Percent Increase 2014-2040
Butte County	73,433	81,998	88,773	96,926	103,948	108,198	34,765	47%

Table 4. Jobs (Non-Farm) to Housing Unit Ratios

Factor	2014*	2020	2025	2030	2035	2040
Jobs/Housing Unit	0.76	0.78	0.78	0.78	0.78	0.78

** Source: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2010-2014, with 2010 Benchmark. Sacramento, California, May 2014. California Employment Development Department, Industry Employment & Labor Force - by Annual Average, September 2013 Benchmark, for Butte County (Chico MSA).*

^ Jurisdictional figures reflect anticipated new growth within the anticipated boundaries of each jurisdiction and do not reflect future annexation of existing units or as-yet-unbuilt new units in unincorporated areas to the respective cities. Assumptions about future boundaries are not intended by BCAG to be interpreted as factors limiting such jurisdictions' future boundaries.

^^ Unincorporated Butte County figures exclude forecasted growth identified in the Butte County General Plan 2030 - Environmental Impact Report as Bell Muir/Chico Area, Doe Mill/Hone Run Specific Plan, Thermalito Afterbay, Biggs Area, and Gridley Area and includes shared growth (50%) of Thermalito, Southern Oroville and Eastern Oroville.

ATTACHMENT 2

Regional Land Use Model Assumptions and Methodology

Attachment #2

Butte County Association of Governments

Land Use Allocation Model

Technical Methodology for Preparing 2016 Regional Transportation Plan / Sustainable Communities Strategy Land Use Allocations

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March 2016

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APPENDICES

INTRODUCTION

In 2012, BCAG, in coordination with local agency members, California State University-Chico, and the University of California at Davis, developed the Butte County region's first land use allocation model for the purpose of preparing the forecasted development pattern included in BCAG's 2012 Metropolitan Transportation Plan (MTP) and Sustainable Communities Strategy (SCS). The model was used by BCAG in developing land use scenarios to be analyzed as part of the 2012 MTP/SCS development process and in preparing the final preferred land use scenario and allocation.

In preparing the 2016 Regional Transportation Plan (RTP) and SCS, the land use allocation model is being used to generate the base year (2014), back-cast year (2005), and update the preferred land use scenario developed as part of the 2012 MTP/SCS for the forecast years 2020, 2035, and 2040.

The 2016 update of the land use allocation model includes the latest regional growth forecasts, local general plan information, and planned projects. In addition, five (5) new job categories have been accounted for, new K-12 school enrollment forecasts incorporated, an occupancy adjustment developed for residential and non-residential land uses, and a process of normalizing the data to state sources.

The following sections of the document provide an overview of the modeling process as well as details regarding specific inputs and assumptions associated with the land use allocations.

BASE YEAR DEVELOPMENT (2014)

As in 2012, the base year land use file was prepared using the latest available existing regional land use and schools datasets. The regional existing land use dataset is updated annually as part BCAG's data maintenance program and contains the most up-to-date information regarding existing residential and non-residential land uses. School data is updated every four years and includes the latest enrollments for K-12, Chico State, and Butte College.

An addition to the 2016 model is the inclusion of job categories for hospitals, hotels, university (Chico State), community college (Butte College), and K-12 schools. Job ratios were developed for each category based on enrollment, rooms, or square footage.

Prior to finalizing the base year land uses, the dataset was normalized to the California Department of Finance (DOF) housing estimates and California Employment

Development Department (EDD) labor force data. This step was not included in previous models and results in higher land use totals regionally in comparison to the 2012 model.

Table 1 provides a summary of the base year assumptions for population, housing, and jobs.

Table 1 - Base Year (2014) Assumptions	
Population[1]	222,316
Housing Units[1]	97,379
Households[1]	89,052
Jobs[2] (Non-Farm)	74,100
Jobs/Housing Unit	0.76

BACK-CAST YEAR DEVELOPMENT (2005)

The year 2005 back-cast land use dataset was carried over from the 2012 model and updated with the new job categories and normalized to the DOF and EDD population and jobs data. As with the base year, applying the new job categories and normalizing to state data resulted in higher land use totals in comparison to the 2012 model.

Table 2 provides a summary of the back-cast year assumptions for population, housing, and jobs.

Table 2 - Back-Cast Year (2005) Assumptions	
Population[3]	214,582
Housing Units[3]	91,666
Households[3]	85,478
Jobs[2] (Non-Farm)	73,400
Jobs/Housing Unit	0.80

[1] State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, January 1. 2011-2014, with 2010 Benchmark. Sacramento, California, May 2014.
[2] State of California, Employment Development Department, Butte County Industry Employment & Labor Force, March 2013 Benchmark. Sacramento, California, October 17, 2014.
[3] State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2010, with 2000 Benchmark. Sacramento, California, May 2010.

FORECAST YEARS DEVELOPMENT (2020, 2035, & 2040)

The 2016 RTP/SCS land use allocations for the forecasted years of 2020, 2035, and 2040 utilize the land use patterns developed and adopted as part the 2012 MTP/SCS preferred "balanced" scenario.

It is important to recognize that although the land use pattern is carried over from the 2012 MTP/SCS, there have been changes which affect the overall forecasted land use for the region. The 2016 RTP/SCS includes revised growth forecasts which call for less population, housing, and jobs over the same planning period. In addition, minor changes in local general plans, planned development, and the accounting of growth occurring over the past four (4) years also affect the future allocations. Lastly, improvements made to the model such as the addition of job categories, revised school enrollment forecasts data, and the normalization of the base years modeled data to state figures also have an effect on the land use.

The future year forecasts have been prepared using the same process developed as part of the 2012 MTP/SCS, with the addition of an occupancy adjustment. First, data is prepared utilizing the latest general plans and development activity. Secondly, future growth is allocated utilizing the prepared data and defined "growth area" types. Lastly, an occupancy adjustment is applied to residential and non-residential uses.

DATA PREPERTATION

The data preparation process follows the same overall process that was used with the 2012 MTP/SCS. The latest general plans are cross-walked into the model and planning areas are established at the jurisdictions level, land use assumptions are applied by planning area, and masks are applied to "no growth" areas or areas with planned development. The result of the data preparation is an "available lands" layer which represents those areas which are available for future growth.

General Plan Classifications

A standard list of general plan classification code values were developed for use in the model as part of the 2012 MTP/SCS. Each of the jurisdiction's general plan land use classes were cross-walked into one of twenty standard modeling classifications (See Appendix A). This addressed any variations in general plans across the county, and allowed for the implementation of a single regional general plan classification system. The purpose of the general plan modeling classifications is to restrict the type and location of new growth to designated areas when preparing the forecasted allocations. For the 2016 RTP/SCS the same twenty standard land use classifications were carried over and the latest local general plans were applied.

Planning Areas

As with the 2012 MTP/SCS model, growth has been modeled individually at the jurisdiction level for each of the forecast years. This approach allows for each jurisdiction to retain individual land use assumptions. BCAG member jurisdictions include Chico, Paradise, Oroville, Gridley, Biggs, and the remaining unincorporated area of Butte County.

In 2012, planning area boundaries were created to define the extent of each jurisdiction, for planning purposes. The Oroville planning area was further divided into an Oroville-City and Oroville-County due to the overlap in anticipated growth planned by both the City and County. Planning areas were adapted from a combination of jurisdiction city limits, Local Agency Formation Commission (LAFCo) spheres of influence, general plan and special planning area considerations. Planning areas do not overlap one another and together they encompass the entirety of Butte County (See Appendix B). For the 2016 RTP/SCS, the planning area boundaries remain unchanged.

Land Use Assumptions

Land Use (LU) modeling assumptions for regional and jurisdiction specific employment and housing characteristics were carried over from the model prepared in 2012 with minor changes being made to the average square foot per employee for the office classifications. The LU modeling assumptions are applied to each of the modeling classifications where new growth is assigned (See Appendix C). These assumptions included metrics for the following:

- Dwelling units per acre (DU/AC): Density of homes for a specific residential or mixed use land classification.
- Average square footage per employee (Avg. SF/E): Density of employees working in a business (Retail, Office, Industrial, or Mixed Use).
- Floor Area Ratio (FAR): Described as the relationship between the total useable floor space inside of a building(s) and the total area of the lot where building(s) are located.
- Mixed Use Ratio: Mixed use LU classifications receive a percentage of two or more different LU types (Residential, Retail, Office, and Industrial).

Land Use Masks

In developing the 2012 model a set layers were utilized to prepare a land use “mask” or areas where new growth is not permitted or reasonably foreseeable to occur. Areas such as existing development, public parks, and protected lands are all examples of areas where growth is not permitted.

In preparing the model for the 2016 RTP/SCS, staff reviewed and updated the latest available datasets to be applied to the mask. This ensured that locations newly designated for non-development or which have been developed within the past four years were accounted for.

Table 3 lists the data layers used in preparing the land use mask.

Table 3 - Mask Layers
Public Park Lands
Existing Protected Lands
Existing Developed Lands
Butte Regional Conservation Plan – Draft Preserve Hardline Area
Lakes
Rivers
Existing Right of Ways
Areas of Slope > 25%
Public Lands
Federal Lands
Utility Lands
State Lands
Union Pacific Lands
Proposed/Approved Development Areas

Appendix D is included and illustrates the areas which make up the “mask” layer within the region.

Available Lands

For each jurisdiction, an “available lands” layer was created for the 2016 RTP/SCS. The layer represents the areas within each jurisdiction which can accept new growth. This layer is created by simply applying the mask to the general plan layer for each planning area.

Appendix E is included and illustrates the areas designated as “available lands” within the model.

ALLOCATING FUTURE LAND USES

Following the data preparation, the preferred “balanced” regional allocation of growth was executed for each of the three forecast years. Revised population, housing, and jobs were applied to each jurisdiction using a spreadsheet tool which has the ability to allocate growth within specific defined growth areas. The tool also has the ability to allocate future development as planned, mixed use (employment and housing), redevelopment, or to standard available land locations.

Growth Areas

As in 2012, each jurisdiction was further broken down into Growth Areas. Jurisdiction plan areas were split into five Growth Areas; center, established, new, rural, and agricultural. Center growth areas are downtown and central business areas where higher densities of commercial LU's are present or planned. Established growth areas are within the current built environment and represent areas where infill and redevelopment opportunities are present. New growth areas are where new development is planned to occur outside of the currently established built environment. Rural and agricultural growth areas are only present in the unincorporated county jurisdiction and represented areas for new growth that are separated from any incorporated area in the county. Appendix F illustrates the locations of Growth Areas.

Allocation Process

In order to retain the land use pattern of the preferred "balanced" scenario developed as part the 2012 MTP/SCS, allocations were distributed by growth area at equal portions to those prepared in 2012 for each jurisdiction. Once allocations were completed in the spreadsheet tool, they were converted back to a GIS format and aggregated at the traffic analysis zone (TAZ) level for input into the travel demand model.

Planned Projects Allocation

In the case of planned projects, or projects which have been or are likely to be approved by local agencies and can reasonably be assumed to develop within the 2016 RTP/SCS planning period, details on the location and development is pre-determined. For these situations growth was allocated into specified parcels, split by TAZ. Appendix G-1 contains the locations of planned projects allocated in the model. In addition, Appendix G-2 contains the detailed listing of planned projects by plan area.

Redevelopment Allocation

Redevelopment was allocated into designated parcels where redevelopment opportunities existed, based on input from local jurisdiction planning staff. Appendix H illustrates the general location of areas receiving redevelopment allocations.

Final Allocation Files

The results of each forecast years allocation is combined at the region level by TAZ. Appendix I illustrates the areas receiving allocations of population, housing, and/or employment for the year 2040.

Table 4, 5, and 6 provide a summary of the year 2020, 2035 and 2040 assumptions for population, housing, and jobs accommodated by the final allocations.

Table 4 - Year 2020 Assumptions[4]	
Population	240,476
Housing Units	105,125
Households	97,766
Jobs (Non-Farm)	81,998
Jobs/Housing Unit	0.78

Table 5 - Year 2035 Assumptions[4]	
Population	306,598
Housing Units	133,266
Households	123,937
Jobs (Non-Farm)	103,948
Jobs/Housing Unit	0.78

Table 6 - Year 2040 Assumptions[4]	
Population	319,342
Housing Units	138,716
Households	129,006
Jobs (Non-Farm)	108,198
Jobs/Housing Unit	0.78

[4] BCAG Long-Term Regional Growth Forecasts 2014-2040

MODEL IMPROVEMENTS

Several improvements were made to the land use model for the purpose of increasing forecasting accuracy as well as the sensitivity of the travel demand model. The latest model includes five (5) new job categories, improved K-12 school enrollment forecasts, occupancy adjustment developed for residential and non-residential land uses, and a process of normalizing the data to state sources.

New Job Categories

Five new job categories were applied to the land use allocations. The addition of job categories for hospitals, hotels, university (Chico State), community college (Butte College), and K-12 schools allow for more accurate accounting of regional jobs. Job ratios were developed for each category based on enrollment, rooms, or square footage. With the 2012 model, the jobs from these categories were included in a "catch all" of other employment.

K-12 Enrollment Forecasts

The 2016 RTP/SCS land use allocations include revised K-12 enrollment forecasts which coincide with projections developed by the DOF. These forecasts are significantly lower than those included in the 2012 MTP/SCS, which directly coincided with increases in population and housing.

Occupancy Adjustment

The application of vacancy for both residential and non-residential uses is now included in the land use allocation model and is applied at both the jurisdiction and TAZ level. In the past, occupancy was accounted for in the travel demand model. The utilization of the land use model allows for greater control over different land uses as well as more flexibility in applying to multiple geographies.

Normalizing Data to State Sources

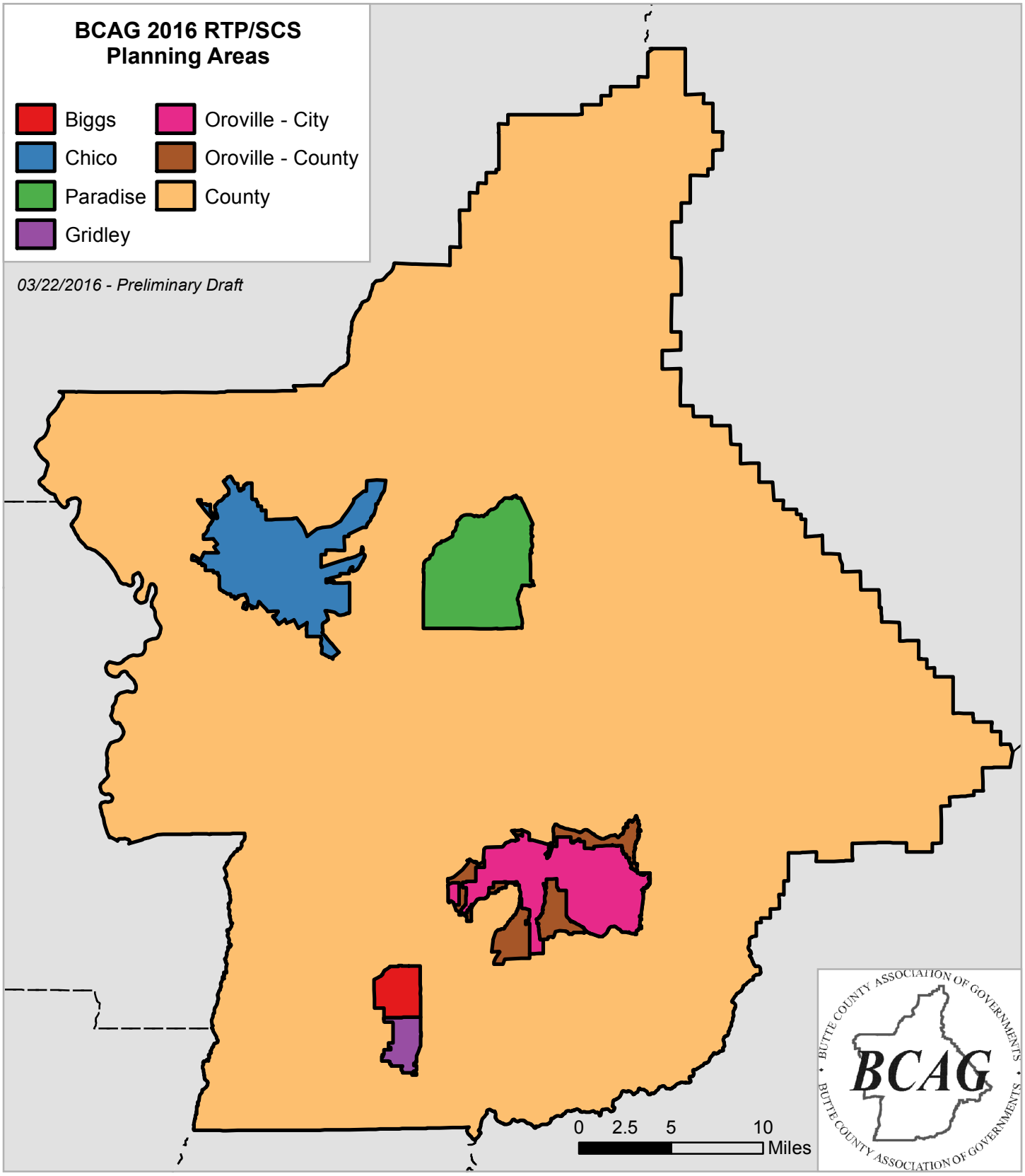
Prior to finalizing the base and back-cast year land uses, the datasets were normalized to the DOF housing estimates and EDD labor force data. This step was not included in previous models and results in higher land use totals regionally in comparison to the 2012 model.

APPENDIX A.

General Plan Class to Model Class Crosswalk

Model Code	Model Classification	TransCAD Classification	City of Chico 2030 GP (Final)	Town of Paradise 1994 GP	City of Gridley GP 2030 (Final)	City of Biggs GP 2030 (Final)	City of Oroville GP 2030 (Final)	Butte County GP 2030 (Final)
0	Unclassified	N/A			Right of Way (ROW), Right of Way Railroad (ROWR), Right of Way Water (ROWW)	Right of Way (ROW), Railroad ROW (RR)	Right of Way (ROW)	Right of Way (ROW), Sports and Entertainment (SE)
1	Agriculture	N/A			Agriculture (AG)	Agriculture (A)		Agriculture (AG)
2	Industry	IND_KSF	Manufactoring and Warehouse (MW)			Agriculture Industrial (AI), Heavy Industrial (HI)	Industrial (IND)	Industrial (I)
4	Agriculture	N/A				Agriculture Commercial (AC)		
5	Office Commercial	OFF_KSF					Office (OFC)	
6.1	Mixed Use Retail	RET_KSF & OFF_KSF	Neighborhood Commercial (NC)	Neighborhood Commercial (NC)	Downtown Mixed Use (DMU)	Commercial (C)	Mixed Use Commercial (MUC)	Mixed Use (MU)
6.2	Mixed Use Retail	RET_KSF & OFF_KSF & MF_DU	Commercial Mixed Use (CMU)	Central Commercial (CC)	Neighborhood Center Mixed Use (MU)	Downtown Mixed Use (DMU)	Retail and Business Services (RBS)	Retail and Office (RTL)
6.3	Mixed Use Retail	RET_KSF & OFF_KSF & MF_DU	Commercial Mixed Use (CMU) with Downtown or Corridor Overlays (OS-3, 7, 9, 13, 14, 15)	Town Commercial (TC)	Commercial (C)	Mixed Use (MU)	Airport Business Park (ABP)	Industrial (I) and Rural Residential (RR) with Retail Overlay (Retail)
6.4	Mixed Use Retail	RET_KSF & OFF_KSF & IND_KSF	Commercial Services (CS)	Business Park (BP)				Recreation Commercial (REC)
6.5	Mixed Use Retail	RET_KSF & OFF_KSF & MF_DU	Regional Commercial (RC)	Community Service (CS)				Research and Business (RBP)
6.6	Mixed Use Office	RET_KSF & OFF_KSF & MF_DU	Office Mixed Use (OMU)					
6.7	Mixed Use Office	RET_KSF & OFF_KSF & MF_DU	Office Mixed Use (CMU) with Downtown or Corridor Overlays (OS-3, 7, 9, 13, 14, 15)					
7	Mixed Use Industrial	IND_KSF & OFF_KSF	Industrial Office Mixed Use (IOMU)	Light Industrial (LI)	Industrial (M), Agriculture Industrial (AI)	Light Industrial (LI)		Agriculture Services (AS)
8.1	Mixed Use Residential	MF_DU & RET_KSF & OFF_KSF	Residential Mixed Use (RMU)					
8.2	Mixed Use Residential	MF_DU & RET_KSF & OFF_KSF	Residential Mixed Use (RMU) with Downtown and Corridor Overlays (OS-3, 7, 9, 13, 14, 15)					
9	High Density Residential	MF_DU	High Density Residential (HDR)		Residential High Density 2 (RHD 2)	High Density Residential (HDR)	High Density Residential (HDR)	High Density Residential (HDR)
10	Medium-High Density Residential	MF_DU	Medium-High Density Residential (MHDR)	Multi-Family Residential (MR)			Medium High Density Residential (MHDR)	
11	Medium Density Residential	SF_DU	Medium Density Residential (MDR)		Residential High Density 1 (RHD 1)	Medium Residential (MDR)	Medium Density Residential (MDR)	Medium High Density Residential (MHDR)
12	Low Density Residential	SF_DU	Low Density Residential (LDR)	Rural Residential (RR) and Town Residential (TR)	Residential Medium Density (RMD), Residential Low Denisty (RLD)	Low Density Residential (LDR)	Medium Low Density Residential (MLDR)	Medium Density Residential (MDR)
13	Very Low Density Residential	SF_DU	Very Low Density Residential (VLDR)	Agricultural Residential (AR)	Residential Very Low Density (RS)		Low Density Residential (LDR)	Very Low Density Residential (VLDR), Low Density Residential (LDR)
14	Rural Residential	SF_DU						Foothill Residential (FR), Rural Residential (RR)
15	Planned Development	N/A	Special Mixed Use (SMU)					Planned Unit Development (PUD)
16	Public Lands & Open Space	N/A	Primary Open Space (POS), Secondary Open Space (SOS)	Recreational (R), Open Space/Agricultural (OS/AG)	Park (PARK), Open Space (OS)		Park (PARK), Environmental Conservation/Safety (ECS), Resource Management (RM)	Resource Conservation (RC)
17	Water Bodies	N/A					State Water Project (SWP)	
18	Urban Reserve	N/A			Urban Reserve (UR)			
19	Timber	N/A		Timber Production (TP)				Timber Mountain (TM)
20	Public Facilities	N/A	Public Facilities and Services (PFS)	Public Institutional (PI)	School (S), Public (PUB)	Public (P)	Public (PUB)	Public (P)

APPENDIX B.


BCAG 2016 RTP/SCS
Planning Areas
Biggs
Chico
Paradise
Gridley
Oroville - City
Oroville - County
County
03/22/2016 - Preliminary Draft
0 2.5 5 10
Miles
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

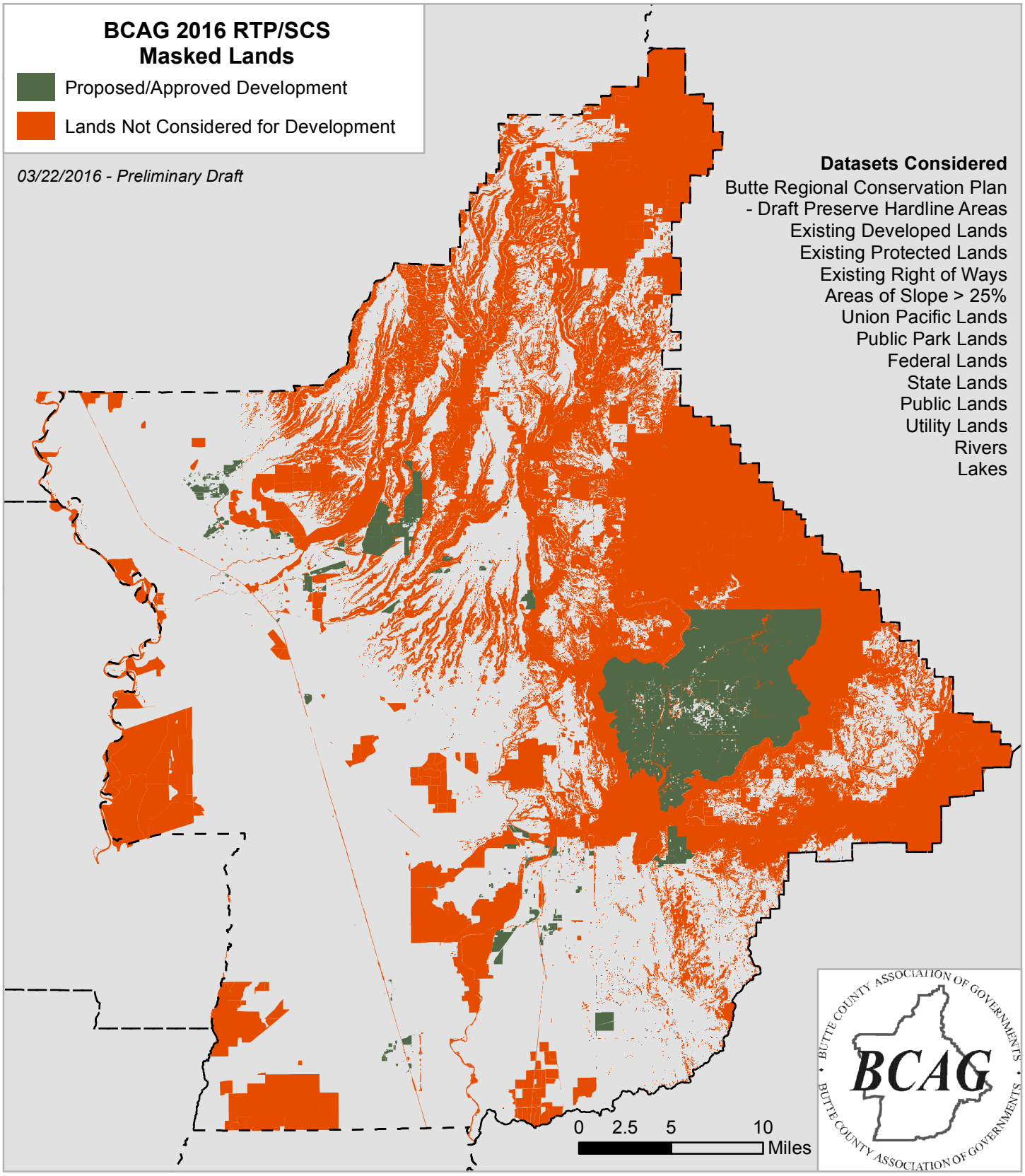
APPENDIX C.

Modeling Assumptions

		CHICO				PARADISE				GRIDLEY				BIGGS			
Model Code	Model Classification	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND
2	Industry		900	0.35			900	0.35			900	0.35			900	0.35	
5	Office Commercial		300	0.35			300	0.35			300	0.35			300	0.35	
6.1	Mixed Use Retail		500	0.3	0 / 85 / 15 / 0	0	416.7	0.5	0 / 70 / 30 / 0	20	454.5	1	10 / 60 / 30 / 0		428.6	0.3	0 / 70 / 30 / 0
6.2	Mixed Use Retail	13	545.5	0.3	10 / 75 / 15 / 0	13	555.6	1	30 / 40 / 30 / 0		428.6	0.3	0 / 70 / 30 / 0	20	454.5	1	10 / 60 / 30 / 0
6.3	Mixed Use Retail	33	537.6	1.7	15 / 73 / 12 / 0	6.5	555.6	0.5	30 / 40 / 30 / 0		428.6	0.3	0 / 70 / 30 / 0	13	461.5	0.3	10 / 60 / 30 / 0
6.4	Mixed Use Retail		534.7	0.3	0 / 85 / 10 / 5		403	0.3	0 / 40 / 40 / 20								
6.5	Mixed Use Retail	15.5	531	0.3	3 / 85 / 12 / 0		545.5	0.3	30 / 40 / 30 / 0								
6.6	Mixed Use Office	13	305.1	0.3	10 / 10 / 80 / 0	0											
6.7	Mixed Use Office	30	365	1.7	13 / 12 / 75 / 0	13											
7	Mixed Use Industrial	10.5	562.5	0.35	0 / 0 / 30 / 70		750	0.35	0 / 0 / 10 / 90		642.9	0.35	0 / 0 / 20 / 80		642.9	0.35	0 / 0 / 20 / 80
8.1	Mixed Use Residential	16.2	400	0.3	95 / 2 / 3 / 0												
8.2	Mixed Use Residential	50	400	1.7	90 / 5 / 5 / 0												
9	High Density Residential	40								22.5				20			
10	Medium-High Density	18.5				13											
11	Medium Density Residential	12								12				10			
12	Low Density Residential	5.1								5				4			
13	Very Low Density Residential	1.1				1.5				1							
14	Rural Residential																

		OROVILLE				OROVILLE - COUNTY PORTION				COUNTY			
Model Code	Model Classification	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND	DU / AC	AVG SF / E	FAR	Mixed Use Ratio RES / RET / OFF / IND
1	Agriculture									0.05			
2	Industry		900	0.35			900	0.35			900	0.35	
5	Office Commercial		300	0.35			300	0.35			300	0.35	
6.1	Mixed Use Retail	20	507	0.3	15 / 60 / 25 / 0	13	514.3	0.3	10 / 70 / 20 / 0	13	461.5	0.3	10 / 60 / 30 / 0
6.2	Mixed Use Retail		428.6	0.3	0 / 70 / 30 / 0		473.7	0.3	0 / 80 / 20 / 0		409.1	0.3	0 / 65 / 35 / 0
6.3	Mixed Use Retail		337.5	0.3	0 / 30 / 60 / 10		428.6	0.3	0 / 70 / 30 / 0		409.1	0.3	0 / 65 / 35 / 0
6.4	Mixed Use Retail						473.7	0.3	0 / 80 / 20 / 0		409.1	0.3	0 / 65 / 35 / 0
6.5	Mixed Use Retail						275.5	0.3	0 / 0 / 90 / 10		275.5	0.3	0 / 0 / 90 / 10
6.6	Mixed Use Office												
6.7	Mixed Use Office												
7	Mixed Use Industrial						818.2	0.35	0 / 10 / 10 / 80		732.6	0.35	0 / 10 / 10 / 80
8.1	Mixed Use Residential												
8.2	Mixed Use Residential												
9	High Density Residential		25			20				20			
10	Medium-High Density		18.5										
11	Medium Density Residential		13			13				13			
12	Low Density Residential		5.5			4.5				4.5			
13	Very Low Density Residential		1			1				1			
14	Rural Residential		0.1			0.1125				0.1125			
19	Timber									0.00625			

APPENDIX D.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Proposed/Approved Development
Lands Not Considered for Development
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Datasets Considered
Butte Regional Conservation Plan
- Draft Preserve Hardline Areas
Existing Developed Lands
Existing Protected Lands
Existing Right of Ways
Areas of Slope > 25%
Union Pacific Lands
Public Park Lands
Federal Lands
State Lands
Public Lands
Utility Lands
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Lakes
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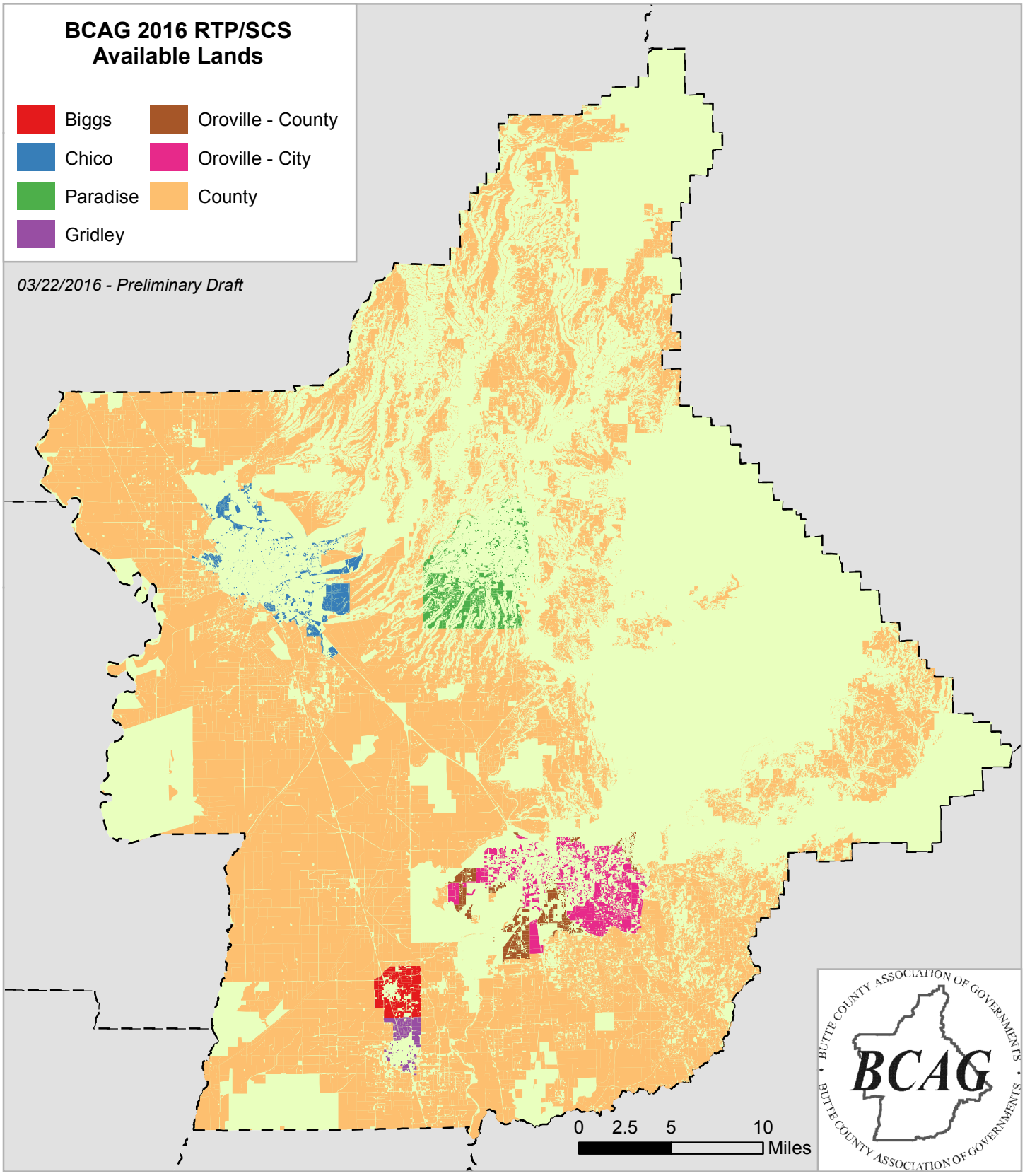
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

APPENDIX E.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Available Lands
Biggs
Chico
Paradise
Gridley
Oroville - County
Oroville - City
County
03/22/2016 - Preliminary Draft
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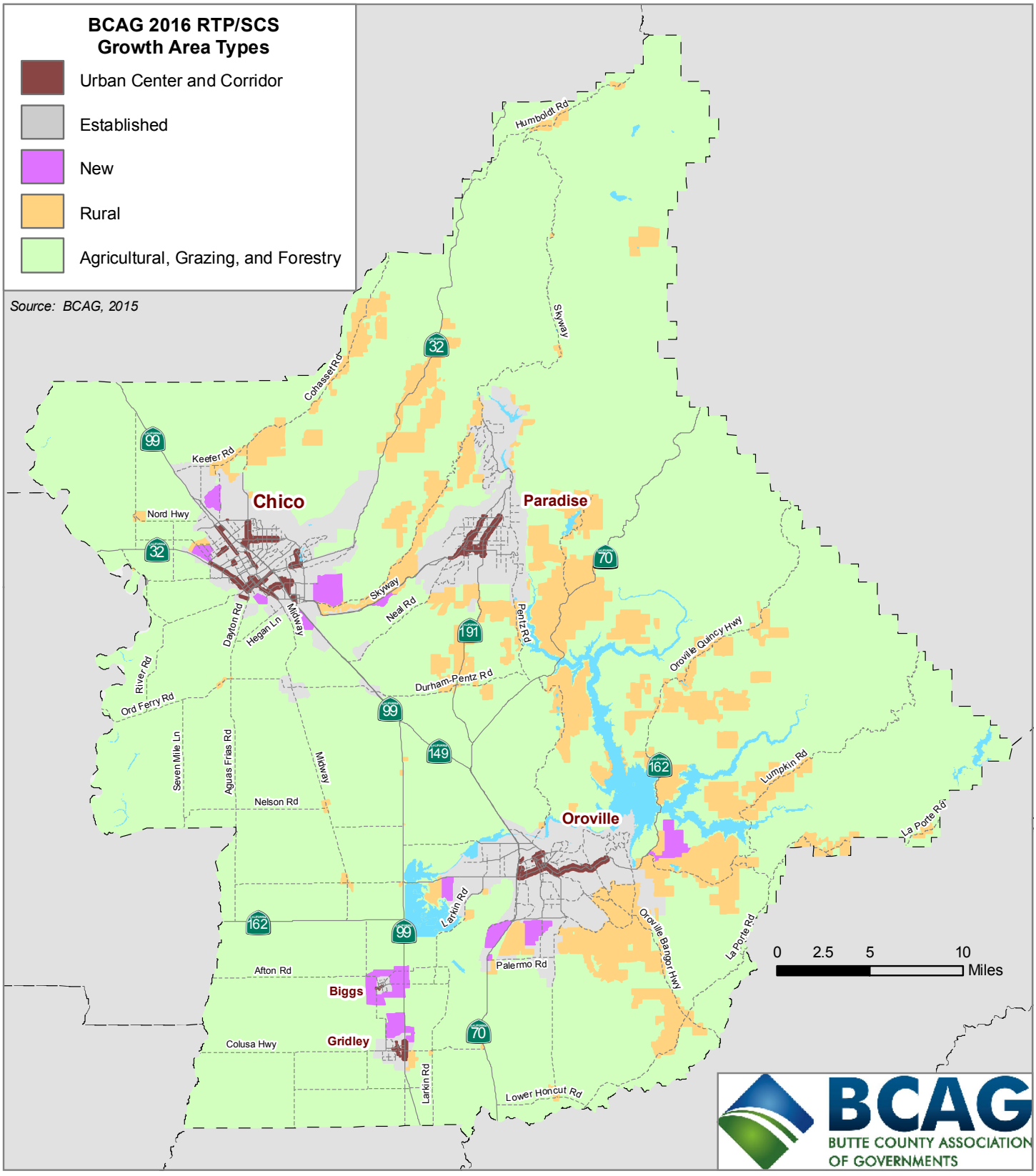
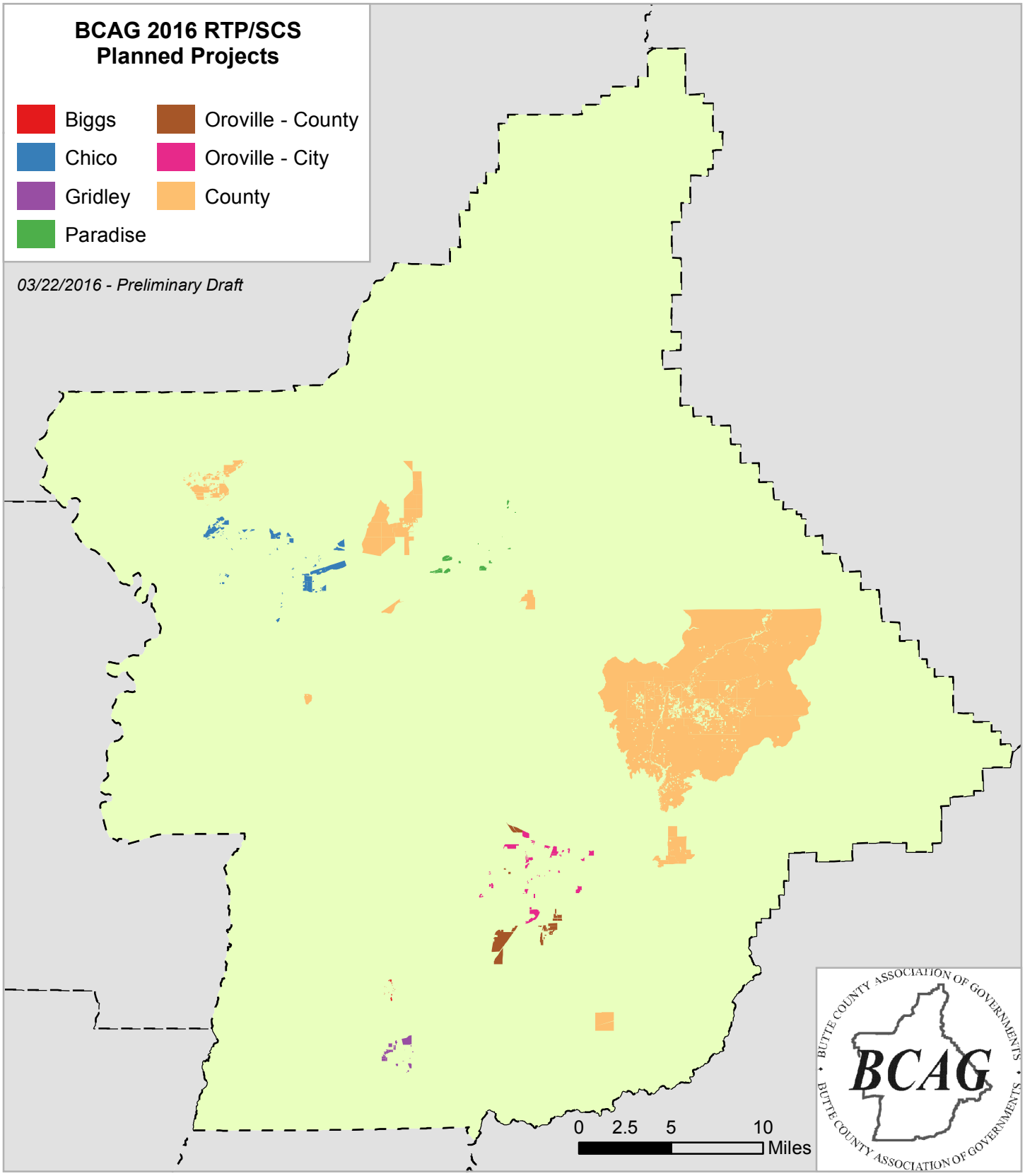
BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

APPENDIX F.


BCAG 2016 RTP/SCS
Growth Area Types
Urban Center and Corridor
Established
New
Rural
Agricultural, Grazing, and Forestry
Source: BCAG, 2015
Chico
Paradise
Oroville
Biggs
Gridley
Humboldt Rd
Skyway
Cohasset Rd
Keefer Rd
Nord Hwy
Dayton Rd
Hegan Ln
Midway
Neal Rd
Pentz Rd
Oroville Quincy Hwy
River Rd
Ord Ferry Rd
Durham-Pentz Rd
Seven Mile Ln
Aguas Frias Rd
Nelson Rd
Lumpkin Rd
La Porte Rd
Larkin Rd
Oroville Bangor Hwy
Palermo Rd
Afton Rd
Colusa Hwy
Lower Honcut Rd
32
99
70
191
149
162
0 2.5 5 10
Miles
BCAG
BUTTE COUNTY ASSOCIATION
OF GOVERNMENTS

APPENDIX G-1.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Planned Projects
Biggs
Chico
Gridley
Paradise
Oroville - County
Oroville - City
County
03/22/2016 - Preliminary Draft
0 2.5 5 10
Miles
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS
BCAG
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APPENDIX G-2.

Planned Projects

CHICO		Housing Units			Non-Residential (KSF)			
Development Name	**Growth Area**	**Single Fam**	**Multi Fam**		**Retail**	**Office**	**Medical Office**	**Industrial**
Sycamore Glen/Mountain Vista	Established	446	200		25			
NW Chico Specific Plan Phase 1	Established	515	500		50			
Oak Valley Phase 1	Established	160						
Meriam Park Phase 1	Established	150	610		200	150		
Belvedere Heights	Established	168						
Tuscan Village	Established	155						
Foothill Park East 7	Established	65						
Wildwood Estates	Established	175						
Various Other Single Family (established)	Established	65						
Various Other Multi Family	Established		18					
Villa Risa Apartments	Established							
Hartford Square	Established							
Valley Oak Vet Center	Established							
CVS	Established							
Sierra Nevada Brewery Security Building	Established							
NW Chico Specific Plan Phase 2	Established	180	200		250			
Oak Valley Phase 2	Established	1164			109			
Meriam Park Phase 2	Established	650	1000		300	250		
Sierra Gardens Townhouses	Established		72					
Lassen Village	Established	25						
Humboldt Subdivision	Established	17						
Chico Senior Living	Established							5
Carriage Park Apartments	Established		141					
Las Palomas	Established	14						
Lassen Subdivision	Established	14						
Twin Creeks	Established	16						
Tannelli Subdivision	Established	12						
Shastan @ Glenwood 2	Established	26						
Lee Estates (established)	Established	4						
Park Forest Neighborhood	Established	34						
Harmony Park Circle	Established	18						
Siena @ Canyon Oaks	Established	32						
Country Vista Apartments	Established		42					
Eaton Mini Storage (52 ksf)	Established							2
Esplanade Commercial	Established					10		
BCAG Transit Facility	Established					15		60
Lee Estates (center)	Center	3						
Mariposa Glen	Center	6						
Zamora Subdivision	Center	14						
Mission Vista Ranch 2	Center	17						
Various Other Single Family (center)	Center	6						
Westside Place	Center	122						
PARADISE								
Paradise Community Village PD Subdivision	Established	32	96					
Skyway Land Project PD Condominiums	Established		35					
Blackberry Knolls PD Subdivision	Established	44						
Valley Vista PD Subdivision	Established	14						
Baume Subdivision	Established	10						
Redbud Estates PD Subdivision	Established	16						
Nielson Estates Subdivision	Established	9						
Pheasant Ridge Commons	Established	2	24					
Walmart PD Subdivision, annexation, etc.	Established				200			
Northwest Assisted Living	Established						5	
Paradise Land Project PD Subdivision	Center	66						
Skyway Meadows PD Subdivision	Center	13			3			
Wendy's restaurant	Center				3			

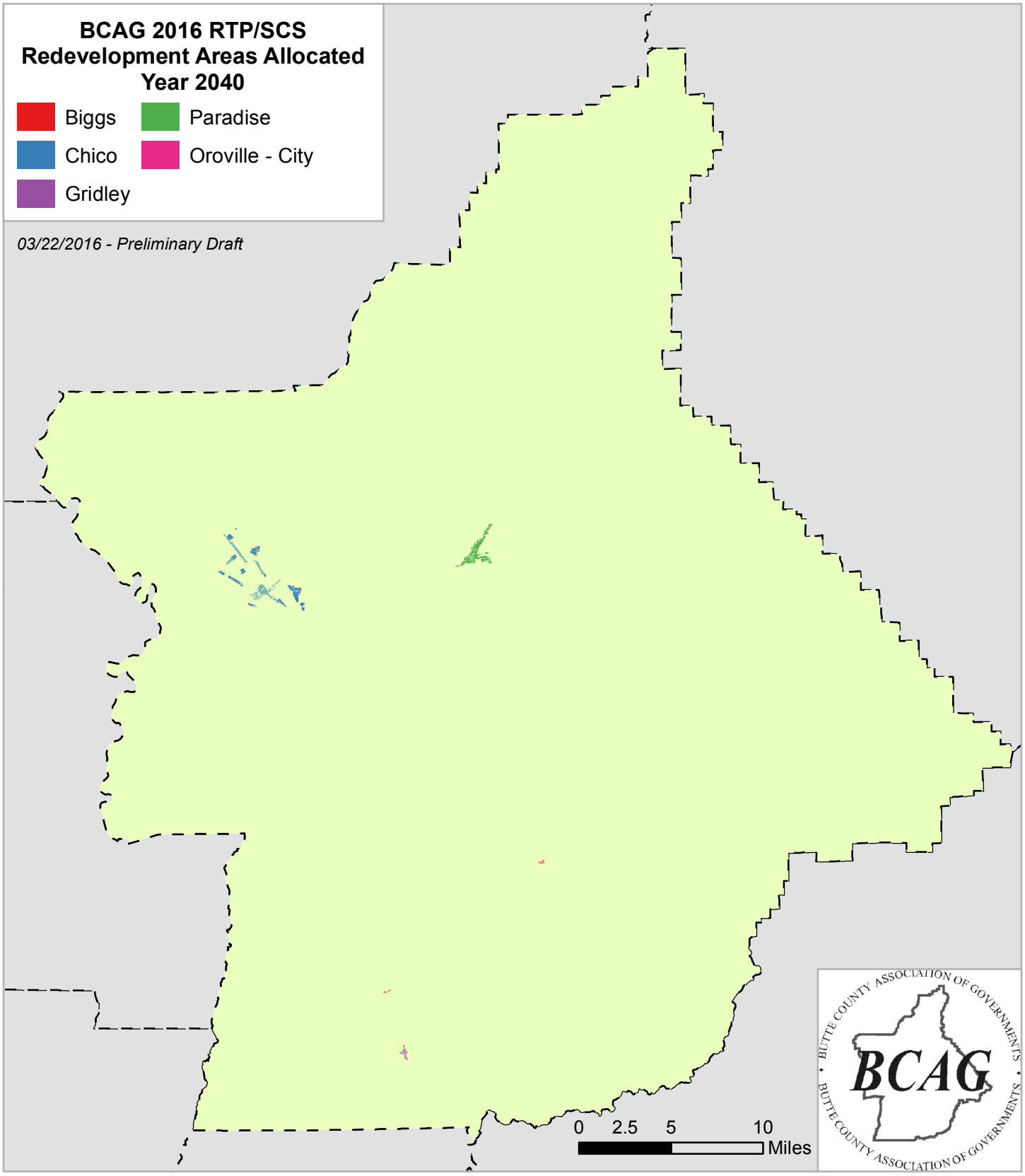
APPENDIX G-2. Continued

GRIDLEY	Growth Area	Single Fam	Multi Fam		Retail	Office	Medical Office	Industrial
Deniz Ranch	Established	465	196					
Little Property	Established	71						
Smith	Established	22						
West Biggs Gridley Road Property	Established	58						
Smith Parcel Map	Established	4						
Valley Oak Estates	Established	18						
North Valley Estates	Established	17						
Steffan Estates	Established	28						
Edler Estates	Established	25						
Butte Country Homes Unit 2	Established	70						
Huffman	Established	3						
Butte Country Homes Unit 1	Established	43						
Moss Parcel Map	Established				9	14		72
Gridley Industrial Park 1	Established							60
Gridley Industrial Park 2	Established							20
Various other Single Family	Established	123						
Qumar Estates	Center	19						
AutoZone	Center							
Ford and 99 Property	Center				6			
Spruce and Washington Property	Center				10			
BIGGS								
Sunwest Rice Mill Warehouse Expansion (Ind.)	Established							
North Biggs Estates Project	Established	56	26					
Infill Development (various)	Established	14						
Summit Estates	New	53						
Eagle Meadows of Biggs	Established	17						
OROVILLE								
Oro Industrial Park	Established					10		400
Martin Ranch	Established	237	795		8		30	
Oak Park	Established	222						
Heritage Oaks	Established	79						
Ford Drive	Established	46						
Deer Creek	Established	79						
River View	Established	93						
Rivers Edge	Established	123						
Nelson 56	Established	197						
PEP Housing Project	Established							
Mission Olive Ranch	Established	18						
Super Walmart	Established				197			
Hillview Ridge Phase 2	Established							
Sierra Silca Sand Plant	Established							
Merle Airport Hanger	Established							
Community Action Agency	Established					10		20
2875 Feather River - Steel Building	Established							
Calle Vista Unit 2 Phase 1	Established	40						
Acacia Estates	Established	20						
Highlands Estates	Established	32						
Buttewoods	Established	167						
Canel view Estates	Established	32						
Forebay Estates	Established	122						
Various other Single Family	Established	75						
Dollar General (2084 3rd St)	Established				9			
Commercial Development (2030 3rd St)	Established				4			
Gateway Development (500 Montgomery St)	Established				71	10		
Fabrication Facility Expansion (Feather River Blvd)	Established							14
GPI Expansion (225 Chuck Yeager Way)	Established							350
Purple Line Winery (760 Safford St)	Established				2.4			
Steve Horn Building	Center							
Weichart Building	Center							
Sonic Burger	Center							

APPENDIX G-2. Continued

OROVILLE	Growth Area	Single Fam	Multi Fam		Retail	Office	Medical Office	Industrial
Oroville Ford (1350 Oro Dam Blvd)	Center				23			
Dollar General (2626 Lincoln Blvd)	Center				9			
Commercial Drive-thru on Oro Dam Blvd	Center				5			
CVS Pharmacy (850 Oro Dam Blvd)	Center				17			
Used Car Lot (Veatch St)	Center				1			
STREAM Charter School (463 Oro Dam Blvd)	Center					14		
Dove's Landing (2450 Oro Dam Blvd)	Center					68		
OROVILLE - COUNTY PORTION								
Rio d Oro	New	2045	655		248			
South Ophir Specific Plan	New	150						
Garden Drive Research & Business Park	Established					650		
M&T Subdivision	Established	29						
Tonriha Subdivision	Established	28						
Lincoln and Ophir	Established	65	125		120			
Southlands Subdivision	Established	174						
Vista Creek Estates	Established	156						
Monte Vista Estates	Established	97						
Monte Vista Park	Established	114						
COUNTY								
Valencia Estates	Agricultural	28						
Tuscan Ridge PUD	New	165						
Stringtown Mountain SP - A	New	166	32					
Stringtown Mountain SP - B	New	487						
Rancho Sol Tierra	Established	139			8			
Sierra Moon	Established	90						
Mandville Park	Established	26						
TSM 03-02	Established	24						
Paradise Summit PUD	Established	335						
North Chico SP (Established)	Established	778						
Upper Stilson Canyon	Rural	75						
Berry Creek Area Plan	Rural	24						
Emerald Sea Ranch	Rural	34						
Southeast Paradise SP	Rural							
Paradise Urban Reserve SP	Rural							
North Chico SP (Rural)	Rural	60						

APPENDIX H.


BCAG 2016 RTP/SCS
Redevelopment Areas Allocated
Year 2040
Biggs
Chico
Gridley
Paradise
Oroville - City
03/22/2016 - Preliminary Draft
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Miles
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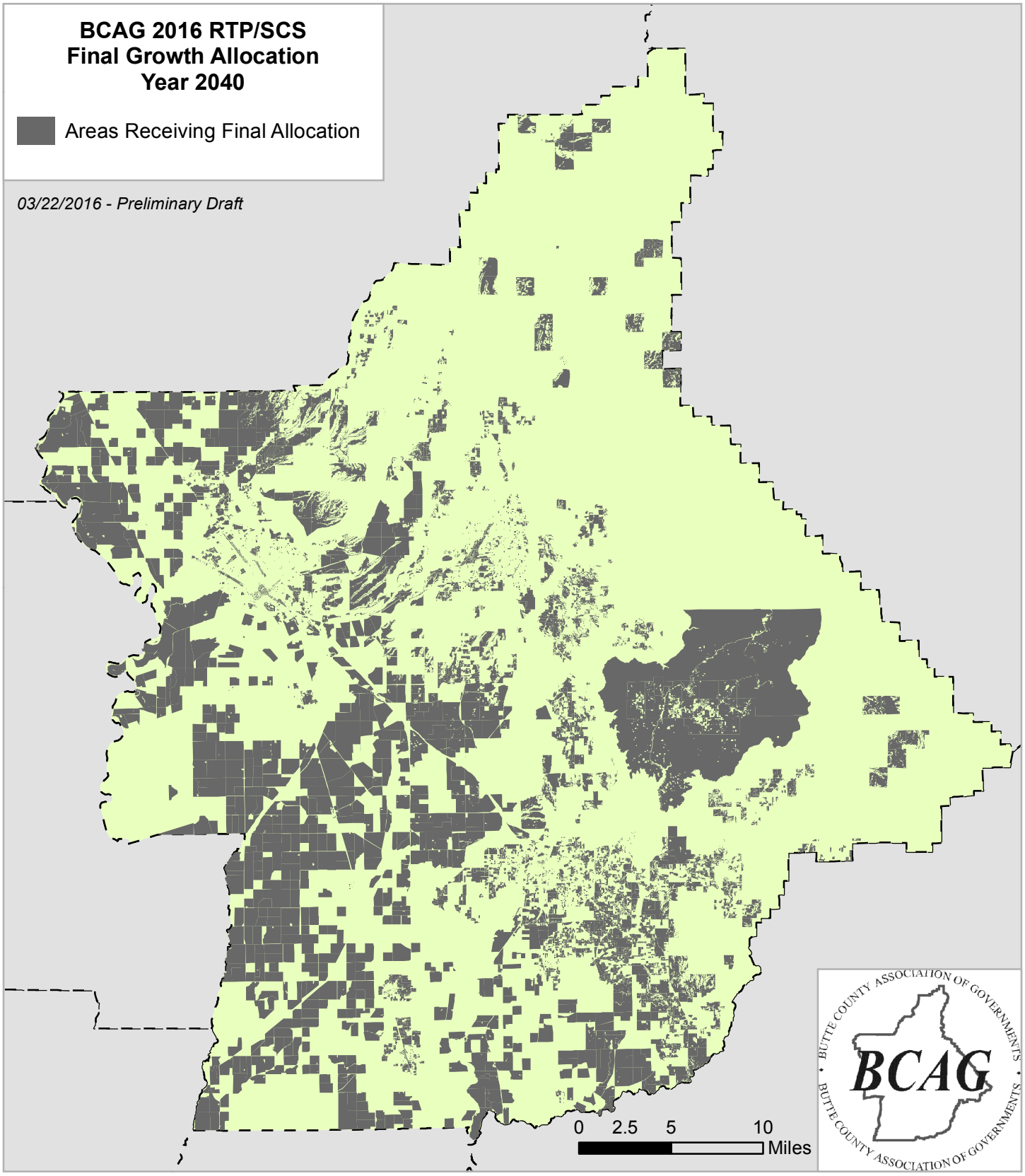
BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

APPENDIX I.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Final Growth Allocation
Year 2040
Areas Receiving Final Allocation
03/22/2016 - Preliminary Draft
0 2.5 5 10
Miles
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ATTACHMENT 3

Regional Travel Demand Model Documentation

BCAG Model Development Report

Prepared for

BCAG
BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

March 2016

FEHR & PEERS

RS14-3263

Table of Contents

Appendicies

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1

INTRODUCTION

This report presents the Travel Demand Forecasting (TDF) model built for the Butte County Association of Governments (BCAG) in preparation for the 2016 Regional Transportation Plan/Sustainable Community Strategy (RTP/SCS) Update. This report describes the model development process, including the data sources used to develop key model inputs.

GENERAL DISCUSSION OF THE TDF MODEL

This section summarizes the answers to commonly asked questions related to TDF models and how BCAG can use a TDF model.

What is a TDF model?

A TDF model is a computer program that simulates traffic levels and travel patterns for a specific geographic area. The program consists of input files that summarize the area's land uses, roadway network, travel characteristics, and other key factors. Using this data, the model performs a series of calculations to determine the amount of trips generated, the beginning and ending location of each trip, and the route taken by the trip. The model's output includes projections of traffic volumes on major roads, and peak hour turning movements at certain key intersections.

How is a TDF model useful?

The TDF model is a valuable tool for preparing long-range transportation planning studies, like the Regional Transportation Plan. The TDF model can be used to estimate the average daily and peak hour traffic volumes on the major roads in response to planned population and employment growth, changes in transportation infrastructure, policy assumptions, and provides a consistent platform to analyze different land use and transportation scenarios.

How do we know if the TDF model is accurate?

To be deemed accurate for projecting traffic volumes in the future, a model must first be calibrated to a year in which actual land use data and traffic volumes are available and well

documented. A model is accurately validated when it replicates the actual traffic counts on the major roads within certain ranges of error established in 2010 California Regional Transportation Plan Guidelines (California Transportation Commission [CTC], 2010) and it demonstrates stable responses to varying levels of inputs.

The BCAG model has been calibrated and validated to 2014 base year conditions using actual traffic counts, census data, and land use data compiled by BCAG staff.

Is the BCAG TDF model consistent with standard practices?

The BCAG model is consistent in form and function with standard travel forecasting models used in transportation planning. The model includes a land-use based trip generation module, a gravity-based trip distribution model, and a capacity-constrained equilibrium traffic assignment process. While it is not sensitive to mode choice in relation to transit, walk or bike, the model was built in a framework that would allow transit and active-mode sensitivity if the need arises. The travel model uses Version 7.0 (Build 12175) of the TransCAD transportation planning software, which is consistent with many of the models used by local jurisdictions in California and throughout the nation.

How can the TDF model be used?

The TDF model can be used for many purposes related to the planning and design of Butte County's transportation system. The following is a partial listing of the potential uses of the TDF model.

- To update the land use and circulation elements of City or County general plans
- To conduct a regional transportation mitigation fee program
- To evaluate the traffic impacts of area-wide land use plan alternatives
- To evaluate the shift in traffic resulting from a roadway improvement
- To evaluate the traffic impacts of land development proposals
- To determine trip distribution patterns of land development proposals
- To support the development of transportation sections of Environmental Impact Reports (EIRs)
- To support the preparation of project development reports for Caltrans

What are the TDF model limitations?

The BCAG TDF Model has been developed for regional planning purposes within a trip-based model framework. The model conforms to the recommendations outlined in the 2010 California Regional Transportation Guidelines for a Type B metropolitan planning organization (MPO), but does have limitations.

- The current structure has limited sensitivity to factors that may affect trip generation rates such as significant declines in economic activity. However, since the model has a land use occupancy component, economic cycles can be reflected in the assumed intensity of land uses within the model.
- Although the model network includes all local roadways, not all local roadways are assigned vehicle trips. Use of the model for local applications will require sub-area refinements and validation to ensure the model is appropriately sensitive to changes at this scale.
- Model parameters relying on household travel survey data are based on a small sample size. Future model updates would benefit from a larger sample of households in Butte County.
- The trip-based model structure does not allow for complete estimates of forecasts of vehicle trips (VT) or

VMT generated by residential households or individual persons. Vehicle trips are assigned at the TAZ level and any connection to individual land uses that originally generated the trips are lost. VT and VMT can be expressed as ratios such as VMT per capita or VMT per household. But these ratios are based only on dividing total VMT by the number of people or households in the model area. It does not indicate the level of VT or VMT being generated.

STUDY AREA

The model area for the BCAG TDF Model encompasses Butte County, which includes the cities of Chico, Paradise, Oroville, Biggs, and Gridley. Figure 1 shows the BCAG TDF model area. To represent travel into and out of Butte County, the model also includes 20 "external gateways" at major roads that cross the county line.

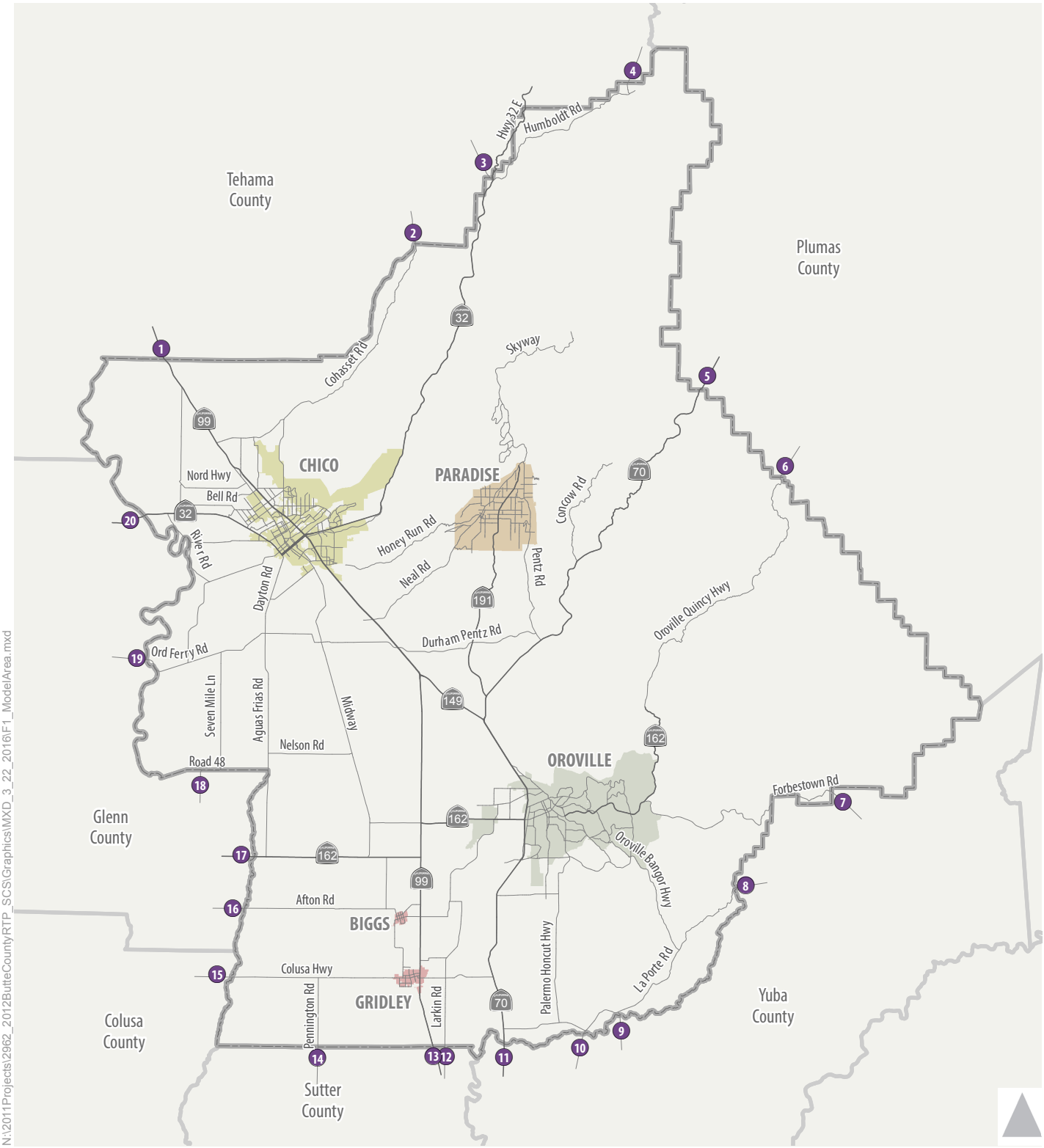


Figure 1

Model Area

02

MODEL INPUT DATA

DATA COLLECTION

A data collection effort was undertaken at the outset of the model development process. Data sources included the BCAG traffic count database, Caltrans Traffic Data Branch for freeway counts, and CSU Chico for Geographic Information Systems (GIS) data. Additional data sources are listed below.

- Census Bureau data
- Department of Finance (DOF) housing estimates
- California Statewide Household Travel Survey (CHTS), 2012
- Employment Development Department (EDD) employment estimates
- Longitudinal Employer-Household Dynamics (LEHD) data

LAND USE DATA

Land use data is one of the primary inputs to the BCAG model and this data is instrumental in estimating trip generation. The model's primary source of land use data is BCAG's residential, school, and commercial parcel and footprint datasets (maintained in a GIS format). Each database provides information on the existing level of development within the county and is aggregated to the model's traffic analysis zones (TAZs). These databases are maintained by BCAG staff in association with CSU Chico.

The land use data in the model is divided into several residential and non-residential categories. The BCAG model has 17 land use categories, which are described in Table 1.

TABLE 1 MODEL LAND USE CATEGORIES

Land Use Type	Model LU	Units
Single Family Residential	SF_DU	Dwelling Units
Multi-Family Residential	MF_DU	Dwelling Units
Mobile Home Residential	MH_DU	Dwelling Units
Office	OFF_KSF	Thousand Square Feet
Medical Office	MED_KSF	Thousand Square Feet
Hospital	HOSP_KSF	Thousand Square Feet
Industrial	IND_KSF	Thousand Square Feet
Public/Quasi-Public	PQP_KSF	Thousand Square Feet
Park	PARK_AC	Acres
Neighborhood-Serving Retail	RET_KSF	Thousand Square Feet
Region-Serving Retail	RRET_KSF	Thousand Square Feet
Hotels	HOTEL_RMS	Rooms
K-12 School	K12_STU	Students
University	UNIV_STU	Students
Community College	CC_STU	Students
Casino (Special Generator)	CASINO_SLT	Slots

Source: Fehr & Peers, 2016.

TRAFFIC ANALYSIS ZONE SYSTEM

TAZs represent geographic areas containing land uses that produce or attract vehicle-trip ends. Travel demand models use TAZs to connect land uses to the roadway network. The TAZ boundaries for the BCAG model were developed from the Butte County parcel layer and closely nest within the City boundaries in Butte County.

The TAZ structure and detail from the previous model were maintained for this update. Therefore, the model TAZ system maintains 962 zones in the model area, of which 912 zones cover Butte County and the remaining 50 are extra zones available for use in more detailed project analyses.

Also included in the TAZ structure are the external stations at points where major roadways provide access into the model area (see Figure 1 for specific locations). The external stations represent all major routes by which traffic can enter, exit, or pass through the model area.

ROADWAY NETWORK

The detailed roadway network for the base year model was originally developed in the 2008 TDF model update from a Butte County GIS centerline file provided by BCAG and subsequently updated in 2012 and 2016. The model roadway network includes all freeways, arterials, collectors, local, and rural roads within the study area (see Figure 1).

As is typical for travel demand models, the model network focuses on the most used facility types. Residential and rural streets are included on the network, but are not widely assigned trips. The roadway classifications included in the model, and consistent with the Butte County RTP/SCS, are described below.

Freeways

Freeways are high-capacity facilities that primarily serve longer distance travel. Access is limited to interchanges typically spaced at least one mile apart. State Route (SR) 70 and SR 99 are the major freeways in the Butte County. Portions of SR 149 that connects SR 70 and SR 99 are also designed to freeway standards.

Expressways

Expressways are high-capacity facilities that primarily serve intermediate distance travel between intercity destinations. Access is limited, but not to the extent of freeways and travel lanes may or may not be divided. Portions of SR 70, SR 99, and SR 149 are classified as expressways in Butte County.

Arterials

Roadway segments classified as Arterials are major roads that provide connections within cities, between cities and neighboring areas, and through the cities (cut-through traffic) of Butte County. Arterials in Butte County typically have one or two lanes in each direction, with travel speeds of 30-40 miles per hour (mph). Examples of these arterials are East Avenue in Chico, Clark Road in Paradise, and Olive Highway in Oroville.

Collectors

Collectors (Major and Minor) are facilities that connect local streets to the arterial system, and may also provide direct access to local land uses. Collectors generally provide two travel lanes and typically have a posted speed limit of 25 mph or greater. Examples of these collectors are Ceres Avenue in Chico, Nunneley Road in Paradise, and Myers Street in Oroville.

Local Streets

Local Streets primarily feed collector roads and generally provide two travel lanes with a posted speed limit of 25-30 mph. The model network focuses on freeways, arterials, and collectors but does include most of the local streets represented in the Butte County GIS centerline file to provide access from traffic analysis zones to the larger network. If a project application needs to assess local roadway performance, the model has been designed such that detail can be added to improve its sensitivity related to these facilities. These types of changes would typically be performed as part of a specific project application.

The roadway network database includes a street name, distance, functional class, speed, capacity, and number of lanes for each record. These attributes were checked using maps, aerial photographs, and other data provided by BCAG. Table 2 shows the initial roadway speeds and capacities used for each roadway class in the model. Where necessary, these values were adjusted to reflect the relative attractiveness of roadways in relation to each other. The speeds listed in the model are primarily used during the traffic assignment routine and may not reflect posted speed limits.

TABLE 2 TYPICAL MODEL ROADWAY SPEEDS AND CAPACITIES

Roadway Functional Classification	Speed Range (MPH)	Lane Capacity (vphl)[1]
Freeway Mainline	55 - 65	1,800
Freeway Ramp	20 - 55	1,700
Expressway (4 Lanes)	35 - 55	1,500
Expressway (2 Lanes)	35 - 55	1,400
Arterial	30 - 40	800
Collector	25 - 45	700
Local	25 - 30	600
Centroid Connectors[2]	25	10,000

1. vphl - vehicles per hour, per lane

2. Centroid connectors are abstract representations of the starting and ending point of each trip, and therefore should have no capacity constraints

Source: Fehr & Peers, 2016.

03

MODEL CALIBRATION

Model calibration is the term used to describe the process by which the coefficients and inputs of the model are determined and adjusted to better replicate travel behavior and traffic volumes. This section provides a general description of the calibration steps and the adjustments made during the process to achieve accuracy levels that are within the established CTC guidelines.

TRIP GENERATION

Trip generation rates relate the number of vehicle trips going to and from a site to the type of land use intensity and diversity of that particular site.

Residential Trip Generation

The previous update of the BCAG model for the 2012 Metropolitan Transportation Plan/ Sustainable Communities Strategy enhanced the residential trip generation sub-model from one that relied exclusively on land use as the independent variable to one that considered land use, demographic, and socioeconomic factors in a cross-classified formulation. The trip generation rates for single family and multi-family homes were expanded to represent the different trip making characteristics of a variety of households within Butte County. For this model update, the trip generation rates were also expanded for mobile homes and the number of household income categories was aggregated from 6 to 4 to simplify the land use inputs for model users. The cross-classification is based on the following characteristics.

- Household size (1, 2, 3, or 4+)
- Number of workers (0, 1, 2, 3, or 4+)
- Household income (<$35K, $35K-$50K, $50K-$75K, >$75K)

Tables 3, 4, and 5 display the cross-classified residential vehicle trip rates for single family, multi-family and mobile homes, respectively. These trip generation rates help to explain the differences in trip generation that are observed in different parts of the BCAG region. The rates were estimated using the 2012 CHTS data and adjusted during the model calibration. This survey was conducted statewide and provides a complete summary of daily household trip making.

TABLE 3 – SINGLE FAMILY DAILY VEHICLE TRIP GENERATION RATES

Household Size	Number of Workers	Income			
		< $35K	$35K - $50K	$50K - $75K	> $75K
1	0	2.90	3.02	3.02	3.02
	1	3.25	3.34	3.09	3.48
	2	N/A	N/A	N/A	N/A
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
2	0	5.50	4.89	5.45	5.73
	1	5.82	4.88	4.94	5.04
	2	5.62	5.62	5.29	5.79
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
3	0	5.37	5.37	5.37	5.37
	1	7.38	7.38	7.02	7.02
	2	8.00	8.00	8.00	8.96
	3	9.33	9.57	9.63	9.40
	4+	N/A	N/A	N/A	N/A
4+	0	7.57	7.57	11.67	10.24
	1	9.45	9.45	14.60	12.81
	2	11.75	11.75	15.52	12.86
	3	13.69	13.69	13.69	13.69
	4+	15.60	15.60	15.60	15.60

Source: Fehr & Peers, 2016

TABLE 4 – MULTI-FAMILY DAILY VEHICLE TRIP GENERATION RATES

Household Size	Number of Workers	Income			
		< $35K	$35K - $50K	$50K - $75K	> $75K
1	0	2.13	2.22	2.22	2.22
	1	2.39	2.47	2.29	2.57
	2	N/A	N/A	N/A	N/A
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
2	0	4.06	3.61	4.02	4.23
	1	4.3	3.59	3.64	3.72
	2	4.13	4.13	3.9	4.26
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
3	0	3.95	3.95	3.95	3.95
	1	5.45	5.45	5.17	5.17
	2	5.89	5.89	5.89	6.6
	3	6.88	7.06	7.1	6.93
	4+	N/A	N/A	N/A	N/A
4+	0	5.58	5.58	8.61	7.55
	1	6.97	6.97	10.76	9.44
	2	8.66	8.66	11.44	9.48
	3	10.09	10.09	10.09	10.09
	4+	11.51	11.51	11.51	11.51

Source: Fehr & Peers, 2016

TABLE 5 – MOBILE HOME DAILY VEHICLE TRIP GENERATION RATES

Household Size	Number of Workers	Income			
		< $35K	$35K - $50K	$50K - $75K	> $75K
1	0	1.99	2.08	2.08	2.08
	1	2.24	2.3	2.13	2.41
	2	N/A	N/A	N/A	N/A
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
2	0	3.78	3.37	3.76	3.95
	1	4.02	3.35	3.41	3.47
	2	3.86	3.86	3.64	3.98
	3	N/A	N/A	N/A	N/A
	4+	N/A	N/A	N/A	N/A
3	0	3.69	3.69	3.69	3.69
	1	5.08	5.08	4.84	4.84
	2	5.51	5.51	5.51	6.16
	3	6.42	6.59	6.64	6.47
	4+	N/A	N/A	N/A	N/A
4+	0	5.21	5.21	8.05	7.06
	1	6.51	6.51	10.05	8.81
	2	8.1	8.1	10.7	8.85
	3	9.43	9.43	9.43	9.43
	4+	10.74	10.74	10.74	10.74

Source: Fehr & Peers, 2016

Non-Residential Trip Generation

The primary source for non-residential trip generation rates in the BCAG TDF model was Trip Generation, 9th Edition (Institute of transportation Engineers [ITE], 2012). This reference document contains national averages of vehicle trip generation rates for a variety of land uses in what are generally suburban locations. These rates were calibrated for major non-residential land uses such as prominent retail centers and institutions within Butte County using a methodology similar to that explained above for residential uses. Table 6 displays the final non-residential trip rates.

Trip Purposes

Trip generation rates are initially defined for total trips and later split by trip purpose. Each trip has two ends, a "production" and an "attraction". By convention, trips with one end at a residence are defined as being "produced" by the residence and "attracted" to the other use (workplace, school, retail store, etc.), and are called "Home-Based" trips. Trips that do not have one end at a residence are called "Non-Home-Based" trips.

There are 6 trip purposes used in the BCAG model:

- Home-Based Work (HBW): trips between a residence and a workplace

TABLE 6 NON-RESIDENTIAL LAND USE DAILY TRIP GENERATION

Land Use Type	Model LU	Units	Rate
Office	OFF_KSF	Thousand Square Feet	11.64
Medical Office	MED_KSF	Thousand Square Feet	33.79
Hospital	HOSP_KSF	Thousand Square Feet	13.22
Industrial	IND_KSF	Thousand Square Feet	3.70
Public/Quasi-Public	PQP_KSF	Thousand Square Feet	8.00
Park	PARK_AC	Acres	1.89
Neighborhood-Serving Retail	RET_KSF	Thousand Square Feet	42.94
Region-Serving Retail	RRET_KSF	Thousand Square Feet	47.63
Hotels	HOTEL_RMS	Rooms	6.23
K-12 School	K12_STU	Students	1.54
University	UNIV_STU	Students	1.71
Community College	CC_STU	Students	1.23
Casino (Special Generator)	CASINO_SLT	Slots	5.18

Source: Fehr & Peers, 2016

- Home-Based Other (HBO): trips between a residence and any other destination
- Non-Home-Based (NHB): trips that do not begin or end at a residence, such as traveling from a workplace to a restaurant, or from a retail store to a bank
- School (SCHOOL): trips to and from a school (K-12)
- University (UNIV): trips to and from a community college or university
- Casino (CASINO): trips to and from a casino

The 2012 CHTS data was used to determine the appropriate proportion of trips that represent each purpose. The University trip purpose category was added as part of this model update to better represent the travel patterns of students attending CSU Chico and Butte College.

Trip Productions and Attractions

Local trips (internal-to-internal, or I-I) are trips that both start and end in the study area. One of the basic requirements of any travel model is that the total number of local trips produced is equal to the total number of local trips attracted. It is logically assumed that if a journey is started somewhere, it must have an ending somewhere else. If the total productions and attractions are not equal, the model will typically adjust the attractions to match the productions, thus ensuring that each departing traveler finds a destination. While it is never possible to achieve a perfect match between productions and attractions prior to the automatic balancing procedure, a substantial mismatch in one or more trip purposes may indicate an error in the model land use inputs or trip generation.

Table 5 summarizes the local trip productions and attractions from the BCAG model for each trip purpose, prior to the application of the automatic balancing procedure. Guidelines published by Federal Highway Administration's Transportation Model Improvement Program (TMIP) and National Highway Cooperative Research Program (NCHRP) suggest that, prior to balancing, the number of productions and attractions should match to within plus or minus 10% (i.e., the production-to-attraction ratio should be within the range of 0.90 to 1.10). The results shown in Table 7 indicate that the model meets the published guidelines for all trip purposes.

TABLE 7 TRIP PRODUCTION TO ATTRACTION RATIOS BY PURPOSE

Home-Based Work (HBW)	0.98
Home-Based Other (HBO)	0.97
Non-Home-Based (NHB)	1.00

1. The trip purposes listed are the broad categories applied in most every travel model. The more specific BCAG trip purposes are subsets of these broader trip purposes, and have been aggregated here for ease of comparison. The School, Casino, and University purposes are subsets of the HBO trip purpose.

Source: Fehr & Peers, 2016.

Trip Generation Sensitivity

The BCAG TDF model contains enhancements added as part of the previous update to better capture local trip making characteristics and provide the ability to test certain policy options for future development scenarios. These enhancements include adjustments for residential and non-residential vacancy rates and adding sensitivity for aging population, the cost of travel, smart growth development, and changes to the transit system.

Vacancy Rates

The trip generation sub-model has the ability to reflect varying levels of occupancy for residential and non-residential buildings. However, for this update, BCAG staff elected to provide land use information already adjusted for vacancy. Therefore, the vacancy rate adjustment factors were set to 1.0.

Aging Population

It has long been recognized that households with older residents generate fewer vehicle trips than similar households where the residents are younger. The reason behind the reduced trip generation is generally thought to be due to the reduced number of work trips, fewer activities requiring travel, and the fact that a proportion of this age group cannot drive.

In the previous TDF model update, a scenario testing adjustment tool was developed to account for the impact an aging population would have on trip generation. However, detailed age distribution forecasts were not available at a subarea level within the county, so the tool was not applied to the future year models. For this model update, the adjustment tool was not applied because the trip generation rates estimated from the 2012 CHTS data were determined to sufficiently capture trip generation within the county.

Cost of Travel

Auto operating costs are a major influence on travel. Auto operating costs include fuel price, maintenance costs, and tire replacement costs. When determining the effects of auto operating costs on travel, economists typically use the idea of price elasticity. In the case of auto operating cost elasticity, this represents the change in VMT with respect to the auto operating cost. For the BCAG TDF model, an elasticity of -0.15 was chosen[11]. This indicates that an increase in auto operating costs of 10 percent would result in a 0.015 percent decline in VMT.

The adjustment is applied to the future year model scenarios and can be easily updated to test auto operating cost scenarios and evaluate how changes impact travel outcomes. Table 8 shows the assumed auto operating costs applied in the model.

[1] Elasticity estimate based on SACOG literature review of long-run elasticities (greater than five years) reported in the SACOG 2012 MTP/SCS. -0.11 to -0.34 (Small and Van Dender, 2007).

TABLE 8 BCAG AUTO OPERATING COSTS

Year	Cost[1]
2014	$ 0.246
2020	$ 0.256
2040	$ 0.290

1. Costs represented in 2010 dollars. 2014 & 2040 values derived from SACOG 2012 Base Year estimates (SACOG 2016 MTP/SCS). 2020 values estimated from linear interpolation.

Source: Fehr & Peers, 2016.

Built Environment Sensitivity

The 2010 RTP Guidelines recognize the importance of increasing travel demand model sensitivity to more compact development with a mix of housing types (e.g., single-family homes and apartments), work places, and retail opportunities and encourage model enhancements to account for their unique travel characteristics.

Such communities have been proven to generate fewer and shorter vehicle trips since residents and employees of these areas have more home, work, and shopping opportunities within walking or biking distance. Since future land use alternatives may be developed to follow these planning principles, the model applies the Ds (specifically Design, Diversity, Destinations, and Density), which are key built environment variables that have a proven influence on vehicle travel.

Density is measured in dwelling units or employment per acre. A wide body of research suggests that, all else being equal, denser developments generate fewer vehicle-trips per dwelling unit than less dense developments.

Diversity measures how closely the neighborhood in question matches the "ideal" mix of jobs and households, which is assumed to be the ratio of jobs to households measured across the region as a whole. Research suggests that having residences and jobs in close proximity will reduce the vehicle trips generated by each use by allowing some trips to be made on foot or by bicycle.

Design relates to the street network characteristics within a neighborhood. The design variable, when isolated, has the weakest influence on the overall adjustment of the D variables. Street networks vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming loops and cul-de-sacs. Street accessibility is usually measured in terms of average block size, proportion of four-way intersections, or number of intersections per square mile. Occasionally, it is also measured in terms of sidewalk coverage, building setbacks, street widths, or other physical variables that differentiate pedestrian-oriented environments.

Destination accessibility is synonymous with regional accessibility. In some cases, regional accessibility is simply represented by distance to the central business district. In other cases, it is represented by the number of jobs or other attractions reachable within a given travel time, which tends to be highest at central locations and lowest at peripheral ones. The gravity model used in the trip distribution stage of the model process adequately accounts for this D variable so it was also not applied.

The Ds are applied by comparing the built environment characteristics of one alternative to another in the same forecast year. For each of the D variables, there is an associated elasticity, derived from numerous studies, which is used to adjust the vehicle trip generation of each TAZ. Table 9 shows the elasticities applied in the BCAG model.

TABLE 9 D ELASTICITIES

Variable	Elasticity
Density	-0.04
Diversity	-0.06
Design	-0.02

Source: ***INDEX® 4D Method: A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes,*** Criterion Planners/Engineers and Fehr & Peers, U.S. EPA, October, 2001.

TRIP DISTRIBUTION (GRAVITY MODEL)

Once the trip generation step has estimated the number of trips that begin and end in each zone, the trip distribution process determines the specific destination of each originating trip. The destination may be within the zone itself, resulting in an intra-zonal trip. If the destination is outside of the zone of origin, it is an inter-zonal trip. Inter-zonal trips consist of three types.

- Internal-internal (I-I) trips that originate and terminate within the model area.
- Internal-external (I-X) trips that originate within but terminate outside of the model area.
- External-internal (X-I) trips that originate outside and terminate inside of the model area.

Trips passing completely through the model area, without stopping, are external-external (X-X).

The trip distribution model uses a gravity model equation to distribute trips to all zones. This equation estimates an accessibility index for each zone based on the number of attractions in each zone and the travel time between zones. Each attraction zone is given its share of productions based on its share of the accessibility index. This process applies to the I-I, I-X, and X-I trips. The X-X trips are added to the trip matrix prior to final assignment.

Friction Factors

Friction factors, also known as travel time factors, are used in calculating the relative attractiveness of each destination zone based on the travel time between TAZs and the number of potential origins and destinations in each TAZ. These factors are used in the trip distribution stage of the model. The BCAG model friction factors are based on data reported in national modeling reference documents such as National Cooperative Highway Research Program (NCHRP) 365 and remain unchanged from the previous model update.

Internal/External Trips Interactions

One of the important inputs to a travel model is an estimate of the amount of travel between the study area and neighboring areas outside the model. These are typically called internal-external, or I-X/X-I, trips. The I-X/X-I percentages were initially estimated for each model trip purpose using the 2012 CHTS data. These estimates were then refined using the County's external station counts. Table 10 summarizes the proportion of trips by purpose that are assumed to have one end outside the model area.

TABLE 10 PERCENT OF TRIPS BY PURPOSE THAT ARE INTERNAL/EXTERNAL

Purpose	Prod.	Attr.
Home-Based Work (HBW)	7.2%	7.6%
Home-Based Other (HBO)	5.2%	5.1%
Non-Home-Based (NHB)	2.8%	2.8%
School	0.5%	0.5%
University	0.5%	0.5%

1. Casino trips are distributed separately to external stations using a special generator specification in the model land use table.

Source: Fehr & Peers, 2016.

After the number of I-X/X-I trips are estimated, these trips are distributed to the stations around the perimeter of the model area using external station weights. External station weights are based on counts collected at each external station (these are roadway segments at the border of the model area). The number of through trips at each station was subtracted from the count and the remainder was filled in by I-X/X-I trips estimates. The resulting external station weights are presented in Table 11.

TABLE 11 EXTERNAL STATION WEIGHTS

ID	Description	Weight
1	Hwy 99 - north of Butte County Line	17.0%
2	Cohasset Rd - north of Musty Buck Rd	0.2%
3	Hwy 32 - north of Humboldt Rd	0.9%
4	Humboldt Rd - north of Jonesville Rd	0.01%
5	Hwy 70 - north of Butte County Line	1.7%
6	Oroville Quincy Hwy - north of Haskins Valley Rd	0.4%
7	Forbestown Rd - east of Reservoir Rd	1.1%
8	La Porte Rd - northeast of Robinson Mill Rd	0.4%
9	Loma Rica Rd - south of La Porte Rd	0.3%
10	La Porte Rd - south of Butte County Line	0.2%
11	Hwy 70 - south of Butte County Line	18.0%
12	Larkin Rd - south of Butte County Line	4.9%
13	Hwy 99 - south of Butte County Line	24.0%
14	Pennington Rd - south of Rutherford Rd	0.6%
15	Colusa Hwy - west of Cherokee Canal Rd	1.2%
16	Afton Rd - west of Aguas Frias Rd	0.2%
17	Hwy 162 - west of Butte County Line	2.3%
18	Road Z - south of Road 48	0.1%
19	Ord Ferry Rd - west of Hugh Baber Ln	4.9%
20	Hwy 32 - west of Butte County Line	21.3%

Source: Fehr & Peers, 2016.

Through Trips

Through trips (also called external-external, or X-X trips) are trips that pass through the study area without stopping inside the study area. The major flows of through traffic in Butte County use Hwy 99, Hwy 70, and Hwy 32, with lower volumes of through traffic using other arterials. The size of these flows was estimated based on traffic counts collected as part of the model update.

TRIP ASSIGNMENT

The trip assignment process determines the route that each vehicle trip takes from a particular origin to a particular destination. It uses an iterative, capacity-restrained assignment routine to determine a travel path that minimizes travel time, while taking into account congestion delays caused by the other simulated trips in the model.

The general assignment process includes the following steps.

- Assign all trips to the links along their selected paths
- After all assignments, examine the volume on each link and adjust its impedance based on the volume-to-capacity ratio
- Repeat the assignment process for a set number of iterations or until specified criteria related to minimizing travel delays are satisfied

Calibration of the roadway network included modification of the centroid connectors to more accurately represent the location that traffic accesses local roads; adjustment of speeds from posted speed limits to reflect the attractiveness of the route and the prevailing speed of traffic; and adjustment of capacities to reflect the attractiveness of the route.

Time Periods

The BCAG model estimates travel for the average weekday (Monday through Friday). The daily roadway volumes are aggregated from the AM and PM peak period, and Mid-day and Evening off-peak period assignments. Additionally, the model performs AM and PM peak one hour assignments. Descriptions of each assignment time period are presented in Table 12. The specific time periods represented in the model were developed by reviewing the distribution of existing traffic counts across a 24 hour period as well as reviewing the time period distributions of travel models in neighboring jurisdictions (i.e. NCTC, SACOG, TRPA).

TABLE 12 TIME PERIODS

Description	Duration	Time
AM Peak Period	3 Hours	6:00 – 8:59 AM
Mid-day Period	7 Hours	9:00 AM – 3:59 PM
PM Peak Period	3 Hours	4:00 – 6:59 PM
Off-Peak Period	11 Hours	7:00 PM – 5:59 AM
AM Peak Hour	1 Hour	7:00 – 7:59 AM
PM Peak Hour	1 Hour	5:00 – 5:59 PM

Source: Fehr & Peers, 2016.

Turn Penalties

Turn penalties are used to prohibit or add delay to certain turning movements. The BCAG model prohibits traffic from making turns across impassable medians. In addition, the model may prohibit U-turns at some locations in order to avoid counter-intuitive traffic routing. Turn penalties may be in effect during the entire day, during one or all peak periods, or only at the peak hour level.

TRANSIT FORECASTING

While the BCAG TDF Model does not have a mode choice sub-model, a separate off-model tool was developed as part of the previous model update to use transportation and land use data along bus lines to predict ridership. Given the geographic and demographic diversity in the County, three direct ridership forecasting (DRF) models were developed and tested, using BCAG's extensive bus data, to best fit the existing ridership levels based on land use and transit system information.

For this update the DRF models were re-estimated and calibrated to fit current ridership data provided by BCAG staff. The models can be used, not only to forecast future B-Line ridership, but to estimate the effect of rerouting existing lines, adjusting headways, or developing new bus lines in the County.

4

MODEL VALIDATION

Model validation is the term used to describe model performance in terms of how closely the model's output matches existing travel data in the base year. The extent to which model outputs match existing travel data validates the assumptions of the inputs.

Traditionally, most model validation guidelines have focused on the performance of the trip assignment function in accurately assigning trips to the roadway network. This metric is called static validation, and it remains the most common means of measuring model accuracy.

Models, however, are seldom used for static applications. By far the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Therefore, another test of a model's accuracy focuses on the model's ability to predict realistic differences in outputs as inputs are changed. This method is referred to as dynamic validation. This section describes the highest-level validation checks that have been performed for the BCAG TDF model.

STATIC VALIDATION

The most critical static measurement of the accuracy of any travel model is the degree to which it can approximate actual traffic counts in the base year. The 2010 California Regional Transportation Plan Guidelines, California Transportation Commission, contains the following specific static validation criteria and thresholds that have been used to evaluate the BCAG model performance.

- At least 75 percent of the roadway links for which counts are available should be within the maximum desirable deviation, which ranges from approximately 15 to 60 percent depending on total volume (the larger the volume, the less deviation is permitted).
- A correlation coefficient of at least 0.88 - The correlation coefficient estimates the overall level of accuracy between observed traffic counts and the estimated traffic volumes from the model. These coefficient ranges from 0 to 1.0, where 1.0 indicates that the model perfectly fits the data.

- The percent root mean square error (RMSE) below 40% - The RMSE is the square root of the model volume minus the actual count squared, divided by the number of counts. In other words, it is the average of all the link-by-link percent differences, and it is an indicator on how far the model volumes are away from counts, on link-by-link average, expressed as a percent. It is a measure similar to standard deviation in that it assesses the accuracy of the entire model.

In addition to these criteria, the model-wide volume-to-count ratio was checked against a desired maximum threshold of no more than a 10 percent deviation. The validity of the BCAG model was tested for 282 individual roadway segments under daily, AM peak hour, and PM peak hour conditions. The results are shown in Table 13.

DYNAMIC VALIDATION

Static validation provides information on a model's ability to reproduce a static condition. However, the most common use of models is to forecast how a change in inputs would result in a change in traffic conditions. Dynamic validation tests, recommended in the 2010 California Regional Transportation Plan Guidelines, evaluate a model's response to changing inputs. The results of dynamic validation tests are inspected for reasonableness relative to the direction and magnitude of change. The tests described below do not reflect any planned changes or improvements.

Land Use Tests

The BCAG Model has been developed to be used as a tool to evaluate land use scenarios in planning efforts such as EIRs, City General Plans, and the Regional Transportation Plan. The

TABLE 13 RESULTS OF MODEL VALIDATION

Validation Item	Criterion of Acceptance	Daily	AM Peak Hour	PM Peak Hour
Model-wide Volume-to-Count Ratio	Within + 10%	0%	-2%	+5%
Percent of Links Within Deviation Allowance	At Least 75%	83%	78%	76%
Correlation Coefficient	At Least 88%	95%	91%	95%
RMSE	40% or Less	29%	39%	32%

Source: Fehr & Peers, 2016.

specific dynamic validation tests completed for this model update are listed below.

- Add 10, 100, and 1,000 dwelling units to a TAZ
- Add 10,000 and 100,000 square feet of retail to a TAZ
- Remove 10 and 100 dwelling units from a TAZ
- Remove 10,000 and 100,000 square feet of retail from a TAZ

The key model output variables involved in the dynamic validation tests are vehicle trips (VT) generated and vehicle miles of travel (VMT). These tests are intended to reveal whether the model output changes in the correct direction and magnitude. The dynamic validation results for the land use changes are summarized in Table 14.

Table 14 shows that the model responds reasonably to changes in land uses. For example, when changing residential uses, the change in overall model vehicle trip generation and VMT is stable across the entire range and produces results that are reasonable (i.e., 7.8 vehicle trips per household and approximately 60 VMT per household). In addition, the change in trip generation at the TAZ level is as expected with the increase/decrease corresponding to the change in households. The magnitude of vehicle trip generation at the TAZ level is reasonable given the socioeconomic characteristics of the test area located in Chico.

TABLE 14 DYNAMIC VALIDATION: CHANGE IN LAND USES

Land Use Change	Change in TAZ Trip Generation	Model-wide Changes			
		Vehicle Trips	Vehicle Trips/HU or KSF	VMT	VMT/HU or KSF
Add 10 Housing Units	+81	251,753	7.79	5,483,894	61.6
Add 100 Housing Units	+731	252,294	7.79	5,484,180	61.5
Add 1,000 Housing Units	+7,229	257,708	7.77	5,488,037	60.9
Remove 10 Housing Units	-72	251,632	7.73	5,332,841	59.9
Remove 100 Housing Units	-717	251,091	7.73	5,332,785	59.9
Add 10 KSF of Retail Space	+421	251,834	59.7	5,335,165	462.2
Add 100 KSF of Retail Space	+4,195	253,103	59.3	5,357,839	460.6
Remove 10 KSF of Retail Space	-419	251,551	59.7	5,330,349	462.6
Remove 100 KSF of Retail Space	-4,201	250,282	60.1	5,310,822	464.5

Source: Fehr & Peers, 2016.

Roadway Network Tests

The specific network dynamic validation tests performed on the BCAG Model focused on what happens when network capacity is increased or decreased via lane additions or new roadway segments. The specific tests are listed below.

- Add lanes to a roadway segment
- Remove lanes from a roadway segment
- Add a new roadway segment
- Remove a roadway segment

The dynamic validation results for the network tests are summarized in Table 15.

As shown in Table 15, the model behaves as would be expected in response to changes in the roadway network. For example, the addition of a lane in each direction on Clark Road between Bille Road and Wagstaff Road increases traffic on the link as well and the entire screen-line. Similarly, removing the E. Lassen Avenue crossing decreases traffic across the screen-line.

When a new extension of Montgomery Street from SR 70 to 7th Street was added, the overall screen-line volumes increased. However, the new roadway experienced more growth than the screen-line as a whole. This result is reasonable, since the new roadway would provide an alternative to more parallel routes and would induce more traffic across the screen-line.

TABLE 15 DYNAMIC VALIDATION: CHANGE IN ROADWAY NETWORK

Test	ADT Before Change	ADT After Change		
	Test Roadway	Screen-line	Test Roadway	Screen-line
Add one lane in each direction to Clark Road between Bille Road and Wagstaff Road[1]	13,650	40,744	13,828	40,791
Remove one lane in each direction from Clark Road between Bille Road and Wagstaff Road	13,650	40,744	11,940	39,397
New Road: New extension of Montgomery Street from SR 70 interchange to 7th Street[2]	0	18,930	2,036	19,217
Remove Road: Remove E. Lassen Avenue crossing under SR 99[3]	5,791	66,286	0	65,033

ADT – Average Daily Traffic

1. Screen-line includes ADT on Skyway, Oak Way, Harvey Rd., Clark Rd., Forest Ln., and Pentz Rd.

2. Screen-line includes ADT on Nelson Ave., Grand Ave., and Oroville Dam Blvd.

3. Screen-line includes ADT on E. Eaton Rd., East Ave., and Cohasset Rd.

Source: Fehr & Peers, 2016.

05

FUTURE YEAR MODEL

Once the base year model calibration and validation was complete, Fehr & Peers received TAZ growth projections provided by BCAG staff and developed one future year (2040) and two interim (2020 & 2035) model scenarios.

Table 16 reports the land use totals for the base year, interim years, and future year, along with the growth projections

TABLE 16 MODEL LAND USE TOTALS BY SCENARIO YEAR

Land Use Type	Units	2014	2020	2035	2040
Single Family Residential	Dwelling Units	54,299	60,630	79,093	82,553
Multi-Family Residential	Dwelling Units	22,948	25,317	33,121	34,573
Mobile Home Residential	Dwelling Units	11,825	11,972	11,972	11,972
Office	Thousand Square Feet	6,423	7,102	9,423	9,489
Medical Office	Thousand Square Feet	1,900	2,014	2,225	2,618
Hospital	Thousand Square Feet	1,157	1,248	1,580	1,647
Industrial	Thousand Square Feet	10,948	12,469	15,628	16,206
Public/Quasi-Public	Thousand Square Feet	2,128	2,293	2,912	3,031
Park	Acres	476	514	651	675
Neighborhood-Serving Retail	Thousand Square Feet	11,533	13,022	16,506	17,154
Region-Serving Retail1	Thousand Square Feet	0	0	0	0
Hotels	Rooms	2,143	2,314	2,933	3,053
K-12 School	Students	28,653	29,021	29,508	29,711
University	Students	16,500	17,812	22,581	23,504
Community College	Students	12,600	13,602	17,243	17,948
Casino (Special Generator)	Slots	2,000	2,159	2,737	2,849

1. For this model update, all retail land uses were placed in the Neighborhood-Serving Retail land use category.

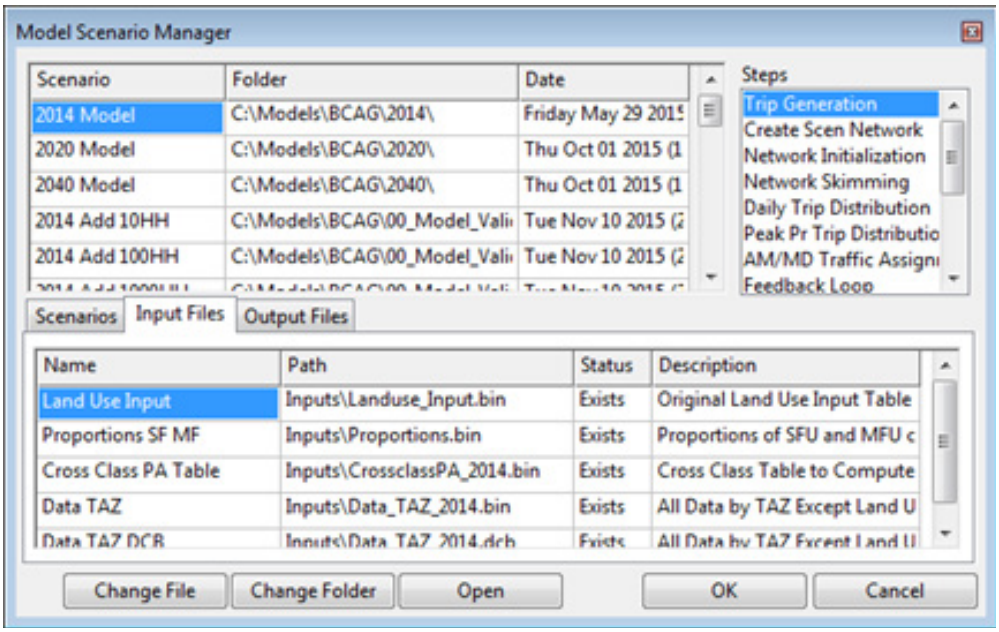
Source: Fehr & Peers, 2016.

06

MODEL INTERFACE

The Graphical User Interface (GUI) developed for the BCAG Travel Demand Model was built to allow the user to conveniently run the model with the click of a button, without going into the technicalities of the programs beneath the model. The GUI closely follows the stages in the model and gives the user the ability to run one stage of the model at a time or run the entire model system by the click of a button.

The figure below shows the TransCAD based GUI and model scenario manager, programmed with GISDK



APPENDIX
TRIP GENERATION RATES

BCAG Trip Generation Table

Output Table for Area 1

[Area Type]	[Employment Type]	LU_Type	LU_Unit	R_HBW_P	R_HBO_P	R_NHB_P	R_SCHOOL_P	R_CASINO_P	R_UNIV_P	R_SP3_P	R_SP2_P	R_SP1_P	R_HBW_A	R_HBO_A	R_NHB_A	R_SCHOOL_A	R_CASINO_A	R_UNIV_A	R_SP3_A	R_SP2_A	R_SP1_A
1	1	SF101	DU	0.081	1.705	0.028	0.000	0.029	0.866	0.000	0.000	0.000	0.000	0.055	0.028	0.000	0.000	0.000	0.000	0.000	0.000
1	2	SF102	DU	0.084	1.774	0.029	0.000	0.030	0.900	0.000	0.000	0.000	0.000	0.057	0.029	0.000	0.000	0.000	0.000	0.000	0.000
1	3	SF103	DU	0.084	1.774	0.029	0.000	0.030	0.900	0.000	0.000	0.000	0.000	0.057	0.029	0.000	0.000	0.000	0.000	0.000	0.000
1	4	SF104	DU	0.084	1.774	0.029	0.000	0.030	0.900	0.000	0.000	0.000	0.000	0.057	0.029	0.000	0.000	0.000	0.000	0.000	0.000
1	5	SF111	DU	1.207	1.695	0.032	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.062	0.032	0.000	0.000	0.000	0.000	0.000	0.000
1	6	SF112	DU	1.240	1.743	0.032	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.063	0.032	0.000	0.000	0.000	0.000	0.000	0.000
1	7	SF113	DU	1.149	1.614	0.030	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.059	0.030	0.000	0.000	0.000	0.000	0.000	0.000
1	8	SF114	DU	1.294	1.817	0.034	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.066	0.034	0.000	0.000	0.000	0.000	0.000	0.000
1	9	SF201	DU	0.204	3.077	0.053	0.109	0.055	1.642	0.000	0.000	0.000	0.000	0.104	0.053	0.000	0.000	0.000	0.000	0.000	0.000
1	10	SF202	DU	0.181	2.735	0.047	0.097	0.049	1.459	0.000	0.000	0.000	0.000	0.093	0.047	0.000	0.000	0.000	0.000	0.000	0.000
1	11	SF203	DU	0.202	3.048	0.053	0.108	0.054	1.626	0.000	0.000	0.000	0.000	0.103	0.053	0.000	0.000	0.000	0.000	0.000	0.000
1	12	SF204	DU	0.213	3.208	0.056	0.114	0.057	1.712	0.000	0.000	0.000	0.000	0.109	0.056	0.000	0.000	0.000	0.000	0.000	0.000
1	13	SF211	DU	1.676	3.425	0.057	0.116	0.058	0.000	0.000	0.000	0.000	0.000	0.111	0.057	0.000	0.000	0.000	0.000	0.000	0.000
1	14	SF212	DU	1.403	2.867	0.047	0.097	0.049	0.000	0.000	0.000	0.000	0.000	0.093	0.047	0.000	0.000	0.000	0.000	0.000	0.000
1	15	SF213	DU	1.422	2.905	0.048	0.098	0.049	0.000	0.000	0.000	0.000	0.000	0.094	0.048	0.000	0.000	0.000	0.000	0.000	0.000
1	16	SF214	DU	1.451	2.966	0.049	0.100	0.050	0.000	0.000	0.000	0.000	0.000	0.096	0.049	0.000	0.000	0.000	0.000	0.000	0.000
1	17	SF221	DU	2.606	2.397	0.055	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.107	0.055	0.000	0.000	0.000	0.000	0.000	0.000
1	18	SF222	DU	2.606	2.397	0.055	0.000	0.056	0.000	0.000	0.000	0.000	0.000	0.107	0.055	0.000	0.000	0.000	0.000	0.000	0.000
1	19	SF223	DU	2.456	2.258	0.051	0.000	0.053	0.000	0.000	0.000	0.000	0.000	0.100	0.051	0.000	0.000	0.000	0.000	0.000	0.000
1	20	SF224	DU	2.685	2.469	0.056	0.000	0.058	0.000	0.000	0.000	0.000	0.000	0.110	0.056	0.000	0.000	0.000	0.000	0.000	0.000
1	21	SF301	DU	0.199	2.903	0.052	0.160	0.054	1.656	0.000	0.000	0.000	0.000	0.102	0.052	0.000	0.000	0.000	0.000	0.000	0.000
1	22	SF302	DU	0.199	2.903	0.052	0.160	0.054	1.656	0.000	0.000	0.000	0.000	0.102	0.052	0.000	0.000	0.000	0.000	0.000	0.000
1	23	SF303	DU	0.199	2.903	0.052	0.160	0.054	1.656	0.000	0.000	0.000	0.000	0.102	0.052	0.000	0.000	0.000	0.000	0.000	0.000
1	24	SF304	DU	0.199	2.903	0.052	0.160	0.054	1.656	0.000	0.000	0.000	0.000	0.102	0.052	0.000	0.000	0.000	0.000	0.000	0.000
1	25	SF311	DU	1.234	4.832	0.072	0.588	0.074	0.000	0.000	0.000	0.000	0.000	0.140	0.072	0.000	0.000	0.000	0.000	0.000	0.000
1	26	SF312	DU	1.234	4.832	0.072	0.588	0.074	0.000	0.000	0.000	0.000	0.000	0.140	0.072	0.000	0.000	0.000	0.000	0.000	0.000
1	27	SF313	DU	1.173	4.594	0.068	0.559	0.070	0.000	0.000	0.000	0.000	0.000	0.133	0.068	0.000	0.000	0.000	0.000	0.000	0.000
1	28	SF314	DU	1.173	4.594	0.068	0.559	0.070	0.000	0.000	0.000	0.000	0.000	0.133	0.068	0.000	0.000	0.000	0.000	0.000	0.000
1	29	SF321	DU	2.449	4.171	0.078	0.477	0.160	0.000	0.000	0.000	0.000	0.000	0.152	0.078	0.000	0.000	0.000	0.000	0.000	0.000
1	30	SF322	DU	2.449	4.171	0.078	0.477	0.160	0.000	0.000	0.000	0.000	0.000	0.152	0.078	0.000	0.000	0.000	0.000	0.000	0.000
1	31	SF323	DU	2.449	4.171	0.078	0.477	0.160	0.000	0.000	0.000	0.000	0.000	0.152	0.078	0.000	0.000	0.000	0.000	0.000	0.000
1	32	SF324	DU	2.744	4.673	0.087	0.535	0.179	0.000	0.000	0.000	0.000	0.000	0.170	0.087	0.000	0.000	0.000	0.000	0.000	0.000
1	33	SF331	DU	4.939	3.010	0.091	0.279	0.187	0.000	0.000	0.000	0.000	0.000	0.177	0.091	0.000	0.000	0.000	0.000	0.000	0.000
1	34	SF332	DU	5.062	3.086	0.093	0.286	0.191	0.000	0.000	0.000	0.000	0.000	0.182	0.093	0.000	0.000	0.000	0.000	0.000	0.000
1	35	SF333	DU	5.097	3.106	0.094	0.288	0.193	0.000	0.000	0.000	0.000	0.000	0.183	0.094	0.000	0.000	0.000	0.000	0.000	0.000
1	36	SF334	DU	4.973	3.031	0.091	0.281	0.188	0.000	0.000	0.000	0.000	0.000	0.178	0.091	0.000	0.000	0.000	0.000	0.000	0.000
1	37	SF401	DU	0.281	3.732	0.074	0.301	0.076	2.635	0.000	0.000	0.000	0.000	0.144	0.074	0.000	0.000	0.000	0.000	0.000	0.000
1	38	SF402	DU	0.281	3.732	0.074	0.301	0.076	2.635	0.000	0.000	0.000	0.000	0.144	0.074	0.000	0.000	0.000	0.000	0.000	0.000
1	39	SF403	DU	0.433	5.758	0.113	0.465	0.117	4.066	0.000	0.000	0.000	0.000	0.222	0.113	0.000	0.000	0.000	0.000	0.000	0.000
1	40	SF404	DU	0.380	5.052	0.100	0.408	0.102	3.568	0.000	0.000	0.000	0.000	0.195	0.100	0.000	0.000	0.000	0.000	0.000	0.000
1	41	SF411	DU	0.965	5.827	0.092	1.693	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000
1	42	SF412	DU	0.965	5.827	0.092	1.693	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000
1	43	SF413	DU	1.491	9.000	0.142	2.615	0.292	0.000	0.000	0.000	0.000	0.000	0.277	0.142	0.000	0.000	0.000	0.000	0.000	0.000
1	44	SF414	DU	1.307	7.894	0.124	2.294	0.256	0.000	0.000	0.000	0.000	0.000	0.243	0.124	0.000	0.000	0.000	0.000	0.000	0.000
1	45	SF421	DU	2.509	5.908	0.114	2.105	0.235	0.000	0.000	0.000	0.000	0.000	0.223	0.114	0.000	0.000	0.000	0.000	0.000	0.000
1	46	SF422	DU	2.509	5.908	0.114	2.105	0.235	0.000	0.000	0.000	0.000	0.000	0.223	0.114	0.000	0.000	0.000	0.000	0.000	0.000
1	47	SF423	DU	3.314	7.803	0.151	2.781	0.310	0.000	0.000	0.000	0.000	0.000	0.295	0.151	0.000	0.000	0.000	0.000	0.000	0.000
1	48	SF424	DU	2.745	6.463	0.125	2.303	0.257	0.000	0.000	0.000	0.000	0.000	0.244	0.125	0.000	0.000	0.000	0.000	0.000	0.000
1	49	SF431	DU	2.287	8.180	0.133	1.771	0.274	0.000	0.000	0.000	0.000	0.000	0.260	0.133	0.000	0.000	0.000	0.000	0.000	0.000
1	50	SF432	DU	2.287	8.180	0.133	1.771	0.274	0.000	0.000	0.000	0.000	0.000	0.260	0.133	0.000	0.000	0.000	0.000	0.000	0.000
1	51	SF433	DU	2.287	8.180	0.133	1.771	0.274	0.000	0.000	0.000	0.000	0.000	0.260	0.133	0.000	0.000	0.000	0.000	0.000	0.000
1	52	SF434	DU	2.287	8.180	0.133	1.771	0.274	0.000	0.000	0.000	0.000	0.000	0.260	0.133	0.000	0.000	0.000	0.000	0.000	0.000
1	53	SF441	DU	5.213	8.138	0.152	0.466	0.312	0.000	0.000	0.000	0.000	0.000	0.296	0.152	0.000	0.000	0.000	0.000	0.000	0.000
1	54	SF442	DU	5.213	8.138	0.152	0.466	0.312	0.000	0.000	0.000	0.000	0.000	0.296	0.152	0.000	0.000	0.000	0.000	0.000	0.000
1	55	SF443	DU	5.213	8.138	0.152	0.466	0.312	0.000	0.000	0.000	0.000	0.000	0.296	0.152	0.000	0.000	0.000	0.000	0.000	0.000
1	56	SF444	DU	5.213	8.138	0.152	0.466	0.312	0.000	0.000	0.000	0.000	0.000	0.296	0.152	0.000	0.000	0.000	0.000	0.000	0.000
1	57	MF101	DU	0.059	1.254	0.021	0.000	0.021	0.637	0.000	0.000	0.000	0.000	0.040	0.021	0.000	0.000	0.000	0.000	0.000	0.000
1	58	MF102	DU	0.062	1.307	0.022	0.000	0.022	0.664	0.000	0.000	0.000	0.000	0.042	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	59	MF103	DU	0.062	1.307	0.022	0.000	0.022	0.664	0.000	0.000	0.000	0.000	0.042	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	60	MF104	DU	0.062	1.307	0.022	0.000	0.022	0.664	0.000	0.000	0.000	0.000	0.042	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	61	MF111	DU	0.888	1.248	0.023	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.045	0.023	0.000	0.000	0.000	0.000	0.000	0.000
1	62	MF112	DU	0.917	1.289	0.024	0.000	0.025	0.000	0.000	0.000	0.000	0.000	0.047	0.024	0.000	0.000	0.000	0.000	0.000	0.000
1	63	MF113	DU	0.850	1.194	0.022	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.043	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	64	MF114	DU	0.956	1.343	0.025	0.000	0.026	0.000	0.000	0.000	0.000	0.000	0.049	0.025	0.000	0.000	0.000	0.000	0.000	0.000
1	65	MF201	DU	0.151	2.270	0.039	0.081	0.041	1.211	0.000	0.000	0.000	0.000	0.077	0.039	0.000	0.000	0.000	0.000	0.000	0.000
1	66	MF202	DU	0.134	2.022	0.035	0.072	0.036	1.079	0.000	0.000	0.000	0.000	0.069	0.035	0.000	0.000	0.000	0.000	0.000	0.000
1	67	MF203	DU	0.149	2.248	0.039	0.080	0.040	1.199	0.000	0.000	0.000	0.000	0.076	0.039	0.000	0.000	0.000	0.000	0.000	0.000
1	68	MF204	DU	0.157	2.364	0.041	0.084	0.042	1.261	0.000	0.000	0.000	0.000	0.080	0.041	0.000	0.000	0.000	0.000	0.000	0.000
1	69	MF211	DU	1.238	2.530	0.042	0.086	0.043	0.000	0.000	0.000	0.000	0.000	0.082	0.042	0.000	0.000	0.000	0.000	0.000	0.000
1	70	MF212	DU	1.032	2.110	0.035	0.071	0.036	0.000	0.000	0.000	0.000	0.000	0.068	0.035	0.000	0.000	0.000	0.000	0.000	0.000
1	71	MF213	DU	1.047	2.141	0.035	0.072	0.036	0.000	0.000	0.000	0.000	0.000	0.069	0.035	0.000	0.000	0.000	0.000	0.000	0.000
1	72	MF214	DU	1.070	2.186	0.036	0.074	0.037	0.000	0.000	0.000	0.000	0.000	0.071	0.036	0.000	0.000	0.000	0.000	0.000	0.000
1	73	MF221	DU	1.919	1.764	0.040	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.078	0.040	0.000	0.000	0.000	0.000	0.000	0.000
1	74	MF222	DU	1.919	1.764	0.040	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.078	0.040	0.000	0.000	0.000	0.000	0.000	0.000
1	75	MF223	DU	1.810	1.665	0.038	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.074	0.038	0.000	0.000	0.000	0.000	0.000	0.000
1	76	MF224	DU	1.979	1.820	0.041	0.000	0.043	0.000	0.000	0.000	0.000	0.000	0.081	0.041	0.000	0.000	0.000	0.000	0.000	0.000
1	77	MF301	DU	0.147	2.137	0.038	0.118	0.040	1.219	0.000	0.000	0.000	0.000	0.075	0.038	0.000	0.000	0.000	0.000	0.000	0.000
1	78	MF302	DU	0.147	2.137	0.038	0.118	0.040	1.219	0.000	0.000	0.000	0.000	0.075	0.038	0.000	0.000	0.000	0.000	0.000	0.000
1	79	MF303	DU	0.147	2.137	0.038	0.118	0.040	1.219	0.000	0.000	0.000	0.000	0.075	0.038	0.000	0.000	0.000	0.000	0.000	0.000
1	80	MF304	DU	0.147	2.137	0.038	0.118	0.040	1.219	0.000	0.000	0.000	0.000	0.075	0.038	0.000	0.000	0.000	0.000	0.000	0.000
1	81	MF311	DU	0.910	3.565	0.053	0.434	0.054	0.000	0.000	0.000	0.000	0.000	0.103	0.053	0.000	0.000	0.000	0.000	0.000	0.000
1	82	MF312	DU	0.910	3.565	0.053	0.434	0.054	0.000	0.000	0.000	0.000	0.000	0.103	0.053	0.000	0.000	0.000	0.000	0.000	0.000
1	83	MF313	DU	0.864	3.386	0.050	0.412	0.052	0.000	0.000	0.000	0.000	0.000	0.098	0.050	0.000	0.000	0.000	0.000	0.000	0.000
1	84	MF314	DU	0.864	3.386	0.050	0.412	0.052	0.000	0.000	0.000	0.000	0.000	0.098	0.050	0.000	0.000	0.000	0.000	0.000	0.000
1	85	MF321	DU	1.804	3.072	0.057	0.352	0.118	0.000	0.000	0.000	0.000	0.000	0.112	0.057	0.000	0.000	0.000	0.000	0.000	0.000
1	86	MF322	DU	1.804	3.072	0.057	0.352	0.118	0.000	0.000	0.000	0.000	0.000	0.112	0.057	0.000	0.000	0.000	0.000	0.000	0.000
1	87	MF323	DU	1.804	3.072	0.057	0.352	0.118	0.000	0.000	0.000	0.000	0.000	0.112	0.057	0.000	0.000	0.000	0.000	0.000	0.000
1	88	MF324	DU	2.023	3.445	0.064	0.394	0.132	0.000	0.000	0.000	0.000	0.000	0.125	0.064	0.000	0.000	0.000	0.000	0.000	0.000
1	89	MF331	DU	3.639	2.218	0.067	0.205	0.138	0.000	0.000	0.000	0.000	0.000	0.131	0.067	0.000	0.000	0.000	0.000	0.000	0.000
1	90	MF332	DU	3.735	2.276	0.069	0.211	0.141	0.000	0.000	0.000	0.000	0.000	0.134	0.069	0.000	0.000	0.000	0.000	0.000	0.000
1	91	MF333	DU	3.756	2.289	0.069	0.212	0.142	0.000	0.000	0.000	0.000	0.000	0.135	0.069	0.000	0.000	0.000	0.000	0.000	0.000
1	92	MF334	DU	3.666	2.234	0.067	0.207	0.139	0.000	0.000	0.000	0.000	0.000	0.132	0.067	0.000	0.000	0.000	0.000	0.000	0.000
1	93	MF401	DU	0.207	2.751	0.054	0.222	0.056	1.943	0.000	0.000	0.000	0.000	0.106	0.054	0.000	0.000	0.000	0.000	0.000	0.000
1	94	MF402	DU	0.207	2.751	0.054	0.222	0.056	1.943	0.000	0.000	0.000	0.000	0.106	0.054	0.000	0.000	0.000	0.000	0.000	0.000
1	95	MF403	DU	0.320	4.245	0.084	0.343	0.086	2.998	0.000	0.000	0.000	0.000	0.163	0.084	0.000	0.000	0.000	0.000	0.000	0.000
1	96	MF404	DU	0.280	3.725	0.073	0.301	0.076	2.631	0.000	0.000	0.000	0.000	0.143	0.073	0.000	0.000	0.000	0.000	0.000	0.000
1	97	MF411	DU	0.711	4.296	0.068	1.248	0.139	0.000	0.000	0.000	0.000	0.000	0.132	0.068	0.000	0.000	0.000	0.000	0.000	0.000
1	98	MF412	DU	0.711	4.296	0.068	1.248	0.139	0.000	0.000	0.000	0.000	0.000	0.132	0.068	0.000	0.000	0.000	0.000	0.000	0.000
1	99	MF413	DU	1.099	6.636	0.105	1.928	0.215	0.000	0.000	0.000	0.000	0.000	0.204	0.105	0.000	0.000	0.000	0.000	0.000	0.000
1	100	MF414	DU	0.964	5.819	0.092	1.691	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000
1	101	MF421	DU	1.848	4.352	0.084	1.551	0.173	0.000	0.000	0.000	0.000	0.000	0.164	0.084	0.000	0.000	0.000	0.000	0.000	0.000
1	102	MF422	DU	1.848	4.352	0.084	1.551	0.173	0.000	0.000	0.000	0.000	0.000	0.164	0.084	0.000	0.000	0.000	0.000	0.000	0.000
1	103	MF423	DU	2.442	5.751	0.111	2.049	0.229	0.000	0.000	0.000	0.000	0.000	0.217	0.111	0.000	0.000	0.000	0.000	0.000	0.000
1	104	MF424	DU	2.023	4.764	0.092	1.698	0.190	0.000	0.000	0.000	0.000	0.000	0.180	0.092	0.000	0.000	0.000	0.000	0.000	0.000
1	105	MF431	DU	1.686	6.028	0.098	1.305	0.202	0.000	0.000	0.000	0.000	0.000	0.192	0.098	0.000	0.000	0.000	0.000	0.000	0.000
1	106	MF432	DU	1.686	6.028	0.098	1.305	0.202	0.000	0.000	0.000	0.000	0.000	0.192	0.098	0.000	0.000	0.000	0.000	0.000	0.000
1	107	MF433	DU	1.686	6.028	0.098	1.305	0.202	0.000	0.000	0.000	0.000	0.000	0.192	0.098	0.000	0.000	0.000	0.000	0.000	0.000
1	108	MF434	DU	1.686	6.028	0.098	1.305	0.202	0.000	0.000	0.000	0.000	0.000	0.192	0.098	0.000	0.000	0.000	0.000	0.000	0.000
1	109	MF441	DU	3.845	6.002	0.112	0.343	0.230	0.000	0.000	0.000	0.000	0.000	0.218	0.112	0.000	0.000	0.000	0.000	0.000	0.000
1	110	MF442	DU	3.845	6.002	0.112	0.343	0.230	0.000	0.000	0.000	0.000	0.000	0.218	0.112	0.000	0.000	0.000	0.000	0.000	0.000
1	111	MF443	DU	3.845	6.002	0.112	0.343	0.230	0.000	0.000	0.000	0.000	0.000	0.218	0.112	0.000	0.000	0.000	0.000	0.000	0.000
1	112	MF444	DU	3.845	6.002	0.112	0.343	0.230	0.000	0.000	0.000	0.000	0.000	0.218	0.112	0.000	0.000	0.000	0.000	0.000	0.000
1	113	MH101	DU	0.055	1.170	0.019	0.000	0.020	0.594	0.000	0.000	0.000	0.000	0.038	0.019	0.000	0.000	0.000	0.000	0.000	0.000
1	114	MH102	DU	0.058	1.223	0.020	0.000	0.021	0.621	0.000	0.000	0.000	0.000	0.039	0.020	0.000	0.000	0.000	0.000	0.000	0.000
1	115	MH103	DU	0.058	1.223	0.020	0.000	0.021	0.621	0.000	0.000	0.000	0.000	0.039	0.020	0.000	0.000	0.000	0.000	0.000	0.000
1	116	MH104	DU	0.058	1.223	0.020	0.000	0.021	0.621	0.000	0.000	0.000	0.000	0.039	0.020	0.000	0.000	0.000	0.000	0.000	0.000
1	117	MH111	DU	0.830	1.166	0.022	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.042	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	118	MH112	DU	0.854	1.200	0.022	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.044	0.022	0.000	0.000	0.000	0.000	0.000	0.000
1	119	MH113	DU	0.792	1.112	0.021	0.000	0.021	0.000	0.000	0.000	0.000	0.000	0.040	0.021	0.000	0.000	0.000	0.000	0.000	0.000

[Employment Type]	R_HBW_IX_P	R_HBO_IX_P	R_NHB_IX_P	R_SCHOOL_IX_P	R_CASINO_IX_P	R_UNIV_IX_P	R_SP3_IX_P	R_SP2_IX_P	R_SP1_IX_P	R_HBW_XI_A	R_HBO_XI_A	R_NHB_XI_A	R_SCHOOL_XI_A	R_CASINO_XI_A	R_UNIV_XI_A	R_SP3_XI_A	R_SP2_XI_A	R_SP1_XI_A
1	0.006	0.093	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
2	0.006	0.096	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
3	0.006	0.096	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
4	0.006	0.096	0.001	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
5	0.093	0.092	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
6	0.096	0.095	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
7	0.089	0.088	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
8	0.100	0.099	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
9	0.016	0.167	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
10	0.014	0.149	0.001	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
11	0.016	0.166	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
12	0.016	0.174	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
13	0.130	0.186	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
14	0.108	0.156	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
15	0.110	0.158	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
16	0.112	0.161	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
17	0.202	0.130	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
18	0.202	0.130	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
19	0.190	0.123	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000
20	0.208	0.134	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
21	0.015	0.158	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000
22	0.015	0.158	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000
23	0.015	0.158	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000
24	0.015	0.158	0.002	0.001	0.000	0.008	0.000	0.000	0.000	0.000	0.005	0.002	0.000	0.000	0.000	0.000	0.000	0.000
25	0.095	0.262	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
26	0.095	0.262	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
27	0.091	0.250	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
28	0.091	0.250	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
29	0.189	0.227	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
30	0.189	0.227	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
31	0.189	0.227	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
32	0.212	0.254	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000
33	0.382	0.164	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000
34	0.391	0.168	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
35	0.394	0.169	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
36	0.384	0.165	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
37	0.022	0.203	0.002	0.001	0.000	0.013	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
38	0.022	0.203	0.002	0.001	0.000	0.013	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
39	0.034	0.313	0.003	0.002	0.000	0.020	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
40	0.029	0.274	0.003	0.002	0.000	0.017	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
41	0.075	0.316	0.003	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
42	0.075	0.316	0.003	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
43	0.115	0.489	0.004	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.004	0.000	0.000	0.000	0.000	0.000	0.000
44	0.101	0.429	0.004	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.004	0.000	0.000	0.000	0.000	0.000	0.000
45	0.194	0.321	0.003	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
46	0.194	0.321	0.003	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
47	0.256	0.424	0.004	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.000	0.000
48	0.212	0.351	0.004	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.004	0.000	0.000	0.000	0.000	0.000	0.000
49	0.177	0.444	0.004	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.004	0.000	0.000	0.000	0.000	0.000	0.000
50	0.177	0.444	0.004	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.004	0.000	0.000	0.000	0.000	0.000	0.000
51	0.177	0.444	0.004	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.004	0.000	0.000	0.000	0.000	0.000	0.000
52	0.177	0.444	0.004	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.004	0.000	0.000	0.000	0.000	0.000	0.000
53	0.403	0.442	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.000	0.000
54	0.403	0.442	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.000	0.000
55	0.403	0.442	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.000	0.000
56	0.403	0.442	0.004	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.004	0.000	0.000	0.000	0.000	0.000	0.000
57	0.005	0.068	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
58	0.005	0.071	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
59	0.005	0.071	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
60	0.005	0.071	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
61	0.069	0.068	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
62	0.071	0.070	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
63	0.066	0.065	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
64	0.074	0.073	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
65	0.012	0.123	0.001	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
66	0.010	0.110	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
67	0.012	0.122	0.001	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
68	0.012	0.128	0.001	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
69	0.096	0.137	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
70	0.080	0.115	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
71	0.081	0.116	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
72	0.083	0.119	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
73	0.148	0.096	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
74	0.148	0.096	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
75	0.140	0.090	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
76	0.153	0.099	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
77	0.011	0.116	0.001	0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
78	0.011	0.116	0.001	0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
79	0.011	0.116	0.001	0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
80	0.011	0.116	0.001	0.001	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
81	0.070	0.194	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
82	0.070	0.194	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
83	0.067	0.184	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
84	0.067	0.184	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
85	0.139	0.167	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
86	0.139	0.167	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
87	0.139	0.167	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
88	0.156	0.187	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
89	0.281	0.120	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
90	0.289	0.124	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
91	0.290	0.124	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
92	0.283	0.121	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
93	0.016	0.149	0.002	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
94	0.016	0.149	0.002	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
95	0.025	0.231	0.002	0.002	0.000	0.014	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000
96	0.022	0.202	0.002	0.001	0.000	0.013	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
97	0.055	0.233	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
98	0.055	0.233	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
99	0.085	0.360	0.003	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
100	0.074	0.316	0.003	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
101	0.143	0.236	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000
102	0.143	0.236	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.002	0.000	0.000	0.000	0.000	0.000	0.000
103	0.189	0.312	0.003	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
104	0.156	0.259	0.003	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
105	0.130	0.327	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
106	0.130	0.327	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
107	0.130	0.327	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
108	0.130	0.327	0.003	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
109	0.297	0.326	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
110	0.297	0.326	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
111	0.297	0.326	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
112	0.297	0.326	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.003	0.000	0.000	0.000	0.000	0.000	0.000
113	0.004	0.064	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
114	0.004	0.066	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
115	0.004	0.066	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
116	0.004	0.066	0.001	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
117	0.064	0.063	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
118	0.066	0.065	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
119	0.061	0.060	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000

BCAG Trip Generation Table

[Area Type]	[Employment Type]	LU_Type	LU_Unit	R_HBW_P	R_HBO_P	R_NHB_P	R_SCHOOL_P	R_CASINO_P	R_UNIV_P	R_SP3_P	R_SP2_P	R_SP1_P	R_HBW_A	R_HBO_A	R_NHB_A	R_SCHOOL_A	R_CASINO_A	R_UNIV_A	R_SP3_A	R_SP2_A	R_SP1_A	R_HBW_IX_P	R_HBO_IX_P	R_NHB_IX_P	R_SCHOOL_IX_P	R_CASINO_IX_P	R_UNIV_IX_P	R_SP3_IX_P	R_SP2_IX_P	R_SP1_IX_P	R_HBW_XI_A	R_HBO_XI_A	R_NHB_XI_A	R_SCHOOL_XI_A	R_CASINO_XI_A	R_UNIV_XI_A	R_SP3_XI_A	R_SP2_XI_A	R_SP1_XI_A
1	120	MH114	DU	0.893	1.255	0.023	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.046	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.069	0.068	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	121	MH201	DU	0.140	2.117	0.037	0.075	0.038	1.129	0.000	0.000	0.000	0.000	0.072	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.115	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	122	MH202	DU	0.125	1.884	0.033	0.067	0.034	1.005	0.000	0.000	0.000	0.000	0.064	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.102	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	123	MH203	DU	0.139	2.102	0.037	0.075	0.038	1.122	0.000	0.000	0.000	0.000	0.071	0.037	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.114	0.001	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	124	MH204	DU	0.147	2.212	0.038	0.079	0.040	1.180	0.000	0.000	0.000	0.000	0.075	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.120	0.001	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	125	MH211	DU	1.156	2.362	0.039	0.080	0.040	0.000	0.000	0.000	0.000	0.000	0.076	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.089	0.128	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	126	MH212	DU	0.965	1.972	0.033	0.067	0.034	0.000	0.000	0.000	0.000	0.000	0.064	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.107	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	127	MH213	DU	0.980	2.003	0.033	0.068	0.034	0.000	0.000	0.000	0.000	0.000	0.065	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.076	0.109	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	128	MH214	DU	0.999	2.041	0.034	0.069	0.035	0.000	0.000	0.000	0.000	0.000	0.066	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.077	0.111	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	129	MH221	DU	1.792	1.648	0.038	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.073	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.090	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	130	MH222	DU	1.792	1.648	0.038	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.073	0.038	0.000	0.000	0.000	0.000	0.000	0.000	0.139	0.090	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	131	MH223	DU	1.689	1.554	0.035	0.000	0.036	0.000	0.000	0.000	0.000	0.000	0.069	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.084	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	132	MH224	DU	1.846	1.698	0.039	0.000	0.040	0.000	0.000	0.000	0.000	0.000	0.076	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.143	0.092	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	133	MH301	DU	0.137	1.996	0.036	0.110	0.037	1.139	0.000	0.000	0.000	0.000	0.070	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.108	0.001	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	134	MH302	DU	0.137	1.996	0.036	0.110	0.037	1.139	0.000	0.000	0.000	0.000	0.070	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.108	0.001	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	135	MH303	DU	0.137	1.996	0.036	0.110	0.037	1.139	0.000	0.000	0.000	0.000	0.070	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.108	0.001	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	136	MH304	DU	0.137	1.996	0.036	0.110	0.037	1.139	0.000	0.000	0.000	0.000	0.070	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.108	0.001	0.001	0.000	0.005	0.000	0.000	0.000	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	137	MH311	DU	0.849	3.327	0.049	0.405	0.051	0.000	0.000	0.000	0.000	0.000	0.097	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.181	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	138	MH312	DU	0.849	3.327	0.049	0.405	0.051	0.000	0.000	0.000	0.000	0.000	0.097	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.181	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	139	MH313	DU	0.808	3.165	0.047	0.385	0.048	0.000	0.000	0.000	0.000	0.000	0.092	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.172	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	140	MH314	DU	0.808	3.165	0.047	0.385	0.048	0.000	0.000	0.000	0.000	0.000	0.092	0.047	0.000	0.000	0.000	0.000	0.000	0.000	0.062	0.172	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	141	MH321	DU	1.688	2.875	0.054	0.329	0.110	0.000	0.000	0.000	0.000	0.000	0.105	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.156	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	142	MH322	DU	1.688	2.875	0.054	0.329	0.110	0.000	0.000	0.000	0.000	0.000	0.105	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.156	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	143	MH323	DU	1.688	2.875	0.054	0.329	0.110	0.000	0.000	0.000	0.000	0.000	0.105	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.156	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	144	MH324	DU	1.888	3.214	0.060	0.368	0.123	0.000	0.000	0.000	0.000	0.000	0.117	0.060	0.000	0.000	0.000	0.000	0.000	0.000	0.146	0.175	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	145	MH331	DU	3.398	2.071	0.062	0.192	0.128	0.000	0.000	0.000	0.000	0.000	0.122	0.062	0.000	0.000	0.000	0.000	0.000	0.000	0.263	0.112	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	146	MH332	DU	3.487	2.125	0.064	0.197	0.132	0.000	0.000	0.000	0.000	0.000	0.125	0.064	0.000	0.000	0.000	0.000	0.000	0.000	0.270	0.115	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	147	MH333	DU	3.515	2.142	0.065	0.198	0.133	0.000	0.000	0.000	0.000	0.000	0.126	0.065	0.000	0.000	0.000	0.000	0.000	0.000	0.272	0.116	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	148	MH334	DU	3.425	2.088	0.063	0.193	0.129	0.000	0.000	0.000	0.000	0.000	0.123	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.265	0.113	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	149	MH401	DU	0.194	2.571	0.051	0.208	0.052	1.816	0.000	0.000	0.000	0.000	0.099	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.140	0.001	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	150	MH402	DU	0.194	2.571	0.051	0.208	0.052	1.816	0.000	0.000	0.000	0.000	0.099	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.140	0.001	0.001	0.000	0.009	0.000	0.000	0.000	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000	0.000
1	151	MH403	DU	0.299	3.969	0.078	0.320	0.080	2.803	0.000	0.000	0.000	0.000	0.153	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.023	0.216	0.002	0.002	0.000	0.014	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	152	MH404	DU	0.262	3.482	0.069	0.281	0.071	2.459	0.000	0.000	0.000	0.000	0.134	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.189	0.002	0.001	0.000	0.012	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	153	MH411	DU	0.665	4.015	0.063	1.167	0.130	0.000	0.000	0.000	0.000	0.000	0.124	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.218	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	154	MH412	DU	0.665	4.015	0.063	1.167	0.130	0.000	0.000	0.000	0.000	0.000	0.124	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.051	0.218	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	155	MH413	DU	1.026	6.195	0.098	1.800	0.201	0.000	0.000	0.000	0.000	0.000	0.191	0.098	0.000	0.000	0.000	0.000	0.000	0.000	0.079	0.337	0.003	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	156	MH414	DU	0.900	5.434	0.086	1.579	0.176	0.000	0.000	0.000	0.000	0.000	0.167	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.070	0.295	0.003	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	157	MH421	DU	1.729	4.148	0.079	1.370	0.162	0.000	0.000	0.000	0.000	0.000	0.154	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.134	0.225	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	158	MH422	DU	1.729	4.148	0.079	1.370	0.162	0.000	0.000	0.000	0.000	0.000	0.154	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.134	0.225	0.002	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.002	0.000	0.000	0.000	0.000	0.000	0.000
1	159	MH423	DU	2.284	5.480	0.104	1.810	0.214	0.000	0.000	0.000	0.000	0.000	0.203	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.177	0.298	0.003	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	160	MH424	DU	1.890	4.534	0.086	1.498	0.177	0.000	0.000	0.000	0.000	0.000	0.168	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.146	0.246	0.003	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	161	MH431	DU	1.575	5.721	0.092	1.126	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.122	0.311	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	162	MH432	DU	1.575	5.721	0.092	1.126	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.122	0.311	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	163	MH433	DU	1.575	5.721	0.092	1.126	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.122	0.311	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	164	MH434	DU	1.575	5.721	0.092	1.126	0.189	0.000	0.000	0.000	0.000	0.000	0.179	0.092	0.000	0.000	0.000	0.000	0.000	0.000	0.122	0.311	0.003	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	165	MH441	DU	3.588	5.602	0.104	0.321	0.215	0.000	0.000	0.000	0.000	0.000	0.204	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.277	0.304	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	166	MH442	DU	3.588	5.602	0.104	0.321	0.215	0.000	0.000	0.000	0.000	0.000	0.204	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.277	0.304	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	167	MH443	DU	3.588	5.602	0.104	0.321	0.215	0.000	0.000	0.000	0.000	0.000	0.204	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.277	0.304	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	168	MH444	DU	3.588	5.602	0.104	0.321	0.215	0.000	0.000	0.000	0.000	0.000	0.204	0.104	0.000	0.000	0.000	0.000	0.000	0.000	0.277	0.304	0.003	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.003	0.000	0.000	0.000	0.000	0.000	0.000
1	169	RET_KSF	KSF	0.000	0.000	8.761	0.000	0.000	0.000	0.000	0.000	0.000	3.174	20.384	8.761	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.256	0.000	0.000	0.000	0.000	0.000	0.000	0.261	1.086	0.256	0.000	0.000	0.000	0.000	0.000	0.000
1	170	RRET_KSF	KSF	0.000	0.000	9.718	0.000	0.000	0.000	0.000	0.000	0.000	3.521	22.610	9.718	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.284	0.000	0.000	0.000	0.000	0.000	0.000	0.290	1.205	0.284	0.000	0.000	0.000	0.000	0.000	0.000
1	171	IND_KSF	KSF	0.000	0.000	0.611	0.000	0.000	0.000	0.000	0.000	0.000	2.016	0.246	0.611	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.166	0.013	0.018	0.000	0.000	0.000	0.000	0.000	0.000
1	172	OFF_KSF	KSF	0.000	0.000	2.261	0.000	0.000	0.000	0.000	0.000	0.000	5.913	0.552	2.261	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.487	0.029	0.066	0.000	0.000	0.000	0.000	0.000	0.000
1	173	MED_KSF	KSF	0.000	0.000	9.849	0.000	0.000	0.000	0.000	0.000	0.000	2.498	10.266	9.849	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.288	0.000	0.000	0.000	0.000	0.000	0.000	0.206	0.547	0.288	0.000	0.000	0.000	0.000	0.000	0.000
1	174	HOSP_KSF	KSF	0.000	0.000	3.853	0.000	0.000	0.000	0.000	0.000	0.000	0.977	4.016	3.853	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.113	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.214	0.113	0.000	0.000	0.000	0.000	0.000	0.000
1	175	PQP_KSF	KSF	0.000	0.000	1.554	0.000	0.000	0.000	0.000	0.000	0.000	0.739	3.798	1.554	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.046	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.202	0.046	0.000	0.000	0.000	0.000	0.000	0.000
1	176	HOTEL_RMS	Rooms	0.000	0.000	1.514	0.000	0.000	0.000	0.000	0.000	0.000	1.152	1.775	1.514	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.044	0.000	0.000	0.000	0.000	0.000	0.000	0.095	0.095	0.044	0.000	0.000	0.000	0.000	0.000	0.000
1	177	UNIV_STU	Student	0.000	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000	0.000	1.531	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.008	0.000	0.000	0.000
1	178	CC_STU	Student	0.000	0.000	0.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.000	0.000	1.101	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.006	0.000	0.000	0.000
1	179	K12_STU	Student	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	1.379	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.007	0.000	0.000	0.000	0.000	0.000
1	180	PARK_AC	Acres	0.000	0.000	0.459	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.897	0.459	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.048	0.013	0.000	0.000	0.000	0.000	0.000	0.000
1	181	CASINO_SLT	Slots	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.149	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.026	0.000	0.000	0.000	0.000
1	182	CASINO_PRD	Slots	0.000	0.000	0.000	0.000	5.175	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	183	LU_Spare17	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	184	LU_Spare16	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	185	LU_Spare15	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	186	LU_Spare14	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	187	LU_Spare13	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	188	LU_Spare12	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	189	LU_Spare11	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	190	LU_Spare10	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	191	LU_Spare09	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	192	LU_Spare08	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	193	LU_Spare07	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	194	LU_Spare06	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	195	LU_Spare05	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	196	LU_Spare04	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	197	LU_Spare03	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	198	LU_Spare02	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1	199	LU_Spare01	none	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
				255.391	596.723	49.715	83.897	23.355	71.648	0.000	0.000	0.000	19.989	85.880	49.715	1.379	5.149	2.632	0.000	0.000	0.000	19.744	32.413	1.455	0.405	0.000	0.346	0.000	0.000	0.000	1.645	4.577	1.455	0.007	0.026	0.014	0.000	0.000	0.000

APPENDIX
FRICTION FACTOR CURVES

B

Friction Factors

TIME	HBW	HBO	NHB	SCHOOL	CASINO	UNIV	SP3	SP2	SP1	IX	XI
0	50	50	50	50	50	50	0	0	0	50	50
1	1416227	1764960	1807770	1349467	1000	1349467	1000	1000	1000	360620	360620
2	528961	659213	649893	504026	1000	504026	1000	1000	1000	314460	314460
3	286078	356522	342572	272592	1000	272592	1000	1000	1000	275814	275814
4	179861	224150	211208	171382	1000	171382	1000	1000	1000	242517	242517
5	122976	153257	141910	117179	1000	117179	1000	1000	1000	213487	213487
6	88514	110310	100934	84342	1000	84342	1000	1000	1000	188123	188123
7	66091	82365	74420	62975	1000	62975	1000	1000	1000	165825	165825
8	50748	63244	56342	48356	1000	48356	1000	1000	1000	146231	146231
9	39654	49419	43386	37785	1000	37785	1000	1000	1000	128982	128982
10	31629	39417	34348	30138	1000	30138	1000	1000	1000	113836	113836
11	25492	31769	27418	24290	1000	24290	1000	1000	1000	100493	100493
12	20771	25886	21995	19792	1000	19792	1000	1000	1000	88652	88652
13	16995	21180	17776	16194	1000	16194	1000	1000	1000	78315	78315
14	14162	17650	14763	13495	1000	13495	1000	1000	1000	69119	69119
15	11802	14708	12052	11246	1000	11246	1000	1000	1000	61065	61065
16	9914	12355	9943	9446	1000	9446	1000	1000	1000	53913	53913
17	8261	10296	8436	7872	1000	7872	1000	1000	1000	47602	47602
18	7081	8825	6930	6747	1000	6747	1000	1000	1000	42072	42072
19	5901	7354	6026	5623	1000	5623	1000	1000	1000	37144	37144
20	4957	6177	5122	4723	1000	4723	1000	1000	1000	32816	32816
21	4249	5295	4218	4048	1000	4048	1000	1000	1000	28970	28970
22	3777	4707	3616	3599	1000	3599	1000	1000	1000	25604	25604
23	3068	3824	3013	2924	1000	2924	1000	1000	1000	22659	22659
24	2832	3530	2712	2699	1000	2699	1000	1000	1000	20014	20014
25	2360	2942	2109	2249	1000	2249	1000	1000	1000	17670	17670
26	2124	2647	1808	2024	1000	2024	1000	1000	1000	15627	15627
27	1888	2353	1808	1799	1000	1799	1000	1000	1000	13764	13764
28	1652	2059	1506	1574	1000	1574	1000	1000	1000	12201	12201
29	1416	1765	1205	1349	1000	1349	1000	1000	1000	10758	10758
30	1180	1471	1205	1125	1000	1125	1000	1000	1000	9496	9496
31	944	1177	904	900	1000	900	1000	1000	1000	7453	7453
32	708	882	603	675	1000	675	1000	1000	1000	5830	5830
33	472	588	603	450	1000	450	1000	1000	1000	4508	4508
34	472	588	301	450	1000	450	1000	1000	1000	3546	3546
35	236	294	301	225	1000	225	1000	1000	1000	2765	2765
36	236	294	1	225	1000	225	1000	1000	1000	1503	1503
37	1	1	1	1	1000	1	1000	1000	1000	240	240
38	1	1	1	1	1000	1	1000	1000	1000	1	1
39	1	1	1	1	1000	1	1000	1000	1000	1	1
40	1	1	1	1	1000	1	1000	1000	1000	1	1
41	1	1	1	1	1000	1	1000	1000	1000	1	1
42	1	1	1	1	1000	1	1000	1000	1000	1	1
43	1	1	1	1	1000	1	1000	1000	1000	1	1
44	1	1	1	1	1000	1	1000	1000	1000	1	1
45	1	1	1	1	1000	1	1000	1000	1000	1	1
46	1	1	1	1	1000	1	1000	1000	1000	1	1
47	1	1	1	1	1000	1	1000	1000	1000	1	1
48	1	1	1	1	1000	1	1000	1000	1000	1	1
49	1	1	1	1	1000	1	1000	1000	1000	1	1
50	1	1	1	1	1000	1	1000	1000	1000	1	1
51	1	1	1	1	1000	1	1000	1000	1000	1	1
52	1	1	1	1	1000	1	1000	1000	1000	1	1

Friction Factors

TIME	HBW	HBO	NHB	SCHOOL	CASINO	UNIV	SP3	SP2	SP1	IX	XI
53	1	1	1	1	1000	1	1000	1000	1000	1	1
54	1	1	1	1	1000	1	1000	1000	1000	1	1
55	1	1	1	1	1000	1	1000	1000	1000	1	1
56	1	1	1	1	1000	1	1000	1000	1000	1	1
57	1	1	1	1	1000	1	1000	1000	1000	1	1
58	1	1	1	1	1000	1	1000	1000	1000	1	1
59	1	1	1	1	1000	1	1000	1000	1000	1	1
60	1	1	1	1	1000	1	1000	1000	1000	1	1
61	1	1	1	1	1000	1	1000	1000	1000	1	1
62	1	1	1	1	1000	1	1000	1000	1000	1	1
63	1	1	1	1	1000	1	1000	1000	1000	1	1
64	1	1	1	1	1000	1	1000	1000	1000	1	1
65	1	1	1	1	1000	1	1000	1000	1000	1	1
66	1	1	1	1	1000	1	1000	1000	1000	1	1
67	1	1	1	1	1000	1	1000	1000	1000	1	1
68	1	1	1	1	1000	1	1000	1000	1000	1	1
69	1	1	1	1	1000	1	1000	1000	1000	1	1
70	1	1	1	1	1000	1	1000	1000	1000	1	1
71	1	1	1	1	1000	1	1000	1000	1000	1	1
72	1	1	1	1	1000	1	1000	1000	1000	1	1
73	1	1	1	1	1000	1	1000	1000	1000	1	1
74	1	1	1	1	1000	1	1000	1000	1000	1	1
75	1	1	1	1	1000	1	1000	1000	1000	1	1
76	1	1	1	1	1000	1	1000	1000	1000	1	1
77	1	1	1	1	1000	1	1000	1000	1000	1	1
78	1	1	1	1	1000	1	1000	1000	1000	1	1
79	1	1	1	1	1000	1	1000	1000	1000	1	1
80	1	1	1	1	1000	1	1000	1000	1000	1	1
81	1	1	1	1	1000	1	1000	1000	1000	1	1
82	1	1	1	1	1000	1	1000	1000	1000	1	1
83	1	1	1	1	1000	1	1000	1000	1000	1	1
84	1	1	1	1	1000	1	1000	1000	1000	1	1
85	1	1	1	1	1000	1	1000	1000	1000	1	1
86	1	1	1	1	1000	1	1000	1000	1000	1	1
87	1	1	1	1	1000	1	1000	1000	1000	1	1
88	1	1	1	1	1000	1	1000	1000	1000	1	1
89	1	1	1	1	1000	1	1000	1000	1000	1	1
90	1	1	1	1	1000	1	1000	1000	1000	1	1
91	1	1	1	1	1000	1	1000	1000	1000	1	1

APPENDIX C
VALIDATION

BCAG Model Validation Results: Daily Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
B ST	E of 7TH ST	2,158	1,463	0.68	-0.51	0.63	Yes	-695	483,025
W BIGGS GRIDLEY RD	S of BANNOCK ST	2,043	1,988	0.97	-0.04	0.63	Yes	-55	3,025
AFTON RD	W of AGUA FRIAS RD	118	81	0.69	-0.46	0.68	Yes	-37	1,369
AGUAS FRIAS RD	S of DURHAM DAYTON RD	761	8	0.01	-1.45	0.68	No	-753	567,009
AGUAS FRIAS RD	S of NELSON RD	593	0	0.00	-1.46	0.68	No	-593	351,649
CHICO RIVER RD	W of ALBERTON RD	1,202	1,130	0.94	-0.09	0.68	Yes	-72	5,184
COHASSET HWY	N of KEEFER RD	1,511	2,503	1.66	1.04	0.63	No	992	984,064
COLUSA HWY	W of HATCH RD	658	660	1.00	0.00	0.68	Yes	2	4
DAYTON RD	S of ARCHER AVE	6,112	5,386	0.88	-0.25	0.48	Yes	-726	527,076
DAYTON RD	N of HEGAN LN	3,138	1,979	0.63	-0.64	0.58	Yes	-1,159	1,343,281
DUNSTONE DR	S of GRUBBS RD	169	271	1.60	0.88	0.68	Yes	102	10,404
DURHAM DAYTON HWY	W of OROVILLE-CHICO HWY	2,235	2,633	1.18	0.28	0.63	Yes	398	158,404
DURHAM PENTZ RD	E of SR 99	9,784	11,096	1.13	0.35	0.38	Yes	1,312	1,721,344
DURHAM PENTZ RD	E of SR 191	2,257	3,050	1.35	0.56	0.63	Yes	793	628,849
E GRIDLEY RD	At FEATHER RIVER BRIDGE	5,972	5,366	0.90	-0.21	0.48	Yes	-606	367,236
FORBESTOWN RD	S of OLD OLIVE HWY	2,859	2,887	1.01	0.02	0.58	Yes	28	784
GARNER LN	N of SR 99	5,300	8,638	1.63	1.33	0.48	No	3,338	11,142,244
HAMILTON CITY NORD	N of BENNETT RD	486	183	0.38	-0.91	0.68	Yes	-303	91,809
HEGAN LN	E of FIMPLE LN	3,406	1,393	0.41	-1.03	0.58	No	-2,013	4,052,169
HICKS LN	N of EATON RD	2,925	1,696	0.58	-0.73	0.58	Yes	-1,229	1,510,441
HONEY RUN RD	W of CENTERVILLE RD	1,363	1,796	1.32	0.50	0.63	Yes	433	187,489
KEEFER RD	W of GARNER LN	886	257	0.29	-1.04	0.68	No	-629	395,641
LARKIN RD	S of CHANDON AVE	2,777	2,776	1.00	0.00	0.58	Yes	-1	1
LARKIN RD	S of SR 162	4,101	3,334	0.81	-0.36	0.52	Yes	-767	588,289
LOS VERJELES RD	S of LA PORTE RD	986	592	0.60	-0.59	0.68	Yes	-394	155,236
LOWER WYANDOTTE RD	W of ALVERDA DR	6,948	12,158	1.75	1.70	0.44	No	5,210	27,144,100
MERIDIAN RD	E of SR 99	1,047	712	0.68	-0.47	0.68	Yes	-335	112,225
MIDWAY RD	S of DURHAM DAYTON RD	3,814	3,494	0.92	-0.16	0.52	Yes	-320	102,400
MIDWAY RD	N of NELSON SHIPPEE RD	1,282	2,067	1.61	0.97	0.63	Yes	785	616,225
MINERS RANCH RD	S of SR 162	2,890	1,361	0.47	-0.92	0.58	Yes	-1,529	2,337,841
OAKVALE AVE	S of SR 162	2,683	2,028	0.76	-0.42	0.58	Yes	-655	429,025
OPHIR RD	E of FEATHER RIVER BLVD	6,641	10,597	1.60	1.35	0.44	No	3,956	15,649,936
ORD FERRY RD	W of RIVER RD	2,955	3,336	1.13	0.22	0.58	Yes	381	145,161
ORD FERRY RD	W of AGUAS FRIAS RD	3,437	3,227	0.94	-0.11	0.58	Yes	-210	44,100
ORO-QUINCY HWY	At LAKE MADRONE BRIDGE	502	1,572	3.13	3.12	0.68	No	1,070	1,144,900
ORO-BANGOR HWY	S of V-7 RD	1,742	1,228	0.70	-0.47	0.63	Yes	-514	264,196
ORO-BANGOR HWY	E of FOOTHILL BLVD	1,558	1,167	0.75	-0.40	0.63	Yes	-391	152,881
OROVILLE-BANGOR HWY	N of SWEDES FLAT RD	1,955	6,315	3.23	3.54	0.63	No	4,360	19,009,600
ORO-QUINCY HWY	E of FOOTHILL BLVD	3,071	1,696	0.55	-0.78	0.58	Yes	-1,375	1,890,625
PENNINGTON RD	S of W EVANS REIMER RD	336	334	0.99	-0.01	0.68	Yes	-2	4
SKYLINE BLVD	S of SR 162	1,135	1,309	1.15	0.22	0.68	Yes	174	30,276
SKYWAY	S of COUTOLENC RD	505	2,789	5.52	6.62	0.68	No	2,284	5,216,656
SKYWAY	N of NIMSHEW RD	1,604	1,529	0.95	-0.07	0.63	Yes	-75	5,625
SKYWAY	S of POWELLTON RD	915	1,419	1.55	0.81	0.68	Yes	504	254,016
UPPER PALERMO RD	S of OPHIR RD/LOWER WYANDO	3,426	2,695	0.79	-0.37	0.58	Yes	-731	534,361
W SACRAMENTO AVE	W of MUIR AVE	836	381	0.46	-0.80	0.68	Yes	-455	207,025
COHASSET RD	N of EATON RD	9,699	10,441	1.08	0.20	0.38	Yes	742	550,564
EAST AVE	W of CUSSICK/HOLLY AVE	19,267	15,365	0.80	-0.72	0.28	Yes	-3,902	15,225,604
EAST AVE	E of SR 32	16,630	14,148	0.85	-0.51	0.29	Yes	-2,482	6,160,324
EATON RD	W of BURNAP AVE	6,016	4,762	0.79	-0.44	0.48	Yes	-1,254	1,572,516
EATON RD	E of ESPLANADE RD	16,955	10,530	0.62	-1.29	0.29	No	-6,425	41,280,625
EATON RD	W of SILVERBELL RD	9,609	6,216	0.65	-0.93	0.38	Yes	-3,393	11,512,449
ESPLANADE RD	N of EAST AVE	**22,320**	26,976	1.21	0.77	0.27	Yes	4,656	21,678,336
ESPLANADE RD	N of EATON RD	12,325	10,070	0.82	-0.54	0.34	Yes	-2,255	5,085,025
ESPLANADE RD	N of LASSEN AVE	15,420	15,072	0.98	-0.07	0.30	Yes	-348	121,104
IVY ST	N of 11TH ST	3,344	907	0.27	-1.27	0.58	No	-2,437	5,938,969
ROSE AVE	S of WEBB AVE	1,461	938	0.64	-0.57	0.63	Yes	-523	273,529
W 1ST AVE	E of HOBART ST	8,725	8,484	0.97	-0.07	0.41	Yes	-241	58,081
W 2ND ST	E of WALNUT ST (SR 32)	5,930	3,401	0.57	-0.90	0.48	Yes	-2,529	6,395,841
W 5TH ST	W of WALNUT ST (SR 32)	5,699	4,473	0.78	-0.45	0.48	Yes	-1,226	1,503,076
W 5TH ST	E of WALNUT ST (SR 32)	5,722	2,165	0.38	-1.31	0.48	No	-3,557	12,652,249
W 8TH AVE	E of NORD AVE (SR 32)	6,700	3,724	0.56	-1.01	0.44	No	-2,976	8,856,576
W LINDO AVE	E of NORD AVE (SR 32)	1,200	738	0.62	-0.56	0.68	Yes	-462	213,444
W SACRAMENTO AVE	W of CITRUS AVE	6,006	9,817	1.63	1.34	0.48	No	3,811	14,523,721
W SACRAMENTO AVE	W of NORD AVE (SR 32)	6,453	5,198	0.81	-0.44	0.44	Yes	-1,255	1,575,025
W SACRAMENTO AVE	E of NORD AVE (SR 32)	12,519	8,192	0.65	-1.06	0.33	No	-4,327	18,722,929
WARNER ST	S of W SACAMENTO AVE	7,694	9,656	1.26	0.62	0.41	Yes	1,962	3,849,444
E GRIDLEY RD	E of SR 99	6,760	4,626	0.68	-0.72	0.44	Yes	-2,134	4,553,956
MAGNOLIA ST	W of SR 99	5,844	6,013	1.03	0.06	0.48	Yes	169	28,561
SPRUCE ST	W of SR 99	8,100	6,577	0.81	-0.46	0.41	Yes	-1,523	2,319,529
SYCAMORE ST	W of SR 99	3,431	1,746	0.51	-0.85	0.58	Yes	-1,685	2,839,225
18TH ST	N of GRAND AV	427	167	0.39	-0.89	0.68	Yes	-260	67,600
5TH AV	S of ORO DAM BLVD (SR 162)	3,750	3,468	0.92	-0.14	0.52	Yes	-282	79,524
5TH AV	S of CAL OAK AV	2,652	1,886	0.71	-0.50	0.58	Yes	-766	586,756
FEATHER RIVER BLVD	S of ORO-DAM BLVD (SR 162)	8,173	6,066	0.74	-0.63	0.41	Yes	-2,107	4,439,449
FOOTHILL BLVD	S of SR 162	6,058	7,869	1.30	0.63	0.48	Yes	1,811	3,279,721
GRAND AVE	E of 20TH ST	1,276	621	0.49	-0.81	0.63	Yes	-655	429,025
GRAND AVE	E of SR 70	5,733	5,861	1.02	0.05	0.48	Yes	128	16,384
GRAND AVE	E of 10TH ST	4,990	3,695	0.74	-0.50	0.52	Yes	-1,295	1,677,025
LINCOLN BLVD	N of OPHIR RD	6,967	4,894	0.70	-0.68	0.44	Yes	-2,073	4,297,329
LINCOLN BLVD	S of JUNCTION W/ MYERS	10,936	10,903	1.00	-0.01	0.36	Yes	-33	1,089
LOWER WYANDOTTE RD	S of SR 162	8,168	7,077	0.87	-0.33	0.41	Yes	-1,091	1,190,281
MITCHELL ST	E of MYERS ST	5,666	5,722	1.01	0.02	0.48	Yes	56	3,136
MITCHELL ST	E of FEATHER RIVER BLVD	3,387	4,050	1.20	0.34	0.58	Yes	663	439,569
MONTGOMERY ST	W of LINCOLN BLVD	6,399	7,553	1.18	0.41	0.44	Yes	1,154	1,331,716
MONTGOMERY ST	W of TABLE MTN BLVD	6,143	9,551	1.55	1.17	0.48	No	3,408	11,614,464
NELSON AVE	E of SR 70	9,161	7,890	0.86	-0.37	0.38	Yes	-1,271	1,615,441
ORANGE AVE	E of BRIDGE ST	613	476	0.78	-0.33	0.68	Yes	-137	18,769
ORO-DAM BLVD	E of FOOTHILL BLVD/BRIDGE	4,891	5,948	1.22	0.42	0.52	Yes	1,057	1,117,249
TABLE MTN BLVD	S of GRAND AVE	17,383	16,606	0.96	-0.15	0.29	Yes	-777	603,729

BCAG Model Validation Results: Daily Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
TABLE MTN BLVD	S of NELSON AVE	12,704	13,400	1.05	0.17	0.33	Yes	696	484,416
WYANDOTTE AVE	W of LOWER WYANDOTTE RD	4,228	6,028	1.43	0.82	0.52	Yes	1,800	3,240,000
BILLE RD	E of CLARK RD	7,639	6,226	0.82	-0.45	0.41	Yes	-1,413	1,996,569
CLARK RD	N of WAGSTAFF RD	10,069	10,707	1.06	0.18	0.36	Yes	638	407,044
CLARK RD	N of PEARSON RD	14,733	11,907	0.81	-0.61	0.31	Yes	-2,826	7,986,276
ELLIOT RD	W of CLARK RD	9,853	10,196	1.03	0.09	0.38	Yes	343	117,649
ELLIOT RD	E of CLARK RD	5,555	4,063	0.73	-0.57	0.48	Yes	-1,492	2,226,064
NEAL RD	S of SKYWAY	3,812	3,399	0.89	-0.21	0.52	Yes	-413	170,569
PEARSON RD	E of CLARK RD	9,104	12,098	1.33	0.87	0.38	Yes	2,994	8,964,036
PENTZ RD	N of PEARSON RD	5,151	5,182	1.01	0.01	0.48	Yes	31	961
PENTZ RD	N of WAGSTAFF RD	6,534	9,542	1.46	1.05	0.44	No	3,008	9,048,064
SKYWAY	N of ELLIOT RD	**20,992**	24,222	1.15	0.56	0.28	Yes	3,230	10,432,900
SKYWAY	W of CLARK RD	9,759	10,616	1.09	0.23	0.38	Yes	857	734,449
NEW SKYWAY	W of PENTZ RD	15,598	17,573	1.13	0.42	0.30	Yes	1,975	3,900,625
NEW SKYWAY	E of PENTZ RD	15,313	19,286	1.26	0.86	0.30	Yes	3,973	15,784,729
SKYWAY	N of WAGSTAFF RD	10,751	12,622	1.17	0.48	0.36	Yes	1,871	3,500,641
SKYWAY	N of WYCLIFF WAY	9,848	12,226	1.24	0.64	0.38	Yes	2,378	5,654,884
WAGSTAFF RD	W of CLARK RD	5,655	3,430	0.61	-0.83	0.48	Yes	-2,225	4,950,625
WAGSTAFF RD	E of CLARK RD	5,964	7,467	1.25	0.53	0.48	Yes	1,503	2,259,009
ENTLER AVE	E of MIDWAY	1,236	1,226	0.99	-0.01	0.68	Yes	-10	100
MIDWAY RD	S of E PARK AVE	17,084	14,178	0.83	-0.58	0.29	Yes	-2,906	8,444,836
MIDWAY RD	S of HEGAN LN	8,742	11,083	1.27	0.65	0.41	Yes	2,341	5,480,281
BROADWAY	N of SR 32 (8TH ST)	7,629	10,364	1.36	0.87	0.41	Yes	2,735	7,480,225
BROADWAY	S of 2ND ST	8,895	11,477	1.29	0.76	0.38	Yes	2,582	6,666,724
BRUCE RD	N of LAKEWEST DR	12,034	11,422	0.95	-0.15	0.34	Yes	-612	374,544
BRUCE RD	S of HUMBOLDT RD	10,790	12,960	1.20	0.56	0.36	Yes	2,170	4,708,900
BRUCE RD	N of SKYWAY	8,058	12,250	1.52	1.27	0.41	No	4,192	17,572,864
BRUCE RD	N of E 20TH ST	10,699	14,536	1.36	1.00	0.36	Yes	3,837	14,722,569
COHASSET RD	N of EAST AVE	19,055	16,131	0.85	-0.55	0.28	Yes	-2,924	8,549,776
COHASSET RD	S of EAST AVE	**23,237**	24,946	1.07	0.28	0.27	Yes	1,709	2,920,681
E 1ST AVE	E of ESPLANADE	12,278	14,288	1.16	0.48	0.34	Yes	2,010	4,040,100
E 1ST AVE	W of ESPLANADE RD	10,848	8,819	0.81	-0.52	0.36	Yes	-2,029	4,116,841
E 1ST AVE	W of LONGFELLOW	16,910	12,714	0.75	-0.84	0.29	Yes	-4,196	17,606,416
E 1ST AVE	W of SHERMAN AVE	17,328	17,975	1.04	0.13	0.29	Yes	647	418,609
E 20TH ST	E of FOREST AVE	10,778	12,599	1.17	0.47	0.36	Yes	1,821	3,316,041
E 20TH ST	W of BRUCE RD	7,831	7,650	0.98	-0.06	0.41	Yes	-181	32,761
E 20TH ST	W of WHITMAN AVE	18,491	18,513	1.00	0.00	0.29	Yes	22	484
E 20TH ST	W of FOREST AVE	**20,931**	24,117	1.15	0.55	0.28	Yes	3,186	10,150,596
E 5TH AVE	E of ESPLANADE RD	4,567	3,098	0.68	-0.62	0.52	Yes	-1,469	2,157,961
E 8TH ST	E of EL MONTE AVE	2,423	3,483	1.44	0.69	0.63	Yes	1,060	1,123,600
E 8TH ST	W of PARK VISTA DR	4,353	5,609	1.29	0.55	0.52	Yes	1,256	1,577,536
E 8TH ST	W of BRUCE RD	2,701	2,788	1.03	0.06	0.58	Yes	87	7,569
EAST AVE	E of FLORAL AVE	18,232	17,174	0.94	-0.20	0.29	Yes	-1,058	1,119,364
EAST AVE	E of COHASSET RD	17,924	17,017	0.95	-0.18	0.29	Yes	-907	822,649
EAST AVE	W of COHASSET RD	14,368	14,663	1.02	0.07	0.31	Yes	295	87,025
EAST AVE	E of ESPLANADE RD	**24,027**	21,759	0.91	-0.36	0.26	Yes	-2,268	5,143,824
EAST AVE	W of ESPLANADE RD	**24,616**	18,348	0.75	-0.98	0.26	Yes	-6,268	39,287,824
E PARK AVE	Btwn SR 99 & CARMICHAEL DR	**23,967**	19,520	0.81	-0.71	0.26	Yes	-4,447	19,775,809
E PARK AVE	E of MIDWAY	18,994	17,881	0.94	-0.21	0.28	Yes	-1,113	1,238,769
EL MONTE AVE	S of 8TH ST	741	86	0.12	-1.29	0.68	No	-655	429,025
ESPLANADE RD	S of EAST AVE	**21,434**	23,812	1.11	0.41	0.27	Yes	2,378	5,654,884
ESPLANADE RD	N of E 1ST AVE	**22,467**	20,822	0.93	-0.27	0.27	Yes	-1,645	2,706,025
ESPLANADE RD	S of W SACRAMENTO AVE	**21,539**	25,789	1.20	0.73	0.27	Yes	4,250	18,062,500
FLORAL AVE	N of EAST AVE	7,109	7,258	1.02	0.05	0.44	Yes	149	22,201
FOREST AVE	S of E 20TH ST	13,750	13,579	0.99	-0.04	0.31	Yes	-171	29,241
FOREST AVE	S of HUMBOLDT RD	14,024	11,349	0.81	-0.61	0.31	Yes	-2,675	7,155,625
LASSEN AVE	W of BURNAP AVE	7,911	4,273	0.54	-1.12	0.41	No	-3,638	13,235,044
LASSEN AVE	E of ESPLANADE RD	9,763	7,656	0.78	-0.57	0.38	Yes	-2,107	4,439,449
MAIN ST	S of 2ND ST	10,171	12,911	1.27	0.75	0.36	Yes	2,740	7,507,600
MAIN ST	S of SR 32 (8TH ST)	10,920	13,036	1.19	0.54	0.36	Yes	2,116	4,477,456
MANGROVE AVE	S of VALLOMBROSA AVE	18,495	19,787	1.07	0.24	0.29	Yes	1,292	1,669,264
MANGROVE AVE	S of COHASSET RD	**21,932**	21,865	1.00	-0.01	0.27	Yes	-67	4,489
MANGROVE AVE	S of E 1ST AVE	**23,197**	18,159	0.78	-0.82	0.27	Yes	-5,038	25,381,444
MANGROVE AVE	N of E 1ST AVE	**20,009**	19,794	0.99	-0.04	0.28	Yes	-215	46,225
MANZANITA AVE	N of VALLOMBROSA AVE	11,371	10,920	0.96	-0.12	0.34	Yes	-451	203,401
MANZANITA AVE	N of CHICO CANYON RD	12,424	11,341	0.91	-0.26	0.34	Yes	-1,083	1,172,889
MANZANITA AVE	E of LONGFELLOW AVE	8,464	5,188	0.61	-0.94	0.41	Yes	-3,276	10,732,176
MULBERRY ST	S of PINE ST/CYPRESS ST J	9,514	13,401	1.41	1.08	0.38	No	3,887	15,108,769
PALMETTO	W of BRYANT AVE	3,880	1,868	0.48	-1.00	0.52	Yes	-2,012	4,048,144
PARK AVE	N of E PARK AVE	12,753	15,134	1.19	0.57	0.33	Yes	2,381	5,669,161
PARK AVE	S of 16TH ST	17,241	17,016	0.99	-0.04	0.29	Yes	-225	50,625
PARK AVE	S of SR 32	18,388	11,489	0.62	-1.31	0.29	No	-6,899	47,596,201
PINE ST	N of 4TH ST	8,961	8,434	0.94	-0.15	0.38	Yes	-527	277,729
SKYWAY	E of BRUCE RD	**21,941**	24,240	1.10	0.39	0.27	Yes	2,299	5,285,401
SKYWAY	W of NOTRE DAME BLVD	**31,242**	33,717	1.08	0.33	0.24	Yes	2,475	6,125,625
SKYWAY	E of NOTRE DAME BLVD	**20,661**	23,971	1.16	0.58	0.28	Yes	3,310	10,956,100
VALLOMBROSA AVE	E of SR 99	4,356	2,617	0.60	-0.77	0.52	Yes	-1,739	3,024,121
VALLOMBROSA AVE	W of MANZANITA AVE	3,842	1,497	0.39	-1.17	0.52	No	-2,345	5,499,025
W 8TH AVE	W of ESPLANADE RD	4,462	2,357	0.53	-0.91	0.52	Yes	-2,105	4,431,025
WHITMAN	N of 23RD ST	7,869	3,293	0.42	-1.42	0.41	No	-4,576	20,939,776
W 3RD ST	E of IVY ST	1,941	1,356	0.70	-0.48	0.63	Yes	-585	342,225
E 3RD ST	E of WALL ST	1,526	1,882	1.23	0.37	0.63	Yes	356	126,736
W 4TH ST	E of HAZEL ST	987	1,191	1.21	0.30	0.68	Yes	204	41,616
E 4TH ST	E of FLUME ST	1,692	263	0.16	-1.34	0.63	No	-1,429	2,042,041
E 8TH ST	E of KERN ST	1,971	3,345	1.70	1.11	0.63	No	1,374	1,887,876
BIDWELL AVE	E of CARRIAGE LN	728	1,865	2.56	2.29	0.68	No	1,137	1,292,769
COHASSET RD	E of RIO LINDO AVE	20,486	14,633	0.71	-1.04	0.28	No	-5,853	34,257,609
ESPANADE	S of COHASSET RD	**23,468**	19,943	0.85	-0.57	0.27	Yes	-3,525	12,425,625
FAIR ST	S of E 20TH ST	6,391	5,157	0.81	-0.44	0.44	Yes	-1,234	1,522,756
FIR ST	S of HWY 32	3,215	3,010	0.94	-0.11	0.58	Yes	-205	42,025

BCAG Model Validation Results: Daily Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
FOREST AVE	W of NOTRE DAME BLVD	11,527	10,180	0.88	-0.34	0.34	Yes	-1,347	1,814,409
FOREST AVE	N of HUMBOLDT RD	13,302	11,561	0.87	-0.40	0.33	Yes	-1,741	3,031,081
FOREST AVE	N of HWY 32	3,534	1,955	0.55	-0.78	0.58	Yes	-1,579	2,493,241
HOOKER OAK AVE	E of MADRONE AVE	1,603	1,482	0.92	-0.12	0.63	Yes	-121	14,641
HOOKER OAK AVE	W of MANZANITA AVE	2,085	1,240	0.59	-0.64	0.63	Yes	-845	714,025
HAWTHORNE AVE	W of MADRONE AVE	1,022	279	0.27	-1.06	0.68	No	-743	552,049
HUMBOLDT RD	W of FOREST AVE	2,777	2,757	0.99	-0.01	0.58	Yes	-20	400
MANZANITA AVE	E of MADRONE AVE	4,297	2,360	0.55	-0.87	0.52	Yes	-1,937	3,751,969
MANGROVE AVE	N of E 7TH AVE	18,938	20,333	1.07	0.26	0.28	Yes	1,395	1,946,025
MARIGOLD AVE	S of EAST AVE	3,071	2,845	0.93	-0.13	0.58	Yes	-226	51,076
MARIGOLD AVE	N of EAST AVE	2,964	3,689	1.24	0.43	0.58	Yes	725	525,625
MARIPOSA AVE	N of EAST AVE	4,403	2,109	0.48	-1.00	0.52	No	-2,294	5,262,436
NOTRE DAME BLVD	N of SKYWAY	13,532	10,308	0.76	-0.73	0.33	Yes	-3,224	10,394,176
NOTRE DAME BLVD	N of FOREST AVE	4,545	2,281	0.50	-0.96	0.52	Yes	-2,264	5,125,696
PALMETTO AVE	E of MANGROVE AVE	5,313	4,194	0.79	-0.44	0.48	Yes	-1,119	1,252,161
PALMETTO AVE	E of SHERIDAN AVE	6,117	2,010	0.33	-1.41	0.48	No	-4,107	16,867,449
SKYWAY	N of COUTOLENC RD	16,277	22,483	1.38	1.30	0.29	No	6,206	38,514,436
SKYWAY	E of CLIFFHANGER LN	19,234	23,218	1.21	0.74	0.28	Yes	3,984	15,872,256
SYCAMORE ST	E of RANDOLPH AVE	3,651	1,810	0.50	-0.88	0.58	Yes	-1,841	3,389,281
W BIGGS GRIDLEY RD	S of SPRUCE ST	2,776	957	0.34	-1.14	0.58	No	-1,819	3,308,761
GEORGIA PACIFIC WAY	E of HWY 70	1,713	2,371	1.38	0.61	0.63	Yes	658	432,964
HUNTOON ST	S of GRACE ST	2,079	2,193	1.05	0.09	0.63	Yes	114	12,996
YARD ST	W of WASHINGTON AVE	1,077	1,899	1.76	1.12	0.68	No	822	675,684
OLIVER RD	W of SKYWAY	4,208	4,595	1.09	0.18	0.52	Yes	387	149,769
PEARSON RD	E of SKYWAY	9,116	6,703	0.74	-0.70	0.38	Yes	-2,413	5,822,569
SKYWAY	S of NEAL RD	**23,054**	25,368	1.10	0.38	0.27	Yes	2,314	5,354,596
BILLE RD	E of SKYWAY	7,957	5,685	0.71	-0.70	0.41	Yes	-2,272	5,161,984
W EATON RD	W of ESPLANADE	5,340	5,875	1.10	0.21	0.48	Yes	535	286,225
NEAL RD	E of HWY 99	1,486	2,225	1.50	0.79	0.63	Yes	739	546,121
PENTZ RD	N of HWY 70	3,393	6,604	1.95	1.65	0.58	No	3,211	10,310,521
HUMBOLDT RD	E of HWY 32 (Chico)	69	0	0.00	-1.46	0.68	No	-69	4,761
NORD HWY	W of ESPLANADE	3,147	2,195	0.70	-0.53	0.58	Yes	-952	906,304
SKYWAY	S of PEARSON RD	**23,230**	28,405	1.22	0.84	0.27	Yes	5,175	26,780,625
LOWER HONCUT RD	E of HWY 70	962	42	0.04	-1.40	0.68	No	-920	846,400
RICHVALE HWY	E of MIDWAY	1,361	3,104	2.28	2.03	0.63	No	1,743	3,038,049
CANYON DR	N of OLIVE HWY	3,266	3,104	0.95	-0.09	0.58	Yes	-162	26,244
OROVILLE DAM BLVD E	E of CANYON HIGHLANDS DR	4,930	4,993	1.01	0.02	0.52	Yes	63	3,969
FEATHER RIVER BLVD	N of ORO DAM BLVD	7,476	4,365	0.58	-0.95	0.44	Yes	-3,111	9,678,321
PALERMO RD	E of HWY 70	1,173	1,289	1.10	0.14	0.68	Yes	116	13,456
FORBESTOWN RD	W of ROBINSON MILL RD	777	885	1.14	0.20	0.68	Yes	108	11,664
LUMPKIN RD	N of FORBESTOWN RD	712	624	0.88	-0.18	0.68	Yes	-88	7,744
PALERMO HONCUT HWY	N of LWR HONCUT RD	897	331	0.37	-0.92	0.68	Yes	-566	320,356
SEVEN MILE LN	S of ORD FERRY RD	424	162	0.38	-0.90	0.68	Yes	-262	68,644
TOWNSHIP RD	W of HWY 99	1,475	1,255	0.85	-0.24	0.63	Yes	-220	48,400
BIGGS EAST HWY	E of HWY 99	2,683	1,751	0.65	-0.60	0.58	Yes	-932	868,624
LARKIN RD	N of EAST GRIDLEY RD	1,217	2,011	1.65	0.96	0.68	Yes	794	630,436
LINCOLN ST	S of GRACE ST	2,570	2,528	0.98	-0.03	0.58	Yes	-42	1,764
MONTGOMERY ST	W of FEATHER RIVER BLVD	7,717	9,354	1.21	0.52	0.41	Yes	1,637	2,679,769
MYERS ST	N of ORO DAM BLVD	6,119	5,533	0.90	-0.20	0.48	Yes	-586	343,396
WASHINGTON AVE	W of ORO DAM BLVD	10,869	11,845	1.09	0.25	0.36	Yes	976	952,576
LINCOLN BLVD	S of ORO DAM BLVD	13,355	15,802	1.18	0.56	0.33	Yes	2,447	5,987,809
LINCOLN BLVD	S of OPHIR RD	5,599	4,336	0.77	-0.47	0.48	Yes	-1,263	1,595,169
GARDEN DR	E of HWY 70	3,020	4,935	1.63	1.10	0.58	No	1,915	3,667,225
KELLY RIDGE RD	N of OLIVE HWY	1,985	1,116	0.56	-0.69	0.63	Yes	-869	755,161
ORO QUINCY HWY	W of OLIVE HWY	3,001	2,426	0.81	-0.33	0.58	Yes	-575	330,625
18TH ST	N of ORO DAM BLVD	1,732	2,189	1.26	0.42	0.63	Yes	457	208,849
CONCOW RD	W of HWY 70	961	2,173	2.26	1.85	0.68	No	1,212	1,468,944
LARKIN RD	N of E RIO BONITO RD	2,887	2,113	0.73	-0.47	0.58	Yes	-774	599,076
WALMER RD	E of LINCOLN BLVD	3,614	2,663	0.74	-0.46	0.58	Yes	-951	904,401
FOOTHILL BLVD	N of LWR WYANDOTTE RD	1,371	5,085	3.71	4.30	0.63	No	3,714	13,793,796
W RIO BONITO RD	E of HAWKINS LN	1,194	1,517	1.27	0.40	0.68	Yes	323	104,329
B ST	E of FIRST ST	2,367	2,087	0.88	-0.19	0.63	Yes	-280	78,400
PEARSON RD	W of CLARK RD	11,544	12,098	1.05	0.14	0.34	Yes	554	306,916
PEARSON RD	E of SAWMILL RD	6,925	5,731	0.83	-0.39	0.44	Yes	-1,194	1,425,636
PENTZ RD	S or PEARSON RD	6,247	7,604	1.22	0.46	0.48	Yes	1,357	1,841,449
PENTZ RD	N or BILLE RD	5,784	5,814	1.01	0.01	0.48	Yes	30	900
SKYWAY	N or BILLE RD	12,184	14,921	1.22	0.66	0.34	Yes	2,737	7,491,169
SKYWAY	N or NEAL RD	**20,119**	25,436	1.26	0.96	0.28	Yes	5,317	28,270,489
WAGSTAFF RD	W of SKYWAY	1,736	707	0.41	-0.94	0.63	Yes	-1,029	1,058,841
BILLE RD	W of SKYWAY	2,728	1,607	0.59	-0.71	0.58	Yes	-1,121	1,256,641
CLARK RD	N of BILLE RD	16,274	13,574	0.83	-0.56	0.29	Yes	-2,700	7,290,000
CLARK RD	N of ELLIOT RD	15,383	14,843	0.96	-0.12	0.30	Yes	-540	291,600
SKYWAY	S of MANZANITA ST (Stirling City)	404	1,176	2.91	2.80	0.68	No	772	595,984
HWY 99	N OF BUTTE COUNTY LINE	11,200	12,076	1.08	0.22	0.36	Yes	876	767,376
COHASSET RD	N OF MUSTY BUCK RD	121	121	1.00	0.00	0.68	Yes	0	0
HWY 32	N OF HUMBOLDT RD	1,050	1,050	1.00	0.00	0.68	Yes	0	0
HUMBOLDT RD	N OF JONESVILLE RD	5	5	1.00	0.00	0.68	Yes	0	0
HWY 70	N OF BUTTE COUNTY LINE	1,450	1,452	1.00	0.00	0.63	Yes	2	4
OROVILLE QUINCY HWY	N OF HASKINS VALLEY RD	243	244	1.00	0.01	0.68	Yes	1	1
FORBESTOWN RD	E OF RESERVOIR RD	777	780	1.00	0.01	0.68	Yes	3	9
LA PORTE RD	NE OF ROBINSON MILL RD	395	393	0.99	-0.01	0.68	Yes	-2	4
LOMA RICA RD	S OF LA PORTE RD	286	285	1.00	-0.01	0.68	Yes	-1	1
LA PORTE RD	S OF BUTTE COUNTY LINE	121	120	0.99	-0.01	0.68	Yes	-1	1
HWY 70	S OF BUTTE COUNTY LINE	11,600	12,520	1.08	0.23	0.34	Yes	920	846,400
LARKIN RD	S OF BUTTE COUNTY LINE	2,777	2,776	1.00	0.00	0.58	Yes	-1	1
HWY 99	S OF BUTTE COUNTY LINE	14,600	14,630	1.00	0.01	0.31	Yes	30	900
PENNINGTON RD	S OF RUTHERFORD RD	336	337	1.00	0.00	0.68	Yes	1	1
COLUSA HWY	W OF CHEROKEE CANAL RD	658	660	1.00	0.00	0.68	Yes	2	4
AFTON RD	W OF AGUAS FRIAS RD	118	119	1.01	0.01	0.68	Yes	1	1
HWY 162	W OF BUTTE COUNTY LINE	1,500	1,502	1.00	0.00	0.63	Yes	2	4
ROAD Z	S OF ROAD 48	243	245	1.01	0.01	0.68	Yes	2	4

BCAG Model Validation Results: Daily Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
ORD FERRY RD	W OF HUGH BABER LN	2,955	3,308	1.12	0.21	0.58	Yes	353	124,609
HWY 32	W OF BUTTE COUNTY LINE	12,400	12,588	1.02	0.04	0.34	Yes	188	35,344
HWY 99	N OF NELSON SHIPPEE RD	10,100	15,643	1.55	1.53	0.36	No	5,543	30,724,849
HWY 99	S OF SR 162 W	14,000	17,094	1.22	0.71	0.31	Yes	3,094	9,572,836
HWY 70	S OF WELSH/PALERMO RD	13,300	16,722	1.26	0.79	0.33	Yes	3,422	11,710,084
HWY 70	BETWEEN NELSON AVE AND GARDEN DR	21,900	31,332	1.43	1.60	0.27	No	9,432	88,962,624
HWY 70	N OF PENTZ RD	2,850	3,887	1.36	0.63	0.58	Yes	1,037	1,075,369
HWY 149	BETWEEN SR 70 & SR 99	16,600	16,085	0.97	-0.11	0.29	Yes	-515	265,225
PENTZ RD	N OF LIME SADDLE ROAD	3,393	5,557	1.64	1.11	0.58	No	2,164	4,682,896
OROVILLE DAM BLVD W	BETWEEN 12TH ST AND SR 70	4,930	10,515	2.13	2.18	0.52	No	5,585	31,192,225
RICETON HWY	S OF SH 162	1,153	709	0.61	-0.56	0.68	Yes	-444	197,136
PALERMO HONCUT HWY	S OF OLD HONCUT RD	897	909	1.01	0.02	0.68	Yes	12	144
	Total	2,089,045	2,090,162						

Indicates Model Below Target Volume

Indicates Model Above Target High Volume

Model/Count Ratio =	**1.00**	
Percent Within Caltrans Maximum Deviation =	**83%**	> 75%
Percent Root Mean Square Error =	**29%**	< 30%
Correlation Coefficient =	**0.95**	> 0.88

Total Count	**282**
Link Within Deviation	**234**
Link Outside Deviation	**48**

BCAG Model Validation Results: AM Peak Hour Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
B ST	E of 7TH ST	153	156	1.02	0.03	0.63	Yes	3	9
W BIGGS GRIDLEY RD	S of BANNOCK ST	170	133	0.78	-0.35	0.63	Yes	-37	1,369
AFTON RD	W of AGUA FRIAS RD	15	8	0.53	-0.68	0.68	Yes	-7	49
AGUAS FRIAS RD	S of DURHAM DAYTON RD	98	1	0.01	-1.45	0.68	No	-97	9,409
AGUAS FRIAS RD	S of NELSON RD	62	0	0.00	-1.46	0.68	No	-62	3,844
CHICO RIVER RD	W of ALBERTON RD	131	48	0.37	-1.01	0.63	No	-83	6,889
COHASSET HWY	N of KEEFER RD	224	245	1.09	0.15	0.63	Yes	21	441
COLUSA HWY	W of HATCH RD	65	23	0.35	-0.95	0.68	Yes	-42	1,764
DAYTON RD	S of ARCHER AVE	498	449	0.90	-0.19	0.52	Yes	-49	2,401
DAYTON RD	N of HEGAN LN	286	133	0.47	-0.93	0.58	Yes	-153	23,409
DUNSTONE DR	S of GRUBBS RD	13	97	7.46	9.46	0.68	No	84	7,056
DURHAM DAYTON HWY	W of OROVILLE-CHICO HWY	243	289	1.19	0.30	0.63	Yes	46	2,116
DURHAM PENTZ RD	E of SR 99	1,297	915	0.71	-0.91	0.33	Yes	-382	145,924
DURHAM PENTZ RD	E of SR 191	217	262	1.21	0.33	0.63	Yes	45	2,025
E GRIDLEY RD	At FEATHER RIVER BRIDGE	455	396	0.87	-0.25	0.52	Yes	-59	3,481
FORBESTOWN RD	S of OLD OLIVE HWY	242	245	1.01	0.02	0.63	Yes	3	9
GARNER LN	N of SR 99	590	802	1.36	0.76	0.48	Yes	212	44,944
HAMILTON CITY NORD	N of BENNETT RD	57	14	0.25	-1.10	0.68	No	-43	1,849
HEGAN LN	E of FIMPLE LN	246	92	0.37	-0.99	0.63	Yes	-154	23,716
HICKS LN	N of EATON RD	273	144	0.53	-0.82	0.58	Yes	-129	16,641
HONEY RUN RD	W of CENTERVILLE RD	137	180	1.31	0.50	0.63	Yes	43	1,849
KEEFER RD	W of GARNER LN	91	17	0.19	-1.19	0.68	No	-74	5,476
LARKIN RD	S of CHANDON AVE	230	97	0.42	-0.92	0.63	Yes	-133	17,689
LARKIN RD	S of SR 162	380	358	0.94	-0.11	0.52	Yes	-22	484
LOS VERJELES RD	S of LA PORTE RD	70	43	0.61	-0.56	0.68	Yes	-27	729
LOWER WYANDOTTE RD	W of ALVERDA DR	473	1,550	3.28	4.38	0.52	No	1,077	1,159,929
MERIDIAN RD	E of SR 99	103	75	0.73	-0.40	0.68	Yes	-28	784
MIDWAY RD	S of DURHAM DAYTON RD	353	517	1.46	0.81	0.58	Yes	164	26,896
MIDWAY RD	N of NELSON SHIPPEE RD	122	169	1.39	0.56	0.68	Yes	47	2,209
MINERS RANCH RD	S of SR 162	200	192	0.96	-0.06	0.63	Yes	-8	64
OAKVALE AVE	S of SR 162	457	256	0.56	-0.85	0.52	Yes	-201	40,401
OPHIR RD	E of FEATHER RIVER BLVD	551	1,048	1.90	1.90	0.48	No	497	247,009
ORD FERRY RD	W of RIVER RD	278	190	0.68	-0.55	0.58	Yes	-88	7,744
ORD FERRY RD	W of AGUAS FRIAS RD	297	245	0.82	-0.30	0.58	Yes	-52	2,704
ORO-QUINCY HWY	At LAKE MADRONE BRIDGE	43	75	1.74	1.09	0.68	No	32	1,024
ORO-BANGOR HWY	S of V-7 RD	184	130	0.71	-0.47	0.63	Yes	-54	2,916
ORO-BANGOR HWY	E of FOOTHILL BLVD	203	185	0.91	-0.14	0.63	Yes	-18	324
OROVILLE-BANGOR HWY	N of SWEDES FLAT RD	150	595	3.97	4.71	0.63	No	445	198,025
ORO-QUINCY HWY	E of FOOTHILL BLVD	303	321	1.06	0.10	0.58	Yes	18	324
PENNINGTON RD	S of W EVANS REIMER RD	40	12	0.30	-1.02	0.68	No	-28	784
SKYLINE BLVD	S of SR 162	112	102	0.91	-0.13	0.68	Yes	-10	100
SKYWAY	S of COUTOLENC RD	49	625	12.76	17.21	0.68	No	576	331,776
SKYWAY	N of NIMSHEW RD	127	35	0.28	-1.15	0.63	No	-92	8,464
SKYWAY	S of POWELLTON RD	71	24	0.34	-0.97	0.68	Yes	-47	2,209
UPPER PALERMO RD	S of OPHIR RD/LOWER WYANDO	382	439	1.15	0.29	0.52	Yes	57	3,249
W SACRAMENTO AVE	W of MUIR AVE	78	39	0.50	-0.73	0.68	Yes	-39	1,521
COHASSET RD	N of EATON RD	1,046	1,066	1.02	0.05	0.36	Yes	20	400
EAST AVE	W of CUSSICK/HOLLY AVE	1,505	1,079	0.72	-0.93	0.30	Yes	-426	181,476
EAST AVE	E of SR 32	1,338	970	0.72	-0.85	0.33	Yes	-368	135,424
EATON RD	W of BURNAP AVE	603	413	0.68	-0.66	0.48	Yes	-190	36,100
EATON RD	E of ESPLANADE RD	1,673	867	0.52	-1.64	0.29	No	-806	649,636
EATON RD	W of SILVERBELL RD	868	544	0.63	-0.91	0.41	Yes	-324	104,976
ESPLANADE RD	N of EAST AVE	1,816	2,173	1.20	0.69	0.29	Yes	357	127,449
ESPLANADE RD	N of EATON RD	1,398	748	0.54	-1.49	0.31	No	-650	422,500
ESPLANADE RD	N of LASSEN AVE	1,259	1,238	0.98	-0.05	0.33	Yes	-21	441
IVY ST	N of 11TH ST	233	87	0.37	-0.99	0.63	Yes	-146	21,316
ROSE AVE	S of WEBB AVE	140	85	0.61	-0.62	0.63	Yes	-55	3,025
W 1ST AVE	E of HOBART ST	605	1,014	1.68	1.42	0.48	No	409	167,281
W 2ND ST	E of WALNUT ST (SR 32)	445	316	0.71	-0.56	0.52	Yes	-129	16,641
W 5TH ST	W of WALNUT ST (SR 32)	375	397	1.06	0.11	0.52	Yes	22	484
W 5TH ST	E of WALNUT ST (SR 32)	404	218	0.54	-0.89	0.52	Yes	-186	34,596
W 8TH AVE	E of NORD AVE (SR 32)	705	366	0.52	-1.09	0.44	No	-339	114,921
W LINDO AVE	E of NORD AVE (SR 32)	122	70	0.57	-0.62	0.68	Yes	-52	2,704
W SACRAMENTO AVE	W of CITRUS AVE	487	868	1.78	1.50	0.52	No	381	145,161
W SACRAMENTO AVE	W of NORD AVE (SR 32)	529	476	0.90	-0.21	0.48	Yes	-53	2,809
W SACRAMENTO AVE	E of NORD AVE (SR 32)	837	678	0.81	-0.46	0.41	Yes	-159	25,281
WARNER ST	S of W SACAMENTO AVE	613	1,183	1.93	1.96	0.48	No	570	324,900
E GRIDLEY RD	E of SR 99	545	228	0.42	-1.22	0.48	No	-317	100,489
MAGNOLIA ST	W of SR 99	439	197	0.45	-1.06	0.52	No	-242	58,564
SPRUCE ST	W of SR 99	637	251	0.39	-1.38	0.44	No	-386	148,996
SYCAMORE ST	W of SR 99	268	778	2.90	3.31	0.58	No	510	260,100
18TH ST	N of GRAND AV	32	14	0.44	-0.82	0.68	Yes	-18	324
5TH AV	S of ORO DAM BLVD (SR 162)	318	306	0.96	-0.07	0.58	Yes	-12	144
5TH AV	S of CAL OAK AV	228	151	0.66	-0.54	0.63	Yes	-77	5,929
FEATHER RIVER BLVD	S of ORO-DAM BLVD (SR 162)	707	371	0.52	-1.08	0.44	No	-336	112,896
FOOTHILL BLVD	S of SR 162	502	664	1.32	0.68	0.48	Yes	162	26,244
GRAND AVE	E of 20TH ST	214	88	0.41	-0.93	0.63	Yes	-126	15,876
GRAND AVE	E of SR 70	570	484	0.85	-0.32	0.48	Yes	-86	7,396
GRAND AVE	E of 10TH ST	562	384	0.68	-0.67	0.48	Yes	-178	31,684
LINCOLN BLVD	N of OPHIR RD	640	443	0.69	-0.70	0.44	Yes	-197	38,809
LINCOLN BLVD	S of JUNCTION W/ MYERS	883	1,052	1.19	0.50	0.38	Yes	169	28,561
LOWER WYANDOTTE RD	S of SR 162	692	551	0.80	-0.46	0.44	Yes	-141	19,881
MITCHELL ST	E of MYERS ST	509	461	0.91	-0.20	0.48	Yes	-48	2,304
MITCHELL ST	E of FEATHER RIVER BLVD	282	340	1.21	0.36	0.58	Yes	58	3,364
MONTGOMERY ST	W of LINCOLN BLVD	527	604	1.15	0.31	0.48	Yes	77	5,929
MONTGOMERY ST	W of TABLE MTN BLVD	578	775	1.34	0.72	0.48	Yes	197	38,809
NELSON AVE	E of SR 70	997	690	0.69	-0.81	0.38	Yes	-307	94,249
ORANGE AVE	E of BRIDGE ST	148	111	0.75	-0.40	0.63	Yes	-37	1,369
ORO-DAM BLVD	E of FOOTHILL BLVD/BRIDGE	457	684	1.50	0.96	0.52	Yes	227	51,529
TABLE MTN BLVD	S of GRAND AVE	1,514	1,552	1.03	0.08	0.30	Yes	38	1,444

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
TABLE MTN BLVD	S of NELSON AVE	1,195	1,263	1.06	0.17	0.34	Yes	68	4,624
WYANDOTTE AVE	W of LOWER WYANDOTTE RD	348	512	1.47	0.82	0.58	Yes	164	26,896
BILLE RD	E of CLARK RD	706	609	0.86	-0.31	0.44	Yes	-97	9,409
CLARK RD	N of WAGSTAFF RD	822	969	1.18	0.44	0.41	Yes	147	21,609
CLARK RD	N of PEARSON RD	1,248	1,008	0.81	-0.57	0.34	Yes	-240	57,600
ELLIOT RD	W of CLARK RD	830	936	1.13	0.31	0.41	Yes	106	11,236
ELLIOT RD	E of CLARK RD	470	444	0.94	-0.11	0.52	Yes	-26	676
NEAL RD	S of SKYWAY	337	391	1.16	0.28	0.58	Yes	54	2,916
PEARSON RD	E of CLARK RD	803	1,097	1.37	0.89	0.41	Yes	294	86,436
PENTZ RD	N of PEARSON RD	449	432	0.96	-0.07	0.52	Yes	-17	289
PENTZ RD	N of WAGSTAFF RD	676	938	1.39	0.88	0.44	Yes	262	68,644
SKYWAY	N of ELLIOT RD	1,822	1,864	1.02	0.08	0.29	Yes	42	1,764
SKYWAY	W of CLARK RD	879	854	0.97	-0.07	0.38	Yes	-25	625
NEW SKYWAY	W of PENTZ RD	1,415	1,300	0.92	-0.26	0.31	Yes	-115	13,225
NEW SKYWAY	E of PENTZ RD	1,481	1,385	0.94	-0.21	0.31	Yes	-96	9,216
SKYWAY	N of WAGSTAFF RD	1,003	978	0.98	-0.07	0.36	Yes	-25	625
SKYWAY	N of WYCLIFF WAY	853	937	1.10	0.24	0.41	Yes	84	7,056
WAGSTAFF RD	W of CLARK RD	495	257	0.52	-0.92	0.52	Yes	-238	56,644
WAGSTAFF RD	E of CLARK RD	579	637	1.10	0.21	0.48	Yes	58	3,364
ENTLER AVE	E of MIDWAY	123	103	0.84	-0.24	0.68	Yes	-20	400
MIDWAY RD	S of E PARK AVE	1,406	1,270	0.90	-0.31	0.31	Yes	-136	18,496
MIDWAY RD	S of HEGAN LN	762	1,007	1.32	0.78	0.41	Yes	245	60,025
BROADWAY	N of SR 32 (8TH ST)	494	439	0.89	-0.21	0.52	Yes	-55	3,025
BROADWAY	S of 2ND ST	651	777	1.19	0.44	0.44	Yes	126	15,876
BRUCE RD	N of LAKEWEST DR	1,119	1,064	0.95	-0.14	0.36	Yes	-55	3,025
BRUCE RD	S of HUMBOLDT RD	910	1,043	1.15	0.38	0.38	Yes	133	17,689
BRUCE RD	N of SKYWAY	684	774	1.13	0.30	0.44	Yes	90	8,100
BRUCE RD	N of E 20TH ST	960	1,227	1.28	0.73	0.38	Yes	267	71,289
COHASSET RD	N of EAST AVE	1,560	1,394	0.89	-0.35	0.30	Yes	-166	27,556
COHASSET RD	S of EAST AVE	1,760	2,068	1.18	0.61	0.29	Yes	308	94,864
E 1ST AVE	E of ESPLANADE	957	1,293	1.35	0.92	0.38	Yes	336	112,896
E 1ST AVE	W of ESPLANADE RD	857	1,068	1.25	0.60	0.41	Yes	211	44,521
E 1ST AVE	W of LONGFELLOW	1,428	993	0.70	-0.97	0.31	Yes	-435	189,225
E 1ST AVE	W of SHERMAN AVE	1,350	1,394	1.03	0.10	0.33	Yes	44	1,936
E 20TH ST	E of FOREST AVE	886	1,085	1.22	0.59	0.38	Yes	199	39,601
E 20TH ST	W of BRUCE RD	712	752	1.06	0.13	0.44	Yes	40	1,600
E 20TH ST	W of WHITMAN AVE	1,433	1,448	1.01	0.03	0.31	Yes	15	225
E 20TH ST	W of FOREST AVE	1,648	1,898	1.15	0.52	0.29	Yes	250	62,500
E 5TH AVE	E of ESPLANADE RD	470	292	0.62	-0.73	0.52	Yes	-178	31,684
E 8TH ST	E of EL MONTE AVE	329	423	1.29	0.50	0.58	Yes	94	8,836
E 8TH ST	W of PARK VISTA DR	445	629	1.41	0.80	0.52	Yes	184	33,856
E 8TH ST	W of BRUCE RD	346	342	0.99	-0.02	0.58	Yes	-4	16
EAST AVE	E of FLORAL AVE	1,648	1,628	0.99	-0.04	0.29	Yes	-20	400
EAST AVE	E of COHASSET RD	1,501	1,431	0.95	-0.15	0.30	Yes	-70	4,900
EAST AVE	W of COHASSET RD	1,122	1,061	0.95	-0.15	0.36	Yes	-61	3,721
EAST AVE	E of ESPLANADE RD	1,822	1,679	0.92	-0.27	0.29	Yes	-143	20,449
EAST AVE	W of ESPLANADE RD	1,838	1,413	0.77	-0.81	0.29	Yes	-425	180,625
E PARK AVE	Btwn SR 99 & CARMICHAEL DR	1,937	1,657	0.86	-0.52	0.28	Yes	-280	78,400
E PARK AVE	E of MIDWAY	1,574	1,585	1.01	0.02	0.30	Yes	11	121
EL MONTE AVE	S of 8TH ST	113	18	0.16	-1.23	0.68	No	-95	9,025
ESPLANADE RD	S of EAST AVE	1,810	1,805	1.00	-0.01	0.29	Yes	-5	25
ESPLANADE RD	N of E 1ST AVE	1,831	1,770	0.97	-0.12	0.29	Yes	-61	3,721
ESPLANADE RD	S of W SACRAMENTO AVE	1,610	1,803	1.12	0.40	0.30	Yes	193	37,249
FLORAL AVE	N of EAST AVE	707	768	1.09	0.20	0.44	Yes	61	3,721
FOREST AVE	S of E 20TH ST	1,215	878	0.72	-0.82	0.34	Yes	-337	113,569
FOREST AVE	S of HUMBOLDT RD	947	981	1.04	0.09	0.38	Yes	34	1,156
LASSEN AVE	W of BURNAP AVE	725	432	0.60	-0.92	0.44	Yes	-293	85,849
LASSEN AVE	E of ESPLANADE RD	749	718	0.96	-0.09	0.44	Yes	-31	961
MAIN ST	S of 2ND ST	726	1,082	1.49	1.11	0.44	No	356	126,736
MAIN ST	S of SR 32 (8TH ST)	800	1,353	1.69	1.69	0.41	No	553	305,809
MANGROVE AVE	S of VALLOMBROSA AVE	1,413	1,805	1.28	0.89	0.31	Yes	392	153,664
MANGROVE AVE	S of COHASSET RD	1,840	1,720	0.93	-0.23	0.29	Yes	-120	14,400
MANGROVE AVE	S of E 1ST AVE	1,888	1,354	0.72	-1.01	0.28	No	-534	285,156
MANGROVE AVE	N of E 1ST AVE	1,634	1,555	0.95	-0.16	0.29	Yes	-79	6,241
MANZANITA AVE	N of VALLOMBROSA AVE	1,185	1,098	0.93	-0.22	0.34	Yes	-87	7,569
MANZANITA AVE	N of CHICO CANYON RD	1,392	1,130	0.81	-0.60	0.31	Yes	-262	68,644
MANZANITA AVE	E of LONGFELLOW AVE	898	601	0.67	-0.87	0.38	Yes	-297	88,209
MULBERRY ST	S of PINE ST/CYPRESS ST J	747	910	1.22	0.50	0.44	Yes	163	26,569
PALMETTO	W of BRYANT AVE	464	334	0.72	-0.54	0.52	Yes	-130	16,900
PARK AVE	N of E PARK AVE	1,043	1,362	1.31	0.85	0.36	Yes	319	101,761
PARK AVE	S of 16TH ST	1,355	1,643	1.21	0.65	0.33	Yes	288	82,944
PARK AVE	S of SR 32	1,389	854	0.61	-1.23	0.31	No	-535	286,225
PINE ST	N of 4TH ST	697	689	0.99	-0.03	0.44	Yes	-8	64
SKYWAY	E of BRUCE RD	1,995	2,334	1.17	0.61	0.28	Yes	339	114,921
SKYWAY	W of NOTRE DAME BLVD	2,309	2,851	1.23	0.89	0.27	Yes	542	293,764
SKYWAY	E of NOTRE DAME BLVD	1,904	2,053	1.08	0.28	0.28	Yes	149	22,201
VALLOMBROSA AVE	E of SR 99	473	306	0.65	-0.68	0.52	Yes	-167	27,889
VALLOMBROSA AVE	W of MANZANITA AVE	435	146	0.34	-1.28	0.52	No	-289	83,521
W 8TH AVE	W of ESPLANADE RD	334	256	0.77	-0.41	0.58	Yes	-78	6,084
WHITMAN	N of 23RD ST	769	224	0.29	-1.73	0.41	No	-545	297,025
W 3RD ST	E of IVY ST	138	89	0.64	-0.56	0.63	Yes	-49	2,401
E 3RD ST	E of WALL ST	160	160	1.00	0.00	0.63	Yes	0	0
W 4TH ST	E of HAZEL ST	91	113	1.24	0.35	0.68	Yes	22	484
E 4TH ST	E of FLUME ST	137	14	0.10	-1.43	0.63	No	-123	15,129
E 8TH ST	E of KERN ST	302	400	1.32	0.56	0.58	Yes	98	9,604
BIDWELL AVE	E of CARRIAGE LN	67	165	2.46	2.14	0.68	No	98	9,604
COHASSET RD	E of RIO LINDO AVE	1,847	1,039	0.56	-1.53	0.29	No	-808	652,864
ESPANADE	S of COHASSET RD	1,782	1,617	0.91	-0.32	0.29	Yes	-165	27,225
FAIR ST	S of E 20TH ST	543	380	0.70	-0.63	0.48	Yes	-163	26,569
FIR ST	S of HWY 32	280	157	0.56	-0.76	0.58	Yes	-123	15,129
FOREST AVE	W of NOTRE DAME BLVD	1,057	840	0.79	-0.57	0.36	Yes	-217	47,089

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
FOREST AVE	N of HUMBOLDT RD	888	966	1.09	0.23	0.38	Yes	78	6,084
FOREST AVE	N of HWY 32	405	190	0.47	-1.02	0.52	No	-215	46,225
HOOKER OAK AVE	E of MADRONE AVE	279	188	0.67	-0.57	0.58	Yes	-91	8,281
HOOKER OAK AVE	W of MANZANITA AVE	326	144	0.44	-0.97	0.58	Yes	-182	33,124
HAWTHORNE AVE	W of MADRONE AVE	120	35	0.29	-1.04	0.68	No	-85	7,225
HUMBOLDT RD	W of FOREST AVE	243	227	0.93	-0.10	0.63	Yes	-16	256
MANZANITA AVE	E of MADRONE AVE	477	246	0.52	-0.93	0.52	Yes	-231	53,361
MANGROVE AVE	N of E 7TH AVE	1,540	1,580	1.03	0.09	0.30	Yes	40	1,600
MARIGOLD AVE	S of EAST AVE	469	312	0.67	-0.64	0.52	Yes	-157	24,649
MARIGOLD AVE	N of EAST AVE	391	339	0.87	-0.26	0.52	Yes	-52	2,704
MARIPOSA AVE	N of EAST AVE	413	210	0.51	-0.95	0.52	Yes	-203	41,209
NOTRE DAME BLVD	N of SKYWAY	1,167	714	0.61	-1.14	0.34	No	-453	205,209
NOTRE DAME BLVD	N of FOREST AVE	419	166	0.40	-1.16	0.52	No	-253	64,009
PALMETTO AVE	E of MANGROVE AVE	513	446	0.87	-0.27	0.48	Yes	-67	4,489
PALMETTO AVE	E of SHERIDAN AVE	625	372	0.60	-0.92	0.44	Yes	-253	64,009
SKYWAY	N of COUTOLENC RD	1,486	1,980	1.33	1.06	0.31	No	494	244,036
SKYWAY	E of CLIFFHANGER LN	1,754	2,153	1.23	0.80	0.29	Yes	399	159,201
SYCAMORE ST	E of RANDOLPH AVE	292	163	0.56	-0.77	0.58	Yes	-129	16,641
W BIGGS GRIDLEY RD	S of SPRUCE ST	226	43	0.19	-1.29	0.63	No	-183	33,489
GEORGIA PACIFIC WAY	E of HWY 70	137	393	2.87	2.97	0.63	No	256	65,536
HUNTOON ST	S of GRACE ST	208	191	0.92	-0.13	0.63	Yes	-17	289
YARD ST	W of WASHINGTON AVE	97	187	1.93	1.36	0.68	No	90	8,100
OLIVER RD	W of SKYWAY	405	400	0.99	-0.02	0.52	Yes	-5	25
PEARSON RD	E of SKYWAY	767	422	0.55	-1.10	0.41	No	-345	119,025
SKYWAY	S of NEAL RD	2,050	2,283	1.11	0.41	0.28	Yes	233	54,289
BILLE RD	E of SKYWAY	634	542	0.85	-0.33	0.44	Yes	-92	8,464
W EATON RD	W of ESPLANADE	582	555	0.95	-0.10	0.48	Yes	-27	729
NEAL RD	E of HWY 99	154	156	1.01	0.02	0.63	Yes	2	4
PENTZ RD	N of HWY 70	283	509	1.80	1.39	0.58	No	226	51,076
HUMBOLDT RD	E of HWY 32 (Chico)	8	0	0.00	-1.46	0.68	No	-8	64
NORD HWY	W of ESPLANADE	333	127	0.38	-1.08	0.58	No	-206	42,436
SKYWAY	S of PEARSON RD	2,055	2,208	1.07	0.27	0.28	Yes	153	23,409
LOWER HONCUT RD	E of HWY 70	66	2	0.03	-1.42	0.68	No	-64	4,096
RICHVALE HWY	E of MIDWAY	124	267	2.15	1.69	0.68	No	143	20,449
CANYON DR	N of OLIVE HWY	308	194	0.63	-0.64	0.58	Yes	-114	12,996
OROVILLE DAM BLVD E	E of CANYON HIGHLANDS DR	495	792	1.60	1.15	0.52	No	297	88,209
FEATHER RIVER BLVD	N of ORO DAM BLVD	632	297	0.47	-1.20	0.44	No	-335	112,225
PALERMO RD	E of HWY 70	78	312	4.00	4.39	0.68	No	234	54,756
FORBESTOWN RD	W of ROBINSON MILL RD	70	47	0.67	-0.48	0.68	Yes	-23	529
LUMPKIN RD	N of FORBESTOWN RD	54	59	1.09	0.14	0.68	Yes	5	25
PALERMO HONCUT HWY	N of LWR HONCUT RD	65	20	0.31	-1.01	0.68	No	-45	2,025
SEVEN MILE LN	S of ORD FERRY RD	33	10	0.30	-1.02	0.68	No	-23	529
TOWNSHIP RD	W of HWY 99	132	128	0.97	-0.05	0.63	Yes	-4	16
BIGGS EAST HWY	E of HWY 99	224	124	0.55	-0.71	0.63	Yes	-100	10,000
LARKIN RD	N of EAST GRIDLEY RD	89	129	1.45	0.66	0.68	Yes	40	1,600
LINCOLN ST	S of GRACE ST	223	143	0.64	-0.57	0.63	Yes	-80	6,400
MONTGOMERY ST	W of FEATHER RIVER BLVD	603	819	1.36	0.75	0.48	Yes	216	46,656
MYERS ST	N of ORO DAM BLVD	572	347	0.61	-0.83	0.48	Yes	-225	50,625
WASHINGTON AVE	W of ORO DAM BLVD	840	643	0.77	-0.57	0.41	Yes	-197	38,809
LINCOLN BLVD	S of ORO DAM BLVD	1,017	1,312	1.29	0.81	0.36	Yes	295	87,025
LINCOLN BLVD	S of OPHIR RD	466	428	0.92	-0.16	0.52	Yes	-38	1,444
GARDEN DR	E of HWY 70	439	441	1.00	0.01	0.52	Yes	2	4
KELLY RIDGE RD	N of OLIVE HWY	145	118	0.81	-0.30	0.63	Yes	-27	729
ORO QUINCY HWY	W of OLIVE HWY	341	544	1.60	1.04	0.58	No	203	41,209
18TH ST	N of ORO DAM BLVD	160	232	1.45	0.71	0.63	Yes	72	5,184
CONCOW RD	W of HWY 70	82	194	2.37	2.00	0.68	No	112	12,544
LARKIN RD	N of E RIO BONITO RD	221	174	0.79	-0.34	0.63	Yes	-47	2,209
WALMER RD	E of LINCOLN BLVD	486	284	0.58	-0.80	0.52	Yes	-202	40,804
FOOTHILL BLVD	N of LWR WYANDOTTE RD	105	470	4.48	5.09	0.68	No	365	133,225
W RIO BONITO RD	E of HAWKINS LN	112	112	1.00	0.00	0.68	Yes	0	0
B ST	E of FIRST ST	220	240	1.09	0.14	0.63	Yes	20	400
PEARSON RD	W of CLARK RD	1,209	1,097	0.91	-0.27	0.34	Yes	-112	12,544
PEARSON RD	E of SAWMILL RD	584	505	0.86	-0.28	0.48	Yes	-79	6,241
PENTZ RD	S or PEARSON RD	506	629	1.24	0.51	0.48	Yes	123	15,129
PENTZ RD	N or BILLE RD	683	508	0.74	-0.58	0.44	Yes	-175	30,625
SKYWAY	N or BILLE RD	1,136	1,103	0.97	-0.09	0.34	Yes	-33	1,089
SKYWAY	N or NEAL RD	1,823	2,164	1.19	0.65	0.29	Yes	341	116,281
WAGSTAFF RD	W of SKYWAY	165	63	0.38	-0.98	0.63	Yes	-102	10,404
BILLE RD	W of SKYWAY	240	136	0.57	-0.69	0.63	Yes	-104	10,816
CLARK RD	N of BILLE RD	1,323	1,241	0.94	-0.19	0.33	Yes	-82	6,724
CLARK RD	N of ELLIOT RD	1,299	1,316	1.01	0.04	0.33	Yes	17	289
SKYWAY	S of MANZANITA ST (Stirling City)	41	57	1.39	0.57	0.68	Yes	16	256
HWY 99	N OF BUTTE COUNTY LINE	973	654	0.67	-0.86	0.38	Yes	-319	101,761
COHASSET RD	N OF MUSTY BUCK RD	11	4	0.36	-0.93	0.68	Yes	-7	49
HWY 32	N OF HUMBOLDT RD	92	68	0.74	-0.38	0.68	Yes	-24	576
HUMBOLDT RD	N OF JONESVILLE RD	1	0	0.00	-1.46	0.68	No	-1	1
HWY 70	N OF BUTTE COUNTY LINE	126	79	0.63	-0.59	0.63	Yes	-47	2,209
OROVILLE QUINCY HWY	N OF HASKINS VALLEY RD	22	9	0.41	-0.87	0.68	Yes	-13	169
FORBESTOWN RD	E OF RESERVOIR RD	68	36	0.53	-0.69	0.68	Yes	-32	1,024
LA PORTE RD	NE OF ROBINSON MILL RD	35	23	0.66	-0.50	0.68	Yes	-12	144
LOMA RICA RD	S OF LA PORTE RD	25	16	0.64	-0.53	0.68	Yes	-9	81
LA PORTE RD	S OF BUTTE COUNTY LINE	11	4	0.36	-0.93	0.68	Yes	-7	49
HWY 70	S OF BUTTE COUNTY LINE	1,008	721	0.72	-0.79	0.36	Yes	-287	82,369
LARKIN RD	S OF BUTTE COUNTY LINE	242	97	0.40	-0.95	0.63	Yes	-145	21,025
HWY 99	S OF BUTTE COUNTY LINE	1,268	562	0.44	-1.71	0.33	No	-706	498,436
PENNINGTON RD	S OF RUTHERFORD RD	30	12	0.40	-0.88	0.68	Yes	-18	324
COLUSA HWY	W OF CHEROKEE CANAL RD	58	23	0.40	-0.88	0.68	Yes	-35	1,225
AFTON RD	W OF AGUAS FRIAS RD	11	4	0.36	-0.93	0.68	Yes	-7	49
HWY 162	W OF BUTTE COUNTY LINE	131	63	0.48	-0.82	0.63	Yes	-68	4,624
ROAD Z	S OF ROAD 48	22	19	0.86	-0.20	0.68	Yes	-3	9
ORD FERRY RD	W OF HUGH BABER LN	257	187	0.73	-0.47	0.58	Yes	-70	4,900
HWY 32	W OF BUTTE COUNTY LINE	1,077	454	0.42	-1.61	0.36	No	-623	388,129

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
HWY 99	N OF NELSON SHIPPEE RD	938	882	0.94	-0.16	0.38	Yes	-56	3,180
HWY 99	S OF SR 162 W	1,216	989	0.81	-0.55	0.34	Yes	-227	51,529
HWY 70	S OF WELSH/PALERMO RD	1,155	1,012	0.88	-0.36	0.34	Yes	-143	20,449
HWY 70	BETWEEN NELSON AVE AND GARDEN DR	1,902	3,510	1.85	3.02	0.28	No	1,608	2,585,664
HWY 70	N OF PENTZ RD	248	362	1.46	0.73	0.63	Yes	114	12,996
HWY 149	BETWEEN SR 70 & SR 99	1,442	1,922	1.33	1.06	0.31	No	480	230,400
PENTZ RD	N OF LIME SADDLE ROAD	295	499	1.69	1.20	0.58	No	204	41,616
OROVILLE DAM BLVD W	BETWEEN 12TH ST AND SR 70	429	938	2.19	2.28	0.52	No	509	259,081
RICETON HWY	S OF SH 162	101	57	0.56	-0.64	0.68	Yes	-44	1,936
PALERMO HONCUT HWY	S OF OLD HONCUT RD	78	80	1.03	0.04	0.68	Yes	2	4
	Total	181,442	177,295						

Indicates Model Below Target Volume

Indicates Model Above Target High Volume

Model/Count Ratio =	**0.98**	
Percent Within Caltrans Maximum Deviation =	**78%**	> 75%
Percent Root Mean Square Error =	**39%**	< 30%
Correlation Coefficient =	**0.91**	> 0.88

Total Count	**282**
Link Within Deviation	**220**
Link Outside Deviation	**62**

BCAG Model Validation Results: PM Peak Hour Two-Way Total Traffic Volumes									
		Count	Model	Model	Model	Maximum	Within	Model	Difference
Roadway	Segment	Two Way	Two Way	/Count	# Deviation	Deviation	Deviation	- Count	Squared
B ST	E of 7TH ST	209	144	0.69	-0.49	0.63	Yes	-65	4,225
W BIGGS GRIDLEY RD	S of BANNOCK ST	189	306	1.62	0.98	0.63	Yes	117	13,689
AFTON RD	W of AGUA FRIAS RD	15	8	0.53	-0.68	0.68	Yes	-7	49
AGUAS FRIAS RD	S of DURHAM DAYTON RD	70	1	0.01	-1.44	0.68	No	-69	4,761
AGUAS FRIAS RD	S of NELSON RD	55	0	0.00	-1.46	0.68	No	-55	3,025
CHICO RIVER RD	W of ALBERTON RD	131	114	0.87	-0.21	0.63	Yes	-17	289
COHASSET HWY	N of KEEFER RD	114	239	2.10	1.61	0.68	No	125	15,625
COLUSA HWY	W of HATCH RD	64	59	0.92	-0.11	0.68	Yes	-5	25
DAYTON RD	S of ARCHER AVE	598	515	0.86	-0.29	0.48	Yes	-83	6,889
DAYTON RD	N of HEGAN LN	333	178	0.53	-0.81	0.58	Yes	-155	24,025
DUNSTONE DR	S of GRUBBS RD	20	22	1.10	0.15	0.68	Yes	2	4
DURHAM DAYTON HWY	W of OROVILLE-CHICO HWY	218	253	1.16	0.25	0.63	Yes	35	1,225
DURHAM PENTZ RD	E of SR 99	938	848	0.90	-0.25	0.38	Yes	-90	8,100
DURHAM PENTZ RD	E of SR 191	197	305	1.55	0.87	0.63	Yes	108	11,664
E GRIDLEY RD	At FEATHER RIVER BRIDGE	529	274	0.52	-1.01	0.48	No	-255	65,025
FORBESTOWN RD	S of OLD OLIVE HWY	259	220	0.85	-0.26	0.58	Yes	-39	1,521
GARNER LN	N of SR 99	510	895	1.75	1.59	0.48	No	385	148,225
HAMILTON CITY NORD	N of BENNETT RD	50	19	0.38	-0.91	0.68	Yes	-31	961
HEGAN LN	E of FIMPLE LN	336	137	0.41	-1.03	0.58	No	-199	39,601
HICKS LN	N of EATON RD	282	187	0.66	-0.59	0.58	Yes	-95	9,025
HONEY RUN RD	W of CENTERVILLE RD	126	165	1.31	0.49	0.63	Yes	39	1,521
KEEFER RD	W of GARNER LN	96	26	0.27	-1.07	0.68	No	-70	4,900
LARKIN RD	S of CHANDON AVE	250	250	1.00	0.00	0.58	Yes	0	0
LARKIN RD	S of SR 162	458	630	1.38	0.72	0.52	Yes	172	29,584
LOS VERJELES RD	S of LA PORTE RD	91	68	0.75	-0.37	0.68	Yes	-23	529
LOWER WYANDOTTE RD	W of ALVERDA DR	592	925	1.56	1.18	0.48	No	333	110,889
MERIDIAN RD	E of SR 99	109	63	0.58	-0.62	0.68	Yes	-46	2,116
MIDWAY RD	S of DURHAM DAYTON RD	354	467	1.32	0.56	0.58	Yes	113	12,769
MIDWAY RD	N of NELSON SHIPPEE RD	134	184	1.37	0.59	0.63	Yes	50	2,500
MINERS RANCH RD	S of SR 162	250	113	0.45	-0.95	0.58	Yes	-137	18,769
OAKVALE AVE	S of SR 162	391	160	0.41	-1.14	0.52	No	-231	53,361
OPHIR RD	E of FEATHER RIVER BLVD	605	674	1.11	0.24	0.48	Yes	69	4,761
ORD FERRY RD	W of RIVER RD	285	289	1.01	0.02	0.58	Yes	4	16
ORD FERRY RD	W of AGUAS FRIAS RD	339	268	0.79	-0.36	0.58	Yes	-71	5,041
ORO-QUINCY HWY	At LAKE MADRONE BRIDGE	47	152	3.23	3.27	0.68	No	105	11,025
ORO-BANGOR HWY	S of V-7 RD	179	91	0.51	-0.78	0.63	Yes	-88	7,744
ORO-BANGOR HWY	E of FOOTHILL BLVD	183	115	0.63	-0.59	0.63	Yes	-68	4,624
OROVILLE-BANGOR HWY	N of SWEDES FLAT RD	178	547	3.07	3.29	0.63	No	369	136,161
ORO-QUINCY HWY	E of FOOTHILL BLVD	300	166	0.55	-0.78	0.58	Yes	-134	17,956
PENNINGTON RD	S of W EVANS REIMER RD	34	30	0.88	-0.17	0.68	Yes	-4	16
SKYLINE BLVD	S of SR 162	102	119	1.17	0.24	0.68	Yes	17	289
SKYWAY	S of COUTOLENC RD	48	380	7.92	10.13	0.68	No	332	110,224
SKYWAY	N of NIMSHEW RD	159	110	0.69	-0.49	0.63	Yes	-49	2,401
SKYWAY	S of POWELLTON RD	87	101	1.16	0.24	0.68	Yes	14	196
UPPER PALERMO RD	S of OPHIR RD/LOWER WYANDO	322	309	0.96	-0.07	0.58	Yes	-13	169
W SACRAMENTO AVE	W of MUIR AVE	90	34	0.38	-0.91	0.68	Yes	-56	3,136
COHASSET RD	N of EATON RD	988	1,312	1.33	0.86	0.38	Yes	324	104,976
EAST AVE	W of CUSSICK/HOLLY AVE	1,661	1,527	0.92	-0.27	0.29	Yes	-134	17,956
EAST AVE	E of SR 32	1,412	1,413	1.00	0.00	0.31	Yes	1	1
EATON RD	W of BURNAP AVE	614	539	0.88	-0.26	0.48	Yes	-75	5,625
EATON RD	E of ESPLANADE RD	1,613	1,000	0.62	-1.25	0.30	No	-613	375,769
EATON RD	W of SILVERBELL RD	942	687	0.73	-0.71	0.38	Yes	-255	65,025
ESPLANADE RD	N of EAST AVE	1,960	2,908	1.48	1.73	0.28	No	948	898,704
ESPLANADE RD	N of EATON RD	1,207	944	0.78	-0.64	0.34	Yes	-263	69,169
ESPLANADE RD	N of LASSEN AVE	1,402	1,534	1.09	0.30	0.31	Yes	132	17,424
IVY ST	N of 11TH ST	276	88	0.32	-1.18	0.58	No	-188	35,344
ROSE AVE	S of WEBB AVE	176	96	0.55	-0.72	0.63	Yes	-80	6,400
W 1ST AVE	E of HOBART ST	744	584	0.78	-0.49	0.44	Yes	-160	25,600
W 2ND ST	E of WALNUT ST (SR 32)	519	394	0.76	-0.51	0.48	Yes	-125	15,625
W 5TH ST	W of WALNUT ST (SR 32)	496	469	0.95	-0.10	0.52	Yes	-27	729
W 5TH ST	E of WALNUT ST (SR 32)	491	218	0.44	-1.07	0.52	No	-273	74,529
W 8TH AVE	E of NORD AVE (SR 32)	601	413	0.69	-0.66	0.48	Yes	-188	35,344
W LINDO AVE	E of NORD AVE (SR 32)	124	72	0.58	-0.61	0.68	Yes	-52	2,704
W SACRAMENTO AVE	W of CITRUS AVE	578	688	1.19	0.40	0.48	Yes	110	12,100
W SACRAMENTO AVE	W of NORD AVE (SR 32)	589	444	0.75	-0.52	0.48	Yes	-145	21,025
W SACRAMENTO AVE	E of NORD AVE (SR 32)	1,072	714	0.67	-0.93	0.36	Yes	-358	128,164
WARNER ST	S of W SACAMENTO AVE	745	312	0.42	-1.32	0.44	No	-433	187,489
E GRIDLEY RD	E of SR 99	581	596	1.03	0.05	0.48	Yes	15	225
MAGNOLIA ST	W of SR 99	529	786	1.49	1.02	0.48	No	257	66,049
SPRUCE ST	W of SR 99	660	647	0.98	-0.04	0.44	Yes	-13	169
SYCAMORE ST	W of SR 99	316	198	0.63	-0.65	0.58	Yes	-118	13,924
18TH ST	N of GRAND AV	40	21	0.53	-0.70	0.68	Yes	-19	361
5TH AV	S of ORO DAM BLVD (SR 162)	377	307	0.81	-0.36	0.52	Yes	-70	4,900
5TH AV	S of CAL OAK AV	271	245	0.90	-0.17	0.58	Yes	-26	676
FEATHER RIVER BLVD	S of ORO-DAM BLVD (SR 162)	714	809	1.13	0.30	0.44	Yes	95	9,025
FOOTHILL BLVD	S of SR 162	550	720	1.31	0.65	0.48	Yes	170	28,900
GRAND AVE	E of 20TH ST	148	48	0.32	-1.07	0.63	No	-100	10,000
GRAND AVE	E of SR 70	552	636	1.15	0.32	0.48	Yes	84	7,056
GRAND AVE	E of 10TH ST	456	352	0.77	-0.44	0.52	Yes	-104	10,816
LINCOLN BLVD	N of OPHIR RD	606	520	0.86	-0.30	0.48	Yes	-86	7,396
LINCOLN BLVD	S of JUNCTION W/ MYERS	1,009	1,000	0.99	-0.02	0.36	Yes	-9	81
LOWER WYANDOTTE RD	S of SR 162	735	813	1.11	0.24	0.44	Yes	78	6,084
MITCHELL ST	E of MYERS ST	547	570	1.04	0.09	0.48	Yes	23	529
MITCHELL ST	E of FEATHER RIVER BLVD	312	468	1.50	0.87	0.58	Yes	156	24,336
MONTGOMERY ST	W of LINCOLN BLVD	574	767	1.34	0.71	0.48	Yes	193	37,249
MONTGOMERY ST	W of TABLE MTN BLVD	591	992	1.68	1.43	0.48	No	401	160,801
NELSON AVE	E of SR 70	892	591	0.66	-0.89	0.38	Yes	-301	90,601
ORANGE AVE	E of BRIDGE ST	74	74	1.00	0.00	0.68	Yes	0	0
ORO-DAM BLVD	E of FOOTHILL BLVD/BRIDGE	452	691	1.53	1.02	0.52	No	239	57,121
TABLE MTN BLVD	S of GRAND AVE	1,527	1,479	0.97	-0.10	0.30	Yes	-48	2,304

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
TABLE MTN BLVD	S of NELSON AVE	1,152	1,099	0.95	-0.14	0.34	Yes	-53	2,809
WYANDOTTE AVE	W of LOWER WYANDOTTE RD	387	776	2.01	1.93	0.52	No	389	151,321
BILLE RD	E of CLARK RD	682	764	1.12	0.27	0.44	Yes	82	6,724
CLARK RD	N of WAGSTAFF RD	947	1,017	1.07	0.19	0.38	Yes	70	4,900
CLARK RD	N of PEARSON RD	1,309	1,171	0.89	-0.32	0.33	Yes	-138	19,044
ELLIOT RD	W of CLARK RD	968	1,029	1.06	0.17	0.38	Yes	61	3,721
ELLIOT RD	E of CLARK RD	520	376	0.72	-0.58	0.48	Yes	-144	20,736
NEAL RD	S of SKYWAY	346	395	1.14	0.25	0.58	Yes	49	2,401
PEARSON RD	E of CLARK RD	816	1,189	1.46	1.11	0.41	No	373	139,129
PENTZ RD	N of PEARSON RD	461	453	0.98	-0.03	0.52	Yes	-8	64
PENTZ RD	N of WAGSTAFF RD	619	953	1.54	1.14	0.48	No	334	111,556
SKYWAY	N of ELLIOT RD	1,902	2,455	1.29	1.04	0.28	No	553	305,809
SKYWAY	W of CLARK RD	961	886	0.92	-0.21	0.38	Yes	-75	5,625
NEW SKYWAY	W of PENTZ RD	1,409	1,474	1.05	0.15	0.31	Yes	65	4,225
NEW SKYWAY	E of PENTZ RD	1,420	1,551	1.09	0.29	0.31	Yes	131	17,161
SKYWAY	N of WAGSTAFF RD	1,006	1,090	1.08	0.23	0.36	Yes	84	7,056
SKYWAY	N of WYCLIFF WAY	906	998	1.10	0.27	0.38	Yes	92	8,464
WAGSTAFF RD	W of CLARK RD	503	347	0.69	-0.65	0.48	Yes	-156	24,336
WAGSTAFF RD	E of CLARK RD	582	906	1.56	1.17	0.48	No	324	104,976
ENTLER AVE	E of MIDWAY	128	135	1.05	0.09	0.63	Yes	7	49
MIDWAY RD	S of E PARK AVE	1,576	1,508	0.96	-0.14	0.30	Yes	-68	4,624
MIDWAY RD	S of HEGAN LN	858	1,115	1.30	0.73	0.41	Yes	257	66,049
BROADWAY	N of SR 32 (8TH ST)	774	1,201	1.55	1.35	0.41	No	427	182,329
BROADWAY	S of 2ND ST	802	1,100	1.37	0.91	0.41	Yes	298	88,804
BRUCE RD	N of LAKEWEST DR	1,218	1,114	0.91	-0.25	0.34	Yes	-104	10,816
BRUCE RD	S of HUMBOLDT RD	1,108	1,175	1.06	0.17	0.36	Yes	67	4,489
BRUCE RD	N of SKYWAY	830	1,014	1.22	0.54	0.41	Yes	184	33,856
BRUCE RD	N of E 20TH ST	1,146	1,314	1.15	0.43	0.34	Yes	168	28,224
COHASSET RD	N of EAST AVE	1,615	1,800	1.11	0.38	0.30	Yes	185	34,225
COHASSET RD	S of EAST AVE	1,909	2,754	1.44	1.58	0.28	No	845	714,025
E 1ST AVE	E of ESPLANADE	1,054	1,064	1.01	0.03	0.36	Yes	10	100
E 1ST AVE	W of ESPLANADE RD	917	615	0.67	-0.87	0.38	Yes	-302	91,204
E 1ST AVE	W of LONGFELLOW	1,436	1,272	0.89	-0.36	0.31	Yes	-164	26,896
E 1ST AVE	W of SHERMAN AVE	1,452	1,296	0.89	-0.34	0.31	Yes	-156	24,336
E 20TH ST	E of FOREST AVE	1,016	1,269	1.25	0.69	0.36	Yes	253	64,009
E 20TH ST	W of BRUCE RD	819	655	0.80	-0.49	0.41	Yes	-164	26,896
E 20TH ST	W of WHITMAN AVE	1,696	1,932	1.14	0.47	0.29	Yes	236	55,696
E 20TH ST	W of FOREST AVE	1,837	2,226	1.21	0.74	0.29	Yes	389	151,321
E 5TH AVE	E of ESPLANADE RD	436	393	0.90	-0.19	0.52	Yes	-43	1,849
E 8TH ST	E of EL MONTE AVE	250	420	1.68	1.18	0.58	No	170	28,900
E 8TH ST	W of PARK VISTA DR	465	656	1.41	0.79	0.52	Yes	191	36,481
E 8TH ST	W of BRUCE RD	279	336	1.20	0.36	0.58	Yes	57	3,249
EAST AVE	E of FLORAL AVE	1,862	1,742	0.94	-0.23	0.29	Yes	-120	14,400
EAST AVE	E of COHASSET RD	1,647	1,759	1.07	0.23	0.29	Yes	112	12,544
EAST AVE	W of COHASSET RD	1,248	1,687	1.35	1.03	0.34	No	439	192,721
EAST AVE	E of ESPLANADE RD	1,950	2,241	1.15	0.53	0.28	Yes	291	84,681
EAST AVE	W of ESPLANADE RD	2,061	1,801	0.87	-0.46	0.28	Yes	-260	67,600
E PARK AVE	Btwn SR 99 & CARMICHAEL DR	2,195	1,982	0.90	-0.36	0.27	Yes	-213	45,369
E PARK AVE	E of MIDWAY	1,703	1,819	1.07	0.23	0.29	Yes	116	13,456
EL MONTE AVE	S of 8TH ST	98	8	0.08	-1.34	0.68	No	-90	8,100
ESPLANADE RD	S of EAST AVE	1,755	2,557	1.46	1.60	0.29	No	802	643,204
ESPLANADE RD	N of E 1ST AVE	2,085	2,099	1.01	0.02	0.28	Yes	14	196
ESPLANADE RD	S of W SACRAMENTO AVE	1,966	2,428	1.23	0.84	0.28	Yes	462	213,444
FLORAL AVE	N of EAST AVE	762	755	0.99	-0.02	0.41	Yes	-7	49
FOREST AVE	S of E 20TH ST	1,298	1,356	1.04	0.14	0.33	Yes	58	3,364
FOREST AVE	S of HUMBOLDT RD	1,253	1,281	1.02	0.07	0.33	Yes	28	784
LASSEN AVE	W of BURNAP AVE	800	546	0.68	-0.77	0.41	Yes	-254	64,516
LASSEN AVE	E of ESPLANADE RD	954	847	0.89	-0.30	0.38	Yes	-107	11,449
MAIN ST	S of 2ND ST	944	1,360	1.44	1.16	0.38	No	416	173,056
MAIN ST	S of SR 32 (8TH ST)	971	1,268	1.31	0.80	0.38	Yes	297	88,209
MANGROVE AVE	S of VALLOMBROSA AVE	1,770	1,743	0.98	-0.05	0.29	Yes	-27	729
MANGROVE AVE	S of COHASSET RD	1,967	2,474	1.26	0.92	0.28	Yes	507	257,049
MANGROVE AVE	S of E 1ST AVE	2,052	2,071	1.01	0.03	0.28	Yes	19	361
MANGROVE AVE	N of E 1ST AVE	1,778	2,268	1.28	0.96	0.29	Yes	490	240,100
MANZANITA AVE	N of VALLOMBROSA AVE	1,186	1,104	0.93	-0.20	0.34	Yes	-82	6,724
MANZANITA AVE	N of CHICO CANYON RD	1,275	1,146	0.90	-0.31	0.33	Yes	-129	16,641
MANZANITA AVE	E of LONGFELLOW AVE	922	482	0.52	-1.26	0.38	No	-440	193,600
MULBERRY ST	S of PINE ST/CYPRESS ST J	980	1,071	1.09	0.24	0.38	Yes	91	8,281
PALMETTO	W of BRYANT AVE	432	253	0.59	-0.80	0.52	Yes	-179	32,041
PARK AVE	N of E PARK AVE	1,139	1,547	1.36	1.05	0.34	No	408	166,464
PARK AVE	S of 16TH ST	1,583	1,980	1.25	0.83	0.30	Yes	397	157,609
PARK AVE	S of SR 32	1,639	1,106	0.67	-1.11	0.29	No	-533	284,089
PINE ST	N of 4TH ST	844	770	0.91	-0.21	0.41	Yes	-74	5,476
SKYWAY	E of BRUCE RD	2,040	2,014	0.99	-0.05	0.28	Yes	-26	676
SKYWAY	W of NOTRE DAME BLVD	3,105	3,429	1.10	0.43	0.24	Yes	324	104,976
SKYWAY	E of NOTRE DAME BLVD	1,896	1,964	1.04	0.13	0.28	Yes	68	4,624
VALLOMBROSA AVE	E of SR 99	469	235	0.50	-0.96	0.52	Yes	-234	54,756
VALLOMBROSA AVE	W of MANZANITA AVE	403	142	0.35	-1.25	0.52	No	-261	68,121
W 8TH AVE	W of ESPLANADE RD	436	256	0.59	-0.79	0.52	Yes	-180	32,400
WHITMAN	N of 23RD ST	818	400	0.49	-1.25	0.41	No	-418	174,724
W 3RD ST	E of IVY ST	179	170	0.95	-0.08	0.63	Yes	-9	81
E 3RD ST	E of WALL ST	132	176	1.33	0.53	0.63	Yes	44	1,936
W 4TH ST	E of HAZEL ST	107	116	1.08	0.12	0.68	Yes	9	81
E 4TH ST	E of FLUME ST	195	11	0.06	-1.50	0.63	No	-184	33,856
E 8TH ST	E of KERN ST	190	446	2.35	2.14	0.63	No	256	65,536
BIDWELL AVE	E of CARRIAGE LN	99	194	1.96	1.40	0.68	No	95	9,025
COHASSET RD	E of RIO LINDO AVE	1,902	1,854	0.97	-0.09	0.28	Yes	-48	2,304
ESPANADE	S of COHASSET RD	1,962	2,130	1.09	0.31	0.28	Yes	168	28,224
FAIR ST	S of E 20TH ST	649	629	0.97	-0.07	0.44	Yes	-20	400
FIR ST	S of HWY 32	307	486	1.58	1.01	0.58	No	179	32,041
FOREST AVE	W of NOTRE DAME BLVD	1,097	1,428	1.30	0.84	0.36	Yes	331	109,561

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
FOREST AVE	N of HUMBOLDT RD	1,145	1,304	1.14	0.41	0.34	Yes	159	25,281
FOREST AVE	N of HWY 32	360	144	0.40	-1.04	0.58	No	-216	46,656
HOOKER OAK AVE	E of MADRONE AVE	203	119	0.59	-0.66	0.63	Yes	-84	7,056
HOOKER OAK AVE	W of MANZANITA AVE	259	99	0.38	-1.07	0.58	No	-160	25,600
HAWTHORNE AVE	W of MADRONE AVE	102	27	0.26	-1.08	0.68	No	-75	5,625
HUMBOLDT RD	W of FOREST AVE	286	346	1.21	0.36	0.58	Yes	60	3,600
MANZANITA AVE	E of MADRONE AVE	469	230	0.49	-0.98	0.52	Yes	-239	57,121
MANGROVE AVE	N of E 7TH AVE	1,724	2,049	1.19	0.64	0.29	Yes	325	105,625
MARIGOLD AVE	S of EAST AVE	346	268	0.77	-0.39	0.58	Yes	-78	6,084
MARIGOLD AVE	N of EAST AVE	296	393	1.33	0.57	0.58	Yes	97	9,409
MARIPOSA AVE	N of EAST AVE	438	202	0.46	-1.04	0.52	No	-236	55,696
NOTRE DAME BLVD	N of SKYWAY	1,248	1,441	1.15	0.45	0.34	Yes	193	37,249
NOTRE DAME BLVD	N of FOREST AVE	467	302	0.65	-0.68	0.52	Yes	-165	27,225
PALMETTO AVE	E of MANGROVE AVE	563	532	0.94	-0.12	0.48	Yes	-31	961
PALMETTO AVE	E of SHERIDAN AVE	662	273	0.41	-1.34	0.44	No	-389	151,321
SKYWAY	N of COUTOLENC RD	1,493	2,028	1.36	1.14	0.31	No	535	286,225
SKYWAY	E of CLIFFHANGER LN	1,819	1,927	1.06	0.21	0.29	Yes	108	11,664
SYCAMORE ST	E of RANDOLPH AVE	333	131	0.39	-1.05	0.58	No	-202	40,804
W BIGGS GRIDLEY RD	S of SPRUCE ST	242	53	0.22	-1.24	0.63	No	-189	35,721
GEORGIA PACIFIC WAY	E of HWY 70	161	255	1.58	0.93	0.63	Yes	94	8,836
HUNTOON ST	S of GRACE ST	203	230	1.13	0.21	0.63	Yes	27	729
YARD ST	W of WASHINGTON AVE	107	233	2.18	1.72	0.68	No	126	15,876
OLIVER RD	W of SKYWAY	395	384	0.97	-0.05	0.52	Yes	-11	121
PEARSON RD	E of SKYWAY	775	645	0.83	-0.41	0.41	Yes	-130	16,900
SKYWAY	S of NEAL RD	2,115	2,224	1.05	0.19	0.28	Yes	109	11,881
BILLE RD	E of SKYWAY	749	688	0.92	-0.19	0.44	Yes	-61	3,721
W EATON RD	W of ESPLANADE	519	593	1.14	0.30	0.48	Yes	74	5,476
NEAL RD	E of HWY 99	140	238	1.70	1.11	0.63	No	98	9,604
PENTZ RD	N of HWY 70	299	588	1.97	1.68	0.58	No	289	83,521
HUMBOLDT RD	E of HWY 32 (Chico)	8	0	0.00	-1.46	0.68	No	-8	64
NORD HWY	W of ESPLANADE	335	199	0.59	-0.71	0.58	Yes	-136	18,496
SKYWAY	S of PEARSON RD	2,082	2,686	1.29	1.05	0.28	No	604	364,816
LOWER HONCUT RD	E of HWY 70	90	4	0.04	-1.40	0.68	No	-86	7,396
RICHVALE HWY	E of MIDWAY	120	390	3.25	3.29	0.68	No	270	72,900
CANYON DR	N of OLIVE HWY	271	212	0.78	-0.38	0.58	Yes	-59	3,481
OROVILLE DAM BLVD E	E of CANYON HIGHLANDS DR	429	626	1.46	0.88	0.52	Yes	197	38,809
FEATHER RIVER BLVD	N of ORO DAM BLVD	641	554	0.86	-0.31	0.44	Yes	-87	7,569
PALERMO RD	E of HWY 70	94	230	2.45	2.12	0.68	No	136	18,496
FORBESTOWN RD	W of ROBINSON MILL RD	66	82	1.24	0.35	0.68	Yes	16	256
LUMPKIN RD	N of FORBESTOWN RD	69	54	0.78	-0.32	0.68	Yes	-15	225
PALERMO HONCUT HWY	N of LWR HONCUT RD	77	30	0.39	-0.89	0.68	Yes	-47	2,209
SEVEN MILE LN	S of ORD FERRY RD	39	15	0.38	-0.90	0.68	Yes	-24	576
TOWNSHIP RD	W of HWY 99	153	124	0.81	-0.30	0.63	Yes	-29	841
BIGGS EAST HWY	E of HWY 99	245	298	1.22	0.34	0.63	Yes	53	2,809
LARKIN RD	N of EAST GRIDLEY RD	129	388	3.01	3.19	0.63	No	259	67,081
LINCOLN ST	S of GRACE ST	244	384	1.57	0.91	0.63	Yes	140	19,600
MONTGOMERY ST	W of FEATHER RIVER BLVD	766	773	1.01	0.02	0.41	Yes	7	49
MYERS ST	N of ORO DAM BLVD	573	719	1.25	0.54	0.48	Yes	146	21,316
WASHINGTON AVE	W of ORO DAM BLVD	882	736	0.83	-0.44	0.38	Yes	-146	21,316
LINCOLN BLVD	S of ORO DAM BLVD	1,169	1,760	1.51	1.49	0.34	No	591	349,281
LINCOLN BLVD	S of OPHIR RD	474	433	0.91	-0.17	0.52	Yes	-41	1,681
GARDEN DR	E of HWY 70	356	429	1.21	0.36	0.58	Yes	73	5,329
KELLY RIDGE RD	N of OLIVE HWY	173	102	0.59	-0.65	0.63	Yes	-71	5,041
ORO QUINCY HWY	W of OLIVE HWY	303	308	1.02	0.03	0.58	Yes	5	25
18TH ST	N of ORO DAM BLVD	158	239	1.51	0.81	0.63	Yes	81	6,561
CONCOW RD	W of HWY 70	93	200	2.15	1.68	0.68	No	107	11,449
LARKIN RD	N of E RIO BONITO RD	263	447	1.70	1.22	0.58	No	184	33,856
WALMER RD	E of LINCOLN BLVD	394	222	0.56	-0.84	0.52	Yes	-172	29,584
FOOTHILL BLVD	N of LWR WYANDOTTE RD	131	484	3.69	4.28	0.63	No	353	124,609
W RIO BONITO RD	E of HAWKINS LN	117	193	1.65	0.95	0.68	Yes	76	5,776
B ST	E of FIRST ST	226	138	0.61	-0.62	0.63	Yes	-88	7,744
PEARSON RD	W of CLARK RD	1,038	1,189	1.15	0.41	0.36	Yes	151	22,801
PEARSON RD	E of SAWMILL RD	614	530	0.86	-0.29	0.48	Yes	-84	7,056
PENTZ RD	S or PEARSON RD	563	673	1.20	0.41	0.48	Yes	110	12,100
PENTZ RD	N or BILLE RD	529	585	1.11	0.22	0.48	Yes	56	3,136
SKYWAY	N or BILLE RD	1,099	1,315	1.20	0.55	0.36	Yes	216	46,656
SKYWAY	N or NEAL RD	1,909	2,179	1.14	0.51	0.28	Yes	270	72,900
WAGSTAFF RD	W of SKYWAY	159	69	0.43	-0.90	0.63	Yes	-90	8,100
BILLE RD	W of SKYWAY	268	147	0.55	-0.79	0.58	Yes	-121	14,641
CLARK RD	N of BILLE RD	1,583	1,419	0.90	-0.34	0.30	Yes	-164	26,896
CLARK RD	N of ELLIOT RD	1,412	1,535	1.09	0.28	0.31	Yes	123	15,129
SKYWAY	S of MANZANITA ST (Stirling City)	40	79	1.98	1.43	0.68	No	39	1,521
HWY 99	N OF BUTTE COUNTY LINE	1,039	1,085	1.04	0.12	0.36	Yes	46	2,116
COHASSET RD	N OF MUSTY BUCK RD	12	11	0.92	-0.12	0.68	Yes	-1	1
HWY 32	N OF HUMBOLDT RD	98	104	1.06	0.09	0.68	Yes	6	36
HUMBOLDT RD	N OF JONESVILLE RD	1	0	0.00	-1.46	0.68	No	-1	1
HWY 70	N OF BUTTE COUNTY LINE	135	137	1.01	0.02	0.63	Yes	2	4
OROVILLE QUINCY HWY	N OF HASKINS VALLEY RD	23	22	0.96	-0.06	0.68	Yes	-1	1
FORBESTOWN RD	E OF RESERVOIR RD	73	71	0.97	-0.04	0.68	Yes	-2	4
LA PORTE RD	NE OF ROBINSON MILL RD	37	37	1.00	0.00	0.68	Yes	0	0
LOMA RICA RD	S OF LA PORTE RD	27	27	1.00	0.00	0.68	Yes	0	0
LA PORTE RD	S OF BUTTE COUNTY LINE	12	11	0.92	-0.12	0.68	Yes	-1	1
HWY 70	S OF BUTTE COUNTY LINE	1,076	1,109	1.03	0.09	0.36	Yes	33	1,089
LARKIN RD	S OF BUTTE COUNTY LINE	258	250	0.97	-0.05	0.58	Yes	-8	64
HWY 99	S OF BUTTE COUNTY LINE	1,354	1,334	0.99	-0.05	0.33	Yes	-20	400
PENNINGTON RD	S OF RUTHERFORD RD	32	30	0.94	-0.09	0.68	Yes	-2	4
COLUSA HWY	W OF CHEROKEE CANAL RD	61	59	0.97	-0.05	0.68	Yes	-2	4
AFTON RD	W OF AGUAS FRIAS RD	11	11	1.00	0.00	0.68	Yes	0	0
HWY 162	W OF BUTTE COUNTY LINE	140	137	0.98	-0.03	0.63	Yes	-3	9
ROAD Z	S OF ROAD 48	23	24	1.04	0.06	0.68	Yes	1	1
ORD FERRY RD	W OF HUGH BABER LN	274	287	1.05	0.08	0.58	Yes	13	169
HWY 32	W OF BUTTE COUNTY LINE	1,150	1,135	0.99	-0.04	0.34	Yes	-15	225

Roadway	Segment	Count Two Way	Model Two Way	Model /Count	Model # Deviation	Maximum Deviation	Within Deviation	Model - Count	Difference Squared
HWY 99	N OF NELSON SHIPPEE RD	1,003	1,476	1.47	1.32	0.36	No	473	224,117
HWY 99	S OF SR 162 W	1,298	1,482	1.14	0.44	0.33	Yes	184	33,856
HWY 70	S OF WELSH/PALERMO RD	1,233	1,275	1.03	0.10	0.34	Yes	42	1,764
HWY 70	BETWEEN NELSON AVE AND GARDEN DR	2,031	2,087	1.03	0.10	0.28	Yes	56	3,136
HWY 70	N OF PENTZ RD	265	348	1.31	0.54	0.58	Yes	83	6,889
HWY 149	BETWEEN SR 70 & SR 99	1,539	868	0.56	-1.44	0.30	No	-671	450,241
PENTZ RD	N OF LIME SADDLE ROAD	315	455	1.44	0.77	0.58	Yes	140	19,600
OROVILLE DAM BLVD W	BETWEEN 12TH ST AND SR 70	458	1,221	2.67	3.20	0.52	No	763	582,169
RICETON HWY	S OF SH 162	107	93	0.87	-0.19	0.68	Yes	-14	196
PALERMO HONCUT HWY	S OF OLD HONCUT RD	84	78	0.93	-0.10	0.68	Yes	-6	36
	Total	193,742	204,159						

Indicates Model Below Target Volume

Indicates Model Above Target High Volume

Model/Count Ratio =	**1.05**	
Percent Within Caltrans Maximum Deviation =	**76%**	> 75%
Percent Root Mean Square Error =	**32%**	< 30%
Correlation Coefficient =	**0.95**	> 0.88

Total Count	**282**
Link Within Deviation	**214**
Link Outside Deviation	**68**

ATTACHMENT 4

Methodology to Calculate CO2 Adjustment to EMFAC Output for SB 375

Methodology to Calculate CO2 Adjustment to EMFAC Output for SB 375 Target Demonstrations

Background:

In 2010, ARB established regional SB 375 greenhouse gas (GHG) targets in the form of a percent reduction per capita from 2005 for passenger vehicles using the ARB Emission Factor model, EMFAC 2007. EMFAC is a California-specific computer model that calculates weekday emissions of air pollutants from all on-road motor vehicles including passenger cars, trucks, and buses. ARB updates the EMFAC model periodically to reflect the latest planning assumptions (such as vehicle fleet mix) and emissions estimation data and methods. Since the time when targets were set using EMFAC2007, ARB has released two subsequent versions, EMFAC2011[1] and EMFAC2014[2].

ARB has improved the carbon dioxide (CO2) emission rates in EMFAC2011 and EMFAC2014, based on recent emission testing data and updated energy consumption for air conditioning. In addition, vehicle fleet mix has been updated in EMFAC2011 and again in EMFAC2014 based on the latest available Department of Motor Vehicle data at the time of model development. These changes have lowered the overall CO2 emission rates in EMFAC2011 and EMFAC2014 compared to EMFAC2007.

Purpose:

Some metropolitan planning organizations (MPOs) used EMFAC 2007 to quantify GHG emissions reductions from their first Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS); others used EMFAC 2011. As MPOs estimate GHG emissions reductions from subsequent RTP/SCSs, they will use the latest approved version of EMFAC, but using a different model will influence their estimates and their ability to achieve SB 375 targets. The goal of this methodology is to hold each MPO to the same level of stringency in achieving their SB 375 targets regardless of the version of EMFAC used for its second RTP/SCS.

ARB staff has developed this methodology to allow MPOs to adjust the calculation of percent reduction in per capita CO2 emissions used to meet the established targets when using either EMFAC2011 or EMFAC2014 for their second RTP/SCS. This method will neutralize the changes in fleet average emission rates between the version used for the first RTP/SCS and the version used for the second RTP/SCS. The methodology adjusts for the small benefit or disbenefits resulting from the use of a different version of EMFAC by accounting for changes in emission rates, and applies an

[1] EMFAC2011 was approved by USEPA in March 2013.
[2] EMFAC2014 is under review for USEPA approval.

adjustment when quantifying the percent reduction in per capita CO2 emissions using EMFAC2011 or EMFAC2014.

Applicability:

The adjustment is applicable when the first RTP/SCS was developed using either EMFAC2007 or EMFAC2011 and the second RTP/SCS will be developed using a different version of the model (EMFAC2011 or EMFAC2014).

- Hold the 2005 baseline CO2 per capita estimated in the first RTP/SCS constant. Use both the human population and transportation activity data (VMT and speed distribution) from the first RTP/SCS to calculate the adjustment.
- Add the adjustment to the percent reduction in CO2 per capita calculated with EMFAC2011 or EMFAC2014 for the second RTP/SCS. This will allow equivalent comparison to the first RTP/SCS where emissions were established with EMFAC 2007 or EMFAC2011.

Example Adjustment Calculation (hypothetical for illustration purposes):

In this example, the first RTP/SCS was developed using EMFAC2007 and the second RTP/SCS using EMFAC2011 to calculate the CO2 per capita.

Step1: Compile the CO2 per capita numbers from the MPO's first adopted RTP/SCS using EMFAC 2007 without any off-model adjustments for calendar years (CY) 2005, 2020, and 2035 for passenger vehicles.

Calendar Year	EMFAC2007 CO2 Per capita (lbs/day)
2005	30.0
2020	28.8
2035	27.6

Step 2: Calculate the percent reductions in CO2 per capita from the 2005 base year for CY 2020 and 2035 from Step 1.

Calendar Year	EMFAC2007 Percent Reductions (%)
2020	4.0%
2035	8.0%

Step 3: Develop the input files for the EMFAC2011 model using the same activity data for CY 2020 and 2035 from the first adopted RTP/SCS (same activity data used in Step 1) and execute the model.

Step 4: Calculate the CO2 per capita for CY 2020 and 2035 using the EMFAC2011 output from Step 3; do not include Pavley I, LCFS, and ACC benefits for passenger vehicles.

Calendar Year	EMFAC2011 CO2 Per capita (lbs/day)
2020	28.2
2035	27.9

Step 5: Calculate the percent reductions in CO2 per capita for CY 2020 and 2035 calculated in Step 4 from base year 2005 established in Step 1.

Calendar Year	EMFAC2011 Percent Reductions (%)
2020	6.0%
2035	7.0%

Step 6: Calculate the difference in percent reductions between Step 5 and Step 2 (subtract Step 5 results from Step 2 results) for CY 2020 and 2035; this yields the adjustment for the respective CY.

Calendar Year	EMFAC2011 Adjustment (%)
2020	-2.0%
2035	+1.0%

Step 7: Develop the input files for the EMFAC2011 model using the activity data from the new/second RTP/SCS for CY 2020 and 2035 without any off-model adjustments and execute the model.

Step 8: Calculate the CO2 per capita for CY 2020 and 2035 using the EMFAC2011 output from Step 7; do not include Pavley I, LCFS, and ACC benefits for passenger vehicles.

Calendar Year	EMFAC2011 CO2 Per capita (lbs/day)
2020	26.4
2035	26.1

Step 9: Calculate the percent reductions in CO2 per capita for CY 2020 and 2035 calculated in Step 8 from base year 2005 established in Step 1.

Calendar Year	EMFAC2011 Percent Reductions (%)
2020	12.0%
2035	13.0%

Step 10: Add the adjustment factors from Step 6 to the percent reductions calculated for the new/second RTP/SCS (Step 9) using EMFAC 2011 for CY 2020 and 2035.

Calendar Year	Adjusted Percent Reductions (%)
2020	10.0%
2035	14.0%

Follow the same steps to adjust for use of EMFAC2007 or EMFAC2011 to EMFAC2014. Do not include any off-model adjustments during application of the EMFAC adjustment factor.

BCAG Modification of ARB EMFAC Methodology to Calculate CO2 Adjustment to EMFAC Output for SB 375 Target Demonstrations – Draft (4/1/2016)

In 2015, ARB developed a methodology to assist metropolitan planning organizations (MPOs), such as BCAG, in adjusting the calculation of percent reduction in per capita CO2 emissions used to meet established targets when using EMFAC2011 or EMFAC2014 for their second round RTP/SCS. ARB's methodology is intended to allow for the direct comparison of reductions achieved in the first rounds of RTP/SCSs to those attained in the second round while holding each MPO to the same level of stringency in achieving the target.

A key assumption of the ARB methodology is that the 2005 baseline travel estimates developed with the first round RTP/SCS travel demand models will be identical to those produced with the updated models used to estimate travel with the second round RTP/SCS. However, in the case of BCAG's updated travel model, changes to land use data and the trip generation sub-model have caused the model to generate greater estimates of per capita travel for the base year and the 2005 back-cast years in comparison to the first round RTP/SCS model. These changes in base year per capita VMT then effect the forecast years since future land uses are added to the base in order to develop the forecasts. The changes to the base year and back-cast year per capita VMT are discussed further in the modeling memorandum included as an attachment.

In order to address this change in year 2005 baseline outputs, BCAG has modified the ARB methodology to incorporate an adjustment which compensates for this change. This modification is in line with the intent of the ARB methodology which seeks to neutralize the changes between the various versions of EMFAC while allowing for an "apples to apples" comparison of the first and second round of RTP/SCSs.

Included below is an example adjustment calculation which includes the BCAG modification and uses EMFAC2014. The BCAG modification steps are highlighted in blue and all other steps are taken directly from the ARB methodology.

Example

Step 1: Determine the BCAG modification adjustment factor for the calendar year (CY) 2005 utilizing the output vehicle miles traveled (VMT) from the first round RTP/SCS and the second round RTP/SCS. The modification adjustment factor is the output of the second round VMT divided by the first round VMT (second round VMT / first round VMT = adjustment factor).

First Round Total VMT for CY 2005 ->	4,213,000
Second Round Total VMT for CY 2005 ->	4,711,000
Adjustment Factor (2^{nd} Round / 1^{st} Round) =	1.118

Step 2: Compile the CO2 per capita numbers from BCAG's first round RTP/SCS using EMFAC 2007 without any off-model adjustments for CY 2005, 2020, and 2035 for passenger vehicles.

CY 2005 CO2 Per Capita (lbs/day) ->	16.50
CY 2020 CO2 Per Capita (lbs/day) ->	16.17
CY 2035 CO2 Per Capita (lbs/day) ->	16.18

Step 3: Multiply the CY 2005, 2020, and 2035 CO2 per capita numbers from Step 2 by BCAG modification adjustment factor determined in Step 1. This step compensates for the across-the-board increases in per capita travel being generated by BCAG's updates travel model.

Adjusted CY 2005 CO2 Per Capita (lbs/day) ->	18.45
Adjusted CY 2020 CO2 Per Capita (lbs/day) ->	18.08
Adjusted CY 2035 CO2 Per Capita (lbs/day) ->	18.10

Step 4: Calculate the percent reductions in CO2 per capita from the 2005 base year in Step 3 for CY 2020 and 2035 from Step 3. The reductions will be equal to those achieved in the first round RTP/SCS.

CY 2020 CO2 Per Capita Percent Reductions ->	-1.98%
CY 2035 CO2 Per Capita Percent Reductions ->	-1.91%

Step 5: Develop the input files for the EMFAC2014 model using the same activity data for CY 2020 and 2035 from the first round RTP/SCS (same activity data used in Step 2) and calculate the CO2 per capita; do not include Pavley I, LCFS, and ACC benefits for passenger vehicles.

CY 2020 CO2 Per Capita (lbs/day) ->	15.54
CY 2035 CO2 Per Capita (lbs/day) ->	15.39

Step 6: Multiply the CY 2020 and 2035 CO2 per capita numbers from the EMFAC2014 output (Step 5) by the BCAG modification adjustment factor determined in Step 1.

Adjusted CY 2020 CO2 Per Capita (lbs/day) ->	17.38
Adjusted CY 2035 CO2 Per Capita (lbs/day) ->	17.21

Step 7: Calculate the percent reductions in CO2 per capita from the EMFAC2014 outputs for CY 2020 and 2035 calculated in Step 6 from base year 2005 established in Step 3.

CY 2020 CO2 Per Capita Percent Reductions ->	-5.80%
CY 2035 CO2 Per Capita Percent Reductions ->	-6.72%

Step 8: Calculate the difference in percent reductions between Step 7 and Step 4 (subtract Step 7 results from Step 4 results) for CY 2020 and 2035; this yields the adjustment for the respective CY.

CY 2020 EMFAC 2014 Adjustment ->	+3.82%
CY 2035 EMFAC 2014 Adjustment ->	+4.81%

Step 9: Develop the input files for the EMFAC2014 model using the activity data from the new/second RTP/SCS for CY 2020 and 2035 without any off-model adjustments and execute the model.

Step 10: Calculate the CO2 per capita for CY 2020 and 2035 using the EMFAC2014 output from Step 9; do not include Pavley I, LCFS, and ACC benefits for passenger vehicles.

CY 2020 CO2 Per Capita (lbs/day) ->	16.64
CY 2035 CO2 Per Capita (lbs/day) ->	16.25

Step 11: Calculate the percent reductions in CO2 per capita for CY 2020 and 2035 calculated in Step 10 from base year 2005 established in Step 3.

CY 2020 CO2 Per Capita Percent Reductions ->	-9.78%
CY 2035 CO2 Per Capita Percent Reductions ->	-11.93%

Step 12: Add the adjustment factors from Step 8 to the percent reductions calculated for the new/second RTP/SCS (Step 11) using EMFAC 2014 for CY 2020 and 2035.

Adjusted Percent Reductions CY 2020 ->	-5.96%
Adjusted Percent Reductions CY 2035 ->	-7.11%

FEHR PEERS

MEMORANDUM

Date: April 5, 2016

To: Brian Lasagna, BCAG

From: Kwasi Donkor, Fehr & Peers

Subject: Updated Base Year (2014) and 2005 VMT Results

RS14-3263

Fehr & Peers has completed a base year (2014) and 2005 back-cast VMT analysis for the BCAG 2016 RTP/SCS using the recently updated travel forecasting model. BCAG uses a 2005 back-cast year as a benchmark to achieve its per capita emissions reduction targets in 2020 and 2035. This memorandum presents the updated base year and 2005 VMT and compares the results to the previous base year and 2005 VMT presented in the 2012 MTP/SCS.

VMT RESULTS

Table 1 compares the updated 2005 VMT developed for the 2016 RTP/SCS to the previous 2005 VMT from the 2012 MTP/SCS. The 2016 RTP/SCS reports a 12% increase in 2005 VMT over the 2012 MTP/SCS.

Table 2 compares the 2014 base year of the 2016 RTP/SCS to the previous 2010 base year from the 2012 MTP/SCS. Given the difference in analysis year, an increase in VMT would be expected. However, the reported VMT growth of 9.7% outpaces the commensurate population growth of 1%[1] over the four years.

The increase in VMT for both years is primarily attributable to the following factors:

- **Land Use** – Several updates were made to the land use model for the purpose of increasing its accuracy. Base year and 2005 land use estimates were normalized to be consistent with reported Department of Finance (DOF) and Economic Development Department (EDD) estimates for housing and employment. Five new job categories were added to the land use model, improving the employment allocations. Occupancy adjustments were removed from the travel model and applied in the land use model, allowing for a more accurate

[1] U.S. Census Bureau, 2010 & 2014 American Community Survey 5-Year Estimates

application of vacancy for both residential and non-residential uses. These changes have resulted in a slight overall increase in residential housing units and employment within the county when compared to the previous base year and 2005 land use estimates.

- **Trip Generation** – The recent update of the BCAG Travel Forecasting Model involved an extensive re-estimation and calibration of the trip generation sub-model. Trip generation rates were updated using the 2012 California Household Travel Survey (CHTS), which was not available at the time the travel forecasting model was updated for the 2012 MTP/SCS. The cross-classification of trips by workers and income category was also updated to align with the new CHTS data. This resulted in an overall higher trip generation model-wide as compared to the 2012 MTP/SCS model.

Land use and trip generation are key variables affecting VMT. For example, more land use activity leads to more trip generation and, therefore, more travel. It is likely that these changes contributed to the increase in base year and 2005 VMT reported for the 2016 RTP/SCS.

TABLE 1: BUTTE COUNTY 2005 DAILY VMT SUMMARY BY SPEED BIN		
VMT Speed Bins (MPH)	**2012 MTP/SCS**	**2016 RTP/SCS**
0 – 5	2,037	4,025
5 – 10	33,211	45,961
15 – 20	4,952	1,474
20 – 25	28,039	26,733
25 – 30	443,889	486,292
30 – 35	148,080	98,711
35 – 40	967,285	1,266,331
40 – 45	264,786	174,491
45 – 50	514,254	750,235
50 – 55	326,201	240,339
55 – 60	459,714	405,646
60 – 65	55,928	39,220
65 – 70	964,798	1,171,154
70 – 75	0	0
>75	0	0
Total	**4,213,175**	**4,710,611**

Note:

- VMT excludes X-X Trips

Source: Fehr & Peers, 2016

TABLE 2: BUTTE COUNTY BASE YEAR DAILY VMT SUMMARY BY SPEED BIN		
VMT Speed Bins (MPH)	**2010**	**2014**
0 – 5	2,113	3,816
5 – 10	34,552	44,286
10 – 15	5,131	1,551
15 – 20	28,708	26,999
20 – 25	460,753	492,949
25 – 30	150,393	102,633
30 – 35	996,203	1,261,339
35 – 40	271,261	179,765
40 – 45	522,693	735,691
45 – 50	334,976	231,386
50 – 55	469,914	415,847
55 – 60	64,069	38,538
60 – 65	980,408	1,206,251
65 – 70	0	0
70 – 75	0	0
>75	0	0
Total	**4,321,174**	**4,741,051**

Note:
- VMT excludes X-X Trips
- 2010 VMT estimates based on 2012 MTP/SCS Model, 2014 VMT estimates based on 2016 RTP/SCS Model

Source: Fehr & Peers, 2016