

**ATTACHMENT 1  
SMALL AREA FORECAST  
TELUM MODEL DOCUMENTATION**

## TAZ Structure

The socio-economic forecast is based on regional population and employment figures prepared by the Colorado State Demographer and adopted by the PPACG Board of Directors. The regional forecast numbers are divided into smaller zones called traffic analysis zones (TAZs). The forecasts for the TAZs are referred to as the small area forecasts.

### *New Transportation Analysis Zones for 2035*

Since the completion of the 2030 Small Area Forecasts in 2003, PPACG was made aware of the desire among its member governments to increase the number of TAZs in the socio-economic forecasting model in order to more accurately forecast growth. In the 2030 Small Area Forecast there were 516 TAZs covering El Paso County and the Woodland Park portion of Teller County. For the 2035 Small Area Forecast, additional TAZs were created resulting in 625 in El Paso County and 51 in Teller County for a total of 676 TAZs.

### *TAZ Development Process*

PPACG staff met with staff from those PPACG member entities that have been experiencing growth in their municipal land area and/or growth in the amount of new development occurring on previously undeveloped land. These entities were the Counties of El Paso and Teller, the Cities of Colorado Springs, Fountain and Woodland Park, and the Town of Monument. The majority of the 171 new TAZs that were created are located within the boundaries of the above municipalities and in those parts of unincorporated El Paso and Teller Counties bordering these municipalities. The following data was analyzed and used as the basis to create new TAZ's:

- The latest available aerial photographs (June 2005) were used to identify growth in housing units that had occurred within the existing TAZs between 2000 and 2005;
- Member entity staff's knowledge of where growth was expected to occur within existing TAZs;
- 2000 Census tract, block group and block geographies;
- 2000 Census population thresholds for Census tracts were used as a guide to splitting existing TAZs;
- Logical divisions of TAZ boundaries based on existing roadways;
- Logical divisions of TAZ boundaries based on creeks and other drainage ways when Census boundaries and roadways were not available;
- The assumption that smaller socio-economic zones would more accurately model future travel behavior throughout the region;
- Minor corrections to 2030 Small Area Forecast boundaries;
- Data from 2030 TAZs were reallocated among new TAZs based on proportional shares of housing units for population, and on aerial photos and the 2004 Qwest employment database for employment;

- In Teller County, TAZs were created as Teller County was not included in the 2030 Small Area Forecast. TAZ boundaries were developed to match the 2000 Census blocks, subdivision boundaries and existing roadways as closely as possible; and
- 2000 and 2005 socio-economic data were developed for all TAZs in Teller County based on Census 2000 block and block group level observed data, parcel maps, and building permits.

## SOCIO-ECONOMIC FORECASTING MODEL

### TELUM Model

To prepare the small area forecasts, PPACG uses a computer modeling program called TELUM (Transportation Employment Land Use Model). TELUM is a socio-economic distribution model that does not predict growth in jobs and households; rather it distributes them within a region.

#### *Definition and History*

Many types of socio-economic models exist. The most detailed and complex models tend to be used by large metropolises with substantial budgets dedicated to forecasting. At the opposite end of the spectrum, the panel-of-experts model, called the “Delphi method”, tends to be used by the smallest agencies, which lack the resources to use almost any mathematical model. Other agencies create models based on simple, linear observed trends. The U.S. Federal Highway Administration (FHWA) funded the development of TELUM so that small- and middle-sized agencies could have access to a level of sophistication and reliability that was traditionally out of their reach.

Like many of the popular models that predict socio-economic conditions, TELUM has a long history. It has evolved over the years to accommodate changes in development patterns, trends, and influences as they have been uncovered by research. Originally developed by Dr. Putman during the early 1970s, the essential model has been called, at different times, ITLUP, Metropolis, DRAM/EMPAL, and TELUM. This model currently enjoys the widest popularity and implementation of all socio-economic models. PPACG used the DRAM/EMPAL version of this model in the preparation of its small area forecasts in the past and has made the decision to return to it because of its reasonable results, replicability and ease of use.

#### *TELUM Process*

The success of TELUM and its predecessors is largely due to their use of widely available data. Although TELUM’s data requirements are not extremely sophisticated, the model maximizes reliability by using variables that have demonstrated the very strongest influence over development. To predict household and employment distribution, TELUM uses existing and prior household and employment distribution and

trends, land use data, and auto accessibility. PPACG used local data rather than national averages in creating the 2035 small area forecast.

TELUM predicts group behavior at the analysis zone level. TELUM does an excellent job providing information about its own level of accuracy in predicting the location of households and employment. In the same vein, the advanced self-calibration process in TELUM is important because it picks up on—and reproduces—regional trends. The TELUM package consists of two core modules: DRAM (Disaggregated Residential Allocation Model) and EMPAL (EMPloyment Allocation Model). Although these two modules overlap during certain stages of the prediction process, EMPAL essentially runs first.

Although PPACG's TELUM model uses six employment categories, TELUM initially makes one important, high-level distinction between these employment types: each is considered to be either basic (non-local market sensitive) or non-basic (local market sensitive). The first type of employment to be allocated is basic, which can be defined as export-related employment. Households and non-basic employment will make location decisions based in part upon the location of basic employment.

Once basic employment has been forecast, a more intense interaction takes place between the households and the non-basic (local market sensitive) employment sectors. So the businesses may follow the rooftops, or the jobs may lead, depending upon which type of employment is being allocated.

During the discussion of a particular variable, it is important to note that each variable, by itself, represents an *influence* over model allocations. No one factor dictates allocation. The relationship between jobs and households is probably the most important one to be used by the model. The nature of the relationship that is modeled is a composite of several relationships. Past regional trends from 2000 to 2005, in the case of the 2035 Small Area Forecast, play a large part. The Census provides information that describes the relationship between households and employment specific to the region. This relationship is called the PUMS Ratio (because it is derived from Census long form data stored in the Public Use Microdata Sample). This ratio describes the way that households of different income categories will respond to changes in different employment types. Another regional ratio, employees per household by income category, describes the number of households that will be affected by a change in employment, again, specific to the Pikes Peak Region.

Other factors that affect the allocation of households and employment are land use acreages and auto accessibility. TELUM uses land use data to make it density sensitive. TELUM picks up on base-year densities and consumes available land at a comparable rate in most analysis zones. In this way the model knows when a zone is “built out” and will densify individual zones only where demand for development is greatest. On the other hand, TELUM is aware of which zones lay adjacent to any given zone, so demand for development in a zone may spill over into an adjacent zone that has more available

land. This enables the model to avoid over densifying one zone while an empty zone sits undeveloped next door.

Auto accessibility inputs come from PPACG's travel demand model. TELUM requires zone-to-zone travel times from a travel demand model for each forecast year. This represents a tremendous improvement over previous models that did not acknowledge the influence of transportation upon the location of households or businesses. Each household and employment type develops its own distinct relationship with travel times within the model. The travel demand model generated travel times for TELUM:

- Using the approved 2030 model with corrections for existing (2005) network (lanes, functional class, speed, capacity);
- Using the approved 2030 projects with completion years identified by member entity staff; and
- Using the congested evening peak travel time between every combination of two analysis zones.

TELUM and the travel demand model work iteratively to show the interaction between land use and transportation over time. This interaction occurs at each forecast period. The first time TELUM is run, data for the base year and the lag year entered together for calibration and to develop trends for forecasts. For the first forecast period, the base year data plus the travel impedances for that time period are entered into TELUM. The resulting household and employment distribution is then fed back into the travel demand model, which generates a new set of travel impedances for use during the next forecast period. This process is repeated for each forecast period until the desired year is reached.

The total numbers of jobs and households to be allocated by the model during a forecast period is dictated by control totals entered by the user. The model does not attempt to predict the level of growth in the region, only its distribution. For the 2035 Small Area Forecast, the control totals come from the Colorado State Demographer.

TELUM offers the option of using local planning knowledge to impose constraints upon the prediction process. TELUM applies these constraints during the distribution of jobs and households eliminating the need for manual redistribution. Zonal numbers of households and employees may be set by the user by total or by category, or, preferably, minima or maxima may be specified, leaving the model free to work within those limits.

### RAZ Structure

#### *The Need for a RAZ Geography*

A limit on the number of analysis zones allowed in TELUM created the need for a new geography called regional analysis zones, or RAZs. TELUM's limit of 499 zones precluded the direct use of the transportation analysis zone (TAZ) structure, which consists of 676 zones.

## *Methodology*

PPACG wanted to create a RAZ geography that deviated as little as possible from the TAZ structure already in place. To that end, the RAZ structure was produced by combining certain TAZs until the upper zone limit allowed by TELUM was reached. RAZs that are not aggregates of TAZs correspond exactly to a single TAZ. Because transportation demand modeling would eventually be performed at the TAZ level, the creation of RAZs was done with consideration for future disaggregation back to TAZs. Specifically, aggregation was only performed upon TAZs that would lead to a RAZ with a relatively homogenous composition. That is, two or more TAZs might be combined if they possessed similar characteristics, especially established residential neighborhoods with similar densities. This would allow zones to be disaggregated based upon simple measures such as the ratio of their land area or population.

### Land Use Data

#### *How TELUM Uses Land Use Data*

TELUM uses different types of land uses as capacity limits in allocating households and employment. Land use data is delineated by TAZ, and given in gross acres. Acreage of specific types of land uses such as vacant developable land, residential land, commercial land and land used for basic employment are used by TELUM to determine where there is room to grow in the region. PPACG staff collected shapefile data for current land use (2005) from each member government. These shapefiles and land uses were taken from master plans, and from zoning maps when master plan data were not available. PPACG staff conducted a process of fitting the member entity land use designations to TELUM land use categories. The following is a list of TELUM land use categories and the corresponding land use designations (generalized) from PPACG member entity land use schemas and zoning classifications.

#### TELUM Land Use

Land area occupied by commercial (service, retail, office) employment.

Land area occupied by basic employment (manufacturing, mining, any industries that export goods and services outside region; high-tech, defense etc., also includes institutional employment).

Land occupied by residential development

#### Member Entity Land Use

Commercial, office uses.

Industrial, extractive, utilities, schools, institutional, military, libraries, police/fire, hospitals.

All residential land uses.  
(all housing types).

Land occupied by streets and highways.	Land occupied by streets and highways.
Vacant developable land (total vacant land minus restricted or reserved land).	Agriculture, vacant land.
Total usable land (developed + vacant developable).	Commercial, basic, residential, agriculture, vacant land.
Total unusable land (restricted or reserved).	Parks, open space, golf courses, cemeteries, conservation easements, flood plains, steep slopes, State lands, National Forest lands, BLM lands.
Total developed land area = (commercial + residential + basic + streets and highways).	
Total land area = all land excluding all bodies of water.	

## POPULATION AND HOUSEHOLDS

### Definitions

The following defines the key population and household data utilized in the 2035 Small Area Forecast:

- Population is defined as the population in households, which is a subset of the total population. The total population in the small area forecast dataset is the sum of the population (in households) and (population in) group quarters.
- Households include all the people who occupy a single housing unit. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room occupied as separate living quarters. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated people who share living quarters.
- Group quarters is defined as all people not living in housing units. Group quarters consists of institutionalized populations and non-institutionalized populations. Institutionalized populations include correctional institutions, nursing homes and other institutions. Non-institutionalized includes college dormitories, military quarters and other non-institutional group quarters.
- Persons per household is a calculated value. Persons per household is the result of dividing population (in household) by the total households.
- Household incomes are split into the following five categories:

- Low Income Households are defined as households with an annual income from all sources of \$0 to \$19,999.
- Lower-Middle Income Households are defined as households with an annual income from all sources of \$20,000 to \$39,999.
- Middle Income Households are defined as households with an annual income from all sources of \$40,000 to \$59,999.
- Upper-Middle Income Households are defined as households with an annual income from all sources of \$60,000 to \$99,999.
- High Income Households are defined as households with an annual income from all sources of \$100,000 or more.

Data Sources

*Control Totals*

Control totals used in the 2035 Small Area Forecast for population are provided by the Colorado State Demographer at the county level. There are no control totals for households or group quarters. The population control totals used in the 2035 Small Area Forecast for population are:

	<b>2000</b>	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
El Paso County	520,571	565,341	647,600	708,186	762,879	816,060	869,071	935,542
Teller County	21,147	22,348	24,982	27,958	30,841	33,408	35,720	37,771
Model Area	541,718	587,689	672,582	736,144	793,720	849,468	904,791	973,313

Annualized Growth Rates

	<b>2005-2010</b>	<b>2010-2015</b>	<b>2015-2020</b>	<b>2025-2035</b>
El Paso County	2.9%	1.9%	1.5%	1.5%
Teller County	2.4%	2.4%	2.1%	1.3%
Model Area	2.9%	1.9%	1.6%	1.5%

2000. 2000 Population and Households data were obtained from the 2000 Census at the block level. Household income splits data were obtained from the 2000 Census at the block group level. The ratio of the households within each of the five income categories was applied to all blocks within each block group to split households into each income category. Although group quarters data was available from the 2000 Census, it was not obtained as TELUM does not use group quarters lag year (2000) data as part of its calibration or forecasting.

2005. 2005 Population and Households data for El Paso County and Woodland Park were grown from the 2000 Census-based levels utilizing growth rates between 2000 and 2005 by TAZ from the adopted 2030 Small Area Forecast. 2005 Population and Household data for Teller County TAZs outside of Woodland Park were grown from the 2000 Census-based levels utilizing 1) Colorado State Demographer estimates of Teller County and Incorporated Jurisdiction’s 2005 population estimates (control totals) and 2)

Teller County building permit data. 2005 group quarters data was based on data provided by:

- The Area Agency on Aging for nursing homes and retirement facilities.
- The actual facilities or their official websites for:
  - Correctional facilities,
  - Colleges with dormitories, and
  - Military facilities with barracks.

### Quality Assurance Checks and Corrective Actions

The 2000 and 2005 year data were plotted and compared to aerial photos for validation. Additionally, data on population and household estimates from the Colorado State Demographer were compared to the 2000 and 2005 year data. Site visits were also conducted for areas with high recent (actual and/or anticipated) development activity. Furthermore, county assessor data were used to verify date of construction and sale of newly developed properties, number of units in selected multi-family developments and overall validation of 2000 and 2005 year data.

### Military: Growth of Households and Population

#### *Methodology*

Military zones are treated differently from all other zones because changes in military personnel are based upon actions of Congress rather than market forces. In PPACG's modeling region, military installations are essentially equivalent to the zones they occupy—they are overwhelmingly the dominant source of population and employment, or are the only source of population and employment within their zones.

Changes are known for the year 2010, and those numbers are held constant for all subsequent years. There is at present no basis for estimating further changes. Growth in military population and households in 2010 was expected due to the 2005 Base Realignment and Closure (BRAC).

For each military installation the distribution of households into the various income levels was done by extension of the 2005 proportions.

### Data Sources

Household and population numbers on military bases were obtained from economic impact studies and base/post representatives. Household numbers used include plans for the construction of new family quarters and barracks.

### Military Caps

The BRAC process determines when and to what degree the number of active duty military total households grow, and also household income groups. The following table summarizes the levels of growth expected in these categories by the end of the year 2010. The levels in 2010 represent the caps in households for each RAZ and TAZ containing a military installation, from 2010 through 2035.

2010 Base Households							
<u>TAZ</u>	<u>RAZ</u>	<u>LI</u>	<u>LMI</u>	<u>MI</u>	<u>UMI</u>	<u>HI</u>	<u>2010 Total</u>
217	<b>199</b>	52	400	429	130	120	1131
280	<b>240</b>	79	233	234	121	70	738
295	<b>24</b>	197	1250	608	138	79	2272
349	<b>294</b>	30	56	98	45	47	275
520	388	0	0	0	0	0	0

LI = Low Income  
LMI = Lower Middle Income  
MI = Middle Income  
UMI = Upper Middle Income  
HI = High Income

Group Quarters

While TELUM uses 2005 and forecasted year group quarters data for forecasting, it does not forecast group quarters data. The group quarters data was forecasted using a separate methodology that grows group quarters numbers at 2005 proportions with the exception of military barracks, as addressed above.

EMPLOYMENT

Definitions

Employment is split into six categories utilizing the Standard Industrial Classification (SIC) system. All splitting was done at the “Major Group” or two-digit level or above. The categories are:

- Basic is defined as SIC codes 01 through 39, which includes:
  - Agriculture, Forestry, and Fishing,
  - Mining,
  - Construction, and
  - Manufacturing.
- Retail is defined as SIC codes 50 through 59, which includes Wholesale and Retail Trade.
- The first service category is defined as SIC codes 40 through 49, and 91 through 99, which includes Transportation, Communications, Electric, Gas, And Sanitary Services and Public Administration.
- The second service category is defined as SIC codes 60 through 67, 80, 81, and 87, which includes:
  - Finance, Insurance, and Real Estate,

- Health Services,
- Legal Services, and
- Engineering, Accounting, Research, Management, and Related Services.
- The third service category is defined as SIC codes 70 through 79, 82 through 86, 88 and 89, which includes all other services.
- Military is defined as active duty military personnel at Fort Carson, Cheyenne Mountain Air Force Station (NORAD), Peterson Air Force Base, Schriever Air Force Base, and the United States Air Force Academy.

Data Sources

*Control Totals*

Control totals for total jobs used in the 2035 Small Area Forecast are provided by the Colorado State Demographer at the county level. The control totals from the Colorado State Demographer do not subdivide the total jobs into the employment categories used by TELUM. Another employment database (Woods and Poole Economics) was used to determine the percentage of each employment category. These proportions were applied to the total jobs. The employment control totals used in the 2035 Small Area Forecast for are:

El Paso County

	<b>2005</b>	<b>2010</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>
Basic	50,727	58,443	65,521	72,510	79,450	86,697	93,052
Retail	57,174	66,485	74,741	82,507	89,808	97,064	104,731
TCU_Gov/Service1	48,090	55,303	61,635	67,502	72,895	78,116	84,124
FIRES/Service2	56,510	67,236	77,362	87,282	96,858	106,390	116,259
Hosp_Amuse/Service3	69,189	82,569	95,419	108,352	121,326	134,844	146,362
Total Civilian	281,690	330,036	374,678	418,154	460,338	503,112	544,528
Military	39,999	50,654	50,654	50,654	50,654	50,654	50,654
Total	321,689	380,690	425,332	468,808	510,992	553,766	595,182

Annualized Growth Rates

	<b>2005-2010</b>	<b>2010-2015</b>	<b>2015-2020</b>	<b>2025-2035</b>
Basic	3.0%	2.4%	2.1%	1.7%
Retail	3.3%	2.5%	2.1%	1.7%
TCU_Gov/Service1	3.0%	2.3%	1.9%	1.5%
FIRES/Service2	3.8%	3.0%	2.6%	2.0%
Hosp_Amuse/Service3	3.9%	3.1%	2.7%	2.1%
Total Civilian	3.4%	2.7%	2.3%	1.8%
Military	5.3%	0.0%	0.0%	0.0%
Total	3.7%	2.3%	2.0%	1.6%

Teller County

	2005	2010	2015	2020	2025	2030	2035
Basic	1,657	1,930	2,103	2,305	2,496	2,647	2,788
Retail	1,541	1,835	2,035	2,264	2,490	2,679	2,818
TCU_Gov/Service1	1,370	1,618	1,780	1,966	2,149	2,299	2,454
FIRES/Service2	1,518	1,832	2,054	2,302	2,537	2,724	2,944
Hosp_Amuse/Service3	3,827	4,703	5,379	6,171	6,986	7,735	8,281
Total Civilian	9,913	11,918	13,351	15,008	16,657	18,083	19,285
Military	-	-	-	-	-	-	-
Total	9,913	11,918	13,351	15,008	16,657	18,083	19,285

Annualized Growth Rates

	2005-2010	2010-2015	2015-2020	2025-2035
Basic	3.3%	1.8%	1.9%	1.2%
Retail	3.8%	2.2%	2.3%	1.3%
TCU_Gov/Service1	3.6%	2.0%	2.1%	1.4%
FIRES/Service2	4.1%	2.4%	2.4%	1.6%
Hosp_Amuse/Service3	4.6%	2.9%	2.9%	1.9%
Total Civilian	4.0%	2.4%	2.5%	1.6%
Military	-	-	-	-
Total	4.0%	2.4%	2.5%	1.6%

Total Model Area

	2005	2010	2015	2020	2025	2030	2035
Basic	52,384	60,373	67,624	74,815	81,946	89,344	95,840
Retail	58,715	68,320	76,776	84,771	92,298	99,743	107,549
TCU_Gov/Service1	49,460	56,921	63,415	69,468	75,044	80,415	86,578
FIRES/Service2	58,028	69,068	79,416	89,584	99,395	109,114	119,203
Hosp_Amuse/Service3	73,016	87,272	100,798	114,523	128,312	142,579	154,643
Total Civilian	291,603	341,954	388,029	433,162	476,995	521,195	563,813
Military	39,999	50,654	50,654	50,654	50,654	50,654	50,654
Total	331,602	392,608	438,683	483,816	527,649	571,849	614,467

Annualized Growth Rates

	2005-2010	2010-2015	2015-2020	2025-2035
Basic	3.1%	2.4%	2.1%	1.7%
Retail	3.3%	2.5%	2.1%	1.7%
TCU_Gov/Service1	3.0%	2.3%	1.9%	1.5%
FIRES/Service2	3.8%	3.0%	2.6%	2.0%
Hosp_Amuse/Service3	3.9%	3.1%	2.7%	2.1%
Total Civilian	3.5%	2.7%	2.3%	1.8%
Military	5.3%	0.0%	0.0%	0.0%
Total	3.7%	2.3%	2.1%	1.6%

Employment data is one of the cornerstones of the overall modeling system. The six categories of employment—basic, retail, three categories of service, and military—are independently calibrated. Base-year employment distribution is a driver of future-year

employment and households distribution. Although portions of the DRAM and EMPAL modules that power TELUM interact iteratively, EMPAL is essentially the first of the modules to run during the prediction process. For this reason, employment distribution may be the single most important data type to be used in TELUM.

Employment data is the most detailed type of data required by TELUM. It must be supplied, by category, for both the base and lag years. Household data, in contrast, must be supplied by category for the “current” year but only by total for the “lag” year.

Because the U.S. Census—the source of PPACG’s household data—does not provide business data at the level necessary to run the model, a commercially available employment database was purchased for both the base (2005) and lag (2000) years. Purchasing the data for both years from the same provider—Claritas—was essential because the calibration/trend data must come from parallel survey processes. If two different methods and/or standards were used to get data for each year, then apparent growth trends may only reflect differences in the survey methods rather than actual changes on the ground. As added assurance, PPACG performed its own geocoding of the databases using the same street network, E-911.

The distribution reflected in the TELUM input files originates with the Claritas database.

#### Quality Assurance Checks and Corrective Actions

While most commercially available business databases paint a good picture of the general distribution of employment across the region, they are often inaccurate at the analysis-zone level. The Claritas datasets are no exception to this rule. For data cleaning, PPACG conducted the following process:

- 1) Manually checked the location of all business that listed over 80 employees. This would give the highest rate of return for time spent performing corrections. It also meant examining the location of fully half of the jobs in the modeling region.
- 2) Used the “city” attribute of the data as a red flag for further investigation. If the location of a business and the attributed city were mismatched, the location was investigated.
- 3) Researched the addresses of over 1,000 businesses (out of 40,000+) that either had no address or were addressed to a P.O. Box.
- 4) Allowed all points for which no correct address could be located to remain at the original locations assigned to them in the dataset. These locations appeared to be the center of zip code areas.

In addition to examining business locations, PPACG also investigated employee numbers that seemed unlikely or that appeared to be double counted.

Finally, employment data was overlaid on land use data to spot areas where extravagant densities raised the suspicion that an error might exist in one of the datasets. This type of

error-checking was especially important since it directly impacts both employment and land use variables and the relationship that TELUM draws between them.

The results of the corrections were dramatically improved predictability statistics (of the R-squared type), which for some employment categories nearly doubled.

#### Military Facility Growth (active duty and civilians)

Military employment used to be included in the Basic category. During the present forecasting cycle, it was decided that the locating behavior of military employees is sufficiently different from other Basic employment sectors to warrant its own category. This would also make it easier to control the number of forecast military personnel without artificially constraining all Basic employment. The modelers require more control over military numbers because the military is not a market-responsive sector. It does not conform to the theories that govern the model. On the other hand, military employment does lead to changes in population and to changes in demand for other services such as restaurants and movie theaters, so that altogether excluding it from the model would be unrealistic. The decision was to maintain this employment type in the model in a controlled fashion, i.e. using the TELUM feature that allows local knowledge of a future condition to override model predictions.

Modeling staff set the number of military personnel for all modeled years based upon current military figures and information concerning directives (BRAC) that will place additional troops in the region. This is the source, at the regional level, of the military control totals and, at the base/fort level, of the constraints set for particular analysis zones. In every case, the base/fort could be considered equivalent to the zone containing it. Military figures are included in the working spreadsheets but are hard-coded numbers as opposed to formula-derivative numbers as are the other employment sectors: all other sectors were adjusted to conform to control totals.

Additionally, economic impact reports issued by the military installations include the number of civilian employees working on them. At the zonal level, these civilian employment totals were used as controls on the number of non-military employees on each installation. These numbers were not subject to adjustment to the regional control totals.

Forecasting of civilian employment on military installations was also done in a unique manner. The 2005 proportioning of the different employment sectors, and the ratio of civilian-to-military jobs on base, were carried forward throughout the forecast.

#### Military Caps

The BRAC process determines when and to what degree the active duty military and civilian employment grows. The following table summarizes the levels of growth expected in all employment categories by the end of the year 2010. The levels in 2010

represent the caps in employment for each RAZ and TAZ containing a military installation, from 2010 through 2035.

**2010 Forward (employment)**

TAZ	RAZ	BSC	RTL	SVC1	SVC2	SVC3	ACTIVE DUTY (MILITARY)*	Total Employment on Base
217	199	78	298	322	1376	1244	6695	10013
280	240	97	303	3086	818	1574	6645	12523
295	24	305	1781	538	1562	2987	30000	37173
349	294	0	13	5	0	0	6612	6630
520	388	0	0	0	0	0	702	702
<b>Region</b>							<b>50654</b>	

- BSC = Basic
- RTL = Retail
- SVC1 = First Service Category
- SVC2 = Second Service Category
- SVC3 = Third Service Category

**SCHOOL ENROLLMENT**

Definitions

School enrollment is split into three categories. The location of school enrollment is the location of the school, not the location of students' residences. The three school categories are:

- K-8 enrollment is defined as public and private school enrolled students in kindergarten through 8<sup>th</sup> grade.
- High school enrollment is defined as public and private school enrolled students in 9<sup>th</sup> grade through 12<sup>th</sup> grade.
- College enrollment is defined as public and private school full-time students in post-secondary educational facilities.

Data Sources

School enrollment data was collected for 2005 only, as TELUM does not forecast school enrollment. Kindergarten through high school enrollment was collected from the Colorado Department of Education for both public and private schools. Locations and capacities of future schools and expansions of existing schools were provided by school districts. College enrollment was collected from the educational facility or its official website.

Forecasting School Enrollment

Since TELUM does not forecast school enrollment, this data was forecasted using a separate methodology that grows school enrollment numbers proportionately to the total population. Locations and capacities of future schools and expansions of existing schools were utilized in the forecast to the extent that they were available.

**ATTACHMENT II  
PIKES PEAK AREA POPULATION  
2005-2035**

**ATTACHMENT III  
EL PASO COUNTY EMPLOYMENT  
2005-2035**

**ATTACHMENT IV  
TELLER COUNTY EMPLOYMENT  
2005-2035**

**ATTACHMENT V  
TOTAL EMPLOYMENT  
2005-2035**

**ATTACHMENT VI**  
**SMALL AREA POPULATION AND EMPLOYMENT DATA**  
**2005-2035**

**ATTACHMENT VII  
POPULATION MAPS**

**ATTACHMENT VIII  
EMPLOYMENT MAPS**