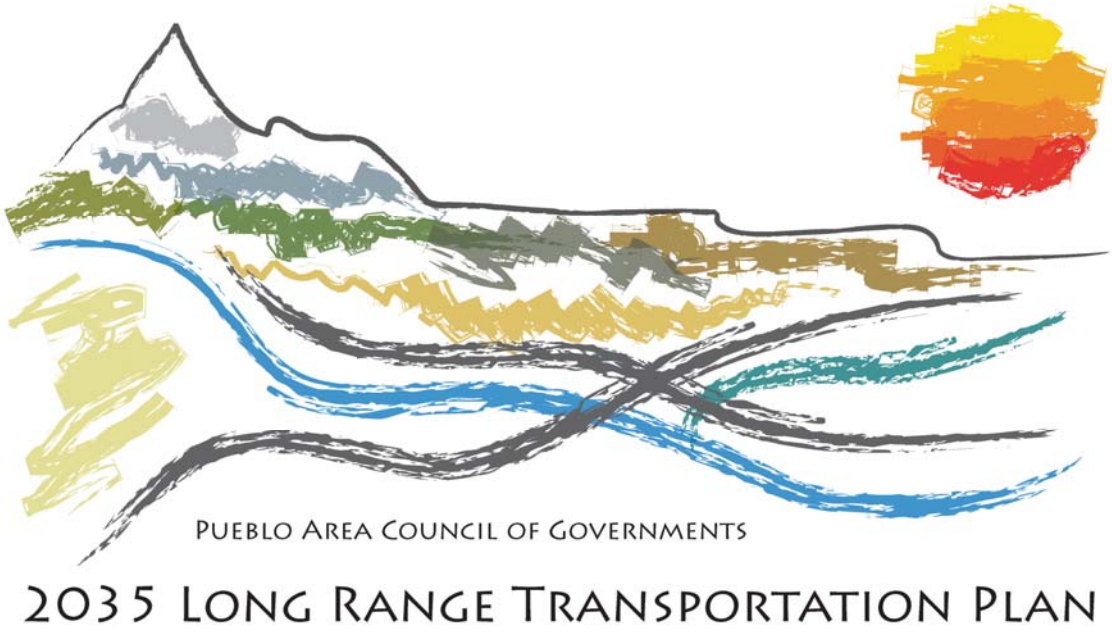

Appendix 4

Development of Population, Household, Employment, and Income Forecasts: 2005-2035

NOTE: This document has been prepared using Federal funding from the United States Department of Transportation. The United States Department of Transportation assumes no responsibility for its contents or use thereof.

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Introduction

As explained in Chapter 4, demographic and economic forecasts are intrinsic to the process of transportation planning. They serve a variety of functions, including transportation modeling, update of the Federally mandated Long Range Transportation Plan, and the development and planning of future roadway networks. The long-range forecasts for Pueblo incorporate a 30-year horizon, from 2005 to a future target data of 2035. The geographic extent of the analysis includes 40 census zones incorporated within Pueblo County and 386 smaller areas known as TAZ's. These are subsequently referred to by their common acronym as TAZ's. The variables forecasted include:

- Total population;
- Population in households;
- Group quarters population
- Households
- Basic sector employment
- Retail sector employment
- Services sector employment
- Income, and
- School enrollment

The selection of variables to be forecasted is largely dependent upon the data required to run the TransCad model. A top-down model approach was used to create the demographic and employment forecasts. Forecasts were initially developed for Pueblo County in its entirety. The countywide forecasts were subsequently disaggregated to 40 smaller areas, which, with some exceptions correspond to the tracts used in conjunction with the 2000 Census. The forecasts at the tract level are presented in Chapter 4. Through an allocation process the forecasts for the 40 zones were distributed to the 386 TAZ's that comprise Pueblo County. The revised forecast which has been incorporated in the 2035 Long Range Plan shows a projected population of 248,012 residents.

Due to the specialized nature of the forecasts by TAZ, and the lengthiness of presenting suitable analyses of the data for 386 Transportation Zones in a publication of this type, persons interested in obtaining the information at the TAZ level should contact the staff of the Metropolitan Planning Organization. This Appendix document to Chapter 4 describes the methodology to develop the forecasts.

Use of the TELUM Model to Develop Small-Area Demographic and Economic Forecasts

TELUM is an abbreviation of Transportation, Economic, and Land-Use Model, and denotes software which was developed by the New Jersey Institute of Transportation. This program is a sophisticated model which has been used by many metropolitan planning organizations to develop long-range forecasts of population, households, and employment. These forecasts are a necessary component of transportation demand forecasting.

Subsequent to the growth analysis described in the preceding section, the TELUM model was used to develop demographic forecasts by five-year increments for the 40 census zones within Pueblo County. The boundaries of these zones are depicted in the sketch maps, Figs. 11 and 12. Each zone is given a numeric designation from 1 through 40. The boundaries of the zones largely reflect the geographic configuration of 2000 census tracts for Pueblo, although in some cases boundaries were modified so that the subsequent allocation of demographic variables to TAZ's would sum to the total for each modified census zone. Also, each Census zone (tract) was assigned a consecutive numeric designation.

The TELUM model requires an extensive dataset of input variables in order to generate. These can be summarized as follows:

- Socioeconomic variables, including population, household and employment data for 2000 and 2005;
- Land use variables, reflecting the current distribution of land use in each census zone, representing total developed land, land suitable for development, vacant land, and the distribution of current land uses for commercial, industrial, and residential usages;
- Zonal travel time data: This is frequently referred to as impedance data, and reflects the travel time between consecutive zones. This is expressed as a 40 x 40 matrix, since there are a total of 40 geographic zones.

An initial run of the TELUM model was executed, which reflects the so-called 'Non-Constrained' scenario. This run represents the base case for subsequent elaborations of the forecasts, and can be viewed as the case where the forecasts are entirely reflective of the dataset values as outlined above.

The reader should also be aware that the 2035 Plan Update revisions to the initial forecasts reflect an assessment that the northeast portions of Pueblo County, particularly zones 34 and 40 are likely to see less growth than was postulated in the set of forecasts developed for the initial 2035 LRTP, due to the downturn in the economic and subsequent withdrawal of the proposed Pueblo Springs Ranch subdivision. These developments reflect policy changes which

cannot be accurately forecasted by models which are based on socioeconomic and land use input data. The TELUM Model incorporates a feature that allows for the reallocation of the initial forecast values in conjunction with the revisions which are subsequently made on the basis of human judgment. These constraints to growth were applied to two census zones having large non-household populations where the TELUM model would have forecast a large growth in household population. Specifically these were Zone 3, the Colorado Mental Health Institute at Pueblo (CMHIP) with its associated correctional facilities, and Zone 9, the CSU-Pueblo campus.

Calculation of Median Income Predictions by TAZ

The forecasts of median income for the 40 census tract areas were based on initially developing long-term forecasts to 2035 for the entire county and then allocating the extrapolations to TAZ's. These were done on the basis of the historic pattern of income trends from 1950-2000, and were extrapolated to 2035 using a 2nd degree polynomial equation fitted to the trend data. The coefficient of determination (R^2) for this data was 0.995. These values were expressed both in current dollars and constant 2005 dollars. Forecasts of U.S. Consumer Price Index data prepared by the Congressional Budget Office were available to 2012. The deflator was calculated using the extrapolated trend of consumer price index data carried forward to 2035.

The countywide forecasts were allocated to individual census tracts using a weighted value of 2 independent estimating techniques.

- Method 1 evaluated the median income of an individual census tract relative to the entire county from 1990 to 2000. The tract's relative change in income ranking during this period was extrapolated to 2035. The final 2035 estimate using this method was derived by multiplying the tract's proportion of the county median income value.
- Method 2 assumes that the tract's median income tends to be stable relative to the countywide value over time. Evaluations of income rankings of census tracts over time suggest that relative changes in the socioeconomic status of neighborhoods occur relatively slowly.

A weighting of 25 percent was given to the Method 1 estimates, and 75 percent to the method 2 values. The deflators expressed in 2005 constant dollars were applied to the estimates to derive income forecasts expressed in both current and constant dollars.

Allocation of the Socioeconomic Forecasts to TAZ's

The final step in the process of developing the forecasts is to allocate

the data for the 40 census zones to the 306 TAZ's. This process is facilitated by the fact that the boundaries of the TAZ's nest within the boundaries of the larger census zones. A ratio technique was used to allocate the tract data to the individual TAZ's. There are three existing datasets of TAZ level demographics that facilitate this process. These include:

- Data from the 2000 Census Transportation Planning Package;
- 2005 estimates developed by the UTPD;
- 2025 forecasts developed in conjunction with the New Pueblo Freeway Project in 2000.

The 2005 estimates were based upon an update of 2000 Census data using residential certificate of occupancy data which is believed to be symptomatic of population growth. Local sources of employment data as well as data from the Quarterly Census of Employment and Wages (QCEW) were the basis of developing employment estimates. The 2025 forecasts were based on land use patterns consistent with the Pueblo Regional Comprehensive Development Plan. The ratio technique alluded to previously is summarized by the following formula, using the example of households:

$$TAZ_{2035} = \left(\frac{TAZ_n}{ZONE_n} \right) * ZONE_{2035}$$

Where TAZ_{2035} = 2035 forecast of households
TAZ_n = number of households in given TAZ for year 2000, 2005, or 2025
$ZONE_n$ = number of households in Census Tract Zone for given year, i.e., 2000, 2005 or 2025
$ZONE_{2035}$ = Zonal number of households in 2035

This ratio was applied to household data for each of the 3 base years, 2000, 2005 and 2025. Therefore a set of 3 separate allocations of households was developed. The final household forecast for 2035 was derived by applying a weighted average of the three separate allocations.

The household forecasts were the basis of deriving forecasted

population. An estimate of the average number of households per census zone for the forecast date of 2035 was derived from the TELUM Model. These ratios were applied to the individual TAZ's which comprised the census zone. The variable 'population in households' was derived by subtracting group quarters population from total population.

The forecasts of employment used a similar ratio technique to allocate census tract zone data to the individual TAZ. Additionally, the employment forecasts were allocated to the following economic sectors:

- Basic employment, i.e., Mining, Construction, Manufacturing, representing North American Industry Classification (NAICS) no's 11-42;
- Retail trade, representing NAICS no's 44-45;
- Services, representing NAICS no's 72-81.

Figure 1: Census Zone Sketch Map – Pueblo Urban Area

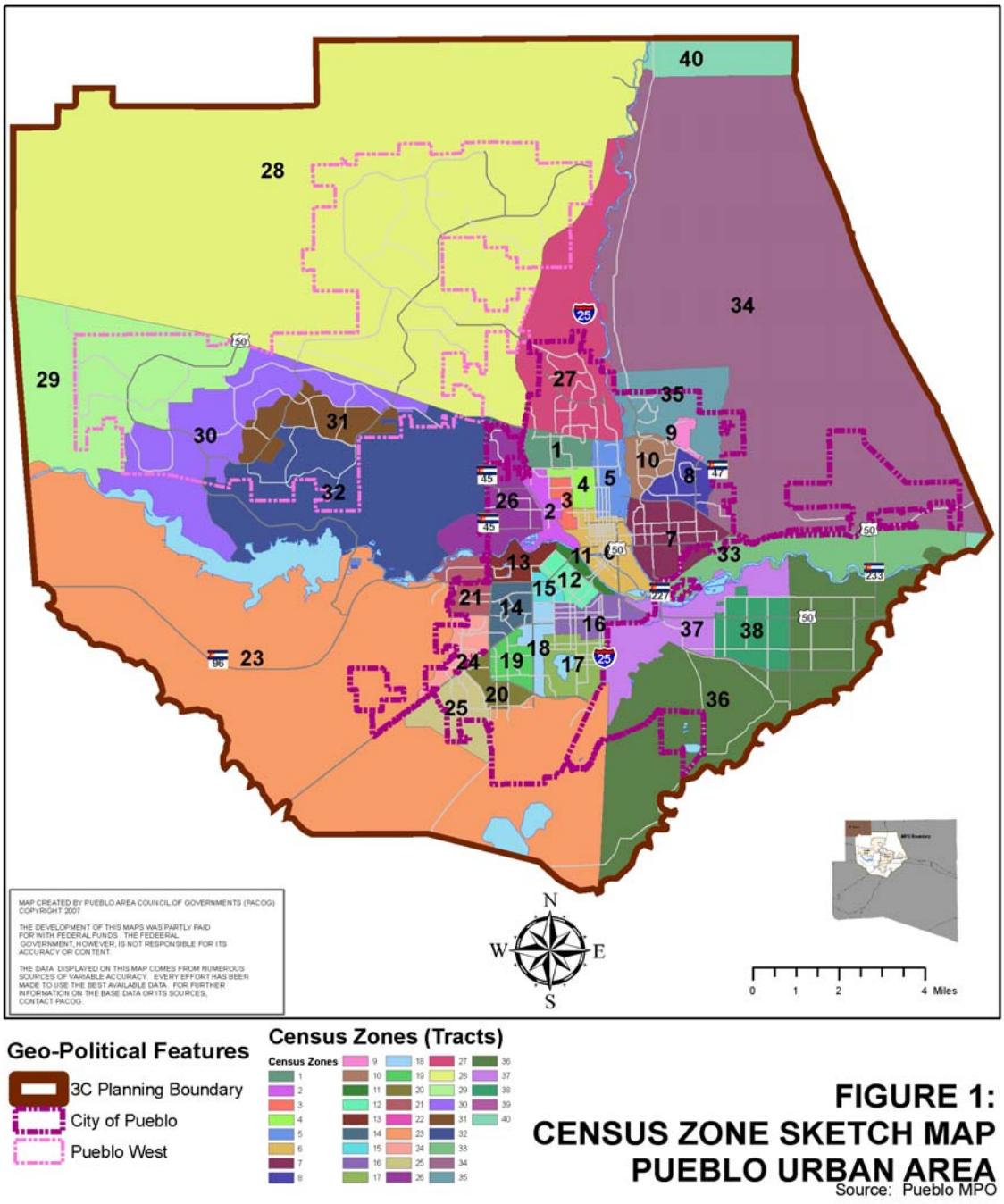

FIGURE 1:
CENSUS ZONE SKETCH MAP
PUEBLO URBAN AREA
Source: Pueblo MPO

Figure 2: Census Zone Sketch Map – Pueblo Rural Area

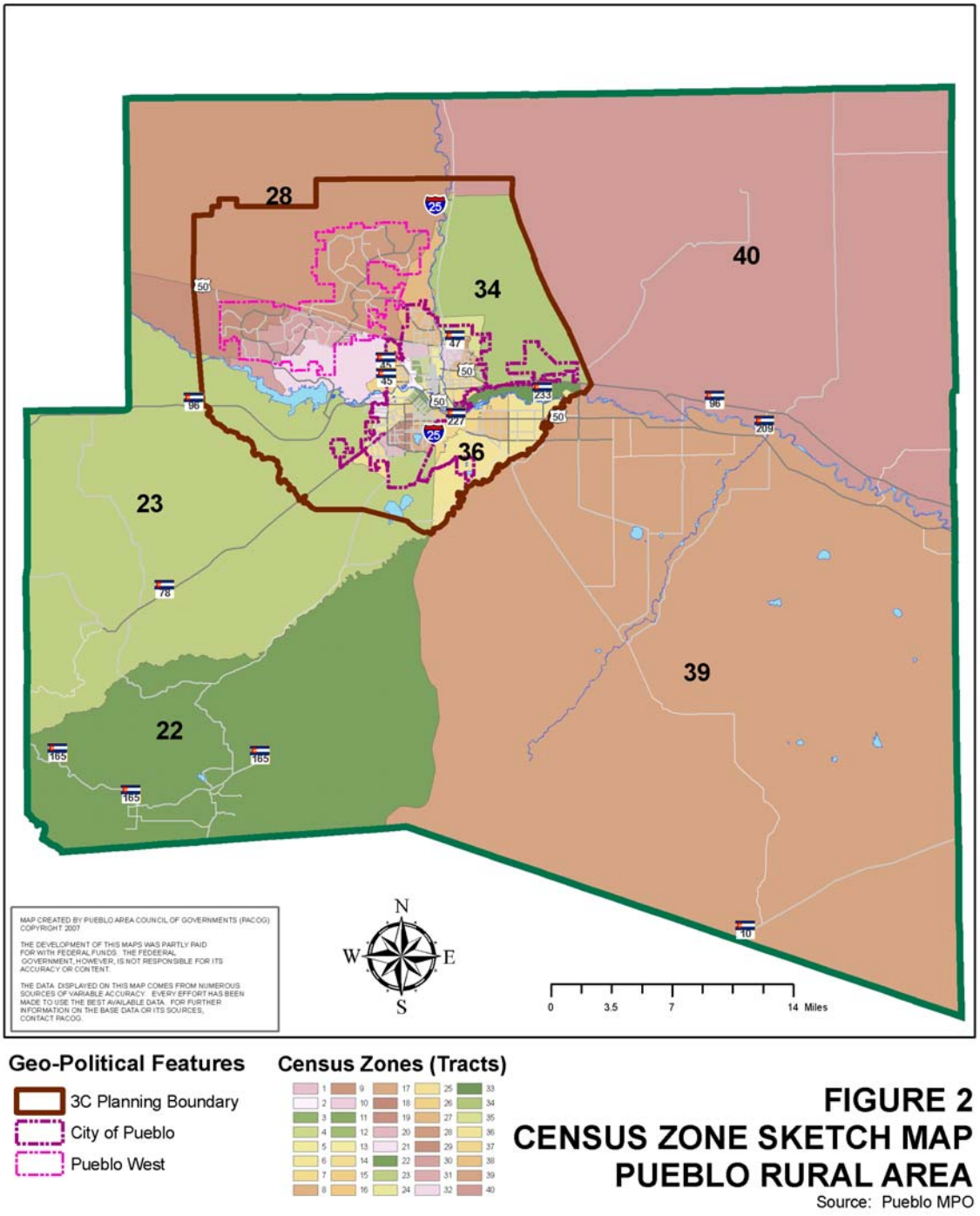

FIGURE 2
CENSUS ZONE SKETCH MAP
PUEBLO RURAL AREA
Source: Pueblo MPO