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Date: September 3, 2010

Memorandum

To: Jim Daisa, Kimley-Horn and Associates

cc:

From: Mike Aronson

Reference: Fresno Public Transportation and Infrastructure Study P08104

Subject: Memorandum #19: Model Development and Adjustment Procedures

The Fresno County Travel Model maintained by the Council of Fresno County Governments (Fresno COG) has been modified to support travel forecasts for the Fresno Public Transportation and Infrastructure Study (PTIS).

Summary

The travel forecasts for the Fresno PTIS are based on the current Fresno County travel demand model maintained by Fresno COG. The model has been modified to ensure that it is sensitive to the range of land use and transit alternatives being studied in the PTIS.

The current travel model was calibrated and validated to replicate observed 2003 traffic and transit volumes. It has been used for travel forecasts for various years up to 2035.

The modifications for the PTIS include:

- Separate coding and attractiveness adjustments for Bus Rapid Transit
- Future increases in gas prices for all trips and increases in parking costs relative to increased land use density
- Shortened walk distances for areas designated as Transit Oriented Development (TOD) to represent effects of increased density, mixed uses and proximity to transit
- Adjustments to account for California High Speed Rail service

The PTIS model modifications result in higher proportions of trips using transit, walk or bicycle modes, particularly to and from designated TOD areas, than the proportions that would be estimated by the current Fresno County model.

Current Travel Model

The Fresno County travel model which is used as the basis for PTIS forecasts is the version completed in September, 2009. This version has been used for air quality conformity. The most recent documentation of the travel model is a draft report dated March 1, 2010.

The Fresno County travel model is a standard "four step" travel demand model:

1. **Trip Generation:** How many person trips by trip purpose (work, shopping, etc…) occur in each TAZ based on the land uses in the TAZ
2. **Trip Distribution:** How many person trips by trip purpose travel to each other TAZ
3. **Mode Choice:** How many person trips by trip purpose between each pair of TAZs choose one of seven travel modes:

    a. Drive Alone
    b. Shared Ride 2 Person
    c. Shared Ride 3+ Person
    d. Transit, Walk Access
    e. Transit, Drive Access
    f. Bicycle
    g. Walk

4. **Trip Assignment:** Which roads or transit routes are used between each pair of TAZs; the traffic assignment spreads traffic among alternate routes to balance congestion

The Fresno County travel model is implemented using the Cube/TP+ software by Citilabs.

Model Calibration and Validation

The Fresno County travel model was *calibrated* (setting equations and parameters) based on the following basic information:

- 2003 land use database representing population, housing, employment, median income and vehicle ownership in each TAZ
- Travel behavior characteristics from household travel diaries reported in the 2000/2001 California Statewide Travel Survey
- Traffic counts representing 2003 traffic volumes
- Transit ridership counts from 2003

Once the equations and parameters were set, the travel model was *validated* by inputting the land use and network information for the 2003 base year, and comparing the model outputs to the observed 2003 traffic and transit counts. The 2003 model validation met

basic standards for replication of traffic volumes by facility type and on selected screenlines, and replicated overall transit ridership volumes.

Model Adjustments for SB 375 Target Setting

Fresno COG added several features to the travel model for the purpose of evaluating land use and transportation scenarios in preparation for proposing air quality targets for compliance with Senate Bill 375 (SB 375). These features focused on reducing the estimates of vehicle trips, and did not provide for improved estimates of transit ridership based on changes in transit service. Therefore, these features were NOT used as a basis for the PTIS model refinements.

Vehicle Trip Adjustments Based on "D" Factors

A process was added to the Fresno County model to estimate changes (decreases or increases) in vehicle trips to and from each transportation analysis zone (TAZ) based on sensitivity to land use and urban design features. The features include Density (housing units and/or employment per square mile), Diversity (mix of uses in each TAZ), Design (elements such as sidewalk completeness) and Destinations, and are typically referred to as the "D factors" or "4 D's."

The "D" factors and corresponding vehicle trip adjustments are calculated relative to a base scenario, which assumes no special land use and urban design features. Fresno COG used the land use forecast from the currently approved Regional Transportation Plan (RTP) as the base scenario. Alternative land use scenarios were developed, and the changes in "D" factors for each TAZ were input to the travel model. The "D's" processor then estimated the changes in vehicle trips based on the changes in "D" factors in each TAZ.

Vehicle Trip Adjustments Based on Rule 9410

The San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) has implemented Rule 9410, which requires employers with more than 100 employees to implement trip reduction strategies. The SJVUAPCD estimated that the proposed trip reduction strategies would result in an average vehicle occupancy (AVO) of 1.3 to 1.4 for commute trips, with an AVO of 1.35 used as a midpoint for calculations.[1]

A set of user input adjustment factors were added to the Fresno County model to test the effectiveness of Rule 9410. The factors allow the person trips using a particular mode for a particular trip purpose to be adjusted above or below the values estimated by the mode choice model.

The Fresno County mode choice model estimated an AVO of 1.08 for Home-Work trips. Fresno COG estimated that 41 percent of employees in Fresno County work at employment sites with more than 100 employees (based on the detailed employment inventory prepared for the 2003 model calibration). If the AVO for 41 percent of the work trips were to be increased from 1.08 to 1.35, the resulting overall AVO for all work trips would be 1.18. A

[1] San Joaquin Valley Unified Air Pollution Control District, "Final Staff Report, Rule 9410 (Employer Based Trip Reduction)," December 17, 2009, Appendix B, page B-4.

factor of 2.00 applied to Home-Work shared ride 2 person and 3+ person trips results in the target AVO and represents implementation of Rule 9410.

The adjustments implemented to represent Rule 9410 are appropriate to represent estimated vehicle trip reductions, but are not sensitive to diversions to various alternative modes such as transit, bicycle or walk based on land use and transit service inputs. Therefore, the Rule 9410 adjustments have not been used for the PTIS travel forecasts.

Model Adjustments for PTIS

The PTIS requires travel forecasts that are sensitive to the range of transportation, land use and policy alternatives being considered in the study. The following changes were made to the model procedures:

Transit Network

- Separate speed estimates for coding of Bus Rapid Transit (BRT) in exclusive bus lanes
- Timed transfers for designated transfer centers and ends of loop routes

High Speed Rail

- Added trips to and from proposed Fresno High Speed Rail station
- Reduced corresponding long-distance auto trips on State Route 99

Travel Costs

- Assumed increases in gas prices and total auto operating costs
- Implemented parking cost increase model based on employment density

Land Use Sensitivity

- Shortened walk distances and times for designated mixed-use and transit-oriented development (TOD) areas, including shortened intrazonal times
- Shortened transit access distances for designated TOD areas

Rapid Transit Adjustments

- Mode choice model includes increased attractiveness of BRT or Light Rail Transit (LRT) modes to account for factors other than travel time and costs

Performance Measures

- Separate calculation of system performance measures for designated TOD areas and Central Business District (CBD)

These modifications are described in greater detail in the following sections.

Transit Network

The modifications to the transit network include separate coding for Bus Rapid Transit and timed transfer centers.

Bus Rapid Transit

Bus Rapid Transit (BRT) is coded similar to other bus lines, by designating a series of nodes along the road network. The standard Fresno County model uses "transit mode" designations of 11 for FAX service, 12 for Clovis fixed-route service, and 13 for rural transit services. Additional transit mode designations have been added for BRT (14) and for light rail transit (15). The travel times on BRT and LRT are tracked separately so they can be used for attractiveness adjustments during the mode choice step.

Bus travel times in the Fresno County model are estimated based on factors which relate the average bus travel time to the average congested auto time on each road segment. The following factors were calibrated based on 2003 auto travel times and published bus schedules:

- Local streets 2.1 x congested auto travel time
- CBD 2.7 x congested auto travel time
- Freeway, highway, rural roads 1.4 x congested auto travel time

Bus rapid transit has several attributes which allow if to travel faster than conventional bus service. The BRT can travel in separate lanes. Whether the BRT is in its own lane or in a shared lane, signal priority is provided at many intersections. Bus stops are spaced further apart, so there are fewer delays for stops. Therefore, new time factors were developed for BRT:

- BRT in exclusive lane 0.7 x congested auto travel time
- BRT in shared lane 1.2 x congested auto travel time

For exclusive bus lanes, the 0.7 factor applied to estimated future congested travel speeds provides overall BRT travel speeds slightly slower than speed limits. For shared lanes, the 1.2 factor provides bus travel times consistent with existing BRT service in shared lanes such as the AC Transit rapid bus service in the Oakland/Berkeley area.

Timed Transfers

The PTIS transit scenarios can include one or more transfer centers. At the transfer centers, bus schedules would be coordinated to minimize wait times for passengers transferring between routes.

The standard travel model calculation of wait times assumes that the average passenger wait time for a bus will be one-half of the scheduled headway (frequency). For a bus route that operates every 30 minutes, the average wait time to board at the initial stop or at a transfer location would be 15 minutes. At transfer centers, the travel model has been adjusted so that the total time between buses is 5 minutes.

Because buses sometimes have to wait at transfer centers to allow other buses to arrive, a 5 minute delay has been added to bus routes that serve transfer centers. The net result is a significant improvement in total travel times for passengers who transfer at the transfer centers, but slightly longer travel times for passengers traveling through the transfer center on the same route.

High Speed Rail

High speed rail adjustments include additional trips at the proposed Fresno station and adjustments to long-distance auto trips on State Route (SR) 99.

California High Speed Rail Ridership

Ridership forecasts for the proposed California High Speed Rail service were obtained from the January 20, 2010 presentation for the Public Information Meeting Open House, California High-Speed Train Project Through Fresno, Fresno to Bakersfield Project EIR/EIS. The presentation presented results of the rail corridor analysis for the full system estimate for the year 2035. The service levels would include 20 through trains per hour with 12 stopping trains per hour during peak hours, and 14 through trains per hour with 8 stopping trains per hour during off-peak hours.

At the Fresno station, the 2035 forecast is for 13,300 average total daily boardings and alightings.

Fresno High Speed Rail Station

The Fresno high speed rail station would be located in TAZ 1324 in downtown Fresno. The rail passenger trips cannot be easily represented using the standard travel model inputs of housing or employment. Therefore, the trips are input as a special generator. A total of 13,300 daily person trips were added to TAZ 1324 as a special generator, split equally between home-end (production) trips and non-home-end (attraction) trips.

Based on other information provided by the California High Speed Rail ridership estimates, 20 percent of the weekday trips were assumed to be work commute (home-work) trips and 80 percent were assumed to be non-work (home-other trip purpose).

The rail passenger trips were input to the travel model as generated person trips, not as trips to and from certain areas or using certain modes. The standard travel model processes are used to estimate the distribution of the rail passenger trips within Fresno County and the travel modes they would use based on attributes such as available transit service.

High Speed Rail Vehicle Reductions

The passenger trips added to the downtown Fresno high speed rail station are assumed to replace other trips by non-rail modes. For the purposes of the PTIS study, the replaced trips are assumed to be auto trips on the State Route 99 corridor which parallels the proposed rail alignment.

The 2035 Fresno travel model includes estimates of "gateway" trips at the county line that would interact with land uses in Fresno County (internal-external and external-internal trips, sometimes referred to as IX/XI or IE/EI). The estimates of IX/XI vehicle trips for 2035 are 73,000 at SR 99 north (Madera County line) and 51,400 at SR 99 south (Tulare County line). Using an average vehicle occupancy (from surveys) of 1.45, these vehicle volumes correspond to 180,300 daily person trips entering or leaving Fresno County via SR 99 in 2035.

The daily high speed rail forecast of 13,300 daily trips at the Fresno station would represent 7.4 percent of the daily trips to and from Fresno via SR 99. Therefore, the gateway trips were assumed to be reduced by 7.4 percent with high speed rail service.

The high speed rail system would also reduce auto trips through Fresno, on Interstate 5 as well as on SR 99. The published documents do not provide specific information on reductions in traffic through Fresno on specific routes. Therefore, the 7.4 percent reduction obtained from the Fresno station analysis was assumed to also apply to through trips on SR 99.

Travel Costs

Travel cost adjustments include gas and auto operating costs, and parking cost changes.

Auto Operating Cost

The mode choice model considers travel times and costs for all modes. The costs for auto travel include *perceived* auto operating cost and parking costs at the destination.

The auto operating costs include gas cost, as well as the perceived amount of other costs such as maintenance and insurance. The auto operating cost is estimated as a cost per mile multiplied by the trip distance.

For many years, the real (adjusted for inflation) cost of fuel remained relatively constant including the effects of increased vehicle fleet mileage. Therefore, most travel models did not assume increases in auto operating cost in constant year dollars. The Fresno County travel model has previously assumed a constant calibrated auto operating cost per mile for all forecast years.

Since around 2005, gas prices have increased faster than standard measures of inflation such as the Consumer Price Index (CPI). Therefore, the travel forecasts for the PTIS assume increases in gas price and average auto operating costs. The assumptions were based on the analysis done by the San Francisco Bay Area Metropolitan Transportation Commission (MTC) in support of their 2009 Regional Transportation Plan (RTP). The operating cost assumptions also include changes in average vehicle fuel efficiency (Table 1).

Table 1: Auto Operating Cost Assumptions

Year	CPI	Gas Price per Gallon	Gas Price (2000 dollars)	Average Fleet MPG	Gas Cost per Mile (2000 cents)	Non Gas Cost (2/3 of gas)	Total Auto Cost (cents per mile
2000	180.2	$1.83	$1.83	19.40	9,43	6.29	15.72
2003	196.4	$1.93	$1.77	19.55	9.05	6.04	15.09
2005	202.7	$2.52	$2.24	19.76	11.34	7.56	18.90
2010	235.3	$4.77	$3.65	20.27	18.01	12.00	30.01
2020	313.2	$7.76	$4.46	25.08	17.78	11.86	29.64
2035	480.9	$16.17	$6.06	32.15	18.85	12.57	31.42

Source: MTC 2009 RTP

The Fresno County model was calibrated to replicate 2003 mode choice characteristics using an average auto operating cost of 15.09 cents per mile. For 2035 travel forecasts, the average auto operating cost will be assumed to increase to 31.42 cents per mile.

Parking Costs

The mode choice model considers auto parking costs at the destination as part of the calculation of the attractiveness of the auto mode versus transit or non-motorized travel. Average parking cost is not necessarily the posted parking rate at a destination. It is intended to represent the average parking cost paid by persons traveling to that destination. Therefore, the average should include those who have parking spaces provided for free as well as those who park further away where parking is lower cost or free.

Existing Parking Costs

The base parking costs in 2000 dollars were based on information on monthly parking rates provided by COG staff. The resulting base parking rates for the 2003 base model validation year are $3.00 per day in the Central Business District (approximately $90 per month in 2010 dollars) and $0.70 at the colleges (approximately $20 per month in 2010 dollars).

Future Parking Costs

Without any changes in parking policies, parking costs tend to increase as employment areas increase in density. A consistent trend can be observed comparing the central business districts of various cities.

A parking cost model has been adapted from the Puget Sound Regional Council (PSRC) to estimate the changes in parking cost which would occur *without policy changes* for each future land use scenario. The PSRC parking cost model was based on a detailed statistical analysis of employment densities and average parking costs.

In the Fresno PTIS modeling, in order to provide a more accurate picture of the entire area affecting parking conditions, employment densities are not calculated for individual TAZs. All TAZs within a ten minute walk are included in the calculation. For each TAZ, the other TAZs (including the subject TAZ) within a ten minute walk are identified, and the total employment in those TAZs is divided by the total land area of those TAZs.

The estimates of future parking cost are based on the following:

- If a TAZ had a parking cost in the 2003 base year, the additional future parking cost is estimated as the increment in employees per square mile times $0.0000831. For example, TAZ 1338 had a density of 16,910 employees per square mile in 2003 and was projected to increase to 64,951 in 2035. The increase in density would be 48,041 and the parking cost would increase by $3.99 for a total of approximately $7.00.

- If a TAZ did not have a parking cost in the 2003 base year, but the employment density is projected to increase to a value greater than 20,000 employees per square mile (the approximate threshold for actual parking costs in the 2003 base year), the

new parking cost is estimated as $1.50 plus the increment (from 20,000) in employees per square mile times $0.0000831.

The parking costs are recalculated for each land use scenario and input to the travel model prior to the full model run.

Land Use Sensitivity

The Fresno County travel model was calibrated based on typical existing urban forms. Alternative types of development use higher density and non-auto-oriented design to encourage greater use of non-auto travel modes. The alternative "urban forms" put complementary land uses closer to each other and closer to transit stops. Since the travel model calibration was not based on these urban forms, additional adjustments are necessary to identify the different types of development and account for their effect on travel behavior.

The "Urban Form Adjustments" included in the PTIS version of the model include adjustments for increased density and proximity of mixed uses, and additional adjustments for Transit Oriented Development (TOD).

Urban Form Adjustments

The PTIS version of the model allows for the identification of TAZs which contain urban forms different from the existing typical Fresno County patterns. These urban forms may include denser single-family or multi-family housing, employment or retail sites that front directly on the street rather than behind large parking lots, mixed uses with housing over commercial, and/or development with improved pedestrian and bicycle connectivity.

The TAZs with non-standard urban forms are given a ranking (or level) between 1 and 3, with a "1" representing the highest level ranking. The subjective ranking is based on the approximate percentage of the TAZ with development encouraging alternative modes, and the intensity of the uses. A TAZ with full redevelopment to mixed-use three-story buildings with ground floor retail and two levels of residential, connected with pedestrian and bike paths to a townhome community would receive a level of 1. A TAZ with standard development in most areas but a mixed-use development in a large corner parcel may receive a level of 3. Most TAZs with no significant changes in urban form would stay at a level of zero.

It is also important to identify groups of TAZs which will have an urban form that encourages non-motorized travel between the TAZs. For example, a dense residential development may be across the street from a pedestrian-oriented shopping center in a different travel model TAZ. If mixed uses are only identified within individual TAZs, the synergy between these two uses would not be recognized. The PTIS model revisions allow TAZs to be grouped into improved urban form districts.

The urban form levels are used to adjust the assumed walk distances within an individual TAZ (intrazonal distance) as follows:

- Urban Form Level 1: Maximum internal walk distance 0.25 miles (5 minutes)

- Urban Form Level 2: Maximum internal walk distance 0.33 miles (7 minutes)
- Urban Form Level 1: Maximum internal walk distance 0.50 miles (10 minutes)

If a TAZ is designated with an Urban Form Level and also an Urban Form District, then the walk distance between the TAZs in each district is set to be no greater than the direct straight line distance between the TAZ centroids. This represents the concept that the improved urban form in these districts will provide direct pedestrian and bicycle connections and not require circuitous connections using the street system.

The shortened walk distances within urban form TAZs and districts affects the model calculations in two places:

- The trip distribution for the urban form areas is based on an average of the shortened walk time and auto time (if the walk time is shorter) rather than just the auto time. This encourages more trips within urban form TAZs and districts compared to conventional modeling, and represents the principal travel behavior benefits of increased densities and mixed uses.

- The mode choice calculations use the shortened walk and bicycle distances when comparing non-motorized travel with other travel modes. The result is higher percentages of walk and bicycle trips within urban form TAZs and districts compared to conventional modeling.

Transit Oriented Development

The PTIS version of the model also allows for the identification of TAZs which are particularly oriented towards improved access to transit, or Transit Oriented Development. As with the Urban Form Levels, the TOD Levels of 1 to 3 are assigned based on the percentage of the TAZ affected and the quality of the transit access improvements.

The TOD Levels are used to adjust the calculated walk distances between a TOD TAZ and transit stops as follows:

- TOD Level 1: Maximum transit walk access time 3 minutes
- TOD Level 2: Maximum transit walk access time 5 minutes
- TOD Level 3: Maximum transit walk access time 7 minutes

The shortened walk access times are used in the mode choice calculations when comparing transit modes to auto and other travel modes. The mode choice model considers walk time to transit to be perceived as twice the equivalent time in a vehicle (a 10 minute walk to a stop or wait for a bus is perceived to be equivalent to 20 minutes riding in a bus or auto). Therefore, reductions in the walk access time can significantly increase the relative attractiveness of the transit mode.

Rapid Transit Adjustments

Higher quality transit services such as Bus Rapid Transit (BRT) or rail transit are known to have attributes that make them relatively more attractive than what would be accounted

for by improved travel times. These attributes may include improved reliability (due to exclusive lanes, traffic signal priority and/or fewer stops), amenities such as designated stations and specially designed vehicles, and very frequent service.

Most travel models such as the Fresno County model can only measure time and cost attributes of travel modes, and cannot inherently model the additional attractiveness of premium transit modes (unless these modes are in operation in the calibration year and parameters are calibrated to represent them). Therefore, adjustments in the attractiveness of the proposed BRT service are used to represent the additional ridership that may use these services.

The source for the adjustment process is the publication TCRP Report 118, *Bus Rapid Transit Practitioner's Guide* (Transportation Research Board, Transit Cooperative Research Program, 2007). The research of existing BRT operations indicates that BRT service can attract up to 25 percent higher ridership than what would be estimated based only on travel time and cost measures. The 25 percent ridership increase only applies to BRT will a full set of amenities, including bus travel lanes that are completely separate from auto travel. A scoring system is used to estimate what share of the maximum 25 percent increase can be assumed for a given BRT system (Figure 1).

The proposed BRT system in Fresno would not have fully grade-separated bus lanes. However, it can be assumed that BRT in Fresno could implement many of the other amenities, including special vehicles and stations. Therefore, a 20 percent ridership increase can be assumed.

The BRT ridership adjustment is implemented within the mode choice model. Once transit paths between origins and destinations are determined, the portion of each transit path on BRT is calculated (from 0 to 100 percent of the transit trip in BRT service). The 20 percent attractiveness increase is applied to the proportion of the transit trip on BRT, and the result is used to compare to the attractiveness of other modes within the mode choice model. A transit trip which only uses BRT would get the full 20 percent increase in attractiveness. A transit trip using BRT for 15 out of the total 30 minutes and a transfer to another non-BRT bus route for 15 minutes would receive a 10 percent increase in attractiveness.

During testing, the attractiveness adjustment was found to increase the estimates of BRT ridership by about nine percent compared to running the travel model without the BRT adjustment.

Figure 1 : Scoring System for BRT Ridership Increases

EXHIBIT 3-22 Additional Ridership Impacts of Selected BRT Components

	Component	Percentage
1.	Running Ways (not additive)	20
	Grade-separated busways (special right-of-way)	(20)
	At-grade busways (special)	(15)
	Median arterial busways	(10)
	All-day bus lanes (specially delineated)	(5)
	Peak-hour bus lanes	—
	Mixed traffic	—
2.	Stations (additive)	15
	Conventional shelter	—
	Unique/attractively designed shelter	2
	Illumination	2
	Telephones/security phones	3
	Climate-controlled waiting area	3
	Passenger amenities	3
	Passenger services	2
3.	Vehicles (additive)	15
	Conventional vehicles	—
	Uniquely designed vehicles (external)	5
	Air conditioning	—
	Wide multi-door configuration	5
	Level boarding (low-floor or high platform)	5
4.	Service Patterns (additive)	15
	All-day service span	4
	High-frequency service (10 min or less)	4
	Clear, simple, service pattern	4
	Off-vehicle fare collection	3
5.	ITS Applications (selective additive)	10
	Passenger information at stops	7
	Passenger information on vehicles	3
6.	BRT Branding (additive)	10
	Vehicles & stations	7
	Brochures/schedules	3
Subtotal (Maximum of 85)		*85*
7.	Synergy (applies only to at least 60 points)	15
Total		*100*

NOTE 1: Applies to a maximum of 10-min travel time bias constant (e.g., percentage of 10 min)

NOTE 2: Applies to a 25% gain in ridership beyond that obtained by travel time and service frequency elasticities

SOURCE: Estimated by research team

Source: TCRP Report 118, *Bus Rapid Transit Practitioner's Guide*, 2007, page 3-22

Performance Measures

A set of systemwide transportation performance measures that could be obtained from the Fresno County model were established during the Blueprint studies:

- Performance Measures based on Transportation Networks
  - Vehicle-Miles of Travel
  - Vehicle-Miles of Travel in Congestion (volume/capacity > 0.90)
  - Percent Vehicle-Miles of Travel in Congestion
  - Person-Miles of Travel in Private Vehicles
  - Person-Miles of Travel in Transit
  - Vehicle-Hours of Travel
  - Person-Hours of Travel in Private Vehicles
  - Person-Hours of Travel in Transit
  - Vehicle-Hours of Delay
  - Person-Hours of Delay in Private Vehicles
  - Person-Hours of Delay in Transit
  - Average Speed in Private Vehicles
  - Average Speed in Transit
- Performance Measures based on Trips
  - Work Auto Trips (number and percent)
  - Work Transit Trips (number and percent)
  - Work Bike/Walk Trips (number and percent)
  - Work Total Trips (number and percent)
  - Non-Work Auto Trips (number and percent)
  - Non-Work Transit Trips (number and percent)
  - Non-Work Bike/Walk Trips (number and percent)
  - Non-Work Total Trips (number and percent)
  - Total Auto Trips (number and percent)
  - Total Transit Trips (number and percent)
  - Total Bike/Walk Trips (number and percent)
  - Total Total Trips (number and percent)

These performance measures are calculated for the entire Fresno County area. For the PTIS study, the trip-based measures can also be reported for the TOD areas (Figure 2), the Fresno/Clovis urban area and/or the CBD.

Figure 2 : Fresno County PTIS Model TOD Dsitricts