FEHR PEERS

UPDATED DRAFT MEMORANDUM

Date: February 21, 2017

To: Ella Wise and Sophie Martin, Dyett & Bhatia

From: Kathrin Tellez and Abhishek Mishra , Fehr & Peers

Subject: ***City of Ceres General Plan – Updated Preliminary Alternatives Analysis***

WC15-3280

This memorandum documents the results of an updated Alternatives Analysis for the City of Ceres General Plan Update. This analysis was conducted using land use data developed by Dyett & Bhatia in consultation with City of Ceres Staff after a preliminary public outreach process. As part of the General Plan process, Fehr & Peers developed a subarea model reflecting the City of Ceres Sphere of Influence pivoting from the Three-County (San Joaquin, Stanislaus, and Merced) regional travel demand model ("Three-County Model"), developed by StanCOG as part of the San Joaquin Valley Model Improvement Program (SJV MIP). Land use and roadway networks within the Ceres subarea were modified to better reflect existing land uses, demographic factors, and roadway network. The Three-County-Model was used as the starting point for this analysis as it has increased sensitivity to the provision of transit, and can also estimate non-auto trip generation. Additional details regarding model development and the validation/calibration process are provided in a separate memorandum.

PROJECT ALTERNATIVES

Three project alternatives were developed by the project team, with a land use summary presented **Table 1**. Existing dwelling units, office, retail, industrial jobs are shown with net-new development in each category shown for each alternative. The number of jobs per household was also calculated. In the existing condition, there are approximately 0.78 jobs within the General Plan boundary per household. All three alternatives would increase the number of jobs per household.

TABLE 1
LAND USE COMPARISON

Major Land Use Category	Dwelling Units/Jobs			
	Base Year Conditions[1]	Alternative 1 (Net New)	Alternative 2 (Net New)	Alternative 3 (Net New)
Single-Family	14,817	4,367	4,312	4,120
Multi-Family	3,185	2,319	2,133	2,341
Office Jobs	4,218	2,084	2,084	2,084
Retail Jobs	2,183	11,619	11,371	11,649
Industrial Jobs	2,835	11,772	12,410	18,967
Other Jobs	4,788	1,056	1,056	1,056
Total Employment	14,024	26,531	26,921	33,756
Jobs per Household	0.78	1.64	1.67	1.95

Notes: 1. Reflects entire General Plan planning area such that the baseline and each Alternative reflect the same geographic area. Baseline land uses within City of Ceres city limits include 14,625 households and 11,319 jobs. This data is based on information developed by the Stanislaus Council of Governments (StanCOG), with some adjustments made based on other published sources and City of Ceres staff review. These numbers may differ from other available data sets due to the difference process employed to develop baseline and future year model land use data, as opposed to other data sources.
Source: Dyett & Bhatia, based on Alternatives Information dated December 21, 2016.

Roadway network improvements that are assumed to be in place to support General Plan buildout include:

- Interchange modifications at SR 99/Mitchell Road/Service Road (StanCOG RTP Tier I Roadway Project [StanGOG Tier I])
- Morgan Road, 7th Street to Grayson Road widening from 2 lanes to 4 lanes [StanGOG Tier I]
- Whitmore Avenue, Mitchell Road to Faith Home Road widening from 2 lanes to 4 lanes [StanGOG Tier I]
- Whitmore Avenue, Ustick Road to Blaker Road widening from 2 lanes to 4 lanes [StanGOG Tier I]

- Central Avenue, Hatch Road to Grayson Road widening from 2 lanes to 4 lanes [StanGOG Tier I]
- Mitchell Road, River Road to Service Road widening to 6 lanes [StanGOG Tier I]
- Crows Landing Road, Service Road to Grayson Road widening from 2 lanes to 4 lanes [StanGOG Tier I]
- Grayson Road, Ustick Road to Central Avenue widening from 2 lanes to 4 lanes [StanGOG Tier I]
- Carpenter Road, Whitmore Avenue to Keyes Road widen to 3 lanes [StanGOG Tier I]
- Faith Home Road SR 99 to SR 132, construct new 4-lane expressway with interchange at Keyes Road/Faith Home Road [StanGOG Tier I]
- Service Road, Faith Home Road to Central Avenue, widen to a 6-Lane Expressway, Central Avenue to Ustick Road, widen to 4 lane arterial
- New collector roadways as shown on the General Plan circulation map to provide local circulation (General Plan Map)

An analysis of roadway conditions without construction of the Faith Home Road expressway was also conducted for Land Use Alternative 1, with results presented below as Alternative 1a.

Refinements to the trip-balancing module within the future year model were conducted to ensure that all trips that could be generated by future land uses within Ceres were distributed to the roadway network. As the proposed land uses under each alternative would increase the number of trip attractions (i.e. jobs and retail) as compared to the number of trip producers (housing units), production-attraction trip balancing was tied to trip attractions within Ceres.

PRELIMINARY RESULTS

The following section summaries the preliminary transportation metric comparison between the project alternatives. More detailed analysis will be conducted for the preferred alternative, with the following summarizing key differences in the transportation network implications of each alternative. The transportation metrics evaluated for each alternative include:

- Vehicle Miles of Travel
- Person Trips by Mode
- Roadways projected to operate at LOS E or F

Additional information for each metric is described below.

VEHICLE MILES OF TRAVEL

The City of Ceres General Plan Model travel demand model was used to develop VMT estimates. The planned growth and transportation network changes outside the City of Ceres Model study area are generally consistent with the 2014 StanCOG RTP. Within the City of Ceres, the land uses reflect the assumptions for each of the Alternatives as presented in Table 1, considering the roadway network improvements listed previously.

To assess vehicle miles of travel generated by land uses in Ceres, three accounting methods were used, including the boundary method, the shared-accounting and the total accounting method.

Boundary Method

A boundary based estimate captures all the VMT on a roadway network within a specified geographic area such as the city limits or General Plan Boundary. A limitation of this method is that it does not capture trips that extend beyond a jurisdictions boundary and includes through traffic on regional roadway facilities over which the City has no control, such as State Route 99. However, this information can use useful in estimating total greenhouse gas emissions within a specified geographic area.

Origin-Destination Method – Shared Accounting

An origin-destination (OD) method tracks all vehicular trips generated by the City of Ceres across the entire regional network. Four types of trips are isolated, which shares the responsibility of trips with other jurisdictions:

- Internal-Internal (II) trips: Include all trips that begin and end within the City of Ceres.
- Internal-External (IX) trips: Include one-half of all trips that begin in within city limits and end outside city limits. The City of Ceres assumes half the responsibility of these kinds of trips.
- External-Internal (XI) trips: Include one-half of all trips that begin outside city limits and end inside city limits. The City of Ceres assumes half the responsibility of these kinds of trips.
- External-External (XX) trips: Trips that begin and end outside the City of Ceres are not included. The City of Ceres assumes no responsibility for External-External trip type VMTs.

To estimate VMT per service population, trips are multiplied by the trip distance for all trip types to estimate VMT and then divided by the residential and working population of the City of Ceres.

Trips that have neither an origin nor destination within the City are not included in the VMT total as City General Plan policies cannot appreciably affect the amount of through traffic in a jurisdiction.

Origin-Destination Method – Total Accounting

The total accounting method is similar to the shared accounting method, except that for internal-external and external-internal trips, the entire trip length is captured. This method would better capture long-distance commute trips and show an increased VMT benefit to providing higher quality jobs within the Ceres area.

VMT Results

The total VMT is then divided by the City's total service population, defined as the residential population plus the number of jobs; results are summarized in **Table 2** for the boundary method, **Table 3** for the shared-accounting method and **Table 4** for the total-accounting method.

TABLE 2
VEHICLE MILES OF TRAVEL, BOUNDARY METHOD

Performance Measure	Base Year Conditions[1]	General Plan Buildout Conditions[1]			
		Alternative 1 (with and without Faith Home Expressway)		Alternative 2	Alternative 3
Households	18,002	24,687		24,448	24,464
Population	55,553	75,609		74,888	74,936
Employment	14,024	40,554		40,943	47,777
Daily VMT (Boundary Method)	930,578	1,387,173	1,524,099	1,382,668	1,399,340
Daily VMT per Household	51.69	56.19	61.74	56.56	57.20
Daily VMT per Service Population	13.37	11.94	13.12	11.94	11.40

Note: 1. Reflects the General Plan planning area such that the baseline and Alternatives reflect the same geographic area.
Source: Fehr & Peers, 2017.

TABLE 3
VEHICLE MILES OF TRAVEL, SHARED ACCOUNTING METHOD

Performance Measure[1]	Base Year Conditions	General Plan Buildout Conditions[1]			
		Alternative 1 (with and without Faith Home Expressway)		Alternative 2	Alternative 3
Households	18,002	24,687		24,448	24,464
Population	55,553	75,609		74,888	74,936
Employment	14,024	40,554		40,943	47,777
Daily VMT (Origin-Destination Method)	1,020,542	1,980,933	2,041,804	1,963,298	2,030,962
Daily VMT per Household	56.69	80.24	82.71	80.31	83.02
Daily VMT per Service Population	14.67	17.05	17.58	16.95	16.55

Note: 1. Reflects the General Plan planning area such that the baseline and Alternatives reflect the same geographic area.
Source: Fehr & Peers, 2017.

TABLE 4
VEHICLE MILES OF TRAVEL, TOTAL ACCOUNTING METHOD

Performance Measure	Base Year Conditions[1]	General Plan Buildout Conditions[1]			
		Alternative 1 (with and without Faith Home Expressway)		Alternative 2	Alternative 3
Households	18,002	24,687		24,448	24,464
Population	55,553	75,609		74,888	74,936
Employment	14,024	40,554		40,943	47,777
Daily VMT (Origin-Destination Method)	2,025,332	3,882,968	4,035,103	3,850,663	3,976,896
Daily VMT per Household	112.51	157.29	163.45	157.50	162.56
Daily VMT per Service Population	29.11	33.43	34.74	33.24	32.41

Note: 1. Reflects the General Plan planning area such that the baseline and Alternatives reflect the same geographic area.
Source: Fehr & Peers, 2017.

TRIPS BY MODE

Mode refers the method of transportation used to make a trip. The summary of modes used by City of Ceres residents as estimated from the model is shown in **Table 5**. For comparison, the respective mode choice from the California Household Travel Survey is also shown. The comparison indicates that the model may underestimate the walk/bike/other mode share while overestimating transit trips. Model error should be taken into consideration in the mode choice comparison of project alternatives.

TABLE 5
MODE SHARE

	CHTS (2012)[1]	Base Year Conditions	Alternative 1	Alternative 2	Alternative 3
Private Vehicle (single occupant and carpool)	89%	87%	87%	87%	86%
Transit	4%	3%	3%	3%	4%
Walk/Bike/Other	7%	10%	10%	10%	10%
Total	100%	100%	100%	100%	100%

Notes: 1. From the California Household Travel Survey, 2012, reflective of all trips, including commute trips, social-recreation trips, school related trips, and shopping trips.
Source: Fehr & Peers, 2017.

ROADWAY OPERATIONS

The preliminary analysis of traffic operations was conducted based on roadway segments representative of the City's overall transportation network. Traffic volumes on roadway segments are used to determine the overall usage and congestion. Note that the roadway segment analysis is based on traffic counts taken at a single location or link, which is intended to be representative of the entire segment. A link connects two intersections; a segment is a series of links. The segments used in this analysis were developed based on where a series of links had common physical and traffic conditions.

Traffic operations on the study roadway segments were measured using a qualitative measure called level of service (LOS). LOS is a general measure of traffic operating conditions whereby a letter grade, from A (free-flow) to F (over-capacity), is assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver. The LOS grades are generally defined as follows:

LOS A represents free-flow travel with freedom to maneuver.

LOS B has stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in convenience, and maneuvering freedom.

LOS C has stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream. LOS C is the desired level of operations for vehicles on roadways within unincorporated Stanislaus County.

LOS D represents high-density, but stable flow. Users may experience restriction in speed and freedom to maneuver, with poor levels of convenience. LOS D is the desired level of operations for vehicles on roadways within incorporated areas of Ceres.

LOS E represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.

LOS F is used to define forced or breakdown conditions. This condition exists wherever the volume of traffic exceeds the capacity of the roadway. Long queues can form behind these bottleneck points with queued traffic traveling in a stop-and-go fashion.

Daily LOS was calculated for approximately 80 roadway segments for the base year and forecast conditions. For forecast conditions, the base year and future year models were run and the difference between the base year and forecast year volume was added to the existing traffic count. The LOS was determined by comparing traffic volumes for selected roadway segments with daily LOS capacity thresholds. Based on this preliminary assessment, congestion approaching daily capacity levels is excepted to occur on several roadways, as outlined in **Table 6,** for all alternatives. Additional deficient roadway segments were identified with Alternative 1a, which would not construct the Faith Home Road expressway, and Alternative 3, which provides greater employment opportunities than Alternatives 1 or 2.

For the preferred land use alternative, additional analysis to inform the circulation element will be conducted. Additionally, the effects of proposed General Plan Policies can also be incorporated into the analysis where feasible, such as a policy requiring specific transportation demand management (TDM) levels of effectiveness for new large employers.

TABLE 6
POTENTIAL ROADWAY DEFICIENCIES

Deficient Roadways Under all Scenarios	Additional Deficient Roadways under Alternative 1	Additional Deficient Roadways under Alternative 1a	Additional Deficient Roadways under Alternative 2	Additional Deficient Roadways under Alternative 3
State Route 99	No substantial change from Column 1	Additional congestion projected.	No substantial change from Column 1	No substantial change from Column 1
Crows Landing Road in the vicinity of SR 99		No substantial change from Column 1		
Carpenter Road around Whitmore Avenue		Additional congestion projected.		
Some segments along the Mitchell Road Corridor		Additional congestion projected.		
Whitmore Avenue at SR 99		No substantial change from Column 1		
		Portions of Hatch Road		Portions of Hatch Road in vicinity of Faith Home Road

Source: Fehr & Peers, 2017.

ALTERNATIVES COMPARISON

Land use development projected under the General Plan alternatives would increase demand for travel throughout Ceres and the surrounding area. All alternatives include similar levels of increases in housing opportunities; Alternatives 1 and 2 have similar levels of employment increases with Alternative 3 providing the largest increase in potential employment growth. An increase in traffic vehicular traffic volumes is expected under all alternatives. In combination with the roadway network improvements contemplated to serve each of the land use alternatives, increased travel would generally be accommodated by increased roadway network capacity, except for some potential areas of congestion as noted above.

When evaluating at the total vehicle miles of travel generated by land uses within the General Plan boundary area, VMT on a per capita basis (boundary method) would decrease between 11 to 15 percent from the base year condition depending on the alternative, indicating that the provision of increased jobs, retail opportunities, and housing would provide greater opportunities for people within the local area to meet their daily needs with less vehicle travel. However, when looking at the full length of trips (total-accounting method), VMT per capita would increase 11 to 15 percent depending on the alternative. If the Faith Home Expressway is not constructed, vehicle miles of travel would increase further as some trip distances would increase.

Increased total VMT is primarily due to the provision of more jobs than can be filled by residents of Ceres, as well as more retail opportunities than needed to support the future population. These factors result in an in-flux of employees on a daily basis, and retail uses attracting patrons from the regional area, as opposed to the local area.

Alternative 3 has the highest potential to increase the transit mode share within the City. This may be due to the higher number of jobs that can be better served by fixed-route, fixed schedule transit that other types of trips.

All alternatives would increase traffic within the planning area. However, coupled with planned roadway network improvements, additional vehicle travel can generally be accommodated by the proposed roadway network. Without the construction of the Faith Home Road expressway and additional connection to the north, additional roadway segments are projected to operate at LOS E or F.

This completes our updated evaluation of the proposed Ceres General Plan update alternatives. Please call Kathrin or Abhishek at (925) 930-7100 if you have questions.