NELSON
NYGAARD

MEMORANDUM

Date: March 21, 2014

Subject: *Bellevue Community Plan*: Traffic Comparison with General Plan

PURPOSE

This memorandum provides an assessment of the net change in future traffic volumes under the proposed *Bellevue Community Plan* (BCP) in comparison with the land uses currently allowed under the adopted Merced *Vision 2030 General Plan* (GP).

STREET NETWORK

Figure 1 shows the basic street network envisioned by the GP, with most traffic to be accommodated on a grid of 4 to 6 lane arterial streets, with one-mile spacing between each arterial. Under the GP, collector streets would provide direct access from specific development areas to adjacent arterials, but collectors would not serve a significant volume of through traffic.

Figure 2 shows the street network envisioned by the BCP, with 2-lane collectors placed at approximately quarter-mile distances from each arterial. Each 2-lane collector could accommodate 13,000 to 20,000 daily vehicles, thus dispersing traffic to a greater degree than envisioned under the GP. Collector roads in the GP are not intended to serve through traffic. Thus, the GP traffic model loaded through traffic via the arterial street network (not based on the shortest route) up to the capacity of each arterial. The BCP includes several continuous collectors, parallel to arterials that connect directly to plan area destinations and other collector and arterial streets, and thus carry some amounts of through traffic.

FUTURE TRAFFIC VOLUMES

Figure 3 shows the anticipated daily traffic volume on each of the key streets in the area based on the GP travel demand forecast, with the vast majority of traffic accommodated on the one-mile grid of arterial streets.

- Bellevue Road is forecasted to carry between 50,000 and 60,000 daily within the BCP area. This volume of traffic s extremely high for an arterial street, but is consistent with a regional highway or expressway. This volume will typically require a 6-lane configuration (and/or 8 lanes in some cases).
- The other key arterials bordering the BCP planning area are forecasted to carry between 26,000 and 30,000 daily vehicles within the study area. This volume of traffic will typically require a 4-lane arterial configuration.
- The total volume on the north-south and east-west arterials that serve the planning area is over 200,000 daily car trips, based on the General Plan forecast of trip generation with buildout of citywide land uses.

Figure 1 General Plan -- Planned Arterial Grid Network

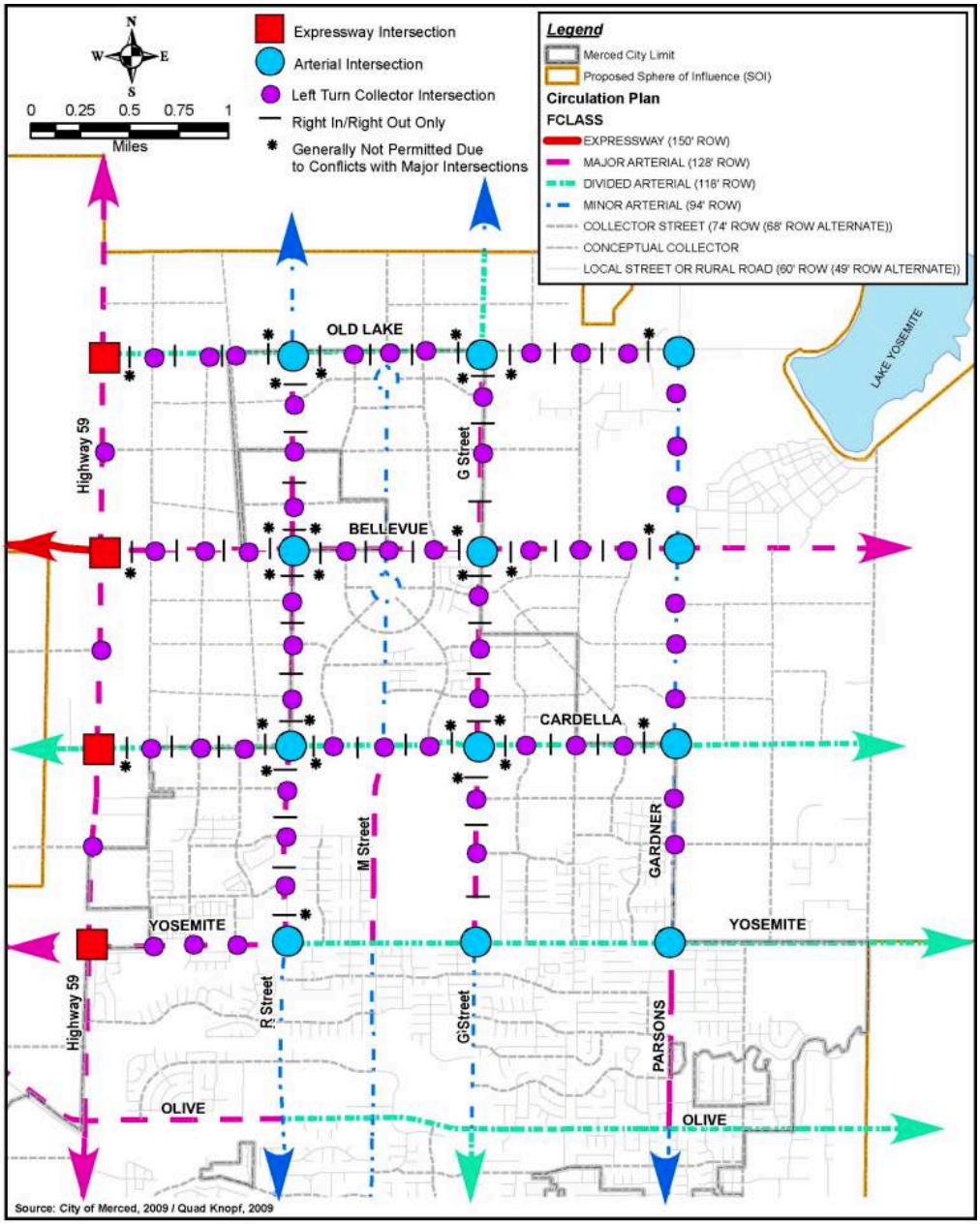


Figure 2 Bellevue Community Plan -- Proposed Grid with Collectors Accommodating Greater Share of Through Traffic

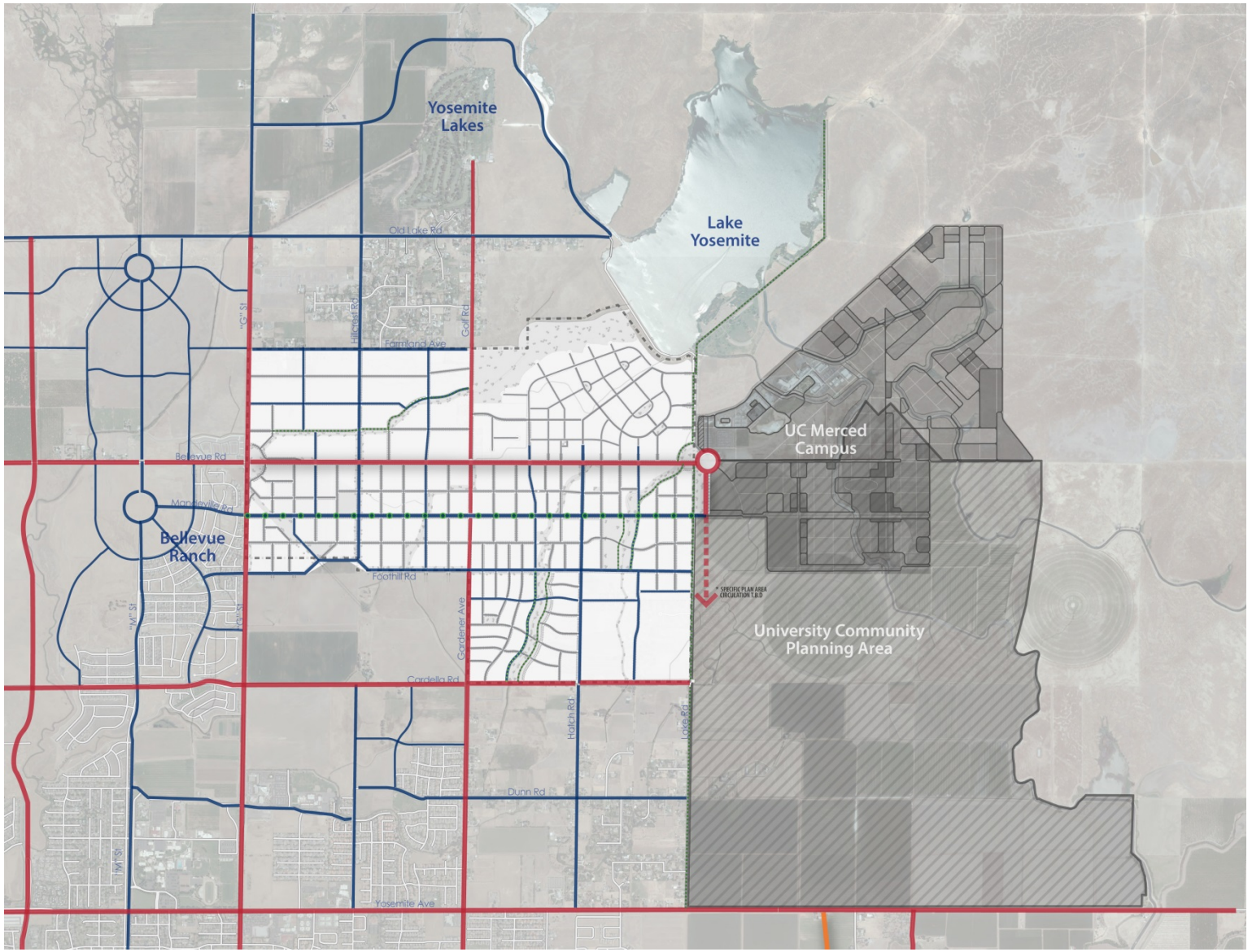
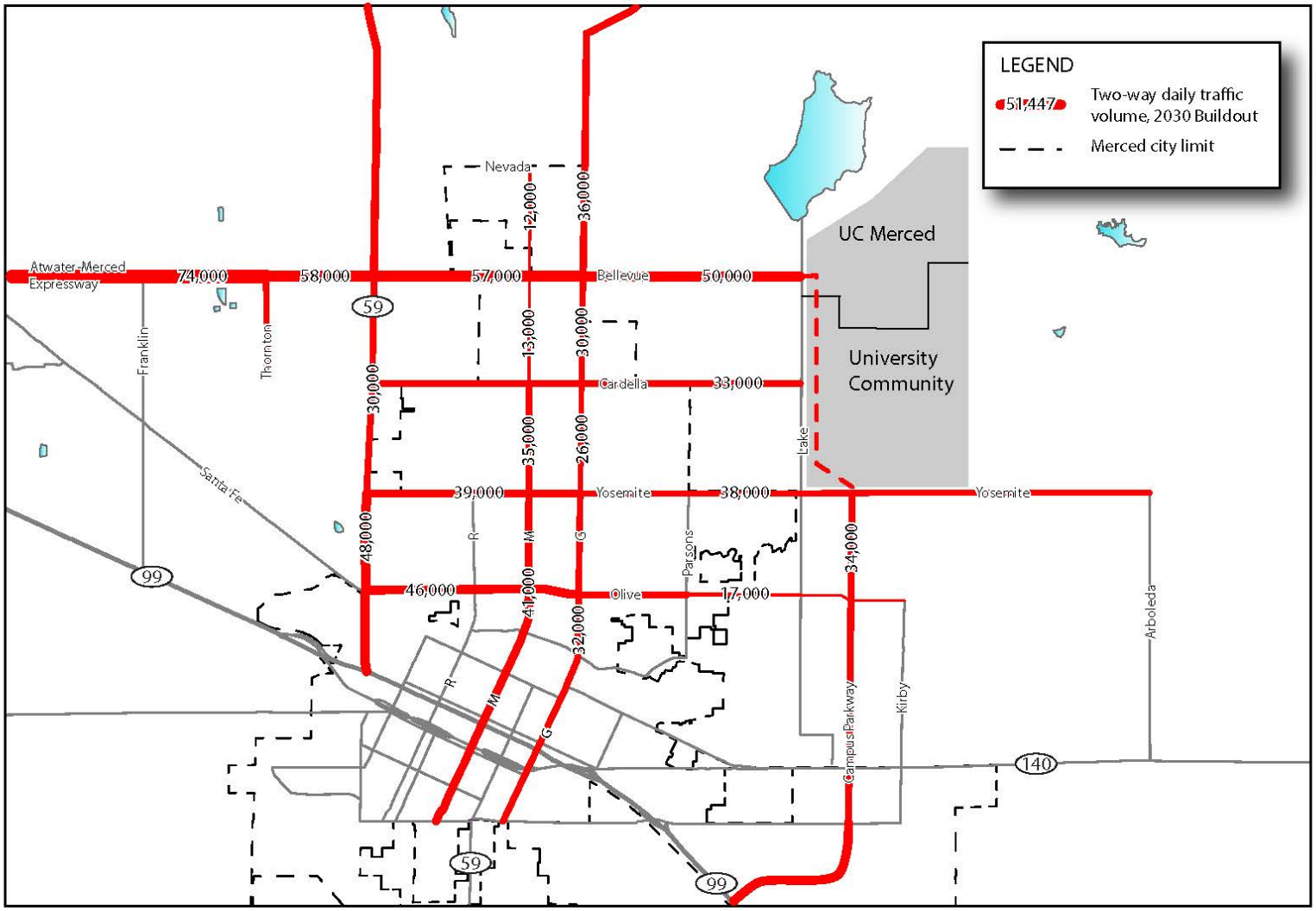


Figure 3 General Plan – Anticipated Daily Traffic Volumes on Key Roadways



POTENTIAL CHANGE IN TRAFFIC VOLUME UNDER BCP

Development Assumptions under GP and BCP

BCP Technical Appendix A provides a description of anticipated development within the planning area under the GP. Tables D-1 through D-4 and Figure 4 summarize information described in Appendix A.

The volume of anticipated development is described in Appendix A for each traffic analysis zone (TAZ). The travel demand forecast and accompanying traffic study that was prepared for the *Merced Vision 2030 General Plan* described anticipated land uses within Traffic Analysis Zones (TAZs). TAZs define land uses by number of dwelling units and employees per acre, within a geographic area. These figures are partly determined by anticipated land uses acreages.

Figure 4 shows the location of TAZs relative to the study area of the BCP. TAZ's 76, 77, and 87 extend past the boundary of the BCP study area. TAZ 86 is completely within the BCP study area. In order to define the anticipated land use acreages within the study area, 809 acres of land uses that occur outside the study area were trimmed from the TAZ data sets. In this manner, a set of defined land uses, consistent with the traffic study that was prepared for the *Merced Vision 2030 General Plan*, was created to serve as a parameter to help define the land use plan for the BCP (see Table A-2 in Appendix A for additional information as described above).

Table D-1 GP & BCP Land Use Types

Land Use Types	***Merced Vision 2030 General Plan***	***Bellevue Community Plan (BCP)***
	General Plan Land Use Designations	BCP Character Areas
Single-Family	- Rural Residential (RR) - Low Density Residential (LD)	- Rural Neighborhood - Single Family Neighborhood
Multifamily	- Low Medium Density (LMD) - High Medium High Density (HMD) - High Density (HD) - Village Residential (VR)	- Multifamily Neighborhood - Mixed-Use TOD
Retail	- Neighborhood Commercial (CN) - Commercial Thoroughfare (CT)	- Neighborhood Commercial - Mixed-Use TOD
Office	- Commercial Office (CO) - Business Park (BP)	- R&D Employment District - Mixed-Use TOD
Open Space	- Open Space/Parks Recreation - Future Parks	- Open Space - Future Schools
Schools	- Future Schools	- Future Schools

Source: Bellevue Community Plan, Appendix A:

Figure 4 Traffic Analysis Zone (TAZ) Map

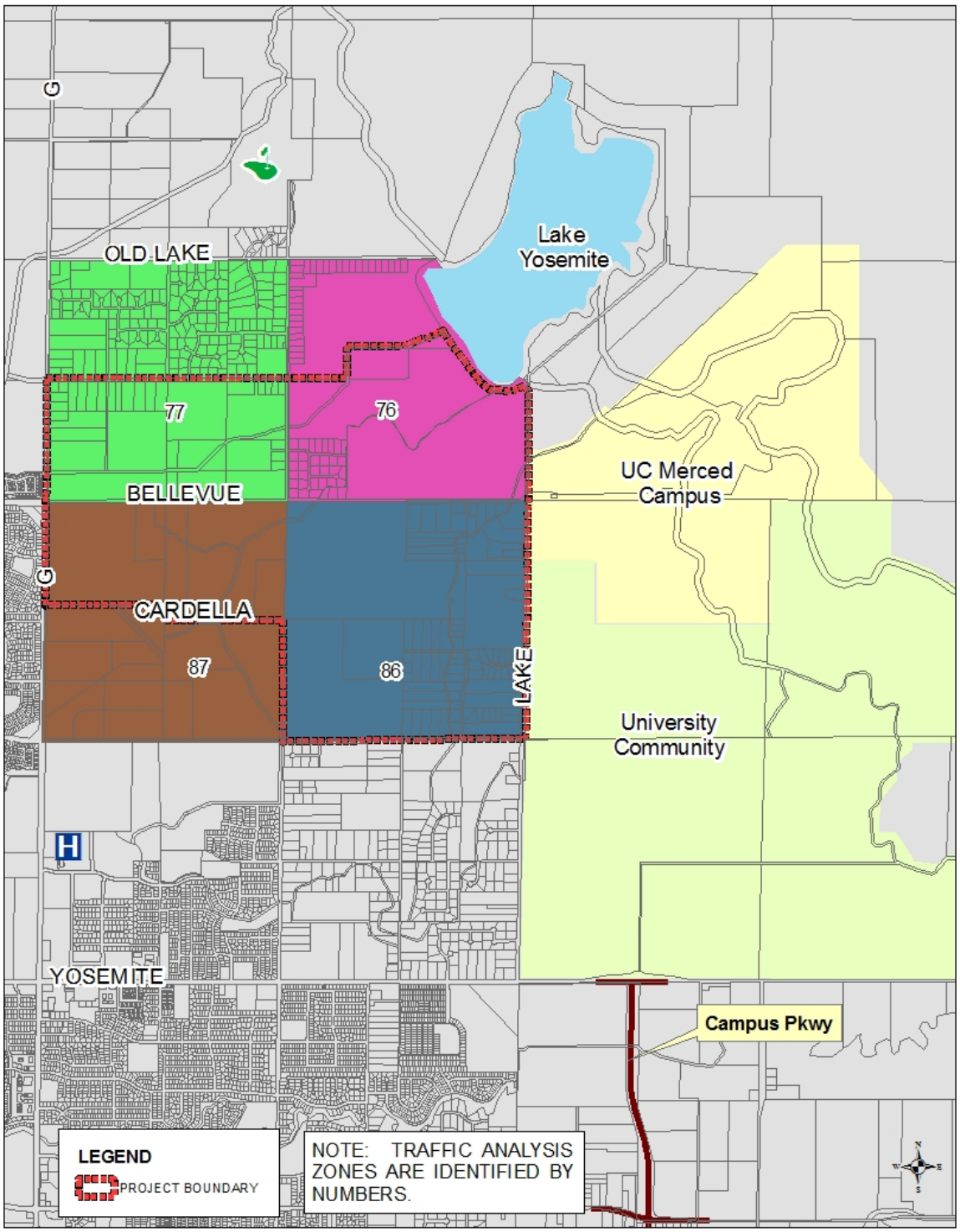


Table D-2 Comparison of Development Capacity by TAZ

		General Plan	RR	LD	LMD	HMD	HD	VR	CT	CN	CO	BP	
		BCP	Rural	Single Family		MF Med	MFHigh	N/A	Retail		Business Park		Total
TAZ 76	Residential Units	General Plan Projection for BCP A	39	317	376	406	769						1,905
		BCP Residential Units	**51**	**696**		**513**	**788**						**2,048**
	Square Footage	General Plan Estimate for BCP[1]							85,600	173,600	0	183,600	442,800
		BCP Square Footage[2]							**221,111**		**211,919**		**433,030**
	Employment	General Plan Projection for BCP							214	434		612	1,260
		BCP Employees[3]							**553**		**706**		**1,259**
TAZ 77	Residential Units	General Plan Projection for BCP Area		640	138		517	479					1,774
		BCP Residential Units	**198**	**770**		**736**	**0**						**1,703**
	Square Footage	General Plan Estimate for BCP[1]							83,200	202,400	211,500	108,000	605,100
		BCP Square Footage[2]							**128,890**		**276,192**		**405,082**
	Employment	General Plan Projection for BCP							208	506	705	360	1,779
		BCP Employees[3]							**322**		**921**		**1,243**
TAZ 86	Residential Units	General Plan Projection for BCP A	181	1,004	129	350	389						2,053
		BCP Residential Units	**300**	**1,107**		**515**	**281**						**2,203**
	Square Footage	General Plan Estimate for BCP[1]							78,000	189,600	198,300	517,500	983,400
		BCP Square Footage[2]							**74,761**		**1,075,540**		**1,150,301**
	Employment	General Plan Projection for BCP							195	474	661	1,725	3,055
		BCP Employees[3]							**187**		**3,585**		**3,772**
TAZ 87	Residential Units	General Plan Projection for BCP Area		536	163								699
		BCP Residential Units		**299**		**287**	**135**						**720**
	Square Footage	General Plan Estimate for BCP[1]							61,200	159,600	154,800	517,500	893,100
		BCP Square Footage[2]							**56,168**		**1,365,704**		**1,421,872**
	Employment	General Plan Projection for BCP							153	399	516	1,725	2,793
		BCP Employees[3]							**140**		**4,552**		**4,693**
TOTAL	Residential Units	General Plan Projection for BCP A	220	2,496	806	755	1,675	479					6,431
		BCP Residential Units	**549**	**2,872**		**2,051**	**1,203**						**6,675**
	Square Footage	General Plan Estimate for BCP[1]							308,000	725,200	564,600	1,326,600	2,924,400
		BCP Square Footage[2]							**480,930**		**2,929,356**		**3,410,285**
	Employment	General Plan Projection for BCP							770	1,813	1,882	4,422	8,887
		BCP Employees[3]							**1,202**		**9,765**		**10,967**

Table D-3 Comparison of Overall Development Capacity – Dwelling Units & Employment

Land Use Types	*Merced Vision 2030 General Plan*	*Bellevue Community Plan (BCP)*
Dwelling Unit Related Uses	Total Dwelling Units	Total Dwelling Units
Single-Family	3,522	3,421
Multifamily	2,909	3,254
Total	*6,431*	*6,675*
Employee Related Uses	Total Employees	Total Employees
Retail	2,583	1,292
R&D/Office	6,305	9,765
Total	*8,989*	*10,967*
Other Uses	Total Acreage	Total Acreage
Open Space	138	165
Schools	30	48

Source: Bellevue Community Plan, Appendix A

Table D-4 Comparison of Overall Development Capacity – Dwelling Units & Commercial Sq Ft

Development Capacity Comparison			
		GP **Total**	**BCP** **Total**
Residential	Single-family dwellings	3,522	3,420
	Multi-family dwellings	2,909	3,255
	Total dwelling units	***6,431***	***6,675***
R&D / Office	Commercial Office (CO) / Services	564,600	
	Business Park (BP) / Office R&D	1,326,600	
	Total CO / BP square feet	***1,891,200***	***2,929,356***
Retail	Thoroughfare Commercial (CT)	308,000	
	Neighborhood Commercial (CN)	725,200	
	Total retail square feet	***1,033,200***	***480,930***
Summary Comparison of Development Capacity			
	Residential (dwelling units)	**6,431**	**6,675**
	Commercial (square feet)	**2,924,400**	**3,410,286**

TRIP GENERATION COMPARISON

Rates of Trip Generation

Table D-5 provides a comparison of unadjusted vehicle trip generation rates for each of the land use types. Rates of trip generation vary by land use type:

- **Employment-related land uses** – such as General Office and Research & Development (R&D) generate between eight (8) and eleven (11) daily vehicle trips per 1,000 square feet of commercial (non-retail) development. During the AM Peak, over 80 percent of trips are inbound to each site, given the large portion of work trips that occur during the AM Peak. This peaking pattern repeats during the PM Peak Hour, when over 80 percent of trips are outbound.
    - On a "per employee" basis, ITE trip generation rates indicate an average of approximately three(3) daily trips per employee – ranging from 2.77 daily trips per employee for R&D and 3.32 for General Office.
- **Residential land uses** typically generates between approximately six (6) and ten (10) daily trips per dwelling unit. The peaking pattern of residences is reversed, in comparison with employment-related uses, in that over 80 percent of AM Peak Hour trips are outbound from residences, while just 36 percent of PM Peak Hour trips are outbound.
- **Retail land uses** generate the highest rate of trips – within a wide range from 40 to 120 daily trips per 1,000 square feet.
- **Balancing peak-hour trips:** Given the different peaking patterns of residential and employment land uses – with residential trips primarily outbound AM and inbound PM, while employment-related land uses are primarily inbound AM and outbound PM – providing a mix of residential and employment-related land uses will help to balance two-way traffic volumes and avoid traffic congestion that can occur in areas where peak-traffic occurs in one direction.

Table D-5 Typical Trip Generation Rates

Land Use Type (Rate Source)	AM Peak Hour		PM Peak Hour		Daily Trips	
	Vehicle Trip Rate (1)	Inbound	Vehicle Trip Rate (1)	Inbound	Vehicle Trip Rate (1)	Inbound
Residential (trips per dwelling unit)						
Single-family residential	0.75	25%	1.01	64%	9.56	50%
Medium-density residential	0.44	19%	0.52	64%	5.81	50%
R&D / Office (trips per thousand square feet)						
Research & Development Park	1.22	88%	1.07	15%	8.01	50%
General Office	0.48	83%	0.46	17%	11.01	50%
Average	0.85	86%	0.77	16%	9.51	50%
R&D / Office (trips per employee)						
Research & Development Park					2.77	50%
General Office					3.32	50%
Average					*3.05*	*50%*
Retail (trips per thousand square feet)						
Supermarket	3.40	62%	9.48	51%	102.24	50%
Shopping Center	0.96	62%	2.74	48%	42.70	50%
Convenience Market	67.03	50%	52.41	51%	120.00	50%
Specialty Retail	N/A	N/A	2.71	44%	44.32	50%
Quality Restaurant	0.81	N/A	7.49	67%	89.95	50%
Community Shopping Center (S)	3.20	60%	8.00	50%	80.00	50%
Mixed Use Supermarket (S)	3.30	60%	9.90	50%	110.00	50%

Sources:
Institute of Transportation Engineers *Trip Generation* (9th Edition, 2012) except (S) indicates trip generation rate described in SANDAG Traffic Generation Rates (April 2002)

Net Change in Trip Generation under BCP

Daily Trip Generation

Table D-6 shows the estimated net change in trip generation under the BCP, in comparison with the GP, based on the trip generation rates described in Table D-5, and the land use comparison described in Tables D-1 through D-4 and Figure 4, an estimate of the net change in daily trip generation was prepared.

As shown:

- **Daily trip generation** would be approximately 17 percent lower under the BCP in comparison with the GP.
- The reduction in retail space is primarily responsible for the reduction, in that retail land uses generate a high rate of trips.

Table D-6 Net Daily Trip Generation Comparison - GP and BCP Land Uses

Daily Trip Generation Comparison			
		GP	BCCP
Residential	Single-family	33,667	32,699
	Multi-family	17,455	19,529
	Total home-based trips	51,123	52,228
R&D / Office	Commercial Office & Services (CO)	6,248	N/A
	Office R&D / Business Park (BP)	12,249	N/A
	Total R&D / Office trips	*18,497*	*28,851*
Retail	Thoroughfare Commercial (CT)	22,321	N/A
	Neighborhood Commercial (CN)	50,764	N/A
	Subtotal retail	73,085	34,853
	Retail pass-by trips (15%)	-10,963	-5,228
	Total retail trips	*62,122*	*29,625*
Total daily trips	***Subtotal trips***	131,742	110,704
	Adjustment for internal home-based trips	*-11,247*	*-10,446*
	Total daily trips	***120,495***	***100,258***
	Net change under BCP		***-20,237***
	Percent change under BCP		**-17%**

Peak Hour Trip Generation

Peak hour trip generation would be affected slightly differently in that work-commute trips are a greater share of peak-hour trips, particularly during the AM Peak Hour when retail trips are low.

- **AM Peak Hour:** BCP land uses anticipate a net increase of approximately 2,000 more jobs than under the General Plan – an increase of approximately 1.04 million square feet of R&D and Office Uses. This would potentially generate more trips during the AM Peak Hour under the BCP, since retail trip generation rates are lower during the AM Peak Hour.
- **PM Peak Hour**: during the PM Peak Hour, the share of work-trips to total trips is lower – generally most PM Peak Hour trips are "non-work" trips. The reduction in retail space will be most noticeable in reducing trips during the afternoon and evening hours.