CHAPTER 9. PARKING SUPPLY

The goal of this chapter is to provide City and University decision-makers with information about Study Area parking that can be used to determine the amount of parking that should be supplied within the Study Area. Given the available data sources, the focus of the chapter is on parking that may be needed to accommodate potential growth; however, some data is also provided to assist with characterizing existing demand. This focus should not be interpreted to mean that TDM activities should be geared only to accommodate future growth and not existing conditions of traffic and spillover parking. The decision whether or not to build additional parking supply will be informed by this Study as well as by each entity's own goals and interpretation of the community's vision as described in Chapter 1.

This Chapter reviews and analyzes the following aspects of understanding the "appropriate" amount of parking supply in the Study Area:

- The community concerns regarding parking;
- The challenges to determining the "right" parking supply;
- The parking supply needed to accommodate future growth if the existing mode split were not to change over time;
- Future mode splits needed to eliminate the need for construction of additional parking assuming maintenance of the "status quo" amount of parking per employees and residents; and
- A discussion of the data that is needed and the analysis steps recommended to determine how the current supply of parking accommodates visitors.

OVERVIEW OF PARKING ISSUES

The community visioning workshop and the stakeholder interviews that were part of this TDM Study revealed the following tensions regarding parking in the Study Area.

FIGURE 9-1
PARKING ISSUES

Lack of parking encourages people to find alternatives to driving, thereby reducing cars and improving livability	**vs.**	Lack of parking encourages people to go elsewhere to shop, eat and be entertained, and thus negatively impacts economic vitality.
Increasing parking supply increases the number of cars on the road.	**vs.**	Additional parking will ease existing congestion caused by cars searching for parking spaces.
Decreasing parking supply will decrease the number of cars on the road.	**vs.**	There are many other factors requiring people to drive. Decreasing parking supply alone will not decrease traffic.
Increasing parking supply will make it easier to find parking in the Study Area.	**vs.**	Additional parking may ease short-term parking shortages. In the long-term, increased parking supply will encourage more people to drive, resulting in similar imbalances in supply & demand.
Parking should be market-priced so travelers can make informed economic decisions about its use.	**vs.**	Parking should be publicly subsidized, because it is part of the public infrastructure.
Parking supply should be increased to make access to the Study Area easier.	**vs.**	Practical barriers to increasing parking exist, such as lack of money and land, and increasing other transportation options is more effective.
Commuter parking is needed to attract and retain Study Area employees.	**vs.**	Adequate parking for visitors is required to maintain healthy business districts in the Study Area.

THE CHALLENGE: DETERMINING THE APPROPRIATE PARKING SUPPLY

No great city is known for its abundant parking supply. Nevertheless, in cities everywhere the construction of more parking spaces remains a high priority among community leaders. In Berkeley, all new development is currently required to add off-street parking spaces. As in most places, these standards are based purely on the type and size of the development, and they do not vary according to the TDM or other programs the building occupants may develop. The standards do not account for the complexity of downtowns in terms of land use, variety of parkers (e.g., residents, commuters, shoppers and tourists), transit availability, density, form,

hours of operation, economic base, land constraints, and community goals. They assume that all parking is free to the user and that alternatives to driving are limited. Most importantly, they tie economic growth to growth in automobile trips in a straight-line manner: if there are more jobs, there will be more congestion.

Such simplistic formulas may work in San Ramon, where almost all trips are by car because there really is no other choice. In Berkeley, however, where there are a multitude of travel options, there is no formula that uses as input community size, transportation resources, and economic activity and determines the appropriate amount of parking based on these variables. For such diverse places the amount of parking needed is driven primarily by the values of the community. Decision-makers must ask, "At what point do the positive values of parking outweigh the negative consequences? Is there enough roadway capacity to serve an increase in parking? Is it cheaper to do something instead of providing parking? Does additional parking or a particular TDM activity serve more people? Does additional parking or greater investment in transit fit better with the values of the community?" The amount of parking to be supplied must be informed by community livability and economic goals.

This study cannot make a definitive recommendation about the "correct" number of spaces to be added (or subtracted) in the Study Area. Instead, it can merely quantify the effects of existing supply and use patterns, and of known future changes upon the parking and transportation systems, and it can qualitatively describe the effects various changes may have on the community's economic development and livability goals. Ultimately it is up to local policymakers to decide which approach is best for the community as a whole.

PARKING DEMAND/SUPPLY ANALYSES

This section presents four analyses of parking demand and supply in the Study Area and the amount of parking or other accommodation that would be needed to address projected Study Area growth. The four analyses are:

- Parking to accommodate Study Area employment growth (non-UC)
- Parking to accommodate UC Berkeley student growth
- Parking to accommodate UC Berkeley faculty and staff growth
- Parking available for visitors and retail shoppers

Each analysis has been conducted utilizing only existing data. Because data collection was not part of the TDM Study, several assumptions were required, and all are footnoted.

Study Area Employees (non UC)

While UC Berkeley is the largest single employer in the Study Area, other area employers combined draw more employee commute trips to the Study Area. Employment beyond the

campus boundaries is expected to grow over the next decade. A straight-line projection – assuming no change in mode split – shows the additional parking that must be supplied to accommodate off-campus employment growth in the Study Area.

In 2000, the non-UC Study Area employment was 13,660[1] employees. According to projections made by the Alameda County Congestion Management Agency that were updated by the City of Berkeley, non-UC Study Area employment will be approximately 14,210 in 2010-11, a 4% increase[2].

Applying data from the 1990 census shows that non-UC employees make about 6,200 vehicle trips to the Study Area on a daily basis[3]. If each commuter requires a full-day parking space[4], non-UC Study Area employees occupy about 6,200 parking spaces. If commute mode-split held constant over the next ten years, these commuters would need 6,450 parking spaces by 2010-11, an increase of 250 parking spaces. These 6,450 parking spaces would be filled by 5,884 drive-alone vehicles (based on a constant drive alone rate of 46%) and 463 carpool/vanpool vehicles (based on a constant HOV rate of 11% and assuming 2.5 passengers per HOV).

If the commuter parking supply in the Study Area stays the same, about 250 daily vehicle trips must be eliminated in order to accommodate the expected growth. The specific reduction could take many different forms (i.e. the proportional shift to transit versus carpooling versus bicycling, etc), as long as the total vehicle trips do not exceed 6,199. The number of people that must shift modes in order to reduce these 250 vehicle trips will also vary depending on how the shift is allocated to carpools versus other modes that do not generate vehicle trips. A *potential* mode split that could absorb the projected growth is shown in Figure 9-2.

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[1] CMA projections show 13,720 employees working in Downtown and the Southside in 1990 and 13,630 in 2005. Using straightline projections, the estimated commute population in 2000 is 13,660. There is some overlap between campus population numbers and the CMA employment numbers due to UCB offices located on the Southside. The amount of overlap is not known.

[2] Based on straightline projections between 1990, 2005 and 2022.

[3] Assumes that 90% of employees come to the Study Area on any given day due to part-time schedules and time off. 1990 Census Journey to Work data for off-campus, Study Area census tracts shows 46% drive alone; 11% are in HOVs. Assuming 2.5 passengers per HOV reveals a 50.4% vehicle trip generation rate. This mode split comes from the 1990 census of employees traveling to the census tracts that make up the Study Area, including the UC campus and the hill area. It is the best data that is available, although it does not separate out the influence of UC employees. Since UC employees have a slightly higher drive alone rate compared to the census data (50% versus 46%), it can be concluded that 46% is higher than the drive alone rate of non-UC Study Area employees. Unfortunately, the mode split of JUST non-UC Study Area employees is not available, so the best estimate available was used.

[4] UC Berkeley data shows that approximately 1 full-day parking space is needed for every commute vehicle trip. A similar assumption is made for off-campus Study Area commuters.

FIGURE 9-2
OFF-CAMPUS STUDY AREA EMPLOYEE MODE SPLIT TO AVOID INCREASE IN PARKING SUPPLY[5]

	Baseline			2010-11 Goal		
	Mode Split	Person Trips	Vehicle Trips	Mode Split	Person Trips	Vehicle Trips
Drive Alone	46%	5,658	5,658	43%	5,501	5,501
HOV	11%	1,353	541	14%	1,535	614
Motorcycle	2%	246		2%	256	
Transit	14%	1,722		16%	2,067	
Walk	18%	2,214		18%	2,325	
Bike	7%	861		7%	904	
Other	2%	246		1%	129	
	100%	**12,300**	**6,199**	**100%**	**12,792**	**6,115**

Parking to Accommodate University Growth

This analysis looks at the amount of additional parking that would need to be supplied by the University, the private sector and the City in order to maintain the existing ratios of parking supply to students, staff and faculty in 2010-11. (It should be noted that this is an exercise and does not represent commitments by the University or the City to grow, nor determine mode split policies for the University, the City or any other area employer.) This analysis first addresses parking needed to accommodate student growth, and then looks at that amount needed to accommodate staff and faculty growth.

Student Growth

To analyze the impact of student growth, data from 1997, 1998 and 1999 is used as a baseline. These three years represent the most recent parking data available for UC Berkeley students.

[5] The difference between person trips and vehicle trips shows that people who travel in carpools continue to generate vehicle trips. There is not a 1-for-1 correlation between the number of people who switch to carpooling and parking space demand reduction. For example, if 10 people form 2-person carpools, five parking spaces would still be needed. This distinction is shown throughout this Chapter.

In 1998-99, UC Berkeley's student headcount[6] was 30,680 students. Possible enrollment increases may be required at UC Berkeley to accommodate increased student demand. According to UC Berkeley's projections (Office of Planning and Analysis), student headcount may be 31,941 in 2010-11, a 4% increase. A straight-line projection that assumes no change in existing mode-split or student residential patterns between the baseline and 2010-11 indicates that a 4% increase in student parking would be necessary.

Data from the 1997 Student Transportation & Housing survey conducted by UC Berkeley indicates that approximately 4,250 students drive to campus on a daily basis.[7] These student parkers occupy approximately 1,585[8] university-provided parking spaces (including valet), 985[9] non-UC paid lot and metered spaces, and 680[10] free off-campus spaces for a total of 3,250[11]. These free off-campus spaces are assumed to be on-street spaces in the residential permit parking (RPP) zone that allow 2-hour parking as well as on-street spaces located beyond the RPP zone. The number parking in RPP versus the number parking beyond the RPP zones is not known.

Thus, given a potential 4% increase in student demand by 2010-11, the University would need to provide 1,660 parking spaces, the paid non-UC supply would need to increase to 1,025 spaces, and the free on-street supply would need to increase to 710 spaces. This is a total of 145 additional parking spaces.

If parking supply were not increased, the 2010-11 student mode split would not be able to produce more than 4,250 vehicle trips. The specific break down of the mode split could take many different forms, as long as the total vehicle trips did not exceed 4,250. A potential mode split that could absorb growth is shown in Figure 9-3. The specific mode split in Figure 9-3 shows the minimum shift necessary in the student drive alone rate to keep vehicle trips below 4,250. It does not suggest that this become a mode split goal for UC students. The reduction in the drive alone rate is arbitrarily applied to other modes (i.e. the 1% increase in bike mode share shown below). Figure 9-3 should be interpreted as an *example* mode share that would absorb student growth without building additional parking.

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[6] Headcount represents the total number of students (part-time and full-time) enrolled at UCB. It does not represent the number on campus at any given time; it does not adjust for the fact that not all students come to campus at the same time.

[7] Conservatively assumes that 90% of students come to campus on any given day due to part-time or staggered class schedules. Source: 1997 Student Transportation & Housing Survey. Student survey shows that 15% drive alone rate, a 1% HOV rate, assume 2.5 passengers per HOV = a driving mode split of 15.4%.

[8] Source: "UCB Parking Policy & Planning Options Study," Wilbur Smith Associates, 1999, Figure 4-1. Assume 50% of "general fee lot" is used by student parkers.

[9] Source: 1997 Student Transportation & Housing Survey. Student survey data shows 29% of student drivers park in non-UC paid lots or metered spaces. Assume that each of these spaces accommodates 1.25 students per day.

[10] Source: 1997 Student Transportation & Housing Survey. Student survey data shows 32% of students park in "free, off-campus spaces." Assume that each of these spaces accommodates 2 student parkers per day.

[11] The 4,250 student parkers use 3,250 parking spaces on a daily basis due to the fact that not all students park all day.

FIGURE 9-3
2010-11 UC STUDENT MODE SPLIT TO AVOID PARKING SUPPLY INCREASE[12]

	Baseline			2010/11 Goal		
	Mode Split	Person Trips	Vehicle Trips	Mode Split	Person Trips	Vehicle Trips
Drive Alone	15%	4,140	4,140	14.5%	4,162	4,162
HOV	1%	276	110	0.5%	144	58
Motorcycle	1%	276	0	1%	287	0
Transit	13%	3,588	0	13%	3,731	0
Walk	56%	15,456	0	56%	16,072	0
Bike	14%	3,864	0	15%	4,305	0
Total	100%	27,600	4,250	100%	28,700	4,226

Faculty/Staff Growth

To analyze the impact of potential faculty/staff growth, data from 1996, 1998 and 1999 is used as a baseline. These three years represent the most recent parking data available for UC Berkeley faculty and staff.

In 1998-99, UC Berkeley's faculty/staff headcount[13] was 11,295. According to UC Berkeley's projections, faculty/staff headcount may be approximately 12,400 in 2010-11, a 10% increase[14]. A straight-line projection that assumes no change in existing mode-split between the baseline and 2010-11 indicates that a 10% increase in faculty/staff parking would be necessary.

Data from the 1996 Faculty/Staff Transportation & Housing survey conducted by UC Berkeley indicates that approximately 5,490 faculty and staff members drive to campus on a daily basis.[15]

[12] The difference between person trips and vehicle trips shows that people who travel in carpools continue to generate vehicle trips. There is not a 1-for-1 correlation between the number of people who switch to carpooling and parking space demand reduction. For example, if 10 people form 2-person carpools, five parking spaces would still be needed. This distinction is shown throughout this Chapter.
[13] Headcount represents the total number of UC faculty and staff, including part-time and full-time.
[14] Faculty/staff headcount increases at a greater percentage than student headcount due to UC policy to increase the ratio of faculty and staff to students.
[15] Conservatively assumes that 90% of faculty and staff come to campus on any given day due to part-time schedules and time off. Source: 1996 Faculty/Staff Transportation Survey; Faculty/staff survey data shows a 50% drive alone rate, a 10% HOV rate, assume 2.5 passengers per HOV = a driving mode split of 54%.

These faculty/staff drivers occupy approximately 4,700[16] university-provided parking spaces (including valet), 165[17] non-UC paid lot spaces, 250[18] free off-campus spaces, and 80[19] metered spaces. These free off-campus spaces are assumed to be on-street spaces in the residential permit parking (RPP) zone that allow 2-hour parking and on-street spaces located beyond the RPP zone. The number parking in RPP versus the number parking beyond the RPP zone is not known.

Thus given a potential 10% increase in faculty/staff demand by 2010-11, the University would need to provide 5,175 parking spaces, the paid non-UC supply would need to increase to 180, the free on-street supply would need to increase to 270 spaces, and metered spaces would need to increase to 90. This is a total of 520 additional parking spaces.

If parking supply were not increased, the 2010-11 faculty/staff mode split would not be able to produce more than 5,490 vehicle trips. The specific break down of the mode split could take many different forms, as long as the total vehicle trips did not exceed 5,490. A potential mode split that could absorb growth is shown in Figure 9-4. It shows one of several potential mode splits in which vehicle trips would not exceed 5,490. It does not suggest that this become a mode split goal for UC staff and faculty. The reduction in the drive alone rate is arbitrarily applied to other modes (i.e. the 3% increase in HOV share shown below). Figure 9-4 should be interpreted as an *example* mode share that would absorb potential staff/faculty growth without building additional parking.

[16] Source: "UCB Parking Policy & Planning Options Study," Wilbur Smith Associates, 1999, Figure 4-1. Assume 50% of "general fee lot" is used by staff parkers.
[17] Source: 1996 Faculty/Staff Transportation Survey; Faculty/staff survey data shows 3% of faculty/staff drivers park in non-UC paid lots. Assume that each of these spaces accommodates 1 faculty/staff parker per day.
[18] Source: 1996 Faculty/Staff Transportation Survey; Faculty/staff survey data shows 9% of faculty/staff park in free, off-campus spaces Assume that each of these spaces accommodates 2 faculty/staff parkers per day.
[19] Source: 1996 Faculty/Staff Transportation Survey; Faculty/staff survey data shows 3% of faculty/staff park in on-street metered spaces. Assume that each of these spaces accommodates 2 faculty/staff parkers per day.

FIGURE 9-4
2010-11 UC FACULTY/STAFF MODE SPLIT TO AVOID INCREASE IN PARKING SUPPLY[20]

	Baseline			2010/11 Goal		
	Mode Split	Person Trips	Vehicle Trips	Mode Split	Person Trips	Vehicle Trips
Drive Alone	50%	5,083	5,083	44%	4,910	4,910
HOV	10%	1,017	407	13%	1,451	580
Motorcycle	1%	102	0	1%	112	0
Transit	16%	1,626	0	19%	2,120	0
Walk	14%	1,423	0	14%	1,562	0
Bike	9%	915	0	9%	1,004	0
Total	100%	10,165	5,490	100%	11,160	5,490

Summary -- University-Related Growth

Students, faculty and staff increases combined would require the parking increases shown in Figure 9-4 if mode-splits did not change and if it is determined that the parking situation that exists today is the desired parking situation ten years from now.

FIGURE 9-5
SUMMARY OF PARKING SPACES NEEDED TO ACCOMMODATE POSSIBLE UNIVERSITY GROWTH WHILE MAINTAINING STATUS QUO MODE SPLIT

	Baseline	2010-11	Increase
University Supply (including valet)	6,285	6,835	550
Non-UC Paid Supply*	1,230	1,295	65
Free On-Street Supply	930	980	50
TOTAL			**665**

** Includes on-street metered spaces.*

Comparison to 1999 UC Berkeley Parking Study

[20] The difference between person trips and vehicle trips shows that people who travel in carpools continue to generate vehicle trips. There is not a 1-for-1 correlation between the number of people who switch to carpooling and parking space demand reduction. For example, if 10 people form 2-person carpools, five parking spaces would still be needed. This distinction is shown throughout this Chapter.

UC Berkeley's most recent comprehensive parking study, "UC Berkeley Campus Parking Policy & Planning Options Study," was conducted in 1999 by Wilbur Smith Associates (WSA). The 1999 study examined existing conditions and did not anticipate growth. The study determined that the total existing demand for parking at UC Berkeley was 11,465 spaces and that UC provided 7,386 spaces, for a deficit of 4,100 spaces. Included in the 4,100 space deficit was a measure of latent demand – those who park at more expensive or less convenient non-UC spaces, plus those who currently use transportation alternatives reluctantly (WSA, pg. 7-2).

The analysis included in the TDM Study does not provide an estimate of the existing latent demand. It does, however, determine that the current UC-affiliated parking demand, based on actual drivers, is 8,445 spaces and that UC provides 6,285 spaces for a deficit of 2,160 spaces. The analysis included in the TDM Study shows that UC Berkeley supplies enough parking to meet 75% of the UC parking demand from those who currently drive. The WSA study recommended that UCB provide enough parking to accommodate 85% of its own parking demand, and that the remaining 15% be accommodated by other parking sources. The WSA study further recommended substantial reductions in the campus drive alone rate, to be pursued in conjunction with parking improvements.

Parking for Visitors and Retail Shoppers

Important to many stakeholders in the Study Area is the supply of parking for visitors and retail shoppers (referred to collectively as visitors throughout this section). There is no existing data on the numbers of daily visitors to the Study Area or their mode split. Data does exist, however, on commuter parkers and the total number of parking spaces in the Study Area. Based on what is known about parking demand and supply, it can be concluded that the parking supply not utilized by the following groups is available to visitors.

The following conclusions can be drawn from the preceding analyses of commuter and student parking.

- UC Students, Faculty and Staff make 9,740 daily vehicle trips to the Study Area
- Off-campus Study Area employees make from 5,900 to 6,200 daily vehicle trips[21] to the Study Area
- UC Students, Faculty and Staff occupy 6,250 UCB-provided parking spaces and 2,160 non-campus spaces on a daily basis.
- Off-campus Study Area employees occupy 4,500 to 6,200 non-campus spaces on a daily basis.[22]

[21] Lower end of vehicle trip generation assumes that 5% of off-campus Study Area employee actually work for UC Berkeley and are counted in the UC Berkeley faculty/staff vehicle trips.

[22] The high range is based on the assumption that there is no overlap between off-campus Study Area employees and UC employees and that each employee needs one full parking space per day. The low range is based on a 5%

- In total, students, UC commuters and other Study Area commuters occupy 6,660 to 8,360 non-UC parking spaces, some located within the Study Area and some located beyond the Study Area.
- There are about 7,500 non-UC parking spaces located in the Study Area. The supply of these spaces comes from the following sources:
  - Privately-owned public fee lots (e.g. Douglas Parking lots)
  - Privately-owned restricted parking (e.g. employer lots for employees or customers)
  - City-owned public fee lots (e.g. Sather Gate garage)
  - On-street metered spaces
  - On-street free spaces within the Study Area (all within RPP zone)

Since there are up to 8,360 Study Area commuters occupying non-UC parking spaces and there are only 7,500 non-UC parking spaces available in the Study Area, it may be concluded that there is *no* available parking for visitors in the Study Area. Many of the 6,660 to 8,360 commuter vehicles needing parking, however, park beyond the Study Area. The more student and commuter vehicles parking beyond the Study Area (i.e. the greater the amount of "spill-over" parking), the more Study Area parking available for visitors.

Because data is not available to know exactly how many commuter vehicles spill over the Study Area borders, a number of assumptions must be made to develop an estimate of the amount of Study Area parking available to visitors. Applying two sets of assumptions -- one at the "low end"[23] of what might be feasible and the other at the "high end"[24] of what might be feasible -- produces the conclusions that:

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overlap and the assumption that any parking space can accommodate 1.3 off-campus employee commute trips on a daily basis due to night-shifts and part-time work.

[23] Low end assumptions:
- 5% of off-campus employees are counted in campus employee totals;
- each off-street fee space accommodates 1.25 student vehicles/day, 1 faculty/staff vehicle/day and 1.3 off-campus employee vehicle/day;
- 50% of UC parkers who park in off-street, non-UC paid parking park in City-owned garages, 50% park in private fee lots;
- 50% of UC parkers who park in on-street free parking park beyond the RPP zone;
- 30% of restricted parking is dedicated to visitor/customer parking;
- 40% of City owned lot spaces are occupied by commuters;
- 75% of private fee lot spaces are occupied by commuters;
- 30% of metered spaces are occupied by commuters;
- 25% of RPP spaces are occupied by residents with RPP stickers, 37% occupied by UC parkers, 22% occupied by off-campus employees, and 16% occupied by visitors.

[24] High end assumptions:
- 0% of off-campus employees are counted in campus employee totals;
- each off-street fee space accommodates 1.25 student vehicles/day, 1 faculty/staff vehicle/day and 1 off-campus employee vehicle/day;
- 50% of UC parkers who park in off-street, non-UC paid parking park in City-owned garages, 50% park in private fee lots;
- 70 to 75% of UC parkers who park in on-street free parking park beyond the RPP zone;
- 50% of restricted parking is dedicated to visitor/customer parking;
- 25% of City owned lot spaces are occupied by commuters;
- 50% of private fee lot spaces are occupied by commuters;
- 25% of metered spaces are occupied by commuters;
- 50% of RPP spaces are occupied by residents with RPP stickers, 20% occupied by UC parkers, 14% occupied by off-campus employees, and 16% occupied by visitors.

A) there could be 2,000 to 5,000 commuter/student vehicles parking beyond the Study Area boundaries on a daily basis.
B) there could be 2,600 to 3,300 parking spaces available for visitor parking within the Study Area on a daily basis.

As can be seen from the very large number of assumptions that must be made to conduct this analysis, additional field research is needed to develop an accurate estimate of the amount of spill-over parking affecting the neighborhoods beyond the Study Area and the number of parking spaces within the Study Area that are available for visitor parking.

Beyond UC information, there is very little data about parking behavior. The following data would be needed to more accurately perform the above analysis:

- The percentage of off-campus Study Area employees who park in each different type of parking supply: on-street RPP, on-street beyond the RPP, city-owned off-street, privately-owned restricted parking (e.g. employer lots for their employees), and privately owned non-restricted parking;
- The number of parking spaces in the RPP zone occupied by resident vehicles;
- The percentage of metered spaces "fed" by commuter parkers;
- Parking turn-over rates; and
- The adequacy of 2,600 to 3,300 visitor spaces to meet retail and entertainment venue needs.

UC Berkeley collects excellent data on its student and employee parkers, but the following pieces of information are also needed about UC parkers:

- Of those who park for free on the street, the percentage who park in the RPP zone versus those who park beyond RPP;
- The amount of time parkers occupy their parking spaces on a daily basis;
- The number of students, staff and faculty coming to campus on an "average" day; and
- The number of UC Berkeley faculty and staff working in UC buildings off campus.

Summary of Parking Supply/Demand Analyses

Chapter 9 presented four parking supply/demand analyses. The first three focused on potential parking increases that would be needed based on A) potential non-UC employment growth B) potential UC student growth, and C) potential UC employment growth. These analyses estimated the number of parking spaces that would be needed if mode split stayed the same through the next decade. They also showed the potential percentage change in Drive Alone mode split to accommodate the growth if additional parking were not supplied. Figure 9-6 summarizes the results of the three growth analyses.

FIGURE 9-6
PARKING SPACES OR MODE SHIFT TO ACCOMMODATE GROWTH BY 2010-11

	Parking Space Increase Needed to Accommodate Growth	Drive Alone Rate Needed to Accommodate Growth	
		Baseline DA Rate	New Rate Needed in 2010-11*
UC Students	145	15%	14% to 14.5%
UC Faculty/Staff	520	50%	42% to 45%
Non UC Study Area Employees	250	46%	42% to 43.5%
TOTAL	**915**		

** This is presented as a range. The lower drive alone rate would be required if all those who stopped driving alone switched to carpooling/vanpooling with an average of 2.5 passengers per vehicle. The higher drive alone rate would be required if all those who stopped driving alone switched to non-vehicular modes, such as bicycling or buses.*

In the case of the analysis of spill-over parking, Figure 9-7 summarizes the range of potential vehicles spilling beyond the Study Area by each commuter group, and presents the mode split needed for each group in order to completely eliminate the "spill-over vehicles." The drive alone rate requirements in Figures 9-6 and 9-7 are not combined, because those in Figure 9-6 are based on what will be needed in the future, while those in Figure 9-7 are what would be needed today. The two sets of drive alone mode splits accomplish two different goals and cannot be combined.

FIGURE 9-7
MODE SHIFT NEEDED TO ELIMINATE SPILL-OVER PARKING

		Drive Alone Rate Needed to Eliminate Spill-Over Cars	
	Spill-Over	**Baseline DA Rate**	**New Rate Needed "Today"****
UC Students*	450 to 580	15%	13% to 13.25%
UC Faculty/Staff*	20 to 100	50%	48% to 49%
Study Area Employees (non-UC)	1,600 to 4,200	46%	10% to 30%
TOTAL	**2,070 to 4,880**		

** UC Berkeley collects data about employee and student parking behavior. Developing the ranges of estimated spill-over parking for UC students, faculty and staff required fewer assumptions than did the calculation for off-campus employees, although it is still a rough estimate.*
***The lower drive alone rate would be required to reduce the lower # of spill-over vehicles; the higher drive alone rate would be required to reduce the higher # of spill-over vehicles.*

Figure 9-7 shows that the drive alone rate needed among Study Area employees (non-UC) to eliminate spill over parking could be as low as 10%. It is estimated that the current drive alone rate of non-UC employees is 46% (see Footnote 3). A reduction from 46% to 30%-10% would be very difficult to achieve. Even San Francisco has a drive alone rate higher than 10%.

It would be extremely difficult to achieve a 10% drive alone rate even if all TDM activities were implemented. Thus, if a policy goal were to eliminate spill over parking, the supply of some additional parking is necessary – either within the Study Area or as park & ride lots elsewhere.

It should also be noted that this very high level of spillover parking lends considerable weight to the argument that there is no single solution to improving access to the Study Area. Strategies that change the price and management of parking must be coupled with improvements to transit, bicycle and pedestrian infrastructure in order to be most effective. If only disincentives are applied, the pressure for spill over parking will continue to increase.

CONCLUSIONS

- There is no formula that inputs community size, transportation resources, and economic activity and outputs the appropriate amount of parking. The amount of parking to be supplied must be informed by community transportation plans, community growth, community goals, and existing levels of supply and demand.

- If parking were managed to maintain "status quo" mode splits by supplying only enough additional parking to meet campus and employment growth, a total of 915 additional parking spaces would be needed within the Study Area between now and 2010-11. This amount would not address spill over parking; it simply addresses the issues raised by the first three growth analyses.

- If additional parking is not constructed to accommodate projected growth, the mode splits needed to absorb the growth into non-driving modes are achievable if some of the basic strategies outlined in this TDM Study are pursued. A 0.5% to 8.0% mode shift from driving to not-driving would be necessary for each group (see Figure 9-6).

- To understand the full magnitude of the number of Study Area commuters and students who park beyond the Study Area boundaries, additional field work and data collection are needed. Non-UC Study Area employee demand should be fully characterized by research, survey and data material.

- A very rough estimate of the number of Study Area commuter and student vehicles that are parked beyond the Study Area boundaries is 2,000 to 5,000 vehicles. This conclusion derives from numerous assumptions.

- A very rough estimate of the number of Study Area parking spaces available for visitor parking on a daily basis is 2,600 to 3,300 spaces. This conclusion derives from numerous assumptions.

- To eliminate the estimated amount of spillover parking, the drive alone rate among non-UC employees must drop to 30-10%. It would be extremely difficult to produce such a low drive alone rate. Thus, if a policy goal were to eliminate spill over parking, the supply of additional parking is necessary.

- The level of spill-over parking shows that the Study Area has maximized the commuter trip reduction that can be achieved with supply-side parking strategies -- e.g. limiting parking supply and parking pricing. Additional trip reduction benefits from parking supply management must be coupled with activities that will make it more feasible for people – especially commuters – to take transit, carpool, vanpool, bicycle or walk to the Study Area.

- It is not possible to relieve the parking and congestion pressures of the Study Area with just TDM strategies or just by providing parking. A combination of these two strategies is needed.

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