UNIVERSITY OF CALIFORNIA, BERKELEY

Parking Supply & Demand Assessment:

Baseline (Status Quo) Scenario

Final Technical Memorandum

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Summary

This memorandum provides a preliminary assessment of future parking supply and demand at UC Berkeley, analyzing the period from the present day through the year 2020. It is intended to provide a "baseline scenario", describing what would happen if status quo parking and transportation policies were maintained for the next 10 years, even as the proposed campus building program goes forward. This report is designed as an interim, working document. Its purpose is to provide a baseline scenario against which proposed policy changes may be compared.

This memorandum does *not* provide recommendations. Recommendations about parking and transportation policies, facilities, programs and services will be provided in future reports.

In essence, this memorandum describes what can be expected to happen if current parking and transportation policies are left unchanged, current transit and transportation demand management programs are maintained at their current levels of service, and no new or replacement parking facilities are built, even as new buildings are built on campus. This “baseline scenario” makes the following basic assumptions[1]:

1. "Status quo" parking policies and prices will be maintained. Specifically, campus-managed permit parking prices for all user groups are assumed to increase at the rate of inflation, so that real (i.e. inflation-adjusted) prices remain unchanged, and therefore exert no influence on current behavior. Parking privileges for all groups are assumed to remain unchanged.

2. Parking prices for nearby, publicly available parking (in private and City-owned lots and garages) are also assumed to increase only at the rate of inflation, and the availability of these facilities to campus affiliates is assumed to remain unchanged.

3. Similarly, “status quo” transit prices and levels of transit service are assumed to continue. For example, the student Class Pass program, where all students pay a fee in exchange for unlimited access to all AC Transit buses, is assumed to continue.

4. Campus population shifts will occur, with the total headcount of faculty and staff growing from 15,016 in 2009 to 15,810 in 2020, while student population declines from 34,525 in 2009 to 33,450 in 2020, and the number of visitors projected to stay even at 2,000 (per the 2020 LRDP EIR Table 3.1-1). This means that overall, campus population is projected to slightly *decline*, from 51,549 people in 2009 to 51,260 in 2020.

5. The proposed campus building program will go forward, with built space increasing by approximately 10%, from roughly 13 million square feet in 2009 to 14.3 million square feet in 2020.

[1]Population, built square footage and parking facility displacement projections were provided by Physical & Environment Planning staff. Parking occupancy and inventory counts were provided by Parking & Transportation Services staff.

6. As existing surface parking lots and structures make way for new buildings, 1,485 campus-managed parking spaces will be displaced.

7. No replacement parking facilities are built, no transit service improvements are made, and no new transportation demand management programs are instituted.

Under these status quo assumptions, the following results can be expected to occur by the year 2020:

1. Although overall campus population is projected to *decrease* slightly, parking demand can be expected to *increase* slightly. This is because the projected decline in student population (and therefore in student parking demand) will be more than offset by growth in faculty/staff parking demand. While student population will decline by more than 1,000, since only 7% of commuter students drive alone to campus, and only 4% of resident students have campus parking permits, the effect of this population change on parking demand is fairly small. With faculty/staff population increasing by nearly 800, and a drive-alone rate among faculty/staff of 47%, the net result is that parking demand increases**. By 2020, peak-hour parking demand is expected to increase from 5,531 to 5,658 spaces.**

2. Currently, the campus has 6,952 parking spaces, 80% of which (5,531 spaces) are occupied at the peak hour. (Note that some campus parking facilities are currently in high demand, while others are underused, so that spot shortages and surpluses do exist.) **Removing 1,485 parking spaces to make way for new buildings would leave the campus with 5,467 spaces.**

3. **If no replacement parking facilities are built, no prices change (after adjusting for inflation), and no new transit services or transportation demand management programs are instituted, the net result would be a campus with 5,467 parking spaces and peak-hour parking demand for 5,658 vehicles.** Even if every single campus parking space were filled, 191 vehicles among the population who currently drive and use campus-managed parking would still be left unserved at peak hour.

4. Most parking system operators seek to have a cushion of available parking spaces left over even at the peak hour of parking demand, so that customers need not search the entire parking system to find the last available parking space, and to allow for a variety of other occurrences, such as temporary construction losses. Assuming that UC Berkeley should have at least 5% of the parking supply vacant at the peak hour, an appropriate parking supply to serve the projected peak hour parking demand of 5,658 parked vehicles would be 5,956 parking spaces (5,658 ÷ 95%). **Since only 5,467 spaces would be left on campus in 2020, and 5,956 would be needed to achieve a vacancy rate of 5% at the peak hour, the gap between supply and demand under the assumptions of this baseline scenario is 489 parking spaces.**

The pages that follow describe this parking supply and demand assessment in more detail. Cost estimates for replacement parking facilities are also provided. Future memoranda and reports will provide recommendations about how to close this identified "gap" between projected parking supply and parking demand.

Introduction

In order to describe the current parking supply and demand at UC Berkeley and then estimate future parking supply and demand, a multi-stage model was developed as outlined below.

The steps in making the model are the following:

1. Review current parking supply (i.e. campus-managed permitted spaces) and demand and current population, by user group (faculty/staff, students);
2. Project future population for each user group;
3. Estimate peak-hour parking demand ratios for each user group;
4. Estimate resulting future parking demand for each user group;
5. Project parking supply changes;
6. Summarize locational parking impacts;

Input Variables

The model requires numerous inputs. The sources for each input are listed in parentheses:

- Campus population of commuter students, resident students, and faculty/staff – current and projected (Office of Physical & Environmental Planning);
- Built space – current and projected (Office of Physical & Environmental Planning);
- Future campus parking displacement (Office of Physical & Environmental Planning);
- Growth in resident student beds (Office of Physical & Environmental Planning);
- Number of existing parking spaces on campus (Parking & Transportation Department);
- Parking utilization rates – current (Parking & Transportation Department);
- Parking permit sales – current (Parking & Transportation Department);

Model Assumptions

In any model, a number of assumptions must be made. To create a baseline scenario, which projects what would happen if "status quo" parking and transportation policies were maintained, even as new campus buildings are built and population shifts occur, we employed the following assumptions:

- "Status quo" parking policies and prices will be maintained. Specifically, parking prices for all user groups are assumed to increase at the rate of inflation, so that real (i.e. inflation-adjusted) prices remain unchanged, and therefore exert no influence on current behavior.

- Parking privileges for all groups are assumed to remain unchanged.

- Parking prices for nearby, publicly available parking (in private and City-owned lots and garages) are also assumed to increase only at the rate of inflation, and the availability of these facilities to campus affiliates is assumed to remain unchanged.

- Similarly, "status quo" transit prices and levels of transit service are assumed to continue. For example, the student Class Pass program, which provides all students with free access to all AC Transit buses, is assumed to continue.

- For all parking spaces, this study uses an "effective parking supply factor" of 95%. Effective supply is defined as the total number of parking spaces in a lot, less the percentage of spaces that the parking operator wishes to have vacant even at the typical peak hour. Choosing an effective parking supply factor of 95% means that the operator wishes to have 5% of the parking supply vacant at peak hour. This provides a cushion of spaces to reduce the search time for the last few available parking stalls and to allow for vehicles moving into and out of parking stalls during peak periods. This cushion also allows for unanticipated variations in parking activity as well as the temporary loss of spaces due to improperly parked vehicles, construction or other factors. The effective supply cushion also compensates for the inefficiencies in the utilization of available supply due to the segregation of spaces for various user groups (e.g. special events).

Parking Supply & Demand

The parking supply monitored by University staff showed a total campus parking inventory of 6,952 spaces.[2] The parking supply includes all space types: permitted (C, F, S), Resident Hall, Special Area, Department Reserved, Disabled Persons, Motorcycle, Physical Plant Reserved, Carpool, Public Parking, Loading/Unloading, and "Other". Parking occupancy counts conducted by Parking & Transportation staff in Fall 2009 show a peak-period demand of 5,531 occupied spaces (80% of total).[3] The parking occupancy also includes all vehicle and permit types. The parking supply and occupancy was as follows:

[2] Parking occupancy and inventory counts were provided by Parking & Transportation Services staff.
[3] Total spaces include attendant parking (i.e. spaces created by parking cars more than one car deep, using parking attendants to move vehicles).

Figure 1 2009 Parking Inventory and Occupancies

Facility Name	Inventory		Spaces Occupied	Occupancy Rate	Facility Name	Inventory		Spaces Occupied	Occupancy Rate
	Marked Spaces	Attendant Spaces				Marked Spaces	Attendant Spaces		
Anna Head Annex	16	0	8	50%	Haste/Channing Parking	39	0	29	74%
Anna Head Lot	55	0	51	93%	Hearst Gym	8	0	8	100%
Anna Head Lot - West	166	0	138	83%	Hearst Gym Westside	2	0	2	100%
Bancroft 2111 Lot	49	0	22	45%	Hesse Service Area	10	0	9	90%
Bancroft Structure	131	30	153	95%	Hildebrand	14	0	14	100%
Bancroft/Fulton Lot	225	54	268	96%	Hildebrand Loading	1	0	1	100%
Bancroft/Fulton West Lot	32	0	29	91%	Kleeberger Lot	31	0	25	81%
Barker Hall lot	6	0	5	83%	Kroeber Lot	21	0	21	100%
Barrows annex	4	0	2	50%	LHS - Circle	10	0	1	10%
Barrows Hall - East	2	0	2	100%	LHS - East Lot	53	0	37	70%
Barrows Lane	34	0	34	100%	LHS - Staff Lot	85	0	51	60%
Bechtel Drive	2	0	1	50%	LHS - Terrace 1	44	0	1	2%
Boalt Lot & Garage	133	30	161	99%	LHS - Terrace 2	54	0	0	0%
Botanical Gardens Parking Lot	79	0	34	43%	LHS - Terrace 3	53	0	1	2%
Bowles Lot	70	0	70	100%	LHS - Vista Lot	58	0	20	34%
Campanile Way	9	0	8	89%	Lower Hearst Structure	622	150	670	87%
Campbell Service Area	4	0	4	100%	Manville Parking Lot	18	0	13	72%
Carleton Street	15	0	13	87%	Minor Hall Lane	10	0	10	100%

Facility Name	Inventory		Spaces Occupied	Occupancy Rate	Facility Name	Inventory		Spaces Occupied	Occupancy Rate
	Marked Spaces	Attendant Spaces				Marked Spaces	Attendant Spaces		
Centennial Drive	11	0	10	91%	MLK Student Union Garage	107	0	72	67%
Centennial Lot	3	0	1	33%	Moffit Loading Area	5	0	4	80%
Clark Kerr - Bldg 20	32	0	21	66%	Moses Court	9	0	9	100%
Clark Kerr - Bldg 23	2	0	0	0%	Mulford Lot	10	0	7	70%
Clark Kerr - Bldg. 19	9	0	5	56%	Oxford Tract Lot North	17	0	13	76%
Clark Kerr - Bldg. 4 Lot	12	0	12	100%	Oxford Tract Lot South	6	0	6	100%
Clark Kerr - Court St	16	0	12	75%	Prospect Court	67	0	64	96%
Clark Kerr - Golden Bear Lot	23	0	17	74%	Ridge Lot	21	0	21	100%
Clark Kerr - Heating Plant Lot	17	0	16	94%	RSF Parking Garage	237	67	287	94%
Clark Kerr - Horseshoe	11	0	10	91%	Sather Lot	7	0	7	100%
Clark Kerr - NW Lot	40	0	26	65%	South Drive	29	0	28	97%
Clark Kerr - Sports Lane	16	0	10	63%	Sproul Lot	20	0	19	95%
Clark Kerr - SW Lot	167	0	121	72%	SSL - Access Road	25	0	5	20%
Clark Kerr North Street	16	0	13	81%	SSL - Loading	2	0	1	50%
College Lot	25	0	19	76%	SSL - Lower Lot	29	0	6	21%
Dana/Durant Lot	86	40	125	99%	SSL - Upper Lot	48	0	40	83%
Donner Lab Lot	13	0	11	85%	Stadium Lot	33	0	32	97%
Donner Meters	3	0	1	33%	Stadium Rimway Lot	31	0	30	97%
Dwight Way Lot	27	0	7	26%	Steam Plant Lot	6	0	6	100%
Dwinelle Annex	13	0	13	100%	Stern West Firelane	1	0	0	0%

Facility Name	Inventory		Spaces Occupied	Occupancy Rate	Facility Name	Inventory		Spaces Occupied	Occupancy Rate
	Marked Spaces	Attendant Spaces				Marked Spaces	Attendant Spaces		
Dwinelle Lot	90	30	116	97%	Tang Center Lot	11	0	5	45%
Edwards Field South	4	0	3	75%	Tolman Hall Breezeway	18	0	14	78%
Edwards Track	1	0	1	100%	Underhill Parking Structure	1011	0	799	79%
Ellsworth Structure	198	0	170	86%	Unit 1 Lot	34	0	33	97%
Epworth Lot - West	8	0	7	88%	Unit 2 Lot	5	0	1	20%
Eshleman Road	11	0	10	91%	University Drive	17	0	14	82%
Etcheverry West	9	0	7	78%	University Hall Structure	258	73	324	98%
Eucalyptus Grove	6	0	4	67%	University Hall Well	19	0	19	100%
Evans Loading Dock	4	0	3	75%	University Hall West	29	0	26	90%
Extension Lot North	8	0	7	88%	Upper Hearst Structure	336	80	403	97%
Extension Lot South	24	0	6	25%	Valley Life Sciences Service A	4	0	2	50%
Faculty Club Lane	7	0	6	86%	Warren Hall, NE Construction	2	0	2	100%
Foothill Lot	229	0	62	27%	Warren Hall, SE Construction	2	0	2	100%
Frank Schlessinger Way	82	0	66	80%	Wellman Court Yard	42	0	36	86%
Genetics Garage	321	0	269	84%	West Circle	12	0	9	75%
Girton Hall North	1	0	0	0%	West Crescent	28	0	19	68%
Greek Theater	5	0	5	100%	Wickson Road	20	0	19	95%
Haas Pavilion Lot	9	0	8	89%	Witter Field Lot	113	0	29	26%

Facility Name	Inventory		Spaces Occupied	Occupancy Rate	Facility Name	Inventory		Spaces Occupied	Occupancy Rate
	Marked Spaces	Attendant Spaces				Marked Spaces	Attendant Spaces		
Haas School North	2	0	2	100%					
Haas School South	1	0	0	0%	Total	6,398	554	5,531	80%

Since University parking counts do not currently distinguish by permit type (e.g. student, faculty/staff), this analysis relies upon permit sales as a proxy to gauge current demand by group. As shown in Figure 2, peak parking demand by group was calculated by dividing the total parking demand by the total parking permits sold and multiplying that ratio by each group's number of permits sold. For example, out of a total of 5,913 parking permits sold, 1,314 (or 22.2%) were sold to commuter students. Therefore, 22.2% of total peak-period parking demand was estimated to be commuter student parking demand. Total peak-period parking demand was 5,531 spaces occupied: 22.2% of this figure equals 1,229 parking spaces used by commuter students. Using the same procedure, peak parking demand for resident students and faculty/staff was also estimated, as shown in Figure 2.

Figure 2 Parking Demand, Estimated by User Group

User (Pass)	Population 2009 (a)	Permits Sold (b)	Peak Parking Demand (c)	Parking Demand Ratio (d) = (c/a)
Commuter Student (S)	26,253	1,314	1,229	0.05
Resident Student (RH)	8,272	334	312	0.04
Faculty, Staff, and Visitors (F & C)	17,016	4,265	3,989	0.23
Total	51,541	5,913	5,531	0.11

Based on the estimated peak parking demand of each group and their respective populations (i.e. potential number of parkers), we can derive basic demand ratios for campus-managed parking. In the 2009-2010 academic year, there were 26,253 commuter students, 8,272 resident students, and 17,016 faculty, staff, and visitors.[4] Using the ratio of peak period parking demand for each group to the population for each group, we can establish that the peak parking demand rates for these three groups are 0.05, 0.04 and 0.23 vehicles per person, respectively (0.11 for all groups combined). During the same academic year, the numbers of parking permits sold to each group were 1,314, 334 and 4,265, respectively (see Figure 2).

Campus Growth

UC Berkeley is steadily growing in building space despite its land constraints, but its overall population is projected to *decline* slightly by 2020. As a result of growth in both education and research functions on campus, University staff project the total headcount of faculty and staff to grow from 15,016 in 2009 to 15,810 in 2020. Conversely, the number of students is anticipated to decline from 34,525 in 2009 to 33,450 in 2020 per the UC Berkeley 2020 LRDP.

Construction of new campus residential facilities will increase the residential student population, while the commuter student population will decline. The rise in faculty and staff is matched by a growth in built square footage as building space will grow from roughly 13 million square feet in 2009 to 14.3 million square feet in 2020. Figure 3 shows both the anticipated increases in population and square feet of built space through 2020.

[4] Population, built square footage and parking facility displacement projections were provided by Physical & Environment Planning staff.

It should be noted that the built space numbers include both projected residential housing development and planned academic structures such as the downtown Helios facility.

Figure 3 Population & Building Space Projections[5]

Population/ Area	2009	2010	2011	2012	2013	2014
Commuter Students	26,253	26,156	26,058	25,536	25,438	25,341
Resident Students	8,272	8,272	8,272	8,696	8,696	8,696
Faculty	6,361	6,407	6,452	6,497	6,543	6,588
Staff	8,655	8,682	8,709	8,735	8,762	8,789
Visitors	2,000	2,000	2,000	2,000	2,000	2,000
Campus Population	51,541	51,516	51,490	51,465	51,439	51,414

Population/ Area	2015	2016	2017	2018	2019	2020
Commuter Students	25,193	24,695	24,597	24,500	24,402	24,254
Resident Students	8,746	9,146	9,146	9,146	9,146	9,196
Faculty	6,633	6,679	6,724	6,769	6,815	6,860
Staff	8,816	8,843	8,870	8,896	8,923	8,950
Visitors	2,000	2,000	2,000	2,000	2,000	2,000
Campus Population	51,388	51,362	51,337	51,311	51,286	51,260

The growth in resident students will take place gradually through 2020. Figure 4 shows the planned expansion of resident student facilities outlined by the University.

Figure 4 Planned Resident Student Housing

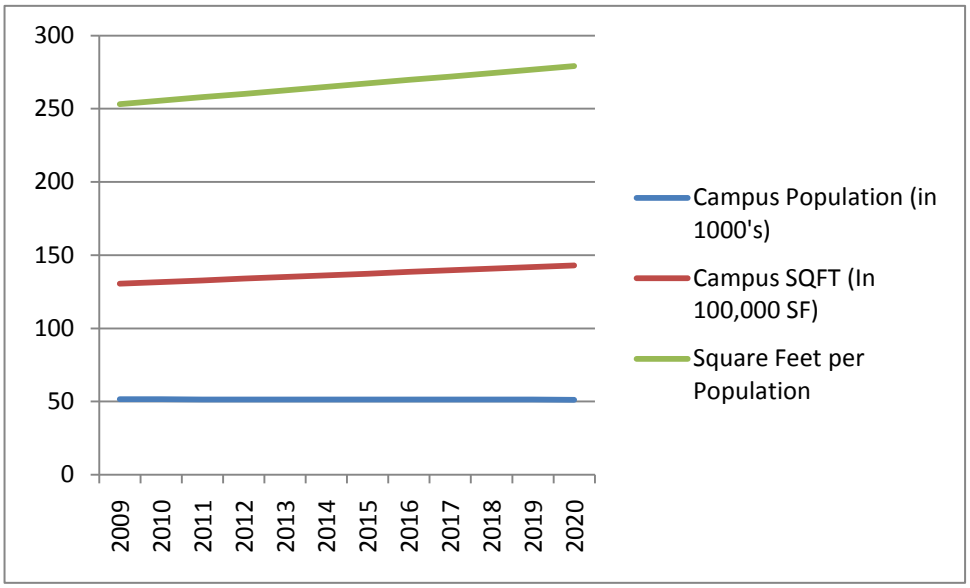
Facility Location	Number of Beds	Year of Opening
Anna Head	424	2012
Bancroft/Fulton	50	2015
Channing/Ellsworth	400	2016
Dana Durant	50	2020

The campus population is expected to decline from 51,541 to 51,260. As a result of this decline and the planned growth of campus buildings, including housing, the number of square feet per person will increase. Currently, there are 253 square feet of built space per person whereas by 2020, the campus will have 279 square feet per person. Newly

[5] Population projections assume a linear decrease from 2009 to 2020. Built space estimates include the potential maximum square footage of development on each of the following parking lots to close: Anna Head West (130,000), Ellsworth Structure (150,000), Memorial Stadium (150,000), Boalt Lot (100,000), Bancroft Structure (100,000), Dwinelle Lot (100,000), Dana Durant (100,000), Oxford DHS Lot (412,600), University Hall Structure (150,000), and Bancroft/Fulton (150,000).

constructed buildings can be expected to create new focal points of parking demand, but the growth in square feet per person shows that some of the new building users will simply be shifting from other points on campus rather than creating new demand for the campus as a whole, as shown in Figure 5.

Figure 5 Campus Growth



Baseline Scenario

As described earlier, this baseline scenario projects parking supply and demand through 2020 assuming a continuation of existing policy conditions and an assumption that user behavior remains unchanged.

Future Parking Demand

Using the parking ratios from Figure 2 in combination with population change estimates, we can estimate future parking demand under this "status quo" scenario. By 2020, total peak-period demand for campus-managed spaces is expected to rise from 5,531 to 5,658 spaces with the overall peak parking demand ratio staying level at 0.11. It should be noted that these figures are strictly based on current parking demand rates, and do not take into account changes in parking behavior due to higher permit price increases or highly incentivized transportation demand management measures.

Figure 6 Projected Parking Demand in 2020

User	2009 Population (a)	2009 Peak Parking Demand (b)	2009 Peak Parking Ratio (c) = (b/a)	2020 Population (d)	2020 Peak Parking Ratio (e)	2020 Peak Parking Demand (f) = (d*e)
Commuter Student	26,253	1,229	0.05	24,254	0.05	1,136
Resident Student	8,272	312	0.04	9,196	0.04	347
Faculty, Staff, and Visitors	17,016	3,989	0.23	17,810	0.23	4,176
Total	51,541	5,531	0.11	51,260	0.11	5,658

There are some UC affiliates parked off-campus. This includes some commuters who park in downtown garages because they work in downtown office space. It includes an unknown number of affiliates who park off-campus on the street or in other private lots.

Future Parking Supply

Given the current and future peak parking demand figures, we can develop an estimate for the appropriate supply of parking under this baseline scenario. This study uses an "effective parking supply factor" of 95%. Effective supply is defined as the total number of parking spaces, less the percentage of spaces that the parking operator wishes to have vacant even at the typical peak hour. Choosing an effective parking supply factor of 95% means that the operator wishes to have 5% of the parking supply vacant at the peak hour. This provides a cushion of spaces to reduce the search time for the last few available parking stalls and to allow for the dynamics of vehicles moving in to and out of parking stalls during peak periods. This cushion also allows for unanticipated variations in parking activity as well as the temporary loss of spaces due to improperly parked vehicles, construction, and other factors. The effective supply cushion also compensates for the loss of utilization and efficiency due to the segregation of spaces for various user groups (e.g. special events). For example, there are currently 6,952 spaces supplied for the university with 5,531 spaces being occupied at peak hour. An appropriate amount of parking for this demand would be 5,822 spaces (5,531 ÷ 95%). Since there are 6,952 spaces currently built, there is presently an oversupply of 1,130 spaces more than is necessary to provide a 5% cushion.[6] By applying this 5% "cushion" in 2020, we estimate the total amount of parking needed to be 5,956 spaces (see Figure 7).

[6] The 95% effective parking supply factor is suitable for universities that experience relatively low parking turnover. Higher turnover uses, such as retail, should use a lower effective parking supply factor.

Figure 7 Projected Parking Demand with Effective Supply Cushion in 2020

User	2009 Population (a)	2009 Peak Parking Demand (b)	2009 Appropriate Parking Supply (c) = (b/.95)	2020 Population (d)	2020 Peak Parking Demand (e)	2020 Appropriate Parking Supply (f) = (e/.95)
Commuter Student	26,253	1,229	1,294	24,254	1,136	1,195
Resident Student	8,272	312	329	9,196	347	366
Faculty & Staff	17,016	3,989	4,199	17,810	4,176	4,395
Total	51,541	5,531	5,822	51,260	5,658	5,956

Comparing Estimated Baseline Parking Demand to LRDP Estimates

The UC Berkeley 2020 Long Range Development Plan (LRDP) suggested that the campus parking supply should be increased up to 9,990 parking spaces.[7] As described in Table 3.1-2, Projected Space Demand, of the 2020 LRDP, the actual parking space count in 2001-2002 was 6900, a net additional 100 spaces were completed by March 2004, and an additional 690 were approved as of the writing of the LRDP, for a total of 7690 "Actual + Approved" spaces[8]. The LRDP estimated that to meet continuing demand not accommodated in the campus supply, and projected campus growth, would require up to 2300 net new parking spaces beyond the 7690 "Actual + Approved" spaces, for a total of 9990.[9]

As the LRDP explains:

> The projected campus growth under the 2020 LRDP could, at target drive-alone rates of 10% for students and 50% for employees, result in a demand by 2020 for up to 2,300 net new parking spaces beyond the current inventory and approved projects. However, while this figure includes substantial current unmet demand as well as future growth, it could be reduced if drive-alone rates could be improved through a combination of transit incentives and transit service improvements, as described below.
>
> As with housing, because the State provides no funds for university parking, the full cost of parking construction, operation and maintenance must be supported by revenues. Our objectives to improve the parking supply must therefore be balanced by the need to maintain reasonable fees for those who must drive to campus, and to avoid building surplus capacity. The 2020 targets may be

[7] *University Of California, Berkeley 2020 Long-Range Development Plan EIR*, Volume 3A, p. 3.1-28.
[8] *University Of California, Berkeley 2020 Long-Range Development Plan EIR*, Volume 3A, p. 3.1-14.
[9] Ibid. Note that the LRDP assumed that 500 of these new spaces could "be deferred until after 2020 if the AC Transit Bus Rapid Transit/Telegraph route is approved and the system is under construction by January 2010"; further, the LRDP Litigation Settlement Agreement between the campus and the City of Berkeley determined that only 1,270 net new parking spaces could be approved under the 2020 LRDP without preparation of a project-specific EIR. See pp 13-14 of the Agreement at lrdp.berkeley.edu.

adjusted in the future to reflect changes in market conditions and parking demand.[10]

By comparison, using the methodology described in this memorandum, we estimate that *at current prices, under current policies, and without accommodating unmet demand that may currently be accommodated by other private, public, or on street parking,* the peak parking demand for campus-managed parking in the year 2020 will be 5,658 spaces, resulting in an appropriate parking supply of 5,956 spaces (see Figure 6 and 7). It should be noted that the methodology used in this memorandum is based upon comparing the number of vehicles observed to be parked in campus-managed parking facilities, at the peak hour, to campus population.

By contrast, the LRDP parking demand estimates employed a different methodology, and understandably, arrived at a different estimate of what future parking demand could be. Providing a detailed comparison of the reasons for the differences between the baseline scenario described in this working paper and the estimate provided in the LRDP is beyond the scope of work of this phase of work.

However, it is important to note that the assessment in this working document is intended only to provide a baseline estimate of future parking demand for campus-managed parking spaces. This memorandum estimates how many vehicles would park in campus-managed parking facilities in the future, *if current prices and current policies were to be maintained on campus and by local parking providers*. If current policies were to be changed, quite different results could be expected. For example, if parking prices for campus-managed parking facilities were substantially lowered, then the peak parking occupancy of these facilities could be expected to increase substantially. In that circumstance, with substantially lower prices, it is quite likely that parking permit sales would increase, and additional permit-holders would then park in campus-managed facilities.

The purpose of this working document is not, as stated earlier, to recommend parking prices or other policy changes. Its purpose is only to provide a baseline scenario against which proposed policy changes may be compared. Recommendations about parking and transportation policies, facilities, programs and services will be provided in future reports.

Although the LRDP offers a maximum on the amount of parking needed, the University is currently planning for the closure of several lots by 2020 to make way for new student housing and academic building use. Figure 8 shows the lots to be closed with their corresponding year of closure and number of spaces.

[10] *University Of California, Berkeley 2020 Long-Range Development Plan EIR*, Volume 3A, p. 3.1-28.

Figure 8 Parking Lot Closures[11]

Parking Location	Year of Closure	Permit types served	Parking Spaces
Anna Head West	2010	Public Parking	216
Stadium	2010	C, F, S	33
Witter Lot	2010-2012	C,F,S, DP	80
University Hall Structure	2013	C, F, S, CP, DP	138[12]
Bancroft Fulton	2013	C,F,S, CP, DP, DR	279
Ellsworth Structure	2014	C,F,S,RH,DP, OTH	198
Dwinelle Lot	2015	C,DR,DP	120
Boalt Lot	2017	C,DR,PP-CS,DP	134
Bancroft Structure	2017	C, DR, DP	161
Dana Durant	2019	F, DR, CP, OTH	126
TOTAL			1,485

These lot closures will be combined with a gradual increase in parking demand as faculty and staff experience higher parking ratios than students (see Figure 2). If, as is assumed in the baseline scenario, parking prices are raised each year to simply keep real (inflation-adjusted) permit prices at current rates, parking demand would increase from 5,531 in 2009 to 5,658 in 2020, an increase in demand of only 2.3%. However, with the loss of almost 1,500 spaces, this would still result in a deficit of 489 spaces by 2020 taking into account the 95% effective parking supply factor discussed in the model assumptions.

[11] Population, built square footage and parking facility displacement projections were provided by Physical & Environment Planning staff. The Department of Health Services (DHS) lot on Shattuck Ave will also close in phases in 2010 and 2016. However, it has been omitted from this table as this recently purchased building's parking spaces were not included in the overall campus parking supply counts.
[12] University Hall Structure displacement includes 103 marked spaces and 35 attendant spaces.

Figure 9 Projected Parking Supply & Demand

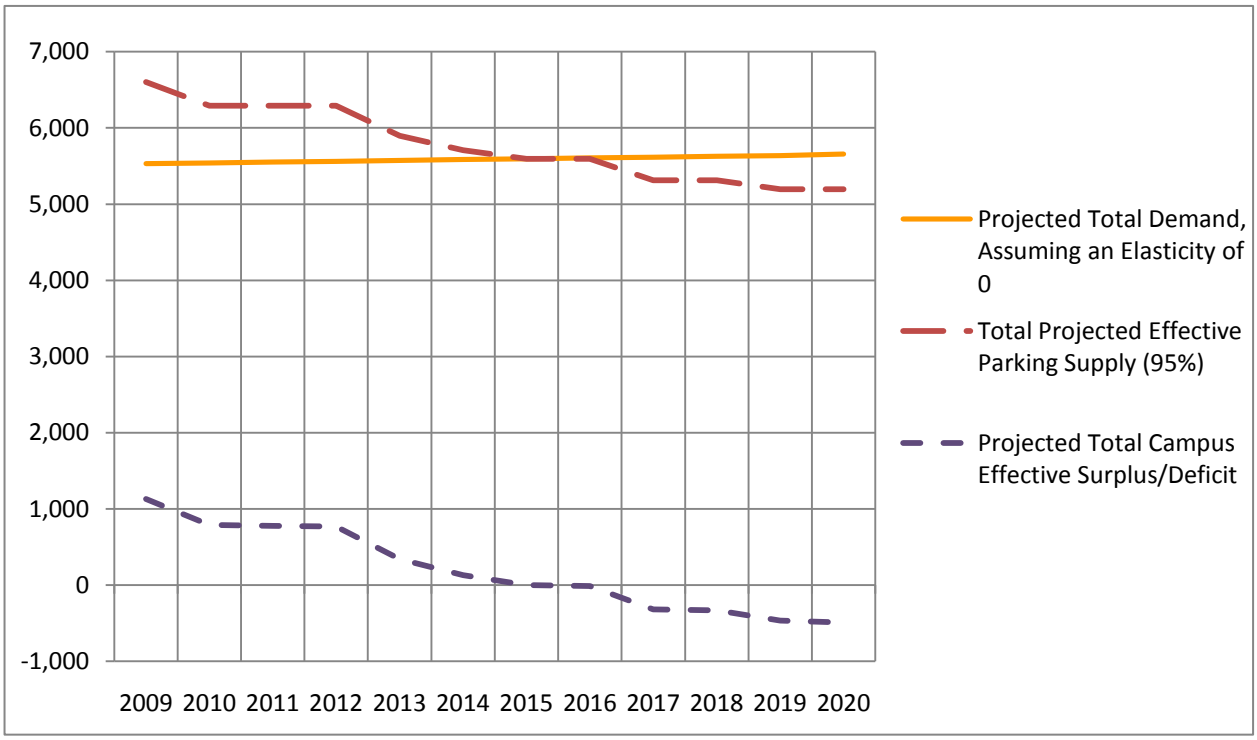


Figure 10 shows commuter student, resident student, and faculty/staff parking demand over time.

Figure 10 Projected Baseline Parking Supply & Demand

	2009	2010	2011	2012	2013	2014
Commuter Students (S permits)	26,253	26,156	26,058	25,536	25,438	25,341
Resident Students (RH permits)	8,272	8,272	8,272	8,696	8,696	8,696
Faculty, Staff (C and F permits) and Visitors	17,016	17,088	17,161	17,233	17,305	17,377
Total School Population	51,541	51,516	51,490	51,465	51,439	51,414
Projected Commuter Student Parking Demand, Assuming an Elasticity of 0	1,229	1,221	1,214	1,206	1,198	1,190
Projected Resident Student Parking Demand, Assuming an Elasticity of 0	312	315	318	321	324	327
Projected Faculty/Staff Parking Demand, Assuming an Elasticity of 0	3,989	4,005	4,020	4,036	4,052	4,067
Projected Total Parking Demand, Assuming an Elasticity of 0	5,531	5,542	5,552	5,563	5,573	5,584
Projected Supply	6,952	6,623	6,623	6,623	6,206	6,008
Projected Effective Supply (95%)	6,604	6,292	6,292	6,292	5,896	5,708
Projected Total Campus Surplus/Deficit	1421	1081	1071	1060	633	424
Projected Total Campus Effective Supply Surplus/Deficit (95%)	**1130**	**790**	**779**	**767**	**339**	**130**

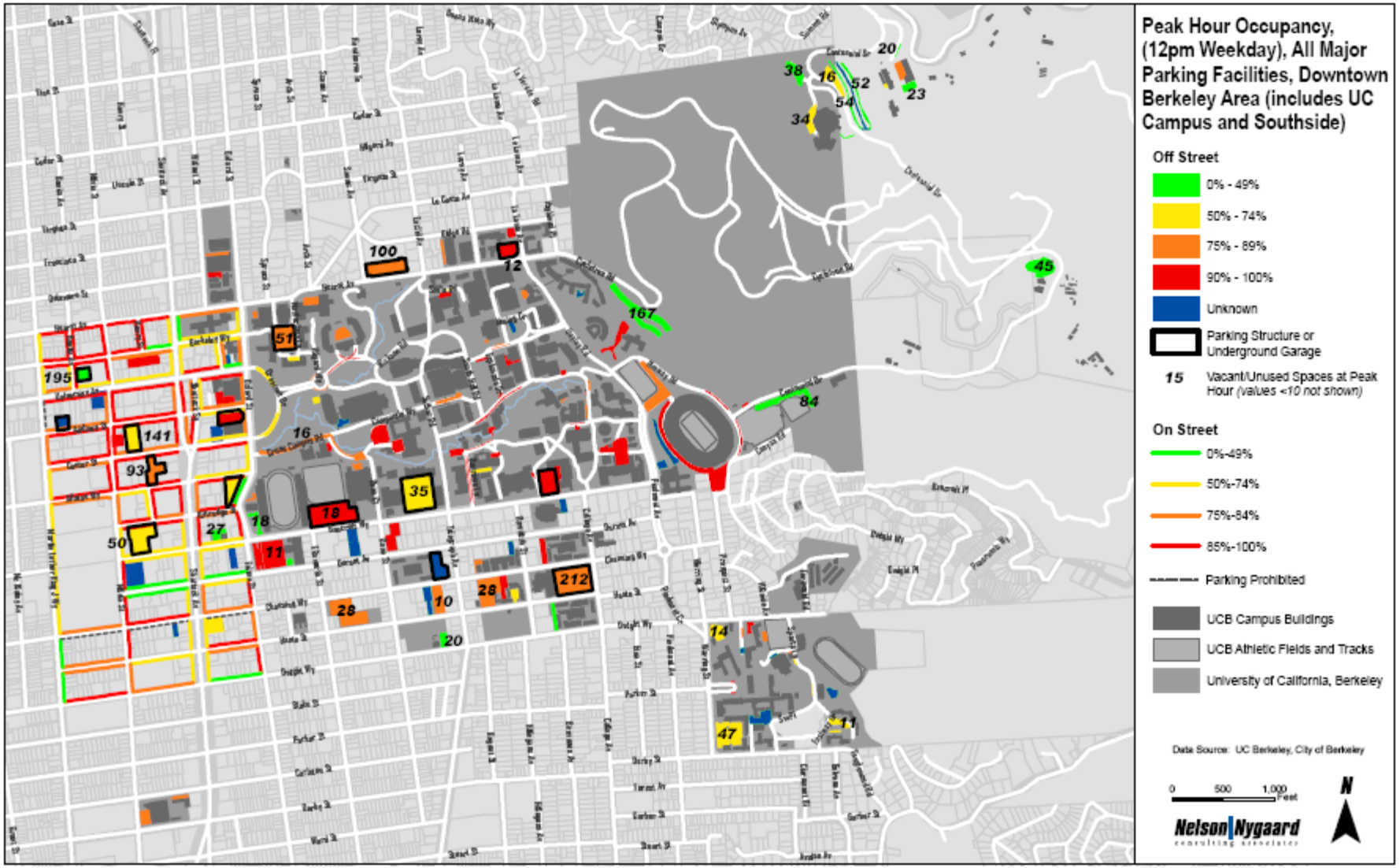
	2015	2016	2017	2018	2019	2020
Commuter Students (S permits)	25,193	24,695	24,597	24,500	24,402	24,254
Resident Students (RH permits)	8,746	9,146	9,146	9,146	9,146	9,196
Faculty, Staff (C and F permits) and Visitors	17,449	17,521	17,594	17,666	17,738	17,810
Total School Population	51,388	51,362	51,337	51,311	51,286	51,260
Projected Commuter Student Parking Demand, Assuming an Elasticity of 0	1,182	1,175	1,167	1,159	1,151	1,136
Projected Resident Student Parking Demand, Assuming an Elasticity of 0	330	333	336	339	342	347
Projected Faculty/Staff Parking Demand, Assuming an Elasticity of 0	4,083	4,098	4,114	4,129	4,145	4,176
Projected Total Parking Demand, Assuming an Elasticity of 0	5,595	5,605	5,616	5,627	5,637	5,658
Projected Supply	5,888	5,888	5,593	5,593	5,467	5,467
Projected Effective Supply (95%)	5,594	5,594	5,313	5,313	5,194	5,194
Projected Total Campus Surplus/Deficit	293	283	(23)	(34)	(170)	(191)
Projected Total Campus Effective Supply Surplus/Deficit (95%)	**(1)**	**(12)**	**(319)**	**(330)**	**(467)**	**(489)**

Demand Distribution

As with many universities, UC Berkeley's parking demand distribution is spread unevenly across campus due to factors such as convenience, price, and even topography. Since prices are relatively similar across campus lots (respective to users), most motorists park in locations that are easily accessible to their destinations. As such, most users opt to park in the area bounded by Gayley Road, Durant Avenue, Shattuck Avenue and Ridge Road – essentially, the heart of campus. This concentration of parking demand leaves a considerable number of vacant parking spaces, particularly east of Gayley Road, which is a steeper incline and further removed from most destinations. See Figure 11 for graphic data.

With the closure of several lots and the opening of new resident and academic buildings through 2020, there will be a significant shift in demand to currently vacant spaces. A majority of the lots scheduled for decommission are located on the southside of campus. These parking losses, combined with all four major resident student housing projects occurring in this area (see Figure 4), will result in a constrained parking supply on the south side of campus if current parking policies, and therefore parking behavior, remain unchanged. It is also important to note that the decommissioning of the University Hall Parking Structure and the construction of the new Helios Energy Research Facility on the west side of campus may produce parking issues downtown. Future memoranda will address options and strategies.

Figure 11 Campus and Downtown Parking Occupancy



Parking Construction Costs for Prospective Garages

In the event that additional parking construction is required to meet projected demand, it is necessary to weigh the costs of prospective garage sites. This analysis examines the *marginal cost* per driver (i.e., the cost to accommodate *one more* driver), rather than the *average cost* per driver (i.e., the total cost of a transportation program, divided by the total number of users). This approach was taken because on the financial side, perhaps the most significant potential change for UC Berkeley is the switch from surface parking lots to parking structures in order to be able to provide additional parking (or replacement of existing garages) to accommodate planned future growth.

The building of parking structures means that the marginal cost for parking (i.e., the cost to add one more parking space) is far higher than the average cost for parking. If a parking structure were built on the University Hall site, total project cost is estimated at $37,500 per space built, and $52,500 for each new space gained (a measure that takes into account the displaced parking spaces). Using typical parking industry assumptions, this translates into a life cycle cost per space gained of $4,157 per space per year, every year for the expected life cycle of the parking structure.

Figure 12 summarizes the results of our life cycle cost analysis for garage sites evaluated by Walker Parking Consultants.[13]

[13] See Walker Parking Consultants Parking Structure Concept Design Study (2005) and University West Parking Concept Study (2009). For the purposes of this analysis, we have examined the most cost-effective alternatives for each site.

Figure 12 Life Cycle Cost Analysis for Proposed Parking Structures

Capital Costs

		University Hall (Scheme 2)	Tang (Alternate 1.3)	Dana Durant (Alternate 2.2)	Bancroft (Alternate 3.2)	Upper Hearst (Alternate 4.1)
a.	Spaces Built	1071	637	203	396	73
b.	Spaces Displaced	306	230	89	131	-62
c.	Net Spaces Gained (c=a-b)	765	407	114	265	135
d.	Original Construction Costs	$32,130,000	$16,944,200	$7,917,000	$10,890,000	$3,752,200
e.	Soft Costs	25%	25%	25%	25%	25%
f.	Original Project Cost (f=d*(1+e))	$40,162,500	$21,180,250	$9,896,250	$13,612,500	$4,690,250
g.	Year Completed	2012	TBD	TBD	TBD	TBD
h.	Inflation Factor	1.00	1.00	1.00	1.00	1.00
i.	Project Cost in Current Dollars (i=f*h)	$40,162,500	$21,180,250	$9,896,250	$13,612,500	$4,690,250
j.	Gross Cost per Space in Current Dollars (j=i/a)	$37,500	$33,250	$48,750	$34,375	$64,250
k.	**Cost per Space Gained in Current Dollars (k=i/c)**	**$52,500**	**$52,040**	**$86,809**	**$51,368**	**$34,743**

Resulting Costs Per Space Per Year

	Annual Debt Service, per Space[14]	$3,621	$3,589	$5,988	$3,543	$2,396
	Operations, Maintenance & Insurance, per Space	$536	$536	$536	$536	$536
	Total Annual Cost per Space per Year	**$4,157**	**$4,125**	**$6,524**	**$4,079**	**$2,932**
	Total Annual Cost per Space per Month	**$346**	**$344**	**$544**	**$340**	**$244**
	Total Annual Cost per Space per Workday	**$15.95**	**$15.82**	**$25.02**	**$15.65**	**$11.25**

[14] The parking structure debt service calculations assume a 6% interest rate over the 35 year useful life of the structure.