

Housing Research Brief 1
How Much Added Housing is Really Needed in California?

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“3.5 million new housing units—a half million every year—is ridiculous!” Many Californians blurted out exactly this statement when they heard two of the gubernatorial candidates had agreed about this target over just 7 years. (The state only averaged 83 thousand permits over the last 7 years—see Exhibit 1 for long-term context on annual rates of housing construction.)

The LA Times dramatized the story with a graph showing it would require building 500,000 units every year until 2025.¹ Compared to previous drought years of production, the 7 tall bars hulked over the rest of the graph like wall-to-wall skyscrapers, resembling some people’s worst fears about apartments.

/* Exhibit 1 about here */

Realistically, how much housing do we actually need and how do we know that? In the past, USC planning scholars have carried out numerous estimates of housing needs in California using different methods. Currently our research team in the USC Price School of Public Policy is working in great detail on housing needs and dynamics in Los Angeles county, supported by the Haynes Foundation. But the candidates called out the statewide number that had been prepared by the McKinsey consulting firm a couple years earlier. Considering this, why not turn our methods toward the whole of California and see what we get?

A crucial distinction when estimating housing needs is how much housing construction is needed to accommodate **expected future growth** and how much is estimated to address the **backlog of past unmet needs**. Future growth can be benchmarked against population or employment projections, but the “backlog” and its timeframe requires some key assumptions.

a) For the present analysis, we will focus only on total housing units regardless of their size or cost, because its easiest to understand and agree on totals first. (Other research

¹ <http://www.latimes.com/politics/la-pol-ca-new-home-building-goal-governor-candidates-20180306-story.html>

briefs are in preparation on rental apartments and issues of affordable housing for low income and middle income residents.)

b) Next, let's agree on how far back in history we should go for measuring the backlog of unmet housing needs. Our ongoing project is using 2000 as the time from which the backlog is accumulated. Not only does that mark the beginning of the new century that we are responsible for now, but 2000 also precedes the housing bubble, the financial crisis, and the Great Recession, all of which disrupted any normal housing conditions in California. An alternative is to begin the accounting in 2006, which precedes the onset of the Great Recession, the collapse of housing construction, and the fitful recovery that followed. (The McKinsey report began its accounting in 2005, but 2006 is the first year for which we have fully detailed data.)

c) Once the backlog is tallied, the final key assumption is how quickly we would propose it be erased in future years. A sizable backlog from the past that is to be accommodated in just a few future years would require a very large annual production target in addition to the needs of expected future growth. For the time being, for comparability, we will accept the 9-year catchup period used by the candidates. We present our estimates as an annual average to be attained in the 9 years between 2016 (the most recent complete data) and 2025.

With issues of timeframe settled, we turn to what particular metrics should be used when estimating the number of housing units that should have been produced each year in the past (for the backlog) and in the future (to accommodate future growth).

The Jobs to Housing Ratio

The first option is a simple jobs/housing equation, the kind people often use for a back of the envelope calculation. This answers the question, "if California adds XX number of jobs between 2018 and 2025, how many housing units would be expected to be added, given the normal, long-run ratio of job growth to housing growth?" The jobs/housing ratio method is based on the theory that an area with job growth demands proportionally more housing. The American Planning Association recommends a ratio of 1.3 to 1.7 jobs per unit.² Two jobs per unit is sometimes considered an acceptable range as this assumes every housing unit is occupied by two adults, both of whom are working. Obviously, a ratio below 2.0 accounts for some units having only a single person employed, and some with none.

Relevant data for this calculation are shown in Exhibit 2, portraying the annual ratio between new housing building permits and added jobs, from 1977 to 2017. The 40-year average is 1.43

² Fairfax County Department of Planning and Zoning. (2012). Jobs-Housing Ratios: National Perspectives and Regional and Local Benchmarks. Retrieved from <http://docplayer.net/13816780-Jobs-housing-ratios.html>.

jobs per added housing units, given job growth of 8,658,400 and 6,039,539 new housing permits. In the recent years since the end of the Great Recession, 2011 to 2017, the jobs-to-permits ratio is considerably higher in California, 4.93 (based on 2,525,500 jobs and only 512,661 permits). The latter ratio is clearly abnormal in light of the 40-year time trend shown in Exhibit 2. It is distorted by both the dramatic rebound of job growth after the steep losses in 2008-10 and also by the unusually sluggish response of recent new construction.

/ Exhibit 2 about here */*

We prefer to use California's long-run ratio of job growth to housing permits in order to estimate normal housing needs. Given the actual and projected employment growth, based on the ratio of 1.43 jobs per housing, California should have added 1.2 million housing units in the 13 years of 2005 through 2017, compared to the 1.0 million units actually added, a shortfall of 0.2 million. Based on the long-run ratio and employment projections, another 0.9 million housing permits would be expected by 2025. The sum of the shortfall and the expected new growth amounts to 1.1 million, far below the 3.5 million-unit goal proposed by McKinsey.

However, this jobs to housing ratio cannot tell the whole story of California's housing needs. With the aging of the massive baby boom generation, together with members of older generations, an increasing share of California's housing is being occupied by retirees. Housing needs cannot be based solely on job growth, and the historic ratio does not account well for our shift toward an older population.

The Housing-Demographic Model

A broader base of estimation is provided by working with the whole population. In fact, the McKinsey analysis is based on a highly simplified version of a population-based analysis. The McKinsey estimate is based on the whole population undifferentiated by age group—a per capita new housing rate formed from dividing new housing units by total population growth. This per capita method counts all people equally, including children, working age adults, and retirees, and it does not account for differing household sizes of different subpopulations or for those with different generational or cultural behaviors.

Equally problematic, the McKinsey method does not use California's own per capita rate to project housing needs, instead relying on a combination of New York and New Jersey experience. (It is not clear whether the California gubernatorial candidates realized they were accepting the New York region as a model for California.)

The most accepted method among experts for linking population and housing is the headship rate, calculated separately by age group and sometimes also by race and Hispanic origin or even immigrant status. The headship rate measures the rate of household formation of each specified segment and can be applied to population projections that account for the changing mix of residents in an area. A key advantage of this approach is that the most reliable and

available forecast data available for counties and states are population projections. This method is focused on the people resident in an area, or expected to reside, the great majority of whom need to live in housing units.

The USC housing-demographic model for estimating housing needs has a simple structure. We compare actual and expected housing occupancy to identify unmet housing needs. Further, to project housing needs in a future period, we estimate expected housing occupancy based on the future population.³ We find the expected housing occupancy from the actual or projected population, disaggregated by age and race, multiplied by a set of headship rates calculated for those age-race/ethnic subgroups.⁴

Headship rates vary between locales and also over time. The preferred set for housing needs calculations for California must be identified, limiting the data to our own state (not borrowed from another state). Sometimes preferred rates are chosen as simply those that are the most recently available, but other times preferred rates are chosen on other bases. Here we consider two alternatives, first the 2016 headship rates which are available from the most recent American Community Survey, and second the headship rates derived from the 2000 census.⁵ These earlier rates have strategic merit because they represent the last “normal” period in the California and United States housing markets, reflecting household formation in a time preceding the distortions of the housing bubble, the financial crisis, the Great Recession with its steep downturn in housing construction, and preceding the sluggish long recovery. The most recent headship rates, as well as homeownership and other market indicators in 2016, have not yet recovered from the deepest and most prolonged downturn since the Great Depression. As such, the 2016 rates lock-in the setbacks of a very bleak period. Accordingly, the 2000 rates deserve consideration as representing a “normal” standard useful for defining housing needs, while the 2016 rates represent the most “recent” standard. We will evaluate both alternatives.

The data used in calculating California’s expected housing needs are presented in Exhibit 3a. These are displayed in a sequence of sections:

- (a) the actual and projected population counts for 2016 and 2025;
- (b) actual headship rates for 2000;
- (c) the actual household counts for 2016;
- (d) expected households in 2016 and 2025 if the 2000 standard of headship rates is applied;
- (e) actual household growth for 2000-16; and
- (f) expected household growth for the same period, plus 2016-25.

³ Population projections are produced by the Demographic Research Unit of the California Department of Finance. The projections produced in 2017 are used here.

⁴ The headship rate is formed by the ratio between householders, identified by each age, race, and Hispanic origin, and the total population of each respective demographic subgroup. Every occupied housing unit has one person the Census Bureau designates the reference person or householder, defined as one of the people in whose name the housing unit is rented or owned.

⁵ The earliest year with full data available from the American Community Survey is 2006.

/* Exhibit 3a about here */

Our estimates of housing needs (occupied housing units) can be assembled from the data in Exhibit 3a, applying some key judgments, with results reported in Exhibit 3b. The top panel applies the 2000 “normal” standard, while the bottom panel applies the 2016 “recent” standard. Unmet housing needs are found by subtracting actual household growth from expected. Future housing needs are found by applying the chosen headship rates to the future population growth.

/* Exhibit 3b about here */

Results on the lower panel, under the 2016 “recent” standard have no unmet needs because by definition the 2016 expected households equal the 2016 actual households. This standard is only applied to future growth, as shown in the last column.

Full housing needs extend beyond the number of expected occupied housing units. An additional number of housing units is required for normal vacancies (5%) and also for the gradual replacements of units lost from the total housing stock due to demolitions or conversions (roughly estimated at 0.15% per year). An additional 190,000 units need to be supplied by 2025 in addition to the needs for future occupied units. The required vacancy additions are applied only to the unmet occupied housing that is anticipated to be added, and those estimates range as high as 137,000 vacant units needed to accompany added occupied units accumulated through 2025.

To facilitate comparisons among the different alternative estimates under the USC housing-demographic model, we present each alternative as an annual average to be attained in the 9 years between 2016 and 2025 (Exhibit 4). The smallest annual housing need for California—181,000—is estimated under the 2016 standard that omits all unmet needs accumulated prior to that date. The largest annual housing need is estimated under the 2000 “normal” standard, including both future needs and unmet needs since 2000: 319,000. If unmet needs are accumulated only since 2006, total needs to be accommodated from 2016 to 2025, including the unmet, are reduced to 284,000 per year, while if all unmet needs are ignored, future needs amount to only 192,000 per year, just 11,000 more than if the 2016 standard is applied instead of the 2000 standard.

/* Exhibit 4 about here */

Comparing All the Alternative Estimates of Housing Needs

The above analysis compares alternative estimates under different assumptions used within the USC Housing-Demographic method. To complete this assessment of housing needs in California, we bring these alongside the McKinsey estimate and the jobs/housing based

estimate (Exhibit 5). Here we portray the different methods side-by-side, covering the past period of 2005/6 to 2015/6, and the future period to 2025. This compares the methods for approximately the same time periods without introducing any additional adjustments.

First we display the actual volume of housing permits from 2005 through 2015, supplemented by the expected future number of permits to be added if the annual permitting rate of the most recent year (132 thousand in 2017) were to be sustained out to 2025. This amounts to 1.8 million permits for the entire 20-year period, 0.8 million of which are actual permits. We subtract these permits from the expected housing needs calculated by each of the other methods, thus yielding an estimate of unmet housing needs through 2016.

/ Exhibit 5 about here */*

Shown second are the estimates from the jobs/housing ratio method, which suggests 0.2 million unmet units were needed by 2016, followed by 0.9 million future units to accommodate expected future growth in number of households. Thus the jobs/housing method suggests total needs (unmet + future) of 1.1 million additional units, just slightly greater than what would be expected if housing permits sustained their high pace of 2017 as in Method 1. For reasons discussed, these are serious under estimates.

The third method summarizes results corresponding to the 2006 to 2025 period from the USC housing-demographic model under the 2000 “normal” standard. In addition to the actual 0.8 million housing units accumulated by permits, we estimate an additional 0.8 million unmet needs through 2016, with another 1.7 million future needs to be met. This is a total housing need estimate of 2.5 million units, roughly 2.5 times the number that could be expected to be delivered if housing production continued at its current pace.

The fourth and final method compares the results from the McKinsey analysis, distinguishing the future needs from the accumulated unmet needs since 2005. McKinsey does not clearly document exactly how each of these components was estimated, but the total of 3.5 million is substantially greater than what is estimated under the USC model for the same time period. Perhaps some of the unmet needs estimated in 2005 actually derive from an earlier period. In that case it could make sense to compare the McKinsey estimate to the full USC estimate that begins in 2000. That adds another 318 thousand housing needs, now summing to 2.87 million needed units. This full USC estimate is still about 18 percent lower than the McKinsey estimate.

Conclusion

We began with shock and exasperation about the seemingly high estimate by McKinsey, calling for 3.5 additional housing units. That number served the purpose of getting people’s attention; however, its exorbitant size may have also encouraged some to ignore it as unrealistic. It also doesn’t help that the public cannot see exactly how McKinsey came up with this figure. Other

methods for estimating housing needs also are sometimes obscure. The public knows that the housing problem is acute, but just how large is it really?

The USC housing-demographic method lays out explicitly what are the assumptions and calculations needed to arrive at a total housing need number. Our method is more comprehensive and fine-tuned than the simple jobs/housing method. We also believe our method is both more detailed and transparent than the McKinsey method. Our total housing need figure under the 2000 “normal” standard, 2.5 million units, calculated for the same time frame that McKinsey used, is a good deal less than 3.5 million but still extremely large. Averaged over 9 years out to 2025 (rather than the 7 years the gubernatorial candidates proposed, or McKinsey’s 11 years), we arrive at expected housing needs production of 284 thousand per year. Or, if we include the unmet needs accrued in the USC model since 2000, not 2006, our total estimate rises to 2.87 million, annualized over 9 years to 319 thousand units needed per year. That is roughly triple the recent annual rate of permitting for housing construction in California. Our analysis also discusses estimates for other alternatives that could be adopted within our method, and we present them in Exhibit 4 for public comparison and debate.

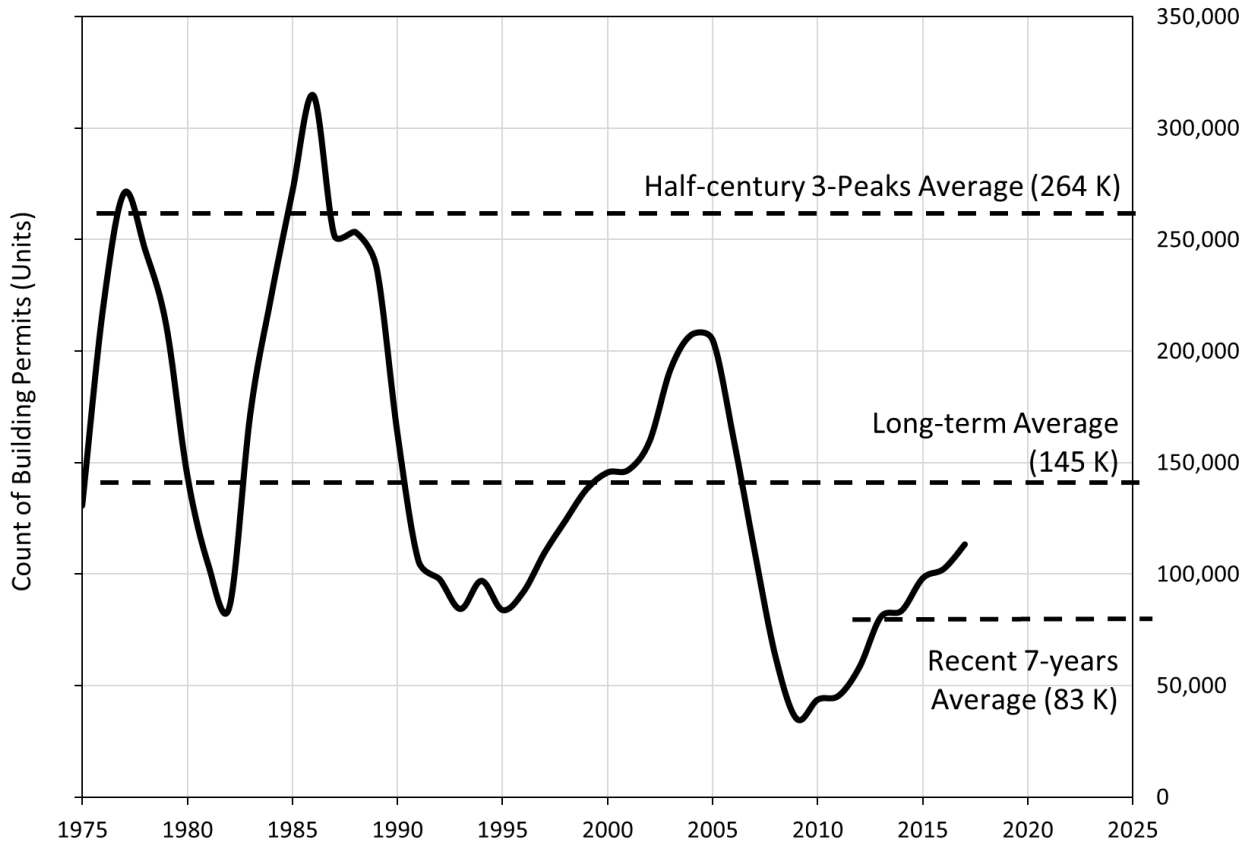
Bear in mind that these calculations pertain only to total housing unit need and do not calculate the substantial subset of need for providing subsidized housing targeted to lower-income households. Affordable, low-income housing is an especially urgent concern and it should be prioritized within the overall goal of expanding the total size of the housing stock in California. Keeping housing from becoming even less affordable for both the middle class and lower income households requires building an adequate number of units in all price ranges.

Any way we slice it, accumulated housing needs in California are extremely large, and they will keep growing larger every year when housing construction falls below target levels. Our political leaders are wise to not kick this can down the road any more. While it might be overly ambitious to claim to completely solve the long-growing problem in less than a decade, erasing even half of the total backlog in that time while also keeping up with future need would be a feasible and very meritorious achievement.

The new series of housing research briefs addresses total housing needs, rental housing problems, displacement and housing dislodgement, and who benefits from newly built housing, with particular reference to Los Angeles but also comparing other metros. We gratefully acknowledge the kind support of the Haynes Foundation, but the authors alone are responsible for any findings and opinions expressed.

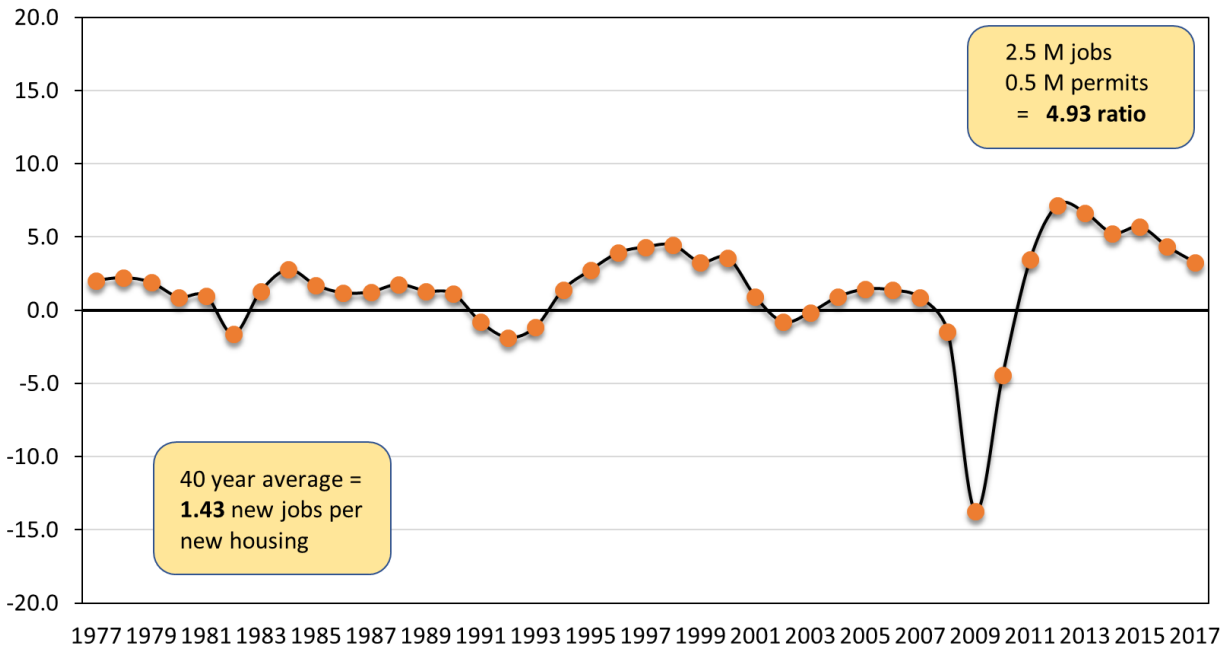
For more resources visit: <https://sites.usc.edu/popdynamics/housing/>

Exhibit 1. Annual Trend in Number of New Housing Construction Permits, California, 1975 to 2025



Source: U.S. Census Bureau, 1975-2017, Building Permits Survey.

Exhibit 2. Annual Ratio of Job Growth to Building Permits, California, 1977 to 2017



Note: 40-years long-term jobs/housing ratio is calculated by annual employment growth divided by annual building permits. For example, 2017 ratio = (2017 employment – 2016 employment) / 2016 building permits. This assumes 1-year time lag between permit authorization of a housing unit and actual occupancy of that unit.

Source: U.S. Census Bureau, 1975-2017, Building Permits Survey; U.S. Bureau of Labor Statistics, 1975-2017, Current Employment Statistics.

Exhibit 3a. Actual and Expected Number of Households under USC-HD Models, California, by Age of Householder and Race/Ethnicity (Unit: Households, %)

(a) Population of California by Age and Race/Ethnicity													
	2016 Population						2025 Population (CA DOF v Jan. 2018)						
	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic	
Total Pop	39,250,017	14,728,382	2,162,764	5,629,487	1,448,755	15,280,629	Total Pop	42,326,397	15,199,116	2,362,561	6,014,758	1,390,789	17,359,173
Pop 15+	31,696,763	12,804,405	1,789,348	4,793,346	975,484	11,334,180	Pop 15+	34,804,693	13,035,650	1,973,519	5,208,520	1,027,000	13,560,004
0-14	7,553,254	1,923,977	373,416	836,141	473,271	3,946,449	0-14	7,521,704	2,163,466	389,042	806,238	363,789	3,799,169
15-24	5,386,008	1,530,446	315,178	656,030	249,327	2,635,027	15-24	5,961,755	1,595,098	331,795	739,535	275,306	3,020,021
25-34	5,886,197	1,989,618	331,125	916,369	225,579	2,423,506	25-34	5,576,783	1,681,031	346,864	720,023	217,123	2,611,742
35-44	5,200,047	1,729,289	271,627	875,029	160,729	2,163,373	35-44	5,349,324	1,861,293	307,475	780,485	163,093	2,236,978
45-54	5,189,622	2,106,495	312,656	810,507	131,253	1,828,711	45-54	5,145,843	1,744,029	283,373	879,597	124,354	2,114,490
55-64	4,680,792	2,344,984	281,452	714,234	106,215	1,233,907	55-64	5,018,621	2,055,786	300,089	806,996	107,544	1,748,206
65-74	3,097,514	1,758,914	167,598	473,792	62,581	634,629	65-74	4,282,638	2,160,908	241,630	683,062	85,159	1,111,879
75-84	1,543,102	898,242	80,552	245,567	28,647	290,094	75-84	2,497,571	1,409,374	119,446	412,670	41,784	514,297
85 +	713,481	446,417	29,160	101,818	11,153	124,933	85 +	972,158	528,131	42,847	186,152	12,637	202,391

(b) Headship Rates (Households per 100 people)						
	2000 Headship Rates					
	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic
Total HH	44.1	51.0	47.1	37.2	43.0	34.3
15-24	11.0	13.3	12.6	9.7	13.6	8.8
25-34	40.7	46.7	45.2	34.7	43.8	35.6
35-44	49.1	52.3	50.8	43.7	51.0	45.4
45-54	55.4	58.2	57.6	50.2	56.6	49.9
55-64	57.7	60.6	66.1	48.3	58.0	50.4
65-74	60.4	64.6	69.8	42.8	61.1	51.6
75-84	65.0	68.6	71.2	45.8	66.5	53.2
85 +	58.9	62.0	59.7	41.3	57.6	44.3

(c) Actual Households						
	2016 Actual Households					
	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic
Total HH	12,944,182	6,257,944	797,081	1,768,486	374,945	3,745,726
15-24	372,309	137,262	24,268	46,395	16,529	147,855
25-34	2,006,192	795,002	126,770	289,454	86,976	707,990
35-44	2,428,330	883,444	132,479	394,073	81,585	936,749
45-54	2,643,817	1,154,028	173,260	380,302	71,204	865,023
55-64	2,454,762	1,327,852	161,070	316,806	59,433	589,601
65-74	1,749,429	1,097,332	109,987	199,071	36,083	306,956
75-84	883,390	578,201	52,008	99,857	17,218	136,106
85 +	405,953	284,823	17,239	42,528	5,917	55,446

(d) Expected Households under the 2000 Standard													
	USC-HD-2000						USC-HD-2000						
	2016 Expected Households						2025 Expected Households						
Total HH	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic	Total HH	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic
Total HH	14,034,254	6,713,150	885,389	1,874,092	414,129	4,147,494	Total HH	15,489,004	6,921,422	995,804	2,053,242	435,419	5,083,117
15-24	572,824	204,278	39,841	63,922	33,932	230,850	15-24	628,955	212,908	41,942	72,059	37,468	264,579
25-34	2,357,821	928,621	149,595	317,982	98,711	862,913	25-34	2,216,095	784,593	156,705	249,850	95,011	929,936
35-44	2,489,666	904,727	138,088	382,642	81,932	982,277	35-44	2,570,234	973,789	156,312	341,299	83,137	1,015,697
45-54	2,799,619	1,225,217	180,186	406,944	74,297	912,976	45-54	2,745,377	1,014,393	163,310	441,633	70,392	1,055,650
55-64	2,636,078	1,421,922	185,916	345,218	61,552	621,470	55-64	2,777,667	1,246,562	198,227	390,054	62,322	880,502
65-74	1,820,999	1,135,445	117,025	202,861	38,237	327,431	65-74	2,481,824	1,394,947	168,718	292,463	52,033	573,664
75-84	959,276	616,186	57,334	112,490	19,049	154,217	75-84	1,542,063	966,818	85,017	189,038	27,785	273,405
85 +	397,971	276,755	17,404	42,033	6,419	55,360	85 +	526,791	327,413	25,573	76,848	7,273	89,684

(e) Actual Household Growth						
	2000 to 2016 Actual Growth					
	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic
Total HH	1,436,863	-427,415	34,585	640,057	3,924	1,185,712
15-24	-153,111	-94,106	-14,869	-7,079	-11,603	-25,454
25-34	-95,880	-151,093	-17,279	69,566	9,141	-6,215
35-44	-349,319	-563,718	-61,916	99,905	-14,658	191,068
45-54	251,214	-282,002	17,823	117,957	-6,882	404,318
55-64	962,541	356,704	56,784	172,132	16,219	360,702
65-74	609,269	294,640	37,496	108,352	8,801	159,980
75-84	56,698	-65,990	10,582	48,355	1,368	62,383
85 +	155,451	78,150	5,964	30,869	1,538	38,930

(f) Expected Household Growth under the 2000 Standard													
	USC-HD-2000						USC-HD-2000						
	2000 to 2016 Expected Growth						2016 to 2025 Expected Growth						
Total HH	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic	Total HH	Total	NH White	NH Black	NH A&PI	NH Others	Hispanic
Total HH	2,526,935	27,791	122,893	745,663	43,108	1,587,480	Total HH	1,454,750	208,272	110,415	179,150	21,290	935,622
15-24	47,404	-27,090	704	10,448	5,800	57,541	15-24	56,131	8,630	2,101	8,137	3,536	33,729
25-34	255,749	-17,474	5,546	98,094	20,876	148,708	25-34	-141,727	-144,028	7,111	-68,132	-3,700	67,023
35-44	-287,983	-542,435	-56,307	88,474	-14,311	236,596	35-44	80,568	69,062	18,224	-41,343	1,205	33,420
45-54	407,016	-210,813	24,749	144,599	-3,789	452,271	45-54	-54,242	-210,824	-16,876	34,689	-3,905	142,674
55-64	1,143,857	450,774	81,630	200,544	18,338	392,571	55-64	141,588	-175,360	12,311	44,836	770	259,032
65-74	680,839	332,753	44,534	112,142	10,955	180,455	65-74	660,825	259,502	51,693	89,602	13,795	246,233
75-84	132,584	-28,005	15,908	60,988	3,199	80,494	75-84	582,787	350,632	27,683	76,547	8,736	119,188
85 +	147,469	70,082	6,129	30,374	2,040	38,844	85 +	128,820	50,658	8,169	34,815	854	34,323

Source: Census 2000 5-percent IPUMS, and 2006 and 2016 ACS 1-year IPUMS.

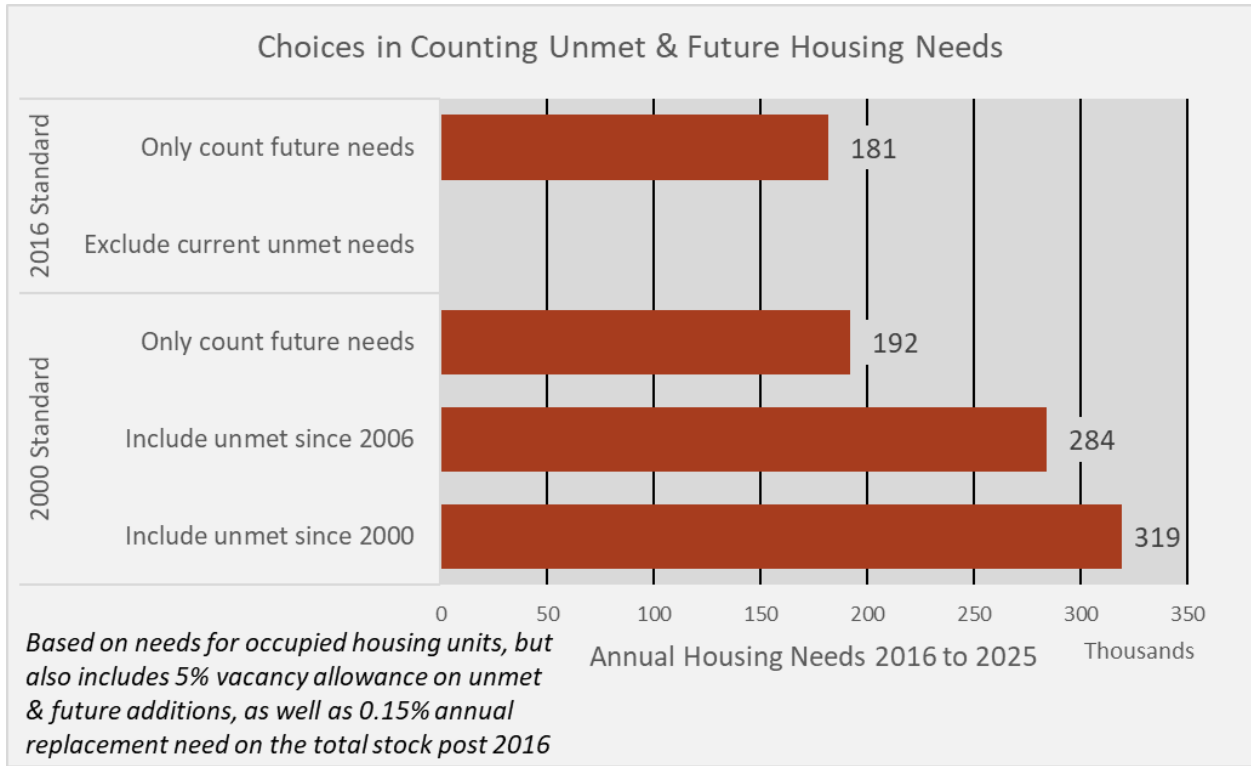
Exhibit 3b. Summary of Housing Needs by Chosen Standard (Before Stock Adjustments)

Unmet Needs under the 2000 Standard					
	Unmet = Expected - Actual			Future 2016-2025	TOTAL HH NEEDS
	2000-06	2006-16	Total Unmet		
Total	303,178	786,895	1,090,072	1,454,750	2,544,822
15-24	68,096	132,419	200,515	56,131	256,646
25-34	42,283	309,346	351,629	-141,727	209,903
35-44	-71,682	133,018	61,336	80,568	141,904
45-54	62,098	93,704	155,802	-54,242	101,560
55-64	64,846	116,470	181,316	141,588	322,905
65-74	61,821	9,749	71,570	660,825	732,395
75-84	64,338	11,548	75,886	582,787	658,673
85 +	11,378	-19,360	-7,982	128,820	120,838

Unmet Needs under the 2016 Standard					
	Unmet = Expected - Actual			Future 2016-2025	TOTAL HH NEEDS
	2000-06	2006-16	Total Unmet		
Total	0	0	0	1,364,692	1,364,692
15-24	0	0	0	36,308	36,308
25-34	0	0	0	-127,568	-127,568
35-44	0	0	0	75,414	75,414
45-54	0	0	0	-50,946	-50,946
55-64	0	0	0	134,545	134,545
65-74	0	0	0	631,157	631,157
75-84	0	0	0	535,167	535,167
85 +	0	0	0	130,616	130,616

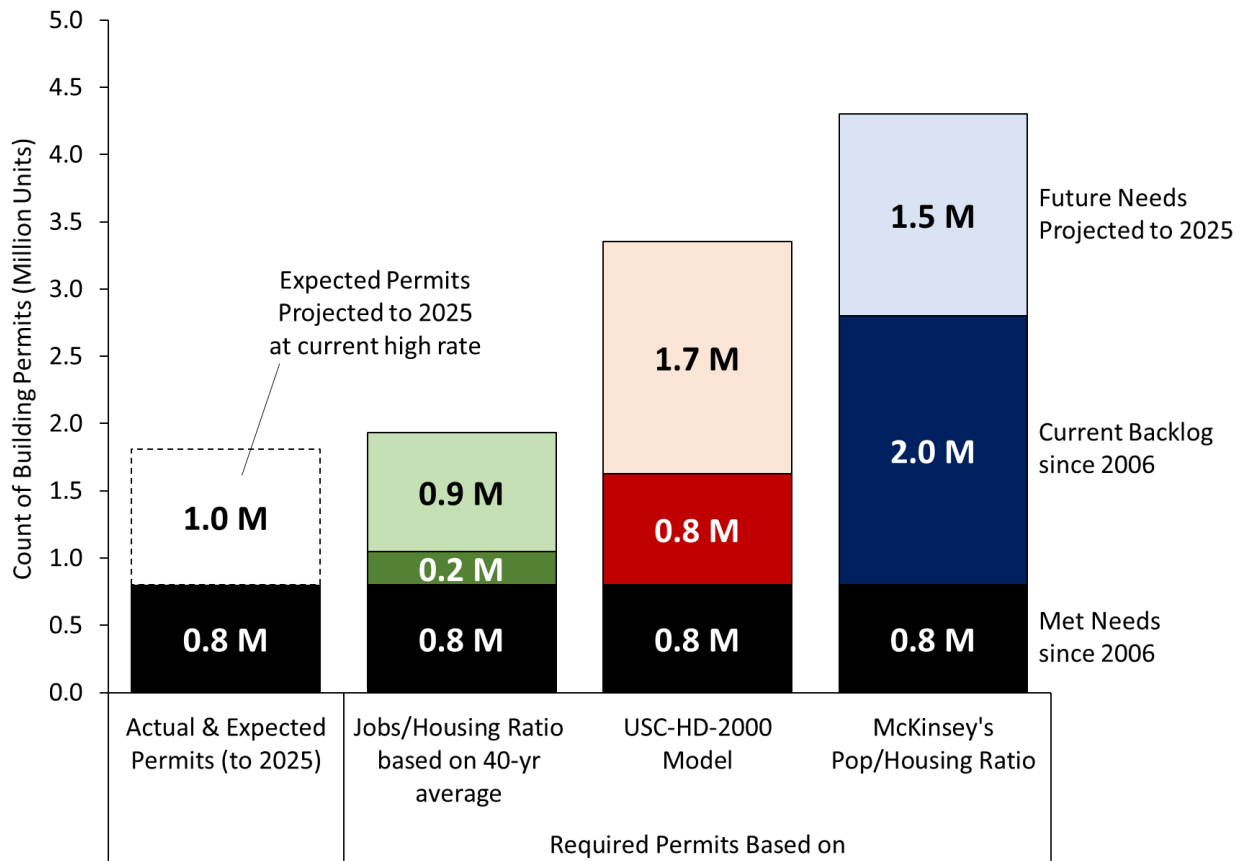
Note: These calculations of housing needs are solely based on expected household occupancies and do not include additional factors of vacancies and replacements that are needed to round out the expected housing units supplied by building permits.

Exhibit 4. Choices for Counting Annual Housing Needs in California, Including Vacancies and Replacements, 2016 to 2025



Source: Census 2000 5-percent IPUMS, and 2006 and 2016 ACS 1-year IPUMS.

Exhibit 5. California's Total Current and Future Housing Needs Compared under Alternative Methods, 2005/6 to 2025



Source: Census 2000 5-percent IPUMS and 2006 through 2016 ACS 1-year IPUMS; U.S. Census Bureau, 1975-2017, Building Permits Survey; U.S. Bureau of Labor Statistics, 1975-2017, Current Employment Statistics; California Employment Development Department (EDD), 2014-2024 Employment Projections; McKinsey&Company, 2014, A Tool Kit to Close California's Housing Gap: 3.5 Million Homes by 2025.