Can Adaptive Reuse of Commercial Real Estate Address the Housing Crisis in Los Angeles?

Appendixes

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About This Report

The sixth cycle of the octennial California Regional Housing Needs Assessment indicates that, over the next eight years, the City of Los Angeles needs to plan for the creation of nearly 260,000 homes for families earning 30 percent to 80 percent of area median income and for the creation of 197,000 units for families earning more than that amount. Meeting this goal would require the production of more than 100,000 homes per year over the next eight years, with more than 50 percent of them available at affordable rents.

The magnitude of the region’s housing needs has led many policymakers and other stakeholders to call for an all-of-the-above approach to expanding the housing supply that includes increasing the production of both publicly funded affordable housing and market-rate housing, incentivizing increased density for infill housing projects, doubling down on such innovations as modular housing, and increasing support for the preservation of the existing affordable housing stock. In this report, we attempt to inform such an approach by focusing on one channel that could be an important part of the overall approach: the adaptive reuse (AR) of underutilized commercial real estate (CRE) as multiunit housing.

The objectives of this report were to (1) generate evidence on the potential capacity of AR to bolster the supply of housing in the region, (2) assess how recent trends in prices and utilization rates of CRE affect the financial feasibility of AR, (3) explore how the geographic distribution of underutilized CRE coincides with social and environmental goals related to the siting of housing, and (4) assess how the distinct aspects of AR projects and relevant policy might affect the feasibility of this approach in terms of meeting regional housing goals.

This research was conducted by the RAND Center on Housing and Homelessness in Los Angeles (CHHLA), part of the Community Health and Environmental Policy Program within RAND’s Social and Economic Well-Being division. The CHHLA is focused on providing policymakers and stakeholders with timely research and analysis to address the dual crises of housing affordability and homelessness in the Los Angeles region and beyond. For more information, visit www.rand.org/chhla.

Community Health and Environmental Policy Program

RAND Social and Economic Well-Being is a division of the RAND Corporation that seeks to actively improve the health and social and economic well-being of populations and communities throughout the world. This research was conducted in the Community Health and Environmental Policy Program within RAND Social and Economic Well-Being. The program focuses on such topics as infrastructure, science and technology, community design, community health promotion, migration and population dynamics, transportation, energy, and climate and the
environment, as well as other policy concerns that are influenced by the natural and built environment, technology, and community organizations and institutions that affect well-being. For more information, email chep@rand.org.
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Appendix A. Data and Methodology

Data Sources and Taxonomy of Commercial Real Estate

Our primary data source for the empirical analyses in this report is the real estate data service CoStar, a subscription-based, industry-standard commercial data service that maintains an extensive database of commercial properties that represents a near-census of properties in the covered markets. The analyses in this report combine the CoStar microdata with U.S. Census data and other public data sources, as described below.

We focus our empirical analyses of what we define as underutilized commercial real estate (CRE) on three broad subsets of commercial properties: hotels/motels, retail space, and office space. Throughout the analyses that follow, we consider these property types separately because they differ in important ways related to their feasibility for reuse as housing. Relevant factors include

- differences in location (e.g., being located on major commercial thoroughfares or not, being adjacent to other similar property types or not)
- differences in price trends related to macroeconomic factors (e.g., hotels are affected by tourism trends, whereas office properties are affected by remote work trends)
- differences in building characteristics (e.g., hotels may convert readily into small-unit housing, whereas retail big-box spaces may be suitable for larger multifamily housing but may require considerable alteration).

Because CoStar data represent a virtual census of commercial properties in the region, we limited our analysis to a more plausible subset of this vast number of commercial properties in these three categories. The first data cut we use is to restrict our attention to properties in Los Angeles County. The other restrictions we incorporate relate to characteristics that we hypothesize to be more likely to make a property amenable to adaptive reuse (AR). We list each of these in turn, as well as why we believe they each contribute to a greater likelihood of suitability for AR:

- Our sample of office and retail properties is limited to class B and C properties. These properties generally command lower rents and have fewer modern amenities and services related to their intended commercial uses, making them potentially more suitable for repurposing (Satow, 2011).
- Our sample of office and retail properties is limited to properties that range in size from 10,000 to 100,000 square feet. This is a heuristic restriction we make based on the notion that, using approximately 800 square feet as an average unit size, buildings that could accommodate roughly 10 to 1,000 units (allowing for the use of roughly 10 percent to 20 percent of the total space for common areas or other shared infrastructure) are more likely to be feasible candidates for AR.
Our sample of hotels/motels is limited to those classified by CoStar as “economy.” Below, we discuss in some detail our motivation for selecting this subset of the broader sector.

Using these data restrictions, we collected a set of cross-sectional CRE microdata in April 2021 for approximately 800 hotel/motel properties, 8,000 retail properties, and 7,000 office properties. CoStar collects and maintains a rich set of covariates on these properties, including land area, building square footage, building age, last sale price, vacancy rates for commercial and retail spaces, number of rooms, and meeting area square footage for hotels/motels, among other measures.

We augment these data with U.S. Census Bureau data (National Historical Geographic Information System [NHGIS] data tabulations from American Community Survey 2014–2019 five-year estimates) from IPUMS (Manson et al., 2021). We incorporate additional U.S. Census Bureau data from the Longitudinal Employer-Household Dynamics Origin-Destination Survey (LODES), Los Angeles County Assessor data, the Open Data portals for both the City and County of Los Angeles, and the Los Angeles County Metropolitan Transit Authority (LA METRO).

Constructing Our Analysis Data Sets

To conduct our analyses, we overlaid multiple geographic shapefiles to generate crosswalks of smaller geographic areas (e.g., census tracts) to larger ones (e.g., City of Los Angeles Community Plan Areas [CPAs]). For example, we assign census tracts to CPAs, small municipalities, or unincorporated areas of Los Angeles County according to the centroid of each census tract. This allows us to assign each census tract to a unique CPA or other geographical area in our analysis. Apart from mean travel time to work, our variables of interest can simply be summed across all census tracts to yield a value for the CPA or other municipal area. A similar procedure is performed for the microdata extracted from CoStar by overlaying the coordinates of these properties onto our combined shapefile of community planning areas and municipalities. Using these crosswalks, we linked characteristics of geographic areas to CoStar properties and vice versa for our spatial analyses.

Identifying Underutilized Commercial Real Estate

Our definition of underutilization for retail and office properties is when a property has 80 percent or less of its total rentable building area (RBA) leased. We do not apply this same

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1 We include properties classified as “flexible” commercial spaces in the “office” category. These properties comprise 23 percent of the combined sample of properties that we henceforth refer to as “office.”

2 Not all of these data fields are complete for all properties in our sample, though the only variable we reference with high levels of missingness is last sale price. We provide variable-specific observation counts in tables describing the data to provide context on the extent of missingness across these measures.
restriction to hotels and motels, as we discuss next. Our definition of underutilized retail and office properties reduces the initial sample of properties in these categories by about 85 percent (to 1,042 properties total). Of this subsample, about 18 percent are fully vacant, and about half are 60 percent to 80 percent leased. Figure A.1 presents this distribution.

Figure A.1. Distribution of Vacancy Rates Among Our Sample of Underutilized Real Estate

One potential question about this approach is whether there is a negative correlation between building size and vacancy rates because of the possibility that smaller buildings are more likely to have only one tenant and therefore would be more likely to be fully vacant than larger buildings are. If this were the case, then cutting our analysis sample by any vacancy percentage could serve as a de facto way of excluding smaller properties from the full sample. However, this relationship appears to be fairly weak: The correlation between the percentage leased and RBA is \(-0.03\) in the case of retail and \(-0.05\) in the case of office properties. Thus, although this is a crude measure of underutilization, we view it as a useful way to highlight a relatively small subsample of properties that may differ in terms of one important measure of fiscal feasibility under their current use.

Hotel/Motel Properties and Underutilization

For economy hotel/motel properties, we do not restrict the sample further according to vacancy rates, since the meaning of vacancy is different for hotel/motel properties versus office and retail properties. For this class of properties, vacancy rates measure the available rooms at a point in time. Furthermore, the hotel/motel sector has experienced a significant and extended shock to demand during the coronavirus disease 2019 (COVID-19) pandemic, suggesting that the entire sector is potentially underutilized. In our initial data collection, we restricted our
attention to *economy* properties. We consider these generally older, lower-value properties to be more amenable to AR, on average, because of such characteristics as location, age, and current condition, as well as lower average acquisition costs, as reflected in recent purchases.

Relatedly, the existence of a major state funding program, Project Homekey, that has focused on the acquisition of economy hotel/motel properties for conversion to housing for individuals and families at risk of homelessness, as well as evidence on the properties acquired under this program to date, which overwhelmingly are members of the subset of economy hotel/motel properties, suggests that this subsector of the hotel/motel market has specific and current policy relevance for AR.

**Three Approaches to Geography**

Because of the vast size of Los Angeles County, which is home to 10 million people spread across 88 municipalities and unincorporated areas, we take three approaches to analyzing the spatial distribution of underutilized CRE: one that is specific to the City of Los Angeles and the independent municipalities that are embedded in the city, one that considers the entire county, and one that considers an area defined by rail transportation, which is a hybrid of city and county geography. The approaches we take involve trade-offs in terms of representativeness and interpretability. Below, we briefly outline the three approaches to regional geography that we employ in our spatial analyses.

**Geographic Definition 1: City of Los Angeles and Associated Municipalities**

Because residents of the City of Los Angeles represent approximately 40 percent of the roughly 10 million people living in Los Angeles County, the city has the highest rate of rent-burdened households of any major U.S. city (Los Angeles City Planning, 2021), and the city contains roughly 60 percent of people experiencing homelessness in the county (Los Angeles Homeless Services Authority, 2020), we focus much of our analysis on the city. But the vast size of the city (469 square miles) requires smaller geographic units of analysis to reveal potentially important spatial relationships. Additionally, the city entirely contains four distinct municipalities in its central area that are members of the Westside Cities Council of Governments: Beverly Hills, Culver City, Santa Monica, and West Hollywood. Within the boundaries of the City of Los Angeles, we use subareas called CPAs. These areas are geographies defined in the City of Los Angeles’s General Plan Land Use Element that are used to establish neighborhood-specific goals and planning related to land use and development (Los
Angeles City Planning, 2021). A map of this geography with the names of the CPAs and municipalities it includes is presented in Figure A.2.  

**Geographic Definition 2: Los Angeles County**

Conducting informative spatial analyses across an area as large as Los Angeles County requires the use of meaningful subcounty-level geographies. We considered county-level geographies, including Los Angeles County Supervisorial Districts (which divide the county into five very large areas) and Service Planning Areas (which divide the county into eight areas that are used to address public health needs, logistics, and other factors). After finding these geographies to be overly aggregated for the purposes of this study, we settled on census county divisions (CCDs): areas defined through a cooperative process between the Census Bureau and state and local government officials. CCDs represent meaningful community areas defined by such characteristics as economic activity or land use. In some cases, they are coincident with municipal boundaries, but they have “visible, permanent, and easily described boundaries” in all cases, according to the Census Bureau (U.S. Census Bureau, 1994). Figure A.3 provides a map of the 19 CCDs in Los Angeles County. We present analogous results for most spatial analyses using this countywide geography in Appendix E.

**Geographic Definition 3: Areas in Los Angeles County Served by Rail Transit**

The confluence of state environmental goals with regard to vehicle miles traveled (Boarnet and Handy, 2017), the city’s ambitious “28 by ’28” plan to expand rail transit significantly prior to the 2028 Summer Olympics (Sharp, 2017; Zahniser and Nelson, 2021), and the success of the Transit-Oriented Communities program in recent years (Zhu et al., 2021) all serve to highlight the importance of transit access in regional planning. For this reason, we conduct one analysis below using a geography that is defined by the reach of current and planned LA METRO rail and bus rapid transit (BRT) projects, which are concentrated within the City of Los Angeles but also extend well into Los Angeles County, particularly to the south and east of city boundaries. We use this geography for one set of maps in Appendix E (see Figure E.1) to specifically consider the incidence of CRE within a one-mile radius of existing or planned train or BRT stops in Los Angeles County.

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3 In this approach, we exclude the large collection of municipalities in the South Bay roughly between Los Angeles International Airport and Long Beach. Although these municipalities (e.g., Torrance, Inglewood, El Segundo) are technically “contained” by the narrow strip of Los Angeles linking the Port of Los Angeles to the core of the city, we viewed them as less integrated into the geography of Los Angeles and left them out of this definition. However, these areas are included in our county-level geography.

4 This definition of Service Planning Areas is used by the Los Angeles Homeless Services Authority to determine jurisdictions for the purposes of service provision for people experiencing homelessness and other related efforts.
### Figure A.2. Reference Map for “Los Angeles City Plus” Geography

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Harbor Gateway</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>2</td>
<td>Palms - Mar Vista - Del Rey</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>3</td>
<td>Del Air - Beverly Crest</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>4</td>
<td>Granada Hills - Kirkwood</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>5</td>
<td>Mission Hills - Panorama City - North Hills</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>6</td>
<td>Elsinore - Tarzana</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>7</td>
<td>Brentwood - Pacific Palisades</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>8</td>
<td>West Adams - Baldwin Hills - La Mirada</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>9</td>
<td>North Hollywood - Valley Village</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>10</td>
<td>Arbo - Picoines</td>
<td>Community Plan Area</td>
</tr>
<tr>
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<td>Northeast Los Angeles</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>12</td>
<td>Venice</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>13</td>
<td>Silver Lake - Echo Park - Elsinon Valley</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>14</td>
<td>San Pedro</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>15</td>
<td>Reseda - West Van Nuys</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>16</td>
<td>San Valley - La Tuna Canyon</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>17</td>
<td>San Bernardino - Lake View Terrace</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>18</td>
<td>Westwood</td>
<td>Community Plan Area</td>
</tr>
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<td>20</td>
<td>Hollywood</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>21</td>
<td>Canoga Park - Winnetts - Woodland Hills - Way Hills</td>
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</tr>
<tr>
<td>22</td>
<td>Central City North</td>
<td>Community Plan Area</td>
</tr>
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<td>23</td>
<td>Chatsworth - Porter Ranch</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>24</td>
<td>Wilmington - Harbor City</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>25</td>
<td>Sylmar</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>26</td>
<td>Westlake</td>
<td>Community Plan Area</td>
</tr>
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<td>27</td>
<td>Central City</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>28</td>
<td>Westside</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>29</td>
<td>Port of Los Angeles</td>
<td>Community Plan Area</td>
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<tr>
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<td>Northridge</td>
<td>Community Plan Area</td>
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<td>Van Noy - North Sherman Oaks</td>
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</tr>
<tr>
<td>32</td>
<td>Boyce Hugueno</td>
<td>Community Plan Area</td>
</tr>
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<td>Sherman Oaks - Studio City - Topanga Cany - Cahuenga Pass</td>
<td>Community Plan Area</td>
</tr>
<tr>
<td>34</td>
<td>Westchester - Playa del Rey</td>
<td>Community Plan Area</td>
</tr>
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<td>Los Angeles International Airport</td>
<td>Community Plan Area</td>
</tr>
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<td>South Los Angeles</td>
<td>Community Plan Area</td>
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<td>Southwest Los Angeles</td>
<td>Community Plan Area</td>
</tr>
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<td>38</td>
<td>West Hollywood</td>
<td>Small Municipality</td>
</tr>
<tr>
<td>39</td>
<td>Beverly Hills</td>
<td>Small Municipality</td>
</tr>
<tr>
<td>40</td>
<td>Culver City</td>
<td>Small Municipality</td>
</tr>
<tr>
<td>41</td>
<td>Santa Monica</td>
<td>Small Municipality</td>
</tr>
</tbody>
</table>
Characteristics of Underutilized Commercial Real Estate in Los Angeles

In Table A.1, we provide descriptive statistics on our data set of underutilized real estate in Los Angeles. For each property type, we provide data on building characteristics for Los Angeles County and for our Los Angeles City Plus geography (as described above). In Table A.1, we present the mean value with standard deviation in parentheses below, then the number of observations for each measure below that (since missingness varies by variable of interest, though the most commonly missing measure is last sale price). A value for building area is present for all properties, so this sample size represents the total number of observations for each property type.

Note that the source of the building area measure differs by property type. For office and retail properties, we use RBA, but there is no measure of RBA for hotel/motel properties. For these properties, we proxy for building area by multiplying the number of rooms by 300 square feet, then add in the “Total Meeting Space” measure provided by CoStar.\(^5\) This measure likely

\(^5\) The 300-square-foot heuristic is mentioned in numerous media articles and represented the modal room size in an informal sampling of websites for franchise locations of economy chains, such as Days Inn (Levere, 2019; Warren, 2019).
understates total building area to some extent, since many common areas (e.g., lobbies, fitness areas) are likely not counted as part of the total meeting space.

### Table A.1. Mean Characteristics of Underutilized Commercial Real Estate in Los Angeles

<table>
<thead>
<tr>
<th></th>
<th>Los Angeles County</th>
<th>Los Angeles City Plus Small Municipalities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hotel/Motel</td>
<td>Office</td>
</tr>
<tr>
<td>Building area (square feet)</td>
<td>13,119</td>
<td>29,447</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>(11,742)</td>
<td>(19,914)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>808</td>
<td>787</td>
</tr>
<tr>
<td>Land area (square feet)</td>
<td>43,876</td>
<td>132,691</td>
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<tr>
<td>Standard deviation</td>
<td>(363,139)</td>
<td>(1,216,455)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>796</td>
<td>777</td>
</tr>
<tr>
<td>Number of stories</td>
<td>2.0</td>
<td>2.6</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>(1.2)</td>
<td>(1.6)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>796</td>
<td>785</td>
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<tr>
<td>Standard deviation</td>
<td>(20.7)</td>
<td>(23.2)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>795</td>
<td>786</td>
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<tr>
<td>Last sale price ($)</td>
<td>3,180,654</td>
<td>7,190,003</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>(4,299,197)</td>
<td>(9,882,128)</td>
</tr>
<tr>
<td>Number of observations</td>
<td>463</td>
<td>462</td>
</tr>
</tbody>
</table>

**SOURCE:** Author calculations using CoStar data.

**NOTE:** The very large standard deviation in land area for countywide office properties is driven by the presence of three outlier properties that are part of office parks located on approximately 20,000,000 square feet of land. The next largest land area values are near 1,000,000 square feet.
The Case for Adaptive Reuse

Many features of AR are well-aligned with key state and federal priorities, as well as both recent and longer-term economic developments related to housing production. In this section, we review some key examples of these factors and how AR relates to them.

Adaptive Reuse Can Contribute to Reduced Greenhouse Gas Emissions

California has set a goal of reducing emissions to 40 percent below 1990 levels by 2030.\(^6\) AR may be able to help meet this goal in at least two important ways. One way is through a reduction in embodied carbon for new housing. Embodied carbon—the total carbon emissions represented by the extraction of raw materials, the processing and manufacturing of raw materials into building materials, transportation involved in these processes, and the actual process of constructing a building using these materials—represents perhaps 20 percent of the total long-term carbon footprint of a building over a 50- to 60-year life cycle (Ibn-Mohammed et al., 2013). Estimates suggest that the AR of buildings generates 50 percent to 75 percent less embodied carbon emissions than new construction does (Siegel and Strain, 2020).

The use or reuse of CRE for housing can also contribute to meeting transportation-related goals for reductions in carbon emissions. The California Air Resources Board has estimated that to meet the state’s 2030 goal of a 40 percent reduction from 1990 greenhouse gas emission levels, vehicle miles traveled must be reduced by 7.5 percent (Boarnet and Handy, 2017). Because CRE is often located in clusters along commercial corridors with relatively greater access to public transit and greater proximity to employment opportunities, AR can contribute meaningfully to this goal.

Adaptive Reuse Can Have Lower Development Costs

High housing production costs in Los Angeles have been highlighted as an important limitation on future economic growth and an impediment to social mobility (Nichols, 2019; Woetzel et al., 2019). Factors behind these high costs include materials costs, a shortage of skilled construction workers (resulting in increased labor costs), and high development fees (Federal Reserve System, 2021; Mawhorter, Garcia, and Raetz, 2018; Raetz et al., 2020). AR may influence each of these factors.

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\(^6\) An even more significant goal has been set for 2050 that requires the state to reduce greenhouse gas emissions to 80 percent below 1990 levels (Long, 2011).
Labor and material costs for AR projects may differ from new construction projects in multiple ways. If the primary components of a building are reusable, then significant savings related to reusing these components may accrue (e.g., masonry, steel framing, roofing). If the building was used for housing purposes, as in the case of hotels, much of a building’s interior may also be reused, saving further on (for example) electrical, plumbing, interior framing, and drywalling.

On the other hand, the discovery of unexpected building conditions once a project is underway may lead to higher levels of labor utilization and unforeseen material costs. Historic buildings may have architectural features that require additional resources to preserve or restore during repurposing, and such tasks may require highly specialized labor. Structural remediation and related engineering challenges, such as seismic retrofitting, may also require specialized additional labor and material expenditures relative to a new construction project.

Development and impact fees are a significant driver of new construction costs in California, with a recent report estimating that a typical 100-unit new construction, multifamily development in Los Angeles incurs fees totaling about $12 per square foot (Mawhorter, Garcia and Raetz, 2018). In many areas, including the City of Los Angeles, certain development fees are assessed only on new square footage added to AR projects. Thus, projects that reuse significant amounts of space can incur substantially lower fees.

**Adaptive Reuse Can Make Use of Flexibility in the Zoning Code**

A potential hurdle related to the viability of AR for CRE relates to whether a property must be rezoned to be compatible with a residential use. Multiple bills have been introduced in the California State Legislature to streamline this type of rezoning for underutilized commercial land (California Assembly Bill 3107, 2020; California Senate Bill 6, 2021). However, none of these bills has yet passed, having been caught up in a larger dispute among state construction labor unions, housing advocacy groups, and lawmakers over the inclusion of restrictive labor regulations that has led to the recent failure of numerous housing-related bills (Tobias, 2021).

Lacking this sort of streamlining, developers interested in pursuing the AR of CRE may need to rely, instead, on flexibility in existing zoning regulations. Several common zoning types associated with commercial properties in Los Angeles offer this flexibility. Table B.1 lists key characteristics of the most common multiunit residential zoning designations in Los Angeles and provides common zoning designations among commercial parcels in the City of Los Angeles and the multiunit residential uses that they permit.  

As shown in Table B.1, all commonly encountered commercial zoning designations in the city of Los Angeles accommodate residential uses. R3-equivalent designations require larger dwelling sizes, but these minimums are comparable to the minimum dwelling size for a two-unit apartment required for projects receiving public funding through the Los Angeles Housing and

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7 Many other small municipalities in Los Angeles County use similar zoning designations.
Community Investment Department (Muhammad, 2015). R4-equivalent designations have minimum dwelling sizes that are congruent with use as studio apartments. This minimum is comparable to the minimum specified in the Downtown Los Angeles (DTLA) AR ordinance (ARO) and related AR provisions in effect for certain plans elsewhere in the city (City of Los Angeles, 2001; Los Angeles City Council, 2002a; Los Angeles City Council, 2002b). All told, more than 75 percent of the sample of underutilized real estate within the City of Los Angeles that we identified have a commercial zoning designation that allows for multiunit residential use.

**Table B.1. Common City of Los Angeles Multiunit Residential and Commercial Zoning Designations**

<table>
<thead>
<tr>
<th>Zoning Designation</th>
<th>Residential Use Permitted</th>
<th>Minimum Area per Dwelling Unit</th>
<th>Minimum Area per Guest Room</th>
<th>Parking Spaces per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>R3</td>
<td>One-family dwellings, Two-family dwellings, apartment houses</td>
<td>800 ft²</td>
<td>500 ft²</td>
<td>Fewer than 3 habitable rooms = 1; 3 habitable rooms = 1.5; more than 3 habitable rooms = 2</td>
</tr>
<tr>
<td>R4</td>
<td>R3 uses, homeless shelter</td>
<td>400 ft²</td>
<td>200 ft²</td>
<td>(same as above)</td>
</tr>
<tr>
<td>CR</td>
<td>R4 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>R3 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1.5</td>
<td>R4 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>R4 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>R4 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>R4 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CM</td>
<td>R3 uses</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** Los Angeles City Planning, 2020.

**NOTE:** “C” indicates commercial zoning designations, and “R” indicates residential zoning designations. Residential uses typically require a minimum lot width of 50 feet and a minimum lot size of 5,000 square feet. The number of units permitted on a given parcel is also subject to restrictions related to the permitted floor area ratio in a building’s height district. Other restrictions apply to some uses (e.g., homeless shelters may not have more than 30 beds under the R4 use and must be a minimum of 600 feet from another shelter outside the Central City CPA). See Los Angeles City Planning, 2020, for more details.

In many cases, however, a change of use, even to a permitted residential use, may trigger a discretionary approval process because of such building characteristics as setbacks and height limitations that conform to the building’s commercial zoning designation but not the permitted residential zoning designation. For example, C1 and CM zoning designations permit R3 uses, but these commercial zoning designations do not specify a maximum height, whereas R3 zoning has a maximum height of 45 feet. Without further policy reform allowing permitted changes of use to follow a ministerial process even when certain building or site characteristics may be nonconforming (as was the case in the original Los Angeles ARO), the number of buildings that
could be converted into housing through AR without an entitlement-based approval process may be limited, even when the zoning nominally allows such a use change.

**Tax Incentives May Be Available for Historic Adaptive Reuse Projects**

Numerous tax incentives exist that may increase the feasibility of AR for certain historic buildings. These include the Federal Historic Preservation Tax Incentives program, which provides for a 20 percent income tax credit for property owners meeting preservation and rehabilitation standards, the California Historic Tax Credit program, which awards about $50 million per year in tax credits for the preservation and rehabilitation of historic buildings, and the Mills Act, a framework for participating municipalities and property owners to enter into a contract specifying long-term property tax abatements in exchange for maintaining relevant properties under specific preservation standards (California State Parks, undated a; California State Parks, undated b; National Park Service, undated). Additionally, there are a variety of additional financial resources and awards for historic preservation provided by private philanthropic entities, such as the National Trust for Historic Preservation.

**Low Income Housing Tax Credit Incentives for Adaptive Reuse Projects**

Current rules governing the allocation of 4 percent tax credits through the Low Income Housing Tax Credit (LIHTC) program are favorable to AR. An applicant seeking this funding must specify one of three channels for tax credit eligibility: new construction, rehabilitation only, or acquisition and rehabilitation. AR projects are eligible for both new construction credits and acquisition and rehabilitation credits. Relatedly, if a property is acquired for AR, the value of the building may be included in the basis (or the calculated project value that determines the size of the tax credit award a project may be eligible for). Properties acquired for the purpose of demolition and new construction may not be used in this manner.

**Other Incentives May Increase the Feasibility of an Adaptive Reuse Project**

Programs aimed at incentivizing denser housing or more-affordable housing might indirectly increase the feasibility of an AR project by granting regulatory forbearance, such as reduced setback requirements, lot coverage limitations, parking requirements, and increased floor area ratio. Examples of such programs in the City of Los Angeles include the original Los Angeles ARO, the permanent supportive housing ordinance (Alpert Reyes and Smith, 2018), and the Transit-Oriented Communities program (Los Angeles City Planning, 2018). These allowances

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8 The Mills Act contains maximums for property valuation thresholds to be used in the calculated tax abatements, and property owners seeking higher abatement levels must apply for exemption from these thresholds. In the area covered by Los Angeles’s ARO, however, eligible properties are automatically exempted from these thresholds (Office of Historic Resources, Cultural Heritage commission, 2019).

9 These features were also present in the original Los Angeles ARO.
may, in some cases, address the issues with nonconforming building characteristics triggering a discretionary approval process, since they specify that a ministerial process be used while allowing for nonconforming site characteristics.

With regard to hotel/motel properties, the City of Los Angeles in 2017 passed the Interim Motel Conversion Ordinance, which provided for significant streamlining of the process of converting motels into transitional or permanent supportive housing. This ordinance allows for the presence of nonconforming property characteristics, the addition of in-unit kitchenettes, the conversion of space for service provision and administration, and other incentives related to, for example, parking for this particular reuse of motels (Los Angeles City Council, 2018).

**Adaptive Reuse May Sidestep Traditional NIMBY Opposition to New Housing**

The conversion of CRE to housing has a potentially important political benefit as well. Many recent state-level attempts at increasing the capacity to build housing by amending existing zoning have focused on upzoning residential parcels that only allow for detached single family housing. With few exceptions, efforts at systematically rezoning these properties have been successfully stopped by various coalitions of homeowners who oppose increased density because of concerns over lowering property values (i.e., positions and groups that commonly are labeled NIMBY, or “not in my backyard,” by advocates of increased housing supply) and community activists and others concerned with the displacement of residents as a consequence of market-rate housing development. Such coalitions have successfully defeated numerous state-level upzoning measures, including the controversial SB 50, which failed to pass in 2020 (Koseff, 2020).

CRE conversion may sidestep both of these strains of opposition. In terms of NIMBY concerns about new developments affecting the value of adjacent homes, most commercially zoned land is not directly adjacent to housing, particularly in higher-income areas, where the proportion of residential land zoned for single-family detached houses only is highest. Thus, CRE is less likely to be in “my backyard” from the perspective of homeowners. In terms of anti-gentrification concerns, CRE, by definition, does not have existing residents that may be displaced by new housing development. Also, because of both existing requirements and the probability that any type of citywide ARO would have an affordable housing component, CRE conversion can reasonably be expected to only add net affordable units, without the dislocation concerns that often accompany development involving existing residential land or properties.10

A third important group of stakeholders in this issue, commercial property owners, may welcome housing that could increase foot traffic to remaining businesses on CRE parcels adjacent to such new housing and may welcome an increase in the supply of nearby housing available to employees. This intuition appears to be supported by, for example, recent initiatives

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10 Certain economy hotel/motel properties may be an exception to this general rule, but we discuss such circumstances in more detail later in this appendix.
by business groups in Manhattan aimed at generating new incentive programs to convert office space into housing (Haag and Rubinstein, 2020). For all these reasons, the conversion of CRE into housing may be a rare win-win in the contentious political debates with regard to increasing the stock of housing in Los Angeles and other high-cost metro areas.

**Detailed Discussion of Distinct Aspects of Adaptive Reuse Projects**

In this section, we present a summary of a set of interviews with 11 individuals with relevant experience on AR projects in California. We interviewed these individuals from February to October 2021. We first initiated contact with two architects and four developers with relevant experience in AR who we learned about through media reports or who contacted us in response to an essay on AR published by the RAND Corporation in 2020 (Ward, 2020). Subsequently, these individuals recommended to us our other four interviewees, either in response to a direct solicitation for such contacts or as a recommendation related to some part of the issues discussed in our interview. We attempted to connect with an additional three practitioners, who declined because of time constraints or who we were unable to reach through email or phone messages.

The group we interviewed over this period comprised

- three Los Angeles–based architects
- one Los Angeles–based structural engineer
- one Los Angeles–based developer of market-rate projects
- one Northern California–based developer of both market-rate and affordable projects
- two Los Angeles–based affordable housing developers
- three Northern California–based affordable housing developers.

Although our interviews began with formal prompts, the conversations were often steered to certain topics of interest or importance by the interviewee. Several consistent themes emerged from these discussions, while other issues were more specific to the area of specialization of each interviewee. Below, we summarize key takeaways from these interviews.

**Building Characteristics That Are Conducive to Adaptive Reuse**

Multiple themes emerged in our interviews regarding building characteristics that are beneficial to AR projects, as follows:

- *Repetitive floor plates.* Buildings with identical layouts from floor to floor allow for the use of common floor plans across multiple floors and easier distribution of utilities.
- *Shallow floor plates.* Floor plates that are more rectangular are generally better, since they have relatively greater access to exterior walls and, thus, to natural light (through either existing or added windows). Such buildings can more easily accommodate the

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11 Our interviews, which lasted 30 to 60 minutes, were all conducted by one interviewer by phone or video conference using a semistructured interview instrument that is presented in Appendix F. The output of these interviews was a set of typed notes that forms the basis of this section.
creation of either larger or smaller units. Larger, deeper floor plates may not accommodate the creation of smaller units with adequate access to light without the installation of an interior light court or internal courtyard, modifications that typically are expensive and could create seismic compliance requirements beyond those that may already exist. More-rectangular floor plates can also better accommodate unit layouts that can be served by a single-loaded corridor (one central hallway) per floor.

- **Usable existing windows and window openings.** Many AR projects may require new windows because of, for example, improved energy efficiency, a lack of operability as points of egress, or an inability to meet residential natural ventilation code requirements. The presence of existing windows that are sufficient for residential use or at least appropriate window openings can represent a significant cost savings relative to situations in which one or both of these factors are not present.

- **Larger buildings.** All else equal, larger buildings are generally better than smaller ones, since spreading the fixed costs of any AR project across more units will reduce per-unit costs (as is also the case for new construction projects). However, differences in acquisition price and numerous other factors may affect the viability of specific buildings in important ways.

- **Construction type.** Steel and concrete construction types are generally better than wood for sound isolation. Steel-frame buildings and newer concrete buildings are also usually less expensive to adapt to residential use because of such factors as a lower probability of requiring significant seismic retrofitting (an issue that is discussed in more detail below) and more flexibility to reconfigure a building’s interior.

- **Newer Buildings.** More-modern buildings will generally have fewer unforeseen costs associated with structural deficiencies, code remediation, and seismic retrofitting. For example, the City of Los Angeles’s non-ductile concrete (NDC) seismic retrofitting program is triggered if an NDC building was designed before 1976. Buildings designed in the past 20 years incorporate updated standards related to the 1994 Northridge earthquake, which revealed significant vulnerabilities in a common method of reinforcing steel construction.

### Site Characteristics That Are Congruent with Adaptive Reuse

Multiple themes emerged in our interviews regarding site characteristics that are congruent with AR projects, as follows:

- **Outdoor space.** Properties with either existing ground-level outdoor space or convertible space, which may include a usable flat roof or excess parking that can be repurposed as green space or outdoor common areas, are more congruent with housing reuse. Creating outdoor roof space may be a meaningful cost driver, depending on building characteristics, but this may be a necessary expenditure in high-density locations that have few other options for outdoor space.

- **Access to transit, walkable amenities, schools and parks.** There is an emerging consensus among planning officials, policymakers, and many stakeholders in the housing space that a focus on siting housing in areas with high walkability and access to public transit is of major importance. Access to such amenities as schools and parks may be particularly important for families (suggesting that, for example, DTLA may be a less-than-ideal environment for family housing). We note that these characteristics are not specific to
housing created through AR. However, to the extent that AR of existing buildings may encounter lower barriers than a new construction project, these characteristics should be considered in the overall cost-benefit calculations of a candidate AR property.

Notable Cost Factors

In addition to the factors that we highlighted above, our experts noted the following other important factors that can influence costs:

- **Utility upgrades.** Existing utilities in commercial buildings will usually require substantial upgrades. Affected systems often include electrical service, fire and domestic water pumps, fire hydrants, sewer service, and heating, ventilation, and air conditioning. One interviewee noted that certain classes of buildings, such as former health care facilities, may have more robust utility service, potentially reducing such costs.

- **Energy efficiency upgrades.** Many older buildings will also require extensive upgrades related to modern energy efficiency and environmental requirements. These may include the installation of rooftop solar, energy-efficient doors and windows, new insulation, waterproofing, and stormwater distribution.

- **Structural deficiencies and environmental remediation.** Older buildings may have various deficiencies that require remediation and that may not be obvious without extensive investigation and expertise or may be missed until demolition has begun. These may include remediating water damage to below-grade walls, which can trigger external excavation and remediation that requires the removal and reconstruction of sidewalks. The presence of asbestos or lead paint may also require costly remediation. Additionally, unpermitted past additions or alterations that are not code compliant may require demolition or other remediation.

- **Seismic retrofitting.** Older buildings may require varying levels of seismic remediation, depending on age, construction type, and building modifications related to AR. Major seismic events dating back to the 1930s have revealed critical weaknesses in a series of once-common building construction types, including unreinforced masonry buildings, soft-story buildings (buildings with large openings in perimeter walls—e.g., for parking or wall-to-wall windows—and with few interior partition walls), and NDC buildings. NDC buildings are of particular concern because these buildings are relatively common: A 2021 report identified 1,337 NDC buildings within the City of Los Angeles (Liljegren et al., 2021). More recently, the 1994 Northridge earthquake revealed significant vulnerabilities in “moment-frame” steel-construction (Hamburger, 2000; Lin, 2018).

- **Seismic retrofitting came up during interviews with multiple developers as an extremely outsize cost driver. A 2021 report estimated that seismic retrofitting costs for several projects in DTLA in recent years have ranged between $30 and $100 per square foot (Liljegren et al., 2021). One interviewee involved in an affordable housing project in an unreinforced masonry building that required extensive seismic retrofitting told us that this added 35 percent to the total costs of the project. This interviewee suggested that only the flexibility of public funding sources used on the project with respect to construction costs and the diversion of the entire developer fee into the project allowed for this project to be completed. Another expert who has worked on numerous projects in DTLA suggested that a building code change that accompanied the 2000 Los Angeles ARO and provided...
alternative seismic retrofitting standards was instrumental in the success of the effort to incentivize the AR of historic buildings downtown.

- **Historic building status.** For historic buildings, there are two primary aspects that affect project costs. One is the need to preserve the distinctive characteristics of a property, which may tend to drive costs up through, for example, the use of specialized materials and labor, the potential need to disassemble and reassemble historical components of a building, and the limitations placed on the reuse of such buildings by the need to preserve such characteristics.

- However, it is also the case that historic status can trigger the use of more-flexible building codes or code interpretation related to, for example, fire safety, accessibility, and energy efficiency. For example, current egress requirements with respect to the number, size, and characteristics of stairwells may be relaxed for historic buildings when meeting current code would be infeasible either because of the existing structure of a building or because of the logistical effects that complying would have on the building. These factors may tend to reduce costs relative to using a nonhistoric building, which would be required to fully meet current standards.

Other Important Factors

Other important factors discussed in our interviews include the following:

- **Access to as-built drawings.** Buildings may have various deficiencies that require remediation that may not be obvious without extensive investigation and expertise or that may be missed until demolition has begun. These may include water damage to below-grade walls, which can trigger external excavation and remediation that requires the removal and reconstruction of sidewalks. Additionally, unpermitted past additions or alterations that are not code compliant may require demolition or remediation. The ability to access a full set of building plans can help identify these and other potential issues early, potentially even before a building has been acquired.

- **Experienced team members.** A recurring theme from our group of experts was the importance of prior AR experience among architects, engineers, and general contractors. Architects and engineers with strong knowledge of building codes for existing structures, historic buildings, and the particulars of any AR or other relevant ordinance can design conforming projects and effectively address nonconforming conditions of buildings in a redesign. Experienced general contractors can work with inspectors to get upfront approvals for nonconforming conditions in a building, reducing delays and redesigns.

- **High levels of coordination among team members.** Multiple interviewees also stressed the need for a much greater than normal level of interaction and communication among these parties. One interviewee from a vertically integrated firm (with financing, development, and contracting components) stressed the benefits of this arrangement for undertaking AR projects.

Issues Specific to Hotel/Motel Properties

Multiple interviewees suggested that hotel/motel properties represent the type of AR project with the lowest levels of uncertainty, since these properties served as short-term housing in their commercial use and AR of these properties is often similar to a standard rehabilitation project for
an apartment building. One affordable housing developer we interviewed estimated that, in the Los Angeles area, the total per-unit development cost, including property acquisition, for hotel/motel conversion likely ranged from $300,000 to $400,000 per unit, which represents a savings of about 25 percent or more relative to current new construction costs for publicly funded affordable housing.

However, a few considerations specific to the AR of hotel/motel properties were highlighted by multiple interviewees. First, there is generally a significant correlation between the condition of a hotel/motel building and the acquisition cost, as would likely be the case with other property types. But, in the case of hotel/motel properties, such price differences reflect a much more direct trade-off with construction costs, since newer hotel/motel properties (particularly, “extended-stay” facilities with in-unit kitchenettes) are more likely to closely approximate the kind of unit that would be produced as part of a new construction project. They also noted that the extent of cost savings with regard to the AR of hotel/motel properties relative to other property types may depend significantly on the extent of modifications to the basic layout of units. This may mitigate against, for example, the creation of family-size units in single-room hotel/motel properties.

There is an additional, distinct issue to consider with economy hotel/motel properties. Recent years have witnessed a significant increase in the incidence of individuals living permanently or semipermanently in extended-stay hotel/motel properties (Allen et al., 2019; Frazier, 2021; Wiltz, 2020). Individuals residing in such properties for longer than 30 days often become eligible for tenant protections, and this situation has complicated some Project Homekey developments in the region (Smith and Oreskes, 2020). This link between these properties and unstably housed or homeless populations—children who are permanent residents of hotel/motel properties are classified as “homeless” under the federal McKinney-Vento Homeless Assistance Act (National Center for Homeless Education, undated)—may complicate conversions of these properties into permanent housing. A potential upside of this phenomenon is that many permanent residents of such properties may qualify for placement into subsidized affordable housing, and this status may create a confluence between right of return obligations, in which displaced individuals or families must be offered the ability to return to a redeveloped property, and the creation of new subsidized housing units, minimizing displacement concerns that have arisen in other cases in recent years (see, e.g., Alpert Reyes, 2018; Alpert Reyes, 2019).

Detailed Discussion of Features of Effective Adaptive Reuse Policy

Below, we provide summaries of the key features of the original Los Angeles ARO and the proposed update to the ARO that is part of the DTLA 2040 plan that include more detail on the benefits and drawbacks of each of these policies. We also highlight disagreements over the advisability of adopting certain policy features when we are aware of the existence of such debate.
Create a Ministerial or “By-Right” Approval Process

The discretionary entitlement process, in which a project must seek and receive various approvals even if its characteristics conform with existing zoning and related requirements, is a critical barrier to expanding the housing supply. Any discretionary project may be challenged under California’s Environmental Quality Act, which research has found is primarily used to block urban infill projects (Hernandez, 2018). Additionally, municipalities often challenge these projects for various reasons that appear to be increasingly at odds with state law (Dineen, 2021). The original Los Angeles ARO allowed for ministerial approval of conforming projects, and research has estimated that this feature reduced the time required to obtain a building permit for an AR project from about 30 months to six months (Riggs and Chamberlain, 2018).

California Senate Bill 35 overrides discretionary approval processes for affordable housing from jurisdictions with a history of creating roadblocks for such projects (Kendall, 2019). The streamlining provisions in California’s Project Homekey were highlighted as a critical factor for one of our interviewees, who worked on a project using a property acquired with this funding source. Another developer we interviewed who was working on a project that is not by-right highlighted this factor as a major contributor to the project being two years old and stuck in a drawn-out approval process.

Scale Back or Eliminate Limits on Density

The original Los Angeles ARO allowed for units as small as 450 square feet, but this fairly dense minimum size was rendered largely irrelevant by a requirement that the average unit size of an AR project be 750 square feet. Figure B.1 demonstrates the effect of such an average size requirement by tracing out a curve that relates the number of 450-square-foot units included in a 100-unit project with the growing size requirement of the remaining units that must be observed to meet the average size constraint in the original ARO. This requirement is not currently included in the language of the revised ARO in the DTLA 2040 housing element update.

The importance of allowing developers to determine the appropriate mix of unit sizes for a project was stressed by multiple members of our group of experts. One developer with significant experience working in DTLA under the original ARO highlighted the appeal of approximately 250-square-foot microunits, calling them “affordable by design.” Such units are especially appealing as a way of creating lower-cost units in amenity-rich, high-cost areas (Lall et al., 2018).
We note that some stakeholders suggest that allowing microunits will lead to relatively too many of such units in AR projects and that a minimum size requirement on the order of 750 to 1,000 square feet is desirable. The stated concern motivating this position is that the insufficiency of smaller units over time as, for example, a family grows in size will contribute to instability in an area by inducing more-frequent moves into and out of such units (Miller and Terrazas, 2021).

Reduce or Eliminate Minimum Parking Requirements

Minimum parking requirements are increasingly viewed as costly and out of step with environmental and land-use goals (Shoup, 2011). At least as importantly, included parking does not appear to be a highly valued amenity in areas with higher-quality transit access and other amenities that reduce the need to drive.

At least two factors concerning parking minimums are specific to AR projects. One is that many buildings in dense areas (such as older high-rise buildings in DTLA) never had parking capacity that conformed to more-typical modern requirements for housing, and parking would have to be created off-site to meet minimums. Another is that repurposed parking areas may offer the only possibility of outdoor green space for some buildings.

One of our interviewees recounted adding nonrequired parking at significant cost to the first AR project they were involved in, only to realize in hindsight that it did not affect the ability to lease up the building. They dropped this feature and its associated costs from their next project. Another developer with experience in DTLA recalled having concerns about an early project
without provisions for parking but quickly discovered that this was not an issue at all in terms of finding tenants for the housing. Research on the original Los Angeles ARO also suggests that the “unbundling” of parking from housing prices represented by the parking-minimum exemptions in this ordinance may have contributed to the production of moderately lower-cost housing (Manville, 2013).

Allow New Floor Area to Be Added to Buildings

Many commercial buildings that are suitable for AR have areas with ceiling clearances that are sufficiently high to construct mezzanine or intermediate floors (e.g., in a large warehouse or on the ground floor of a multistory commercial building), but such additions of new floor area typically are restricted. Additionally, many warehouse-style buildings have large, flat roofs that can readily accommodate an additional story. Creating a clear set of criteria for these means of adding floor area will increase the efficient use of a building and, thus, the potential cost-effectiveness of AR projects.

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12 The original Los Angeles ARO only allowed for the addition of mezzanine floor space—essentially, open balcony-style space—in such high-ceilinged buildings.
Appendix C. Details of Financial Feasibility Analyses in Section 3

Regression Modeling of Adaptive Reuse and Non–Adaptive Reuse Permanent Supportive Housing Projects in Los Angeles

The original cost analysis presented in Section 3 of the main report uses estimated cost data on publicly funded supportive housing projects in Los Angeles that are either currently in development or recently completed. We assembled these data from multiple sources, including the City of Los Angeles Department of Housing and Community Development; Galperin, 2019; the California Tax Credit Allocation Committee and the California Debt Limit Allocation Committee; the Los Angeles County Office of the Assessor; and various media outlets. A full description of the data set used for this analysis and discussion and testing of the validity of the estimated cost data used is available in Chapter 3 and Appendixes A and B of Ward, 2021.

From the full data set of 98 projects, we exclude projects of 64 units or more. This is due to the fact that many of the projects in our data were funded by a City of Los Angeles funding program known as Proposition HHH. This $1.2 billion bond has provided funding to well over 100 projects in Los Angeles in recent years, but one component of this funding program is a project labor agreement that requires projects that propose to build 65 units or more to primarily use a union labor force and to observe several other related requirements. Ward, 2021, finds that this agreement resulted in a dearth of larger projects and that these projects affected by the agreement had construction costs that were approximately 15 percent higher than projects not affected by the agreement. To increase the comparability of the projects used in this analysis, we exclude not only projects of 65 units or more, which were explicitly affected by the requirements, but also the disproportionately high number of 64-unit projects in the data (64 units was the modal number in the data set, at 15, with the next-largest incidence of units being six projects of 56 units), which appear to be related to a desire to avoid the aforementioned agreement and, thus, may not be comparable to other 64-unit projects.

From the remaining 59 projects (six AR or rehabilitation projects and 53 new construction projects), we retain 47 (five AR or rehabilitation projects and 42 new construction projects) for which we have complete data on the control variables we include in the regression models. These models and the controls we use are described below.

Model 1: Differences in Construction Costs for Adaptive Reuse and Non–Adaptive Reuse Projects

\[ y_{it} = \alpha + \beta \text{AR}_t \text{rehab}_i + \gamma \text{units}_i + X'_l \theta + \delta_t + \epsilon_{it}. \]
This model regresses the estimated per-unit construction cost $y$ (in dollars) for project $i$ in year $t$ on a binary indicator variable for being an AR or rehabilitation project and a variable with the number of housing units for each project. Several additional controls that may meaningfully affect project costs are included in the vector $X$ (these are detailed below), and a set of year dummy variables, $\delta_t$, is included to control for otherwise unobservable common shocks to construction costs (“year” here is the year that the project applied for LIHTC funding).

Model 2: Differences in Total Development Costs for Adaptive Reuse and Non-Adaptive Reuse Projects

$$y_{it} = \bar{\alpha} + \bar{\beta} \ AR\_rehab_i + \bar{\gamma} \ units_i + \pi \ land\_acquisition\_cost_i + X'_i \Phi + \bar{\delta}_t + \varepsilon_{it}.$$ 

This model uses estimated total per-unit development costs (instead of only construction or hard costs) as the outcome. To control for the fact that AR or rehabilitation projects are likely to have different acquisition costs (since new construction projects are more likely to acquire either vacant land or land with a building unsuitable for reuse), this model includes a variable controlling for this cost component of total development costs ($land\_acquisition\_cost_i$).

Control Variables Included in Analysis and Motivation for Inclusion

We included the following control variables in our analysis:

- **Shares of unit type in each project** (i.e., proportion of units that are studio, one bedroom, two bedroom, or three or more bedrooms). The motivation for including this variable is that a project comprising only three-bedroom units will necessarily have a higher per-unit cost than a project of only studio units, since the former units are simply larger, meaning that each unit costs more in materials. The inclusion of this variable along with the number of units in each project also effectively controls for the overall size of the project, since the actual sizes of units of different types are typically quite close to the minimum unit sizes specified by the city.

- **Share of units that are supportive housing.** The number of supportive housing units is correlated with potential cost drivers, such as the amount of common and service areas (e.g., meeting rooms, case worker offices) required, so controlling for the share of these units is important.

- **Stories.** The number of stories can influence project size by directly increasing costs (as stories increase, different building types must be used: e.g., wood over a concrete foundation versus steel construction) but can also increase economies of scale (e.g., building additional stories over a common building foundation with shared electrical and plumbing infrastructure can be less costly than building multiple single-story buildings). To control for both of these factors, we use (1) a linear measure of stories as a continuous variable and (2) an indicator variable for six- to eight-story buildings, which are most likely to be wood-over-cement-podium-type construction.

- **Commercial prevailing wage.** An indicator variable controls for projects of five or more stories, which triggers the requirement to pay workers using the commercial prevailing wage scale (one of two state-mandated wage scales associated with most publicly funded
public housing projects in California). We note that this variable may understate the number of projects subject to commercial prevailing wage, since other project aspects may also trigger this requirement. (We do not control for the requirement to pay residential prevailing wages, since all the projects in our analysis indicated being subject to this requirement, so there was no variation along this dimension.)

- **Elevator and parking.** These two variables are indicator variables representing data from LIHTC funding applications. The California Tax Credit Allocation Committee and the California Debt Limit Allocation Committee, the agencies that allocate this funding, allow for higher costs for properties when at least 95 percent of the project’s upper floor units are serviced by an elevator. Similarly, the parking variable indicates whether the project involves either subterranean parking or an additional parking structure, both of which trigger an allowance for higher project costs.

- **Transit-oriented development.** This is an indicator variable equal to 1 for projects sited within one-half mile of a major transit stop. This qualification influences the “eligible basis” for a project under the LIHTC program and can affect the interest rate of various bond funding programs (for example, Proposition HHH–funded projects were eligible for a 50 percent interest rate reduction).

- **Controls for the target population types of a project.** Specific characteristics of supportive housing projects, such as the size and makeup of common areas or areas for the provision of services, as well as other aspects of construction (e.g., accessibility accommodations), may be influenced by needs that are specific to various target groups of a given project. These controls are implemented as a set of three mutually exclusive binary indicator variables for the following three key subpopulations (the nonspecific category for “individuals” is omitted from the model, serving as the reference category):
  - individuals
  - families
  - special populations (which includes veterans, survivors of domestic abuse or sexual trafficking, individuals suffering from mental illness, seniors, transition-aged youth, and HIV-positive individuals).

In some projects, these populations overlap, so these are implemented in a hierarchical fashion that prioritizes coding family projects (since these may require larger amounts of common area for meeting the service needs of both children and adults), special populations, and then individuals.

Table C.1 presents the results of these models. The first column presents the association between AR and construction costs alone (labor, materials, and ancillary costs directly related to construction). In the second column, we use total development cost as the outcome variable and add a control for the acquisition cost of the property. This is done for two reasons. First, AR projects include one or more buildings, whereas some new construction projects acquire property with buildings and demolish them and others acquire vacant land. Second, a significant number of new construction projects in these data used donated land. By controlling for this factor, the model estimates the combined cost differences for AR projects versus new construction on both construction and *soft* costs, a category which includes a variety of costs related to financing, architectural and engineering fees, construction cost contingency funds, and other costs that fall
outside of either direct construction or land and acquisition costs but that may differ for AR projects versus new construction.\textsuperscript{13}

These results suggest economically significant cost savings for AR projects relative to new construction. For construction costs alone, the estimated costs are 49 percent lower ($164,000 per unit). Using total costs as the outcome while controlling for land and acquisition costs generates an estimate of a total savings of 30 percent ($153,000 per unit).

We note that the sample of AR projects in this analysis is quite small and may not generalize; further, these projects primarily use buildings that had some history of serving as housing or quasi-housing (two were apartment buildings in poor condition, two were small hospital-related facilities, and one was originally a school that had also served as housing), which may have contributed to relatively lower costs compared with AR using structures that were not previously used for housing-related purposes. On the other hand, three of the five projects use historic buildings that are between approximately 75 and 130 years old, a factor that may have contributed to higher costs than might otherwise prevail with the conversion of newer structures (Hahm, 2018; U.S. Department of Veterans Affairs, 2016).

| Table C.1. Estimated Cost Differences Associated with Rehabilitation or Adaptive Reuse Versus New Construction for Los Angeles Permanent Supportive Housing Projects |
|---------------------------------------------|---------------------------------------------|
| Model 1: Construction Costs | Model 2: Total Costs |
| AR project | −$163,687 | −$153,700 |
| | ($43,735) | ($60,285) |
| | [0.001] | [0.017] |
| Mean cost of new construction projects | $339,372 | $565,701 |
| Percentage difference for AR projects | −48 | −27 |
| Adjusted R² | 0.629 | 0.559 |
| Number of observations | 47 | 47 |

\textsuperscript{13} The mean values of land and acquisition costs for the projects used in this analysis were $49,274 per unit for the 42 new construction projects and $138,771 per unit for the five AR projects.

\textsuperscript{13} The mean values of land and acquisition costs for the projects used in this analysis were $49,274 per unit for the 42 new construction projects and $138,771 per unit for the five AR projects.
Cost Comparisons Between Market Rate Apartments and Commercial Real Estate Across Areas in the Los Angeles Region

For these comparisons, we use CRE submarkets defined by CoStar for three relatively broad areas of Los Angeles County that include large parts of the city, some nearby small municipalities, and unincorporated county areas. The first, which we call “Western Los Angeles,” comprises roughly the Los Angeles neighborhoods of Los Feliz, Hollywood, Century City, West Los Angeles, and Brentwood and the cities of West Hollywood and Beverly Hills. Note that this submarket is called “Hollywood/Beverly Hills” in the CoStar application. The second area, “Central Business District,” includes the Los Angeles neighborhoods of Silver Lake, Echo Park, DTLA, Koreatown, Leimert Park, South Los Angeles (including parts of the adjacent municipality Inglewood) and unincorporated Los Angeles County. The third area, “Southeast Los Angeles,” is composed of parts of southeast Los Angeles; the municipalities of Montebello, Whittier, Huntington Park, Bell, Bell Gardens, Cudahy, Southgate, Downey, Bellflower, Norwalk, Santa Fe Springs, La Habra Heights, La Mirada, Norwalk, Lakewood, Compton, Hawaiian Gardens, Southgate, Maywood, Commerce, Paramount, Artesia, and Cerritos; and parts of unincorporated Los Angeles County. To make the most-plausible comparisons, we compare:

- economy hotel/motel properties with non–class A multiunit studio apartment properties
- non–class A office properties between 10,000 and 100,000 square feet with non–class A one- and two-bedroom multiunit properties.

Table C.2 presents the sample sizes of each property type across the three areas we analyze, and Table C.3 presents the price and demographic characteristics of the three areas.

**Table C.2. Sample Sizes of Properties from CoStar Data Included in Adaptive Reuse Cost Comparisons**

<table>
<thead>
<tr>
<th></th>
<th>Western Los Angeles (or “Hollywood/Beverly Hills”) Submarket</th>
<th>Los Angeles Central Business District Submarket</th>
<th>Southeast Los Angeles Submarket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel/Motel properties</td>
<td>63</td>
<td>153</td>
<td>145</td>
</tr>
<tr>
<td>Office properties</td>
<td>193</td>
<td>184</td>
<td>65</td>
</tr>
<tr>
<td>Studio multiunit properties</td>
<td>1,498</td>
<td>1,353</td>
<td>230</td>
</tr>
<tr>
<td>One-bedroom multiunit properties</td>
<td>5,437</td>
<td>5,786</td>
<td>2,492</td>
</tr>
<tr>
<td>Two-bedroom multiunit properties</td>
<td>1,850</td>
<td>1,253</td>
<td>903</td>
</tr>
</tbody>
</table>

*SOURCE: Author calculations using CoStar data.*
**Table C.3. Price and Demographic Characteristics of Submarket Areas Used in Cost Comparisons**

<table>
<thead>
<tr>
<th></th>
<th>Hollywood/Beverly Hills Submarket</th>
<th>Los Angeles Central Business District Submarket</th>
<th>Southeast Los Angeles Submarket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Studio average price per unit</td>
<td>$339,455</td>
<td>$213,698</td>
<td>$223,650</td>
</tr>
<tr>
<td>One-bedroom average price per unit</td>
<td>$356,004</td>
<td>$241,517</td>
<td>$231,666</td>
</tr>
<tr>
<td>Two-bedroom average price per unit</td>
<td>$404,942</td>
<td>$265,594</td>
<td>$246,078</td>
</tr>
<tr>
<td>Hotel/Motel average price per unit</td>
<td>$154,695</td>
<td>$121,798</td>
<td>$107,915</td>
</tr>
<tr>
<td>Office average price per studio unit size</td>
<td>$301,100</td>
<td>$191,650</td>
<td>$127,350</td>
</tr>
<tr>
<td>Office average price per one-bedroom unit size</td>
<td>$481,760</td>
<td>$306,640</td>
<td>$203,760</td>
</tr>
<tr>
<td>Office average price per two-bedroom unit size</td>
<td>$782,860</td>
<td>$498,290</td>
<td>$331,110</td>
</tr>
<tr>
<td>Percentage non-Hispanic White</td>
<td>58.63</td>
<td>8.46</td>
<td>10.58</td>
</tr>
<tr>
<td>Percentage non-Hispanic Black</td>
<td>3.65</td>
<td>21.56</td>
<td>5.76</td>
</tr>
<tr>
<td>Percentage Asian/Pacific Islander</td>
<td>12.06</td>
<td>9.23</td>
<td>8.18</td>
</tr>
<tr>
<td>Percentage Hispanic</td>
<td>21.20</td>
<td>58.38</td>
<td>73.67</td>
</tr>
<tr>
<td>Percentage non-Hispanic Other</td>
<td>4.47</td>
<td>2.37</td>
<td>1.80</td>
</tr>
</tbody>
</table>

**SOURCE:** Author calculations using CoStar and NHGIS data.

Figures C.1 through C.4 show the sale prices for various property sizes in the three submarket areas, and Figure C.5 provides a map of the three submarket areas.
Figure C.1. Sale Prices for Studio Apartments and Hotel/Motel Rooms

Panel A. Western Los Angeles
Panel B. Central Business District
Panel C. Southeast Los Angeles

SOURCE: Author calculations using CoStar data.
NOTE: The vertical dashed line indicates the second quarter of 2021, when the COVID-19 pandemic plausibly began to affect real estate prices. The multiunit real estate used in these price comparisons excludes class A properties.

Figure C.2. Sale Prices for Studio Apartments and Equivalent Area in Office Properties

Panel A. Western Los Angeles
Panel B. Central Business District
Panel C. Southeast Los Angeles

SOURCE: Author calculations using CoStar data.
NOTE: The vertical dashed line indicates the second quarter of 2021, when the COVID-19 pandemic plausibly began to affect real estate prices. The multiunit real estate used in these price comparisons excludes class A properties.
Figure C.3. Sale Prices for One-Bedroom Apartments and Equivalent Area in Office Properties

Panel A. Western Los Angeles

Panel B. Central Business District

Panel C. Southeast Los Angeles

SOURCE: Author calculations using CoStar data.
NOTE: The vertical dashed line indicates the second quarter of 2021, when the COVID-19 pandemic plausibly began to affect real estate prices. The multiunit real estate used in these price comparisons excludes class A properties.

Figure C.4. Sale Prices for Two-Bedroom Apartments and Equivalent Area in Office Properties

Panel A. Western Los Angeles

Panel B. Central Business District

Panel C. Southeast Los Angeles

SOURCE: Author calculations using CoStar data.
NOTE: The vertical dashed line indicates the second quarter of 2021, when the COVID-19 pandemic plausibly began to affect real estate prices. The multiunit real estate used in these price comparisons excludes class A properties.
Figure C.5. Geography of Market Areas Used in Cost Comparisons

Panel A. Western Los Angeles (Hollywood/Beverly Hills CoStar Submarket)

Panel B. Los Angeles Central Business District
Panel C. Southeast Los Angeles

SOURCE: CoStar.
Appendix D. Trends in Commercial Real Estate During the COVID-19 Pandemic

One critical aspect of the feasibility of an AR project is the acquisition cost of the candidate property, which represents the cost of acquiring the land and the reusable components of a building or buildings. Depending on the scope of the rehabilitation work required to repurpose a property into housing, acquisition may represent the largest single expenditure on a project. For this reason, price trends in CRE since the start of the COVID-19 pandemic may play a large role in assessing whether an AR project is fiscally viable.

The analyses presented here were generated by built-in analysis tools on the CoStar website using the property categories and restrictions related to property characteristics that we outlined in Appendix A. We begin by assessing how vacancy rates across our three CRE property types were affected by the COVID-19 pandemic. In Figure D.1, we present these rates for a period that spans the beginning of 2016 to the end of the second quarter of 2021. Panel A shows that office vacancy rates increased by about 40 percent, from an average rate of about 6.5 percent to 9 percent by late 2020. There is evidence of a broadly similar pattern in retail vacancies, but the magnitude is about half the size, or about 20 percent (an increase from about 5 percent to 6 percent in 2020).

Panel B presents vacancy measures for hotel/motel properties. It is important to note that the measure of vacancies is intrinsically different for these properties. Office and retail space vacancies reflect the presence of an active, rent-paying tenant in a space (i.e., the “occupation” is by a business, not some measure of individual employees or customers using a property). Under such an alternative measure, office and retail vacancy rates would likely be much higher.

However, because room occupancy is a clear measure of the ongoing feasibility of operating a hotel/motel property (since occupied rooms are the “product” of this business, in contrast to, for example, office space utilization, where remote work may break the connection between the use of office space and business health), vacancies arguably provide more-accurate contemporary information on the fiscal health of this sector than they may among retail and office properties.

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14 CoStar produces a large number of analytic outputs for its users that employ various methodologies that are beyond the scope of this report to explain in detail, but explanations of these methodologies are available to CoStar users in a white paper on the company’s website. Some analyses are straightforward, but others use relatively involved imputation, smoothing, and other measures to generate market trends that compensate for a variety of confounding factors, such as bias in the type of properties that do or do not regularly report data or the effect of the changing composition of property types in a submarket on measures of asking rents.

15 This rate for class B and C office properties is lower than the overall vacancy rate for office properties, which CoStar reported at 13.5 percent at the end of the second quarter of 2021.
Shelter-in-place orders, travel bans, and the closure of myriad tourist attractions suggests that this vacancy measure should be quite large, and Figure D.1 shows a steep increase in vacancies throughout 2020, from a baseline rate of about 25 percent to a peak of approximately 42 percent in early 2021 (a nearly 70 percent increase). Because some hotel/motel properties closed during this period and these “permanent vacancies” are not reflected in the measure we present, the true vacancy rate from an AR-capacity perspective likely is higher.

On balance, these trends suggest some important differences in the effects of COVID-19 on the utilization of different types of CRE. Hotel and motel vacancies reflect significant declines in revenue and a higher probability of fiscal distress in this property sector (Singh, 2021). Increases in office vacancies were also fairly large, while retail vacancies were the smallest, though we note again the differences in how vacancies are measured. We turn now to assessing how these patterns relate to rental prices, sale prices, and sales volume for these property types.

We assess recent trends in the sales volume (sales activity measured in millions of dollars of transactions) and sale prices per square foot for our three focal property types. Figure D.2 reports these results. For each of our three property types, sales volume is presented via a histogram that corresponds to the left y-axis, while price per square foot is presented as the line plot that corresponds to the right y-axis.

For office properties, there is evidence of a significant decline in quarterly (hereafter denoted Q1, Q2, etc.) sales volume associated with the timing of the pandemic. From Q1 of 2016 through Q1 of 2020, the average sales volume for office properties was $572 million. From Q2 of 2020 through Q2 of 2021, this volume was $385 million, a 33 percent decline. Much of this average decline during the pandemic was, however, driven by a large single-quarter decline in Q2 of 2020, when only $183 million in transactions occurred. This transaction volatility, however, seemed to have only a transitory effect on sale price per square foot, which briefly flattened at
about $375 per square foot after years of 4 percent to 6 percent annual increases but which appears to have returned to an upward trajectory in the first half of 2021.

This lack of a strong downward price adjustment may be related to the fact that the volume of office space on offer under a sublease has been at a record high (including during the Great Recession) since Q3 of 2020 (Kahn, 2021), suggesting that there is significant surplus office capacity but that long-term contracts may have, to date, prevented this surplus from being reflected in prices. Additionally, the dramatic expansion of certain sectors during the pandemic, such as streaming media content providers (e.g., Netflix and others, which have a disproportionately large presence in Los Angeles) appears to have contributed to a countercyclical pattern of regional leasing activity (Bergman, 2021).

Retail CRE experienced a similar decline in sales volume (about 31 percent, on average, but with greater quarterly volatility). But unlike the office sector, prices in the retail sector appear to have declined more significantly, from an early 2020 peak of $348 per square foot to $337 per square foot by Q2 of 2021, a level that previously was passed at the beginning of 2019. Retail real estate prices are likely to continue to decline because of the pandemic (especially apparel, consumer electronics, and furniture) with a continued increase in brick-and-mortar closures (Wahba, 2021).

Hotel and motel properties also had a significant decline in sales volume in Q2 of 2021. But this decline was followed by a large increase in the volume of transactions. This increase is directly related to California’s Project Homekey program, which used federal dollars to subsidize the purchase of hotels and motels to use as interim (and, ultimately, permanent) housing for people experiencing homelessness. The influence of this program on sales volume is evident: The top recent buyers in this submarket are the City of Los Angeles, Los Angeles County, and nonprofits involved in Project Homekey.

This large upswing in hotel/motel sales volume occurred at an average price that was approximately 18 percent below the late 2019 peak in per-room prices in this submarket. This likely reflects the fact that a large proportion of distressed CRE sales have been in the hotel sector (Heschmeyer, 2021).
Figure D.2. Commercial Real Estate Sales Volume and Price per Square Foot

Panel A. Office

Panel B. Retail

Panel C. Hotel/Motel

SOURCE: Author calculations using CoStar data.
NOTE: For Panel C, the estimated price per square foot is derived by dividing rooms by 300 square feet to generate a comparable estimate to Panels A and B.

We note that Panel C presents prices on a per-room basis that we have converted into approximate square feet using an average size of 300 square feet per room to generate a roughly comparable measure of building area for comparison with the other property types. However, it is important to point out that the differences in this approach to calculating prices (per room versus per square foot) are likely to overstate the square footage costs of hotel/motel properties in a meaningful manner, since all common and meeting areas are excluded from these CoStar-generated market analyses.
Appendix E. Spatial Distribution of Underutilized Commercial Real Estate Relative to Social and Environmental Goals for Siting Housing

In this appendix, we explore the geographic distribution of CRE across Los Angeles and assess how this distribution relates to potentially important measures that may inform the optimal siting of housing with respect to socioeconomic and environmental goals. As mentioned previously, our analyses focus on a subset of real estate we define as underutilized by keeping only non–class A retail and office properties with 0 percent to 80 percent of their RBA currently leased. For hotel/motel properties, we retain all economy properties, because this category includes most of the properties that have been acquired for use as interim or permanent housing for people experiencing homelessness under the state of California’s Project Homekey.

We note again that this approach to generating an analysis sample is crude and that the complexity that is typical of many AR projects suggests that these analyses represent something that is probably closer to a best-case scenario in terms of the number of potentially adaptable CRE properties. However, the distribution of these properties should accurately represent the general spatial relationships between potentially reusable CRE and the social and economic measures we consider. The true number of properties that would be financially feasible if they were used in an AR housing project may be substantially larger or smaller than the number of properties we identify here, depending on the characteristics of the properties and sites, the level of incentives that the project might obtain (depending on planned use and other factors), and the extent to which the criteria addressed in this appendix are explicitly quantified in analyses of the costs and benefits of a hypothetical AR project.

Considering the Role of Social Goals in Housing Policy

The issue of how to equitably and optimally site housing has become a persistent area of interest for researchers and policymakers in recent years. This increased focus is reflected in historical research on how redlining, or the use of geographic boundaries based on the racial composition of neighborhoods when allocating housing lending, has contributed to persistent gaps in home values (Aaronson, Hartley, and Mazumder, 2021) and in recent state and local efforts to limit or end single-family zoning, which arose as a tool to maintain racially segregated neighborhoods (Bailey, 2020; McCormick, 2020; Ruggiero, 2021).

The federal government has also weighed in on this issue. The Obama administration implemented the Affirmatively Furthering Fair Housing rule, introduced by the U.S. Department of Housing and Urban Development in 2015. Since then, the rule was repealed by the Trump administration and reintroduced by the Biden administration (Jan, 2021).
Issues of both equity and environmental impact have come to the fore in California’s octennial Regional Housing Needs Assessment (RHNA). This process involves regional consortia of municipal governments allocating to municipalities the responsibility to identify and, if necessary, rezone or otherwise make feasible sufficient land for the creation of new housing to meet expected population changes. Since the fifth RHNA cycle, conducted in 2014, many policymakers and stakeholders have placed much greater emphasis not only on the need for affordable housing but also on identifying sites for such housing that satisfy important social and economic goals. These include proximity to employment, high-quality transit, and other amenities, as well as addressing historic patterns of discrimination through downzoning and other means that have reduced social and economic opportunities for racial and ethnic minorities and low-income individuals (Armstrong and Sears, 2001; Badger and Bui, 2019; Bedsworth, Hanak, and Kolko, 2011).

However, meeting these criteria when siting new housing that is affordable to most Angelenos has been difficult. Challenges include the simple fact that there is a strong negative correlation between employment density, low transit times, other amenities (such as high-quality schools), housing prices, and multifamily zoning (Dedousis, 2021). Additionally, there is often a negative correlation between transit access (particularly, rail access) and these other characteristics, though access to high-frequency public transit is significantly prioritized in the “amenity scoring” portion of the funding application used in allocating LIHTC funding. LIHTC is the dominant source of funding for the production of deed-restricted affordable housing in the United States, with an estimated cost of about $11 billion per year (Keightley, 2021). In order for projects to qualify for highly competitive 9 percent tax credit funding, which can cover the majority of project costs for either a new construction or a rehabilitation project, the proposed project must generally receive all available amenity points.

In a 2021 report, the City of Los Angeles planning department explored how these criteria mapped to parcels in the city by first restricting the sample of parcels to those that were proximate to both high-frequency public transit and a supermarket (another highly prioritized factor), then considering proximity to other scored amenities, including public parks, schools, and health facilities, among other criteria. The results of this exercise indicated that more than 50 percent of the most-competitive parcels for LIHTC funding were in either “low resource” areas or areas with “high segregation and poverty.” Only 23 parcels of parcels were located in “high opportunity” areas (Bertoni and Sewill, 2021).

We use measures that relate to three key socioeconomic goals regarding the siting of housing to contextualize the distribution of underutilized real estate properties that we identify. We then use these measures to generate a single social and environmental housing priority index to use when ranking areas around the region. The goals, the measures that we use to represent them, and the interpretation we make of them with respect to housing goals are given in Table E.1.
Table E.1. A Set of Socioeconomic Goals for Siting Adaptive Reuse Housing Projects

<table>
<thead>
<tr>
<th>Goal</th>
<th>Measures Utilized</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reducing vehicle miles traveled</td>
<td>Proximity to rail and bus rapid transit (1 mile); average commute time to work</td>
<td>Greater proximity to high-quality transit and lower commute times will reduce vehicle miles traveled.</td>
</tr>
<tr>
<td>Access to jobs-rich areas</td>
<td>Number of workers per square mile</td>
<td>Higher numbers of worker per square mile indicate greater relative employment opportunities.</td>
</tr>
<tr>
<td>Prioritizing new housing in unaffordable areas</td>
<td>Median gross rent</td>
<td>Higher area rents indicate greater housing scarcity in areas with higher levels of amenities.</td>
</tr>
</tbody>
</table>

We begin by presenting a series of maps that use color gradation to express variation in direct or proxy measures for the socioeconomic criteria mentioned above. These maps are overlaid with points representing parcels of underutilized CRE by type.

Spatial Distribution of Underutilized Commercial Real Estate

To assess the extent to which this distribution is congruent with potentially important socioeconomic goals for siting housing (such as reducing vehicle miles traveled, proximity to employment, and increasing housing in high-cost areas), we present graphical analyses that overlay points for each property in our sample of underutilized real estate onto maps of city and county geography that represent these relationships.

Measures Related to Reducing Vehicle Miles Traveled

Transit Access

Figure E.1 presents the distribution of each of our underutilized properties in relation to proximity to LA METRO rail and BRT stops, which are shown as colored circles that represent a one-mile radius from each stop.\(^{16}\)

A few patterns are clear from these maps. For hotel/motel properties, one can see that the Central City, Westlake, and Hollywood CPAs in the city and Inglewood and Long Beach in south Los Angeles County all have areas of significant overlap between transit stops and economy hotel/motel properties. There is some overlap in West Los Angeles and the Purple Line train extension in Wilshire, as well as along the future Crenshaw/LAX line. Additionally, there are a modest number of these properties along the Exposition Line, which runs through the West Los Angeles and Palms CPAs, as well as Culver City and Santa Monica. In contrast, rail and

\(^{16}\) The hybrid city and county geography used for these maps (“Geographic Definition 3”) was described in Appendix A.
BRT lines serving the San Fernando Valley (Canoga Park, Encino, Reseda, North Hollywood) and Northeast Los Angeles have little to no overlap with economy hotel/motel properties.

There are large numbers of these properties without access to rail or BRT along a corridor of South Los Angeles along the border of the South Los Angeles and Southeast Los Angeles CPAs (along, primarily, Figueroa Avenue and Vermont Avenue). We will discuss this corridor in more detail below, but this lack of high-quality transit access is accompanied by multiple factors that correspond to lower socioeconomic opportunities for residents. It is notable that most of the Project Homekey acquisitions we identify are within these transit corridors, reflecting the fact that this criterion is part of the points system used in awarding this funding (Newsom, Castro Ramirez, and Velasquez, 2021).

Underutilized office properties are also relatively concentrated in the Central City CPA, but they are highly concentrated in Beverly Hills and West Hollywood (along the LA METRO Purple Line extension), as well as in the West Los Angeles CPA and a significant concentration in Santa Monica, areas served by Exposition Line train service. These areas are all “high opportunity” areas that have been criticized for underproducing housing (particularly, affordable multifamily housing) in recent decades. This underproduction is due, at least in part, to these areas receiving low housing allocations in past RHNA cycles.  

The greatest density of underutilized retail properties is in the Central City CPA. However, they are also more widely distributed across the city and much of the county and are fairly well represented in some of the same resource-rich areas of west Los Angeles County that have a higher density of underutilized office properties.

Commuting Time

In Figure E.2, we present the distribution of properties using the Los Angeles City Plus geography; for each CPA and small municipality, we have generated an estimate of the mean commute time to work for workers residing in each area and presented these data as a “heat map” that uses varied color intensity to indicate shorter (lighter green) and longer (darker green) commute times. We note that the data source we use (LODES data, described in Appendix A) does not allow us to distinguish the mode of transit (i.e., car versus bus or train). However, research has shown that, in the six-county area represented by the Southern California Association of Governments (Imperial, Los Angeles, Orange, Riverside, and Ventura), only about 2 percent of people used public transit frequently, with another 22 percent using it occasionally, and ridership fell by approximately 13 percent between 2005 and 2016 (Manville, Taylor and Blumenberg, 2018). Los Angeles makes up about half of the total population of these counties, suggesting that the commute time measure we use is primarily representative of

17 Beverly Hills, for example, was allocated three affordable housing units in the fifth cycle of the RHNA, but this was increased to 1,008 in the recently completed sixth cycle allocations (Duara, 2021; Kiszla, 2021). For more background on the issue of both the past formula used to calculate allocations and lobbying over allocation numbers, see Duara, 2021.
commuting by car. We note, however, that the small amount of transit ridership is likely not evenly distributed across areas, so certain CPAs in our analysis may have relatively high transit ridership, while many others reflect nearly 100 percent car commutes. To the extent that transit users experience longer commutes because of the mode of transportation, rather than distance, this would inflate the differences we are measuring. Using percentiles as our final index measure may serve to minimize any biases arising from this fact if commuters in any such areas of heavy transit ridership would still have longer commutes by car than residents of areas with mostly car commuters.

Overlaying the distributions of our three property types onto this map makes a few things clear. The cluster of hotel/motel properties in the South/Southeast Los Angeles CPA corridor, which has poor access to high-quality transit, is also characterized by the high commute times, further suggesting a poor alignment between using these properties as housing and achieving goals related to reducing vehicle miles traveled. In contrast, there is a rich concentration of office properties in West Los Angeles, Westwood, Santa Monica, Beverly Hills, and adjacent areas with some of the lowest commute times in the region (this is, to some extent, a mechanical relationship, since areas with high concentrations of office properties are a key destination for both white-collar and service workers). The distribution of retail properties in these very low commute time areas is relatively sparse compared with the Central City and Hollywood CPAs, which have somewhat higher commute times.

Employment Density

The map in Figure E.3 shows workers per square mile across the Los Angeles City Plus geography. Among the CPAs and municipalities with underutilized CRE properties present, this measure of worker density averages 12,087 but ranges widely, with a minimum value of 289 and a maximum of 82,047. The areas of highest employment density range from the Central City North CPA west to Santa Monica. As mentioned previously, there is a mechanical linkage between employment and the location of CRE. This relationship is much more apparent in the maps of underutilized office and retail properties, which are both quite densely distributed across this area. There is also relatively high employment and office property density to the south of this band, from Culver City to the Venice CPA.

Existing Area Affordability

As shown in Table E.1, we proxy for the existing affordability of a geography by measured median gross rent (rent plus the average estimated cost of utilities). The mean of median gross rent across all Los Angeles City Plus geographic regions with underutilized properties present is $1,807, with a minimum value of $1,078 and a maximum of $2,418. We note that our measures come from 2015–2019 Census Bureau data, so the rents calculated here are likely lower than current rents. Using Zillow rental cost data for City of Los Angeles single-family plus multifamily properties from the beginning of 2017 (the midpoint of the time span of our Census
Bureau data) to September 2021, we calculate that estimated rents increased by 19 percent over this period.\(^\text{18}\)

Figure E.4 presents this map with our three property type overlays. The West Los Angeles and Westwood CPAs have among the highest rental prices, likely caused by the relative scarcity of multifamily rental properties.\(^\text{19}\) The Palms CPA, Santa Monica, and Culver City all have lower rental prices because of a much greater number of multifamily properties. The West Adams, South Los Angeles, and Southeast Los Angeles CPAs all have much lower rental prices. Rental prices in these areas are, in general, negatively correlated with high commute times and low employment density.

According to the interpretation given in Table E.1 that high rental prices proxy for relatively greater housing scarcity in areas with relatively higher levels of amenities, these figures suggest that, despite the negative average price gap between multiunit housing and office prices estimated in Section 3 in the main report, social and environmental goals related to housing production suggest that the AR potential of the dense cluster of office properties in Beverly Hills, West Hollywood, and the West Los Angeles and Westwood CPAs (and, to a lesser extent, in the Hollywood, Central City, and Central City North CPAs) may not be fully captured in a pure cost-difference analysis.

We note that throughout this discussion we have largely ignored the modest but nontrivial number of underutilized properties in the San Fernando Valley (e.g., Canoga Park, Encino, Sherman Oaks). Although these areas are characterized by, for example, relatively high rents, they also generally have poor access to transit, high commute times, and low employment density.

The Composition of Our Housing Priority Index

In this section, we explore an approach to ranking the socioeconomic value of building housing in a given geography by creating an index score that aggregates three of the socioeconomic measures we focused on above across the areas in our Los Angeles City Plus geography. Our simple approach uses the following formula:

\[
SEI_i = \frac{1}{3}(med \ \text{rent \ percentile}_i) + \frac{1}{3}(1 - mean \ \text{travel \ time \ percentile}_i) + \frac{1}{3}(employment \ \text{density \ percentile}_i)
\]

This formula evenly weights the percentile rankings of median gross rent, the inverse of mean travel time (since lower travel time is a more desirable characteristic), and employment

---

\(^{18}\) The Zillow data are available from the Zillow Research website (Zillow, undated).

\(^{19}\) Owner-occupied single-family homes are the predominant housing type in these areas, with the notable exception of the Wilshire Corridor, an area comprising thousands of luxury high-rise condominium properties.
density for each of the 43 CPAs and municipalities to generate a single index that allows these geographies to be ranked by this simple proxy measure of area resources and amenities.

This approach is similar to index-scoring systems that have been implemented in settings that are focused on equitable access to high-quality public schools (e.g., the Chicago public school system; see Quick, 2016). It is also closely related to a system for prioritizing housing allocation in Los Angeles proposed by two regional housing advocacy organizations: Abundant Housing LA and Pacific Urbanism. Their FAIR LA plan focuses only on City of Los Angeles CPAs and uses a more complex methodology that includes as its primary measures housing costs (sale prices), household income, transit access, jobs access, commuting patterns (inflow versus outflow in an area), the change in the zoned capacity of an area (to reflect the historical effects of downzoning), and an index of environmental risk factors. These inputs are weighted non-uniformly to generate an index that similarly ranks CPAs according to their appropriateness for siting new housing (Dedousis, 2020).
Figure E.1. Distribution of Underutilized Real Estate, by Proximity to Rail Transit Stop (One-Mile Radius)

Hotel/Motel properties

Office properties

Retail properties

SOURCES: CoStar, Los Angeles County Metropolitan Transit Authority, and Los Angeles City and County Open Data Portals.
NOTE: For hotel/motel properties, Project Homekey acquisitions are indicated by yellow dots.
Figure E.2. Distribution of Underutilized Real Estate, by Mean Travel Time to Work

Hotel/Motel properties

Office properties

Retail properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau LODES data.
NOTE: For hotel/motel properties, Project Homekey acquisitions are indicated by white dots.
Figure E.3. Distribution of Underutilized Real Estate, by Employment Density

Hotel/Motel properties

Office properties

Retail properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau NHGIS data.
NOTE: For hotel/motel properties, Project Homekey acquisitions are indicated by white dots.
Figure E.4. Distribution of Underutilized Real Estate, by Median Rent

Hotel/Motel properties
Office properties
Retail properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau NHGIS data.
NOTE: For hotel/motel properties, Project Homekey acquisitions are indicated by white dots.
County Subdivision-Level Analyses of the Distribution of Underutilized Commercial Real Estate

Figures E.5 through E.7 present similar analyses of the distribution of underutilized CRE overlaid on a map of Los Angeles County subdivisions.

Figure E.5. Distribution of Underutilized Real Estate at the County Subdivision Level, by Mean Travel Time to Work

Panel A. Hotel/Motel Properties
Panel B. Office Properties
Panel C. Retail Properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau LODES data.
Figure E.6. Distribution of Underutilized Real Estate at the County Subdivision Level, by Employment Density

Panel A. Hotel/Motel Properties
Panel B. Office Properties
Panel C. Retail Properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau NHGIS data.
Figure E.7. Distribution of Underutilized Real Estate at the County Subdivision Level, by Median Rent

Panel A. Hotel/Motel Properties
Panel B. Office Properties
Panel C. Retail Properties

SOURCES: CoStar, Los Angeles County and City Open Data Portals, and U.S. Census Bureau NHGIS data.
Appendix F. Consent Form and Semistructured Interview Prompts

Semistructured Interview Consent

Verbal Consent Language
The RAND Corporation, a non-profit policy research organization, is conducting a study to understand the potential for the adaptive reuse of underutilized commercial real estate into housing as an effective approach to address the shortage of affordable housing in the Los Angeles metro area. Funding for this work is provided by the Lowy RAND Center on Housing and Homelessness in Los Angeles.

As part of this effort, we are speaking with architects and developers about their professional experiences and expertise working on adaptive reuse projects.

Our discussion today will last approximately 45 minutes to one hour. Your participation is completely voluntary. Though we value your responses, you are free to end the interview at any time, without penalty. If any of our questions make you uncomfortable, please let us know and we can skip these.

We will be taking detailed notes during our interview today. Notes from this interview will not be made available to anyone but core researchers involved in the project. Summary information from this interview and others will be included in published reports and presentations and may include quotations, but we will only identify you in our research as a practitioner/expert in your field. Any direct quotations will only be attributed to you with your consent, which you may give or withhold after reviewing the draft materials for the report.

If you have questions about your rights as a research participant or need to report a research-related injury or concern, you can contact RAND’s Human Subjects Protection Committee, or the principal investigator for this study. I will share their contact information with you via email, text, or verbally, whichever you prefer.

[Information to be provided:
The RAND Human Subjects Protection Committee can be reached toll-free at (866) 697-5620 or by emailing hspscommittee@rand.org. When you contact the Committee, please reference Study #2021-N0019. You can also contact the principal investigator of this study, Jason Ward, at jward@rand.org.]

Do I have your permission to proceed with the interview?
[IF NO:] Thank you anyway.
[IF YES:] Thank you. Do you have any questions before we begin? [Answer any questions and then proceed to interview.]
Interview Protocol

For architects:

1. Can you start by telling me about your organization and your role within it?

2. Tell us about the characteristics of commercial properties that make them more or less suitable for adaptive reuse as housing.
   a. *Potential probes:* What types of building locations are ideal? What types of construction? What features including footprint, number of stories, plate depth, utility services, etc. are important to consider?

3. What characteristics of a building have the largest influence on costs associated with conversion to housing?
   a. *Potential probes:* Upgrading utility services both into and within the property? Meeting differing parking requirements? Delays or risk associated with seeking required zoning changes?

4. Are there any unique skills or experience required by workers and tradespeople on these projects relative to working on traditional new construction projects?

5. Are there any unique skills or expertise required by architects working on adaptive reuse projects?

6. What are the most significant legal or regulatory barriers to adaptive reuse?
   a. *Potential probes:* How much of an issue is the need for code variances related to nonconforming features of an existing building? How do these projects differ in the process of gaining approvals across state/municipal govt units?

7. What features would you recommend incorporating into an updated Adaptive Reuse ordinance for Los Angeles?

8. Can you tell us a story about the most rewarding and most challenging examples of adaptive reuse projects you have been involved in?

Is there anything else you think would be helpful for me to know about the potential for adaptive reuse to address the housing crisis in the Los Angeles region or any other information you consider to be relevant to what we’ve discussed?
For developers:

1. Can you start by telling me about your organization and your role within it?

2. What are the most significant legal or regulatory barriers to adaptive reuse?
   a. *Potential probes:* How common is uncertainty in allowable uses related to a parcel being located at the intersection of multiple zoning overlays?

3. What challenges in putting together funding are unique to adaptive reuse projects relative to new construction?
   a. *Potential probes:* Are traditional sources of funding like LIHTC credits available once rezoning has been secured? Are there any funding sources specific to this type of project?

4. What features would you recommend incorporating into an updated Adaptive Reuse ordinance for Los Angeles?

5. Can you tell us a story about the most rewarding and most challenging examples of adaptive reuse projects you have been involved in?

6. Is there anything else you think would be helpful for me to know about the potential for adaptive reuse to address the housing crisis in the Los Angeles region or any other information you consider to be relevant to what we’ve discussed?
### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AR</td>
<td>adaptive reuse</td>
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<tr>
<td>ARO</td>
<td>adaptive reuse ordinance</td>
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<tr>
<td>BRT</td>
<td>bus rapid transit</td>
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<tr>
<td>CCD</td>
<td>census county division</td>
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<tr>
<td>CPA</td>
<td>Community Plan Area</td>
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<tr>
<td>COVID-19</td>
<td>coronavirus disease 2019</td>
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<tr>
<td>CRE</td>
<td>commercial real estate</td>
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<tr>
<td>DTLA</td>
<td>Downtown Los Angeles</td>
</tr>
<tr>
<td>LA METRO</td>
<td>Los Angeles County Metropolitan Transit Authority</td>
</tr>
<tr>
<td>LIHTC</td>
<td>Low Income Housing Tax Credit</td>
</tr>
<tr>
<td>LODES</td>
<td>Longitudinal Employer-Household Dynamics Origin-Destination Survey</td>
</tr>
<tr>
<td>NDC</td>
<td>non-ductile concrete</td>
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<tr>
<td>NHGIS</td>
<td>National Historical Geographic Information System</td>
</tr>
<tr>
<td>NIMBY</td>
<td>not in my backyard</td>
</tr>
<tr>
<td>RBA</td>
<td>rentable building area</td>
</tr>
<tr>
<td>RHNA</td>
<td>Regional Housing Needs Assessment</td>
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