

Cambridge Incentive Zoning Ordinance Nexus Study

Final Report

to

**City of Cambridge
Community Development Department**

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Executive Summary

The City of Cambridge established an Incentive Zoning Ordinance in 1988 and amended it in 2015 to require non-residential development projects over 30,000 to make a housing contribution payment to mitigate impacts on the need for affordable housing. As part of the 2015 amendments, Cambridge undertakes a review to update housing contribution levels every three years. This report provides a nexus study to assist Cambridge in completing this update and conducts a nexus analysis related to establishing an employment contribution similar to the jobs linkage fees in Boston and Somerville. The report quantifies the impact of future non-residential development on the demand for affordable low, moderate, and middle-income housing in Cambridge and the need for training services to allow less skilled Cambridge residents to access jobs at these projects. It then analyses the proportionate housing contribution rate and employment contribution rate to mitigate these impacts. It also reviews the current Incentive Zoning Ordinance, several policy options and recommends a maximum determined rate for a new employment contribution along with changes to the City's current housing contribution rate and the Incentive Zoning Ordinance.

Housing Demand. Based on projected new development of 5,840,000 square feet over the next ten years and the likely mix of tenant businesses, 14,863 new jobs are estimated to be generated in Cambridge by this development. Information on the occupations and earnings of these new employees was combined with data on the distribution of households by size and number of workers as well as survey results on the share of employees who moved to or sought housing in Cambridge when they obtained a job in Cambridge to estimate the demand for new housing units by income level from projected new development and employment. This analysis projected the need for 722 new housing units to address this demand over the next ten years, including 200 low-income units, 267 moderate-income units and 255 middle-income units¹.

Development Costs and Needed Subsidy. A separate analysis of the development costs and needed subsidy for rental and homeownership units was conducted based on 251 ownership units and 471 rental units². Development costs were estimated based on costs for recent comparable affordable housing projects built in Cambridge. For rental projects, the needed subsidy was calculated as the difference between total development costs and the amount of debt and equity that could be supported by the housing cash flow using affordable rents at 30% of household income and comparable operating costs. For ownership projects, the needed subsidy was calculated as the difference between total development costs and the affordable purchase price based on home mortgage payments, insurance and property taxes at 30% of household income and a 5% down payment. The results of this analysis are:

- Total development costs of \$441.4 million; and

¹ A low-income unit is for a household with income at or less than 50% of the Boston area median income (AMI), a moderate-income unit is for a household between 50% and 80% of Boston AMI and a middle-income unit is for a household between 80% and 100% of Boston AMI.

² This mix is based on all of the low-income units developed as rental units, 70% of moderate-income units built as rental and 30% ownership, and middle-income units divided 50/50 between rental and ownership housing.

- Total needed subsidy of \$322.8 million with \$241.7 million needed for the low and moderate-income units and \$81.1 million for the middle-income units.

The housing contribution rate needed to provide the full \$241.7 million in subsidy is \$55.27 per square foot on new non-residential development. However, low and moderate-income housing development leverages public subsidies from federal and state sources in addition to those provided by Cambridge. Since the Cambridge Affordable Housing Trust has provided 43% of the public subsidy in recent affordable rental projects and 67% of the subsidy for one recent affordable ownership project, it is appropriate to use these shares to determine the needed subsidy for low and moderate-income units used to calculate the housing contribution rate. Middle-income ownership units do not qualify for these subsidies so the city's housing trust has to cover the full subsidy for these units. Any available state subsidy was applied for middle-income rental housing. The resulting maximum determined housing contribution rate is \$33.34 per square foot, with \$20.90 needed to build low and moderate-income units and \$12.44 needed for the middle-income units.

Resident Employment and Employment Contributions. Large non-residential development projects are expected to generate 5,932 low- and middle-skill jobs accessible to low-income and moderate-income Cambridge residents. Depending on the city's policy goal for resident employment, this development will generate demand for occupation training that ranges from 593 training slots to reach a goal of filling 10% of the jobs at new development projects with city residents to 2,966 training slots for a goal of preparing city residents to fill 50% of these jobs. Existing skills training programs have existing resource to train 1,080 to 1,300 Cambridge residents for these jobs over a ten-year period. This results in a funding gap, or needed subsidy, of \$4.8 to \$12.8 million based on resident employment goals between 30% and 50%. The resulting maximum determined employment contribution ranges from \$.82 to \$2.20 per square foot of new non-residential development.

Impact on Competitiveness. An important consideration for Cambridge in establishing the housing and employment contribution rates is their potential impact on attracting new development and tenants. This is particularly important since the combined maximum determined rate of \$35.54 per square foot (\$33.54 for housing and \$2.20 for employment) is more than twice the current rate of \$17.10, more than three times the combined housing and jobs linkage fee in Boston (\$10.81) and almost three times Somerville's combined \$12.46 linkage fee. If the maximum determined rate is fully passed on as increased tenant rents, it is estimated to add \$2.22 per square foot to Cambridge rents, assuming the added cost is spread over a ten-year lease. This \$2.22 rent increase would raise the current rent differential for Class A office space between West Cambridge and the 128/West market area by 11% and raise the rent differential for Class A office space between East Cambridge and Boston's Seaport District from \$17.28 to \$19.50 per square foot. If the increased cost of housing and employment contributions are fully borne by investors, their estimated impact on investment returns ranges from a reduction by .45% to a drop by 1.46%, depending on project total development costs and the expected return on equity prior to the rate changes. Cambridge also needs to consider the impact of a large increase in the housing contribution rate and a new employment contribution when they are

combined with other fees and contributions required or negotiated for public realm improvements and to further other public purposes.

Recommendations. In recognition of the potential impact that adoption of the maximum determined contribution rate could have on Cambridge's regional competitiveness, we recommend that Cambridge increase the current housing contribution rate by \$6 over a five year period beginning with a \$2 increase in 2020 and annual increases of \$1 in the following four years. This increase represents a 35% increase from the current rate of \$17.10 per gross square foot and will have a modest impact on development costs and rents that is feasible to absorb under current commercial market conditions in Cambridge. Annual CPI increases would continue as now required in the Incentive Zoning Ordinance. Additional recommendations include maintaining a single citywide housing contribution rate and increasing the time period for regular reviews of the Incentive Zoning policies from three to five years.

It is recommended that Cambridge not adopt a new employment contribution but instead use annual city appropriations to address the funding needed to prepare unemployed and lower skilled city residents for jobs created at new development projects. This will allow Cambridge to more quickly respond to this need while focusing development contributions on addressing the much larger funding gap needed to mitigate affordable housing impacts.

Introduction

The City of Cambridge established an Incentive Zoning Ordinance (IZO) in 1988 through which developers seeking special permits to increase the density or intensity of use of their development above what is otherwise permitted are required to make a housing contribution in return for such permits. Based on a 2015 nexus study, Cambridge amended the IZO to require housing contributions for non-residential development projects over 30,000 square feet independent of any zoning changes or special permit needs. The 2015 IZO amendment also requires Cambridge to undertake a review and update the housing contribution rate within three years of a prior rate change by the City Council. This nexus study was commissioned to address this requirement by analyzing how recent changes in Cambridge's commercial development and housing market conditions have affected the impact of new non-residential development on need for affordable housing and the proportionate housing contribution rate to mitigate these impacts. Additionally, this study analyzes the nexus between new development and employment and training services to connect Cambridge residents with employment opportunities at new development projects. Based on this nexus, it determines a maximum determined employment contribution rate to address this need.

The report presents its analysis and recommendations in six sections. The first section presents a likely development scenario for Cambridge over the next decade, based on its development capacity, planned projects and economic and market conditions. The scale and type of future development has a direct relationship to the number and type of new jobs created by non-residential development in Cambridge, which drives new demand for low, moderate, and middle-income housing³. In the second section, the job composition from the ten-year development scenario is converted into specific demand for affordable housing units based on the share of employees who will seek housing in Cambridge and the likely distribution of household income among these employees. Next, data on housing market conditions and development costs are applied to determine the housing contribution level needed to fund the additional affordable and middle-income housing required to address the demand generated by new development projects. The fourth section estimates the demand for low- and middle-skill jobs from the projected non-residential development and compares it to the supply and cost of existing employment and training services to determine the maximum determined employment contribution over several resident employment goals. A fifth section reviews the impact of the 2015 IZO amendments on housing contribution revenue, considers several policy options for changes to the Incentive Zoning Ordinance and assesses the impact of the combined maximum determined housing contribution and employment contribution rate on the city's competitive position in attracting new development and businesses. The final section presents recommendations for changes to the Cambridge's housing contribution rate, employment contributions and other incentive zoning policies.

³ A low-income household has an annual income at 50% or less of the Boston area median income (AMI), a moderate-income household has annual income between 50% and 80% of Boston AMI and a middle-income household has annual income between 80% and 100% of Boston AMI.

Cambridge Development Potential and Future Development

Cambridge experienced considerable new development over the past decade, heavily fueled by strong growth in technology firms, particularly research and development lab space for the life sciences sector. Institutional growth also contributed to the city’s development along with modest increases in hotels and ground floor retail uses. Table 1 summarizes non-residential development by use in Cambridge from 2009 through 2018 along with projects at the construction stage (defined as having building permit) and those permitted for future development but not yet ready for construction, as December 31, 2018.

**Table 1. Gross Floor Area for Cambridge Non-Residential Development
Projects Over 30,000 Square Feet
Completed from 2009 to 2018 and Permitted December 2018**

Development Type	Completed 2009 to 2018	Percent of Completed	Construction (Building Permit)	Permitted, Pre-Construction	Percent of Construction and Permitted
Hotel	214,629	3.3%	32,485	0	0.5%
Retail	188,992	2.9%	97,806	180,304	4.7%
Institutional	1,758,856	26.9%	633,892	175,251	13.6%
Office/R&D	4,336,043	66.9%	1,633,097	3,130,194	79.9%
Other Commercial	0	0.0%	0	75,000	1.3%
Total Non-Residential	6,528,520	100.0%	2,397,280	3,560,749	100.0%

Source: City of Cambridge Development Log, December 2018

In the past decade, 94% of the city’s new non-residential development in projects over 30,000 square feet occurred in two categories, institutional and office/R&D space. However, the amount of office/R&D was two and a half times that of new institutional development. Retail and hotel space accounted for the balance of new development, each accounting for 3% of new non-residential space. Based on data from the real estate firm Colliers that separately tracks office and laboratory space (see Table 2), the bulk of new office/R&D development over the past decade was laboratory space. Based on Colliers data, the supply of Cambridge office and laboratory space increased by 3.7 million square feet from 2008 to third quarter 2018 with almost 2.9 million square feet, or 79%, comprising lab space.

Cambridge is likely to experience considerable new development over the next decade based on the projects already permitted for development. New development in the next decade will continue to be concentrated in private office/R&D development with a reduced pace of institutional growth and modest retail and hotel space. As Table 1 shows, almost 6 million square feet of new space is permitted for development, with 79.9% private office/research and development space, 13.6% institutional space, and 5.2% retail and hotel space. Since most of the permitted institutional development is for student housing, private development represents an even greater share of non-residential development projects.

Table 2. Cambridge Non-Owner Occupied Office and Lab Space, 2008 to 2018

Year	Office Space Supply (Square Feet)	Laboratory Space (Supply)	Total
2008	10,191,593	9,238,729	19,430,322
2009	10,191,593	9,506,054	19,697,647
2010	10,110,992	9,584,766	19,695,758
2011	10,310,992	9,351,456	19,662,448
2012	10,333,992	9,359,512	19,693,504
2013	10,910,006	9,601,398	20,511,404
2014	11,223,930	9,814,533	21,038,463
2015	11,371,893	10,659,033	22,030,926
2016	11,248,893	11,157,388	22,406,281
2017	11,133,893	11,711,038	22,844,931
2018 3 Quarter	11,013,883	12,136,548	23,150,431
10 Year Change	822,290	2,897,819	3,720,109

Source: Colliers International

Additional non-residential projects are in the planning stage and not yet permitted that may generate additional development. New zoning in place for redevelopment of the Volpe site in Kendall Square allows for 1.7 million square feet of commercial space. Early plans for reuse of the Cambridge Galleria and other sites near Kendall Square anticipate close to 1 million square feet of commercial space while MIT is planning three new academic building projects that will total close to 400,000 square feet, which does not include plans for the Volpe site .

Market Demand and Absorption

New employment and the resulting demand for housing will depend on the actual absorption of new real estate space by new and expanding employers and the city’s success in attracting business growth within the region. Within the Boston metropolitan area, Cambridge is a highly desirable business location with strong market demand and premium rents, especially in Kendall Square and the surrounding East Cambridge area. Its proximity to MIT, Harvard University and area research hospitals and institutes has made it one of the top locations for research and development facilities for major pharmaceutical companies and biotechnology firms. A recent article noted that 16 of the top 20 pharmaceutical companies have a strong presence in the Greater Boston market⁴, with many in Cambridge. Both expansions of existing firms, such as Sanofi Genzyme and new relocations to Cambridge, e.g., Phillips Healthcare, are fueling the growth in lab space development. Cambridge is also a highly desirable location for large internet and information technology companies, with many of the major firms leasing space in Kendall Square. Most recently, Google announced a major expansion of its presence in Kendall Square with its lease for 362,000 square feet in the new building at 325 Main Street, potentially doubling its workforce in the city from 1,500 to 3,000⁵. Cambridge’s strong market position is

⁴ “Greater Boston Needed Economic Toolkit And Regional Approach To Become The World’s Life Science Hub,” Cameron Sperance, *Bisnow Boston*, March 26, 2019.

⁵ “It’s official: Google will occupy a new tower in Kendall Square,” Tim Logan, *Boston Globe*, February 13, 2019

demonstrated by extremely low vacancy rates (see Table 3) and the region’s highest rents, which averaged almost \$81 for Class A offices and \$85 for lab space in the first quarter of 2019⁶.

Table 3. Real Estate Absorption and Supply in Cambridge 2008 to 2018

Market Indicator	Cambridge
Average Annual Net Absorption, Office Space*	108,323
Average Annual Net Absorption, Lab Space*	347,976
Available Office Space 2018, 3 rd Quarter	587,485
Available Lab Space 2018, 3 rd Quarter	116,977
Total Supply Office Space, 2018, 3 rd Quarter	11,013,883
Total Supply, Lab Space, 2018, 3 rd Quarter	12,136,548
Vacancy Rate, Available Office Space, 2018, 3 rd Quarter	5.3%
Vacancy Rate, Available Lab Space, 2018, 3 rd Quarter	1.0%

Source: Colliers International Real Estate Market Data * 2008 to 2017

Market absorption of space in the recent past also informs the likely scale of new development and employment growth over the next decade for the non-institutional portion of the Cambridge economy. Table 3 summarizes average absorption and other market indicators for office and laboratory space in Cambridge. Based on data from Colliers International, average net absorption of new commercial space in Cambridge in the past decade averaged 456,300 square feet, as follows:

- Net absorption of office space averaged 108,323 square feet from 2008 through 2017;
- For lab space, net absorption averaged 347,976 from 2008 through 2017—over three times that of office space, with 91% occurring in East Cambridge.
- Office space absorption was negative for 2016 and 2017 by 160,000 and 180,000 respectively and is barely positive by just over 5,000 for through the third quarter of 2018
- Lab space absorption has been very strong since 2014, peaking at 1.36 million square feet in 2015 and reaching almost 600,000 square feet in 2016, 2017 and through three quarters of 2018.
- Available office and lab space was very low as of 3rd quarter 2018. The vacancy rate for office space was 5.3% while only 1% of lab space was available to lease—both rates are the lowest rates dating back to 2004.

Several factors indicate that the pace of new office/laboratory development over the next ten years is likely to exceed that of the prior ten years. First, the current inventory of available office and laboratory space is extremely low, at 5% and 1%, respectively. This situation indicates the high level of demand and means the new development will be necessary to address further demand. Furthermore, the type of firms seeking to locate in Cambridge is expanding beyond life science and IT firms to other large firms, such as Boeing, looking to have a research and development presence in Cambridge. Second, Cambridge has a large pipeline of permitted projects with allow for almost 4 million square feet of new office and laboratory space. These projects, without the permitting of any new office or laboratory development, equals the amount

⁶ Lincoln Property Company, *Cambridge Office & Lab Market Report, First Quarter 2019*

of space completed from 2008 through the 3rd quarter of 2018. Moreover, the dynamics of technology cluster development is accelerating growth in existing agglomerations as existing firms seek to collocate in cities with a large supply of talent, research centers and supporting/supplier industries. Furthermore, the large concentration of firms, research centers and talent generates a large number of new start-up and spinoff enterprises. Cambridge has benefited from this self-reinforcing innovation ecosystem in the recent decades and it is very likely to continue over the next decade⁷.

Interviews with developers and real estate professionals confirmed the strong market demand for office and lab space in Cambridge. They report that demand for space has grown in recent years, especially of office space, as more information technology and large corporations are looking to locate in Cambridge. Firms are seeking proximity to universities and research institutes and the supply of a very talented and innovative labor force, many of whom want to live near where they work. Interviewees reported that the market is now more balanced between demand for office space and life science lab space- a change from earlier emphasis on lab space development. The development community expects the market demand for office and lab space in Cambridge to remain strong but sees the limited supply of land for new development as a key constraint to future development. They point to the limited supply of space as a factor that is forcing companies to look at alternative locations.

Some factors could slow future development in Cambridge. The high rents in Cambridge may cause some firms to move to or locate at lower cost competing locations in Boston, Somerville or nearby suburbs. Boston's Seaport innovation district is attracting life science and biotech firms while planned new developments in Union and Assembly Square are looking to draw technology firms away from Cambridge. Developers also noted that some firms do chose to locate at far less costly options in suburbs along I-95. While these competitors have not slowed Cambridge development to date, they may be more successful in the future if rent differentials between Cambridge and other locations increase. A second risk is that a recession may result in a sustained decline or stalled growth in the development market. With over ten years of sustained growth without a recession, there is a high likelihood that a national economic recession will occur over the next ten years. Finally, as noted above the limited availability of land for new development was cited as a growth constraint by several developers. Given the current level of permitted development and sites in the planning phase for reuse or redevelopment, this constraint seems unlikely to slow the pace of non-residential development in the next ten years

Future Institutional Development Plans

Although Cambridge experienced 1.7 million square feet of new institutional development over the past decade, non-residential institutional expansion over the next decade is expected to be far less. Most of the permitted institutional development projects are for student housing. Based on a review of the most recent Town/Gown report and interviews with university planning staff, neither Harvard nor Lesley University have current plans for new buildings or major expansion

⁷ *Greater Boston's Economy and the Entrepreneurial Age*, Rapport Institute for Greater Boston, February 2014 discusses Cambridge's role in the Boston region's technology economic and the factors shaping its success.

projects for their institutional needs. These two universities are focused on upgrades and improvements to existing buildings over the foreseeable future. MIT, on the other hand, has three new building projects that are in the planning stages:

- A new building for the Schwartzman College of Computing
- Renovation of the Metropolitan Warehouse Building for the School of Architecture and Planning; and
- A new music building.

While the exact size of these three projects is not yet known, their combined scale is expected to be in the range of 400,000 to 450,000 square feet.

Future Development and Employment Projection

Based on its strong market position, pipeline of permitted development and rate of absorption and new development over the past ten years, **Cambridge is projected to absorb and spur new development of 5 million square feet in office and laboratory space over the next ten years.**

This estimate assumes the Cambridge will have eight years of robust development of office and lab space reflecting the recent level of absorption from 2010 to 2017 of 640,000 square feet per year plus a two-year pause in development due to recession. Institutional development over the next ten years assumes completion of MIT’s three projects plus another 100,000 square feet for one or two new projects that may emerge in several years. New ground floor retail development is projected at 4% of office/research and development space—close to the level for the past ten years, reflecting the increased level of office and lab development and three new small hotel projects (one of which is now permitted) supported by the increased business, education and research activity, and its continued role as a regional visitor destination.

The components of projected new development in Cambridge over the next decade include:

- 5 million square feet of office and research and development laboratory space;
- 520,000 square feet of new institutional development;
- 200,000 square feet of retail and restaurant space; and
- 120,000 square feet for three new hotel developments.

Table 4. Summary of Expected Development, 10 Year Period

Type of Use	Projected Square Feet of Development
Office and R&D Lab Space	5,000,000
Institutional Space	520,000
Retail and Restaurant	200,000
Hotel	120,000
Total	5,840,000

Source: Karl F. Seidman Consulting Services

Expected Tenant Businesses

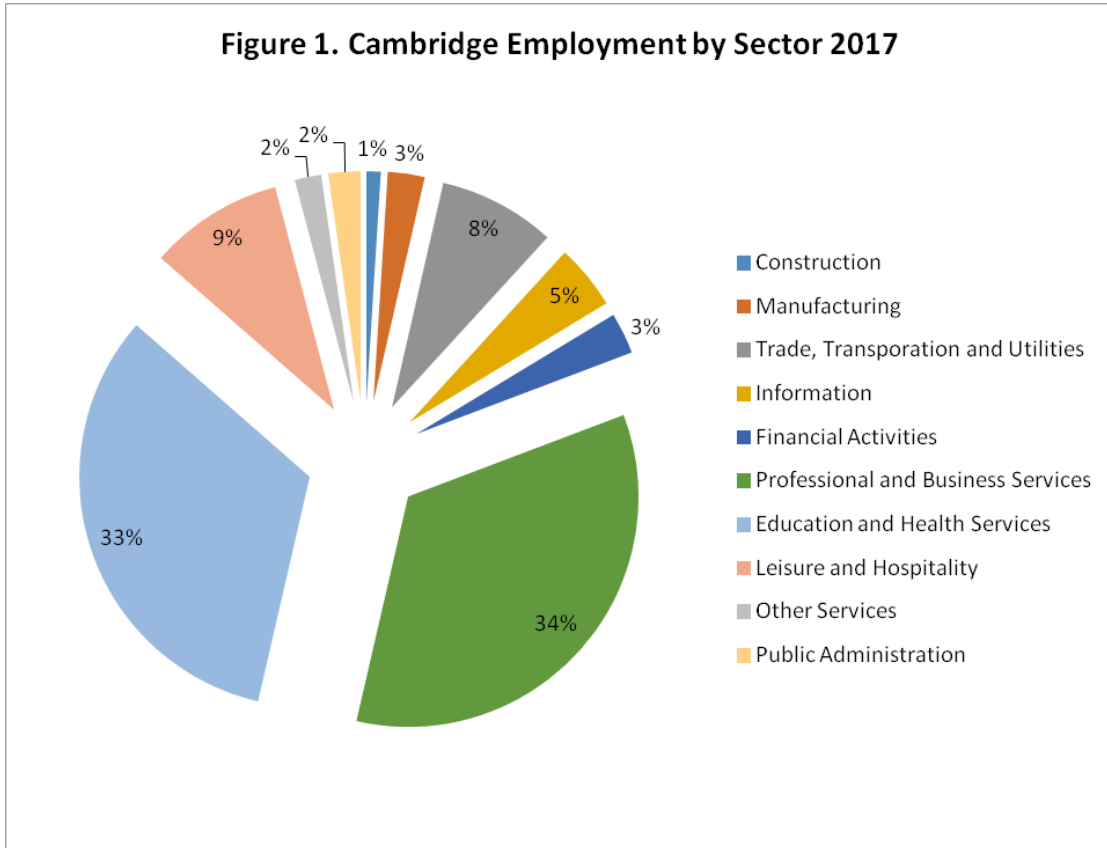
To determine the likely jobs and earnings from this new development, the industries likely to occupy the new space need to be projected. Given Cambridge's unique position as a research, life sciences and high technology center, new tenants are likely to reflect growth trends within Cambridge itself, rather than the diversified industry mix within the Boston region or the adjacent Metro North and Boston real estate markets.

Since housing contributions under the Incentive Zoning Ordinance are tied to **new development**, this analysis focus on the scale and type of new business and employment growth, which will differ from Cambridge's overall or net job growth. Cambridge has experienced decline in some parts of the economy, especially Manufacturing but also Trade Transportation and Utilities and Other Services which offsets growth in other sectors to yield overall net employment change. Since the growing sectors require different facilities, have different workforce needs and provide the basis for new development, it is Cambridge's growth industries and resulting employment that will generate a need for job training services and associated employment contributions to fund these services along with new housing demand that constitutes the nexus for the housing contributions to address this demand.

Existing Employment Base

As shown in Figure 1, Cambridge employment in 2017 (the last full year for which city employment data is available) was concentrated in Health and Education Services and Professional and Business Services, which combined to provide two-thirds of the city's 124,210 jobs. The two next largest sectors, with 9% and 8% of city employment, respectively, were Leisure and Hospitality (with hotels, restaurants and drinking establishments accounting for 90% of these jobs) and Trade, Transportation and Utilities (retailers are the biggest segment at 55% of this sector's jobs).

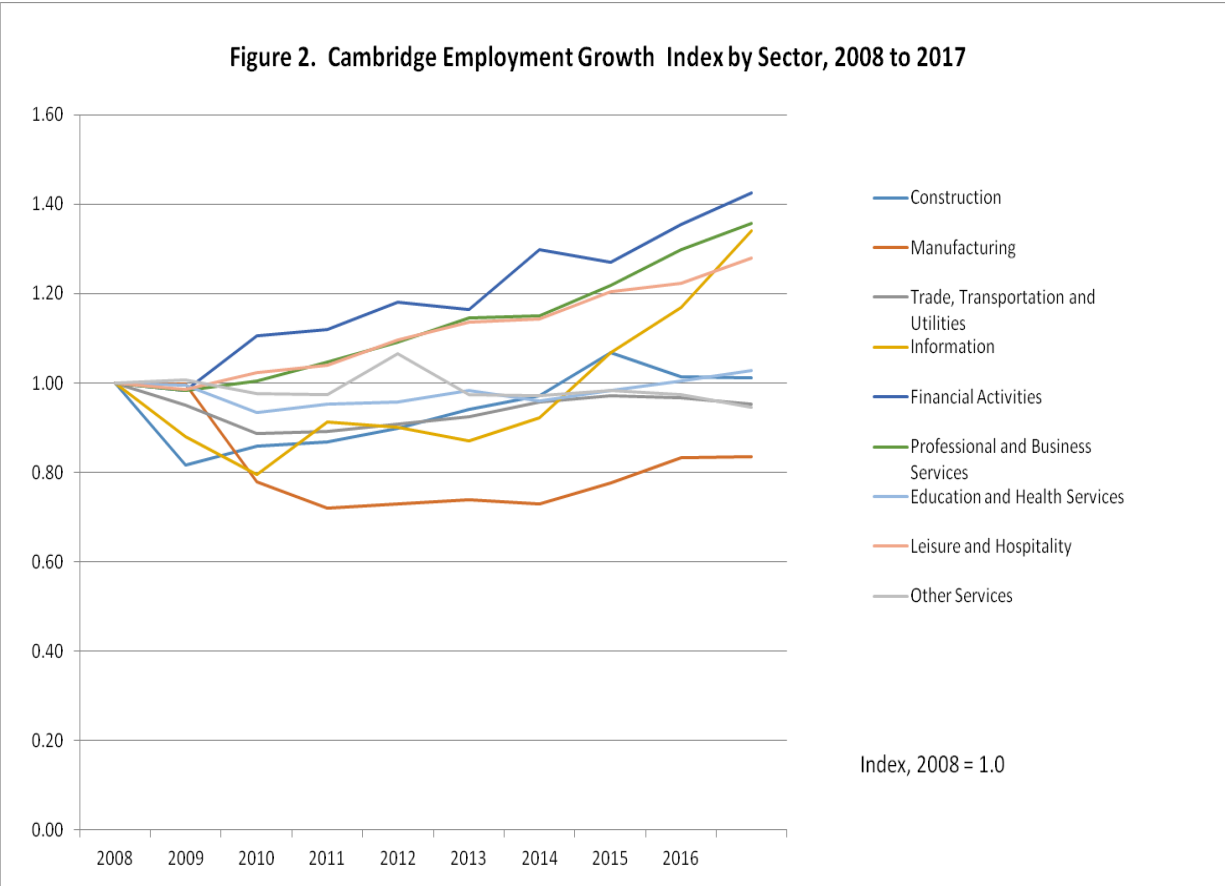
Not surprisingly, Colleges and Universities constituted the bulk of employment within Education and Health Services, with 28,600 jobs in 2017, or 61% of the entire sector. For Business and Professional Services, the largest sub-sector was Scientific Research and Development (which includes biotech and life sciences research) which employed 21,383 people in 2017, just over half of the sector's 42,676 jobs. Computer Systems Design and Related Services was the next largest component, with employment of 9,763.



Source: Massachusetts Department of Labor and Workforce Development ES-202 Data Series

Growth Industries

Cambridge’s recent employment growth is a better indicator of the likely industry composition of new development than its overall employment base. An employment index that tracks growth by major sector from 2008 to 2017 is presented in Figure 2. Job growth occurred in five sectors: Information, Financial Activities, Professional and Business Services, Education and Health Services and Leisure and Hospitality. Construction had stable employment over this period, while jobs declined for the other three sectors, with the steepest decline for Manufacturing.



Since sector level data combines patterns across many component industries, more detailed industry level data was examined to identify industries with the largest job gains from 2008 to 2017. Table 5 presents absolute job growth from 2008 to 2017 for expanding Cambridge industries that added at least 500 jobs during this period. Ten industries meet this criterion and combined to add 21,085 jobs. Scientific Research and Development Services accounted for 31.9% of these new jobs, followed by Computer Systems Design and Related Services at 25.4%. Two other information technology industries, Software Publishers and Other Information Services, contributed another 15.5% of new jobs from the city’s high growth industries. These data confirm recent development patterns and what real estate developers reported: Cambridge’s growth is driven by expanding research and development and IT-related businesses. Individual and Family Services and Restaurants and Other Eating Places also demonstrated considerable growth adding 1,097 jobs and 2,401 jobs, respectively. Another four other industries across diverse sectors each added between 673 and 888 jobs during this recent ten year period.

**Table 5. Cambridge Job Growth, 2008 to 2017
Industries Adding at least 500 Jobs**

Industry	Job Growth	Percent of Total
Scientific Research and Development Services	6,736	31.9%
Computer Systems Design and Related Services	5,346	25.4%
Restaurants and Other Eating Places	2,407	5.2%
Other Information Services	1,652	11.4%
Social Assistance	1,097	7.8%
Employment Services	888	4.2%
Software Publishers	854	4.1%
Insurance Carriers & Related Activities	743	3.5%
Other Schools and Instruction	689	3.3%
Druggists' Goods Merchant Wholesalers	673	3.2%
Total	21,085	100.0%

Source: Massachusetts Department of Labor and Workforce Development ES-202 Data Series

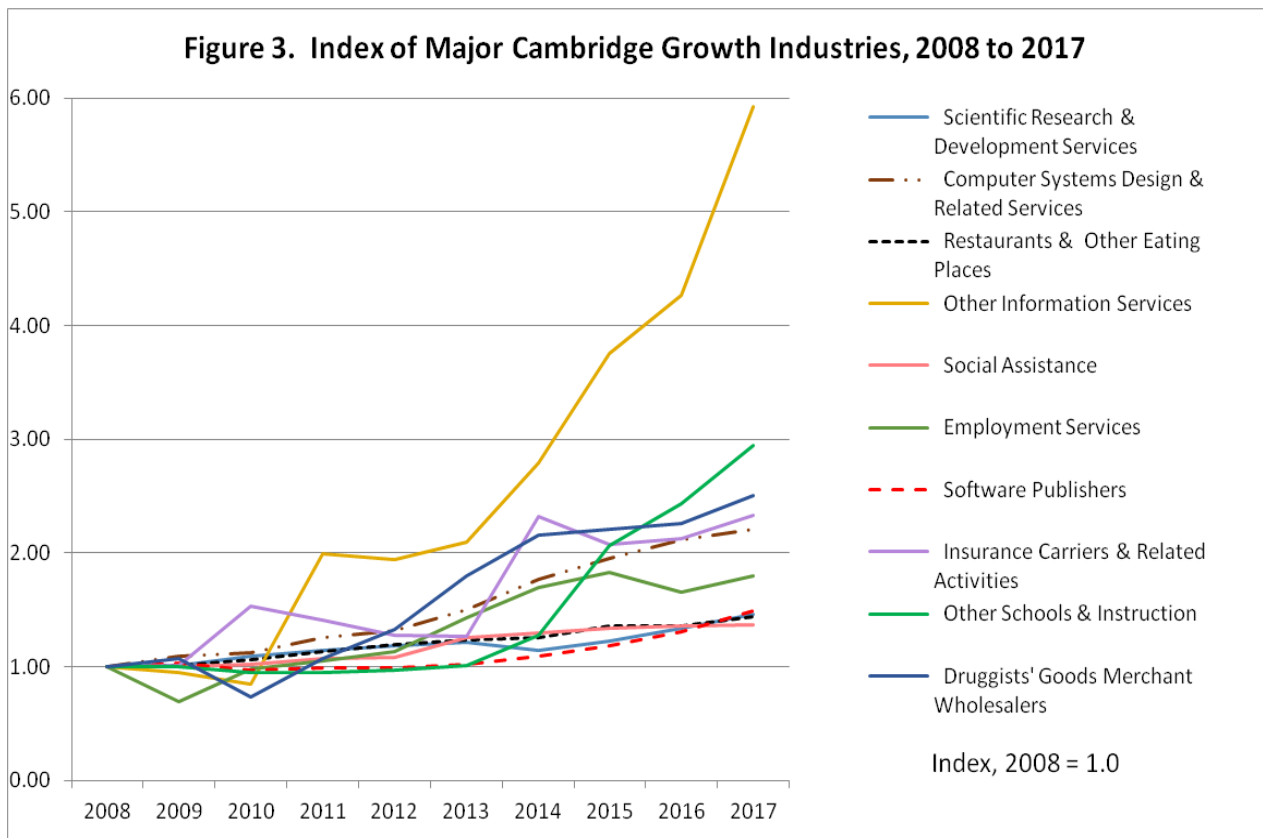


Figure 3 shows percentage, rather than absolute growth, among Cambridge’s ten growth industries using an employment index. Other Information Services grew at the highest rate over twice that of any other industry, with particularly steep growth since 2013. However, this result reflects the industry’s low initial employment of 335 jobs in 2008. Several other industries that

started with modest employment in 2008 more than doubled their size over the ten year period including Insurance Carriers and Related Activities, Other Schools and Instruction and Druggist Goods Merchant Wholesalers. Computer Systems Design also more than doubled its employment from 4,417 to 9,763 with fairly steady growth from 2010 through 2017.

Based on Cambridge's market position, growth trends and developer plans, the distribution of tenants for the 5 million square feet of new office and lab development over the next decade is expected to be:

- Scientific Research and Development (including biotechnology) 50%
- Computer Systems Design and Related Services 25%
- Other Information Services 8%
- Software Publishers 3%
- Individual and Family Services 4%
- Employment Services 2%
- Real Estate 2%
- Other Professional and Technical Services 2%
- Doctor's Offices and Ambulatory Health Services 2%
- Other Schools and Instruction 2%

The first four industries are large and growing industries that are driving much of the demand for new space and willing to pay the higher rents associated with new development. Consequently, they are projected to account for 86% of new office and research and development space. The balance is divided among 6 industries, each of which has been growing in Cambridge over the past decade.

Retail Tenants

The projections for new ground floor retail space are based on planned projects, employment trends and recent leasing activity in Cambridge. A large share, or 60%, of new ground floor retail space is expected to be occupied by restaurants, consistent with the current leasing activity in Cambridge. The remaining 80,000 square feet, is projected to be occupied by a mix of retail stores and services including one pharmacy (10,000 square feet), specialty food, liquor and convenience stores (10,000), a day care center (10,000), real estate and insurance offices (20,000), clothing stores (10,000), general merchandise stores (10,000), and bank branches (10,000).

Table 6 summarizes the overall projected development by use, tenant type and employment over the next ten years. These projections will be used to estimate occupations and wage levels for new employees working in the expected new buildings. Employment projections assume one new employee per 325 square feet of office users, 500 square feet per employee for research and development tenants, 500 square feet per employee for retail, bank and day care tenants: and one

employee per 125 square feet for restaurants⁸. Hotel employment is projected at one employee per 1,000 square feet which assumes a mid-price full service hotel and is consistent with existing patterns in Cambridge. One employee per 600 square feet is used for institutional space, reflecting the presence of classroom and other community and shared spaces.

Table 6. Projected New Cambridge Development by Use and Tenant Type, 2020 to 2029

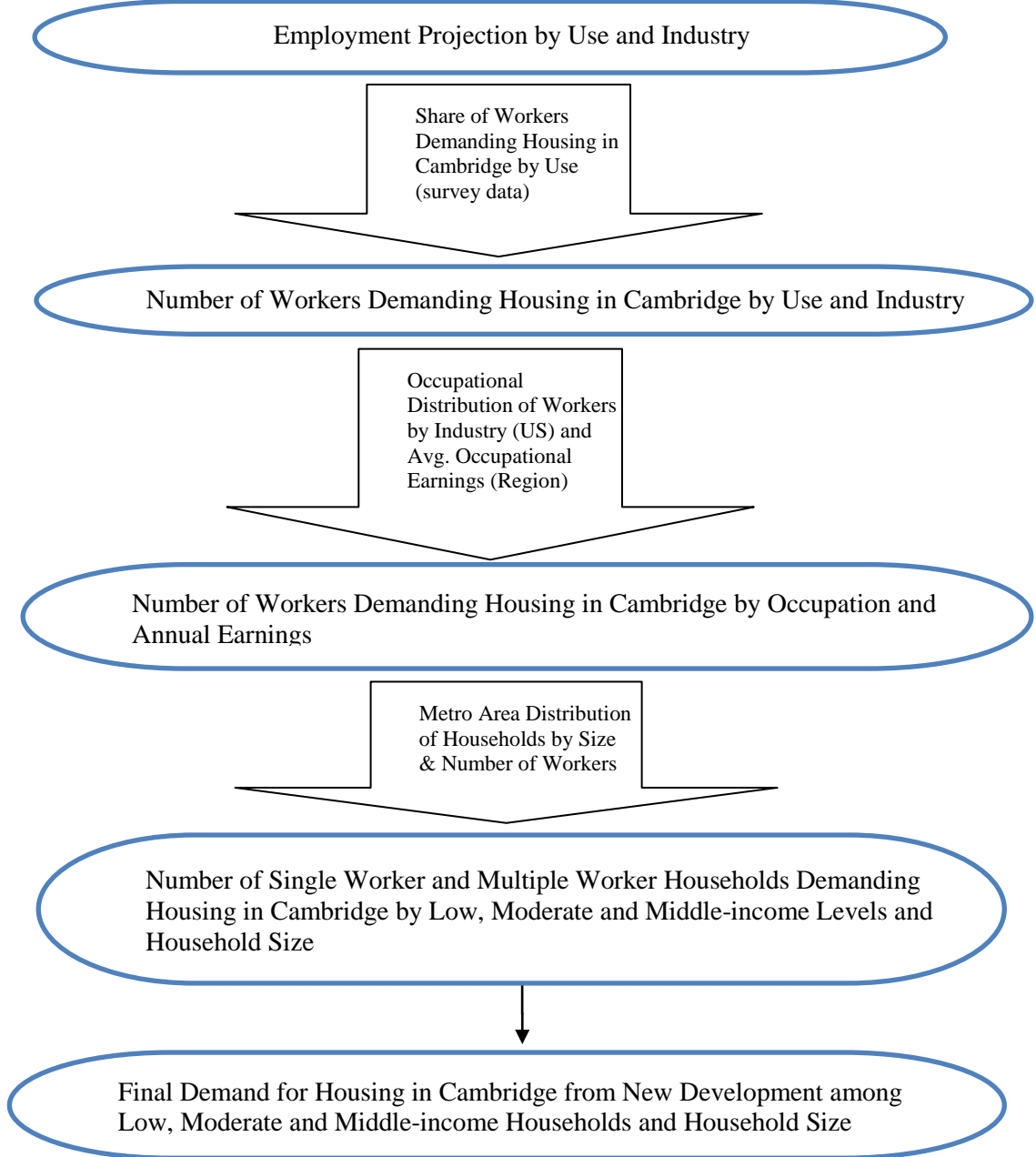
Use/Tenant Type	Projected Square Feet	Estimated New Employment
Office/Lab: Scientific Research and Development Services	2,500,000	5,000
Office/Lab: Computer Systems Design and Related Services	1,250,000	3,846
Office: Individual and Family Services	200,000	615
Office: Other Information Services	400,000	1,231
Office: Employment Services	100,000	308
Office: Software Publishers	150,000	462
Office: Other Schools and Instruction	100,000	308
Office: Doctor's Offices	100,000	308
Office: Real Estate Activities	100,000	308
Office: Other Professional & Technical Services	100,000	308
Retail: Food and Beverage Stores	10,000	20
Retail: Pharmacy	10,000	20
Retail: General Merchandise	10,000	20
Retail: Clothing Stores	10,000	20
Day Care Center	10,000	20
Bank branches	10,000	20
Real estate offices	10,000	31
Insurance Agencies, Brokerage and Support	10,000	31
Restaurants	120,000	1,000
Institutions/Universities	520,000	867
Hotel	120,000	120
Total	5,840,000	14,863

⁸ These figures reflect existing ratios among employers obtained from transportation planning surveys.

Impact of Large Scale Development on Affordable Housing Demand

Using the 10-year development scenario and employment projections summarized in Table 6, this section forecasts the demand for affordable housing in Cambridge that will result from this development. Since this analysis utilizes several data sources and assumptions to prepare the forecast, a full explanation of the methodology used is provided along with the results. Figure 4 provides an overview of the analytical steps and data sources for the housing demand projections.

Figure 4. Methodology and Data Sources for Housing Demand Analysis



Since demand for affordable housing is tied to household income, the first step projects the distribution of new jobs by earnings. Using 2016 national data for the occupational distribution by industry, the number of new jobs in 22 occupational categories was calculated for each of the 21 industries expected to occupy new development. Earnings were then estimated for these occupations were based on the median annual earnings for the respective occupation in May 2017 for the Metro North Workforce Development adjusted for inflation by the Boston region Consumer Price Index to estimate earnings as of January 2019. These calculations yielded the projected number of jobs at different annual earning levels by occupation and industry.

Since new employees will live in a variety of communities, it is necessary to determine the share that will demand housing in Cambridge. To estimate the percent of new employees who will demand housing within the city, the results from a survey of employees in office, laboratory institutional, hotel and retail buildings conducted in fall 2014 were used. This survey measured demand by asking employees whether, as a result of obtaining a job in Cambridge, they either moved to the city or sought housing in Cambridge but did not move due to housing costs. Based on the survey results⁹, the percentage of new employees who are expected to demand housing in Cambridge is 11.3% for employees in research and development firms, 13.3% for office workers, 26.5% for employees at educational institutions and 12.3% for retail, restaurant and hotel employees. These percentages were multiplied by the gross number of new jobs in each industry to estimate the number of new workers who will demand housing in Cambridge. The occupational distributional for each industry was then applied to the number of workers in that industry who were expected to seek Cambridge housing to estimate their earnings distribution.

Table 7. Distribution of Annual Earnings for Expected Jobs among New Employees Demanding Housing in Cambridge from New Development by Use and Earnings Level

Tenant Use/Industry	Gross New Jobs	Number Demanding Cambridge Housing	No. with Earnings below 50% AMI*	No. with Earnings below 50 to 80% AMI*	No. with Earning 80 to 100% AMI*	Total with Earnings Below 100% AMI*	No. With Earning at 100% AMI or Above*
Research and Development	5,000	565	15	77	15	107	458
Office—IT Related	5,539	737	59	89	39	187	549
Office-Other	2,155	287	84	98	38	220	65
Institutional	867	230	9	58	106	173	59
Retail and Personal Services	182	20	8	9	0	17	2
Restaurants	1,000	123	115	5	0	120	4
Hotel	120	15	5	9	0	14	1
Total	14,863	1,977	295	345	198	838	1138

*Income level for annual earnings from one employee; Totals may not agree due to rounding.

⁹ 1,318 surveys response were received, 29% from research and development firms, 23% from office tenants, 34% from institutions, and 14% from employees at retailers, restaurants and hotels.

To provide a picture of the resulting earning distribution, Table 7 summarizes this data by income category based on a single person household. These figures are not the same as the number of households that will demand housing in each category for two reasons: (1) many households will be larger and thus a higher income threshold will determine if they are low-, moderate- or middle-income; and (2) households with two workers will have higher incomes that reflect the earnings of both workers.

The next step to project demand for affordable housing units among the 1,977 employees who are expected to seek housing in Cambridge requires considering their household type in terms of the number of wage-earners and the household size. Since the employees in Cambridge’s new developments will be drawn from the greater Boston area, the most recent (2013 to 2017) American Community Survey data for the Boston Metropolitan Area¹⁰ on the distribution of households by number of earners and household size were used to estimate the type of households for these employees. Workers in each occupation expected to demand housing in Cambridge were first divided into one-, two-, three- and four-or-more-person households based on the metro area distribution¹¹. Then each household size group was divided into one-, two- and three-worker households, using the American Community Survey metro area percentages (see Table 8).

**Table 8. Household Size by Number of Wage-Earners,
Boston-Cambridge Nashua MA-NH NECTA**

Number or Workers	One Worker	Two Workers	Three Workers	Total
One Person Household	100.0%	0.0%	0.0%	100.0%
Two Person Household	41.7%	58.3%	0.0%	100.0%
Three Person Household	31.7%	47.9%	20.4%	100.0%
Four or More Person Household	26.1%	47.0%	26.9%	100.0%

Source: US Census 2013 to 2017 American Community Survey

For the single-earner households, the median wage for the occupation was used to estimate their household income and determine if they fell below the low-income, moderate-income and middle-income thresholds for their respective household size. Among the single earner households who are expected to demand Cambridge housing, 200 are estimated to be low-income (less than 50% of area median income), 210 are projected to be moderate-income (between 50% and 80% of area median income) and 168 are estimated as middle-income (80% to 100% of area median income) for a total demand of 578 affordable housing units. Projecting affordable housing demand among multiple-earner households required estimating the earnings from other wage earners. To simplify this analysis, it was assumed that the second worker’s earnings equaled the median annual wage for all occupations in the Metro North Workforce Area, which was \$58,042 adjusted for inflation to January 2019. This resulted in an additional 144 dual worker households from new development that will demand housing in Cambridge, 57

¹⁰ The formal name for this geographic area is the Boston-Cambridge-Nashua MA-NH Metropolitan New England City and Town Area (NECTA)

¹¹ From the 2013 to 2017 ACS, the ratios are: 28.0% one-person, 32.2% two-person 16.8% three person and 23.1% four or more.

in the moderate-income level and 87 in the middle-income category. No three-worker households fall within the middle-income range.

Across all household sizes and income groups, the total number of affordable and middle-income housing units needed to meet the demand generated by new office and retail development is 722 units. Table 9 summarizes the total projected demand for new housing by household size and among low-income, moderate-income and middle-income households.

**Table 9. New Affordable Housing Demand in Cambridge from New Large Developments*
by Income Type and Household Size, 2020 to 2029**

Income Group	One-Person Households	Two-Person Households	Three Person Households	Four Person Households	Total
Low-income	83	49	31	37	200
Moderate-income	97	63	14	93	267
Middle-income	56	51	49	99	255
Total	236	163	94	229	722

*Includes Hotel, Institutional, Office, R&D and Retail Developments

Subsidy Required to Address Impact of Large-Scale Development

This section builds upon the framework established in the earlier sections to project the total subsidy required to address the projected increased demand for affordable housing generated by large-scale developments in Cambridge. Housing affordability is a function of household income and the cost of available rental and for-sale housing units in a given real estate market. The City of Cambridge and the entire Metropolitan Boston region suffer from a well-known and demonstrated lack of sufficient affordable housing. This section reviews housing conditions in Cambridge and calculates subsidy needed to create new affordable housing that satisfies the demand generated by new workers in new commercial and institutional development by comparing the total development cost of new affordable housing units to the housing prices that can be supported by low, moderate, and middle-income households. Before calculating the projected subsidy required, current housing conditions in Cambridge are reviewed to provide background and context.

Housing Conditions in Cambridge

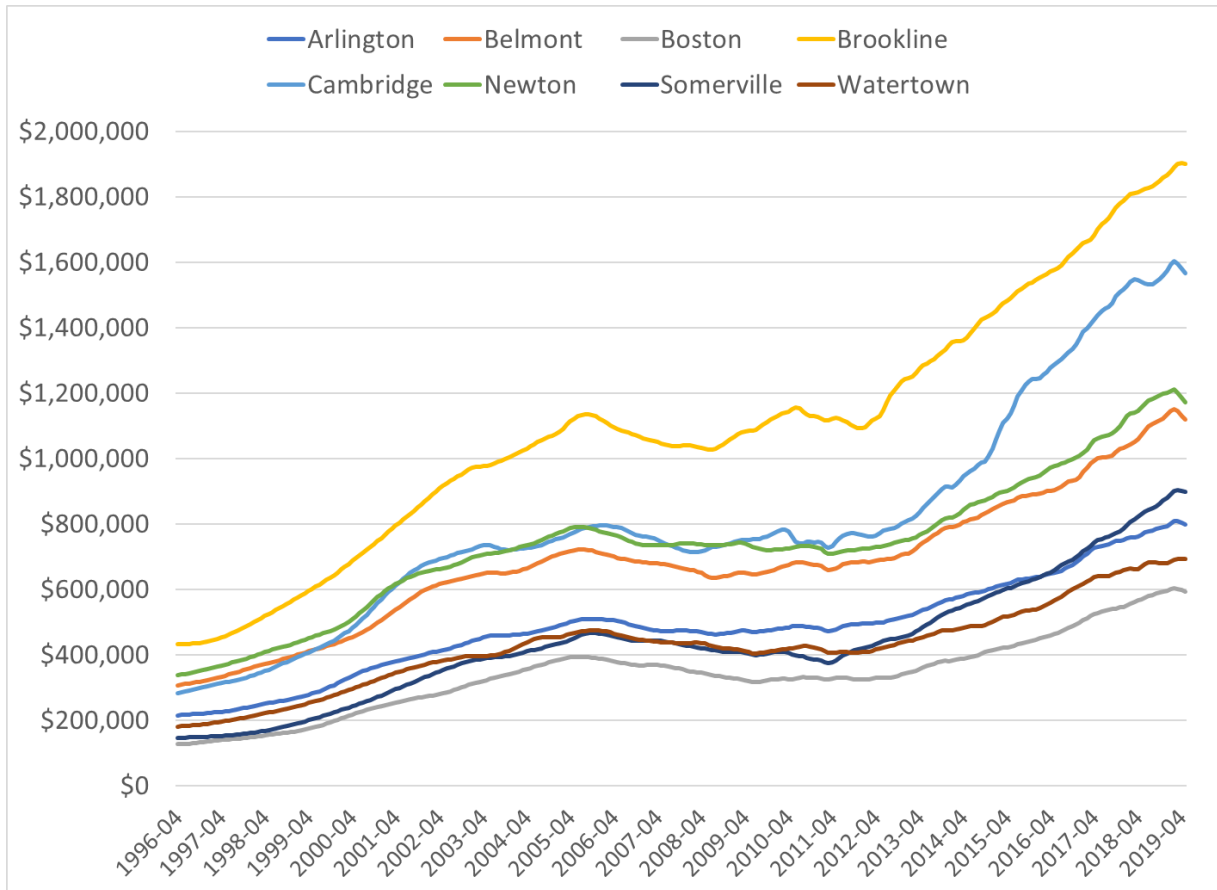
Combined with city and regional growth in employment, especially in high wage industries, Cambridge, like many cities in the Boston's urban core such as Boston, Somerville, and others, is experiencing an affordable housing shortage, because demand for affordable units is outstripping the supply of housing affordable to very-low-, low- and moderate-income households.

Housing Stock Key Drivers

According to the Cambridge Housing Profile, 2016, important drivers of housing demand in Cambridge are employment, population growth and household composition. In 2016, Cambridge had approximately 135,000 jobs and 110,000 residents in almost 46,000 households. According to the City of Cambridge, there were almost 53,000 residential units in the city in 2016. Cambridge's renters and owners are relatively affluent, with the median renter income of \$75,000 and median owner income of \$121,000 in 2016. Many of Cambridge's residents are post-secondary students. Including undergraduate, graduate and non-degree students, there were approximately 45,000 students in 2018, according to the 2018 Town Gown Report Summary. Half of the students live in Cambridge, mostly in the dorms. Approximately 62 percent of students living in Cambridge lived in on campus dormitories and 38 percent lived in off campus housing.

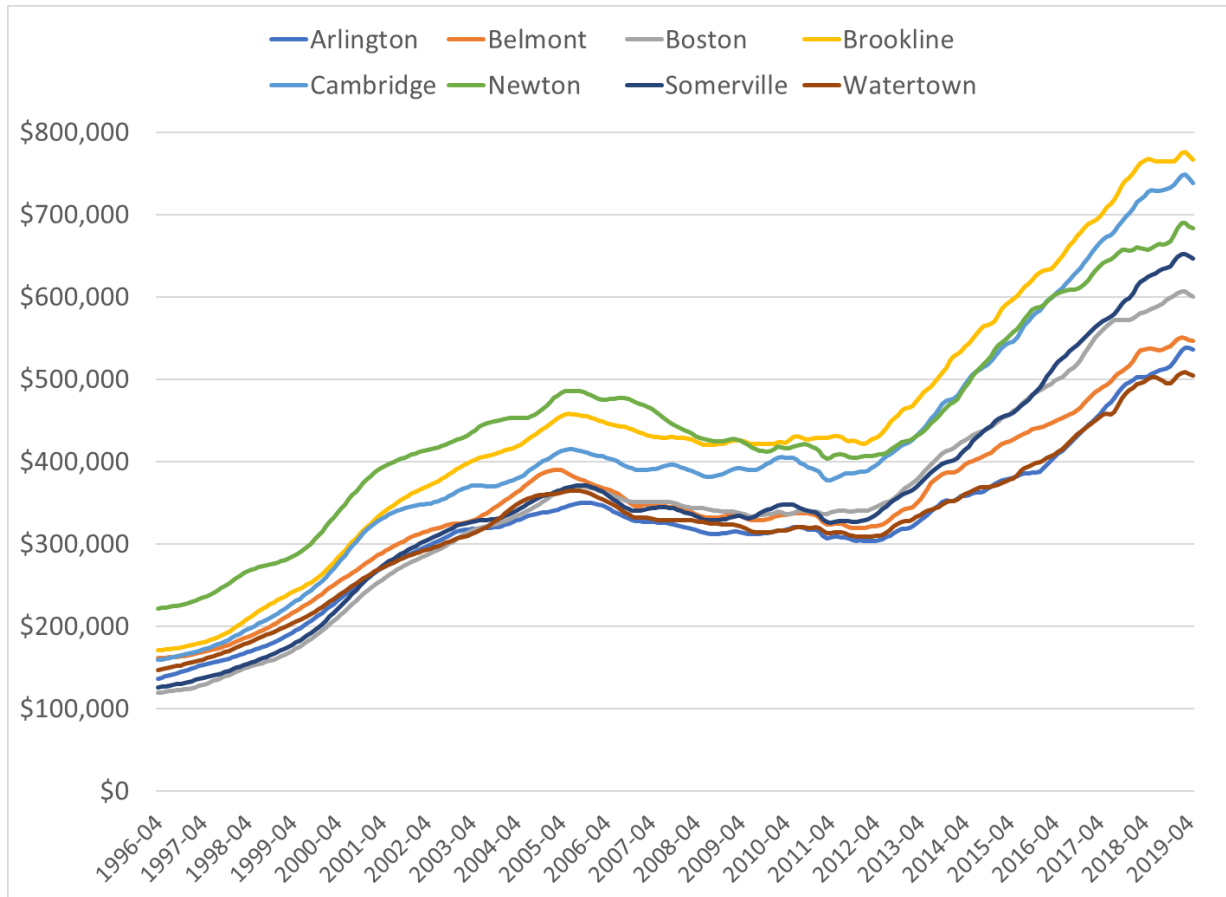
Despite an increase in residential units, housing prices and rents continue to increase, as shown by data in **Figure 5** and in **Figure 6**. Between 2010 and June 30, 2016, the city had a net increase of over 3,000 units. According to Zillow, the median value of a single-family home in 2019 was \$1.6 million and the median value of a condo was \$738,000. Between 2010 and 2019, condo housing prices increased 82 percent in Cambridge, or an average annual rate of 9.1 percent. Over the same period, single family housing prices increased 105 percent in Cambridge, or an average annual rate of 11.7 percent.

Figure 5
Monthly Median Single-Family Value, Zillow Home Value Index, 1996 to 2019, in
Cambridge and Surrounding Cities and Towns



Note: Zillow Home Value Index (ZHVI): A smoothed, seasonally adjusted measure of the median estimated home value across a given region and housing type. It is a dollar-denominated alternative to repeat-sales indices.
 Source: Zillow and ConsultEcon, Inc.

Figure 6
Monthly Median Condominium Value, Zillow Home Value Index, 1996 to 2019, in
Cambridge and Surrounding Cities and Towns



Note: Zillow Home Value Index (ZHVI): A smoothed, seasonally adjusted measure of the median estimated home value across a given region and housing type. It is a dollar-denominated alternative to repeat-sales indices.
 Source: Zillow and ConsultEcon, Inc.

Rental Housing

Cambridge and surrounding areas have had a relatively low rental vacancy rates in recent years. As reported by the U.S. Census Bureau, the American Community Survey estimates that in 2017, Cambridge had a rental vacancy rate of 4.2 percent. A low vacancy rate in rental housing continues to be a factor in the availability and cost of housing in Cambridge. Data from the Census Bureau also indicates that the median gross monthly rental payment among Cambridge renting households has increased 43 percent from \$1,471 in 2010 to \$2,100 in 2017.¹² Assuming 30 percent of income used for housing costs, the median rent in 2017 was affordable to households earning \$84,000 or more annually. By comparison, the general rate of inflation

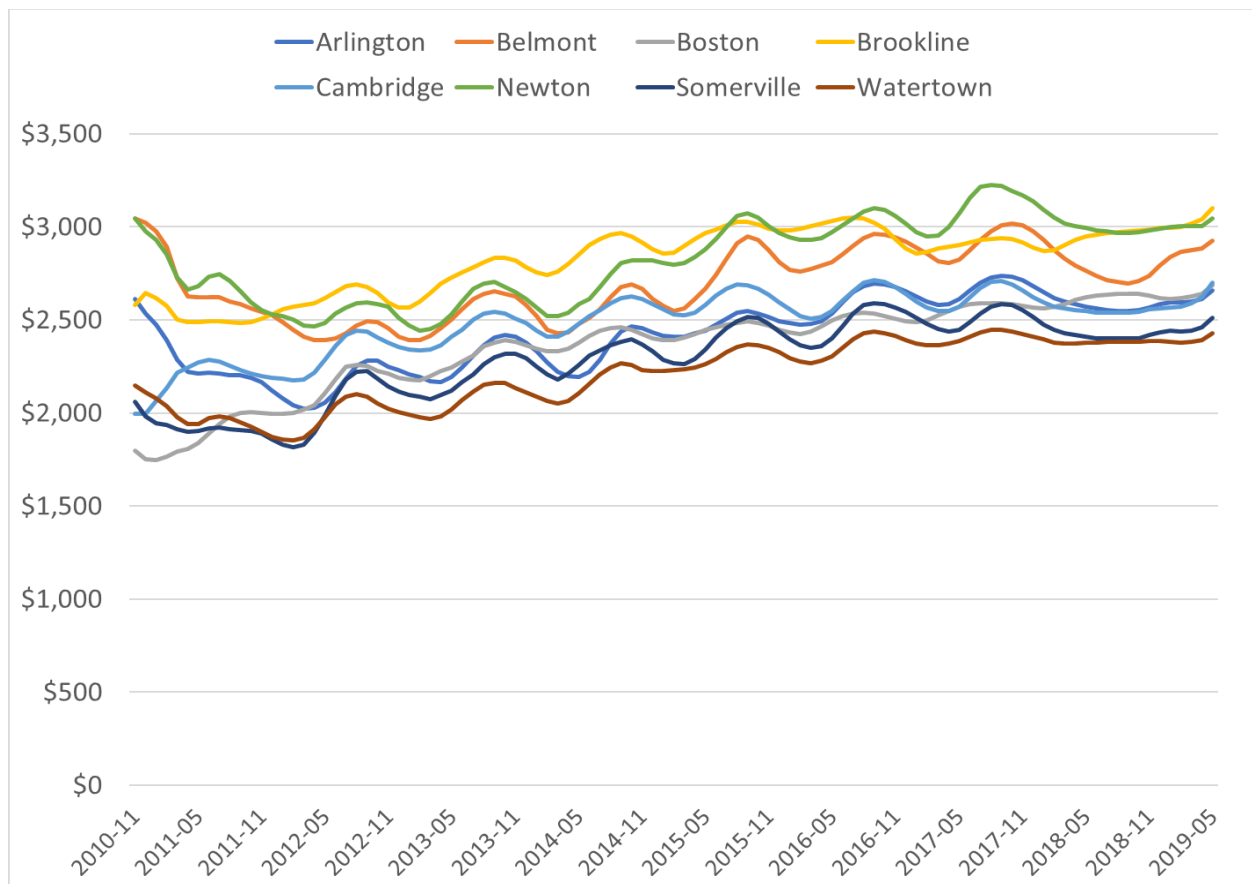
¹² This figure is based on the Census Bureau’s American Community Survey 1-year (2017) estimates and reflects average tenant rent payments not including any rental subsidies.

nationally, as indicated by the Consumer Price Index (CPI), is much lower. Between 2010 and 2017, CPI increased 12 percent, which would indicate that Cambridge households are devoting an increasing share of their financial resources to housing.

Median Cambridge Rent

According to data from Zillow, the median market rent in Cambridge between 2010 and 2019 is shown in **Figure 7**. The median Cambridge rent increased 35 percent from \$2,000 in 2010 to \$2,700 in 2019. Cambridge rent increases were higher than all surrounding communities, except for Boston, where market rents increased 49 percent from \$1,800 to \$2,700 over the same period. It should be noted that other sources of rents may report different values, but this source is used to show the long-term change in rents over time.

Figure 7
Monthly Median Market Rent, Zillow Rent Index, 2010 to 2019, in Cambridge and Surrounding Cities and Towns



Note: Zillow Rent Index (ZRI): A smoothed measure of the median estimated market rate rent across a given region and housing type. ZRI is a dollar-denominated alternative to repeat-rent indices.

Source: Zillow and ConsultEcon, Inc.

Housing Costs as a Percent of Household Income

Due to the high cost of housing, many Cambridge households devote a large portion of their incomes to housing, as shown by data in **Table 10**. Thirty-seven percent of all occupied housing units in Cambridge in 2017 were “cost burdened,” which means the household was paying more than 30 percent of its income on housing costs. Housing is typically considered affordable if housing costs are no more than 30 percent of household incomes. In Cambridge, both homeowners and renters were cost burdened. According to the census data, Cambridge had 44,000 occupied housing units in 2017. Of those, 36 percent were owner-occupied units and 64 percent were renter-occupied units. In 2017, about 25 percent of homeowners were cost-burdened, and 43 percent of renters were cost burdened. The average is 37 percent.

Table 10
Renter- and Owner-Occupied Housing Costs as a Percent of Household Income in the City of Cambridge, and Massachusetts, 2017

Percent of Income	Owner-Occupied		Renter-Occupied		All Occupied Housing	
	Housing Units	Percent to Total	Housing Units	Percent to Total	Housing Units	Percent to Total
Less than 20.0 percent	8,776	55%	7,168	25%	15,944	36%
20.0 to 29.9 percent	3,048	19%	7,428	26%	10,476	24%
30.0 to 39.9 percent	1,493	9%	4,229	15%	5,722	13%
40.0 to 49.9 percent	737	5%	1,962	7%	2,699	6%
50.0 percent or more	1,839	11%	5,935	21%	7,774	18%
Not Computed	141	1%	1,478	5%	1,619	4%
Total	16,034	100%	28,200	100%	44,234	100%

Source: U.S. Census Bureau, American Community Survey, 2013-2017, 5-Year Estimates; and ConsultEcon, Inc.

National Housing Market Trends

Cambridge’s market experience can be evaluated in context of national and regional trends. According to *The State of the Nation’s Housing, 2018*, the national housing market is starting to stabilize after its arduous recovery from the recession. In the past decade, rental growth has been strong but the growth has begun to slow in the years 2016 to 2017. After a period of low vacancy, rental vacancy rates have started to rise in 2017, and there has been an increase in rental supply largely from increased multi-family rental construction. Multi-family rental construction accounted for almost 30 percent of all housing starts in 2017, more than the long-term average, but slightly less than in 2016. Rents continue to increase, though at a slower rate than the previous years, and new builds are pushing up asking rents due to rising construction costs and additional amenities in multi-family rentals. Additionally, most of the new units constructed in

the Northeast are at the upper end of the market, with monthly asking rents over \$2,450, which is similar to the situation in Cambridge where upper end units can rent for twice that. The strength of the rental market contributes to the number of renters that are cost burdened—those households that are paying more than 30 percent of their income on rent—especially among low-income, moderate-income, and increasingly middle-income households.

While growth in the number of renter households has declined nationally, owner households have grown from 2015 to 2017, which has helped stabilize the, formerly depressed, homeownership rate. Nationally, housing prices for owner-occupied homes continue to increase but have not yet returned to previous levels before the economic downturn except in a few leading markets, like the Boston region. Low interest rates are helping make homeownership more affordable despite the increasing home prices. If interest rates rise, this may further limit people's access to homeownership. The national homeownership rate is stabilizing after a period of decline, despite a number of demographic and economic factors that would depress homeownership—including the slowing of new household formation as people are delaying marriage and child birth, high levels of foreclosures, low levels of income growth, higher lending standards, and increasing student debt burdens. As the economic recovery continues to support employment and income growth, it is anticipated that household formation will increase and once again provide support for higher levels of homeownership.

Regional Housing Market

The *Greater Boston Housing Report Card, 2017* reinforces many of the national trends. In the Boston region, affordability of housing is a greater problem than ever. There is a significant disparity between the incomes of renters and homeowners in the region—in 2015, the median income for homeowners was \$103,267 and the median income of renters was less than half at \$43,583. Renters in the region are facing serious challenges in finding affordable housing, especially in a tight rental market. In the region, 52 percent of renters are paying 30 percent or more of their gross income to rent alone, which is the highest percent on record for the region.

In the Greater Boston region, single-family home sales are declining as are condominium sales, albeit at a slower rate. Overall in the region, the number of building permits is up from 2016, by approximately 12 percent, and there are now more permits for larger housing complexes rather than single-family homes. Many of the new permitting has been in luxury unit construction. Due to zoning restrictions and the rising cost of construction, luxury complexes are the most financially feasible for developers. Meanwhile, condominium prices have stabilized over the past three years, likely a result from the construction boon and increase in supply. If this luxury market is approaching its saturation point, which a pricing stabilization may indicate, then the overall median price may decrease in time.

The market and economic conditions which fostered the boom in luxury development have disrupted affordable unit production in the Boston region. Due to the increase in luxury development, the proportion of affordable housing development has been falling since 2003. In Boston from 1996 to 2003, 39 percent of all new housing permits were for affordable units,

however, by 2011, the proportion of affordable housing unit permits to total new housing permits decreased to only 18 percent. With a strong economy, the Boston region will continue to attract and retain residents, but the pressures on the affordable housing market will continue. It is imperative to increase the number of units in development and increase the number of affordable units, in the Boston region so that renters and owners alike can afford housing and housing costs fall within a financially sustainable range of their total income.

Estimate of Required Affordable Housing Subsidy Contribution

The previous section projected demand for new housing from 722 low, moderate, and middle-income households ranging in size from one person to four or more persons. This section determines the projected subsidy required to construct housing that is affordable for those households.

Following is a summary of data and analyses used in calculating the total per square foot subsidy from new non-residential development required to support development of new affordable housing for workers. The subsidies would be for low, moderate- and middle-income households whose jobs would be located in Cambridge's new commercial buildings over the next 10 years.

The analyses establish that affordable rents and affordable sales prices do not currently support development of affordable housing, due to high development costs. Therefore, to stimulate affordable housing development, subsidies or other incentives must be provided. This analysis estimates the amount of subsidy required from the housing contribution for new commercial development. The total required subsidy is the estimated difference between the total development costs of producing new affordable housing units and the capitalized value of affordable rent and unit sale proceeds. The required subsidy is presented as a per square foot housing contribution for projected non-residential development over a 10 year period.

Methodology

The following methodology was used to calculate the subsidy required to produce sufficient housing to satisfy projected ten-year affordable housing demand generated by new development non-residential buildings.

- ◆ Estimate the number of low-income, moderate-income and middle-income households moving to or seeking to live in Cambridge that would be generated by new non-residential development. Specify demand by number of persons in the household, number of bedrooms, and by tenure (i.e. renter-occupied units and owner-occupied units).
- ◆ Estimate the total development costs of affordable units to satisfy the demand generated based on recent unit costs of new affordable housing developments completed since 2015 or currently under construction.
- ◆ Estimate the potential capitalized revenue due to annual rents and sales proceeds of affordable units segmented by middle-income, moderate-income and low-income households.

- ◆ Calculate the difference between the total development costs and the capitalized revenue that is internally generated by renters and owners. This amount is the total subsidy required to produce the targeted new affordable units created by demand from new workers in new non-residential developments.
- ◆ Divide the total subsidy required by the total non-residential square feet subject to the housing contribution. This amount is the per square foot subsidy projected to be required to produce the new affordable units created by demand from new workers in new non-residential developments.

The majority of state and federal funding programs for affordable housing are targeted to low-income and moderate-income households. The state has a new workforce housing initiative that funds middle-income housing as well. Nonetheless, federal and state tax credits prioritize creation of units for households below 50 percent AMI and 60 percent AMI. Therefore, because of the targeting of available subsidy sources of funding, it is likely that much of the new affordable housing created in Cambridge will be targeted to these income levels. As the following analysis shows, the amount of subsidy required to create housing for low-income households is substantial. Yet moderate-income and middle-income households are also increasingly finding housing to be unaffordable in Cambridge's housing market.

The following key assumptions were made to calculate the housing subsidy required.

Unit Distribution for New Affordable Housing

The distribution of households by number of persons and income levels was derived in Section 3. The households range in size from one to four or more persons. All one-person households are assumed to be one-bedroom units. Two-person households are allocated as 20 percent to one-bedroom units and 80 to two-bedroom units. Three-person households are allocated 80 percent to two-bedroom units and 20 percent to three-bedroom units. Four or more person households are allocated to three-bedroom units. Data in **Table 11** show the estimated distribution of housing units by size and income levels (low-moderate-middle).

Table 11
Distribution of New Affordable Housing Demand in Cambridge
by Number of Bedrooms due to Projected Non-Residential Development

	Households by Size				Total
	One Person	Two Person	Three Person	Four Person	
Total New Housing Units Needed Based on New Non-Residential Construction					722
<i>Distribution of Units</i>					
Low Income	83	49	31	37	200
Moderate Income	97	63	14	93	267
Middle Income	56	51	49	99	255
Total	236	163	94	229	722
<i>Distribution of Units by Number of Bedrooms</i>					
One Bedroom	100%	20%	0%	0%	37%
Two Bedrooms	0%	80%	80%	0%	28%
Three Bedrooms	0%	0%	20%	100%	34%
	100%	100%	100%	100%	100%
Units by Number of Bedrooms					
<i>Low Income</i>					
One Bedroom	83	10	0	0	93
Two Bedrooms	0	39	25	0	64
Three Bedrooms	0	0	6	37	43
<i>Moderate Income</i>					
One Bedroom	97	13	0	0	110
Two Bedrooms	0	50	11	0	61
Three Bedrooms	0	0	3	93	96
<i>Middle Income</i>					
One Bedroom	56	10	0	0	66
Two Bedrooms	0	41	39	0	80
Three Bedrooms	0	0	10	99	109
<i>Units by Size, Number of Bedrooms</i>					
One Bedroom	236	33	0	0	269
Two Bedrooms	0	130	75	0	205
Three Bedrooms	0	0	19	229	248
Total Units	236	163	94	229	722

NOTE: ROUNDING MAY AFFECT TOTALS.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Mix of Rental and Ownership Units

New affordable housing has primarily been supplied through rental housing, due to the available subsidy from federal sources. This analysis assumes that the affordable housing to be supplied will be a mix of rental and ownership units. The estimated required subsidy in this analysis assumes that:

- ◆ 50 percent of units for middle-income households will be ownership units; and the remaining 50 percent will be rental.
- ◆ 30 percent of units for moderate-income households will be ownership units; and the remaining 70 percent will be rental.
- ◆ All of the units for low-income households will be rental units.

Data in **Table 12** show the distribution of rental and home ownership housing units by size and income level.

Table 12
New Affordable Housing Demand in Cambridge
by Renter and Owner-Occupied Units

	Households by Size				Total
	One Person	Two Person	Three Person	Four Person	
<i>Distribution of Units</i>					
Low Income	83	49	31	37	200
Moderate Income	97	63	14	93	267
Middle Income	56	51	49	99	255
Total Units	236	163	94	229	722
<i>Percent of Households Occupying Ownership Housing</i>					
Low Income	0%	0%	0%	0%	
Moderate Income	30%	30%	30%	30%	
Middle Income	67%	67%	67%	67%	
<i>Number of Ownership Units</i>					
Low Income	0	0	0	0	0
Moderate Income	29	19	4	28	80
Middle Income	38	34	33	66	171
Total	67	53	37	94	251
<i>Percent of Households Occupying Rental Housing</i>					
Low Income	100%	100%	100%	100%	
Moderate Income	70%	70%	70%	70%	
Middle Income	33%	33%	33%	33%	
<i>Number of Rental Units</i>					
Low Income	83	49	31	37	200
Moderate Income	68	44	10	65	187
Middle Income	18	17	16	33	84
Total	169	110	57	135	471
<i>Units by Tenure (rounded)</i>					
Ownership	67	53	37	94	251
Rental	169	110	57	135	471
Total	236	163	94	229	722
<i>Rental Units by Number of Bedrooms</i>					
One Bedroom	169	22	0	0	191
Two Bedrooms	0	88	46	0	134
Three Bedrooms	0	0	11	135	146
Total Rental	169	110	57	135	471
<i>Ownership Units by Number of Bedrooms</i>					
One Bedroom	67	11	0	0	78
Two Bedrooms	0	42	30	0	72
Three Bedrooms	0	0	7	94	101
Total Ownership	67	53	37	94	251
Total Housing	236	163	94	229	722

NOTE: ROUNDING MAY AFFECT TOTALS.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Historic Unit Costs

The unit costs used to calculate the Total Development Cost (TDC) are based on an inventory of three Cambridge affordable housing projects with a total of 161 new affordable units completed or under construction since 2015. They had an average cost of \$580,000 per unit. Data in **Table 13** show the aggregate and unit costs for the affordable housing projects in Cambridge completed or under construction since 2015.

Table 13
Aggregate and Unit Costs of Affordable Housing Projects in Cambridge, 2015 to 2019

		<u>Gross Average Unit</u>		
		<u>Units</u>	<u>Square Feet</u>	<u>Size</u>
Affordable Housing Projects, 2017 and under construction as of April 2019		161	200,008	1,242
<i>Cost Categories, Inflation Adjusted</i>	<i>Cost</i>	<i>Cost per Unit</i>	<i>Cost per GSF</i>	<i>Percent to Total</i>
Hard Costs	\$55,807,361	\$346,630	\$279	59.7%
Soft Costs ^{1/}	20,901,850	\$129,825	\$105	22.4%
Acquisition/Land Costs	16,736,688	\$103,955	\$84	17.9%
Total Development Cost	\$93,445,900	\$580,409	\$467	100.0%
Totals Rounded	\$93,400,000	\$580,000	\$467	

NOTE: ROUNDING MAY AFFECT TOTALS.

^{1/} Includes, Architect/Engineer, Fees/Overhead, Reserves, and Other Soft Costs.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Calculation of Needed Subsidy

The following presents the analysis of estimated total development costs, supportable financing, and needed subsidy for affordable housing units that must be created in order to satisfy the new demand generated by workers in new commercial developments in Cambridge over the next 10 years. The analysis only presents selected tables that summarize the calculation of the needed subsidy. Additional tables in **Appendix A** detail all assumptions and intermediate calculations that underlie required subsidy calculation.

Development Project Costs

The average costs of new developments constructed since 2015 or currently under construction are used as the basis for calculating the costs of new affordable housing in Cambridge over the next ten years. It is likely, however, that housing development costs will vary considerably according to the particulars of individual projects and may change over time.

Rental Housing

Data in **Table 14** summarize TDC of developing 471 affordable rental units in Cambridge. The TDC is assumed to be \$603,000 per unit. The unit cost for these units is higher than the historic cost because they are larger in square footage than the recent projects in Cambridge, which reflects the demographics of the worker households demanding affordable housing in Cambridge.

Table 14
Calculation of Total Development Costs of Affordable Rental Housing Units in Cambridge

Project Assumptions		
Number of Units		471
Average Unit Size GSF		1,301
Total Project GSF		613,000
Cost Assumptions ^{1/}		
Land/Acquisition per Unit Costs		\$104,000
Construction per GSF Costs		\$280
Soft Costs, including Design, Permitting, Overhead, Profit, and Contingency, as a Percent of Construction Cost		37.0%
Development Costs		
	Amount	Percent to Total
Land/Acquisition	\$48,984,000	17.2%
Construction	\$171,640,000	60.4%
Soft Costs, including Design, Permitting, Overhead, Developer's Fee, and Contingency	\$63,507,000	22.4%
Total Development Costs (TDC)	\$284,131,000	100.0%
TDC per Unit (rounded to nearest \$100)	\$603,000	
TDC per GSF (rounded to nearest \$1)	\$464	

1/ Cost assumptions are based on weighted average cost metrics from three affordable housing development projects in the City Cambridge constructed or under construction between 2017 and 2019. Estimates are rounded.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Ownership Housing

Data in **Table 15** summarize TDC of developing 251 affordable ownership units in Cambridge. Like rental housing units, the TDC is assumed to be \$627,000 per ownership unit.

Table 15
Calculation of Total Development Costs
of Affordable Ownership Housing Units in Cambridge

<i>Project Assumptions</i>		
Number of Units		251
Average Unit Size GSF		1,363
Total Project GSF		342,000
<i>Cost Assumptions</i> ^{1/}		
Land/Acquisition per Unit Costs		\$104,000
Construction per GSF Costs		\$280
Soft Costs, including Design, Permitting, Overhead, Profit, and Contingency, as a Percent of Construction Cost		37%
	Amount	Percent to Total
<i>Development Costs</i>		
Land/Acquisition	\$26,104,000	16.6%
Construction	\$95,760,000	60.9%
Soft Costs, including Design, Permitting, Overhead, Developer's Fee, and Contingency	\$35,431,000	22.5%
Total Development Costs (TDC)	\$157,295,000	100.0%
<i>TDC per Unit (rounded to nearest \$100)</i>	<i>\$627,000</i>	
<i>TDC per GSF (rounded to nearest \$1)</i>	<i>\$460</i>	

1/ Cost assumptions are based on weighted average cost metrics from three affordable housing development projects in the City Cambridge constructed or under construction between 2017 and 2019. Estimates are rounded.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Rental Housing Development Project Revenue

An important step in calculating the subsidy required to create new affordable housing units is to define the rental housing development project’s revenue that will be used to support the development and operations of new affordable housing. This analysis assumes that the new rental housing will be solely supported by rental income from tenant households and ownership housing will be supported by the sales of affordable units. Affordable rents and sales prices are derived based on household income. In prior sections of this report, annual occupational wages were the input for establishing the demand for affordable housing by low, moderate and middle-income levels of households of new workers in new commercial development in Cambridge. The weighted average gross income for each income level¹³, as shown by the data in **Table 16**, is the basis for calculating affordable rents and sales prices that in turn support the development of affordable housing.

Table 16
Weighted Average Income by Income Group and Household Size, Households of Workers in Projected Non-Residential Development

	Households by Number of Persons			
	One Person	Two Person	Three Person	Four Person
<i>Distribution of Weighted Average Income</i>				
Low Income	\$32,382	\$33,860	\$38,528	\$38,870
Moderate Income	\$43,980	\$54,328	\$62,457	\$81,673
Middle Income	\$64,519	\$81,513	\$87,362	\$96,539

Source: U.S. Bureau of Labor Statistics; Karl F. Seidman Consulting Services; and, ConsultEcon, Inc.

The needed subsidy for new affordable rental housing is calculated first, followed by the calculation of the needed subsidy for affordable ownership housing.

Affordable Rent Levels

The affordable rents for rental units are based on the estimated annual income of workers in the new commercial developments in Cambridge. Construction of the 471 rental units of affordable housing projected in this analysis are supported by rental revenue from tenants with subsidies used to fill the gap between rental revenue and the cost of developing the housing. In general,

¹³ This average is based on the average annual earnings for the occupations projected for low, moderate and middle-income household as discussed in section two on the Impact of New Development on Affordable Housing Demand.

the federal department of Housing and Urban Development (HUD) is a source of many subsidies for affordable housing. HUD defines housing costs as affordable to a household when the total cost of shelter consumes no more than 30 percent of gross (total) income. For this analysis, households are assumed to pay 30 percent of household income in rent. Data in **Table 17** detail the assumed income levels of households to derive the total gross rental revenue for the 471 units, based on the distribution of households by size and income. Total annual gross rental revenue for the units is estimated at \$7.6 million.

Table 17
Annual Rental Revenue by Household Income and Size of Household

Household Size	Annual Income ^{1/}	Applicable Monthly Rent ^{2/}	Number of Households	Total Annual Rent
<i>Low Income Households</i>				
1 Person	\$32,382	\$810	83	\$806,312
2 Persons	\$33,860	\$847	49	\$497,748
3 Persons	\$38,528	\$963	31	\$358,311
4 Persons	\$38,870	\$972	37	\$431,454
<i>Moderate Income</i>				
1 Person	\$43,980	\$1,100	68	\$897,192
2 Persons	\$54,328	\$1,358	44	\$717,128
3 Persons	\$62,457	\$1,561	10	\$187,370
4 Persons	\$81,673	\$2,042	65	\$1,592,619
<i>Middle Income Households</i>				
1 Person	\$64,519	\$1,613	18	\$348,404
2 Persons	\$81,513	\$2,038	17	\$415,717
3 Persons	\$87,362	\$2,184	16	\$419,338
4 Persons	\$96,539	\$2,413	33	\$955,739
Total Households / Housing Units			471	
Total Annual Rent				\$7,627,331
Total Annual Rent (Rounded)				\$7,627,000
<hr/>				
Aggregate Annual Rent by Income Level	Number of Units	Total Annual Rent (Rounded)	Percent of Total Rent	Average Monthly Rent
Low Income	200	\$2,094,000	27.5%	\$873
Moderate Income	187	\$3,394,000	44.5%	\$1,512
Middle Income	84	\$2,139,000	28.0%	\$2,122
Total	471	\$7,627,000	100.0%	\$1,349

1/ Weighted average annual earnings based on anticipated mix of occupant types and wages in new non-residential development in Cambridge.

2/ Assumed at 30% of monthly income.

Note: Rounding may affect totals.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

To calculate the rental revenue available to support the total development costs described above, the gross rents must be adjusted to reflect lost revenue due to periodic vacancies and the operating costs of maintaining and managing housing. As shown by data in **Table 18**, vacancy is assumed at 3 percent of gross rental revenue. Operating costs typically include such items as building management, janitorial services, trash removal, building maintenance, landscaping, marketing and other administrative costs. For this analysis, the full cost of utilities is also included. Based on comparable projects in Cambridge and the region and interviews with Cambridge developers, total operating costs were calculated as \$10,000 per unit or \$4.7 million total. Net rental income after deducting vacancy and operating costs is estimated at \$2.7 million.

Table 18
Summary of Required Affordable Housing Subsidy Rental Units

			By Household Type		
			Low Income	Moderate Income	Middle Income
	All Units				
Potential Development Costs					
Number of Units	471	200	187	84	
Percent to Total	57.5%	42.5%	39.7%	17.8%	
TDC per Unit	\$603,000	\$603,000	\$603,000	\$603,000	
TDC per GSF	\$464	\$464	\$464	\$464	
Total Gross Square Footage (GSF)	613,000	260,297	243,378	109,325	
Total Development Costs (TDC)	\$284,131,000	\$120,650,106	\$112,807,849	\$50,673,045	
Net Rental Income					
	Unit Factor	Amount	Amount	Amount	Amount
Gross Annual Rent		\$7,627,000	\$2,094,000	\$3,394,000	\$2,139,000
Less Vacancies	3% of Gross Rent	(\$228,810)	(\$62,820)	(\$101,820)	(\$64,170)
Less Total Operating Costs ^{1/}	\$10,000 per Unit	(\$4,710,000)	(\$2,000,000)	(\$1,870,000)	(\$840,000)
Net Operating Income (NOI)		\$2,688,190	\$31,180	\$1,422,180	\$1,234,830
Derivation of Permanent Mortgage / Supportable Debt Calculation					
	Amount	Amount	Amount	Amount	
Net Operating Income (NOI)	\$2,688,190	\$31,180	\$1,422,180	\$1,234,830	
Debt Coverage Ratio	1.1	1.1	1.1	1.1	
Available for Debt Service	\$2,443,800	\$28,300	\$1,292,900	\$1,122,600	
Mortgage Constant ^{2/}	5.974%	5.974%	5.974%	5.974%	
Permanent Mortgage / Supportable Debt	\$40,909,000	\$474,000	\$21,643,000	\$18,792,000	
Supportable Equity Calculation					
	Amount	Amount	Amount	Amount	
Required Return on Equity	10.0%	10.0%	10.0%	10.0%	
Revenue Available for Return to Equity	\$268,819	\$3,118	\$142,218	\$123,483	
Supportable Equity Investment	\$2,688,000	\$31,000	\$1,422,000	\$1,235,000	
Subsidy Required Calculation					
	Amount	Amount	Amount	Amount	
Total Development Costs	\$284,131,000	\$120,650,106	\$112,807,849	\$50,673,045	
Less Permanent Mortgage / Supportable Debt	(\$40,909,000)	(\$474,000)	(\$21,643,000)	(\$18,792,000)	
Less Supportable Equity	(\$2,688,000)	(\$31,000)	(\$1,422,000)	(\$1,235,000)	
Subsidy Required (TDC-Mortgage-Equity)	\$240,534,000	\$120,145,106	\$89,742,849	\$30,646,045	
Subsidy Required as a Percent of TDC	84.7%	99.6%	79.6%	60.5%	

^{1/} Source: ConsultEcon, based on data from Massachusetts Housing Partnership, and City of Cambridge staff input.

^{2/} Source: ConsultEcon calculation of mortgage constant based on interest rates from the Massachusetts Housing Partnership.

Source: City of Cambridge: Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Rental Affordability Gap and Needed Subsidy

The next step is to find the gap in project finance between the permanent mortgage and developer equity that the net rental income can support and the total development costs of the 471 rental units. In general, the amount of loan that lenders will approve is based on the income stream from the project. In this case, the annual net income from rents is \$2.7 million. However, lenders prefer to build into their mortgage calculations a cushion between projected net income from rents and the annual debt service needed to pay down the loan. The debt coverage ratio (ratio of net income to allowable debt) reduces the effective amount of net income that can be used to support a mortgage. This analysis assumes a debt coverage ratio of 1.1, based on permanent financing programs offered by the Massachusetts Housing Partnership. After adjusting the net income by the debt coverage ratio, the project has \$2.4 in annual net income with which to pay the debt service on a permanent mortgage.

The total allowable permanent loan is calculated by dividing the net income by the mortgage constant, based on a 5.974 percent mortgage constant, (assuming the available current Massachusetts Housing Partnership financing rate amortized over a 30-year period). The permanent loan that could be supported by the resident households is \$40.9 million. The annual revenue not required for the mortgage is then available to support equity investment. Based on a required return of 10.0 percent, this revenue would support \$2.7 million in equity investment. Given the total development costs of \$284.1 million, the subsidy required to create 471 new affordable rental housing units is \$240.5 million, approximately 85 percent of the total development cost (TDC).

Ownership Housing Development Project Revenue

The average sales price of affordable units sold in Cambridge is the basis for estimating the sales proceeds available to support the creation of 246 affordable ownership units in Cambridge. Of the total, 69 units are for moderate-income households and 177 units are for middle-income households.

As shown by analysis in **Table 19**, the “affordable” sales price is derived based on 30 percent of gross income spent on housing and estimates of housing costs, the same as rental housing. Housing costs for ownership units include mortgage payments based on 5% down payment on the home, real estate taxes and condo fees. (Private Mortgage Insurance is not included in this analysis as it is waived for moderate-income households through a housing lending program offered by the Massachusetts Housing Partnership. For middle-income households, it is assumed that they pay PMI which raises their annual housing costs slightly.)

It is assumed that low-income units are all rental units, so estimates of sales prices based on low-income earnings were not prepared.

Table 19
Aggregate Affordable Ownership Unit Sales by Household Income and Size of Unit

Household Size	Annual Income	Monthly Housing Costs ^{1/}	Number of Households	Supportable Sales Price	Total Sales
<i>Moderate Income</i>					
One bedroom	\$44,905	\$1,123	33	\$167,206	\$5,517,800
Two bedroom	\$56,980	\$1,425	18	\$214,298	\$3,857,362
Three bedroom	\$80,579	\$2,014	29	\$307,339	\$8,912,829
<i>Middle Income Households</i>					
One bedroom	\$66,800	\$1,670	45	\$260,268	\$11,712,062
Two bedroom	\$85,349	\$2,134	53	\$334,869	\$17,748,055
Three bedroom	\$95,181	\$2,380	73	\$373,816	\$27,288,578
Total Households / Housing Units			251		
Total Sales					\$75,036,686
Total Sales (Rounded)					\$75,037,000
Aggregate Sales by Income Level					
		Number of Units	Total Sales	Percent of Total	Average Sales Price
Moderate Income		80	\$18,288,000	24.4%	\$228,600
Middle Income		171	\$56,749,000	75.6%	\$331,865
Total		251	\$75,037,000	100.0%	\$298,952

1/ Assumed at 30% of monthly income.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Ownership Housing Needed Subsidy

The affordability gap in project financing of ownership units is the difference between the TDC and the proceeds from the sale of the estimated required 251 ownership units. Based on the mix of units and the assumed sales prices, the total estimated sales proceeds are \$75.0 million. Assuming TDC of \$157.3 million, the estimated financing gap for 251 affordable home ownership units is \$82.3 million, approximately 52% of the TDC. Data in **Table 20** summarize the subsidy needed for ownership units.

Table 20
Summary of Subsidy Required for Affordable Ownership Housing

				By Household Type	
				Moderate Income	Middle Income
All Units					
Potential Development Costs					
Number of Units	251			80	171
<i>Percent to Total</i>				31.9%	68.1%
TDC per Unit	\$627,000			\$627,000	\$627,000
TDC per GSF	\$460			\$460	\$460
Total Gross Square Footage (GSF)	342,000			109,004	232,996
Total Development Costs (TDC)	\$157,295,000			\$50,133,865	\$107,161,135
Aggregate Unit Sales Proceeds					
	Units	Average Price	Sales Proceeds	Sales Proceeds	Sales Proceeds
Moderate Income	80	\$228,600	\$18,288,000	\$18,288,000	\$0
Middle Income	171	\$331,865	\$56,749,000	\$0	\$56,749,000
Total Sales Proceeds	251	\$298,952	\$75,037,000	\$18,288,000	\$56,749,000
Subsidy Required Calculation					
	Amount			Amount	Amount
Total Development Costs	\$157,295,000			\$50,133,865	\$107,161,135
Less Sales Proceeds	(\$75,037,000)			(\$18,288,000)	(\$56,749,000)
Subsidy Required (TDC-Sales Proceeds)	\$82,258,000			\$31,845,865	\$50,412,135
<i>Subsidy Required as a Percent of TDC</i>	52.3%			63.5%	47.0%

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Subsidy Needed to Satisfy Ten-Year Affordable Housing Demand

The total development costs for rental and ownership units in Cambridge that satisfy the demand for new affordable housing due to workers in new non-residential developments who will be seeking housing in Cambridge is \$441.4 million. The total subsidy needed for the 722 rental and ownership units is \$322.8 million, approximately 73 percent of the TDC. The total subsidy is then divided by the total estimated commercial development building area.

Based on an estimated 5.84 million square feet of non-residential space projected over 10 years, the total subsidy required is estimated at \$55.27 per square foot of non-residential development, as shown by data in **Table 21**. (Data tables in Appendix detail the amount of the subsidy required for rental and ownership units.)

Table 21
Unadjusted Calculation of Subsidy Required for new Affordable Rental and Ownership Units per Square Foot of Projected Non-Residential Development

	All Units	Moderate		
		Low Income	Income	Middle Income
Number of Units	722	200	267	255
Total Development Cost	\$441,426,000	\$120,650,106	\$162,941,714	\$157,834,180
Total Subsidy Required	\$322,792,000	\$120,145,106	\$121,588,714	\$81,058,180
Percent TDC that is Subsidy	73.1%	99.6%	74.6%	51.4%
Derivation of Commercial Square Footage Subject to Housing Contribution				
Total Commercial Square Footage	5,840,000	5,840,000	5,840,000	5,840,000
Subsidy Required per Square Foot of New Commercial Development	\$55.27	\$20.57	\$20.82	\$13.88

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Modified Subsidy Required Based on Other Subsidy Sources

This analysis calculates the full cost of subsidizing the housing demand generated by workers of households in projected large-scale developments in the City of Cambridge. Cambridge has relatively high affordable housing development costs, given the scarcity of vacant land, and high acquisition and construction costs. The purpose of affordable housing is to limit the rental or mortgage payments of low-income households; there is a limited income stream with which to finance development financing. Therefore, the City and developers are challenged to find additional sources of subsidy to fill the gap between the rents and sales proceeds that low, moderate and middle-income families can afford and the development financing that would be incurred by affordable housing developers. Since most affordable housing developers layer multiple subsidies to support the construction of new housing units, the housing contribution will work in conjunction with other subsidy sources to fill the \$322.8 million needed subsidy.

The housing contribution due to new commercial development is contributed to the Cambridge Affordable Housing Trust (CAHT). Because there are other sources of subsidy available for development of new affordable housing in Cambridge, the housing contribution to the CAHT does not have to provide all the funds needed to subsidize affordable housing. On average, CAHT funds have represented 43% of the total subsidies used in recent affordable rental housing projects in Cambridge and 67% of the total subsidies used in one recent affordable ownership housing project in Cambridge, as shown by data in **Table 22**. It should be noted that these funds are available only to projects targeting low-income and moderate-income households. There is a single state source of funds for middle-income renter households and no regular sources of funds for ownership housing.

Table 22
Sources of Funds for Recent Affordable Housing Projects in Cambridge
(Nominal Dollars)

Source of Funds - Detail	Rental Projects ^{1/}		Ownership Project ^{1/}	
	Amount	Percent to Total	Amount	Percent to Total
Debt	\$22,697,713	16.2%	\$0	0.0%
Sales (not applicable to rental projects)	\$0	0.0%	2,720,000	42.6%
Equity	\$40,799,941	29.1%	0	0.0%
Cambridge Affordable Housing Trust (CAHT)	\$50,469,282	36.0%	2,455,686	38.4%
Other City Source (CDBG, HOME, etc.) ^{2/}	\$4,228,966	3.0%	1,200,000	18.8%
Department of Housing and Community Development, Commonwealth of Massachusetts	\$19,681,339	14.0%	0	0.0%
Other miscellaneous	\$2,278,453	1.6%	11,750	0.2%
Total Sources of Funds	\$140,155,694	100.0%	\$6,387,436	100.0%
Source of Funds - Summary				
Debt/Sales	\$22,697,713	16.2%	\$2,720,000	42.6%
Cambridge Affordable Housing Trust (CAHT)	50,469,282	36.0%	2,455,686	38.4%
Other Sources of Subsidy Funds	66,988,699	47.8%	1,211,750	19.0%
Total Sources of Funds	\$140,155,694	100.0%	\$6,387,436	100.0%
Total Subsidy Funds (CAHT + Other Sources of Subsidy Funds)	\$117,457,981		\$3,667,436	
CAHT Percent of Total Subsidy Funds ^{3/}	43.0%		67.0%	
CAHT "Leverage" Ratio, CAHT to Other Subsidies ^{4/}	1.33		0.49	

1/ Source: City of Cambridge. Based on eight affordable housing development projects completed or under construction in Cambridge between 2009 and 2019.

2/ CDBG = Community Development Block Grant. HOME funds are another federal program that supports housing.

3/ CAHT contribution divided by the Total Subsidy Funds.

4/ The leverage ratio is equal to the Other Sources of Subsidy Funds divided by CAHT contribution.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Cambridge's future supply of affordable housing subsidies is likely to reflect the diversity of the programs utilized by projects in the past. The primary non-City funding sources available for new affordable housing development in Cambridge in the future will likely be Low-Income Housing Tax Credits, Federal HOME and CDBG Funds, Massachusetts Housing Stabilization Funds, and Massachusetts Affordable Housing Trust Funds. Since state sources are often awarded competitively, Cambridge is not guaranteed funding from all of these programs. Moreover, projects do not typically receive funding from all of these sources. Nonetheless, it is

reasonable to assume that future affordable housing projects will require multiple sources of subsidy including the housing contribution to the CAHT due to new commercial development.

Because these funds apply only to housing targeted to low- and moderate-income households, the historic ratio of CAHT subsidy (43%) to the total subsidy required would only apply to 387 low-income and moderate-income rental housing projects in Cambridge. Assuming that middle-income rental housing projects receive state funds for workforce housing, the CAHT would need to subsidize 73% of the total subsidy required for 84 middle-income rental units. Because there is no regular source of subsidy for affordable ownership housing, the CAHT would need to subsidize 100% of the subsidy required for 251 ownership units. After applying the CAHT ratios of subsidy required, the adjusted amount of subsidy required for 722 affordable housing units is \$33.34 per square foot of new non-residential development.

Table 23
Adjusted Amount of Subsidy Required Per Square Foot of Projected Non-Residential Development based on Cambridge CAHT Share

	All Units	Low Income	Moderate Income	Middle Income
Rental Units				
Amount of Subsidy Required per SF	\$41.19	\$20.57	\$15.37	\$5.25
CAHT Share of Subsidy Required ^{1/}	47%	43%	43%	73%
Adjusted Amount of Subsidy Required per SF	\$19.25	\$8.84	\$6.60	\$3.81
Ownership Units				
Amount of Subsidy Required per SF	\$14.09		\$5.45	\$8.63
CAHT Share of Subsidy Required ^{2/}	100%		100%	100%
Adjusted Amount of Subsidy Required per SF	\$14.09		\$5.45	\$8.63
All Units				
Amount of Subsidy Required per SF	\$55.27	\$20.57	\$20.82	\$13.88
CAHT Share of Subsidy Required	60%	43%	58%	90%
Adjusted Amount of Subsidy Required per SF	\$33.34	\$8.84	\$12.06	\$12.44

1/ Low and moderate income rental units CAHT Share of Subsidy Required is based on affordable housing projects completed or under construction, 2009 to 2019. Middle income CAHT Share of Subsidy Required is based on \$100,000 per unit subsidy from the Commonwealth.

2/ The CAHT Share of Subsidy Required is assumed to be 100%.

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Summary of Development Costs and Needed Subsidy

The analysis of the development costs and needed subsidy for rental and homeownership units was conducted based on 251 ownership units and 471 rental units. Development costs were

estimated based on costs for recent comparable affordable housing projects built in Cambridge. For rental projects, the needed subsidy was calculated as the difference between total development costs and the amount of debt and equity that could be supported by the housing cash flow using affordable rents at 30% of household income and comparable operating costs. For ownership projects, the needed subsidy was calculated as the difference between total development costs and the affordable purchase price based on home mortgage payments, insurance and property taxes at 30% of household income and a 5% down payment.

Based on these assumptions and detailed analysis, the total development cost required to build 722 units of affordable housing is \$441.4 million. The total needed subsidy is estimated to be \$322.8 million. The housing contribution rate needed to provide the full \$322.8 million in subsidy is \$55.27 per square foot, based on an estimated 5.84 million square feet of non-residential space projected over 10 years. However, affordable housing development leverages public subsidies from federal and state sources in addition to those provided by Cambridge. Since the Cambridge AHT has provided 43% of the public subsidy in recent affordable housing projects, it is appropriate to use this share of the needed subsidy for low- and moderate-income rental units to adjust the housing contribution rate. For middle-income rental units, the share of needed subsidy would be 73%, based on the state's workforce housing initiative. Home ownership units do not qualify for these subsidies, and would require 100% of required subsidy through CAHT. Thus, based on this blend of housing types and affordability categories, the maximum determined housing contribution rate is \$33.34 per square foot.

New Development, Resident Employment and Jobs Linkage Fee

New development projects in Cambridge will create jobs with the potential to benefit Cambridge residents, and improve employment and earnings for low- and moderate-income workers. An employment contribution may be warranted to address specialized employment and training services that are needed to allow Cambridge residents to gain access to employment opportunities and share in the benefits from new large scale development. Such services may be needed either if Cambridge workers lack the specific occupational skills demanded by employers in new development and/or if workers have more general gaps in education, skills or experience that pose barriers to their employment. Occupational and job specific training services are warranted to address the first situation while basic education, English language and job readiness programs address the latter need. Both services may be needed, and may be combined into an integrated skills training program, to ensure that Cambridge unemployed and low-income residents have equitable access to jobs created by new development.

A two-part methodology was used to analyze the need for employment and job training services to link Cambridge residents to the jobs created by the expected new development. First, an analysis of the potential occupational supply gaps for jobs in projected development over the next ten years was completed. This analysis used the occupational composition of projected industries expected to occupy new projects to estimate the expected number of new jobs in different occupations. These data were then compared to the occupational composition of Cambridge's labor force to identify occupations for which the supply of existing residents may be insufficient to meet this new demand. Information on the capacity of existing job training programs to supply new workers was then considered in estimating the occupational supply gap. Information from a separate workforce development study conducted by the Donahue Institute also was used in the employment contribution analysis. This study informed the size and characteristic of the potential Cambridge labor force in need of education and training services, including the unemployed labor force and non-student adults who may want to work but have dropped out of the labor force. The second part of the analysis draws on recent regional workforce development reports and interviews with Cambridge workforce programs to better understand the supply of existing workforce development services, employer relationships and the needs and employment barriers faced by Cambridge residents.

Labor Supply Gaps

Table 24 compares the expected number of jobs in major occupational categories to ACS data from 2013 to 2017 on the number of Cambridge workers in these occupations. For two occupational groups, the number of new jobs is a very small share of the current labor force at less than 5%. Consequently, there is likely to be a good supply of city residents within these occupations to address employer needs, although mismatches may exist based on unique employer needs or for occupations that are more specialized. In another nine occupations, new employment in future large development projects falls between 5% and 20% of Cambridge's labor force, which may make it somewhat difficult to locate city residents for these jobs, but there are still 5 to 10 city workers in these occupations for every new expected job. Moreover,

71% of these jobs are in higher skill management, education, health care and art/design/media/sports occupations that are less likely to benefit low-income residents. For the remaining eleven occupational groups, projected new jobs account for a large share of the current labor force, ranging from 20.5% (Life, Physical, and Social Science Occupations) to 66.1% (Computer and Math Occupations). Six of these occupational groups (Food Preparation and Serving Occupations, Health Care Support Occupations, Office and Administrative Support Occupations, Personal Care Occupations, Production Occupations, and Installation, Maintenance and Repair Occupations) are sources of entry-level jobs for low-income and less educated workers and account for 34% of the jobs in these “tight demand” occupations. Although four other “tight demand” occupational groups are dominated by high skill jobs that require college or advanced degrees, some also include technician and support occupations that are accessible with a two-year college degree or certificate program.

Table 24. Comparison of Expected Occupational Demand and Cambridge Labor Force by Major Occupational Groups

Occupational Group	Estimated Number of New Jobs	Cambridge Labor Force	New Jobs as % of City Labor Force
Management occupations	1,521	8,589	17.7%
Business and financial operations occupations	1,223	5,216	23.4%
Computer and mathematical occupations	3,497	5,289	66.1%
Architecture and engineering occupations	954	2,322	41.1%
Life, physical, and social science occupations	1,279	6,240	20.5%
Community and social services occupations	143	1,403	10.2%
Legal occupations	47	1,430	3.3%
Education, training, and library occupations	664	10,338	6.4%
Arts, design, entertainment, sports, and media occupations	370	2,777	13.3%
Health diagnosing and treating practitioners and other technical occupations	434	3,750	11.6%
Healthcare support occupations	222	793	28.0%
Protective service occupations	59	633	9.3%
Food preparation and serving related occupations	984	1,922	51.2%
Building, grounds cleaning and maintenance occupations	147	866	17.0%
Personal care and service occupations	374	1,328	28.2%
Sales and related occupations	731	3,770	19.4%
Office and administrative support occupations	1,627	5,684	28.6%
Farming, fishing, and forestry occupations	21	45	46.7%
Construction and extraction occupations	26	536	4.9%
Installation, maintenance, and repair occupations	201	391	51.4%
Production occupations	208	665	31.3%
Transportation & Material Moving	138	1,178	11.7%
Total	14,870	65,165	22.8%

Source: Karl F. Seidman Consulting and American Community Survey 2013-2017 5- Year Sample

Additional analysis was conducted on several mid-level jobs in occupational groups with “tight demand” that are more accessible to non-college educated workers. These include: Computer Support Specialists; Drafters, Engineering, and Mapping Technicians; Life, Physical, and Social Science Technicians; and Health Technologists and Technicians. The results, shown in Table 25, indicate demand for an additional 1,194 workers in these occupations. Although data on the Cambridge labor force in these specific occupations were not available, the supply is likely be tight for the first two occupations since the ratios of new jobs to the existing city labor force for the broader category in which these jobs fall are 66% and 41%, respectively.

Table 25. Expected New Workforce Demand for Additional Middle Skill Occupations

Occupation	Projected New Jobs*
Computer Support Specialists	462
Drafters, Engineering, and Mapping Technicians	184
Life, Physical, and Social Science Technicians	359
Health Technologists and Technicians	189
Total	1,194

Source: Karl F. Seidman Consulting

*Based on 11 industries with demand for these occupations

Overall, Cambridge and the Metro North Workforce Development Area (WDA) region have a tight labor market with strong employment growth and low unemployment rates. Cambridge’s unemployment rate was 2.2% in May 2019, and it averaged 2.0% over from June 2018 to May 2019. From 2014 to 2018, the city average annual resident unemployment rate ranged from 3.6% to 2.2%. Similarly, the Metro North region unemployment rate averaged 2.4% during this period. As noted in the *2018 Greater Boston Workforce Blueprint*, when the regional unemployment rate was 3%, “employers can expect to have some difficulty in filling positions as there is little excess supply of labor”. With these tight labor market conditions, employers in Cambridge are likely to have difficulty finding workers and also may face increased employee turnovers as workers have more opportunities for career advancement and are less concerned about the risk of job loss.

Despite the low citywide rate, disparities exist with several demographic groups facing much higher levels of unemployment. Based on 5 year American Community Survey data from 2012-2016, the Black non-student unemployment rate was 9% compared to 5% for all of Cambridge with the Black male unemployment rate at 26% and the Hispanic male rate 12%. Male unemployment, at 8%, was twice the rate of females (4%) for this period. Unemployment levels also varied with education level for Cambridge residents 25 and older: those without a high school education had a 44% unemployment rate and those with only a high school degree or equivalent experienced 12% unemployment, compared to 5% for Cambridge workers with a bachelor’s degree or higher. This data indicate that segments of the Cambridge labor force that are a potential source of workers to address the employment demand at new development and

can benefit from targeted education and training services. As shown in Table 26, there is a pool of unemployed workers with experience in several occupational groups in which new development projects are expected to generate significant demand. For some occupations where demand is modest, unemployed workers with related experience have the potential to fill all or most of these jobs. However, their share is a fraction of demand for several occupation groups including Office and Administrative Support; Life, Physical and Social Sciences; and Architecture and Engineering.

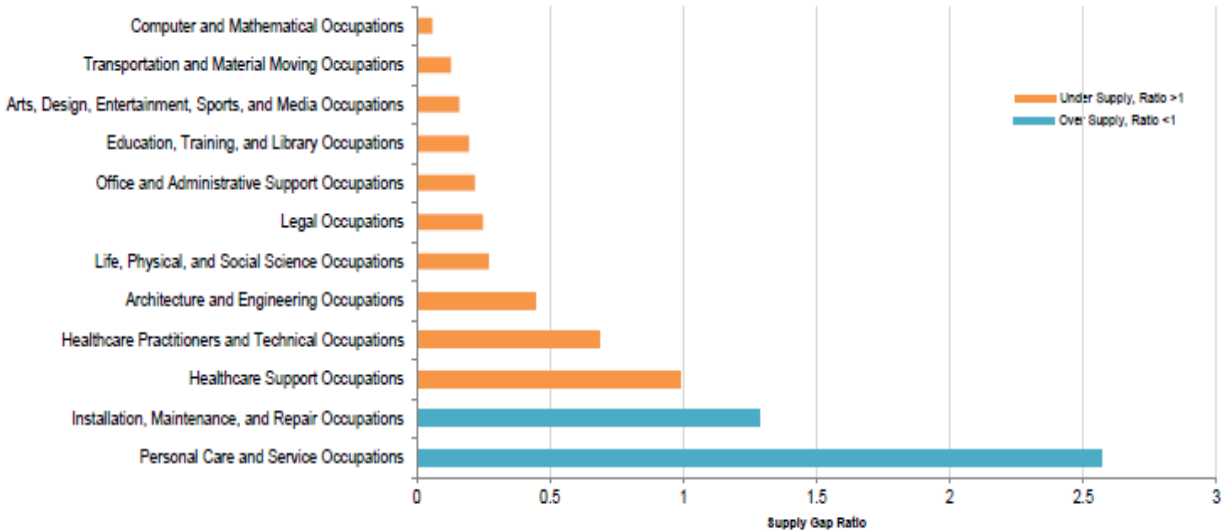
Table 26. Top Previous Occupations of Unemployed Cambridge Workers

Occupation	Count	Percent Projected Demand at New Development
Transportation and Material Moving	514	372.5%
Arts, Design, Entertainment, Sports, and Media	321	86.8%
Architecture and Engineering	265	27.8%
Sales	233	31.9%
Construction Trades	228	876.9%
Office and Administrative Support	228	14.0%
Management	216	14.2%
Life Physical and Social Science	214	16.7%
Education, Training, and Library	195	29.4%
Building and Grounds Cleaning and Maintenance	153	104.1%

Source: Umass Donahue Institute from ACS 2016 5-Year Sample via IPUMs

Several regional studies have identified labor supply gaps that provide further evidence that expanded and targeted skills training will be needed to address employment demand resulting from new Cambridge development projects. As part of its FY2018 Plan prepared under the federal Workforce Innovation and Opportunity Act (WIOA), the Metro North Regional Employment Board conducted an analysis of occupations with labor supply gaps. Figure 8 presents the result for “middle skill” level occupations that require some level of post-High School education or training. Ten occupational groups face a labor supply gap with eight having a supply of workers less than one-half of the projected demand for workers. These ten occupational groups account for 62% of the projected new employment at Cambridge development projects over the next ten years.

Figure 8. Metro North Regional Supply Gap of Occupations Requiring Less than a Bachelor’s Degree



Occupations requiring a postsecondary non-degree award, some college, or an Associate’s Degree, 100+ Demand Index only

Source: Metro North Workforce Development Area Greater Boston Region WIOA Local Plan FY2018

An earlier 2015 report by Northeastern University’s Dukakis Center¹⁴ projected future occupation demand for Massachusetts and its Workforce Investment Areas and analyzed the capacity of the existing vocational education system to address this expected demand. This study found that the majority of job openings in Massachusetts through 2022 will not require a college degree and can be met through no more than a vocational education or associate’s degree. The four occupational groups with the highest projected job openings are:

- Food Preparation and Serving Related Occupations;
- Office and Administrative Support Occupations;
- Sales and Related Occupations; and
- Healthcare Practitioners and Technical Occupations.

These four categories account for 25% of the expected jobs at future Cambridge development projects.

The report also assessed the capacity of the existing vocational education system across WDA regions to fill projected job openings through 2020 in positions that do not require a college degree. Although changes in the economy and education and training system likely have altered specific demand and supply parameters over the past four years, its findings on occupations for which the educational system is not keeping pace with employer demand are probably still

¹⁴ *Meeting the Commonwealth’s Workforce Need: Occupation Projections and Vocational Education*, Northeastern University Kitty and Michael Dukakis Center for Urban and Regional Policy, October, 2015.

relevant and thus are included in this report. Table 27 presents the study results for the Metro North WDA region. Across all occupations, it found that 10.9% of future jobs requiring a high school degree or less, 5.2% of job openings requiring some college; and 11.3% of job openings requiring an associate's degree will be filled through the region's vocational high schools and community colleges. However, this capacity varies considerably across occupational groups, as shown in Table 27. Metro North high schools and community colleges have the highest capacity to meet expected job openings for Installation, Maintenance and Repair occupations, Architectural and Engineering occupations, Construction and Extraction occupations, and Arts, Design, Entertainment, Sports, and Media occupations, at 32.7%, 27.7% 19.6%, 18.5% and 18.1%, respectively. In the Architecture/Engineering and Arts/Design/Media categories, capacity is especially strong for jobs requiring only a high school degree—supplying two-thirds to 86% of expected demand. Capacity to fill jobs requiring an associate's degree is also relatively strong, at close to two-thirds, for the Architectural and Engineering and one-third for Arts, Design, Entertainment, Sports, and Media occupations.

Table 27. Supply of Annual New Graduates from College and Vocational Education System, Metro North Workforce Investment Area

Occupational Group	Supply as Share of Openings by Educational Level				
	HS Graduate	Some College	Associate's Degree	BA	Total
Management Occupations	19.6%	5.0%	9.4%	3.2%	6.4%
Business and Financial Operations Occupations	22.5%	4.3%	5.6%	2.6%	2.4%
Computer and Mathematical Occupations	45.1%	8.8%	14.5%	5.1%	9.6%
Architecture and Engineering Occupations	86.4%	35.1%	62.6%	10.4%	27.7%
Life, Physical, and Social Science Occupations	25.6%	1.7%	9.1%	2.2%	4.3%
Community and Social Service Occupations	5.3%	2.3%	2.4%	1.1%	2.2%
Legal Occupations	6.8%	0.7%	2.1%	1.4%	1.9%
Education, Training, and Library Occupations	32.7%	8.4%	13.5%	8.6%	12.4%
Arts, Design, Entertainment, Sports, and Media Occupations	64.7%	14.0%	32.4%	9.4%	18.1%
Healthcare Practitioners & Technical Occupations	13.0%	4.4%	13.3%	4.1%	7.1%
Healthcare Support Occupations	11.6%	7.8%	11.1%	5.5%	9.5%
Protective Service Occupations	0.0%	0.0%	0.0%	0.0%	0.0%
Food Preparation and Serving Occupations	5.5%	2.9%	7.4%	1.9%	4.2%
Building, Grounds Cleaning and Maintenance Occupations	0.0%	0.0%	0.0%	0.0%	0.0%
Personal Care and Service Occupations	14.4%	5.5%	10.8%	2.6%	9.2%
Sales and Related Occupations	1.4%	0.5%	1.8%	1.0%	1.0%
Office and Administrative Support Occupations	2.2%	1.6%	3.0%	1.3%	1.9%
Construction and Extraction Occupations	19.6%	15.4%	30.4%	10.5%	18.5%
Installation, Maintenance, and Repair Occupations	36.8%	26.8%	41.9%	13.8%	32.7%
Production Occupations	17.7%	13.2%	23.7%	10.6%	16.6%
Transportation and Material Moving Occupations	1.8%	1.8%	2.2%	0.8%	1.7%
Total All Occupations	10.9%	5.2%	11.3%	3.8%	7.1%

Source: *Meeting the Commonwealth's Workforce Needs: Occupation Projections and Vocational Education*

Based on the Northeastern Report, the vocational education supply capacity is especially low in the Metro North Workforce Investment Area for three occupational areas in which future development projects are expected to generate many new jobs:

- Computer and Mathematical at 9.6% of expected job openings;
- Life, Physical, and Social Science at 4.3% of expected job openings;
- Food Preparation and Serving at 4.2% of expected job openings; and
- Office and Administrative Support at 1.9% of expected job openings.

These findings highlight the need for expanded investment in vocational and job training to prepare Cambridge residents and workers for the type of jobs that will arise from the city's future development projects.

Education Barriers to Employment for Cambridge Residents

Beyond the occupational labor imbalances discussed above, Cambridge residents may not have access to jobs at new development projects due to more general barriers to employment, such as lack of English language skills, poor reading and math skills, low educational attainment, limited work experience, prior criminal record and other factors. Cambridge has a well-educated and experienced labor force with 83% of workers 25 to 64 having a college education or higher (see Table 28). Nonetheless, there is a portion of the city's labor force and adult residents not in the labor force that face language and educational barriers to employment. Based on the Donahue Institute analysis, there are 10,717 non-student adult residents either unemployed, employed or not in the labor force with less than a college education. Just over 13% of them, or 1,421, do not speak English well and thus may need ESOL services as shown in Table 29. Job training providers also reported that some participants from other countries who can speak English well lack sufficient English reading and writing skills to do well in the academic components of technology-oriented training programs and thus needs additional English language education that is different than ESOL. There are also 2,641 Cambridge workers and residents not in the labor force without a high school education (see Table 30), and thus may need high school equivalency and other adult basic education services to be able to participate in occupation skills training programs.

**Table 28. Educational Attainment, Cambridge Labor Force
Age 25 to 64**

Educational Level	Number	Percentage
Less than HS	1,188	2.0%
HS Graduate	3,392	5.7%
Some college or associate's degree:	5,538	9.2%
Bachelor's degree or higher	49,801	83.1%
Total	59,919	100.0%

Source: American Community Survey, 2017 5-Year Sample

Table 29. Estimated Need for English Language Education among Cambridge Workers and Low Skill Non-Student Population Not in the Labor Force

Population Group	Estimated Number in Cambridge	Percent Not Speaking English Well	Estimated Number Needing ESOL
Unemployed workers, 25 + Less Than College	584	6.0%	35
Employed Workers , 25+ Less Than College	8,222	15.0%	1,233
Not In Lobar Force Due to low skills, 18- 65	1,911	8.0%	153
Total	10,717	13.26%	1,421

Source: Donahue Institute from 2016 5-Year Sample Via PUMS

Existing services in Cambridge appear to be sufficient to address the need for English language and Adult Basic education service and do not face a funding gap to fill through a new Employment Contribution. Cambridge’s Learning Center currently provides funding to provide ESOL training to 520 people annually. Over ten years, these programs have the capacity to serve 5,200 people, which is close to the 5,923 total low- and middle-skill jobs projected to be created by new development in Cambridge. Furthermore, with 1,421 worker and potential workers estimated to need ESOL, the current level of services appears capable of addressing these workers’ ESOL needs over several years. Cambridge Learning Center’s ABE program is smaller in scale servicing 59 people annually, or 590 over a ten-year period. Although the estimated need for these services appears larger than current services, the Cambridge Learning Center has experienced declining demand for its ABE programs in recent years and scaled back the number of classes due to this lower demand. While there does not appear to be a need to expand funding for these services through an Employment Contribution, it is possible that a need for ABE services exists but the current design of ABE services or other barriers are preventing residents from accessing them. City staff should continue to assess this situation and revisit the need for additional ABE funding in future workforce development studies and nexus study updates.

Table 30. Cambridge Adults Age 18 to 64 Years with Less than High School Education

Education Level	Number
In Labor Force, 18 to 64 Years Old	1,188
Not in the Labor Force, 18 or older	1,453
Total	2,641

Source: American Community Survey, 2017 5-Year Sample and Donahue Institute from 2016 5-Year Sample Via PUMS

Maximum Determined Jobs Contribution and Recommendations

Cambridge’s future commercial development will create demand for workers in several occupational areas that are accessible to low-income and moderate-income residents, but insufficient workforce training capacity and funding exists to address this demand. With the

tight city and regional labor market and limited capacity in the existing workforce development system to address new demand, additional investment in job training will be necessary to fill this demand for workers. Although Cambridge has an existing labor force in the occupations needed to fill this demand, the number of projected new jobs in many occupations is a large share of the corresponding city labor force and this is unlikely to be met with current city labor force in needed occupations. Moreover, the goal of a new Employment Contribution policy would be to expand opportunity for Cambridge's low-income and moderate-income workers. Therefore, it is necessary to provide training and education to connect and prepare unemployed and under-employed workers for these new jobs rather than relying on existing employed residents to fill them. Finally and most importantly, the current workforce development services does not have sufficient funding and capacity to provide skills training and education needed to fill a large share of jobs at new development projects with unemployed and less skilled Cambridge residents. For all these reasons, a new employment contribution is warranted to fund job training and workforce development services to address the potential occupational and skills gaps among Cambridge residents to meet labor demand at the projected new development, particularly in occupations that can benefit low-income and lower skilled workers. In considering an Employment Contribution policy, it is important for Cambridge to recognize that the labor market operates on regional scale in which it cannot guarantee that expanded training of city residents will result in their employment by local firms. Employers draw on an available labor force from the entire metropolitan area (and beyond) and Cambridge residents who receive city-funded training may be employed in jobs outside the city. Additional efforts beyond expanded funding of education and training services will be needed to the goal of connecting low- and moderate-income residents to job opportunities created by new development. These include creating strong connections between training providers and firms in major development projects and working to change hiring practices and priorities such that employers value and are committed to hiring newly trained city residents.

To quantify this need, the analysis focused on those low-skill and middle-skill occupations that are most accessible to low-income and moderate-income residents. Table 31 summarizes the 10-year projected new employment for these occupations, which total 5,932 jobs. To estimate the cost of training services for these jobs, a range goals for filling 10% of 50% if these positions with Cambridge residents is used. A wide range was used since the City of Cambridge does not currently have a resident employment goal for permanent jobs at new development projects. Under this range, the level of services needed varies from supporting training for 593 to 2,966 low-income and moderate-income Cambridge residents (see Table 32).

**Table 31. Development Projects' Estimated Ten-Year Job Growth
in Low-Skill and Middle-Skill Occupations**

Occupation Category or Position	Estimated New Jobs at Projected Development
Office and Administrative Support Occupations	1,627
Food Preparation and Serving Related Occupations	984
Sales and Related Occupations	731
Computer Support Specialists	462
Personal Care and Service Occupations	374
Life, physical, and social science technicians	359
Healthcare Support Occupations	222
Production Occupations	208
Installation, Maintenance, and Repair Occupations	201
Health technologists and technicians	189
Drafters, Engineering, and Mapping Technicians	184
Building, Grounds Cleaning and Maintenance Occupations	147
Transportation and Material Moving Occupations	138
Protective Service Occupations	59
Construction and Extraction Occupations	26
Farming, Fishing, and Forestry Occupations	21
Total	5,932

Source: Karl F. Seidman Consulting Services

Table 32. Number of Occupation Training Positions for Varied Resident Employment Goals

Goal for City Resident Share of New Jobs	Number of Training Slots Needed
10%	593
20%	1,186
30%	1,780
40%	2,373
50%	2,966

To quantify a maximum determined Employment Contribution under this range of resident employment goals, the funding gap to train 593 to 2,966 Cambridge residents was estimated. First the existing supply of existing training services utilized by Cambridge residents from the major occupation training providers was determined through data provided by these providers. These training providers included:

- Cambridge Learning Center health care occupational training;
- Just-A-Start Corporation biomed and IT training programs;
- Per Scolas IT training program;
- Rindge Technology Arts vocational training in ten occupations;
- Bunker Hill Community College certificate and Associates degree programs; and

- Training vouchers funded under the federal Workforce Opportunity and Innovation Act and provided through the Metro North Regional Employment Board.

A “training supply gap” was estimated as the difference between the number of number of training slots needed to achieve a specific goal and the current supply of training used by Cambridge residents among the above training providers. Both low and high training supply estimate were used to account for variability in capacity and the number of Cambridge residents served. Table 33 shows the low and high capacity for each training provider. Second, the cost per participant cost to train adults for different occupations was used to estimate the cost to provide skills training. Cost data from training programs in Cambridge and Boston were used and a weighted average cost was calculated based on the distribution of projected new jobs by occupation. The weighted average cost per training position was \$6,802 and this amount was used to estimate the total cost to address the estimated training supply gap. The estimated funding gap under each resident employment goal is shown in Table 34, along with the maximum determined Employment Contribution on a per square foot (PSF) basis. To obtain the PSF Employment Contribution, the applicable funding gap was divided by the ten-year projected 5,840,000 square feet of non-residential development.

A training supply and funding gap exists when the resident employment goal is 30% or higher, reflecting the existing capacity to train 1,080 to 1,300 Cambridge residents over ten years. Maximum determined Employment Contribution levels vary from a low of \$.82 PSF to a high of \$2.20. The low contribution level is to train Cambridge resident to fill 30% of the expected low and middle skill jobs at new development, based on accessing the low level of existing training capacity. The high amount is needed to reach a goal of filling 50% of these new jobs with Cambridge residents and utilizing the low level of existing training service.

Table 33. Estimated Skills Training Supply for Cambridge Residents

Educational Program or Funding Source	Low Training Supply	High Training Supply
Cambridge Learning Center- Health	30	30
Just A Start Biomed	12	19
Just A Start IT	10	17
Per Scolas	4	12
Rindge Technology Arts	12	12
Metro North WIB ITAs	9	9
Bunker Hill Community College	31	31
Total	108	130
Ten Year Amount	1,080	1,300

Source: Karl F. Seidman Consulting Services

**Table 34. Funding Gap and Maximum determined Employment Contribution
Under Different Resident Employment Goals**

Cambridge Resident Employment Goal	Ten-Year Training Positions Needed	Existing Training Supply - Low	Existing Training Supply - High	Gap- Low Supply	Gap: High Supply	Funding Gap at Low Supply	Funding Gap at High Supply	PSF Employment Contribution Low Supply	PSF Employment Contribution High Supply
10%	593	1,080	1,300	None	None	\$0	\$0	\$0	\$0
20%	1,186	1,080	1,300	None	None	\$0	\$0	\$0	\$0
30%	1,780	1,080	1,300	700	None	\$4,761,522	\$0	\$0.82	\$0
40%	2,373	1,080	1,300	1,293	1,073	\$8,795,212	\$7,298,733	\$1.51	\$1.25
50%	2,966	1,080	1,300	1,886	1,666	\$12,828,901	\$11,332,423	\$2.20	\$1.94

Source: Karl F. Seidman Consulting Services

Review of Current Ordinance and Policy Options

Cities across the country have implemented policies to generate funding to address the impact of commercial development on affordable housing demand for more than three decades. Many California communities have enacted such programs, and they are also found in other states, such as Washington, Colorado, Florida, and New Jersey. Locally, Boston, Cambridge Somerville and Barnstable County have implemented such programs. This section reviews the current Incentive Zoning Ordinance, considers several policy options for changing the application of the housing contribution and assesses the impact of the new maximum determined housing and employment contribution rate on Cambridge's competitiveness for attracting businesses and development.

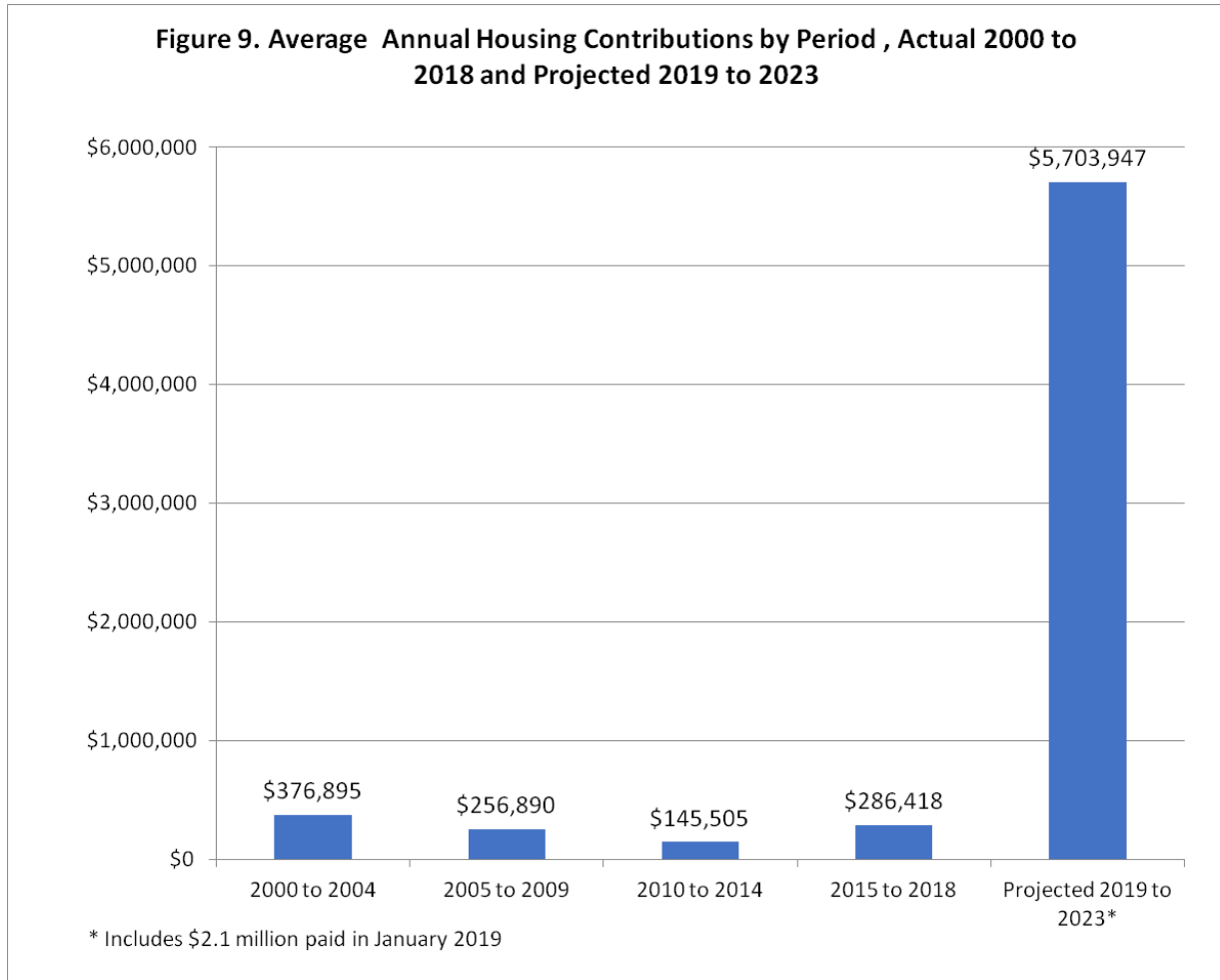
Current Ordinance

Cambridge's current policy was established in 1988 with the adoption of the Incentive Zoning Ordinance (IZO). In 2015, the IZO was amended to increase the housing contribution rate and change the policy's application to new development. With these amendments, housing contributions are required for non-residential development projects (including commercial, industrial, institutional and research and development) with over 30,000 square of new construction, substantial rehabilitation or change in use from one that does not require housing contributions to a use that does require them. While prior to the 2015 amendments, housing contributions were only required for projects seeking special permits to increase the density or intensity of use, the project size, obtain changes in dimension requirements or parking requirements, they are now required for all projects over 30,000 gross square feet with the specified use, independent of how they are permitted. Cambridge also eliminated a 2,500 square foot exemption and raised the housing contribution rate from \$4.58 to \$12.00 per gross square foot with three scheduled one dollar annual increases in the rate occurring on September 28, 2016 through September 28, 2018. Annual increases in the rate also occur based on annual changes in the Consumer Price Index for the Boston metropolitan area or a similar index. With these changes, the current Housing Contribution rate is \$17.10. Housing contributions are based on the rate effective when a project's building permit is issued and are made in a single payment prior to the issuance of the project's certificate of occupancy.

Impact of 2015 Ordinance Changes

The combined impact of the higher rate and broad application of housing contributions to most non-residential development will have a major impact on affordable housing funding generated by housing contribution. With the multi-year lead time for projects to move from permitting into construction completion and occupancy, this increase is just beginning to materialize and is projected to grow significantly to reach a magnitude of over \$5 million annually during the next five years. In January 2019, Cambridge received a \$2,109,176 payment for a single project (399 Binney Street) that exceeded the \$1,787,754 in housing contributions collected over a ten-year period from 2004 to 2013. Assuming that all Incentive Zoning Projects with a building permit issued as of January 1, 2019 are constructed and issued a certificate of occupancy between 2019 and 2023, Cambridge will receive \$28.5 million in housing contributions, or \$5.7 million per

year. Figure 9 compares the average annual amount of housing contributions during five and four-year periods from 2000 through 2018 with the projected annual average contribution during 2019 to 2023. Over the next five years, annual housing contributions are expected to average 15 to 39 times the level received in these prior period, These data show that the 2015 changes to the Incentive Zoning Ordinance will significantly expand funding for affordable housing and help mitigate this impact from large non-residential development.



Policy Options

There are several potential policy changes to the current Incentive Zoning Ordinance that are important to consider and that are discussed in this section:

- Changing the project size threshold for which housing (and potentially employment) contributions apply;
- Varying the housing and job contribution rate by type of use; and

- Varying the contribution rate by geography or development district.

Furthermore, if Cambridge decides to establish an employment contribution, it will need to establish policies for deploying the funds generated by this new contribution.

Size Threshold. Communities vary in the size threshold that triggers the application of housing contributions or linkage fees. In Boston, their equivalent Development Impact Project (DIP) fee applies to developments over 100,000 square feet, while in Somerville, it applies to developments over 30,000 square feet. Some communities have no minimum size threshold for the application of commercial linkage/housing contribution fees and collect them from projects independent of size. This is particularly true in California where a majority of communities with such fees do not have a size threshold¹⁵.

In Cambridge, large projects over 30,000 square feet are the most common type of non-residential developments and account for the vast majority of newly developed non-residential space. At year end 2018, there were nine permitted non-residential projects with less than 30,000 square feet that together totaled 167,196 gross square feet. Five projects were retail, two were hotels and two were for office or research and development space. This compares to 28 projects with almost 6 million square feet that were 30,000 square feet or larger. Moreover, the combined square feet of projects under 30,000 square was less than the average size of a single project over 30,000 square feet. Consequently, removing or lowering the project size threshold will have a minimal impact on housing contribution revenue. Small projects also are more likely than large projects to face challenges to their financial feasibility given increasing land and construction costs, and thus, could face negative impacts from the additional costs incurred with higher housing and job contributions.

Variation of Housing and Employment Impacts by Use. Three factors shape how different uses impact the demand for affordable housing in Cambridge:

1. The density of employees in the occupied space;
2. The percentage of employees expected to seek housing in Cambridge; and
3. The share of employees with earnings at the low, moderate and middle-income levels.

The following table summarizes how these factors vary across six use categories and creates a composite impact index that combines all three factors.

¹⁵ *Jobs Housing Nexus Study*, Prepared for the City of San Diego, Prepared by Keyser Marston Associates, Inc., October 2010.

Table 35. Factors Affecting the Impact on Housing Demand by Use

Use	Employees per 1,000 SF (a)	Percent of Employees Demanding Housing in Cambridge (b)	Percent of Jobs with Salaries at Low, Moderate and Middle-incomes (c)	Composite Index 100 times (a*b*c)
R & D	2.00	11.3%	19.0%	4
Office*	3.08	13.3%	39.8%	16
Institutional+	1.67	26.5%	74.9%	33
Restaurant	8.33	12.3%	97.9%	100
Hotel	1.00	12.3%	95.2%	12
Retail/Personal Services*	2.00	12.3%	82.1%	20

Source: Karl F. Seidman Consulting Services

+Colleges and Universities only;*Weighted average for industries within use category

The greatest variations occur in employment density and employee earnings. For employment density, restaurants are highest at 8.33 workers per 1,000 square feet, or more than eight times that of hotels with only 1 worker per 1,000. The weighted share of employees with earnings below middle-income levels is also quite variable: R&D use is the lowest at 19%, which is less than one-fifth the percentage for restaurants (97.9%).

When all three factors are combined into a composite impact measure: R&D has the lowest impact on the need for affordable housing; hotel and office are the second lowest with three to four times the impact of R&D; retail and personal services and institutional uses are next at five and eight times the impact of R & D; and restaurants have by far the greatest impact at 25 times the impact from R&D use. A combination of very high employment density and low wages results in restaurants' high impact on affordable housing demand.

For the employment contribution, impacts on the demand for training services depend on both employment density and the share of low- and middle-skill jobs for each use. Table 36 presents these figures across uses along with an index similar to the one used for housing demand impacts. The lowest impact is for institutional and research and development while the greatest impact, as with housing demand, is for restaurants.

Table 36. Factors Affecting Impact on Training Demand for Low and Middle Skill Jobs

Use	Employees per 1,000 SF (a)	Percent of Low and Middle Skill Jobs (b)	Composite Impact Index 100 times (a*b)
R & D	2.00	29.7%	59
Office*	3.08	38.0%	117
Institutional+	1.67	32.7%	55
Restaurant	8.33	97.6%	813
Hotel	1.00	95.2%	95
Retail/Personal Services*	2.00	82.1%	164

Source: Karl F. Seidman Consulting Services

+Colleges and Universities only;*Weighted average for industries within use category

Based on impact alone, there is a case for varying the housing and employment contributions by use. Cambridge could establish a tiered fee schedule with different contribution rates for research and development, office, institutional, retail/personal service, hotel and restaurant uses.

However, Cambridge may choose to stick with a single contribution level for administrative simplicity and competitive factors. From an administrative perspective, the use may be difficult to determine for some projects and uses may change over time for a building. The first problem is most likely to occur for office and research and development uses since many of the life science facilities combine office and lab space and these can be interspersed in the same floor or laboratory. There would be an incentive for developers to classify mixed space as research and development space or to under-estimate office space if differential contribution rates were applied. Additional administrative complexities might result from the need to allocate common areas and shared uses (e.g., reception areas, conference rooms, etc.) among different uses. Furthermore, developers and building owners might seek a refund of housing contributions if the allocation of uses changed upon final occupancy. These problems can be addressed by having the contribution rate based on the predominant use in the building, but this would limit achieving the goal of relating the contribution rate to differential impacts. Another issue is that building uses often change over time: ground floor space may first be rented to a retail store and later converted to a restaurant. Similarly, a building might first have an office tenant and later be converted to institutional or R&D use. Cambridge could address this issue by basing the housing contribution rate on the initial use but this could create inequitable results between buildings with stable uses and those for which uses change more often. This problem seems greatest for buildings with a larger share of ground floor commercial space which may change more frequently between retail, restaurant and office uses.

Variation of Contribution Rates by Geography. The growing demand among large firms for space in the East Cambridge/Kendall Square area has resulted in much different rent levels across Cambridge. This is most pronounced for office rents, as shown in Table 37, in which East Cambridge rents are 69% higher than in West Cambridge and 31% higher than in Mid-Cambridge. Consequently, the market conditions and development economics in other parts of the city will be different than for projects in East Cambridge. With lower rents but similar construction and soft costs, projects outside East Cambridge will face greater challenges to feasibility and are more sensitive to changes in development costs. Since the capacity to support additional costs is related to the rental income that a project can generate, there is a case for varying housing and employment contributions for lower and higher rent development districts, as indicated by their rent levels. Seattle uses this approach varying its affordable housing impact fees by development zone. Boston applies a similar approach in its inclusionary housing policy, with three zones based on differences in median sales price and the cash payment in lieu of building housing units varying by zone.

Table 37. Office and Lab Rents by Cambridge Market Area, First Quarter 2019

Cambridge Market Area	Average Office Rent	Average Lab Rent
East Cambridge	\$88.06	\$86.26
Mid Cambridge	\$67.12	\$80.43
West Cambridge	\$52.20	\$64.36

Source: Lincoln Property Company Cambridge Office & Lab Market Report, First Quarter 2019

Employment Contribution Policies. As part of establishing an employment contribution policy, Cambridge will need to define its policy and process for how to deploy funds raised from employment contributions. There are two broad options for using employment contribution funds:

1. **Project-specific training** in which contributions collected from a project are used to train residents for jobs with employers at that specific project; and
2. **Citywide programs** in which funds collected from multiple projects are pooled and then awarded to training providers to provide training for jobs with employers throughout Cambridge.

The first option has several advantages but is challenging to implement. One advantage is the more direct connection between the fees collected and impacts generated by the project than with the citywide training approach. Secondly, this approach fosters relationships between the city and new employers around resident hiring, training and career ladder development that may be leveraged for future programs and benefits. Finally, in some cases, the availability of training dollars might serve as an incentive that helps retain or attract firms to Cambridge; this is most likely to be the case for small or mid-size firms that lack internal training resources. Project-specific training requires the engagement and cooperation of employers in a development, but the city’s working relationship for the project is with the developer. This places a burden on the city to establish these relationships and a willingness of developers to initially broker this process. Most developers interviewed for this study did not expect employers to be interested in creating training programs for low- or middle-skill positions since their greatest need is for high-skill workers. Another obstacle is that employers at a single project would need to hire a sufficient number of people for the same or similar positions for a program specific to the project to be feasible. Finally, the single project linkage fee revenue needs to be large enough to cover the full costs to implement the training program and related services. These last two conditions are more likely to exist for larger projects with employers that will be hiring many employees.

Although the second option does not directly leverage the employment and training opportunities presented by specific projects, it is easier to implement because it addresses hiring and occupational training needs among employers across Cambridge. It can pool employment contributions across projects to fund larger scale or more integrated programs and pool demand across employers to achieve economies of scale for programs. Secondly, by soliciting proposals and awarding funds through training providers, it builds on the existing employer relationships among these providers while also providing an incentive for them to expand relationship with new and growing employers in Cambridge. Citywide programs also increase opportunities to use funds to support training linked to higher paying jobs and career ladders initiatives that connect

to multiple Cambridge employers. Finally, it allows for the competitive awarding of funds across different occupations and program designs, and thus may allow the city to target funds to programs that are most likely to offer the best employment outcomes for residents.

A second policy issue is the city's goal for the percentage of low- and middle-skill jobs at new development projects to target for Cambridge residents. As noted in the prior section, this policy affects the scale of training services needed and thus the rate for an employment contribution. Labor markets and hiring typically operate on a regional or metropolitan level with employers drawing on the labor force across many communities. Since Cambridge's labor force constitutes 14.5% of the labor force for the Metro North labor market region (and an even lower share of the entire Boston metropolitan area), it is likely that employers will draw many, if not most, of their workers from outside of the city. On the other hand, based on the Donahue Institute study, there is a target population of almost 4,000 residents that the city is seeking to assist in gaining new or better employment. These include unemployed and underemployed workers and adults not in the labor force who face barriers to jobs that utilize their skills. The size of this target population suggests the potential to fill some share of the almost 6,000 expected jobs in new development projects that is large than the city's share of the regional labor force. Moreover, with 44.3% of employed Cambridge working at jobs within the city (according to the 2013-2017 American Community Survey), there is a strong tendency for Cambridge residents to be employed within the city. These two considerations filling 30% to 40% of jobs at new development with city residents may be an appropriate policy goal to guide setting the employment contribution rate.

Impact on Cambridge's Competitiveness

An important consideration in establishing the housing and employment contribution rate is the rate's potential impact on attracting new development and tenants. This is a concern since the combined maximum determined employment and adjusted housing contribution rates would be \$33.34 per square foot—almost double the current rate of \$17.10. It would also be almost three times that of Boston (\$10.81) and over two and one-half times Somerville's linkage fee rate (\$12.46). An increase in the housing contribution rate and potentially a new employment contribution add to development costs, which developers must offset through either paying less for land (or an existing building in the case of renovation projects), reducing their return on investment, or collecting higher rents from tenants. The last option, raising rents, may affect Cambridge's competitiveness in attracting businesses to new development projects. Cambridge is a highly desirable and unique location with its proximity to MIT, Harvard, and concentration of research activities and innovative firms. Moreover, the existing market is extremely tight with 2019 first quarter vacancy rates of 3.5% for office space and 1.6% for lab space¹⁶. The limited availability of space combined with Cambridge's desirable location may give developers more capacity to add all or part of any increase in housing/employment contributions onto tenant rents. A countervailing factor is that Cambridge has the region's highest rents well above competing locations in Boston and suburban communities. Far lower occupancy costs may allow other locations to become an attractive alternative to Cambridge, especially if other districts gain more

¹⁶ Colliers International Greater Boston Market Viewpoint, 2019 Quarter 1

technology firms and a reputation as productive centers for innovation and attracting highly skilled workers.

Tables 38 and 39 show the dollar and percentage impact on Cambridge office and laboratory rents for the maximum determined housing contribution and maximum employment contribution amortized over a 10 year lease¹⁷. If fully passed on to tenants, the combined contribution increase would raise East Cambridge office and laboratory rents by 2.5% and 2.6% respectively. For West Cambridge, the impact would be the highest with office rents increasing by 4.3% and lab rents by 3.5%. In comparison, average Cambridge office rents increased 19.2% and lab rents 16.8% from 2nd quarter 2017 to 2nd quarter 2019¹⁸.

Table 38. Impact of Maximum Determined Housing and Employment Contributions on Cambridge Office Rents

Market Area	Housing Dollar Impact	Employment Impact	Average Rent Class A+ B	Percentage Change
East Cambridge	\$1.96	\$.26	\$88.06	2.5%
Mid Cambridge	\$1.96	\$.26	\$67.12	3.3%
West Cambridge	\$1.96	\$.26	\$52.20	4.3%

Source: Karl F. Seidman Consulting Services
and Lincoln Property Company Cambridge Office & Lab Market Report, First Quarter 2019

Table 39. Impact of Maximum Determined Housing and Employment Contributions on Cambridge Laboratory Rents

Market Area	Housing Dollar Impact	Employment Impact	Average Rent Class A+ B	Percentage Change
East Cambridge	\$1.96	\$.26	\$86.26	2.6%
Mid Cambridge	\$1.96	\$.26	\$80.43	2.8%
West Cambridge	\$1.96	\$.26	\$64.36	3.5%

Source: Karl F. Seidman Consulting Services
and Lincoln Property Company Cambridge Office Lab Market Report, First Quarter 2019

Table 40 compares Class A office rents for Cambridge, the East and West Cambridge submarkets, competing areas in Boston, Inner Suburbs and the Route 128/West area with Lexington, Newton and Waltham. Both suburban market areas are the highest rent suburban locations and more likely to compete with Cambridge based on location and existing business base. Cambridge office rents are well above the Inner Suburbs and 128/West suburban market areas with East Cambridge rents over 130% above these suburban alternatives. West Cambridge office rents are close to 50% higher than competing suburban locations. Boston's Seaport and Financial District average Class A office rents are 17% above those in West Cambridge but significantly below East Cambridge by \$28. The Seaport is a key competing location for East Cambridge as Boston's Innovation District and with recent success in attracting biotech, IT and

¹⁷ These figures are based on a 270,000 gross square foot building with an assumption of 85% leasable space.

¹⁸ Lincoln Prop Company Cambridge Office Lab Market Report, Second Quarter 2017 and 2019 Second Quarter data from <http://www.lpcboston.com/research/cambridge-office-market/>

corporate headquarter leases, including several relocations from Cambridge. The potential \$2.22 per square foot rent impact from the maximum determined housing and employment contributions would add to the current rent differential between West Cambridge and suburban locations and bring its office rents closer to Boston’s Financial District (the difference would drop from \$4.93 to \$2.71). It would also add to the Seaport’s cost advantage over East Cambridge, raising the average Class A rent differential to almost \$20 per square foot.

Table 40. 2019 First Quarter Class A Office Rents in Cambridge, Boston and Suburbs

Community	Average Asking Rent Per Square Foot
Boston—Total	\$63.26
Boston—Seaport District	\$72.05
Boston—Financial District	\$61.68
Suburbs-128/West	\$37.58
Inner Suburbs	\$38.79
Cambridge	\$81.41
East Cambridge	\$89.33
West Cambridge	\$56.75

Source: Lincoln Property Company Cambridge, Boston and Suburban Market Reports, First Quarter 2019

With the current strong demand for office and lab space in East Cambridge, this modest increase in rents is unlikely to deter major life science, IT and other companies from locating in Cambridge or change Cambridge market dynamics. The increased pace of development, rising rents and strong demand for space in East Cambridge despite an almost \$12 increase in housing contributions since 2015 indicate that this part of the Cambridge market can absorb this magnitude of increased contributions. There is a larger risk that a large increase in contributions will impact future non-residential development in West Cambridge, by adding to its cost and rent differential with competing suburbs.

Table 41. Estimated Impact of Increased Contribution on Investment Returns for Different Total Development Costs (TDC) and Initial Return Thresholds

Equity Share of TDC	Return Before Change in Contribution Rate		
	20%	15%	10%
Equity at 40% of TDC			
TDC of \$800 per square foot	-1.11%	-0.84%	-0.56%
TDC of \$1000 per square foot	-0.90%	-0.68%	-0.45%
Equity at 30% of TDC			
TDC of \$800 per square foot	-1.46%	-1.09%	-0.73%
TDC of \$1000 per square foot	-1.18%	-0.89%	-0.59%

Source: Karl F. Seidman Consulting Services

When market conditions prevent developers from passing on increased housing and employment contributions to tenants or offsetting the cost with lower land (or other development) costs,

higher contribution rates will impact investment returns. To evaluate the potential impact on investment returns, it was assumed that the full costs of the maximum increase in housing and employment contributions was paid as developer or investor equity. The impact of this added investment on equity return was analyzed for an average size project of 270,000 square feet under scenarios with total development costs (TDC) at \$800 and \$1,000 per square foot and equity comprising 30% and 40% of TDC (with the balance provided by debt financing). Table 41 shows the change in the annual percentage return on equity investment resulting from the increased contribution costs under different return levels. Reduction in investment returns range from .45% (45 basis points) to 1.46% (146 basis points) with the largest negative impact occurring for projects with a 20% target return and 30% equity investment. At a 40% equity share and target returns of 10%, the return on investment declines by 45 to 56 basis points depending on total development costs. These impacts are potentially large enough to impact new investment, particularly for projects with equity returns closer to investor thresholds and that rely more heavily on debt financing.

Developers recognize the importance of addressing the city's affordable housing needs and expanding employment opportunities and are supportive contributing to addressing these issues through housing and potentially employment contributions. While developers recognize that the 2015 expansion and increase in housing contributions has not slowed development, they are concerned about the number of city fees and its overall impact on raising development costs. If there are additional fees, perhaps to address transportation and infrastructure needs, the full impact could slow development, especially if the economy goes into a recession. There were also mixed views on who would bear the cost of higher housing and/or employment contributions. Some developers think it can be absorbed through lower land costs while others don't see land values declining, and expect that increased housing/employment contributions will have to be borne by investors or tenants.

Recommended Housing and Employment Contribution Rate and Incentive Zoning Policies

The City of Cambridge established an Incentive Zoning Ordinance (IZO) in 1988 that requires developers to make a housing contribution to mitigate the impact of new office, research and development, and retail space on housing demand. Amendments to IZO in 2015 broadened its application to most non-residential development projects over 30,000 square feet, increased the housing contribution level to \$15.50 over three years and instituted an annual inflation adjustment of the contribution rate. The 2015 amendments also required Cambridge to review and update its housing contribution levels every three years. This report completed an updated nexus analysis to quantify the impact of future non-residential development on the demand for affordable low, moderate, and middle income housing in Cambridge and the recommended housing contribution rate to mitigate these impacts. It also assessed the impact of new development on employment opportunities for unemployed and low- and moderate-income Cambridge residents and the maximum determined rate for a potential contribution to address these employment impacts.

Housing Contribution. The analysis detailed in this report supports an increase in Cambridge's housing contribution rate under the Incentive Zoning Ordinance. A recommended increase in the contribution rate involves balancing public policy goals and considering both the need to address increased demand for affordable housing and the potential impacts of an increased rate on the city's future development. New demand for affordable and middle-income housing from projected new development of 5,840,000 square feet over the next 10 years is projected to total 722 units. All of these units require some level of subsidy to be affordable to low-income, moderate-income and middle-income households. The total required subsidy to build these units is \$322.8 million. Since federal and state resources contribute to meeting this subsidy for low- and moderate-income units, Cambridge's expected share from the housing contributions is 60.3% or \$194.7 million. When applied to the 5.84 million square feet of projected new development, this translates into a maximum determined housing contribution rate of up to \$33.34 per square gross square foot.

Since the maximum determined contribution rate would almost double Cambridge's current fee and be far higher than fees in Boston and Somerville, it poses risk to the city's regional competitiveness by further raising development costs and rents. Therefore, we recommend that Cambridge raise its contribution rate by \$6 by continuing its recent policy of incremental increases each year. The recommended \$6 dollar change would include an immediate \$2 increase to \$19.10 per gross square foot with annual \$1 increases over the next 4 years. Annual CPI increases would continue as now required in the Incentive Zoning Ordinance. With these CPI adjustments, this will likely bring Cambridge's housing contribution rate close to the mid-point between the current rate and maximum determined rate over the next several years. It is also recommended that Cambridge stay with a single citywide rate to simplify administration, avoid potentially divisive views over how different parts of the city are perceived and valued, and prevent unintended outcomes that might result from creating differential fees and development costs at district borders. In setting the final housing contribution rate, the City

Council should also consider the combined impact of any increase with other fees that might be established to address transportation, climate change mitigation and other development impacts. A final recommendation is to increase the time period for review and updating of the housing contribution rate and policies from three years to five years. The three-year period is too soon to evaluate the impact of changes given the multiyear time lag between policy changes and the completion of new development projects.

Employment Contribution. Although the report found a nexus between new development and the need for employment training services that provides the basis for establishing an employment contribution, it is recommended that Cambridge not establish an employment contribution at this time for three reasons. First, the required funding to mitigate the affordable housing impact from new development is far larger, by a factor of 20 to 30 times, than the funding required to address employment impacts. Given this situation, Cambridge may want to dedicate all of its development impact contributions to address this housing funding gap. Second, the amount of annual funds needed to address the training impacts from new development is on the scale of \$500,000 to \$1 million annually, which is feasible to address through Cambridge budget appropriations. Finally, revenue from a new employment contribution will not be collected for another four to five years given the both the need to obtain state legislative authorization and the time lag between when a new contribution would take effect and projects would be permitted and constructed.

If the Cambridge City Council decides to establish an employment contribution, a fee in the range of \$.82 to \$1.51 is recommended based on the goal of employing 30% to 40% of Cambridge residents at new jobs in development projects. The revenue from this fee and any future city workforce development appropriations should focus on preparing unemployed and lower skilled Cambridge residents for living wage jobs and occupations while recognizing that funding alone is insufficient to secure these desired employment outcomes. It must be complemented with efforts to engage employers to work with the city and training providers to design and implement skills training that addresses their skills needs, change their hiring practices to recognize the value of skills gained through this training versus more traditional academic degrees, and make city residence a consideration in their hiring decisions.

Appendix A:

**Table A-1
Illustrative Distribution of Affordable Rental Housing Units by Number of Bedrooms and Building Area**

	Number of Units	Average Unit Size	Total Living Area
One Bedroom	191	700	133,700
Two Bedroom	134	950	126,920
Three Bedroom	146	1,150	168,360
Total Units	471	911	428,980
Net Square Feet as a Percent of Gross Square Feet			70.0%
Total Gross Square Feet (GSF) (Rounded)			613,000
<i>Average Unit Size per GSF</i>			<i>1,301</i>

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Table A-2
Affordable Ownership Housing Units by Number of Bedrooms and Building Area

	Number of Units	Average Unit Size	Total Living Area
One Bedroom	78	700	54,320
Two Bedroom	72	950	68,400
Three Bedroom	101	1,150	116,610
Total Units	251	954	239,330
Net Square Feet as a Percent of Gross Square Feet			70.0%
Total Gross Square Feet (GSF) (Rounded)			342,000
<i>Average Unit Size per GSF</i>			<i>1,363</i>

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Table A-3
Conversion of Ownership Unit Household Income by Persons to Household Income by Bedrooms

Household Size	Annual Income ^{1/}	Number of Households	Aggregate Income	
Calculation of Aggregate Income				
Moderate Income Households				
1 Person	\$43,980	29	\$1,275,420	
2 Persons	\$54,328	19	\$1,032,230	
3 Persons	\$62,457	4	\$249,827	
4 Persons	\$81,673	28	\$2,286,837	
Total	\$60,554	80	\$4,844,314	
Middle Income Households				
1 Person	\$64,519	38	\$2,451,733	
2 Persons	\$81,513	34	\$2,771,446	
3 Persons	\$87,362	33	\$2,882,948	
4 Persons	\$96,539	66	\$6,371,595	
Total	\$84,665	171	\$14,477,721	
Units by Number of Bedrooms				
	One bedroom	Two bedroom	Three bedroom	All Units
Distribution of Units by Number of Bedrooms				
1 Person	100%	0%	0%	100%
2 Persons	20%	80%	0%	100%
3 Persons	0%	80%	20%	100%
4 Persons	0%	0%	100%	100%
Distribution of Moderate Income Aggregate Income by Unit Size				
1 Person	\$1,275,420	\$0	\$0	\$1,275,420
2 Persons	\$206,446	\$825,784	\$0	\$1,032,230
3 Persons	\$0	\$199,862	\$49,965	\$249,827
4 Persons	\$0	\$0	\$2,286,837	\$2,286,837
Total	\$1,481,866	\$1,025,646	\$2,336,802	\$4,844,314
Total Units by Size	33	18	29	80
Avg. Income per Unit by Size	\$44,905	\$56,980	\$80,579	\$60,554
Distribution of Middle Income Aggregate Income by Number of Bedrooms				
1 Person	\$2,451,733	\$0	\$0	\$2,451,733
2 Persons	\$554,289	\$2,217,157	\$0	\$2,771,446
3 Persons	\$0	\$2,306,358	\$576,590	\$2,882,948
4 Persons	\$0	\$0	\$6,371,595	\$6,371,595
Total	\$3,006,022	\$4,523,515	\$6,948,184	\$14,477,721
Total Units by Size	45	53	73	171
Avg. Income per Unit by Size	\$66,800.48	\$85,349	\$95,181	\$84,665

1/ Source: Karl F. Seidman Consulting Services. Weighted average annual household income based on anticipated mix of occupations and average occupational wages for based on projected commercial development in Cambridge. Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Table A-4
Sales Price Analysis by Unit Size / Number of Bedrooms based on Estimated Monthly Housing Costs Set at 30% of Household Income

<u>Assumptions</u>			
Mortgage	5% Assumed Downpayment		
	95% Percent of Price covered by Mortgage		
	4.08% Mortgage interest rate ^{1/}		
	0.72% Private Mortgage Insurance ^{2/}		
Assessed Values for Affordable Housing Units in Cambridge	\$150,000 One Bedroom		
	\$165,000 Two Bedrooms		
	\$180,000 Three Bedrooms		
Real Estate Taxes	\$6.29 per 1,000 of assessed values.		
Condo Fees, as a Percent of Sales Price	1.50% Middle Income unit		
	2.00% Moderate Income unit		
Unit Size / Number of Bedrooms			
	One Bedroom	Two Bedroom	Three Bedroom
Low Income Households	Not applicable because Low Income housing units are assumed to be all rental units.		
Moderate Income Households			
Sales Price	\$167,206	\$214,298	\$307,339
Downpayment	\$8,360	\$10,715	\$15,367
Monthly Payment Calculation			
First Mortgage Payment	\$766	\$981	\$1,407
Real Estate Taxes	\$79	\$86	\$94
Condo Fees	\$279	\$357	\$512
Total Monthly Payment	\$1,123	\$1,425	\$2,014
Monthly Payment Target	\$1,123	\$1,425	\$2,014
Middle Income Household			
Sales Price	\$260,268	\$334,869	\$373,816
Downpayment	\$13,013	\$16,743	\$18,691
Monthly Payment Calculation			
First Mortgage Payment	\$1,192	\$1,533	\$1,712
Real Estate Taxes	\$79	\$86	\$94
Condo Fees	\$325	\$419	\$467
PMI	\$74	\$95	\$107
Total Monthly Payment	\$1,670	\$2,134	\$2,380
Monthly Payment Target	\$1,670	\$2,134	\$2,380

1/ Average 30-year fixed mortgage rate per Bankrate.com.

2/ Moderate and middle income households earning less than \$75,000 annually are assumed to utilize the One Mortgage Program (http://www.mhp.net/homeownership/homebuyer/one_mortgage.php) that waives paying Private Mortgage Insurance (PMI) through participating lenders, many of which are located in Cambridge. Half of moderate income households are assumed to have PMI. PMI costs "between \$40 and \$80 per month for every \$100,000 borrowed" or an average of 0.72% according to Freddie Mac.

Source: Massachusetts Housing Partnership; City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

Table A-5
Calculation of Subsidy Required for New Affordable Rental Units per Square Foot of Projected Non-Residential Development

	All Units	Low Income	Moderate Income	Middle Income
Number of Units	471	200	187	84
Total Development Cost	\$284,131,000	\$120,650,106	\$112,807,849	\$50,673,045
Total Subsidy Required	\$240,534,000	\$120,145,106	\$89,742,849	\$30,646,045
Percent TDC that is Subsidy	84.7%	99.6%	79.6%	60.5%
Derivation of Commercial Square Footage Subject to Housing Contribution				
Total Commercial Square Footage	5,840,000	5,840,000	5,840,000	5,840,000
Subsidy Required per Square Foot of New Commercial Development	\$41.19	\$20.57	\$15.37	\$5.25

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.

**Table A-6
Calculation of Subsidy Required for New Affordable Ownership Units per Square Foot of
Projected Non-Residential Development**

	All Units	Moderate Income Middle Income	
Number of Units	251	80	171
Total Development Cost	\$157,295,000	\$50,133,865	\$107,161,135
Total Subsidy Required	\$82,258,000	\$31,845,865	\$50,412,135
Percent TDC that is Subsidy	52.3%	63.5%	47.0%
Derivation of Commercial Square Footage Subject to Housing Contribution			
Total Commercial Square Footage	5,840,000	5,840,000	5,840,000
Subsidy Required per Square Foot of New Commercial Development	\$14.09	\$5.45	\$8.63

Source: City of Cambridge; Karl F. Seidman Consulting Services; and ConsultEcon, Inc.