GLOBEMASTER CORRIDOR TRANSITION MASTER PLAN UPDATE

Prepared for the City of Long Beach

January 2018

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Part I - Workforce Trends and Employment Opportunities

Economy

By the fourth quarter of 2017, Long Beach and Signal Hill (208,600 jobs) trailed behind the state of California as a whole in overall job growth since the fourth quarter of 2010 (12.7% vs. 16.3%). Since the late stages of 2010, Long Beach and Signal Hill have experienced lower growth overall than the greater Los Angeles-Long Beach-Anaheim, CA MSA. As of the end of 2017, Long Beach and Signal Hill were both behind the larger MSA in growth by 1.1 percentage points (12.7% to 13.8%), adding just over 23,000 jobs since the end of 2010. Figure 1 below reflects the percentile change in overall employment from 2010 to 2017 for comparison regions.

FIGURE 1: OVERALL CHANGE IN EMPLOYMENT FROM 2010 TO 2017 (REGION)[1]
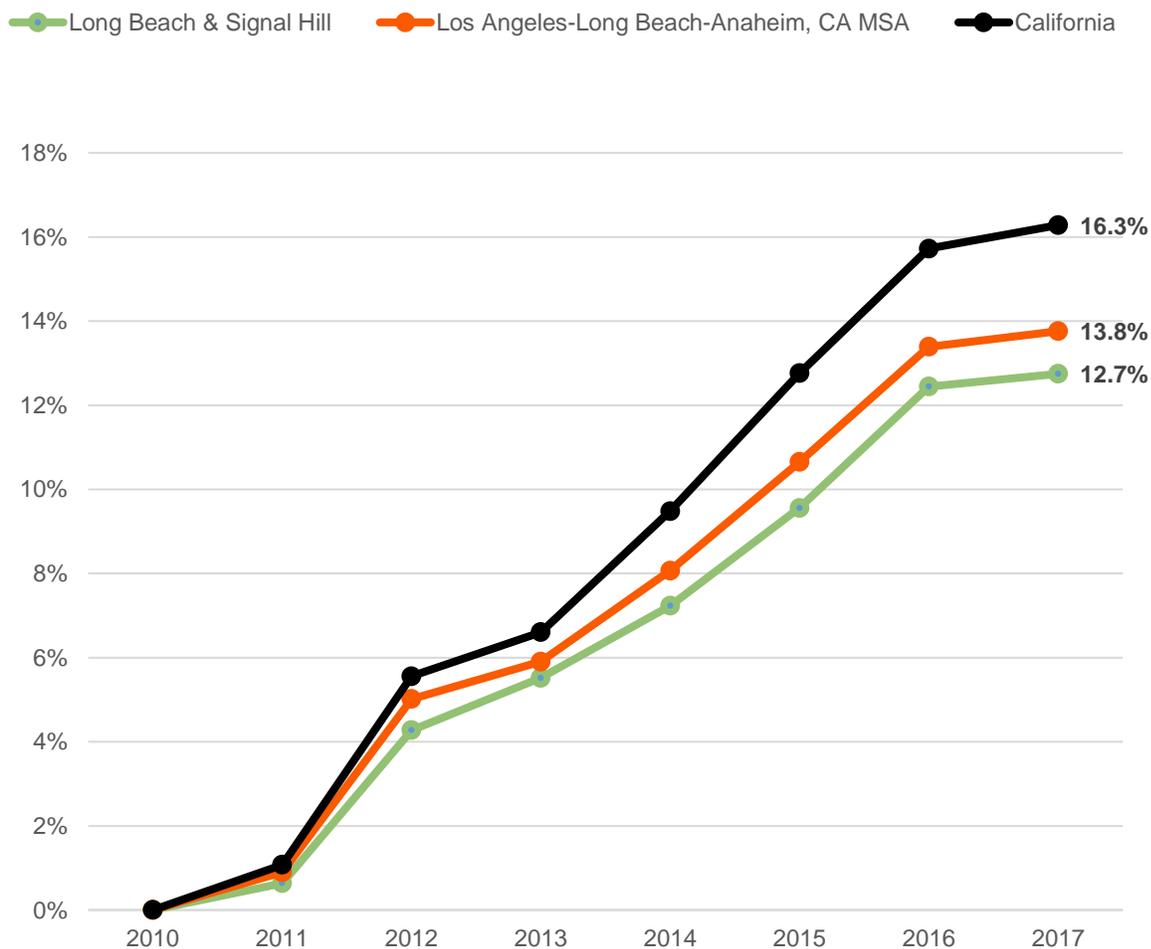
The following figure displays the unemployment level of all Long Beach and Signal Hill residents versus those throughout California. The unemployment rate in the Long Beach and Signal Hill region fell to 4.6% in January 2017, slightly higher than California (4.2%). In January 2010, the unemployment rate for Long Beach and Signal Hill residents was 13.9%, more than three times the January 2017 rate. The labor force participation rate in Long Beach and Signal Hill in 2016 was 66.2%, higher than that of California (63.4%).[2]

FIGURE 2: LONG BEACH AND SIGNAL HILL HISTORIC UNEMPLOYMENT RATE (JAN 2010 TO JAN 2017)[3]
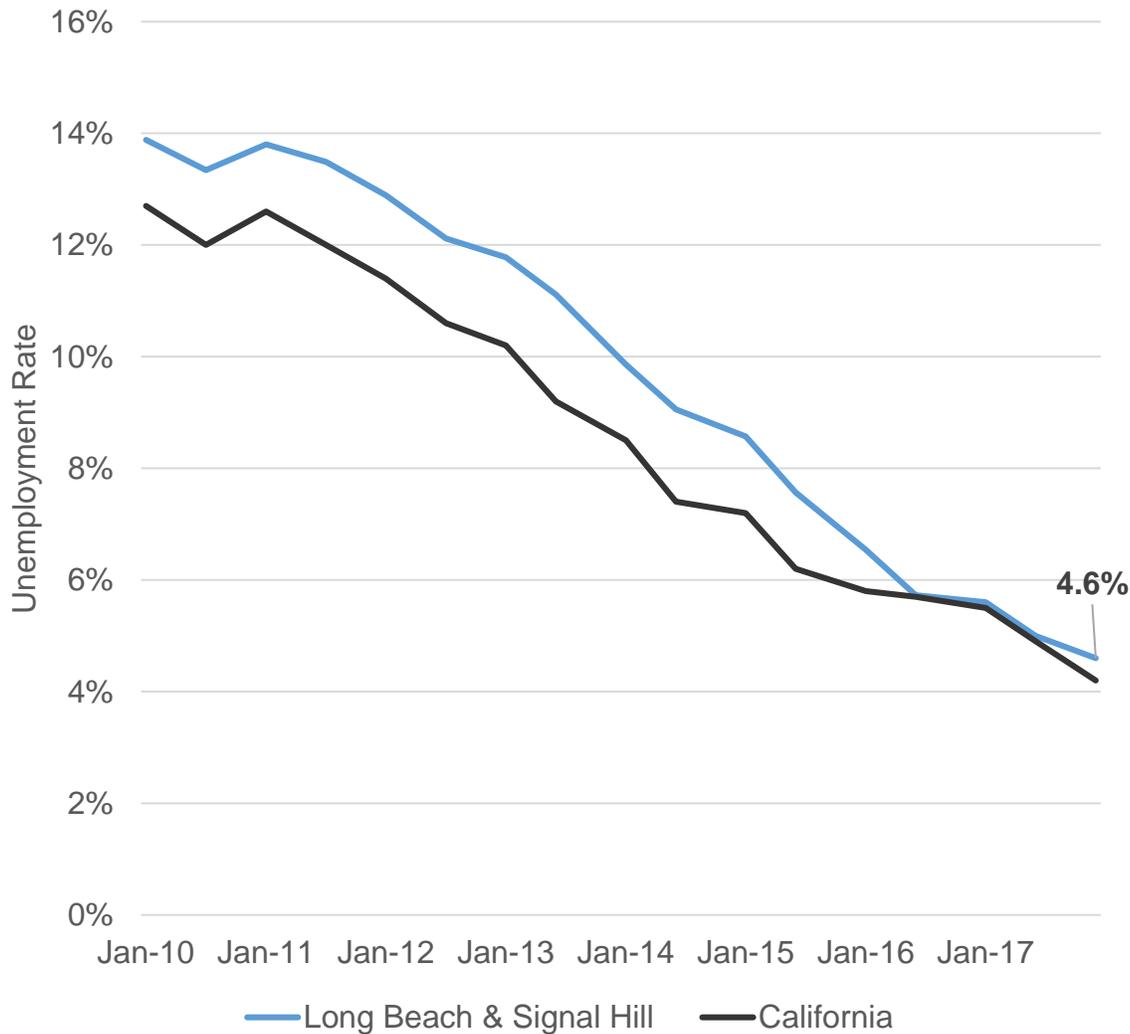
Regional Employment by Industry

Several traditional industries have undergone strong growth since 2010, with Healthcare outpacing them all at 64.2% growth. This is a higher growth rate than Healthcare in the larger regional MSA and California. Accommodation and Food Services growth in Long Beach and Signal Hill experienced higher growth than the industry's growth in the MSA (32.4% vs. 30.1%) and California as a whole (32.4% vs. 27.7%). Agriculture, Manufacturing, and Information in Long Beach and Signal Hill had fewer total jobs in 2017 when compared to 2010 (Figure 4).

FIGURE 3: INDUSTRY CHANGE IN EMPLOYMENT BY REGION FROM 2010 TO 2017[4]

- Long Beach & Signal Hill
- Los Angeles-Long Beach-Anaheim, CA MSA
- California

Healthcare: 64.2%, 54.2%, 49.2%
Accommodation & Food Svcs.: 32.4%, 30.1%, 27.7%
Arts, Entertainment & Rec.: 27.4%, 29.9%, 23.1%
Construction: 19.1%, 32.3%, 38.1%
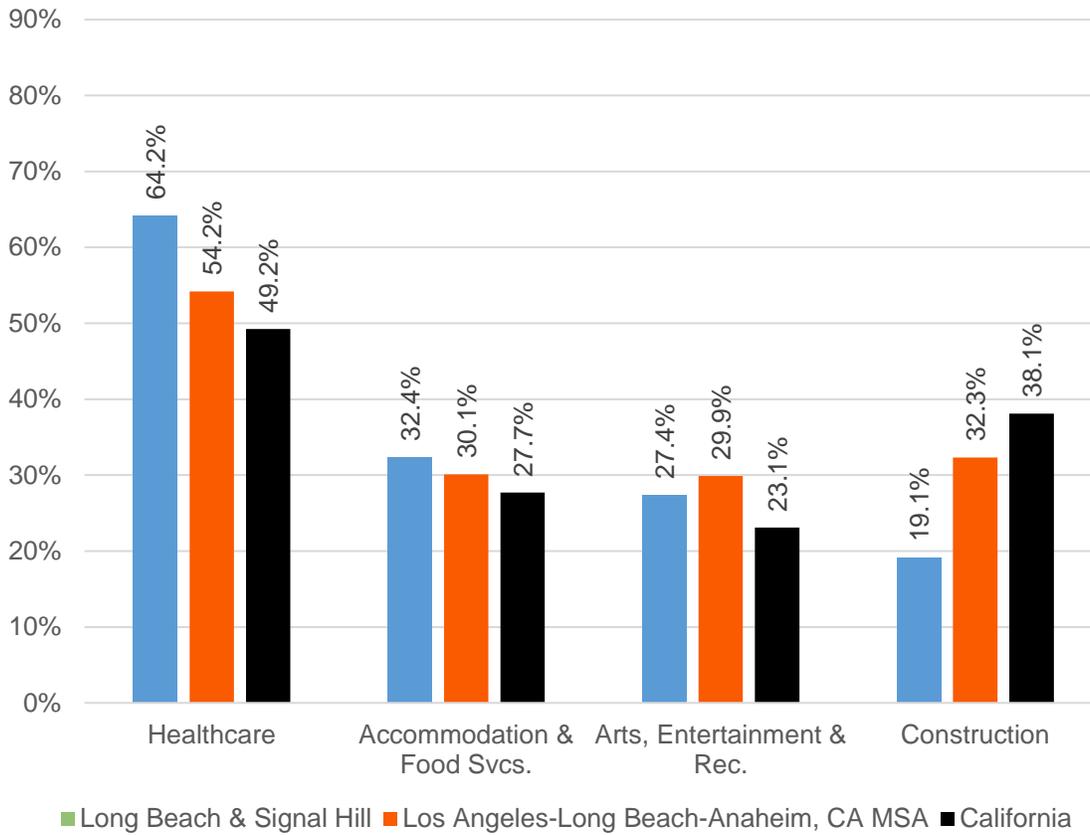
[4] Source: EMSI 2017 Q4 QCEW and Non-QCEW employment

Legend: ■ Long Beach & Signal Hill ■ Los Angeles-Long Beach-Anaheim, CA MSA ■ California
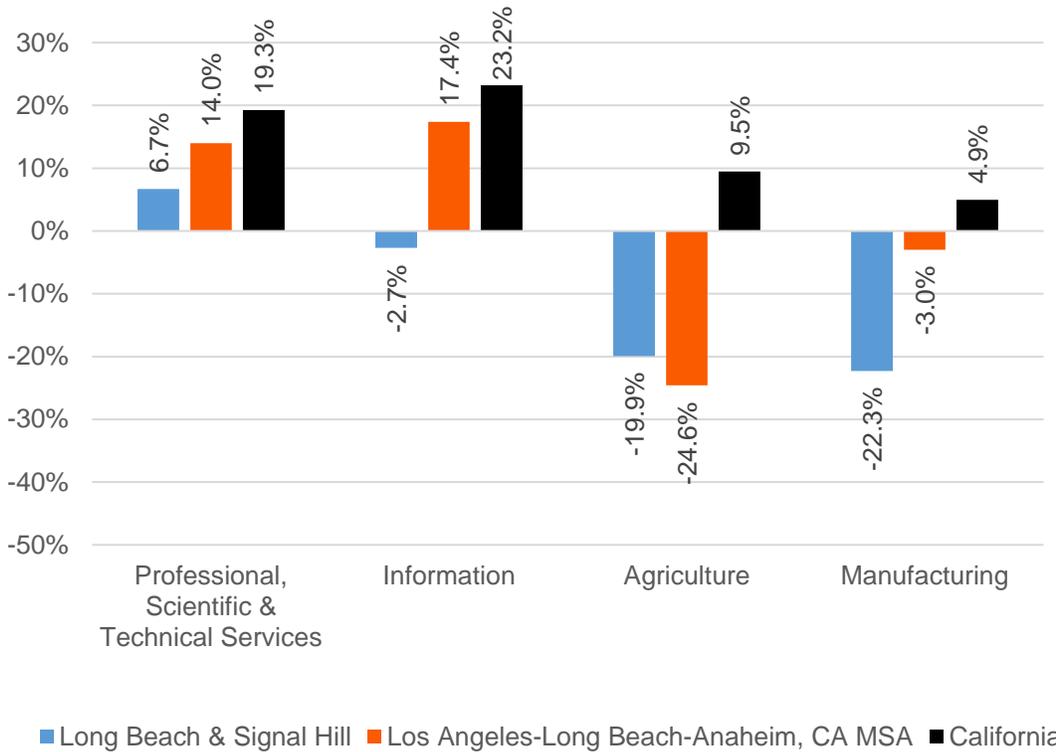
Long Beach and Signal Hill Occupational Profile

The unemployment rate, number of jobs created, number of people employed, and the size of the workforce - all these general indicators have value when looking at Long Beach and Signal Hill's economy, but they also mask some critical information, starting with the reality **that not all jobs are equal**. An entry-level job that pays minimum-wage with limited training and on-the-job skill development is considerably less valuable than a high-paying, full-time position with full benefits that continually develops and trains an individual for increasing levels of responsibility.

A recent study by David Autor examined changes in the nation's occupational profile. Autor provided an in-depth examination of the quality and quantity of the jobs that employers have demanded over the last 30 years. In his analysis, Autor developed an occupational segmentation that BW Research has also used in regional occupational analyses. This occupational segmentation technique delineates all occupations into one of three tiers. The occupational tiers are broadly defined as follows:

Tier 1 Occupations include managers (Chief Executives, Financial Managers, and Sales Managers), professional positions (Lawyers, Accountants, and Physicians) and highly-skilled technical occupations, such as scientists, computer programmers, and engineers. These occupations are typically the highest-paying, highest-skilled occupations in the economy. In 2017, the average wage for Tier 1 occupations in Long Beach and Signal Hill was $48.82 an hour or approximately $101,500 a year (assuming a 40-hour work week for the entire year).

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[5] Source: EMSI 2017 Q4 QCEW and Non-QCEW employment

Tier 2 Occupations include sales positions (Sales Representatives), teachers, and librarians, office and administrative positions (Accounting Clerks and Secretaries), and manufacturing, operations, and production positions (Assemblers, Electricians, and Machinists). These occupations have historically provided the majority of employment opportunities and could be referred to as middle-wage, middle-skill positions. In 2017, the average wage for Tier 2 occupations in Long Beach and Signal Hill was $24.37 an hour or approximately $50,700 a year (assuming a 40-hour work week for the entire year).

Tier 3 Occupations include protective services (Security Guards), food service and retail positions (Waiters, Cooks, and Cashiers), building and grounds cleaning positions (Janitors), and personal care positions (Home Health Aides and Child Care Workers). These occupations typically represent lower-skilled service positions with lower wages that require little formal training and/or education. In 2017, the average wage for Tier 3 occupations in Long Beach and Signal Hill was $13.79 an hour or approximately $28,700 a year (assuming a 40-hour work week for the entire year).

As Figure 5 illustrates, occupational Tiers have experienced differing overall rates of growth since 2010. Tier 3 occupations have fared better than Tier 1 or Tier 2 occupations, despite losing employment between 2012 and 2013. Since the beginning of the economic recovery in 2010, Tier 3 jobs expanded by 17%, while Tier 2 jobs increased by 11% and Tier 1 jobs grew by 7%.

FIGURE 5: PERCENTAGE CHANGE IN LONG BEACH AND SIGNAL HILL OCCUPATIONAL TIER EMPLOYMENT FROM 2010 TO 2017[6]
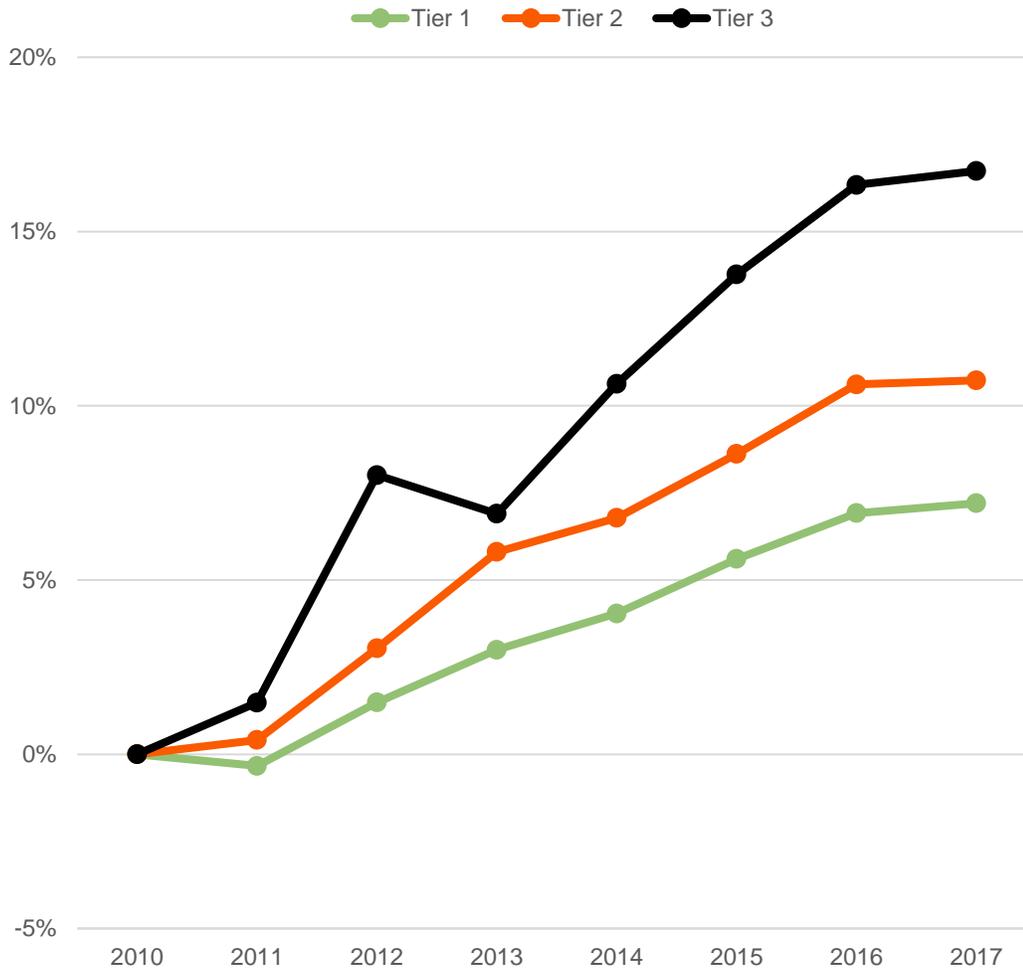
People

The total population in the Long Beach and Signal Hill area was 481,197 people in 2016, representing 3.6% of the Los Angeles-Long Beach-Anaheim, CA MSA. Just over a quarter of the population in Long Beach and Signal Hill was 18 or younger in 2016, slightly higher than the proportion in California as a whole. Just under 19% of Long Beach and Signal Hill residents was 55 or older in 2016, this is compared to just over 21% for the larger regional MSA and 22% in California.

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[6] Source: EMSI 2017 Q4 QCEW and Non-QCEW employment

Long Beach & Signal Hill ■ Los Angeles-Long Beach-Anaheim, CA MSA ■ California
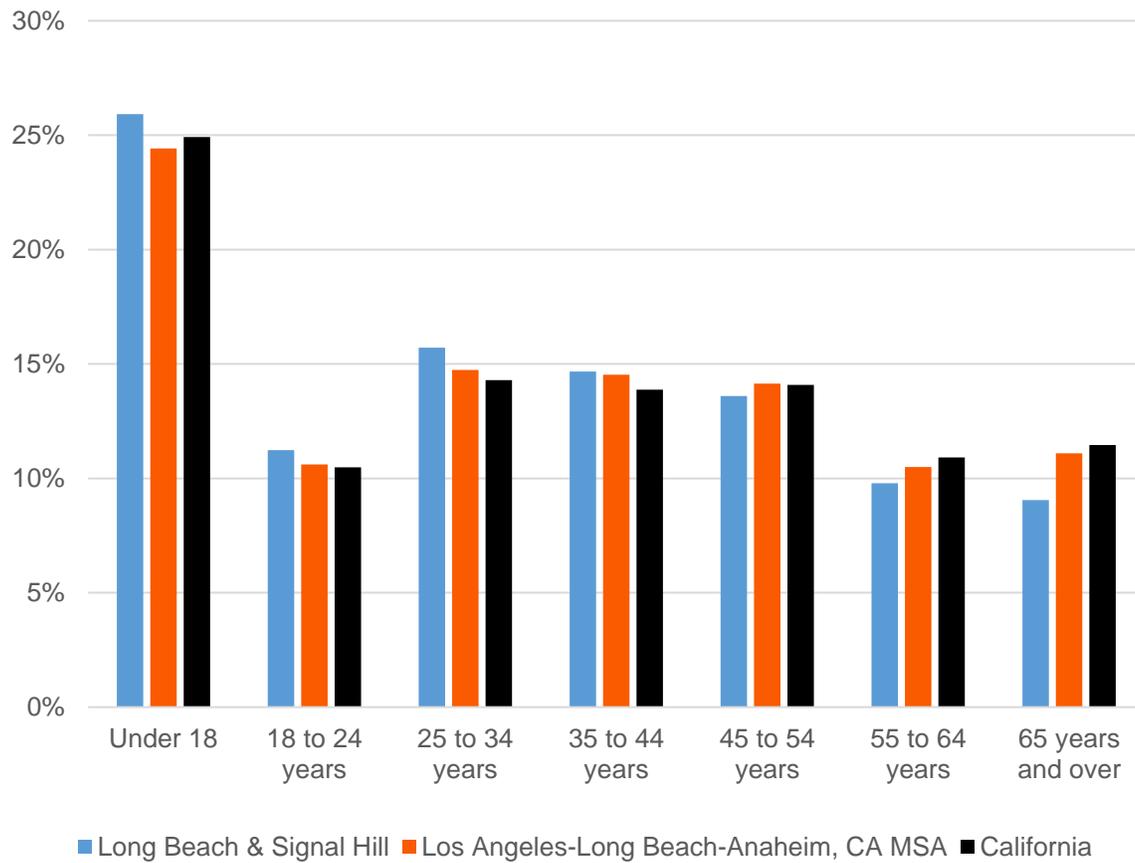
The Long Beach and Signal Hill area is home to a lower proportion of residents possessing a bachelor's degree or more (30%) when compared to the larger MSA (31%) and California as whole (31%).

[7] Source: American Community Survey (ACS) 2016 5-year estimates
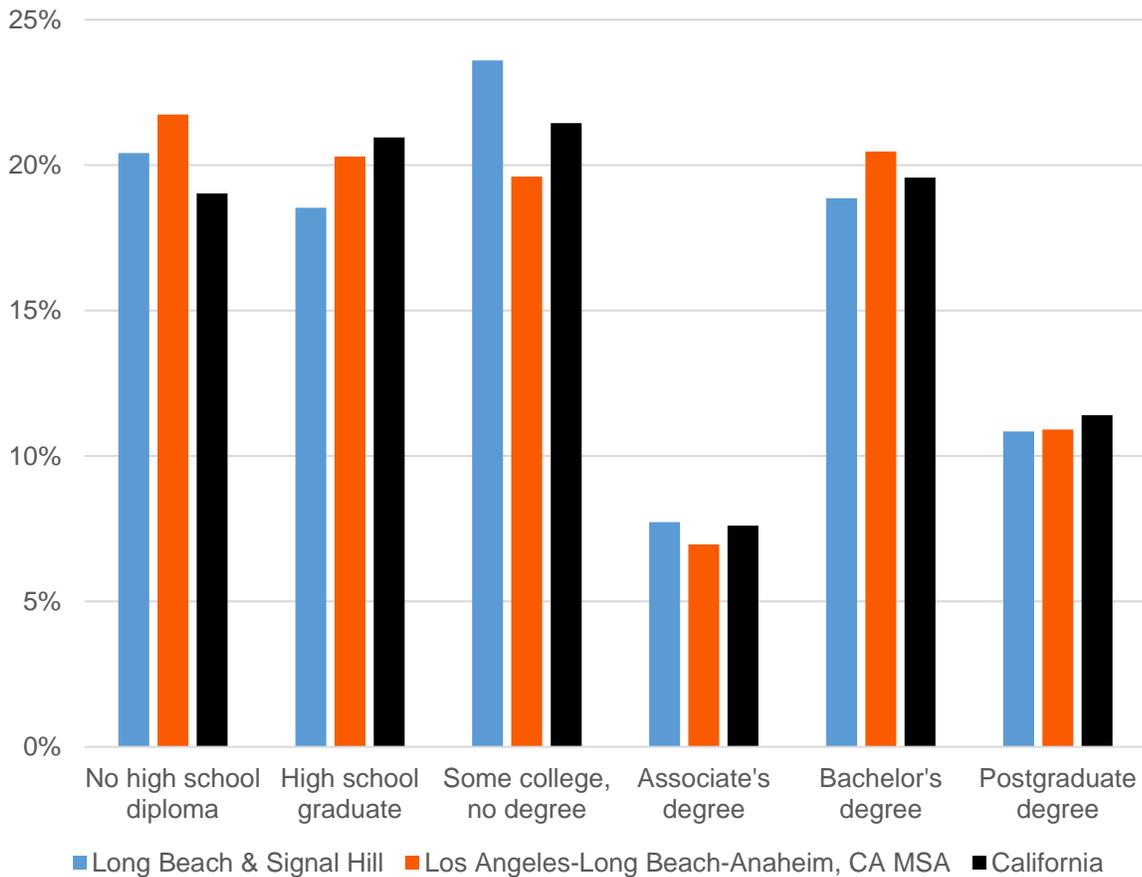
The Long Beach and Signal Hill area is home to a lower median household income ($55,518) in comparison to the Los Angeles-Long Beach-Anaheim, CA MSA ($62,216), and the state of California ($63,783). Approximately one-fifth (20%) of all residents in Long Beach and Signal Hill are living below the federal poverty level (Los Angeles-Long Beach-Anaheim, CA MSA: 17% and California: 14%) and over one-tenth of households (12%) are receiving food stamps (Los Angeles-Long Beach-Anaheim, CA MSA: 10% and California: 11%).[9]

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[8] Source: Source: American Community Survey (ACS) 2016 5-year estimates
[9] Source: Source: American Community Survey (ACS) 2016 5-year estimates

The following figure illustrates the breakdown of the population by ethnicity for Long Beach and Signal Hill, the Los Angeles-Long Beach-Anaheim, CA MSA and California.[10]

FIGURE 8: ETHNICITY BY REGION (2015)[11]

■ Long Beach & Signal Hill ■ Los Angeles-Long Beach-Anaheim, CA MSA ■ California
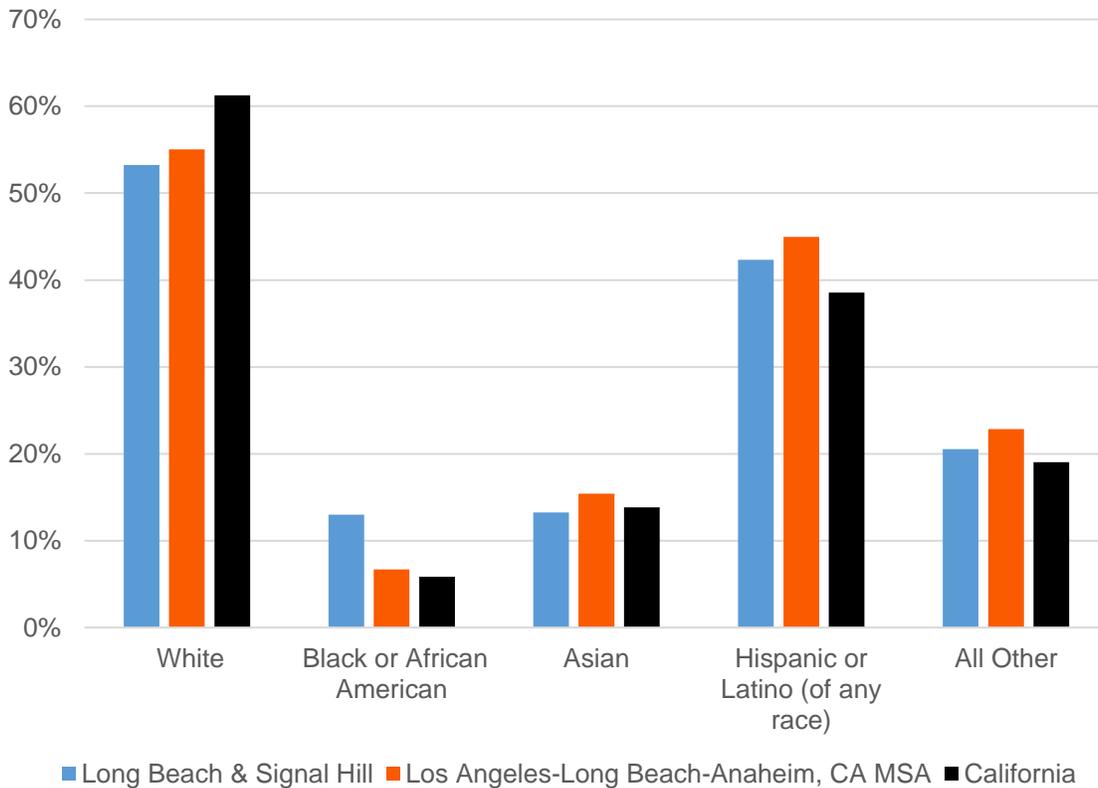
Education

The number of STEM completions at Long Beach and Signal Hill's postsecondary institutions represented 1.8% of all STEM completions in California during the 2015-2016 school year. Long Beach and Signal Hill STEM completions totaled 1,896 total awards (includes certificates and 2-year awards, 4-year awards, and postgraduate awards).

Workforce

There are several ways of examining how the region's residents are prepared to work for regional employers. One way is to compare how residents of Long Beach and Signal Hill in the labor force (identified as the resident workforce) and those working or employed in Long Beach and Signal Hill (regardless of where they live) look in terms of the general occupational categories and skills that they provide.

Long Beach and Signal Hill has a larger resident workforce than the total amount of workers employed in the region (resident workforce: 227,402; employed in the region: 206,449). As in previous years, the largest gaps between the resident workforce and those employed in the region are found in management,

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[10] The percentages of White, Black or African American, Asian, and All Other sum to 100%. These ethnicities are combined categories that include Hispanic and non-Hispanic individuals.
[11] Source: American Community Survey (ACS) 2016 5-year estimates

business, science, and arts occupations and service occupations. This signifies that Long Beach and Signal Hill is generally an exporter of higher-skilled workers, such as those in management, business, science, and arts occupations, and an importer of lower-skilled workers, such as those in production, transportation, and material moving occupations.

FIGURE 9: RESIDENT WORKFORCE VS. WORKING IN THE REGION BY OCCUPATIONS[12]

■ Long Beach and Signal Hill Workforce   ■ Working in Long Beach and Signal Hill
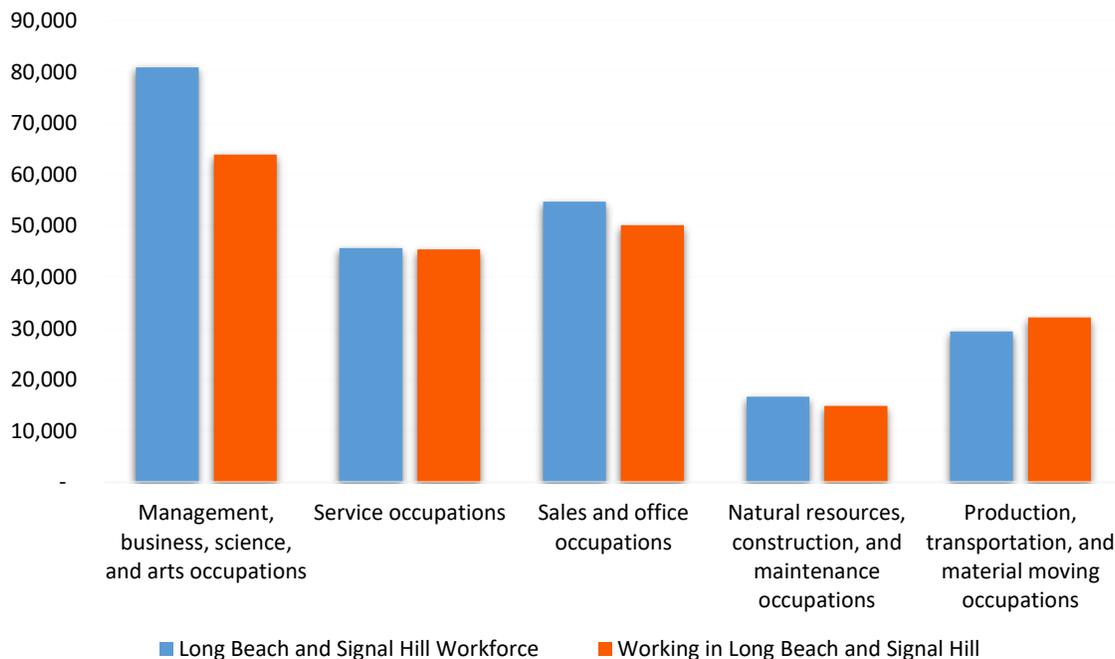
Housing

Thirty-three percent of home owners with a mortgage and forty-six percent of renters allocated over a third of their household earnings to housing in 2016. Two-thirds (66%) of all households Long Beach and Signal Hill were renters in 2016.

There is negative side to the relative high cost of housing in the Long Beach and Signal Hill besides the cost itself; medium to low wage earners will more likely live further away from the locations in which they work, contributing to higher traffic volume and congestion (a scenario that is playing out currently in Silicon Valley[13]). Those that pay more for housing will have less for other essentials such as food, clothing, utilities, health care, etc. Furthermore, high costs are detrimental to first-time home buyers or those medium to low wage earners looking to move to the region for work.

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[12] Source: American Community Survey (ACS) 2016 5-year estimates and EMSI 2017 Q4 QCEW and Non-QCEW employment
[13] See: http://sanfrancisco.cbslocal.com/2016/02/16/study-bay-area-cant-keep-up-with-job-income-growth-in-silicon-valley/
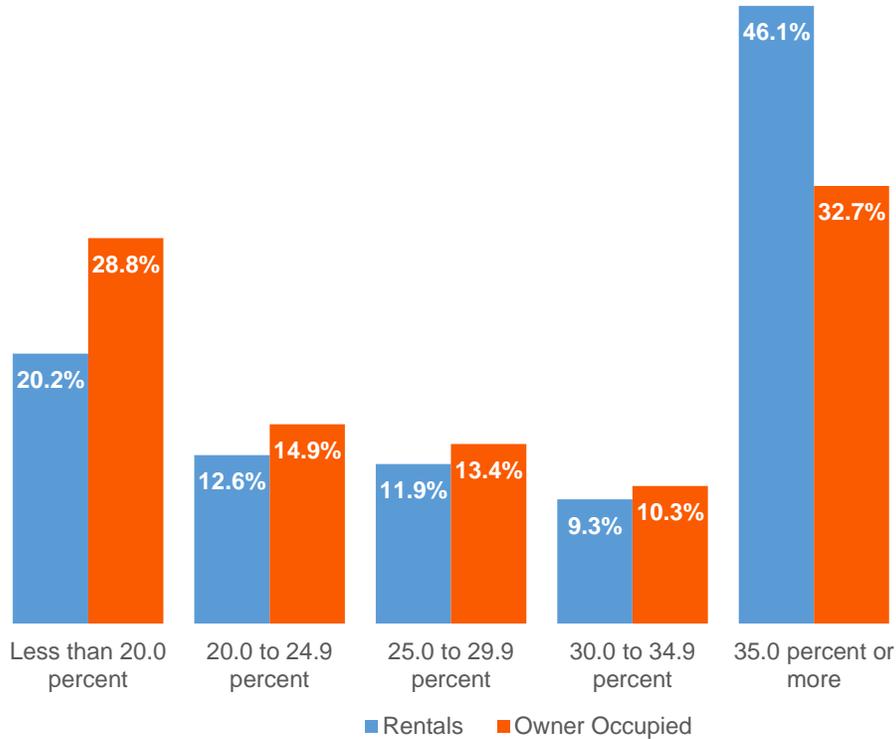
Commute

Nearly 200,000 workers aged 16 or over utilized a vehicle to travel to work in the Long Beach and Signal Hill in 2016.[15]

- Car, truck, or van – drove alone: 164,057
- Car, truck, or van – carpooled: 20,593
- Public transportation (excluding taxicab): 14,888

Forty-seven percent of all commuters 16 years of age and older in Long Beach and Signal Hill spent at least 30 minutes or more getting to work in 2016.

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[14] Source: American Community Survey (ACS) 2016 5-year estimates
[15] Doesn't include walking, bicycling, or motorized bikes and scooters.

- Car, truck, or van -- drove alone
- Car, truck, or van -- carpooled
- Public transportation (excluding taxicab)

82.2%
10.3%
7.5%

[16] Source: American Community Survey (ACS) 2016 5-year estimates

FIGURE 12: TRAVEL TIME TO WORK FOR WORKERS 16 YEARS AND OLDER BY REGION (2016)

■ Long Beach & Signal Hill

■ Los Angeles-Long Beach-Anaheim, CA MSA

■ California
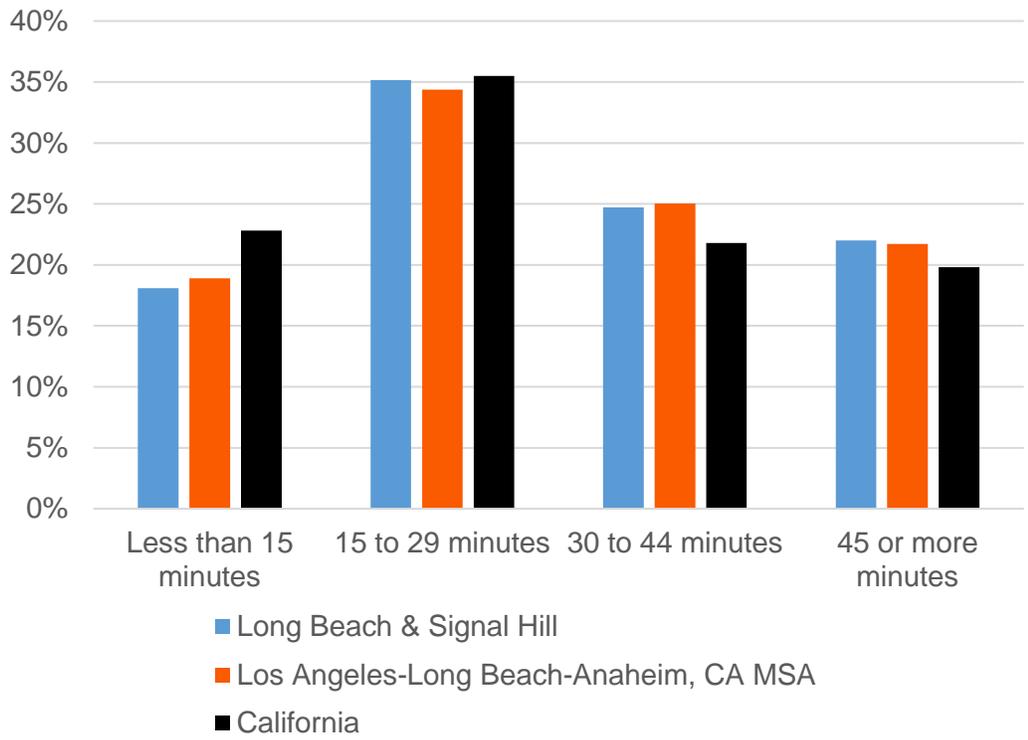
Part II - Cluster Mapping Analysis

The following memo identifies the potential industry clusters of focus for Long Beach and the wider Los Angeles-Long Beach-Anaheim, CA Metropolitan Statistical Area (MSA). The industry clusters were identified based on numerous factors, including;

- Total employment
- Average annual wages of workers
- Growth potential (based on past growth 2010-2017)
- Occupational composition (high-skill, medium-skill, low-skill)

All data for this memo can be attributed to EMSI 2017 Q4 QCEW and Non-QCEW employment.[17]

Identified Clusters

Below is a brief description of the industry clusters that were examined for the Los Angeles-Long Beach-Anaheim, CA MSA. The industry clusters contain a mix of export-oriented and population serving industry clusters. These clusters represent 32% of all employment within the MSA.

- **Healthcare** includes the diagnosis, treatment, and prevention of disease, illness, injury, and other physical and mental impairments. Healthcare is delivered by a wide range of practitioners in medicine, chiropractic, dentistry, nursing, pharmacy, etc. This industry cluster includes ambulatory care services, hospitals, and residential care facilities. Healthcare employs **583,485 workers** (3.9% of all cluster jobs located in Long Beach) in 2017 with an **average annual wage of $61,505** ($61,122 in Long Beach). The cluster has expanded employment by over 77,400 workers since 2010 (15% growth).

- **Business Services** consists of supportive service industries for businesses in the Los Angeles-Long Beach-Anaheim, CA MSA (advertising agencies, tax preparation services, public relations agencies, human resources consulting services, etc.). This cluster employs **570,183 workers** (2.3% of all cluster jobs located in Long Beach) and has an **average annual wage of $66,140** ($67,612 in Long Beach). The industry cluster increased employment by nearly 17% when pegged to 2010, or approximately 81,100 more workers.

- **Finance, Insurance & Real Estate** includes the commercial banks, credit unions, consumer lending agencies, securities brokerages, insurance services, and offices of real estate agents and brokers, etc. As of the first quarter of 2016, the cluster employs **314,312 workers** (2.4% of all cluster jobs located in Long Beach) at an **average annual wage of $103,824** ($94,243 in Long Beach). The cluster added over 21,500 workers between 2010 and 2017 at a growth rate of just over 7%.

- **Education & Knowledge Creation** includes schools (primary, secondary, tertiary) and information industries (publishers of newspapers, periodicals, internet publishing, etc.) and employs **201,686** (1.1% of all cluster jobs located in Long Beach) across the MSA with an **average annual wage of $55,108** ($49,789 in Long Beach). With just over 15% growth since 2010, the cluster has added over 26,700 workers in the MSA region over the last seven years.

- **Information & Communications Technologies (ICT)** is a diverse group of technology industries that focus on the development and production of new products and services in telecommunications

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and information technology in the Los Angeles-Long Beach-Anaheim, CA MSA region. Some of the sectors in this cluster include telecommunications carriers, software publishers, cyber security developers and computer and electronic product manufacturing. ICT employs **133,082 workers** (1.9% of all cluster jobs located in Long Beach) with an **average annual wage of $123,427** ($132,709 in Long Beach). The cluster has added nearly 13,900 workers since 2010 (12% growth)

- o **Information & Communications Technology & Design** – This sub-cluster includes software publishers, satellite telecommunications, computer design services, etc. Information, Technology and Design employs the majority of the parent ICT cluster (**108,122 workers** or 81% of ICT) with an **average annual wage of $117,092** per worker. The sub-cluster added approximately 13,500 workers between 2010 and 2017 (14% growth).

- o **Information & Communications Technologies Manufacturing** – Includes computer manufacturing, communications equipment manufacturing, semiconductor manufacturing, etc. The ICT sub-cluster represents **24,960 workers** in the MSA region at an **average annual wage of $150,866**. The manufacturing sub-cluster experienced growth of over 300 jobs since the beginning of 2010, or a 1% growth rate.

- **Defense, Transportation & Related Manufacturing** is made up of aerospace manufacturing, motor vehicle manufacturing and other production activities related to transportation. This cluster employs **79,325 workers** (8.4% of all cluster jobs located in Long Beach) in 2017 and had workers make an **average annual wage of $104,080** ($107,681 in Long Beach). This manufacturing cluster has experienced significant job losses since 2010, shedding over 10,100 jobs (-11% growth).

- **Biotech and Medical Devices** accounts for the research, development and production of medical equipment and pharmaceuticals and employs **60,267 workers** (1.8% of all cluster jobs located in Long Beach) in that earn an **average annual wage of $83,189** ($74,873 in Long Beach). Biotech and Medical Devices experienced growth from 2010 to 2017, adding nearly 6,900 jobs (a growth rate of 13%).

- o **Testing, Research & Development in Biotechnology** – Includes the research and development and testing elements related to biotechnology. The sub-cluster employs 17% of the larger Biotech and Medical Devices industry cluster (**10,195 workers**) and workers earn an **average annual wage of $80,014**. Since 2010 the sub-cluster has grown 10% (nearly 1,000 added workers).

- o **Biotech & Medical Devices Production & Manufacturing** – Includes pharmaceutical manufacturing, surgical appliance manufacturing, electromedical and electrotherapeutic apparatus manufacturing, etc. The production and manufacturing of biotech and medical devices employs **50,073 workers** in the Los Angeles-Long Beach-Anaheim, CA MSA region at an **average annual wage of $83,835**. Biotech & Medical Devices Production & Manufacturing increased employment by more than 5,900 workers between 2010 and 2017 (13% growth).

Figure 13 displays the relative size of employment (2017 estimates) in each industry cluster within the Los Angeles-Long Beach-Anaheim, CA MSA (by the size of the sphere), the average annual wages per worker within the region (2017), and the overall employment growth or decline from 2010 to 2017. Six of the seven industry clusters experienced overall employment growth (over 7% each) over the last seven years and six clusters had annual average wages that were above the MSA average in 2017 ($59,960). Information and Communications Technologies paid its workers the most among industry clusters on

average in 2015 ($123,427), followed by Defense, Transportation and Related Manufacturing ($104,080), and Finance, Insurance and Real Estate ($103,824).
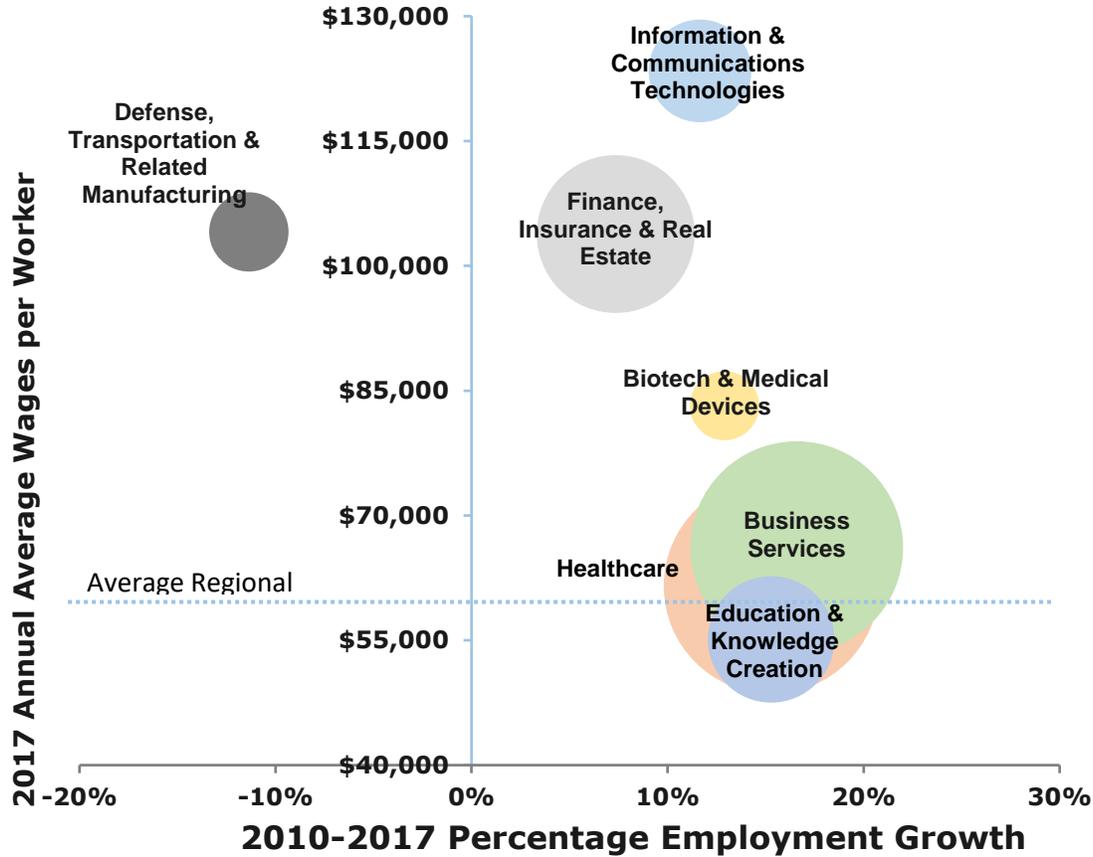
The following figure (Figure 14) splits out the Information and Communications Technologies (ICT) and Biotech and Medical Devices industry clusters into their relevant sub-segments. Biotech & Medical Devices Production & Manufacturing has undergone healthy growth in the Los Angeles-Long Beach-Anaheim, CA MSA since 2010 (13% growth), unlike its counterparts in Information & Communications Technologies Manufacturing (1% growth) and Defense, Transportation & Related Manufacturing (-11% growth) (Figure 13).

Figure 14: Information & Communications Technologies and Biotech & Medical Devices Industry Sub-Clusters
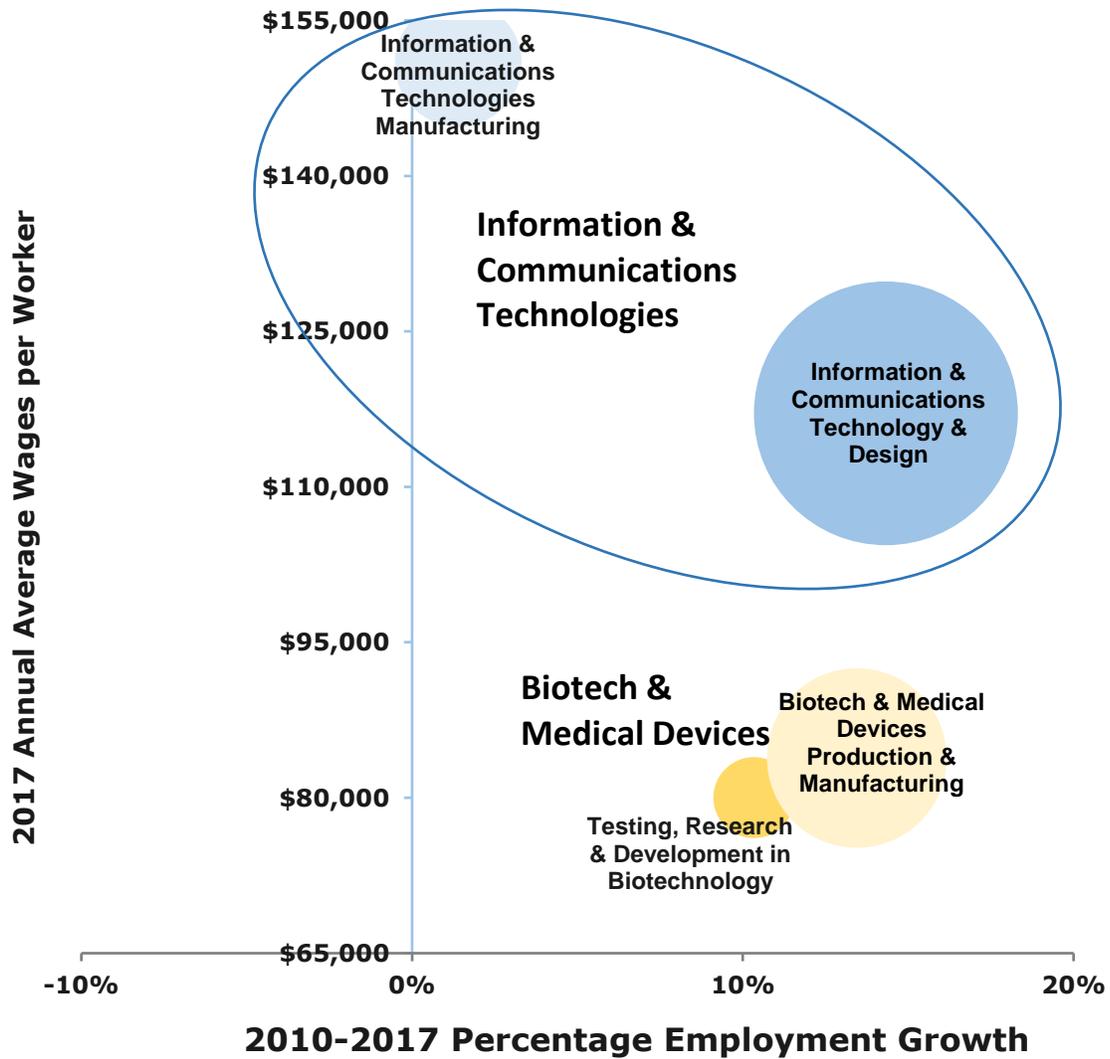
South Bay Industrial Real Estate Market

The South Bay industrial submarket is part of the Greater Los Angeles area that also includes Los Angeles, Commerce/Vernon, Mid-Counties, San Gabriel Valley, Westside, and North Los Angeles. As

the table below illustrates, the South Bay had the highest overall inventory (233,358,074 sq/ft), the fourth lowest vacancy rate in the fourth quarter of 2017, and sat in the upper half of submarkets in terms of manufacturing, office service/flex, or warehousing distribution rent per square foot.

Industry Cluster	Inventory (SF)	Overall Vacancy Rate	Avg. Rent per SF - Manufacturing	Avg. Rent per SF - Office Service/Flex	Avg. Rent per SF - Warehousing/Distribution
South Bay	233,358,074	1.2%	$ 0.81	$ 1.27	$ 0.87
Los Angeles	123,669,204	1.0%	$ 1.05	$ 1.45	$ 0.76
Commerce/Vernon	164,349,392	1.4%	$ 0.65	$ 1.23	$ 0.69
Mid-Counties	122,473,592	1.0%	$ 0.74	$ 1.10	$ 0.77
San Gabriel Valley	195,689,886	1.3%	$ 0.53	$ 0.75	$ 0.71
Westside	16,681,394	0.4%	$ 0.00	$ 2.09	$ 2.21
North Los Angeles	224,419,913	1.6%	$ 0.65	$ 1.34	$ 0.73

As of the fourth quarter of 2016, the South Bay was the most active submarket in terms of industrial square footage under construction, with 1,428,280 sq/ft. Total year to date construction completions for the South Bay (through Q1) was 164,780 sg/ft.

Occupational Landscape

The following section breaks down the occupational composition of the selected industry clusters by occupational tier and lists the top ten growth occupations over the last six years (since the beginning of the economic recovery). Occupational tiers are defined below;

- **Tier 1 Occupations** include managers (Chief Executives, Financial Managers, and Sales Managers), professional positions (Lawyers, Accountants, and Physicians) and highly-skilled technical occupations, such as scientists, computer programmers, and engineers. These occupations are typically the highest-paying, highest-skilled occupations in the economy. Tier 1 occupations currently occupy approximately 23% of all positions in the Los Angeles-Long Beach-Anaheim, CA MSA.

- **Tier 2 Occupations** include sales positions (Sales Representatives), teachers, and librarians, office and administrative positions (Accounting Clerks and Secretaries), and manufacturing, operations, and production positions (Assemblers, Electricians, and Machinists). These occupations have historically provided the majority of employment opportunities and could be referred to as middle-wage, middle-skill positions. Thirty-eight percent of all workers in the MSA region are employed in Tier 2 occupations

- **Tier 3 Occupations** include protective services (Security Guards), food service and retail positions (Waiters, Cooks, and Cashiers), building and grounds cleaning positions (Janitors), and personal care positions (Home Health Aides and Child Care Workers). These occupations typically represent lower-skilled service positions with lower wages that require little formal training and/or education. Just under 30% of all occupations in the MSA region are classified as Tier 3 occupations.

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[18] Cushman & Wakefield, from: http://www.cushmanwakefield.us/en/

Tier 2
38.0%

Tier 3
29.8%

All Other
8.8%
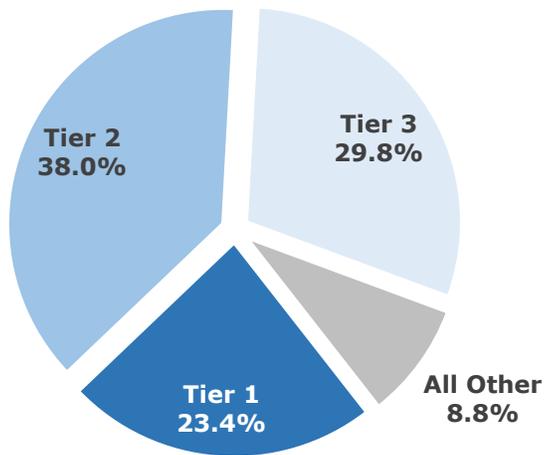
Tier 1
23.4%

Healthcare

The Healthcare industry cluster has a significantly higher concentration of Tier 1 workers when compared to the MSA region as a whole (40% vs. 23%). Just over a third of workers are employed in middle-skill, middle-wage positions (Tier 2) within the cluster, a smaller share when weighed against the regional number (38%).The proportion of Tier 3 occupations within Healthcare is the highest when compared to other selected industry clusters, but on par with the region as a whole.

Figure 16: Healthcare Occupational Tier Distribution
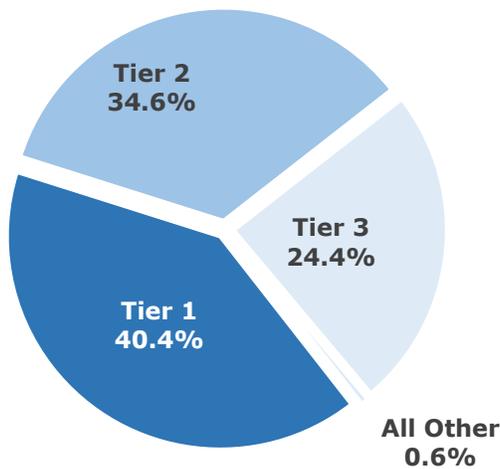
Tier 2
34.6%

Tier 3
24.4%

Tier 1
40.4%

All Other
0.6%

The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Registered Nurses (84,712 workers), Medical and Health Services Managers (9,795 workers), Physicians and Surgeons, All Other (7,278 workers), Dental Hygienists (7,073 workers), and Medical and Clinical Laboratory Technicians (6,781 workers).
- **Tier 2** – Medical Secretaries (25,572 workers), Licensed Practical and Licensed Vocational Nurses (22,679 workers), Receptionists and Information Clerks (18,620 workers), Office Clerks (13,370 workers), and Supervisors of Office and Administrative Support Workers (11,153 workers).

The table below lists the top ten growth occupations for the Healthcare industry cluster by total growth over the last seven years. Registered Nurses, Health Technologists and Technicians, All Other, Licensed Practical and Licensed Vocational Nurses, and Nursing Assistants increased total employment levels by over 3,000 workers each from 2010 to 2017.

Table 2: Healthcare Highest Growth Occupations from 2010 to 2017

| Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Registered Nurses	1	12,566	17.4%	14.5%	$ 45.39	Bachelor's degree	None	None
Health Technologists and Technicians, All Other	2	3,995	86.9%	1.5%	$ 19.92	High school diploma or equivalent	None	None
Licensed Practical and Licensed Vocational Nurses	2	3,457	18.0%	3.9%	$ 24.21	Postsecondary nondegree award	None	None
Nursing Assistants	3	3,100	13.1%	4.6%	$ 14.10	Postsecondary nondegree award	None	None
Medical Secretaries	2	2,950	13.0%	4.4%	$ 17.17	High school diploma or equivalent	None	Moderate-term on-the-job training
Medical Assistants	3	2,926	11.7%	4.8%	$ 16.10	Postsecondary nondegree award	None	None
Dental Assistants	3	2,568	17.8%	2.9%	$ 16.75	Postsecondary nondegree award	None	None
Receptionists and Information Clerks	2	1,888	11.3%	3.2%	$ 13.86	High school diploma or equivalent	None	Short-term on-the-job training
Medical and Health Services Managers	1	1,644	20.2%	1.7%	$ 51.27	Bachelor's degree	Less than 5 years	None

First-Line Supervisors of Office and Administrative Support Workers	2	1,467	15.1%	1.9%	$ 27.65	High school diploma or equivalent	Less than 5 years	None

Business Services

Proportionally, the Business Services industry cluster employs a slightly larger amount of Tier 2 workers compared to the wider MSA region. The concentration of Tier 1 occupations within the cluster is higher when compared to the region as whole (31% vs. 23%) while the percentage of Tier 3 employment is markedly less for Business Services compared to the overall regional economy (18% vs. 30%). Just over one-tenth of employment exists in occupations that are either transitional or do not adhere to tier definition metrics.

Figure 17: Business Services Occupational Tier Distribution
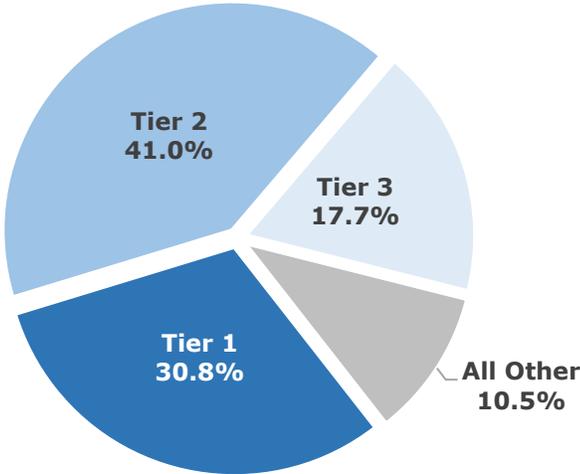
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Accountants and Auditors (25,799 workers), Lawyers (24,283 workers), General and Operations Managers (11,867 workers), Management Analysts (10,317 workers), and Market Research Analysts and Marketing Specialists (8,796 workers).

- **Tier 2** – Office Clerks (18,515 workers), Customer Service Representatives (16,633 workers), Bookkeeping, Accounting, and Auditing Clerks (13,734 workers), Legal Secretaries (13,449 workers), and Secretaries and Administrative Assistants (except legal, medical, and executive) (11,934 workers).

Laborers and Freight, Stock, and Material Movers (hand) was the highest growth occupation in the Business Services cluster from 2010 to 2017, adding more than 8,200 jobs over the seven-year time

period. The remaining occupations listed in the table below each increased by over 1,700 workers between 2010 and 2017.

Table 3: Business Services Highest Growth Occupations from 2010 to 2017

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Laborers and Freight, Stock, and Material Movers, Hand	N/A	8,206	35.8%	5.5%	$12.03	No formal educational credential	None	Short-term on-the-job training
Accountants and Auditors	1	4,271	19.8%	4.5%	$34.95	Bachelor's degree	None	None
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	3	3,725	12.3%	6.0%	$12.56	No formal educational credential	None	Short-term on-the-job training
Packers and Packagers, Hand	N/A	3,560	44.6%	2.0%	$10.28	No formal educational credential	None	Short-term on-the-job training
Management Analysts	1	2,885	38.8%	1.8%	$41.73	Bachelor's degree	Less than 5 years	None
Lawyers	1	2,493	11.4%	4.3%	$70.97	Doctoral or professional degree	None	None
Customer Service Representatives	2	2,300	16.0%	2.9%	$17.44	High school diploma or equivalent	None	Short-term on-the-job training
Team Assemblers	2	1,987	34.8%	1.3%	$12.38	High school diploma or equivalent	None	Moderate-term on-the-job training
Market Research Analysts and Marketing Specialists	1	1,964	28.7%	1.5%	$30.16	Bachelor's degree	None	None
Helpers--Production Workers	3	1,771	34.9%	1.2%	$11.21	No formal educational credential	None	Short-term on-the-job training

Finance, Insurance & Real Estate

The majority of employment in the Finance, Insurance & Real Estate industry cluster is located in Tier 2 jobs (51%). The proportion of Tier 2 jobs in the cluster is 13 percentage points higher when compared to the Los Angeles-Long Beach-Anaheim industry as a whole (38%). Over a third of workers within the cluster are employed in high-skill, high-wage (Tier 1) positions (36%) and 12% work in Tier 3 occupations.
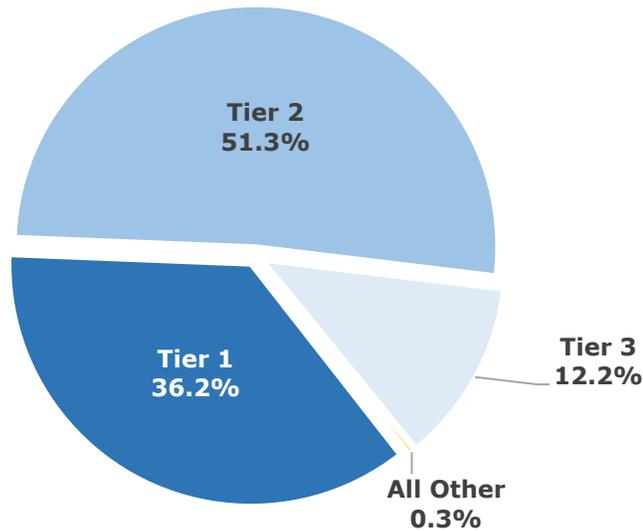
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Loan Officers (15,288 workers), Property, Real Estate, and Community Association Managers (10,335 workers), Personal Financial Advisors (9,445 workers, Claims Adjusters, Examiners, and Investigators (8,375 workers), and Financial Managers (6,625 workers).

- **Tier 2** – Insurance Sales Agents (19,202 workers), Securities, Commodities, and Financial Services Sales Agents (18,300 workers), Customer Service Representatives (14,393 workers), Maintenance and Repair Workers (12,717 workers), and Insurance Claims and Policy Processing Clerks (11,318 workers).

Six occupations employed within the Finance, Insurance and Real Estate industry cluster added over 1,500 jobs since the beginning of the financial recovery (2010);

- Insurance Sales Agents added 3,437 workers
- Personal Financial Advisors added 1,922 workers
- Loan Officers added 1,874 workers
- Counter and Rental Clerks added 1,703 workers
- Property, Real Estate, and Community Association Managers added 1,558 workers
- Maintenance and Repair Workers, General added 1,506 workers

Table 4: Finance, Insurance & Real Estate Highest Growth Occupations from 2010 to 2017

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Insurance Sales Agents	2	3,437	21.8%	6.1%	$ 27.38	High school diploma or equivalent	None	Moderate-term on-the-job training
Personal Financial Advisors	1	1,922	25.5%	3.0%	$ 46.49	Bachelor's degree	None	Long-term on-the-job training
Loan Officers	1	1,874	14.0%	4.8%	$ 33.23	Bachelor's degree	None	Moderate-term on-the-job training
Counter and Rental Clerks	3	1,703	19.8%	3.3%	$ 12.69	No formal educational credential	None	Short-term on-the-job training
Property, Real Estate, and Community Association Managers	1	1,558	17.8%	3.3%	$ 27.10	High school diploma or equivalent	Less than 5 years	None
Maintenance and Repair Workers, General	2	1,506	13.4%	4.0%	$ 19.34	High school diploma or equivalent	None	Long-term on-the-job training
Loan Interviewers and Clerks	2	1,435	18.5%	2.9%	$ 21.01	High school diploma or equivalent	None	Short-term on-the-job training
Insurance Claims and Policy Processing Clerks	2	1,233	12.2%	3.6%	$ 19.88	High school diploma or equivalent	None	Moderate-term on-the-job training
Office Clerks, General	2	640	6.8%	3.2%	$ 14.65	High school diploma or equivalent	None	Short-term on-the-job training
Market Research Analysts and Marketing Specialists	1	534	17.7%	1.1%	$ 30.16	Bachelor's degree	None	None

Education & Knowledge Creation

Approximately half of all workers employed in the Education and Knowledge Creation industry cluster are classified as Tier 2 employees (50%), which is higher when compared to the overall economy measure in the MSA region (38%). The proportion of Tier 1 employment in the industry cluster is equal to the overall regional proportion (23%). Fourteen percent of all employment is in the Education and Knowledge industry cluster sits in low-skill, low-wage jobs (Tier 3). Just over 13% of employment exists in occupations that are either transitional or do not adhere to tier definition metrics.

Figure 19: Education & Knowledge Creation Occupational Tier Distribution
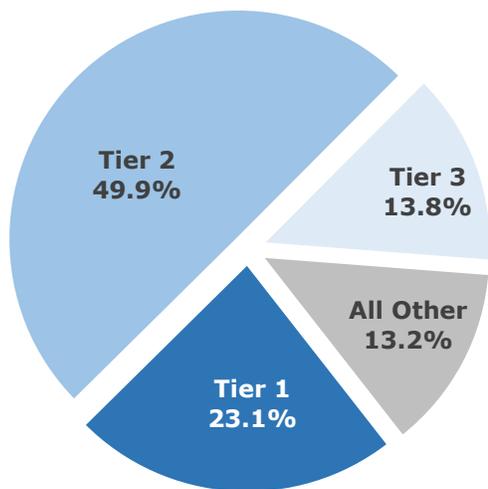
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Coaches and Scouts (5,285 workers), Education Administrators (2,785 workers), General and Operations Managers (2,577 workers), Computer User Support Specialists (2,247 workers), and Business Operations Specialists (2,210).

- **Tier 2** – Teachers and Instructors, All Other (10,303), Secretaries and Administrative Assistants, (except legal, medical, and executive) (9,649 workers), Office Clerks (8,591 workers), Elementary School Teachers (8,217 workers), and Secondary School Teachers (except Special and CTE) (7,306 workers).

The following table displays the top ten occupations in the Education and Knowledge Creation industry cluster by total growth from 2010 to 2017. Three occupations experienced the addition of more than 1,500 total jobs in the seven-year time period;

- Elementary School Teachers (except Special Education) added 1,667 workers
- Teachers and Instructors (all Other) added 1,545 workers
- Secretaries and Administrative Assistants (except Legal, Medical, and Executive) added 1,503 workers

Table 5: Education & Knowledge Creation Highest Growth Occupations from 2010 to 2017

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Elementary School Teachers, Except Special Education	2	1,667	25.5%	4.1%	$ 36.93	Bachelor's degree	None	Internship/residency
Teachers and Instructors, All Other	2	1,545	17.6%	5.1%	$ 17.60	Bachelor's degree	None	Internship/residency
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2	1,503	18.5%	4.8%	$ 18.83	High school diploma or equivalent	None	Short-term on-the-job training
Secondary School Teachers, Except Special and Career/Technical Education	2	1,421	24.1%	3.6%	$ 38.00	Bachelor's degree	None	Internship/residency
Teacher Assistants	3	1,396	22.7%	3.7%	$ 15.34	Some college, no degree	None	None
Office Clerks, General	2	1,121	15.0%	4.3%	$ 14.65	High school diploma or equivalent	None	Short-term on-the-job training
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	3	969	24.8%	2.4%	$ 12.56	No formal educational credential	None	Short-term on-the-job training
Coaches and Scouts	1	870	19.7%	2.6%	$ 17.37	Bachelor's degree	None	None
Self-Enrichment Education Teachers	2	826	19.3%	2.5%	$ 18.63	High school diploma or equivalent	Less than 5 years	None

Information & Communications Technologies (ICT)

Information and Communications Technologies has the highest proportion of Tier 1 occupational employment among the clusters identified in the Los Angeles-Long Beach-Anaheim, CA MSA region (64%). Nearly all of the remaining employment in the cluster is located in Tier 2 occupations (34%), which is a slightly lower share when compared to the overall industry proportion in the region (38%).

Figure 20: ICT Occupational Tier Distribution
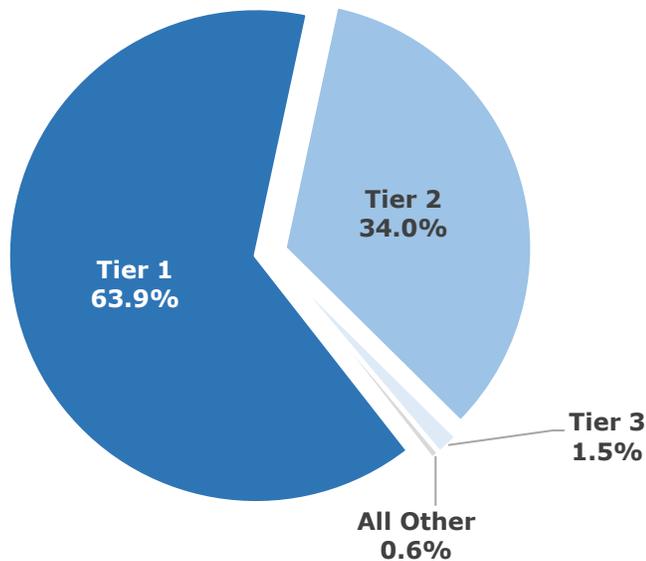
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Software Developers (applications) (10,729 workers), Software Developers (systems software) (7,717 workers), Computer User Support Specialists (5,996 workers), Computer Systems Analysts (5,635 workers), and Computer Programmers (4,709 workers).

- **Tier 2** – Telecommunications Equipment Installers and Repairers (except line installers) (7,823 workers), Sales Representatives (services) (5,221 workers), Customer Service Representatives (4,627 workers), Electrical and Electronic Equipment Assemblers (2,567 workers), and Sales Representatives (2,499 workers).

Software Developers (applications) (2,364 added workers) and Software Developers (systems software) (1,543 added workers) were the only occupational categories to increase employment numbers by over 1,500 additional workers from 2010 to 2017 for the Information and Communications Technologies (ICT) industry cluster in the MSA region.

Table 6: ICT Highest Growth Occupations from 2010 to 2017

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Software Developers, Applications	1	2,364	28.3%	8.1%	$ 52.79	Bachelor's degree	None	None
Software Developers, Systems Software	1	1,543	25.0%	5.8%	$ 56.39	Bachelor's degree	None	None
Computer Systems Analysts	1	1,303	30.1%	4.2%	$ 44.13	Bachelor's degree	None	None
Computer User Support Specialists	1	1,069	21.7%	4.5%	$ 26.53	Some college, no degree	None	None
Management Analysts	1	559	27.6%	1.9%	$ 41.73	Bachelor's degree	Less than 5 years	None
Computer and Information Systems Managers	1	552	22.8%	2.2%	$ 69.38	Bachelor's degree	5 years or more	None
Web Developers	1	527	45.8%	1.3%	$ 32.41	Associate's degree	None	None
Market Research Analysts and Marketing Specialists	1	519	26.0%	1.9%	$ 30.16	Bachelor's degree	None	None
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2	467	23.0%	1.9%	$ 36.95	Bachelor's degree	None	Moderate-term on-the-job training
Computer Programmers	1	383	8.9%	3.5%	$ 40.35	Bachelor's degree	None	None

Defense, Transportation & Related Manufacturing

Nearly all employment is split evenly between Tier 1 (47%) and Tier 2 (48%) within Defense, Transportation and Related Manufacturing in the Los Angeles-Long Beach-Anaheim, CA MSA region. The remaining employment in the cluster sits within the Tier 3 occupational classification (2%), or exists in occupations that are either transitional or do not adhere to tier definition metrics.

Figure 21: Defense, Transportation & Related Manufacturing Occupational Tier Distribution
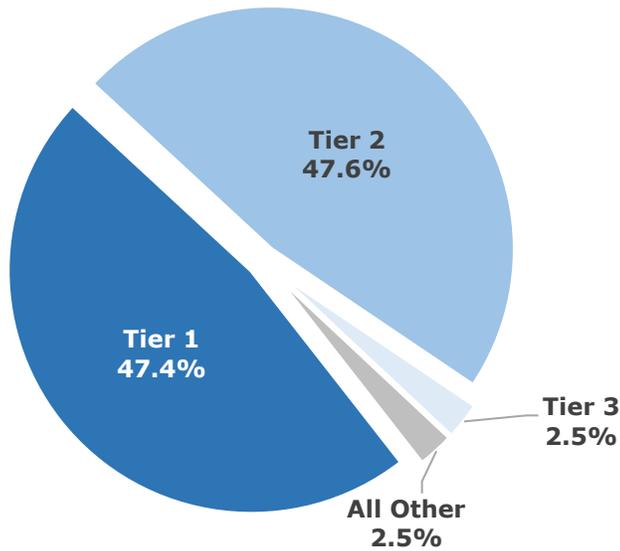
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Software Developers (systems software) (3,254 workers), Aerospace Engineers (3,001 workers), Industrial Engineers (2,649 workers), Mechanical Engineers (1,852 workers), and Business Operations Specialists (1,672 workers).

- **Tier 2** – Team Assemblers (4,644 workers), Inspectors, Testers, Sorters, Samplers, and Weighers (3,232 workers), Machinists (2,507 workers), Electrical and Electronic Equipment Assemblers (2,088 workers), and Supervisors of Production and Operating Workers (1,779 workers).

The Defense, Transportation and Related Manufacturing industry cluster is the only identified cluster to contract in total employment from 2010 to 2017. Only Computer-Controlled Machine Tool Operators (Metal and Plastic) added 50 or more employees in the seven-year time period.

Table 7: Defense, Transportation & Related Manufacturing Highest Growth Occupations from 2010 to 2017

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Computer-Controlled Machine Tool Operators, Metal and Plastic	2	75	5.3%	1.9%	$ 16.31	High school diploma or equivalent	None	Moderate-term on-the-job training
Operations Research Analysts	1	34	11.5%	0.4%	$ 39.92	Bachelor's degree	None	None
Materials Scientists	1	33	73.3%	0.1%	$ 41.41	Bachelor's degree	None	None
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	2	31	11.1%	0.4%	$ 17.43	High school diploma or equivalent	None	Moderate-term on-the-job training
Industrial Machinery Mechanics	2	22	4.3%	0.7%	$ 26.30	High school diploma or equivalent	None	Long-term on-the-job training
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	2	22	10.2%	0.3%	$ 27.56	High school diploma or equivalent	None	Long-term on-the-job training
Engine and Other Machine Assemblers	2	9	4.7%	0.3%	$ 19.94	High school diploma or equivalent	None	Moderate-term on-the-job training
Rail Car Repairers	2	8	800.0%	0.0%	$ 15.85	High school diploma or equivalent	None	Long-term on-the-job training
Sewing Machine Operators	3	6	8.0%	0.1%	$ 10.45	No formal educational credential	None	Short-term on-the-job training
Private Detectives and Investigators	2	5	7.9%	0.1%	$ 25.38	High school diploma or equivalent	Less than 5 years	Moderate-term on-the-job training

Biotech & Medical Devices

Middle-skill, middle-wage (Tier 2) workers represent the majority of workers in the Biotech and Medical Devices industry cluster in the MSA region. Over 38% of employment in the cluster is within Tier 1 occupations, with only 4% of total employment categorized as low-skill, low-wage (Tier 3).

Figure 22: Biotech & Medical Devices Occupational Tier Distribution
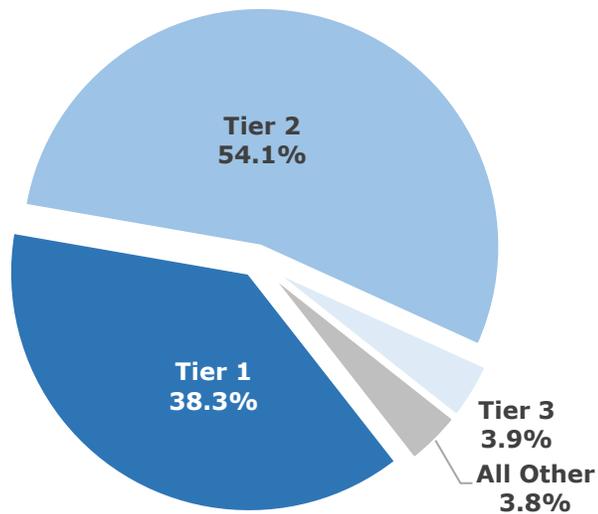
The largest amount of employment for Tier 1 and Tier 2 jobs is located in the following detailed occupational categories;

- **Tier 1** – Industrial Engineers (1,305 workers), General and Operations Managers (2,781 workers), Chemists (1,001 workers), Software Developers (Systems Software) (801 workers), and Architectural and Engineering Managers (758 workers).

- **Tier 2** – Team Assemblers (3,477 workers), Inspectors, Testers, Sorters, Samplers, and Weighers (2,781 workers), Dental Laboratory Technicians (1,791 workers), Packaging and Filling Machine Operators and Tenders (1,681 workers) and Supervisors of Production and Operating Workers (1,444 workers).

Team Assemblers (430 added workers), Electrical and Electronic Equipment Assemblers (298 added workers) and Inspectors, Testers, Sorters, Samplers, and Weighers (249 added workers) increased employment by over 200 workers over the last seven years (2010 to 2017) within the Biotech and Medical Devices industry cluster. The remaining occupations in the table below grew by more than 100 employees each in the same time period.

Table 8: Biotech & Medical Devices Highest Growth Occupations from 2010 to 2016

Description	Tier	Change (2010 - 2017)	% Change (2010 - 2017)	% of Total Jobs in Industry Group (2017)	Median Hourly Earnings	Typical Entry Level Education	Work Experience Required	Typical On-The-Job Training
Team Assemblers	2	430	14.1%	5.8%	$ 12.38	High school diploma or equivalent	None	Moderate-term on-the-job training
Electrical and Electronic Equipment Assemblers	2	298	31.5%	2.1%	$ 13.51	High school diploma or equivalent	None	Moderate-term on-the-job training
Inspectors, Testers, Sorters, Samplers, and Weighers	2	249	9.8%	4.6%	$ 17.92	High school diploma or equivalent	None	Moderate-term on-the-job training
Software Developers, Systems Software	1	185	30.0%	1.3%	$ 56.39	Bachelor's degree	None	None
Industrial Engineers	1	164	14.4%	2.2%	$ 47.10	Bachelor's degree	None	None
Packaging and Filling Machine Operators and Tenders	2	161	10.6%	2.8%	$ 11.40	High school diploma or equivalent	None	Moderate-term on-the-job training
General and Operations Managers	1	148	13.5%	2.1%	$ 54.93	Bachelor's degree	5 years or more	None
Biomedical Engineers	1	143	30.9%	1.0%	$ 41.25	Bachelor's degree	None	None
First-Line Supervisors of Production and Operating Workers	2	142	10.9%	2.4%	$ 26.04	High school diploma or equivalent	Less than 5 years	None
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	2	141	20.2%	1.4%	$ 36.95	Bachelor's degree	None	Moderate-term on-the-job training

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