



Opportunity
Collaborative

BALTIMORE REGIONAL TALENT DEVELOPMENT PIPELINE STUDY

OCTOBER 2013



Baltimore Metropolitan Council

Baltimore Regional Talent Development Pipeline Study

The Opportunity Collaborative has been working since February of 2012 to develop cooperative strategies to address the challenges facing the Baltimore region. These strategies will be designed to reduce regional disparities and foster greater opportunity and success throughout the region. Ultimately, we hope that our efforts will inform policies and decisions that truly make for a greater Baltimore region.

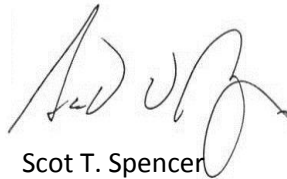
One pillar of the Collaborative's work is a broad and inclusive approach to our workforce development needs. The Baltimore region is home to some of the world's finest hospitals, a thriving international port and the fastest growing cyber-security economy in the nation. As we plan for the mid-21st century our region must work to ensure that we are giving our next generation of workers the skills they need to fill the high demand, family supporting jobs in our region. The *Baltimore Regional Talent Development Pipeline Study* is a critical first step in this effort.

This study, based on a 2010 study issued by the Baltimore City Mayor's Office of Employment Development, is a comprehensive report that establishes workforce supply and demand conditions and projections throughout the Baltimore region. By identifying and exploring the region's current and anticipated workforce needs, this study will be a tremendous asset in shaping workforce policy and investment for the next decade. As the Collaborative begins work on our Regional Plan for Sustainable Development, the data in this report will be an essential tool in increasing access to opportunity throughout the region.

We would like to thank the region's Workforce Investment Boards, community colleges, state agencies, and non-profit organizations that helped us shape this report. The Opportunity Collaborative operates through a process of inclusive cooperation and we are proud of the diverse partners who sit around our various tables. The strength of this study comes, in no small part, from the thoughtful and generous efforts of our members.



Joshua J. Cohen, Mayor
City of Annapolis
Co-Chair, Opportunity Collaborative



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The Opportunity Collaborative is a coalition of local governments, state agencies and nonprofit organizations in the Baltimore region. This unique partnership was formed in 2012 to develop a Regional Plan for Sustainable Development. The plan will be published in early 2015 and will help all of our partners coordinate regional investments in housing, transportation and workforce development to connect all of our citizens to a prosperous future. **Consortium members include:**

The City of Annapolis • Anne Arundel County • Annie E. Casey Foundation • Associated Black Charities • Baltimore City • Baltimore County • Baltimore Integration Partnership • Baltimore Metropolitan Council • Baltimore Neighborhood Collaborative • Baltimore Regional Transportation Board • Citizens Planning & Housing Association, Inc. • Baltimore Regional initiative Developing Genuine Equality (BRIDGE) • Central Maryland Transportation Alliance • Enterprise Community Partners, Greater Baltimore Committee • Innovative Housing Institute • Harford County • Howard County • Maryland Department of Housing and Community Development • Maryland Department of Planning • Maryland Department of Transportation • Maryland Sustainable Growth Commission • Morgan State University • University of Maryland National Center for Smart Growth • 1,000 Friends of Maryland

The Collaboration is funded by a Sustainable Regional Planning Grant from the U.S. Department of Housing and Urban Development. The work of the Collaborative is coordinated and staffed by the Baltimore Metropolitan Council.



Baltimore Metropolitan Council

The Baltimore Metropolitan Council (BMC) is the organization of the region's elected executives. We are committed to identifying regional interests and developing collaborative strategies, plans and programs which will improve the quality of life and economic vitality throughout the region. The BMC board of directors is composed of the mayor of Baltimore, the executives of Anne Arundel, Baltimore, Harford and Howard counties and a member of the Carroll County Board of Commissioners.

For more information about the Opportunity Collaborative, please visit www.opportunitycollaborative.org, or call Michael Kelly at the Baltimore Metropolitan Council, (410) 732-0500.

BALTIMORE REGIONAL TALENT DEVELOPMENT PIPELINE STUDY

Opportunity Collaborative

Report

Prepared by

RDA Global Inc.

Foreword

The Development Pipeline Study presents foundational information on workforce supply and demand conditions for sectors in the Baltimore Region. The focus of the report is on 13 selected industry sectors in the region and the study provides a detailed analysis of the expected future hiring demand within each sector, coupled with summary statistics on the formal education and occupational training programs that serve each sector, as well as the enrollment in and graduation from those programs. Most sectors evaluated align with the sector definitions established by the Maryland Governor's Workforce Investment Board (WIB) and include:

- Bioscience
- Business Services
- Construction
- Education
- Finance & Insurance
- Healthcare
- Hospitality & Tourism
- Information Technology (incl. Cyber Security and Health Informatics)
- Manufacturing
- Retail Trade
- Transportation And Warehousing
- Utilities
- Wholesale

The report collects information on opportunities for workers at all levels of educational attainment, ranging from jobs that do not require a high school diploma (typically requiring only on-the-job training) to jobs that require a doctoral degree. The report also considers wages for jobs in each sector in order to identify occupations that are most likely to offer a family-supporting wage. Information is presented on average annual job vacancies in the region as an indicator of opportunity, although caution should be exercised in interpreting this data due to limitations in the coverage of the data (not all job opportunities are posted online) and the limitations of the job postings themselves (not all jobs can be strongly linked to an occupation).

The study is an initial step toward preparing a Regional Workforce Development Plan for the Baltimore Region. Information presented in the study will be used by the Workforce Committee to identify key areas of opportunity that will be the focus of Career Pathways to help low-income residents gain the education, skills, and other capacities necessary to connect to economic opportunities.

In addition, the Opportunity Collaborative is undertaking a study of barriers to employment opportunity in the region that will further inform the regional workforce development plan.

Table of Contents

EXECUTIVE SUMMARY	5
BALTIMORE REGIONAL TALENT DEVELOPMENT PIPELINE OVERVIEW, SELECTED SECTORS	7
BALTIMORE'S ECONOMIC RECOVERY AND GROWTH CONTEXT	7
REGIONAL EMPLOYMENT AND HIRING OUTLOOK.....	8
CONTINUED CHALLENGES FOR THE REGION'S LOW-INCOME POPULATION	9
CAREER OPPORTUNITIES BY EDUCATIONAL ATTAINMENT	10
BALTIMORE'S EDUCATIONAL SUPPLY CAPACITY	12
RECOMMENDATIONS	14
<i>Occupations in Healthcare</i>	15
<i>Occupations in Construction</i>	19
<i>Occupations in Information Technology</i>	23
<i>Occupations in Transportation and Logistics (T&L)</i>	27
<i>Occupations in Business Services</i>	29
<i>Occupations in Manufacturing</i>	31
CONCLUSIONS	32
METHODOLOGY	42
INDICATORS OF HIRING DEMAND	42
INDICATORS OF EDUCATIONAL AND TRAINING SUPPLY CAPACITY	44
FUTURE WORKER DEMAND OUTLOOK FOR SECTORS IN THE BALTIMORE REGION	47
GROWTH OUTLOOK BY SECTOR	47
HEALTHCARE	47
INFORMATION TECHNOLOGY (IT)	48
BIOSCIENCES	49
CONSTRUCTION	49
MANUFACTURING	50
TRANSPORTATION AND WAREHOUSING	50
BUSINESS SERVICES	51
EDUCATION	51
HOSPITALITY AND TOURISM	51
BIOSCIENCES	52
BUSINESS SERVICES	64
CONSTRUCTION	83
EDUCATION (K-12 AND HIGHER EDUCATION)	92
FINANCE AND INSURANCE	102
HEALTHCARE	109
HOSPITALITY AND TOURISM	121

INFORMATION TECHNOLOGY.....	129
MANUFACTURING.....	138
RETAIL	147
TRANSPORTATION AND WAREHOUSING.....	155
UTILITIES	162
WHOLESALE.....	166
 APPENDIX A: SELECTED EDUCATIONAL PROGRAMS FOR HEALTHCARE, CONSTRUCTION, IT, TRANSPORTATION & LOGISTICS, AND BUSINESS SERVICES OCCUPATIONS	 174

Synopsis

The Baltimore Region¹ is enjoying a broadbased recovery from the recession that began in 2008, with job growth in 2012-2013 occurring across many sectors including professional and business services (including IT), construction, retail & wholesale trade, transportation, education, healthcare and other sectors. Future hiring demand is expected to be strong in many of the same sectors, but as the region has emerged from the recession, unemployment of Baltimore region residents has remained elevated at historically high levels especially for workers with lower educational attainment.² One third of the region's workforce is comprised of individuals who either have not completed a high school diploma or have attained a high school diploma or equivalent as their highest level of education. In 2011, the unemployment rate of workers with a high school diploma was three times higher than that of workers with a Bachelors degree. Workers who do not have a high school diploma or equivalent had unemployment of nearly 21% in 2011, more than five times higher than workers with a Bachelors degree.

The region's job opportunities fall mainly into two categories: high-paying jobs requiring at least a Bachelors degree and jobs that require few technical skills and pay less than a living wage. Mid-skilled job opportunities that pay a living wage typically require some post-secondary technical education and they comprise a small portion of the labor market. This trend is evident at a macro level and for most industry sectors, making it difficult for low skilled workers to recognize and progress into specialized mid-skill career paths that pay family-supporting wages. A review of occupational hiring requirements in 13 industry sectors reveals that six sectors offer the greatest promise for low skilled workers to move into family-supporting, mid-skilled jobs: The healthcare sector, the construction sector, the information technology sector (including cybersecurity), the transportation and warehousing sector, the business services sector, and the manufacturing sector. Within these sectors, 39 mid-skilled occupations have been identified that offer career advancement opportunities leading to jobs that pay a family-supporting wage. The combined hiring for the selected 39 mid-skilled occupations is expected to account for at least 35,800 new job hires in the region between 2012 and 2020, which equates to approximately one third of the population of 105,000 unemployed adults in the Baltimore Region in 2012.

Each of the 39 occupations requires technical education or training in order for workers to attain the technical competencies required to perform work tasks. *Career Pathways* is a workforce development approach that uses sector-based strategies that provide low skilled adults with a clear sequence of education and training courses, combined with comprehensive wrap-around support services, that lead to careers in a particular industry sector. Career Pathways workforce development systems can be used to help low-skilled adults in the Baltimore Region progress into careers in promising sectors through coordinated action by businesses, workforce development service providers, education and training service providers, and human services providers. While some characteristics of Career Pathways are evident in the region's industries today, further development of regional Career Pathways systems can create efficient paths and onramps to help individuals enter and progress in the region's talent development pipeline.

The executive summary of this report presents key findings from the study and the full report contains detailed statistics on the occupational demand and the educational programs in the region serving each industry sector.

¹ Includes Baltimore City, Baltimore County, Anne Arundel County, Harford County, Howard County and Carroll County

² The unemployment rate for workers with less than a high school diploma in 2011 was nearly 21%.

Career pathways offer a clear sequence of education and training courses and credentials that are built around:

Sector Strategies <ul style="list-style-type: none"> • Aligned with the skill needs of industry sectors. • Employers actively engaged in determining skill requirements. 	“Stackable” Training <ul style="list-style-type: none"> • Arranged or “chunked” in a non-duplicative progression of courses. • Provide opportunities to earn credits that have labor market value. 	Contextual Learning <ul style="list-style-type: none"> • Instructional strategies that make work a central context for learning and help students attain work readiness skills. 	Accelerated/Integrated Learning <ul style="list-style-type: none"> • Combine adult education with postsecondary technical training. • Accelerate career advancement of participants.
Multiple Entry/Exit Points <ul style="list-style-type: none"> • Enable workers of varying education and skill levels to enter or advance in a specific sector or occupational field. 	Intensive Wrap-Around Services <ul style="list-style-type: none"> • Incorporate academic and career counseling and wraparound support services (particularly at points of transition). 	Designs for Working Learners <ul style="list-style-type: none"> • Meet needs of nontraditional students who combine work and study. 	Industry Credentials <ul style="list-style-type: none"> • Lead to the attainment of industry-recognized degrees or credentials that have value in the labor market.

Source: The Promise of Career Pathways, June 2012

Executive Summary

Baltimore Regional Talent Development Pipeline Overview, Selected Sectors

Table 1 Baltimore Regional Talent Development Pipeline Summary Overview

Sector	Job Opportunity				Training and Education Capacity				Earnings for Occupations in the Sector	
	Employment 2012	Share of Workforce (Employed in the Region)	Total Hiring Demand (Including Turnover) 2012-2020	Pct. Of Jobs with Minimum Education Requirement Less than a Bachelors Degree	WIA-Eligible Training		All Education and Training Programs Lasting Less than Four Years		Average Hourly Wage 2012	Average Annual Earnings 2012
					Programs	Enrollment	Programs	Enrollment		
Bioscience	57,089	4.7%	15,694	40%	7	119	115	6,072	\$36.09	\$75,144
Business Services	190,554	15.6%	46,787	62%	56	1,000	341	18,115	\$29.55	\$61,550
Construction	67,953	5.6%	17,254	95%	26	586	62	2,677	\$24.62	\$51,216
Education	116,339	9.5%	33,270	37%	2	338	142	40,329	n.a.	\$58,992
Finance & Insurance	71,452	5.9%	14,783	74%	7	144	52	2,881	\$28.45	\$59,183
Healthcare	188,405	15.5%	49,374	78%	66	4,153	218	20,150	\$25.95	\$54,288
Hospitality & Tourism	118,294	9.7%	39,658	98%	7	244	39	2,212	\$12.87	\$26,719
Information Technology	49,182	4.0%	12,458	43%	28	176	151	5,490	\$36.82	\$76,586
Manufacturing	62,863	5.2%	11,889	81%	9	189	38	1,506	\$25.43	\$52,891
Retail Trade	138,329	11.3%	37,514	97%	4	99	9	649	\$16.56	\$34,451
Transportation & Warehousing	32,100	2.6%	7,746	94%	15	1,668	44	2,918	\$20.94	\$43,565
Utilities	5,894	0.5%	1,532	78%	-	-	10	486	\$28.73	\$59,760
Wholesale	46,389	3.8%	10,093	84%	9	1,129	33	2,201	\$26.93	\$56,008

Sources: Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Calculation of average wages in defined sectors by RDA Global. Association of programs with sectors is based on O*Net Occupation and CIP Program Mapping as well as qualitative review by the author. See sector chapters for a detailed description of industries included in sector definitions.

Baltimore's Economic Recovery and Growth Context

Figures from the Current Employment Statistics (CES) database show that the Baltimore Region is continuing a recovery from the recession.³ Total nonfarm employment for residents of the Baltimore-Towson Metropolitan Statistical Area (MSA) increased by 2.1 percent between March 2012 and March 2013, an increase of 27,400 jobs, out-pacing the national growth rate of 1.5 percent. The March 2013

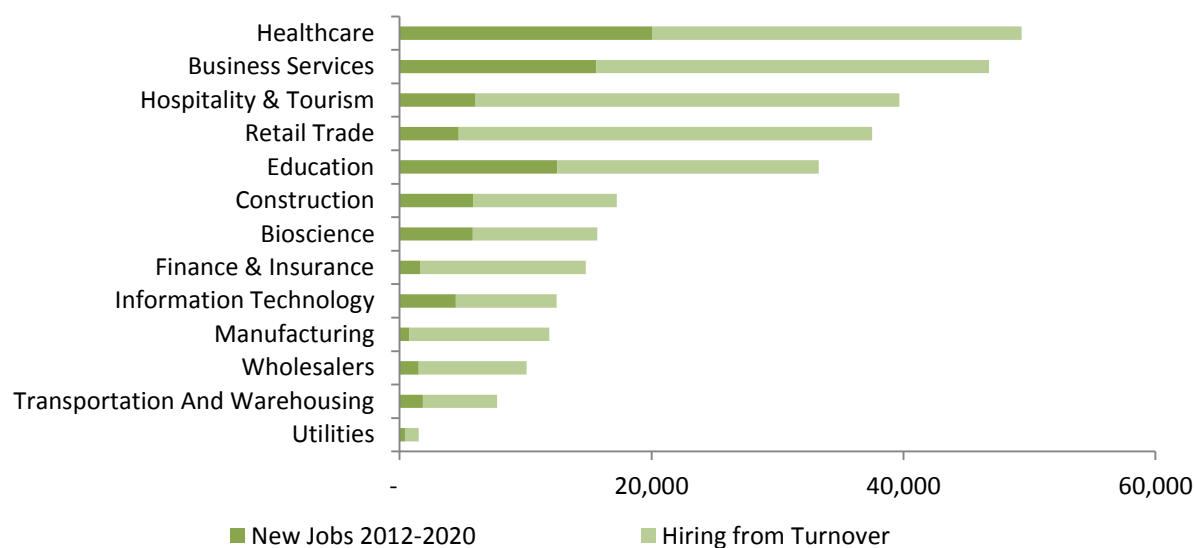
³ See BLS Mid-Atlantic Information Service, May 3, 2013. Last Accessed at: <http://www.bls.gov/ro3/cesqbalt.pdf>

increase was the 36th consecutive month of over-the-year job gains for the metro area, with most of the growth occurring in the professional and business services supersector (10,900 new jobs), the construction supersector⁴ (7,700 new jobs), the retail & wholesale trade, transportation and utilities supersector (combined 6,200 new jobs), and education and health sectors (combined 5,300 new jobs).

Regional Employment and Hiring Outlook

Over the long term, the total number of job opportunities in the region (total hiring activity) is expected to increase in several sectors. The sectors that are projected to experience the greatest hiring demand between 2012 and 2020 include healthcare (hiring demand of approximately 49,400 workers including turnover), business services (46,800 workers), hospitality and tourism (39,700 workers), retail trade (37,500 workers) and education (33,270 workers). In the retail and hospitality sectors, most hiring demand will be for replacement of lost workers, while new business growth will account for a larger portion of hiring demand in healthcare, business services and education. Hiring demand is projected to be more modest in other sectors ranging from a low of 1,500 workers in the utilities sector to a high of 17,250 workers in the construction sector.

Figure 1 Total Projected Hiring Demand by Sector in the Baltimore Region 2012-2020



Source: RDA Global Baltimore Region Outlook 2012-2020

While the projections of job growth within individual sectors are in line with the most recent reports on the region's hiring activity, the projections of future job demand are based on an economic model, and the forecast has both upward and downward risks. The drivers and assumptions in the model are based on a combination of long-term structural trends and recent sector activities, but public policy decisions,

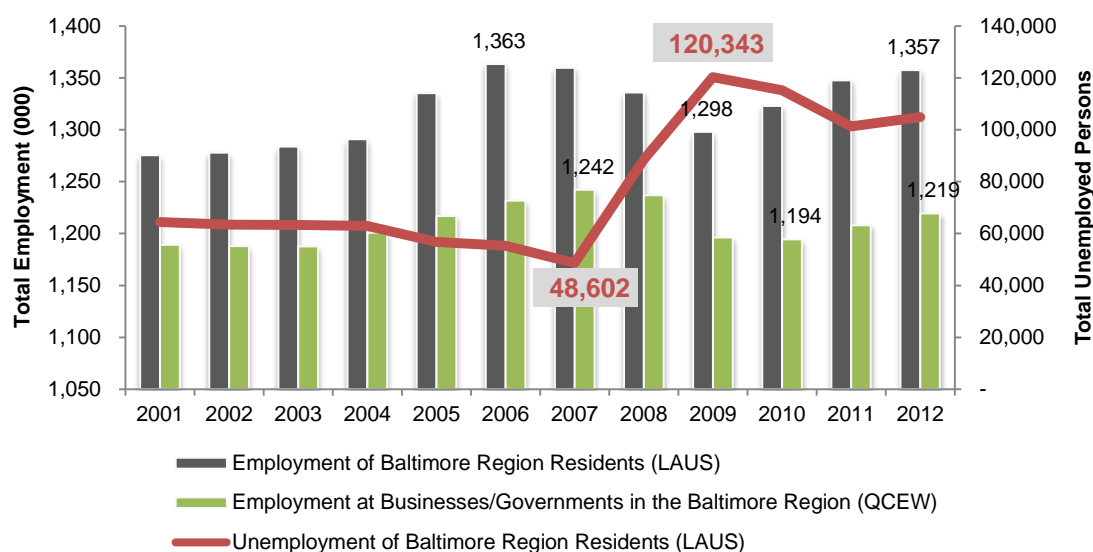
⁴ This sector also includes any mining and logging employment in the region.

major infrastructure projects, or unpredictable events will inevitably mean that actual growth differs from forward-looking projections. For instance, if major construction projects such as the Red Line⁵ move forward, they will increase the demand for workers in the construction sector. Likewise, the widening of the Panama Canal in 2014 combined with infrastructure investments in the Port of Baltimore could potentially bring new private sector transportation and distribution investment to the Port. There are down-side risks in the outlook scenario for the manufacturing sector; employment in this sector has been declining for three decades and this outlook assumes that global changes in manufacturing costs will limit future off-shoring of manufacturing activities and the sector will experience flat growth over the forecast period, with job demand generated mostly by replacement of workers. While unforeseen events will mean that the real future sector growth is different from the projected growth, the methodology used to predict job growth is conservative and follows standard practices for workforce planning.

Continued Challenges for the Region's Low-Income Population

The macro trends in sustained employment growth are good news for the region's economy and they will strengthen the career opportunities that are available to area residents, but the growth in employment alone does not mean that the region's low income and unemployed population will enjoy access to jobs.

Figure 2 Baltimore Region Employment and Unemployment - Comparative Measures



The Local Area Unemployment Statistics (LAUS) show that by year-end 2012, the number of employed individuals who are residents in the region had nearly reached pre-recession levels (from 1.363 million

⁵ The proposed Red Line is a 14.1-mile, east-west transit line connecting the areas of Woodlawn, Edmondson Village, West Baltimore, downtown Baltimore, Harbor East, Fell's Point, Canton and the Johns Hopkins Bayview Medical Center Campus.

workers in 2006 to 1.357 workers in 2012). Figures from the Quarterly Census of Employment and Wages (QCEW), however, suggest that some of the increases in employment for Baltimore's residents are attributable to individuals who reside in the region but commute out of the region for work. According to the QCEW, which estimates employment at businesses and organizations that are physically located in the Baltimore Region, the region lost over 47,500 local jobs between 2007 and 2010 and by year-end 2012, the region had regained only about 53% of the jobs lost during the recession. Concurrently, unemployment among Baltimore residents grew from 48,600 unemployed workers in 2007 to over 120,300 workers in 2009 and has remained at historically high levels for the past three years. While the number of unemployed individuals has declined somewhat over the past three years, the total number of unemployed Baltimore residents was still nearly 105,000 workers in December of 2012.

Table 2 Unemployment by Educational Attainment, Baltimore-Towson MSA

Attainment	Share of the Labor Force	Unemployment Rate (2011)
Less than high school graduate	8%	20.7%
High school graduate or equivalent	25%	11.4%
Some college or Associates degree	28%	7.9%
Bachelors degree or higher	38%	3.8%
Total Population 25 to 64 years	100%	7.8%

Source: American Community Survey 2011

Opportunities in the Baltimore Region differ dramatically by educational attainment of workers. One third of the region's workforce is comprised of individuals who either have not completed a high school diploma or have attained a high school diploma or equivalent as their highest level of education. In 2011, the unemployment rate of workers with a high school diploma was three times higher than that of workers with a Bachelors degree. Workers who do not have a high school diploma or equivalent had unemployment of nearly 21% in 2011, more than five times higher than workers with a Bachelors degree.

Career Opportunities by Educational Attainment

Several workforce studies in the region have noted that there is a divergence of job opportunities available to the Baltimore Region's residents that include two broad groups of jobs: (1) low-skilled jobs that require little post-secondary education and do not offer family-supporting wages and (2) high-skilled, high-paying jobs requiring education at the Bachelors degree level or higher.⁶ At a macro-level, this study confirms this overall trend, underscoring the difficulty of creating regional Career Pathways⁷

⁶ See Investing in Baltimore's Workforce, Job Opportunities Task Force; Creating Opportunity in Baltimore's Next Economy, Brookings.

⁷ For an introduction to Career Pathways systems for workforce development, see The Promise of Career Pathways System Change, Last Accessed May 2013 at http://www.jff.org/sites/default/files/CareerPathways_JFF_Paper_060112.pdf

that are both aligned with industry workforce requirements and at the same time lead to family-supporting careers. Individual industry sectors, however, differ somewhat in their opportunities for jobs at the mid-skill level. Industry sectors such as bioscience, education, and information technology have historically been some of the best performing sectors in the region but many of the high-paying jobs in these sectors require a Bachelors degree or higher. By contrast, sectors such as retail trade and the tourism & hospitality sector require a large number of workers for comparatively low-wage jobs that require a high school education or lower.

Table 3 Share of Jobs by Minimum Required Education and by Industry Sector, 2012

Sector	Less than High School	High School Diploma or Equivalent	Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	Bachelors Degree or Higher
Bioscience	2%	25%	13%	60%
Business Services	13%	36%	12%	38%
Construction	18%	65%	12%	5%
Education	4%	28%	5%	63%
Finance & Insurance	6%	64%	4%	26%
Healthcare	11%	30%	38%	22%
Hospitality & Tourism	76%	20%	2%	2%
Information Technology	2%	28%	13%	57%
Manufacturing	15%	55%	11%	19%
Retail Trade	62%	31%	3%	3%
Transportation And Warehousing	24%	66%	4%	6%
Utilities	4%	63%	11%	22%
Wholesalers	15%	61%	8%	16%

Sources: RDA Global Baltimore Employment Forecast 2012-2020, Quarterly Census of Employment and Wages, Occupational Employment Statistics, O*Net Database, Analysis by author.

Healthcare stands out as the single sector with a large portion (38%) of jobs in the mid-skill level (jobs requiring an Associates degree or other level of post-secondary education less than a Bachelors degree). After healthcare, other sectors with a significant number of jobs at this mid-skill level include bioscience (13%), business services (12%), construction (12%), and information technology (13%). While these percentages suggest good mid-skill job opportunities within these sectors, a detailed review of mid-skill occupations reveals that many jobs in these sectors are for supervisors, managers, or sales professionals, typically requiring either moderate to longer-term on the job training or multiple years of experience, restricting opportunities for workers with little relevant work experience.

According to the Living Wage Calculator at MIT's Living Wage Project, the living wage for a single adult with one child living in Baltimore city is \$22.88.⁸ Workers in occupations requiring a Bachelors degree

⁸ See Living Wage Calculator (Glasmeier, 2013), last accessed at <http://livingwage.mit.edu/counties/24510>

generally have access to jobs that pay at or above this level. This is evident in all sectors evaluated in this study, which have mean wages in the range of \$32 per hour to \$48 per hour. Not surprisingly, average wages are lower for jobs requiring less than a high school education – and this trend is evident in all sectors - ranging from about \$10 per hour to a high near \$16 per hour. Average wages for occupations that don't require a high school education are highest in the construction sector (\$16.19 per hour), transportation and warehousing sector (\$14.34 per hour), and utilities sector (\$14.11 per hour). Jobs requiring a high school diploma or equivalent have wages ranging from a low of \$17 per hour in the education sector to higher average wages in the bioscience sector, information technology sector, finance and insurance sector, and construction sector – all of which have average wages similar to a living wage at about \$23 to \$24 per hour.

Table 4 Mean Hourly Wages by Minimum Required Education and by Industry Sector, 2012⁹

Sector	Less than High School	High School Diploma or Equivalent	Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	Bachelors Degree or Higher
Bioscience	\$13.90	\$24.37	\$33.55	\$42.05
Business Services	\$12.39	\$20.81	\$32.58	\$42.60
Construction	\$16.19	\$23.01	\$40.91	\$38.91
Education	\$11.39	\$17.05	\$28.11	n.a.
Finance & Insurance	\$12.87	\$23.63	\$45.04	\$41.36
Healthcare	\$11.05	\$18.42	\$27.50	\$40.46
Hospitality & Tourism	\$10.02	\$18.62	\$47.91	\$31.64
Information Technology	\$13.30	\$24.73	\$33.86	\$44.33
Manufacturing	\$13.30	\$20.40	\$36.36	\$43.27
Retail Trade	\$11.77	\$19.55	\$45.67	\$47.61
Transportation And Warehousing	\$14.34	\$19.98	\$44.14	\$41.44
Utilities	\$14.11	\$23.18	\$38.23	\$41.98
Wholesalers	\$13.65	\$23.99	\$42.28	\$43.42

Sources: RDA Global Baltimore Employment Forecast 2012-2020, Quarterly Census of Employment and Wages, Occupational Employment Statistics, O*Net Database, Analysis by author.

Baltimore's Educational Supply Capacity

The study identified a total of 2,049 educational programs in the Baltimore Region that reported enrollment during the 2011-2012 period. This included 1,778 college and university programs with combined enrollment of 184,844 students in 2012; 186 WIA-eligible¹⁰ training programs with combined

⁹ Note: In the mid-skill level, there are a few sectors in which average wages for mid-skill occupations exceed wages for jobs requiring a Bachelors degree or higher. This is attributable to the number of mid-skilled management or sales jobs in these sectors, which contribute to a higher overall average wage at the mid-skill level.

¹⁰ Programs for which students may be eligible to receive financial aid through the Workforce Investment Act.

enrollment of 7,939 students; and 85 other programs (non-WIA eligible) with combined enrollment of 6,435 students. In total, these programs reported graduations of 46,250 students from all programs in the most recent year of reporting (2011-2012).

The business services sector benefits from over 767 programs in the region that had a combined enrollment of 61,684 students in 2012. These programs are highly diverse, reflecting the range of sub-industries that comprise the business services sector, which include legal services, accounting, engineering, consulting services, computer systems, facilities support, security services, waste management, treatment and remediation, repair and maintenance services and other services included in the definition of the sector. The majority of these programs are at the Bachelors degree level or higher, but there are 56 WIA-eligible programs in the region that are linked to the business services sector that had a combined enrolment of 1,000 students in 2012.

A large number of educational programs and occupational training programs are associated with careers in the healthcare sector. A total of 459 programs were identified which include programs for healthcare professionals and technicians, health support occupations, business occupations in healthcare, and other occupations that support healthcare operations (e.g. stationary power systems engineers who assure back-up power at hospitals). There were about 48,200 individuals enrolled in these programs in 2012. Healthcare also has the largest number of WIA-eligible programs (66) and these programs had a combined reported enrollment of 4,153 students in 2012.

Table 5 Educational Programs and Enrollment by Sector, 2011-2012

Sector	Training and Education Capacity					
	WIA-Eligible Training Programs	Enrollment in WIA-Eligible Training Programs	All Programs Less than a Bachelors Degree	Enrollment in Programs Less than a Bachelors Degree	Total Educational and Training Programs	Total Enrollment - All Programs
Bioscience	7	119	115	6,072	384	28,869
Business Services	56	1,000	341	18,115	767	61,648
Construction	26	586	62	2,677	65	2,792
Education	2	338	142	40,329	413	64,015
Finance & Insurance	7	144	52	2,881	101	6,995
Healthcare	66	4,153	218	20,150	459	48,194
Hospitality & Tourism	7	244	39	2,212	115	7,485
Information Technology	28	176	151	5,490	271	15,117
Manufacturing	9	189	38	1,506	72	4,556
Retail Trade	4	99	9	649	15	888
Transportation and Warehousing	15	1,668	44	2,918	45	2,957
Utilities	-	-	10	486	17	1493
Wholesale	9	1,129	33	2,201	45	3656

Sources: Trends in Enrollments by Program, Maryland Higher Education Commission 1999-2012, Trends in Degrees and Certificates by Program, Maryland Higher Education Commission 1999-2012, WIA Occupation Training Programs, Online Database of WIA Service Providers by County, RDA Global Survey of Occupational Training Providers, MHEC online database of private career schools in Maryland. Linkages between educational training programs and occupations in high demand in each sector are based on the Bureau of Labor Statistics crosswalk for occupations and educational programs (<http://www.bls.gov/soc/soccrosswalks.htm>) and a subsequent qualitative review of each educational

program was performed to associate programs with occupations and sectors. Caution is urged in interpreting the total programs, enrollment and graduations by sector because some judgment was applied in making associations.

Other sectors with a large number of training programs include the education sector (enrollment of approximately 61,650 students in 413 programs), the bioscience sector (384 programs), and the information technology sector (271 programs). There are comparatively fewer training programs for the construction, finance & insurance, hospitality & tourism, information technology, retail trade, manufacturing, transportation and warehousing, wholesale, and utilities sector. In 2012, there were just 15 WIA-eligible programs that trained approximately 1,668 students for careers in the transportation and warehousing sector. While few formal educational and training programs are linked to the construction sector, the apprenticeship training system serving the region is robust. There are at least 24 local unions and organizations for construction trades in the Baltimore Region offering apprenticeship training programs or similar services, typically through 3-year to 5-year programs that combine on-the-job training with classroom education.

Recommendations

There are several sectors that have a subset of jobs that are suitable to a Career Pathways workforce development systems including:

- The healthcare sector,
- The construction sector,
- The information technology sector,
- The transportation and warehousing sector in combination with the wholesale sector (“Transportation and Logistics”),
- The business services sector, and
- The manufacturing sector.

These sectors stand out as offering a combination of (1) comparatively strong hiring demand for family-supporting mid-skilled jobs, (2) good potential for career progression into these jobs, and (3) an adequate inventory of existing educational programs to prepare workers for these careers. Each of these sectors has demand for workers with specialized competencies that require a combination of some post-secondary education, industry-specific knowledge, and some on-the-job training to progress into family-supporting careers.

Career Pathways workforce development could also be developed in other sectors as well, although hiring demand in some sectors such as finance and insurance and the utilities sector will be driven to a greater extent by turnover of workers who will replace individuals who transition out of jobs due to retirements or job changes. While some new careers and occupations have emerged in these sectors, the majority of education and training programming for occupations in these three sectors are mainly linked to occupations that have been important to these sectors over time.

Other sectors such as the education sector, the retail trade sector, and the hospitality and tourism sector are each large employment sectors that together represent nearly a third of all employment in

the region (30.6% of employment or 373,000 workers in total). The total hiring demand by these three sectors, including both new jobs and hiring due to turnover, is very significant at over 110,000 jobs between 2012 and 2020. While these sectors are large, they have comparatively fewer opportunities for well-paying mid-skill jobs. Many of the jobs in the retail sector, in hotel accommodations, restaurants, and education (support positions) require mainly on-the-job training and do not require extensive technical knowledge or skills. This is not to say that occupational training and adult education is not needed in these sectors as customer service skills and basic math and reading skills are required for many of the jobs in the sector. While these sectors offer many job opportunities to workers, average earnings for many occupations are below a living wage and do not offer much mobility into higher-paying careers beyond supervisory or management positions.

For the recommended sectors, a set of selected occupations has been identified that offer the best potential for workers to move into family-supporting careers, based on the hiring demand outlook, the potential for workers to earn a living wage, and the existing capacity to train workers.

Occupations in Healthcare

Healthcare is one of the largest employment sectors in the Baltimore Region with 188,000 employees as of 2012. There are at least 24 healthcare systems and medical centers in the region that have over 1,000 employees each, including:

- Anne Arundel Medical Center
- Baltimore Washington Medical Center
- Carroll Hospital Center
- Charlestown Community
- Greater Baltimore Medical Center
- Heartland Employment Services
- Helix Health System
- Howard County General Hospital
- Johns Hopkins Bayview Medical Center
- Johns Hopkins Health System
- Johns Hopkins Hospital
- Johns Hopkins University
- Kennedy Krieger Institute
- Maryland General Hospital
- Medstar Union Memorial Hospital
- Mercy Hospital
- Northwest Hospital Center
- Oak Crest Village
- Saint Joseph Medical Center
- Sheppard Pratt Hospital
- Sinai Hospital
- St Agnes Hospital
- University Of Maryland Medical System
- Upper Chesapeake Health Systems

Three major hospitals - Johns Hopkins Health System, University of Maryland Medical Center and Medstar Union Memorial Hospital - provide service to the entire region. Combined, the three systems alone consistently post openings for between 600 and 800 jobs. Many of the region's hospitals are currently advertising jobs for a very broad set of occupations, including strong demand for nurses and technicians in all areas of care. Eleven (11) occupations have been identified that offer strong potential for Career Pathways initiatives, including two medical office occupations, four health technician occupations, four occupations in acute care, and dental hygienists:

Medical Office Occupations

- Medical Assistants
- Medical Records and Health Information Technicians

Medical Technicians:

- Pharmacy Technicians
- Surgical Technologists
- Radiologic Technologists and Technicians
- Medical and Clinical Laboratory Technicians

Acute Care Occupations:

- Licensed Practical and Licensed Vocational Nurses (LPNs)
- Emergency Medical Technicians and Paramedics (EMTs)
- Registered Nurses (RNs)
- Respiratory Therapists (RTs)

Dental Occupations:

- Dental Hygienists

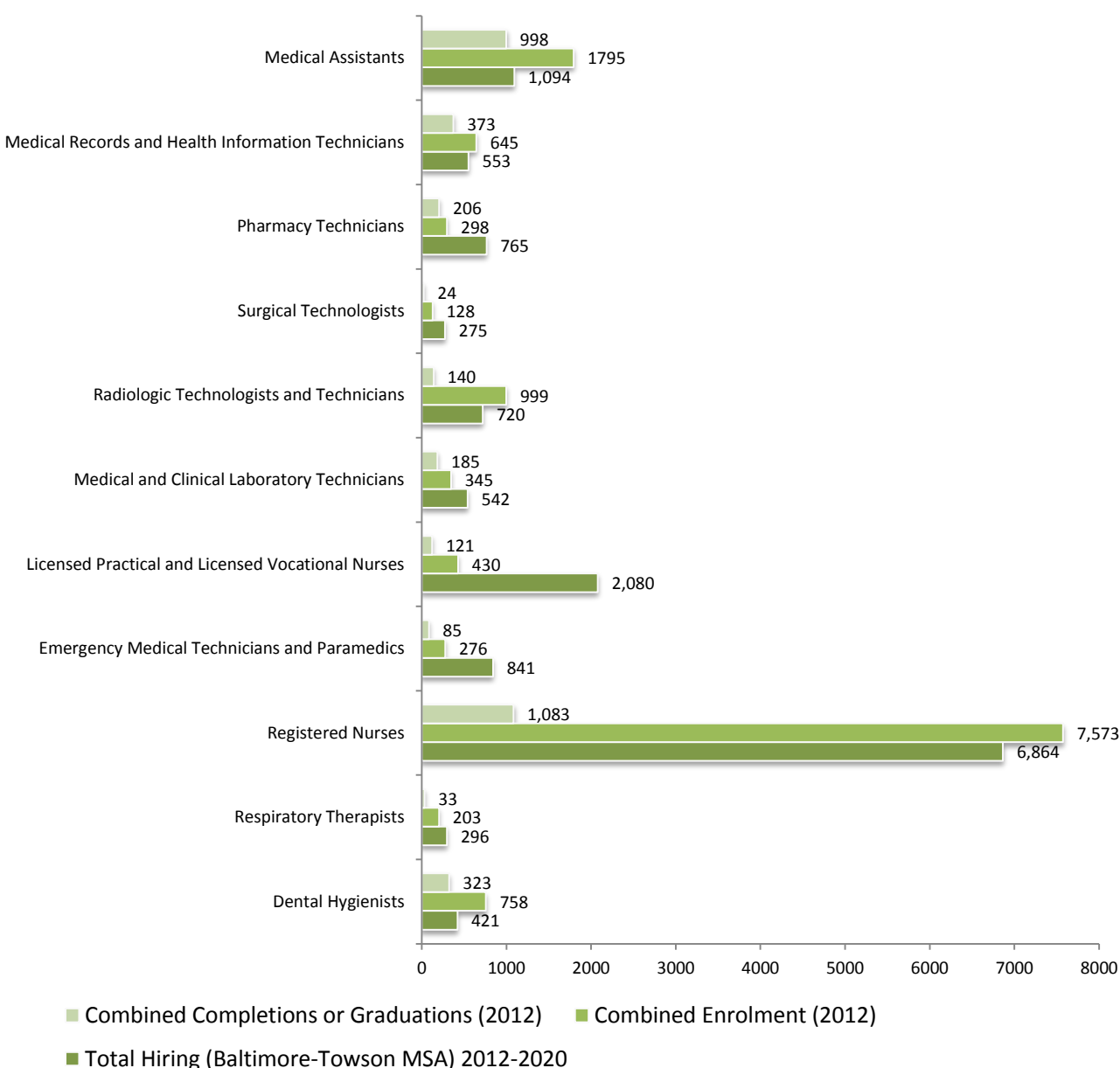
In 2012, there were over 57,000 workers employed in the region in these 11 occupations, of which registered nurses were the largest category with over 28,000 workers. While most jobs for workers in these occupations are with healthcare sector employers, a portion of these workers are also employed by retail employers (pharmacies), by residential care providers, by schools, or by other employers. Between 2012 and 2020, employers in the region are expected to hire for 14,450 jobs in the 11 selected healthcare occupations, including over 400 jobs for dental hygienists, over 1,600 medical office jobs, over 2,300 medical technician jobs, and over 10,000 acute care positions for LPNs, RNs, EMTs, and RTs.

The region has 118 educational training programs that prepare students for careers in the eleven occupations. In 2012, these programs had combined enrolment of 13,450 students and over 3,500 students completed or graduated from these programs. Enrolment and completions are high in programs that prepare workers for careers as medical assistants, medical records information technicians, and dental hygienists. By comparison, enrolment and program completions are low when compared to the expected hiring demand for some of the healthcare occupations including:

- Surgical technicians,
- Radiologic technicians and technologists,
- LPNs,
- EMTs, and
- RTs

These occupations may be particularly good targets for Career Pathways because hiring demand will likely exceed the number of new qualified workers entering the labor market in these occupations. Without a more robust training system for these occupations, Baltimore's healthcare employers will likely be forced to look outside the region to find qualified workers to fill vacant positions.

Figure 3 Enrolment and Completion of Formal Education Programs vs. Total Hiring Demand 2012-2020, Selected Healthcare Occupations



See Appendix A for a list of specific training and education programs leading for the selected healthcare occupations.

Table 6 Talent Pipeline and Career Pathways Candidates: Selected Healthcare Occupations

Sub-Area	Selected Occupations		Total Employment (Baltimore-Towson MSA) 2012	Total Hiring (Baltimore-Towson MSA) 2012-20	Healthcare Sector Employment		Mean Wages (2011)		Training Programs in the Baltimore Region			On The Job Training Require- ments
	SOC	Occupation			2012	Total Hiring 2012-20	Hourly	Annual	Education and Training Programs with Students (2012)	Combined Enrollment (2012)	Combined Completions or Graduations (2012)	
Medical Office	31-9092	Medical Assistants	4,600	1,094	3,777	898	\$15.68	\$32,620	20	1795	998	M
	29-2071	Medical Records and Health Information Technicians	2,100	553	1,736	457	\$19.45	\$40,470	19	645	373	-
Healthcare Technicians	29-2052	Pharmacy Technicians	3,260	765	716	168	\$14.59	\$30,340	8	298	206	M
	29-2055	Surgical Technologists	1,150	275	1,092	261	\$22.75	\$47,320	6	128	24	-
	29-2034	Radiologic Technologists and Technicians	3,200	720	2,290	515	\$32.34	\$67,260	9	999	140	-
	29-2012	Medical and Clinical Laboratory Technicians	2,100	542	1,697	438	\$20.86	\$43,390	10	345	185	-
	29-2061	Licensed Practical and Licensed Vocational Nurses	6,560	2,080	5,444	1,726	\$24.45	\$50,860	9	430	121	-
Acute Care	29-2041	Emergency Medical Technicians and Paramedics	3,200	841	2,477	651	\$20.69	\$43,040	14	276	85	-
	29-1141	Registered Nurses	28,310	6,864	26,267	6,369	\$37.14	\$77,250	10	7,573	1,083	-
	29-1126	Respiratory Therapists	1,200	296	1,039	256	\$31.22	\$64,930	3	203	33	-
Dental	29-2021	Dental Hygienists	1,450	421	1,180	343	\$35.55	\$73,940	10	758	323	-
	Total: Selected Occupations		57,130	14,450	47,715	12,082			118	13,450	3,571	

Sources: Occupational Employment Statistics Database (BLS), Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Notes: *Occupational demand for the region is reported by the Occupational Employment Statistics Database (BLS) and is also estimated using data from the Quarterly Census of Employment and Wages. Where there is a discrepancy between the figures, the estimates based on the QCEW are presented. ** Education and training programs presented include only those with enrollment or graduates/completions in 2012. Comparisons between enrollment and completions should be made with caution because not all programs report completions and some programs last longer than one year and thus only a portion of enrolled student complete the program each year. On the Job Training Codes: S: Short Term Training Required, M: Medium Term Training Required, L: Long-Term Training Required, A: Apprenticeship Training Required. Wage figures in red indicate that the mean wage is below the living wage for a single parent with one child living in Baltimore City.

Occupations in Construction

Construction sector employment in the Baltimore Region stabilized in 2010 and is expected to experience steady growth leading to an 8.1% increase in jobs between year end 2012 and year end 2020 (compound annual growth of 1.0% per year). Over the 2012-2020 period, the construction sector is expected to add over 5,800 net new jobs as the sector increases from employment of 67,950 in 2012 to over 73,800 in 2020. The estimated total hiring demand for workers in construction occupations between 2012 and 2020 is projected to exceed 17,000 total job openings, including replacement hiring for turnover.

Projects that are currently driving growth include investment in hotels, shopping, apartments and other residential construction.¹¹ Many of the region's larger construction firms are currently advertising for project managers & superintendents, project engineers, estimators, administrative staff and skilled trades including carpenters, welders, pipe layers, equipment operators, drywall installers, mechanics, HVAC installers, and several other skilled trades.

Job demand in the construction sector is cyclical and therefore at times the sector will create opportunities for workforce development, but as major projects are completed or investment cycles conclude workers may face difficulties finding jobs. The housing bubble in the first half of the 2000s, for instance, drove strong job creation in the region's construction sector, adding over 13,000 jobs between 2002 and 2006. These gains in total jobs were removed when the region lost nearly 19,000 construction jobs between 2006 and 2010. The hiring demand outlook for the construction sector assumes recent trends in construction investment will continue throughout the forecast period, but additional upside growth potential is also possible if major construction projects such as the Red Line are funded and begin construction as planned between 2015 and 2021.¹²

There are nine occupational categories for construction trades that have been identified as candidates for Career Pathways initiatives. These occupations include:

- Electricians,
- Plumbers, Pipefitters, and Steamfitters,
- Carpenters,
- Operating Engineers and Other Construction Equipment Operators,
- Highway Maintenance Workers,
- Brickmasons and Blockmasons,
- Glaziers,
- Elevator Installers and Repairers, and

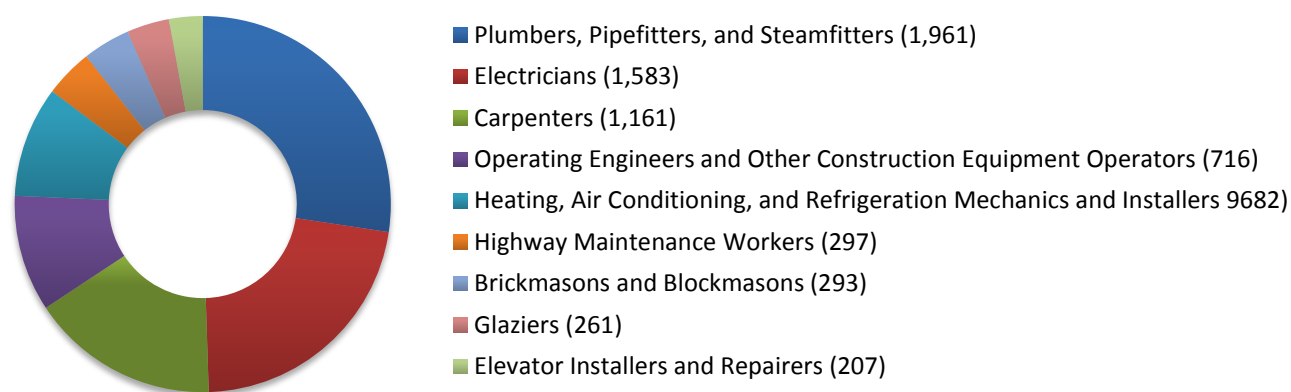
¹¹ There are over 500 apartment units under construction within one mile of downtown Baltimore and as of June, 2013, there were over 17 major commercial developments under construction in Anne Arundel County along the highway 295 corridor, near Fort Meade, and in proximity to BWI Thurgood Marshal Airport.

¹² The forecast methodology is conservative and does not factor in potential major projects that have not yet been funded with final approvals.

- Heating, Air Conditioning, and Refrigeration Mechanics and Installers (HVAC).

Within the construction sector, employers are expected to hire for over 5,900 job openings between 2012 and 2020. Similar to healthcare workers, not all jobs for construction trades workers are within the construction sector (other employers include building maintenance, the retail sector, governments, educational and healthcare institutions, industrial sectors, and other industries). Total economy-wide hiring for workers in the nine recommended construction occupations is expected to exceed 7,100 workers. Hiring for plumbers (incl. pipefitters and steamfitters), electricians, and carpenters is expected to represent two thirds (67 per cent) of all hiring for the nine recommended construction occupations. The remaining one third of hiring will be spread across other specialist occupations including operating engineers, equipment operators, HVAC mechanics, highway maintenance workers, brickmasons, glaziers, and elevator repairers.

Figure 4 Total Hiring Demand for Selected Construction Occupations 2012-2020, Baltimore Region



With the exception of highway maintenance workers, most training for construction trades is performed through apprenticeship programs. There are 22 construction sector apprenticeship programs that have been identified that have training locations within the region or nearby - and these programs provide apprenticeship training for carpenters, electricians, HVAC, plumbers, sheet metal workers, sprinkler fitters, pipe fitters, boilermakers, ironworkers and other construction trades.

In 2012, there were over 2,000 students enrolled in formal education or training courses for construction trades, of which nearly 1,300 of the students enrolled were in HVAC programs that typically require a greater classroom educational component. Enrolment in formal courses for plumbers, electricians and carpenters in 2012 totaled 627 students at community colleges, private career schools, and other education providers. In addition, 116 students were enrolled in four pre-apprenticeship training programs identified in the region that prepare students to take math exams and gain skills needed for entering an apprenticeship program. Education in apprenticeship programs combine classroom and on-the-job training and not all trades offer courses through community colleges or other for-credit education classes.

Baltimore Regional Talent Development Pipeline Study

Table 7 Apprenticeship Training Programs

	Occupation	Location	Organization	Program Description
1	Brickmasons and Blockmasons	Near Anne Arundel County	Bricklayers Local 1 JATC MD, VA & DC	Bricklayer apprentice training
2	Carpenters & Other Occupations	Anne Arundel County	Associated Builders and Contractors, Inc., Chesapeake Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting
3	Carpenters & Other Occupations	Baltimore City	Associated Builders and Contractors, Inc. - Baltimore Metropolitan Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting
4	Carpenters & Other Occupations	Baltimore County	Associated Builders and Contractors, Inc. - Baltimore Metropolitan Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting
5	Electricians	Anne Arundel County	Independent Electrical Contractors - Chesapeake	4-year apprenticeship electrician, 3-year Voice-Data-Video (VDV) apprenticeship
6	Electricians	Baltimore City	International Brotherhood of Electrical Workers Local 24	5-year electrical apprenticeship, 3-Year Voice/Data/Video
7	Electricians	Baltimore County	Independent Electrical Contractors - Chesapeake	4-year apprenticeship electrician, 3 year Voice-Data-Video (VDV) apprenticeship
8	Elevator Installers and Repairers	Baltimore City	International Union of Elevator Constructors, Local No. 7	Program opens once a year for new hires.
9	Glaziers	(Out of Region)	Painters and Allied Trades District Council No. 51	4-year commercial painter/wallcoverer, 3-year drywall finisher/installer, a 3-year bridge/industrial painter, 4-year glazier/architectural metal program
10	Operating Engineers and Other Construction Equipment Operators	(Out of Region)	International Union of Operating Engineers Local No. 99	Operating engineers apprenticeship program (25 to 30 positions accepted per year).
11	Operating Engineers and Other Construction Equipment Operators	Baltimore City	Boilermakers Local 193 JATC	Boilermakers national apprenticeship program
12	Other Construction Trades	(Out of Region)	Operative Plasterers and Cement Masons Local 891	3-year apprenticeship
13	Other Construction Trades	(Out of Region)	Roofers Local 30	3-year roofers apprenticeship
14	Other Construction Trades	Anne Arundel County	Road Sprinkler Fitters Local No. 669	5-year apprenticeship (correspondence)
15	Other Construction Trades	Baltimore City	Ironworkers Local 16	3-year apprenticeship: structural steel structures.
16	Other Construction Trades	Baltimore City	Road Sprinkler Fitters Local No. 669	5-year Apprenticeship (correspondence)
17	Other Construction Trades	Baltimore City	Sheet Metal Workers Local Union #100	4-year sheet metal apprenticeship
18	Other Construction Trades	Baltimore City	Sprinkler Fitters Local Union 536	5-year apprenticeship sprinkler fitters.
19	Other Construction Trades	Near Howard County	Heat and Frost Insulation Workers and Asbestos Workers, Local No. 24	4-year apprenticeship, pre-apprenticeship "Improver" program
20	Plumbers, Pipefitters, and Steamfitters	Anne Arundel County	Maryland Plumbing, Heating Cooling Contractors, Inc.	4-year plumbing apprenticeship
21	Plumbers, Pipefitters, and Steamfitters	Baltimore City	Maryland Plumbing, Heating Cooling Contractors, Inc.	4-year plumbing apprenticeship
22	Plumbers, Pipefitters, and Steamfitters	Baltimore City	Plumbers & Steamfitters Local Union 486	5-year apprenticeship plumber/steamfitter

Table 8 Talent Pipeline and Career Pathways Candidates: Selected Construction Occupations

SOC	Selected Occupations	Total Employment (Baltimore-Towson MSA) 2012	Total Hiring (Baltimore-Towson MSA) 2012-20	Construction Sector Employment		Mean Wages (2011)		Training Programs in the Baltimore Region**				On The Job Training Require- ments
				2012	Total Hiring 2012-20	Hourly	Annual	Apprenticeship Training Programs/ Unions	Classroom Education Programs	Classroom Education Enrollment	Classroom Completions	
47-2111	Electricians	5,230	1,583	4,923	1,490	\$24.69	\$51,350	3	6	452	265	A
47-2152	Plumbers, Pipefitters, and Steamfitters	6,170	1,961	3,870	1,230	\$26.36	\$54,830	3	1	100	n.a.	A
47-2031	Carpenters	4,560	1,161	4,044	1,030	\$20.98	\$43,640	3	1	75	44	A
47-2073	Operating Engineers and Other Construction Equipment Operators	2,610	716	2,572	706	\$21.06	\$43,810	2	2	28	2	A,M
47-4051	Highway Maintenance Workers*	995	297	995	297	\$17.46	\$36,310	n.a.	n.a.	n.a.	n.a.	M
47-2021	Brickmasons and Blockmasons	1,180	293	1,051	261	\$20.40	\$42,430	1	n.a.	n.a.	n.a.	A
47-2121	Glaziers	680	261	539	207	\$18.74	\$38,980	1	n.a.	n.a.	n.a.	A
47-4021	Elevator Installers and Repairers	640	207	617	200	\$35.36	\$73,550	1	n.a.	n.a.	n.a.	A
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2,990	682	2,226	508	\$22.71	\$47,240	n.a.	13	1,291	699	A,L
	<i>Pre-Apprenticeship Training</i>								4	116	n.a.	
	Total: Selected Occupations	25,055	7,163	20,837	5,929			14	27	2,062	1,010	

Sources: Occupational Employment Statistics Database (BLS), Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Search of Apprenticeship Training for Construction Trades (online). Notes: *Occupational demand for the region is reported by the Occupational Employment Statistics Database (BLS) and is also estimated using data from the Quarterly Census of Employment and Wages. Where there is a discrepancy between the figures, the estimates based on the QCEW are presented. ** Education and training programs presented include only those with enrollment or graduates/completions in 2012. Apprenticeship programs include those in the Baltimore Region. Comparisons between enrollment and completions should be made with caution because not all programs report completions and some programs last longer than one year and thus only a portion of enrolled student complete the program each year. On the Job Training Codes: S: Short Term Training Required, M: Medium Term Training Required, L: Long-Term Training Required, A: Apprenticeship Training Required.

Occupations in Information Technology

The Baltimore-Washington corridor is one of the strongest IT markets in the country, and the IT sector in the Baltimore region employs nearly 68,000 workers. The IT sector added over 18,600 jobs between 2002 and 2012 and was comparatively resilient through the recession, losing only around 1,300 jobs in 2009, the only year of negative growth over the recession period. The IT sector is projected to add around 7,800 new jobs between 2012 and 2020 (compounded annual growth of 1.4% per year).

The stability of the sector is attributable in part to the number of federal government agencies located in the Baltimore Region, including Fort Meade, Aberdeen Proving Ground, the National Security Agency, and the Social Security Administration along with large private defense contractors such as Northrop Grumman, Lockheed Martin and General Dynamics. The US Cyber Command is located at Fort Meade and investments in cybersecurity will contribute to the sector's growth.

In Maryland, approximately 83 per cent of job openings for Cybersecurity professionals require a Bachelors degree or higher,¹³ but there are also good opportunities for less experienced workers with less than a Bachelors level education. According to the Cybersecurity Jobs Report (2013):

- 3 per cent of Maryland job openings require an Associates degree,
- 17 per cent require just a high school diploma,
- 29 per cent require less than 2 years of work experience.

Many of the region's entry-level jobs in cybersecurity are designed for younger workers through work-study programs, internships, and cooperative programs to help less experienced workers gain work experience while in training.

At the Bachelors degree level and higher, several programs prepare students for Cybersecurity careers in the Baltimore Region. U.S. Naval Academy has announced plans to develop a \$100 million on-campus Center for Cybersecurity Studies to coincide with its new Cyber Operations major.¹⁴ University of Maryland

UMBC Cybersecurity Academy

The UMBC Training Centers Cybersecurity Academy was established to address the cyber workforce training needs of the military, the intelligence community, federal civilian agencies, and the commercial sector in the Mid-Atlantic region. Building on UMBC's designation as a National Center of Excellence in Information Assurance Education and Research, the Cybersecurity Academy delivers practical training programs to develop today's and tomorrow's cyber workforce, preparing participants for careers in this high demand industry. The intent of the Cybersecurity Academy is to transform civilians and military personnel with basic computer literacy skills into professionals ready for entry-level positions within one of five Computer Network Operations (CNO) job specialties.

There are four Certificate Programs offered by the Cybersecurity Academy:

- Certificate in Cyber Foundations
- Certificate in Cybersecurity
- Certificate in Cyber Operations
- Certificate in Cyber Development

Learn More at:
www.umbctraining.com/cybersecurity

¹³ See Cybersecurity Jobs Report, 2013, Abel Foundation

¹⁴ See Cybersecurity, Baltimore Industry Highlights, December 2012, Last Accessed June, 2013 at http://www.cassidyurley.com/Research/MarketReports/Report.aspx?topic=2012_Industry_Highlight_Cybersecurity&action=download

Baltimore County (UMBC) created Maryland's first Masters in Professional Studies in Cybersecurity and other universities in the region offer numerous degrees linked to cybersecurity careers. In addition to UMBC, John's Hopkins University, Towson University, and the US Naval Academy have each been designated as a Center of Academic Excellence (CAE) by the National Security Administration (NSA). At the community college level, Anne Arundel Community College, Harford Community College, and Community College of Baltimore County have also attained CAE recognition. These colleges offer Associates degree programs in computer science and information systems fields as well as certificate programs in network security, information assurance, cybersecurity, and other IT-related certificates.

For many IT jobs, occupational training leading to an IT certification is the main pathway to obtaining employer-recognized credentials. In particular, the Certified Information Systems Security Practitioner (CISSP) Tier 1 certification is one of the highest-demand certifications for cybersecurity professionals, and students are able to complete course work to prepare for the CISSP through community colleges or through courses offered online by organizations outside the region. Classroom-based occupational training for cybersecurity professionals is expanding in the region. In 2012-2013, UMBC launched the Cyber Academy, a new occupational training program designed to help students obtain skills needed for entry-level positions in Cybersecurity (see inset on page 21 for a program description). While the outcomes of this new program will be better understood in 2014, this type of training specific to cybersecurity careers is a promising example of what a cybersecurity Career Pathway might look like for workforce training.

In addition to cybersecurity, jobs in Health Information Technology (HIT) are also growing in the region. While the exact number of jobs in HIT is difficult to estimate, there are approximately 1,900 IT professionals working directly in the healthcare sector in the Baltimore Region. In addition, other HIT workers are employed by system integrators and software development companies outside of the healthcare sector, that are implementing Maryland's healthcare exchange based on the Affordable Care Act.¹⁵

HIT occupations range from medical coders and medical records specialists (mentioned in the section on healthcare occupations) and also include jobs that require an Associates degree such as coder supervisors, compliance officers, documentation specialists, disclosure specialists, clinical data dictionary analysts, quality improvement specialists, and experienced HIT managers.¹⁶

Broadly within the IT sector, there are four occupational categories that are recommended for Career Pathways which are linked to the Cybersecurity, HIT and other IT fields. These include:

- Computer Support Specialists,
- Computer Systems Analysts,
- Network and Computer Systems Administrators, and

¹⁵ See Maryland Health Benefit Exchange <http://marylandhbe.com/>

¹⁶ See Maryland's Health Information Technology Workforce Task Force Report and Findings (2010), Governor's Workforce Investment Board.

- Information Security Analysts, Web Developers, and Computer Network Architects

Employers are expected to hire 7,166 workers in these four occupations between 2012 and 2020 in the Baltimore Region. Average annual earnings for workers in these occupations are high ranging from an average of \$56,000 per year for computer support specialists up to an average of over \$91,000 for information security analysts, web developers, and computer network architects, well above a living wage.

There are 69 related educational programs that are below a Bachelors degree level that are offered by colleges, universities, and private career schools in the Baltimore Region and in 2012 there were 3,132 students enrolled in these programs, combined. While the educational capacity for these occupations is high in terms of number of programs and enrolment, the number of graduates or program completions for these programs is low compared to enrolment. Only 475 students completed these programs in 2012. It is difficult to know the reason for low completion rates in these programs as students may be transferring to other degree programs or obtaining an exam-based IT certification that does not require completion of the formal education program. Further research will be needed to understand the supply and demand conditions in the IT pipeline and determine how to best strengthen or build Career Pathways within this sector.

A complete list of programs and their enrolment and completion information for 2012 is listed in Appendix A.

Table 9 Talent Pipeline and Career Pathways Candidates: Selected IT Occupations

Sub-Area	Selected Occupations		Total Employment (Baltimore-Towson MSA) 2012	Total Hiring (Baltimore-Towson MSA) 2012-20	IT Sector Employment		Mean Wages (2011)		Training Programs in the Baltimore Region Below a Bachelors Degree**			On the Job Training Require- ments	Experience Required
	SOC	Occupation			2012	Total Hiring 2012-20	Hourly	Annual	Education and Training Programs with Students (2012)	Combined Enrolment (2012)	Combined Completion s/ Graduation s (2012)		
Tech Support	15-1150	Computer Support Specialists	8,480	2,680	2,921	923	\$26.93	\$56,020				M	-
	15-1121	Computer Systems Analysts	4,720	1,245	2,381	628	\$39.57	\$82,290				-	-
	15-1142	Network and Computer Systems Administrators	5,170	1,266	1,315	322	\$40.35	\$83,920	69	3132	475	-	-
Systems Design	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	8,610	1,975	1,739	399	\$44.06	\$91,640				-	1 to 5 years
		Total: Selected Occupations	26,980	7,166	8,356	2,272			69	3,132	475		

Sources: Occupational Employment Statistics Database (BLS), Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Notes: *Occupational demand for the region is reported by the Occupational Employment Statistics Database (BLS) and is also estimated using data from the Quarterly Census of Employment and Wages. Where there is a discrepancy between the figures, the estimates based on the QCEW are presented. ** Education and training programs presented include only those with enrolment or graduates/completions in 2012 at an Associates degree level or below. Comparisons between enrolment and completions should be made with caution because not all programs report completions and some programs last longer than one year and thus only a portion of enrolled student complete the program each year. On the Job Training Codes: S: Short Term Training Required, M: Medium Term Training Required, L: Long-Term Training Required, A: Apprenticeship Training Required.

Occupations in Transportation and Logistics (T&L)

The Baltimore Region supports supply chains across the entire mid-Atlantic region with a robust road and rail network connecting BWI airport and the Port of Baltimore to major cities and the continental US. The sector, which is inclusive of transportation, warehousing, and wholesale trade companies, employed approximately 78,500 workers in the Baltimore Region in 2012 and is expected to add at least 3,300 new jobs between 2012 and 2020. The outlook for the sector is positive, but also has the potential to be higher than projected. The flow of international shipping container traffic is expected to increase at ports all along the US East Coast as mega ships transporting goods from Asia begin passing through the expanded Panama Canal when it opens in 2014. The Maryland Department of Transportation and CSX Rail are working together to relocate CSX's existing facility away from the Seagirt Marine Terminal in order to provide train service supporting Port of Baltimore international customers at the terminal. The relocation will also allow additional space at the Port to accommodate the increased flow of international shipping traffic.

There are five skilled occupations linked to the T&L Sector that are recommended for Career Pathways initiatives including:

- Industrial Truck and Tractor Operators (e.g. forklift operators and other equipment operators)
- Heavy and Tractor-Trailer Truck Drivers
- Cargo and Freight Agents
- Dispatchers
- Bus and Truck Mechanics and Diesel Engine Specialists

Across the region, employers are expected to hire for nearly 4,500 jobs in these five occupations from 2012 to 2020. There are 20 training programs that are offered in the region to prepare workers for these occupations. Truck driving and engine mechanic programs comprise the majority of enrolment which totaled 1,227 students and 930 program graduates in 2012. Jobs for cargo and freight agents and dispatchers typically require on-the-job training and there are few programs that are linked to these occupations although a handful of programs provide training for basic office and computer skills needed to work in these occupations.

Table 10 Talent Pipeline and Career Pathways Candidates: Selected Transportation and Logistics Occupations

Sub-Area	Selected Occupations		Total Employment (Baltimore-Towson MSA) 2012	Total Hiring (Baltimore-Towson MSA) 2012-20	Mean Wages (2011)		Training Programs in the Baltimore Region**			On The Job Training Requirements	Experience Required
	SOC	Occupation			Hourly	Annual	Education and Training Programs with Students (2012)	Combined Enrollment (2012)	Combined Completions/Graduations (2012)		
Equipment & Trucking	53-7051	Industrial Truck and Tractor Operators	3,710	1,048	\$17.87	\$37,170	8	1030	851	S	Less than 1 year
	53-3032	Heavy and Tractor-Trailer Truck Drivers	11,580	2,562	\$20.06	\$41,730				S	1 to 5 years + Age 21
Logistics	43-5011	Cargo and Freight Agents	570	138	\$19.76	\$41,110	5	31	7	S	-
	43-5032	Dispatchers, Except Police, Fire, and Ambulance	1,850	382	\$18.08	\$37,610	4	48	4	S	-
Mechanic Trades	49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	1,380	319	\$20.98	\$43,630	3	118	68	S	-
Total: Selected Occupations			19,090	4,449			20	1,227	930		

Sources: Occupational Employment Statistics Database (BLS), Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Notes: *Occupational demand for the region is reported by the Occupational Employment Statistics Database (BLS) and is also estimated using data from the Quarterly Census of Employment and Wages. Where there is a discrepancy between the figures, the estimates based on the QCEW are presented. ** Education and training programs presented include only those with enrolment or graduates/completions in 2012. Comparisons between enrolment and completions should be made with caution because not all programs report completions and some programs last longer than one year and thus only a portion of enrolled student complete the program each year. On the Job Training Codes: S: Short Term Training Required, M: Medium Term Training Required, L: Long-Term Training Required, A: Apprenticeship Training Required.

Occupations in Business Services

The Business Services sector is the largest sector in the Baltimore Region. Employment in the sector peaked prior to the recession in 2008 at 193,000 employees and lost around 11,000 jobs during the recession. The sector is expected to reach pre-recession levels by 2014 and then add another 12,000 jobs between 2014 and 2020, supported by the region's close proximity to Washington DC and the sector's close relationship with other growing sectors such as IT, biosciences, and healthcare.

Some of the larger employers in the region include corporate offices, engineering services companies, temporary staffing companies, environmental management companies, and other business-to-business service providers such as:

- Abacus Corporation
- ABM Janitorial Services
- Aerotek
- Arbitron
- Arinc Incorporated
- Black & Decker
- Booz Allen Hamilton Inc
- Broadway Services
- CBS Personnel Services
- Ciena Corporation
- Computer Sciences Corp
- Eagle Alliance
- Exelis Inc
- Healthcare Housekeeping Systems
- Jacob's Technology Inc
- Johns Hopkins Applied Physics Laboratory
- Johns Hopkins Health System Corp
- Johns Hopkins Medical Management Corp
- L-3 Services Inc
- LM Operations Support Inc
- M V M Inc
- Maryland Environmental
- Maxim Healthcare Service
- Micros Systems Inc
- Science Applications International Corp
- Teksystems
- V I P'S Inc
- W R Grace & Company

Within the Business Services Sector, there three groups of occupations that offer good potential for Career Pathways development (See Table 11):

- (1) Accounting and human resource occupations including tax preparers and HR assistants,
- (2) Environmental occupations including hazardous materials removal workers and environmental technicians, and
- (3) Engineering technicians and drafting occupations.

In 2012, there were nearly 9,300 workers employed in the region in these three occupational categories, and most (over 5,000) were employed directly by business services companies. Between 2012 and 2020, employers in the region are expected to hire for 900 jobs in the selected accounting and HR occupations, nearly 200 jobs in environmental occupations, and nearly 1,500 jobs in high-paying engineering technology and drafting occupations.

Table 11 Talent Pipeline and Career Pathways Candidates: Selected Business Services Occupations

Selected Occupations			Total Employment (Baltimore-Towson MSA) 2012	Total Hiring (Baltimore-Towson MSA) 2012-20	Business Services Sector		Mean Wages (2011)		Training Programs in the Baltimore Region			On The Job Training Requirements
Sub-Area	SOC	Occupation			Employment 2012	Total Hiring 2012-20	Hourly	Annual	Education and Training Programs with Students (2012)**	Combined Enrolment (2012)	Combined Completions or Graduations (2012)	
Acct. & HR	13-2082	Tax Preparers	930	246	791	209	\$15.55	\$32,350	18	1,238	188	M
	43-4161	Human Resources Assistants, Except Payroll and Timekeeping	2,090	665	399	127	\$20.52	\$42,680	5	121	44	S
Environ- mental	47-4041	Hazardous Materials Removal Workers*	395	93	392	92	\$18.85	\$39,200	9	123	16	M
	19-4091	Environmental Science and Protection Technicians, Including Health	220	96	171	75	\$24.25	\$50,450				M
Engineer- ing Techs. and Drafters	17-3022	Civil Engineering Technicians*	925	242	923	241	\$23.13	\$48,110	36	2,237	314	-
	17-3023	Electrical and Electronics Engineering Technicians	1,700	439	681	176	\$29.73	\$61,840				-
	17-3027	Mechanical Engineering Technicians	410	108	300	79	\$28.63	\$59,540				-
	17-3029	Engineering Technicians, Except Drafters, All Other	1,570	415	820	217	\$32.66	\$67,930				-
	17-3011	Architectural and Civil Drafters	490	128	340	89	\$24.65	\$51,280	30	527	150	-
	17-3013	Mechanical Drafters	550	144	203	53	\$25.90	\$53,870				-
		Total: Selected Occupations	9,280	2,576	5,020	1,358			98	4,246	712	

Sources: Occupational Employment Statistics Database (BLS), Quarterly Census of Employment and Wages (BLS), RDA Global Employment Forecast, Baltimore Region, American Community Survey, MHEC Trends in Enrollment in Higher Education Institutions, MHEC Trends in Degrees and Certificates by Program, MHEC WIA Occupational Training Program Database. Notes: *Occupational demand for the region is reported by the Occupational Employment Statistics Database (BLS) and is also estimated using data from the Quarterly Census of Employment and Wages. Where there is a discrepancy between the figures, the estimates based on the QCEW are presented. ** Education and training programs presented include only those with enrollment or graduates/completions in 2012. Comparisons between enrollment and completions should be made with caution because not all programs report completions and some programs last longer than one year and thus only a portion of enrolled student complete the program each year. On the Job Training Codes: S: Short Term Training Required, M: Medium Term Training Required, L: Long-Term Training Required, A: Apprenticeship Training Required.

Manufacturing

The US manufacturing sector has struggled over the past three decades with continual declines in total manufacturing employment and these historical trends are similar for the Baltimore Region. The Baltimore Region had nearly 92,000 manufacturing workers in 2001 but has consistently lost jobs every year until 2011 as manufacturing firms become more efficient and also moved operations offshore to low wage countries. The advantage of production in low wage countries has been narrowing over the recent years as wages and the prices for resource inputs have increased in developing countries. In addition some manufacturing companies are investing in expansions in North America in order to optimize supply chain logistics within North America.

The future trend in the manufacturing sector is far from certain; cyclical patterns after a recession can also lead to growth in manufacturing jobs but it is unclear yet what direction manufacturing jobs in Maryland will take in the future. The projections for growth in the manufacturing sector in the Baltimore are flat during the forecast period, with most of the expected hiring expected to be driven by replacement positions. The Baltimore Region has a small base for high paying manufacturing jobs with firms like Lockheed Martin and is well supported by a robust supply chain across the entire mid-Atlantic region, strong transportation and logistics, and a good network of roads, rails, airports and warehouses. These advantages, along with federal, state and local initiatives to attract new manufacturing companies and jobs may give this sector a greater upward potential for growth.

Over the months of May through September 2013, manufacturing firms in the region placed online advertisements for over 6,900 job vacancies.¹⁷ Only 280 of these positions are for occupations that

Figure 5 Mid-Skill Level Job Vacancies at Manufacturing Firms in the Baltimore Region, May-September 2013

Occupation	Job Vacancies
Computer Occupations (all others)	548
Computer User Support Specialists	180
Electrical and Electronics Engineering Technicians	56
General and Operations Managers	53
Industrial Engineering Technicians	16
Registered Nurses (at labs and biomanufacturing firms)	11
Chemical Technicians	7
Paralegals and Legal Assistants	6
Mechanical Engineering Technicians	6
Construction Managers	5
Environmental Science and Protection Technicians	4
Electro-Mechanical Technicians	2
Architectural and Civil Drafters	2
Medical Equipment Repairers	2
Mechanical Drafters	2
Civil Engineering Technicians	2
Other Occupations	4
Total	906

Source: RDA Global Job Vacancy Database

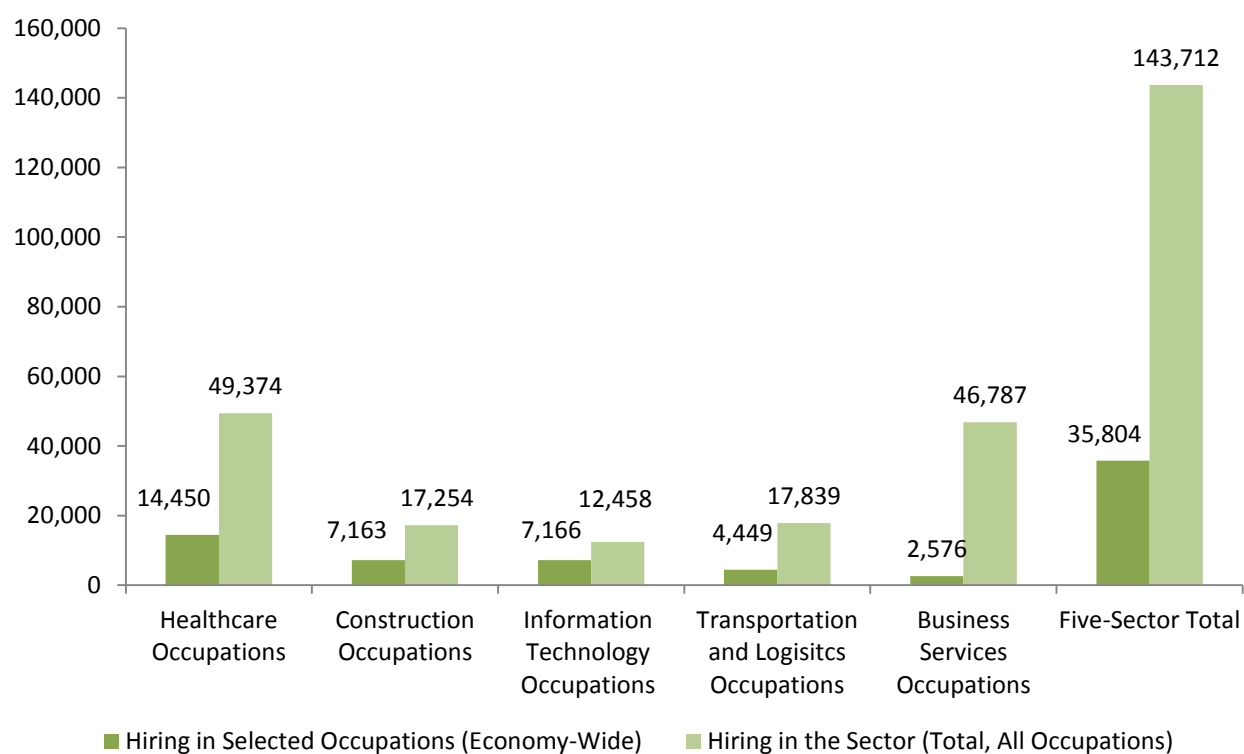
¹⁷ Source: RDA Global Job Vacancy Database. Top employers recruiting for job vacancies that require an Associates degree or lower level of educational attainment include Northrop Grumman, Lockheed Martin, Johnson Controls, Inc, Ecolab, Raytheon Corporation, Panera Bread, Covelli Enterprises, Pitney Bowes, Inc., Stanley Security Solutions, Mattel, Medifast, Inc., Aai Corporation, L-3 Communications, Tenable Network Security, SIMPLEXGRINNELL LP, Coca-Cola Refreshments, Stryker Corporation, McCormick & Company, Pepsico, Berry Plastics, Flowserve, Trident Seafoods, Motorola Solutions, Under Armour, Inc., WEST SIDE TRANSPORT, Ciena, Force 3, Bombardier Inc., Domino Sugar,

typically require less than a high school education, but over 900 job openings for positions that require a high school diploma, an Associates degree or some college education. Currently the top occupations that are in demand in the manufacturing sector and which also require an Associates degree or less are similar to the occupations identified in other sectors. More than half of job openings are for computer specialist occupations and a large number are for computer user support specialists, engineering technicians, and operations managers.

Because the skills that are in demand currently at manufacturing firms are similar to those of other sectors (in particular IT and business services), no additional manufacturing occupations are recommended Career Pathways workforce development, but opportunities within the manufacturing sector should be considered in the design of Career Pathways for IT occupations and engineering technicians in business services.

Conclusions

Figure 6 Projected Hiring Demand: Five Recommended Sectors and Selected Occupations Recommended for Career Pathways



Noodles & Company, UOP LLC, Micros, Annapolis Micro Systems, Inc, Wolverine World Wide, Scotts Miracle-Gro Company, Interdynamics Inc, Danfoss, Shimadzu U.S.A. Manufacturing, Inc., Emc Corporation, Laboratory Corporation of America, LaFarge, Xerox Corporation, Valvoline Consolidated Container Company, Creative Circle, Novartis, Apple Signs, Oldcastle, Siemens AG, and Cargill Limited.

The Regional Talent Development Pipeline Study confirms that Career Pathways approaches can be used to address a portion of the Baltimore Region's high unemployment rates for workers who have lower educational attainment. There are 39 occupations in five sectors that recommended for Career Pathways, and each of these occupations offers the potential for workers to progress into mid-skilled family-supporting jobs. The combined hiring for the selected 39 mid-skilled occupations is expected to account for over 35,800 new job hires between 2012 and 2020. This figure is impressive in the context of regional unemployment: The expected hiring in these occupations equates to approximately one third of the population of 105,000 unemployed adults in the Baltimore region in 2012. What's more, if economic conditions are better than expected, the total hiring in these high-growth occupations could exceed 35,800, creating a strong opportunity for low-skilled adults to move into family-supporting careers.

It is important to note, however, that the challenges faced by the region cannot be solved entirely by stronger Career Pathways in these five sectors alone. In addition to Career Pathways strategies to address occupational training strategies, other strategies will be needed. This may include strategies to market the region for business attraction, strategies to leverage public investments to create local jobs, and strategies to strengthen the competitiveness of existing industries in the region, and strategies to equip workers with the basic math and reading skills that are prerequisites for training and progression into mid-skilled careers. Other barriers to employment opportunity must also be addressed and will be explored further in a forthcoming report on Barriers to Employment Opportunity in the Baltimore Region.

Recognizing that the Baltimore Region's total job growth is largely linked to a combination of (1) high-skilled jobs requiring a Bachelors degree or higher and (2) low-skilled jobs offering low wages without much potential for career progression, Career Pathways should be developed in a highly-targeted manner with a focus on selected mid-skilled occupations. When developing Career Pathways for these occupations, the region should consider a range of activities including:

- Raising awareness of the Region's best career opportunities for low skilled workers (career planning and awareness) and the specific steps that an individual may take to move into one of these high-opportunity careers.
- Raising awareness and building capacity for support services to help working parents and working students succeed along the pathways.
- Strengthening completion rates for training programs leading to high-demand occupations.
- Increasing training capacity in selected occupations that are underserved, including selected healthcare occupations and occupations in cybersecurity.
- Increasing the availability of training throughout the region for construction occupations and other occupations with limited program availability.
- Addressing all barriers to employment opportunity for the selected sectors, including basic math and literacy skills, and other barriers which will be identified in a subsequent study on barriers to employment opportunity.

Baltimore Regional Talent Development Pipeline Study

Table 12 Worker Demand by Sector

Demand Indicator	Bio-sciences	Business Services	Construction	Education	Finance and Insurance	Healthcare	Hospitality & Tourism	Information Technology	Manufacturing	Retail Trade	Transportation & Warehousing	Utilities	Wholesale
Indicators of Job Demand													
Sector Employment (2012)	57,089	190,554	67,953	116,339	71,452	188,405	118,294	49,182	62,863	138,329	32,100	5,894	46,389
Sector Employment (2020)	62,915	206,161	73,819	128,849	73,076	208,454	124,294	53,661	63,652	143,024	33,942	6,334	47,917
New Jobs (2012-2020)	5,825	15,608	5,867	12,509	1,624	20,049	6,000	4,479	789	4,695	1,842	440	1,528
Hiring from Turnover	9,869	31,179	11,388	20,761	13,159	29,325	33,658	7,980	11,101	32,818	5,904	1,092	8,564
Total Hiring	15,694	46,787	17,254	33,270	14,783	49,374	39,658	12,458	11,889	37,514	7,746	1,532	10,093
Indicators of Job Demand by Educational Attainment													
Sector Employment (2012)													
Less than High School	896	24,509	12,500	4,340	4,358	19,793	90,435	1,154	9,493	86,140	7,722	210	7,063
High School Diploma or Equivalent	14,114	69,355	44,188	32,920	45,623	55,789	23,267	13,618	34,539	42,691	21,071	3,714	28,341
Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	7,688	23,542	7,827	5,331	2,978	71,157	2,354	6,371	6,811	4,797	1,315	645	3,645
Bachelors Degree or Higher	34,391	73,147	3,437	73,748	18,493	41,666	2,238	28,038	12,021	4,701	1,992	1,325	7,340
Total Sector Employment (2012)	57,089	190,554	67,953	116,339	71,452	188,405	118,294	49,182	62,863	138,329	32,100	5,894	46,389
New Jobs (2012-2020)													
Less than High School	74	726	1,076	463	102	2,130	4,504	49	191	2,930	472	14	228
High School Diploma or Equivalent	1,328	4,644	3,818	3,636	1,091	6,124	1,269	911	362	1,446	1,213	262	926
Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	805	2,000	675	549	67	7,260	122	564	65	163	66	49	122
Bachelors Degree or Higher	3,619	8,238	297	7,861	364	4,535	105	2,954	170	157	90	115	252
Total New Jobs (2012-2020)	5,825	15,608	5,867	12,509	1,624	20,049	6,000	4,479	789	4,695	1,842	440	1,528
Total Hiring from Turnover													
Less than High School	178	4,263	1,624	940	871	2,979	28,693	260	1,973	23,356	1,662	40	1,658
High School Diploma or Equivalent	2,388	11,200	8,269	5,723	8,737	8,819	4,171	2,489	5,911	7,821	3,622	732	5,043
Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	1,311	3,928	920	1,170	479	10,388	392	1,216	984	742	231	94	599
Bachelors Degree or Higher	5,992	11,789	574	12,928	3,072	7,139	401	4,014	2,232	900	389	225	1,264
Total Hiring from Turnover	9,869	31,179	11,388	20,761	13,159	29,325	33,658	7,980	11,101	32,818	5,904	1,092	8,564

Baltimore Regional Talent Development Pipeline Study

Demand Indicator	Bio-sciences	Business Services	Construction	Education	Finance and Insurance	Healthcare	Hospitality & Tourism	Information Technology	Manufacturing	Retail Trade	Transportation & Warehousing	Utilities	Wholesale
Indicators of Job Demand by Educational Attainment													
Total Hiring (2012-2020)													
Less than High School	253	4,989	2,701	1,403	973	5,109	33,198	309	2,164	26,286	2,134	55	1,886
High School Diploma or Equivalent	3,715	15,844	12,088	9,359	9,828	14,943	5,441	3,401	6,273	9,266	4,835	994	5,969
Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	2,115	5,928	1,595	1,719	546	17,649	514	1,780	1,050	904	297	143	721
Bachelors Degree or Higher	9,611	20,026	870	20,789	3,436	11,674	506	6,968	2,402	1,057	480	340	1,516
Total Hiring (2012-2020)	15,694	46,787	17,254	33,270	14,783	49,374	39,658	12,458	11,889	37,514	7,746	1,532	10,093
Average Earnings for Occupations in the Sector													
Less than High School	\$13.90	\$12.39	\$16.19	\$11.39	\$12.87	\$11.05	\$10.02	\$13.30	\$13.30	\$11.77	\$14.34	\$14.11	\$13.65
High School Diploma or Equivalent	\$24.37	\$20.81	\$23.01	\$17.05	\$23.63	\$18.42	\$18.62	\$24.73	\$20.40	\$19.55	\$19.98	\$23.18	\$23.99
Associates Degree, Post-Secondary Award, or Some College, less than a Bachelors Degree	\$33.55	\$32.58	\$40.91	\$28.11	\$45.04	\$27.50	\$47.91	\$33.86	\$36.36	\$45.67	\$44.14	\$38.23	\$42.28
Bachelors Degree or Higher	\$42.05	\$42.60	\$38.91	n.a.	\$41.36	\$40.46	\$31.64	\$44.33	\$43.27	\$47.61	\$41.44	\$41.98	\$43.42
Average Earnings, All Occupations	\$36.09	\$29.55	\$24.62	n.a.	\$28.45	\$25.95	\$12.87	\$36.82	\$25.43	\$16.56	\$20.94	\$28.73	\$26.93

Baltimore Regional Talent Development Pipeline Study

Table 13 Enrollment in Education Programs by Level, Length of Program and Sector, 2012

Programs	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation Warehousing	Utilities	Wholesale
College and University Programs with Enrollment in 2012, by Level																
Lower Division Certificate	278	46	147	12	26	19	61	14	67	1	11	10	2	16	1	12
Associates	282	51	110	12	76	10	67	12	44	4	5	15	2	9	4	10
Non-Degree Undergraduate	71	10	21	-	37	2	6	1	10	-	1	3	-	-	1	2
Bachelors	503	113	227	2	126	30	109	58	70	5	4	21	2	1	3	8
Post-Baccalaureate Certificate/ Certificate of Advanced Study	129	16	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Non-Degree Graduate	30	2	134	1	109	16	80	15	35	7	6	10	3	-	4	4
Professional/Masters	338	75	1	-	11	-	9	-	-	-	-	-	-	-	-	-
Upper Division Certificate or Post-Masters	9	2	4	-	3	-	15	-	-	-	-	-	-	-	-	-
Doctorate	136	61	60	-	18	3	28	3	15	2	-	3	1	-	-	-
Unknown Degree Level	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Total College & University Programs with Enrollment	1,778	376	704	27	410	80	375	103	241	19	27	62	10	26	13	36
College & University Programs and Programs with No Enrollment in 2012																
	1,385	356	602	49	288	64	310	61	208	11	7	94	18	43	19	52
WIA-Eligible Programs with Enrollment in 2012, by Max Program Length																
1 month or less	9	-	1	4	-	1	1	-	-	-	-	1	-	3	-	3
1 to 3 months	21	-	4	6	-	-	8	-	1	-	-	-	-	1	-	1
3 to 6 months	21	1	2	1	1	-	8	-	6	-	2	-	-	2	-	2
6 to 9 months	42	1	20	3	-	2	16	2	3	-	-	2	3	3	-	2
9 to 12 months	30	1	9	7	-	2	11	1	7	-	1	1	-	1	-	-
1 to 2 years	58	4	17	5	1	1	21	3	9	1	-	4	-	4	-	-
2 to 3 years	5	-	3	-	-	1	1	1	2	-	-	1	1	1	-	1
Total WIA-Eligible Programs with Enrollment	186	7	56	26	2	7	66	7	28	1	3	9	4	15	-	9
WIA-Eligible Programs with No Enrollment in 2012																
	83	4	32	15	2	2	18	7	14	-	-	9	2	8	5	3
Non-WIA-Eligible Training Programs (2011-2012)																
	85	1	7	12	1	14	18	5	2	1	-	1	1	4	4	-
Total Programs with Enrollment	2,049	384	767	65	413	101	459	115	271	21	30	72	15	45	17	45

Baltimore Regional Talent Development Pipeline Study

Table 14 Number of Programs by Type of Program, County and Sector, 2012

Programs	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation/Warehousing	Utilities	Wholesale
College and University Programs with Enrollment in 2012, by County																
Anne Arundel County	170	27	70	2	38	4	43	9	41	2	11	2	1	3	1	-
Baltimore City	752	173	283	6	170	34	173	49	69	12	8	22	3	2	5	11
Baltimore County	522	118	220	10	101	22	95	31	86	3	5	24	3	11	5	10
Carroll County	95	16	24	1	43	6	15	3	11	2	-	3	1	-	-	4
Harford County	150	21	71	1	37	10	22	5	21	-	3	8	-	5	2	9
Howard County	89	21	36	7	21	4	27	6	13	-	-	3	2	5	-	2
Grand Total	1,778	376	704	27	410	80	375	103	241	19	27	62	10	26	13	36
WIA-Eligible Programs with Enrollment in 2012, by County																
Anne Arundel County	42	1	18	5	-	3	14	4	8	-	-	4	3	5	-	4
Baltimore City	46	4	10	3	1	-	25	1	4	1	-	3	-	4	-	2
Baltimore County	72	-	19	15	-	2	18	1	14	-	3	-	1	3	-	2
Carroll County	2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Harford County	14	1	7	1	-	2	3	-	1	-	-	1	-	1	-	1
Howard County	10	1	2	2	1	-	4	1	1	-	-	1	-	2	-	-
Total Programs with Enrollment	186	7	56	26	2	7	66	7	28	1	3	9	4	15	-	9
Non-WIA-Eligible Training Programs (2011-2012)																
Anne Arundel County	16	-	-	2	-	4	2	2	-	-	-	1	-	3	1	-
Baltimore City	27	1	3	6	1	1	9	2	-	-	-	-	1	-	2	-
Baltimore County	31	-	4	3	-	4	5	-	1	-	-	-	-	1	1	-
Carroll County	4	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-
Harford County	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
Howard County	5	-	-	1	-	3	1	1	1	1	-	-	-	-	-	-
Total Programs	85	1	7	12	1	14	18	5	2	1	-	1	1	4	4	-
Total Programs with Enrollment by County																
Anne Arundel County	228	28	88	9	38	11	59	15	49	2	11	7	4	11	2	4
Baltimore City	825	178	296	15	172	34	207	52	73	13	8	25	3	6	7	13
Baltimore County	625	118	243	28	101	28	118	32	101	3	8	24	4	15	6	12
Carroll County	101	16	24	1	43	7	18	3	11	2	-	3	1	-	-	4
Harford County	166	22	78	2	37	13	25	5	22	-	3	9	-	6	2	10
Howard County	104	22	38	10	22	7	32	8	15	1	-	4	2	7	-	2
Grand Total	2,049	384	767	65	413	101	459	115	271	21	30	72	15	45	17	45

Baltimore Regional Talent Development Pipeline Study

Table 15 Enrollment by Level, Length of Program and Sector, 2012

Enrollment by Level	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation/Warehousing	Utilities	Wholesale
College and University Enrollment by Level (2012)																
Lower Division Certificate	6,651	648	2,392	499	565	428	2,581	311	574	2	132	308	280	564	4	299
Associates	60,534	5,170	14,368	319	31,588	984	12,413	842	4,530	270	777	958	270	621	159	770
Non-Degree Undergraduate	7,963	99	114	-	7,678	3	36	3	92	-	1	6	-	-	3	3
Bachelors	68,480	14,352	27,042	48	13,302	2,792	16,204	4,428	5,926	492	-	1,774	93	39	63	1,276
Post-Baccalaureate Certificate/ Certificate of Advanced Study	1,575	150	448	-	555	25	490	135	100	-	23	93	-	-	76	12
Non-Degree Graduate	2,598	4	14	-	2,386	-	197	1	-	-	-	-	7	-	-	-
Professional/Masters	26,576	5,358	11,067	67	6,532	1,148	6,915	676	2,919	236	290	1,094	90	-	868	167
Upper Division Certificate or Post-Masters	33	7	7	-	8	-	24	-	-	-	-	-	-	-	-	-
Doctorate	10,376	2,926	4,955	-	845	149	4,214	33	682	49	-	89	49	-	-	-
Unknown Degree Level	58	-	-	-	58	-	-	-	-	-	-	-	-	-	-	-
Total College and University Enrollment	184,844	28,714	60,407	933	63,517	5,529	43,074	6,429	14,823	1,049	1,223	4,322	789	1,224	1,173	2,527
Reported Enrollments in WIA-Eligible Training by Max Program Length (2012)																
1 month or less	397	-	-	-	-	30	204	-	-	-	-	-	-	163	-	163
1 to 3 months	1,082	-	183	59	-	-	726	-	-	-	-	-	-	7	-	7
3 to 6 months	1,721	25	28	-	330	-	464	-	39	-	25	-	-	860	-	860
6 to 9 months	1,410	-	104	97	-	30	1,123	30	12	-	-	30	30	134	-	30
9 to 12 months	1,299	63	70	160	-	-	1,158	17	27	-	-	63	-	63	-	-
1 to 2 years	1,874	31	505	270	8	15	409	128	52	9	-	27	-	372	-	-
2 to 3 years	156	-	110	-	-	69	69	69	46	-	-	69	69	69	-	69
Grand Total	7,939	119	1,000	586	338	144	4,153	244	176	9	25	189	99	1,668	-	1,129
Enrollment in Non-WIA-Eligible Training (2011-2012)																
Total Post-Secondary Education and Training Enrollment	199,218	28,869	61,648	2,792	64,015	6,995	48,194	7,485	15,117	1,130	1,248	4,556	888	2,957	1,493	3,656

Baltimore Regional Talent Development Pipeline Study

Table 16 Enrollment by Type of Program, County and Sector, 2012

Enrollment by County	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation/Warehousing	Utilities	Wholesale
College and University Enrollment by County (2012)																
Anne Arundel County	23,579	1,893	6,712	100	12,199	207	3,125	688	2,199	15	733	100	4	113	4	-
Baltimore City	64,686	12,074	24,638	248	14,098	2,285	18,335	2,590	4,373	657	296	1,916	79	41	957	734
Baltimore County	68,001	12,620	24,016	283	19,986	2,579	16,438	2,897	6,867	336	110	1,969	374	653	165	1,428
Carroll County	7,379	401	848	21	5,456	110	661	75	295	41	-	75	21	-	-	91
Harford County	9,937	694	2,216	1	5,343	168	2,109	30	492	-	84	175	-	19	47	229
Howard County	11,262	1,032	1,977	280	6,435	180	2,406	149	597	-	-	87	311	398	-	45
Grand Total	184,844	28,714	60,407	933	63,517	5,529	43,074	6,429	14,823	1,049	1,223	4,322	789	1,224	1,173	2,527
Reported WIA Training Enrollment (2012)																
Anne Arundel County	706	-	301	67	-	99	328	120	81	-	-	99	99	106	-	106
Baltimore City	2,679	56	412	58	8	-	1,295	15	17	9	-	27	-	807	-	786
Baltimore County	3,029	-	60	157	-	-	2,225	17	66	-	25	-	-	341	-	237
Carroll County	80	-	-	-	-	-	80	-	-	-	-	-	-	-	-	-
Harford County	179	-	65	-	-	45	72	-	12	-	-	-	-	-	-	-
Howard County	1,266	63	162	304	330	-	153	92	-	-	-	63	-	414	-	-
Grand Total	7,939	119	1,000	586	338	144	4,153	244	176	9	25	189	99	1,668	-	1,129
Non-WIA-Eligible Training Enrollment (2011-2012)																
Anne Arundel County	951	-	-	145	-	170	48	562	-	-	-	45	-	5	45	-
Baltimore City	1,398	36	50	642	160	n.a.	330	70	-	-	-	-	n.a.	-	153	-
Baltimore County	2,817	-	191	414	-	193	508	-	46	-	25	-	-	60	122	-
Carroll County	287	-	-	-	-	274	9	-	-	-	-	-	-	-	-	-
Harford County	53	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-
Howard County	929	-	-	72	-	677	72	180	72	72	-	-	-	-	-	-
Grand Total	6,435	36	241	1,273	160	1,322	967	812	118	72	25	45	-	65	320	-
Total Enrollments by County																
Anne Arundel County	25,236	1,893	7,013	312	12,199	476	3,501	1,370	2,280	15	733	244	103	224	49	106
Baltimore City	68,763	12,166	25,100	948	14,266	2,285	19,960	2,675	4,390	666	296	1,943	79	848	1,110	1,520
Baltimore County	73,847	12,620	24,267	854	19,986	2,772	19,171	2,914	6,979	336	160	1,969	374	1,054	287	1,665
Carroll County	7,746	401	848	21	5,456	384	750	75	295	41	-	75	21	-	-	91
Harford County	10,169	694	2,281	1	5,343	221	2,181	30	504	-	84	175	-	19	47	229
Howard County	13,457	1,095	2,139	656	6,765	857	2,631	421	669	72	-	150	311	812	-	45
Grand Total	199,218	28,869	61,648	2,792	64,015	6,995	48,194	7,485	15,117	1,130	1,273	4,556	888	2,957	1,493	3,656

Baltimore Regional Talent Development Pipeline Study

Table 17 Graduations and Completions by Type of Program, Level or Length of Program and Sector, 2012

Graduations	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation/Warehousing	Utilities	Wholesale
College and University Graduations/Completions by Level (2012)																
Lower Division Certificate	2,562	257	1,005	233	64	73	1,194	51	184	2	35	68	1	67	1	57
Associates	6,979	462	1,581	33	3,587	72	1,529	81	481	31	75	90	26	126	8	67
Bachelors	14,279	2,543	5,455	4	2,033	694	3,923	982	1,024	95	-	376	4	1	67	273
Post-Baccalaureate/Certificate of Advanced Study	1,194	156	379	-	397	19	327	81	141	21	43	107	-	-	95	12
Professional/Masters	10,624	2,014	4,133	16	2,833	793	3,077	271	984	73	105	617	18	-	189	417
Upper Division Certificate or Post-Masters	156	66	107	-	30	29	58	-	70	-	1	26	-	-	-	26
Doctorate	2,034	396	1,043	-	76	17	841	13	54	4	-	9	6	-	-	-
Grand Total	37,828	5,894	13,703	286	9,020	1,697	10,949	1,479	2,938	226	259	1,293	55	194	360	852
Reported Completions of WIA-Eligible Training by Max Program Length (2012)																
1 month or less	367	-	-	-	-	30	195	-	-	-	-	-	-	142	-	142
1 to 3 months	954	-	163	29	-	-	664	-	-	-	-	-	-	-	-	-
3 to 6 months	1,182	18	28	-	93	-	322	-	30	-	25	-	-	709	-	709
6 to 9 months	752	-	3	43	-	1	651	1	-	-	-	1	1	57	-	1
9 to 12 months	678	24	24	101	-	-	578	17	6	-	-	24	-	24	-	-
1 to 2 years	877	3	56	204	1	12	97	94	2	2	-	2	-	345	-	-
2 to 3 years	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	4,810	45	274	377	94	43	2,507	112	38	2	25	27	1	1,277	-	852
Reported Graduations in Non-WIA-Eligible Training (2011-2012)																
	3,612	31	106	475	-	822	706	540	22	-	-	-	-	5	136	-
Total Post-Secondary Education and Training Enrollment	46,250	5,970	14,083	1,138	9,114	2,562	14,162	2,131	2,998	228	284	1,320	56	1,476	496	1,704

Baltimore Regional Talent Development Pipeline Study

Table 18 Graduations and Completions by Type of Program, County and Sector, 2012

Graduations	All Programs	Bio-science	Business Services	Construction	Education	Finance and Insurance	Health-care	Hospitality/Tourism	Information Technology	Health Informatics	Cyber Security	Manufacturing	Retail Trade	Transportation/Warehousing	Utilities	Wholesale
College and University Graduates by County (2012)																
Anne Arundel County	3,384	236	1,191	22	1,190	25	772	91	294	3	94	22	1	28	-	-
Baltimore City	18,082	3,198	7,041	196	2,638	1,041	6,452	671	1,117	179	115	855	8	9	339	548
Baltimore County	12,564	2,209	4,747	57	3,114	581	2,899	669	1,363	38	41	377	43	148	18	254
Carroll County	1,387	71	172	3	884	20	203	23	30	6	-	8	3	-	-	13
Harford County	1,192	84	334	-	563	25	260	7	72	-	9	23	-	1	3	35
Howard County	1,219	96	218	8	631	5	363	18	62	-	-	8	-	8	-	2
Grand Total	37,828	5,894	13,703	286	9,020	1,697	10,949	1,479	2,938	226	259	1,293	55	194	360	852
Reported Completes of WIA-Eligible Training by County (2012)																
Anne Arundel County	167	-	73	29	-	1	66	1	-	-	-	1	1	1	-	1
Baltimore City	1,551	21	42	1	1	-	816	3	2	2	-	2	-	665	-	664
Baltimore County	2,015	-	29	120	-	-	1,415	17	-	-	25	-	-	243	-	187
Carroll County	72	-	-	-	-	-	72	-	36	-	-	-	-	-	-	-
Harford County	100	-	14	-	-	42	56	-	-	-	-	-	-	-	-	-
Howard County	905	24	116	227	93	-	82	91	-	-	-	24	-	368	-	-
Grand Total	4,810	45	274	377	94	43	2,507	112	38	2	25	27	1	1,277	-	852
Reported Completes of Non-WIA-Eligible Training by County (2012)																
Anne Arundel County	732	-	-	-	-	151	3	525	-	-	-	-	-	5	-	-
Baltimore City	569	31	-	209	-	-	216	15	-	-	-	-	-	-	66	-
Baltimore County	1,730	-	106	266	-	125	478	-	22	-	-	-	-	-	70	-
Carroll County	141	-	-	-	-	129	9	-	-	-	-	-	-	-	-	-
Harford County	27	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Howard County	413	-	-	-	-	413	-	-	-	-	-	-	-	-	-	-
Grand Total	3,612	31	106	475	-	822	706	540	22	-	-	-	-	5	136	-
Total Completes/Graduations by County																
Anne Arundel County	4,283	236	1,264	51	1,190	177	841	617	294	3	94	23	2	34	-	1
Baltimore City	20,202	3,250	7,083	406	2,639	1,041	7,484	689	1,119	181	115	857	8	674	405	1,212
Baltimore County	16,309	2,209	4,882	443	3,114	706	4,792	686	1,385	38	66	377	43	391	88	441
Carroll County	1,600	71	172	3	884	149	284	23	66	6	-	8	3	-	-	13
Harford County	1,319	84	348	-	563	71	316	7	72	-	9	23	-	1	3	35
Howard County	2,537	120	334	235	724	418	445	109	62	-	-	32	-	376	-	2
Grand Total	46,250	5,970	14,083	1,138	9,114	2,562	14,162	2,131	2,998	228	284	1,320	56	1,476	496	1,704

Methodology

This study is patterned after the Talent Development Pipeline Study completed by the Baltimore Workforce Investment Board in 2010, which uses a time-tested methodology that estimates demand for occupations within industry clusters and adds additional data on job demand from job vacancy advertisements posted online.

Indicators of Hiring Demand

Based on dialogue with the Workforce Committee overseeing the project and a literature review of growth industries in the region, a set of industry sectors were selected for research in the study. Sector definitions (the industries included in a sector) were based on the definitions used by the Governor's WIB for most industry sectors. Data on county-level employment by NAICS industry sector was collected from QCEW data for Anne Arundel, Baltimore, Carroll, Harford and Howard counties and Baltimore City and a forecast model was estimated to predict employment growth in each industry.

The forecast projections of new job creation are produced using an econometric model that makes use of a set of autoregressive integrated moving average (ARIMA) models that are estimated for each industry at the 2-digit and 3-digit NAICS levels, incorporating independent variables that are selected for each industry as indicators of hiring demand. The forecast model was run to estimate industry employment demand through 2020 for each 4-digit NAICS industry category. A qualitative review of the forecast data was performed to assure that other forecasts aligned with expectations for sector growth in the region and a benchmarking process was used to compare the forecast output with forecasts from the Baltimore Metropolitan Council.

Each industry's total employment was then disaggregated to produce estimates of the occupations that comprise the workforce of each detailed industry category. This was performed using the cross-industry occupational statistics from the Occupational Employment Statistics (OES) Database. The model makes use of the national cross-industry occupational statistics and estimates that vary by NAICS industry sector to produce estimates of the number of workers in each occupation, within each industry.

The occupational employment forecast of a sector is then estimated by totalling the number of workers in each occupation for all 4-digit NAICS industries included in a sector that is defined for the study.

Replacement demand (hiring due to job turnover) is based on the projected average rate of job turnover for occupations predicted over the 2010-2020 period. The turnover estimates are produced directly by the department of labor and are based on analysis of the American Community Survey.

Estimated Annual Job Vacancies

The RDA Global database of job vacancies was used to estimate the annual level of new job postings in the Baltimore Region for occupations studied. A set of computer algorithms were developed to associate job vacancies with occupation categories in the Standard Occupational Classification (SOC) that are used in official occupational statistics. An estimate of the total annual job openings was made for the region using a model developed for this project.

Job vacancy data is subject to many limitations. One such limitation is that many of the job vacancies advertised online do not contain enough information to definitively classify a job into a single SOC occupational category. As a result, some occupational categories may be underrepresented in the job vacancy data. To address this issue, a subsample of job vacancies that could be classified with a high degree of confidence was used to estimate total demand for job openings by occupation. For the estimation exercise, a random sample of SOC-classified job vacancies was used to construct estimates of occupational demand in the population of jobs online.

The summary figures in this study could be best interpreted as a positive indicator of opportunity for an occupation. Occupations with a large number of reported job openings are likely to be in high demand and offer good opportunities for workers. The opposite, however, may not be correct: a low number of job vacancies or a lack of job vacancies for an occupation does not mean definitively that recent demand for the occupation is low. A low number of online vacancies may be due to issues with classifying occupations or may be related to limited online publication of job postings (e.g. Relatively few jobs for waiters or construction laborers are posted online, despite high demand for workers).

The reporting of job openings is not sub-divided by sectors and thus the reported number of job vacancies for occupations in a sector reflects the total for the region across all sectors.

Wages

Wage data presented in the study is based on the BLS Occupational Employment Statistics (OES) for the Baltimore-Towson MSA for 2011. This data source is the most comprehensive official source of wage data at an occupational level, but the data reflects averages for workers in a particular occupation, averaging among workers in all industries. In reality, workers in an occupation earn different wages depending on the industry where they work (e.g. an accountant at a school district may earn less than an accountant working in corporate finance at a bank). The use of the OES data was selected for this study because it is reported at the occupation level and occupational talent is the subject of the study.

An alternative source of earnings information is the QCEW database. The QCEW reports average wages for all workers in an industry, regardless of occupation. The QCEW data describing average industry earnings will differ from the estimates in this study. However, because the QCEW data does not track occupations, it was not the preferred wage data source.

Wage data presented in this study are best interpreted as a wage that reflects the average for all workers in an occupation across all industries.

The wage information presented in the report reflects both average (mean) hourly wages and average (mean) annual income, exclusive of bonuses, benefits, and other forms of compensation. The annual income figures incorporate averages across full-time and part-time workers and reflect average earnings for average hours worked by employees in each occupation.

Indicators of Educational and Training Supply Capacity

Data on the number of programs, enrollment and graduates of college and university educational programs in the region are based on annual reports from the Maryland Higher Education Commission (MHEC). They include data for colleges and universities that are located in the region or in very close proximity. Data on WIA-eligible programs and private career schools is also sourced from online MHEC databases. This information was augmented with a region-wide survey of education and training providers to identify organizations that provide occupational training but are not captured in the data on private career schools, colleges, and universities. Any duplication existing between the private career school data and data collected in the survey of educational and training providers was removed in summary statistics in this report.

The association of education programs with industry sectors was based on a two-step method. In the first step, a BLS crosswalk between the Classification of Instructional Programs (CIP) and the Standard Occupational Classification (SOC) was used to associate the region's educational programs with the SOC occupations that are linked to each program. The high-demand occupations in each sector were then linked to educational programs.

After this initial step was performed, a qualitative review was performed to associate instructional programs with each of the sectors. This second step resulted in some changes to linkages between programs and sectors, based on the program name and description. The data on programs, enrollment, and graduates are subject to limitations. Some occupational training programs in the region may not be reflected in the figures if they are not part of a university, college, or private career school. In addition, not all programs report enrollment which may lead to some misstatement of total training capacity in the region. Finally, some discretion was used in associating programs with sectors.

The data on programs, enrollment, and graduations for sectors is best interpreted from the perspective of the employing industry sector, showing the number of programs that prepare workers that the industry may potentially hire.

Data on apprenticeship training is partially covered in the study if the classroom educational component of the training is offered by a college, university, or private career school. The chapter on construction also includes a separate listing of identified apprenticeship training programs in the region.

It is also important to note that a portion of the educational capacity serving the region is available through programs offered outside the region and programs offered online. The study does not count

Baltimore Regional Talent Development Pipeline Study

online programs offered by organizations that are based outside the region, and this may be a considerable component of the educational training capacity for sectors such as the IT sector.

Table 19 Baltimore Region Universities and Colleges

Anne Arundel County	Baltimore County
Anne Arundel Community College	CCBC – Dundalk
Bowie State University	CCBC – Essex
St. John’s College	CCBC –Catonsville
Baltimore City	Community College of Baltimore County – All Campuses
Baltimore City Community College	Goucher College
Baltimore Hebrew University	ITT Technical Institute
Baltimore International College	Ner Israel Rabbinical College
Binah Institute of Advanced Judaic Study	Stevenson University
Coppin State University	Talmudical Academy of Baltimore
Johns Hopkins University	Towson University
Loyola University Maryland	University of Maryland Baltimore County
Maryland Institute College of Art	Carroll County
Morgan State University	Carroll Community College
Notre Dame of Maryland University	McDaniel College
Sojourner-Douglass College	Harford County
St. Mary’s Seminary and University	Cecil College
TESST College of Technology	Harford Community College
University of Baltimore	Howard County
University of Maryland Baltimore	Howard Community College
Women’s Institute of Torah Seminary	Lincoln College of Technology
	Maryland University of Integrative Health

Table 20 Baltimore Region Providers of WIA-Eligible Occupational Training Programs

Anne Arundel County	Baltimore County (Cont)
Anne Arundel County Community College	Stein Academy-School of Health, Technology and Career Development
Baltimore City	SW Design & Communications, LLC
All-State Career Center	TESST College of Technology
Baltimore City Community College	Towson University
Baltimore Educational Enrichment	University of MD Baltimore County (UMBC)
Digit All Systems, Inc.	Vision Allied Health Institute
Health Focus, Inc.	Von Lee International School of Aesthetics
Holistic Massage Training Institute	Institute of Health Sciences
IT Works Learning Center, Inc.	North American Trade School
Maryland Center for Arts & Technology, Inc.	Carroll County
Sojourner-Douglass College	Carroll Community College
Baltimore County	Harford County
Broadcasting Institute of Maryland	1st ASAP Insurance School
Community College of Baltimore County	Harford Community College
Delta School of Trades	Howard County
Fortis Institute	DATS OF Maryland at Columbia
Fortis Institute-Towson	Howard Community College
Gandhi Health Career Services	Lincoln College of Technology
Innovative Healthcare Training, Inc.	Maryland University of Integrative Health
Sheffield Institute for the Recording Arts	

Baltimore Regional Talent Development Pipeline Study

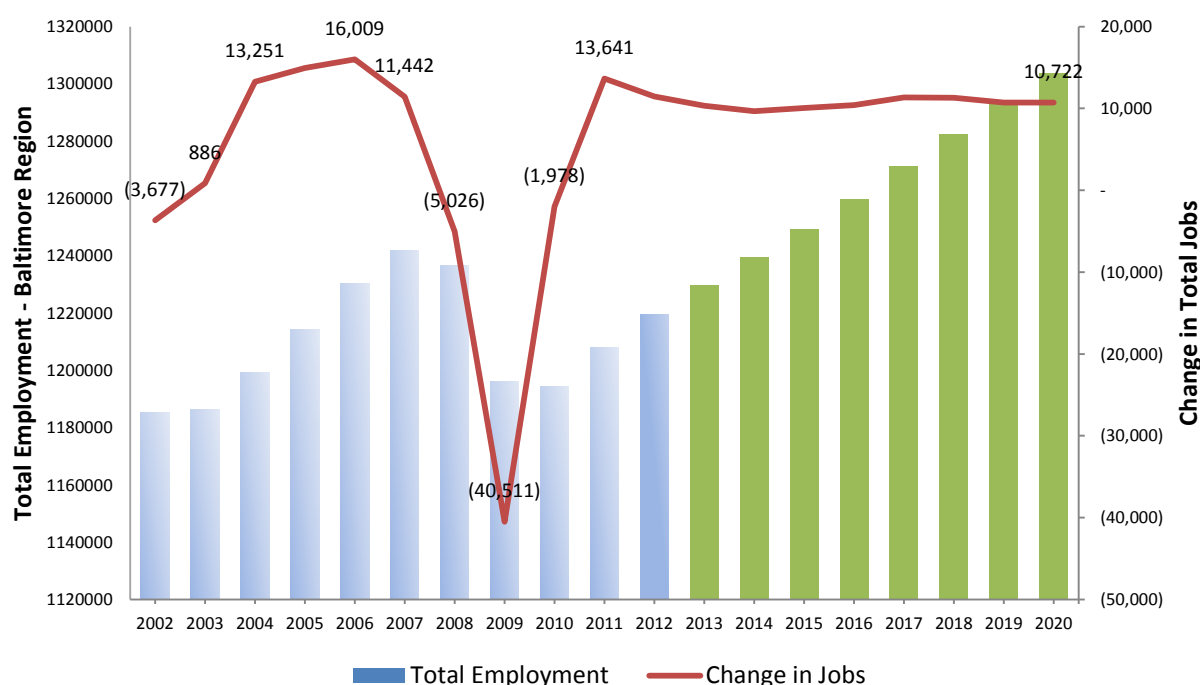
Table 21 Baltimore Region Providers of Occupational Training Programs that are Not WIA-Eligible

Anne Arundel County	Baltimore County
ABC Chesapeake Shores	Accounting and Bookkeeping Center, Inc. (The)
Arundel House of Hope	American Beauty Academy - Baltimore
Aspen Beauty Academy - Laurel	American Red Cross, Central Maryland Chapter
Carruthers Academy of Real Estate, LLC	Baltimore Academy of Nursing Assistants
Champion Institute of Real Estate	Baltimore School of Massage
Chesapeake School of Esthetics: Skin Care & Make-up	Chesapeake Residential School of Real Estate
DATS of Maryland at Annapolis	Empire Beauty School
DLLR	Fortis Institute
Don Gurney Academy of Real Estate	Gandhi Health Career Services
Elite Learning Academy	GBBR® School of Real Estate (The)
Empire Beauty School - Glen Burnie	Johns Hopkins Hospital School of Cardiac Sonography
Maritime Institute of Technology & Graduate Studies (MITAGS)	Maryland Beauty Academy
Maryland Bartending Academy	Maryland Beauty Academy - Essex
Maryland Institute of Criminal Justice	Maryland Center for Montessori Studies
Baltimore City	Maryland Healthcare Training Center
All-State Career	Maryland School of Travel
America Works of Maryland, Inc.	North American Trade Schools
Avara's Academy of Hair Design	Precise Academy
Baltimore City Joint Apprenticeship Program	Real Estate Education Center of MD
Baltimore School of Dog Grooming	Regency Beauty Institute
Baltimore Studio of Hair Design	Robert Paul Academy of Cosmetology Arts & Sciences
BEAT - Beauty Expert Artistry Training	Sheffield Institute for the Recording Arts (The)
BioTechnical Institute of Maryland, Inc	Stein Academy - School of Health, Technology & Car
Business Interface, LLC	Vehicles for Change
Caroline Center	Carroll County
Center for Urban Families	DATS of Maryland at Westminster
Chesapeake Center for Youth Development	Frederick Academy of Real Estate
Civic Works, Inc.	Maryland Beauty Academy - Westminster
GBMC School of Radiography	Harford County
GlobalTech Bilingual Institute	Colorlab Academy of Hair (The)
Goodwill Industries of the Chesapeake, Inc	Diana School of Real Estate
GROUP Ministries Baltimore, CDC	Howard County
International Academy of Hair Design & Technology	CE Shop (The)
IT Works Learning Center - Manor Care	Coldwell Banker Residential Brokerage School of RE
Job Opportunities Task Force	Columbia Nursing Assistant Academy
Johns Hopkins Hospital Schools of Medical Imaging (The)	Cosmopolitan Beauty & Tech School
Keller Professional Services, Inc.	Howard County Dept. of Corrections
LVI Power, LLC	Howard County Office of Workforce Development
Mid-Atlantic Carpenters' Training Centers - Baltimore	Lawyers Advantage Career School
Moveable Feast	Paul Mitchell the School-Jessup
St. Vincent de Paul of Baltimore, Inc./St. Ambrose Center.	
Urban Alliance	

Future Worker Demand Outlook for Sectors in the Baltimore Region

Cumulatively, between 2012 and 2020, the Baltimore Region is expected to add just over 101,600 new jobs. During the growth period from 2004-2007, the region added on average 10,000 to 16,000 new jobs per year. Total future employment growth of jobs in the region is expected to range from 9,000 to 13,000 net new jobs per year, continuing through 2020. The forecast assumptions equate to a compound annual growth rate of 0.8% per year from 2013 to 2020, which is in line with long-term forecasts by the Baltimore Metropolitan Council and other analysts.

Figure 7 Jobs and Job Growth at Businesses and Organizations in the Baltimore Region: Historical Employment 2001-2012 and Forecast of Growth 2013-2020



Source: Baltimore Region Employment Demand Model, RDA Global, July, 2013

Growth Outlook by Sector

Healthcare

Healthcare has been the strongest-growth industry cluster over the past decade and is expected to add the most new jobs in the 8-year period between 2012 and 2020, a total increase of 20,049 new jobs. Healthcare is one of the largest employment sectors in the Baltimore Region with 188,000 employees as of 2012. An aging workforce and interlinks between the healthcare and bioscience sectors are expected to support growth of the sector over next decade. Three major hospitals - Johns Hopkins Health System, University of Maryland Medical Center and Medstar Union Memorial Hospital - provide service to the

entire region. Combined, the three systems alone consistently post openings for between 600 and 800 jobs. Many of the region's hospitals are currently advertising jobs for a very broad set of occupations, including strong demand for nurses and technicians in all areas of care. Major healthcare developments in the region include Kaiser Permanente's new facility in Lansdowne, the Northwest Hospital expansion, the Allegis data center at bwtech, the New Mercy outpatient facility in Timonium, and a new patient tower at Franklin.¹⁸ Similar projections of healthcare job creation in Maryland State expect the Healthcare sector to add around 75,000 jobs between the years 2010 and 2020 and our projections indicate that approximately one third of that will come from the Baltimore Region.

Information Technology (IT)

The Baltimore Region has seen strong growth in the IT sector in the past decade mainly due to the Baltimore-Washington corridor which is one of the strongest IT markets in the country. The sector employs a strong base of nearly 68,000 workers and is supported by a good network of colleges, universities and training centers. The IT sector added over 18,600 jobs between 2002 and 2012 and lost only around 1,300 jobs for one year in 2009 during the entire recession. The IT sector is projected to add around 7,800 new jobs between 2012 and 2020 (compounded annual growth of 1.4% per year).

The stability of the sector is attributable in part to the number of federal government agencies located in the Baltimore Region, which include Fort Meade, Aberdeen Proving Ground, the National Security Agency, and the Social Security Administration along with large private defense contractors such as Northrop Grumman, Lockheed Martin and General Dynamics. The US Cyber Command is located at Fort Meade and investments in cybersecurity will contribute to the sector's growth. University of Maryland Baltimore County created Maryland's first Masters in Professional Studies in Cybersecurity and the U.S. Naval Academy has announced plans to develop a \$100 million on-campus Center for Cybersecurity Studies to coincide with its new Cyber Operations major.¹⁹ The Baltimore Region is also ahead of the curve in developing the first healthcare exchange based on the Affordable Care Act and will be functional by October 2013.²⁰

Major development activity in the region include expansion of CSC Maricom, growth of the UMBC Cyber Incubator, the Northrop expansion, Mindgrub and Ebay expansions along with National Business Park expansion in Anne Arundel County.²¹ Many of the region's IT firms are currently advertising jobs for programmers, IT managers, engineers and various IT analyst positions (system, network and security).

¹⁸ Baltimore County Strategic Operations Plan, 2012

¹⁹ See Cybersecurity, Baltimore Industry Highlights, December 2012, Last Accessed June, 2013 at http://www.cassidyturley.com/Research/MarketReports/Report.aspx?topic=2012_Industry_Highlight_Cybersecurity&action=download

²⁰ See Maryland Health Benefit Exchange <http://marylandhbe.com/>

²¹ National Business Park, Anna Arundel - http://www.copt.com/propertyModule/park_detail.asp?parkid=108 and Baltimore County Strategic Operations Plan, 2012

Biosciences

Baltimore's Bioscience sector is comprised of several larger biosciences employers including BD Diagnostics, Chesapeake Biological Laboratories, Martek Biosciences, Eisai Corp, Pharmaceuticals International, ProSpect Pharma, Shire US Manufacturing and other firms and is supported by research and development at Johns Hopkins and the University of Maryland. In 2009, colleges and universities in Maryland spent over \$3 billion on research and development capacity in science and engineering fields. Expenditures at the Johns Hopkins University accounted for \$1.86 billion in 2009 and \$2.1 billion in 2010 (ranking 1st in the US).²² Expenditures at the University of Maryland, Baltimore, accounted for \$359.5 million (ranking 52nd out of over 700 universities). The University of Maryland, Baltimore County (UMBC), University of Maryland Biotechnology Institute, the U.S. Naval Academy, Morgan State University, The University of Baltimore, and Towson University accounted for the majority of additional university research and development expenditures in the metro area.

Major institutions in the region include the NIH, Johns Hopkins Applied Physics Lab, and Centers for Medicare and Medicaid Services. Three major science parks support growth of the private sector: Science+Technology Park²³ at Johns Hopkins, University of Maryland BioPark, and bwtech@UMBC Research & Technology Park. These parks together have over 3.2 million square foot of lab and office space and have attracted state-of-the-art facilities including bioscience, medical devices, chemistry, biology labs and nuclear magnetic resonance (NMR) facilities. As of 2012 there are nearly 57,000 workers employed in this sector, including 13,500 workers in scientific research and development services and 21,200 in the technical services, engineering and architectural services industry. Pharmaceutical manufacturing employed nearly 3,200 workers and manufacturing of precision instruments employed 6,500 workers. Building on the region's resources and the region's supply of available high skilled workers, Bioscience sector is projected to add around 5,800 jobs between 2012 and 2020, or about a 10 percent employment growth in the sector, which is similar to the sector's rate of growth in the previous eight years.

Construction

Construction sector employment in the Baltimore Region stabilized in 2010 and is expected to experience steady growth leading to an 8.1% increase in jobs between year end 2012 and year end 2020 (compound annual growth of 1.0% per year). This outlook assumes recent trends in construction investment continue throughout the forecast period. Additional upside growth potential is also possible if major construction projects such as the Red Line are funded and begin construction as planned between 2015 and 2021.²⁴

Job demand in the construction sector is cyclical, creating opportunities for workforce development, but also declining as major projects are completed or investment cycles conclude. The housing bubble in

²² National Science foundation, "Academic research and Development expenditures"

²³ STP@Johns Hopkins - <http://www.scienceparkjohnshopkins.net>

²⁴ The forecast methodology is conservative and does not factor in potential major projects that have not yet been funded with final approvals.

the first half of the 2000s drove strong job creation in the region's construction sector, adding over 13,000 jobs between 2002 and 2006, but removing nearly 19,000 jobs between 2006 and 2010.

As the sector began to regain its equilibrium in 2010, most jobs being created were for specialty trade contractors. Projects that are currently driving growth include investment in hotels, shopping, apartments and other residential construction. There are over 500 apartment units under construction within one mile of downtown Baltimore and as of June, 2013, there were over 17 major commercial developments under construction in Anne Arundel County along the highway 295 corridor, near Fort Meade, and in proximity to BWI Thurgood Marshal Airport. Many of the region's larger construction firms are currently advertising for project managers & superintendents, project engineers, estimators, administrative staff and skilled trades including carpenters, welders, pipe layers, equipment operators, drywall installers, mechanics, HVAC installers, and several other skilled trades.

Manufacturing

The Baltimore Region had nearly 92,000 manufacturing workers in 2001 but has consistently lost jobs every year until 2011. This downward trend was typical for the entire US during that period mainly due to firms moving operations offshore to low wage countries. The wage advantage of low wage countries has been shrinking over the recent years and, when combined with optimal logistics, is removing the cost savings of moving manufacturing offshore. As a result some firms are moving operations back to the US.

The future trend in the manufacturing sector is far from certain, since cyclical patterns after a recession can also lead to growth in manufacturing jobs. As a result, the projection for this sector is flat during the forecast period. The Baltimore Region has a small base for high paying manufacturing jobs with firms like Lockheed Martin and is well supported by a robust supply chain across the entire mid-Atlantic region, strong transportation and logistics, and a good network of roads, rails, airports and warehouses. These factors along with federal, state and local initiatives to bring back manufacturing jobs might give this sector a greater upward potential for growth.

Transportation and Warehousing

The Baltimore Region has a robust supply chain across the entire mid-Atlantic region with a good network of road and rail connecting BWI airport and the Port of Baltimore to major cities. This sector employed around 32,800 workers in 2006 and lost around 2,800 jobs during the recession (2007 to 2009) but is expected to recover back to pre recession levels by the end of 2013. It is projected to add over 1,800 jobs between 2012 and 2020 primarily in truck transportation and warehousing, the two largest components of the sector.

The forecast outlook for the sector is conservative, and it may experience stronger growth linked to expanded shipping through the Port of Baltimore. International container traffic is expected to increase at ports along the US East Coast as mega ships begin passing through the expanded Panama Canal when it opens in 2014. The Maryland Department of Transportation and CSX are working together to relocate CSX's existing facility away from the Seagirt Marine Terminal in order to provide train service supporting

Port of Baltimore international customers at the terminal. This project is a key component of the National Gateway and will allow a more efficient flow of goods traveling along CSX's emerging double-stack rail network. The relocation will also allow additional space at the Port to accommodate the increased flow of international shipping traffic.

Business Services

Business Services is the largest sector in the Baltimore Region, with a total of 177,000 jobs in 2001 and grew to peak of 193,000 in 2008 just before the recession. The sector lost around 11,000 jobs during the recession and is expected to reach pre-recession levels by 2014 and will add another 12,000 jobs between 2014 and 2020. Several companies have set up regional head offices in the Baltimore Region leading to near 20% growth in the corporate headquarters sector in 2011 alone. This trend is expected to continue given the close proximity to Washington DC and the sector's close relationship with other growing sectors like IT, biosciences, and healthcare.

Education

As of 2012 there were 116,000 workers employed in this sector and the sector continued to grow during the recession as more unemployed workers returned back to school. Between 2004 and 2012, total employment at elementary and secondary schools increased by 4%; employment at colleges, universities, and professional schools increased by 40% and employment at technical and trade schools more than doubled. Combined, all components of the education sector increased employment by 14% between 2004 and 2012 and employment is expected to continue to grow by 10.8% between 2012 and 2020, adding 12,500 jobs in the region.

Hospitality and Tourism

Baltimore enjoys a strong tourism sector that attracted nearly 22.3 million visitors in 2011 who spent nearly 4.75 billion dollars. The region's gambling industry got a boost in 2008 when voters approved the installation of video lottery terminals (slot machines) at five privately-owned facilities in Maryland. This was followed by a 2012 referendum where voters approved the legalization of table games at Maryland casinos. Maryland Live, located in Anne Arundel County, opened in 2012 featuring 4,337 slot machines, 122 table games, a live music venue, several restaurants, and almost 5,000 parking spaces. Baltimore City's Horseshoe Casino is expected to open in mid-2014. The casino, which will be Maryland's second-largest casino, will feature over 3,000 slot machines and over 100 table games.²⁵ Recently, Baltimore has been able to attract a number of major public events like Artscape, the nation's largest free arts festival; the annual African American Festival, the largest cultural festival of its kind on the East Coast, the Star-Spangled Sailabration, the Grand Prix of Baltimore, American Le Mans Series racing and other events that contribute to growth in visitor spending. Driven by recent investment in tourism and growth in the gambling industry, the Baltimore Region is projected to add 6,000 jobs between 2012 and 2020.

²⁵ Maryland Lottery and Gaming Agency - <http://gaming.mdlottery.com>

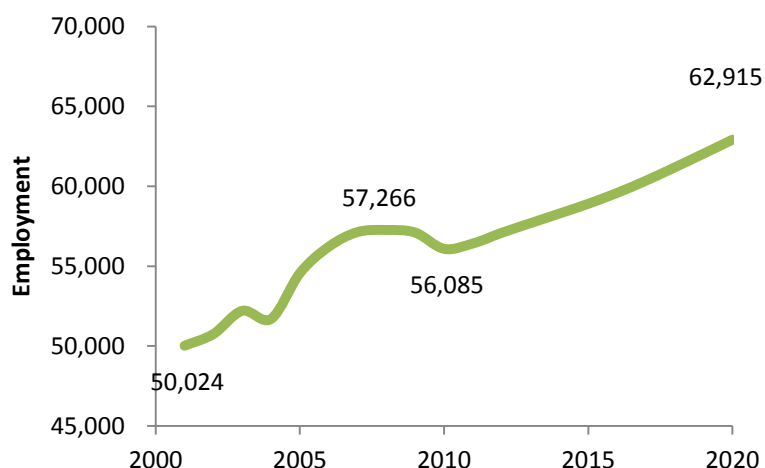
Biosciences

The bioscience sector is made up of businesses involved in research, design and manufacturing of medicines and medical equipment as well as research and development organizations at both private and educational institutions. The sector has demonstrated steady positive growth over the past decade, with employment growth of 13% between 2002 and 2012. Employment in the sector reached a high of just over 57,000 workers in 2008, before experiencing a slight decline in 2009

and 2010 during the recession. The sector has since recovered most of the jobs lost since 2008, adding over 1,000 jobs in the last two years. The sector is expected to add nearly 6,000 new jobs in the Baltimore Region between 2012 and 2020, a 10% increase in total demand. In addition, job turnover will require replacement of nearly 10,000 workers between 2012 and 2020, bringing the total hiring demand to nearly 16,000 over the period.

Most of the growth in the sector is expected to come from the architecture and engineering, management and scientific/technical consulting and scientific research and development services industries. Together, these industry clusters will account for over 95% of the total new job growth in the sector.

Figure 8 Employment in the Baltimore Region Biosciences Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Table 22 Employment Outlook for the Bioscience Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
3254	Pharmaceutical and Medicine Manufacturing	4,540	3,182	3,186	-30%	0.1%	5
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	3,239	6,507	6,740	101%	3.6%	232
3391	Medical Equipment and Supplies Manufacturing	1,008	1,059	1,080	5%	2.0%	21
5413	Architectural, Engineering, and Related Services	19,985	21,206	23,503	6%	10.8%	2,297
5416	Management, Scientific, and Technical Consulting Services	9,724	11,584	12,962	19%	11.9%	1,378
5417	Scientific Research and Development Services	13,206	13,552	15,443	3%	14.0%	1,891
	Total Bioscience Sector	51,702	57,089	62,915	10%	10.2%	5,825

Source: RDA Global Baltimore Region Job Demand Outlook

Supply and Demand Snapshot

In 2012, there were approximately 6,000 graduates of 384 educational programs in the region that prepare workers for careers in occupations related to the bioscience sector. Most graduates of bioscience related programs (87%) earn a Bachelors degree or higher. In 2012, nearly 5,200 workers in the Baltimore Region earned Bachelors degrees or other degrees or certificates beyond Bachelors in a bioscience related occupational field; total hiring demand within the bioscience sector for jobs requiring a Bachelors degree or higher is expected to reach just over 9,600 between 2012 and 2020. A portion of graduates from bioscience programs will likely find jobs in other industries (e.g. an electronics engineer who might design medical devices working instead for a computer designer) and others will likely relocate to find work outside the Baltimore Region.

Approximately 39% of the future hiring demand in the bioscience sector is expected to occur for jobs that require education less than a Bachelors degree (total hiring demand of approximately 6,000 workers between 2012 and 2020). There are approximately 115 programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree. There were nearly 800 graduates of these programs in 2012 and if the number of graduates of these programs maintains nominal growth, the supply of new graduates from these programs should be sufficient to satisfy the demand for new workers in the bioscience sector.

Table 23 Bioscience Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	896	971	74	178	253	2,996	\$13.90	\$28,914
High school diploma or equivalent	14,114	15,441	1,328	2,388	3,715	12,627	\$24.37	\$50,707
Some College or postsecondary non-degree award	1,062	1,163	102	198	300	1,570	\$26.63	\$55,387
Associates degree	6,627	7,330	703	1,113	1,816	2,081	\$34.65	\$72,082
Bachelors degree	31,237	34,483	3,246	5,475	8,721	10,353	\$42.10	\$87,635
Masters degree	1,092	1,220	128	300	428	131	\$35.07	\$72,945
Doctoral or professional degree	2,062	2,307	245	217	462	424	\$44.99	\$94,455
Total	57,089	62,915	5,825	9,869	15,694	30,752	\$36.09	\$75,144

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Occupational Demand Summary

The bioscience sector is expected to generate demand for approximately 250 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. Most of these jobs will be for workers involved in freight and materials movement, jobs that do not require extensive occupational training. Jobs at this education level earned average hourly wages of \$13.90 in 2012, well below the living wage level for a single parent family with one child in Baltimore City.

The regional economy is expected to generate demand for approximately 3,700 new jobs that require a high school diploma or equivalent. Some of the highest demand jobs at this education level include operations personnel, secretaries, receptionists and administrative assistants, as well as supervisory workers for these positions. Hourly earnings for workers in these occupations averaged \$24.37 in 2012. The higher average wage is in part attributable to the inclusion of workers who are supervisors or have longer job tenure and experience.

High demand occupations requiring an Associates degree or other post-secondary education less than a Bachelors degree include life science technicians, engineering technicians (including electrical and mechanical technicians and drafters), operations managers and computer support specialists. With average hourly wages that range from a low of \$22.38 per hour for life, physical and social science technicians to a high of \$56.53 for general and operations managers, most of these occupations offer wages that exceed the minimum living wage for a single parent with one child in Baltimore City.

Occupations at the Bachelors degree and higher level are diverse and include mechanical and electrical engineers, environmental scientists, software developers and other occupations. A majority of new job openings will come to workers in these occupations between 2012 and 2020. With the exception of biological technicians (average wages of \$21.31 per hour), all of the high-demand occupations in this category pay average wages in excess of the living wage.

Education and Training Supply Summary

Table 24 Programs, Enrollment and Graduates of Programs in Biosciences, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	1	0%	36	0%	31	1%
WIA-eligible Training (Reported)	7	2%	119	0%	45	1%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	107	28%	5,917	20%	719	12%
Bachelors	113	29%	14,352	50%	2,543	43%
Masters, PhD, and Post-Bachelors Certificates and Programs	156	41%	8,445	29%	2,632	44%
Total, All Levels	384	100%	28,869	100%	5,970	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 25 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Biosciences	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	1	-	-	-	-	1
WIA-eligible Training (Reported)	1	4	-	-	1	1	7
College and University	27	173	118	16	21	21	376
Total Programs	28	178	118	16	22	22	384
Enrollment							
Non-WIA Eligible Training (Reported)	-	36	-	-	-	-	36
WIA-eligible Training (Reported)	-	56	-	-	-	63	119
College and University	1,893	12,074	12,620	401	694	1,032	28,714
Total Enrollment	1,893	12,166	12,620	401	694	1,095	28,869
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	31	-	-	-	-	31
WIA-eligible Training (Reported)	-	21	-	-	-	24	45
College and University	236	3,198	2,209	71	84	96	5,894
Total Graduates/Completions	236	3,250	2,209	71	84	120	5,970

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 26 Bioscience Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	227	244	17	58	76	44	\$13.52	\$28,130
	13-1199	Business Operations Specialists, All Other	1,587	1,759	172	244	416	385	\$37.54	\$78,080
	43-9061	Office Clerks, General	1,037	1,149	112	147	259	n.a.	\$14.75	\$30,680
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	1,090	1,210	120	117	237	330	\$17.80	\$37,020
	43-4051	Customer Service Representatives	619	677	57	141	198	1,386	\$17.29	\$35,960
	43-6011	Executive Secretaries and Executive Administrative Assistants	908	1,006	98	97	195	378	\$24.28	\$50,500
	11-9199	Managers, All Other	594	656	61	106	167	1,290	\$51.50	\$107,110
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	449	484	35	96	132	40	\$31.14	\$64,760
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	391	430	39	84	123	580	\$26.45	\$55,010
	41-3099	Sales Representatives, Services, All Other	340	380	40	80	120	474	\$31.23	\$64,960
High school diploma or equivalent	11-3011	Administrative Services Managers	365	401	36	72	108	198	\$37.52	\$78,040
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	433	463	31	75	106	20	\$19.01	\$39,540
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	467	514	47	41	88	310	\$19.69	\$40,950
	51-2092	Team Assemblers	327	341	13	52	65	n.a.	\$13.35	\$27,760
	43-5061	Production, Planning, and Expediting Clerks	196	211	14	41	56	81	\$22.35	\$46,480
	43-4171	Receptionists and Information Clerks	155	172	16	38	54	120	\$13.54	\$28,170
	15-1150	Computer Support Specialists	428	472	43	90	133	570	\$26.93	\$56,020
	11-1021	General and Operations Managers	1,704	1,880	176	254	429	77	\$56.53	\$117,580
	17-3029	Engineering Technicians, Except Drafters, All Other	770	852	82	118	200	n.a.	\$32.66	\$67,930
	19-4099	Life, Physical, and Social Science Technicians, All Other	389	440	50	131	182	n.a.	\$22.38	\$46,550
Some college, no degree	17-3023	Electrical and Electronics Engineering Technicians	698	758	60	107	167	36	\$29.73	\$61,840
Associates degree										

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Bachelors degree	17-3027	Mechanical Engineering Technicians	321	354	34	49	83	n.a.	\$28.63	\$59,540
	19-4091	Environmental Science and Protection Technicians, Including Health	150	167	17	51	68	n.a.	\$24.25	\$50,450
	17-3013	Mechanical Drafters	199	219	20	31	51	88	\$25.90	\$53,870
	17-2141	Mechanical Engineers	1,183	1,301	119	305	423	n.a.	\$43.87	\$91,250
	11-9041	Architectural and Engineering Managers	1,364	1,499	136	213	349	n.a.	\$59.08	\$122,880
	17-2071	Electrical Engineers	1,205	1,316	111	232	343	n.a.	\$42.50	\$88,400
	19-2041	Environmental Scientists and Specialists, Including Health	904	1,010	106	214	320	11	\$34.50	\$71,770
	15-1133	Software Developers, Systems Software	1,621	1,768	146	135	281	730	\$52.64	\$109,490
	19-4021	Biological Technicians	682	759	76	184	260	n.a.	\$21.13	\$43,950
	19-2031	Chemists	716	780	64	187	251	n.a.	\$39.34	\$81,840
	17-2072	Electronics Engineers, Except Computer	793	868	76	153	229	n.a.	\$44.62	\$92,810
	17-2199	Engineers, All Other	817	900	83	144	227	27	\$44.09	\$91,700
	13-2011	Accountants and Auditors	718	791	73	124	197	270	\$35.18	\$73,180
	11-9121	Natural Sciences Managers	316	349	33	153	186	11	\$55.94	\$116,360
	15-1799	Computer Occupations, All Other	677	753	76	101	178	n.a.	\$45.49	\$94,630
	17-2112	Industrial Engineers	509	548	39	89	128	n.a.	\$41.95	\$87,260
	17-2081	Environmental Engineers	440	489	49	77	127	n.a.	\$39.86	\$82,900
	15-1121	Computer Systems Analysts	481	532	51	72	123	572	\$39.57	\$82,290
	13-1041	Compliance Officers	621	679	57	60	118	90	\$30.13	\$62,680
	11-3021	Computer and Information Systems Managers	495	544	49	61	110	144	\$57.11	\$118,790
	15-1142	Network and Computer Systems Administrators	447	494	47	60	108	330	\$40.35	\$83,920
	15-1132	Software Developers, Applications	558	617	59	46	105	864	\$47.92	\$99,670
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	442	490	48	52	100	780	\$44.06	\$91,640
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	370	410	39	50	89	n.a.	\$30.75	\$63,960

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	11-3031	Financial Managers	341	373	33	50	83	480	\$51.58	\$107,290
	15-2031	Operations Research Analysts	225	250	25	57	82	40	\$42.36	\$88,110
	13-2051	Financial Analysts	302	331	29	51	80	120	\$39.02	\$81,160
	15-1131	Computer Programmers	274	303	29	51	80	715	\$37.15	\$77,270
	17-2041	Chemical Engineers	206	228	22	53	75	n.a.	\$46.89	\$97,530
	27-3042	Technical Writers	279	306	28	44	72	n.a.	\$33.52	\$69,730
	11-2021	Marketing Managers	220	240	21	51	72	99	\$51.62	\$107,370
	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	235	252	18	44	62	9	\$39.57	\$82,310
	13-2031	Budget Analysts	220	243	23	37	60	30	\$34.65	\$72,070
	29-9011	Occupational Health and Safety Specialists	133	147	14	37	52	n.a.	\$35.51	\$73,860
Masters degree	15-2041	Statisticians	210	234	25	101	126	n.a.	\$36.61	\$76,140
Doctoral or professional degree	19-1042	Medical Scientists, Except Epidemiologists	1,082	1,212	129	54	183	n.a.	\$42.61	\$88,640
	15-1111	Computer and Information Research Scientists	408	459	51	61	112	80	\$47.68	\$99,180
	19-1029	Biological Scientists, All Other	296	327	31	53	84	n.a.	\$44.38	\$92,310

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Baltimore Regional Talent Development Pipeline Study

Table 27 Bioscience Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	13	24	7	2	10	21
	13-1199	Business Operations Specialists, All Other	80	84	30	8	56	159
High school diploma or equivalent	43-9061	Office Clerks, General	55	50	21	5	35	93
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	51	43	17	4	34	87
	43-4051	Customer Service Representatives	39	47	15	5	26	66
	43-6011	Executive Secretaries and Executive Administrative Assistants	37	35	13	3	31	76
	11-9199	Managers, All Other	26	34	12	2	26	67
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	16	29	11	3	27	47
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	24	27	11	2	17	42
	41-3099	Sales Representatives, Services, All Other	29	25	11	3	12	42
	11-3011	Administrative Services Managers	17	22	9	2	18	40
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	17	31	9	2	17	30
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	19	17	6	2	13	31
	51-2092	Team Assemblers	6	14	4	2	18	22
Some college, no degree	43-5061	Production, Planning, and Expediting Clerks	8	15	4	1	10	18
	43-4171	Receptionists and Information Clerks	11	11	5	1	7	18
Some college, no degree	15-1150	Computer Support Specialists	24	27	12	3	20	48
	11-1021	General and Operations Managers	86	85	35	8	63	153
Associates degree	17-3029	Engineering Technicians, Except Drafters, All Other	35	32	17	3	35	77
	19-4099	Life, Physical, and Social Science Technicians, All Other	23	22	15	1	30	90
	17-3023	Electrical and Electronics Engineering Technicians	26	28	15	3	37	57
	17-3027	Mechanical Engineering Technicians	16	14	8	1	14	30
	19-4091	Environmental Science and Protection Technicians, Including Health	16	15	8	1	7	21
	17-3013	Mechanical Drafters	12	10	6	1	8	14
Bachelors	17-2141	Mechanical Engineers	78	81	50	8	69	137

Baltimore Regional Talent Development Pipeline Study

Education degree	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	11-9041	Architectural and Engineering Managers	67	65	34	6	60	117
	17-2071	Electrical Engineers	58	62	36	7	68	113
	19-2041	Environmental Scientists and Specialists, Including Health	73	63	33	7	36	110
	15-1133	Software Developers, Systems Software	40	33	15	5	71	117
	19-4021	Biological Technicians	26	54	17	2	41	122
	19-2031	Chemists	27	80	17	2	33	92
	17-2072	Electronics Engineers, Except Computer Engineers, All Other	34	37	21	4	47	85
	17-2199	Engineers, All Other	40	43	21	4	38	81
	13-2011	Accountants and Auditors	38	41	16	4	28	70
	11-9121	Natural Sciences Managers	19	48	14	1	26	79
	15-1799	Computer Occupations, All Other	27	28	11	2	30	79
	17-2112	Industrial Engineers	16	27	10	2	27	45
	17-2081	Environmental Engineers	30	26	13	3	15	40
	15-1121	Computer Systems Analysts	23	23	9	2	19	47
	13-1041	Compliance Officers	18	26	6	2	18	48
	11-3021	Computer and Information Systems Managers	17	19	7	2	20	45
	15-1142	Network and Computer Systems Administrators	20	19	8	2	17	41
	15-1132	Software Developers, Applications	18	14	6	2	21	45
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	20	17	7	2	16	39
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	18	18	6	2	12	33
	11-3031	Financial Managers	14	16	6	2	14	31
	15-2031	Operations Research Analysts	14	17	6	2	11	32
	13-2051	Financial Analysts	14	16	5	2	13	30
	15-1131	Computer Programmers	12	14	6	1	14	33
	17-2041	Chemical Engineers	12	16	7	1	11	28
	27-3042	Technical Writers	12	14	6	1	12	27
	11-2021	Marketing Managers	12	16	6	1	11	25

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	7	14	4	1	13	22
	13-2031	Budget Analysts	9	9	4	1	12	25
	29-9011	Occupational Health and Safety Specialists	9	12	4	1	6	19
	15-2041	Statisticians	15	26	9	1	17	57
Masters degree	19-1042	Medical Scientists, Except Epidemiologists	18	19	5	1	37	103
	15-1111	Computer and Information Research Scientists	15	15	7	1	19	55
	19-1029	Biological Scientists, All Other	9	17	5	1	15	39

Table 28 Bioscience Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
High school diploma or equivalent	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
	11-9199	Managers, All Other	None	1 to 5 years
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	Long-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	41-3099	Sales Representatives, Services, All Other	Short-term on-the-job training	None
	11-3011	Administrative Services Managers	None	1 to 5 years
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	Moderate-term on-the-job training	None
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	51-2092	Team Assemblers	Moderate-term on-the-job training	None
	43-5061	Production, Planning, and Expediting Clerks	Moderate-term on-the-job training	None
	43-4171	Receptionists and Information Clerks	Short-term on-the-job training	None
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
	17-3029	Engineering Technicians, Except Drafters, All Other	None	None
	19-4099	Life, Physical, and Social Science Technicians, All Other	Moderate-term on-the-job training	None
	17-3023	Electrical and Electronics Engineering Technicians	None	None
	17-3027	Mechanical Engineering Technicians	None	None
	19-4091	Environmental Science and Protection Technicians, Including Health	Moderate-term on-the-job training	None
	17-3013	Mechanical Drafters	None	None
Bachelors degree	17-2141	Mechanical Engineers	None	None
	11-9041	Architectural and Engineering Managers	None	More than 5 years
	17-2071	Electrical Engineers	None	None
	19-2041	Environmental Scientists and Specialists, Including Health	None	None
	15-1133	Software Developers, Systems Software	None	None
	19-4021	Biological Technicians	None	None
	19-2031	Chemists	None	None
	17-2072	Electronics Engineers, Except Computer	None	None
	17-2199	Engineers, All Other	None	None
	13-2011	Accountants and Auditors	None	None

Baltimore Regional Talent Development Pipeline Study

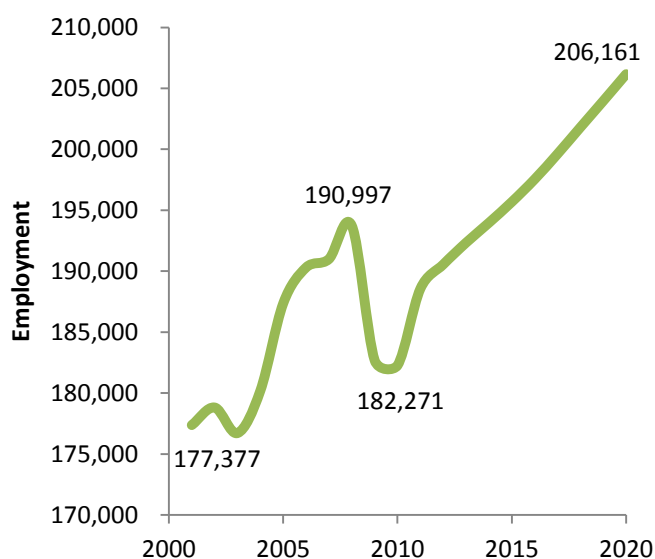
Education	SOC	Occupation	Training Requirement	Experience Required
	11-9121	Natural Sciences Managers	None	More than 5 years
	15-1799	Computer Occupations, All Other	None	None
	17-2112	Industrial Engineers	None	None
	17-2081	Environmental Engineers	None	None
	15-1121	Computer Systems Analysts	None	None
	13-1041	Compliance Officers	Moderate-term on-the-job training	None
	11-3021	Computer and Information Systems Managers	None	More than 5 years
	15-1142	Network and Computer Systems Administrators	None	None
	15-1132	Software Developers, Applications	None	None
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	None	1 to 5 years
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	None	None
	11-3031	Financial Managers	None	More than 5 years
	15-2031	Operations Research Analysts	None	None
	13-2051	Financial Analysts	None	None
	15-1131	Computer Programmers	None	None
	17-2041	Chemical Engineers	None	None
	27-3042	Technical Writers	Short-term on-the-job training	1 to 5 years
	11-2021	Marketing Managers	None	1 to 5 years
	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Moderate-term on-the-job training	None
	13-2031	Budget Analysts	None	None
	29-9011	Occupational Health and Safety Specialists	Moderate-term on-the-job training	None
Masters degree	15-2041	Statisticians	None	None
Doctoral or professional degree	19-1042	Medical Scientists, Except Epidemiologists	None	None
	15-1111	Computer and Information Research Scientists	None	None
	19-1029	Biological Scientists, All Other	None	None

Business Services

The business services sector encompasses a broad set of services including:

- Legal, accounting, engineering, consulting, and related services,
- Computer systems design,
- Scientific research and technical services,
- Business support services such as employment, agencies, facilities support, security services, and management services,
- Waste management, treatment and remediation, and
- Repair and maintenance services.

Figure 9 Employment in the Baltimore Region Business Services Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

There were approximately 190,500 workers employed in the business services sector in 2012, up from a low of approximately 182,300 workers in 2009 during the recession. The sector is expected to add over 15,600 new jobs in the Baltimore Region between 2012 and 2020, an 8.2% increase in total demand. In addition, job turnover will require replacement of 31,200 workers between 2012 and 2020, bringing the total hiring demand to nearly 46,800 over the period.

Most of the growth in the sector is expected to come from the architecture and engineering, computer systems design, consulting services, research and development, and corporate and divisional headquarters (NAICS 5511) industries. Each of these industry categories will contribute over 1,000 new jobs to the regional economy between 2012 and 2020.

Supply and Demand Snapshot

In 2012, there were approximately 14,100 graduates of 767 educational programs in the region that prepare workers for careers in business services occupations. Most graduates of programs for business services occupations (79%) earn a Bachelors degree or higher. In 2012, over 11,100 workers in the Baltimore Region earned a Bachelors degree or other degree or certificate beyond Bachelors; however the total hiring demand within the business services sector for jobs requiring a Bachelors degree or higher is expected to reach only 11,700 between 2012 and 2020. A portion of graduates from business services programs will find business jobs in other industries (e.g. an accountant working in government) and others will likely relocate or work in jobs outside the Baltimore Region.

Approximately 57% of the future hiring demand in the business services sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 26,800 workers between 2012 and 2020). There are approximately 341 programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree. There were approximately 3,000 graduates of these programs in 2012 and if the number of graduates of these programs maintains nominal growth, the supply of new graduates from these programs will roughly match demand for new workers in the business services sector.

Table 29 Employment Outlook for the Business Services Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
5411	Legal Services	12,387	12,044	12,845	-3%	6.6%	801
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	10,470	9,479	10,277	-9%	8.4%	798
5413	Architectural, Engineering, and Related Services	19,985	21,206	23,503	6%	10.8%	2,297
5414	Specialized Design Services	1,584	1,338	1,459	-16%	9.0%	121
5415	Computer Systems Design and Related Services	19,181	28,171	31,691	47%	12.5%	3,519
5416	Management, Scientific, and Technical Consulting Services	9,724	11,584	12,962	19%	11.9%	1,378
5417	Scientific Research and Development Services	13,206	13,552	15,443	3%	14.0%	1,891
5418	Advertising, Public Relations, and Related Services	3,549	3,251	3,522	-8%	8.3%	271
5419	Other Professional, Scientific, and Technical Services	6,342	6,598	7,409	4%	12.3%	811
5511	Management of Companies and Enterprises	3,883	9,783	11,878	152%	21.4%	2,095
5611	Office Administrative Services	4,522	4,506	4,600	0%	2.1%	94
5612	Facilities Support Services	174	542	567	210%	4.8%	26
5613	Employment Services	30,959	23,001	23,441	-26%	1.9%	441
5614	Business Support Services	5,766	3,551	3,625	-38%	2.1%	74
5615	Travel Arrangement and Reservation Services	476	1,166	1,198	145%	2.8%	33
5616	Investigation and Security Services	9,037	11,236	11,412	24%	1.6%	177
5617	Services to Buildings and Dwellings	21,040	19,852	20,354	-6%	2.5%	502
5619	Other Support Services	2,051	2,144	2,203	4%	2.8%	60
5621	Waste Collection	1,531	2,613	2,670	71%	2.2%	57
5622	Waste Treatment and Disposal	977	921	927	-6%	0.7%	6
5629	Remediation and Other Waste Management Services	1,110	1,753	1,791	58%	2.2%	39
8112	Electronic and Precision Equipment Repair and Maintenance	847	748	785	-12%	5.0%	37
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	1,394	1,517	1,596	9%	5.2%	80
	Total Business Services Sector	180,196	190,554	206,161	6%	8.2%	15,608

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The business services sector is expected to generate demand for approximately 5,000 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. Most of these jobs will be for janitors, material movers, landscaping workers, waste and recycling workers, packers, stock clerks, telemarketers and other occupations that do not require extensive occupational training. Jobs at this education level earned average hourly wages of \$12.39 in 2012.

The sector is expected to generate demand for approximately 15,800 hires for jobs requiring a high school diploma or equivalent. Some of the highest demand jobs at this education level include security guards, customer service representatives, office clerks and specialists, secretaries and receptionists, sales representatives, bookkeepers, and other occupations. Hourly earnings for workers in these occupations averaged \$20.81 in 2012, although the higher average wage is in part attributable to the inclusion of workers who are supervisors or have longer job tenure and experience.

High demand occupations requiring an Associates degree or other post-secondary education less than a Bachelors degree include engineering technicians (including civil, electrical, and mechanical technicians and drafters), computer support specialists, court reporters, paralegals, veterinary technicians, architectural and civil drafters, and several manager and supervisory occupations. Average wages vary by occupation but several occupations offer wages in excess of the minimum living wage for a single parent with one child in Baltimore City.

Occupations at the Bachelors degree and higher level are diverse and include accountants, engineers, IT professionals, attorneys, management analysts, and a variety of business and sciences specialist occupations. All of the high-demand occupations in this category pay average wages in excess of a living wage.

Table 30 Business Services Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	24,509	25,234	726	4,263	4,989	3,521	\$12.39	\$25,775
High school diploma or equivalent	69,355	73,999	4,644	11,200	15,844	13,811	\$20.81	\$43,297
Some College or postsecondary non-degree award	8,309	8,896	587	1,625	2,212	2,300	\$25.44	\$52,916
Associates degree	15,233	16,646	1,413	2,303	3,716	2,291	\$36.47	\$75,851
Bachelors degree	64,163	71,546	7,383	10,357	17,739	10,960	\$41.59	\$86,723
Masters degree	1,311	1,460	148	346	495	263	\$34.23	\$72,218
Doctoral or professional degree	7,673	8,380	707	1,085	1,792	424	\$52.50	\$109,441
Total	190,554	206,161	15,608	31,179	46,787	34,140	\$29.55	\$61,550

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Education and Training Supply Summary

Table 31 Programs, Enrollment and Graduates of Programs in Business Services, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	7	1%	241	0%	106	1%
WIA-eligible Training (Reported)	56	7%	1,000	2%	274	2%
College & University Lower Division Certificate, Associates Degrees and Non-Degree Undergrad	278	36%	16,874	27%	2,586	18%
Bachelors	227	30%	27,042	44%	5,455	39%
Masters, PhD, and Post-Bachelors Certificates and Programs	199	26%	16,491	27%	5,662	40%
Total, All Levels	767	100%	61,648	100%	14,083	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 32 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Business Services	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	3	4	-	-	-	7
WIA-eligible Training (Reported)	18	10	19	-	7	2	56
College and University	70	283	220	24	71	36	704
Total Programs	88	296	243	24	78	38	767
Enrollment							
Non-WIA Eligible Training (Reported)	-	50	191	-	-	-	241
WIA-eligible Training (Reported)	301	412	60	-	65	162	1,000
College and University	6,712	24,638	24,016	848	2,216	1,977	60,407
Total Enrollment	7,013	25,100	24,267	848	2,281	2,139	61,648
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	106	-	-	-	106
WIA-eligible Training (Reported)	73	42	29	-	14	116	274
College and University	1,191	7,041	4,747	172	334	218	13,703
Total Graduates/Completions	1,264	7,083	4,882	172	348	334	14,083

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 33 Business Services Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	9,117	9,362	245	1,379	1,624	60	\$11.62	\$24,170
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	3,096	3,189	92	793	885	44	\$13.52	\$28,130
	37-3011	Landscaping and Groundskeeping Workers	4,494	4,613	119	636	756	88	\$12.20	\$25,370
	53-7081	Refuse and Recyclable Material Collectors	798	814	16	189	205	10	\$13.71	\$28,520
	37-2012	Maids and Housekeeping Cleaners	974	999	25	131	156	32	\$10.42	\$21,670
	53-7064	Packers and Packers, Hand	616	630	14	141	155	8	\$12.00	\$24,950
	51-9198	Helpers--Production Workers	816	833	18	108	126	n.a.	\$12.70	\$26,410
	43-5081	Stock Clerks and Order Fillers	436	459	23	86	110	380	\$12.42	\$25,840
	41-9041	Telemarketers	465	485	20	79	100	9	\$14.51	\$30,190
	41-2011	Cashiers	170	177	8	62	69	143	\$10.52	\$21,880
High school diploma or equivalent	33-9032	Security Guards	9,645	9,821	176	1,227	1,403	456	\$14.85	\$30,880
	43-4051	Customer Service Representatives	3,910	4,197	287	888	1,175	1,386	\$17.29	\$35,960
	43-9061	Office Clerks, General	5,297	5,658	361	750	1,111	n.a.	\$14.75	\$30,680
	13-1199	Business Operations Specialists, All Other	3,094	3,456	362	475	837	385	\$37.54	\$78,080
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	4,069	4,382	313	436	749	330	\$17.80	\$37,020
	41-3099	Sales Representatives, Services, All Other	2,071	2,231	160	487	647	474	\$31.23	\$64,960
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	1,817	1,973	157	388	545	580	\$26.45	\$55,010
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	2,704	2,940	236	238	474	310	\$19.69	\$40,950
	43-6011	Executive Secretaries and Executive Administrative Assistants	2,177	2,391	214	233	447	378	\$24.28	\$50,500
	43-4171	Receptionists and Information Clerks	1,351	1,458	107	326	434	120	\$13.54	\$28,170
	11-9199	Managers, All Other	1,176	1,322	146	209	355	1,290	\$51.50	\$107,110
	47-4011	Construction and Building Inspectors	925	1,024	100	218	318	10	\$25.40	\$52,820
	11-3011	Administrative Services Managers	1,082	1,186	104	214	318	198	\$37.52	\$78,040
	43-6012	Legal Secretaries	1,655	1,765	111	177	288	n.a.	\$19.89	\$41,370

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	43-9799	Office and Administrative Support Workers, All Other	902	964	62	152	214	n.a.	\$17.81	\$37,050
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	652	727	74	140	214	40	\$31.14	\$64,760
	43-3011	Bill and Account Collectors	971	1,032	60	152	212	297	\$17.18	\$35,740
	13-2082	Tax Preparers	791	858	67	142	209	n.a.	\$15.55	\$32,350
	37-2021	Pest Control Workers	455	466	11	163	174	10	\$17.43	\$36,260
	49-9071	Maintenance and Repair Workers, General	846	895	50	124	174	126	\$19.26	\$40,070
	43-3021	Billing and Posting Clerks	736	798	62	102	165	297	\$17.25	\$35,880
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	548	597	50	103	153	18	\$33.18	\$69,020
	43-9021	Data Entry Keyers	693	739	46	97	143	8	\$15.19	\$31,590
	31-9096	Veterinary Assistants and Laboratory Animal Caretakers	562	632	69	69	138	n.a.	\$12.15	\$25,270
	43-4161	Human Resources Assistants, Except Payroll and Timekeeping	399	437	38	89	127	16	\$20.52	\$42,680
	43-4111	Interviewers, Except Eligibility and Loan	453	504	51	72	123	n.a.	\$16.58	\$34,480
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	468	505	37	82	119	20	\$19.01	\$39,540
	43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	527	559	32	81	113	n.a.	\$14.32	\$29,790
	43-5071	Shipping, Receiving, and Traffic Clerks	424	450	26	86	113	380	\$15.89	\$33,050
	37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	780	801	21	91	111	90	\$22.64	\$47,080
	43-5061	Production, Planning, and Expediting Clerks	329	361	32	69	101	81	\$22.35	\$46,480
	37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	737	756	19	81	101	96	\$18.62	\$38,740
	17-3031	Surveying and Mapping Technicians	380	421	41	58	100	n.a.	\$23.72	\$49,340
	33-1099	First-Line Supervisors of Protective Service Workers, All Other	332	340	8	91	99	n.a.	\$28.95	\$60,220
	23-2099	Legal Support Workers, All Other	514	550	36	62	98	9	\$27.74	\$57,700
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	362	383	21	76	97	270	\$29.91	\$62,220
	27-4021	Photographers	475	533	58	37	95	9	\$19.19	\$39,920

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	47-4041	Hazardous Materials Removal Workers	392	401	9	83	92	11	\$18.85	\$39,200
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	300	327	27	61	88	18	\$41.20	\$85,690
	43-3051	Payroll and Timekeeping Clerks	331	358	27	54	81	50	\$19.48	\$40,520
	41-9011	Demonstrators and Product Promoters	259	277	17	61	78	32	\$13.99	\$29,110
	43-4071	File Clerks	282	300	17	59	77	280	\$14.76	\$30,700
	53-3033	Light Truck or Delivery Services Drivers	377	394	17	60	77	176	\$17.18	\$35,730
	51-2099	Assemblers and Fabricators, All Other	405	416	11	64	75	90	\$14.98	\$31,160
	43-4199	Information and Record Clerks, All Other	246	265	19	55	74	63	\$20.21	\$42,050
	49-9041	Industrial Machinery Mechanics	346	365	20	53	73	24	\$23.22	\$48,290
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	164	172	8	60	68	22	\$13.46	\$28,000
	49-9799	Installation, Maintenance, and Repair Workers, All Other	362	376	14	53	67	n.a.	\$19.77	\$41,120
	23-2093	Title Examiners, Abstractors, and Searchers	272	291	19	33	52	32	\$19.99	\$41,570
	15-1150	Computer Support Specialists	3,271	3,648	376	688	1,065	570	\$26.93	\$56,020
	33-9021	Private Detectives and Investigators	347	358	10	62	72	n.a.	\$23.09	\$48,030
	23-2091	Court Reporters	1,455	1,485	30	176	206	n.a.	\$18.93	\$39,370
Postsecondary non-degree award	49-2011	Computer, Automated Teller, and Office Machine Repairers	268	290	22	53	75	24	\$20.70	\$43,050
	11-1021	General and Operations Managers	5,306	5,783	477	789	1,267	77	\$56.53	\$117,580
Associates degree	23-2011	Paralegals and Legal Assistants	2,808	3,002	194	319	513	22	\$24.98	\$51,950
	29-2056	Veterinary Technologists and Technicians	1,237	1,389	153	172	325	n.a.	\$15.36	\$31,950
	17-3022	Civil Engineering Technicians	923	1,023	100	141	241	n.a.	\$23.13	\$48,110
	17-3029	Engineering Technicians, Except Drafters, All Other	820	912	92	125	217	n.a.	\$32.66	\$67,930
	17-3023	Electrical and Electronics Engineering Technicians	681	753	72	104	176	36	\$29.73	\$61,840
	17-3011	Architectural and Civil Drafters	340	376	36	53	89	77	\$24.65	\$51,280
	17-3027	Mechanical Engineering Technicians	300	333	33	46	79	n.a.	\$28.63	\$59,540
	19-4091	Environmental Science and Protection Technicians, Including Health	171	188	18	58	75	n.a.	\$24.25	\$50,450

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Bachelors degree	17-3013	Mechanical Drafters	203	225	21	32	53	88	\$25.90	\$53,870
	13-2011	Accountants and Auditors	5,438	5,949	512	935	1,447	270	\$35.18	\$73,180
	13-1111	Management Analysts	5,055	5,640	585	659	1,244	128	\$45.73	\$95,120
	15-1133	Software Developers, Systems Software	4,388	4,925	537	365	902	730	\$52.64	\$109,490
	15-1799	Computer Occupations, All Other	2,897	3,253	357	433	790	n.a.	\$45.49	\$94,630
	15-1121	Computer Systems Analysts	2,843	3,192	349	425	774	572	\$39.57	\$82,290
	17-2051	Civil Engineers	2,531	2,803	272	411	683	660	\$39.89	\$82,960
	15-1131	Computer Programmers	2,247	2,513	266	417	683	715	\$37.15	\$77,270
	15-1132	Software Developers, Applications	2,886	3,247	360	240	600	864	\$47.92	\$99,670
	11-3021	Computer and Information Systems Managers	2,110	2,375	264	258	523	144	\$57.11	\$118,790
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	2,153	2,411	258	255	513	780	\$44.06	\$91,640
	15-1142	Network and Computer Systems Administrators	1,868	2,090	222	253	474	330	\$40.35	\$83,920
	17-2141	Mechanical Engineers	1,054	1,171	117	272	388	n.a.	\$43.87	\$91,250
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	1,839	1,973	134	249	382	n.a.	\$30.75	\$63,960
	13-1161	Market Research Analysts and Marketing Specialists	1,122	1,255	132	239	371	310	\$31.38	\$65,270
	11-9041	Architectural and Engineering Managers	1,309	1,463	154	204	358	n.a.	\$59.08	\$122,880
	19-2041	Environmental Scientists and Specialists, Including Health	975	1,086	112	231	343	11	\$34.50	\$71,770
	17-2071	Electrical Engineers	1,042	1,161	119	201	320	n.a.	\$42.50	\$88,400
	11-3031	Financial Managers	1,109	1,242	133	162	295	480	\$51.58	\$107,290
	17-2199	Engineers, All Other	902	1,004	102	159	261	27	\$44.09	\$91,700
	17-2061	Computer Hardware Engineers	817	921	104	154	258	n.a.	\$43.12	\$89,680
	17-1011	Architects, Except Landscape and Naval	948	1,051	103	154	257	n.a.	\$36.94	\$76,840
	27-1024	Graphic Designers	711	781	71	176	247	36	\$23.37	\$48,610
	17-2072	Electronics Engineers, Except Computer	754	844	91	145	236	n.a.	\$44.62	\$92,810

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	19-4021	Biological Technicians	567	643	76	153	229	n.a.	\$21.13	\$43,950
	17-2011	Aerospace Engineers	755	848	93	133	226	n.a.	\$52.27	\$108,720
	19-2031	Chemists	544	610	67	142	208	n.a.	\$39.34	\$81,840
	13-1041	Compliance Officers	889	1,000	111	86	197	90	\$30.13	\$62,680
	13-1081	Logisticians	691	779	88	106	194	n.a.	\$40.93	\$85,140
	13-2051	Financial Analysts	616	698	82	105	186	120	\$39.02	\$81,160
	15-1141	Database Administrators	727	814	88	98	186	440	\$39.09	\$81,310
	15-2031	Operations Research Analysts	477	539	62	122	184	40	\$42.36	\$88,110
	11-2021	Marketing Managers	476	536	60	111	171	99	\$51.62	\$107,370
	13-1151	Training and Development Specialists	678	753	75	92	167	286	\$28.97	\$60,250
	11-9121	Natural Sciences Managers	266	302	36	129	165	11	\$55.94	\$116,360
	11-2022	Sales Managers	474	528	54	110	165	340	\$60.09	\$124,990
	19-3099	Social Scientists and Related Workers, All Other	319	361	43	106	149	90	\$45.52	\$94,680
	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	465	523	58	87	145	9	\$39.57	\$82,310
	17-2081	Environmental Engineers	496	548	52	87	139	n.a.	\$39.86	\$82,900
	13-2099	Financial Specialists, All Other	460	519	59	78	137	370	\$25.38	\$52,780
	27-3042	Technical Writers	499	556	58	79	137	n.a.	\$33.52	\$69,730
	17-2112	Industrial Engineers	411	461	51	72	122	n.a.	\$41.95	\$87,260
	27-3031	Public Relations Specialists	380	418	39	81	120	36	\$31.40	\$65,320
	13-2031	Budget Analysts	375	425	50	64	114	30	\$34.65	\$72,070
	27-1025	Interior Designers	320	351	31	79	111	66	\$24.39	\$50,740
	11-1011	Chief Executives	341	379	38	71	109	96	\$84.71	\$176,200
	17-1012	Landscape Architects	408	445	37	66	103	n.a.	\$34.53	\$71,810
	19-2042	Geoscientists, Except Hydrologists and Geographers	282	314	32	67	99	n.a.	\$32.92	\$68,470
	17-1022	Surveyors	345	383	37	60	98	n.a.	\$26.33	\$54,770
	13-1141	Compensation, Benefits, and Job Analysis	310	347	36	42	78	108	\$26.72	\$55,590

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
		Specialists								
	11-3121	Human Resources Managers	230	258	28	45	73	60	\$52.27	\$108,720
	17-2041	Chemical Engineers	190	213	23	49	72	n.a.	\$46.89	\$97,530
	29-9011	Occupational Health and Safety Specialists	184	203	19	52	71	n.a.	\$35.51	\$73,860
	41-9031	Sales Engineers	170	191	21	46	68	n.a.	\$39.28	\$81,700
	11-3061	Purchasing Managers	134	155	21	33	53	88	\$50.11	\$104,220
	17-1021	Cartographers and Photogrammetrists	177	196	20	31	51	n.a.	\$26.17	\$54,430
	19-3051	Urban and Regional Planners	596	663	67	122	188	n.a.	\$34.37	\$71,500
Masters degree	15-2041	Statisticians	232	263	31	112	143	n.a.	\$36.61	\$76,140
Doctoral or professional degree	23-1011	Lawyers	4,922	5,274	352	748	1,100	216	\$55.89	\$116,260
	15-1111	Computer and Information Research Scientists	853	962	109	128	237	80	\$47.68	\$99,180
	19-1042	Medical Scientists, Except Epidemiologists	942	1,073	131	47	177	n.a.	\$42.61	\$88,640
	29-1131	Veterinarians	514	577	63	81	145	n.a.	\$51.39	\$106,890
	19-1029	Biological Scientists, All Other	230	260	30	41	72	n.a.	\$44.38	\$92,310

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Baltimore Regional Talent Development Pipeline Study

Table 34 Business Services Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	Hiring Demand by County							
	SOC	Occupation	ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	449	480	187	115	55	338
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	184	262	227	29	27	156
	37-3011	Landscaping and Groundskeeping Workers	212	223	84	54	25	159
	53-7081	Refuse and Recyclable Material Collectors	42	67	30	29	8	29
	37-2012	Maids and Housekeeping Cleaners	43	46	20	10	4	32
	53-7064	Packers and Packagers, Hand	31	47	43	4	3	26
	51-9198	Helpers--Production Workers	26	39	33	3	2	23
	43-5081	Stock Clerks and Order Fillers	22	31	22	3	4	27
	41-9041	Telemarketers	20	35	18	3	4	21
	39-2021	Nonfarm Animal Caretakers	17	21	4	4	8	31
	41-2011	Cashiers	13	21	16	3	2	14
High school diploma or equivalent	33-9032	Security Guards	104	613	388	97	16	185
	43-4051	Customer Service Representatives	244	338	184	38	47	323
	43-9061	Office Clerks, General	237	312	169	37	60	295
	13-1199	Business Operations Specialists, All Other	168	185	77	24	63	320
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	161	206	96	25	49	212
	41-3099	Sales Representatives, Services, All Other	150	172	85	26	32	182
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	107	158	82	18	28	151
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	99	148	53	17	24	133
	43-6011	Executive Secretaries and Executive Administrative Assistants	91	107	47	12	34	156
	43-4171	Receptionists and Information Clerks	86	127	71	15	25	108
	11-9199	Managers, All Other	63	78	36	10	27	142
	47-4011	Construction and Building Inspectors	79	69	43	7	36	84
	11-3011	Administrative Services Managers	62	82	42	10	19	102
43-6012	Legal Secretaries	50	110	73	8	13	35	
43-9799	Office and Administrative Support Workers, All Other	41	59	36	6	10	61	
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	40	51	25	6	16	77	

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	43-3011	Bill and Account Collectors	39	73	37	6	7	50
	13-2082	Tax Preparers	40	94	36	7	9	23
	37-2021	Pest Control Workers	47	52	22	13	9	32
	49-9071	Maintenance and Repair Workers, General	37	46	26	7	9	50
	43-3021	Billing and Posting Clerks	32	57	24	6	7	38
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	29	43	21	6	7	47
	43-9021	Data Entry Keyers	29	42	23	4	6	37
	31-9096	Veterinary Assistants and Laboratory Animal Caretakers	29	33	6	6	14	51
	43-4161	Human Resources Assistants, Except Payroll and Timekeeping	24	34	19	4	6	40
	43-4111	Interviewers, Except Eligibility and Loan	25	30	8	5	11	45
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	26	28	17	3	11	33
	43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	19	41	21	2	4	25
	43-5071	Shipping, Receiving, and Traffic Clerks	23	31	21	3	5	30
	37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	32	33	12	8	3	24
	43-5061	Production, Planning, and Expediting Clerks	20	26	13	3	6	33
	37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	29	30	11	7	2	22
	17-3031	Surveying and Mapping Technicians	25	21	12	2	12	27
	33-1099	First-Line Supervisors of Protective Service Workers, All Other	7	40	29	6	2	13
	23-2099	Legal Support Workers, All Other	17	34	23	3	5	17
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	19	29	15	5	6	23
	27-4021	Photographers	21	22	3	5	9	35
	47-4041	Hazardous Materials Removal Workers	47	5	22	2	3	14
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	19	25	11	3	4	26
	43-3051	Payroll and Timekeeping Clerks	16	26	13	3	3	20
	41-9011	Demonstrators and Product Promoters	12	31	16	1	3	15
	43-4071	File Clerks	14	25	18	2	3	14
	53-3033	Light Truck or Delivery Services Drivers	16	23	14	4	3	17
	51-2099	Assemblers and Fabricators, All Other	15	22	19	2	2	14

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	43-4199	Information and Record Clerks, All Other	13	21	12	2	4	22
	49-9041	Industrial Machinery Mechanics	10	25	13	2	9	14
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	12	22	14	3	5	11
	49-9799	Installation, Maintenance, and Repair Workers, All Other	17	20	9	4	3	14
	23-2093	Title Examiners, Abstractors, and Searchers	9	19	13	1	2	7
Some college, no degree	15-1150	Computer Support Specialists	250	239	88	37	50	401
Postsecondary non-degree award	33-9021	Private Detectives and Investigators	7	29	19	4	1	11
	23-2091	Court Reporters	36	83	41	5	3	37
	49-2011	Computer, Automated Teller, and Office Machine Repairers	21	18	6	3	5	22
	11-1021	General and Operations Managers	275	315	142	45	79	411
	23-2011	Paralegals and Legal Assistants	88	190	128	14	23	71
Associates degree	29-2056	Veterinary Technologists and Technicians	67	79	14	15	31	118
	17-3022	Civil Engineering Technicians	61	51	29	5	31	65
	17-3029	Engineering Technicians, Except Drafters, All Other	42	38	22	4	28	83
	17-3023	Electrical and Electronics Engineering Technicians	39	35	18	4	19	61
	17-3011	Architectural and Civil Drafters	23	19	11	2	11	24
	17-3027	Mechanical Engineering Technicians	16	14	8	1	11	28
	19-4091	Environmental Science and Protection Technicians, Including Health	19	15	11	1	7	23
	17-3013	Mechanical Drafters	13	11	7	1	6	15
	13-2011	Accountants and Auditors	279	538	214	48	70	298
	13-1111	Management Analysts	296	271	92	37	88	460
Bachelors degree	15-1133	Software Developers, Systems Software	220	163	39	30	62	387
	15-1799	Computer Occupations, All Other	175	160	53	26	49	327
	15-1121	Computer Systems Analysts	185	159	48	27	40	315
	17-2051	Civil Engineers	171	145	85	13	84	185
	15-1131	Computer Programmers	164	142	46	24	34	272
	15-1132	Software Developers, Applications	148	112	25	21	35	259
	11-3021	Computer and Information Systems Managers	119	107	31	18	30	218
	15-1179	Information Security Analysts, Web Developers, and Computer	123	106	31	18	29	207

Baltimore Regional Talent Development Pipeline Study

Education	SOC		Occupation	Hiring Demand by County						
				ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD	
			Network Architects							
	15-1142		Network and Computer Systems Administrators	109	102	34	16	27		186
	17-2141		Mechanical Engineers	83	74	51	7	49		124
	13-1078		Human Resources, Training, and Labor Relations Specialists, All Other	79	100	57	11	17		119
	13-1161		Market Research Analysts and Marketing Specialists	78	92	36	11	24		130
	11-9041		Architectural and Engineering Managers	78	67	36	7	44		126
	19-2041		Environmental Scientists and Specialists, Including Health	80	66	36	7	36		117
	17-2071		Electrical Engineers	69	62	36	6	38		108
	11-3031		Financial Managers	54	81	31	9	15		105
	17-2199		Engineers, All Other	52	50	28	5	30		96
	17-2061		Computer Hardware Engineers	51	42	17	6	26		115
	17-1011		Architects, Except Landscape and Naval	65	55	32	5	32		69
	27-1024		Graphic Designers	52	65	41	11	12		66
	17-2072		Electronics Engineers, Except Computer	48	42	22	5	28		92
	19-4021		Biological Technicians	26	22	17	2	41		122
	17-2011		Aerospace Engineers	39	32	19	3	34		98
	19-2031		Chemists	31	27	21	2	32		95
	13-1041		Compliance Officers	34	39	15	5	18		87
	13-1081		Logisticians	40	40	16	5	15		78
	13-2051		Financial Analysts	36	45	17	6	11		73
	15-1141		Database Administrators	42	40	13	6	11		74
	15-2031		Operations Research Analysts	38	38	15	5	13		74
	11-2021		Marketing Managers	33	42	17	5	10		63
	13-1151		Training and Development Specialists	35	38	15	5	10		65
	11-9121		Natural Sciences Managers	21	20	15	2	25		82
	11-2022		Sales Managers	33	43	18	6	7		58
	19-3099		Social Scientists and Related Workers, All Other	20	18	11	2	22		75
	41-4011		Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	33	29	10	5	9		59

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	17-2081	Environmental Engineers	36	27	16	3	15	43
	13-2099	Financial Specialists, All Other	24	40	15	4	6	48
	27-3042	Technical Writers	31	27	11	4	11	53
	17-2112	Industrial Engineers	23	23	12	3	13	48
	27-3031	Public Relations Specialists	20	40	17	3	6	34
	13-2031	Budget Analysts	21	24	9	3	9	48
	27-1025	Interior Designers	27	24	21	6	8	26
	11-1011	Chief Executives	22	27	12	3	6	38
	17-1012	Landscape Architects	27	23	12	3	11	27
	19-2042	Geoscientists, Except Hydrologists and Geographers	23	20	12	2	11	31
	17-1022	Surveyors	24	21	12	2	12	26
	13-1141	Compensation, Benefits, and Job Analysis Specialists	15	19	8	2	4	29
	11-3121	Human Resources Managers	13	18	8	2	4	27
	17-2041	Chemical Engineers	13	11	8	1	10	29
	29-9011	Occupational Health and Safety Specialists	15	13	9	2	6	25
	41-9031	Sales Engineers	16	14	5	2	4	27
	11-3061	Purchasing Managers	9	12	5	2	3	22
	17-1021	Cartographers and Photogrammetrists	13	11	6	1	5	15
	19-3051	Urban and Regional Planners	47	40	22	4	21	54
	15-2041	Statisticians	21	21	12	2	19	67
Masters degree	23-1011	Lawyers	180	398	298	28	47	149
	15-1111	Computer and Information Research Scientists	48	37	13	6	25	108
Doctoral or professional degree	19-1042	Medical Scientists, Except Epidemiologists	18	12	5	1	37	104
	29-1131	Veterinarians	30	36	6	7	13	52
	19-1029	Biological Scientists, All Other	9	7	5	1	13	38

Table 35 Business Services Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
	37-3011	Landscaping and Groundskeeping Workers	Short-term on-the-job training	None
	53-7081	Refuse and Recyclable Material Collectors	Short-term on-the-job training	None
	37-2012	Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	53-7064	Packers and Packagers, Hand	Short-term on-the-job training	None
	51-9198	Helpers--Production Workers	Short-term on-the-job training	None
	43-5081	Stock Clerks and Order Fillers	Short-term on-the-job training	None
	41-9041	Telemarketers	Short-term on-the-job training	None
	41-2011	Cashiers	Short-term on-the-job training	None
High school diploma or equivalent	33-9032	Security Guards	Short-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	41-3099	Sales Representatives, Services, All Other	Short-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
	43-4171	Receptionists and Information Clerks	Short-term on-the-job training	None
	11-9199	Managers, All Other	None	1 to 5 years
	47-4011	Construction and Building Inspectors	Moderate-term on-the-job training	More than 5 years
	11-3011	Administrative Services Managers	None	1 to 5 years
	43-6012	Legal Secretaries	Moderate-term on-the-job training	None
	43-9799	Office and Administrative Support Workers, All Other	Short-term on-the-job training	None
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	Long-term on-the-job training	None
	43-3011	Bill and Account Collectors	Moderate-term on-the-job training	None
	13-2082	Tax Preparers	Moderate-term on-the-job training	None
	37-2021	Pest Control Workers	Moderate-term on-the-job training	None
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	43-3021	Billing and Posting Clerks	Short-term on-the-job training	None

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Training Requirement	Experience Required
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Moderate-term on-the-job training	None
	43-9021	Data Entry Keyers	Moderate-term on-the-job training	None
	31-9096	Veterinary Assistants and Laboratory Animal Caretakers	Short-term on-the-job training	None
	43-4161	Human Resources Assistants, Except Payroll and Timekeeping	Short-term on-the-job training	None
	43-4111	Interviewers, Except Eligibility and Loan	Short-term on-the-job training	None
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	Moderate-term on-the-job training	None
	43-9051	Mail Clerks and Mail Machine Operators, Except Postal Service	Short-term on-the-job training	None
	43-5071	Shipping, Receiving, and Traffic Clerks	Short-term on-the-job training	None
	37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	None	1 to 5 years
	43-5061	Production, Planning, and Expediting Clerks	Moderate-term on-the-job training	None
	37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	None	1 to 5 years
	17-3031	Surveying and Mapping Technicians	Moderate-term on-the-job training	None
	33-1099	First-Line Supervisors of Protective Service Workers, All Other	None	1 to 5 years
	23-2099	Legal Support Workers, All Other	Short-term on-the-job training	None
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	None	1 to 5 years
	27-4021	Photographers	Long-term on-the-job training	None
	47-4041	Hazardous Materials Removal Workers	Moderate-term on-the-job training	None
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	None	More than 5 years
	43-3051	Payroll and Timekeeping Clerks	Moderate-term on-the-job training	None
	41-9011	Demonstrators and Product Promoters	Short-term on-the-job training	None
	43-4071	File Clerks	Short-term on-the-job training	None
	53-3033	Light Truck or Delivery Services Drivers	Short-term on-the-job training	None
	51-2099	Assemblers and Fabricators, All Other	Moderate-term on-the-job training	None
	43-4199	Information and Record Clerks, All Other	Short-term on-the-job training	None
	49-9041	Industrial Machinery Mechanics	Long-term on-the-job training	None
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	Moderate-term on-the-job training	None
	49-9799	Installation, Maintenance, and Repair Workers, All Other	Moderate-term on-the-job training	None
	23-2093	Title Examiners, Abstractors, and Searchers	Short-term on-the-job training	None
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
	33-9021	Private Detectives and Investigators	Moderate-term on-the-job training	1 to 5 years
Postsecondary non-degree award	23-2091	Court Reporters	Short-term on-the-job training	None
	49-2011	Computer, Automated Teller, and Office Machine Repairers	None	None

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Training Requirement	Experience Required
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
	23-2011	Paralegals and Legal Assistants	None	None
	29-2056	Veterinary Technologists and Technicians	None	None
	17-3022	Civil Engineering Technicians	None	None
	17-3029	Engineering Technicians, Except Drafters, All Other	None	None
	17-3023	Electrical and Electronics Engineering Technicians	None	None
	17-3011	Architectural and Civil Drafters	None	None
	17-3027	Mechanical Engineering Technicians	None	None
	19-4091	Environmental Science and Protection Technicians, Including Health	Moderate-term on-the-job training	None
Bachelors degree	17-3013	Mechanical Drafters	None	None
	13-2011	Accountants and Auditors	None	None
	13-1111	Management Analysts	None	1 to 5 years
	15-1133	Software Developers, Systems Software	None	None
	15-1799	Computer Occupations, All Other	None	None
	15-1121	Computer Systems Analysts	None	None
	17-2051	Civil Engineers	None	None
	15-1131	Computer Programmers	None	None
	15-1132	Software Developers, Applications	None	None
	11-3021	Computer and Information Systems Managers	None	More than 5 years
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	None	1 to 5 years
	15-1142	Network and Computer Systems Administrators	None	None
	17-2141	Mechanical Engineers	None	None
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	None	None
	13-1161	Market Research Analysts and Marketing Specialists	None	None
	11-9041	Architectural and Engineering Managers	None	More than 5 years
	19-2041	Environmental Scientists and Specialists, Including Health	None	None
	17-2071	Electrical Engineers	None	None
	11-3031	Financial Managers	None	More than 5 years
	17-2199	Engineers, All Other	None	None
	17-2061	Computer Hardware Engineers	None	None
	17-1011	Architects, Except Landscape and Naval	Internship/residency	None
	27-1024	Graphic Designers	None	None
	17-2072	Electronics Engineers, Except Computer	None	None
	19-4021	Biological Technicians	None	None
	17-2011	Aerospace Engineers	None	None
	19-2031	Chemists	None	None
	13-1041	Compliance Officers	Moderate-term on-the-job training	None
	13-1081	Logisticians	None	1 to 5 years
	13-2051	Financial Analysts	None	None
	15-1141	Database Administrators	None	1 to 5 years
	15-2031	Operations Research Analysts	None	None
	11-2021	Marketing Managers	None	1 to 5 years
	13-1151	Training and Development Specialists	None	None
	11-9121	Natural Sciences Managers	None	More than 5 years
	11-2022	Sales Managers	None	1 to 5 years
	19-3099	Social Scientists and Related Workers, All Other	None	None
	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Moderate-term on-the-job training	None

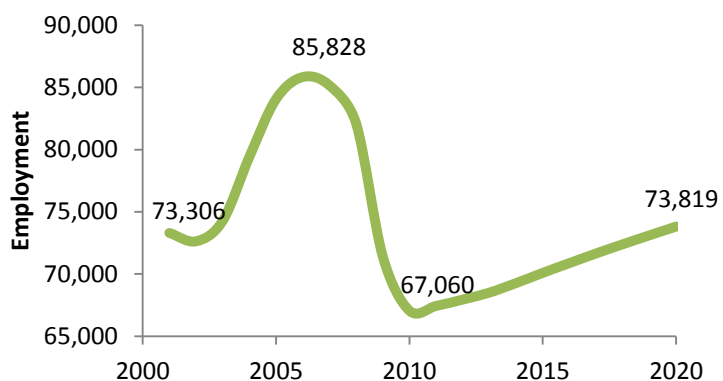
Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Training Requirement	Experience Required
	17-2081	Environmental Engineers	None	None
	13-2099	Financial Specialists, All Other	Moderate-term on-the-job training	None
	27-3042	Technical Writers	Short-term on-the-job training	1 to 5 years
	17-2112	Industrial Engineers	None	None
	27-3031	Public Relations Specialists	Moderate-term on-the-job training	None
	13-2031	Budget Analysts	None	None
	27-1025	Interior Designers	None	None
	11-1011	Chief Executives	None	More than 5 years
	17-1012	Landscape Architects	Internship/residency	None
	19-2042	Geoscientists, Except Hydrologists and Geographers	None	None
	17-1022	Surveyors	None	None
	13-1141	Compensation, Benefits, and Job Analysis Specialists	None	None
	11-3121	Human Resources Managers	None	1 to 5 years
	17-2041	Chemical Engineers	None	None
	29-9011	Occupational Health and Safety Specialists	Moderate-term on-the-job training	None
	41-9031	Sales Engineers	Moderate-term on-the-job training	None
	11-3061	Purchasing Managers	None	More than 5 years
	17-1021	Cartographers and Photogrammetrists	None	None
Masters degree	19-3051	Urban and Regional Planners	None	None
	15-2041	Statisticians	None	None
Doctoral or professional degree	23-1011	Lawyers	None	None
	15-1111	Computer and Information Research Scientists	None	None
	19-1042	Medical Scientists, Except Epidemiologists	None	None
	29-1131	Veterinarians	None	None
	19-1029	Biological Scientists, All Other	None	None

Construction

Construction in the Baltimore Region has shown steady improvement beginning in 2010 and is expected to experience steady growth leading to an 8.1% increase in jobs between year end 2012 and year end 2020 (compound annual growth of 1.0% per year). This outlook assumes recent trends in construction investment continue throughout the forecast period. Additional upside growth potential is also possible if major construction projects such as the Red Line are funded and begin construction as planned between 2015 and 2021.²⁶

Figure 10 Employment in the Baltimore Region Construction Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Job demand in the construction sector is cyclical, creating opportunities for workforce development, but also contracting as major projects or investment cycles conclude. The housing bubble in the first half of the 2000s drove strong job creation in the region's construction sector, adding over 13,000 jobs between 2002 and 2006, but removing nearly 19,000 jobs between 2006 and 2010. The sector began to regain its equilibrium in 2010 with most jobs being created for specialty trade contractors.

Supply and Demand Snapshot

The estimated hiring demand for workers in construction occupations between 2012 and 2020 is projected to exceed 17,000 total job openings. Nearly 6,000 new jobs are expected to be created across the region, while just over 11,000 job openings will be a result of turnover.

Educational statistics on the construction sector do not adequately describe the level of training and experiential learning that is required for careers in construction trades. The region's apprenticeship training programs are the main source of education and training for workers entering careers in the construction sector. Some apprenticeship programs offer direct training at training centers while others have partnerships with colleges in the region that provide formal education courses as part of the apprenticeship training program. A scan for apprenticeship training programs in the region identified 26 construction sector trades programs in the region, most of which offer 3-year, 4-year or 5-year apprenticeships that typically allow workers to gain paid on-the-job experience while taking classes. According to official statistics, in 2012, there were approximately 1,100 graduates from 65 educational

²⁶ The forecast methodology is conservative and does not factor in potential major projects that have not yet been funded with final approvals.

programs in the region that prepare workers for careers in occupations related to the construction sector. Most of these formal training programs (nearly 60%) are not affiliated with a college or university. It is worth noting in addition that the construction sector benefits from a few established or emerging Career Pathways initiatives. The Maryland Center for Construction Education and Innovation (MCCEI) at Towson University is a public-private partnership that promotes the vitality of construction in Maryland and promotes construction as a career choice for tomorrow's workforce. In addition the Maryland Department of Labor, Licensing and Regulation and the Maryland Department of Transportation's State Highway Administration (SHA) are implementing the BuildUp program, a Career Pathways approach for highway construction.

Table 36 Baltimore Region Apprenticeship Training Organizations

Apprenticeship Organization	Apprenticeship Program Description
Air Conditioning Contractors of America - Central Maryland Chapter	4-year program for a career in the heating, ventilation, air conditioning, and refrigeration (HVACR) industry.
Air Conditioning Contractors of America - National Capital Chapter	4-year program for a career in the heating, ventilation, air conditioning, and refrigeration (HVACR) industry.
Associated Builders and Contractors, Inc. - Baltimore Metropolitan Chapter	Classes in carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting.
Associated Builders and Contractors, Inc., Chesapeake Chapter	Classes at Anne Arundel Community College, North Point High School, College of Southern Maryland
Boilermakers Local 193 JATC	Boilermakers National Apprenticeship Program
Bricklayers Local 1 JATC MD, VA & DC	Apprentice Training Program
Heat and Frost Insulation Workers and Asbestos Workers, Local No. 24	4-year apprenticeship, held at Local No. 24's Apprenticeship Training Facility in the evenings. A pre-apprenticeship "Improver" program is also offered to gain work experience and prepare to enter the Apprenticeship program.
Independent Electrical Contractors - Chesapeake	4-year apprenticeship electrician training program and a 3 year Voice-Data-Video (VDV) Apprenticeship Program is designed to prepare the apprentice to take the Level I, II, and III BICSA certification exams.
International Brotherhood of Electrical Workers Local 24	5-year Electrical Apprenticeship Program and a 3-Year Voice/Data/Video Apprenticeship Program for telecommunications installer/technicians.
International Union of Elevator Constructors, Local No. 10	Program opens once a year for new hires.
International Union of Elevator Constructors, Local No. 7	n.a.
International Union of Operating Engineers Local No. 99	Operating Engineers Apprenticeship Program accepts applications once per year for 25 to 30 program positions per year.
Iron Workers Local No. 5 Joint Apprenticeship and Training Committee	College accredited courses in welding.
Ironworkers Local 16	3-year apprenticeship trained in skills such as the erection of structural steel, miscellaneous steel, metal curtainwall and window wall systems, precast concrete structures, fences, towers, pre-engineered metal buildings, and other steel structures.
Laborers Training Center	n.a.
Magna Baltimore Technical Training Center	Offers machinist training.
Maryland Plumbing, Heating Cooling Contractors, Inc.	4-year Plumbing Apprenticeship Program
Operative Plasterers and Cement Masons Local 891	3-year Apprenticeship Program
Painters and Allied Trades District Council No. 51	4-year Commercial Painter/Wallcoverer Program, a 3-year Drywall Finisher/Installer Program, a 3-year Bridge/Industrial Painter Program, and a 4-year Glazier/Architectural Metal Program
Plumbers & Steamfitters Local Union 486	5-year Apprenticeship Program for a Certified Plumber/Steamfitter Craftsmen
Reinforcing Ironworkers Local Union No. 201 Joint Apprenticeship & Training Committee	3-year Apprenticeship Program for Reinforcing Ironworkers

Baltimore Regional Talent Development Pipeline Study

Apprenticeship Organization	Apprenticeship Program Description
Road Sprinkler Fitters Local No. 669	5-year Apprenticeship correspondence program
Roofers Local 30	3-year Roofers Apprenticeship Program
Sheet Metal Workers Local Union #100	4-year sheet metal apprenticeship program offered at Local 100's training centers in each of their area offices.
Sprinkler Fitters Local Union 536	5-year apprenticeship program for sprinkler fitters.
Steamfitters Local Union No. 602	5-year Steamfitter Apprenticeship Program

Table 37 Employment Outlook for the Construction Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
2361	Residential Building Construction	11,167	7,859	8,527	-30%	8.5%	668
2362	Nonresidential Building Construction	5,912	5,150	5,567	-13%	8.1%	417
2371	Utility System Construction	3,298	3,575	3,919	8%	9.6%	343
2372	Land Subdivision	791	210	230	-74%	9.8%	20
2373	Highway, Street, and Bridge Construction	3,721	2,853	3,102	-23%	8.7%	248
2379	Other Heavy and Civil Engineering Construction	1,132	966	1,072	-15%	11.0%	106
2381	Foundation, Structure, and Building Exterior Contractors	11,852	9,439	10,227	-20%	8.3%	788
2382	Building Equipment Contractors	25,785	24,539	26,665	-5%	8.7%	2,126
2383	Building Finishing Contractors	10,029	7,405	8,048	-26%	8.7%	643
2389	Other Specialty Trade Contractors	5,731	5,957	6,463	4%	8.5%	507
	Total Construction Sector	79,419	67,953	73,819	-14%	8.6%	5,867

Source: RDA Global Baltimore Region Job Demand Outlook

Table 38 Construction Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	12,500	13,576	1,076	1,624	2,701	1,957	\$16.19	\$33,676
High school diploma or equivalent***	44,188	48,007	3,818	8,269	12,088	11,271	\$23.01	\$47,867
Some College or postsecondary non-degree award***	2,653	2,883	230	379	609	661	\$23.02	\$47,882
Associates degree**	5,174	5,619	445	541	986	464	\$50.08	\$104,171
Bachelors degree	3,425	3,720	296	572	867	8,768	\$38.85	\$80,800
Doctoral or professional degree	12	13	1	2	3	216	\$55.89	\$116,260
Total	67,953	73,819	5,867	11,388	17,254	23,907	\$24.62	\$51,216

* Includes all job vacancies for occupations linked to this industry sector. Some actual job vacancies may be for other industry sectors.

** Most workers in this education level are employed as construction managers and general operations managers.

*** Many of the jobs at this level are for construction trades that require formal education at a high school level, but also require apprenticeship training lasting 3 to 5 years in length, combined with moderate to long-term on-the-job training.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The construction sector is expected to generate demand for approximately 2,000 new hires over the 2012 to 2020 period for jobs that typically require minimum education that is less than a high school diploma. Most of these jobs will be for construction laborers, painters (mainly non-commercial), maintenance personnel, cement finishers, carpentry helpers, roofers and drywall installers. Jobs at this education level earned average hourly wages of \$16.19 in 2012, which is lower than the living wage standard for a single parent family with one child in Baltimore City.

The regional economy should generate over 11,000 job openings for trade workers who gain skills through on the job training and apprenticeship programs, but are classified at the level of having completed a high school diploma. Most construction occupations are for workers in this category and jobs include trades such as electricians, plumbers, carpenters, equipment operators and supporting office jobs. Many workers in these occupations will require some level of occupation-specific training or certification. Hourly earnings for workers in these occupations averaged \$23.01 in 2012, which is somewhat higher due to the inclusion of supervisory workers who have longer job tenure and experience.

High demand occupations requiring an Associates degree or other post-secondary education less than a Bachelors degree include heating, air conditioning, and refrigeration mechanics and installers, general and operations managers and construction managers. Most workers with an Associates degree in construction occupations are management workers, and have high average wages at \$50.08 per hour, due to their level of experience or job tenure. Workers with some college or a postsecondary award have average wages that are slightly higher than the living wage for a single parent family in Baltimore City at \$23.02 per hour.

The sector should create opportunities for approximately 600 total job openings for workers with a Bachelors degree or higher level of education between 2012 and 2020. The only high demand occupation identified that requires a Bachelors degree is cost estimators, who earned an average of just over \$32 per hour in 2012.

Education and Training Supply Summary

Table 39 Programs, Enrollment and Graduates of Programs in Construction, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	12	18%	1,273	46%	475	42%
WIA-eligible Training (Reported)	26	40%	586	21%	377	33%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	24	37%	818	29%	266	23%
Bachelors	2	3%	48	2%	4	0%
Masters, PhD, and Post-Bachelors Certificates and Programs	1	2%	67	2%	16	1%
Total, All Levels	65	100%	2,792	100%	1,138	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 40 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Construction	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	2	6	3	-	-	1	12
WIA-eligible Training (Reported)	5	3	15	-	1	2	26
College and University	2	6	10	1	1	7	27
Total Programs	9	15	28	1	2	10	65
Enrollment							
Non-WIA Eligible Training (Reported)	145	642	414	-	-	72	1,273
WIA-eligible Training (Reported)	67	58	157	-	-	304	586
College and University	100	248	283	21	1	280	933
Total Enrollment	312	948	854	21	1	656	2,792
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	209	266	-	-	-	475
WIA-eligible Training (Reported)	29	1	120	-	-	227	377
College and University	22	196	57	3	-	8	286
Total Graduates/Completions	51	406	443	3	-	235	1,138

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 41 Construction Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	47-2061	Construction Laborers	5,876	6,385	509	376	885	22	\$14.49	\$30,140
	47-2141	Painters, Construction and Maintenance	1,271	1,381	110	222	332	n.a.	\$19.13	\$39,780
	47-2051	Cement Masons and Concrete Finishers	1,145	1,241	96	145	241	10	\$18.79	\$39,090
	47-3012	Helpers--Carpenters	744	807	63	158	221	n.a.	\$11.06	\$23,010
	47-2181	Roofers	798	865	67	132	198	n.a.	\$21.70	\$45,140
	47-2081	Drywall and Ceiling Tile Installers	600	652	52	132	184	n.a.	\$21.42	\$44,540
	47-2111	Electricians	4,923	5,350	427	1,063	1,490	11	\$24.69	\$51,350
	47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	5,109	5,548	439	940	1,379	220	\$30.93	\$64,340
High school diploma or equivalent	47-2152	Plumbers, Pipefitters, and Steamfitters	3,870	4,206	336	895	1,230	36	\$26.36	\$54,830
	47-2031	Carpenters	4,044	4,388	344	686	1,030	50	\$20.98	\$43,640
	47-2073	Operating Engineers and Other Construction Equipment Operators	2,572	2,800	228	477	706	66	\$21.06	\$43,810
	43-9061	Office Clerks, General	2,616	2,842	225	370	596	n.a.	\$14.75	\$30,680
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,068	2,246	178	222	400	330	\$17.80	\$37,020
	47-3013	Helpers--Electricians	1,032	1,122	89	219	308	n.a.	\$14.30	\$29,730
	47-4051	Highway Maintenance Workers	995	1,082	87	210	297	n.a.	\$17.46	\$36,310
	47-2021	Brickmasons and Blockmasons	1,051	1,138	88	173	261	n.a.	\$20.40	\$42,430
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	567	616	50	208	258	22	\$13.46	\$28,000
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	1,298	1,410	112	114	226	310	\$19.69	\$40,950
	47-2071	Paving, Surfacing, and Tamping Equipment Operators	874	949	75	144	219	n.a.	\$19.04	\$39,610
	47-2121	Glaziers	539	584	45	162	207	n.a.	\$18.74	\$38,980
	47-4021	Elevator Installers and Repairers	617	671	53	147	200	n.a.	\$35.36	\$73,550
	53-3032	Heavy and Tractor-Trailer Truck Drivers	769	836	67	122	189	117	\$20.06	\$41,730
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and	669	726	58	126	183	18	\$33.18	\$69,020

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
		Scientific Products								
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	577	628	51	121	172	270	\$29.91	\$62,220
	47-3015	Helpers--Pipefitters, Plumbers, Pipefitters, and Steamfitters	567	616	49	120	169	n.a.	\$13.14	\$27,320
	41-3099	Sales Representatives, Services, All Other	516	561	44	121	166	474	\$31.23	\$64,960
	47-2211	Sheet Metal Workers	741	805	64	101	164	32	\$26.71	\$55,550
Post-secondary non-degree award	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	2,226	2,419	193	315	508	176	\$22.71	\$47,240
Associates degree	11-1021	General and Operations Managers	2,543	2,762	219	378	598	77	\$56.53	\$117,580
	11-9021	Construction Managers	2,379	2,583	204	124	328	27	\$45.73	\$95,120
Bachelors degree	13-1051	Cost Estimators	1,319	1,432	113	203	316	261	\$32.50	\$67,600

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 42 Construction Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	47-2061	Construction Laborers	239	270	112	48	114	102
	47-2141	Painters, Construction and Maintenance	83	104	45	18	32	49
	47-2051	Cement Masons and Concrete Finishers	63	77	31	18	20	32
	47-3012	Helpers--Carpenters	53	70	29	14	22	33
	47-2181	Roofers	53	65	27	15	11	28
High school diploma or equivalent	47-2081	Drywall and Ceiling Tile Installers	44	60	25	10	17	28
	47-2111	Electricians	354	539	197	75	121	203
	47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	328	467	180	83	132	189

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	47-2152	Plumbers, Pipefitters, and Steamfitters	286	447	164	62	102	169
	47-2031	Carpenters	251	336	134	63	99	147
	47-2073	Operating Engineers and Other Construction Equipment Operators	180	187	90	58	102	89
	43-9061	Office Clerks, General	149	196	77	35	59	80
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	102	133	51	22	41	51
	47-3013	Helpers--Electricians	73	112	41	16	25	42
	47-4051	Highway Maintenance Workers	106	57	69	25	8	31
	47-2021	Brickmasons and Blockmasons	68	87	34	19	15	37
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	59	89	35	14	23	37
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	59	75	29	12	24	28
	47-2071	Paving, Surfacing, and Tamping Equipment Operators	58	54	31	23	26	27
	47-2121	Glaziers	52	67	28	17	11	32
	47-4021	Elevator Installers and Repairers	47	73	27	10	16	28
	53-3032	Heavy and Tractor-Trailer Truck Drivers	48	51	25	17	25	24
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	45	60	24	11	17	26
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	41	58	24	9	17	23
	47-3015	Helpers--Pipefitters, Plumbers, Pipefitters, and Steamfitters	39	61	23	8	15	23
	41-3099	Sales Representatives, Services, All Other	40	54	22	11	15	24
	47-2211	Sheet Metal Workers	41	58	22	9	13	22
	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	126	183	67	24	43	66
Post-secondary non-degree award								
Associates degree	11-1021	General and Operations Managers	147	202	77	34	58	80
	11-9021	Construction Managers	84	117	40	14	36	36
Bachelors degree	13-1051	Cost Estimators	77	108	41	19	29	43

Table 43 Construction Sector Job Training and Experience Requirements, Selected High-Demand Occupations

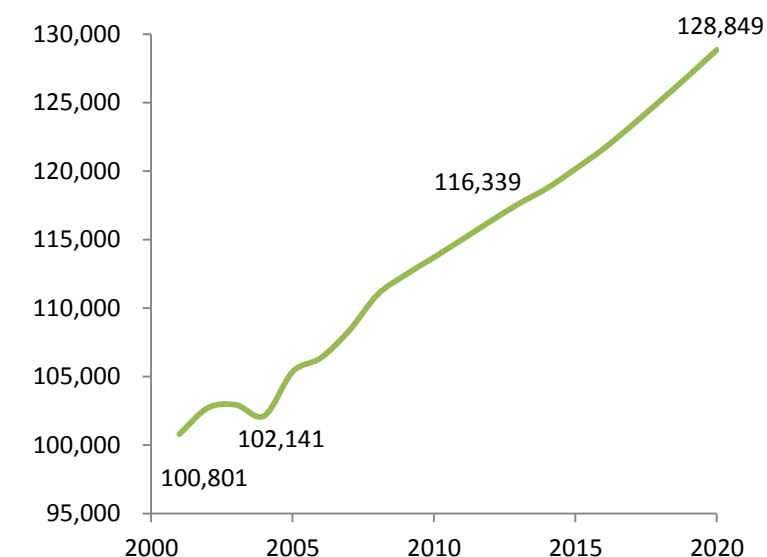
Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	47-2061	Construction Laborers	Short-term on-the-job training	None
	47-2141	Painters, Construction and Maintenance	Moderate-term on-the-job training	None
	47-2051	Cement Masons and Concrete Finishers	Moderate-term on-the-job training	None
	47-3012	Helpers--Carpenters	Short-term on-the-job training	None
	47-2181	Roofers	Moderate-term on-the-job training	None
	47-2081	Drywall and Ceiling Tile Installers	Moderate-term on-the-job training	None
High school diploma or equivalent	47-2111	Electricians	Apprenticeship	None
	47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	None	More than 5 years
	47-2152	Plumbers, Pipefitters, and Steamfitters	Apprenticeship	None
	47-2031	Carpenters	Apprenticeship	None
	47-2073	Operating Engineers and Other Construction Equipment Operators	Moderate-term on-the-job training	None
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	47-3013	Helpers--Electricians	Short-term on-the-job training	None
	47-4051	Highway Maintenance Workers	Moderate-term on-the-job training	None
	47-2021	Brickmasons and Blockmasons	Apprenticeship	None
	49-9098	Helpers--Installation, Maintenance, and Repair Workers	Moderate-term on-the-job training	None
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	47-2071	Paving, Surfacing, and Tamping Equipment Operators	Moderate-term on-the-job training	None
	47-2121	Glaziers	Apprenticeship	None
	47-4021	Elevator Installers and Repairers	Apprenticeship	None
	53-3032	Heavy and Tractor-Trailer Truck Drivers	Short-term on-the-job training	1 to 5 years
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Moderate-term on-the-job training	None
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	None	1 to 5 years
	47-3015	Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	Short-term on-the-job training	None
	41-3099	Sales Representatives, Services, All Other	Short-term on-the-job training	None
	47-2211	Sheet Metal Workers	Apprenticeship	None
Post-secondary non-degree award	49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Long-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
	11-9021	Construction Managers	None	More than 5 years
Bachelors degree	13-1051	Cost Estimators	None	None

Education (K-12 and Higher Education)

The education sector in the Baltimore Region has shown steady growth during the last eight years with an overall 14% growth in employment between 2004 and 2012. Sub-sectors showing the strongest growth during this period include technical and trade schools and colleges, universities and professional schools. Businesses in NAICS 6116: Other schools and instruction include those that are not affiliated with an academic or collegiate institution or a technical or trade school that provide instruction in diverse settings,

including private training facilities or workplace training and through diverse means such as distance learning, internet or correspondence²⁷.

Figure 11 Employment in the Baltimore Region Education Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Between 2012 and 2020 the sector is expected to continue producing new jobs with an overall growth in employment of nearly 11%. Over 12,500 new jobs will be created in the sector in the coming years. Approximately 92% of new job growth in the sector is expected to come from three education sub-sectors: elementary and secondary education; colleges, universities and professional schools; and other schools and instruction.

Supply and Demand Snapshot

In 2012, there were over 9,000 graduates from 413 educational programs in the region that prepare workers for careers in education. Virtually all of these programs (99.3%) are affiliated with a college, university or graduate level institution. Approximately 40% of graduates from programs related to the sector were from non-degree granting lower division college and university programs or Associates degree programs where students complete the first two years of a 2+2 four-year Bachelors degree. In total, 59% of program graduates obtained a Bachelors degree or higher from a university. Approximately 75% of the training programs are located in Anne Arundel County, Baltimore City and Baltimore County.

²⁷ Source: US Census Bureau, industry definition.

The estimated demand for workers in the education sector between 2012 and 2020 is projected to exceed 33,000 total job openings; approximately 12,500 of these openings will be for new jobs created in the sector, while nearly 21,000 will result from turnover.

Table 44 Employment Outlook for the Education Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
6111	Elementary and Secondary Schools	54,343	56,470	62,757	4%	11.1%	6,287
6112	Junior Colleges	-	-	-	-	-	-
6113	Colleges, Universities, and Professional Schools	27,102	38,075	41,273	40%	8.4%	3,199
6114	Business Schools and Computer and Management Training	1,885	1,755	1,982	-7%	12.9%	227
6115	Technical and Trade Schools	1,596	4,005	4,517	151%	12.8%	513
6116	Other Schools and Instruction	11,969	13,717	15,790	15%	15.1%	2,073
6117	Educational Support Services	5,246	2,318	2,529	-56%	9.1%	211
	Total Education Sector	102,141	116,339	128,849	14%	10.8%	12,509

Source: RDA Global Baltimore Region Job Demand Outlook

Table 45 Education Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	4,340	4,804	463	940	1,403	3,328	\$11.39	\$23,695
High school diploma or equivalent	32,920	36,557	3,636	5,723	9,359	12,724	\$17.05	\$43,107
Some College or postsecondary non-degree award	2,267	2,486	218	604	822	2,853	\$21.84	\$45,421
Associates degree	3,064	3,394	330	566	897	2,225	\$38.28	\$79,627
Bachelors degree	49,458	54,971	5,513	9,140	14,653	10,919	n.a.	\$63,270
Masters, Doctoral, or professional degree	24,290	26,638	2,348	3,788	6,136	823	n.a.	\$76,780
Total	116,339	128,849	12,509	20,761	33,270	32,872	n.a.	\$58,992

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The education sector is expected to generate demand for approximately 1,400 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. Most of these jobs will be for janitors and cleaning personnel, cooks, food preparation and service workers, and counter/concession service workers. These occupations typically do not require extensive occupational training, and jobs at this education level earned average hourly wages of \$11.39 in 2012, well below the living wage level for a single parent family with one child in Baltimore City.

The demand for workers in the education sector is fairly strong for people who have a high school diploma or equivalent education level. There are expected to be over 9,000 job openings for workers at this education level between 2012 and 2020. The occupations that will be in greatest demand include teaching assistants, office clerks, secretaries and administrative assistants, library assistants, coaches and scouts, bus drivers and several other occupations. Workers in the education sector at this level of education have a wide range of earnings. On the low side, security guards have an average hourly wage of \$8.90, while more experienced workers holding management positions may earn significantly more. Together, the average hourly wage for occupations at this education level in the sector is \$17.05, which is lower than the average living wage in Baltimore City.

High demand occupations requiring postsecondary education up to an Associates degree include computer support technicians, library technicians, nursing workers and preschool teachers. The highest demand for workers at this education level will be for library technicians and operations managers. Workers with some college or a postsecondary award have average wages that are slightly below the living wage for a single parent family in Baltimore City at \$21.84 per hour.

The highest demand for workers in the education sector will be for those with a Bachelors degree or higher. These workers may have a university degree or a post-graduate degree, certificate or a PhD. Approximately 62% of all job openings in the sector between 2012 and 2020 will be for workers with this high education level. High demand occupations in the sector include a variety of teachers (at all levels), administrators, social workers, counselors, speech-language pathologists and post-secondary teachers. Hourly wage data was not available for many of these occupations; however annual salaries should range from an average of \$63,000 for workers with a Bachelors degree, to nearly \$77,000 for those with a post-graduate degree or certificate.

Education and Training Supply Summary

Table 46 Programs, Enrollment and Graduates of Programs in Education, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	1	0%	160	0%	-	0%
WIA-eligible Training (Reported)	2	0%	338	1%	94	1%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	139	34%	39,831	62%	3,651	40%
Bachelors	126	31%	13,302	21%	2,033	22%
Masters, PhD, and Post-Bachelors Certificates and Programs	145	35%	10,384	16%	3,336	37%
Total, All Levels	413	100%	64,015	100%	9,114	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 47 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Education	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	1	-	-	-	-	1
WIA-eligible Training (Reported)	-	1	-	-	-	1	2
College and University	38	170	101	43	37	21	410
Total Programs	38	172	101	43	37	22	413
Enrollment							
Non-WIA Eligible Training (Reported)	-	160	-	-	-	-	160
WIA-eligible Training (Reported)	-	8	-	-	-	330	338
College and University	12,199	14,098	19,986	5,456	5,343	6,435	63,517
Total Enrollment	12,199	14,266	19,986	5,456	5,343	6,765	64,015
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	-	1	-	-	-	93	94
College and University	1,190	2,638	3,114	884	563	631	9,020
Total Graduates/Completions	1,190	2,639	3,114	884	563	724	9,114

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 48 Education Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2,070	2,288	218	313	531	60	\$12.00	\$24,170
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	238	264	26	138	164	n.a.	\$9.00	\$19,090
	35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	411	456	46	92	137	n.a.	\$9.00	\$18,510
	35-2012	Cooks, Institution and Cafeteria	397	440	43	68	111	n.a.	\$14.00	\$29,250
	25-9041	Teacher Assistants	6,750	7,531	782	1,220	2,002	342	n.a.	\$31,750
High school diploma or equivalent	43-9061	Office Clerks, General	3,278	3,639	361	464	825	n.a.	\$15.00	\$30,680
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	3,095	3,430	335	332	667	330	\$18.00	\$37,020
	43-4121	Library Assistants, Clerical	993	1,088	95	358	452	n.a.	\$11.00	\$23,680
	25-3021	Self-Enrichment Education Teachers	1,572	1,805	233	192	426	10	\$17.00	\$36,180
	43-9799	Office and Administrative Support Workers, All Other	1,202	1,321	119	203	322	n.a.	\$18.00	\$37,050
	43-6011	Executive Secretaries and Executive Administrative Assistants	1,272	1,402	129	136	266	378	\$24.00	\$50,500
	27-2022	Coaches and Scouts	748	853	105	152	257	n.a.	n.a.	\$53,440
	53-3022	Bus Drivers, School or Special Client	952	1,058	106	147	253	n.a.	\$14.00	\$29,950
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	729	804	75	156	231	580	\$26.00	\$55,010
	43-4171	Receptionists and Information Clerks	541	611	70	131	200	120	\$14.00	\$28,170
	39-9011	Childcare Workers	500	557	57	126	183	n.a.	\$11.00	\$23,070
	49-9071	Maintenance and Repair Workers, General	563	622	59	83	142	126	\$19.00	\$40,070
	11-9199	Managers, All Other	475	524	48	84	133	1,290	\$52.00	\$107,110
Some college, no degree Postsecondary non-degree award	43-3031	Bookkeeping, Accounting, and Auditing Clerks	620	691	71	55	126	310	\$20.00	\$40,950
	33-9032	Security Guards	491	540	49	62	111	456	\$8.90	\$30,880
	15-1150	Computer Support Specialists	685	754	69	144	213	570	\$14.06	\$56,020
	25-4031	Library Technicians	814	892	78	278	356	n.a.	n.a.	\$35,000

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Associates degree	19-4099	Life, Physical, and Social Science Technicians, All Other	320	347	27	108	135	n.a.	\$17.80	\$46,550
	29-1111	Registered Nurses	532	583	51	77	128	1,155	\$42.62	\$77,250
	25-2011	Preschool Teachers, Except Special Education	367	411	44	76	120	176	\$11.39	\$31,090
	25-2031	Secondary School Teachers, Except Special and Career/Technical Education	9,518	10,578	1,060	2,079	3,139	10	\$17.40	\$61,830
	25-2021	Elementary School Teachers, Except Special Education	10,291	11,438	1,147	1,811	2,958	9	\$37.54	\$61,280
Bachelors degree	25-2022	Middle School Teachers, Except Special and Career/Technical Education	6,858	7,622	764	1,207	1,971	546	\$17.81	\$66,710
	25-3999	Teachers and Instructors, All Other	5,227	5,904	677	640	1,317	135	\$24.28	\$55,080
	25-2053	Special Education Teachers, Middle School	1,720	1,912	191	406	597	36	n.a.	\$63,130
	25-2054	Special Education Teachers, Secondary School	1,464	1,627	163	345	508	n.a.	\$14.40	\$63,230
	25-9099	Education, Training, and Library Workers, All Other	1,757	1,936	179	311	490	88	\$26.45	\$60,870
	25-2012	Kindergarten Teachers, Except Special Education	1,521	1,690	169	316	486	n.a.	\$37.52	\$37,100
	25-2041	Special Education Teachers, Preschool, Kindergarten, and Elementary School	1,364	1,515	151	322	473	n.a.	\$13.54	\$62,680
	21-1021	Child, Family, and School Social Workers	590	655	66	112	178	16	\$11.09	\$50,310
	15-1799	Computer Occupations, All Other	613	670	56	92	148	n.a.	\$18.26	\$94,630
	25-2032	Career/Technical Education Teachers, Secondary School	425	473	48	93	140	n.a.	\$19.26	\$58,400
	13-2011	Accountants and Auditors	450	497	46	77	124	270	\$51.50	\$73,180
	19-4021	Biological Technicians	286	310	24	77	101	n.a.	\$19.69	\$43,950
Masters degree	11-9032	Education Administrators, Elementary and Secondary School	2,179	2,422	243	492	734	88	\$17.29	\$100,480
	21-1012	Educational, Guidance, School, and Vocational Counselors	1,863	2,058	196	319	515	54	\$31.23	\$58,930
	25-9031	Instructional Coordinators	1,352	1,509	157	239	396	n.a.	\$14.85	\$62,550
	25-4021	Librarians	1,258	1,386	128	262	389	n.a.	\$26.93	\$60,210
	11-9033	Education Administrators, Postsecondary	1,179	1,289	110	266	376	64	\$16.83	\$110,870
	29-1127	Speech-Language Pathologists	389	431	42	59	101	n.a.	\$56.53	\$85,340

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Doctoral or professional degree	25-1071	Health Specialties Teachers, Postsecondary	3,387	3,689	302	434	736	18	\$22.38	\$80,660
	25-1199	Postsecondary Teachers, All Other	3,325	3,614	288	426	714	11	\$37.14	\$77,980
	25-1191	Graduate Teaching Assistants	1,483	1,608	125	190	315	n.a.	\$14.95	\$29,170
	25-1011	Business Teachers, Postsecondary	1,104	1,202	98	141	239	n.a.	n.a.	\$87,300
	25-1121	Art, Drama, and Music Teachers, Postsecondary	951	1,056	105	122	226	9	n.a.	\$70,880
	19-3031	Clinical, Counseling, and School Psychologists	463	512	49	117	166	11	n.a.	\$71,230
	25-1194	Vocational Education Teachers, Postsecondary	619	697	79	79	158	55	n.a.	\$49,460
	25-1123	English Language and Literature Teachers, Postsecondary	497	542	46	64	109	9	n.a.	\$74,540

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 49 Education Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County				
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HOWARD
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	100	146	184	34	22
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	27	43	62	11	7
	35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	23	38	45	11	7
	35-2012	Cooks, Institution and Cafeteria	19	31	36	8	6
	25-9041	Teacher Assistants	350	542	578	199	97
High school diploma or equivalent	43-9061	Office Clerks, General	173	226	256	80	16
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	140	188	203	56	19
	43-4121	Library Assistants, Clerical	80	112	214	13	12
	25-3021	Self-Enrichment Education Teachers	88	113	37	102	7
	43-9799	Office and Administrative Support Workers, All Other	67	83	130	17	6
	43-6011	Executive Secretaries and Executive Administrative Assistants	58	75	93	17	5

Baltimore Regional Talent Development Pipeline Study

Education	SOC		Occupation	Hiring Demand by County				
				ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD
	27-2022	Coaches and Scouts	51	66	39	54	42	5
	53-3022	Bus Drivers, School or Special Client	43	71	77	19	28	15
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	48	63	87	15	15	3
	43-4171	Receptionists and Information Clerks	43	61	40	29	23	3
	39-9011	Childcare Workers	31	47	58	17	21	9
	49-9071	Maintenance and Repair Workers, General	30	40	49	9	10	4
	11-9199	Managers, All Other	27	34	51	9	9	2
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	28	37	31	14	13	3
	33-9032	Security Guards	23	30	42	5	7	3
	15-1150	Computer Support Specialists	41	63	83	9	13	5
Some college, no degree	25-4031	Library Technicians	64	88	166	11	18	9
Postsecondary non-degree award	19-4099	Life, Physical, and Social Science Technicians, All Other	26	30	76	0	2	1
Associates degree	29-1111	Registered Nurses	25	33	54	4	7	4
	25-2011	Preschool Teachers, Except Special Education	21	32	33	14	15	5
Bachelors degree	25-2031	Secondary School Teachers, Except Special and Career/Technical Education	509	877	1,018	224	329	182
	25-2021	Elementary School Teachers, Except Special Education	489	831	924	218	321	176
	25-2022	Middle School Teachers, Except Special and Career/Technical Education	325	554	616	144	213	117
	25-3999	Teachers and Instructors, All Other	256	356	244	221	197	42
	25-2053	Special Education Teachers, Middle School	96	165	198	42	62	34
	25-2054	Special Education Teachers, Secondary School	82	140	168	36	53	29
	25-9099	Education, Training, and Library Workers, All Other	96	119	192	31	39	12
	25-2012	Kindergarten Teachers, Except Special Education	79	136	156	35	51	28
	25-2041	Special Education Teachers, Preschool, Kindergarten, and Elementary School	76	131	157	33	49	27
	21-1021	Child, Family, and School Social Workers	31	41	60	16	22	8
	15-1799	Computer Occupations, All Other	31	38	67	4	7	2

Baltimore Regional Talent Development Pipeline Study

Education			Occupation	Hiring Demand by County					
				ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	SOC								
	25-2032	Career/Technical Education Teachers, Secondary School	24	41	44	10	14	8	
	13-2011	Accountants and Auditors	26	36	45	7	8	2	
	19-4021	Biological Technicians	20	23	56	-	2	1	
	11-9032	Education Administrators, Elementary and Secondary School	119	204	240	52	77	42	
	21-1012	Educational, Guidance, School, and Vocational Counselors	103	145	181	30	39	17	
	25-9031	Instructional Coordinators	79	112	111	41	43	10	
	25-4021	Librarians	71	104	154	18	28	14	
	11-9033	Education Administrators, Postsecondary	82	103	171	7	9	3	
	29-1127	Speech-Language Pathologists	17	26	34	7	12	6	
	25-1071	Health Specialties Teachers, Postsecondary	174	206	333	5	12	5	
	25-1199	Postsecondary Teachers, All Other	161	186	344	3	14	5	
	25-1191	Graduate Teaching Assistants	69	76	161	0	6	3	
	25-1011	Business Teachers, Postsecondary	53	66	111	2	5	2	
	25-1121	Art, Drama, and Music Teachers, Postsecondary	49	57	71	26	21	3	
	19-3031	Clinical, Counseling, and School Psychologists	28	41	63	10	16	8	
	25-1194	Vocational Education Teachers, Postsecondary	54	74	17	10	3	0	
	25-1123	English Language and Literature Teachers, Postsecondary	24	28	48	4	4	1	

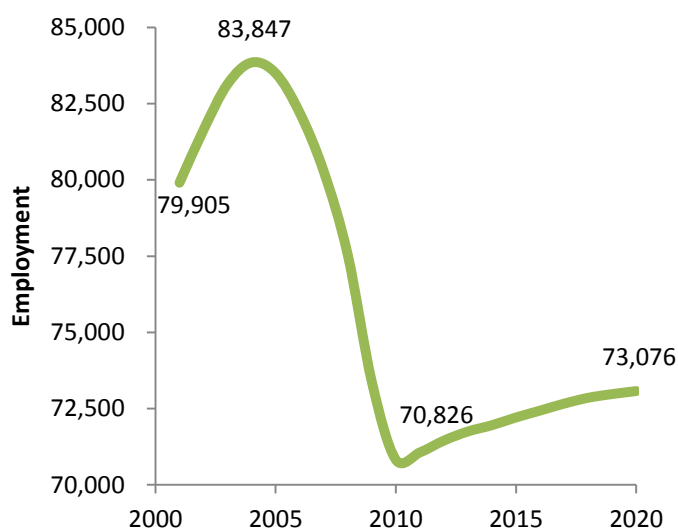
Table 50 Education Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	Short-term on-the-job training	None
High school diploma or equivalent	25-9041	Teacher Assistants	Short-term on-the-job training	None
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	43-4121	Library Assistants, Clerical	Short-term on-the-job training	None
	43-9799	Office and Administrative Support Workers, All Other	Short-term on-the-job training	None
	53-3022	Bus Drivers, School or Special Client	Moderate-term on-the-job training	None
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
	25-3021	Self-Enrichment Education Teachers	None	1 to 5 years
	27-2022	Coaches and Scouts	Long-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
Postsecondary non-degree award	25-4031	Library Technicians	None	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	25-2031	Secondary School Teachers, Except Special and Career/Technical Education	Internship/residency	None
	25-2021	Elementary School Teachers, Except Special Education	Internship/residency	None
	25-2022	Middle School Teachers, Except Special and Career/Technical Education	Internship/residency	None
	25-2053	Special Education Teachers, Middle School	Internship/residency	None
	25-3999	Teachers and Instructors, All Other	None	None
	25-2054	Special Education Teachers, Secondary School	Internship/residency	None
	25-2012	Kindergarten Teachers, Except Special Education	Internship/residency	None
	25-2041	Special Education Teachers, Preschool, Kindergarten, and Elementary School	Internship/residency	None
Masters degree	25-9099	Education, Training, and Library Workers, All Other	None	None
	11-9032	Education Administrators, Elementary and Secondary School	None	1 to 5 years
	21-1012	Educational, Guidance, School, and Vocational Counselors	None	None
	25-4021	Librarians	None	None
	11-9033	Education Administrators, Postsecondary	None	1 to 5 years
Doctoral or professional degree	25-9031	Instructional Coordinators	None	More than 5 years
	25-1071	Health Specialties Teachers, Postsecondary	None	None
	25-1199	Postsecondary Teachers, All Other	None	None
	25-1191	Graduate Teaching Assistants	None	None
	25-1011	Business Teachers, Postsecondary	None	None

Finance and Insurance

Employment in the finance and insurance sector in the Baltimore Region peaked in 2004 with nearly 84,000 workers. Between 2004 and 2010, the sector contracted by 16% reaching a low of 70,826 workers. Since 2010 the sector has rebounded modestly adding over 600 jobs in the last two years. Industries that were least impacted by the decline in the past eight years include other financial investment activities (principals and agents involved in buying and selling financial contracts), insurance and employee

Figure 12 Employment in the Baltimore Region Finance and Insurance Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

benefit funds, and real estate services such as property management or appraisals. Between 2012 and 2020 the sector is expected to continue to see modest growth, averaging less than 1% annually.

The sector is expected to produce nearly 15,000 new job openings between 2012 and 2020. A large percentage of job growth (89%) will be driven by turnover, while the sector is expected to create over 1,600 new jobs during the period. Industries that will produce the largest number of new jobs include insurance carriers, agencies, and brokers, as well as depository credit intermediation (e.g. banks, credit unions, etc.). Each of these industries is expected to add nearly 300 new jobs to the regional economy, accounting for over half of the new jobs created in the coming years.

Supply and Demand Snapshot

In 2012, there were over 2,500 graduates from 101 educational programs in the region that prepare workers for careers in the finance and insurance sector. Education and training programs are well represented across educational categories with 21% of programs being unaffiliated with a college or university program; 31% of programs are affiliated with an Associates degree or non-degree granting institution; 30% result in a Bachelors degree and 19% of programs are related to post-graduate qualifications. Approximately 60% of graduates from these programs earn a Bachelors degree or higher level certification or degree. Counties with the highest number of graduates in 2012 include Baltimore City (1,041 graduates), Baltimore County (706 graduates) and Howard County (418 graduates).

Among the nearly 15,000 job openings expected in the sector between 2012 and 2020, the majority of job openings will be related to turnover. Approximately 1,600 of these openings will be for new jobs created in the sector, while over 13,000 will result from turnover. If graduation levels seen in 2012 continue throughout the forecast period, the regional supply of workers may exceed demand for high-

skilled workers with a Bachelors degree or higher, while the supply of low and mid-skilled workers may be inadequate to meet the demand. Workers in high-skilled occupations such as financial analysis and accounting have transferrable skills that can be applied in a variety of industry settings and not all graduates from these programs will seek work in the finance and insurance sector.

Table 51 Employment Outlook for the Finance and Insurance Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
5211	Monetary Authorities-Central Bank	-	-	-	-	-	-
5221	Depository Credit Intermediation	14,494	12,963	13,255	-11%	2.3%	292
5222	Nondepository Credit Intermediation	9,503	4,810	4,949	-49%	2.9%	139
5223	Activities Related to Credit Intermediation	4,517	2,079	2,143	-54%	3.1%	64
5231	Securities and Commodity Contracts Intermediation and Brokerage	4,145	330	333	-92%	0.8%	3
5232	Securities and Commodity Exchanges	-	-	-	-	-	-
5239	Other Financial Investment Activities	4,985	10,014	10,101	101%	0.9%	88
5241	Insurance Carriers	13,760	11,293	11,594	-18%	2.7%	301
5242	Agencies, Brokerages, and Other Insurance Related Activities	8,630	8,318	8,575	-4%	3.1%	257
5251	Insurance and Employee Benefit Funds	558	796	816	43%	2.5%	20
5259	Other Investment Pools and Funds	80	46	47	-43%	2.6%	1
5311	Lessors of Real Estate	7,032	6,444	6,585	-8%	2.2%	141
5312	Offices of Real Estate Agents and Brokers	3,952	3,592	3,665	-9%	2.0%	74
5313	Activities Related to Real Estate	4,828	5,509	5,622	14%	2.1%	113
5321	Automotive Equipment Rental and Leasing	3,715	2,688	2,754	-28%	2.4%	65
5322	Consumer Goods Rental	2,415	1,603	1,646	-34%	2.6%	42
5323	General Rental Centers	298	194	199	-35%	2.8%	5
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	615	645	659	5%	2.2%	14
5331	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	321	130	133	-59%	2.3%	3
	Total Finance and Insurance Sector	83,847	71,452	73,076	-15%	2.3%	1,624

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The finance and insurance sector is expected to generate demand for approximately 11,000 job openings between 2012 and 2020 for workers with an education level at or below a high school diploma or equivalent. Most of these jobs will be for occupations such as customer service representatives, tellers, counter and rental clerks, insurance claims and salespersons and other office/clerical positions. These occupations require varying degrees of training or experience. Workers below a high school education earned average wages of \$12.87 per hour in 2012 (well below the living wage level), while workers with a high school education earned an average of \$23.63 per hour in 2012, slightly higher than the living wage for Baltimore City.

The lowest demand for workers in the sector is for those who have some postsecondary education or an Associates degree. Approximately 3.7% of the total hiring requirements in the sector between 2012 and 2020 will be for workers with this level of education.

Nearly one quarter of job openings in the sector between 2012 and 2020 will be for workers with a Bachelors degree or higher qualification. Occupations included in the sector at this level of education include securities, commodities and financial services sales agents, financial analysts, managers and specialists, auditors and accountants and other skilled financial or management workers. Average annual salaries for workers with this level of education may range from \$52,000 to over \$100,000 per year.

Table 52 Finance and Insurance Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	4,358	4,460	102	871	973	3,197	\$12.87	\$26,764
High school diploma or equivalent	45,623	46,714	1,091	8,737	9,828	12,910	\$23.63	\$49,150
Some College or postsecondary non-degree award	749	767	18	154	172	1,608	\$25.61	\$53,274
Associates degree	2,229	2,278	49	325	374	1,499	\$51.58	\$107,275
Bachelors degree	18,078	18,432	354	2,996	3,350	9,750	\$41.10	\$85,492
Masters, Doctoral, or professional degree	415	424	9	77	86	362	n.a.	\$109,048
Total	71,452	73,076	1,624	13,159	14,783	29,896	\$28.45	\$59,183

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-20

Education and Training Supply Summary

Table 53 Programs, Enrollment and Graduates of Programs in Finance and Insurance, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	14	14%	1,322	19%	822	32%
WIA-eligible Training (Reported)	7	7%	144	2%	43	2%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	31	31%	1,415	20%	145	6%
Bachelors	30	30%	2,792	40%	694	27%
Masters, PhD, and Post-Bachelors Certificates and Programs	19	19%	1,322	19%	858	33%
Total, All Levels	101	100%	6,995	100%	2,562	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 54 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Finance and Insurance	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	4	1	4	1	1	3	14
WIA-eligible Training (Reported)	3	-	2	-	2	-	7
College and University	4	34	22	6	10	4	80
Total Programs	11	35	28	7	13	7	101
Enrollment							
Non-WIA Eligible Training (Reported)	170	n.a.	193	274	8	677	1,322
WIA-eligible Training (Reported)	99	-	-	-	45	-	144
College and University	207	2,285	2,579	110	168	180	5,529
Total Enrollment	476	2,285	2,772	384	221	857	6,995
Graduates / Completions							
Non-WIA Eligible Training (Reported)	151	-	125	129	4	413	822
WIA-eligible Training (Reported)	1	-	-	-	42	-	43
College and University	25	1,041	581	20	25	5	1,697
Total Graduates/Completions	177	1,041	706	149	71	418	2,562

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 55 Finance and Insurance Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Jobs Created 2012-2020	Regional Hiring Demand		Estimated Annual Online Job Vacancies *	Mean Wages	
			2012	2020		Replacement Demand 2012-2020	Total Hiring Requirements		Hourly	Annual
Less than high school	41-2021	Counter and Rental Clerks	1,328	1,360	31	242	274	n.a.	\$15.26	\$31,730
	43-3071	Tellers	3,975	4,066	91	1,307	1,398	207	\$13.21	\$27,480
	43-4051	Customer Service Representatives	4,023	4,125	101	914	1,016	1,386	\$17.29	\$35,960
	13-1031	Claims Adjusters, Examiners, and Investigators	3,981	4,092	112	812	924	153	\$32.56	\$67,730
	41-3021	Insurance Sales Agents	2,758	2,840	82	505	587	128	\$39.48	\$82,110
High school diploma or equivalent	13-2072	Loan Officers	2,542	2,606	64	521	585	132	\$33.76	\$70,220
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	1,979	2,025	46	423	469	580	\$26.45	\$55,010
	43-9041	Insurance Claims and Policy Processing Clerks	1,738	1,788	49	417	467	200	\$19.65	\$40,870
	49-9071	Maintenance and Repair Workers, General	2,543	2,598	54	374	429	126	\$19.26	\$40,070
	43-9061	Office Clerks, General	2,581	2,637	56	365	421	n.a.	\$14.75	\$30,680
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,207	2,253	46	237	282	330	\$17.80	\$37,020
	41-9022	Real Estate Sales Agents	1,308	1,336	27	235	263	18	\$22.89	\$47,620
	11-9141	Property, Real Estate, and Community Association Managers	1,220	1,246	26	206	232	370	\$34.65	\$72,070
	43-4131	Loan Interviewers and Clerks	1,252	1,284	32	185	217	189	\$17.87	\$37,170
	13-1199	Business Operations Specialists, All Other	1,061	1,085	24	163	187	385	\$37.54	\$78,080
Associates degree	43-6011	Executive Secretaries and Executive Administrative Assistants	1,342	1,367	25	144	169	378	\$24.28	\$50,500
	11-1021	General and Operations Managers	1,788	1,826	39	266	305	77	\$56.53	\$117,580
	41-3031	Securities, Commodities, and Financial Services Sales Agents	2,185	2,219	34	482	517	n.a.	\$50.43	\$104,890
	13-2051	Financial Analysts	1,625	1,648	23	276	298	120	\$39.02	\$81,160
	13-2099	Financial Specialists, All Other	1,420	1,449	29	241	270	370	\$25.38	\$52,780
	13-2011	Accountants and Auditors	1,395	1,421	26	240	266	270	\$35.18	\$73,180
	11-3031	Financial Managers	1,424	1,453	29	208	238	480	\$51.58	\$107,290
	13-2053	Insurance Underwriters	741	761	20	193	214	11	\$31.04	\$64,570
	13-2052	Personal Financial Advisors	1,463	1,480	17	135	152	n.a.	\$43.16	\$89,770
	13-1111	Management Analysts	979	1,001	22	128	150	128	\$45.73	\$95,120
Bachelors degree	41-3031	Securities, Commodities, and Financial Services Sales Agents	2,185	2,219	34	482	517	n.a.	\$50.43	\$104,890
	13-2051	Financial Analysts	1,625	1,648	23	276	298	120	\$39.02	\$81,160
	13-2099	Financial Specialists, All Other	1,420	1,449	29	241	270	370	\$25.38	\$52,780
	13-2011	Accountants and Auditors	1,395	1,421	26	240	266	270	\$35.18	\$73,180
	11-3031	Financial Managers	1,424	1,453	29	208	238	480	\$51.58	\$107,290
Bachelors degree	13-2053	Insurance Underwriters	741	761	20	193	214	11	\$31.04	\$64,570
	13-2052	Personal Financial Advisors	1,463	1,480	17	135	152	n.a.	\$43.16	\$89,770
	13-1111	Management Analysts	979	1,001	22	128	150	128	\$45.73	\$95,120

Baltimore Regional Talent Development Pipeline Study

Table 56 Finance and Insurance Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	41-2021	Counter and Rental Clerks	77	122	42	2	13	17
	43-3071	Tellers	217	428	296	52	127	277
	43-4051	Customer Service Representatives	121	469	177	19	53	177
	13-1031	Claims Adjusters, Examiners, and Investigators	72	501	138	12	24	176
	41-3021	Insurance Sales Agents	53	318	66	13	21	116
	13-2072	Loan Officers	72	212	105	17	52	128
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	60	186	90	11	31	91
High school diploma or equivalent	43-9041	Insurance Claims and Policy Processing Clerks	39	250	70	7	13	87
	49-9071	Maintenance and Repair Workers, General	57	177	90	10	22	73
	43-9061	Office Clerks, General	49	181	81	8	20	82
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	30	122	54	5	13	59
	41-9022	Real Estate Sales Agents	34	83	57	7	12	70
	11-9141	Property, Real Estate, and Community Association Managers	33	90	51	5	11	41
	43-4131	Loan Interviewers and Clerks	24	82	36	6	18	52
Associates degree	13-1199	Business Operations Specialists, All Other	19	88	36	3	8	33
	43-6011	Executive Secretaries and Executive Administrative Assistants	15	78	35	2	7	31
	11-1021	General and Operations Managers	39	138	59	5	15	49
	41-3031	Securities, Commodities, and Financial Services Sales Agents	50	224	138	8	30	67
Bachelors degree	13-2051	Financial Analysts	15	154	85	2	9	34
	13-2099	Financial Specialists, All Other	27	110	58	6	17	50
	13-2011	Accountants and Auditors	24	126	62	3	10	41
	11-3031	Financial Managers	23	102	49	5	14	45
	13-2053	Insurance Underwriters	17	114	37	2	5	39
	13-2052	Personal Financial Advisors	6	83	38	1	5	19
	13-1111	Management Analysts	12	75	27	2	6	29

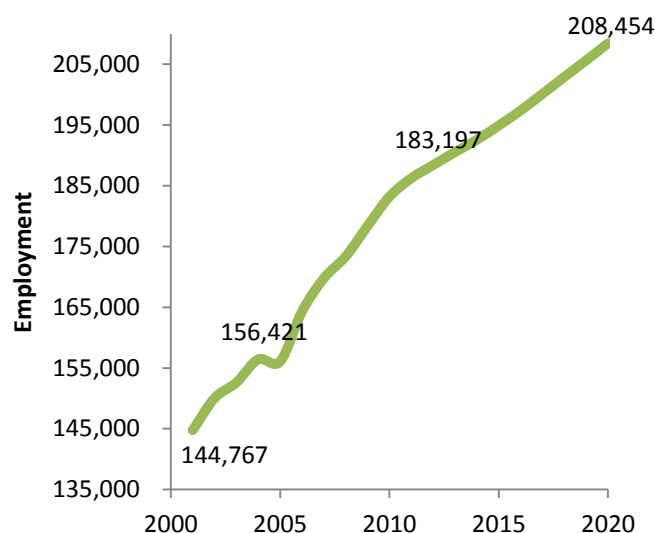
Table 57 Finance and Insurance Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	41-2021	Counter and Rental Clerks	Short-term on-the-job training	None
High school diploma or equivalent	43-3071	Tellers	Short-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	13-1031	Claims Adjusters, Examiners, and Investigators	Long-term on-the-job training	None
	41-3021	Insurance Sales Agents	Moderate-term on-the-job training	None
	13-2072	Loan Officers	Moderate-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	43-9041	Insurance Claims and Policy Processing Clerks	Moderate-term on-the-job training	None
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	41-9022	Real Estate Sales Agents	Long-term on-the-job training	None
	11-9141	Property, Real Estate, and Community Association Managers	None	1 to 5 years
	43-4131	Loan Interviewers and Clerks	Short-term on-the-job training	None
	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	41-3031	Securities, Commodities, and Financial Services Sales Agents	Moderate-term on-the-job training	None
	13-2051	Financial Analysts	None	None
	13-2099	Financial Specialists, All Other	Moderate-term on-the-job training	None
	13-2011	Accountants and Auditors	None	None
	11-3031	Financial Managers	None	More than 5 years
	13-2053	Insurance Underwriters	Moderate-term on-the-job training	None
	13-2052	Personal Financial Advisors	None	None
	13-1111	Management Analysts	None	1 to 5 years

Healthcare

The healthcare sector in the Baltimore Region has been resilient and well performing since 2000 and should continue to exhibit strong growth through 2020. Employment in the sector grew at an average of 2.3% between 2004 and 2012, adding nearly 32,000 total jobs. The sector has experienced positive employment growth every year since 2001, with the exception of a slight dip in employment that occurred in 2005. The healthcare sector encompasses business such as dental and physician's offices, outpatient and home health care, hospitals, nursing and residential care facilities, individual and family services, and vocational rehabilitation services.

Figure 13 Employment in the Baltimore Region Healthcare Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Between 2012 and 2020, the sector is expected to create over 20,000 new job openings across the region. In addition, approximately 29,000 job openings will result from hiring related to turnover. Total new job openings in the sector are expected to create opportunities for employment for nearly 50,000 workers across the Baltimore Region. Job openings for workers will be distributed across all education levels and many industry segments. The industries that will see the highest number of job openings will be hospitals and physicians' offices, followed by nursing facilities, elder care facilities and individual and family services (e.g. child and youth services).

Supply and Demand Snapshot

In 2012, there were over 14,000 graduates from 459 education and training programs in the Baltimore Region that prepare workers for careers in the healthcare sector. Education and training programs are well represented across education levels with the majority of programs (58%) resulting in a Bachelors degree or higher level qualification. Nearly 84% of the programs that train workers for careers in the healthcare sector are located in Anne Arundel County, Baltimore City and Baltimore County. Together, these three geographic areas accounted for over 13,000 of the over 14,000 graduates in the region.

Total demand for workers in the healthcare sector is expected to reach 208,000 by 2020. The estimated number of online job vacancies advertised for occupations in the healthcare sector is estimated at an impressive 32,000 openings, although some of these jobs are for positions in other industries. Most healthcare industry sub-sectors will experience employment growth rates in excess of 10% over the period. The lowest employment growth will be in "other residential care facilities," with 8.9%

employment growth. Overall, the current supply of workers should satisfy regional labor demand in the sector between 2012 and 2020.

There may be workforce development opportunities for jobs that require qualifications at an Associates degree or lower. The supply of graduates at this level from regional training programs in 2012 was approximately 6,000. Total job demand for workers between 2012 and 2020 will be nearly 38,000 workers. Summary statistics suggest that the current training and education capacity in the region is adequate to satisfy demand, if 2012 trends in enrollment and graduations continue.

Table 58 Employment Outlook for the Healthcare Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
6211	Offices of Physicians	23,677	25,896	28,991	9%	12.0%	3,096
6212	Offices of Dentists	8,765	9,132	10,325	4%	13.1%	1,194
6213	Offices of Other Health Practitioners	6,396	8,652	9,729	35%	12.4%	1,077
6214	Outpatient Care Centers	5,056	6,802	7,551	35%	11.0%	749
6215	Medical and Diagnostic Laboratories	2,056	2,756	3,069	34%	11.3%	313
6216	Home Health Care Services	3,223	7,380	8,178	129%	10.8%	797
6219	Other Ambulatory Health Care Services	2,348	2,837	3,148	21%	11.0%	311
6221	General Medical and Surgical Hospitals	55,181	69,033	75,403	25%	9.2%	6,369
6222	Psychiatric and Substance Abuse Hospitals	-	-	-	-	-	-
6223	Specialty (except Psychiatric and Substance Abuse) Hospitals	-	-	-	-	-	-
6231	Nursing Care Facilities	16,752	15,810	17,357	-6%	9.8%	1,547
6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities	5,668	7,161	7,992	26%	11.6%	831
6233	Community Care Facilities for the Elderly	9,808	13,146	14,595	34%	11.0%	1,448
6239	Other Residential Care Facilities	1,295	1,897	2,066	46%	8.9%	169
6241	Individual and Family Services	10,703	10,800	12,137	1%	12.4%	1,337
6242	Community Food and Housing, and Emergency and Other Relief Services	1,853	2,389	2,627	29%	10.0%	239
6243	Vocational Rehabilitation Services	3,638	4,715	5,286	30%	12.1%	571
	Total Healthcare Sector	156,421	188,405	208,454	20%	10.6%	20,049

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The healthcare sector is expected to generate demand for over 20,000 new job openings between 2012 and 2020 for workers with an education level at or below a high school diploma or equivalent. The top high-demand occupations in the sector include home health aides, receptionists and information clerks, office clerks, medical secretaries, office/administrative supervisors, medical assistants, and social and human service assistants. Many of these occupations require a small amount of occupational training or experience, and wages are predominantly below the living wage level for a single parent family in Baltimore City. Workers with education below a high school diploma earned average wages of \$11.05 per hour in 2012, while workers with a high school diploma earned an average of \$18.42 per hour in 2012.

A large group of workers with postsecondary training or an Associates degree will be required in the sector between 2012 and 2020 with nearly 18,000 expected new jobs. Approximately 36% of the total

hiring requirements in the sector will be for workers with this level of education. High demand occupations for workers at this education level include nursing aides, licensed practical/vocational nurses, dental assistants, emergency medical technicians or paramedics, medical records technicians, registered nurses and medical technicians and technologists. Healthcare workers in the Baltimore Region who have an Associates degree earn average wages of \$35.93 per hour, while those with qualifications below an Associates degree earn wages below the living wage at \$17.57 per hour.

Demand for workers with a Bachelors degree or higher level qualification will approach 12,000 total jobs between 2012 and 2020. High demand occupations include medical and health services managers, healthcare, child and family social workers, medical laboratory technologists, physicians and surgeons and physical therapists. Average hourly wages for workers with this level of education may range from \$32.00 per hour to nearly \$49.00 per hour.

Table 59 Healthcare Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	19,793	21,923	2,130	2,979	5,109	3,338	\$11.05	\$22,987
High school diploma or equivalent	55,789	61,913	6,124	8,819	14,943	13,102	\$18.42	\$38,505
Some College or postsecondary non-degree award	32,660	36,060	3,400	4,773	8,174	2,221	\$17.57	\$36,539
Associates degree	38,497	42,357	3,860	5,615	9,475	2,116	\$35.93	\$74,728
Bachelors degree	21,369	23,640	2,271	3,790	6,061	10,842	\$32.45	\$68,494
Masters, Doctoral, or professional degree	20,297	22,561	2,264	3,349	5,613	646	\$48.89	\$103,035
Total	188,405	208,454	20,049	29,325	49,374	32,835	\$25.95	\$54,289

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Education and Training Supply Summary

Table 60 Programs, Enrollment and Graduates of Programs in Healthcare, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	18	4%	967	2%	706	5%
WIA-eligible Training (Reported)	66	14%	4,153	9%	2,507	18%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	134	29%	15,030	31%	2,723	19%
Bachelors	109	24%	16,204	34%	3,923	28%
Masters, PhD, and Post-Bachelors Certificates and Programs	132	29%	11,840	25%	4,303	30%
Total, All Levels	459	100%	48,194	100%	14,162	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 61 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Healthcare	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	2	9	5	1	-	1	18
WIA-eligible Training (Reported)	14	25	18	2	3	4	66
College and University	43	173	95	15	22	27	375
Total Programs	59	207	118	18	25	32	459
Enrollment							
Non-WIA Eligible Training (Reported)	48	330	508	9	-	72	967
WIA-eligible Training (Reported)	328	1,295	2,225	80	72	153	4,153
College and University	3,125	18,335	16,438	661	2,109	2,406	43,074
Total Enrollment	3,501	19,960	19,171	750	2,181	2,631	48,194
Graduates / Completions							
Non-WIA Eligible Training (Reported)	3	216	478	9	-	-	706
WIA-eligible Training (Reported)	66	816	1,415	72	56	82	2,507
College and University	772	6,452	2,899	203	260	363	10,949
Total Graduates/Completions	841	7,484	4,792	284	316	445	14,162

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 62 Healthcare Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	31-1011	Home Health Aides	5,251	5,837	586	542	1,128	480	\$11.45	\$23,810
	39-9021	Personal Care Aides	3,758	4,194	436	237	674	605	\$10.44	\$21,710
	37-2012	Maids and Housekeeping Cleaners	2,300	2,529	229	309	538	32	\$10.42	\$21,670
	35-3041	Food Servers, Nonrestaurant	1,382	1,522	140	313	453	33	\$9.76	\$20,290
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1,567	1,730	164	237	401	60	\$11.62	\$24,170
	35-2021	Food Preparation Workers	939	1,033	94	270	365	10	\$10.83	\$22,530
	35-2012	Cooks, Institution and Cafeteria	1,083	1,195	112	185	296	n.a.	\$14.06	\$29,250
	43-4171	Receptionists and Information Clerks	4,839	5,412	572	1,169	1,742	120	\$13.54	\$28,170
	43-9061	Office Clerks, General	4,690	5,213	523	664	1,187	n.a.	\$14.75	\$30,680
	43-6013	Medical Secretaries	5,203	5,795	592	558	1,150	n.a.	\$16.58	\$34,490
High school diploma or equivalent	43-1011	First-Line Supervisors of Office and Administrative Support Workers	2,797	3,115	318	597	915	580	\$26.45	\$55,010
	31-9092	Medical Assistants	3,777	4,212	435	462	898	n.a.	\$15.68	\$32,620
	21-1093	Social and Human Service Assistants	2,878	3,210	331	497	829	n.a.	\$16.23	\$33,760
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	3,193	3,550	356	342	699	330	\$17.80	\$37,020
	43-3021	Billing and Posting Clerks	1,958	2,178	221	273	493	297	\$17.25	\$35,880
	31-9799	Healthcare Support Workers, All Other	1,920	2,118	198	235	433	n.a.	\$17.39	\$36,170
	43-4051	Customer Service Representatives	1,094	1,210	116	249	365	1,386	\$17.29	\$35,960
	11-3011	Administrative Services Managers	1,066	1,178	112	211	322	198	\$37.52	\$78,040
	49-9071	Maintenance and Repair Workers, General	1,142	1,260	118	168	286	126	\$19.26	\$40,070
	13-1199	Business Operations Specialists, All Other	1,099	1,212	113	169	282	385	\$37.54	\$78,080
	43-6011	Executive Secretaries and Executive Administrative Assistants	1,251	1,385	135	134	269	378	\$24.28	\$50,500
	21-1011	Substance Abuse and Behavioral Disorder Counselors	930	1,035	105	159	264	44	\$20.97	\$43,630
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	1,198	1,333	135	105	241	310	\$19.69	\$40,950
	33-9032	Security Guards	1,029	1,130	101	131	232	456	\$14.85	\$30,880

Baltimore Regional Talent Development Pipeline Study

Education	Regional Hiring Demand			Employment		Mean Wages					
	SOC	Occupation		2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	31-2022	Physical Therapist Aides		781	871	90	97	186	n.a.	\$11.01	\$22,890
	29-2052	Pharmacy Technicians		716	784	68	100	168	33	\$14.59	\$30,340
	29-2051	Dietetic Technicians		677	743	66	94	160	n.a.	\$19.41	\$40,370
	43-2011	Switchboard Operators, Including Answering Service		604	666	62	94	156	n.a.	\$11.95	\$24,870
	43-4071	File Clerks		477	530	53	100	153	280	\$14.76	\$30,700
Some college, no degree	15-1150	Computer Support Specialists		480	529	49	101	150	570	\$26.93	\$56,020
Postsecondary non-degree award	31-1012	Nursing Aides, Orderlies, and Attendants		15,528	17,084	1,556	1,602	3,158	540	\$13.64	\$28,370
	29-2061	Licensed Practical and Licensed Vocational Nurses		5,444	6,007	563	1,163	1,726	387	\$24.45	\$50,860
	31-9091	Dental Assistants		2,404	2,717	313	404	717	585	\$17.49	\$36,370
	29-2041	Emergency Medical Technicians and Paramedics		2,477	2,732	255	396	651	30	\$20.69	\$43,040
	29-2071	Medical Records and Health Information Technicians		1,736	1,915	179	278	457	n.a.	\$19.45	\$40,470
	29-2799	Health Technologists and Technicians, All Other		1,481	1,636	155	237	392	n.a.	\$19.48	\$40,510
	29-2055	Surgical Technologists		1,092	1,201	109	152	261	18	\$22.75	\$47,320
	29-1111	Registered Nurses		26,267	28,833	2,566	3,803	6,369	1,155	\$37.14	\$77,250
	29-2037	Radiologic Technologists and Technicians		2,290	2,521	231	284	515	117	\$32.34	\$67,260
	11-1021	General and Operations Managers		1,777	1,972	196	264	460	77	\$56.53	\$117,580
Associates degree	29-2012	Medical and Clinical Laboratory Technicians		1,697	1,870	173	265	438	319	\$20.86	\$43,390
	29-2021	Dental Hygienists		1,180	1,334	154	189	343	16	\$35.55	\$73,940
	29-1126	Respiratory Therapists		1,039	1,137	98	158	256	n.a.	\$31.22	\$64,930
	29-2031	Cardiovascular Technologists and Technicians		688	755	67	85	152	8	\$26.91	\$55,980
	11-9111	Medical and Health Services Managers		3,809	4,197	388	744	1,132	451	\$45.14	\$93,880
Bachelors degree	21-1021	Child, Family, and School Social Workers		1,821	2,035	213	345	559	16	\$24.19	\$50,310
	29-2011	Medical and Clinical Laboratory Technologists		2,172	2,387	215	339	554	66	\$28.78	\$59,850
	21-1023	Mental Health and Substance Abuse Social Workers		964	1,073	109	183	292	11	\$22.36	\$46,510

Baltimore Regional Talent Development Pipeline Study

Education	Occupation		Employment		Regional Hiring Demand				Mean Wages	
	SOC		2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	21-1798	Community and Social Service Specialists, All Other	955	1,063	107	165	272	n.a.	\$17.80	\$37,020
	29-9799	Healthcare Practitioners and Technical Workers, All Other	610	672	62	172	234	n.a.	\$26.34	\$54,790
	11-9151	Social and Community Service Managers	757	843	86	131	218	210	\$32.89	\$68,410
	39-9032	Recreation Workers	861	954	93	110	203	n.a.	\$15.39	\$32,010
	13-2011	Accountants and Auditors	649	718	69	112	181	270	\$35.18	\$73,180
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	727	804	77	98	175	n.a.	\$30.75	\$63,960
	21-1022	Healthcare Social Workers	1,581	1,744	163	300	462	n.a.	\$28.78	\$59,860
	21-1015	Rehabilitation Counselors	1,516	1,695	179	260	439	33	\$15.47	\$32,170
	29-1122	Occupational Therapists	1,212	1,342	131	184	315	n.a.	\$38.05	\$79,140
	29-1071	Physician Assistants	1,142	1,269	127	174	301	n.a.	\$46.67	\$97,080
Masters degree	21-1014	Mental Health Counselors	1,027	1,144	117	176	293	24	\$18.00	\$37,440
	21-1013	Marriage and Family Therapists	957	1,068	111	164	275	n.a.	\$21.84	\$45,420
	29-1127	Speech-Language Pathologists	831	923	92	126	218	n.a.	\$41.03	\$85,340
	29-1069	Physicians and Surgeons, All Other	2,301	2,554	253	364	617	24	\$94.43	\$196,400
	29-1123	Physical Therapists	2,043	2,267	224	191	415	9	\$40.03	\$83,270
	29-1021	Dentists, General	1,078	1,218	140	256	396	n.a.	\$75.76	\$157,580
	29-1062	Family and General Practitioners	1,442	1,605	163	228	392	n.a.	\$80.45	\$167,340
	19-3031	Clinical, Counseling, and School Psychologists	765	854	89	193	282	11	\$34.24	\$71,230
	29-1051	Pharmacists	768	841	73	156	229	n.a.	\$51.33	\$106,760
Doctoral or professional degree										

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Baltimore Regional Talent Development Pipeline Study

Table 63 Healthcare Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	31-1011	Home Health Aides	161	541	177	77	35	137
	39-9021	Personal Care Aides	98	291	137	18	57	72
	37-2012	Maids and Housekeeping Cleaners	66	186	202	42	3	39
	35-3041	Food Servers, Nonrestaurant	52	176	136	52	0	37
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	55	124	159	17	13	33
	35-2021	Food Preparation Workers	46	136	129	31	2	22
	35-2012	Cooks, Institution and Cafeteria	35	119	82	32	2	26
	43-4171	Receptionists and Information Clerks	291	537	391	128	214	180
	43-9061	Office Clerks, General	181	356	371	57	110	112
	43-6013	Medical Secretaries	188	311	331	61	141	117
High school diploma or equivalent	43-1011	First-Line Supervisors of Office and Administrative Support Workers	147	275	264	51	92	86
	31-9092	Medical Assistants	159	253	233	53	113	87
	21-1093	Social and Human Service Assistants	118	323	233	11	50	94
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	106	205	218	32	68	69
	43-3021	Billing and Posting Clerks	82	142	147	24	53	46
	31-9799	Healthcare Support Workers, All Other	58	142	173	8	11	41
	43-4051	Customer Service Representatives	54	108	145	10	19	29
	11-3011	Administrative Services Managers	45	98	127	13	14	25
	49-9071	Maintenance and Repair Workers, General	35	101	99	21	5	25
	13-1199	Business Operations Specialists, All Other	37	78	127	6	12	22
	43-6011	Executive Secretaries and Executive Administrative Assistants	39	77	98	10	20	25
	21-1011	Substance Abuse and Behavioral Disorder Counselors	43	97	73	5	15	31
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	37	75	66	12	25	25
	33-9032	Security Guards	27	63	114	8	2	18
	31-2022	Physical Therapist Aides	28	56	49	12	24	18
	29-2052	Pharmacy Technicians	20	34	100	1	2	9

Baltimore Regional Talent Development Pipeline Study

Education	Hiring Demand by County							
	SOC	Occupation	ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	29-2051	Dietetic Technicians	20	47	75	8	1	10
	43-2011	Switchboard Operators, Including Answering Service	22	44	64	7	7	12
	43-4071	File Clerks	25	43	51	7	14	13
Some college, no degree	15-1150	Computer Support Specialists	20	40	70	3	6	11
Postsecondary non-degree award	31-1012	Nursing Aides, Orderlies, and Attendants	436	1,225	1,015	261	19	203
	29-2061	Licensed Practical and Licensed Vocational Nurses	258	638	554	122	52	102
	31-9091	Dental Assistants	121	207	78	65	144	103
	29-2041	Emergency Medical Technicians and Paramedics	71	236	264	2	3	75
	29-2071	Medical Records and Health Information Technicians	67	124	195	16	23	31
	29-2799	Health Technologists and Technicians, All Other	60	94	170	13	25	30
	29-2055	Surgical Technologists	35	56	137	5	11	18
Associates degree	29-1111	Registered Nurses	827	1,554	3,330	130	149	379
	29-2037	Radiologic Technologists and Technicians	71	129	248	9	20	38
	11-1021	General and Operations Managers	66	166	133	24	27	44
	29-2012	Medical and Clinical Laboratory Technicians	60	130	192	7	13	36
	29-2021	Dental Hygienists	58	99	36	31	70	50
	29-1126	Respiratory Therapists	30	54	155	2	2	14
	29-2031	Cardiovascular Technologists and Technicians	20	33	84	2	4	10
Bachelors degree	11-9111	Medical and Health Services Managers	155	326	491	42	39	79
	21-1021	Child, Family, and School Social Workers	63	200	179	4	59	54
	29-2011	Medical and Clinical Laboratory Technologists	70	151	278	4	9	41
	21-1023	Mental Health and Substance Abuse Social Workers	46	100	85	8	21	32
	21-1798	Community and Social Service Specialists, All Other	35	91	98	4	19	26
	29-9799	Healthcare Practitioners and Technical Workers, All Other	31	57	114	6	10	16
	11-9151	Social and Community Service Managers	28	81	69	4	15	22
	39-9032	Recreation Workers	26	89	43	20	6	18
	13-2011	Accountants and Auditors	25	55	70	6	10	15
	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	25	56	68	5	7	15

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Masters degree	21-1022	Healthcare Social Workers	63	149	190	15	16	29
	21-1015	Rehabilitation Counselors	75	183	109	3	15	54
	29-1122	Occupational Therapists	45	98	108	15	24	24
	29-1071	Physician Assistants	52	79	98	15	31	26
	21-1014	Mental Health Counselors	47	105	78	8	22	33
	21-1013	Marriage and Family Therapists	42	82	84	10	31	27
Doctoral or professional degree	29-1127	Speech-Language Pathologists	31	68	69	12	20	19
	29-1069	Physicians and Surgeons, All Other	103	163	216	27	57	51
	29-1123	Physical Therapists	62	125	130	21	41	37
	29-1021	Dentists, General	67	116	46	36	75	55
	29-1062	Family and General Practitioners	70	107	116	21	44	35
	19-3031	Clinical, Counseling, and School Psychologists	42	88	80	13	31	28
	29-1051	Pharmacists	27	46	140	1	2	12

Table 64 Healthcare Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	31-1011	Home Health Aides	Short-term on-the-job training	None
	39-9021	Personal Care Aides	Short-term on-the-job training	None
	37-2012	Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	35-3041	Food Servers, Nonrestaurant	Short-term on-the-job training	None
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	35-2021	Food Preparation Workers	Short-term on-the-job training	None
	35-2012	Cooks, Institution and Cafeteria	Short-term on-the-job training	None
High school diploma or equivalent	43-4171	Receptionists and Information Clerks	Short-term on-the-job training	None
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-6013	Medical Secretaries	Moderate-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	31-9092	Medical Assistants	Moderate-term on-the-job training	None
	21-1093	Social and Human Service Assistants	Short-term on-the-job training	None
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	43-3021	Billing and Posting Clerks	Short-term on-the-job training	None
	31-9799	Healthcare Support Workers, All Other	Short-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	11-3011	Administrative Services Managers	None	1 to 5 years
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
	21-1011	Substance Abuse and Behavioral Disorder Counselors	Moderate-term on-the-job training	None
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	33-9032	Security Guards	Short-term on-the-job training	None
	31-2022	Physical Therapist Aides	Moderate-term on-the-job training	None
	29-2052	Pharmacy Technicians	Moderate-term on-the-job training	None
	29-2051	Dietetic Technicians	Moderate-term on-the-job training	None
	43-2011	Switchboard Operators, Including Answering Service	Short-term on-the-job training	None
	43-4071	File Clerks	Short-term on-the-job training	None
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
Postsecondary non-degree award	31-1012	Nursing Aides, Orderlies, and Attendants	None	None
	29-2061	Licensed Practical and Licensed Vocational Nurses	None	None
	31-9091	Dental Assistants	None	None
	29-2041	Emergency Medical Technicians and Paramedics	None	None
	29-2071	Medical Records and Health Information Technicians	None	None
	29-2799	Health Technologists and Technicians, All Other	Short-term on-the-job training	None
	29-2055	Surgical Technologists	None	None
Associates degree	29-1111	Registered Nurses	None	None
	29-2037	Radiologic Technologists and Technicians	None	None
	11-1021	General and Operations Managers	None	1 to 5 years

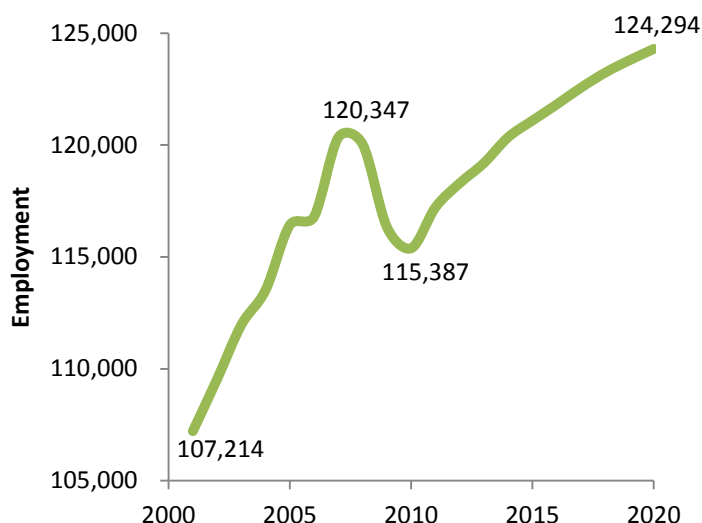
Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Training Requirement	Experience Required
	29-2012	Medical and Clinical Laboratory Technicians	None	None
	29-2021	Dental Hygienists	None	None
	29-1126	Respiratory Therapists	None	None
	29-2031	Cardiovascular Technologists and Technicians	None	None
Bachelors degree	11-9111	Medical and Health Services Managers	None	None
	21-1021	Child, Family, and School Social Workers	None	None
	29-2011	Medical and Clinical Laboratory Technologists	None	None
	21-1023	Mental Health and Substance Abuse Social Workers	None	None
	21-1798	Community and Social Service Specialists, All Other	None	None
	29-9799	Healthcare Practitioners and Technical Workers, All Other	None	None
	11-9151	Social and Community Service Managers	None	1 to 5 years
	39-9032	Recreation Workers	None	None
	13-2011	Accountants and Auditors	None	None
Masters degree	13-1078	Human Resources, Training, and Labor Relations Specialists, All Other	None	None
	21-1022	Healthcare Social Workers	None	None
	21-1015	Rehabilitation Counselors	None	None
	29-1122	Occupational Therapists	None	None
	29-1071	Physician Assistants	None	None
	21-1014	Mental Health Counselors	Internship/residency	None
	21-1013	Marriage and Family Therapists	Internship/residency	None
Doctoral or professional degree	29-1127	Speech-Language Pathologists	None	None
	29-1069	Physicians and Surgeons, All Other	Internship/residency	None
	29-1123	Physical Therapists	None	None
	29-1021	Dentists, General	Internship/residency	None
	29-1062	Family and General Practitioners	Internship/residency	None
	19-3031	Clinical, Counseling, and School Psychologists	Internship/residency	None
	29-1051	Pharmacists	None	None

Hospitality and Tourism

The hospitality and tourism sector in the Baltimore Region includes businesses in industries such as full service restaurants, other amusement and recreation industries (bowling, golf, marinas, fitness centers, etc.), traveler accommodation, food services, drinking establishments, performing arts, and spectator sports. Between 2004 and 2012, employment in the sector grew by a total of 4%, reaching a high of over 120,000 workers in 2008. The sector lost over 4,600 jobs in 2009 and 2010 and has since regained nearly two thirds of the jobs lost during the recession.

Figure 14 Employment in the Baltimore Region Hospitality and Tourism Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Between 2012 and 2020, the sector is expected to create nearly 40,000 total job opportunities for workers in the Baltimore Region. Approximately 6,000 of these jobs (15%) will be a result of new job creation, while the large majority of jobs will be hiring related to turnover. Most of the new job opportunities will be created in two primary industries: full service restaurants and gambling industries. Other industries that will see larger employment growth are “other amusement and recreation industries,” traveller accommodation and special food services (e.g. catering or mobile food service).

Supply and Demand Snapshot

In 2012, there were over 2,100 graduates from 115 education and training programs in the Baltimore Region that prepare workers for careers in the hospitality and tourism sector. Education and training programs exist at all education levels, and approximately 66% of all programs result in a Bachelors degree or higher education level. The sector includes workers in the arts, sports and entertainment industries, and many of the Bachelors degree and higher level programs prepare workers for jobs in these industries. Approximately 30% of graduates from hospitality and tourism sector training programs are from non-degree-granting training programs that are not associated with a college or university, and most programs (93%) are located in Anne Arundel County, Baltimore City and Baltimore County.

The demand for workers in the hospitality and tourism sector is predominantly for occupations that require an education level at or below a high school diploma or equivalent. Among the nearly 40,000 job openings expected between 2012 and 2020, over 97% (38,600) will be for workers with a high school diploma or lower. Approximately 1,000 job openings will be for workers with any postsecondary education, including non-degree awards, Associate, Bachelors, or Masters Degrees.

There may be workforce development opportunities for low-skilled jobs that lack post-secondary education requirements, although employers seeking workers with low educational attainment are not likely to require that the applicant be a graduate of a workforce training program. If 2012 training trends persist through 2020, there would be approximately 5,000 workers trained through WIA and non-WIA eligible workforce training programs, while the demand for workers with no postsecondary education would be nearly 39,000. Workforce development opportunities may exist to help up-skill the labor force, especially related to customer service skills, food safety, and similar public health skills.

Table 65 Employment Outlook for the Hospitality and Tourism Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
4871	Scenic and Sightseeing Transportation, Land	-	-	-	-	-	-
4872	Scenic and Sightseeing Transportation, Water	266	125	127	-53%	2.0%	3
4879	Scenic and Sightseeing Transportation, Other	-	-	-	-	-	-
5615	Travel Arrangement and Reservation Services	476	1,166	1,198	145%	2.8%	33
7111	Performing Arts Companies	2,189	950	983	-57%	3.5%	33
7112	Spectator Sports	391	1,011	1,039	159%	2.7%	28
7113	Promoters of Performing Arts, Sports, and Similar Events	370	961	1,028	160%	7.0%	67
7114	Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures	13	27	28	118%	3.8%	1
7115	Independent Artists, Writers, and Performers	643	209	221	-67%	5.6%	12
7121	Museums, Historical Sites, and Similar Institutions	1,659	1,523	1,557	-8%	2.2%	34
7131	Amusement Parks and Arcades	31	126	128	303%	2.0%	3
7132	Gambling Industries	168	134	735	-20%	447.9%	601
7139	Other Amusement and Recreation Industries	14,181	14,460	14,897	2%	3.0%	437
7211	Traveler Accommodation	9,186	8,273	8,593	-10%	3.9%	320
7212	RV (Recreational Vehicle) Parks and Recreational Camps	33	97	102	193%	4.4%	4
7213	Rooming and Boarding Houses	669	623	696	-7%	11.8%	73
7221	Full-Service Restaurants	72,117	77,864	81,763	8%	5.0%	3,899
7223	Special Food Services	7,156	6,876	7,161	-4%	4.2%	286
7224	Drinking Places (Alcoholic Beverages)	3,972	3,869	4,037	-3%	4.3%	168
	Total Hospitality and Tourism Sector	113,523	118,294	124,294	4%	5.1%	6,000

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The top high-demand occupations in the sector include waiters and waitresses, restaurant and fast food preparation and serving workers, cafeteria, concession and coffee shop attendants, hosts and hostesses, dishwashers, bartenders and helpers, restaurant cooks, amusement and recreation attendants, hotel desk clerks, fitness trainers and instructors, as well as supervisory workers in these occupations. Many of these occupations require a little or no formal occupational training or experience, and wages for most occupations are below the living wage level in Baltimore city. On average, workers in occupations that require less than a high school diploma in the sector earn \$10.02 per hour, less than half of the living wage.

Approximately 3% of all job openings between 2012 and 2020 will require postsecondary education (1,020 jobs). Workers in the sector who have a formal postsecondary training (non-degree award, Associates degree or higher) should be able to earn wages that are close to or greater than the living wage for a single parent family in Baltimore City, although there may not be a large number of jobs available. The average wage for workers with an Associates degree was over \$50.00 per hour in 2012. This figure includes general and operations managers who have comparatively higher experience or job tenure.

Table 66 Hospitality and Tourism Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	90,435	94,940	4,504	28,693	33,198	2,221	\$10.02	\$20,836
High school diploma or equivalent	23,267	24,536	1,269	4,171	5,441	12,300	\$18.62	\$38,373
Some College or postsecondary non-degree award	537	574	38	120	158	650	\$20.08	\$41,759
Associates degree	1,817	1,901	84	272	356	1,493	\$56.13	\$116,754
Bachelors degree	2,088	2,189	101	370	471	9,343	\$31.85	\$67,061
Masters, Doctoral, or professional degree	150	154	4	31	35	225	\$28.68	\$59,666
Total	118,294	124,294	6,000	33,658	39,658	26,802	\$12.87	\$26,719

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Education and Training Supply Summary

Table 67 Programs, Enrollment and Graduates of Programs in Hospitality and Tourism, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	5	4%	812	11%	540	25%
WIA-eligible Training (Reported)	7	6%	244	3%	112	5%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	27	23%	1,156	15%	132	6%
Bachelors	58	50%	4,428	59%	982	46%
Masters, PhD, and Post-Bachelors Certificates and Programs	18	16%	845	11%	365	17%
Total, All Levels	115	100%	7,485	100%	2,131	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 68 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Hospitality and Tourism	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	2	2	-	-	-	1	5
WIA-eligible Training (Reported)	4	1	1	-	-	1	7
College and University	9	49	31	3	5	6	103
Total Programs	15	52	32	3	5	8	115
Enrollment							
Non-WIA Eligible Training (Reported)	562	70	-	-	-	180	812
WIA-eligible Training (Reported)	120	15	17	-	-	92	244
College and University	688	2,590	2,897	75	30	149	6,429
Total Enrollment	1,370	2,675	2,914	75	30	421	7,485
Graduates / Completions							
Non-WIA Eligible Training (Reported)	525	15	-	-	-	-	540
WIA-eligible Training (Reported)	1	3	17	-	-	91	112
College and University	91	671	669	23	7	18	1,479
Total Graduates/Completions	617	689	686	23	7	109	2,131

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 69 Hospitality and Tourism Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	35-3031	Waiters and Waitresses	21,883	22,985	1,102	8,736	9,838	18	\$9.94	\$20,680
	35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	17,471	18,337	867	3,899	4,766	n.a.	\$8.90	\$18,510
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	4,906	5,146	240	2,845	3,085	n.a.	\$9.18	\$19,090
	35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	3,494	3,673	179	1,962	2,141	143	\$9.69	\$20,150
	35-9021	Dishwashers	4,415	4,636	222	1,614	1,836	n.a.	\$9.51	\$19,780
	41-2011	Cashiers	3,669	3,870	201	1,333	1,534	143	\$10.52	\$21,880
	35-3011	Bartenders	4,504	4,727	223	1,254	1,477	10	\$9.83	\$20,440
	35-2021	Food Preparation Workers	4,336	4,553	217	1,249	1,466	10	\$10.83	\$22,530
	35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	3,721	3,918	197	1,107	1,304	n.a.	\$9.04	\$18,800
	39-3091	Amusement and Recreation Attendants	2,611	2,706	95	1,199	1,294	24	\$10.26	\$21,330
	35-2014	Cooks, Restaurant	5,085	5,345	261	866	1,127	9	\$12.51	\$26,020
	35-2011	Cooks, Fast Food	4,507	4,732	225	768	993	99	\$10.23	\$21,280
	35-2015	Cooks, Short Order	2,052	2,154	102	350	451	n.a.	\$10.75	\$22,360
	37-2012	Maids and Housekeeping Cleaners	1,933	2,026	93	260	353	32	\$10.42	\$21,670
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	1,126	1,195	69	170	239	60	\$11.62	\$24,170
	39-3031	Ushers, Lobby Attendants, and Ticket Takers	455	479	24	212	236	44	\$8.73	\$18,150
	37-3011	Landscaping and Groundskeeping Workers	1,142	1,179	37	162	199	88	\$12.20	\$25,370
High school diploma or equivalent	35-3041	Food Servers, Nonrestaurant	602	630	28	136	165	33	\$9.76	\$20,290
	35-1012	First-Line Supervisors of Food Preparation and Serving Workers	5,331	5,597	265	904	1,169	16	\$18.05	\$37,540
	43-4081	Hotel, Motel, and Resort Desk Clerks	1,080	1,125	45	345	390	9	\$11.33	\$23,570
	39-9031	Fitness Trainers and Aerobics Instructors	2,233	2,301	68	286	354	n.a.	\$18.26	\$37,980
	53-3031	Driver/Sales Workers	1,356	1,423	67	216	283	55	\$14.48	\$30,110
	33-9032	Security Guards	1,199	1,308	109	153	261	456	\$14.85	\$30,880
	33-9092	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	408	420	13	209	221	44	\$9.24	\$19,220

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
	35-1011	Chefs and Head Cooks	1,126	1,183	57	161	218	18	\$19.04	\$39,590
	49-9071	Maintenance and Repair Workers, General	881	924	43	130	173	126	\$19.26	\$40,070
	11-9051	Food Service Managers	810	850	40	119	159	56	\$25.85	\$53,760
	41-2012	Gaming Change Persons and Booth Cashiers	129	241	112	47	159	n.a.	\$10.12	\$21,050
	43-4051	Customer Service Representatives	563	591	28	128	156	1,386	\$17.29	\$35,960
Associates degree	11-1021	General and Operations Managers	1,798	1,881	83	267	351	77	\$56.53	\$117,580

Table 70 Hospitality and Tourism Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County						
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD	
Less than high school	35-3031	Waiters and Waitresses	2,524	2,855	1,794	535	927	1,205	
	35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	1,232	1,408	792	267	502	564	
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	749	909	627	163	255	383	
	35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	559	618	381	121	198	265	
	35-9021	Dishwashers	464	533	343	99	176	222	
	41-2011	Cashiers	371	438	325	77	132	191	
	35-3011	Bartenders	314	420	398	55	128	162	
	35-2021	Food Preparation Workers	362	429	280	78	145	172	
	35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	321	367	263	66	136	152	
	39-3091	Amusement and Recreation Attendants	304	439	166	52	108	226	
	35-2014	Cooks, Restaurant	292	327	193	61	122	132	
	35-2011	Cooks, Fast Food	262	293	153	56	113	117	
	35-2015	Cooks, Short Order	108	132	90	22	46	53	
	37-2012	Maids and Housekeeping Cleaners	97	63	120	10	27	35	
	37-2011	Janitors and Cleaners, Except Maids and	49	57	73	8	20	33	

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
		Housekeeping Cleaners						
	39-3031	Ushers, Lobby Attendants, and Ticket Takers	30	8	108	1	8	81
	37-3011	Landscaping and Groundskeeping Workers	44	62	28	7	16	42
	35-3041	Food Servers, Nonrestaurant	36	46	51	6	8	18
	35-1012	First-Line Supervisors of Food Preparation and Serving Workers	296	344	207	62	125	135
	43-4081	Hotel, Motel, and Resort Desk Clerks	114	68	144	13	10	40
	39-9031	Fitness Trainers and Aerobics Instructors	78	119	32	10	32	83
	53-3031	Driver/Sales Workers	74	84	44	16	32	33
	33-9032	Security Guards	38	48	126	5	14	31
	33-9092	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	54	76	26	9	18	38
	35-1011	Chefs and Head Cooks	52	64	46	10	20	26
	49-9071	Maintenance and Repair Workers, General	40	38	49	6	14	24
	11-9051	Food Service Managers	40	47	29	8	17	18
	41-2012	Gaming Change Persons and Booth Cashiers	9	19	126	1	0	4
	43-4051	Customer Service Representatives	41	39	42	5	8	22
Associates degree	11-1021	General and Operations Managers	83	95	77	14	31	50

Table 71 Hospitality and Tourism Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	35-3031	Waiters and Waitresses	Short-term on-the-job training	None
	35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	Short-term on-the-job training	None
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	Short-term on-the-job training	None
	35-9031	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	None	None
	35-9021	Dishwashers	Short-term on-the-job training	None
	41-2011	Cashiers	Short-term on-the-job training	None
	35-3011	Bartenders	Short-term on-the-job training	None
	35-2021	Food Preparation Workers	Short-term on-the-job training	None
	35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	Short-term on-the-job training	None
	39-3091	Amusement and Recreation Attendants	Short-term on-the-job training	None
	35-2014	Cooks, Restaurant	Moderate-term on-the-job training	Less than 1 year
	35-2011	Cooks, Fast Food	Short-term on-the-job training	None
	35-2015	Cooks, Short Order	Short-term on-the-job training	None
	37-2012	Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	39-3031	Ushers, Lobby Attendants, and Ticket Takers	Short-term on-the-job training	None
	37-3011	Landscaping and Groundskeeping Workers	Short-term on-the-job training	None
	35-3041	Food Servers, Nonrestaurant	Short-term on-the-job training	None
High school diploma or equivalent	35-1012	First-Line Supervisors of Food Preparation and Serving Workers	None	1 to 5 years
	43-4081	Hotel, Motel, and Resort Desk Clerks	Short-term on-the-job training	None
	39-9031	Fitness Trainers and Aerobics Instructors	Short-term on-the-job training	None
	53-3031	Driver/Sales Workers	Short-term on-the-job training	None
	33-9032	Security Guards	Short-term on-the-job training	None
	33-9092	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	Short-term on-the-job training	None
	35-1011	Chefs and Head Cooks	None	1 to 5 years
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	11-9051	Food Service Managers	None	1 to 5 years
	41-2012	Gaming Change Persons and Booth Cashiers	Short-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years

Information Technology

The information technology sector in the Baltimore Region includes businesses involved in industries such as:

- Computer Systems Design and Related Services
- Professional and Commercial Equipment and Supplies
- Electrical and Electronic Goods Wholesalers, and
- Wholesale Electronic Agents and Brokers.

Between 2004 and 2012 the industry added approximately 8,700 jobs, achieving a 21% growth in employment over the period. The industry has seen employment fluctuate in the past decade, losing over 1,700 jobs between 2001 and 2003, and again in 2009 when the sector lost over 2,400 jobs.

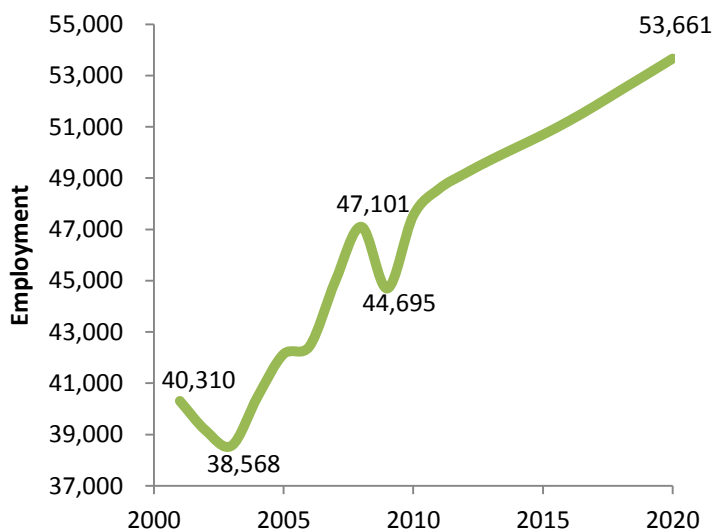
During the next eight years, the sector is expected to create approximately 4,500 new job opportunities for Baltimore Region workers, with an additional 8,000 jobs being created as a result of turnover within the industry. Most of the new jobs created in the sector will be driven by the computer systems design and related services industry, where an estimated 3,519 new jobs will be created. Businesses in this industry are involved in systems design, programming, computer facilities management and other related areas.

Supply and Demand Snapshot

In 2012, there were nearly 3,000 graduates from 271 education and training programs in the Baltimore Region that prepare workers for careers in the IT sector. Nearly half (45%) of all programs result in college or university non-degree awards or Associates degrees, while another 44% of programs result in a Bachelors degree or higher. There are several college and university programs available to workers in each geographic segment of the Baltimore Region. Approximately 64% of programs are located in Baltimore City and Baltimore County and these two geographies account for nearly 84% of all graduates in the region.

There are a number of training programs in the Baltimore Region that train workers for careers in specialized fields that are related to IT, which merit discussion in this analysis. In the region, there are

Figure 15 Employment in the Baltimore Region IT Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

21 specialized training programs that prepare workers for jobs in the health informatics sub-sector. In 2012, these programs produced a total of 228 graduates, primarily located in Baltimore City and Baltimore County. In addition to programs related to health informatics, there are 30 education and training programs that prepare workers for jobs in the cybersecurity sub-sector. In 2012, these programs graduated 284 students in Anne Arundel County, Baltimore City and Baltimore County, as well as a small number of graduates in Harford County. Most of these specialized training programs are affiliated with a college or university, and graduates receive some sort of formal degree, e.g. Associates, Bachelors or Masters Degree.

The demand for workers in the IT sector is highest for those with a Bachelors degree and for those with a high school diploma or equivalent. Over 81% of all new job openings between 2012 and 2020 will require workers with these two education levels. While IT sector demand for workers with a post-graduate degree or certificate will comprise only 2% of total new jobs between 2012 and 2020 in 2012 alone there were over 1,200 graduates from Masters, PhD and other post-graduate programs, contributing to the region's tremendous supply of highly-skilled IT talent.

There may be a need for additional workforce development programs for low-skilled jobs that lack post-secondary education requirements. In 2012 there were 60 graduates from training programs not associated with a college or university. Demand for workers with a high school education or lower will comprise approximately 30% of the total new job openings, or 3,700 jobs. There may be a need to train additional workers in order to satisfy the demand for these low-skilled positions.

Table 72 Employment Outlook for the IT Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
3341	Computer and Peripheral Equipment Manufacturing	-	-	-	-	-	-
3342	Communications Equipment Manufacturing	1,300	240	245	-82%	2.2%	5
3343	Audio and Video Equipment Manufacturing	-	-	-	-	-	-
3346	Manufacturing and Reproducing Magnetic and Optical Media	146	17	18	-88%	6.8%	1
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	7,539	6,562	6,796	-13%	3.6%	234
4236	Electrical and Electronic Goods Merchant Wholesalers	5,301	4,350	4,516	-18%	3.8%	166
4251	Wholesale Electronic Markets and Agents and Brokers	2,613	3,974	4,119	52%	3.7%	146
5112	Software Publishers	381	969	1,060	154%	9.4%	92
5182	Data Processing, Hosting, and Related Services	1,713	1,579	1,707	-8%	8.2%	129
5191	Other Information Services	1,458	2,572	2,722	76%	5.8%	149
5415	Computer Systems Design and Related Services	19,181	28,171	31,691	47%	12.5%	3,519
8112	Electronic and Precision Equipment Repair and Maintenance	847	748	785	-12%	5.0%	37
	Total Information Technology and Cyber Security Sector	40,479	49,182	53,661	21%	9.1%	4,479

Source: RDA Global Baltimore Region Job Demand Outlook

Table 73 IT Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	1,154	1,203	49	260	309	1,865	\$13.30	\$27,676
High school diploma or equivalent	13,618	14,529	911	2,489	3,401	12,684	\$24.73	\$51,440
Some College or postsecondary non-degree award	4,004	4,381	377	848	1,225	711	\$25.46	\$52,962
Associates degree	2,367	2,555	188	367	555	1,813	\$48.06	\$99,958
Bachelors degree	27,143	30,007	2,864	3,860	6,725	9,623	\$44.35	\$92,238
Masters, Doctoral, or professional degree	895	985	90	154	243	395	\$43.99	\$91,496
Total	49,182	53,661	4,479	7,980	12,458	27,661	\$36.82	\$76,586

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The IT sector is expected to generate demand for over 37,700 job openings between 2012 and 2020 for workers with an education level at or below a high school diploma or equivalent. The top high-demand occupations in the sector include sales and service representatives, business operations specialists, and general office clerks.

Demand for workers with some postsecondary education up to an Associates degree is the lowest among all levels of education. Approximately 1,800 job openings (14% of job demand) will be for workers in this education level. High demand occupations for workers at this education level include computer support specialists and general/operations managers. Workers with some college or postsecondary education earned an average of \$25.46 in 2012.

Hiring demand for workers with a Bachelors degree or higher level qualification will approach 7,000 total jobs between 2012 and 2020. High demand occupations include software designers, computer programmers and analysts, applications developers, system administrators, and computer hardware engineers. The average hourly wage for workers with a Bachelors degree or higher was approximately \$44.00 per hour in 2012, and all individual occupations in these educational categories earn wages that are well above the living wage level in Baltimore City.

Education and Training Supply Summary – Total IT Sector

Table 74 Programs, Enrollment and Graduates of Programs in the IT Sector, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	2	1%	118	1%	22	1%
WIA-eligible Training (Reported)	28	10%	176	1%	38	1%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	121	45%	5,196	34%	665	22%
Bachelors	70	26%	5,926	39%	1,024	34%
Masters, PhD, and Post-Bachelors Certificates and Programs	50	18%	3,701	24%	1,249	42%
Total, All Levels	271	100%	15,117	100%	2,998	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 75 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Information Technology	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	-	1	-	-	1	2
WIA-eligible Training (Reported)	8	4	14	-	1	1	28
College and University	41	69	86	11	21	13	241
Total Programs	49	73	101	11	22	15	271
Enrollment							
Non-WIA Eligible Training (Reported)	-	-	46	-	-	72	118
WIA-eligible Training (Reported)	81	17	66	-	12	-	176
College and University	2,199	4,373	6,867	295	492	597	14,823
Total Enrollment	2,280	4,390	6,979	295	504	669	15,117
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	22	-	-	-	22
WIA-eligible Training (Reported)	-	2	-	36	-	-	38
College and University	294	1,117	1,363	30	72	62	2,938
Total Graduates/Completions	294	1,119	1,385	66	72	62	2,998

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Education and Training Supply Summary – Health Informatics

Table 76 Programs, Enrollment and Graduates of Programs in Health Informatics, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	1	5%	72	6%	-	0%
WIA-eligible Training (Reported)	1	5%	9	1%	2	1%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	5	24%	272	24%	33	14%
Bachelors	5	24%	492	44%	95	42%
Masters, PhD, and Post-Bachelors Certificates and Programs	9	43%	285	25%	98	43%
Total, All Levels	21	100%	1,130	100%	228	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 77 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Health Informatics	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	1	1
WIA-eligible Training (Reported)	-	1	-	-	-	-	1
College and University	2	12	3	2	-	-	19
Total Programs	2	13	3	2	-	1	21
Enrollment							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	72	72
WIA-eligible Training (Reported)	-	9	-	-	-	-	9
College and University	15	657	336	41	-	-	1,049
Total Enrollment	15	666	336	41	-	72	1,130
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	-	2	-	-	-	-	2
College and University	3	179	38	6	-	-	226
Total Graduates/Completions	3	181	38	6	-	-	228

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Education and Training Supply Summary - Cybersecurity

Table 78 Programs, Enrollment and Graduates of Programs in Cybersecurity, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	-	0%	-	0%	-	0%
WIA-eligible Training (Reported)	3	10%	25	2%	25	9%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	17	57%	910	73%	110	39%
Bachelors	4	13%	-	0%	-	0%
Masters, PhD, and Post-Bachelors Certificates and Programs	6	20%	313	25%	149	52%
Total, All Levels	30	100%	1,248	100%	284	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 79 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Cybersecurity	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	-	-	3	-	-	-	3
College and University	11	8	5	-	3	-	27
Total Programs	11	8	8	-	3	-	30
Enrollment							
Non-WIA Eligible Training (Reported)	-	-	25	-	-	-	25
WIA-eligible Training (Reported)	-	-	25	-	-	-	25
College and University	733	296	110	-	84	-	1,223
Total Enrollment	733	296	160	-	84	-	1,273
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	-	-	25	-	-	-	25
College and University	94	115	41	-	9	-	259
Total Graduates/Completions	94	115	66	-	9	-	284

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 80 Information Technology and Cyber Security Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	2,328	2,421	94	438	531	18	\$33.18	\$69,020
	43-4051	Customer Service Representatives	1,448	1,552	104	329	433	1,386	\$17.29	\$35,960
	41-3099	Sales Representatives, Services, All Other	659	728	69	155	224	474	\$31.23	\$64,960
	13-1199	Business Operations Specialists, All Other	890	971	81	137	218	385	\$37.54	\$78,080
	43-9061	Office Clerks, General	984	1,058	74	139	213	n.a.	\$14.75	\$30,680
Some college, no degree	15-1150	Computer Support Specialists	2,921	3,229	308	615	923	570	\$26.93	\$56,020
Associates degree	11-1021	General and Operations Managers	1,660	1,803	143	247	390	77	\$56.53	\$117,580
	15-1133	Software Developers, Systems Software	3,696	4,114	419	307	726	730	\$52.64	\$109,490
Bachelors degree	15-1121	Computer Systems Analysts	2,381	2,653	272	356	628	572	\$39.57	\$82,290
	15-1131	Computer Programmers	1,917	2,142	226	356	581	715	\$37.15	\$77,270
	15-1799	Computer Occupations, All Other	2,223	2,470	247	333	580	n.a.	\$45.49	\$94,630
	15-1132	Software Developers, Applications	2,693	2,999	306	224	530	864	\$47.92	\$99,670
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	1,739	1,933	193	206	399	780	\$44.06	\$91,640
	11-3021	Computer and Information Systems Managers	1,656	1,841	185	203	388	144	\$57.11	\$118,790
	15-1142	Network and Computer Systems Administrators	1,315	1,459	145	178	322	330	\$40.35	\$83,920
	13-1111	Management Analysts	1,294	1,433	139	169	308	128	\$45.73	\$95,120
	17-2061	Computer Hardware Engineers	506	561	56	95	151	n.a.	\$43.12	\$89,680

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Baltimore Regional Talent Development Pipeline Study

Table 81 Information Technology and Cyber Security Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	132	144	38	11	24	182
	43-4051	Customer Service Representatives	98	116	30	13	16	161
	41-3099	Sales Representatives, Services, All Other	54	53	13	9	8	87
	13-1199	Business Operations Specialists, All Other	52	53	11	8	9	86
	43-9061	Office Clerks, General	52	52	12	7	9	82
Some college, no degree	15-1150	Computer Support Specialists	222	206	53	32	36	373
Associates degree	11-1021	General and Operations Managers	96	92	20	13	16	152
	15-1133	Software Developers, Systems Software	185	145	24	27	32	314
	15-1121	Computer Systems Analysts	156	132	30	23	25	263
	15-1131	Computer Programmers	144	123	29	22	24	240
	15-1799	Computer Occupations, All Other	140	128	26	22	24	240
Bachelors degree	15-1132	Software Developers, Applications	134	107	17	20	24	229
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	99	86	16	15	16	167
	11-3021	Computer and Information Systems Managers	96	83	16	14	16	163
	15-1142	Network and Computer Systems Administrators	80	69	14	12	13	134
	13-1111	Management Analysts	76	65	14	11	13	129
	17-2061	Computer Hardware Engineers	38	33	8	5	6	62

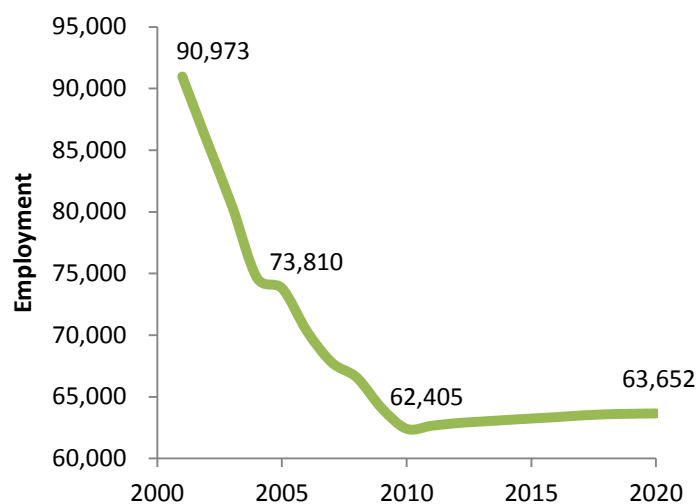
Table 82 Information Technology and Cyber Security Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Moderate-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	41-3099	Sales Representatives, Services, All Other	Short-term on-the-job training	None
	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	43-9061	Office Clerks, General	Short-term on-the-job training	None
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	15-1133	Software Developers, Systems Software	None	None
	15-1121	Computer Systems Analysts	None	None
	15-1131	Computer Programmers	None	None
	15-1799	Computer Occupations, All Other	None	None
	15-1132	Software Developers, Applications	None	None
	15-1179	Information Security Analysts, Web Developers, and Computer Network Architects	None	1 to 5 years
	11-3021	Computer and Information Systems Managers	None	More than 5 years
	15-1142	Network and Computer Systems Administrators	None	None
	13-1111	Management Analysts	None	1 to 5 years
	17-2061	Computer Hardware Engineers	None	None

Manufacturing

The manufacturing sector is highly diverse and includes large employers in food production and baking, printing and related activities, pharmaceutical manufacturing, machine shops, instrument manufacturers, shipbuilding, plastics, chemicals, and cement products. Trends in the region's manufacturing sector mirror national trends with a decline in employment over the past decade (a 27% decline between 2002 and 2012). The beverage manufacturing industry experienced the greatest loss in jobs between 2004 and 2012, losing over 1,700 jobs during the period. Employment in the sector reached a low point in 2010, with slightly over 62,400 workers.

Figure 16 Employment in the Baltimore Region Manufacturing Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Expectations on the future of the manufacturing sector are uncertain and mixed, with some evidence showing that a portion of off-shore manufacturing is relocating into the US while other evidence suggests that ever-improving technology will lead to continued declines in the total number of workers required in the sector. The forecast outlook in the Regional Talent Development Pipeline Study is essentially a flat growth scenario, with most hiring demand being generated by worker turnover. Between 2012 and 2020 the forecast scenario projects an increase of 789 new jobs in the Baltimore Region (this represents a 1.3% growth over eight years). Food manufacturing, cut and sew apparel manufacturing, precision Instruments manufacturing, and other electrical equipment and component manufacturing are expected to account for most of the total new job growth in the sector. Job turnover will require replacement of nearly 11,000 workers between 2012 and 2020, bringing the total hiring demand to nearly 12,000 over the period.

Table 83 Employment Outlook for the Manufacturing Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
3111	Animal Food Manufacturing	167	275	296	65%	7.9%	22
3112	Grain and Oilseed Milling	-	-	-	-	-	-
3113	Sugar and Confectionery Product Manufacturing	766	741	755	-3%	1.9%	14
3114	Fruit and Vegetable Preserving and Specialty Food Manufacturing	-	-	-	-	-	-
3115	Dairy Product Manufacturing	-	53	53	-	-0.6%	(0)
3116	Animal Slaughtering and Processing	284	594	610	110%	2.6%	15
3117	Seafood Product Preparation and Packaging	-	-	-	-	-	-
3118	Bakeries and Tortilla Manufacturing	4,660	4,374	4,494	-6%	2.7%	120

Baltimore Regional Talent Development Pipeline Study

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
3119	Other Food Manufacturing	2,613	4,355	4,456	67%	2.3%	101
3121	Beverage Manufacturing	2,873	1,108	1,144	-61%	3.2%	36
3131	Fiber, Yarn, and Thread Mills	-	-	-	-	-	-
3132	Fabric Mills	-	13	14	-	6.6%	1
3133	Textile and Fabric Finishing and Fabric Coating Mills	620	421	431	-32%	2.3%	10
3141	Textile Furnishings Mills	149	91	94	-39%	3.6%	3
3149	Other Textile Product Mills	653	343	354	-47%	3.2%	11
3152	Cut and Sew Apparel Manufacturing	1,180	1,336	1,442	13%	7.9%	106
3159	Apparel Accessories and Other Apparel Manufacturing	-	-	-	-	-	-
3162	Footwear Manufacturing	-	-	-	-	-	-
3169	Other Leather and Allied Product Manufacturing	-	-	-	-	-	-
3211	Sawmills and Wood Preservation	-	-	-	-	-	-
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	113	530	495	370%	-6.6%	(35)
3219	Other Wood Product Manufacturing	2,100	656	658	-69%	0.2%	1
3221	Pulp, Paper, and Paperboard Mills	-	-	-	-	-	-
3222	Converted Paper Product Manufacturing	3,697	1,848	1,845	-50%	-0.2%	(4)
3231	Printing and Related Support Activities	7,496	5,523	5,538	-26%	0.3%	15
3241	Petroleum and Coal Products Manufacturing	243	240	228	-1%	-4.7%	(11)
3251	Basic Chemical Manufacturing	1,101	1,395	1,358	27%	-2.6%	(37)
3252	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	-	-	-	-	-	-
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	82	81	79	-1%	-3.2%	(3)
3254	Pharmaceutical and Medicine Manufacturing	4,540	3,182	3,186	-30%	0.1%	5
3255	Paint, Coating, and Adhesive Manufacturing	473	1,083	1,070	129%	-1.2%	(13)
3256	Soap, Cleaning Compound, and Toilet Preparation Manufacturing	2,730	646	695	-76%	7.6%	49
3259	Other Chemical Product and Preparation Manufacturing	745	2,226	2,220	199%	-0.3%	(7)
3261	Plastics Product Manufacturing	3,066	2,063	2,042	-33%	-1.0%	(21)
3262	Rubber Product Manufacturing	418	149	145	-64%	-2.5%	(4)
3271	Clay Product and Refractory Manufacturing	-	-	-	-	-	-
3272	Glass and Glass Product Manufacturing	-	-	-	-	-	-
3273	Cement and Concrete Product Manufacturing	1,868	2,027	2,025	9%	-0.1%	(3)
3274	Lime and Gypsum Product Manufacturing	-	-	-	-	-	-
3279	Other Nonmetallic Mineral Product Manufacturing	505	839	820	66%	-2.3%	(19)
3311	Iron and Steel Mills and Ferroalloy Manufacturing	165	103	101	-38%	-1.4%	(1)
3312	Steel Product Manufacturing from Purchased Steel	2,098	100	98	-95%	-1.4%	(1)
3313	Alumina and Aluminum Production and Processing	-	-	-	-	-	-
3314	Nonferrous Metal (except Aluminum) Production and Processing	-	-	-	-	-	-
3315	Foundries	768	7	7	-99%	-1.4%	(0)
3321	Forging and Stamping	71	246	240	246%	-2.3%	(6)
3322	Cutlery and Handtool Manufacturing	-	-	-	-	-	-
3323	Architectural and Structural Metals Manufacturing	1,480	1,503	1,601	2%	6.5%	98
3324	Boiler, Tank, and Shipping Container Manufacturing	122	195	200	60%	2.4%	5
3326	Spring and Wire Product Manufacturing	958	251	244	-74%	-2.8%	(7)
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	2,487	2,907	3,006	17%	3.4%	98
3328	Coating, Engraving, Heat Treating, and Allied Activities	317	243	238	-23%	-2.2%	(5)
3329	Other Fabricated Metal Product Manufacturing	830	252	263	-70%	4.0%	10
3331	Agriculture, Construction, and Mining Machinery Manufacturing	-	-	-	-	-	-
3332	Industrial Machinery Manufacturing	1,772	1,488	1,541	-16%	3.6%	54

Baltimore Regional Talent Development Pipeline Study

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
3333	Commercial and Service Industry Machinery Manufacturing	330	104	115	-69%	10.6%	11
3334	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing	153	150	147	-2%	-2.0%	(3)
3335	Metalworking Machinery Manufacturing	371	382	403	3%	5.4%	21
3336	Engine, Turbine, and Power Transmission Equipment Manufacturing	-	-	-	-	-	-
3339	Other General Purpose Machinery Manufacturing	4,096	2,797	2,800	-32%	0.1%	3
3341	Computer and Peripheral Equipment Manufacturing	-	-	-	-	-	-
3342	Communications Equipment Manufacturing	1,300	240	245	-82%	2.2%	5
3343	Audio and Video Equipment Manufacturing	-	-	-	-	-	-
3344	Semiconductor and Other Electronic Component Manufacturing	618	454	449	-26%	-1.2%	(5)
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	1,619	3,254	3,370	101%	3.6%	116
3346	Manufacturing and Reproducing Magnetic and Optical Media	146	17	18	-88%	6.8%	1
3351	Electric Lighting Equipment Manufacturing	-	52	56	-	7.1%	4
3352	Household Appliance Manufacturing	-	-	-	-	-	-
3353	Electrical Equipment Manufacturing	-	-	-	-	-	-
3359	Other Electrical Equipment and Component Manufacturing	1,638	2,518	2,618	54%	4.0%	100
3361	Motor Vehicle Manufacturing	-	-	-	-	-	-
3362	Motor Vehicle Body and Trailer Manufacturing	-	-	-	-	-	-
3363	Motor Vehicle Parts Manufacturing	447	203	218	-55%	7.1%	14
3364	Aerospace Product and Parts Manufacturing	489	467	500	-4%	7.1%	33
3365	Railroad Rolling Stock Manufacturing	-	-	-	-	-	-
3366	Ship and Boat Building	4,253	4,446	4,222	5%	-5.0%	(224)
3369	Other Transportation Equipment Manufacturing	-	-	-	-	-	-
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	1,716	1,197	1,220	-30%	1.9%	23
3372	Office Furniture (including Fixtures) Manufacturing	294	78	84	-74%	8.2%	6
3379	Other Furniture Related Product Manufacturing	-	-	-	-	-	-
3391	Medical Equipment and Supplies Manufacturing	1,008	1,059	1,080	5%	2.0%	21
3399	Other Miscellaneous Manufacturing	1,953	1,957	2,022	0%	3.3%	64
	Total Manufacturing Sector	74,641	62,863	63,652	-16%	1.3%	789

Source: RDA Global Baltimore Region Job Demand Outlook

Supply and Demand Snapshot

Approximately 80% of the future hiring demand in the manufacturing sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 9,500 workers between 2012 and 2020). Most jobs in the sector require at least short-term on-the-job training and several of the higher-demand occupations in this sector require mid-term to longer term on the job training. There are relatively few job training or formal educational programs that prepare workers for careers at this level. There are approximately 38 manufacturing-related programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion less than a Bachelors degree.

In total in 2012, there were approximately 1,300 graduates of 72 educational programs in the region that prepare workers for careers in occupations related to the manufacturing sector. Most graduates of the region's formal manufacturing-related programs (86%) earn a Bachelors degree or higher. In 2012, just over 1,100 program graduates in the Baltimore Region earned a Bachelors degree or other degree

or certificate beyond a Bachelor in a program that is related to the manufacturing sector; total hiring demand within the manufacturing sector for jobs requiring a Bachelors degree or higher is expected to reach just above 2,400 between 2012 and 2020.

Table 84 Manufacturing Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	9,493	9,683	191	1,973	2,164	2,237	\$13.30	\$27,661
High school diploma or equivalent	34,539	34,901	362	5,911	6,273	11,222	\$20.40	\$42,425
Some College or postsecondary non-degree award	3,084	3,109	25	418	443	1,028	\$26.65	\$55,421
Associates degree	3,727	3,768	40	566	607	2,007	\$44.40	\$92,356
Bachelors degree	11,714	11,882	169	2,190	2,358	9,733	\$43.25	\$89,956
Masters, Doctoral, or professional degree	307	309	2	42	44	316	\$44.03	\$91,596
Total	62,863	63,652	789	11,101	11,889	27,113	\$25.43	\$52,891

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The manufacturing sector is expected to generate demand for about 2,170 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. Most of these jobs will be for workers involved in freight and materials movement, truck and tractor operators, production workers, and stock and order fillers. Jobs at this education level earned average hourly wages in the range of \$10 to \$14 per hour in 2012, below the living wage level for a single parent family with one child in Baltimore City.

The sector is expected to generate demand for approximately 6,300 new hires that require a high school diploma or equivalent. Higher demand jobs in this sector include both office jobs such sales representatives, purchasing agents, and customer service representatives, as well as jobs in production and delivery such as assemblers, shipping clerks, heavy truck drivers, machinists, and industrial mechanics. Average hourly earnings for workers in these occupations in 2012 were as low as \$13.25 per hour for team assemblers, although most jobs pay wages in the \$14 to \$20 range. Purchasing agents and sales representatives earn higher wages, in excess of \$20 per hour, and require moderate to long-term on the job training.

The only high demand occupations requiring an Associates degree or other post-secondary education less than a Bachelors degree are operations managers and first-line supervisors of production and operating workers. The hourly wages for first line supervisors of production workers were \$27.48 per hour and these jobs typically require a minimum of several years of experience.

Occupations at the Bachelors degree and higher level include engineers (mechanical, industrial), industrial production managers, chemists, accountants and auditors. Only 20% of new job openings will be for workers in these occupations between 2012 and 2020. All of the high-demand occupations in this category pay average wages in excess of the living wage.

Education and Training Supply Summary

Table 85 Programs, Enrollment and Graduates of Programs in Manufacturing, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	1	1%	45	1%	-	0%
WIA-eligible Training (Reported)	9	13%	189	4%	27	2%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	28	39%	1,272	28%	158	12%
Bachelors	21	29%	1,774	39%	376	28%
Masters, PhD, and Post-Bachelors Certificates and Programs	13	18%	1,276	28%	759	58%
Total, All Levels	72	100%	4,556	100%	1,320	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 86 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Manufacturing	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	1	-	-	-	-	-	1
WIA-eligible Training (Reported)	4	3	-	-	1	1	9
College and University	2	22	24	3	8	3	62
Total Programs	7	25	24	3	9	4	72
Enrollment							
Non-WIA Eligible Training (Reported)	45	-	-	-	-	-	45
WIA-eligible Training (Reported)	99	27	-	-	-	63	189
College and University	100	1,916	1,969	75	175	87	4,322
Total Enrollment	244	1,943	1,969	75	175	150	4,556
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	1	2	-	-	-	24	27
College and University	22	855	377	8	23	8	1,293
Total Graduates/Completions	23	857	377	8	23	32	1,320

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 87 Manufacturing Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	1,437	1,456	18	368	386	44	\$13.52	\$28,130
	53-7064	Packers and Packagers, Hand	1,029	1,049	21	235	256	8	\$12.00	\$24,950
	53-7051	Industrial Truck and Tractor Operators	938	947	10	212	222	10	\$17.87	\$37,170
	51-9198	Helpers--Production Workers	1,440	1,457	17	191	209	n.a.	\$12.70	\$26,410
	43-5081	Stock Clerks and Order Fillers	500	507	7	99	106	380	\$12.42	\$25,840
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,674	1,699	25	315	340	18	\$33.18	\$69,020
High school diploma or equivalent	43-4051	Customer Service Representatives	1,364	1,381	17	310	327	1,386	\$17.29	\$35,960
	51-2092	Team Assemblers	1,893	1,919	26	300	326	n.a.	\$13.35	\$27,760
	43-5071	Shipping, Receiving, and Traffic Clerks	1,063	1,080	17	217	234	380	\$15.89	\$33,050
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1,167	1,184	17	204	220	20	\$19.01	\$39,540
	51-9111	Packaging and Filling Machine Operators and Tenders	1,434	1,459	25	189	215	n.a.	\$14.23	\$29,590
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	896	907	11	192	204	40	\$31.14	\$64,760
	53-3032	Heavy and Tractor-Trailer Truck Drivers	1,205	1,209	5	192	197	117	\$20.06	\$41,730
	43-9061	Office Clerks, General	1,235	1,254	19	175	194	n.a.	\$14.75	\$30,680
	51-4041	Machinists	1,069	1,093	23	157	181	40	\$22.44	\$46,670
	49-9071	Maintenance and Repair Workers, General	1,154	1,164	10	170	180	126	\$19.26	\$40,070
Postsecondary non-degree	51-4121	Welders, Cutters, Solderers, and Brazers	804	803	-1	172	170	n.a.	\$19.81	\$41,210
	49-9041	Industrial Machinery Mechanics	901	909	9	138	147	24	\$23.22	\$48,290
	51-5112	Printing Press Operators	872	875	3	137	140	16	\$19.63	\$40,820
	43-5061	Production, Planning, and Expediting Clerks	604	608	4	127	131	81	\$22.35	\$46,480
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	534	541	6	114	121	580	\$26.45	\$55,010
	51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	426	429	2	102	104	8	\$18.93	\$39,370
	51-1011	First-Line Supervisors of Production and Operating Workers	2,185	2,205	20	229	249	70	\$27.48	\$57,150

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
award										
Associates degree	11-1021	General and Operations Managers	2,182	2,213	31	325	356	77	\$56.53	\$117,580
Bachelors degree	17-2141	Mechanical Engineers	847	852	5	218	223	n.a.	\$43.87	\$91,250
	11-3051	Industrial Production Managers	658	665	7	124	131	n.a.	\$46.84	\$97,440
	19-2031	Chemists	464	464	0	121	121	n.a.	\$39.34	\$81,840
	17-2112	Industrial Engineers	627	639	11	109	121	n.a.	\$41.95	\$87,260
	13-2011	Accountants and Auditors	644	652	8	111	119	270	\$35.18	\$73,180

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 88 Manufacturing Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	Hiring Demand by County							
	SOC	Occupation	ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	82	100	89	34	37	45
	53-7064	Packers and Packers, Hand	45	60	70	11	30	40
	53-7051	Industrial Truck and Tractor Operators	42	61	50	14	27	27
	51-9198	Helpers--Production Workers	61	43	48	11	22	24
	43-5081	Stock Clerks and Order Fillers	23	29	21	7	12	14
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	93	81	62	28	39	36
	43-4051	Customer Service Representatives	95	89	55	19	33	36
	51-2092	Team Assemblers	102	66	45	22	33	59
	43-5071	Shipping, Receiving, and Traffic Clerks	62	58	43	19	24	28
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	55	56	39	17	22	30
	51-9111	Packaging and Filling Machine Operators and Tenders	28	67	52	5	36	26
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	50	54	28	16	24	31
	53-3032	Heavy and Tractor-Trailer Truck Drivers	57	48	26	16	30	19

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	43-9061	Office Clerks, General	57	42	32	15	25	22
	51-4041	Machinists	73	29	16	20	26	16
	49-9071	Maintenance and Repair Workers, General	44	45	42	9	18	22
	51-4121	Welders, Cutters, Solderers, and Brazers	39	54	23	13	25	17
	49-9041	Industrial Machinery Mechanics	29	39	37	8	17	17
	51-5112	Printing Press Operators	49	44	21	2	15	8
	43-5061	Production, Planning, and Expediting Clerks	31	39	21	11	13	16
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	30	33	21	10	13	14
	51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	26	34	21	4	10	9
	51-1011	First-Line Supervisors of Production and Operating Workers	71	54	45	17	31	31
Postsecondary non-degree award	11-1021	General and Operations Managers	100	83	58	26	46	43
Bachelors degree	17-2141	Mechanical Engineers	54	65	29	19	23	34
	11-3051	Industrial Production Managers	33	35	24	9	14	16
	19-2031	Chemists	13	73	21	0	9	4
	17-2112	Industrial Engineers	31	28	16	7	15	24
	13-2011	Accountants and Auditors	30	32	19	8	15	16

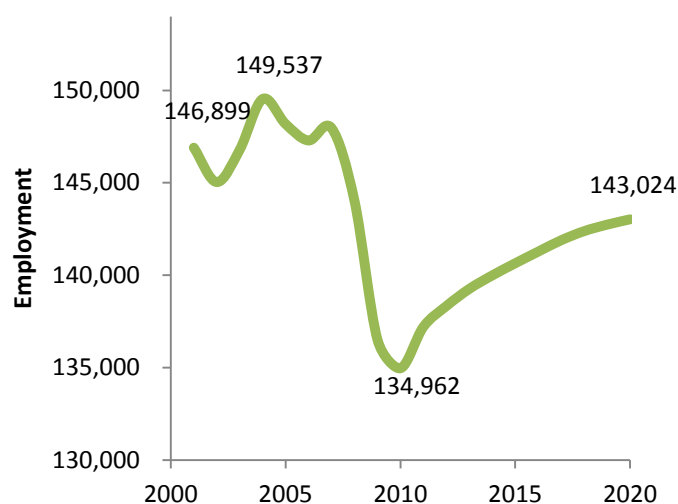
Table 89 Manufacturing Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
	53-7064	Packers and Packagers, Hand	Short-term on-the-job training	None
	53-7051	Industrial Truck and Tractor Operators	Short-term on-the-job training	Less than 1 year
	51-9198	Helpers--Production Workers	Short-term on-the-job training	None
	43-5081	Stock Clerks and Order Fillers	Short-term on-the-job training	None
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Moderate-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	51-2092	Team Assemblers	Moderate-term on-the-job training	None
	43-5071	Shipping, Receiving, and Traffic Clerks	Short-term on-the-job training	None
	51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	Moderate-term on-the-job training	None
	51-9111	Packaging and Filling Machine Operators and Tenders	Moderate-term on-the-job training	None
	13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	Long-term on-the-job training	None
	53-3032	Heavy and Tractor-Trailer Truck Drivers	Short-term on-the-job training	1 to 5 years
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	51-4041	Machinists	Long-term on-the-job training	None
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	51-4121	Welders, Cutters, Solderers, and Brazers	Moderate-term on-the-job training	Less than 1 year
	49-9041	Industrial Machinery Mechanics	Long-term on-the-job training	None
	51-5112	Printing Press Operators	Moderate-term on-the-job training	None
	43-5061	Production, Planning, and Expediting Clerks	Moderate-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	Moderate-term on-the-job training	None
Postsecondary non-degree award	51-1011	First-Line Supervisors of Production and Operating Workers	None	1 to 5 years
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	17-2141	Mechanical Engineers	None	None
	11-3051	Industrial Production Managers	None	1 to 5 years
	19-2031	Chemists	None	None
	17-2112	Industrial Engineers	None	None
	13-2011	Accountants and Auditors	None	None

Retail

The largest employers in the retail sector are automobile dealerships, clothing retailers, grocery stores, and department stores. The retail sector has demonstrated sporadic growth and decline until the recession, when it began a sharp downward trend. Between 2002 and 2012, the retail sector experienced an overall decline of roughly 5%. Employment in the sector reached a low point in 2010, with slightly under 135,000 workers. New investment in the retail sector and improvements in earnings in the region are expected to support a

Figure 17 Employment in the Baltimore Region Retail Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

gradual recovery of the sector by 2020 with the addition of 4,695 jobs in the Baltimore Region (this represents a 3.4% growth rate). In addition, job turnover will require replacement of nearly 33,000 workers between 2012 and 2020, bringing the total hiring demand to nearly 38,000 over the period. Department stores, automobile dealers, building materials and supplies dealers, grocery stores, and general merchandise stores account for 58% of the total new job growth in the sector.

Supply and Demand Snapshot

In 2012, there were approximately 56 graduates of 15 educational programs in the region that prepare workers for careers in occupations related to the retail sector. Most graduates of retail related programs earn a college & university lower division certificate, Associates degree or a non-degree undergrad award (48%) or a Masters degree or higher (43%) for operational managers or specialists. In 2012, there were only 28 individuals that completed a Bachelors degree or other degree or certificate beyond a Bachelor that was oriented to the retail sector.

Approximately 97% of the future hiring demand in the retail sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 36,500 workers between 2012 and 2020). There are nine programs at colleges, universities and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree. There were 28 graduates of these programs in 2012. Many of the jobs for workers in the retail sector provide on-the-job training for new hires. There may be an opportunity to expand workforce development efforts across the region in order to meet the large demand for workers and to help workers refresh their skills or learn new skills such as customer service, basic literacy and math skills or other skills that are important to the retail sector.

Baltimore Regional Talent Development Pipeline Study

Table 90 Employment Outlook for the Retail Trade Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
4411	Automobile Dealers	13,863	11,725	12,124	-15%	3.4%	398
4412	Other Motor Vehicle Dealers	1,462	1,076	1,109	-26%	3.1%	33
4413	Automotive Parts, Accessories, and Tire Stores	3,764	3,340	3,430	-11%	2.7%	90
4421	Furniture Stores	3,645	2,099	2,159	-42%	2.9%	60
4422	Home Furnishings Stores	2,598	2,734	2,831	5%	3.5%	97
4431	Electronics and Appliance Stores	5,548	4,717	4,834	-15%	2.5%	117
4441	Building Material and Supplies Dealers	9,551	8,834	9,084	-8%	2.8%	250
4442	Lawn and Garden Equipment and Supplies Stores	1,536	1,016	1,041	-34%	2.5%	25
4451	Grocery Stores	27,534	27,038	27,808	-2%	2.8%	770
4452	Specialty Food Stores	2,521	2,040	2,108	-19%	3.3%	68
4453	Beer, Wine, and Liquor Stores	3,464	3,079	3,150	-11%	2.3%	71
4461	Health and Personal Care Stores	9,079	9,268	9,507	2%	2.6%	238
4471	Gasoline Stations	4,323	3,295	3,380	-24%	2.6%	85
4481	Clothing Stores	12,096	9,797	10,040	-19%	2.5%	243
4482	Shoe Stores	2,028	2,581	2,634	27%	2.1%	53
4483	Jewelry, Luggage, and Leather Goods Stores	1,763	1,576	1,629	-11%	3.4%	53
4511	Sporting Goods, Hobby, and Musical Instrument Stores	4,502	4,700	4,914	4%	4.6%	214
4512	Book, Periodical, and Music Stores	2,756	1,174	1,225	-57%	4.4%	51
4521	Department Stores	19,041	20,531	21,568	8%	5.0%	1,037
4529	Other General Merchandise Stores	4,985	6,297	6,561	26%	4.2%	263
4531	Florists	1,455	871	912	-40%	4.7%	41
4532	Office Supplies, Stationery, and Gift Stores	4,327	3,687	3,847	-15%	4.4%	161
4533	Used Merchandise Stores	1,553	1,719	1,774	11%	3.2%	55
4539	Other Miscellaneous Store Retailers	3,315	2,522	2,628	-24%	4.2%	106
4541	Electronic Shopping and Mail-Order Houses	436	905	977	108%	7.9%	71
4542	Vending Machine Operators	670	449	457	-33%	1.8%	8
4543	Direct Selling Establishments	1,722	1,258	1,293	-27%	2.8%	36
	Total Retail Trade Sector	149,537	138,329	143,024	-7%	3.4%	4,695

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The retail sector is expected to generate demand for just under 26,300 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. High demand occupations in the sector will be for cashiers, retail salespersons, and clerks. Jobs at this education level earned average hourly wages of \$11.77 in 2012, well below the living wage level for a single parent family with one child in Baltimore City.

The retail sector is expected to generate hiring demand for approximately 9,200 jobs that require a high school diploma or equivalent. Some of the highest demand jobs at this education level include first-line supervisors of retail, sales, office support and administrative workers, customer service representatives, pharmacy technicians, and various types of clerks.

The only high demand occupation requiring an Associates degree or other post-secondary education less than a Bachelors degree is a general and operations manager. This occupation offers a range of wages, the lowest of which do not exceed the minimum living wage for a single parent with one child in Baltimore City.

Occupations at the Bachelors degree and higher level include sales managers and pharmacists. Only 3% of new job openings will be for workers in these occupations between 2012 and 2020. All of the high-demand occupations in this category pay average wages in excess of the living wage.

Table 91 Retail Trade Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	86,140	89,069	2,930	23,356	26,286	2,259	\$11.77	\$24,483
High school diploma or equivalent	42,691	44,137	1,446	7,821	9,266	11,661	\$19.55	\$40,651
Some College or postsecondary non-degree award	1,367	1,416	49	230	279	1,105	\$20.75	\$43,150
Associates degree	3,430	3,544	113	512	625	1,491	\$55.60	\$115,652
Bachelors degree	2,919	3,023	103	544	647	8,903	\$45.75	\$95,155
Masters, Doctoral, or professional degree	1,781	1,835	54	356	410	324	\$50.66	\$105,359
Total	138,329	143,024	4,695	32,818	37,514	26,313	\$16.56	\$34,451

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Education and Training Supply Summary

Table 92 Programs, Enrollment and Graduates of Programs in Retail, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	1	7%	-	0%	-	0%
WIA-eligible Training (Reported)	4	27%	99	11%	1	2%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	4	27%	550	62%	27	48%
Bachelors	2	13%	93	10%	4	7%
Masters, PhD, and Post-Bachelors Certificates and Programs	4	27%	146	16%	24	43%
Total, All Levels	15	100%	888	100%	56	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 93 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Retail	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	-	1	-	-	-	-	1
WIA-eligible Training (Reported)	3	-	1	-	-	-	4
College and University	1	3	3	1	-	2	10
Total Programs	4	4	4	1	-	2	15
Enrollment							
Non-WIA Eligible Training (Reported)	-	n.a.	-	-	-	-	-
WIA-eligible Training (Reported)	99	-	-	-	-	-	99
College and University	4	79	374	21	-	311	789
Total Enrollment	103	79	374	21	-	311	888
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	-	-	-	-	-	-
WIA-eligible Training (Reported)	1	-	-	-	-	-	1
College and University	1	8	43	3	-	-	55
Total Graduates/Completions	2	8	43	3	-	-	56

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 94 Retail Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	41-2011	Cashiers	26,393	27,249	856	9,586	10,442	143	\$10.52	\$21,880
	41-2031	Retail Salespersons	33,072	34,213	1,142	7,778	8,920	680	\$12.12	\$25,210
	43-5081	Stock Clerks and Order Fillers	12,182	12,633	451	2,417	2,868	380	\$12.42	\$25,840
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	2,995	3,108	113	767	880	44	\$13.52	\$28,130
	53-7064	Packers and Packagers, Hand	1,394	1,435	42	319	360	8	\$12.00	\$24,950
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	519	536	17	301	318	n.a.	\$9.18	\$19,090
	41-2022	Parts Salespersons	906	934	28	265	293	104	\$17.18	\$35,730
	51-3021	Butchers and Meat Cutters	801	824	23	186	209	n.a.	\$17.67	\$36,750
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	926	961	35	140	175	60	\$11.62	\$24,170
	51-3011	Bakers	604	623	19	140	159	n.a.	\$14.01	\$29,130
	53-7061	Cleaners of Vehicles and Equipment	473	489	16	112	128	n.a.	\$10.60	\$22,040
	41-2021	Counter and Rental Clerks	577	597	20	105	126	n.a.	\$15.26	\$31,730
High school diploma or equivalent	41-1011	First-Line Supervisors of Retail Sales Workers	10,576	10,925	349	1,971	2,320	112	\$20.74	\$43,140
	43-4051	Customer Service Representatives	3,127	3,238	111	710	821	1,386	\$17.29	\$35,960
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	2,020	2,098	78	432	509	580	\$26.45	\$55,010
	29-2052	Pharmacy Technicians	2,340	2,409	69	326	395	33	\$14.59	\$30,340
	53-3033	Light Truck or Delivery Services Drivers	1,764	1,818	55	281	335	176	\$17.18	\$35,730
	43-5071	Shipping, Receiving, and Traffic Clerks	1,277	1,326	48	261	309	380	\$15.89	\$33,050
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	1,666	1,722	56	147	203	310	\$19.69	\$40,950
	27-1023	Floral Designers	526	549	23	130	153	11	\$16.36	\$34,030
	33-9032	Security Guards	767	799	33	98	130	456	\$14.85	\$30,880
	13-1022	Wholesale and Retail Buyers, Except Farm Products	446	461	15	90	105	n.a.	\$29.60	\$61,570
Associates degree	11-1021	General and Operations Managers	3,319	3,429	110	494	604	77	\$56.53	\$117,580

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Bachelors degree	11-2022	Sales Managers	854	884	30	199	229	340	\$60.09	\$124,990
Doctoral or professional degree	29-1051	Pharmacists	1,694	1,746	52	344	396	n.a.	\$51.33	\$106,760

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 95 Retail Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County							
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD		
Less than high school	41-2011	Cashiers	2,183	3,611	1,414	666	1,161	1,407		
	41-2031	Retail Salespersons	2,180	3,251	766	423	961	1,339		
	43-5081	Stock Clerks and Order Fillers	595	1,014	281	187	397	393		
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	183	323	80	57	120	117		
	53-7064	Packers and Packers, Hand	66	119	54	22	53	47		
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	62	105	49	19	37	46		
	41-2022	Parts Salespersons	62	114	21	18	40	39		
	51-3021	Butchers and Meat Cutters	39	68	31	13	30	28		
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	35	65	15	10	25	26		
	51-3011	Bakers	30	54	21	10	22	21		
High school diploma or equivalent	53-7061	Cleaners of Vehicles and Equipment	26	54	3	5	20	21		
	41-2021	Counter and Rental Clerks	25	51	8	7	17	18		
	41-1011	First-Line Supervisors of Retail Sales Workers	517	836	241	120	270	337		
	43-4051	Customer Service Representatives	174	293	84	46	115	109		
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	105	187	42	33	72	70		
	29-2052	Pharmacy Technicians	72	145	61	19	54	43		

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
	53-3033	Light Truck or Delivery Services Drivers	61	130	40	19	43	42
	43-5071	Shipping, Receiving, and Traffic Clerks	67	110	26	17	45	44
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	40	73	16	10	33	32
	27-1023	Floral Designers	29	64	13	10	18	20
	33-9032	Security Guards	27	46	8	9	21	19
	13-1022	Wholesale and Retail Buyers, Except Farm Products	22	37	11	5	15	16
Associates degree	11-1021	General and Operations Managers	127	216	58	32	82	89
Bachelors degree	11-2022	Sales Managers	50	87	16	12	30	34
Doctoral or professional degree	29-1051	Pharmacists	75	145	62	21	51	43

Table 96 Retail Sector Job Training and Experience Requirements, Selected High-Demand Occupations

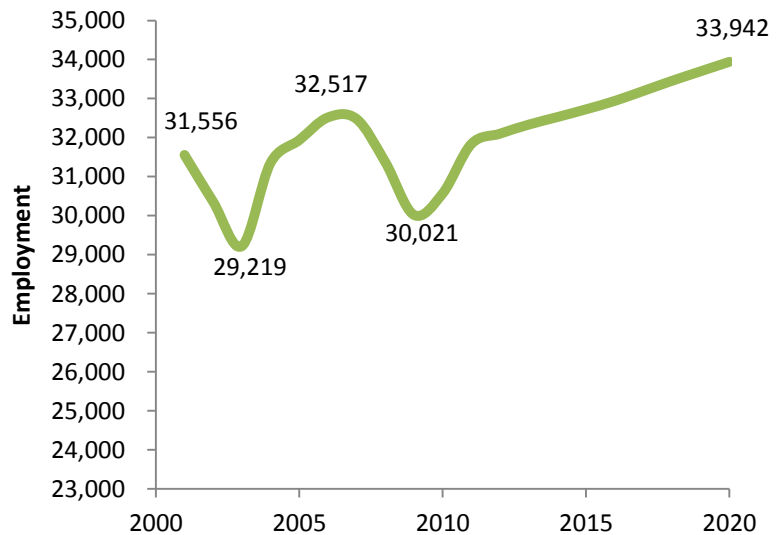
Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	41-2011	Cashiers	Short-term on-the-job training	None
	41-2031	Retail Salespersons	Short-term on-the-job training	None
	43-5081	Stock Clerks and Order Fillers	Short-term on-the-job training	None
	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
	53-7064	Packers and Packagers, Hand	Short-term on-the-job training	None
	35-3022	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	Short-term on-the-job training	None
	41-2022	Parts Salespersons	Moderate-term on-the-job training	None
	51-3021	Butchers and Meat Cutters	Long-term on-the-job training	None
	37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	Short-term on-the-job training	None
	51-3011	Bakers	Long-term on-the-job training	None
	53-7061	Cleaners of Vehicles and Equipment	Short-term on-the-job training	None
	41-2021	Counter and Rental Clerks	Short-term on-the-job training	None
High school diploma or equivalent	41-1011	First-Line Supervisors of Retail Sales Workers	None	1 to 5 years
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	29-2052	Pharmacy Technicians	Moderate-term on-the-job training	None
	53-3033	Light Truck or Delivery Services Drivers	Short-term on-the-job training	None
	43-5071	Shipping, Receiving, and Traffic Clerks	Short-term on-the-job training	None
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	27-1023	Floral Designers	Short-term on-the-job training	None
	33-9032	Security Guards	Short-term on-the-job training	None
	13-1022	Wholesale and Retail Buyers, Except Farm Products	Long-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	11-2022	Sales Managers	None	1 to 5 years
Doctoral or professional degree	29-1051	Pharmacists	None	None

Transportation and Warehousing

The transportation and warehousing sector is made up of businesses providing air, rail and water transportation services, trucking and bus services (including urban transit), taxi and limousine services, warehousing and storage and other businesses that provide supporting services to these industries. The transportation and warehousing sector has demonstrated cyclical growth and decline over the past decade, with overall employment growth of 6% over the last decade.

Employment in the transportation and warehousing sector reached a low point in 2003, with slightly over 29,000 workers. The sector peaked three years later with over 32,500 jobs, before falling again to a low point of 30,021 jobs in 2009. The sector is expected to grow slowly until 2020 with an addition of 1,842 jobs in the Baltimore Region (this represents a 5.7% growth). In addition, job turnover will require replacement of nearly 5,904 workers between 2012 and 2020, bringing the total hiring demand to nearly 8,000 jobs over the period. General and specialized freight trucking, and warehouse and storage will account for approximately 60% of the total new job growth in the sector.

Figure 18 Employment in the Baltimore Region Transportation and Warehousing Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Supply and Demand Snapshot

In 2012, there were approximately 1,476 graduates of 45 educational programs in the region that prepare workers for careers in occupations related to the transportation and warehousing sector. Most graduates (87%) earned awards from WIA-eligible training providers (mainly truck driving schools).

Approximately 94% of the future hiring demand in the transportation and warehousing sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 7,270 workers between 2012 and 2020). There are approximately 44 programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree and there were nearly 1,500 graduates of these programs in 2012.

Baltimore Regional Talent Development Pipeline Study

Table 97 Employment Outlook for the Transportation and Warehousing Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
4811	Scheduled Air Transportation	3,954	3,974	4,066	1%	2.3%	92
4812	Nonscheduled Air Transportation	358	124	134	-65%	8.5%	10
4821	Rail Transportation	-	-	-	-	-	-
4831	Deep Sea, Coastal, and Great Lakes Water Transportation	8	32	33	285%	2.1%	1
4832	Inland Water Transportation	-	896	926	-	3.3%	30
4841	General Freight Trucking	6,894	5,191	5,575	-25%	7.4%	383
4842	Specialized Freight Trucking	2,774	2,237	2,384	-19%	6.6%	147
4851	Urban Transit Systems	1,935	2,526	2,650	31%	4.9%	123
4852	Interurban and Rural Bus Transportation	-	258	267	-	3.2%	8
4853	Taxi and Limousine Service	1,007	1,144	1,180	14%	3.2%	37
4854	School and Employee Bus Transportation	1,935	2,526	2,650	31%	4.9%	123
4855	Charter Bus Industry	-	-	-	-	-	-
4859	Other Transit and Ground Passenger Transportation	428	630	657	47%	4.3%	27
4869	Other Pipeline Transportation	-	-	-	-	-	-
4881	Support Activities for Air Transportation	709	700	736	-1%	5.1%	35
4882	Support Activities for Rail Transportation	-	-	-	-	-	-
4883	Support Activities for Water Transportation	2,260	2,427	2,544	7%	4.8%	117
4884	Support Activities for Road Transportation	961	1,153	1,239	20%	7.5%	86
4885	Freight Transportation Arrangement	1,698	1,520	1,601	-10%	5.4%	82
4889	Other Support Activities for Transportation	248	34	35	-86%	2.3%	1
4931	Warehousing and Storage	6,185	6,726	7,265	9%	8.0%	539
	Total Transportation and Warehousing Sector	31,354	32,100	33,942	2%	5.7%	1,842

Source: RDA Global Baltimore Region Job Demand Outlook

Occupational Demand Summary

The transportation and warehousing sector is expected to generate demand for about 2,130 new hires over the 2012 to 2020 period for jobs that typically require less than a high school diploma. Most of these jobs will be for workers in occupations such as general labor and freight, stock, and materials movers, industrial truck and tractor operators, and clerks and order fillers. Jobs at this education level earned average hourly wages of \$14.34 in 2012.

The regional economy is expected to generate demand for approximately 4,840 new jobs that require a high school diploma or equivalent. Some of the highest demand jobs at this education level include heavy and tractor-trailer truck drivers, bus, school bus, transit drivers and cargo and freight agents. Hourly earnings for workers in these occupations averaged \$19.98 in 2012.

The only high demand occupation requiring an Associates degree or other post-secondary education less than a Bachelors degree is a general and operations manager. Occupations at the Bachelors degree and higher level include captains, mates, and pilots of water vessels. Only 6% of new job openings will be for workers in these occupations between 2012 and 2020. All of the high-demand occupations in this category pay average wages in excess of the living wage.

Table 98 Transportation and Warehousing Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	7,722	8,194	472	1,662	2,134	1,951	\$14.34	\$29,825
High school diploma or equivalent	21,071	22,284	1,213	3,622	4,835	11,538	\$19.98	\$41,558
Some College or postsecondary non-degree award	568	590	23	120	143	615	\$28.42	\$59,119
Associates degree	747	791	44	111	155	1,327	\$56.08	\$116,653
Bachelors degree	1,982	2,072	90	387	478	8,870	\$41.38	\$86,070
Masters, Doctoral, or professional degree	10	11	0	2	2	271	\$54.36	\$113,073
Total	32,100	33,942	1,842	5,904	7,746	25,142	\$20.94	\$43,565

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Education and Training Supply Summary

Table 99 Programs, Enrollment and Graduates of Programs in Transportation and Warehousing, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	4	9%	65	2%	5	0%
WIA-eligible Training (Reported)	15	33%	1,668	56%	1,277	87%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	25	56%	1,185	40%	193	13%
Bachelors	1	2%	39	1%	1	0%
Masters, PhD, and Post-Bachelors Certificates and Programs	-	0%	-	0%	-	0%
Total, All Levels	45	100%	2,957	100%	1,476	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 100 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Transportation and Warehousing	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	3	-	1	-	-	-	4
WIA-eligible Training (Reported)	5	4	3	-	1	2	15
College and University	3	2	11	-	5	5	26
Total Programs	11	6	15	-	6	7	45
Enrollment							
Non-WIA Eligible Training (Reported)	5	-	60	-	-	-	65
WIA-eligible Training (Reported)	106	807	341	-	-	414	1,668
College and University	113	41	653	-	19	398	1,224
Total Enrollment	224	848	1,054	-	19	812	2,957
Graduates / Completions							
Non-WIA Eligible Training (Reported)	5	-	-	-	-	-	5
WIA-eligible Training (Reported)	1	665	243	-	-	368	1,277
College and University	28	9	148	-	1	8	194
Total Graduates/Completions	34	674	391	-	1	376	1,476

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 101 Transportation and Warehousing Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	3,044	3,252	208	779	987	44	\$13.52	\$28,130
	53-7051	Industrial Truck and Tractor Operators	1,073	1,151	78	243	321	10	\$17.87	\$37,170
	43-5081	Stock Clerks and Order Fillers	656	703	47	130	177	380	\$12.42	\$25,840
	53-3041	Taxi Drivers and Chauffeurs	1,136	1,177	42	113	154	64	\$12.27	\$25,510
	53-5011	Sailors and Marine Oilers	385	400	14	133	147	n.a.	\$19.86	\$41,300
	53-7064	Packers and Packers, Hand	353	381	27	81	108	8	\$12.00	\$24,950
	53-3032	Heavy and Tractor-Trailer Truck Drivers	5,141	5,512	371	818	1,189	117	\$20.06	\$41,730
High school diploma or equivalent	53-3022	Bus Drivers, School or Special Client	2,372	2,486	115	366	481	n.a.	\$14.40	\$29,950
	53-3021	Bus Drivers, Transit and Intercity	1,130	1,184	53	175	228	n.a.	\$16.86	\$35,060
	43-5011	Cargo and Freight Agents	698	731	33	136	169	18	\$19.76	\$41,110
	43-5032	Dispatchers, Except Police, Fire, and Ambulance	813	858	45	123	168	n.a.	\$18.08	\$37,610
	53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	600	634	35	99	133	27	\$27.55	\$57,300
	43-9061	Office Clerks, General	650	691	41	92	133	n.a.	\$14.75	\$30,680
	43-4199	Information and Record Clerks, All Other	517	531	14	116	130	63	\$20.21	\$42,050
Associates degree	53-3033	Light Truck or Delivery Services Drivers	545	584	39	87	126	176	\$17.18	\$35,730
	49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	515	544	29	89	119	32	\$20.98	\$43,630
	43-5071	Shipping, Receiving, and Traffic Clerks	415	445	30	85	115	380	\$15.89	\$33,050
	11-1021	General and Operations Managers	735	778	43	109	152	77	\$56.53	\$117,580
	53-5021	Captains, Mates, and Pilots of Water Vessels	539	559	21	159	180	n.a.	\$41.03	\$85,350

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Baltimore Regional Talent Development Pipeline Study

Table 102 Transportation and Warehousing Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	123	179	270	10	225	181
	53-7051	Industrial Truck and Tractor Operators	17	58	94	2	84	65
	43-5081	Stock Clerks and Order Fillers	25	19	36	0	57	39
	53-3041	Taxi Drivers and Chauffeurs	45	16	75	3	4	11
	53-5011	Sailors and Marine Oilers	3	16	129	0	0	0
	53-7064	Packers and Packers, Hand	8	14	24	0	37	25
High school diploma or equivalent	53-3032	Heavy and Tractor-Trailer Truck Drivers	130	371	204	42	150	292
	53-3022	Bus Drivers, School or Special Client	122	51	149	36	71	52
	53-3021	Bus Drivers, Transit and Intercity	51	22	85	16	32	22
	43-5011	Cargo and Freight Agents	68	38	39	1	5	18
	43-5032	Dispatchers, Except Police, Fire, and Ambulance	31	36	52	6	16	27
	53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	24	27	40	4	19	20
	43-9061	Office Clerks, General	23	28	31	3	23	25
	43-4199	Information and Record Clerks, All Other	119	2	3	0	4	3
	53-3033	Light Truck or Delivery Services Drivers	14	31	23	3	24	29
	49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	22	24	34	6	15	18
Associates degree	43-5071	Shipping, Receiving, and Traffic Clerks	9	18	29	0	33	25
	11-1021	General and Operations Managers	27	31	44	4	23	23
Bachelors degree	53-5021	Captains, Mates, and Pilots of Water Vessels	3	24	153	0	0	0

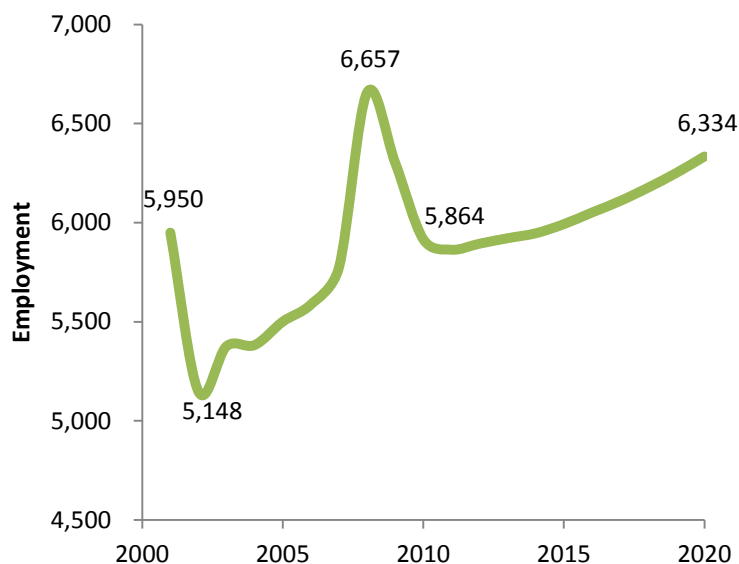
Table 103 Transportation and Warehousing Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
	53-7051	Industrial Truck and Tractor Operators	Short-term on-the-job training	Less than 1 year
	43-5081	Stock Clerks and Order Fillers	Short-term on-the-job training	None
	53-3041	Taxi Drivers and Chauffeurs	Short-term on-the-job training	None
	53-5011	Sailors and Marine Oilers	Short-term on-the-job training	None
	53-7064	Packers and Packagers, Hand	Short-term on-the-job training	None
High school diploma or equivalent	53-3032	Heavy and Tractor-Trailer Truck Drivers	Short-term on-the-job training	1 to 5 years
	53-3022	Bus Drivers, School or Special Client	Moderate-term on-the-job training	None
	53-3021	Bus Drivers, Transit and Intercity	Moderate-term on-the-job training	None
	43-5011	Cargo and Freight Agents	Short-term on-the-job training	None
	43-5032	Dispatchers, Except Police, Fire, and Ambulance	Moderate-term on-the-job training	None
	53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	None	1 to 5 years
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	43-4199	Information and Record Clerks, All Other	Short-term on-the-job training	None
	53-3033	Light Truck or Delivery Services Drivers	Short-term on-the-job training	None
	49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	Long-term on-the-job training	None
	43-5071	Shipping, Receiving, and Traffic Clerks	Short-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	53-5021	Captains, Mates, and Pilots of Water Vessels	None	None

Utilities

The utilities sector is made up of industries that provide electricity, natural gas and water and sewer services in the Baltimore Region. The utilities sector has demonstrated an upward growth trend over the past decade, with an employment growth of 15% between 2002 and 2012. Electric power generation, transmission, and distribution had the largest growth, with 700 jobs created between 2004 and 2012. Employment in the sector reached a low point in 2002, with slightly over 5,100 workers. By 2020, it is expected that there will be 6,334 workers in the utilities sector

Figure 19 Employment in the Baltimore Region Utilities Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

in the Baltimore Region. Between 2012 and 2020, there will be 440 jobs created (this represents a 7.5% growth). In addition, job turnover will require replacement of nearly 1,100 workers during the period, bringing the total hiring demand to over 1,500 new job openings in coming years.

Two industries represent 100% of the total new job growth expected in the sector: electric power generation, transmission and distribution and water, sewage and other systems.

Supply and Demand Snapshot

In 2012, there were approximately 496 graduates of 17 educational programs in the region that prepare workers for careers in occupations related to the utilities sector. Most graduates of utilities-related programs (71%) earn a Bachelors degree or higher. In 2012, just over 350 workers in the Baltimore Region earned Bachelors degree or other degree or certificate beyond a Bachelors; total hiring demand within the utilities sector for jobs requiring a Bachelors degree or higher is expected to reach 340 between 2012 and 2020.

Approximately 77% of the future hiring demand in the utilities sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 1,190 workers between 2012 and 2020). There are approximately 10 programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree.

Baltimore Regional Talent Development Pipeline Study

Table 104 Employment Outlook for the Utilities Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
2211	Electric Power Generation, Transmission and Distribution	3,279	3,978	4,346	21%	9.2%	367
2212	Natural Gas Distribution	-	-	-	-	-	-
2213	Water, Sewage and Other Systems	2,103	1,916	1,988	-9%	3.8%	73
	Total Utilities Sector	5,383	5,894	6,334	9%	7.5%	440

Source: RDA Global Baltimore Region Job Demand Outlook

Table 105 Utilities Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	210	224	14	40	55	827	\$14.11	\$29,356
High school diploma or equivalent	3,714	3,977	262	732	994	10,634	\$23.18	\$48,217
Some College or postsecondary non-degree award	186	199	13	24	38	567	\$26.97	\$56,101
Associates degree	459	495	36	70	106	1,629	\$42.78	\$88,980
Bachelors degree	1,305	1,418	113	222	335	8,696	\$41.86	\$87,077
Masters, Doctoral, or professional degree	20	22	2	3	5	296	\$49.72	\$103,434
Total	5,894	6,334	440	1,092	1,532	23,219	\$28.73	\$59,760

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The regional economy is expected to generate demand for approximately 1,000 new jobs that require a high school diploma or equivalent. Some of the highest demand jobs at this education level include electrical power line installers and repairers, water treatment plant operators and customer service representatives. Hourly earnings for workers in these occupations averaged \$23.18 in 2012. Electrical engineers are the only Bachelors degree level occupation in high demand over the forecast period.

Education and Training Supply Summary

Table 106 Programs, Enrollment and Graduates of Programs in Utilities, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	4	24%	320	21%	136	27%
WIA-eligible Training (Reported)	-	0%	-	0%	-	0%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	6	35%	166	11%	9	2%
Bachelors	3	18%	63	4%	67	14%
Masters, PhD, and Post-Bachelors Certificates and Programs	4	24%	944	63%	284	57%
Total, All Levels	17	100%	1,493	100%	496	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 107 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Utilities	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	1	2	1	-	-	-	4
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	1	5	5	-	2	-	13
Total Programs	2	7	6	-	2	-	17
Enrollment							
Non-WIA Eligible Training (Reported)	45	153	122	-	-	-	320
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	4	957	165	-	47	-	1,173
Total Enrollment	49	1,110	287	-	47	-	1,493
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	66	70	-	-	-	136
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	-	339	18	-	3	-	360
Total Graduates/Completions	-	405	88	-	3	-	496

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 108 Utilities Sector Job Demand Outlook, Selected High-Demand Occupations

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
High school diploma or equivalent	49-9051	Electrical Power-Line Installers and Repairers	477	521	44	135	179	n.a.	\$25.81	\$53,680
	51-8031	Water and Wastewater Treatment Plant and System Operators	547	568	21	113	134	55	\$20.75	\$43,160
	43-4051	Customer Service Representatives	331	357	26	75	101	1,386	\$17.29	\$35,960
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	209	227	17	44	61	270	\$29.91	\$62,220
Bachelors degree	17-2071	Electrical Engineers	272	297	25	52	77	n.a.	\$42.50	\$88,400

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 109 Utilities Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
High school diploma or equivalent	49-9051	Electrical Power-Line Installers and Repairers	0	0	175	0	0	3
	51-8031	Water and Wastewater Treatment Plant and System Operators	16	99	2	4	2	12
	43-4051	Customer Service Representatives	2	16	79	1	0	3
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	1	6	52	0	0	2
Bachelors degree	17-2071	Electrical Engineers	0	1	75	0	0	2

Table 110 Utilities Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
High school diploma or equivalent	49-9051	Electrical Power-Line Installers and Repairers	Long-term on-the-job training	None
	51-8031	Water and Wastewater Treatment Plant and System Operators	Long-term on-the-job training	None
	43-4051	Customer Service Representatives	Short-term on-the-job training	None
	49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	None	1 to 5 years
Bachelors degree	17-2071	Electrical Engineers	None	None

Wholesale

The wholesale sector is made up of businesses in sub-industries such as vehicle parts suppliers and wholesalers, grocery wholesalers, electrical and electronics suppliers, machinery and equipment wholesalers, and other wholesalers of a diverse range of goods or products. The wholesale sector in the Baltimore Region has demonstrated an overall decline since 2000. The sector experienced a slight recovery starting in 2004 before losing over 5,000 jobs between 2005 and 2011. The total decline in employment between 2002 and 2012 was 8%. Employment in the

sector reached a low point in 2011, with slightly under 46,000 workers. The projected number of workers in 2020 is 47,917 (this represents a 3.3% growth from the 2012 employment figures). In addition, job turnover will require replacement of nearly 8,570 workers between 2012 and 2020, bringing the total hiring demand to nearly 10,100 over the period.

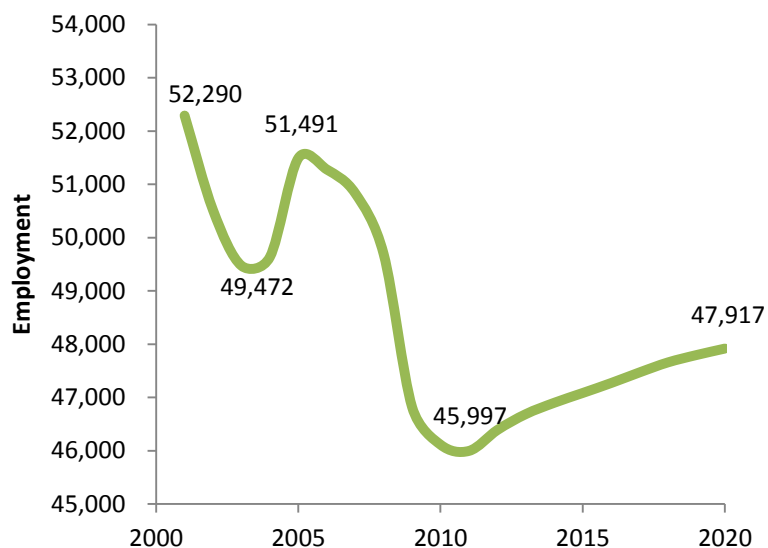
Grocery and related product merchant wholesalers, professional and commercial equipment and supplies merchant wholesalers, and electrical and electronic goods merchant wholesalers are expected to account for just under 50% of the total new job growth in the sector.

Supply and Demand Snapshot

In 2012, there were approximately 1,700 graduates of 45 educational programs in the region that prepare workers for careers in occupations related to the wholesale sector. Half of the graduates of wholesale-related training (50%) are from WIA-eligible training providers. In 2012, just over 725 workers in the Baltimore Region earned Bachelors degree or other degree or certificate beyond a Bachelors; total hiring demand within the wholesale sector for jobs requiring a Bachelors degree or higher is expected to reach just above 1,515 between 2012 and 2020.

Approximately 85% of the future hiring demand in the wholesale sector is expected to be for jobs that require education less than a Bachelors degree (total hiring demand of approximately 8,576 workers between 2012 and 2020). There are approximately 33 programs at colleges, universities, and career schools that lead to an Associates degree or other certificate or program completion that is less than a Bachelors degree. There were nearly 1,000 graduates of these programs in 2012.

Figure 20 Employment in the Baltimore Region Wholesale Trade Sector 2001-2020



Source: RDA Global Baltimore Region Job Demand Outlook

Table 111 Employment Outlook for the Wholesale Trade Sector, by Sub-Industry

NAICS	Industry	Employment			Job Growth		Jobs Created 2012-2020
		2004	2012	2020	2004-12	2012-20	
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	3,177	2,613	2,682	-18%	2.6%	69
4232	Furniture and Home Furnishing Merchant Wholesalers	1,457	1,039	1,072	-29%	3.2%	33
4233	Lumber and Other Construction Materials Merchant Wholesalers	3,178	1,666	1,703	-48%	2.2%	37
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	7,539	6,562	6,796	-13%	3.6%	234
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	887	740	745	-17%	0.7%	5
4236	Electrical and Electronic Goods Merchant Wholesalers	5,301	4,350	4,516	-18%	3.8%	166
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	2,297	2,061	2,130	-10%	3.4%	69
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	4,182	3,702	3,824	-11%	3.3%	122
4239	Miscellaneous Durable Goods Merchant Wholesalers	1,990	2,048	2,100	3%	2.6%	52
4241	Paper and Paper Product Merchant Wholesalers	2,107	1,860	1,927	-12%	3.6%	68
4242	Drugs and Druggists' Sundries Merchant Wholesalers	1,288	909	938	-29%	3.2%	29
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	783	274	286	-65%	4.1%	11
4244	Grocery and Related Product Merchant Wholesalers	7,186	8,851	9,200	23%	4.0%	350
4245	Farm Product Raw Material Merchant Wholesalers	-	-	-	-	-	-
4246	Chemical and Allied Products Merchant Wholesalers	989	1,133	1,167	15%	3.0%	34
4247	Petroleum and Petroleum Products Merchant Wholesalers	75	303	311	306%	2.3%	7
4248	Beer, Wine, and Distilled Alcoholic Beverage Merchant Wholesalers	1,084	1,482	1,515	37%	2.2%	33
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	3,501	2,824	2,887	-19%	2.2%	63
4251	Wholesale Electronic Markets and Agents and Brokers	2,613	3,974	4,119	52%	3.7%	146
	Total Wholesale Trade Sector	49,635	46,389	47,917	-7%	3.3%	1,528

Source: RDA Global Baltimore Region Job Demand Outlook

Table 112 Wholesale Trade Sector Job Demand Outlook by Education Level

Minimum Education Required	Sector Employment 2012	Sector Employment 2020	New Jobs 2012-2020	Hiring from Turnover	Total Hiring Requirements	Est. Annual Online Job Vacancies*	Average Hourly Wage 2012	Average Annual Earnings 2012
Less than high school	7,063	7,291	228	1,658	1,886	1,987	\$13.65	\$28,402
High school diploma or equivalent	28,341	29,267	926	5,043	5,969	11,160	\$23.99	\$49,896
Some College or postsecondary non-degree award	1,259	1,303	44	233	277	707	\$25.08	\$52,163
Associates degree	2,386	2,464	78	366	444	1,956	\$51.35	\$106,816
Bachelors degree	7,234	7,482	248	1,249	1,497	9,555	\$43.32	\$90,114
Masters, Doctoral, or professional degree	106	110	4	16	20	316	\$49.94	\$103,870
Total	46,389	47,917	1,528	8,564	10,093	26,251	\$26.93	\$56,008

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors.

Sources: Quarterly Census of Employment and Earnings (Bureau of Labor Statistics), Occupational Employment Statistics Database (Bureau of Labor Statistics), RDA Global Baltimore Employment Forecast 2012-2020.

Occupational Demand Summary

The wholesale sector is expected to generate demand for nearly 1,900 new hires between 2012 and 2020 for jobs that typically require less than a high school diploma. Most of these jobs will be for workers involved in freight, stock, and material movement, store clerks and order fillers and industrial truck and tractor operators. Jobs at this education level earned average hourly wages of \$13.65 in 2012.

The region is expected to generate demand for approximately 5,970 new wholesale sector jobs that require a high school diploma or equivalent. Some of the highest demand jobs at this education level include sales and customer service representatives, heavy and tractor-trailer truck drivers, and office clerks. Hourly earnings for workers in these occupations averaged \$23.99 in 2012, which is slightly above the living wage level for a single parent family with one child in Baltimore City.

Some high demand occupations requiring an Associates degree or other post-secondary education less than a Bachelors degree include computer support specialists, office machine repairers, and general and operations managers. Occupations at the Bachelors degree and higher level include sales representatives and managers, accountants and auditors, market research analysts and marketing specialists. Only 15% of new job openings will be for workers in these occupations between 2012 and 2020. All of the high-demand occupations in this category pay average wages in excess of the living wage.

Education and Training Supply Summary

Table 113 Programs, Enrollment and Graduates of Programs in Wholesale Trade, Baltimore Region

Education or Training Category	Programs with Enrollment	% of Programs	Reported Enrollment	% of Enrollment	Graduates / Completions	% of Graduates/ Completions
Non-WIA Eligible Training (Reported)	-	0%	-	0%	-	0%
WIA-eligible Training (Reported)	9	20%	1,129	31%	852	50%
College & University Lower Division Certificate, Associates and Non-Degree Undergrad	24	53%	1,072	29%	124	7%
Bachelors	8	18%	1,276	35%	273	16%
Masters, PhD, and Post-Bachelors Certificates and Programs	4	9%	179	5%	455	27%
Total, All Levels	45	100%	3,656	100%	1,704	100%

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Table 114 Occupational Training Programs, Enrollment, and Graduates by County, 2012

Supply by County: Wholesale Trade	Anne Arundel County	Baltimore City	Baltimore County	Carroll County	Harford County	Howard County	Total
Programs							
Non-WIA Eligible Training (Reported)	1	2	1	-	-	-	4
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	1	5	5	-	2	-	13
Total Programs	2	7	6	-	2	-	17
Enrollment							
Non-WIA Eligible Training (Reported)	45	153	122	-	-	-	320
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	4	957	165	-	47	-	1,173
Total Enrollment	49	1,110	287	-	47	-	1,493
Graduates / Completions							
Non-WIA Eligible Training (Reported)	-	66	70	-	-	-	136
WIA-eligible Training (Reported)	-	-	-	-	-	-	-
College and University	-	339	18	-	3	-	360
Total Graduates/Completions	-	405	88	-	3	-	496

Sources: Maryland Higher Education Commission, Baltimore Survey of Workforce Development Managers, Analysis by Author. Note: Not all programs report enrollment or graduations/completions and this may lead to under-reporting of total enrollment and graduates.

Baltimore Regional Talent Development Pipeline Study

Table 115 Wholesale Trade Sector Job Demand Outlook, Selected High-Demand Occupations

Education	Occupation		Employment		Regional Hiring Demand					Mean Wages	
	SOC		2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual	
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	2,749	2,836	87	704	791	44	\$13.52	\$28,130	
	43-5081	Stock Clerks and Order Fillers	1,437	1,486	48	285	333	380	\$12.42	\$25,840	
	53-7051	Industrial Truck and Tractor Operators	736	760	24	167	190	10	\$17.87	\$37,170	
	53-7064	Packers and Packers, Hand	470	487	16	108	124	8	\$12.00	\$24,950	
	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	7,135	7,368	233	1,341	1,574	18	\$33.18	\$69,020	
High school diploma or equivalent	53-3032	Heavy and Tractor-Trailer Truck Drivers	1,738	1,794	56	277	333	117	\$20.06	\$41,730	
	43-9061	Office Clerks, General	1,549	1,600	50	219	270	n.a.	\$14.75	\$30,680	
	53-3033	Light Truck or Delivery Services Drivers	1,400	1,445	45	223	268	176	\$17.18	\$35,730	
	43-5071	Shipping, Receiving, and Traffic Clerks	1,124	1,161	37	229	266	380	\$15.89	\$33,050	
	53-3031	Driver/Sales Workers	1,154	1,195	41	184	225	55	\$14.48	\$30,110	
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	833	860	27	168	195	18	\$41.20	\$85,690	
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	726	750	24	155	179	580	\$26.45	\$55,010	
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	968	999	31	104	135	330	\$17.80	\$37,020	
	13-1022	Wholesale and Retail Buyers, Except Farm Products	491	508	16	99	115	n.a.	\$29.60	\$61,570	
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	957	988	31	84	115	310	\$19.69	\$40,950	
	43-4151	Order Clerks	432	446	14	97	111	n.a.	\$14.99	\$31,180	
	13-1199	Business Operations Specialists, All Other	498	515	17	77	93	385	\$37.54	\$78,080	
	53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	307	317	10	51	60	n.a.	\$24.60	\$51,170	
	49-9071	Maintenance and Repair Workers, General	325	336	11	48	58	126	\$19.26	\$40,070	
	11-3011	Administrative Services Managers	238	246	8	47	55	198	\$37.52	\$78,040	
	53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	273	282	9	45	54	27	\$27.55	\$57,300	
	43-6011	Executive Secretaries and Executive Administrative Assistants	375	387	12	40	52	378	\$24.28	\$50,500	

Baltimore Regional Talent Development Pipeline Study

Education	SOC	Occupation	Employment		Regional Hiring Demand				Mean Wages	
			2012	2020	Jobs Created 2012-2020	Replacement Demand 2012-2020	Total Hiring Requirements	Estimated Annual Online Job Vacancies *	Hourly	Annual
Some college, no degree	43-4171	Receptionists and Information Clerks	185	191	6	45	51	120	\$13.54	\$28,170
	15-1150	Computer Support Specialists	595	616	21	125	146	570	\$26.93	\$56,020
Associates degree	11-1021	General and Operations Managers	1,953	2,016	63	291	354	77	\$56.53	\$117,580
Bachelors degree	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1,239	1,282	43	233	276	9	\$39.57	\$82,310
	11-2022	Sales Managers	553	571	18	129	147	340	\$60.09	\$124,990
	13-2011	Accountants and Auditors	571	589	19	98	117	270	\$35.18	\$73,180
	13-1161	Market Research Analysts and Marketing Specialists	254	263	9	54	63	310	\$31.38	\$65,270

* Includes all job vacancies for occupations linked to this industry sector. Actual job vacancies may be for other industry sectors. Sources: Quarterly Census of Employment and Wages, Occupational Employment Statistics, RDA Global Job Vacancy Database, and RDA Global Baltimore Region Job Demand Outlook.

Table 116 Wholesale Trade Sector Total Hiring Demand (new jobs and turnover) by County 2012-2020, Selected High-Demand Occupations

Education	SOC	Occupation	Hiring Demand by County					
			ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	182	164	121	44	45	234
	43-5081	Stock Clerks and Order Fillers	75	68	41	18	19	112
	53-7051	Industrial Truck and Tractor Operators	43	35	29	8	11	64
	53-7064	Packers and Packers, Hand	27	22	15	7	8	46
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	380	375	202	65	84	468
	53-3032	Heavy and Tractor-Trailer Truck Drivers	71	56	49	16	26	115
	43-9061	Office Clerks, General	62	64	33	12	17	83
	53-3033	Light Truck or Delivery Services Drivers	61	58	35	15	17	81
	43-5071	Shipping, Receiving, and Traffic Clerks	63	67	34	12	14	78
	53-3031	Driver/Sales Workers	49	26	26	10	16	98
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	47	49	26	8	10	55
	43-1011	First-Line Supervisors of Office and Administrative	41	43	24	8	10	54

Baltimore Regional Talent Development Pipeline Study

Education	SOC		Occupation	Hiring Demand by County					
				ANNE ARUNDEL	BALTIMORE	BALTIMORE CITY	CARROLL	HARFORD	HOWARD
			Support Workers						
	43-6014		Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	32	34	15	5	9	40
	13-1022		Wholesale and Retail Buyers, Except Farm Products	27	27	15	5	6	36
	43-3031		Bookkeeping, Accounting, and Auditing Clerks	27	29	12	5	7	36
	43-4151		Order Clerks	26	28	14	5	6	33
	13-1199		Business Operations Specialists, All Other	22	24	10	3	5	29
	53-1021		First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	14	13	8	3	4	19
	49-9071		Maintenance and Repair Workers, General	13	14	7	2	4	18
	11-3011		Administrative Services Managers	13	13	7	2	3	17
	53-1031		First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	12	10	8	3	4	18
	43-6011		Executive Secretaries and Executive Administrative Assistants	12	13	6	2	3	16
	43-4171		Receptionists and Information Clerks	12	13	7	2	3	15
	15-1150		Computer Support Specialists	31	38	17	3	6	51
	11-1021		General and Operations Managers	82	89	44	15	21	103
	41-4011		Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	61	78	30	7	14	87
Bachelors degree	11-2022		Sales Managers	35	35	19	5	8	45
	13-2011		Accountants and Auditors	27	30	15	5	7	34
	13-1161		Market Research Analysts and Marketing Specialists	15	16	8	2	3	19

Table 117 Wholesale Trade Sector Job Training and Experience Requirements, Selected High-Demand Occupations

Education	SOC	Occupation	Training Requirement	Experience Required
Less than high school	53-7062	Laborers and Freight, Stock, and Material Movers, Hand	Short-term on-the-job training	None
	43-5081	Stock Clerks and Order Fillers	Short-term on-the-job training	None
	53-7051	Industrial Truck and Tractor Operators	Short-term on-the-job training	Less than 1 year
	53-7064	Packers and Packagers, Hand	Short-term on-the-job training	None
High school diploma or equivalent	41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	Moderate-term on-the-job training	None
	53-3032	Heavy and Tractor-Trailer Truck Drivers	Short-term on-the-job training	1 to 5 years
	43-9061	Office Clerks, General	Short-term on-the-job training	None
	53-3033	Light Truck or Delivery Services Drivers	Short-term on-the-job training	None
	43-5071	Shipping, Receiving, and Traffic Clerks	Short-term on-the-job training	None
	53-3031	Driver/Sales Workers	Short-term on-the-job training	None
	41-1012	First-Line Supervisors of Non-Retail Sales Workers	None	More than 5 years
	43-1011	First-Line Supervisors of Office and Administrative Support Workers	None	1 to 5 years
	43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	Short-term on-the-job training	None
	13-1022	Wholesale and Retail Buyers, Except Farm Products	Long-term on-the-job training	None
	43-3031	Bookkeeping, Accounting, and Auditing Clerks	Moderate-term on-the-job training	None
	43-4151	Order Clerks	Short-term on-the-job training	None
	13-1199	Business Operations Specialists, All Other	Long-term on-the-job training	Less than 1 year
	53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	None	1 to 5 years
	49-9071	Maintenance and Repair Workers, General	Moderate-term on-the-job training	None
	11-3011	Administrative Services Managers	None	1 to 5 years
	53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	None	1 to 5 years
	43-6011	Executive Secretaries and Executive Administrative Assistants	None	1 to 5 years
	43-4171	Receptionists and Information Clerks	Short-term on-the-job training	None
Some college, no degree	15-1150	Computer Support Specialists	Moderate-term on-the-job training	None
Associates degree	11-1021	General and Operations Managers	None	1 to 5 years
Bachelors degree	41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Moderate-term on-the-job training	None
	11-2022	Sales Managers	None	1 to 5 years
	13-2011	Accountants and Auditors	None	None
	13-1161	Market Research Analysts and Marketing Specialists	None	None

Appendix A: Selected Educational Programs for Healthcare, Construction, IT, Transportation & Logistics, and Business Services Occupations

Table 118 Educational Programs for Selected Occupations in Healthcare

Sub-Area	Occupation	County	Provider	Program Name	Program Type	Enrolment (2012)	Completes (2012)
Medical Office	Medical Records and Health Information Technicians	Anne Arundel	Anne Arundel Community College	Health Information Technology	A	11	3
		Anne Arundel	Anne Arundel Community College	Medical Coding Certificate	WIA OT	19	0
		Baltimore City	All-State Career School	Medical Billing & Coding	WIA OT	51	33
		Baltimore City	Baltimore City Community College	Health Information Technology	A	24	6
		Baltimore City	Baltimore City Community College	Coding Specialist	LDC	13	5
		Baltimore City	Baltimore City Community College	Health Information Technology	WIA OT	9	2
		Baltimore City	Baltimore City Community College	Coding Specialist	WIA OT	n.a.	n.a.
		Baltimore City	Tesst College Of Technology	Health Info Tech (Towson & Beltsvil	A	0	4
		Baltimore City	Tesst College Of Technology	Medical Billing & Coding Specialist	LDC	198	190
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Coding Certificate	LDC	67	1
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Coding Certificate	NDU	0	1
		Baltimore County	Fortis Institute	Medical Billing & Coding	WIA OT	156	98
		Baltimore County	Towson University	Online Medical Billing & Coding	WIA OT	n.a.	n.a.
		Baltimore County	Towson University	Online Medical Coding Program	WIA OT	n.a.	n.a.
		Baltimore County	Towson University	Online Medical Transcription	WIA OT	n.a.	n.a.
		Carroll County	Carroll Community College	Health Information Technology	A	39	4
		Carroll County	Carroll Community College	Advanced Certif In Health Info Tchn	LDC	2	2
		Carroll County	Carroll Community College	Core Certificate In Health Info Tch	LDC	18	7
		Howard County	Howard Community College	Medical Coding	WIA OT	38	17
	Medical	Anne Arundel	Anne Arundel Community College	Medical Assisting	A	66	8

Baltimore Regional Talent Development Pipeline Study

Sub-Area	Occupation	County	Provider	Program Name	Program Type	Enrolment (2012)	Completes (2012)
	Assistants	Anne Arundel	Anne Arundel Community College	Managed Care Operations	LDC	13	13
		Anne Arundel	Anne Arundel Community College	Medical Assisting	LDC	81	22
		Anne Arundel	Anne Arundel Community College	Medical Assisting	NDU	0	22
		Anne Arundel	Anne Arundel Community College	Medical Assisting Certificate	WIA OT	6	0
		Anne Arundel	Anne Arundel Community College	Medical Assisting	WIA OT	14	0
		Baltimore City	All-State Career School	Medical Assisting	WIA OT	199	151
		Baltimore City	Tesst College Of Technology	Medical Assistant	LDC	479	395
		Baltimore County	Community College Of Baltimore County	Medical Office Certificate	WIA OT	10	0
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Office Assistant	A	72	4
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Office	LDC	39	5
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Office Assistant	U	0	4
		Baltimore County	Fortis Institute	Medical Assisting	WIA OT	457	266
		Baltimore County	Fortis Institute-Towson	Medical Office Assisting	WIA OT	139	77
		Harford County	Harford Community College	Medical Assisting	A	123	16
		Harford County	Harford Community College	Medical Office Assistant	LDC	25	4
		Harford County	Harford Community College	Medical Assisting	LDC	52	5
		Harford County	Harford Community College	Medical Office Assistant	WIA OT	7	3
		Harford County	Harford Community College	Medical Assisting Certificate	WIA OT	13	3
		Howard County	Howard County Office Of Workforce Development	Medical Assistant	Non-WIA OT	n	n.a.
		Anne Arundel	Anne Arundel Community College	EMT Paramedic	LDC	2	23
Healthcare Technicians	Emergency Medical Technicians and Paramedics	Baltimore City	Baltimore City Community College	Emergency Medical Service	A	2	4
		Baltimore City	Baltimore City Community College	Emergency Med. Tech-Intermediate	LDC	1	0
		Baltimore City	Baltimore City Community College	Emergency Medical Services	WIA OT	13	0
		Baltimore City	Baltimore City Community College	Emergency Medical Technician	WIA OT	n.a.	n.a.
		Baltimore County	Community College Of Baltimore County – All Campuses	Emergency Medical Tech	A	90	3
		Baltimore County	Community College Of Baltimore County – All Campuses	Emergency Medical Tech	LDC	54	0

Baltimore Regional Talent Development Pipeline Study

Sub-Area	Occupation	County	Provider	Program Name	Program Type	Enrolment (2012)	Completes (2012)
		Baltimore County	University Of Maryland Baltimore County	Emergency Health Services (W/Umab)	NDU	0	22
		Carroll County	Carroll Community College	Emergency Medical Services-Paramedi	A	15	0
		Harford County	Cecil College	Emergency Medical Tech. - Paramedic	A	8	0
		Howard County	Howard Community College	EMT/Paramedic	A	76	8
		Howard County	Howard Community College	EMT/Paramedic	LDC	11	8
		Howard County	Howard Community College	EMT/Paramedic	NDU	0	8
		Anne Arundel	Anne Arundel Community College	Pharmacy Technician	Non-WIA OT	24	8
		Anne Arundel	Anne Arundel Community College	Pharmacy Technician Certificate	WIA OT	20	0
		Baltimore City	All-State Career School	Pharmacy Technology	WIA OT	78	60
		Baltimore City	Baltimore City Community College	Pharmacy Technician	WIA OT	15	9
Pharmacy Technicians		Baltimore City	Caroline Center	Pharmacy Technician	Non-WIA OT	95	58
		Baltimore City	Tesst College Of Technology	Pharmacy Technician	LDC	47	60
		Baltimore County	Gandhi Health Career Services	Pharmacy Technician Training	Non-WIA OT	2	2
		Baltimore County	Stein Academy-School Of Health, Tech. & Career Dev.	Pharmacy Technician	WIA OT	17	9
		Anne Arundel	Anne Arundel Community College	Surgical Technology	A	60	0
		Baltimore City	Baltimore City Community College	Surgical Technologist	A	9	5
		Baltimore City	Baltimore City Community College	Surgical Technology	LDC	0	1
		Baltimore City	Baltimore City Community College	Surgical Technologist	NDU	0	5
		Baltimore County	Community College Of Baltimore County	Surgical Technology	WIA OT	26	0
		Baltimore County	Fortis Institute	Surgical Technologist	WIA OT	33	13
Surgical Technologists		Anne Arundel	Anne Arundel Community College	Medical Laboratory Technician	A	10	9
		Baltimore City	Baltimore City Community College	Biotechnology Lab Science	LDC	3	0
		Baltimore City	Baltimore City Community College	Multi-Skilled Medical Technician	WIA OT	151	93
		Baltimore City	Biotechnical Institute Of Maryland, Inc	Laboratory Associates	Non-WIA OT	36	31
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Laboratory Tech	A	1	0
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Laboratory Technology	A	100	20
Medical and Clinical Laboratory Technicians							

Baltimore Regional Talent Development Pipeline Study

Sub-Area	Occupation	County	Provider	Program Name	Program Type	Enrolment (2012)	Completes (2012)
		Baltimore County	Community College Of Baltimore County – All Campuses	Biotechnology Laboratory Technician	LDC	16	3
		Baltimore County	Community College Of Baltimore County – All Campuses	Medical Laboratory Technology	NDU	0	23
		Harford County	Harford Community College	Science Lab Tech	A	23	6
		Howard County	Howard Community College	Medical Laboratory Technician	A	5	0
		Anne Arundel	Anne Arundel Community College	Practical Nursing	LDC	11	10
		Baltimore City	Baltimore City Community College	Practical Nursing	LDC	1	8
		Baltimore City	Baltimore City Community College	Practical Nursing	WIA OT	12	6
		Baltimore City	Sojourner-Douglass College	Licensed Practical Nursing	LDC	1	33
		Baltimore City	Sojourner-Douglass College	Practical Nursing	WIA OT	42	0
		Baltimore County	Community College Of Baltimore County – All Campuses	Practical Nursing	LDC	272	32
Acute Care	Licensed Practical and Licensed Vocational Nurses	Carroll County	Carroll Community College	Licensed Practical Nursing	LDC	0	8
		Harford County	Cecil College	Practical Nursing	LDC	9	0
		Howard County	Howard Community College	Licensed Practical Nursing	LDC	82	24
		Anne Arundel	Anne Arundel Community College	Nursing	A	294	117
		Baltimore City	Baltimore City Community College	Nursing	A	242	83
		Baltimore City	Baltimore City Community College	Nursing	WIA OT	89	66
		Baltimore County	Community College Of Baltimore County – All Campuses	Nursing	A	3759	305
		Carroll County	Carroll Community College	Nursing	A	226	84
		Harford County	Cecil College	Nursing	A	486	142
		Harford County	Cecil College	Nursing	NDU	9	52
	Registered Nurses	Harford County	Harford Community College	Nursing	A	1090	142
		Harford County	Harford Community College	Nursing	NDU	16	0
		Howard County	Howard Community College	Nursing	A	1362	158
		Baltimore City	Baltimore City Community College	Respiratory Care	A	25	7
		Baltimore City	Baltimore City Community College	Respiratory Care	WIA OT	6	5
		Baltimore County	Community College Of Baltimore County – All Campuses	Respiratory Care Ther.	A	172	21
		Anne Arundel	Anne Arundel Community College	Basic Dental Assistant & Radiology	WIA OT	97	63
Dental	Dental						

Baltimore Regional Talent Development Pipeline Study

Sub-Area	Occupation	County	Provider	Program Name	Program Type	Enrolment (2012)	Completes (2012)
Hygienists		Anne Arundel	Dats Of Maryland At Annapolis	Entry-Level Dental Assistant	Non-WIA OT	3	3
		Baltimore City	All-State Career School	Expanded Function Dental Assistant	WIA OT	52	39
		Baltimore City	Baltimore City Community College	Dental Hygiene	A	50	20
		Baltimore City	Baltimore City Community College	Dental Hygiene	WIA OT	25	19
		Baltimore County	Community College Of Baltimore County – All Campuses	Dental Hygiene	A	293	24
		Baltimore County	Fortis Institute-Towson	Dental Assisting	WIA OT	177	105
		Carroll County	Dats Of Maryland At Westminster	Entry-Level Dental Assistant	Non-WIA OT	9	9
		Howard County	Dats Of Maryland At Columbia	Entry Level Dental Assistant	WIA OT	9	3
		Howard County	Howard Community College	Introduction To Dental Assisting	WIA OT	43	38

Program Types: A-Associates, WIA OT- Occupational Training that is eligible for WIA funding, Non-WIA OT – Occupational Training the is not eligible for WIA funding, LDC- Lower Division Certificate, NDU – Non-Degree Undergraduate, APT – Apprenticeship Training

Table 119 Educational Programs for Selected Occupations in Construction Trades

Program	Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
Pre-Apprenticeship	Construction Trades	Baltimore City	Chesapeake Center For Youth Development	Construction Preparation	Non-WIA OT	n.a.	n.a.
	Construction Trades	Baltimore City	Job Opportunities Task Force	Pre-Apprenticeship Electrician, Plumber, Carpenter, Etc.	Non-WIA OT	71	n.a.
	Construction Trades	Baltimore City	Baltimore City Community College	Pre-Apprenticeship Training	WIA OT	37	n.a.
	Construction Trades	Baltimore City	Group Ministries Baltimore, Cdc	Electrical, Plumbing, Mathematics Exam, Language Arts Exam	Non-WIA OT	8	n.a.
	Construction Trades	Baltimore County	Community College Of Baltimore County	Construction Craft Professional	A	19	1
Formal Education	Construction Trades	Baltimore County	Community College Of Baltimore County	Construction Craft Professional	LDC	4	2
	Construction Trades	Baltimore County	Community College Of Baltimore County	Introduction To Construction Method	LDC	0	1
	Carpenters	Baltimore County	North American Trade Schools	Building Construction Technology	Non-WIA OT	75	44
	Operating Engineers and Other	Baltimore City	Baltimore City Community College	Construction Supervision	A	24	1
	Construction Equipment	Baltimore City	Baltimore City Community College	Construction Supervision	LDC	4	1

Baltimore Regional Talent Development Pipeline Study

Program	Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
	Operators						
	Electricians	Anne Arundel County	Anne Arundel Community College	Electronic Engineering Tech	A	62	10
		Anne Arundel County	Anne Arundel Community College	Electronic Engineering Tech	LDC	38	12
		Baltimore City	All-State Career	Electrical Systems Technology	Non-WIA OT	124	66
		Baltimore City	TESST College Of Technology	Electrical Technician	LDC	105	107
		Baltimore County	North American Trade Schools	Electrical Technology	Non-WIA OT	122	70
		Harford County	Cecil College	Electronics Technology	A	1	0
	Plumbers, Pipefitters, and Steamfitters	Anne Arundel County	Abc Chesapeake Shores	Plumber	Non-WIA OT	100	0
		Baltimore County	Delta School Of Trades	Gas Tungsten Arc Welding Pipe	WIA OT	n.a.	n.a.
		Baltimore County	Delta School Of Trades	Shielded Metal Arc Welding Pipe	WIA OT	n.a.	n.a.
	Elevator Installers and Repairers	Baltimore City	Baltimore City Community College	Electronics Tech	A	2	1
	HVAC Repairers and Mechanics	Anne Arundel County	Abc Chesapeake Shores	HVAC Technician	Non-WIA OT	100	0
		Anne Arundel County	Anne Arundel Community College	HVAC - Exam Review Prep-Journeyman Or Master	WIA OT	25	23
		Anne Arundel County	DLR	HVAC	Non-WIA OT	n	n
		Baltimore City	All-State Career	Heating, Ventilation, Air Conditioning & Refrigeration	Non-WIA OT	291	143
		Baltimore City	TESST College Of Technology	Heating/Ventilation & A.C./Refrig	LDC	86	78
		Baltimore County	Community College Of Baltimore County	Basic HVAC & Energy Technology	LDC	11	15
		Baltimore County	Community College Of Baltimore County	Advanced HVAC & Energy Technology	LDC	2	3
		Baltimore County	Community College Of Baltimore County	HVAC & Energy Technology	A	81	4
		Baltimore County	Community College Of Baltimore County	Alternative Energy	LDC	0	1
		Baltimore County	Community College Of Baltimore County	Refrigeration,Air Conditioning & Heating	A	1	0
		Baltimore County	North American Trade Schools	Heating, Refrigeration, Ventilation, & Air Conditioning Technology	Non-WIA OT	217	152

Baltimore Regional Talent Development Pipeline Study

Program	Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
Apprenticeship Training		Baltimore County	TESST College Of Technology	Heating/Ventilation & A.C./Refrigeration	WIA OT	80	77
		Howard County	Howard County Office Of Workforce Development	HVAC	Non-WIA OT	n	n
		Howard County	Lincoln College Of Technology	A/C, Refrigeration & Heating Technology	LDC	156	0
		Howard County	Lincoln College Of Technology	Air Conditioning, Refrigeration & Heating Technology	WIA OT	241	203
	Brickmasons and Blockmasons	Near Anne Arundel County	Bricklayers Local 1 JATC MD, VA & DC	Bricklayer apprentice training	APT	n.a.	n.a.
	Operating Engineers and Other	(Out of Region)	International Union of Operating Engineers Local No. 99	Operating engineers apprenticeship program (25 to 30 positions accepted per year).	APT	n.a.	n.a.
	Construction Equipment Operators	Baltimore City	Boilermakers Local 193 JATC	Boilermakers national apprenticeship program	APT	n.a.	n.a.
	Electricians	Anne Arundel County	Independent Electrical Contractors - Chesapeake	4-year apprenticeship electrician, 3 year Voice-Data-Video (VDV) apprenticeship	APT	n.a.	n.a.
		Baltimore City	International Brotherhood of Electrical Workers Local 24	5-year electrical apprenticeship, 3-Year Voice/Data/Video	APT	n.a.	n.a.
		Baltimore County	Independent Electrical Contractors - Chesapeake	4-year apprenticeship electrician, 3 year Voice-Data-Video (VDV) apprenticeship	APT	n.a.	n.a.
	Glaziers	(Out of Region)	Painters and Allied Trades District Council No. 51	4-year commercial painter/wallcoverer, 3-year drywall finisher/installer, a 3-year bridge/industrial painter, 4-year glazier/architectural metal program	APT	n.a.	n.a.
	Plumbers, Pipefitters, and Steamfitters	Anne Arundel County	Maryland Plumbing, Heating Cooling Contractors, Inc.	4-year plumbing apprenticeship	APT	n.a.	n.a.
		Baltimore City	Maryland Plumbing, Heating Cooling Contractors, Inc.	4-year plumbing apprenticeship	APT	n.a.	n.a.
		Baltimore City	Plumbers & Steamfitters Local Union 486	5-year apprenticeship plumber/steamfitter	APT	n.a.	n.a.
	Elevator Installers and Repairers	Baltimore City	International Union of Elevator Constructors, Local No. 7	Program opens once a year for new hires.	APT	n.a.	n.a.
	Construction Trades	(Out of Region)	Operative Plasterers and Cement Masons Local 891	3-year apprenticeship	APT	n.a.	n.a.
		(Out of Region)	Roofers Local 30	3-year roofers apprenticeship	APT	n.a.	n.a.

Baltimore Regional Talent Development Pipeline Study

Program	Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
		Anne Arundel County	Associated Builders and Contractors, Inc., Chesapeake Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting	APT	n.a.	n.a.
		Anne Arundel County	Road Sprinkler Fitters Local No. 669	5-year apprenticeship (correspondence)	APT	n.a.	n.a.
		Baltimore City	Associated Builders and Contractors, Inc. - Baltimore Metropolitan Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting	APT	n.a.	n.a.
		Baltimore City	Ironworkers Local 16	3-year apprenticeship: structural steel structures.	APT	n.a.	n.a.
		Baltimore City	Sheet Metal Workers Local Union #100	4-year sheet metal apprenticeship	APT	n.a.	n.a.
		Baltimore City	Road Sprinkler Fitters Local No. 669	5-year Apprenticeship (correspondence)	APT	n.a.	n.a.
		Baltimore City	Sprinkler Fitters Local Union 536	5-year apprenticeship sprinkler fitters.	APT	n.a.	n.a.
		Baltimore County	Associated Builders and Contractors, Inc. - Baltimore Metropolitan Chapter	4-year apprenticeship programs: carpentry, electrical, HVACR, plumbing, sheet metal, sprinkler fitting and pipe fitting	APT	n.a.	n.a.
		Near Howard County	Heat and Frost Insulation Workers and Asbestos Workers, Local No. 24	4-year apprenticeship, pre-apprenticeship "improver" program	APT	n.a.	n.a.
		Program Types: A-Associates, WIA OT- Occupational Training that is eligible for WIA funding, Non-WIA OT – Occupational Training the is not eligible for WIA funding, LDC- Lower Division Certificate, NDU – Non-Degree Undergraduate, APT – Apprenticeship Training					

Table 120 Educational Programs for Selected IT Occupations (Programs Less than a Bachelors Degree)

County	Provider	Program Name	Program Level	Enrolment	Completes
Anne Arundel County	Anne Arundel Community College	Advanced Network Security	LDC	14	4
Anne Arundel County	Anne Arundel Community College	Business Enterprise Systems	A	1	0
Anne Arundel County	Anne Arundel Community College	Business Mngmnt:Database Administration	LDC	6	1
Anne Arundel County	Anne Arundel Community College	Cisco Certified Network Assoc (CCNA)	LDC	12	10
Anne Arundel County	Anne Arundel Community College	Computer Science: Internet & Mobile Device Software	LDC	5	1
Anne Arundel County	Anne Arundel Community College	Computer Info Sys:Database Administ	LDC	11	7
Anne Arundel County	Anne Arundel Community College	Computer Information Systems	A	115	11
Anne Arundel County	Anne Arundel Community College	Computer Information Systems	LDC	44	11

Baltimore Regional Talent Development Pipeline Study

County	Provider	Program Name	Program Level	Enrolment	Completes
Anne Arundel County	Anne Arundel Community College	Computer Information Systems	NDU	0	2
Anne Arundel County	Anne Arundel Community College	Computer Network Management	A	71	16
Anne Arundel County	Anne Arundel Community College	Computer Network Management	LDC	18	4
Anne Arundel County	Anne Arundel Community College	Computer Network Management	NDU	0	16
Anne Arundel County	Anne Arundel Community College	Computer Science: Internet & Mobile Device Software	A	33	6
Anne Arundel County	Anne Arundel Community College	Cyber Forensics	LDC	1	0
Anne Arundel County	Anne Arundel Community College	Cybercrime	A	46	4
Anne Arundel County	Anne Arundel Community College	Cybercrime	LDC	8	0
Anne Arundel County	Anne Arundel Community College	Homeland Security Management	A	225	14
Anne Arundel County	Anne Arundel Community College	Information & Cyber Security	LDC	30	6
Anne Arundel County	Anne Arundel Community College	Information Assurance & Cybersecurity	A	355	44
Anne Arundel County	Anne Arundel Community College	Intelligence Analytics	LDC	5	4
Anne Arundel County	Anne Arundel Community College	Network Security	LDC	34	8
Anne Arundel County	Anne Arundel Community College	Personal Computer Systems Technology	WIA OT	33	0
Anne Arundel County	Anne Arundel Community College	Personal Computer Technician	WIA OT	14	0
Anne Arundel County	Anne Arundel Community College	Server Administration & Security	LDC	3	0
Baltimore City	Baltimore City Community College	Computer Information Systems	A	149	19
Baltimore City	Baltimore City Community College	Computer Information Systems	LDC	0	2
Baltimore City	Baltimore City Community College	Database System Administration	LDC	0	1
Carroll County	Carroll Community College	Computer Information Systems-Micro	A	93	9
Carroll County	Carroll Community College	Computer Information Systems-Micro	NDU	1	0
Harford County	Cecil College	Computer Info Systems-Applications	LDC	4	1
Harford County	Cecil College	Computer Info Systems-Programming	LDC	6	0
Harford County	Cecil College	Computer Information Systems	A	100	9
Harford County	Cecil College	Computer Information Systems	LDC	0	1
Harford County	Cecil College	Computer Information Systems	NDU	2	0
Baltimore County	Community College Of Baltimore County – All Campuses	CIS General Information Technology	LDC	2	0
Baltimore County	Community College Of Baltimore County – All Campuses	Computer Applications	LDC	3	0

Baltimore Regional Talent Development Pipeline Study

County	Provider	Program Name	Program Level	Enrolment	Completes
Baltimore County	Community College Of Baltimore County – All Campuses	Computer Science	A	454	15
Baltimore County	Community College Of Baltimore County – All Campuses	Database	LDC	5	2
Baltimore County	Community College Of Baltimore County – All Campuses	Database	NDU	0	2
Baltimore County	Community College Of Baltimore County – All Campuses	General Networking	LDC	4	0
Baltimore County	Community College Of Baltimore County – All Campuses	Information Management	LDC	2	0
Baltimore County	Community College Of Baltimore County – All Campuses	Information Security	LDC	5	1
Baltimore County	Community College Of Baltimore County – All Campuses	Information Security	U	0	1
Baltimore County	Community College Of Baltimore County – All Campuses	Information Systems Security	A	81	4
Baltimore County	Community College Of Baltimore County – All Campuses	Information Systems Security	LDC	7	2
Baltimore County	Community College Of Baltimore County – All Campuses	Information Technology	A	257	26
Baltimore County	Community College Of Baltimore County – All Campuses	Information Technology Support Cert	LDC	27	0
Baltimore County	Community College Of Baltimore County – All Campuses	MCITP Certificate	LDC	2	5
Baltimore County	Community College Of Baltimore County – All Campuses	MCITP Certificate	U	0	5
Baltimore County	Community College Of Baltimore County – All Campuses	Network Technology	A	242	37
Baltimore County	Community College Of Baltimore County – All Campuses	Preparation For Network+	NDU	0	4
Baltimore County	Fortis Institute	Computer Support Technician	Non-WIA OT	46	22
Harford County	Harford Community College	Computer Information Systems	A	98	17
Harford County	Harford Community College	Computer Information Systems	LDC	13	4
Harford County	Harford Community College	Computer Information Systems	NDU	1	0
Harford County	Harford Community College	Information Systems Security	A	70	9
Harford County	Harford Community College	Information Systems Security	LDC	13	0
Harford County	Harford Community College	Information Systems Security	NDU	1	0
Howard County	Howard Community College	Info Technology - Internet Professi	LDC	1	1
Howard County	Howard Community College	Information Technology	A	201	24
Howard County	Howard Community College	Network Administration	A	36	4
Howard County	Howard Community College	Network Administration	LDC	10	4
Howard County	Howard Community College	Web Developer	LDC	6	3
Baltimore City	Tesst College Of Technology	Computer Networking Technology	A	78	43

Baltimore Regional Talent Development Pipeline Study

County	Provider	Program Name	Program Level	Enrolment	Completes
Baltimore City	Tesst College Of Technology	Network Information Systems	A	0	10
Baltimore City	Tesst College Of Technology	Network Information Technology	LDC	0	10
Baltimore County	Towson University	A+/Net+ Certification	WIA OT	8	4
Baltimore County	Towson University	Cert: A+, Network +, CCNA Online (+ Clock Hours)	WIA OT	20	5
Baltimore County	University of Maryland Baltimore County	Cyber Academy	WIA OT	n.a.	n.a.

Program Types: A-Associates, WIA OT- Occupational Training that is eligible for WIA funding, Non-WIA OT – Occupational Training the is not eligible for WIA funding, LDC- Lower Division Certificate, NDU – Non-Degree Undergraduate, APT – Apprenticeship Training

Table 121 Educational Programs for Selected Transportation and Logistics Occupations

Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
Heavy and Tractor-Trailer Truck Drivers, and Industrial Truck and Tractor Operators	Anne Arundel County	Anne Arundel Community College	Commercial Drivers License-Class B	WIA OT	n.a.	n.a.
	Anne Arundel County	Anne Arundel Community College	Commercial Driver's License Class A	WIA OT	7	0
	Baltimore City	All-State Career School	Advanced Tractor Trailer Driving	WIA OT	709	595
	Baltimore City	All-State Career School	Class B CDL Driver Training Program	WIA OT	77	69
	Baltimore City	America Works Of Maryland, Inc.	Forklift Operations, Commercial Drivers License	Non-WIA OT	n.a.	n.a.
	Baltimore County	Community College Of Baltimore County	CDL-A Upgrade	WIA OT	86	73
	Baltimore County	North American Trade School	Commercial Truck Driving	WIA OT	151	114
	Harford County	Harford Community College	Truck Driver CDL 'B' License	WIA OT	n.a.	n.a.
	Anne Arundel County	Anne Arundel Community College	Trnsprtation, Logistics & Cargo Sec	LDC	13	6
Cargo and Freight Agents	Harford County	Cecil College	Transport. & Logistics- Transport. Mng	LDC	3	0
	Harford County	Cecil College	Transport & Logistics-Commerc Trans	LDC	2	0
	Harford County	Cecil College	Transport & Logistics-Materials Mngm	LDC	1	0
	Harford County	Cecil College	Transportation & Logistics	A	12	1
	Baltimore City	Baltimore City Community College	Office Administration	A	23	3
Dispatchers	Baltimore City	Baltimore City Community College	Office Administration	NDU	0	0
	Baltimore City	Keller Professional Services, Inc.	Administrative Skills Training	Non-WIA OT	n.a.	n.a.
	Harford County	Harford Community College	Business Mngmnt-Admin Office Assist	WIA OT	25	1

Baltimore Regional Talent Development Pipeline Study

Bus and Truck Mechanics and Diesel Engine Specialists	Baltimore County	Community College Of Baltimore County – All Campuses	Diesel & Engine Specialist	LDC	1	6
	Baltimore County	Community College Of Baltimore County – All Campuses	Diesel & Equipment Maintenance Tchn	A	13	6
	Baltimore County	North American Trade School	Diesel Technician	WIA OT	104	56

Program Types: A-Associates, WIA OT- Occupational Training that is eligible for WIA funding, Non-WIA OT – Occupational Training the is not eligible for WIA funding, LDC- Lower Division Certificate, NDU – Non-Degree Undergraduate, APT – Apprenticeship Training

Table 122 Educational Programs for Selected Business Services Occupations

Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
Tax Preparers	Anne Arundel County	Anne Arundel Community College	Business Accountant	LDC	31	1
	Anne Arundel County	Anne Arundel Community College	Financial Accounting	LDC	53	9
	Anne Arundel County	Anne Arundel Community College	Financial Accounting	A	111	9
	Anne Arundel County	Anne Arundel Community College	Professional Bookkeeper	LDC	12	10
	Baltimore County	Accounting And Bookkeeping Center, Inc.	ABA: Basic Accounting & Bookkeeping	Non-WIA OT	94	53
	Baltimore County	Accounting And Bookkeeping Center, Inc.	ABA: Advanced Small Business Accounting Applications	Non-WIA OT	41	21
	Baltimore County	Community College Of Baltimore County – All Campuses	Accounting	LDC	111	18
	Baltimore County	Community College Of Baltimore County – All Campuses	Accounting	A	380	26
	Baltimore County	Community College Of Baltimore County – All Campuses	Business Accounting	LDC	63	3
	Carroll County	Carroll Community College	Accounting	LDC	28	2
	Carroll County	Carroll Community College	Accounting	A	38	2
	Harford County	Cecil College	Business & Commerce Tech-Accounting I	LDC	9	0
	Harford County	Cecil College	Business & Commerce Tech-Accounting I	LDC	2	0
	Harford County	Harford Community College	Accounting	NDU	1	0
	Harford County	Harford Community College	Accounting	LDC	31	14
	Harford County	Harford Community College	Accounting	A	210	7

Baltimore Regional Talent Development Pipeline Study

Occupation	County	Provider	Program Name	Program Level	Enrollment	Completes
Human Resources Assistants, Except Payroll and Timekeeping	Harford County	Harford Community College	Accounting	WIA OT	15	12
	Howard County	Howard Community College	Certified Bookkeeping	LDC	8	1
	Anne Arundel County	Anne Arundel Community College	Human Resource Management	WIA OT	53	40
	Baltimore County	Community College Of Baltimore County – All Campuses	Human Resources Management	LDC	28	2
	Baltimore County	Towson University	Online-Professional In Human Resources/HCRI	WIA OT	n.a.	n.a.
	Harford County	Cecil College	Human Resources	A	8	0
	Harford County	Harford Community College	Human Resources	LDC	7	1
	Harford County	Harford Community College	Business Mngmnt-Admin Office Assist	WIA OT	25	1
	Anne Arundel County	Anne Arundel Community College	Architecture & Interior Design	LDC	8	20
	Anne Arundel County	Anne Arundel Community College	Architecture & Interior Design	A	218	33
Architectural, Civil, and Mechanical Drafters	Anne Arundel County	Anne Arundel Community College	Architecture CAD	WIA OT	6	0
	Anne Arundel County	Anne Arundel Community College	Designing & Drafting Tech	LDC	14	9
	Anne Arundel County	Anne Arundel Community College	Designing & Drafting Technology (Computer-Aided)	WIA OT	12	1
	Baltimore City	Baltimore City Community College	Computer-Aided Draft. & Design	LDC	3	0
	Baltimore City	Baltimore City Community College	Computer-Aided Draft. & Design	A	29	3
	Baltimore City	Baltimore City Community College	Computer-Aided Drafting & Design	WIA OT	6	0
	Baltimore City	Baltimore City Community College	Computer-Aided Drafting & Design	WIA OT	21	1
	Baltimore County	Community College Of Baltimore County	CAD Architecture Cert.	WIA OT	8	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Autocad Operator	NDU	0	11
	Baltimore County	Community College Of Baltimore County – All Campuses	Autocad Operator	LDC	6	11
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Architecture	U	0	6
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Architecture	LDC	17	6

Baltimore Regional Talent Development Pipeline Study

Occupation	County	Provider	Program Name	Program Level	Enrollment	Completes
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Management	LDC	0	1
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Management	NDU	0	1
	Baltimore County	Community College Of Baltimore County – All Campuses	Computer-Aided Design For Arch. & Engineering	A	66	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Drafting Tech	A	2	0
	Carroll County	Carroll Community College	Computer-Aided Design	NDU	1	0
	Carroll County	Carroll Community College	Computer-Aided Design	LDC	3	1
	Carroll County	Carroll Community College	Computer-Aided Design	A	15	3
	Harford County	Harford Community College	Computer-Aided Design & Drafting	NDU	1	0
	Harford County	Harford Community College	Computer-Aided Design & Drafting	A	38	2
	Harford County	Harford Community College	Computer-Aided Design & Drafting	LDC	14	6
	Howard County	Howard Community College	Computer Aided Design Tech	NDU	0	5
	Howard County	Howard Community College	Computer Aided Design Tech	LDC	6	5
	Howard County	Howard Community College	Computer Aided Design Tech	A	17	7
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Mechanical Modeling	U	0	6
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Mechanical Modeling	NDU	0	6
	Baltimore County	Community College Of Baltimore County – All Campuses	CAD Mechanical Modeling	LDC	16	6
Mechanical Drafters	Anne Arundel County	Anne Arundel Community College	Electronic Engineering Tech	NDU	0	12
	Anne Arundel County	Anne Arundel Community College	Electronic Engineering Tech	LDC	38	12
	Anne Arundel County	Anne Arundel Community College	Electronic Engineering Tech	A	62	10
	Baltimore City	All-State Career	Electrical Systems Technology	Non-WIA OT	124	66
	Baltimore City	Baltimore City Community College	Electronics Tech	A	2	1
	Baltimore City	Baltimore City Community College	Electronics Tech	WIA OT	14	1
Electrical and Electronics Engineering Technicians						

Baltimore Regional Talent Development Pipeline Study

Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
	Baltimore City	Baltimore City Community College	Electronics Tech (// Credit Hours)	WIA OT	7	0
	Baltimore City	TESST College Of Technology	Electronics, Computer & Telecommun.	A	0	7
	Baltimore County	North American Trade Schools	Electrical Technology	Non-WIA OT	122	70
	Carroll County	Carroll Community College	Electrical Engineering (Ase)	A	18	0
	Harford County	Cecil College	Electronics Technology	A	1	0
	Howard County	Howard Community College	Electrical Engineering	NDU	30	0
	Howard County	Howard Community College	Electrical Engineering	A	2	2
	Howard County	Howard Community College	Electronics Tech	LDC	10	6
	Howard County	Howard Community College	Electronics Tech	A	24	2
	Howard County	Lincoln College Of Technology	Electronic Systems Technician	WIA OT	63	24
	Baltimore County	Community College Of Baltimore County	Minor Engineering Certificate	WIA OT	n.a.	n.a.
	Baltimore County	Community College Of Baltimore County – All Campuses	Civil Design	LDC	8	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Computer Automated Manufacturing	A	2	0
	Baltimore City	Baltimore City Community College	Engineering Transfer	A	104	4
Civil, Mechanical, Electrical, and Electronics Technicians	Anne Arundel County	Anne Arundel Community College	Engineering Transfer	A	387	28
	Baltimore County	Community College Of Baltimore County – All Campuses	Minor Engineering	LDC	0	4
	Baltimore County	Community College Of Baltimore County – All Campuses	Engineering	A	494	13
	Baltimore County	Community College Of Baltimore County – All Campuses	Engineering Technology	A	111	5
	Baltimore County	Community College Of Baltimore County – All Campuses	Engineering Technology	NDU	0	3
	Baltimore County	Community College Of Baltimore County – All Campuses	Engineering Transfer Certificate	LDC	41	1
	Harford County	Harford Community College	Engineering Technology	A	44	3

Baltimore Regional Talent Development Pipeline Study

Occupation	County	Provider	Program Name	Program Level	Enrollment	Completes
Engineering Technicians, Except Drafters, All Other	Harford County	Harford Community College	Engineering Technology	NDU	3	3
	Harford County	Harford Community College	Engineering Technology	WIA OT	14	1
	Harford County	Harford Community College	Engineering Transfer	A	189	16
	Harford County	Harford Community College	Engineering Transfer	NDU	5	0
	Howard County	Howard Community College	Engineering Transfer	A	270	4
	Baltimore County	Community College Of Baltimore County – All Campuses	Industrial Maintenance Technology	A	1	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Land Surveying	U	11	6
	Anne Arundel County	Anne Arundel Community College	Alternative & Sustainable Energy Systems	LDC	4	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Survey Technology	NDU	0	5
	Baltimore County	Community College Of Baltimore County – All Campuses	Survey Technology	A	32	5
Environmental Science and Protection Technicians, Including Health	Anne Arundel Community College	Anne Arundel Community College	Environmental Monitoring & Assessment	LDC	5	1
	Baltimore City	Baltimore City Community College	Environmental Science	A	2	1
	Baltimore City	Civic Works, Inc.	Abatement Workers, Weatherization Installers, Green & Healthy Homes Workers, Epa Ahera, Osha Hr Hazwoper, Lead Abatement Worker, Confined Space Operations	Non-WIA OT	84	0
	Baltimore County	Community College Of Baltimore County – All Campuses	Environmental Science & Technology	A	3	0
	Baltimore County	Towson University	Online Certified Microbial Investigator	WIA OT	n.a.	n.a.
	Baltimore County	Towson University	Online Certified Sustainability Professional	WIA OT	n.a.	n.a.
	Baltimore County	Towson University	Online Indoor Air Quality	WIA OT	n.a.	n.a.
	Baltimore County	University Of Maryland Baltimore County	Environmental Science	NDU	0	1
	Harford County	Harford Community College	Science Lab Tech	NDU	0	6
	Harford County	Harford Community College	Environmental Technology	LDC	3	0
	Harford County	Harford Community College	Environmental Technology	A	3	1

Baltimore Regional Talent Development Pipeline Study

Occupation	County	Provider	Program Name	Program Level	Enrolment	Completes
	Harford County	Harford Community College	Science Lab Tech	A	23	6
Hazardous Materials Removal Workers	Baltimore County	Towson University	Online Hazwoper -Hour Moderate Risk	WIA OT	n.a.	n.a.

Program Types: A-Associates, WIA OT- Occupational Training that is eligible for WIA funding, Non-WIA OT – Occupational Training the is not eligible for WIA funding, LDC- Lower Division Certificate, NDU – Non-Degree Undergraduate, APT – Apprenticeship Training



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