

Tri-County Technical College

Economic Overview and Program Demand Gap Analysis

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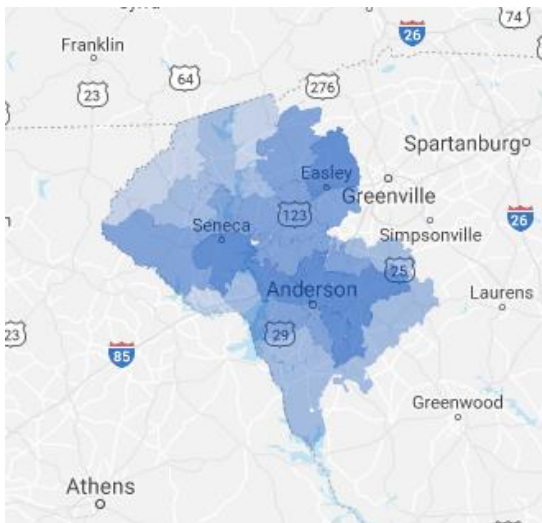


Executive Summary

Tri-County Technical College (TCTC) is a public, two-year postsecondary educational institution in South Carolina. To further its goal of providing a “stimulating, rigorous, and inclusive learning environment,” TCTC pursues continual improvement in various forms. An up-to-date understanding of the regional economy and the demand for skilled labor is vital to the planning efforts of colleges and universities seeking to adapt their program offerings to the requirements of an ever-changing workforce.

For purposes of this report, TCTC serves a larger region beyond Anderson County. This region, called the TCTC Service Region, is comprised of three counties in South Carolina: Anderson, Oconee, and Pickens Counties (Figure 1). This report outlines the region’s economy and provides a program demand gap analysis to determine how well TCTC’s program offerings satisfy regional workforce demand. This report also offers recommendations for new program development. The following figures and table display key findings of the analyses.

FIGURE 1: MAP OF THE TCTC SERVICE REGION



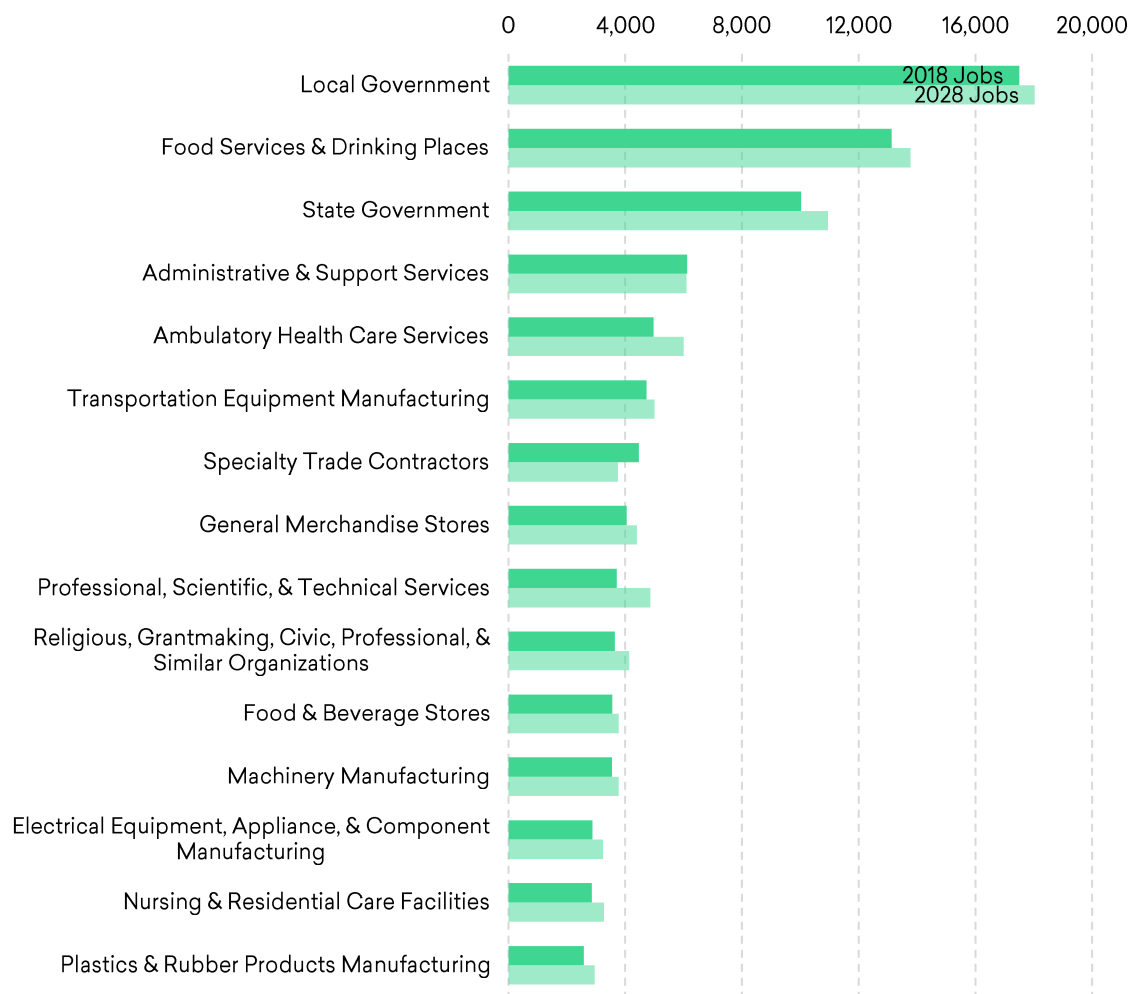
Source: Emsi Analyst. Region provided by TCTC.



ECONOMIC OVERVIEW

Figure 2 displays the top industry subsectors in terms of employment in the TCTC Service Region, and Figure 3 shows the top industry subsectors in terms of employment concentrations, referred to as location quotients (LQs). High LQs (usually anything greater than 1.2) are an indication that the region has a comparative advantage or specialization in certain industry subsectors relative to the rest of the nation or potentially to other competing regions.

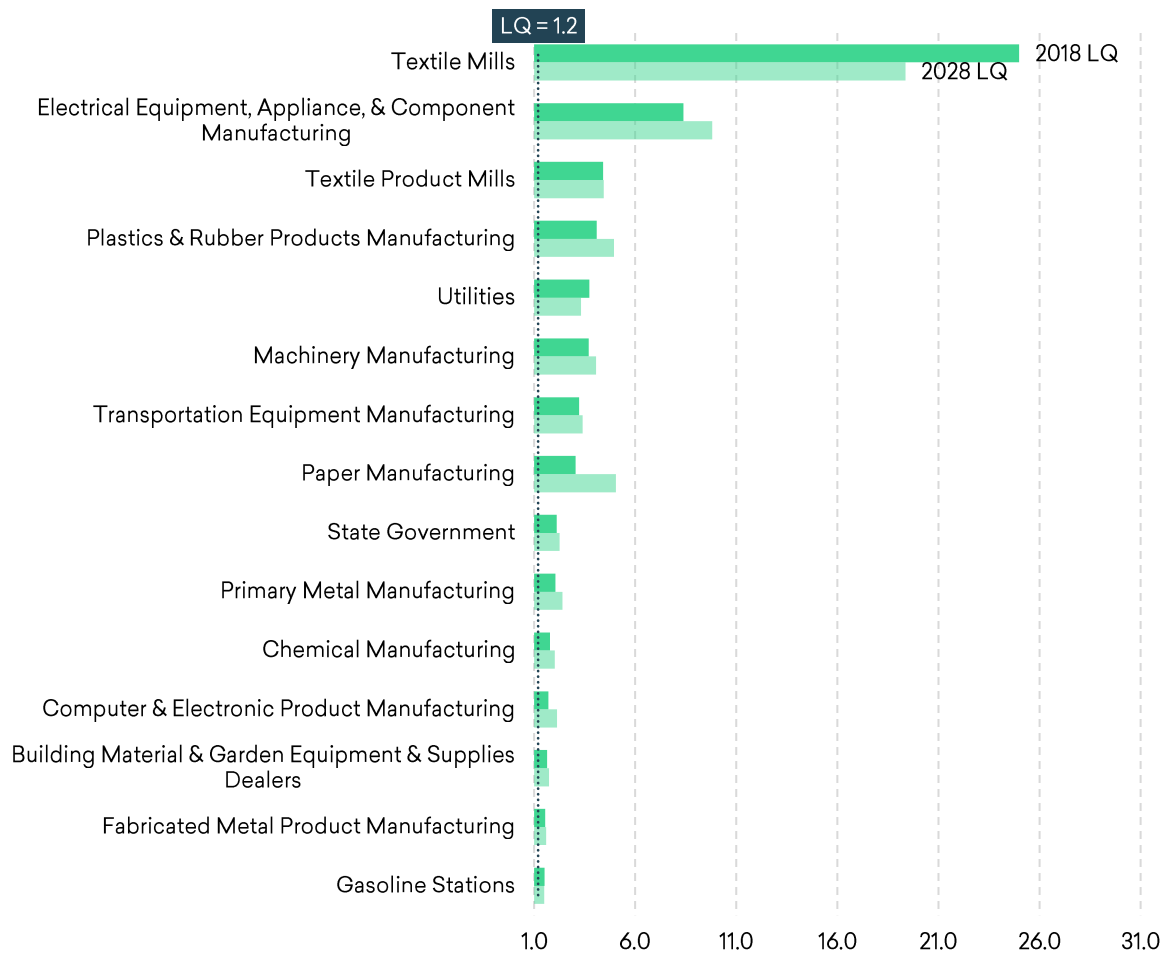
FIGURE 2: TOP INDUSTRY SUBSECTORS IN THE TCTC SERVICE REGION BY JOBS



Source: Emsi program demand gap model.



FIGURE 3: TOP INDUSTRY SUBSECTORS IN THE TCTC SERVICE REGION BY EMPLOYMENT CONCENTRATION (LQ)



Source: Emsi program demand gap model.

Across all of TCTC Service Region’s industry subsectors, five are within the top 15 in terms of jobs and relatively large LQs. The appearance of these industry subsectors provides an indication of their strength in the region’s economy and offers the college insight into potential employment opportunities for its students. The five industry subsectors are:

- State Government
- Transportation Equipment Manufacturing
- Machinery Manufacturing



- Electrical Equipment, Appliance, & Component Manufacturing
- Plastics & Rubber Products Manufacturing

PROGRAM DEMAND GAP ANALYSIS

The program demand gap analysis provides results across all of TCTC's certificate and associate degree level programs, referred to by their formal CIP code titles.¹ The analysis connects the college's program completers with the availability of regional job openings. Furthermore, the analysis focuses on the gaps and surpluses in the programs by award level. A gap or surplus larger than 90 is considered beyond normal labor market fluctuations and therefore an area of consideration for program development.

TCTC offers 26 certificate level programs, eight of which have a significant gap above the 90-job level of significance, as shown in Figure 4. The eight programs are:

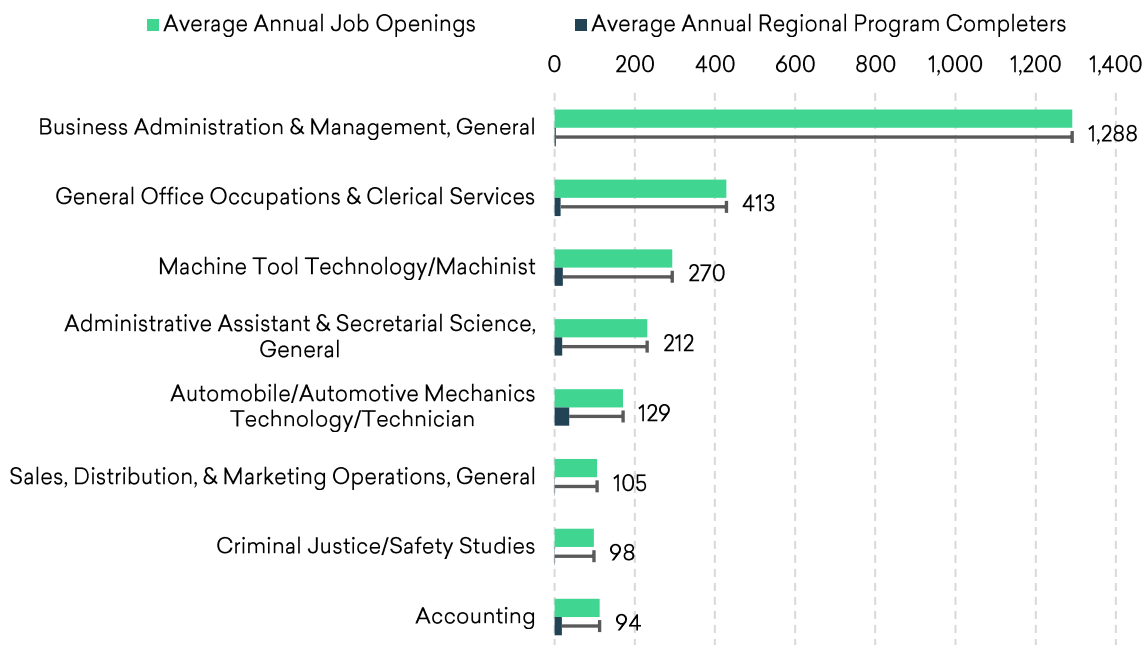
- Business Administration & Management, General
- General Office Occupations & Clerical Services
- Machine Tool Technology/Machinist
- Administrative Assistant & Secretarial Science, General
- Automobile/Automotive Mechanics Technology/Technician
- Sales, Distribution, & Marketing Operations, General
- Criminal Justice/Safety Studies
- Accounting

All should be considered for expansion at the certificate level, considering the industries and occupations of the TCTC Service Region. Understanding that some of these programs did not work at the certificate level at TCTC, including their associated skill sets in an associate degree is a strong way to capture these aspects of the market and make completers competitive. No programs at this award level have a significant surplus.

1 CIP refers to the Classification of Instructional Program and was originally developed by the U.S. Department of Education's National Center for Education Statistics (NCES).

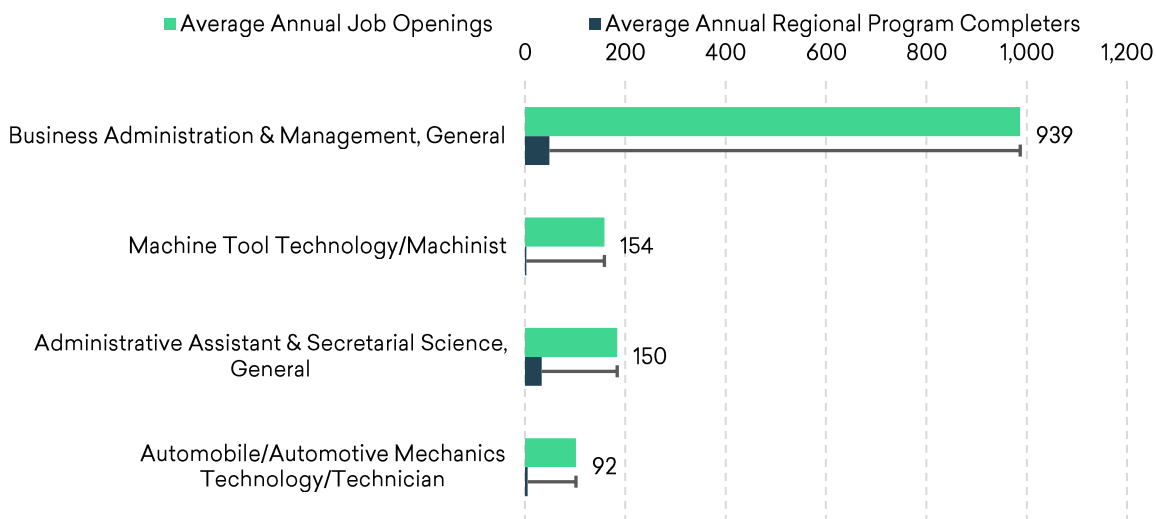


FIGURE 4: SIGNIFICANT CERTIFICATE LEVEL GAPS



Source: Emsi program demand gap model.

FIGURE 5: SIGNIFICANT ASSOCIATE DEGREE LEVEL GAPS



Source: Emsi program demand gap model.



At the associate degree level, four programs have a significant gap (Figure 5). Several should be considered for a college-wide expansion, many of which are related to other associate degree level programs without a significant 90-job gap. Furthermore, if the associate degree level program is associated with a formal industry-specific certificate, permit, or license required for employment, it is also recommended for expansion. The four programs are:

- Business Administration & Management, General
- Machine Tool Technology/Machinist
- Administrative Assistant & Secretarial Science, General
- Automobile/Automotive Mechanics Technology/Technician

A liberal arts program expansion is not recommended at this time, but TCTC administrators should be aware that students can find success in a variety of business-related occupations. Using Emsi's Profile Analytics database, many liberal arts program completers are currently employed as retail salespersons, administrative assistants, customer service representatives, as well as a variety of managers and supervisors. These occupations have a considerable number of job openings in the TCTC Service Region. The college's liberal arts program, therefore, serves as a starting point to students' career goals beyond an associate degree level of education.

PROGRAM ADDITIONS

Twenty certificate and eleven associate degree level programmatic areas of opportunity have been identified in the program demand gap analysis, many of which are related to service, healthcare, or business programs. Please note that these tables highlight particular occupations, and in many cases a program can be designed to train for multiple occupations. Once these occupations are grouped with other similar occupations – such as physical therapist assistants and occupational therapy assistants at the associate degree level – the actual workforce gap may be larger. Many program additions are related to TCTC's current program offerings. This indicates an opportunity for a curriculum adjustment to better align with the region's current and projected labor market demand, such as by adding new areas of emphasis to existing courses at TCTC. A selection of these occupations, which have the most regional job openings by award level, appear in Table 1.



TABLE 1: PROGRAM ADDITIONS BY EDUCATION LEVEL

SOC CODE	SOC TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	GAP	MEDIAN HOURLY WAGE	EDUCATION LEVEL
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	143	0	143	\$12.35	Certificate
39-9032	Recreation Workers	31	0	31	\$14.57	Certificate
35-1011	Chefs and Head Cooks	30	0	30	\$16.67	Certificate
53-1048	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	24	0	24	\$23.59	Certificate
39-9031	Fitness Trainers and Aerobics Instructors	24	1	24	\$13.72	Certificate
31-2021	Physical Therapist Assistants	10	0	10	\$25.59	Associate
29-2021	Dental Hygienists	8	0	8	\$28.73	Associate
29-2034	Radiologic Technologists	8	0	8	\$23.99	Associate
29-1126	Respiratory Therapists	6	0	6	\$23.99	Associate
31-2011	Occupational Therapy Assistants	4	0	4	\$29.72	Associate

SOC refers to the Standard Occupational Classification system used to classify occupations. Average annual job openings represent regional data from 2018 to 2028. Numbers may not sum due to rounding. Due to insufficient data, the region's median hourly wage rates by occupation are aggregated across all educational levels.

Source: Emsi program demand gap model.



Introduction

An efficient labor market requires a seamless flow of skilled workers between the educational institutions that train them and the employers that hire them. One factor behind workforce misalignment stems from when the needs of the employers evolve differently than the educational programs that train their workers.

These misalignments may happen at different times and for different reasons: 1) employer training becomes more tailored and comprehensive; 2) businesses come and go, and certain educational programs become more or less pertinent to a specific region; 3) rapid advances in technology and business create curriculum needs that few educational institutions possess; and 4) as economic conditions shift, businesses have different hiring requirements of their employees.

In light of these dynamics, an up-to-date understanding of the regional economy and the demand for skilled labor is vital to the planning efforts of colleges and universities seeking to adapt their program offerings to the requirements of an ever-changing workforce.

To gain better insight into economic conditions and workforce trends, Tri-County Technical College (TCTC) partnered with Emsi, a leading provider of economic impact studies and labor market data. In this report, Emsi conducts an overview of the region's economy, provides a program demand gap analysis of TCTC program offerings, and makes recommendations for new program development.

The program demand gap analysis is performed by assessing the supply and demand of skilled workers and identifying the educational programs that need to be adapted in order to fill any existing or future gaps. The analysis weighs the educational output of TCTC and other postsecondary educational institutions in the region against the number of job openings related to the college's program offerings to determine whether a deficit or an oversupply of skilled workers exists. The goal of the analysis is to provide TCTC with relevant data and information that it can use when solving problems and making decisions about current and future program development.



IMPORTANT NOTE

This analysis is intended to serve as a starting point for TCTC as the college discusses regional workforce needs. A deficit (gap) or oversupply (surplus) of workers in a particular occupation category represents a potential problem for the region, making it important for each program and occupation group to be evaluated by the college on a case-by-case basis. The purpose of this analysis is, therefore, to initiate the conversation on evaluating program effectiveness. Once evaluated internally within the college, specific implications may be considered for programs with substantial gaps or surpluses.

It must be noted that our analysis does have its limitations in that only the education supply pipeline is considered. This is due to data availability at the regional and school levels. However, other sources—unemployed workers, industry trained pipelines, workers migrating to the region, and job changers from other occupational categories—can also be a source of skilled workers. These types of considerations are useful when evaluating specific types of occupations. Publicly available data sources are limited in accounting for this, and consequently these labor sources are unavailable for Emsi analysis. Primary data collection methods (i.e., interviews and surveys) are among the only ways to obtain information on the other sources for skilled workers.

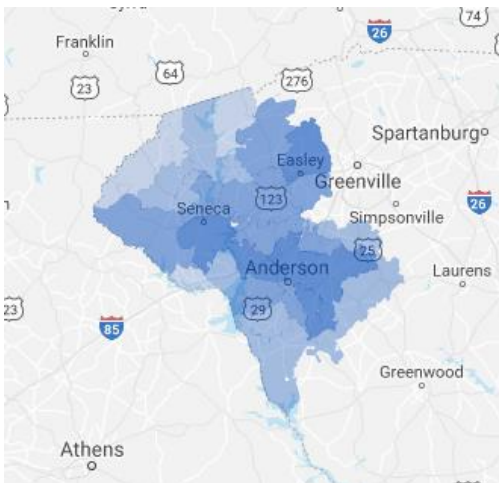


CHAPTER 2:

Economic Overview

Before looking at the results of the program demand gap analysis, an institution should first consider the economic structure of its region, referred to in this report as the TCTC Service Region and defined as Anderson, Oconee, and Pickens Counties in South Carolina (Figure 2.1). Identifying the key driving industries within the region is an important first step for three reasons: 1) it helps TCTC understand where the college should logically target its efforts, 2) it helps to reveal whether there are industries that may be overlooked as a result of recent economic growth, and 3) it helps identify the top occupations within those key driving industries.

FIGURE 2.1: MAP OF THE TCTC SERVICE REGION



Source: Emsi Analyst. Region provided by TCTC.

In addition to knowing the industry structure of the region, it is important to have an understanding of the workforce—how connected the region’s workers are to the surrounding community and the educational attainment of workers in the region. To these ends, this chapter provides an overview of the TCTC Service Region’s industry composition, shows common occupations in the region’s key industries, illustrates



worker commuting patterns, and discusses the educational attainment of the region's adult residents. Supporting data tables are available in Appendix 3.

INDUSTRY COMPOSITION

Evaluating current and future employment by industry provides information on the economic diversification of a given region. Understanding the industry mix of the region is important for drawing connections to the occupations and companies that are in-demand in the region. The North American Industry Classification System (NAICS) is the structure used by federal agencies to classify business establishments based on their production process (although the final product or service is usually similar for the firms in a given industry). NAICS applies a six-digit hierarchical coding system to organize more than 1,100 detailed industries in the U.S.

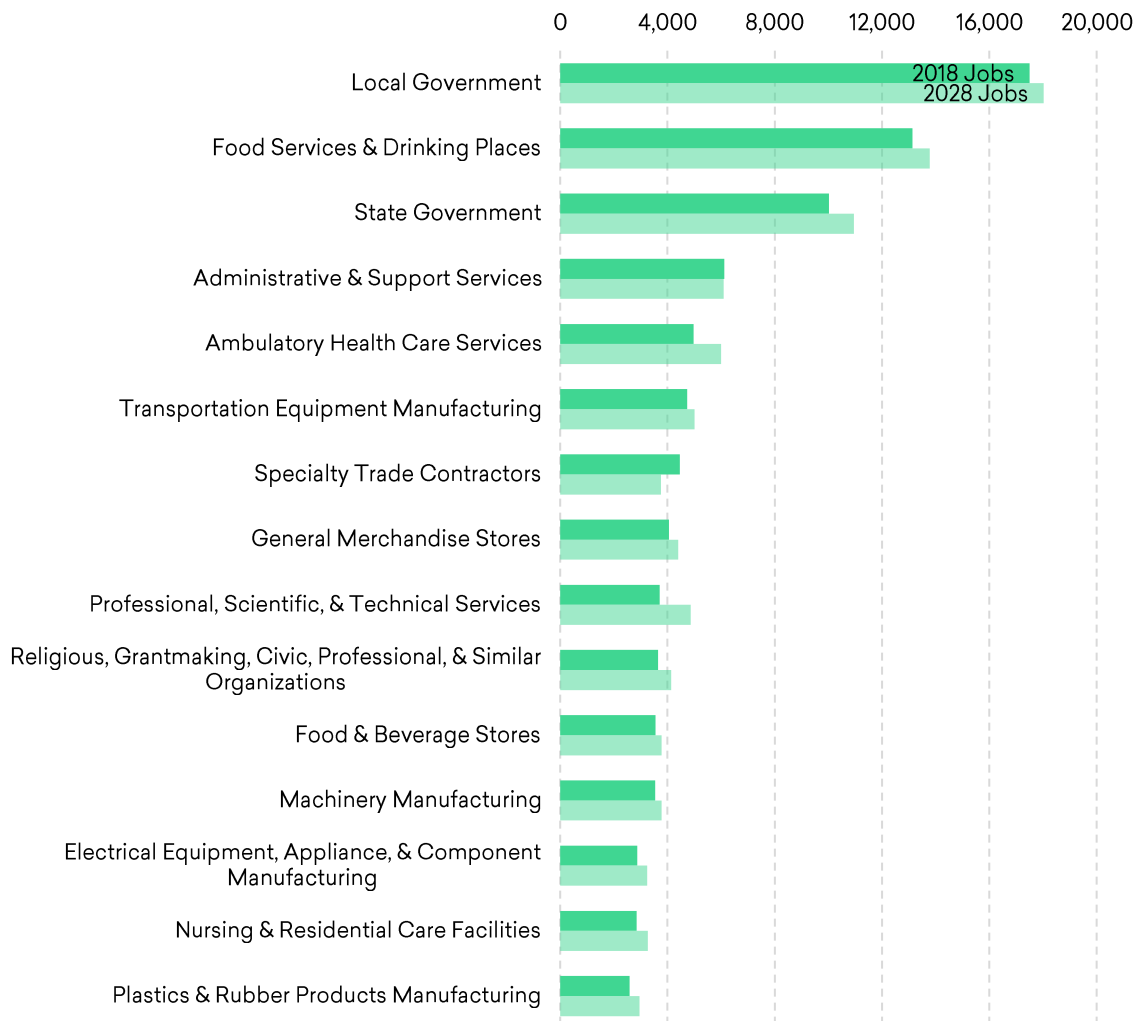
For this analysis, Emsi has aggregated these detailed industries into their three-digit NAICS codes, referred to as industry subsectors.² Figure 2.2 presents the 15 largest industry subsectors in the TCTC Service Region, by their 2018 job counts, and also shows the industry subsectors' projected growth or decline over the next decade.

The TCTC Service Region supported 141,908 jobs in 2018, and by 2028, it is projected to add about 9,654 new jobs for a 7% job growth rate. As shown in the figure, the Local Government industry subsector had the most jobs in the TCTC Service Region in 2018, with 17,505 jobs and is expected to remain the top regional employer. The Food Services & Drinking Places and State Government industry subsectors are the next largest in terms of jobs, with 13,132 jobs and 10,026 jobs in 2018, respectively. As for growth, Professional, Scientific, & Technical Services is projected to add the most jobs of the top 15 industry subsectors, with a 10-year growth rate of 31% or 1,151 new jobs. Two of the top 15 industry subsectors are expected to contract between now and 2028 - the Specialty Trade Contractors industry subsector and the Administrative & Support Services industry subsector.

2 In Emsi data, all establishments in the main NAICS hierarchy are private-sector only. For example, jobs in the Educational Services (NAICS 61) industry sector and the Health Care & Social Assistance (NAICS 62) industry sector are not associated with local, state, or federal governments.



FIGURE 2.2: JOBS BY INDUSTRY SUBSECTOR IN THE TCTC SERVICE REGION, 2018 AND 2028



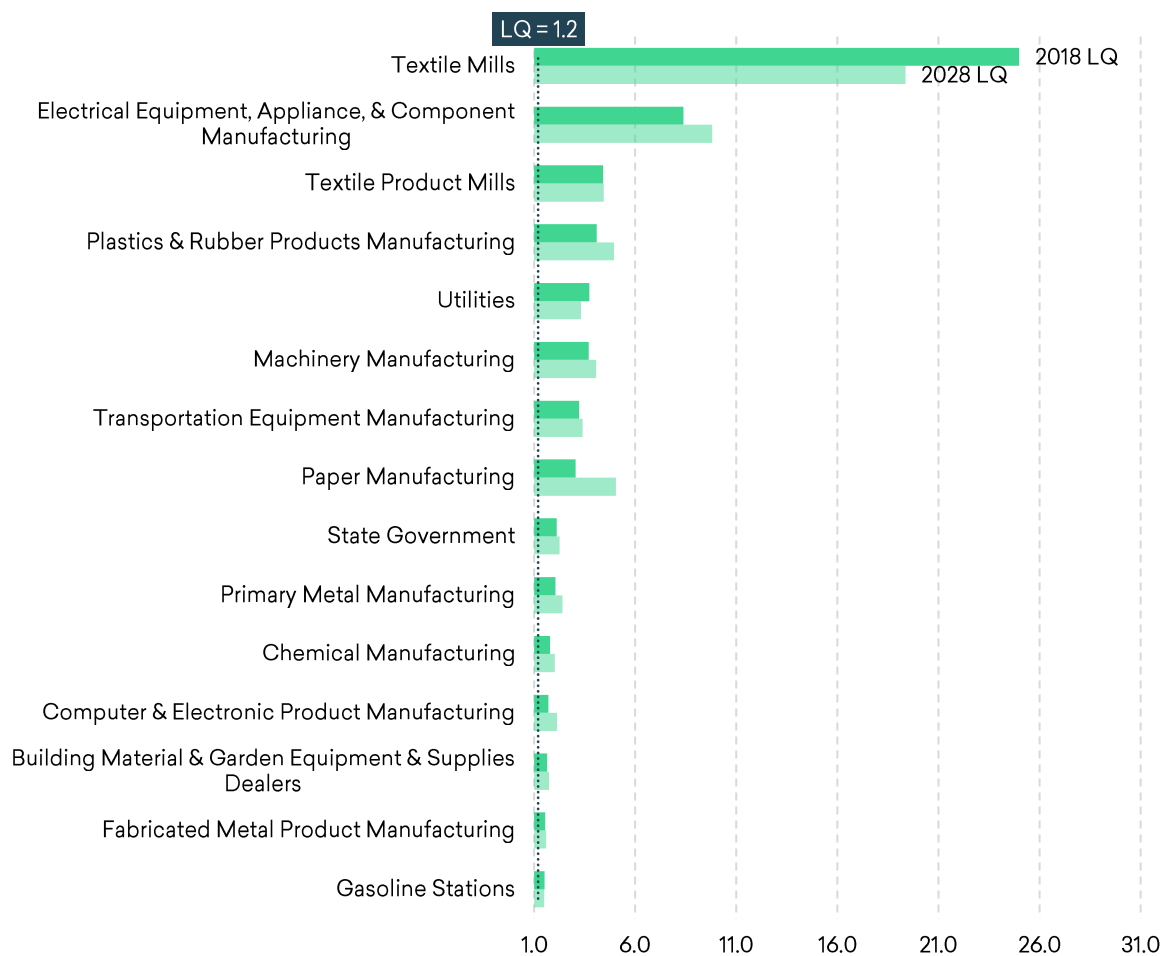
Source: Employees & Self-Employed 2018.4.

The employment concentration of the TCTC Service Region's industry subsectors is measured by a location quotient (LQ). LQs are used to assess regional competitiveness by comparing the concentration of employment in an industry in the region against the employment concentration for that same industry across the nation. An LQ equal to 1.0 indicates that the percentage of total employment comprised by an industry in the region matches the percentage of total employment of that industry in the U.S. An LQ greater than 1.0 means that the industry comprises a greater proportion of total employment in the region than it does in the U.S, and high LQs (greater than 1.2) are an



indication that the region has a comparative advantage or specialization in an industry relative to the rest of the U.S.

FIGURE 2.3: EMPLOYMENT CONCENTRATION (LQ) BY INDUSTRY SUBSECTOR IN THE TCTC SERVICE REGION, 2018 AND 2028



Source: Employees & Self-Employed 2018.4.

Figure 2.3 shows the industry subsectors in the TCTC Service Region with the 15 largest LQs. The Textile Mills industry subsector had the largest LQ in 2018 (LQ of 25.0) but is expected to decrease in employment concentration between 2018 and 2028. However, it is projected to still remain at the top of the industry subsectors with large LQs by a substantial margin. The Electrical Equipment, Appliance, & Component Manufacturing; Textile Product Mills; and Plastics & Rubber Products Manufacturing



industry subsectors also have relatively large employment concentrations, with LQs of 8.4, 4.4, and 4.1 in 2018, respectively. As for the 10-year growth rate, the Paper Manufacturing industry subsector is projected to increase in LQ by 65%, which is the largest increase among the top 15 industry subsectors in the figure.

On the other hand, three industry subsectors are expected to drop in LQ between 2018 and 2028. The industry subsector with the largest percent decline is Textile Mills, with a 23% decrease. Despite the declines, all of the region's top 15 industry subsectors will remain above the 1.2 high-LQ threshold.

OCCUPATIONS WITHIN KEY INDUSTRY SUBSECTORS

Five industry subsectors are found in both Figure 2.2 and Figure 2.3 because they are top employers and have high LQs. These industry subsectors are State Government; Transportation Equipment Manufacturing; Machinery Manufacturing; Electrical Equipment, Appliance, & Component Manufacturing; and Plastics & Rubber Products Manufacturing. Their appearance in the figures provides an indication of their relative strength in the TCTC Service Region, and thus, we identify the most common occupations within the five industry subsectors, called the staffing pattern.³ Not only do the industry subsectors' staffing patterns provide insight into the region's labor market demand, but by extension, the demand for the college's program offerings.

The State Government subsector is a top employer in the area and is expected to grow modestly over the next ten years. Postsecondary teachers account for 21% of all jobs in the industry subsector, followed by office clerks, general and secretaries & administrative assistants, except legal, medical, & executive, at 10% and 7%, respectively. Many of the top jobs in this industry subsector are either education, healthcare, or business occupations, with a strong mix of education requirements for entry level positions. TCTC's business administration and healthcare courses appear to be good opportunities for students seeking employment in this industry subsector.

3 The top occupations, in terms of the percent of total jobs in an industry, are identified using data from the National Occupational Employment Statistics program, projections from the National Industry-Occupation Employment Matrix, and Emsi's proprietary employment data.



The Transportation Equipment Manufacturing subsector is a top employer in the area and is expecting slight growth over the next decade. Assemblers & fabricators, all other, including team assemblers alone accounts for almost 33% of all jobs in the subsector. Machinists account for another near 12%, followed by inspectors, testers, sorters, samplers, & weighers at 4%. While many jobs in this industry subsector can be entered with a high school diploma, industrial engineers, mechanical engineers, and industrial engineering technicians are all well-performing occupations in the subsector that do require some level of postsecondary education and are expected to grow over the next decade. Most of the top jobs in this subsector have very good entry level wages for the region, and many of the occupations are expecting to add jobs over the next decade. Many of TCTC's programs, such as their machinist and industrial technician programs, offer strong avenues for students seeking to enter this industry subsector.

The Machinery Manufacturing industry subsector is a top employer in the area and shares a very similar growth pattern and occupation composition as Transportation Equipment Manufacturing. Assemblers & fabricators, all other, including team assemblers accounts for just over 20% of the jobs in the subsector, followed closely by machinists at just shy of 20%. As with Transportation Equipment Manufacturing, many of the jobs in this industry subsector do not require a postsecondary education, but occupations such as industrial engineers, mechanical engineers, and managerial occupations are well-performing within the subsector. TCTC's welding and machinist programs offer entry to students looking to begin in this industry subsector.

The Electrical Equipment, Appliance, & Component Manufacturing industry subsector is one of the smaller top employers in the area, but has an extremely high LQ at 8.4 (second largest in the area) and is expecting strong growth over the next decade. Assemblers & fabricators, all other, including team assemblers continues to show its strength in the region and comprises just about 29% of all jobs in the subsector, distantly followed by electrical, electronic, & electromechanical assemblers, except coil winders, tapers, & finishers, at nearly 6%. Mechanical, industrial, & electrical engineers continue to be strong and well-growing jobs in the industry subsector, whereas many occupations in the subsector do not require a postsecondary education. TCTC's Industrial Electronics Technology/Technician program appears to be a great option for students looking to enter this industry subsector, along with their Quality Control Technology/Technician program.

The Plastics & Rubber Products Manufacturing industry subsector is the smallest top employer in the region, but has the fourth largest LQ in the area and is expecting strong



growth over the next decade. Tire builders account for just over 19% of all jobs in the subsector, followed by assemblers & fabricators, all other, including team assemblers and extruding & drawing machine setters, operators, & tenders, metal & plastic, at nearly 13% and 6%, respectively. Managerial occupations and industrial engineers appear to be the only top jobs in the industry subsector that require any sort of postsecondary education. TCTC's industrial programs, such as their machinist and industrial technician programs, offer good avenues for students seeking employment in this subsector.

See Chapter 3 for the results of the program demand gap analysis that targets the five industry subsectors with high employment and large LQs. Appendix 3 has a complete list of the top 25 occupations, with employment projections, related to the five industry subsectors.

WORKFORCE COMMUTING PATTERNS

The Longitudinal Employer-Household Dynamics (LEHD) program⁴ at the Census Bureau provides information on the residential and employment locations of workers. Such data shows the commuting patterns of regional employees. More specifically, the LEHD data demonstrate the extent to which employees commute to the region for work and how many residents commute to surrounding communities for work. Workers from outside the region could be filling current employment gaps, or the region's residents could be out-commuting when there is a surplus of available jobs. The concepts of a "gap" and "surplus" are discussed in greater detail in the first section of Chapter 3.

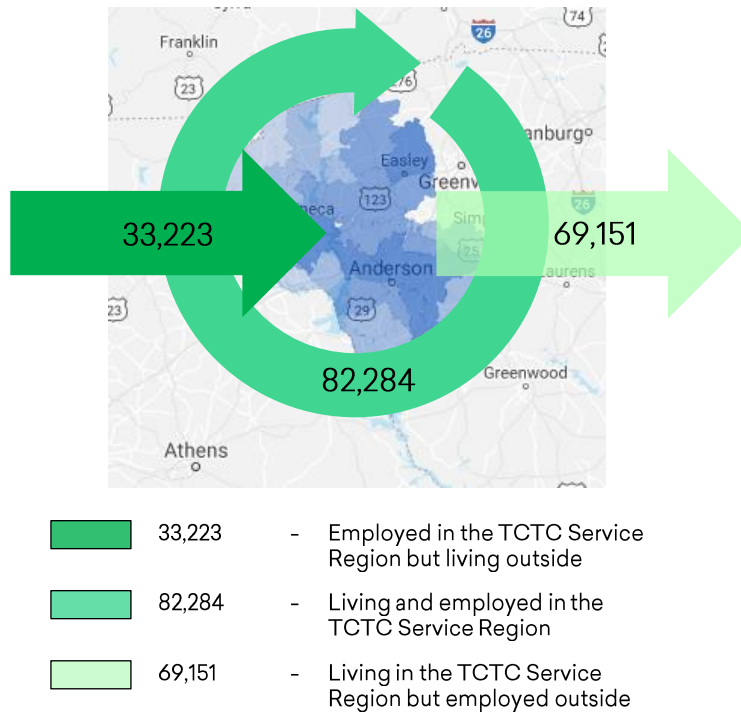
Figure 2.4 presents the inflow and outflow of jobs to and from the TCTC Service Region. According to the LEHD data, there are 115,507 jobs in the region, with 82,284 jobs filled by residents and 33,223 jobs going to people living outside the region. In addition, 69,151 jobs are held by the region's residents outside the region. In other words, 69,151 residents commute outside the region for work. The job counts represent primary jobs, as opposed to all jobs, and differ slightly than job counts in the previous

4 LEHD is an innovative program that uses modern statistical and computing techniques to combine federal and state administrative data on employers and employees with core Census Bureau censuses and surveys while protecting the confidentiality of people and firms that provide the data.



sections, which use Emsi’s complete employment data (see industry data in Appendix 1). As shown in the figure, about twice as many workers out-commute than in-commute. Supporting data tables can be found in Appendix 3.

FIGURE 2.4: TCTC SERVICE REGION JOB INFLOW AND OUTFLOW



Source: Census Bureau, Center for Economic Studies.

Table 2.1 provides further insight into the places where the region’s residents work. As shown in the figure, some of the region’s residents are out-commuting to neighboring counties for work, but the greatest number of residents work in the TCTC Service Region (54% of all jobs). Table 2.2 also shows commuting patterns, except the data highlights the counties in which the region’s workers reside.

TABLE 2.1: COUNTIES WHERE TCTC SERVICE REGION RESIDENTS WORK

COUNTY OF EMPLOYMENT	JOBS	% JOBS
Anderson	41,973	28%
Greenville	40,176	27%



COUNTY OF EMPLOYMENT	JOBS	% JOBS
Pickens	23,317	15%
Oconee	16,994	11%
Spartanburg	5,615	4%
Richland	3,690	2%
Lexington	1,970	1%
Charleston	1,515	1%
Greenwood	1,420	1%
Laurens	1,251	1%
All Other Counties	13,514	9%
Total Primary Jobs, TCTC Service Region Residents	151,435	100%

Source: Census Bureau, Center for Economic Studies.

TABLE 2.2: COUNTIES WHERE TCTC SERVICE REGION WORKERS LIVE

COUNTY OF RESIDENCE	JOBS	% JOBS
Anderson	42,159	36%
Pickens	22,149	19%
Oconee	17,976	16%
Greenville	12,255	11%
Spartanburg	2,886	2%
Abbeville	1,458	1%
Richland	1,126	1%
Laurens	1,018	1%
Greenwood	1,017	1%
York	969	1%
All Other Locations	12,494	11%
Total Primary Jobs, TCTC Service Region Workers	115,507	100%

Source: Census Bureau, Center for Economic Studies.



EDUCATIONAL ATTAINMENT

Educational attainment data are useful for targeting specific population groups with low education levels. The population and educational attainment numbers in this section are based on Emsi's data and publicly available sources from state and federal agencies. Sources include annual population estimates and population projections from the U.S. Census Bureau and birth and mortality rates from the U.S. Health Department. In addition, demographic information relies on the annual results of the American Community Survey. Educational attainment data cover the population in the TCTC Service Region aged 25 years or more, referred to as adults, and indicate the highest award level achieved.

Demographic information is presented by gender and the major race and ethnic groups, and educational attainment data are broken out according to the following categories: 1) less than a high school diploma (<HS), 2) high school diploma or equivalent (HS), 3) some college,⁵ 4) associate degree (Assoc), 5) bachelor's degree (Bach), and 6) graduate degree and higher (Grad+). See Appendix 3 for supplemental tables.

About 273,609 adults live in the TCTC Service Region⁶, and Figure 2.7 displays their educational attainments, without reference to gender and the major race and ethnic groups. State and national results are also presented for context.

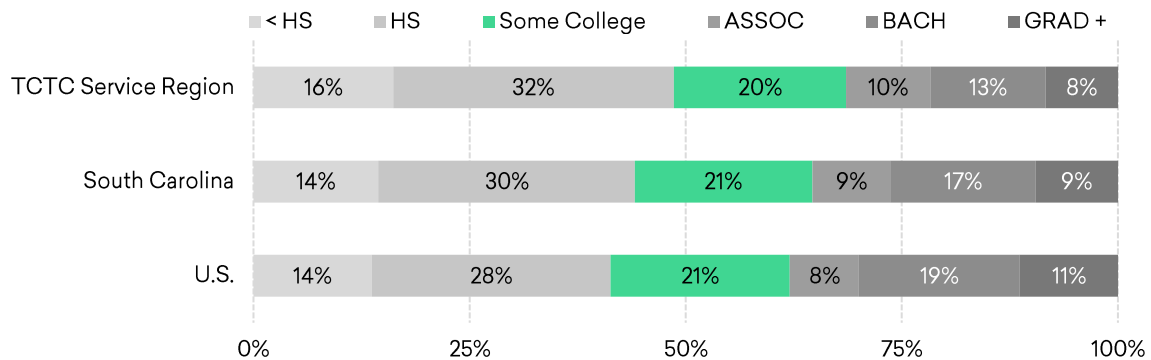
In the TCTC Service Region, 49% of adults have a high school diploma or less, which is more than the state average (44%) and the national average (41%). Out of all the education categories in the figure, the people who are most likely to seek education and training from TCTC are those in the "Less than High School Diploma," "High School Diploma," and "Some College" categories. Together, these categories total 187,597 people or 69% of the region's adults.

5 The "Some College" category includes individuals who attended college but did not successfully obtain a degree and individuals who have received a postsecondary vocational award or professional certification but did not receive an associate or bachelor's degree.

6 This figure includes all adults in the TCTC Service Region, including those no longer in the workforce (retired, unemployed, stay at home parent, etc) and is used for our educational attainment calculations. LEHD data, used in the prior workforce commuting pattern analysis, examines only the active workforce and is thus looking at a smaller subset of the regional population.



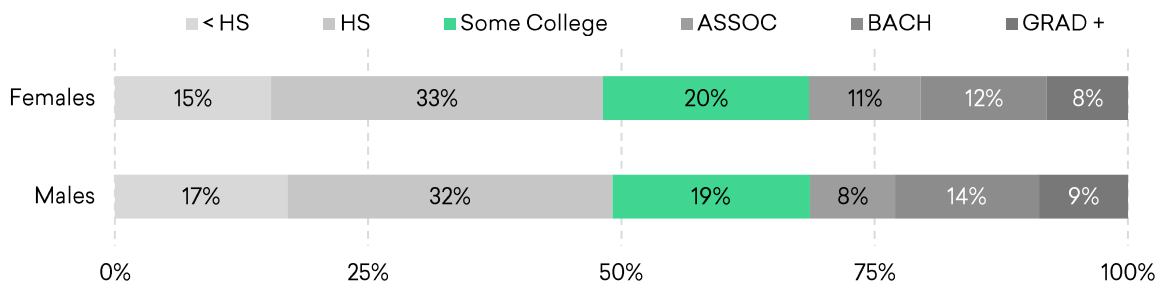
FIGURE 2.5: EDUCATIONAL ATTAINMENT OF THE ADULT POPULATION IN THE TCTC SERVICE REGION, SOUTH CAROLINA, AND THE U.S.



Numbers may not sum due to rounding.
Source: Emsi Analyst

The adults’ distribution of educational attainment by gender is fairly similar in the TCTC Service Region. Twenty percent of the region’s female adults and 19% of the region’s male adults have some college education but no degree, which represent 29,119 females and 25,426 males, respectively. Another 11% of female adults and 8% of male adults in the region have an associate degree as their highest award level. This information appears in Figure 2.6

FIGURE 2.6: EDUCATIONAL ATTAINMENT OF THE ADULT POPULATION IN THE TCTC SERVICE REGION BY GENDER



Numbers may not sum due to rounding.
Source: Emsi Analyst

Table 2.3 shows the adult population in the TCTC Service Region by the major race and ethnic groups, and Figure 2.7 displays their educational attainments. As shown in the table, 84% of the region’s adults are White, non-Hispanic. Another 11% of adults are



Black, non-Hispanic and 3% are Hispanic, all types, the next largest groups. Altogether, less than one percent of the region’s adults are Two or more races, non-Hispanic; American Indian or Alaskan Native, non-Hispanic; and Native Hawaiian or Pacific Islander, non-Hispanic.

TABLE 2.3: ADULT POPULATION IN THE TCTC SERVICE REGION BY MAJOR RACE AND ETHNIC GROUPS

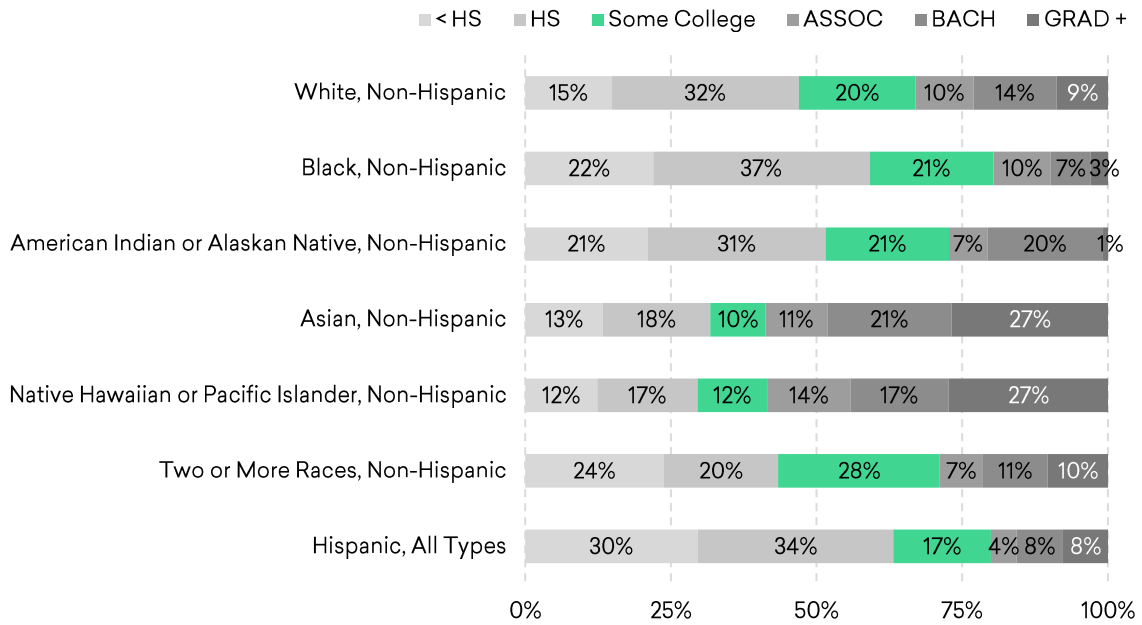
GROUP	POPULATION	% POPULATION
White, non-Hispanic	229,313	83.8%
Black, non-Hispanic	29,780	10.9%
Hispanic, all types	8,630	3.2%
Asian, non-Hispanic	3,119	1.1%
Two or more races, non-Hispanic	2,021	0.7%
American Indian or Alaskan Native, non-Hispanic	683	0.2%
Native Hawaiian or Pacific Islander, non-Hispanic	63	<0.1%
Total	273,609	100.0%

Source: Census Bureau.

Figure 2.7 displays the educational attainment of the TCTC Service Region’s adults by their major race and ethnic groups. Native Hawaiian or Pacific Islander, non-Hispanic adults have the highest percentage of adults with a postsecondary education (70%) among all the groups. However, the group accounts for a very small portion of the region’s adults. The Asian, non-Hispanic group follows with 68%. Hispanic, all types adults and Black, non-Hispanic adults have the lowest levels of educational attainment in the region. For these groups, only 37% and 41%, respectively, of the adults have had education beyond high school. Across all groups, these data suggest that there are many opportunities to increase the educational attainments of the region’s adults, whether such actions involve outreach to local high schools or supporting TCTC students who plan to transfer into a bachelor’s degree level program.



FIGURE 2.7: EDUCATIONAL ATTAINMENT OF THE ADULT POPULATION IN THE TCTC SERVICE REGION BY MAJOR RACE AND ETHNIC GROUPS



Numbers may not sum due to rounding.
 Source: Census Bureau and Emsi Analyst.



CHAPTER 3:

Program Demand Gap Analysis

With the region's top industry subsectors and workforce in mind, the program demand gap analysis can now be conducted, answering the following question:

Where are there misalignments between the workforce demand and the supply of college completers?

This chapter outlines the deficit of TCTC's program completers to the workforce (gap), as well as the oversupply of completers to the workforce (surplus). The occupations directly related or mapped to the significant gaps are also displayed. Before providing and discussing the results, we will go over the interpretation of the results.

INTERPRETATION

The terms used in the analysis are as follows:

Gap Represents a deficit, or when there are more job openings in a particular occupation than there are completers from higher education institutions within the region. If left unaddressed, a gap may lead to missed opportunities for economic growth and put stress on local businesses to find the necessary talent elsewhere. Significant gaps translate into higher human resources costs and decreased efficiencies in the economic system. They also provide an opportunity for institutions to develop new programs and/or strengthen their current programs.

Surplus Represents an oversupply, or when there are more completers from regional higher education institutions than there are job openings in a particular occupation. If left unaddressed, significant surpluses may lead to higher unemployment rates or higher attrition rates—the college could be educating a workforce that is leaving the region after program completion because of a lack of job opportunities. Values in parentheses in the result tables represent a surplus.



One important consideration when reviewing the results is that not all gaps or surpluses indicate necessary adjustments. Due to labor market inefficiencies, it is common for most program categories to face a certain level of gap or surplus. This means only significant gaps or surpluses should be reviewed to allow for focus on the areas of concern. Given the size and characteristics of the TCTC Service Region, any gap or surplus within 90 jobs either above or below zero should be considered within the normal range of labor market fluctuations.

The program gaps and surpluses are discussed by award level below and presented as figures and tables. The purpose of the figures is to show the gap between job demand and the supply of program completers. The job demand is measured as the total number of annual job openings, on average, from 2018 to 2028. This total is calculated as the sum of the average annual job openings for every occupation mapped to the program. The job openings, by occupation, are not a gross measure of job openings available in the region; they have been weighted by the program's award level. In addition, the job openings have been de-duplicated across programs, when an occupation is mapped to more than one program. As for supply, it is shown as the average number of program completers in the region, by award level, between 2015 and 2017. The gap, then, is the difference between job openings and program completers. See Appendix 4 for TCTC's program to occupation map and Appendix 5 for a detailed description of the report's methodology.

A greater amount of data is presented in the tables. The first set shows the gaps and surpluses across all the programs offered at TCTC by award level. The tables include the Classification of Instructional Program (CIP) code and title, the average annual number of job openings associated with the program (which have been de-duplicated using the process outlined in Appendix 5), the average annual program completers from the region and from TCTC, and the gap or surplus for the TCTC Service Region. The programs' median hourly wage rates are specific to the TCTC Service Region and tailored for the educational levels.

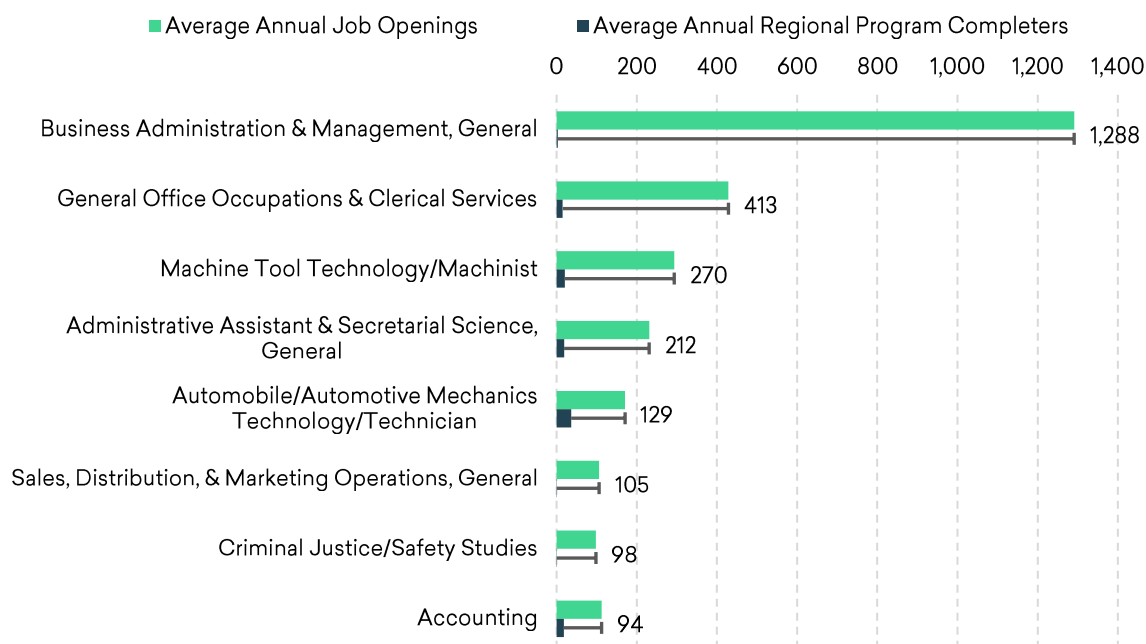
The second set of tables provides insight into the occupations mapped to the programs with a significant gap, by award level, particularly what occupations are driving each significant gap. The tables include the CIP code, CIP title, and occupations mapped to the program, by their Standard Occupational Classification (SOC) codes and titles. The regional job counts, by occupation, are shown for 2018 and 2028 with the change in jobs and average annual job openings for those years. The occupations' median hourly wage rates are specific to the TCTC Service Region, but



due to data limitations, they are aggregated across all educational levels. See Appendix 6 for a complete list of job projections and Appendix 7 for unemployment information by industry and occupation.

CERTIFICATE LEVEL ANALYSIS

FIGURE 3.1: TCTC'S CERTIFICATE LEVEL PROGRAMS WITH A SIGNIFICANT GAP



Source: Emsi program demand gap model.

TCTC offers 26 certificate level programs at the college. The largest certificate level gap, at 1,288 job openings, is in the Business Administration & Management, General program (Figure 3.1). The gap takes annual reported openings at the certificate level of education into account and adjusts for other programs in the region that train for occupations related to Business Administration & Management, General. Within the program, TCTC produces three average annual completers and is the only regional institution with completers in this program (Table 3.1).

While the gaps are important for building or expanding TCTC's programs, the surpluses are equally important. An analysis of the surplus programs ensures that the



college is educating and training students with the skills the region's workforce requires. At the certificate level, no programs have a significant surplus.

TABLE 3.1: GAPS AND SURPLUSES FOR TCTC'S CERTIFICATE LEVEL PROGRAMS

CIP CODE	CIP TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	ANNUAL TCTC COMPLETERS	GAP OR SURPLUS	MEDIAN HOURLY WAGE
52.0201	Business Administration & Management, General	1,291	3	3	1,288	\$15.01
52.0408	General Office Occupations & Clerical Services	429	15	15	413	\$12.94
48.0501	Machine Tool Technology/Machinist	291	21	21	270	\$18.64
52.0401	Administrative Assistant & Secretarial Science, General	231	19	18	212	\$13.70
47.0604	Automobile/Automotive Mechanics Technology/Technician	166	36	36	129	\$14.40
52.1801	Sales, Distribution, & Marketing Operations, General	106	1	1	105	\$13.91
43.0104	Criminal Justice/Safety Studies	98	1	1	98	\$14.97
52.0301	Accounting	112	18	18	94	\$17.16
48.0508	Welding Technology/Welder	193	102	102	91	\$17.73
15.0702	Quality Control Technology/Technician	96	19	19	77	\$16.74
47.0105	Industrial Electronics Technology/Technician	95	31	31	64	\$19.39
51.3901	Licensed Practical/Vocational Nurse Training	109	63	63	46	\$13.63
51.0904	Emergency Medical Technology/Technician (EMT Paramedic)	39	0	0	38	\$12.61
51.0805	Pharmacy Technician/Assistant	26	1	1	25	\$13.49
51.0601	Dental Assisting/Assistant	30	19	19	11	\$17.01
52.0101	Business/Commerce, General	9	2	2	7	\$33.14
15.1001	Construction Engineering Technology/Technician	6	1	1	5	\$14.61
19.0709	Child Care Provider/Assistant	8	4	4	4	\$8.38



CIP CODE	CIP TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	ANNUAL TCTC COMPLETERS	GAP OR SURPLUS	MEDIAN HOURLY WAGE
51.1199	Health/Medical Preparatory Programs, Other	0	0	0	0	\$38.29
51.0909	Surgical Technology/Technologist	11	11	11	(0)	\$16.73
51.0801	Medical/Clinical Assistant	18	19	19	(0)	\$13.78
52.0701	Entrepreneurship/Entrepreneurial Studies	0	1	1	(1)	\$32.22
50.0402	Commercial & Advertising Art	2	5	5	(2)	\$17.05
10.0202	Radio & Television Broadcasting Technology/Technician	5	9	9	(3)	\$17.86
50.0605	Photography	1	7	7	(6)	\$12.10
15.0699	Industrial Production Technologies/Technicians, Other	1	10	10	(9)	\$24.66

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

The next step in the program demand gap analysis is to take a closer look at the occupations mapped to a certificate in the program and their median hourly wage rates. As shown in Table 3.2, there are several occupations mapped to the Business Administration & Management, General program, such as retail salesperson, customer service representatives, and general & operations managers. The median hourly wage of chief executives, the highest paid occupation mapped to the program, is \$48.84, well above South Carolina's state minimum wage of \$7.25⁷ per hour. However, there are only two annual openings for this occupation at the certificate level in the region. However, customer service representatives see 256 annual openings and a median hourly wage of \$13.23. Program expansion looks promising. As shown in Table 3.2, there are many projected annual job openings for occupations mapped to the program with wages above the minimum wage. Understanding that the Business Administration & Management, General program did not work at the certificate level at TCTC, including

7 South Carolina's minimum wage as of January 1, 2017 is \$7.25 per hour. Source: South Carolina Department of Labor, Licensing and Regulation.



this skill set in an associate degree is a strong way to capture these aspects of the market and make completers competitive.⁸

This kind of analysis can be applied to the other program gaps in the table as well. In general, gaps around occupations with high wages should be considered more noteworthy than gaps around occupations with low wages. Also, if the occupational forecasts around a certain gap are not positive, the gap may not be worth further consideration. Keep in mind that there could be other sources of skilled workers filling the gaps, such as unemployed workers or workers from outside the region.

TABLE 3.2: OCCUPATIONS RELATED TO SIGNIFICANT GAP PROGRAMS AT THE CERTIFICATE LEVEL

SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
BUSINESS ADMINISTRATION & MANAGEMENT, GENERAL (CIP 52.0201)						
41-2031	Retail Salespersons	4,124	4,543	419	511	\$10.34
43-4051	Customer Service Representatives	2,547	2,757	210	256	\$13.23
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	(45)	166	\$15.03
41-1011	First-Line Supervisors of Retail Sales Workers	1,558	1,656	98	120	\$14.90
43-1011	First-Line Supervisors of Office & Administrative Support Workers	1,137	1,212	75	65	\$22.13
41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	1,013	1,138	125	53	\$22.23
11-1021	General & Operations Managers	1,905	2,108	202	50	\$35.62
15-1151	Computer User Support Specialists	414	481	66	15	\$21.54
13-1071	Human Resources Specialists	369	409	40	10	\$21.50
13-1199	Business Operations Specialists, All Other	211	270	59	6	\$23.12
13-1111	Management Analysts	398	453	55	6	\$29.39
13-2011	Accountants & Auditors	779	876	96	6	\$26.54

8 Further research must be conducted before making a final determination, such as top employer identification within the region; business surveys to verify the data; resume and job postings analysis to determine trending skills for individuals with similar educations; industry recommendations on curriculum development; and analysis of the strengths, weaknesses, and capacities of similar programs at other regional higher education institutions. Emsi is available to conduct this research; see your Emsi contact for details.



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
11-3031	Financial Managers	245	289	44	5	\$47.61
11-9199	Managers, All Other	478	509	31	5	\$16.35
13-1161	Market Research Analysts & Marketing Specialists	308	384	76	4	\$24.70
11-3121	Human Resources Managers	143	159	15	4	\$39.99
11-2022	Sales Managers	188	218	30	3	\$48.59
11-1011	Chief Executives	173	177	4	2	\$53.16
11-3021	Computer & Information Systems Managers	118	142	24	2	\$48.84
11-2021	Marketing Managers	98	114	16	2	\$42.48
GENERAL OFFICE OCCUPATIONS & CLERICAL SERVICES (CIP 52.0408)						
43-5081	Stock Clerks & Order Fillers	1,713	1,902	190	203	\$11.14
43-5071	Shipping, Receiving, & Traffic Clerks	597	650	53	55	\$14.26
43-9061	Office Clerks, General	2,798	2,908	109	51	\$13.07
41-2021	Counter & Rental Clerks	202	233	31	23	\$11.24
43-5061	Production, Planning, & Expediting Clerks	374	425	51	22	\$19.05
43-3021	Billing & Posting Clerks	262	292	30	20	\$15.12
43-4171	Receptionists & Information Clerks	698	757	59	8	\$12.52
43-5032	Dispatchers, Except Police, Fire, & Ambulance	101	110	9	8	\$15.85
43-4051	Customer Service Representatives	2,547	2,757	210	6	\$13.23
43-4151	Order Clerks	63	69	6	6	\$16.22
43-3031	Bookkeeping, Accounting, & Auditing Clerks	1,233	1,269	37	6	\$15.98
43-9051	Mail Clerks & Mail Machine Operators, Except Postal Service	35	41	6	4	\$12.52
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	(45)	4	\$15.03
43-3061	Procurement Clerks	85	87	2	3	\$18.06
43-6011	Executive Secretaries & Executive Administrative Assistants	234	222	(12)	3	\$25.07
43-9041	Insurance Claims & Policy Processing Clerks	39	42	3	3	\$14.39
43-1011	First-Line Supervisors of Office & Administrative Support Workers	1,137	1,212	75	1	\$22.13
43-4071	File Clerks	51	53	2	1	\$13.82
43-5011	Cargo & Freight Agents	14	14	(0)	1	\$18.69



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
43-9022	Word Processors & Typists	32	28	(3)	0	\$16.46
43-3051	Payroll & Timekeeping Clerks	137	138	1	0	\$16.62
43-9021	Data Entry Keyers	70	65	(5)	0	\$14.77
43-4021	Correspondence Clerks	1	2	0	0	\$13.51
43-4141	New Accounts Clerks	21	18	(3)	0	\$18.21
MACHINE TOOL TECHNOLOGY/MACHINIST (CIP 48.0501)						
51-4041	Machinists	2,326	2,456	131	154	\$17.26
51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	421	442	20	31	\$14.79
51-4011	Computer-Controlled Machine Tool Operators, Metal & Plastic	413	456	43	29	\$19.31
51-4021	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic	330	321	(9)	23	\$24.33
51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	233	233	0	15	\$22.81
51-4081	Multiple Machine Tool Setters, Operators, & Tenders, Metal & Plastic	183	203	20	14	\$27.10
49-9041	Industrial Machinery Mechanics	652	681	29	5	\$23.17
51-4191	Heat Treating Equipment Setters, Operators, & Tenders, Metal & Plastic	57	56	(1)	4	\$17.79
51-4023	Rolling Machine Setters, Operators, & Tenders, Metal & Plastic	45	49	4	3	\$17.32
49-9044	Millwrights	23	26	3	2	\$20.53
49-9043	Maintenance Workers, Machinery	116	133	18	2	\$20.10
51-4199	Metal Workers & Plastic Workers, All Other	19	20	1	2	\$16.55
51-4022	Forging Machine Setters, Operators, & Tenders, Metal & Plastic	24	25	0	2	\$15.87
51-4034	Lathe & Turning Machine Tool Setters, Operators, & Tenders, Metal & Plastic	19	21	2	1	\$17.34
51-4035	Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	16	17	1	1	\$15.22
51-4032	Drilling & Boring Machine Tool Setters, Operators, & Tenders, Metal & Plastic	15	16	0	1	\$14.99
51-4192	Layout Workers, Metal & Plastic	11	12	1	1	\$19.77
ADMINISTRATIVE ASSISTANT & SECRETARIAL SCIENCE, GENERAL (CIP 52.0401)						
43-9061	Office Clerks, General	2,798	2,908	109	173	\$13.07
43-4171	Receptionists & Information Clerks	698	757	59	28	\$12.52
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	(45)	13	\$15.03



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
43-6011	Executive Secretaries & Executive Administrative Assistants	234	222	(12)	10	\$25.07
43-4071	File Clerks	51	53	2	4	\$13.82
43-9022	Word Processors & Typists	32	28	(3)	2	\$16.46
43-9021	Data Entry Keyers	70	65	(5)	1	\$14.77
AUTOMOBILE/AUTOMOTIVE MECHANICS TECHNOLOGY/TECHNICIAN (CIP 47.0604)						
49-3023	Automotive Service Technicians & Mechanics	885	917	32	66	\$13.32
53-7061	Cleaners of Vehicles & Equipment	279	336	57	35	\$10.05
49-9071	Maintenance & Repair Workers, General	2,045	2,255	211	27	\$17.81
49-3093	Tire Repairers & Changers	120	128	7	12	\$11.35
49-1011	First-Line Supervisors of Mechanics, Installers, & Repairers	458	495	38	12	\$25.33
49-3021	Automotive Body & Related Repairers	108	109	1	8	\$14.60
17-3027	Mechanical Engineering Technicians	96	114	18	2	\$24.72
49-3022	Automotive Glass Installers & Repairers	25	25	0	2	\$15.21
53-6051	Transportation Inspectors	6	7	2	1	\$27.46
49-2093	Electrical & Electronics Installers & Repairers, Transportation Equipment	7	8	1	0	\$28.77
49-2096	Electronic Equipment Installers & Repairers, Motor Vehicles	7	6	(1)	0	\$15.90
SALES, DISTRIBUTION, & MARKETING OPERATIONS, GENERAL (CIP 52.1801)						
53-3031	Driver/Sales Workers	537	513	(24)	45	\$8.70
41-3021	Insurance Sales Agents	477	486	10	23	\$16.70
41-1012	First-Line Supervisors of Non-Retail Sales Workers	279	283	3	13	\$22.31
41-9041	Telemarketers	59	74	15	10	\$11.99
41-9091	Door-to-Door Sales Workers, News & Street Vendors, & Related Workers	99	97	(2)	7	\$14.16
41-4011	Sales Representatives, Wholesale & Manufacturing, Technical & Scientific Products	120	142	23	7	\$23.44
41-9031	Sales Engineers	17	23	6	0	\$40.35
41-3011	Advertising Sales Agents	55	51	(4)	0	\$18.34
13-1028	Buyers & Purchasing Agents	209	229	20	0	\$24.78
41-1011	First-Line Supervisors of Retail Sales Workers	1,558	1,656	98	0	\$14.90
41-9022	Real Estate Sales Agents	327	334	7	0	\$17.69



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	1,013	1,138	125	0	\$22.23
41-3031	Securities, Commodities, & Financial Services Sales Agents	81	76	(5)	0	\$22.79
13-1161	Market Research Analysts & Marketing Specialists	308	384	76	0	\$24.70
11-2022	Sales Managers	188	218	30	0	\$48.59
CRIMINAL JUSTICE/SAFETY STUDIES (CIP 43.0104)						
33-9032	Security Guards	473	600	126	48	\$11.73
33-3051	Police & Sheriff's Patrol Officers	733	812	79	21	\$17.87
33-3012	Correctional Officers & Jailers	205	235	30	10	\$16.79
43-5031	Police, Fire, & Ambulance Dispatchers	133	146	12	8	\$14.65
33-2021	Fire Inspectors & Investigators	40	41	2	3	\$17.93
33-1012	First-Line Supervisors of Police & Detectives	119	131	12	2	\$25.66
33-1011	First-Line Supervisors of Correctional Officers	42	45	3	2	\$21.25
33-3011	Bailiffs	15	16	1	1	\$10.56
33-9021	Private Detectives & Investigators	15	15	(0)	1	\$22.84
21-1092	Probation Officers & Correctional Treatment Specialists	25	32	7	1	\$21.70
33-3021	Detectives & Criminal Investigators	53	60	7	0	\$23.62
11-9161	Emergency Management Directors	25	26	1	0	\$28.69
13-1199	Business Operations Specialists, All Other	211	270	59	0	\$23.12
13-1041	Compliance Officers	129	149	20	0	\$22.28
11-9199	Managers, All Other	478	509	31	0	\$16.35
13-2099	Financial Specialists, All Other	51	56	5	0	\$28.18
25-1099	Postsecondary Teachers	2,499	2,853	354	0	\$33.61
21-1021	Child, Family, & School Social Workers	108	146	39	0	\$17.88
15-1122	Information Security Analysts	43	52	9	0	\$33.46
33-3052	Transit & Railroad Police	3	4	0	0	\$39.14
ACCOUNTING (CIP 52.0301)						
43-3031	Bookkeeping, Accounting, & Auditing Clerks	1,233	1,269	37	92	\$15.98
43-3051	Payroll & Timekeeping Clerks	137	138	1	8	\$16.62

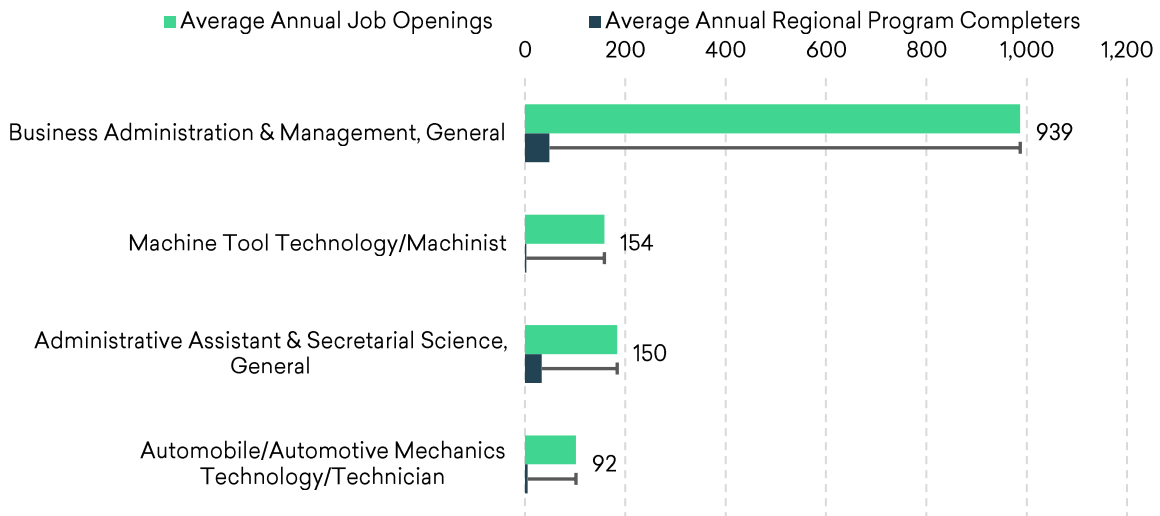


SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
13-2082	Tax Preparers	88	95	7	5	\$14.73
13-2011	Accountants & Auditors	779	876	96	2	\$26.54
11-3031	Financial Managers	245	289	44	2	\$47.61
25-1099	Postsecondary Teachers	2,499	2,853	354	1	\$33.61
13-2081	Tax Examiners & Collectors, & Revenue Agents	14	17	3	1	\$33.60
13-2041	Credit Analysts	45	42	(2)	0	\$25.56
13-2051	Financial Analysts	96	106	10	0	\$31.28
43-9111	Statistical Assistants	4	4	1	0	\$19.68
13-2031	Budget Analysts	18	23	4	0	\$27.85
43-4011	Brokerage Clerks	6	7	1	0	\$24.71
13-2061	Financial Examiners	9	10	1	0	\$30.25

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

ASSOCIATE DEGREE LEVEL ANALYSIS

FIGURE 3.2: TCTC'S ASSOCIATE DEGREE LEVEL PROGRAMS WITH A SIGNIFICANT GAP



Source: Emsi program demand gap model.



The college offers 19 associate degree level programs, and Figure 3.2 shows the programs with a significant gap. The Business Administration & Management, General program has the largest, followed by the Machine Tool Technology/Machinist and Administrative Assistant & Secretarial Science, General programs.

Since Business Administration & Management, General was examined in the previous section, we'll look at Machine Tool Technology/Machinist here. As shown in Table 3.3, there are 158 average annual job openings in the region for occupations related to the Machine Tool Technology/Machinist program. On average, the college graduates three annual completers and is the only regional institution with completers in this program. These data take annual reported job openings at the associate degree level of education into account and have been adjusted for other programs that train for the occupations related to Machine Tool Technology/Machinist.

The next step in the analysis is to consider the occupational gaps within the program. Machinists; computer-controlled machine tool operators, metal & plastic; and cutting, punching, & press machine setters, operators, & tenders, metal & plastic are the top three occupations mapped to the program with the highest average annual job openings, and these three occupations have median hourly wage rates above \$14.97 for entry level positions. Within the program, multiple machine tool setters, operators, & tenders, metal & plastic have the highest median hourly wage rate at \$27.10, but there are only six annual job openings for the occupation in the region at the associate degree level. Understanding that TCTC has replaced their Machine Tool Technology/Machinist program with their Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist, it is important to note that the CNC program can easily pick up the specializations gaps showing for the discontinued Machinist program discussed above. There appears to be enough evidence to support this expansion of the CNC Machinist program, especially considering the high LQs for many manufacturing industries in the region.⁹

Using Table 3.4, this step-by-step process of evaluating occupational gaps by their median hourly wage rates can be applied to the other TCTC associate degree programs with a significant gap. In general, gaps around occupations with high wages should be considered more noteworthy than gaps around occupations with low wages. Also, if the occupational forecasts around a certain gap are not positive, the gap

⁹ As stated previously, further research must be conducted before making a final determination. Emsi is available to conduct this research; see your Emsi contact for details.



may not be worth further consideration. Keep in mind that there could be other sources of skilled workers filling the gaps, such as unemployed workers or workers from outside the region.

TABLE 3.3: GAPS AND SURPLUSES FOR TCTC'S ASSOCIATE DEGREE LEVEL PROGRAMS

CIP CODE	CIP TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	ANNUAL TCTC COMPLETERS	GAP OR SURPLUS	MEDIAN HOURLY WAGE
52.0201	Business Administration & Management, General	987	49	49	939	\$15.52
48.0501	Machine Tool Technology/Machinist	157	3	3	154	\$18.58
52.0401	Administrative Assistant & Secretarial Science, General	184	34	34	150	\$13.76
47.0604	Automobile/Automotive Mechanics Technology/Technician	98	6	6	92	\$15.08
48.0508	Welding Technology/Welder	106	24	24	82	\$17.78
52.0301	Accounting	94	20	20	75	\$17.43
43.0104	Criminal Justice/Safety Studies	81	35	35	45	\$15.56
48.0510	Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist	51	7	7	44	\$18.75
51.0904	Emergency Medical Technology/Technician (EMT Paramedic)	38	0	0	37	\$12.89
47.0201	Heating, Air Conditioning, Ventilation & Refrigeration Maintenance Technology/Technician	26	8	8	18	\$17.84
47.0105	Industrial Electronics Technology/Technician	63	64	64	(1)	\$19.54
15.0000	Engineering Technology, General	13	19	19	(6)	\$24.98
15.1306	Mechanical Drafting & Mechanical Drafting CAD/CADD	2	10	10	(7)	\$29.83
15.0699	Industrial Production Technologies/Technicians, Other	0	11	11	(11)	\$24.66
51.0808	Veterinary/Animal Health Technology/Technician & Veterinary Assistant	11	23	23	(12)	\$14.55
10.0202	Radio & Television Broadcasting Technology/Technician	5	17	17	(12)	\$17.94



CIP CODE	CIP TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	ANNUAL TCTC COMPLETERS	GAP OR SURPLUS	MEDIAN HOURLY WAGE
51.1004	Clinical/Medical Laboratory Technician	1	14	14	(13)	\$27.76
11.0301	Data Processing & Data Processing Technology/Technician	1	21	21	(20)	\$19.28
14.4201	Mechatronics, Robotics, & Automation Engineering	31	59	59	(28)	\$20.90
51.3801	Registered Nursing/Registered Nurse	68	105	105	(37)	\$27.98
15.0499	Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other	22	59	59	(37)	\$21.57

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

While the gaps are important to keep in mind for building or expanding programs, the surpluses are equally important to ensure the college is training students with skills the regional workforce requires. There are zero associate degree programs at TCTC with a significant surplus. What surpluses do exist are not concerning as the completers are likely finding employment outside the service region, most likely in Greenville County.

TABLE 3.4: OCCUPATIONS RELATED TO SIGNIFICANT GAP PROGRAMS AT THE ASSOCIATE DEGREE LEVEL

SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
BUSINESS ADMINISTRATION & MANAGEMENT, GENERAL (CIP 52.0201)						
41-2031	Retail Salespersons	4,124	4,543	419	366	\$10.34
43-4051	Customer Service Representatives	2,547	2,757	210	180	\$13.23
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	(45)	144	\$15.03
41-1011	First-Line Supervisors of Retail Sales Workers	1,558	1,656	98	89	\$14.90
43-1011	First-Line Supervisors of Office & Administrative Support Workers	1,137	1,212	75	54	\$22.13
11-1021	General & Operations Managers	1,905	2,108	202	43	\$35.62
41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	1,013	1,138	125	41	\$22.23
15-1151	Computer User Support Specialists	414	481	66	16	\$21.54



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
13-1071	Human Resources Specialists	369	409	40	10	\$21.50
13-2011	Accountants & Auditors	779	876	96	8	\$26.54
13-1111	Management Analysts	398	453	55	6	\$29.39
13-1199	Business Operations Specialists, All Other	211	270	59	5	\$23.12
11-3031	Financial Managers	245	289	44	5	\$47.61
11-9199	Managers, All Other	478	509	31	4	\$16.35
13-1161	Market Research Analysts & Marketing Specialists	308	384	76	4	\$24.70
11-3121	Human Resources Managers	143	159	15	4	\$39.99
11-2022	Sales Managers	188	218	30	3	\$48.59
11-1011	Chief Executives	173	177	4	2	\$53.16
11-3021	Computer & Information Systems Managers	118	142	24	2	\$48.84
11-2021	Marketing Managers	98	114	16	2	\$42.48
MACHINE TOOL TECHNOLOGY/MACHINIST (CIP 48.0501)						
51-4041	Machinists	2,326	2,456	131	90	\$17.26
51-4011	Computer-Controlled Machine Tool Operators, Metal & Plastic	413	456	43	19	\$19.31
51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	421	442	20	13	\$14.79
51-4021	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic	330	321	(9)	11	\$24.33
51-4081	Multiple Machine Tool Setters, Operators, & Tenders, Metal & Plastic	183	203	20	6	\$27.10
51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	233	233	0	6	\$22.81
49-9041	Industrial Machinery Mechanics	652	681	29	3	\$23.17
51-4191	Heat Treating Equipment Setters, Operators, & Tenders, Metal & Plastic	57	56	(1)	2	\$17.79
51-4023	Rolling Machine Setters, Operators, & Tenders, Metal & Plastic	45	49	4	1	\$17.32
49-9044	Millwrights	23	26	3	1	\$20.53
49-9043	Maintenance Workers, Machinery	116	133	18	1	\$20.10
51-4199	Metal Workers & Plastic Workers, All Other	19	20	1	1	\$16.55
51-4034	Lathe & Turning Machine Tool Setters, Operators, & Tenders, Metal & Plastic	19	21	2	1	\$17.34
51-4035	Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	16	17	1	1	\$15.22
51-4022	Forging Machine Setters, Operators, & Tenders, Metal & Plastic	24	25	0	0	\$15.87



SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
51-4032	Drilling & Boring Machine Tool Setters, Operators, & Tenders, Metal & Plastic	15	16	0	0	\$14.99
51-4192	Layout Workers, Metal & Plastic	11	12	1	0	\$19.77
ADMINISTRATIVE ASSISTANT & SECRETARIAL SCIENCE, GENERAL (CIP 52.0401)						
43-9061	Office Clerks, General	2,798	2,908	109	137	\$13.07
43-4171	Receptionists & Information Clerks	698	757	59	21	\$12.52
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	(45)	11	\$15.03
43-6011	Executive Secretaries & Executive Administrative Assistants	234	222	(12)	9	\$25.07
43-4071	File Clerks	51	53	2	3	\$13.82
43-9022	Word Processors & Typists	32	28	(3)	1	\$16.46
43-9021	Data Entry Keyers	70	65	(5)	1	\$14.77
AUTOMOBILE/AUTOMOTIVE MECHANICS TECHNOLOGY/TECHNICIAN (CIP 47.0604)						
49-3023	Automotive Service Technicians & Mechanics	885	917	32	42	\$13.32
49-9071	Maintenance & Repair Workers, General	2,045	2,255	211	17	\$17.81
53-7061	Cleaners of Vehicles & Equipment	279	336	57	16	\$10.05
49-1011	First-Line Supervisors of Mechanics, Installers, & Repairers	458	495	38	10	\$25.33
49-3093	Tire Repairers & Changers	120	128	7	6	\$11.35
49-3021	Automotive Body & Related Repairers	108	109	1	4	\$14.60
17-3027	Mechanical Engineering Technicians	96	114	18	2	\$24.72
49-3022	Automotive Glass Installers & Repairers	25	25	0	1	\$15.21
53-6051	Transportation Inspectors	6	7	2	0	\$27.46
49-2093	Electrical & Electronics Installers & Repairers, Transportation Equipment	7	8	1	0	\$28.77
49-2096	Electronic Equipment Installers & Repairers, Motor Vehicles	7	6	(1)	0	\$15.90

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

LIBERAL ARTS AND GENERAL STUDIES TRANSFER STUDENTS

A number of students attend TCTC with the intention of transferring to a four-year institution to receive a bachelor's degree. Although these students study any number of topics at TCTC, a large portion of them receive associate of arts degrees in general



studies. In fact, over the past three years, 388 students, on average, have completed a liberal arts or general studies program at the associate degree level, which accounts for 39% of the college's annual production of certificates and degrees. Many of these students are a part of TCTC's Bridge to Clemson program, an invitation only transfer program that allows students to make progress in their intended Clemson University major during their freshman year at TCTC while preparing to enroll at Clemson University beginning their sophomore year.

Once liberal arts students leave TCTC, their educational and career track is difficult to predict. They could attend a four-year institution in the region or outside the region, and they could study any number of different programs that will ultimately determine their future careers. What can be shown is that over the next 10 years, jobs that require a bachelor's degree are projected to be in high demand. In any given year between 2018 and 2028, 12,729 jobs will require a bachelor's degree and 29,594 will require a bachelor's degree level of education or less, availing these students of 40% of all regional job openings.

This section shows the top occupations mapped to liberal arts programs, using Emsi's Profile Analytics database, which contains more than 106 million workforce profiles from all the major professional social media websites. The database was filtered to include workforce profiles from those people who received an associate degree or a bachelor's level of education from a liberal arts program, which include programs in CIP codes 24 and 30 at the two-digit level. In addition, we only analyzed the workforce profiles that were updated from as early as 2010. Using these search parameters, about 204,000 workforce profiles were found in the database, and the occupations in Table 3.5 represent the most common jobs of the liberal arts alumni.

As shown, there are a considerable number of job openings for retail salespersons; customer service representatives; and secretaries & administrative assistants, except legal, medical, & executive. Together, the three occupations account for over half of all the liberal arts program's job openings, and their median hourly wage rates are not more than \$15.03. However, the profiles data also include managers and supervisors, occupations with relatively higher wage rates. A liberal arts program expansion is not warranted at this time, but TCTC administrators should be aware that graduates can find success in a variety of business-related occupations



TABLE 3.5: OCCUPATIONS RELATED TO LIBERAL ARTS PROGRAMS

SOC CODE	SOC TITLE	2018 JOBS	2028 JOBS	JOB CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
41-2031	Retail Salespersons	4,124	4,543	419	730	\$10.34
43-4051	Customer Service Representatives	2,547	2,757	210	392	\$13.23
43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	2,790	2,744	-45	327	\$15.03
11-1021	General & Operations Managers	1,905	2,108	202	199	\$35.62
41-1011	First-Line Supervisors of Retail Sales Workers	1,558	1,656	98	198	\$14.90
43-1011	First-Line Supervisors of Office & Administrative Support Workers	1,137	1,212	75	134	\$22.13
41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	1,013	1,138	125	132	\$22.23
13-2011	Accountants & Auditors	779	876	96	90	\$26.54
21-1093	Social & Human Service Assistants	316	386	70	53	\$12.02
13-1111	Management Analysts	398	453	55	45	\$29.39
13-1071	Human Resources Specialists	369	409	40	45	\$21.50
13-1161	Market Research Analysts & Marketing Specialists	308	384	76	44	\$24.70
15-1151	Computer User Support Specialists	414	481	66	42	\$21.54
13-1199	Business Operations Specialists, All Other	211	270	59	30	\$23.12
43-6011	Executive Secretaries & Executive Administrative Assistants	234	222	-12	27	\$25.07
Nov-31	Financial Managers	245	289	44	26	\$47.61
Nov-22	Sales Managers	188	218	30	22	\$48.59
Nov-21	Human Resources Managers	143	159	15	15	\$39.99
11-1011	Chief Executives	173	177	4	14	\$53.16
Nov-21	Marketing Managers	98	114	16	11	\$42.48

Source: Emsi gap model.

SUMMARY

Between both the certificate and associate degree levels, there are a total of 12 programs associated with significant workforce gaps—with four programs having gaps at both levels.



There are eight certificate level programs with significant gaps. Business Administration & Management, General has the largest certificate level gap in the TCTC Service Region (gap of 1,288; median hourly wage of \$15.01). General Office Occupations & Clerical Services (gap of 413; median hourly wage of \$12.94) and Machine Tool Technology/Machinist (gap of 273; median hourly wage of \$18.67) are the second and third largest gaps at the certificate level in the TCTC Service Region. There are four associate degree level programs that also registered a gap. The top three are Business Administration & Management, General (gap of 939; median hourly wage of \$15.52), Machine Tool Technology/Machinist (gap of 156; median hourly wage of \$18.61), and Administrative Assistant & Secretarial Science, General (gap of 150; median hourly wage of \$13.76). All four associate degree level programs with a gap also show a gap at the certificate level.

New Program Additions

Thus far, the analysis has centered around programs offered by TCTC. This chapter looks at workforce gaps that exist within occupations that TCTC does not currently train for and provides new program recommendations. Please note that these recommendations are based solely on the gap and whether or not the occupation looks promising (job growth, wages, etc.). These are initial findings and should serve as a starting point for further research. The college will still need to undergo steps before deciding whether or not these programs would be a good fit for the college and the region. This future work could include surveying local employers, analyzing skills and similar programs offered elsewhere, calculating program specific economic impacts, and looking at capacity and capital requirements for building these programs.

The tables below contain lists of programmatic areas of opportunity that could fill gaps in the labor market at each respective award level. These selected occupations present unmet annual job openings within the region. Please note that these tables highlight particular occupations, and in many cases a program can be designed to train for multiple occupations. Once these occupations are grouped with other similar occupations – such as physical therapist assistants and occupational therapy assistants at the associate degree level - the actual workforce gap may be larger. Therefore, several occupations with relatively small gaps are included. The occupations are placed into a recommended level of education for the program; this



is a mere suggestion of what credential level the potential program could be offered at based on the education required to perform in the occupation. Again, it is up to the college to determine what degree level each potential program should be offered, based on all capacity and capital requirements for building new programs.

ADDITIONS AT THE CERTIFICATE LEVEL

Table 4.1 contains a list of 20 programmatic areas of opportunity that could fill gaps in the labor market by certificate level completers. These selected occupations present unmet annual job openings within the region, their median hourly wage rates are above \$12.00, and the typical level of education required for the occupations is some college. As seen in Table 4.1, service industry jobs like first-line supervisors of food preparation & serving workers, chefs & head cooks, and food service managers appear to be undersupplied in the TCTC Service Region. Business and education occupations additionally appear to be undersupplied.

At the certificate level the top three new program gaps are for first-line supervisors of food preparation & serving workers (gap of 143; median hourly wage of \$12.35), recreation workers (gap of 31; median hourly wage of \$14.57), and chefs & head cooks (gap of 30; median hourly wage of \$16.67). Most occupations require a certificate level of education or lower, but creating an associate degree program may capture more of the regional demand for these occupations and make completers more competitive in the labor market.

TABLE 3.6: TCTC'S PROGRAMMATIC AREAS OF OPPORTUNITY AT THE CERTIFICATE LEVEL

SOC CODE	SOC TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	GAP	MEDIAN HOURLY WAGE
35-1012	First-Line Supervisors of Food Preparation and Serving Workers	143	0	143	\$12.35
39-9032	Recreation Workers	31	0	31	\$14.57
35-1011	Chefs and Head Cooks	30	0	30	\$16.67
53-1048	First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	24	0	24	\$23.59
39-9031	Fitness Trainers and Aerobics Instructors	24	1	24	\$13.72



SOC CODE	SOC TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	GAP	MEDIAN HOURLY WAGE
25-3021	Self-Enrichment Education Teachers	23	0	23	\$16.20
25-4031	Library Technicians	22	0	22	\$13.90
27-2022	Coaches and Scouts	21	0	21	\$19.99
11-9051	Food Service Managers	16	0	16	\$16.84
33-2011	Firefighters	15	0	15	\$15.31
49-9051	Electrical Power-Line Installers and Repairers	13	0	13	\$26.42
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	12	0	12	\$25.18
25-3097	Teachers and Instructors, All Other	12	0	12	\$16.06
43-4161	Human Resources Assistants, Except Payroll and Timekeeping	12	0	12	\$16.28
39-1021	First-Line Supervisors of Personal Service Workers	10	0	10	\$12.40
51-8031	Water and Wastewater Treatment Plant and System Operators	10	0	10	\$20.39
25-2012	Kindergarten Teachers, Except Special Education	10	0	10	\$25.22
51-8011	Nuclear Power Reactor Operators	8	0	8	\$42.74
31-9097	Phlebotomists	9	2	7	\$12.45
31-9011	Massage Therapists	7	0	7	\$13.00

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

ADDITIONS AT THE ASSOCIATE DEGREE LEVEL

Eleven occupations have been identified as programmatic areas of opportunity at the associate degree level (Table 4.2). These selected occupations present unmet annual job openings within the region, their median hourly wage rates are above \$15.00, and they typically require an associate degree level of education.

At the associate degree level, a number of medical occupations like physical therapist assistants, occupational therapy assistants, and nuclear medicine technologists appear to be undersupplied in the TCTC Service Region. Median hourly wage rates range between \$18.65 for morticians, undertakers, & funeral directors to \$32.68 for nuclear medicine technologists. Occupations with small gaps have been included;



once these occupations are grouped with other similar occupations, the actual workforce gap may be larger.

TABLE 3.7: TCTC'S PROGRAMMATIC AREAS OF OPPORTUNITY AT THE ASSOCIATE DEGREE LEVEL

SOC CODE	SOC TITLE	ANNUAL JOB OPENINGS	ANNUAL REGIONAL COMPLETERS	GAP	MEDIAN HOURLY WAGE
31-2021	Physical Therapist Assistants	10	0	10	\$25.59
29-2021	Dental Hygienists	8	0	8	\$28.73
29-2034	Radiologic Technologists	8	0	8	\$23.99
29-1126	Respiratory Therapists	6	0	6	\$23.99
31-2011	Occupational Therapy Assistants	4	0	4	\$29.72
39-4031	Morticians, Undertakers, and Funeral Directors	2	0	2	\$18.65
29-2031	Cardiovascular Technologists and Technicians	2	0	2	\$25.91
29-2032	Diagnostic Medical Sonographers	2	0	2	\$31.74
29-2035	Magnetic Resonance Imaging Technologists	2	0	2	\$28.91
29-2033	Nuclear Medicine Technologists	1	0	1	\$32.68
17-3019	Drafters, All Other	1	0	1	\$20.21

Numbers may not sum due to rounding.
Source: Emsi program demand gap model.

SUMMARY

Thirty-one certificate and associate degree level programmatic areas of opportunity have been identified, many of which are related to service, healthcare, or business programs. Some of the suggested potential new programs are related to current programs, indicating that there may be an opportunity to adjust current programming to align with the labor market demand.



Appendix 1: Glossary of Terms

Associate Degree A degree granted for the successful completion of a sub-baccalaureate program of study, usually requiring at least two years (or equivalent) of full-time college-level study. This includes degrees granted in a cooperative or work-study program. For the program demand gap analysis, degrees of greater than two years but less than four, as defined by IPEDs, are included in the associate degree category.

Certificate A formal award certifying the satisfactory completion of a postsecondary education program. Certificates can be awarded at any level of postsecondary education and include awards below the associate degree level. For the program demand gap analysis, this includes awards of less than one year and greater than one year but less than two, as defined by IPEDs.

Gap Represents a deficit, or when there are more job openings in a particular occupation than there are completers from higher education institutions within the region. If left unaddressed, a gap may lead to missed opportunities for economic growth and put stress on local businesses to find the necessary talent elsewhere. Significant gaps translate into higher human resources costs and decreased efficiencies in the economic system. They also provide an opportunity for educational institutions to develop new programs and/or strengthen their current programs.

Industry Jobs Emsi industry data have various sources depending on the class of worker. Emsi primarily uses the QCEW (Quarterly Census of Employment and Wages), with supplemental estimates from County Business Patterns. Non-QCEW employees data are based on a number of sources including QCEW, Current Employment Statistics, County Business Patterns, BEA State and Local Personal Income reports, the National Industry-Occupation Employment Matrix (NIOEM), the American Community Survey, and Railroad Retirement Board statistics. Self-Employed class of worker data are primarily based on the American Community Survey, Nonemployer Statistics, and BEA State and Local Personal Income Reports. The Extended Proprietor class of worker is not included in the analysis. Projections for QCEW and non-QCEW Employees are informed by NIOEM and long-term industry projections published by individual states.

IPEDS The Integrated Postsecondary Education Data System (IPEDS) aggregates interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers information from every



educational institution in the U.S. that participates in the federal student financial aid programs authorized by Title IV of the Higher Education Act of 1965. These educational institutions include research universities, state colleges and universities, private religious and liberal arts colleges, for-profit institutions, community and technical colleges, non-degree-granting institutions such as beauty colleges, and others.

Job Openings Job openings are a combination of job growth, which occurs when an employer experiences greater demand for its products and hires new employees to increase production, and replacement needs, which occurs when employees leave the workforce or change occupations. Throughout the program demand gap analysis, they represent the average number of projected openings between 2018 and 2028. Job openings are calculated for each occupation mapped to a program and are de-duplicated across programs mapped to the same occupation using Emsi's weighting methodology. For each award level, the number of openings is reported for that educational level and one education level below it.

Location Quotient (LQ) A comparative statistic used to calculate the relative employment concentration of an industry or occupation against the employment of the industry in a larger geographic region (i.e. a county's LQ relative to the U.S.). Industries with a higher location quotient (usually greater than 1.2) indicate that the smaller geographic region has a comparative advantage or specialization in the production of that good or service or has a high degree of specialization within its workforce.

NAICS The North American Industry Classification System (NAICS) classifies North American business establishment in order to better collect, analyze, and publish statistical data related to the business economy.

New Programs Additions New program additions are workforce gaps that exist for occupations the institution does not currently train for, based on the mapping of the institution's current programs. The award level recommended for the occupations is determined based by the level of education of workers currently employed in the occupation.

Program Completers For the program demand gap analysis, program completers are the average number of students, over a three-year period, who receive an award or degree for a program of study, as reported to IPEDs. An average over three years is used to control for upward or downward spikes in completions in any one year.



Surplus Represents an oversupply, or when there are more completers from regional educational institutions than there are job openings in a particular occupation. If left unaddressed, significant surpluses may lead to higher unemployment rates or higher attrition rates—the institution could be educating a workforce that is leaving the region after program completion because of a lack of job opportunities. In the tables, values in parentheses represent a surplus.



Appendix 2: About Emsi Data

Emsi data are used to calculate the projected number of annual job openings from 2018 to 2028. These projections account for openings due to job growth and openings due to replacement needs, such as when a worker retires or leaves the position.

To capture a complete picture of industry employment, Emsi gathers and integrates economic, labor market, demographic, and educational data from over 40 government and private-sector sources. In doing so, Emsi creates a comprehensive and current database that includes both published data and detailed estimates, with full coverage of the U.S.

More specifically, Emsi combines covered employment data from the Quarterly Census of Employment and Wages (QCEW-produced by the Department of Labor) with total employment data in Regional Economic Information System (REIS-published by the Bureau of Economic Analysis or BEA). The data are augmented with County Business Patterns (CBP) and Non-Employer Statistics (NES) published by the Census Bureau. Job projections are based on the latest-available Emsi industry data, 15-year past local trends in each industry, growth rates in statewide and, where available, sub-state area industry projections published by individual state agencies and, in part, growth rates in national projections from the Bureau of Labor Statistics (BLS).

Through this combination of data sources, Emsi is able to fill gaps in individual sources (such as suppressions), yielding a composite database that leverages the strengths of all its sources. Finally, Emsi's database is updated quarterly, providing the most up-to-date integrated information possible.



Appendix 3: Economic Overview Tables

INDUSTRY COMPOSITION

TABLE A3.1: CURRENT AND PROJECTED JOBS BY INDUSTRY SUBSECTOR IN THE TCTC SERVICE REGION, 2018 AND 2028

NAICS CODE	NAICS TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE
111	Crop Production	107	93	(15)	(14%)
112	Animal Production & Aquaculture	70	89	19	27%
113	Forestry & Logging	102	66	(37)	(36%)
114	Fishing, Hunting & Trapping	7	6	(0)	(5%)
115	Support Activities for Agriculture & Forestry	181	214	32	18%
211	Oil & Gas Extraction	0	0	0	0%
212	Mining (except Oil & Gas)	124	132	8	7%
213	Support Activities for Mining	7	16	9	119%
221	Utilities	1,835	1,680	(155)	(8%)
236	Construction of Buildings	1,513	1,358	(155)	(10%)
237	Heavy & Civil Engineering Construction	804	792	(12)	(2%)
238	Specialty Trade Contractors	4,466	3,758	(708)	(16%)
311	Food Manufacturing	594	798	204	34%
312	Beverage & Tobacco Product Manufacturing	66	111	44	67%
313	Textile Mills	2,514	1,652	(862)	(34%)
314	Textile Product Mills	485	425	(60)	(12%)
315	Apparel Manufacturing	23	25	1	6%
316	Leather & Allied Product Manufacturing	8	9	0	4%
321	Wood Product Manufacturing	402	414	12	3%
322	Paper Manufacturing	985	1,482	497	50%
323	Printing & Related Support Activities	463	478	15	3%
324	Petroleum & Coal Products Manufacturing	33	59	26	79%



NAICS CODE	NAICS TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE
325	Chemical Manufacturing	1,303	1,425	122	9%
326	Plastics & Rubber Products Manufacturing	2,583	2,958	375	15%
327	Nonmetallic Mineral Product Manufacturing	529	470	(59)	(11%)
331	Primary Metal Manufacturing	674	699	25	4%
332	Fabricated Metal Product Manufacturing	1,981	2,010	29	1%
333	Machinery Manufacturing	3,542	3,780	237	7%
334	Computer & Electronic Product Manufacturing	1,576	1,790	214	14%
335	Electrical Equipment, Appliance, & Component Manufacturing	2,872	3,242	370	13%
336	Transportation Equipment Manufacturing	4,733	5,008	276	6%
337	Furniture & Related Product Manufacturing	152	176	24	16%
339	Miscellaneous Manufacturing	376	451	74	20%
423	Merchant Wholesalers, Durable Goods	1,909	2,174	265	14%
424	Merchant Wholesalers, Nondurable Goods	816	978	162	20%
425	Wholesale Electronic Markets & Agents & Brokers	312	271	(41)	(13%)
441	Motor Vehicle & Parts Dealers	2,252	2,408	157	7%
442	Furniture & Home Furnishings Stores	318	276	(42)	(13%)
443	Electronics & Appliance Stores	356	312	(43)	(12%)
444	Building Material & Garden Equipment & Supplies Dealers	1,909	2,131	222	12%
445	Food & Beverage Stores	3,556	3,779	223	6%
446	Health & Personal Care Stores	1,195	1,005	(190)	(16%)
447	Gasoline Stations	1,253	1,312	60	5%
448	Clothing & Clothing Accessories Stores	978	1,040	62	6%
451	Sporting Goods, Hobby, Musical Instrument, & Book Stores	687	781	94	14%
452	General Merchandise Stores	4,054	4,405	350	9%
453	Miscellaneous Store Retailers	945	1,114	169	18%
454	Nonstore Retailers	458	411	(48)	(10%)
481	Air Transportation	11	16	5	41%
482	Rail Transportation	80	84	3	4%
483	Water Transportation	0	0	0	0%



NAICS CODE	NAICS TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE
484	Truck Transportation	800	743	(57)	(7%)
485	Transit & Ground Passenger Transportation	78	106	28	36%
486	Pipeline Transportation	0	0	0	0%
487	Scenic & Sightseeing Transportation	1	1	(0)	(47%)
488	Support Activities for Transportation	135	166	32	23%
491	Postal Service	0	0	0	0%
492	Couriers & Messengers	285	322	37	13%
493	Warehousing & Storage	1,072	1,191	119	11%
511	Publishing Industries (except Internet)	317	243	(73)	(23%)
512	Motion Picture & Sound Recording Industries	146	163	17	11%
515	Broadcasting (except Internet)	49	53	4	8%
517	Telecommunications	403	387	(16)	(4%)
518	Data Processing, Hosting, & Related Services	78	124	46	58%
519	Other Information Services	10	14	3	31%
521	Monetary Authorities-Central Bank	1	1	0	70%
522	Credit Intermediation & Related Activities	1,430	1,298	(131)	(9%)
523	Securities, Commodity Contracts, & Other Financial Investments & Related Activities	117	127	10	9%
524	Insurance Carriers & Related Activities	821	797	(24)	(3%)
525	Funds, Trusts, & Other Financial Vehicles	3	5	2	81%
531	Real Estate	1,114	1,201	87	8%
532	Rental & Leasing Services	195	247	52	27%
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	0	0	0	0%
541	Professional, Scientific, & Technical Services	3,712	4,863	1,151	31%
551	Management of Companies & Enterprises	311	294	(16)	(5%)
561	Administrative & Support Services	6,119	6,098	(21)	(0%)
562	Waste Management & Remediation Services	234	305	72	31%
611	Educational Services	2,512	3,014	502	20%
621	Ambulatory Health Care Services	4,973	5,999	1,026	21%
622	Hospitals	1,606	1,860	254	16%



NAICS CODE	NAICS TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE
623	Nursing & Residential Care Facilities	2,851	3,269	418	15%
624	Social Assistance	2,081	2,687	606	29%
711	Performing Arts, Spectator Sports, & Related Industries	323	411	88	27%
712	Museums, Historical Sites, & Similar Institutions	27	53	26	95%
713	Amusement, Gambling, & Recreation Industries	1,566	1,745	179	11%
721	Accommodation	1,073	1,335	262	24%
722	Food Services & Drinking Places	13,132	13,779	647	5%
811	Repair & Maintenance	1,790	1,741	(49)	(3%)
812	Personal & Laundry Services	1,880	2,072	192	10%
813	Religious, Grantmaking, Civic, Professional, & Similar Organizations	3,645	4,141	496	14%
814	Private Households	1,042	1,223	181	17%
901	Federal Government	2,243	2,343	100	4%
902	State Government	10,026	10,949	923	9%
903	Local Government	17,505	18,030	524	3%
Total		141,908	151,562	9,654	12%

Source: Employees & Self-Employed 2018.4.

TABLE A3.2: EMPLOYMENT CONCENTRATION (LQ) BY INDUSTRY SUBSECTOR IN THE TCTC SERVICE REGION, 2018 AND 2028

NAICS CODE	NAICS TITLE	2018 LQ	2028 LQ
111	Crop Production	0.15	0.13
112	Animal Production & Aquaculture	0.19	0.25
113	Forestry & Logging	1.51	1.11
114	Fishing, Hunting & Trapping	0.21	0.20
115	Support Activities for Agriculture & Forestry	0.36	0.40
211	Oil & Gas Extraction	0.00	0.00
212	Mining (except Oil & Gas)	0.75	0.83
213	Support Activities for Mining	0.03	0.05
221	Utilities	3.74	3.32



NAICS CODE	NAICS TITLE	2018 LQ	2028 LQ
236	Construction of Buildings	0.83	0.69
237	Heavy & Civil Engineering Construction	0.87	0.72
238	Specialty Trade Contractors	0.89	0.70
311	Food Manufacturing	0.42	0.55
312	Beverage & Tobacco Product Manufacturing	0.28	0.43
313	Textile Mills	24.99	19.36
314	Textile Product Mills	4.41	4.45
315	Apparel Manufacturing	0.20	0.29
316	Leather & Allied Product Manufacturing	0.32	0.36
321	Wood Product Manufacturing	1.09	1.12
322	Paper Manufacturing	3.06	5.05
323	Printing & Related Support Activities	1.15	1.41
324	Petroleum & Coal Products Manufacturing	0.33	0.60
325	Chemical Manufacturing	1.79	2.02
326	Plastics & Rubber Products Manufacturing	4.09	4.95
327	Nonmetallic Mineral Product Manufacturing	1.42	1.31
331	Primary Metal Manufacturing	2.06	2.40
332	Fabricated Metal Product Manufacturing	1.56	1.60
333	Machinery Manufacturing	3.70	4.07
334	Computer & Electronic Product Manufacturing	1.71	2.14
335	Electrical Equipment, Appliance, & Component Manufacturing	8.39	9.81
336	Transportation Equipment Manufacturing	3.23	3.40
337	Furniture & Related Product Manufacturing	0.42	0.49
339	Miscellaneous Manufacturing	0.67	0.80
423	Merchant Wholesalers, Durable Goods	0.71	0.79
424	Merchant Wholesalers, Nondurable Goods	0.44	0.51
425	Wholesale Electronic Markets & Agents & Brokers	0.43	0.35
441	Motor Vehicle & Parts Dealers	1.25	1.24
442	Furniture & Home Furnishings Stores	0.72	0.64
443	Electronics & Appliance Stores	0.78	0.78



NAICS CODE	NAICS TITLE	2018 LQ	2028 LQ
444	Building Material & Garden Equipment & Supplies Dealers	1.64	1.74
445	Food & Beverage Stores	1.29	1.35
446	Health & Personal Care Stores	1.24	0.98
447	Gasoline Stations	1.52	1.50
448	Clothing & Clothing Accessories Stores	0.77	0.89
451	Sporting Goods, Hobby, Musical Instrument, & Book Stores	1.23	1.30
452	General Merchandise Stores	1.48	1.58
453	Miscellaneous Store Retailers	1.12	1.31
454	Nonstore Retailers	0.73	0.60
481	Air Transportation	0.03	0.04
482	Rail Transportation	0.41	0.42
483	Water Transportation	0.00	0.00
484	Truck Transportation	0.55	0.49
485	Transit & Ground Passenger Transportation	0.14	0.18
486	Pipeline Transportation	0.00	0.00
487	Scenic & Sightseeing Transportation	0.03	0.01
488	Support Activities for Transportation	0.21	0.23
491	Postal Service	0.00	0.00
492	Couriers & Messengers	0.45	0.48
493	Warehousing & Storage	1.15	1.05
511	Publishing Industries (except Internet)	0.47	0.37
512	Motion Picture & Sound Recording Industries	0.33	0.33
515	Broadcasting (except Internet)	0.20	0.24
517	Telecommunications	0.58	0.63
518	Data Processing, Hosting, & Related Services	0.27	0.38
519	Other Information Services	0.04	0.04
521	Monetary Authorities-Central Bank	0.03	0.06
522	Credit Intermediation & Related Activities	0.61	0.54
523	Securities, Commodity Contracts, & Other Financial Investments & Related Activities	0.13	0.13
524	Insurance Carriers & Related Activities	0.34	0.31



NAICS CODE	NAICS TITLE	2018 LQ	2028 LQ
525	Funds, Trusts, & Other Financial Vehicles	0.24	0.38
531	Real Estate	0.60	0.61
532	Rental & Leasing Services	0.39	0.47
533	Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)	0.00	0.00
541	Professional, Scientific, & Technical Services	0.40	0.47
551	Management of Companies & Enterprises	0.15	0.14
561	Administrative & Support Services	0.72	0.67
562	Waste Management & Remediation Services	0.61	0.69
611	Educational Services	0.68	0.72
621	Ambulatory Health Care Services	0.73	0.71
622	Hospitals	0.36	0.39
623	Nursing & Residential Care Facilities	0.97	1.00
624	Social Assistance	0.55	0.59
711	Performing Arts, Spectator Sports, & Related Industries	0.43	0.52
712	Museums, Historical Sites, & Similar Institutions	0.18	0.30
713	Amusement, Gambling, & Recreation Industries	1.01	1.02
721	Accommodation	0.61	0.73
722	Food Services & Drinking Places	1.26	1.21
811	Repair & Maintenance	1.20	1.12
812	Personal & Laundry Services	0.98	0.99
813	Religious, Grantmaking, Civic, Professional, & Similar Organizations	1.40	1.50
814	Private Households	1.31	1.47
901	Federal Government	0.53	0.57
902	State Government	2.12	2.27
903	Local Government	1.40	1.39

Source: Employees & Self-Employed 2018.4.



INDUSTRY STAFFING PATTERNS

The following tables show the staffing patterns of the industry subsectors discussed in Chapter 2. The Entry Ed Level column describes the typical award level required for an entry level position in the occupation. “None” indicates that the occupation typically requires no formal educational credential; “HS/GED” refers to a high school diploma or its equivalent, a General Equivalency Development or General Equivalency Diploma test; “Certificate” refers to a postsecondary nondegree award or some college education with no degree; and “Doctoral” refers to a doctoral or professional degree level of education. The other education classifications are straightforward.

TABLE A3.3: EMPLOYMENT PROJECTIONS IN THE TCTC SERVICE REGION FOR THE TOP 25 OCCUPATIONS RELATED TO THE STATE GOVERNMENT INDUSTRY SUBSECTOR

SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Postsecondary Teachers	2,141	2,424	283	21.4%	\$33.61	Doctoral
Office Clerks, General	1,021	1,056	35	10.2%	\$13.07	HS/GED
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	703	691	(12)	7.0%	\$15.03	HS/GED
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	393	440	47	3.9%	\$10.43	None
Maintenance and Repair Workers, General	273	302	29	2.7%	\$17.81	HS/GED
Education Administrators, Postsecondary	214	234	20	2.1%	\$38.08	Master's
Computer User Support Specialists	149	168	19	1.5%	\$21.54	Certificate
Bookkeeping, Accounting, and Auditing Clerks	138	142	4	1.4%	\$15.98	Certificate
Police and Sheriff's Patrol Officers	130	149	19	1.3%	\$17.87	HS/GED
Educational, Guidance, School, and Vocational Counselors	130	152	22	1.3%	\$25.45	Master's
Office and Administrative Support Workers, All Other	128	147	19	1.3%	\$10.88	HS/GED
Teacher Assistants	124	141	17	1.2%	\$10.05	Certificate
Registered Nurses	114	127	13	1.1%	\$26.93	Bachelor's
Correctional Officers and Jailers	112	124	12	1.1%	\$16.79	HS/GED



SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Psychiatric Technicians	97	43	(54)	1.0%	\$12.33	Certificate
First-Line Supervisors of Office and Administrative Support Workers	95	98	3	0.9%	\$22.13	HS/GED
Landscaping and Groundskeeping Workers	88	98	10	0.9%	\$10.19	None
Customer Service Representatives	88	97	9	0.9%	\$13.23	HS/GED
Psychiatric Aides	79	62	(17)	0.8%	\$11.08	HS/GED
Accountants and Auditors	77	88	11	0.8%	\$26.54	Bachelor's
Library Technicians	77	84	7	0.8%	\$13.90	Certificate
Computer Network Support Specialists	66	72	6	0.7%	\$22.22	Associate's
Security Guards	62	67	5	0.6%	\$11.73	HS/GED
Management Analysts	60	69	9	0.6%	\$29.39	Bachelor's
Civil Engineers	58	68	10	0.6%	\$34.62	Bachelor's

Source: Employees & Self-Employed 2018.4.

TABLE A3.4: EMPLOYMENT PROJECTIONS IN THE TCTC SERVICE REGION FOR THE TOP 25 OCCUPATIONS RELATED TO THE TRANSPORTATION EQUIPMENT MANUFACTURING INDUSTRY SUBSECTOR

SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Assemblers and Fabricators, All Other, Including Team Assemblers	1,536	1,434	(102)	32.5%	\$15.86	HS/GED
Machinists	552	589	37	11.7%	\$17.26	HS/GED
Inspectors, Testers, Sorters, Samplers, and Weighers	204	191	(13)	4.3%	\$16.56	HS/GED
First-Line Supervisors of Production and Operating Workers	167	185	18	3.5%	\$28.82	HS/GED
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	125	136	11	2.6%	\$14.79	HS/GED
Laborers and Freight, Stock, and Material Movers, Hand	116	131	15	2.5%	\$12.55	None
Industrial Engineers	116	151	35	2.5%	\$36.65	Bachelor's
Mechanical Engineers	108	134	26	2.3%	\$40.12	Bachelor's



SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Computer-Controlled Machine Tool Operators, Metal and Plastic	96	105	9	2.0%	\$19.31	HS/GED
Welders, Cutters, Solderers, and Brazers	87	98	11	1.8%	\$17.73	HS/GED
Maintenance and Repair Workers, General	85	95	10	1.8%	\$17.81	HS/GED
Industrial Machinery Mechanics	74	89	15	1.6%	\$23.17	HS/GED
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	67	74	7	1.4%	\$27.10	HS/GED
Tool and Die Makers	62	66	4	1.3%	\$25.96	Certificate
Engine and Other Machine Assemblers	57	57	0	1.2%	\$19.58	HS/GED
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	53	54	1	1.1%	\$17.97	HS/GED
Helpers--Production Workers	47	54	7	1.0%	\$11.04	HS/GED
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	46	50	4	1.0%	\$22.81	HS/GED
Production, Planning, and Expediting Clerks	41	48	7	0.9%	\$19.05	HS/GED
Shipping, Receiving, and Traffic Clerks	40	45	5	0.8%	\$14.26	HS/GED
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	40	42	2	0.8%	\$13.30	HS/GED
Industrial Engineering Technicians	39	45	6	0.8%	\$24.66	Associate's
Industrial Production Managers	39	45	6	0.8%	\$49.01	Bachelor's
General and Operations Managers	37	42	5	0.8%	\$35.62	Bachelor's
Industrial Truck and Tractor Operators	33	38	5	0.7%	\$13.99	None

Source: Employees & Self-Employed 2018.4.



TABLE A3.5: EMPLOYMENT PROJECTIONS IN THE TCTC SERVICE REGION FOR THE TOP 25 OCCUPATIONS RELATED TO THE MACHINERY MANUFACTURING INDUSTRY SUBSECTOR

SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Assemblers and Fabricators, All Other, Including Team Assemblers	714	707	(7)	20.2%	\$15.86	HS/GED
Machinists	689	747	58	19.5%	\$17.26	HS/GED
Welders, Cutters, Solderers, and Brazers	143	161	18	4.0%	\$17.73	HS/GED
Computer-Controlled Machine Tool Operators, Metal and Plastic	142	155	13	4.0%	\$19.31	HS/GED
Mechanical Engineers	125	146	21	3.5%	\$40.12	Bachelor's
First-Line Supervisors of Production and Operating Workers	121	135	14	3.4%	\$28.82	HS/GED
Inspectors, Testers, Sorters, Samplers, and Weighers	83	78	(5)	2.3%	\$16.56	HS/GED
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	70	80	10	2.0%	\$22.23	HS/GED
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	60	52	(8)	1.7%	\$22.81	HS/GED
Industrial Engineers	58	70	12	1.6%	\$36.65	Bachelor's
General and Operations Managers	56	61	5	1.6%	\$35.62	Bachelor's
Laborers and Freight, Stock, and Material Movers, Hand	53	59	6	1.5%	\$12.55	None
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	49	47	(2)	1.4%	\$14.79	HS/GED
Industrial Machinery Mechanics	49	59	10	1.4%	\$23.17	HS/GED
Tool and Die Makers	47	47	0	1.3%	\$25.96	Certificate
Shipping, Receiving, and Traffic Clerks	39	41	2	1.1%	\$14.26	HS/GED
Customer Service Representatives	39	43	4	1.1%	\$13.23	HS/GED
Maintenance and Repair Workers, General	38	41	3	1.1%	\$17.81	HS/GED
Structural Metal Fabricators and Fitters	38	38	0	1.1%	\$23.84	HS/GED
Helpers--Production Workers	32	34	2	0.9%	\$11.04	HS/GED



SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Mechanical Drafters	30	30	0	0.8%	\$29.83	Associate's
Production, Planning, and Expediting Clerks	29	31	2	0.8%	\$19.05	HS/GED
Industrial Production Managers	29	32	3	0.8%	\$49.01	Bachelor's
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	28	26	(2)	0.8%	\$15.03	HS/GED
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	26	30	4	0.7%	\$27.10	HS/GED

Source: Employees & Self-Employed 2018.4.

TABLE A3.6: EMPLOYMENT PROJECTIONS IN THE TCTC SERVICE REGION FOR THE TOP 25 OCCUPATIONS RELATED TO THE ELECTRICAL EQUIPMENT, APPLIANCE, & COMPONENT MANUFACTURING INDUSTRY SUBSECTOR

SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Assemblers and Fabricators, All Other, Including Team Assemblers	828	769	(59)	28.8%	\$15.86	HS/GED
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	163	197	34	5.7%	\$17.97	HS/GED
Mechanical Engineers	101	126	25	3.5%	\$40.12	Bachelor's
Inspectors, Testers, Sorters, Samplers, and Weighers	98	103	5	3.4%	\$16.56	HS/GED
Machinists	92	123	31	3.2%	\$17.26	HS/GED
Customer Service Representatives	88	98	10	3.1%	\$13.23	HS/GED
First-Line Supervisors of Production and Operating Workers	87	112	25	3.0%	\$28.82	HS/GED
Laborers and Freight, Stock, and Material Movers, Hand	76	90	14	2.7%	\$12.55	None
Industrial Engineers	61	87	26	2.1%	\$36.65	Bachelor's
Maintenance and Repair Workers, General	55	67	12	1.9%	\$17.81	HS/GED
Helpers--Production Workers	51	61	10	1.8%	\$11.04	HS/GED
Electrical Engineers	48	70	22	1.7%	\$38.16	Bachelor's
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	46	50	4	1.6%	\$14.79	HS/GED



SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
General and Operations Managers	41	52	11	1.4%	\$35.62	Bachelor's
Industrial Truck and Tractor Operators	41	43	2	1.4%	\$13.99	None
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	37	47	10	1.3%	\$22.23	HS/GED
Welders, Cutters, Solderers, and Brazers	35	45	10	1.2%	\$17.73	HS/GED
Production, Planning, and Expediting Clerks	33	40	7	1.1%	\$19.05	HS/GED
Computer-Controlled Machine Tool Operators, Metal and Plastic	30	39	9	1.0%	\$19.31	HS/GED
Shipping, Receiving, and Traffic Clerks	27	33	6	0.9%	\$14.26	HS/GED
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	27	27	0	0.9%	\$24.33	HS/GED
Industrial Machinery Mechanics	26	31	5	0.9%	\$23.17	HS/GED
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	22	23	1	0.8%	\$27.10	HS/GED
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	21	25	4	0.7%	\$15.03	HS/GED
Structural Metal Fabricators and Fitters	21	19	(2)	0.7%	\$23.84	HS/GED

Source: Employees & Self-Employed 2018.4.

TABLE A3.7: EMPLOYMENT PROJECTIONS IN THE TCTC SERVICE REGION FOR THE TOP 25 OCCUPATIONS RELATED TO PLASTICS & RUBBER PRODUCTS MANUFACTURING INDUSTRY SUBSECTOR

SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
Tire Builders	498	584	86	19.3%	\$19.75	HS/GED
Assemblers and Fabricators, All Other, Including Team Assemblers	328	329	1	12.7%	\$15.86	HS/GED
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	149	159	10	5.8%	\$24.33	HS/GED
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	138	168	30	5.3%	\$20.25	HS/GED
Inspectors, Testers, Sorters, Samplers, and Weighers	124	125	1	4.8%	\$16.56	HS/GED



SOC TITLE	2018 JOBS	2028 JOBS	JOB OPENINGS	% JOBS IN INDUSTRY	MEDIAN HOURLY WAGE	ENTRY ED LEVEL
First-Line Supervisors of Production and Operating Workers	103	124	21	4.0%	\$28.82	HS/GED
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	96	104	8	3.7%	\$13.30	HS/GED
Machinists	76	90	14	2.9%	\$17.26	HS/GED
Maintenance and Repair Workers, General	50	60	10	1.9%	\$17.81	HS/GED
Laborers and Freight, Stock, and Material Movers, Hand	50	59	9	1.9%	\$12.55	None
Industrial Machinery Mechanics	45	57	12	1.7%	\$23.17	HS/GED
Mixing and Blending Machine Setters, Operators, and Tenders	38	46	8	1.5%	\$16.24	HS/GED
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	37	41	4	1.4%	\$14.79	HS/GED
Helpers--Production Workers	37	44	7	1.4%	\$11.04	HS/GED
Shipping, Receiving, and Traffic Clerks	32	38	6	1.2%	\$14.26	HS/GED
Packaging and Filling Machine Operators and Tenders	32	37	5	1.2%	\$11.64	HS/GED
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	31	37	6	1.2%	\$22.23	HS/GED
Industrial Engineers	31	37	6	1.2%	\$36.65	Bachelor's
Packers and Packagers, Hand	30	36	6	1.2%	\$10.87	None
Cutting and Slicing Machine Setters, Operators, and Tenders	29	36	7	1.1%	\$16.81	HS/GED
General and Operations Managers	29	35	6	1.1%	\$35.62	Bachelor's
Customer Service Representatives	27	32	5	1.0%	\$13.23	HS/GED
Computer-Controlled Machine Tool Operators, Metal and Plastic	25	29	4	1.0%	\$19.31	HS/GED
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	24	28	4	0.9%	\$27.10	HS/GED
Industrial Production Managers	20	24	4	0.8%	\$49.01	Bachelor's

Source: Employees & Self-Employed 2018.4.



WORKFORCE COMMUTING PATTERNS

TABLE A3.8: TCTC SERVICE REGION JOB INFLOW AND OUTFLOW

	JOBS	COMMUTE SHARE
EMPLOYMENT PATTERNS		
Employed in the TCTC Service Region	115,507	100%
Employed in the TCTC Service Region but Living Outside	33,223	29%
Employed and Living in the TCTC Service Region	82,284	71%
RESIDENTIAL PATTERNS		
Living in the TCTC Service Region	151,435	100%
Living in the TCTC Service Region but Employed Outside	69,151	46%
Living and Employed in the TCTC Service Region	82,284	54%

Source: Census Bureau, Center for Economic Studies.

EDUCATIONAL ATTAINMENT

TABLE A3.9: BREAKDOWN OF ADULT POPULATION IN THE TCTC SERVICE REGION BY EDUCATIONAL ATTAINMENT, 2013 AND 2018

EDUCATION LEVEL	2013 POP	2013 % POP	2018 POP	2018 % POP	POP CHANGE	% SHARE CHANGE
Less than high school diploma or equivalent	42,581	17%	44,280	16%	1,699	(0.4%)
High school diploma or equivalent	80,235	31%	88,772	32%	8,537	1.1%
Some college	53,540	21%	54,545	20%	1,005	(1.0%)
Associate degree	24,417	10%	26,752	10%	2,335	0.2%
Bachelor's degree	34,270	13%	36,361	13%	2,091	(0.1%)
Graduate degree or higher	21,227	8%	22,899	8%	1,672	0.1%
Total	256,269	100%	273,609	100%	17,339	(0.0%)

Source: Emsi Analyst.



TABLE A3.10: BREAKDOWN OF ADULT POPULATION IN THE TCTC SERVICE REGION BY EDUCATIONAL ATTAINMENT AND GENDER

EDUCATION LEVEL	MALE	% MALE	FEMALE	% FEMALE
Less than high school diploma or equivalent	22,234	17%	22,046	15%
High school diploma or equivalent	41,905	32%	46,867	33%
Some college	25,426	19%	29,119	20%
Associate degree	10,987	8%	15,765	11%
Bachelor's degree	18,579	14%	17,782	12%
Graduate degree and higher	11,434	9%	11,465	8%
Total	130,566	100%	143,043	100%

Source: Census Bureau.

TABLE A3.11: BREAKDOWN OF ADULT POPULATION IN THE TCTC SERVICE REGION BY EDUCATIONAL ATTAINMENT AND MAJOR RACE AND ETHNICITY GROUPS

GROUP		EDUCATIONAL ATTAINMENT					
		< HS	HS	SOME COLLEGE	ASSOC	BACH	GRAD +
White, non-Hispanic	POP	34,134	73,628	45,758	22,920	32,613	20,260
	% POP	15%	32%	20%	10%	14%	9%
Black, non-Hispanic	POP	6,546	11,054	6,333	2,920	2,029	899
	% POP	22%	37%	21%	10%	7%	3%
American Indian or Alaskan native, non-Hispanic	POP	143	208	145	45	135	7
	% POP	21%	31%	21%	7%	20%	1%
Asian, non-Hispanic	POP	415	575	297	330	664	838
	% POP	13%	18%	10%	11%	21%	27%
Native Hawaiian or Pacific Islander, non-Hispanic	POP	8	11	8	9	11	17
	% POP	12%	17%	12%	14%	17%	27%
Two or more races, non-Hispanic	POP	480	397	560	150	224	210
	% POP	24%	20%	28%	7%	11%	10%
Hispanic, all types	POP	2,554	2,898	1,445	379	686	668
	% POP	30%	34%	17%	4%	8%	8%

Source: Census Bureau and Emsi Analyst.



Appendix 4: Program-to-Occupation Mapping

Table A4.1 displays the crosswalk between educational programs (CIP codes) and occupations (SOC codes) that Emsi used to complete the program demand gap analysis. Also listed are the adjustment factors which were applied to the annual openings figures for every occupation in every program. The methodology for these factors is described in Appendix 5, with the program based weight figure discussed under “De-duplication of Annual Openings” and the educational level adjustments explained under “Education Level Adjustments.”

TABLE A4.1: PROGRAM TO OCCUPATION MAPPING WITH EMPLOYMENT ADJUSTMENT FACTORS

CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
10.0202	Radio & Television Broadcasting Technology/Technician	25-9011	Audio-Visual & Multimedia Collections Specialists	1.00	31	28	42
		27-2012	Producers & Directors	0.51	19	18	71
		27-4011	Audio & Video Equipment Technicians	0.84	56	47	40
		27-4012	Broadcast Technicians	1.00	56	47	40
		27-4013	Radio Operators	1.00	56	47	40
		27-4031	Camera Operators, Television, Video, & Motion Picture	1.00	31	30	62
11.0301	Data Processing & Data Processing Technology/Technician	15-1141	Database Administrators	0.11	15	16	59
		15-1199	Computer Occupations, All Other	0.03	36	41	52
		43-9011	Computer Operators	0.11	55	47	38
		43-9021	Data Entry Keyers	0.08	62	50	33
14.4201	Mechatronics, Robotics, & Automation Engineering	17-3023	Electrical & Electronics Engineering Technicians	0.26	59	54	35
		17-3026	Industrial Engineering Technicians	0.17	59	54	35



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		47-4021	Elevator Installers and Repairers	0.50	82	42	14
		49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	0.37	78	52	17
		49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.27	78	52	17
		49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	0.50	78	52	17
		49-2096	Electronic Equipment Installers and Repairers, Motor Vehicles	0.37	79	31	13
		49-2097	Electronic Home Entertainment Equipment Installers and Repairers	0.50	71	49	20
		49-9011	Mechanical Door Repairers	0.50	77	50	18
		49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	0.50	77	50	18
		49-9041	Industrial Machinery Mechanics	0.25	71	47	19
		49-9043	Maintenance Workers, Machinery	0.42	71	39	20
		49-9045	Refractory Materials Repairers, Except Brickmasons	0.50	71	47	19
		49-9081	Wind Turbine Service Technicians	0.50	71	39	15
		49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.47	62	26	7
		49-9099	Installation, Maintenance, and Repair Workers, All Other	0.47	71	39	15
		51-2031	Engine and Other Machine Assemblers	0.50	70	36	18
		51-9199	Production Workers, All Other	0.66	70	33	11



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		17-3029	Engineering Technicians, Except Drafters, All Other	0.18	59	54	35
		17-3027	Mechanical Engineering Technicians	0.49	59	54	35
15.0000	Engineering Technology, General	17-3011	Architectural & Civil Drafters	0.15	36	57	58
		17-3012	Electrical & Electronics Drafters	1.00	36	57	58
		17-3013	Mechanical Drafters	0.66	36	57	58
		17-3021	Aerospace Engineering & Operations Technicians	1.00	59	54	35
		17-3022	Civil Engineering Technicians	0.97	59	54	35
		17-3023	Electrical & Electronics Engineering Technicians	0.08	59	54	35
		17-3024	Electro-Mechanical Technicians	0.17	59	54	35
		17-3026	Industrial Engineering Technicians	0.05	59	54	35
		17-3027	Mechanical Engineering Technicians	0.16	59	54	35
		17-3029	Engineering Technicians, Except Drafters, All Other	0.06	59	54	35
15.0499	Electromechanical and Instrumentation and Maintenance Technologies/Technicians, Other	17-3023	Electrical & Electronics Engineering Technicians	0.26	59	54	35
		47-4021	Elevator Installers and Repairers	0.50	82	42	14
		49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	0.37	78	52	17
		49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.27	78	52	17
		49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	0.50	78	52	17



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		49-2096	Electronic Equipment Installers and Repairers, Motor Vehicles	0.37	79	31	13
		49-2097	Electronic Home Entertainment Equipment Installers and Repairers	0.50	71	49	20
		49-9011	Mechanical Door Repairers	0.50	77	50	18
		49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	0.50	77	50	18
		49-9041	Industrial Machinery Mechanics	0.25	71	47	19
		49-9043	Maintenance Workers, Machinery	0.42	71	39	20
		49-9045	Refractory Materials Repairers, Except Brickmasons	0.50	71	47	19
		49-9081	Wind Turbine Service Technicians	0.50	71	39	15
		49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.47	62	26	7
		49-9099	Installation, Maintenance, and Repair Workers, All Other	0.47	71	39	15
		51-2031	Engine and Other Machine Assemblers	0.50	70	36	18
15.0699	Industrial Production Technologies/Technicians, Other	17-3026	Industrial Engineering Technicians	0.06	59	54	35
15.0702	Quality Control Technology/Technician	11-3051	Industrial Production Managers	0.05	38	28	48
		19-4099	Life, Physical, & Social Science Technicians, All Other	0.26	45	41	44
		51-9061	Inspectors, Testers, Sorters, Samplers, & Weighers	1.00	64	39	24
15.1001	Construction Engineering Technology/Technician	11-9021	Construction Managers	0.00	39	27	50
		13-1051	Cost Estimators	0.00	44	39	50
		17-3011	Architectural & Civil Drafters	0.01	36	57	58



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		17-3022	Civil Engineering Technicians	0.03	59	54	35
		17-3031	Surveying & Mapping Technicians	1.00	65	52	28
		47-1011	First-Line Supervisors of Construction Trades & Extraction Workers	0.00	66	33	19
		47-4011	Construction & Building Inspectors	0.01	58	45	36
15.1306	Mechanical Drafting & Mechanical Drafting CAD/CADD	17-3013	Mechanical Drafters	0.34	36	57	58
19.0709	Child Care Provider/Assistant	21-1021	Child, Family, & School Social Workers	0.01	13	12	55
		21-1093	Social & Human Service Assistants	0.02	39	36	48
		25-9041	Teacher Assistants	0.02	60	45	32
		39-9011	Childcare Workers	0.05	65	46	22
43.0104	Criminal Justice/Safety Studies	11-9161	Emergency Management Directors	0.57	32	34	52
		11-9199	Managers, All Other	0.02	32	26	50
		13-1041	Compliance Officers	0.10	23	23	55
		13-1199	Business Operations Specialists, All Other	0.04	26	23	54
		13-2099	Financial Specialists, All Other	0.17	25	23	56
		15-1122	Information Security Analysts	0.15	25	29	56
		21-1021	Child, Family, & School Social Workers	0.08	13	12	55
		21-1092	Probation Officers & Correctional Treatment Specialists	0.74	20	20	65
		25-1099	Postsecondary Teachers	0.01	13	13	38
		33-1011	First-Line Supervisors of Correctional Officers	1.00	65	54	32
		33-1012	First-Line Supervisors of Police & Detectives	0.48	52	54	39
		33-2021	Fire Inspectors & Investigators	0.95	60	50	35
		33-3011	Bailiffs	1.00	68	54	30
		33-3012	Correctional Officers & Jailers	0.63	68	54	30



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		33-3021	Detectives & Criminal Investigators	0.37	24	29	59
		33-3051	Police & Sheriff's Patrol Officers	0.76	46	49	49
		33-3052	Transit & Railroad Police	1.00	46	49	49
		33-9021	Private Detectives & Investigators	1.00	34	31	52
		33-9032	Security Guards	0.73	71	50	22
		43-5031	Police, Fire, & Ambulance Dispatchers	0.76	67	52	28
47.0105	Industrial Electronics Technology/Technician	17-3023	Electrical & Electronics Engineering Technicians	0.41	59	54	35
		17-3024	Electro-Mechanical Technicians	0.83	59	54	35
		17-3026	Industrial Engineering Technicians	0.27	59	54	35
		17-3029	Engineering Technicians, Except Drafters, All Other	0.29	59	54	35
		49-2011	Computer, Automated Teller, & Office Machine Repairers	1.00	59	57	37
		49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.43	78	52	17
		49-9041	Industrial Machinery Mechanics	0.40	71	47	19
		49-9071	Maintenance & Repair Workers, General	0.35	70	44	17
		51-9141	Semiconductor Processors	1.00	70	33	11
47.0201	Heating, Air Conditioning, Ventilation & Refrigeration Maintenance Technology/Technician	13-1199	Business Operations Specialists, All Other	0.01	26	23	54
		47-2151	Pipelayers	1.00	73	32	10
		47-2152	Plumbers, Pipefitters, & Steamfitters	0.06	73	32	10
		47-2211	Sheet Metal Workers	0.06	75	35	11
		47-4011	Construction & Building Inspectors	0.13	58	45	36
		47-4098	Miscellaneous Construction & Related	1.00	67	34	11



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
			Workers				
		49-1011	First-Line Supervisors of Mechanics, Installers, & Repairers	0.08	61	51	31
		49-2094	Electrical and Electronics Repairers, Commercial and Industrial Equipment	0.04	78	52	17
		49-9021	Heating, Air Conditioning, & Refrigeration Mechanics & Installers	1.00	72	44	17
		49-9031	Home Appliance Repairers	1.00	74	45	13
		49-9071	Maintenance & Repair Workers, General	0.03	70	44	17
		49-9098	Helpers--Installation, Maintenance, and Repair Workers	0.06	62	26	7
47.0604	Automobile/Automotive Mechanics Technology/Technician	17-3027	Mechanical Engineering Technicians	0.35	59	54	35
		49-1011	First-Line Supervisors of Mechanics, Installers, & Repairers	0.40	61	51	31
		49-2093	Electrical and Electronics Installers and Repairers, Transportation Equipment	0.26	78	52	17
		49-2096	Electronic Equipment Installers and Repairers, Motor Vehicles	0.26	79	31	13
		49-3021	Automotive Body & Related Repairers	1.00	68	35	12
		49-3022	Automotive Glass Installers & Repairers	1.00	83	33	4
		49-3023	Automotive Service Technicians & Mechanics	1.00	68	43	17
		49-3093	Tire Repairers & Changers	1.00	68	33	9
		49-9071	Maintenance & Repair Workers, General	0.16	70	44	17
		53-6051	Transportation Inspectors	1.00	71	51	23
		53-7061	Cleaners of Vehicles & Equipment	1.00	66	29	6



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
48.0501	Machine Tool Technology/Machinist	49-9041	Industrial Machinery Mechanics	0.10	71	47	19
		49-9043	Maintenance Workers, Machinery	0.16	71	39	20
		49-9044	Millwrights	1.00	76	42	13
		51-4011	Computer-Controlled Machine Tool Operators, Metal & Plastic	0.76	74	47	18
		51-4021	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic	0.76	82	39	9
		51-4022	Forging Machine Setters, Operators, & Tenders, Metal & Plastic	0.76	78	23	4
		51-4023	Rolling Machine Setters, Operators, & Tenders, Metal & Plastic	0.76	81	33	5
		51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	0.76	72	29	6
		51-4032	Drilling & Boring Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.76	72	29	6
		51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.76	72	29	6
		51-4034	Lathe & Turning Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.76	72	29	6
		51-4035	Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	0.76	72	34	8
		51-4041	Machinists	0.76	73	42	17
		51-4081	Multiple Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.76	73	34	8
51-4191	Heat Treating Equipment Setters, Operators, & Tenders, Metal & Plastic	0.76	73	34	8		



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		51-4192	Layout Workers, Metal & Plastic	0.76	73	34	8
		51-4199	Metal Workers & Plastic Workers, All Other	1.00	73	34	8
48.0508	Welding Technology/Welder	47-1011	First-Line Supervisors of Construction Trades & Extraction Workers	0.60	66	33	19
		47-2152	Plumbers, Pipefitters, & Steamfitters	0.94	73	32	10
		47-2171	Reinforcing Iron & Rebar Workers	1.00	60	18	4
		47-2211	Sheet Metal Workers	0.94	75	35	11
		47-2221	Structural Iron & Steel Workers	1.00	73	34	12
		49-9071	Maintenance & Repair Workers, General	0.47	70	44	17
		51-4121	Welders, Cutters, Solderers, & Brazers	1.00	70	36	12
		51-4122	Welding, Soldering, & Brazing Machine Setters, Operators, & Tenders	1.00	70	36	12
48.0510	Computer Numerically Controlled (CNC) Machinist Technology/CNC Machinist	51-4011	Computer-Controlled Machine Tool Operators, Metal & Plastic	0.24	74	47	18
		51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal & Plastic	1.00	74	47	18
		51-4021	Extruding & Drawing Machine Setters, Operators, & Tenders, Metal & Plastic	0.24	82	39	9
		51-4022	Forging Machine Setters, Operators, & Tenders, Metal & Plastic	0.24	78	23	4
		51-4023	Rolling Machine Setters, Operators, & Tenders, Metal & Plastic	0.24	81	33	5
		51-4031	Cutting, Punching, & Press Machine Setters, Operators, & Tenders, Metal & Plastic	0.24	72	29	6
		51-4032	Drilling & Boring Machine Tool Setters, Operators, & Tenders,	0.24	72	29	6



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
			Metal & Plastic				
		51-4033	Grinding, Lapping, Polishing, & Buffing Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.24	72	29	6
		51-4034	Lathe & Turning Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.24	72	29	6
		51-4035	Milling & Planing Machine Setters, Operators, & Tenders, Metal & Plastic	0.24	72	34	8
		51-4041	Machinists	0.24	73	42	17
		51-4081	Multiple Machine Tool Setters, Operators, & Tenders, Metal & Plastic	0.24	73	34	8
		51-4191	Heat Treating Equipment Setters, Operators, & Tenders, Metal & Plastic	0.24	73	34	8
		51-4192	Layout Workers, Metal & Plastic	0.24	73	34	8
		51-4194	Tool Grinders, Filers, & Sharpeners	1.00	73	34	8
50.0402	Commercial & Advertising Art	11-2011	Advertising & Promotions Managers	0.02	9	11	81
		27-1011	Art Directors	0.08	31	27	59
		27-1013	Fine Artists, Including Painters, Sculptors, & Illustrators	0.14	31	27	59
		27-1014	Multimedia Artists & Animators	0.09	31	27	59
		27-1019	Artists & Related Workers, All Other	0.22	31	27	59
		27-1021	Commercial & Industrial Designers	0.03	23	26	67
		27-1024	Graphic Designers	0.03	23	26	67
		27-1027	Set & Exhibit Designers	0.12	23	26	67
		27-4021	Photographers	0.12	46	40	47
		41-3011	Advertising Sales Agents	0.74	28	23	63
		43-9031	Desktop Publishers	0.04	45	40	46



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
50.0605	Photography	25-1099	Postsecondary Teachers	0.00	13	13	38
		27-4021	Photographers	0.18	46	40	47
		51-9151	Photographic Process Workers & Processing Machine Operators	0.57	61	45	31
51.0601	Dental Assisting/Assistant	25-1099	Postsecondary Teachers	0.00	13	13	38
		31-9091	Dental Assistants	1.00	69	64	27
51.0801	Medical/Clinical Assistant	31-9092	Medical Assistants	0.25	66	67	31
		43-6013	Medical Secretaries	0.26	56	49	39
51.0805	Pharmacy Technician/Assistant	25-1099	Postsecondary Teachers	0.00	13	13	38
		29-2052	Pharmacy Technicians	1.00	57	60	40
		31-9095	Pharmacy Aides	1.00	68	56	25
51.0808	Veterinary/Animal Health Technology/Technician & Veterinary Assistant	25-1099	Postsecondary Teachers	0.00	13	13	38
		29-2056	Veterinary Technologists & Technicians	1.00	57	60	40
		31-9096	Veterinary Assistants & Laboratory Animal Caretakers	0.20	57	50	35
51.0904	Emergency Medical Technology/Technician (EMT Paramedic)	53-3011	Ambulance Drivers and Attendants, Except Emergency Medical Technicians	1.00	78	56	15
		29-2041	Emergency Medical Technicians and Paramedics	1.00	61	68	36
51.0909	Surgical Technology/Technologist	25-1099	Postsecondary Teachers	0.00	13	13	38
		29-2055	Surgical Technologists	1.00	57	60	40
		29-2099	Health Technologists & Technicians, All Other	1.00	51	55	41
		31-9093	Medical Equipment Preparers	1.00	72	45	18
51.1004	Clinical/Medical Laboratory Technician	25-1099	Postsecondary Teachers	0.00	13	13	38
		29-2018	Clinical Laboratory Technologists & Technicians	0.11	35	40	58



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
51.3801	Registered Nursing/Registered Nurse	11-9111	Medical & Health Services Managers	0.87	25	30	50
		25-1099	Postsecondary Teachers	0.06	13	13	38
		29-1141	Registered Nurses	0.89	5	33	88
		29-1151	Nurse Anesthetists	1.00	3	2	15
		29-1161	Nurse Midwives	0.89	1	0	6
		29-1171	Nurse Practitioners	0.89	1	0	6
51.3901	Licensed Practical/Vocational Nurse Training	29-2061	Licensed Practical & Licensed Vocational Nurses	1.00	76	76	22
		31-1011	Home Health Aides	0.30	72	55	17
		31-1014	Nursing Assistants	0.36	72	55	17
52.0101	Business/Commerce, General	11-2022	Sales Managers	0.03	21	20	65
		11-3011	Administrative Services Managers	0.22	43	40	48
		11-3051	Industrial Production Managers	0.06	38	28	48
		11-3071	Transportation, Storage, & Distribution Managers	0.21	59	40	31
		11-9021	Construction Managers	0.18	39	27	50
		11-9151	Social & Community Service Managers	0.15	19	18	55
		11-9199	Managers, All Other	0.01	32	26	50
		11-1011	Chief Executives	0.03	24	22	55
		11-1021	General & Operations Managers	0.02	42	36	47
		13-1051	Cost Estimators	0.06	44	39	50
		13-1111	Management Analysts	0.03	15	14	56
		13-1121	Meeting, Convention, & Event Planners	0.09	30	28	60
		13-1199	Business Operations Specialists, All Other	0.03	26	23	54
		15-1199	Computer Occupations, All Other	0.04	36	41	52
25-1099	Postsecondary Teachers	0.00	13	13	38		
52.0201	Business Administration & Management, General	11-2021	Marketing Managers	0.70	21	20	65



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		11-2022	Sales Managers	0.69	21	20	65
		11-3021	Computer & Information Systems Managers	0.72	20	22	60
		11-3031	Financial Managers	0.61	32	30	52
		11-3121	Human Resources Managers	0.83	33	30	50
		11-9199	Managers, All Other	0.37	32	26	50
		11-1011	Chief Executives	0.72	24	22	55
		11-1021	General & Operations Managers	0.60	42	36	47
		13-1071	Human Resources Specialists	0.86	26	25	59
		13-1111	Management Analysts	0.86	15	14	56
		13-1161	Market Research Analysts & Marketing Specialists	0.63	14	14	68
		13-1199	Business Operations Specialists, All Other	0.77	26	23	54
		13-2011	Accountants & Auditors	0.72	9	12	66
		15-1151	Computer User Support Specialists	0.79	45	47	48
		41-1011	First-Line Supervisors of Retail Sales Workers	1.00	61	45	31
		41-2031	Retail Salespersons	1.00	70	50	22
		41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	1.00	40	31	51
		43-1011	First-Line Supervisors of Office & Administrative Support Workers	0.97	50	42	41
		43-4051	Customer Service Representatives	0.98	67	47	27
		43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	0.91	56	49	39
52.0301	Accounting	11-3031	Financial Managers	0.23	32	30	52
		13-2011	Accountants & Auditors	0.28	9	12	66



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		13-2031	Budget Analysts	0.63	9	11	57
		13-2041	Credit Analysts	0.63	15	14	68
		13-2051	Financial Analysts	0.62	6	6	66
		13-2061	Financial Examiners	0.63	11	8	67
		13-2081	Tax Examiners & Collectors, & Revenue Agents	1.00	35	30	52
		13-2082	Tax Preparers	1.00	40	33	41
		25-1099	Postsecondary Teachers	0.05	13	13	38
		43-3031	Bookkeeping, Accounting, & Auditing Clerks	0.94	63	51	32
		43-3051	Payroll & Timekeeping Clerks	0.94	55	50	41
		43-4011	Brokerage Clerks	0.63	19	20	73
		43-9111	Statistical Assistants	0.71	52	43	37
52.0401	Administrative Assistant & Secretarial Science, General	43-4071	File Clerks	0.75	67	49	27
		43-4171	Receptionists & Information Clerks	0.36	71	54	24
		43-6011	Executive Secretaries & Executive Administrative Assistants	0.69	56	49	39
		43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	0.07	56	49	39
		43-9021	Data Entry Keyers	0.20	62	50	33
		43-9022	Word Processors & Typists	0.77	59	51	36
		43-9061	Office Clerks, General	0.69	66	53	28
52.0408	General Office Occupations & Clerical Services	41-2021	Counter & Rental Clerks	1.00	67	44	22
		43-1011	First-Line Supervisors of Office & Administrative Support Workers	0.02	50	42	41
		43-3021	Billing & Posting Clerks	1.00	61	51	34



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		43-3031	Bookkeeping, Accounting, & Auditing Clerks	0.06	63	51	32
		43-3051	Payroll & Timekeeping Clerks	0.06	55	50	41
		43-3061	Procurement Clerks	1.00	33	33	56
		43-4021	Correspondence Clerks	0.88	63	43	27
		43-4051	Customer Service Representatives	0.02	67	47	27
		43-4071	File Clerks	0.22	67	49	27
		43-4141	New Accounts Clerks	0.09	57	52	40
		43-4151	Order Clerks	1.00	63	43	27
		43-4171	Receptionists & Information Clerks	0.10	71	54	24
		43-5011	Cargo & Freight Agents	0.88	64	53	31
		43-5032	Dispatchers, Except Police, Fire, & Ambulance	1.00	67	52	28
		43-5061	Production, Planning, & Expediting Clerks	1.00	45	37	45
		43-5071	Shipping, Receiving, & Traffic Clerks	1.00	74	40	14
		43-5081	Stock Clerks & Order Fillers	1.00	75	41	12
		43-6011	Executive Secretaries & Executive Administrative Assistants	0.20	56	49	39
		43-6014	Secretaries & Administrative Assistants, Except Legal, Medical, & Executive	0.02	56	49	39
		43-9021	Data Entry Keyers	0.06	62	50	33
		43-9022	Word Processors & Typists	0.23	59	51	36
		43-9041	Insurance Claims & Policy Processing Clerks	1.00	55	48	40
		43-9051	Mail Clerks & Mail Machine Operators, Except Postal Service	1.00	76	50	16
		43-9061	Office Clerks, General	0.20	66	53	28



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
52.0701	Entrepreneurship/Entrepreneurial Studies	11-9199	Managers, All Other	0.00	32	26	50
		11-1011	Chief Executives	0.00	24	22	55
		11-1021	General & Operations Managers	0.00	42	36	47
		13-1131	Fundraisers	0.01	24	21	55
		13-1199	Business Operations Specialists, All Other	0.00	26	23	54
		13-2099	Financial Specialists, All Other	0.01	25	23	56
		15-1199	Computer Occupations, All Other	0.00	36	41	52
		25-1099	Postsecondary Teachers	0.00	13	13	38
52.1801	Sales, Distribution, & Marketing Operations, General	11-2022	Sales Managers	0.00	21	20	65
		13-1028	Buyers & Purchasing Agents	0.02	35	30	55
		13-1161	Market Research Analysts & Marketing Specialists	0.00	14	14	68
		41-1011	First-Line Supervisors of Retail Sales Workers	0.00	61	45	31
		41-1012	First-Line Supervisors of Non-Retail Sales Workers	1.00	46	33	43
		41-3011	Advertising Sales Agents	0.11	28	23	63
		41-3021	Insurance Sales Agents	1.00	44	39	51
		41-3031	Securities, Commodities, & Financial Services Sales Agents	0.00	25	22	61
		41-4011	Sales Representatives, Wholesale & Manufacturing, Technical & Scientific Products	1.00	40	31	51
		41-4012	Sales Representatives, Wholesale & Manufacturing, Except Technical & Scientific Products	0.00	40	31	51
41-9022	Real Estate Sales Agents	0.00	40	36	52		



CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	CIP BASED WEIGHT	% WORKFORCE WITH EDUCATION LEVEL AND ONE LEVEL BELOW		
					CERT	ASSOC	BACH
		41-9031	Sales Engineers	1.00	10	17	76
		41-9041	Telemarketers	1.00	76	50	17
		41-9091	Door-to-Door Sales Workers, News & Street Vendors, & Related Workers	1.00	63	39	20
		53-3031	Driver/Sales Workers	1.00	74	38	11
51.1199	Health/Medical Preparatory Programs, Other	29-1141	Registered Nurses	0.00	5	33	88
		31-9092	Medical Assistants	0.00	66	67	31
		29-1071	Physician Assistants	1.00	6	13	29

Source: Emsi program demand gap model.



Appendix 5: Program Demand Gap Analysis

Methodology

This appendix focuses on describing and understanding the methodology used in the program demand gap analysis. This requires data on both occupation demand (e.g., annual job openings) and education supply (e.g., number of postsecondary degree completions). These are then compared through an education “gap” analysis to determine whether an education program is potentially producing a surplus or shortage of workforce talent relative to the number of job openings. In this way, it is possible to see how the institution’s current programs are satisfying the region’s workforce needs.

SUPPLY AND DEMAND MODEL

Emsi builds a model using demand-side data (average annual openings) and supply-side data (postsecondary education output) to compare workforce demand with education supply. The purpose of this analysis is to find the difference or “gap” between the average annual openings for an occupation and the number of people completing postsecondary degrees for that occupation, whether at TCTC or at another educational institution within the region. This makes it possible to identify whether there may be talent shortages or surpluses within the TCTC Service Region.

The first step involves mapping the linkage between annual openings for a SOC code and the number of completions for an education program CIP code. The BLS provides information on the occupations that completers of specific CIP codes are more likely to enter. Specific connections have been refined through previous engagements with educational institutions and state departments of labor. Some programs have direct occupational ties. For example, a physical therapist assistant is a specific occupation that requires specialized postsecondary training. In this case, one CIP code (physical therapy technician/assistant) maps to only one SOC code (physical therapist assistants). This provides an easy comparison of annual openings for physical therapist assistants to the number of people completing the relevant program to see whether a talent shortage or surplus exists. Unfortunately, this is not always the case. More often than not an educational program maps to multiple occupations and an occupation maps to multiple educational programs. For this reason, Emsi has pioneered a method



of de-duplicating job openings, such that the potential sources of demand are not double-represented for any occupation. The details of this process are outlined in this chapter, under “De-duplication of Annual Openings.”

OCCUPATION DEMAND

Educational Level Adjustments

To capture occupation demand, Emsi uses a proprietary employment dataset that reflects total employment. Emsi uses the QCEW data source, which measures employment covered by unemployment insurance (UI). According to the BLS, “employment covered by these UI programs represents about 97% of all wage and salary civilian employment in the country.” Through a proprietary process, Emsi removes BLS local area employment suppressions to yield the best employment data available at local levels. The analysis uses Emsi’s Employees & Self-Employed 2018.4 datarun. In this datarun, Emsi calculates the number of regional annual job openings for the occupations that require different levels of education for entry level positions.¹⁰ The BLS also provides educational attainment data of current workers for each SOC code, broken out by their highest level of education attained. The data is presented as the percentage of workers in the SOC code with educational attainment ranging from less than a high school degree to a doctoral degree. Using these data, Emsi adjusts the annual opening estimates for each SOC code to only incorporate the percentage of workers that correspond with TCTC’s program offerings.

For example, as shown in Table A5.1, there are three occupations trained for by Corrections (CIP code 43.0102). Within that cluster are an assortment of career fields, including correctional officers and jailers, first-line supervisors of police and detectives, and first-line supervisors of correctional officers. Among correctional officers, the majority of job openings (75%) are available to somebody with “some college” or a certificate. Alternatively, for first-line supervisors of police & detectives, only 46% of job openings are accessible to a person without a college degree. The weighted average of job openings is calculated for each program at each program/degree level where TCTC has produced completers over the past three years. Not taking into account the

10 See Appendix 1 for a description of the sources and processes of Emsi data.



educational attainment dynamics in this way would bias the result by over-counting potential job opportunities for completers.¹¹

TABLE A5.1: EDUCATIONAL LEVEL ADJUSTMENTS

CIP CODE	CIP TITLE	SOC CODE	SOC TITLE	SOME COLLEGE, CERT, AND ONE LEVEL BELOW	ASSOC AND ONE LEVEL BELOW
43.0102	Corrections	33-3012	Correctional Officers & Jailers	75%	88%
		33-1012	First-Line Supervisors of Police & Detectives	46%	62%
		33-1011	First-Line Supervisors of Correctional Officers	61%	75%
Weighted average				68%	85%

De-duplication of Annual Openings

Most educational programs are designed to train people for multiple occupational types, many of which are simultaneously linked with other educational programs. This presents a complexity when comparing supply and demand for any particular educational program. For instance, the Computer Systems Networking & Telecommunications program is mapped to three different occupations: computer support specialists, information security analysts, and computer systems analysts. If we focus on just one of the occupations for this list—computer support specialists—it is also mapped to 10 different educational programs, spanning program titles such as Computer Systems Analysis and Medical Office Computer Specialist.

To ensure that no double-counting occurs, it is necessary to either realign the program groupings to eliminate the mapping of occupations to multiple programs or to determine what proportion of demand should be compared with supply numbers from each program. Emsi takes the second approach in this analysis, which has the advantage of maintaining the program titles and descriptions in roughly the same format that completer data were originally delivered to Emsi. Emsi uses a formula that favors program types with the largest number of completers, attributing a greater proportion of demand to these than the programs which produce a smaller number of completers. This method utilizes the assumption that the higher output educational

11 Given the changing dynamics and need for more education in the existing workforce (i.e., skills-biased technology change in many occupations and industry sectors), this assumption is considered conservative.



programs are likely feeding a higher degree of demand within the TCTC Service Region.¹² Appendix 4 contains the detailed mapping of each CIP code to all relevant occupations.

Emsi uses a methodology that allocates jobs on a proportional basis according to the number of program completers. For example, in a region where a unique program such as Commercial & Advertising Art is more prevalent than Graphic Design, it is assumed that the graduates of the Commercial & Advertising Art program will be offered a proportional, therefore a larger number of local openings than students from the Graphic Design program.

Emsi also provides an alternative program demand gap analysis, which does not de-duplicate the number of annual openings based on the size of each educational program. Rather the total number of annual openings available for students at each educational level for each program is provided without further modification. Due to this modification, these numbers have not been de-duplicated, unlike the annual openings figures shown in Chapter 3. This leads to double counting the job openings and overstates the true number of jobs available to all students. While these figures have not been provided in this analysis, they are available upon request from Emsi.

EDUCATION OUTPUT

There are several educational institutions in the TCTC Service Region, some of which have programs similar to those offered at TCTC. Hence, completers at TCTC will be competing for some jobs with completers from other regional institutions. Emsi determined education output by CIP codes and identified the number of completers for every award level within those CIP codes. To find the output for all public and private educational institutions in the TCTC Service Region, Emsi uses data from the

12 Note this adjustment is performed on a program-by-program basis without consideration of individual colleges or training providers. Therefore, a single program offered at one large institution has no advantage over a group of similar programs offered at several smaller educational providers given that the aggregate output of the smaller schools is near the output of the single larger school.



Integrated Postsecondary Educational System (IPEDS).¹³ These data are publicly available through the National Center for Educational Statistics. Completions data are averaged for a three-year period, 2015 through 2017, to smooth out any bumps in enrollment that may be unique to a particular academic year. Data gathered for TCTC from IPEDS were reviewed for accuracy by TCTC.

Tables A5.2 and A5.3 display the completion breakdown by institution in the TCTC Service Region at the certificate and associate degree levels, respectively. TCTC is one of three institutions in the region. Using a three-year average, TCTC grants 416 certificates and 503 associate degrees every year, which is 72% and 85% of the totals, respectively.

TABLE A5.2: SUMMARY OF CERTIFICATE LEVEL REGIONAL COMPLETIONS BY INSTITUTION

INSTITUTION	3-YEAR AVERAGE	% TOTAL
Tri-County Technical College	416	72%
Clemson University	143	25%
Forrest College	17	3%
Total	576	100%

Source: IPEDS.

TABLE A5.3: SUMMARY OF ASSOCIATE DEGREE REGIONAL COMPLETIONS BY INSTITUTION

INSTITUTION	3-YEAR AVERAGE	% TOTAL
Tri-County Technical College	503	85%
Southern Wesleyan University	55	9%
Forrest College	34	6%
Total	593	100%

Source: IPEDS.

13 These data come with inherent weaknesses. Primarily, numbers are only available for institutions that participate in or are applicants for any federal financial assistance program authorized by the Higher Education Act (HEA). Also, IPEDS does not collect data on non-credit courses and programs. Nevertheless, this system is the best source for collecting information on a broad range of educational institutions.



Appendix 6: Detailed Employment Projections

TABLE A6.1: DETAILED EMPLOYMENT PROJECTIONS BY OCCUPATION, 2018 AND 2028

SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Chief Executives	173	177	4	2%	14	\$53.16
General and Operations Managers	1,905	2,108	202	11%	199	\$35.62
Legislators	46	51	6	13%	4	\$8.61
Advertising and Promotions Managers	12	13	1	11%	2	\$37.66
Marketing Managers	98	114	16	16%	11	\$42.48
Sales Managers	188	218	30	16%	22	\$48.59
Public Relations and Fundraising Managers	55	62	7	14%	6	\$39.19
Administrative Services Managers	171	193	23	13%	18	\$38.15
Computer and Information Systems Managers	118	142	24	21%	13	\$48.84
Financial Managers	245	289	44	18%	26	\$47.61
Industrial Production Managers	256	287	31	12%	24	\$49.01
Purchasing Managers	46	53	7	15%	5	\$46.21
Transportation, Storage, and Distribution Managers	70	79	9	12%	7	\$41.99
Compensation and Benefits Managers	5	6	1	14%	1	\$40.96
Human Resources Managers	143	159	15	11%	15	\$39.99
Training and Development Managers	37	41	4	11%	4	\$46.78
Farmers, Ranchers, and Other Agricultural Managers	78	88	10	12%	8	\$10.23
Construction Managers	314	258	(56)	(18%)	21	\$23.12
Education Administrators, Preschool and Childcare Center/Program	61	67	6	10%	6	\$12.27
Education Administrators, Elementary and Secondary School	292	306	14	5%	26	\$40.43
Education Administrators, Postsecondary	263	286	24	9%	25	\$38.08
Education Administrators, All Other	14	17	3	22%	2	\$26.14



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Architectural and Engineering Managers	171	211	40	23%	19	\$56.66
Food Service Managers	198	203	5	2%	24	\$16.84
Funeral Service Managers	16	16	0	0%	1	\$28.89
Gaming Managers	0	0	0	46%	0	\$34.62
Lodging Managers	21	27	6	27%	3	\$14.03
Medical and Health Services Managers	261	294	34	13%	27	\$35.04
Natural Sciences Managers	13	16	4	30%	2	\$52.47
Postmasters and Mail Superintendents	11	11	(0)	(4%)	1	\$32.90
Property, Real Estate, and Community Association Managers	160	172	12	7%	15	\$19.69
Social and Community Service Managers	60	82	22	37%	9	\$25.45
Emergency Management Directors	25	26	1	4%	2	\$28.69
Managers, All Other	478	509	31	7%	41	\$16.35
Agents and Business Managers of Artists, Performers, and Athletes	8	9	2	25%	1	\$17.06
Buyers and Purchasing Agents	209	229	20	9%	25	\$24.78
Claims Adjusters, Examiners, and Investigators	62	54	(8)	(12%)	5	\$23.88
Insurance Appraisers, Auto Damage	2	2	(0)	(9%)	0	\$15.33
Compliance Officers	129	149	20	15%	14	\$22.28
Cost Estimators	184	187	2	1%	20	\$25.95
Human Resources Specialists	369	409	40	11%	45	\$21.50
Farm Labor Contractors	0	1	0	33%	0	\$18.09
Labor Relations Specialists	16	19	3	19%	2	\$26.36
Logisticians	143	161	18	13%	18	\$29.84
Management Analysts	398	453	55	14%	45	\$29.39
Meeting, Convention, and Event Planners	86	100	14	17%	13	\$15.20
Fundraisers	95	117	23	24%	14	\$23.73
Compensation, Benefits, and Job Analysis Specialists	36	41	4	11%	4	\$23.97
Training and Development Specialists	179	200	21	12%	22	\$21.21



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Market Research Analysts and Marketing Specialists	308	384	76	25%	44	\$24.70
Business Operations Specialists, All Other	211	270	59	28%	30	\$23.12
Accountants and Auditors	779	876	96	12%	90	\$26.54
Appraisers and Assessors of Real Estate	68	71	3	4%	5	\$20.18
Budget Analysts	18	23	4	22%	2	\$27.85
Credit Analysts	45	42	(2)	(6%)	4	\$25.56
Financial Analysts	96	106	10	11%	10	\$31.28
Personal Financial Advisors	67	64	(3)	(4%)	6	\$32.87
Insurance Underwriters	17	15	(2)	(12%)	1	\$22.36
Financial Examiners	9	10	1	8%	1	\$30.25
Credit Counselors	32	36	3	10%	3	\$20.94
Loan Officers	174	174	(0)	(0%)	17	\$22.40
Tax Examiners and Collectors, and Revenue Agents	14	17	3	19%	1	\$33.60
Tax Preparers	88	95	7	9%	12	\$14.73
Financial Specialists, All Other	51	56	5	10%	5	\$28.18
Computer and Information Research Scientists	4	5	1	35%	0	\$50.60
Computer Systems Analysts	214	243	28	13%	19	\$35.62
Information Security Analysts	43	52	9	20%	4	\$33.46
Computer Programmers	111	114	3	3%	8	\$31.49
Software Developers, Applications	232	306	74	32%	26	\$35.76
Software Developers, Systems Software	100	135	35	35%	12	\$37.76
Web Developers	63	76	13	21%	7	\$24.29
Database Administrators	45	53	7	16%	4	\$31.39
Network and Computer Systems Administrators	257	278	21	8%	20	\$29.67
Computer Network Architects	43	48	5	13%	4	\$34.19
Computer User Support Specialists	414	481	66	16%	42	\$21.54
Computer Network Support Specialists	224	247	23	10%	21	\$22.22



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Computer Occupations, All Other	56	70	14	25%	6	\$28.82
Actuaries	2	3	0	14%	0	\$29.93
Mathematicians	1	2	0	37%	0	\$15.40
Operations Research Analysts	23	30	8	33%	2	\$29.37
Statisticians	7	10	3	42%	1	\$28.52
Miscellaneous Mathematical Science Occupations	0	1	0	25%	0	\$33.12
Architects, Except Landscape and Naval	61	62	1	2%	5	\$27.26
Landscape Architects	20	21	1	6%	2	\$21.46
Cartographers and Photogrammetrists	12	14	2	20%	1	\$21.84
Surveyors	22	29	7	30%	3	\$20.30
Aerospace Engineers	13	23	10	77%	2	\$45.25
Agricultural Engineers	5	4	(0)	(10%)	0	\$29.82
Biomedical Engineers	7	9	2	29%	1	\$32.03
Chemical Engineers	45	55	9	20%	4	\$34.96
Civil Engineers	332	462	130	39%	45	\$34.62
Computer Hardware Engineers	15	20	5	32%	2	\$39.56
Electrical Engineers	269	336	67	25%	28	\$38.16
Electronics Engineers, Except Computer	63	76	13	20%	6	\$36.58
Environmental Engineers	25	34	9	34%	3	\$32.17
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	52	55	3	6%	4	\$34.37
Industrial Engineers	542	659	117	22%	55	\$36.65
Marine Engineers and Naval Architects	5	7	2	29%	1	\$37.41
Materials Engineers	24	28	4	18%	2	\$35.76
Mechanical Engineers	619	758	139	22%	62	\$40.12
Mining and Geological Engineers, Including Mining Safety Engineers	1	1	1	66%	0	\$35.23
Nuclear Engineers	350	316	(33)	(10%)	28	\$51.18
Petroleum Engineers	5	6	1	31%	1	\$58.96



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Engineers, All Other	57	71	14	24%	6	\$37.81
Architectural and Civil Drafters	41	54	13	31%	6	\$22.30
Electrical and Electronics Drafters	19	24	5	29%	3	\$26.39
Mechanical Drafters	102	118	15	15%	12	\$29.83
Drafters, All Other	9	11	2	20%	1	\$20.21
Aerospace Engineering and Operations Technicians	7	10	3	42%	1	\$32.30
Civil Engineering Technicians	46	64	19	41%	7	\$17.83
Electrical and Electronics Engineering Technicians	103	125	22	21%	13	\$24.33
Electro-Mechanical Technicians	10	12	2	23%	1	\$22.89
Environmental Engineering Technicians	10	13	3	36%	1	\$17.75
Industrial Engineering Technicians	120	141	21	17%	15	\$24.66
Mechanical Engineering Technicians	96	114	18	19%	12	\$24.72
Engineering Technicians, Except Drafters, All Other	50	62	12	24%	7	\$28.09
Surveying and Mapping Technicians	55	66	11	20%	8	\$14.17
Animal Scientists	1	2	0	38%	0	\$26.38
Food Scientists and Technologists	4	5	2	41%	1	\$28.25
Soil and Plant Scientists	4	5	1	20%	1	\$28.29
Biochemists and Biophysicists	6	8	2	33%	1	\$34.92
Microbiologists	4	5	1	31%	1	\$24.52
Zoologists and Wildlife Biologists	5	6	1	23%	1	\$26.40
Biological Scientists, All Other	5	7	2	36%	1	\$33.06
Conservation Scientists	5	7	1	24%	1	\$24.36
Foresters	6	6	1	10%	1	\$25.57
Epidemiologists	2	2	0	25%	0	\$32.14
Medical Scientists, Except Epidemiologists	28	36	8	28%	4	\$31.63
Life Scientists, All Other	1	2	1	49%	0	\$31.54
Astronomers	2	3	0	15%	0	\$71.60
Physicists	8	9	1	12%	1	\$51.96



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Atmospheric and Space Scientists	6	7	1	17%	1	\$41.59
Chemists	59	69	10	17%	7	\$28.95
Materials Scientists	5	6	1	16%	1	\$35.08
Environmental Scientists and Specialists, Including Health	18	24	6	35%	3	\$23.39
Geoscientists, Except Hydrologists and Geographers	7	10	3	36%	1	\$38.78
Electro-Mechanical Technicians	1	12	0	23%	0	\$22.89
Physical Scientists, All Other	10	10	1	10%	1	\$37.83
Economists	4	5	1	28%	0	\$32.82
Survey Researchers	3	5	2	56%	1	\$25.11
Clinical, Counseling, and School Psychologists	125	138	12	10%	10	\$29.30
Industrial-Organizational Psychologists	0	0	0	2%	0	\$46.30
Psychologists, All Other	5	6	1	25%	0	\$41.32
Sociologists	1	1	0	33%	0	\$37.40
Urban and Regional Planners	24	28	5	19%	3	\$24.37
Anthropologists and Archeologists	1	2	0	29%	0	\$25.77
Geographers	0	1	0	29%	0	\$40.24
Historians	1	1	0	24%	0	\$29.50
Political Scientists	1	1	0	27%	0	\$45.86
Social Scientists and Related Workers, All Other	7	9	2	24%	1	\$32.99
Agricultural and Food Science Technicians	7	9	2	33%	1	\$18.34
Biological Technicians	18	22	5	28%	3	\$19.52
Chemical Technicians	88	97	9	11%	10	\$19.58
Geological and Petroleum Technicians	2	3	1	45%	0	\$19.33
Nuclear Technicians	212	187	(26)	(12%)	25	\$36.30
Social Science Research Assistants	9	12	3	33%	2	\$18.35
Environmental Science and Protection Technicians, Including Health	14	17	3	24%	2	\$20.33
Forensic Science Technicians	12	15	3	23%	2	\$21.21



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Forest and Conservation Technicians	3	4	1	30%	0	\$16.80
Life, Physical, and Social Science Technicians, All Other	23	29	6	26%	4	\$23.30
Educational, Guidance, School, and Vocational Counselors	285	321	36	12%	38	\$25.45
Marriage and Family Therapists	13	18	5	40%	2	\$19.61
Rehabilitation Counselors	24	29	5	21%	4	\$11.84
Substance Abuse, Behavioral Disorder, and Mental Health Counselors	112	140	28	25%	17	\$17.56
Counselors, All Other	12	15	3	25%	2	\$15.76
Child, Family, and School Social Workers	108	146	39	36%	18	\$17.88
Healthcare Social Workers	101	121	19	19%	14	\$25.41
Mental Health and Substance Abuse Social Workers	24	33	8	34%	4	\$19.05
Social Workers, All Other	134	147	13	9%	17	\$19.30
Health Educators	51	58	8	15%	8	\$25.20
Probation Officers and Correctional Treatment Specialists	25	32	7	29%	3	\$21.70
Social and Human Service Assistants	316	386	70	22%	53	\$12.02
Community Health Workers	18	23	5	30%	3	\$17.26
Community and Social Service Specialists, All Other	33	42	9	29%	6	\$18.10
Clergy	514	628	114	22%	79	\$22.35
Directors, Religious Activities and Education	266	304	38	14%	41	\$23.58
Religious Workers, All Other	115	137	22	19%	21	\$11.84
Lawyers	252	254	2	1%	13	\$33.85
Judicial Law Clerks	7	9	2	22%	1	\$12.01
Administrative Law Judges, Adjudicators, and Hearing Officers	3	4	1	22%	0	\$36.59
Arbitrators, Mediators, and Conciliators	4	5	1	18%	0	\$20.35
Judges, Magistrate Judges, and Magistrates	27	31	5	17%	2	\$27.26
Paralegals and Legal Assistants	138	144	6	5%	17	\$17.39
Court Reporters	15	15	0	3%	2	\$19.13



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Title Examiners, Abstractors, and Searchers	14	14	(0)	(2%)	1	\$17.43
Legal Support Workers, All Other	10	12	2	16%	1	\$23.05
Postsecondary Teachers, General	2,499	2,853	354	14%	258	\$33.61
Preschool Teachers, Except Special Education	443	496	52	12%	56	\$8.68
Kindergarten Teachers, Except Special Education	188	197	9	5%	21	\$25.22
Elementary School Teachers, Except Special Education	1,849	1,927	77	4%	156	\$23.33
Middle School Teachers, Except Special and Career/Technical Education	563	589	25	4%	48	\$25.41
Career/Technical Education Teachers, Middle School	15	16	1	4%	1	\$23.80
Secondary School Teachers, Except Special and Career/Technical Education	1,315	1,370	56	4%	108	\$26.12
Career/Technical Education Teachers, Secondary School	90	94	5	5%	7	\$23.66
Special Education Teachers, Preschool	10	12	1	15%	1	\$22.60
Special Education Teachers, Kindergarten and Elementary School	124	131	8	6%	11	\$25.90
Special Education Teachers, Middle School	99	102	3	3%	8	\$26.26
Special Education Teachers, Secondary School	138	145	7	5%	12	\$27.23
Special Education Teachers, All Other	7	9	2	23%	1	\$28.77
Adult Basic and Secondary Education and Literacy Teachers and Instructors	61	60	(1)	(2%)	7	\$20.86
Self-Enrichment Education Teachers	316	354	38	12%	44	\$16.20
Teachers and Instructors, All Other	158	185	28	18%	23	\$16.06
Substitute Teachers	657	675	17	3%	82	\$11.27
Archivists	3	3	0	17%	0	\$18.61
Curators	4	6	2	38%	1	\$21.30
Museum Technicians and Conservators	2	3	1	62%	0	\$16.91
Librarians	137	148	11	8%	16	\$26.46
Library Technicians	183	203	20	11%	30	\$13.90



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Audio-Visual and Multimedia Collections Specialists	5	5	1	13%	1	\$23.52
Farm and Home Management Advisors	9	12	2	22%	1	\$22.75
Instructional Coordinators	103	114	11	11%	12	\$32.50
Teacher Assistants	1,041	1,122	81	8%	129	\$10.05
Education, Training, and Library Workers, All Other	20	26	6	31%	3	\$19.08
Art Directors	30	36	6	19%	3	\$15.35
Craft Artists	19	21	2	9%	2	\$5.01
Fine Artists, Including Painters, Sculptors, and Illustrators	32	36	4	12%	3	\$6.78
Multimedia Artists and Animators	19	21	2	12%	2	\$10.38
Artists and Related Workers, All Other	5	5	(0)	(2%)	0	\$10.73
Commercial and Industrial Designers	114	119	4	4%	12	\$34.32
Fashion Designers	6	7	1	20%	1	\$24.45
Floral Designers	59	56	(3)	(6%)	6	\$9.87
Graphic Designers	146	165	19	13%	18	\$17.72
Interior Designers	33	34	1	2%	4	\$18.52
Merchandise Displayers and Window Trimmers	55	62	7	12%	7	\$12.25
Set and Exhibit Designers	3	4	1	28%	0	\$18.86
Designers, All Other	5	5	0	2%	1	\$20.17
Actors	16	19	3	19%	2	\$11.44
Producers and Directors	29	34	6	20%	4	\$19.27
Athletes and Sports Competitors	9	11	1	15%	2	\$23.55
Coaches and Scouts	229	255	26	11%	38	\$19.99
Umpires, Referees, and Other Sports Officials	7	8	2	25%	1	\$11.55
Dancers	4	4	(0)	(1%)	1	\$12.08
Choreographers	1	1	0	17%	0	\$18.43
Music Directors and Composers	91	105	15	16%	12	\$18.30
Musicians and Singers	233	266	33	14%	29	\$14.03



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Entertainers and Performers, Sports and Related Workers, All Other	20	22	2	12%	3	\$16.13
Radio and Television Announcers	13	14	1	8%	2	\$13.77
Public Address System and Other Announcers	9	10	1	10%	1	\$12.64
Broadcast News Analysts	4	4	0	10%	1	\$20.98
Reporters and Correspondents	27	19	(8)	(29%)	2	\$13.90
Public Relations Specialists	154	174	20	13%	20	\$19.12
Editors	47	50	3	6%	6	\$15.55
Technical Writers	26	30	5	18%	3	\$25.07
Writers and Authors	79	91	11	14%	9	\$12.36
Interpreters and Translators	66	81	14	21%	9	\$17.82
Media and Communication Workers, All Other	15	17	3	20%	2	\$19.16
Audio and Video Equipment Technicians	55	67	12	22%	7	\$17.77
Broadcast Technicians	12	13	1	11%	1	\$14.10
Radio Operators	0	0	0	34%	0	\$11.95
Sound Engineering Technicians	8	9	1	9%	1	\$25.44
Photographers	56	51	(5)	(9%)	5	\$12.28
Camera Operators, Television, Video, and Motion Picture	8	10	2	24%	1	\$19.71
Film and Video Editors	8	10	3	33%	1	\$22.14
Media and Communication Equipment Workers, All Other	11	12	1	14%	1	\$36.53
Chiropractors	31	27	(3)	(11%)	1	\$24.99
Dentists, General	121	128	7	5%	5	\$97.63
Oral and Maxillofacial Surgeons	4	4	0	2%	0	\$126.49
Orthodontists	5	6	0	2%	0	\$109.10
Prosthodontists	2	2	0	17%	0	\$89.16
Dentists, All Other Specialists	3	4	0	8%	0	\$85.98
Dietitians and Nutritionists	69	72	3	4%	5	\$24.85
Optometrists	36	38	2	6%	2	\$60.29
Pharmacists	332	285	(47)	(14%)	14	\$59.44



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Anesthesiologists	27	27	0	2%	1	\$90.41
Family and General Practitioners	176	181	5	3%	6	\$100.77
Internists, General	31	32	1	3%	1	\$93.61
Obstetricians and Gynecologists	11	12	1	6%	0	\$95.58
Pediatricians, General	15	16	1	7%	1	\$73.11
Psychiatrists	19	17	(2)	(11%)	1	\$101.51
Surgeons	51	51	1	1%	2	\$91.36
Physicians and Surgeons, All Other	133	153	20	15%	6	\$90.98
Physician Assistants	59	73	14	25%	5	\$45.55
Podiatrists	4	5	0	9%	0	\$58.68
Occupational Therapists	107	119	12	11%	7	\$32.86
Physical Therapists	219	241	22	10%	13	\$38.26
Radiation Therapists	20	20	1	3%	1	\$40.24
Recreational Therapists	22	17	(5)	(22%)	1	\$19.12
Respiratory Therapists	125	144	19	16%	9	\$23.99
Speech-Language Pathologists	91	100	9	10%	6	\$37.82
Exercise Physiologists	9	10	1	12%	1	\$23.13
Therapists, All Other	14	17	3	23%	1	\$24.57
Veterinarians	66	82	16	24%	5	\$39.93
Registered Nurses	3,094	3,324	231	7%	202	\$26.93
Nurse Anesthetists	51	52	2	3%	3	\$83.50
Nurse Midwives	3	4	0	11%	0	\$44.06
Nurse Practitioners	116	141	25	22%	9	\$41.97
Audiologists	8	9	1	14%	1	\$28.44
Health Diagnosing and Treating Practitioners, All Other	16	19	3	20%	1	\$29.30
Clinical Laboratory Technologists and Technicians	377	421	44	12%	31	\$27.40
Dental Hygienists	157	183	25	16%	14	\$28.73
Cardiovascular Technologists and Technicians	57	60	3	5%	4	\$25.91
Diagnostic Medical Sonographers	40	47	7	19%	3	\$31.74



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Nuclear Medicine Technologists	18	19	1	4%	1	\$32.68
Radiologic Technologists	194	207	13	7%	13	\$23.99
Magnetic Resonance Imaging Technologists	41	45	4	10%	3	\$28.91
Emergency Medical Technicians and Paramedics	546	592	46	8%	42	\$13.72
Dietetic Technicians	21	23	2	9%	2	\$12.78
Pharmacy Technicians	514	444	(70)	(14%)	41	\$13.86
Psychiatric Technicians	109	57	(52)	(48%)	7	\$12.33
Respiratory Therapy Technicians	17	10	(7)	(44%)	1	\$23.16
Surgical Technologists	112	118	6	5%	10	\$17.63
Veterinary Technologists and Technicians	108	136	27	25%	13	\$15.87
Ophthalmic Medical Technicians	38	40	2	6%	4	\$16.59
Licensed Practical and Licensed Vocational Nurses	630	688	58	9%	57	\$18.47
Medical Records and Health Information Technicians	135	148	13	10%	11	\$16.61
Opticians, Dispensing	80	91	11	14%	8	\$20.24
Orthotists and Prosthetists	8	9	1	11%	1	\$30.87
Hearing Aid Specialists	6	8	2	27%	1	\$25.45
Health Technologists and Technicians, All Other	27	35	9	32%	3	\$18.79
Occupational Health and Safety Specialists	58	63	5	9%	4	\$23.44
Occupational Health and Safety Technicians	27	29	2	9%	2	\$29.69
Athletic Trainers	26	30	4	15%	2	\$21.81
Genetic Counselors	4	5	1	14%	0	\$37.67
Healthcare Practitioners and Technical Workers, All Other	10	13	3	25%	1	\$25.76
Home Health Aides	469	703	234	50%	97	\$8.98
Psychiatric Aides	100	85	(15)	(15%)	11	\$11.08
Nursing Assistants	1,267	1,401	134	11%	177	\$11.18
Orderlies	268	276	8	3%	34	\$10.45
Occupational Therapy Assistants	30	31	1	4%	4	\$29.72



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Occupational Therapy Aides	6	7	1	8%	1	\$11.26
Physical Therapist Assistants	118	124	7	6%	17	\$25.59
Physical Therapist Aides	30	33	3	10%	4	\$9.82
Massage Therapists	83	97	15	18%	12	\$13.00
Dental Assistants	308	351	43	14%	44	\$16.95
Medical Assistants	464	525	61	13%	63	\$13.39
Medical Equipment Preparers	31	34	3	10%	5	\$13.87
Medical Transcriptionists	22	24	1	7%	3	\$14.77
Pharmacy Aides	30	22	(8)	(27%)	4	\$10.06
Veterinary Assistants and Laboratory Animal Caretakers	150	181	31	21%	31	\$10.34
Phlebotomists	77	103	25	33%	13	\$12.45
Healthcare Support Workers, All Other	35	43	8	23%	6	\$18.54
First-Line Supervisors of Correctional Officers	42	45	3	8%	3	\$21.25
First-Line Supervisors of Police and Detectives	119	131	12	10%	9	\$25.66
First-Line Supervisors of Fire Fighting and Prevention Workers	78	84	5	7%	6	\$24.37
First-Line Supervisors of Protective Service Workers, All Other	25	30	6	23%	4	\$25.40
Firefighters	300	325	26	9%	25	\$15.31
Fire Inspectors and Investigators	40	41	2	4%	5	\$17.93
Forest Fire Inspectors and Prevention Specialists	1	1	0	36%	0	\$17.35
Bailiffs	15	16	1	8%	1	\$10.56
Correctional Officers and Jailers	205	235	30	15%	23	\$16.79
Detectives and Criminal Investigators	53	60	7	13%	5	\$23.62
Fish and Game Wardens	1	1	0	35%	0	\$19.73
Parking Enforcement Workers	9	7	(1)	(17%)	1	\$14.98
Police and Sheriff's Patrol Officers	733	812	79	11%	62	\$17.87
Transit and Railroad Police	3	4	0	12%	0	\$39.14
Animal Control Workers	10	11	1	12%	1	\$14.00



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Private Detectives and Investigators	15	15	(0)	(1%)	2	\$22.84
Gaming Surveillance Officers and Gaming Investigators	5	5	1	12%	1	\$19.83
Security Guards	473	600	126	27%	91	\$11.73
Crossing Guards	16	21	4	26%	4	\$10.17
Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	76	89	12	16%	24	\$8.74
Transportation Security Screeners	11	11	1	6%	1	\$17.59
Protective Service Workers, All Other	47	55	8	16%	15	\$17.43
Chefs and Head Cooks	381	388	7	2%	54	\$16.67
First-Line Supervisors of Food Preparation and Serving Workers	1,245	1,311	66	5%	205	\$12.35
Cooks, Fast Food	916	860	(56)	(6%)	137	\$8.75
Cooks, Institution and Cafeteria	617	609	(9)	(1%)	97	\$10.23
Cooks, Private Household	6	7	1	14%	1	\$15.68
Cooks, Restaurant	1,269	1,411	142	11%	221	\$8.56
Cooks, Short Order	82	84	2	2%	13	\$8.30
Cooks, All Other	10	14	4	35%	2	\$8.56
Food Preparation Workers	972	1,030	58	6%	191	\$9.15
Bartenders	346	357	12	3%	65	\$8.48
Combined Food Preparation and Serving Workers, Including Fast Food	4,670	5,146	476	10%	1,033	\$8.50
Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	173	190	17	10%	45	\$8.67
Waiters and Waitresses	2,278	2,450	172	8%	508	\$8.37
Food Servers, Nonrestaurant	249	262	13	5%	43	\$9.30
Dining Room and Cafeteria Attendants and Bartender Helpers	163	193	30	18%	36	\$8.51
Dishwashers	224	247	23	10%	43	\$8.61
Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	314	344	30	10%	85	\$8.33
Food Preparation and Serving Related Workers, All Other	21	25	4	21%	5	\$10.03



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
First-Line Supervisors of Housekeeping and Janitorial Workers	209	233	25	12%	30	\$13.81
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	183	184	1	0%	20	\$13.48
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	2,379	2,632	253	11%	381	\$10.43
Maids and Housekeeping Cleaners	1,336	1,582	247	18%	236	\$8.46
Building Cleaning Workers, All Other	16	17	1	6%	3	\$12.22
Pest Control Workers	117	113	(4)	(4%)	17	\$12.43
Landscaping and Groundskeeping Workers	1,510	1,595	85	6%	212	\$10.19
Pesticide Handlers, Sprayers, and Applicators, Vegetation	23	23	(0)	(1%)	3	\$12.38
Tree Trimmers and Pruners	94	101	7	8%	14	\$12.93
Grounds Maintenance Workers, All Other	10	12	2	16%	2	\$12.22
First-Line Supervisors of Gaming Workers	2	2	1	42%	0	\$10.93
First-Line Supervisors of Personal Service Workers	138	157	19	14%	18	\$12.40
Animal Trainers	23	26	3	11%	3	\$11.06
Nonfarm Animal Caretakers	277	353	76	28%	60	\$10.42
Gaming Dealers	10	12	2	20%	2	\$8.36
Gaming and Sports Book Writers and Runners	5	6	1	12%	1	\$8.66
Gaming Service Workers, All Other	1	1	0	32%	0	\$9.69
Motion Picture Projectionists	3	3	(0)	(0%)	0	\$9.09
Ushers, Lobby Attendants, and Ticket Takers	98	113	15	16%	30	\$8.03
Amusement and Recreation Attendants	422	470	48	11%	116	\$8.80
Costume Attendants	3	3	1	30%	1	\$17.52
Locker Room, Coatroom, and Dressing Room Attendants	7	9	2	23%	2	\$8.92
Entertainment Attendants and Related Workers, All Other	3	4	0	10%	1	\$10.56
Embalmers	16	14	(2)	(10%)	2	\$18.16
Funeral Attendants	114	106	(9)	(7%)	18	\$10.12



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Morticians, Undertakers, and Funeral Directors	29	27	(1)	(4%)	4	\$18.65
Barbers	82	93	11	13%	10	\$10.94
Hairdressers, Hairstylists, and Cosmetologists	842	949	107	13%	127	\$11.61
Makeup Artists, Theatrical and Performance	1	2	0	18%	0	\$27.16
Manicurists and Pedicurists	47	58	11	23%	8	\$9.15
Shampooers	9	9	0	1%	1	\$7.98
Skincare Specialists	49	58	10	20%	8	\$13.16
Baggage Porters and Bellhops	12	15	3	28%	2	\$8.16
Concierges	8	11	3	37%	2	\$10.11
Tour and Travel Guides	21	26	5	23%	5	\$9.12
Childcare Workers	1,024	1,102	78	8%	177	\$7.66
Personal Care Aides	1,438	1,942	504	35%	316	\$8.64
Fitness Trainers and Aerobics Instructors	218	243	25	12%	45	\$13.72
Recreation Workers	285	317	32	11%	58	\$14.57
Residential Advisors	158	189	31	20%	35	\$10.98
Personal Care and Service Workers, All Other	51	61	10	19%	10	\$11.06
First-Line Supervisors of Retail Sales Workers	1,558	1,656	98	6%	198	\$14.90
First-Line Supervisors of Non-Retail Sales Workers	279	283	3	1%	29	\$22.31
Cashiers	4,654	4,715	60	1%	967	\$8.41
Gaming Change Persons and Booth Cashiers	3	4	1	33%	1	\$9.79
Counter and Rental Clerks	202	233	31	15%	34	\$11.24
Parts Salespersons	210	229	19	9%	32	\$11.83
Retail Salespersons	4,124	4,543	419	10%	730	\$10.34
Advertising Sales Agents	55	51	(4)	(8%)	7	\$18.34
Insurance Sales Agents	477	486	10	2%	52	\$16.70
Securities, Commodities, and Financial Services Sales Agents	81	76	(5)	(6%)	9	\$22.79
Travel Agents	21	24	3	13%	3	\$11.95



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Sales Representatives, Services, All Other	586	637	51	9%	85	\$15.21
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	120	142	23	19%	17	\$23.44
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	1,013	1,138	125	12%	132	\$22.23
Demonstrators and Product Promoters	53	55	2	4%	10	\$11.54
Models	5	6	1	18%	1	\$14.42
Real Estate Brokers	85	87	3	3%	9	\$22.94
Real Estate Sales Agents	327	334	7	2%	34	\$17.69
Sales Engineers	17	23	6	34%	3	\$40.35
Telemarketers	59	74	15	25%	13	\$11.99
Door-To-Door Sales Workers, News and Street Vendors, and Related Workers	99	97	(2)	(2%)	11	\$14.16
Sales and Related Workers, All Other	61	73	12	20%	11	\$13.49
First-Line Supervisors of Office and Administrative Support Workers	1,137	1,212	75	7%	134	\$22.13
Switchboard Operators, Including Answering Service	75	66	(8)	(11%)	10	\$11.86
Telephone Operators	5	5	0	3%	1	\$14.43
Communications Equipment Operators, All Other	7	7	0	7%	1	\$16.82
Bill and Account Collectors	211	231	20	10%	27	\$14.66
Billing and Posting Clerks	262	292	30	11%	33	\$15.12
Bookkeeping, Accounting, and Auditing Clerks	1,233	1,269	37	3%	156	\$15.98
Gaming Cage Workers	2	3	1	47%	1	\$13.03
Payroll and Timekeeping Clerks	137	138	1	1%	15	\$16.62
Procurement Clerks	85	87	2	3%	11	\$18.06
Tellers	257	225	(32)	(12%)	31	\$13.52
Financial Clerks, All Other	11	13	2	20%	2	\$20.35
Brokerage Clerks	6	7	1	10%	1	\$24.71
Correspondence Clerks	1	2	0	15%	0	\$13.51



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Court, Municipal, and License Clerks	119	135	15	13%	13	\$14.26
Credit Authorizers, Checkers, and Clerks	14	15	1	4%	2	\$15.61
Customer Service Representatives	2,547	2,757	210	8%	392	\$13.23
Eligibility Interviewers, Government Programs	32	40	8	25%	4	\$18.93
File Clerks	51	53	2	4%	7	\$13.82
Hotel, Motel, and Resort Desk Clerks	177	213	37	21%	37	\$9.04
Interviewers, Except Eligibility and Loan	125	147	22	17%	20	\$13.40
Library Assistants, Clerical	118	135	17	15%	21	\$11.68
Loan Interviewers and Clerks	77	80	3	4%	9	\$16.20
New Accounts Clerks	21	18	(3)	(13%)	2	\$18.21
Order Clerks	63	69	6	9%	9	\$16.22
Human Resources Assistants, Except Payroll and Timekeeping	184	186	2	1%	23	\$16.28
Receptionists and Information Clerks	698	757	59	8%	110	\$12.52
Reservation and Transportation Ticket Agents and Travel Clerks	11	13	3	26%	2	\$13.67
Information and Record Clerks, All Other	53	66	13	25%	9	\$17.39
Cargo and Freight Agents	14	14	(0)	(1%)	1	\$18.69
Couriers and Messengers	69	82	13	19%	9	\$13.71
Police, Fire, and Ambulance Dispatchers	133	146	12	9%	15	\$14.65
Dispatchers, Except Police, Fire, and Ambulance	101	110	9	9%	11	\$15.85
Meter Readers, Utilities	51	50	(1)	(3%)	4	\$14.94
Postal Service Clerks	53	55	2	4%	5	\$24.36
Postal Service Mail Carriers	299	309	9	3%	24	\$22.26
Postal Service Mail Sorters, Processors, and Processing Machine Operators	106	104	(2)	(2%)	8	\$24.69
Production, Planning, and Expediting Clerks	374	425	51	14%	50	\$19.05
Shipping, Receiving, and Traffic Clerks	597	650	53	9%	74	\$14.26
Stock Clerks and Order Fillers	1,713	1,902	190	11%	272	\$11.14



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	57	61	4	7%	7	\$14.92
Executive Secretaries and Executive Administrative Assistants	234	222	(12)	(5%)	27	\$25.07
Legal Secretaries	59	48	(10)	(17%)	6	\$17.74
Medical Secretaries	401	454	53	13%	55	\$14.30
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,790	2,744	(45)	(2%)	327	\$15.03
Computer Operators	50	46	(4)	(7%)	5	\$18.73
Data Entry Keyers	70	65	(5)	(7%)	9	\$14.77
Word Processors and Typists	32	28	(3)	(10%)	4	\$16.46
Desktop Publishers	4	5	0	6%	1	\$15.71
Insurance Claims and Policy Processing Clerks	39	42	3	8%	5	\$14.39
Mail Clerks and Mail Machine Operators, Except Postal Service	35	41	6	16%	5	\$12.52
Office Clerks, General	2,798	2,908	109	4%	377	\$13.07
Office Machine Operators, Except Computer	14	16	2	16%	2	\$12.63
Proofreaders and Copy Markers	6	6	1	13%	1	\$15.12
Statistical Assistants	4	4	1	13%	1	\$19.68
Office and Administrative Support Workers, All Other	217	254	37	17%	32	\$10.88
First-Line Supervisors of Farming, Fishing, and Forestry Workers	19	18	(0)	(1%)	3	\$26.31
Agricultural Inspectors	4	5	1	28%	1	\$17.09
Animal Breeders	3	4	1	28%	1	\$18.01
Graders and Sorters, Agricultural Products	11	13	1	13%	2	\$10.29
Agricultural Equipment Operators	16	18	2	13%	3	\$12.80
Farmworkers and Laborers, Crop, Nursery, and Greenhouse	178	196	18	10%	34	\$10.05
Farmworkers, Farm, Ranch, and Aquacultural Animals	22	24	2	8%	4	\$11.49
Agricultural Workers, All Other	5	6	1	12%	1	\$15.22
Fishers and Related Fishing Workers	5	5	(0)	(8%)	1	\$13.58
Hunters and Trappers	2	2	0	16%	0	\$16.22



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Forest and Conservation Workers	9	10	1	9%	2	\$10.33
Fallers	6	4	(2)	(30%)	1	\$18.97
Logging Equipment Operators	46	31	(15)	(34%)	5	\$12.48
Log Graders and Scalers	2	2	(0)	(11%)	0	\$14.20
Logging Workers, All Other	4	3	(1)	(28%)	0	\$16.86
First-Line Supervisors of Construction Trades and Extraction Workers	562	499	(63)	(11%)	55	\$22.50
Boilermakers	7	8	0	3%	1	\$25.52
Brickmasons and Blockmasons	72	60	(13)	(18%)	6	\$17.56
Stonemasons	8	8	(0)	(1%)	1	\$12.13
Carpenters	775	634	(141)	(18%)	69	\$13.68
Carpet Installers	34	30	(5)	(14%)	3	\$12.89
Floor Layers, Except Carpet, Wood, and Hard Tiles	10	8	(2)	(23%)	1	\$13.69
Floor Sanders and Finishers	5	4	(2)	(30%)	0	\$12.59
Tile and Marble Setters	38	28	(10)	(25%)	3	\$14.14
Cement Masons and Concrete Finishers	113	80	(32)	(29%)	11	\$14.74
Terrazzo Workers and Finishers	1	1	(0)	(10%)	0	\$15.12
Construction Laborers	1,144	1,015	(128)	(11%)	119	\$12.33
Paving, Surfacing, and Tamping Equipment Operators	32	32	1	2%	4	\$13.80
Pile-Driver Operators	14	13	(0)	(1%)	2	\$17.61
Operating Engineers and Other Construction Equipment Operators	375	384	9	2%	47	\$16.81
Drywall and Ceiling Tile Installers	74	61	(13)	(17%)	7	\$13.58
Tapers	9	7	(2)	(24%)	1	\$14.86
Electricians	534	460	(74)	(14%)	60	\$19.72
Glaziers	37	38	1	2%	5	\$17.11
Insulation Workers, Floor, Ceiling, and Wall	37	32	(5)	(14%)	4	\$15.09
Insulation Workers, Mechanical	24	19	(5)	(22%)	2	\$13.03
Painters, Construction and Maintenance	378	284	(94)	(25%)	30	\$12.54



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Paperhangers	2	1	(1)	(42%)	0	\$12.21
Pipelayers	27	26	(1)	(4%)	3	\$16.78
Plumbers, Pipefitters, and Steamfitters	266	281	15	6%	34	\$16.01
Plasterers and Stucco Masons	12	11	(1)	(7%)	1	\$13.78
Reinforcing Iron and Rebar Workers	13	11	(2)	(16%)	1	\$14.45
Roofers	120	124	4	3%	15	\$13.38
Sheet Metal Workers	110	115	6	5%	13	\$11.59
Structural Iron and Steel Workers	41	42	1	2%	5	\$18.24
Solar Photovoltaic Installers	6	8	2	32%	1	\$15.46
Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	40	31	(9)	(22%)	5	\$15.13
Helpers--Carpenters	34	30	(4)	(12%)	5	\$11.46
Helpers--Electricians	71	54	(17)	(24%)	9	\$13.73
Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	7	5	(2)	(31%)	1	\$10.61
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	82	85	3	4%	13	\$11.95
Helpers--Roofers	7	9	2	22%	1	\$10.15
Helpers, Construction Trades, All Other	10	11	0	3%	2	\$11.45
Construction and Building Inspectors	55	66	11	21%	8	\$20.59
Elevator Installers and Repairers	10	9	(1)	(10%)	1	\$28.33
Fence Erectors	15	16	0	3%	2	\$12.71
Hazardous Materials Removal Workers	29	40	11	38%	6	\$12.95
Highway Maintenance Workers	46	57	10	22%	7	\$13.94
Rail-Track Laying and Maintenance Equipment Operators	5	6	1	18%	1	\$16.80
Septic Tank Servicers and Sewer Pipe Cleaners	34	42	9	25%	6	\$15.82
Miscellaneous Construction and Related Workers	27	28	1	5%	3	\$17.26
Derrick Operators, Oil and Gas	0	0	0	95%	0	\$15.25
Rotary Drill Operators, Oil and Gas	1	1	0	55%	0	\$17.57



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Service Unit Operators, Oil, Gas, and Mining	2	3	1	32%	0	\$15.69
Earth Drillers, Except Oil and Gas	6	6	(0)	(1%)	1	\$15.78
Explosives Workers, Ordnance Handling Experts, and Blasters	17	18	1	7%	2	\$20.55
Continuous Mining Machine Operators	4	5	0	8%	1	\$25.18
Mine Cutting and Channeling Machine Operators	1	1	0	15%	0	\$23.96
Mining Machine Operators, All Other	1	1	0	5%	0	\$18.93
Rock Splitters, Quarry	5	5	0	4%	1	\$18.17
Roof Bolters, Mining	0	0	(0)	(21%)	0	\$36.40
Roustabouts, Oil and Gas	5	5	1	15%	1	\$13.73
Helpers--Extraction Workers	1	2	0	28%	0	\$15.61
Extraction Workers, All Other	1	1	0	11%	0	\$21.57
First-Line Supervisors of Mechanics, Installers, and Repairers	458	495	38	8%	48	\$25.33
Computer, Automated Teller, and Office Machine Repairers	54	55	1	2%	6	\$14.90
Radio, Cellular, and Tower Equipment Installers and Repairs	8	9	1	10%	1	\$23.16
Telecommunications Equipment Installers and Repairers, Except Line Installers	145	139	(6)	(4%)	17	\$25.18
Avionics Technicians	20	23	3	17%	2	\$31.62
Electric Motor, Power Tool, and Related Repairers	41	40	(1)	(2%)	4	\$15.70
Electrical and Electronics Installers and Repairers, Transportation Equipment	7	8	1	10%	1	\$28.77
Electrical and Electronics Repairers, Commercial and Industrial Equipment	66	74	8	12%	8	\$21.80
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	31	31	(0)	(0%)	3	\$38.34
Electronic Equipment Installers and Repairers, Motor Vehicles	7	6	(1)	(18%)	1	\$15.90
Electronic Home Entertainment Equipment Installers and Repairers	15	12	(3)	(19%)	2	\$18.08
Security and Fire Alarm Systems Installers	18	17	(1)	(7%)	2	\$17.86
Aircraft Mechanics and Service Technicians	78	88	10	13%	8	\$27.83



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Automotive Body and Related Repairers	108	109	1	1%	12	\$14.60
Automotive Glass Installers and Repairers	25	25	0	0%	3	\$15.21
Automotive Service Technicians and Mechanics	885	917	32	4%	97	\$13.32
Bus and Truck Mechanics and Diesel Engine Specialists	190	207	17	9%	21	\$19.05
Farm Equipment Mechanics and Service Technicians	20	26	6	32%	3	\$15.90
Mobile Heavy Equipment Mechanics, Except Engines	88	91	2	2%	10	\$20.49
Rail Car Repairers	7	7	1	8%	1	\$22.61
Motorboat Mechanics and Service Technicians	42	46	4	10%	5	\$13.41
Motorcycle Mechanics	24	28	3	14%	3	\$14.43
Outdoor Power Equipment and Other Small Engine Mechanics	36	41	5	13%	5	\$14.59
Bicycle Repairers	9	12	2	27%	2	\$11.75
Recreational Vehicle Service Technicians	16	18	1	9%	2	\$15.12
Tire Repairers and Changers	120	128	7	6%	18	\$11.35
Mechanical Door Repairers	18	17	(1)	(4%)	1	\$17.72
Control and Valve Installers and Repairers, Except Mechanical Door	22	24	2	10%	2	\$26.12
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	303	318	14	5%	35	\$17.64
Home Appliance Repairers	34	37	3	10%	4	\$13.41
Industrial Machinery Mechanics	652	681	29	4%	66	\$23.17
Maintenance Workers, Machinery	116	133	18	15%	16	\$20.10
Millwrights	23	26	3	13%	3	\$20.53
Refractory Materials Repairers, Except Brickmasons	1	1	0	4%	0	\$21.13
Electrical Power-Line Installers and Repairers	166	178	12	7%	17	\$26.42
Telecommunications Line Installers and Repairers	52	54	2	4%	6	\$18.69
Camera and Photographic Equipment Repairers	2	2	0	2%	0	\$14.85
Medical Equipment Repairers	18	21	3	16%	2	\$20.24



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Musical Instrument Repairers and Tuners	17	20	3	17%	2	\$11.63
Watch Repairers	4	3	(1)	(28%)	0	\$11.46
Precision Instrument and Equipment Repairers, All Other	12	13	1	12%	1	\$19.72
Maintenance and Repair Workers, General	2,045	2,255	211	10%	251	\$17.81
Wind Turbine Service Technicians	5	8	3	63%	1	\$21.60
Coin, Vending, and Amusement Machine Servicers and Repairers	62	46	(16)	(26%)	7	\$10.33
Commercial Divers	5	5	0	5%	1	\$16.59
Fabric Menders, Except Garment	1	1	1	93%	0	\$13.10
Locksmiths and Safe Repairers	18	14	(4)	(20%)	2	\$17.75
Manufactured Building and Mobile Home Installers	3	3	(0)	(1%)	0	\$11.38
Riggers	13	13	1	5%	1	\$17.39
Signal and Track Switch Repairers	3	4	0	8%	0	\$28.58
Helpers--Installation, Maintenance, and Repair Workers	90	98	9	10%	14	\$15.32
Installation, Maintenance, and Repair Workers, All Other	116	130	14	12%	14	\$16.05
First-Line Supervisors of Production and Operating Workers	1,211	1,318	108	9%	146	\$28.82
Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	21	24	3	15%	3	\$24.47
Coil Winders, Tapers, and Finishers	28	35	7	26%	5	\$14.28
Electrical, Electronic, and Electromechanical Assemblers, Except Coil Winders, Tapers, and Finishers	372	411	40	11%	56	\$17.97
Engine and Other Machine Assemblers	94	95	1	1%	11	\$19.58
Structural Metal Fabricators and Fitters	182	170	(12)	(7%)	21	\$23.84
Fiberglass Laminators and Fabricators	31	35	4	12%	5	\$12.76
Timing Device Assemblers and Adjusters	4	4	(0)	(6%)	1	\$16.75
Assemblers and Fabricators, All Other, Including Team Assemblers	4,847	4,461	(385)	(8%)	597	\$15.86
Bakers	159	174	15	9%	27	\$11.18
Butchers and Meat Cutters	133	147	14	11%	20	\$13.82



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Meat, Poultry, and Fish Cutters and Trimmers	81	90	9	11%	12	\$9.40
Slaughterers and Meat Packers	6	7	1	22%	1	\$10.36
Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	6	9	3	51%	1	\$11.72
Food Batchmakers	74	92	18	24%	15	\$12.66
Food Cooking Machine Operators and Tenders	21	26	5	23%	4	\$11.32
Food Processing Workers, All Other	11	14	4	33%	2	\$10.54
Computer-Controlled Machine Tool Operators, Metal and Plastic	413	456	43	10%	52	\$19.31
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	46	56	10	22%	7	\$23.48
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	330	321	(9)	(3%)	37	\$24.33
Forging Machine Setters, Operators, and Tenders, Metal and Plastic	24	25	0	2%	3	\$15.87
Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	45	49	4	9%	6	\$17.32
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	421	442	20	5%	57	\$14.79
Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	15	16	0	1%	2	\$14.99
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	233	233	0	0%	28	\$22.81
Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	19	21	2	9%	2	\$17.34
Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	16	17	1	7%	2	\$15.22
Machinists	2,326	2,456	131	6%	279	\$17.26
Metal-Refining Furnace Operators and Tenders	34	37	3	9%	4	\$17.11
Pourers and Casters, Metal	13	13	1	4%	2	\$17.01
Model Makers, Metal and Plastic	13	14	1	7%	2	\$22.58
Patternmakers, Metal and Plastic	5	5	0	8%	1	\$18.45



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Foundry Mold and Coremakers	26	29	2	9%	4	\$16.26
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	218	229	12	5%	30	\$13.30
Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	183	203	20	11%	25	\$27.10
Tool and Die Makers	164	174	10	6%	19	\$25.96
Welders, Cutters, Solderers, and Brazers	517	557	40	8%	68	\$17.73
Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders	51	53	2	4%	6	\$14.88
Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	57	56	(1)	(1%)	7	\$17.79
Layout Workers, Metal and Plastic	11	12	1	8%	2	\$19.77
Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	22	23	1	6%	3	\$13.85
Tool Grinders, Filers, and Sharpeners	14	13	(1)	(5%)	2	\$16.69
Metal Workers and Plastic Workers, All Other	19	20	1	5%	2	\$16.55
Prepress Technicians and Workers	36	39	4	10%	5	\$14.37
Printing Press Operators	258	293	36	14%	35	\$16.13
Print Binding and Finishing Workers	32	34	2	8%	5	\$12.86
Laundry and Dry-Cleaning Workers	122	126	4	3%	19	\$9.86
Pressers, Textile, Garment, and Related Materials	38	28	(10)	(25%)	4	\$9.76
Sewing Machine Operators	195	193	(2)	(1%)	23	\$9.95
Shoe and Leather Workers and Repairers	10	11	1	8%	1	\$14.30
Shoe Machine Operators and Tenders	7	7	1	8%	1	\$12.90
Sewers, Hand	13	14	1	4%	2	\$8.93
Tailors, Dressmakers, and Custom Sewers	51	54	3	7%	8	\$11.35
Textile Bleaching and Dyeing Machine Operators and Tenders	183	148	(35)	(19%)	22	\$13.99
Textile Cutting Machine Setters, Operators, and Tenders	121	91	(30)	(25%)	16	\$12.23



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Textile Knitting and Weaving Machine Setters, Operators, and Tenders	1,011	586	(424)	(42%)	105	\$13.10
Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders	363	236	(126)	(35%)	36	\$11.90
Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	97	80	(17)	(18%)	12	\$15.11
Fabric and Apparel Patternmakers	4	4	(0)	(7%)	1	\$16.43
Upholsterers	32	35	3	8%	4	\$12.66
Textile, Apparel, and Furnishings Workers, All Other	15	19	4	26%	3	\$13.02
Cabinetmakers and Bench Carpenters	105	116	11	10%	14	\$13.20
Furniture Finishers	10	10	(0)	(1%)	1	\$13.42
Model Makers, Wood	4	4	1	16%	1	\$18.83
Patternmakers, Wood	3	3	0	8%	0	\$19.39
Sawing Machine Setters, Operators, and Tenders, Wood	68	69	1	2%	10	\$13.84
Woodworking Machine Setters, Operators, and Tenders, Except Sawing	58	63	5	8%	8	\$11.47
Woodworkers, All Other	15	16	1	7%	2	\$11.57
Nuclear Power Reactor Operators	168	139	(29)	(17%)	15	\$42.74
Power Distributors and Dispatchers	7	6	(0)	(7%)	1	\$35.74
Power Plant Operators	14	13	(1)	(6%)	1	\$30.64
Stationary Engineers and Boiler Operators	16	19	3	21%	2	\$22.48
Water and Wastewater Treatment Plant and System Operators	152	160	8	5%	15	\$20.39
Chemical Plant and System Operators	39	41	2	6%	5	\$23.52
Gas Plant Operators	11	11	(0)	(4%)	1	\$20.10
Petroleum Pump System Operators, Refinery Operators, and Gaugers	6	9	3	51%	1	\$22.43
Plant and System Operators, All Other	5	6	1	14%	1	\$21.60
Chemical Equipment Operators and Tenders	216	222	5	2%	28	\$18.99
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	20	25	5	23%	3	\$18.58



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	19	20	1	6%	3	\$14.50
Grinding and Polishing Workers, Hand	19	17	(2)	(13%)	2	\$11.76
Mixing and Blending Machine Setters, Operators, and Tenders	200	218	18	9%	28	\$16.24
Cutters and Trimmers, Hand	12	13	1	6%	2	\$9.92
Cutting and Slicing Machine Setters, Operators, and Tenders	105	132	26	25%	18	\$16.81
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	201	237	36	18%	33	\$20.25
Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	21	23	2	7%	3	\$16.09
Inspectors, Testers, Sorters, Samplers, and Weighers	1,145	1,099	(47)	(4%)	149	\$16.56
Jewelers and Precious Stone and Metal Workers	22	21	(1)	(6%)	3	\$13.72
Dental Laboratory Technicians	18	19	1	5%	2	\$15.13
Medical Appliance Technicians	5	6	1	23%	1	\$17.79
Ophthalmic Laboratory Technicians	24	28	4	17%	4	\$14.85
Packaging and Filling Machine Operators and Tenders	321	370	49	15%	49	\$11.64
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	116	133	17	15%	16	\$14.05
Painters, Transportation Equipment	39	40	1	2%	5	\$17.70
Painting, Coating, and Decorating Workers	15	17	2	12%	2	\$15.59
Semiconductor Processors	14	12	(2)	(13%)	2	\$15.69
Photographic Process Workers and Processing Machine Operators	13	12	(1)	(11%)	2	\$10.81
Adhesive Bonding Machine Operators and Tenders	13	18	5	35%	2	\$12.29
Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	15	17	2	12%	2	\$12.45
Cooling and Freezing Equipment Operators and Tenders	2	2	0	19%	0	\$13.71
Etchers and Engravers	8	9	1	17%	1	\$14.00
Molders, Shapers, and Casters, Except Metal and Plastic	74	75	2	2%	9	\$15.07



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Paper Goods Machine Setters, Operators, and Tenders	231	344	114	49%	45	\$17.66
Tire Builders	509	595	86	17%	79	\$19.75
Helpers--Production Workers	526	545	19	4%	91	\$11.04
Production Workers, All Other	123	141	18	14%	18	\$11.51
Aircraft Cargo Handling Supervisors	2	2	0	15%	0	\$19.29
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	292	326	34	12%	38	\$23.59
Airline Pilots, Copilots, and Flight Engineers	30	33	3	12%	4	\$41.85
Commercial Pilots	22	27	5	22%	3	\$40.95
Air Traffic Controllers	8	8	1	8%	1	\$40.27
Airfield Operations Specialists	4	4	0	13%	0	\$17.58
Flight Attendants	1	0	(0)	(19%)	0	\$24.88
Ambulance Drivers and Attendants, Except Emergency Medical Technicians	102	105	3	3%	17	\$10.44
Bus Drivers, Transit and Intercity	59	70	11	18%	10	\$12.93
Bus Drivers, School Or Special Client	381	394	14	4%	52	\$11.31
Driver/Sales Workers	537	513	(24)	(5%)	61	\$8.70
Heavy and Tractor-Trailer Truck Drivers	1,196	1,224	28	2%	147	\$18.07
Light Truck Or Delivery Services Drivers	693	743	50	7%	89	\$12.02
Taxi Drivers and Chauffeurs	107	117	10	10%	14	\$9.42
Motor Vehicle Operators, All Other	15	18	3	22%	4	\$16.48
Locomotive Engineers	12	12	1	5%	1	\$27.89
Locomotive Firers	0	0	(0)	(36%)	0	\$29.19
Rail Yard Engineers, Dinkey Operators, and Hostlers	1	1	0	5%	0	\$24.27
Railroad Brake, Signal, and Switch Operators	4	4	0	5%	0	\$34.17
Railroad Conductors and Yardmasters	14	15	1	7%	2	\$27.67
Subway and Streetcar Operators	4	5	1	20%	1	\$23.92



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Rail Transportation Workers, All Other	2	2	0	10%	0	\$22.89
Sailors and Marine Oilers	8	9	1	11%	1	\$14.75
Captains, Mates, and Pilots of Water Vessels	12	14	1	12%	2	\$27.18
Motorboat Operators	4	5	1	25%	1	\$16.00
Ship Engineers	4	4	1	16%	1	\$29.04
Bridge and Lock Tenders	3	4	0	14%	0	\$18.29
Parking Lot Attendants	53	68	16	30%	12	\$10.03
Automotive and Watercraft Service Attendants	69	84	15	22%	15	\$10.82
Traffic Technicians	4	5	1	27%	1	\$16.67
Transportation Inspectors	6	7	2	31%	1	\$27.46
Transportation Attendants, Except Flight Attendants	6	7	1	12%	1	\$10.87
Transportation Workers, All Other	6	7	1	15%	1	\$18.23
Conveyor Operators and Tenders	13	15	2	15%	2	\$15.35
Crane and Tower Operators	13	16	3	21%	2	\$19.74
Dredge Operators	4	4	0	9%	1	\$16.40
Excavating and Loading Machine and Dragline Operators	23	22	(1)	(3%)	3	\$16.13
Loading Machine Operators, Underground Mining	0	0	0	37%	0	\$21.66
Hoist and Winch Operators	5	5	0	8%	1	\$20.21
Industrial Truck and Tractor Operators	436	486	50	11%	62	\$13.99
Cleaners of Vehicles and Equipment	279	336	57	20%	53	\$10.05
Laborers and Freight, Stock, and Material Movers, Hand	2,435	2,515	81	3%	379	\$12.55
Machine Feeders and Offbearers	131	140	9	7%	21	\$16.92
Packers and Packagers, Hand	575	599	24	4%	99	\$10.87
Gas Compressor and Gas Pumping Station Operators	1	1	0	9%	0	\$21.40
Pump Operators, Except Wellhead Pumps	3	4	1	17%	1	\$18.07
Wellhead Pumps	1	1	0	8%	0	\$24.38
Refuse and Recyclable Material Collectors	105	114	9	8%	16	\$10.81



SOC TITLE	2018 JOBS	2028 JOBS	CHANGE	% CHANGE	ANNUAL JOB OPENINGS	MEDIAN HOURLY WAGE
Mine Shuttle Car Operators	0	0	0	6%	0	\$33.24
Tank Car, Truck, and Ship Loaders	3	4	1	27%	1	\$15.04
Material Moving Workers, All Other	9	10	1	17%	1	\$12.86
Military occupations	671	702	31	5%	85	\$17.74

Source: Employees & Self-Employed 2018.4.



Appendix 7: Unemployment

Data on unemployment give researchers an idea of where skills mismatches may exist in the region. Unemployment data can also provide important context when identifying the training programs that are best suited to transitioning unemployed workers into in-demand occupations.

The tables and figures present the number of people unemployed by two-digit industry sector¹⁴ and by two-digit occupation group in the TCTC Service Region. Data reflect July 2018 and follow the same methodology used by the federal statistical agencies to determine the number of workers in an industry/occupation that are not currently employed. The unemployment rate is not provided because it is difficult to accurately determine the size of the labor force in a given industry/occupation on a monthly basis. Rather than the unemployment rate, the percent of all unemployed for the region, state, and nation are provided to display which sectors have the highest concentration of unemployed workers.

TABLE A7.1: UNEMPLOYED WORKERS BY INDUSTRY SECTOR IN THE TCTC SERVICE REGION WITH STATE AND NATIONAL COMPARISON

NAICS CODE	NAICS TITLE	REGIONAL UNEMPLOYED	REGIONAL % UNEMPLOYED	STATE % UNEMPLOYED	NATIONAL % UNEMPLOYED
99	No Previous Work Experience/Unspecified	1,288	20%	18%	7%
31	Manufacturing	1,092	17%	10%	9%
72	Accommodation & Food Services	740	11%	10%	8%
44	Retail Trade	610	9%	8%	8%
62	Health Care & Social Assistance	532	8%	9%	11%
56	Administrative & Support & Waste Management & Remediation Services	482	7%	12%	12%
81	Other Services (except Public Administration)	310	5%	4%	3%
23	Construction	296	5%	5%	9%

14 Unemployment by industry data is only available at the two-digit level whereas the industry data reported elsewhere in this analysis is at the three-digit level.

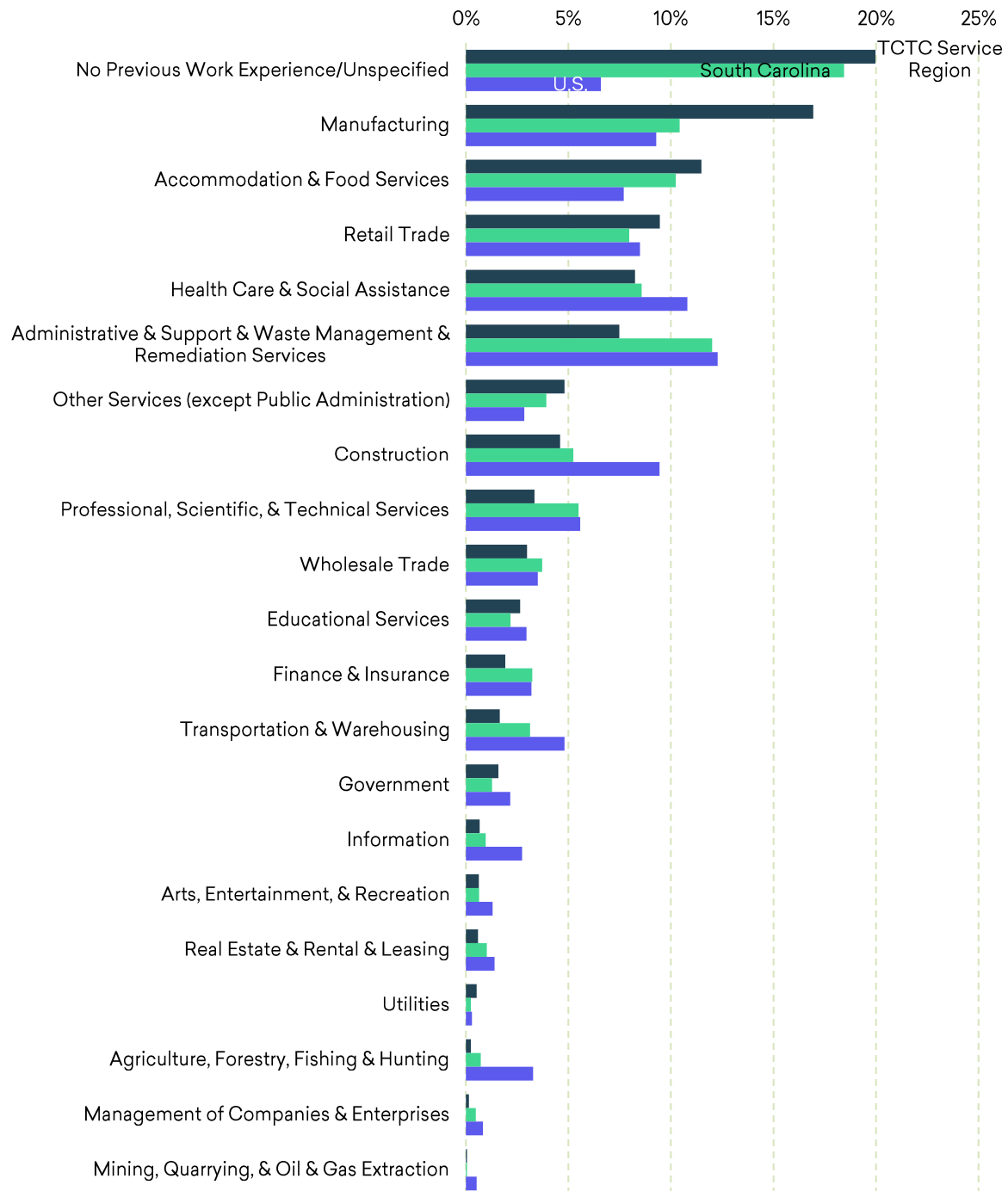


NAICS CODE	NAICS TITLE	REGIONAL UNEMPLOYED	REGIONAL % UNEMPLOYED	STATE % UNEMPLOYED	NATIONAL % UNEMPLOYED
54	Professional, Scientific, & Technical Services	215	3%	5%	6%
42	Wholesale Trade	192	3%	4%	4%
61	Educational Services	171	3%	2%	3%
52	Finance & Insurance	124	2%	3%	3%
48	Transportation & Warehousing	107	2%	3%	5%
90	Government	102	2%	1%	2%
51	Information	44	1%	1%	3%
71	Arts, Entertainment, & Recreation	41	1%	1%	1%
53	Real Estate & Rental & Leasing	38	1%	1%	1%
22	Utilities	34	1%	0%	0%
11	Agriculture, Forestry, Fishing & Hunting	16	0%	1%	3%
55	Management of Companies & Enterprises	10	0%	0%	1%
21	Mining, Quarrying, & Oil & Gas Extraction	4	0%	0%	1%

Source: Emsi Total Unemployment (July 2018).



FIGURE A7.1: UNEMPLOYED WORKERS BY INDUSTRY SECTOR IN THE TCTC SERVICE REGION WITH STATE AND NATIONAL COMPARISON



Source: Emsi Total Unemployment (July 2018).



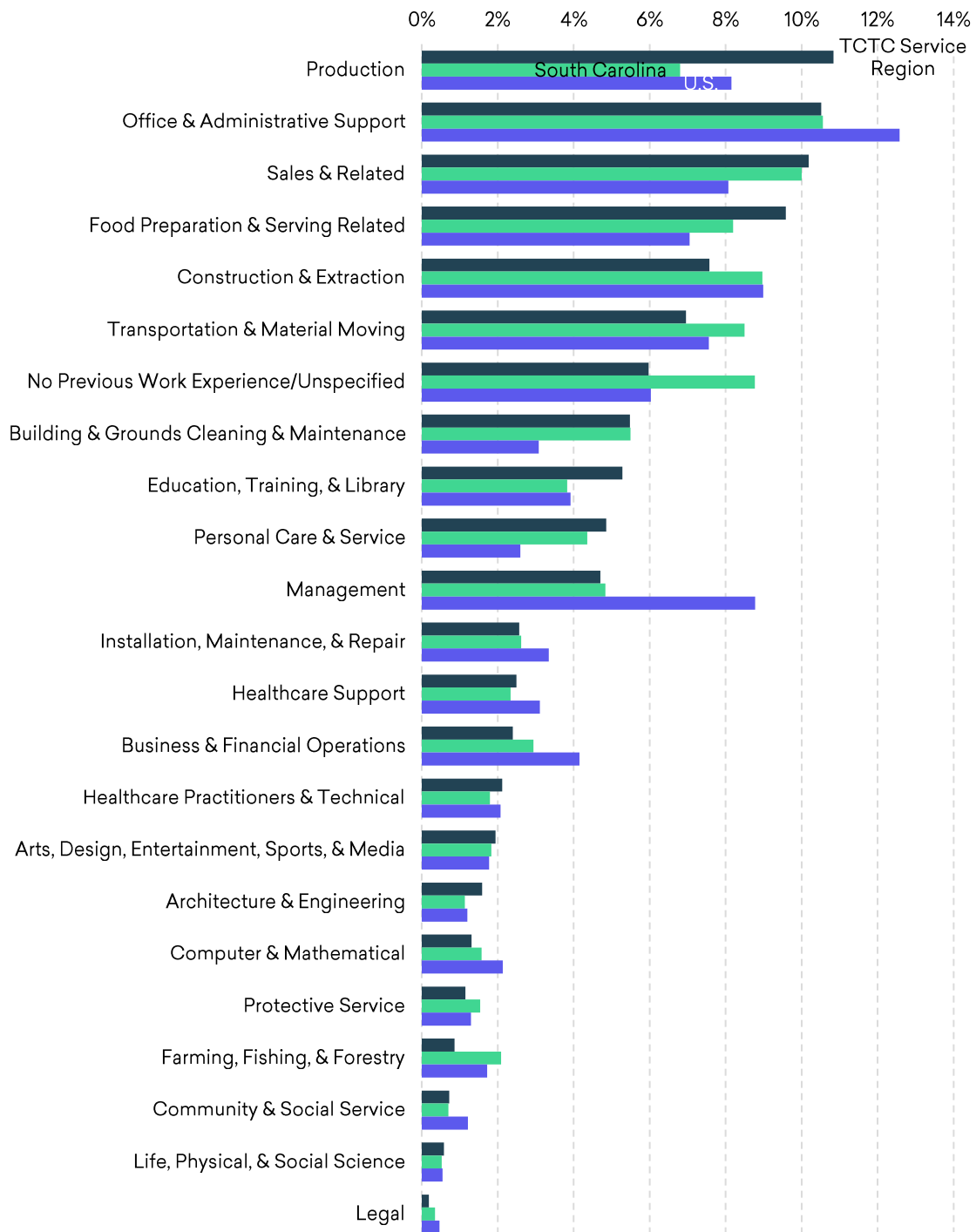
TABLE A7.2: UNEMPLOYED WORKERS BY OCCUPATIONAL GROUP IN THE TCTC SERVICE REGION WITH STATE AND NATIONAL COMPARISON

SOC CODE	SOC TITLE	REGIONAL UNEMPLOYED	REGIONAL % UNEMPLOYED	STATE % UNEMPLOYED	NATIONAL % UNEMPLOYED
51-0000	Production	699	11%	7%	8%
43-0000	Office & Administrative Support	678	11%	11%	13%
41-0000	Sales & Related	657	10%	10%	8%
35-0000	Food Preparation & Serving Related	618	10%	8%	7%
47-0000	Construction & Extraction	488	8%	9%	9%
53-0000	Transportation & Material Moving	448	7%	8%	8%
99-0000	No Previous Work Experience/Unspecified	385	6%	9%	6%
37-0000	Building & Grounds Cleaning & Maintenance	353	5%	5%	3%
25-0000	Education, Training, & Library	341	5%	4%	4%
39-0000	Personal Care & Service	313	5%	4%	3%
11-0000	Management	303	5%	5%	9%
49-0000	Installation, Maintenance, & Repair	165	3%	3%	3%
31-0000	Healthcare Support	161	2%	2%	3%
13-0000	Business & Financial Operations	155	2%	3%	4%
29-0000	Healthcare Practitioners & Technical	136	2%	2%	2%
27-0000	Arts, Design, Entertainment, Sports, & Media	125	2%	2%	2%
17-0000	Architecture & Engineering	102	2%	1%	1%
15-0000	Computer & Mathematical	84	1%	2%	2%
33-0000	Protective Service	74	1%	2%	1%
45-0000	Farming, Fishing, & Forestry	56	1%	2%	2%
21-0000	Community & Social Service	47	1%	1%	1%
19-0000	Life, Physical, & Social Science	38	1%	1%	1%
23-0000	Legal	12	0%	0%	0%

Source: Emsi Total Unemployment (July 2018).



FIGURE A7.2: UNEMPLOYED WORKERS BY OCCUPATIONAL GROUP IN THE TCTC SERVICE REGION WITH STATE AND NATIONAL COMPARISON



Source: Emsi Total Unemployment (July 2018).

