Architectural Engineering Technicians

An analysis of the current and future architectural engineering technician workforce in the Delmarva Region

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Vision: The Center for Industry Research & Workforce Alignment strives to be Delaware’s key source of labor-market insight to enable educational institutions to better align their program and training resources to meet the skill demands of business and industry.

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Introduction
This occupational brief seeks to provide Delaware Tech faculty and administrators with data outcomes and recommendations specific to Architectural Engineering Technology that will aid in course development, curriculum delivery and non-credit training and certifications that will give students an advantage in the job market upon graduation.

This survey data contained within this occupational brief was taken from a larger study that examines several disciplines of engineering technology within a 13-county mid-Atlantic region that includes the three counties in the State of Delaware and ten bordering counties where graduates of Delaware Tech are likely to find employment. The purpose of that labor market study was to examine current and projected employment levels, how these jobs are changing due to a variety of market drivers, and what Delaware Tech and other community colleges can do to ensure that associate degree programs accurately reflect the skill needs of employers in the near future.

This brief primarily highlights data and information specific to architectural engineering technicians gleaned from an extensive workforce survey conducted in July of 2014 from a sample of over 7,400 companies in the region. Survey interviewers fully screened 400 firms for qualifying criteria. Surveying efforts resulted in 252 occupational-level completions from 153 firms. Several firms responded for more than a single occupation. Extrapolations of employment data were conducted to provide readers with a more comprehensive picture of current and projected workforce demographics and to perform a supply/demand gap analysis for the region. In addition, executive interviews were held with 17 individuals from 15 public and private sector firms and existing sources were researched for secondary supporting data.

A total of 28 employers responded to the regional survey for architectural engineering technicians. The proceeding sections of this brief provide an overview of data outcomes and executive interviews held with employers of this occupation. Aggregate data for all occupations such as market drivers, soft skill needs, and can be found in the full labor market study available on the CIRWA web page at www.dtcc.edu/cirwa.

Architectural Engineering Technicians - SOC 17-3011

Occupational Definition
Prepare detailed drawings of architectural designs and plans for buildings and structures according to specifications provided by architect.¹

Figure 1 - Hiring Difficulty
Forty-six percent of the 28 firms that responded for architectural engineering technicians find it difficult or very difficult to find a quality candidate to fill their position vacancies. Eighty-two percent find it at least somewhat difficult to find the right candidate.

Table 1 - Current and Projected Employment – SURVEY DATA (n=28)
The data in the table below reflects data from survey responses only. Projected job change, retirements and turnover were combined to determine total 3YR and annual openings.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>104</td>
<td>+14 (16%)</td>
<td>10 (11%)</td>
<td>11 (12%)</td>
</tr>
</tbody>
</table>

Table 2 - Universe of Firms and Employment – EXTRAPOLATED REGIONAL ESTIMATES
From the survey’s qualifying incidence rate (percentage of firms screened that hire the occupation), CIRWA was able to determine the estimated total number of firms in the region that employ architectural engineering technicians. After eliminating outliers out 2 standard deviations, CIRWA utilized adjusted employment means to extrapolate regional estimates for current and projected employment. Projected job change, retirements and turnover were combined to determine total 3YR and annual openings.

<table>
<thead>
<tr>
<th>Total Firms that Employ Architectural Technicians</th>
<th>Current Employment</th>
<th>Projected Employment in 3 years</th>
<th>3YR Projected Openings</th>
<th>Total 3YR Openings incl. Growth</th>
<th>Annual Openings over next 3 yrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>117</td>
<td>250</td>
<td>309</td>
<td>+59 (24%)</td>
<td>23 (9.2%)</td>
<td>39 (16%)</td>
</tr>
</tbody>
</table>

Figure 2 - Educational Attainment of the Current Workforce – Survey Data (n=28)
A large percentage (87%) of the architectural engineering technician workforce currently holds an associate degree or higher with 64% holding a bachelor’s degree. Only 9% workers in this field currently hold less than an associate degree. The educational attainment of roughly 4% of the workforce was unknown to survey takers.
Figure 3 - Educational Hiring Requirements and Preferences – Survey Data (n=28)
The figures below demonstrate survey respondents’ required versus preferred educational attainment for an architectural engineering technician position in their firm. The data shows that the majority of firms (54%) require an associate degree for employment. Eighty-nine percent (89%) of firms prefer that their technicians have an associate degree or above with 53% preferring that job candidates hold a bachelor’s degree. Seventeen (17) of 28 respondents (61%) indicated that they would prefer at least one education level higher than they currently require.

![Bar chart showing required and preferred educational levels](image)

Figure 4 - Entry-Level Wages – Survey Data (n=28)
Ten of 28 (36%) firms that employ architectural engineering technicians offer an entry-level salary of between $30,000 and $39,000. Five firms offer starting salaries of $50,000-$59,000 a year.

![Bar chart showing entry-level wages](image)

Figure 5 – Barriers to Hiring Qualified Architectural Engineering Technicians – Survey Data (n=28)
Forty-six percent (46%) of firms that employ architectural engineering technicians find it either “difficult” or “very difficult” to find a highly-qualified worker. Respondents were asked to indicate all of the challenges they encounter during the resume review and interview processes. Responses are summarized below:

![Bar chart showing barriers to hiring](image)
**Figure 6 – Top Technical Skill Needs based on Survey Data (n=28)**

The figure to the right illustrates the skills most frequently selected as “Extremely Important” or “Very Important” on a 5-point scale with an option for “Not applicable”. Larger circles reflect higher response counts. Of the 28 companies that responded to this question, all 28 chose Knowledge of Codes and Regulations as an “Extremely Important” or “Very Important” skill. A number of other skills and topic areas were close behind with between 24 and 27 companies selecting them as “Extremely” or “Very Important”. Important to note is that two items, Proficiency in Calculus and Proficiency in Spanish were not included in this graphic due to both receiving less than 10 responses as “Extremely” or “Very Important”.

**Figure 7 - Preferred and Required Industry Certifications – Survey Data (n=28)**

Survey completers were provided with a list of industry recognized certifications for architectural engineering technicians and asked to indicate which certifications they require for employment and which they prefer. Employers were also provided a “neutral” option if they had no preference. A summary of responses is provided below:

<table>
<thead>
<tr>
<th>Certification</th>
<th>Preferred</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEED Green Associate</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Program Management Professional (PMP)</td>
<td>2</td>
<td>26</td>
</tr>
</tbody>
</table>

Of the two certifications that were listed for employers of architectural engineering technicians, neither was selected as a requirement for hire. However, six employers do prefer that new hires have the LEED Green Associate certification.

**Figure 8 - Top Software Needs for Architectural Engineering Technicians – Survey Data (n=28)**

In an effort to determine what software programs students should be exposed to, employers of architectural engineering technicians were given a list of software commonly used in the industry. They were asked to select all of the programs that their technicians use on a day-to-day basis. The chart below provides a summary count of the selected software:

<table>
<thead>
<tr>
<th>Software</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic AutoCAD</td>
<td>20</td>
</tr>
<tr>
<td>Sketch-up</td>
<td>10</td>
</tr>
<tr>
<td>Revit</td>
<td>8</td>
</tr>
<tr>
<td>Architectural desktop</td>
<td>7</td>
</tr>
<tr>
<td>3D Studio Max</td>
<td>4</td>
</tr>
<tr>
<td>Navisworks</td>
<td>2</td>
</tr>
</tbody>
</table>
Employer Insight based on Executive Interviews
All four of the architectural firms interviewed for this study do hire architectural engineering technicians and have been very pleased with Delaware Tech interns. However, firms that seek to hire Delaware Tech graduates and advance them along a career path face a significant challenge in that no 4-year degree programs for architecture exist in Delaware and most credits that architectural engineering technology students earn do not transfer to 4-year programs in neighboring states. The housing collapse during the recent recession was particularly tough on the architectural industry. As a result, interviewees stated that many interior architectural design technician positions were eliminated; their job responsibilities undertaken by bachelor’s degree-prepared interior designers or architects. Those jobs have not yet returned, and interviewees were not optimistic that they would return anytime in the near future.

Supply and Demand Gap Analysis
Table 3 provides data on regional program completions for architectural engineering technicians. An annual average was calculated by pulling program (CIP code) completion data from the IPEDS database for a 3-year period (2011, 2012, and 2013) for all schools within the region that offer this program and report completions to IPEDS. These average annual completions were added together to produce a total annual completion number for the region.

Table 3 - Regional Annual Program Graduates

<table>
<thead>
<tr>
<th>CIP Codes &amp; Descriptions</th>
<th>Regional Educational Programs</th>
<th>Delaware Technical Community College</th>
<th>Delaware County Community College</th>
<th>Wor-Wic Community College</th>
<th>Penn Institute of Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.0101 - Architectural Engineering Technologies/Technician</td>
<td></td>
<td>22</td>
<td>6</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>15.1303 - Architectural Drafting and Architectural CAD/CADD</td>
<td></td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>

Delaware Tech is one of four community/technical colleges in the region that offers an associate degree in architectural engineering technology. Over the last 3 years, Delaware Tech has averaged 22 graduates per year from this program. On average, the entire region is producing approximately 38 graduates annually.

Table 4 - Extrapolated Employment Demand versus Supply

<table>
<thead>
<tr>
<th>Current Employment</th>
<th>Employment in 3 Years</th>
<th>3YR Growth</th>
<th>3YR Openings</th>
<th>3YR Turnover</th>
<th>Total 3YR Openings</th>
<th>Supply/Demand Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>309</td>
<td>+59 (24%)</td>
<td>121</td>
<td>(7)</td>
<td>114</td>
<td>(2)</td>
</tr>
</tbody>
</table>

Table 4, above, shows 3YR openings data when paired with 3YR projected program graduates. Architectural engineering technicians are projected to show the highest growth rate at 23.6% over the next 3 years. If the region continues to produce approximately 38 graduates annually, it should be able to keep pace with that growth without oversupplying the market. Data shows a supply gap of just 7 workers over the next 3 years and two annually.
Conclusions and Recommendations
Overall, the employment outlook for architectural engineering technicians in the region appears positive. Survey completers are generally optimistic about their ability to add jobs to the workforce over the next three years. Of the 247 firms screened that do not currently employ any of the engineering technicians examined in the survey, 14 firms indicated that they plan to hire for 21 new architectural engineering technician positions over the next 3 years. The conclusion below were taken from the full study and have been adapted to reflect findings specific to architectural engineering technology.

Conclusions

1. **The region is currently producing enough architectural technicians to keep pace with the replacement and growth need projected through 2018.** Table 1 shows that survey takers are predicting approximately 35 position openings over the next 3 years due solely to growth and replacements within their firms. The region is, on average, producing roughly 38 architectural engineering technicians a year to meet that need. After extrapolating the data, estimates show that the region may experience a slight shortage of just a few technicians a year, which may be beneficial to keeping jobs and wages competitive for new graduates.

2. **Computer technology, software applications and knowledge of mandates and regulations are changing the “must-have” skills needed for these jobs.** Forty-nine percent (49%) of all survey respondents feel that advancements in technology, particularly software packages, is a key factor that will impact technical skill need over the next few years. The integration of hand-held technology into everyday work responsibilities and the continued advancement of 3D drafting, GPS/GIS applicability and project management software are changing the way these firms do business and remain competitive in the marketplace. As a result, knowledge of these software programs is in high-demand and, over the next few years, could become “must-have” for employment. In addition, federal, state and local codes, regulations and mandates such as Delaware’s new stormwater management regulations are constantly changing and architectural technicians must put in the necessary time and effort to remain knowledgeable on all of these requirements to avoid heavy fines and penalties for their employer or clients.

3. **On-site work experience (preferably on a construction site) gives new program graduates a significant advantage over job applicants lacking this experience.** Eleven out of 15 firms (more than 70%) interviewed noted that they prefer to see some sort of construction experience on a job applicant’s resume. While several of these jobs focus on design or activities specific to one particular element of a construction project, familiarity with scheduling, budgeting, safety protocol and the sequence of activities that occur on a job site gives workers the perspective needed to plan, anticipate and predict in their specialty areas. It also exposes the student to several of the local, state, and federal codes, standards and regulations that govern these industries.

4. **Employers in the region are cautiously optimistic about the growth and resurgence of architectural engineering technology jobs.** Survey data clearly shows that firms in the region are predicting growth of their workforce over the coming 3 years. Raw survey data shows an overall 3-year growth rate of roughly 16% for these jobs. Much of this growth they attribute to the slow, but steady, recovery of the economy and stricter regulatory requirements. This is good news for educational institutions that are faced with the opportunity to provide employers throughout the region with highly-skilled, experienced workers that not only meet their hiring requirements, but also their preferences for hire.
Recommendations

The recommendations below are listed so as to correspond to the conclusions listed above and can be generalized into two broad objectives:

- Continuing to Keep Pace with Workforce Demand; and
- Improving Educational Programs to Better Meet Employer Needs.

1. Promote involvement and partnerships with K-12 and other related organizations in an effort to increase teachers', counselors', parents', and middle and high school students' awareness of engineering technology options available to them. Addressing a shortage of workers to meet demand begins with targeted efforts to boost awareness, interest, and enrollment in these programs. These efforts can be bolstered by developing statewide and regional strategies that engage not only K-12 education, but also organizations such as the Delaware STEM Council, trade associations, and other business and economic development agencies. Several survey respondents indicated that one of the drivers for increased technician employment will be greater recognition of the affordability and return on investment of 2-year degrees. The College would be well-served to emphasize these aspects to individuals looking to enter into a STEM occupation or who are currently in the process of choosing a career path.

2. Continue working toward developing a 4-year engineering technology degree within the State of Delaware to stimulate more connected degree opportunities for Delaware Tech graduates in these fields. While survey data shows that roughly 86% of employers only require an associate degree or lower for employment, 54% of respondents indicated that they would prefer their technicians have a bachelor’s degree. Employers that were interviewed for this scan all agreed that creating an opportunity for students to continue their education seamlessly into a bachelor’s degree program may help draw more students into these programs and improve their turnover rates given that technicians must attend classes in another state to earn a higher degree. Currently, no transfer opportunity exists in Delaware for architectural engineering technicians looking to obtain a bachelor’s degree in architecture or architectural engineering.

3. Consider adopting a cooperative workplace education experience or internship as a requirement for graduation. Similar to the last CIRWA study focused on Mechanical and Electrical-related engineering technologies, interviewees were surprised to find that this is not already a requirement for Delaware Tech graduates given that many employers are moving away from hiring graduates without relevant experience. This requirement would help Delaware Tech accomplish the following:

   a. Expand the College’s network of companies that hire program graduates;
   b. Expose a greater number of companies to the variety of programs offered at the college;
   c. Demonstrate the skills and abilities of Delaware Tech program graduates over other hiring options available to companies;
   d. Provide students with relevant, real-life workplace experiences and situations that will enable them to be more competitive and attractive to local employers upon graduation; and
   e. Open students up to the possibility of securing employment prior to graduation which may, in effect, provide increased incentive to complete the program and improve graduation and placements rates for the College.

4. Consider curriculum updates or changes that would place increased emphasis on exposing students to software applications, state codes and regulations and the importance of developing interpersonal and networking skills. Programs may be well-served to integrate more exercises that utilize the software programs
and applications identified by employers in this scan. In addition, emphasizing the importance and implications of federal, state, and local mandates and codes will help students recognize that continually staying updated and knowledgeable about regulatory changes is a requirement of these jobs. Finally, exercises or group projects that focus on developing a student’s professionalism and confidence as well as business and marketing skills will help enable graduates to facilitate relationships and catalyze business opportunities for their employer.

The full labor market scan available at www.dtcc.edu/cirwa contains more generalized data for architectural engineering technology and other related occupations. Supplemental employment data for architectural engineering technicians is provided in Appendix B of the full study. For further detail on the methodology of extrapolating employment estimates, please see the Methodology section in Appendix C of the full study.
Delaware Technical Community College established the Center for Industry Research & Workforce Alignment (CIRWA) in October 2011 as part of a U.S. Department of Labor Trade Adjustment Assistance Community College Career Training Grant.

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www.dtcc.edu/cirwa

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