EXECUTIVE SUMMARY

Engineering Technology

An analysis of the current and future workforce for the following engineering technician occupations:

- Civil
- Surveying
- Architectural
- Environmental
- Construction Management
- Water/Wastewater

Delmarva Region

Author:
Veronica S. Buckwalter, MPA
Center for Industry Research & Workforce Alignment (CIRWA)
Delaware Technical Community College

Data Analysis:
Alan Phillips, MS
Center for Industry Research & Workforce Alignment (CIRWA)
Delaware Technical Community College
Mission: The Center for Industry Research & Workforce Alignment, in close partnership with local businesses, government, and academia, delivers future-focused labor-market data and workforce information enabling educational institutions to make proactive and flexible decisions in response to the evolving workforce needs of Delaware’s competitive industries.

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.

This report was completed by The Center for Industry Research and Workforce Alignment (CIRWA), an initiative of Delaware Technical and Community College. It was completed in cooperation with the California Centers of Excellence as part of the USDOL-ETA Trade Adjustment Assistance Community College Career Training grant awarded to Delaware Tech in October 2011. Special thanks to the following individuals from the California Community Colleges’ Centers of Excellence:

**Elaine Gaertner – Former Statewide Director of Centers of Excellence**
Breakthrough Consulting Services
1218 Fiddlers Green
San Jose, CA 95125

**John Carrese – Director, Bay Region Center of Excellence**
City College of San Francisco
50 Phelan Avenue Cloud Hall, Rm 233
San Francisco, CA 94112

**Zhenya Lindstrom – Director, San Diego-Imperial Regions Center of Excellence**
Chaffey College
5897 College Park Ave
Chino, CA 91710

This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites, and including, but not limited to accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability or ownership.

Unless otherwise specified, this work by Delaware Technical Community College is licensed under a Creative Commons Attribution 4.0 International License: [http://creativecommons.org/licenses/by/4.0/](http://creativecommons.org/licenses/by/4.0/).
# Table of Contents

Top Industries for Employment ................................................................. Page 2
Drivers of Employment Growth ............................................................ Page 2
Employment Outlook – Extrapolated Survey Data .................................. Page 3
Supply/Demand Gap Analysis – Extrapolated Survey Data ..................... Page 4
Employer Hiring Challenges ................................................................. Page 4
Common Skill Needs Across All Occupations ...................................... Page 5
Soft Skill Needs by Degree of Importance ............................................ Page 5
Key Conclusions & Recommendations ................................................ Page 6
Executive Summary

Delaware Technical Community College requested this labor market scan in an effort to determine employment dynamics and drivers for the following set of engineering technology programs:

1. Civil Engineering Technicians (n=49)
2. Surveying Technicians (n=46)
3. Architectural Engineering Technicians (n=28)
4. Environmental Engineering Technicians (n=42)
5. Construction Management Technicians (n=43)
6. Water/Wastewater Operators (n=44)

*(n) = number of firms that responded to the regional survey of employers for the occupation

The scan seeks to provide Delaware Tech faculty and administrators with data outcomes and recommendations specific to each occupation 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. The scan examines engineering technicians within a 13-county mid-Atlantic region that includes all three counties in the State of Delaware and ten bordering counties in Pennsylvania, Maryland and New Jersey. The scan includes data and information that addresses a range of workforce issues including employment demand, soft and technical skill needs, educational preferences, and wages.

This scan includes information gleaned from a regional survey of employers which yielded responses from 153 firms. Given that firms may employ multiple types of technicians, many respondents completed the survey for more than one occupation resulting in 252 occupation-level responses. Executive interviews were held with 17 individuals from 15 firms so as to provide qualitative context to the survey data.

Top Industries for Employment of Engineering Technicians – Survey Data

The Construction, Professional Scientific & Technical Services, and Government (Public Administration) sectors together accounted for 141 of 153 responses (92%). Construction industry responses were comprised of 2 main subsectors, Construction of Buildings and Heavy Civil Engineering Construction. Architectural, Engineering, Drafting, Interior Design, Surveying, and Testing firms made up the majority of responses for the Professional Scientific & Technical Services industry. Public Works, Public Transportation, and Municipalities made up the majority of responses from the Government sector. The Government, Professional, Scientific & Technical Services, and Construction industries are ranked first, sixth, and ninth respectively in terms of their regional employment levels.

Drivers of Employment Growth – Survey Data

Roughly 36% of firms predict that demand for this cluster of engineering technicians will grow over the next three years. Forty-one percent (41%) predict that demand will remain the same and 19% were unsure as to how demand would shift. Below is a list of market factors that were identified in an open ended question as having the greatest impact on employment demand over the next 3 years. The percentage of firms that listed that factor is also provided.
1. **Economic Recovery (35%)** – As the construction market slowly rebounds and financing requirements ease, the long-suppressed architecture and design market will gain momentum and add jobs to accommodate increased workloads.

2. **Increased Regulatory Requirements (21%)** – Increased regulatory requirements will drive the need for added jobs at the technician level. Land use and water management regulations will spur the need for more highly-trained inspectors, testers, and drafters, particularly in the environmental and water management sectors.

3. **Increased Demand Due to Rising Population (10%)** – Fifteen firms predict that steady increases in the region’s population will force the creation of new services to meet demand. New health care facilities, housing developments, and water/wastewater treatment plants will be required to accommodate a rise in the aging population as well.

4. **Increasing Environmental Awareness (10%)** – As more builders and land owners seek to reduce their energy expenses and carbon footprint, the need for technicians and drafters that are knowledgeable about energy efficient materials, processes and green infrastructure will increase.

**Engineering Technician Employment Outlook – Extrapolated Survey Data**

The table below provides extrapolated employment data based on responses gathered in the regional survey of employers. Total 3YR openings were calculated by combining 3YR job change and openings due to projected retirements and turnover.

<table>
<thead>
<tr>
<th>Estimated Universe of Firms</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><strong>Civil Eng. Technicians</strong></td>
<td>247</td>
<td>944</td>
<td>1091</td>
<td>147 (15%)</td>
<td>112 (12%)</td>
</tr>
<tr>
<td><strong>Surveyors/Survey Eng. Technicians</strong></td>
<td>234</td>
<td>569</td>
<td>608</td>
<td>39 (7%)</td>
<td>39 (7%)</td>
</tr>
<tr>
<td><strong>Architectural Eng. Technicians</strong></td>
<td>117</td>
<td>250</td>
<td>309</td>
<td>59 (24%)</td>
<td>23 (9%)</td>
</tr>
<tr>
<td><strong>Environmental Eng. Technicians</strong></td>
<td>208</td>
<td>588</td>
<td>672</td>
<td>84 (14%)</td>
<td>87 (15%)</td>
</tr>
<tr>
<td><strong>Construction Mgt. Technicians</strong></td>
<td>188</td>
<td>1,428</td>
<td>1,844</td>
<td>416 (29%)</td>
<td>134 (9%)</td>
</tr>
<tr>
<td><strong>Water/Wastewater Operators</strong></td>
<td>195</td>
<td>1,498</td>
<td>1,665</td>
<td>167 (11%)</td>
<td>132 (9%)</td>
</tr>
<tr>
<td><strong>All Technicians</strong></td>
<td>649*</td>
<td>5,277</td>
<td>6,189</td>
<td>912 (17%)</td>
<td>527 (10%)</td>
</tr>
</tbody>
</table>

*Reflects the number of firms that have at least one of these occupations on staff. This number is not the sum of each occupation’s universe of firms.

Combined employment for all occupations in the region could be as high as 5,277 jobs. This is a conservative estimate based on the survey’s qualifying and occupational incidence rates (the percentage of firms in each industry that currently employ any of the technicians of focus and the percentage of qualifiers that hire each specific occupation). That being said, CIRWA estimates that this survey data (n=153) is representative of approximately 24% of the total “universe of firms” (649 firms).

The survey data indicates that participants are projecting a 17% increase in employment over the next 3 years. Retirement and turnover rates are predicted to hover around 10% over the next 3 years. Combining job growth with openings due to retirements and turnover, the data indicates that the 13-county region could see as many as 648 job openings annually within these occupations.
Supply/Demand Gap Analysis – Extrapolated Estimates

The table below provides an overview of regional program graduates based on IPEDS (Integrated Postsecondary Education Data System) data compared to CIRWA’s extrapolated estimates of annual and 3-year position openings for all technicians of focus except for water/wastewater technicians, which do not report into IPEDS. Data provided in this table is aggregated; however, extrapolated estimates specific to each discipline can be found within each occupation’s section of this report.

IPEDS Regional Graduate Data versus Extrapolated Estimates for Regional Position Openings

<table>
<thead>
<tr>
<th></th>
<th>Openings due to Growth</th>
<th>Openings due to Replacements</th>
<th>Total Position Openings</th>
<th>Average Regional Program Graduates</th>
<th>Supply/Demand Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3YR</td>
<td>Annual</td>
<td>3YR</td>
<td>Annual</td>
<td>3YR</td>
</tr>
<tr>
<td>Civil</td>
<td>147</td>
<td>49</td>
<td>231</td>
<td>77</td>
<td>378</td>
</tr>
<tr>
<td>Surveying</td>
<td>39</td>
<td>13</td>
<td>107</td>
<td>36</td>
<td>146</td>
</tr>
<tr>
<td>Architectural</td>
<td>59</td>
<td>20</td>
<td>62</td>
<td>21</td>
<td>121</td>
</tr>
<tr>
<td>Environmental</td>
<td>84</td>
<td>28</td>
<td>142</td>
<td>47</td>
<td>226</td>
</tr>
<tr>
<td>Construction Mgt.</td>
<td>416</td>
<td>139</td>
<td>258</td>
<td>86</td>
<td>674</td>
</tr>
<tr>
<td>TOTAL</td>
<td>745</td>
<td>249</td>
<td>800</td>
<td>267</td>
<td>1,545</td>
</tr>
</tbody>
</table>

Please note: While the supply gap shown in the data may seem large, it is likely that the firm-level job growth mean on which “Openings due to Growth” extrapolations were based is slightly inflated due to the inherently optimistic bias of self-reported data. In addition, medium and large size firms are overrepresented in the completed survey sample by approximately 15%. This could potentially skew the average growth rate toward the high end. It is also important to keep in mind that this gap does not necessarily reflect a shortage of “associate degree-prepared” workers since a large percentage of these workers do not currently possess an associate degree and there are no industry standards that require job candidates to have or obtain one to hold these positions. Finally, completion data does not include graduates of any programs that do not receive federal financial aid since those programs do not report to IPEDS. Regardless, the data shows that even when putting growth projections aside, programs are still not producing enough graduates to meet the replacement needs of these occupations due to retirements and turnover.

Employer Hiring Challenges – Survey Data

More than 50% of all responses from employers indicated that it is “difficult” or “very difficult” to find a qualified candidate to fill these job openings. Seventy-four percent (74%) of employers’ responses indicated that it is at least “somewhat difficult” to find a highly-qualified job candidate.

Sixty-five percent (n=198 occupation-level responses) of respondents identified “Lack of relevant work experience” as a contributing factor in their difficulty finding qualified workers. Additional contributing factors include:
- Lack of position-related technical skills (59%)
- Lack of “employability” or “soft” skills (52%)
- Lack of required education and/or training (51%)

This data suggests that when hiring for technician-level positions, firms are experiencing a variety of competing factors that contribute almost equally to their difficulty in finding qualified talent.
Common Skill Needs across All Occupations

Executive interviews conducted with regional employers of these technicians and open-ended questions included in the regional survey revealed several employment needs that cut across all occupations. This data was analyzed and combined to compile a comprehensive list of themes that are changing the way employers identify “highly-qualified” applicants for these jobs.

1. **Relevant work experience** – Employers want to see project outcomes and a summary of the job applicant’s contributions on previous projects.

2. **Knowledge of state and local mandates, codes and regulations** – A baseline knowledge and understanding of codes and regulations is becoming a “must-have” within all of the occupations of focus.

3. **Ability and desire to build relationships and network** – Many of these firms rely on client networking and word-of-mouth recommendations. Technicians must have the interpersonal skills necessary to facilitate new business opportunities for the firm.

4. **Global Positioning and Geographic Information Systems** – GPS and GIS are not new technologies, but they are rapidly increasing in daily use within these industries and improving the accuracy and detail of drawings and blueprints for firms.

5. **Need for greater diversity in the Architectural/Engineering industry** – The general lack of workforce diversity in the architectural and engineering industries is a growing concern for firms that desire their workforce be more reflective of their multicultural client base.

**Soft Skill Needs by Degree of Importance**

Employers were asked to rank, in general, the degree of importance of several “soft” skills that cut across all of these occupations. Figure 3 provides a breakdown of the 153 responses from survey-takers ranked from top to bottom according to the percentage of firms that identified the skill as either “very” or “moderately important”.

![Figure 3. Importance Level of Soft Skills Across All Occupations (n=153)](chart.png)
**Key Conclusions and Recommendations**

The conclusions and recommendations provided below offer a brief overview of key outcomes from this study based on the regional survey of employers and interviews with local firms that hire these technicians. For more detailed information about each of these findings and recommendations, please see the full Conclusions and Recommendations section of the report which begins on page 44.

**Key Conclusions**

1. **The region is not producing enough of these types of technicians to fill the replacement or growth need projected through 2018.** The supply/demand gap analysis shows that until the region is able to increase the supply of associate-degree prepared workers to enter these jobs, employers may be forced to continue hiring individuals without the level of educational preparation and experience they prefer in order to fill job openings.

2. **Computer technology and software applications are changing the “must-have” skills needed for these jobs.** Forty-nine percent (49%) of survey respondents feel that advancements in software packages, particularly 3D drafting, GPS/GIS applicability and project management software, is a key factor that will impact technical skill need over the next few years. As a result, knowledge of these programs is in high-demand and could soon become “must-have” for employment.

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%) noted that they prefer to see some sort of construction experience on a job applicant’s resume. Familiarity with scheduling, budgeting, safety protocol, and the sequence of activities that occur on a job site gives new workers the perspective needed to plan, anticipate and predict in their specialty areas.

**Key Recommendations**

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.**

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.**

3. **Consider retiring the AAS in Interior Architectural Design program currently located at Terry Campus and the AAS in Water Quality program currently located at Owens Campus due to low current and projected demand from industry.**

4. **Consider adopting a cooperative workplace education experience as a requirement for graduation in the Civil, Surveying, Architectural, Environmental, and Construction Management programs.**

5. **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 as these are all “high-need” areas for local employers.**