



# Building Bridges

Solutions and Alternatives to Maryland's  
Persistent Deficit in Built Environment College Degrees



**MCCEI**



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## **Introduction**

Established in 2009, the Maryland Center for Construction Education and Innovation (MCCEI) partners industry, education, and government in addressing workforce development issues facing Maryland's built environment industry.

Representing roughly 19,500 businesses and 190,000 employees, Maryland's built environment industry is a major segment of the state's economy. Having emerged during the Great Recession and currently experiencing robust growth, the industry projects \$12.6 billion in annual commercial project volume and \$2.5 billion in annual payroll during the next five years (Construction Labor Market Analyzer). Its growth has coincided with the rapid evolution of the construction business, due to advances in technology and adaptations to processes, including building information modeling (BIM), component modularization, robotics, and 3-D printing. By extension, with parametric modeling for design and construction, as well as advanced computer and control systems for operations, buildings are becoming as complex as the business of constructing them, given revised standard contracting and delivery methods to optimize the efficiency of the entire process, from conceptualization to operations.

However, the industry and its growth potential currently suffer from a lack of holders and candidates of built environment-related bachelor's degrees, including engineering, construction management, and architecture, from in-state colleges and universities. Despite the decades-long need for built environment professionals with baccalaureate education, as the complexities of construction and building processes increase, so does the demand for professionals with bachelor's degrees. For years, Maryland-based companies have been at a disadvantage in hiring personnel with bachelor's degrees in engineering and construction management, due to a lack of in-state programs that offer such degrees and a lack of awareness about and interest in those subjects among high-school graduates. In response, by drawing upon direct feedback from industry and independent research, MCCEI has not only quantified industry demand, but furthermore qualified the steps necessary to overcoming the labor challenges facing Maryland's built environment industry.

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## **About Building Bridges**

*Building Bridges* is a call to action for Maryland's industry, education, and government to expand existing educational assets, create new assets, and simplify pathways to careers.

In past research and assessments of Maryland's built environment industry and the K-12, postsecondary, and apprenticeship education system that produces its workforce, a recurring theme has been the persistent gap between skills that Maryland-based businesses seek and skills developed at in-state institutions. Prior to Building Bridges, numerous reports revealed that the default labor pools of Maryland's built environment companies were out-of-state schools, given perceptions that Maryland lacks adequate built environment degree-granting programs. To address that trend, MCCEI conducted an in-depth analysis involving three components:

- 1.** Verifying and quantifying the gap between skills demanded by built environment companies and skills produced in-state institutions;
- 2.** Identify reasons for the gap; and
- 3.** Conducting qualitative analysis on actions Maryland can take to close the gap.

## Methods

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*Building Bridges* compiles three distinct phases of research:

**Phase 1** – Verifying the gap. From MCCEI’s primary research, we obtained graduation and enrollment rates at in-state bachelor’s degree programs in construction management and engineering. Second, we obtained hiring data from construction companies with matching demands of supply output and hiring patterns from in-state and out-of-state schools. This phase confirmed that demand vastly outweighs supply and that Maryland firms have tended to hire from out-of-state instead of in-state schools at a margin of 3 to 1.

**Phase 2** – Quantifying the statewide gap. MCCEI hired Towson University’s Regional Economic Studies Institute (RESI) and HR&A Advisors to conduct an extensive analysis of statewide hiring trends and benchmark select out-of-state programs to determine why their graduates are preferred over graduates from in-state programs. RESI and HR&A used modeling software to extrapolate hiring data for all of Maryland’s industry and develop a five-year forecast of demand. Please note, none of the quotes used in this report were gathered by RESI/HR&A and are solely attributable to the work completed by MCCEI.

**Phase 3** – Identifying actions that Maryland’s schools can take to become more competitive. MCCEI conducted primary research on types of degrees in demand, attractive alternatives to traditional four-year degrees, and suggestions for encouraging more students to pursue built environment careers by studying at in-state programs.

This report is a summary of the findings of these three phases of research. To find out more information, please visit [MCCEI.org](http://MCCEI.org) and download the following works:

1. *The Critical Path* – Positioning Maryland as an Innovation Leader in the Global Construction Industry (MCCEI, December 2012).
2. *Digging Deeper* – Aligning Skills, Technology and Attainment Between Industry and Education (MCCEI, October 2014).
3. State of Maryland Industry Bachelor’s Degree Demand Analysis (RESI and HR&A Advisors, June 2015).

## Funding

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*Building Bridges* was funded entirely by industry donations. No public dollars were used in the research or in the compensation of consultants or MCCEI staff. Results and recommendations contained herein should be considered to represent an unbiased reflection of Maryland’s built environment industry.

## Key Findings

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### The Deficit

In the next five years, Maryland's built environment industry is anticipated to hire **8,700** more bachelor degree holders than produced by in-state institutions (Tables 1 and 2, p. 8).

### Degrees in Demand

Based on historical hiring data, Maryland's built environment industry hires personnel with bachelor's degrees in the following areas of study:

1. Civil engineering
2. Construction management
3. Other engineering (e.g., architectural, structural, construction, and mechanical)
4. Real estate
5. Other (e.g., business, economics, architecture, the sciences, and the liberal arts).

For detailed breakdowns of estimated demand per area of study, see Tables 1 and 2 (p. 8).

### Sources of Graduates

Nearly three quarters (74%) of new hires in Maryland's built environment industry hold degrees from colleges and universities outside Maryland, whereas only 26% hold degrees from in-state schools (Figure 12, p. 20). This gap is projected to widen during the next five years as out-of-state schools expand or add programs. For example, at Virginia Tech:

- Enrollment in the Building Construction program hit a five-year high in Spring 2015;
- Capacity of the Construction Engineering and Management program is being expanded;
- An Intelligent Infrastructure program was announced in May 2016

For further comparison, in December 2015, the University of Delaware announced the launch of a Construction Engineering and Management program and began to hire staff.

### Home Field Advantage

Maryland businesses would greatly prefer to hire Maryland residents with degrees from in-state schools for several reasons, including:

- Familiarity with state geography and culture;
- Larger professional networks and business contacts;
- Reduced hiring expenses; and
- Substantially reduced turnover (Figure 5, p. 11).

### Reasons Maryland Businesses Hire Primarily Out of State

Maryland businesses hire graduates with degrees from out-of-state institutions due to:

- General unfamiliarity with in-state programs;
- Bad hiring experiences with graduates and university student placement services;
- Perceptions that Maryland's schools are slightly inferior to out-of-state schools;
- A limited number of programs and locations statewide; and
- Preferences for established graduates from out-of-state schools who achieved leadership positions to return to their alma maters for talent recruitment. (Table 11, p. 17).

## A Hidden Tax

**\$73 million per year** is the cost of Maryland's built environment industry's relying primarily on graduates from out-of-state schools (Table 4, p. 10). Since the vast majority of graduates hired by Maryland's industry comes from out-of-state schools, the industry experiences exceptionally high turnover at the four-to-six-year seniority mark, and Maryland-based businesses have to hire a large amount of entry-level graduates each year to retain only a small fraction of that amount after five years of employment. The primary reason for such turnover is that employees, after acquiring marketable skills and experience, typically desire to relocate to their home states. For Maryland's industry, the cost of that trend is significant, resulting in lost production, project disruption, additional hiring expenses and training.

## A Massive Export of Dollars

**\$24 million per year** is the total in-state tuition, room and board, and books and supplies spent outside Maryland by Maryland residents that attend out-of-state construction and related programs, but later return to Maryland to work in the industry (Table 4, p. 10).

## A Foundation to Build Upon

Maryland possesses critical components to better serve the state's built environment industry and create opportunities for state residents:

**University of Maryland College Park** – Offers majors in civil engineering, project management, and architecture, as well as a minor in construction management

**Morgan State University** – Offers majors in construction management, civil engineering, and architecture

**University of Maryland Eastern Shore** – Offers a major in construction management technology

**Johns Hopkins University** – Offers a major in civil engineering

**University of Baltimore** – Offers a major in real estate and economic development

## 2+2 Success

A 2 + 2 combined degree is an associate's degree from a community college articulated with two years of study at a university in order to earn a bachelor's degree. The built environment industry sees no difference between a 2 + 2 combination and a traditional four-year degree. There are several existing articulations that need broadbased promotion, as well as numerous, potential combinations to be made that would provide more options for Maryland residents.

## A Well-Kept Secret

Businesses and students in Maryland are generally unaware of both the many career options in the built environment industry and the programs offered in the state that award degrees qualifying graduates for those careers. A larger campaign to spread awareness of both points among businesses and students is therefore needed; please see suggestions on p. 15.



Penza Bailey Architects



Skanska



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## MCCEI Recommendations

**1.** Expand existing bachelor's degree programs in construction management at Morgan State University (MSU) and the University of Maryland, Eastern Shore (UMES). These established programs represent the most logical sites for fast-tracking graduates into the built environment industry. Program expansions should include increasing raw enrollment numbers through traditional enrollment and articulations with associate's degree programs at state community colleges, as well as launching co-op programs that blend on-campus learning with onsite job experience in specific intervals. This recommendation is consistent with those of RESI and HR&A Advisors; please see pp. 45–50 of *State of Maryland Construction Industry Bachelor's Degree Demand Analysis*.

**Actions:** By way of the General Assembly, the University System of Maryland (USM), and independent colleges and universities in the state, Maryland should allocate money and resources to marketing the programs in order to facilitate the expansion of faculty to teach classes, mentor students, and strengthen partnerships with the business community.

**2.** Establish a temporary, single-purpose taskforce to examine and evaluate the creation and strengthening of current and proposed articulations between community colleges and four-year institutions. Of course, creating articulation agreements can be time consuming and plagued by inter-institutional roadblocks. This recommendation is consistent with those of RESI and HR&A Advisors; please see pp. 45–50 of *State of Maryland Construction Industry Bachelor's Degree Demand Analysis*.

**Actions:** Comprised of industry professionals and both community college and university educators, the taskforce should adopt the mission of:

- a. Creating a publicly accessible database of existing built environment program articulations;
- b. Identifying and creating a minimum of eight articulations in a 24-month timeframe;
- c. Creating a marketing and promotion plan for high-school counselors, students, and parents about articulated programs; and
- d. Funding the marketing and promotion plan.

**3.** Create new bachelor's degree programs at four-year institutions throughout the state in majors not currently offered in Maryland. These programs should be modeled according to degree-granting programs at Virginia Tech and Pennsylvania State University in construction engineering, structural engineering, and architectural engineering that have deep-seated industry relationships and attract a significant amount of Maryland residents. This recommendation is consistent with those of RESI and HR&A Advisors; please see pp. 45–50 of *State of Maryland Construction Industry Bachelor's Degree Demand Analysis*.

**Actions:** The University of Maryland System should add the following programs:

**a.** Short term: A bachelor's degree in construction engineering at University of Maryland, College Park (UMCP). With its widespread recognition in the built environment industry and established programs, UMCP is the logical site for adding the program to the state university system. Establishing the program at UMCP would furthermore clearly indicate to the industry that the state is committed to addressing the long-term problem facing in-state built environment human resources.



Towson University- CLA Building  
Whiting-Turner Contracting Company

- b. Midterm: Add an American Council for Construction Education (ACCE) accreditation-track program in construction management at Frostburg State University (FSU). There are currently no construction-related bachelor's degree programs west of the Baltimore–Washington, DC corridor.
  - c. Long term: Create bachelor's degree programs in either architectural or structural engineering at a university with an established engineering program, such as MSU, UMCP, FSU, or the University of Maryland, Baltimore County (UMBC).
- 4.** The state of Maryland should establish another temporary, single-purpose taskforce to examine and evaluate the potential for creating a technological or apprenticeship-based university modeled after successful institutions such as the Pennsylvania College of Technology in Williamsport, PA, and Ferris State University in Big Rapids, MI. These schools are hybrid two-year/four-year programs with an intensive focus on hands-on learning, apprenticeship-based curricula, and alternative pathways to earning a bachelor's degree, including:
- a. Intensive internships and work–study components to education; and
  - b. Official co-op programs with state businesses.

Programs such as those at the Pennsylvania College of Technology and Ferris State University focus on graduating teachable, trainable practitioners with solid academic backgrounds, instead of young professionals with high academic qualifications able to learn but with limited practical experience. Although the construction industry highly values both kinds of graduates, Maryland has no four-year program focused on the former. This recommendation is consistent with those of RESI and HR&A Advisors; please see pp. 45–50 of *State of Maryland Construction Industry Bachelor's Degree Demand Analysis*.

**Actions:** Comprised of industry professionals, university educators and administrators, and officials from USM, the Maryland Higher Education Commission, the Maryland Association of Community Colleges, the Department of Labor, Licensing, and Regulation, and the Maryland Independent Colleges and Universities Association, the taskforce should adopt the mission of:

- a. Determining the feasibility of creating a technological or apprenticeship-based university in Maryland; and
  - b. Coordinating findings and recommendations with existing efforts to expand apprenticeships in Maryland.
- 5.** The state of Maryland should establish another temporary, single-purpose taskforce to examine and evaluate the potential of creating a centralized, statewide coordination body for arranging, scheduling, administering, and monitoring internships specific to the built environment industry. Internships can be difficult to manage for employers, students, and institutions, due in large part to conflicts among state employment laws, student preparation and availability, and desired university outcomes. By contrast, the state should facilitate internship activity as much as possible in order to minimize employers' costs and risks, maximize student experiences, and promote learning objectives.

**Action:** One solution is to establish a statewide, industry-specific, temporary placement agency for students in Maryland's built environment-related academic programs. This recommendation is consistent with those of RESI and HR&A Advisors; please see pp. 45–50 of *State of Maryland Construction Industry Bachelor's Degree Demand Analysis*.

**Note:**

Throughout the report, we have included anonymous quotes from participants. Sometimes, words from impassioned professionals can say things better than we ever could.

**"There is no degree out there that understands our business. No single major is the ticket."**

Acquired by MCCEI.

**"We hire primarily in construction management or civil engineering. Nuts and bolts guys that can get things done."**

Acquired by MCCEI.

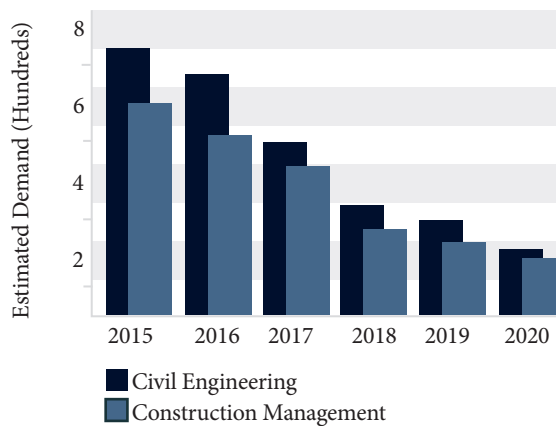
## The Supply-Demand Gap

In research conducted by RESI and HR&A Advisors, when extrapolated to the state level, Maryland's built environment industry will need to hire **9,715** construction managers and engineers with bachelor's degrees during 2015–2020 in order to accommodate business growth and anticipated retirement. During that period, with all else being equal, Maryland's schools will produce only **1,020** graduates with relevant bachelor's degrees, thereby leaving demand in excess of supply by **8,695** degree holders.

### Degrees in Demand

The analysis by RESI and HR&A Advisors focuses entirely on bachelor's degrees in construction management and civil engineering, which are together slated to meet 56% of future hiring demand. The vast majority of hires made by construction companies will possess degrees in those fields and other related engineering fields, including construction and architectural, structural, and mechanical engineering. Degree demand by year is illustrated in Table 1 :

**Table 1** – Estimated demand by major for Civil Engineering and Construction Management: 2015-2020.

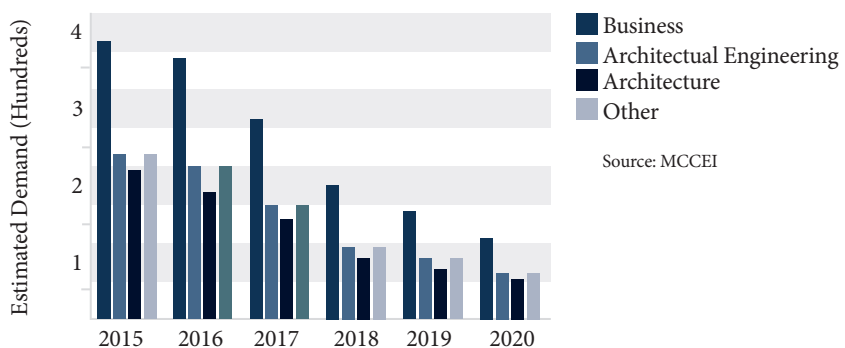


Source: RESI/ HR&A

### Alternate Degrees

In the near future, construction companies will look beyond traditional construction degrees and consider personnel with alternative academic backgrounds in business, the liberal arts, and the sciences. Graduates in those fields are projected to represent 44% of total hires during 2015–2020.

**Table 2** – Estimated demand for alternate degrees beyond Construction Management and Civil Engineering: 2015-2020.



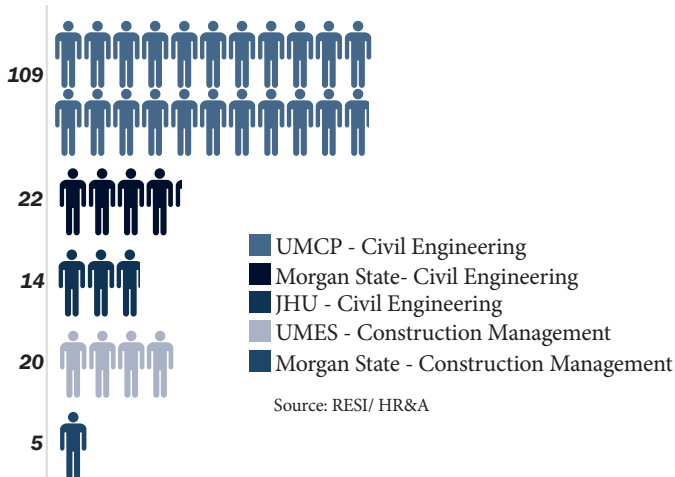
Source: MCCEI



## Sources of Graduates

In Maryland, four institutions offer bachelor's degrees in construction-related fields. For the purposes of this analysis, the most recent three-year graduation rates used were assumed to be steady during 2015–2020:

**Table 3** – Estimated graduates from Maryland based schools.



It should be noted that annual totals fluctuate and that all figures are therefore estimates.

## Home Field Advantage

Most businesses interviewed for *Building Bridges* indicated distinct advantages in hiring Maryland residents educated in Maryland, including their geographical, cultural, and economic familiarity with areas in the state, greatly reduced hiring and recruitment expenses, and above all, extended length of employment. However, given that demand greatly outpaces supply, the industry's solution has been to hire graduates from out-of-state schools, primarily in Pennsylvania and Virginia.

## Hiring Types

There are four types of bachelor's degree holders defined by RESI/HR&A below. Year by year estimates of the hire type are shown in Table 4:

- Staters** – Maryland residents educated at Maryland Schools and stay in Maryland after graduation.
- Returns** – Maryland residents educated at out-of-state schools returning to Maryland after graduation.
- Scholars** – Out-of-state residents educated at Maryland Schools and stay in Maryland after graduation.
- Careerists** – Out-of-state residents educated at out-of-state schools and coming to Maryland post-graduation.

"There is no favorability. When we see a resume, there is nothing good or bad about a school, it's all good."

Acquired by MCCEI.

"It is not the degree that matters. We are a series of utility players. People need to understand the terms and language and expand to everything with a broad breadth of experiences."

Acquired by MCCEI.

"I once hired a crop out of NC State; they all went back after a few years."

Acquired by MCCEI.

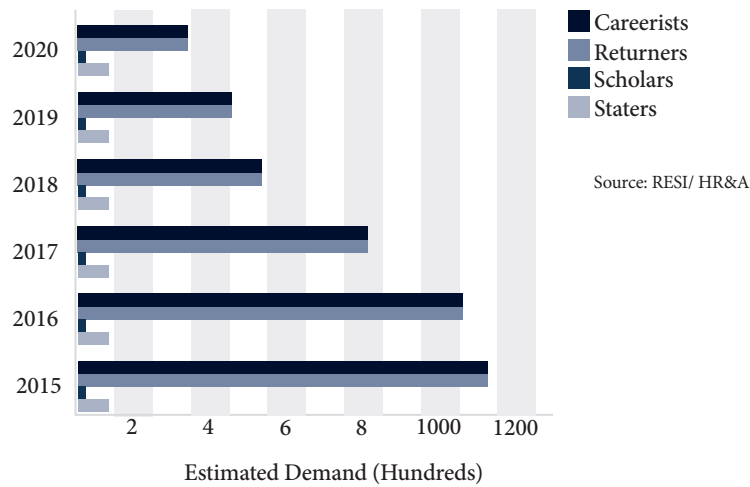
"It costs is in the high \$10's of thousands just to hire someone. The actual costs include months of learning curve, and then when they leave, it is 6 months of productivity loss."

Acquired by MCCEI.

"We lose about one third of new hires after 3 to 5 years, reasons are geographical moves back home or they leave the business all-together."

Acquired by MCCEI.

**Table 4** – Estimated demand by student type: 2015-2020



### A Hidden Tax

Given the above data and a projected 8,700 degree-holder gap, coupled with limited sources of graduates in Maryland, the majority of projected hires will graduate from out-of-state institutions. Throughout the interview process, respondents repeatedly indicated that when new hirees are graduates from out-of-state schools, the typical duration of employment is three to five years. According to the hiree types outlined above, scholars and careerists have the highest probability of leaving Maryland after three to five years, a trend that MCCEI interview respondents attributed primarily to:

- The marketable skills of recent graduates, which allow them to move to other companies, often in their home states;
- The desire to return home to be near family or familiar surroundings, if not both; and
- Their departure from the industry altogether to pursue other careers.

Companies make significant investments in hiring out-of-state residents and graduates, due to hiring and recruitment expenses, training and orientation, and two year's-worth of salary and benefits. Those two years of initial employment are typically conceived as a training period for employees and constitute a net loss for companies as employees learn skills, knowledge, and processes that they will ultimately take elsewhere. Added to those costs are other expenses due to lost production, disruption of work flow, and opportunity costs. Depending on the company, that investment can total \$140,000–160,000 per hiree.

When extrapolated to scholars and careerists, the hidden tax of maintaining adequate staffing is highly significant. Using the projections shown in Table 4, the cost to Maryland's construction industry averages \$73.4 million per year, with the following assumptions:

- A 15% annual attrition rate, meaning 75% of all scholars and careerists will have left the original hiring company after five years, 60% after four years, and 45% after three years;
- Hiring and recruitment costs of \$22,000 per person, at a 3% rate of inflation per year; and
- Salaries and benefits estimated at \$65,000 per year, at a 3% rate of inflation per year.

Exclude from the direct costs of employee turnover are tangential items such as:

- Offers of signing bonuses to attract staff that can maintain project momentum as turnover occurs;
- Negative effects on quality control; and
- Diminished safety due to unfamiliarity with projects as they evolve.

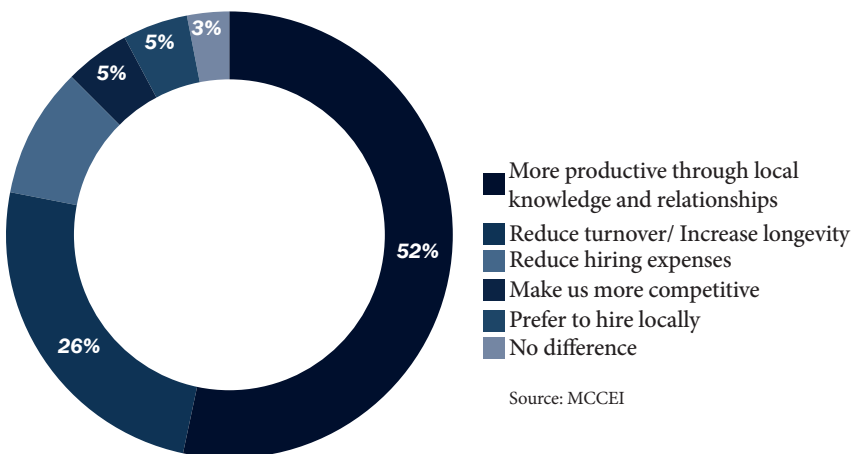
Simply put, this hidden tax is money wasted; however, Maryland’s construction industry just learned to accept it as another cost of doing business in Maryland.

### Benefits to Producing More Graduates in Maryland

While there is no guarantee that a Maryland resident will stay at a particular company longer than a non-resident, empirical data show that the likelihood is far greater with residents over non-residents. Slightly more than one fourth (26%) of industry interviewees indicated that turnover would likely be reduced if more graduates were produced in Maryland.

A clear case can be made that hiring out-of-state graduates results in significantly increased costs with hiring, training, and productivity losses due to employee turnover. Maryland residents also spend millions of dollars in other states each year in tuition, fees, and commerce. In response, we asked industry actors what other benefits to their businesses would be if they could hire more graduates from Maryland’s schools.

**Figure 5** – Responses to the interview question - What would be the top 3 benefits to your business if you were able to hire more college graduates from Maryland institutions, instead of from out-of-state institutions?



"It costs us \$150,000 per head in salary, training, relocations, interview expenses, hotels and benefits. In-state costs would probably be about half that for jobs in Maryland."

"Home grown people know that area and the environment, bring contacts and networks. Everyone networks."

Over half of respondents expressed that having more access to people with local ties would be highly beneficial. Many interviewees added that employee turnover is not necessarily indicative of employees’ dissatisfaction with jobs or employers, but often due to a sense that they do not belong in the culture of the company or the society of the local area. Although Maryland has a lot to offer in terms of lifestyle, it is not for everyone.

This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.



Gilbane Building Company

## Solving the Problem without Starting from Scratch

The state of Maryland possesses crucial components to close the gap in demand and supply for bachelor's degree holders in the state's built environment industry.

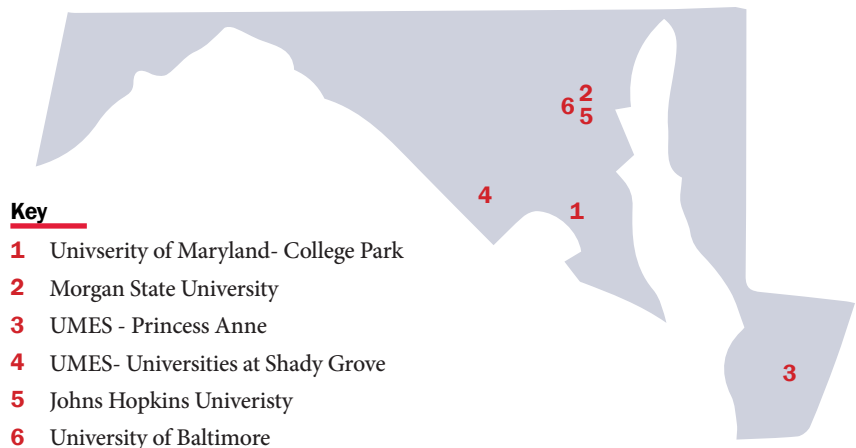
**The University of Maryland, College Park** - Offers majors in civil engineering, architecture, and project management, as well as minor in construction management. UMCP offers the largest, most well-known, and most highly regarded programs in the state. What UMCP lacks, however, is a program focused exclusively on construction; its programs are related but not directly linked to the construction industry to the same extent of primary out-of-state competitors such as Pennsylvania State University and Virginia Tech.

**Morgan State University (Baltimore)** – Offers majors in construction management, architecture, and civil engineering. MSU also offers programs in built environment and infrastructure studies at the new Center for Built Environment and Infrastructure Studies (CBEIS). What MSU lacks, however, is awareness of its programs and facilities outside Baltimore, sufficient faculty to increase class offerings, and broad-based, statewide industry recognition.

**University of Maryland, Eastern Shore** – Offers a major in construction management at both its main campus in Princess Anne and its satellite campus in Shady Grove. In fact, UMES has the only accredited Construction Management program in Maryland, one that has earned an excellent reputation. As with MSU, however, UMES lacks widespread awareness, faculty positions to increase output, and broad-based, statewide industry recognition. Nevertheless, UMES has made significant progress in spreading awareness and gaining industry recognition beyond the Eastern Shore by offering the Construction Management program at its Montgomery County facility.

**Johns Hopkins University (Baltimore)** – Offers a major in civil engineering. Johns Hopkins's program is known for its more theoretical coursework and very small classes. While highly regarded given its institutional heritage, the university's Civil Engineering program is so small and academically focused that it is largely insignificant for Maryland's construction industry.

**The University of Baltimore** – Offers a major in real estate and economic development, as well as articulation agreements planned with area community colleges that offer associate's degree programs in construction management, which industry representatives deemed to be valuable. As with its counterparts in the Baltimore area, however, UB lacks awareness of its program among potential students and the industry as a source of talent.



## 2+2 Success

Maryland hosts numerous excellent community college programs that offer associate's degrees in construction management. Highly useful in many areas, associate's degrees are widely accepted in the built environment industry as valid measurements of skill and ability. The industry, however, especially general contractors and construction management companies, primarily seek to hire bachelor's degree holders. Combination 2 + 2 or 2 + 3 degrees that include an associate's degree with a bachelor's degree are viewed no differently than a traditional bachelor's degree earned in four years.

2 + 2 degrees quickly prepare more graduates for the workforce by readying students currently enrolled within two years, instead of having high-school students take four or more years to complete a bachelor's degree program. To activate that benefit, more articulations between community colleges and four-year institutions need to be codified. Many such articulations already exist and should be replicated, including:

- The Community College of Baltimore County's Associate of Applied Science in Construction Management program, which is articulated in MSU's Bachelor's in Construction Management program and the University of Baltimore's Bachelor's in Real Estate and Economic Development program; and
- Montgomery College's Associate of Applied Science in Construction Management program, which is articulated in UMES's Bachelor's in Construction Management program offered at the Shady Grove campus.

2 + 2 programs can come in several forms, though all non-traditional degrees should be encouraged in light of clear evidence that the industry values them. Some suggestions are articulating associate's degrees in construction management offered at Baltimore, Montgomery, Prince Georges, Howard, Anne Arundel, and Frederick Community Colleges into the following:

- The University of Baltimore's Bachelor's in Real Estate and Economic Development program offered through the Merrick School of Business;
- Traditional business, finance, or economics programs at the University of Baltimore, Towson University, Coppin State University, Salisbury University, Loyola University, Bowie State University, and Stevenson University; and
- Mechanical engineering programs at UMBC, FSU, UMCP, Loyola University, and the US Naval Academy.

## Attitude and Experience above Education

The built environment industry is exceptionally welcoming to anyone who exhibits a positive attitude, an ability to learn, and a passion for building. Although having earned a construction-related degree is a clear indicator of those traits, it is not the sole indicator. In fact, holders of non-traditional construction degrees (e.g., in real estate, business, economics, or liberal arts) can similarly succeed in the industry. After four to six years in the business, having earned a degree becomes less relevant than experience and reputation for career advancement.

"I don't care how you got there, I care about the skills you bring and the capabilities you have. If 2+2 works for the individual, great!"

"The path is irrelevant; getting the bachelor's is the key."

"If the 2+2 allowed the same type of practical experience, say 6 months + of field experience plus the bachelors, then we'd consider hiring right out of school, which we typically do not do."

"If you have straight A's it doesn't mean you are going to get hired. Construction is a people business."

"It is really about accomplishments in a short period of time, after that it is attitude and aptitude."

"Our requirement is a 4-year degree; it creates levels of critical thinking that serves throughout a career."

"We're looking for people that completed their education."

### Paths Towards Degrees

In short, the built environment industry does not care how an individual earned a degree, but that he or she earned a degree. Earning a bachelor's degree not only demonstrates an ability to achieve a difficult, long-term goal, but moreover represents a measure of character. The industry does not view a job candidate who completed a degree in four years after graduating from high school any differently from one who attended community college for two years before earning a degree at university or one who attended six years of night school while working full time. The result is the same.

Nearly three quarters (72%) of MCCEI interview respondents indicated that the preferred degree among hires during the past five years has been a bachelor's degree, whereas the remainder indicated an associate's degree (17%) or apprenticeship for hands-on positions or postgraduate degree for business or real estate (11%). During the next five years, the level of hires with bachelor's degrees is anticipated to grow to 91%, with the remainder of hires having postgraduate degrees or other qualifications, depending on the job.

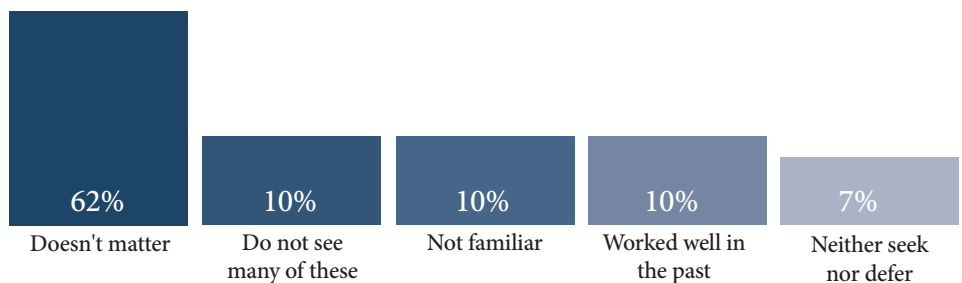
Figure 6 - Past and present hiring trend for bachelors degree



Source: MCCEI

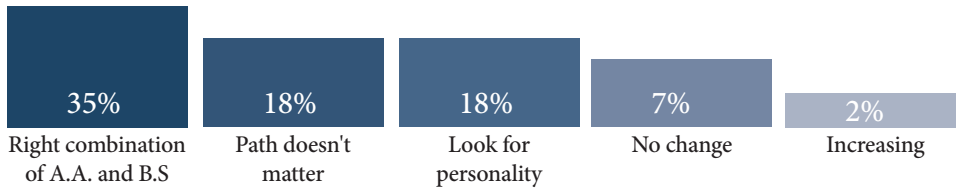
Generally, the built environment industry does not distinguish a student who graduated with a bachelor's degree by attending a college or university from one who earned a bachelor's degree by way of a 2 + 2 articulation split between community college and university. When asked what reception 2 + 2 combinations might receive in hiring decisions during 2015–2020, much of the industry would reportedly focus more on the particular combination and the personality of the applicant over the path taken.

Figure 7 - Opinions on hiring 2+2 degree holders: 2010-2015



Source: MCCEI

**Figure 8** - Opinions on hiring 2+2 degree holders: 2015-2020



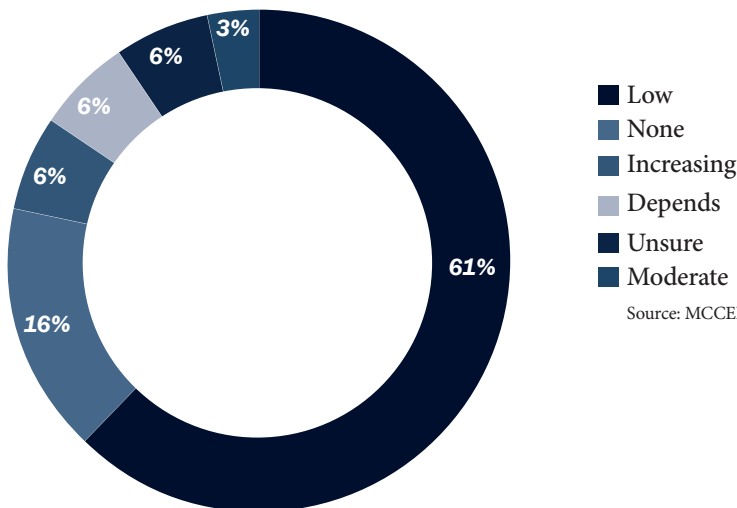
Source: MCCEI

### Awareness of Career Options

The vast majority of interviewees (77%) felt that high-school students have little or no awareness of careers in the built environment industry. By extension, they expressed no shortage of opinions regarding the reasons why, including the elimination of shop classes in middle and high schools, the push for all students to attend college, the lack of attention paid to the field by school counselors, and the industry's dismal marketing of itself.

However, those trends and setbacks are not unique to Maryland, but have persisted for years at the national level. Nevertheless, schools in Virginia and Delaware have added and expanded built environment-related programs; they have done what schools in Maryland have not, as well as have something that schools in Maryland do not, as explored later in the Benchmarking Programs section.

**Figure 9** - Level of awareness as perceived by MCCEI interview participants:



Source: MCCEI

"When they think construction, they think "Dirty Jobs." This is a huge issue, there is not a lot of positive outreach."

"The industry has to do a better job of making known the opportunities."

"The perception is that construction equals being a carpenter. Construction is a career opportunity."

When asked what should be done to increase awareness of the many career options in the built environment industry, 48% of respondents suggested direct exposure via internships, field trips, and industry engagement would yield the best results. A significant number of interviewees (39%) also indicated that direct marketing, outreach, and recruiting at the postsecondary level would result in increased awareness.

**Industry suggestions on increasing high school awareness of construction as a career path**

- 48% Exposure and internships**
- 39% Messaging outreach/recruiting**
- 9% Promote earnings potential**
- 5% Show examples of BIM modeling**

Source: MCCEI

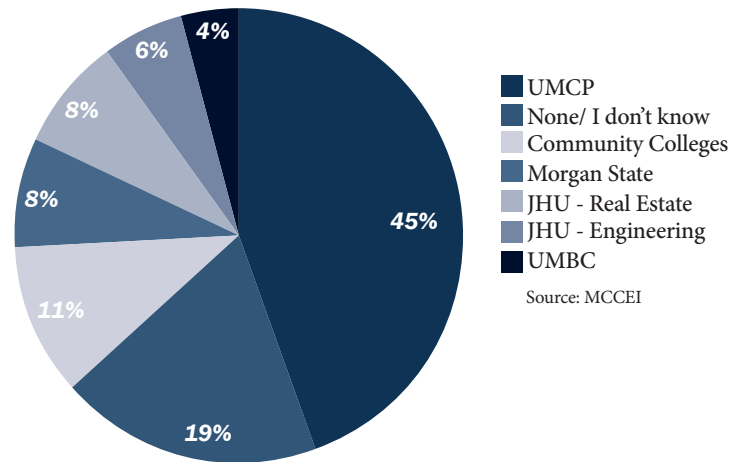


Whiting-Turner Contracting Company

**How Maryland Stacks Up**

Awareness cuts both ways. Not only does the built environment industry perceive little to no awareness of construction as a career path among students, but a significant portion of the industry itself is also unaware of in-state programs or holds a less-than-positive opinion of Maryland’s academic programs in the field. When asked which of Maryland’s programs have the best reputation for construction-related degrees, the interviewees offered some eye-opening responses. According to the interviewees, UMCP is clearly the highest regarded in-state program with 45% positive response. MSU, UMES, UB and JHU combined received 26%. Nearly rivaling the combined score from MSU, UMES, JHU and UB were the responses “none” or “I don’t know” with 19%.

**Figure 10** – Responses to the question “Which schools do you think have the best reputations for construction-related majors in Maryland?”



Source: MCCEI

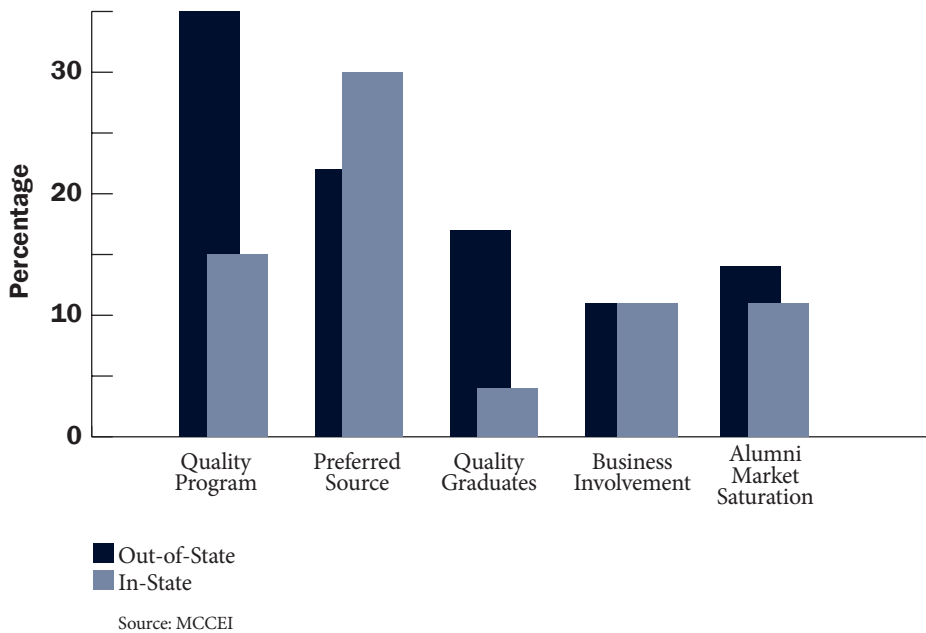
As a follow-up question, interviewees were asked why they held certain perceptions of in-state program reputations. Responses were fairly mixed between positive (59%) and negative (41%) viewpoints. Conversely, when the same question was asked regarding out-of-state schools, positive responses were nearly unanimous (98%).

In an additional examination of why out-of-state schools have stellar reputations in Maryland’s built environment industry and why Maryland’s schools receive unenthusiastic reactions, negative opinions of in-state schools stemmed from two primary sources: bad hiring experiences of individual candidates and a blasé attitude among schools’ student services departments toward employers. Notably, 26% of respondents were unaware that built environment-related programs were offered across Maryland, whereas an additional 11% altogether excluded Maryland’s programs from consideration for future hiring.

Stinging responses aside, the problems facing human resources in Maryland’s built environment industry are entirely fixable, provided that better marketing, student preparation, and faculty engagement with the business community can be engaged. Table 11 outlines other key categories of comparison mentioned by respondents and clearly shows the advantage enjoyed by out-of-state programs and their graduates.



**Table 11** – Industry opinions on In-state and Out-of-state program reputations.



"We don't hire from Maryland schools so there's no baseline to compare."

"No strong opinion either way, but everyone employed here are imports."

"It is who you come across, and who you're impressed with."

Often, a pithy anecdote can sum up an issue better than any survey or carefully worded prose. Throughout the Phase 3 interview process, respondents repeatedly shared unflattering stories of students from Maryland schools who had shown up for interviews completely unprepared or student services departments that could not have cared less about helping companies to hire their students.

One interviewee recounted calling the “school down the street” with a need to hire several students for internships and entry-level positions. In response, the school merely advised the company to visit the school’s website, register an account, follow the instructions, post job listings with as much detail as desired, and wait to see what happens. If the company encountered any trouble, it was encouraged to contact the school, who would forward them a link.

When the interviewee called Pennsylvania State University with the same request, the university responded by requesting the job descriptions and ensuring the company that students would be informed and reply shortly. The school even proposed scheduling a time for the company to interview students and meet program faculty.

In sum, employers value and appreciate customer service as much as anyone. It does not matter if an employer needs to hire one, a dozen, or several hundred people each year; schools that facilitate the hiring process and show enthusiasm quickly rise to the top of companies’ lists of schools with hireable graduates.

This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.

## A Massive Annual Outflow of Dollars



J Vinton Schafer

**"Keep the money in-state, taxes, tuition, fees, alumni stay here."**

**"Maryland is one of those states where people grow up here and stay here."**

For Maryland's built environment industry, the setbacks of in-state programs' poor reputation, output, and credibility can be overcome. A major reason to make such efforts is economic, for Maryland residents spend millions of dollars each year in surrounding states on tuition, fees, books, room and board, and incidental expenditures toward earning built environment degrees at out-of-state schools.

As Table 4 shows, a great deal of potential hires are returners: Maryland residents who leave the state to pursue higher education, yet return after graduation to initiate and advance their careers. Construction management and engineering programs in schools in other states (e.g., Pennsylvania State University and Virginia Tech) have developed stellar reputations and deep alumni bases in Maryland's built environment industry. As a result, those schools greatly attract Maryland residents to their built environment programs.

For example, assuming the estimated number of returners shown in Table 4, the average published 2015–2016 in-state tuition rates, fees, room and board, and a flat \$750 for books, Maryland residents spend \$24.5 million per year in other states that could be spent in Maryland instead.

Added to that massive outflow is that returners are more than likely to pay significantly higher rates for out-of-state tuition. Given sustained attention to the cost of higher education and the debt that often accompanies it, strengthening, expanding, and adding programs would arguably help Maryland students and families to reduce the cost of higher education.

In reality, we realize that capturing 100% of returners in Maryland's schools is unlikely. Fields such as construction management and civil engineering are rarely incoming first-year students' intended majors, but are more often found during the course of undergraduate education. However, having larger, stronger, and simply more built environment programs across Maryland can make a real difference for the state's industry and residents, namely by:

- Helping Maryland students and families reduce costs through in-state tuition;
- Capturing more tuition, fee, and ancillary revenue in the state;
- Over time, building an alumni base that includes the state's future business leaders in positions currently held by alumni of out-of-state institutions; and
- Reducing hiring costs and employee turnover.

To better understand what could be done, MCCEI engaged RESI and HR&A Advisors to conduct benchmarking exercises at key out-of-state institutions to learn firsthand what they do and how they do it.

Maryland is surrounded by institutions that have good reputations and are hiring sources for its built environment industry.

In Phase 1 research, MCCEI determined that the institutions shown below provide a significant amount of graduates hired by Maryland based businesses.

**Pennsylvania College of Technology** -

Williamsport, PA

- Bachelor's Degree in Construction Management
- 2+2 Degree in Residential Construction Technology
- Associates Degree in Building Construction Technology

**Pennsylvania State University** -

University Park, State College, PA

- Bachelor's Degree in Architectural Engineering with a Construction Option

**West Virginia University** -

Morgantown, West Virginia

- Bachelor's Degree in Civil Engineering

**Bucknell University** - Lewisburg, PA

- Bachelor's Degree in Civil Engineering

**Penn State Harrisburg** - Harrisburg, PA

- Bachelor's Degree in Structural Design and Construction Engineering Technology

**Drexel University** - Philadelphia, PA

- Bachelor's Degree in Construction Management (5 year co op)

**University of Delaware** - Newark, DE

- Bachelor's Degree in Civil Engineering
- Adding Bachelor's Degree in Construction Engineering

**University of Virginia** - Charlottesville, VA

- Bachelor's Degree in Civil Engineering
- Bachelor's Degree in Architecture

**Virginia Polytechnic Institute and State University (Virginia Tech)** - Blacksburg, VA

- Bachelor's Degree in Construction Engineering and Management through the Myers-Lawson School of Construction under the College of Engineering
- Bachelor's Degree in Building Construction through Myers-Lawson School of Construction under the College of Architecture and Urban Studies

This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.

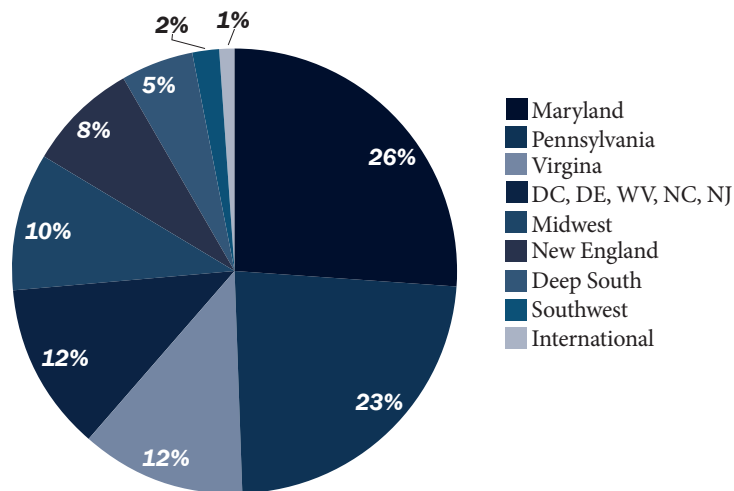
"I meet a lot of people in the field and they're all Penn State and Virginia Tech guys. There are a lot of people that have done well through those programs, they are the category killers."

"Our absolute favorite is Virginia Tech. The Myers Lawson School knows what they are doing, including a soft skills class."

## Benchmarking Programs

Collected in Phase 1 of the study, hiring data indicated that Maryland-based businesses hire from out-of-state institutions instead of in-state ones at a **3:1 ratio**. Notably, those businesses hire only 26% of their workforce from in-state schools, but nearly double that amount (47%) from schools in surrounding states, including Pennsylvania, Virginia, Delaware, Washington, DC, North Carolina, West Virginia, and New Jersey, with the bulk of the remainder coming from schools in New England, the Midwest, and the Deep South.

**Figure 12** – Sources of graduates by state.



Source: MCCEI

At present, Maryland has no programs similar to those offered at Pennsylvania State University, Pennsylvania College of Technology, Drexel University, and Virginia Tech (Table 13), all regularly cited as programs with excellent reputations and go-to sources for hiring. The Construction Management programs at MSU and UMES are similar to Virginia Tech's Building Construction program, yet are significantly smaller, produce only a fraction of the graduates, and lack the benefit of being attached to an umbrella program (e.g., Virginia Tech's Myers–Lawson School of Construction).

### To compound matters:

- In December 2015, the University of Delaware announced the launch of a Construction Engineering and Management program at its Newark campus (source: University of Delaware);
- The CEM program at Virginia Tech is anticipating growth from 120 to 160 students by 2020 (source: RESI and HR&A Advisors);
- In May 2016, Virginia Tech announced the launch of an Intelligent Infrastructure program to combine its engineering, business, building, and design programs. This \$100-million endeavor will train students in designing and constructing smart buildings to communicate with cars and transportation networks, as well as in using and developing new materials. It also includes the development of a 300-acre "smart neighborhood" (source: *Washington Business Journal*).

"The key leaders now went to PSU. There are an awful lot of Penn State alums in this region."

During Phase 2, the consultant team visited the above campuses, with the exception of Pennsylvania State University at University Park, interviewed faculty, examined facilities and, in general, sought to identify what made their programs work so well. Consultants were tasked with discovering what the programs do, how they do it, and what practices could be implemented in Maryland. Table 13 shows a side-by-side comparison of the programs; for the full benchmarking analysis, please see the State of Maryland Construction Industry Bachelor's Degree Demand Analysis (pp. 37–45).

**Table 13** – Out-of-state program benchmarks.

	<b>Penn State - Harrisburg</b>	<b>Virginia Tech – Myers-Lawson School of Construction</b>		<b>Penn College of Technology</b>	<b>Drexel University</b>
<b>Degree Type</b>	Bachelors of Science	Bachelors of Science	Bachelors of Science	Bachelors of Science	Bachelors of Science
<b>Major</b>	Structural Design and Construction Engineering Technology	Construction Engineering and Management (CEM)	Building Construction (BC)	Construction Management	Building Construction Management
<b>Accreditation</b>	ABET	ABET	ACCE	ACCE	ACCE
<b>Enrollment (2015)</b>	120	120	232	120	120-140
<b>Estimated % of MD Enrollments</b>	5% to 8% (and growing)	5%	5%	6% to 8%	5%
<b>Placement Rate of Graduates</b>	95%	100%	100%	98%	100%
<b>Average Starting Salary of Graduates</b>	Not Available	\$55,000 to \$62,000 per yr.	Not Available	Not Available	\$52,000 per yr.
<b>Faculty</b>	2 - Emeritus Professors 7 - FT Faculty 0 - Adjuncts	Shares faculty between the two programs: 20 – Professors of Practice (split between FT Tenure Track and FT non tenure Track) 0 - Adjuncts		4 FT tenured faculty. 1 - Adjunct	2 – FT Tenure Track 5.5 – FT Non tenure 28 - Adjuncts
<b>Faculty to Student Ratio</b>	20:1	18:1		18:1	17:1
<b>Distinguishing Features</b>	High school student - recruitment through ACE Mentorship Program and an annual High Schools Guidance luncheon.  Non tenure faculty with significant industry experience.  Active alumni engagement program.	Meyers-Lawson School is a bridge between the Colleges of Engineering and Architecture and Urban Studies.  High School and Community College Recruitment efforts to attract new students.  Industry Mentorship Program Bi-Annual Construction Industry career fairs.  Non tenure faculty with significant industry experience.  Endowment funded faculty and a 50 member industry advisory board that often provides internships to CEM and BC students.		Special mission campus of the Pennsylvania State University System.  High school recruitment through the ACE  Mentorship Program. Associates and 2+2 options focus on hands on learning.  Non-tenured faculty with significant industry experience.	Co-Operative program requiring three 3-6 month work sessions within the industry.  Non Tenure Track Faculty have extensive industry experience averaging 30 years or more.

"Penn State and Virginia Tech grads are so much more prepared. Everyone that comes from Tech is awesome."

"If I see something like the Air Force Academy, Naval Academy, WestPoint, you know what it takes and you know what that means. With Penn State, if they made it through that, you know what it takes and it shows commitment."

"In-state not so well, lesser than out of state. The perception is that Maryland state schools are not as good as Virginia's."

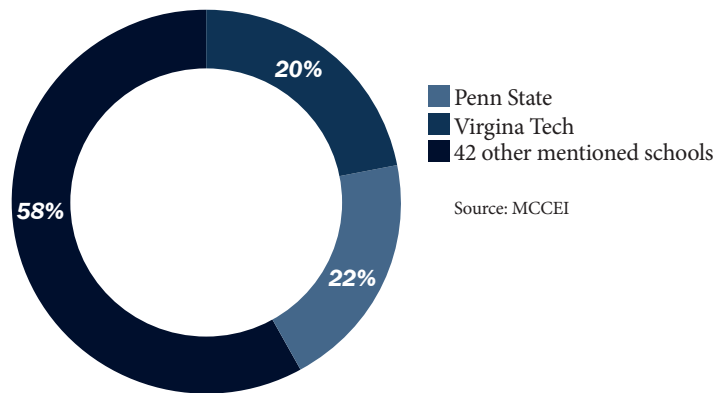
"Nothing else in Maryland except UMCP. Maryland has tremendous potential but right now we're lucky with getting the right kid."

"We have had luck with Morgan, hiring was a good experience and good staff at Morgan."

"There is something about the Maryland programs. We should figure out what Penn State and Virginia Tech are doing that we're not. PSU and VT have the brand name and recognition."

With a continuous emphasis on student experiences and faculty with significant industry experience, the benchmark examples have garnered tremendous reputations among Maryland businesses in terms of quality of both programming and graduates. In Phase 3, we asked interviewees which out-of-state schools had the best reputation. Unsurprisingly, Pennsylvania State University and Virginia Tech received the most responses, followed by a range of other schools, including Drexel University and Pennsylvania College of Technology.

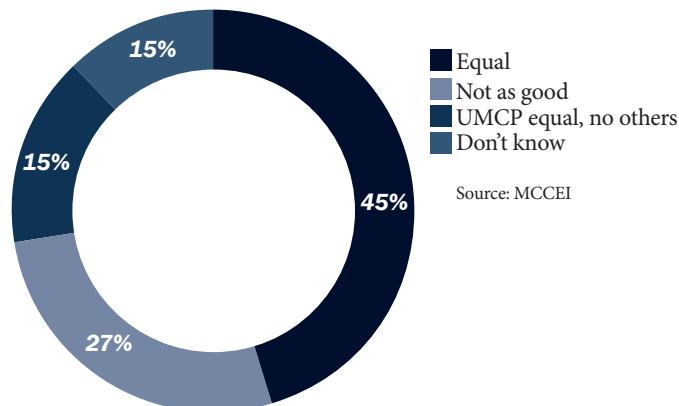
**Figure 14** – Out-of-state schools with the best reputation.



### How Maryland Schools Compare in Reputation Perception

Part of our analysis involved gauging how Maryland businesses view Maryland's programs in relation to the out-of-state competition. To that end, we asked interviewees how they thought graduates from Maryland schools compared to graduates of out-of-state schools. Results show that nearly half of respondents (45%) felt that graduates from Maryland programs were equal to those from programs in other states, 15% felt that graduates from UMCP were equal to those from out-of-state schools, and 27% felt that overall graduates from Maryland schools were not as good. Many respondents qualified their answers as solely representing a numbers game, in which Maryland's schools do not have the output to keep pace with schools such as Pennsylvania State University and Virginia Tech. Other respondents tended to amplify the experience of one bad hire, thereby often unfairly maligning an entire program based on a single experience. In any case, the results are eye opening.

**Figure 15** – Comparison of Maryland Schools to Out-Of-State Schools



This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.

## Maryland Industry Speaks on Needed Improvements

The built environment industry is based on solving problems. In that sense, we asked interviewees what should be done to improve degree-granting programs in Maryland and received the following top suggestions:

### Improve and Expand Program Content to include

- A broad-based curriculum, including hands-on experiences focused on built environments from a holistic perspective, from design to construction, commissioning, and life cycle;
- Mandatory internships or co-op experiences;
- Communication and soft skills;
- Business and real estate-based courses, not simply technical or engineering courses, because graduates need to understand that construction is a business;
- Technology including Building Information Modeling (BIM), Integrated Project Delivery (IPD), and Virtual Design and Construction (VDC); and
- Specific classes (e.g., Spanish and OSHA certified safety training).

### Teaching

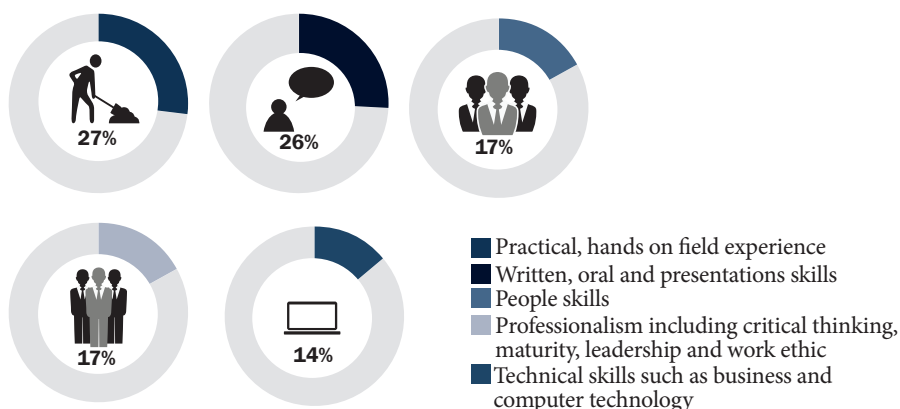
- Use industry professionals as teachers; and
- Embrace and invite the industry into the classrooms.

### Create More Graduates In Maryland

- Improve marketing and promotions to recruit students; and
- Expand or create new programs to increase the numbers of graduates.

We furthermore asked interviewees to specify what recent construction management graduates lack in terms of skills and what they, as employers, spend the most time teaching to young staff. Regarding recent engineering graduates, the answers were quite similar, despite a few notable differences.

**Figure 16** – Industry suggested curricula improvements in Construction Management programs.



Source: MCCEI

"A degree does not mean a quality education."

"Focus on the whole building, not just construction. We need a well-rounded understanding of design, facilities management, valuations, etc."

**On Teaching**

“Try to make this a blend of academics and reality. Academics equals theory, industry equals reality. Use a strong adjunct professor network to bring in industry and reality.”

**On Missing Pieces**

“Adding construction management as a major is important. We’re missing the boat with construction as a major, cannot short change this.”

“Develop an AET program and a co-op program.”

**On Soft Skills**

“Teach soft skills and professional aptitudes. Programs in engineering or construction management do not prepare students for the business aspects of the job.”

**On Industry Partnerships**

“Just do it, there are a lot of committees, too much talk, not enough do. Industry needs to step up and do something but it can’t do it in a vacuum. We need partnerships, passion and we all have vested interests.”

**On Broad Business Knowledge**

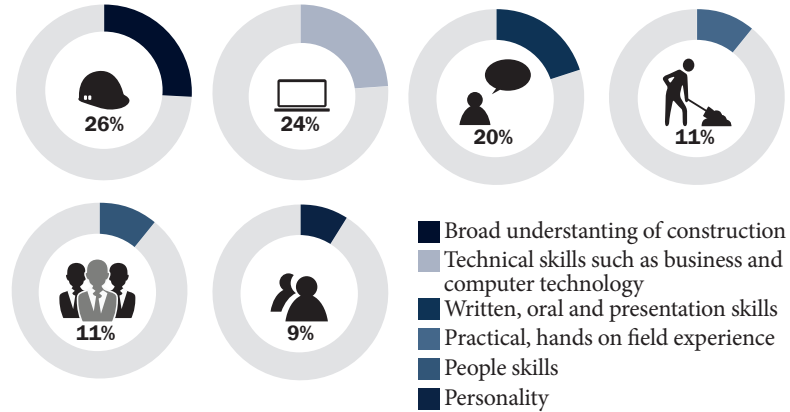
“Get real estate 101 and 102 put into the curriculums. Helps them understand the business and clients.”

**On Internships**

“When in a program, require summer internships. The practical side is a lot different than the educational side. You have to work with people to solve problems.”

For recent engineering graduates, the answers were very similar with a few notable differences.

**Figure 17** - Industry suggested curricula improvements in engineering programs.

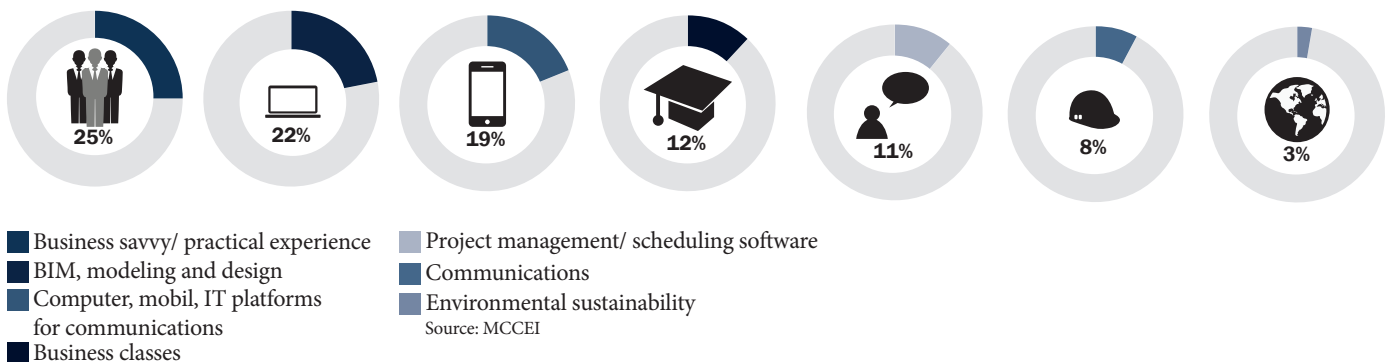


Source: MCCEI

For both engineers and construction managers, field experience, communication, familiarity with technology, and people skills are critical to success. Interviewees agreed that colleges and universities excel in producing technically proficient graduates who, however, are not necessarily ready for the workplace. Construction is a business of relationships, and ways to nurture those relationships cannot be taught in the classroom. In that sense, field experience becomes a critical element of the educational experience, one demonstrating that technical proficiency goes only so far.

The development of a co-op program similar to Drexel University’s Construction Management Program would attract significant industry interest, as long as it can maintain focus on the core technical aspects of accredited construction management or engineering programs. Moreover, interviewees stressed that as technologies in construction, design, and facility management continue to rapidly advance, graduates in construction management and engineering should be well versed in the following:

**Figure 18** – Suggested technical skills improvements.



Source: MCCEI

This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.



## Reality Check

In Maryland, the need to expand existing bachelor's degree programs for construction and built environment studies or create new ones is clear. However, the phenomenon is not a new one. In fact, for decades, Maryland's built environment industry has relied on schools such as Pennsylvania State University and Virginia Tech as much as in-state schools and, too often, even more. The financial burden thus placed upon the industry is immense, as is the potential loss to the state university system for students and future alumni bases.

A reality in higher education is that state contributions to colleges and universities have steadily declined since the early 1980s. Plus, in recent decades, the massive building sprees that the nation's colleges and universities have sustained to attract and retain students, faculty, and researchers have resulted in enormous increases in tuition and fees for prospective students. Colleges and universities cannot balance reduced government contributions and increased expenses on the backs of students and alumni alone. Part of the solution has to involve innovating research departments and placing greater emphasis on tenure-track faculty to encourage the pursuit of research grants, corporate assignments, technology transfer, and publication royalties.

Creating new programs or expanding existing ones is not as simple as simply hiring a few teachers. Universities often take the long-term view to problem solving, which involves not solving problems now, but crafting solutions that work today and will work 50 years from now.

Another reality is that accreditation is critical to how university-level programs are structured. Independent accreditation bodies, including the ACCE for construction management programs and the Accreditation Board for Engineering and Technology (ABET) for engineering programs, dictate appropriate student-to-faculty ratios, laboratory space, full- and part-time faculty, and curricula.

### Costs

To convert an existing program or create a new one that can service 120 or more students and graduate 60 per year, the cost is significant. Based on the benchmark programs outlined in Table 13 (p. 21), such a program would need:

- 2–3 tenure-track, research-focused faculty
- 5–6 full time, non-tenure-track teaching faculty
- Adjunct faculty as needed to meet accreditation criteria.

Each tenure-track, research-focused faculty member costs approximately \$200,000 per year, which includes their base salary, benefits, and perquisites. Each non-tenure track teaching faculty member costs approximately \$120,000–150,000 per year, while adjunct faculty cost anywhere between \$2,500 and \$5,000 per class taught.

A cursory estimate cost of establishing a program similar to that described in Table 20, assuming 100% funding through endowments, is **\$25 million**. Excluded from that estimate are the costs of facilities, laboratories, laboratory equipment, software, scholarships for student recruitment, continuing education for faculty, study abroad programs, and rainy day funds.

**We should assume that any major expansion or program creation will adhere to the following pattern:**

1. Tenure-track faculty prioritizing a research component focused on publication, grants, and self-generated revenues will be sought.
2. Non-tenure-track teaching faculty will follow tenure-track research faculty possibly on a one-to-one basis, but not reach full staffing until tenure-track positions are filled.
3. New programs or those seeking accreditation will model themselves after the accreditation guidelines for staffing, student-to-teacher ratios, laboratories, and curriculum.
4. Using adjunct faculty is a short or mid-term solution; accreditations limit the use of adjunct faculty.
5. Adding faculty will require an endowment of funds or self-generated revenue to offset expenses.

**Table 19** – Costs and associated endowment funds to create a program

	Number Needed	Cost Per Position	Endowment Funds per position	Endowment Funds (extended)
Tenure Track Faculty	2	\$200,000	\$4 million	\$8 million
Non Tenure Track Faculty	5	\$150,000	\$3 million	\$15 million
Adjuncts, TA's, Operational Overhead and Supplies	1	\$100,000	\$2 million	\$2 million

**Total \$25 million**

Source: MCCEI

### Articulations

As mentioned earlier, Maryland’s built environment industry sees no difference between a standard, four-year degree and an articulated degree between a two- and four-year programs. Therefore, articulated programs between Maryland’s community colleges and existing four-year institutions can be a significant part of the solution to the state’s bachelor’s degree deficit.

In 2013, Maryland instituted legislation known as the College and Career and College Readiness and College Completion Act (Chapter 533), a section of which mandates the seamless transfer of credits between community colleges and universities and vice versa. However, the reality is that articulations are handled between individual institutions and that the transfer of credits is not seamless. Often, a university has requirements for graduation for items such as core credits, liberal arts and humanities credits, and math and English credits, among others. In some circumstances, credits earned by a student at the community-college level do not neatly translate into a university’s general education or core program criteria.

Articulations between programs do not simply happen, but require a push. When articulations are made available, they tend to be known primarily to students, teachers, and administrators in specific programs, not to the general public. Unless there are staff members at specific schools dedicated to exploring and completing articulations and working with administrators on both sides, articulations tend to be organized on a piecemeal basis. Without broad-based marketing, the general public may not know that such options exist.

### Co-Ops and Internships

The built environment industry seeks talent with practical, hands-on experience. Higher education is important, but earning a degree without a significant measure of onsite, hands-on experience is a waste of time, energy, and money. Throughout the interview process, respondents repeatedly stated that the co-op model of blending classroom training with work experience in six-month intervals would be highly preferred. Short of that, companies prefer at least two summers of onsite job experience.

For students, co-op programs typically extend the time to graduate with a bachelor’s degree to five years, and often, students opt to keep co-op jobs instead of returning to school to complete their degrees. As such, universities are hesitant to adopt such models, since anything that might prevent students from graduating runs counter to their core mission and, statistically speaking, hurts their graduation rates.



Archstone

**"We pay close attention to this. There is usually a reason, either they had to go to work, affordability. They tend to be very hard working individuals, the best people come this way."**

Internships are another story altogether. During the Great Recession, companies of all sorts abused the internship process as a way to get free or very inexpensive labor. Conversely, paid interns often abused the process by filing for unemployment benefits after the internship ended without understanding the costs and ramifications for the company of doing so. As a result, a whole new set of rules govern paid versus unpaid and for-credit versus not-for-credit internships. Although both students and companies want to pursue internships, such rules often discourage them from doing so.

## Numbers

The bachelor's degree deficit in the labor market for the built environment industry is not unique to Maryland. On the contrary, the trend is nationwide, and expanding existing programs or creating new ones here or there will not solve the problem. Nevertheless, it is clear that Maryland's university system can play a far greater role than it currently assumes. Any steps taken to that end should be implemented quickly, yet also cautiously. The built environment industry is cyclical and only a few years ago experienced a deep, nationwide contraction. When facing a deficit of thousands of workers, expanding an existing program to serve 60 graduates each year and adding new programs for another 60–120 graduates seems insignificant. However, as the industry expands and contracts, programs can grow or shrink with demand.

Regardless of steps taken or the timeline for implementation, the industry, education, and government should prepare for the following:

- The million-dollar cost of expanding and creating programs, in which both government and private industry need to play a part;
- Initially small programs that grow over time; and
- Industry's critical role in advising programs and providing internships for students and employment opportunities for graduates.

This section relies on data collected by MCCEI, RESI and HR&A in Phase 2 and Phase 3 of the methodology.

## Conclusion

Maryland faces a tremendous opportunity to solve a longstanding problem that costs its built environment industry and residents millions of dollars each year. Recommendations based on the findings of this study seek to expand existing programs in Maryland, make it easier for more people to pursue postsecondary education in 2 + 2 programs, and add programs as needed. With a projected deficit of 8,700 bachelor's degree holders in the state, there is indeed ample opportunity to grow and add programs across Maryland.

Universities in neighboring states are expanding programs to meet growing demand not only from Maryland, but the nation as a whole. In that light, Maryland also faces an opportunity to capitalize on the national shortage of construction managers and engineers as the workforce ages and retirement plays a larger role in reducing the labor supply. Given those factors, as well as rapidly advancing technology in building science and design, playing catch up for years on end is simply not enough.

Through MCCEI, the state of Maryland, its university system, its independent colleges and universities, its community colleges, and its built environment industry can cooperate to develop viable solutions with the recommended taskforces, or else identify ways around obstacles by expanding and adding programs. MCCEI has determined that the demand for bachelor's degree holders in the built environment industry is quantified, qualified, and clear. It is only a matter of deciding whether Maryland collectively wants to be part of the solution or surrender that role to other states.

"We have an internship program at the high school level. Our core business is education facilities. We like to get them in early, get to see and work on their own school. Real life applications. It's typically good for the industry and for the schools."

"Create very challenging programs at the high school age and get students exposed to some parts of the industry. Real Estate has so many disciplines coming together between design, engineering, law, etc. "

"Experience matters, internships and co-ops matter."

"Experience will always beat out pure education."

## Appendix - Phase 1 and 2 - Interview and Data Participants

All names, affiliations, companies and locations listed at time of interview.

<b>Allen &amp; Shariff Construction Services, LLC</b> Columbia, MD	<b>GEDCO</b> Baltimore, MD	<b>Rommel Cranston Construction</b> Linthicum, MD
<b>Armada-Hoffler Construction</b> Baltimore, MD	<b>Gilbane Building Company</b> Laurel, MD	<b>Scheibel Construction</b> Huntingtown, MD
<b>ATAPCO Properties, Inc.</b> Baltimore, MD	<b>Grunley Construction Company, Inc.</b> Rockville, MD	<b>Shapiro &amp; Duncan</b> Rockville, MD
<b>Ayers Saint Gross Architects</b> Baltimore, MD	<b>Harkins Builders</b> Marriottsville, MD	<b>Southway Builders</b> Baltimore, MD
<b>Barton Malow</b> Baltimore, MD	<b>Hensel Phelps</b> Chantilly, VA	<b>St. John Properties, Inc.</b> Baltimore, MD
<b>Bozzuto Construction Company</b> Greenbelt, MD	<b>Hess Construction Company</b> Gaithersburg, MD	<b>The Bozzuto Group</b> Greenbelt, MD
<b>Brawner Builders, Inc.</b> Hunt Valley, MD	<b>J.V. Shafer/Quandel</b> Abingdon, MD	<b>The JBG Companies</b> Chevy Chase, MD
<b>Caves Valley Partners</b> Towson, MD	<b>Jones Lang LaSalle</b> Washington, DC	<b>The , Inc. ullan Contracting Company</b> Lutherville, MD
<b>Chaney Enterprises</b> Gabrills, MD	<b>John J. Kirlin, LLC</b> Rockville, MD	<b>The Time Group</b> Owings Mills, MD
<b>Cianbro</b> Baltimore, MD	<b>KCI Technologies, Inc.</b> Sparks, MD	<b>The Whiting-Turner Contracting Co.</b> Towson, MD
<b>Clark Construction Group, LLC</b> Bethesda, MD	<b>Kimball Construction</b> Baltimore, MD	<b>Therrien-Waddell</b> Gaithersburg, MD
<b>Corman Construction</b> Annapolis Junction, MD	<b>Kinsley Construction</b> Timonium, MD	<b>Turner Construction Company</b> Baltimore, MD
<b>Davis Construction</b> Rockville, MD	<b>Lewis Contractors</b> Owings Mills, MD	<b>W.M. Davis, Inc.</b> Leonardtown, MD
<b>DPR Construction</b> Columbia, MD	<b>Mahogany, Inc.</b> Baltimore, MD	<b>Waverly Construction &amp; Management Company</b> Baltimore, MD
<b>Ekistics, LLC</b> Baltimore, MD	<b>Maryland Stadium Authority</b> Baltimore, MD	<b>Willow Construction</b> Easton, MD
<b>Facchina</b> La Plata, MD	<b>Morgan-Keller Construction</b> Frederick, MD	<b>Wohlsen Construction</b> Baltimore, MD
<b>Forest City - New East Baltimore Partnership</b> Baltimore, MD	<b>Oak Contracting</b> Towson, MD	<b>WRIT</b> Rockville, MD
<b>Forrester Construction Company</b> Rockville, Md	<b>Plano-Coudon</b> Baltimore, MD	
<b>Freestate Electric</b> Laurel, MD	<b>Poole and Kent</b> Baltimore, MD	
	<b>Reliable Contracting Co. Inc.</b> Gambrills, MD	

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