

Michigan State University  
Construction Management Undergraduate Program  
Public Disclosures (ACCE Standard Section 8.1.5)

September, 2019

Construction Management Program Mission, Objectives, and Learning Outcomes

The **mission** of the Construction Management (CM) Program at Michigan State University (MSU) is to inspire and educate future leaders who will innovate the industry.

To support this mission, our **program's objectives** are to provide:

- A learning setting where students develop an understanding of the real world of construction management and its requisite content and skills.
- Appropriate course content building upon sound fundamentals which is accurate and up to date in construction science and management.
- A learning setting where students can master the material and are encouraged to explore.
- A learning setting where students can develop strong interpersonal, communication, and leadership skills.
- A learning environment where students develop an understanding of the broader social, environmental, economic and business context in which the construction industry operates.

CM **program learning outcomes** align with the American Council for Construction Education's (ACCE) twenty Student Learning Outcomes (SLOs) listed below. Upon graduation our students shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multidisciplinary team.
10. Apply electronic-based technology to manage the construction process.

11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.

## Program Admission Requirements

Admission to the CM program is at junior level. As presented in MSU's Official Academic Programs catalog:<sup>1</sup>

Construction management builds upon a basic understanding of mathematics, physics, statistics, and economics to develop the skills necessary to manage construction projects. Prior to enrollment in the major, students must have demonstrated this basic understanding by a minimum performance in the courses listed and a minimum overall grade point average.

Enrollment in the construction management major is limited. Those seeking admission must at least meet the criteria listed below.

1.	Completion of at least 56 credits.		
2.	Completion of the following courses with a minimum grade of 2.0 in each course:		
	MTH 124	Survey of Calculus I	3
	PHY 231	Introductory Physics I	3
	STT 200	Statistical Methods	3
	Or		
	STT 201	Statistical Methods	4
	Or		
	STT 315	Introduction Probability and Statistics for Business	3
	Or		
	STT 421	Statistics I	3
	EC 201	Introduction to Microeconomics	3
	Or		

<sup>1</sup> Source accessed on 9/3/2019 via: <https://reg.msu.edu/AcademicPrograms/Text.aspx?Section=114#s1516>

EC 202	Introduction to Macroeconomics	3
CMP 101	Principles of Construction Management	2
CMP 124	Residential Construction Materials and Methods	3
CMP 210	Commercial Construction Methods	3
CMP 211	Building Codes	3
CMP 222	Statics and Strengths of Materials	3
CMP 230	Utility Systems	4
3.	Have either a cumulative grade-point average of 3.00 in the CMP courses listed in item 2. or a cumulative MSU grade-point average of 3.00.	

While meeting all of the criteria above is necessary to be considered for admission to the Bachelor of Science Degree in Construction Management, it does not guarantee admission. Other factors such as work experience, personal experience, and diversity may also be considered.

### Program Assessment Measures

In 2014, our program faculty voted to adopt the latest American Council for Construction Education (ACCE) Student Learning Outcomes (SLO) to measure achieving program objectives. Student learning outcomes adopted include the following:

Upon graduation from an accredited ACCE 4-year program a graduate shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
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17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.

Each SLO is measured annually using one direct and one indirect measure:

1. Direct assessment measures include the use of in-class assessments for some SLOs and the use Associate Constructor (AC) Exam results for others.
  - a. For in-class assessments, our program collects assessment data annually, and records are kept in electronic form through an MSU shared drive site which is accessible by all program faculty to upload their assessment information which includes:
    - The individual course SLO assessment plan with performance targets for individual SLO.
    - Specific assessment tools including exam questions and homework assignments used for data collection.
    - Summary assessment data.
    - Analysis against performance criteria in an annual report card.
    - Any corrective measures as needed to address gaps from performance objectives and actual achievement are indicated in the report card.
  - b. All of our seniors are required to take the AC exam in the senior year as they are enrolled in CMP 415 and CMP 423. The College of Agriculture and Natural Resources pays the exam fee from funds obtained from the university.
2. Indirect assessment measures include feedback from graduating senior survey administered by our program and distributed to senior students every fall semester. This anonymous survey is administered via the MSU subscription of Qualtrics. Students registered for CMP 415 are invited to participate. An initial invitation is sent during the first week of November and a weekly reminder is sent till the exam week. During the exam week, 2 reminders were sent to the remaining list of students. In the survey, students are asked to rate their perception of ability in relation to each SLO using a five-point Likert scale (between 1: Not much – 5: Great deal).

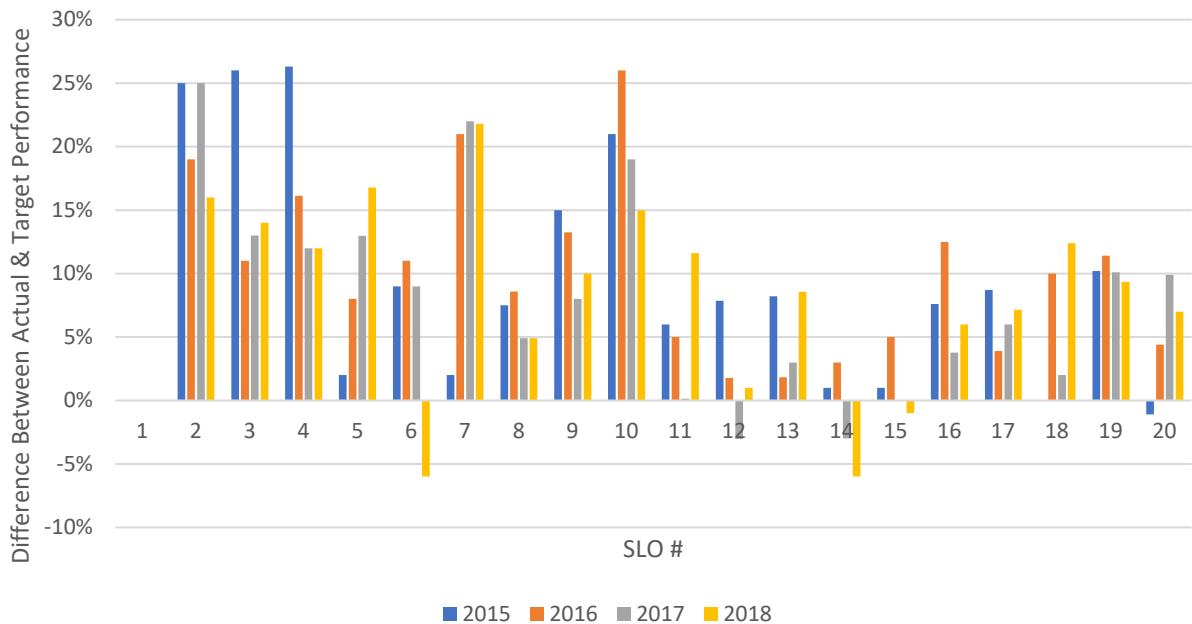
### Information Obtained from Assessment Measures

Target performance for direct assessment measures are: (a) average of 70% performance on a group of test/exam questions or assignment that reflect the essence of the SLO; and (b) AC exam performance for relating SLOs are equal to the passing rate or above the national average.

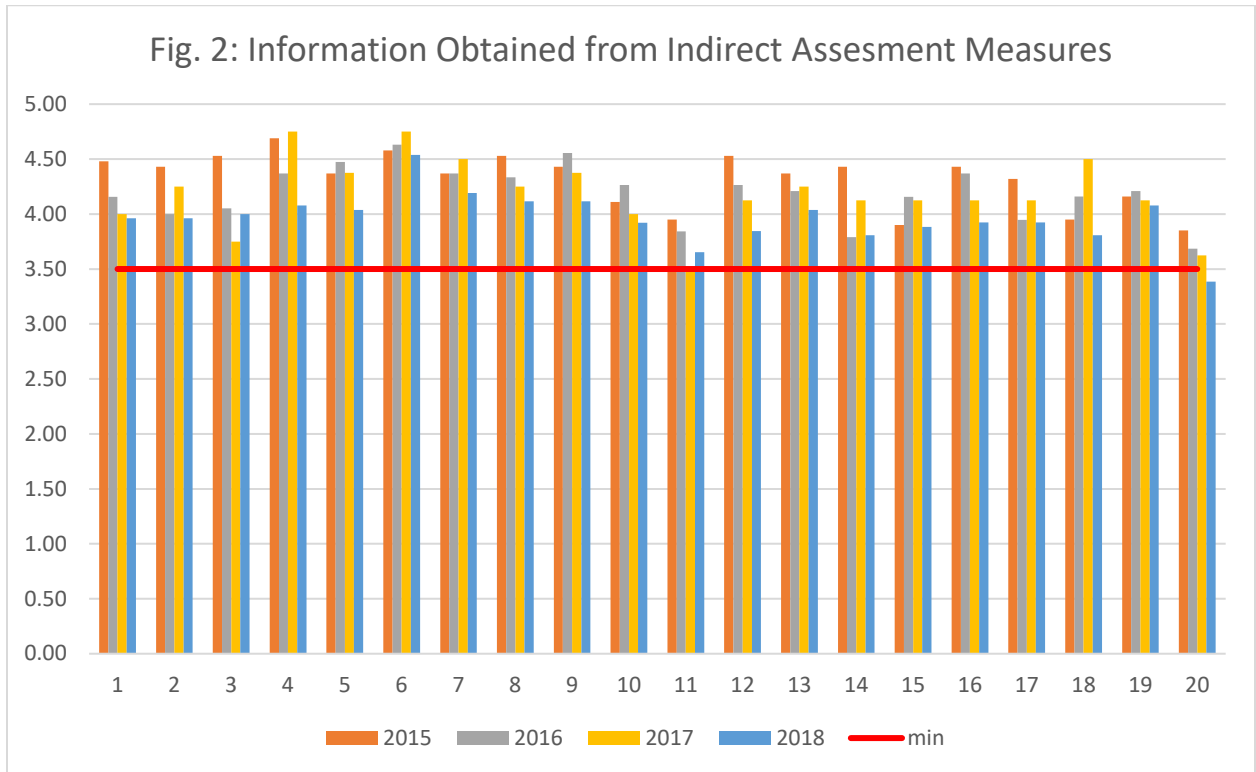
Table 1: Direct Assessment Measures and Faculty Champions for each SLO

SLO #	Class	Faculty Champion	Direct Assessment
1	CMP 385	Mrozowski	Writing Assignment
2	CMP 328	Zhao	Final Project presentation Assignment
3	CMP 401	Welch	Safety Plan Book
4	CMP 415	ElGafy	Project 2
5	CMP 311	Mollaoglu	Individual Scheduling Project
6	AC	Mrozowski	Associate Constructor (AC) Exam
7	CMP 210	Berghorn	Plan Reading Quiz Average
8	CMP 210	Berghorn	Average of 3 exams
9	CMP 423	Syal	Question from Exam 1
10	CMP 328	Zhao	Navisworks- Simulation
11	CMP 305	Welch	Surveying questions of Exam 1
12	CMP 385	Mrozowski	Set of Questions on Test 1
13	CMP 385	Mrozowski	Subset of Q- Test 3
14	CMP 325	Metoyer	Associate Constructor (AC) Exam
15	AC	Mrozowski	Associate Constructor (AC) Exam
16	CMP 423	Syal	Exam 2 Questions
17	CMP 385	Mrozowski	Set of questions (Test 3)
18	CMP 210	Berghorn	Average of LEED Assignments
19	CMP 322	Mrozowski	Average of Test 1-5
20	CMP 230	Metoyer	Term Project

Fig.1: Information Obtained from Direct Assessment Measures



In the graduating senior survey for indirect assessment, the target average rating for each SLO is 3.5 out of 5.0 (using a five point Likert scale between 1: Not much – 5: Great deal to measure student perception for their own SLO related abilities).



### Actions Taken as Result of Assessment Data Collected

The CM program collects data and maintains records for each SLO annually. Every year the CM faculty hold an SLO meeting where approximately seven SLO are examined on a rotational basis in detail using data collected since the last analysis. This cycle ensures that all SLO will be evaluated at least every three years. Additionally, any SLO requiring corrective action may be required to be assessed again in the next year.

The CM program also holds an annual strategic meeting devoted to reviewing information obtained from assessment measures, records and documents action items at program level and shares with stakeholders at school, college and industry board levels.

For Fall 2019, the program set up two SLO review meetings: one in August and one in December, 2019. On August 23, 2019, select SLOs and results of assessment data collected related to those were reviewed by the CM faculty. Actions taken as a result of this meeting are listed below.

**SLO 01: Create written communications for a construction project and construction business**

1. **Review and Revise Assessment:** The faculty agreed to the proposal to correlate 1,2,3 to different percentages (Champion Discretion) but we need to be consistent over the years. The direct measure will be a simple average across the different evaluators at target performance of 70%.
2. **Review of Assessment Instrument:** Good assignment.
3. **Review performance trend & Action items:** Data to be provided for 2015, 2016, 2017, 2018.
4. **Report action items follow-up:**
  - a. Next year add in a second practice assignment. (Great Idea)
  - b. Need to expand writing assignments throughout the curriculum and provide writing feedback in multiple classes. (Instruct Instructors of CMP 210, CMP 311, CMP 415, and CMP 491-01 to give feedback on written reports)
  - c. Need to reconsider scoring system when multiple reviewers and how to address outlier scores. (Addressed)
5. **Potential continuous improvement:** N/A
6. **Others:** N/A

**SLO 02: Create and deliver an oral presentation appropriate to the construction discipline**

1. **Review and Revise Assessment tool:** It looks good. Starting Fall 2020, SLO 02 will be assigned in CMP 435, 436, and 492 Capstone Class
2. **Review of Assessment Instrument:** Good
3. **Review performance trend & Action items:** met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** N/A
6. **Others:** N/A

**SLO 04: Create construction project cost estimates**

1. **Review and Revise Assessment Tool:** Accepted
2. **Review of Assessment Instrument:** Accepted but Rubric needs to be included.
3. **Review performance trend & Action items:** Met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** Align CMP 315 and CMP 415 with AC exam content. Faculty to report in the December meeting on their plans.
6. **Others:** N/A

**SLO 08: Analyze methods, materials and equipment used to construct projects**

1. **Review and Revise Assessment:** Revised to reflect the “Crane Selection assignment”.
2. **Review of Assessment Instrument:** Starting Fall 2019, the assessment tool in CMP 210 will change to “Crane Assignment”. Faculty feels that would be a better alignment with the spirit of the SLO.

3. **Review performance trend & Action items:** met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** N/A
6. **Others:** N/A

**SLO 09: Apply construction management skills as an effective member of a multi-disciplinary team**

1. **Review and Revise Assessment:** Remove AC grades and convert to DOCX.
2. **Review of Assessment Instrument:** Appropriate assessment instrument.
3. **Review performance trend & Action items:** Met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** N/A
6. **Others:** Revisit in December 2019 to decide on the scope of the assignment and the home course for direct assessment.

**SLO 11: Apply basic surveying techniques for construction layout and control**

1. **Review and Revise Assessment:** Good
2. **Review of Assessment Instrument:** Good
3. **Review performance trend & Action items:** Met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** Align CMP 305 content with AC exam. Faculty to report in the December meeting on their plans.
6. **Others:** N/A

**SLO 14: Understand construction cost accounting and cost control**

1. **Review and Revise Assessment tool:** In review of the curriculum, the content of this SLO was found to be covered in multiple elective courses (CMP 492, CMP 453, CMP 491-02), faculty decided to include a teaching module in CMP 325: Real Estate Principles and Construction Finance (required class for all students). Direct Assessment will be an assignment in CMP 325. The direct assessment will be the average grade of this assignment and target performance is 70%.
2. **Review of Assessment Instrument:** N/A- Changing
3. **Review performance trend & Action items:** Low performance is recognized, and lack of action items lead to the decision in item 1.
4. **Report action items follow-up:** N/A- Changing
5. **Potential continuous improvement:** Align CMP 325 content with AC exam. Faculty to report in the December meeting on their plans.
6. **Others:** N/A

**SLO 17: Understand the legal implications of contract, common and regulatory law to manage a construction project**

1. **Review and Revise Assessment:** Good
2. **Review of Assessment Instrument:** Good



3. **Review performance trend & Action items:** Met performance & No action items
4. **Report action items follow-up:** N/A
5. **Potential continuous improvement:** Align CMP 385 content with AIC exam. Faculty to report in the December meeting on their plans.
6. **Others:** N/A

**SLO 18: Understand the basic principles of sustainable construction**

1. **Review and Revise Assessment:** Defer to the December meeting for further review.
2. **Review of Assessment Instrument:**
3. **Review performance trend & Action items:**
4. **Report action items follow-up:**
7. **Potential continuous improvement:** A new course is proposed for the curriculum: CMP 245 – Green Building Principles. Align CMP 245 content with AC exam. The change is through college curriculum committee and now is at university curriculum committee. Faculty to report in the December meeting on their plans.
5. **Others:** N/A

**Other Action Items:**

- ALL Rubrics to be made accessible to students with the assignments
- ALL SLO report cards need:
  - Supervisor: Dr.s El-Gafy and Mollaoglu
  - An industry supervisor of SLO Faculty Champion's choosing, if not, a curriculum committee member from the Industry and Alumni Board will be assigned.
  - Industry supervisors will review and provide feedback to SLOs before the next review cycle for each SLO.
  - Description of the evaluation of assessment data collected and how it was included in Quality Improvement Plan.
- ALL SLOs for Create, Evaluate, Analyze, and Apply needs a rubric.
- ALL students must be measured.
  - SLO3
- Standardize course name across the syllabi
- Balance SLOs across courses (CLO/SLO Matrix)
  - CMP 385
  - SLO1
  - SLO12
- Do not use AC Exam or multiple choice for SLOs above Understand in Bloom's (CLO/SLO Matrix)
  - SLO-6
  - SLO-8
  - SLO-9

### Next Meeting SLOs (December 16, 2019):

- SLO 01: Create written communications for a construction project and construction business
- SLO 05: Create construction project schedules
- SLO 06: Analyze professional decisions based on ethical principles
- SLO 07: Analyze construction documents for planning and management of construction processes
- SLO 09: Apply construction management skills as an effective member of a multi-disciplinary team
- SLO 10: Apply electronic based technology to manage the construction process
- SLO 12: Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process
- SLO 13: Understand construction risk management
- SLO 15: Understand construction quality assurance and control
- SLO 16: Understand project control processes
- SLO 18: Understand the basic principles of sustainable construction
- SLO 19: Understand the basic principles of structural behavior
- SLO 20: Understand the basic principles of mechanical, electrical and plumbing systems

### Student Achievement

Select student achievements from past year are presented below:

- Rachael Boerma and Hannah Baird were awarded 2018 National Association of Home Builders Professional Women in Building (PWB) scholarships. Their scholarships were presented to them by the past PWB-Greater Lansing Council president of Karen Schroeder. Scholarship background/criteria was a preference to work in the residential side of the industry upon graduation, experience with the residential construction industry, academic excellence, and evidence of leadership via engagement in enrichment activities. Rachael Boerma is a senior and Hannah Baird is a dual degree master's student.
- At the 2019 International Builder's Show, the MSU dominated the stage and won the following awards:
  - ❖ 2019 National Champion - Residential Construction Management Competition Team.
  - ❖ 2018 Outstanding Student Chapter – 2nd Place Nationally.
  - ❖ 2018 Outstanding Student Chapter Member: Dan Hamilton.
- CM junior and sophomore, Carolyn Whiting and Patty Girardot presented at MSU's University Undergraduate Research and Arts Forum on April 5, 2019 and received 1st place award.

- CM sophomore, Katie Cross received Associated General Contractors of Michigan Scholarship in Spring 2019.
- CM student Zhiting Chen received her BS degree with high honor in Spring 2019. She is the only 4.0 GPA graduate in the SPDC, and one of the seven in the College of Agriculture and Natural Resources (CANR) in 2019.

### Rate and Types of Employment of Graduates

Destination survey of graduating senior students is administered by the CANR annually at the CM program. In Fall 2018, 23 CM students responded to the survey.

Of those, 96% were employed by the time of graduation, only one student continued to graduate education. Career fair (63%) and internships (43%) were instrumental in job finding upon graduation for CM students.

Average starting salary for these students is \$57,675 (ranged between \$41,500 and \$68,000). Majority of the students were employed in Midwest (See Figure below).

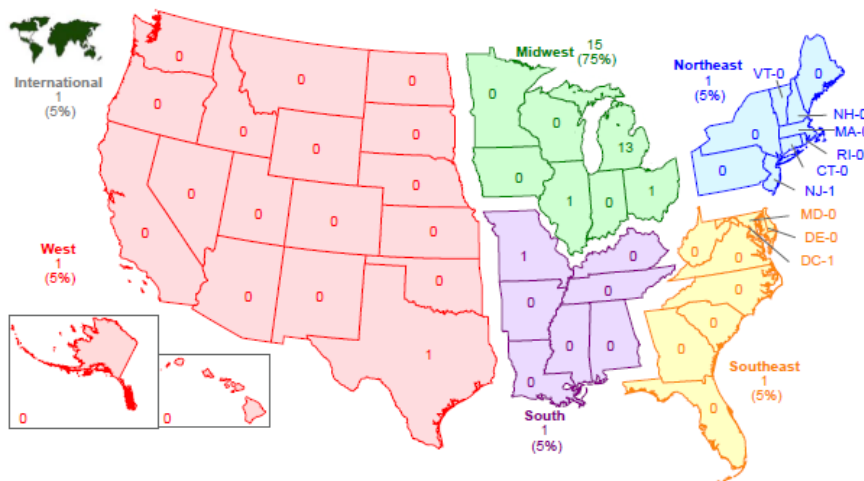


Fig. 3: Geographic Distribution of CM students employed across the U.S. (Fall 2018)

Graduates of the CM program have been hired by commercial, residential, infrastructure, and industrial sectors of the architecture, engineering, and construction industry. Commercial sector has been the dominant sector that has recruited our graduates in the recent years followed by the residential sector.

The career options for our graduates upon graduation include: project engineer, assistant project manager, project manager, scheduler, estimator, superintendent, project controls manager, and virtual design coordinator.

Types of companies that have hired our graduates include but are not limited to: general contractors, construction managers, design-builders, developers, multi-family and residential builders, transportation and logistics companies, real estate companies, suppliers, material testing firms, renovation, facility management and maintenance companies, mechanical and electrical contractors, insurance companies, project managers, consultants, and utility and renewable energy companies.

### Data to Support Qualitative Claims made by the Program

The data provided in this document intends to satisfy the public disclosure requirements of ACCE accreditation and to show that MSU's CM program is striving to continuously improve while providing the industry with well-prepared graduates that can become leaders in the future.

CM Career Fair has been well attended, with 60-80 companies attending, in the past three years. Employer to graduating CM senior rate has been consistently at around 1.5. One of the local general contractors that is a regular recruiter at our career fair events reported in person to the program director (personal communication on April 24, 2019) that in the last year they hired three of our students as full time employees; they hire from a variety of other programs from MSU and other CM programs in Michigan and Midwest. She commented that MSU's CM program has the best graduates among them all, mentioning that our graduates are very professional, approachable, and hardworking; and they communicate and work well with others.

Some of the current industry leaders that are alumni of our Construction Management undergraduate program are:

- ❖ Alan Scott, President and Owner of Alan F Scott, Inc., and Former Co-Founder and Managing Member of the NRP Group
- ❖ Dennis Carignan, Executive Vice President of Granger Construction
- ❖ Glenn Simon, Vice President and Project Executive at Granger Construction
- ❖ John Clark, chairman of the Board for Clark Construction Company
- ❖ John Kelly, Owner of Kelly Building and Development
- ❖ Kevin Foucher, Vice President, Commercial Contracting Corporation
- ❖ Matt Getchell, Partner at Wieland
- ❖ Mike Vangessel, Founder and Chief Executive of Rockford Construction
- ❖ Pat Gillespie, Founder and President of the Gillespie Group
- ❖ Rob Train, Vice President of Operations at Granger Construction and Corrections and Public Sector Market Leader
- ❖ Robert M. Aydukovic, President, Maryland Center for Construction Education Innovation.
- ❖ Ron Boji, President of The Boji Group
- ❖ Steve Nellis, President / CEO of American Council for Construction Education

2018-2019 survey of MSU's CM Program alumni and recruiters<sup>2</sup> (n=248) showed that most participants highly regard the CM program as one of the best in the Midwest, but pointed that the program needs to improve marketing to showcase it as one of the best programs in the nation.

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<sup>2</sup> El-Gafy, M. (2019). 2019 Alumni Perspectives Survey Report. Submitted to The Construction Management Alumni and Industry Association. School of Planning Design and Construction, Michigan State University, East Lansing, MI, July 22, 2019. 81 Pages.