**Master of Science in Construction Management**

Appendix A

Workforce Analysis Request Form

# Workforce Analysis Request Form

Directions: An institution shall use this form to request workforce data analysis of a proposed degree program. In completing the form, the institution should refer to the document AHECB Policy 5.11 Approval of New Degree Programs and Units, which prescribes specific requirements for new degree programs. **Note:** This form is required to be submitted by the Chief Academic Officer or individual(s) they designate. Answers need not be confined to the space allotted but may extend to several pages.

## Program Information for Analysis

1. Institution:
**University of Arkansas Fayetteville**

2. Program Name – Show how the program would appear on the Coordinating Board's program inventory (*e.g., Bachelor of Business Administration or Associate of Science in Accounting*):
**Master of Science in Construction Management**

3. Proposed CIP Code: If the proposed program does not fit easily into one CIP Code, provide the code it most closely falls into and explain differences / nuances of your program
**52.2001**

4a. Standard Occupational Classification (SOC) from CIP-SOC Crosswalk:

Take SOC codes from NCES Crosswalk of CIP to SOC, ranked in order of relevance (i.e., the degree to which program graduates are expected to desire and/or be qualified to work in each occupation) **(See Appendix A)**

| | | | |
|---|---|---|---|
| **52.2001** | **Construction Management.** | **11-9021** | **Construction Managers** |

4b. Standard Occupational Classification (SOC) from Expert/Staff Opinion (optional): If you think the standard NCES crosswalk accurately represents the list of occupations in which graduates of the proposed program will be qualified to work, leave this blank. If you think the list of target occupations is longer, shorter, or different, please provide an alternative list here, ranked in order of relevance. Feel free to add qualitative information about the variety of jobs and pay scales that may exist within target occupations, and where you expect graduates to fit in. **(See Appendix A)**

| | | | |
|---|---|---|---|
| **52.0211** | **Project Management.** | **11-9199** | **Managers, All Other** |
| **46.0412** | **Building/Construction Site Management/Manager.** | **47-1011** | **First-Line Supervisors of Construction Trades and** |
| **52.0205** | **Operations Management and Supervision.** | **11-9021** | **Construction Managers** |

5. Brief Program Description – Describe the proposed program, the costs and investments involved in implementing it, the students you expect to recruit into it, and its educational objectives.

**General Description.** The proposed Master of Science in Construction Management (MSCM) will be a 30 hour, online, distance education program. The curriculum will contain topics including but not limited to scheduling, project finance, construction productivity, construction safety, and legal aspects of construction.

**Program Costs.**
All courses will be delivered online through a format that is similar to MSE that is offered through the COE. Two courses have been developed which leaves five courses for development. Twenty-five thousand dollars will be necessary for course development ($5000 per course). Additional expenses may include a portion of staff salary for course delivery ($25,000 per year). It is expected that the tuition and fees for the program would be similar to that of the MSE.

**Students to recruit:**
Based on the employer survey, the students will be recruited from construction companies in Arkansas. Many of the companies indicated that they would provide tuition reimbursement for their employees. Also, entry level professionals in the construction industry will be targeted as potential students. The program will provide opportunities for advancement for entry level to early career professionals. Finally, students will be recruited through professional societies in the construction industry.

**Educational Objectives:**
Develop a system or process to meet desired needs.

Identify and solve complex construction management problems by selecting and applying appropriate tools and techniques.

Locate and evaluate pertinent published literature relevant to a given topic, and apply the information gained to a design, analysis, or research effort.

6. North American Industry Classification System (NAICS) – List some industries and/or companies which graduates would be most likely and/or qualified to work in (optional), and feel free to comment on why/in what capacity. Also, a description of the target industry in your region, its relative strength or weakness relative to other regions, and the reasons for that relative strength or weakness, is welcome. Lookup NAICS Code

7. Region of Possible Position(s) – Describe the region where you think graduates are most likely to work, e.g., in terms of a list of counties, a metropolitan statistical area, or a commuting radius:

With the economic boom that Northwest Arkansas has experienced over the last 20 years and the potential future growth, there is a need for this program.

8. Existing Data – Describe any existing anecdotes or data you have that would shed light on the job prospects of graduates from the proposed academic program. This data can be helpful to ADFA in conducting labor market analysis.

Shown below in Table 2 are the number of future positions that the company would hire within the next 2 to 5 years. All data were provided by the surveyed companies. These future positions are individuals who would benefit from having the MSCM degree. Due to the number of different positions, similar titles were combined into the four positions listed below. The size of the companies who responded varied which is represented in the numbers below. For example, the smaller companies reported hiring a minimum of 2 employees per position while the larger companies reported hiring up to 100 employees for the given position over the next 2 to 5 years.

Table 2. Future Positions.

| Job Title | Number of Future Positions |
|---|---|
| Project Engineers | 2 to 20 |
| Project Managers | 2 to 100 |
| Project Superintendents | 2 to 100 |
| Preconstruction Managers | 2 to 100 |

9. Proposed Implementation Date – (MM/DD/YY): **08/15/20**

10. Contact Person – Provide contact information for the person who can answer specific questions about the program:

Name: W. Michal Hale

Title: Professor of Civil Engineering

E-mail: micah@uark.edu

Phone: 479-575-6343

Email the completed form: Dr. Nathan Smith (Nathan.Smith@adfa.arkansas.gov)

After the labor market analysis has been completed, the institution will be invited to respond, providing further information that might shed light and help to interpret the data provided.

Workforce Analysis

Institution: University of Arkansas-Fayetteville

Program Name: Master of Science in Construction Management

Proposed CIP Code: 52.2001

By: ADFA Economic Policy Division

Date:

UA-Fayetteville proposes to introduce a new Master of Science (MS) in Construction Management. The labor market prospects of graduates are likely to be strong. Construction management is a well-paid, job-rich field, with 3,723 workers in the state earning an average of $78,300 per year. Even at the low end of the pay scale, earnings are decent, with $43,200 at the 10th percentile and $47,000 for average entry level pay. MS graduates will be much more educated than is typical for Construction Managers, more than half of which have less than an Associate's degree. The challenge, then, will be to make advanced education relevant and a job market asset in a field where experience is more important. But the workforce analysis request explains that UA-Fayetteville

> Will… recruit [students] from construction companies in Arkansas. Many of the companies indicated that they would provide tuition reimbursement for their employees. Also, entry level professionals in the construction industry will be targeted as potential students. The program will provide opportunities for advancement for entry level to early career professionals. Finally, students will be recruited through professional societies in the construction industry.

Mid-career students will likely have the complementary experience and contacts they need to find work as construction managers, and will be informed consumers of the education UA-Fayetteville's MS program offers. The program looks promising.

Institution Focus: UA-Fayetteville

The University of Arkansas at Fayetteville eclipses most other colleges and universities in Arkansas with the respect to the wages that its graduates enjoy when they do achieve full-time equivalent (FTE) employment. Its Bachelor's degree graduates earned, on average, about 10% more than the statewide average, and some of its advanced degree programs, such as MBA graduates and Masters degree graduates in Nursing Professions, achieved six-figure salaries on average. However, job placement rates tend to look like, presumably in large part because the University of Arkansas, being located near the state border and enjoying a national reputation to a greater extent than other Arkansas schools, sees many of its graduates leave the state. The New Arkansan Non-Resident Tuition Award Scholarship helps the University of Arkansas especially to recruit students from out of state, of which some may stay, but substantial numbers probably return to their home states or move elsewhere. Almost all University of

Arkansas programs saw full-time equivalent (FTE) employed graduates earning wages of at least $30,000. But most UA-Fayetteville programs saw less than half of their graduates FTE employed in Arkansas, with only about one-third of all Bachelor's degree graduates working full-time in the state, and about half the programs saw less than one-half of graduates earn *any* wages in Arkansas in the 3rd to 6th quarters after graduation.

*Table 1: Job placement track record of programs at University of Arkansas-Fayetteville (ARC Economic Security Report, 2018)*

| Award | Broad CIP | Detailed CIP | Grads | % em-ployed (any wage) | Avg. wage (any) | % full-time employed (FTE) | Avg. wage (FTE) |
|---|---|---|---|---|---|---|---|
| Bacc. | ALL | | 8148 | 49% | $31,692 | 34% | $42,793 |
| Bacc. | Health Professions | Registered Nursing/Registered Nurse | 490 | 54% | $50,012 | 43% | $56,358 |
| Bacc. | Business, Management & Marketing | Finance, General | 400 | 36% | $40,516 | 26% | $49,317 |
| Bacc. | Business, Management & Marketing | Marketing/Marketing Management, General | 398 | 46% | $41,412 | 35% | $48,238 |
| Bacc. | Parks, Recreation, Leisure & Fitness | Health and Physical Education/Fitness, General | 391 | 45% | $21,987 | 27% | $33,405 |
| Bacc. | Biological & Biomedical Sciences | Biology/Biological Sciences, General | 384 | 44% | $16,633 | 20% | $30,382 |
| Bacc. | Communication & Journalism | Journalism | 329 | 42% | $26,916 | 29% | $35,264 |
| Bacc. | Communication & Journalism | Speech Communication and Rhetoric | 267 | 41% | $27,334 | 24% | $39,755 |
| Bacc. | Psychology | Psychology, General | 254 | 54% | $19,926 | 31% | $28,694 |
| Bacc. | Business, Management & Marketing | Logistics, Materials, and Supply Chain Management | 243 | 51% | $46,493 | 41% | $53,322 |
| Bacc. | Engineering | Mechanical Engineering | 232 | 53% | $45,538 | 40% | $56,926 |
| Bacc. | Business, Management & Marketing | Business Administration and Management, General | 232 | 44% | $36,596 | 31% | $47,059 |
| Bacc. | Family & Consumer Sciences | Foods, Nutrition, and Wellness Studies, General | 190 | 46% | $26,590 | 29% | $34,664 |
| Bacc. | English Language & Literature | English Language and Literature, General | 180 | 55% | $20,840 | 32% | $32,581 |
| Bacc. | Social Sciences | Political Science and Government, General | 169 | 42% | $21,746 | 21% | $37,162 |
| Bacc. | Business, Management & Marketing | Accounting | 168 | 51% | $37,554 | 40% | $44,002 |
| Bacc. | History | History, General | 157 | 61% | $21,984 | 44% | $29,394 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bacc. | Engineering | Industrial Engineering | 135 | 49% | $49,700 | 37% | $60,976 |
| Bacc. | Law Enforcement & Protective Serv. | Criminal Justice/Safety Studies | 133 | 61% | $27,688 | 47% | $34,040 |
| Bacc. | Social Sciences | International Relations and Affairs | 133 | 53% | $19,787 | 25% | $33,926 |
| Bacc. | Health Professions | Audiology/Audiologist and Speech-Language Pathology/Pathologist | 125 | 38% | $16,239 | 18% | $35,041 |
| Bacc. | Parks, Recreation, Leisure & Fitness | Parks, Recreation and Leisure Studies | 121 | 42% | $23,164 | 26% | $31,976 |
| Bacc. | Physical Sciences | Chemistry, General | 120 | 37% | $13,198 | 15% | $31,643 |
| Bacc. | Computer & Information Sciences | Computer and Information Sciences, General | 118 | 53% | $50,494 | 48% | $58,102 |
| Bacc. | Business, Management & Marketing | Management Science | 117 | 46% | $44,260 | 36% | $51,461 |
| Bacc. | Architecture | Architecture | 114 | 41% | $35,343 | 31% | $42,247 |
| Bacc. | Visual & Performing Arts | Art/Art Studies, General | 114 | 64% | $24,166 | 43% | $30,415 |
| Bacc. | Engineering | Civil Engineering, General | 113 | 50% | $51,012 | 47% | $57,649 |
| Bacc. | Health Professions | Public Health, General | 110 | 50% | $20,775 | 30% | $30,465 |
| Bacc. | Agriculture | Agribusiness/Agricultural Business Operations | 109 | 67% | $32,144 | 51% | $42,109 |
| Bacc. | Agriculture | Animal Sciences, General | 109 | 71% | $25,519 | 46% | $35,941 |
| Bacc. | Family & Consumer Sciences | Apparel and Textiles, General | 107 | 47% | $32,030 | 35% | $39,426 |
| Bacc. | Engineering | Chemical Engineering | 99 | 28% | $58,486 | 23% | $65,876 |
| Bacc. | Family & Consumer Sciences | Human Development and Family Studies, General | 99 | 59% | $20,678 | 35% | $28,286 |
| Bacc. | Engineering | Bioengineering and Biomedical Engineering | 90 | 31% | $16,279 | 13% | $29,908 |
| Bacc. | Engineering | Electrical and Electronics Engineering | 90 | 34% | $48,691 | 30% | $57,509 |
| Bacc. | Education | Kindergarten/Preschool Education and Teaching | 86 | 72% | $34,149 | 57% | $40,104 |
| Bacc. | Social Sciences | Anthropology | 82 | 57% | $18,873 | 38% | $25,981 |
| Bacc. | Social Sciences | Sociology | 80 | 58% | $24,534 | 38% | $33,976 |
| Bacc. | Public Admin. & Social Service | Social Work | 78 | 63% | $23,459 | 48% | $30,333 |
| Bacc. | Visual & Performing Arts | Music Performance, General | 73 | 48% | $24,073 | 32% | $35,338 |
| Bacc. | Business, Management & Marketing | Human Resources Development | 73 | 68% | $39,496 | 50% | $46,052 |
| Bacc. | Education | Education, General | 72 | 56% | $18,048 | 33% | $25,726 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Bacc. | Business, Management & Marketing | International Business/Trade/Commerce | 65 | 46% | $39,093 | 34% | $47,769 |
| Bacc. | Business, Management & Marketing | Business/Managerial Economics | 60 | 48% | $34,664 | 30% | $45,748 |
| Bacc. | Physical Sciences | Physics, General | 58 | 33% | $28,081 | 16% | $40,594 |
| Bacc. | Natural Resources & Conservation | Environmental Science | 48 | 44% | $18,447 | 28% | $31,262 |
| Bacc. | Foreign Languages & Linguistics | Spanish Language and Literature | 48 | 48% | $27,991 | 36% | $39,712 |
| Bacc. | Engineering | Computer Engineering, General | 46 | 43% | $43,515 | 32% | $57,937 |
| Bacc. | Social Sciences | Economics, General | 46 | 41% | $28,281 | 26% | $46,189 |
| Bacc. | Agriculture | Agricultural and Extension Education Services | 41 | 68% | $30,137 | 50% | $36,827 |
| Bacc. | Education | Technical Teacher Education | 41 | 80% | $34,201 | 64% | $38,890 |
| Bacc. | Mathematics & Statistics | Mathematics, General | 39 | 44% | $36,176 | 37% | $41,354 |
| Bacc. | Engineering | Biological/Biosystems Engineering | 38 | 45% | $32,983 | 31% | $47,926 |
| Bacc. | Agriculture | Poultry Science | 35 | 60% | $33,656 | 45% | $45,317 |
| Bacc. | Physical Sciences | Geology/Earth Science, General | 35 | 46% | $23,373 | 38% | $32,043 |
| Bacc. | Visual & Performing Arts | Drama and Dramatics/Theatre Arts, General | 34 | 56% | $16,176 | 39% | $22,063 |
| Bacc. | Agriculture | Ornamental Horticulture | 31 | 61% | $24,076 | 37% | $38,667 |
| Bacc. | Visual & Performing Arts | Interior Design | 31 | 23% | $40,954 | 23% | $40,954 |
| Bacc. | Business, Management & Marketing | Retail Management | 31 | 61% | $36,050 | 47% | $41,298 |
| Bacc. | Agriculture | Food Science | 28 | 57% | $47,697 | 52% | $52,506 |
| Bacc. | Architecture | Landscape Architecture | 26 | 31% | $35,181 | 20% | $43,911 |
| Bacc. | Philosophy & Religious Studies | Philosophy | 26 | 54% | $15,306 | 17% | $25,557 |
| Bacc. | Agriculture | Agronomy and Crop Science | 25 | 48% | $24,207 | 30% | $34,078 |
| Bacc. | Social Sciences | Geography | 21 | 71% | $41,566 | 37% | $81,906 |
| Bacc. | Foreign Languages & Linguistics | French Language and Literature | 15 | 67% | $26,219 | 54% | $29,238 |
| Bacc. | Business, Management & Marketing | Business/Commerce, General | 15 | 67% | $51,829 | 67% | $51,829 |
| Bacc. | Ethnic & Cultural Studies | American/United States Studies/Civilization | 11 | 64% | $18,416 | 40% | $26,745 |
| Grad. Cert. | ALL | | 33 | 73% | $48,438 | 61% | $58,812 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Grad. Cert. | Business, Management & Marketing | Management Science | 20 | 85% | $60,263 | 79% | $66,254 |
| M.D./ J.D. | ALL | | 248 | 60% | $47,065 | 41% | $60,895 |
| M.D./ J.D. | Legal Professions & Studies | Law | 234 | 59% | $42,366 | 40% | $54,825 |
| M.D./ J.D. | Health Professions | Nursing Practice | 14 | 64% | $119,632 | 57% | $129,176 |
| Mast. | ALL | | 2358 | 45% | $51,925 | 37% | $62,124 |
| Mast. | Engineering Technology | Engineering/Industrial Management | 447 | 24% | $72,603 | 20% | $80,588 |
| Mast. | Business, Management & Marketing | Business Administration and Management, General | 222 | 56% | $98,505 | 46% | $114,301 |
| Mast. | Education | Elementary Education and Teaching | 143 | 69% | $42,782 | 66% | $43,869 |
| Mast. | Business, Management & Marketing | Accounting | 92 | 36% | $41,270 | 23% | $55,952 |
| Mast. | Education | Secondary Education and Teaching | 81 | 78% | $38,503 | 67% | $40,685 |
| Mast. | Health Professions | Audiology/Audiologist and Speech-Language Pathology/Pathologist | 69 | 61% | $49,185 | 49% | $56,338 |
| Mast. | Business, Management & Marketing | Management Science | 51 | 55% | $94,830 | 49% | $103,193 |
| Mast. | Education | Higher Education/Higher Education Administration | 47 | 57% | $34,068 | 41% | $40,765 |
| Mast. | Parks, Recreation, Leisure & Fitness | Parks, Recreation and Leisure Facilities Management, General | 46 | 50% | $39,397 | 42% | $43,843 |
| Mast. | Public Admin. & Social Service | Social Work | 45 | 71% | $36,429 | 51% | $43,166 |
| Mast. | Education | Counselor Education/School Counseling and Guidance Services | 42 | 83% | $40,138 | 68% | $43,956 |
| Mast. | Engineering | Electrical and Electronics Engineering | 40 | 12% | $40,005 | 9% | $50,652 |
| Mast. | Agriculture | Agricultural Economics | 39 | 44% | $45,544 | 26% | $66,411 |
| Mast. | Engineering | Engineering, General | 38 | 21% | $78,483 | 18% | $83,555 |
| Mast. | Education | Adult and Continuing Education and Teaching | 36 | 72% | $40,660 | 63% | $45,531 |
| Mast. | Parks, Recreation, Leisure & Fitness | Kinesiology and Exercise Science | 35 | 26% | $26,467 | 17% | $41,033 |
| Mast. | Visual & Performing Arts | Music Performance, General | 31 | 45% | $25,549 | 26% | $40,767 |
| Mast. | Physical Sciences | Geology/Earth Science, General | 30 | 30% | $30,732 | 25% | $37,296 |
| Mast. | Health Professions | Vocational Rehabilitation Counseling/Counselor | 29 | 72% | $30,537 | 64% | $33,171 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Mast. | Agriculture | Agronomy and Crop Science | 27 | 37% | $49,768 | 31% | $57,354 |
| Mast. | Agriculture | Food Science | 26 | 23% | $37,145 | 17% | $54,155 |
| Mast. | Engineering | Civil Engineering, General | 26 | 50% | $68,030 | 55% | $77,559 |
| Mast. | Engineering | Industrial Engineering | 26 | 58% | $54,979 | 55% | $62,710 |
| Mast. | English Language & Literature | English Language and Literature, General | 26 | 62% | $28,042 | 45% | $37,202 |
| Mast. | Physical Sciences | Materials Chemistry | 25 | 36% | $44,283 | 27% | $62,597 |
| Mast. | Education | Educational/Instructional Technology | 24 | 67% | $52,766 | 55% | $59,806 |
| Mast. | Communication & Journalism | Speech Communication and Rhetoric | 22 | 73% | $37,936 | 55% | $47,546 |
| Mast. | Education | Physical Education Teaching and Coaching | 22 | 32% | $51,850 | 25% | $51,745 |
| Mast. | Social Sciences | Anthropology | 21 | 38% | $38,647 | 19% | $49,046 |
| Mast. | Visual & Performing Arts | Drama and Dramatics/Theatre Arts, General | 21 | 57% | $11,542 | 14% | $20,729 |
| Mast. | Education | Special Education and Teaching, General | 20 | 85% | $47,546 | 74% | $51,305 |
| Mast. | English Language & Literature | Creative Writing | 20 | 45% | $21,734 | 17% | $40,150 |
| Mast. | Social Sciences | Sociology | 19 | 58% | $30,823 | 37% | $43,978 |
| Mast. | Education | Educational Leadership and Administration, General | 17 | 82% | $48,993 | 77% | $51,751 |
| Mast. | Legal Professions & Studies | Legal Professions and Studies, Other | 16 | 19% | $97,444 | 20% | $97,444 |
| Mast. | Education | Agricultural Teacher Education | 15 | 93% | $55,115 | 73% | $65,876 |
| Mast. | Mathematics & Statistics | Statistics, General | 15 | 53% | $56,684 | 50% | $62,068 |
| Mast. | Foreign Languages & Linguistics | Spanish Language and Literature | 14 | 36% | $29,004 | 25% | $28,149 |
| Mast. | Agriculture | Agricultural Production Operations, General | 13 | 54% | $67,860 | 46% | $70,182 |
| Mast. | Education | Adult and Continuing Education Administration | 13 | 85% | $41,532 | 67% | $50,588 |
| Mast. | Family & Consumer Sciences | Family and Consumer Sciences/Human Sciences, General | 13 | 77% | $30,788 | 55% | $40,382 |
| Mast. | Visual & Performing Arts | Art/Art Studies, General | 13 | 31% | $22,465 | 23% | $28,354 |
| Mast. | Health Professions | Registered Nursing/Registered Nurse | 13 | 77% | $69,811 | 70% | $74,780 |
| Mast. | Health Professions | Public Health Education and Promotion | 12 | 67% | $21,200 | 50% | $32,164 |
| Ph.D./ Ed.D. | ALL | | 351 | 36% | $57,867 | 27% | $70,729 |
| Ph.D./ Ed.D. | Engineering | Engineering, General | 49 | 20% | $62,954 | 10% | $81,628 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ph.D./ Ed.D. | Public Admin. & Social Service | Public Policy Analysis, General | 21 | 43% | $73,380 | 33% | $87,722 |
| Ph.D./ Ed.D. | English Language & Literature | English Language and Literature, General | 20 | 35% | $26,348 | 17% | $38,006 |
| Ph.D./ Ed.D. | Education | Higher Education/Higher Education Administration | 18 | 72% | $72,834 | 67% | $75,153 |
| Ph.D./ Ed.D. | Education | Curriculum and Instruction | 16 | 62% | $61,622 | 57% | $60,793 |
| Ph.D./ Ed.D. | Agriculture | Poultry Science | 14 | 43% | $109,566 | 43% | $109,566 |
| Ph.D./ Ed.D. | History | History, General | 11 | 55% | $29,473 | 27% | $42,935 |
| Spec. Deg. | ALL | | 12 | 67% | $69,551 | 56% | $73,061 |

Occupation Focus: Construction Management

Construction management—the field of study is matched by NCES with the occupation of the same name—is a job-rich, well-paid field, as shown in Tables 2 and 3, albeit one where education is less important than experience. Just over one-third of incumbent workers have a Bachelor's degree or more, as shown in Table 4. Growth has been slightly negative in recent years but is forecasted to rise slightly in future. Work in the construction industry can be cyclical, but construction managers are not particularly threatened by automation or obsolescence. No data on workforce outcomes for graduates in construction management are available, seemingly due to a lack of existing programs. With annual demand of 308 jobs and few or no existing programs channeling graduates into the pipeline, graduates in a new program in construction management might face a bright future, but the key challenge will be to convince employers that academic training is valuable as a substitute for and/or supplement to experience.

*Table 2: Matched Occupations - Construction Management (Source: NCES)*

| CIP2010 Code | CIP2010Title | SOC2010Code | SOC2010Title |
|---|---|---|---|
| 52.2001 | Construction Management. | 11-9021 | Construction Managers |

*Table 3: Occupation Snapshot of Construction Managers in Arkansas, 2019q2*

| | Current | | | | | | 5-Year History | | 1-Year Forecast | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Occupation** | **Empl** | **Avg Ann Wages[2]** | **LQ** | **Unempl** | **Unempl Rate** | **Online Job Ads[3]** | **Empl Change** | **Ann %** | **Total Demand** | **Exits** | **Transfers** | **Empl Growth** | **Ann % Growth** |
| Construction Managers | 3,919 | $78,300 | 1.06 | 63 | 1.7% | 61 | -177 | -0.9% | 308 | 93 | 178 | 38 | 1.0% |

*Table 4: Occupation Wages, Average Annual in Arkansas, 2018*

| | | | | Percentiles | | | | | Mean | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Occupation** | **Mean** | **Entry Level** | **Experienced** | **10%** | **25%** | **50% (Median)** | **75%** | **90%** | **Texas** | **USA** |
| Construction Managers | $78,300 | $47,000 | $93,900 | $43,200 | $54,700 | $66,400 | $90,500 | $114,900 | $98,400 | $103,100 |

*Table 5: Educational Attainment Profile - Construction Managers*

| | Empl (Place of Residence) | | | | | | | | Overall Occupation[1] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **< High School** | **High School** | **Some College** | **Two-Year** | **Four-Year** | **Master's** | **PhD** | **Total Empl** | **Avg Ann Wages** | **Forecast Ann Growth** | **Unempl Rate** |
| Construction Managers | 218 | 1,133 | 798 | 302 | 1,037 | 205 | 30 | 3,723 | $78,300 | 0.9% | 1.7% |

# Arkansas Education Loans

**The Arkansas Student Loan Authority has helped Arkansas families pay for college since 1977. We have three affordable education loans to help you pay for college.**

## THE STUDENT LOAN
For undergraduate & graduate students

## THE FAMILY LOAN
For a family member or friend borrowing on behalf of a student

## THE REFINANCING LOAN
To refinance or consolidate federal & private student loans

## The Arkansas Advantages

- Easy online application
- Low interest rates
- No origination fees
- No prepayment fees
- Deferments available
- Death & disability forgiveness
- A 0.25% interest rate reduction is available when using auto-debit to make monthly principal and interest payments

**Arkansas Student Loan Authority**
A Division of the Arkansas Development Finance Authority
www.asla.info 800-443-6030

**Master of Science in Construction Management**

Appendix B

Standard Purdue Course Evaluation

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The University of Arkansas provides online instructor/course evaluations for all end of course evaluations. Please note the following as you complete this online course evaluation:

1. Evaluations are located on a confidential evaluation site.
2. Your instructor will not see the evaluations until after final grades have been submitted. Your instructor's department chair and college dean will receive the composite results.
3. There is one open-ended question. If you provide a response, only the instructor will see it unless he/she decides to share responses with his/her department chair and/or college dean.
4. Your evaluations will be confidential. Your responses to scaled questions will be simply part of the composite data reported to your Instructor. Also the instructor will not be able to attribute any comments you make in the open-ended questions to you unless you write something that identifies you either directly or indirectly.

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If you have questions or comments about this survey, click here to send a message to the survey administrator.

# Demographics

## UofA Student Demographics

Your class

Freshman Sophomore Junior Senior Graduate Other

Expected grade

A/PASS B C D F/FAIL

Your College:

College of Education and Health Professions
College of Engineering
Dale Bumpers College of Agricultural, Food and Life Sciences
Fay Jones School of Architecture and Design
J. William Fulbright College of Arts and Sciences

Sam M. Walton College of Business
School of Law
Graduate School
UNDECLARED

Course required

Yes No

# ENGR College Core: Instructor Questions

## Instructor Based Questions

My instructor gives appropriate/timely feedback on each student's performance.

Strongly Agree Agree Undecided Disagree Strongly Disagree

My instructor is readily available for consultation.

Strongly Agree Agree Undecided Disagree Strongly Disagree

My instructor is fair and impartial when dealing with students.

Strongly Agree Agree Undecided Disagree Strongly Disagree

My instructor seems well-prepared for class.

Strongly Agree Agree Undecided Disagree Strongly Disagree

My instructor is effective in teaching the subject matter of this course.

Strongly Agree Agree Undecided Disagree Strongly Disagree

# University Core Course

## Course Based Questions

Overall, I would rate this course as:

Excellent Good Fair Poor Very Poor

# University Core Instructor

## Instructor Based Questions

Overall, I would rate this instructor as:

Excellent Good Fair Poor Very Poor

My Instructor is fluent in English

Strongly Agree Agree Undecided Disagree Strongly Disagree

## Faculty Comment Questions

Please use the box below to provide additional comments regarding your instructor or this course. All comments are seen only by the instructor and are not viewed by department heads, chairs or deans.

**Comments:**

Comments:

If you have questions or comments about this survey, click here to send a message to the survey administrator.

Thank you for your time and participation in the University of Arkansas online instructor and course evaluations.

**Master of Science in Construction Management**

Appendix C

Faculty CVs

**ANDREW F BRAHAM, Ph.D., P.E.**

EDUCATION

| | | | |
|---|---|---|---|
| BSCE | Civil Engineering | University of Wisconsin | 2000 |
| MSCE | Civil Engineering | University of Wisconsin | 2002 |
| Ph.D. | Civil Engineering | University of Illinois | 2008 |

ACADEMIC EXPERIENCE

| | | | |
|---|---|---|---|
| University of Arkansas | Associate Professor | 2016-present | Full time |
| Barcelona Tech | Visiting Scholar | Spring 2018 | Full time |
| University of Arkansas | Assistant Professor | 2011-2016 | Full time |
| Southeast University | Postdoctoral Fellow | 2009-2010 | Full time |

NON-ACADEMIC EXPERIENCE

Civil Engineer Koch Materials Company 2002-2004 Full time
Worked as a field and research engineer – provided technical support for development, production, and construction of asphalt emulsion based pavement maintenance and rehabilitation treatments

PROFESSIONAL REGISTRATION

Professional Engineer, Arkansas, No. 15638

CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (ASCE)
Asphalt Emulsion Manufacturing Association (AEMA)
Transportation Research Board (TRB)
Association of Asphalt Paving Technologists (AAPT)
American Society for Testing and Materials (ASTM)
Arkansas Asphalt Paving Association (AAPA)

HONORS AND AWARDS

2019 AEMA President's Award *Asphalt Emulsion Manufacturing Association (AEMA)*
2018, 2106 Outstanding Teacher Award *College of Engr / Civil Engr*
2018, 2014, 2012 Outstanding Mentor Award *Univ. of Arkansas*
2018 Paper award, TRB committee AT045 *Transportation Research Board (TRB)*
2016 Award of Recognition *Association of Asphalt Paving Technologists*
2012 New Faculty Teaching Commendation *Univ. of Arkansas*

SERVICE ACTIVITIES

Co-Developed LeadershipWWEB Podcast Series (SoundCloud, Apple Podcast) (2019 – current)
*Leadership in University Service*

Chair University of Arkansas Faculty Athletics Committee (2017 - current)
Champion University of Arkansas Diversity and Inclusion (2018 - current)
Member College of Engineering Technology Committee (2013 - current)
Chair Department of Civil Engineering Sustainability Minor Task Group (2012 - current)

*Leadership in Professional Service – Technical*
Chair Asphalt Emulsion Manufacturing Assoc. Young Member Committee (2017 – current)
Member Transportation Research Board committee AHD18, AFK50 (2012 – current)
Assoc. Member TRB Special Committee on Inclusion and Diversity (2018 – current)

## SELECTED KEY PUBLICATIONS / PRESENTATIONS

**Braham, Andrew.** "Perpetual Pavements Plus (PP+) – Improving Traditional Asphalt Concrete Perpetual Pavements", *Australian Asphalt Pavement Association*, Sydney, NSW, Aug 21, 2018.

Smith, Sadie; **Braham, Andrew**. "Quantifying Workability, Compactability, and Cohesion Gain of Asphalt Emulsion Cold In-Place Recycling", *AEMA-ARRA-ISSA Annual Meeting*, Cancun, Mexico, February 20, 2019.

**Braham, Andrew**; Kadrmas, Arlis; Ishee, Mark. "Asphalt Emulsion Manufacturing Association (AEMA) Online Certificate", Annual Meeting of the *Transportation Research Board*, Washington, DC, January 16, 2019.

Yeung, Erica; **Braham, Andrew.** "Characterizing The Influence of Time After Crushing for Cold In-place Recycling (CIR) on Compaction and Raveling", Annual Meeting of the *Transportation Research Board*, Washington, DC, January 15, 2019.

**Braham, Andrew.** "Taking Care of our Roads: Pavement Maintenance and Rehabilitation", *Warren Lecture Series, University of Minnesota – Twin Cities*, Minneapolis, MN, Nov 30, 2018.

Yeung, Erica; **Braham, Andrew.** "Characterizing The Influence of Time After Crushing for Cold In-place Recycling (CIR) on Compaction and Raveling", Annual Meeting of the Transportation Research Board, Washington, DC, January 15, 2019.

Kiihnl, Logan; **Braham, Andrew.** "Exploring the influence of pavement preservation, maintenance, and rehabilitation on Arkansas' highway network: an education case study", *International Journal of Pavement Engineering*, published online Jun 26, 2019.

Yeung, Erica; **Braham, Andrew.** "The Influence of Time after Crushing for Cold In-Place Recycling on Compaction and Raveling", Transportation Research Record, 2019, Vol. 2673(3), pp. 419–426.

Yeung, Erica; **Braham, Andrew.** "Evaluation and Compaction of Laboratory-Produced Recycled Asphalt Pavement in Cold In-Place Recycling", *J. Transp. Eng., Part B: Pavements*, 2018, 144(3).

Smith, Sadie; **Braham, Andrew.** "Comparing layer types for the use of PavementME for asphalt emulsion Full Depth Reclamation design", *Construction and Building Materials*, 2018, Vol. 158, pp. 481–489

## RECENT PROFESSIONAL DEVELOPMENT ACTIVITIES

Australian Asphalt Pavement Association International Flexible Pavements Conference & Exhibition, Sydney, NSW, Australia, Aug 18-21, 2019.

Association of Asphalt Paving Technologists Annual Meeting, Fort Worth, TX, March 2-6, 2019.


# Carl J. Circo

University of Arkansas School of Law
Waterman Hall
Fayetteville, AR 72701
(479) 575-2714
ccirco@uark.edu
https://works.bepress.com/carl_circo/


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## Education

J.D., University of Nebraska College of Law, 1976 (with high distinction); Nebraska Law Review (associate editor); Order of the Coif.
B.A., University of Nebraska—Lincoln, 1971 (Philosophy).

## Current Faculty Position

Ben J. Altheimer Professor of Legal Advocacy, University of Arkansas School of Law (Arkansas Bar Foundation Professor, 2012-13; Associate Dean and Professor, 2011-2016; Associate Professor, 2007-2010; Assistant Professor, 2003-07).

Courses: Property; Land Use; Real Estate Transactions; Negotiations; Construction Law Practice; Interviewing, Counseling & Negotiating; Corporate Counsel Externship; Wills, Trusts and Estates; Global Construction Law and Practice (2018 summer study abroad program at Downing College, Cambridge University, a collaboration between the University of Arkansas and the University of Mississippi); Literature and Law (2019 summer study abroad program at the University of Arkansas Rome Center). Supervisor for Habitat for Humanity Wills Project (pro bono clinical project); coach for 2010 ABA Regional and National Negotiations Competitions.

## Prior Law School Faculty Positions

Adjunct Professor, The University of Missouri—Kansas City School of Law, spring semester, 1990,
Course: Real Estate Transactions; spring semester, 2003, Course: International Aspects of Real Estate Transactions.

Assistant Professor, Benjamin N. Cardozo School of Law, 1979-81.
Courses: Property; Criminal Law; Law and Mental Health.

Interim Assistant Professor and Assistant Dean, University of Nebraska College of Law, 1978-79.
Courses: Criminal Law; Law and Mental Health.

## Professional Experience

Stinson Morrison Hecker LLP (now Stinson LLP), Business and Real Estate Practice Groups, 1982 to 2003 (partner beginning in 1986); Litigation, 1981. Areas of concentration: Real Estate; Construction and Design Law; Secured Financing; Commercial Law; Business Transactions; Transactional Negotiations; Contract Dispute Resolution; and Professional Development Program.

Law Clerk, Hon. Warren K. Urbom, United States District Court for the District of Nebraska, 1976-78.

**Professional Affiliations**

Fellow of the American College of Real Estate Lawyers (Co-chair of Law School Teaching Working Group 2010-2012); Member, American Bar Association Forum on Construction Law (Division 11 Steering Committee 2015 to present; Division 8 International Construction 2018); Member, Arkansas Bar Association Construction Law Section (2018 Chair); Arkansas Bar Association Corporate and In-House Counsel Section (chair 2010); Fellow of the American College of Mortgage Attorneys (through 2003); listed since 1995 in *The Best Lawyers in America*; past chair of the American Bar Association Committee on Design and Construction of the Section of Real Property, Trust and Estate Law; past member of the Pro Bono Committee of the American Bar Association Section of Real Property, Trust and Estate Law; past president of the Kansas Bar Association Real Estate, Probate and Trust Law Section; member, American Bar Association, Arkansas Bar Association, former member, Kansas Bar Association, Missouri Bar Association and Nebraska Bar Association. Admitted to practice in Arkansas (inactive or formerly in Nebraska, Missouri, and Kansas).

**Law Review and Professional Journal Articles**

*Rome, Shakespeare, and the Rule of Law* (work in progress).

*Interpreting Stale Preferential Rights to Acquire Real Estate: Beyond the Restatement of Property*, 62 VILL. L. REV. 603 (2017) (lead article).

*Rethinking Rights of First Refusal, Rights of First Offer, and Options to Purchase* (with Kathryn E. Allen, Wilhelmina Kightlinger, Beat U. Steiner, & KenDrell D. Collins), PROB. & PROP., Sept/Oct. 2017, at 45. (Reprinted in the October 2017 issue of GPSolo eReport, the e-newsletter of the American Bar Association Solo, Small Firm and General Practice Division.)

*Selected Construction Contract Clauses: From the Routine to the Cutting Edge*, 2015 ARK. L. NOTES 1800.

*A Case Study in Collaborative Technology and the Intentionally Relational Contract: Building Information Modeling and Construction Industry Contracts*, 67 ARK. L. REV. 873 (2014).

*Land Use Impact Fees: Does Koontz v. St. Johns River Water Management District Echo an Arkansas Philosophy of Property Rights?*, 2014 ARK. L NOTES 1626.

*Using Development Financing Tools to Help Cover Costs of Adapting to Climate Change in Tornado Alley and Beyond*, 47 JOHN MARSHALL L. REV. 609 (2013).

*Teaching Transactional Skills in Partnership with the Bar*, 9 BERKELEY BUS. L. J. 101 (2012) (Institute for Law Teaching and Learning "Article of the Month," September, 2013).

*The Evolving Role of Relational Contract in Construction Law*, CONSTRUCTION LAW., Fall 2012, at 16 (cover article).

*Will Green Building Contracts Transform Construction and Design Law?*, 43 URB. LAW. 483 (2011).
*An Educational Partnership Model for Establishing, Structuring, and Implementing a Successful Corporate Counsel Externship*, 17 CLINICAL L. REV. 99 (2010).

*Real Estate Project Valuation and Underwriting—A Primer*, 2010 ARK. L. NOTES 177.

*Does Sustainability Require a New Theory of Property Rights?,* 58 KAN. L. REV. 91 (2009).

*Should Owners and Developers of Low-Performance Buildings Pay Impact or Mitigation Fees to Finance Green Building Incentive Programs and Other Sustainable Development Initiatives?*, 34 WM & MARY ENVTL L. & POL'Y REV. 55 (2009).

*Using Mandates and Incentives to Promote Sustainable Construction and Green Building Projects in the Private Sector: A Call for More State Land Use Policy Initiatives*, 112 PENN. ST. L. REV. 731 (2008).

*Put the Arkansas Construction Lien Notice Statute Out of Its Misery*, 2008 ARK. L. NOTES 3.

*Placing the Commercial and Economic Loss Problem in the Construction Industry Context*, 41 J. MARSHALL L. REV. 39 (2007).

*How Does the Arkansas Trust Code Affect Real Estate Transactions?*, 2007 ARK. L. NOTES 45.

*Learning from Real Estate Lore*, 2007 ARK. L. NOTES 57.

*Contract Theory and Contract Practice: Allocating Design Responsibility in the Construction Industry*, 58 FLA. L. REV. 561 (2006).

*An Exchange of Collegial Memoranda on the Attachment of a Judgment Lien to Real Property Subject to a Buy-Sell Agreement*, 2006 ARK. L. NOTES 93 (co-authored with Robert Laurence).

*When Specialty Designs Cause Building Disasters: Responsibility for Shared Architectural and Engineering Services*, 84 NEB. L. REV. 162 (2005).

*Why Is this Boilerplate in My Real Estate Contract?*, 2005 ARK. L. NOTES 1.

*Building a Better Construction and Design Contract*, PRAC. LAW., July 2000, at 21.

*Small Construction Contracts: Big Issues*, PROB. & PROP., Nov./Dec. 1997, at 32.

*The Role of Lender's Counsel in the Design and Construction Process: Contract Review, Conditional Assignments of Contracts, and Related Due Diligence*, 24 REAL PROP., PROB. & TR. J. 557 (1990) (co-author and primary editor).

*Involuntary Psychiatric Treatment and Other Coercive Behavioral Interventions as Criminal Sanctions: Reflections on Vitek v. Jones*, 59 WASH. U.L.Q. 81 (1981).

*Habeas Corpus Practice and Procedure: A Proposal for the Management of Section 2254 Cases in the Federal District Courts*, 31 OKLA. L. REV. 914 (1978).

**Book**

CONTRACT LAW IN THE CONSTRUCTION INDUSTRY Context (forthcoming, 2019, Routledge).

**Book Chapters**

*Architect's Contract Administration, in* CONSTRUCTION LAW (2d ed., Carol J. Patterson et al., eds., 2019).

*Professional Liability* (co-authored with David L. Gershner) *in* ARKANSAS CONSTRUCTION LAW HANDBOOK (Carl J. Circo, David M. Powell & John Dewey Watson eds., 2016).

*Liability for Delegated or Shared Design in Standard Form Contracts, in* DELEGATED AND SHARED DESIGN IN THE CONSTRUCTION INDUSTRY (Michael T. Callahan, ed., 2011).

*Architect's Contract Administration, in* CONSTRUCTION LAW (William Allensworth et al., eds., 2009).

*Drafting Deeds of Trust, in* MISSOURI PRACTICE METHODS OF PRACTICE TRANSACTION GUIDE 319 (2001) (co-author).

*Introduction to Construction Contracts, in* KANSAS CONSTRUCTION LAW ch.1 (Harold A. Houck ed., 2000) (co-author).

*Deeds, in* KANSAS REAL ESTATE PRACTICE AND PROCEDURE HANDBOOK ch.10 (Carl J. Circo & Lewis A. Heaven, Jr. eds., 4th Ed. 1999).

*Kansas Construction and Design Law, in* A STATE-BY-STATE GUIDE TO CONSTRUCTION & DESIGN LAW: CURRENT STATUTES AND PRACTICES 287 (Carl J. Circo & Christopher H. Little eds., 1998) (co-author).

*Loan Documentation, in* TROUBLED CONSTRUCTION LOANS: LAW AND PRACTICE 13 (Stanley P. Sklar ed., 1991).

**Books Edited**

ARKANSAS CONSTRUCTION LAW MANUAL (Carl J. Circo, lead editor, David M. Powell & John Dewey Watson co-eds., 2016).

A STATE-BY-STATE GUIDE TO CONSTRUCTION & DESIGN LAW: CURRENT STATUTES AND PRACTICES (Carl J. Circo & Christopher H. Little eds., 2d ed., 2009).

KANSAS REAL ESTATE PRACTICE AND PROCEDURE HANDBOOK (Carl J. Circo & Lewis A. Heaven, Jr. eds., 4th Ed. 1999).

A STATE-BY-STATE GUIDE TO CONSTRUCTION & DESIGN LAW: CURRENT STATUTES AND PRACTICES (Carl J. Circo & Christopher H. Little eds., 1998).

**Shorter Writings**

*Observations from Teaching Global Construction Law and Practice*, UNDER CONSTRUCTION, Spring 2019 (online edition).

*Introducing Law Students to the Inside Counsel Role,* UNDER CONSTRUCTION, Winter, 2017 (online edition).

*Should Your Client Ever Grant a Right of First Refusal*?, AM. C. REAL EST. LAW. NEWS, Nov. 2016, at 25.

*Preferential Purchase Rights in Practice and Theory*, CEB REAL PROP. L. REP., September 2016, at 108 (lead article).

*U.S. Supreme Court Extends Heightened Scrutiny in Land Use Exaction Cases*, ARK. REAL EST. REV. (fall, 2013) (co-authored).

*Building Information Modeling, Integrated Project Delivery, and Collaborative Contract Trends in the Construction Industry*, AM. C. REAL EST. LAW. NEWS, Summer 2012, at 8.

*Is There a Dark Side to Green?,* (University of Arkansas Law Review Recent Developments blog (March 2011), http://lawreview.law.uark.edu/the-arkansas-record.html.

*An Overview of Risk Allocation Provisions for Green Building Contracts,* ARK. REAL EST. REV. (fall, 2010).

*Case Comment, Mortgage Electronic Registration System, Inc. v. Southwest Homes of Arkansas,* ARK. REAL EST. REV. (spring, 2010).

*Real Estate Project Valuation and Underwriting Metrics—A Refresher*, AM. C. REAL EST. LAW. NEWS, April 2010, at 5.

*Why Real Estate Lawyers Should Care About the Uniform Trust Code*, AM. C. REAL EST. LAW. NEWS, May 2007, at 3.

*Crafting a License to Use Architectural Plans*, AM. C. REAL EST. LAW. NEWS, May 2005, at 15 (co-authored with Penny Slicer).

**Conference Papers and Presentations (from 1990)**

International Construction Topics, 2019 Construction Law Conference, Arkansas Bar Association, April 2019.

Easier Said than Done: Rights of First Offer, Rights of First Refusal, and Options, American College of Real Estate Lawyers ACRELive online program, June 2016.

Arkansas Construction Law panel, presented at Arkansas Bar Association Annual Meeting, June 2016.

Rights of First Refusal, Rights of First Offer, and Options to Purchase, American College of Real Estate Lawyers 2016 Spring Meeting.
10 Things to Look Out for in Construction Contracts, presented at Arkansas Bar Association Construction Law Conference, April 2015, repeated at Arkansas Bar Association Best of CLE Conference, June, 2015.

Reflections on the U.S. Supreme Court's Takings Jurisprudence after Koontz v. St. Johns River Water Management District, Elon University School of Law faculty exchange, November 2013.

Using Development Financing Tools to Help Cover Costs of Adapting to Climate Change in Tornado Alley, presented at 13th Kratovil Conference on Real Estate Law and Practice: Adaptation of the Built Environment to Achieve Resilience to Climate Change, September 2013.

Relational Contracts in the Construction Industry, presented at Faculty Colloquium, St. Mary's University School of Law, November 2012.

What Every Builder Needs to Know about Building Information Modeling, presented at Arkansas Building & Construction Trades Conference, October 2012

Building Information Modeling, Integrated Project Delivery, and Relational Contract Theory in the Construction Industry, presented at University of Missouri-Kansas City faculty exchange, March 2012.

IPD and BIM Basics, presented at Arkansas Bar Association 8th Annual Construction Law Conference, February 2012.

What's Special about Green Building Contracts?, presented at the Benton County, Arkansas Bar Association CLE, February 2012.

Differing Site Conditions and Changes, presented at the Construction Contracts Program, sponsored by the American Bar Association Forum on the Construction Industry, November 2011.

The ABCs of SNTs: A Primer on Special Needs Trusts, presented at Northwest Arkansas Community Foundation CLE, February 2011.

Allocating Green Building Risks in Construction and Design Contracts, Association of American Law Schools 2011 Annual Meeting.

The University of Arkansas Corporate Counsel Externship: Using Experiential Learning to Help Law Students Develop the Specialized Skills of Corporate and In-House Counsel, at Externships 5: Responding to Changing Times, University of Miami, March 2010.

Managing the Swell of Conflicting Regulation in the Construction Industry, at the Fall Meeting of the American Bar Association's Forum on the Construction Industry, October 2009.

Recent Developments, presented at the Benton County Bar Association CLE, May 2009.

Using Economic Instruments to Promote Sustainable Construction Practices: The Role of Incentives and Developer Fees in Green Building Programs, at the International Municipal Lawyers Association Mid-Year Seminar, April 2009.

Should Owners and Developers of Low-Performance Buildings Pay Impact or Mitigation Fees to Finance Green Building Programs?, presented at the William and Mary Environmental Law and Policy Review Symposium, *It's Not Easy Building Green*, January 2009.

An Update on Sustainable Construction Programs Around the Nation: Trends and Developments in Green Building Incentives, presented at the University of Arkansas School of Law 2009 Winter CLE.

Land Grab? Legal and Jurisprudential Responses to *Kelo v. London*, presented at The Arkansas Bar Association's 9th Annual Government Practice Institute, October 2007.

Using Mandates and Incentives to Promote Sustainable Construction and Green Building Projects in the Private Sector, presented at the University of Houston Law Center, March 2007.

Planning Your Estate in Retirement, presented at the University of Arkansas Countdown to Retirement program, March, 2007.

Food, Water, Religion, and Death, presented at the University of Arkansas School of Law 2007 Winter CLE.

Planning Your Estate in Retirement, presented at the University of Arkansas Countdown to Retirement program, April 2006.

Selected Issues under the New Arkansas Trust Code, presented at the University of Arkansas School of Law 2006 Winter CLE.

Allocating Design Responsibility in the Construction Industry, presented at Faculty Colloquium, University of Nebraska College of Law, Fall 2005.

Using the Internet to Bring Guest Lecturers into the Classroom, presented at the Workshop on Technology and Pedagogy at the Association of American Law Schools 2004 Annual Meeting.

Speaker for Education Committee Workshop, New Tricks: Enhancing Teaching Effectiveness, American College of Real Estate Lawyers 2003 Fall Meeting.

Post-Closing: Malpractice Risk, Management Nightmare and Mundane Details, presented at Kansas Bar Association's Fall 2003 seminar, The Anatomy of a Real Estate Transaction.

Liability for Design in Design/Build Subcontracts, presented at American Bar Association Section of Real Property, Probate and Trust Law 2001 Annual Real Property Symposium.

Speaker for American Bar Association Section of Real Property, Probate and Trust Law 1999 Annual Real Property Symposium, Noah's Ark to Arcturus (mock negotiation session among members of project team for a proposed urban, mixed-use development project).

Construction and Design Contracts: The Construction Lender's Perspective, presented at American College of Mortgage Attorneys 1997 Annual Meeting.

Speaker for Construction Documentation workshop at the 1996 Mid-year meeting of the American College of Real Estate Lawyers.

Speaker for the Missouri Municipal Attorneys Association 1995 Seminar, Construction Contracts:  Pitfalls to Avoid.

Speaker for the Missouri Bar Association's 1995 Seminar, Drafting and Negotiating Construction Contracts for Small Projects.

Speaker for the 1993 Kansas Bankers Association/Kansas Bar Association, Annual Bank Counsel Update.

Program coordinator and speaker for the 1992 Kansas Bar Association Seminar, Real Estate Finance in Troubled Times.

Speaker for 1990 American Bar Association Forum on the Construction Industry and TIPS Fidelity and Surety Law Committee program, Liens and Other Security Interests—Money, Money, Money, Who Gets The Money?

**ERIC V. FERNSTROM, Ph.D., P.E.**

## EDUCATION

| | | | |
|---|---|---|---|
| BSCE | Civil Engineering | Bucknell University | 1997 |
| MSCE | Civil Engineering | Rutgers University | 2004 |
| Ph.D. | Civil Engineering | University of Arkansas | 2014 |

## ACADEMIC EXPERIENCE

| | | | |
|---|---|---|---|
| University of Arkansas | Adjunct Instructor | 2013-2020 | Part time |

## NON-ACADEMIC EXPERIENCE

| | | | |
|---|---|---|---|
| Civil Engineer | Van Cleef Engineering Assoc. | 2011-2020 | Part time |
| Civil Engineer | Van Cleef Engineering Assoc. | 2009-2011 | Full time |

Director of Structural Design – primarily managed bridge design projects. Design of other transportation structures: culverts, walls, sign structures, etc. Design and analysis for contractors: structure demolition plans, erection plans, hoisting and rigging design, etc. Quality control for structural designs performed by others.

| | | | |
|---|---|---|---|
| Civil Engineer | CMX | 1998-2009 | Full time |

Senior Project Manager – Performed and managed bridge design projects. Performed and managed bridge inspection contracts.

## PROFESSIONAL REGISTRATIONS

Professional Engineer, New Jersey, 24GE04345600
Professional Engineer, Pennsylvania, PE061694
Professional Engineer, Arkansas, No. 13486

## CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (ASCE)

## HONORS AND AWARDS

| | |
|---|---|
| 2013 Winner Ph.D. Student Competition | *OkTC Heartland Transp. Consortium* |
| 2007 Elected to Associate of the Firm | *CMX* |
| 2006 Chairperson of Outstanding Professionals | *CMX* |
| 2005 Elected to Outstanding Professionals | *CMX* |

## SERVICE ACTIVITIES

Peer reviewer; Journal of Professional Issues in Engineering Education and Practice (2015-20)

## SELECTED KEY PUBLICATIONS / PRESENTATIONS

**Fernstrom, E.V.**, Carreiro, J.L., Rawn, J.D., and Grimmelsman, K.A. (2013). "Dynamic Characterization of a Truss Bridge by Falling-Weight Deflectometer." Transportation Research Record: Journal of the Transportation Research Board, No. 2331, Transportation Research Board of the National Academies, Washington, D.C., 81–89.

**Fernstrom, E.V.**, Carreiro, J.L., and Grimmelsman, K.A. (2013). "Evaluation of Economical Dynamic Exciters for Vibration Testing of Bridges." Topics in Dynamics of Civil Structures, Volume 4, Springer New York, 423-434.

**Fernstrom, E.V.**, Wank, T.R., and Grimmelsman, K.A. (2012). "A Comparison of Dynamic Testing Methods for Evaluating a Truss Bridge." Proceedings of the 2012 Structures Congress, ASCE, 757- 768.

**Fernstrom, E.V.**, Wank, T.R., and Grimmelsman, K.A. (2012). "Dynamic Testing of a Truss Bridge Using a Vibroseis Truck." Topics on the Dynamics of Civil Structures, Volume 26, Springer, New York, 155-163.

**T. Kirk Morrow, Ph.D., P.E.**

EDUCATION

| | | | |
|---|---|---|---|
| Ph.D. | Civil Engineering | The University of Texas at Austin | 1998 |
| MSCE | Civil Engineering | North Carolina State University | 1993 |
| BSCE | Civil Engineering | University of Arkansas | 1988 |

ACADEMIC EXPERIENCE

| | | | |
|---|---|---|---|
| University of Arkansas | Instructor of Civil Eng. | 2019 | 25% |
| University of Houston | Lecturer | 2011-2014 | 25% |
| The University of Texas at Austin | Research Eng. & Lecturer | 2005-2007 | Full time |

NON-ACADEMIC EXPERIENCE

Owner — Morrow Consulting — 2017-Present — 75%

Provide consulting services to the heavy industrial engineering, procurement, and construction market. Includes industry best practice evaluation, implementation, and training. Areas of proficiency are field work planning / advanced work packaging, productivity improvement, change management, contract strategy, team alignment, lessons learned, and construction safety.

Vice President — S & B Eng. and Constructors — 2007-2017 — Full time

Leadership of multiple construction division departments including estimating, procurement, materials management, subcontracts, construction technical services, craft human resources, and construction equipment & tools. S & B is a full-service engineering, procurement, and construction provider to heavy industry with annual revenue of approximately $1.5 billion.

Construction Management — BE&K Construction Co. — 1999-2005 — Full time

Served in various construction management roles with progressive responsibility from project construction engineer to construction manager for heavy industrial projects throughout the U.S. BE&K was a full-service engineering, procurement, and construction provider to heavy industry with annual revenue of approximately $2.0 billion.

CII Specialist — Phillips Petroleum Co. — 1998-1999 — Full time

Trained capital project team members in the use of Construction Industry Institute (CII) best practices and assisted in implementation. This position acted as an internal consultant to project management. Example practices include planning for process plant startup, constructability, team building/alignment, project objective setting, and lessons learned.

Led and worked with various teams to develop and document capital asset development processes to ensure use of industry best practices.

Project Engineer/Supt. J.A. Jones Construction Co. 1993-1994 Full time
As project engineer, initially responsible for development and maintenance of the project cost and schedule control system for the U.S. Army Corps of Engineers Grays Landing Dam project in Masontown, PA. After promotion to project superintendent, assumed responsibility for central-mix concrete plant erection, concrete production, and concrete placement operations. This included work and material planning, scheduling, procurement, and quality control.

Bridge Engineer Federal Highway Admin. 1989-1992 Full time
Design responsibilities included approximately 2 1/2 years of highway bridge design primarily in prestressed and reinforced concrete. Construction responsibilities included 1 year of highway bridge project field engineering with experience in construction surveying, materials testing, payment estimate preparation, and general construction inspection.

## PROFESSIONAL REGISTRATION

Professional Engineer, Texas, No. 82036

## CURRENT MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (ASCE)

## HONORS AND AWARDS

2011 Distinguished Service Award Construction Industry Institute (CII)

## SERVICE ACTIVITIES

*Leadership in Professional Service – Education*

Representative, University of Houston, CM Industry Advisory Board (P&I Constr.), 2010-2015
Lecturer, CII Best Practices Course, The University of Texas at Austin, Broadcast to 13 Universities, 2009-2014

*Leadership in Professional Service – Industry*

Member, Board of Advisors, CII, 2010-2017
Member, Power, Utilities, and Infrastructure Sector Committee, CII, 2016-2017
Member, Research Committee, CII, 2015-2016
Member, Professional Development Committee, CII, 2013-2015
Chair, Benchmarking and Metrics Committee, CII, 2010-2012

## RECENT PROFESSIONAL DEVELOPMENT ACTIVITIES

"Design and Maintenance of Gravel Roads," McKissock Online, December 20, 2018.
"Constructed Wetlands for Wastewater Treatment," McKissock Online, December 29, 2018.
Construction Industry Institute (CII) Annual Conference, Orlando, FL, July 31-August 2 2017.
FIATECH Technology Conference and Showcase, Orlando, FL, April 10-12, 2017.
IHS "Understanding the Global Petrochemical Industry," Houston, TX, February 7-9, 2017.
CII Annual Conference, National Harbor, MD, August 1-3, 2016.

CURT National Conference, Orlando, FL, February 8-10, 2016.
Engineering and Construction Contracting Conference, San Antonio, TX, September 9-12, 2015
CII Annual Conference, Boston, MA, August 3-5, 2015

# Nathaniel J. Sobin, Ph.D., P.E. – *Curriculum Vitae*

5845 Bourke Drive
Colorado Springs, CO 80919
Tel: (719) 761-6782
E-mail: natsobin@gmail.com

## Education

**Doctor of Philosophy - Civil Engineering (Ph.D.)**
**University of Colorado at Boulder**
*Degree Conferred – August 2013*
Dissertation Title: *A Methodology for Building Evaluation Capacity in Alternative Fuel Deployment Programs*

**Master of Science - Civil Engineering (MSCE)**
**University of Arkansas at Fayetteville**
*Degree Conferred – August 2005*
Thesis Title: *Evaluation of Strand Bond Assurance Tests for Pretensioned Concrete Applications*

**Bachelor of Science - Civil Engineering (BSCE)**
**University of Arkansas at Fayetteville**
*Degree Conferred (Summa Cum Laude) – May 2004*

## Related Experience

**DoDEA Project Director – Widefield School District 3 – 10/17 to Present**
Experience in managing a 5-year Department of Defense Education Activity (DoDEA) grant valued at $1M. Required duties include co-management of the Project Lead the Way (PLTW) program at the district level including personnel and purchasing decisions, full management for creating, maintaining and analyzing a district-wide data acquisition system for math score improvement due to STEM curriculum integration and interim/annual reporting to the DoDEA program, and full management for specifying and constructing Maker Space facilities in all junior high and high schools (5 Maker Spaces in total) in Widefield School District 3.

**Career & Technical Education (CTE) Classroom Instructor – Widefield School District 3 08/14 to Present**
Experience in developing a four-year engineering pathway and delivering multiple CTE courses including PLTW Engineering courses, CAD courses using AutoCAD, Autodesk Inventor, and Solidworks software, internal combustion engines, and applied physics. Development of program also included the design, development and construction of a Maker Space and an accompanying year-long curriculum titled "Maker 101". Details on courses taught are listed in the "Teaching Experience – *Courses Delivered*" section.

**Southern Colorado Clean Cities – Member – Board of Advisors – 09/14 to 10/15**
Experience in serving as a board member for helping specify the vision and direction of the Southern Colorado Clean Cities Coalition.

**Southern Colorado Clean Cities Coordinator – 01/14 to 08/14**
*Clean Cities Coordinator* – Experience in building and maintaining a diverse group of stakeholders for the purpose of deploying alternative fuel technologies for the transportation sector. Specific duties include organizing and executing outreach events and technical trainings for our stakeholder group, finding and applying for grant opportunities to fund the coalition and stakeholder projects, and engaging the public with the purpose of disseminating information about the coalition and alternative fuel vehicle technologies.

**University of Colorado at Boulder - College of Engineering - 08/13 to 01/14**
*Research Associate (Post-doctoral Researcher)* – Experience in national research on the current state-of-practice in the construction industry regarding the interrelationships of cost, schedule, level of integration, and sustainability outcomes based on project delivery method (Charles Pankow Foundation / Construction Industry Institute). Research in the effectiveness of outreach and education efforts during accelerated highway construction projects (FHWA).

**University of Colorado at Boulder - College of Engineering - 5/08 to 8/13**
*Research Assistant* – Experience in national research on delivery and procurement methods in sustainable construction projects and procurement in alternative fuel partnership programs.

**University of California at Davis-Institute for Transportation Studies - 1/11 to 6/11**
*Visiting Student* – Additional coursework in technology and policy coursework specific to alternative fuel topics for the transportation sector.

**Stresscon Corporation – 8/05 to 8/08** (Concurrent Employment)
*Project Engineer* – Experience in prestressed and precast concrete design, estimating, and project management in the Colorado region.

**HCDA Engineering – 7/07 to 2/08** (Concurrent Employment)
*Project Engineer* – Consulting engineering experience in steel, timber, and masonry design.

**University of Arkansas College of Engineering - 5/04 to 7/05**
*Research Assistant* – Experience in research and design of testing methods for quantifying attainable bond strength of prestressing strand in concrete elements and presenting reports on such methods.

**Beaver Water District - 5/03 to 5/05**
*Engineering Intern* – Aide to Chief Engineer of BWD during construction of $85 million water treatment facilities expansion including intake facility with microtunneling operations, water treatment facility, raw water pipeline, and solids handling facility.

## Teaching Experience – *Courses Delivered*

**Widefield School District 3 – CTE Instructor (Fall 2014-Present)**
*Project Lead the Way (PLTW) – Engineering Design and Development* – Capstone design course for the PLTW Engineering pathway where students identify, justify and solve a real-world problem (course taught x 1 full-year term)

*Project Lead the Way (PLTW) – Computer-Integrated Manufacturing* – Introduction to manufacturing methods, using CAD to produce CAM strategies and toolpaths, and VEX robotics (course taught x 1 full year term)
*Project Lead the Way (PLTW) – Aerospace Engineering* – Introduction to aerodynamics, flight navigation and planning, orbital mechanics, and VEX robotics (course taught x 2 full-year terms)

*Project Lead the Way (PLTW) – Introduction to Engineering Design* – Introduction theory and practice to the engineering field (course taught x2 full-year terms)

*Maker 101* – Self-developed curriculum for building 21st century skills via a project-based layout that includes coding, microcontrollers, robotics, woodworking, metals, and flight (course taught x 2 full-year terms)

*CAD I* – Computer Assisted Drafting course using Autodesk AutoCAD and Autodesk Inventor Pro (course taught x 5 full-year terms)

*CAD II* – Computer Assisted Drafting course using Autodesk Inventor Pro (course taught x 3 full-year terms)

*Internal Combustion Engines (Small Engines)* – Basic 4-cycle engine theory and shop experience in fully disassembling, reassembling, and testing a Briggs & Stratton small engine (course taught x4 semester terms)

*Principles of Technology* – Applied physics curriculum and project-based construction class (course taught x1 full-year term)

**University of Colorado at Boulder (Spring 2010/Fall 2013)**

*AREN 4466 – Construction Planning and Scheduling (Lab Instructor)* – Senior level course that teaches common planning and scheduling techniques for construction and engineering projects such as the critical path method and the accompanying software. Specific duties include the design and administration of lab coursework using Oracle Primavera 6 software (course taught x 1 semester term).

*AREN 4317 - Architectural Eng. Senior Design (Instructor)* – Capstone design course for architectural engineering majors at the University of Colorado. Specific duties included design of the semester curriculum, teaching, mentoring, and evaluating all structural engineering portions of the design course (course taught x 1 semester term).

**University of Arkansas at Fayetteville (Spring 2005)**

*CVEG 2113 – Structural Materials (Lab Instructor)* – Course designed for building a fundamental understanding of the mechanical properties of common construction materials including steel, timber, and concrete. Specific duties included the administration of several predesigned, hands-on labs culminating in an American Concrete Institute (ACI) Grade 1 field-testing certification (course taught x 1 semester term).

## Teaching Experience – *Service*

**Board/Committee Membership**

*ACTE Engineering and Technology Education Division (ETED) – Region V Representative for the National ACTE ETED Policy Board* (Summer 2018 to Present)
Representative and voting member for the Region V District of ACTE on policy changes and programmatic inclusion in the ETED Division of ACTE.

*MRHS School Leadership Team* (Fall 2017 to Present)
Departmental representation within Mesa Ridge High School (MRHS) for developing, implementing and disseminating curriculum and school policy strategies for improving academic performance and culture in the building.

**Student Organizations Developed**

*Technology Student Association (TSA) – Mesa Ridge Engineering Club (2015 to present)*
Chapter Founder and Advisor – Mesa Ridge High School
*State level competition in Integrated Autonomous Vehicle (IAV), Underwater Remotely-Operated Vehicle (UROV), 3D CAD, and other career related competitions.*

*Skills USA - Mesa Ridge High School (2017 to present)*
Chapter Founder and Advisor – Mesa Ridge High School
*Focus on 3D Additive modeling and career preparation for college and non-college bound student success.* Received Chapter of Excellence Award – 2016-17 and 2017-18 academic years

*Flight Club – Mesa Ridge High School (2016 to 2018)*
Chapter Founder and Advisor – Mesa Ridge High School
*Program developed to achieve a Private Pilot Certificate (VFR) for students in conjunction with the AEFCO program. Secondary programmatic focus of FPV drone piloting and sensing.*

**Faculty/Staff Development Delivered**

*"CAD Across the Curriculum" – Staff Development Course*

Staff development course delivered in the 2016-17 academic year to facilitate the use of CAD in multi-curricular, interdisciplinary environments.

*"Utilizing Maker Spaces in Multiple Disciplines" – Staff Development Course*

Staff development course delivered in the 2018-19 academic year to facilitate the use of 3D modeling and printing in multi-curricular, interdisciplinary environments.

**External (Non-District) Curriculum Developed**

*"Introduction to STEM" – Statewide CCCS*

Inter-district curriculum development task force to develop a statewide, entry-level STEM curriculum that can be implemented in any urban or rural environment with open source or lost cost tools for the Colorado Community College System (CCCS).

## Fellowships, Scholarships, and Awards

Teachers First Award for Southern Colorado (February 2018) – *Peer-nominated award to honor teachers who exemplify excellence, encourage and inspire others and raise the importance of the teaching profession.*
https://koaa.com/teachers-first/2018/02/20/dr-nat-sobin-wins-february-teachers-first-award-2/

National Science Foundation (NSF) – Graduate Research Fellowship Program (GRFP) (Summer 2010-Summer 2013)

Federal Highway Administration (FHWA) – Eisenhower Transportation Fellowship (Summer 2010-Summer 2013) *Concurrent Fellowship – Travel Funds Accepted Only*

Civil Engineering Departmental Fellowship – University of Colorado at Boulder
(Fall 2008-Summer2010)

Dean's Outstanding Merit Fellowship – University of Colorado at Boulder (Fall/Spring 2008)

Teaching Assistant of the Year in Civil Engineering 2004-2005 – Structural Materials Concrete Lab – University of Arkansas at Fayetteville.

Montgomery, Watson, Harza (MWH) / Beaver Water District (BWD) – General Scholarship to Outstanding Student (Fall/Spring 2004)

Junior of the Year in Civil Engineering 2002 – Arkansas Academy of Civil Engineers

National Science Foundation (NSF) – CSEMS Undergraduate Scholarship (2002-2004)

## Professional Licensure

*Professional Engineering (PE) License*
License No. 52576 – State of Colorado – Expiration 10/31/2019

*Colorado Principal License (School Principal K-12 Endorsement)* – No. 268064 (Exp. 05/16/21)

*Colorado Career and Technical Education (CTE) Director License* – No. 284206 (Exp. 09/23/23)

*Colorado Teaching License (Technology Education – Science Education – School Librarian Endorsements)* – No. 211565 (Exp. 12/09/21)

*Colorado Career and Technical Education License (STEM Pathway)* – No. 211565 (Exp. 12/09/21)

*Colorado Career and Technical Education License (Architecture and Construction Pathway)* – No. 211565 (Exp. 12/09/21)

## Professional Affiliations

*Association for Career and Technical Education (ACTE)*
Active Member and Engineering and Technology Education Division (ETED) Voting Policy Board Member for the Region V District – Summer 2018-Present

*Technology Student Association (TSA)*
Chapter Founder and Advisor – Mesa Ridge High School – 2015-Present

*Skills USA*
Chapter Founder and Advisor – Mesa Ridge High School – 2016-Present

*American Society of Civil Engineers (ASCE)*
National Member 2001-Present
President of UA Chapter – December 2002-December 2003
Vice President of UA Chapter – December 2003-December 2004

*Tau Beta Pi*
National Member (2004-Present)

*Chi Epsilon*
National Member (2003-Present)

## Publications

[1] Minooei, F., Sobin, N., Goodrum, P., and Molenaar, K., (2016). *Community Outreach Tools and Strategies for Accelerated Highway Construction Projects*. In Transportation Research Board 95th Annual Meeting (No. 16-4757).

[2] Sobin, N., Molenaar, K., and Cahill, E., (2012). *Mapping Goal Alignment of Deployment Programs for Alternative Fuel Technologies: An Analysis of Wide-Scope Grant Programs in the United States*. Journal of Energy Policy, Volume 51, p.405-416.

[3] Molenaar, K., Sobin, N., and Antillon, E. (2010). *A Synthesis of Best-Value Procurement Practices for Sustainable Design-Build Projects in the Public Sector*. Journal of Green Building, Vol. 5, Issue 4, pp.148-157.

[4] Molenaar, K.R., Gransberg, D.D., Korkmaz, S., Riley, D, and Sobin, N. (2010). *Influence of Project Delivery on Sustainable, High Performance Buildings, Report to the Charles Pankow Foundation*, Claremont, White Paper published by the Charles Pankow Foundation, available online at http://www.dbia.org/NR/rdonlyres/C1C4F052-14E3-4625-8C50-E39273450360/0/pankow20110209.pdf.

[5] Korkmaz, S., Swarup, L., Horman, M., Riley, D., Molenaar, K., Sobin, N., and Gransberg, D. (2010). *Influence of Project Delivery Methods on Achieving Sustainable, High Performance Buildings: Report on Case Studies*. White Paper published by the Charles Pankow Foundation, available online at http://www.dbia.org/NR/rdonlyres/F15664D5-B617-487C-9C95-EE4F5E453A9D/0/CPF_ThrustII_05212010_Final.pdf.

[6] Sobin, N., Molenaar, K., and Gransberg D. (2010). *Sustainability by...A Synthesis of Procurement Approaches for High Performance Buildings*. Proceedings of the ASCE Construction Research Congress 2010, p.1366-1375

[7] Molenaar, K., Sobin, N., Gransberg, D., McCuen, T., Korkmaz, S., and Horman, M. (2009). *Sustainable, High Performance Projects and Project Delivery Methods: A State-of-Practice Report*. White Paper published by the Charles Pankow Foundation, available online at http://www.dbia.org/NR/rdonlyres/AA033026-60BF-495B-9C9C-51353F744C71/0/Sep2009ReportPankowDBIA.pdf.