

NEW DEGREE PROGRAM REQUEST

Graduate Certificate in Construction Management

FORMAT 3

Submit original with signatures + 4 copies

NEW DEGREE PROGRAM REQUEST

(UA Regulation 10.04.02)

NOTE: Because of the extensive reviews required to initiate a new graduate degree program, consultation with Graduate Academic & Advisory Committee during early phases of the request preparation is strongly recommended. This will allow for a more efficient review and, more importantly, it will provide the department with up-to-date information about which aspects of the request can be expected to receive particular attention at the final higher levels of review. The department may be requested to obtain outside reviews of the new program proposal.

Submit the request according to the following format: (Please number pages and include a table of contents.)

I. Cover Memorandum should include:

Memorandum

Date: September 18, 2008

To: The Board of Regents of the University of Alaska

From: Dr. Robert A. Perkins
CEM, Civil & Environmental Engineering

Re: New Degree Program Request
Graduate Certificate in Construction Management

The objective of the Graduate Certificate in Construction Management is to increase the skills of graduate engineers and other construction professionals in order to accelerate their advancement into more responsible management positions. The program was designed with strong input from construction industry employers and will continue to regard the employer as a partner in the program. Career opportunities are integral to the program.

The graduate certificate is designed to provide the needed skill level by taking short academic courses during the winter season when construction work is slowed. Students can obtain the credential, the graduate certificate, in several years of part-time studies – an attainable goal for working students.

Employers will influence the curriculum several ways. First, they already have been involved in the program development. Second, an industry advisory committee will advise the program. Third, the employers will sponsor courses that they believe are most useful to their employees/students. Fourth, the program is flexible enough that new courses can be added that are specific to particular employers or situations. The flexibility derives from the division of the main skills into rubrics, then requiring the students to take a certain amount of courses from each rubric. Within the rubrics, for the individual courses, the academy establishes the quality, but the employer determines the direction. The program will emphasize overarching virtues of ethical practices, respect and fair dealing for the other parties to the construction contract, and effective communications within the project and outside the project, especially to the public.

The nature of the self-support and the employer involvement will dictate the success of the program – employers will not pay unless they feel the students/employees are gaining useful skills. Students will lose interest in the program, if they do not feel the program is

aiding their advancement. Hence, the student and employer participation in the program is a key benchmark of its success.

Approvals:

Department Chair, Civil & Environmental Engineering _____

CEM Curriculum Council Chair _____

Dean, College of Engineering and Mines _____

Dean of Graduate School _____

President, UAF Faculty Senate _____

Chancellor _____

President, UA System _____

Board of Regents _____

II. Identification of the Program (All pages should be numbered.)

A. *Description of the Program*

1. *Program title*

Graduate Certificate in Construction Management

2. *Credential level of the program, if appropriate*

Graduate Certificate

3. *Admissions requirements and prerequisites*

Education and Experience

1. A four-year ABET college degree in engineering and at least two years construction experience, or
2. A four-year non-ABET degree in engineering, science or math-field and four years construction experience, or
3. A four-year college degree and six years construction experience, or
4. At least ten years of management-level construction experience.

Recommendations

Three letters of recommendation, including one from the line supervisor of the applicant.

4. *Course descriptions of required and recommended elective courses. (For new courses, use FORMAT 1; to revise courses, use FORMAT 2)*

The degree is design to permit flexibility of courses within the major rubrics: human relations and communications, construction project management, and construction technical areas. The students may acquire those credits by any combination of courses. UAF's standard three-credit courses could be used. In addition, the employer may request special courses. After vetting those with the college curriculum committee and the dean, those could be added to appropriate rubric for the student.

5. *Requirements for the degree.*

a. *Include a sample course of study and a 3-Year Cycle of course offerings.*

b. *Include a proposed general catalog layout copy of the program with short descriptive paragraph.*

a.) For example: Here are courses that are available now, or have been suggested by the industry advisors, and how they fit into the rubrics.

Human Relations and Communications	Construction Project Management	Construction Technical
UAF 3-credit courses currently available		
BA 607, Human Resource Management	ESM 609, Project Management	CE 451, Construction Cost Estimating and Bid Preparation
ESM 601, Managing and Leading Engineering Organizations	CE 620, Civil Engineering Construction	CE 603, Arctic Engineering
	ESM 608, Legal Principles for Engineering Management	ESM 622, Engineering Decisions
One-credit courses that were offered in Spring 08 as special topics		
Big Picture: systems thinking and organizational dynamics	Construction Claims Case Studies	Managing Risk
	Scheduling for Construction Administration	Overview of Environmental Laws and Permitting
One-credit courses that were suggested and outlined in Spring 08		
Power and Politics: its effect on motivation	Network Scheduling	Construction Estimating Basics
Leading Teams	Project Network Scheduling In Owners Organizations	Introduction To Construction Contract Administration
Supervising Others	Construction Claims Prevention, Analysis And Dispute Resolution	
Legal and Ethical and Practical Aspects of Personnel Decision Making		
Making Change		
Project Interaction with Stakeholders and the Public		
One-credit courses suggested by industry advisors since spring 2008, one credit unless noted		

Crew Employee Motivation	Project Management Organization and Delivery Systems	Advanced Topics in Cost
Writing Technical Proposals	Contract Management for Alternate Project Delivery Systems (1 or 2 credits)	Advanced Dirt Estimating
Oral and Visual Communications, In-house and Technical		New Techniques in Construction – GIS, GPS and Others
Public Communications and Media Relations		Introduction to Right of Way Law
Negotiations, (1 or 2 credits)		Special Law Topics
Meeting Management		Arctic Construction
Effective Written Communications, (1, 2, or 3 credits)		Introduction to Safety Engineering
Remote and Alaska Issues, (1, 2, or 3)		Quality Control
Retention		

b.) Catalog Entry

Graduate Certificate in Construction Management
 College of Engineering and Mines
 Department of Civil and Environmental Engineering
 (907) 474 xxxx
<http://www.alaska.edu/uaf/cem/cee/>

Graduate Certificate

Minimum requirements for degree: 15 credits

This program will advance the managerial skill level – the ability to make wise management decisions - of graduate engineers and other professionals in the construction industry to help prepare them for more responsible jobs.

Not for full-time students

Graduate Program – Graduate Certificate

1. Complete the following admission requirements:

a. Education and Experience:

- i. A four-year ABET college degree in engineering and at least two years construction experience, or
- ii. A four-year non-ABET degree in engineering, science or math-field and four years construction experience, or

- iii. A four-year college degree and six years construction experience,
or
 - iv. At least ten years of management-level construction experience.
 - b. Recommendations. Provide three letters of recommendations, at least one from the applicant's line supervisor.
- 2. Complete the general university requirements (page 182), as adopted for this program
 - a. Registration requirement: Students must take at least one course per year to remain in good standing in the program.
 - b. There will be a construction management certificate faculty advisor or faculty committee appointed by the College of Engineering and Mines (CEM) dean who will be the student's graduate advisory committee.
 - c. The student will complete a graduate study plan after completing five credits.
- 3. Complete a total of 15 credits of courses from the three main construction management rubrics and two main associated rubrics as approved by the student's advisory committee as follows:
 - a. Human relations and communications, 4 to 6 credits
 - b. Construction project management and scheduling, 4 to 6 credits
 - c. Technical management of construction and costs, 4 to 6 credits
 - d. Financial aspects of construction, 0 to 3 credits
 - e. Other technical areas, 0 – 3 credits
- 4. Examples of suitable courses under each rubric are
 - a. Human relations and communications, 4 to 6 credits
 - i. BA 607, Human Resources Management
3
 - ii. ESM 601, Managing and Leading Engineering Organizations
3
 - iii. BA 6XX, Big Picture, Systems Thinking and Organizational Dynamics
1
 - iv. BA 6XX, Power and Politics and Its Effect On Motivation
1
 - v. BA 6XX, Leading Teams
1
 - vi. BA 6XX, Supervising Others
1
 - vii. BA 6XX, The Legal Ethical and Practical Aspects of Personnel Decision Making
1
 - viii. BA 6XX, Making Change
1
 - ix. ESM 6XX, Project Interaction with Regulators, Stakeholders, and The Public
1
 - b. Construction project management and scheduling, 4 to 6 credits

- i. ESM 609, Project Management
3
- ii. CE 620, Civil Engineering Construction
3
- iii. ESM 608, Legal Principles for Engineering Management
3
- iv. CE 6XX, Construction Claims Case Studies
1
- v. CE 6XX, Scheduling for Construction Administration
1
- vi. CE 6XX, Network Scheduling Basics
1
- vii. CE 6XX, Project Network Scheduling Applications in Owner Organizations
1
- viii. CE 6XX, Construction Claims: Prevention, Analysis, and Dispute Resolution
1
- ix. CE 6XX, Project Management Organization and Delivery Systems
1
- x. CE 6XX, Contract Management for Alternate Project Delivery Systems
1
- c. Technical management of construction and costs, 4 to 6 credits
 - i. CE 451, Construction Cost Estimating and Bid Preparation
3
 - ii. CE 603, Arctic Engineering
3
 - iii. ESM 622, Engineering Decisions
3
 - iv. CE 6XX, Managing Risk
3
 - v. CE 6XX, Construction Estimating Basics
1
 - vi. CE 6XX, Introduction to Construction Contract Administration
1
 - vii. CE 6XX, Advanced topics In Cost
1
 - viii. CE 6XX, Advanced Dirt Estimating
1
 - ix. CE 6XX, Intro to Right Of Way Law, Procedures, and Issues
1
 - x. CE 6XX, Construction-Related Law topics
1
 - xi. CE 6XX, Arctic Construction

- 1
- xii. CE 6XX, Introduction to Safety Engineering
- 1
- xiii. CE 6XX, Quality Control
- 1
- d. Business and Financial aspects of construction, 0 to 3 credits
 - i. ACCT 602, Accounting for managers
 - 3
 - ii. ESM 605, Engineering Economics
 - 3
- e. Other technical areas, 0 to 3 credits
 - i. CE 603, Arctic Engineering
 - 3
 - ii. ENVE 644, Environmental Laws and Permitting
 - 3

5. Credits obtained toward the GCCM may be applied toward another master's degree.

B. Program Goals

1. Brief identification of objectives and subsequent means for their evaluation

Mission Statement of degree:

This program will advance the managerial skill level – the ability to make wise management decisions - of graduate engineers and other professionals in the construction industry to help prepare them for more responsible jobs.

Goals

General:

By capitalizing on the students' prior experience and active work in the construction field, and the employer's understanding of the student's skill or knowledge gaps, UAF faculty can provide the academic setting and rigor to advance the student's skills in a direction most beneficial to both the student and the employer.

Specific:

- Improve the student's ability to communicate with project team members and diverse stakeholders. Students must demonstrate an ability to communicate by written, oral, visual, and electronic means and to understand their professional roles and the likely effects of their communications on others.
- Improve the student's ability to lead project teams. Students must demonstrate that they understand their roles in personnel management and the ability to make legal and ethical personnel decisions.
- Improve the student's ability to manage the student's organization in the project matrix. Students must demonstrate they understand the project cycle and the roles of the teams in that cycle, including the legal relations of the parties and their contracts, the effects of scheduling decisions on the project.
- Improve the student's technical abilities related to construction management. Students must demonstrate their appreciation of cost-drivers in construction, risks involved, and knowledge in appropriate technical areas.

2. Relationship of program objectives to "Purposes of the University"

This is a teaching program with an emphasis on one of Alaska's most important industries, construction. By its nature it will emphasize construction in Alaska and the circumpolar North. It is devoted to lifelong learning of key professionals in that industry. The program relates to the purposes of the university:

- The program is responsiveness to the state's needs. The need for skilled middle-management engineers and construction professionals is great in Alaska. There is a nationwide shortage of manager-level engineers. The shortage in Alaska is acute in many fields. In the field of construction management, major Alaskan owners of construction projects note a current shortage of trained managers and predict it will get worse as the current age class of senior managers retires. Besides the managerial skill and technical knowledge of construction that will be lost, these senior managers are also the mentoring class of the incipient middle managers. Besides engineers, many agencies have professional employees who do not have engineering degrees, but do perform professional-level work and should be on the management track. In the Alaskan construction industry, these workforce problems are exacerbated by the remoteness of many projects and our extreme seasonality. In former times these were compensated by high salaries, but this is no longer the case - today qualified construction professionals are paid high salaries in warmer climates. These problems are worse in Alaskan government service, where the personnel policies are less flexible.
- The program is based on strategic partnerships with internal and external partners. At the teaching level, the program is a partnership between the CEM and UAF School of Management (SoM). At the administration level, the program is a partnership between University of Alaska Corporate Programs (UACP), UAF Center for Distance Education (CDE) and CEM. At the programmatic level, the program is a partnership between Alaskan construction industry and UAF Civil and Environmental Engineering (CEE). Representatives of major construction contractors, major private, state, federal, and local construction project owners, and management contractors all participated in program development and will continue to do so through the advisory committee.
- This program has a statewide perspective. This proposed program is part of UAF efforts, together with UAA, to meet the state's workforce needs. As part of the pre-development of this program, we have met with and consulted UAA faculty and administrators active in civil engineering and construction management, met key managers of many Alaskan industries: AK DOT&PF, Corps of Engineers, Alyeska, local governments, the AGC (Associated General Contractors), and managers of major contractors. During this predevelopment we confirmed with personal interviews what has been published - that the state as a whole has a serious lack of engineers and construction managers. This problem must be addressed comprehensively, from grade school, middle school, and high school. Students must be prepared and motivated before they reach UA. The next step, student retention, is centered in the universities. Engineering courses are

- demanding and students often need support in the form of tutoring and encouragement to succeed. Recognizing the importance of all the foregoing, the proposed program addresses the next step, post graduate education. In civil engineering, the accreditation requirements limit the specialization that is available in the undergraduate curriculum. Yet construction managers need many skills that are not available in the undergraduate courses. In addition, there are many managerial skills that are better understood after several years of experience. Of the many options to impart those skills, senior managers of the industry believe short, intense courses with material that can be applied quickly, and a credential that can be obtained in a reasonable time are keys.
- This program builds from our current strengths. CEE has had some strong construction management faculty and others available as adjuncts. While these strengths were bottled up in the ESM (Engineering and Science Management) program, they were only available to MS students and then in the context of broad engineering project management, not necessarily construction. This program's narrow focus on construction is more suited to the construction industry. UAF SoM faculty have demonstrated skill in teaching practical courses related to personnel management and management communications relevant to construction.
 - The program is planned to approach self-support and thus will be cost effective. The partnership with industry and the relations of course sponsorship force the program towards delivering courses that have strong enrollments.

3. Occupational/other competencies to be achieved

One hundred percent of this program is devoted to improving the occupational competence of engineers and other professionals in the construction industry. Almost all construction management programs above the bachelor's level stress: communications and personnel management, construction project management, and various technical areas, although there is no agreed body-of-knowledge that would distribute the emphasis between those areas. By laying out a menu of courses in each rubric and involving the student's employer in the selection, the combination of courses that will advance the student can be customized for each student and employment situation.

4. Relationship of courses to the program objectives

The flexible nature of the program permits a flexible approach to the program's objectives. Taking virtually any combination of courses within the rubrics will advance the student's skills, but the employer is the best judge of the skills the student/employee will need and the employer heavily involved in determining which courses will be offered. The employer may also be involved in the individual student's course selection.

III. Personnel Directly Involved with Program

A. List of faculty involved in the program including brief statement of duties and qualifications

- Dr. Robert A. Perkins, PE, associate professor of civil and environmental engineering, will be the coordinator of this program. He had over 20 years of engineering and construction experience in Alaska before joining the UAF faculty.

- He is currently the coordinator of the ESM program within CEE.
- Dr. F. Lawrence Bennett, PE, professor emeritus of engineering management, will support the program by adjunct teaching. Dr. Bennett has many years of practical construction experience.
 - Dr. Susan Herman, professor of business administration, will support the program by teaching. She has many years of teaching, research, and practical experience in personnel management.
 - This program will require one half of a new faculty position in construction management.
 - There are several faculty in CEE that may help:
 - Dr. Ming Lee, PE, assistant professor of civil engineering, will support the program by teaching statistics and operations research related courses, as needed.
 - The ESM program in CEE has used a variety of adjuncts to teach and many of these would be available to teach in this program; for example the ESM 608 law class is generally taught by an attorney.

B. Administrative and coordinating personnel

The CEM and CEE administrative staff supports the program. This program is special because it will be administered by UACP and/or UAF CDE. If courses are requested by a corporate (or agency) sponsor, UACP will administer the courses via a contract with the sponsor (or sponsors). However all courses will be open to individuals, whether or not they are employed by the sponsoring employers. These will register through CDE. The School of Management will also support the program administratively.

C. Classified personnel

If the program grows, a half-time office manager might be needed.

IV. Enrollment Information

A. Projected enrollment/present enrollment

About 22,000 Alaskans are directly working in the construction field, with several thousand in direct support. If 10% of those are managerial or incipient managerial, that would provide a base of 2500 potential students. Our offerings in Spring 2008 found about 20 students in the Northern Region DOT alone, who are interested in the program. That would extrapolate to 45 students in the DOT, 35 in the Corps of Engineers – major employers who have expressed an interest in the program. Since those employers are about a quarter of the engineering workforce, one could extrapolate to about 320 students with a high potential for the program. We predict with moderate marketing, offering 6 to 9 special one-credit courses each year, each with 10 to 15 students. After a few years, we should graduate 5 to 10 each year.

B. How determined/who surveyed/how surveyed

We surveyed state and Fairbanks-area employers in spring and summer 2007, held courses in spring 2008, and in May 2008 held a round table in Anchorage at which the major statewide employers of engineers participated.

C. Minimum enrollments to maintain program for years 1, 2, 3, 4, and 5

Six one-credit courses per year is the minimum and a minimum class size of about 10 is reasonable. Since this is often an employer-sponsored program and the students are working, we expect to have many students take courses and later apply for admission.

The actual enrollments in the program, that is, those that have applied for admission should be:

Year	Admitted
1	5
2	7
3, 4, 5	10

D. Maximum enrollment which program can accommodate

None, see next.

E. Special restrictions on enrollments

Each course, other than the standard courses, will be stand-alone, self-supporting offerings. Typically there will be a sponsor that guarantees minimum enrollment for each course. Often the sponsor will provide the venue as well. Conversely, if there is a sponsor, the class will go forward, if suitable faculty are available or can be hired.

V. Need for Program

A. Required for other programs. In what way? How has this requirement been met to date?

This program is not required for other programs.

B. Employment market needs:

1. Who surveyed? How? (Standard procedures should be developed for this.)

The increasingly worse shortage of middle management engineers is widely acknowledged in all developed countries [See 1, for example]. In the United States there shortage is also acute [2, 3]. In construction, there is a more general shortage from skilled workers to skilled managers [4, 5]. Regarding construction managers there is a shortage [6, 7, 8] and that is true in Alaska [9] UAF CEE held a roundtable in Anchorage on May 29th 2008 to review this situation and found it severe here. [See Attachment 3]

2. Job opportunities now, and two, five, and ten years from now. How were these predictions determined? (Local, regional, State surveys?) (Standard procedures should be developed for this.)

The students will all be employed construction professionals while they are taking courses. In general there is a shortage of skilled management-level engineers and construction professionals in Alaska. If construction work in Alaska slows down the pressure would be relieved somewhat. If the gas line is built, the shortage will become much, much worse.

3. How have positions been filled to date?

Senior managers decry the shortage of skilled middle managers and incipient middle managers. Work goes on, of course, but the skill level of decision makers is declining because of general lack of experience and training. This is made more difficult because of the dilution of supervision of the upper managers, who would do more mentoring, if they had time.

VI. Other

This permits consideration of additional justifying information which might not fit under III and IV above. Caution should be exercised to assure that the need for

program is clearly established and that enrollment requirements are proposed and agreed upon at the time of the program's approval. Examples might be low enrollment programs in Alaska Native Languages, Alaska Native Arts, etc.

Attachment 1 has references

- UAF School of Management
 - Susan Herman, Professor, School of Management
- Alaska University Transportation Center
 - Billy Connor, Director
- University of Alaska Corporate Programs
 - Bruce C. Rowe, Director, UACP
- UAF Center for Distance Education
 - Curt Madison, Director CDE
- UA Video Conferencing
 - Donna Rohwer
- Construction Industry
 - Doug Smith, Haskell Corp.
 - Galen Johnson, TVC Construction Management Program
 - Roger Healy/Lon Krol, AKDOT
 - Ben Northey, VP Colaska and Chair AGC Education Committee

Attachment 3 is the report from the May 29, 2008, roundtable on construction management education needs.

Attachment 4 is Resource Form

Attachment 5 is the Assessment Form

VII. Resource Impact

Model

Both UA Corporate Programs and UAF Center for Distance Education have models for self-support courses. This program will be a hybrid between those self-support models and regular academic programs, which we term “approaching self-support.” If the courses are heavily sponsored by one or several employers, the administration will tend toward the self support model and be administered by AUCP. If the course is not so sponsored and the students are from mix of employers, the administration will tend toward that of academic courses administered by CDE.

A. Budget (complete the Resource Commitment Form)

See attached resource form. The model of the program is self support, beyond the one half new faculty position required, which will be funded by workforce funding.

B. Facilities/space needs

Most of the classes will be in facilities provided by sponsors.

C. Credit hour production

135 graduate credits a year is our estimate. [9 one-credit classes with 15 students]

D. Faculty

The teaching will be by a combination of full-time CEE and SoM faculty and adjuncts. About one-half a new CEE faculty will be required.

E. Library/Media materials, equipment and services: Have you reviewed the Library/Media material, equipment and services needed by this proposed action

with the Library Collection Development Officer? (Pauline Wilson, 6695)

No library media needed.

VIII. Relation of Program to other Programs within the System

A. *Effects on enrollments elsewhere in the system*

There are few graduate civil engineering construction courses in the system. The working engineer population is underserved.

B. *Does it duplicate/approximate programs anywhere in the system?*

There are no comparable programs in the system. There are some courses in other programs that might be beneficial, but not a comprehensive program or degree for graduate professionals.

If so, what is the justification for the duplication?

C. *How does the program relate to research or service activities?*

1. *Contributions to research or service*

The optimum method for solving the shortages in technical workforce is an interesting research question, but such research is not the purpose of this program. The nature of the program will be to serve Alaska and the Alaskan construction industry by teaching. UAF CEE and the program has and will interact with the main service organizations in the construction industry, such as the AGC and the ASCE.

2. *Benefits from research or service activities*

None noted.

IX. Implementation/Termination

A. *Date of implementation*

Fall 2009

B. *Plans for recruiting students*

We have been recruiting students as we teach the courses. We have also been marketing employers, as we solicit their input into the program.

C. *Termination date (if any)*

None

D. *Plans for phasing out program if it proves unsuccessful*

If the program is at least moderately successful, we would expect enrollments to gradually increase, but at some point the market would become saturated and enrollments would decrease. That would take four to seven years. In any case, if enrollments decline it will be apparent.

E. **Assessment of the program.** *(Include a Student Outcomes Assessment Plan. to avoid delays, submit the plan for review by the Vice Provost, Susan Henrichs, before submitting the new program request.)*

See Attachment 5.

X. Regents Guidelines

The Board of Regents' requires the completion of the following Summary Form.

University of Alaska Board of Regents

Program Approval Summary Form

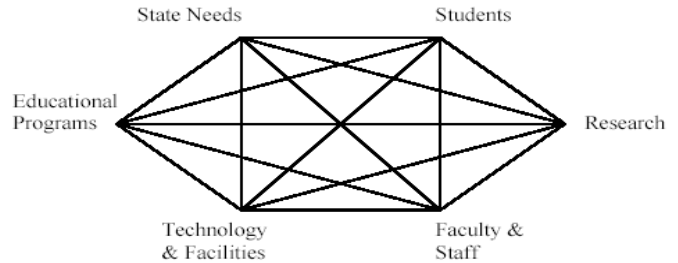
Requirements:

1. 2 pages or less
2. Must be a stand-alone document

MAU: UAF

Title: Graduate Certificate in
Construction Management

Target admission date: Fall 2009



How does the program relate to the **Education** mission of the University of Alaska and the MAU?

This proposed program is a 15 credit graduate certificate in construction management that will provide advanced training for graduate engineers and other professionals in the Alaskan construction workforce. The program was developed in close coordination with Alaska construction industry employers and envisions continuing that relationship with employers sponsoring courses, providing classroom space, and participating in an industry advisory committee.

**Who promoted the development of the program?*

The program developed from the convergence of three trends: 1. UAF engineering's goal of increasing graduate-level courses for working engineers; 2. the nationwide trend of graduate engineering programs to "package" their graduate offerings for particular industries; and 3. the Alaska Department of Transportation's (DOT) need to provide advanced training for its engineers and other professionals who are making decisions that affect the physical and economic well-being of Alaskans. In spring 2008, with the support of a Workforce Development Grant, UAF Civil and Environmental Engineering (CEE) led the offering of five one-credit special topics courses in Fairbanks and, via video conferencing, in Juneau and Anchorage. Other team members were the UAF School of Management, UA Corporate Programs (UACP), UAF Center for Distance Education (CDE); and UA Video Conferencing Services.

**What process was followed in development of program (including internal and external consultation)*

UAF CEE had a series of meetings with upper managers of interior Alaska construction organizations in spring and summer 2007. These meetings identified likely course topics and meeting formats used in the spring 2008 courses. In May 2008, UAF CEE sponsored a meeting in Anchorage of state-wide major employers and others interested in the workforce training of graduate engineers and construction managers, who endorsed the key elements of this proposed program.

**Impact on existing programs and units across MAU and system, including GERs.*

Most of the students will already be four-year college graduates and this program will assume that they have the basic general education requirements. Both UAA and UAF have associates programs in construction management and UAA has a bachelor's program. The proposed program is a graduate program that will allow the next step in a career pathway and fill a gap between the bachelors in engineering and masters degrees in construction management and related areas.

What **State Needs** met by this program.

**Information describing program need and why existing programs in UA system are not able to meet it.*

There is currently a nationwide shortage of engineers and technical mid-level managers in all technical fields. The shortage is acute for the construction industry in Alaska with its extreme seasonally, remote project venues, and transient workforce. The shortage is often more acute for

Alaska governments with less flexible personnel policies. There is broad agreement that education that is specific to construction management can accelerate the learning cycle for newer engineers into management ranks. For example, about one-third of UAF CEE graduates go into construction directly, and most of the rest of them that stay in Alaska are involved in the construction project cycle. However engineering accreditation requirements make it difficult for them to take construction courses. They enter the difficult world of construction management lacking formal courses in contract and procurement law, construction planning and cost control, labor relations, and myriad other topics. In addition, most graduates need skills in communications special to the project environment, including dealing with the public.

Both UAA and UAF have graduate programs in engineering management, but not construction management, although some of the engineering management courses might be used in the proposed program. This program approaches a different demographic than the established masters programs, namely those college graduate students with several years of construction experience who are: primarily interested in construction, not attracted to the traditional MS programs, and with employers that will encourage participation in the new degree program.

What are the Student opportunities and outcomes? Enrollment projections?

This program is designed to reduce the students' time to obtain a credential and improve the students' current job performance and career expectations by offering courses that are specific to the industry needs. Offering the classes in venues convenient to the students invites employer participation. We expect that the typical class size will be 10 to 15 students and 5 to 10 students will obtain degrees each year.

Describe Research opportunities:

This is not a research program.

Describe Fiscal Plan for development and implementation:

**Identify funding requirement, sources and plan to generate revenue and meet identified costs:*

The overall funding plan is to approach self-support. The per credit charge will be double the standard tuition, with half going to CEM directly and half to UAF general tuition account (Fund I). Use of special tuition is warranted for this program, since it serves a special population and, generally, employers will sponsor most courses. UAF faces many demands on general fund dollars to support educational programs. Although there is demand for this program from the perspective of students and employers and significant state need, it does not have a high enough priority to compete for scarce state funds. Thus we propose to meet the needs by self support of the program. The employers will guarantee a minimum number of students. If there is capacity beyond that, students who do not work for that employer may register. Some courses will not be associated with an employer and will be "non-sponsored." The plan calls for administration of tuition and fees by UACP for corporate sponsors or CDE for individual students. The annual income, based on special tuition, offering 6 to 9 classes per year with 10 to 15 students would be \$35,000 to \$75,000. That, plus a workforce increment to the CEE budget should approach self-support, after the program is developed – two to three years.

**Indirect costs to other units (e.g. GERS, distance delivery)*

There should be no indirect costs other academic units. UAF SoM is participating in this as a partner of CEE, for SoM courses. The support of UA video conferencing is needed for classes that are offered in two locations. In the past, there has not been a charge for this. Students may use Blackboard and library services, but the costs per student should be no more than for typical students.

➤ **Faculty and Staff*

UAF CEE needs another faculty member to help both with this program and other CEE construction management courses. The cost of this is approximately \$105,000/year. At some point, the program might need a half time clerical worker. CEM currently has budget for about half this amount. Program revenues could potentially help provide the other half. Program revenues will be needed for overhead expenses such as, start-up, administration, and travel.

➤ **Technology, Facilities and Equipment*

Generally, we plan to offer the classes in employer's locations or at other central off-campus locations. In general, fees for that venue would be paid by the course sponsor. In general, there should be no special charges for facilities or equipment. UA video conferencing has helped with IT for remote classes without charge.

Attachment 1, References

Attachment 2, Letters of Support

- UAF School of Management
 - Susan Herman, Professor, School of Management
- Alaska University Transportation Center
 - Billy Connor, Director
- University of Alaska Corporate Programs
 - Bruce C. Rowe, Director, UACP
- UAF Center for Distance Education
 - Curt Madison, Director CDE
- UA Video Conferencing
 - Donna Rohwer
- Construction Industry
 - Doug Smith, Haskell Corp.
 - Galen Johnson, TVC Construction Management Program
 - Roger Healy/Lon Krol, AKDOT
 - Ben Northey, VP Colaska and Chair AGC Education Committee

Attachment 3, Report from the May 29, 2008, roundtable on construction management education needs.

Attachment 4 is Resource Form

Attachment 5 is the Assessment Form

Attachment 1, References

1. A Study of Knowledge Succession in Engineering Process Management, Gaku Ishii (System Engineering Laboratory, Corporate Research & Development Center, Toshiba Corporation, Kawasaki, Japan) in conference proceedings of PICMET 07, Portland International Center for Management of Engineering and Technology, Proceedings - Management of Converging Technology.
- 2 Aerospace and Defense Sector Braces for Potential Brain Drain As Cold War Workers Retire, Joelle Tessler, AP Business Writer, Tuesday March 4, 2008.
3. The Inter-generational Workforce, Edward G. Perkins, Gregory B. Hutchins, Elizabeth Lions, Henry J. Lindborg (IEEE-USA, Career & Workforce Policy Committee, Washington, DC, USA) in conference proceeding of PICMET 07 Portland International Center for Management of Engineering and Technology, Proceedings - Management of Converging Technology.
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- 5 Entry-Level Transportation Construction Workforce Shortages, ICF International (Submitted to: State of Florida, Department of Transportation) September, 2007
6. National Electrical Contractors Association Annual Report 2006, http://www.necanet.org/downloads/pdf/about/about-neca/annual-report/AR_2006.pdf
7. Building a Larger Pipeline, O'Brien, George, : BusinessWest Date: Monday, July 10 2006 <http://www.allbusiness.com/educational-services/junior-colleges/4073361-1.html>
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9. Featured Articles from November 2006 issue of *Alaska Economic Trends*: [2004-2014 Occupational Forecast](http://www.labor.state.ak.us/research/trends/nov06ind.pdf) 10-Year Industry Forecast 2004-2014 <http://www.labor.state.ak.us/research/trends/nov06ind.pdf>

Attachment 2, Letters of Support

- UAF School of Management
 - Susan Herman, Professor, School of Management
- Alaska University Transportation Center
 - Billy Connor, Director
- University of Alaska Corporate Programs
 - Bruce C. Rowe, Director, UACP
- UAF Center for Distance Education
 - Curt Madison, Director CDE
- UA Video Conferencing
 - Donna Rohwer
- Construction Industry
 - Doug Smith, Haskell Corp.
 - Galen Johnson, TVC Construction Management Program
 - Roger Healy/Lon Krol, AKDOT
 - Ben Northey, VP Colaska and Chair AGC Education Committee

Sept. 16, 2008

To the Board of Regents
From Susan Herman, Professor, School of Management
Regarding Graduate Certificate in Construction Management

I am writing to support the establishment of the Graduate Certificate in Construction Management. When you promote a superb professional engineer into the ranks of management without the requisite training, you lose a great engineer and gain a poor manager. No one is served by this event... not the engineers, not those they supervise, not the organizations they serve, and certainly not the State of Alaska.

As part of the team that has worked for the past 18 months to create the certification program, I have had an opportunity to teach a pilot course in Managing and Leading in Engineering Organizations to a team of engineers from the Alaska Department of Transportation. I have also done some in-house management training with several of our local engineering firms in Fairbanks. The DOT, like many engineering organizations, is facing a challenging demographic problem; many of the engineering ranks are reaching retirement age. These are the skilled engineering graduates who are being groomed to take on the management positions within their organizations. These are the younger engineers moving up, who don't have management training... yet will be expected to fill these managerial slots. The DOT is hardly alone in facing the challenge of bringing skilled professionals who are clueless about leadership, management and supervision skills into the managerial ranks.

It was clear from working with these young DOT engineers that they were hungry for management training, highly motivated to read, study, discuss, role play, problem-solve, analyze cases, and acquire the theory to prepare them for these new roles.

The University has a responsibility to prepare future engineers to work in teams, to understand leadership, employee discipline, group dynamics, conflict management, decision-making, hiring and orienting new engineers, performance appraisal, motivation, etc. These are the kinds of skills that the Graduate Certificate in Construction Management is designed to provide. The certification will enable a gifted technician to acquire the theory to overlay opportunities to manage engineering teams that will result in high productivity and high satisfaction, a major goal of any organization.

Sincerely,

Susan Herman, Professor, School of Management
Director, Northern Leadership Center
University of Alaska Fairbanks
P.O. Box 756080
Fairbanks, Alaska 99775-6080
907-474-1939 (o)
907-474-5219 (f)
www.uaf.edu/nlc

September 18, 2008

UA Corporate Programs
1815 Bragaw Street Suite 102
Anchorage, AK 99508

Dr. Doug Goering, PE
Dean, College of Engineering & Mines
University of Alaska Fairbanks
PO Box 755960
Fairbanks, AK 99775-5960

The relationship that UA Corporate Programs has for training and educational services with business and industry has been ongoing for over 10 years. During this time, we managed to build strong relationships with UA academic departments and some have been willing to build programs to address specific workforce requests. A number of clients have asked for specific certificate programs in a variety of fields to meet their educational and training needs.

Specifically, Dr. Perkins has been very responsive and instrumental in addressing the needs of one of our clients, the Alaska Department of Transportation (DOT). Based on discussions with the client and other similar industries, he is proposing a graduate construction management certificate that gives current engineers a common knowledge base to successfully apply their specific engineering discipline to the construction industry. Over time, we have found that other clients are also interested in this potential certificate.

Additionally, with the new adoption of recertification requirements of engineers in the State of Alaska, this graduate certificate would be wholeheartedly welcomed by a number of engineers who need to maintain that endorsement. Many would like their continuing education to lead to an educational experience that would lead them to additional certification.

We are looking forward to the approval of this graduate certificate so we promote the certificate with engineers and engineering firms.

Sincerely,

Bruce C. Rowe
Contract Manager

October 2, 2008

Dean, College of Engineering & Mines
University of Alaska Fairbanks
PO Box 755960
Fairbanks, AK 99775-5960

Dr. Doug Goering,

During this past year the Center for Distance Education worked with Dr. Robert Perkins, Dr. Susan Hermann, and others to give access to engineering courses by distance. The collaboration was a success.

We look forward to building on our past efforts by exploring even better ways to involve working professionals. Clearly it is unrealistic to ask engineers outside Fairbanks to attend on campus courses. It is also unlikely that local engineers can get work typical campus courses into a busy schedule. Distance delivery is a good way to use all the modern electronic tools to expand the outreach capabilities of UAF's excellent faculty.

The Graduate Certificate in Construction Management is a good candidate program for distance delivery in collaboration with the Center for Distance Education.

A handwritten signature in black ink that reads "Curt Madison". The signature is written in a cursive, flowing style.

Curt Madison
Director
Center for Distance Education
College of Rural and Community Development
University of Alaska Fairbanks

From: Donna Rohwer [donna.rohwer@alaska.edu]
Sent: Thursday, October 02, 2008 9:27 AM
To: Dr. Robert A. Perkins, PE
Subject: Re: Support for Construction Management, New Degree Program Request
I will make sure you have the support letter before Oct 15. I have it on my agenda to do.

Donna Rohwer
University of Alaska Office of Information Technology
Video Conferencing Services Manager
907 450-8393

On Oct 1, 2008, at 6:38 PM, Dr. Robert A. Perkins, PE wrote:

The New Degree Program Request for the Graduate Certificate in Construction Management is moving forward in the College of Engineering and Mines. After the college, the next step is approval by the Faculty Senate. For that we need your support letter by 15 October. Attached are two example letters. If you don't have time to write a letter, an email would help.

From: Dr. Robert A. Perkins, PE [<mailto:ffrap@uaf.edu>]
Sent: Tuesday, September 16, 2008 6:18 PM
To: Donna Rohwer ()
Subject: Support for Construction Management, New Degree Program Request
We've started the process to launch the New Degree Program Request for the Graduate Certificate in Construction Management. Attached is a copy, although you are familiar with most of it. It mentions the cooperation and support of the UA Video Conferencing in several places. Could you write a letter of support for the proposed program? The letter will be placed in the NDPR. Please address it to:
Dr. Doug Goering, PE
Dean, College of Engineering & Mines
University of Alaska Fairbanks
PO Box 755960
Fairbanks, AK 99775-5960

October 1, 2008

Dr. Doug Goering, PE
Dean, College of Engineering & Mines
University of Alaska Fairbanks
PO Box 755960
Fairbanks, AK 99775-5960

Dear Dr. Goering,

I am writing to express my support for the Graduate Certificate in Construction Management Program proposed by Dr. Robert Perkins. I took part in the roundtable discussions conducted by Drs. Perkins and Bennett, and found that the program they proposed will fit the training requirements I foresee for the employees that my organization will be hiring in the near future.

The most significant issue that my organization faces as a private enterprise is the recruitment and retention of qualified candidates for leadership roles in construction. The current management cadre is approaching retirement age, and there is currently not a strong following of engineers trained and equipped to step up and lead engineering and construction projects. I believe the program proposed by Dr. Perkins will provide the training necessary to groom future construction leaders. In my opinion, the structure of the program will show early career engineers a path to becoming leaders of projects, and the compact timeframe of the certificate program will motivate many to seek the education and training offered.

Alaska and the rest of the nation are entering a time when infrastructure is in need of modernization and replacement, and a time when energy projects will dominate the engineering and construction industry. These will be complex and demanding projects, and will require leaders able to cope with the challenges. The proposed Graduate Certificate in Construction Management Program will help develop those leaders.

I look forward to seeing the Program begin to produce the next generation of construction leaders.

Yours truly,

HASKELL CORPORATION

Doug Smith
General Manager, Alaska

September 22, 2008

Dr. Doug Goering, PE
Dean, College of Engineering & Mines
University of Alaska Fairbanks
PO Box 755960
Fairbanks, AK 99775-5960

Dr. Goering,

I heartily support the proposed Graduate Certificate in Construction Management.

I concur with the need to make construction management educational opportunities more readily available to engineering graduates and other construction management professionals and I agree with the proposed Graduate Certificate's delivery method of specialty short courses combined with existing traditional CEE and ESM courses.

As coordinator of UAF Tanana Valley Campus' two-year Construction Management degree program, I've been requested to comment on any concerns with competition or duplication of effort between this proposed Graduate Certificate and our AAS program which bear the same name. At first blush, the Grad Certificate's target audience of engineering graduates clearly differentiates the two programs as our AAS degree is intended to offer construction management concepts that will equip individuals, who presently have less formal education and construction experience, with entry level knowledge and skills.

Where the two programs may overlap is in the interpretation/application of the proposed admission requirement of "At least ten years of construction experience". I'm assuming that the intent is construction management-type experience, but unless it's stipulated elsewhere, it appears to leave the door open to individuals with a pretty wide range of experience – including potential candidates for our AAS CM program. I'd appreciate reconsideration of the certificate admission requirements to something more closely resembling other graduate level programs. If a sponsoring employer desired wider admittance to a special topics course for its own employees, then I wonder if it would be more appropriate to acknowledge the participation of the non-degreed attendees differently than the Graduate Certificate seeking (degreed) students.

Thank you for the opportunity to provide this input.

Regards,

Galen R. Johnson P.E. Coordinator/Assistant Professor
Construction Management and Drafting Technology
UAF Tanana Valley Campus
PO Box 758000
Fairbanks, AK 99775-8000
(907) 455-2846

From: Krol, Longin (DOT) [lon.krol@alaska.gov]

Sent: Thursday, October 02, 2008 8:25 AM

To: Dr. Robert A. Perkins, PE

Cc: Allen, Jake (DOT)

Subject: RE: Support for Construction Management, New Degree Program Request

We will be drafting a letter to be signed by Roger Healy, Chief Engineer. Roger replaced Gary Hogins . Gary Hogins stated at the round table discussion you sponsored in Anchorage that the department would support the program with both employee time and tuition.

Are you going to visit with Roger Healy in Juneau on October 6th?

Contact Info for Roger Healy

Roger.healy@alaska.gov

(907) 465-6958

Bob, it would be a good idea for you to contact me before you visit with Roger. Call me on my cell 322-0600 anytime.

LONGIN KROL, P.E. | REGIONAL CONSTRUCTION ENGINEER| DOT&PF Northern Region Construction

2301 Peger Road; Fairbanks, AK 99709 | ph: 907.451.5473| CELL 907.322.0600 |

fax: 907.451.5487 | Lon.Krol@alaska.gov

From: Dr. Robert A. Perkins, PE [mailto:ffrap@uaf.edu]

Sent: Wednesday, October 01, 2008 6:39 PM

To: Krol, Longin (DOT)

Cc: Allen, Jake (DOT)

Subject: FW: Support for Construction Management, New Degree Program Request

The New Degree Program Request for the Graduate Certificate in Construction Management is moving forward in the College of Engineering and Mines. After the college, the next step is approval by the Faculty Senate. For that we need your support letter by 15 October. Attached are two example letters. If you don't have time to write a letter, an email would help.

Dr. Robert A. Perkins, PE

Associate Professor

Civil and Environmental Engineering

University of Alaska Fairbanks

Fairbanks 99775

907 474 7694

ffrap@uaf.edu

Attachment 3

TRAINING NEEDS OF ALASKA'S
PROFESSIONALS IN
CONSTRUCTION

Report from a Roundtable
held May 29, 2008
at
Coast International Inn
Anchorage, Alaska

Robert A. Perkins, P.E.
F. Lawrence Bennett, P.E.
University of Alaska Fairbanks
College of Engineering and Mines
June 25, 2008

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Graduate Construction Education Roundtable
May 29, 2008

Roundtable Report

Executive Summary & Conclusions

A roundtable to discuss needs for training Alaska's construction professionals was attended by 22 persons representing many aspects of the state's construction industry. Specific skills often lacking in construction management professionals were identified, and means for providing training opportunities were explored. Attendees supported the approach introduced by the University of Alaska Fairbanks in Spring 2008 to teach one-credit courses at convenient times and locations. They encouraged the planning, approval and offering of a construction management graduate certificate program.

Among the primary guiding principles and action items for such a program, as identified at the roundtable, were the following:

1. The construction industry – owners, designers, contractors, construction managers – agrees with the need for additional course offerings and supports the concept of a graduate certificate program.
2. Make any such offerings available for any employees who are or are likely to become professionals in the industry; do not restrict admission to those holding Bachelor's degrees.
3. Ultimately the program should include those working in other phases of the project life cycle – planning, design, maintenance and operations, and the like, not just the assembly of the constructed product. A designation other than “construction management” may be needed.
4. The short term one credit hour course format at times and in places that are convenient to students, utilizing video conferencing where appropriate in order to reach a wider student audience, is a sensible approach.
5. With regard to financing, employers should be expected to cover at least some of the costs.

6. The program should coordinate with other engineering and construction management education in Alaska and work to the benefit of the entire industry.
7. Continue offerings of several one-credit courses each semester, including the up-coming Fall 2008 semester.
8. Proceed to prepare and submit a proposal for the establishment of a graduate certificate program, through necessary university channels up to, ultimately, the Board of Regents (a process that is likely to require about one year).

Introduction

According to the Construction Industry Progress Fund and the Associated General Contractors of Alaska, “construction is the third largest industry in the state, pays the state’s second highest wages, employs nearly 22,000 workers with a payroll of over \$1 billion, accounts for 20 percent of Alaska’s economy and currently contributes more than \$7 billion to the state’s economy.”¹ If ten percent of the 22,000 workers are professionals – project managers, engineers, corporate executives, various other specialists – then over 2000 members of the Alaskan workforce can be classified as construction professionals. They work for contractors, subcontractors, construction management firms, private and public owners, and the military services. The focus of the roundtable reported in these pages is the training needs of these professionals.

In Alaska, as elsewhere, a number of trends are underway in the procurement and execution of construction services. New project delivery systems such as design-build and construction-manager-at-risk, reduced numbers entering the construction workforce, an aging workforce poised to retire in the near future, and new technologies in such areas as material placement, surveying, and information management all present needs and opportunities for training construction personnel at all levels. Within the state, the anticipated gas pipeline project, together with the entire attendant infrastructure and other projects not directly associated with the pipeline, are likely to overwhelm the industry and make training needs even more acute.

¹ Goldsmith, S and M. Killorin, Alaska’s Construction Spending: 2008 Forecast. Construction Industry Progress Fund and Associated General Contractors of Alaska

Thus, workforce development in construction is a current issue that must be addressed immediately by all parties involved in Alaskan construction. Training opportunities are important in an individual's career development, but they are also essential to employers seeking to attract and retain quality employees. A job with training as a fringe benefit is a more attractive job. A trained employee is a more productive employee. An aging workforce that will soon retire will result in a substantial reduction in traditional mentoring between experienced and new employees. The typical undergraduate engineering program develops engineers who are technically astute but who lack management skills, especially "soft skills" essential in managing personnel and projects.

The University of Alaska Fairbanks College of Engineering and Mines, with support from a Workforce Development Grant, convened a roundtable on the morning of May 29, 2008, at the Coast International Inn in Anchorage to discuss education for the Alaskan construction professional. The twenty-two attendees ranged from contractors and Alaska Department of Transportation and Public Facilities (AK DOT&PF) and US Army Corps of Engineers construction managers to other private and public owners and included the Associated General Contractors of Alaska and faculty and administrative staff from the University of Alaska Fairbanks., the University of Alaska Anchorage, and the University of Alaska statewide administration. Attendees are listed in Appendix A. In advance of the meeting, each attendee was furnished a list of nine questions that formed the basis for discussion in the early part of the roundtable. The nine questions are listed in Appendix B.

There were a number of reasons for convening the roundtable at this time. Under University of Alaska President Hamilton's guidance, the university has placed the development of Alaska's workforce as one of its primary emphasis areas. In addition to long-standing programs both inside and outside the university, some recent efforts show promise of success in providing additional training opportunities for Alaska's construction professionals. Also, there is an often-expressed need to accelerate the professional growth of young engineers in old fields, including construction. Training designed and offered in Alaska stands a better chance of meeting Alaska-specific needs than more general offerings given elsewhere. Further, the cost of sending professionals to training courses outside the state is becoming increasingly expensive, both in terms of direct costs and the time committed to such travel events.

Appendix C contains the roundtable agenda, which served as a general outline for discussion. After introductions, the roundtable's purpose was explained as identifying the needs for construction management training of Alaskan engineers and other technical professionals, brainstorming how those needs might be met and who might meet them, and beginning to draft a summary of those needs and strategies. The group then developed a list of currently available construction training opportunities in Alaska, after which Lon Krol of AK DOT&PF reviewed his department's experience with courses in a pilot program presented by the University of Alaska Fairbanks in Spring 2008. Then, Bob Perkins of UAF's Department of Civil and Environmental Engineering described the current status of the approval of that pilot program.

Four participants gave brief responses to the nine questions listed in Appendix B, and the roundtable then divided into three focus groups for more in-depth discussion. The focus groups then gave their reports, the group listed some other recommendations, a tentative outline for this report was developed, and the roundtable concluded with a luncheon.

The balance of this report describes some history and the current status of construction management training in Alaska with emphasis on training for the professional employee, identifies specific needs and skills suggested at the roundtable, presents some general guidelines for any new programs, and presents some proposals for further development.

Background and Current Status

A rather large number of training experiences are available in Alaska for those working in the construction industry. Roundtable participants developed a quick listing of such various opportunities as a way to begin to focus on training for construction professionals. The list is presented in Appendix D. The offerings include union apprentice programs, university degree programs, and seminars and short courses given by Alaskan agencies and by private providers. UAF and UAA offer graduate courses in engineering management for engineers and science management and project management for non-engineers, but these are not focused on construction. Besides the lack of focus on construction, these are full masters programs that take 3 or 4 years of evening classes. The broad focus of the classes makes it difficult to take full advantage of the students' construction experience.

In the spring of 2008, the University of Alaska Fairbanks launched an expansion of offerings by teaching a series of five one-credit graduate courses in subjects useful to construction professionals. The courses were presented in Fairbanks, were available to others in Juneau and Anchorage via live interactive television, and were scheduled between 3:00 and 5:15 PM for the convenience of students and their employers.

The courses, the locations offered, and the number enrolled in each, were as listed below. Their descriptions are given in Appendix E.

- Big picture, systems thinking and organizational dynamics, Fairbanks, (15)
- Construction Claims Case Studies, Fairbanks and Anchorage, (5)
- Scheduling for construction administration , Fairbanks and Juneau, (17)
- Managing Risk, Fairbanks and Juneau, (13).
- Overview of environmental laws, regulations, and permitting, Fairbanks and Anchorage, (2)

Courses were developed in cooperation with AK DOT&PF, and most of the students were AK DOT&PF professional employees. The classes were held live in Fairbanks and via video conferencing in Anchorage or Juneau. Lon Krol, Northern Region AK DOT&PF Construction Engineer, reported to the roundtable that the courses were popular, well-received, sufficiently rigorous and generally very valuable for professional employees at AK DOT&PF who have or will have management roles. He suggested continuing the program for the AK DOT&PF in the future.

The five courses discussed above were the initial offerings in a proposed program that will, if approved, grant a Graduate Certificate in Construction Management. Bob Perkins described the proposal ideas, which are in the early stages of development. The general plan for such a program involves a requirement for 12 or 15 graduate credits in the subject area, thus meeting a need for a credential beyond the Bachelor's degree but with fewer requirements than for the Master's degree.

Graduate certificates are becoming very popular in engineering programs nationwide. They recognize that four-year bachelors' programs can not provide education in an engineering specialty area. They also recognize that the traditional thirty-credit masters degree take too long for many students. The University of Alaska has recognized graduate certificates in some fields - nursing and coastal

engineering at UAA. Academic courses have long term benefits to the students and their employers because they require rigor to complete and the knowledge stays with the student longer. Academic courses must be approved by curriculum committees within the college and approved by Faculty Senate. Since the graduate certificate is a new degree, it must be approved by the UA Board of Regents.

The philosophy of the graduate certificate is to maximize the benefit to the students and their employers while minimizing the time and inconvenience to the student. Our discussions with employers and students indicate that one-credit modules seem to work well. Employers can often accommodate late afternoon classes as part of the workday. The locations of the classes may be in an employer's building or in a nearby, convenient locations – without a parking problem. The video conferencing seems to work well and the equipment and bandwidth seem to get cheaper each year.

Our tentative outline of the certificate program is to require 15 credits divided between main subject areas – rubrics. The actual course selection within the areas will be left to the students and their employers. Some standard courses are available and others can be modified as needed. For example, our proposed class on “Alaska and Rural Issues” which deals with technical logistics topics but also issues special to native and remote populations, such as organization of native governments and non-governmental organizations, might be a one, two, or three credit class depending on depth importance of those issues to the employer. All new courses must be approved by the college curriculum committee and that approval requires a full syllabus.

The main rubrics and their required credits are:

- 4 to 6 credits of Human Relations and Communications
- 4 to 6 credits of Construction Project Management
- 4 to 6 credits of Construction Technical.

An outline of the courses is in Appendix F, which includes courses within these three rubrics as well as the categories “Business and Financial” and “Non-Construction Technical Topics.” It includes established courses and some that are only topics and have not yet been developed.

The efforts described above are focused on training the working professional who must balance job, family, community and other obligations with any training she or he might undertake. Sensitivity to those time and effort challenges is important in

the design of any additional training programs. The next section identifies a large number of specific training needs for these people, as recognized at the roundtable.

Identification of Needs

The roundtable approached the identification of training needs in two ways. Participants were provided, in advance, with a list of nine questions and asked to contemplate them prior to coming to the meeting. Several developed written responses, which are included as Appendix G. At the roundtable, four attendees, all of whom employ professionals in construction, briefed the group on their responses. Training needs for professionals in construction identified in this exercise included the entire realm of the business aspects of construction, an understanding of the interrelationships and interdependencies of construction management, such cost and finance issues as estimating, cost control, and forecasting, and presentation skills.

The group was then divided into three focus groups, to allow for concentrated discussion on the needs for communication skills, “soft” skills, and technical skills. Unedited transcripts of the notes taken during those sessions are included in Appendix H. In summary, the communications group placed high emphasis on written communications including both formal and informal, proposal preparation, claims documentation, web-based communication and the importance of reading written materials for understanding. In addition, public communications, meeting management, negotiations, “Toastmasters”-type training, crew motivation, listening skills, and Power Point preparation and use were suggested as often unmet communication needs.

Within the “soft skills” area, the group noted both organizational dynamics and interpersonal skills (including supervision, communications, and leadership v. managements) as important training needs. It suggested the partnering concept as primarily a soft skills notion that should be taught. In addition, the group encouraged team approaches to some technical courses as a means of learning the importance and challenges of teams in the workplace. The technical skills focus group emphasized the importance of training in both construction schedule and cost management. Legal matters (contract, claims, dispute resolution, environmental, labor), other environmental concerns, and tradeoffs among cost, schedule and quality were also listed. The group also pointed out the need for training in such Alaska-specific issues as regional differences, cultural

understanding, tribal matters, arctic construction techniques, and local labor training.

One conclusion from this part of the discussion was that any training providers must continually assess such needs in light of changing employee backgrounds and industry conditions.

Some Suggested Guiding Principles

Toward the end of the morning, each participant was asked to identify one guiding principle that she or he would suggest be included in any program design. Appendix I contains an unedited transcript of the suggestions. Although the suggestions were not ranked or otherwise voted upon for preference, there seemed to be widespread support for the following ideas as the university continues its planning for training for professionals in the construction industry:

- The construction industry – owners, designers, contractors, construction managers – agrees with the need for additional course offerings and supports the concept of a graduate certificate program.
- Make any such offerings available for any employees who are or are likely to become professionals in the industry; do not restrict admission to those holding Bachelor's degrees.
- Broaden the program to include those working in other phases of the project life cycle – planning, design, maintenance and operations, and the like, not just the assembly of the constructed product. A designation other than “construction management” may be needed.
- The short term one credit hour course format at times and in places that are convenient to students is a sensible approach.
- Soft skills should receive equal emphasis with technical skills.
- A wide and flexible selection of courses and convenience of course location should be a priority.

- With regard to financing, employers should be expected to cover at least some of the costs. Tuition and fees might be set high enough so that the program is self supporting, as has been done with other programs in the university system.
- While attempting to attract large numbers of students, the program must still insure quality content and instruction.
- Wide publicity will be essential to a successful program.
- The program is one way the university can respond to the need by professional engineers to comply with registration board educational requirements for initial and continuing registration.
- The program should coordinate with other engineering and construction management education in Alaska and work to the benefit of the entire industry.

Conclusions and Follow-up Steps

It was clear from the roundtable discussion that there is widespread support for the concept of a graduate certificate program for those working in the construction industry. While the emphasis may go beyond traditional construction management, and while it may be desirable to include non-Bachelor-degreed students, the steps already taken – Spring 2008 course offerings and initial discussions about a certificate program – seem to coincide with the roundtable’s primary consensus. Thus it appears that the following should be undertaken in the near future:

- Continue offerings of several one-credit courses each semester, including the up-coming Fall 2008 semester.
- Publicize course offerings widely so that support and interest will grow beyond that from AK DOT&PF.
- Proceed to prepare and submit a proposal for the establishment of a graduate certificate program, through necessary university channels up to, ultimately, the Board of Regents (a process that is likely to require about one year).
- Assure students taking one-credit courses that credit earned now will be able to be applied to the new certificate after it is approved.

- Continue to use video conferencing to reach remote sites where appropriate.
- Insofar as possible, follow the guiding principles outlined in the previous section.

APPENDIX A -- Attendee List -- Graduate Construction Education Roundtable
 May 29, 2008

<u>Name</u>	<u>Title</u>	<u>Affiliation</u>	<u>e-mail address</u>
Allen, Jake	QA Engineer; Northern Region Construction	Alaska Department of Transportation & Public Facilities	jake.allen@alaska.gov
Bennett, F. Lawrence	Owner	Bennett Engineering	benco@alaska.net
Callahan, Jeff	Director of Construction & Design Technology	University of Alaska Anchorage	callahan@uaa.alaska.edu
Cattanach, Dick	Executive Director Emeritus	Associated General Contractors of Alaska	dick@agcak.org
Connor, Billy	Director	Alaska University Transportation Center; University of Alaska Fairbanks	ffbgc@uaf.edu
Cress, Bob	Training Director Central Region Construction Project Manager	Associated General Contractors of Alaska; Construction Education Foundation	bob@agcak.org
DeSentis, Eric	Interim Graduate School Dean	Alaska Department of Transportation & Public Facilities	eric.desentis@alaska.gov
Duffy, Larry		University of Alaska Fairbanks	graddean@uaf.edu
Hogins, Gary	Chief Engineer Coordinator/ Assistant Professor of Construction Management	Alaska Department of Transportation & Public Facilities	gary.hogins@alaska.gov
Johnson, Galen		Tanana Valley Campus; University of Alaska Fairbanks	ffgrj@uaf.edu
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APPENDIX B
The Nine Questions

1. What is lacking in the preparation of graduate engineers and other technical professionals for employment in Alaska's construction industry?
2. What is your company/firm/agency currently doing to try to remedy this lack of preparation?
3. Is your organization's approach working successfully?
4. What is different about Alaska's needs in this regard?
5. How does this issue impact such employment concerns as recruitment, retention, efficiency, compensation, and the like?
6. Is this situation likely to get worse?
7. How can the University of Alaska assist in meeting these needs?
8. How should such offerings be packaged – Time of year? Time of day? Module size? Location? Video conferencing? Other?
9. Who should support (with time and dollars) such offerings – Employer? Employee/student? Shared support? Other?

APPENDIX C
Agenda

Roundtable on Graduate Construction Education
Thursday, May 29, 2008, 9:00 AM – 1:00 PM

Coast International Inn, 3333 West International Airport Road, Anchorage

Welcome and Introductions – Bennett

Purpose of the Roundtable – Bennett

Agenda Review – Bennett

Housekeeping Matters – Bennett

Brief Updates on Current Construction Training Programs

- A list of current programs – All
- AK DOT&PF recent experience with graduate construction management courses – Krol
- Graduate Certificate Program – Perkins

Construction Education Needs – Several Responses to the Nine Questions

Focus Groups to Discuss Specific Topics – Perkins

Reports from Focus Groups – Perkins and Group Reporters

Compile List of Recommended Future Actions – Bennett

Discuss Framework and Contents of Report from the Roundtable – Bennett

Other Business

Luncheon

Adjournment

APPENDIX D
Construction Training Venues for Alaskans

- 1) Apprenticeship programs
 - a) Trades
 - b) Pipeline training
- 2) High school construction academies
- 3) Construction management degrees
 - a) Associate
 - b) Four-year
 - c) Other schools
- 4) MS level coursework and programs
 - a) Engineering Management
 - b) Project Management
- 5) Large number of seminars and short courses given by and/or sponsored by
 - a) National Highway Institute
 - b) AK DOT&PF
 - c) AGC
 - d) Corps of Engineers
 - e) Western Alliance for Quality Transportation Construction (WAQTC)
Topics include CESCL (Certified Erosion Sediment and Control Lead), Safety, Contactor Quality Control, Hazwopper, Legal Issues
- 6) Seminars and short courses presented by private providers from outside Alaska

APPENDIX E

Descriptions of One-credit Construction Management Courses Offered in Spring 2008

Big Picture, Systems Thinking and Organizational Dynamics, Fairbanks, (15)
Required and emergent systems. Understanding how to analyze organizational functionality. (organizational structure, rules and policies, work design, organizational culture, technology, layout, personal systems, reward systems, status).

Construction Claims Case Studies, Fairbanks and Anchorage, (5)
This course reviews and analyzes a variety of construction contract claims from the annals of the Alaska Department of Transportation and Public Facilities and other owner organizations. Case reviews, role playing exercises, guest speakers.

Scheduling for Construction Administration , Fairbanks and Juneau, (17)
Topics include contract provisions related to project scheduling, introduction to construction scheduling, network scheduling fundamentals and software features, MS Project demonstration, guidelines for working with the contractor's schedule, review of AK DOT&PF contractor schedules, change order and delay claims analysis utilizing network scheduling, and computer-based scheduling exercise.

Managing Risk, Fairbanks and Juneau, (13).
Goal: Students will develop a basic understanding of risk in project management practice with applications to construction management. They will be able to write a project risk management plan and perform some basic risk calculations with Excel and Crystal Ball.

Overview of Environmental Laws, Regulations, and Permitting, Fairbanks and Anchorage, (2)

Goal: Develop a broad understanding of the environmental laws that affect engineering projects, and some specific knowledge of the permits and regulatory requirements specific to AK DOT&PF projects. Understand the work effort required for permitting and the budgeting and scheduling of the permitting process. Understand our agency compliance and the contractual implications of third party (contractor) actions.

APPENDIX F

Proposed Graduate Certificate Program

Outline of rubrics, courses, and suggested courses and topics.

The degree will be awarded after the student has successfully completed, with a average grade of 2.0 or better, 15 credits of appropriate courses. The selection of courses will be determined by the student and the student's advisor, from within the following rubric:

4 to 6 credits of Human Relations and Communications

4 to 6 credits of Construction Project Management

4 to 6 credits of Construction Technical.

Several credits may be taken from the Business and Financial, and/or with the advisor's approval, from a non-construction technical area.

Courses marked with a double asterisk are noted as being suitable for professionals in the pre-construction disciplines. The entire Human Relations and Communications rubric is suitable for them.

1) **Human Relations and Communications

a) BA 607 HR management

i) Existing, 3-credits

ii) The study of the effective management of human resources in organizations to include employee planning and recruiting, selection and orientation, training and career development, performance evaluation, compensation, EEO, occupational safety and health, and labor relations.

b) ESM 601 Managing and leading engineering organizations

i) Existing, 3 credits

ii) Leadership knowledge and skills as applied to motivation, direction and communication within engineering and technical organizations, and their relations with other organizations and the public. The general tools of management are reviewed including management theory, communications, conflict management and resolution.

c) Big picture, systems thinking and organizational dynamics

i) Existing special topics, 1 credit

ii) Required and emergent systems. Understanding how to analyze organizational functionality. (organizational structure, rules and policies, work design, organizational culture, technology, layout, personal systems, reward systems, status). (Eagle Smelting Case)

(1) Social cognition and attribution theory, dealing w/prejudice, first impressions, assumptions, diversity issues.

- (2) Four frames (HR, Structural, Political, Symbolic) from Bolman and Deal
- (3) Goal setting and planning, designing systems and structures that meet organizational needs.
- (4) Understanding oneself... predictors of success, self-concept, Myers Briggs Type Indicator
- d) Power and politics and its effect on motivation
 - i) Existing special topics, 1 credit
 - ii) Not taught
 - iii) Understanding organizational politics, using and sharing power appropriately. Benefits and dangers of power. What to do when you don't have power, how to use influence. What are the goodies and how to give them out. Motivating individuals and teams, through non-financial and financial incentives.
- e) Leading Teams:
 - i) Proposed special topics, 1 credit
 - ii) Creating high performance teams, understanding team dynamics, roles people play in groups, stages of group development and appropriate leadership styles for working with groups in each stage; ethical and practical decision-making processes. Situational Leadership, building trust, establishing values, understanding trigger points, managing conflict, understanding stages of group development.
- f) Supervising Others
 - i) Proposed special topics, 1 credit
 - ii) Supervision skills including communication, feedback, performance evaluation, employee discipline, dealing with conflict constructively, balancing needs of the individuals with the needs of the organization. Managing a diverse workforce. Building loyalty and company spirit. Rules and policies and how to make effective ones and to enforce them reasonably, esp. policies that affect health and safety.
- g) The Legal Ethical And Practical Aspects Of Personnel Decision Making:
 - i) Proposed special topics, 1 credit
 - ii) Making personnel decisions that are useful, legal and ethical. Recruiting, hiring and firing, promotions, determining training needs, dealing with sexual harassment. Training and development of employees. Succession planning and career development.
- h) MAKING CHANGE.
 - i) Proposed special topics, 1 credit
 - ii) When the organization has problems or new opportunities, helping to move the organization in a new direction. Determining what needs to

- change, how to deal with resistance to change, and how to institutionalize change. Integrating the course concepts.
- i) Project interaction with regulators, stakeholders, and the public.
 - i) Proposed special topics, 1 credit
 - ii) Goal: Develop knowledge to identify non-project employed persons, groups, and organizations that may affect this or future projects. Learn how to plan to interact with these stakeholders. Develop skill to interact with these stakeholders in order to minimize adverse effects of projects, both real and perceived.
 - j) Crew employee motivation
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Leadership and motivation of non-professional employees
 - iii) Labor relations
 - k) Writing professional technical proposals
 - i) (Effective writing)
 - (1) Government proposal formats
 - (2) In-house proposals, budgets
 - (3) Lectures by selection committee members
 - (4) Ethics and business practices
 - l) Oral and Visual Presentations, In-house and Technical
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Effective content
 - iii) Effective presentation
 - (1) PowerPoint
 - (2) Handouts
 - (3) Students give several presentations
 - (a) One on ethics topic
 - m) Public Communications and Media Relations
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Introduction to PR
 - n) Negotiations
 - o) Meeting management
 - i) 29 May Workshop Suggestion, 1 credit
 - p) Effective Written Communications
 - i) 29 May Workshop Suggestion, Could be 1, 2, or 3 credits
 - ii) Formal
 - (1) Memos
 - (2) Meeting minutes
 - iii) Email and etiquette
 - (1) Overuse

- (2) Not a replacement for verbal communications
- iv) Meeting management
- v) Effectiveness Claims documentation
- vi) Web-based contract and project administration
 - (1) Programs
 - (2) Standard project requirements
 - (3) Listening skills
 - (4) Contract (read) understand
- q) Remote and Alaska Issues
 - i) 29 May Workshop Suggestion, 1,2, or 3 credits
 - ii) Culture issues
 - iii) Difference between regions
 - (a) Factors
 - iv) Training of local labor
 - v) Community involvement
 - vi) Tribal issues
 - (1) Various
 - (2) Organizations
 - (3) Structures
- r) Retention
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Understanding the “millennia generation”
 - iii) Knowledge of Industry
 - iv) Manger expectations of new and old employees
 - v) Internships and mentoring.
- s) Miscellaneous HR and Communications topics
 - i) Partnering
 - ii) Which may be covered in the above
 - iii) Delegation
 - iv) Burn out
 - v) Stress Management
 - vi) Time management
 - vii) Establishing credibility
 - viii) Customer Service

2) Construction Project Management (includes “contract management” and technical scheduling)

- a) **ESM 609 Project Management
 - i) Existing, 3 credits

- ii) On-line
- iii) Organizing, planning, scheduling and controlling projects. Use of CPM and PERT; computer applications. Case studies of project management problems and solutions. Has introduction to CPM, MS Project
- b) CE 620 Civil Engineering Construction
 - i) Existing, 3 credits
 - ii) Has introduction to CPM, MS Project
 - iii) Construction equipment, methods, planning and scheduling, construction contracts, management and accounting, construction estimates, costs and project control.
- c) **ESM 608 Law
 - i) Existing, 3 credits
 - ii) Those aspects of law specifically related to technical management. Contracts, sales, real property, business organization, labor, patents and insurance.
- d) Construction Claims Case Studies
 - i) Existing special topics, 1 credit
 - ii) Taught as trial in spring 08.
 - iii) This course reviews and analyzes a variety of construction contract claims from the annals of the Alaska Department of Transportation and Public Facilities and other owner organizations. Case reviews, role playing exercises, guest speakers.
- e) Scheduling for construction administration
 - i) Existing special topics, 1 credit
 - ii) This module would contain the same content as in the two-day short course developed and taught by FLB for AK DOT&PF. Topics include contract provisions related to project scheduling, introduction to construction scheduling, network scheduling fundamentals and software features, MS Project demonstration, guidelines for working with the contractor's schedule, review of AK DOT&PF contractor schedules, change order and delay claims analysis utilizing network scheduling, and computer-based scheduling exercise.
- f) **Network scheduling basics
 - i) Suggested 1 credit course
 - ii) This module would concentrate on network scheduling as used in construction, from the viewpoint of both the owner and the contractor. Topics include network elements, basic calculations, interpretation of results, scheduling monitoring, software features, software demonstration,

- time/cost tradeoffs, cost estimating and tracking, resource management, and case studies.
- g) ****Project network scheduling applications in owner organizations**
 - i) This module takes the knowledge learned in Network scheduling basics, extends it further, and concentrates on the use of the technique by contract administrators in an owner's organization. Topics include typical contract provisions related to scheduling, resources needed by the owner to administer a construction schedule, review of initial schedule, tracking schedule progress, review and analysis of schedule case studies, change order and delay claims analysis with network scheduling, use of network scheduling within the owner organization for design and administration including resource scheduling.
 - h) **Construction claims: prevention, analysis, and dispute resolution**
 - i) Suggested 1 credit course
 - ii) This module would include topics similar to what Perkins and Bennett developed for Fairbanks NSPE (ASCE?) several years ago, with emphasis on claims from the viewpoint of the owner. Topics include overview of the construction claims process; sample cases of claims becoming disputes; minimizing contrast disputes from the viewpoint of owner, designer and contractor.
 - i) ****Project management organization and delivery systems**
 - i) Suggested 1 credit course
 - ii) This module includes topics related to the project organizational structure, delivery systems, work breakdown structure, project life cycle, coordination and integration.
 - j) ****Contract management for Alternate Project Delivery Systems**
 - i) 29 May Workshop Suggestion, 1 or 2 credits.
 - ii) Scheduling and other issues
 - iii) QBS, qualifications based selection
 - iv) Design Build
 - v) CMAR, construction manager at risk
 - vi) PPP, public private partnerships
 - (1) build, operate, transfer (BOT), Build, own, operate, transfer (BOOT)
 - design, build, finance, operate (DBFO)

3) Construction Technical (includes costs and estimating)

- a) ****CE 451 (formerly ESM 401) Construction Cost Estimating and Bid Preparation**
 - i) Existing, 3 credits

- ii) Compilation and analysis of the many items that influence and contribute to the cost of projects to be constructed. Preparation of cost proposals and study of bidding procedures.
- b) ****CE 603, Arctic Engineering**
 - i) Existing, 3 credits
 - ii) Application of engineering fundamentals to problems of advancing civilization to polar regions. Logistics, foundations on frozen ground and ice thermal aspects of structures, materials, transport and communications, and heating and ventilating.
- c) ****ESM 622, Engineering Decisions**
 - i) Existing, 3 credits
 - ii) **Risk** and uncertainty in engineering decisions. Basic applied probability and statistics, data analysis, regression analysis and time series. Practical applications of decision tools: linear programming, inventory analysis, queuing, network models, utility theory. Engineering judgment and uncertainty. Public safety and ethics. A class project and paper are required.
- d) ****ENVE 644 Environmental Laws and Permitting**
 - i) Existing, 3 credits
 - ii) Topics of environmental impact statements, environmental law (local, state and federal), public involvement and environmental quality. Impact from projects of mining, highways, airports, pipelines, industrial development, water, wastewater and solid waste, and others—theoretical considerations and case studies.
- e) ****Managing Risk**
 - i) Existing special topics, 1 credit
 - ii) Goal: Students will develop a basic understanding of risk in project management practice with applications to construction management. They will be able to write a project risk management plan and perform some basic risk calculations with Excel and Crystal Ball.
- f) ****Overview of environmental laws, regulations, and permitting**
 - i) Existing special topics, 1 credit
 - ii) Goal: Develop a broad understanding of the environmental laws that affect engineering projects, and some specific knowledge of the permits and regulatory requirements specific to AK DOT&PF projects. Understand the work effort required for permitting and the budgeting and scheduling of the permitting process. Understand our agency compliance and the contractual implications of third party (contractor) actions.
- g) ****Construction estimating basics**
 - i) Suggested special topics, 1 credit

- ii) This module looks at estimating construction projects from both the contractor and owner standpoint. Topics include purposes, types and level of details of various estimates; guidelines, samples and exercises of owner/designer-prepared estimates; guidelines, samples and exercises of contractor-prepared estimates; lump sum v. unit cost estimates; distinction between cost estimate and final bid (tender) proposal; recognition and inclusion of risk.
- h) Introduction to construction contract administration
 - i) Suggested special topics, 1 credit
 - ii) This module could include such topics as contract law, public procurement law, payments, bonding and insurance, change order management, claims management, inspection and quality control, and project termination and closeout.
- i) **Advanced topics in cost
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Not the same a price
 - iii) Escalation
 - iv) Inflation
 - v) Logistics
 - vi) Risk
- j) **Advanced dirt estimating
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Earthwork quantity calculations
 - (1) Programs and problems
 - iii) Cat Handbook
 - iv) GIS GPS
- k) **New techniques: Survey, Design, Construction, QC, Maintenance
 - i) May Workshop Suggestion, 1 credit
 - ii) GIS
 - iii) GPS
 - iv) IT
 - v) Programs
- l) **Intro to Right of Way Law, Procedures, and Issues
 - i) May Workshop Suggestion, 1 credit
 - ii) Construction needs to know to develop solutions.
- m) **Construction-related law topics
 - i) May Workshop Suggestion, 1, 2, or 3 credits
 - (1) Need to establish relation to general law class such as ESM 608
 - (2) Each topic below could be a one-credit class for someone who has had such an introductory course.

- ii) Labor law
- iii) AK construction law
- iv) Public Procurement law
- v) DSC, differing site conditions
- vi) Delay claims
 - (1) Tie to scheduling
- n) **Arctic Construction
 - i) 29 May Workshop Suggestion, 1 credit
 - ii) Logistics
 - iii) Ice roads
 - iv) Winter construction
- o) Introduction to Safety Engineering
 - i) 07-08 Suggestion, 1 credit
 - ii)
 - iii) Project safety issues,
 - iv) workers comp and
 - v) record-keeping
- p) Quality Control
 - i) Inspections
 - ii) Record Keeping
 - iii) Human relations
 - iv)

4) Business and Financial

- a) ACCT 602 Accounting for managers
 - i) Existing, 3 credits
 - ii) A complete and balanced treatment of the concepts, procedures and uses of financial accounting. Coverage includes the accounting cycle, accounting principles, mass processing of transactions, internal control, inventories and merchandising operations, long-lived assets and liabilities, corporate accounting and reporting, partnership accounting, financial statements, funds flow analysis, cost systems for manufacturing operations and managerial accounting.
- b) **ESM 605 Engineering Economics.
 - i) Existing, 3 credits
 - ii) The economic basis of engineering decisions, Graduate level studies of capital investment analysis techniques, including present worth, annual cash flow and rate of return. Applications to replacement problems,

benefits/cost analysis and capital budgeting. Consideration of impacts of depreciation accounting, income taxes and inflation. Risk and uncertainty in economic decisions. Simulation.

5) Non-Construction Technical Topics

- a) These are topics that come up when discussing construction management needs:
 - i) Asset and Maintenance Management
 - ii) GPS/GIS, Construction Surveying
 - iii) upper level classes in pavement design,
 - iv) survey (identifying and requesting data acquisition needs, interpreting data, project layout, datums)
 - v) transportation (airport, railroad and highway design) and
 - vi) geotechnical engineering (slope stability, use of fabrics to solve foundation problems, seismic influences on soil properties)

APPENDIX G
Four Responses to the Nine Questions

David Miller

1. What is lacking in the preparation of graduate engineers and other technical professionals for employment in Alaska's construction industry?

Real on the job experience is hard to duplicate in the classroom.

2. What is your company/firm/agency currently doing to try to remedy this lack of preparation?

Our organizational structure promotes mentoring by the Sr. staff to the less experienced managers.

3. Is your organization's approach working successfully?

Yes

4. What is different about Alaska's needs in this regard?

5. How does this issue impact such employment concerns as recruitment, retention, efficiency, compensation, and the like?

Being on the public side limits our ability to offer competitive compensation as compared to what the private side can do. We get and retain some quality individuals by being more flexible in working hours and time off.

6. Is this situation likely to get worse?

The gas line is the wild card in the deck. We are hearing talk of a \$5-7 billion dollar state capital budget next year which will tax the existing engineering infrastructure.

7. How can the University of Alaska assist in meeting these needs?

Long range is new Engineering facilities, both laboratories and classrooms.

8. How should such offerings be packaged – Time of year? Time of day? Module size? Location? Video conferencing? Other?

There doesn't seem to be a slow time that would be better for continuing education and with 50-60 hour weeks being the norm a good time is hard to identify. I am not aware of how successful your electronic offerings have been.

9. Who should support (with time and dollars) such offerings – Employer? Employee/student? Shared support? Other?

All of the above. With the states current financial windfall it might be time to endow a new version of the Alaskan Student Loan Program or at least one for critical requirements like engineering, nursing etc.

Doug Smith

1. What is lacking in the preparation of graduate engineers and other technical professionals for employment in Alaska's construction industry?

Estimating and cost control skills, and experience in presenting estimates, cost reports

and forecasts to customers and/or upper management. There is also a need to be able to adequately explain changes in cost and schedule, and reasoning for the changes. In a role as a contractor, it is necessary to explain changes to the Owner's satisfaction as a financial matter. For an Owner Construction Manager, it is necessary to explain changes in cost and schedule to the satisfaction of upper management or boards of directors in order to keep the project funded and progressing, and to ensure that the forecast project cost still meets the organization's ROI goals and will provide the necessary business value.

2. What is your company/firm/agency currently doing to try to remedy this lack of preparation? *As a firm, little except continuing OJT and continual searching of the job market for talented individuals. We have started sending representatives to university career fairs. The appearances are not necessarily recruiting but to introduce construction as a professional career that certain graduates will find rewarding. Individuals within the company participate in industry forums and workplace development.*
3. Is your organization's approach working successfully? *Not particularly. Recruiting is still a difficult and lengthy process.*
4. What is different about Alaska's needs in this regard? *1) Finding recruits willing to live here, and 2) finding recruits willing to travel to villages and remote jobsites for estimating and/or supervising work.*
5. How does this issue impact such employment concerns as recruitment, retention, efficiency, compensation, and the like? *There is an expectation in Lower 48 graduates and early career workers that living and working in Alaska commands a premium of 30% to 50% above Lower 48 ranges. Those that are motivated strictly by the salaries are disappointed at the reality. Those that are motivated by the opportunity to live and work here don't mind.*
6. Is this situation likely to get worse? *In my opinion, the pool of candidates willing to take on construction as a career is diminishing in both management and skilled labor ranks. I haven't seen anything reversing this trend yet. Last November I hosted a booth at an ASME graduate and early career fair. I spoke to about 200 soon-to-graduate mechanical engineers. 2 of those 200 were interested in construction, and both were far more interested in living in a major metropolitan area than in Alaska. Another was interested only in working in our fabrication design office.*

7. How can the University of Alaska assist in meeting these needs? *Promoting construction as a viable professional career alternative. Providing professional education that helps prepare candidates to take on challenges in estimating, negotiating, logistics, labor relations and project recovery.*

8. How should such offerings be packaged – Time of year? Time of day? Module size? Location? Video conferencing? Other? *I like the distance education model of providing classes on a year round basis via a mixed media approach that includes reading, listening to audio or video-taped lectures, online discussions via video conference or online chat, and one-on-one or small group meetings with instructors via telephone or in person. Collaborative assignments with other students, such as giving each a discipline or spec section to estimate, and assigning one student in the group to assemble the components and prepare a complete bid. Other situations could include diagnosing a job on which the schedule is slipping. Have the instructor play the role of the job superintendent, and provide answers to student questions, while the students work collaboratively as a project staff to determine the root cause of schedule slippage and how to correct it.*

9. Who should support (with time and dollars) such offerings – Employer? Employee/student? Shared support? Other? *Ideally, the employer could contribute the bulk of the cost, as the employer (and its customers) will receive much of the benefit of additional training. However, as a manager in a small firm that has control of overhead as a motto, it's seldom possible to contribute cash to employee training. Offering time is lower cash outlay alternative that is sometimes acceptable, but is largely dependent on the individual. I'm finding some generational differences in workers. Those on salary in my generation tend to give the company a few hours a week on a routine basis. Workers just entering the workforce seem to hold a slightly more mercenary view. If there is any give on the work hours, it will be on their side. A shared support role is probably the best situation.*

Galen Johnson

1. What is lacking in the preparation of graduate engineers and other technical professionals for employment in Alaska's construction industry? **Assuming that we're talking about engineering grads who are tasked with construction management and not design duties; I believe that the B.S. curriculum lacks a lot of the business aspects - but, then those topics would not likely be as useful to a grad planning to work in design versus construction. It's easy for a construction contractor to say that engineering graduates ought to know how to read construction documents and understand the business - but I doubt that a design professional would necessarily believe that those elements are the best use of a undergrad's learning time.**

2. What is your company/firm/agency currently doing to try to remedy this lack of preparation?
My former company attempted to train in-house to whatever degree necessary, but there was not always time to do this well.

3. Is your organization's approach working successfully?
It's time-consuming and very disappointing when a candidate doesn't work out after many hours of tutoring.

4. What is different about Alaska's needs in this regard?
Having no construction experience outside of Alaska, I believe that logistics (even on the road system, but especially in rural areas) creates far more critical consequences to lack of planning or just bad luck. The short construction season (although work continues off-season) also magnifies the intensity of efforts required to succeed.

5. How does this issue impact such employment concerns as recruitment, retention, efficiency, compensation, and the like? **I think that Alaska represents unique opportunities to individuals who are willing to rise to the challenge and that an employer willing to take a risk on a less "qualified" individual can be well rewarded. My limited experience with high paid experts from outside, left me with the impression that many have a sort of mercenary attitude that doesn't necessarily foster positive working/management conditions.**

6. Is this situation likely to get worse?
I guess that increasing needs will cause a shortage to worsen.

7. How can the University of Alaska assist in meeting these needs? **I believe that UAF's Eng Mgmt program does a good job of "finishing" and Eng grad for management work. I also believe that UA/TVC's Constr Mgmt AAS program will help provide the concepts to non-engineering students of varied construction experience. Those students with significant construction savvy will most likely be the better equipped to handle CM duties than those students with no previous work experience.**

8. How should such offerings be packaged - Time of year? Time of day? Module size? Location? Video conferencing? Other? **Regarding the graduate certificate offerings; I think the more flexible, the better - anything to accommodate work schedules.**

9. Who should support (with time and dollars) such offerings - Employer? Employee/student? Shared support? Other?
I'm sure some students will go-it-alone, but I'd guess many employers would see the benefit and participate in costs.

Mike Redmond

1. What is lacking in the preparation of graduate engineers and other technical professionals for employment in Alaska's construction industry?

In the past, most of our hiring for construction professionals have been engineers, civil, mechanical, electrical and environmental. Most of their continuing education in the construction arena has been On the Job (OJT) and numerous week-long courses offered by the Corps of Engineers, (courses in contract administration, costing, scheduling, contract pricing, claims, and disputes). What is lacking is an education that leads to an overall understanding of the interrelationships and interdependencies of construction management. In the past, the Corps approach has been focused on individual courses that are not linked together.

2. What is your company/firm/agency currently doing to try to remedy this lack of preparation?

We have increased our training budget to allow for our folks to take university and other technical/professional courses. We have added ‘mentors’ to our new hires to provide guidance in applying their engineering education to construction management. We are now hiring construction management graduates.

3. Is your organization’s approach working successfully?

The Corps of Engineers is leading the Federal Government in petitioning Office of Personnel Management (OPM) to establish Construction Management as a Professional Series. This effort will better align the opportunities for Construction Managers to have a distinct career field. Currently, there is no specific career track for construction managers; each current construction management employee is in a unique position description without a career program to follow. This new effort would establish Construction Management on equal footing with Engineers – who have a distinct career path and progression.

4. What is different about Alaska’s needs in this regard?

Alaska not only has progressive development, we have booms and busts of major programs (oil pipeline, housing, micro-hotel infusion, etc.). The Federal Government also has a strong Alaskan presence and opportunities for significant need for construction managers. Currently, on the military side of construction, the Stryker Brigades, the Airborne Brigades, the C-17 and F-22 Aircraft programs have brought over \$2B of work to Alaska. On the Civil Works side, the State continues to see expansions of her harbors. In the future, we see large State programs (KABATA, gas pipeline, ANWAR, more housing, Railroad linked to Canada and the lower 48 lines, etc.) and also booms from the Federal Government (maintaining the facilities being constructed, planning the renovations/upgrades beginning in 10 years, coastal erosion, Ports of Refuge, etc.)

Alaska is different! We are now constructing year-round, gone are the days of ‘slow’ winters. Clients demand their completed facilities “yesterday.” The public and the current economy demand facilities faster than ever before. And all this needs to be completed in an arctic environment.

5. How does this issue impact such employment concerns as recruitment, retention, efficiency, compensation, and the like?

Alaska does not have enough construction managers, either experienced CM's nor young graduates to begin their experience journey to professional CMs. With the Corps being able to hire CMs into the new professional series, the Corps will need graduates and experienced CMs for our future workload.

6. Is this situation likely to get worse?

Yes, infrastructure is critical to the future of Alaska and that program needs construction managers. Currently, the Federal Government has mostly engineers in Project Engineer position overseeing construction contracts. There are a significant number of these project engineers eligible for retirement within the next 5 years. There are not only enough engineers to replace the project engineers leaving but the Corps will be mirroring industry and hiring construction management professionals for these type of positions. Finally, with the continued sophistication of construction, reduced schedules, and design build, construction managers have a significant role as a separate discipline to manage the construction contracts of the future.

7. How can the University of Alaska assist in meeting these needs?

Both the UAF and UAA directions are strong steps to support the construction management needs for the State. UAA's new 4-year Construction Management Degree and their current 2-yr AA program offer a strong beginning to improving the available pool of candidates . This roundtable by UAF is a further improvement to offer specific support to the construction industry.

8. How should such offerings be packaged – Time of year? Time of day? Module size? Location? Video conferencing? Other?

For UAF, I talked to our project engineers and they hoped for normal courses during the evening.

9. Who should support (with time and dollars) such offerings – Employer? Employee/student? Shared support? Other?

For the Corps, employees would provide their own time and funding, and the Corps has set up additional training funding for professional development.

APPENDIX H
Unedited Notes from Focus Group Discussions

Communications focus group

- 1) Proposal preparation
 - a) Use owners as adjuncts
 - b) Technical writing
 - c) Oral
- 2) Presentations
- 3) Communications
 - a) Convey info
 - b) Receive Info
- 4) Written and Graphical
- 5) Real experience
- 6) Mentoring
 - a) Effective communications
- 7) Public communications
 - i) Media
 - ii) PR
- 8) Communicate what construction is and what programs can prepare them for
- 9) Negotiating Skills
- 10) Crew employee motivation
- 11) PowerPoint Training
- 12) Effective meeting management
 - a) Simulations
- 13) Toastmasters
 - a) Variable audiences
 - b) Dress
- 14) Negotiations
- 15) Written communications
 - a) Formal
 - i) Memos
 - ii) Meeting minutes
 - b) Informal
 - i) Email and etiquette
 - ii) Overuse
 - iii) Not a replacement for verbal communications
 - c) Meeting management
 - i) Effectiveness

- d) Claims documentation
- e) Web-based contract and project administration
 - i) Programs
- f) Standard project requirements
- g) Listening skills
- h) Contract (read) understand

“Soft skills” focus group

- 1) Certification Program
 - a) Virtues
 - i) Flexible
 - ii) Attainable
 - iii) Distance delivery
 - iv) Notify widely
- 2) Partnering
 - a) AK DOT&PF
 - b) Corps
- 3) Organizational dynamics
- 4) Interpersonal
 - a) Supervision
 - b) Communications
 - c) Manager/Leader
 - d) Academy
 - i) Work ethic
 - (1) On time
 - ii) Sexual harassment
- 5) UA engineering programs should give equal weight to soft skills as technical
- 6) Team vs. individual achievement
 - a) Integrate team into technical courses.

Technical skills focus group

- 1) Scheduling
 - a) Basics
 - i) CPM
 - (1) Float
 - b) Now working all year, so schedules are compressed

- i) Crashing more expensive
- c) Scheduling for
 - i) DSC
 - ii) Claims
 - iii) Sub contractors
- d) Special for Design-Build
 - i) Other project delivery systems
- e) Programs
 - i) MS Project
 - ii) Primavera
- 2) Cost
 - a) Not the same as price
 - b) Escalation
 - c) Inflation
 - d) Logistics
 - e) Course on How to use the Cat handbook
 - f) Estimating v. Cost control
 - g) Advanced cost estimating
 - i) Risk
 - h) Earthwork quantity calculations
 - i) Programs and problems
 - i) New techniques
 - i) GPS
 - ii) GIS
 - iii) Cost of maintaining systems
- 3) Risk Management
- 4) Right of Way
 - a) Law
 - b) Construction needs to know to develop solutions.
- 5) Environmental law
- 6) Technical negotiations
 - a) Tradeoff between cost, time and quality
- 7) Alternate dispute resolution
 - a) Case studies
- 8) Law
 - a) Labor law
 - b) AK construction law
 - c) DSC
 - d) Delay claims
 - i) Tie to scheduling

- 9) Remote and Alaska Issues
- a) Cultural issues
 - b) Difference between regions
 - (1) Factors
 - c) Arctic Construction
 - d) Training of local labor
 - e) Community involvement
 - f) Tribal issues
 - i) Various
 - ii) Organizations
 - iii) Structures

Retention (discussed by communications group)

- Understanding the “millennia generation”
- Knowledge of Industry
- Manger expectations of new and old employees
- Internships and mentoring.

APPENDIX I
Suggested Guiding Principles

- 1) Give soft skills equal weight with technical skills
- 2) Non-degree folks
 - a) Make certificate available for those without BS
- 3) Use industry/owners group for instructors
- 4) Maximize flexibility of offerings
- 5) Industry agrees with need and supports concept
- 6) Apply concepts to existing undergraduate courses
- 7) Insure accessibility
- 8) Employer \$ support
- 9) Wide publicity
- 10) Emphasize group work
- 11) Capture institutional knowledge
- 12) Not just construction
 - a) Broaden to other phases of project cycle
- 13) Short term class format
 - a) One credit
- 14) Price to self-support
- 15) Insure quality
- 16) Respond to AELS requirements
 - a) Initial registration
 - b) Continuing education
- 17) Foster leadership and stewardship of industry
- 18) Web-based inventory of ALL Alaska construction education opportunities

**RESOURCE COMMITMENT TO THE
PROPOSED DEGREE PROGRAM**

This program is will approach a self-support program, beyond the one-half faculty position. For example, if travel is needed, it would be in the budget for a particular course and the sponsor would need to pay for it. Many of the courses will be taught by adjuncts, and these will likewise be in the budget for each course. The exceptions are noted below.

Resources	Existing	New		Total
	College/School	College/School	Others (Specify)	
Regular Faculty (FTE's & dollars)	None	One-half FTE \$53,000	Income from workforce \$40,000	\$13,000
Adjunct Faculty (FTE's & dollars)				(self-support)
Teaching Assistants (Headcount)				0
Instructional Facilities (in dollars and/or sq. footage)				0
Office Space (Sq. footage)	Adjunct office			½ adjunct office, 120 SF
Lab Space (Sq. Footage)				0
Computer & Networking (in dollars)			Support of UA Video Conferencing	Support of UA Video Conferencing
Research/ Instructional/ office Equipment (in dollars)				0
Support Staff (FTE's & dollars)	½ FTE \$35,000 or as needed		Offset by program income	
Supplies (in dollars)		\$3,000	From workforce \$3,000	0
Travel (in dollars)		\$10,000	From workforce \$10,000	\$0

Signature _____ Date _____
Dean of College/School Proposing New Degree Program

UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment
 Graduate Certificate in Construction Management
 Summer 2008

Expanded Statement of Institutional Purpose	Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
<p>MISSION STATEMENT: This program will advance the managerial skill level – the ability to make wise management decisions - of graduate engineers and other professionals in the construction industry to help prepare them for more responsible jobs.</p> <p>GOAL STATEMENT: General: By capitalizing on the students’ prior experience and active work in the construction field, and the employer’s understanding of the student’s skill or knowledge gaps, UAF faculty can provide the academic setting and rigor to advance the</p>	<p>Students must demonstrate an ability to communicate by written, oral, visual, and electronic means and to understand their professional roles and the likely effects of their communications on others.</p>	<p>The student’s advisor will approve all the student’s courses. The distribution of courses within the main rubrics, which corresponds to the outcomes, is designed to provide the student coursework to meet the intended objectives.</p>	<p>This has been implemented for some of the trial courses in the spring of 2008 and will continue. The program coordinator will supply the forms.</p> <p>The completed feedback forms from all the previous year’s courses will be presented to the industry advisory committee each year for comment and direction.</p>
	<p>Students must demonstrate that they understand their roles in personnel management and the ability to make legal and ethical personnel decisions.</p>	<p>All courses must have an assessment plan in the course syllabus, which is approved by the college curriculum committee.</p>	
	<p>Students must demonstrate they understand the project cycle and the roles of the teams in that cycle, including the legal relations of the parties and their contracts, the effects of scheduling decisions on the project.</p>	<p>Because most courses will have a corporate sponsor that funds their students and this sponsor is the</p>	
	<p>Students must demonstrate their appreciation of cost-drivers in construction, risks involved, and</p>		

<p>student's skills in a direction most beneficial to both the student and the employer.</p> <p>Specific: Improve the student's ability to communicate with project team members and diverse stakeholders.</p> <p>Improve the student's ability to lead project teams.</p> <p>Improve the student's ability to manage the student's organization in the project matrix.</p> <p>Improve the student's technical abilities related to construction management.</p>	<p>knowledge in appropriate technical areas.</p>	<p>students' employer, the program has a rapid feedback loop. If the employers do not believe their employee/ our students are gaining from the course, they will let us know and/or not sponsor future courses. In addition, we will have an industry advisory committee made up of sponsors and likely sponsors of courses and these will be queried once a year about their perception of our students, and those statements added to a data base.</p> <p>At the end of each course, the sponsor(s) of the course will be asked to debrief the instructor on the perceived effectiveness of the course. They will answer some standard questions and questions</p>	
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		particular to that course. The overall effectiveness of the program will be manifest by the sponsor's commitment to the program.	
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