Request for Authorization to Establish

Master of Science in Construction and Facilities Management

November 2009

UNC CHARLOTTE

Lee College of Engineering Department of Engineering Technology
THE UNIVERSITY OF NORTH CAROLINA
Request for Authorization to Establish a New Degree Program

INSTRUCTIONS: Please submit five copies of the proposal to the Senior Vice President for Academic Affairs, UNC Office of the President. Each proposal should include a 2-3 page executive summary. The signature of the Chancellor is required.

Date __November 17, 2009__

Constituent Institution: The University of North Carolina at Charlotte

CIP Discipline Specialty Title: Construction Management

CIP Discipline Specialty Number: 15.9999 Level: B ☐ M ☑ 1st Prof ☐ D ☐

Exact Title of Proposed Program: Master of Science in Construction & Facilities Management

Exact Degree Abbreviation (e.g. B.S., B.A., M.A., M.S., Ed.D., Ph.D.): M.S.C.F.M.

Does the proposed program constitute a substantive change as defined by SACS? Yes ☐ No ☑

a) Is it at a more advanced level than those previously authorized? Yes ☐ No ☑

b) Is the proposed program in a new discipline division? Yes ☐ No ☑

Proposed date to establish degree program (allow at least 3-6 months for proposal review):

month August year 2010

Do you plan to offer the proposed program away from campus during the first year of operation?

Yes ☐ No ☑

If so, complete the form to be used to request establishment of a distance learning program and submit it along with this request.
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Executive Summary

Construction Management is a program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases. Such programs include instruction in commercial, residential, mechanical, highway/heavy civil, electrical, environmental, industrial, and specialty construction; \textit{facilities management}; project planning; budgeting and cost control; logistics and materials management; personnel management and labor relations; site safety; construction contracting; construction processes and techniques; organization and scheduling; and applicable codes and regulations [U.S. Dept. of Education’s NCES CIP-2000].

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. The body of knowledge required for facility management degree programs includes facility function (professional practice), human and environmental factors, planning and project management, finance, operation and maintenance, real estate, written and oral communication, information technology, quality management and assessment procedures (research and analytical methods), and integrative and problem solving skills [IFMA Standards for Recognized Programs]. \textit{Construction management} was listed as a job responsibility by 71 percent of facility managers in an industry-wide survey [IFMA.org, Facilities Industry Survey, 2004]. As can be seen, there is a considerable overlap between the construction management and facility management professions.

More corporations, industries, and owners are demanding more full-service, turn-key procurement of their physical infrastructure and associated operations and maintenance. As a result, more construction industry professionals are being asked to manage and deliver design, construction, and facility operations and maintenance services. Keeping abreast of the ever increasing and expanding knowledge of materials, methods, and technology in this broad field requires advanced training and education beyond the baccalaureate degree level.

To fill this need, the Department of Engineering Technology proposes the creation of a Master of Science in Construction and Facilities Management (MSCFM) degree program. The MSCFM degree program will build off the body of knowledge required by the American Council for Construction Education (ACCE) for the existing construction management undergraduate degree program and will incorporate areas of knowledge required by the International Facility Management Association (IFMA). The proposed model curriculum is a 30 semester-hour program and consists of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The program will be offered through both on-campus and online delivery. Online delivery is expected to begin during year two or three. It is anticipated that the program will have 20 graduates per year when fully established.

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Currently, there are two institutions with master degree programs in construction management
(ECU and WCU) and no schools with facility management master’s degree programs. The proposed MSCFM program differs from the other construction management graduate programs because of its increased facility management focus and because it is designed to serve students and industry within the Charlotte metropolitan area of the State. With the proposed MSCFM program, UNC Charlotte will also be one of only five schools in the nation to host a facility management graduate degree program joining the ranks of such prestigious institutions as Cornell University, Georgia Institute of Technology, and the University of Florida.

The Bureau of Labor Statistics’ 2007-08 Edition of the Occupational Outlook Handbook [OOH] indicates that construction managers held 487,000 jobs in 2006 and employment has been projected to increase by 16 percent during the 2006-16 decade, faster than the average for all occupations, because the number of job openings exceeds the number of qualified individuals seeking to enter the occupation. Although the recession has curtailed current demand, the longer term need for highly educated construction managers remains. There were an estimated 2,190 construction managers in the Charlotte Metropolitan Region earning a mean annual salary of $81,830 according to the 2006 Metropolitan Area Occupational Employment and Wage Estimates [MAOEW] for the metropolitan area of Charlotte-Gastonia-Rock Hill, NC-SC.

About 60 colleges and universities offer a master’s degree program in construction management or construction science. Master’s degree recipients, especially those with work experience in construction, typically become construction managers in very large construction or construction management companies. Often, individuals who hold a bachelor’s degree in an unrelated field seek a master’s degree in construction management or construction science to work in the construction industry [OOH]. The MSCFM program will assist working professionals in obtaining this additional education.

Similarly, the job outlook for facility managers is also good. The number of jobs for administrative services managers, of which facility managers are a subset, is projected to grow 12 percent over the 2006-16 decade, about as fast as the average for all occupations. The recession has affected the market for facilities managers, but longer term remains attractive as issues of sustainability, building efficiency, automated systems, and facility security will demand more and more highly educated professionals. Currently, there are an estimated 1,180 administrative services managers in the Charlotte Metropolitan Region earning a mean annual salary of $67,130 [MAOEW].

Most facility managers have an undergraduate or graduate degree in engineering, architecture, construction management, business administration, or facility management. Many have a background in real estate, construction, or interior design, in addition to managerial experience. Advancement of facility managers is based on the practices and size of individual companies. Completion of the competency-based professional Certified Facility Manager (CFM) certification program offered by the International Facility Management Association can give prospective candidates an advantage. In order to qualify for this designation, applicants must meet certain educational and experience requirements [OOH]. The MSCFM program will assist working professionals in attaining the additional educational knowledge required for the CFM certification.
UNC Charlotte sits in a unique place from geographic, demographic, and business perspectives for a construction and facilities management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte has been home to one of the most robust construction climates in North America and that is expected return as the economy recovers. In addition to its large construction industry, Mecklenburg Country and the surrounding metropolitan area are home to eight of the Fortune 500 companies. In 2006, these headquarters represented more than $267.3 billion in revenue. More importantly, 328 of the Fortune 500 companies have made a commitment to the city by placing one or more of their facilities within the county [Charlotte Chamber of Commerce].

These 328 Fortune 500 companies represent a diverse range of industries such as energy, commercial banking, automotive retailing, steel fabrication, electronics, aerospace and defense, general merchandisers, and specialty retailers. Each of these companies maintains and operates numerous facilities that require experienced and trained facility management professionals. In addition, there are numerous smaller companies and industries within the region that also require facility management services.

Although recent events have tempered the robustness of the economic climate for construction and business services in the Charlotte region temporarily, the regional construction industry is already showing signs of rebounding. The emerging economic climate for green construction, sustainable facility management, energy infrastructure and related business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. Our Department has provided quality technical education for more than 30 years. Our programs have met rigorous standards for specialized accreditation, and we have a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department’s outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the construction, facility management, energy infrastructure, and related business entities of Charlotte, the state and nation.

The MS in Construction and Facilities Management promises to be a key player in the renewal and expansion of the new energy economy in North Carolina as a major contributor to the Energy Production and Infrastructure Center (EPIC) initiative. UNC Charlotte proposed to create EPIC in response to a projected 30 percent increase in the demand for energy in the U.S. by 2030. Industry leaders are looking toward UNC Charlotte to help address a critical shortage in the intellectual capital necessary to modernize current energy production operations and infrastructure, and to facilitate the development of alternative energy sources. The North Carolina General Assembly has funded a new 200,000 square feet EPIC building and provided funding to hire faculty and staff. This program will have a special relationship with and focus on sustainability and energy infrastructure as part of the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.
I. DESCRIPTION OF THE PROGRAM

A. Describe the proposed degree program (i.e., its nature, scope, and intended audience).

Construction Management is a program that prepares individuals to manage, coordinate, and supervise the construction process from concept development through project completion on timely and economic bases. Such programs include instruction in commercial, residential, mechanical, highway/-heavy civil, electrical, environmental, industrial, and specialty construction; facilities management; project planning; budgeting and cost control; logistics and materials management; personnel management and labor relations; site safety; construction contracting; construction processes and techniques; organization and scheduling; and applicable codes and regulations [U.S. Dept. of Education’s NCES CIP-2000].

Facility management is a profession that encompasses multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology. The body of knowledge required for facility management degree programs includes facility function (professional practice), human and environmental factors, planning and project management, finance, operation and maintenance, real estate, written and oral communication, information technology, quality management and assessment procedures (research and analytical methods), and integrative and problem solving skills [IFMA Standards for Recognized Programs]. Construction management was listed as a job responsibility by 71 percent of facility managers in an industry-wide survey [IFMA.org, Facilities Industry Survey, 2004]. As can be seen, there is a considerable overlap between the construction management and facility management professions.

More corporations, industries, and owners are demanding more full-service, turn-key procurement of their physical infrastructure and associated operations and maintenance. As a result, more construction industry professionals are being asked to manage and deliver design, construction, and facility operations and maintenance services. In order to keep abreast of the ever increasing and expanding knowledge of materials, methods, and technology in this broad field requires advance training and education beyond the baccalaureate degree level.

To fill this need, the Department of Engineering Technology proposes the creation of a Master of Science in Construction and Facilities Management (MSCFM) degree program. The MSCFM degree program will build off the body of knowledge required by the American Council for Construction Education (ACCE) for the existing construction management undergraduate degree program and will incorporate areas of knowledge required by the International Facility Management Association (IFMA). The proposed model curriculum is a 30 semester-hour program and consists of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The program will be offered through both on-campus and online delivery. Online offerings will commence in year two or three.
Construction and facility management professionals work with owners, engineers, architects, specialty and sub-contractors, government agencies, and others to deliver, operate and maintain constructed projects and facilities. This program will provide ready access to construction and facility management education and careers for the citizens of the Greater Charlotte region and beyond.

The proposed program is designed to provide the advanced professional development and graduate education necessary for construction and facility management professionals to work in the increasing high tech, rapidly changing construction industry and related careers such as real estate and land development, infrastructure development, code enforcement, and insurance. This program will have a special relationship with and focus on sustainability and energy infrastructure as part of the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

B. List the education objectives of the program.

**Program Educational Objectives:** These are statements that describe the expected accomplishments of MSCFM graduates during the first few years after graduation.

The Department of Engineering Technology at UNC Charlotte is committed to providing the environment and expertise to ensure that its graduates make substantive contributions in their professional endeavors after graduation, both in the areas of technical proficiency and community involvement. Accordingly, the MSCFM program alumni will contribute to society as productive construction and facility managers and engaged citizens by:

1. Applying general and discipline-specific concepts and methodologies to identify, analyze, and solve technical problems in a sustainable manner.

2. Articulating technical material in a professional manner to potentially diverse audiences and in a variety of circumstances, employing effective oral and written strategies and techniques.

3. Contributing within team environments, demonstrating ethical, respectful and professional behavior in all associations.

4. Recognizing and appreciating the environmental, societal and fiscal impact of the technical professions in a local, national and global context.

5. Demonstrating an individual desire and commitment to pursue continuous self-improvement and lifelong learning.

**Program Outcomes:** These are statements that describe what students are expected to know and able to do by the time of graduation. Graduates with a Master of Science in Construction and Facilities Management (MSCFM) degree from UNC Charlotte will be able to:

1. Develop solutions to construction and facilities management problems to achieve performance goals related to safety, schedule, quality, sustainability, and economics.
2. Analyze, develop, and articulate open-ended construction and facilities management problems with specific applications to sustainable energy infrastructure.

3. Function as an effective leader of an interdisciplinary team within the construction and facilities management industries.

4. Apply research-based methodologies to solve unique construction and facilities management issues in a sustainable manner.

C. Describe the relationship of the program to other programs currently offered at the proposing institution, including the common use of: (1) courses, (2) faculty, (3) facilities, and (4) other resources.

1) Courses: This program is a new program which includes development of new courses and the proposed core curriculum includes no common courses with other programs. However, as the program develops, additional major elective graduate courses will be identified from other programs such as the Engineering Management program or others.

Graduate level courses developed as part of the MSCFM program will be available and may be applicable to students studying in the following colleges and departments, subject to internal acceptance by those departments and colleges:

A. College of Engineering
   i. Civil and Environmental Engineering
   ii. Mechanical Engineering
   iii. Engineering Management
   iv. Fire Protection

B. College of Business
   i. Management
   ii. Business Information Systems and Operations Management

C. School of Architecture

2) Faculty Resources: This program will share faculty resources with the existing BSCM in Construction Management and existing BSET in Civil Engineering Technology programs. As of fall 2009, thirteen (13) full-time and two (2) part-time faculty members deliver the Construction Management and Civil ET courses. In total, thirty-two (32) faculty members deliver courses which support these programs within the interdisciplinary Department. Members of the Graduate School Faculty currently teaching in those programs will deliver courses in the proposed MSCFM program. These programs will efficiently serve the spectrum of civil and construction technology through shared faculty and vertically integrated coursework, thus providing additional synergy and optimizing the use of resources.

3) Facilities: With the move by Electrical and Computer Engineering (ECE), Mechanical Engineering and Engineering Sciences, and Civil and Environmental Engineering to new
facilities in 2006, ample space is now available in the Smith Building to move forward with this program. Office space for new faculty members is available, as is construction project space for graduate student projects and research activity. Existing laboratories and offices in Smith which now support the Construction Management (CM) and Civil Engineering Technology (CIET) programs will be utilized by the MSCFM program and are adequate to deliver the programs. Those laboratories include the following instructional laboratories: 1) Construction Materials; 2) Construction Practices; 3) Hydraulics & Hydrology; 4) Soil Mechanics; 5) Asphalt; 6) Senior Design; 7) Stress Analysis; 8) Building Systems; 9) multiple computer/CAD laboratories; and various additional research laboratories.

4) Other resources: Other resources such as Engineering Computing and Library resources are available for use by the MSCFM program. Computing applications such as computer-aided drafting and design, cost estimating, project scheduling, electronic Internet plan room, hydraulics and hydrology are in place for existing programs and will be utilized by the MSCFM program. Library resources for the existing BS programs will also be utilized by the MSCFM program.

D. Describe any explorations of collaborative offering of this program and the results of those explorations.

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Furthermore, the program will take on a sustainable energy infrastructure focus both in the curriculum and in research as part of the Innovative Design, Engineering and Sustainability (IDEAS) Center and Energy Production and Infrastructure Center (EPIC) initiatives at UNC Charlotte. After initial review of curriculum and conversation with other institutions, it became apparent that due to the unique focus of this program, collaboration with other institutions was not immediately viable. However, it is anticipated that the program will be offered online beginning in year two or three and be available to students at other institutions in the UNC system.

II. JUSTIFICATION FOR THE PROGRAM

A. Describe the proposed program as it relates to:

1. The institutional mission and strategic plan and response to UNC Tomorrow

The proposed graduate program meshes nicely with the institutional mission and strategic plan. It fits the University themes of Applied Sciences and Technologies and Urban and Regional Development. As the first graduate level program to be located within the Department of Engineering Technology, the program will allow the ET Department and its faculty to become active participants in the institutional goal of raising the University’s graduate research and scholarly profile. This program was specifically targeted in UNC Charlotte’s response to UNC Tomorrow to increase the intellectual and research capacity of
the University. Specifically, this program is one of the desired deliverables in response to the Energy Production and Infrastructure Center (EPIC) initiative at UNC Charlotte.

The Department mission statement indicates that our programs exist to serve business and industry in this region by supplying highly competent construction management and engineering technology graduates (technologists). With the increasing urbanization and associated transportation and infrastructure challenges, the resultant exploding demand for construction professionals and the associated demand for facility managers across the nation and particularly in North Carolina and the Charlotte region become ever more acute. This proposed program is positioned in support of the Department, College and University missions to provide intellectual capital and to educate North Carolina citizens to meet the challenges of the region and state.

The proposal contributes to Goals 1, 2, 3, 4, 5 and 6 of the Department’s 2005-2010 Strategic Plan as listed below. In particular, the proposal contributes to Goal 1 of the Department’s strategic plan which is the planned development of a School of Technology with graduate level programs.

**GOAL #1:** Establish the School.

**GOAL #2:** Increase the quality, diversity, and number of students in Engineering Technology and Construction Management while maintaining and continuously improving quality educational experience.

**GOAL #3:** Add new and expand existing programs in niche areas in Engineering Technology, Construction & Facilities Management and Fire Protection to serve the Greater Charlotte region, the state of North Carolina and the United States.

**Initiatives for the Five-Year Period**

1. BS in Construction Management (completed 2006)
2. Multi-Disciplinary BS in Facilities & Plant Engineering Technology
3. Industrial Safety or Fire Protection track in BS Fire Safety ET program
4. **MS in Construction & Facilities Management (2009)**
5. Plan/Add MS in Fire Protection & Administration (2009)

**GOAL #4:** Provide adequate facilities to support expanding program offerings and facilitate applied research and outreach missions of the School.

1. Modify/Renovate Smith Building to provide adequate support for current and planned programs (2005-2010)
2. Plan new facility to support growing School of Engineering Technology as part of Construction Institute on CRI Campus (in concert with CE and others) (2007-2009)

**GOAL #5:** Participate in and contribute to Centers of Excellence

**GOAL #6:** Partner to Establish an Industrial Solutions Center
Additionally, as shown above, Goal 3 of the Department’s strategic plan is to add new and/or expand existing programs in specific niche areas. Among the alternatives considered as part of this effort, the M.S. in Construction and Facilities Management is the Department’s first priority for its initial graduate level program. The nature and sophistication of construction management and facilities management functions have evolved over the past two decades to the point where an advanced degree has become necessary to adequately function at the highest levels in these fields. Advances and emerging awareness of green initiatives, environmental and sustainability issues, energy management, security, and integrated facility management needs have all evolved to require a more sophisticated professional who can apply state-of-the-art tools such as Building Information Modeling (BIM), “smart controls”, LEED, etc. This evolutionary trend in the use of sophisticated tools and analysis techniques has driven the need for advanced study at the Master’s level.

This plan has been reviewed at various stages of development and endorsed by our stakeholders.

This proposal is aligned with UNC Charlotte’s response to UNC Tomorrow; specifically, this program is in direct response to the Energy Production and Infrastructure Center (EPIC) initiative at UNC Charlotte and is specifically listed in UNC Charlotte’s response to UNC Tomorrow. Faculty members of the Department are participating in the Innovative Design, Engineering and Sustainability (IDEAS) Center as part of the EPIC umbrella. Graduates of this program will contribute to the construction and management of energy infrastructure and to the research mission associated with development of new technologies in energy production and management and facilities operation in the new energy economy.

2. **Student demand**

Conservatively, it is estimated that initial enrollments will range from five to ten students depending upon timing of approval and subsequent recruiting efforts. With reasonable marketing and brand development, enrollments are expected to increase to 35 full-time students and another 30 part-time students within a few years. Recently established graduate level construction management programs at East Carolina University and Western Carolina University have enrollments below and above this range, respectively. However, neither of these programs is located in a metropolitan area of 1.5 million people as is the proposed UNC Charlotte program. The infrastructure and building needs in the Charlotte metropolitan area, coupled with the large construction industry located here provide unique opportunities for a Master of Science in Construction and Facility Management program, including outreach and collaboration with the Charlotte construction community. Student interest within the Department for graduate study is high. The Department’s Fall 2009 undergraduate enrollment is 826 students. In fact, the Department is, by a large margin, the largest at UNC Charlotte without a graduate program. Currently, no graduate programs exist within the Department to support research of the faculty or provide
opportunities for advanced study to our students. In the absence of graduate programs, many students who might pursue graduate study leave UNC Charlotte to pursue other options.

3. **Societal need** (For graduate, first professional, and baccalaureate professional programs, cite manpower needs in North Carolina and elsewhere.)

Of approximately 116 million workers in the U.S., just over five percent or six million people are employed in the construction industry. Discounting the U.S. Government, which includes the Armed Forces, the construction industry is the largest employer in the nation. Projections for needed construction and related services are estimated at $3.3 trillion over the next 10 years. The following are just a few examples of work that will be needed over the next ten years:

- Replace 375,000 bridges as part of $360 billion spent on roadwork.
- Mass transit will need $72 billion worth of construction.
- Repair or renovate one out of every three existing schools at a cost of $60 billion.


Construction managers held 487,000 jobs in 2006. About 57 percent were self-employed, many as owners of general or specialty trade construction firms. Most salaried construction managers were employed in the construction industry, 13 percent by specialty trade contractor businesses—for example, plumbing, heating, air-conditioning, and electrical contractors—nine percent in residential building construction; and nine percent in nonresidential building construction. Others were employed by architectural, engineering, and related services firms and by local governments [OOH].

Employment of construction managers is projected to increase by 16 percent during the 2006-16 decade, faster than the average for all occupations, because the number of job openings exceeds the number of qualified individuals seeking to enter the occupation [OOH]. This equates to a total of 77,000 new jobs over the decade. This situation is expected to continue even as college construction management programs expand to meet the current high demand for graduates. Currently, there are an estimated 2,190 construction managers in the Charlotte Metropolitan Region earning a mean annual salary of $81,830 [MAOEW].

More construction managers will be needed as the level of construction activity returns. Population and business growth will result in more construction of residential homes, office buildings, shopping malls, hospitals, schools, restaurants, and other structures that require construction managers [OOH].
The increasing complexity of construction projects will also boost demand for specialized management-level personnel within the construction industry. Sophisticated technology and the proliferation of laws setting standards for buildings and construction materials, worker safety, energy efficiency, environmental protection, and the potential for adverse litigation have further complicated the construction process. Advances in building materials and construction methods; the need to replace portions of the Nation’s infrastructure; and the growing number of multipurpose buildings and energy-efficient structures will further add to the demand for more construction managers [OOH].

In addition to job openings arising from employment growth, many additional openings should result annually from the need to replace workers who transfer to other occupations or leave the labor force for other reasons. A substantial number of seasoned managers are also expected to retire over the next decade, likely resulting in a large number of openings [OOH].

About 60 colleges and universities offer a master’s degree program in construction management or construction science. Master’s degree recipients, especially those with work experience in construction, typically become construction managers in very large construction or construction management companies. Often, individuals who hold a bachelor’s degree in an unrelated field seek a master’s degree in construction management or construction science to work in the construction industry [OOH]. The MSCFM program will assist working professionals in obtaining this additional education.

Similarly, the job outlook for facility managers is also good. The number of jobs for administrative services managers, of which facility managers are a subset, is projected to grow 12 percent over the 2006-16 decade, about as fast as the average for all occupations. However, demand should be stronger for facility managers because businesses increasingly realize the importance of maintaining, securing, and efficiently operating their facilities, which are very large investments for most organizations [OOH]. Currently, there are an estimated 1,180 administrative services managers in the Charlotte Metropolitan Region earning a mean annual salary of $67,130 [MAOEW].

Cost-cutting measures to improve profitability, streamline operations, and compete globally will continue to be addressed by many public and private organizations, resulting in more firms outsourcing facility management services or hiring qualified facility managers who are capable of achieving these goals in-house. The proliferation of facility management outsourcing should result in employment growth in facilities management firms as companies increasingly look to outside specialists to handle the myriad of tasks that have become increasingly complex and expensive [OOH].

Most facility managers have an undergraduate or graduate degree in engineering, architecture, construction management, business administration, or facility management. Many have a background in real estate, construction, or interior design, in addition to managerial experience. Advancement of facility managers is based on the practices and size
of individual companies. Completion of the competency-based professional Certified Facility Manager (CFM) certification program offered by the International Facility Management Association can give prospective candidates an advantage. In order to qualify for this designation, applicants must meet certain educational and experience requirements [OOH].

The MSCFM program will assist working professionals in attaining the additional educational knowledge required for the CFM certification.

UNC Charlotte sits in a unique place from geographic, demographic, and business perspectives for a construction and facilities management program. The institution provides educational opportunities to residents of the largest metropolitan area in North Carolina. Charlotte has been home to one of the most robust construction climates in North America. The attraction of the area is apparent in the numbers. In 2006, Charlotte awarded 24,250 building permits representing over $4 billion of new construction and the industry has shown continued growth over the last ten years as shown in Table 1 [Charlotte Chamber of Commerce].

Table 1: Charlotte-Mecklenburg 10-Year Construction Summary 1997 - 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Permits</th>
<th>Value Residential (millions)</th>
<th>Value Non-Residential (millions)</th>
<th>Value Total (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>24,250</td>
<td>$2,709.5</td>
<td>$1,560.9</td>
<td>$4,270.4</td>
</tr>
<tr>
<td>2005</td>
<td>22,037</td>
<td>2,063.2</td>
<td>1,297.6</td>
<td>3,360.7</td>
</tr>
<tr>
<td>2004</td>
<td>19,243</td>
<td>1,730.8</td>
<td>1,326.0</td>
<td>3,056.8</td>
</tr>
<tr>
<td>2003</td>
<td>18,984</td>
<td>1,600.8</td>
<td>905.7</td>
<td>2,506.5</td>
</tr>
<tr>
<td>2002</td>
<td>19,770</td>
<td>1,564.1</td>
<td>814.4</td>
<td>2,378.5</td>
</tr>
<tr>
<td>2001</td>
<td>19,174</td>
<td>1,640.2</td>
<td>1,117.5</td>
<td>2,757.7</td>
</tr>
<tr>
<td>2000</td>
<td>18,937</td>
<td>1,641.0</td>
<td>1,670.6</td>
<td>3,311.6</td>
</tr>
<tr>
<td>1999</td>
<td>19,323</td>
<td>1,313.7</td>
<td>1,044.2</td>
<td>2,357.9</td>
</tr>
<tr>
<td>1998</td>
<td>17,845</td>
<td>1,362.5</td>
<td>1,005.3</td>
<td>2,367.8</td>
</tr>
<tr>
<td>1997</td>
<td>15,635</td>
<td>1,036.1</td>
<td>836.2</td>
<td>1,872.3</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>195,198</strong></td>
<td><strong>$16,661.9</strong></td>
<td><strong>$11,578.4</strong></td>
<td><strong>$28,240.2</strong></td>
</tr>
</tbody>
</table>

The growth of Charlotte has been a magnet for construction companies. Low costs, high construction activity levels, and convenient access to both materials and skilled labor provide the reasons that over 4,700 construction firms employ 48,273 qualified workers in the metro area. These companies come in a wide variety of sizes, from a number of small, more personal operations to at least 65 firms each employing more than 100 people [Charlotte Chamber of Commerce].

In addition to its large construction industry, Mecklenburg Country and the surrounding metropolitan area are home to eight of the Fortune 500 companies, as listed in Table 2. This ranks Charlotte 7th nationally in number of Fortune 500 companies headquartered within the
county. These headquarters represent more than $267.3 billion in revenue for 2006. More importantly, 325 of the Fortune 500 companies have made a commitment to the city by placing one or more of their facilities within the county [Charlotte Chamber of Commerce].

Table 2: Charlotte Area's Fortune 500 Headquarters (as of April 2008)

<table>
<thead>
<tr>
<th>Name</th>
<th>Revenue</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of America (Banking)</td>
<td>$113.1 billion</td>
<td>9</td>
</tr>
<tr>
<td>Lowe's (Retail)</td>
<td>$48.2 billion</td>
<td>48</td>
</tr>
<tr>
<td>Nucor (Metals)</td>
<td>$23.7 billion</td>
<td>106</td>
</tr>
<tr>
<td>Duke Energy (Utilities)</td>
<td>$13.2 billion</td>
<td>204</td>
</tr>
<tr>
<td>Sonic Automotive (Retailing)</td>
<td>$7.5 billion</td>
<td>337</td>
</tr>
<tr>
<td>Family Dollar (Retail)</td>
<td>$7.0 billion</td>
<td>359</td>
</tr>
<tr>
<td>Goodrich Corp. (Aerospace)</td>
<td>$7.1 billion</td>
<td>354</td>
</tr>
<tr>
<td>SPX (Electronics)</td>
<td>$6.1 billion</td>
<td>402</td>
</tr>
</tbody>
</table>

These 325 Fortune 500 companies represent a diverse range of industries such as energy, commercial banking, automotive retailing, steel fabrication, electronics, aerospace and defense, general merchandisers, and specialty retailers. Each of these companies maintains and operates numerous facilities that require experienced and trained facility management professionals. In addition, there are numerous smaller companies and industries within the region that also require facility management services.

This economic climate for construction and business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. In addition, UNC Charlotte would be only one of a few select institutions in the entire country with a facility management related graduate degree program. Institutions with IFMA acknowledged graduate programs include Arizona State University, Cornell University, Georgia Institute of Technology, and the University of Florida.

UNC Charlotte’s Department of Engineering Technology has provided quality technical education for more than 30 years. Our programs have met rigorous standards for specialized accreditation, and we have a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department’s outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the Charlotte construction and business community.

The following data from the Employment Security Commission of North Carolina shows specific employment projections through 2016 in the Construction Management and Facilities Management areas.
<table>
<thead>
<tr>
<th>Job Category</th>
<th>Region</th>
<th>2006 Employment</th>
<th>2016 Employment</th>
<th>Annual Growth Rate (%)</th>
<th>Average Annual Opening (including replacements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM</td>
<td>US</td>
<td>487,000</td>
<td>564,000</td>
<td>1.57</td>
<td>152,000</td>
</tr>
<tr>
<td>CM</td>
<td>NC</td>
<td>21,320</td>
<td>27,180</td>
<td>2.46</td>
<td>920</td>
</tr>
<tr>
<td>CM</td>
<td>Charlotte</td>
<td>3,320</td>
<td>4,520</td>
<td>3.14</td>
<td>170</td>
</tr>
<tr>
<td>FM*</td>
<td>US</td>
<td>247,000</td>
<td>276,000</td>
<td>1.17</td>
<td>94,000</td>
</tr>
<tr>
<td>FM*</td>
<td>NC</td>
<td>3,700</td>
<td>4,390</td>
<td>1.73</td>
<td>100</td>
</tr>
<tr>
<td>FM*</td>
<td>Charlotte</td>
<td>530</td>
<td>650</td>
<td>2.03</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes: *Administrative Services Managers of which facility management is a subset.

It should be noted that there are no facilities management programs in North Carolina, so the employees for those positions are either being imported from outside North Carolina or the positions are being filled by people without facilities management educational credentials. The number of BSCM degrees awarded annually in North Carolina is less than 150 so North Carolina is also importing construction managers. Assuming a modest three percent of 2016 Charlotte region construction management workforce in these areas seek graduate degrees to upgrade skills or qualify for positions of leadership in the industry, that would equate to 135 CM students. Assuming three percent of the 2016 North Carolina facilities management workforce seeks this degree to upgrade skills, another 132 students could be served.

4. **Impact on existing undergraduate and/or graduate academic programs of your institution.** (e.g., Will the proposed program strengthen other programs? Will it stretch existing resources? How many of your programs at this level currently fail to meet Board of Governors’ productivity criteria? Is there a danger of proliferation of low-productivity degree programs at the institution?)

This MSCFM program will strengthen the existing degree programs in the Department of Engineering Technology. Academic infrastructure is in place to support laboratory experiences and computing needs of the program. The existing construction management (BSCM) and engineering technology programs (BSET) are growing quickly (Fall 2009 enrollment shows 826 students in the Department) and will benefit from the synergy of the proposed MSCFM program. The program will enlarge the scholarly and research capacity of the faculty. As the Department’s programs represent popular and lucrative career opportunities which are technologically-based and appeal to today’s college-bound population, data indicate that this proposed program and all existing engineering technology programs will continue to grow at UNC Charlotte.
B. Discuss potential program duplication and program competitiveness

1. Identify similar programs offered elsewhere in North Carolina. Indicate the location and distance from the proposing institution. Include a) public and b) private institutions of higher education.

   a) public institutions

Two master’s level programs in Construction Management exist in the UNC system, namely:

- East Carolina University – CIP 15.1001 - Master in Construction Management (MCM) - 240 miles (4+ hours) from UNC Charlotte
- Western Carolina University – CIP 15.1001 - Master in Construction Management (MCM) – 190 miles (3+ hours) from UNC Charlotte

The programs at ECU and WCU are approved for both on-campus and online delivery. Both programs are being offered online only according to their most current web postings.

Currently, there are no graduate level facility management programs within the University of North Carolina system.

   b) private institutions

None.

2. Indicate how the proposed new degree program differs from other programs like it in the University. If the program duplicates other UNC programs, explain a) why is it necessary or justified and b) why demand (if limited) might not be met through a collaborative arrangement (perhaps using distance education). If the program is a first professional or doctoral degree, compare it with other similar programs in public and private universities in North Carolina, in the region, and in the nation.

The proposed new degree program is unique in that it will be the first integrated construction and facility management graduate degree program in the University of North Carolina system. Currently, there are two other schools with master degree programs in construction management (MCM) and no schools with facility management master’s degree programs. The focus of the existing MCM programs at ECU and WCU is on employed professionals who are pursing the degree part-time. The proposed MSCFM program differs from the other construction management graduate programs because of its facility management focus, its ties to the energy sector and emphasis on energy infrastructure, its strong research component, and because it is designed specifically to serve the students and energy industry of the Greater Charlotte Metropolitan area. The existing programs in the state are focused on general project management and management of general commercial or residential construction. This program is clearly
aligned with the **Energy Production & Infrastructure Center (EPIC)** and **Innovative Design, Engineering and Sustainability (IDEAS) Center** initiatives at UNC Charlotte. Those initiatives are described in significant detail in the ensuing pages of this document. With the proposed MSCFM program, UNC Charlotte will also be one of only five schools in the nation to host a facility management graduate degree program joining the ranks of such prestigious institutions as Cornell University, Georgia Institute of Technology, and the University of Florida. No competing facility program exists in North Carolina.

Longer term, the program will be offered statewide via online delivery.
The following table highlights some, but not all, key differences in the proposed Master of Science in Construction and Facilities Management (MSCFM) program and the existing Master of Construction Management (MCM) programs at ECU and WCU.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Degree</th>
<th>Focus / advertised emphasis or uniqueness</th>
<th>Delivery Mode(s)</th>
<th>Research / Thesis Option</th>
<th>Target Population(s)</th>
<th>Entry Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECU</td>
<td>Master of Construction Management (MCM); non-thesis terminal degree</td>
<td>Management of Construction / “…collaborative network-based learning and offers its graduate program completely online. Graduates from this program are prepared to manage rapidly changing technologies and technical systems.”</td>
<td>Approved as both on-campus / online; advertised and delivered online</td>
<td>Capstone research seminar (3 credits) required; thesis not required</td>
<td>Existing construction industry workers with BS degree and a minimum of management experience; w/o regional focus; advertised as completely online program w/collaborative network-based learning</td>
<td>Grad School Requirements plus BSCM or related degree w/3 years construction experience at management level; or BS unrelated degree w/10 years of construction experience; require portfolio to demonstrate type and extent of construction experience; GRE or GMAT.</td>
</tr>
<tr>
<td>WCU</td>
<td>Master of Construction Management (MCM); non-thesis terminal degree</td>
<td>Project Management / “…fully online (MCM) Program is designed with you, the working professional, in mind. Delivered from WCU’s main campus, this cohort-based program can be completed in two years.”</td>
<td>Approved as both on-campus / online; advertised and delivered online</td>
<td>Research seminar (1 credit); No thesis option</td>
<td>Working professionals; general population w/o regional focus; advertised as designed for working professionals with experience managing projects; cohort-based two-year program w/fall semester entry only</td>
<td>Grad School Requirements plus BS degree w/prerequisite of general business courses in accounting, business law, economics, and statistics; employment experience in managing projects; knowledge of word processing and commonly used business software applications; must have Internet access; GRE or GMAT.</td>
</tr>
<tr>
<td>UNC Charlotte</td>
<td>Master of Science in Construction &amp; Facilities Management (MSCFM); thesis-based research</td>
<td>Sustainable Construction and Management of Facilities / emphasis on energy infrastructure with close curriculum and research relationship to the Energy Production &amp; Infrastructure Center (EPIC) initiative at UNC Charlotte</td>
<td>On-campus initially; online to follow in year 2 or 3</td>
<td>Two Options: 1) Research &amp; Analytical Methods, AND Research &amp; Thesis (9 credits) OR 2) course-work only</td>
<td>NC population w/focus on Charlotte region; Construction &amp; Facilities Management industry professionals plus 2000+ UNC Charlotte College of Engineering undergraduate interested in sustainable energy infrastructure</td>
<td>Grad School Requirements plus BS in Construction Management, Engineering Technology, Civil Engineering, Electrical Engineering, Mechanical Engineering, Systems Engineering, or related degree [early entry option to be added]; GRE or GMAT</td>
</tr>
</tbody>
</table>
A listing and comparison of required courses for each of the programs is shown in the following table. Distinct differences are evident in the facilities content and research focus of the proposed UNC Charlotte MS in Construction and Facilities Management (MSCFM) degree program. In addition, content in the construction portion of the curriculum is focused on energy infrastructure to service the Energy Production and Infrastructure Center (EPIC) and Innovative Design, Engineering and Sustainability (IDEAS) Center initiatives at UNC Charlotte.

<table>
<thead>
<tr>
<th>UNC Charlotte</th>
<th>Western Carolina University</th>
<th>East Carolina University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Science in Construction &amp; Facilities Management (MSCFM)</td>
<td>Master of Construction Management (MCM)</td>
<td>Master of Construction Management (MCM)</td>
</tr>
<tr>
<td>Credit Hours</td>
<td>Credit Hours</td>
<td>Credit Hours</td>
</tr>
<tr>
<td>*CMET 5240 - Safety &amp; Risk Management</td>
<td>*CM 650 - Project Management Systems</td>
<td>*CMGT6660. Quality Control Systems</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>*CMET 5270 - Operation of Constructed Facilities</td>
<td>*CM 652 - Project Plan Development</td>
<td>*CMGT6610. Advanced Computer Applications in Construction</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>*CMET 6130 - Building Information Modeling</td>
<td>*CM 654 - Project Plan Analysis and Approval</td>
<td>*CMGT6620. Human Resources and Training</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>*CMET 6140 - Building Energy Management</td>
<td>*CM 655 - Advanced Topics in Construction Management</td>
<td>*CMGT6640. Land Use Management and Development</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>*CMET 6160 - Research and Analytical Methods</td>
<td>*CM 659 - Advanced Legal Aspects in Construction</td>
<td>*CMGT6650. Global Management of Construction</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Each Student Selects One Emphasis - **Facilities OR ***Construction</td>
<td></td>
<td>CMGT6662. Legal Implications of Design and Construction</td>
</tr>
<tr>
<td>**CMET 6145 - Facilities Management Financial Analysis (3) OR ***CMET 6180 - Alternative Project Delivery Methods (3)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>**CMET 6250 - Asset Management for Facility Managers (3) OR ***CMET 6285 - Quality Assurance in Construction (3)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMET 6900 - Master’s Thesis &amp; Research OR elective (E) courses for distance students</td>
<td>*CM 651 - Research in Construction (non-thesis)</td>
<td>*CMGT6700. Research Capstone Seminar (Non-thesis)</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits Required for degree = 30</strong></td>
<td><strong>Total Credits Required for degree = 37</strong></td>
<td><strong>Total Credits Required for degree = 30</strong></td>
</tr>
</tbody>
</table>

Notes:
1) *Required Courses; 2) Each Student Selects One Emphasis - **Facilities OR ***Construction; 3) Non-thesis option requires two (E) Elective courses from the following list: CMET 6000 - Special Topics in Construction & Facility Management; CMET 6155 - Facility Instrumentation and Controls; CMET 6255 - Advanced Plant Layout and Design; CMET 6290 - Temporary Structures in Construction; CMET 6295 - Design & Improvement of Construction Operations; CMET 6800 - Independent Study in Construction & Facilities Management.
The MS in Construction and Facilities Management promises to be a key player in the renewal and expansion of the new energy economy in North Carolina as a major contributor to the Energy Production and Infrastructure Center (EPIC) initiative. UNC Charlotte proposed to create EPIC in response to a projected 30 percent increase in the demand for energy in the U.S. by 2030. Industry leaders are looking toward UNC Charlotte to help address a critical shortage in the intellectual capital necessary to modernize current energy production operations and facilitate the development of alternative energy sources. A new, 200,000 square foot, EPIC building will be located on the Charlotte Research Institute’s campus. The target date for completion is January 2012. The EPIC building will provide classroom, office and laboratory space to accommodate growth in energy infrastructure research and collaboration with industry partners, including Duke Energy, and construction partners like AREVA, Parsons, and Shaw Group.

Following is additional information, article excerpts, and quotes from several key participants of the EPIC initiative which is provided to provide some background and context for UNC Charlotte’s EPIC initiative. "EPIC is about regional growth and advancement in the energy industry," said Dr. Steve Patterson, director of EPIC and a distinguished professor in the Lee College of Engineering. "Clearly one strength of EPIC is the outstanding energy engineering assets of the region in which we live." Regional energy corporations include AREVA, Duke Energy, the Electric Power Research Institute (EPRI), The Shaw Group, URS Washington Group, Westinghouse, Siemens and Metso Power. "Part of what we're doing is developing and implementing energy concentrations based on industry needs,” Dr. Patterson adds. Industry involvement with EPIC is led through a board of advisors that oversees the center's strategy and helps build industry relations.

Keyes Niemer, a project manager for the Nuclear Division of The Shaw Group's Power Group, is a member of the implementation team and his been involved with EPIC since its inception three years ago. Shaw Group employs 27,000 people worldwide in energy engineering, procurement and construction work, 1,400 of those in Charlotte. Niemer notes, "What Shaw would like to see is a core curriculum of power engineering within UNC Charlotte's engineering program. Shaw needs graduates with strong project management, scheduling and budgeting skills." They also want students to see that there are good, exciting jobs building and upgrading power plants.

Dhiaa Jamil is Duke Energy's group executive and chief nuclear officer, and chairman of the EPIC advisory board. He is also a UNC Charlotte engineering alumnus. “EPIC will play a significant role in providing engineering students with the fundamentals for supporting power production and infrastructure design and maintenance,” said Jamil. “Additionally, EPIC provides Duke Energy with a local partner for research opportunities. This can include solving technology problems, as well as developing and improving existing technology. EPIC will also have a key role in expanding emphasis on renewable technology and will serve as a hub for renewables research."
Jim Little, senior vice president of Nuclear Energy Programs with URS Washington Group, is a member of the EPIC board of advisors. He is with URS's Nuclear Center in Fort Mill, South Carolina, which provides engineering, procurement and construction services for the entire life cycle of nuclear facilities. "The U.S. will be rebuilding its energy infrastructure in the near future," Little concludes. "The pipeline of talent for this effort will come from our educational system. EPIC is a great opportunity for strengthening this educational system, and we're very interested in providing our support and guidance to make it successful." The EPIC board is working with the Lee College of Engineering to create programs that go beyond just technical skills. Little adds, "We need to emphasize skills outside of engineering, such as project management, collaborative teamwork, risk analysis and leadership. We want to see a balanced portfolio of skills."

This robust economic climate for green construction, sustainable facility management, energy infrastructure and related business services in the Charlotte region make UNC Charlotte an ideal fit for a Master of Science in Construction and Facilities Management degree program. The Department of Engineering Technology has provided quality technical education for over 30 years. Its programs have met rigorous standards for specialized accreditation, and the Department has a long history of working with the Charlotte area construction industry to supply graduates for the greater Charlotte region and throughout North Carolina. This proposed program will only enhance the Department's outreach and integration with the community, enlarge its scholarly research capacity, and produce much needed graduates for the construction, energy and business communities of Charlotte, the state, and nation.

C. Enrollment (baccalaureate programs should include only upper division majors, juniors, and seniors).

Headcount enrollment

Show a five-year history of enrollments and degrees awarded in similar programs offered at other UNC institutions (using the format below for each institution with a similar program); indicate which of these institutions you consulted regarding their experience with student demand and (in the case of professional programs) job placement. Indicate how their experiences influenced your enrollment projections.
**Program Title:** Construction Management, Master (MCM) programs

| University | Data | Year
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>East Carolina University (15.1001, Master of Construction Management; New program in Spring 2007)</td>
<td>Fall Enrollment</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Degrees awarded</td>
<td>-</td>
</tr>
<tr>
<td>Western Carolina University (15.1001, Master of Construction Management; New program in Fall 2005)</td>
<td>Fall Enrollment</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Degrees awarded</td>
<td>-</td>
</tr>
</tbody>
</table>

Contact was made with each institution above to gather information on program development and student demand. Based upon enrollment growth experiences of consulted programs, discussions with our construction advisory committee, and evaluation of demographic data the enrollment projections for the proposed program are deemed realistic. Given the geographic proximity of UNC Charlotte to the Greater Charlotte metro region, its rapidly growing population and construction industry, our consultants anticipate that this proposed program can reach enrollments of 50 to 70 students at steady state within the next decade.

Use the format in the chart below to project your enrollment in the proposed program for four years and explain the basis for the projections:

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1: 2010-11</th>
<th>Year 2: 2011-12</th>
<th>Year 3: 2012-13</th>
<th>Year 4: 2013-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>6</td>
<td>15</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Part-time</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>30</td>
</tr>
</tbody>
</table>

Please indicate the anticipated steady-state headcount enrollment after four years:

- Full-time: 35+
- Part-time: 30+
- Total: 65+

The Department conducted a study of all construction programs nationally, including those accredited by ABET, ACCE and NAIT. Enrollment projections are consistent with the average size of programs in the study. Obviously, UNC Charlotte’s location and the expected renewal and expansion of the energy economy place us in a competitive environment.
advantage over many of the programs in the study; therefore, it is a conservative estimate that the proposed program will achieve only average size.

SCH production. Use the format in the chart below to project the SCH production for four years. Explain how projections were derived from enrollment projections (see UNC website for a list of disciplines comprising each of the four categories).

<table>
<thead>
<tr>
<th>Year 1: 2010-11</th>
<th>Student Credit Hours (SCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2: 2011-12</th>
<th>Student Credit Hours (SCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 3: 2012-13</th>
<th>Student Credit Hours (SCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 4: 2013-14</th>
<th>Student Credit Hours (SCH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Category</td>
<td>UG</td>
</tr>
<tr>
<td>Category I</td>
<td></td>
</tr>
<tr>
<td>Category II</td>
<td></td>
</tr>
<tr>
<td>Category III</td>
<td></td>
</tr>
<tr>
<td>Category IV</td>
<td></td>
</tr>
</tbody>
</table>

Student credit hour projections were derived assuming that full-time students will enroll in 18 credits per year and that part-time students will average 9 credits per year.
III. Program Requirements and Curriculum

A. Program Planning

1. List the names of institutions with similar offerings regarded as high quality programs by the developers of the proposed program.

<table>
<thead>
<tr>
<th>M.S. Construction Management or similar programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State University</td>
</tr>
<tr>
<td>Auburn University</td>
</tr>
<tr>
<td>Clemson University</td>
</tr>
<tr>
<td>Colorado State University</td>
</tr>
<tr>
<td>Florida International University</td>
</tr>
<tr>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>Purdue University</td>
</tr>
<tr>
<td>Southern Polytechnic State University</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
</tr>
<tr>
<td>University of Cincinnati</td>
</tr>
<tr>
<td>University of Florida</td>
</tr>
<tr>
<td>Virginia Polytechnic Institute and State University</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>M.S. Facilities Management or similar programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State University</td>
</tr>
<tr>
<td>Cornell University</td>
</tr>
<tr>
<td>Georgia Institute of Technology</td>
</tr>
<tr>
<td>University of Florida</td>
</tr>
</tbody>
</table>

The Georgia Institute of Technology is currently the only school in the country that has an integrated construction and facility management graduate program similar to one being proposed at UNC Charlotte.

2. List other institutions visited or consulted in developing this proposal. Also list any consultants’ reports, committee findings, and simulations (cost, enrollment shift, induced course load matrix, etc.) generated in planning the proposed program.

The following institutions were consulted in developing this proposal:

- Florida International University
- Georgia Institute of Technology
- Purdue University
- University of Florida
B. Admission. List the following:

1. Admissions requirements for proposed program (indicate minimum requirements and general requirements).

The minimum admission requirements for the program are:
   a. An earned undergraduate degree in construction management, facility management, engineering technology, engineering, architecture or a closely related field
   b. An undergraduate GPA of 2.75 or better
   c. Acceptable scores on the verbal, quantitative, and analytical sections of the GRE
   d. Positive letters of recommendation
   e. A combined TOEFL score of 220 (computer-based) or 557 (paper-based) is required if the previous degree was from a country where English is not the common language
   f. Integral and differential calculus (MATH 1120 or 1121 or ETGR 3171 at UNC Charlotte or equivalent from other institution).
   g. Statistics (STAT 1220 or STAT 3128 at UNC Charlotte or equivalent from other institution).
   h. Other credentials as required by the Graduate School

2. Documents to be submitted for admission (listing or sample).

   a. Official transcripts from all colleges and universities attended.
   b. Official GRE scores.
   c. Official TOEFL scores.
   d. The UNC Charlotte application for graduate admission form.
   e. Three letters of recommendation.

C. Degree requirements. List the following:

1. Total hours required. Major. Minor.

   The proposed program leading to the Master of Science degree in Construction and Facilities Management is a 30 semester-hour program. The program would consist of an 18-credit hour common core, a 6-credit hour elective core in either construction management or facility management, and a capstone experience including either a sequence of 6-credit hours of major electives or a formal 6-credit hour graduate research thesis. The 30-credit hour degree program is outlined below:

**Common Core Courses (18-credit hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 5240 Safety &amp; Risk Management</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>CMET 5270 Operation of Constructed Facilities</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>CMET 6130 Building Information Modeling</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>CMET 6135 Advanced Construction Planning &amp; Management</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>CMET 6140 Building Energy Management</td>
<td>3 credit hours</td>
</tr>
<tr>
<td>CMET 6160 Research and Analytical Methods</td>
<td>3 credit hours</td>
</tr>
</tbody>
</table>
Request to Establish the Master of Science in Construction and Facilities Management
UNC Charlotte

Students select one of the following technical cores:

Construction Management Core (6-credit hours)
- CMET 6180 Alternative Project Delivery Methods 3 credit hours
- CMET 6285 Quality Assurance in Construction 3 credit hours

Facilities Management Core (6-credit hours)
- CMET 6145 Facilities Management Financial Analysis 3 credit hours
- CMET 6250 Asset Management for Facility Managers 3 credit hours

Students select one of the following capstone options:

Non-Thesis Option (6-credit hours)
- Major Elective 3 credit hours
- Major Elective 3 credit hours

Thesis and Research Option (6-credit hours)
- CMET 6900 Master’s Thesis & Research 6 credit hours

Major electives will be selected from the following:

- CMET 6290 Temporary Structures in Construction 3 credit hours
- CMET 6295 Design & Improvement of Construction Operations 3 credit hours
- CMET 6000 Special Topics in Construction Facilities Management 3 credit hours
- CMET 6800 Independent Study in Construction and Facilities Management 3 credit hours
- CMET 6155 Facility Instrumentation and Controls 3 credit hours
- CMET 6255 Advanced Plant Layout and Design 3 credit hours

Additional new major electives courses may be created based on industry needs and faculty research interest. In addition, appropriate existing graduate level courses will be identified from other programs such as the Engineering Management program or others.

2. Proportion of courses open only to graduate students to be required in program (graduate programs only).

At UNC Charlotte, courses having 5000 numbers are open to graduate students and advanced undergraduate students. Courses with 6000 are open to graduate students only. A minimum of 12 credit hours presented towards a Master of Science in Construction and Facilities Management degree must be numbered 6000 or higher. Twenty-four of thirty credits, or eighty percent, of required courses are at the 6000 level.

3. Grades required.

All candidates must earn an overall 3.0 to graduate. Accumulation of one U grade will result in the suspension of the student’s enrollment in the program.
4. **Amount of transfer credit accepted.**

Up to six hours of approved coursework may be transferred from appropriately accredited master’s and doctoral programs. Only courses in which the student earned a grade of B or better may be transferred.

5. **Other requirements (e.g. residence, comprehensive exams, thesis, dissertation, clinical or field experience, second major, etc.)**

The program will have both a thesis and non-thesis track. After admission to candidacy, thesis students will complete a comprehensive oral exam while non-thesis students will complete a comprehensive written exam. Residence will be per Graduate School rules.

6. **Language and/or research requirements.**

None.

7. **Any time limits for completion.**

While full-time students will typically take three semesters to complete the program, part-time students are expected to take no more than six years to complete the program as per Graduate School rules.

D. **List existing courses by title and number and indicate (*) those that are required. Include an explanation of numbering system. List (under a heading marked “new”) and describe new courses proposed.**

**Existing:**

None

**New:**

*CMET 5240  Safety & Risk Management  3 credits
*CMET 5270  Operation of Constructed Facilities  3 credits
CMET 6000  Special Topics in Construction & Facility Management  3 credits
*CMET 6130  Building Information Modeling  3 credits
*CMET 6135  Advanced Construction Planning & Management  3 credits
*CMET 6140  Building Energy Management  3 credits
*CMET 6145  Facilities Management Financial Analysis  3 credits
CMET 6155  Facility Instrumentation and Controls  3 credits
*CMET 6160  Research and Analytical Methods  3 credits
*CMET 6180  Alternative Project Delivery Methods  3 credits
*CMET 6250  Asset Management for Facility Managers  3 credits
CMET 6255  Advanced Plant Layout and Design  3 credits
CMET 6285  Quality Assurance in Construction  3 credits
CMET 6290  Temporary Structures in Construction  3 credits
CMET 6295  Design & Improvement of Construction Operations  3 credits
CMET 6800  Independent Study in Construction and Facility Management  3 credits
CMET 6900  Master’s Thesis and Research  1 – 6 credits

New Course Descriptions:

CMET 5240. Safety and Risk Management. (3) Prerequisite: CMET 4228 or consent of instructor. Topics of study will include causes and prevention of industrial accidents, hazardous processes and material, OSHA regulations and requirements, and design of accident prevention programs. (Spring)

CMET 5270. Operation of Constructed Facilities. (3) Prerequisite: CMET 3224 and ETCE 3271 or consent of instructor. Topics of study will include acquisition, operation, maintenance, and disposal of building systems, structures, permanent interiors, furniture, and equipment; grounds and other exterior elements. (Spring)

CMET 6000. Special Topics in Construction and Facility Management. (3) Study of specific new areas emerging in the various fields of construction and facility management. May be repeated for credit. (On demand)

CMET 6130. Building Information Modeling. (3) Prerequisite: ETCE 1104 or ETGR 1104 or consent of instructor. Topics of study will include the creation, management, and application of building information models to the construction, operation, and maintenance of a facility. Focus will be on 2D and 3D computer models of building components, renderings, animations, and interfacing with analysis tools. (Fall)

CMET 6135. Advanced Construction Planning and Management. (3) Prerequisite: ETCE 4126 or consent of instructor. Advanced methods for planning and controlling construction projects will be covered. Specific topics of study will include resource allocation, leveling and management, critical path method (CPM) and project evaluation and review techniques (PERT) of scheduling, project controls through cost-schedule integration, and schedule compression. (Fall)

CMET 6140. Building Energy Management. (3) Prerequisite: ETCE 3271 or ETME 3143 or consent of instructor. Topics of study will focus on the integrated planning of energy efficient technologies for building environmental control systems. Introduction to the design, planning, and optimization of HVAC systems and technology needed to integrate the heating, cooling, natural ventilation, lighting, electricity, and building energy management systems into a building's structure and design. (Fall)
CMET 6145. Facilities Management Financial Analysis. (3) Prerequisite: ETGR 3222 or ECON 2102 or consent of instructor. This course is a study of real property concepts, issues, and topics pertinent to the facility management professional to include fundamentals of commercial real estate investment, understanding market influences, contracts and property portfolio management. (Fall)

CMET 6155. Facility Instrumentation and Controls. (3) Prerequisite: ETME 3163 or consent of instructor. This course covers design and analysis of industrial process control instrumentation. Topics include process control devices and process control applications associated with industrial instrumentation and building and facility operation. (Fall)

CMET 6160. Research and Analytical Methods. (3) Prerequisite: STAT 1220 or consent of instructor. This course focuses on analytical and research techniques applicable to construction and facility management problems. Topics of study include defining research problems, experiment design, measurement, sampling, and analysis. (Fall)

CMET 6180. Alternative Project Delivery Methods. (3) Prerequisite CMET 3224 or consent of instructor. This course provides study of the many organizational arrangements between construction owners, designers, contractors, and financiers. Delivery methods studied include design-bid-build (DBB), design-build (DB), construction management (agency CM and CM@Risk), design-build-operate (DBO), and design-build-finance-operate (DBFO). (Fall)

CMET 6250. Asset Management for Facility Managers. (3) Prerequisite: CMET 5270 or consent of instructor. Study of useful life of building and infrastructure systems and creating a process to manage their life cycles; emphasis on justifying and funding capital projects. (Spring)

CMET 6255. Advanced Plant Layout and Design. (3) Prerequisite: CMET 5270 or consent of instructor. Topics of study include designing construction sites and facility plants with respect to material handling, equipment location, auxiliary services, capital requirements, safety, and personnel organization. (On demand)

CMET 6285. Quality Assurance in Construction. (3) Prerequisite: CMET 6160 or consent of instructor. This course covers the principles and applications of quantitative methods of quality control to production processes with an introduction to process control charts, Pareto charts, and other quality analysis tools for the construction industry. (Spring)

CMET 6290. Temporary Structures in Construction. (3) Prerequisite: ETCE 3163 or consent of instructor. Topics of study include temporary structures used to support construction operations such as concrete formwork, scaffolding systems, shoring systems, cofferdams, underpinning, slurry walls, and construction dewatering systems. (On demand)
CMET 6295. Design and Improvement of Construction Operations. (3) Prerequisite: CMET 6135. Topics of study include design of construction operations based on productivity concepts. Techniques for collecting data, analyzing, and formulating solutions to improve construction operations will be emphasized. (Spring)

CMET 6800. Independent Study in Construction and Facility Management. (3) Prerequisite: Consent of graduate committee advisor. Individual investigation and exposition of results for a directed project in construction and facility management. May be repeated for credit. (On demand)

CMET 6900. Master’s Thesis and Research. (1 – 6) Prerequisite: Consent of graduate committee advisor. Individual investigation culminating in the preparation and presentation of a thesis. May be repeated for credit. (On demand)

IV. FACULTY

A. List the names of persons on the faculty who will be directly involved in the proposed program. Provide complete information on each faculty member’s education, teaching experience, research experience, publications, and experience in directing student research, including the number of theses and dissertations directed for graduate programs. The official roster forms approved by SACS can be submitted rather than actual faculty vita.

Licensure Track: All tracks, educational research component

<table>
<thead>
<tr>
<th>Faculty Name</th>
<th>Highest Degree and Institution</th>
<th>Other degrees and Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthony L. Brizendine, Professor</td>
<td>PhD, West Virginia University</td>
<td>MS, Virginia Tech</td>
</tr>
<tr>
<td>Dong Chen, Assistant Professor</td>
<td>PhD, Iowa State University</td>
<td>MS, Iowa State University</td>
</tr>
<tr>
<td>Rosida Coowar, Associate Professor</td>
<td>PhD, University of Central Florida</td>
<td>MS, University of Massachusetts</td>
</tr>
<tr>
<td>David Cottrell, Assistant Professor</td>
<td>PhD, Texas A&amp;M University</td>
<td>BS, United States Military Academy</td>
</tr>
<tr>
<td>G. Bruce Gehrig, Assistant Professor</td>
<td>PhD, Colorado State University</td>
<td>MS, University of Colorado</td>
</tr>
<tr>
<td>John Hildreth, Assistant Professor</td>
<td>PhD, Virginia Tech</td>
<td>MS, West Virginia University</td>
</tr>
<tr>
<td>Donald Liou, Adjunct Assoc Professor</td>
<td>PhD, University of California at Berkeley</td>
<td>MS, University of California at Berkeley</td>
</tr>
<tr>
<td>Na Lu, Assistant Professor</td>
<td>EdD, Clemson University</td>
<td>MS, Clemson University</td>
</tr>
<tr>
<td>Chung-Suk Cho, Assistant Professor</td>
<td>PhD, University of Texas</td>
<td>MS, University of Hawaii at Manoa</td>
</tr>
<tr>
<td>Faculty Name</td>
<td>Highest Degree and Institution</td>
<td>Other degrees and Institutions</td>
</tr>
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<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Carlos Orozco, Associate Professor</td>
<td>PhD, Carnegie Mellon University</td>
<td>MS, Carnegie Mellon University</td>
</tr>
<tr>
<td>Peter Schmidt, Assistant Professor</td>
<td>PhD, Vanderbilt University</td>
<td>MS, Rose Hulman Institute of Technology</td>
</tr>
<tr>
<td>Ahmad Sleiti, Assistant Professor</td>
<td>PhD, University of Central Florida</td>
<td>MS, University of Jordan</td>
</tr>
<tr>
<td>Aixi Zhou, Assistant Professor</td>
<td>PhD, Virginia Tech</td>
<td>MS, Lanzhou University</td>
</tr>
</tbody>
</table>

Full vitae for the above faculty are included in Appendix C.

**B. Estimate the need for new faculty for the proposed program for the first four years.**
If the teaching responsibilities for the proposed program will be absorbed in part or in whole by the present faculty, explain how this will be done without weakening existing programs.

It is anticipated that this new enrollment stream will warrant the addition of four new faculty members over the next four years to adequately deliver the program.

**C. If acquisition of new faculty requires additional funds, please explain where and how these funds will be obtained.**

Faculty in the Construction Management program will be added through the campus’ faculty line allocation process. These positions will be justified through enrollment growth. Additionally, research capability and production will increase as new faculty and graduate students are added.

**D. Explain how the program will affect faculty activity including course load, public service and scholarly research.**

No adverse effect is anticipated. In fact, the addition of new faculty hires in this developing construction group will provide additional catalyst for construction research, scholarly publication, and community outreach activity.

**V. LIBRARY**

**A. Provide a general statement as to the adequacy of present library holdings for the proposed program.**

Present library holdings are adequate to support the proposed MSCFM program. A search of the online catalog in the area of construction and facility management retrieved 3817 pertinent items. This total includes 3412 books and government documents, 44 periodical subscriptions, and 454 electronic resources specific to this area. In addition, the library has approximately 40 electronic databases, many with links to full text articles. The required
memorandum from the library summarizing its consultation concerning the MSCFM program is included in Appendix C.

B. State how the library will be improved to meet program requirements for the next five years. The explanation should discuss the need for books, periodicals, reference materials, primary source materials, etc. What additional library support must be added to areas supporting the proposed program?

No additional library support, other than the ongoing purchases for materials in this and the interrelated Engineering Technology, Civil Engineering, Engineering Management and Architecture programs, is necessary to support the program. Holdings are current and quite adequate to support this new degree program.

C. Discuss the use of other institutional libraries

The library’s participation in an interlibrary loan consortium provides another means of effectively supporting research and instructional needs.

VI. FACILITIES AND EQUIPMENT

A. Describe facilities available for the proposed program.

The proposed program will share facilities with the existing Construction Management, Civil ET and Mechanical ET programs in the Smith Building. Laboratories currently exist to support construction materials, surveying, computer drafting, cost estimating, structures, hydraulics, soils, asphalt, stress analysis, thermodynamics, and instrumentation. Additional laboratories are in development which will support the building systems area.

B. Describe the effect of this new program on existing facilities and indicate whether they will be adequate, both at the commencement of the program and during the next decade.

Existing facilities are adequate to support the on-campus program at commencement and during the next decade.

C. Discuss any information technology services needed and/or available.

Existing information technology services and engineering computing capabilities are adequate to support the on-campus program. Additional infrastructure to support the online, distance education program will be required. Estimates of additional IT infrastructure (hardware and software) to support delivery of the distance component are approximately $150,000.

D. Discuss sources of financial support for any new facilities and equipment.

Existing facilities and equipment are in place. Any additional new facilities or equipment will be funded through normal university funding sources to include projected funding from
RFPs from General Administration. Supplemental funding from public and private sources to include construction industry support will be utilized for program enhancements.

VII. ADMINISTRATION

Describe how the proposed program will be administered giving the responsibilities of each department, division, school, or college. Explain any inter-disciplinary or inter-unit administrative plans. Include an organizational chart showing the “location” of the proposed program.

The proposed program will be administered within the Department of Engineering Technology. The Department Chair has ultimate responsibility for the programs within the Department, reporting to the Dean of the College of Engineering, who in turn reports to the Provost.

At the University of North Carolina at Charlotte, the Dean of the Graduate School is the administrative officer with primary responsibility for the supervision of graduate programs. The Dean is responsible for the executive and administrative affairs of the Graduate School in accordance with policies determined by the UNC Charlotte Graduate Council, the Graduate faculty, and the Faculty Council. The Graduate School is responsible for monitoring the quality of graduate programs, the final admission of graduate students, appointments to the Graduate faculty, and the enhancement of research activities essential to the conduct of graduate programs.

The Graduate Dean’s main duties include the following:

- Admission of students
- Appointment of dissertation and thesis committees
- Approval of programs of study
- Admission of students to candidacy
- Final approval of dissertations

Upon admission to the MSCFM Program, the student will be assigned an appropriate Faculty Advisor from among the Construction Management or other appropriate Engineering Technology Faculty, based on the student’s prior training and stated interests. The Faculty Advisor will recommend a Plan of Study for the student’s first year of enrollment in the Program.

If the thesis option is selected, the Faculty Advisor will assist the student in identification of an appropriate research project. Before the beginning of the third semester following admission to the program, the student must form a three-member Advisory Committee with members chosen from among the Engineering Technology Faculty. The assigned Faculty Advisor may chair this committee or the student may select a new Faculty Advisor from among the Engineering Technology Faculty at the time the committee is formed.
Subject to the approval of the Dean of the Graduate School, the functions of the committee are to:

- Approve the student’s plan of study
- Evaluate the student’s academic progress each semester
- Evaluate the internship project or research project plan
- Certify the candidate’s qualifications for the degree subject to the approval of the Dean of the Graduate School

VIII. ACCREDITATION

Indicate the names of all accrediting agencies normally concerned with programs similar to the one proposed. Describe plans to request professional accreditation. If the proposed new degree program is at a more advanced level than those previously authorized or if it is in a new discipline division, was SACS notified of a potential “substantive change” during the planning process? If so, describe the response from SACS and the steps that have been taken to date with reference to the applicable procedure.

Currently, there is no agency that accredits construction management graduate programs. The International Facility Management Association (IFMA) accredits first professional degrees in facility management. The program may ultimately seek accreditation by the IFMA for the facility management option within the curriculum.

IX. SUPPORTING FIELDS

Are other subject-matter fields at the proposing institution necessary or valuable in support of the proposed program? Is there needed improvement or expansion of these fields? To what extent will such improvement or expansion be necessary for the proposed program?

The MSCFM program has been designed to be self-contained within the Department of Engineering Technology, and support from other subject-matter fields outside the department is not necessary. As an inter-disciplinary program within an interdisciplinary department, the MSCFM program will rely on support from all disciplines within the department including construction management, civil engineering technology, mechanical engineering technology, fire safety engineering technology, and electrical engineering technology. Although not necessary to initiate the program, as the program matures valuable collaboration opportunities with other units within the College of Engineering, Belk College of Business, and College of Architecture can be developed to realize the program’s full potential.
X. ADDITIONAL INFORMATION

Include any additional information deemed pertinent to the review of this new degree program proposal.

**UNC Charlotte Construction & Facilities Management (CFM) Fellows Program**

A unique aspect of the MS in Construction and Facilities Management program proposal will be the incorporation of a Construction and Facilities Management (CFM) Fellows Program which will provide the framework for graduate students in the MS in Construction and Facilities Management program to compete for and earn CFM Fellows appointments. Initially, these appointments will be within the UNC Charlotte Facilities Management Organization. Fellows will perform project-based campus work within the Capital Projects, Design Services, Maintenance and Operations, and Planning Divisions of the Facilities Management Group at UNC Charlotte to leverage services and organizational efficiency for the institution while completing degree requirements. Selected CFM Fellows will typically possess a BS in Construction Management, Bachelor of Architecture, or BS in Engineering so they will possess excellent education and experience which they can bring to bear in their Fellow appointments within UNC Charlotte’s Facilities Management Organization. Once established, the CFM Fellows Program may also be extended to serve other community organizations such as CMS Schools, North Carolina Community Colleges, and various other state agencies and charitable organizations in the Greater Charlotte region.

The MS in Construction and Facilities Management program courses will incorporate “green or sustainable” components throughout the curriculum. Some examples of how this will be accomplished in specific individual courses are outlined in the following table:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>“Sustainability” or “Green” Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 5240</td>
<td>Safety &amp; Risk Management</td>
<td>Risk management issues associated with sustainable construction operations.</td>
</tr>
<tr>
<td>CMET 5270</td>
<td>Operation of Constructed Facilities</td>
<td>Acquisition, operation, maintenance, and disposal of sustainable building systems, structures, permanent interiors, furniture, and equipment; grounds and other exterior elements.</td>
</tr>
<tr>
<td>CMET 6140</td>
<td>Building Energy Management</td>
<td>Energy efficiency applications in homes, businesses, large buildings and industry. Topics include energy auditing, energy management, energy cost analysis, energy &amp; electric rate structures, lighting, HVAC systems, motors and drivers, boilers and steam systems, cogeneration, evaluation of alternative systems and technologies, commercial and industrial applications.</td>
</tr>
</tbody>
</table>
As an example of the potential impact the CFM Fellows program, current students in ETME 4245 - Energy Management (a senior elective) learn the theory and practical knowledge needed to perform energy audits for small to medium sized businesses. As part of the course requirements, students perform actual energy audits of local facilities for regional businesses as their final project. They collect data, do the calculations to perform an energy balance for each facility, make recommendations on how the business could save money through reduced energy consumption, and calculate the payback period for each energy-saving opportunity to determine which are cost effective. Students complete the course with a readily applicable skill set to reduce energy use for a greener planet while assisting the business community in North Carolina in becoming more energy efficient, and thus, more competitive in the global marketplace. CFM Fellows will have extended knowledge which will leverage this type of activity within UNC Charlotte, and extend this work to other state agencies and community organizations across the Greater Charlotte region.

### XI. BUDGET

Provide estimates (using the attached form) of the additional costs required to implement the program and identify the proposed sources of the additional required funds. Use SCH projections (section II.C.) to estimate new state appropriations through enrollment increase funds. Prepare a budget schedule for each of the first three years of the program, indicating the account number and name for all additional amounts required. Identify EPA and SPA positions immediately below the account listing. New SPA positions should be listed at the first step in the salary range using the SPA classification rates currently in effect. Identify any larger or specialized equipment and any unusual supplies requirements.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
<th>“Sustainability” or “Green” Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMET 6155</td>
<td>Facility Instrumentation and Controls</td>
<td>Design and analysis of process control and instrumentation required in sustainable building operations; “smart” controls for green buildings.</td>
</tr>
<tr>
<td>CMET 6250</td>
<td>Asset Management for Facility Managers</td>
<td>Life cycle analysis and capital budgeting of building and infrastructure systems based on the principles of sustainability.</td>
</tr>
<tr>
<td>CMET 6255</td>
<td>Advanced Plant Layout and Design</td>
<td>Layout and design for improved air quality, thermal comfort, noise and light. Create facilities that are warm in winter, cool in the summer, comfortably illuminated while promoting the health and wellbeing of the occupants. Use of land, energy and green materials efficiently to create facilities that are sustainable while economical to operate.</td>
</tr>
<tr>
<td>CMET 6285</td>
<td>Quality Assurance in Construction</td>
<td>Incorporating sustainability as a prominent evaluation criterion in process and quality control planning.</td>
</tr>
</tbody>
</table>
For the purposes of the second and third year estimates, project faculty and SPA position rates and fringe benefits rates at first year levels. *Include the continuation of previous year(s) costs in second and third year estimates.*

Additional state-appropriated funds for new programs may be limited. Except in exceptional circumstances, institutions should request such funds for no more than three years (e.g., for start-up equipment, new faculty positions, etc.), at which time enrollment increase funds should be adequate to support the new program. Therefore it will be assumed that requests (in the “New Allocations” columns of the following worksheet) are for one, two, or three years unless the institution indicates a continuing need and attaches a compelling justification. However, funds for new programs are more likely to be allocated for limited periods of time.

See Appendix A for detailed budget information.

**XII. EVALUATION PLANS**

All new degree program proposals and degree program track descriptions must include an evaluation plan which includes: (a) the criteria to be used to evaluate the quality and effectiveness of the program, (b) measures to be used to evaluate the program, (c) expected levels of productivity of the proposed program/track for the first four years of the program (numbers of graduates), (d) the names, addresses, and telephone numbers of at least three persons...qualified to review this proposal and to evaluate the program once operational, and (e) the plan and schedule to evaluate the proposed new degree program prior to the completion of its fifth year of operation once fully established.

**A. Criteria to be used to evaluate the proposed program (not in an order of priority).**

The Department will employ its existing robust continuous improvement assessment process to this proposed program. The existing programs are assessed by an integrated program and course assessment process which external consultants have described as outstanding based upon their evaluation of our programs and processes. For the MSCFM program, the process will begin by establishing assessment measures and tools (i.e. primarily student work activities) that are directly tied to the established program educational outcomes. The assessment tools will be administered as part of the Department’s Individual Course Assessment Process (ICAP). Data collected through the ICAP process will be evaluated by a Focus Area Improvement Team (FAIT) that will be established for the MSCFM program. The FAIT team will then, based on the student performance data, make any recommendations for course and curricular improvement that may be deemed necessary to ensure continued program quality and improvement.

Other external criteria which will be utilized to evaluate the program include but are not limited to the:

1. ability to attract students
2. quality of instruction
3. quality of program faculty
4. ability to produce graduates
5. quality and competence of graduates
6. career mobility and success
7. satisfaction of industry employers in construction and facilities management
8. quality of research and scholarly activity

B. Measures to be used to evaluate the program:
Various measures, both direct and indirect, are currently utilized to evaluate our existing programs. Those same measures will be applied to the proposed MSCFM program. Those measures include, but are not limited to:
   a. student enrollments
   b. scores on student course evaluations
   c. annual and post tenure reviews of faculty
   d. number of graduates produced
   e. graduate grade point averages and results of nationally-normed tests where applicable
   f. satisfaction of alumni on surveys
   g. satisfaction of employers on surveys
   h. level of research and scholarly activities

C. Projected productivity levels (numbers of graduates):

<table>
<thead>
<tr>
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<td>B</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0</td>
<td>3 to 5</td>
<td>5 to 10</td>
<td>10 to 15</td>
<td>18 to 30</td>
</tr>
<tr>
<td>I/P</td>
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<td>D</td>
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</tr>
</tbody>
</table>

Ultimately, graduation rates are expected on the order of 20 to 30 students per year when the program has reached full maturity within 6 to 8 years.

D. Recommended consultants/reviewers: Names, titles, addresses, e-mail addresses, and telephone numbers. May not be employees of the University of North Carolina.

Franklin Hart, Dean, College of Engineering Technology & Computer Science  
Bluefield State University  
219 Rock Street, Bluefield, WV 24701  
E-mail: frankh@bluefieldstate.edu  
Office Phone: (304) 327-4121

Warren Hill, Dean, College of Applied Science & Technology  
Weber State University  
1801 University Circle  
Ogden, UT 84408-1801  
Email: whill@weber.edu  
Phone: 801-626-6303

E. Plan for evaluation prior to sixth operational year.

Normal department level assessments will occur as outlined in the Strategic Plan. Maturation of the proposed program is expected to take several years. The measures for evaluating
program success, as described above, are not likely to be fully realized in four years. Evaluation of the program must therefore assess progress toward the steady-state goals.

From the inception of the program, we will maintain a database of enrollment and student outcome data for students entering the MSCFM program. Application, admission, graduation, and post-graduate placement data will be collected. College of Engineering and Department of Engineering Technology staff will track the progress of alumni and their satisfaction with their employment outcomes for up to five years after graduation, when possible, by using mailed or e-mailed surveys. Staff will encourage self-reporting for alumni over longer periods by creating a self-service alumni website that encourages graduates to submit their contact information and current employment information, network via online discussion, and contact other alumni.

Based on employment data supplied by graduates, staff will make contact with frequent employers of our graduates and initiate formal or informal surveys of employer satisfaction. Feedback from the program’s Industrial Advisory Board concerning the program and its educational outcomes will be solicited.

Fourth year milestones are listed below.

1. During the fourth year of the proposed program, enrollment will be assessed to determine whether it is meeting projections. Full-time enrollment in the program should approach 25 to 30 by the fourth year.
2. The program should have produced 18 to 30 graduates by the fourth year of operation.
3. Educational program outcomes should be satisfactorily met for 85 percent of graduates.
4. A panel of external evaluators will visit the UNC Charlotte campus to assess the overall success of the program. The evaluation report prepared by the evaluators will be reviewed by the Department Chair, by the Dean of the College of Engineering, and by the Provost.
5. Necessary changes in the program will be implemented based on the review to ensure that program goals are achieved.

XIII. REPORTING REQUIREMENTS

Institutions will be expected to report on program productivity after one year and three years of operation. This information will be solicited as a part of the biennial long-range planning revision.

Proposed date of initiation of proposed degree program: August 2010

This proposal to establish a new program has been reviewed and approved by the appropriate campus committees and authorities.

Chancellor [Signature] Date 12/01/09
Appendix A:

Budget projections for the first three years of program operation
## Projected Funding for New Degree Program
### Master of Science in Construction and Facilities Management
#### Regular Term 2010-2011
(Based on 2009-2010 Change in Student Credit Hours)

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Change in Student Credit Hours</th>
<th>Instructional - Position</th>
<th>Instructional Positions Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Undergrad</td>
<td>Masters</td>
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</tr>
<tr>
<td>Category I</td>
<td>708.64</td>
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<tr>
<td>Category III</td>
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<tr>
<td>Category IV</td>
<td>232.25</td>
<td>90.17</td>
<td>80.91</td>
</tr>
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</table>

**Total Positions Required**: 0.000

- **Instructional - Position Salary Rate**: $79,891
- **Instructional Salary Amount**: $0
- **Other Academic Costs**: 44.89300% 0

**Fringe rates for staff**
- **FICA @ 7.65%**: $0
- **Retirement @ 8.75%**: $0
- **Medical @ $4,527**: $0

**Fringes for faculty salaries**
- **FICA @ 7.65%**: $0
- **Retirement @ 11.86%**: $0
- **Medical @ $4,527**: $0

**Total Requirements**: $0
### SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

**Institution**

UNC Charlotte

**Date**

October 26, 2009

**Program (API#, Name, Level)**

15.9999 Construction Management

**Degree(s) to be Granted**

M.S.C.F.M.

**Program Year**

2010-11

---

**ADDITIONAL FUNDING REQUIRED - BY SOURCE**

<table>
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<tr>
<th>Reallocation of</th>
<th>Institutional Present Resources</th>
<th>Other Non-state Funds (Identify)</th>
<th>New Allocations</th>
<th>Total</th>
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<td>$0</td>
<td>$0</td>
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</table>

**151 Libraries**

| 5000 Capital Outlay (Equipment) | 500 | 0 | 500 |
| 5600 Library Book/Journal | 500 |
| TOTAL Libraries | $500 | $0 | $0 | $0 | $500 |

**189 General Institutional Support**

| 2000 Supplies and Materials | 0 |
| 2600 Office Supplies | 0 |
| 3000 Current Services | 0 |
| 3200 Communications | 0 |
| 3400 Printing & Binding | 0 |
| 5000 Capital Outlay (Equipment) | 0 |
| 5100 Office Equipment | 0 |
| 5200 EDP Equipment | 0 |
| TOTAL General Inst. Support | $0 | $0 | $0 | $0 | $0 |

**TOTAL ADDITIONAL COSTS**

$500 | $0 | $0 | $0 | $500

**NOTE:** Accounts may be added or deleted as required.
Projected Funding for New Degree Program
Master of Science in Construction and Facilities Management
Regular Term 2011-2012
(Based on 2010-2011 Change in Student Credit Hours)

<table>
<thead>
<tr>
<th>Program Category</th>
<th>Change in Student Credit Hours</th>
<th>Instructional - Position Funding Factors</th>
<th>Instructional Positions Required</th>
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<td></td>
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<td>Masters</td>
<td>Doctoral</td>
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<td>Category II</td>
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<tr>
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<tr>
<td>Category IV</td>
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</table>

Total Positions Required: 0.967

Instructional - Position Salary Rate: $79,891

Instructional Salary Amount: $77,218

Other Academic Costs: 44.89%

Purpose 101: Total Academic Requirements: $111,884

Purpose 151: Library: 11.48%

Purpose 152, 160, 170: General Inst Support: 54.04%

Fringe rates for staff:
- FICA @ 7.65%
- Retirement @ 8.75%
- Medical @ $4,527

Fringes for faculty salaries:
- FICA @ 7.65%: $5,907
- Retirement @ 11.86%: $9,158
- Medical @ $4,527: $4,376

Total Fringes: $19,441

Total Requirements: $185,206
### SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

**Institution**  
UNC Charlotte  
**Program (API#, Name, Level)**  
15.9999 Construction Management  
**Degree(s) to be Granted**  
M.S.C.F.M.  
**Date**  
October 26, 2009  
**Program Year**  
2011-12

#### ADDITIONAL FUNDING REQUIRED - BY SOURCE

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<th>New Allocations</th>
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<tr>
<td><strong>TOTAL Libraries</strong></td>
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**NOTE:** Accounts may be added or deleted as required.
### Projected Funding for New Degree Program

**Master of Science in Construction and Facilities Management**  
**Regular Term 2012-2013**  
*(Based on 2011-2012 Change in Student Credit Hours)*

<table>
<thead>
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<th>Program Category</th>
<th>Change in Student Credit Hours</th>
<th>Instructional - Position Funding Factors</th>
<th>Instructional Positions Required</th>
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<tbody>
<tr>
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<td>Undergrad</td>
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<tr>
<td>Category IV</td>
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</tr>
</tbody>
</table>

- **Total Positions Required**: 1.257
- **Instructional - Position Salary Rate**: $79,891
- **101-1310 Instructional Salary Amount**: $100,384
- **Other Academic Costs**: 44.89300% $45,065
- **Purpose 101 Total Academic Requirements**: $145,449
- **Purpose 151 Library** 11.48462% 16,704
- **Purposes 152, 160, 170 180 General Inst Support** 54.04980% 78,615
- **Neg Adj Factor** 50.00000% n/a
- **In-state SCHs** 0
- **Financial Aid (in-state)** 67.99800% 0
- **Total Requirements**: $240,768

---

**Fringe rates for staff**  
- FICA @ 7.65%
- Retirement @ 8.75%
- Medical @ $4,527

**Fringes for faculty salaries**  
- FICA @ 7.65% $7,679
- Retirement @ 11.86% $11,906
- Medical @ $4,527 $5,688

**In-state SCHs**: 0

---

_budgets.xlsx/Yr2 El Funds_
# SUMMARY OF ESTIMATED ADDITIONAL COSTS FOR PROPOSED PROGRAM/TRACK

**Institution**: UNC Charlotte  
**Program (API#, Name, Level)**: M.S.C.F.M.  
**Degree(s) to be Granted**: 15.9999 Construction Management  
**Date**: October 26, 2009  
**Program Year**: 2012-13

## ADDITIONAL FUNDING REQUIRED - BY SOURCE

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<th>Reallocation of Present Institutional Resources</th>
<th>Enrollment Increase Funds</th>
<th>Federal/State or Other Non-state Funds (Identify)</th>
<th>New Allocations</th>
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<td></td>
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<tr>
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</tr>
<tr>
<td>3200 Communications</td>
<td></td>
<td>13,100</td>
<td></td>
<td>13,100</td>
</tr>
<tr>
<td>3400 Printing &amp; Binding</td>
<td></td>
<td>13,100</td>
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<td>13,100</td>
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<tr>
<td>5000 Capital Outlay (Equipment)</td>
<td></td>
<td>26,215</td>
<td></td>
<td>26,215</td>
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<tr>
<td>5100 Office Equipment</td>
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<td>13,100</td>
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<tr>
<td>5200 EDP Equipment</td>
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<td>13,115</td>
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<td>13,115</td>
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<td><strong>TOTAL General Inst. Support</strong></td>
<td>$0</td>
<td>$78,615</td>
<td>$0</td>
<td>$78,615</td>
</tr>
<tr>
<td><strong>TOTAL ADDITIONAL COSTS</strong></td>
<td>$0</td>
<td>$240,767</td>
<td>$0</td>
<td>$240,767</td>
</tr>
</tbody>
</table>

**NOTE**: Accounts may be added or deleted as required.
Appendix B:

Faculty Curriculum Vitae
ANTHONY L. BRIZENDINE

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, West Virginia University (GPA 4.0/4.0)
- M.S. in Civil Engineering, Virginia Polytechnic Institute and State University
- B.S. in Civil Engineering Technology, Summa Cum Laude, Bluefield State College
- REGISTERED PROFESSIONAL ENGINEER, Virginia & West Virginia
- PROFESSIONAL SURVEYOR, West Virginia

Teaching and Other Work Experience

- University of North Carolina at Charlotte, Professor & Department Chair, July 2002 to present
- Fairmont State University, School of Technology, Chair, 2000 – 2002
- West Virginia Transportation Technician Certification & Training Program, Director, 1999-2002
- Fairmont State University, Director of Engineering Technology, 1999 - 2000
- Fairmont State University Honors Program, Director, 1994 – 1999
- Fairmont State University, Department of Civil Engineering Technology: Professor w/ tenure, 1991-2002; Dept Coordinator, 1995-99
- West Virginia University, Dept of Civil & Environmental Engineering: Adjunct Prof, 1998-2000; Guest Lecturer, 1995-1997
- West Virginia University Institute of Technology, Department of Civil Engineering, Visiting Professor, 1998
- U.S. Army Corps of Engineers, Waterways Experiment Station (WES), Vicksburg, Mississippi, Research Faculty/Civil Engineer on IPA Contract, 5/94 - 8/94, 5/93 - 8/93, 5/92 - 8/92, followed by contracts through December 1997

Active Membership in Professional and Scientific Societies

- Accreditation Board for Engineering & Technology - TAC Commissioner since 1998
  o TAC Executive Committee since 2002; Seats held: Vice-Chair for Policy; Criteria Committee Chair; Vice-Chair for Training; Operations Executive 2004-05; Chair-Elect 2005-06; TAC Chair, 2006-07.
- American Society of Engineering Education (ASEE)
- Technological Education Initiative (TEI); NSF/ABET/Industry-sponsored program
  o Facilitator, Technological Education Initiative, NSF, 2001-2004
- American Society of Civil Engineers (ASCE)
  o 2000 Engineering Technology Program Chair for Second National Civil Engineering Education Congress, Seattle, WA; 1999 Engineering Technology Program Chair for First National Civil Engineering Education Congress, Charlotte, NC; 1998 Engineering Technology Program Chair for Civil Engineering Conference, Boston, MA
- West Virginia Section ASCE President, 1996-97; Section Treasurer, 1997-1999; Section Continuing Education Committee Chair, 1995-96; Section Board of Directors, 1995-2000; National Management Conference Delegate ’99
- International Society of Soil Mechanics & Foundation Engineers (ISSMFE) Member

**Honors / Awards / Recognitions**

- Senior Mentor, ASCE Excellence in Civil Engineering Education (ExCEED) Program, 2001
- Bluefield State College 1999 Commencement Speaker; “Bearer of the Mace” - Distinguished Faculty, 1997-2000.
- 1998-99 William A. Boram Award for Teaching Excellence
- Excellence in Civil Engineering Teaching Award; Department of Civil and Environmental Engineering at West Virginia University, 1999
- 1997 Fairmont State University Excellence in Academic Advising Award (one award for university)
- 1997 Fairmont State University Outstanding Faculty Achievement Award (one of 3 university-wide)
- West Virginia Young Engineer of the Year, 1994, American Society of Civil Engineers
- FSU “Breaking Down Barriers for Students with Disabilities” Award, 1994; West Virginia Great Teachers Award, 1993

**Selected Publications / Presentations / Grant Awards**

- Co-PI, Diversity in Engineering Technology, NSF ($898,000), 2003-2006; Enhancing Diversity, NSF ($810,000), 2006-2009.
- PI, Transportation Certification & Training Programs, WV Dept. of Transportation ($456,000), 2002: ($397,000), 2001; 2000; ($76,000), 1999; Ruskin Manufacturing Grant, 2001; NSF/WV EPSCOR Grants; Global Positioning, 2000; Penetration Resistance & Kinematic Viscosity, 1994; Direct Shear & Data Acquisition, 1993; Permeability & Consolidation, 1992
- Invited Plenary Speaker, “What Have We Learned from Recent Experiences with the Accreditation of Engineering Technology Programs Under the New Outcomes Assessment Criteria?,” The 2004 Assessment Institute, Indianapolis, IN.


PDW Participants, “A Model For Faculty Development: The ExCEEd Teaching Workshop,” Consultant Report to the ASCE Board of Directors, September 1999


Brizendine, A.L., Risk Based Analysis of Levees, Doctoral Dissertation, West Virginia University, August 1997

“Probabilistic Analysis of Hydraulic Conductivity in Woody Vegetation,” U.S. Army Engineer Corps, Waterways Experiment Station, Vicksburg, Mississippi, December 1997
- Gabr, Brizendine and Taylor, “Comparison Between Finite Element Study and Simplified Analysis of Levee Underseepage,” Technical Report GL-95-11, Department of the Army, Waterways Experiment Station, Corps of Engineers, Vicksburg, Mississippi, July 1995
G. BRUCE GEHRIG

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, Colorado State University, 2002
- M.S. in Civil Engineering, University of Colorado at Denver, 1990
- B.S. in Civil Engineering, Brigham Young University, 1984
- Professional Engineer, Colorado No. 26710.
- Professional Engineer, North Carolina No. 30648

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

6 years, Department of Engineering Technology, Civil Engineering Technology. Original appointment July 2002 at the rank of Assistant Professor, received tenure effective July 2008.

Related Teaching and Other Work Experience

- Colorado State University, Civil Engineering Department, Graduate Teaching Assistant, 1999 – 2002
- American Samoa Power Authority, Resident Construction Manager, 1993-1996
- Denver Water Department, Project Civil Engineer, 1985-1993

Active Membership in Professional and Scientific Societies

- American Society of Civil Engineers, Member
- American Society for Engineering Education, Member
- International Technology Education Association, Member
- Construction Institute (ASCE), Member
- Environmental and Water Resources Institute (ASCE), Member
- Tau Beta Pi National Engineering Honor Society, Member

Honors/Awards/Recognition

- Department of Engineering Technology’s nominee for the William States Lee College of Engineering’s 2007 Excellence in Undergraduate Teaching Award
- ASCE Excellence in Civil Engineering Education (ExCEEd) Fellow, 2003

Selected Recent Publications/Presentations/Grant Awards

- TECT: Teaching Engineering to Counselors and Teachers, $300,000 (3-year project), The National Science Foundation, PI: Dr. G. Bruce Gehrig, Co-PI’s: Dr. Deborah Bosley, Dr. Lyndon Abrams, Dr. James Conrad, and Mr. Stephen Kuyath, May 2006 to present.
- Development of an Integrated Construction Management and Civil Engineering Technology Curriculum, $11,350, UNC-Charlotte Curriculum Improvement and Development Grant, PI: Dr. G. Bruce Gehrig, Co-PI’s: Dr. Donald Liou and Dr. Carlos Orozco, January 2005 to June 2006.

**Industrial and Professional Service (last five years)**

- American Public Works Association (AWPA), in conjunction with Dr. Vincent Ogunro established a UNC-Charlotte AWPA student chapter, 2007.
- TPC Advisory Group. Invited by NSF and the Education Development Center, Inc. to serve on the advisory group to plan the agenda for the next NSF TPC PI Conference, 2006 - 07
- Associated Schools of Construction, Construction Education Task Force, Member, 2006 - 07
• API/CID Grants Committee, COE representative, 2005 - 07.
• Undergraduate Course and Curriculum Committee, COE representative, 2007 - 08.
• Computing Facilities Advisory Committee, ET representative, 2004 to present.
• Academic Policy and Curriculum Committee, ET representative, 2006 - 07.
• Faculty Associate for Advising and Recruiting Search Committee, Member, 2004.
• Faculty Associate for Freshman Engineering & Advising Search Committee, Member, 2004.
• Construction Management Faculty Search Committee, Chair, 2007 to present.
• Civil Engineering Technology FAIT, Chair, 2004 to present.
• Freshman Engineering Technology FAIT, Member, 2004 to present.
• UNC-Charlotte SOAR Freshman & Transfer Orientation, CIET faculty representative
• JETS Summer Camp, 2005 -06.
• AGC Student Chapter advisor, 2008 to present.

Professional Development Activities (last five years)
• Ph.D. in Civil Engineering, Colorado State University, 2002
• Attended ASCE Excellence in Civil Engineering Education (ExCEEd) faculty workshop, July 2003
• Attended numerous workshops and seminars on grant writing and advising
• Completed several advanced software application training sessions
• Attended workshops on WebCT and web-based course delivery
• Attended professional conferences
JOHN C. HILDRETH

**Degrees & Professional Registrations**
- Ph.D. in Civil Engineering, Virginia Polytechnic Institute and State University, 2003
- M.S. in Civil Engineering, West Virginia University, 1999
- B.S in Civil Engineering, West Virginia University, 1997
- Engineer Intern Number 7063, West Virginia

**Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:**
1 year, Department of Engineering Technology, Civil Engineering Technology
Original appointment January 2008 at the rank of Assistant Professor

**Related Teaching and Other Work Experience**
- Virginia Polytechnic Institute and State University, Department of Civil Engineering, Senior Research Associate, 2005-2008
- Boyles and Hildreth Consulting Engineers, Inc, Project Engineer, 2002-2005
- Virginia Polytechnic Institute and State University, Department of Civil Engineering, Graduate Research Assistant, 1999-2002
- West Virginia University, Department of Civil Engineering, Graduate Teaching Assistant, 1997-1999
- Civil Tech Engineering, Inc, Project Engineer, 1996-1999

**Active Membership in Professional and Scientific Societies**
- American Society of Civil Engineers (ASCE) - Member
- Construction Institute (ASCE) - Member
- Construction Research Council (ASCE) - Member
- Transportation Research Board (TRB) - Member
- Association for the Advancement of Cost Engineering International (AACE) - Member
- American Society for Engineering Education (ASEE) - Member
- ASEE Construction Division - Member, Secretary/Treasurer 2008

**Honors/Awards/Recognitions**
- ASCE Excellence in Civil Engineering Education (ExCEEd) Fellow, 2008
- Charles E. Via, Jr Research Fellow, 1999 - 2002

**Selected Recent Publications/Presentations/Grant Awards**


Institutional and Professional Service (last five years)

• Reviewer for Journal of Construction Engineering and Management
• Reviewer for Automation in Construction
• Reviewer for 1st International Conference on Transportation Construction
• Member, TRB Application of Emerging Technologies to Design and Construction Committee
• Member, TRB Contract Law Committee
• Member, Civil Engineering Technology Focus Area Improvement Team (FAIT)
• Civil ET/Construction Management Faculty Search Committee
Professional Development Activities (last five years)

- Attended ASCE Excellence in Civil Engineering Education (ExCEEd) faculty workshop, July 2008
- Completed Primavera P6 construction scheduling training
- Attended UNCC Summer Diversity Institute
- Attended workshops and seminars on grant writing and research funding
- Attended ASEE Annual Conference, 2007
- Attended 25th Anniversary Construction Management and Economics Conference (CME25)
- Attended Construction Research Council meeting, Fall 2006, Fall 2007
- Attended VDOT-VRTBA Consultant Forum, 2006
PETER L. SCHMIDT

Degrees & Professional Registrations

- Ph.D. in Mechanical Engineering, Vanderbilt University, 2006
- M.S. in Mechanical Engineering, Rose Hulman Institute of Technology, 1991
- B. S. in Mechanical Engineering, University of Louisville, August 1986
- Mechanical Engineer, State of Tennessee, License Number 102087
- Mechanical Engineer, State of Georgia, License Number 24125

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Mechanical Engineering Technology
Original appointment August 2007 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Lecturer / Research Associate, Department of Mechanical Engineering, Vanderbilt University, August 2006 – July 2007
- Graduate Research Assistant, Department of Mechanical Engineering, Vanderbilt University, January 2003 – August 2006
- Sr. Mechanical Engineer, United Technologies/Carrier, June 2001 – December 2002
- Sr. Applications Engineer, Wynn’s International/Parker Hannifin, May 1992 – October 1995
- Mechanical Engineer, Dept. of Defense, Naval Surface Warfare Center, October 1986 – April 1992

Active Membership in Professional and Scientific Societies

- Institute of Noise Control Engineers
- American Society of Mechanical Engineers
- American Society of Heating, Refrigeration and Air Conditioning Engineers
- Acoustical Society of America
- American Society for Engineering Education

Selected Recent Publications/Presentations/Grant Awards

• P.L. Schmidt, I.E. A mundson and K.D. Frampton, “Localization of acoustic sources with a
distributed sensor network”, presented at the 147th Meeting of the Acoustical Society of America,

Institutional and Professional Service (last five years)
• Reviewer for American Society of Mechanical Engineers, IMECE Conference, Fall 2006
• Reviewer for American Society of Mechanical Engineers, Journal of Vibration and Acoustics
• Reviewer for Journal of the Acoustical Society of America
• Reviewer for American Society of Engineering Education
• NCJets Trebuchet Competition Judge and Referee, October 2007
• Mechanical Engineering Tutor, Vanderbilt Athletic Department, 2006/2007
• Vanderbilt Student Volunteers for Science, Team Leader 2005/2006

Professional Development Activities (last five years)
• Attended 2004 Acoustical Society of America, New York NY, USA
• Attended 2005 Acoustical Society of America, Vancouver BC, Canada
• Attended 2006 Acoustical Society of America, Providence, RI, USA
DAVID S. COTTRELL

Degrees & Professional Registrations
- Ph. D. in Civil Engineering, Texas A&M University, 1995
- M.S. in Civil Engineering, Texas A&M University, 1987
- Bachelor of Science, United States Military Academy, 1978
- Registered Professional Engineer, Virginia, 1982

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:
3 years, Department of Engineering Technology, Civil Engineering Technology
Original appointment August 2005 at the rank of Assistant Professor

Related Teaching and Other Work Experience
- Assistant Professor, Department of Civil and Mechanical Engineering, United States Military Academy, 1996 – 1998
- Instructor, Department of Civil and Mechanical Engineering, United States Military Academy, 1995 – 1996
- Chief, Concepts Branch (R & D), U.S. Army Engineer Center, 1993 - 1994
- Assistant Deputy Chief of Staff for Engineering, 1992 - 1993
- Senior Operations Officer (S3) for Engineer Battalion, 1991 - 1992
- Construction Management Engineer, 1987 - 1990

Active Membership in Professional and Scientific Societies
- American Society of Engineering Education (ASEE): Member
- Army Engineering Association (AEA): Lifetime Member and Association Fellow
- Associated Schools of Construction (ASC): Member

Honors/Awards/Recognition
- Recipient of the 2003-2004 James Jordan Award for teaching excellence
- Recipient of the 2002 New Faculty Fellow Award during the Frontiers in Education National Conference
- The Silver Order of the de Fleury Medal, 2000
- The Bronze Order of the de Fleury Medal, 1993

Selected Recent Publications/Presentations/Grant Awards


• ADVANCE Grant ($120,000), Apr 2007

• “Civil and Construction Engineering Technology Outreach to Girl Scouts.” ($6,000), Faculty Research Grant

Institutional and Professional Service (last five years)

• SPART Committee member
• Undergraduate Teaching Award Selection Committee member
• Graduate Teaching Award Selection Committee member
• Civil Engineering Technology F.A.I.T. Committee member

Professional Development Activities (last five years)

• Diversity Workshop, 2007
• NSF Career Workshop, 2007
• NSF Workshop: “Writing Proposals to meet NSF Expectations.”, 2006
• DBAI Workshop, 2006
• “Grant Seeking A-Z Workshop” sponsored by the Office of Research and Graduate Studies at The Pennsylvania State University at Harrisburg, 2005
ROSIDA COOWAR

Degrees & Professional Registrations

- Ph.D. in Industrial Engineering, University of Central Florida, 2001
- M.S. in Electrical Engineering, University of Massachusetts, 1992
- Diploma in Telecommunications and Electronics, South London College, UK, 1972
- Six Sigma Black Belt Certification, 2005

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

1 year, Department of Engineering Technology, Electrical Engineering Technology
Original appointment August 2007 at the rank of Associate Professor and Assistant Chair

Related Teaching and Other Work Experience

- Associate Professor/Assistant Chair/Program Coordinator, Engineering Technology Department, University of Central Florida, 1992 - 2007
- Visiting Professor, Department of Electrical Engineering Technology, University of Massachusetts, 1982 - 1992
- Professor, Institut National de Petrole, 1981 - 1982
- Professor, Institut National D’Electricite et D’Electronique, 1979 - 1981
- Lecturer, School of Industrial Technology, University of Mauritius, 1972 - 1973
- Production Control Manager, Integrated Technology Applications and Components, 1976 - 1978
- Process Engineer, Littronix, 1973 - 1976

Active Membership in Professional and Scientific Societies

- American Society of Engineering Education, Member
- Institute of Electrical and Electronics Engineers, Senior Member
- Tau Alpha Pi Honor Society for Engineering Technology, Member
- American Society for Quality, Senior Member

Honors/Awards/Recognitions

- Senior Faculty Fellowship (2004-2005) from UCF
- Recipient of the Teaching Incentive Program (TIP) Award from the State of Florida (2002)
- Advisor of the Year, Department of Engineering Technology (1997)
- Teacher of the Year, Department of Engineering Technology (1996)
- Advisor of the Year, Department of Engineering Technology (1995, 1996)
- Recipient of the Teaching Incentive Program (TIP) Award from the State of Florida (1995)
- Member of Tau Alpha Pi, the National Engineering Technology Honor Society
- Pride in Performance Certificate of Recognition from the State of Massachusetts (1990)

Selected Recent Publications/Presentations/Grant Awards

• “Screening Designs for Large Numbers of Variables” R. Coowar – Dissertation Bell & Howell 2002
• “ASM Charts in VHDL”, R. Coowar and H. Biggelaar, Computers in Education, October 2004
• “Lean Six Sigma as an Improvement Tool in Academia”, R. Coowar and S. Furterer, ASEE 2006
• “Comprehensive Engineering Tech education Using Interactive Compressed Video” $20,000, Co-Pi, SPIA, funded, 1994-1995
• “Grant-Aid Scholarship”, $10,000, Funded, UCF, Fall 1997
• “Grant-Aid Scholarship”, $10,000, Funded, UCF, Fall 1998
• “PLC_Robotics Undergraduate Teaching Laboratory Equipment” Provost’s Office, $19,931, Pi, funded, 2003-2004
• “CNC-CIM Undergraduate Teaching Laboratory Equipment” Provost’s Office, $19,977, Co-Pi, funded, 2004-2005

Institutional and Professional Service (last five years)
• IEEE Representative on TAC of ABET Commission
• Reviewer for the IEEE Transactions on Education
• Reviewer for Brooks/Cole publishing company
• Reviewer for the NSF ILI proposals FY 1996
• Reviewer for ITP and Prentice Hall
Aixi Zhou

Degrees & Professional Registrations

- Ph.D. in Engineering Mechanics, Virginia Tech, 2002
- M.S. in Mechanical Engineering, Lanzhou University of Technology, 1999
- B.S. in Mechanical Engineering, Shenyang Institute of Aeronautical Engineering, 1996

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:
1 year, Department of Engineering Technology, Fire Safety Engineering Technology
Original appointment August 2007 at the rank of Assistant Professor

Related Teaching and Other Work Experience

- Postdoctoral Associate, Department of Engineering Science and Mechanics, Virginia Tech, 2006 – 2007
- Research Associate, Department of Structural Engineering, University of California-San Diego, 2002 – 2003
- Research and Teaching Assistant, Department of Engineering Science and Mechanics, Virginia Tech, 2000 – 2002
- Research and Teaching Assistant, Department of Mechanical Engineering, Lanzhou University of Technology, 1996 - 1999

Active Membership in Professional and Scientific Societies

- Society of Fire Protection Engineers (SFPE)
- American Society of Civil Engineers (ASCE)
- American Society for Engineering Educators (ASEE)

Honors/Awards/Recognitions

- International Association of Bridge and Structural Engineering (IABSE) Young Engineer Travel Award, Zurich, Switzerland, 2004
- Excellent Science and Technology Development Award in Higher Education, the Government of Gansu, China, 2002
- Science and Technology New Star Award, the Government of Gansu, China, 1999
- Excellent Thesis Award, Lanzhou University of Technology, 1999
- Outstanding Graduate Student Award, Lanzhou University of Technology, 1996-1999
- Outstanding Student Award, Shenyang Institute of Aeronautical Engineering, 1992-1996

Selected Recent Publications/Presentations/Grant Awards

- "Structural Fire Resistance of Fiber Reinforced Polymer Composites", supported by the UNC Charlotte Faculty Research Grant, 1/2008-5/2009, $6,000, PI
- "Standard for Load Resistance Factor Design of Pultruded Fiber-Reinforced Polymer Structures (Chapter 7-Plates", supported by the American Society of Civil Engineers (in collaboration with Virginia Tech and the University of Maine), 10/2007-9/2010, $138,896, Co-PI.
- "Development and Application of Fire Resistant Models for Naval Composite Structures", supported by the Office of Naval Research through the Naval International Cooperative Opportunities in Science and Technology Program (NICOP), 7/2007-6/2010, $385,759, PI.
- "Fire Integrity in Advanced Ship Structures (SBR)”, supported by the Office of Naval Research, 08/2007-03/2008, $5,000, Co-PI.
“Fiber Reinforced Polymer Composites under Elevated and High Temperatures”, supported by the Swiss National Science Foundation, 10/2005-09/2007, CHF 90,160 ($72,000), Co-PI.

“Fatigue of Adhesively Bonded Joints from Pultruded GFRP Composites (Phases I and II)”, supported by the Swiss National Science Foundation, 05/2004-04/2008, CHF 234,881 ($188,000), Co-PI. [Additional equipment funding of €142, 600 ($240,000) was also awarded.]


Institutional and Professional Service (last five years)

- Editorial Advisory Board Member, Recent Patents on Materials Science, Bentham Science Publishers.
- Associate Editor and Editorial Advisory Board Member, International Handbook of FRP Composites in Civil Engineering, CRC Press.
- Reviewer for Journal of Composites for Construction
- Reviewer for Engineering Fracture Mechanics
- Reviewer for International Journal of Fatigue
- Reviewer for Composites Science and Technology
CARLOS EDUARDO OROZCO

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, Carnegie Mellon University, 1993
- M.S in Civil Engineering, Carnegie Mellon University, 1984
- B.S. in Civil Engineering, Universidad Nacional de Colombia, Medellin, Colombia, 1983.

Number of years service on this faculty, including date of original appointment and dates of advancement in rank:

7 years, Department of Engineering Technology, Civil Engineering Technology
Original appointment July 2001 at the rank of Associate Professor, granted tenure as of August, 2005.

Related Teaching and Other Work Experience

- University of Virginia, Department of Civil Engineering, Assistant Professor, 1994-2001
- Pittsburgh Supercomputing Center, Senior User Consultant, 1993-1994
- Antioquia School of Engineering, Medellin, Colombia, Adjunct Professor, 1989
- Medellin University, Medellin, Colombia, Adjunct Professor, 1985, 1989
- International Colombia Resources Corporation (Exxon), Barranquilla, Colombia, Systems Analyst, 1985-1988

Active Membership in Professional and Scientific Societies.

- American Society for Engineering Education (ASEE), Member

Honors/Awards/Recognitions

- Tau Alpha Pi Teacher of the Year, UNC Charlotte, 2004.
- Selected by the Aeronautics Branch of the NASA Langley Research Center for the NASA Faculty Fellowship Program (NFPP). Summer, 2003
- Ohio Aerospace Institute (OAI) summer faculty fellowship. NASA Glenn Research Center, 1999
- Nominate for an All-University Teaching Award. University of Virginia, 1998
- Certificate of Appreciation. Summer Bridge Program, University of Virginia, 1998
- Fulbright Grantee, 1983-1984
- National University of Colombia Fellow, 1983

Selected Recent Publications/Presentations/Grant Awards


• PI, “A Reliability-based Monitoring System for Highway Bridges,” Mid-Atlantic Universities Transportation Center ($90,546), 1999
• PI, “Applications of the Strain-Compatible Volume-Averaging Method to the Analysis of Unidirectional Composites,” Life Prediction Branch, NASA Glenn Research Center ($10,000), Summer 1999
• PI, “From the Traveling Salesman to the Diet Problem: An Introduction to Optimization,” University of Virginia, Office of the Provost ($6,500), 1998

Institutional and Professional Service (last five years)
• University of North Carolina at Charlotte, Faculty Advisory Summer Sessions Committee, Member, 2007-2009.
• ETGR FAIT Chairman, ongoing.
• CIET FAIT, Member, ongoing.
• Department of Engineering Technology Reappointment and Tenure Review Committee, Member, ongoing.
• Department of Engineering Technology CIET Faculty Search Committee, Member, ongoing.
• Department of Engineering Technology ABET Committee, Member, 2003.
• Explore UNC Charlotte, Engineering Technology Department Representative, 2003 & 2004
• Session Chair: 14th International Conference on Composites/Nano Engineering, ICCE/14, Boulder, CO, August 2006.
• Session Chair: 12th International Conference on Composites/Nano Engineering, ICCE/12, Tenerife, Canary Islands, Spain, August 2005.

Professional Development Activities (last five years)
• 14th International Conference on Composites/Nano Engineering, ICCE/14, Boulder, CO, July 2-8, 2006.
• 12th International Conference on Composites/Nano Engineering, ICCE/12, Tenerife, Canary Islands, Spain, August 2005.
• 11th International Conference on Composites/Nano Engineering, ICCE/11, Hilton Head Island, SC, August 2004.
• 10th International Conference on Composites/Nano Engineering, ICCE/10, New Orleans, LA, July 2003.
CHUNG-SUK CHO

Degrees & Professional Registrations

- Ph.D. in Civil Engineering, University of Texas at Austin, May 2000
- M.S. in Civil Engineering, University of Hawaii at Manoa, July 1997
- B.S. in Civil Engineering, Sung Kyun Kwan University, February 1995

Numbers of years service on this faculty, including date of original appointment and dates of advancement in rank:

Original appointment August 2008 at the rank of Assistant Professor
Department of Engineering Technology, Civil Engineering Technology

Related Teaching and Other Work Experience

- Assistant Professor, North Carolina A&T State University, Department of Construction Management and Occupational Safety & Health, 2004 - 2008
- Research Assistant, University of Texas at Austin, 1998 - 2000
- Research Assistant, University of Hawaii at Manoa, 1996 - 1997
- Project Manager/Associate Project Control Specialist, Fluor Corporation, 2000 - 2004

Active Membership in Professional and Scientific Societies

- Member, American Society of Civil Engineers
- Member, National Association of Industrial Technology
- Member, Academic Committee, Construction Industry Institute (CII)
- Member, Risk Committee, Construction Institute (CI)

Honors/Awards/Recognition

- Certificate of Appreciation – “OSHA 10-Hour Construction Safety & Health Course”, 39th
- NAIT Convention
- Certificate of Appreciation – NAIT Presenter, Panama City Beach, FL. 2007
- Certificate of Appreciation – NAIT Presenter, Cleveland, OH. 2006
- Chair for NAIT Construction Focus Group

Selected Recent Publications/Presentations/Grant Awards


Cho, C. S. “Development of the Project Definition Rating Index (PDRI) for Building Projects” Dissertation Defense at the University of Texas at Austin, February 28, 2000.


**Industrial and Professional Service (last five years)**

- Faculty Council, School of Technology, 2006 – 2008
- Distance Learning Committee, School of Technology, 2007 – 2008
- University Senates, 2005 – 2007
- Graduation and Retention, School of Technology, 2004 – 2007
- Curriculum Committee, School of Technology, 2005 – 2006
- Grades Appeal Board, School of Technology, 2004 – 2005
DON CHEN

Degrees & Professional Registration
- Ph.D., Civil Engineering (Construction Engineering and Management emphasis), Iowa State University, May 2006
- M.S., Civil Engineering (Construction Engineering and Management emphasis), Iowa State University, December 2002
- M.S., Statistics, Iowa State University, degree expected December 2009
- B.S., Civil Engineering, Tongji University, Shanghai, China, July 1992

Number of years service on this faculty, including date of original appointment and dates of advancement in rank
- Assistant Professor, Civil Engineering Technology & Construction Management, University of North Carolina at Charlotte, May 2009 to present
- Assistant Professor, Construction Management, Ball State University, Muncie, Indiana, August 2006 to May 2009

Related Teaching and Other Work Experience
- Research and Teaching Assistant, Construction Engineering, Iowa State University, Ames, Iowa, August 2000 to August 2006
- MWH-Boda Environmental Engineering Group, Project Engineer, Beijing, China, January 1999 to August 2000
- Wuzhou Engineering Services, Structural Engineer, Beijing, China, July 1992 to January 1999

Active Membership in Professional and Scientific Societies
- LEED AP, June 2009 to present
- Full Member, Sigma Xi, 2003 to present
- Member, American Society of Civil Engineers (ASCE), 2001 to present
- Member, National Association of Industrial Technology (NAIT), April 2008 to present
- Member, American Statistical Association (ASA), 2004 to 2006

Honors/Awards/Recognition
- Teaching Excellence Award, Iowa State University, Ames, Iowa, March 2006
- Research/Teaching Assistantship and Graduate College Scholarship, Iowa State University, Ames, Iowa, August 2000 to August 2006

Selected Recent Publications/Presentations/Grant Awards

Institutional and Professional Service (last five years)
- Member, University Senate, Ball State University, 2007 to present
- Member, Faculty Council, Ball State University, 2007 to present
- Member, Undergraduate Education Committee, Ball State University, 2007
- Member, Creative Teaching Committee, Ball State University, 2007
- Member, University Salary & Benefits Committee, Ball State University, 2007
- Member, University Traffic Appeals Subcommittee, Ball State University, 2007

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- Member, Promotion and Tenure Committee, Department of Technology, Ball State University, 2008-2009
- Chair, Facilities Planning and Renovation Committee, Dept. of Technology, Ball State University, 2007 to present
- Member, Sustainability Committee, Department of Technology, Ball State University, 2007 to 2008
- Member, Salary Committee, Department of Technology, Ball State University, 2007 to present
- Member, Search Committee, Construction Management Tenure Track Faculty Position, Ball State University, 2008
- Reviewer, Journal of Construction Engineering and Management, ASCE, 2005 to present
- Reviewer, Proceedings of Associated Schools of Construction Annual Conference, April 2008 to present

**Professional Development Activities (last five years)**
- Coach, Commercial Team, Associated Schools of Construction (ASC) Region III, Student Competition, Downers Grove, Illinois, October 2007
- Representative of Department of Technology, Faculty/Student Exchanges Program (1+2+1) with institutions in China, March 31st to April 14th, 2007
- Instructor, Microsoft Project Training, National Society of Black Engineers Regional Leadership Conference, Ames, Iowa, August 2005
- Representative, Construction Engineering and Management Division, Graduate Student Dean's Advisory Board, Iowa State University, August 2005 to Aug. 2006
**NA LU, Ed.D., AIC**

**Degrees & Professional Registration**
- Master of Construction Science & Management, Clemson University, August 2005
- Master of Business Management, Xi’an University of Architecture & Technology, Beijing International MBA (Fordham University, NY & Beijing University, China), August 2003
- Bachelor of Construction Management, Xi’an University of Architecture & Technology, Xi’an, Shannxi Province, PRC, August 1997
- Construction Safety Training Program, Japanese Construction Safety and Health Association, Tokyo, Japan 2003-2004

**Number of years service on this faculty, including date of original appointment and dates of advancement in rank**
- University of North Carolina at Charlotte, Charlotte, NC, May 2009- Present, Assistant Professor of Construction Management Engineering Technology

**Related Teaching and Other Work Experience**
- Roger Williams University, Bristol, RI, Assistant Professor, School of Engineering, Computing and Construction Management, August 2007- May 2009
- Clemson University, Clemson, SC, Lecturer, Department of Construction Science & Management, September 2006 - May 2007
- Kiewit Southern Co. Atlanta, GA, Project Engineer at Miami International Airport, Miami, FL, August 2005- September 2006
- Clemson University, Clemson, SC, Teaching Assistant, Department of Construction Science & Management, September 2005 – September 2006
- Three River Eco-builder Co. Phoenix, AZ, Summer intern as field engineer, May 2005 - August 2005
- Japanese Construction Occupational Safety and Health Association, Researcher, 2003 - 2004
- Xi’an University of Architecture & Technology, Xi’an, PRC, Assistant Professor, School of Construction Management, September 1999 - August 2002
- Xi’an University of Architecture & Technology, Xi’an, PRC, worked as owner’s rep, August 1997- August 1999

**Active Membership in Professional and Scientific Societies**
- American Society of Civil Engineering (ASCE)
- US Green Building Council Rhode Island Chapter (USGBC)
- International Building Performance Simulation Association (IBPSA)
- American Institute of Constructors (AIC)

**Selected Recent Publications/Presentations/Grant Awards**
• The current use of offsite construction techniques in US construction industry, ASCE Construction Research Congress, Seattle, April 2009.
• Undergraduate internship experience with their academic performance, The 44th annual ASC international conference, Gainesville, FL, April 2009.
• Sustainable Site Analysis for Manufactured Residential Housing, Fall Convention of Manufactured Housing Institute of South Carolina, Greenville, South Carolina, November 2006.
• The Design and implementation of nuclear power plant construction engineering course modules, Co-PI $124,296, Nuclear Regulatory Commission, 2009.
• Assessment the correlation of undergraduate internship with their academic performance, PI, $2,000, Roger Williams University, RI, 2008.
• Innovative technology for an existing commercial building in Phoenix, AZ, 2007, Sponsored by Roger Williams University.
• Offsite construction techniques in the United States Construction Industry, Co-PI, $55,000, Clemson University, 2007.
• A comparative analysis of asynchronous distance education, Directed by Dr. Dennis C. Bausman, Sponsored by Clemson University, SC, 2005.
• A compensation module for project manager in construction, Sponsored by Xi’an Construction Economic Institute, PRC, 2003.
• Organizational plan for Mozambique Officer building project, 2002, Sponsored by Xi’an International Project Contract Corp. PRC.

Institutional and Professional Service (last five years)
• ASC/AGC Students Heavy Civil Competition Team, Northeast Region First Place, New Jersey, 2007 & 2008.
• Co-advisor for the engineering student competition team in developing innovative technologies for existing building. The team won 1st place of the international WERC competition in Albuquerque, NM, in April 2008.
AHMAD K. SLEITI

Degrees & Professional Registration
· Ph.D. in Mechanical Engineering, University of Central Florida (UCF), Orlando, FL, 2004
· M.S., Mechanical Engineering, University of Jordan (UJ), Amman, Jordan, 2001
· B.S. and M.S. in Mechanical Engineering, Rostov State Building University (RISI), Rostov on Don, Russia, 1991
· Certified Energy Manager (CEM), http://www.aeecenter.org/certification/CEMpage.htm
· Certified Energy Auditor, (CEA), USA

Number of years service on this faculty, including date of original appointment and dates of advancement in rank
· University of North Carolina at Charlotte, Assistant Professor, Department of Engineering Technology, and Member, Energy Production and Infrastructure Center (EPIC), May 2009 to Present

Related Teaching and Other Work Experience
· University of Central Florida (UCF), Assistant Professor - Director of Hydrogen and Fuel Cell/Energy Systems Technology Program, Mechanical, Materials and Aerospace Engineering & Engineering Technology Departments, 2007-2009
· University of Central Florida (UCF), Research Associate, Project Manager and Adjunct Professor, Mechanical, Materials and Aerospace Engineering Department (MMAE), 2004-2007
· Electrodynamics Associates, Inc., Oviedo Florida, USA, Senior Mechanical Engineer, Thermal and mechanical design and testing of high-speed rotating electric machines, 2003-2004
· University of Central Florida (UCF), Research and Teaching Assistant and Instructor, Department of Mechanical, Materials and Aerospace Engineering (MMAE), 2001-2004
· BETA Engineering Industries Co, Jordan, Research and Development Engineer, Design, Manufacturing and Development of Boilers, Compressors and Burners, 1991-1993

Active Membership in Professional and Scientific Societies
· Member of American Society of Mechanical Engineers (ASME), Since 2001
· Member of American Institute of Aeronautics and Astronautics (AIAA), Since 2003
· Member of American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE)
· Member of The American Society of Engineering Education (ASEE), since 2008
· Florida Renewable Energy Producers Association (FREPA), since 2008

Selected Recent Publications/Presentations/Grant Awards
· A.K. Sleiti, "Transient Flow of Air through Rectangular Vents in Horizontal Partition", Accepted by HVAC&R Research, American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), 2009.


Hydrogen and fuel cell/Energy systems technologies Program Development, PI, 09/08-09/10, US Department of Energy FSEC, $499K

Instrumentation for Multiscale Thermal Transport of Dielectric Composites, PI, 05/09-06/10, AFSOR, $94K

Thermal/fluids transport processes in High Power-Low Density El. Machines, PI, 12/07-12/09, DOD, through Electro dynamics, $89K


Intermediate Temperature SOFCs: A comprehensive approach to designing materials for superior functionality, Co-PI, 03/07-06/08, NASA, $130K

Optimization of Thermoelectric/Control Design for Advanced Motor/Generator, Co-PI, 12/05–01/08, DOD SBIR II, Electro dynamics, $176K

Computational Fluid Dynamics Study for Design and Pressure Loss Reduction in the Omega Cooler - Phase I, 07/05–11/05, Senior Investigator, Siemens Power Generation (SPG)/Generator, $60K

Integration of High Speed Compact Efficient Generator for DEW applications, 01/05–08/05, Senior Investigator, DOD (Air Force) – Electro dynamics, $70K

Impingement Film Coupling Project - Phase I AND II , 02/04–05/06, Senior Invest. & Project manager, Siemens Power Generation (SPG) / Gas Turbine, $185K

Development of Physics Based Cooling Feasibility Tool, 04/04–02/05, Senior Invest. & Project manager, Siemens Power Generation (SPG), $65K

An advanced cooling technology: Basic Film Cooling- Phase II, 03/05–03/06, Senior Invest. & Project manager, Siemens Power Generation (SPG) / Gas Turbine, $89K

Shroud Cooling Shroud Cooling Test (SCT), 03/04-02/06, Senior Invest & Project manager, Siemens Power Generation (SPG) / Gas Turbine, $277K

Professional Development Activities (last five years)

- (ABET a-k criteria): develop assessment tools to evaluate student learning outcomes in the classroom.
- Information Fluency Initiative Grants Conference, UCF 2008
- SBIR/STTR Grant preparation workshop (2006, 2007)
University Address

Department of Engineering Technology  
The University of North Carolina at Charlotte  
Charlotte, NC 28223-0001  
(704) 687-4179

Education

Dissertation Title: Seismic Analysis of Offshore Structures Supported on Pile Foundation.


M.S. in Civil Engineering, University of California at Berkeley, 1972.  
Dissertation Title: Nonlinear Analysis of Axisymmetric Reinforced Concrete Structures.

B.S. in Civil Engineering, National Taiwan University, Taiwan, 1970.

Professional Affiliations

Member, American Society of Civil Engineers (ASCE)  
Professional Civil Engineer, State of California, C 24861  
Advisor, Student Chapter of the Association of General Contractor of America (AGC)

Teaching Experience

Tenured Associate Professor of Engineering Technology, William States Lee College of Engineering, University of North Carolina at Charlotte, 1995-

Awards and Honors

1991: 10-year service award, Bechtel Corporation, San Francisco.  
1993: Outstanding service award for completion of Kawasaki Man Made Island Project, Bechtel Civil Company, San Francisco.

Professional Experience


Project manager, Jihe Expressway ($250 millions, 35 km, four-lane freeway north of Shen Zhen, China) and Daxie Island Bridge projects (highway and rail combined RC bridge south of Shanghai). Bechtel Civil Inc., Hong Kong Office, HK, November 1993 to June 1995.

Project manager and manager of instrumentation, Trans-Tokyo Bay East Kawasaki Island Project, Taisei, Tobishima, Penta Ocean, and Bechtel Joint-Venture ($1 billion, deep-sea diaphragm island), Bechtel International Inc., Tokyo Office, Japan, October 1991 to October 1993.
Project engineer and proposal manager, San Francisco Muni Metro Turnback Project (tunnel in soft bay mud), McCarran airport south freeway tunnel project (highway tunnel), Golden Gate Bridge transit study project (suspension bridge), Bechtel Civil Inc. San Francisco Office, September 1989 to September 1991.

Chief Civil and Architectural Engineer and Director of Quality Center, Taipei Department of Rapid Transit Systems ($12 billion, 70 km, 72 stations rapid and medium capacity transit system), Taipei City Government, Taipei, Taiwan, ROC, July 1987 to August 1989.

Part-time structural consultant, Hsu and Associates, AIA, structural design of Quelin Holiday Inn Hotel Project (9 story RC building), Quelin, Quangsi, China, July 1985 to June 1987.


Principal Engineer, Structural consultant to various nuclear power generation projects, URS/Blume, San Francisco, August 1977 to January 1978.

Research Assistant to Prof. Joseph Penzien, Standard Oil of California Grant (offshore platform on piles project), University of California at Berkeley, Berkeley, California, January 1975 to July 1977.

Associate Engineer, EDS Nuclear Inc., San Francisco, Structural consultant to various nuclear power generation projects, January 1973 to December 1974.

Research Assistant to Prof. A. C. Scordelis, University of California at Berkeley, (development of finite element program for RC structure), December 1971 to December 1972.

Second Lieutenant of the Construction and Maintenance Unit, Chia Yi Air Base, ROC Air Forces, June 1970 to July 1971.

Publications

“Retrofitting a Missouri Steel Baghouse,” Accepted for publication in ASCE Journal of Performance of Constructed Facilities accepted for publication on April 9, 2002.


“Thermal Cracking in the Diaphragm-Wall Concrete of Kawasaki Island,” Proceedings of the International RILEM Symposium, Munich, Germany, October 1994, pp 393-400.


“Seismic Soil-Structure Interaction Analysis Considering Basemat Uplift,”


“Nonlinear Analysis of Axisymmetric Reinforced Concrete Structures,” Graduate Student Report, Structural Engineering and Structural Mechanics, University of California, Berkeley, California, 1972.

Research Proposals and White Papers


“Thermally Optimized Concrete for Building Structures,” (PI: Carlos E. Orozco and Co-PI: Donald D. Liou), submitted to the National Science Foundation on December 2003.


“Design of a Beam Furnace to be used in the Fire Safety Program,” (Co-PI: Charles Mobley), a multidisciplinary design project proposal to SUCCEED and the Creative Projects Laboratory, May 7, 1999.


“Development of a Module of Computer-Aided Design Tool for Teaching,” a subcontract proposal to Northeastern University, included in Using CAD Analysis Tools to Teach Engineering Fundamentals, a proposal to the National Science Foundation, Ref. 9872441 (PI: Dr. William Cole), March 31, 1998.


“Laboratory Study on the Use of Tire Crumb in Backfill and Reinforced Soil Applications,” a white paper to Continental Tire Company, Germany, July 9, 1997.

“Study on the Time-Dependent Behavior of Buried Thermoplastic Pipe,” a proposal to the National Science Foundation, Ref. CMS-9713580, April 1997.

**Funded Research and Education Activities**


**Graduate Program & Competition Advising**

Member of the Master Degree Advising Committee for David Cranford, Civil Engineering, testing of geogrid, academic advisor: Alan Stadler, defense date: June 16, 2000.
Appendix C:

Supporting Letters
Consultation on Library Holdings

To: John Hildreth
From: Alison Bradley
Date: April 23, 2008
Subject: Master of Science in Construction and Facilities Management

Summary of Librarian's Evaluation of Holdings:

Evaluator: Alison Bradley Date: April 23, 2008

Check One:
1. Holdings are superior
2. Holdings are adequate
3. Holdings are adequate only if Dept. purchases additional items.
4. Holdings are inadequate

Comments:

Current library holdings should be sufficient to support the proposed MS in Construction and Facilities Management. A search of the catalog shows that we currently own 3817 relevant items, with 3412 books and government documents, 44 periodical subscriptions, and 454 electronic resources (these numbers include some duplication). A summary of these holdings with the Library of Congress Subject Headings and keywords used to search is attached.

Additional research interests may be supported through the library’s interlibrary loan services as well.

With anticipated ongoing purchases in this and related fields of study, library support for this degree should be sufficient to support research at the Master’s level.

Alison Bradley
Evaluator's Signature

April 23, 2008
Date

Revised 4/23/2008
OAA jdp
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Some duplication of entries may occur
April 23, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001

SUBJECT: MASTERS of SCIENCE
IN CONSTRUCTION & FACILITIES MANAGEMENT

Dear Dr. Brizendine:

As Chairman of the Civil & Construction Board of Industry Advisors for the Department of Engineering Technology, I am writing this letter of support for the proposed Masters of Science in Construction & Facilities Management program at UNC Charlotte. The Engineering Technology Department has taken the Advisory’s Board input seriously and has addressed the needs of the construction industry in and around Charlotte in developing this proposed program. The Board is pleased that this initiative is moving forward.

The proposed program will benefit greatly from the existing BSET program in Construction Management. Courses, laboratories and facilities currently utilized in the Civil ET program can be shared and provide an excellent base for the proposed Masters of Science in Construction & Facilities Management program. Additionally, the existing Civil ET faculty provides a strong core from which to build the program; they are an outstanding group with excellent credentials and significant construction and project management experience. The practical experience of the existing faculty, overall strength of the engineering technology programs, and philosophy of applied engineering in the Department provides the ideal formula for success of the proposed construction management program.

The construction industries of Charlotte and the surrounding areas have needed this program for some time, and we look forward with anticipation to the initiation of the program.

Sincerely yours,

Jeffrey L. Gagné, PE, DBIA
Chairman - UNC Charlotte Civil & Construction Technology Advisory Board
Vice President - STV/Ralph Whitehead Associates, Inc.
April 23, 2008

Mr. Anthony L. Brizendine, PHD, PE  
Chair & Professor, Department of Engineering Technology  
University of North Carolina at Charlotte  
9201 University City Blvd.  
Charlotte, NC  28223-001

Dear Dr. Brizendine:

On behalf of RT Dooley Construction Company, I offer an endorsement for the proposed Master of Science in Construction and Facilities Management (MSCFM) at UNCC.

We are proud of our partnership with UNCC, which provides opportunities for undergraduates to experience practical field and office experience during summer and after school hours. These internships provide an environment for the students to apply what they are learning in their studies to real world situations and more adequately prepares them for employment after graduating.

The curriculum suggested for the MSCFM program will provide for studies in specific areas which will open even greater opportunities for students choosing to participate.

Building Information Modeling, Building Energy Management studies and other courses suggested in the curricula will provide MSCFM graduates with valuable education that will enable them to compete at higher levels within our industry. Green building requirements (LEED), the ever growing complexity of Building Management Systems and many other technological advancements in our industry have increased dramatically in the past few years, making the MSCFM program not only appropriate, but quite timely.

We offer our best wishes for the program, and our continued support of your endeavors.

Sincerely,

RT DOOLEY CONSTRUCTION COMPANY

Tim Garrison  
President
April 24, 2008

Dr. Anthony L. Brizendine  
Chair and Professor  
Engineering Technology/Construction Management  
UNC Charlotte  
9201 University City Blvd.  
Charlotte, NC 28223-0001

Re: Master of Science in Construction & Facilities Management

Dear Dr. Brizendine,

I write this letter in support of your proposal to implement a Master of Science in Construction & Facilities Management program.

As Vice President of Whiting-Turner Contracting Company, I am very cognizant of the need for qualified graduates in these disciplines. As a member of your Construction Management Advisory Board and having presented to your Construction Professional Development Seminar during each of the past two years at UNC Charlotte, I am also extremely aware of the quality programming in your BS Construction Management program. Extension of this program to the MS in Construction & Facilities Management is a logical step to produce advanced technical workers for the North Carolina construction and business communities.

I look forward to continuing the working relationship between Whiting Turner Contracting Company and your Department to establish this program and provide internship and career opportunities for graduates of the program.

Very truly yours,

THE WHITING-TURNER CONTRACTING COMPANY

Timothy L. Stevens  
Vice President

HEADQUARTERS: BALTIMORE, MARYLAND  
OFFICES NATIONWIDE
April 23, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223-0001

Dear Dr. Brizendine:

As a member of the Civil Engineering Technology and Construction Management Industry Advisory Board representing AREVA NP, it is my pleasure to provide this letter of support for the proposed Master of Science program in Construction & Facilities Management at the University of North Carolina, Charlotte (UNCC). AREVA NP has been a strong supporter of the Engineering Technology program for many years and has benefited from the employment UNCC graduate engineers in our nuclear engineering, services, and construction operations.

The need for such a program is quite apparent, not only for AREVA, but other engineering and construction companies in this area. Charlotte has become the hub for engineering and construction companies poised to deploy the next generation of nuclear power generation plants in the United States. The proposed program will provide the type of construction leadership necessary to build these plants, and facilities manager’s necessary to maintain them once in operation.

AREVA NP thanks you for your progressive planning to prepare future construction professionals for North Carolina and our nation.

Sincerely yours,

Michael K. Phillips
Manager, Construction Management
AREVA NP, Inc.
April 21, 2008

Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001

Re: Master of Science in Construction and Facilities Management

Dear Mr. Brizendine,

Thank you for the opportunity to review your proposal to implement a Master of Science in Construction and Facilities Management. I can say with confidence that this is a worthy program to be offered at the University of North Carolina at Charlotte.

The education I received as a graduate of the Master of Civil Engineering / Construction Management Program from the New Jersey Institute of Technology has helped progress my career in a direction that I do not believe would have been available to me had I not pursued the degree. As a result, I believe that implementation of the proposed program at the University of North Carolina at Charlotte would be beneficial not only to the individual students but to the industry as a whole. I am confident that graduates of this program would enter the industry with a professional advantage not possessed by other job candidates.

Currently, the Carolinas Business Unit of Turner Construction Company employs six University of North Carolina at Charlotte graduates. It is our hope to continue to grow our business unit with the hiring of graduates of the Master of Construction and Facilities Management Program. In addition, Turner would like to offer our continued support with guest speakers.

I applaud your efforts to implement this program and look forward to supporting the program in any way that I can.

Sincerely,

Edward Maher
Project Manager, LEED AP
Turner Construction Company
Carolinas Region
April 18, 2008

Anthony L. Brizendine, PhD, PE  
Chair & Professor, Department of Engineering Technology  
University of North Carolina at Charlotte  
9201 University City Blvd  
Charlotte, NC 28223-0001

Re: Need for Facilities Management Graduates

Dr. Brizendine,

As a facilities management professional with more than 25 years of experience in construction and facilities engineering, I am keenly aware of the need for qualified graduates having specialized knowledge in these fields.

Over the past several months I have been reviewing resumes of individuals who have applied for the position of Assistant Director of Facilities at Providence Day School. I have been disappointed in the qualifications of these applicants. Most of the applicants fall into two broad categories; those with backgrounds as mechanical or construction technicians but lacking academic credentials, and those with college degrees but lacking specific facilities management experience.

I would be very interested in having a graduate-level program in Charlotte that would provide the necessary training and focus to produce qualified facilities management personnel. I am convinced that there is a very real and pressing need for these graduates, and I applaud your efforts to bring such a program to UNCC.

Please contact me if you have any graduates that you believe may fit our needs.

Sincerely,

Thomas F. Beggs, P.E.  
Director of Facilities  
Providence Day School
April 23, 2008

Dr. Anthony L. Brizendine, PhD, PE
Chair & Professor, Department of Engineering Technology
University of North Carolina at Charlotte
9201 University City Blvd.
Charlotte, NC 28223-0001

Subject: Master of Science in Construction & Facilities Management Proposal
Request to Establish MS Program for acceptance of Engineering Technology
Department of Engineering Technology
University of North Carolina at Charlotte

Dear Dr. Brizendine:

This letter is being issued to your attention for submittal to the UNC System General Administration showing my support for the subject MS program in the Department of Engineering Technology at UNC-Charlotte. There is such a need for this type program in the Department of Engineering Technology at UNC-Charlotte that will produce graduates who will contribute to the North Carolina construction and facilities management industries. Having worked first hand, and trained, in the Cost Engineering Division of Project Time & Cost, Inc., I have seen first hand the need for Engineering Technology Graduates to further their education beyond the bachelor level to meet our client and industry needs. The availability of the subject MS program in the Department of Engineering Technology at UNC-Charlotte will support this effort.

I graduated in 1980 from UNC-Charlotte in the Department of Engineering Technology with a Bachelor of Engineering Technology Degree of Civil Engineering.

Sincerely,

Gary B. Bradley, PE, CIT
Senior Forensic Consultant
Dr. Anthony L. Brizendine, PhD, PE  
Construction Management & Engineering Technology  
University of North Carolina at Charlotte  
9201 University City Boulevard  
Charlotte, NC 28223  

July 30, 2009  

Dear Dr. Brizendine,  

I am pleased to provide a letter of support from Charlotte Mecklenburg Schools to the University of North Carolina at Charlotte for your proposal to establish a Master of Construction and Facilities Management program.  

This program will be one of only a few true graduate level facility management programs in the country, and allow UNC Charlotte to supply a well educated facilities workforce that does not readily exist in North Carolina. A unique aspect of the MS Construction & Facilities Management program is the Construction & Facilities Management (MSCFM) Fellows Program which will provide graduate students in the MS Construction & Facilities Management program to perform project-based campus work within the Capital Projects, Design Services, Maintenance & Operations, and Planning Divisions of the Facilities Management Group at UNC Charlotte.  

Of particular interest to Charlotte Mecklenburg Schools is the potential for the MSCFM Fellows Program to be extended to serve other community organizations such as CMS, local community colleges, and other state agencies and charitable organizations in the Charlotte region.  

Sincerely,  

Guy Chamberlain  
Associate Superintendent for Auxiliary Services
June 12, 2009

Dr. Anthony L. Brizendine, PhD, PE
Professor & Chairman
Engineering Technology & Construction Management

Dear Dr. Brizendine,

Facilities Management at the University of North Carolina at Charlotte is pleased to endorse the proposal to establish the MS in Construction & Facilities Management degree program. Through our Facilities Management Department, we agree to partner with the academic program to establish the Construction & Facilities Management (CFM) Fellows Program. This is a unique aspect of the proposed program which will assist the University in meeting green construction and energy efficiency goals within the business unit of UNC Charlotte. Incorporation of the Construction & Facilities Management (CFM) Fellows Program will provide the framework for graduate students in the program to compete for and earn CFM Fellows appointments. Initially, we anticipate three appointments within the UNC Charlotte Facilities Management Department. As the program grows, additional appointments will be made.

Fellows will perform project-based campus work within the Capital Projects, Design Services, Maintenance & Operations, and Planning Sections of the Facilities Management Department at UNC Charlotte. Projects will leverage services and organizational efficiency for the institution while allowing the Fellows to complete degree requirements. CFM Fellows will typically possess a BS in Construction Management, Bachelor of Architecture, or BS in Engineering so they will possess excellent education and experience which they can bring to bear in their appointments.

I believe this program will provide excellent opportunities for your future students while also allowing them to make significant, positive contributions in construction management and facilities management to the state of North Carolina.

Sincerely yours,

[Signature]

Phillip M. Jones, P.E.
Associate Vice Chancellor Facilities Management