Ferris State University
College of Technology
Construction Technology &
Management Department

ACADEMIC PROGRAM REVIEW REPORT

AAS, Building Construction Technology
AAS, Civil Engineering Technology
BS, Construction Management

September, 2005

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BS, Construction Management

Program Review Panel:

1. **Robert Eastley, Associate Professor, PRP Chair**
2. **David Hanna, Associate Professor, Department Chair**
3. **Edward Brayton, Professor**
4. **Carl Shangraw, Assistant Professor, Surveying Dept.**

September, 2005

Acknowledgements

The committee would like to acknowledgement a couple individuals for their help.

First, thanks to Mr. Ray Dickinson for his enthusiastic support of this project and his efforts in supplying necessary Library resources and related government documents.

Secondly, special thanks to Shari Wessels, the secretary in the construction programs, for all her efforts in compiling and posting survey results.

ACADEMIC PROGRAM REVIEW REPORT
AAS BETM, AAS CETM, and BS CM PROGRAMS

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Introduction

The following report is for the BS Construction Management (CM), AAS Building Construction Technology (BCTM) and AAS Civil Engineering Technology (CETM) programs, collectively known as the Construction Technology & Management programs at Ferris. The first two years of the four-year CM degree is either the CETM or BCTM program. Therefore, the three programs have been combined for one APR report.

Prior to analyzing this report, it is important for the reader to have a basic overview of the programs' current status. First, all three programs are now housed in the newly constructed Granger Center. Over a million dollars in donations were acquired to make this arguably the finest, most well-equipped construction education center in the country.

The combined enrollment in the three programs is at an all-time high of well over 300 students. The Ferris administration has recognized the success of the programs by authorizing additional faculty positions to keep up with the teaching loads. The graduates of the programs are readily employable, and the employment rates for graduates have been 100%, or very close to it, for several years.

In addition, the programs just went through an extensive accreditation renewal through The American Council for Construction Education (ACCE). Programs evaluated for accreditation can earn a renewal ranging from one to six years depending on the number of concerns identified by the visiting ACCE team. The Ferris CM program earned the maximum six-year renewal, with absolutely no curriculum changes required. Reports must be submitted at one and three years due to a couple concerns identified by the visiting team. Specifically, they were concerned about the lack of a permanent Dean in the College of Technology and also about the lack of resources assigned to the Construction programs. They noted that a program with over 300 students needs a full-time secretary (at the time of their site visit, ours was half time).

Therefore, it is the belief of this faculty that, except for needed resources, the Construction Technology & Management programs are not only succeeding, but are some of the top programs anywhere in the United States.

ACADEMIC PROGRAM REVIEW

SECTION 1 OVERVIEW

Construction Technology & Management
Academic Program Review

Section 1: Program Overview

The following section is intended to acquaint the readers with the programs' goals, mission and history, as well as explaining the relevance of the programs in today's market, their value to the university community, and their plans for expansion and improvement.

(A) Program Goals: The Mission Statement of the Construction Technology & Management Programs is, "To educate students in Building Construction Technology, Civil Engineering Technology and Construction Management through a broad-based foundation of appropriate technical and general education courses that will provide them with highly competitive skills and knowledge, construction related employment opportunities at graduation, and the potential for advancement in their careers." This mission was written through faculty and administrative consensus.

The goals of the faculty and staff support the mission statement. It is the goal of the faculty to be the premier construction education center in the country. While this is a lofty goal, its achievement is being pursued on several levels. The new Granger Center is arguably one of the finest construction education facilities in the world. Its laboratories and computer facilities greatly enhance the delivery of education. In addition, a very energetic and proactive Advisory Committee has been instrumental in offering constructive advice and criticism. Finally, compliance with the standards of the American Council for Construction Education, the world's premier construction accrediting organization, insures that the programs remain current and viable.

Several goals have changed since the last program review. Specifically, the faculty hopes to enhance the program by initiating a Masters Degree in Construction Management. Initially, this would likely be offered through traditional delivery at the Grand Rapids campus. Eventually, it is hoped that the program would be offered on-line to a much larger audience.

It is believed that the programs are in compliance with the mission of the university, as there has been a steady upward trend in enrollment, the students receive a practical education that typically results in employment, and their skills prepare them to be immediately useful to their employers.

(B) Program Visibility and Distinctiveness: The Construction Technology & Management programs have a number of distinct characteristics. First, Ferris is one of only three accredited Construction Management (CM) programs in the State of Michigan. The other two are in southeast Michigan, making Ferris the only ACCE accredited program north of Grand Rapids. Unlike most traditional

CM programs, Ferris has two associate degree programs (Building Construction Technology and Civil Engineering Technology) which not only stand alone, but also make up the first two years of the Construction Management program. These two-year programs attract a number of students who initially feel that they only wish to pursue an associate degree. However, a large number subsequently choose to stay and earn the Bachelor of Science degree in CM. The enrollment in all programs has steadily increased over the past ten years, partly due to active recruiting and also due to the reputation of the programs. The current enrollment is well over 300 students, which is in excess of the published capacity. Over the past five years, there has been an upward trend in the ACT scores of incoming freshmen, so the program is doing very well at attracting quality students.

Another unique feature of the CM program is that it is being offered in Grand Rapids to working professionals who wish to attend night school. Typically, a total of four courses are taught per semester.

There are only two other institutions in the state that have accredited Construction Management programs. They are Michigan State University and Eastern Michigan University. Other schools, such as Western Michigan University and Michigan Technological University, have Construction Engineering programs, but these are more oriented toward design. The MSU program was only recently accredited, and is derived from a primarily residential program. The EMU program is more closely aligned with the Ferris program, as it is primarily a commercial construction program educating people to be general contractors and project managers. Both the EMU and MSU programs primarily recruit from southern and southeast Michigan, and thus are not considered a detriment to enrollment at Ferris. Neither is considered by this faculty group to be superior to Ferris in any way.

There are two-year associate degree construction programs in other institutions across the state. For example, Michigan Tech has a Civil Engineering Technology (CETM) program which, like the Ferris program, is primarily related to the highway industry. The Building Construction Technology (BCTM) program is quite unique, as there are very few associate degree programs aimed at light commercial construction. Regardless, demand for graduates exceeds the number of available graduates every year. Only a handful of BCT graduates choose to leave Ferris, but 100% typically find work. The rest continue in the CM program. However, the BCTM program acts as an important recruiting tool for students unsure they want a 4-year degree. The CETM program is very unique because students are invited to earn certifications as Aggregate Technicians and Bituminous Technicians through the Instituted for Construction Education and Training (ICET) while still at Ferris. There are typically at least three jobs waiting for every graduate, and employers desperate to hire Ferris CETM graduates.

(C) Program Relevance: Attached in the appendix is a labor market analysis from the U.S. Department of Labor and also from the official State of Michigan website. According to the U.S. Department of Labor data, the opportunities for Construction Managers (CM's) are expected to increase at an average rate compared to all occupations, with good opportunities through 2012. Median earnings are $66,280. According to the State of Michigan, average CM salaries are $86,437.

Jobs for Civil Engineering Technicians (CETM's) and Construction Inspectors (including Building Construction Technicians) are also expected to increase at the average rate of all professions, according to the Department of Labor. The State of Michigan concurs with this data, citing 70 new openings per year in Civil Engineering Technology, with median earnings of $37,720. Construction Inspectors have median earnings of $45,322.

The field of construction has a major need for graduates in the upcoming years, according to information from our advisory committee members, employers of our students, and construction professional organizations affiliated with our programs (such as the Associated General Contractors and the Michigan Asphalt Paving Association). Due to a great need for repair and replacement of infrastructure during the next few decades, it is anticipated that the demand for construction graduates and skilled craftsmen may exceed the available supply. In the Ferris CETM program, there is a large demand for qualified technicians, and not enough graduates to fill the positions.

The programs respond to emerging issues in the discipline, changes in the labor force, changes in employer needs and other factors of change in a variety of ways. First, the programs have an energized and dynamic Industry Advisory Committee that identifies the changing needs of the industry. These could include such things as computer software usage and communication skills, but also include new concepts in the industry, such as Green Construction and Superpave. Secondly, the Construction Management Program (which includes the two associate degree programs) is accredited by the American Council for Construction Education (ACCE), which is the premier accrediting body for construction programs in the United States and abroad. ACCE is comprised of both educators and industry representatives. These people are constantly examining and changing ACCE's curriculum requirements to reflect the current needs of industry. Therefore, the accreditation of the Ferris Construction Management program is a testimonial to its relevance.

The programs also respond to the changes in students' needs in several ways. Currently, all upper level Construction Management courses are offered at night in Grand Rapids to allow working professionals to continue their educations. In addition, the faculty has recently decided to investigate the implementation of an M.S. degree in Construction Management.

Students come to Ferris to pursue degrees in construction for a variety of reasons. First, an active student recruitment program made a number of students in career technical centers aware of their educational opportunities. Secondly, the Ferris construction programs have an excellent reputation as being some of the best in the country, so many parents and teachers are recommending Ferris to students. The Graduate Exit Survey and Student Program Evaluation indicate that students and graduates appreciate the hands-on, laboratory intensive coursework offered at Ferris.

(D) Program Value: The Ferris Construction programs, its facilities and personnel are a benefit to the University community in a variety of ways. First, they account for over 300 paying student customers, which is more than 17% of the College of Technology's enrollment. The programs attract transfer students from all over the university, and provide support courses for the Architectural Technology and Surveying Engineering programs. Faculty members in the Construction programs are very active in a variety of ways. Some are involved in the faculty senate. Others work with student organizations, such as the Associated Constructed Students. Another has been very involved with the Admissions office in recruiting activities.

With the construction of the new Granger Center, the students in the construction programs have the finest educational facility in the country. The building has laboratory facilities that are second to none, including four computer labs with user friendly work stations and all the latest software. Students also have access to the facility and computers at almost any time of the day and in the evenings. In addition, program faculty members are very involved with the students as academic advisors, as professional organization advisors, and as coaches for student competition teams.

The Faculty Survey is included in Section 2 of this report. The survey indicates that faculty members feel the new Granger Center is an excellent facility. In general, the concerns of the faculty are primarily related to resources. Faculty members have been teaching overloads for years, and the programs lack adequate financial and secretarial resources. In general, the Construction Department faculty believes that the Construction programs at Ferris provide a relevant education to students, and adequately prepare them for careers in the industry. Graduates are prepared to go to work and immediately be an asset to the firms hiring them. This opinion is derived from employer and advisory committee feedback. Many of the employers who hire our graduates, from prestigious firms such as Pulte Homes, Walsh Construction, and Whiting-Turner, return every year to hire more people, and indicate that Ferris is providing a superior graduate.

The programs, faculty and facilities have benefited entities external to the university in a variety of ways. First, faculty are very involved in professional organizations. These include the Associated General Contractors, the Associated Builders and Contractors, the Michigan Asphalt Paving Association and several

others. Members attend meetings and have memberships in a variety of committees. Two faculty are members of ACCE (The American Council for Construction Education), and have traveled on accreditation site visits to other institutions. Several members are active in the Associated Schools of Construction, and have coached student competition teams at the regional and national levels. At least four members regularly do consulting or provide continuing education presentations to outside groups and organizations. In addition, the building construction lab is annually used as a testing facility for those seeking to earn a Builder's License.

The Department Chair and several faculty members have regularly made recruiting trips to high schools, career technical centers and community colleges across the state. During these trips, presentations are made to explain the need for construction graduates and the opportunities available to young people in this field.

ACADEMIC PROGRAM REVIEW

SECTION 2 PERCEPTIONS

TAB 3

Construction Technology & Management
Academic Program Review

Section 2: Collection of Perceptions (Survey Results)

As specified by the Academic Program Review Guidelines, six surveys are required in this section. They include:

(1) Graduate follow-up survey
(2) Employer follow-up survey
(3) Graduate exit survey
(4) Current student program evaluation
(5) Faculty perceptions
(6) Advisory committee perceptions

The tabulated results of each survey are attached. As there were an extremely large number of surveys (approximately 300 total), it was felt that it would be appropriate to include all individual documents. Instead, the survey instruments and summary results are included in this report. The numbers of individual surveys were as follows:

(1) Graduate follow-up survey:	132
(2) Employer follow-up survey:	7
(3) Graduate exit survey:	14
(4) Current student survey:	128
(5) Faculty survey:	9
(6) Advisory committee survey:	16

Although only seven employers responded to the survey, virtually all of the advisory committee members are also employers of our graduates, and thus reinforce the perceptions listed in the employer survey.

GRADUATE SURVEY RESULTS

Academic Program Review
Graduate Survey

Please complete the following and return in provided return envelope. Please drop in mail by May 20, 2004. (In the event that you do not receive this in a timely fashion, please respond immediately- regardless of date!) Enclose any *additional* comments that you may wish to express on a separate sheet. Thank you.

A. Education

Name: _____

Degree(s) and Year(s) Received from Ferris State University:

BCT: AAS– Year _____ CET: AAS– Year _____ CM: BS– Year _____

Other degrees, corresponding year received, and institutions since high school:

Degree	Year	College/University
_____	_____	_____
_____	_____	_____

B. Current Location Information

Home Address Correction (if necessary): _____

Home Phone: _____ Work Phone: _____

Company Name: _____

Position Title: _____

Company Address: _____

_____

Email Address: _____

C. Initial Salary Range:

If you received an AAS in BCT or CET from Ferris, and then got a job base on that degree, please circle the range of your initial salary. *(Skip this question if you did not obtain a job based on a Ferris AAS in construction or if you continued school toward a BS in Construction Management)*

1 Below $20k	3 $25k to $30k	5 $35k to $40k	7 $45k to $50k
2 $20k to $25k	4 $30k to $35k	6 $40k to $45k	8 Above $50k

If you continued your education beyond the first two years (or AAS) to receive a four-year CM BS, then got a job based on your BS degree, please circle the range of your initial salary. (*Skip this question if you did not obtain a job based on a Ferris CM BS.)*

1 Below $20k	3 $25k to $30k	5 $35k to $40k	7 $45k to $50k
2 $20k to $25k	4 $30k to $35k	6 $40k to $45k	8 Above $50k

D. Current Salary Range:

1 Below $20k	3 $25k to $30k	5 $35k to $40k	7 $45k to $50k
2 $20k to $25k	4 $30k to $35k	6 $40k to $45k	8 Above $50k

E. Career Avenue which most closely describes your daily activities (circle one):

Estimating	Scheduling	Field Supervision
Construction Management	Project Management	Company Management
Marketing/ Sales	Other _____	Company Ownership

Construction Technology and Management
Graduate Survey

F. Scientific and Technical Topics for Your Career:
Mark the two columns next to each topic as follows:

Relevance
Under Column A, rate the relevance of the topic to your career using:
5 = Very Important, 4 = Important, 3 = Relevant, 2 = Not Very Relevant, 1 = Unimportant

Preparation
Under Column B, rate the preparation that you received from your construction program using: 5 = Very Well Prepared, 4 = Well Prepared, 3 = Fairly Prepared, 2 = Barely Prepared, 1 = Poorly Prepared, N/A = Not Applicable

A	B		A	B	
_____	_____	Business Law	_____	_____	Marketing & Selling
_____	_____	Communication- Oral & Public Speaking	_____	_____	Materials Properties & Testing
_____	_____	Communication- Written	_____	_____	Mathematics
_____	_____	Computer Applications- CAD Software	_____	_____	Mechanical & Electrical Systems
_____	_____	Computer Application- Office Software	_____	_____	Pavement Design & Construction
_____	_____	Computer Applications- Technical Software	_____	_____	Physics
_____	_____	Construction Administration	_____	_____	Plan Reading
_____	_____	Construction Practices	_____	_____	Productivity
_____	_____	Contracts & Specifications- Interpretation	_____	_____	Project Management
_____	_____	Contracts & Specifications – Writing	_____	_____	Quality assurance & Quality Control
_____	_____	Economics- Construction	_____	_____	Safety
_____	_____	Economics- Macro	_____	_____	Scheduling
_____	_____	Estimating- Costing	_____	_____	Soils & foundations
_____	_____	Estimating- Quantity Takeoffs	_____	_____	Statistics & Strength of Materials
_____	_____	Field Engineering	_____	_____	Structural Analysis
_____	_____	Framing –Steel & Wood	_____	_____	Supervision
_____	_____	Highway Technology	_____	_____	Surveying
_____	_____	Hydraulics & Hydrology	_____	_____	Total Quality Management
_____	_____	Issues in Construction	_____	_____	Value Engineering

Average rate for Relevance (Column A): _____
Average rate for Preparation (Column B): _____
Maximum Delta for Preparation- Relevance: _____
Minimum Delta for Preparation- Relevance: _____

Salary Results

Average Total

	4	Initial Salary 2 yr	(30 - 35,000)
	4	Initial Salary 4 year	(30 - 35,000)
	7	Current Salary	(45 - 50,000)
	5	Career Avenue	N/A

		Based on Relevance of the topic to your career
Average	**Total**	
	3	Business Law
	5	Communication - Oral & Public speaking
	5	Communication - Written
	3	Computer Applications - CAD Software
	4	Computer Application - Office software
	4	Computer Applications - Technical
	4	Construction Administration
	4	Construction Practices
	5	Contracts & Specifications Interpretation
	4	Contracts & Specifications - Writing
	3	Economics - Construction
	3	Economics - Macro
	4	Estimating - costing
	4	Estimating - quantity Takeoffs
	4	Field Engineering
	4	Framing - Steel & Wood
	2	Highway Technology
	2	hydraulics & Hydrology
	4	Issues in Construction
	4	Marketing & Selling
	3	Materials Properties & Testing
	4	Mathematics
	4	Mechanical & Electrical Systems
	2	Pavement Design & Construction
	3	Physics
	5	Plan Reading
	4	Productivity
	5	Project Management
	4	quality Assurance & quality Control
	5	Safety
	5	Scheduling
	4	Soils & Foundations
	3	Statistics & Strength of Materials
	3	Structural Analysis
	4	Sup[ervision
	3	Surveying
	4	Total Quality Management
	4	Value Engineering
	144	Total
	3.80	Average

Based on Preparation that you received from your program.

	Average Total			
	3	Business Law		
	4	Communication - Oral & Public speaking		
	4	Communication - Written		
	3	Computer Applications - CAD Software		
	4	Computer Application - Office software		
	4	Computer Applications - Technical		
	4	Construction Administration		
	4	Construction Practices		
	4	Contracts & Specifications Interpretation		
	4	Contracts & Specifications - Writing		
	3	Economics - Construction		
	3	Economics - Macro		
	4	Estimating - costing		
	4	Estimating - quantity Takeoffs		
	4	Field Engineering		
	4	Framing - Steel & Wood		
	3	Highway Technology		
	3	hydraulics & Hydrology		
	4	Issues in Construction		
	3	Marketing & Selling		
	4	Materials Properties & Testing		
	4	Mathematics		
	3	Mechanical & Electrical Systems		
	3	Pavement Design & Construction		
	3	Physics		
	4	Plan Reading		
	4	Productivity		
	4	Project Management		
	4	quality Assurance & quality Control		
	4	Safety		
	4	Scheduling		
	4	Soils & Foundations		
	4	Statistics & Strength of Materials		
	4	Structural Analysis		
	4	Sup[ervision		
	4	Surveying		
	4	Total Quality Management		
	4	Value Engineering		
	134	Total		
	3.70	Average		

EMPLOYER SURVEYS

TAB 5

FERRIS STATE UNIVERSITY
BCTM/CETM
EMPLOYER SURVEY *RESULTS*

Your firm has been identified as having hired at least one graduate of the *A.A.S Degree Civil Engineering Technology or Building Construction Technology* program at Ferris State University. Please take a couple minutes to complete the survey. Responses may be filled out by hand and sent to the address below. They may also be sent as an e-mail attachment. This information is very important to us, so we would appreciate your timely response.

Robert Eastley
209 Granger Center
Ferris State University
Big Rapids, MI 49307
(231) 591-2369
eastleyr@ferris.edu

FSU Construction Management Employer Survey

Name of firm:

Type of firm:

Address:

Contact name:

Contact e-mail:

Contact phone number:

Number of **CET** graduates employed by firm:

Number of **BCT** graduates employed by firm:

For each of the questions, please give a response of 1 to 5, with 5 being the highest response, or list N/A if not applicable.

5: Strongly Agree 4: Agree 3: Neutral 2: Disagree 1: Strongly Disagree N.A.: Not Applicable

Ferris BCT/CET graduates are adequately prepared in the following areas:

__3.7_ (1) Written communication skills
__3.0_ (2) Oral presentation skills
__3.7_ (3) Computer software competency
__3.3_ (4) Contract documents
__3.5_ (5) Bidding strategies
__4.0_ (6) Construction safety
__3.7_ (7) Estimating
__3.7_ (8) Hands-on practices
__4.0_ (9) Engineering principles
__4.0_ (10) Surveying and layout
__3.7_ (11) Construction inspection
__4.0_ (12) Blueprint reading

CET Graduates Only:
__---_ (13) Material properties and testing
__3.0_(14) Highway technology
__3.0_(15) Hydraulics principles

BCT Graduates Only:
__4.0 _ (16) Field engineering
__4.0_ (17) Mechanical/electrical plans and systems
__4.0_ (18) Wood and steel framing

All Graduates:
__4.7 _ (19) Ferris graduates are properly prepared to go to work.
__4.7 _ (20) I would hire another Ferris graduate.

Written Comments:
Program Strengths: No written comments

Program Weaknesses:

Other Comments:

FERRIS STATE UNIVERSITY
CONSTRUCTION MANAGEMENT
EMPLOYER SURVEY *RESULTS*

Your firm has been identified as having hired at least one graduate of the *Bachelor of Science Construction Management* program at Ferris State University. Please take a couple minutes to complete the survey. Responses may be filled out by hand and sent to the address below. They may also be sent as an e-mail attachment. This information is very important to us, so we would appreciate your timely response.

Robert Eastley
209 Granger Center
Ferris State University
Big Rapids, MI 49307
(231) 591-2369
eastleyr@ferris.edu

FSU Construction Management Employer Survey

Name of firm:

Type of firm:

Address:

Contact name:

Contact e-mail:

Contact phone number:

Number of graduates employed by firm:

For each of the questions, please give a response of 1 to 5, with 5 being the highest response, or list N/A if not applicable.

5: Strongly Agree 4: Agree 3: Neutral 2: Disagree 1: Strongly Disagree N.A.: Not Applicable

Ferris Construction Management graduates are adequately prepared in the following areas:

__3.8 _ (1) Written communication skills
__3.0_ (2) Oral presentation skills
__4.5_ (3) Computer software competency
__4.7_ (4) Project management
__4.0 _ (5) Contract documents
__4.7 _ (6) Bidding strategies
__3.3 _ (7) Employee supervision
__4.3 _ (8) Construction safety
__4.3_ (9) Estimating
__4.3 _ (10) Scheduling
__4.0 _ (11) Hands-on practices
__4.0 _ (12) Engineering principles
__4.3 _ (13) Surveying and layout
__3.3 _ (14) Business principles
__4.5 _ (15) Blueprint reading

__4.5 _(16) Ferris has an excellent Construction Management program.
__4.5 _(17) Ferris CM graduates are properly prepared to go to work.
__4.5 _(18) I would hire another Ferris CM graduate.

Written Comments: (All comments listed)

Program Strengths: *(1) Technical side of things, overall project management. (2) Students prepared for Business and Management better than grads from other programs. (3)Good attitudes, well-rounded, ready to get up to speed quickly*
Program Weaknesses: *(1) Contract documents, purchase agreements; teach how to conduct preconstruction, progress, close out meetings. (2) Students are better prepared with hands-on skills than other students. However, this seems to be less and less the case lately.*
Other Comments: *(1) Excellent program (2) Overall a very strong program*

GRADUATE EXIT SURVEY

Student Exit Assessment
CONSTRUCTION DEPARTMENT

Dear graduating senior:

Congratulations on your upcoming graduation from our program. You are to be commended for your academic accomplishments in our program. You are also at a special point in time to offer our departmental faculty timely feedback and assessment of your undergraduate education experience.

Please consider carefully the following questions and answer appropriately. Your answers will be kept confidential and only used to develop a general understanding of student assessment. We ask for employment information, including salary, to develop a yearly average for future seniors to use in their employment negotiations and to contact you in the future. Again, all information will be kept confidential.

Please know that your input to be provided below is very important to us. You are in a unique position because of your current experience to directly affect the quality of education provided by our department. Thank you for your contribution.

Sincerely,

David Hanna, Chair
Construction Department

CURRICULA

Please describe your assessment of our curricula (specific course material and sequencing of courses)

Course content:

Course sequencing:

Academic rigor of coursework:

Other elements:

STUDENT LIFE

Please describe your experience as life on campus as a construction student:

Student organizations: ACS SLC
(Circle each organization if you
Were an active member)

Student Competitions:

Associated Schools of Construction

Mechanical Contractors Association

National Association of Homebuilders

PROGRAM FACILITIES

Please describe your assessment of any aspect of program facilities:

Labs

Classrooms

Textbooks

Computer equipment

Other (please specify)

STUDENT ADVISING

Please describe your experience with our department advising system:

Was your advisor helpful ?

Was your advisor knowledgeable ?

Was your advisor accessible ?

What impact did assistance in the department office play in your experience?

SUGGESTED IMPOROVEMENTS

Courses

Textbooks

Course sequencing

Course scheduling

Classrooms

Labs

Other

THINGS WE SHOULD MAINTAIN AS IS

OPEN RECOMMENDATIONS

OPEN COMMENTS

EMPLOYMENT

Name of employer:

Address of employer:

Size of employer by number of employees: (approximate)

Employer phone number:

Job title:

Position salary:

Description of duties:

Any other information you wish to share on your upcoming employment:

Fall 2004 Semester

Student Exit Assessment

Summary of Results

SUMMARY

Number of student assessments	14
Number of students in CONM 499, Fall 2004	14

Assessment conducted in CONM 499 with final examination

STUDENT ASSSSMENT CATEGORIES:

I. CURRICULA
II. STUDENT LIFE
III. PROGRAM FACILITIES
IV. STUDENT ADVISING
V. SUGGESTED IMPROVEMENTS
VI. THINGS WE SHOULD MAINTAIN AS IS
VII. OPEN RECOMMENDATIONS
VIII. OPEN COMMENTS
IX. EMPLOYMENT

Submitted to: Faculty, Construction Department

Submitted by: David Hanna, Chair, Construction Department

Date distributed: 29 December 2004

I. CURRICULA

Course Content: Overall a source of satisfaction. Respondents thought the content well balanced and a good preparation for internships or full-time employment.

Specific comments:

Add more material to CONM 423
More material desired in the MEP areas
More material desired on specifications

Course Sequencing: Respondents thought sequencing was logical, relevant, and well thought out.

Specific comments:

Place CONM 423 earlier in the program

Academic Rigor: More of a range of reactions to this category. See below:

Specific comments:

Overwhelming, but worth it
Courses range from easy to challenging
Some courses could demand more
Too much busywork in some classes
Balance across the program needed

Other Elements: Specific comments:

Professors are interested in what they teach
Teaching quality is excellent
Work is needed on non-construction classes
Enjoyed small class sizes
Desire a course in interviewing, resume building, etc.

II. STUDENT LIFE

Participation in organizations	ACS		SLC
	11		6
Participation in student competitions	ASC	MCA	NAHB
	1	0	1

III. PROGRAM FACILITIES

Laboratories All thought the labs were excellent and state of the art.

Specific comments:

Computer labs should be open at all times.

Classrooms: All thought the classrooms were well equipped with AV equipment and the right size for effective learning.

Textbooks: The area of highest dissatisfaction. All but one respondent cited lack of use of required texts as a deficiency, accompanied by the high costs of texts.

Specific comments:

Resale of books is organized crime
The CONM 311 text should not be sold in the bookstore
Have texts that can be used in more than one course
Coursepacks are a good idea

IV. STUDENT ADVISING

Summary	Yes	No/Not Available
Advisor helpful	12	2
Advisor knowledgeable	13	1
Advisor accessible	12	2

Specific comments:

Good help from Profs on scholarships & scheduling
Prof. Templin cited for excellent advising
Need to monitor transfer students closely
Department Chair availability without an appointment was very helpful and important

V. SUGGESTED IMPROVEMENTS

Courses: Specific comments:

CONM 423 out of date
CONM 111 needs updating
CONM 222 needs more focus on fewer topics
Expand time in CONM 412
Project plans need to be more readable
More material on MEP areas desirable
Separate coursework on industry software
Hands on drafting course needed (this respondent had 2 drafting classes prior to coming to FSU and said that "the drafting classes opened the world of construction to me")

Texts: Specific comments:

Use the book (multiple citations)
Use the required text
Stop using the Barnes & Noble bookstore

Sequencing: Specific comment:

Have more computer work near the end of the program

Scheduling: Specific comments:

Make classes more available
Revise the MTWR format to two days per week

VI. THINGS WE SHOULD MAINTAIN AS IS

Specific comments:

Retain the emphasis on hands-on basics
Size of the classes (teachers know who you are)
Well run program-keep it as is
Student/professor relationship
Open lab hours
Teachers who have real industry experience

VII. OPEN RECOMMENDATIONS

Specific comments:

Continue to emphasize technology whenever possible
In upper level testing focus more on testing for grading than on tedious homework
Need to keep the work level difficult to keep the degree serious and weed out students who are not serious and won't represent the program well in industry
Professor should not talk down to students
Have more companies come to FSU to recruit
Have other faculty sit in on classes to review course criteria and make suggestions to Instructors
Mr. Kantorowski is a good teacher who strives to do better and takes a lot of pride in his work. He cares about student success academically and personally –he will be an asset to the CM program and FSU

VIII. OPEN COMMENTS

Specific comments:

Remove the on-campus computer registration pre-requisites for enrollment
A couple teachers need to work harder at returning graded work-they owe it to their students, it's their job

IX. EMPLOYMENT

Type of employer:

General Contractor:	5
Construction Management:	3
Home Builder:	1
Self-employed:	1
Family Business:	1
Equipment Co.:	1

IX. EMPLOYMENT (continued)
Starting Salary:

Range:	$ 36,000-63,000
	$ 36,000-48,000 construction only
Average:	$ 46,000
# Data points:	10
Average Construction only	$ 44,111

Employer Profiles:

Michigan	Three Rivers/Midland
	Allen Edwin Homes/Portage
	GDK/Holland
	Carpentry firm
	Self-employed
	DeMaria
Non-Michigan	Walsh Construction (2)/Chicago
	Leica
	McCarthy/St. Louis
	Whiting-Turner/Baltimore
	PCI/ Fayetteville, GA

CURRENT STUDENT SURVEY

CONSTRUCTION TECHNOLOGY & MANAGEMENT
CURRENT STUDENT SURVEY *RESULTS*

The following survey is intended to measure your perceptions of the program and your general satisfaction with the curriculum, the facilities and the faculty at Ferris.

Name (optional): _____

Program: _____

Class: _____

Please rate the following questions on a scale from 1-5. **5=Strongly Agree. 4=Agree. 3=Neutral. 2=Disagree. 1-Strongly Disagree. List N/A if not applicable.**

Questions 1-17 pertain to the curriculum.

I am satisfied with the education I received in the following areas:

1. _____ Hands-on practices
2. _____ Interpreting blueprints and specifications
3. _____ Construction computer applications
4. _____ Program specific CET courses (Adv. Materials, Hydraulics, Highway Tech., etc.)
5. _____ Program specific BCT courses (Framing, Mech/Elect, Field Eng., etc.)
6. _____ Engineering principles (e.g., Statics, Structures, Formwork, Soils)
7. _____ Mathematics and science
8. _____ Written communications
9. _____ Oral communications
10. _____ Business principles (e.g., MGMT, MKTG, STQM, BLAW)
11. _____ Construction accounting
12. _____ Contracts
13. _____ Construction economics
14. _____ Estimating
15. _____ Scheduling
16. _____ Safety
17. _____ General education courses

The following pertain to facilities, faculty, and overall perceptions.

18. _____ My academic advisor was helpful and professional.
19. _____ The faculty in Construction are an asset to the program.
20. _____ The faculty outside my program were excellent.
21. _____ The Granger Center is an excellent teaching facility.
22. _____ The equipment and facilities in Granger are excellent.
23. _____ My overall perception is that the Construction programs are excellent.
24. _____ I would recommend the Construction programs to a friend.

Other comments:

Questions	Averages
1. Hands- on practices	4
2. Interpreting blueprints and specifications	4
3. Construction computer applications	4
4. Program specific CET courses	2
5. Program specific BCT courses	4
6. Engineering principles	4
7. Mathematics and Science	4
8. Written Communications	4
9. Oral Communications	3
10. Business principles	3
11. Construction Accounting	2
12. Contracts	3
13. Construction economics	3
14. Estimating	4
15. Scheduling	3
16. Safety	3
17. General education	3
18. May academic advisor was helpful and professional	4
19. The faculty in Construction are an asset to the program	4
20. The faculty outside my program were excellent	3
21. The Granger Center is an excellent teaching facility	5
22. The equipment and facilities in Granger are excellent	5
23. My overall perception is that the Construction programs are excellent	4
24. I would recommend the Construction programs to a friend	5

Overall Average 1-17	3.352941
Overall Average 18-24	4.285714

FACULTY SURVEY

TAB 8

Faculty Survey
Construction Department
May 2004

Please circle the appropriate response indicating how much you agree or disagree with each of the statements, based on the following scale:

5	Strongly agree with the statement
4	Agree with the statement
3	Neutral with the statement
2	Disagree with the statement
1	Strongly Disagree with the statement
N/R	No Response to the statement

Survey Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Response
1. The Granger Center facilities are adequate.	8	0	0	0	0	0
2. Student advisory loads are reasonable.	1	1	1	4	1	0
3. The Construction Department (CD) is well represented on the COT Curriculum Committee.	1	4	1	0	0	2
4. The CD is well represented on the COT promotion committee.	1	4	2	0	0	1
5. The CD curriculum review process is effective.	1	2	5	0	0	0
6. There are sufficient meeting times for the CD faculty.	0	1	1	5	1	0
7. Student advisory loads are reasonable.	1	1	1	2	1	2
8. Course assignments are appropriate.	1	6	0	0	0	1
9. Course assignments are equitable.	1	4	2	0	0	1
10. Faculty teaching loads are appropriate.	0	1	0	4	3	0

11. Course textbook approval policy is appropriate.	1	5	1	0	0	1
12. Travel funds are sufficient.	1	2	2	2	1	
13. Representation in professional societies by faculty is adequate.	1	2	1	2	1	1
14. Faculty collegiality is appropriate.	0	4	2	1	1	0
15. The Chair has done an effective job.	0	4	3	1	0	0
16. The CD receives a proper share of COT resources.	0	2	1	3	2	0
17. The CD has enough visibility in the construction industry.	0	3	1	4	0	0
18. The CD industry board does an effective job.	0	5	1	1	0	1

Open-Ended Questions

Please list (at least) the 3 most positive features of being a faculty member in the CD

1. Student interaction/development
2. Ability to reinforce learning needs based on experience
3. Ability to network and showcase students to industry
4. The opportunity to interact with students and pass on your knowledge to them.
5. The new building facilities are a real asset to give adequate classroom space and lab equipment, an identity to the program and to no longer have to run all over campus to get to class.
6. Also, faculty are now more available for students
7. Teaching is rewarding
8. Contact with students
9. Excellent program
10. Good facilities
11. Adequate funding
12. Being part of a growing program.
13. Having excellent teaching facilities.
14. Interaction with students.
15. "Teaching"
16. "Applied" Educational mission
17. New & state of the industry facilities.
18. Working with the students

19. Additional initiatives in areas of environmental CM and synergistic opportunities with HVACR/EHSM.

Please list the 3 most negative aspects of being a faculty member in the CD

1. Nothing to do between 12am and 4 am
2. Faculty loads (teaching & advisory)
3. Finding time/funds to attend professional development
4. Need more meeting time as faculty sometimes during the year to work out issues.
5. Need more faculty in the department to ease overloads and demands that pull a person in too many directions, including student advising.
6. Overloads
7. Lack of leadership at Dean's level
8. Lack of faculty harmony
9. Ownership of classes
10. Workload is excessive
11. Not always aware of what other faculty are doing.
12. Teaching Loads – No time for additional initiatives or scholarly activities.
13. Advisee loads – Difficult for us to spend as much time as we would like to mentor students.
14. Time – Not enough time to do all we would like to do.
15. Secretarial support – Inadequate! The 2nd largest department in the College of Technology has been required to share ½ of a secretary.
16. The Granger facility with the exposure of all construction elements.
17. All classrooms and offices under one roof.
18. Separate labs for construction practices, soils lab and the Klett Family materials lab.

Please describe the most significant accomplishments of the CD in the past few years:

1. Granger Center
2. New Building
3. New building
4. Increasing enrollment
5. Securing funding for new building
6. Student competitions
7. Extension to Grand Rapids
8. New building
9. Completion of Granger Center
10. Growth in enrollment and addition of new courses.
11. The design, building, and occupation of the Granger Center for Construction and HVACR.
12. The new Granger Facility

Please describe the most significant disappointments of the CD in the past few years:

1. Granger Center
2. Inability to gain more full-time permanent tenure-track positions
3. Not getting more faculty positions
4. Lack of time for professional interests due to constant overloads
5. Lack of adequate funding
6. Inability to hire qualified individuals for faculty. Pay scale has a lot to do with that.
7. Lack of Leadership in the College of Technology.

Please describe those issues that needed to be addressed in the upcoming academic year:

1. New faculty position
2. Faculty positions to be filled
3. Dean of COT
4. Funding
5. Changes in course outlines
6. Faculty teaching loads.
7. Continued growth of program
8. Increased funding for adjunct pay.
9. Adjuncts.
10. Matters in CM need to be revisited after ACCE & APRC.
11. Additional faculty to replace a vacancy
12. Additional faculty

Please describe the issues of long-term importance to the CD:

1. Obtain more faculty resources (positions and professional development funds)
2. Funding for program
3. Faculty development
4. Control the growth and increase standards.
5. Continued growth
6. Growth – control and/or support
7. Raise the entry standards for entry into CM

What are your thoughts on the CD mentoring process for tenure?

1. Needs to be stronger in the early years of the process
2. It is inconsistent in the past in that some faculty had an involved and open relationship with their mentor, and others not so. I think David will be more disciplined in this regard for future years than Bob was I the past.
3. OK. Still needs improvement
4. Good process.
5. Needs to be formalized.
6. Needs to be greatly expanded.

What are your thoughts in COT wide cross-disciplining common subjects (such as static's, engineering economics, etc.)?

1. I think that we need to investigate this opportunity.
2. Poor idea. We need program specific courses.
3. Excellent responses to resource management
4. Can be considered, provided that student needs of various programs are met.
5. Should be done. Without increased funding this is the next method of handling loads for low-enrollment sections.
6. Static's and Engineering Economics can be integrated to core classes in the College of Technology.

Please discuss any other issue of concern:

1. Format of this survey makes it impossible to be completely candid.

ADVISORY COMMITTEE SURVEY

TAB 9

Advisory Committee Survey
For The Ferris State University
Building Construction Technology (BCT) Program

	The following results are based upon survey given on 5/07/04.	Excellent	Good	Average	Below Average	Poor	N/A
1.	The BCT program provides the skills and training needed by the industry.	8	4	1	1	0	0
2.	There is a high demand for students from this program.	7	5	1	1	0	0
3.	Your company would hire a student from this program.	7	4	1	0	0	2
4.	The program provides an adequate number of graduates.	3	7	2	0	0	2
5.	The program has adequate computer facilities.	6	5	0	0	0	3
6.	The program has adequate laboratory facilities.	7	3	0	0	0	4
7.	The program has adequate number of faculty.	1	4	5	4	0	0
8.	The program's curriculum meets the needs of the industry.	3	9	1	1	0	0
9.	The program's faculty have adequate academic credentials and experience.	8	4	2	0	0	0
10.	The program's faculty have adequate institutional support for professional development and continuing education.	2	6	3	0	1	2
11.	The graduates of the program are properly prepared to go to work.	5	7	2	0	0	0
12.	The graduates of the program are competitive with graduates of similar programs from other universities.	7	5	1	0	0	0
13.	The program receives adequate financial support from the university.	0	4	5	0	0	5
14.	The American Council for Construction Education (ACCE) accreditation is vitally important to the success of the program.	10	4	0	0	0	0

Advisory Committee Survey
For The Ferris State University
Civil Engineering Technology (CET) Program

Please circle the appropriate response, with a score of "5" being excellent and "1" being poor. If a question is not applicable, or you don't know the answer, please respond "N/A".

		Excellent	Good	Average	Below Average	Poor	N/A
1.	The CET program provides the skills and training needed by the industry.	4	8	1	0	0	3
2.	There is a high demand for students from this program.	4	5	2	0	0	4
3.	Your company would hire a student from this program.	2	2	2	0	0	8
4.	The program provides an adequate number of graduates.	0	4	5	0	0	5
5.	The program has adequate computer facilities.	3	4	1	0	0	5
6.	The program has adequate laboratory facilities.	5	3	0	0	0	4
7.	The program has adequate number of faculty.	0	2	3	3	0	5
8.	The program's curriculum meets the needs of the industry.	1	8	1	0	0	4
9.	The program's faculty have adequate academic credentials and experience.	6	4	1	0	0	3
10.	The program's faculty have adequate institutional support for professional development and continuing education.	0	4	3	0	1	6
11.	The graduates of the program are properly prepared to go to work.	4	5	1	0	0	3
12.	The graduates of the program are competitive with graduates of similar programs from other universities.	4	6	0	0	0	4
13.	The program receives adequate financial support from the university.	0	2	4	0	0	8
14.	The American Council for Construction Education (ACCE) accreditation is vitally important to the success of the program.	7	4	0	0	0	3

Advisory Committee Survey
For The Ferris State University
Construction Management (CM) Program

Please circle the appropriate response, with a score of "5" being excellent and "1" being poor. If a question is not applicable, or you don't know the answer, please respond "N/A".

		Excellent	Good	Average	Below Average	Poor	N/A
1.	The CM program provides the skills and training needed by the industry.	11	3	0	0	0	0
2.	There is a high demand for students from this program.	12	1	1	0	0	0
3.	Your company would hire a student from this program.	10	3	0	0	0	3
4.	The program provides an adequate number of graduates.	3	8	1	0	0	2
5.	The program has adequate computer facilities.	7	4	0	0	0	2
6.	The program has adequate laboratory facilities.	10	1	2	0	0	1
7.	The program has adequate number of faculty.	1	5	4	4	0	0
8.	The program's curriculum meets the needs of the industry.	4	8	1	1	0	0
9.	The program's faculty have adequate academic credentials and experience.	9	1	2	0	0	0
10.	The program's faculty have adequate institutional support for professional development and continuing education.	1	6	3	1	0	3
11.	The graduates of the program are properly prepared to go to work.	6	7	1	0	0	0
12.	The graduates of the program are competitive with graduates of similar programs from other universities.	9	5	0	0	0	0
13.	The program receives adequate financial support from the university.	0	5	5	1	0	3
14.	The American Council for Construction Education (ACCE) accreditation is vitally important to the success of the program.	13	1	0	0	0	0

ADDITIONAL COMMENTS BCTM PROGRAM

1. Question 8. Need BCM Degree

2. Question 10. A Dean is needed for direction!

3. I have serious problem with information example in Question 5, 6, 11 and 13.

ADDITIONAL COMMENTS CETM PROGRAM

1. Not familiar enough with CET to make comment.

2. Question 10. A Dean is needed for support!

3. I have need to have more information on Question 4, 7, 8, 10 and 11.

ADDITIONAL COMMENTS CM PROGRAM

1. It is interesting to note that there seems to be a lack of knowledge of the program, or that graduates do not speak up about their education. It is easy to find graduates of MSU or other places because they tend to mention that up front..."I graduated from MSU, and I think that ..." So how do you instill a broader sense of pride so that word goes out more rapidly?

2. Question 10. A Dean's oversight is needed!

ADDITIONAL COMMENTS GENERAL

1. Ferris graduates are generally more equipped to take on real world positions than some of the other university programs. There is a definite bias toward careers rather than theory...This is a good thing!

2. I have a couple areas of concern.

   a. With regard to the four-year programs, in the residential end of the construction industry it has been my experience that degreed students have an expectation of owning their own company one day. IT would be nice to include some business related courses and link them to the industry. One of members commented to me that while he holds a Masters Degree in Construction, he struggles just reading a balance sheet.

b. Secondly, certainly the courses offered apply across the board to the industry as a whole. However, there is little emphasis on the residential side. Just a thought.

ACADEMIC PROGRAM REVIEW

SECTION 3 PROGRAM PROFILE

TAB 10

Construction Technology & Management
Academic Program Review

Section 3: Program Profile

The following information pertains to the profile of students, program enrollments, program capacities, student success and retention, access to courses, curriculum requirements, quality of instruction, faculty quality and workloads, assessment and administrative effectiveness.

(A) Profile of Students:

(1) Student Demographic Profile

(a) Gender, Race/Ethnicity and Age: *Construction Management (2004):* Considering only technical students, the average age of all CM students was 22.7 years. 14 of 253 students were female, and 12 of 253 reported being non-white. *Building Construction Technology Students (2004):* The average age was 19.8 years. One of 40 students was female. 3 of 40 students reported being non-white. *Civil Engineering Technology (2004):* The average age was 19.9 years. Zero of 14 students were female. One of 14 reported being non-white.

(b) In-State and Out-of-State: In 2004, 15 of 253 Construction Management students were non-residents. All 14 Civil Engineering Technology students were residents. 2 of 40 Building Construction Technology students were non-residents.

(c) Full-Time and Part-Time: In 2004, 27 of 253 CM students were part-time. 1 of 40 BCTM students was part-time. All 14 CETM students were full-time.

(d) Class Attendance: Construction classes are offered during the day on the Big Rapids campus and in the evening at the Grand Rapids ATC campus. There are no weekend classes. A total of 21 out of 253 students in Construction Management took evening classes in Grand Rapids in 2004. All CETM and BCTM students were enrolled in Big Rapids.

(e) Course Delivery: There are no on-line courses in the Construction programs.

(f) Impacts of Student Profiles on Curriculum, Scheduling and Delivery Methods: Because all Grand Rapids students are working professionals, courses must be scheduled in the evening. The faculty is exploring a possible Masters degree in CM which eventually would be offered on-line.

(2) Quality of Students:

(a) Ranges and Average GPA's and ACT's of Current Students: The 2004 Construction Management (CM) students had an average GPA of 2.878 and an average ACT score of 19.7. The

Civil Engineering Technology (CETM) students had an average GPA of 2.741 and an average ACT of 21.2. The Building Construction Technology (BCTM) students had an average GPA of 2.743 and an average ACT of 19.6. All three have an increase in ACT scores of 1 to 3 points since 2000, indicating a significant increase in the quality of students.

(b) Ranges and Average GPA's and ACT's of Graduates: The 2004 average ACT of CM graduates was 17.8, down from 18.1 in 2000. Their average GPA was 3.009, compared to 3.000 in 2000. The average ACT of BCTM students was 18.2, compared to 17.2 in 2000. Their average GPA was 2.99, compared to 2.89 in 2000. The average ACT of CETM students was 18.7, compared to 17.3 in 2000. Their average GPA was 3.146, compared to 2.81 in 2000. The only surprise was the relatively low ACT of CM graduates. Students entering CM with a math ACT of under 19 are pre-technical students. This low composite ACT score indicates little correlation between ACT score and the chance for success.

(c) All students entering the BCTM, CETM or CM programs must have a math ACT of 19, or complete MATH 110 with a C- or better before they may take technical courses. In addition, all students entering the third year CM courses must have a minimum 2.30 GPA, have completed all freshman and sophomore coursework, and have earned a C- or better in MATH 126.

(d) Construction students have earned a large number of scholarships. These include several which are offered through the program, from money raised at our annual golf outing. However, several students have competed for and earned national or regional scholarships from the Associated General Contractors AGC), the National Association of Women in Construction, the local Home Builders, and others. These awards have increased the visibility of the Ferris Construction programs.

(e) The Ferris Construction students have participated in a variety of other scholarly activities. For example, they have helped to staff Safety Day for the AGC. In addition, Ferris has sent up to three teams (of six students each) annually to the Associated Schools of Construction Project Management Competition, where they have competed regionally and nationally against other construction programs. Again, this sort of exposure helps to raise awareness of the programs at Ferris.

(f) Other accomplishments of the Construction students at Ferris include the activities of the professional student organization, the Associated Construction Students (ACS). They have participated in a variety of functions, including Adopt a Highway

and Habitat for Humanity, which help create a positive image for the programs.

(3) Employability of Students:

(a) The 2002-03 Graduate Follow-up Survey Report indicates that 100% of CM graduates found employment at an average salary of $46,200. Also, 100% of BCTM students found employment at an average salary of $33,100. The report also shows that 75% of CETM graduates found employment. However, only 4 students reported, with one not finding employment. Our internal surveys indicate 100% of CETM students finding work or continuing their education every year for the past five years.

(b) As noted above, 2002-03 average starting salaries were $46,200 for CM students and $33,100 for BCTM students. The book doesn't list CETM salaries. Our internal data indicates an average starting salary of $31,500.

(c) Typically, all students found full-time employment, and none were employed as temporary or part-time employees.

(d) Career assistance is available at Ferris both through the Job Fairs and also through Career Services, where students may sign up for interviews. In addition, some interviews are arranged directly through the Construction office. Assistance in résumé preparation is available through program faculty. In general, students seem to appreciate the available career assistance.

(e) Again according to our internal data, virtually all construction graduates continue to remain employed in the construction industry. Those that enter the field are very career-focused.

(f) The majority of Construction graduates are employed in Michigan. However, a significant number have left the state, due in part to active on-campus recruiting by firms like Turner Construction, Whiting-Turner and Walsh Construction. Therefore, therefore, there are graduates located all over the United States.

(g) The majority of graduates earn B.S. degrees in Construction Management and go to work. Of the students who leave Ferris after earning a two-year BCTM or CETM degree, a small number (one or two annually) choose to continue their educations by earning the CM degree in Grand Rapids. A small number of CM graduates have also continued to earn degrees in Education, MBA's, etc.

(h) Most additional education is either earned in Grand Rapids, where Ferris offers evening CM classes, or at institutions near the graduates' places of employment.

(B) Enrollment

(1) The enrollment in the programs is expected to steadily increase. The FSU Fact Book indicates a total 2004-05 CM enrollment (excluding pre-technical students) of 253 students. The total BCTM enrollment is 40. The total CETM enrollment is 14. It would appear that there is an enrollment issue in the CETM program. However, the total CM enrollment includes 11 Construction Management Highway/Bridge Track students, which are students going through the CETM program as the first two years of the CM program. As a result, the four distinct CETM classes have actually gone from enrollments of 6-8 students to enrollments of 16-20 students during the last five years. As these are lab based courses, we are now (for the first time) experiencing the need to offer additional CETM sections.

(2) The total enrollment in CM has increased from 212 to 253 (19.3%) since 2000-01. SCH's have increased from 3177 to 3635 (14.4%). The total enrollment in BCTM has increased from 28 to 40 (42.9%) since 2000. SCH's have increased from 409 to 611 (49.4%). The total CETM enrollment has increased from 11 to 14 (27.3%). SCH's have increased from 149 to 198 (32.9%).

(3) According to information obtained from the Admissions office, the following data pertains to the 2004-05 school year. First, for Construction Management, a total of 199 students applied. Of these, 120 (60.3%) were admitted, and 80 (66.7% of admitted students) enrolled at Ferris. In the Civil Engineering Technology program, 28 applied. Of these, 12 (42.9%) were admitted, and 6 (50% of accepted students) enrolled. In the Building Construction Technology program, 45 applied. Of these, 22 (48.9%) were accepted, and 14 (63.6% of accepted students) enrolled. The small number of students enrolled in the CETM program may appear to be cause for concern. However, part of the Construction Management enrollment is the Highway/Bridge track (CMCT designation). *Students in this track actually complete the CET degree as the first two years of the 4-year program.* The CMCT track had 14 applicants, 14 admitted students, and all 14 (100%) enrolled. Therefore, the actual CETM enrollment was actually 20 students.

(4) It is the goal of the Construction programs to continue to grow enrollment, especially in the CETM program, but to also improve the quality of students. Generally, the programs have had a total freshman enrollment that was higher than desired. Sections have been overfilled to accommodate students. There is a policy to not allow pre-tech students to take technical courses. Instead, they must be ready for MATH 115/116 prior to entering the technical sequence. In addition, to improve the quality of Bachelor of Science students, a student must complete all freshman and sophomore coursework, have a C- in MATH 126, and have an overall 2.30 GPA to continue into the junior year.

(C) Program Capacity:

(1)All students in the Construction programs have a common freshman year. Therefore, one number is used for combined total enrollment. Currently, the maximum desired total program enrollment is 72 technical students entering in the fall semester. It is felt that the current maximum desired total enrollment is approximately 270 students. This includes 90-100 freshmen (72 students in fall, plus an additional 20 fall pre-techs that enter in winter). The maximum desired sophomore enrollment is approximately 70, assuming some natural attrition. Then the desired junior and senior class sizes are about 50 each. In 2004-05, total enrollment was 320 students (compared to 271 in 2001-02). The primary reasons for not wanting to increase enrollment further are a lack of faculty resources and a lack of available funding, as well as lack of space in the hands-on practices lab. For the past several years, we have taught overloads and accommodated students, but having over 300 students is becoming a drain on faculty and finances.

(D) Retention and Graduation:

(1) The attrition rates and numbers of students in the programs as listed in the Administrative program Review seem to be somewhat different than the 2004-05 FSU Fact Book. The Administrative Program Review indicates that 54% of 22 CONM students entering in Fall, 1999 graduated or persist. 78% of 33 Fall, 2003 entries are still enrolled. In BCTM, 66% of 9 entering in 2001 graduated or persist. 79% of 15 from 2002 have graduated or persist. In CETM, 66% of 3 from 2002 have graduated or persist. **Contrast this** with the information from the Fact Book, which shows 31 BCTM degrees awarded in 2003, and 53 in 2004. It also shows 9 CETM degrees in 2003, and 14 in 2004. In Construction Management, 59 were awarded in 2003, and 45 in 2004.

(2) Students are retained in the program through a number of efforts. Faculty are always available to help students. Students are encouraged to call faculty at home, if necessary. Tutoring is available through the Sigma Lambda Chi, the student honor society. Incoming freshmen must be ready for MATH 115/116 prior to taking technical coursework. In addition, a student must have a 2.30 GPA and a C- in MATH 126 to be allowed to take junior level courses. However, a number of students come to Ferris from career technical centers, where they have good skills, but lack sufficient math and English to be successful. Therefore, a certain failure rate is not unexpected.

(3) The number of degrees in the CETM grogram has increased from 8 in 2002 to 14 in 2004. There is a steady increase in the number of students enrolled in CET classes. In BCTM program, 37 degrees were awarded in 2002, and 53 in 2004. The number of CM graduates went from 36 in 2002 to 45 in 2004. Actually, there were 59 in 2003, but this was an unusual occurrence.

(4) Most students who enter the CETM or BCTM programs graduate within two years, assuming they are not pre-techs. CM students who stay on the checksheet graduate in the planned four years. However, a fairly high

percentage of students choose to lighten their course loads, and may take an extra semester to graduate.

(5) On average, most two-year students graduate from CETM and BCTM in two years, with pre-techs taking an extra semester. Most four-year Construction Management students take an extra semester to graduate.

(E) Access

(1) The Construction programs have endeavored to make themselves accessible to more students in a number of ways. First, the upper level CM courses, as well as several lower level courses are offered at night in Grand Rapids (typically four per semester) for working professionals wishing to pursue a degree. In addition, beginning in summer of 2004, classes are being offered on campus in the summer. At least two of these have been offered as 4-week accelerated courses to allow students to work part of the summer. Finally, students may enter any Construction program in either the fall or winter semester.

(2) The result of offering classes in Grand Rapids has been to provide better visibility for Ferris and its Construction programs. However, offering four classes per semester (a full faculty load equivalent) has contributed to the need for most program faculty to be on overloads every year.

(3) The items listed in (1) above certainly serve to improve enrollment and visibility for the programs. When a full contingent of faculty is brought into the program, all these things will help in recognizing the programs' goals and priorities.

(F) Curriculum: attached in the appendix of this report are checksheets and sample syllabi.

(1) The requirements of the program are found in two parts. First, the organization that accredits the Construction Management program is the American Council for Construction Education (ACCE). Since the two-year BCTM and CETM programs make up the first two years of the CM program, their content is also accreditation driven. ACCE provides requirements for all technical and general education courses in the program. In addition, Ferris has requirements for such things as cultural enrichment and social awareness electives.

(a) The program-related courses for the all programs include hands-on practices. blueprint reading, estimating, administration, surveying and layout, soils and material properties, and structural analysis, and several program specific courses, including highway technology, hydraulics, advanced materials, framing, field engineering and mechanical-electrical courses. The junior and senior years in CM require formwork, economics, advanced estimating, scheduling, supervision and safety, advanced computer applications, contracts and project management. These are very adequate, according to ACCE.

(b) Directed electives and general education courses include PHYS 211, ACCT 201, MGMT 301/310, MKTG 231, BLAW 221, STQM 260, MATH 132 and ECON 221 as a social awareness elective. All of these are driven by accreditation requirements.
(c) There are no hidden prerequisites for any required courses.

(2) The program has undergone a number of curriculum changes since the last review, primarily to comply with ACCE requirements or to improve program delivery. For example, ENGL 211 replaced ENGL 250 to add technical writing. ACCT 201 replaced a business elective due to ACCE's requirements. Other changes are considered minor.

(3) Curriculum changes currently in progress are all relatively minor. The current computer class is being split to allow students to more easily test out of individual parts. A graphics course is being added. In addition, a MATH 115/120 sequence will replace MATH 116/126 to improve the ability to transfer students into the program.

(4) There are no additional plans to revise the programs in the near future unless directed by ACCE.

(G) Quality of Instruction

(1) As noted in the compiled Current Student Survey (found in Section 2 of this report), the students spoke favorably, in fact very highly, of the core construction courses, such as estimating, scheduling, contracts, safety, blueprint interpretation, and hands-on courses. In addition, they felt their faculty advisors were very helpful, and they felt that the Construction faculty members were an asset to the programs. Results were somewhat mixed regarding courses from outside the curriculum. Program alumni (as found in the survey in Section 2) similarly felt that graduates were well-prepared for their career positions. Curricula, relevant coursework and quality of faculty were all cited as positive elements of the programs.

(2) The advisory committee surveys (Section 2) indicate that both the BCTM and CETM programs provide excellent skills and training, have a high demand for graduates, and have excellent lab and teaching facilities. The CM program provides the skills and education needed by industry, has a high demand for graduates, has excellent computer and lab facilities, and meets the needs of industry. They note a need for additional faculty resources.

(3) The learning environment has been vastly improved by the construction of the Granger Center, its new computer and lab facilities, and multi-media podiums available in all classrooms and the auditorium. There are no graduate assistants.

(4) Each faculty member has attempted to attend at least one continuing education class or seminar annually to improve the level of instruction. In addition, several faculty offer continuing education seminars. One is the Chair of the Examination Committee for the CPC (Certified Professional Constructor) exam. Another attended two workshops (including WebCT) through the Center for Teaching, Learning and Faculty Development.

(5) Students are encouraged to interact with faculty and peers in a number of ways. First, all are encouraged to join ACS, the Associated Construction Students, a professional organization that has several social and community service initiatives. Their activities include field trips to industry construction sites and other activities. Top students in CM are invited to join SLC (Sigma Lambda Chi), a professional honor fraternity. Finally, the program supports several competition teams. These include sending up to three teams to the Associated Schools of Construction Project Management Competition, as well as teams to Home Builders and Mechanical Contractors competitions. Finally, guest speakers are brought in annually to make presentations to students.

(6) It is felt that the new Granger Center, together with complying with current ACCE requirements and the feedback from our advisory committee, infuse teaching and learning in these programs.

(7) The qualities of teaching and learning have been enhanced due to state-of-the-art facilities and a strong interaction between students, faculty and the industry.

(H) Composition and Quality of Faculty

(1) The following are the names, ranks and qualifications of all tenured and tenure-track faculty in the Construction programs.

(a) Edward Brayton, Professor, Ph.D, 23 years, tenured
John Schmidt, Professor, Ph.D, 7 years, tenured
Robert Eastley, Assoc. Prof., M.S., 22 years, tenured
David Hanna, Assoc. Prof., M.S., 13 years, tenured
Ken Reinink, Assoc. Prof., B.S., 22 years, tenured
Kelly Seitter, Assoc. Prof., M.S., 7 years, tenured
Lee Templin, Assoc. Prof., M.S., 8 years, tenured
Harry Cooke, Assist. Prof., Ph.D, 3 years, tenure track

(b) Promotions and merit raises since last review: There has been one promotion to professor, two to associate professor, one merit increase at the professor level, and two at the associate professor level.

(c) Professional activities since last review: These are almost too numerous to list. Most have taken one or more continuing education courses and seminars. Edward Brayton has been involved with the American Society of Professional Estimators. He also has been Chair of the Examination Committee for the Certified Professional Constructor Exam. He regularly presents seminars to industry professionals. Harry Cooke attended a teaching workshop through ASCE, and also a two-week professor training course in Asphalt Technology in Auburn. Robert Eastley was appointed to the American Council for Construction Education (ACCE) Register of Visitors, and participated in an accreditation site visit. David Hanna is a former Distinguished Teacher award winner, is very active in

numerous committees, and has made site visits for ACCE. He also has presented a number of professional seminars. Ken Reinink is active with the Michigan Homebuilders Association. John Schmidt has been active in CTLFD training faculty in WebCT. He is very active in the Associated Schools of Construction as a departmental representative and coach of student competition teams. Kelly Seitter is very involved with MAPA (the Michigan Asphalt Paving Association), and has taken students to numerous meetings and field sites. Lee Templin is strongly tied to the Associated General Contractors (AGC). He is a member of their Education Committee, and a judge in the Build Michigan Award Committee. In addition, both David Hanna and Robert Eastley are founding members of the Distinguished Constructor Award for the Michigan Construction Hall of Fame, an initiative, housed at Ferris, which honors distinguished professionals in the profession.

(2) Workload

(a) All but one of the full-time faculty members were on overloads during the 2004-05 school year. A normal load is 12 credits or 18 contacts per semester, or 24/36 per year. Overloads are annualized. Some faculty had credit overloads, and some had contact overloads. Where the overload was from contacts, three contacts will be considered equivalent to 1 credit. The 2004-05 overloads were: Brayton (6 cr.), Cooke (1 cr.), Eastley (7 cr.), Hanna (7 cr.), Schmidt (3 cr.), Templin (3 cr.), and Reinink (2 cr.). Therefore, for eight tenured or tenure track faculty, there were 28 overload credits, or 3.5 overload credits per faculty member. Therefore, the average annual load per faculty member was 27.5 credits.

(b) Release time is granted to the Department Chair (in 2004-05, David Hanna) to perform administrative duties. This person teaches one-fourth load and has three-fourths release time.

(3) Recruitment

(a) Typically, advertisements for new faculty are published both locally and nationally, in newspapers, the Chronicle, Engineering News Record, and the Associated Schools of Construction website. Applications are reviewed by faculty, and the top three or four candidates invited to campus. They spend a day here, including a one-hour discussion session with faculty and also must make an academic presentation.

(b) Candidates must have a Masters degree (or, if exceptional experience, obtain one within two years) and a minimum of five years of U.S. construction experience.

(c) The programs are open to faculty from diverse backgrounds. A new faculty member joins us in the fall, and then two of nine faculty members will be women.

(d) Based on (c) above, the programs have been successful in their diversity goals.

(4) All new faculty attend the new faculty orientation sessions offered by the university during their first year at Ferris. These sessions provide teaching techniques, how to write an outline, etc. All new faculty are assigned a tenured faculty member as a mentor. New faculty are not assigned advisees during the first year so they may concentrate on teaching.

(5) Reward Structure:

(a) There is no reward structure in the college or department. Exceptional teachers may apply for promotion or merit raises. Professional Development and travel funds are dispersed proportionally, and as funding permits. Individuals seeking professional development may also apply for funds through the dean's office, and awards are based on the merits of the proposal.

(b) The existing salary structure absolutely limits the ability of the programs to recruit new faculty. Salaries offered typically are less than current faculty members receive, and significantly less than a faculty candidate is currently earning. Therefore, it is difficult to attract highly experienced professionals. New faculty are likely to be younger and less experienced.

(c) There is no reward structure. However, additional funding is needed for faculty development and travel. A minimum of $10,000 in additional funding is needed.

(d) There is no reward structure related to diversity.

(6) Graduate Instruction: The Construction programs are considering expansion to offer a graduate degree, but currently no curriculum or courses exist.

(7) Non-Tenure Track and Adjunct Faculty

(a) During the 2004-05 school year, non-tenure track faculty who taught courses in the Construction Technology & Management programs were John Kantorowski, Dan Hazen and Susan O'Neill-Cook. John Kantorowski is a one-year, full-time temporary instructor. 2004-05 is his first year of teaching. He taught 11 credits each in the fall and winter semesters. Both Dan Hazen and Susan O'Neill-Cook are adjuncts. Mr. Hazen is the director of ICET, and Mrs. O'Neill-Cook is on loan from another program area. They both taught 3 credits in fall and 3 in winter. Therefore, 33 total credits were taught by adjuncts and temporary faculty, which equal approximately 1.5 faculty positions. It is difficulty to find temporary faculty, primarily because the pay structure is very limited, and interested persons are reluctant to travel from Grand Rapids or other locations that require a commute.

(b) As noted, 33 credits were taught by adjuncts and temporaries. This was approximately 14% of the courses taught in the

programs for 2004-05. John Kantorowski was teaching a range of courses, including Field Engineering, Mechanical-Electrical Plans and Specs, and a Professional Methods class. Dan Hazen taught Plans and Specs, and Susan O'Neill-Cook taught our basic computer course.

(c) Both adjunct faculty members were hired to fill needs in specific program areas. Dan Hazen has a strong construction background to teach plans and specs. Susan O'Neill-Cook is very qualified to teach computer literacy. John Kantorowski was hired was hired because of strong construction management experience and appropriate academic credentials, especially in the mechanical-electrical field. He has interviewed and been recommended for tenure-track hire in fall of 2005. Typically, a full-time temporary position requires a relevant B.S. or M.S. degree and five years of U.S. construction experience.

(d) The programs consider the minimal use of non-tenure track faculty to be appropriate. They often bring a different perspective. If the need for these faculty persists, we prefer to convert the position to tenure-track.

(e) Our accrediting body, ACCE, understands the need to use some non-tenure track faculty. This has never been an issue, but our programs have never had more than 1-1.5 equivalent positions taught by non-tenure track faculty.

(I) Service to Non-majors

(a) The Construction Department offer no general education service courses to other departments.

(b) The Construction Department teaches one course to the Architectural Technology program (ARCH 223) and two courses (SURE 321 and 421) to the Surveying Engineering program. In return, the Surveying Engineering program teaches all sections of CONM 122 to Construction students. This has provided wonderful interaction between departments. In addition, some Architectural Technology students continue in Construction Management after earning a two-year degree.

(c) Since the number of service courses taught by our department is roughly equivalent to the courses taught by others for our students, there is no negative impact on the department.

(d) It is likely that the number of service courses will remain the same for the foreseeable future.

(J) Degree Program Cost and Productivity Data: Attached at the end of this section is data from Institutional Research and Testing. For the 2003-04 school year, the Construction Technology & Management programs had the following:

SCH's: 5003

FTEF's: 9.80
SCH/FTEF: 510.68

The last number, 510.68 SCH/FTEF increased steadily from 491.02 the year before and 415.05 the year before that, indicating an enrollment increase without an increase in faculty resources.

In addition, the 510.68 SCH/FTEF is considerably higher than the College of Technology average (360.57) and the Ferris average (454.22), indicating a very high productivity.

(K) Assessment and Evaluation

(1) Several variables are tracked and assessed when assessing the effectiveness of the construction programs. These include:

(a) Classroom examinations
(b) Industry Advisory Committee feedback
(c) ACCE accreditation requirements and results
(d) Internal curriculum reviews
(e) Employment rates
(f) Success in CONM 499 capstone course
(g) Success in passing AIC Construction Certification Level I examination (recommended, but not required for graduation)
(h) Senior student exit surveys

(2) In analyzing the factors above, it appears that the Construction programs are on the right track. Our Industry Advisory Committee is very active and very committed. They indicate that we are teaching the appropriate material and providing the necessary support to our students. We have submitted (as of April, 2005) a comprehensive curriculum change proposal that addresses certain concerns and updates the curricula. The accrediting body, ACCE, granted the Construction Management program its third renewal, a 6-year renewal (which is the maximum possible to be earned). The ACCE report noted no deficiencies in the curriculum, and presented a glowing assessment of the Ferris CM program. Employment rates for all programs have been at or very near 100% for the past several years, with many employers returning annually to hire more graduates. Student success in CONM 499 is typically very high. Normally, most or all students earn a grade of "C" or better in the course, indicating a good general knowledge and retention of construction-related coursework. Senior exit surveys indicate general satisfaction with constructed-related courses. Finally, approximately half of the graduating CM students choose to take part one of the AIC Certification Examination to become a Certified Professional Constructor. Currently, approximately 70% pass the exam on their first try.

(3) All of the above are used to assess the curricula and make appropriate changes as deemed necessary. These programs have made significant

changes annually to improve delivery, eliminate outdated subject matter, and respond to industry needs.

(4) The success of students, high placement rates, and continued ACCE accreditation all indicate that program goals are being met.

(L) Administrative Effectiveness

(1) Some of the concerns of the faculty, the Industry Advisory Committee and ACCE, the accrediting body, have been the lack of consistent leadership in the College of Technology and the lack of secretarial support for the Construction programs. As of May, 2005, a full-time secretary has been assigned to the Construction programs, eliminating that concern. The College of Technology leadership continues to be a concern, as the structure of the College is currently being evaluated. The Dean's office is currently staffed by only an interim dean, and this individual is leaving in July, 2005. There is no Assistant or Associate Dean, and it is likely that there will be no permanent dean for at least another year. Regarding the Construction programs, the Department Chair, who should have 75% release time, has typically had to take a teaching overload, rendering the position very difficult to manage.

(2) It is believed that the programs and department have been run very well, despite a lack of secretarial and administrative support. However, certain initiatives, like expansion to on-line courses or a possible Masters degree, have been put on hold until time and resources allow.

(3) Class and teaching schedules are prepared with faculty input, and are effectively and fairly prepared. Where possible, schedules may allow a day or blocks of time without teaching duties, to allow faculty to pursue outside interests.

(4) Students are able to take courses in a timely manner. Block schedules are prepared to allow all students to get needed courses. Multiple sections of courses are often available, and most core Construction courses are offered in both the fall and winter semesters.

Please note that Program Checksheets and the Administrative Program Review Documents are included in the Appendix,

ACADEMIC PROGRAM REVIEW

SECTION 4 FACILITIES & EQUIPMENT

Construction Technology & Management
Academic Program Review

Section 4: Facilities and Equipment

The Construction Technology & Management programs have been housed in the newly constructed Granger Center for about one year. This is arguably the finest construction teaching facility in the country.

(A) Instructional Environment: The Construction Technology & Management programs operate both at the Big Rapids Campus and at the Applied Technology Center in Grand Rapids. The facilities in Grand Rapids are adequate, since only upper level Construction Management courses and a few lower level courses are taught there, and there is little need for hands-on laboratory facilities. The only real need is for adequate classrooms and computer labs, both of which are available at the ATC.

The Construction programs on the Big Rapids campus are now completely housed in the newly constructed Granger Center, which is shared by the HVACR and Construction programs. The facilities and laboratories are excellent. All instructors have large, private offices. The building has four large classrooms (two dedicated to each program area) and a shared auditorium, all with multimedia podiums. There are four computer labs (two dedicated to each program area) with eighteen stations each. In addition, there are separate laboratories for materials, soils and hands-on framing and practices. The building is so new that punch-list items are still being resolved. Therefore, the current condition of the building greatly enhances program delivery.

The programs' projected needs depend on enrollment. Currently, there are adequate facilities and equipment to accommodate growth. No additional facilities are required at this time. In addition, there are no projected needs for new facilities, with the exception of routine replacement of computers and other lab equipment.

(B) Computer Access and Availability: Excluding the computers in faculty and secretarial offices, there are two computer labs with eighteen stations allocated to the Construction programs. These computers are new (less than a year old), and included as part of the new building project. They are loaded with all the software needed for our programs, including word processing, database and spreadsheet packages, AutoCad, and program specific software. Both labs are used for instruction. They are available for student use during the evenings, on weekends, and when no classes are scheduled. Adjacent to the labs are available printers and plotters. In addition, there are thirteen general-use computers in the public area of the building that are available to students from the Construction and HVACR programs.

The Granger Center was designed and built to meet the needs of these programs. Therefore, additional computer resources are not needed at this time, and there is no acquisition plan to obtain additional resources. Obviously, computers will eventually need to be upgraded or replaced, but routine equipment replacement will not be addressed here.

Regarding on-line instruction, WebCT is available and used by at least two instructors in the program to supplement instruction and provide a means for assessment. Therefore, in conclusion, the Construction programs have all necessary computer resources.

(C) Other Instructional Technology: The Construction Technology & Management programs have a wide range of additional resources in addition to computers. First, all classrooms are equipped with multi-media podiums which allow the user to use VHS tapes, DVD's or laptop computers. The high-bay construction lab has a wide range of equipment for framing, mixing and placing concrete, and erecting structural steel. The materials laboratory was made state-of-the-art through a $100,000 cash donation. Virtually all equipment and furnishings are new. Therefore, no acquisition plan is in effect to procure additional resources.

(D) Library Resources: The FLITE library has a variety of resources available to the Construction programs. These include such things as the 2002 National Electric Code, the new 2003 ICC codes, ASTM Standards and a variety of construction and engineering related references. When polled, the faculty felt that the available resources were adequate.

The faculty and staff at FLITE have been very generous and accommodating regarding group instruction in the use of the library and its resources. They are very helpful to FSUS 100 classes. Regarding budget allocations, Mr. Dickinson frequently requests lists of desired texts and references, so the budget allocation is considered adequate.

ACADEMIC PROGRAM REVIEW

SECTION 5 CONCLUSIONS

Construction Technology & Management
Academic Program Review

Section 5: Conclusions

(A) Relationship to FSU Mission: It is felt that the FSU Construction programs provide education that is exactly aligned with the FSU mission. Students in the program receive practical, career-oriented education that typically leads to employment.

(B) Program Visibility and Effectiveness: The Ferris Construction programs are developing a reputation as some of the best programs in the country. The new Granger Center, national ACCE accreditation, student competition teams and employers from nationally prestigious construction firms all serve to increase Ferris' visibility and effectiveness.

(C) Program Value: The Ferris Construction Technology & Management have over 350 total students (including technical and pre-technical), accounting for about 17% of the College of Technology enrollment. The Student Credit Hour per Faculty ratio is very high, making the Construction programs a valuable asset to the College and the University.

(D) Enrollment: The enrollment in the programs is very high, and has been steadily increasing for several years. Currently, the total enrollment is above optimum, but incoming new faculty resources will help to alleviate the problem.

(E) Characteristics, Quality and Employability of Students: Students are typically from Michigan, but there are a significant number of transfer and non-traditional students. ACT scores of incoming freshmen have risen over the past several years. Most students who do not succeed fail because of poor math or reading skills, and often leave before the sophomore year. Those that succeed in their first year have a good expectation for success. Employment rates for graduates are typically 100%, with many students receiving multiple job offers.

(F) Quality of Curriculum and Instruction: The curriculum meets all the requirements of the accrediting body, the American Council for Construction Education. Students typically rate the quality of instruction in technical courses as very high.

(G) Composition and Quality of Faculty: The faculty members are primarily full-time tenure track individuals who are involved in professional organizations, consulting, and continuing education. All have significant industry work experience.

Appendices

PROGRAM CHECKSHEETS

TAB A

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CIVIL ENGINEERING TECHNOLOGY
ASSOCIATE OF APPLIED SCIENCE
FALL SEMESTER
Curriculum Guide Sheet

Total semester hours required for graduation: 64

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. The student is also responsible for meeting all FSU General Education requirements as outlined in the university catalog. Your advisor is available to assist you.

FIRST YEAR - FALL SEMESTER			**CREDITS/GRADES**
CONM	111	Construction Practices (MATH 116 concurrent)	3 _____
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3 _____
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR** Cultural Enrichment Elective	3 _____
ENGL	150	English 1 (Placement)	3 _____
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4 _____

FIRST YEAR - WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3 _____
Cultural Enrichment Elective **OR** CONM	121	Materials Properties and Testing (MATH 116 concurrent)	3 _____
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3 _____
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4 _____
PHYS	211	Introductory Physics 1 (MATH 116)	4 _____

SECOND YEAR - FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112,113, C- in MATH 116)	3 _____
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR** CONM 221 Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4 _____
CETM	214	Advanced Materials Properties and Testing (CONM 121, C- in MATH 116)	3 _____
ENGL	211	Industrial and Career Writing (ENGL 150)	3 _____
Social Awareness Elective (ECON 221 - Prin. of Economics 1 required for students laddering into the BS Construction Management)			3 _____

SECOND YEAR - WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR** CONM 212 Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3 _____
CONM	222	Construction Administration (CONM 211)	3 _____
CETM	215	Pavement Design and Construction	3 _____
CETM	226	Highway Technology (CONM 113, 122)	3 _____
CETM	227	Hydraulics and Hydrology (MATH 126, PHYS 211)	3 _____

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
CIVIL ENGINEERING TECHNOLOGY
ASSOCIATE DEGREE IN APPLIED SCIENCE
FALL SEMESTER

TECHNICAL			CREDIT HOURS
CETM	214	Adv. Materials Properties & Testing	3
CETM	215	Pavement Design & Construction	3
CETM	226	Highway Technology	3
CETM	227	Hydraulics & Hydrology	3
CONM	111	Construction Practices	3
CONM	112	Plans & Specifications	3
CONM	113	Comp. Appl. for Construction	3
CONM	121	Materials Properties & Testing	3
CONM	122	Construction Surveying & Layout	3
CONM	211	Construction Quantity Estimating	3
CONM	212	Soils & Foundations	3
CONM	221	Statics & Structures	4
CONM	222	Construction Administration	3

GENERAL EDUCATION			CREDIT HOURS
Communication Competence			
ENGL	150	English 1	3
ENGL	211	Industrial & Career Writing	3
Scientific Understanding			
PHYS	211	Introductory Physics 1	4
Quantitative Skills			
MATH	116	Interm. Algebra & Numerical Trig.	4
MATH	126	Algebra & Analytic Trigonometry	4
Cultural Enrichment			
Elective			3
Social Awareness			
Elective			3

A.A.S. Degree Minimum General Educational Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communication Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3/4

4/03
pm/cksh03f/cetm

(OVER)

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

BUILDING CONSTRUCTION TECHNOLOGY
ASSOCIATE OF APPLIED SCIENCE
BUILDING EMPHASIS
Curriculum Guide Sheet

Total semester hours required for graduation: 64

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. The student is also responsible for meeting all FSU General Education rquirements as outlined in the university catalog. Your advisor is available to assist you.

FIRST YEAR - FALL SEMESTER			**CREDITS/GRADES**
CONM	111	Construction Practices (MATH 116 concurrent)	3
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR**	
		Cultural Enrichment Elective	3
ENGL	150	English 1 (Placement)	3
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4
FIRST YEAR - WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3
Cultural Enrichment Elective **OR**			
		CONM 121 Materials Properties and Testing (MATH 116 concurrent)	3
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4
PHYS	211	Introductory Physics 1 (MATH 116)	4
SECOND YEAR - FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112,113, C- in MATH 116)	3
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR**	
		CONM 221 Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4
BCTM	213	Wood and Steel Framing and Finishes (Sophomore Standing) **OR**	
		BCTM 225 Field Engineering (CONM 113,122)	3
BCTM	223	Mechanical and Electrical Plans and Specifications (CONM 112) **OR**	
		HVAC 337 Mechanical/Electrical Systems for Buildings	3
ENGL	211	Industrial and Career Writing (ENGL 150)	3
SECOND YEAR - WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR**	
		CONM 212 Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3
CONM	222	Construction Administration (CONM 211)	3
BCTM	225	Field Engineering (CONM 113, 122) **OR**	
		BCTM 213 Wood and Steel Framing and Finishes (Sophomore Standing)	3
HVAC	337	Mechanical/Electrical Systems for Buildings **OR**	
		BCTM 223 Mechanical and Electrical Plans and Specifications (CONM 112)	3
Social Awareness Elective (ECON 221 - Prin of Economics 1 required for students laddering into the BS Construction Management)			3

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
BUILDING CONSTRUCTION TECHNOLOGY
ASSOCIATE DEGREE IN APPLIED SCIENCE
BUILDING EMPHASIS

TECHNICAL			CREDIT HOURS
BCTM	213	Wood & Steel Framing/Finishes	3
BCTM	223	Mechanical & Electrical Plans/Specs	3
BCTM	225	Field Engineering	3
CONM	111	Construction Practices	3
CONM	112	Plans & Specifications	3
CONM	113	Comp. Appl. for Construction	3
CONM	121	Materials Properties & Testing	3
CONM	122	Construction Surveying & Layout	3
CONM	211	Construction Quantity Estimating	3
CONM	212	Soils & Foundations	3
CONM	221	Statics & Structures	4
CONM	222	Construction Administration	3
HVAC	337	Mechanical/Electrical Sys for Builders	3

GENERAL EDUCATION			CREDIT HOURS
Communication Competence			
ENGL	150	English 1	3
ENGL	211	Industrial & Career Writing	3
Scientific Understanding			
PHYS	211	Introductory Physics 1	4
Quantitative Skills			
MATH	116	Interm. Algebra & Numerical Trig.	4
MATH	126	Algebra & Analytic Trigonometry	4
Cultural Enrichment			
Elective			3
Social Awareness			
Elective			3
(ECON 221 required for BS CONM)			

Entry to the BS in Construction Management program requires successful completion of MATH 126 with a C- or higher grade, and a minimum overall GPA of 2.30, and Departmental approval and acceptance.

A.A.S. Degree Minimum General Educational Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communication Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3/4

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

BUILDING CONSTRUCTION TECHNOLOGY
ASSOCIATE OF APPLIED SCIENCE
MECHANICAL/ELECTRICAL/PLUMBING EMPHASIS
Curriculum Guide Sheet

Total semester hours required for graduation: 64

NOTE: Meeting the requirements for graduation indicated on this sheet is the responsibility of the student. The student is also responsible for meeting all FSU General Education rquirements as outlined in the university catalog. Your advisor is available to assist you.

FIRST YEAR - FALL SEMESTER			CREDITS/GRADES
CONM	111	Construction Practices (MATH 116 concurrent)	3
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR**	
		Cultural Enrichment Elective	3
ENGL	150	English 1 (Placement)	3
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4

FIRST YEAR - WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3
Cultural Enrichment Elective **OR**			
		CONM 121 Materials Properties and Testing (MATH 116 concurrent)	3
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4
PHYS	211	Introductory Physics 1 (MATH 116)	4

SECOND YEAR - FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112,113, C- in MATH 116)	3
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR**	
		CONM 221 Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4
BCTM	225	Field Engineering (CONM 113,122)	3
BCTM	223	Mechanical and Electrical Plans and Specifications (CONM 112)	3
ENGL	211	Industrial and Career Writing (ENGL 150)	3

SECOND YEAR - WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR**	
		CONM 212 Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3
CONM	222	Construction Administration (CONM 211)	3
BCTM	233	Mechanical, Electrical and Plumbing Construction (CONM 111, 112, BCTM 223)	3
HVAC	337	Mechanical/Electrical Systems for Buildings	3
Social Awareness Elective (ECON 221 - Prin of Economics 1 required for students laddering into the BS Construction Management)			3

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CURRICULUM REQUIREMENTS
BUILDING CONSTRUCTION TECHNOLOGY
ASSOCIATE DEGREE IN APPLIED SCIENCE
MECHANICAL/ELECTRICAL/PLUMBING EMPHASIS

TECHNICAL			CREDIT HOURS
BCTM	223	Mechanical & Electrical Plans/Specs	3
BCTM	225	Field Engineering	3
BCTM	233	Mech., Elect., Plumbing Construction	3
CONM	111	Construction Practices	3
CONM	112	Plans & Specifications	3
CONM	113	Comp. Appl. for Construction	3
CONM	121	Materials Properties & Testing	3
CONM	122	Construction Surveying & Layout	3
CONM	211	Construction Quantity Estimating	3
CONM	212	Soils & Foundations	3
CONM	221	Statics & Structures	4
CONM	222	Construction Administration	3
HVAC	337	Mechanical/Electrical Sys for Builders	3

GENERAL EDUCATION			CREDIT HOURS
Communication Competence			
ENGL	150	English 1	3
ENGL	211	Industrial & Career Writing	3
Scientific Understanding			
PHYS	211	Introductory Physics 1	4
Quantitative Skills			
MATH	116	Interm. Algebra & Numerical Trig.	4
MATH	126	Algebra & Analytic Trigonometry	4
Cultural Enrichment			
Elective			3
Social Awareness			
Elective			3
(ECON 221 required for BS CONM)			

A.A.S. Degree Minimum General Educational Requirements in Semester Hours:

Cultural Enrichment Credits - 3
Communication Credits - 6
Social Awareness Credits - 3
Scientific Understanding Credits - 3/4

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
BACHELOR OF SCIENCE DEGREE
COMMERCIAL/INDUSTRIAL CONCENTRATION (cmbt)
BUILDING EMPHASIS
Curriculum Guide Sheet

BS Degree Minimum General Education Requirements

(See the General Education webpage at www.ferris.edu/HTML/academics/gened/gened.html for details and acceptable courses in each program)

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT score

Scientific Understanding: 7/8 semester hours, including at least one lab course

Cultural Enrichment: 9 semester hours, including at least one course 200 level or higher.

Social Awareness: 9 semester hours, including at least one Foundation course and at least one course 300 level or higher.

At least one Global Consciousness (G) course and one Race/Ethnicity/Gender (REG) course (within Cultural Enrichment or Social Awareness)

Meeting all requirements for graduation is the student's responsibility. Your advisor is available to assist you.

Total semester hours required for graduation: 129/130

FIRST YEAR - FALL SEMESTER			CREDITS/GRADES
CONM	111	Construction Practices (MATH 116 concurrent)	3
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR**	
		Cultural Enrichment Elective	3
ENGL	150	English 1 (Placement)	3
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4
FIRST YEAR - WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3
Cultural Enrichment Elective **OR**			
		CONM 121 Materials Properties and Testing (MATH 116 concurrent)	3
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4
PHYS	211	Introductory Physics 1 (MATH 116)	4
SECOND YEAR - FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112, 113, C- in MATH 116)	3
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR**	
		CONM 221 Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4
BCTM	213	Wood and Steel Framing and Finishes (Sophomore Standing) **OR**	
		BCTM 225 Field Engineering (CONM 113, 122)	3
BCTM	223	Mechanical and Electrical Plans and Specifications (CONM 112) **OR**	
		HVAC 337 Mechanical/Electrical Systems for Buildings	3
ENGL	211	Technical and Career Writing (ENGL 150)	3
SECOND YEAR - WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR**	
		CONM 212 Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3
CONM	222	Construction Administration (CONM 211)	3
BCTM	225	Field Engineering (CONM 113, 122) **OR**	
		BCTM 213 Wood and Steel Framing and Finishes (Sophomore Standing)	3
HVAC	337	Mechanical/Electrical Systems for Buildings **OR**	
		BCTM 223 Mechanical and Electrical Plans and Specifications (CONM 112)	3
ECON	221	Principles of Economics 1 (Social Awareness)	3
		(required for students laddering into the BS CONM degree)	

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
COMMERCIAL/INDUSTRIAL CONCENTRATION (CMBT)
BUILDING EMPHASIS
BACHELOR OF SCIENCE DEGREE
Curriculum Guide Sheet

			CREDITS/GRADES
THIRD YEAR-FALL SEMESTER			
CONM	311	Formwork and Temporary Structures (CONM 221)	3
CONM	312	Construction Scheduling (CONM 222) **OR**	
		CONM 321 Construction Cost Estimating (CONM 211)	3
CONM	313	Construction Economics	3
MATH	132	Calculus for Business (C- in MATH 126) **OR**	
		ELECTIVE Lab Science Elective	3 or 4/5
ACCT	221	Principles of Construction Accounting (C- in MATH 126)	3
THIRD YEAR-WINTER SEMESTER			
CONM	321	Construction Cost Estimating (CONM 211) **OR**	
		CONM 312 Construction Scheduling	3
CONM	324	Advanced Construction Computer Techniques (CONM 113)	3
BLAW	221	Elementary Business Law	3
COMM	121	Fundamentals of Public Speaking	3
ELECTIVE		Lab Science Elective (e.g. PHYS 212, CHEM 121, GEOL 121) **OR**	
		MATH 132 Calculus for Business	3 or 4/5
ELECTIVE		Social Awareness Elective (300+)	3
FOURTH YEAR-FALL SEMESTER			
CONM	412	Construction Contracts (CONM 222, BLAW 221, ENGL 250) **OR**	
		COMM 422 Construction Supervisoun and Safety (CONM 222, ENGL 250)	3
CONM	423	Construction Management Professional Methods	4
		(ENGL 211/250, CONM 313, Senior Standing)	
MGMT	301/310	Applied Management/Small Business Management	3
MKTG	231	Professional Selling	3
ELECTIVE		Cultural Enrichment Elective (200+)	3
FOURTH YEAR-WINTER SEMESTER			
CONM	422	Construction Supervision and Safety (CONM 222, ENGL 250) **OR**	
		CONM 412 Construction Contracts (CONM 222, BLAW 221, ENGL 250)	3
CONM	499	Construction Project Management	3
		(CONM 312,321,323,324; CONM 412,422 concurrent; C- in MATH 126)	
STQM	260	Introduction to Statistics (MATH 116)	3
ELECTIVE		Cultural Enrichment Elective	3
ELECTIVE		Social Awareness Elective	3

A minimum 2.30 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

The upper level communications competence requirement will be fulfilled by completing (CONM 412, CONM 422, and CONM 423, which are Writing Intensive Courses. A minimum of 2.3 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
BACHELOR OF SCIENCE DEGREE
COMMERCIAL/INDUSTRIAL CONCENTRATION (CMBT)
MECHANICAL/ELECTRICAL/PLUMBING EMPHASIS
Curriculum Guide Sheet

BS Degree Minimum General Education Requirements

(See the General Education webpage at www.ferris.edu/HTMLS/academics/gened/gened.html for details and acceptable courses in each program)

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT score

Scientific Understanding: 7/8 semester hours, including at least one lab course

Cultural Enrichment: 9 semester hours, including at least one course 200 level or higher.

Social Awareness: 9 semester hours, including at least one Foundation course and at least one course 300 level or higher.

At least one Global Consciousness (G) and one Race/Ethnicity/Gender (REG) course (within Cultural Enrichment or Social Awareness)

Meeting all requirements for graduation is the student's responsibility. Your advisor is available to assist you.

Total semester hours required for graduation: 129/130

			CREDITS/GRADES
FIRST YEAR-FALL SEMESTER			
CONM	111	Construction Practices (MATH 116 concurrent)	3
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR**	
		Cultural Enrichment Elective	3
ENGL	150	English 1 (Placement)	3
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4
FIRST YEAR-WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3
Cultural Enrichment Elective **OR**			
	CONM 121	Materials Properties and Testing (MATH 116 concurrent)	3
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4
PHYS	211	Introductory Physics 1 (MATH 116)	4
SECOND YEAR-FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112, 113, C- in MATH 116)	3
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR**	
	CONM 221	Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4
BCTM	225	Field Engineering (CONM 113, 122)	3
BCTM	223	Mechanical and Electrical Plans and Specifications (CONM 112)	3
ENGL	211	Technical and Career Writing (ENGL 150)	3
SECOND YEAR-WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR**	
	CONM 212	Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3
CONM	222	Construction Administration (CONM 211)	3
BCTM	233	Mechanical, Electrical, and Plumbing Construction (CONM 111, 112, BCTM 223)	3
HVAC	337	Mechanical/Electrical Systems for Buildings	3
ECON	221	Principles of Economics 1 (Social Awareness Foundation)	3

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
COMMERCIAL/INDUSTRIAL CONCENTRATION (CMBT)
MECHANICAL/ELECTRICAL/PLUMBING EMPHASIS
BACHELOR OF SCIENCE DEGREE
Curriculum Guide Sheet

		CREDITS/GRADES
THIRD YEAR - FALL SEMESTER		
CONM 311	Formwork and Temporary Structures (CONM 221)	3
CONM 312	Construction Scheduling (CONM 222) **OR**	
	CONM 321 Construction Cost Estimating (CONM 211)	3
CONM 313	Construction Economics	3
MATH 132	Calculus for Business (C- in MATH 126) **OR**	
	ELECTIVE Lab Science Elective	3 or 4/5
ACCT 221	Principles of Construction Accounting (C- in MATH 126)	3
THIRD YEAR - WINTER SEMESTER		
CONM 321	Construction Cost Estimating (CONM 211) **OR**	
	CONM 312 Construction Scheduling	3
CONM 324	Advanced Construction Computer Techniques (CONM 113)	3
BLAW 221	Elementary Business Law	3
COMM 121	Fundamentals of Public Speaking	3
ELECTIVE	Lab Science Elective (e.g. PHYS 212, CHEM 121, GEOL 121) **OR**	
	MATH 132 Calculus for Business	3 or 4/5
ELECTIVE	Social Awareness Elective (300+)	3
FOURTH YEAR - FALL SEMESTER		
CONM 412	Construction Contracts (CONM 222, BLAW 221, ENGL 250) **OR**	
	CONM 422 Construction Supervision and Safety (CONM 222, ENGL 250)	3
CONM 423	Construction Management Professional Methods	4
	(ENGL 211/250, CONM 313, Senior Standing)	
MGMT 301/310	Applied Management/Small Business Management	3
MKTG 231	Professional Selling	3
ELECTIVE	Cultural Enrichment Elective (200+)	3
FOURTH YEAR - WINTER SEMESTER		
CONM 422	Construction Supervision and Safety (CONM 222, ENGL 250) **OR**	
	CONM 412 Construction Contracts (CONM 222, BLAW 221, ENGL 250)	3
CONM 499	Construction Project Management	3
	(CONM 312, 321, 323, 324; CONM 412, 422 concurrent; C- in MATH 126)	
STQM 260	Introduction to Statistics (MATH 116)	3
ELECTIVE	Cultural Enrichment Elective	3
ELECTIVE	Social Awareness Elective	3

A minimum 2.30 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

The upper level communications competence requirement will be fulfilled by completing CONM 412, CONM 422, and CONM 423, which are Writing Intensive Courses. A minimum of 2.3 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
BACHELOR OF SCIENCE DEGREE
HIGHWAY/BRIDGE CONCENTRATION (CMCT)

BS Degree Minimum General Education Requirements

(See the General Education webpage at www.ferris.edu/HTMLS/academics/gened/gened.html for details and acceptable courses in each program)

Communications Competence: 12 semester hours

Quantitative Skills: MATH 115 or ACT score

Scientific Understanding: 7/8 semester hours, including at least one lab course.

Cultural Enrichment: 9 semester hours, including at least one course 200 level or higher.

Social Awareness: 9 semester hours, including at least one Foundation course and at least one course 300 level or higher.

At least one Global Consciousness (G) course and one Race/Ethnicity/Gender (REG) course (within Cultural Enrichment or Social Awareness).

Meeting all requirements for graduation is the student's responsibility. Your advisor is available to assist you.

Total hours required for graduation: 129/130

FIRST YEAR - FALL SEMESTER			CREDITS/GRADES
CONM	111	Construction Practices (MATH 116 concurrent)	3
CONM	113	Computer Applications for Construction (MATH 116 concurrent)	3
CONM	121	Materials Properties and Testing (MATH 116 concurrent) **OR**	
		Cultural Enrichment Elective	3
ENGL	150	English 1 (Placement)	3
MATH	116	Intermediate Algebra and Numerical Trigonometry (Placement)	4

FIRST YEAR - WINTER SEMESTER			
CONM	112	Plans and Specifications (CONM 111, C- in MATH 116)	3
Cultural Enrichment Elective **OR**			
	CONM 121	Materials Properties and Testing (MATH 116 Concurrent)	3
CONM	122	Construction Surveying and Layout (C- in MATH 116)	3
MATH	126	Algebra and Analytic Trigonometry (C- in MATH 116)	4
PHYS	211	Introductory Physics 1 (MATH 116)	4

SECOND YEAR - FALL SEMESTER			
CONM	211	Construction Quantity Estimating (CONM 112, 113, C- in MATH 116)	3
CONM	212	Soils and Foundations (CONM 121, C- in MATH 116) **OR**	
	CONM 221	Statics and Structures (C- in MATH 116, PHYS 211)	3 or 4
CETM	214	Advanced Materials Properties and Testing (CONM 121, C- in MATH 116)	3
ENGL	211	Industrial and Career Writing (ENGL 150)	3
ECON	221	Principles of Economics 1 (Social Awareness)	3

SECOND YEAR - WINTER SEMESTER			
CONM	221	Statics and Structures (C- in MATH 116, PHYS 211) **OR**	
	CONM 212	Soils and Foundations (CONM 121, C- in MATH 116)	4 or 3
CONM	222	Construction Administration (CONM 211)	3
CETM	215	Pavement Design and Construction	3
CETM	226	Highway Technology (CONM 113, 122)	3
CETM	227	Hydraulics and Hydrology (MATH 126, PHYS 211)	3

FERRIS STATE UNIVERSITY
COLLEGE OF TECHNOLOGY

CONSTRUCTION MANAGEMENT
HIGHWAY/BRIDGE CONCENTRATION (CMCT)
FALL SEMESTER
Curriculum Guide Sheet

			CREDITS/GRADES
THIRD YEAR-FALL SEMESTER			
CONM	311	Formwork and Temporary Structures (CONM 221)	3
CONM	312	Construction Scheduling (CONM 222) **OR**	
	CONM 321	Construction Cost Estimating (CONM 211)	3
CONM	313	Construction Economics	3
MATH	132	Calculus for Business (C- in MATH 126) **OR**	
	ELECTIVE	Lab Science Elective	3 or 4/5
ACCT	221	Principles of Construction Accounting (C- in MATH 126)	3
THIRD YEAR-WINTER SEMESTER			
CONM	321	Construction Cost Estimating (CONM 211) **OR**	
	CONM 312	Construction Scheduling	3
CONM	324	Advanced Construction Computer Techniques (CONM 113)	3
BLAW	221	Elementary Business Law	3
COMM	121	Fundamentals of Public Speaking	3
ELECTIVE		Lab Science Elective (e.g. PHYS 212, CHEM 121, GEOL 121) **OR**	
	MATH 132	Calculus for Business	3 or 4/5
ELECTIVE		Social Awareness Elective(300+)	3
FOURTH YEAR-FALL SEMESTER			
CONM	412	Construction Contracts (CONM 222, BLAW 221, ENGL 250) **OR**	
	CONM 422	Construction Supervision and Safety (CONM 222, ENGL 250)	3
CONM	423	Construction Management Professional Methods	4
		(ENGL 211/250, CONM 313, Senior Standing)	
MGMT	301/310	Applied Management/Small Business Management	3
MKTG	231	Professional Selling	3
ELECTIVE		Cultural Enrichment Elective (200+)	3
FOURTH YEAR-WINTER SEMESTER			
CONM	422	Construction Supervision and Safety (CONM 222, ENGL 250) **OR**	
	CONM 412	Construction Contracts (CONM 222, BLAW 221, ENGL 250)	3
CONM	499	Construction Project Management	3
		(CONM 312,321,323,324; CONM 412,422 concurrent; C- in MATH 126)	
STQM	260	Introduction to Statistics (MATH 116)	3
ELECTIVE		Cultural Enrichment Elective	3
ELECTIVE		Social Awareness Elective	3

A minimum 2.30 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

The upper level communications competence requirement will be fulfilled by completing CONM 412, CONM 422, and CONM 423, which are Writing Intensive Courses. A minimum of 2.3 GPA and C- in MATH 126 is required of all students entering junior year CONM courses.

ACCE ACCREDITATION REPORT

TAB B

AMERICAN COUNCIL FOR CONSTRUCTION EDUCATION

REACCREDIDATION VISIT TO

CONSTRUCTION TECHNOLOGY AND MANAGEMENT PROGRAM

FERRIS STATE UNIVERSITY
BIG RAPIDS, MI

OCTOBER 16- 19, 2004

VISITING TEAM

CHAIR
Professor James H. Gill, Jr. JD, AIC
Louisiana State University, Baton Rouge, Louisiana

MEMBER
Dr. David Lickteig EED
Central Washington University, Ellsberg, Washington

MEMBER
Mr. Jeff Christmann
Vice President, GE Johnson Construction Company, Colorado Springs, Colorado

MEMBER-IN-TRAINING
Professor Hal Johnston
California Polytechnic University, San Luis Obispo, CA

INDUSTRY OBSERVER
Mr. James A. Klett
President, Klett Construction

VISITING TEAM REPORT

SECTION I. INTRODUCTION

1. SIZE, BRIEF HISTORY, TYPE, AND PURPOSE OF THE INSTITUTION.

Ferris State University was founded in 1884 as a private industrial school in Big Rapids, Michigan. The University joined Michigan's higher education system in 1950 as Ferris Institute. In 1987, the Legislature of Michigan granted Ferris University status. The University provides career oriented education to approximately 10,768 students each year. More than 100 undergraduate programs, five masters' degrees and two doctorate degrees offered by the University's eight Colleges: Allied Health Sciences, Arts and Sciences, Business, Health and Human Services, Optometry, Pharmacy, Technology, University College. In addition to the main campus at Big Rapids, a number of programs are offered off campus at various locations in Michigan and the Applied Technology Center in Grand Rapids. The Construction Management Program offers the BS degree and two CM Certificates at the Applied Technology Center.

Ferris State University's stated mission is "to be a national leader in providing opportunities for innovative teaching and learning in career-oriented, technological and professional education". Ferris enrollment is fairly divided between four year, professional degree and the associate programs. Of the four year undergraduate, masters and doctorate programs, approximately ninety-one (91%) percent are bachelor's degree programs. Ferris employs over 521 full time faculty and 293 adjunct faculty. Of the full time faculty approximately forty (40%) percent have Doctorate Degrees, forty-eight (48%) percent have Masters Degrees, and eight (8%) percent Bachelor Degrees. Additionally, there are three (3%) percent who hold Medical Doctorate Degrees. There is a collective bargaining agreement in effect between the faculty bargaining unit and the University.

2. INSTITUTION ORGANIZATION AND LOCATION OF THE CONSTRUCTION UNIT.

The Chief Executive Officer of the University is David L. Eisler. He reports to a Board of Trustees, who are appointed by the Governor of the state of Michigan for eight year staggered terms. The Vice President of Academic Affairs, Michael J. Harris reports directly to the President. There are also Vice Presidents for Administration and Finance, Student Affairs and Governmental Relations.

Reporting to the Vice President of Academic Affairs are the Deans of the eight Colleges plus the Deans for the Library and for University Center for Extended Learning. The Dean of the College of Technology, Charles Matrosic is in interim status. A search for this position will be instituted in 2005. Reporting to the Interim Dean of Technology are twelve (12) departments including the Construction Technology and Management Department Chaired by Associate Professor David Hanna, PE. The BS degree in Construction Management is housed within the Department of Construction Technology and Management.

3. SIZE, NUMBER OF FACULTY MEMBERS, BRIEF HISTORY, AND PURPOSE OF THE CONSTRUCTION UNIT.

Ferris State University has offered construction-related education for over forty-five years. Initial programming began at the Associate Degree level with Architectural Technology in 1954, Surveying Technology in 1958, Construction Engineering Technology in 1960 and Building Construction Technology in 1968. Baccalaureate programming began in 1973 with the BS in Surveying (not Survey Engineering)

Development of a Baccalaureate Degree in Construction Management began in the late 1970's. The Construction Management Program was designed as an upper division (third and fourth year) sequence leading to the BS degree for graduates of the Associate Degree programs in Architectural Technology, Construction Engineering Technology and Building Construction Technology. The BS Construction Management Program was implemented in the fall quarter of the 1981-82 academic years. During the 1989-90 academic year, construction management courses were first offered to employed individuals at the Ferris State University Applied Technology Center (ATC) in Grand Rapids, Michigan. The University continues to offer four CTM courses a semester taught in Grand Rapids, Michigan a number of times since the 1989-90 academic years. All ATC courses are taught traditionally by full time program faculty. In the Fall semester 2003, one course was taught by an adjunct faculty.

In the fall of 1993, Ferris State University switched from the quarter system to the semester system. At that time, a new 0+4 BS degree program in Construction Management was instituted for incoming students committed to the four year degree. The Construction Engineering Technology associate degree program has become the Civil Engineering Technology program. The first two years of the four-year degree program did not mirror any two year feeder programs. In the fall of 1996, the curriculum was revised to create two distinct tracks – Commercial/Industrial Construction and Highway/Bridge Construction.

This revision also made the transition from the Building Construction Technology and Civil Engineering Technology associate degree programs to the BS in Construction Management transparent (a return to true 2+2 programming). In addition, the first year of the Building Construction Technology, Civil Engineering Technology and the Construction Management Programs are identical in order to provide undecided student flexibility. The transition from the Architectural Technology associate degree to the BS degree in Construction Management is now 2+2.5 in order to include essential first and second year courses. In essence students laddering from Architectural Technology to Construction Management are treated as if they were external transfers.

All Building Construction Technology and Civil Engineering Technology students are considered to be enrolled in the Construction Management Program, as well as those students enrolling directly into the four-year BS Construction Management Program. There are 323 students enrolled in the Construction Management Program on the Big Rapids (main) campus. There are approximately 23 students enrolled off main campus taking courses at ATC.

4. ACCREDITATION HISTORY - FIRST ACCREDITED AND REACCREDITED.

The Construction Management Program was first accredited in 1993. The program was reaccredited in 1998. This report covers the second reaccredidation visit.

5. DEGREE TITLE AND CREDIT HOURS REQUIRED.

Bachelor of Science, Construction Management is the Degree title. The credit hours required for this Degree are 129 hours.

6. OTHER DEGREE PROGRAMS ADMINISTERED BY THE CONSTRUCTION UNIT.

There are two associate degree programs administered by the construction unit, AAS Building Construction Technology and AAS Civil Engineering Technology.

7. NAME OF REGIONAL ACCREDITING AGENCY OF THE INSTITUTION.

Ferris State University is accredited by The Higher Learning Commission of the North Central Association.

8. NAME AND POSITIONS OF PERSONS INTERVIEWED DURING THE VISIT.

- David L. Eisler, President
- Michael Harris, PhD., Vice-President for Academic Affairs
- Charles Matrosic, PE, CPC, Interim Dean, College of Technology
- David Nicol, PhD., Dean College of Business
- Roxanne Cullen Department Head (Languages & Literature), Assistant Dean, College of Arts & Sciences
- David Frank, Department Head (Mathematics and Physical Sciences-two separate Departments)
- Roy Gifford, Professor, Math Department
- David Hanna, Associate Professor and Chair, Construction Technology and Management
- Edward Brayton, Professor, Construction Technology and Management
- Kelly Seitter, Associate Professor, Construction Technology and Management
- Ray Dickinson, Professor, College of Technology Liaison & Patent/Trademark Librarian
- Harry Cooke, Assistant Professor, Construction Technology and Management
- Robert Eastley, Associate Professor, Construction Technology and Management
- John Schmidt, Professor, Construction Technology and Management
- John Kantorowski, Adjunct Faculty
- Ken Reinink, Assistant Professor, Construction Technology and Management

- Susan O'Neill-Cook, Adjunct Faculty
- Shari Wessels, Department Secretary, Construction Technology and Management
- Lee Templin, Associate Professor, Construction Technology and Management
- Daniel Hazen, Coordinator of the Institute for Construction Education and Training
- Representative students including Presidents of Associated Construction Students, Trade Association Chapters and Sigma Lambda Chi
- Industry Advisory Board members included:
  John Becsey, P.E., Michigan Asphalt Paving Association
  Phillip V. Frederickson, P.E., Chairman, the Christman Company
  Ken Hubers, Executive Vice President, Home Builders Association of Greater Kalamazoo, Michigan
  O.L. Pfaffmann, Ph.D.,F.A.I.C., CPC, Chairman Emeritus of the Board of Woods Construction Inc.
  Kim Ridings, CPC, MM, Eagle Management Co.
  Robert G. "Bob" Shilander, President, Constructors & Technical Services, LLC
  Andy Zorn, Project Manager, Clifford Buck Construction Company, Inc.

SECTION II. ORGANIZATION AND ADMINISTRATION

A. INSTITUTION

1. THE ORGANIZATIONAL STRUCTURE OF THE INSTITUTION PROVIDES A BASIS FOR ESTABLISHING AUTHORITY AND RESPONSIBILITY, UTILIZING RESOURCES AND ACHIEVING GOALS WITHIN THE CONSTRUCTION EDUCATION UNIT. THE INSTITUTION ADMINISTRATION ALSO HAS A POSITIVE ATTITUDE AND SUPPORT FOR THE CONSTRUCTION EDUCATION UNIT.

The organizational structure and its function provide a basis for establishment of authority and responsibility and provide for utilization of resources to achieve the goals of the CTM Department.

The institution's administration at the top and intermediate levels have a positive attitude and support for the educational unit as indicated in the documentation reviewed and the interviews made by the Visiting Team.

2. INSTITUTIONAL SUPPORT OF THE ADMINISTRATION OF THE CONSTRUCTION EDUCATION UNIT ACCORDS STATUS WITHIN THE INSTITUTION COMPARABLE TO THAT OF OTHER ACADEMIC UNITS OF SIMILAR SIZE AND FUNCTION WITH REGARD TO FINANCES, STAFFING, TEACHING LOADS, PROMOTIONS IN RANK AND SALARY, APPOINTMENT TO INSTITUTION POLICY MAKING COMMITTEES, PROGRAM PRIORITIES, AND OTHER ACADEMIC AFFAIRS.

To the extent that comparisons can be made, the CTM Program is accorded status within the institution comparable to that of other academic units of similar size and function within the college and the institution. The program is clearly an identifiable academic unit on campus and highly recognized and respected as such.

3. THE CONSTRUCTION EDUCATION PROGRAM FUNCTIONS WITHIN THE FRAMEWORK ESTABLISHED FOR THE INSTITUTION AND IS CONSISTENT WITH THE INSTITUTIONAL MISSION AND ASSESSMENT PROCEDURES.

The Construction Technology and Management Program functions within the constraints of the institution and its actions are consistent with the institutional mission and assessment procedures.

B. CONSTRUCTION UNIT

1. THE CONSTRUCTION EDUCATION UNIT IS HEADED BY A QUALIFIED ADMINISTRATOR WHO HAS SUFFICIENT AUTHORITY, SUPPORT, AND TIME TO ACCOMPLISH THE UNIT'S GOALS AND OBJECTIVES.

The Visiting Team noted as a strength that there is strong recognition and respect for the leadership of the CTM Program Department Chair within the Department, the College and the University. Although the Chair has been in the position for a relatively short period (just over one year), his historical presence and understanding of the Department assures his understanding of the CTM Program history, goals and progress. The Visiting Team noted a

Concern not directed at the Chair but at the need for exchange of Professional Development plan documentation between the College and the Department to assure that the Professional Development plan would be accurately monitored. Although the Department Chair is given adequate release time for administrative duties, the Chair has voluntarily accepted addition teaching load in respect of the needs of the students and the similar overloads of other faculty members. The Visiting Team noted the need for additional faculty as a Weakness.

2. **THE INSTITUTION AND THE CONSTRUCTION UNIT ADMINISTRATOR INSURE THAT THE TOTAL ADMINISTRATIVE WORK LOAD IS CAREFULLY CONTROLLED IN RELATION TO THE TOTAL WORK LOAD OF THE ADMINISTRATOR.**

   Although the Department Chair is given adequate release time for administrative duties, the Chair has voluntarily accepted addition teaching load in respect of the needs of the students and the similar overloads of other faculty members. The Visiting Team noted the need for additional faculty as a Weakness. Although the Chair devotes the required time to properly administer the CTM Program, this is beyond the time normally required when an administrator is under a more balanced teaching/release time.

3. **THE ADMINISTRATOR PROVIDES SUFFICIENT LEADERSHIP AND SUPERVISION TO DEVELOP A STRONG ACADEMIC PROGRAM.**

   The Visiting Team noted the deep personal and effective commitment of the Chair to the CTM Program, students and administration. The President of the University as well as faculty members indicated that the Chair was involved and articulate in a leadership and supervision role, both within the CTM Program and on the campus in general.

4. **THE ORGANIZATIONAL STRUCTURE OF THE CONSTRUCTION EDUCATION UNIT IS DESIGNED TO ENCOURAGE COMMUNICATION, COORDINATION, AND INTERACTION BETWEEN ADMINISTRATIVE OFFICERS, FACULTY, STUDENTS AND OTHER DISCIPLINES.**

   Subject to the resolution of the Weaknesses noted by the Visiting Team in faculty and staff, the organizational structure of the CTM Program lends itself to exceptional interaction among administrative officers, faculty and students. Concerning other disciplines, while there is communication and coordination, the Visiting Team suggested under Undeveloped Potentials that a more active and visible interaction/collaboration among the disciplines was ripe for development.

5. **THE ADMINISTRATIVE STRUCTURE IS SUFFICIENTLY FLEXIBLE TO MAKE THE FUNCTIONAL CHANGES NECESSARY TO ATTAIN PROGRAM OBJECTIVES.**

   The Visiting Team noted that the administrative structure was sufficiently flexible to allow functional changes to be made.

6. **THE ADMINISTRATOR ENCOURAGES PROFESSIONAL DEVELOPMENT OF FACULTY AND ADMINISTRATIVE POLICY INSURES THAT OPPORTUNITIES FOR PROFESSIONAL DEVELOPMENT ARE MADE AVAILABLE AND USED BY THE FACULTY.**

   The Visiting Team noted that the Chair of the Department had access only to the professional develop plans of individual faculty for non-tenured faculty. Further, the Chair was aware that professional development funds were at times used by faculty members for the financial support of the students in competitions. These items were included as Concerns by the Visiting Team. The faculty indicated that there were adequate opportunities and resources to pursue professional development; however, in some cases these opportunities were not taken as noted above. The Interim Dean of the College of Technology noted that there are funds for professional development also at the College level which are available to all units within the College upon application.

8. **THE ADMINISTRATOR AND THE FACULTY COOPERATE TO DEVELOP A PROGRAM OF HIGH QUALITY AND ESTABLISH A STRUCTURE TO FACILITATE PLANNING AND EVALUATION FOR CONTINUOUS IMPROVEMENT OF THE TOTAL PROGRAM.**

   The Visiting Team found that there did exist a good cooperative attitude and working relationship between the faculty and the administrator that was reflected in a good working relationship. This included planning and evaluation of the CTM Program's continuous improvement.

9. THE CONSTRUCTION UNIT HAS CLEAR AND CONCISE POLICIES RELATIVE TO CURRICULUM, FACULTY, STUDENTS, AND FACILITIES.

The Visiting Team confirmed that the CTM Program had clear and concise policies relative to curriculum, faculty, students and facilities.

10. EXPERIMENTATION AND INNOVATION ARE ENCOURAGED IN TEACHING METHODS AND CURRICULUM.

The Visiting Team noted in the strengths of the CTM Program the new facilities including the well equipped labs. These facilities and the innovation of the faculty assure that experimentation within the Mission, Goals and Objectives of the CTM Program is accomplished.

C. BUDGET

1. WITHIN THE INSTITUTION, BUDGET ALLOCATIONS ARE COMPATIBLE WITH THE SIZE OF THE UNIT WITH RESPECT TO STUDENTS, FACULTY AND STAFF.

Subject to the Visiting Team comments regarding additional faculty and staff noted as a Weakness, the budget allocations are generally comparable with similar units within the College of Technology.

2. BUDGET SUPPORT IS ADEQUATE TO ENABLE THE PROGRAM TO ACHIEVE ITS STATED PURPOSES.

Subject to the Visiting Team comments regarding additional faculty and staff noted as a Weakness, the budget is presently adequate to enable the CTM Program to achieve its purposes.

3. NON-BUDGETED FUNDS ARE USED TO SUPPLEMENT INSTITUTION FUNDS ALLOCATED BY THE ADMINISTRATION RATHER THAN TO REPLACE THOSE FUNDS.

The Visiting Team found that non-budgeted funds directed into the department were not replacing institutional funds but were mainly grants relating to the facilities and scholarships. The Visiting Team noted an Undeveloped Potential was the development/implementation of a written formal plan, including supporting resources, to solicit student scholarships and endowments for CTM students, faculty and facilities.

D. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team has no additional comments.

SECTION III. CURRICULUM

A. PROGRAM DESCRIPTION

1. THE CURRICULUM IS RESPONSIVE TO SOCIAL, ECONOMIC, AND TECHNICAL DEVELOPMENTS AND REFLECTS THE APPLICATION OF EVOLVING KNOWLEDGE IN CONSTRUCTION AND IN THE BEHAVIORAL AND QUANTITATIVE SCIENCES.

The Visiting Team found the curriculum to be generally current and meeting the needs of the constituencies it serves. This was supported by comments from the industrial advisory committee and documents/patent librarian.

2. THE PROFESSIONAL PROGRAM OFFERED BY THE CONSTRUCTION EDUCATION UNIT IS CONSISTENT WITH THE PHILOSOPHY AND THE PURPOSES OF THE INSTITUTION AND THE GOALS AS ESTABLISHED.

The Visiting Team found the curriculum to be consistent with the philosophy and purposes of the institution and Construction Management Program.

3. RECOGNIZING THE AUTONOMY OF EDUCATIONAL INSTITUTIONS IN THE MATTER OF CURRICULUM DEVELOPMENT, AND THE LEVELS AND DESIGNATIONS OF THE DEGREES AWARDED; IT IS PREFERRED THAT THE WORD "CONSTRUCTION" BE INCLUDED IN THE NAME OF THE DEGREE AWARDED.

The name of the degree is a Bachelor of Science in Construction Management.

B. CURRICULUM

1. THE CONSTRUCTION EDUCATION UNIT DEVELOPS ITS OWN PROGRAM GOALS, OBJECTIVES AND PARTICULAR EMPHASIS, AND PRESCRIBES THE NUMBER OF COURSES FOR GRADUATION, SEQUENCING OF STUDY, COURSE NUMBERS, AND TITLES.

The Construction Management Program does develop its own goals, objectives, required courses for graduation, sequencing of study, course numbers and titles. The Visiting Team noted that calculus, statistics, and the second physics, or chemistry 121 or geology is sequenced in the junior year due to the 2 + 2 nature of the program. These courses are subsequently not used as program foundation courses. The Visiting Team noted and cited as a Weakness the fact that the University catalogue description of courses was not consistently cited in the CTM course Syllabi.

2. THE CURRICULUM IS DESIGNED TO ACCOMMODATE CONTINUALLY EXPANDING REQUIREMENTS OF THE PROFESSION, ADVANCEMENTS IN KNOWLEDGE, AND THE CONTRIBUTIONS OF RELATED DISCIPLINES.

The Visiting Team found that the curriculum could accommodate continually expanding requirements of the profession, advancements in knowledge, and the contributions of related disciplines within present courses.

3. THE CONSTRUCTION EDUCATION UNIT STRIVES TO PROVIDE CURRICULUM OFFERINGS BEYOND THE MINIMUM REQUIREMENTS OF THE ACCE STANDARDS AND CRITERIA FOR ACCREDITATION.

The construction education unit does provide curriculum offerings beyond the minimum requirements of the ACCE Standards and Criteria for Accreditation as evidenced by more credits required for the bachelor's degree than required by accreditation standards.

4. THE TOTAL CURRICULUM SUPPORTS THE GOALS AND OBJECTIVES OF THE CONSTRUCTION EDUCATION UNIT, PROVIDES BALANCED CONTENT, AND MEETS ACCE'S MINIMUM REQUIREMENTS FOR CREDIT HOURS IN THE CATEGORIES OF GENERAL EDUCATION, MATHEMATICS AND SCIENCE, CONSTRUCTION SCIENCES, BUSINESS AND MANAGEMENT, CONSTRUCTION, AND OTHER REQUIREMENTS.

The Visiting Team found that the curriculum supports the goals and objectives of the construction education unit, provides balanced content, and meets ACCE's minimum requirements for credit hours in the categories of General Education, Mathematics and Science, Construction Sciences, Business and Management, Construction, and other requirements. As noted below in the Chart, the Visiting Team agreed with the categorical placement of courses. The Visiting Team noted the integration of oral and written communications into specified construction courses.

Curricula Category	ACCE Min. Requirements Baccalaureate	Total Credit Hours	
	Semester	Program	Team
General Education	15	24	24
Mathematics and Science	15	18	18
Construction Science	20-30	22-26**	22-26
Business and Management	18	20	20
Construction	20-30	37-33**	37-33
Other Requirements	22	8	8
Totals	120	129	129

**Commercial /Industrial Track/Highway/Heavy Track (Total of Construction Science and Construction is 59 SH in both cases.)

5. THE TOTAL CURRICULUM MEETS ALL MINIMUM REQUIREMENTS FOR CORE SUBJECT MATTER AT THE MINIMUM REQUIRED LEVEL OF ACADEMIC CREDIT.

The Visiting Team found that the total curriculum meets all minimum requirements for core subject matter at the minimum required level of academic credit.

6. THE TOTAL CURRICULUM CONTAINS ALL REQUIRED CURRICULUM TOPICAL CONTENT.

The Visiting Team found that the total curriculum contains all required curriculum topical content. The Visiting Team found that a number of courses had discrepancies in the catalog description and syllabus description.

C. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team observed two computer courses that may hold the potential to be combined. The combining of the two computer courses and exploration of other potential locations of the course could free up credit hours.

SECTION IV. FACULTY

A. QUALIFICATIONS

1. THE FACULTY POSSESSES APPROPRIATE ACADEMIC QUALIFICATIONS, PROFESSIONAL EXPERIENCE, AND PURSUE SCHOLARLY AND CREATIVE ACTIVITIES ESSENTIAL TO THE SUCCESSFUL CONDUCT OF AN ASSOCIATE/A BACCALAUREATE LEVEL ACADEMIC PROGRAM OF CONSTRUCTION.

The faculty possesses appropriate academic qualifications and professional experience consistent with the courses they teach when they were originally hired The Visiting Team confirmed this with review of resume and interviews.

2. THE INSTITUTION PROVIDES THE FACULTY WITH RANK, STATUS, SALARY, AND BENEFITS COMMENSURATE WITH THEIR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

These issues are all included in the collective bargaining agreement with the University.

3. THE EDUCATIONAL PREPARATION OF EACH FACULTY MEMBER INCLUDES STUDY IN THE AREAS FOR WHICH HE HAS TEACHING RESPONSIBILITY AND INCLUDES ADEQUATE BACKGROUND IN THE SUPPORTING DISCIPLINES FROM WHICH HIS AREA OF SPECIALTY DRAWS MAJOR CONCEPTS AND PRINCIPLES.

The Visiting Team found the educational preparation of the faculty adequate for their teaching duties.

4. EVALUATION OF FACULTY COMPETENCE RECOGNIZES APPROPRIATE PROFESSIONAL EXPERIENCE AS BEING EQUALLY AS IMPORTANT AS FORMAL EDUCATIONAL BACKGROUND AND THAT CONTINUING PROFESSIONAL GROWTH OF THE FACULTY IS A PREREQUISITE TO EFFECTIVE TEACHING.

The formal evaluation of all faculty is covered by a collective bargaining agreement. The Visiting Team reviewed the professional development program for tenured faculty with the Interim Dean. The program existed as indicated in the self study; however the Visiting Team determined that there was no requirement for professional development plan during the four years after tenure was granted. This was noted as a concern.

5. THE FACULTY ACTIVELY PARTICIPATES IN PROFESSIONAL ORGANIZATIONS AND COMMUNITY SERVICES, AND IN INTERPRETING CONSTRUCTION EDUCATION TO OTHER PROFESSIONS AND TO THE GENERAL PUBLIC.

The Visiting Team found that faculty is active in professional organizations and community services. The faculty is active in professional groups on campus and off campus, as well as with community organizations involved with the general public.

6. THE SIZE OF THE CONSTRUCTION FACULTY IS COMMENSURATE WITH THE NUMBER OF COURSES OFFERED, THE NUMBER OF STUDENTS ENROLLED, AND THE OTHER RESPONSIBILITIES OF THE FACULTY AND IS APPROPRIATE TO THE TYPE OF INSTRUCTION AND COMPARABLE TO THAT OF THE FACULTY OF OTHER ACADEMIC PROGRAMS OF THE INSTITUTION.

The Visiting Team noted as a Weakness under Article 4.1 of the ACCE Standards that the size of the Construction Management faculty is not adequate with the assigned teaching loads. The faculty, department chair, and the Interim Dean indicated that faculty has taught overloads for a number of years and that the faculty must agree before being assigned overloads. The response from the faculty was they desired to meet the needs of the students as they saw them at the time. The Visiting Team has observed that contact hours of over 20 hours per week were normal for some faculty.

B. Faculty Workload

1. Faculty workload assignment takes into consideration the number of lecture hours, number of laboratory hours, number of separate preparations, class size, availability of teaching assistants, counseling activities, administrative activities, committee assignments, extension or continuing education commitments, and research activities.

Faculty teaching hours and contact hours are excessive when compared to other departments of the college and similar sized and methods programs at other comparable Universities; and the number of faculty is not commensurate with the number of courses offered, the number of students enrolled and the other responsibilities of the faculty. (Article 4.1) The department chair was/is teaching more than required for the Department Head out of consideration for the teaching loads of the other faculty. The faculty and the Department administrator indicated faculty have continually carried teaching overloads. There were faculty members who felt that the teaching overload restricted their time for professional development. However, in reviewing this issue with the Interim Dean, it was pointed out that under the labor agreement certain the overloads could not be imposed upon faculty members without their consent. Thus, the conflicting issue was the faculty's commitment to the students needs versus their requirement to meet their needs for professional development. Additional faculty would relieve this issue of choice. This issue of choice was further illustrated by faculty indicating that they used their departmental professional development funds for deferring costs of student competitions. The Interim Dean indicated that at the College level there were additional funding available for professional development. In light of the facts given to the Visiting Team, this issue was noted as a Concern.

C. Administrative and Technical Staff Support

1. Administrative and technical staff supports are adequate to sustain fulfillment of the construction program's mission and are consistent with the level of support enjoyed by other program units within the parent institution.

The Visiting Team found the administrative and technical staff support while capable and supportive, were not adequate to support fulfillment of the construction program's mission nor was it consistent with the level of support enjoyed by other program units. There had been a historic sharing of secretarial support before the CTM Program moved into the new Granger Center Building. Since that time the sharing arrangement now in two buildings has severely lessen the availability of the support staff. The CTM Program office desk has times with out any personnel present. Very limited student help is available. This has been noted as a Weakness under Article 4.3.

D. Employment Policies

1. Faculty compensation is competitive with comparable positions in other institutions and industry to insure that quality faculty and high morale exist.

Faculty generally indicated that faculty compensation is competitive with comparable positions in other institutions in the region. Faculty indicated that the level of salaries does impede in the hiring some individuals trying to enter the teaching field from an industrial career. Faculty is part of the collective bargaining agreement.

E. Professional Development

1. Consulting work is desirable and encouraged, provided such activities do not conflict with normal assigned duties and responsibilities of the faculty member.

Professional Development of faculty was a Weakness in the prior Visiting Team Report. In the first year report the CTM Program reported that this weakness had been alleviated. The Visiting Team determined that there was a clear plan in place for Professional Development relating to tenured faculty. Non-tenure faculty are not included in the Plan but are addressed with the faculty by the Department Head. The Visiting Team reviewed the tenured faculty professional development plan with the Interim Dean. It was noted that the plan did not require a written professional development plan during the first four years following faculty being granted tenure; however, after the first post tenure review there was a requirement for the faculty to submit a written professional development plan. This has been noted as a concern by the Visiting Team. The faculty and the Department administrator indicated faculty have continually carried teaching overloads. There were faculty members who felt that the teaching overload restricted their time for professional development. However, in reviewing this issue with the Interim Dean, it was pointed out that under the labor agreement certain the overloads could not be imposed upon faculty members without their consent. Thus, the conflicting issue was the faculty's commitment to the students needs versus their requirement to meet their needs for professional development. Faculty interviews indicated minimal consulting work, mainly because of the remote location of Ferris State University limiting consultancy opportunities.

F. Faculty Evaluation

1. A clearly defined program of annual faculty evaluation is in place and may include student, peer, and/or administrator evaluations.

Annual faculty evaluations are being carried out in accordance with the collective bargaining agreement.

G. General comments of the Visiting Team, if any, not included in the preceding discussion in this section of the report.

The Visiting Team has no additional comments.

SECTION V. STUDENTS

A. ADMISSIONS AND ENROLLMENT

1. Qualifications of students admitted to the construction education unit are comparable with those of students in other areas of the institution and appropriate to the requirements for construction education.

The Visiting Team confirmed that, based upon comparable ACT scores, the qualifications of the students in the CTM Program are comparable with those of students in other areas and are appropriate to the requirements for construction education.

2. Admission policies, where applicable, are directed toward students with the ability and credentials for successful completion of the curriculum.

The admission policies of the University are directed toward students who meet and exceed the University minimum standard, so that the students are successful in completing their two, four or post graduate work.

3. Recruitment and publicity for the construction program are comparable to other programs of the institution.

The Visiting Team found that there is adequate publicity for the construction program and it is comparable with other programs of the institution, especially as the result of the opening and continuing use of the Granger Center Building for the benefit of the CTM Program.

B. ACADEMIC PROGRESS

1. An organized system of counseling and professional guidance is available to all students in the construction education program so that their needs, interests, and abilities are considered in preparing and implementing a plan of study.

The Visiting Team confirmed an aggressive and open advising attitude of the faculty and confirmed the students' recognition and appreciation of this availability. The issue of advising and access of students to faculty was cited by the Visiting Team as a CTM Program strength, There is strong awareness and appreciation among the students for continuous faculty availability and caring concern for student growth.

2. A RECORD SYSTEM EXIST THAT KEEPS BOTH THE STUDENT AND ADVISOR INFORMED REGARDING THE STUDENTS' PROGRESS TOWARD COMPLETION OF DEGREE REQUIREMENTS.

The University and the Department maintain student records that provide both the organization and the students with accurate records concerning the status of the student's educational process.

C. EXTRACURRICULAR ACTIVITIES

1. STUDENTS ARE ENCOURAGED TO PARTICIPATE IN ACTIVITIES IN ADDITION TO THEIR ACADEMIC STUDIES. SUCH ACTIVITIES INCLUDE INVOLVEMENT WITH INDUSTRY-BASED PROFESSIONAL AND OTHER ORGANIZATIONS.

The Visiting Team confirmed with the students, documentation, industry representatives and the faculty that there is a continuing encouragement to have students participate in various opportunities related to trade, professional and training organizations. The Associated Construction Students (ACS) is the student umbrella organization that houses the various student chapters of national trade associations. The students participate in trade association competitions, and through industry, participate in informal internships and free industry certification training.

D. GRADUATES

1. THERE IS AN ESTABLISHED PLAN FOR COMMUNICATION WITH ALUMNI AND PERIODIC FOLLOW UP OF GRADUATES.

The Visiting Team confirms that the alumni are in communication with the CTM Program and even participate as members of the industry advisory council. However, as indicated under Section IX, there is a draft of an Academic Quality Plan which includes references and involvement of alumni and recent graduates. However, this Academic Quality Plan is in draft form and has not been approved or implemented. This issue was listed as a Weakness in this report.

E. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team has no additional comments.

SECTION VI. FACILITIES AND SERVICES

A. PHYSICAL FACILITIES

1. Physical facilities are well maintained and organized to accommodate academic activities such as lectures, discussions, seminars, conferences, laboratory work, and research.

2. There are laboratory facilities for the teaching of construction principles and practices and facilities for office oriented activities with adequate storage space for multiple copies of plans and specifications, and facilities for field-oriented activities.

B. LIBRARY

1. The program has adequate access to holdings related to the general and professional components in the various fields of construction.

2. There is evidence of both adequacy and use in the selection of library materials and responsibility for their effective use.

C. OTHER SERVICES

Appropriate services on campus are effectively used, including the computer center, audiovisual services, placement services, student services, and financial aid. The classroom facilities under the control of the CTM Program are as noted in the Self Study and are located within the new Granger Center Building. These classrooms are in excellent condition and have new computers and state-of-the-art audiovisual equipment support.

D. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team was impressed with the facilities and the multiple use of them. The Visiting Team noted this as an Undeveloped Potential and encouraged the CTM Program with the aid of the Industry Advisory Board to develop a written plan for the most effective use of the new Granger Center Building facilities.

SECTION VII. VII. RELATIONS WITH INDUSTRY

A. SUPPORT FROM INDUSTRY

1. An Industry Advisory Board committee, consisting of representatives from the construction industry, is actively involved in an advisory role for the construction program with the department and the students. The Visiting Team noted an Undeveloped Potential relating to the Board's support of the CTM Program, particularly in light of the recent contributions of the construction industry and the equipping of the new Granger Center Building and the establishment of the Michigan Construction Hall of Fame. The Industry Advisory Board and its members should be encouraged to develop open communications with upper administration levels also for the mutual benefit of the University and the CTM Program. The Visiting Team met with the Industry Advisory Board including members of national trade associations such as the AGC, Michigan Asphalt Paving Association, as well as other regional and local general contractors and subcontractors. The Industry Advisory Board is very dedicated and enthusiastic. The Visiting Team was advised in general of the results of the Industry Advisory Board's recent meeting the students including their feedback and ideas. The Industry Advisory Board members were impressed with the comments of the students at their joint meeting.

2. The Industry Advisory Board meets on a regular basis, at least once a year, for the purpose of advising and assisting the development and enhancement of the program. The board will be meeting at least twice in the future. The Industrial Advisory Board is also representative of the potential employers of the graduates of the program.

3. In addition to the contributions for the Granger Center Building and the equipping of the asphalt lab, industry participants were involved with supporting student competitions and other activities of the Associated Construction Students.

B. SUPPORT FOR INDUSTRY

1. The construction program maintains continuous liaison with the various trade associations and professional societies to determine needs of the construction community for the purpose of establishing educational and professional development activities for the construction industry. The faculty often provides continuing education seminars for local and regional trade and professional associations.

   The program has liaisons with various local, regional and national construction related trade and professional organizations and conducts some professional development activities for the industry. The Visiting Team noted that, with the recent completion of the new state-of-the-art Granger Center, this was a great testimony of the industry's support through time and donations. The University and the Department host the Michigan Construction Hall of Fame dinner at the Granger Center Building. The Granger Center also provides greater visibility on campus and in the community for the CTM Program.

C. STUDENT-INDUSTRY RELATIONS

1. There is well-documented evidence of industry involvement and support for the student construction association programs, such as field trips and speakers for the Associated Construction Students Association (ACS), and participating in many construction association-sponsored events and activities, including informal summer internships.

2. The Associated Construction Students membership is about 112. It is the umbrella organization for student chapters of trade association and professional societies. The Sigma Lambda Chi, Omicron II Chapter has 45 members.

3. The students have free access to the contractors' supported Institute for Construction Education and Training through which they receive the same training as industry participants and the same certifications for the successful completion of that training.

D. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team notes as a strength that there is overwhelming respect and enthusiastic support for the CTM Program and Faculty members by the CTM students. There is strong awareness and appreciation among the students for continuous faculty availability and caring concern for student growth.

SECTION VIII. RELATIONS WITH THE GENERAL PUBLIC

A. THE CTM PROGRAM AND THE UNIVERSITY BROADLY AND ACCURATELY PUBLISHES THE OBJECTIVES OF THE PROGRAM, ADMISSION REQUIREMENTS, PROGRAM ASSESSMENT MEASURES EMPLOYED AND THE INFORMATION OBTAINED THROUGH THESE ASSESSMENT MEASURES, STUDENT ACHIEVEMENT, THE RATE AND TYPES OF EMPLOYMENT OF GRADUATES, AND ANY DATA SUPPORTING QUALITATIVE CLAIMS MADE BY THE PROGRAM.

The CTM Program broadly and accurately publishes the objectives of the program, admission requirements; they also keep accurate records of the program assessment and outcomes. They maintain records of graduates and student achievement through yearly student surveys.

B. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

There are no additional comments for the Visiting Team.

SECTION IX. PROGRAM QUALITY AND OUTCOME ASSESSMENT

A. THE PROGRAM HAS A WELL DEFINED MISSION STATEMENT WITH ESTABLISHED GOALS AND SPECIFIC OBJECTIVES FOR ACHIEVING EACH GOAL THAT REFLECT ACCE CRITERIA AND STANDARDS.

The Visiting Team found that the CTM Program has a well defined mission statement with established goals and specific objects for achieving each goal and that reflects the ACCE Criteria and Standards.

B. PROGRAM GOALS AND OBJECTIVES ARE REALISTIC AND ATTAINABLE.

The visiting Team confirmed that the goals and objectives are realistic and attainable.

C. THE CONSTRUCTION EDUCATION UNIT'S PLAN FORMS THE BASIS FOR ASSESSING OUTCOMES OF THE PROGRAM. ASSESSMENT INPUT IS OBTAINED FROM ALL PROGRAM CONSTITUENCIES, SUCH AS STUDENTS, GRADUATES, BENEFACTORS, EMPLOYERS, INDUSTRY, FACULTY AND ADMINISTRATION.

Although the CTM Program has a draft of an Academic Quality Plan found in the Self Study documents and also has additional historical information and documentation, the Visiting Team did not find documentation of a current, adopted and approved Academic Quality Plan with specific compliance of ACCE Standards in the sub sections of Planning and Evaluation (Article 9.2), Application (Article 9.3) and Resources (Article 9.4) sections of the ACCE Standards. (Article IX.)

D. THE PLANNING AND EVALUATION PROCESS IS INCORPORATED INTO THE PROGRAM PLAN IN SUCH A MANNER AS TO FOSTER ENHANCED STUDENT ACHIEVEMENT WITH RESPECT TO THE CONSTRUCTION EDUCATION DEGREE PROGRAM AS IT RELATES TO STUDENT LEARNING, RESEARCH, AND SERVICE.

Although the CTM Program has a draft of an Academic Quality Plan found in the Self Study documents and also has additional historical information and documentation, the Visiting Team did not find documentation of a current, adopted and approved Academic Quality Plan with specific compliance of ACCE Standards in the sub sections of Article 9.2, Article 9.3 and Article 9.4 of the ACCE Standards. (Article IX.)

E. ADEQUATE RESOURCES ARE AVAILABLE SO THAT THE PROGRAM MAY STRUCTURE A MISSION STATEMENT, PROGRAM GOALS, AND MEASURABLE OBJECTIVES WHICH WILL SERVE TO ENSURE CONTINUAL IMPROVEMENT OF THE PROGRAM. RESOURCES SUPPORT A SYSTEMATIC MEANS FOR COLLECTING, QUANTIFYING, AND ANALYZING DATA RELATIVE TO THE PROGRAM OBJECTIVES; FORMULATION OF CONCLUSIONS BASED ON THIS DATA, AND APPROPRIATE PROGRAM MODIFICATIONS.

Although the CTM Program has a draft of an Academic Quality Plan found in the Self Study documents and also has additional historical information and documentation, the Visiting Team did not find documentation of a current, adopted and approved Academic Quality Plan with specific compliance of ACCE Standards in the sub sections of Article 9.2, Article 9.3 and Article 9.4 of the ACCE Standards. (Article IX.)

F. GENERAL COMMENTS OF THE VISITING TEAM, IF ANY, NOT INCLUDED IN THE PRECEDING DISCUSSION IN THIS SECTION OF THE REPORT.

The Visiting Team noted that the content of the proposed draft Academic Quality Plan found in the Self Study meets the requirements of the ACCE Standards for the plan; however, it was a draft and not an adopted and approved plan.

SECTION X. REVIEW OF LAST VISITING TEAM'S WEAKNESSES AND CONCERNS (TO BE COMPLETED FOR RENEWAL OF ACCREDITATION VISITS ONLY)

A. ANALYZE THE PROGRESS MADE SINCE THE LAST VISIT BY REVIEWING THE LAST VISITING TEAM REPORT AND THE THREE YEAR INTERIM REPORT AND ANY OTHER REQUIRED INTERIM REPORT.

The Visiting Team has reviewed the required materials and concluded, subject to the statement of Weaknesses and Concerns stated herein, that the program has progressed and met or exceed the minimum standards required by ACCE.

B. LIST LAST VISITING TEAM'S NOTED WEAKNESSES AND ACTIONS TAKEN BY THE INSTITUTION.

1. The previous Visiting Team indicated one (1) weakness of the program: "A formal faculty professionalism development program does not exist." The University responded in its November 21, 2000 Third Year Interim Report as follows:

"This weakness has been alleviated entirely. The annual evaluation of Tenure-track faculty includes assessing the past year's professional Development activities and a written professional development for the next year. Tenured faculty are evaluated on a four-year cycle which includes an assessment of past professional development activities and a written plan for the next cycle."

The Visiting Team reviewed the professional assessment plan which resides with the office of the Dean of the College, who is charged with the implementation of the evaluation of tenure track faculty. The documentation of individual tenured faculty was present. The Visiting Team noted however, that the Professional Development plan for tenure tract faculty did not require a written faculty professional development plan for the first four-year cycle following the initial tenure of the faculty member. This is noted as a concern in this report. Additionally, the Visiting Team noted in this report that non-tenure track faculty who are evaluated by the Department Chair, were required to submit a written professional development plan which was part of the annual faculty evaluation process for non-tenure faculty. It is noted as a Concern that the Department Chair only has access to the professional development plans of the non-tenured faculty.

C. List last Visiting Team's noted concerns and actions taken by the institution.

The previous Visiting Team indicated the following concerns:

1. "Calculus, statistics, and the second physics courses are taken in the junior year which is too late since these courses cover fundamentals which the students should have as prerequisites to courses taken in the third year of the program."

   Although the Visiting Team recognized the similar issues of course sequencing, the integral 2+2 relationship with the two track two-year programs, the Visiting Team did not find evidence that concern had in fact weakened the four year program student performance at this institution, nor did the faculty consider the issue as an impediment to the program and student performance. This also was also the conclusion of the faculty in regards to the lack of prerequisite construction fundamental courses for student in the 2+2 relationship. The Visiting Team noted the deviation from the traditional approach resulting from the 2+2 relationship established at the University.

2. "The program is two semester credit hours short of ACCE minimum recommended for Business and Management category. In addition, is short four semester hours in the Other category. In the response to the review of the (prior) Visiting Team report, the program proposes to move four (4) semester hours from the Self Study total in General Education to the Other category. So doing would remove this issue as a Concern.

   The Visiting Team, under the revised and current ACCE Standards, determined that the University CTM Program has compiled with the requirements of Section III of the ACCE Standards establishing minimum hours, categories, and topical content.

SECTION XI. STRENGTHS, WEAKNESSES, CONCERNS, & UNDEVELOPED POTENTIALS

A. Strengths

1. There is overwhelming respect and enthusiastic support for CTM Program and faculty members by the CTM students.

2. There is strong awareness and appreciation among the students for continuous faculty availability and caring concern for student growth.

3. There is strong recognition and respect for the CTM Department Chair's leadership both within the Department, College and University administration.

4. There is a positive and cooperative interest from other Colleges and/or Departments in providing their course presentations specific to the CTM student designated major study area.

5. There is recognition within the University of the steady enrollment growth of the CTM Program compared with other College and University programs.

6. The establishment of the new Granger Center facility, its design, construction, furnishings and equipment.

7. There is an organized and active Industry Advisory Board that has been instrumental in contributing to the Granger Center.

8. There is an exceptional dedicated asphalt laboratory area established by contractor grants in the new facilities.

B. WEAKNESSES

1. Faculty teaching hours and contact hours are excessive when compared to other departments of the college and similar sized and methods programs at other comparable Universities; and the number of faculty is not commensurate with the number of courses offered, the number of students enrolled and the other responsibilities of the faculty. (Article 4.1)

2. Insufficient secretarial/staff assistance for the CTM Department (Article 4.3.).

3. Inconsistency of University catalogue course descriptions and Departmental Syllabus course descriptions. (Article 3.2)

4. Although the CTM Program has a draft of an Academic Quality Plan found in the Self Study documents and also has additional historical information and documentation, the Visiting Team did not find documentation of a current and approved Academic Quality Plan with specific compliance of ACCE Standards in the sub sections of Planning and Evaluation (Article 9.2), Application (Article 9.3) and Resources (Article 9.4) sections of the ACCE Standards. (Article IX.)

C. CONCERNS

1. At the Departmental level, the Chair has access only to the professional development plans of non-tenure track-faculty. Without coordination between the Chair and the Dean's office, the Chair would have no information concerning tenure track professional development plans of the Departmental Faculty.

2. The post tenure professional development plan does not require a written faculty professional development plan for the first four years following initial tenure. This could become a Weakness if the concern does not address the issue of a professional development plan for the period immediately following the grant of tenure to a faculty member.

3. The faculty has used professional development funds to support the financial needs of CTM student competition expenses. While the motivation of such actions is laudable, the failure to use professional development funds for their intended use may lead to restriction or non application of the Professional Development Plans of faculty members.

4. The extended and continuous issue relating to the permanent appointment of the Dean of the College of Technology affects the stability of the program. This matter has been open for up to ten (10) years, some reported. Instability in this position could have many effects the relate to the performance of the CTM Program.

D. UNDEVELOPED POTENTIALS

1. Development/implementation of a written plan, including supporting resources, for continuous utilization of the new Granger Center to enhance and market the program's identification and presence both on the campus and throughout Michigan.

2. Development/implementation of a written plan, including supporting resources, for publication and exposure of the Michigan Contractor's Hall of Fame.

3. Establish and encourage communication and participation of the CTM Industry Advisory Board members with various additional levels of the University administration for mutual benefit of the University, the CTM Program and the contracting industry.

4. Development/implementation of a written formal internship program, including supporting resources, with the CTM Program, the University career services capabilities and the contracting community.

5. Development/implementation of a written formal plan, including supporting resources, to solicit student scholarships and endowments for CTM students, faculty and facilities.

6. Explore, develop and implement inter-disciplinary projects, certificates/degrees and/or competing teams with other Department/Colleges including CTM students and other student groups, i.e. HVAC, etc.

TAB C

ADMINISTRATIVE PROGRAM REVIEW

Ferris State University
Administrative Program Review 2004
College of Technology
Pre-Building Construction Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	15		**15**	8		**8**	5		**5**	3		**3**	6		**6**
Freshman SCH's	213		**213**	110		**110**	73		**73**	45		**45**	80		**80**
Sophomore Headcount	1		**1**	1		**1**	1		**1**			**0**			**0**
Sophomore SCH's	13		**13**	13		**13**	10		**10**			**0**			**0**
TOTAL HEADCOUNT	16		**16**	9		**9**	6		**6**	3		**3**	6		**6**
TOTAL SCH's	226		**226**	123		**123**	83		**83**	45		**45**	80		**80**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			**0**			**0**			**0**			**0**			**0**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Pre-Building Construction Technology

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	0	0	16	18.3	0	0	0	15.7	11	21
2001F	0	0	0	9	18.6	2.214	2.113	2.315	16.9	14	23
2002F	0	0	0	6	18.8	2.105	2.105	2.105	17.2	15	19
2003F	0	1	0	2	18.3	0	0	0	18	17	19
2004F	0	0	0	6	18.8	0	0	0	15.8	15	17

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Pre-Building Construction Technology

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	16	15	1	0	2	0	0	0	14	0	16	0
2001F	9	9	0	0	0	1	0	0	8	0	9	0
2002F	6	6	0	0	0	0	0	1	5	0	5	1
2003F	3	3	0	0	0	0	1	0	2	0	3	0
2004F	6	6	0	0	0	0	1	0	5	0	6	0

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

ntering Fall Term	Major	N		Fall Term Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	PBCT	16							
			% Graduated By	0	0	6	6	12	12
			% Still Enrolled In	50	25	12	12	13	6
			% Persisters	50	25	18	18	25	18
			% Non-Persisters	50	75	82	82	75	82
1995F	PBCT	14							
			% Graduated By	0	0	0	0	0	7
			% Still Enrolled In	35	21	14	14	7	0
			% Persisters	35	21	14	14	7	7
			% Non-Persisters	65	79	86	86	93	93
1996F	PBCT	10							
			% Graduated By	0	0	0	29	39	39
			% Still Enrolled In	69	59	50	21	0	0
			% Persisters	69	59	50	50	39	39
			% Non-Persisters	31	41	50	50	61	61
1997F	PBCT	16							
			% Graduated By	0	0	0	12	18	18
			% Still Enrolled In	50	31	31	19	7	13
			% Persisters	50	31	31	31	25	31
			% Non-Persisters	50	69	69	69	75	69
1998F	PBCT	8							
			% Graduated By	0	12	25	25	25	37
			% Still Enrolled In	50	25	12	12	12	0
			% Persisters	50	37	37	37	37	37
			% Non-Persisters	50	63	63	63	63	63
1999F	PBCT	6							
			% Graduated By	0	0	0	0	16	
			% Still Enrolled In	16	16	16	16	0	
			% Persisters	16	16	16	16	16	
			% Non-Persisters	84	84	84	84	84	

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

				Fall Term					
ntering Fall Term	**Major**	**N**		**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
2000F	PBCT	14							
			% Graduated By	0	0	21	42		
			% Still Enrolled In	64	50	21	0		
			% Persisters	64	50	42	42		
			% Non-Persisters	36	50	58	58		
2001F	PBCT	7							
			% Graduated By	0	0	14			
			% Still Enrolled In	71	71	28			
			% Persisters	71	71	42			
			% Non-Persisters	29	29	58			
2002F	PBCT	5							
			% Graduated By	0	0				
			% Still Enrolled In	39	19				
			% Persisters	39	19				
			% Non-Persisters	61	81				
2003F	PBCT	3							
			% Graduated By	0					
			% Still Enrolled In	66					
			% Persisters	66					
			% Non-Persisters	34					

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Pre-Building Construction Technology*

Major Code: *PBCT*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	0	0	1	1	0	1	0	0	1	1	1	2
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	0	0	0	0		0
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	0	0	0	0		0
Admission Decisions	0	0	1	1	0	1	0	0	1	1	1	2
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	1	1	0	1	0	0	1	1	1	2
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	1	1	0	1	0	0	1	1	1	2
Less Nonscheduled	0	0	1	1		1	0	0	0	0		0
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	0	0	0	0	1	1	1	2
Difference in Enrolled Students	---------->						0	0	1	1	1	2
Final Enrolled	0	0	1	1	0	1						

Ferris State University
Administrative Program Review 2004
College of Technology
Building Construction Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	7		**7**	15		**15**	21		**21**	15		**15**	12		**12**
Freshman SCH's	103		**103**	221		**221**	318		**318**	237		**237**	186		**186**
Sophomore Headcount	10		**10**	6		**6**	15		**15**	15		**15**	20		**20**
Sophomore SCH's	146		**146**	86		**86**	216		**216**	221		**221**	304		**304**
Junior Headcount	8		**8**	3		**3**	3		**3**	8		**8**	7		**7**
Junior SCH's	115		**115**	46		**46**	49		**49**	108		**108**	101		**101**
Senior Headcount	3		**3**	1		**1**			**0**	1		**1**	1		**1**
Senior SCH's	45		**45**	13		**13**			**0**	19		**19**	20		**20**
TOTAL HEADCOUNT	28		**28**	25		**25**	39		**39**	39		**39**	40		**40**
TOTAL SCH's	409		**409**	366		**366**	583		**583**	585		**585**	611		**611**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	39		**39**	42		**42**	37		**37**	31		**31**	53		**53**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR Enrolled/Graduated 00-04
TEC
Building Construction Technology

Graduated Students

Year	FSU GPA			ACT		
	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000-2001	2.89	2.119	3.687	17.2	11	26
2001-2002	2.752	2.011	3.865	17.3	11	27
2002-2003	2.896	2.155	3.765	16.7	11	24
2003-2004	2.99	2.014	3.948	18.2	7	33

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Building Construction Technology

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	0	0	28	20.1	2.668	1.825	3.784	18.9	14	26
2001F	0	0	0	25	19.4	2.559	1.838	3.819	18.4	11	26
2002F	0	1	0	38	19.6	2.675	1.49	3.845	18.7	11	30
2003F	0	1	0	38	19.9	2.68	1.77	3.697	18.3	11	30
2004F	0	2	0	38	19.8	2.743	1.696	3.974	19.6	15	29

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

AFR 00-04 Enrollment by Sex and Ethnicity

TEC

Building Construction Technology

Student Enrollment

Term	Enrolled	Sex		Ethnicity							Enrollment	
		Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	28	26	2	0	0	0	0	0	28	0	27	1
2001F	25	24	1	0	1	0	0	0	24	0	25	0
2002F	39	38	1	2	1	0	0	0	36	0	38	1
2003F	39	39	0	0	3	0	0	0	36	0	36	3
2004F	40	39	1	4	3	0	0	0	33	0	39	1

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

Entering Fall Term	Major	N		Fall Term Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	BCTM	10							
			% Graduated By	0	29	69	79	79	79
			% Still Enrolled In	79	50	10	0	0	0
			% Persisters	79	79	79	79	79	79
			% Non-Persisters	21	21	21	21	21	21
1995F	BCTM	13							
			% Graduated By	0	15	38	53	53	53
			% Still Enrolled In	61	38	15	0	0	0
			% Persisters	61	53	53	53	53	53
			% Non-Persisters	39	47	47	47	47	47
1996F	BCTM	8							
			% Graduated By	0	0	25	25	25	25
			% Still Enrolled In	75	62	25	25	12	0
			% Persisters	75	62	50	50	37	25
			% Non-Persisters	25	38	50	50	63	75
1997F	BCTM	11							
			% Graduated By	0	9	18	45	54	63
			% Still Enrolled In	81	54	45	18	9	0
			% Persisters	81	63	63	63	63	63
			% Non-Persisters	19	37	37	37	37	37
1998F	BCTM	16							
			% Graduated By	0	12	31	56	68	68
			% Still Enrolled In	75	56	31	12	0	0
			% Persisters	75	68	62	68	68	68
			% Non-Persisters	25	32	38	32	32	32
1999F	BCTM	11							
			% Graduated By	0	18	36	36	36	
			% Still Enrolled In	45	18	0	0	0	
			% Persisters	45	36	36	36	36	
			% Non-Persisters	55	64	64	64	64	

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

Fall Term

Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2000F	BCTM	5							
			% Graduated By	0	0	0	0		
			% Still Enrolled In	19	19	0	0		
			% Persisters	19	19	0	0		
			% Non-Persisters	81	81	100	100		
2001F	BCTM	9							
			% Graduated By	0	11	44			
			% Still Enrolled In	77	55	22			
			% Persisters	77	66	66			
			% Non-Persisters	23	34	34			
2002F	BCTM	15							
			% Graduated By	0	26				
			% Still Enrolled In	79	53				
			% Persisters	79	79				
			% Non-Persisters	21	21				
2003F	BCTM	12							
			% Graduated By	0					
			% Still Enrolled In	91					
			% Persisters	91					
			% Non-Persisters	9					

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Building Construction Technology*

Major Code: *BCTM*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	2	1	2	5	38	43	2	1	1	4	47	51
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	1	0	1		1	1	0	0	1		1
Pending Cancelled	1	0	0	1		1	0	0	0	0		0
Pending Total	1	1	0	2		2	1	0	0	1		1
Admission Decisions	1	0	2	3	38	41	1	1	1	3	47	50
Less Rejections	1	0	0	1		1	0	0	0	0		0
Offers (Accepted)	0	0	2	2	38	40	1	1	1	3	47	50
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	2	2	38	40	1	1	1	3	47	50
Less Nonscheduled	0	0	1	1		1	1	0	0	1		1
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	1	1	38	39	0	1	1	2	47	49
Difference in Enrolled Students	---------->						0	1	0	1	9	10
Final Enrolled	0	0	1	1	38	39						

Ferris State University
Administrative Program Review 2004
College of Technology
Pre-Civil Engineering Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	1		**1**	3		**3**	1		**1**	4		**4**			**0**
Freshman SCH's	15		**15**	42		**42**	17		**17**	58		**58**			**0**
Sophomore Headcount			**0**			**0**	1		**1**			**0**			**0**
Sophomore SCH's			**0**			**0**	13		**13**			**0**			**0**
TOTAL HEADCOUNT	1		**1**	3		**3**	2		**2**	4		**4**			**0**
TOTAL SCH's	15		**15**	42		**42**	30		**30**	58		**58**			**0**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			**0**			**0**			**0**			**0**			**0**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Pre-Civil Engineering Technology

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	0	0	1	20	0.427	0.427	0.427	16	16	16
2001F	0	0	0	3	18	0	0	0	18	16	21
2002F	0	0	0	2	19	0	0	0	17.5	17	18
2003F	0	0	0	4	20.5	0	0	0	17.3	15	20

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Pre-Civil Engineering Technology

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	1	1	0	0	0	0	0	0	1	0	1	0
2001F	3	3	0	0	0	0	0	0	3	0	3	0
2002F	2	2	0	0	0	0	0	0	2	0	2	0
2003F	4	4	0	0	1	0	0	0	3	0	4	0

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

Fall Term

Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2002F	PCET	1							
			% Graduated By	0	0				
			% Still Enrolled In	100	100				
			% Persisters	100	100				
			% Non-Persisters	0	0				
2003F	PCET	4							
			% Graduated By	0					
			% Still Enrolled In	100					
			% Persisters	100					
			% Non-Persisters	0					

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

ntering Fall Term	Major	N		Fall Term Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	PCET	2							
			% Graduated By	0	0	0	50	50	50
			% Still Enrolled In	50	50	50	0	0	0
			% Persisters	50	50	50	50	50	50
			% Non-Persisters	50	50	50	50	50	50
1995F	PCET	2							
			% Graduated By	0	50	50	50	50	100
			% Still Enrolled In	100	50	50	50	50	0
			% Persisters	100	100	100	100	100	100
			% Non-Persisters	0	0	0	0	0	0
1996F	PCET	4							
			% Graduated By	0	0	25	50	50	50
			% Still Enrolled In	50	50	50	25	25	25
			% Persisters	50	50	75	75	75	75
			% Non-Persisters	50	50	25	25	25	25
1998F	PCET	4							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	25	25	0	0	0	0
			% Persisters	25	25	0	0	0	0
			% Non-Persisters	75	75	100	100	100	100
1999F	PCET	3							
			% Graduated By	0	0	0	0	0	
			% Still Enrolled In	66	0	0	0	0	
			% Persisters	66	0	0	0	0	
			% Non-Persisters	34	100	100	100	100	
2001F	PCET	3							
			% Graduated By	0	0	0			
			% Still Enrolled In	0	0	0			
			% Persisters	0	0	0			
			% Non-Persisters	100	100	100			

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Pre-Civil Engineering Technology*

Major Code: *PCET*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	0	0	0	0	1	1	0	0	1	1	0	1
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	0	0	1	1		1
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	0	0	1	1		1
Admission Decisions	0	0	0	0	1	1	0	0	0	0	0	0
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	0	0	1	1	0	0	0	0	0	0
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	0	0	1	1	0	0	0	0	0	0
Less Nonscheduled	0	0	0	0		0	0	0	0	0		0
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	1	1	0	0	0	0	0	0
Difference in Enrolled Students	---------->						0	0	0	0	-1	-1
Final Enrolled	0	0	0	0	1	1						

Ferris State University
Administrative Program Review 2004
College of Technology
Civil Engineering Technology AAS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	1		**1**	5		**5**	4		**4**	6		**6**	7		**7**
Freshman SCH's	16		**16**	71		**71**	61		**61**	94		**94**	95		**95**
Sophomore Headcount	7		**7**	2		**2**	4		**4**	2		**2**	5		**5**
Sophomore SCH's	99		**99**	25		**25**	59		**59**	29		**29**	76		**76**
Junior Headcount	1		**1**	2		**2**	2		**2**	2		**2**	2		**2**
Junior SCH's	10		**10**	26		**26**	27		**27**	29		**29**	27		**27**
Senior Headcount	2		**2**			**0**	1		**1**	1		**1**			**0**
Senior SCH's	24		**24**			**0**	16		**16**	9		**9**			**0**
TOTAL HEADCOUNT	11		**11**	9		**9**	11		**11**	11		**11**	14		**14**
TOTAL SCH's	149		**149**	122		**122**	163		**163**	161		**161**	198		**198**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	6		**6**	13		**13**	8		**8**	9		**9**	10		**10**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR Enrolled/Graduated 00-04
TEC
Civil Engineering Technology

Graduated Students

Year	FSU GPA			ACT		
	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000-2001	2.81	1.89	3.617	17.3	13	21
2001-2002	2.537	2.06	3.503	18.6	13	24
2002-2003	3.235	2.519	3.632	17.4	16	19
2003-2004	3.146	2.27	3.694	18.7	13	33

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Civil Engineering Technology

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	1	0	10	20.9	2.665	1.734	3.558	18.1	15	21
2001F	0	0	0	9	19.9	2.724	2.408	2.981	19.8	15	24
2002F	0	0	0	11	20.1	3.075	2.265	3.575	20.2	16	25
2003F	0	0	0	11	19.8	2.938	2.244	3.654	20.5	15	25
2004F	0	0	0	14	19.9	2.741	1.95	3.339	21.2	17	26

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Civil Engineering Technology

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	11	11	0	0	0	0	0	0	11	0	9	2
2001F	9	7	2	0	0	0	0	0	9	0	8	1
2002F	11	11	0	1	0	0	0	0	10	0	11	0
2003F	11	11	0	1	0	0	0	0	10	0	10	1
2004F	14	14	0	2	1	0	0	0	11	0	14	0

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

				Fall Term					
Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	CETM	3							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	0	33	0	0	0	0
			% Persisters	0	33	0	0	0	0
			% Non-Persisters	100	67	100	100	100	100
1995F	CETM	1							
			% Graduated By	0	0	0	0	100	100
			% Still Enrolled In	100	100	100	100	0	0
			% Persisters	100	100	100	100	100	100
			% Non-Persisters	0	0	0	0	0	0
1996F	CETM	2							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	50	0	0	0	0	0
			% Persisters	50	0	0	0	0	0
			% Non-Persisters	50	100	100	100	100	100
1997F	CETM	2							
			% Graduated By	0	0	0	50	50	50
			% Still Enrolled In	100	50	50	0	0	0
			% Persisters	100	50	50	50	50	50
			% Non-Persisters	0	50	50	50	50	50
1998F	CETM	1							
			% Graduated By	0	0	100	100	100	100
			% Still Enrolled In	100	100	0	0	0	0
			% Persisters	100	100	100	100	100	100
			% Non-Persisters	0	0	0	0	0	0
1999F	CETM	2							
			% Graduated By	0	50	50	50	50	
			% Still Enrolled In	100	50	50	50	50	
			% Persisters	100	100	100	100	100	
			% Non-Persisters	0	0	0	0	0	

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Two-Year Degree Programs

Fall Term

Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2000F	CETM	1							
			% Graduated By	0	0	0	0		
			% Still Enrolled In	0	0	0	0		
			% Persisters	0	0	0	0		
			% Non-Persisters	100	100	100	100		
2001F	CETM	4							
			% Graduated By	0	0	0			
			% Still Enrolled In	0	25	25			
			% Persisters	0	25	25			
			% Non-Persisters	100	75	75			
2002F	CETM	3							
			% Graduated By	0	33				
			% Still Enrolled In	66	33				
			% Persisters	66	66				
			% Non-Persisters	34	34				
2003F	CETM	5							
			% Graduated By	0					
			% Still Enrolled In	39					
			% Persisters	39					
			% Non-Persisters	61					

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Civil Engineering Technology*

Major Code: *CETM*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	0	1	0	1	12	13	3	1	0	4	13	17
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	1	0	1		1	3	0	0	3		3
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	1	0	1		1	3	0	0	3		3
Admission Decisions	0	0	0	0	12	12	0	1	0	1	13	14
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	0	0	12	12	0	1	0	1	13	14
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	0	0	12	12	0	1	0	1	13	14
Less Nonscheduled	0	0	0	0		0	0	1	0	1		1
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	12	12	0	0	0	0	13	13
Difference in Enrolled Students	---------->						0	0	0	0	1	1
Final Enrolled	0	0	0	0	12	12						

Ferris State University
Administrative Program Review 2004
College of Technology
Pre-Construction Management BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	22		22	17		17	18		18	21		21	22		22
Freshman SCH's	313		313	243		243	259		259	304		304	313		313
Sophomore Headcount	1		1	1		1	4		4	4		4	2		2
Sophomore SCH's	14		14	13		13	51		51	48		48	26		26
Junior Headcount			0			0			0			0	3		3
Junior SCH's			0			0			0			0	40		40
Senior Headcount			0			0	1		1	1		1	1		1
Senior SCH's			0			0	16		16	9		9	17		17
TOTAL HEADCOUNT	23		23	18		18	23		23	26		26	28		28
TOTAL SCH's	327		327	256		256	326		326	361		361	396		396

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			0			0			0			0			0

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Pre-Construction Management

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	1	1	21	18.6	2.103	1.957	2.25	16.5	13	20
2001F	0	2	0	16	18.6	1.779	0.7	2.381	16.1	12	20
2002F	0	0	0	23	18.9	2.104	1.686	2.424	18.1	13	21
2003F	1	3	0	22	19	2.358	2.061	2.618	17.1	14	21
2004F	0	1	1	26	19.6	3.135	2.812	3.458	17.4	13	21

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Pre-Construction Management

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	23	22	1	0	3	0	1	0	19	0	23	0
2001F	18	18	0	0	1	0	2	0	15	0	18	0
2002F	23	23	0	0	2	0	1	0	20	0	23	0
2003F	26	26	0	0	1	1	1	0	23	0	24	2
2004F	28	28	0	3	2	0	0	0	23	0	28	0

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

Entering Fall Term	Major	N		Fall Term Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	PCNM	1							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	0	0	0	0	0	0
			% Persisters	0	0	0	0	0	0
			% Non-Persisters	100	100	100	100	100	100
1995F	PCNM	2							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	50	50	0	0	0	0
			% Persisters	50	50	0	0	0	0
			% Non-Persisters	50	50	100	100	100	100
1996F	PCNM	20							
			% Graduated By	0	0	9	25	34	34
			% Still Enrolled In	64	50	25	9	5	5
			% Persisters	64	50	34	34	39	39
			% Non-Persisters	36	50	66	66	61	61
1997F	PCNM	10							
			% Graduated By	0	0	9	19	39	39
			% Still Enrolled In	59	59	30	10	0	0
			% Persisters	59	59	39	29	39	39
			% Non-Persisters	41	41	61	71	61	61
1998F	PCNM	21							
			% Graduated By	0	0	9	28	42	47
			% Still Enrolled In	52	47	43	24	10	5
			% Persisters	52	47	52	52	52	52
			% Non-Persisters	48	53	48	48	48	48
1999F	PCNM	11							
			% Graduated By	0	0	0	9	18	
			% Still Enrolled In	45	36	36	27	9	
			% Persisters	45	36	36	36	27	
			% Non-Persisters	55	64	64	64	73	

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

Fall Term

Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2000F	PCNM	20							
			% Graduated By	0	0	9	29		
			% Still Enrolled In	44	50	30	5		
			% Persisters	44	50	39	34		
			% Non-Persisters	56	50	61	66		
2001F	PCNM	12							
			% Graduated By	0	0	16			
			% Still Enrolled In	33	25	9			
			% Persisters	33	25	25			
			% Non-Persisters	67	75	75			
2002F	PCNM	17							
			% Graduated By	0	0				
			% Still Enrolled In	94	70				
			% Persisters	94	70				
			% Non-Persisters	6	30				
2003F	PCNM	21							
			% Graduated By	0					
			% Still Enrolled In	52					
			% Persisters	52					
			% Non-Persisters	48					

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Pre-Construction Management*

Major Code: *PCNM*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	2	0	0	2	7	9	3	1	0	4	1	5
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	0	0	0	0		0
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	0	0	0	0		0
Admission Decisions	2	0	0	2	7	9	3	1	0	4	1	5
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	2	0	0	2	7	9	3	1	0	4	1	5
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	2	0	0	2	7	9	3	1	0	4	1	5
Less Nonscheduled	2	0	0	2		2	3	1	0	4		4
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	7	7	0	0	0	0	1	1
Difference in Enrolled Students	---------->						0	0	0	0	-6	-6
Final Enrolled	1	0	0	1	8	9						

Ferris State University
Administrative Program Review 2004
College of Technology
Construction Mgt/Commercial/Industrial Bldg Track BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	9		**9**	3		**3**	15		**15**	1		**1**	6		**6**
Freshman SCH's	130		**130**	38		**38**	243		**243**	16		**16**	86		**86**
Sophomore Headcount	21		**21**	12		**12**	5		**5**	26		**26**	6		**6**
Sophomore SCH's	309		**309**	171		**171**	71		**71**	399		**399**	83		**83**
Junior Headcount	14		**14**	17		**17**	14		**14**	22		**22**	20		**20**
Junior SCH's	206		**206**	254		**254**	211		**211**	315		**315**	306		**306**
Senior Headcount	43		**43**	32		**32**	28		**28**	22		**22**	32		**32**
Senior SCH's	610		**610**	479		**479**	419		**419**	319		**319**	493		**493**
TOTAL HEADCOUNT	87		**87**	64		**64**	62		**62**	71		**71**	64		**64**
TOTAL SCH's	1255		**1255**	942		**942**	944		**944**	1049		**1049**	968		**968**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			**0**			**0**			**0**			**0**			**0**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Construction Mgt/Commercial/Industrial Bldg Track

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	5	1	81	21.9	2.667	1.352	3.747	19.4	13	26
2001F	0	5	1	58	21.9	2.675	1.496	3.845	18.6	13	24
2002F	0	7	0	55	21.2	2.707	1.849	3.845	19.3	15	26
2003F	0	5	1	65	21.4	2.699	1.675	3.913	19.3	12	27
2004F	0	4	1	59	22	2.842	1.8	3.942	19.5	12	26

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Construction Mgt/Commercial/Industrial Bldg Track

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	87	79	8	4	3	0	0	0	79	1	82	5
2001F	64	61	3	3	1	0	0	0	59	1	64	0
2002F	62	57	5	3	2	0	0	1	56	0	60	2
2003F	71	68	3	2	0	0	0	2	66	1	68	3
2004F	64	59	5	4	2	0	0	1	56	1	64	0

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

Fall Term

ntering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1996F	CMBT	6							
			% Graduated By	0	0	16	50	50	50
			% Still Enrolled In	66	50	34	0	0	0
			% Persisters	66	50	50	50	50	50
			% Non-Persisters	34	50	50	50	50	50
1997F	CMBT	4							
			% Graduated By	0	50	50	75	75	75
			% Still Enrolled In	75	25	25	0	0	0
			% Persisters	75	75	75	75	75	75
			% Non-Persisters	25	25	25	25	25	25
1998F	CMBT	2							
			% Graduated By	0	0	50	50	50	50
			% Still Enrolled In	50	50	0	0	0	0
			% Persisters	50	50	50	50	50	50
			% Non-Persisters	50	50	50	50	50	50
1999F	CMBT	1							
			% Graduated By	0	0	0	0	0	
			% Still Enrolled In	0	0	0	0	0	
			% Persisters	0	0	0	0	0	
			% Non-Persisters	100	100	100	100	100	
2000F	CMBT	4							
			% Graduated By	0	0	25	25		
			% Still Enrolled In	75	50	0	0		
			% Persisters	75	50	25	25		
			% Non-Persisters	25	50	75	75		
2001F	CMBT	1							
			% Graduated By	0	0	0			
			% Still Enrolled In	0	0	0			
			% Persisters	0	0	0			
			% Non-Persisters	100	100	100			

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

Fall Term

Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2002F	CMBT	14							
			% Graduated By	0	14				
			% Still Enrolled In	50	28				
			% Persisters	50	42				
			% Non-Persisters	50	58				

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Construction Mgt/Commercial/Industrial Bldg Track*

Major Code: *CMBT*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	1	4	0	5	63	68	1	2	1	4	72	76
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	2	0	2		2	1	0	0	1		1
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	2	0	2		2	1	0	0	1		1
Admission Decisions	1	2	0	3	63	66	0	2	1	3	72	75
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	1	2	0	3	63	66	0	2	1	3	72	75
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	1	2	0	3	63	66	0	2	1	3	72	75
Less Nonscheduled	1	2	0	3		3	0	2	1	3		3
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	63	63	0	0	0	0	72	72
Difference in Enrolled Students	---------->						0	0	0	0	9	9
Final Enrolled	0	1	0	1	64	65						

Ferris State University
Administrative Program Review 2004
College of Technology
Construction Management/Highway/Bridge Track BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	2		**2**	2		**2**			**0**	1		**1**			**0**
Freshman SCH's	29		**29**	36		**36**			**0**	7		**7**			**0**
Sophomore Headcount	1		**1**	2		**2**	2		**2**			**0**	2		**2**
Sophomore SCH's	13		**13**	31		**31**	29		**29**			**0**	21		**21**
Junior Headcount	3		**3**	1		**1**	4		**4**	7		**7**			**0**
Junior SCH's	48		**48**	16		**16**	62		**62**	95		**95**			**0**
Senior Headcount	7		**7**	4		**4**	4		**4**	5		**5**	9		**9**
Senior SCH's	104		**104**	59		**59**	35		**35**	77		**77**	130		**130**
TOTAL HEADCOUNT	13		**13**	9		**9**	10		**10**	13		**13**	11		**11**
TOTAL SCH's	194		**194**	142		**142**	126		**126**	179		**179**	151		**151**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates			**0**			**0**			**0**			**0**			**0**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Construction Management/Highway/Bridge Track

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	0	0	13	22.8	2.577	1.894	3.488	19.2	15	24
2001F	0	0	0	9	21.8	2.672	2.19	3.578	20.1	17	24
2002F	1	0	0	9	23	2.877	2.062	3.666	19.4	14	26
2003F	0	0	0	13	23.4	3.023	2.038	3.814	17.8	14	24
2004F	0	0	0	11	24.5	3.079	2.059	3.829	18	14	26

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Construction Management/Highway/Bridge Track

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	13	13	0	0	1	0	0	0	12	0	13	0
2001F	9	7	2	0	0	0	0	0	9	0	9	0
2002F	10	7	3	1	1	0	0	0	8	0	8	2
2003F	13	9	4	1	1	0	0	0	11	0	11	2
2004F	11	7	4	1	1	0	0	0	9	0	9	2

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

				Fall Term					
Entering Fall Term	**Major**	**N**		**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**
1997F	CMCT	2							
			% Graduated By	0	0	0	0	0	0
			% Still Enrolled In	50	0	0	0	0	0
			% Persisters	50	0	0	0	0	0
			% Non-Persisters	50	100	100	100	100	100
2001F	CMCT	1							
			% Graduated By	0	100	100			
			% Still Enrolled In	100	0	0			
			% Persisters	100	100	100			
			% Non-Persisters	0	0	0			

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Construction Management/Highway/Bridge Track*

Major Code: *CMCT*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	0	0	1	1	12	13	0	0	0	0	12	12
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	0	0	0	0		0
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	0	0	0	0		0
Admission Decisions	0	0	1	1	12	13	0	0	0	0	12	12
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	1	1	12	13	0	0	0	0	12	12
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	1	1	12	13	0	0	0	0	12	12
Less Nonscheduled	0	0	1	1		1	0	0	0	0		0
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	12	12	0	0	0	0	12	12
Difference in Enrolled Students	---------->						0	0	0	0	0	0
Final Enrolled	0	0	1	1	13	14						

Ferris State University
Administrative Program Review 2004
College of Technology
Construction Management BS

Student Enrollment

	Fall 2000			Fall 2001			Fall 2002			Fall 2003			Fall 2004		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Freshman Headcount	35		**35**	41	1	**42**	22	1	**23**	48	2	**50**	34		**34**
Freshman SCH's	522		**522**	636	6	**642**	316	6	**322**	761	18	**779**	523		**523**
Sophomore Headcount	24	2	**26**	30	1	**31**	41		**41**	23	2	**25**	48		**48**
Sophomore SCH's	344	9	**353**	432	6	**438**	592		**592**	341	24	**365**	727		**727**
Junior Headcount	22	5	**27**	29	3	**32**	32	6	**38**	35	7	**42**	25	12	**37**
Junior SCH's	312	36	**348**	440	12	**452**	501	54	**555**	521	61	**582**	374	82	**456**
Senior Headcount	31	6	**37**	34	2	**36**	44	9	**53**	39	9	**48**	50	9	**59**
Senior SCH's	469	36	**505**	489	12	**501**	672	59	**731**	584	57	**641**	754	56	**810**
TOTAL HEADCOUNT	112	13	**125**	134	7	**141**	139	16	**155**	145	20	**165**	157	21	**178**
TOTAL SCH's	1647	81	**1728**	1997	36	**2033**	2081	119	**2200**	2207	160	**2367**	2378	138	**2516**

Graduates

	Academic Yr 99/00			Academic Yr 00/01			Academic Yr 01/02			Academic Yr 02/03			Academic Yr 03/04		
	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total	On	Off	Total
Number of Graduates	31		**31**	40	2	**42**	34	1	**35**	58	2	**60**	42	3	**45**

Source: 7th/4th Day Counts
Institutional Research and Testing
1/26/2005

Ferris State University
APR Enrolled/Graduated 00-04
TEC
Construction Management

Graduated Students

Year	FSU GPA			ACT		
	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000-2001	3	2.186	3.954	18.1	11	26
2001-2002	2.736	2.06	3.579	17.9	12	26
2002-2003	2.779	2.093	3.695	17.5	10	27
2003-2004	3.009	2.193	3.948	17.8	12	28

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Residency, Age, FSU GPA, and ACT
TEC
Construction Management

Student Enrollment

	Residency				Age	FSU GPA			ACT		
Term	Blank	Midwest Compact	Non-Resident	Resident	Avg. Age	Avg. GPA	Min. GPA	Max. GPA	Avg. ACT	Min. ACT	Max. ACT
2000F	0	6	1	118	21.8	2.71	1.524	4	19	13	30
2001F	0	6	1	134	21.7	2.794	1.19	4	19.2	13	30
2002F	0	7	1	147	22.2	2.805	1.448	4	19.4	12	30
2003F	0	9	0	156	21.8	2.85	1.42	4	20	14	30
2004F	0	10	0	168	21.7	2.879	1.506	3.951	19.9	14	29

Source:
Institutional Research and Testing
2/9/2005

Ferris State University
APR 00-04 Enrollment by Sex and Ethnicity
TEC
Construction Management

Student Enrollment

		Sex		Ethnicity							Enrollment	
Term	Enrolled	Male	Female	Blank	Black	Hispanic	Indian/ Alaskan	Asian/Pac Islander	White	Foreign	Full-Time	Part-Time
2000F	125	119	6	3	1	1	0	0	119	1	109	16
2001F	141	136	5	5	1	0	0	1	133	1	128	13
2002F	155	148	7	6	3	1	0	0	144	1	137	18
2003F	165	160	5	11	3	3	0	0	148	0	146	19
2004F	178	173	5	14	2	5	0	0	157	0	153	25

Source:
Institutional Research and Testing
2/9/2005

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

Entering Fall Term	Major	N		Fall Term Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
1994F	CONM	5							
			% Graduated By	0	0	39	39	39	39
			% Still Enrolled In	59	39	20	20	0	0
			% Persisters	59	39	59	59	39	39
			% Non-Persisters	41	61	41	41	61	61
1995F	CONM	11							
			% Graduated By	0	0	9	27	27	36
			% Still Enrolled In	54	45	36	9	9	0
			% Persisters	54	45	45	36	36	36
			% Non-Persisters	46	55	55	64	64	64
1996F	CONM	10							
			% Graduated By	0	0	9	19	29	39
			% Still Enrolled In	79	69	41	20	10	0
			% Persisters	79	69	50	39	39	39
			% Non-Persisters	21	31	50	61	61	61
1997F	CONM	18							
			% Graduated By	0	16	33	44	44	44
			% Still Enrolled In	50	28	11	0	0	0
			% Persisters	50	44	44	44	44	44
			% Non-Persisters	50	56	56	56	56	56
1998F	CONM	11							
			% Graduated By	0	27	54	63	81	81
			% Still Enrolled In	90	63	27	18	0	0
			% Persisters	90	90	81	81	81	81
			% Non-Persisters	10	10	19	19	19	19
1999F	CONM	22							
			% Graduated By	0	18	31	40	50	
			% Still Enrolled In	63	41	19	14	4	
			% Persisters	63	59	50	54	54	
			% Non-Persisters	37	41	50	46	46	

Ferris State University

Retention and Graduation Rates of Full-Time FTIAC Students - By Major

Four-Year Degree Programs

				Fall Term					
Entering Fall Term	Major	N		Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
2000F	CONM	25							
			% Graduated By	0	3	7	35		
			% Still Enrolled In	55	52	44	12		
			% Persisters	55	55	51	47		
			% Non-Persisters	45	45	49	53		
2001F	CONM	32							
			% Graduated By	0	6	15			
			% Still Enrolled In	71	62	47			
			% Persisters	71	68	62			
			% Non-Persisters	29	32	38			
2002F	CONM	10							
			% Graduated By	0	0				
			% Still Enrolled In	59	50				
			% Persisters	59	50				
			% Non-Persisters	41	50				
2003F	CONM	33							
			% Graduated By	0					
			% Still Enrolled In	78					
			% Persisters	78					
			% Non-Persisters	22					

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

ON CAMPUS

Winter 2004 and **Winter 2005**

Major: *Construction Management*

Major Code: *CONM*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	2	5	5	12	134	146	2	15	2	19	137	156
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	1	1	1	3		3	1	8	2	11		11
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	1	1	1	3		3	1	8	2	11		11
Admission Decisions	1	4	4	9	134	143	1	7	0	8	137	145
Less Rejections	0	1	1	2		2	0	1	0	1		1
Offers (Accepted)	1	3	3	7	134	141	1	6	0	7	137	144
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	1	3	3	7	134	141	1	6	0	7	137	144
Less Nonscheduled	1	1	0	2		2	0	2	0	2		2
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	2	3	5	134	139	1	4	0	5	137	142
Difference in Enrolled Students	---------->						1	2	-3	0	3	3
Final Enrolled	1	3	2	6	138	144						

TOTALS BY MAJOR IN COLLEGE

OFF CAMPUS

Winter 2004 and **Winter 2005**

Major: *Construction Management*

Major Code: *CNMO*

	Winter 2004						Winter 2005					
College: TEC	FR	TA	RA	SUB	CON	TOT	FR	TA	RA	SUB	CON	TOT
Apps	0	0	0	0			0	0	0	0	3	3
Pending In Progress	0	0	0	0		0	0	0	0	0		0
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	0	0	0	0		0
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	0	0	0	0		0
Admission Decisions	0	0	0	0		0	0	0	0	0	3	3
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	0	0			0	0	0	0	3	3
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	0	0			0	0	0	0	3	3
Less Nonscheduled	0	0	0	0		0	0	0	0	0		0
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	0	0	0	0	0	0	3	3
Difference in Enrolled Students	---------->						0	0	0	0	3	3
Final Enrolled	0	2	0	2	17	19						

Stat Date: 12-20-2003 / 12-18-2004

TOTALS BY MAJOR IN COLLEGE

OFF CAMPUS

Winter 2004 and **Winter 2005**

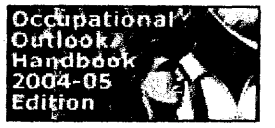
Major: *Construction Management*

Major Code: *ZCMO*

	Winter 2004						Winter 2005					
College: TEC	**FR**	**TA**	**RA**	**SUB**	**CON**	**TOT**	**FR**	**TA**	**RA**	**SUB**	**CON**	**TOT**
Apps	0	0	0	0			1	5	0	6	18	24
Pending In Progress	0	0	0	0		0	0	2	0	2		2
Pending Complete	0	0	0	0		0	0	0	0	0		0
Pending Incomplete	0	0	0	0		0	1	2	0	3		3
Pending Cancelled	0	0	0	0		0	0	0	0	0		0
Pending Total	0	0	0	0		0	1	4	0	5		5
Admission Decisions	0	0	0	0		0	0	1	0	1	18	19
Less Rejections	0	0	0	0		0	0	0	0	0		0
Offers (Accepted)	0	0	0	0			0	1	0	1	18	19
Students Cancelled	0	0	0	0		0	0	0	0	0		0
University Cancelled	0	0	0	0		0	0	0	0	0		0
Total Cancelled	0	0	0	0		0	0	0	0	0		0
Net Accepted	0	0	0	0			0	1	0	1	18	19
Less Nonscheduled	0	0	0	0		0	0	0	0	0		0
Less Other Exit	0	0	0	0		0	0	0	0	0		0
Enrolled	0	0	0	0	0	0	0	1	0	1	18	19
Difference in Enrolled Students	---------->						0	1	0	1	18	19
Final Enrolled	0	2	0	2	17	19						

Labor Market Analysis Data from the U.S. Department of Labor and the Official State of Michigan Website

TAB D



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Key phrases in the *Handbook*

This table explains how to interpret the key phrases used to describe projected changes in employment. It also explains the terms used to describe the relationship between the number of job openings and the number of jobseekers. The descriptions of this relationship in a particular occupation reflects the knowledge and judgment of economists in the Bureau's Office of Occupational Statistics and Employment Projections.

Changing employment between 2002 and 2012

If the statement reads:	Employment is projected to:
Grow much faster than average	increase 36 percent or more
Grow faster than average	increase 21 to 35 percent
Grow about as fast as average	increase 10 to 20 percent
Grow more slowly than average	increase 3 to 9 percent
Little or no growth	increase 0 to 2 percent
Decline	decrease 1 percent or more

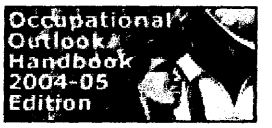
Job openings compared

If the statement reads:	Job openings compared to jobseekers may be:
Very good to excellent opportunities	More numerous
Good or favorable opportunities	In rough balance
May face, or can expect, keen competition	Fewer

Last Modified Date: May 18, 2004

U.S. Bureau of Labor Statistics
Office of Occupational Statistics and Employment Projections
Suite 2135
2 Massachusetts Avenue, NE

URL: http://www.bls.gov/OCO/
Phone: (202) 691-5700
Fax: (202) 691-5745
Do you have a question about the *Occupational Outlook Handbook*?



Printer-friendly version (**HTML**)

Construction trades and related workers

- Boilermakers
- Brickmasons, blockmasons, and stonemasons
- Carpenters
- Carpet, floor, and tile installers and finishers
- Cement masons, concrete finishers, segmental pavers, and terrazzo workers
- Construction and building inspectors
- Construction equipment operators
- Construction laborers
- Drywall installers, ceiling tile installers, and tapers
- Electricians
- Elevator installers and repairers
- Glaziers
- Hazardous materials removal workers
- Insulation workers
- Painters and paperhangers
- Pipelayers, plumbers, pipefitters, and steamfitters
- Plasterers and stucco masons
- Roofers
- Sheet metal workers
- Structural and reinforcing iron and metal workers

Last Modified Date: February 27, 2004

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U.S. Bureau of Labor Statistics
Office of Occupational Statistics and Employment Projections
Suite 2135
2 Massachusetts Avenue, NE
Washington, DC 20212-0001

URL: http://www.bls.gov/OCO/
Phone: (202) 691-5700
Fax: (202) 691-5745
Do you have a question about the *Occupational Outlook Handbook*?
Technical (web) questions: webmaster@bls.gov
Other comments: feedback@bls.gov

Construction Managers

Significant Points

Construction managers must be available—often 24 hours a day—to deal with delays, bad weather, or emergencies at the jobsite.

- Employers prefer individuals who combine construction industry work experience with a bachelor's degree in construction science, construction management, or civil engineering.
- Good employment opportunities are expected; however, employment can be sensitive to the short-term nature of many construction projects and to cyclical fluctuations in construction activity.

Nature of the Work

Construction managers plan and coordinate construction projects. They may have job titles such as constructor, construction superintendent, general superintendent, project engineer, project manager, general construction manager, or executive construction manager. Construction managers may be owners or salaried employees of a construction management or contracting firm, or may work under contract or as a salaried employee of the owner, developer, contractor, or management firm overseeing the construction project. They may plan and direct a whole project or just a part of a project. The *Handbook* uses the term "construction manager" to describe salaried or self-employed managers who oversee construction supervisors and workers.

In contrast with the *Handbook* definition, "construction manager" is defined more narrowly within the construction industry to denote a management firm, or an individual employed by such a firm, involved in managerial oversight of a construction project. Under this definition, construction managers usually represent the owner or developer along with other workers throughout the project. Although they usually play no direct role in the actual construction of a structure, they typically schedule and coordinate all design and construction processes, including the selection, hiring, and oversight of specialty trade contractors.

Managers who work in the construction industry, such as general managers, project engineers, and others, increasingly are called *constructors*. Constructors manage, coordinate, and supervise the construction process from the conceptual development stage through final construction on a timely and economical basis. Given designs for buildings, roads, bridges, or other projects, constructors oversee the organization, scheduling, and implementation of the project to execute those designs. They are responsible for coordinating and managing people, materials, and equipment; budgets, schedules, and contracts; and safety of employees and the general public.

On large projects, several different management systems may be used. In the general contractor system, the owner hires a general contractor to manage all activities. Working for the general contractor, construction managers oversee the completion of all construction in accordance with the engineer's and architect's drawings and specifications and prevailing building codes. They arrange for trade contractors to perform specialized craftwork or other specified construction work. On small projects, such as remodeling a home, a self-employed construction manager or skilled trades worker who directs and oversees employees often is referred to as the construction "contractor." In the construction management system, the owner hires a firm to oversee all aspects of the project. The management firm will then hire a general contractor to run the construction process and oversee construction of the structure. The major difference from the general contractor system is that the hired management firm, rather than the owner, works with the individual construction manager. In the design-build system, the owners, architects, general contractors, and major subcontractors are brought together to cooperatively plan and design the project. The design-build group may be from an individual firm or a conglomeration of separate entities. The construction manager participates during the design process and may be in charge of the construction project once the design is agreed upon.

Large construction projects, such as an office building or industrial complex, are too complicated for one person to manage. These projects are divided into many segments: Site preparation, including land clearing and earth moving; sewage systems; landscaping and road construction; building construction, including excavation and laying of foundations, as well as erection of structural framework, floors, walls, and roofs; and building systems, including fire-protection, electrical, plumbing, air-conditioning, and heating. Construction managers may be in charge of one or more of these activities. Construction managers often work with engineers, architects, and others who are involved in the construction process.

Construction managers evaluate and determine appropriate construction methods and the most cost-effective plan and schedule. They divide all required construction site activities into logical steps, budgeting the time required to meet established deadlines. This may require sophisticated estimating and scheduling techniques and use of computers with specialized software. (See the statement on cost estimators elsewhere in the *Handbook.*) They oversee the selection of trade contractors to complete specific pieces of the project—which could include everything from structural metalworking and plumbing to painting and carpet installation. Construction managers determine the labor requirements and, in some cases, supervise or monitor the hiring and dismissal of workers. They oversee the performance of all trade contractors and are responsible for ensuring that all work is completed on schedule.

Construction managers direct and monitor the progress of construction activities, sometimes through construction supervisors or other construction managers. They oversee the delivery and use of materials, tools, and equipment; and the quality of construction, worker productivity, and safety. They are responsible for obtaining all necessary permits and licenses and, depending upon the contractual arrangements, direct

or monitor compliance with building and safety codes and other regulations. They may have several subordinates, such as assistant managers or superintendents, field engineers, or crew supervisors, reporting to them.

Construction managers regularly review engineering and architectural drawings and specifications to monitor progress and ensure compliance with plans and schedules. They track and control construction costs against the project budget to avoid cost overruns. Based upon direct observation and reports by subordinate supervisors, managers may prepare daily reports of progress and requirements for labor, material, machinery, and equipment at the construction site. They meet regularly with owners, other constructors, trade contractors, vendors, architects, engineers, and others to monitor and coordinate all phases of the construction project.

Working Conditions

Construction managers work out of a main office from which the overall construction project is monitored, or out of a field office at the construction site. Advances in telecommunications and Internet access allow construction managers to be onsite without being out of contact of the office. Management decisions regarding daily construction activities generally are made at the jobsite. Managers usually travel when the construction site is in another State or when they are responsible for activities at two or more sites. Management of overseas construction projects usually entails temporary residence in another country.

Construction managers may be "on call"—often 24 hours a day—to deal with delays, bad weather, or emergencies at the site. Most work more than a standard 40-hour week because construction may proceed around-the-clock. They may have to work this type of schedule for days, even weeks, to meet special project deadlines, especially if there are delays.

Although the work usually is not considered inherently dangerous, construction managers must be careful while performing on-site services.

Employment

Construction managers held 389,000 jobs in 2002. Almost half were self-employed. Most of the rest were employed in the construction industry, 15 percent by specialty trade contractors—for example, plumbing, heating and air-conditioning, and electrical contractors—and 21 percent by general building contractors. Architectural, engineering and related services firms, as well as local governments, employed others.

Training, Other Qualifications, and Advancement

Persons interested in becoming a construction manager need a solid background in building science, business, and management, as well as related work experience within

the construction industry. They need to understand contracts, plans, and specifications, and to be knowledgeable about construction methods, materials, and regulations. Familiarity with computers and software programs for job costing, online collaboration, scheduling, and estimating also is important.

Traditionally, persons advance to construction management positions after having substantial experience as construction craftworkers—, carpenters, masons, plumbers, or electricians, for example—or after having worked as construction supervisors or as owners of independent specialty contracting firms overseeing workers in one or more construction trades. However, employers—particularly large construction firms—increasingly prefer individuals who combine industry work experience with a bachelor's degree in construction science, construction management, or civil engineering. Practical industry experience also is very important, whether it is acquired through internships, cooperative education programs, or work experience in the industry.

Construction managers should be flexible and work effectively in a fast-paced environment. They should be decisive and work well under pressure, particularly when faced with unexpected occurrences or delays. The ability to coordinate several major activities at once, while analyzing and resolving specific problems, is essential, as is an understanding of engineering, architectural, and other construction drawings. Good oral and written communication skills also are important, as are leadership skills. Managers must be able to establish a good working relationship with many different people, including owners, other managers, designers, supervisors, and craftworkers.

Advancement opportunities for construction managers vary depending upon an individual's performance and the size and type of company for which they work. Within large firms, managers may eventually become top-level managers or executives. Highly experienced individuals may become independent consultants; some serve as expert witnesses in court or as arbitrators in disputes. Those with the required capital may establish their own construction management services, specialty contracting, or general contracting firm.

Many colleges and universities offer 4-year degree programs in construction management, construction science, and construction engineering. These programs include courses in project control and development, site planning, design, construction methods, construction materials, value analysis, cost estimating, scheduling, contract administration, accounting, business and financial management, safety, building codes and standards, inspection procedures, engineering and architectural sciences, mathematics, statistics, and information technology. Graduates from 4-year degree programs usually are hired as assistants to project managers, field engineers, schedulers, or cost estimators. An increasing number of graduates in related fields—engineering or architecture, for example—also enter construction management, often after acquiring substantial experience on construction projects or after completing graduate studies in construction management or building science.

Several 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 order to work in the construction industry. Some construction managers obtain a master's degree in business administration or finance to further their career prospects. Doctoral degree recipients usually become college professors or conduct research.

Many individuals also attend training and educational programs sponsored by industry associations, often in collaboration with postsecondary institutions. A number of 2-year colleges throughout the country offer construction management or construction technology programs.

There is a growing movement towards certification of construction managers to ensure that a construction manager has a certain body of knowledge, abilities, and experience. Both the American Institute of Constructors (AIC) and the Construction Management Association of America (CMAA) have established voluntary certification programs for construction managers. Requirements combine written examinations with verification of education and professional experience. AIC awards the Associate Constructor (AC) and Certified Professional Constructor (CPC) designations to candidates who meet its requirements and pass appropriate construction examinations. CMAA awards the Certified Construction Manager (CCM) designation to practitioners who meet its requirements through work performed in a construction management firm and by passing a technical examination. Applicants for the CMAA certification also must complete a self-study course that covers a broad range of topics central to construction management, including the professional role of a construction manager, legal issues, and allocation of risk. Although certification is not required to work in the construction industry, voluntary certification can be valuable because it provides evidence of competence and experience.

Job Outlook

Good employment opportunities for construction managers are expected through 2012 because the number of job openings should be sufficient to accommodate the number of qualified managers seeking to enter the occupation. Because the construction industry often is seen as having dirty, strenuous, and hazardous working conditions, even for managers, many potential managers choose other types of careers.

Employment of construction managers is projected to grow about as fast as the average for all occupations through 2012, as the level and complexity of construction activity continues to grow. Prospects in construction management, architectural and engineering services, and construction contracting firms should be best for persons who have a bachelor's or higher degree in construction science, construction management, or civil engineering, as well as practical experience working in construction. Employers prefer applicants with previous construction work experience who can combine a strong background in building technology with proven supervisory or managerial skills. In

addition to those arising from job growth, many openings should result annually from the need to replace workers who transfer to other occupations or leave the labor force.

The increasing complexity of construction projects should boost demand for management-level personnel within the construction industry, as sophisticated technology and the proliferation of laws setting standards for buildings and construction materials, worker safety, energy efficiency, and environmental protection have further complicated the construction process. Advances in building materials and construction methods; the need to replace much of the Nation's infrastructure; and the growing number of multipurpose buildings, electronically operated "smart" buildings, and energy-efficient structures will further add to the demand for more construction managers. However, employment of construction managers can be sensitive to the short-term nature of many projects and to cyclical fluctuations in construction activity.

Earnings

Earnings of salaried construction managers and self-employed independent construction contractors vary depending upon the size and nature of the construction project, its geographic location, and economic conditions. In addition to typical benefits, many salaried construction managers receive benefits such as bonuses and use of company motor vehicles.

Median annual earnings of construction managers in 2002 were $63,500. The middle 50 percent earned between $48,720 and $84,080. The lowest 10 percent earned less than $38,130, and the highest 10 percent earned more than $112,810. Median annual earnings in the industries employing the largest numbers of construction managers in 2002 were:

Nonresidential building construction	$66,280
Foundation, structure, and building exterior contractors	60,020
Building finishing contractors	59,950
Residential building construction	59,900
Other specialty trade contractors	58,860

According to a 2003 salary survey by the National Association of Colleges and Employers, candidates with a bachelor's degree in construction science/management received job offers averaging $42,229 a year.

Related Occupations

Construction managers participate in the conceptual development of a construction project and oversee its organization, scheduling, and implementation. Other workers who perform similar functions include architects, except landscape and naval; civil engineers; cost estimators; landscape architects; and engineering and natural sciences managers.

Sources of Additional Information

Disclaimer:

Links to non-BLS Internet sites are provided for your convenience and do not constitute an endorsement.

For information about constructor certification, contact:

- American Institute of Constructors, 466 94th Ave. North, St. Petersburg, FL 33702. Internet: http://www.constructorcertification.org or http://www.aicnet.org

For information about construction management and construction manager certification, contact:

- Construction Management Association of America, 7918 Jones Branch Dr., Suite 540, McLean, VA 22102-3307. Internet: http://www.cmaanet.org

Information on accredited construction science and management educational programs and accreditation requirements is available from:

- American Council for Construction Education, 1300 Hudson Lane, Suite 3, Monroe, LA 71201. Internet: http://www.acce-hq.org

Engineering Technicians

Significant Points

- Electrical and electronic engineering technicians make up 42 percent of all engineering technicians.
- Because the type and quality of training programs vary considerably, prospective students should carefully investigate training programs before enrolling.
- Opportunities will be best for individuals with an associate degree or extensive job training in engineering technology.

Nature of the Work

Engineering technicians use the principles and theories of science, engineering, and mathematics to solve technical problems in research and development, manufacturing, sales, construction, inspection, and maintenance. Their work is more limited in scope and more practically oriented than that of scientists and engineers. Many engineering technicians assist engineers and scientists, especially in research and development. Others work in quality control—inspecting products and processes, conducting tests, or collecting data. In manufacturing, they may assist in product design, development, or production. Although many workers who repair or maintain various types of electrical, electronic, or mechanical equipment are called technicians, these workers are covered in the *Handbook* section on installation, maintenance, and repair occupations.

Engineering technicians who work in research and development build or set up equipment, prepare and conduct experiments, collect data, calculate or record results, and help engineers or scientists in other ways, such as making prototype versions of newly designed equipment. They also assist in design work, often using computer-aided design (CAD) equipment.

Most engineering technicians specialize in certain areas, learning skills and working in the same disciplines as engineers. Occupational titles, therefore, tend to reflect those of engineers.

Aerospace engineering and operations technicians install, construct, maintain, and test systems used to test, launch, or track aircraft and space vehicles. They may calibrate test equipment and determine causes of equipment malfunctions. Using computer and communications systems, aerospace engineering and operations technicians often record and interpret test data.

Chemical engineering technicians usually are employed in industries producing pharmaceuticals, chemicals, and petroleum products, among others. They work in laboratories as well as processing plants. They help to develop new chemical products and processes, test processing equipment and instrumentation, gather data, and monitor quality.

Civil engineering technicians help civil engineers to plan and build highways, buildings, bridges, dams, wastewater treatment systems, and other structures, and to do related research. Some estimate construction costs and specify materials to be used, and some may even prepare drawings or perform land-surveying duties. Others may set up and monitor instruments used to study traffic conditions. (Cost estimators; drafters; and surveyors, cartographers, photogrammetrists, and surveying technicians are covered elsewhere in the *Handbook.*)

Electrical and electronics engineering technicians help to design, develop, test, and manufacture electrical and electronic equipment such as communication equipment, radar, industrial and medical measuring or control devices, navigational equipment, and computers. They may work in product evaluation and testing, using measuring and diagnostic devices to adjust, test, and repair equipment. (Workers whose jobs are limited to repairing electrical and electronic equipment, who often are referred to as electronics technicians, are included with electrical and electronics installers and repairers elsewhere in the *Handbook.*)

Electrical and electronic engineering technology also is applied to a wide variety of systems such as communication and process controls. *Electromechanical engineering technicians* combine fundamental principles of mechanical engineering technology with knowledge of electrical and electronic circuits to design, develop, test, and manufacture electrical and computer-controlled mechanical systems.

Environmental engineering technicians work closely with environmental engineers and scientists in developing methods and devices used in the prevention, control, or correction of environmental hazards. They inspect and maintain equipment affecting air pollution and recycling. Some inspect water and wastewater treatment systems to ensure that pollution control requirements are met.

Industrial engineering technicians study the efficient use of personnel, materials, and machines in factories, stores, repair shops, and offices. They prepare layouts of machinery and equipment, plan the flow of work, make statistical studies, and analyze production costs.

Mechanical engineering technicians help engineers to design, develop, test, and manufacture industrial machinery, consumer products, and other equipment. They may assist in product tests—by setting up instrumentation for auto crash tests, for example. They may make sketches and rough layouts, record data, make computations, analyze results, and write reports. When planning production, mechanical engineering technicians prepare layouts and drawings of the assembly process and of parts to be manufactured. They estimate labor costs, equipment life, and plant space. Some test and inspect machines and equipment or work with engineers to eliminate production problems.

Working Conditions

Most engineering technicians work at least 40 hours a week in laboratories, offices, or manufacturing or industrial plants, or on construction sites. Some may be exposed to hazards from equipment, chemicals, or toxic materials.

Employment

Engineering technicians held 478,000 jobs in 2002. 204,000 of these were electrical and electronics engineering technicians, as indicated by the following tabulation.

Electrical and electronic engineering technicians	204,000
Civil engineering technicians	92,000
Industrial engineering technicians	62,000
Mechanical engineering technicians	55,000
Electro-mechanical technicians	31,000
Environmental engineering technicians	19,000
Aerospace engineering and operations technicians	15,000

About 39 percent of all engineering technicians worked in manufacturing, mainly in the computer and electronic equipment, transportation equipment, and machinery manufacturing industries. Another 20 percent worked in professional, scientific, and technical service industries, mostly in engineering or business services companies that do engineering work on contract for government, manufacturing firms, or other organizations.

In 2002, the Federal Government employed 11,000 engineering technicians. State governments employed 34,000, and local governments employed 24,000.

Training, Other Qualifications, and Advancement

Although it may be possible to qualify for certain engineering technician jobs without formal training, most employers prefer to hire someone with at least a 2-year associate degree in engineering technology. Training is available at technical institutes, community colleges, extension divisions of colleges and universities, and public and private vocational-technical schools, and in the Armed Forces. Persons with college courses in science, engineering, and mathematics may qualify for some positions but may need additional specialized training and experience. Although employers usually do not require engineering technicians to be certified, such certification may provide jobseekers a competitive advantage.

Prospective engineering technicians should take as many high school science and math courses as possible to prepare for postsecondary programs in engineering technology. Most 2-year associate degree programs accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC/ABET)

require, at a minimum, college algebra and trigonometry, and one or two basic science courses. Depending on the specialty, more math or science may be required.

The type of technical courses required also depends on the specialty. For example, prospective mechanical engineering technicians may take courses in fluid mechanics, thermodynamics, and mechanical design; electrical engineering technicians may need classes in electric circuits, microprocessors, and digital electronics; and those preparing to work in environmental engineering technology need courses in environmental regulations and safe handling of hazardous materials.

Because many engineering technicians assist in design work, creativity is desirable. Because these workers often are part of a team of engineers and other technicians, good communication skills and the ability to work well with others also are important.

Engineering technicians usually begin by performing routine duties under the close supervision of an experienced technician, technologist, engineer, or scientist. As they gain experience, they are given more difficult assignments with only general supervision. Some engineering technicians eventually become supervisors.

Many publicly and privately operated schools provide technical training; the type and quality of training varies considerably. Therefore, prospective students should be careful in selecting a program. They should contact prospective employers regarding their preferences and ask schools to provide information about the kinds of jobs obtained by graduates, instructional facilities and equipment, and faculty qualifications. Graduates of ABET accredited programs usually are recognized to have achieved an acceptable level of competence in the mathematics, science, and technical courses required for this occupation.

Technical institutes offer intensive technical training through application and practice, but less theory and general education than do community colleges. Many offer 2-year associate degree programs, and are similar to or part of a community college or State university system. Other technical institutes are run by private, often for-profit organizations, sometimes called proprietary schools. Their programs vary considerably in length and types of courses offered, although some are 2-year associate degree programs.

Community colleges offer curriculums that are similar to those in technical institutes, but that may include more theory and liberal arts. There may be little or no difference between programs at technical institutes and community colleges, as both offer associate degrees. After completing the 2 year program, some graduates get jobs as engineering technicians, while others continue their education at 4-year colleges. However, there is a difference between an associate degree in pre-engineering and one in engineering technology. Students who enroll in a 2-year pre-engineering program may find it very difficult to find work as an engineering technician should they decide not to enter a 4-year engineering program, because pre-engineering programs usually focus less on hands-on applications and more on academic preparatory work. Conversely, graduates of 2-year engineering technology programs may not receive credit for some of the courses

they have taken if they choose to transfer to a 4-year engineering program. Colleges with these 4-year programs usually do not offer engineering technician training, but college courses in science, engineering, and mathematics are useful for obtaining a job as an engineering technician. Many 4-year colleges offer bachelor's degrees in engineering technology, but graduates of these programs often are hired to work as technologists or applied engineers, not technicians.

Area vocational-technical schools, another source of technical training, include postsecondary public institutions that serve local students and emphasize training needed by local employers. Most require a high school diploma or its equivalent for admission.

Other training in technical areas may be obtained in the Armed Forces. Many military technical training programs are highly regarded by employers. However, skills acquired in military programs are often narrowly focused, so they may not be useful in civilian industry, which often requires broader training. Therefore, some additional training may be needed, depending on the acquired skills and the kind of job.

The National Institute for Certification in Engineering Technologies (NICET) has established a voluntary certification program for engineering technicians. Certification is available at various levels, each level combining a written examination in 1 of about 30 specialties with a certain amount of job-related experience, a supervisory evaluation, and a recommendation.

Job Outlook

Opportunities will be best for individuals with an associate degree or extensive job training in engineering technology. As technology becomes more sophisticated, employers will continue to look for technicians who are skilled in new technology and require a minimum of additional job training. An increase in the number of jobs related to public health and safety should create job opportunities for engineering technicians with the appropriate certification.

Overall employment of engineering technicians is expected to increase about as fast as the average for all occupations through 2012. Competitive pressures will force companies to improve and update manufacturing facilities and product designs, resulting in more jobs for engineering technicians. However, the growing use of advanced technologies, such as computer simulation and computer-aided design and drafting will continue to increase productivity and limit job growth. In addition to growth, many job openings will stem from the need to replace technicians who retire or leave the labor force.

As is the case for engineers, employment of engineering technicians is influenced by local and national economic conditions. As a result, the employment outlook varies with industry and specialization. Growth in the largest specialty—electrical and electronics engineering technicians—is expected to be about as fast as the average, and there will also be many jobs created by the need to replace technicians who retire or leave the labor force. Employment of environmental engineering technicians is expected to grow faster

than average, partly due to increased demand for environmental protection and partly due to recognition of environmental engineering technicians as a separate occupation.

Earnings

Median annual earnings of engineering technicians by specialty is shown in the following tabulation.

Aerospace engineering and operations technicians	$51,650
Electrical and electronic engineering technicians	42,950
Industrial engineering technicians	41,910
Mechanical engineering technicians	41,280
Electro-mechanical technicians	38,120
Civil engineering technicians	37,720
Environmental engineering technicians	36,850

Median annual earnings of electrical and electronics engineering technicians were $42,950 in 2002. The middle 50 percent earned between $33,760 and $53,200. The lowest 10 percent earned less than $26,770, and the highest 10 percent earned more than $64,070. Median annual earnings in the industries employing the largest numbers of electrical and electronics engineering technicians in 2002 are shown below.

Federal government	$58,520
Wired telecommunications carriers	49,610
Architectural, engineering, and related services	43,670
Semiconductor and other electronic component manufacturing	40,110
Navigational, measuring, electromedical, and control instruments manufacturing	39,760

Median annual earnings of civil engineering technicians were $37,720 in 2002. The middle 50 percent earned between $29,030 and $47,260. The lowest 10 percent earned less than $23,080, and the highest 10 percent earned more than $56,910. Median annual earnings in the industries employing the largest numbers of civil engineering technicians in 2002 are shown below.

Local government	42,120
Architectural, engineering, and related services	36,930
State government	34,800

In 2002, the average annual salary for aerospace engineering and operations technicians in the aerospace products and parts manufacturing industry was $54,530, and the average

annual salary for environmental engineering technicians in the architectural, engineering, and related services industry was $32,690. The average annual salary for industrial engineering technicians in the semiconductor and other electronic component manufacturing industry was $38,230. In the architectural, engineering, and related services industry, the average annual salary for mechanical engineering technicians was $42,090.

Related Occupations

Engineering technicians apply scientific and engineering principles usually acquired in postsecondary programs below the baccalaureate level. Similar occupations include science technicians; drafters; surveyors, cartographers, photogrammetrists, and surveying technicians; and broadcast and sound engineering technicians and radio operators.

Sources of Additional Information

Disclaimer:
Links to non-BLS Internet sites are provided for your convenience and do not constitute an endorsement.

High school students interested in obtaining information about careers in engineering technology should visit the JETS web site:

- JETS-Guidance, 1420 King St., Suite 405, Alexandria, VA 22314-2794. Internet: http://www.jets.org

Information on ABET-accredited engineering technology programs is available from:

- Accreditation Board for Engineering and Technology, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202. Internet: http://www.abet.org

Information on certification of engineering technicians as well as job and career information is available from:

- National Institute for Certification in Engineering Technologies (NICET), 1420 King St., Alexandria, VA 22314-2794. Internet: http://www.nicet.org

#403 - CIVIL ENGINEERING TECHNICIAN

Civil Engineering Technicians apply theories and principles of civil engineering in planning, designing, and overseeing the construction and maintenance of structures and facilities under the direction of members of the engineering staff and physical scientists.

NATURE OF THE OCCUPATION

Civil Engineering Technicians may:

Tabulate data and prepare sketches, diagrams, and graphs for evaluation by engineering staff

Test construction materials and soil samples and examine foundations

Serve as surveyor helpers; operate transits, levels, and other instruments; or even perform manual labor in clearing brush or weeds

Summarize and/or make written reports from maps, reports, field investigations, land surveys, plans, and specifications

Review plans, prints, and specifications for details concerning the construction, maintenance, and repair of structures and facilities

Expedite work on production orders, assist in the preparation of work schedules, and develop cost estimates of work to be completed

Set up and maintain monitoring equipment to obtain samples, measurements, and other data

Conduct preliminary inspection of existing systems and those under construction, while in progress and after completion, to ensure that standards and other requirements are met

Perform various other duties, such as file plans, prints, and other documents; answer inquiries; and help to direct the work of equipment operators, laborers, and other workers

Tools, equipment, and work aids used may include:

* Charts & graphs	* Hand tools & sampling equipment
* Prints & diagrams	* Federal, state & local ordinances
* Laboratory equipment	* Standards & specifications
* Calculators & computers	* Surveying instruments
* Drafting tools & equipment	

OCCUPATIONAL SPECIALTIES

005.261-014 CIVIL ENGINEERING TECHNICIAN conduct surveys and studies and inspect existing water and wastewater treatment systems, plus those under construction, to ensure that pollution control requirements are met. Civil Engineering Technicians may work in a single field involving structures, transportation or the environment or they may work in specialized areas such as research, design, or inspection. Civil Engineering Technicians may work under a variety of titles such as highway engineering technician, pollution control technician, and engineering aide or assistant.

In addition to learning about these specialties, you may also find it helpful to explore the following MOIScripts:

053 ROBOT TECHNICIAN	140 CHEMICAL TECHNICIAN
143 DRAFTER	145 ELECTRICAL & ELECTRONICS TECH.
147 INDUSTRIAL ENGINEERING TECHN.	150 MECHANICAL ENGINEERING TECHN.
282 METALLURGICAL TECHNICIAN	076 PETROLEUM TECHNICIAN

WORKING CONDITIONS AND REQUIREMENTS

Civil Engineering Technicians usually work with other employees at all levels, including Engineers, surveyors, supervisors, managers, and skilled trade workers. They generally are supervised by experienced civil engineers. Technicians may instruct and supervise other workers. Working conditions for Civil Engineering Technicians vary. They may work outdoors at construction or survey sites, or indoors in well-lighted and well ventilated offices and/or in testing labs. Working outdoors may expose Technicians to extreme types of weather and to such hazards as snakes, poison ivy, heat exhaustion, sunburn, and frostbite. Those working near busy highways and construction sites may risk a variety of injuries. Technicians can offset most hazards with safety precautions and appropriate dress.

Most Technicians work a 5-day, 40-hour week. They might work longer hours when completing seasonal projects and when important projects must be finished. Technicians might have to travel to collect samples, make inspections, or conduct surveys and other studies.

Civil Engineering Technicians might have to furnish some or all of their drafting equipment.

Civil Engineering Technicians may be members of labor unions which represent employees in the industry in which they work. They may join professional associations, such as the American Society of Certified Engineering Technicians. Members of associations pay periodic membership fees.

You Should Prefer:

- Activities of a scientific and technical nature
- Activities involving the use of machines, processes, and techniques
- Activities dealing with things and objects

You Should Be Able To:

- Perform a variety of duties which may change often
- Perform mathematical operations quickly and accurately
- Work within set limits and standards of accuracy
- Use logical step-by-step procedures in your work
- Rate information according to standards which can be measured/checked
- Communicate well, both orally and in writing
- Visualize how flat drawings or pictures would look as solid objects

Math Problem You Should Be Able to Solve:

If building A is 400 feet away from building B and the angle between that line and the line that connects building A and building C is 45 degrees, what is the

distance between building A and building C?

Reading Example You Should Be Able to Read and Comprehend:

The instant a mass is uplifted, gravity starts its relentless pull on the mass--a pull that never ceases until the mass is once again at the same level as its surroundings.

Writing Example You Should Be Able to Produce:

You should be able to write a report to your supervising engineer, explaining your findings during the tests you conducted.

Thinking Skill You Should Be Able to Demonstrate:

You should be able to decide the best materials to use when constructing different types of structures.

Civil Engineering Technicians are not required to be certified, but some employers may require it. Certification is available from the American Society of Certified Engineering Technicians or the National Institute for Certification in Engineering Technologies to applicants with acceptable education and experience. Written tests are required. Specialty certification is available from other organizations in such areas as soil erosion and sediment control, bitumen testing, and concrete testing.

Employers may hire individuals who have a background in related fields, such as surveyor helpers or drafters, and train them on the job. However, others prefer graduates of formal civil engineering technology programs. Technicians driving motorized vehicles in their work must have valid Michigan driver's license.

EDUCATION AND PREPARATION OPPORTUNITIES

NOTE: On-The-Job Training provided by the employer and a High School Diploma or Equivalent; with specific vocational education courses or an Associate Degree (two years of study beyond high school) may qualify a person for this occupation.

The following education and preparation opportunities are helpful in preparing for occupations in the MOIScript:

****SCHOOL SUBJECTS****

0500 BUILDING TRADES , 0700 CAREERS , 0900 COMMUNICATIONS , 1000 COMPUTERS , 2200 MATH , 2900 SCIENCE , 3200 TECHNICAL DRAWING , 3300 TECHNOLOGY

****VOCATIONAL EDUCATION PROGRAMS****

There are no Vocational Education Programs related to this MOIScript

****POSTSECONDARY PROGRAMS****

033 **CIVIL ENGINEERING TECHNOLOGY**

Programs in Civil Engineering Technology provide opportunities to gain the technical knowledge and skills needed for employment in the planning, design, and construction of civil engineering projects. Examples of these projects include ground facilities for land, sea, and air transportation, and projects that control the flow and use of water. On the job, the technician serves as the link between the engineer and the skilled worker.

Courses will vary from school to school but may include courses relating to six areas:

Civil Technology - Construction Option

Civil Technology - Highway Option

Civil Technology - Sanitary Option

Civil Technology - Structural Option

Civil Technology - Surveying Option

Civil Technology - Traffic Option

199 **CONCRETE TECHNOLOGY**

Programs in Concrete Technology provide opportunities to gain the knowledge and skills needed for employment in the concrete industry. Persons completing Concrete Technology Programs may be employed as laboratory technologists, quality control inspectors, production supervisors, plant controllers, engineering assistants, materials estimators, and salespersons.

Courses within this program will vary but may include:

* Concrete Mixes	* Construction Design & Methods
* Concrete Products	* Placed Concrete-Structural Design
* Concrete, Steel, Wood & General Building Components	

Search for a College and/or Instructional Program

****APPRENTICESHIP OPPORTUNITIES****

There are no Apprenticeships related to this MOIScript

****MILITARY TRAINING PROGRAMS****

Please check the Military website at http://www.myfuture.com

CIVIL ENGINEER

Airfields, roads, bridges, buildings, power plants, docks, and water treatment plants on military bases around the world are continually being built, repaired, and improved. Civil engineers plan, design, and direct the construction of military facilities.

What They Do

Civil engineers in the military perform some or all of the following duties:

- Study the need for roads, airfields, buildings and other facilities
- Direct surveys of construction areas
- Design construction projects
- Help select contractors to build facilities
- Check construction progress to see that it meets plans
- Plan and direct facility maintenance and modernization
- Plan temporary facilities for use in emergencies
- Keep master plans for military bases up to date

Special Requirements

A 4-year college degree in civil, architectural, sanitary, or environmental engineering, or another closely related field is required to enter this occupation.

Helpful Attributes

Helpful attributes include:

Interest in engineering principles and concepts

Interest in working with mathematical formulas

Training Provided

No initial job training is provided to officers in this occupation. However, advanced courses are offered to support medical service and environmental control building programs.

Civilian Counterparts

Civilian civil engineers work for engineering firms, construction companies, and government agencies. Some may work for public utilities, railroads, and manufacturing firms. Civilian civil engineers perform duties similar to those performed in the military; however, they often specialize in certain types of projects.

Work Environment

Civil engineers work in offices when designing projects or reviewing reports. They work outdoors when overseeing survey or construction activities.

Opportunities

The services have about 8,100 civil engineers. On average, they need 600 new civil engineers each year. Newly commissioned civil engineers usually assist senior engineering officers in planning and design. With experience, they may manage construction projects and eventually, engineering offices. In time, they may advance to senior management or command positions in the engineering field.

E-Learning Courses and Programs

OPPORTUNITIES FOR EXPERIENCE AND METHODS OF ENTRY

Postsecondary education programs in civil engineering technology and concrete technology may offer co-op or internship opportunities. Summer and part-time jobs with construction and surveying companies or state and local highway departments, may offer you an opportunity to observe conditions under which Civil Engineering Technicians work. Military service may offer opportunities for experience also.

School-to-Work opportunities include:

informal apprenticeships

mentorships

job shadowing experiences

touring a local Civil Engineering Technician employer

internships

volunteer work with a Civil Engineering Technician employer

community service work with an agency

The most common method of entry is by direct application to employers and civil service offices. Job openings may be located through school placement offices, at a local office of Michigan Works!, or in newspaper want ads. In addition, you should access and search the Internet's on-line employment

services sites such as:

Michigan Talent Bank
America's Job Bank
Classifieds Employment
Yahoo! Careers
MONSTER.COM
JobOptions
MONSTERTRAK.COM

You should also enter an electronic resume on these on-line services.

EARNINGS AND ADVANCEMENT

Earnings of Civil Engineering Technicians depend on their level of education, work experience, and technical specialty, as well as the size, type, and geographical location of the company.

Nationally, the median annual salary of all Civil Engineering Technicians in 1998 was $34,736. Many Civil Engineering Technicians in private industry earned from $19,900 to $55,000.

In the federal government, Technicians with a high school diploma and no experience started at $15,023 annually (1999). Technicians with an associate degree and no experience started at $18,401 per year, and those with a bachelor's degree started at $20,588 or $22,948 per year, depending on their academic records. The salaries of these federal government workers may be higher in some urban areas.

Civil Engineering Technicians (traffic technicians) working for the State of Michigan earned between $23,511 and $49,882 per year (1999). Civil Engineering Technicians employed by governments in Michigan had annual earnings of (1999):

Local Government	Salary Range
City of Detroit	$28,000 - $39,500
Wayne County	$26,976 - $41,116
Oakland County	$30,334 - $39,490

Depending on the employer, most Civil Engineering Technicians receive paid vacations and holidays; life, accident, disability, and hospitalization insurance; retirement plans; and sick pay. These benefits are usually paid for, at least in part, by employers.

As Civil Engineering Technicians gain experience, they are given more responsibility. Promotions usually depend on the availability of job openings and the individual's job performance, the development of technical skills, education, length of employment, and ability to supervise. With additional college education and training, some Technicians may advance to professional engineering or scientific positions.

EMPLOYMENT AND OUTLOOK

There were about 73,000 Civil Engineering Technicians employed nationally in 1996. Employment of Civil Engineering Technicians is expected to increase about as fast as the average for all occupations through the year 2006. Opportunities will be best for graduates of postsecondary civil engineering technology programs.

There were at least 2,250 Civil Engineering Technicians employed in Michigan . Most worked in urban areas. The majority worked for engineering, surveying, and architectural consulting firms; government transportation and highway departments; and urban planning and development agencies. Others worked for public utility companies; construction companies; and federal, state, and local water pollution control agencies.

Employment of Civil Engineering Technicians in Michigan is expected to grow about as fast as the average for all occupations through the year 2005. An average of 70 annual openings is expected, with 30 due to growth and 40 due to the replacement of those who retire, die, or leave the labor force for other reasons. Some additional openings will occur as workers change jobs or occupations.

The need for housing, industrial plants, utility plants, and transportation systems, created by an expanding population and population shifts, should result in openings for Civil Engineering Technicians.

Employment growth in the construction industry, which depends on favorable economic conditions, could also result in a greater need for Civil Engineering Technicians to help plan, design, and build roads and bridges, and for doing site route surveys.

In Southeastern Michigan , several major building projects are in the planning and early construction phases. They include two professional sports stadiums and three casinos in downtown Detroit and the expansion of Detroit Metro Airport with a new midfield terminal. Additionally, roadbuilding and repair work to major highways on an ongoing basis should provide numerous employment opportunities for consulting Civil Engineering Technicians.

MICHIGAN 'S EMPLOYMENT OUTLOOK TO 2005

EMPLOYMENT AND OUTLOOK REGIONS	NUMBER EMPLOYED	PERCENT GROWTH	PROJECTED YEARLY JOB OPENINGS
State Total	2,250	12.6%	70

SOURCES OF ADDITIONAL INFORMATION

Printed Occupational information is available upon written request from the sources below.

Public Affairs Office U.S. Army Corp of Engineers #142 Detroit District P.O. Box 1027 Detroit, MI 48231 1-313-226-6413 http://www.usace.army.mil/	National Action Council for Minorities in Engineering 350 Fifth Avenue, Suite 2212 New York , NY 10118 1-212-279-2626 http://www.nacme.org
National Institute for Certification in Engineering Technologies 1420 King Street Alexandria , VA 22314 1-703-684-2835 http://www.nicet.org	American Society of Certified Engineering Technicians P.O. Box 1348 Flowery Branch , GA 30542 1-770-967-9173
Michigan Works!	School Placement Offices
Federal, State, and Local Civil Service Offices	Local Military Recruiters

SUMMARY PROFILE

The occupation of Civil Engineering Technician can be summarized by the following:

Growth Outlook:	As fast as average
Salary Potential:	Average potential growth
GOE Cluster:	Mechanical Interest Group (#05)
Work Values:	Work with machines or equipment, work with numbers
SDS Code:	Realistic (prefers working with machines and objects)

Relationship to Data:	Analyzing (examining and evaluating data)
Relationship to People:	Speaking-Signaling (signals or relays data to other workers)
Relationship to Things:	Precision Working (locates and marks reference lines)

[Printer Friendly] [Text Version]

#250 - CONSTRUCTION INSPECTOR

Construction Inspectors employed by government agencies examine public and private construction projects to ensure that set standards of safe construction and quality of work are observed.

NATURE OF THE OCCUPATION

Inspectors usually specialize in one particular type of construction work and may:

Inspect buildings during and after construction to ensure that building specifications and zoning, grading, and safety regulations are met

Issue stop-work orders in case of violation

Explain regulations and codes to builders and property owners and recommend changes in procedures

Review electrical plans and material lists

Verify circuit loads to prevent overloading

Inspect wiring, fixtures, and equipment for safety

Inspect plumbing and sewer systems, fire sprinkler systems, air-conditioning, and gas piping systems

Inspect building sites for soil type to determine fill and seepage conditions

Review complaints concerning plumbing code violations

Measure distances to verify accuracy of dimensions

Verify level, alignment, and elevation of installations

Observe work in progress to ensure specification conformity

Examine the quality of work of finished installations

Interpret blueprints and specifications

The equipment and materials used may include:

Cameras	Measuring Instruments
Ammeters	Voltmeters & Ohmmeters
Reference Books	Surveyor's Level & Transit
Blueprints & Charts	Concrete strength testing equipment
Federal/state/city code/statute books	Cellular Telephones & Personal Digital Assistants (PDA's)

OCCUPATIONAL SPECIALTIES

Construction Inspectors may specialize in these areas:

168.167-030 BUILDING INSPECTORS make on-site inspections of new and existing buildings to enforce state and city building codes, zoning laws, and approved standards.

168.167-034 ELECTRICAL INSPECTORS check electrical installations at public and private construction projects for compliance with safety laws and ordinances.

168.167-050 PLUMBING INSPECTORS check plumbing installations at public and private construction projects for compliance with government codes, sanitary standards, and construction specifications.

182.267-010 CONSTRUCTION INSPECTORS examine and oversee the construction

of bridges, buildings, dams, highways, and other types of construction work to ensure that the procedures and materials comply with codes and specifications. They are often designated according to the material inspected such as structural steel inspector, reinforced-concrete inspector, masonry inspector, bituminous inspector, or highway inspector.

168.267-102 PLAN CHECKERS examine commercial and private building plans and inspect construction sites to ensure that building code regulations are followed, and that the construction is following the plans that have been approved.

In addition to learning about these specialties, you may also find it helpful to explore the following MOIScripts:

012 MANUFACTURING INSPECTOR	083 COMPLIANCE/ENFORCE. INSPECTOR
142 CIVIL ENGINEER	224 REAL ESTATE APPRAISER
407 FIRE INSPECTOR	421 FIRE FIGHTING SUPERVISOR

WORKING CONDITIONS AND REQUIREMENTS

Construction Inspectors work under general supervision. They work closely with construction superintendents and engineers and with the skilled craft workers whose work they inspect. Inspectors work indoors in offices and outdoors at construction sites in all kinds of weather. They usually must inspect the project after each new stage of construction is completed. They may encounter such hazards as falls from ladders or scaffolds and injury from moving machinery or falling building materials.

They work an average of 40 hours per week and may work overtime during the peak of the construction season. Although employment in many of the skilled craft trades in the construction industry is seasonal, their work tends to be steady, year-round. They spend much time traveling to construction sites and may be required to provide their own transportation.

You Should Prefer:

- Traveling within your local area
- Working with things and objects
- Performing scientific, technical activities
- Performing activities involving use of special processes or methods

You Should Be Able To:

- Evaluate information using personal judgment or measurable standards
- Picture three-dimensional objects from drawings and diagrams
- Use arithmetic accurately
- Ensure accuracy in records of permits granted/buildings inspected
- Keep detailed records
- Communicate and work well with people at all levels
- Work within precise limits or standards of accuracy

Math Problem You Should Be Able to Solve:

A structure is only allowed to occupy half of the lot that it is located on. A building is 50 feet by 75 feet and the lot is 100 feet by 70 feet. Can this building legally be built there?

Reading Example You Should Be Able to Read and Comprehend:

An ammeter measures current (amps) and a voltmeter measures voltage (volts). A basic component of both of these meters is a galvanometer.

Writing Example You Should Be Able to Produce:

You should be able to write an explanation to a builder, telling him or her what is wrong with a specific structure and how the problem can be corrected.

Thinking Skill You Should Be Able to Demonstrate:

You should be able to notice a problem with a structure and then decide the best way to correct it.

An Inspector must have several years of experience as a construction contractor, supervisor, engineer, technician, or skilled craft worker in order to be employed. The State of Michigan requires a license for this occupation. Click here for "Michigan Licensed Occupations," see Inspector, Building Inspector, Electrical; Inspector, Mechanical; Inspector, Plumbing; Elevator Inspector; Boiler Inspector; and Inspector, Construction Plan (Reviewer) for specific licensing information.

EDUCATION AND PREPARATION OPPORTUNITIES

NOTE: On-The-Job Training provided by the employer; a Certificate (program of up to one years of study beyond High School); an Associate Degree (two years of study beyond High School) or a Bachelor's Degree (four years of study beyond High School) may qualify a person for this occupation.

The following education and preparation opportunities are helpful in preparing for occupations in the MOIScript:

****SCHOOL SUBJECTS****

0500 BUILDING TRADES , 0700 CAREERS , 0900 COMMUNICATIONS , 1000 COMPUTERS , 1700 GOVERNMENT , 2200 MATH , 3200 TECHNICAL DRAWING , 3300 TECHNOLOGY , 3400 WOODS

****VOCATIONAL EDUCATION PROGRAM****

032 **CONSTRUCTION/BUILDING MAINTENANCE**

Approved vocational education programs in the Construction/Building Maintenance prepare students to erect, maintain, and repair buildings, highways, airports, and other structures using materials such as metal wood, stone, brick, glass concrete, and composition substances. Instruction is given in cost estimating, the use of hand and power tools, and in following technical specifications and blueprints. Instruction may be given in classroom, shop, or laboratory settings or at the actual location of construction projects.

The following courses may be required for completion of this program:

CONSTRUCTION - (ON SITE)

CONSTRUCTION - (IN SCHOOL)

FLOOR COVERING

High school students should consult their guidance office for more information about the specific requirements of this program at their school or area vocational education center.

Students should obtain the local Career Preparation Consumer Report for information on what happens to students who successfully complete a program. This information is available at each high school or career/technical center.

****POSTSECONDARY PROGRAMS****

035 **CONSTRUCTION & BUILDING TECHNOLOGY**

Construction and Building Technology programs provide opportunities to gain the needed knowledge and skills for employment in the many different types of construction and building jobs. Individuals who teach Construction and Building Technology at the secondary school level must have a Michigan Teaching Certificate.

Courses within this program will vary but may include:

Plumbing	Cement & Brick Masonry
Carpentry	Metal Working & Welding
Care & Use of Tools	Electrical Circuits & controls
Construction Materials	Measurement & Blueprint Reading
Refrigeration, Heating & Air Conditioning	

Search for a College and/or Instructional Program

****APPRENTICESHIP OPPORTUNITIES****

There are no Apprenticeships related to this MOIScript

****MILITARY TRAINING PROGRAMS****

There are no Military Programs related to this MOIScript

E-Learning Courses and Programs

OPPORTUNITIES FOR EXPERIENCE AND METHODS OF ENTRY

Individuals may explore this occupation by working as helpers to skilled craft workers, such as plumbers and cement masons. Vocational education programs in construction/building maintenance may offer a co-op segment. Postsecondary education programs in construction and building technology may provide co-op, internship, or other related work experience opportunities.

School-to-Work opportunities include:

informal apprenticeships

mentorships

job shadowing experiences

touring a local Construction Inspector employer

internships

volunteer work with a Construction Inspector employer

community service work with an agency

Most Construction Inspectors find jobs by applying directly to federal, state, and local civil service offices. Assistance in locating a job may be obtained from college placement offices and local offices of Michigan Works!. In addition, you should access and search the Internet's on-line employment services sites such as:

Michigan Talent Bank (http://www.michworks.org/mtb/user/MTB_EMPL.EntryMainPage)

Building Industry Exchange (http://www.building.org)

America's Job Bank (http://www.ajb.dni.us)

You should also enter an electronic resume on these on-line services.

EARNINGS AND ADVANCEMENT

Earnings of Inspectors depend on job specialty, job responsibility, geographic location, and the amount and nature of the worker's experience. Salaries are usually set by Civil Service regulations.

Construction Inspectors employed by the federal government earned between $22,737 and $44,783 (2002), depending on experience and level of responsibility. The salaries of these federal government workers may be higher in some urban areas.

Annual salary ranges for Inspectors employed statewide and by several Michigan cities were (late 2001):

CITY	BUILDING
Detroit	$44,542 - $45,116
Grand Rapids	$37,109 - $46,950
Kalamazoo	$38,189 - $45,706
Jackson	$42,209 - $59,127
Saginaw	$36,565 - $38,365
Lansing	$37,565 - $50,378
Muskegon	$29,470 - $35,902
Traverse City	$38,751 - $44,564

Construction Inspectors employed by the State of Michigan earned between $36,080 and $53,286 per year (mid 2002). Supervisory Inspectors earned more. They may have titles such as Building Code Inspector, Electrical Inspector, or Plumbing Inspector.

Construction Inspectors may be reimbursed for transportation, food, lodging, and other expenses when working away from home. Some employers may provide cost-of-living allowances and tuition payments for related training at colleges and technical schools.

Depending on the employer, Construction Inspectors may receive paid vacations and holidays; life, health, disability and hospitalization insurance; sick leave; and retirement plans. Some government agencies also provide dental and optical insurance and prescription drug plans. These benefits are usually paid for, at least in part, by the employer.

Beginning Construction Inspectors receive most of their training on the job. By working with experienced Inspectors, they learn about inspection methods; codes, ordinances (laws), and regulations; contract specifications; and record keeping and reporting duties. They usually begin by inspecting less complex types of construction.

Individuals wishing to advance to supervisory Inspector often need to be a master (one step above the journey level) in a construction specialty or have an engineering degree. Advancement in government agencies is usually through a competitive exam. Construction Inspectors may increase their chances for promotion by attending government training programs or by taking college or correspondence courses.

EMPLOYMENT AND OUTLOOK

Nationally, about 70,000 government Construction Inspectors were employed in 2000. Employment in this occupation is expected to grow about as fast as the average for all occupations through the year 2010. About 4.8% of them were self-employed. The industry distribution for Construction Inspector looked like this:

SIC CODE	INDUSTRY	% EMPLOYED

90930	Local Government, Except Education and Hospitals	48.5
80871	Engineering and Architectural Services	18.0
90920	State Government, Except Education and Hospitals	7.4
90910	Federal Government	4.1
30150	General Building Contractors	2.5
80730	Business Services	2.4
80873	Research and Testing Services	2.3
30160	Heavy Construction, Except Building	1.7
70650	Real Estate	1.5
80820	Educational services, Public and Private	1.4
- -	Others	10.2

Because of the increasing complexity of construction technology and the trend toward setting professional standards for Inspectors, opportunities will be best for those with some college education and knowledge of specialized types of construction.

Approximately 2,100 Construction Inspectors were employed in Michigan. Almost all worked for government agencies in urban areas. Most of the Inspectors employed by the federal government worked for the U.S. Army Corps of Engineers.

Employment of Construction Inspectors in Michigan should grow more slowly than the average for all occupations through the year 2008. An average of 70 annual openings is expected, with 10 due to growth and 60 due to replacement of those who retire, die or leave the labor force for other reasons. Additional openings will occur as workers change jobs or occupations. Better than average growth is predicted for the short term due to recent increase in new construction, both residential and non-residential.

The number of new positions for Construction Inspectors will be determined by levels of new building activity as well as economic conditions. The demand for Construction Inspectors should increase as they are given more responsibility for ensuring quality and safe construction of more complex building materials and other components assembled in fabrication shops and at construction sites.

Employment of Construction Inspectors is less sensitive to changes in the level of residential and commercial construction activity than is employment of other construction workers. Construction Inspectors usually do not experience layoffs when construction activity decreases. Also, when construction activity increases, the hiring of new Inspectors does not increase to the same degree.

MICHIGAN'S AREA EMPLOYMENT OUTLOOK TO 2008

EMPLOYMENT REGION	NUMBER EMPLOYED	PERCENT GROWTH	PROJECTED YEARLY JOB OPENINGS
Ann Arbor Area	80	16.5	3
Battle Creek Area	55	0.0	1
Benton Harbor Area	55	1.9	1
Central Michigan	30	6.5	1
Detroit MSA	990	5.5	30
East Central Michigan	20	0.0	1
Flint Area	80	0.0	2

Grand Rapids Area	90	10.0	3
Jackson Area	50	0.0	1
Kalamazoo Area	50	7.8	1
Lansing MSA	120	8.3	4
Muskegon Area	25	8.7	1
Northeast Lower Peninsula	25	8.7	1
Northwest Lower Peninsula	40	7.1	1
Saginaw MSA	90	8.0	3
Thumb Area	35	5.4	1
Upper Peninsula	85	8.0	3
West Central Michigan	25	0.0	1

MSA designates a Metropolitan Statistical Area

SOURCES OF ADDITIONAL INFORMATION

Printed Occupational information is available upon written request from the sources below.

United States Office of Personnel Management Federal Job Info. & Test Center P.O. Box 52 1900 E. Street, N.W., Room 1425 Washington, DC 20415	International Conference of Building Officials 5360 South Workman Mill Road Whittier, CA 90601
Michigan Department of Consumer & Industry Services Bureau of Construction Codes P.O. Box 30254 Lansing, MI 48909 1-517-322-1801	Building Officials and Code Administrators International 4051 W. Flossmoor Road Country Club Hills, IL 60478 1-708-799-2300
Federal, State, and Local Civil Service Offices	College Placement Offices

SUMMARY PROFILE

The occupation of Construction Inspector can be summarized by the following:

Growth Outlook:	As fast as average
Salary Potential:	Average potential growth
GOE Cluster:	Mechanical Interest Group (#05)
Work Values:	Work with machines or equipment, work with hands, blueprint reading
SDS Code:	Conventional (enjoys working with data)
Relationship to Data:	Coordinating (directs and oversees the construction of buildings)
Relationship to People:	Speaking-Signaling (relays the changes that have to done to a structure)
Relationship to Things:	Handling (files documents in alphabetical or numerical order)

Close Report

2003 November Occupational Employment and Wage Estimates for:

Michigan

SOC Code	Occupational Title	Employment	Wage Estimates	
			Average Hourly	Average Annual
47-0000	Construction and Extraction Occupations	180,560	$20.82	$43,310.00
47-2061	Construction Laborers	18,190	$15.94	$33,162.00

Close Report

2003 November Occupational Employment and Wage Estimates for:

Michigan

SOC Code	Occupational Title	Employment	Wage Estimates	
			Average Hourly	Average Annual
47-0000	Construction and Extraction Occupations	180,560	$20.82	$43,310.00
47-4011	Construction and Building Inspectors	2,650	$21.79	$45,322.00

Close Report

2003 November Occupational Employment and Wage Estimates for:

Michigan

SOC Code	Occupational Title	Employment	Wage Estimates Average Hourly	Wage Estimates Average Annual
11-0000	Management Occupations	172,270	$43.78	$91,061.00
11-9021	Construction Managers	4,570	$41.56	$86,437.00

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STATE of MICHIGAN

Pick New Area Notes

OCCUPATIONAL EMPLOYMENT FORECASTS
2000 - 2010

(By SOC Code)

SOC CODE	OCCUPATION	EMPLOYMENT 2000	EMPLOYMENT 2010	CHANGE LEVEL	CHANGE %	ANNUAL AVERAGE TOTAL	ANNUAL AVERAGE GROWTH	ANNUAL AVERAGE REP
00-0000	Total, All Occupations	5,016,040	5,485,360	469,320	9.4	167,738	46,931	120,
11-0000	Management Occupations	262,710	284,790	22,080	8.4	6,482	2,207	4,
11-1011	Chief Executives	12,480	13,750	1,270	10.2	519	127	
11-1021	General and Operations Managers	44,450	48,280	3,830	8.6	1,131	383	
11-1031	Legislators	2,920	3,050	130	4.5	105	13	
11-2011	Advertising & Promotions Managers	1,670	2,120	450	27.1	69	45	
11-2021	Marketing Managers	3,920	4,810	890	22.7	145	89	
11-2022	Sales Managers	8,660	10,760	2,100	24.4	335	211	
11-2031	Public Relations Managers	1,170	1,530	360	30.6	54	36	
11-3011	Administrative Services Managers	4,940	5,470	530	10.7	133	53	
11-3021	Computer & Information Systems Managers	9,530	12,750	3,220	33.9	484	323	
11-3031	Financial Managers	15,880	17,840	1,960	12.4	440	196	
11-3040	Human Resources Managers	5,560	5,650	90	1.6	105	9	
11-3051	Industrial Production Managers	12,470	12,650	180	1.4	221	18	
11-3061	Purchasing Managers	3,840	3,480	-360	-9.5	121	0	
11-3071	Transport/Storage/Distribution Managers	2,990	3,360	370	12.2	85	37	
11-9011	Farm/Ranch/Other Agricultural Managers	7,480	7,780	300	4.1	117	31	
11-9012	Farmers and Ranchers	38,140	36,870	-1,270	-3.3	217	0	
11-9021	Construction Managers	5,340	6,140	800	15.0	167	80	
11-9031	Education Adminrs, Preschool/Child Care	1,200	1,470	270	22.7	58	27	
11-9032	Education Administrators: Elem/Sec School	8,300	8,690	390	4.7	254	39	
11-9033	Education Administrators, Postsecondary	3,840	4,330	490	13.0	149	50	
11-9041	Engineering Managers	12,920	13,060	140	1.0	224	14	
11-9051	Food Service Managers	6,950	7,780	830	12.0	166	83	
11-9061	Funeral Directors	1,240	1,380	140	10.8	35	13	
11-9071	Gaming Managers	90	120	30	34.1	5	3	
11-9081	Lodging Managers	1,210	1,310	100	8.9	25	11	
11-9111	Medical & Health Services Managers	7,260	8,800	1,540	21.2	279	154	
11-9121	Natural Sciences Managers	660	640	-20	-2.3	12	0	
11-9131	Postmasters & Mail Superintendents	710	730	20	3.5	15	3	
11-9141	Property/Real Est/Community Assoc Manager	3,630	4,290	660	18.2	125	66	
11-9151	Social/Community Service Managers	3,380	3,870	490	14.6	113	49	
11-9199	Managers, All Other	29,910	32,020	2,110	7.0	740	211	
13-0000	Business & Financial Operations Occup	197,710	217,460	19,750	10.0	5,952	1,975	3,
13-1011	Agents/Business Mgrs: Artists/Performers	550	650	100	18.2	21	10	
13-1021	Purchasing Agents & Buyers, Farm Products	680	770	90	13.0	23	9	
13-1022	Wholesale/Retail Buyers, Ex Farm Products	5,660	5,380	-280	-5.0	172	0	
13-1023	Purchasing Agents, Ex Wholesle/Retl/Farm	10,730	11,260	530	4.9	265	53	
13-1031	Claims Adjusters/Examiners/Investigators	3,900	4,740	840	21.4	127	83	
13-1032	Insurance Appraisers, Auto Damage	1,190	1,310	120	9.7	25	12	
13-1041	Compliance Officer, Ex Ag/Con/Hlth/Sft/Tr	3,100	3,110	10	0.3	80	1	
13-1051	Cost Estimators	10,380	11,820	1,440	13.9	373	144	
13-1061	Emergency Management Specialists	280	310	30	8.5	11	2	
13-1071	Employment/Recruit/Placement Specialists	6,010	6,410	400	6.7	156	40	
13-1072	Compensation/Benefit/Job Anls Specialists	2,710	2,890	180	6.6	71	18	
13-1073	Training & Development Specialists	8,240	8,890	650	7.9	224	65	
13-1111	Management Analysts	12,260	14,650	2,390	19.4	346	238	
13-1121	Meeting and Convention Planners	970	1,120	150	15.6	33	15	
13-1199	Business Operations Specialists, AO	62,630	67,560	4,930	7.9	2,082	492	1,
13-2011	Accountants and Auditors	35,420	39,600	4,180	11.8	942	417	
13-2021	Appraisers/Assessors of Real Estate	2,300	2,550	250	10.8	90	25	
13-2031	Budget Analysts	1,770	1,840	70	4.1	43	7	
13-2041	Credit Analysts	1,600	1,720	120	7.5	44	12	
13-2051	Financial Analysts	4,260	4,910	650	15.2	123	65	
13-2052	Personal Financial Advisors	2,760	3,410	650	23.5	97	65	
13-2053	Insurance Underwriters	2,010	2,100	90	4.3	39	9	
13-2061	Financial Examiners	380	390	10	1.8	8	1	
13-2071	Loan Counselors	520	590	70	14.5	18	8	
13-2072	Loan Officers	6,750	7,010	260	3.8	160	26	
13-2081	Tax Examiners/Collectors/Revenue Agents	1,480	1,500	20	1.3	41	2	
13-2082	Tax Preparers	2,030	2,340	310	15.0	71	31	
13-2099	Financial Specialists, All Other	7,120	8,660	1,540	21.6	296	154	
15-0000	Computer & Mathematical Occupations	85,730	124,290	38,560	45.0	4,672	3,855	

		Employment 2000	2010	Change Level	%	Total	growth	
15-1011	Computer/Information Scientists-Research	400	510	110	28.6	15	11	
15-1021	Computer Programmers	12,760	12,550	-210	-1.7	268	0	
15-1031	Computer Software Engineers-Applications	10,220	17,110	6,890	67.4	758	689	
15-1032	Computer Software Engineers-Systems Softw	6,870	11,940	5,070	73.8	553	507	
15-1041	Computer Support Specialists	13,630	23,750	10,120	74.3	1,071	1,013	
15-1051	Computer Systems Analysts	18,380	25,410	7,030	38.2	864	702	
15-1061	Database Administrators	2,020	2,900	880	43.5	97	88	
15-1071	Network & Computer Systems Administrators	6,670	11,020	4,350	65.2	463	435	
15-1081	Network Systems & Data Comm Analysts	2,720	4,520	1,800	66.1	192	180	
15-1099	Computer Specialists, All Other	6,480	9,120	2,640	40.8	321	264	
15-2011	Actuaries	460	480	20	3.9	8	2	
15-2021	Mathematicians	500	480	-20	-5.4	6	0	
15-2031	Operations Research Analysts	1,820	1,850	30	2.1	62	4	
15-2041	Statisticians	250	230	-20	-6.1	3	0	
15-2099	Mathematical Science Occupations, AO	2,510	2,380	-130	-5.3	32	0	
17-0000	Architecture & Engineering Occupations	168,980	176,160	7,180	4.2	4,294	717	3,
17-1011	Architects, Except Landscape & Naval	2,740	3,170	430	15.7	59	43	
17-1012	Landscape Architects	470	580	110	23.4	14	11	
17-1021	Cartographers & Photogrammetrists	40	50	10	7.0	2	0	
17-1022	Surveyors	1,940	2,080	140	6.9	73	13	
17-1099	Architect/Surveyor/Cartographer, AO --	220	280	60	27.3	7	6	
17-2011	Aerospace Engineers	160	170	10	10.3	6	2	
17-2021	Agricultural Engineers	40	40	0	0.0	1	0	
17-2031	Biomedical Engineers	60	70	10	12.9	2	1	
17-2041	Chemical Engineers	930	970	40	4.5	21	4	
17-2051	Civil Engineers	12,140	13,310	1,170	9.6	307	117	
17-2061	Computer Hardware Engineers	710	750	40	6.0	14	4	
17-2071	Electrical Engineers	6,920	7,600	680	9.8	195	68	
17-2072	Electronics Engineers, Except Computer	2,160	2,590	430	19.6	82	42	
17-2081	Environmental Engineers	1,750	2,140	390	22.4	74	39	
17-2111	Health/Safety Engineers, Ex Mining	1,210	1,280	70	5.1	27	6	
17-2141	Mechanical Engineers	17,380	19,120	1,740	10.0	683	174	
17-2151	Mining/Geological Engineers, Inc Safety	70	60	-10	-1.5	1	0	
17-2161	Nuclear Engineers	430	420	-10	-2.6	9	0	
17-2171	Petroleum Engineers	140	120	-20	-17.3	3	0	
17-2199	Engineers, All Other	51,510	48,630	-2,880	-5.6	1,027	0	1,
17-3011	Architectural and Civil Drafters	2,500	2,850	350	14.0	111	35	
17-3012	Electrical & Electronics Drafters	1,230	1,550	320	26.3	69	32	
17-3013	Mechanical Drafters	7,980	8,390	410	5.2	283	42	
17-3021	Aerospace Engineering & Operations Techn	510	520	10	2.0	11	1	
17-3022	Civil Engineering Technicians	1,720	1,920	200	11.5	55	20	
17-3023	Electrical/Electronic Engnr Technicians	5,580	5,840	260	4.7	139	26	
17-3024	Electro-Mechanical Technicians	860	960	100	11.1	27	10	
17-3025	Environmental Engineering Technicians	610	740	130	20.2	25	12	
17-3026	Industrial Engineering Technicians	2,530	2,800	270	10.7	78	27	
17-3027	Mechanical Engineering Technicians	3,370	3,740	370	10.7	104	36	
17-3029	Engineering Technicians, Ex Drafters, AO	320	290	-30	-10.9	7	0	
17-3031	Surveying and Mapping Technicians	1,850	2,250	400	21.3	99	39	
17-3099	Drafters/Engineerg/Mapping Technician, AO	23,940	26,580	2,640	11.0	782	264	
19-0000	Life, Physical, & Social Science Occup	42,370	49,440	7,070	16.7	1,979	707	1,
19-1010	Agricultural and Food Scientists	510	510	0	-1.2	17	0	
19-1012	Food Scientists and Technologists	120	110	-10	-6.7	4	0	
19-1021	Biochemists and Biophysicists	420	500	80	17.0	23	7	
19-1022	Microbiologists	410	510	100	22.5	24	9	
19-1023	Zoologists & Wildlife Biologists	210	210	0	1.9	8	0	
19-1031	Conservation Scientists	290	290	0	-1.0	9	0	
19-1032	Foresters	270	260	-10	-3.4	9	0	
19-1041	Epidemiologists	90	90	0	3.4	2	0	
19-1042	Medical Scientists, Ex Epidemiologists	620	710	90	14.2	23	9	
19-1099	Life Scientists, All Other	670	700	30	3.7	27	3	
19-2012	Physicists	200	190	-10	-3.0	6	0	
19-2021	Atmospheric and Space Scientists	380	400	20	5.5	15	2	
19-2031	Chemists	2,430	2,700	270	11.1	103	27	
19-2032	Materials Scientists	300	340	40	13.0	13	4	
19-2041	Environment Scientst/Specialst, Inc Hlth	2,670	3,020	350	12.9	122	35	
19-2042	Geoscientists: Ex Hydrologist/Geographers	660	760	100	15.8	32	10	
19-2043	Hydrologists	120	150	30	29.6	7	3	
19-2099	Physical Scientists, All Other	930	1,030	100	10.1	49	9	
19-3011	Economists	340	360	20	7.4	10	3	
19-3021	Market Research Analysts	2,670	3,130	460	17.4	105	46	
19-3022	Survey Researchers	1,300	1,480	180	13.8	47	18	
19-3031	Clinical/Counseling/School Psychologists	5,500	6,090	590	10.7	187	59	
19-3032	Industrial-Organizational Psychologists	1,110	1,310	200	17.9	46	20	
19-3051	Urban and Regional Planners	1,240	1,310	70	5.1	37	6	
19-3091	Anthropologists and Archeologists	140	150	10	11.8	5	2	
19-3093	Historians	60	60	0	-3.2	2	0	
19-3099	Social Scientists & Related Workers, AO	760	830	70	9.5	26	7	
19-4011	Agricultural & Food Science Technicians	130	140	10	7.1	4	1	
19-4021	Biological Technicians	1,030	1,100	70	5.9	30	6	
19-4031	Chemical Technicians	3,210	3,420	210	6.7	96	22	
19-4091	Environment Scien/Protect Techn, Inc Hlth	970	1,120	150	16.4	51	16	

43-4999	Financial, Info/Record Clerks, AO --	9,710	10,780	1,070	11.0	234	107	
43-5011	Cargo and Freight Agents	1,030	1,070	40	3.7	25	4	
43-5021	Couriers and Messengers	5,230	4,600	-630	-12.0	142	0	
43-5031	Police, Fire, & Ambulance Dispatchers	2,040	2,160	120	6.0	46	12	
43-5032	Dispatchers, Ex Police/Fire/Ambulance	4,900	5,630	730	15.0	154	74	
43-5041	Meter Readers, Utilities	1,550	1,000	-550	-35.5	38	0	
43-5051	Postal Service Clerks	2,410	2,490	80	3.5	61	9	
43-5052	Postal Service Mail Carriers	12,520	12,960	440	3.6	424	45	
43-5053	Postal Serv Mail Sort/Process/Mach Oper	8,530	8,210	-320	-3.8	187	0	
43-5061	Production, Planning, & Expediting Clerks	9,740	10,450	710	7.3	235	72	
43-5071	Shipping, Receiving, & Traffic Clerks	27,550	28,890	1,340	4.9	688	134	
43-5081	Stock Clerks and Order Fillers	68,630	72,120	3,490	5.1	2,791	349	2,
43-5111	Weighers/Measurr/Checkr/Samplr, Recordkpg	2,870	3,200	330	11.5	103	33	
43-5199	Material Record/Sched/Disptch/Distrib, AO	2,210	2,230	20	0.8	81	2	
43-6011	Executive Secretaries & Admin Assistants	38,750	40,680	1,930	5.0	852	193	
43-6012	Legal Secretaries	9,020	9,210	190	2.1	173	19	
43-6013	Medical Secretaries	12,170	12,810	640	5.3	271	65	
43-6014	Secretaries, Ex Legal/Medical/Executive	64,660	60,720	-3,940	-6.1	1,099	0	1,
43-9011	Computer Operators	5,060	3,810	-1,250	-24.7	91	0	
43-9021	Data Entry Keyers	11,430	11,070	-360	-3.1	181	0	
43-9022	Word Processors and Typists	7,850	5,870	-1,980	-25.3	158	0	
43-9031	Desktop Publishers	840	1,270	430	51.1	58	43	
43-9041	Insurance Claims/Policy Processing Clerks	7,180	5,550	-1,630	-22.7	124	0	
43-9051	Mail Clerks/Mail Mach Oper, Ex Postl Serv	3,360	3,530	170	5.0	115	17	
43-9061	Office Clerks, General	76,250	81,610	5,360	7.0	2,001	537	1,
43-9071	Office Machine Operators, Ex Computer	2,800	2,150	-650	-23.2	98	0	
43-9081	Proofreaders and Copy Markers	830	820	-10	-0.6	30	0	
43-9111	Statistical Assistants	1,160	1,110	-50	-4.2	10	0	
43-9199	Office/Administrative Support Workers, AO	2,890	2,580	-310	-10.6	46	0	
43-9999	Secretary/Admin Assist/Off Suprt Wrkr, AO	22,400	21,690	-710	-3.2	360	0	
45-0000	Farming, Fishing, & Forestry Occupations	46,740	45,040	-1,700	-3.6	1,416	0	1,
45-1011	First-Line Sup/Mgrs: Farm/Fish/Forest Wrk	600	680	80	13.0	12	8	
45-2011	Agricultural Inspectors	220	220	0	-2.3	5	0	
45-2041	Graders & Sorters, Agricultural Products	1,900	1,860	-40	-1.8	44	0	
45-2091	Agricultural Equipment Operators	200	220	20	13.2	9	3	
45-2092	Farmworker/Laborer: Crop/Nursery/Greenhse	910	1,070	160	16.9	46	15	
45-2093	Farmworkers, Farm & Ranch Animals	400	400	0	-1.0	14	0	
45-2099	Agricultural Workers, All Other	30,940	28,830	-2,110	-6.8	1,033	0	1,
45-4011	Forest and Conservation Workers	420	430	10	1.4	11	1	
45-4021	Fallers	100	100	0	-1.0	2	0	
45-4022	Logging Equipment Operators	1,220	1,250	30	2.3	26	3	
45-4023	Log Graders and Scalers	260	260	0	-2.3	5	0	
45-9099	Farm/Fish/Forestry Workers, AO --	9,550	9,720	170	1.7	254	17	
47-0000	Construction & Extraction Occupations	224,030	257,320	33,290	14.9	7,526	3,329	4,
47-1011	First-Line Sup/Mgrs: Construction/Extract	25,730	29,450	3,720	14.5	960	372	
47-2011	Boilermakers	1,000	1,030	30	3.1	29	3	
47-2021	Brickmasons and Blockmasons	4,810	5,630	820	17.2	172	83	
47-2022	Stonemasons	750	930	180	24.9	33	19	
47-2031	Carpenters	40,280	46,610	6,330	15.7	1,314	633	
47-2041	Carpet Installers	1,700	1,960	260	15.7	55	27	
47-2042	Floor Layers, Ex Carpet/Wood/Hard Tiles	260	320	60	21.8	10	6	
47-2043	Floor Sanders and Finishers	50	60	10	24.0	2	1	
47-2044	Tile and Marble Setters	1,230	1,440	210	17.7	42	22	
47-2051	Cement Masons & Concrete Finishers	4,410	4,820	410	9.3	79	41	
47-2061	Construction Laborers	24,430	29,030	4,600	18.9	684	461	
47-2071	Paving/Surfacing/Tamping Equip Operators	1,360	1,560	200	15.2	47	21	
47-2072	Pile-Driver Operators	50	50	0	6.5	1	0	
47-2073	Operating Engineer/Othr Constr Equip Oper	9,850	10,200	350	3.6	250	35	
47-2081	Drywall & Ceiling Tile Installers	1,420	1,660	240	17.4	38	25	
47-2082	Tapers	990	1,170	180	18.2	27	18	
47-2111	Electricians	27,600	33,120	5,520	20.0	1,069	552	
47-2121	Glaziers	1,480	1,590	110	7.2	38	11	
47-2130	Insulation Workers	2,010	2,450	440	22.1	105	44	
47-2141	Painters, Construction & Maintenance	10,750	12,560	1,810	16.9	371	181	
47-2142	Paperhangers	1,150	1,360	210	18.5	43	21	
47-2151	Pipelayers	880	950	70	8.0	22	7	
47-2152	Plumbers, Pipefitters, & Steamfitters	21,590	24,280	2,690	12.4	624	269	
47-2161	Plasterers and Stucco Masons	830	970	140	16.6	29	14	
47-2171	Reinforcing Iron & Rebar Workers	510	570	60	12.0	12	6	
47-2181	Roofers	4,240	4,740	500	11.8	147	50	
47-2211	Sheet Metal Workers	7,220	8,950	1,730	24.1	323	174	
47-2221	Structural Iron and Steel Workers	2,330	2,640	310	13.4	56	31	
47-3011	Helpers: Brick/Block/Stone/Tile Setters	1,280	1,490	210	16.7	85	21	
47-3012	Helpers: Carpenters	1,490	1,560	70	4.4	81	7	
47-3013	Helpers: Electricians	2,050	2,470	420	20.2	143	41	
47-3014	Helpers: Paint/Paperhang/Plast/Stucco Msn	340	400	60	17.6	23	6	
47-3015	Helpers: Pipelayer/Plumbr/Pipefit/Steamft	1,710	1,990	280	16.1	112	28	
47-3016	Helpers: Roofers	680	750	70	10.5	41	7	
47-3019	Helpers, Construction Trades, AO	140	150	10	12.4	9	2	
47-4011	Construction & Building Inspectors	2,490	2,510	20	0.8	58	2	
47-4021	Elevator Installers and Repairers	130	140	10	6.9	5	1	

47-4031	Fence Erectors	680	710	30	4.3	15	3	
47-4041	Hazardous Materials Removal Workers	590	660	70	11.9	25	7	
47-4051	Highway Maintenance Workers	5,330	5,410	80	1.5	88	8	
47-4061	Rail-Track Laying/Maint Equip Operators	320	250	-70	-22.0	7	0	
47-4071	Septic Tank Servicers/Sewer Pipe Cleaners	500	520	20	2.4	12	1	
47-4091	Segmental Pavers	220	280	60	28.0	10	6	
47-4999	Construction Trades/Relatd Wrkrs, AO --	4,100	4,800	700	17.1	140	70	
47-5011	Derrick Operators, Oil and Gas	170	160	-10	-5.2	6	0	
47-5012	Rotary Drill Operators, Oil & Gas	110	90	-20	-24.1	4	0	
47-5013	Service Unit Operators, Oil/Gas/Mining	100	90	-10	-13.1	4	0	
47-5021	Earth Drillers, Except Oil & Gas	1,190	1,330	140	11.2	37	13	
47-5041	Continuous Mining Mach Operators	140	150	10	5.0	6	1	
47-5071	Roustabouts, Oil and Gas	130	100	-30	-20.0	4	0	
47-5081	Helpers: Extraction Workers	800	730	-70	-8.9	36	0	
49-0000	Installation, Maintenance, & Repair Occup	188,310	202,690	14,380	7.6	5,689	1,438	4,
49-1011	First-Line Sup/Mgrs: Mechanic/Instll/Repr	15,770	17,560	1,790	11.3	589	178	
49-2011	Computer/ATM/Office Machine Repairers	3,060	3,180	120	4.2	46	13	
49-2021	Radio Mechanics	160	90	-70	-46.0	3	0	
49-2022	Telecomm Equip Install/Repairers, Ex Line	2,980	2,800	-180	-5.8	56	0	
49-2091	Avionics Technicians	80	80	0	-1.2	2	0	
49-2092	Electric Motor/Power Tool/Related Repair	930	970	40	4.3	25	4	
49-2093	Electrical/Elect Inst/Repair, Trnsprt Equ	280	290	10	3.6	6	1	
49-2094	Electrical/Elect Repair, Comm/Ind Equip	2,950	3,130	180	6.2	78	18	
49-2095	Electrical/Elec Repairer, Pwrhs/Subst/Rly	380	370	-10	-2.4	8	0	
49-2096	Electronic Equip Instll/Repair, Motor Veh	660	760	100	16.3	26	11	
49-2097	Electronic Hm Entertain Equip Inst/Repair	1,340	1,020	-320	-23.9	25	0	
49-2098	Security & Fire Alarm Systems Installers	450	530	80	16.9	16	8	
49-2099	Electrical/Elect Eq Mech/Instl/Repair, AO	1,010	1,150	140	14.4	38	15	
49-3011	Aircraft Mechanics & Service Technicians	1,480	1,690	210	13.8	52	21	
49-3021	Automotive Body & Related Repairers	7,720	8,790	1,070	13.8	297	106	
49-3022	Automotive Glass Installers & Repairers	1,610	1,740	130	7.9	53	13	
49-3023	Automotive Service Technicians/Mechanics	24,970	29,040	4,070	16.3	996	407	
49-3031	Bus/Truck Mechanics/Diesel Eng Specialist	9,580	10,560	980	10.2	344	98	
49-3041	Farm Equipment Mechanics	1,030	1,020	-10	-0.4	27	0	
49-3042	Mobile Heavy Equip Mechanics, Ex Engines	4,130	4,730	600	14.6	167	60	
49-3043	Rail Car Repairers	200	160	-40	-21.6	5	0	
49-3051	Motorboat Mechanics	1,110	1,120	10	1.4	29	2	
49-3052	Motorcycle Mechanics	410	480	70	15.0	17	6	
49-3053	Outdoor Power Equip/Small Engine Mechanic	1,560	1,590	30	1.7	42	3	
49-3091	Bicycle Repairers	180	230	50	24.2	11	4	
49-3092	Recreational Vehicle Service Technicians	480	610	130	28.0	32	13	
49-3093	Tire Repairers and Changers	3,390	3,540	150	4.5	145	15	
49-3099	Vehicle/Mobile Equip Mech/Inst/Repair, AO	2,270	2,380	110	4.9	98	11	
49-9011	Mechanical Door Repairers	50	60	10	20.8	3	1	
49-9012	Control/Valve Instll/Repair, Ex Mech Door	970	940	-30	-3.0	31	0	
49-9021	Heating/Air Cond/Refrig Mechanics/Instllr	4,620	5,460	840	18.2	132	84	
49-9031	Home Appliance Repairers	1,220	1,490	270	22.2	52	27	
49-9041	Industrial Machinery Mechanics	10,560	11,090	530	5.0	338	53	
49-9042	Maintenance & Repair Workers, General	40,670	40,430	-240	-0.6	528	0	
49-9043	Maintenance Workers, Machinery	3,840	3,840	0	0.0	104	0	
49-9044	Millwrights	7,770	7,250	-520	-6.7	234	0	
49-9045	Refractory Material Repair, Ex Brickmason	330	290	-40	-10.1	7	0	
49-9052	Telecommunications Line Install/Repairers	4,750	5,930	1,180	24.8	208	118	
49-9061	Camera & Photographic Equipment Repairers	100	100	0	-2.9	3	0	
49-9062	Medical Equipment Repairers	520	550	30	7.4	17	4	
49-9063	Musical Instrument Repairers & Tuners	410	500	90	21.5	19	9	
49-9064	Watch Repairers	180	230	50	24.7	9	5	
49-9069	Precision Instrument/Equip Repairers, AO	510	560	50	9.0	17	5	
49-9091	Coin/Vending/Amusement Mach Serv/Repairer	640	690	50	7.0	19	5	
49-9094	Locksmiths and Safe Repairers	100	110	10	8.8	4	1	
49-9095	Manufactured Building/Mobile Home Install	790	900	110	13.0	26	10	
49-9096	Riggers	730	760	30	4.0	18	3	
49-9097	Signal & Track Switch Repairers	150	120	-30	-19.1	3	0	
49-9098	Helpers: Install/Maint/Repair Workers	4,360	4,950	590	13.4	281	58	
49-9099	Installation/Maint/Repair Workers, AO	10,290	11,060	770	7.5	287	77	
51-0000	Production Occupations	649,410	652,300	2,890	0.4	14,992	289	14,
51-1011	First-Line Sup/Mgrs: Productn/Oper Wrkrs	38,670	37,670	-1,000	-2.6	1,017	0	1,
51-2021	Coil Winders, Tapers, & Finishers	1,950	2,020	70	3.7	57	7	
51-2022	Electrical & Electronic Equip Assemblers	6,220	6,270	50	0.9	165	6	
51-2023	Electromechanical Equipment Assemblers	1,580	1,670	90	5.8	50	9	
51-2031	Engine & Other Machine Assemblers	3,290	2,960	-330	-10.0	66	0	
51-2041	Structural Metal Fabricators & Fitters	3,500	3,610	110	3.3	66	12	
51-2091	Fiberglass Laminators/Fabricators	1,290	1,270	-20	-1.2	23	0	
51-2092	Team Assemblers	75,960	74,610	-1,350	-1.8	1,329	0	1,
51-2093	Timing Device Assemb/Adjust/Calibrators	1,010	880	-130	-13.0	18	0	
51-2099	Assemblers/Fabricators, All Other	37,590	36,360	-1,230	-3.3	658	0	
51-3011	Bakers	6,080	6,690	610	9.9	157	60	
51-3021	Butchers and Meat Cutters	4,350	3,750	-600	-13.8	106	0	
51-3022	Meat, Poultry, & Fish Cutters & Trimmers	1,500	1,650	150	9.7	51	15	
51-3023	Slaughterers and Meat Packers	3,590	3,940	350	9.7	122	35	
51-3091	Food/Tobco Roast/Bake/Dry Mach Oprs/Tndrs	1,210	1,090	-120	-10.3	29	0	