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HOW WELL ARE BACCALAUREATE BUILDING CONSTRUCTION MANAGEMENT PROGRAMS SERVING THEIR PRINCIPAL MARKET - THE EMPLOYERS?

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HOW WELL ARE BACCALAUREATE BUILDING CONSTRUCTION MANAGEMENT PROGRAMS SERVING THEIR PRINCIPAL MARKET - THE EMPLOYERS?

By

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ABSTRACT

HOW WELL ARE BACCALAUREATE BUILDING CONSTRUCTION MANAGEMENT PROGRAMS SERVING THEIR PRINCIPAL MARKET - THE EMPLOYERS?

By

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The overall purpose of this study is to assess how well baccalaureate building construction management education programs are serving their principal market - the employers.

The study was based on results using a questionnaire mailed to the top four hundred building contractors and the top four hundred construction contractors throughout the United States. One hundred thirty-five building contractors and one hundred forty-six construction contractors responded for response rates of 33.8 and 36.5 per cent. The responses were analyzed by MANOVA, specifically Wilks' lambda, and ANOVA were applied to data for each response.

Eleven major hypotheses were developed to determine how important, for day to day use, the curriculums of baccalaureate building construction management programs are to employers of graduates with regard to five major subject areas.

Findings indicate significant differences with respect to the five major course group classifications in five different categories. Results are compared with other studies.

DEDICATED TO

My wife, Lynn, for putting up with me;

for always being there to love,

and to

My son, Andy, who keeps everything

in perspective

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LIST OF ABBREVIATIONS

ACCE ..... American Council for Construction Education

AGC ..... Associated General Contractors of America

ANOVA ..... Univariate Analysis of Variance

BCM ..... Building Construction Management

CAD ..... Computer - Aided Design

MANOVA ..... Multivariate Analysis of Variance

SPSS ..... Statistical Package for the Social Sciences

CHAPTER I
INTRODUCTION

Many of today's construction projects require both complex technological and sophisticated management techniques. The Associated General Contractors of America (AGC), in its Construction Education Directory, describes the construction industry as a highly competitive, extremely volatile and unique business. It also stresses the immediate and continuing need for talented, well educated and sufficiently motivated personnel (AGC, 1984). The Associated General Contractors of America further believes that the construction industry will be served best by personnel specifically educated and trained in the managerial and scientific techniques necessary to meet the ever increasing demands of this rapidly changing technological age (Shofoluwe, 1990).

Over the past ten years, a great deal of effort has been directed toward improving the quality of students graduating from building construction management schools in the United States. It has been well recognized that, in order for the construction industry to remain competitive, it is important that building construction management graduates receive the best possible education. To accomplish this goal, an alliance needs to be developed between the universities and industry.

Technological advancements are accelerating at unprecedented rates and avoiding obsolescence in the future will be increasingly

difficult for building construction management graduates. Introducing emerging technologies into today's curricula cannot insure against future deficiencies (Baker,1988). Building construction management graduates of today, four years from now, and in the twenty-first century must have the foundation and tools to transfer from specialty channels made obsolete by new technologies and shifting global economics into new ones open by the forces of change (Baker,1988).

One enormous challenge facing the educational institution today is to improve the quality of construction education so that graduates are better prepared to deal with real world problems. The addition of more highly trained building construction management graduates to the nation's work force will help alleviate the acute shortage of experienced constructors our country has had (Braunstein,1988).

Because the construction industry is composed of many unique types of construction, all of which offer career opportunities to construction graduates, it is recognized that some types of construction will require greater emphasis in selected curriculum components than others. To prepare graduates with a broad based education necessary to function at several levels in the construction industry, several construction programs have placed greater emphasis on management aspects of the industry (Shofoluwe, 1990).

The process of developing, assessing, and revising building construction management curricula at universities throughout the United States to respond to the construction industry needs is overwhelming. How have the universities fared in this venture? How well have baccalaureate building construction management programs

prepared their graduates? What effects, if any, have these construction programs had on the construction industry? What does the construction industry view as important curriculum for future employees? Those are a few of the issues and questions addressed by this study.

General Statement of the Problem

Declining productivity is a major issue confronting the construction industry today (Shofoluwe, 1990). While there are several contributing factors, the major one that has been identified is the lack of adequate education in technical and management skills. For project and construction managers to ascertain that baccalaureate construction engineering technology programs best serve the needs of the construction industry, it is essential that a continuing dialogue and close relations be maintained between construction educators and industry (Shofoluwe, 1990).

To further complicate matters, today's technology within the construction industry is rapidly changing, and building construction management graduates will work in a world unlike yesterday. Construction has always, and will continue to, require technical skills. However, construction companies will also need qualified personnel who are profitable to the company. Profitable personnel are those equipped with both technical information and the knowledge needed to apply it in work situations. No new employee will be profitable when hired, but the better their education background the more quickly they will become profitable (Gold, 1987).

Quality construction education is essential to ensure cost effective construction projects. Thus, undergraduate building construction management programs must be upgraded and made flexible to reflect changes within the industry. Furthermore, the extent to which a program should be upgraded depends largely on the importance of courses as perceived by prospective employers.

The analysis reflected in this study provides a further understanding of the construction industry's needs in curriculum design. Without such an understanding little change will really occur in building construction management curricula.

Purpose of the Study

The overall purpose of this study is to assess how well baccalaureate building construction management education programs are serving their principle market - the employers. The following objectives formulated as a means of achieving the purpose of this study:

- To determine how important the curriculums of baccalaureate building construction management programs are to employers of their graduates.
- To assess industry -- academic relations in an attempt to gather information on cooperative efforts and performance of graduates.

Research Hypotheses

Are there predictable differences between the ratings of Building Contractors and Construction Contractors in regard to curriculum with respect to industrial applications? To answer this question, the study tested the following research hypotheses:

Hypothesis 1. There are differences between Building Contractors and Construction Contractors with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 2. There are differences between administrative title of position with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 3. There are differences between company classification with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 4. There are differences between how many permanent management employees are employed with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 5. There are differences between what percentage of permanent employees hold a bachelor's degree in Building Construction Management with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 6. There are differences between how you categorize your own personal background with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 7. There are differences between the participants who responded yes to the question: **Does your company regularly hire graduates of Building Construction Management programs**?, and those who said no with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 8. There are differences between the participants who responded yes, no, or not sure to the question: **Based on their performance, do you anticipate more hiring in the future**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 9. There are differences between the participants who responded yes, no, or not sure to the question; **Should a master's degree in construction be a criterion for promotion**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 10. There are differences between the participants who responded yes, no, or not sure to the question: **Does your company feel that current Building Construction Management programs are adequately structured to serve industry needs**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 11. There are differences between the participants who responded yes, no, or not sure to the question: **Do you perceive that a graduate of a Building Construction Management program would be more valuable to your company than a graduate of another program, for example Business**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Delimitations

To establish clear and definitive boundaries for the study, the following delimiting factors were identified:

1. The study was based on information and findings generated from building contractors and construction contractors which maintain headquarters within the parameters of the United States.
2. The top four hundred building contractors listed in the Professional Builder & Remodeler July 1991 magazine were surveyed.
3. The top four hundred construction contractors listed in the Engineering News-Record May 1991 were surveyed.
4. Nationwide, four geographic sections were noted on the questionnaire: North, South, East, and West.
5. Internationally, eight regions were indicated on the questionnaire: North America, Africa, Europe, Australia, South America, Asia, Middle East, and Polar.

6. Five major groupings of courses typically offered by Building Construction Management programs were listed in the questionnaire: General Education, Construction Design, Business and Management, Construction Technology, and Management of Construction Operations. Within these five major course groupings, thirty-nine subject areas were presented.

Definition of Terms

For the purpose of this study, terms were defined as follows:

Building Contractor:

A person, firm or corporation who contracts for and supervises the construction of single family detached housing, rental housing, condominiums, mobile homes and manufactured housing.

Construction Contractor:

A person, firm or corporation who contracts for and supervises the construction of manufacturing facilities, transportation and infrastructure systems, industrial processing (petrochemical, power, nuclear, and hazardous waste), and commercial or storage buildings.

Building Construction Management Program:

A baccalaureate program designed to provide a student with a background in the economic, social, environmental,

technical and managerial aspects of residential and commercial construction.

The Five Major Course Groups:

Are general education, construction design, business and management, construction technology, and management of construction operations. These five categories were created from thirty-nine classes commonly offered in typical building construction management programs (Appendix B).

Organization of the Study

The thesis contains five chapters. Chapter I contains an introduction to the study, a general statement of the problem, the delimitations of the study, and definitions of terms used in the study.

Chapter II contains a review of the literature, a review of previous research and opinions, an interpretative summary of the current state of knowledge, recent studies, and a summary.

Chapter III contains the research methodology, the research design, the populations and samples of the study, the instrumentation (cover letter and questionnaire), the research hypotheses, the pilot study, and the method of data collection.

Chapter IV contains the analysis of the data, the statistical processing, the sample population, the description of results for each hypothesis and hypothesis testing, and supplemental analysis.

Chapter V contains summaries, conclusions, and discussion of the literature, methodology, general observations and results. In

addition, chapter V contains an interpretation of each result, the limitations of the study, implications, conclusions and recommendations for further research and final reflections.

CHAPTER II
REVIEW OF THE LITERATURE

Introduction

The general purpose of the literature review is to help develop a thorough understanding and insight into previous works and the trends that have emerged (Borg and Gall, 1989). To help investigate and more clearly define how building contractors differ with construction contractors concerning typical building construction management baccalaureate curriculum a review of the literature was conducted. In this chapter, both historical and current perspectives are considered. To begin with, a review of previous research and opinions will be submitted. Subsequently, an interpretative summary of the current state of knowledge will be discussed. Finally, the recent studies will be presented with some implications of relevant curriculum decision making issues.

Review of Previous Research and Opinions

Construction education has an acknowledged existence of more than fifty years as a recognizable academic discipline, but its origins go back much further (Rounds, 1992). Rudiments of construction education could be found in Agriculture and Industrial Arts programs early in the century. Other elements of the body of knowledge now associated with the profession of construction reach back to Business,

Architecture and various Engineering disciplines, all of which have evolved away from those components that have now coalesced into today's well accepted construction academic discipline.

From the early construction programs emerging as recognizable entities in the forties and fifties, each decade has shown change and growth. In the sixties the beachhead was secured for recognition of construction as a professional discipline through the formation of a professional society and an accreditation body. Together they worked with the academic programs to establish the character of the profession, and began to formulate the body of knowledge of the profession of construction.

In the seventies, as the number of accredited programs began to grow, the academic discipline of construction gained even greater acceptance when programs at the Departmental level emerged, demonstrating the viability of construction as a distinct and independent academic area; an area which could stand on its own beside its progenitors in Agriculture, Industrial Arts, Architecture, Engineering and Business.

The eighties saw a resurgence of interest in construction education in the more traditional Engineering areas, primarily at the graduate level. At the other end of the spectrum, two year associate degree programs gained strength and acceptance, culminating in the establishment of their own accreditation standards by the end of the decade. The eighties represented a positive and healing decade as the industry and the academic community acknowledged that the diverse and complex construction industry needs academically prepared individuals from diverse backgrounds with a variety of academic

preparation. Debates over where construction education belongs within the academic community have subsided and have matured to recognize that representation in all areas is needed and must work together to move the industry forward. At long last, construction education has moved into an age of mutual respect among professional constructors and other professionals in the industry.

Truly, the eighties was a remarkable decade in the emergence of the profession and the academic discipline of construction. The question facing us now is where construction education will go in the nineties as civilization moves into a new world order (Rounds, 1992).

With the approach of the twenty-first century, the role and mission of universities is constantly being challenged. Because of the virtual revolution in knowledge over the past twenty years, this challenge is particularly strong for engineering education. Engineering education not only needs to satisfy the traditional goals of higher education, but needs to properly prepare our students for a productive and satisfying professional career. Moreover, both sets of objectives need to be achieved within the confines of the traditional four-year curricula.

A university's first concern must be for the student's social and intellectual development, both as an individual and as an informed participant in a democratic society. A university education should enrich the life experience of all it touches. In order to achieve these objectives, universities must provide students with:

- the fundamental tools for their careers
- the ethical, moral, and humanizing philosophies with which to use these tools

- an appreciation for human achievement
- a perspective from which to understand and address complex societal problems
- the ability to think critically; that is, the ability to be skeptical without being cynical
- an appreciation of artistic creativity and scholarly accomplishment
- an appreciation for other cultures
- a mastery of the principles of science and technology

The achievement of these objectives, particularly within the confines of a four-year curricula, is a tall order. Moreover, engineering curricula must give special attention to two of these, the first and the last. Specifically, engineering graduates must have a comprehensive understanding of scientific principles and the skill to apply these principles to the practical ends such as the design, construction and operation of efficient and economical systems (McDowell, 1988).

The curriculum in undergraduate construction education was established in the sixties and seventies, being crystallized in the accreditation standards of the American Council for Construction Education (ACCE). These standards have been altered from time to time to improve their effectiveness, but in the last twenty years, little change has occurred in what is taught and how it is taught.

This is both good and bad. Little change has occurred because the curriculum has been highly successful. Today's construction education programs exist because the industry demanded them and supported their development. Many successful industry leaders and companies owe their success, in great part, to the preparation provided by first class construction programs (Rounds, 1992). As we move

forward, we want to avoid, at all costs, losing the effectiveness of well established programs in providing academically strong leaders for our industry.

Yet, the world has changed. In fact, everything about the world has changed. Change appears to have become the only stable characteristic of our world today. And if the world is changing around us, then we must change as well. A static curriculum in a dynamic world is dangerous. We must move with the times (Rounds, 1992).

The past decade has seen a major change in the United States industrial sector. The need for improved productivity, improved quality, and lowered cost of production has caused industry to reexamine the need for new methods of production.

High-tech tools for manufacturing, such as computer-aided design (CAD) and robotics can be used to enhance the individual manufacturing steps. Communications tools, such as local area networks and complex wide band nets, are also being used to augment the manufacturing process. The successful utilization of these tools requires the realization that the manufacturing enterprise is a system (albeit a very complex one). Such systems require sophisticated techniques for their effective operation and control.

Both industry and universities recognize this problem. In searching for a solution, they discovered that an engineer involved in manufacturing requires an interdisciplinary education. The problems facing today's engineers are not neatly divided into categories such as electrical, mechanical, or industrial. The breadth of these problems has resulted in universities offering a larger selection of interdepartmental programs.

Another area that requires improvement is involving top students and faculty in the problems facing manufacturing. Although financial support is required, the primary function is to provide valuable interaction between faculty and students and the manufacturing industry, thereby generating meaningful topics for research and education; in particular, developing industry's role in curriculum enhancement, personnel exchange, and research. This role is advisory in nature as the manufacturing companies recognize that the educational expertise resides in academia.

In the curriculum area, the manufacturing companies contribute case studies, projects, seminar speakers, and educational modules. Participation in this manner provides the university with a view of some "real" problems. Even though the problems must be scaled down significantly for classroom use, it is helpful to know that they represent a real problem that either has been solved or still needs to be solved. Real problems help in the evaluation of the content and relevance of the new programs (Book, Krosner, and Habbad, 1987).

Another adjustment that needs to be made in construction education of the nineties is a realignment of the basic mission and goals of programs. Because some programs developed are in response to industry demands, emphasis was placed upon the teaching of knowledge and skills in construction. In the world of rapid change, knowledge and skills change, so if all that is taught is knowledge and skills, graduates will be left critically deficient. The consequence is that the world will change out from under their competence, they will not survive the change, and, even worse, the industry will suffer. What is important in the nineties is to impart skills like creative thinking,

critical analysis, communication, and, most important of all, how to learn. If graduates cease to learn when they leave their programs, they will be out dated in just a few years.

The construction graduates must also be globally aware. The traditional narrow minded, nationalistic, American dominated education cannot prepare our graduates to participate in a world in which the United States is only one of many strong players, but no longer the dominant player. If construction education does not make some drastic changes, the United States may not even remain one of the strong players. How well is construction education dealing with the realities of the new world order?

Construction educators must still teach content, but must also teach thinking, learning and communication. In fact these are the most important, because the industry can teach construction skills, but they cannot teach intellectual skills. The program that address only the traditional subjects like methods, estimating and scheduling in traditional academic ways rooted in lecture and objective testing is hopelessly out dated in the nineties.

Another change which must come is the integration of construction education discipline. Construction has traditionally been seen as different entities coming together to provide their service to produce a static product. These entities have had different goals; thus resulting in well known adversarial relationships. Industry, responding to the realities of an integrated world, is beginning to break these adversarial relationships down, but in the university still foster the old approach. We are the Constructors. We hire (sub-professional) subcontractors to do most of our work. The Engineers are over there. The

Architects are up stairs, and the owner is somewhere off in never-never land (Rounds, 1992).

The integrated construction curriculum needed today will work intimately with designers, because design will become "real time" and constructability will dominate design. The sub-contractor will be recognized as being as important as the general contractor because, in today's industry, major subs have more invested in most projects than the general. Teaching the construction process will be fundamental, where each entity will provide "value added" in their area of expertise. Focus will be less on new construction; retro-fit and renovation will become more important such that life cycle concepts will dominate. Integration will be the dominant factor, not only across the breadth of the players in the game, but also across the lifetime of the facility from concept to decommissioning. Construction education must adapt to the integration of the industry.

At the same time, another change is already taking place. ACCE accreditation standards have been modified to recognize the importance of specialty construction. The specialty contractor, especially in major areas like electrical and mechanical systems, has been growing in importance and in market share during the eighties. As an example, in the building area, structure and shell have not undergone significant changes in recent years, but the systems that go into buildings have seen revolutionary changes. In construction programs, we still focus on developing general contractors, yet the overwhelming need and opportunity is in the major specialty areas. In order to support the needs of the industry and to align ourselves with the direction it is

going, the construction program of the nineties must provide opportunity for specialization in major discipline areas.

In addition, we must build construction terminal degree programs which will produce the professional construction educators for our next generation of academic programs. These terminal degree programs must also provide highly trained construction researchers for the industry, for I am convinced industry will soon begin initiating legitimate research programs in-house (Rounds, 1992).

Beaufait (1991) states that, in the eighties, our universities rediscovered the value of a general education for all students. What many institutions failed to recognize was that engineering education had known the value of a general education for years. Unfortunately, the requirements that many of our universities set forth in the name of general education resulted in a regression in the general education of engineering students. The problem is not with the concept of a general education, but with the implementation.

The idea of a smorgasbord of introductory level courses from which students elect a course in each of several areas to satisfy some distribution requirement was not a good idea twenty-five years ago, and it is not a good idea today. I am amazed that we believe our students are getting a general education by requiring them to take one course in humanities, one course in history, one course in social science, one course in visual arts, one course in foreign culture, etc. General education requirements should be designed to provide opportunities for students to broaden their interests, explore other interests, and develop new interests.

Dr. Tadmor (1987) concurs, stating that in engineering education the subject matters taught should lead to broad education rather than narrow specialization. The perception of engineering education as an education firmly rooted in the sciences, rather than being specialized, vocational, and of trade school nature, is part of a new educational philosophy. Technology has emerged as a dominant factor in determining the nature of society. Humanists must, therefore, study technology to understand social change, and engineers must study humanities to appreciate the complex interaction between society and the technology they help create. A strong background in humanities and social sciences also helps the engineer better cope with changing social, economic, and political conditions.

Dr. Singer (1987) in his study, states that there is unanimous agreement on the need to stress and improve communication skills.

One of the key recommendations of the Committee on the Education and Utilization of the Engineer deals with the broad band of nontechnical skills. In addition to a broad engineering education with strong grounding in the fundamentals of science, the curriculum must be expanded to include a greater exposure to a variety of nontechnical subjects (humanities, economics and sociology) as well as work-oriented skills and knowledge. Education in these areas is needed to improve the communication skills of engineers as well as their ability to understand and adapt to changing conditions that affect technological development.

American universities excel at providing rich learning environments, developing research talent, and bringing out the best ideas. We hold enormous potential in our hands. The challenge is before us -- to

educate the kind of technically skilled work force which America needs to sustain economic prosperity and growth.

In the last few years, the nation has come a long way toward reaching a consensus on the need to improve technical education to remain competitive in world markets. What remains is to develop and broadly implement the kinds of programs that will do the job (Bloch, 1989). In particular, the focus must shift from preparation for the design of elements of systems to understanding and design of complex technological delivery systems that also incorporate public and private institutions and communication networks with social processes and cultural preference to produce goods and services for a world community in the twenty-first century (Wenk, 1988).

Interpretative Summary of the Current State of Knowledge

Construction management education has been receiving continuous interest over the last two decades, both in the academy and among the practitioners. The sad truth that a graduate of a construction management school is usually less prepared to deal with typical construction tasks than with almost any type of design chores may be disappointing and even frustrating to those who choose this career, as well as to their employers. The question of how to prepare students for professional performance that requires experience and personal attributes as well as "book knowledge" is therefore of great importance to the industry and conscientious educators (Warszawski, 1984). In his study of construction management programs, Warszawski states, that the teaching of construction management is a formidable task. The

various programs offered in this area consistently suffer from several typical limitations which are as follows:

1. Analytical orientation of studies: These courses teach analytical techniques or offer factual data necessary for exploration of specific attributes of various building components, rather than teaching how to examine whole self-contained systems even of very simple nature, including their overall performance requirements, technological solutions and execution problems.

2. Difficulty to simulate real life construction environment: Successful construction management involves not only performance of specific tasks such as scheduling, cost estimating, organizing, etc., but also a multitude of routine activities such as negotiating and coordinating subcontractors and suppliers, quality control, processing of design information, contract details administration, interaction with local authorities, introduction of changes, and so forth.

3. Lack of emphasis on communication skills: Although communication, both oral and written, can be taught as a special subject within the academic curriculum, such a course most often does not attain the desired purpose since it is considered by students as "non-engineering", and therefore not important material.

4. Not enough teaching of technical solutions: The emphasis in most construction management programs is usually placed on general managerial techniques and their application and adaptation to the construction practices. Too little effort is expended upon exposure to technical construction alternatives (selection of appropriate construction methods, equipment type, and site organization) for various types of works, such as high rise construction, excavations, use of

prefabricated elements, underground construction and others, which fall under various types of constraints.

5. Limited emphasis on design: There has been a trend in various circles to view construction management as a distinctive profession, divorced form engineering design. Thereby the analysis and design courses which form the core of regular construction management education could be substituted to a large degree by additional management and construction oriented courses in special programs designated for this purpose.

Warszawski (1984) concludes that an effective construction management program on the undergraduate level should provide the students with a good insight into all managerial tasks, starting with the general definition of their objectives, through the various stages of design and execution, and up to their operation and maintenance upon completion.

Rubin (1991), in her study, suggests that construction education in the United States is a product of evolution which sooner or later catches up with the changing needs of the nation and industry. However, some critics claim that the process is too slow to produce the kind of well-rounded talent needed to lead the industry into the 21st Century. They want revolutionary change now.

Today's universities are turning out graduates into a world where technical skills and knowledge of fundamentals must be exemplary. It is also a world where regulatory and cost pressures and intense global competition require more than just good constructors. "We have to take a hard look at the structure of the profession, including the educational part, to see if the skills we are providing young people are

the ones that will make them most competitive in a global economy," says Neil A. Norman, immediate past president of the National Society of Professional Engineers.

Existent also is the fear that traditional educational approaches are failing to attract and retain those who will help stave off the industry's looming personnel crisis.

According to (Junkins, 1989), the competitive challenge Americans face in world markets has prompted intense national soul-searching over the causes and cures of declining United States competitiveness. Though the United States construction industry must have skilled human resources to keep the nation's products competitive, present trends are not encouraging. To offset the projected shortfall, methods must be found to encourage more young people to enter construction fields and increase the productivity of the work force. Both goals require collaboration between industry and all levels of the educational system from college continuing on through career-long learning. Collaborative efforts between industry and education can facilitate earlier productivity of construction graduates and contribute to increasing their retention rate in the profession by providing a better understanding of construction practices within the industry.

Preparing graduates for a career in construction is only part of the process of developing a technically competent work force. The half-life of a degree in most construction disciplines is estimated at from five to nine years, and in some areas, it may be as short as three years. This means that constructors face the challenge of educational renewal throughout their careers (Junkins, 1989).

A most recent study used to establish the current state of knowledge of construction curriculum is by (Kibert, 1992). He concludes that the ultimate goal of construction education is to prepare an individual to improve the quality of the construction industry, initially through service as a viable employee. Therefore, construction curricula should be designed to reflect current real needs of the construction industry. Since the construction industry is undergoing an accelerated rate of change compared to twenty years ago, the knowledge and capabilities of its employees must not be static.

The building construction curricula should be under constant review due to changes in the industry and research. Kibert (1992), makes two recommendations:

1. Regular Reviews: The chairman of a building construction department should schedule regular meetings with professors for the sole purpose of reviewing emerging trends and new developments. Changes can then be incorporated into current or future courses.

2. Lengthen Programs: Currently, most construction programs are squeezed into four years. "To introduce new areas of study into the curriculum or to treat already-covered areas in greater depth in any of the four-year programs is not feasible," according to C.H. Oglesby, a Professor at Stanford University. New developments in construction education need to be incorporated into current classes. The need to accommodate new information and maintain current course loads suggests that a fifth year be added to programs. An additional year would also provide room for more electives for students to customize their construction education.

Recent Studies

The construction marketplace, reflecting the world around it, is going to encounter some challenging times in the 1990's and beyond. To survive, constructors will need to upgrade the sophistication of their project management skills and devote greater attention to the skills of all their employees (Friedman, 1984). In April 1989, Paul Emerick, while serving as President of the Associated General Contractors of America (AGC), in his address to the closing session of the national convention, stressed this point when he stated:

> "As I look back some twenty -five years when I first took over the management of our company, we were a contractor involved in business. Now, however, with the creeping evolution of man-dated requirements upon entrepreneurship, we have necessarily become a business involved in contracting. At the time, my education and experience permitted me to successfully estimate and supervise the work, communicate with the bank and surety, and monitor the bookkeeping department that performed the mundane task of record keeping."

That was about it! Contracting was rather simple and fun. Today, even with the additional years of experience, I am far less capable of starting or managing a construction company. Why? Because technical and production skills are only two of the many components necessary to survive. Now we must have knowledge and expertise in all disciplines of a complex business; i.e., finance, bonding, taxes, insurance, legal,

marketing, training, education, contract administration, labor relations, legislation, and regulation, to name but a few. All of these are critical components in the business of contracting and at times would seem to either devour or smother us.

While experience is still important, entrants into the construction field, especially in the construction management phase, will be expected to have a strong academic background in several disciplines. Knowledge of construction materials and methods, design, engineering principles, safety, environmental concerns, computer skills, personnel management, law, business management, codes, labor relations, finance, and communication skills (oral and written) will place demands on the ability and will all be required to be in the "tool box" of tomorrow's construction manager (Weidman, 1992).

The need to expand education in the field of construction can be compared to the need to meet the requirements of the vast construction industry (Moss, 1989).

Construction education programs at the undergraduate level continue to expand in size and to increase in number. Thirty-five years ago, the number of university level construction programs could be counted on one hand. Today, there are approximately sixty-five colleges and universities offering four year baccalaureate degree programs. Nearly all of these programs have curricula separate and distinct from traditional engineering and architecture degree programs. The trend is for construction education programs to have a separate identity from classical architecture and engineering programs (Badger, 1989).

A recent study by the Construction Industry Institute gathered data from two hundred sixty-six respondents of upper and middle managers of construction firms and facilities owners as to what skills / traits are required for an individual to perform well in various positions in today's construction industry. The following findings were evident:

1. The broad perception that current education and training at all levels are not adequate to meet the changing needs of the construction industry.
2. Formal education at all levels should be strong in the fundamental skills of communication and mathematics.
3. The subject matter of continuing education and on-the-job experience are closely correlated, thus implying that there should be more coordination of the two through formal, ongoing training programs.

The study concludes that application subjects such as scheduling, estimating and planning are important. Courses should incorporate elements to enhance development of strong problem solving and communication skills, while general college courses are valuable in providing a well-rounded individual for employment. The education process should create a base for the continuation of learning throughout the individual's life (Grubbs, 1992).

Another report supporting the view that construction education must be tailored to the needs of the industry is by Loughney and (Reams, 1990). This report is based on a study conducted by the

faculty at Eastern Michigan University and is directed towards the needs of contractors within the state of Michigan. A survey of general contractors revealed the following five most important subjects (from a list of forty-three subjects) for eight entry level positions in the construction industry:

1. Cost estimating and bidding
2. Project planning, scheduling and time control
3. Construction cost control
4. Working drawings reading: Interpretation and use
5. Specifications: Interpretation and use

The results demonstrated that contractors believe construction management is the most important area in the construction curriculum.

The final study presented for review is by Musibau A. Shofoluwe. In his study, (Shofoluwe, 1990) one hundred ten randomly selected construction firms operating in the states of Arkansas, Louisiana, and Texas were surveyed. The purpose of the survey was to determine how important the curriculum of baccalaureate construction engineering technology programs is to employers of their graduates. Survey respondents were asked to characterize each course commonly offered in a typical construction engineering technology program. Respondents could rate each major course group by four degrees of importance. The courses were grouped under five major categories:

1. General education

2. Construction design and engineering
3. Business and management
4. Construction technology
5. Management of construction operations

The findings of the study indicate that there is a lack of instruction in good communication skills (verbal, written, graphics and listening). The data also indicated that there seems to be relatively lower interest in topics such as humanities, social science, chemistry, and physics. Strong interest was expressed in the following courses: architectural design, blue print reading, project management and control, construction methods, project scheduling and time control. The findings are not that a construction engineering technology program should focus solely on the high ranking topics, but should recognize the varying needs expressed.

In order to develop effective programs to meet industry needs, educators must better understand the specific requirements of potential clients. This study suggests that opportunities exist in meeting the education and training needs of the construction industry. The study also suggests the importance of direct and continuing contact with the construction industry.

Summary

Construction education has an acknowledged existence of more than fifty years as a recognizable academic discipline. From the early construction programs in the forties and fifties, each decade has

shown growth and change. In the seventies accredited programs began to emerge, and construction education gained even greater acceptance. During the eighties, interest in construction education at the graduate level increased. As a result of this, the nineties have shown an increase in research by construction educators. As we approach the twenty-first century, the role and mission of universities offering construction education programs will constantly be challenged.

Specifically, little change has occurred in the curriculum of undergraduate construction education. A static curriculum in a dynamic world of construction is dangerous. We must move with the times. Construction education programs must adapt to the integration of the industry. In response, the construction industry must provide financial support as required for research, and at the same time, endorse valuable interaction with construction educators to generate meaningful topics, case studies, projects, seminar speakers, and educational modules.

Construction educators differ on curriculum development. One recommendation is vocational in design, i.e., to help prepare the graduate for the first job, focus on specialized and highly technological studies of the trade school nature. This researcher disagrees with this approach and prefers a more encompassing proposal to construction education reform, which, in addition to teaching a broad band of technical skills, offers greater exposure to a variety of non technical subjects (humanities, economics, social sciences, cross cultural studies) as well as work oriented skills and knowledge. A strong background in these nontechnical studies helps the construction graduate to better understand social change and appreciate the

complex interaction between society and the technology they help create.

As Kibert contends, the ultimate goal of construction education is to prepare an individual to improve the quality of the construction industry. Therefore, construction curricula should be designed to reflect current and future real needs of the construction industry.

From the Shofoluwe study of construction firms operating in the south central United States, findings suggest that construction programs should not focus solely on high ranking topics such as construction methods, project scheduling, time management and architectural design, but should recognize the varying needs expressed throughout the construction industry. In other words, produce well-rounded graduates equipped to adapt to the dynamic and constantly changing global construction industry.

CHAPTER III
RESEARCH METHODOLOGY

Introduction

This chapter contains an overview of the design, populations and samples, instrumentation, and methodology used in this study. Also described are the procedures utilized in preparing and mailing of the survey cover letter and questionnaire. The survey instrument that was used, in part, was a modification of the questionnaire developed by Shofoluwe (1989) in his research. Shofoluwe provided a formal authorization for the use of the questionnaire (Appendix D). The questionnaire was modified to be appropriate for a nation wide survey. Finally, the data collection methods and statistical processing are discussed in this chapter.

Populations and Samples of the Study

To assess how well baccalaureate building construction management education programs are serving their principal market - the employers, regarding the importance for day to day use within the industry, of the five major course groups, two populations were studied: building contractors and construction contractors.

Building Contractors

The sample of this population, the top four hundred building contractors, ranked by revenue, was selected from the twenty-fourth annual report of housing giants as registered in Professional Builder & Remodeler July, (1991). These housing giants specialize in the construction of single family detached housing, rental housing, condominiums, mobile homes and manufactured housing. Their revenues ranged from a high of 2.28 billion dollars to a low of 21.89 million dollars. This sample was represented in all the geographical regions of the United States.

Construction Contractors

The sample of this population, the top four hundred construction contractors, ranked by revenue, was selected from the annual report as registered in the Engineering News-Record May, (1991). These construction giants specialize in the following construction arenas: manufacturing facilities, transportation and infrastructure systems, industrial processing (petrochemical, power, nuclear, and hazardous waste), and commercial or storage buildings. Their revenues ranged from a high of 4.37 billion dollars to a low of 38.0 million dollars. This sample was represented in all the geographical regions of the United States, and, additionally, several international regions.

Research Design

The initial purposes of this study were primarily exploratory and descriptive. Borg and Gall (1989), suggest that researchers attempt to design a study which yield the strongest possible evidence to support or refute a knowledge claim. Therefore, Krathwohl's (1885) "chain of reasoning" model was used, linking the network sequence of steps that form complex descriptive research.

The questionnaire, as modified, was specifically designed to assess how well baccalaureate building construction management education programs are serving their principal market - the employers, regarding the importance for day to day use within the industry, of the five major course groups commonly offered in typical building construction management programs. Survey research was used to collect, compare and describe data from the two samples of different, but interrelated, populations. According to Kidder (1981), survey research is ideally suited to study naturally occurring phenomena.

Particular attention was paid to the style and appearance of all materials sent to the survey participants. Every effort was made to create a professional image in order to educe maximum response. Official letter head stationary and envelopes of Michigan State University were used for all correspondence. Within the cover letter, participants were informed that the survey would take less than five minutes to complete. All responses were compared using statistical analysis (MANOVA) and (ANOVA) techniques.

Instrumentation

To accomplish this study, a survey questionnaire was constructed to solicit information from building contractors (Appendix G) and construction contractors (Appendix H) regarding the importance for day to day use within the construction industry of the five major course groups that are commonly offered in typical building construction management baccalaureate programs.

After reviewing research studies with similar purposes, the researcher was able to find an instrument appropriate for this study. The similar study was: Shofoluwe, Musibau A. Construction Engineering Technology Education: The Employer's View. Grambling State University, 1989. Permission to use the survey instrument was requested and granted (Appendix C).

The questionnaire after several revisions, was mailed to both sample populations, and included a letter of transmittal (cover letter) and a self addressed stamped envelope. Both populations were surveyed simultaneously.

Cover Letter

Each questionnaire was accompanied by a cover letter that addressed the purpose of the study, the importance of the respondent's participation, the specific time limit of response, an assurance of confidentiality, an offer to send the respondent a copy of the results, and directions for obtaining assistance if the respondent had any questions while completing the study. The cover letter (Appendix A) was

identical for both sample groups and was addressed thus; Dear Construction Executive:

The cover letter was reviewed by the research committee members before mailing.

Questionnaire

The questionnaire for this study was patterned from an instrument prepared by Musibau A. Shofoluwe in his study titled: Construction Engineering Technology Education: The Employer's View, Grambling State University, 1989. The questionnaire was reconstructed with the following objectives in mind: making the questionnaire as neat and attractive as possible; organizing the questions so they could be completed effortlessly; including concise, comprehensible instructions to the participant; and keeping the questions consistent with the objectives of the study. The completed questionnaire, two pages long, (Appendix B) consisted of three major parts.

Part I contained seven questions concerning demographical data and company characteristics. Questions one and two were open form responses, requiring the participant to fill in their administrative title of position and years of experience in their present position. The five remaining questions were closed form requesting a check mark by the subjects' chosen response.

Part II contained five questions regarding the perspective of the participant's company about current building construction management programs. These five closed form questions required a check

mark to one of the three following possible choices: Yes, No, and Not sure.

Part III, the entire back page of the questionnaire, used a Likert -- type scale. The five major course groups were presented in order, with thirty-nine distinct subject areas. The participant was asked to check one of five possible responses for each subject area. The choices were as follows: very essential, highly useful, somewhat useful, of little use, and of no use.

The questionnaire was identical in content for both sample groups. However, to help distinguish the returned responses, white color paper was sent to building contractors and linen color paper was sent to construction contractors.

The questionnaire was reviewed by the research committee members before mailing.

Research Hypotheses

Part I and II of the questionnaire was composed of twelve questions. The data from each group in part I and II were compared with each of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations) in part III. Multivariate analysis of variance (MANOVA) was used because it simultaneously explores the relationship between several independent variables and two or more dependent variables. When MANOVA was completed, the researcher used univariate analysis of variance (ANOVA) to determine for each case if a significance occurred. This reduces Type I error rates and

provides the strongest evidence of reliable group differences. An alpha level of .05 was used for all statistical tests.

Hypothesis 1. The two groups of respondents, building contractors and construction contractors, were directed toward the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 2. One question in part I was directed toward the administrative title of position and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 3. One question in part I was directed toward the company classification and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 4. One question in part I was directed toward how many permanent management employees are employed with a company and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 5. One question in part I was directed toward the percentage of permanent employees holding a bachelor's degree in building construction management and the importance of the five outcome variables (general education, construction design, business

and management, construction technology, and management of construction operations).

Hypothesis 6. One question in part I was directed toward how the respondents categorize their own personal background and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 7. One question in part II was directed toward whether the respondents company regularly hire graduates of building construction management programs and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 8. One question in part II was directed toward based on the performance of building construction management graduates, whether the respondents anticipate more hiring in the future and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 9. One question in part II was directed toward should a master's degree in construction be a criterion for promotion and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 10. One question in part II was directed toward does the respondents company feel that current building construction management programs are adequately structured to serve industry

needs and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

Hypothesis 11. One question in part II was directed toward whether the respondents perceive that a graduate of a building construction management program would be more valuable to their company than a graduate of another program, for example business and the importance of the five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations).

The Pilot Study

According to Borg and Gall (1989), to further improve data collecting routines, to reduce the number of questionnaire treatment errors, to determine whether any communication problems exist, and to locate ambiguities, a thorough pilot study should be conducted. For the pilot study, four subjects were selected. Two building contractors and two construction contractors were interviewed. These four subjects represented similar populations as in the main study, however, none were listed in the top four hundred of The Professional Builder & Remodeler, July, 1991 or The Engineering News-Record, May, 1991.

Before conducting a formal pilot study, the cover letter and questionnaire were reviewed by Dr. Rudman, and the members of the research committee, Dr. von Bernuth, Dr. Yelon, Tim Mrozowski, and Doug Cron. Several changes and corrections were recommended.

These were subsequently incorporated into the cover letter and questionnaire.

The cover letter was written three times. Reasons for rewriting were: to streamline the information, include a brief assurance of confidentiality, present the subject with a good reason for completing the questionnaire and sending it back, and convince the subject that the study was significant and important.

The questionnaire for this study was patterned from an instrument prepared by Musibau A. Shofoluwe in his study titled Construction Engineering Technology Education: The Employer's View, Grambling State University, 1989. This questionnaire, after examination by the researcher and research committee, was redesigned to embody a high degree of content validity with the study. Subsequently, reorganization along with several modifications were incorporated into the new questionnaire used in this study. These modifications were as follows: To help assure a satisfactory percentage of responses, the questionnaire was reduced in size to fit entirely on one sheet of paper, both sides; Within Part I, the geographical regions of company operations were divided into two distinct categories, Nationwide and International. These categories were then subdivided into representative sub sets of the two regional classifications. Question number four, within Part I, "Please indicate the dollar amount in millions of dollars, of your annual volume of business", was completely deleted. The researcher thought this question was not relevant to the study. Part III from the instrument prepared by Musibau A. Shofoluwe was exchanged with part II to help streamline the new questionnaire. In Part III, question number three, "Will your

company provide financial support full or partial for an employee to complete a B.S. in construction under certain contractual obligation?" was deleted. In addition, question number five, of Part III "Is your company in favor of providing financial grants to Institutions in support of undergraduate construction education?" was deleted. The researcher felt that these two questions were not pertinent to the new study and could possibly limit the response return rate of the questionnaire. The new part III was reformatted to reflect a Likert--type scale where the individual checks one of five possible responses. A fifth response, (of little use), was added to the new instrument. The order of responses was transposed from: Of no use, Somewhat useful, Highly useful but not essential, and Very essential, to the following: Very essential, Highly useful, Somewhat useful, Of little use, and Of no use. This, according to Dr. Rudman, better reflects a positive response condition. Finally, in part III, four other subset courses were introduced as follows: under the major course group of general education, foreign languages and cross cultural studies were added, and within the major course group of management of construction operations, land development and acquisition and land use regulations were added.

Data Collection

Mail surveys of the two sample groups, building contractors and construction contractors, were conducted. Only one mailing was performed. This occurred on July 3, 1992 and all the envelopes were addressed to the attention of the human resource director. The envelope contained a cover letter addressed to the construction

executive, the questionnaire, and a pre-printed, stamped return envelope in which to return the completed questionnaire. The mailing used first class mail rather than that recommended by Dillman (1978); certified mail. As a result of sufficient responses from the first mailing, and anonymity of the respondents a follow-up mailing was deemed unnecessary by the researcher.

After selecting the list of names for both sample groups, data entry began. The four hundred building contractors, as presented in The Professional Builder & Remodeler, July, 1991, contained completed addresses with postal zip codes. The four hundred construction contractors, as presented in the Engineering News-Record, May, 1991, listed only the company name, city of headquarters, and state. For this group all the street addresses and postal zip codes had to be derived. Many of these were registered in Dun & Bradstreet's Million Dollar Directory America's Leading Public & Private Companies Top 50,000. New Jersey: 1992. Remaining street addresses and postal zip codes were located in city directory phone books.. Using the computer database program by Microsoft called Excel version 4.0 running on a Macintosh IIsi micro computer, two separate data layouts were designed to imput and export data according to specific formats. The company names and addresses of the four hundred building contractors and the four hundred construction contractors, respectively, were entered into the two databases. After all the names and addresses were entered and checked for errors, the two databases were linked with a mail merge program by Avery, called MaclabelPro 1.0. The researcher decided to personalize the envelopes by printing the addresses on the envelope rather than using mailing labels. This was accomplished by

using a Macintosh Style Writer programmable printer, using helvetica font set at twelve characters per inch. Both the envelopes used in the mailing and the accompanying return envelopes included the Michigan State University return address in the upper left hand corner. The questionnaire, which used helvetica font set at ten characters per inch, was printed on plain paper, white color paper was used for the building contractors and linen color paper was used for the construction contractors. The cover letter was printed on Michigan State University building construction management program stationary, using helvetica font set at ten characters per inch. The cover letters were dated and individually signed by the researcher using a black ink pen. In the cover letter, the researcher requested a return date for the completed questionnaire of July 31, 1992. This allowed one month from time of mailing to expected return deadline.

Statistical Processing

As each survey questionnaire was returned, they were sorted by color into two groups and assigned a subject number; white for the building contractors and linen for the construction contractors. Additionally, each questionnaire was reviewed for respondents who indicated that they would like a copy of the results. To facilitate data imput, a data key was made from the questionnaire, and each variable on the questionnaire was assigned a number, V0 through V82 (Appendix F). Each group of variables was then assigned numbers depending on the possible number of outcomes to the response. It was

decided by the researcher to use the number -9 for all missing responses to any variable.

The responses were entered into a Macintosh personal computer database program, Microsoft Excel. The input and export layout was designed to comply with a format which could be uploaded to the SPSS-PC 4.0.1 statistical package. The data was arranged in a spread sheet format containing eighty-five columns, reflecting the total number of outcome variables of the questionnaire. The first column contained the subject number. Column two contained the group number; the number 1 represented building contractors and the number 2 represented construction contractors. The subsequent eighty-two columns were as follows: three through forty was for the variables to the questions in part I of the questionnaire, forty-one through forty-five for the variables in part II, and forty-six through eighty-five for the variables in part III. Five outcome variables (general education, construction design, business and management, construction technology, and management of construction operations) were created from the thirty-nine variables in part III, by using the mean of the items in each of the five groups. After all the data was entered it was printed out and each data entry was verified three times by the researcher.

When the data collection period ended, the data was uploaded to the SPSS-PC 4.0.1 software system for analysis. The responses from both groups were compared for all eleven hypotheses using the MANOVA and ANOVA statistics test. The data was analyzed using the SPSS-PC 4.0.1 (Statistical Package for the Social Sciences) software package running on an IBM 386 personal computer.

Explanation of Statistical Tests

Multivariate analysis of variance (MANOVA) was selected by the researcher to run first because it is a statistical technique for determining whether several groups differ on more than one dependent variable. The purpose of MANOVA is to determine whether there are statistically significant differences between the centroids of different groups. The next step is to do a test of the statistical significance of the difference between group centroids. The most commonly used test for this purpose is Wilks lambda. This test yields an F value, which can be looked up in an F ratio table to determine its level of statistical significance. If a significant MANOVA F is obtained, we can then do an analysis of variance ANOVA on each dependent variable to determine which of these variables are statistically significant and contributing to the overall MANOVA F, (Borg and Gall, 1989).

CHAPTER IV
ANALYSIS AND PRESENTATION OF THE DATA

Introduction

The data for this research and analysis was obtained through a mailed questionnaire during the period from July 1, 1992 through August 27, 1992. A cover letter explaining the goal and objectives of the survey accompanied the three part questionnaire. The survey was forwarded to the top four-hundred building contractors and the top four hundred construction contractors as listed in the Professional Builder & Remodeler July, 1991, and the Engineering News-Record May, 1991, respectively. Aside from color, both samples were surveyed with identical instruments. Chapter III outlined the methodology used in this study. The qualitative and statistical analysis of the data collected are presented as follows.

The Sample Population

In total, two hundred eighty-one completed questionnaires were returned, representing an over-all response rate of 35.1%. Of these, one hundred thirty-five were from building contractors and one hundred forty-six were from construction contractors reflecting response rates of 33.8% and 36.5%, respectively. Two respondents returned untouched questionnaires. One construction contractor indicated, "Please be advised that it is corporate policy not to participate in surveys of any

type." A building contractor questionnaire was returned by a bank receiver stating, "I regret to tell you that this firm has been dissolved."

The two hundred eighty-one responses provided the basis for the comparative analysis conducted in this study.

Research Hypotheses

Are there predictable differences between the ratings of Building Contractors and Construction Contractors in regard to curriculum with respect to industrial applications? To answer this question, the study tested the following research hypotheses:

Hypothesis 1. There are differences between Building Contractors and Construction Contractors with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 2. There are differences between administrative title of position with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 3. There are differences between company classification with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 4. There are differences between how many permanent management employees are employed with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 5. There are differences between what percentage of permanent employees hold a bachelor's degree in Building Construction Management with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 6. There are differences between how you categorize your own personal background with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 7. There are differences between the participants who responded yes to the question: **Does your company regularly hire graduates of Building Construction Management programs**?, and those who said no with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 8. There are differences between the participants who responded yes, no, or not sure to the question: **Based on their performance, do you anticipate more hiring in the future**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 9. There are differences between the participants who responded yes, no, or not sure to the question: **Should a master's degree in construction be a criterion for promotion**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 10. There are differences between the participants who responded yes, no, or not sure to the question: **Does your company feel that current Building Construction Management programs are adequately structured to serve industry needs**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis 11. There are differences between the participants who responded yes, no, or not sure to the question: **Do you perceive that a graduate of a Building Construction Management program would be more valuable to your company than a graduate of another program, for example, Business**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

Hypothesis Testing

To help better understand the hypothesis testing, a mean approaching 1 indicates the course group is very essential where as a mean approaching 5 indicates the course group is of no use.

Table 1 shows the Wilks' lambda, F-values and p-values for the five major course groups tested within the ten subject category areas identified in each hypothesis ($p \leq .05$ are highlighted).

Table 1. Overview of the Five Major Course Groups and Company Categories with Significant Difference

Company Categories	Wilks' lambda	F-value	p-value
Group Classification	0.83830	10.3391	.0001*
Administrative Title	0.86220	1.5943	.033*
Company Classification	0.93640	1.1843	.278
Management Employees	0.87737	1.4137	.086
Bachelor's Degree in BCM	0.91430	1.6166	.064
Personal Background	0.89950	1.4010	.113
Hire BCM Graduates	0.92063	4.5173	.001*
Future Hiring	0.93950	1.5671	.113
Adequately Structured BCM Programs	0.90084	2.8195	.004*
BCM Graduates more Valuable	0.90586	2.6859	.009*

*Significant at or beyond the .05 level

There were significant differences found within the following five subject categories: group classification, administrative title, hiring of building construction management graduates, adequately structured building construction management programs, and are building construction graduates more valuable. Hypothesis 9 was dismissed altogether, due to an overwhelming no response, and, therefore, insufficient data for analysis.

Hypothesis 1. There are differences between Building Contractors and Construction Contractors with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the two groups (building contractors and construction contractors) differ in their views about the importance of the five major course groups. MANOVA

was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .83830 produced an F-value of 10.33918 and a probability (p) of .0001 (Table 2). **Thus there was a significant difference between the two groups over their perception of the importance of the five major course groups. Hypothesis 1 was not rejected.**

The ANOVA test of significance identified three topics in which the two groups differed significantly (Table 2). Figure 4-1 graphically illustrates where the two groups differed the most. Construction contractors consistently viewed these topics more important than did building contractors: general education (2.846 vs. 2.584), construction design (2.253 vs. 1.914), and construction technology (1.816 vs. 1.595). Figure 4-1 shows that general education is viewed lower than the other four major course groups by both building contractors and construction contractors. Furthermore, the larger standard deviation in all categories by the building contractor's suggests building contractors were not as unified in their rating of the topics.

Hypothesis 2. There are differences between administrative title of position with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the six administrative title groups (president, manager, vice president, human resource director, project manager and chairman) differ in their views about the importance of the five major course groups. MANOVA was used as a

Table 2. Group Classification and The Five Major Course Groups

MANOVA: Wilks' lambda = 0.83830 F = 10.33918 p = .0001*

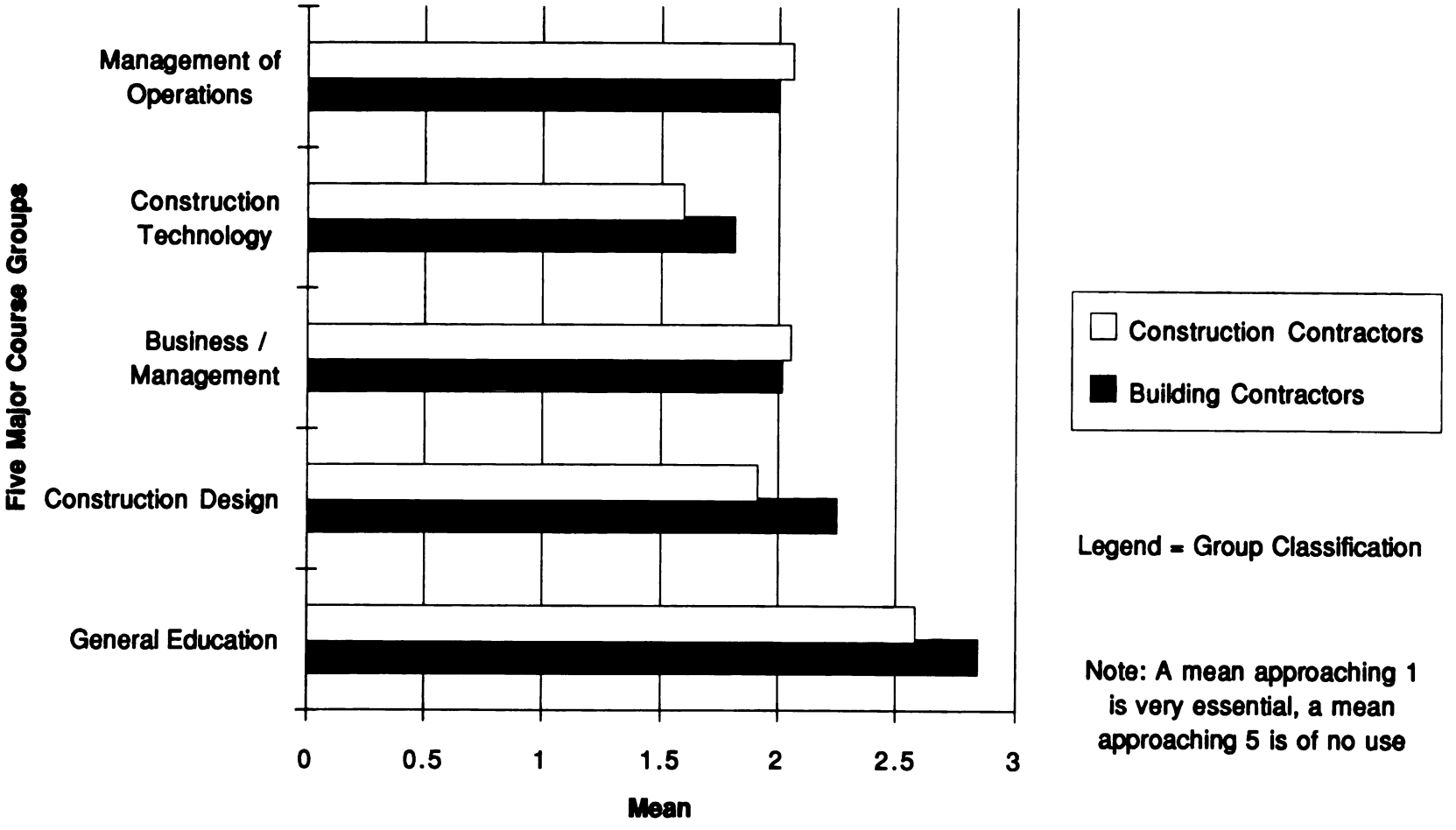
Group	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Building	2.846	0.638	130	2.253	0.700	130	2.018	0.529	130	1.816	0.588	130	1.999	0.578	130
Construction	2.584	0.400	144	1.914	0.600	144	2.056	0.515	144	1.595	0.506	144	2.062	0.504	144
Entire Sample	2.708	0.542	274	2.074	0.670	274	2.030	0.521	274	1.700	0.557	274	2.032	0.540	274

ANOVA:				
F =	16.860	18.584	0.3657	11.192	0.9392
p =	.0001*	.0001*	.546	.001*	.333

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-1. Group Classification



test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .8622 produced an F-value of 1.5943 and a probability (p) of .033 (Table 3). **Thus there was a significant difference between the administrative title of position over the perception of the importance of the five major course groups. Hypothesis 2 was not rejected.**

The ANOVA test of significance identified one category in which the six groups differed significantly (Table 3). Figure 4-2 graphically illustrates where the six groups differed the most. Vice presidents and chairman viewed the topics in general education lower than did human resource directors, (2.828 and 2.792 vs. 2.496). Figure 4-2 shows, general education is viewed lower by all six administrative title groups than the other four major course groups. Furthermore, the larger standard deviation score from vice presidents suggests they are not as unified in their ratings of the topics.

Hypothesis 3. There are differences between company classification with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the four groups of company classification (building construction, engineering, industrial, and other) differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value

Table 3. Administration Title and The Five Major Course Groups

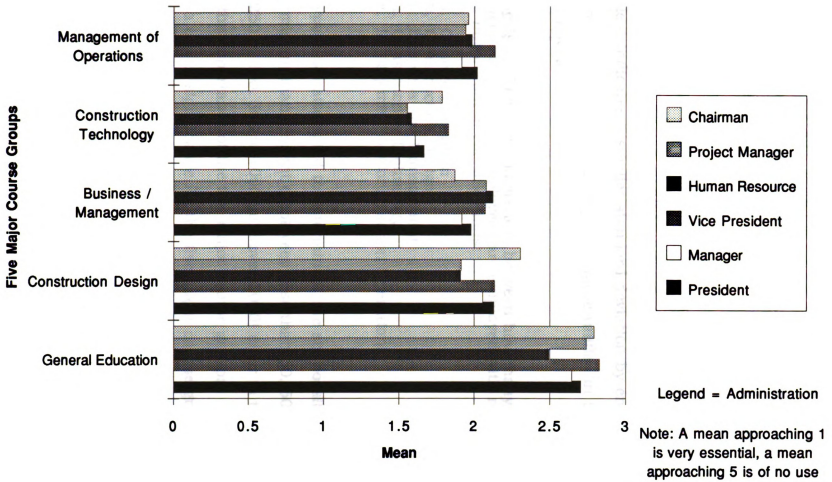
MANOVA: Wilks' lambda = 0.8622 F = 1.5943 p = .033*

Titles	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
President	2.707	0.398	46	2.134	0.711	46	1.981	0.466	46	1.668	0.549	46	2.022	0.435	46
Manager	2.646	0.417	38	2.061	0.577	38	1.921	0.494	38	1.609	0.510	38	1.918	0.474	38
Vice President	2.828	0.672	102	2.139	0.711	102	2.077	0.542	102	1.832	0.604	102	2.141	0.564	102
Human Resource	2.496	0.481	54	1.912	0.664	54	2.127	0.549	54	1.585	0.478	54	1.986	0.592	54
Project Manager	2.741	0.383	18	1.917	0.586	18	2.083	0.509	18	1.556	0.465	18	1.944	0.493	18
Chairman	2.792	0.335	15	2.309	0.468	15	1.875	0.520	15	1.790	0.576	15	1.963	0.593	15
Entire Sample	2.709	0.541	273	2.077	0.669	273	2.038	0.523	273	1.704	0.555	273	2.036	0.538	273
ANOVA:															
F =	2.9445			1.4804			1.2438			2.2239			1.4081		
p =	.013*			.196			.289			.052			.222		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-2. Administration Title



of .93640 produced an F-value of 1.18430 and a probability (p) of .278 (Table 4). **There was no significant difference between the four groups of company classification over their perception of the importance of the five major course groups. Hypothesis 3 was rejected.**

As Figure 4-3 shows, general education is rated higher than the four other major course groups by all four company classifications. In addition Table 4 indicates a smaller standard deviation by engineering company respondents, suggesting they were more unified in their ratings of the topics.

> Hypothesis 4. There are differences between how many permanent management employees are employed with respect to the five major course classifications:
>
> a. General Education
> b. Construction Design
> c. Business and Management
> d. Construction Technology
> e. Management of Construction Operations

This hypothesis attempted to determine if the six possible groups of permanent management employees (less than 50, 50 to 100, 100 to 250, 250 to 500, 500 to 1000, and over 1000) differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .87737 produced a F-value of 1.4137 and a probability (p) of .086 (Table 5). **There was no significant difference between the six groups of permanent management employees relative to their understanding of the importance of the five major course groups. Hypothesis 4 was rejected.**

Table 4. Company Classification and The Five Major Course Groups

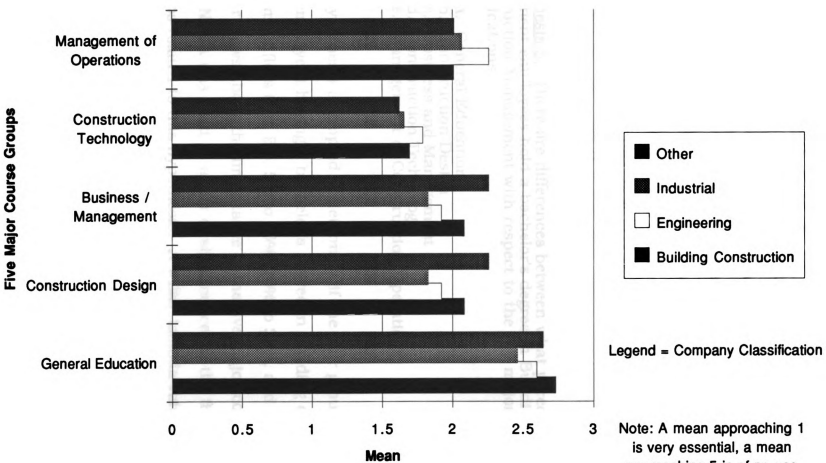
MANOVA: Wilks' lambda = 0.93640 F = 1.18430 p = .278

Titles	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Building Const.	2.735	0.563	229	2.085	0.686	229	2.044	0.537	229	1.699	0.568	229	2.011	0.545	229
Engineering	2.601	0.387	17	1.922	0.312	17	2.088	0.292	17	1.790	0.452	17	2.261	0.460	17
Industrial	2.462	0.405	13	1.828	0.601	13	1.933	0.588	13	1.659	0.476	13	2.068	0.584	13
Other	2.646	0.377	16	2.260	0.720	16	1.945	0.459	16	1.625	0.576	16	2.014	0.523	16
Entire Sample	2.709	0.541	275	2.073	0.670	275	2.035	0.522	275	1.699	0.556	275	2.029	0.541	275
ANOVA: F =	1.3870			1.3157			0.4010			0.2656			1.1560		
p =	.247			.270			.752			.850			.327		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-3. Company Classification



The ANOVA test of significance identified general education as having a statistical difference probability of .013; however, we cannot conclude that this is significant because the univariate F test is not independent. Figure 4-4 shows the category of less than 50 permanent management employees generally viewed lower than did the category of 500 to 1000 (2.779 vs. 2.303). Also shown by figure 4-4, is that the category of over 1000 viewed business and management courses lowest but a standard deviation of .884, indicates they were not unified in their ratings.

Hypothesis 5. There are differences between what percentage of permanent employees hold a bachelor's degree in Building Construction Management with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the four groups of permanent employees having a bachelor's degree in building construction management (less than 5%, 5% to 10%, 10% to 25%, and over 25%) differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .9143 produced an F-value of 1.6166 and a probability (p) of .064 (Table 6). **There was no significant difference between the four groups of permanent employees having a bachelor's degree in building construction management over their perception of the importance of the five major course groups. Hypothesis 5 was rejected.**

Table 5. Permanent Management Employees and The Five Major Course Groups

MANOVA: Wilks' lambda = 0.87737 F = 1.4137 p = .086

Classification	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Less Than 50	2.779	0.432	146	2.136	0.706	146	2.036	0.517	146	1.750	0.554	146	2.041	0.542	146
50 to 100	2.759	0.796	59	2.103	0.579	59	2.011	0.556	59	1.663	0.585	59	1.966	0.582	59
100 to 250	2.517	0.448	35	1.913	0.599	35	2.064	0.486	35	1.592	0.540	35	2.060	0.509	35
250 to 500	2.631	0.364	22	1.924	0.691	22	2.097	0.516	22	1.688	0.554	22	2.182	0.487	22
500 to 1000	2.303	0.485	11	1.955	0.800	11	1.795	0.368	11	1.545	0.526	11	1.778	0.484	11
Over 1000	2.500	0.393	2	1.667	0.236	2	2.875	0.884	2	1.857	0.404	2	2.222	0.629	2
Entire Sample	2.709	0.541	275	2.073	0.670	275	2.035	0.522	275	1.699	0.556	275	2.029	0.541	275
ANOVA: F =	2.9627			1.1150			1.6261			0.7468			1.0735		
p =	.013*			.353			.153			.589			.375		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-4. Permanent Management Employees

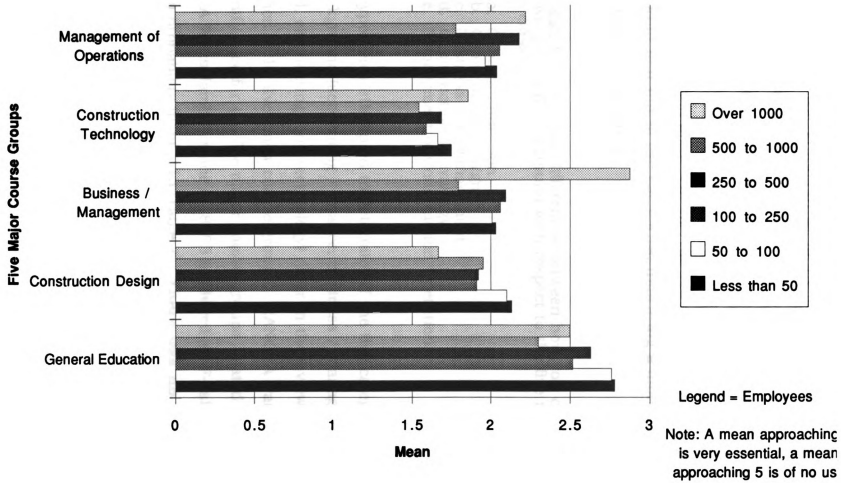


Figure 4-5 shows that general education was rated higher than the other four major course groups by all four categories. Furthermore, figure 4-5 indicated, that companies employing more than 5% building construction management graduates gave construction design a high rating. Also of interest is that companies which employ more than 20% building construction management graduates show a lower standard deviation in four out of five categories, indicating a more harmonious rating of their responses.

Hypothesis 6. There are differences between how you categorize your own personal background with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the five categories of personal background (accounting / finance, business / management, architectural, engineering, and technology) differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .8995 produced an F-value of 1.4010 and a probability (p) of .113 (Table 7). **There was no significant difference between the five categories of personal background concerning the perception of the importance of the five major course groups. Hypothesis 6 was rejected.**

Figure 4-6 illustrates that all five categories viewed general education the lowest. Also, those respondents having a technology

Table 6. Employees with a Bachelor's Degree in Building Construction Management and The Five Major Course Groups

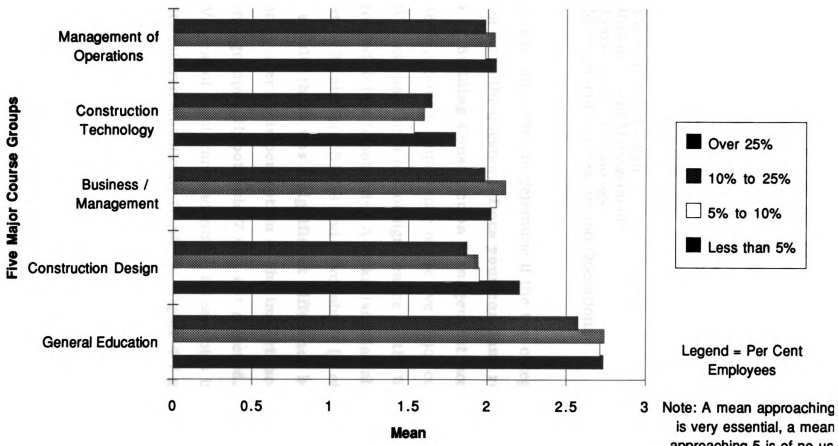
MANOVA: Wilks' lambda = 0.9143 F = 1.6166 p = .064

Percentage	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Less than 5%	2.737	0.449	150	2.206	0.676	150	2.025	0.550	150	1.796	0.567	150	2.054	0.563	150
5% to 10%	2.717	0.847	54	1.948	0.670	54	2.056	0.500	54	1.534	0.493	54	1.986	0.513	54
10% to 25%	2.742	0.398	31	1.941	0.677	31	2.117	0.528	31	1.599	0.599	31	2.047	0.545	31
over 25%	2.576	0.396	39	1.869	0.525	39	1.984	0.447	39	1.648	0.497	39	1.986	0.512	39
Entire Sample	2.711	0.540	274	2.077	0.668	274	2.036	0.523	274	1.701	0.556	274	2.030	0.542	274
ANOVA: F =	0.9599			4.3749			0.4206			3.6531			0.3129		
p =	0.412			.005*			.738			.013*			.816		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-5. Employees with a Bachelor's Degree in Building Construction Management



background viewed construction design lowest and construction technology highest of the five major course groups.

> Hypothesis 7. There are differences between the participants who responded yes to the question: **Does your company regularly hire graduates of Building Construction Management programs**?, and those who said no with respect to the five major course classifications:
>
> a. General Education
> b. Construction Design
> c. Business and Management
> d. Construction Technology
> e. Management of Construction Operations

This hypothesis attempted to determine if the two categories responding yes or no to the question: **Does your company regularly hire graduates of Building Construction Management programs**?, differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .92063 produced an F-value of 4.51729 and a probability (p) of .001 (Table 8). **As a result, there was a significant difference between the two categories over their perception of the importance of the five major course groups. Hypothesis 7 was not rejected.**

The ANOVA test of significance identifies three topics in which the two categories differed statistically (Table 8). Figure 4-7 graphically illustrates where the two categories differ the most. The no respondents consistently viewed general education, construction design, and construction technology lower than those answering yes. As Figure 4-7 displays, both categories viewed general education lower than the other four major course groups. In addition, the higher

Table 7. Personal Background Category and The Five Major Course Groups

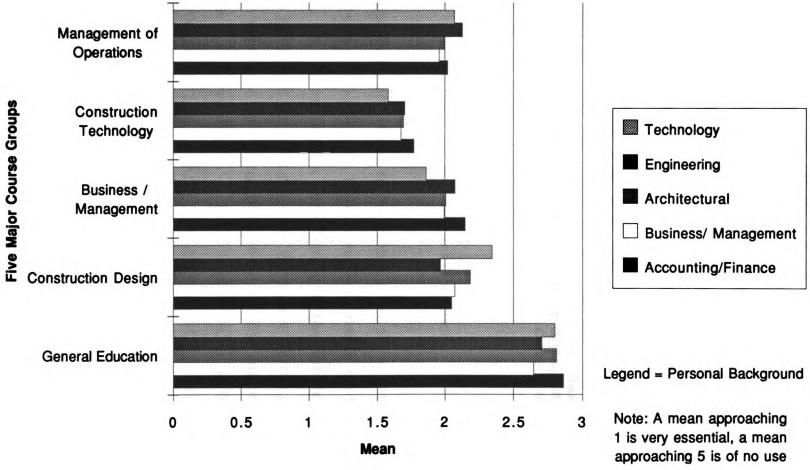
MANOVA: Wilks' lambda = 0.8995 F = 1.4010 p = .113

Categories	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Accounting/Fin.	2.863	0.941	37	2.050	0.766	37	2.152	0.558	37	1.772	0.669	37	2.024	0.602	37
Business/Mgt.	2.648	0.468	128	2.074	0.687	128	1.998	0.495	128	1.676	0.525	128	1.961	0.536	128
Architectural	2.810	0.376	15	2.189	0.710	15	2.008	0.494	15	1.695	0.451	15	2.000	0.403	15
Engineering	2.705	0.417	78	1.970	0.596	78	2.077	0.541	78	1.705	0.561	78	2.130	0.518	78
Technology	2.798	0.460	11	2.348	0.361	11	1.864	0.611	11	1.584	0.555	11	2.071	0.656	11
Entire Sample	2.709	0.542	269	2.058	0.665	269	2.037	0.522	269	1.695	0.552	269	2.025	0.540	269
ANOVA:															
F =	1.3523			1.0305			1.0550			0.3308			1.2131		
p =	0.251			.392			.379			.857			.306		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-6. Personal Background Category



standard deviation for all categories of the no responses suggests a greater disagreement in their ratings.

Interestingly, the number of responses for this hypothesis was:

Yes =	136
No =	132
Not sure =	5

Therefore, the "not sure" response, having negligible statistical significance to this hypothesis, was discounted by the researcher.

Hypothesis 8. There are differences between the participants who responded yes, no, or not sure to the question: **Based on their performance, do you anticipate more hiring in the future**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the three categories responding yes, no, and not sure, to the question: **Based on their performance, do you anticipate more hiring in the future**?, differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of .9395 produced an F-value of 1.5671 and a probability (p) of .113 (Table 9). **There was no significant difference between the three categories over their perception of the importance of the five major course groups. Hypothesis 8 was rejected.**

Figure 4-8 shows, general education was again viewed lowest by all three respondents. Furthermore, the "not sure" respondents viewed all five major course groups lower than the other two.

Table 8. Hire Building Construction Management Graduates and The Five Major Course Groups

MANOVA: Wilks' lambda = 0.92063 F = 4.51729 p = .001*

Response	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Yes	2.605	0.427	136	1.948	0.626	136	1.995	0.509	136	1.598	0.534	136	2.005	0.500	136
No	2.820	0.625	132	2.218	0.687	132	2.067	0.534	132	1.807	0.557	132	2.051	0.579	132
Entire Sample	2.711	0.543	268	2.081	0.670	268	2.031	0.522	268	1.701	0.555	268	2.028	0.540	268

ANOVA:					
F =	10.899	11.365	1.2693	9.8965	0.4952
p =	.001*	.001*	.261	.002*	.482

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

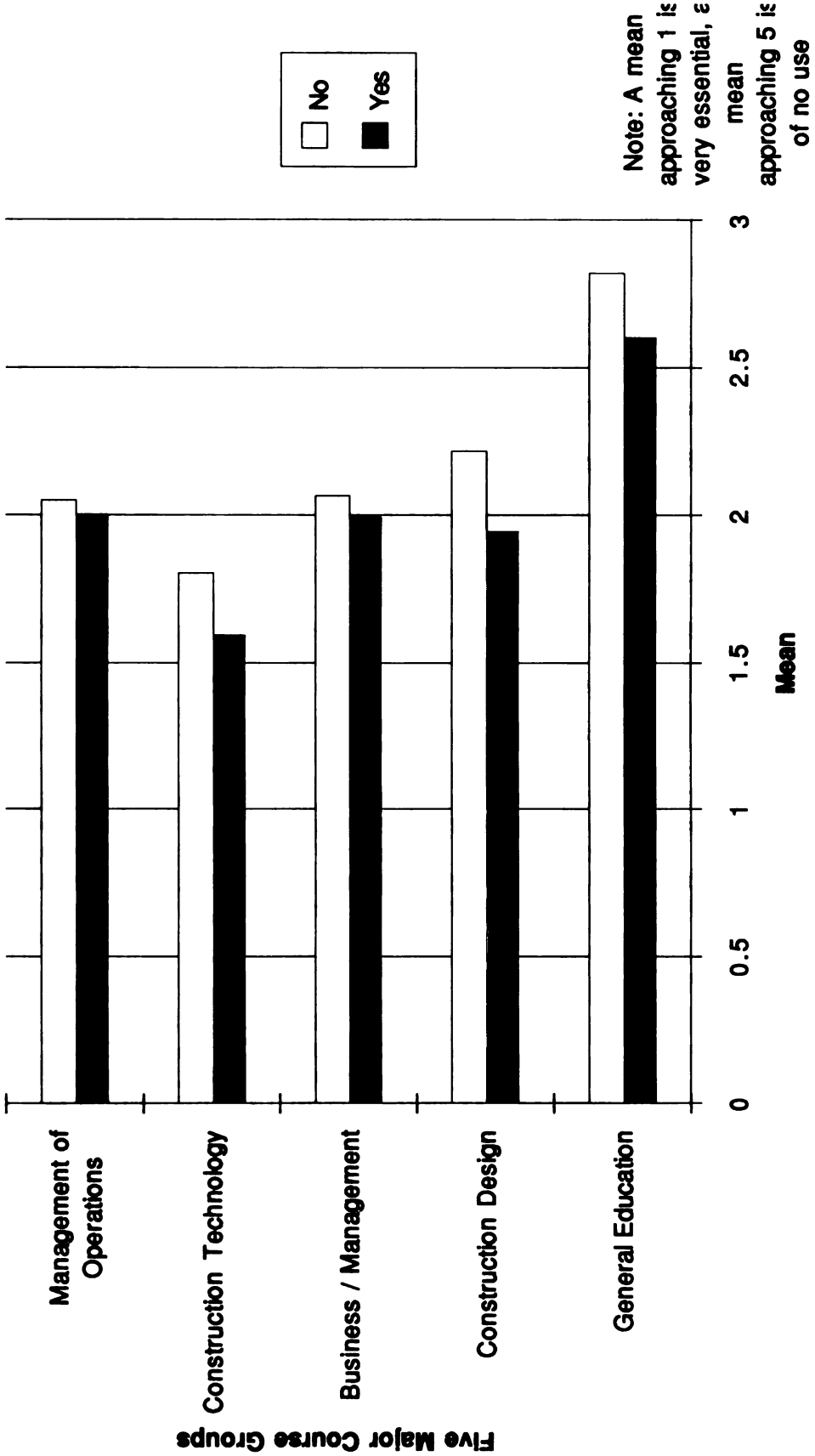


Figure 4-7. Hire Building Construction Management Graduates

Hypothesis 9. There are differences between the participants who responded yes, no, or not sure to the question: **Should a master's degree in construction be a criterion for promotion**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the three categories responding yes, no, and not sure, to the question: **should a master's degree in construction be a criterion for promotion**?, differ in their views about the importance of the five major course groups. 246 out of a possible 274 of the responses for the hypothesis were no; therefore, due to unsuitable data for analysis, the researcher eliminated this hypothesis.

Hypothesis 10. There are differences between the participants who responded yes, no, or not sure to the question: **Does your company feel that current Building Construction Management programs are adequately structured to serve industry needs**?, with respect to the five major course classifications:

a. General Education
b. Construction Design
c. Business and Management
d. Construction Technology
e. Management of Construction Operations

This hypothesis attempted to determine if the three categories responding yes, no, and not sure, to the question: **Does your company feel that current Building Construction Management programs are adequately structured to serve industry needs**?, differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups

Table 9. More Hiring in the Future and The Five Major Course Groups

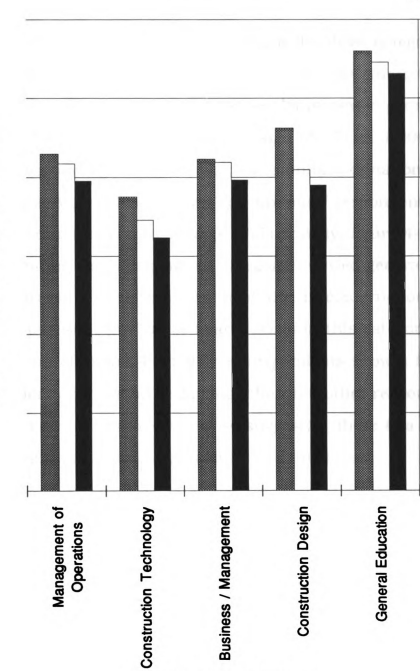
MANOVA: Wilks' lambda = 0.9395 F = 1.5671 p = .113

Response	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Yes	2.658	0.594	155	1.954	0.621	155	1.986	0.508	155	1.621	0.545	155	1.980	0.517	155
No	2.729	0.513	39	2.051	0.752	39	2.099	0.537	39	1.733	0.482	39	2.091	0.535	39
Not Sure	2.802	0.447	60	2.314	0.675	60	2.119	0.553	60	1.881	0.610	60	2.152	0.601	60
Entire Sample	2.703	0.552	254	2.054	0.670	254	2.035	0.525	254	1.700	0.561	254	2.038	0.544	254
ANOVA:															
F =	1.5188			6.5108			1.7343			4.8682			2.4131		
p =	0.221			.002*			.179			.008*			.092		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-8. More Hiring in the Future



related to this hypothesis. A Wilks' lambda value of .90084 produced an F-value of 2.8195 and a probability (p) of .002 (Table 10). Hence **there was a significant difference between the two groups over their perception of the importance of the five major course groups. Hypothesis 10 was not rejected.**

The ANOVA test of significance identifies two topics, general education and construction design, in which the three categories differed statistically (Table 10). Figure 4-9 illustrates where the three categories differ the most. The "no" respondents viewed general education (2.918 vs. 2.585) and construction design (2.179 vs. 1.906) lower than those responding yes. Moreover, the standard deviation for the "no" group was higher than the "yes" or "not sure" respondents, indicating a greater division in their ratings. Additionally, figure 4-9 illustrates that all three respondent categories viewed general education lowest. A statistical p-value of .051 in construction technology suggests significance nearly exists in this category. On further analysis of Figure 4-9 the "yes" respondents show a higher importance for construction technology than the other respondents. The standard deviations are very close suggesting there is a high agreement within all three respondents over this issue.

> Hypothesis 11. There are differences between the participants who responded yes, no, or not sure to the question: **Do you perceive that a graduate of a Building Construction Management program would be more valuable to your company than a graduate of another program, for example Business**?, with respect to the five major course classifications:
>
> a. General Education
> b. Construction Design
> c. Business and Management
> d. Construction Technology
> e. Management of Construction Operations

Table 10. Are Programs Adequately Structured and the Five Major Course Groups

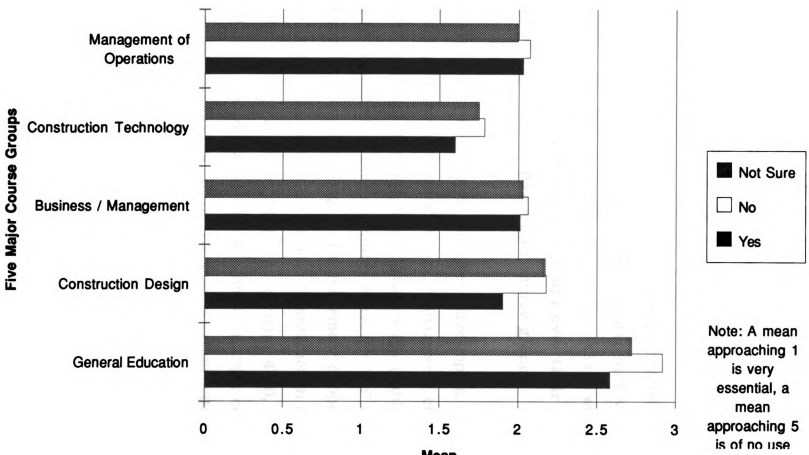
MANOVA: Wilks' lambda = 0.90084 F = 2.8195 p = .002*

Response	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Yes	2.585	0.431	115	1.906	0.595	115	2.013	0.535	115	1.600	0.533	115	2.032	0.535	115
No	2.918	0.822	54	2.179	0.702	54	2.063	0.507	54	1.788	0.545	54	2.074	0.514	54
Not Sure	2.723	0.422	101	2.173	0.694	101	2.031	0.527	101	1.754	0.586	101	1.996	0.567	101
Entire Sample	2.703	0.542	270	2.061	0.666	270	2.030	0.525	270	1.695	0.560	270	2.027	0.542	270
ANOVA:															
F =	7.3809			5.5610			0.1628			3.0126			0.3761		
p =	.001*			.004*			.850			.051			.687		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-9. Are Programs Adequately Structured



This hypothesis attempted to determine if the three categories responding yes, no, and not sure, to the question: **Do you perceive that a graduate of a Building Construction Management program would be more valuable to your company than a graduate of another program, for example Business?**, differ in their views about the importance of the five major course groups. MANOVA was used as a test of significance for the five major course groups related to this hypothesis. A Wilks' lambda value of ..90586 produced an F-value of 2.6859 and a probability (p) of .003 (Table 11). Thus, **there was a significant difference between the two groups over their perception of the importance of the five major course groups. Hypothesis 11 was not rejected.**

The ANOVA test of significance identifies three topics, (construction design, construction technology, management of operations) in which the three categories differed statistically (Table 11). Figure 4-10 shows where the three categories differ; the "no" respondents viewed construction technology and management of operations lowest, while the "not sure" respondents viewed construction design lowest of the three. Once again, as illustrated in Figure 4-10, general education is viewed lower than the other four major course groups by all three respondents. In the category of construction design, the standard deviation for the no respondents is high suggesting they are not in agreement on this issue.

Table 11. Are Building Construction Management Graduates more Valuable and The Five Major Course Groups

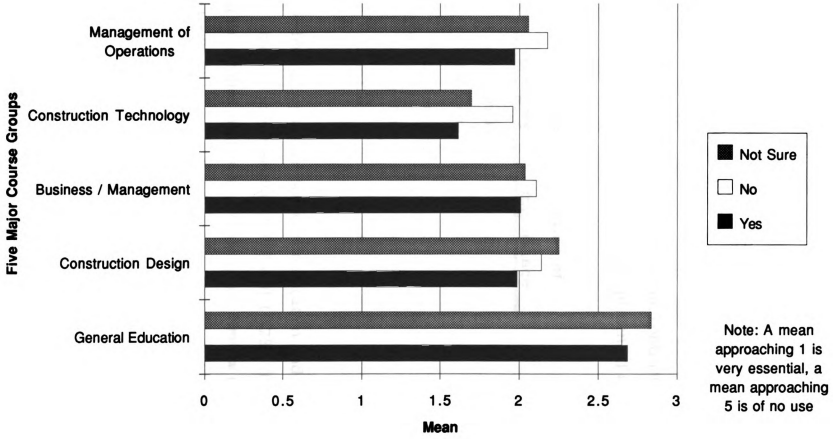
MANOVA: Wilks' lambda = 0.90586 F = 2.6859 p = .003*

Response	General Education			Construction Design			Business/ Mgt			Construction Tech			Mgt. of Operations		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Yes	2.688	0.589	171	1.988	0.641	171	2.009	0.515	171	1.616	0.525	171	1.970	0.534	171
No	2.652	0.469	52	2.141	0.717	52	2.108	0.553	52	1.959	0.617	52	2.177	0.569	52
Not Sure	2.837	0.419	49	2.250	0.662	49	2.038	0.528	49	1.700	0.527	49	2.059	0.506	49
Entire Sample	2.708	0.543	272	2.065	0.666	272	2.033	0.524	272	1.696	0.558	272	2.026	0.540	272
ANOVA:															
F =	1.7872			3.4407			0.7185			7.9290			3.0950		
p =	0.169			.033*			.488			.000*			.047*		

* Significant at or beyond the .05 level

Note: A mean approaching 1 is very essential, a mean approaching 5 is of no use

Figure 4-10. Are Building Construction Management Graduates more Valuable



Supplemental Analysis

Descriptive statistics were run on all thirty-nine typical courses as presented in Part III of the questionnaire. Table 12 delineates the mean and standard deviation for each class in ascending importance to both the building contractors and the construction contractors. The variable responses range from one to five, and are presented as follows:

Response Category	Rating of Importance
Very Essential	1
Highly Useful	2
Somewhat Useful	3
Of Little Use	4
Of No Use	5

Both respondent groups rated oral communication and written communication classes as very essential (1.272 and 1.373). This agrees with data from other studies as presented in: Review of the Literature, Chapter 3.

Summary

The results of the statistical analysis for each of the eleven hypotheses were presented in this chapter. Multivariate analysis of

Table 12 Ascending order in means of the class list

CLASS LISTING	MEAN	S D	C V
Oral Communication	1.272	.500	2.544
Project Scheduling & Time Control	1.305	.507	2.574
Written Communication	1.373	.561	2.447
Construction Methods	1.418	.601	2.359
Construction Management	1.433	.609	2.353
Project Management & Control	1.440	.603	2.388
Quality Control	1.487	.630	2.360
Construction Estimating	1.498	.664	2.256
Construction Safety	1.524	.736	2.071
Architectural Design / Blueprint	1.538	.663	2.320
Construction Productivity Improvement	1.675	.727	2.304
Construction Materials	1.702	.724	2.351
Management Principles	1.731	.651	2.659
Building Codes	1.865	.811	2.300
Construction Equipment	1.920	.872	2.202
Foundation & Soil Mechanics	1.953	.842	2.319
Surveying & Layout	1.964	.823	2.386
Legal Aspects of Construction	2.000	.824	2.427
Construction Economics	2.033	.761	2.671
Personnel Management	2.040	.830	2.458
Reinforced Concrete Design	2.138	.937	2.282
Structural Wood Design	2.178	.901	2.417
Engineering Graphics	2.228	.905	2.462
Organization Behavior	2.229	.872	2.556
Financial Management	2.247	.800	2.809
Accounting Principles	2.269	.745	3.046
Construction Labor Relations	2.276	.898	2.535
Business Law	2.295	.822	2.792
Technical Report Writing	2.375	.842	2.821
Basic Steel Design	2.404	1.029	2.336
Algebra & Trigonometry	2.425	.874	2.775
Construction Firm Organization	2.480	.877	2.828
Land Use Regulations	2.800	1.060	2.642
Land Development and Acquisition	2.807	1.055	2.661
Humanities & Social Science	3.059	.732	4.179
Calculus	3.146	.972	3.237
Chemistry & Physics	3.444	2.793	1.233
Foreign Language	3.554	.827	4.297
Cross Cultural Studies	3.733	.865	4.316
TOTAL CLASS MEAN	2.1348		

variance and univariate analysis of variance were employed to analyze the data collected for the study.

Each of the eleven hypotheses was tested using five categories: General Education, Construction Design, Business / Management, Construction Technology, and Management of Operations. These topics were identified as major course groups in Part III of the questionnaire. The average of all the means of the sub-courses within a major course group represented the mean used in the analysis.

Table 13. shows a summary of the accepted and rejected hypotheses. Hypothesis 9 was deemed unsuitable for analysis and subsequently discarded.

Table 13. -- Summary of the Accepted and Rejected Hypotheses

Hypothesis 1	Accepted
Hypothesis 2	Accepted
Hypothesis 3	Rejected
Hypothesis 4	Rejected
Hypothesis 5	Rejected
Hypothesis 6	Rejected
Hypothesis 7	Accepted
Hypothesis 8	Rejected
Hypothesis 9	Discounted *
Hypothesis 10	Accepted
Hypothesis 11	Accepted

Significant differences were found between the two groups (building contractors and construction contractors) concerning the importance of general education, construction design and construction technology. They maintained similar views on the importance of business / management and management of operations (Hypothesis 1).

Similarly, statistical differences were found between the administrative title of position and the five major course groups concerning the importance of general education (Hypothesis 2).

No significant difference was found between the company classification and the five major course groups. However general education was rated higher than the other four groups (Hypothesis 3)

In like manner, no significant difference was found between the number of permanent management employees and the five major course groups. Still, they did differ over the importance of general education, and again all six groups rated general education higher than the other four course groups (Hypothesis 4).

No significant difference was found between the percentage of employees having a bachelor's degree in building construction management and the five major course groups. However, they differed in the two categories of construction design and construction technology. Again all four groups rated general education highest of the major course groups (Hypothesis 5).

No significant difference was found between the personal background category and the five major course groups. Nevertheless all five personal background categories rated general education the highest. (Hypothesis 6).

Significant differences were found between the responses (yes, no) of the participants hiring building construction management graduates and the five major course groups in the categories of general education, construction design, and construction technology. Both respondent groups rated general education the highest (Hypothesis 7).

No significant differences were established between the respondents (yes, no, and not sure) of the participants who anticipate future hiring and the five major course groups. The groups do differ, but not significantly, in regard to construction design and construction technology; they were in agreement of highly rating the general education course group (Hypothesis 8).

Statistical differences were found between the respondents (yes, no, and not sure) of the participants who perceive the building construction management programs are adequately structured with respect to the five major course groups. They differed in the categories of general education and construction design (Hypothesis 10).

Similarly, statistical differences were found between the respondents (yes, no, and not sure) of the participants who perceived that building construction management graduates are more valuable and the five major course groups. The three categories of disagreement were construction design, construction technology and management of operations (Hypothesis 11).

Altogether, significant statistical differences were discovered in five of the ten (50 per cent) individual hypotheses.

CHAPTER V
SUMMARY, CONCLUSION AND DISCUSSION

Introduction

This study was primarily designed to be exploratory and descriptive. A structured three part questionnaire was used to obtain responses from both building contractors and construction contractors. The initial focus was to determine how well baccalaureate building construction management education programs are serving their principal market - the employers.

The analysis included two sample groups, building contractors and construction contractors. They represented the top four hundred in the nation in dollar volume of their representative populations for 1990. During July of 1991, a mail survey of both groups was conducted, and except for color, each group received the same survey. The data received was analyzed by SPSS-PC, using multivariate analysis of variance MANOVA, and univariate analysis of variance ANOVA.

A literature review was conducted for the following reasons: to locate previous research and opinions, to establish an interpretative summary of the current state of knowledge, and to discover any relevant recent studies.

Based on the literature review and the comparative analysis, eleven hypotheses were tested for significant differences. One hypothesis was discarded do to lack of meaningful data, five hypotheses were rejected, and five hypotheses were accepted.

Literature

A search of the literature was conducted to discover previous research related to the study. Due to the lack of directly related studies and references in the area of this study, the review of the literature considers elements that held logical ties.

The literature supported change and growth in the construction industry. As the twenty-first century approaches, the mission of universities and their faculty will be challenged to produce building construction management graduates properly prepared to be productive constructors.

The building construction management curriculum has changed little in the past twenty years, primarily because the curriculum has been highly successful., however the construction business is dynamic and the world around us is changing rapidly, therefore construction curriculum must also change with the times and technology. Skill in creative thinking, critical analysis, communication, and, most important, how to learn, will help prevent our graduates from becoming critically deficient. In addition to an extensive building construction management education, the curriculum must be expanded to include greater exposure to a variety of non-building construction management subjects such as humanities, economics, and sociology to name a few. Education in these areas is necessary to ensure the communication skills of building construction management graduates, as well as to strengthen their ability to understand and adapt to changing conditions of the new global economies.

It was suggested in the literature review that building construction management curricula should be under constant review and designed to reflect current real needs of the construction industry.

Finally, universities must maintain direct and continuing interrelations with the construction industry. The results would be meaningful curriculum enhancement, and the provision of real world construction case studies, projects, and problems for discussion in the classroom.

Methodology

Two populations were surveyed in this study. The first population (building contractors) was sampled using the list of the top four hundred building contractors as illustrated in Professional Builder & Remodeler, July 1991. One hundred thirty-five building contractors responded to the survey instrument, a response rate of 33.8 per cent.

The second population consisted of construction contractors. This population was sampled using the list from the top four hundred construction contractors as presented in the Engineering News-Record, May 1991. One hundred forty-six construction contractors responded to the survey instrument, a response rate of 36.5 per cent.

With the exception of color, both groups were given the same questionnaire. The questionnaire contained three parts. Part I contained seven questions concerning demographical data and company characteristics. Part II was composed of five questions regarding the perspective of the participant's company concerning current building construction management programs. Part III of the

questionnaire, a Likert -- type scale, presented the five major course groups along with an applicable roster of thirty-nine typical classes which are offered in building construction management programs. Returned surveys were reviewed and the responses were entered into a data base and transferred to the SPSS-PC statistical analysis software for processing.

Statistical analysis was completed using multivariate analysis of variance and univariate analysis of variance. Each of the subject areas were subjected to five MANOVA analyses (general education, construction design, business / management, construction technology, and management of operations) at a significance level of .05. Where significance was found, further topic analysis within a subject area and category was completed using univariate analysis. One table was developed for each hypothesis with Wilks' lambda, F-values, p-values, topic means, and standard deviations for all groups, and p-values for topic area significance. A graph was developed to graphically illustrate differences in group response means and standard deviations for each subject area where significant difference occurred.

General Observations

One particular general observation worth noting in this study, regarding construction graduates, is a perceived need for better communication skills by both building contractors and construction contractors. Nearly every category in parts I and II of the questionnaire, when correlated to Part III, rated the major course group of general education the highest. When the group of general education is reduced

empirically to its nine individual classes, the descriptive statistics indicate the following results: (Table 14.).

Table 14. Descriptive Statistics for the Nine Classes within the General Education Category.

General Education Classes	Mean	S D
1. Oral Communication	1.272	.500
2. Written Communication	1.373	.561
3. Technical Report Writing	2.375	.842
4. Humanities and Social Science	3.059	.732
5. Algebra and Trigonometry	2.425	.874
6. Calculus	3.146	.972
7. Chemistry and Physics	3.444	2.793
8. Foreign Languages	3.554	.827
9. Cross Cultural Studies	3.733	.865

To help interpret this data, a Likert--type scale was used. A number from one to five was assigned to each of the five possible class responses depicted by the following:

1 = Very essential
2 = Highly useful
3 = Somewhat useful
4 = Of little use
5 = Of no use

A mean of 1 indicates a very essential class, whereas a mean of 5 indicates a class of no use for day to day operations. With means in oral communications and written communications of 1.272 and 1.373 respectively, a generalization can be made that both sample groups

(building contractors and construction contractors) perceive a greater need for communication skills connected with building construction management graduates.

In a like manner, numerous authors of the literature review support this concern. In his study on construction curriculum design, Mr. Shofoluwe's findings strongly indicate that the construction industry perceives a lack of instruction by baccalaureate construction programs in good communication skills (verbal, written, graphics and listening).

With emphasis on team building, where no clear superior is appointed, good communication skills become absolutely critical. These skills must be taught within the framework of today's building construction management programs.

Interpretation of Each Result

The first hypothesis pertained to how the two sample groups (building contractors and construction contractors) differ over the importance of the five major course categories (general education, construction design, business and management, construction technology, and management of construction operations). The two groups differed in ratings of general education, construction design and construction technology. In all three categories construction contractors considered these three class groups to be more important than building contractors for day to day application. Additionally, both groups rate construction technology as the most important course grouping.

This suggests that construction contractors prefer building construction management graduates to be better prepared in areas of construction methods, estimating, safety, materials and building codes. Building contractors, though recognizing a need for these skills, placed less emphasis in the degree of training in these areas.

The standard deviation values of the building contractors in all three categories were much larger than those of the construction contractors. This implies greater disagreement over the importance of these class groupings among building contractors.

Questions about the second hypothesis rated the significance of the administrative title of position (president, manager, vice president, human resource director, project manager, and chairman) relative to the five major course groups. Of the two hundred seventy-three responses, the title of vice president was declared one hundred and two times; i.e., a rate of 37.4 per cent. Even though the survey instrument was mailed to the human resource director, this respondent placed a distant second, at 19.1 percent. Chairmen responded at a rate of 5.5 percent.

The significant difference in this hypothesis was shown by the category of general education; more specific between the vice presidents (mean of 2.828) and the human resource director (mean of 2.496). From this contrast, a statement can be made that human resource directors view general education courses as being more useful for day to day application.

There were no statistical significant differences from data obtained regarding hypotheses 3, concerning differences between company classification, 4, regarding differences between how many

permanent management employees are employed, and 5, in regard to differences between what percentage of permanent employees hold a bachelor's degree in building construction management. However in hypothesis 4, as depicted in figure 4-4, those companies (2) having over one thousand permanent management employees viewed the business and management course category much lower than the other four choices. Though data is inconsequential, this suggests firms employing large numbers of management personnel favor graduates with more training in business and management courses. Interestingly, hypothesis 5 shows that firms which employ less than five per cent building construction management graduates tend to favor classes in the construction design and construction technology categories. This implies that such firms would be more interested in graduates with training in construction methods, estimating, safety, materials, architectural design and blue print reading.

No significance was found in hypothesis 6, which considered differences between how respondents categorize their own personal background, however, business and management was the most frequently selected personnel background category (47.6 per cent).

Hypothesis 7, whether the respondents company regularly hire graduates of building construction management programs, showed significance in three categories: general education, construction design, and construction technology. This indicates that firms hiring building construction management graduates prefer classes with more emphasis on design and technology.

No significance was discovered in hypothesis 8, concerning more anticipated hiring in the future, however, 69.5 per cent responded yes

to the question: Based on the performance of building construction management graduates, do you anticipate more hiring in the future?. This response suggests that firms which have hired BCM graduates in the past are willing to do so again and are satisfied with their training. This reflects a positive trend that indicates present BCM programs are in tune with the needs of many firms in the construction industry. Of particular concern were the participants who responded no to the same question. More study is needed in this area to ascertain reasons these firms do not plan on hiring building construction graduates in the future.

Hypothesis 9, which concerned should a master's degree in construction be a criterion for promotion, was discarded.

In hypothesis 10, respondents were asked if they feel that current building management programs are adequately structured to serve industrial needs. There wasn't a high degree of satisfaction, 42.6 per cent. This was a surprising result, in view of the high ratings received for more hiring in the future of BCM graduates. Consequently, it appears that there is skepticism of building construction management programs within the construction industry. This is in agreement with Book, Krosner, and Habbad (1987); adjustments need to be made in construction education of the nineties, with necessary realignments of the basic mission and goals of current building construction management programs.

Results from hypothesis 11, pertaining to how respondents perceive graduates of a building construction management program as being more valuable than graduates of another program, supported a high level of satisfaction in that building construction management

graduates are more valuable than graduates of other programs (76.7 per cent). An examination of Table 11. reveals three categories (construction design, construction technology, and management of operations) as being statistically significant. In all three categories, the "yes" respondents viewed them lower, signifying more importance for day to day use in these three categories.

Many of the results suggest that building construction management programs are serving their principal market - the employers adequately. Nevertheless, concern is indicated in the structure of these programs, primarily in the general education course groupings. In addition, several respondents from both sample groups prefer more emphasis on construction design and construction technology classes. Both the review of the literature and the survey repeatedly suggested that universities and the construction industry work together in developing a curriculum that would benefit the discipline.

Limitations of the Study

The findings of the study were limited by the following:

1. The inability of the researcher to secure a 100 per cent questionnaire response rate.
2. The time and financial restraints of the researcher.
3. The survey instrument was addressed to the Human Resource Director, thus distorting the response of the survey instrument question number one.
4. No second mailing was used.

5. The ability to ascertain appropriate and valid data from a diverse group using a common questionnaire.
6. The state of the United States economy at the time of the survey.
7. Stratified sampling procedures were inadequate for subgroup analysis.
8. The only method used for collecting data in this study was by questionnaire.
9. The course grouping of general education should have been further subdivided into two groups: communications, and math's and sciences.
10. The questionnaire did not provide write in space for additional courses not mentioned on the back page.

Conclusion, Implications and Recommendations

Conclusion:

This study tries to answer the question of how well are baccalaureate building construction management education programs serving their principal market - the employer? Clearly, as the data in this study indicates, the future of building construction management programs will need to change with the times. Change is occurring in the construction industry today at an unprecedented rate; this change is placing a new set of demands on the building construction management graduate currently entering the work place. The relationship between education and the construction industry will become increasing important in the 1990's and beyond. The future of the construction industry as well as building construction management graduates

depends on nurturing this relationship. The need for new approaches to this interaction will become paramount in order to insure that the construction industry will have a competitive work force and a continuous supply of well trained, well informed talent adaptable to the new processes, methodologies, and technologies which lie ahead.

To improve building construction management education and to produce successful future graduates, we must first fully recognize current short comings and clearly define what should be accomplished. Secondly, building construction management departments and their faculty need to identify and overcome these shortcomings while agreeing on new objectives for their programs. Thirdly, these objectives must be implemented. Finally, building construction management programs need to be continuously monitored and adapted to keep pace with the dynamic construction industry.

Implications:

From this study, several generalizations concerning shortcomings in building construction management programs can be made. First and foremost, communication skills need to be improved. Both building contractors and construction contractors are in agreement over this issue.

The next generalization is that construction contractors view classes in the categories of construction technology and construction design significantly lower than building contractors perceive these categories. Paradoxically, among both groups regularly hiring BCM graduates, these same categories are rated highest by building

contractors. Finding possible reasons could be a focus for a future study.

A third generalization is that the administrative title of human resource director perceives the classes within the category of general education as more relevant than those within the other categorical groups. Human resource directors typically supervise the hiring of new employees. One may assume that these administrators are looking for graduates with a well rounded construction education; graduates with the skills, knowledge and abilities to adapt to the dynamics of the construction industry.

Another broad based generalization is that the more management employees a construction firm employs, the more they prefer graduates with credentials in business and management courses; this is an area building construction management programs presently address very well.

Of particular interest was the overwhelming rejection of the requirement of a master's degree in building construction management for promotion. This consensus could change as the number of universities providing terminal degree programs in building construction management continues to increase.

Finally, the literature review suggests that universities continue to provide broad based nontechnical curriculum (humanities, economics, sociology), along with the essential technical courses. Improve communication skills (verbal, written, graphic, listening), and teach thinking, learning, and the ability to change.

Recommendations:

The construction industry is a highly competitive, extremely volatile and unique business with an immediate and continuing need for talented, well educated, and sufficiently motivated personnel. Specifically, personnel educated and trained in the managerial and scientific techniques needed to meet the ever increasing demands of the construction industry. From results of this study, various recommendations for BCM programs can be proposed:

1. Encourage valuable interaction between faculty and students and construction industry. This association will provide real problems for case studies, projects, and potential seminar speakers, and also generate meaningful topics for future research.
2. Involve students and faculty with real world problems facing the construction industry. This affiliation would enhance the foundation and contribute tools which can improve the quality of construction education so that graduates are better prepared to enter the field.
3. Develop capstone projects in which students within the building construction management programs work together to solve construction related problems.
4. Endorse sabbatical exchanges between the construction industry and faculty.
5. Encourage internship employment in the construction industry for undergraduate students.

6. Conduct regular reviews of building construction management programs for the sole purpose of reviewing emerging trends and new developments.

Recommendations for Future Research

Based on the review of the literature and the analysis conducted in this study, there are several general recommendations identifying areas for future exploration and attention. The recommendations for future studies might include, but are not limited to, the following:

1. Would building contractors and construction contractors, if studied separately, compare similarly to the results of this study?
2. Would there be a significant difference in the responses of building contractors and construction contractors?
3. What impact would regional analysis have on the two groups studied?
4. Would changes occur if these two groups were studied in five years?
5. What would the impact of the building construction management graduate perspective be on these two groups?
6. Would the response of the two groups be similar if they were randomly selected from a larger strata of company size?

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APPENDICES

APPENDIX A

Questionnaire Cover Letter

MICHIGAN STATE UNIVERSITY

BUILDING CONSTRUCTION MANAGEMENT PROGRAM
207 A. W. FARRALL HALL
(517) 336-2096 • FAX (517) 353-8982

EAST LANSING • MICHIGAN • 48824-1323

July 1992

Dear Construction Executive,

I am doing Master's thesis research under the supervision of Tim Mrozowski in the Building Construction Management program of the Agriculture Engineering Department, Michigan State University. My objective is to assess how well baccalaureate construction management education programs are serving their principle market - the employer.

The voluntary participation of your company in my study is important. Please take a few minutes to complete the enclosed questionnaire and mail it in the return stamped envelope provided. A high rate of return for my survey will enable me to better define those aspects of Building Construction Management which are important to building and construction companies throughout the United States. In return, upon request, I will provide feedback to your company regarding results. No individual company data will be used or made public.

I am hoping to have your completed questionnaire by July 31. Should you have difficulty with this request or regarding the questionnaire, please do not hesitate to contact me. This research has no affiliation with any consulting firm or national organization.

Sincerely,

Ronald V. Stroup
(616) 846-8968

APPENDIX B

Questionnaire
Survey Instrument

MICHIGAN STATE UNIVERSITY
BUILDING CONSTRUCTION MANAGEMENT PROGRAM **110**
207 A.W. FARRALL HALL

EAST LANSING, MICHIGAN 48824-1323
(517) 336-2096 FAX (517) 353-8982

QUESTIONNAIRE FOR UNDERGRADUATE PROGRAM:

Part I. Please answer each statement by placing a check or write in the choice that indicates your response.

1. Administrative title of position? _____
2. Years of experience in your present position? _____
3. How would you classify your company?
   - ____ Building Construction [Institutional, Educational, Commercial, Residential, etc.]
   - ____ Engineering [Highway, Heavy]
   - ____ Industrial [Power plants, Petrochemicals, etc.]
   - ____ Other [Please specify] _____
4. Approximately how many permanent management employees are employed with your company?
   - ____ Less than 50
   - ____ 50 - 100
   - ____ 100 - 250
   - ____ 250 - 500
   - ____ 500 - 1000
   - ____ over 1000
5. What percentages of your permanent employees hold bachelor's degree in Building Construction Management?
   - ____ less than 5%
   - ____ 5 - 10%
   - ____ 10 - 25%
   - ____ over 25%
6. Please indicate the geographical regions of your company's operation: Check all that apply.

Nationwide				International			
____	East	____	North	____	N. America	____	S. America
				____	Africa	____	Asia
____	West	____	South	____	Europe	____	Middle East
				____	Australia	____	Polar

7. How would you categorize your own personal background?
   - ____ Accounting / Financing
   - ____ Business / Management
   - ____ Architectural
   - ____ Engineering
   - ____ Technology

Part II. Please answer the following questions by placing a check in the appropriate column.

		Yes	No	Not sure
1.	Does your company regularly hire graduates of Building Construction Management programs?	____	____	____
2.	Based on their performance, do you anticipate more hiring in the future?	____	____	____
3.	Should a master's degree in construction be a criterion for promotion?	____	____	____
4.	Does your company feel that current Building Construction Management programs are adequately structured to serve industry needs?	____	____	____
5.	Do you perceive that a graduate of a Building Construction Management program would be more valuable to your company than a graduate of another program, for example Business?	____	____	____

PLEASE SEE REVERSE SIDE

Part III. Listed below are groups of major courses that are commonly offered in typical Building Construction Management programs. Indicate with a check in the appropriate box your judgment about the importance for day to day use of each from the stand point of an employer of Building Construction Management graduates. Check only one description for each major course.

General Education	Very essential	Highly useful	Somewhat useful	Of little use	Of no use
Oral Communication	☐	☐	☐	☐	☐
Written Communication	☐	☐	☐	☐	☐
Technical Report Writing	☐	☐	☐	☐	☐
Humanities & Social Science	☐	☐	☐	☐	☐
Algebra & Trigonometry	☐	☐	☐	☐	☐
Calculus	☐	☐	☐	☐	☐
Chemistry & Physics	☐	☐	☐	☐	☐
Foreign Languages	☐	☐	☐	☐	☐
Cross Cultural Studies	☐	☐	☐	☐	☐
Construction Design					
Architectural Design / Blueprint	☐	☐	☐	☐	☐
Reinforced Concrete Design	☐	☐	☐	☐	☐
Engineering Graphics	☐	☐	☐	☐	☐
Basic Steel Design	☐	☐	☐	☐	☐
Structural Wood Design	☐	☐	☐	☐	☐
Foundation & Soil Mechanics	☐	☐	☐	☐	☐
Business and Management					
Management Principles	☐	☐	☐	☐	☐
Accounting Principles	☐	☐	☐	☐	☐
Financial Management	☐	☐	☐	☐	☐
Project Management & Control	☐	☐	☐	☐	☐
Business Law	☐	☐	☐	☐	☐
Personnel Management	☐	☐	☐	☐	☐
Organization Behavior	☐	☐	☐	☐	☐
Construction Economics	☐	☐	☐	☐	☐
Construction Technology					
Construction Methods	☐	☐	☐	☐	☐
Construction Equipment	☐	☐	☐	☐	☐
Construction Safety	☐	☐	☐	☐	☐
Construction Materials	☐	☐	☐	☐	☐
Surveying & Layout	☐	☐	☐	☐	☐
Construction Estimating	☐	☐	☐	☐	☐
Building Codes	☐	☐	☐	☐	☐
Management of Construction Operations					
Construction Productivity Improvement	☐	☐	☐	☐	☐
Quality Control	☐	☐	☐	☐	☐
Project Scheduling & Time Control	☐	☐	☐	☐	☐
Construction Management	☐	☐	☐	☐	☐
Legal aspects of Construction	☐	☐	☐	☐	☐
Construction Labor Relations	☐	☐	☐	☐	☐
Construction Firm Organization	☐	☐	☐	☐	☐
Land Development and Acquisition	☐	☐	☐	☐	☐
Land Use Regulations	☐	☐	☐	☐	☐

APPENDIX C

Approval of
Musibau A. Shofoluwe
To Use His Survey Instrument

MICHIGAN STATE UNIVERSITY

BUILDING CONSTRUCTION MANAGEMENT PROGRAM
207 A. W. FARRALL HALL
(517) 336-2096 • FAX (517) 353-8982

EAST LANSING • MICHIGAN • 48824-1323

October 30, 1991

Mr. Musibau A. Shofoluwe
Department of Industrial Technology
Construction Management Division
Cedar Falls, Iowa 50614

Dear Mr. Shofoluwe:

I am doing Master Thesis Research under the supervision of Tim Mrozowski in the Building Construction Program of the Agriculture Engineering Department at Michigan State University. My research will address the various ways educational programs in the building construction management and technological curriculum can be tailored to better prepare college graduates for career opportunities in these fields. This project is similar to one you published in (The Journal of Industrial Technology, Summer 1990, Volume 6, Number 3).

I would therefore greatly appreciate your permitting my use of your research instrument to assist me in my endeavor. I would also find it very helpful if you include the following: the list of construction firms interviewed, the questionnaire used, your bibliography and references.

This research is totally supported with my own funds having no affiliation with a consulting firm or national organization. I will gladly assume any cost you may incur in forwarding me this material. If you will notify me of the amount, I will forward you a check for payment, or you may send it C.O.D. to the following address,15248 Kelly Road, Spring Lake, Michigan, 49456.

I am certain this information will be extremely helpful, and I will be sure to return these documents to you as well as a copy of my work as soon as it is complete.

Sincerely,

Ronald V. Stroup
(616) 846-1546

11/30/91

Ronald, You have my permission to use my instrument as you see fit. The instrument is enclosed herewith. With respe to the references, those could be found at the end of my article in the JIT, V6, #3. Sorry it took so long to reply For further info., please write ago Good luck! Ondele

APPENDIX D

Musibau A. Shofoluwe's
Survey Instrument

DEPARTMENT OF INDUSTRIAL AND ENGINEERING TECHNOLOGY
GRAMBLING STATE UNIVERSITY
P.O. BOX 34
GRAMBLING, LOUISIANA 71245

QUESTIONNAIRE FOR UNDERGRADUATE PROGRAM:

PART 1. Please answer each statement by placing a check ( ) or write in the choice that indicates your response.

1. Administrative title or position _____

2. Years of Experience in your present position _____

3. How would you classify your Company:

   a. ____ Building Construction (Institutional, Educational, Commercial, Residential, etc.)
   b. ____ Engineering (Highway, Heavy)
   c. ____ Industrial (Power plants, Petro-chemicals, etc.)
   d. ____ Other (Please specify)

4. Please indicate the dollar amount (in million of dollars) of your annual volume of business:

   ____ under 5
   ____ 5-20
   ____ 20-100
   ____ over 100

5. How many permanent employees (including craftsmen) are employed with your company ? _____

6. What percentage of your permanent Employees hold Bachelor's degree in Construction Engineering Technology ?

   ____ less than 5%
   ____ 5-10%
   ____ 10-25%
   ____ over 25%

7. Please indicate in dollars the average job size or most of your Company's job size: _____

8. Indicate the geographical regions of your Company's Operation:

a. ____ East c. ____ North

b. ____ West d. ____ South

e. ____ Nationwide

f. ____ International

PART II ___ Construction Engineering Technology Programs: Degree of importance.

Listed below are groups of major courses which are commonly offered in a typical Construction Engineering Technology programs.Indicate with a check in the appropriate column your judgement about the importance of each from the standpoint of an employer of Construction Engineering Technology graduates.

GROUP A ___ General Education

	1 Of no use	2 Somewhat useful	3 Highly useful but not essential	4 Very essenti
1. Oral Communication	___	___	___	___
2. Written Communication	___	___	___	___
3. Technical Report	___	___	___	___
4. Humanities & Soc. Sci.	___	___	___	___
5. Algebra & Trigonometry	___	___	___	___
6. Calculus	___	___	___	___
7. Chemistry & Physics	___	___	___	___

GROUP B __ Construction Design Courses

1. Reinf. Conc.Design	___	___	___	___
2. Arch. Design/Blueprint	___	___	___	___
3. Eng. Graphics	___	___	___	___
4. Basic Steel Design	___	___	___	___
5. Structural Wood Design	___	___	___	___
6. Found. & Soils Mech.	___	___	___	___

GROUP C __ Business and Management

	1 Of no use	2 Somewhat useful	3 Highly useful but not essential	4 Very essential
1. Mnagement Principles	___	___	___	___
2. Accounting Principles	___	___	___	___
3. Financial Management	___	___	___	___
4. Project Mgt. & Control	___	___	___	___
5. Business Law	___	___	___	___
6. Personnel Management	___	___	___	___
7. Organization Behavior	___	___	___	___
8. Construction Economics	___	___	___	___

GROUP D__ Construction Technology Courses

1. Construction Methods	___	___	___	___
2. Construction Equipment	___	___	___	___
3. Construction materials	___	___	___	___
4. Construction Safety	___	___	___	___
5. Surveying & Layout	___	___	___	___
6. Constr. Estimating	___	___	___	___
7. Building Codes	___	___	___	___

GROUP E __ Management of Construction Operations

1. Constr. Productivity Improvement	___	___	___	___
2. Quality Control	___	___	___	___
3. Project Scheduling & Time Control	___	___	___	___
4. Construction Management	___	___	___	___
5. Legal aspects of constr.	___	___	___	___
6. Constr. Labor Relations	___	___	___	___
7. Construction Firm Organization	___	___	___	___

PART III ___ Construction Industry Relationship:

Please answer the following questions by placing a check ( ) in the appropriate column.

	Yes	No	Not sure
1. Does your company regularly hire graduates of undergraduate construction engineering technology programs ?	___	___	___
2. Based on their performance, do you anticipate more hiring in tne future ?	___	___	___

	Yes	No	Not sure
3. Will your company provide financial support (full or partial) for an employee to complete a B.S. in construction under certain contractual obligation ?	___	___	___
4. Should a master's degree in construction be a criterion for promotion ?	___	___	___
5. Is your company in favor of providing financial grants to Institutions in support of undergraduate construction education ?	___	___	___
6. Does your company feel that current construction engineering technology undergraduate programs are adequately structured to serve Industry needs ?.	___	___	___

APPENDIX E

Approval of the University Committee on Research Involving Human Subjects

MICHIGAN STATE UNIVERSITY

OFFICE OF VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

EAST LANSING • MICHIGAN • 48824-1046

July 9, 1992

Ronald Stroup
5 Farrall Hall

RE: HOW WELL ARE BACCALAUREATE CONSTRUCTION MANAGEMENT PROGRAMS SERVING THEIR PRINCIPLE MARKET-THE EMPLOYER?, IRB #92-315

Dear Mr. Stroup:

The above project is exempt from full UCRIHS review. The proposed research protocol has been reviewed by a member of the UCRIHS committee. The rights and welfare of human subjects appear to be protected and you have approval to conduct the research.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval one month prior to June 30, 1993.

Any changes in procedures involving human subjects must be reviewed by UCRIHS prior to initiation of the change. UCRIHS must also be notifed promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

David E. Wright, Ph.D., Chair
University Committee on Research Involving
Human Subjects (UCRIHS)

DEW/pjm

cc: Dr. Tim Mrozowski

APPENDIX F

List of Data Variables

APPENDIX F

List of Data Variables

V0	Group
V1	Part I. Question 1.
V2	Part I. Question 2.
V3	Part I. Question 3.
V4	Part I. Question 4.
V5	Part I. Question 5.
V6	Part I. Question 6.
V7	Part I. Question 6.
V8	Part I. Question 6.
V9	Part I. Question 6.
V10	Part I. Question 6.
V11	Part I. Question 6.
V12	Part I. Question 6.
V13	Part I. Question 6.
V14	Part I. Question 6.
V15	Part I. Question 6.
V16	Part I. Question 6.
V17	Part I. Question 6.
V18	Part I. Question 6.
V19	Part I. Question 6.
V20	Part I. Question 6.
V21	Part I. Question 6.
V22	Part I. Question 6.
V23	Part I. Question 6.
V24	Part I. Question 6.
V25	Part I. Question 6.
V26	Part I. Question 6.
V27	Part I. Question 6.
V28	Part I. Question 6.
V29	Part I. Question 6.
V30	Part I. Question 6.
V31	Part I. Question 6.
V32	Part I. Question 6.
V33	Part I. Question 6.
V34	Part I. Question 6.
V35	Part I. Question 6.
V36	Part I. Question 6.
V37	Part I. Question 6.
V38	Part I. Question 6.
V39	Part II. Question 1.
V40	Part II. Question 2.
V41	Part II. Question 3.
V42	Part II. Question 4.
V43	Part II. Question 5.
V44	Part III. G. E 1.
V45	Part III. G. E 2.
V46	Part III. G. E 3.
V47	Part III. G. E 4.
V48	Part III. G. E 5.
V49	Part III. G. E 6.
V50	Part III. G. E 7.
V51	Part III. G. E 8.
V52	Part III. G. E 9.
V53	Part III. C. D. 1.
V54	Part III. C. D. 2.
V55	Part III. C. D. 3.
V56	Part III. C. D. 4.
V57	Part III. C. D. 5.
V58	Part III. C. D. 6.
V59	Part III. B. M. 1.
V60	Part III. B. M. 2.
V61	Part III. B. M. 3.
V62	Part III. B. M. 4.
V63	Part III. B. M. 5.
V64	Part III. B. M. 6.
V65	Part III. B. M. 7.
V66	Part III. B. M. 8.
V67	Part III. C, T. 1.
V68	Part III. C, T. 2.
V69	Part III. C, T. 3.
V70	Part III. C, T. 4.
V71	Part III. C, T. 5.
V72	Part III. C, T. 6.
V73	Part III. C, T. 7.
V74	Part III. M. C. O. 1.
V75	Part III. M. C. O. 2.
V76	Part III. M. C. O. 3.
V77	Part III. M. C. O. 4.
V78	Part III. M. C. O. 5.
V79	Part III. M. C. O. 6.
V80	Part III. M. C. O. 7.
V81	Part III. M. C. O. 8.
V82	Part III. M. C. O. 9.

Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
1	1	6	20	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	1	1	2	1
2	1	3	5	1	5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	2	1
3	1	4	2	1	4	4	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	3	2	3
4	1	4	14	4	5	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	1	2	2
5	1	4	18	1	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	1	2	1
6	1	3	6	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	2	2	2	1
7	1	4	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9	2	2	2	3
8	1	4	22	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1
9	1	5	6	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	3	3	3
10	1	4	8	1	5	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	3	2	1
11	1	3	2	4	4	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	2	2	1	2	3
12	1	3	8	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	3	2	2
13	1	3	26	1	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	1	2	1
14	1	3	17	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	3	1
15	1	4	7	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	2	2	3
16	1	4	11	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	1	2	2
17	1	4	7	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	1	1	2	3
18	1	4	2	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	-9	2	3
19	1	3	7	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	3
20	1	4	5	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	-9	2	3
21	1	4	4	1	2	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	3	2	3
22	1	3	22	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	2	2	1
23	1	4	7	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	1
24	1	3	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	-9	2	-9
25	1	3	7	1	1	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	3	1
26	1	1	8	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	-9	2	3
27	1	1	6	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	2
28	1	3	20	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	2	3	2	3
29	1	3	6	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	2	1
30	1	1	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	2	2
31	1	2	10	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	2	2	1
32	1	3	7	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	3	2	2
33	1	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	3	2	2
34	1	6	20	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	3
35	1	3	1	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	2	3
36	1	1	2	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	-9	2	3
37	1	3	5	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	3	2
38	1	1	13	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	3
39	1	4	5	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2
40	1	3	8	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	1	2	2
41	1	2	25	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1
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Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
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Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
109	1	4	20	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	2	2	1
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114	1	-9	23	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-9	2	2	2	3
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159	2	3	20	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	3	3	2	2
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Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
163	2	4	15	1	3	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	2	1
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165	2	4	1	4	5	4	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	1	0	1	0	0	1	1	0	2	1	1	1	1
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167	2	3	10	2	3	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	1	2	2
168	2	5	10	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	2	2	3
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178	2	2	8	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	1	1	2	1
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188	2	4	18	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	2	3	2	3
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214	2	-9	-9	1	2	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
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216	2	2	3	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	3

Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
217	2	4	-9	4	5	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	1	1	1	1
218	2	1	15	4	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	2	2	3
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222	2	4	18	3	5	1	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	1	1	3	1
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Sub.	V0	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29	V30	V31	V32	V33	V34	V35	V36	V37	V38	V39	V40	V41	V42
271	2	4	15	1	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	2	1
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Sub.	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
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18	2	3	2	2	4	3	3	3	4	4	1	3	3	3	1	2	2	2	2	1	3	3	3	2	1	1	1	1	2	2	1	1	1	1	1	2	2	2	2	2
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Sub	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
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Sub.	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
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Sub.	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
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206	1	1	1	2	3	3	3	3	4	4	1	1	1	1	2	2	1	1	2	1	2	3	3	2	1	1	1	1	1	1	1	4	2	1	2	3	4	4	5	5
207	1	1	1	3	3	3	3	4	3	3	2	2	2	2	2	2	2	2	2	1	1	2	2	1	1	2	2	2	2	1	1	1	1	1	1	2	2	3	3	3
208	3	1	1	4	5	2	3	4	5	5	1	1	1	1	1	1	2	4	3	2	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2
209	2	1	1	3	3	2	4	2	5	5	1	1	1	1	1	1	3	3	3	2	3	3	4	3	2	2	2	1	2	3	3	2	1	2	2	3	3	4	3	3
210	1	1	1	2	3	2	4	4	3	4	1	2	2	2	3	2	3	2	2	1	3	3	3	3	1	1	1	2	1	1	1	1	1	1	1	2	3	3	3	3
211	-9	3	1	1	3	2	3	2	4	4	2	2	3	3	3	2	1	2	2	1	3	4	4	3	2	2	1	2	3	2	3	2	3	1	2	4	3	3	5	5
212	1	1	1	1	2	2	2	2	3	3	1	1	2	2	2	2	2	1	1	1	1	2	2	2	1	2	1	1	1	1	1	2	1	1	2	2	2	2	3	2
213	2	1	1	2	3	4	4	4	5	5	2	3	3	3	3	1	3	3	3	1	2	1	1	1	1	1	1	3	3	1	3	1	1	1	1	3	3	3	5	5
214	1	1	1	1	-9	1	3	4	5	2	1	1	1	1	1	1	2	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
215	1	1	2	3	3	2	3	4	4	3	1	2	3	2	2	1	1	2	3	2	3	2	3	3	1	1	1	1	1	1	2	2	2	1	1	2	3	3	4	3
216	1	1	1	2	3	3	3	4	4	5	2	4	2	4	4	4	3	3	3	2	4	5	2	3	2	4	2	3	4	1	1	4	1	1	2	3	3	3	4	4

Sub.	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
217	1	1	1	2	3	2	2	2	3	3	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	2	2
218	1	1	1	2	1	1	4	3	5	4	1	5	2	5	5	5	1	3	2	1	2	1	1	1	1	1	1	1	5	1	4	1	2	1	1	2	3	1	5	3
219	1	1	1	2	3	2	3	3	3	3	2	2	2	2	2	2	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	3
220	1	1	2	2	1	2	2	3	4	4	2	2	2	2	2	2	2	2	2	1	3	3	2	2	1	2	1	1	2	1	2	2	2	1	1	2	2	2	3	3
221	1	2	2	3	4	2	2	2	2	4	2	2	2	2	3	2	2	3	3	1	3	2	2	3	1	1	1	2	2	1	2	2	2	1	1	2	3	3	3	3
222	1	1	1	1	3	2	2	4	2	1	2	2	1	2	2	1	1	1	1	1	1	1	2	2	1	1	1	2	2	2	2	1	1	1	1	2	1	3	4	4
223	1	1	2	3	3	2	4	4	4	4	1	1	2	2	1	1	1	2	2	1	3	1	1	1	1	1	2	1	2	1	1	2	2	1	1	1	1	1	2	2
224	3	1	1	3	3	1	2	2	3	3	2	1	2	1	1	1	3	2	3	1	3	3	3	2	1	1	1	1	1	1	2	2	1	1	1	2	2	3	4	4
225	1	1	1	3	3	3	3	3	3	3	1	1	1	1	1	1	2	2	2	1	2	1	2	3	1	1	1	1	1	1	1	1	1	1	1	1	2	2	3	2
226	1	2	2	2	3	2	2	3	4	4	3	2	3	2	3	2	3	3	3	2	3	3	3	2	2	2	1	2	2	1	2	1	2	1	2	2	2	3	3	4
227	1	1	1	1	3	3	3	3	5	5	1	1	1	1	4	2	1	3	3	1	2	1	2	2	1	2	1	1	2	1	2	1	1	1	1	2	2	1	4	4
228	2	2	2	2	4	1	3	3	4	4	1	2	2	1	1	1	2	3	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	1	2	2	2	3	4	4
229	1	2	2	3	2	2	2	3	4	4	1	1	1	1	3	2	3	3	3	2	2	3	1	3	1	1	1	1	1	1	1	3	3	1	3	1	3	3	4	4
230	1	1	2	3	3	3	5	4	4	4	1	3	3	3	3	2	2	2	2	1	3	2	2	3	2	3	3	2	3	1	2	2	2	1	1	2	3	3	2	2
231	2	1	1	2	2	3	2	2	4	2	1	3	3	2	1	1	1	2	2	2	3	2	3	2	2	3	2	3	2	2	2	1	2	2	1	2	2	1	3	3
232	1	1	1	2	2	2	4	3	3	3	1	2	1	2	2	2	1	2	2	1	1	2	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	2	2
233	2	1	1	1	2	2	3	3	4	3	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	1	1	2	1	1	1	1	1	2	2	1	1	2	2	2
234	2	1	1	2	3	2	4	4	4	4	1	1	2	1	1	1	2	3	3	2	3	3	3	2	1	3	2	2	2	1	2	1	1	1	2	2	3	3	4	4
235	1	2	1	2	3	1	1	3	4	4	2	1	2	1	3	1	2	2	2	1	2	2	2	2	2	2	1	2	1	1	2	2	1	1	2	2	2	3	4	3
236	1	1	1	3	5	3	3	5	5	3	2	2	2	3	3	3	3	3	3	1	3	2	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	3	3
237	1	1	1	2	3	2	3	4	3	4	2	2	2	2	3	3	2	2	2	1	2	1	1	2	1	1	1	2	2	1	2	1	1	1	1	2	1	2	3	2
238	1	2	1	3	3	1	2	3	4	5	1	2	4	2	4	2	2	3	3	1	1	4	4	3	1	1	1	1	1	1	3	2	2	1	3	1	3	4	5	5
239	1	2	2	3	3	3	3	4	4	4	2	2	3	3	3	2	2	2	3	1	2	2	2	2	2	1	2	2	2	3	3	2	1	1	2	2	2	4	4	4
240	1	2	2	3	4	2	4	2	4	4	3	1	2	3	1	3	2	3	2	1	2	2	3	3	3	2	1	2	1	1	3	2	3	2	3	3	1	3	4	4
241	1	1	1	3	3	2	3	3	2	3	1	2	3	2	3	2	1	1	1	1	1	1	1	1	1	2	1	2	2	1	2	2	2	1	1	1	2	2	3	4
242	1	1	1	3	4	3	4	3	4	4	1	2	1	3	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
243	1	1	1	2	2	1	1	2	3	3	1	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	2	2
244	1	2	1	3	2	2	3	3	3	4	1	2	2	2	2	2	2	2	3	1	2	2	2	2	2	2	1	1	1	1	2	1	1	1	1	2	2	2	3	2
245	1	1	1	2	3	1	3	3	3	3	1	1	1	1	1	1	1	2	2	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
246	1	1	1	2	3	2	2	2	3	3	1	1	1	1	1	1	2	2	2	1	3	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2	3	3
247	2	1	1	1	3	1	1	2	3	3	2	2	3	2	3	2	2	2	2	1	1	2	2	2	1	2	1	1	2	2	2	2	1	1	1	2	2	2	3	3
248	1	1	1	1	3	2	2	3	4	5	2	2	3	2	3	2	2	3	3	1	2	2	3	2	1	2	2	2	2	1	2	2	2	1	1	2	4	4	5	5
249	1	2	1	3	3	3	3	3	3	4	1	1	2	1	2	2	1	2	1	1	2	2	3	3	1	2	2	2	2	2	3	1	1	1	1	2	3	3	3	4
250	2	1	2	4	2	2	2	3	3	3	3	2	2	3	3	3	1	1	1	1	1	1	1	1	3	3	3	3	3	3	3	3	3	2	2	2	2	2	4	4
251	2	2	1	3	4	3	4	4	4	4	3	3	3	3	3	2	2	2	2	2	3	2	3	3	2	2	1	2	3	2	1	2	2	1	1	2	2	3	4	4
252	2	1	1	1	3	2	4	2	3	4	3	1	2	2	2	2	1	2	3	1	3	1	2	1	1	2	1	2	2	2	2	2	1	1	1	2	2	2	3	3
253	1	1	1	1	3	1	2	3	3	1	1	1	1	1	1	1	1	2	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
254	2	1	1	2	4	3	2	4	4	4	3	1	1	1	2	1	2	2	2	1	2	3	2	2	1	1	1	2	1	2	2	1	1	1	2	2	2	2	2	2
255	1	2	2	2	4	1	1	1	4	3	1	1	1	1	1	1	2	3	3	1	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	4	4
256	1	1	1	2	4	3	4	3	4	4	1	2	1	2	3	2	2	3	2	1	2	1	2	2	1	2	1	3	3	2	3	2	2	2	1	3	1	1	4	4
257	2	1	1	2	2	3	3	3	4	4	1	1	1	1	1	1	2	2	1	1	3	2	2	2	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2
258	1	2	2	2	2	2	2	2	3	3	1	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
259	1	1	1	1	2	2	2	2	4	3	1	1	2	2	2	1	1	2	2	1	1	2	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	3	2
260	3	1	2	3	3	2	3	3	4	3	1	1	2	1	1	1	2	3	3	2	3	2	2	3	2	2	1	2	1	1	2	2	2	1	2	3	3	4	3	3
261	1	1	1	1	3	1	5	4	3	4	3	3	2	3	3	3	3	3	3	2	2	4	3	2	1	2	1	2	1	2	3	2	1	1	1	2	2	3	4	4
262	1	2	2	2	4	3	3	4	4	4	2	2	2	3	4	2	2	2	2	1	2	3	3	3	2	3	2	2	2	2	2	1	3	2	2	3	3	3	3	3
263	1	1	1	3	2	4	4	4	4	4	1	2	2	2	2	2	2	3	2	2	3	3	3	3	1	1	1	1	1	1	1	2	1	2	2	2	2	2	4	4
264	1	1	1	3	-9	2	4	3	4	5	1	2	3	3	3	3	2	3	2	2	3	4	4	2	2	3	2	3	2	1	3	1	3	2	2	3	3	3	3	3
265	1	1	1	3	3	4	4	4	4	4	2	2	2	2	2	2	3	3	4	2	3	2	2	3	2	2	2	2	2	1	3	2	2	1	1	3	2	3	5	4
266	3	1	1	1	3	1	1	3	3	4	1	1	1	1	1	1	2	3	3	1	1	3	2	1	1	1	1	1	1	1	3	1	1	1	1	1	1	3	4	4
267	1	1	1	4	5	1	1	3	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4
268	1	2	2	3	3	3	4	3	4	3	3	3	3	3	3	3	2	3	3	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
269	1	2	2	3	3	3	3	3	4	4	1	2	2	2	2	2	2	2	2	1	2	3	2	2	1	1	1	1	2	1	1	2	1	1	1	2	2	2	2	2
270	1	1	1	1	3	2	2	3	3	3	1	3	2	3	2	2	1	2	2	1	2	2	3	3	1	1	1	1	1	1	2	1	1	1	1	2	1	2	3	3

Sub.	V43	V44	V45	V46	V47	V48	V49	V50	V51	V52	V53	V54	V55	V56	V57	V58	V59	V60	V61	V62	V63	V64	V65	V66	V67	V68	V69	V70	V71	V72	V73	V74	V75	V76	V77	V78	V79	V80	V81	V82
271	3	1	1	2	2	2	2	2	2	3	1	1	1	1	1	1	2	3	4	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	3	3	3
272	1	1	1	1	3	2	4	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	2	1	1	1	1	1	2	2	3	3
273	1	1	1	2	2	1	2	3	4	2	2	1	1	2	3	1	2	3	2	2	1	1	3	2	1	1	1	2	1	2	3	1	2	2	2	2	3	3	4	4
274	1	2	2	2	3	3	3	4	4	4	2	2	2	2	2	2	2	3	3	2	3	1	1	2	2	2	1	1	2	2	4	2	3	2	2	3	3	3	4	4
275	1	1	2	2	3	3	4	3	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	1	3	2	1	2	3	2	1	1	1	3	2	3	3
276	2	2	2	4	3	1	1	1	2	4	3	2	2	2	2	2	3	3	4	3	5	3	4	3	4	4	4	4	2	4	3	3	3	3	3	4	4	4	4	4
277	2	1	1	3	5	1	1	1	5	5	2	1	1	1	1	1	3	3	3	2	2	4	4	2	1	1	1	1	1	1	1	2	2	2	2	3	2	3	5	5
278	1	1	1	2	4	3	4	3	4	4	1	1	2	2	2	1	2	3	3	1	2	2	2	2	1	2	1	1	2	2	1	1	1	1	1	2	2	2	3	3
279	1	1	1	1	3	3	3	3	3	4	1	2	2	2	2	2	1	1	1	1	2	1	1	2	1	1	1	1	2	1	2	2	1	1	1	2	2	2	3	3
280	3	1	1	3	2	2	4	4	4	5	2	2	2	2	4	2	1	1	1	1	1	3	2	1	1	1	1	1	3	1	3	2	2	1	1	1	1	3	4	5

APPENDIX G

List of Building Contractors

APPENDIX G

List of Building Contractors

A-M Homes
125 East Victoria Street
Santa Barbara, California 93101

A. G. Spanos Construction
1341 West Robinhood Drive
Stockton, California 95207

Acacia Construction Inc.
1021 West Bastanchury Road
Fullerton, California 92633

Ahmanson Development Inc.
1370 South Valley Vista Drive
Diamond Bar, California 91765

Akins Development Company
5 Park Plaza
Irvine, California 92714

Alden Company
411 Borel Avenue
San Mateo, California 94402

American West Development
2700 East Sunset Road
Las Vegas, Nevada 89120

Amir Development Company
8730 Wilshire Boulevard
Beverly Hills, California 90211

Amrep Corporation
10 Columbus Circle
New York, New York 10019

Amurcon Corporation of Virginia
1001 East Main Street
Richmond, Virginia 23219

Anden Group
15260 Ventura Boulevard
Sherman Oaks, California 91403

Andrade Development
1620 West Fairmont
Fresno, California 93705

Arker Construction
1015 Cedar Lane
Woodmere, New York 11598

Artery Organization Inc.
7200 Wisconsin Avenue
Bethesda, Maryland 20814

Arthur Rutenberg Homes Inc.
13922 58th Street N
Clearwater, Florida 34620

Baldwin Company
16811 Hale Avenue
Irvine, California 92714

Barden & Robeson Corporation
26 Copeland Avenue
Homer, New York 13077

Barnett - Range Corporation
PO Box 8189
Stockton, California 95208

Barratt American Inc.
30 Fairbanks
Irvine, California 92718

Barry, Bette & Led Duke Inc.
PO Box 12789
Albany, New York 12212

Bay Ridge Properties
411 108th Avenue
Bellevue, Washington 98004

BBC Group Inc.
31731 Northwestern Highway
Farmington Hills, Michigan 48334

Beazer Properties Inc.
945 East Paces Ferry Road
Atlanta, Georgia 30326

Bennett & Compton Inc.
PO Box 1597
Lodi, California 95241

Bergheer Company
840 Newport Center Drive
Newport Beach, California 92660

Blazer Building
10101 Harwin
Houston, Texas 77036

Blitman Building Corporation
222 Grace Church Street
Port Chester, New York 10573

Borror Corporation
5501 Frantz Road
Dublin, Ohio 43017

Boston Capital Partners Inc.
313 Congress Street
Boston, Massachusetts 02210

Bovis Homes
498 Palm Springs Drive
Altamonte Springs, Florida 32701

Bozzuto & Associates
6401 Colden Triangle Drive
Greenbelt, Maryland 20770

Braddock & Logan Associates
4155 Blackhawk Circle
Danville, California 94506

Bradley Construction
PO Box 6875
Clearwater, Florida 33518

Braemar Homes
30495 Canwood Street
Agoura Hills, California 91301

Bramalea California Inc.
One Park Plaza
Irvine, California 92714

Brehm Communities
2835 Camino Del Rio
San Diego, California 92108

Bresler & Reiner Inc.
401 Main Street SW
Washington, D.C. 20024

Brighton Homes
505 North Tustin Avenue
Santa Ana, California 92705

Broadmoor Homes
5405 Oberlin Drive
San Diego, California 92121

Buie Corporation
16935 West Bernardo Drive
San Diego, California 92127

Burkart & Oehlerking
14 North 808 Route 25
East Dundee, Illinois 60118

Burnside Construction Company
18400 South Halsted Street
Glenwood, Illinois 60425

C-I / Mitchell & Best Company
1686 East Gude Drive
Rockville, Maryland 20850

CP Morgan Company
1980 East 116th Street
Carmel, Indiana 46032

Cal Coast Development Group
2500 VIA Cabrillo Marina
San Pedro, California 90731

California Community Builders
233 Wilshire Boulevard
Santa Monica, California 90401

Calprop Corporation
5456 McConnell Avenue
Los Angeles, California 90066

Calton Inc.
500 Craig Road
Freehold, New Jersey 07728

Cambridge Homes Inc.
800 South Milwaukee Avenue
Libertyville, Illinois 60048

Casden Company
9090 Wilshire Boulevard
Beverly Hills, California 90211

Castle & Cooke Properties
10900 Wilshire Boulevard
Los Angeles, California 90024

Catalina Homes
644 Ferguson Drive
Orlando, Florida 32858

Cavalier Homes Inc.
600 M Bank Building
Wichita Falls, Texas 76307

Cayman Development
18012 Cowan Street
Irvine, California 92714

CEH Investments
410 Severn Avenue
Annapolis, Maryland 21403

Centex Corporation
3333 Lee Parkway
Dallas, Texas 75219

Century American
PO Box 3500
Laguna Hills, California 92705

Century Homes Communities
1535 South D Street
San Bernardino, California 92408

Champion Home Builders
5573 East North Street
Dryden, Michigan 48428

Chandler Group
704 South Victory Boulevard
Burbank, California 91502

Charles Rutenberg Housing Group
28059 Highway 19 N
Clearwater, Florida 34621

Charter Group Inc.
PO Box 241089
Omaha, Nebraska 68124

Christopher Construction
8290 Old Courthouse Road
Vienna, Virginia 22180

Ciotti Construction
111 Summit Drive
Exton, Pennsylvania 19341

Citation Builders
15101 Redhill Avenue
Tustin, California 92680

Clayton Homes Inc.
PO Box 15169
Knoxville, Tennessee 37901

Coachmen Industries
601 East Beardsley Avenue
Elkart, Indiana 46514

Coleman Homes Inc.
PO Box 9336
Bakersfield, California 93389

Colony Homes
PO Box 100
Woodstock, Georgia 30168

Colson & Colson Construction
2741 12th Street SE
Salem, Oregon 97302

Commodore Corporation
PO Box 577
Coshen, Indiana 46526

Communities Construction Corporation
1555 Palm Beach Lakes Boulevard
West Palm Beach, Florida 33401

Community Construction Inc.
531 California Avenue
Bakersfield, California 93304

Condiotti Enterprises
PO Box 6855
Santa Rosa, California 95406

Contempri Homes Inc.
Stauffer Industrial Park
Taylor, Pennsylvania 18504

Continental Homes Holding
7001 North Scottsdale Road
Scottsdale, Arizona 85250

Cooper Communities Inc.
1 Sunset Drive
Bella Vista, Arkansas 72714

Coscan Development Corporation
PO Box 428
Toronto, Canada M5X1H9

Costain Homes Inc.
620 Newport Center Drive
Newport Beach, California 92660

Covington Development Group
2451 East Orangethorpe
Fullerton, California 92631

Crisp - Lingerfelt Company
9440 Phillips Highway
Jacksonville, Florida 32256

Crosland Contractors
135 Scaley Bark Road
Charlotte, North Carolina 28209

Crosswinds Communities
7380 Meadowridge Circle
Bloomfield, Michigan 48033

Custom Living Homes
375 Route 24
Chester, New Jersey 07930

D. G. & Associates
10769 Woodside Avenue
Santee, California 92071

David Cutler Group
1 Valley Square
Blue Bell, Pennsylvania 19422

Davidson Communities
12520 High Bluff Drive
San Diego, California 92130

Davis Building Corporation
8200 North Haverstick Road
Indianapolis, Indiana 46240

DeLuca Enterprises Inc.
842 Durham Road
Newtown, Pennsylvania 18940

Deluxe Homes of Pennsylvania
499 West 3rd Street
Berwick, Pennsylvania

Dematteis Construction
EAB Plaza West Tower
Uniondale, New York 11556

DiLoreti Construction
PO Box 70280
Reno, Nevada 89570

Diversified Homes
10015 Old Columbia Road
Columbia, Maryland 21046

Dividend Development Corporation
3600 Pruneridge Avenue
Santa Clara, California 95051

Divosta & Company
10358 Riverside Drive
Palm Beach Gardeb, Florida 33410

Dobson Builders
753 D & E Thimble Shoals Boulevard
Newport News, Virginia 23606

Dominion Developments Inc.
5911 Orchard Streat West
Tacoma, Washington 98467

Don Galloway Homes
11231 Carmel Commons Boulevard
Charlotte, North Carolina 28226

Douglas Alfred Company
1660 North Hotel Circle Drive
San Diego, California 92108

Doyle Wilson Homebuilder
8310 Capital of Texas Highway
Austin, Texas 78731

Drake Homes
PO Box 1448
Chico, California 95927

Drees Company
211 Grandview Drive
Covington, Kentucky 41017

Dunmore Homes
2150 Professional Drive
Roseville, California 95661

Edward Rose Building Enterprises
PO Box 937
Southfield, Michigan 48037

Elam G. Stoltzfus Inc.
474 Mount Sidney Road
Lancaster, Pennsylvania 17602

Elliott Homes Inc.
11093 Sun Center Drive
Rancho Cordova, California 95670

Embrey Investments Inc.
750 East Mulberry Street
San Antonio, Texas 78212

Emerald Homes
333 North Belt
Houston, Texas 77060

Engle Group Inc.
123 Northwest 13th Street
Boca Raton, Florida 33432

Enterprise Development
710 West Oakdale
Chicago, Illinois 60657

Eproch Properties Inc.
359 Carolina Avenue
Winter Park, Florida 32789

Estes Home Building
PO Box 17360
Tucson, Arizona 85731

Estridge Construction
148 West Carmel Drive
Carmel, Indiana 46032

Evans Withycombe Inc.
4455 East Camelback Road
Phoenix, Arizona 85018

Fairfield Communities Inc.
2800 Cantrell Road
Little Rock, Arkansas 72203

Fairfield Homes Inc.
12876 Harbor Drive
Woodbridge, Virginia 22192

Falcon Development Corporation
2290 South Jones Boulevard
Las Vegas, Nevada 59102

Fieldstone Company
14 Corporate Plaza
Newport Beach, California 92660

Fischer & Frichtel
7 The Pines Court
St. Louis, Missouri 63141

Fleetwood Enterprises
PO Box 7638
Riverside, California 92523

Flournoy Construction
PO Box 6566
Columbus, Georgia 31995

Forecast Group
10670 Civic Center Drive
Rancho Cucamonga, California 91730

Forest City Enterprises
10800 Brookpark Road
Cleveland, Ohio 44130

Foreston Development Corporation
5 Dakota Drive
Lake Success, New York 11042

Foster Brothers Inc.
3975 University Drive
Fairfax, Virginia 22030

FPA Corporation
2507 Philmont Avenue
Huntingdon Valley, Pennsylvania 19006

Frank Robino & Associates
5189 West Woodmill Drive
Wilmington, Delaware 19808

Frankel Enterprises
1845 Walnut Street
Philadelphia, Pennsylvania 19103

Friedman Homes
10807 Laurel
Rancho Cucamonga, California 91730

Friendswood / Village Builders
PO Box 2567
Houston, Texas 77001

Fryling Construction
2100 Chicago Drive SW
Wyoming, Michigan 49509

Fuqua Homes Inc.
7100 South Cooper
Arlington, Texas 76017

G.L. Homes of Florida
1401 University Drive
Coral Gables, Florida 33071

Garden State Land Company
101 Interchange Plaza
Cranbury, New Jersey 08512

GBW Properties
520 South Lafayette Park Place
Los Angeles, California 90057

General Development
2601 South Bayshore Drive
Miami, Florida 33133

General Homes Corporation
7322 Southwest Freeway
Houston, Texas 77074

Gentry Homes
PO Box 295
Honolulu, Hawaii 96809

Ginsburg Development
245 Saw Mill River Road
Hawthorne, New York 10532

Glenfed Development Corporation
16601 Ventura Boulevard
Encino, California 91436

Golden West Homes
1308 Wakeham
Santa Ana, California 92705

Goldrich & Kest Industries
5150 Overland Avenue
Culver City, California 90231

Good Value Homes
1460 93rd Lane NE
Blaine, Minnesota 55434

Goodman Homes Inc.
1424 Gables Court
Plano, Texas 75075

Graham Construction
6843 Main Street
Miami Lakes, Florida 33014

Grancorp
8309 North Lake Drive
Dublin, California 94568

Grant Construction
1117 Lone Palm Avenue
Modesto, California 95353

Grayson Homes Inc.
9025 Chevrolet Drive
Ellicott City, Maryland 21043

Gregory Group Inc.
1070 Sixth Avenue
Belmont, California 94002

Griffin Homes
24005 Ventura Boulevard
Calabasa, California 91302

Grupe Company
PO Box 7576
Stockton, California 95207

Guerdon Homes
5285 Meadows
Lake Oswego, Oregon 97305

Gulfstream Housing Corporation
861 Douglas Avenue
Altamonte Springs, Florida 32714

Hal Porter Homes
1280 Central Boulevard
Brentwood, California 94513

Harkins Builders Inc.
12301 Old Columbia Pike
Silver Spring, Maryland 20904

Harold Moore Associates
PO Box 756
Fayetteville, Tennessee 37334

Hassinger Construction
300 Park Boulevard
Itasca, Illinois 60143

Hearndon / Rosewell Construction
2010 Old Greenbrier Road
Chesapeake, Virginia 23320

Henry Fischer Builder Inc.
1035 Eaton Drive
Ft. Wright, Kentucky 41017

Highland Homes
12880 Hillcrest
Dallas, Texas 75230

Hill Williams Development Corporation
175 Riverview
Anaheim Hills, California 92808

Hills Developers Inc.
7420 Montgomery Road
Cincinnati, Ohio 45236

Hofmann Company
PO Box 907
Concord, California 94522

Holiday Builders Inc.
1901 South Harbor City Boulevard
Melbourne, Florida 32901

Holiday Organization Inc.
400 Post Avenue
Westbury, New York 11590

Holly Corporation
101 East 26th Street
Tacoma, Washington 98421

Holtzman & Silverman Construction
30833 Northwestern Highway
Farmington Hills, Michigan 48018

Home by Hemphill
330 West Frontage Road
Northfield, Illinois 60093

Home Capital Development Group
707 Broadway
San Diego, California 92185

Homes by Dave Brown
2164 East Broadway Road
Tempe, Arizona 85282

Homes of Mreit Inc.
PO Box 1606
Barton, Florida 33830

Homestead Group Association
10345 West Olympic Boulevard
Century City, California 90064

Honestead Land Development
979 Broadway
Millbrae, California 94030

Horton Homes Inc.
PO Box 581
Eatontown, Georgia 31024

Housing Group
1399 Ygnacio Valley Road
Walnut Creek, California 94598

Hovnanian Enterprises Inc.
10 Highway 35
Red Bank, New Jersey 07701

Hughes - Patwil Homes
PO Box 6181
Harrisburg, Pennsylvania 17112

Hunt Building Corporation
PO Box 9368
El Paso, Texas 79984

Hylton Group
5593 Mapledale Plaza
Dale City, Virginia 22193

Icon Development Corporation
6262 Bird Road
Miami, Florida 33155

Inco Homes
PO Box 970
Upland, California 91785

Interamerican Builders Corporation
15375 Barranca Parkway
Irvine, California 92718

International American Homes
100 Walnut Avenue
Clark, New Jersey 07066

Interstate General Company
222 Smallwood Village Center
St. Charles, Maryland 20602

ITT Community Homes
1 Corporate Drive
Palm Coast, Florida 32151

Ivory Homes
127 South 500 E
Salt Lake City, Utah 84102

J.E. Jones Constructon Company
13100 Manchester Road
St. Louis, Missouri 63131

J.L. Mason Group Inc.
5020 Tamiami Trail North
Naples, Florida 33940

Jacobsen Manufacturing
PO Box 368
Safety Harbor, Florida 34695

James Lewis Corporation
1301 Lancaster Avenue
Berwyn, Pennsylvania 19312

JCC Development
3480 Torrance Boulevard
Torrance, California 90503

Jim Walter Homes Inc.
1500 North Dale Mabry Highway
Tampa, Florida 33607

JMC Homes
1830 Vernon Street
Roseville, California 95678

Joe Keim Builders Inc.
618 Frazier Court
Wheaton, Illinois 60187

John Cooley Company
36250 DeQuindre
Sterling Heights, Michigan 48310

John Laing Homes, Inc.
23382 Mill Creek
Laguna Hills, California 92653

John Wieland Homes
PO Box 87363
Atlanta, Geordia 30337

Joseph Miller Construction
18133 Cedar Avenue S
Farmington, Minnesota 55024

Kaplan Organization
3100 Woodbridge Avenue
Edison, New Jersey 08818

Kathryn Thompson Development
85 Argonaut
Aliso Viejo, California 92656

Kaufman and Broad
10877 Wilshire Boulevard
Los Angeles, California 90024

Kennedy Group (Florida)
2001 West Sample Road
Pompano Beach, Florida 33064

Kennedy Group (Illinois)
3721 Ventura Drive
Arlington Heights, Illinois 60004

Kettler Brothers Inc.
9426 Stewartown Road
Montgomery Village, Maryland 20879

Kettler Forlines Inc.
19110 Montgomery Village Avenue
Gaithersburg, Maryland 20760

Key Company
1020 East Wendover
Greensboro, North Carolina 27420

Kimball Hill Inc.
5999 New Wilke Road
Rolling Meadows, Illinois 60008

Kirk Corporation
201 Juniper Circle
Streamwood, Illinois 60107

Kit Manufacturing Company
PO Box 848
Long Beach, California 90801

Klutts Homes
1433 Emerywood Drive
Charlotte, North Carolina 28210

Kopf Construction Corporation
32730 Walker Road
Avon Lake, Ohio 44012

L.A. Chanco Inc.
22632 Golden Springs Road
Diamond Bar, California 91765

L.J. Hooker Homes
6000 Live Oak Parkway
Norcross, Georgia 30093

Landstar Homes
510 Elkwood Court
Kissimmee, Florida 34743

Larwin Construction Company
16255 Ventura Boulevard
Encino, California 91436

Leader Enterprises Inc.
146 Timber Creek Drive
Cordova, Tennessee 38134

Lecesse Corporation
1412 West Colonial Drive
Orlando, Florida 32804

Legacy Homes
900 Roosevelt Parkway
Chesterfield, Missouri 63017

Leisure Technology
12233 West Olympic Boulevard
Los Angeles, California 90064

Lennar Corporation
700 NW 107th Avenue
Miami, Florida 33172

Levitt Corporation
7777 Glades Road
Boca Raton, Florida 33434

Lewis Homes Group
PO Box 670
Upland, California 91785

Lexington Homes Inc.
1156 West Shure Drive
Arlington Heights, Illinois 60004

Lexington Homes - SKK Development
7700 College Town Drive
Sacramento, California 95826

Liberty Homes Inc.
1101 Eisenhower Drive North
Goshen, Indiana 46526

Lincoln Property Company
500 North Akard
Dallas, Texas 75201

Lindal Cedar Homes Inc.
4300 South 104th Place
Seattle, Washington 98178

Linpro Company
200 Berwyn Park
Berwyn, Pennsylvania 19312

Lokey Construction
1800 Bering Drive
Houston, Texas 77057

Long Signature Homes
13601 Office Place
Woodbridge, Virginia 22192

Lowder Construction Company
2000 Interstate Park Drive
Montgomery, Alabama 36142

Luckey Company
PO Box 7428
Stockton, California 95207

Lusk Company
17550 Gillette Avenue
Irvine, California 92713

Lycon Group
15303 Ventura
Sherman Oaks, California 91403

M.D.C. Holdings Inc.
3600 South Yosemite
Denver, Colorado 80237

MacLeod Development Company
2 North Lake Avenue
Pasadena, California 91101

Manning Company
2031 Orchard Drive
Santa Ana Heights, California 92707

Marrano / Marc Equity Company
2730 Transit Road
Buffalo, New York 14884

Martin Selko Company
110 North Doheny Drive
Beverly Hills, California 90211

Matzel & Mumford Organization
61 Village Court
Hazlet, New Jersey 07730

Mayer Homes
1799 New Smizer Mill Road
St. Louis, Missouri 63026

McBail Company
3200 Danville Bulavarde
Alamo, California 94507

McBride & Son Enterprises
11 McBride Corporation Center
St. Louis, Missouri 63005

McKellar Communities
5151 Shoreham Place
San Diego, California 92122

McMillin Communities
2727 Hoover Avenue
National City, California 92050

Meeker Development Company
19100 VonKarman Avenue
Irvine, California 92715

Mercedes Homes
1600 West Eau Gallie Boulevard
Melborne, Florida 32935

Miceli Holding Company
14897 Clayton Road
Ballwin, Missouri 63011

Michael Andrew Group
12526 High Bluff Drive
San Diego, California 92130

Michael T. Rose Associates
PO Box 40
Laurel, Maryland 20707

Michaels Group
PO Box 887
Latham, New York 12110

Milburn Investments Inc.
11911 Burnet Road
Austin, Texas 78766

Miller and Smith Construction
1568 Spring Hill Road
McLean, Virginia 22102

Milton Company
1430 Spring Hill Road
McLean, Virginia 22102

Mitchell Company
PO Box 160306
Mobile, Alabama 36616

Morris General Building Company
PO Box 3632
Chatsworth, California 91313

Mungo Company
4400 South Andrews Road
Columbia, South Carolina 29210

Nanticoke Homes Inc.
PO Box F
Greenwood, Delaware 19950

National Enterprises Inc.
2301 South Banker
Effingham, Illinois 62401

Newhall Land & Farming Company
23823 Valencia Boulevard
Valencia, California 91355

Newmark Home Corporation
10435 Greenbough
Stafford, Texas 77477

Newport Pacific Development
4400 McArthur Boulevard
Newport Beach, California 92660

North American Housing Corporation
PO Box 145
Point of Rocks, Maryland 21777

NVR L.P.
7601 Lewinsville Road
McLean, Virginia 22102

Oakwood Homes Corporation
PO Box 7386
Greensboro, North Carolina 27417

Oberer Development Company
4324 Webster Street
Dayton, Ohio 45414

Orange Blossom Hills Inc.
1200 Avenida Central
Lady Lake, Florida 32159

Oriole Homes Corporation
1151 NW 24th Street
Pompano Beach, Florida 33064

Owen Construction
2035 South Myrtle Avenue
Monrovia, California 91016

Owings & Terry Homebuilding
PO Box 7679
Marietta, Georgia 30065

Pacesetter Homes Inc.
4540 Campus Drive
Newport Beach, California 92660

Pacific Scene Inc.
3900 Harney Street
San Diego, California 92110

Pacific U.S. Corporation
2 North Lake Avenue
Pasadena, California 91101

Pacific Corporation
200 North Westlake Boulevard
Westlake Village, California 91362

Palm Harbor Homes Inc.
15301 Dallas Parkway
Dallas, Texas 75248

Panic Myers / Woodside Group
43531 Edgewater Drive
Orlando, Florida 32804

Paragon Group Inc.
7557 Rambler Road
Dallas, Texas 75231

Paragon Homes Inc.
1448 15th Street
Santa Monica, California 90404

Parker Lancaster Corporation
711 Moorefield Park Drive
Richmond, Virginia 23236

Pasquinelli Construction Company
PO Box 1639
Homewood, Illinois 60430

Patriot Homes Inc.
57420 County Road
Elkhart, Indiana 46517

Pembroke Enterprises Inc.
4425 Corporation Lane
Virginia Beach, Virginia 23462

Pennhill Company
3991 MacArthur
Newport Beach, California 92660

Peters (J.M.) Company
3501 Jamboree Road
Newport Beach, California 92658

PHM Corporation (Pulte)
33 Bloomfield Parkway
Bloomfield Hills, Michigan 48013

Picerne Properties
75 Lambert Lind Highway
Warwick, Rhode Island 02886

Pinn Brothers Construction
1475 Saratoga Avenue
San Jose, California 95129

PLH Corporation
PO Box 27
Selinsgrove, Pennsylvania 17870

Post Properties
100 Cumberland Circle
Atlanta, Georgia 30339

Premier Homes
2010 Main Street
Irvine, California 92714

Primark Corporation
1200 South 192nd Street
Seattle, Washington 98148

Projects West Corporation
17000 Ventura Boulevard
Encino, California 91316

Prometheus Development Company
2600 Campus Drive
San Mateo, California 94403

Quaker Group Builders
593 Bethlehem Pike
Montgomeryville, Pensylvania 18836

R.B. McComic Inc.
4920 Carroll Canyon Road
San Diego, California 92121

Radnor Homes Inc.
5544 Franklin Road
Nashville, Tennessee 37220

Randall Group
9500 Southwest Barbur Boulevard
Portland, Oregon 97219

Randall Properties
330 North Sixth Street
Redlands, California 92374

Rayco Inc.
PO Box 5250
San Antonio, Texas 78201

Realen Homes
1235 Westlake Drive
Berwyn, Pennsylvania 19312

Red Seal Development Corporation
425 Huehl Road
Northbrook, Illinois 60062

Redman Homes
2550 Walnut Hill Lane
Dallas, Texas 75229

Regency Homes Inc.
2826 University Drive
Pompano Beach, Florida 33065

Regis Homes
5120 Campus Drive
Newport Beach, California 92660

Reynolds Construction
111 South Marshall Street
El Cajon, California 92020

RGC Group
20 Corporate Plaza
Newport Beach, California 92660

Richnarr Construction Corporation
5301 Wisconsin Avenue NW
Washington, D.C. 20015

Ritz - Craft Corporation
PO Box 70
Mifflinburg, Pennsylvania 17884

Roberts Properties Inc.
PO Box 28744
Atlanta, Georgia 30328

Robertson Homes
6653 Embarcadero Drive
Stockton, California 95209

Robson Communities
25612 E.J. Robson Boulevard
Sun Lakes, Arizona 85248

Rocky Gorge Communities
1410 Spring Hill Road
McLean, Virginia 22102

Rottlund Company
5201 East River Road
Fridley, Minnesota 55421

Royce Homes Inc.
14614 Falling Creek
Houston, Texas 77068

RWR Development
16461 Sherman Way
Van Nuys, California 91406

RWS Development Corporation
9650 West 194th Street
Mokena, Illinois 60448

Ryder Homes
PO Box 4008
Walnut Creek, California 94596

Ryland Group Inc.
10221 Wincopin Circle
Columbia, Maryland 21044

S & A Custom Built Homes
501 Rolling Drive
State College, Pennsylvania 16801

Schneider Homes
6510 South Center Boulevard
Seattle, Washington 98188

Scottenstein (M/I) Inc.
1855 East Dublin - Granville
Columbus, Ohio 43229

Schuler & Associates
1001 Bishop Street
Honolulu, Hawaii 96813

Schult Homes Corporation
PO Box 151
Middlebury, Indiana 46540

Selective Group Inc.
27655 Middlebelt Road
Farmington Hills, Michigan 48018

Sexton Construction
9001 North Meridian Street
Indianapolis, Indiana 46260

Shapell Industries
8383 Wilshire Boulevard
Beverly Hills, California 90211

Shawntana
3501 Jamboree
Newport Beach, California 92660

Shea Homes
655 Brea Canyon Road
Walnut, California 91789

Shelter Canadian Holdings
2600 Seven Evergreen Place
Winnipeg, Manitoba, Canada R312T3

Signature Homes
801 South Rancho Drive
Las Vegas, Nevada 89106

Signature Properties
6685 Owens Drive
Pleasanton, California 94566

Skyline Corporation
PO Box 743
Elkhart, Indiana 46515

Spielman - Cohen Builders
9025 Wilshire Boulevard
Beverly Hills, California 90211

Stafford Homes Inc.
16016 118th Place
Bothell, Washington 98011

Standard Pacific L.P.
1565 West MacArthur
Costa Mesa, California 92626

Stanley Martin Construction
8000 Towers Crescent Drive
Vienna Spring, Virginia 22182

Stok Homes Inc.
1420 Spring Hill
McLean, Virginia 22102

Stokes - Collins
PO Box 19417
Jacksonville, Florida 32245

Stuard - Signature Homes
23701 Birtcher Drive
ElToro, California 92630

Summerhill Development
777 California Avenue
Palo Alto, California 94304

Summit Properties
212 South Tryon Street
Charlotte, North Carolina 28281

Sun City Center Corporation
PO Box 5698
Sun City Center, Florida 33570

Sundance Homes
5360 Keystone Court
Rolling Meadows, Illinois 60008

Sunland Communities
5095 Murphy Canyon Road
San Diego, California 92123

Sunrise Company
42-600 Cook Street
Palm Desert, California 92260

Taylor Morley Simon Inc.
1227 Fernridge Parkway
St. Louis, Missouri 63141

Taylor Woodrow Homes USA
3991 McArthur Boulevard
Newport Beach, California 92660

Techbilt Construction
3575 Kenyon Street
San Diego, California 92110

Toll Brothers Inc.
3103 Philmont Avenue
Huntingdon Valley, Pennsylvania 19006

Tompkins Heritage Homes
9799 Old St. Augustine Road
Jacksonville, Florida 32257

Torino Construction Coporation
PO Box 2941
Palos Verdes, California 90274

Town & Country Homes
1603 West 16th Street
Oak Brook, Illinois 60521

Trafalgar House Property
300 Phillps Boulevard
Trenton, New Jersey 08618

Trammell Crow Residential
2001 Ross Avenue
Dallas, Texas 75201

Triad Development Inc.
320 Andover Park
Seattle, Washington 98138

Trojan Properties Inc.
PO Box 962
Rancho Mirage, California 92270

U.S. Home Corporation
1800 West Loop South
Houston, Texas 77252

UDC - Universal Development
4812 South Mill Avenue
Tempe, Arizona 85282

Union Valley Corporation
2209 Route 9
Howell, New Jersey 007731

United Development Management
1400 South Wolf Road
Wheeling, Illinois 60090

Universal Constructors
PO Box 28
McMinnville, Tennessee 37110

Van Daele Development
2900 Adams Street
Riverside, California 92504

Van Metre Construction
5252 Lyngate Court
Burke, Virginia 22015

Village Homes Ltd.
6 West Dry Creek Road
Littleton, Colorado 80127

W.O. Brisbem Construction
4750 Ashwood Drive
Cincinnati, Ohio 45241

Wallick Construction Company
PO Box 1023
Columbus, Ohio 43216

Warmington Homes
3090 Pullman Street
Costa Mesa, California 92626

Washington Homes Inc.
1802 Bright Seat Road
Landover, Maryland 20785

Waterloo Inc.
7447 Bee Caves Road
Austin, Texas 78746

Watt Industries Inc.
2716 Ocean Park Boulevard
Santa Monica, California 90406

Wausau Homes Inc.
PO Box 8005
Wausau, Wisconsin 54402

Wayne Homes
6370 Mt. Pleasant Road NW
North Canton, Ohio 44720

Webb (Del) Communities
PO Box 29040
Phoenix, Arizona 85038

Weekley Homes Inc.
1300 Post Oak Boulevard
Houston, Texas 77056

Weingarten Seigel Group Inc.
198 Route Nine
Manalapan, New Jersey 07726

Wellesley Constriction
17875 University Drive
Livonia, Michigan 48152

West Venture Development Company
6345 Balboa Boulevard
Encino, California 91316

Western National Properties
630 The City Drive
Orange, California 92668

Wesrfield Homes
33073 North Hunt Club Road
Gurnee, Illinois 60031

Weston Development
10960 Wilshire Boulevard
Los Angeles, California 90024

Westrend Corporation
23671 Birtcher Drive
Lake Forest, California 92630

Westway Construction Corporation
250 West River Drive
Saint Charles, Illinois 60174

Weyerhauser Real Estate Company
Building WRE - 2
Tacoma, Washington 98477

Whitecliff Company
859 San Mateo Drive
San Mateo, California 94401

Whittaker Construction
355A Mid Rivers Mall Drive
St. Peters, Missouri 63376

Wick Building Systems
404 Walter Road
Mazomanie, Wisconsin 53560

William L. Berry Company
6701 Democracy Boulevard
Bethesda, Maryland 20817

William Lyon Construction
4490 Von Karmon
Newport Beach, California 92658

Williamsburg Properties Inc.
423 Wards Corner Road
Loveland, Ohio 45140

Wimpey (George) Inc.
3565 Seventh Avenue
San Diego, California 92103

Winncrest Homes
9985 Flosom Boulevard
Sacramento, California 95827

Wiseman - Hughes Enterprises
975 East 22nd Street
Wheaton, Illinois 60187

Woodcrest Development Inc.
17911 Mitchell Avenue
Irvine, California 92714

Woodside Homes
2275 Renaissance Drive
Las Vegas, Nevada 89119

Woodview Development Company
200 East Sandpointe Avenue
Santa Ana, California 92707

Wooldrige Organization
1500 Green Hill Road
West Chester, Pennsylvania

Zale Group
100 Lexington Drive
Buffalo Grove, Illinois 60089

Zaring National Corporation
11300 Cornell Park Drive
Cincinnati, Ohio 45242

Zicka Homes
11939 Montgomery Road
Cincinnati, Ohio 45249

APPENDIX H

List of Construction Contractors

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List of Construction Contractors

A.J. Contracting Company Inc.
470 Park Avenue South
New York, New York 10016

ABB Lummus Crest Inc.
1515 Broad Street
Bloomfield, New Jersey 07003

Absher Construction Company
1106 Shaw Road SE
Puyallup, Washington 98372

Adolfson & Peterson Inc.
6701 West 23rd Street
Minneapolis, Minnesota 55426

Advanco Constructors Inc.
1500 West 9th Street
Upland, California 91786

Al Johnson Construction Company
3209 West 76th Street
Minneapolis, Minnesota 55435

Alex J. Etkin Inc.
31440 Northwestern Highway, Suite 150
Farmington Hills, Michigan 48018

Allam A. Meyers Inc.
PO Box 98
Worchester, Pennsylvania 19490

Alvin H. Butz Inc.
Route 309 North 22
Allentown, Pennsylvania 18104

Andrew T. Curd Builders Inc.
230 North Maryland Avenue
Glendale, California 91206

Anthony Marino Construction Corporation
485 Broadway
New York, New York 10013

ARB Inc.
4042 Patton Way
Bakersfield, California 93308

Armada / Hoffler Construction Company
860 Greenbriar Circle
Chesapeake, Virginia 23320

Austin Industries
2949 Stemmons Freeway
Dallas, Texas 75247

Ball, Ball & Brosamer Inc.
333 Camille
Alamo, California 94507

Barge - Wagener Inc.
1815 The Exchange
Atlanta, Georgia 30339

Barnard & Burk Group Inc.
10252 Mayfair Drive
Baton Rouge, Louisiana 70809

Barnhill Contracting Company
2311 North Main Street
Tarboro, North Carolina 27886

Barr & Barr Inc.
330 West 42nd
New York, New York 10036

Barry, Bette & Led Duke Inc.
1245 Kings Road
Schenectady, New York 12303

Barton Malow Company
27777 Franklin Road
Southfield, Michigan 48034

Batson - Cook Company
817 4th Avenue
West Point, Georgia 31833

Baugh Enterprises Inc.
900 Poplar Place South
Seattle, Washington 98144

BE & K Inc.
2000 International Park Drive
Birmingham, Alabama 35243

Beaver Builders Inc.
One Wells Avenue
Newton, Massachusetts 02159

Beazer USA Inc.
2515 McKinney Avenue
Dallas, Texas 75201

Bechtel Group Inc.
50 Beale Street
San Francisco, California 94105

Becker Brothers Inc.
1200 Peoria Savings Plaza
Peoria, Illinois 61602

Becon Construction Company Inc.
650 North Belt
Houston, Texas 77060

Bedford Development Company
3470 Mount Diablo Boulevard
Lafayette, California 94549

Beers Construction Company
70 Ellis Street NE
Atlanta, Georgia 30303

Bell Ray Construction Company Inc.
255 Wilson Pike Circle
Brentwood, Tennessee 37027

Bernards Brothers Construction
610 Ilez Street
San Fernando, California 91340

Biehn Construction Inc.
2100 Quaker Pointe Drive
Quakertown, Pennsylvania 18951

Big - D Construction Corporation
389 West 2nd Street
Ogden, Utah 84404

Birtcher Construction Ltd.
27822 Lazo Road
Laguna Beach, California 92656

Blake Construction Company Inc.
1120 Connecticut Avenue NW
Washington, D.C. 20007

Blounting Inc.
4520 Executive Park Drive
Montgomery, Alabama 36116

Blythe Industries Inc.
2911 North Graham Street
Charlotte, North Carolina 28206

BMW Constructors Inc.
1740 West Michigan Street
Indianapolis, Indiana 46222

BOH Brothers Construction Company Inc.
730 South Street
New Orleans, Louisiana 70119

Boldt Group Inc.
2525 North Roemer Road
Appleton, Wisconsin 54915

Bradbury & Stamm Construction Company Inc.
1217 1st NW
Albuquerque, New Mexico 87102

Brasfield & Gorne General Contractors Inc.
729 South 30th Street
Birmingham, Alabama 35233

Breton Construction Inc.
2 Corporate Park
Irvine, California 92714

Brice Building Company Inc.
PO Box 1028
Birmingham, Alabama 35203

Brinderson Corporation
19700 Fairchild
Irvine, California 92715

Brown & Root Building Co.
5830 142nd Avenue N
Clearwater, Florida 34620

Brown & Root Inc.
4100 Clinton Drive
Houston, Texas 77020

Burns and Roe Enterprises Inc.
800 Kinderkamack Road
Oradell, New Jersey

Butler Construction
31st Southwest Trafficway
Kansas City, Missouri 64108

C. J. Langenfelder & Sons Inc.
8427 Pulaski Avenue
Baltimore, Maryland 21217

C. Overaa & Company
200 Parr Boulevard
Richmond, California 94801

C. D. Smith Construction Inc.
889 E. Johnson Street
Fond Du Lac, Wisconsin 54935

C. G. Schmidt Inc.
4199 North Richards Street
Milwaukee, Wisconsin 53212

C. J. Rogers Inc.
G3328 Torrey Road
Flint, Michigan 48507

C. R. Klewin Construction Company
40 Connecticut Avenue
Norwich, Connecticut 06360

C. R. Meyer & Sons Company
895 West 20th Avenue
Oshkosh, Wisconsin 54901

Caddell Construction Company Inc.
2700 Lagoon Park Drive
Montgomery, Alabama 36109

Cajun Contractors Inc.
15131 Airline Highway
Baton Rouge, Louisiana 70817

Campbell Construction Company
2120 20th Street
Sacramento, California 95818

Carrothers Construction Inc.
Highway 7 S
Water Valley, Mississippi 38965

CCC Group Inc.
5797 Dietrich
San Antonio, Texas 78219

CDI Contractors Inc.
3000 Cantrell
Little Rock, Arkansas 72202

CDK Contracting Company
800 South Hutton Street
Farmington, New Mexico 87401

Centennial Contractors Inc.
8381 Old Courthouse Road
Vienna, Virginia 22182

Centex Construction Group Inc.
3333 Lee Parkway
Dallas, Texas 75219

Centric / Jones Company
5490 West 13th Avenue
Denver, Colorado 80214

Century Contractors West Inc.
4 Kingwood Place
Kingwood, Texas 77339

Chanen Construction Company
3300 North 3rd Avenue
Phoenix, Arizona 85013

Charles Pankow Builders Ltd.
2476 North Lake Avenue
Altadena, California 91001

Charter Builders Inc.
10105 West Technology Boulevard
Dallas, Texas 75207

Chicago Bridge Iron Company
901 West 22nd Street
Hinsdale, Illinois 60521

Cianbro Corporation
PO Box 1000
Pittsfield, Maine 04967

Citadel Corporation
6075 The Corners
Norcross, Georgia 30076

Cives Corporation
411 Rouse Lane
Roswell, Georgia 30076

Clandy & Theys Construction Company
516 West Cabarrus Street
Raleigh, North Carolina 27603

Clark Construction Company
PO Box 40087
Lansing, Michigan 48901

CRSS Construction Inc.
216 16th Street
Denver, Colorado 80202

Cruz Construction Corporation
952 Holmdel Road
Holmdel, New Jersey 07733

Dal - Mac Construction Company
111 West Spring Valley Road
Richardson, Texas 75081

Damon G. Douglas Company
245 Birchwood Avenue
Cranford, New Jersey 07016

Daniel J. Keating Construction Company
812 Lancaster Avenue
Villanova, Pennsylvania 19085

Danis Industries Corporation
2 Riverplace Suite 400
Dayton, Ohio 45401

Davidson & Jones Construction Company
1201 Front Street
Raleigh, North Carolina 27609

Davy McKee Corporation
One Oliver Plaza
Pittsburg, Pennsylvania 15222

Day & Zimmermann Inc.
1818 Market Street
Philadelphia, Pennsylvania 19103

DeMaria Building Company Inc.
45500 Grand River
Novi, Michigan 48050

DeMetree Central Constructors Corporation
895 SE Lake Street
Longwood, Florida 32750

Denton Construction Company
20415 Mack
Grosse Pointe Woods, Michigan 48236

Destec Engineering Inc.
2500 Citywest Boulevard
Houston, Texas 77042

Devcon Construction Inc.
555 Los Coches Street
Milpitas, California 95035

Dick Corporation
900 State Route 51
Clairton, Pennsylvania 15025

Dillingham Construction Holdings Inc.
5960 Inglewood Drive
Pleasanton, California 94588

Donald M. Drake Company
1740 NW Flanders Street
Portland, Oregon 97209

Dondlinger & Sons Construction
1206 East Lincoln
Wichita, Kansas 67211

Donohoe Construction Inc.
2101 Wisconsin Avenue NW
Washington, D.C. 20007

Duke Associates
8888 Keystone Cross
Indianapolis, Indiana 46240

Dunn Construction Company Inc.
2 Old River Place
Jackson, Mississippi 39202

E.A. Hathaway & Company
565 Laurelwood Road
Santa Clara, California 95054

E.L. Yeager Construction Company Inc.
1995 Agua Mansa Road
Riverside, California 92509

E.W. Howell Company Inc.
2 Seaview Boulevard
Port Washington, New York 11050

Ebasco Services Inc.
2 World Trade Center
New York, New York 10048

EBY Corporation
610 North Main
Wichita, Kansas 67203

ECCO III Enterprises Inc.
500 East 132nd
Bronx, New York 10454

Ecology and Environment Inc.
368 Pleasantview Drive
Lancaster, New York 14086

Edward Kraemer & Sons Inc.
1 Plainview Road
Plain, Wisconsin 53577

Eichleay Holdings Inc.
5th & Penn's Avenue
Pittsburgh, Pennsylvania 15206

EMJ Corporation
6148 Lee Highway
Chattanooga, Tennessee 37421

Environmental Contracting Corporation
445 South Figueroa
Los Angeles, California 90071

Environmental Industries Inc.
24121 Ventura Boulevard
Calabasas, California 91302

F.A. Wilhelm Construction Company Inc.
3914 Prospect Street
Indianapolis, Indiana 46203

Facilities Systems Engineering Corporation
8933 La Cienega Boulevard
Inglewood, California 90301

Facility Constructors Inc.
2233 Lake Park Drive
Smyrna, Georgia 30080

Faulkner Construction Company
3901 South Lamar, Suite 200
Austin, Texas 78704

Federal Construction Company
1355 Snell Isle Boulevard NE
St. Petersburg, Florida 33704

Ficon Corporation
14011 Telegraph Road
Woodbridge, Virginia 22192

Fish Engineering & Construction Inc.
1990 Post Oak Boulevard
Houston, Texas 77056

Fitzpatrick & Associates Inc.
1115 Pine Brook Road
Eatontown, New Jersey 00724

Foster Wheeler Corporation
Perryville Plaza
Clinton, New Jersey 08809

Frank L. Ciminelli Construction Company Inc.
369 Franklin Street
Buffalo, New York 14202

Frank Messer & Sons Construction Company
4612 Paddock Road
Cincinnati, Ohio 45229

Fred Weber Inc.
2320 Creve Coeur Mill Road
St. Louis, Missouri 63146

Freesen Inc.
316 South Pearl Highway
Bluffs, Illinois 62621

Frontier - Kemper Construction Inc.
1695 Allen Road
Evansville, Indiana 47710

Fru - Con Consrtuction Corporation
15933 Clayton Road
Ballwin, Missouri 63011

Fusco Corporation
555 Longwharf Drive, Suite 14
New Haven, Connecticut 06511

G.E. Johnson Construction Company Inc.
310 South 14th Street
Colorado Springs, Colorado 80904

Gall Landau & Young Construction Company Inc.
100 116th Avenue SE
Bellevue, Washington 98004

Gentosi Brothers Inc.
42 Corporate Park, Suite 200
Irvine, California 92714

George & Lynch Inc.
113 West 6th Street
New Castle, Delaware 19720

George A. Fuller Company
919 Third Avenue
New York, New York 10022

George B.H. Macomber Company
Russia Wharf 530 Atlintic
Boston, Massachusetts 02210

Gerald H. Phipps Inc.
1530 West 13th Avenue
Denver, Colorado 80204

Geupel Construction Company Inc.
1661 Old Henderson Road
Columbus, Ohio 43220

Geupel De Mars Inc.
1919 North Meridian Street
Indianapolis, Indiana 46202

Gilbane Building Company
7 Jackson Walkway
Providence, Rhode Island 02903

Glen Construction Company Inc.
9055 Comprint Court
Gaitersburg, Maryland 20877

Gosnell Builders
2728 North 24th Street
Phoenix, Arizona 85008

Granger Construction Company
PO Box 22187
Lansing, Michigan 48909

Granite Construction Company
585 West Beach Street
Watsonville, California 95076

Graycor Inc.
640 North La Salle, Suite 610
Chicago, Illinois 60610

Great Lakes Dredge Dock Company
2122 York Road
Hinsdale, Illinois 60521

Green Holdings Inc.
8055 East Tufts Avenue, Suite 600
Denver, Colorado 80237

Gulf States Inc.
323 Cherry
Freeport, Texas 77541

Gust K. Newberg Construction Company
2040 North Ashland
Chicago, Illinois 60614

Guy F. Atkinson Company of California
10 West Orange Avenue
South San Francisco, California 94080

H & M Construction Company Inc.
50 Security Drive
Jackson, Tennessee 38305

H.B. Alexander Enterprises Inc.
3300 North 3rd Street
Harrisburg, Pennsylvania 17110

H.B. Zachry Company
527 Harding Boulevard
San Antonio, Texas 78221

H.J. Russell Construction Company
504 Fair Street SW
Atlanta, Georgia 30313

Haden Management Corporation
32450 North Avis
Madison Heights, Michigan 48071

Halmar Contracting Inc.
160 West Lincoln Avenue
Mt. Vernon, New York 10550

Harbert International Inc.
1 Riverchase Parkway S
Birmingham, Alabama 35224

Hardin Construction Group Inc.
1380 West Paces Ferry Raod
Atlanta, Georgia 30327

Harkins Builders Inc.
12301 Old Columbia Pike
Silver Springs, Maryland 20904

Harris Construction Company
1505 North Chestnut Avenue
Fresno, California 93703

Harvey Construction Company Inc.
10 Harvey Road
Manchester, New Hampshire 03102

Haselden Construction
2134 South Valentia
Denver, Colorado 80231

Hawkins Construction Company
2512 Deerpark Boulevard
Omaha, Nebraska 68105

HBE Corporation
11330 Olive Street Raod
St. Louis, Missouri 63141

HCB Contractors
1401 Elm Street, Suite 4600
Dallas, Texas 75202

Hensel Phelps Construction Company
420 6th Avenue
Greeley, Colorado 80631

Hoar Construction
1900 International Park Drive
Birmingham, Alabama 35243

Hoffman Corporation
1300 SW 6th
Portland, Oregon 97201

Holder Corporation
900 Ashwood Parkway, Suite 300
Atlanta, Georgia 30338

Hood Corporation
8201 South Sorensen Avenue
Whittier, California 90607

HRH Construction Corporation
909 3rd Avenue
New York, New York 10022

Hubbard Construction Company
1936 Lee Road
Winter Park, Florida 32789

Huber, Hunt and Nichols Inc.
2450 South Tibbs Avenue
Indianapolis, Indiana 46241

Hunt Building Corporation
4401 North Mesa
El Paso, Texas 79902

Huntcor Inc.
426 North 44th Street, Suite 410
Phoenix, Arizona 85008

Hunzinger Construction Company
21100 Enterprise Avenue
Brookfield, Wisconsin 53005

IA Construction Corporation
Route 202
Concordville, Pennsylvania 19331

IC Harbor Construction Company
701 Harger Road, Suite 100
Hinsdale, Illinois 60521

ICA - Construction Corporation
2655 Le Jeune Road
Miami, Florida 33134

ICF Kaiser Engineers Inc.
9300 Lee Highway
Fairfax, Virginia 22031

Industrial Contractors Inc.
401 NW 1st Street
Evansville, Indiana 47708

International Technology Corporation
23456 Hawthorne
Torrance, California 90505

J. Fletcher Creamer & Sons Inc.
101 East Broadway
Hackensack, New Jersey 07601

J.S. Alberici Construction Company Inc.
2150 Kienlen Avenue
St. Louis, Missouri 63121

J.A. Tiberti Construction Company
1806 Industrial Road
Las Vegas, Nevada 89102

J.D. Abrams Inc.
111 Congress Avenue, Suite 2400
Austin, Texas 78701

J.E. Dunn ConstructionCompany
929 Holmes
Kansas City, Missouri 64106

J.F. White Contracting Company
1 Gateway Court
Newton, Massachusetts 02158

J.H. Findorff & Son Inc.
601 West Wilson Street
Madison, Wisconsin 53703

J.H. Kelly Inc.
821 3rd Avenue
Longview, Washington 98632

J.H. Pomeroy & Company Inc.
400 West Lake Street, Suite 206
Roselle, Illinois 60172

J.R. Roberts Enterprises Inc.
5330 Primrose Drive, Suite 248
Fair Oaks, California 95628

Jack B. Parson Construction
5100 South Washington Boulevard
Ogden, Utah 84403

Jackson Construction Company
280 Bridge Street
Dedham, Massachusetts 02026

Jacobs Engineering Group Inc.
251 South Lake Avenue
Pasadena, California 91101

James McHugh Construction Company
2222 South Indiana Avenue
Chicago, Illinois 60616

James N. Gray Construction Company
Highway 90
Glasgow, Kentucky 42141

Jaynes Corporation
2906 Broadway Boulevard NE
Albuquerque, New Mexico 87107

Joe E. Woods Inc.
63 East Main Street, Suite 410
Mesa, Arizona 85201

John Brown E & C Inc.
333 Ludlow Street
Stamford, Connecticut 06902

John S. Clark Company Ltd.
450 Airport Road
Mount Airy, North Carolina 27030

Jones Group Inc.
6060 South Albans
Charlotte, North Carolina 28287

Kajima Engineering & Construction Inc.
510 West 6th Street, Suite 200
Los Angeles, California 90014

Kajima International Inc.
2100 North Central Road
Fort Lee, New Jersey 07024

Kaiser Foundation Inc.
1 Kaiser Plaza
Oakland, California 94612

Kasler Corporation
27400 East 5th Street
Highland, California 92346

Keller Construction Company Ltd.
9950 East Baldwin Place
El Monte, California 91731

Kiewit Construction Group Inc.
3555 Farnam
Omaha, Nebraska 68131

Kitchell Corporation
1707 East Highland, Suite 100
Phoenix, Arizona 85016

Knutson Construction Company
5301 East River Road
Minneapolis, Minnesota 55437

Kokosing Construction Company Inc.
PO Box 226
Fredericktown, Ohio 43019

Koll Construction
4343 Vonkarman Avenue
Newport Beach, California 92660

Koren - Diresta Construction Company Inc.
475 5th Avenue
New York, New York 10017

Korte Construction Company
700 St. Louis Union Station
St. Louis, Missouri 63103

Koss Construction Company
4090 Westown Parkway
West Des Moines, Iowa 50265

Kraus - Anderson Construction Company
525 South 8th Street
Minneapolis, Minnesota 55404

L.E. Wentz Company
1599 Industrial Road
San Carlos, California 94070

L.F. Driscoll Company
9 Presidential Boulevard
Bala Cynwyd, Pensylvania 19004

LaQuila Construction Inc.
789 East 91st
Brooklyn, New York 11236

Layton Construction Company Inc.
2987 South 300 West
Salt Lake City, Utah 84115

Lee Lewis General Contractors Inc.
2521 74th
Lubbock, Texas 79423

Lehrer McGovern Bovis Inc.
387 Park Avenue S
New York, New York 10016

Leon D. DeMatteis Construction Corporation
820 Elmont Road
Elmont, New York 11003

Linbeck Construction Corporation
3810 West Alabama
Houston, Texas 77027

Lionmark Inc.
1620 Woodson Road
St. Louis, Missouri 63114

Litwin Engineers & Constructors Inc.
580 Westlake Park Boulevard
Houston, Texas 77079

Lunda Construction Company
620 Gebhardt Road
Black River Falls, Wisconsin 54615

Lusardi Construction Company
1570 Linda Vista Drive
San Marcos, California 92069

Lyda Inc.
6228 Bandera Road
San Antonio, Texas 78238

Lydig Construction Inc.
North 603 Havana
Spokane, Washington 99202

M.A. Mortenson Company
700 North Meadow Lane
Minneapolis, Minnesota 55422

M.B. Kahn Construction Company Inc.
Flintlake & Highway 555
Columbia, South Carolina 29201

Macco Construction Inc.
14409 South Paramount Boulevard
Paramount, California 90723

Maescher Industries Inc.
2106 Florance Avenue
Cincinnati, Ohio 45206

Majestic Construction Company
275 North Franklin Turnpike
Ramsey, New Jersey 07446

Manhattan Building Construction
1717 South Boulder
Tulsa, Oklahoma 74119

Marnell Corrao Association Inc.
4495 Polaris Avenue
Las Vegas, Nevada 89103

Marshall Contractors Inc.
75 Newman Avenue
Rumford, Rhode Island 02916

Mashuda Corporation
21101 Route 19
Evans City, Pennsylvania 16033

McCarthy Building Construction
1341 North Rock Hill Road
St. Louis, Missouri 63124

McMormick Construction Company
2507 Empire Avenue
Burbank, California 91504

McCroy Construction Company Inc.
1616 Gervais Street
Columbia, South Carolina 29201

McDermott International Inc.
1010 Common Street
New Orleans, Louisiana 70112

McDevitt & Street Company
One Parkway Plaza
Charlotte, North Carolina 28210

McGough Construction Company Inc.
2737 Fairview Avenue N
St. Paul, Minnesota 55113

McShane Builders Inc.
2604 East Dempster, Suite 500
Des Plaines, Illinois 60016

Mellon Stuart Company
One North Shore Court
Pittsburgh, Pennsylvania 15212

Miller Building Corporation
1410 Commonwealth Drive
Wilmington, North Carolina 28403

Miron Construction Company Inc.
806 Valley Road
Menasha, Wisconsin 54952

Misener Marine Construction Inc.
544 West Tyson Avenue
Tampa, Florida 33611

Modern Continental Construction Company Inc,
2277 Massachusetts Avenue
Cambridge, Massachusetts 02138

Morganti Group Inc.
10 South Street
Ridgefield, Connecticut 06877

Morley Construction Company Inc.
2999 Overland Avenue
Los Angeles, California 90064

Morrison Knudsen Corporation
Morrison Knudsed Plaza
Boise, Idaho 83729

Morse Diesel International
1515 Broadway
New York, New York 10036

Mosser Construction Inc.
122 South Wilson Avenue
Fremont, Ohio 43420

Mountain States Mineral Enterprises Inc.
4370 South Fremont Avenue
Tucson, Arizona 85714

Mumane Associates Inc.
99 Boynton Avenue
Plattsburgh, New York 12901

NAB Construction Corporation
112-20 14th Avenue
College Point, New York 11356

Nabholz Construction Corporation
612 Garland
Conway, Arkansas 72032

Nason & Cullen Inc.
150 South Warner Road
Wayne, Pennsylvania 19087

National Engineering & Contracting Company
12608 Alameda Drive
Cleveland, Ohio 44136

Nielsen Construction Company
3127 Jefferson Street
San Diego, California 92110

Nielsons Inc.
22419 County Road G
Cortez, Colorado 81321

Norwood Industrial Construction Company Inc.
530 Brandywine Parkway
West Chester, Pennsylvania 19380

Nuhann Inc.
614 West 184th Street
Gardena, California 90248

O & G Industries Inc.
112 Wall Street
Torrington, Connecticut 06790

OHM Corporation
16406 State Route 224 East
Findlay, Ohio 45840

Oltmans Construction Company
10005 Mission Mill Raod
Whittier, California 90601

Opus Construction
9900 East Bren Road
Hopkins, Minnesota 55343

P J Dick Contracting Inc.
1020 LaBanon Road Route 885
West Mifflin, Pennsylvania 15122

Pacific Construction Company Ltd.
707 Richards Street, Suite 400
Honolulu, Hawaii 96813

Pan - Pacific Construction Inc.
1001 Bishop Street
Honolulu, Hawaii 96813

Paul H. Schwendener Inc
1000 VanDustrial Drive
Westmont, Illinois 60559

Pavarini Construction Company Inc.
West Putnum Avenue
Greenwich, Connecticut 06830

PCL Enterprises Inc.
2000 South Colorado Boulevard
Denver, Colorado 80222

Peabody Construction Company Inc.
Granite Street Route 536
Braintree, Massachusetts 02184

Peck / Jones Construction Corporation
10866 Wilshire Boulevard
Los Angeles, California 90024

Perini Corporation
73 Mount Wayte Avenue
Framingham, Massachusetts 01701

Peter Brown Construction Company
205 4th Street SW
Largo, Florida 34640

Petracca & Sons Inc.
109-37 Sutphin Boulevard
Jamaica, New York 11435

Pike Holdings Inc.
Route 3 at I 93
Tilton, New Hampshire 03276

Pioneer Construction Company
550 Kirtland Street SW
Grand Rapids, Michigan 49507

Pitt - Des Moines Inc.
3400 Grand Avenue
Pittsburgh, Pennsylvania 15225

Pizzagalli Construction Company
55 Joy Drive
Burlington, Vermont 05403

PKF - Mark III Inc.
170 Pheasant Run Road
Newtown, Pennsylvania 18940

Power Contracting & Engineering Corporation
3205 North Wilke Road
Arlington Heights, Illinois 60004

R. S. Mowery & Sons Inc.
625 Hamilton Street
Carlisle, Pennsylvania 17013

R.J. Griffin & Company
5775 Peachtree - Dunwoody
Atlanta, Georgia 30342

R.M. Shoemaker Company
100 Front Street, Suite 1300
West Conshohocken, Pennsylvania 19428

R.W. Granger & Sons Inc.
415 Boston Turnpike
Shrewsbury, Massachusetts 01545

Ray Wilson Company
199 South Los Robles Avenue
Pasadena, California 91101

Rentenbach Engineering Company
2400 Sutherland Avenue
Knoxville, Tennesse 37919

Riedel International Inc.
4555 North Channel Avenue
Portland, Oregon 97217

Rieth - Riley Construction Company Inc.
311 West Madison
Elkhart, Indiana 46516

Ringland - Johnson - Crowley Company
500 SW 7th, Suite 300
West Des Moines, Iowa 50265

River City Construction Company
1050 West Washington Street
Peoria, Illinois 61611

Robert A. Kinsley Inc.
Water Street Extended
York, Pennsylvania 17403

Robert E. Bayley Construction Inc.
1 Union Square, Suite 1601
Seattle, Washington 98101

Rodgers Builders Inc.
5701 North Sharon Amity Road
Charlotte, North Carolina 28215

Roebbelen Engineering Inc.
1241 Hawk's Flight Court
Folsom, California 95630

Rudolph and Sletten Inc.
989 East Hillsdale Boulevard
Foster City, California 94404

Ruscilli Construction Comapny Inc.
2042 Arlingate Lane
Columbus, Ohio 43228

Ruscon Corporation
149 East Bay Street
Charleston, South Carolina 29401

Rust International Corporation
100 Corporate Parkway
Birmingham, Alabama 35242

Ryan Construction Company of Minnesota
900 2nd Avenue S, Suite 700
Minneapolis, Minnesota 55402

S & B Engineers & Constructors Inc.
7809 Park Place Boulevard
Houston, Texas 77087

S.A. Healy Company
47th & East Avenue
La Grange, Illinois 60525

S.J. Amboroso Construction Company
348 Hatch Drive
Foster City, California 94404

S.G. Phillios Constructors Inc.
PO Box 510
Waitsfield, Vermont 05673

SAE Engineering and Construction Company
11400 Rockville Pike
Rockville, Maryland 20852

Saturn Construction Company Inc.
115 Stevens Avenue
Valhalla, New York 10595

Schal Associates Inc.
200 West Hubbard
Chicago, Illinois 60610

Sciaba Construction Corporation
18 Walcott Street
Boston, Massachusetts 02172

SDL Corporation
2100 112th NE
Bellevue, Washington 98004

Sellen Construction Company Inc.
228 9th Avenue N
Seattle, Washington 98109

Sevenson Environmental Services Inc.
2749 Lockport Road
Niagara Falls, New York 14305

Sheehan Pipeline Construction Company
1924 South Utica Avenue
Tulsa, Oklahoma 74104

Shiel Sexton Company Inc.
8035 Castleton Road
Indianapolis, Indiana 46250

Shook National Corporation
440 Hunter Avenue
Dayton, Ohio 45404

Sigal Construction Corporation
3299 K Street NW
Washington, D.C. 20007

Slattery Associates Inc.
46-36 54th Road
Maspeth, New York 11378

Sletten Construction Company
1000 25th Street N
Great Falls, Montana 59401

Snyder - Langston Builders
17962 Cowan Avenue
Irvine, California 92714

Sordoni Construction Services
45 Owen Street
Wilkes Barre, Pennsylvania 18704

Starboard Development Corporation
1202 Kettner Boulevard
San Diego, California 92101

Stevens Painton Corporation
14470 York Road
Cleveland, Ohio 44133

Stone & Webster Engineering Corporation
245 Summer Street
Boston, Massachusetts 02110

Structure Tone Inc.
15 East 26th Street
New York, New York 10010

Suffolk Construction Company Inc.
65 Allerton Street
Boston, Massachusetts 02119

Suitt Construction Company Inc.
1400 Cleveland Street
Greenville, South Carolina 29605

Sullivan Long & Hagerty Inc.
PO Box 2247
Birmingham, Alabama 35203

Summit Constructors Inc.
5470 Valley Highway
Denver, Colorado 80216

Sundt Corporation
4101 East Irvington
Tucson, Arizona 85714

Sverdrup Boulevard Corporation
1836 Lackland Hill Parkway
St. Louis, Missouri 63146

Swinerton & Walberg Company
580 California Street
San Francisco, California 94104

T.L. James & Company Inc.
106 West Mississippi
Ruston, Louisiana 71270

Tarlton Corporation
5500 West Park Avenue
St. Louis, Missouri 63110

Teichert Inc.
3500 American River Drive
Sacramento, California 95864

Temple Associates Inc.
700 North Temple Drive
Diboll, Texas 75941

Terminal Construction Corporation
Route 17 Moonachie Avenue
Woodridge, New Jersey 07074

The Albert M. Higley Company
2926 Chester Avenue
Cleveland, Ohio 44114

The Auchter Company
1021 Oak Street
Jachsonville, Florida 32204

The Austin Company
3650 Mayfueld Road
Cleveland, Ohio 44121

The Badger Company Inc.
1 Broadway
Cambridge, Massachusetts 02142

The Branch Group Inc.
3902 Franklin Road SW
Roanoke, Virginia 24014

The Christman Company
408 Kalamazoo Plaza
Lansing, Michigan 48901

The Clark Construction Group Inc.
7500 Old Georgetown Road
Bethesda, Maryland 20814

The Conduit & Foundation Corporation
33 Rock Hill Road
Bala Cynwyd, Pennsylvania 19004

The Dimeo Construction
75 Chapman Street
Providence, Rhode Island 02905

The Flintco Construction Inc.
1624 West 21st Street
Tulsa, Oklahoma 74107

The George Sollitt Construction Company
790 North Central
Wood Dale, Illinois 60191

The Great Lakes Construction Company
6600 Schaaf Road
Cleveland, Ohio 44131

The Hardway Company
945 Broadway
Columbus, Georgia 31901

The Haskell Company
111 Riverside Avenue
Jacksonville, Florida 32202

The Henderson Corporation
575 Route 28
Raritan, New Jersey 08869

The Lane Construction Corporation
965 East Main Street
Meriden, Connecticut 06450

The Lott Group Inc.
3500 South Gressner Drive
Houston, Texas 77063

The M.W. Kellogg Company
3 Greenway Plaza
Houston, Texas 77046

The Parsons Corporation
100 West Walnut Street
Pasadena, California 91103

The Pepper Construction
643 North Orleans Street
Chicago, Illinois 60610

The Pinkerton & Laws Company
875 Douglas Road
Atlanta, Georgia 30342

The Pritchard Corporation
8205 West 108th Terrace
Shawnee Mission, Kansas 66210

The Quandel Group Inc.
PO Box E
Minersville, Pensylvania 17954

The Robins Corporation
1901 Robins Drive
Birmingham, Alabama 35209

The Rudolph Libbe Construction Inc.
6494 Latcha Road
Walbridge, Ohio 43465

The Ruhlin Company
6931 Ridge Road
Sharon Center, Ohio 44274

The Turner Corporation
633 3rd Avenue
New York, New York 10017

The Whiting - Turner Contracting Company
300 East Joppa Road
Baltimore, Marryland 21204

Thomas O'Connor & Company Inc.
45 Industrial Drive
Canton, Massachusetts 02021

TIC Holdings Inc.
40185 Routt County Road
Steamboat Springs, Colorado 80487

Tidewater Construction Corporation
809 South Military Highway
Virginia Beach, Virginia 23464

Torcon Inc.
214 Grove Street E
Westfield, New Jersey 07090

Townsend and Bottum Inc.
2245 South State Street
Ann Arbor, Michigan 48104

Trataros Construction Inc.
664 64th Street
Brooklyn, New York 11220

Traylor Brothers Inc.
835 North Congress Avenue
Evansville, Indiana 47715

Tutor - Saliba Corporation
15901 Olden Street
San Fernando, California 91342

Underground Construction Company Inc.
5145 Industrual Way
Benicia, California 94510

United Dominion Constuction
6000 Poplar Avenue
Memphis, Tennessee 38137

United Engineers & Constructors International
30 South 17th Street
Philadelphia, Pennsylvania 19103

V.R.H. Construction Corporation
320 Grand Avenue
Englewood, New Jersey 07631

Vecellio & Grogan Inc.
PO Box V
Beckley, West Virginia 25802

Veco International Inc.
5151 Fairbanks Street
Anchorage, Alaska 99503

Vratsinas Construction Company
216 Louisiana
Little Rock, Arkansas 72201

W.E. O'neil Construction Company
2751 North Clybourn Avenue
Chicago, Illinois

W.J. Barney Corporation
360 Lexington Avenue
New York, New York 10017

W.A. Klinger Inc.
2015 East 7th Street
Sioux City, Iowa 51105

W.G. Yates & Sons Constuction Company
1 Gully Avenue
Philadelphia, Mississippi 39350

W.M. Blanchard Company
199 Mountain Avenue
Springfield, New Jersey 07081

W.M. Jordan Company Inc.
11010 Jefferson Avenue
Newport News, Virginia 23601

W.M. Schlosser Company Inc.
2400 51st Place
Hyattsville, Maryland 20781

W.S. Bellows Construction Corporation
7272 Pinemont
Houston, Texas 77040

Walbridge Aldinger Company
613 Abbott Street
Detroit, Michigan 48226

Walsh Construction Company of Illinois
3710 South Western
Chicago, Illinois 60609

Washington Construction Company
101 International Way
Missoula, Montana 59802

Webcor Builders Inc.
777 Mariner's Island Boulevard
San Mateo, California 94404

Wehr Construction Inc.
2517 Plantside Drive
Louisville, Kentucky 40299

Weitz Company Inc.
800 2nd Avenue
Des Moines, Iowa 50309

White Barclay Inc.
22 Cassatt Avenue
Berwyn, Pennsylvania 19312

Wilder Construction Company
2006 North State Street
Bellingham, Washington 98225

Williams Brothers Construction Company Inc.
3800 Milam
Houston, Texas 77006

Wohlsen Construction Company
548 Steel Way
Lancaster, Pennsylvania 17601

Worth Construction Company Inc.
24 Taylor Avenue
Bethel, Connecticut 06801