CONSTRUCTION MANAGEMENT CERTIFICATION

Project Superintendent Certification Program

Prepare to demonstrate your skills, gain valuable feedback, and achieve the recognition you deserve. Engage with our Project Superintendent Evaluation and take the next step towards professional excellence in construction management.

Let's Build Your Future Together

Welcome to Construction Management Certification

Dear Student and Fellow Worker,

Welcome to a pivotal moment in your career journey! We at Construction Management Certification are thrilled to have you join our community of forward-thinking construction professionals. As you embark on this learning path, we want to acknowledge the significant effort and time you're investing by stepping away from your daily responsibilities to enhance your skills and knowledge.

Your Learning Experience

This course is meticulously designed to familiarize you with essential industry terminology and to provide you with a foundational understanding of the topics covered. While it may not delve deeply into every nuance of the subject matter, it will equip you with the critical tools and concepts needed to succeed in your role.

Remember, you are here to learn and grow—so do not feel intimidated by new concepts or terminology. Each lesson is crafted to be accessible and engaging, ensuring that you gain confidence as well as competence.

Accredited Certification – Opening Doors to New Opportunities

By choosing an accredited certification program like ours, you are not just learning—you are unlocking new opportunities. The knowledge and credentials you acquire here will significantly enhance your professional profile and open up new avenues in the construction industry. Certification is a testament to your dedication to professional development and positions you well to soar to new heights in your career.

Let's Begin

As we start this lesson, remember that every module is a step towards greater opportunities. We are here to support you throughout your learning journey and to celebrate your achievements along the way.

Thank you for choosing Construction Management Certification. Let's build a robust future together!

Warm regards,

The Construction Management Certification Team

We encourage you to approach each lesson with curiosity and enthusiasm as you pave your way

Chapter

1

A Construction Industry Snapshot

The construction industry is a unique business. The size of a construction company can vary from a one-man skilled mechanic/entrepreneur to a multibillion dollar international giant operating throughout the world. Locally operated family businesses compete with multibillion dollar contractors, but opportunities abound for anyone who is willing to work hard and catch a little bit of good luck.

The construction industry is a vital part of the U.S. economy. As of January 2007, the annual adjusted rate of construction was $1.18 trillion and was projected to increase to $1.21 trillion in 2007 and $1.302 trillion in 2008. Government projections point to increases in both wage and salaried jobs in the construction industry, where the growth rate of 11 percent through the year 2014 is expected. With 7 million wage and salaried jobs and 1.9 million self-employed and unpaid family member workers as of 2004—the latest information available from the U.S. Department of Labor—construction is one of the nation's largest industries, and it is an industry that pays well. Bureau of Labor Statistics (BLS) figures reveal that weekly earnings for full-time construction workers in 2006 was $642 for nonunion workers, and $833 for union workers.

Union versus Nonunion Shops and Other Labor Trends

Union membership reached an all-time high of 20 million workers in 1983 before falling to 16.4 million by 2002. Between 2005 and 2006, the Department of Labor indicated that the actual number of union members increased from 1,111,000 to 1,146,000 but, as a percentage of total employed workers, this number decreased slightly from 13.8 to 13.6 percent.

Certain other labor trends have become evident in the industry. Older craft workers have already retired or nearing retirement age and younger entrants to the nation's labor pool have chosen career paths other than construction. Labor shortages have had more impact than material costs on construction cost increases, as one major U.S. contractor reported in mid-2007.

BLS projects the following labor force scenario over the next 50 years:

- The impact of the baby-boomer generation will continue to be felt as baby-boomers become a larger portion of an older labor force; their exit from the marketplace will be the main factor in slowing the growth of the labor force.
- The stabilization of the women's labor force participation will occur. It peaked at 60 percent in 1999 and has decreased every year thereafter, reaching 59.3 percent in 2005.
- The labor force will become even more diverse as immigration and border security issues continue to be a hot political topic.

A Risky Business

The building business is a high-risk, highly competitive business in which average gross profit margins, before taxes, are in the 2.4 percent range, according to statistics compiled by the Construction Financial Management Association (CFMA) for the year 2006. The Surety Industry Organization (ISO), in a study conducted in 2002, revealed that there was a 28.4 percent failure rate for specialty contractors during that period. A Dun & Bradstreet survey in this same time frame showed that 32 percent of all contractors in business for 5 years or less will fail and 29 percent of all contractors in business for 6 to 10 years will fail.

In that D&B report, the five factors contributing to contractor failure were:

Unrealistic growth	37 percent
Performance issues	36 percent
Character/personal issues	29 percent
Accounting issues	29 percent
Management issues	29 percent

Few new technologies have been developed by contractors or equipment manufacturers, and old ways seem to die hard. Although we accept computer technology in the office, the field is still trowel and mortar and screw gun oriented. Construction has been compared to an outdoor factory producing a one-off product, while being exposed, and dealing with, all of the vagaries imposed by Mother Nature. Setting those differences aside, the construction industry has failed to keep up with the technological advances of the indoor factory.

Other production-oriented businesses such as the automobile industry have long since switched from muscle power to computer-directed robots to assemble their product, but construction workers still butter up bricks one at a time before placing them side by side in a wall. We still cut and fit individual wood or metal studs every 16 or 24 inches apart in order to build interior partition walls.

We are, however, an industry in transition. As with so many businesses and institutions, the twenty-first century holds untold opportunities and challenges for construction.

Developing Trends in the Construction Industry

Some changes in the construction industry are apparent, whereas others are more subtle. These changes will affect the way in which projects are designed and built, and the people who are responsible to deliver them recognize shifts in the following areas:

- The Organization
- Human Resources—the Workforce
- Project Delivery Systems
- Technology
- Productivity
- Quality Control
- Safety
- The Accelerating Green Building and Sustainability Movement

The Organization

Many of the trends that developed in the 1980s and 1990s, such as industry consolidation and the infusion of foreign-based contractors seeking the relative stability of American markets, have continued. The move to globalization that permeated much of American industry during that time left its mark on the building business. Contractors from Great Britain, Sweden, Germany, France, Japan, and the Netherlands are firmly established in this country either by buying up American companies or opening branches that echo the corporate philosophy of "Act Globally—Think Locally." Even stalwarts such as Turner Construction have yielded to the trend, as it was bought out by Germany's Hochtief A.G. organization in 1999. A look at bidders on many private and public lists reveal names such as Skanska, Bovis Lend Lease, Philip Holzman, Bouygues, Kvaerner, Balfour-Beatty, Kajima, and Bilfinger+Brau right up there with the more recognizable local construction companies.

Changes in the subcontracting industry

Ninety-seven percent of all specialty contractors, more commonly referred to as subcontractors, attain annual revenues of less than $2.5 million; 27 percent reported yearly sales of less than $250,000, but the top 3 percent are getting bigger, expanding by consolidation. This trend began in the mid-1990s and

accelerated in 1998 as a few investor groups began to purchase competitors, assuming that consolidation could bring increased profits as a result of economies of scale and increased geographic exposure. Emcor, the giant mechanical and electrical contractor, reported sales in the $2 billion range in 2005 after buying a series of regional firms. And foreign corporations have seen the value of entering the U.S. market; Great Britain's Keller plc has bought up old-line U.S. companies such as Hayward Baker, McKinney Drilling, and Suncoast Post Tension.

Human Resources—The Workforce

The U.S. government is predicting a slowdown in the growth of our labor force. From 1950 to 2000, our workforce grew from 62 million to 141 million, an average annual increase of 1.6 percent. It is anticipated that from 2000 to 2050, the average annual growth rate will be only 0.6 percent. The changing workforce is characterized by an impending shortage of workers, which was first predicted in the 1980s but has accelerated during the past two decades. In today's marketplace, a shortage of skilled craftsmen (or should we say craftspersons?) and mechanics along with experienced administrators and managers remain one of the major problems facing the industry. Who would have thought, several years ago, that staid construction industry companies would be offering "signing bonuses," just like the NFL or NBA, to attract experienced and productive employees?

One of the major challenges of this new twenty-first century will be to recruit and train new entrants to the construction industry, a task that is vital to the interests of the United States. An aging workforce, the lack of technological advances, and the lure of more attractive vocations have all contributed to construction's stodgy image and the difficulty in recruiting the best and the brightest. The demographics of the U.S. population sounded the warning bell several decades ago, but the construction industry failed to recognize the signs. By the year 2010, it is estimated that the number of 55- to 64-year-old males will outnumber the 18- to 24-year-old group by at least 1.5 million. The number of males age 55 to 64 will increase from 10 million to 17 million in the next 8 years. This gap appears to be filled by immigrants and female workers attracted to the opportunities and the decent wage that the construction industry provides.

Statistics developed by the Pew Hispanic Center reveal that the number of Hispanics in the construction industry grew by 556,000 in 2006, representing 66.5 percent of the entire industry workforce. This is a dramatic increase in just the past 2 years, when Hispanics represented only 21.3 percent of the construction workforce. The Pew Center studies show that 45.6 percent of that 66.5 percent figure are recent arrivals to this country. An English-Spanish dictionary of construction terminology can be seen on the desk in many field offices these days, as superintendents struggle with directing a crew to caulk the *junta de aislamiento* (isolation joint).

The growing female workforce

Female workers present yet another challenge in the construction workforce. When Occupational Safety & Health Administration (OSHA) was enacted in 1970, women made up less than 1 percent of workers in the construction trades. Female workers in the industry have grown steadily from 498,000 in 1980 to 877,000 in 2000, the latest available statistics from the U.S. Department of Labor:

- 412,000 women work as administrative support staff.
- 289,000 work in managerial capacities.
- 141,000 are employed in production crafts such as carpentry, plumbing, and painting.
- 37,000 are laborers or helpers.

  (Note: rounding somewhat effects the overall number)

Ergonomics, fitting jobs to the needs and abilities of workers, has not kept pace with this influx of female workers, who complain about personal protective equipment that doesn't fit properly, because it was designed and produced for the male body. Studies by the National Institute of Occupational Safety and Health (NIOSH) revealed that 46 percent of female construction workers interviewed said that they could not find work shoes that fit properly, and 41 percent had trouble finding appropriately sized work gloves. Two respondents to a NIOSH questionnaire were quoted as saying: "They gave me gloves so humungous, I couldn't even pick things up," and "You can be hurt. ... That glove could get wrapped up in a fan belt."

Women on the job site are demanding better quality-of-life working conditions, cleaner temporary toilets, and more attention to potable water for drinking and washing. This movement has energized OSHA to declare unsanitary toilets as "not available," requiring either additional ones or cleanup of poorly maintained Porta Pottis. This will be better for the entire industry as it tries to "clean up its act" and attract more people.

Project Delivery Systems

Fast-track and flash-track construction projects have given way to "Hypertrack," a system of utilizing advanced computer modeling to produce more time-compressed projects. The design-build process has gained more credence in the private sector and with government agencies. Adherents to the process claim that its more efficient design and construction capability, combined with lower overall costs, has been responsible for its increased popularity as a project delivery system. This concept allows an owner to contract with only one entity to provide both design and construction, thereby creating a single source for responsibility and accountability.

Changes in the design process have provided benefits to owners, architects, and contractors alike. By utilizing some new software programs, the architect and engineer can generate a list of materials simultaneously with their design of each component of construction such as structural steel, framing and drywall systems, flooring, and ceiling materials. At the end of a design day, this list of materials can be transmitted to the owner's contractor to update design costs versus budget. The contractor, in turn, can transmit the list of structural steel members to their steel subcontractor not only for confirmation of price but also to confirm a mill's rolling schedule.

The process known as Building Information Modeling presents a 3D (three-dimensional) image of all design components. Each member of the design team who receives these images can review and comment on matters such as constructability and interference issues, which affect the placement and coordination of systems—and do something about it *before* the design has been completed, not *after* the plans have been printed and distributed.

Architectural and engineering firms in the United States are subcontracting portions of their work to overseas designers who operate in different time zones. Taking advantage of Asian time zone differences, an American architect or engineer can punch out in New York at 5:00 P.M. after e-mailing design criteria to a firm in Hong Kong or Thailand, where their day is just beginning. On return to their U.S. office the next morning, they will find detailed drawings resting in the computer awaiting printout to full-scale plans.

Technology

Although lasers have more or less replaced optical leveling devices in the field and digital computerized estimating in the office is commonplace, the construction industry has lagged far behind other segments of the economy in utilizing advanced electronic technology. But it is starting to catch up. Wireless communication is producing instantaneous verbal and document transfer as Blackberrys® and other handheld PDAs (personal digital assistant) devices permit the project superintendent to instantaneously transmit or receive vital information when walking the site.

Several construction equipment manufacturers are entering the robotic age, producing unmanned excavators that can go about their business guided by an operator working a joystick nearby. Caterpillar has developed a system known as Accugrade®, a sensor-independent process involving lasers and GPS that automatically controls bulldozer blade lift and angle, allowing the operator to grade faster and with more accuracy. Complex 3D designs can be loaded into the systems via compact flash cards.

The National Institute of Standards and Technology (NIST) has been experimenting with the problem of identifying and tracking materials and equipment on the job site, which has been a major impediment to productivity. NIST has developed a prototype tracking system known as Comp-TRAK, which uses bar codes and tiny radio frequency identifying devices (RFID). Structural steel

components delivered to the job site are tagged with either bar codes or RFIDs, allowing them to be instantly identified, picked up by a crane, and directed to the exact place required. Advances like this could lead to a fully automated structural steel erection process.

Productivity

The scarcity of experienced, skilled workers and managers has had its effect on productivity on the construction site. Some contractors are complaining that tasks previously requiring 8 hours to complete now take 12 hours because of inadequately trained tradesmen. Experienced managers are being asked to assume more responsibilities on more projects and, ultimately more things slip through the cracks. With 85 to 95 percent of all construction dollars being consumed in field operations, the companies with the "leanest and meanest" operations will excel. However, in order for that to occur, both workers and supervisors will have to acquire the necessary skill levels and tools to increase productivity while maintaining acceptable quality levels. More research and development dollars will have to be spent by equipment manufacturers and construction trade organization to increase levels of productivity in both field and office operations. This means that more highly trained workers and managers equipped with better tools and the ability and desire to extract that extra effort from the team will be required. More systems such as NIST's CompTRAK will attract the attention of manufacturers and vendors, as time wasted locating materials on site has been proven to be one of the most unproductive activities.

Quality Control

"Do it right and do it right the first time" will take on more importance in the future. The shortage of skilled workers and experienced supervisors makes it even more important to increase productivity by reducing or eliminating "rework" and callbacks to address poor quality issues. Not only is price important to owners; they also will demand a quality product. If your company cannot satisfy this demand, there are others waiting in the wings to step into your place.

Quality of product means complying with *all* of the demands of the contract documents, including a thorough review of the plans and specifications, submission of shop drawings that have been reviewed *before* submission, being responsive to all close-out documents, and reducing punch list work to "0" tolerance levels.

Safety

There were 392,400 nonfatal injuries and illnesses in the construction industry in 2004. Incident rates for nonfatal accidents fell from 6.8 per 100 full-time workers to 6.2 per 100 full-time workers in 2004. This drop in nonfatal occupational

injuries was driven largely by declines in injuries incurred by specialty contractors, whose incident rate dropped from 7.3 to 6.8 percent. Although credit must be given to all who were responsible for this decline in injuries, when compared to the figure for all private industry (4.5 incidents per 100 workers), we have a long way to go.

The shortage of qualified tradesmen adds another dimension to the need to maintain a safe working environment, not only to polish the industry's image and reduce human pain but also to retain the integrity of productive work teams. A long-term absence of a skilled carpenter as a result of an on-the-job injury can affect costs, quality of work, and productivity for the entire crew.

Many project owners, aware of job site safety from a moral and economic standpoint, require contractors to provide them with a history of safe working conditions as part of the bid requirements. No owner wants media attention focusing on their new construction project if a serious accident or fatality has just occurred.

Worker compensation insurance rates continue to remain a significant factor in the calculation of a company's overhead costs, thereby affecting its competitive position. As a result, builders are becoming more aware of the penalties accruing from a poor safety record.

The Green Building and Sustainability Movement Accelerates

Green building construction is based on designs that are environmentally sensitive and help preserve our natural resources. Once thought of as the domain of "tree huggers," both the private and public sector have seized on new opportunities to affect capital and operating efficiencies while protecting the planet on which we live.

The United States Green Building Council (USGBC) has taken the lead in promoting and guiding manufacturers and builders in the construction of these environmentally friendly factories, office buildings, schools, and homes. USGBC has created a series of standards—Leadership in Energy and Environmental Design (LEED)—that qualify structures for various levels of achievement.

LEED ratings range from Basic certification (the lowest) to Platinum certification (the highest). As of February 2005, 41 cities in the United States adopted some form of LEED certification for construction of their capital projects. Studies verifying the savings in energy costs have led both the private and public sectors to wholeheartedly endorse the green buildings movement.

Sustainability in the construction industry means creating designs that employ materials and operating systems that protect the environment and our natural resources. Using natural light to reduce interior lighting loads, and using engineered wood products such as oriented strand board (OSB) and medium density fiberboard (MDF) instead of virgin lumber, are all part of a sustainability program.

The Project Superintendent's Role

Managing the work process with its emphasis on maintaining schedule, controlling costs, and dealing with quality issues in today's complex construction projects can be an overwhelming experience at times. But that is what the construction industry is about, and what makes it so interesting and challenging. Management and control are the operative words today. There are four basic components in the construction cycle:

- Construction engineering—The process of assembling materials, components, equipment, and systems, and the selection and utilization of the optimum technology for this process.
- Management of the construction process—Establishing the best way to implement the construction process to include precise scheduling and the coordination and control of the flow of labor, materials, and equipment to the job site.
- Human Resource management—Labor productivity and creation of a harmonious working environment as essential elements of a successful project. Control over human resources (the workforce) is important in these days of labor scarcities.
- Financial management—Construction is a high-risk business with historically low profit margins. Control over costs, cash flow, and adequate project funding is critical to the success of any business endeavor, but even more so in the building business.

All of these key management functions, to some degree or other, will fall to the project superintendent, who forms the first line of defense at the construction site and is one of the most visible and important members of the construction team.

The successful project superintendent will need to manage and control the following seven basic elements of a successful project:

1. The project is completed on time.
2. The completed project meet the company's profit goals.
3. The quality levels expected are achieved.
4. The project was completed with no unresolved disputes and no outstanding claims.
5. The contractor has maintained a professional relationship with the architect and engineer.
6. The contractor has maintained a mutually beneficial relationship with all subcontractors, suppliers, and vendors.
7. The contractor-client relationship was a good one.

Although the responsibilities of the project superintendent may vary from company to company, depending primarily on the size and sophistication of the contractor and availability of support staff, one thing remains constant: the orchestration and management of the construction project. This is the role that the project superintendent will play in this complex process called construction.

End of Lesson Wrap-Up

Congratulations on completing this lesson! You've taken another important step in your journey to becoming a certified professional in the construction industry.

Up Next: Quiz Time

Before we move forward, there's a short quiz waiting for you. Remember, this quiz isn't designed to trip you up but to reinforce your understanding of the concepts we've covered. It's a way to ensure that you have grasped the essential elements of the lesson and are ready to build on this knowledge in subsequent modules.

You're Doing Great!

You're doing an excellent job so far, and we encourage you to keep up the momentum. Every quiz and lesson is a building block towards your ultimate goal of certification and professional advancement.

See You in the Next Lesson!

We are excited to continue this journey with you and look forward to seeing you in the next lesson. Keep up the great work and stay motivated—your future in construction management looks promising!

Keep learning, keep growing, and remember, we are here to support you every step of the way. See you soon for more learning and development

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