

Missouri

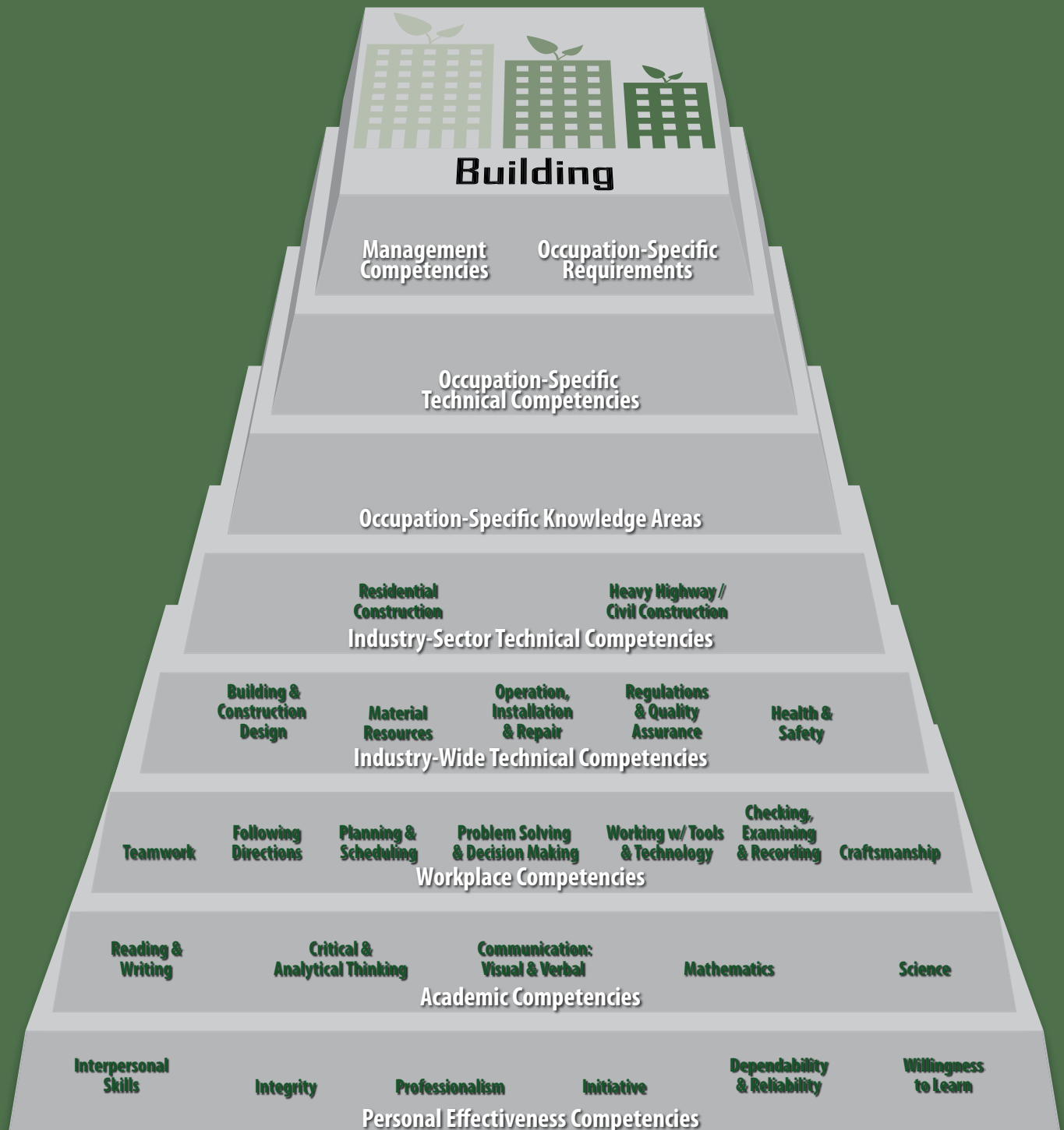
Green
INDUSTRY

COMPETENCY

MODEL



Green Building Competency Model



What is Green Building?

Energy Efficiency and the long term cost savings provided by green building products will continue to appeal to consumers and industry alike. Missouri has the opportunity now to transition its construction related workforce over to a profitable industry which may one day completely replace traditional building practices.

Green Building



In this section the results of the Green Building Competency Model analysis are discussed. Each tier lists the most essential competencies and each competency is further described in terms of behavioral attributes.

TIER 1—Personal Effectiveness Competencies

INTERPERSONAL SKILLS	INTEGRITY	PROFESSIONALISM	DEPENDABILITY & RELIABILITY	WILLINGNESS TO LEARN
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INTERPERSONAL SKILLS

- ▶ Respect the opinions, customs and individual differences of others
- ▶ Interact respectfully with coworkers of different cultures, genders and backgrounds
- ▶ Work cooperatively with others on the job and display a good-natured attitude
- ▶ Resolve conflicts and differences to maintain a smooth workflow

INTEGRITY

- ▶ Apply ethical standards of the industry to workplace/jobsite conduct
- ▶ Treat others with honesty, fairness and respect
- ▶ Demonstrate respect for property of customers, employer and coworkers
- ▶ Take responsibility for accomplishing work goals within accepted timeframes
- ▶ Accept responsibility for one's decisions and actions

PROFESSIONALISM

- ▶ Take pride in one's work and the work of the organization
- ▶ Demonstrate self-control by keeping emotions in check
- ▶ Accept criticism and deal calmly with stressful situations
- ▶ Dress appropriately for the workplace/jobsite
- ▶ Maintain appropriate personal hygiene
- ▶ Refrain from substance abuse

INITIATIVE

- ▶ Pursue work with energy, drive and effort to accomplish tasks
- ▶ Persist at a task or problem despite interruptions, obstacles or setbacks
- ▶ Work independently and perform effectively even with little or no supervision
- ▶ Demonstrate the ability to change from one task to another
- ▶ Take initiative to seek out new responsibilities
- ▶ Establish and maintain challenging, but realistic work goals

DEPENDABILITY & RELIABILITY

- ▶ Arrive at work fit and on time each day
- ▶ Avoid absenteeism
- ▶ Work accurately and quickly under pressure
- ▶ Complete assignments and meet deadlines
- ▶ Comply with rules, policies and procedures such as safety, personal hygiene, personal discipline, substance abuse, employee theft and sexual harassment

WILLINGNESS TO LEARN

- ▶ Participate in training opportunities
- ▶ Learn new skills related to the job
- ▶ Treat unexpected circumstances as opportunities to learn
- ▶ Accept help from supervisors and co-workers
- ▶ Seek out feedback from others to improve job performance
- ▶ Take charge of personal career development by identifying occupational interests, strengths and opportunities
- ▶ Identify opportunities for career advancement and certification requirements

TIER 2—Academic Competencies

READING & WRITING	CRITICAL & ANALYTICAL THINKING	COMMUNICATION: VISUAL & VERBAL	MATHEMATICS	SCIENCE
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READING AND WRITING

- ▶ Read and understand technical and workplace documents such as contracts, regulations, manuals, reports, memos, forms, graphs, charts, tables, calendars, schedules, signs and notices
- ▶ Read and understand operating directions, installation instructions and standard operating procedures
- ▶ Recognize the meaning of specialized words or phrases unique to the industry
- ▶ Apply what is learned from written material to follow instructions and complete tasks
- ▶ Communicate ideas, information and messages which may contain technical material, in a logical manner
- ▶ Prepare documents such as written estimates, work orders, memos and technical reports
- ▶ Fill out forms, reports, records, logs and documents to comply with project requirements

CRITICAL AND ANALYTICAL THINKING

- ▶ Use the principles of logic to make valid inferences and analyze problems
- ▶ Use inductive and deductive reasoning to analyze, synthesize, compare and interpret information
- ▶ Draw conclusions from relevant or missing information
- ▶ Understand the underlying relationship among facts and connections between issues
- ▶ Organize problems into manageable parts

COMMUNICATION: VISUAL AND VERBAL

- ▶ Speak in English well enough to be understood by others
- ▶ Speak clearly and succinctly to convey information correctly
- ▶ Demonstrate knowledge of slang and jargon related to the different trades
- ▶ Comprehend terminology spoken on a construction site
- ▶ Understand and respond to verbal messages and instructions
- ▶ Use hand signals to communicate with other workers
- ▶ Identify the correct location to see and be seen as the signaler
- ▶ Recognize universal signs and symbols such as colors, flags, stakes to function safely in the workplace

MATHEMATICS

- ▶ Add, subtract, multiply and divide with whole numbers, fractions, decimals and percents
- ▶ Calculate averages, ratios, proportions and rates
- ▶ Convert decimals to fractions; convert fractions to percents
- ▶ Take measurements of structures, distances, length, width, height, perimeter, area, weight and temperature
- ▶ Use and report measurements correctly
- ▶ Convert common units of measurement (e.g., from English to metric)
- ▶ Find level, plumb and square
- ▶ Read gauges and measurement instruments accurately
- ▶ Estimate sizes, distances and quantities
- ▶ Use dimensions, spaces and structures calculations to estimate resources, materials and supplies needed for project completion
- ▶ Choose the right mathematical method or formula to solve a problem
- ▶ Perform math operations accurately to complete jobsite/workplace tasks
- ▶ Use various formulas for calculating the amount of materials needed to complete a task
- ▶ Calculate volumes of shapes and structures
- ▶ Calculate dimensions from blueprints

SCIENCE

- ▶ Understand scientific principles critical to the construction profession: physics, chemistry, geology and environmental science, hydraulics, hydrology and engineering
- ▶ Understand chemical reactions such as how mortar sets
- ▶ Understand physical principles such as forces, friction and energy
- ▶ Understand weight and mass and how it relates to rigging, wind and structure supports
- ▶ Understand and evaluate the characteristics and hazards of electricity
- ▶ Recognize and understand the interactions of compatible and incompatible substances
- ▶ Apply basic scientific principles and technology to solve problems and complete tasks

TIER 3—Academic Competencies

TEAMWORK	FOLLOWING DIRECTIONS	PLANNING & SCHEDULING	PROBLEM SOLVING & DECISION MAKING	WORKING WITH TOOLS & TECHNOLOGY	CHECKING EXAMINING & RECORDING	CRAFTSMANSHIP
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TEAMWORK

- ▶ Understand the roles and responsibilities of the individual as part of a team and the hierarchy of individuals on the jobsite
- ▶ Perform responsibly as a team member and assist other members of the work team
- ▶ Effectively communicate with all members of the group or team to achieve team goals
- ▶ Effectively resolve conflicts with co-workers to maintain a smooth workflow
- ▶ Learn from other team members
- ▶ Assist others who have less experience or have heavy workloads

FOLLOWING DIRECTIONS

- ▶ Receive, interpret, understand and respond to verbal messages and other cues
- ▶ Pick out important information in verbal messages
- ▶ Understand complex instructions
- ▶ Ask questions to clarify unclear directions
- ▶ Act upon the instruction to complete an assignment
- ▶ Comprehend and follow steps used in construction work

PLANNING AND SCHEDULING

- ▶ Planning & Scheduling
 - Plan for and implement phases of a project
 - Identify methods of planning that will save a contractor money, time and materials
 - Identify the relationship between available resources and requirements of a project
 - Research jobsite information to identify appropriate craft responsibilities
 - Coordinate work between trades
 - Plan work processes including matching material amounts and types of work to be done
 - Create work sequences for tasks and units of work
 - Allocate time and resources effectively and coordinate efforts with all affected parties
- ▶ Time Management
 - Estimate the time required to perform activities needed to accomplish a specific task
 - Develop a timeline for sequencing the activities of a project/job
 - Establish specific goals to accomplish work in a timely manner
 - Ensure that others receive needed materials in time
 - Stay on schedule
 - Keep all parties informed of progress and all relevant changes to project timelines
- ▶ Manage Obstacles
 - Anticipate obstacles to project completion and develop contingency plans to address them
 - Incorporate potential job disruptions into planning time lines
 - Adjust plan/schedules to respond to unexpected events and conditions
 - Provide a project update to track changes

PROBLEM SOLVING AND DECISION MAKING

- ▶ **Identify the Problem**
 - Recognize the existence of a problem
 - Identify the nature of the problem define critical issues
 - Locate, obtain and review information relevant to the problem
- ▶ **Generate Alternatives**
 - Generate a variety of approaches to the problem
 - Think creatively to develop new ideas for and answers to work related problems
 - Use logic and reasoning to identify the strengths and weaknesses of alternative solutions or approaches to problems
- ▶ **Choose and Implement a Solution**
 - Choose the best solution after contemplating approaches to the problem
 - Commit to a solution in a timely manner
 - Use strategies, tools, resources and equipment to implement the solution
 - Observe and evaluate the outcomes of implementing the solution to assess the need for alternative approaches and to identify lessons learned

WORKING WITH TOOLS AND TECHNOLOGY

- ▶ **Select and Use Tools & Technology**
 - Identify the hand and power tools appropriate to the work site and to the trade
 - Select tools, technology, machinery and equipment appropriate for a given job
 - Demonstrate appropriate use of tools to complete work functions
 - Identify potential hazards related to the use of tools
 - Operate hand or power tools and equipment in accordance with established operating procedures and safety standards
- ▶ **Keep Current**
 - Demonstrate an interest in learning about new and emerging tools and technologies
 - Identify sources of information concerning state-of-the-art tools, equipment, materials and technologies
- ▶ **Troubleshoot**
 - Perform routine maintenance on tools, technology and equipment
 - Determine causes of operating errors and decide what to do about it
 - Troubleshoot maintenance problems in accordance with established procedures

CHECKING, EXAMINING AND RECORDING

- ▶ Examine structures and systems to determine need for repair
- ▶ Diagnose malfunctioning systems, apparatus and material components
- ▶ Develop a checklist to track preventative maintenance
- ▶ Complete and maintain preventative maintenance records
- ▶ Monitor work and record progress of the project
- ▶ Keep track of details to ensure work is performed accurately and completely
- ▶ Keep logs, records and files that are up-to-date and readily accessible

CRAFTSMANSHIP

- ▶ **Physical Aptitude**
 - Recognize the physical aptitudes necessary to perform critical work functions
 - Demonstrate manual dexterity, balance and eye-hand coordination
 - Demonstrate sufficient stamina to complete critical work functions (e.g., complete full shift, walking, carrying heavy objects for extended periods)

- ▶ **Trade Knowledge**
 - Read trade magazines and journals, manufacturers' catalogues, industry publications and internet sites to keep current on industry trends
 - Stay up-to-date technically and apply new knowledge and skills
 - Perform quality work meeting or exceeding the standards of the industry
 - Exert effort toward task mastery

TIER 4—Industry-Wide Competencies

BUILDING & CONSTRUCTION DESIGN	MATERIAL RESOURCES	OPERATION, INSTALLATION & REPAIR	REGULATIONS & QUALITY ASSURANCE	HEALTH & SAFETY
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BUILDING AND CONSTRUCTION DESIGN

- ▶ **Design**
 - Recognize basic engineering and architectural principles in structures
 - Identify components of building systems needed to complete a construction project
 - Understand design techniques, tools and principles involved in the production of precision technical plans, blueprints, drawings and models
 - Interpret documentation, detailed instructions, drawings or specifications about how devices, parts, equipment or structures are to be fabricated, constructed, assembled, modified, maintained or used
- ▶ **Blueprints/Drawings/Specifications**
 - Draw rough and detailed scale plans for foundations, buildings and structures based on preliminary concepts, sketches, engineering calculations, specification sheets and other data
 - Recognize elements and symbols of blueprints, drawings and specifications
 - Interpret dimensions, symbols, types of lines, views and scales
 - Visualize three-dimensional forms from two-dimensional drawings
 - Locate worksite features included on a construction plan
 - Convert scaled blueprint drawing measurements to full dimensions for a given project
- ▶ **Site Planning**
 - Apply surveying methods to problems of leveling, line direction, measurement of angles, measurement of distance and transverse computations
 - Demonstrate knowledge of zoning, property lines, utilities, building line, setback, building corners and elevation
 - Identify the actual location/elevation
 - Use lasers/levels/transits to check alignment and elevations
 - Identify specific hazards and be aware of them while performing excavation tasks
 - Demolish and/or disassemble and remove structures and buildings prior to repair or new construction

MATERIAL RESOURCES

- ▶ **Identification**
 - Identify materials necessary to complete tasks in the trade
 - Describe the structure and properties of various materials
 - Evaluate waste of resources/materials
 - Evaluate necessity for additional/alternative resources/materials
 - Differentiate between compatible and incompatible substances

- ▶ Selection
 - Evaluate and select building materials and assemblies to meet project specifications (e.g., metals, woods, ceramics, concrete, rubber, plastics, polymers, composites, etc.)
 - Understand criteria used for material selection
- ▶ Use
 - Handle, install, position, move and store materials properly
 - Demonstrate knowledge of various material finishing techniques
 - Identify and perform material testing techniques
 - Understand appropriate transport methods of various construction materials
 - Use appropriate combinations of building materials and components

OPERATION, INSTALLATION AND REPAIR

- ▶ Operation/Installation
 - Operate machinery that moves materials, earth and other heavy materials
 - Install equipment, machines and/or materials to meet specifications
 - Assemble temporary facilities, rigging, formwork, scaffolding
 - Install, connect, test and maintain electrical systems
 - Select, cut, install, replace and remove all types of glass
 - Place and install iron or steel girders
 - Recognize appropriate applications for finishing techniques
 - Apply finishing techniques
- ▶ Rigging
 - Use slings and common rigging hardware
 - Perform basic hitch configurations and ensure their proper connections
 - Practice basic load-handling safety
 - Demonstrate proper use of American National Standards (ANSI) hand signals to communicate with other workers:
 - ⇒ Identify the correct signal to direct the load
 - ⇒ Use the correct signal to direct the load
 - ⇒ Demonstrate how to work out signal use with the equipment operator
 - ⇒ Identify and occupy vantage points to see and be seen as the signaler
- ▶ Maintenance/Repair
 - Repair machines, systems or structures using the needed tools
 - Identify, diagnose and/or repair equipment problems
 - Maintain and troubleshoot mechanical, electrical and plumbing systems
 - Perform preventative maintenance to service existing structures
 - Repair and restore existing structures

REGULATIONS AND QUALITY ASSURANCE

- ▶ Regulations
 - Be aware of and comply with governmental regulations, local and state building codes, contract provisions and construction standards
 - Use information given in regulations and codes correctly
 - Pass job inspections and comply with regulations at all times

► Quality Assurance

- Complete construction projects according to specified standards of quality and performance
- Evaluate efficiency and effectiveness of a project/job
- Ensure work is done well, safely and according to code and customer requirements
- Inspect job sites, equipment, structures or materials to identify the cause of errors or other problems or defects
- Inspect structures and systems for structural quality, general safety and conformance to specifications and codes
- Conduct tests and inspections of products or processes to evaluate quality
- Report on issues that affect quality
- Ensure contractual roles and responsibilities are fulfilled

► Environmental Impact Mitigation

- Recognize and abate all types of environmental hazards
- Operate, maintain and interpret data from air sampling equipment
- Set up and maintain decontamination systems
- Remove, package, dispose of and document hazardous materials
- Take steps to prevent/control wind or water erosion in land development and construction
- Obtain relevant permits when work will impact wetlands and take steps to minimize negative impact

HEALTH AND SAFETY

► Personal Safety

- Select, inspect and use personal protective equipment such as respiratory protection and fall protection equipment
- Work to create a hazard-free, accident-free environment
- Know effects of and how to deal with temperature extremes and weather conditions
- Work safely in confined spaces or at heights

► Safety Procedures

- Follow rules and regulations to comply with personal and jobsite safety standards
- Identify workplace/jobsite environmental hazards to promote workplace/jobsite safety
- Understand shop and worksite safety, fire safety, electrical safety and chemical safety
- Follow ladder and scaffold safety procedures
- Demonstrate knowledge of hazardous properties of materials such as radiation, toxicity, flammability, reactivity, corrosivity and limits of fire resistance exposure
- Complete accident reports in accordance with required standards; file reports with appropriate personnel
- Use Material Safety Data Sheets (MSDS) information to manage, use and dispose of hazardous materials

TIER 5—Industry—Sector Competencies

RESIDENTIAL CONSTRUCTION	HEAVY CIVIL CONSTRUCTION
⇒ Construction of Specific Home Components	⇒ Construction of Heavy Highway/Civil Structures
⇒ Specialty Skills	⇒ Site Preparation
⇒ Business Fundamentals	⇒ Heavy Equipment Operators
⇒ Customer Service & Homeowner Relations	⇒ Materials & Installation
⇒ Green Building Practices	⇒ Traffic Control

TARGET OCCUPATIONS

The analysis in the section that follows will be focused on a specific set of occupations within Green Building. These were identified by creating a custom industry staffing pattern for this industry cluster in Missouri. This was then sorted by each occupation's impact on the economy and then mapped against the US DOL's In Demand occupation list for Green Building. The Target Occupations (does not include the all occupations in this industry) for this sector are:

O*NET SOC Code	Title
17-1011	Architects, Except Landscape and Naval
17-2051	Civil Engineers
47-2031	Construction Carpenters Rough Carpenters
47-2061	Construction Laborers
11-9021	Construction Managers
49-9021	Heating, Air Conditioning Mechanics and Installers Refrigeration Mechanics and Installers
47-2073	Operating Engineers and Other Construction Equipment Operators
47-2152	Pipe Fitters and Steamfitters Plumbers
47-2211	Sheet Metal Workers

TIER 6—Occupation-Specific Knowledge Areas

ARCHITECTS, EXCEPT LANDSCAPE AND NAVAL	CIVIL ENGINEERS
⇒ Design	⇒ Engineering and Technology
⇒ Building and Construction	⇒ Design
⇒ Engineering and Technology	⇒ Building and Construction
⇒ Customer and Personal Service	⇒ Mathematics
⇒ Administration and Management	⇒ English Language
⇒ Public Safety and Security	⇒ Physics
⇒ English Language	⇒ Transportation
⇒ Sales and Marketing	⇒ Administration and Management
⇒ Law and Government	⇒ Customer and Personal Service
⇒ Mathematics	⇒ Public Safety and Security
CONSTRUCTION CARPENTERS	ROUGH CARPENTERS
⇒ Building and Construction	⇒ Building and Construction
⇒ Mathematics	⇒ Mathematics
⇒ Mechanical	⇒ Design
⇒ Production and Processing	⇒ Administration and Management
⇒ Design	⇒ English Language
⇒ Administration and Management	⇒ Production and Processing
⇒ Public Safety and Security	⇒ Education and Training
⇒ Customer and Personal Service	
⇒ Engineering and Technology	

TIER 6—Occupation-Specific Knowledge Areas

CONSTRUCTION LABORERS <ul style="list-style-type: none"> ⇒ Building and Construction ⇒ Design ⇒ Mathematics ⇒ Mechanical ⇒ Public Safety and Security ⇒ Engineering and Technology ⇒ English Language 	CONSTRUCTION MANAGERS <ul style="list-style-type: none"> ⇒ Building and Construction ⇒ Administration and Management ⇒ Customer and Personal Service ⇒ Engineering and Technology ⇒ Design ⇒ English Language ⇒ Public Safety and Security ⇒ Mathematics ⇒ Mechanical ⇒ Personnel and Human Resources
HEATING/AIR CONDITIONING MECHANICS & INSTALLERS <ul style="list-style-type: none"> ⇒ Mechanical ⇒ Customer and Personal Service ⇒ Mathematics ⇒ Building and Construction ⇒ Public Safety and Security ⇒ Education and Training ⇒ Engineering and Technology ⇒ Design ⇒ English Language ⇒ Physics 	REFRIGERATION MECHANICS AND INSTALLERS <ul style="list-style-type: none"> ⇒ Mechanical ⇒ Customer and Personal Service ⇒ English Language ⇒ Mathematics ⇒ Computers and Electronics ⇒ Physics ⇒ Engineering and Technology ⇒ Building and Construction ⇒ Administration and Management ⇒ Public Safety and Security
OPERATING ENGINEERS AND OTHER CONSTRUCTION EQUIPMENT OPERATORS <ul style="list-style-type: none"> ⇒ Building and Construction ⇒ Mechanical ⇒ Public Safety and Security ⇒ English Language ⇒ Education and Training ⇒ Administration and Management ⇒ Customer and Personal Service 	PIPE FITTERS AND STEAMFITTERS <ul style="list-style-type: none"> ⇒ Mechanical ⇒ Building and Construction ⇒ English Language ⇒ Design ⇒ Mathematics ⇒ Administration and Management ⇒ Customer and Personal Service ⇒ Engineering and Technology ⇒ Education and Training
PLUMBERS <ul style="list-style-type: none"> ⇒ Building and Construction ⇒ Mechanical ⇒ Mathematics ⇒ Design ⇒ Customer and Personal Service ⇒ English Language ⇒ Physics ⇒ Administration and Management 	SHEET METAL WORKERS <ul style="list-style-type: none"> ⇒ Mechanical ⇒ Building and Construction ⇒ Design ⇒ Mathematics ⇒ Administration and Management ⇒ Engineering and Technology ⇒ Production and Processing ⇒ English Language ⇒ Customer and Personal Service

TIER 7—Occupation-Specific Technical Competencies

ARCHITECTS, EXCEPT LANDSCAPE AND NAVAL	
TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Compasses—Dividers ⇒ Drafting kits or sets—Arm drafting machines; Track drafting machines ⇒ Photocopiers—Dialzo copiers; Engineering copiers ⇒ Power saws—Circular saws; Fretsaws ⇒ Straight edges—Parallel bars 	<ul style="list-style-type: none"> ⇒ Computer aided design CAD software—Autodesk AutoCAD software; Google SketchUp software; Roof Builder Tools software; Virtual reality modeling language VRML software ⇒ Document management software—Adobe Systems Adobe Acrobat software; CADFind Sketch & Search software; FileNet P8 software ⇒ Graphics or photo imaging software—Adobe Systems Adobe Illustrator; Adobe Systems Adobe Photoshop software; Micro-Press MicroStation PowerDraft ⇒ Office suite software—ArchiOffice software; Microsoft Office software ⇒ Project management software—Craftsman CD Estimator; Microsoft Project; Primavera Systems software; Turtle Creek Software Goldenseal (project management feature)
CIVIL ENGINEERS	
TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Compasses—Dividers ⇒ Distance meters—Electronic distance measuring devices; Rhodes arcs ⇒ Levels—Laser levels; Precision levels ⇒ Scales—Drafting scales; Rolling scales ⇒ Theodolites—Total stations 	<ul style="list-style-type: none"> ⇒ Analytical or scientific software—HEC-1*; Hydraulic modeling software; Trimble Geomatics Office; WinTR-55* ⇒ Computer aided design CAD software—Autodesk AutoCAD software; Bentley InRoads Site; Eagle Point Site Design; Mathsoft Mathcad ⇒ Map creation software—Cartography software; ESRI ArcView; Geographic information system GIS software; Intergraph MGE ⇒ Project management software—Cost estimating software; Microsoft Project; The Gordian Group PROGEN Online ⇒ Word processing software—Corel WordPerfect software; Microsoft Word
CONSTRUCTION CARPENTERS	
TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Levels—Calibrating electronic levels; Infrared laser levels; Spirit levels; Visible beam laser levels ⇒ Power routers—Plunge routers; Portable routers; Routers; Trim routers ⇒ Power sanders—Belt sanders; Handheld rotary tools; Random orbit sanders; Sanders ⇒ Power saws—Band saws; Circular saws; Reciprocating saws; Worm-drive saws ⇒ Squares—Combination squares; Framing squares; Layout bars 	<ul style="list-style-type: none"> ⇒ Accounting software—Intuit QuickBooks; Intuit Quicken software; Job costing software ⇒ Office suite software—Microsoft Office software ⇒ Project management software—Bosch Punch List; Craftsman CD Estimator; Turtle Creek Software Goldenseal Architect; Virtual Boss software ⇒ Web page creation and editing software ⇒ Word processing software—Microsoft Word; Wilhelm Publishing Threshold

* Software developed by a government agency and/or distributed as freeware/shareware.

TIER 7—Occupation-Specific Technical Competencies

CONSTRUCTION CARPENTERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Levels—Calibrating electronic levels; Infrared laser levels; Spirit levels; Visible beam laser levels ⇒ Power routers—Plunge routers; Portable routers; Routers; Trim routers ⇒ Power sanders—Belt sanders; Handheld rotary tools; Random orbit sanders; Sanders ⇒ Power saws—Band saws; Circular saws; Reciprocating saws; Worm-drive saws ⇒ Squares—Combination squares; Framing squares; Layout bars 	<ul style="list-style-type: none"> ⇒ Accounting software—Intuit QuickBooks; Intuit Quicken software; Job costing software ⇒ Office suite software—Microsoft Office software ⇒ Project management software—Bosch Punch List; Craftsman CD Estimator; Turtle Creek Software Goldenseal Architect; Virtual Boss software ⇒ Web page creation and editing software ⇒ Word processing software—Microsoft Word; Wilhelm Publishing Threshold

ROUGH CARPENTERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Jacks—Beam-lifting jacks; Screw jacks; Wall-lifting jacks ⇒ Ladders—Extension ladders; Fold-up ladders; Non-conducting ladders ⇒ Levels—Self-stopping levels; Spirit levels; Torpedo levels; Visible beam laser levels ⇒ Power saws—Circular saws; Reciprocating saws; Table saws; Worm-drive saws ⇒ Squares—Combination squares; Framing squares; Layout bars 	<ul style="list-style-type: none"> ⇒ Computer aided design CAD software—Drawing and drafting software ⇒ Office suite software—Microsoft Office software ⇒ Project management software—Bosch Punch List ⇒ Spreadsheet software—Microsoft Excel ⇒ Word processing software—Microsoft Word

CONSTRUCTION LABORERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Blow torches—Liquid propane torches; Oxygen/acetylene torches; Torches ⇒ Forklifts—Masonry forklifts; Rough terrain forklifts ⇒ Levels—Carpenters' levels; Laser levels; Spirit levels; Water levels ⇒ Manlift or personnel lift—Bosun chairs; Manlifts; Swing chairs ⇒ Power drills—Electric drills; Hammer drills ⇒ Power grinders—Bench grinders; Disc grinders; Pedestal grinders; Stump cutters ⇒ Power saws—Circular saws; Cutoff saws; Hydraulic track-guided wall saws; Walk-behind saws ⇒ Pressure or steam cleaners—Pressure washers; Steam jennies; Steaming equipment ⇒ Vacuum cleaners—Ride-on vacuum cleaners; Sidewalk sweepers; Suction sweepers ⇒ Water trucks—Jet trucks for cleaning sewer lines; Water spraying equipment; Water tank trucks 	<ul style="list-style-type: none"> ⇒ Not Applicable

TIER 7—Occupation-Specific Technical Competencies

CONSTRUCTION MANAGERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Notebook computers—Laptop computers ⇒ Personal computers ⇒ Personal digital assistant PDAs or organizers—Pocket personal computers PC ⇒ Scanners—Large-format scanners 	<ul style="list-style-type: none"> ⇒ Calendar and scheduling software—AEC Software FastTrack Schedule; Scheduling software ⇒ Data base user interface and query software—Database software; Integrated construction management software; Microsoft Access ⇒ Document management software—Axios Systems assyst; Daily Manager; Site Manager ⇒ Internet browser software—Microsoft Internet Explorer ⇒ Presentation software—Microsoft PowerPoint ⇒ Project management software—Microsoft Project; Primavera Systems software; UDA Construction Office Construction Management; Versa-Calc Jobber 6 Construction Calculator

HEATING AND AIR CONDITIONING MECHANICS AND INSTALLERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Flow sensors—Turbine flow meters; Venturi meters; Water flow meters; Water pressure gauges ⇒ Hammers—Soft face hammers; Tinnners hammers ⇒ Pressure indicators—Differential pressure detectors; Pneumatic air gauges; Pressure gauges; Refrigerant pressure meters ⇒ Thermocouples—Bead type thermocouples; Pipe clamp thermocouples ⇒ Voltage or current meters—Alternating current AC line splitters; Electrical current meters; Non-contact voltage detectors; Voltmeters 	<ul style="list-style-type: none"> ⇒ Computer aided design CAD software—HVAC tools software ⇒ Customer relationship management CRM software—Contact management systems ⇒ Data base user interface and query software—Data logging software; Database software ⇒ Industrial control software—Building automation software ⇒ Word processing software—Atlas Construction Business Forms; Microsoft Word

REFRIGERATION MECHANICS AND INSTALLERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Flowmeters—Air flow hoods; Pilot tubes ⇒ Handheld thermometer—Temperature gauges; Thermometers; Water temperature gauges ⇒ Levels—Bubble levels; Laser levels; Precision levels; Water levels ⇒ Pipe or tube cutters—Pipe cutters; Tube cutters ⇒ Platform lift—Platform lifts; Staging equipment ⇒ Power drills—Cordless drills; Electric drills; Hand drills ⇒ Pressure indicators—Gas pressure gauges; Magnehelic gauges; Pressure simulators ⇒ Soldering irons or guns—Soldering guns; Soldering irons 	<ul style="list-style-type: none"> ⇒ Data base user interface and query software—Database software ⇒ Facilities management software—Facility energy management software; Johnson Controls Metasys

TIER 7—Occupation-Specific Technical Competencies

OPERATING ENGINEERS AND OTHER CONSTRUCTION EQUIPMENT OPERATORS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Dump trucks—Belly dumpers; Heavy dump trucks; Single axle dump trucks; Tandem axle dump trucks ⇒ Front end loaders—End loaders; Tracked loaders ⇒ Graders—Motor graders; Tilt graders ⇒ Hoists—Silent hoists; Tugger hoists ⇒ Land drilling rigs—Churn drills; Vertical drills ⇒ Power saws—Chain saws; Circular saws; Concrete saws ⇒ Scrubbing machines—Mechanical sweepers; MultiPurpose vacuum catch basin cleaners; Sweepers ⇒ Skid steer loaders—Skid steer machines; Skiploaders 	<ul style="list-style-type: none"> ⇒ Facilities management software—Maintenance record software ⇒ Time accounting software—Work record software

PIPE FITTERS AND STEAMFITTERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Levels—Automatic levels; Laser levels; Pocket levels; Two-hole pins ⇒ Power grinders—Offset grinders; Pedestal grinders; Portable grinders; Stationary grinders ⇒ Screwdrivers—Flat screwdrivers; Impact screwdrivers; Phillips head screwdrivers ⇒ Taps or dies—Dies; Drophead dies; Taps ⇒ Welders—Alternating current/direct current AC/DC welders; Arc welders; Welding machines 	<ul style="list-style-type: none"> ⇒ Analytical or scientific software—AutoPIPE software; COADE CAESAR II; Pipepro Pipefitting software; Watter Hammer Software Hytran ⇒ Computer aided design CAD software—AEC Design Group CADPIPE; Pipe 2D software; ViziFlow software ⇒ Project management software—Piping construction costs estimation software ⇒ Spreadsheet software—Microsoft Excel; PipingOffice software ⇒ Word processing software

PLUMBERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Drain or pipe cleaning equipment—Drain cleaning cables; Hand spinners; Power sink machine drain cleaners; Toilet augers ⇒ Pipe or tube cutters—Pipe cutters; Power pipe cutters; Ratcheting polyvinyl chloride PVC cutters; Tubing cutters ⇒ Pipe wrenches—End pipe wrenches; Offset pipe wrenches; Straight pipe wrenches ⇒ Pressure indicators—Air pressure gauges; Heavy duty water pressure gauges; Maximum reading water pressure gauges; Water pressure gauges ⇒ Specialty wrenches—Chain wrenches; Spud wrenches; Strainer wrenches; Water heater element removal wrenches 	<ul style="list-style-type: none"> ⇒ Accounting software—Intuit QuickBooks; Intuit Quicken software; Job costing software; KRS Enterprises Service First! ⇒ Analytical or scientific software—Elite Software DPIPE; Elite Software FIRE; Klear Estimator; Quote Software QuoteExpress ⇒ Computer aided design CAD software—Autodesk Building Systems; Drawing and drafting software; Elite Software Sprinkler CAD; Horizon Engineering Sigma Plumbing Calculator ⇒ Project management software—Estimating software; FastEST FastPipe; FastEST software; Vision InfoSoft Plumbing Bid Manager ⇒ Word processing software—Atlas Construction Business Forms; Contractor City Contractor Forms Pack; Microsoft Word; Wilhelm Publishing Threshold

TIER 7—Occupation-Specific Technical Competencies

SHEET METAL WORKERS

TOOLS USED IN THIS OCCUPATION	TECHNOLOGY USED IN THIS OCCUPATION
<ul style="list-style-type: none"> ⇒ Hammers—Ball peen hammers; Bumping hammers; Setting hammers ⇒ Metal cutters—Aviation snips; Hand notchers; Power notchers; V-notchers ⇒ Punches or nail sets or drifts—Center punches; Hole punches; Prick punches; Rotary punches ⇒ Sequential forming machines—Bar folders; Beading machines; Spiral duct machines; Wiring machines ⇒ Shears—Power shears; Ring and circular shears; Squaring shears; Unishears ⇒ Workshop presses—Drill presses; Hand brakes; Power presses; Rivet presses 	<ul style="list-style-type: none"> ⇒ Computer aided design CAD software—Autodesk AutoCAD software; Parametric Technology Pro/ENGINEER software; UGS NX; XY Soft Sheet Cutting Suite ⇒ Computer aided manufacturing CAM software—Applied Production ProFab; JETCAM Expert; Striker Systems SS-Profile; WiCAM PN4000 ⇒ Data base user interface and query software—Data entry software ⇒ Spreadsheet software

TIER 8—Occupation Specific Requirements

SOC CODE	OCCUPATION	CIP CODE	CIP TITLE
17-1011	Architects Except Landscape and Naval	04.0201	Architecture (BArch, BA/BS, MArch, MA/MS, PhD)
		04.0401	Environmental Design/Architecture
		04.0801	Architectural History and Criticism, General
		04.9999	Architecture and Related Services, Other
17-2051	Civil Engineers	14.0801	Civil Engineering, General
		14.0804	Transportation and Highway Engineering
		14.0805	Water Resources Engineering
		14.0899	Civil Engineering, Other
47-2031	Construction Carpenters	46.0201	Carpentry/Carpenter
47-2031	Rough Carpenters	46.0201	Carpentry/Carpenter
47-2061	Construction Laborers	46.9999	Construction Trades, Other
11-9021	Construction Managers	15.1001	Construction Engineering Technology/Technician
		52.0101	Business/Commerce, General
		52.0201	Business Administration and Management, General
		52.0205	Operations Management and Supervision
		52.2001	Construction Management
49-9021	Heating, Air Conditioning Mechanics and Installers	15.0501	Heating, Air Conditioning & Refrigeration Technology/ Technician (ACH/ACR/ACHR/HRAC/HVAC/
		15.0505	Solar Energy Technology/Technician
		47.0201	Heating, Air Conditioning, Ventilation & Refrigeration Maintenance Technology/Technician
49-9021	Refrigeration Mechanics and Installers	15.0501	Heating, Air Conditioning & Refrigeration Technology/ Technician (ACH/ACR/ACHR/HRAC/HVAC/
		15.0505	Solar Energy Technology/Technician
		47.0201	Heating, Air Conditioning, Ventilation & Refrigeration Maintenance Technology/Technician

TIER 8—Occupation Specific Requirements

SOC CODE	OCCUPATION	CIP CODE	CIP TITLE
47-2073	Operating Engineers and Other Construction Equipment Operators	49.0202	Construction/Heavy Equipment/Earthmoving Equipment Operation
		49.0206	Mobil Crane Operation/Operator
47-2152	Pipe Fitters and Steamfitters	46.0502	Pipefitting/Pipefitter and Sprinkler Fitter
47-2152	Plumbers	46.0502	Pipefitting/Pipefitter and Sprinkler Fitter Plumbing
		46.0503	Technology/Plumber
		46.0599	Plumbing and Related Water Supply Services, Other
47-2211	Sheet Metal Workers	48.0506	Sheet Metal Technology/Sheetworking

In addition to the above listed trainings, the Leadership in Energy & Environmental Design (LEED) is a world wide recognized green building certification system. Developed by the U.S. Green Building Council (USGBC), LEED is intended to provide building owners and operators a specific guideline for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. LEED can be applied to commercial as well as residential buildings.⁶

The Green Building Certification Institute manages the LEED professional credentialing program. The various LEED professional credentials are:

- ▶ LEED Green Associate
- ▶ LEED AP Building Design and Construction
- ▶ LEED AP Homes
- ▶ LEED AP Interior Design & Construction
- ▶ LEED AP Operations & Maintenance
- ▶ LEED AP Neighborhood Development

A LEED Professional Credential is a distinguishing mark for green building professionals in the market place and provides employers, policymakers and other stakeholders with assurances of an individual's level of competence.

TIER 9—Management Competencies

- ⇒ Manpower Planning
- ⇒ Delegating
- ⇒ Managing Work Flow
- ⇒ Entrepreneurship
- ⇒ Leadership
- ⇒ Developing & Monitoring
- ⇒ Preparing and Managing Budgets
- ⇒ Team Building
- ⇒ Developing an Organizational Vision
- ⇒ Managing Resources

⁶ US Green Building Council—<http://www.usgbc.org/>



Department of Economic Development

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