ABSTRACT

This competency-based curriculum is designed to be a handbook for the construction trades. It includes all competencies a student will acquire in the course of building a complete house. Based on a survey of Alaskan construction employers and employees, the handbook stresses both principles and skills. The 23 units are presented in the sequence that they would be used by someone building a house from start to finish; however, the units can stand alone as complete courses. The curriculum is divided into basic skills and specialized construction activities. The handbook is organized in seven sections. Section 1 introduces the concept of competency-based curriculum, while Section 2 provides the scope, sequence, and hierarchy of construction education competencies. Section 3 presents the curriculum, including the competencies and tasks for construction trades instruction. These are categorized as basic (employability skills, health and safety, hand and power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection) and specialized (foundations and forming; masonry and concrete; blocks and bricks; framing—subfloor/floor, walls, and roofing; roof finishing; plumbing and heating; wiring; windows and doors; exterior and interior finish; and cabinets). Section 4 contains course descriptions to assist school districts in developing their vocational programs. Section 5 contains a curriculum analysis matrix to be used in determining competencies to be included in specific courses. Section 6 contains a sample skills card for evaluating and recording student progress. Section 7 lists resources and materials available in Alaska and the rest of the country.
CONSTRUCTION TRADES CURRICULUM

Bill Sheffield, Governor

Developed by the...

ALASKA DEPARTMENT OF EDUCATION
Adult and Vocational Education

Marshall L. Lind, Commissioner

Gerald D. Hiley, Director for Vocational Education

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Forward

This competency-based curriculum is designed to be a handbook for the construction trades. It includes all competencies a student will acquire in the course of building a complete residential dwelling according to local and national building codes, accepted practices, and the latest energy and resource conservation techniques.

Development of this handbook began with a survey of Alaskan construction employers and employees. Their priorities regarding the skills and knowledge students need to acquire to survive and thrive in the industry form the basis of this handbook. For example, industry's emphasis on the importance of communication and personal skills is reflected in the long and detailed first unit, employability skills.

The handbook also stresses the importance of understanding the principles associated with the various elements of construction: Units begin with principles, science, and math so that students will have conceptual frameworks to which they may add the details of various techniques. Alaska requires construction techniques tailored to local environmental, economic, and transportation concerns. As a result, rather than advocate specific construction techniques, the handbook advocates a general approach. It encourages selecting the most appropriate energy and material-efficient construction techniques. Meeting this objective will require many considerations including the structure's intended use, its ultimate site, and the shop facilities available.

The 23 units are presented in the sequence that they would be taught by someone building a house from start to finish. However, the units stand on their own and can be used as complete courses. The curriculum is also divided into two categories, basic skills and specialized construction activities. The basic includes Employability Skills, Safety and Health, Technical Skills, and Resource Conservation, competencies which are fundamental but not necessarily restricted to the construction trades. Specialized construction skills include Foundations, Framing, Finishing, and Utilities.

During two audioconferences, educators from around the state provided input for completing the draft. A task force of three educators convened to complete the handbook.

The handbook is organized in seven sections:

Section I introduces the concept of competency-based curriculum. The role of vocational educators in curriculum planning, implementation and evaluation is also included.

Section II provides the scope, sequence, and hierarchy of construction education competencies.

Section III presents the curriculum, it includes the competencies and tasks for construction trades instruction.
Section IV contains course descriptions to assist school districts in developing their vocational programs.

Section V contains the curriculum analysis matrix to be used in determining competencies to be included in specific construction courses.

Section VI contains a sample skills card for evaluating and recording student progress.

Section VII lists information on resources and specific materials available in Alaska and the rest of the nation.

It is recommended that all students participate in career awareness and exploration experiences to help them understand the connection between school and work and make career plans.
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Office of Adult and Vocational Education
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Introduction to Competency-Based Curriculum
Competency-Based Curriculum

Vocational education should be directed toward the skills, knowledge, and attitudes needed for successful employment. Changes in technology are affecting the job requirements in construction. Such changes require construction educators to continually update their curriculum in order to prepare students for competition in the job market.

An effective method for delivering vocational education is through a competency-based curriculum. This curriculum is based on a task analysis of the key occupations in construction. Once a competency-based curriculum is set in place, student performance must be measured on levels of proficiency in those competencies. Thus, the critical features of competency-based education are:

1) validating competencies to be included in the curriculum; and
2) evaluation of student competency levels.

This curriculum handbook sets direction for local curriculum developers. It provides a framework for developing courses of study and lesson plans in local schools.

Curriculum Based On Competencies

Competence refers to the adequate performance of a task. The task may be evaluated according to the performance or process, the product, or both.

Competency-Based Vocational Education consists of programs that derive their content from the tasks performed in each occupation/job and assess student performance on the basis of preset performance standards.

Learning materials define the competencies the student is to learn, the criteria by which the student will be evaluated, and the conditions under which the evaluation will occur.

Competency-based instruction places emphasis on the ability to do, as well as on learning how and why. Student performance and knowledge are individually evaluated against the stated criteria, rather than against group norms.

The competency process utilizes a checklist of attitudes, knowledge and skills that are commonly needed by entry level employees in construction occupations. In developing this curriculum handbook, a cross-section of construction professionals were asked to respond to the checklist on the basis of needs within their own establishments. The checklists were tallied and summarized to determine which attitudes, knowledge and skills were common to firms in Alaska. Also, the competencies in each area were ranked as to decreasing importance.
Student Performance Assessment

A curriculum becomes competency-based when students are assessed on the basis of their competence. Sample skill cards are provided in this guide for teachers who wish to use them in assessing the competency levels of their students. The card has four levels of proficiency which allow continued development of skills. The card can be used to monitor students' progress as they move between construction classes, between teachers and grade levels and between school and work. The completed skills card is an important part of a placement portfolio when students begin their job searches.

Curriculum Delivery Systems

Vocational Student Leadership Organizations

Some of the competencies in this curriculum guide cannot be fully met in traditional classroom and lab settings. The Vocational Industrial Clubs of America (VICA) is a delivery system which can be integrated into the regular school program. Human relations skills as well as job skills will be enhanced by student participation in VICA. VICA activities should complement instruction in the construction classroom and lab. They should be integrated as a curriculum delivery system and not allowed to become an extracurricular activity.

Cooperative Work Experience

Some of the competencies identified in this guide cannot be fully developed at a school site. A work station in the community offers realistic experiences in fulfilling the program goals in career development and human relations. Cooperative Work Experience offers an excellent vehicle for the delivery of instruction. With well developed training plans, teachers and employers can cooperate to prepare students for employment. Cooperative Work Experience extends the instructional program beyond the availability of equipment and instructor time at the local school. Teachers and employers must maintain regular communications to assure that students are receiving a high quality experience.

The Rural Student Vocational Program (RSVP) provides a two week fulltime work experience for students from rural areas where job stations are limited or non-existent.

The Job Training Partnership Act (JTPA) provides on-the-job experience to disadvantaged youth in both urban and rural areas.
Role of Instructor in Curriculum Planning, Implementation and Evaluation

The vocational instructor fulfills many roles which include the following responsibilities:

- Prepares a written vocational program plan.
- Develops and maintains a written program philosophy with objectives that support the philosophy.
- Maintains a written list of competencies identified as needed for the program area.
- Devises and maintains a classroom management system for implementing the curriculum materials provided for the program area.
- Evaluates the curriculum content periodically to determine curriculum changes and updates. This includes the involvement of the students (present and former), advisory committee members, and other personnel.
- Blocks units of instruction and plans lesson plans based on the competencies of the occupation.
- Provides appropriate instructional materials, supplies, and equipment for the students to use.
- Reviews the instructional materials to assure that they are free from sex bias and sex role stereotyping.
- Works with an advisory committee.
- Assists and/or serves as an advisor to the appropriate student organization related to the vocational program area.
- Plans and arranges an appropriate classroom learning environment. This involves assisting students of different abilities to work at their own pace and in cases where remedial instruction is needed, securing additional help for those students.
- Reinforces basic skills of reading, communication (written & oral) and computation through vocational education experiences.
- Helps determine what objective(s) should be established for handicapped students as a part of the individual educational plan (IEP) development.
- Uses a grading procedure that is made available to all students at the beginning of their training.
- Sets an example for grooming and dress that is generally found in the occupational area in business or industry to enable students to establish appropriate standards.
Benefits of the Competency-Based Curriculum

Competency-based vocational education offers several benefits to students:

1. The competencies/tasks are directed to the student and provide measurable criteria for determining when the student has acquired the necessary knowledge and skills.

2. Students receive realistic training for the job. They become competent in tasks that are relevant to the occupation.

3. Students know what is expected of them throughout the course. The competencies are made available to them at the onset. They know what they will be doing and how well it must be done.

4. Each student is individually responsible for completing each competency attempted in the curriculum.

5. Students are not compared with other students in their accomplishments because each is expected to work according to his/her individual capabilities and learning style. Because of the various evaluation policies of different school systems, the ideal of not comparing students in determining grades is not always possible. However, the basic thrust of the competency-based program is to evaluate each student according to his/her accomplishment of each task as he/she works up to individual capability.
Program Development
Program Development

The format of this handbook was selected to aid administrators and teachers in concentrating on the skills needed for vocational training. It will assist in selecting the array of units and the delivery system which fit the school. This provides the flexibility of varying the course content to include the most valuable skills as appropriate for the scope and sequence. The primary importance is that students are able to secure foundation skills. Schools can vary their delivery systems to maximize student opportunities by:

1. Offering courses on alternate years or other planned sequences
2. Offering two or more courses in the same class
3. Providing individualized materials and instruction

A matrix is included in this guide for use in planning the courses to be offered and the content of each course.

The following chart shows the hierarchy of construction competencies and details specialized competencies for construction education.
Hierarchy of Construction Competencies

Basic Construction Competencies

Employability Skills
- Career Planning
- Job Seeking
- Work Attitudes
- Human Relations
- Appearance
- Communication Skills

Safety and Health
- Employee Rights
- Safety & Health Regulations
- Job Site Management
- Safe Job Site Procedures
- Personal Health
- Hand & Power Tool Safety

Technical Skills
- Measurement
- Computation
- Blueprint Reading
- Building Codes

Resource Conservation
- Site Selection
- Zoning
- Energy
- Materials
- Insulation
- Moisture Management

Specialized Construction Competencies

Foundations
- Selection
- Forming
- Masonry
- Concrete
- Blocks
- Bricks

Framing
- Subfloor
- Floor
- Walls
- Window & Door Openings
- Stairs
- Ceiling
- Roof

Finishing
- Roof
- Windows
- Doors
- Exterior
- Interior
- Cabinets

Utilities
- Wiring
- Plumbing
- Heating
- Ventilation
III
Competencies
and Tasks
Employability
Skills

Competency: Identify the major purposes of carpentry and construction

Tasks: Describe the differences between single-family homes, apartment buildings, and condominiums

Differentiate between residential and commercial construction

Differentiate between residential construction, remodeling, and renovation

Identify the primary construction season in Alaska

Competency: Identify construction careers

Tasks: List the skills most needed by carpenters

Describe qualities typically found in carpenters

Differentiate between union and independents and between residential and commercial building contractors

Identify other potential employers such as lumber yards, companies with residential buildings to maintain and government

Explain the specialties such as former, framer, sheetrocker, and exterior finisher versus jack or jill of all trades

Identify openings and positions

Identify courses, apprenticeships and other experiences which provide required skills

Identify personal traits essential for construction careers

Describe what skills and attributes carpenters need to build houses

Describe what employers look for in applicants
Competency: Identify career choices

Tasks: Conduct a self-assessment:

a. Assess values in relation to work
b. Recognize skills and aptitudes
c. Assess employment history and experience
d. Describe obstacles to employment
e. Use Alaska Career Information System and other career
counseling systems and publications

Identify career clusters:

a. Know specific duties and jobs within clusters
b. Describe apprenticeship/training programs

Explain the use of labor market information:

a. Describe the current local labor market
b. Identify occupations which are likely to grow
c. Relate career choices to local labor market

Select career goals:

a. Know how skills could be used in other jobs
b. Plan for career goal
c. Develop specific steps to reach goal

Competency: Prepare a resume and job application

Tasks: Explain the purposes, types, and limitations of resumes and applications

Obtain a social security number

List:

a. Work experience
b. Hobbies and interests
c. Community activities or memberships
d. School activities or memberships
e. Awards, positions or club offices
f. References, including addresses and phone numbers

When filling out applications be sure to:

a. Obtain extra copies, in case of mistakes
b. Read application carefully
c. Follow instructions
d. Complete all items as accurately as possible
e. Write legibly
f. Verify references before using
g. Use NA for items which do not apply to you
Competency: Write a cover letter

Tasks: Explain when and how to write a cover letter
      Explain what a writing sample tells a potential employer
      List the things the cover letter must say

Competency: Prepare for an interview

Tasks: Explain how to schedule an interview
      Demonstrate good phone and conversation manners
      Make checklists of the things you need to say and need to learn during the call
      List things you need to find out before you hang up (interview date, time, and location, name of interviewers, application, resume, references)
      List the elements of a good interview
      List things which typically go awry in interviews
      Discuss how to answer the tough questions
      Describe the importance of knowing your strengths and weaknesses
      Describe the importance of being on time
      Describe the importance of appearance (proper dress and grooming)
      Describe the importance of body language: proper handshake, posture, eye contact and mannerisms
      Explain interview etiquette

Competency: Follow up the interview

Tasks: Analyze the interview
      Determine whether a thank-you letter or a follow-up call is appropriate
      Explain how to write a thank you note or make a follow-up call
Competency: Be reliable and dependable

Tasks: Maintain acceptable attendance records
   Explain importance of being on time
   Give timely notice of interruptions to work schedule
   Demonstrate reliability
   Follow rules of work site or training site

Competency: Maintain good personal relations

Tasks: Use positive attitudes with others
   Accept supervision and criticism
   Cooperate with others
   Accept the chain of command

Competency: Be honest

Tasks: Define honesty and integrity
   Explain how to deal with theft and dishonesty
   Discuss the relationship between employee integrity and overall company performance

Competency: Demonstrate initiative and productivity

Tasks: Explain importance of:
   a. Organizing time effectively
   b. Taking responsibility for successfully completing tasks on time
   c. Caring about the quality of work

Discuss the value of constructive suggestions

Discuss the importance of timing and approach in making constructive suggestions

Explain how to demonstrate initiative and make suggestions
Competency: Be assertive

Tasks: Differentiate between assertive, aggressive and passive behavior

Discuss whom to go to for employee problems
Describe the importance of setting reasonable goals
Discuss the importance of setting limits in terms of tolerating the behavior of others

Competency: Demonstrate work maturity

Tasks: Describe importance of openness to new situations on the job

Discuss the characteristics of the mature person:

a. Self-acceptance
b. Consideration and respect for others
c. Self-control
d. Positive thinking and attitudes
e. Flexibility

Describe the importance of being flexible
Name ways to develop and maintain good work relationships
Differentiate between personal and job-related problems
Describe the importance of orderly and systematic behavior in a business
Describe how to get along and resolve differences with employers, customers, contractors, suppliers, and building inspectors

Competency: Use effective leadership skills

Tasks: Describe the Vocational Industrial Clubs of America (VICA) and how it teaches leadership skills:

a. Participate in meetings according to rules of parliamentary procedure
b. Function effectively on committees by accepting assigned responsibilities
c. Plan and conduct effective group leadership activities
d. Participate in society in a democratic way
e. Be punctual and dependable
f. Follow rules, standards and policies
g. Work cooperatively with others

Describe leadership characteristics and responsibilities
Describe membership characteristics and responsibilities
Competency: Solve problems

Tasks: Describe the importance of having a method for analyzing and solving problems

- Describe how to identify problems
- Discuss the importance of information in problem analysis and resolution
- Describe how to analyze problems
- Describe how to develop and weigh alternative solutions
- Describe how to choose a course of action
- Persevere through hardships
- Explain how to recognize and change unworkable solutions

Competency: Identify employee rights and responsibilities

Tasks: Discuss state labor laws relating to compensation

- Explain the use of tax forms
- Explain the minimum wage and types of exempt businesses
- Explain employee benefits, rights, and responsibilities
- Explain labor contracts, grievance procedures, and the role of unions
- Discuss a sample company personnel policy

Competency: Identify personal responsibilities related to employment

Tasks: Secure adequate transportation

- List adequate child care alternatives
- Inventory independent living skills
- Develop personal finance plan
- Discuss employer’s expectations regarding substance abuse
Competency: Maintain good health for effective job performance

Tasks: Discuss the relationship between regular exercise, proper nutrition and rest, and job performance

Discuss the issue of smoking on the job

Discuss drug abuse as it relates to job performance

Competency: Prevent work-related injuries

Tasks: Describe the importance of safe working attitudes

Describe first-aid and CPR

Discuss the importance of wearing protective gear including: hardhats, eye and ear protection, respirators, gloves, chaps, safety lines, boots, personal flotation devices and survival suits

Describe safety procedures for:

a. chemicals and explosives
b. flammables
c. electricity
d. sodding and weeding
e. heavy equipment
f. hand and power tools
g. ladders and scaffolds
h. construction materials
i. lifting
j. extreme weather conditions
k. noise
m. boats and aircraft
n. wildlife and domestic animals
n. hazardous wastes and carcinogens
o. driving
p. carbon monoxide poisoning from vehicles and space heaters
q. excavations

Discuss special safety considerations relevant to each construction activity

Competency: Follow OSHA guidelines

Tasks: Explain the purpose of the Occupational Safety and Health Act

Describe your right under workers-right-to-know and other portions of the Act

Discuss how to resolve hazardous and OSHA violation situations
Competency: Apply reading and writing skills

Tasks: Describe how to find information in trade and consumer magazines and journals
Describe how to write memos, lists, and reports
Describe how to complete forms accurately
Describe how to use supply catalogs to identify and order materials
Describe how to check a shipment against a bill of lading
Describe how to recognize and correct errors in spelling, grammar, and punctuation

Competency: Follow verbal and written directions

Tasks: Follow directions
Ask for clarification
Explain how to listen
Review situations of poor communication
Explain the importance of reading directions when assembling and repairing equipment

Competency: Identify proper job termination procedures

Tasks: Describe how to:
  a. Write a letter of termination
  b. Give notice verbally
  c. Conduct an exit interview
  d. Ask for a letter of recommendation
  e. Write your own letter of recommendation
  f. Fill out paperwork required for income tax, social security, unemployment, severance pay, etc
Competency: Identify the types of health and safety hazards in residential construction

Tasks: List short-term hazards
List long-term health hazards
Differentiate between the hazards of working alone with those of working with a crew

Competency: Identify employee rights related to job hazards

Tasks: Explain the purpose of the Occupational Safety and Health Act (OSHA)
Explain rights under OSHA
Explain why the ultimate responsibility for a worker's health and safety rests with the worker
Discuss how to bring hazardous situations to the attention of coworkers and employers
Explain how to remedy hazardous situations without, if possible, getting fired

Competency: Identify the elements of safe job sites

Tasks: Describe safe working attitudes
List safety equipment which should be on each job site
List and describe the importance of personal protective gear

Competency: Identify the hazards associated with excavations

Tasks: Describe why utilities must be located before digging
Explain how to locate buried utilities
Explain the risks of cave-in due to soil collapse
Describe the signs of collapse-prone soils
Learn methods of shoring-up excavations
Discuss strategies for minimizing exposure to soil collapse

Explain the danger of working in excavations while heavy equipment works nearby

Explain safe excavation

Competency: Identify heavy equipment safety procedures

Tasks: Describe the importance of keeping unauthorized personnel out of the worksite

List primary safety concerns associated with the operation of bulldozers, backhoes, lifts, cranes, graders, and other heavy equipment

List primary safety concerns associated with operating and working around large trucks

Differentiate between picks, slings, and spreader bars

Explain hand commands

Describe proper procedures for parking equipment and leaving it unattended

Explain safety procedures when working close to heavy equipment

Competency: Control space heater hazards

Tasks: Explain how space heaters work

Describe the hazards of carbon monoxide poisoning

Describe the symptoms of carbon monoxide poisoning

Describe strategies for assuring adequate ventilation in areas heated by space heaters

Identify emergency exits and escape routes

Develop an escape plan

Continually monitor coworkers for signs of carbon monoxide poisoning

Discuss carbon monoxide warning devices

Explain evacuation procedures
Competency: Prevent fires

Tasks: Describe the fire hazards posed by space heaters

Describe the fire hazards posed by the installation of plumbing

List the fire hazards posed by wiring

Identify the fire hazards posed by smoking (cigarettes, etc.)

Describe the fire hazards posed by adhesives, caulks, paints, varnishes, and certain types of insulation

Explain how to operate fire extinguishers

Explain how to establish fire escape routes

Explain how to install, inspect, and maintain smoke detection and alarm devices

Explain fire prevention/safety procedures

Competency: Control electrical hazards

Tasks: Describe how electricity kills

Identify the reasons why utility lines should be located before digging

Identify the hazards of working near exposed, live wires

Describe the hazards of carrying large objects or using ladders and heavy equipment around live wires

Identify the hazards of using improperly grounded power tools

List the hazards of working in wet weather or with power equipment in poor condition

Describe the purpose and proper use of stud safety plates

Describe electrical safety procedures
Competency: Prevent lung injuries

Tasks: Calculate the volume of air inhaled in each breath, in each minute, in each hour

Describe the hazards of inhaling cement dust

Describe how sawdust and other particulates enter, lodge in, and damage the lung

Describe how volatile materials such as paints, solvents, and plastics can damage the lung

Differentiate between carcinogenic and caustic compounds

Describe asbestos and asbestosis

Explain where asbestos is likely to be encountered and what to do if it is

Describe the importance of:

a. Reading and following manufacturers instructions and warnings and labels
b. Avoiding using aerosols
c. Not using known and suspected carcinogens
d. Wearing respirators

Explain lung safety procedures

Competency: Prevent skin injuries

Tasks: Define terms associated with the skin, its function, and injury

Explain the principles governing the function of the body's largest organ

Identify skin injury mechanisms, agents, and symptoms

Describe the importance of:

a. Reading manufacturer's instructions, warnings, and contents labels
b. Avoiding known or suspected carcinogens and caustic compounds
c. Using insect repellants according to manufacturer's instructions
d. Wearing protective clothing and equipment

Explain safety procedures designed to protect the skin
Competency: Prevent injuries from falls

Tasks: Identify the types of injuries resulting from falls
Describe improper and proper use of scaffolds and ladders
Describe obstacles, situations, and personal habits leading to tripping and falling, and list ways to prevent falls
Discuss the importance of:
   a. Marking and barricading openings and other areas which present falling hazards
   b. Explain safety procedures designed to prevent falls

Competency: Prevent injuries from falling objects

Tasks: Identify objects and materials likely to fall on workers
Describe head injuries and how they can be prevented or minimized by hardhats
Discuss the importance of:
   a. Preventing tools and materials from falling
   b. Minimizing overhead hazards
   c. Wearing hardhats
   d. Following safety procedures

Competency: Prevent eye injuries

Tasks: Describe how eyes are injured
Identify situations demanding the use of safety glasses or goggles.
Identify hazards to the eyes posed by volatile chemicals
Identify hazards to the eyes posed by intense lights, such as torches
Discuss the importance of:
   a. Locating and operating eyewash stations
   b. Reading manufacturers' labels, warnings, contents, and instructions
   c. Wearing eye protection
   d. Following eye safety procedures
Competency: Prevent hearing damage

Tasks: Explain the ear and how it works

- Explain the decibel system
- Explain how decibel levels and length of exposure combine to damage hearing
- Describe the long-term, cumulative effects of noise on hearing
- Describe the contribution of noise to fatigue and accidents
- Describe situations requiring ear protection
- Describe ear protection devices and their proper use
- Discuss the importance of wearing ear protectors

Competency: Prevent lifting injuries

Tasks: Describe hernias and slipped disks

- Identify proper methods of lifting and moving heavy and over-size objects
- Explain the importance of lifting properly

Competency: Wear safe work clothing

Tasks: Describe the purpose of work clothing

- List the attributes of safe clothing
- Explain clothing's role in protecting the body from weather extremes and from work hazards such as power tools and obstacles
- Explain the importance of wearing proper work and protective clothing
Competency: Prevent cold weather injuries

Tasks: Explain how cold causes injuries

List the personal habits which contribute to susceptibility to cold injuries

Explain the importance of proper clothing in preventing frostbite and other cold weather injuries

List the working conditions which contribute to susceptibility to cold injuries

Explain the significance of wind chill

List the symptoms and treatment of frostbite

List conditions which produce hypothermia

Explain how to recognize and treat hypothermia

Differentiate between immersion hypothermia and the exposure which results from long-term exposure to extremely low temperatures

Explain how to prevent frostbite and other cold injuries

Explain the importance of:

a. Carrying and using cold/hypothermia weather survival gear appropriate to the locale and season

b. Preparing for unexpected exposure due to such events as mis-communication, weather changes, power-outage, fire, vehicle and boating accidents and breakdowns, and emergency landings

c. Living life/workstyles that minimize the potential for cold weather injuries
Hand Tool Safety

Competency: Use and care for hand tools appropriately

Tasks: Describe general procedures for maintaining tools

  Explain the importance of using the right tool for the job
  Explain the importance of keeping tools sharp and in good working condition
  Describe proper handling, transporting, and stowing techniques
  Explain the proper use and care of:

a. Layout and Measuring Tools:
   Squares, rules, tapes, scribes, dividers, chalk lines, levels, plumb bobs, calculators, and transits

b. Boring Tools:
   Drills, bits, braces, and augers

c. Pounding, Impelling, and Extracting Tools:
   Hammers, hatchets, mauls, mallets, nail sets and pullers, screwdrivers, wrenches, pliers, and wrecking bars

d. Sawing Tools:
   Rip, crosscut, miter, compass, coping and hacksaws

e. Knives and Edge Tools:
   Chisels, bolt cutters, planes, adzes, and draw, utility, linoleum, and putty knives

f. Holding and Supporting Tools:
   Clamps, vices, braces, come-alongs, jacks, ladders, scaffolds, sawhorses, and stilts

g. Abrading and Scraping Tools:
   Rasps, files, sanding blocks, scrapers, and wire brushes

h. Painting and Finishing Tools:
   Brushes, rollers, buckets, and trays

i. Drywall Tools

j. Cement and Masonry Tools:
   Trowls, hoes, troughs, and buckets

k. Sheet Metal Tools:
   Snips and straight edges
1. Electrical Tools:
   Pliers, screwdrivers, wire cutters, and strippers

m. Plumbing Tools:
   Torches, wrenches, and threaders

n. Excavating Tools:
   Shovels, picks, mattox, pulaskis, posthole diggers, dirt augers, and prybars

o. Maintenance, Cleaning, and Other Related Tools:
   Brooms, dust pans, wire brushes, buckets, and sponges
Power Tool Safety

Competency: Use and care for power tools properly

Tasks: List general safety rules for using power tools
Match tasks with the appropriate tools
Identify common power tools used by carpenters and demonstrate their safe use
Distinguish between portable and stationary power tools and know the general safety concerns associated with both types
Distinguish between electric and pneumatic tools and list the general safety concerns associated with both types
Identify special safety equipment required by each tool, such as ear protection, goggles, chaps, gloves, and respirators
Identify the working parts, define the terms associated with the use, and demonstrate the proper use and care of the following portable power tools:

a. Portable power drills
b. Portable circular saws
c. Portable saber and bayonet saws
d. Portable sanders
e. Portable routers and planes
f. Pneumatic tools
g. Power driven fasteners
h. Power miter and panel saws
i. Portable generators
k. Portable compressors
l. Airless painters
m. Chainsaws

Identify the working parts, know the terms associated with the use, and demonstrate proper use and care of the following shop equipment and machines:

a. Table saws
b. Radial arm saws
c. Band saws
d. Edge jointer
e. Thickness planer
f. Uni-plane
g. Shaper
h. Belt and disc sanders
i. Drill presses
j. Grinders and Abraders
Measurement and Mathematics

Competency: Explain the importance of math and measurement

Tasks: Explain the importance of accuracy in calculations and measurements for construction

Describe the variety of measurements that must be done to build a house

List the tools typically used for measurement and calculation

Competency: Use and care for measuring tools properly

Tasks: Explain proper use and care of measuring tools such as bench rules, steel tapes, and framing and combination squares

Demonstrate proper use and care of hand calculators

Competency: Calculate using fractions

Tasks: Manipulate whole numbers

Define graduations, using variously calibrated rules and tapes

Manipulate halves, quarters, eighths, sixteenths, and thirty-seconds

Show how to add and subtract fractions having different denominators

Competency: Draw and measure various geometric figures

Tasks: Explain formulas and their importance to carpentry

Define squares and rectangles

Lay out squares, rectangles, and triangles

Calculate their dimensions and areas

Explain slope and its significance to carpentry
Calculate slopes

Explain ratios and their significance

Calculate ratios

Illustrate the significance of 3-4-5 triangles

Layout 3-4-5 triangles and their variants

Describe the relationship between the radius, diameter, and circumference of circles

Draw a circle and calculate its area

Read graphs

Calculate percentages and explain their significance

Calculate board feet

Calculate linear feet

Make an end to end center measurement

Strike a straight line on a level surface using a chalk line

Make a center to center measurement

Make a center to center measurement overall

Make a stud face to stud face measurement

Grade a length of pipe with a level

Check squareness using diagonal measurements

Layout a line at a 90-degree angle from a chalk line using several different methods

Layout a 45-degree angle using several different methods

Measure using the plumb bob and rule

Measure for fitting allowance when installing pipes

Make a throat to throat measurement
Layout a line at a 45-degree angle from a chalk line using a folding rule

Calculate the travel of a 45 degree offset

Set up a tripod and transit level for use

Use a tripod and transit level for laying out angles and levels

Level using a hose or hydro level

Understand the basics of the metric system

Calculate wages and deductions
Blueprint Reading

Competency: Identify uses of plot plans, blueprints, specifications, and building codes

Tasks: Explain the purpose of plot plans, blueprints, specifications, and building codes

Explain the importance of the information in these documents

Competency: Use a plot plan

Tasks: Explain the significance of set-backs, rights-of-way, and easements

Distinguish between front, side, and rear property lines

Identify the actual dwelling and determine its dimensions

Describe how to locate benchmarks, monuments, and corners

Competency: Use the alphabet of lines

Tasks: Describe the meaning and significance of:

a. Object lines
b. Dimension lines
c. Extension lines
d. Hidden lines
e. Center lines
f. Cutting planes
g. Break-line short
h. Break-line long
i. Leaders
j. Section lining

Competency: Use floor plan symbols

Tasks: Distinguish between rough and finished wood

Distinguish between brick, firebrick, concrete, concrete blocks, sand plaster, cement, and tile

Identify outside, inside, and double-acting doors

Describe cinder, earth, gravel, and sand fill symbols

Identify iron and structural steel
Differentiate between hollow, terra cotta, and glazed tile and brick veneer

Explain the symbols for loose and solid insulation, vapor barriers, flashing, and waterproofing

Describe double-hung, casement and arch-cased windows

Identify floor drain, telephone jack, and cable TV symbols

Competency: Use electrical symbols

Tasks: Explain the difference between service and distribution panels

Differentiate between switch leg indication and low-voltage relays

Describe the different types of outlets

Describe the different types of switches

Competency: Use sectioning symbols

Tasks: Describe the difference between rough and finished lumber and metal

Explain the symbols for earth, concrete, and other types of fill

Competency: Use architects scale

Tasks: Explain the six different calibrations on the three faces of the architects scale

Describe how to use full, half, fourth, and eighth scales

Use the scale to calculate actual dimensions and quantities

Competency: Use door and window schedule symbols

Tasks: Explain door schedules

Explain window schedules

Competency: Use foundation plans

Tasks: Determine foundation type

Identify entrances, vents, crawl holes and spaces
Competency: Use floor plans
Tasks: Explain the difference between internal and external walls
       Identify windows, doors, closets, and entrances
       Describe the meaning and significance of numbers enclosed in circles and triangles

Competency: Use an elevation plan
Tasks: Distinguish between front, rear, and side elevations
       Differentiate between grade, finish floor, ceiling, and ridge levels
       Describe how to determine roof pitch and its significance

Competency: Use section-thru-sill and section-thru-cornice
Tasks: Identify the various components of each section and the material from which they are made
       Describe the purpose of each element used, for example the anchor bolt, joists, water table, etc

Competency: Use specifications
Tasks: Explain the significance of specifications
       Calculate material quantities given blueprints and specifications
Energy

Competency: Understand energy conservation

Tasks:
- Explain the first law of thermodynamics (\(\Delta E = \Delta W + \Delta H\)), and explain its significance to residential construction
- Explain the second law of thermodynamics (the entropy of an isolated system always tends to increase) and its significance to residential construction
- Explain why, according to the above laws, it is imperative to insulate all surfaces of the building envelope
- Know the health and safety concerns associated with heating and cooling residential structures, paying particular attention to fire and indoor air pollution

Competency: Calculate your structure's energy needs

Tasks:
- Calculate annual heat loss for buildings in your area
- Calculate the heating degree days for your locale
- Calculate most energy-efficient building design for your locale
- Calculate the most energy efficient building locations and orientations for your locale
- Discuss the role of windows in the dynamics of home heating
- Calculate the most energy-efficient window systems for your locale
- Explain space and water heating options
- Calculate the most energy efficient space heating system for your locale
- Investigate heat pump and air-to-air heat exchanger options
- Calculate pay back periods for alternate energy conservation construction techniques
- Explain the relationship between dew point and vapor barriers
- Calculate the dew point in any insulated wall, ceiling, floor, door, or window
Calculate the cost and pay back of movable insulation on windows.

Calculate the efficiency, cost, and pay back of various door systems, including arctic entries.

Calculate the efficiency, cost, and pay back of various water heating methods, such as oil, electric, and wood.

Explain how to install, maintain, and repair insulation and vapor barriers.
Materials

Competency: **Identify the materials commonly used in northern residential construction**

Tasks:
- Define the terms associated with different types of building materials
- List the different types of materials, the forms, dimensions, grades, and quantities, in which they are typically sold
- Identify the fire-rating and insulating values of construction materials used in your locale

Competency: **Identify wood growing, milling, curing, grading, and scaling methods**

Tasks:
- Differentiate between wood defects, such as blemishes, knots, warps, and twists
- Explain what kinds of lumber are sold by the board foot and by the linear foot
- Show how to calculate board feet using the T X W X L formula
- List the grades of construction lumber
- Describe the differences between boards, dimension lumber, and timbers

Competency: **Identify the different wood sheet products**

Tasks:
- Describe different wood sheet products, such as plywood, particle, hard, chip, wafer and compressed
- Explain the difference between interior and exterior plywood
- Describe how plywood is graded and used
- Explain the proper use and care of these wood sheet products
Competency: Identify other building materials

Tasks: Describe the composition, characteristics, common forms, use, care, fire rating, toxicity, and insulation values of:

a. Gypsum  
b. Felts  
c. Fiberglass  
d. Other common insulation materials  
e. Vapor barrier materials  
f. Fasteners, such as nails, staples, screws, bolts, and anchors  
g. Framing hardware, such as joist hangers, Tyvo clips, and nail safety plates  
h. Adhesive compounds, such as glues, tars, resins, and caulks  
i. Abrasives

Competency: Conserve materials and energy

Tasks: Explain how to organize a construction site

Plan construction activities so as to minimize material handling

Explain the importance of:

a. Always moving materials towards job site  
b. Ordering so materials will arrive when needed  
c. Observing manufacturers instructions and standard safety procedures when moving, storing, or installing materials
Competency: Identify residential insulation systems appropriate for your locale

Tasks: Explain the principles associated with insulation, vapor barriers, and building envelopes

Define the terms associated with insulation and vapor barriers

Identify the types of insulation and vapor barriers commonly used in Alaska

Explain the significance of conduction, convection, and radiation

Explain the role of doors, windows, and other openings in heating and cooling

Name the places in houses which should be thermally insulated

Explain R-values

Calculate R-value requirements for your locale

Define common insulation forms such as batt, loose sheet, and site-manufactured

Discuss special considerations involved in insulating structures in areas having extremely cold temperatures

Discuss moisture-control issues

Discuss the super-insulated home and its special insulation, air quality, and moisture management problems

Differentiate between rigid and loose insulation, and blankets and bats

Explain the significance of one-way membranes in controlling air infiltration

Discuss the pros and cons of various types of insulation systems, relative to such factors as cost, ease of installation, fire safety, and toxicity

Calculate pay back periods for various types of insulation systems
Explain why vapor barriers are placed toward the living area side of floor, wall and roof or ceiling systems.

Follow standard safety procedures.

Follow safety practices specific to working with insulation, such as wearing protective clothing and respirators and minimizing fire hazards.

Explain importance of maintaining the integrity of insulation and vapor barriers throughout the construction.

**Competency: Insulate foundation system for local conditions**

**Tasks:**
- Explain the principles, terms, and approaches to insulating various types of foundations, such as basements, pilings, pads, treated-timbers, and crawlspaces.
- Determine insulation style and sequence appropriate to foundation system and construction method.
- Calculate material quantities.

**Competency: Insulate floor system**

**Tasks:**
- Calculate insulation requirements for your structure.
- Determine insulation thickness and material from blueprints.
- Calculate material quantities.
- Rough-in all plumbing and electrical service before installing insulation.
- Plan, cut, fit, and sequence insulation and vapor barrier installation in accordance with building technique used, northern construction standards, applicable codes, and manufacturer's instructions.
- Support batt insulation with sheathing or wire mesh.

**Competency: Insulate exterior wall systems**

**Tasks:**
- Obtain insulation requirements from blueprints.
- Calculate material quantities.
- Plan, cut, fit, and sequence insulation and vapor barrier installation according to manufacturer's instructions, building technique used, northern construction standards, and applicable codes.
- Explain how to seal all gaps such as those around electrical and plumbing outlets and doors and windows.
Competency: Insulate ceiling and/or roof systems

Tasks: Obtain insulation specifications from blueprints

Calculate material quantities

Rough-in electrical and plumbing fixtures before installing insulation

Insulate and seal all electrical and plumbing fixtures and openings, before trimming

Plan, cut, fit, and sequence insulation and vapor barrier installation according to construction technique, manufacturer's instructions, applicable codes, and northern construction standards

Competency: Ventilate the roof cavity system and provide access to the attic

Tasks: Discuss the principles involved with roof system ventilation for moisture control

Discuss access needs for inspection, maintenance, and fire prevention/suppression

Discuss techniques and approaches to attic/roof cavity ventilation appropriate to your structure and locale

Determine attic/roof cavity ventilation specifications/system from the blueprints

Calculate material needs

Plan, cut, fit, and install

Competency: Insulate water and wastewater systems

Tasks: Obtain insulation specifications from blueprints

Explain techniques, principles, and terms associated with insulating plumbing systems

Explain the importance and techniques of minimizing exposure of energy and water and wastewater systems to extreme temperatures

Calculate material requirements

Install electrical heat tapes approved for arctic construction

Install fiberglass and preformed styrofoam insulation
Competency: Maintain integrity of all insulation and vapor barriers

Tasks: Sequence insulation and vapor barriers installation appropriately for construction method

Minimize number of openings in building envelope

Repair damage to insulation and vapor barriers as soon as it occurs
Site Selection

Competency: Identify the legal considerations involved in siting a structure in your locale

Tasks: List and identify different types of zoning in your locale
       Describe the importance of and reasons for zoning

Competency: Identify the environmental/safety concerns related to siting

Tasks: Explain how to site structures to take advantage of natural features such as southern exposures and windbreaks
       Explain the importance of avoiding low-lying areas prone to fog, flooding, and cold air drainage
       List various types of soil in Alaska and the hazards associated with building on them
       Describe how to identify frozen ground
       Describe construction methods appropriate for permafrost and intermittent permafrost
       Describe how to identify and build for high water tables
       Identify sites with high-wind hazards
       Describe how to site buildings to minimize exposure to wind
       List the hazards of building on or at the base of slopes
       Explain how to identify avalanche and slope failure potential, and list siting strategies to minimize hazards
       Identify areas and sites with high seismic risks
       Describe siting and construction strategies which minimize seismic hazards
       Identify flood-plain, storm surge, and tsunami risk zones
Competency: Use a plot plan

Tasks: Define plot plan elements such as easements and set backs

Differentiate between front, side, and rear property lines

Obtain building size (length and width) and orientation (square or diagonal) from plot plan

Identify and protect trees, shrubs, and other natural features shown on plot plan

Competency: Use a transit and leveling rod

Tasks: Explain parts of a level and its uses

Explain the parts of a rod and its uses

Describe the importance and method of caring for transit and rod

Explain leveling procedures

List common measurement errors

Set up transit for use

Establish a benchmark (building elevation reference point)

Locate property corners and other blueprint features using transit and level rods

Orient blueprints using compass

Locate property lines on the ground and establish corners of structure

Define, identify, and locate benchmarks, property lines, and minimum allowable setbacks

Locate sewer, water, electrical, natural gas, phone, and cable TV services

Stake grades and grade lines

Distinguish between flat, rolling, and sloping terrain

Competency: Square a building

Tasks: Square using the 3-4-5 method

Square using the diagonal method

Know the principles of batter boards and adapt to locate building lines
Competency: Follow building permits and codes

Tasks: Discuss the purposes of building permits and codes

Discuss who is responsible for obtaining and following building permits

Describe what activities require building permits

Describe what building permits allow one to do

Describe how to obtain a building permit

Discuss purpose of building inspections

Discuss procedures for scheduling inspections and complying with inspectors

Discuss using building inspectors as information resources
Foundations and Forming

Competency: Identify the purposes of foundation systems

Tasks: Explain the purpose and importance of foundation systems

- Define the terms associated with different types of foundations and their construction
- Explain the principles and practices associated with insulating and weatherizing various foundation systems
- Follow standard safety practices as well as those specific to foundation construction
- Explain how to maintain safe, clean, and orderly worksites

Competency: Identify factors to consider before deciding on foundation type

Tasks: Explain the relationship between soil type, temperature, and water content and the building

- Describe how the weight of the house, snowloads, windage, and other factors influence the selection of foundation type and size
- Differentiate between pads, slabs, pilings, and footing-type foundations
- Determine the most appropriate foundation type for site and locale
- Explain the considerations in building gravel pad foundations
- Describe how to prepare sites for the construction of a concrete slab
- Describe how pilings are located and driven to the appropriate depth
- Describe footing type foundation systems
- Describe how to construct and install treated wood and truss foundation systems
- Describe systems to anchor structures to the various foundations
- Identify applicable zoning and building codes
Competency: Construct foundation systems

Tasks: Explain the steps required in building forms

Describe methods of building forms

Define terms used in various types of concrete foundations (piers, piers and beams, square footings, T-footings, monolithic pours, stem walls, and stepped footings)

Calculate material quantities from blueprints and specifications

Layout forms for footings, stem walls, driveways, sidewalks, patios, and steps

Competency: Install insulation, weatherization, and pest and moisture management systems

Tasks: Explain the principles of foundation moisture management

Describe the different insulation strategies required by piling, post and beam, pad and beam, concrete with crawl space, basement, subgrade, and other foundation systems used in your locale
Competency: Identify the steps involved in pouring concrete foundations

Tasks: Explain concrete chemistry

- Explain how concrete is made and how it cures
- Explain special considerations when making and curing concrete in extreme climates
- Define the terms associated with concrete
- List the various steps and special considerations involved in working with a premix delivery truck
- List the various steps involved in mixing and using your own concrete
- Explain the safety procedures relevant to concrete work

Competency: Prepare site subsurface and forms

Tasks: Describe the steps involved in preparing site subsurface, including grading, excavation, piers, insulation, geotextiles, reinforcement, hardware, or other special considerations

Competency: Compute the volume of concrete required

Tasks: Calculate the number of cubic yards with standard formula \((L \times W \times H + \text{percentage for wasteage})\)

- Select rock material from excavation to reduce the volume of concrete required
- Explain importance of having sheathing/forms flush with ground to minimize waste of concrete
- Determine the appropriate mixture for sites not accessible to premix trucks
- Calculate number of sacks of sand and cement and gravel
- Calculate other material needs, such as rebar, from blueprints
Competency: Use and maintain concrete tools and equipment properly

Tasks: Identify concrete tools such as shovels, hoes, trowls, buckets, and wheelbarrows

Determine the number of tools required for the pour

Explain the importance of cleaning tools and equipment immediately after use

Competency: Plan a concrete pour

Tasks: Explain the importance of preparation and the necessity of working fast

Erect ramps and scaffolding as required

Schedule sufficient personnel, equipment, and tools to mix, cart, place, and tamp concrete

Locate mixing/delivery site to maximize downhill hauling and minimize the distance and total amount of hauling

Identify and install concrete joints where appropriate

Install building anchor bolts as appropriate

Explain safety procedures relevant to working with heavy equipment, using scaffolding and ramps, and working with caustic compounds

a. Wear protective clothing and equipment
b. Maintain clean and orderly worksite
c. Hoist and lift appropriately

Competency: Finish concrete

Tasks: Maintain proper curing temperature and humidity

Treat and finish surfaces
Blocks
and Bricks

Competency: Organize job site
Tasks: Explain how to prepare foundation or base
- Protect materials, particularly cement, from moisture
- Determine most appropriate building material (bricks, blocks, mortar, or rocks)
- Calculate material quantities
- Layout building materials to save time and effort

Competency: Lay and mortar blocks
Tasks: Describe masonry problems common to your locale, and their recognition and prevention
- Mix mortar to appropriate consistency
- Lay blocks and bricks using a line and level
- Offset blocks and bricks to maximize strength
- Cut and trim materials
- Wash masonry walls
- Point and caulk walls
- Describe the use of fastening devices
- Build block corners and lay block pilasters
- Build block leads

Competency: Identify other masonry skills
Tasks: Explain how to:
- a. Lay glazed tile
- b. Build brick corners and leads
- c. Lay SCR brick
- d. Construct single and double fireplaces
- e. Lay flagstone
- f. Build block piers
- g. Design and layout stone patterns
Framing: Subfloor/Floor

Competency: Identify energy-efficient framing systems for your locale

Tasks: Define the terms associated with framing systems

- Explain the principles of framing
- Explain the difference between western, balloon, and post and beam framing
- Compare various framing systems for their strength, cost, and energy efficiency
- Calculate and compare the payback periods of various energy-efficient framing systems
- Describe safety procedures relevant to framing, such as proper carrying and storing of materials and proper bracing and supporting of structures
- Identify applicable building codes

Competency: Frame and insulate various floor systems

Tasks: Define the terms associated with framing and insulating floor systems

- Explain the principles of floor framing
- Determine floor-framing system from blueprints
- Calculate material quantities
- Determine systems (framing, insulation, and moisture and noise management) installation sequence appropriate for floor system

Competency: Install a floor support system

Tasks: Define the terms associated with various floor support systems such as glue-lam beams, girders, trusses, or posts

- Explain the principles associated with floor support systems
- Determine floor support system-type from blueprints
- Calculate material requirements
- Plan and sequence insulation and moisture management systems installation as appropriate
Competency: Frame a sill

Tasks: Define the terms associated with sill framing

- Explain the importance of sill seals and insulation

- Calculate material requirements

- Install sill seals and insulation appropriate to structure and locale

- Anchor the sill plate to the foundation using bolts

Competency: Construct energy-efficient floor systems

Tasks: Compare TJI, solid wood, truss, and joist systems

- Determine the framing type from the blueprints

- Determine the spacing of the centers

- Calculate materials, include an extra joist for each end and partition wall

- Explain how to allow for utilities

- Measure out the joist positions on sill and mark

- Install rim or band joist and square

- Install joists, joist bridging, and blocking

- Frame openings in floor for stairwells, stoveflues, chimneys, and other utility exits

Competency: Install sub-floor

Tasks: Explain types of sub-floor

- Determine from blueprints whether the sub-floor is to be plywood or 1" lumber

- Calculate material requirements (factor for waste)

- Determine fastening system appropriate to materials and construction methods

- Install joist fastening and connecting systems, such as hangers, according to blueprints

- Rough in all sub-floor plumbing, heating, and electrical systems, before installing sub-floor

- Splice on joists

- Drill holes for pipe
Framing: Walls

Competency: Identify the principles of energy-efficient wall construction for northern locales

Tasks: Define the terms associated with walls and their construction

From the blueprints, floor plans and elevations, differentiate between interior and exterior and load and non-load bearing walls

Determine the sequence of wall construction

Implement state-of-the-art insulation, energy conservation, and moisture management techniques

Calculate materials

Explain safety practices relevant to wall construction

Competency: Layout exterior walls

Tasks: Obtain wall locations from elevations and floor plans

Layout the first wall according to the following sequence:

a. Snap a chalk line the width of the sole plate from the outside edge of the box sill or from the outside of the floor
b. Fit top and sole plates
c. Locate joints appropriately
d. Locate the center of intersecting partitions and openings along edge of floor
e. Mark the location of intersecting walls, openings, and studs on plates
f. Locate partition intersections so as to maximize wall energy-efficiency
g. Repeat sequence for the other walls

Determine partition wall measurements and dimensions from the blueprints and lay them out
Competency: Construct exterior walls
 Tasks: Define terms associated with framing walls
 Calculate materials
 Separate wall plates
 Nail studs in place, allowing for openings, and extra studs for partition walls
 Rough in door and window openings with trimmer and cripple studs, rough sill, and header
 Assemble and install partitions and corner posts
 Align and square wall frame
 Insulate cavities which will become inaccessible
 Erect walls and brace temporarily as appropriate

Competency: Install different types of wall sheathing
 Tasks: Explain wall sheathing terms and principles
 Explain the characteristics, such as insulation, flammability, and strength of different sheathing types
 Determine sheathing type from blueprints
 Install for energy conservation and moisture management concerns, using appropriate fastening systems for material and locale
 Erect walls and brace temporarily
 Nail double top plate on all exterior walls

Competency: Rough-in window and door openings
 Tasks: Define terms and explain principles associated with roughing-in openings
 Determine header type and dimensions from blueprints
 Measure, cut, and install headers using appropriate spacers
 Measure, cut, and install trimmer and cripple studs
Competency: Construct interior walls

Tasks: Lay out partition sole plate according to blueprints, making sure to differentiate between bearing and non-bearing walls

- Chalk lines on floor
- Layout partition top plate
- Mark locations of intersections and openings
- Separate wall plates
- Measure and mark for stud locations
- Fit top and sole plates, locating joints appropriately
- Nail studs in place, allowing extra studs for intersections
- Rough in openings with headers and trimmers
- Erect, square with floor plan, and nail in place
- Install backing and blocking at partition "T" (the partition/exterior wall intersection) allowing for special concerns such as energy management, plumbing, wiring, and backing for cabinetry and other furnishings

Competency: Identify the principles of stair construction

Tasks: List and define the terms associated with stairs and their construction

- Identify the parts of a staircase
- Differentiate between open, semi-housed, housed, L-shaped, winder, and straight stairs
- Identify rise, run, width, and head room minimums and other standards
- Define other terms related to stairs
- Describe safety practices relevant to stair construction
- Identify applicable building codes, paying special attention to those designed for occupant safety
Competency: Construct stairs according to building plans

Tasks: Calculate total rise of the stair in inches
       Calculate total run of the stair in inches
       Calculate the stringer length using the formula (diagonal between total run and total rise = stringer length, but add two feet for waste)
       Calculate unit rise (should be between seven and eight inches)
       Calculate unit run (Should be between nine and eleven inches)
       Explain why all risers must be same size and all treads must be same size
       Calculate number of risers and treads

Competency: Layout stringer

Tasks: Mark unit run on blade of framing square and rise on tongue, using the formula (the diagonal between these two marks equals the stringer length per unit run)
       Using the rise and run marks on the framing square, lay out tread and riser locations
       Lay off bottom end cut as if for last riser
       Shorten the lowest unit rise by the tread thickness (the step from the floor should be the same height as all the other steps)
       Explain how to cut with appropriate tools
       Cut risers and treads

Competency: Assemble the stairs

Tasks: Nail stringers to side wall
       Nail all the risers in place
       Level and nail treads in place
       Measure, cut, and install the baluster rails
Competency: Identify the principles of energy-efficient cold-region roof framing

Tasks: Define the terms associated with roofs and their construction

- Differentiate between various roofing styles, such as flat, gable, gambrel, hip, mansard, and shed roofs
- Explain concepts, principles, and considerations associated with roofing, such as snow loading and pitch
- Distinguish between various types of roof truss systems, such as the Fink, or W, and Howe trusses
- Describe the Arkansas and other energy-efficient roof construction systems
- Describe safety procedures relevant to roofing, such as preventing falling objects and workers
- Identify applicable building codes

Competency: Install ceiling systems

Tasks: Define the terms associated with framing ceilings

- Explain the principles and considerations associated with constructing various types of ceilings
- Calculate materials from blueprints and specifications
- Layout, cut, and install ceiling joists in the following sequence:
  a. Measure and lay off joist locations on double plate
  b. Layout the outside of the first joist flush with the double plate's inside corner
  c. Starting from the inside edge of the end double plate, measure and mark the double plate every 16 inches
  d. X the far side of the mark to show where the joists should be nailed
  e. Repeat steps for the opposite wall
Competency: Construct hip-type roof

Tasks: Explain how to construct hip-type roof

Layout and construct in the following sequence:

a. Cut joist ends to match roof pitch
b. Position joists on plates as marked
c. If necessary to splice joists, make sure the splice is on a bearing wall
d. Use butt splice with a scab or lap
e. Toe nail to plate

Competency: Lay off rafter locations

Tasks: Define unit rise, unit run, and unit span

Determine roof slopes from blueprints

Calculate rafter lengths using several methods such as framing square, rafter tails, pythagorean theorem, and full-length rafter tables

Explain importance for ridge boards being next dimension wider than rafter

Cut ridge board to correct length (if barge rafter used at each end, make allowance)

Mark ridge board and top plate

Mark location of rafters on wall plates and ridge board according to blueprints

Competency: Calculate rafter lengths

Tasks: Calculate using the following methods:

a. Pythagorean theorem
b. Framing square step-off
c. Formula: \[
\text{rafter length} = \text{line length} + \text{overhang length} - \frac{1}{2} \times \text{thickness of ridge board}
\]
d. Rafter tables from framing squares for common rafters

Competency: Cut and install rafters

Tasks: Explain the importance of using a rafter pattern

Explain the importance of making an accurate pattern
Layout and cut a common rafter pattern using the formula:
(Common rafter length = line length + overhang - 1/2 the thickness of the ridge board)

Use pattern to cut remaining common rafters

Layout and cut hip, valley, jack, and barge rafter patterns and install

Make sure rafter boards are sufficiently long for rafter span plus overhang

Place rafter board across two saw horses

Use framing square to determine and mark ridge or crown cut angle first (This cut must be plumb when rafter is nailed in place)

Competency: Cut birdsmouth or seat

Tasks: Mark plumbcut, then seatcut, and square or tail cut last, using appropriate tools

Competency: Identify the principles of truss construction

Tasks: Define the terms associated with different truss systems

- Explain truss design and construction engineering specifications and legal requirements
- Explain state-of-the-art techniques for energy and moisture management

Competency: Construct a truss

Tasks: Differentiate between manufactured and site-constructed trusses

- Determine truss specifications from blueprints
- Calculate number of trusses and quantities of materials
- Construct gable trusses using a jig
- Construct regular house trusses using a jig
Competency: Set, align, and brace truss

Tasks: Align and temporarily brace exterior walls, using a string line
Stack trusses on top of wall
Set, square, plumb, and brace gable and regular house trusses
Install barge rafter

Competency: Complete other roof features

Tasks: Install bracing according to blueprints and local building codes
Construct cornice frame (see Exterior Finish Unit for cornice trim)
Construct gable walls
Install air ventillation system framework, paying particular attention to access and air and moisture management concerns for locale

Competency: Sheath roof

Tasks: Define terms associated with roof sheathing
Explain principles and considerations associated with sheathing roofs
Check blueprints for sheathing specifications
Calculate material quantities
Tack sheathing in place:
   a. Sheathing should be flush with the face of the false facia and the barge rafter
   b. Splice on rafters
   c. Stagger splices for strength
   d. Leave ridge sheathing for last
   e. Snap a chalk line to mark the center of each rafter
   f. Fasten according to manufacturers' instructions, blueprints, and applicable codes
   g. Sheath to center of ridge from each side of roof
Roof Finishing

Competency: Identify energy-efficient roofing systems appropriate to your structure

Tasks: Identify the components associated with various types of roofing systems, such as shake, metal, asphalt, and shingle

Describe the insulation value, flammability, useful life, and other characteristics of these common roofing systems

Define terms associated with roofing styles, elements, and materials

Determine local strength requirements for wind, water, and snow-loading

List the principles and considerations associated with finishing roofs

Determine the ideal roofing system for your locale and structure

Obtain roofing specifications and calculate area from plans

Calculate roof material quantities, such as felt, insulation, shingles, flashing, drip edge, fasteners, and adhesives and sealants

Describe relevant safety procedures, such as ladder and scaffold installation and use and material management

Identify applicable building codes

Competency: Apply roofing

Tasks: Erect scaffolding and ladders

Follow manufacturer's directions, building codes, and specifications

Apply and fasten felt

Measure, cut, and sequence insulation and vapor barrier installation as required

Layout, fasten, finish, and cap roofing material
Install metal drip edge:

a. Starting at one end of facia board, work way around structure
b. Overlap one inch, when joining sections of drip edge
   c. Nail every eight inches

Install flashing in valleys and around chimneys and saddles:

a. Start at bottom and work towards ridge
b. Flashing must extend at least four inches to either side of valley
c. Overlaps between pieces of flashing should be three inches
d. Counter-flashing on chimneys must have at least a four inch rise
e. Where roofs abut walls, flashing should extend a minimum of three inches under wall sheathing, four inches under roof shingles

Install and fasten standard wood shingles:

a. End shingles should extend 3/4" beyond rake and eaves
b. First layer should be flush with drip edge
c. Leave one quarter to one half inch space between each shingle
d. Nail each shingle 3/4" from edge, six and one half inches from butt or lower end
e. Drive nail only until head is flush with shingle surface
f. Use a double layer of shingles on first row

Install metal roofing

Install and fasten shakes:

a. Extend starter shakes 3/4" beyond rake or eave edge
b. Leave 1/4" to 1/3" gap between each shake
c. Nail shakes 3/4" from each edge, 11.5 inches above the butt end
d. Double the first row
e. The bottom of the second and all subsequent rows should be 10 inches above the previous row
f. A chalk line will help keep the shingles straight
g. Offset joints at least two inches from one row to the next
h. Joints should not be directly above one another for at least three rows

Install and fasten asphalt shingles:

a. Extend first shingle of each row 3/4" beyond rake and eaves
b. Install first row upside down (tabs up)
c. Start first course with full strip
d. Follow manufacturer's exposure recommendations
e. Start the second course tabs down, using full strip minus half a tab
f. Begin the third row with a strip minus a full tab
g. Use a chalk line for keeping courses linear
Shingle along flashing:

a. Expose 4" of flashing at the top of valleys
b. Expose all but 2" of flashing at valley base
c. Snap chalk line on flashing for a guide
d. Be careful not to puncture flashing in valley
e. Custom cut shingles
f. Where roofs abut walls, shingle up to wall edge

Shingle roof hips and ridges:

a. Shingle up to crown on both sides
b. To shingle hips, start at bottom and work up
c. With asphalt roofs, use a single tab
d. Double the bottom shingle
e. Nail one inch in from the edge on both sides and six inches up from the bottom
f. Leave five inches exposed
g. With wood shingle and shake roofs, choose shingles of the same size
h. Nail shingles in pairs, one on each side or ridge, but overlap right side and left side alternately,
i. With asphalt shingle roofs, start at the hip bottom or one end of the ridge, and shingle to the opposite end, leaving five inches of shingle exposed
Competency: Identify plumbing systems
Tasks: Define the terms associated with plumbing systems
Identify the purposes of water and wastewater systems
Explain the physics of plumbing and plumbing principles, concepts, and considerations
Sketch isometric drawings of water and wastewater systems for a two-story house
Identify the various types of plastic pipe and their uses
Describe relevant safety practices, such as insuring adequate ventilation when working with volatile and toxic compounds and taking extra precautions to prevent fires when working with torches
Identify all applicable building and plumbing codes

Competency: Install plastic waste and wastewater pipes
Tasks: Determine pipe specifications from blueprints
Calculate material quantities
Explain the uses and limitations of various types of plastic pipes and fittings
Explain correct use of plumbing tools and materials such as saws, vices, and files
Follow manufacturer's instructions and observe applicable building codes
Prepare plastic pipe joints
Assemble and solvent-weld plastic pipe
Cut, fit, hang, and pressure test as necessary

Competency: Install copper pipe and tubing
Tasks: Define the terms associated with copper pipes and their installation
Explain the principles associated with copper tubing
Discuss various types of copper fittings and their use

Describe relevant safety procedures, such as proper use of torches, saws, and solder

Prepare copper pipe and fittings

Flare copper tube using yoke and screw-type flaring tool

Assemble a torch kit

Complete a joint using compression fittings

Sweat-solder a joint

Cut, fit, hang, and pressure-test system

Competency: Install water supply and wastewater systems

Tasks: Make an isometric drawing of the water supply system for a two-bathroom house

Install building water and wastewater systems, including vents and stacks

Test systems

Rough-in, install, trim, and test fixtures, such as sinks, tubs, showers, toilets, garbage disposals, washing machines, and dishwashers

Competency: Insulate and/or bury pipe for your locale

Tasks: Discuss local pipe insulation strategies

Explain use of slip-lining and other low cost, state-of-the-art methods to protect pipes from freezing

Compare the pros and cons of the various piping insulation strategies available

Identify heat tapes and passive insulation appropriate for burial

Describe relevant safety procedures, such as those governing heavy equipment operation, cave-in, and electrical hazards

Explain how to back-fill without damaging pipe
Competency: Install heaters and heat exchange systems

Tasks: Define the terms associated with systems such as heat pumps, air-to-air heat exchangers, boilers, furnaces, and radiators

Explain the principles associated with these systems

Compare alternative heating systems, such as space heaters, monitors, and solar heating

Calculate costs, benefits, and pay-back periods of various systems for your structure and locale

Determine the optimal heating and ventilation systems for your structure and locale

Obtain specifications from blueprints

Calculate combustion air supply needs and install appropriate system

Follow standard safety procedures and those specific to working with torches and electricity

Install appropriate fire prevention/defense systems

Maintain clearances specified by manufacturers' instructions and applicable building codes

Install warmed/forced-air, hydronic or baseboard, and radiant systems such as wood stoves

Competency: Install air and moisture management systems

Tasks: Define the terms associated with air and moisture control systems

Explain the principles associated with these systems

Calculate ventilation requirements for your structure and locale

Compare various systems

Obtain systems specifications from building plans

Calculate costs, benefits, and payback periods of various systems

Select and plan installation of system, minimizing penetrations through building floor and roof in particular, and building envelope in general

Explain relevant safety procedures

Rough-in, install, and trim air and moisture management systems according to manufacturers' instructions and applicable building codes
Wiring

Competency: Identify residential electrical systems

Tasks: Define terms associated with residential electrical systems

Explain the physics of residential electricity

Explain relevant safety procedures

Competency: Design a residential electrical system

Tasks: Determine electrical requirements from blueprints and specifications

Follow national and local electrical codes

Read and interpret electrical schematics and diagrams

Determine how many convenience and appliance outlets should be on each circuit

Competency: Rough-in electrical system

Tasks: Follow applicable electrical and building codes and safety procedures

Schedule electrical inspections as required

Demonstrate proper use and care of electrical tools and equipment

Prepare, install, and ground electrical service entrance

Install a main electrical panel and breakers

Rough-in feeders, branch circuit cables, and junction boxes

Rough-in outlet and switch and other circuits, such as those for appliances, door chimes, and chandeliers

Rough-in circuits for outlets controlled by multiple switches

Rough-in circuits for thermostat wiring

Install outlet boxes for switches and receptacles

Install switches and receptacles

Joint and splice using various methods and devices, such as crimps and mechanical connectors
Competency: Connect and trim residential electrical system

Tasks:
- Rough-in armored and non-metallic cable to outlet boxes
- Install lighting fixtures
- Connect pole switches with and without pilot lights
- Install flush mount switches in finished walls
- Connect split circuit duplex receptacles
- Connect three- and four-wire 220-volt receptacles
- Install an appliance pilot light
- Install ground fault interrupting device
- Connect furnace motor
- Install and connect baseboard heat units
- Install and connect environmental system controls, such as heaters and heat exchangers
Competency: Identify energy-efficient window systems and installation strategies

Tasks: Define terms associated with energy-efficient windows and their installation

- Explain the principles associated with energy-efficient window systems
- Identify types and uses of residential window systems
- Compare the energy efficiencies of available glazing and window systems
- Explain the latest developments in energy-efficient window construction
- Identify applicable building codes when selecting and installing residential window systems
- Identify relevant safety practices, such as those for working with glass and caulking compounds

Competency: Install energy-efficient windows

Tasks: Obtain window type from window schedule

- Calculate material needs
- Explain how to remove window unit from packing
- Measure rough opening and compare with window unit
- Determine if rough opening is correct size according to blueprint and door schedule
- Line the rough opening with appropriate materials to prevent condensation damage and air filtration
- Shim sill until level, ensuring that sides are plumb
- Center the window unit in the opening and tack in place
- Make sure window opens without binding
- Re-check opening for level and plumb
- Fasten framing appropriately
Competency: Identify energy-efficient door systems and installation methods

Tasks: Define terms associated with different door styles and systems and their installation

- Explain the principles associated with energy-efficient door systems and their installation
- List the various types of door systems in common use
- Differentiate between interior and exterior and site-fitted and pre-hung doors
- Compare the energy-efficiency of available door-unit systems
- Identify applicable residential code requirements, especially those designed to protect the occupants, such as door size and location
- Explain relevant safety practices

Competency: Fit and assemble exterior jamb set

Tasks: Select door and collect jamb materials

- Bevel door
- Cut matching hinge gains in door and side jambs
- Cut jamb and sill sections to correct dimensions, allowing for proper door clearance (and uneven floors)
- Assemble jamb set with jamb extensions if necessary
- Fit and apply exterior casing such as buck mold
- Attach hinges and connect door to Jamb

Competency: Install exterior door unit

Tasks: Carefully uncrate door unit

- Measure rough opening and compare with door unit size
- Check rough opening for level and plumb
- Line opening with material to prevent moisture damage and air filtration
- Place unit in opening, assuring exterior casing fits tight against wall surface
- Shim door and fasten, assuring level and plumb installation with proper clearance
- Check door for proper swing and closing
Mark glass to prevent breakage through accidental use of window space
Cut off excess shims
Nail exterior casing

Competency: Fit and assemble interior door jamb set

Tasks: Select door and collect jamb materials
Bevel door
Cut matching hinge gains in door and side jambs
Cut jamb, allowing for proper clearance and uneven floors
Assemble jamb set
Attach hinges and connect door to jamb

Competency: Install interior door unit

Tasks: Check the rough opening for size, level, and plumb
Set door unit into opening
Shim and fasten door assembly, assuring level and plumb installation with proper clearance and flush closure
Check for proper swing
Trim excess shim material

Competency: Install locks

Tasks: Obtain lock type from specifications
Select appropriate lockset and read instructions

Competency: Fit and install interior doorstops

Tasks: Miter ends of head and side stops to fit jamb set
Tack stop into place, flush on lock side, but allowing for hinge-side clearance
Check door unit assembly for proper operation
Adjust stops as necessary
Fasten stop permanently
Competency: Install special operating doors

Tasks: Explain the difference between byfold, multifold, pocket, sliding, and bypass doors

Select appropriate doors according to blueprints

Prepare opening

Check rough opening

Cut, fit, and assemble jamb set to accommodate door

Use spreaders when installing jamb set

Shim and fasten door assembly assuring level and plumb
Exterior Finish

Competency: Identify exterior finish systems

Tasks: Define the terms associated with exterior finish systems

Explain the principles associated with exterior finish systems

Compare the cost and energy effectiveness of exterior finish systems common in your locale

Determine the exterior finish system for your structure from the blueprints

Explain relevant safety practices

Competency: Install cornice trim

Tasks: Cornice trim installation sequence depends on roofing type and styles

Calculate material quantities from blueprints

Erect and use scaffolding and ladders safely

Cut, fit, and install:

a. facia
b. soffit
c. frieze
d. molding
e. shingle stop

Competency: Identify siding options

Tasks: List and define siding types and styles, such as sheet, drop, and clapboard

List and describe siding materials (such as metal, wood, and petroleum-derived synthetics) and their uses

Calculate differences in insulation value of various siding materials

Calculate siding and related material quantities from blueprints
Competency: Apply siding materials and trim

Tasks: Erect scaffolding and ladders as needed

Apply air filtration and moisture management materials such as building felt or TYVEK

Calculate and layout most efficient siding applications procedure according to manufacturer's specifications and such factors as strength, horizontal and vertical spacing, and joint and opening locations

Cut, fit, and apply siding materials and corner trim as needed

Install, cover, and trim attic ventilation
Interior Finish

Competency: Identify ceiling finish systems

Tasks: List and define terms associated with ceilings and ceiling finish methods

- Explain principles of ceiling systems and their installation
- Compare types of ceiling systems and their uses, and insulation values
- Calculate material requirements according to blueprints and specifications

Competency: Install ceiling

Tasks: Ensure that all cavities have been properly insulated and that air and vapor barriers have been installed and their integrity has been maintained

- Determine installation sequence and layout optimally according to manufacturer's instructions, building plans, and applicable codes
- Assemble special lifting and holding equipment
- Cut and fit

Competency: Identify wall finish systems

Tasks: Define the terms associated with wall finish systems and their installation

- Explain the principles associated with finishing walls
- Calculate and compare the energy-efficiency and cost of various wall finish systems
- Explain relevant safety procedures
- Obtain wall finish system from building plans
- Calculate wall finish materials
Competency: Apply wall finish system

Tasks: Ensure that all wall cavities have been properly insulated

- Ensure that the integrity of wall insulation and vapor management systems have been maintained
- Determine installation sequence
- Layout optimally according to manufacturer's instructions and all applicable building codes
- Assemble and position special lifting and holding devices

Competency: Identify gypsum board walls and ceilings

Tasks: Define the terms associated with sheetrock and its installation

- Explain the physical characteristics, strengths, and weaknesses of gypsum wallboard
- Explain the principles of sheetrock construction
- Calculate material requirements from blueprints
- Assemble special tools, including lifts and jacks
- Follow relevant safety practices

Competency: Install gypsum board

Tasks: Install backing at corners

- Plan, layout, cut fit and install:
  - a. Install long dimension at right angles to joists or studs
  - b. Fasten according to applicable building codes and manufacturer's specifications
- Install metal corners
Competency: Finish and texture gypsum board

Tasks:
Mix, cure, and spread joint cement compound according to manufacturer's instructions
Tape joints
Spot nails
Bed Tape
Feather seams
Respot
Sand
Apply texture

Competency: Complete stairs and trim

Tasks:
Review stairs construction terms and principles
Determine trim specifications from building plans
Calculate material needs
Cut, fit, and install false stringers
Remove temporary treads
Cut, fit, and install risers and treads
Fasten with adhesives, screws, and other approved methods
Install baluster rails according to building plans
Trim out staircase according to building plans

Competency: Identify different types of flooring

Tasks:
Define the terms associated with various types of flooring systems
Explain the principles of flooring systems
Obtain flooring specifications from building plans
Calculate material requirements
Competency: Install underlayment

Tasks: Determine underlayment specifications from building plans
  Select materials
  Calculate material requirements
  Cut, laydown, and install felt, air/vapor barriers, and/or construction adhesive
  Layout, cut, fit, and install optimally, according to subfloor, applicable building codes, and manufacturer's instructions

Competency: Lay a hardwood strip floor

Tasks: Define terms and describe principles associated with hardwood floors and their installation
  Laydown underlayment, according to building plans
  Calculate hardwood material requirements
  Plan, layout, cut, fit, and install:
    a. Overlap joints four inches
    b. Begin in central area and work toward exterior walls
    c. Lay flooring at right angles to joists
    d. Make sure first strip is straight (square with building walls)
    e. Snug each subsequent strip before nailing
    f. Use scrap from end of one row to begin next
    g. Cut the last strip to fit
    h. Leave a 1/2" gap for molding

Competency: Lay a resilient tile floor

Tasks: Define terms associated with resilient tile floors and their installation
  Explain the principles associated with tile floors and their installation
  Clean sub-floor
  Make sure sub-floors are smooth and level
  Fill any unfilled joints
  Plan and layout according to materials selected, manufacturer's specifications, building plans, and applicable codes
Snap a chalk line across each room from endwall to endwall

Spread adhesive according to manufacturer's instructions, using proper trowel

Lay tile, trimming border, if necessary

Eliminate all air pockets with flooring roller

Competency: Install paneling

Tasks: Define terms related to paneling

Explain the principles and materials associated with paneling and its installation

Determine from blueprints whether paneling is to be attached directly to studs or sheet rock or to furring strips

Calculate materials

Stand sheets on end

Plan, layout, cut, fit, and install for optimal material use and aesthetics:

a. Work your way around room
b. Fasten according to manufacturer's instructions, building specifications, and applicable building codes

c. Make all joints on stud
d. Panel edges should coincide with window and door openings whenever possible

Locate and cut receptacle and switch holes accurately

Competency: Install carpeting

Tasks: Define the terms associated with carpets and their installation

Explain carpet installation principles

Demonstrate the proper use of carpeting tools

Obtain carpeting specifications from building plans

Calculate carpeting quantities

Plan, layout, and install carpeting according to manufacturer's instructions
Competency: Finish interior trim and molding

Tasks: Case and trim interior door and windows

Cut, fit, and install wall moldings such as coves, corner molds, and base trim

Competency: Identify surface treatment methods

Tasks: Define the terms associated with paints, seals, stains, and finishes, and their application

- Explain the principles of surface finishing

- Explain safety hazards specific to using paints and other finishing compounds

- Explain relevant standard safety procedures:
  a. Read manufacturer's warnings
  b. Do not apply compounds containing asbestos and known or suspected carcinogens
  c. Demonstrate proper use and care of painting supplies and equipment such as thinners, removers, rollers, brushes, and mechanical applicators

Competency: Apply paint, stain, finish, or sealants

Tasks: Wear protective equipment, such as respirators and impervious gloves

Select correct finish according to building specifications

Follow manufacturer's instructions:

a. Prepare surfaces to be finished
b. Apply when weather and temperature are favorable
c. Maintain adequate ventilation
Cabinets

Competency: Identify cabinet construction methods

Tasks: Define the terms associated with cabinets and their construction and installation

- Explain the principles associated with cabinets and their installation
- Generate detailed cabinet schedules for a given kitchen, bathroom, and utility room
- Explain relevant safety procedures

Competency: Construct a cabinet

Tasks: Obtain cabinet design

- Calculate materials

Plan, layout, cut, fit, and install cabinet components in the following order:

- a. Construct the base
- b. Construct bottom plane and risers
- c. Cut and install back supports
- d. Notch the back supports and install
- e. Cut and install shelf supports and kickers
- f. Cut and install partitions
- g. Plumb end rises
- h. End panels
- i. Shelves
- j. Rails
- k. Miter stiles
- l. Counter top
- m. Edging

Finish surfaces as required
Competency: Install pre-finished wall and base cabinets

Tasks: Follow blueprints and manufacturer's instructions

- Plumb, level, and secure base units, wall face frames, and vanities
- Pre-fit counter sections to walls
- Assemble counter tops and corners
- Plumb, level, and fasten with screws and or adhesives
Course Descriptions

The brief course descriptions provide conceptual frameworks for educational planners that seek to design and implement a balanced program in construction education. Teachers can use these descriptions to organize course offerings in construction education. These descriptions are examples of content organization and are too brief for purposes of program approval. Local schools will need to be much more definitive regarding the content of their courses than is reflected in these course descriptions.

Course: Construction I
Length: One year
Grades: 9-12

This program covers all of the basics of building a residential structure. The first course includes an introduction to: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets.

Course: Construction II
Length: One year
Grades: 10-12

This program covers all of the basics of building a residential structure. The second year course provides intermediate level skills in all of units taught in the first year course: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have successfully completed Construction I should be enrolled in Construction II.

Course: Construction III
Length: One year
Grades: 11-12

This program covers all of the skills required to build a residential structure. This third year course includes advanced level training in: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have successfully completed Construction I and II should be enrolled in Construction III.
Course: Construction IV
Length: One year
Grade: 12

This program covers all the skills required to build a residential structure. The fourth course is designed to build mastery-level skills in the following areas: employability skills, health and safety, hand tool safety, power tool safety, measurement and mathematics, blueprint reading, energy, materials, insulation, site selection, foundations and forming, masonry and concrete, blocks and bricks, framing subfloors and floors, framing walls, framing roofing, roof finishing, plumbing and heating, wiring, windows and doors, exterior finish, interior finish, and cabinets. Only those students who have completed Construction I, II, and III should be enrolled in this senior-level construction course.
Curriculum Analysis Matrix

**Identified Competencies by Course Offerings**

This competency checklist should be used by teachers in identifying competencies to be included in specific classes in construction education. This checklist is a curriculum analysis tool for use by teachers in assigning responsibilities for the competencies of a total construction education program.

All courses taught in the construction education program are identified in the columns at the top of the matrix. The individual competencies can be allocated to specific courses. One method for analyzing the competency list is to assign letters where the competency will be introduced (I), taught (T), or mastered (M). Curriculum sequences can be organized through this approach.

To assist construction teachers to reinforce basic skills instruction, competencies have been cross-referenced with the following academic areas:

<table>
<thead>
<tr>
<th>Math (M)</th>
<th>Science (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Studies (SS)</td>
<td>Language Arts (LA)</td>
</tr>
</tbody>
</table>

This will assist local school districts in awarding cross-credit (academic credit) for participation in vocational classes they deem appropriate.

The following checklists are also cross-referenced with the Job Training Partnership Act pre-employment competencies and student leadership competencies. The Job Training Partnership Act provides funds to train economically disadvantaged youth to enter and succeed in employment. Each Private Industry Council responsible for administering these funds adopted youth pre-employment competencies as one of the measures for positive termination for program participants. The other measures are attained through unsubsidized employment, or through another training program.

The following categories of work-related knowledge must be evaluated and measured in the course of a participant's enrollment in a JTPA program:

1. Pre-Employment Competencies, which require the participant to demonstrate the skills and knowledge necessary to identify career objectives, seek and obtain employment and understand job performance.

2. Work Maturity Competencies, which require the participant to demonstrate the ability to apply skills in a training position.

3. Educational Skills Competencies, which require the participant to demonstrate basic computation and communication skills necessary to enter the labor market.

4. Occupational Skills Competencies, which require that the participant demonstrate proficiency in those skills necessary to maintain employment in a specific occupation or occupational cluster.
The pre-employment and work maturity competencies have been specifically cross-referenced in this curriculum so that construction instructors could specify where these competencies are integrated into the curriculum.

These youth competencies were identified by the Vice Presidents of the Task Force on Youth Employment, Private Sector/Education Roundtables: Summary Report 1979 as critical elements for employability of the nation's youth.

Student leadership programs are designed to be an integral part of the curriculum. The competencies are reinforced by student participation in approved student organizations such as Vocational Industrial Clubs of America. The student leadership competencies have been cross-referenced in this handbook to assist the construction education instructor identify specifically where these competencies will be taught.

**VOCATIONAL INDUSTRIAL CLUBS OF AMERICA (VICA)**

Vocational Industrial Clubs of America (VICA) is for students enrolled in secondary and postsecondary vocational courses in trade, industrial, technical and health education.

Through planned club activities, VICA develops the "whole" student, social and leadership abilities as well as vocational skills. The VICA motto is "Preparing for Leadership in the World of Work." VICA goals include:

- Foster an understanding of the functions of labor and management organizations and a recognition of their interdependence.
- Foster respect for the dignity of work.
- Relate school experiences to a young person's search for meaning, identity and achievement.
- Teach young people how to live and work with others...to accept and be accepted.
- Offer activities that complement occupational skill development.

- Create interest in and stimulate favorable community response to trade, industrial, technical and health occupations education.
- Promote high standards in work ethics, craftsmanship, scholarship and safety.
- Help students understand their roles in a technological age.

Alaska VICA, chartered in 1973, serves about 140 members in 10 chapters. The national organization is located in Leesburg, Virginia.

**KEY**

- M Math
- SS Social Studies
- S Science
- LA Language Arts
- * Pre-Employment Competencies
- + Student Leadership Competencies
## Recommended Competencies by Course Offerings

### Competencies

<table>
<thead>
<tr>
<th>EMPLOYABILITY SKILLS</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify major purposes of carpentry and construction</td>
<td>* SS</td>
<td></td>
<td></td>
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<tr>
<td>Identify construction careers</td>
<td>* SS</td>
<td></td>
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<tr>
<td>Identify career choices</td>
<td>* + LA</td>
<td></td>
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<tr>
<td>Prepare a resume and job application</td>
<td>* + LA</td>
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<tr>
<td>Write a cover letter</td>
<td>* LA</td>
<td></td>
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<tr>
<td>Prepare for an interview</td>
<td>* LA</td>
<td></td>
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</tr>
<tr>
<td>Follow up the interview</td>
<td>* LA</td>
<td></td>
<td></td>
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<tr>
<td>Be reliable and dependable</td>
<td>* + LA</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Maintain good personal relations</td>
<td>* + LA</td>
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<tr>
<td>Be honest</td>
<td>* + LA</td>
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<tr>
<td>Demonstrate initiative and productivity</td>
<td>* * SS</td>
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</tbody>
</table>
## Recommended Competencies by Course Offerings

### Competencies

<p>| * | + | Be assertive |
| * | + | Demonstrate work maturity |
| * | + | Use effective leadership skills |
| * | + | Solve problems |
| * | + | Identify employee rights and responsibilities |
| * | + | Identify personal responsibilities related to employment |
| * | S | Maintain good health for effective job performance |
| S | S | Prevent work-related injuries |
| S | Follow OSHA guidelines |
| * | + | Apply reading and writing skills |
| * | + | Follow verbal and written directions |
| * | LA | Identify proper job termination procedures |</p>
<table>
<thead>
<tr>
<th>Competencies</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEALTH AND SAFETY</strong></td>
<td></td>
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</tr>
<tr>
<td>S Identify the types of health and safety hazards in residential construction</td>
<td></td>
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<tr>
<td>* S Identify employee rights related to job hazards</td>
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<tr>
<td>SS Identify the elements of safe job sites</td>
<td></td>
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<tr>
<td>S Identify the hazards associated with excavations</td>
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<tr>
<td>S Identify heavy equipment safety procedures</td>
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<td></td>
<td></td>
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<tr>
<td>S Control space heater hazards</td>
<td></td>
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<tr>
<td>S Prevent fires</td>
<td></td>
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<tr>
<td>S Control electrical hazards</td>
<td></td>
<td></td>
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<tr>
<td>S Prevent lung injuries</td>
<td></td>
<td></td>
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<tr>
<td>S Prevent skin injuries</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>S Prevent injuries from falls</td>
<td></td>
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</table>
## Recommended Competencies by Course Offerings

### Competencies

<table>
<thead>
<tr>
<th>Course</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Prevent injuries from falling objects</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>S</td>
<td>Prevent eye injuries</td>
<td></td>
<td></td>
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<tr>
<td>S</td>
<td>Prevent hearing damage</td>
<td></td>
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<tr>
<td>S</td>
<td>Prevent lifting injuries</td>
<td></td>
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<tr>
<td>*</td>
<td>Wear safe work clothing</td>
<td></td>
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<tr>
<td>S</td>
<td>Prevent cold weather injuries</td>
<td></td>
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</tr>
</tbody>
</table>

### HAND TOOL SAFETY

- Use and care for hand tools appropriately

### POWER TOOL SAFETY

- Use and care for power tools appropriately

### MEASUREMENT AND MATHEMATICS

- Explain the importance of math and measurement
Recommended Competencies by Course Offerings

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Use and care for measuring tools properly</td>
<td></td>
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<tr>
<td>M Calculate using fractions</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>M Draw and measure geometric figures</td>
<td></td>
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<tr>
<td><strong>BLUEPRINT READING</strong></td>
<td></td>
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</tr>
<tr>
<td>LA M Identify uses of plot plans, blueprints, specifications and building codes</td>
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<tr>
<td>LA M Use a plot plan</td>
<td></td>
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</tr>
<tr>
<td>LA Use the alphabet of lines</td>
<td></td>
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</tr>
<tr>
<td>LA Use floor plan symbols</td>
<td></td>
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<tr>
<td>LA Use electrical symbols</td>
<td></td>
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<tr>
<td>LA Use sectioning symbols</td>
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<tr>
<td>LA M Use architects scale</td>
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<tr>
<td>Use door and window schedule symbols</td>
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</table>
# Recommended Competencies by Course Offerings

## Competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Course I</th>
<th>Course II</th>
<th>Course III</th>
<th>Course IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MLA</strong> Use foundation plans</td>
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<tr>
<td><strong>MLA</strong> Use floor plans</td>
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<tr>
<td><strong>MLA</strong> Use an elevation plan</td>
<td></td>
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<tr>
<td><strong>MLA</strong> Use Section Thru Sill and Section Thru Cornice</td>
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<tr>
<td><strong>MLA</strong> Use specifications</td>
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<tr>
<td><strong>ENERGY</strong> Understand energy conservation</td>
<td></td>
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<tr>
<td><strong>MSSS</strong> Calculate your structure's energy needs</td>
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<tr>
<td><strong>MATERIALS</strong> Identify the materials commonly used in northern residential construction</td>
<td></td>
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<tr>
<td><strong>SM</strong> Identify wood growing, milling, curing, grading and scaling methods</td>
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<tr>
<td><strong>S</strong> Identify wood sheet products</td>
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</tbody>
</table>
## Recommended Competencies by Course Offerings

### Competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify other building materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conserve materials and energy</td>
<td></td>
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<tr>
<td><strong>INSULATION</strong></td>
<td></td>
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<tr>
<td>Identify residential insulation systems appropriate for your locale</td>
<td></td>
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<td></td>
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<tr>
<td>Insulate foundation system for local conditions</td>
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<tr>
<td>Insulate floor system</td>
<td></td>
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<tr>
<td>Insulate exterior wall systems</td>
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<tr>
<td>Insulate ceiling and/or roof systems</td>
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<tr>
<td>Ventilate the roof cavity system and provide access to the attic</td>
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<tr>
<td>Insulate water and wastewater systems</td>
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<tr>
<td>Maintain integrity of all insulation and vapor barriers</td>
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</tbody>
</table>

### SITE SELECTION

- Identify other building materials
- Conserve materials and energy
- **INSULATION**
  - Identify residential insulation systems appropriate for your locale
  - Insulate foundation system for local conditions
  - Insulate floor system
  - Insulate exterior wall systems
  - Insulate ceiling and/or roof systems
  - Ventilate the roof cavity system and provide access to the attic
  - Insulate water and wastewater systems
  - Maintain integrity of all insulation and vapor barriers
### Recommended Competencies by Course Offerings

#### Competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SITE SELECTION</strong></td>
<td></td>
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<tr>
<td>Identify the legal considerations in siting a structure in your locale</td>
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<tr>
<td>Identify the environmental/safety concerns related to siting</td>
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<tr>
<td>Use a plot plan</td>
<td></td>
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<tr>
<td>Use a transit and leveling rod</td>
<td></td>
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<tr>
<td>Square a building</td>
<td></td>
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<tr>
<td>Follow building permits and codes</td>
<td></td>
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<tr>
<td><strong>FOUNDATIONS AND FORMING</strong></td>
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<tr>
<td>Identify the purposes of foundation systems</td>
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<tr>
<td>Identify factors to consider before deciding on foundation type</td>
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<tr>
<td>Construct foundation systems</td>
<td></td>
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</tr>
<tr>
<td>Install insulation, weatherization, and pest and moisture management systems</td>
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</tbody>
</table>
## Recommended Competencies by Course Offerings

### MASONRY AND CONCRETE

<table>
<thead>
<tr>
<th>SM</th>
<th>Identify the steps involved in pouring concrete foundations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prepare site subsurface and forms</td>
</tr>
<tr>
<td>M</td>
<td>Compute the volume of concrete required</td>
</tr>
<tr>
<td></td>
<td>Use and maintain concrete tools and equipment properly</td>
</tr>
<tr>
<td>M</td>
<td>Plan a concrete pour</td>
</tr>
<tr>
<td>S</td>
<td>Finish concrete</td>
</tr>
</tbody>
</table>

### BLOCKS AND BRICKS

<table>
<thead>
<tr>
<th>SM</th>
<th>Organize job site</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Lay and mortar blocks</td>
</tr>
<tr>
<td></td>
<td>Identify other masonry skills</td>
</tr>
</tbody>
</table>

### FRAMING: SUBFLOOR/FLOOR
<table>
<thead>
<tr>
<th>Competencies</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify energy-efficient framing systems for your locale</td>
<td></td>
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<tr>
<td>Frame and insulate various floor systems</td>
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<tr>
<td>Install a floor-support system</td>
<td></td>
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<tr>
<td>Frame a sill</td>
<td></td>
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<tr>
<td>Construct energy-efficient floor systems</td>
<td></td>
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<tr>
<td>Install sub-floor</td>
<td></td>
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<tr>
<td><strong>FRAMING: WALLS</strong></td>
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<tr>
<td>Identify the principles of energy-efficient wall construction for northern locales</td>
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<tr>
<td>Layout exterior walls</td>
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<tr>
<td>Construct exterior walls</td>
<td></td>
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<tr>
<td>Install different types of wall sheathing</td>
<td></td>
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<tr>
<td>Rough-in window and door openings</td>
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</table>
Recommended Competencies by Course Offerings

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Construct interior walls</td>
<td></td>
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<tr>
<td>S M Identify the principles of stair construction</td>
<td></td>
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<tr>
<td>M LA Construct stairs according to building plans</td>
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<tr>
<td>M Layout stringer</td>
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<tr>
<td>M Assemble the stairs</td>
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<tr>
<td><strong>FRAMING: ROOFING</strong></td>
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<tr>
<td>S Identify the principles of energy-efficient cold region roof framing</td>
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<tr>
<td>S M Install ceiling systems</td>
<td></td>
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<tr>
<td>M Construct hip-type roof</td>
<td></td>
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<tr>
<td>M Lay off rafter locations</td>
<td></td>
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<tr>
<td>M Calculate rafter lengths</td>
<td></td>
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<tr>
<td>M Cut and install rafters</td>
<td></td>
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<tr>
<td>Competencies</td>
<td>Construction I</td>
<td>Construction II</td>
<td>Construction III</td>
<td>Construction IV</td>
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<tr>
<td>M Cut birdsmouth or seat</td>
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<tr>
<td>S M Identify the principles of truss construction</td>
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<tr>
<td>M Construct a truss</td>
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<tr>
<td></td>
<td>Set, align and brace truss</td>
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<tr>
<td>S Complete other roof features</td>
<td></td>
<td></td>
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<tr>
<td>M Sheath roof</td>
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<tr>
<td><strong>ROOF FINISHING</strong></td>
<td></td>
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<tr>
<td>S M Identify energy-efficient roofing systems appropriate to your structure</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>M Apply roofing</td>
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<tr>
<td><strong>PLUMBING AND HEATING</strong></td>
<td></td>
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<tr>
<td>S M Identify plumbing systems</td>
<td></td>
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<tr>
<td>S M Install plastic water and wastewater pipes</td>
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</tr>
<tr>
<td>Competencies</td>
<td>Construction I</td>
<td>Construction II</td>
<td>Construction III</td>
<td>Construction IV</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Install copper pipe and tubing</td>
<td></td>
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<tr>
<td>Install water supply and wastewater systems</td>
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<tr>
<td>Insulate and/or bury pipe for your locale</td>
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<tr>
<td>Install heaters and heat exchange systems</td>
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<tr>
<td>Install air and moisture management systems</td>
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<tr>
<td>Identify residential electrical systems</td>
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<tr>
<td>Design a residential electrical system</td>
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<tr>
<td>Rough-in electrical system</td>
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<tr>
<td>Connect and trim residential electrical system</td>
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<tr>
<td>Identify energy-efficient window systems and installation strategies</td>
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**Recommended Competencies by Course Offerings**

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Construction I</th>
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<tr>
<td>Install energy-efficient windows</td>
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<tr>
<td>Identify energy-efficient door systems and installation methods</td>
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<tr>
<td>Fit and assemble exterior jamb set</td>
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<td></td>
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</tr>
<tr>
<td>Install exterior door unit</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Fit and assemble interior door jamb set</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Install interior door unit</td>
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<td></td>
</tr>
<tr>
<td>Install locks</td>
<td></td>
<td></td>
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<tr>
<td>Fit and install interior doorstops</td>
<td></td>
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<tr>
<td>Install special operating doors</td>
<td></td>
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<tr>
<td><strong>EXTERIOR FINISH</strong></td>
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<tr>
<td>Identify exterior finish systems</td>
<td></td>
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<tr>
<td>Install cornice trim</td>
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## Recommended Competencies by Course Offerings

### Competencies

<table>
<thead>
<tr>
<th>Competency</th>
<th>Construction I</th>
<th>Construction II</th>
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<th>Construction IV</th>
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<tr>
<td>Identify siding options</td>
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<td></td>
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<tr>
<td>Apply siding materials and trim</td>
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<tr>
<td><strong>INTERIOR FINISH</strong></td>
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<tr>
<td>Identify ceiling finish systems</td>
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</tr>
<tr>
<td>Install ceiling</td>
<td></td>
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<tr>
<td>Identify wall finish systems</td>
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</tr>
<tr>
<td>Apply wall finish systems</td>
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<tr>
<td>Identify gypsum board walls and ceilings</td>
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<tr>
<td>Install gypsum board</td>
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<tr>
<td>Finish and texture gypsum board</td>
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<tr>
<td>Complete stairs and trim</td>
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</tr>
<tr>
<td>Identify different types of flooring</td>
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### Recommended Competencies by Course Offerings

<table>
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<tr>
<th>Competencies</th>
<th>Construction I</th>
<th>Construction II</th>
<th>Construction III</th>
<th>Construction IV</th>
</tr>
</thead>
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<tr>
<td>M Install underlayment</td>
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<tr>
<td>M Lay a hardwood strip floor</td>
<td></td>
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<tr>
<td>M Lay a resilient tile floor</td>
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<td></td>
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<tr>
<td>M Install paneling</td>
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<td></td>
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</tr>
<tr>
<td>M Install carpeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish interior trim and molding</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>S Identify surface treatment methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply paint, stain, finish, or sealants</td>
<td></td>
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</tr>
<tr>
<td>CABINETS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M Identify cabinet construction methods</td>
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</tr>
<tr>
<td>M Construct a cabinet</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>M Install pre-finished wall and base cabinets</td>
<td></td>
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</tbody>
</table>
Sample Skills Card

This section of the guide provides teachers with an example format of an instrument for evaluating the effectiveness of instruction. The skills record allows teachers to assess competency at four levels of proficiency. Teachers are encouraged to construct their own skills performance record using the competency lists in the curriculum section of this guide.

Instructions for Use

The list of vocational skills/traits was developed from a task analysis of a construction competency.

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>CODE KEY:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introductory Level: Can do simple parts of task. Needs to be told/shown how to do most of the task. Needs extremely close supervision.</td>
</tr>
<tr>
<td>2</td>
<td>Minimum Level: Can do most parts of the task. Needs help only with most difficult parts. Needs close supervision.</td>
</tr>
<tr>
<td>3</td>
<td>Average Level: Can do all parts of task. Needs only spot-check of completed work. Meets local demands for speed and accuracy. Needs moderate job entry supervision.</td>
</tr>
<tr>
<td>4</td>
<td>Proficiency Level: Can complete task quickly and accurately. Can direct others in how to do the task. Needs little supervision.</td>
</tr>
</tbody>
</table>

DIRECTIONS: The instructor/employer may write, date and initial in appropriate square.

Fit and assemble interior door jamb set

1 2 3 4

- Select door and collect jamb materials
- Bevel door
- Cut matching hinge gains in door and side jambs
- Cut jamb, allowing for proper clearance and uneven floors
- Assemble jamb set
- Attach hinges and connect door to jamb

COMMENTS:
VII
Suggested Resources
Suggested Resources

This section identifies specific resources and sources for finding instructional materials and supplies for construction.

The following source lists have been characterized by media type to facilitate teacher use: resource libraries, publishers of texts and instructional materials, state resources, periodicals, associations, special books and pamphlets, multi-media and materials suppliers.

The Alaska Department of Education has not formally reviewed nor approved all the resources listed in this section. Teachers are encouraged to preview materials before using them in the classroom.
Resource Libraries

Alaska Vocational Materials Library
Office of Adult & Vocational Education
Alaska State Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

The Library maintains curricula for all vocational areas. Resources are loaned for a 2 month review period. There are also many materials which may be purchased from the Library's special collections. Some materials are available free of charge.

The Library's catalog is computerized and may be operated on an Apple Computer using Appleworks Software. The catalog may be obtained by sending $10.00 (please make your check payable to the South East Regional Resource Center) or by sending five blank disks for duplication.

Alaska Career Information System
Office of Adult and Vocational Education
Alaska State Department of Education
Box F
Juneau, AK 99811
(907) 465-2980

Comprehensive career guidance system developed by Alaskans and for Alaskans seeking occupational and educational opportunities in and out of Alaska.

Alaska Health Sciences Library
3211 Providence Drive
Anchorage, AK
(907) 786-1870

Journals and magazines in the area of job safety and health.
Alaska State Film Library
Juneau Center
Box G
Juneau, AK 99811
(907) 465-2916

Northwestern Vocational Curriculum
Coordination Center
St. Martin's College
Lacey, WA 98503

National Center for Research in
Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, OH 43210

Publishers

American Technical Publishers, Inc.
12235 South Laramie Ave.
Alsip, IL 60658

Bennett & McKnight
A Division of Glencoe Publishing Co.
17337 Ventura Blvd.
Encino, CA 91316

Chilton Book Company
Chilton Way
Radnor, PA 19089

Craftsman Book Company
P.O. Box 6500
Carlsbad, CA 92008

Dancraft
Daniel International Corporation
301 North Main Street
Greenville, SC 29601

Delmar Publishers, Inc.
2 Computer Drive, West
Albany, NY 12212

Goodheart-Wilcox, Inc.
123 W. Taft Drive
South Holland, IL 60473

Hobart School of Welding Technology
Trade Square East
Troy, OH 48373

Industrial Press, Inc.
200 Madison Avenue
New York, NY 10016

Intertec Publishing Corporation
Technical Publications
P.O. Box 12901
Overland Park, KS 66212

A Place To Live
Alaskan Timber for Houses
All Weather Wood Foundations
Concrete Construction
Foundation and Floor Construction
Housing: House Construction for
the Arctic Climate
Plumbing and Heating
Roof Framing for the North
Welding: Operation of Welding Equipment

10-State regional library of vocational materials. Can be accessed through the Alaska Vocational Materials Library.

Vocational Education Curriculum Materials database of all 50 states. Can be accessed through the Alaska Vocational Materials Library.

Catalog of materials available on construction education.
State Resources

Curriculum Publications Clearinghouse
Western Illinois University
Horrabin Hall Y6
Macomb, IL 61457

Curriculum and Instructional Materials Center (CIMC)
Oklahoma State Department of Vocational & Technical Education
1500 West Seventh Avenue
Stillwater, OK 74074

Curriculum Development Unit
Office of Vocational Education
2024 Capital Plaza Tower
Frankfort, KY 40601

Instructional Materials Laboratory
10 Industrial Education Bldg.
University of Missouri-Columbia
Columbia, MO 65211

South Western Publishing Co.
5101 Madison Road
Cincinnati, OH 45227

McGraw-Hill Book Co./Gregg Division
8171 Redwood Highway
Novato, CA 94947

Prakken Publications
P. O. Box 8623
Ann Arbor, MI 48107

Reston Publishing Company
P. O. Box 546
Reston, VA 22090

State Resources

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Technical Training Aids
P. O. Box 20042
Birmingham, AL 35216

Trade Press Publishing Co.
407 E. Michigan Street
Milwaukee, WI 53201

- Competency-Based Pre-Service Construction Trades Curriculum
- Vocational-Technical Education Consortium of States (V-TECS) Catalogs of performance objectives

- Bricklaying
- Cement Masonry
- General Construction Trades
- Industrial Electricity and Electronics
- Millwright
- Residential Carpentry

- Competency-Based Materials for Carpentry, Masonry and Welding

- Building Trades
- Concrete Masonry
- Electrical
- Math
- Metric Measurement
- Plumbing
- Welding
Michigan Vocational Education Resource Center
133 Erickson Hall
Michigan State University
East Lansing, MI 48824

Mid-America Vocational Curriculum Consortium (MAVCC)
1500 West Seventh Ave.
Stillwater, OK 74074

Minnesota Curriculum Services Center
3554 White Bear Avenue
White Bear Lake, MN 55110

Occupational Curriculum Laboratory
East Texas State University
Mayo Hall, Room 213
Commerce, TX 75428

Ohio Instructional Materials Laboratory
The Ohio State University
154 W. 12th Ave. Room 139
Columbus, OH 43210

Portland State University
Division of Continuing Education
P.O. Box 1491
Portland, OR 97207

University of Texas at Austin
P.O. Box 7218
Austin, TX 78713

Vocational Studies Center
University of Wisconsin - Madison
964 Educational Sciences Bldg.
1025 West Johnson Street
Madison, WI 53706

*Construction Trade Series*
- Welding

*Basic Electronics Book I & II*
- Residential Plumbing
- Residential Solar Systems
- Residential Wiring
- Sheet Metal Series
- Welding Series

*Carpentry*
- Heating and Air Conditioning
- Masonry
- Superinsulation in Housing Construction
- Welding Occupations Terminal Performance Objectives

*General Construction Trades I,II*
*General Metal Trades I-IV*

*Shop Safety*

*Individualized Learning Systems for Construction, Drafting, Electrical, and Welding*

*Bricklayer and Stonemason*
*Cabinetmaker*
*Carpentry I, II*
*Construction Technology*
*Woodworking Technology*

*Carpentry Business Modules*
*Construction Electrician Business*
*Plumbing Business Modules*
*Tools, Equipment & Machinery: Adapted for Vocational Education and the Employment of Handicapped People*
*Welding Business Modules*
Associations

American Association for Vocational Instructional Materials (AAVIM)
120 Driftmeir Engineering Center
Athens, GA 30602

American Technical Society
12235 So. Laramie Ave.
Alsip, IL 60658

American Vocational Association (AVA)
1410 King Street
Alexandria, VA 22314

American Welding Society
550 NW LeJeune Road
P.O. Box 351040
Miami, FL 33135

Associated Builders & Contractors
729 15th Street N.W.
Washington, DC 20005
Associated General Contractors of America
1957 E. Street N.W.
Washington, DC 20006

Bricklaying
Cement Masonry
Construction and Residential
Carpentry Series
Construction Craftsman
Manual of Accident Prevention
in Construction

Instrument Society of America
67 Alexander Drive
P.O. Box 12277
Research Triangle Park, NC 27709

Publications & Training Aids
Catalog

International Association of Plumbing
& Mechanical Officials
IAPMO Hdg
5032 Alhambra Avenue
Los Angeles, CA 90032

Uniform Plumbing Code

National Institute for Occupational
Safety and Health
321 Second Avenue
Mail Stop 502
Seattle, WA

OSHA Regulations

Occupational Safety and Health
Administration
U.S. Federal Court Building Room C543
701 C Street
Box 29
Anchorage, AK 99503

Painting and Decorating Contractors
of America
7223 Lee Highway
Falls Church, VA 22046

Painting & Decorating Craftsman's
Manual

United Brotherhood of Carpenters
and Joiners of America
101 Constitution Avenue NW
Washington, DC 20001

Carpentry Apprentice Training
Course

Vocational Industrial Clubs of
America (VICA)
P.O. Box 3000
Leesburg, VA 22075

Advisor Guide/Integrating
VICA into the Trades &
Industrial Program
National Leadership
Handbook
## Periodicals

<table>
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<tr>
<th>Periodical</th>
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<tr>
<td>American Industrial Arts Association</td>
<td>1914 Association Drive, Reston, VA 22091</td>
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<tr>
<td>Associated General Contractors of America</td>
<td>1957 E. Street N.W., Washington, DC 20006</td>
</tr>
<tr>
<td>Cummins Publishing Company</td>
<td>31600 Telegraph Road, Suite 200, Birmingham, MI 48010</td>
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<tr>
<td>Energy Publications Inc.</td>
<td>P.O. Box 2098, Laconia, NH 03247</td>
</tr>
<tr>
<td>National Association of Home Builders of the United States</td>
<td>15th and M Streets NW, Washington, DC 20005</td>
</tr>
<tr>
<td>Prakash Publications</td>
<td>P.O. Box 8623, Ann Arbor, MI 48107</td>
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<tr>
<td>Solar Vision, Inc.</td>
<td>P.O. Box 9420, Philadelphia, PA 19101</td>
</tr>
<tr>
<td>Taunton Press, Inc.</td>
<td>P.O. Box 365, Newton, CT 06470</td>
</tr>
<tr>
<td>United Brotherhood of Carpenters and Joiners of America</td>
<td>101 Constitution Avenue NW, Washington, DC 20001</td>
</tr>
<tr>
<td>Vernon Publications, Inc.</td>
<td>100 N. Mercer Street, Seattle, WA 98119</td>
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- The Technology Teacher
- The Constructor Magazine
- Industrial Education
- WoodHeat
- The NAHB Journal of Home Building
- School Shop
- Progressive Builder: Energy Efficiency and Quality Home Construction
- Fine Homebuilding
- Fine Woodworking
- The Carpenter Magazine
- Alaska Construction and Oil
Special Books/Pamphlets

Alaska Health Project
417 West Eighth Ave.
Anchorage, AK 99501

- Alaskan Health Hazards in the Workplace: It's Your Right to Know
- Keep This In Your Tool Box: A Health & Safety Manual for Alaska Construction Workers

Better Homes and Gardens
Meredith Corporation
Des Moines, IA

- Do-It-Yourself Home Repairs

Centennial College Press
651 Warden Avenue
Scarborough, Ont. MIL 3Z6 Canada

- Construction Geometry

Cooperative Extension Service
Statewide Office
University of Alaska
303 Tanana Drive
Fairbanks, AK 99701

- Alaska Dwelling Construction Guide
- Design of Roofs for Northern Residential Construction
- Effects of Insulation on Energy Requirements of a Residence
- Home Heating Systems/Fuels/Controls
- Housing & Energy Construction Materials
- How to Install Insulation for Ceilings, Walls, Floors and Basements
- Know the Soil You Build On
- Maintaining Subsurface Drains
- Painting Inside & Out
- Permafrost--A Problem of Building in Alaska
- Permeability of Common Building Materials to Water Vapor
- Simple Plumbing Repairs For The Home
- Special Considerations for Building in Alaska
- Warm Floors are Essential for Comfort
- Wood Finishing Series
Heat, Cooling and Ventilation
Plumbing for Old and New Homes
Tile Indoors and Out
The Good Housekeeping Illustrated Book of Home Maintenance
All About Basic Home Repairs
Basic & Finish Carpentry Techniques
Basic Masonry Techniques
Basic Plumbing Techniques
Basic Remodeling Techniques
Basic Wiring Techniques
Energy Saving Projects for the Home
Home Improvement Encyclopedia
How To Build and Use Greenhouses
Painting and Wallpapering
Home Improvements Manual
Reader's Digest Complete Do-It-Yourself Manual
Low-Cost, Energy Efficient Shelter for the Owner & Builder
Movable Insulation
Means Illustrated Construction Dictionary
Basic Carpentry
Basic Home Repairs
Basic Home Wiring
Basic Masonry
Do-It-Yourself Energy Savings Projects
Do-It-Yourself Floors
Home Lighting
Home Repair Handbook
Home How-To Sourcebook
Insulation and Weatherstripping
Solar Heating & Cooling
Multi-Media Materials

Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965

Career Aids, Inc.
20417 Nordhoff Street, Dept SW8
Chatsworth, CA 91311

Dana Corporation
School Assistance
Box 453
Toledo, OH 43692

DCA Educational Products, Inc.
4685 Stenton Ave
Philadelphia, PA 19144

Edu-Tech Publications Division
Commercial Service Co.
Box 2499
Anderson, IN 46011

EMC Publishing Co.
Changing Times Education Service
300 York Ave.
Saint Paul, MN 55101

Hobar Publications
1234 Tiller Lane
St. Paul, MN 55112

Masonry Specialty Company
4430 Gibsonia Road, RT 910
Gibsonia, PA 15044

Before You Build: A Pre
Construction Guide
Building Your Own House
The Complete Woodworker
The Practical Woodworker

Meridian Educational Corp.
Library Filmstrip Center
205 E. Locust Street
Bloomington, IL 61701

National Archives & Records
Administration
National Audiovisual Center
8700 Edgeworth Drive
Capitol Heights, MD 20743

National Innovative Media Co.
Route #2, Box 301 B
Calhoun, KY 42327

Pictures, Inc.
811 W. 8th Ave.
Anchorage, AK 99501

Teaching Aids, Inc.
P.O. Box 1798
Costa Mesa, CA 92626

The Media Center
State Fair Community College
1900 Clarendon Road
Sedalia, MO 65301

Vocational Media Associates
Prentice-Hall Media
P.O. Box 1050
Mount Kisco, NY 10549

VTR-Industrial Training
Video Training Resources, Inc.
7500 West 78 Street
Edina, MN 55435
Materials Suppliers

Advance Process Supply Co.
400 N. Noble Street
Chicago, IL 60622

Allied Electronics
401 E. 8th Street
Fort Worth, TX 76102

Broadhead-Garrett Co.
Western Division
161 Commerce Circle
P.O. Box 15528
Sacramento, CA 95852

Buckner-Weatherby Company, Inc.
5931 Fourth Ave. South
Seattle, WA 98108

Delvies Plastics, Inc.
P.O. Box 1415
Salt Lake City, UT 84110

Enco Manufacturing Co.
5000 W. Bloomingdale
Chicago, IL 60639

Industrial Arts Supply Co.
5724 West 36th Street
St. Louis Park, MN 55416

John Deere and Company
Distribution Service Center, Dept 150
1400 3rd Avenue
Moline, IL 61265

Midwest Shop Supplies, Inc.
2600 Bridgeport
P.O. Box 3717
Sioux City, IA 51102

Modern School Supplies, Inc.
P.O. Box 958
Hartford, CT 06143

Northern Hydraulics, Inc
P.O. Box 1499
Burnsville, MN 55337

SATCO
A Division of Saterlee
924 South 19th Ave.
Minneapolis, MN 55404

Sears, Roebuck & Co.
Sears Tower
Chicago, IL 60684

Snap-On-Tools Corp.
2801 80th Street
Kenosha, WI 53204

T & W Systems
7372 Prince Drive
Huntington Beach, CA 92647

Woodcraft Supply Corp.
Dept FB 125
41 Atlantic Ave Box 4000
Woburn, MA 01888