Tennessee CTE

Fundamentals of Construction

Safety 1	**1 Safety Rules: Identify safety hazards on a jobsite and demonstrate practices for safe working conditions. Accurately read, interpret, and demonstrate adherence to safety rules, including but not limited to rules pertaining to electrical safety, Occupational Safety and Health Administration (OSHA) guidelines, and state and national code requirements. Be able to distinguish between the rules and explain why certain rules apply.** 1.1
	2 Safety Practices: Define and demonstrate adherence to industry-standard practices regarding general machine safety, tool safety, equipment safety, electrical safety, and fire safety to protect all personnel and equipment. For example, when operating tools and equipment, regularly inspect and carefully employ the appropriate personal protective equipment (PPE), as recommended by Occupational, Safety & Health Administration (OSHA) regulations. Incorporate safety procedures when operating tools and equipment, such as hand and power tools, ladders, scaffolding, and lifting equipment. Complete safety test with 100 percent accuracy. 1.2
	3 Materials Safety: Follow procedures to work safely around materials. Adhere to responsibilities for employees in material safety as outlined by the Hazard Communication Standard (HazCom), such as locating and interpreting material safety data sheets (MSDS). Demonstrate safe procedures to move materials by planning the movement, properly lifting, stacking, and storing materials, and selecting proper materials-handling equipment. 1.3
History of Architecture & Construction 2	**1 History of Architecture and Construction: Investigate the evolution of architecture and construction across a variety of civilizations throughout history. Identify major architectural and construction innovations, such as technological advances in materials or construction processes.** 2.1
Introduction to the Construction Industry 3	**1 Construction Industry: Analyze the organization of the modern construction industry. Distinguish among the various personnel involved in the industry and explain the roles of each in the construction process, including but not limited to the owner, developer, architects, engineers, building officials, contractors, suppliers, unions, and professional craftsmen. Describe the basic steps of traditional building delivery for a construction project (from pre-design to post-construction), outlining who and what is involved in each step.** 3.1

2 **Construction Regulations: Research basic regulations affecting today's construction industry.** 3.2

a Investigate and report on the process for securing a building permit for a selected location in the community. 3.2.A

b Explain what a building code is and where to find published local building codes. Write persuasively to defend why a particular building code is necessary. 3.2.B

3 **Impact of Construction: Investigate the social, economic, and environmental impact of construction work at the local, national, and global levels. Analyze current and emerging trends in the construction industry such as LEED certification and green building design, critically examining each source consulted for its validity and reasoning.** 3.3

Career Exploration 4

1 **Construction Professions: Research the major professions and trades within construction, such as electrician, carpenter, mason, plumber, HVAC technician, cost estimator, and construction manager. Analyze the aptitudes and training needed for at least three careers of interest. For example, outline the typical steps needed to become a journeyman electrician, such as completing postsecondary training and obtaining on-the-job training through an apprenticeship, and devise a tentative career plan to reach employment goals.** 4.1

2 **Employment Opportunities: Evaluate jobs data and employment projections in the construction industry from sources such as O*Net OnLine, synthesizing findings from each source. Determine areas of largest growth and discuss the significance of construction to the national and global economy. Articulate why construction is considered a STEM field, citing the specific knowledge, skills, and abilities required to be successful in a variety of construction occupations.** 4.2

Introduction to Measurement 5

1 **Measuring: Use physical measurement devices typically employed in construction to complete accurate field measurements. Determine the appropriate units and record accurate measurements of lengths and angles. Tools should include but are not limited to fractional rule, metric rule, measuring tape, architect's scale, engineer's scale, dial caliper, micrometer, protractor, and square.** 5.1

2 **Dimensions: Interpret given linear and angular dimensions to accurately set up layouts to complete a project. For example, use an architect's scale to measure distance on a construction drawing, and then use a measuring tape to lay out cuts in dimensional lumber to an accuracy of 1/16 inch.** 5.2

Construction Math 6

1 **Math: Apply mathematics concepts to solve construction problems, distinguishing which principles apply to a given construction problem. Concepts should include, but are not limited to:** 6.1

- a Operating with whole numbers, fractions, and decimals. 6.1.A
- b Performing conversions between fractions, decimals, and percent. For example, convert a decimal to a fraction to prepare a unit for measurement on a fractional scale to the precision of 1/16 of an inch. 6.1.B
- c Working with units such as feet, inches, meters, centimeters, and millimeters, and determining appropriate units for a given construction task. For example, determine how many pieces of 2 ft. 4 in. PVC pipe may be cut from a 10 ft. piece and how much pipe will be left over. 6.1.C
- d Calculating the area of two-dimensional spaces. Calculating surface area and volume for three-dimensional objects employing related geometric terminology. 6.1.D
- e Performing proportionate reasoning to estimate quantities. 6.1.E
- f Using basic rules of right triangles, such as the Pythagorean Theorem, to find missing lengths. 6.1.F

Tools & Equipment 7

1 **Identify Tools: Accurately identify a wide range of hand and power tools used in the construction trades, such as striking tools, cutting tools, torque producing tools, leveling and squaring tools, grinding and shaping tools, clamping tools, and pulling and lifting tools. Explain when each is used and describe the characteristics that make each appropriate for a given task.** 7.1

2 **Use Tools and Equipment: Assess a variety of situations requiring the use of hand tools, power tools, and equipment. Select the proper tool and accessories, critique the readiness of the tool, use the tool to accomplish the desired task, and then return the tool and accessories to their proper storage. For example, demonstrate the ability to safely use a crosscut saw to cut a straight square to specified dimensions on dimensional lumber.** 7.2

Introduction to Building Systems and Materials 8

1 **Construction Materials: Compare and contrast the properties and uses of basic construction materials employed in building construction processes, such as aggregates, asphalt, concrete, steel, wood, and masonry materials.** 8.1

2 **Fasteners: Distinguish between the various types of fasteners commonly used in construction, such as nails, screws, and bolts, outlining the properties and uses of each type. Demonstrate the ability to accurately select and install the appropriate fastener in a variety of situations.** 8.2

3 **Building Systems: Identify and describe major building systems (i.e. foundation, structural, mechanical, electrical, and plumbing systems) to establish a basic knowledge of their purpose, structure, and function. Discriminate between the different types of construction drawings related to these systems, analyze how those drawings are organized, and interpret the common symbols used in each.** 8.3

Construction Drawings & Specifications 9	1	**Construction Drawings: Inspect and interpret construction drawings, diagrams, and written specifications for construction projects. Explain how pictorial representations relate to a physical layout. Use an architect's scale and the given dimensions on a construction document to determine an unknown dimension. For example, interpret electrical schedules and single-pole or three-way light switch symbols in electrical plans to determine the types, quantities, and exact physical locations of the light switches to be installed in a construction project.** 9.1
	2	**Specifications: Describe the purpose of specifications in a construction document set. Examine how specifications are organized according to the Construction Specifications Institute's (CSI) Master Format. Select an assortment of building products and classify them according to Master Format. Analyze actual specifications and create a list of items commonly included in a specification. Following CSI models and format, write a specification for a given component of a building project.** 9.2
	3	**Create Drawings: Create two-dimensional scale drawings using accepted dimensioning rules and measurement systems. For example, as part of a project to build a simple structure, develop the complete drawings that specify the dimensional details for each step of the construction process, annotating all drawings such that another person could replicate the work.** 9.3
Course Project 10	1	**Course Project: Interpret construction drawings to determine the correct materials, tools, and equipment needed to complete a basic construction project. Plan and implement the steps needed to complete the project, attending to precise details and employing safe practices throughout. For example, read and interpret a technical document to build a simple toolbox.** 10.1
Portfolio 11	1	**Portfolio: Compile important artifacts to create a portfolio connecting personal career preparation to concepts learned in this course. Continually update and reflect upon artifacts produced, including written products, to strengthen work samples over time, using technology where appropriate.** 11.1