

## **Appendix K**

### **ARCHITECTURE AND CONSTRUCTION YOUTH APPRENTICESHIP**

#### **CONSTRUCTION PATHWAY CARPENTRY FUNDAMENTALS (UNIT 4)**

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **1. Read blueprints, plans and specifications**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Learn the functionality of blueprints, plans and specifications
- Interpret technical drawings accurately as needed for job task
- Use appropriate carpentry terminology
- Identify basic elements of technical drawings
- Identify lines, views, symbols, and representations on the drawings as applicable
- Interpret dimensions and scale on the drawings as applicable
- Utilize an architect/engineers scale to properly read a drawing

Learning Objectives:

- Identify basic design principles
- Explain where a design professional finds basic Architectural/Structural design codes
- Demonstrate basic drafting skills (AutoCAD)
- Demonstrate blueprint reading skills
- Explain why precision in interpretation is critical
- Demonstrate knowledge of fundamentals of statistics, trigonometry, and algebra and explain their relevance
- Discuss different types of architectural technical drawings
- Define and explain the use of lines, views, symbols, dimensions, and scale on architectural technical drawings
- Compare pictorial format, orthographic projection, sectional views, and detail schedules
- Describe the standard usage of linear units in architectural drafting
- Identify a section cut through the drawing and explain how the carpenter would use this detail.

Comments:

## **UNIT 4: Construction Pathway**

### **Carpentry Fundamentals Unit**

Competency

#### **2. Interpret symbols and procedures**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learners:**

- Explain the role of drawings and specifications
- Identify drawings and symbols used on a construction drawing
- Apply information from drawings in construction activities
- Interpret specifications appearing on construction drawings
- Interpret and convert measurements in terms of actual dimensions
- Explain specifications in terms of work requirements

Learning Objectives:

- Explain the role of drawings in relation to quantities, project specifications, and contract documentation
- Explain the role of specifications in relation to quantities, quality of work, contract documentation and payment to contractors
- State the difference between general and project specifications
- Identify drawings in terms of type and application for a construction process
- Explain the key functions of the drawing in terms of the finished product
- Identify the key users of the drawing in terms of work responsibility
- Interpret symbols and abbreviations in terms of their functions and meanings
- Interpret the layout in terms of the different views shown
- Explain the purpose of each view in terms of the result of the end product

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **3. Identify job prep needs and develop job task plan**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learner:**

- Set up and prepare tool/equipment for safe operation:
  - Lubrication and fluid level checks
  - Air and pressure supplies
  - Power supply
- Determine the scope of work:
  - Timetable
  - Work schedule
  - Cleanup process
  - Safety measures
  - Acceptable noise levels
- Demonstrate an understanding of contractual relationships between all parties involved in the building process
- Apply scheduling practices to ensure the successful completion of a construction project

Learning Objectives:

- Explain the process to prepare the site and working with other construction professionals
- Strategize the scope of work for successful project completion
- Identify the importance of planning ahead to prevent problems on site before they occur
- Describe safety inspections to ensure regulations relating to health safety and the environment are adhered to
- Prepare sample project schedule that incorporates sequencing of events
- Prepare a flow chart explaining shop drawing review process
- Describe the approval procedures required for successful completion of a construction project

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **4. Execute job prep needs as a coordinated effort**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Review the scope and phases of the project with a worksite professional
- Illustrate how to control the main resources of a job including
  - Materials
  - Tools
  - Equipment
  - labor

Learning Objectives:

- Identify the components of building systems needed to complete a construction project
- Define planning and describe what it involves
- Explain why it is important to plan
- Explain the importance of documenting one's work
- Explain the sequence of events for project completion
- Explain how schedules are developed and used
- Define the terms production and productivity and explain why they are important
- Describe how efficiency can affect costs associated with the project
- Explain the supervisors role in controlling costs
- Describe the estimating process and classification of costs (e.g., direct and indirect, fixed and variable, methods and standards)
- Identify the steps to overseeing the running of several projects
- Demonstrate a working knowledge of communicating with a range of people including the client, subcontractor, supplier, the public and the workforce
- Describe how work teams coordinate work flow and help manage resources

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **5. Select tools and materials**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Choose the tools they are going to work with taking into consideration the usefulness and portability of the tool.
- Choose the appropriate tools and materials to minimize cost while meeting product performance goals.

Learning Objectives:

- Identify the hand tools commonly used by carpenters and describe their uses
- Use hand tools in a safe and appropriate manner
- State the general rules for properly maintaining all power tools, regardless of type
- Explain importance of equipment and tool tracking
- Describe ways that a contractor can manage materials
- Compare the value of renting versus purchasing equipment

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **6. Use hand tools and light duty tools**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Use correct hand tools in a safe and appropriate manner
- Demonstrate the general safety rules for operating all power tools, regardless of type
- Use portable power tools in a safe and appropriate manner
- Use stationary power tools in a safe and appropriate manner
- Demonstrate proper handling and storage of tools.

Learning Objectives:

- Identify the hand tools commonly used by carpenters and describe their uses
- Identify the portable power tools commonly used by carpenters and describe their uses
- Identify the stationary power tools commonly used by carpenters and describe their uses
- Describe the proper handling and storage of hand and power tools.
- Identify trends in power tool use
- Describe battery time and voltage in various power tools.

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **7. Operate tools and equipment safely**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Operate only equipment that he/she is trained on
- Choose correct tool(s) or equipment for the task
- Follow and complete a tool check list
- Inspect tool/equipment and work area for safety considerations
- Verify tool/equipment is available for use and in working order
- Verify tool/equipment is current for preventative maintenance and/or calibration
- Verify safety equipment and any Personal Protective Equipment (PPE) needed for tool/equipment use
- Wear the required Personal Protective Equipment (PPE) at all times as required for the operation of the tool/equipment
- Operate tools/equipment safely with guarding devices in the manner required for the job task
- Investigate and promptly report abnormal tool/equipment conditions
- Properly shut down and label any tool/equipment that is not operating as expected
- Follow Lock Out/Tag Out procedures as applicable
- Document use and maintenance as required

Learning Objectives:

- Distinguish between common hand tools (e.g., hammers, wrenches, pliers, taps, and dies, etc.)
- Outline applications of each tool and equipment
- Describe and demonstrate the safety requirements for each tool and equipment
- Discuss start up and shut down procedures for each tool/equipment you will operate
- Explain the purpose of preventative maintenance
- Describe emergency shutdown procedures for the tool/equipment you will operate
- Explain how to recognize and address malfunctions for the tool/equipment you will operate
- Describe how to recognize wear and tear on equipment components
- Describe how to select lubricants and coolants as applicable
- List which tools and equipment require safety certification

Comments:



## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **8. Assist with the installation of materials per job specifications**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learners:**

- Articulate the scope of work
- Retrieve the correct material(s) for the job
- Plan sequencing, tools, and equipment needed for the installation
- Identify set up needed
- Consult with worksite professional to verify production schedule, deadlines, and timeframes
- Assist with loading unloading of materials, tools, equipment and supplies
- Assist in lifting, position, and securing of materials and work pieces during installation
- Demonstrate the application of measuring knowledge
- Demonstrate the ability to identify labels and read labels on products
- Demonstrate the ability to read and follow directions
- Demonstrate the ability to listen and take direction well

Learning Objectives:

- Define the needed materials associated with the various jobs
- Determine effective and active listening skills
- Use acceptable language in the classroom
- Demonstrate writing legibly for all assignments
- Determine technical reading strategies
- Determine proper measuring techniques and explain how to use measuring tools.
- Demonstrate the ability to follow directions from the teacher/mentor in the classroom
- Explain the functions or collaborative nature of each department or unit within the larger organization

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **9. Demonstrate accuracy in measuring using various instruments**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learners:**

- Choose appropriate instrument(s) or aid(s) for measuring task
- Verify instrument(s) are accurate for calibration if applicable
- Use instrument(s) and/or measure as required
- Read measuring instrument accurately
- Scale proportions accurately
- Apply appropriate formula and units for measurements
- Confirm measurement to given specification
- Record measurements using proper symbols
- Calibrate, clean, and store measuring instrument(s) properly as required

Learning Objectives:

- List drafting aids and measuring devices commonly used by carpenters
- List common measurements used by carpenters
- Discuss how to convert standard English measures to metric and vice versa
- Explain architectural and engineer scale and identify where each is used
- Explain the impact of error in measurement
- Add, subtract, multiply, and divide whole numbers, fractions, decimals and percent's
- Calculate averages, ratios, proportions, and rates
- Compare accuracy and precision when using measuring equipment
- Identify various calipers, micrometer instruments, and layout tools and their applications
- Identify digital measuring gages and instruments and their applications
- Describe how to read and interpret gages
- Understand the use of angles and how they assist in creating square corners

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **10. Maintain clean and safe work environment**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learners:**

- Inspect tool(s) and work area for safety considerations
- Comply with posted safety warnings and symbols
- Identify unsafe conditions and/or work habits and reports them to the worksite professional immediately, if applicable
- Help maintain a clean and safe working environment free of debris and obstacles
- Clean, organize, put away items in the work area
- Safely identify, handle, store, and use hazardous materials according to company procedure, if applicable
- Report any indications of insects or pests

Learning Objectives:

- List the major components of a facility safety program
- List the different state and federal agencies that provide regulatory oversight at your facility for personal safety, environmental safety, and equipment safety
- List accident and fire prevention techniques
- Describe posted safety warnings and symbols and what they mean
- Describe safe and unsafe work habits and their implications
- Discuss the importance of keeping the work area and tools/equipment clean
- List mechanical, electrical, and equipment safety hazards at your facility
- Discuss how to identify and report unsafe conditions in your facility
- Discuss safety procedures to prevent accidents
- Describe the requirements at your facility for safety training and auditing
- Assess need for good housekeeping practices
- List hazards that contribute to injury due to slips, trips, or falls
- Outline compliance requirements of sanitation and health inspections

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **11. Clean up work area**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Follow directions based on foreman scope of work plans.
- Clean and maintain materials and tools as required
- Store materials and tools properly
- Follow facility procedures for clean-up and shut down after use

Learning Objectives:

- Explain the basic clean up procedures at the end of classroom or project build
- Explain the proper storage of tools and materials
- Articulate how a clean work environment supports safety
- Articulate how a clean work environment support efficiency

Comments:

## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **12. Practice quality craftsmanship**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Inspect and/or test materials/piece/product at all stages of production to determine quality or condition
- Monitor materials, processes, equipment, tools, and products throughout the production process for safety and quality specifications
- Inspect final product/piece to ensure it meets specifications
- Promptly identify and segregate materials and/or product that do not meet specification
- Communicate with worksite professional if materials and/or product do not meet requirements
- Document all quality checks

Learning Objectives:

- Explain and analyze the quality approval process used in the Construction industry
- Describe the roles and responsibilities for quality in your facility
- List the major stages involved in producing products
- Explain the procedures for rejecting sub-standard products
- Define terms used in quality assurance
- Describe the impact of quality standards in construction
- Describe how materials are selected and tested for product requirements
- Articulate the importance of getting the job done correctly the first time
- Explain the financial implications of poor craftsmanship

Comments:

**UNIT 4: Construction Pathway  
Carpentry Fundamentals Unit**

Competency

**13. Assist with rough framing or forming**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when the learner is able to perform one or more of the standards below in accordance with the employer site, based on scope of work:**

- Demonstrate proper techniques for framing floor systems
- Demonstrate proper techniques for framing roofs
- Demonstrate proper techniques for stair layout
- Demonstrate proper techniques for framing walls

**Learning Objectives**

<p>Floor Systems:</p> <ul style="list-style-type: none"> <li>• Identify the different types of joists and framing systems</li> <li>• Given specific floor load and span data, select the proper girder/beam or joist size from a list of available girders/beams</li> <li>• List and recognize different types of floor joists</li> <li>• Given specific floor and span data, select the proper joist size from a list of available girders/beams</li> <li>• Explain the purposes of subflooring and underlayment</li> <li>• Match selected fasteners used in floor framing to their correct use</li> <li>• Estimate the amount of material needed to frame a floor assembly</li> <li>• Lay out and construct a floor assembly with bridging</li> <li>• Explain how to install a subfloor using butt-joint plywood/OSB panels</li> <li>• Explain how to install a single floor system using tongue and groove plywood/OSB panels</li> </ul>	<p>Roofing:</p> <ul style="list-style-type: none"> <li>• Define the terms associated with roof framing and roofing</li> <li>• Identify the roof framing members used in gable and hip roofs</li> <li>• Identify the methods used to calculate the length of a rafter</li> <li>• Identify the various types of trusses used in roof framing</li> <li>• Use a rafter framing square, speed square, and calculator in laying out a roof</li> <li>• Identify various types of sheathing and types of roofing used in roof construction</li> <li>• Explain the safety requirements with roofing</li> <li>• Frame a gable roof with vent openings</li> <li>• Frame a roof opening</li> <li>• Construct a frame roof, including hips, valleys, commons, jack rafters, sheathing, and shingling</li> <li>• Erect a gable roof using trusses</li> <li>• Estimate the materials used in framing, sheathing and shingling a roof</li> </ul>
<p>Walls and Ceiling Framing:</p> <ul style="list-style-type: none"> <li>• Identify the components of a wall and ceiling layout</li> <li>• Describe and perform laying out interior and exterior wood frame walls, including plates, corner posts, door and window openings, partition T's, bracing, fire stops, and sheathing</li> <li>• Describe wall framing techniques used in masonry construction</li> <li>• Explain the use of metal studs in wall framing</li> <li>• Describe the correct procedure for laying out a ceiling</li> <li>• Cut and install ceiling joists on a wood frame building</li> <li>• Estimate the materials required to frame walls &amp; ceilings.</li> </ul>	<p>Stairs:</p> <ul style="list-style-type: none"> <li>• Identify the various types and parts of stairs</li> <li>• Interpret construction drawings of stairs</li> <li>• Explain the methods of construction various types of stairs</li> <li>• Demonstrate how to lay out and cut stringers</li> <li>• Determine the number of sizes of risers and treads required for a stairway</li> <li>• Demonstrate how to build a small stair unity with a handrail</li> <li>• Demonstrate how to lay out a skirt board</li> </ul>

Comments:

**UNIT 4: Construction Pathway  
Carpentry Fundamentals Unit**

Competency

**14. Assist with finish framing or forming**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

***Performance will be successful when the learner is able to perform the standard below in accordance with the employer site that the student is employed with based on separate trade specialties:***

- Demonstrate proper techniques for stair and railing construction per the job specification
- Demonstrate proper techniques for installing insulation per the job specification
- Demonstrate proper techniques for installation of flooring per the job specification
- Demonstrate proper techniques for installation of plaster, drywall and/or painting
- Demonstrate proper techniques for assisting with the installation and/or building of cabinets.

Learning Objectives

<p>Stairs and Railings:</p> <ul style="list-style-type: none"> <li>• Identify and explain construction methods for the various types of stairs, railings and their parts.</li> <li>• Identify the materials used in the construction of stairs</li> <li>• Interpret construction drawings of stairs</li> <li>• Determine the number of sizes of risers and tread required for a stairway</li> <li>• Identify the proper layout and cutting of a stair stringers along with the layout of the skirt board.</li> </ul>	<p>Insulation:</p> <ul style="list-style-type: none"> <li>• Identify the various types of insulation</li> <li>• Explain the proper use of various types of insulation</li> <li>• Calculate the R factor of insulation</li> <li>• Explain how to properly install insulation</li> <li>• Describe the use and purpose of vapor barriers</li> </ul>
<p>Flooring:</p> <ul style="list-style-type: none"> <li>• Identify the various types of flooring based on design and/or usage factor</li> <li>• Identify proper storage before installation</li> <li>• Explain the various types of floor installation techniques</li> <li>• Explain the various type of finishes that may be needed on flooring</li> <li>• Calculate and estimate flooring material required and costs for the type of flooring being used</li> </ul>	<p>Plaster/Drywall and Painting:</p> <ul style="list-style-type: none"> <li>• Identify the various types of drywall</li> <li>• Describe the various installation techniques based on selected drywall</li> <li>• Explain taping and topping techniques used in drywall</li> <li>• Explain the various techniques used for plaster and painting finishes</li> <li>• Identify the various types and amount of paints needed for the job</li> </ul>
<p>Cabinets:</p> <ul style="list-style-type: none"> <li>• Identify the basic cabinet construction based style for installation purposes</li> <li>• Calculate cabinet dimensions and cabinet installation schematics</li> <li>• Explain various types of countertops and installation techniques required</li> </ul>	

Comments:

**UNIT 4: Construction Pathway**  
**Carpentry Fundamentals Unit**  
 Competency

**15. Assist with interior finishing**

Performance Standard Condition

**Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

**Performance will be successful when learners:**

- Demonstrate proper techniques for window and door trim regardless of material
- Demonstrate proper techniques for installation of doors and fire doors
- Demonstrate proper techniques for the installation of windows and fire windows
- Demonstrate proper techniques for completion of trim work
- Demonstrate proper techniques for the installation of specialty items

Learning Objectives

<p>Doors:</p> <ul style="list-style-type: none"> <li>• Identify the proper techniques for the installation of windows and doors</li> <li>• Articulate the installation techniques for various types of interior doors.</li> <li>• Explain the proper installation of a lockset</li> </ul>	<p>Trim Work:</p> <ul style="list-style-type: none"> <li>• Describe how to properly install baseboards to the specifications</li> <li>• Describe how to properly install windows, doors and/or other trims to specifications</li> <li>• Estimate the amount of materials and costs associated to complete the job</li> </ul>
<p>Other:</p> <ul style="list-style-type: none"> <li>• Describe the proper installation and placement of fire extinguishers</li> <li>• Describe the proper installation techniques for bathroom partitions and accessories</li> <li>• Estimate the amount of paint needed for the job</li> <li>• Identify the type of paint best suited for the job</li> </ul>	

Comments:



## **UNIT 4: Construction Pathway Carpentry Fundamentals Unit**

Competency

### **16. Assist with exterior finishing**

Performance Standard Condition

#### **Competence will be demonstrated**

- At the worksite and classroom

Performance Standard Criteria

#### **Performance will be successful when learners:**

- Demonstrate proper techniques for application of vapor barriers, flashing and siding
- Demonstrate proper installation of various types of windows
- Demonstrate proper installation of various exterior doors and/or garage doors
- Demonstrate proper techniques for exterior trims (e.g., cornices, soffits, downspouts and/or gutters.)

Learning Objectives:

- Describe the various types of siding
- Describe how to properly install various types of siding
- Identify the types and styles of gutters and downspouts and their accessories
- Describe how to install selected types of metal or vinyl gutters and downspouts
- Identify types of window options
- Explain techniques for window installation based on type
- Explain proper ventilation techniques of soffits
- Identify proper placement of attic ventilation
- Identify the various types of locksets used on exterior doors and explain how they are installed

Comments: