

## **Appendix O**

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

#### **CONSTRUCTION PATHWAY PLUMBING/SPRINKLER FITTING (UNIT 8)**

## **UNIT 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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:**

- Explain the functionality of blueprints, plans and specifications
- Interpret technical drawings accurately as needed for job task
- Use appropriate plumbing 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 a metric scale to properly read a drawing

Learning Objectives:

- Explain basic design principles
- Explain where a design professional finds basic plumbing codes
- Demonstrate blueprint reading skills
- Explain why precision in specification interpretation is critical
- Apply the fundamentals of statistics, trigonometry, and algebra and explain their relevance
- Discuss different types of architectural technical drawings
- Define the basic types of lines
- Define and explain the use of lines, views, symbols, dimensions, and scale on architectural technical drawings
- Identify different lines by name, type, order of usage and application such as object, hidden, center, section, dimension, extension, cutting plane, short break, long break, phantom
- Demonstrate standard view placement practices
- Compare pictorial format, orthographic projection, sectional views, and detail schedules

Comments:

## **UNIT 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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:**

- Identify drawings and symbols used on a drawing
- Apply information from drawings in activities
- Interpret specifications appearing on drawings
- Interpret measurements and dimensions in terms of site requirements

Learning Objectives:

- Explain the role of drawings in relation to project specifications, contract documentation, quantities and construction
- 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 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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 learners:**

- Set up and prepare tool/equipment for safe operation:
- Determine the scope of work:
  - Timetable
  - Work schedule
  - Cleanup process
  - Safety measures
  - Acceptable noise levels
- Describe 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
- Articulate the importance of planning ahead to prevent problems on site before they occur
- Explain the process of 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 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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 phased of the project with a worksite professional
- Demonstrate how to control the main resources of a job:
  - Materials
  - Tools
  - Equipment
  - Labor

Learning Objectives:

- Define planning and describe what it involves
- Explain why it is important to plan
- Explain the importance of documenting one's work
- Describe the estimating process
- 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
- 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 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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
- Select the appropriate materials, fittings, grades and types of pipe

Learning Objectives:

- Identify the hand tools commonly used by plumbers 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 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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 the 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 plumbers and describe their uses
- Identify the portable power tools commonly used by plumbers 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 8: Construction Pathway Plumbing/Sprinkler Fitting 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 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 tool/equipment safely with guarding devices in the manner required for the job task
- Investigate and promptly reports 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
- Document use and maintenance as required

Learning Objectives:

- Distinguish between common hand tools including hack saw, pliers, compression sleeve puller, screw driver, and allen, basin, pipe and adjustable wrenches
- Give examples of manufacturing processes that use fixtures
- 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 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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
- Apply measuring knowledge to procure the material
- Demonstrate the ability to identify labels and read labels on products
- Demonstrate the ability to take direction well
- Assist with install of valves
- Assist with install of toilets
- Demonstrate how to solder pipes
- Assist with cutting, threading and reaming

Learning Objectives:

- Understand all of the materials associated with the various trades
- Demonstrate proper listening techniques
- Demonstrate the ability to read directions
- Demonstrate the ability to properly use measuring tools
- Demonstrate how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping
- Demonstrate how to properly measure, cut, and join plastic piping
- Demonstrate the ability to follow directions from the supervisor/mentor
- Identify types of fittings and valves and their uses
- Select the appropriate personal protective equipment
- Properly measure, cut, and join piping
- Select the correct support and spacing for the application
- Identify the material properties, storage, and handling requirements of copper tube

Comments:

## **UNIT 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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 or aid for measuring task
- Verify instrument is accurate for calibration if applicable
- Use 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 instruments properly as required

Learning Objectives:

- List drafting aids and measuring devices commonly used by architects
- List common measurements used by plumbers
- Discuss how to convert standard English measures to metric and vice versa
- Explain architectural scale
- 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

Comments:

## **Unit 8: Construction Pathway Plumbing/Sprinkler Fitting 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 tools 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 8: Construction Pathway**  
**Plumbing/Sprinkler Fitting 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 proper storage of tools and materials
- Articulate how a clean work environment supports safety
- Articulate how a clean work environment support efficiency

Comments:

## **Unit 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting 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 Plumbing 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 plumbing
- Describe how materials are selected and tested for product requirements
- Explain the financial implications of poor craftsmanship

Comments:

## **Unit 8: Construction Pathway**

### **Plumbing/Sprinkler Fitting Fundamentals Unit**

Competency

#### **13. Assist with testing and maintenance of fixtures**

Performance Standard Condition

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

- at the worksite and classroom

Performance Standard Criteria

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

- Identify the basic types of materials used in the manufacture of plumbing fixtures
- Demonstrate knowledge of testing plumbing fixtures
- Demonstrate knowledge of maintaining plumbing fixtures
- Assist with common repair and maintenance requirements for fixtures, valves and faucets such as:
  - sinks, lavatories, and faucets
  - bathtubs and showers
  - toilets, urinals, and bidets
  - drinking fountains and water coolers
  - appliances connected by a plumber
- Assist with the preparation of blocking and supports
- Assist with cutting and patching of walls

Learning Objectives:

- Explain selected plumbing and aligning tasks
- Identify job-site hazardous work specific to plumbers
- Describe and demonstrate the importance of the lockout/tagout process
- Identify the basic types of materials used in the manufacture of plumbing fixtures
- Identify the basic types of valves and various pressure ratings
- Identify common types of sinks, lavatories, faucets, bathtubs, shower stalls, drinking fountains, garbage disposals and dishwashers
- Identify parts of a fitting and use common pipe measuring techniques
- Calculate end to end measurements using fitting allowances and thread makeup.

Comments: