UNIT 6: Construction Pathway
Masonry/Concrete 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 masonry 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:
• 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
• 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
• Compare pictorial format, orthographic projection, sectional views, and detail schedules
• Describe the standard usage of metric (SI) linear units in architectural drafting

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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 drawing
• Apply information from drawings in activities
• Interpret specifications appearing on drawings
• Interpret and convert measurements in terms of actual dimensions requires
• 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 masonry 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

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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:
    o Timetable
    o Work schedule
    o Cleanup process
    o Safety measures
    o Acceptable noise levels
  • Articulate how the contractual relationships between all parties involved in the building process are connected to the job plan
  • Apply scheduling practices to ensure the successful completion of a construction project
  • Show a basic understanding of the planning process, scheduling, and cost and resource control
  • Inspect job site after wind or adverse weather conditions

Learning Objectives:
• Explain the process to prepare the site and work 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
• Understand 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 masonry project

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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:  
  - 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

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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

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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 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
• Explain the battery time and voltage in various power tools

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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 report abnormal tool/equipment conditions
- Properly shut down and label any tool/equipment that is not operating as expected
- Document use and maintenance as required

Learning Objectives:
- Distinguish between common hand tools including trowel, mason hammer, chisel, mashing hammer, masonry power saw, level, steel squares, jointers, chalk lines, and brushes
- 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
- List which tools and equipment require safety certification

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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(s)
• Identify labels and read labels on products
• Take direction well
• Assure solid footing
• Lay a dry bond
• Spread and furrow a bed joint, and butter masonry unit
• Cut brick and block accurately
• Lay masonry units in a true course
• Plan sequencing, tools, and equipment needed for the installation
• Identify set up needed
• Consult with worksite professional to verify production schedule, deadlines, and timeframes

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
• Describe the most common types of masonry units
• Describe and demonstrate how to set up a wall

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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 for measuring task
- Verify instrument is accurate for calibration if applicable
- Use and/or measure as required
- Read measuring instrument(s) 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 architects
- 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

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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

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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

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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 Masonry/Concrete/Brick and Block 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 within the Masonry/Concrete/Brick and Block industry
- Describe how materials are selected and tested for product requirements
- Emphasize the importance of getting the job done correctly the first time
- Explain the financial implications of poor craftsmanship

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Competency
13. Assist with cutting brick and block

Performance Standard Condition
**Competence will be demonstrated**
- At the worksite and classroom

Performance Standard Criteria
**Performance will be successful when learners:**
- Demonstrate the ability to work with brick and block for application
- Demonstrate use of proper tools in cutting brick and block
- Accurately cut brick and block
- Demonstrate the ability to accurately prepare joints
- Assure proper techniques for bonding

Learning Objectives:
- Describes and demonstrates the basic techniques for working with concrete block and brick
- Understand how to apply head joints
- Explain how to spread mortar for bed joints
- Explain how to appropriately lay brick and block to line
- Explain the curing process

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Competency
14. Assist with depositing, spreading, consolidating, and striking of concrete in a form

Performance Standard Condition
Competence will be demonstrated
• At the worksite and classroom

Performance Standard Criteria

Performance will be successful when learners:
• Assist with masonry and installation techniques

Learning Objectives:
• Explain how the properties of concrete are used in construction
• Describe the most common types of masonry units
• Describe how to set up a wall
• Explain how to lay a dry bond
• Describe how to spread and furrow a bed joint
• Explain how to butter masonry units
• Describe the different types of masonry bonds
• Describe how to lay masonry units in a true course
• Describe quality-control tests on concrete influence mix, placement, finishing, durability and performance
• Describe how the wind, heat, or cold affect the curing of the concrete throughout the entire process.

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Competency
15. Lay masonry units to job specification

Performance Standard Condition
   Competence will be demonstrated
   • At the worksite and classroom

Performance Standard Criteria
   Performance will be successful when learners:
   • Assist with building a concrete footer
   • Assist with setting and aligning forms that hold concrete to the desired pitch and depth
   • Assist with preparing units for placement
   • Verify the proper construction of forms
   • Ensure proper placement onto spacers
   • Assist with placing concrete

Learning Objectives:
   • Describe basic site layout using levels and measuring tools
   • Discuss how to properly locate, grade and build forms and horizontal placement
   • Discuss compaction activities on subgrades
   • Describe various joints and where to locate them
   • Describe various reinforcements and how to place them when ordering concrete
   • Describe how concrete is conveyed and placed
   • Determine an appropriate pre-placement checklist
   • Describe how to use the equipment and tools for placing concrete
   • Describe the process of depositing, spreading, consolidating, and striking off concrete in a form
   • Define the trade terms to the appropriate processes and equipment

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Competency
16. Assist with selecting the correct types of materials for the job.

Performance Standard Condition
Competence will be demonstrated
• At the worksite and classroom

Performance Standard Criteria
Performance will be successful when learners:
• Assist with the use of mortar applications in a project
• Assist with mixing mortar to the proper consistency for the application
• Assist with selecting the various types of mortar for the specific jobs

Learning Objectives:
• Name and describe the primary ingredients in mortar and their properties
• Identify the various types of mortar used in masonry work
• Describe the common admixtures and their uses
• Identify the common problems found in mortar application and their solutions
• Describe how to properly set up the mortar mixing area
• Describe how to properly mix mortar by hand
• Describe how to properly mix mortar with a mechanical mixer
• Describe the properties of concrete
• Determine how the ingredients of concrete influence mix, placement, finishing, durability and performance
• Mix a test batch on concrete
• Describe how the wind, heat, or cold affect the curing of the concrete throughout the entire process
• Explain the importance of wall bracing
• Identify when and where the materials should be applied
• Describe scaffold basics

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Competency
17. Perform volume estimates for concrete quantity requirements

Performance Standard Condition
Competence will be demonstrated
• At the worksite and classroom

Performance Standard Criteria
Performance will be successful when learners:
• Assist with applying measurements, drawings, and specifications to a project
• Perform a slump test
• Successfully mix a batch of concrete

Learning Objectives:
• Work with denominate numbers
• Read a mason’s measure
• Convert measurements in the English system into metric equivalents
• Recognize, identify, and calculate areas, circumferences, and volumes of basic geometric shapes
• Identify the basic parts of a set of drawings
• Discuss the different types of specifications used in the building industry and the sections that pertain to masonry.
• Describe the basic finishing process
• Describe quality-control tests on concrete influence mix, placement, finishing, durability and performance
• Mix a test batch on concrete

Comments: