

Instructional Framework

Construction Technologies

46.0415.00

This Instructional Framework identifies, explains, and expands the content of the standards/measurement criteria, and, as well, guides the development of multiple-choice items for the Technical Skills Assessment. This document corresponds with the Technical Standards reviewed on May 27, 2025.



Domain 1: Residential Construction Applications	
Instructional Time: 40 - 45%	
STANDARDS 5.0 DEMONSTRATE MASONRY WORK	
5.1 Describe the benefits of masonry construction (i.e., structural integrity, durability, fire resistance, aesthetic appeal, thermal efficiency, etc.)	<ul style="list-style-type: none">● Masonry construction benefits
5.2 Identify basic masonry materials (i.e., stone, bricks, concrete blocks, glass bricks, stucco, etc.)	<ul style="list-style-type: none">● Concrete Masonry Unit (CMU)● Bond beam● Rebar● Mortar● Grout● Wall ties● Horizontal ladders● Rebar positioners● Firebrick● Silicate brick● Nominal vs. actual● Architectural block
5.3 Explain basic masonry techniques (e.g., bricklaying, dry-stone masonry, rubble masonry, bonding, pointing, and ashlar masonry)	<ul style="list-style-type: none">● Buttering● Initial layout● Masonry wall● Dry stacking● Building leads● Lintels● Spread● Bed joints● Head joints● Keystone

	<ul style="list-style-type: none"> ● Clinkers ● Laying to the line
5.4 Explain the primary functions of mortar and grout in masonry construction	<ul style="list-style-type: none"> ● Bonding units together ● Structural integrity ● Compensating for the different sizes of units ● Increasing weather resistance ● Create a neat, uniform appearance
5.5 Mix mortar and grout for masonry installation	<ul style="list-style-type: none"> ● Mixture ratio ● Sand, water, cement, lime ● Agents <ul style="list-style-type: none"> ○ Coloring, add mixtures, etc.
5.6 Use masonry tools (i.e., wire brush, hammer, jointers, masonry square, masonry saw, plumb bob, chisel, mortar board, straight edge, etc.)	<ul style="list-style-type: none"> ● Identify tools with proper and common name ● Identify appropriate tool for the job or task ● Inspect tools for damage (sharpen chisels, etc.) ● Trowel ● Sled runner ● Soft brush ● Brick hammer ● Tape measure ● Mason line ● Line block ● Line trigs ● Marking crayons ● Chalk line ● Mason level ● Margin trowel ● Wire cutters ● Saw wrench ● Construction calculator ● Folding rule
5.7 Calculate masonry work according to project specifications (i.e., volume of brick, brick size, number of bricks, quantity of mortar, etc.)	<ul style="list-style-type: none"> ● Material estimations ● Estimate block or brick quantity
5.8 Lay brick block to specification	<ul style="list-style-type: none"> ● Perform masonry work
5.9 Clean brick/block work surfaces and cavities and remove excess mortar	<ul style="list-style-type: none"> ● Dress/tool the joints ● Workmanship

5.10 Use a level to evaluate masonry work	<ul style="list-style-type: none"> ● Level ● Plum ● Square ● Straight ● Range
STANDARD 6.0 DEMONSTRATE FLOOR AND CEILING FRAMING	
6.1 Identify the components of a floor system (e.g., floor covering, underlayment, subfloor, and floor joists)	<ul style="list-style-type: none"> ● Floor opening (header, trimmers, tail joists, etc.) ● Supports (steel, wood, beams, girders, etc.) ● Beams (glulam, LVL, PSL, wood I-joist, etc.) ● Posts ● Piers ● Foundation walls/stem walls ● Termite shields ● Mud sill/sill plate/sill sealer ● Bridging/blocking ● Floor trusses ● Rim joist ● Types of subfloors (plywood, OSB, etc.) ● Pressure-treated lumber
6.2 Explain the function of the floor plan (e.g., to illustrate a property's design and structural details such as walls, windows, doors, and stairs of a property)	<ul style="list-style-type: none"> ● Show the visual/structural layout of the building ● Show locations of supports, plumbing, HVAC, electrical, etc.
6.3 Describe what the floor framing plan shows (i.e., the layout of the supporting features such as bearing walls, columns, beams, girders, etc.)	<ul style="list-style-type: none"> ● Required blocking ● Spans ● Stairwell openings
6.4 Identify types of floor frames (i.e., floor joist, head joist, blocking, beam, sill plate, subfloor, etc.)	<ul style="list-style-type: none"> ● Platform ● Balloon ● Post/beam ● Concrete ● Cantilever ● Long pans or dome pans
6.5 Identify fasteners used in floor systems (i.e., screws, nuts and bolts, washers, self-drilling screws, anchor bolts, rivets, etc.)	<ul style="list-style-type: none"> ● Nail size and screw size ● Fastener spacing ● Clips and hangers ● Chemical vs. mechanical fastener ● Adhesives

<p>6.6 Identify ceiling components (i.e., joists, noggins or struts, lateral restraints, insulation and ceiling board, coving, etc.)</p>	<ul style="list-style-type: none"> ● Ceiling/floor joists ● Interior support wall ● Frames and stairs ● Roof rafters ● Trusses ● Ceiling openings ● Strong backs ● Rib bands ● Hangars
<p>6.7 Identify ceiling accessories (i.e., trim, crown molding, adhesive, etc.)</p>	<ul style="list-style-type: none"> ● Finishes ● Drywall ● Paint ● Textures ● Acoustic Ceiling Tiles (ACTs)
<p>6.8 Calculate the amount of material needed to frame a floor and the ceiling</p>	<ul style="list-style-type: none"> ● Material estimate ● Linear feet calculated ● Area and perimeter
<p>6.9 Layout and construct a floor system</p>	<ul style="list-style-type: none"> ● Squaring techniques ● 3:4:5 triangle ● Chalk line ● Marking material ● Pythagorean Theorem
<p>6.10 Layout and construct ceiling framing</p>	<ul style="list-style-type: none"> ● Squaring techniques ● 3:4:5 triangle ● Chalk line ● Marking material ● Pythagorean Theorem ● In-line framing
<p>STANDARD 7.0 DEMONSTRATE INTERIOR AND EXTERIOR WALL FRAMING</p>	
<p>7.1 Define wall framing (e.g., the vertical and horizontal members of exterior walls and interior partitions)</p>	<ul style="list-style-type: none"> ● Wall framing components ● Headers ● Trimmers ● Studs ● Steel studs ● King studs ● Window sills

	<ul style="list-style-type: none"> ● Channels ● Sole plate ● Top plate ● Double-top plate ● Rough openings (RO) ● Corner assembly ● Partition T ● Partition wall assembly ● Fire blocking ● Top track ● Bottom track
7.2 Identify wall framing specifications and building requirements (i.e., IRC custom and standard codes, stud size for interior load, wall weight, location of windows, doors, electrics, plumbing, HVAC, etc.)	<ul style="list-style-type: none"> ● Load bearing = 16" on center ● Non-load bearing = 24" on center ● Plumbing walls = 2 x 6 ● Minimum 7' ceiling height ● Egress
7.3 Layout wall lines including plates, corner posts, door and window openings, pony/half wall, partition Ts, bracing, and firestops	<ul style="list-style-type: none"> ● Plan reading and application for wall layout ● Select and use appropriate tools for wall layout ● Chalk line ● Mark material
7.4 Calculate the materials, fasteners, and adhesives required to frame walls	<ul style="list-style-type: none"> ● Determine area, perimeter, and cost of materials ● Determine amount of waste and overage
7.5 Calculate lumber, panel, and concrete quantities	<ul style="list-style-type: none"> ● Determine area, perimeter, and cost of materials ● Determine amount of waste and overage ● Linear feet, square feet ● Concrete volume
7.6 Assemble wood and metal stud walls	<ul style="list-style-type: none"> ● Advantages of wood vs. metal ● Fastening methods used for wood (nails) vs. metal (self-tapping screws) ● Select and use appropriate tools for stud walls
7.7 Assemble, erect, and brace exterior walls for a framed building	<ul style="list-style-type: none"> ● Shear wall ● Strapping ● Anchoring ● Select and use appropriate tools for exterior walls ● Let-in bracing (wood or metal) ● Level

	<ul style="list-style-type: none"> ● Plumb and line ● Platform vs. balloon vs. post and beam
STANDARD 8.0 DEMONSTRATE ROOF FRAMING AND FINISHING	
8.1 Describe the components of a roof plan [i.e., roof design (e.g., gable, gambrel, hip, mansard, flat), rafters vs trusses, roofing application, roofing sheathing, and roofing finish]	<ul style="list-style-type: none"> ● Truss placement ● Temporary and permanent bracing ● Dormers ● Skylights ● Roof windows ● Chimney
8.2 Identify the common layers of a roof (i.e., shingles, flashing, underlayment, ice and water protector, roof frame, roof's edge, etc.)	<ul style="list-style-type: none"> ● Sheathing ● Drip edge ● Felt
8.3 Describe the common roofing applications (e.g., self-adhered, heat-applied, liquid or cold applied, and mechanically attached)	<ul style="list-style-type: none"> ● Metal ● Shingle ● Built-up roofing (BUR) ● Thermoplastic ● Polyvinyl chloride (PVC) ● Loose layered ● Shake shingles ● Tile ● Slate
8.4 Discuss the factors that determine what roofing application to use (i.e., cost, local building codes, energy efficiency, maintenance, lifespan, etc.)	<ul style="list-style-type: none"> ● Environmental factors ● Aesthetic factors
8.5 Define roof sheathing and explain its importance	<ul style="list-style-type: none"> ● Plywood ● Oriented Strand Board (OSB) ● Structural integrity ● Strengthen the frame ● Backing for finish material
8.6 Explain the main framing structures of a roof (e.g., rafters and trusses) and the roof framing parts (e.g., rafters, trusses, and joists)	<ul style="list-style-type: none"> ● Fascia ● Lookouts ● Valleys ● Crickets ● Barge rafters ● Hips ● Girders

	<ul style="list-style-type: none"> ● False fascia ● Freeze blocks ● Bird blocks ● Slope ● Pitch ● Spans ● Ridge ● Pressure blocks ● Trusses (tension web, compression web, top cord, bottom cord) ● Rafters (collar ties, birds mouth/seat cut, ridge board) ● Parapet
8.7 Estimate the materials used in framing and sheathing a roof	<ul style="list-style-type: none"> ● Calculate area and perimeter ● Linear footage ● Span ● Pythagorean Theorem
8.8 Calculate lumber and panel quantities	<ul style="list-style-type: none"> ● Calculate area and perimeter ● Linear footage ● Span ● Pythagorean Theorem
8.9 Frame and finish a roof	<ul style="list-style-type: none"> ● Select and use appropriate materials and tools to frame and finish a roof
STANDARD 11.0 INSTALL INTERIOR TRIM AND STAIRS	
11.1 Identify types of millwork [i.e., floors, doors, panels, stair parts, cabinets, moldings, cornices and archways, etc.]	<ul style="list-style-type: none"> ● Baseboards ● Crown molding ● Ship lap ● Skirt boarding ● Wainscoting ● Chair rail trim ● Door and window casing
11.2 Define interior trim (e.g., the edge material used around doors, windows, between different floors, and on walls and ceilings)	<ul style="list-style-type: none"> ● Creates a finished look
11.3 Identify types of interior trim (i.e., wood, fiberboard, vinyl, fiber cement, wood-plastic, etc.)	<ul style="list-style-type: none"> ● MDF (Medium Density Fiberboard) ● PVC (Polyvinyl chloride)

11.4 Explain the Rule of 25 for safe comfortable stairs	<ul style="list-style-type: none"> ● The sum of twice the riser height plus the tread depth should be approximately 25 inches
11.5 Identify types of stair railings (i.e., steel, aluminum, and wrought iron for commercial and industrial settings; wood provides a more classic appearance, etc.)	<ul style="list-style-type: none"> ● Minimum requirements (height range, width, etc.)
11.6 Design and layout ideas for staircases	<ul style="list-style-type: none"> ● L-shaped ● Landings ● U-shaped ● Narrow U ● Wide U ● Spiral ● Straight run
11.7 Calculate the cost to install a small stair unit	<ul style="list-style-type: none"> ● Estimate materials based on the plan
STANDARD 15.0 PREPARE, PLACE, AND FINISH CONCRETE	
15.1 Identify uses of concrete (i.e., driveways, sidewalks, patios, foundation, floors, walls, etc.)	<ul style="list-style-type: none"> ● Tilt-up walls vs. monolithic walls
15.2 Refer to job specifications for materials needed to form, scaffold, and place concrete	<ul style="list-style-type: none"> ● Read blueprints ● Grading ● Rebar ● Wire mesh ● Admixtures ● Slump
15.3 Explain the ingredients of concrete (e.g., cement, water, and sand and gravel aggregates)	<ul style="list-style-type: none"> ● Admixtures
15.4 Identify the properties of concrete (e.g., workability, strength, curability, creep, shrinkage, unit weight, modular ratio, and Poisson's ratio)	<ul style="list-style-type: none"> ● Properties of concrete
15.5 Identify equipment and tools for moving and handling concrete (i.e., wheelbarrows, belt conveyors, forklifts, trolleys, manual lifting, etc.)	<ul style="list-style-type: none"> ● Concrete mule ● Concrete truck ● Concrete pump
15.6 Mix, convey, and finish concrete	<ul style="list-style-type: none"> ● Select and use appropriate materials and tools to mix, convey, and finish concrete ● Mixers

	<ul style="list-style-type: none"> ● Forms ● Concrete tools (i.e., trowels, power trowels, bull floats, vibrators, etc.) ● Screed
15.7 Explain the concrete leveling process [e.g., when/why leveling is required, needed equipment (automatic level, tripod, leveling rod, and benchmark)]	<ul style="list-style-type: none"> ● Level forms ● Screed and finish to the forms

Domain 2: Safety and Tools Instructional Time: 20 - 30%	
STANDARD 1.0 MAINTAIN A SAFE WORK ENVIRONMENT	
1.1 Comply with OSHA's (Occupation Safety and Health Administration), safety and health standards [e.g., safe work attire and PPE (personal protective equipment); fall protection requirements; lifting procedures; stuck-by, caught-in, and caught between hazards; lockout tagout (LOTO) procedure; fire protection plan; emergency plan, and Safety Data Sheets (SDS)]	<ul style="list-style-type: none"> ● Hazard recognition ● Risk assessment ● Job Safety Analysis/Job Hazard Analysis (JSA/JHA)
1.2 Explain safe work procedures around electrical hazards	<ul style="list-style-type: none"> ● De-energize machinery/circuits ● Follow lockout/tagout procedures ● Inspect before use ● Recognize and maintain safe distances from electrical hazards
1.3 Identify types of fires and the appropriate use of fire extinguishers	<ul style="list-style-type: none"> ● Class A, B, C, D, and E fires and fire extinguishers ● Pull, Aim, Squeeze, Sweep (PASS) ● Extinguisher locations ● Components of the fire triangle
1.4 Describe methods to establish work zone safety per Standard, U.S. Code of Federal Regulations 1926 (i.e., danger signs, caution signs, information signs, safety instruction signs, barricades and barriers, etc.)	<ul style="list-style-type: none"> ● Recognize colors and symbols for work zone signage ● Scaffolds ● Fall protection ● Lockout tagout (LOTO) ● Proper guarding ● Excavating ● HazCom recognition
1.5 Practice safe use, maintenance, and storage of hand tools, power	<ul style="list-style-type: none"> ● Inspect for damaged cords ● Portable GFCIs (Ground Fault Circuit Interrupters)

tools, and equipment according to manufacturer guidelines	<ul style="list-style-type: none"> ● Maintain sharpened blades, chisels, and drill bits ● Properly guarded hand and power tools
1.6 Follow good housekeeping procedures (e.g., keeping the work area clean, storing materials properly, eliminating hazards, performing safety checks, and reporting injuries, incidents, and near misses)	<ul style="list-style-type: none"> ● Proper lighting ● Slips, Trips, and Falls hazards ● Awareness of surroundings ● Proper disposal of flammable material ● OSHA reporting procedures ● Job Safety Analysis/Job Hazard Analysis (JSA/JHA)
STANDARD 4.0 USE HAND, POWER, AND PNEUMATIC TOOLS	
4.1 Identify and explain the use of common hand tools (i.e., hammers and demolition tools, chisels and punches, screwdrivers, socket wrenches, pliers, etc.)	<ul style="list-style-type: none"> ● Identify tools with proper and common names ● Identify the appropriate tool for the job or task ● Inspect tools for damage (sharpen chisels, etc.)
4.2 Identify and explain the use of layout, marking, and measurement tools (i.e., metal rule, carpenter's square, engineer's square, marking gauge, sliding T-bevel, marking knife, etc.)	<ul style="list-style-type: none"> ● Use a speed square, tape measures, chalk lines, laser levels, digital levels, spirit levels, water levels, plumb bob, folding rule, tri-square, combination square, builders level, transit level, auto level, theodolite, etc.
4.3 Identify and describe how to use common power/pneumatic tools [i.e., electric drill, jack hammer, saws (jigsaw, circle, reciprocating, cutoff, miter, table) grinders (portable, bench), sanders, wrenches, nail and staple guns, etc.]	<ul style="list-style-type: none"> ● Identify tools with proper and common name ● Proper working order for tools (check for damaged cords, sharp blades, etc.) ● Pneumatic tool use (lubricated and air PSI) ● Hydraulic tools (porta-power) ● Gas-powered tools (generators, concrete saws, chainsaws) ● Powder-actuated (concrete pin driver) ● Circular saws (miter saw, table saw, cutoff saw, handheld circular saw)

Domain 3: Applied Math and Construction Documents

Instructional Time: 15 - 20%

STANDARD 2.0 APPLY CONSTRUCTION MATH SKILLS

2.1 Add, subtract, multiply, and divide whole numbers	<ul style="list-style-type: none"> ● Whole numbers
2.2 Add, subtract, multiply, and divide fractions	<ul style="list-style-type: none"> ● Add and subtract fractions in feet and inches ● Convert from tenths of a foot to feet and inches

2.3 Add, subtract, multiply, and divide decimals	<ul style="list-style-type: none"> ● Decimal use
2.4 Convert decimals, fractions, and percentages	<ul style="list-style-type: none"> ● Convert fractions to decimals ● Convert decimals to fractions ● Convert percentages to decimals ● Convert decimals to percentages
2.5 Use English and metric rulers and measuring tapes	<ul style="list-style-type: none"> ● Read and identify components of a tape measure to a 16th of an inch/to the millimeter ● Types of rulers and tapes <ul style="list-style-type: none"> ○ Steel, Architectural, Engineering, Folding, Laser, etc.
2.6 Identify common length, weight, volume, and temperature units in inch-pounds and metric systems and convert them into other comparable units	<ul style="list-style-type: none"> ● Convert feet and inches to scale ● Fahrenheit to Celsius ● Imperial (inch/pound) to Metric System
2.7 Identify angle types	<ul style="list-style-type: none"> ● Acute, adjacent, obtuse, opposite, right, straight, etc.
2.8 Identify common geometric shapes and summarize their qualities	<ul style="list-style-type: none"> ● Rectangle, square, triangle, circle, etc.
2.9 Calculate the area of two-dimensional shapes	<ul style="list-style-type: none"> ● Area (paint coverage, flooring, etc.)
2.10 Calculate the volume of three-dimensional shapes	<ul style="list-style-type: none"> ● Volume (concrete volume, etc.)
2.11 Calculate the quantities of materials needed for a job	<ul style="list-style-type: none"> ● Estimated materials
2.12 Calculate cost estimate based on the job specifications (i.e., timeline, materials, equipment, labor, etc.)	<ul style="list-style-type: none"> ● Blueprint analysis, etc. ● Job cost analysis
STANDARD 3.0 USE CONSTRUCTION DOCUMENTS AND TECHNOLOGY TOOLS	
3.1 Describe guidelines and details provided by construction documents (i.e., blueprint, diagrams, drawings, specification sheets, site layout plans, cutting list, schedule, etc.)	<ul style="list-style-type: none"> ● Legend ● Keynotes ● General notes ● Scale ● Legality of construction drawings
3.2 Identify six types of construction drawings and explain their use (e.g., civil plans, architectural plans, structural plans, mechanical plans, plumbing/piping, and electrical plans)	<ul style="list-style-type: none"> ● Types of construction drawings and uses
3.3 Explain the basic components of a construction drawing (e.g., title block, border, drawing area, revision block, legend, and north arrow)	<ul style="list-style-type: none"> ● Components of construction drawings ● Door and window schedules

	<ul style="list-style-type: none"> ● Header schedule
3.4 Explain drawing elements (i.e., lines, symbols, keynotes, etc.)	<ul style="list-style-type: none"> ● Line types (extension, cut, dimension, etc.) ● Legends ● Trade-specific symbols ● Abbreviations <ul style="list-style-type: none"> ○ Above Floor Finish (AFF) ○ Water Closet (WC) ○ On Center (OC) ○ Not to Scale (NTS), etc.
3.5 Explain how dimensions relate to drawing scales	<ul style="list-style-type: none"> ● Symbol for inches (") ● Symbol for feet (') ● Architectural scale ● Engineering scale ● Not to Scale (NTS) ● Ex. 1/4" = 1'.0"
3.6 Use scales to interpret drawing dimensions (e.g., engineer's scales, architect's scales, and metric scale)	<ul style="list-style-type: none"> ● Not to Scale (NTS) ● Types of scale (1/4 inch = 1 foot or 1/4" = 1') ● Use scales to determine actual size
3.7 Explain the importance of building codes (i.e., National Electric Code, IBC, Plumbing Code, state/county/city codes, etc.)	<ul style="list-style-type: none"> ● International Building Code (IBC) ● Universal Plumbing Code (UPC) ● International Residential Code (IRC) ● Life Safety ● Minimum requirements for safe structures ● Environmental considerations
3.8 Identify software applications and technology tools used in construction [i.e., electronic software (email, operating system, spreadsheet, word processing, text messaging, instant messaging), radios, intercoms, smartphones, drones, robots, AI, etc.]	<ul style="list-style-type: none"> ● Computer Aided Design (CAD) ● Global Positioning Satellite (GPS) ● Lasers ● Building Information Modeling (BIM)

Domain 4: Interior and Exterior Finishes

Instructional Time: 5 - 10%

STANDARD 9.0 ANALYZE GREEN BUILDING SUSTAINABILITY

9.1 Explain a green or sustainable building (e.g., a physical barrier separates the interior of the building from the outside environment to	<ul style="list-style-type: none"> ● Product selection (reuse, repurposed, or Low E) ● Make a house more energy efficient
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protect the building from the weather, to separate conditioned space to the unconditioned space, and to save energy)	
9.2 Identify the elements of building envelope (e.g., foundation, exterior walls, windows, doors, and roof)	<ul style="list-style-type: none"> ● Conditioned crawl space vs. open-air crawl space ● Conditioned attic vs. open attic ● Insulation vs. foam ● Insulated/sealing building
9.3 Identify insulation materials for optimizing energy efficiency and maintaining comfortable indoor temperatures	<ul style="list-style-type: none"> ● Advantages and disadvantages of different types of thermal insulation (i.e., glass fiber vs. plastic foam, etc.) ● Purpose of the vapor barrier ● R-values vs. U-values ● Outside door vs. inside door
9.4 Describe tools and materials used to construct and seal a new home or building	<ul style="list-style-type: none"> ● Liquid vapor barrier ● Liquid insulation ● Foam ● Caulking ● Zip panel system ● Structural Insulated Panel System (SIPS)
9.5 Explain procedures to seal the building envelope (i.e., renewable energy sources, rainscreen systems, self-cleaning technology, materials with good thermal inertia, metal roofs, windows located to capture natural light, facades that reduce energy inputs, etc.)	<ul style="list-style-type: none"> ● Solar electricity ● Solar water heating ● Cocoon insulation systems ● Gray water systems ● Turbines ● Economization ● Variable Refrigerant Flow (VRF) ● Multi-speed and variable-speed motors ● Passive solar
9.6 Compare, select, and use products to seal leaks and maximize energy efficiency	<ul style="list-style-type: none"> ● Liquid vapor barrier ● Liquid insulation ● Foam ● Caulking ● Zip panel system ● Vapor barrier tape
STANDARD 10.0 INSTALL EXTERIOR FINISHES	
10.1 Differentiate among finishes, trim, and molding	<ul style="list-style-type: none"> ● Common types of molding and trim

10.2 Explain the functional and aesthetic purposes of exterior finishes applied around openings, windows, doors, attic vents, crawl space vents, shutters, etc.	<ul style="list-style-type: none"> ● To protect framing from weather intrusion while making it aesthetically pleasing
10.3 Identify examples of exterior molding and trim [i.e., gable pediment, brackets, polyvinyl chloride (PVC), wood, etc.]	<ul style="list-style-type: none"> ● Soffits, sills, sashes ● Board and batten ● Lap siding ● Tongue and groove ● Corner molding ● Window and door trim ● Mill work
10.4 Explain common exterior trim terms (i.e., fascia, frieze, rake, barge, soffit, box end, gutters, etc.)	<ul style="list-style-type: none"> ● Advantages and disadvantages of frieze board or soffit ● Gable vents ● Soffit vents ● Ridge vents
10.5 Describe types and applications of exterior finishing materials (e.g., stucco, wood siding, vinyl and metal siding, fiber cement siding, and brick veneer)	<ul style="list-style-type: none"> ● Common types of siding (stucco, tongue and groove, shiplap, brick, block/Concrete Masonry Unit (CMU), etc. ● Board and batten ● Paneling ● Stucco (scratch coat, brown coat, and finish coat)
10.6 Apply exterior finishes according to the plan (i.e., stucco, siding, soffits, wainscot, etc.)	<ul style="list-style-type: none"> ● Select and use appropriate materials and tools to finish exterior walls
STANDARD 14.0 INSTALL INTERIOR WALL AND CEILING FINISH	
14.1 Identify types of wall and ceiling finishes (i.e., drywall, hardwood, fiberboard, particleboard, wood paneling, etc.)	<ul style="list-style-type: none"> ● Texture type ● Acoustical Ceiling Tile (ACT) ● Type X fire rated
14.2 Identify finishing tools (i.e., trowels, silica, sanders, screw guns, plastering tools, utility knife, dust mask, tape measure, etc.)	<ul style="list-style-type: none"> ● Mud-pan
14.3 Describe and demonstrate techniques for handling, staging, storing, and cutting drywall and drywall materials	<ul style="list-style-type: none"> ● Razor blade/knife score and snap technique ● Drywall saw ● Drywall rasp ● Drywall thickness ($\frac{5}{8}$" vs. $\frac{1}{2}$") ● Drywall lifts ● Proper storage practice (vertical storage, horizontal storage) ● Silica awareness

	<ul style="list-style-type: none"> ● Asbestos awareness
14.4 Use fasteners, anchors, and adhesives to fasten drywall	<ul style="list-style-type: none"> ● Lifting methods (hangman, drywall lift, etc.) ● Nailing/screwing procedures ● Types of fasteners ● Furring techniques
14.5 Demonstrate drywall finishing techniques (i.e., use Portland or gypsum plaster, use tape and apply joint compound, use tape/mesh, install corner bead, etc.)	<ul style="list-style-type: none"> ● Types of “mud” (premix, dried, etc.) ● Types of tape (paper vs. fiberglass) ● Drying rates ● Corner plows
14.6 Demonstrate appropriate order, material use, and paint application for walls, trims, and ceilings	<ul style="list-style-type: none"> ● Application types (spray, roll, brush, etc.) ● Types of paint (latex, clear, enamels, primer, etc.) ● Select and use appropriate materials and tools to finish interior walls and ceilings

Domain 5: Applied Sciences - Plumbing and Electrical

Instructional Time: 5 - 10%

STANDARD 12.0 ASSEMBLE PIPING, WASTE, AND VENTING SYSTEMS

12.1 Identify basic piping systems (e.g., water supply, drainage, and venting)	<ul style="list-style-type: none"> ● Supply/potable ● Sewage/waste lines ● Air intake and exit
12.2 Identify the major components of a water distribution system (i.e., pipes, valves, vents, traps, sewer lines, pumps, etc.)	<ul style="list-style-type: none"> ● Temperature and pressure relief valves (TMP) ● Manifolds ● Copper pipes ● Pex ● Galvanized steel ● Polyvinyl chloride (PVC) ● Fixtures
12.3 Explain how a plumbing venting system works (e.g., ensures fresh air gets into the drainage pipes so that water can move from the toilet, sink, or shower)	<ul style="list-style-type: none"> ● Ensure traps don't empty ● Siphon ● Creates pressure equalization ● Gas release

<p>12.4 Explain the function of plumbing fixtures and equipment (i.e., boilers, water heaters, etc.)</p>	<ul style="list-style-type: none"> ● Heat water ● Control the mixture of hot/cold water ● Valves <ul style="list-style-type: none"> ○ Control the flow of water ● Clean-outs ● Faucet insulation ● Toilets ● Water hammer suppression
<p>12.5 Measure, cut, and join plastic and copper piping</p>	<ul style="list-style-type: none"> ● Assemble pipes ● Cut PVC, copper, etc. ● Sweat copper fittings ● Glue PVC fittings
<p>12.6 Explain how an efficient drainage and water distribution system affects the usage of water</p>	<ul style="list-style-type: none"> ● Control ● Leaks ● Reclaimed water usage ● Water conservation ● Flow restrictors
<p>12.7 Assemble a soil waste and vent (plumbing) system</p>	<ul style="list-style-type: none"> ● Plumbing fixtures (i.e., P-trap, J-trap, J-bend, etc.) ● Rise, run, and slope ● Sewage gas ● Drain, Waste, Vent (DWV) System ● Uniform Plumbing Code (UPC)
<p>12.8 Assemble a water distribution system</p>	<ul style="list-style-type: none"> ● Select supply line pipe sizes and materials ● Identify and select the assembly tools and equipment needed ● Pipe assembly technique (crimp, sweating, glue, push to connect, expansion, or threaded) ● Uniform Plumbing Code (UPC)
<p>STANDARD 13.0 INSTALL ELECTRICAL COMPONENTS/SYSTEM</p>	
<p>13.1 Refer to the NFPA 70E Standard for Electrical Safety in the Workplace (i.e., minimum approach distance, arc flash boundaries, lockout/tagout, appropriate PPE, etc.)</p>	<ul style="list-style-type: none"> ● National Electric Code (NEC) ● Grounding
<p>13.2 Explain Ohm's law of basic electrical theory (e.g., the relationship among voltage, resistance, and amperage in a circuit)</p>	<ul style="list-style-type: none"> ● Volts, watts, amps

<p>13.3 Define electrical system (e.g., box containing electrical components that transport electrical power for electrical outlets, lights, and switches)</p>	<ul style="list-style-type: none"> ● Electrical panel ● Wiring systems ● Low volt ● High volt ● Lighting ● Interior/exterior ● Alarm
<p>13.4 Identify and explain types of electrical systems (i.e., three-phase, single-phase, medium voltage, line voltage, low voltage, etc.)</p>	<ul style="list-style-type: none"> ● Branch circuits ● Dedicated circuits ● Home run ● Grounding ● Residential vs. commercial
<p>13.5 Identify major components of an electrical system (i.e., resistor, capacitor, inductor, etc.)</p>	<ul style="list-style-type: none"> ● Service panel/entrance/watt meter ● Breaker ● Overhead service conductor ● Heating, Ventilation, and Air Conditioning (HVAC) ● Ground Fault Circuit Interrupter (GFCI) ● Arc Fault Circuit Interrupter (AFCI) ● Switches ● Conductor ● Grounding ● Bonding
<p>13.6 Identify electrical materials used in construction projects (i.e., electrical box, wiring system, circuit breaker, power strip, digital multimeter, etc.)</p>	<ul style="list-style-type: none"> ● Wire type and size (gauge, wire count) ● Light switches (single pole, three-way, dimmers) ● Wire material (copper, aluminum, etc.) ● Outlet types (15-amp, 20-amp, GFCI, etc.) ● Junction boxes (inside use, outside use) ● Wire protection (metal conduit, plastic conduit, wire sleeve, etc.) ● Copper ● Metal clad (MC) cable
<p>13.7 Identify electrical tools and testing equipment (e.g., battery testers, voltage testers, wire tracers, outlet testers, circuit testers, multimeters, oscilloscopes, and generators)</p>	<ul style="list-style-type: none"> ● Wire strippers ● Lineman pliers/side cutters ● Screwdrivers ● Nut drivers ● Fish tape

<p>13.8 Rough in electrical enclosures (e.g., switch boxes, outlet boxes, conduit fabrication, wire pulling, raceway, and box capacity)</p>	<ul style="list-style-type: none">● Breaker box● Circuit breaker box● Gang box type (single, double, round, metal, plastic, etc.)● Gang boxes (new construction, existing construction)● Conduit fabrication, wire pulling, raceway, box capacity, and cable
<p>13.9 Demonstrate the termination of electrical devices, appliances, light fixtures, and ceiling fans</p>	<ul style="list-style-type: none">● Install outlets (120V)● Install lights (120V)● Install 220 appliances (range, stove, dryer, etc.)