Instructional Framework

Architectural Drafting

15.1300.20

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 endorsed on January 27, 2021.

Domain 1: Creating Architectural Drawings **Instructional Time: 50 – 60%**	
STANDARD 6.0 PRODUCE TECHNICAL DRAWINGS	
6.1 Use fundamental drafting techniques for drawings	• Read scales • Multiviews ○ Draw a perfect square • Drafting equipment • Alphabet lines • Scaled dimensioning
6.2 Demonstrate freehand lettering technique (i.e., all uppercase without slant)	• All uppercase without slant

6.3 Determine correct line types and line weights (i.e., when to use heavy, solid, dotted, hidden, etc.)	• Knowing when to use
	  ○ Heavy
	  ○ Light
	  ○ Solid
	  ○ Dotted
	  ○ Hidden

6.4 Create title blocks	• Logo • Sheet number • Sheet name • Scale • Drawn by • Checked by • Project date • File creation date • Customer • Project name

	• Project location • Firm location
6.5 Format a sheet set (i.e., sequence number, deciding numbering system to be consistent within the project, etc.)	• Sequence number ○ A letter and a number (i.e., A100) • Deciding numbering system to be consistent within the project
6.6 Apply notes/annotations and dimensions as appropriate and required	• Apply notes/annotations • Apply dimensions
6.7 Plot, print, or create digital drawings (i.e., PDF, etc.)	• Scan to PDF
6.8 Organize a sequence of drawings and supporting documents [i.e., narrative (standards used), calculation, etc.]	• Narrative (standards used) • Sheet format • Calculation
STANDARD 7.0 APPLY DESIGN DRAFTING CONCEPTS AS RELATED TO ARCHITECTURAL DESIGN	

7.1 Prepare a foundation or basement plan	• Types
	  ○ Monolithic slab foundation
	  ○ Post (column) foundation
	  ▪ Wood foundation
	  ▪ Pier foundation
	  ○ Slab foundation
	  ○ Stepping foundation
	  ○ T-foundation
	• Apply
	  ○ Footing
	  ○ Stem wall
	  ○ Concrete slabs
	  ○ Masonry
	  ○ Crushed rock
	  ○ Footing
	  ○ Dead load
	  ○ Live load
	  ○ Reinforcement bars (rebars)

7.2 Prepare a floor plan or model from a preliminary sketch	• Dimensions
	  ○ Square footage
	  ○ Length
	  ○ Width

	• Tag
	  ○ Doors/windows
	  ○ Rooms
	• Components/families
	  ○ Furniture
	  ○ Appliances
	  ○ Doors/windows
	• Walls
	  ○ Interior
	  ○ Exterior
	  ○ Load bearing
	  ○ Non load bearing
	  ○ Plumbing walls
	  ○ Shear wall
	• Material type
	  ○ Fire rating
	  ○ Thickness
	  ○ Material

7.3 Prepare roof details (i.e., roof drain schedules, gutter details, roof flashing, scupper details, roof vent, pitch calculation, flat, tile, etc.)	• Roof drain schedules • Gutter details • Roof flashing • Scupper details • Roof vent • Pitch calculation • Flat • Tile • Soffit • Fascia • Material type
7.4 Prepare an electrical plan locating receptacle, switch, and lighting fixtures	• Legend • Load calculations • Wiring diagram • Ampere (amp) • Branch circuit • Circuit • Circuit breaker • Conductor • Conduit

	• Ohm • Receptacle outlet • Ground fault circuit interrupter (GFCI) • Lighting circuit • Lighting outlet • Three-way switch • Two-way switch • Voltage • Watt • Single-pole switch • Service drop • Service entrance • Small-appliance circuit
7.5 Prepare a plumbing plan showing fixture locations and floor drains	• Legend • Isometric drawing • Acrylonitrile butadiene styrene (ABS) • Activated carbon system • Branch main • Building main • Chlorinated polyvinyl chloride (CPVC) • Cleanout • Cold water branch lines • Cold water main • Cross-linked polyethylene (PEX) • Disposal field • Distillation system • Distribution box • Hot water branch lines • Hot water main • House drain • House sewer • Ion exchange • Main stack • Plumbing • Fixture • Polyvinyl chloride (PVC) • Secondary stack • Septic system • Septic tank

	• Soil stack • Stack vent • Stack wall • Trap • Vent stack • Water softener

7.6 Prepare a basic HVAC plan locating air handlers, condensers, duct returns, return plenum, transfer ducts, and diffusers (vents)	• Legend
	• Per room CFM
	• Air handlers
	• Condensers
	• Return plenum
	• Duct
	  ○ Size
	  ○ Returns
	  ○ Transfer
	  ○ Diagram
	• Diffusers (vents)

7.7 Prepare drawings of four exterior elevations (e.g., north, east, south, and west) including keynote elements (i.e., dimension any special elements; provide building height, material finishes, etc.)	• Exterior elevations
	  ○ North
	  ○ East
	  ○ South
	  ○ West
	• Dimension any special elements
	• Provide building height
	• Material finishes
	• Component tags
	• Section views (if applicable)

7.8 Identify and prepare the components of door and window schedules	• Door
	  ○ Tag number
	  ○ Location
	  ○ Size
	  ○ Finish type
	  ○ Material type
	  ○ Left-/right-handed (door only)
	• Window
	  ○ Tag number
	  ○ Location
	  ○ Size

	○ Material type ○ Single/double (window)
7.9 Assemble a set of working drawings for a residential or small commercial structure	• Sheet formatting ○ Floor plan ○ Site plan ○ Foundation plan ○ Electrical plan ○ Plumbing plan ○ Window/door schedule ○ Mechanical plan ○ Roof plan ○ Section and detail drawing plans ○ Elevations
7.10 Prepare site plan [i.e., drain and drainage, site walls (block, fencing), utility lines, easement, setbacks, stairs, sidewalks, etc.]	• Drain and drainage • Site walls ○ Block ○ Fencing • Utility lines • Easement • Setbacks • Stairs • Sidewalks • Property line ○ Azimuth ○ Bearings • Benchmarks • Topographical surface
7.11 Prepare a landscape plan including vegetation, irrigation, and retention basins [i.e., NAOS (natural area open space), sidewalks, etc.]	• Landscape plan ○ Vegetation ○ Irrigation ○ Retention basins • Natural area open space (NAOS) • Sidewalks
STANDARD 8.0 PREPARE DRAWINGS OF SECTIONS AND DETAILS	
8.1 Create and place one North/South and one East/West cross section on a plan	• Place one North/South cross section on a plan • Place one East/West cross section on a plan

	• Label appropriate cross section

8.2 Create a larger scale detail of one area of a cross section/detail (i.e., end of full height wall section, etc.)	• Larger scale detail
	  ○ End of full height wall section
	  ○ Kitchen cabinets
	  ○ Stairs or ramps

8.3 Create plan details (i.e., enlarged floor plans of restrooms, column details, any unique detail to show architectural intent for the contractor, reflected ceiling details of soffits or coves, etc.)	• Enlarged floor plans of restrooms • Column details • Any unique detail to show architectural intent for the contractor • Reflected ceiling details of soffits or coves
8.4 Identify parts and pieces for detailed drawings (i.e., leaders, keynotes, texts, descriptive terms, sequencing, major components, etc.)	• Leaders • Keynotes • Texts • Descriptive terms • Sequencing • Major components

Domain 2: Interpret and Prepare Architectural Drawings **Instructional Time: 20-25%**	
STANDARD 2.0 INTERPRET TECHNICAL DOCUMENTS AND BUILDING SPECIFICATIONS USED BY ARCHITECTS AND ENGINEERS	
2.1 Interpret dimensions, symbols, legends, scales, and directions/orientations	• Dimension lines • Extension lines • Legends • Schedules • Meridian arrow/North • Trade symbols

2.2 Read and interpret content and information communicated in schematics (preliminary concept) and technical drawings	• Identify
	  ○ Title block
	  ○ Symbols
	  ○ Dimensions
	  ○ Options
	  ○ Legends
	  ○ Architectural notes

	○ Alphabet of lines
2.3 Locate and interpret information on specific documents (i.e., schedules, existing drawings, reference callouts, plan notes, cut sheets, etc.)	• Schedules • Existing drawings • Reference callouts • Plan notes • Cut sheets • Revisions
2.4 Analyze schematics (preliminary concept) and technical drawings for clarity, completeness, and accuracy	• Inspect ○ Title block ○ Symbols ○ Dimensions ○ Options ○ Legends ○ Architectural notes ○ Alphabet of lines
2.5 Recognize cross-referencing on technical drawings (e.g., sections, elevations, and details related to a floor plans and roof plan)	• Sections • Elevations • Details related to a floor plans and roof plan
2.6 Identify and describe basic types of drawings by trade (e.g., architecture, mechanical, structural, electrical, plumbing, HVAC, and civil engineering systems)	• Basic types of drawings ○ Architecture ○ Mechanical ○ Structural ○ Electrical ○ Plumbing ○ HVAC ○ Civil engineering systems
2.7 Verify and justify documents for dimensional accuracy, completeness, and details (i.e., plans, elevations, doors, windows, etc.)	• Plans • Elevations • Doors • Windows
2.8 Compare schematics to technical drawings (i.e., isometric schematic related to electrical plans, plumbing plans, etc.)	• Isometric schematics ○ Electrical plans ○ Plumbing plans

2.9 Interpret legal land descriptions (i.e., ALTA, GIS, plat maps, etc.) needed for a site plan	• American Land Title Association (ALTA) • Geographic Information System (GIS) • Plat maps (Surveying)
2.10 Verify state, county, local, and national building standards, codes, and regulations used in architectural drafting (i.e., ADA, ANSI, etc.)	• International Residential Building Codes (IRC) • Americans with Disabilities Act (ADA) • American National Standards Institute (ANSI)
2.11 Apply appropriate specifications for project-specific jobs (i.e., CSI format, outline, drawing, etc.)	• Construction Specialties Installations (CSI) format • Outline • Drawing
STANDARD 5.0 DETERMINE THE TYPES AND COMPONENTS OF BUILDING SYSTEMS	
5.1 Identify the components of a site plan (i.e., property lines, utility access, setbacks, easements, landscaping, contour and topography lines, etc.)	• Property lines • Utility access • Setbacks • Easements • Landscaping • Contour • Contour colors • Topography lines • Meridian arrow • Azimuth • Bearing • Toposurface • Topographical features

5.2 Identify different types/parts of foundations/footings (i.e., concrete slabs, stem walls, masonry, rebar, crushed rock, etc.)	• Concrete slabs
	• Stem walls
	• Masonry
	• Crushed rock
	• Footing
	• Dead load
	• Live load
	• Monolithic slab foundation
	• Post (column) foundation
	  ○ Wood foundation
	  ○ Pier foundation
	• Reinforcement bars (rebars)
	• Slab foundation

	• Stepping foundation • T-foundation
5.3 Identify different types/parts of plans (i.e., first level, upper level, basement, finish, dimension, equipment, demolition, electrical, HVAC, reflected ceiling, etc.)	• First level • Upper level • Basement • Finish • Dimension • Equipment • Demolition • Electrical • HVAC • Reflected ceiling • Plumbing • Section • Elevation • Detail • Roof
5.4 Identify different types of floor structures/systems (i.e., framing, wood or steel trusses/joists, sheathing, wood or steel beams, i-joists, concrete, girders, etc.)	• Framing • Wood or steel trusses/joists • Sheathing ○ Subfloor • Wood or steel beams • I-joists • Concrete • Girders
5.5 Examine types of walls [i.e., architectural and structural stud walls (steel or wood), masonry, concrete, fire, etc.]	• Architectural and structural stud walls (steel or wood) • Masonry • Concrete • Fire • Plumbing • Load bearing • Partition • Shear
5.6 Distinguish components of a wall (i.e., sheeting, sheathing, insulation, air space, vapor barrier, stud spacing, bracing, tie-/hold-downs, etc.]	• Sheeting • Sheathing • Insulation ○ Total R-value

	• Air space • Vapor barrier • Stud spacing • Bracing • Tie-/hold- downs • Framing • Wall finish
5.7 Identify parts of a staircase systems (i.e., treads, risers, stringers, handrails, landing, railing, structural support, steel/wood, cast in place, precast, etc.)	• Treads • Risers • Runners • Total run • Total rise • Stringers • Handrails • Landing • Railing • Structural support • Steel/wood • Cast in place • Precast • Headroom • Housed stringer • Newel • Plain stringer
5.8 Identify parts of ramp systems (i.e., support walls, handrails, landing, railing, steel/wood, concrete, etc.)	• Support walls • Handrails • Landing • Railing • Steel/wood • Concrete • Total run • Total rise • Slope

5.9 Identify types of roofs (i.e., pitched, inverted pitch, flat, shed, gable, barrel, etc.)	• Pitched
	• Inverted pitch
	• Common roof types
	  ○ Flat roof
	  ○ Gable roof

	○ Hip roof ○ Shed roof ○ Gambrel roof ○ Mansard roof • Specialty roof types ○ Barrel roof ○ Winged gable roof ○ Dutch hip roof, etc.
5.10 Identify components of roofs (i.e., tile, membrane, shingles, framing, wood or steel trusses/joists, wood or steel beams, i-joists, concrete, girders, rigid insulation, rafters, steel decking, wood/gypsum sheathing, etc.)	• Finish ○ Tile ○ Shingles ○ Box cornice ○ Rolled roofing • Membrane • Framing • Wood or steel trusses/joists • Wood or steel beams • I-joists • Concrete • Girders • Rigid insulation • Rafters • Steel decking • Sheathing ○ Interior ▪ Gypsum ○ Exterior ▪ Wood • Bird box • Span • Flashing • Gusset • Gutter • Lookout • Asphalt
STANDARD 9.0 CREATE PICTORIAL DRAWINGS, MODELS, AND RENDERINGS	

9.1 Create isometric or perspective drawings using manual and/or electronic techniques	• 3D • Picture • Snapshot • Walk-through

9.2 Select appropriate materials and properties to apply to the entities (i.e., textures, concrete vs. stucco, glass, metals, etc.)	• Thickness
	• Materials
	  ○ Glass
	  ○ Metals
	  ○ Wood
	• Finishes
	  ○ Textures
	  ○ Concrete vs. stucco
	  ○ Colors

9.3 Render a model to create a presentation drawing (i.e., shadowing, coloring, lighting, shading, camera perspective, vanishing points, etc.)	• Shadowing • Coloring • Lighting • Shading • Camera perspective • Vanishing points
9.4 Create video of rendered model (i.e., fly-thru, exterior aerial views, animation, etc.)	• Fly-thru • Interior views • Exterior aerial views • Animation

Domain 3: Computer Aided Drafting Design (CADD) and BIM **Instructional Time: 15 – 20%**	
STANDARD 3.0 UTILIZE HARDWARE AND SOFTWARE TOOLS INCLUDING BASIC COMPUTER CONCEPTS, OPERATIONS, AND TECHNOLOGY APPLICATIONS	
3.1 Use computer hardware/software for design drafting solutions	• Use hardware to run the software needed to create architectural drawings ○ Introduction to a variety of options

3.2 Apply electronic file management techniques (e.g., consistency, folders/subfolders, reference files, PDFs, simple/intuitive naming, and follow through)	• Consistency • Folders/subfolders • Reference files • PDFs • Simple/intuitive naming • Follow through
3.3 Maintain electronic file management techniques (e.g., archiving, file cleanup, and void folders)	• Archiving • File cleanup • Void folders

3.4 Use various formats (e.g., dxf, dxb, Tiff, gif, pcx, eps, spd, and pdf) to import and export data files	• File formats
	  ○ dxf
	  ○ dxb
	  ○ Tiff
	  ○ gif
	  ○ pcx
	  ○ eps
	  ○ spd
	  ○ pdf

3.5 Prepare files for electronic transfer and/or storage	• Introduction to a variety of options
	  ○ USB drives
	  ○ Digital workflows

3.6 Use the Internet, Intranet, and/or third-party file transfer/storage programs (i.e., FTP, Cloud, etc.)	• FTP • Cloud • Digital workflows
STANDARD 4.0 UTILIZE COMPUTER-AIDED SOFTWARE SYSTEMS FOR PROJECT MANAGEMENT	

4.1 Compare and contrast services and processes provided by CADD, VDCM, and BIM systems	• Analysis of services and processes
	  ○ Computer Aided Drafting Design (CADD)
	  ○ Building Information Modeling (BIM)
	  ○ Virtual Digital Content Manager (VDCM)

4.2 Determine the program to analyze drawings (e.g., CADD, VDCM, or BIM)	• Identify program to analyze drawings
	  ○ Computer Aided Drafting Design (CADD)
	  ○ Building Information Modeling (BIM)
	  ○ Virtual Digital Content Manager (VDCM)

4.3 Use CADD, VDCM, and BIM software functions and commands to set up drawing scale, format, dimensioning, etc.	• Use functions and commands
	  ○ Computer Aided Drafting Design (CADD)
	  ○ Building Information Modeling (BIM)
	  ○ Virtual Digital Content Manager (VDCM)

4.4 Apply item properties, colors, line types, editing commands, text styles, and grouping techniques	• Item properties
	  ○ Colors
	  ○ Line types
	  ○ Editing commands
	  ○ Text styles
	  ○ Grouping techniques

4.5 Incorporate standard parts, symbol libraries, and/or templates	• Components/families
	  ○ Standard parts
	  ○ Symbol libraries
	  ○ Templates
	  ▪ Imperial
	  ▪ Metric

4.6 Control viewing commands (i.e., setting scale, title block, view reference, sheet layout, cartoon set, sheet organization, etc.)	• Setting scale • Title block • View reference • Sheet layout • Cartoon set • Sheet organization • Visibility/graphics
4.7 Characterize the difference between model space and paper space to determine scale using computer-aided software	• Model space • Paper space

Domain 4: Measurement and Dimensioning **Instructional Time: 5 – 10%**	
STANDARD 1.0 APPLY MEASUREMENT AND SCALE CONCEPTS IN DESIGN DRAFTING	

1.1 Compare types of measurement instruments used by architects and engineers (e.g., architectural scale and engineering scale)	• Architectural scale
	  ○ Imperial scale
	• Engineering scale
	  ○ Metric scale

	• Feet • Inches

1.2 Perform field measurements with handheld instruments (i.e., tape measure, lasers, digital applications, electronic measuring tools, etc.)	• Handheld instruments
	  ○ Tape measures
	  ○ Lasers
	  ○ Digital applications
	  ○ Electronic measuring tools

1.3 Select and apply the appropriate scale for viewing information and drawings (i.e., readability, etc.)	• Readability • Scale options (i.e., ¾" = 1, 1 to 10, etc.)
1.4 Transcribe illustrations and/or field measurements accurately to a scale	• Topography
1.5 Verify interior dimensions for spatial awareness	• Square footage • Area • Volume • Aligned dimensions
1.6 Assess measurements for accuracy by documenting existing conditions (i.e., photographs, portable drones, etc.)	• Photographs • Portable drones • Sample blueprints