Appendix Q

ARCHITECTURE AND CONSTRUCTION
YOUTH APPRENTICESHIP

DESIGN/PRE-CONSTRUCTION PATHWAY
ARCHITECTURAL PLANNING (UNIT 10)
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency
1. Draw a site plan

Performance Standard Condition
Competence will be demonstrated
- at the worksite

Performance Standard Criteria
Performance will be successful when learners:
- Compile site measurements and other data
- Review design data and dimensions of site layout
- Analyze measurement, service, utility, zoning & coding, and ecosystem data with worksite professional
- Select size and scale for plan
- Use architectural drafting software OR draw manually
- Identify parcel features
  - Indicate existing ground features on drawing (e.g., utilities, contours, landscape features, etc.)
  - Indicate boundaries, easement, buffer areas, and established setbacks of site
  - Draw existing structures
  - Locate and identify bench mark and elevation level
- Indicate modifications of any existing site elements
  - Draw proposed contour lines and indicate any new grade elevations
- Place proposed structure on site with favorable orientation considering site-specific information
  - Draw utility lines and connections
  - Draw additional construction extending beyond exterior walls of structure (e.g., driveways, sidewalks, patios, decks, proposed utilities, etc.)
  - Draw landscaping elements
- Estimate the amount of cut and/or fill necessary to build a structure
- Estimate the increase in storm water runoff from a site
  - Apply Low Impact Development techniques to reduce the impact of development on the storm water runoff quantity and quality
- Indicate scale of drawing and view title
- Indicate north arrow
- Check drawing

Learning Objectives:
- Explain the purpose of a site plan
- Describe the process to draw a site plan
- Explain the purpose of contour lines
- Define easement, buffer area and setback as they relate to local codes and construction sites
- Describe how choice of structure placement on site relates to energy, utility, sanitation, and drainage requirements
- Explain how to locate and identify an elevation level
- Discuss issues of storm water run-off and methods to reduce
- Identify site factors which affect the design of a house, including neighborhood property values, review board controls, and access to the site
- Classify roadways according to level of use
- Describe additional features to be considered for commercial properties such as pedestrian access, vehicular access, parking, storm water runoff storage/collectors
- Define cut and fill
- Explain how to calculate cut or fill needed
- Discuss the need to prevent/control wind or water erosion in land development and construction

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency

2. Draw sectional and elevation views

Performance Standard Condition

Competence will be demonstrated
- at the worksite

Performance Standard Criteria

Performance will be successful when learners:
- Review design data and layouts
- Use architectural drafting software OR draw manually
- **EXTERIOR**
  - Draw grade line
  - Project construction lines from plans
  - Indicate finished floor level(s)
  - Indicate finished ceiling level(s)
  - Draw and detail windows and doors
  - Draw roof outline
  - Letter wall and roof finishes, roof pitch, chimney, decks, and porches
  - Add dimensions, scale, notes, labels and view title
  - Check drawing
- **INTERIOR**
  - Indicate true width of walls
  - Indicate all openings in interior or exterior walls
  - Indicate typical sections of standard built-in features
  - Note wall materials or finish
  - Indicate fixtures, built-ins, trim and molding, and utilities
  - Add dimensions, scale, notes, labels and view title
  - Darken finish lines
  - Check drawing

Learning Objectives:
- Explain how to draw exterior elevations from one and two point perspectives
- Describe how the grade line is determined
- Distinguish between the characteristics of various exterior styles
- Explain how to draw interior elevations from one and two point perspectives
- List common abbreviations and symbols for interior fixtures, built ins and utilities
- List standard built ins in common residential and commercial structures

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency
3. Draw a floor plan

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Review preliminary sketches, notes and specifications
• Use architectural drafting software OR draw manually
• Lay out exterior limits of structure
• Block out exterior and interior walls with appropriate thickness
• Indicate openings in exterior and interior walls
• Draw door and window sizes
  o Use a manual to reference basic door types, sizes, ADA requirements, and drawing conventions
  o Use a manual to reference basic window types, sizes, extent openable, and drawing conventions
• Draw other floor plan features
  o Draw cabinetry, appliances, plumbing fixtures, fireplaces and stairs
  o Draft basic electrical symbols, including switches, duplex receptacle outlets, ceiling and wall-mounted lights, and circuit lines
  o Draft second-floor and basement plans
• Use appropriate leads and line weights for both construction and finish lines
• Add dimensions, notes and room labels
• Draw material symbols
• Indicate scale of drawing and view title
• Indicate north arrow
• Check drawing

Learning Objectives:
• Describe how detail schedules are written from a floor plan
• Discuss how dimensions of materials/fixtures impact a floor plan and vice versa
• State the ideal orientation, location relative to traffic patterns and plumbing, and egress requirements of bedrooms
• Describe the process of overlay drafting
• Describe the role of layers in CAD floor plan drafting
• Identify the general sizes and drawing conventions of cabinets, fixtures and appliances found in kitchens, bathrooms, and utility rooms
• Identify the finish material semiology use on floor plans
• Differentiate between types of fireplaces
• Delineate miscellaneous floor-plan symbols, including those for hose bibs, concrete slabs, attic crawl space access, floor drains, and cross-section symbols
• Articulate how CAD floor-plan symbols are stored, placed and moved, and how attributes are used
• Discern when it is appropriate to place electrical symbols on a floor plan and when they should be placed on a separate sheet
• Define basic electrical terms
• Identify basic service specification requirements, including service capacity, service entrance, meter base, and distribution panel locations

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency

4. Develop a stair section drawing

Performance Standard Condition

Competence will be demonstrated
• at the worksite

Performance Standard Criteria

Performance will be successful when learners:
• Review floor plan and stair specifications
• Use architectural drafting software OR draw manually
• Confirm floor to floor heights
• Draw finished floor and finished ceiling lines heights
• Calculate and layout risers, treads and landings
• Draw stringer
• Indicate framing around stairs
• Identify materials used to construct stairs
• Draw trim features (e.g., handrail(s), tread covers, etc.)
• Dimension total rise and run
• Indicate headroom clearance and stairwell opening
• Add dimensions, notes and labels
• Check drawing

Learning Objectives:
• Explain how to divide any length into an equal number of sections
• Define basic terms and requirements used in stair design and construction
• Explain how to calculate rise and run dimensions for stairs
• Compare construction of open and closed stair designs
• List minimum stair width, tread, riser, landing, and head clearance requirements, as well as known drafting criteria for straight-run, winding, and spiral stairs
• Discuss how to calculate and incorporate headroom clearance and stairwell opening
• Distinguish between requirements for straight, u-shaped, and exterior stairs

Comments:
Unit 10: Design/Pre-Construction Pathway  
Architectural Planning Unit

Competency

5. Draw a floor system and foundation plan

Performance Standard Condition

Competence will be demonstrated

• at the worksite

Performance Standard Criteria

Performance will be successful when learners:

• Review floor plan, sketches, notes, and specifications
• Use architectural drafting software OR draw manually
• Copy common features from floor plan
• Draw the exterior outline of the foundation wall
• Draw the interior wall of the foundation after scaling the wall thickness
• Lay out the footings and structural information
• Draw foundation, structural supports and footing outline
  o Draw floor/Joist foundations
  o Draw post-and-beam foundations
  o Draw foundations for columns, chimneys, etc.
• Draw in the floor framing plan showing the layout of girders and joists
• Indicate floor drains, bridges or plates
• Add dimensions, scale, notes, labels and view title
• Indicate symbols and references
• Indicate north arrow
• Check drawing

Learning Objectives:

FOUNDATIONS

• Compare the various foundation types and describe their use
• List common materials used for foundations
• Discuss requirements for foundations based on load requirements
• Compare types of foundation construction methods
• Identify how and why slabs may require protection from ground moisture

FLOOR FRAMING

• Distinguish between control, construction, and isolation joints
• Identify basic components, sizes and spacing for joist (stick) and post-and-beam framing
• Compare and contrast the three common framing systems used with wood construction: balloon, platform, and post-and-beam
• Discuss how the shape of the ground affects the framing method
• Identify conventional floor framing components and know their typical sizes and spacing
• Explain the function of wood posts and steel columns in floor framing
• Compare and contrast conventional floor joists, open web floor joists, I-joists, and laminate veneer lumber (LVL)
• Define cantilever
• State methods of bracing floor joists

Comments:
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Architectural Planning Unit

Competency
6. Draw a framing plan

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Review floor plan, foundation plans and construction specifications
• Use architectural drafting software OR draw manually
• Draw footing and foundation walls
• Draw supporting girders and joists
• Indicate dimensions of the bearing walls
• Draw in locations of beams and columns with direction of span and size
• Draw waterproofing and ground control for foundation walls, around footings (drain tiles) and under basement floor slabs
• Draw termite protection
• Draw external stud wall construction
• Draw floor and ceiling construction
• Draw wall and ceiling insulation
• Add labels, notes and dimensions
• Indicate material symbols
• Indicate scale of drawing and view title
• Indicate north arrow
• Check drawing

Learning Objectives:
FRAMING
• Compare and contrast the three common framing systems used with wood construction: balloon, platform, and post-and beam
• Cite the advantages & disadvantages of steel framing
• Describe the classifications of concrete masonry unit (CMU) construction
• Define basic brick-laying terms and describe insulation and reinforcement options
• Define footing
• Compare types of footings
LOADS
• Distinguish between bearing and non-bearing walls
• Identify categories of loads acting on structures
• Explain how load-bearing factors are considered in structural design
• Describe the physics of structures to bear loads via walls, columns, and beams
• Explain the characteristics of structural beams, cables, trusses, and other structural forms
• Determine loads applied during the design of a structure using load tables and appropriate mathematics
WALLS

- Name the basic components of wall framing, and know their typical sizes and spacing
- Differentiate between double- and single-wall constructions
- Compare external and internal wall construction
- Describe methods for termite control in building design
- Differentiate between three phases of electrical installation: temporary, rough-in, and finish

Comments:
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Competency
7. Draw a roof framing plan

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Review floor plan, foundation plans and construction specifications
• Use architectural drafting software OR draw manually
• Draw exterior wall outline from floor plan
• Confirm roof style (e.g., gable, shed, hip, etc.) and cornice overhang size
• Draw center ridge board(s)
• Draw all rafters, jack rafters, intersecting pieces, etc., with specified on-center spacing
• Indicate any special construction (e.g., around chimney, etc.)
• Draw gutter and method of roof ventilation
• Add labels, notes and dimensions
• Indicate material symbols
• Indicate scale of drawing and view title
• Indicate north arrow
• Check drawing

Learning Objectives:
• Define roof pitch
• Outline common components and their function required in roof framing
• Identify and explain framing terms common to both conventional and trussed roofs
• Define the basic members of conventionally framed roofs, as well as know typical sizes and spacing
• Contrast vaulted roof framing from standard roof/ceiling systems
• Define truss and basic truss terminology
• Identify basic truss types
• Describe how trusses are secured to bearing points
• Explain the role of metal hangers
• Identify the functions of the roof overhang and gutter
• Explain the basic flow of heat, air and moisture through a facility and methods used to control them
• Explain the need for air flow and ventilation in structures

Comments:
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Competency
8. Develop sustainable/conservation elements into a design

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Review roof framing, floor plan, foundation plans and construction specifications
• Apply the principles of conservation to design plan
• Evaluate construction techniques for energy conservation in framing, caulking, use of vapor retardants, and insulation procedures
• Evaluate the insulation value for walls, floors, vaulted and flat ceilings
• Evaluate the common building products containing formaldehyde-based resins and solvents, as well as appliances for causes indoor pollution
• Calculate the heat loss through one wall of a conditioned building
• Calculate the heat loss for a building envelope with given conditions appropriate for the project

Learning Objectives:
• Discuss architectural design and building practices that impact the environment
• Describe the building elements covered by the model energy code
• Explain the Green Building program and Sustainable Building design
• Identify climatic and geographic design criteria, which will have bearing on the design of a structure
• Identify light source types
• Identify daylight design strategies
• Identify energy design strategies
• Explain how window and door details can be designed to provide energy efficiency
• Define R value factors in building
• Explain why caulking is effective, and identify places where caulking is best used
• Explain why vapor barriers help save energy, and name locations where vapor retarders should be installed
• Identify the venting requirements of garages
• Compare types of insulation
• Identify R value information for common types of insulation
• Calculate the recommended roof overhang for different latitudes, as well as specify other methods of achieving alternative overhang protection
• Articulate how the idea of envelope design works, cite its principle components, and discuss the disadvantages of the concept, including safety concerns
• Identify methods of reducing indoor pollution

Comments:
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Architectural Planning Unit

Competency
9. Review completed architectural plans and documents

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Compare completed plan with architectural/engineering notes/data, manufacturers’
catalogs and construction specifications
• Check drawing for accuracy (e.g., wall placement and size, feature sizes, door/window
placement, etc.)
• Check and verify dimensions
• Check and verify notes, lettering, symbols and references
• Check and verify title block information
• Check plan for line quality and type for feasibility, thoroughness, accuracy, code
compliance
• Submit completed plans to worksite professional for approvals

Learning Objectives:
• Discuss the various systems components of building structures including lighting,
heating, ventilation, air conditioning, mechanical, electrical, plumbing, communication
and vertical transport on completed plans
• Explain how detailed technical construction documents, schedules, and plans are
created from the architectural plan

Comments:
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Architectural Planning Unit

Competency
10. Revise drawings

Performance Standard Condition
Competence will be demonstrated
• at the worksite

Performance Standard Criteria
Performance will be successful when learners:
• Review drawing revision (change) procedures
• Identify drawing to be modified
• Use architectural drafting software OR draw manually
• Make modifications to drawing
• Construct a revision table on drawing
• Record changes properly on revision table
• Apply appropriate line thickness and type
• Check drawing

Learning Objectives:
• Compare how drawing changes are made and tracked on CAD and/or manual drawings
• Explain how drawing revisions are tracked to other connected technical documents and materials specifications documents
• Discuss the impact on resources of revisions to completed plans

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency

11. Construct a Bill of Materials

Performance Standard Condition
Competence will be demonstrated
- at the worksite

Performance Standard Criteria
Performance will be successful when learners:
- Review architectural plan with worksite professional, engineering notes/data, manufacturers’ catalogs and construction specifications
- Utilize appropriate reference handbooks
- Convert architectural drawing scale to full dimensions for a construction project
- Calculate the required materials needed
- Select building materials and assemblies upon evaluation that meet project specifications
- Use appropriate combinations of building materials and components that satisfy the requirements of building programs

Learning Objectives:
- Explain how to assign numbers to materials required for construction
- Explain how to calculate materials needed from an architectural plan
- Explain criteria used for building materials selection
- Discuss the use of sustainable construction materials and products
- Explain how factors such as force, torque, and shear impact choice of structural materials
- Describe applications and restrictions pertaining to the use of construction materials

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency
12. Assist to develop architectural detail schedules

Performance Standard Condition
Competence will be demonstrated
• at the worksite
• while assisting a worksite professional

Performance Standard Criteria
Performance will be successful when learners:
• Collect notes and format(s) pertaining to schedules
• Use architectural drafting software OR draw manually
• Interior finish schedule
  o Lay out schedule to fit given format
  o Lay out lettering guidelines
  o Make headings for each schedule
  o Define details for interior finish
  o Letter information into finish schedule
  o Check drawing
• Door and window schedules
  o Lay out schedules on floor plan
  o Make headings for window schedule
  o Make headings for door schedule
  o Define details
  o Letter schedules
  o Check drawing
• Door details
  o Review wall section, floor plan, construction specifications and manufacturers’
    catalogs
  o Draw head, jamb and sill details, including interior and exterior trim finishes
  o Add dimensions, notes and labels
• Window details
  o Review wall section, floor plan, construction specifications, and manufacturers’
    catalogs
  o Draw head, jamb and sill details, including interior and exterior trim finishes
  o Add dimensions, notes and labels

Learning Objectives:
• Articulate the need for schedules, identify information described within it, and how to
  configure and place schedules on a sheet
• Describe the difference between water supply, distribution, sanitary and storm drainage
  systems
• Identify structural symbols on technical drawings
• Identify plumbing, piping and drainage symbols on technical drawings
• Identify electrical & wiring symbols on technical drawings

Comments:
Unit 10: Design/Pre-Construction Pathway
Architectural Planning Unit

Competency
13. Assist to coordinate architectural project activities

Performance Standard Condition
Competence will be demonstrated
- at the worksite
- while assisting a worksite professional

Performance Standard Criteria
Performance will be successful when learners:
- Review plans and schedules for work to be completed
- Note timeframes, overlaps, and allowances for work completion
- Compile contracts, permits, and licenses as needed
- Coordinate work between trades based on plan
- Schedule contractor work dates
- Plan and route materials shipments
- Follow up to ensure movement of materials and equipment needed to meet established deadlines
- Monitor work completion deadlines
- Track and report any construction issues to worksite professional
- Communicate in a timely and accurate manner to correct parties

Learning Objectives:
- Explain how to read architectural schedules and work plans
- List methods of productivity measurement for architectural projects
- Discuss how to schedule contract work and delivery functions with respect to project schedule and requirements
- Compare contracts, licenses and permits uses and the information required on them

Comments: