

CTE Standards Unpacking
Architectural Drafting and Design

Course: Architectural Drafting and Design

Course Description: People with careers in design and pre-construction create our future. They turn a concept into a set of plans whether for a component, a system or a building. The plans guide other construction or manufacturing professionals as they continue the building process. These standards, combined with the knowledge and skills students master in the Introduction to Drafting and Design course, will provide students the basis to sit for the ADDA (American Drafting and Design Association) Architectural Apprentice certification. Details of the ADDA competencies addressed in each standard can be found at <http://www.adda.org>.

Career Cluster: Architecture & Construction

Prerequisites: Introduction to Drafting and Design

Program of Study Application: This is the fourth course in the suggested sequence of the Architectural & Construction career cluster. It is recommended that it is preceded by (1) Foundation Courses, (2) Introduction to Architecture and Construction, and (3) Introduction to Drafting and Design; and followed by (5) Capstone Experience.

INDICATOR #ADD 1: Understand architectural design fundamentals and history.		
SUB-INDICATOR 1.1 (Webb Level: 1 Recall): Identify architectural products and styles.		
SUB-INDICATOR 1.2 (Webb Level: 2 Skill/Concept): Interpret the fundamentals of framing plans.		
SUB-INDICATOR 1.3 (Webb Level: 2 Skill/Concept): Identify building codes and governing bodies.		
SUB-INDICATOR 1.4 (Webb Level: 1 Recall): Identify residential building materials		
Knowledge (Factual): House styles (types, origins) Roof types (styles, purposes) Building codes Construction materials- (veneer, concrete blocks, brick) Types of wood frame construction Common types of framing	Understand (Conceptual): Construction methods (balloon, post & beam, platform, modular) House details (columns, railings, dormer) Living and non-living spaces (definitions, requirements, and types) Floor framing system requirements Wall construction relating to	Skills (Application): Describe historical influences that contributed to current home styles Describe design elements of contemporary dwellings Discuss current trends in architecture List family needs that

construction	the foundation	should be considered when planning a dwelling
Beam terms	Joist & truss construction	
Framing terms	Interior wall covering construction	Justify the components of a typical framed wall
Wood types used in constructing walls	American with Disabilities Act (ADA) specifications	Compare the different methods of frame wall construction
Pressure treated wood requirements (when, why)	CO2 detection requirements	Interpret the information shown on a ceiling joist span data chart and trusses
Smoke detector requirements	Direction of door openings	
	Minimum FHA standards	
Ceiling height minimums	Weights on structures	Draw a typical wall section and full cross sections
Location for fire walls	Laws governing construction	
Local zoning restrictions for a residence	Roof identifications	Apply the Uniform Building Code (UBC) to a residential design
The Uniform Building Code (UBC) as it applies to residential design	Window construction	
	Concrete construction methods	Design a residence to meet the minimum FHA standards
Governing body acronyms		Evaluate the different siding types that will affect the design of a residence
Garage definitions		
Steel shapes		
Concrete reinforcement parts		
Roof parts identification		
Concrete masonry unit (CMU) terms		

Benchmarks

Students will be assessed on their *ability* to:

- Identify various architectural products and construction styles
- Meet ADDA Apprentice Drafting Competency: Architecture #6
- Create accurate framing plans
- Meet ADDA Apprentice Drafting Competency: Architecture # 14
- List and describe the purposes of and regulations from architectural governing bodies and their building codes
- Meet ADDA Apprentice Drafting Competency: Architecture #17
- Create a list of building materials and their uses and describe how they will affect the design of a residence.
- Meet ADDA Apprentice Drafting Competency: Architecture #20

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

RI1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RI4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text

Sample Performance Task Aligned to the Academic Standard(s):

Students will evaluate the different siding types that will affect the design of a residence and will orally or in writing explain the impact of selection.

INDICATOR #ADD 2: Understand drawing management, dimensioning, and notations.

<p>SUB-INDICATOR 2.1 (Webb Level: 2 Skill/Concept): Examine drawing identification and management techniques used in architectural drafting.</p>		
<p>SUB-INDICATOR 2.2 (Webb Level: 3 Strategic Thinking): Illustrate proper dimensioning and notation practices used in architectural drafting.</p>		
<p>Knowledge (Factual): Location and placement of basic design elements (title blocks, north arrow, schedules and symbols, revisions and change orders, dimensions) Types of structural and architectural drawings Dimensioning units Metric system units Dimension placement Room notations Schedules (types, placement, when to use) Stair section (information on section and plan) Drafting vocabulary</p>	<p>Understand (Conceptual): Architectural numbering system HVAC drawings Uses of construction documents Drawing and print production (equipment identification, types of prints) Types and differences of site plans (major, normal, and minor) Proper dimensioning practices (doors, windows) Dimension line spacing (first dimension, subsequent dimensions) Types of dimensions (unilateral, aligned) Use of abbreviations Numbering (doors, windows) Note placement Placement and use of title block information</p>	<p>Skills (Application): Analyze types and uses of architectural drawings Choose best location for dimensions Apply uniform spacing between dimension lines Fully dimension an object Correctly use leaders and notes Use appropriate angles for leaders Use correct text height Use architectural style letters and numerals</p>
<p>Benchmarks Students will be assessed on their <i>ability</i> to:</p>		

- Properly lay out drawings with the proper information to design a residence
- Meet ADDA Apprentice Drafting Competency: Architecture #8...
- Utilize proper dimensioning techniques
- Meet ADDA Apprentice Drafting Competency: Architecture #9

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

G.SRT.1 Verify experimentally the properties of dilations given by a center and a scale factor.

a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

G.MG.3 Apply geometric methods to solve design problems

RI1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RI4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text

Sample Performance Task Aligned to the Academic Standard(s):

Students will analyze and compute various aspects of blue prints.

Students will analyze types and uses of architectural drawings and explain orally the function of each.

INDICATOR #ADD 3: Develop a residential plot and foundation system plan.

SUB-INDICATOR 3.1 (Webb Level: 4 Extended Thinking): Create a plot/site plan

for a residence.		
SUB-INDICATOR 3.2 (Webb Level: 3 Strategic Thinking): Design footings and foundation for a residence.		
Knowledge (Factual): Dwelling types that will fit best on plot plan Contour lines (what they indicate, how they indicate it) Site plan symbols Location of exterior drains Purpose of foundation systems Foundation terms Types of foundations Foundation identification Materials used for foundations Drafting vocabulary	Understand (Conceptual): Site selection Slope indication Factors influencing plan scales (paper size, site area, amount of information) Method to locate a house on a site plan Design considerations for slab construction Concrete design components Steps in creating slab on grade Footing requirements Moisture content design considerations (soils)	Skills (Application): Draw a plot/site plan for a residence showing grade elevations against the home, lot contours and corners of the lot for drainage purposes Show water, power, gas and sewer lines or septic system in plan Show walks, driveways, patios, and other onsite improvements in plan Show the relationship of the finished floor elevation and the finished grade around the home Analyze list major considerations when designing a footing for a residential foundation Describe the procedure for staking out a house location Analyze a typical floor plan to determine the appropriate foundation Analyze design considerations for wood, concrete, and masonry foundation walls Calculate the load to be supported by a beam
Benchmarks Students will be assessed on their <i>ability</i> to:		

- Properly design a plot/site plan
- Meet ADDA Apprentice Drafting Competency: Architecture #7
- Properly design and calculate a footings/foundation system
- Meet ADDA Apprentice Drafting Competency: Architecture # 15

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

G.SRT8 Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

SL2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose and audience.

RI1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

Sample Performance Task Aligned to the Academic Standard(s):

Students will use trig to calculate elevations that are used in a blueprint.

Students will orally describe the procedure for staking out a house location.

Students will analyze a typical floor plan and explain orally how to determine the appropriate foundation.

INDICATOR #ADD 4: Generate the necessary construction plans to build a residence.

SUB-INDICATOR 4.1 (Webb Level: 3 Strategic Thinking): Develop a floor plan

using accepted symbols and techniques.		
SUB-INDICATOR 4.2 (Webb Level: 3 Strategic Thinking): Prepare a working drawing of the residence HVAC, lights and electrical needs.		
SUB-INDICATOR 4.3 (Webb Level: 3 Strategic Thinking): Design a residential roof plan.		
SUB-INDICATOR 4.4 (Webb Level: 2 Skill/Concept): Understand the use of elevations in the design of a residence.		
SUB-INDICATOR 4.5 (Webb Level: 3 Strategic Thinking): Draw interior and exterior stair details appropriate to those found in a residence.		
SUB-INDICATOR 4.6 (Webb Level: 3 Strategic Thinking): Develop door, window, and finishing schedules.		
SUB-INDICATOR 4.7 (Webb Level: 2 Skill/Concept): Understand basic estimating practices used in the construction industry.		
SUB-INDICATOR 4.8 (Webb Level: 4 Extended Thinking): Generate final presentation drawings and three dimensional computer model.		
Knowledge (Factual):	Understand (Conceptual):	Skills (Application):
Types of vent pipes	Residential floor plan scales	List information required on a typical floor plan
Interior wall sizes & locations	Stair & handrail construction minimums	Represent typical materials using standard architectural symbols
Exterior wall sizes & locations	Stair sections & plan views	Draw to scale a residential floor plan using accepted symbols and techniques
Partial walls	Garage floor design (finishes & thickness)	Draw dimensions of a floor plan in a clear and precise manner which complies with architectural standards
Bathroom dimensions	Electrical requirements	Recognize the difference between a good and poor drawing of a floor plan
Roof framing terminology	HVAC supports (ground, suspended)	Discuss accessibility requirements for functional utility
Residential symbols	Duct placement regulations	Draw electric and HVAC plans for all floors of an architectural design to comply with National Electrical Code (NEC)
HVAC equipment access	Use of multiple compressors	Use correct architectural and national electrical code symbols
Different types of heating systems (radiant, hot water, central air)	Outlet requirements	
HVAC symbols	Correlation between roof shape & floor plan	
Residential piping versus industrial piping	Elements of a roof framing plan (roof members, additions)	
Plumbing abbreviations		
Plumbing symbols	Information found on elevations (material,	

Electrical codes	ornamental items)	Show the correct location of smoke detectors according to code
Electrical symbols	Irregular shaped structures	
Roof types	Skylight placement on a drawing (how drawn, how it appears on drawings)	Identify issues associated with roof framing plans
Scale of a roof plan		
Drawing procedures for roof plans	Tread to riser ratio	Draw a roof plan
When to draw the roof framing plan	Direction indicators	Identify items on elevations (columns & posts, outside material)
Elevation scales	Items shown in section	Identify the dimensions commonly shown on elevations
Number of elevation needed	Hand rail requirements	
Information needed to draw elevations	Door and window labels	Illustrate symbols that are often found on elevations
Elevation material symbols (roofing, siding)	Window size designations	
Stair components	Finished vs. rough opening	Draw a typical exterior elevation which demonstrates proper techniques
Tread sizes	Procedures for doing basic estimations/calculations	
Riser sizes	Application of specifications	Draw millwork elevations and special details for kitchen cabinets, bathroom cabinets, wardrobe & utility closet and cabinets
Stair type identification	Order of the sheets for presentation drawings	
Section Types	Communication strategies	Draw interior and exterior stair details appropriate to those found in a home that comply with applicable building codes
Typical scales for sections		Show hand rails, guard rails and other safety features in a drawing
Hand rail parts		
Residential door sizes		
Wall components		
Door styles		Use & label correct material in stair details

<p>Window styles</p> <p>Types of schedules</p> <p>Types of finishes</p> <p>Basic algebra formulas & formula manipulation</p> <p>Specifications</p> <p>Roof shingles & squares (sizes, sq/ft)</p> <p>Square yard of carpet</p> <p>Number of studs per foot</p> <p>Number of floor tiles per sq/ft</p> <p>3D computer modeling techniques</p> <p>Presentation techniques</p> <p>Drafting vocabulary</p>		<p>Draw a window schedule that would include window size, make, material, & type of glazing</p> <p>Draw a door schedule that would include door size, style, type of lockset, special features, & jamb size</p> <p>Draw a finish schedule that would include different types of wall & ceiling finishes, types of floor coverings, special wainscot wall finishes, etc.</p> <p>Perform basic math functions (area, square feet/square yard)</p> <p>Calculate area of geometric shapes (triangle, square, rectangle)</p> <p>Determine heights</p> <p>Add dimensions with mixed units</p> <p>Convert from one unit to another</p> <p>Determine square footage</p>
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Benchmarks

Students will be assessed on their *ability* to:

- Properly draw a floor plan

- Meet ADDA Apprentice Drafting Competency: Architecture #10
- Develop HVAC and electrical plans that meet National Electrical Code (NEC)
- Design a proper HVAC system
- Meet ADDA Apprentice Drafting Competency: Architecture #11
- Design a roof plan to the proper strength and design requirements
- Meet ADDA Apprentice Drafting Competency: Architecture #12
- Demonstrate the proper use of elevations in both the design and layout of a plot/site plan
- Meet ADDA Apprentice Drafting Competency: Architecture #13
- Accurately follow existing building codes and accessibility requirements in the design of a residence
- Draw a properly designed set of stairs
- Meet ADDA Apprentice Drafting Competency: Architecture #16
- Create a proper finishing schedule including material needs and design details
- Meet ADDA Apprentice Drafting Competency: Architecture #18
- Complete an accurate construction estimate
- Meet ADDA Apprentice Drafting Competency: Architecture #19

Academic Connections

ELA Literacy and/or Math Standard (if applicable, Science and/or Social Studies Standard):

RI1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

SL4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose and audience.

Sample Performance Task Aligned to the Academic Standard(s):

Students will orally explain the difference between a good and poor drawing of a floor plan.

Students will calculate the dimensions of the roof, elevations, and other aspects of a project to determine if the measurements are correct.

Additional Resources

Please list any resources (e.g., websites, teaching guides, etc.) that would help teachers as they plan to teach these new standards.

Vocabulary

ADD1.1 Identify architectural products and styles.

1. **Arch:** curved masonry construction for spanning an opening, consisting of a number of wedgelike stones, bricks, or the like, set with the narrower side toward the opening in such a way that forces on the arch are transmitted as vertical or oblique stresses on either side of the opening.
2. **Colonial style:** These styles are associated with the houses, churches and government buildings of the period from about 1600 through the 19th century.
3. **Contractor:**
a person who contracts to furnish supplies or perform work at a certain price or rate.
4. **Craftsman style:** an American domestic architectural, design, landscape, applied arts, and decorative arts style and lifestyle philosophy that began in the last years of the 19th century.
5. **Gambrel:** gable roof, each side of which has a shallower slope above a steeper one.
6. **modular construction:** consist of universal parts (or modules) that are manufactured in a factory and then shipped to a build site where they are assembled into a variety of arrangements
7. **owner:** a person who has the exclusive right or title to something
8. **planned communities:** any community that was carefully planned from its inception and is typically constructed in a previously undeveloped area
9. **Ranch:** a domestic architectural style originating in the United States. The ranch house is noted for its long, close-to-the-ground profile, and minimal use of exterior and interior decoration.
10. **Remodel:** to reconstruct; make over.
11. **Renovation:** to reinvigorate; refresh; revive.
12. **Restoration:** return of something to a former, original, normal, or unimpaired condition.
13. **Spanish style:** a United States architectural stylistic movement arising in the early 20th century based on the Spanish Colonial architecture of the Spanish colonization of the Americas.

14. Split level: (also called a tri-level home) is a style of house in which the floor levels are staggered, so that the "main" level of the house (e.g. the level that usually contains the front entry), is partway between the upper and lower floors.

ADD1.2 Interpret fundamentals of framing plans.

- 1. Balloon:** utilizes long continuous framing members (studs) that run from the sill plate to the top plate, with intermediate floor structures let into and nailed to them.^{[11][12]} Here the heights of window sills, headers and next floor height would be marked out on the studs with a story pole
- 2. Cantilever:** a bracket for supporting a balcony, cornice, etc.
- 3. Concrete masonry unit (CMU):** also called concrete brick, concrete block, cement block, besser block, breeze block and cinder block – is a large rectangular brick used in construction.
- 4. Cripple stud:**
any structural member shorter than usual, as a stud beneath a windowsill.
- 5. double top plate:** a second piece of Timber upon which some considerable weight is framed
- 6. fascia:** architectural term for a frieze or band running horizontally and situated vertically under a roof edge, or which forms the outer surface of a cornice, visible to an observer
- 7. gutters:** a narrow trough or duct which collects rainwater from the roof of a building and diverts it away from the structure, typically into a drain
- 8. Gypsum board:** is a panel made of gypsum plaster pressed between two thick sheets of paper. It is used to make interior walls and ceilings.
- 9. Header:** structural members in light-frame construction which run perpendicular to floor and ceiling joists, "heading" them off to create an opening
- 10. Joist:** one of the horizontal supporting members that run between foundations, walls, or beams to support a ceiling or floor
- 11. Platform:** in platform framing a floor box and joists making up the platform is built and placed on a supporting under structure (sill plates, headers, or beams) where it sits flat and gets fastened down against wind lifting with galvanized metal tie straps. Once the boxed floor platform is squared, leveled and fastened then subfloor, walls, ceilings, and roof are built onto and above that initial platform, which can be repeated floor by floor, 'without the slow downs and dangers of fastening and leveling rough-sawn joists of a new floor together to the walls from ladders extending one or even two stories up.

12. **Pressure treatment:** increase the durability of lumber and resistance from being destroyed by insects or fungus.
13. **Rafter:** one of a series of sloped structural members (beams) that extend from the ridge or hip to the wall plate, downslope perimeter or eave, and that are designed to support the roof deck and its associated loads
14. **Sheathing:** the exterior material applied to the walls of a house or other building meant to shed water, protect the walls from the effects of weather, and is a key in the aesthetics of the structure
15. **Soffit:** the exposed undersurface of any exterior overhanging section of a roof eave
16. **Sole (bottom) plate:** the bottom horizontal member of a wall or building to which vertical members are attached.
17. **Span:** a section between two intermediate supports
18. **Stud:** a vertical member in construction
19. **sub-floor:** the support and subfloor together always provides the strength of a floor one can sense underfoot
20. **Top plate:** upper wall plate which is fastened along the top of the wall studs, before the wall is lifted into position and on which the platform of the next story or the ceiling and roof assembly rest and are attached.
21. **Truss:** a structure comprising five or more triangular units constructed with straight members whose ends are connected at joints referred to as nodes.
22. **Veneer:** a thin facing layer of wood

ADD1.3 Identify building codes and governing bodies.

1. **Americans with Disabilities Act (ADA):** a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. It affords similar protections against discrimination to Americans with disabilities as the Civil Rights Act of 1964,^[4] which made discrimination based on race, religion, sex, national origin, and other characteristics illegal. Disability is defined by the ADA as "...a physical or mental impairment that substantially limits a major life activity."
2. **crawl space:** a basement someone cannot stand up in
3. **fire wall:** a barrier inside a building or vehicle, designed to limit the spread of fire, heat and structural collapse
4. **habitable room:** able to be lived in
5. **Hallway width:** as a rule, 36" is the extreme minimum hall width. This can and will vary from state to state and from AHJ to AHJ (Authority Having Jurisdiction). ADA requires a minimum hallway width between 44" and 60"

6. **Handicapped ramp:** essential to the welfare of those who depend on them to safely access and exit buildings or other areas that would otherwise be inaccessible to them. These ramps are used by both those in wheelchairs and using canes/walkers.
Live load: or imposed loads, are temporary, of short duration, or a moving load. These dynamic loads may involve considerations such as impact, momentum, vibration, slosh dynamics of fluids and material fatigue.
7. **Masonry:** building of structures from individual units laid in and bound together by mortar
8. **Pressure treated:** increase the durability of lumber and resistance from being destroyed by insects or fungus.
9. **Sleeping area:** an area for sleeping or those things concerned with or related to the act of sleeping.

ADD1.4 Identify residential building materials.

1. **Aggregate:**
any of various loose, particulate materials, as sand, gravel, or pebbles, added to a cementing agent to make concrete, plaster, etc.
2. **Attic:** the part of a building, especially of a house, directly under a roof
3. **Berm:** a level space, shelf, or raised barrier separating two areas
4. **Blocking:** horizontal boards placed between wall studs to facilitate hardware attachment
5. **Board foot:** a specialized unit of measure for the volume of lumber. It is the volume of a one-foot length of a board one foot wide and one inch thick.
6. **Channel:** 'U' metal structural member
7. **Codes** - is a set of rules that specify the minimum standards for constructed objects such as buildings and non-building structures.
8. **Concrete masonry unit (CMU) block types:** standard, split-face, scored block, ribbed block, honed block, glazed, offset.
9. **Condensation:** the result of being made more compact or dense.
10. **Coping:** piece of woodwork having its end shaped to fit together with a molding
11. **Dead load:** static forces that is relatively constant for an extended time. They can be in tension or compression
12. **dormer:** a structural element of a building that protrudes from the plane of a sloping roof surface
13. **eave:** the bottom edges of a roof that normally projects beyond the side of the building, forming an overhang to throw water clear of the walls
14. **foyer:** usually a small entry area or room by the front door

- 15. hardware:** metal ware, as tools, locks, hinges, or cutlery
- 16. Hip roof:** a type of roof where all sides slope downwards to the walls, usually with a fairly gentle slope. Thus it is a house with no gables or other vertical sides to the roof
- 17. Live load:** or imposed loads, are temporary, of short duration, or a moving load. These dynamic loads may involve considerations such as impact, momentum, vibration, slosh dynamics of fluids and material fatigue.
- 18. Molding:** strip of contoured wood or other material placed just below the juncture of a wall and a ceiling
- 19. Mortar:** a material used to fill the gaps between blocks and bind them together
- 20. Mullion:** a vertical element that forms a division between units of a window, door, or screen, or is used decoratively
- 21. Purlin:** any longitudinal, horizontal, structural member in a roof except a type of framing with what is called a crown plate
- 22. reinforcing rods:** a steel bar or mesh of steel wires used as a tension device in reinforced concrete and reinforced masonry structures, to strengthen and hold the concrete in tension
- 23. riser:** the vertical elements in a set of stairs
- 24. slope:** a surface of which one end or side is at a higher level than another; a rising or falling surface
- 25. Tongue & groove:** a method of fitting similar objects together, edge to edge, used mainly with wood, in flooring, parquetry, paneling, and similar constructions. Tongue and groove joints allow two flat pieces to be joined strongly together to make a single flat surface

ADD2.1 Examine drawing identification and management techniques used in architectural drafting.

- 1. Blueprint:** a reproduction of a technical drawing, documenting an architecture or an engineering design, using a contact print process on light-sensitive sheets
- 2. Demolition plans:** a set of plans that set out the sequence of events in the demolition of a building or area.
- 3. drawing:** a form of visual art that makes use of any number of drawing instruments to mark a two-dimensional medium
- 4. electrical drawing:** a type of technical drawing that shows information about power, lighting, and communication for an engineering or architectural project

5. **elevations:** a view of a building seen from one side, a flat representation of one façade
6. **Floor plans (types):** Structural, HVAC, plumbing/piping, electrical.
7. **grading plans** A plan showing contours and grade elevations for existing and proposed ground surface elevations at a given site.
8. **Mylar:**a brand of strong, thin polyester film used in photography, recording tapes, & insulation
9. **Plot:** plan, map, diagram, or other graphic representation, as of land, a building, etc.
- 10.**Print:** a reproduction of a technical drawing, documenting architecture or an engineering design, using a contact print process on light-sensitive sheets or directly from a computer to a printing device.
- 11.**Sections:** represents a vertical plane cut through the object, in the same way as a floor plan is a horizontal section viewed from the top.
- 12.**structural drawing:** a type of technical drawing, shows information about foundations, roof, or other structural details
- 13.**survey drawing:** Measured drawings of existing land, structures and buildings
- 14.**Tracing:**
a copy of a drawing, map, plan, etc., made by tracing on a transparent sheet placed over the original.

ADD2.2 Illustrate proper dimensioning and notation practices used in architectural drafting.

1. **Aligned:** Dimensioning technique that requires all numerals, figures, and notes be aligned with the dimension lines so that they may be read from the bottom and from the right side of the sheet.
2. **Dimensions line:** A line used to define the measurement of a part feature. Dimension lines consist of a solid line with arrows at both ends and a dimension in the center.
3. **Extension line:** Thin lines used to establish the extent of a dimension. Extension lines begin with a short space from the object and extend to about .125 inches past the last dimension line.
4. **General note:** Written instructions, or requirements shown on the drawings which pertain to the performance of the work.
5. **labels**
6. **Leader** - A thin solid line that is drawn from some note to its detail on an object.
7. **Local note-** also known as a specific note, relates to a specific feature within the floor plan, such as the header size over a window opening. These notes are often connected to a feature with a leader line and they identify isolated items.

8. **Millimeter (MM):** one thousandth of a meter.
9. **Overall dimension** – the overall dimensions on frame construction are understood to be given to the outside of the stud frame of the exterior walls. The reason for locating dimensions on the outside of the stud frame is that the frame is established first, and windows, doors, and partitions are usually put in place before sheathing and other wall coverings material is applied.
10. **Schedules** - A table or chart on a drawing that provides a place for specifications as well as part and detail information.

ADD3.1 Create a plot/site plan for a residence.

1. **Benchmark** – a mark on a permanent object indicating elevation and serving as a reference in topographic surveys and tidal observations.
2. **Berm** – a flat strip of land, raised bank, or terrace bordering a river or canal. An artificial ridge or embankment.
3. **Contour lines:** a line on a map joining points of equal height above or below sea level.
4. **Domes:** a rounded vault forming the roof of a building or structure, typically with a circular base.
5. **Elevation:** height above a given level, especially sea level.
6. **Landscape plan** – is a plan concerned with reconciling competing land uses while protecting natural processes and significant cultural and natural resources.
7. **Plot plan:** A plot plan is an architecture, engineering, and/or landscape architecture plan drawing—diagram which shows the buildings, utility runs, and equipment layout, the position of roads, and other constructions of an existing or proposed project site at a defined scale.
8. **Property lines:** the boundary line between two pieces of property.
9. **Site plan:** A site plan is an architectural plan, landscape architecture document, and a detailed engineering drawing of proposed improvements to a given lot.
10. **Topography:** a detailed description or representation on a map of the natural and artificial features of an area.

ADD3.2 Design footings and foundation for a residence.

1. **Cement:** a powdery substance made with calcined lime and clay. It is mixed with water to form mortar or mixed with sand, gravel, and water to make concrete.

2. **Concrete:** a heavy, rough building material made from a mixture of broken stone or gravel, sand, cement, and water, that can be spread or poured into molds and that forms a stone like mass on hardening.
3. **Concrete pier:** a foundation element suitable for many types of structures but most commonly used for timber frame post and beam buildings. A concrete pier typically consists of a round or square concrete pillar supported at the bottom by a footer piece which serves to spread the load carried by the pier.
4. **Continuous foundation:**
A foundation which supports a number of independent loads.
5. **Control joints:** a joint placed in concrete slabs to control random cracking.
6. **crawl space & ventilation:** an area of limited height under a floor or roof, giving access to wiring and plumbing
7. **Expansions joints:** a joint that makes allowance for thermal expansion of the parts joined without distortion.
8. **Footing:** the bottommost part of a foundation walls, with a course of concrete wider than the base of the wall.
9. **Frost line:** the maximum depth of ground below which the soil does not freeze in winter.
10. **Masonry:** the building of structures from individual units laid in and bound together by mortar; the term masonry can also refer to the units themselves.
11. **Monolithic slab:** A slab foundation that is part of the footings.
12. **Pilings:** a long slender column usually of timber, steel, or reinforced concrete driven into the ground to carry a vertical load
13. **reinforcement:** the strengthening structure or material employed in reinforced concrete
14. **Retaining wall:** a wall that holds back earth or water.
15. **Sill plate:** is the bottom horizontal member of a wall or building to which vertical members are attached.
16. **Slab:** large, thick, flat piece of stone, concrete, or wood, typically rectangular.
17. **Slab-on-grade:** A type of construction in which footings are needed but little or no foundation wall is poured.
18. **Vapor barrier:** a thin layer of impermeable material, typically polyethylene sheeting, included in building construction to prevent moisture from damaging the fabric of the building.

ADD4.1 Develop a residential floor plan using the accepted symbols and techniques.

1. **Egress:** required in specific locations in a dwelling and is intended to provide an emergency means of exiting a dwelling
2. **Ground fault circuit interrupted (GFCI):** is a fast-acting circuit breaker designed to shut off electric power in the event of a ground-fault within as little as 1/40 of a second.
3. **Hearth:** the floor of a fireplace.
4. **Heating ventilation & air conditioning (HVAC):** a major sub-discipline of mechanical engineering. The goal of HVAC design is to balance indoor environmental comfort with other factors such as installation cost, ease of maintenance, and energy efficiency.
5. **Heel**
 - a) The lower end of a door's hanging stile or of a vertically placed timber, especially if it rests on a support.
 - b) A socket, floor brace, or similar device for wall-bracing timbers.
 - c) The bottom inside edge of a footing or a retaining wall.
 - d) The back end of a carpenter's plane.
 - e) Steel fastening device for connecting a rafter to its tie beam.
6. **Hose bib (H.B.):** A tap is a valve controlling release of liquids or gas.
7. **Knee wall:** is a short wall, typically less than three feet (one metre) in height, used to support the rafters in timber roof construction.
8. **Partial wall:** Wall that partially encloses a stairway. It usually begins part of the way up the Stairway so the bottom few Treads are open and the Treads above are closed.
9. **Soil stack:** the pipe that takes all the waste water from the upstairs plumbing system of a building.
10. **Vapor barrier:** a thin layer of impermeable material, typically polyethylene sheeting, included in building construction to prevent moisture from damaging the fabric of the building.
11. **Vent through roof (VTR)** Vents provide a means to release sewer gases outside instead of inside the house. Venting through the roof also provides a way to equalize pressure in the system.

ADD4.2 Prepare a working drawing of the residence Heating Ventilation & Air Conditioning (HVAC), lights and electrical needs.

1. **Ampere (AMP):** a unit of electric current equal to a flow of one coulomb per second.
2. **Compressor:** an electrical amplifier that reduces the dynamic range of a signal.
3. **Conduit:** a tube or trough for protecting electric wiring.

4. **Expansion valve:** is a component in refrigeration and air conditioning systems that controls the amount of refrigerant flow into the evaporator thereby controlling the superheating at the outlet of the evaporator.
5. **Isometric:** incorporating a method of showing projection or perspective in which the three principal dimensions are represented by three axes 120° apart.
6. **National Electrical Code (NEC):** is a regionally adoptable standard for the safe installation of electrical wiring and equipment in the United States
7. **Plenum:** an enclosed chamber where a treated substance collects for distribution, as heated or conditioned air through a ventilation system.
8. **Return:** extracts air from a room and recycles it through the system to further condition it by cooling or heating.
9. **Supply:** a stock of a resource from which a person or place can be provided with the necessary amount of that resource.
12. **Soil pipe:** the pipe that takes all the waste water from the upstairs plumbing system of a building.
10. **Split system:** is an air conditioning unit made up of two units — an outside unit, the compressor, and an inside air outlet unit, usually referred to as the “wall hung head unit”.
11. **Turning vane:** devices inside mechanical ductwork that directs air inside a duct when a change of direction happens.
12. **Underwriter’s laboratories (UL):** a safety consulting and certification company with a large involvement in the electrical discipline.
13. **Valve:** a device for controlling the passage of fluid through a pipe or duct, especially an automatic device allowing movement in one direction only.
14. **Water closet:** a flush toilet.

ADD4.3 Design a residential roof plan.

1. **A-frame:** a basic structure designed to bear a load in a lightweight economical manner. The simplest form of an A-frame is two similarly sized beams, arranged in a 45-degree or less angle, attached at the top.
2. **Bearing wall:** any of the walls supporting a floor or the roof of a building. Generally, a bearing wall runs at right angles to the joists above.
3. **Dormer:** a window that projects vertically from a sloping roof.
4. **Gable:** the part of a wall that encloses the end of a pitched roof.
5. **Hip:** the sharp edge of a roof from the ridge to the eaves where two sides meet.
6. **Mansard:** a roof that has four sloping sides, each of which becomes steeper halfway down.
7. **Pitch:** the steepness of a slope, especially of a roof.

8. **Rafters:** one of several internal beams extending from the eaves to the peak of a roof and constituting its framework.
9. **Shingles:** a rectangular tile of asphalt composite, wood, metal, or slate used on walls or roofs.
10. **Slope:** the angle of the roof surface above the "flat" or horizontal plane.

ADD4.4 Understand the use of elevations in the design of a residence.

ADD4.5 Draw interior and exterior stair details appropriate to those found in a residence.

1. **Detail section:** are drawn to provide clarity of a small area such as the intersection of the floor system to a wall. With a detailed section a smaller area can be seen, but each material in the display increases in size. Details provide more specific information about a smaller area than seen in other types of sections.
2. **full section:** A sectional view generated by passing a single cutting plane completely through the object
3. **L-shaped stairs:** two mutually perpendicular flights of stairs are connected by a landing in between.
4. **Landing:** a level area at the top of a staircase or between one flight of stairs and another.
5. **Line of sight:** (sightline) is normally an unobstructed line of sight between an intended observer and an object such as a stage.
6. **Longitudinal section:** is produced by a cutting plane that is parallel to the long axis of the structure and is generally perpendicular to most structural materials used to frame the roof, ceiling and floor systems. Because the framing members are perpendicular to the cutting plane they are seen as if they had been cut.
7. **Partial section:** is a section that does not go completely through the structure and can be used to show construction materials that are not seen in other sections. Partial sections are used to show only a specific area of the structure, whereas other sections are used to define balance of the structure.
8. **Rise:** the vertical change in height per unit of horizontal movement or run.
9. **Riser:** a vertical section between the treads of a staircase.
10. **Run:** the horizontal change in distance, typically in construction we use 12" or one foot and express roof slopes as units of rise per single unit of run, such as 3 inches of rise per 12 inches of run or 3" per ft.
11. **Section line:** is used to show a cutaway view of a floor plan.
12. **Straight run stairs:** as the name implies have no turns. Straight run stairs are the stairs used most often in new home construction.

13. **Stringer:** a side of a staircase, which supports the treads and risers.
14. **Transverse section:** is produced by a cutting plane that is parallel to the short axis of the structure, and is often referred to as a cross section. The cutting plane for a transverse section is usually parallel to the materials used to frame a roof, ceiling, and floor systems and generally shows the shape of the structure better.
15. **Tread:** the top surface of a step or stair.

ADD4.6 Develop door, window, and finishing schedules

1. **Accessories**
2. **Dead bolt:** is a locking mechanism distinct from a spring bolt lock because a dead bolt cannot be moved to the open position except by rotating the lock cylinder with the key.
3. **Door panels:** a door having panels framed by stiles and rails of greater thickness.
4. **Finish schedule:** a room finishes schedule is a spreadsheet like table, like the door and window schedules, which tell the builder precisely what finish goes on the ceiling, walls, base and floors of every room of a design.
5. **Hardware:** all hardware used in building constructions, especially that which is attached to movable elements such as doors and windows. Also called finished hardware, such as hinges, locks, catches, etc.
6. **Laminate flooring:** is a multi-layer synthetic flooring product fused together with a lamination process. Laminate flooring simulates wood (or sometimes stones) with a photographic appliques layer under a clear protective layer. The inner core layer is usually composed of melamine resin and fiber board materials.
7. **Nominal size:** the size used for general identification on a part.
8. **Schedule keys:** are nothing more than a schedule of keys that you can use in other schedules. They are associated to a particular category and create a parameter for that category that can be used in schedules.
9. **Schedules:** a table or chart on a drawing that provides a place for specifications as well as part and detail information.

ADD4.7 Understand basic estimating practices used in the construction industry.

1. **Cubic yard:** unit of volume, used in the United States, Canada, and the UK. It is defined as the volume of a cube with sides of 1 yard (3 feet, 36 inches, 0.9144 meters) in length.

2. **Square foot:** is an imperial unit and U.S. customary unit (non-SI, non-metric) of area, used mainly in the United States, Canada, United Kingdom, Bangladesh, India and Pakistan. It is defined as the area of a square with sides of 1 foot.
3. **Square of shingles:** a square of shingles is 100 square feet of shingles.
4. **Square yard:** a unit of area measurement equal to a square measuring one yard on each side.