

# Civil Engineering and Architecture

## At-A-Glance - Lamar CISD

Ongoing Skills Imbedded All Year	Professional Standards/Employability Skills/Technical Skills		
	Unit Name	Estimated Time Frame	TEKS
Grading Period 1 28 Days	<b>History of Civil Architect</b>	<b>13 Days</b>	1.1A, 1.1B 1.1C, 1.1D, 1.1E, 1.1F
	CEA 1.1(A) The student will connect modern structural and architectural designs to historical architectural and civil engineering achievements. CEA 1.1(B) The student will identify three general categories of structural systems used in historical buildings. CEA 1.1(C) The student will explain how historical innovations have contributed to the evolution of civil engineering and architecture. CEA 1.1(D) The student will identify and explain the application of principles and elements of design to architectural buildings. CEA 1.1(E) The student will determine architectural style through identification of building features, components, and materials. CEA 1.1(F) The student will create a mock-up model depicting an architectural style or feature using a variety of materials.		
	<b>Career Exploration</b>	<b>8 Days</b>	2.1A, 2.1B, 2.1C, 2.1D
	CEA 1.2(A) The student will identify the primary duties, and attributes of a civil engineer and an architect along with the traditional path for becoming a civil engineer or architect. CEA 1.2(B) The student will identify various specialty disciplines associated with civil engineering. CEA 1.2(C) The student will participate in a design charrette and recognize the value of using a charrette to develop innovative solutions to support whole building design. CEA 1.2(D) The student will understand the relationship among the stakeholders involved in the design and construction of a building project.		
	<b>Building Design Construction</b>	<b>7 Days</b>	2.1A, 2.1B
Grading Period 2 25 Days	CEA 2.1(A) The student will identify typical components of a residential framing system. CEA 2.1(B) The student will recognize conventional residential roof designs.		
	<b>Building Design Construction continue</b>	<b>7 Days</b>	2.1C, 2.1D
	CEA 2.1(C) The student will model a common residential roof design and detail advantages and disadvantages of that style. CEA 2.1(D) The student will use 3D architectural software to create a small building.		
	<b>Lesson Cost Efficiency</b>	<b>7 Days</b>	2.2A, 2.2B, 2.2C, 2.2D, 2.2E
	CEA 2.2(A) The student will apply basic math skills to calculate the quantity and cost of concrete needed to pour the pad for a small building. CEA 2.2(B) The student will create a cost estimate for a small construction project, including a detailed cost break-down. CEA 2.2(C) The student will calculate the heat loss through one wall of a conditioned building. CEA 2.2(D) The student will calculate the heat loss for a building envelope with given conditions appropriate for the project. CEA 2.2(E) The student will apply principles of sustainable design to a small project.		
<b>Residential Design</b>	<b>11 Days</b>	2.3A, 2.3B, 2.3C, 2.3D, 2.3E, 2.3F	
CEA 2.3(A) The student will apply elements of good residential design to the design of a basic house to meet the needs of a client. CEA 2.3(B) The student will design a home design that complies with applicable codes and requirements. CEA 2.3(C) The student will incorporate sustainable building principles and universal design concepts into a residential design. CEA 2.3(D) The student will create bubble diagrams and sketch a floor plan. CEA 2.3(E) The student will identify residential foundation types and choose an appropriate foundation for a residential application. CEA 2.3(F) The student will calculate the head loss and estimate the water pressure for a given water supply system.			

<b>Grading Period 3 25 Days</b>	<b>Residential Design continue</b>	<b>8 Days</b>	2.3G, 2.3H, 2.3I, 2.3J, 2.3K, 2.3L
	<p>CEA 2.3(G) The student will create sketches to document a preliminary plumbing and a preliminary electrical system layout for a residence that comply with applicable codes.</p> <p>CEA 2.3(H) The student will design an appropriate sewer lateral for wastewater management for a building that complies with applicable codes.</p> <p>CEA 2.3(I) The student will create a site opportunities map and sketch a project site.</p> <p>CEA 2.3(J) The student will choose an appropriate building location on a site based on orientation and other site-specific information.</p> <p>CEA 2.3(K) The student will calculate the storm water runoff from a site before and after development.</p> <p>CEA 2.3(L) The student will document the design of a home using 3D architectural design software and construction drawings.</p>		
	<b>Commercial Building Systems</b>	<b>10 Days</b>	3.1A, 3.1B, 3.1C
	<p>CEA 3.1(A) The student will identify applicable building codes and regulations that apply to a given development.</p> <p>CEA 3.1(B) The student will classify a building according to its use, occupancy, and construction type using the International Building Code.</p> <p>CEA 3.1(C) The student will research Land Use regulations to identify zoning designations and allowable uses of property.</p>		
	<b>Commercial Design Project</b>	<b>7 Days</b>	3.1D, 3.1E, 3.1F, 3.1G, 3.1H, 3.1I, 3.1J, 3.1K
<p>CEA 3.1(D) The student will comply with specifications, regulations, and codes during a design process.</p> <p>CEA 3.1(E) The student will compare a variety of commercial wall systems and select an appropriate system for a given commercial application based on materials, strength, aesthetics, durability, and cost.</p> <p>CEA 3.1(F) The student will compare a variety of commercial low-slope roof systems and select an appropriate system for a given commercial application based on materials, strength, durability, and cost.</p> <p>CEA 3.1(G) The student will incorporate sustainable building practices, especially a green roof, into the design of a commercial building.</p> <p>CEA 3.1(H) The student will use 3D architectural design software to incorporate revisions for the redesign of a building.</p> <p>CEA 3.1(I) The student will use 3D architectural design software to create appropriate documentation to communicate a commercial building design.</p> <p>CEA 3.1(J) The student will calculate the structural efficiency of a structure.</p> <p>CEA 3.1(K) The student will use load-span tables to design structural elements.</p>			
<b>Grading Period 4 33 Days</b>	<b>Structures</b>	<b>18 Days</b>	3.2A, 3.2B, 3.2C, 3.2D, 3.2E, 3.2F, 3.2G, 3.2H, 3.2I, 3.2J, 3.2K
	<p>CEA 3.2(A) The student will identify the work of a structural engineer.</p> <p>CEA 3.2(B) The student will use building codes and other resources to calculate roof loading to a structure and select appropriate roof beams to safely carry the load.</p> <p>CEA 3.2(C) The student will analyze a simply supported beam subjected to a given loading condition to determine reaction forces, sketch shear and moment diagrams, and determine the maximum moment resulting in the beam.</p> <p>CEA 3.2(D) The student will use beam formula to calculate end reactions and the maximum moments of a simply supported beam subjected to a given loading condition.</p> <p>CEA 3.2(E) The student will use structural analysis software to create shear and moment diagrams of simply supported beams subjected to a given loading condition.</p> <p>CEA 3.2(F) The student will calculate the deflection of a simply supported beam subjected to a given loading condition.</p> <p>CEA 3.2(G) The student will use building codes and other resources to determine the required floor loading and design a structural steel floor framing system (beams and girders) for a given building occupancy.</p> <p>CEA 3.2(H) The student will identify and describe the typical usage of foundation systems commonly used in commercial construction.</p> <p>CEA 3.2(I) The student will determine the loads transferred from a steel framed structure to the ground through a foundation.</p> <p>CEA 3.2(J) The student will size a spread footing for a given loading condition.</p> <p>CEA 3.2(K) The student will check structural calculations created by others for correctness.</p>		
	<b>Utilities Services</b>	<b>15 Days</b>	3.3A, 3.3B, 3.3C, 3.3D
<p>CEA 3.3(A) The student will interpret and apply code requirements and constraints as they pertain to the installation of services and utilities.</p> <p>CEA 3.3(B) The student will read and understand HVAC construction drawings for a commercial project.</p> <p>CEA 3.3(C) The student will apply criteria and constraints to size and locate the new utility service connections for a commercial facility.</p> <p>CEA 3.3(D) The student will modify system designs to incorporate energy conservation techniques.</p>			

<b>Grading Period 5 34 Days</b>	<b>Site Considerations</b>	<b>34 Days</b>	3.4A, 3.4B, 3.4C, 3.4D, 3.4E, 3.4F, 3.4G
	CEA 3.4(A) The student will use differential leveling to complete a control survey to establish a point of known elevation for a project. CEA 3.4(B) The student will design appropriate pedestrian access, vehicular access and a parking lot for a commercial facility. CEA 3.4(C) The student will analyze a site soil sample to determine the United Soil Classification System designation and predict soil characteristics important to the design and construction of a building on the site. CEA 3.4(D) The student will estimate the increase in storm water runoff from a commercial site and create a preliminary design for a storm water storage facility. CEA 3.4(E) The student will apply Low Impact Development techniques to a commercial site design reduce the impact of development on storm water runoff quantity and quality. CEA 3.4(F) The student will follow specifications and codes during a design process. CEA 3.4(G) The student will, given 3D architectural design software, document a commercial site design.		
<b>Grading Period 6 28 Days</b>	<b>Commercial Building</b>	<b>18 Days</b>	4.1A, 4.1B, 4.1C, 4.1D, 4.1E, 4.1F, 4.1G, 4.1H, 4.1I, 4.1J
	CEA 4.1(A) The student will work individually and in groups to produce a solution to a team project. CEA 4.1(B) The student will research codes, zoning ordinances and regulations to determine the applicable requirements for a project. CEA 4.1(C) The student will identify the boundaries of a property based on its legal description. CEA 4.1(D) The student will perform research and visit a site to gather information pertinent to the viability of a project on the site. CEA 4.1(E) The student will identify the criteria and constraints, and gather information to promote viable decisions regarding the development of their solution. CEA 4.1(F) The student will create an architectural program, a project organization chart, and a Gantt chart and hold project progress meetings to help manage the team project. CEA 4.1(G) The student will communicate ideas while developing a project using various drawing methods, sketches, graphics, or other media collected and documented. CEA 4.1(H) The student will investigate the legal, physical, and financial requirements of a project and consider the needs of the community to determine project viability. CEA 4.1(I) The student will apply current common practices utilized in Civil Engineering and Architecture to develop a viable solution in their project. CEA 4.1(J) The student will develop an understanding of how software is used as a tool to aid in the solution and then the communication of a project.		
	<b>Design Presentation</b>	<b>10 Days</b>	4.2A, 4.2B, 4.2C
	CEA 4.2(A) The student will assemble and organize work from a commercial project to showcase the project in an effective and professional manner. CEA 4.2(B) The student will create visual aids for a presentation that include the appropriate drawings, renderings, models, documentation, and the rationale for choosing the proposal for project development. CEA 4.2(C) The student will conduct an oral presentation to present a proposal for the design and development of a commercial building project.		