

Project Lead the Way: Civil Engineering and Architecture, (CEA)		Grades 9-12	
Standards		Benchmarks	Activities/Examples
1. Students will develop an understanding of the characteristics and scope of technology.	J	The nature and development of technological knowledge and processes are functions of the setting.	Introduction to site planning.
	M	Most development of technologies these days is driven by the profit motive and the market.	Introduction to project and project planning.
2. Students will develop an understanding of the core concepts of technology.	W	Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.	Introduction to commercial architecture.
	X	Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.	Overview of Civil Engineering and Architecture.
	Z	Selecting resources involves trade-offs between competing values, such as availability, cost, desirability, and waste.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
	AA	Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.	Introduction to site planning.
	CC	New technologies create new processes.	Introduction to commercial architecture.
EE	Management is the process of planning, organizing, and controlling work.	Introduction to commercial architecture.	
3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	J	Technological progress promotes the advancement of science and mathematics.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to site planning.
			Introduction to commercial architecture.
			Introduction to structural engineering.

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4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.	H	Changes caused by the use of technology can range from gradual to rapid and from subtle to obvious.	Introduction to commercial architecture.
	I	Making decisions about the use of technology involves weighing the trade-offs between the positive and negative effects.	Overview of Civil Engineering and Architecture.
			Introduction to site planning.
J	Ethical considerations are important in the development, selection, and use of technologies.	Introduction to project and project planning. Introduction to structural engineering.	
5. Students will develop an understanding of the effects of technology on the environment.	H	When new technologies are developed to reduce the use of resources, considerations of trade-offs are important.	Introduction to site planning.
			Introduction to structural engineering.
	I	With the aid of technology, various aspects of the environment can be monitored to provide information for decision-making.	Introduction to site planning.
	J	The alignment of technological processes with natural processes maximizes performance and reduces negative impacts on the environment.	Introduction to site planning.
	K	Humans devise technologies to reduce the negative consequences of other technologies.	Introduction to site planning.
Introduction to commercial architecture.			
L	Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.	Overview of Civil Engineering and Architecture.	
		Introduction to project and project planning.	
		Introduction to site planning. Introduction to commercial architecture.	
6. Students will develop an understanding of the role of society in the development and use of technology.	H	Different cultures develop their own technologies to satisfy their individual and shared needs, wants, and values.	Introduction to project and project planning.
			Introduction to site planning.
			Introduction to commercial architecture.
			Introduction to structural engineering.
	I	The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.	Introduction to commercial architecture.

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7. Students will develop an understanding of the influence of technology on history.	I	Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape.	Introduction to site planning. Introduction to structural engineering.
	J	Early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.	Introduction to project and project planning.
	N	The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.	Introduction to commercial architecture.
8. Students will develop an understanding of the attributes of design.	H	The design process includes defining a problem, brainstorming, researching an degenerating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	Introduction to project and project planning.
			Introduction to commercial architecture.
			Introduction to site planning.
	I	Design problems are seldom presented in a clearly defined form.	Introduction to site planning. Introduction to commercial architecture.
	J	The design needs to be continually checkcd and critiqued, and the ideas of the design must be redefined and improved.	
	K	Requirements of a design, such as criteria, constraints, and efficiency, sometimes compete with each other.	Overview of Civil Engineering and Architecture.
Introduction to commercial architecture.			

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9. Students will develop an understanding of engineering design.	I	Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to site planning.
			Introduction to commercial architecture.
	J	Engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.	Introduction to project and project planning.
			Introduction to commercial architecture.
	K	A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	Introduction to commercial architecture.
	L	The process of engineering design takes into account a number of factors.	Introduction to project and project planning.
Introduction to commercial architecture.			
Introduction to structural engineering.			
10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	L	Many technological problems require a multidisciplinary approach.	Introduction to project and project planning.

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11. Students will develop the abilities to apply the design process.	M Identify the design problem to solve and decide whether or not to address it.	Overview of Civil Engineering and Architecture.
		Introduction to project and project planning.
		Introduction to site planning.
		Introduction to commercial architecture.
		Introduction to structural engineering.
	N Identify criteria and constraints and determine how these will affect the design process.	Introduction to project and project planning.
		Introduction to site planning.
	O Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of the final product.	Introduction to site planning.
		Introduction to commercial architecture.
	P Evaluate the design solution using conceptual, physical, and mathematical models at various intervals of the design process in order to check for proper design and to note areas where improvements are needed.	Introduction to project and project planning.
Introduction to commercial architecture.		
R Evaluate final solutions and communicate observation, processes, and results of the entire design process, using verbal, graphic, quantitative, virtual, and written means, in addition to three-dimensional models.	Introduction to commercial architecture.	
	Student will present to professional engineers and architects and receive feedback.	
12. Students will develop the abilities to use and maintain technological products and systems.	L Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	Introduction to commercial architecture.
	N Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	Introduction to commercial architecture.
	P Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	Introduction to commercial architecture.
13. Students will develop the abilities to assess the impact of products and systems.	L Use assessment techniques, such as trend analysis and experimentation, to make decisions about the future development of technology.	Introduction to site planning.
	M Design forecasting techniques to evaluate the results of altering natural systems.	Introduction to site planning.

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17. Students will develop an understanding of and be able to select and use information and communication technologies.	Q	Technological knowledge and processes are communicated using symbols, measurement, conventions, icons, graphic images, and languages that incorporate a variety of visual, auditory, and tactile stimuli.	Student will present to professional engineers and architects and receive feedback.
20. Students will develop and understanding of and be able to select and use construction technologies.	J	Infrastructure is the underlying base or basic framework of a system.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to commercial architecture.
			Introduction to structural engineering.
	K	Structures are constructed using a variety of processes and procedures.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to commercial architecture.
			Introduction to structural engineering.
	L	The design of structures includes a number of requirements.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to site planning.
			Introduction to commercial architecture.
	M	Structures require maintenance, alteration, or renovation periodically to improve them or to alter their intended use.	Overview of Civil Engineering and Architecture.
			Introduction to project and project planning.
			Introduction to commercial architecture.
			Introduction to structural engineering.
N	Structures can include prefabricated materials.	Overview of Civil Engineering and Architecture.	
		Introduction to project and project planning.	
		Introduction to commercial architecture.	
		Introduction to structural engineering.	