Unit 06: Low-Rise Commercial Buildings

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 2**
Length: **5 Weeks**
Status: **Published**

Brief Summary of Unit

Introduction

Students will explore the planning, design, and functionality of a strip shopping center and its associated parking facilities. Emphasis will be placed on the factors that influence site development, including building placement, traffic circulation, signage, accessibility, universal design, and customer experience. Students will apply design principles and technical skills to develop a strip shopping center that responds to site requirements and user needs while incorporating space for a future interior design project.

Revision Date: July 2026

Essential Questions/Enduring Understandings

Essential Questions:

How can CAD be used to communicate solutions to complex design and engineering problems?

How can the design loop be applied to develop effective solutions to complex challenges?

How can previously acquired knowledge and skills be applied to new design problems?

How can CAD be used to communicate engineering solutions to technological challenges?

Enduring Understandings:

CAD is used to create drawings and technical documents for a variety of audiences. Understanding the needs of the intended audience helps determine the content, level of detail, and presentation of a drawing.

Specific drafting, design, and organizational strategies can be used to improve the efficiency and accuracy of the drawing process.

The design loop is an iterative and efficient problem-solving process that supports the development of successful design solutions.

Building designs are typically the result of an evolving process of research, analysis, refinement, and continuous improvement.

Students Will Know/Students Will Be Skilled At

Students will know:

Unit vocabulary, including footprint, bay, steel column, built-up roof, strip mall, strip shopping center, ADA, universal design, compartmentalization, fire-rated construction, and demising wall.

How landscape elements can be used to create visual, environmental, and functional buffers within a site design.

How parking lot layouts can be designed to improve pedestrian safety, circulation, and accessibility.

That parking lot designs must comply with Americans with Disabilities Act (ADA) requirements and accessibility standards.

That single-story buildings must incorporate means of egress systems that meet applicable life-safety requirements.

How setbacks, zoning regulations, and other site development requirements influence the design of buildings and parking facilities.

Students will be skilled at:

Designing plans, sections and elevations for a low rise building.

Designing parking to meet zoning and Americans with Disabilities Act requirements.

Designing buildings and improvements that are less impactful on the environment.

Designing buildings using construction technologies consistant with the building scale and use.

Designing buildings that are safe.

Learning Plan

- Preview the essential questions and establish connections to the concepts, skills, and learning objectives that will be explored throughout the unit.
- Examine guiding questions using images and examples of strip shopping centers:
    - Why are accessible parking spaces located in specific locations within the parking lot?
    - Why are parking lots designed with a particular number of parking spaces?
    - Why is the entrance to the parking lot located where it is?
    - Why are trees and landscape elements incorporated into parking lot designs?
    - How can parking lot design improve safety for families, pedestrians, and other users?
    - What challenges might individuals using wheelchairs encounter when accessing a building, and how can these challenges be addressed through design?
    - Why are commercial signs limited in size and placement?
    - Why are certain types of signs permitted while others are restricted?

    - What is the purpose of a canopy, and how does it contribute to the functionality and appearance of a building?
    - What are the major components of a strip shopping center, and what are their space requirements?
    - Where are the primary structural elements that support the building located?
    - What structural systems and components are used to support the building?
- Participate in lectures and discussions focused on the Strip Shopping Center and Parking Design Project, including a review of project expectations, assessment criteria, and opportunities for student involvement in developing grading rubrics.
- Engage in lectures and guided reviews covering the components, systems, and design considerations associated with strip shopping centers and parking facilities.
- Observe demonstrations illustrating how architects and designers approach site planning, building design, and problem-solving within a commercial development project.
- Formative assessments will be conducted throughout the design process to monitor student understanding, provide feedback, and support project development.
- Summative assessment of the design project will be conducted collaboratively by the student and teacher using a rubric aligned with the project objectives and design criteria.
- Complete a unit test or quiz assessing knowledge of site planning, building design, accessibility requirements, zoning considerations, and related course content.
- Complete a written response or writing prompt that demonstrates understanding of key concepts, design decisions, and project outcomes.

Assessment

Formative Assessments

Formative assessments will be conducted throughout the design process through teacher feedback, class discussion, progress checks, and review of student work.

Teacher feedback will be provided on student design logs to support reflection, revision, and continued development of the project.

Summative Assessment:

Answer the essential questions.

Design a strip shopping center with parking and develop the project using CAD. The site will be located on the student's site plan. Students will design and create presentation drawings for a strip shopping center and parking area that demonstrate an understanding of means of egress, curtain wall systems, steel construction, accessibility, circulation, and site planning. The presentation will include a written description explaining the technical aspects of the proposal. The project will be evaluated using a rubric.

Demonstrate the ability to use software and technical drawing conventions to communicate a design solution effectively.

Complete written quizzes and tests assessing understanding of course content and subject materials.

Maintain a design log demonstrating how the design loop was used throughout the project.

Maintain a design log explaining how the design evolved, including sources of information, research, feedback, and critiques.

The presentation will be evaluated using teacher- and student-designed rubrics.

The presentation will be included in an electronic portfolio.

Write a response to one or more writing prompts. Possible prompts may include: Reflecting on the strip shopping center project, which concepts were new and which concepts reviewed prior learning? What is universal design, and how can its concepts be applied in the design of a strip shopping center?

Benchmark Assessment:

Final Exam

Alternative Assessment:

Presentation of Design Log

Materials

The CADD LAB-computers equipped with up-to-date AutoCAD and/or other design and drafting software, presentation software, productivity software, a scanner and printers/plotters.

Traditional drafting equipment and supplies-vellum, colored and graphite pencils, pen and ink, drawing boards, tape, scissors, t-squares, triangles etc.

Chip-board, X-acto knives and other model making supplies.

A computer with INTERNET based presentation software (i.e. Prezi and Google Slides) and Microsoft Powerpoint.

3-D printer and supplies

Safety glasses

INTERNET resources and tutorials on how to use CAD software.

Teacher e-board.

SmartBoard use for teacher presentation and interactive lessons

SmartBoard use for student presentations.

Model making materials, dependant on projects that used.

Standards

9.2.12.CAP	Career Awareness and Planning
TECH.K-12.1.1	Empowered Learner
9.4.12.CI	Creativity and Innovation
	There are strategies to improve one’s professional value and marketability.
L.SS.9–10.1	Demonstrate command of the system and structure of the English language when writing or speaking.
TECH.K-12.1.1.a	articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
	Innovative ideas or innovation can lead to career opportunities.
TECH.K-12.1.1.c	use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
9.2.12.CAP.3	Investigate how continuing education contributes to one's career and personal growth.
9.4.12.CI.2	Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
	Career planning requires purposeful planning based on research, self-knowledge, and informed choices.
9.4.12.CI.3	Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
TECH.K-12.1.2	Digital Citizen
9.4.12.CT	Critical Thinking and Problem-solving
L.KL.9–10.2	Apply knowledge of language to make effective choices for meaning, or style, and to comprehend more fully when reading, writing, speaking or listening.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
	Collaboration with individuals with diverse experiences can aid in the problem-solving process, particularly for global issues where diverse solutions are needed.
9.4.12.CT.1	Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
9.2.12.CAP.7	Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.
9.4.12.CT.2	Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
TECH.K-12.1.2.c	demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.

TECH.K-12.1.2.d	manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
L.VL.9–10.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 9–10 reading and content, including technical meanings, choosing flexibly from a range of strategies.
TECH.K-12.1.3	Knowledge Constructor
TECH.K-12.1.3.a	plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
TECH.K-12.1.3.c	curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
L.VI.9–10.4	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings, including connotative meanings.
LA.RST.9-10.1	Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.
TECH.K-12.1.3.d	build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.
TECH.K-12.1.4	Innovative Designer
TECH.K-12.1.4.a	know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
TECH.K-12.1.4.c	develop, test and refine prototypes as part of a cyclical design process.
9.4.12.GCA	Global and Cultural Awareness
9.4.12.GCA.1	Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
TECH.K-12.1.6	Creative Communicator
TECH.K-12.1.6.a	choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
TECH.K-12.1.6.b	create original works or responsibly repurpose or remix digital resources into new creations.
TECH.K-12.1.6.c	communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models or simulations.
TECH.K-12.1.6.d	publish or present content that customizes the message and medium for their intended audiences.
9.4.12.TL	Technology Literacy
	Digital tools differ in features, capacities, and styles. Knowledge of different digital tools is helpful in selecting the best tool for a given task.
9.4.12.TL.1	Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
	Engineering design is a complex process in which creativity, content knowledge, research, and analysis are used to address local and global problems. Decisions on trade-offs involve systematic comparisons of all costs and benefits, and final steps that may involve redesigning for optimization.
	Collaborative digital tools can be used to access, record and share different viewpoints and to collect and tabulate the views of groups of people.
8.2.12.ED.1	Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.

8.2.12.ED.2	Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.
8.2.12.ED.3	Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.
8.2.12.ED.4	Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.
	Engineering design evaluation, a process for determining how well a solution meets requirements, involves systematic comparisons between requirements, specifications, and constraints.
8.2.12.ED.5	Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
ETW	Effects of Technology on the Natural World
	Development and modification of any technological system needs to take into account how the operation of the system will affect natural resources and ecosystems. Impacts of technological systems on the environment need to be monitored and must inform decision-making. Many technologies have been designed to have a positive impact on the environment and to monitor environmental change over time.
HS-ETS1	Engineering Design
HS-ETS1-1	Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
	Asking Questions and Defining Problems
	Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations.
ETS1.A	Delimiting Engineering Problems
	Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.
	Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
	Constructing Explanations and Designing Solutions
ETS1.C	Optimizing the Design Solution

Integrated Accommodation and Modifications, Special Education students, English Language Learners, At-Risk Students, Gifted and Talented students, Career Education, and those with 504s