- Use techniques, skills, and modern engineering skills necessary for engineering practice. In this unit, use structural analysis software and other engineering tools to model and analyze structural components.

Understandings

Students will understand that:

- The purpose of a structure is to withstand all applied loads and forces and to transfer these forces to the Earth.
- Structural engineering involves the critical analysis of forces and loads, the anticipated effect of these loads on a structure, and the design of structural elements to safely and efficiently resist the anticipated forces and loads.
- Design loads are often dictated by building codes.
- Structural design includes the determination of how structures disperse the applied loads.
- The application of loads to a building will result in resisting forces from the structure. This process can be predicted through the use of mathematics and physical science principles.

Knowledge and Skills

Knowledge: Students will:

- Identify and describe the typical usage of common commercial foundation systems.
- Given a structural form, describe how the structure resists and transfers applied loads.
- Identify and differentiate between the various design loads that may influence the structural design of a building including dead, live, snow, wind, earthquake, flood, and earth pressure loads.

EQUIPMENT / MATERIALS / RESOURCES:

Students will need or utilize:

- ☒ Assignment Handouts / Instructions
- ☒ CAD Software
- ☒ Classroom Materials / Equipment
- ☒ Computer / Device
- ☒ Internet Access
- ☒ Microsoft Office Software
- ☒ Online Resources
- ☒ Other Software
- ☒ Schoology
- ☒ Teacher Handouts
- ☐ Other:

AGENDA / ACTIVITIES / INSTRUCTIONAL PROCEDURES:

Teacher Activity (Introduction to New Material)

The teacher will:

- Review the Learning Objectives and Essential Questions for the lesson (at the beginning and throughout).
- Lead a class discussion about the Learning Objectives and Essential Questions for the lesson.
- Provide an overview of assignments that will be worked on throughout the lesson.
- Demonstrate expectations / skills.
- Provide instructions for *Project 3.1.1 Keystone Library Renovation*.
- Lead a class discussion via the teacher-led PowerPoint presentation called “Introduction to Structural Design”.
- Provide instructions for *Project 3.2.1 Structural Forms*.
- Review and provide access to the *Project 3.2.1 Structural Forms Rubric*.
- Lead a class discussion via the teacher-led PowerPoint presentation called “Loads and Load Paths”.
- Provide instructions for *Activity 3.2.2 Loads*.
- Provide access to the *Importance Factor Table*.
- Provide access to the *Weights of Materials Table*.
- Provide access to the *Roof Deck Span-Load Table*.
- Provide access to the *K-Series Standard ASD Load Table for Open Web Steel Joists*.
- Lead a class discussion via the teacher-led PowerPoint presentation called “Beam Analysis”.
- Provide instructions for