General Residential Building for Master Dorm Expansion

Hallie Fenimore, Makenna Sheets, and Lia Vawter
Design Engineering Technology
Advisor: Professor Jeremy Rentz

## Opportunity

The Senior Design project was to design a general dormitory building for Trine University. The project was to add more housing for students on campus behind the Moss apartment if those houses were ever torn down.
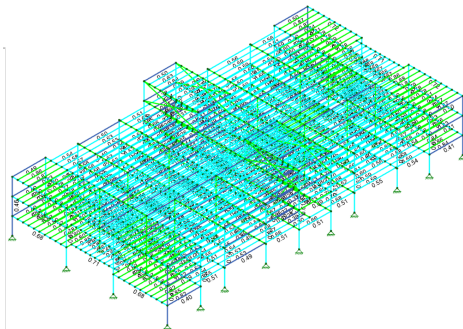
Structural Analysis

Loads (forces) were researched from ASCE 7-10 design manual and then the analysis of the load path was how the structure was designed for the general dormitory.
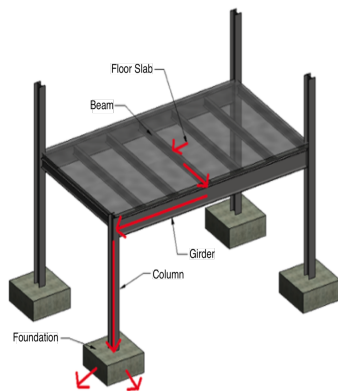
Structural Design

RISA 3D was the BIM program used in assisting in the analysis of the framing system of the dormitory building.

Foundations

The foundation of the project was designed using RISAFoundations and checked with hand calculations.

Green Roof

The design of an Intensive green roof was used for the idea of additional outdoor space for students to study, relax, and hang out in a different way.
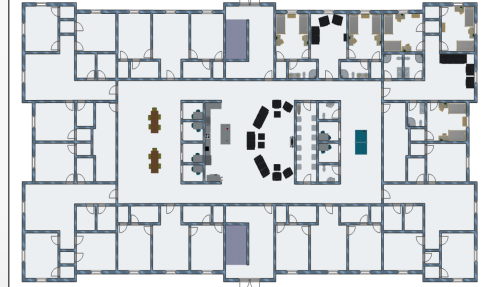

Soil Testing

Soil samples were gathered by hand auguring to get accurate calculations for foundation design.

Layout

The dormitory layout was designed based on the survey that Trine University students answered last Spring Semester (2022).

Group Members

Left to Right:
Lia Vawter
Makenna Sheets
Hallie Fenimore

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Opportunity

The Senior Design project was to design a general dormitory building for Trine University. The project was to add more on-campus housing for students behind Moss Street Apartments. The houses on the site will be torn down to accommodate this project. Five dorms will be orientated on the site with parking and a small green space.

Green Roof

There are not many places on campus available for outdoor studying. By including an intensive green roof, it allows students to enjoy the outdoors while studying, relaxing, and making lifelong friendships. A green roof not only provides social benefits to the school, but it also helps the environment by decreasing runoff and reducing heat flux from roof to building by up to 72%.

Layout

The floor layout was designed based on the golf course apartments with added features that students liked from other housing offered on campus. Trine University's goal is to be a residential campus and since these dorm buildings were going to be the farthest from athletics and academic buildings, these buildings needed to be student-oriented in its design.

Soil Testing

Soil samples were taken by hand auguring to get accurate calculations for foundation design. A hand augur sample can only reach 5 ft into the surface. More in-depth data was provided by the school. Results were analyzed to design the type of foundation needed for the building.


Structural Analysis

Loads (forces) were taken from ASCE 7-10 design manual. The path that the loads travel was then analyzed to be able to design the foundation. This process was used to size the beam as well. The beam size can be determined by knowing the force acting on each beam
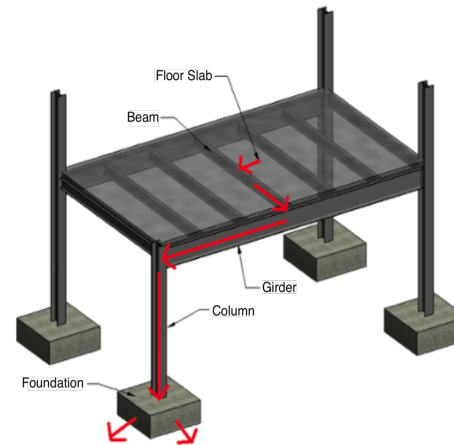
Structural Design

RISA 3D was the Building Information Modeling (BIM) program used in assisting the analysis of the framing system of the dormitory building. The colors of the structure represent the beams being properly sized.
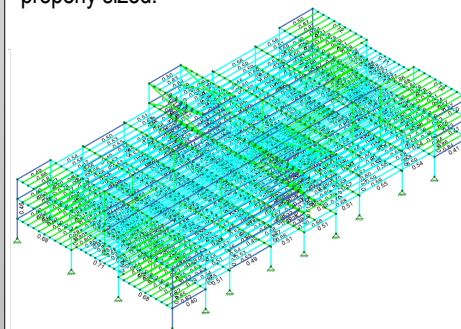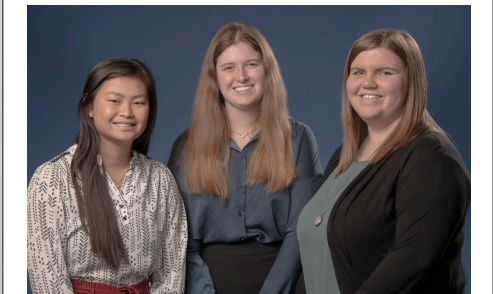

Foundations

The foundation of the building was designed using RISAFoundations and was checked with hand calculations. The foundation of the building was designed as square concrete footings. The square footing base sizes ranged from 6 ft to 13 ft. In total, the building has 40 square footings to support the building.

Group Members

Left to Right: Lia Vawter, Makenna Sheets, Hallie Fenimore

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