



# Trine University Student Design Center

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## INTRODUCTION

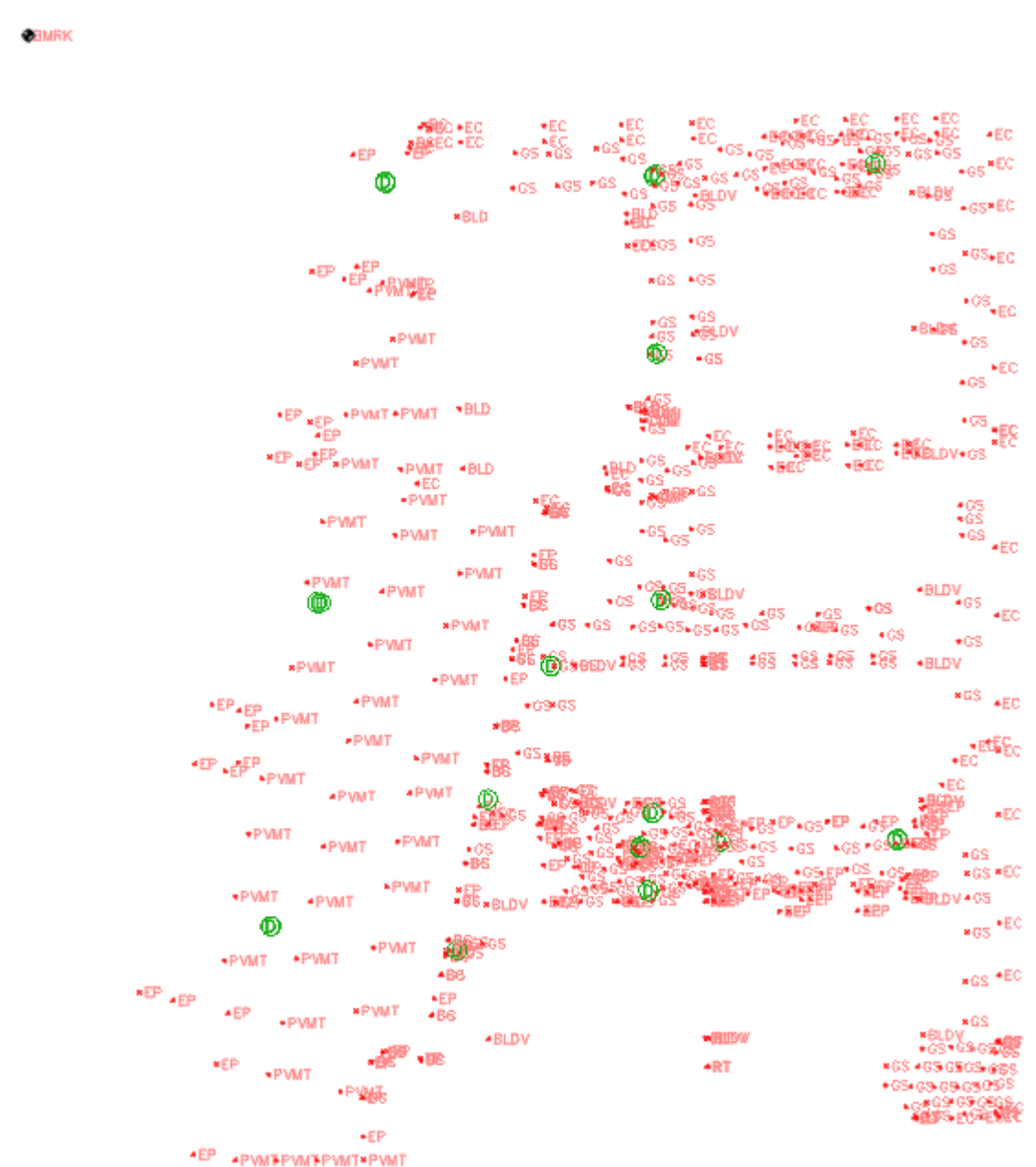
The Trine University campus wants to increase the size of the existing Student Design Center. The new building will help accommodate the growing engineering enrollment on campus.

The scope of this project includes the building design, foundation design, and improving the storm sewer system.



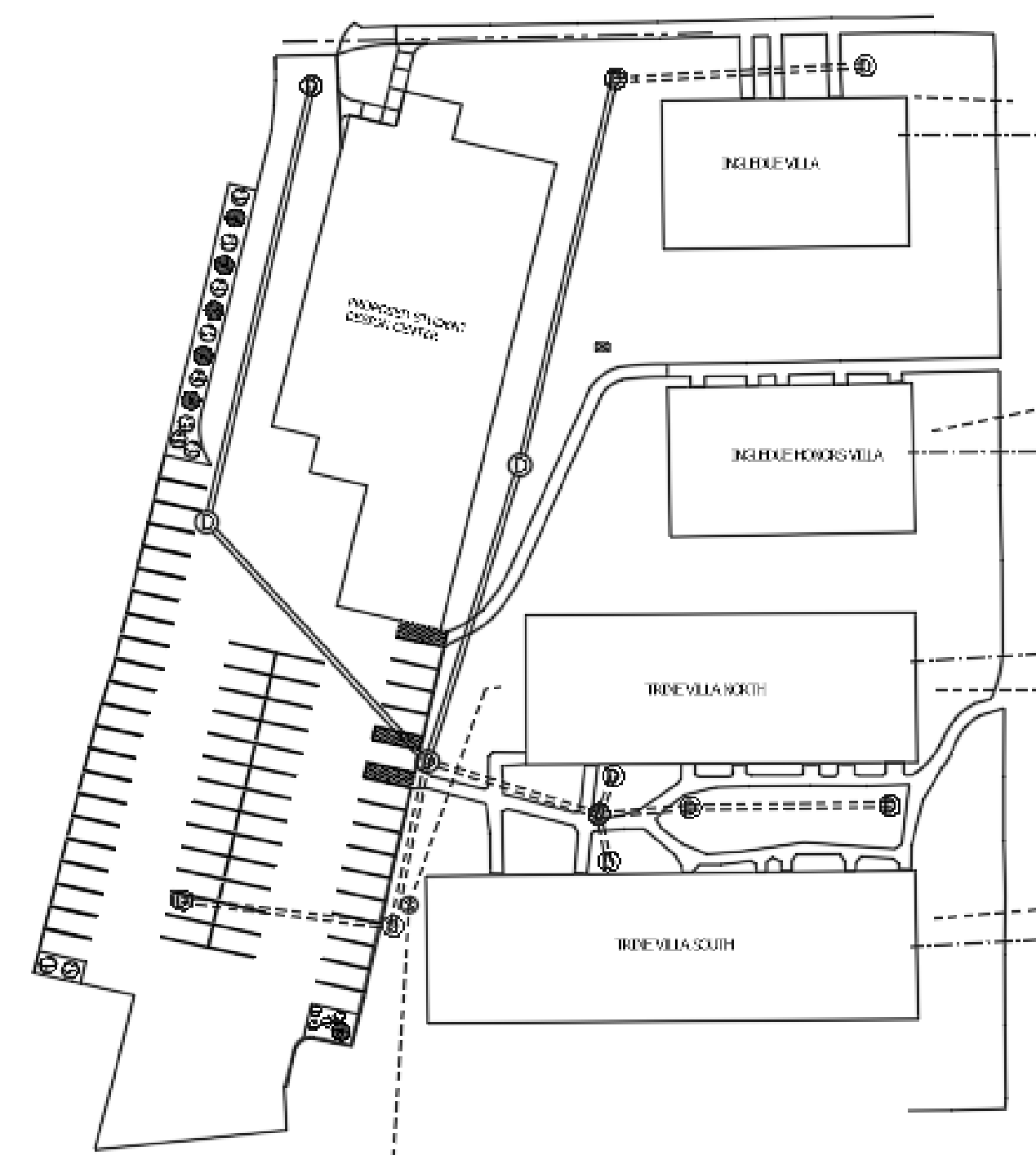
## DATA COLLECTION

The initial stages involved conducting detailed land surveys to understand the topography and layout of the existing plot of land and the surrounding areas. Additionally, soil boring tests were performed across various locations around the project site during previous projects. These tests were crucial for assessing soil composition and stability, which are vital for determining the appropriate pavement design and infrastructure placement.



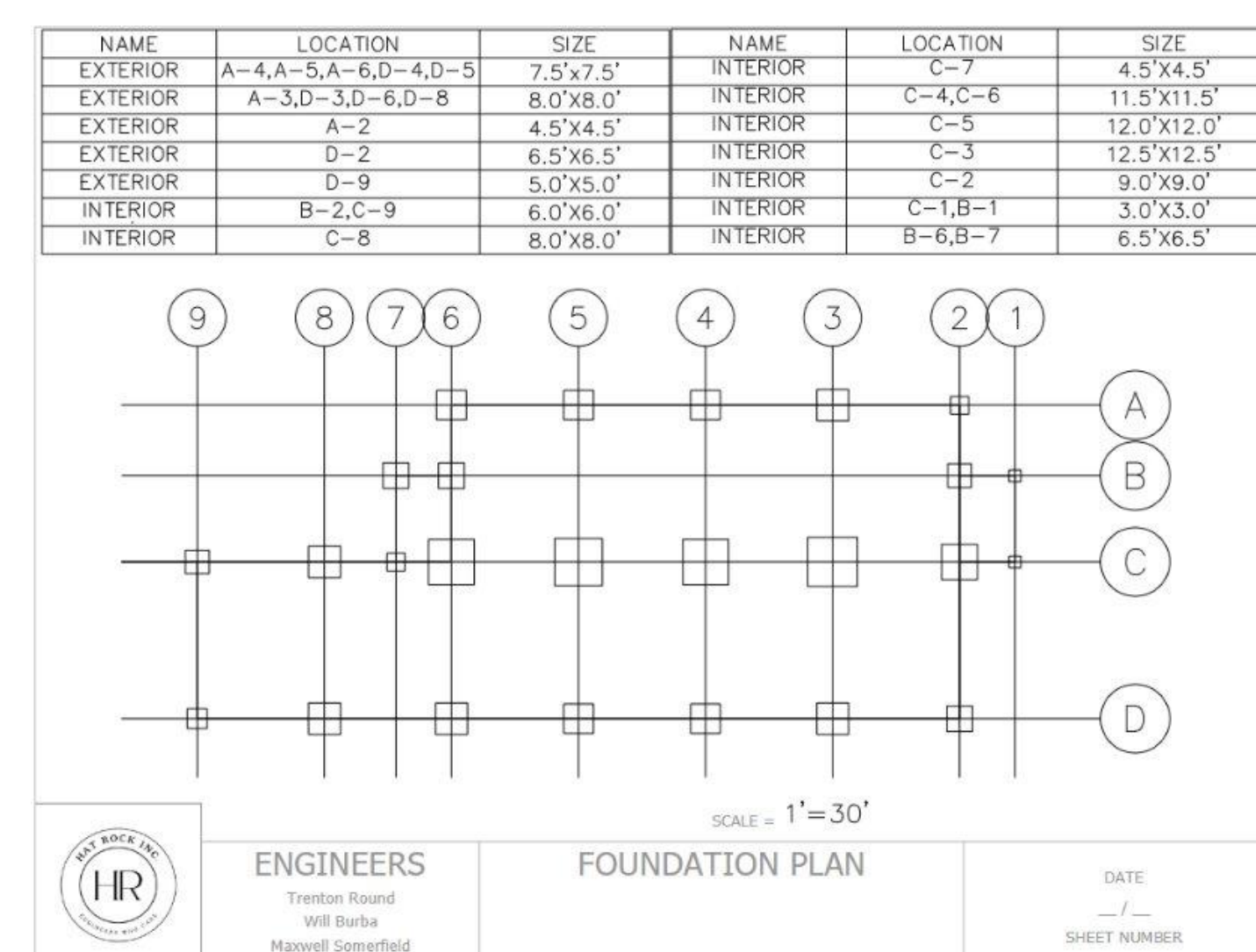
## SITE DESIGN

We utilized Civil3D to layout our proposed building and storm sewer. Considering the existing Villas and parking lot, we produced a layout that best utilizes the existing parking lot space and storm sewer.



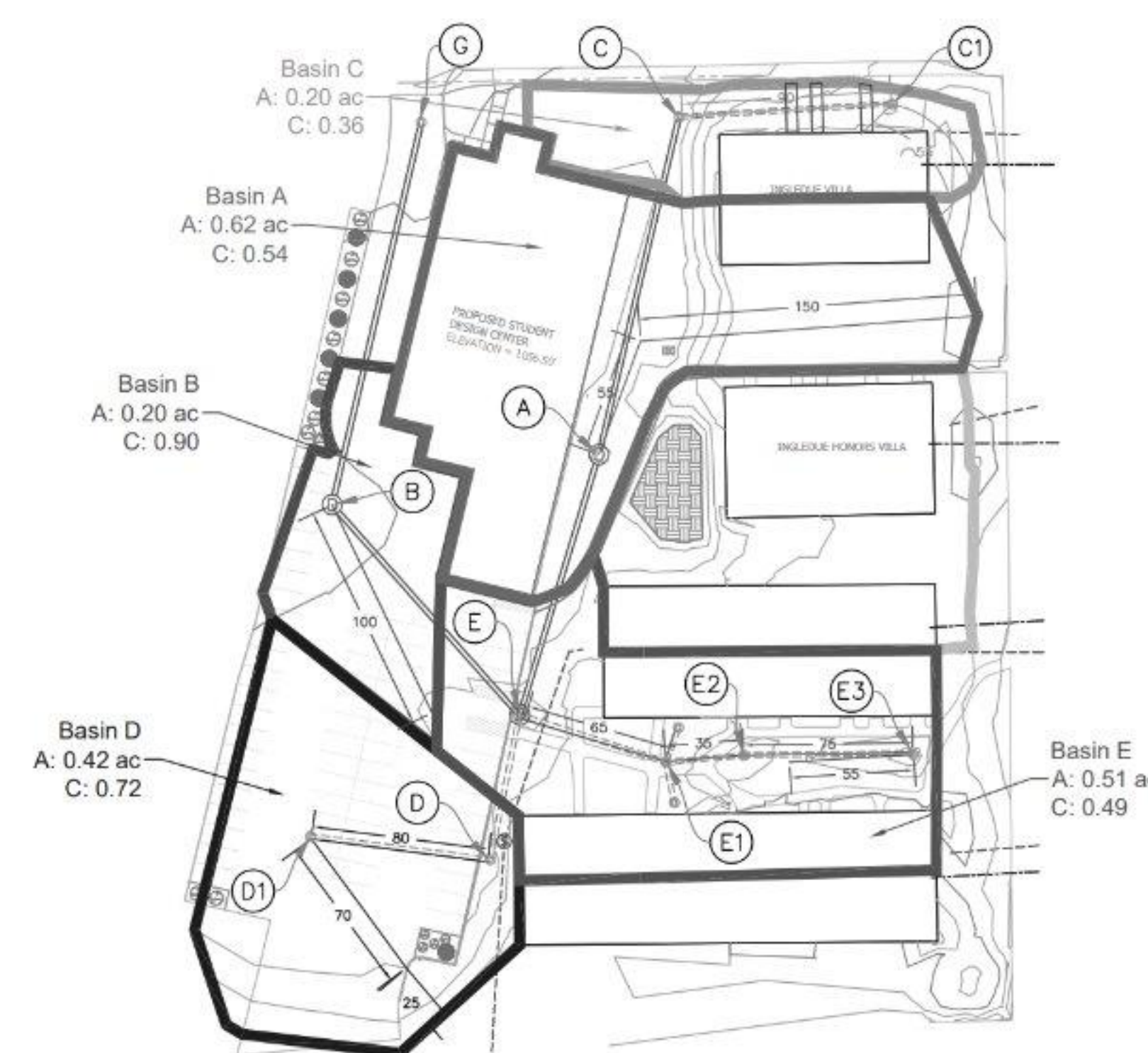
## FOUNDATION DESIGN

The foundation design used Terzaghi's Settlement Theory and ACI 318-19. Square footings were used in this design. We began by calculating an initial footing base width based on bearing pressure, column loads, footing thickness and soil thickness. This was then used to calculate footing settlement to ensure did not exceed the maximum settlement of 1 inch. We then referenced the RISA-3D design into RISA Foundations to check the shear, moment, and supporting steel to ensure the design would not fail.



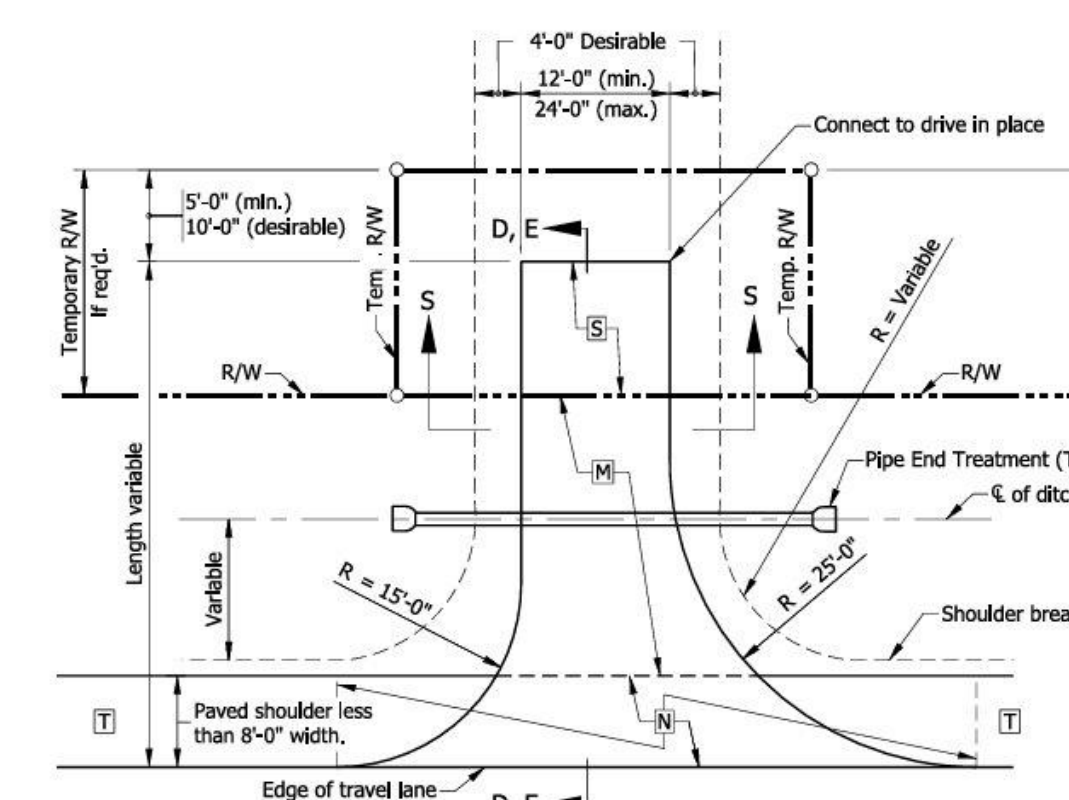
## STORMWATER MANAGEMENT

Stormwater management includes a well-designed storm sewer system to efficiently channel runoff to a safe outlet, preventing localized flooding. Additionally, the project incorporates a single rain garden, placed to slow down water flow, naturally filter out pollutants and reduce stress on the infrastructure.



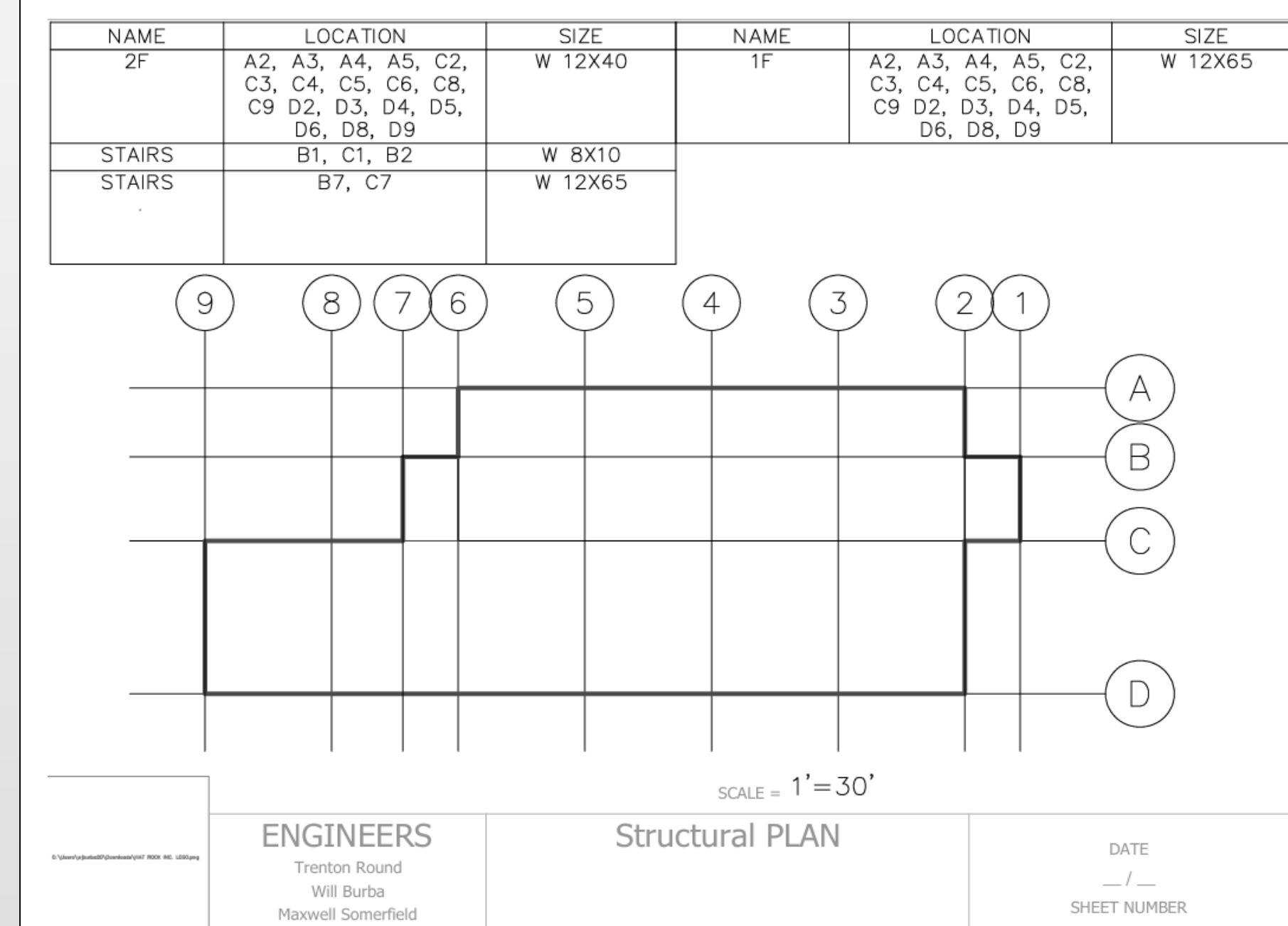
## PAVEMENT DESIGN

The parking lot and drive experience a minimal amount of traffic. Because of this, the ESALs are low, and the minimum pavement depth is used. For the drive, INDOT's Standard drawing Class 2 Residential Drive will be used.



## STRUCTURAL DESIGN

The Student Design Center at Trine will add another story, increase the size of the ground floor, and allow more students to have access to the building. We decided to design a steel frame building utilizing steel joists as beams and girders and composite decks for the roof and second story floor. These members were selected to optimize strength to weight ratio to create an effective yet inexpensive design.



## FINAL COST ESTIMATE

PayItem	Cost
Building	\$653,600.00
Utilities	\$101,395.00
Erosion Control	\$1,050.00
Pavement	\$221,077.53
Engineering Design	\$25,000.00

Cost Estimate

\$1.01 million