

Sustainable architecture is a necessity for the preservation of the planet and all forms of life. To consider the future and long term effects of design, better use of resources is essential. Population growth, energy demands, and lifestyle continue to change the realities of energy production and consumption. In short, better design of our built world will allow for a less harmful human impact.

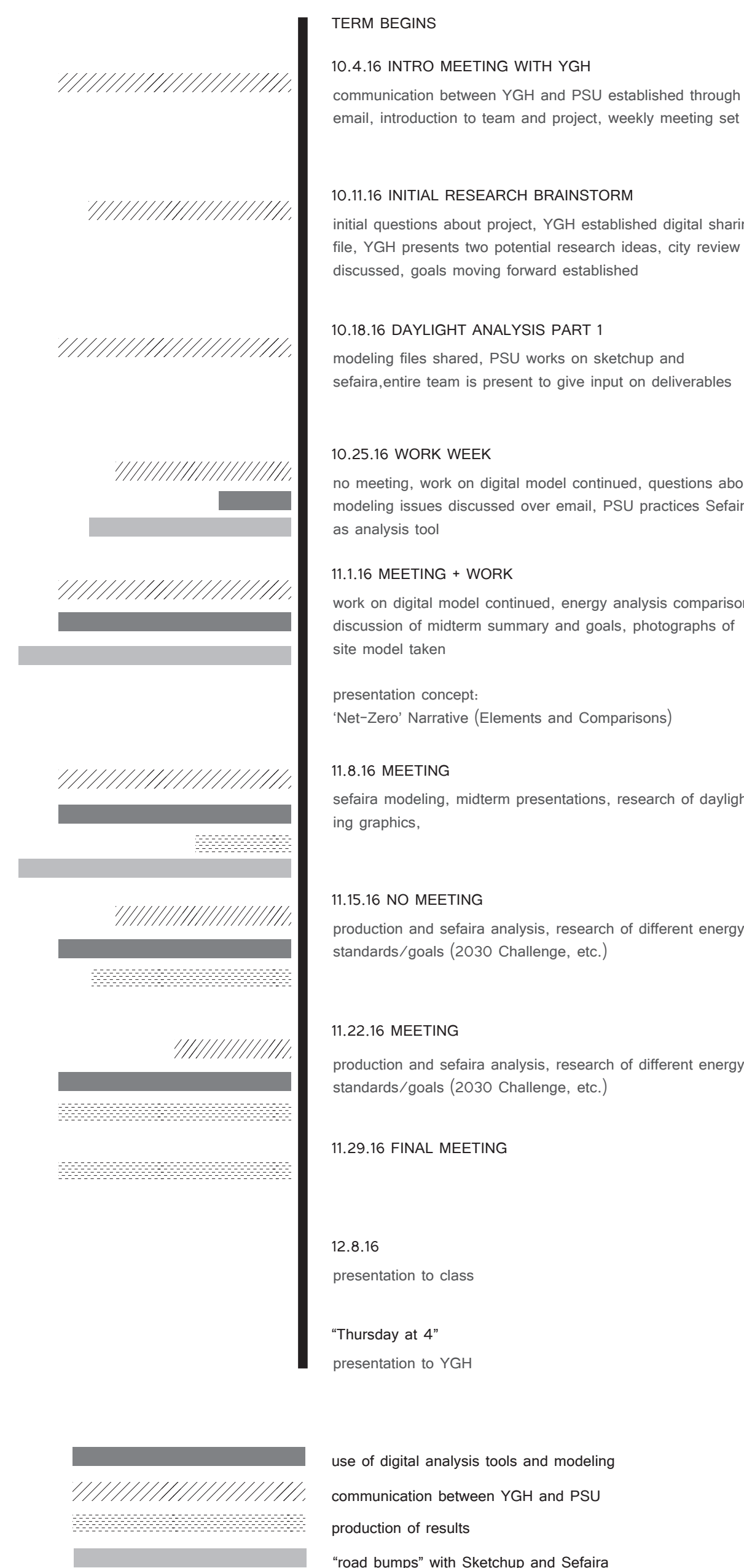
A variety of sustainability strategies can be considered in all types of design. To narrow the method to one single equation is impossible. Solutions should consider all aspects of a building and site. For example, daylighting can reduce the energy needs of a building. Daylight is limited based on the climate and location. It also depends on the relationship between building and sky. Daylighting is passive strategy to use natural light to brighten a space. The benefits range from aesthetic space to psychological health to energy efficiency. How to best incorporate daylighting into a design has become a digital activity for many architects and engineers. A continuous development in software aids in the process of scientifically answering these questions.

OVERVIEW

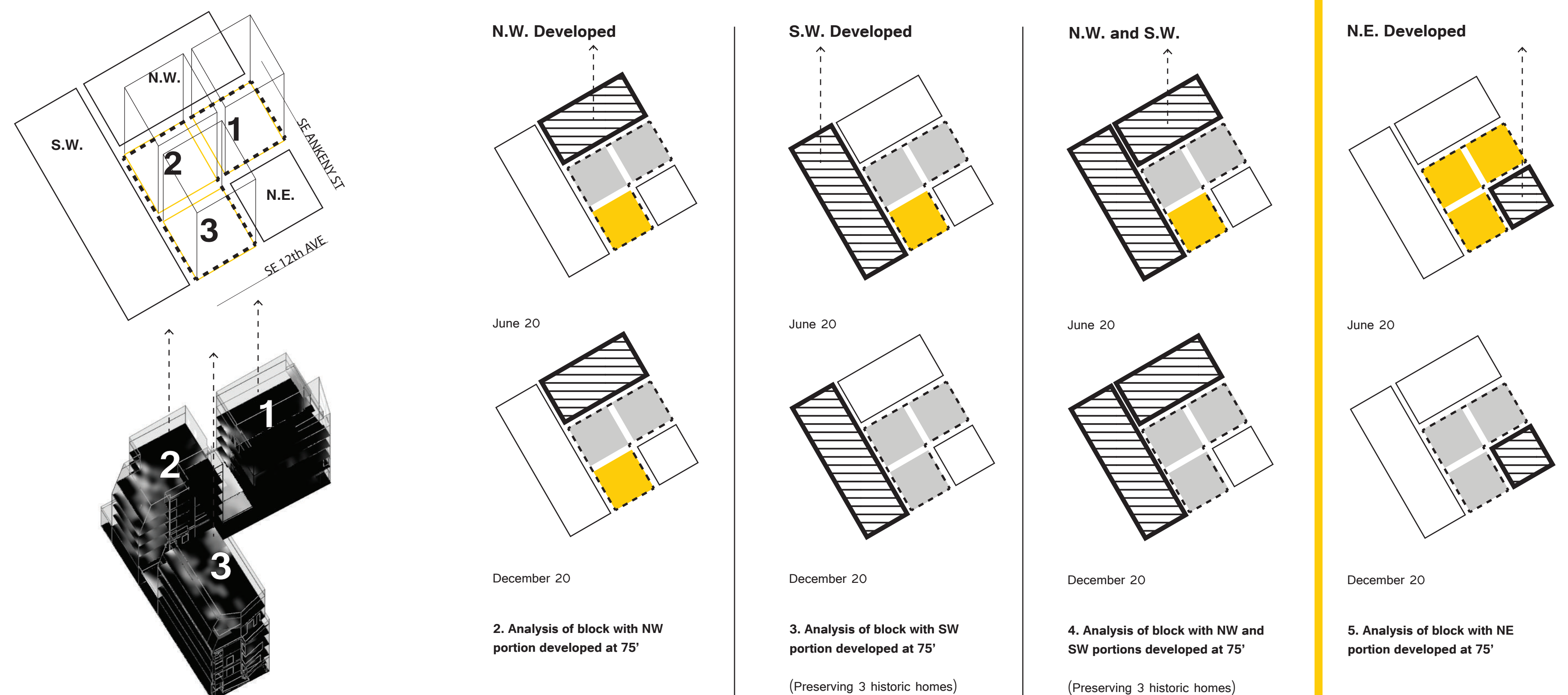
The goal of this research is to produce a daylight and energy analysis of the Yost Grube Hall Ankeny 'Net Zero' Multi-Family Housing project. The examination of current daylight levels provides information on what is gained or lost in regards to daylighting and net-zero goals. A focus on the progression of the surrounding neighbourhood development will guide the different daylight studies. This combined with the other strategies employed by YGH in their design efforts forms a narrative about the realities of 'Net-Zero' architecture and the various routes to success.

RESEARCH GOALS:

- Daylighting Analysis
- Energy Analysis in relation to daylighting
- Graphics/Representation of results



3 Daylighting "Zones" with 4 Scenarios of Surrounding Block Development



1. Analysis of block 'as is'

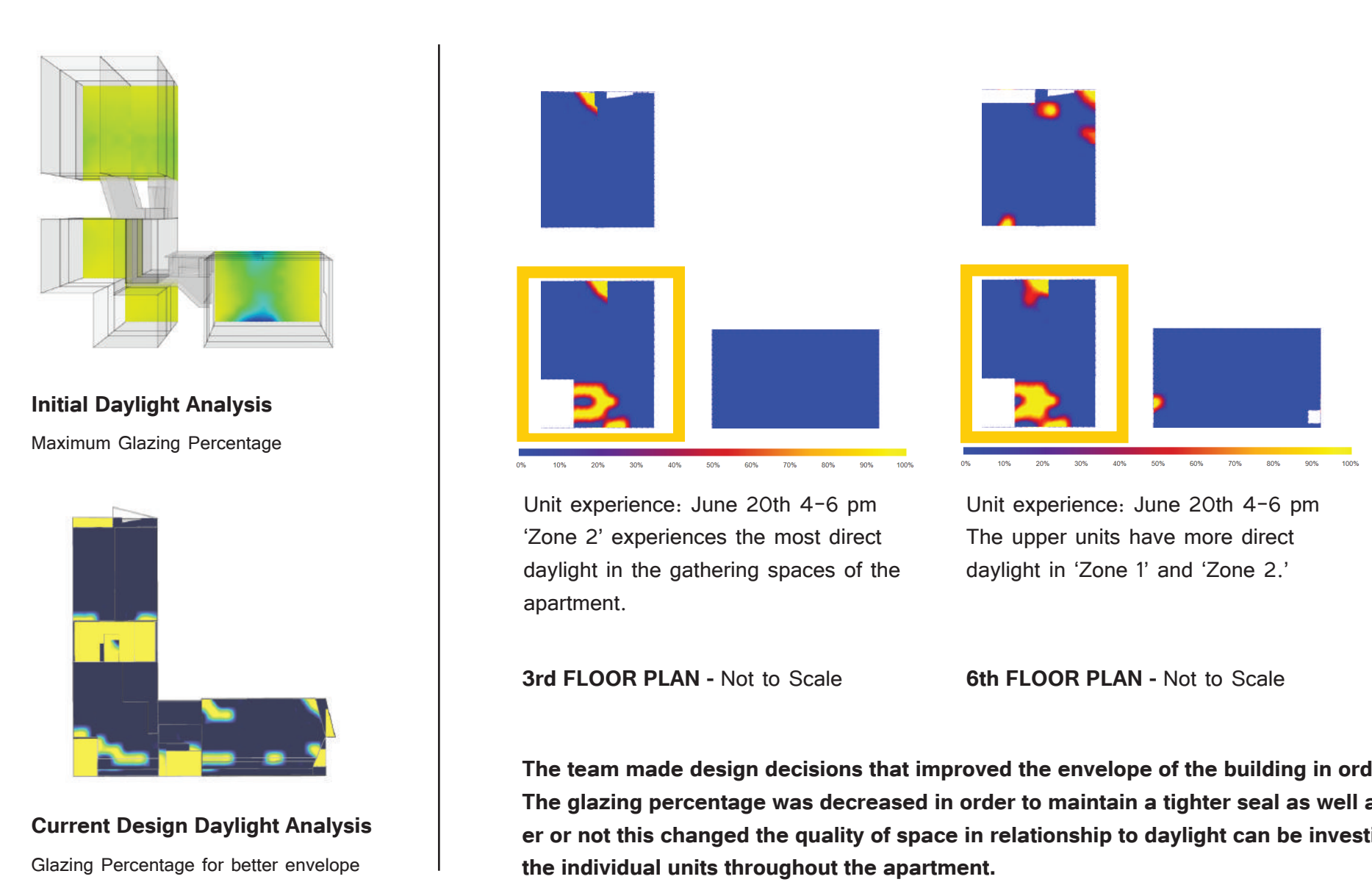
Focus: "Residential" Hours
Morning: 8-10 AM
Evening: 3-6PM

Conclusion: The direct daylighting is best during the summer month evenings.

DECEMBER
Morning: 1.1 hrs
Evening: 0 hrs

JUNE
Morning: 1.8 hrs
Evening: 1.9 hrs

Daylighting and Energy Use



Conclusions

Surrounding Development
The direct-daylight will be decreased if surrounding buildings on the block are developed.

Quality of Space
The daylighting of residential gathering spaces remains relatively high. When taking a closer look at the individual units at specifically "residential hours," the units still experience direct daylighting. Therefore, the daylighting was not lost in the efforts to reach net-zero standards.

Sefaira as a Tool of Analysis
Sefaira produced inconsistent numbers throughout the process of this research. Whether the glitch was a misread or an inability to read the digital model in any manner, the conclusion can be made that the concrete metrics desired for research cannot be found using Sefaira. However, the analysis of general relationships and relative increase or decrease is attainable using the tool.

