

# Senior Thesis Final Report

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## Executive Summary

This thesis presents the process taken to create a new design for Parkview at Bloomfield Station, a residential building located in Bloomfield, New Jersey. The summary of the original design is introduced and the initial design requirements are laid out. From here, the new structural system is created and analyzed based on structural and architectural requirements. Finally, two breadth topics are introduced to determine the new buildings cost advantage and cladding as compared to the original design.

## Original Design

The original structural system is composed of light gage roof trusses, panelized bearing light gage walls, 16" deep D500 Hambro® floor joists, and 38 shear walls in the main lateral force resisting system. The precast garage at the center of the building is structurally separate, and only the 4" building separation is considered for story drift.

## New Structural Design

The analysis of a new steel braced frame design is conducted to replace the current light gage bearing wall system. The most recent codes are used in the design analysis, updating the codes used in the original design. From the two different framing orientations analyzed, the 20K9 bar joist floor system spanning 38'-0" was concluded to be the most efficient and compatible design. Furthermore, the use of the braced frame system requires less lateral frames than the original system, creating the use of gravity frames at some unit separation locations. This helps to preserve the architecture of the living units while allowing for changes in future use. The foundation system in the new design is composed of spread footings that replace the original strip footings. In addition to these structural issues, a vibration analysis on the bar joist system shows that the floor is over the design limits but can still be considered acceptable.

## Breadth Overview

This section investigates two breadth topics that effect large portions of Parkview at Bloomfield Station. First, the effect of changing from a Hambro® system to the new bar joist on steel frame system had on the cost and schedule is analyzed to show that the new system has cost benefits and better sequencing flexibility than the original system. Secondly, an analysis of the current Exterior Insulation and Finish System (EIFS) is studied and shown that a drainable EIFS system is the best solution.