

Executive Summary:

This Final Thesis Report is the culmination of a yearlong study of the MICA Gateway Residence. The Gateway is a residence hall at the Maryland Institute College of Arts designed to be a cornerstone of their campus in downtown Baltimore, Maryland. Gateway is 122' tall, with 9 stories and a mechanical penthouse and has a useable floor area of 108,000 square feet. The Gateway is primarily circular in plan with a rectangular tower on the side that faces a highway. The circle, or drum component of the building encloses an open-air courtyard that actually begins on the third floor of the structure. This plaza is located directly above a large "black-box" multipurpose room capable of multiple arrangements to fit a variety of functions. Beyond the multipurpose assembly room, Gateway features 64 student apartments, several art galleries and studios, and a café. The Gateway was designed by RTKL Associates and KCW Engineering Technologies and was built by Whiting Turner.

The proposal for this thesis was an investigation of the necessary structural design changes required to design the Gateway as a museum rather than as a residence hall. The live loads for a museum are considerably higher than those for a residence hall. This fact led to changes in the gravity system of the structure, specifically an increase in strength of the concrete floor slabs. The increased live and dead loads, along with architectural changes that increase the floor-to-floor height of the structure, necessitate new designs for the columns, including new sizes, reinforcement, and slenderness checks.

Changes to the gravity system and the overall number of floors required an in-depth look at the Gateway lateral system. Under the new loading conditions and gravity structure it was important to check if the shear walls could resist the new lateral loads and to redesign them if they could not. Changes in the overall superstructure of the building also required that the foundation of the building be assessed to handle the new loading conditions.

In addition to the structural depth of this thesis, two breadth topics were also studied. An architectural breadth was chosen due to the many changes required to make the Gateway adequate for a museum. Changes to the floor plan, circulation of people, elevations, and façade were all analyzed. Sustainability was chosen as the second breadth due to the Gateway's lack of sustainable features. A green roof was designed for the building as an additional architectural component as well as a sustainable measure to reach LEED certification. Several LEED credits were also deemed feasible to achieve in the Gateway, thus accumulating enough credits for the building to become LEED certified.