
Executive Summary

Building Description

The Center for Science & Medicine is an 11-story research laboratory located in New York City's Upper Manhattan. Situated within the building are a spacious lobby area, 6 floors of wet lab research space, 1½ floors of clinical space, a clinical trial area, and space for research imaging. The building stands a total of 184'-0" above grade, with a typical floor to floor height of 15'-0." It is a steel structure designed with a core of braced frames in the center of the building and moment frames around the perimeter. The footprint of CSM is approximately 172 feet by 200 feet.

Depth Study: Lateral System Re-Design

At its current phase of design, the Center for Science and Medicine has been planned to utilize a combination of perimeter moment frames and core braced frames to resist lateral loads. After careful study of this system, it has been determined that moment frames are not significantly stiff, due to their double-heightened configuration, and braced frames pose coordination headaches as well as constructability issues. Therefore, two alternative systems will be proposed to in an attempt to eliminate these issues.

Alternative 1: The first option for a lateral system re-design is a core-only system of shear walls. These shear walls will be designed to resist 100% of the lateral load in both directions, therefore eliminating the need for perimeter moment frames. Such a system is expected to provide more stiffness than the current braced frame design, provide added resistance to uplift, and possibly speed erection time while cutting costs in the elimination of expensive moment frames.

Alternative 2: The second system considered will use a combination of shear walls at the core and moment frames at the perimeter to resist lateral loads. Shear walls around the building core will be thinner in this configuration since they will be aided by moment frames in resisting load. Moment frames will be located one bay length inside of the perimeter and will be designed with moment connections at every level. With this configuration, frames will be stiffer, they will not need to run the whole length of the building, and the exterior cladding system will become a non-issue. This system should be lighter than Alternative 1 while still reducing the number of moment connections needed to resist lateral loads.

Breadth Study 1: Sustainability

The Center for Science and Medicine has been designed with the goal of attaining a LEED Gold rating. Such a classification requires the building and its systems to fulfill at least 39 out of a possible 69 LEED points. Since the project is still in the design development phase, only a pre-certification estimate has been performed to determine which points can be earned. The estimate indicates that 33 points are planned or have already been incorporated into the design of the building. This leaves a minimum of 6 points to still be fulfilled in order to attain LEED Gold. This breadth study will investigate various sustainable solutions that will earn the needed LEED credits to obtain a Gold rating. Cost analysis of these systems, as well as schedule impacts, will be considered as well.

Breadth Study 2: Construction Management & Building Information Modeling (BIM)

One of the unique aspects of the Center for Science & Medicine is that it is being designed in 4-D, utilizing BIM (building information modeling) technology. Since this is a relatively new design tool in an industry based on historically-rooted standards and practices, it is a question as to whether this cutting-edge design method will truly pay off. This breadth study will consider the positive and negative effects BIM has had on the design process of CSM thus far. Additional research will be done to investigate other design / construction processes done using BIM, and data collected from such case studies will be used to compare to CSM's specific case. From here, conclusions can be drawn regarding the effectiveness of building information modeling, and recommendations can be made to CSM's design team as well as the rest of the AEC community.