

# Cardiovascular Innovation Institute

Louisville, KY



## Team

### Owner:

University of Louisville, Louisville, KY

### Architect:

Arrasmith Judd Rapp Chovan Inc.  
Louisville, KY

### Engineer:

Rangaswamy & Associates Inc.  
Louisville, KY

### General Contractor:

Gilbane Building Co., Westerville, OH

### Reinforcing Bar Fabricator:

Gerdau Ameristeel, Louisville, KY

### Total Project Cost:

\$27.5 million

### Total Project Size:

85,000 sq ft (7-story)

### Photography:

Feinknopf Studios

## STRUCTURAL FRAMING SYSTEM

Creating a seven-story facility to research cardiovascular diseases requires balancing a wide range of specialized needs. Vibration control, climate control and energy efficiency are critical concerns that must be addressed from the start, with the materials selected for the structural design. After factoring in additional considerations, including the restricted site and the architectural and functional needs of the structure, designers chose a system made with site-cast reinforced concrete.

The building's functional uses required open floor expanses to accommodate large research equipment and research areas. A glass curtain wall enclosed the exterior staircases and the interior elevator has glass on two sides, which eliminated the possibility of using concrete shear walls. As a result, a reinforced concrete moment-frame system was used, consisting of a reinforced pan-joint system framing into reinforced concrete beams.

## UNIQUE DESIGN FEATURES

The building's site was in close proximity to three existing buildings, and in contact with two of them on two sides. The restricted access necessitated all columns located on the abated sides to be placed eccentrically on the pile caps. This eccentric loading required tie beams to nearby columns to offset the overturning moment on the pile caps. The eccentric column loads caused severe stress concentration on the outside edge of the pile caps. This problem was solved by designing a unique system of welded shear blocks, which distributed column loads through the pile caps and eliminated the punching shear.

Using reinforced concrete on this project met a number of key challenges. It helped maintain constant, uniform temperatures even with a large amount of research equipment in the rooms, which can generate a lot of heat. As an inorganic material, it also will not compromise air quality. Likewise, it offers natural fire resistance, which can help prevent the loss of lives and valuable research.

## REASONS FOR CHOOSING REINFORCED CONCRETE

Concrete's mass will help absorb vibrations throughout the structure, which can be detrimental to highly sensitive research equipment. Its durability also will lower maintenance costs compared to other building-material alternatives and will increase longevity of the building. In connection with that, the open expanses created with long-span reinforced concrete components will allow the building's levels to be reconfigured as changes are needed over the years.

***The local availability of concrete and reinforcing steel helped to maintain the construction schedule. Delays were minimal, which reduced construction time and cost and ensured the facility would open on time.***