

NUCLEUS

Louisville, KY



Team

Owner:

Nucleus, Louisville, KY
(City of Louisville and the University of Louisville, Joint Venture)

Architect:

Arrasmith Judd Rapp & Chovan Architects,
Louisville, KY

Structural Engineer:

Rangaswamy & Associates Inc.
Louisville, KY

Construction Manager:

Sullivan & Cozart, Louisville, KY

Total Project Cost:

\$22.5 million

Total Project Size:

200,000 sq ft (phase one)

Award:

2013 CRSI Award Winner –
Commercial Building Category

Photography:

Arrasmith Judd Rapp & Chovan Architects,
Louisville, KY

Rangaswamy & Associates Inc.

Louisville, KY

NUCLEUS is a development by the University Of Louisville Foundation (a Joint Venture of City of Louisville and the University of Louisville). The first phase of the project is an eight-story 200,000sf (200' x 115') office/dry lab building to serve as an incubator for healthcare related start-up companies.

The master plan envisions, an entire city block comprising of 900,000sf including a four-building complex and a 1500 car parking garage. The typical existing buildings along Market Street are four stories and constructed of brick load bearing walls. The architectural design called for the new buildings to relate to the classical architectural themes of the historic buildings along Market Street in appearance as well as scale. Hence, the building is creatively articulated to break the vertical dimension by offsetting the top four stories from the bottom four stories. This design blends the architecture of the new building with that of the existing buildings along the Market Street.

UNIQUE STRUCTURAL AND/OR ARCHITECTURAL DESIGN FEATURES

Due to the architectural features, the structural engineer (Rangaswamy & Associates, Inc) was certain that reinforced concrete was the most efficient method of framing for this project. The building is constructed of augercast piles, steel reinforced concrete pile caps, concrete columns, beams and wide module floor joists. The entire structural system consists of very complicated steel reinforced concrete that was designed aesthetically to blend with the surrounding environment.

REASONS FOR CHOOSING REINFORCED CONCRETE

This building is rectangular in plan with several breaks in the vertical as well as horizontal planes. It is constructed of reinforced concrete moment resisting frame designed per International Building Code 2006 and applicable State of Kentucky supplements. The foundation system consisted of augercast piles of 16" dia. with an allowable load of 125 tons and pile caps. The floor system composed of 4½" thick slab over wide module one-way joists of 20" deep x 6" wide ribs spaced at 6'-0" on centers. The wide module joists were selected for this office/laboratory building to facilitate future floor openings for additional staircases and/or other openings. To reduce the building height and utilize a straight HVAC ducting system, the joists frame was 24½" deep band beams spanning up to 45'. The floor design live loads varied between 50.0 psf to 125 psf depending on the usage.

Portions of the roof are green to reduce the storm-water runoff. Review of the structural floor plans show that on the upper 4 floors the exterior façade moves inward by several feet. This design was accomplished by having cantilevered concrete beams and slabs around the entire structure for the bottom 4 floors. The use of reinforced concrete made this plan easy to achieve by simply extending the interior beam reinforcing to create the cantilever. This method was extremely cost-effective. The exterior facade also had several bump outs along each side. Using reinforced concrete made this as simple as adding some extra steel reinforcement. Since the building contains leasable office space, the owner required the greatest amount of open space possible. The concrete column design was thoroughly reviewed through several iterations of varying reinforcing sizes and quantities and concrete strengths to provide the most efficient construction while also using the smallest column size possible.

CRSI Concrete Reinforcing
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