

THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

DEPARTMENT OF ARCHITECTURAL ENGINEERING

SSM ST. CLARE HEALTH CENTER: STRUCTURAL REDESIGN WITH REINFORCED
CONCRETE FLAT SLAB CONSTRUCTION CONSIDERING COST AND SCHEDULING
IMPLICATIONS

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Abstract

An alternative reinforced concrete structure was proposed and designed for SSM St. Clare Health Center's new hospital facility in Fenton, Missouri. The original composite steel structure, with a lateral system consisting of special moment frames, special concentrically braced frames, and perforated special reinforced concrete shear walls, was altered to a flat slab and drop panel construction, with a lateral system of unperforated special reinforced concrete shear walls. An analysis of resulting construction and schedule implications demonstrated the feasibility of a flat slab to reduce cost and accelerate the construction time line. The proposed structure was designated as government use and the site was redesigned to meet UFC Minimum Antiterrorism Standards for Buildings. A single degree of freedom blast load analysis verified the effectiveness of the redesigned landscape.

SSM St. Clare Health Center

Fenton, Missouri: St. Louis County

General Information

Full Height:	90 feet
Number of Stories:	6
Size:	427,000 square feet
Cost:	\$223.5 million
Date of Construction:	Sept. 2006 – March 2009
Project Delivery Method:	Integrated “Lean” Project Delivery

Project Team

Owner:	SSM Health Care, St. Louis
Owner’s Program Manager:	Hammes Company
Architect of Record:	HGA Architects and Engineers
Associate Architect:	Mackey Mitchel Associates
Structural Engineers:	HGA Architects and Engineers
MEP Engineers:	KJWW Engineering
Construction Manager:	Alberici Construction
Elevator Consultants:	Lerch, Bates & Associates Inc.

Architecture

The hospital program contains a wide variety of medical use spaces, including 158 emergency supported inpatient beds, diagnostic and surgical services, administrative offices, dietary facilities, and pharmaceutical dispensaries. The floor plans were developed using Lean process principles classically used in manufacturing facilities.

Structural Systems

- Framing:**..... Steel framing, composite deck and lightweight concrete over composite wide flange members
- Foundation:**..... Slab on grade, drilled concrete column piers connected by grade beams
- Lateral:**..... Various systems including special moment frames (SMF), special concentrically braced frames (SCBF), special reinforced concrete shear walls (SRCSW), and ordinary concentrically braced frames (OCBF)

Mechanical Systems

Fan coil units in each patient room fed by central boiler and chiller system for heating and cooling. VAV dedicated outside air for ventilation.

Lighting and Electrical Systems

Electrical system supported by back up generators designed to power the entire hospital for at least 90 minutes. Lighting controls include ultrasonic ceiling sensors and infrared wall switch sensors for energy savings.

Construction

Noise control procedures were specified to mitigate problems with surrounding residents. Smoking was prohibited on the site to comply with hospital policies and avoid contaminating the patient rooms.



Photos compliments of HGA Architects and Engineers