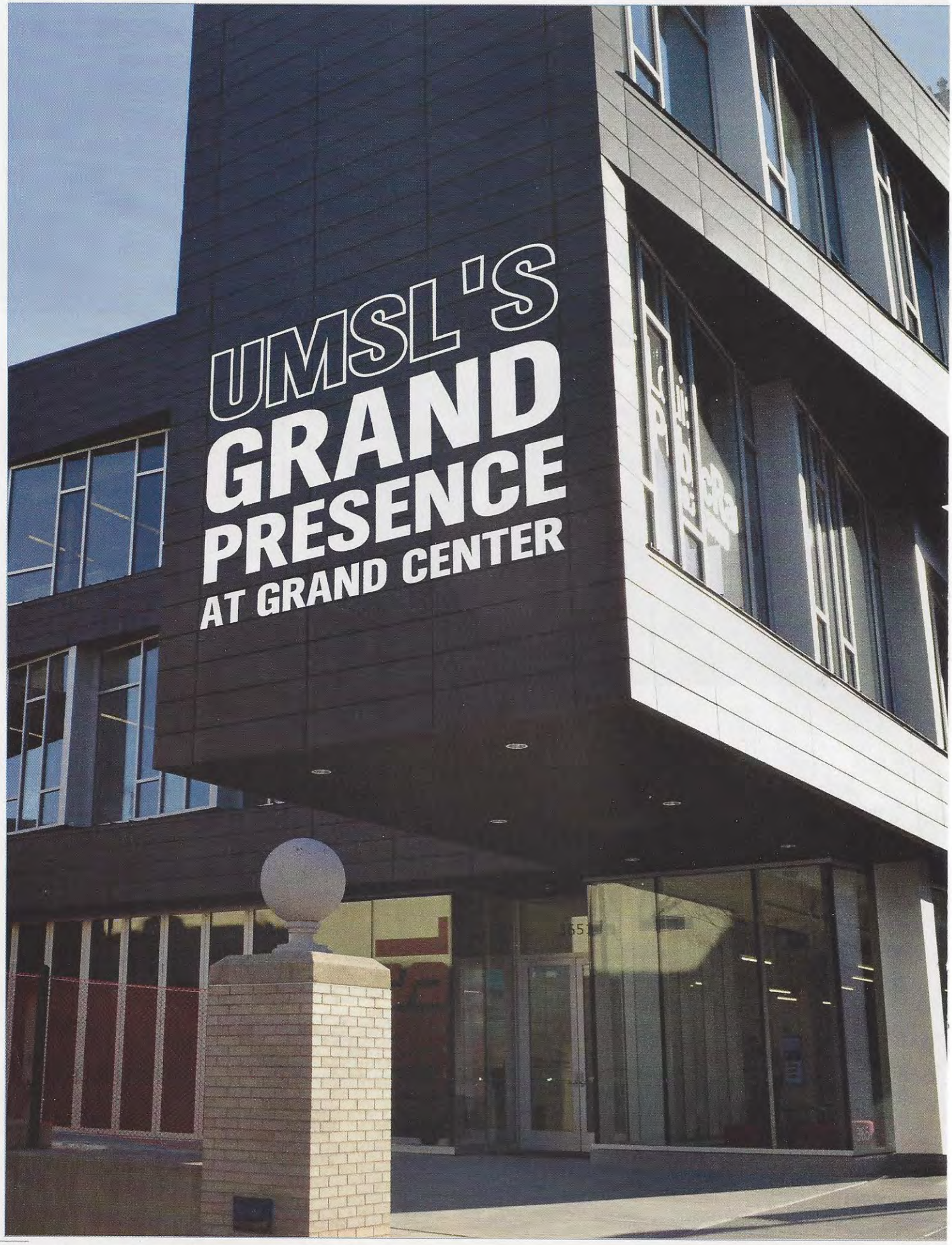

UMSL'S GRAND PRESENCE AT GRAND CENTER

With a saw-tooth facade and cantilevered floor sections, the University of Missouri – St. Louis's new building in Grand Center is much more than a radio station and a place for media classes. It is, in the words of UMSL Chancellor Thomas George, "a presence."

Heather Woofter and Sung Ho Kim of Axi:Ome, LLC, describe the interior of the 27,000-square-foot building on their website as "an orchestration between separate and shared space for academics and the workings of a public radio station."

The three-story structure at 3651 Olive Street houses academic spaces for media classes and a broadcast auditorium on the first floor; offices, a lunchroom, and administrative space on the second floor; and offices, a newsroom, and radio production studios on the third floor.

But, what first strikes a visitor or passerby are the various cantilevered projections that give the building its distinctive look: second floor and third floor saw-tooth projections on the street-side facade, a two-story cantilevered projection in the southwest corner that creates a sort of gateway to the planned media plaza between the UMSL building and the KETC Channel 9 building to west, and a third floor cantilevered projection to create a covered terrace on the second floor in the northwest corner of the building.

The $12 million facility "has features you would see in a more expensive building," said Kurt Mollet, director of preconstruction services for design/build contractor S.M. Wilson & Co. UMSL was able to get an extraordinary level of features and finish because everyone on the design/build team was deeply attentive to the details. Here are just two examples: Axi:Ome modeled the design so that every eastern facing window in an Olive Street saw-tooth provided a view of the clock tower on St. Francis Xavier College Church; and S.M. Wilson and IWR overextended the flashing under the saw-tooth windows to mask the changes in fall

height and, in Mollet's words, "make it look right."

Geometric Challenges

The shape and geometry of the structure proved challenging to builders.

"We assigned the cost up front," Mollet said. "We were comfortable at the start that we could build the cantilever (the large, two-story section in the southwest corner of the building) with a truss system," he said.

As the project progressed, however, the project team discovered that the truss and window systems were not going to match up. After that, "it was a challenge fitting the cantilever structure within the budget," Mollet said.

They ended up using two large steel beams measuring 40-inches tall and 77-feet long. Each beam weighed 294 pounds per foot, or over 22,000 pounds (11 tons) each.

"We upsized the beams," said Dan Brouk of Hammerts Iron Works, the steel supplier. "The size they designed for was not available. Mills don't normally run it and the warehouses didn't have it in stock, so to meet their schedule we went to a larger size," he said.

One of the challenges with the cantilever was anticipating the load it would carry. The beams have a camber, a built in curvature to offset the deflection that designers anticipate would happen under full loading, so that they don't bounce or sag. "Typically the center is higher, but in these we cambered the ends up to counter the weight of the cantilever rooms," Brouk said.

Fully loading the installed beams on site, before building the second and third stories on top of them, was a particular challenge. "We considered several methods, including using a water tank and then draining the water as we needed, but we would have needed a huge water tank," said Bob Leimberg, senior project manager for S.M. Wilson.

The project team ended up using a cable system with turnbuckles and scales to get and maintain the 50,000 pounds per square foot load they needed on each beam. They excavated the ground and poured huge concrete lags to anchor one end of each cable and Hammerts Iron Works welded heavy duty lugs to the bottom of each beam where the other end of each cable would be attached. Turnbuckles were used to increase the downward force on each beam and scales attached to each cable measured the increase in tension.

"We needed the scales so that we didn't pull down too much," Leimberg said. As the second and third floors were assembled on top of each beam, the project team would release tension with the turnbuckle to the same load.

"We wanted to get the beam close to what the load would be when fully loaded so there would be no worry about making the skin fit or about cracking glass or concrete," Brouk said.

The cantilever supports two conference rooms, one on each floor, each with wide expanses of glass in their north and south walls.

The saw-tooth facade was another challenge. "It means the building is cantilevered in two directions, which changes the seismic requirements and increased the challenges in making it weather tight. It was like designing a jewel box," Mollet said.

The exterior utilizes a rain screen assembly. "We looked at a dozen different skin materials, from brick to white panels, to find what would work and was constructable within the budget," Mollet said. They ended up picking zinc panels recommended by Axi:Ome. Zinc panels aren't used much in the U.S., so the project team had to import them from Europe from VM Zinc. The panels, of course, have to attach to something. In order to avoid doubling up on the metal studs, S.M. Wilson installed metal channels at a 45 degree angle on top of the vapor shield and IWR anchored the panels to those channels.

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The old radio station was in converted classrooms on UMSL's campus. Guests waited in the hallway. The staff was spread out in two buildings and a trailer. Even though the new building provides much more space and nicer space, and has five studios instead of one, designers and builders had to be extremely attentive to the details of sound. Trucks hauling semi-trailers full of gear for productions at Fox Theater drive up and down the alley behind the new studios. The back-up electrical generator is beneath a studio.

Sound Control

"We needed to isolate the studios from sounds and vibrations," Mollet said.

The studio side of the third floor is a "box within a box." The floor, walls, and ceiling are isolated from the rest of the building, and each studio is isolated from the others. Wall assemblies consist of two stud walls separated by a space. Exterior windows let natural light into studios, but a gap between the stud walls and the glass assemblies is specifically designed to isolate sound.

None of the studio booths are square. The geometry is designed for the pitch of human voices, not just to deaden sound

"We initially put the price together on a cocktail napkin, but the science of acoustics means you don't need floor-to-ceiling sound panels," Mollet said. The size of the sound panels, and how far off the floor they started, were designed to deliver the specific performance the owner

Saw-tooth windows and cantilevered conference rooms give UMSL a unique presence in Grand Center.

KWMU at Grand Center Project Team

Owner:
BC Development

Archtitects:
WKN Architects/Axi:Ome
Chiodini Associates

Engineer:
Optimal Engineering Solutions Inc.
McClure Engineering
Russ Berger Design Group

General Contractor:
S.M. Wilson & Co.

Major subcontractors:
Acoustical Ceiling Specialists
Architectural Systems of St. Louis
C & R Mechanical Co.
Castle Contracting
Commercial Bathwares
County Asphalt Paving Co.
Fenix Construction Company
Fire Protection Systems
Full Circle Flooring
Guarantee Electrical Construction Co.
Golterman & Sabo
H & G Sales
Hammerts Iron Works
IWR Building Systems
Kelpe Contracting
O.J. Laughlin Plumbing Co.
Lorenz & Associates
Missouri Valley Glass Co.
Otis Elevator Co.
Scally Waterproofing
Superior Waterproofing
Tops Unlimited
Joseph Ward Painting Co.
Warehouse Design and Services
Waterhout Construction Co.
T.J. Wies Contracting Co.
Zumwalt Corporation

wanted. The walls have two layers of drywall. Mollet estimated for a double layer of 5/8-inch drywall, "but for acoustics, 5/8 + ½ has better properties," he said.

Sound also can travel along any pipe or conduit penetrating the walls, however. "We were very concerned about sound transmission along conduit," Leimberg said.

"In the studio space, we used MC cable, which keeps the pathway for electrical service as small as possible so as to minimize the pathway for sound to travel through," said Michael Richardson, project manager for Guarantee Electrical Contractors, the electrical and data systems contractor. "In addition, we insulated the areas where the MC ran through the metal studs, which will keep any rattles or vibrations from being heard in the studio. We insulated and caulked all of our boxes as well," he said.

Power and Data

Overall, Guarantee had the task of installing a large amount of work, about 6 miles of cable, in a small space, the majority of which has exposed ceilings.

"We used 3D modeling to plan ahead and coordinate with other trades to ensure that we eliminated any conflicts," Richardson said. "In order to keep the ceilings looking as clean as possible, we used PVC coated MC to install

the majority of feeds in the deck. This kept our exposed runs to a minimum," he said.

UMSL is pursuing a LEED (Leadership in Energy and Environmental Design) Silver certificate for the project. In support of that goal, the lighting uses T8 and T5 fluorescent bulbs and Guarantee installed occupancy sensors in all areas. The sensors are tied to both lights and the heating and cooling system. "This allows the building to keep power usage down when the building is not fully occupied," Richardson said.

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Back-up power was an important consideration for the radio station. Guarantee installed both a UPS (uninterrupted power supply) power source that provides one hour of uninterrupted power and a 150kW generator which will provide up to 24 hours of power. Typically, the generator would be installed on a slab outside the building, but esthetic and noise concerns led to the decision to install the generator in a pit behind the building. That created its own challenges. "We had to ensure safety of the public and of any maintenance workers, and we had to ensure that the generator would work in such a confined space and the intake would not short cycle from the exhaust," Richardson said.

Senior Project Manager Rick Velasco ran the low voltage work for Guarantee with assistance from Systems Designer Brad White. The facility has three different data systems and multi-strand fiber locations for audio-visual equipment. The systems all terminate within different locations in a secure data room. Door access to the data room is run on a Black Board Security system that is monitored and controlled from a location on the main the UMSL campus.

The building was a long time coming. Originally, UMSL was going to build the facility on campus. The process that led to construction in Grand Center instead began in 2008 after Grand Center Inc. donated the land to the university.

"It was such a different deal for the university that it took a long time," said Tim Eby, general manager, St. Louis Public Radio.