



Steel Ensures Future **Flexibility**

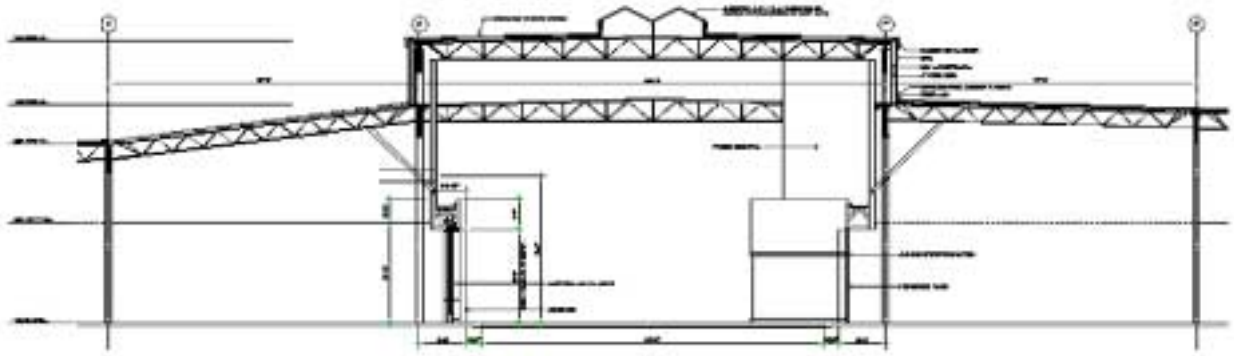
By Mark Lauterbach AIA, Tom Hippman AIA &
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E-commerce aside, people still love innovative and entertaining shopping environments, as evidenced by the 16 million consumers who have visited Katy Mills since its opening in late October of 1999. Located 25 miles west of downtown Houston in the rapidly expanding suburbs along I-10, a growing residential/retail corridor and the major link between the city and San Antonio, the retail/entertainment center currently has a 40-mile radius trade area containing a population of 3.3 million people. With further dramatic growth predicted for the I-10 corridor, Katy Mills is prepared to adapt and change through the flexibility inherent in its architectural and structural design.

Designed in conjunction with the developer, The Mills Corporation, the \$250-million, 1.3 million sq. ft. mega center offers a juxtaposition of 200 retailers interspersed within thematically designed neighborhoods. The theming begins on the exterior with each of the mall's seven mall entrances marked by dynamic entry icons that are oversized, whimsical twists on household products, toys or items recalling the heritage of Katy, TX.

With all of the excitement the shopper experiences, the gift of flexibility is an added bonus. By making use of the innovative structural frame developed by The Mills Corporation and McNamara/Salvia Engineers, Inc., Katy Mills was designed to change throughout the construction process as well as beyond grand opening. The fast track project was completed within 16 months, with leasing on-going during construction.

Katy Mills is a large super regional shopping and entertainment complex with a structural arrangement that is essentially a concrete slab-on-grade covered by roof framing. To easily accommodate future expansion of the mall, steel studs with an exterior insulation and finish system (EIFS) were specified for the building enclo-



Building cross-section.

sure. While the structural system is simple in arrangement, the complex presented significant challenge to the project team whose task it was to minimize structural construction costs without compromising functionality or flexibility. In retail construction, the ability to easily incorporate modifications made late in the design process is very important, and Katy Mills was no exception. In a rather extreme implementation of this approach, construction proceeded from the center of the mall, where the smaller tenants had fewer special requirements, outward toward the exterior, allowing major tenants located there to provide more input in the construction of the space they would occupy.



Interior view of mall court.

Center portions of the mall structure were completed before design began on most of the exterior portions. As leasing agreements were signed, construction commenced on exterior sections, thus the ultimate shape of the perimeter of the building was not known until the majority of leases for major tenants had been signed. The challenge was to create a structural framework that functioned as one contiguous building even though construction began before the final configuration was known.

Structural concept work began with parametric studies to identify the effect of structural bay size and framing type on construction costs. Given this information, the typical structural bay sizes selected were those judged to provide the best compromise between construction costs and tenant layout requirements. The lateral load resisting system to be used also had to accommodate the final plan configuration, whatever that may be. Joist and joist girder framing and steel tube columns, carefully detailed, provided economical roof framing with lateral load resisting moment frames in both directions that could be expanded easily into new areas.

Roof drainage is accomplished by sloping the steel roof framing to interior roof drains so the roof framing elevations had to be set such that the roof drainage functioned correctly whether the roof framing ended

where currently decided or expanded at some time in the future. Additionally, to reduce earthwork costs on a sloping site, the slab-on-grade had several 30" tall grade changes from one end of the building to the other. The roof framing elevations were set to also step down, but in a gradual way that did not add costs to a straightforward membrane roof covering. Other special roof framing features that were designed to enliven the public spaces were also done in such a way as to minimize added roofing costs.

It is Katy Mills' retail tenant storefront design that offers The Mills Corporation the greatest flexibility. The team, together with the developer, devised a storefront wall that hangs from the roof framing and extends down to within 9' of the floor, thus providing maximum storefrontage along the interior pedestrian walkways while also offering flexibility in the location of tenant entrances. Within the 9' high space below the hanging wall, tenant entrances, glass walls and display cases can be arbitrarily arranged.

This suspended wall allows the developer to adapt to changes in the size of the tenant spaces behind the mall wall without major construction renovations. The demising walls are floor supported and structurally separated from the hanging wall. Each tenant entry is marked by a portal designed to enhance the theme of the mall and coordinated with the



Sculptural element suspended from roof structure.

color scheme of the neighborhood. This portal is not structurally attached to the suspended wall. It can be removed, relocated, or resized without structural effects to the mall building.

Viewing the exterior less as concrete architecture and more as a flexible, movable shell allows exterior walls to expand or contract easily. Interior portals and glass systems move without too much disturbance. The formula works. The design and development concept that created Katy Mills allows the building to change in size, the perimeter to be reconfigured, and new stores added. This flexibility to change promises that visitors will always experience the freshest concepts in destination retail and “shoppertainment” at Katy Mills.

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The Mills Corporation

Structural Engineer:

McNamara/Salvia, Inc.

Architect:

RTKL Associates