“If it’s not cheaper, faster, better, don’t come to the table” has been the construction industry credo as long as I have been in the masonry business, some 35 years now. And “everyone knows that you can never have all three.” Only two are possible. But, for the last 35 years and long before that, loadbearing masonry has exceeded the cheaper, faster, better to be the cheapest, fastest, best solution to many building types. Yes, all three. And Zaragon Place, a 100,000 sf, 10 story residential building adjacent to U of M with 248 bedrooms and 66 living units above ground floor retail and underground parking demonstrates this.

Its broad shoulders make Zaragon Place feel taller. Off-campus housing for 248 of the new creative class is just a one minute walk from U of M’s diag. The soaring space enhances the verticality of the building becoming soft and transparent toward the top. Darker brick between bedroom windows, floor to floor, connects and emphasizes the vertical feel. Larger floor to ceiling windows define living spaces. The light stripe on both sides depicts the glass block continuous window bringing daylighting into the stairwell, minimizing the use of electricity. Scott Bonney, AIA, LEED AP, Design Director, is carrying forth Ken Neumann’s love of masonry and the firm’s sustainable design strategies. He has created an iconic, high tech building that students will feel comfortable and secure in, just across the street from the University of Michigan campus. It is fully furnished complete with laundry facilities in each apartment, stainless steel appliances, granite countertops, European cupboards, flat screen HDTV and wireless internet. Ceilings are 9 1⁄2 feet tall in this loft like living space catering to the new life style in a building of classic proportions. A 40-space parking garage is below ground. Dramatic lobby, retail, bike room and state-of-the-art fitness center are on street level.

CHEAPER, FASTER, BETTER
Zaragon Place – a prime example

BY ED DAVENPORT

Learning Objectives
Upon reading the article you will:
1. identify benefits of loadbearing masonry to a repetitious floor plan building
2. summarize ways the masonry industry is working to improve loadbearing masonry’s appeal
3. list qualities of masonry that make it a “best” choice of construction materials

See page 46 for test and answer form.

Zaragon Place, Ann Arbor
ARCHITECT Neumann/Smith Architecture, Southfield
ENGINEER Desai/Nasr Consulting Engineers, West Bloomfield
CONSTRUCTION MANAGER O’Neal Construction, Ann Arbor
TESTING ENGINEER SME, Plymouth
QUALITY CONSULTANT Mariano “Skip” DiGiovanni, IMI
MASON CONTRACTOR Davenport Masonry, Holt
MASONRY MATERIALS Advanced Building Products, Dow Cavylamate, Glass Block Sales, Grace Construction Products, Grand Blanc Cement Products, Masonpro, St Marys Cement, Solomon Colors, Superior Materials, Superior Precast Products, Williams Products, Wire-Bond
MASONRY EQUIPMENT TNT Equipment
Masonry has forever been the façade of choice. Steel and concrete production ramped up during WWII to meet increasing demand. After the war, the increased production flooded the construction market.

**Cheaper**

Today, with the ever increasing costs of steel and delays of up to 14 weeks in procuring it, the paradigm shift is clearly back to loadbearing masonry. Loadbearing masonry is cheaper, roughly only $30/sf of exterior wall surface. Whereas steel systems run $40/sf. The foundation cost is also greater with steel. It is minimized with masonry. Masonry inherently brings a fire rating of up to four hours. Steel needs to be fire proofed. Masonry is a finished product. Steel needs metal stud/drywall to be installed and painted.

**Faster**

Concrete masonry units (CMU) are readily available from 28 block manufacturing plants throughout Michigan. There is NO wait for loadbearing CMU. Construction on your project can begin immediately. Schedule is enhanced when trades are minimized. We laid the brick façade up floor by floor right behind the block. When steel is involved, the iron-workers, carpenters and fire provers need to be sequenced.

We could lay up CMU 10 for each story — all bearing walls — in just four days. Precast plank took 3 days. Every seven days another 10 of loadbearing masonry and precast plank floor went up.

Exposed raw CMU was the finish on the inside juxtaposed against high-end furnishings for a crisp, durable, modern take on student housing.

Loadbearing masonry is likely the most cost effective, schedule sensitive, fire proof system to use for a building greater than two-stories in which people sleep.

Loadbearing masonry may not lend itself to retail with an open floor plan. So the art of the mixed-use facility is using concrete frame to the height of the second floor and loadbearing masonry to the top of the building. For the residential portion, the repetitious floorplan, story upon story, lends itself to the loadbearing masonry with hollow core precast plank flooring. The Excalibur Hotel in Las Vegas is a prime example — 240 tall and all loadbearing masonry.

Brick and block insulated cavity wall brings a high performance R-Value of 23.85, which equates to energy savings exceeding 200% of the ASHRAE standard. This energy efficient cavity wall consisted of 8” CMU, 2 1/2” Dow CavityMate Ultra with an R-Value of 7.5 per inch, airfilm, 2” air space and 4” exterior brick. With the current oil crisis, putting buildings and cars in competition for available energy, we need to address the shortage and begin producing walls with higher R-Values. The owner requested that the energy efficiency of the building be maximized. Masonry met the challenge.

**Masonry Alternate Design**

Zaragon Place was originally designed as a steel frame/metal stud backup structure. We saw a potential opportunity for loadbearing masonry to be used as the structure and back-up walls, so we put together a voluntary alternate. Tim Stout, project estimator from construction manager O’Neal Construction, saw the possibilities with our voluntary alternate and pursued its merits to give the owner a more durable building that will last forever, with increased energy efficiency and decreased sound transmission.

Elevator shaft and stairwells were originally designed as loadbearing CMU; lintels and building structure were converted to CMU. It is never an easy/seamless task to convert one design to another. I could tell from the first time we met with the team from O’Neal Construction, Neumann/Smith Architecture and Desai/Nasr Consulting Engineers that the conversion was possible. They had a “can do” attitude. Neumann/Smith and Desai/Nasr are well versed in loadbearing masonry; they have designed this system in numerous types of buildings.

Both Neumann/Smith and the partners of Zaragon Corp, developers from Chicago who are both alumni of U of M, were thrilled with the possibility of a masonry building that came in net net, saving both dollars and construction time. Joel Smith, president of Neumann/Smith Architecture, complimented Desai/Nasr on their heroic effort to redesign the engineering within 30 days prior to construction. “The incredible turnaround was quite impressive. With the loadbearing masonry design, we were able to give our client a better building with better dimensioning. There are no columns. We have the aesthetic of block and sound isolation between rooms.”

“We converted this project with masonry design completed in just about two weeks and delivered a preliminary masonry bid package,” mentioned Jay Desai, President of Desai/Nasr
Consulting Engineers, “then followed up with remaining details a week after. Today, with the new total building Ram Advanse loadbearing masonry software we are using, we can shorten this time frame for redesign. Major advantages in the new design were the elimination of columns freeing up space for furniture and living within the units and reducing the size of the partition walls because masonry inherently absorbs sound and we did not have to add another material to do that task. Add to that the budget and time savings. Bearing walls also served as shear walls for both wind and seismic lateral loads in the East-West direction. Shear walls in the North-South direction were not symmetrically located, resulting in torsion in the floor diaphragms. These forces were transferred to the East-West walls through shear forces in the floor diaphragms. We checked all the grout keys between the hollow core planks to make sure that the in-plane shear stresses were within the allowable limits. Also, because of the parking underneath, all the walls could not be extended to the foundations, requiring concrete transfer beams at the second level spanning between concrete columns,” said Desai.

“This project was such a success in large part because of the close communication and cooperation of the architect, engineer, testing engineer, construction manager, quality assurance consultant and mason contractor. At the preproduction meeting, an agenda was created. The crew followed everything agreed to in achieving good quality construction. The masons took great pride in the quality of their work.”

Kudos go to this team — especially Mark Steinhobel, PE, of Desai/Nasr, Pat Macoska, RA, of Neumann/Smith Architecture and Tim Stout of O’Neal who had the willingness to work together and try a new system.

Lessons Learned
Many lessons were learned in constructing this building. There is always a learning curve whenever you do something for the first time.

Minimizing the quantity of subcontractors and trade disciplines creates a distinct advantage, especially when job site space restrictions exist as in the heart of Ann Arbor. It may make sense to include façade steel, precast hollow core plank and perhaps other precast concrete elements in the mason contractor’s package for optimum seamless schedule efficiency.

Training, certifying and counseling made available through Bricklayers and Allied Craftworkers (BAC) 9 and International Masonry Institute (IMI) was another very critical element to the success of this project. Without their support, this project would have been much more difficult.

Skip DiGiovanni, as quality assurance advisor with BAC-1 Loadbearing masonry with hollow core precast plank flooring system is the most cost effective and quickest to erect structural system. Every story can be laid in just seven days using hydraulic scaffolding to wrap the entire structure with the façade bricking immediately following.

Structural masonry lintels built and installed by the mason, avoid schedule lags waiting for another trade and require less maintenance down the road.

With the current oil crisis, putting buildings and cars in competition for available energy, we need to address the shortage and begin producing walls with higher R-Values.
Detroit, implemented the hands-on technical reinforced masonry training with the assistance of Pete Loughney, CPC, AIC, Michigan Director of the International Masonry Institute. Tradespeople benefit from refresher training in loadbearing masonry. It may not be the wall system they are most used to. But it will become much more common with the paradigm shift.

Once they understand how this engineered wall system is structurally designed, it makes more sense. Productivity and speed increase. Costs go down. Execution becomes more perfect.

A team attitude prevailed with the special masonry inspector, the structural engineer and representatives from the construction manager and architect, all in attendance. Special accolades need to go to Hayder Al Ailal, EIT, of Soils and Materials Engineers (SME). He was the special masonry inspector and critical member of the team. He worked with the crew to assure compliance. His proactive behavior and no "Monday morning quarterbacking" produced amazing results.

Loadbearing masonry should prove to be the fastest system to construct housing type structures. There is much we can, as an industry, do to improve speed at construction and reduce costs.

The masonry industry is in the process of developing a series of standard details. As example, "what is the simplest, least expensive, fastest way to install relief steel shelf angles to a loadbearing masonry structure?"

Another way to reduce costs and improve speed of construction is for the mason contractors and their tradespeople to win the respect of the engineer. When engineers believe in us, the quantity of reinforcing need not be overdesigned. Special masonry inspection and training are ways to improve the engineer’s confidence. CMU is reinforced in grouted cores. The centers of the reinforcement typically are spaced further apart as the building rises taller.

In the last 30 plus years, many multi-story buildings were constructed with a frame of structural steel or structural cast-in-place concrete. Exterior backup used metal studs and gypsum drywall. With the structural frame costing $8–10 per exterior surface sf and the metal stud/gypsum wall cost being comparable to masonry backup, it is logical and quite cost effective to use the masonry wall as the structure and enclosure, eliminating the additional cost of $10/wall sf.

All lead time for structural steel can be eliminated, as masonry units for a loadbearing system are readily available. Depending on the size of the building, it is feasible to cycle a floor of loadbearing masonry construction in just 7 working days.

**Best**

Loadbearing masonry is one material with inherent qualities enabling it to play lots of roles bringing great added value to every project.

2. Structurally, it carries both gravity and lateral loads.
3. Thermally, as one or more components of the insulated masonry cavity wall system, it can contribute up to an R-34, 350% of ASHRAE requirements, saving nearly 70% of energy costs year after year for the building’s entire life span — and for masonry that easily exceeds 100 years.
4. Thermal mass efficiency.
5. Acoustically, when CMU cores are filled with sand, grout, foam insulation or dried and processed slag, it dampens sound. CMU mass absorbs the lower frequency. When chiseled-, rock- or split-face, sound waves are reflected enhancing acoustical performance.
6. Masonry stops fire cold with a fire resistance rating of up to 4 hours, allowing those contained in the building safe egress.
7. Masonry is inorganic, therefore providing no food source for mold growth, contributing to cleaner air and a healthier indoor environment.
8. Masonry is finished on all sides and needs no paint, coating or sealant. If one is desired, low VOC options are available. Again, contributing to cleaner air and a healthier environment.
9. Masonry is durable, withstanding abuse of equipment, vehicles and occupants.
10. Masonry wall system is more effective for anchoring stone.
11. Masonry is strong, surviving severe weather conditions and intentional acts of violence. It can be washed down and disinfected after a flood. Often the only part of a home left standing after a hurricane or tornado is the masonry part of the house, the fireplace and chimney. Even the masonry Pentagon with its inherent arching action survived the Boeing 757 jet crash impact without collapse. It merely left a hole, while the remainder of the building remained in tact. That is structural redundancy!
12. Initial cost for masonry, the premier wall system, is lower than other systems.
13. Because masonry stands up to fire and to severe weather, vandalism and acts of violence, its survival rate is higher and its insurance premiums are lower. A big benefit to the owner over the life of the building.
14. Net operating income of a real estate investment trust is greater when the expenses of insurance, maintenance, energy are minimized.
15. Masonry requires little maintenance over its lifetime — maybe a little tuckpointing after 30–50 years. And a cleaning after 50–100 years. Greatly reducing its life cycle costs, a huge benefit to the owner.
16. Masonry is sustainable. In other parts of the world, masonry remains standing after thousands of years. In Michigan, it dates to the mid 19th century. Today, adaptive reuse is prevalent for masonry buildings that have
outlived their original use.

17. Masonry is green, environmentally friendly, LEED compliant. Besides all of its attributes noted above, block and brick often use recycled content keeping it from landfills and conserving precious natural resources. Masonry materials, in turn, are 100% recyclable. Materials manufactured within 500 miles of the job site may be specified, saving fossil fuels and transportation costs. Use Masonry for ALL Its Worth and apply for an Innovation in Design LEED point. Four innovation points are allowed per project for greatly exceeding LEED requirements.

They say, “the only constant in life is change.” Maybe they should add taxes. The masonry industry is at the fledgling beginnings of one of those changes. This paradigm shift is driven by the high price of steel and oil. I believe, at present, the Arabs and the Chinese may be the masonry industry’s best friends. Their great demand for steel is driving prices up and cause for extending lead times.

Ed Davenport is CEO of Davenport Masonry, Inc, mason contractor specializing in new construction, restoration, preservation and building maintenance headquartered in Holt. Davenport is a trustee on the MIM board, Mason Contractors’ Association (MCA) board, Michigan Mason Contractors Association (MMCA) board, president of Michigan Council of Employers (MCE) and regional vice president of Mason Contractors Association of America (MCAA). He has worked over 35 years in the construction industry, beginning as a laborer at the age of 17. He was recognized as Masonry Construction Magazine’s 2006 Industry Leader of the Year. Davenport Masonry was founded in 1993 with strong business practices, emphasis on training, safety and innovation. He encourages every employee to think and keep his/her mind open to new ideas, technology and processes.
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