Size Matters

I’ve never seen anything like it. This building is as big as a football field!

Literally.

All kidding aside, the steel frame structure for the Al Glick Field House at the University of Michigan is 89’ tall at the apex and 52’ to the top of masonry perimeter walls (see figure 1). The size requirements were not made up – the football team actually needs this amount of space to facilitate indoor practices. The width is needed to run full speed practices. The height is needed to practice punts and kickoffs. Achieving these goals meant that the walls and supports had to be far enough off of the field to enable players to run full speed and throw or kick the ball without the potential of running into any part of the building. In order to better accommodate the inside mass and provide the aesthetic the University required, the walls are huge; they are both tall and wide.

A little creative genius was required on the part of the masons to build the University’s Indoor Football Practice Facility – now named the Al Glick Field House. Starting at the base – the walls were battered. Batter means to give a receding upward slope. Not a problem you think – until you come to a corner. More on that later.

Glick Field House
Ann Arbor, MI

Architect TMP Architecture,
Bloomfield Hills, MI

Engineer Structural Design Inc,
Ann Arbor, MI

Construction Manager O’Neal Construction, Ann Arbor, MI

Mason Contractors Koch Masonry, Dexter, MI;
Brazen & Greer Masonry, Livonia, MI

Masonry Quality Assurance Mariano “Skip” DiGiovanni

Masonry Materials The Beldon Brick Company,
Belden Brick Sales, Best Block,
Consumers Concrete, Dow,
Grace Construction Products, Lafarge NA,
Mortar Net, Quikrete/Spec Mix,
St Marys Cement, Wire-Bond

Completion Date October 2009
Total Project Budget $26,000,000
Masonry Budget $3,000,000

Collaboration Optimizes Constructability for Indoor Practice Facility
by Betsy Baird, AIA and Paul Koch

Figure 1 Building Section
This aerial photo shows Al Glick Field House in relation to Yost Ice Arena and the outdoor practice facility. Large enough to enclose a regulation football field with clear span and height of 89’ at the apex, the new indoor practice facility allows players to compete without compromise, as illustrated in Figure 1.
Walls rise from the foundation at a whopping 3' in width. Although designed as cavity wall construction, it is not your ordinary cavity wall. This width was necessary in order to create 12" brick returns at the window and battered wall base similar to those at Yost Ice Arena next door. There is traditional block backup, then 3" closed cell rigid insulation and air space, and then there is block backup for the brick veneer. The R-value of the wall is greater than R-21 (see figure 2). Thoughtful consideration was required to construct even typical details of these massive walls. For example, a 3' wide roll of through wall flashing was not wide enough to extend from the backup to the face of the veneer, but again, more on that later.

Battered Corners
Battering walls is not common architecture practice today. They were originally an architectural device for adding mass and thickness to the base of a wall to account for construction forces that are now accounted for by engineering steel into the structure. The design concept was predicated on the architectural vernacular of the adjacent Yost Ice Arena. Walls of Yost, built in 1923, are battered. The idea was to replicate the architectural lines along State Street so that when approaching the campus from this direction, two things are apparent: One, there is no mistaking that the traveler has arrived at the influential University of Michigan and two, a visual statement is made about the power, strength and size of the University’s football and athletic programs. A mock-up wall panel was made to confirm construction practices and expectations and to evaluate the actual appearance of the new walls and how closely they would match Yost. The slope could be made to match, but as corners returned into doorways and piers, if the brick were laid in the traditional saw-toothed manner, the corner brick had a stepped look.

Brick used for Yost Ice Arena were laid in a saw-tooth manner with tolerances different from those which are enforced today. Mortar joints were up to 1" thick. This was enough play to massage the placement of the corner brick so they did not appear jagged. Adopting this wide coursing would have thrown off the entire layout. This was not an option since today’s modular construction dictates 3/4" bed joints.

Masons created several new mockups and tried various methods of making good corners with clean lines. The double slope was accounted for by stacking a half brick along the battered slope in two dimensions. This created a vertical joint on either side of the corner, but produced clean lines. Although the detail does not match its predecessor, it is unobtrusive and allowed for better constructability.

Through Wall Flashing
Through wall flashing is used to divert moisture entering the wall to the outside before it can cause damage. The flexible through wall flashing was installed in two layers. The University wanted the flashing turned into the block backup and not mechanically fastened with a term bar to the face of the block. Turning the flashing into the block required being installed as the backup was going up. As a result, it would be exposed to the weather, mortar drop-pings and the general abuse of construction until the brick veneer was laid.

To minimize the damage to the flashing in the meantime, masons used a 12" wide roll of product, trimmed a few inches of the paper from the backing and installed that end into the CMU backup. This left the protective paper on the remaining exposed portion until it was ready for the second part of the installation.

The paper would then be removed and the flashing itself would still be sticky when the veneer was installed. Two things were accomplished with this two piece installation – the flashing was long enough to extend from the backup to the face of veneer and new material was used to make the tie-in – critical for the water shedding.

There were more interesting details to refine as walls terminated at the roof and 52’ parapet. Massive walls were articulated...
with openings. Figure 3 shows the typical detail for the top of wall. The through wall flashing counter flashed the roofing termination. It also had to serve as a coping style flashing and as sill flashing. Metal counter flashing was installed on the roof side as a receiver for the roofer. A stainless steel drip was provided under the stone to prevent any possibility of water seeping in underneath and making its way to the roof insulation. It also separated clay masonry from cast stone units. The same attention was given to flashing lintels and copings – none being “traditional” details.

Teamwork Fosters Quality

All of the modifications mentioned above were made for the benefit of the project and were accomplished through teamwork. Construction photos illustrate the points; they are not finished examples of the completed work.

In addition to the collaborative relationship O’Neal Construction and Koch Masonry enjoy, structural engineer of record, Structural Design Inc (SDI), was open to a similar collaboration in order to achieve the best possible outcomes. Principal Andy Greco admits that it is not common to have this kind of relationship with the mason contractor during pre-construction or construction, but working together on some of the details allowed the building to be engineered to work toward the masons’ strengths.

Strategies were implemented to limit mason excursion due to rebar lap requirements and oversized CMU. Together SDI and Koch Masonry decided to use lightweight 16” CMU and threaded rebar with couplers. Normal practice would have required the masons to lift a heavy block almost 4’ over rebar. This change eliminated the lap requirements and increased grout heights. Using threaded rebar gave the masons flexibility on grout pours without concern of meeting lap splice requirements and allowing them smoother construction operations. Also, early in the project, steel prices had peaked. The amount of lap splicing that would have to take place during grouting operations almost paid for the extra cost that threaded rebar added and with very little waste. The threaded rebar costs the same whether it is grade 60 or grade 75, but masons required fewer of the grade 75, so the savings were greater. While a mason contractor has a thorough knowledge of the costs and abilities of a wall component like rebar, what is ultimately used is determined by the engineer.

Another very important aspect of this effort is that the project was awarded as a lump sum bid. The mason contractor was the low bidder. The Quality Assurance Program for the project included inspections early and often. In addition to regular observations by O’Neal Construction, quality assurance for the masonry work was provided by the International Masonry Institute (IMI) and the BAC Union Local 9.

It was the project’s good fortune to have Mariano “Skip” DiGiovanni administer the Quality Assurance Program. Requested for his incredible know-how, Skip, master of his craft taught by his father and uncle, can be counted on as a coach to bring new methodology to make procedures better and easier. As a certified special inspector for structural masonry and ICC member, he is in tune with every requirement for the Perfect Wall System and the Code. DiGiovanni was recently honored with the Lifetime Achievement Award for outstanding voluntary contributions to the masonry industry and dedicated service to the Masonry Institute of Michigan (MIM). He has an enormous
amount of knowledge about the craft, the industry and a passion for seeing to it that masonry is built right.

As he commented, “Participation and dialogue were outstanding.” Questions were raised but they were always answered. Any concerns raised by DiGiovanni or any member of the crew were taken seriously. The stars were aligned when this team came together.

Lesson Learned
Paul Koch said, “It is sometimes at the Masonry Awards ceremonies that I first understand why what I’ve done is the way it is. Architects should explain design concepts to masons – they would have a better understanding of why some things are being asked of them through the contract documents. Masonry is a lot of humans – in contact with small units – making a larger whole. TMP took the time to do that with our team.

It was that big picture description which enabled each individual mason to do his part well and make a contribution to this spectacular masonry project.”

The construction team’s efforts were rewarded when the Al Glick Field House received the 2009 Craftsmanship Award for best sports facility from the International Union of Bricklayers and Allied Craftworkers in Washington DC.

Betsy Baird, AIA, VP of Quality at O’Neal Construction. Involved in document review, identification of quality issues, site inspection and follow-up, Baird has been director of the program since its inception in 1990 and has been implementing changes to improve quality standards. She is a member of the Michigan Masonry Advisory Board, Building Enclosure Council, American Institute of Architects and Masonry Institute of Michigan. Baird has been an instructor, speaker and has written about various construction topics. She has a Bachelor of Science from University of Illinois and a Master of Architecture in Facilities Planning from University of Michigan.

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Paul E Koch, president, Koch Masonry, is a fourth generation mason. Koch is a trustee of the board for the Masonry Institute of Michigan, a certified ICC/ICBO Structural Masonry Special Inspector and historic masonry specialist. He has a degree in interdisciplinary studies from the University of the State of New York. Architects, GC’s and structural engineers appreciate Koch’s extensive knowledge as he is called upon frequently in pre-planning collaboration.

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A Bricklayer’s Perspective

This is a watermark job in most masons’ careers.

The grand scale of the project included:

1. Approximately 365,000 of the 1.6 million “University Blend” brick manufactured and blended by Belden Brick exclusively for the University of Michigan Athletic Department create the veneer.

2. There were 55,000 16” lightweight CMU plus an additional 54,000 CMU of various sizes for a total approximately 109,000 CMU.

3. There were more than 2500 pieces of architectural cast stone (from base to coping).

4. Over 95,500 lineal feet of rebar were installed.

5. There was 32,000 sf of 3” rigid insulation producing walls with R-21 and an effective R-value likely in excess of R-35.

6. Over 3800 lineal feet of flashing were installed.

7. 855 cubic yards of structural grout for reinforced cores and below grade block were used.

8. Backup CMU comprised approximately 9690 man-hours of the total project man-hours which were approximately 26,500 mason/laborer hours.

9. Due to the stone and brick detailing at the parapet 60% of the time working was spent at a height of 45’ and over.

10. Massive masonry walls were 3’ thick at the base.

11. The project was constructed with modularity in mind. Taking advantage of the modularity of brick in coordinating such things as window openings and piers size uses less energy and reduces waste. Full price is paid for every “piece/cut” of masonry put into the wall as a full unit. PLUS the price to haul it away and fill our landfills was saved. The architect was instrumental in detailing the building to accomplish such efficiencies.

12. EVERY masonry product used was made in the USA, with the majority of products used for the structure from Michigan. Most importantly, all were installed with local area labor.

13. This brings us to the point that Michigan Architecture, Engineering and Contracting firms were used to design and build this University of Michigan building!

14. When Mason’s engage a project like this, they take pride and ownership. They are employed from the surrounding area and are drawn to support the facility’s endeavors... even during bad markets.

15. Thank your for this opportunity, providing jobs for bricklayers and stone masons.