MASONRY SMART EFFICIENCIES

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dynamicfeatures

OPTIMIZING EFFICIENCIES
Through Masonry Modeling
BIM Software to Design

MAKING MASONRY EFFICIENT
a Smarter Approach

GOT BLOCK?

distinguisheddesign

MODELING | CODING SUPPORTS CREATIVE
Sculpted Chapel at
St Mary Mercy Hospital

Tools Include iPads & Jack String

Interior Brick Complements Exterior
at 187 Franklin Street Townhouse

masonryculture

DRONE | Restoration Efficiency

CONSTRUCTION MOCK-UPS
for EFFICIENCY | QUALITY

ENERGY MODELING
Compliance Path

FIELD DAYS
Expanding Hands-On Curricula

BRANDING STRONG & DURABLE
Chevy Truck & CMU Alike

AIA/CES-HSW Credit

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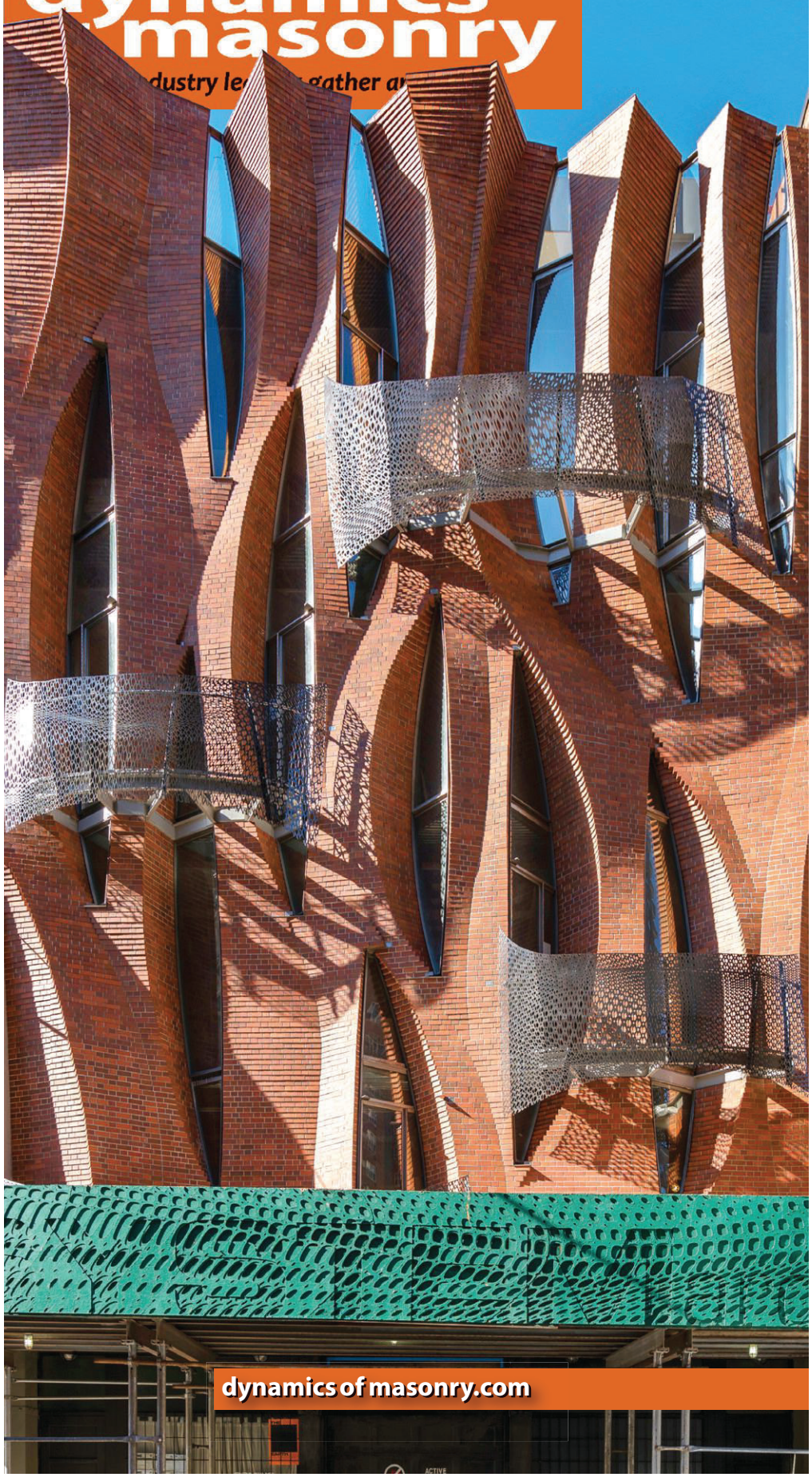

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CONSTRUCTABILITY MOCK-UP SETS EXPECTATIONS

Photos Courtesy of Pepper Construction

Each project has a traditional mock-up to verify assumptions about the design and a constructability mock-up to provide a detailed review of the installation.

TEARDOWN REVEALS QUALITY STANDARDS & ISSUES

As a general contractor, Pepper Construction depends on a team atmosphere for success. We pride ourselves on a low project rework rate of 0.35% versus the industry average of 3%–12%. To achieve this type of success, we work extensively with subcontractors to make sure that expectations and groups grasp of project requirements are well understood from the beginning.

by Corey Zussman, AIA, NCARB, RBEC, LEED AP BD+C

I love masonry. As a young architect, I was trained initially to work with masonry and to understand the material. Infinite possibilities of the material with limitless and unbelievable talent of tradespeople have always made masonry a desirable material over many others.

In my almost 30-year career, I have been fortunate to work with masonry in many applications. As an architect, I designed churches, schools and other buildings that utilized masonry as a main component. As a quality director for a large masonry restoration construction company, I learned the unique trade of masonry restoration and

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Larson Engineering | Naperville

Masonry Suppliers
Architectural Cast Stone | Carlisle Construction Materials
Glen-Gery Brick | Hohmann & Barnard
Hunter Panels | Illinois Products | Mortar Net
Oldcastle Northfield | Spec Mix

preservation. This extremely talented team of tradesmen taught me what it took to truly detail a building more than a 100 years-old. Moreover, now, as a quality director for a large construction company in Chicago, I am privileged to work with many talented and dedicated tradesmen throughout the industry. From what I have learned over the years, I developed the current Quality Program based on that experience and understanding the importance of clearly setting expectations for the project.

Gaining buy-in on ways to install products is key to overall success

As part of this process, both the architect and owner are provided with their traditional mock-up as specified for their use. One or two steps are taken further through the use of pre-planning and mock-ups to verify assumptions about the design and construction.

Preinstallation Meeting

Setting expectations early provides for a successful and profitable project. This process begins with a very detailed preinstallation meeting where drawings, specifications, building envelope trade preinstallation meeting minutes, product installation instructions, compatibility confirmation and an extensive lessons-learned library of construction for masonry are reviewed. At this meeting, design assumptions are reviewed and confirmed and RFIs for the architect are produced to clearly detail or to clear up conflicts in the drawings. During these meetings, adjacent materials are reviewed and confirmed, so the mason understands their role in the entire building and not just the façade or the structural system and the façade. These meetings typically take three hours. The project's level of expectation related to craftsmanship is very clearly set, with the participation of the mason foreman.

Virtual Mock-up

In the preinstallation meeting, the possibility of working with a virtual mock-up is discussed. Virtual mock-ups are implemented on projects that may need more attention to sequencing with other trades that require extremely intricate detailing that would benefit from building it on the computer first, or when the detailing is new and the team would benefit from detailing many trials. A virtual mock-up is typically followed up with a traditional mock-up to confirm the assumptions.

Constructability Mock-up

Once parameters are set, a physical mock-up is designed, which is the most important tool in setting expectations early for tradespeople. At Pepper Construction, we specify what we call a *constructability mock-up*. The constructability mock-up is designed to provide the mason with a detailed review of the installation and to produce a document that the team can easily pass down to other tradespeople.

The constructability mock-up is not an in-place mock-up. It is built by the mason's project team with the understanding that it will be taken apart and analyzed to confirm detailing and their understanding of the preinstallation decisions. The constructability mock-up incorporates most of the significant elements about detailing, not general appearance. It is essential that the flashing is properly installed, that the masonry anchors are properly detailed to the air/vapor barrier, and basic

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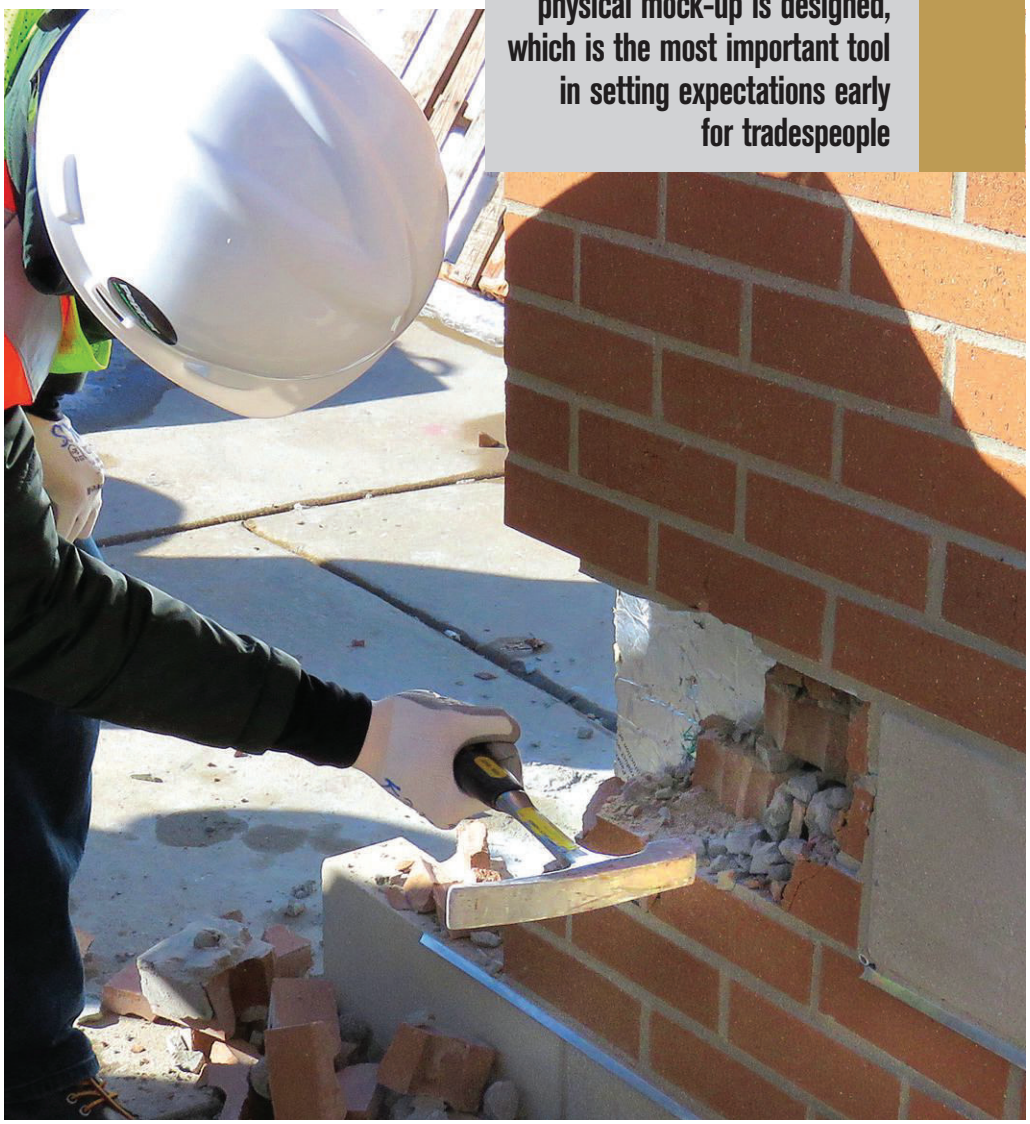
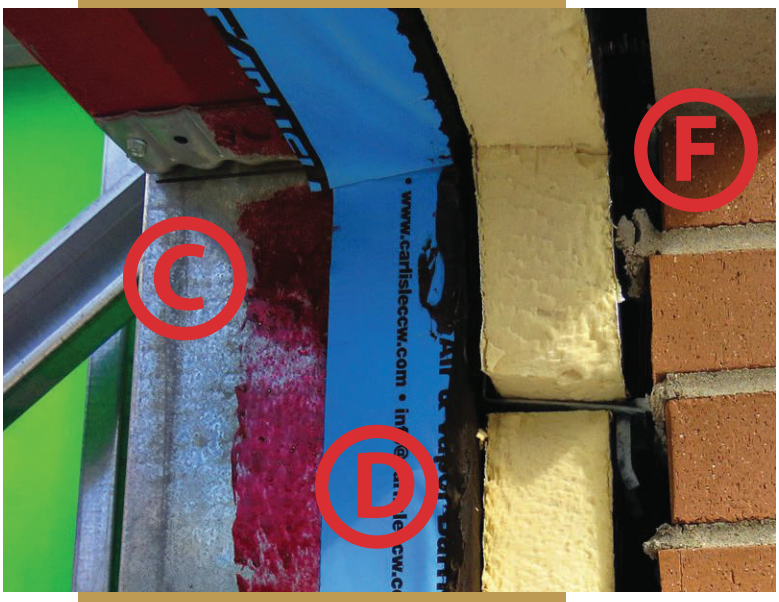


A constructability mock-up is systematically deconstructed so that it can be analyzed to confirm compliance with expectations and preinstallation decisions.



Observation | Recommendations

A – Masonry head joints are properly being installed full.

B – AVB is installed at proper thickness of 40 mil dry.

C – AVB at openings are properly being installed with full primer and rolled... Joints must be sealed with sealant (Dow 758 or similar) with at least 1/8" thickness,

D– ABV must go back about 3" (to front side of pre-punched holes) coordinate with window installer.

E – Mortar net is properly being installed full in the cavity.

F – Cavity is properly being installed with a clear cavity.

masonry practices are properly followed. Proper masonry backup is included as part of the constructability mock-up. This mock-up is key to getting the tradespeople comfortable with different materials they will be working up against and will need to maintain.

Air/vapor barriers on the substrate, are now standard practice to build up against and understanding that their continuity is important for the entire project's success. However, there are many different types of systems, and they all have special detailing the mason must understand. The constructability mock-up allows the tradesperson to essentially practice before actually working on the building. Doing this type of mock-up allows for real-time feedback and discussion, ensuring the mason is able to confidently work with the specified products.

Once the constructability mock-up has been designed and built, the team comes together to review installation procedures. This team will generally include the masonry superintendent, foreman and tradesperson who worked on the mock-up, as well as the architect, owner, general contracting team, including the quality department. I then proceed to break the

Constructability mock-ups and collaboration are used to update lessons learned for more efficient preinstallation meetings

constructability mock-up apart in a systematic way to determine compliance with project expectations, reviewing each item and confirming proper installation.

Mock-up Items Reviewed

Several items are specifically reviewed:

- Proper masonry coursing/joints
- Mortar tooling (slight concave, raked, beaded, etc)
- Full head and bed joints
- Clean cavities and mortar collection device installation

- Flashing installation, including primer, overlapping, joint finishing and sealant installation
- Inside and outside corner flashing
- How the stainless-steel drip edge or other is overlapped, detailed at the corners and sealed to the substrate
- Masonry anchor placement and proper installation, detailing at the air/vapor barrier and fastener installation
- Installation and detailing of insulation, including at floor lines
- Window sill flashing and end dams
- Window lintel flashing and end dams
- Shelf angle detailing, including proper gaps below the shelf angle
- Proper parapet detailing
- Proper masonry movement joint detailing
- Tuckpointing
- Proper masonry cleaning

Shared Plan

Details listed above and more are carefully reviewed with the team at the mock-up review. Gaining buy-in on different ways to install products is key to overall success. Working together, to review conditions along with installation instructions and building documents before construction, builds a positive team relationship rather than potentially negatively reviewing work in place later. It can be typically determined if the condition is a one-time concern or if it happens throughout the mock-up. Behaviors are able to be modified with shared understanding before work is started on the building.

Once all these items, and others, are exposed and evaluated, a full color document is produced for the masonry team to distribute and keep with them at the area of construction. Both correct and incorrect installations are identified, ensuring that each component is discussed and answered. The report is typically laminated and placed on a ring in the corner for convenient access whether on a stage, platform or scaffold. The intent is for the entire team to be able to review the mock-up, even if all were not involved. This document helps achieve consistent results, even with multiple masonry teams on site.

The constructability mock-up remains on site for most of the duration for masons and entire construction team to reference.

Benefits

Constructability mock-ups and on-site collaboration are used to constantly update lessons learned in the preinstallation meeting, making these meetings more efficient and useful. With information learned, Pepper Construction has worked with the local International Masonry Institute (IMI) staff to identify masonry installation trends and potential learning opportunities for the industry.

This course of review and verification has proven greatly successful for more than six years. Masonry re-work has gone from 1.5% of the construction cost to less than 0.20%. This results in a savings to the mason and helps the schedule stay on track. The mason's overall involvement has increased project after project as they have become a consistent trade that our construction team can rely on to stay on track and even ahead of schedule.

I am extremely proud of the masonry tradespeople whom I have worked with over the years for wanting to improve their installations. We work to keep masons on our projects now and we will into the future.

Corey Zussman
AIA, NCARB, ALA, RBEC, REWC, RWC, CQM, CxA+BE, LEED® AP BD+C, Director of Quality Assurance for Pepper Construction in Chicago, is a registered architect in several states, practicing for almost 30 years, specializing in building envelope, restoration, preservation and life safety. Zussman works on 50-75 projects a year, including constructability reviews, conducting pre-installation meetings, conducting comprehensive envelope meetings, construction observation and providing education throughout the industry. He is a frequent speaker and instructor and has been promoting the company's Quality Program for more than seven years. Zussman holds his Master of Business Administration with a specialization in Quality Management and his Bachelor of Architecture with minors in Construction Management and Business Administration from the Illinois Institute of Technology.

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