MASONRY ADVISORY COUNCIL

THUNK SYSTEMS



A SYSTEMS APPROACH TO THE DESIGN AND EXECUTION OF MASONRY CAVITY AND VENEER WALL SYSTEMS

To successfully design and build masonry cavity walls and veneers, one must take a systems approach. A masonry wall is an organized assemblage of interdependent parts which work together to form a building envelope. The wall may be made of a combination of clay brick, concrete masonry units, stone, calcium silicate units, etc. The backup may be concrete masonry, wood frame construction, steel stud construction, concrete, etc. A good designer should know the intricacies of each material and what detailing implications those characteristics may require. This document is intended to aide the designer to make these decisions for some of the more common masonry wall systems used today.







Anchorage

All masonry veneers must be laterally anchored to the structural backup. Corrugated ties, adjustable anchors, and horizontal joint reinforcement are all examples of anchoring devices. Building codes require the architect to indi- cate specified type, size and spacing of all ties and anchors on the project drawings. Since the architect is responsible for the design of the anchorage strategy, she would be wise to understand the intricacies of veneer anchor- age.

Movement control

All materials will undergo dimensional changes over time. The degree of expansion or contraction varies with the material in question. Brick, for exam- ple, is fired in a kiln and is as small as it will ever be. Once installed, a brick will undergo a slight degree of irreversible moisture expansion. Conversely, concrete masonry is cured by hydration, and will shrink over time. To control this shrinkage in concrete masonry, hot dipped galvanized joint reinforcing is set in bed joints at 16" o.c. vertically. Control joints are created to control cracking in concrete block while expansion joints are placed in brick walls to allow expansion.

Moisture Control

All 4" unreinforced masonry veneers are expected to allow some wind driven rain to penetrate, most likely through hairline cracks between brick and mor- tar. For this reason, an airspace is designed between veneer and backup to allow moisture to drain down the cavity and exit at flashing and weep holes. All of these systems require proper flashing details to perform correctly. See "Flashing...Tying the Loose Ends" published by the Masonry Advisory Council for more information on flashing details.



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3 5/8" CMU Veneer + 2" Airspace + 7 5/8" CMU

This system is a cavity wall consisting of an exterior concrete masonry veneer and a structural CMUbackup. The two wythes are anchored with horizontal joint reinforcement.. The joint reinforcement can be ladder trirod type, tab type, or adjustable. To resist shrinkage of the concrete masonry veneer, the selection of joint reinforcement should take into account the requirements for shrinkage con- trol in the veneer. These exterior units should be integrally water repellent treat- ed or coated after construction.



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3 5/8" Brick Veneer + 2" Airspace + 6" Steel Studs

Due to the potentially corrosive nature of the steel stud backup, moisture con- trol is an important issue. The airspace must be at least two inches and indus- try standard flashing procedures should be followed to establish a water man- agement system. The brick veneer is anchored to the steel stud backup using adjustable veneer anchors(not corrugated anchors). These anchors should be screwed though the sheathing to the studs behind at one anchor per 2.67 ft2 of wall. For this system, the Brick Industry Association recommends Type S mortar for higher tensile bond strength. Steel studs should be designed for a maximum deflection of L/600 to L/720.





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3 5/8" CMU/Calcium Silicate Veneer + 2" Airspace + 6" Steel Studs

Due to the potentially corrosive nature of the steel stud backup, moisture con- trol is an important inssue. The airspace must be at least two inches and industry standard flashing procedures should be followed to establish a water management system. The CMU veneer is anchored to the steel stud backup using adjustable veneer anchors(not corrugated anchors). These anchors should be screwed though the sheathing into the studs behind at one anchor per 2.67 ft2of wall. Due to natural shinkage of the CMU, joint reinforcement should be placed in the bed joints @ 16" o.c. vertically. Steel studs should be designed for a maximum deflection of L/600 to L/720.





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3 5/8" Brick Veneer w/ cmu band + 2" Airspace + 6" Steel Studs

Due to the potentially corrosive nature of the steel stud backup, moisture control is an important inssue. The airspace must be at least two inches and industry standard flashing procedures should be followed to establish a water manage- ment system. The veneer is anchored to the steel stud backup using adjustable veneer anchors(not corrugated anchors). These anchors should be screwed though the sheathing to the studs behind. Due to natural shinkage of the CMU, joint reinforcement should be placed in the bed joints of the CMU ribbon @ 16" o.c. vertically. Type S mortar should be used for greater bond. Steel studs should be designed for a maximum deflection of L/600 to L/720.



ANCHORAGE NOTES PROVIDE AT LEAST ONE ANCHOR FOR EACH 2.67FTOF WALL SPACE ANCHORS AT A MAXIMUM OF 32 IN. HORIZ. AND 18 IN.VERT. STEEL STUDS PROVIDE ADDITIONAL ANCHORS @16" O.C. AROUND ALL OPENINGS LARGER 2" AIRSPACE THAN 16" IN EITHER DIMENSION. PLACE ANCHORS AROUND PERIMETER O é è e 3 5/8" BRICK OPENING AT A MAXIMUM OF 3 FT. O.C. PLACE ANCHORS WITHIN 12" OF OPENINGS. • ANCHORS ATTACHED WITH 2 HOT-DIPPED Type S mortar should be used for greater tensile bond strength GALVANIZED OR NON CORROSIVE SCREWS



3 5/8 "BRICK VENEER

3 5/8" Brick Veneer + 1" Airspace + Wood Studs

This system is most likely to be a residential application. Since 4 inches of unre- inforced brick masonry will allow some water to penetrate, we design the system to manage the entrant water. A clean airspace provides a space for water to drain down where it can be directed to the exterior at flashing locations. The veneer is anchored to the wood backup using corrugated veneer ties nailed into wood studs @ one tie per 2.67ft2 . More anchors are required around openings larger than 16 inches in any dimension - see anchor notes below.





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3 5/8" Brick Veneer with CMU Band + 1" Airspace + Wood Studs

This system is most likely to be a residential application. Since 4 inches of unreinforced brick masonry will allow some water to penetrate, we design the system to manage the entrant water. A clean airspace provides a space for water to drain down where it can be directed to the exterior at flashing loca- tions. The veneer is anchored to the wood backup using corrugated veneer ties nailed into wood studs @ one tie per 2.67ft2.









MOVEMENT NOTES VERTICAL CONTROL JOINTS IN CO CRETE MASONRY SHOULD BE AS FOLLOWS:	N-
1.) SPACED AT 20 O.C.	
2.) PLACED AT EVERY INSIDE CORN	IER
3.) PLACED 4 INCHES FROM ONE SIDE OF EVERY OUTSIDE CORNER	

* All joint reinforcement should be hot-dipped galvanized **MASONRY** DVISORY COUNCIL

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3 5/8" Glazed Brick + 2" Airspace + 7 5/8" CMU Backup

This system is a cavity wall consisting of an exterior glazed brick veneer and a CMUbackup. The two wythes are anchored with horizontal joint reinforce- ment, providing one tie per 2.67 ft2of wall area The joint reinforcement can be ladder tri-rod type, tab type, or adjustable. This system uses glazed clay units which have a low perm rating. The glazing does not allow water to enter or escape in the same manner as a non-glazed brick. For this reason the air space in the cavity should be no smaller than 2" and the cavity should be vented at the top andbottom of the wall with open head joints @ 24"O.C.





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NARROWER, MORE ECONOMICAL BRICK / BLOCK CAVITY WALL

This system is a cavity wall consisting of an exterior brick and a CMUbackup. The two wythes are anchored with horizontal joint reinforcement, providing one tie per 2.67 ft2of wall area The joint reinforcement can be ladder tri-rod type, tab type, or adjustable. Here we are using an insulated and attached drainage board to eliminate the need for a clear air space. This allows one to create a thinner more economical wall. Water drains down the drainage board and exits though weep holes at flashing locations.







DISCLAIMER NOTICE

This guide contains technical information on masonry wall systems. It provides some of the basic information required to properly design and detail these systems. This booklet does not cover all designs or conditions. The information presented illustrates only principles that are involved. The information contained in this guide is based on the available data and experience of the technical staff of the Masonry Advisory Council. This information should be recognized as suggestions which, if followed

with good judgement, should produce positive results.

Final decisions on the use of information, details and materials as discussed in this guide are not within the purview of the Masonry Advisory Council, and must rest with the project designer, owner, or both.



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