

SINGLE WYTHE CONCRETE MASONRY

BY JASON YANA



Single wythe concrete masonry construction is a durable, cost effective and aesthetically versatile form of masonry construction that is used successfully all over the world.

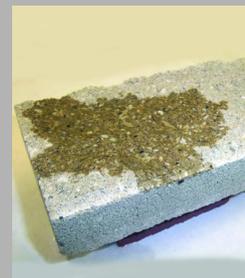
Single wythe walls, unlike cavity walls and veneered walls, require additional special attention regarding moisture penetration prevention. The following 3 items make up what is the industry standard for how to properly use concrete masonry for single wythe walls.



1

MATERIALS

Concrete masonry units are not all created equal. Specify and insist on concrete masonry units which contain integral water repellent which greatly limits the amount of water absorbed by the unit. Specify and insist on the use of integral water repellent additives in mortar as well.



TREATED

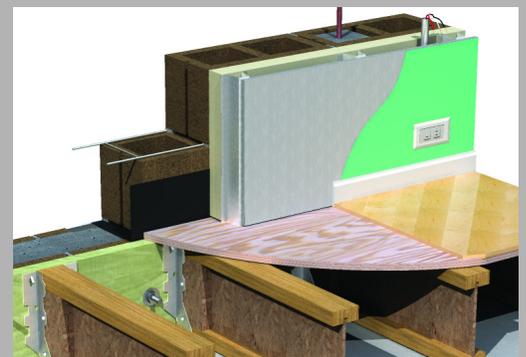


UNTREATED

2

DESIGN / DETAILING

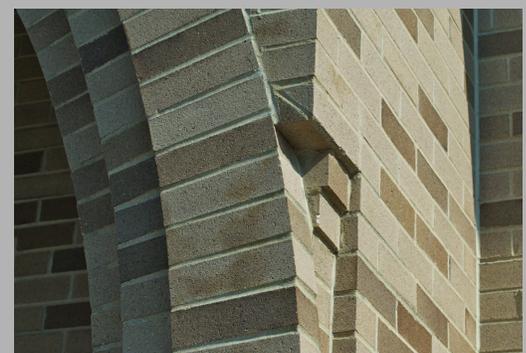
Design and detailing of single wythe walls to avoid moisture problems requires the proper flashing details serve as a line of defense against water penetration at parapets, windows, structural floor connections and at the base of the wall. These details are illustrated on page 2.



3

WORKMANSHIP

As with any construction project, requiring a qualified contractor with documented experience is critical. Salient factors for workmanship include proper joint filling & tooling, proper cleaning, the use of a mock-up panels and the application of a post-applied water repellent after completion.



SINGLE WYTHE CONCRETE MASONRY MATERIALS

INTEGRAL WATER REPELLENT IN UNITS AND MORTAR

For years, block manufacturer's have had the option of adding an integral water repellent additive to their concrete mixture during the manufacture of concrete masonry units. For any single wythe concrete masonry project, specify and insist on units that include this admixture. On the right, untreated and treated samples of concrete masonry both had the same amount of water poured on them, the results are obvious.



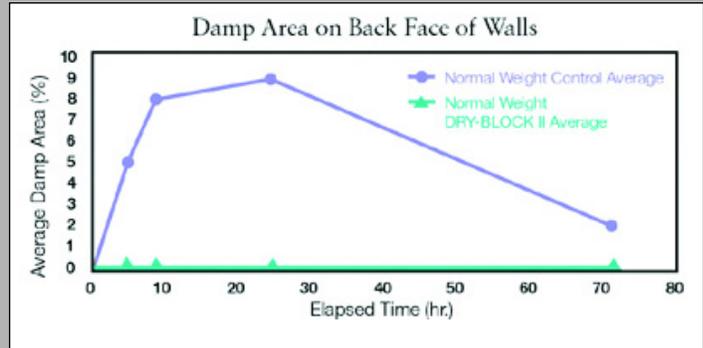
TREATED



UNTREATED

MORTAR ADDITIVE

Often overlooked is integral water repellent mortar additive. The companies that produce integral water repellent also provide bottles of admixture to be added to the mortar. This is a critical component of a single wythe wall system! Consider using a preblended batched silo mortar system such as Spec-Mix, which can ship mortar to the jobsite with water repellent already added (if requested). The integral water repellent must be compatible with the water repellent treated cmu chosen for the job.



Walls treated with integral water repellent in the units and mortar, plus a post-applied sealant outperform untreated walls dramatically

POST APPLIED WATER REPELLENT COATINGS

Post applied water repellent must be used on all single wythe CMU walls. Adding a water repellent that is specifically made for concrete masonry units will reduce capillary action and limit staining while maintaining the appearance and vapor permeability of the wall. It is important to note that water repellents cannot bridge cracks or voids, or eliminate the effects of excessively harsh cleaning.

Water repellent is not a replacement for poor detailing
Water repellent is not a cover-up for poor workmanship

On split face cmu consider a silicone emulsion or RTV Silicone Coatings
On half high cmu and dense concrete brick consider using silane /siloxane coatings



MORE INFORMATION

Block Manufacturers	Integral Water Repellents	Post-Applied Water Repellents	Batch Silo Mortars	Information
www.NorthfieldBlock.com www.CountyMaterials.com	www.DryBlock.com www.AcmChem.com	www.Prosoco.com www.diedrichtechnologies.com www.nawkaw.com	www.pci-il.com www.specmix.com	www.ncma.org masonryadvisorycouncil.org

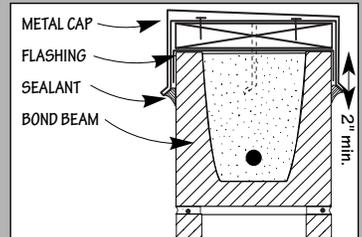
SINGLE WYTHE CONCRETE MASONRY

DETAILING

FLASHING AT COPING / PARAPET

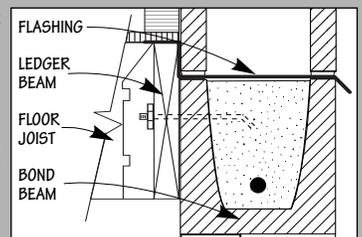
The parapet is a vulnerable location for water penetration. It should extend down the cmu a minimum of 2 inches and should have a slope for drainage.

Seal underside of the cap to prevent wind driven rain from getting under the sill.



FLASHING ABOVE WINDOWS & BOND

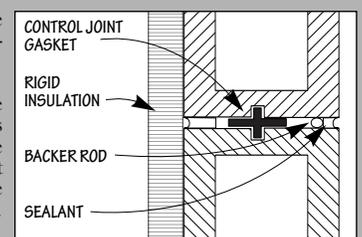
Through wall flashing must be installed above all openings, at all bond beams and at all floor connection lines. Flashing should turn up on the inside and extend outside the face of the wall to ensure water is directed outward.



CONTROL JOINTS

Control joints must be placed at a maximum spacing of 24 feet on center.

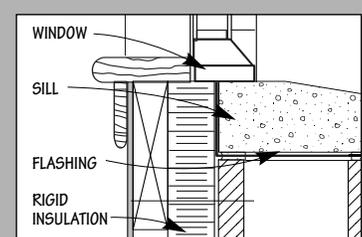
Control joints must be placed adjacent to windows and doors. For more information on placement of control joints, see NCMA 10 series tek notes.



FLASHING BELOW OPENINGS

Window sills should be precast concrete or stone, they should have an overhang and a drip.

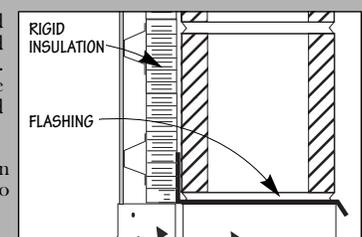
Flashing must be installed beneath the sill with end dams installed on either end.



FLASHING AT WALL BASE

Flashing must be installed at the wall base, and turned upward on the inside. Grade level should be below the flashing level and sloped away.

Block-Flash is shown on the left as an alternative to traditional flashing.



USE RIGID INSULATION ONLY!

DO NOT USE BATT INSULATION!! Use only closed cell rigid insulation to avoid mold, mildew and condensation problems. Below is a list of the IECC Insulation requirements by climate zone. Minimum thicknesses of insulation required is shown for extruded polystyrene (XPS) and polyisocyanurate (P-ISO).

2009 IECC Building Envelope Requirements - Opaque Assemblies

Climate Zone	1	2	3	4	5	6	7	8
Min. R	R 5.7 ci	R 7.6 ci	R 9.5 ci	R 11.4 ci	R 13.3 ci	R 15.2 ci	R 15.2 ci	R 25 ci
XPS req.	1.5"	2"	2"	2.5"	3"	3.5"	3.5"	5"
P-ISO req.	1"	1"	1.5"	2"	2"	2.5"	2.5"	4"



Block-Flash

SINGLE WYTHE CONCRETE MASONRY

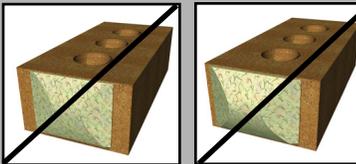
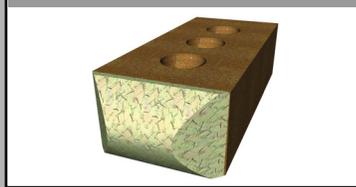
WORKMANSHIP

MORTAR JOINT BEDDING

Head joints in brick and block walls must be completely filled with mortar. In Brick this is accomplished by fully buttering the ends of the brick before laying. In CMU the full width of each face shell should be mortared.

Incomplete joints may appear full on the finished face of the wall, but can allow water to penetrate. Proper mortar bedding is shown to the right for brick and block construction.

FULLY BEDDED HEAD JOINTS



FACE SHELLS FULLY BEDDED



JOINT TOOLING

The tooling of mortar joints can have an impact on the weatherability of masonry walls. There are many varieties of mortar joint tooling, but the only type of mortar joint that should be used in exterior walls is concave or vee.

The concave and vee mortar joints, when done properly, have the effect of compressing the mortar into the joint ensuring consistency and density. These joints promote water to shed off the joint without collecting.

CONCAVE MORTAR JOINT



VEE MORTAR JOINT



CLEANING

To minimize cleaning, brush down the exterior during construction to eliminate excess mortar adhesion. Cleaning of masonry walls should be done 7 - 10 days after the walls are finished. Walls should be saturated with water first. Then using a chemical cleaner made for the job, clean walls with a bucket and nylon brush and then rinsed again with water. Sandblasting wears away the surface of masonry and makes it much more absorbent. Power-washing can also do damage if done incorrectly.

CONSEQUENCES OF AGGRESSIVE POWER WASHING

