

# BRICK, BLOCK & BEERS

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## Masonry Best Practices: Keeping your Single Wythe Masonry Building Dry

Moisture penetration through exterior walls is a concern on every project (or – it should be a concern on every project!). Single wythe concrete block construction does a great job in preventing water from entering the interior of your building but there are several important “belts and suspenders” that should be included in your design to make sure your masonry wall does the best job possible.

So, what do we consider a single wythe wall? There are three major types of masonry walls built in Florida. The very best masonry wall to prevent water passage (we call it The World’s Best Wall!!) is called a double wythe cavity wall and contains a drainage/air space between two separate wythes or “layers” of masonry. Water that makes it through the first wythe runs down the back side of the wall and is discharged to the exterior through flashing and weeps. This wall is the acknowledged gold standard for exterior walls. (See [“The Perfect Wall”](#) by *Joseph Lstiburek* }

The second type of masonry wall (and the focus of this article) is called a single wythe masonry wall and, as the name suggests, it is constructed of a single wythe or “layer” of masonry. Obviously, building one layer or wall of masonry is more cost effective than building two so one of the reasons single wythe walls are so popular is because they are cost effective and still have all the many built in advantages of masonry construction. Additionally, single wythe walls are usually 2 to 4 inches thinner than double wythe walls and in the world of real estate area is money. Single wythe walls are normally built with architectural units that allow the designer an almost limitless selection of colors and textures. In this masonry wall system, the exterior surface of the masonry becomes the primary water barrier. We use the “belts and suspenders” approach to ensure that everything possible is done to keep water from getting past the exterior surface and then proactively deal with the small amount that does.

The third type of masonry wall that is weather proven and very popular is concrete block with direct applied stucco. In this case the bonded stucco layer becomes our primary defense against water intrusion.

So, let’s get back to discussing the “belts and suspenders” approach to water tight single wythe masonry wall. There are four main areas that are essential to proper construction. These are: integral water repellents; properly tooled mortar joints; spray applied sealers; flashing and weeps; and properly located and spaced control joints.

An integral water repellent is added to the block mixture when the block is being made. It lasts the lifetime of the block and has many positive effects such as reducing the potential for efflorescence and reducing water absorption. It isn’t a water “proofer” – it just inhibits the water being absorbed by the masonry. One way to tell if a CMU has been batched with an integral water repellent is to put a teaspoon of water on the block and wait a couple of minutes. If the water is quickly absorbed into the block you don’t. If the water just sits on top of the block without being absorbed then the unit has integral water repellent.

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In Florida, all of the manufactures of COLORED architectural units automatically include an integral water repellent in the block mixture. ANY GRAY UNIT USED IN A SINGLE WYTHE WALL, WHETHER PAINTED OR NOT, NEEDS TO HAVE AN INTEGRAL WATER REPLENT SPECIFIED TO BE USED IN PRODUCING THE UNIT. Two other important things to remember is that you would NEVER use an integral water repellent in a block that was going to have direct applied stucco as it would negatively affect the bond between the block and the stucco. The second thing is that when your block contains an integral water proofing agent your mortar should also contain a water proofing agent recommended by the supplier of the integral water proofing.

Next on our “belts and suspenders” list is proper tooling of the joints to help seal the area between the mortar and the masonry and compress and densify the mortar. Concave tooled joints, either rounded or “V” shaped, are best as the mortar is compressed into the block at the joint. Mortar is tooled when it is “thumb print hard”. That is, the mortar is stiff enough that the jointing tool doesn’t just rip it out without actually compressing it, and it is not so hard that the jointing tool just “scraps” the mortar out of the joint.

Architects often like the look of a raked joint where half the thickness of the mortar joint is simply ripped out forming a square joint with a sharp block edge top and bottom. A raked mortar joint in exterior single wythe walls should NEVER be used if the wall will be exposed to wind driven rain. The square ledge is the perfect place for water to collect and ripping out half the joint does nothing to compress and seal the mortar to the block.

There are many good spray-applied masonry sealers on the market. Silanes and siloxanes and the best but also the most expensive. Whichever brand you choose you will be looking to reapply about every 5 to 7 years. This is just part of the normal maintenance – like repainting. A single wythe wall that was dry for years and then starts to develop some wet patches probably just needs resealing.

Two or three good coats of acrylic paint will do the job if you don’t need a clear finish but just remember that a painted single wythe wall still needs ALL of the “belts and suspenders” to ensure water tightness. Paint alone, just like clear sealers, is just one part of the treatment.

Next on the list is flashing and weeps. Normally we think of flashing and weeps as part of a double wythe wall where they are required and essential. They are often overlooked in single wythe applications but are an important addition none the less. Because your block in a single wythe application will contain integral water repellents any water that makes it past the front face will run down the inside face of the block cell. Where it ends up there should be a way to expel it from the wall. In the last few years there have been several creative products appear on the market that handle this water in a quick and cost-effective way and gets it out of the wall rather than end up inside the building.

Last on the list is crack control through the proper placement of control joints in the wall. Cracks in a single wythe wall are a pathway for water along with being unsightly. To keep their size and frequency to a minimum the wall needs to be able to accommodate small movements due to temperature swings and moisture shrinkage.

Control joints at 20 to 25 feet O/C and at window and door openings allow the stresses in the wall to be released without cracking. The rule of thumb for control joint placements are: abrupt changes in wall height; changes in wall thickness; above joints in foundations and floors; below joints in roofs and floors; ½ the allowable joint spacing from wall corners; and one or both sides of doors and windows.

Single wythe walls are one of the favorites for designers because of their beauty and design flexibility. Of course, they also have all the other positive attributes of solid concrete block construction: fire proof, termite proof, not a food source for mold and mildew growth, sound deadening, strong etc., etc. With just a little care in detailing and construction they can also provide a lifetime of moisture free living.

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## Additional Resources:

- National Concrete Masonry Association ([www.ncma.org](http://www.ncma.org)) [NCMA TEK: \(19\) Water Penetration Resistance](#)
- Building Science Corporation ( [www.buildingscience.com](http://www.buildingscience.com) ) [The Perfect Wall - by Joseph Lstiburek](#)
- Brick Industry Association Technical Documents ([www.gobrick.com](http://www.gobrick.com)) :
  - [Water Penetration Resistance – Design and Detailing](#)
  - [Water Penetration Resistance – Materials](#)
  - [Water Penetration Resistance – Construction and Workmanship](#)
- Mason Contractors Association of America  
( [www.masoncontractors.org](http://www.masoncontractors.org) ) [Wall System Details](#)

## View the MAF On-demand Webinar

### Preventing Moisture Penetration in Masonry Construction (1 Hour AIA, CILB & FBPE )

View this webinar in our MAF On-demand webinar catalog.

To register: <https://bit.ly/2GvZqHI>



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