



**Easy to Build.
Tough to Beat.**

Installation Manual

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What is Mikey Block?

Mikey Block is an insulated concrete form (ICF) system. Its main components are expanded polystyrene (EPS) foam blocks manufactured to the International Residential Code specifications for ICF screen grid systems. The standard stretcher block is 10.5" wide by 12" tall by 48" long and weighs 3 pounds. An oriented strand board (OSB) spline inserted into grooves on the block faces provides continuous horizontal backing on 12" centers. In addition to our 10.5" block, we also offer the original Mikey Block, which is 12" wide and has a 1.5" cementitious layer of Portland cement and polystyrene laminated to the outside face of the block.

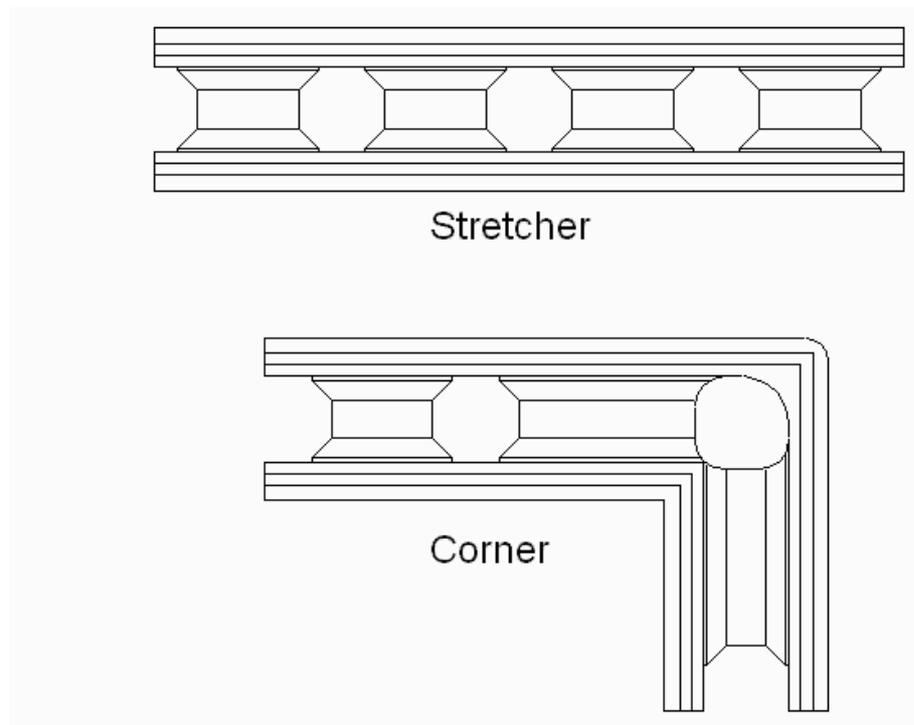


Figure 1: Mikey Blocks in Plan View

Building With Mikey Block

Mikey Block is one of the most versatile building materials in use today. It cuts with a handsaw and can be assembled easily by two people with no special tools or equipment. In residential and commercial applications, Mikey Block can be used in basement and stem walls, interior and exterior walls, as well as fence and partition walls. If the project can be designed in stick frame, metal or block construction, it can be designed with Mikey Block.

When stacked, Mikey Block forms a grid of posts and beams spaced on 12-inch centers. Rebar is placed in the channels as required by the design and the channels are filled with concrete grout to form a “screen grid” matrix. Figure 2 illustrates the internal structure of a Mikey Block wall with the foam removed. The steel and concrete matrix provides structural strength, while the foam provides insulation. For projects falling within the design parameters of the International Residential Code (IRC), the rebar size, spacing and the concrete grout design

strength is already specified. For custom projects, an engineer's design may be required. Check with your local building department.



Figure 2: Mikey Block Wall Section with Foam Removed

Insulation Qualities of Mikey Block

Mikey Block has a calculated static R-Value of 28, excluding drywall and stucco. This equates to savings for the owner/occupant in the form of lower energy bills. Figure 3 shows the end view of a Mikey Block, made entirely of 1.5 pound per cubic foot expanded polystyrene, or EPS, which has an R-value of 4 per inch.

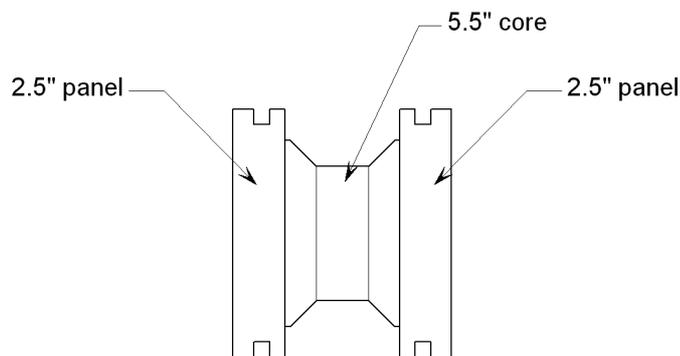


Figure 3: Mikey Block End View

Each 2.5" panel has an R-value of 10. The 5.5" core has an R-value of 22, but we reduce this by the fraction of concrete in the core, (63%) yielding R8. The total R-value is the sum of $10 + 8 + 10$, or R28.

Sound Qualities

Mikey Block has a decibel rating of 55 when used with half-inch drywall. This gives it exceptional sound absorbing qualities making it very effective when used on noisy street-side walls and in sound resistant rooms such as home media rooms, sound studios, and theater rooms.

Fire Resistance

The EPS used in Mikey Block has a smoke density rating of 450 and a flame spread of 25 or less under ASTM-E84. When used with half inch interior drywall face Mikey Block is acceptable for residential construction. When used with 5/8" drywall, Mikey Block has a one-hour firewall rating. The firewall rating, in combination with the sound absorption qualities, makes Mikey Block an excellent choice for multi-unit and multi-family projects.

Frost Resistance

The high R-Value of Mikey Block insulates the concrete grout during pouring. This is advantageous when pouring in cold weather, where the heat of hydration is retained within the grout, allowing it to cure at low temperatures.

Additional Features

Mikey Block has other features and qualities that make it unique. It does not hold or wick water the way concrete block or wood products do. It does not rot, stain or mildew. It has no food value for termites and thus will not attract them.

Recommended Tools and Supplies

Mikey Block can be installed using conventional tools normally used in construction. Below is a list and brief description of commonly used tools. Many of these may already be owned or may be purchased at a local hardware store. Others can be found at a rental outlet or may be available through the manufacturer.

Common Tools

1. Handsaw, preferably one with fine teeth, for cutting Mikey Block.
2. 12" Speed Square: Used as a guide for cutting Mikey Block.
3. Cordless "Skil" saw: Used for cutting provided OSB splines to length.
4. Tin snips: Used to cut 2.5" track.
5. Level: A standard 4-foot level is needed. Attach a 4-foot level to a straight edge for a longer level to plumb and level walls.
6. Chalk line: Used for initial layout.
7. String line: Used for aligning walls.
8. Tape measure: A standard 25-foot tape and a 100-ft tape are needed.
9. Stepladder.
10. Small rolling scaffold.

11. Cordless Drill: For attaching bracing to Mikey Block (if required).
12. Keyhole type drywall saw: Used for cutting holes in block and to cut slits for installing rebar chairs.
13. Long (6" minimum) nails: Used to hold glued bucks in place while glue sets up.
14. Shim shingles: Used as needed to level first course and plumb walls.

Rental Tools

1. Rolling scaffold. Used as a working platform as walls rise above 6 foot. Particularly useful in grouting.
2. Unistrut bracing (optional). Used to align and support prior to and during grouting. Can be screwed into the OSB at four-foot intervals to align the walls between corners.
3. Concrete Vibrator (optional). Used to consolidate the grout during a pour.
4. Rebar cutter/bender. Used to cut and bend rebar for placement in walls.

Manufacturer Available Tools

1. Glue gun. Used with the polyurethane foam glue to fill voids, attach window and door bucks, and to bond blocks together. The gun is much more effective than conventional straw applicators.
2. Hot knife. Used to cut holes in the foam for electrical boxes or electrical wire.
3. Sanding Block. Used to knock off excess foam glue and to round corners.

Materials Available From Mikey Block

1. Mikey Block: includes Schvensons (rebar chairs) and agency-rated OSB splines. Order in advance so it may be delivered or picked up when needed.
2. 2.5" track: Multiple uses. Used for laying out the first course. Used to align walls and cover OSB channels during grouting. Used as an attachment detail at the bottom and top of wall.
3. Window and Door Bucks: Used for sizing and closing off window and door openings. Supplied in a variety of thicknesses.
4. Foam glue: Used to bond block together, fill gaps, fasten bucks, install doors, windows and popouts.

Materials From Other Suppliers

1. Rebar: Used to reinforce walls and foundation. Size and spacing as determined by building design.
2. Concrete Grout: Provides the structural strength of the wall. Use a 3/8" minus pea gravel, 2500-psi (minimum) mix. Pump at a 6 to 7.5-inch slump.
3. Wood: Used to brace openings during grouting.

The Planning Stage

Mikey Blocks are four-foot long, but modulate in one-foot increments. The most important rule of thumb is to design the wall lengths and heights in one-foot increments as measured from the outside. This allows all block cuts to be in one-foot increments and maintains the structural integrity of the steel and concrete matrix.

Footing and Stem Walls

The first item in the wall construction schedule is the footing and stem wall. Stem walls can be Mikey Block, Mikey Block wet-set block, as shown in Figure 4, or conventional monopour.

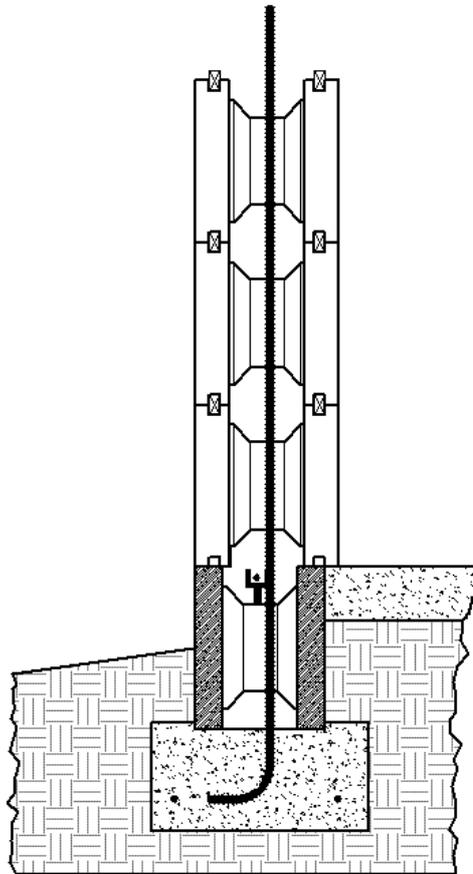


Figure 4: Mikey Block Wet Set Footing Detail

Mikey Block stem walls provide an insulated perimeter, use less concrete than a monopour footing, serve as the form for the slab and eliminate setting and stripping forms after the slab is poured. If Mikey Block wet-set blocks are used for the stem wall, they can be set into the still wet footing, allowing easy leveling of the entire stem wall using string lines. Mikey Block wet-set blocks work best in a one course stem wall, and for locations that can be supplied from our Tucson plant, where wet-sets are exclusively made.

Mikey Block with a conventional monopour footing is shown in Figure 5. Although the monopour footing allows pouring the stem and slab at the same time, it uses about 30% more concrete, requires setting and stripping forms, and does not provide an insulated perimeter.

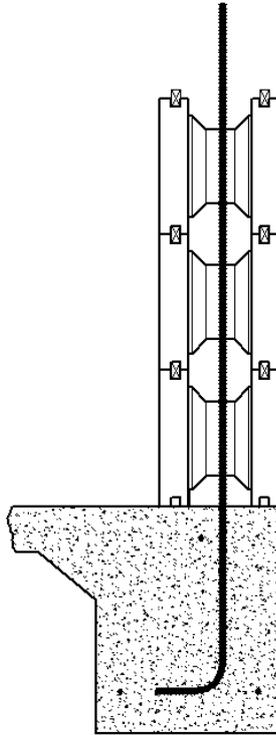


Figure 5: Mikey Block Monopour Footing Detail

Rebar Placement

Vertical rebar (or verts) must be stubbed up from the slab or stem wall so that it will be centered in the Mikey Block grout columns. To satisfy requirements for overlap, bars extending out of the slab or stem wall must be at least 40 bar diameters in length. This equates to 20 inches for half-inch rebar. We call for 24 inches just in case the inspector can't do math. Verts should have a 4-inch leg, minimum, and extend into the footing to 3" from the bottom.

Verts should be placed inward half a block width from a line locating the edge of the slab. Depending on the designed height of the walls, the verts will be placed at 12", 24", 36", or 48" intervals. Except for the corner grout cell and cells adjacent to the corner, placement intervals should be measured *from the outside edge* of an adjacent outside corner. For the corner grout cell, place the rebar half a block width in from the edge of the slab. For the remaining rebar, locate at 12" intervals *from the outside edge of the slab, starting at 24"*. **Do not locate rebar at 12" increments from the rebar located in the corner cell.** Figure 6 shows the layout scheme.

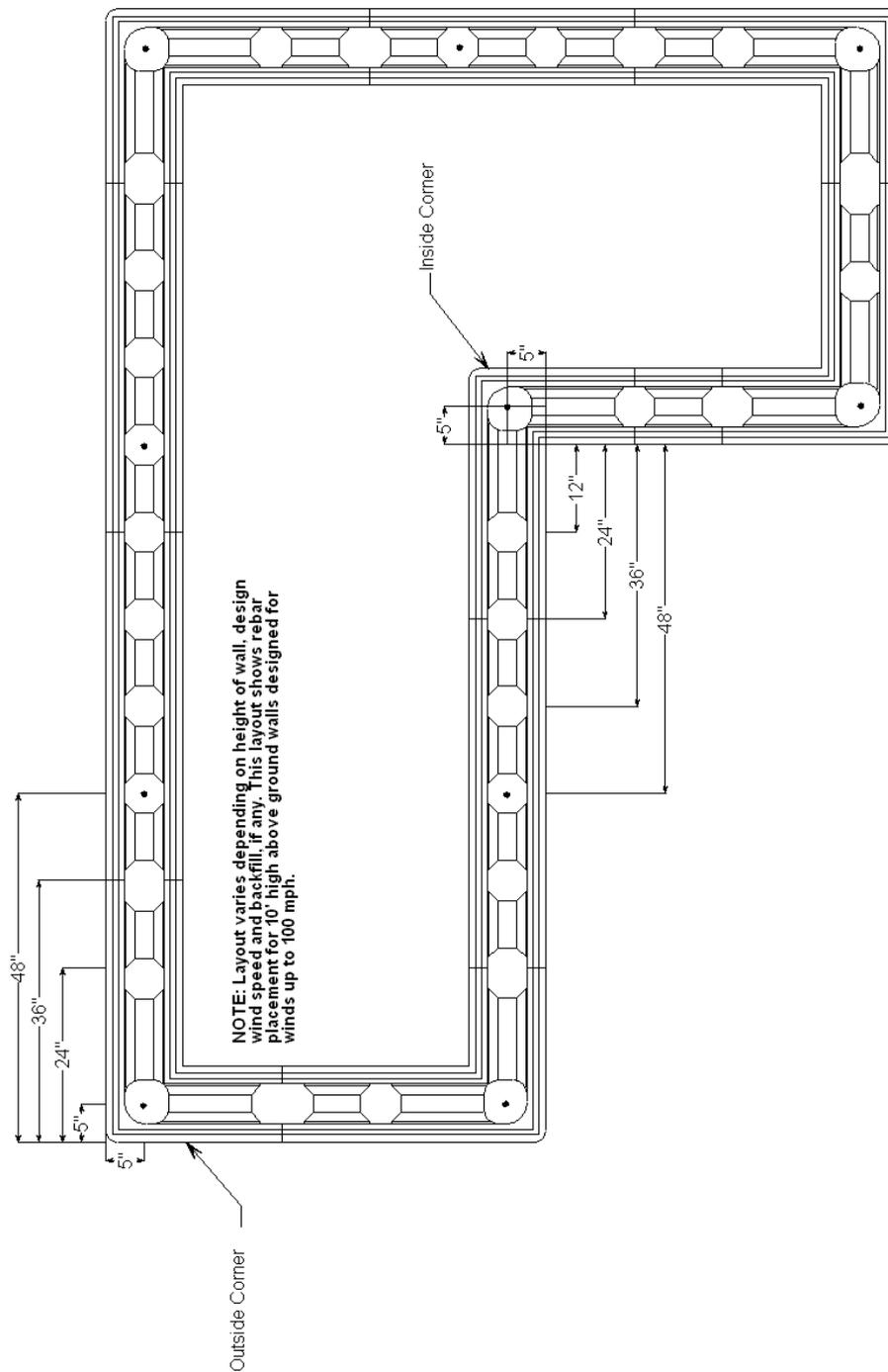


Figure 6: Rebar Layout Example for Mikey Block

Adjust the rebar placement to accommodate door openings (and windows with low sills) by making sure no rebar is placed within door openings, but be sure to place it within one foot of both sides of door openings (or as required by building codes or the engineer's requirements).

Verts can be wire-tied in place before the pour or “stabbed in” after the pour. The latter method is much easier, but make sure your local building code department allows it.

A Note On Rebar

Rebar comes in 20 (or 40-foot) lengths. Thus, it can be cut expediently in 4', 5', 6'8", or 10' lengths. You can minimize waste and save money by planning ahead with regard to cutting your verts. For example, a 12" stem wall and a 10" footing would require verts to be at least $(4 + (10-3) + 12 + 24) = 47$ inches in length. Thus, cutting 4' verts for the footing works well. If the walls are 10 foot, you can cut verts an inch shy of that and go all the way up. If you do an intermediate grout pour (recommended), you'll have to lift the block up and over the rebar after the first pour, but it will save 2 feet of overlap per vert, plus whatever waste you would have cutting verts for both lifts. There may not always be an efficient cutting scheme for a given scenario, but it's always worthy of a little consideration ahead of time.

Layout and Installation of the First Course

The installation of the first course begins with layout. Start by measuring the slab or stem wall to identify any anomalies that will require adjustment to the planned layout. Once any issues have been resolved, snap lines locating the placement of the 2.5" track that will serve as a guide for placing the first course of block. The inside edge of the track will be placed inward the depth of the block (10.5" for Mikey Block) from the edge of the slab or stem wall. Use a mason's string and tape measure first to check for square and mark the slab. When the lines are square and true, carefully snap your lines in chalk. Be sure to mark the locations for door openings (and not putting a chalk line through them may save cleaning up later).

After the lines are snapped, install 2.5" track. The track is used to aid placement of the first course and as an attachment detail for drywall and baseboards. Locate the track so its inside edge is on the snapped lines. Cut the track so it doesn't protrude into door openings and so the ends meet in the corners without overlapping. Fasten the track to the slab using $\frac{1}{4}$ " x $\frac{3}{4}$ " length drive pin anchors or other suitable means.

Once the track is anchored, you are ready to lay the first course. Start from a corner and slide the inside panel of the corner block into the track. Do the same at an adjacent corner and then place the stretchers in between. If necessary, cut the last block to fit (all cuts should be on one-foot marks).

Cutting Corners

Mikey Block is designed to bond at one-foot intervals and the unique design of the Max corner allows it to be used for both inside and outside corners. However, because Mikey Block is 10.5 inches deep, an outside layout requires that inside corners have 1.5 inches cut off each end (the corners have score marks indicating where to cut).

For inside layout, the inside corners are left as is and the outside corners have 1.5 inches removed from each end. In addition, the dimensions of the slab are reduced 1.5 inches for each outside corner and increased 1.5 inches for each inside corner.

In both situations, the cuts are necessary to stay on bond, which, in turn, allows us to retain our cardinal rule of designing walls in one-foot increments. Refer to Appendix A for examples of a floor plan illustrating layouts from the outside and from the inside.

Placing OSB

Place the OSB splines into the grooves cut into the top of the blocks. You want the splines to bridge between blocks, which aids in locking them together. We joke about college-educated types that will proudly cut all their OSB into 4-foot lengths that perfectly line up with the ends of the blocks. Don't be "that guy". In addition, pretty much any size piece of OSB can be used in the wall, but you're allowed to throw away pieces less than one inch long. Once the OSB has been installed, move back to the corners and start stacking the next course.

Installation to the First Grout Level

Corners blocks have a two-foot leg and a three-foot leg. Typically, you will reverse the corners at each course so that the ends of blocks in one row don't line up with those in the row above or below. This creates a running bond, which helps interlock the blocks, which stabilizes the wall prior to and during grouting. This guideline can be ignored in situations where cutting block can be eliminated. For example, if there is a door opening set two feet from the corner, you would stack all the corners with their two-foot leg running to the doorway, thus avoiding cutting one foot off the corner's three-foot leg every other course.

Mikey Block has score marks at one-foot intervals. Use these marks to aid in alignment when stacking and as a guide when cutting block. As the walls go up, the score marks should all line up from one course to the next. After the second or third course, mark where window openings will be located, so you know to leave openings for them. Typically, horizontal rebar will be installed every fourth course as well as above and below openings.

Schvensons (rebar chairs) are provided to facilitate placing horizontal rebar in the center of the grout channel. Schvensons are installed every 4-5 feet by piercing the foam with a keyhole saw and then inserting the schvenson until it is seated, as shown in Figure 7.



Figure 7: Schvenson With Rebar

Plumbing and Aligning the Walls

Plumbing and aligning is normally done after stacking three or four courses (three is easier). Place 2.5" track on top of the wall on both sides, staggering the ends of the track. The wall will magically snap into place. Plumb and glue the corners, inside and out. Be sure to squirt glue between the bottom track and the first course about every 12" so the wall will not hinge or float during grouting.



Figure 8: Using 2.5" Track to align the wall

When the corners have been aligned and glued, sight or string line the walls between corners. Shim or lean a brace where necessary. Glue the rest of the wall in place by spot gluing every foot between courses. Remove and set aside the 2.5" track from the top of the walls. Then install the remaining block for the first grout lift.

Bracing

For windy conditions and for longer walls, if needed, bracing can be screwed into the OSB at four-foot intervals between corners. Anything that is straight and provides stiffness (e.g. unistrut) can be used.

Gluing

Expanding polyurethane foam adhesive is used to adhere the walls together and to fill any gaps prior to grouting. It is dispensed from a can using a glue gun. We advise spot gluing about every foot in between courses. This is most critical for the top and bottom courses, where the hydraulic pressure of the grout will tend to lift the blocks up slightly.

Window and Door Placement

Like the wall dimensions, if window and door openings are made in incremental feet, there will be no wasted block. However, to contain the concrete, openings must be closed off. Typically, you will leave an opening that is the next incremental foot larger than the required rough opening required for the window or door. Then the opening is “bucked down” to the desired size using Mikey Block foam or cementitious bucks. We manufacture cementitious or foam bucks to do this. Our bucks come in 1”, 2”, 3”, 4”, 5” and 6” widths, allowing the flexibility to rough-in openings down to one-inch increments. For example, if a door plus frame requires a rough opening of 40 inches, a four-foot (48”) opening should be made. Gluing a 4-inch buck on either side closes off the opening, while reducing its width to 40 inches. Simply glue the bucks in place with foam glue, holding them with long nails until the glue sets.

Our foam bucks have notches cut to accept 2.5” track, which can be used for an attachment detail, if needed. Our cementitious bucks are made from recycled material and can be easily sanded when a more rounded appearance is desired.



Figure 9: Foam & Cementitious Door Bucks

We recommend using Mikey bucks because they are easy to work with, provide excellent insulation, can be glued into place and are not removed after grouting. After the walls are grouted, windows can be placed, shimmed, leveled, plumbed and then glued in place using foam glue—a very simple, yet very efficient and expedient installation method. However, if so desired, windows and door openings can be bucked using 2x6s, allowing the installation of windows and doors with conventional fasteners.

Preparation for Grouting

Carefully check off each item in the following list prior to grouting:

1. Verify all walls are straight and plumb. Adjust as needed.
2. Place all rebar, horizontal and vertical, per code or engineering design.
3. Fill all gaps between blocks with glue.
4. Buck window and door openings.
5. Brace window and door openings to prevent the grout's hydraulic pressure from bowing or blowing out any openings (no, a one-inch cementitious buck won't hold without bracing).
6. To prevent the grout from lifting any portion of the wall, spot glue the blocks together on both sides at one-foot intervals.
7. Place 2.5" track over both panels of the top course, staggering them slightly from one side to the other so their ends don't line up.
8. Sight along the walls and adjust alignment as necessary.
9. Cut inspection holes in long windowsills for ensuring complete grout filling beneath.
10. Pass any required inspections by the local building authority.
11. Calculate the required amount of grout (one yard fills 91 square feet of Mikey Block)
12. Schedule the grout pumping service
13. Order the grout from your ready mix company.



Figure 10: Pumping Grout

Pumping the Grout

Although the lift may go higher, we recommend grouting no more than four feet per hour. The grout, if at the right slump (6-7 ½ inch), will flow at a 45-degree angle as it fills. Keep moving two to four cells at a time and watch that the grout is filling to the desired level. Use inspection holes to verify the grout completely fills beneath long windowsills.

If the building requires two or more grout lifts, the rebar will need to extend past the point of the first grout lift the specified amount (24" for 1/2" rebar) to get the required overlap with the next section of rebar. For walls up to 10 feet high, full-length rebar can be used, but will require lifting the blocks up and over after the first grout lift.

Ledgers and Anchors

For parapet walls or second-story walls, ledgers are used to attach ceiling/floor joists to the walls. We recommend our Olski product for hanging ledgers. Olskies are inserted into the wall between blocks or through a slot cut just large enough to slip the metal through. Slots will be cut on score marks, as they also indicate the centers of grout columns. Olski spacing is typically every two feet for bearing walls and every four feet for non-bearing walls.

A flange bent in the olski at 90 degrees is left exposed and lies flat against the wall. If using wood ledgers, be sure to install carriage bolts in the olskis prior to grouting. It is not necessary to run rebar through the olski. Holes in the embedded portion of the olski allow grout to flow through it, locking it securely in the wall. After the walls are grouted, ledgers are attached to the olskis and ceiling/floor joists are attached to the ledger.

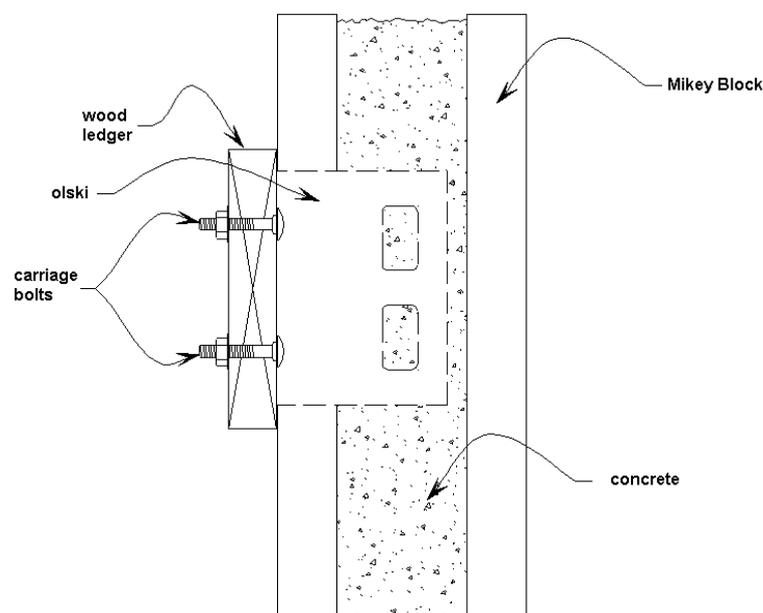


Figure 11: Ledger Detail With Olski

Installing Electrical Wiring

Electrical wiring is typically installed by placing it into a deep groove cut into the block after grouting. The grooves can be made with either a saw or a hot knife. Grout cells are 2.5” inches inward from the inside block face, so that is the recommended depth for cutting the grooves. Placing the wiring as deep into the block as possible is desirable to help prevent any drywall screws from piercing the wiring during drywall installation. In locations that are more susceptible to potential damage from fasteners, protective steel plates can be installed over the wiring. If possible, do not place grooves next to the OSB, as this will weaken the embedded strength of the OSB.

If required, conduit may be placed within the internal grout cells prior to grouting or it can be embedded into the face of the block by routing out the material and inserting the conduit. All three methods are acceptable. If you decide to place conduit inside the grout cells, it may be necessary to have the electrician on site while the blocks are stacked. This is similar to standard concrete block construction. This method is usually more expensive and slows down the erection of the walls.

Electrical boxes can be installed into holes cut into the block using a hot knife or other method. The 2.5” inside panel depth is sufficient for placement of most electrical boxes. If a deeper hole is required, it can be located in between the one-foot score marks so that the cut is made into the foam hourglass and not into the grout.

Installing Plumbing

Plumbing installations may be accomplished in a manner similar to electrical, with a few exceptions. When copper pipes are placed in grout cells, they must be wrapped to protect them from the concrete. If they are to be routed into the face of the Mikey Block, the installation would be the same as previously described. Plastic pipes may be placed in either location. Vent pipes must be placed within grout cells, as they are too large to be routed into the block face. If there is a concern regarding wall strength with a vent pipe running through a grout column, compare it to a very narrow window.

Handling and Storage

Mikey Block is lightweight and handles easily. However, because it is so light, take precautions to keep it from blowing around in high winds. When possible, store block under cover to protect ends from breakage and from the weather. Be especially careful to store the OSB splines where they won't get wet, as they will swell and become difficult to work with. If Mikey Block is to be stored for extended periods, it should be covered to protect it from over exposure to sunlight. Cementitious products should be stored flat and protected from breakage.

Technical Information

Item	Value
Dimensions	10.5" x 12" x 48" - standard block
Cores	5½" x 5½" @ 12" OC horizontally and vertically
Surface Area	4.0 square feet
Weight	3 pounds per block
Concrete Volume	.29 cubic feet per square foot 1.15 cubic feet per standard block 91 square feet per cubic yard 23 blocks per cubic yard
R-factor	28 excluding drywall, stucco, air films, thermal mass
U-value	.0357
EPS Density	1.5 pounds per cubic foot
Water Absorption Rate	< 2% by volume
Permeability	1.25 perm inches
Decibel Rating	55 dB with ½" drywall
EPS Compressive Strength (100% deformation)	21 PSI+
Smoke Development	450 or less (ASTM-E84)
Flame Spread	25 or less (ASTM-84)
Recommended Concrete Compressive Strength	Minimum 2500 PSI at 7.5" slump, maximum

Appendix A: Layout Examples

Mikey Block lays out in one-foot increments from the inside or the outside of the walls (Mikey Block OG lays out in one-foot increments from both the outside and the inside). The design of a given project may require layout from either the outside or from the inside. Fortunately, with the versatility of our Max corners, this is easily achieved. The following examples show two nearly identical floorplan layouts. The difference is that the first has outside layout and the second has inside layout. For outside layout, only inside corners will have 1.5 inches removed from both ends. For inside layout, all outside corners will have 1.5 inches removed from both ends. Note how the dimensions of the slab change for the two cases. When layout is from the inside, the length of walls with outside corner pairs are decreased by three inches, while the length of walls with inside corner pairs are increased by three inches. For walls having one inside and one outside corner, the length will be in incremental feet regardless of layout.

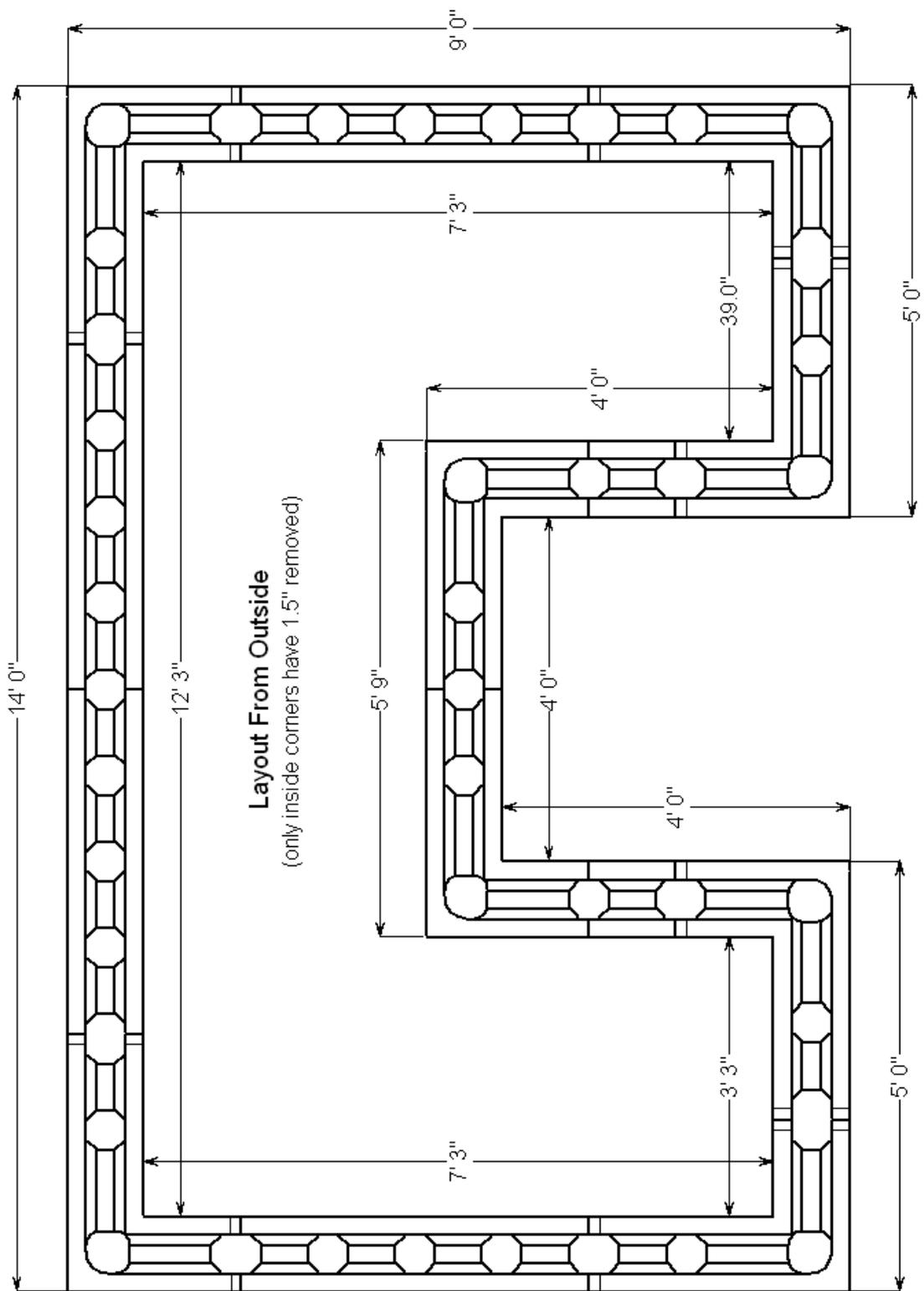


Figure 12: Mikey Block Outside Layout Example

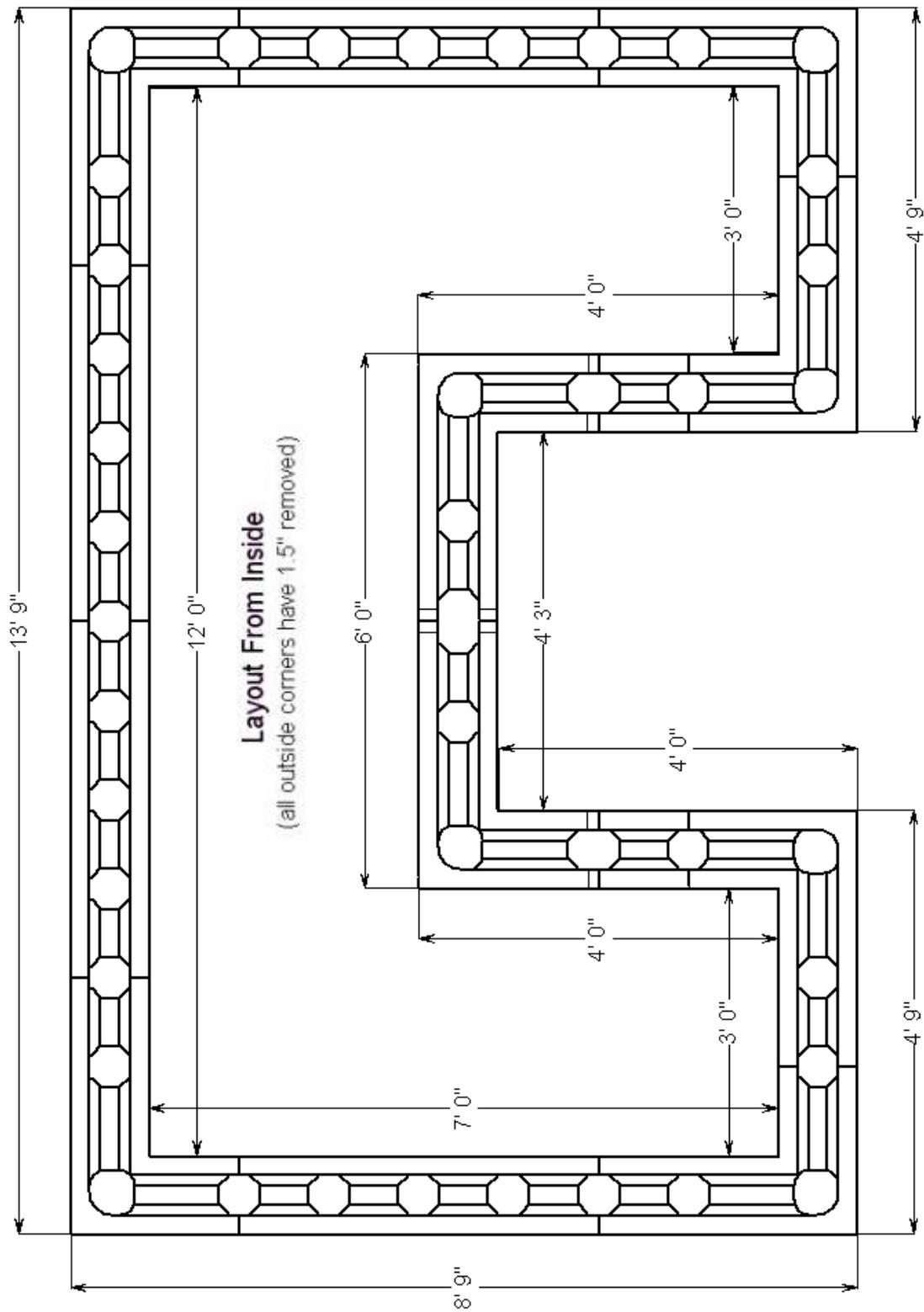


Figure 13: Mikey Block Inside Layout Example