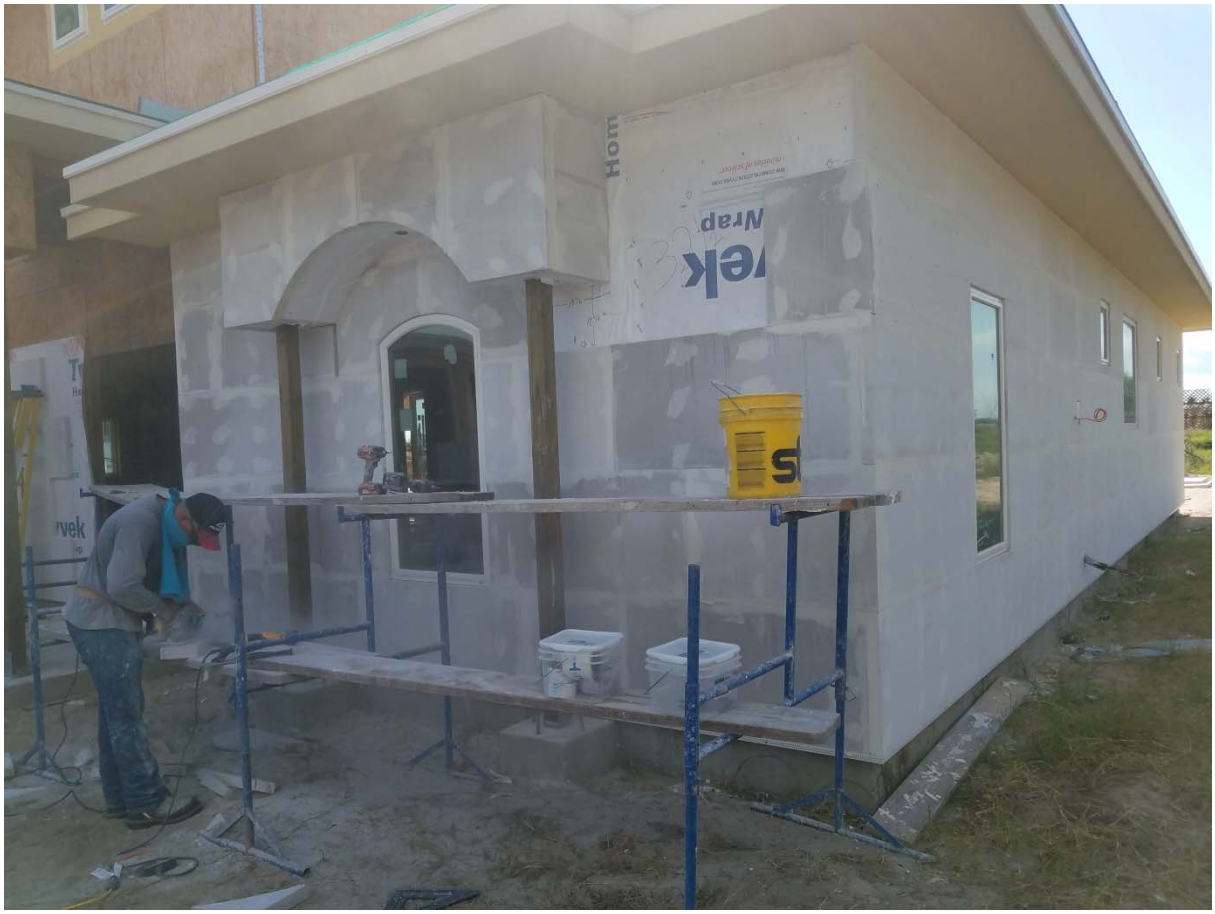
ACCS SYSTEM INSTALLATION



Guideline and notes for successful AAC panel installation

PRODUCT DESCRIPTION

Aircrete autoclaved aerated concrete panels supplied by AAC Build are lightweight concrete panels used primarily for exterior cladding. AAC panels are ecologically friendly, water repellant, fire resistant, pest and rot resistant, and durable.

AAC panels can be installed over wood or metal framing, and, *if approved by the project engineer*, may be installed without underlying sheathing. When properly installed per the following instructions, they become the key element of a cladding system, or ACCS (Aerated Concrete Cladding System).

AAC panels are delivered in pallet form directly from the distributor. Steel reinforced, two inch (2") thick panels are available 2' x 4', or 2' x 6'-8", and 2'x 8', or in non-reinforced three inch (3") panels in 2' x 4'. Pallets are packaged for easy handling and placement at the job site.

MATERIAL HANDLING

Pallets of AAC material should be staged around the job in pairs, in a way to allow good access and scaffold placement. Placement in pairs allows one pallet to be used as a workstation while pulling directly from the other. Pallets should be placed on level ground to prevent stress on the panels once packaging is opened. Delivery personnel should take care not to bounce, drop or bump the pallet. AAC material can crack when stressed off axis. When moving by hand, panels should be carried on edge (vertically), not flat, especially panels longer than 48". *(see Appendix 4 for more information)*

SAFETY

SAFETY is an important issue when working with AAC products. AAC products are formulated with crystalline silica, a known lung carcinogen. Cutting AAC product creates silica dust which must be handled with caution.

The following measures should always be observed when working with AAC products:

- **Wear full wrap protective glasses** when cutting, drilling or rasping AAC product to protect the eyes from silica dust and metal tailings. If dust or tailings get into the eye do not rub it as this may cause damage. Wash the eye with clean water. For severe cases immediately visit a doctor.
- **Wear a protective mask** when cutting, drilling or rasping AAC product to protect the lungs from ingesting silica dust. **Filters for the mask should be rated P100 Particulate Filter Cartridges (HEPA) rated for Toxic Dust**, and should be exchanged often.
  (see Appendix 3 for more information)

JOB PREPARATION

Foundation

Before the slab is started ask for a brick ledge of between 1½". If the AAC Panel is to be installed over sheathing a brick ledge of 2" is appropriate. The brick ledge provides a seat for the first row of AAC Panels. The AAC panel will overhang the foundation by ~ ½", creating a shadow line which will hide imperfections on the foundation edge. This will also act as a drip edge for the wall assembly. If no brick ledge can be supplied, 1½" x 1½" angle material can be attached to framing as a guide, and protection for the bottom face of panels.

Framing

Inspect framing for straightness, plumb and planarity before work begins. Make sure studs are on 16" centers. Wall sections should be in-plane with adjoining sections. This is necessary to allow proper attachment of the panels. On multi-story buildings pay particular attention to corners and the transition between floors. Planarity of the installed panel wall will follow and reflect "planarity" in framing.

If framing is not aligned a good deal of work may need to correct the poorly aligned walls. THIS WORK IS NOT PART OF YOUR ORIGINAL BID. YOU SHOULD QUOTE THIS AS EXTRA WORK.

Inside corners will need additional studs to allow for attachment of the panels. Install these as needed.

If no sheathing is to be used make sure diagonal bracing is installed on the inside face of the outside walls to eliminate racking during panel installation. Use 1½" wide light gauge metal strap nailed to the inside face of framing from top plate to foot plate. Straps can remain in place with drywall installed directly on top of the metal straps.

Check that soffit lighting and vents are placed so they will not be blocked by installed panels. Meet with the builder to determine how window(s) and door(s) are to be installed, and how mouldings and trims are to be applied.

Verify if outdoor kitchens, attached privacy walls or fences will have utilities installed.

Utility Penetrations

Ask the builder to have electricians, plumbers and other trades to locate and mark penetrations that will be needed. It is best you make the required cut-outs as other trades may not have proper tools for the job, or may not be familiar with the properties of AAC.

Roof Flashing, Windows, Doors, Attic Vents, Soffit and Ceilings

Make sure all roof flashings are in place. DO NOT run screws into the roof flashings near the roof surface. Ask the roofer where you should place screws so as to not compromise his flashing. Snap a chalk line where your panel installation will start or end.

For flat or parapet roofs make sure to coordinate with the builder and roofer with regards to the roof flashing. With parapets make sure the top framing is angled so water flows to the roof, not to the outside wall.

If you apply the weather barrier make sure window sills are properly flashed during installation.

Make sure all windows are installed and door framing is in place before panel placement begins. Inspect all windows and casings for damage before you start installation. Bring any cracked or broken windows to the attention of the builder at this time. Shoot an image of all damage for your job files.

Install weather flashing to the top and sides of window nail fins. Do not cover the bottom fin to allow for incidental drainage. Cover windows with 90-day film or other such material to protect the glass and casings during panel installation and stucco. Do not use masking tape because it will leave a residue if in place longer than a few days. Red stucco tape is a better choice.

Remind the builder that since the ACCS is virtually an air tight system he must insure that adequate ventilation in attic areas is available to prevent internal condensation. This is particularly true with modern designs without soffits.

Ask the builder to paint the portion of door casings that adjoin the wall with a good quality primer. This will provide a bonding surface for flashing tape. This is not necessary if a liquid-applied weather barrier is used. This is the only time to permanently waterproof outer walls. Primary sealing cannot be effectively accomplished once the AAC panels are installed.

Ask the builder his choice for soffit installation:

A. Install AAC panel first, then the soffit;
B. Install the soffit first, then the AAC panel;
C. Install the soffit, holding it away from sheathing or studs by 2”, then install AAC panel behind the soffit.

Ask that the painter to not paint the soffit until AFTER the AAC panel is installed, but before the final coat is applied. This will make your installation finish easier to seal and clean.

SYSTEM INSTALLATION

Weather Barrier

Install the fabric or fluid-applied air/moisture barrier per manufacturer's installation guidelines. Your contract may require the builder to install the weather barrier. In this case fully inspect the walls to insure all penetrations have been properly flashed before proceeding with panel installation.

Flashing

Flash window mounting flanges to the air/moisture barrier. Flash jambs first, then the head. DO NOT FLASH THE BOTTOM OF THE WINDOW. Flash between door framing and the air/moisture barrier. Note that wood with a coat of primer creates the best bond. Flash around all utility penetrations to the air/moisture barrier. *(see Appendix 6 for more information)*

Handling and Moving AAC Panels

Ask the delivery driver to strategically place pallets of AAC panels, in pairs, around the job site. This minimizes the distance panels will need to be carried. It is also a good idea to use one pallet for cut pieces (and use the pallet itself as a cutting table) with the other pallet for full panels.

Always carry the panel on a vertical position. Carrying a panel flat increases the stress and may result in a cracked panel. The problem is more likely with panels longer than 4'. Take care not to bump or jam panels during handling. Corners are the weakest part of a panel. *(see Appendix 4 for more information)*

Tools Required

AAC panels, while very durable, do not require special tools to cut, form and assemble. It is advised that diamond blades and bits be used for cutting and drilling. If diamond blades are not available use bi-metal saw blades or blades hardened for cutting metal. Solid blades perform better with AAC than slotted blades. *(see Appendix 1 for recommended tools)*

Adhesive Mortar

Mix a batch of Adhesive Mortar using a low RPM mixer with a paddle blade. Mix with the amount of water recommended on the bag. Pour water into the dry mix. Do not add too much water. Do not mix at high speed. Mix until the mud is wet and smooth. Let the adhesive sit for 5 minutes, then mix again for 15 seconds until smooth and creamy. The adhesive is now ready to use. Pot life is approximately 1 hour.

Mortar is applied to the brick ledge in large dabs approximately 3" wide by ½" thick. Leave 3" in between dabs to create weep holes. Mortar is applied to mating panel faces at 1/16" deep with striations. A notched trowel can be used. **COAT THE ENTIRE FACE OF THE PANEL EDGE. This bond is important in order to achieve full load transfer and sharing between panels.**

Placing Panels on the Wall

Check the brick ledges to make sure they are level. A small amount of unevenness is expected. If there is a large variance from corner to corner, or between the corners, you need to find a way to fill the low spots.

Starting with a corner, brush debris from the brick ledge and dab Adhesive Mortar on the brick ledge along the area where the panel will be installed. Mortar should be ½" thick, allowing 2"-3" open space between dabs of mortar to allow wall cavity drainage. *(see Document: Panel Installation for details)*

Position the first panel making sure it is installed level and plumb. Use a rubber mallet to adjust the panel alignment. It is allowable to lay the first course of panels on the brick ledge even if it is not completely level. You can correct small variances in level as you install the second and third course.

Install fasteners into underlying studs. Start with the center of the panel. Set the clutch on the impact driver so the head of the fastener is seated just under the surface of the panel. Over-tightening of the fastener may pull the panel out of alignment and/or cause it to crack from excessive stress.
(see Document: ACCS Details)

Set additional panels in the same manner. Brush dust and debris from the new panel edges and apply Adhesive Mortar to the vertical edge of the corner panel just placed and a ½" bed of adhesive to the Brick ledge in the area where the next panel will be placed. Carefully place this second panel into place, checking alignment as before, and make minor adjustment(s) with a rubber mallet. Repeat this process for the bottom course of panels.

Before completing the bottom course, set the opposite corner and work back towards the middle of the wall section. Use full length panels at outside corners if possible. DO NOT end a panel at the corner of a window, top or bottom, but continue the panel to the next stud under/over the window/door. Any panel piece (less than full length) must attach to at least two studs. Joints need not be backed by nor centered over studs. Butt joints should be staggered a minimum of 16" from panels in adjacent rows.

Continue panel installation on this wall segment using a running bond pattern (offset each panel so not to have a continuous joint on the wall from top to bottom). Apply Adhesive Mortar to the entire surface of all joining faces of panels as they are installed. Stagger panels on all inside and outside corners.

Remove excess Adhesive Mortar from the wall surface as you work. Cured adhesive is extremely difficult to remove by hand (the adhesive cures to 1,450 psi density). Rasp excess adhesive from the wall at least 4 hours after it has been applied, but not more than 24 hours after application.

Special Considerations When Placing Panels

Do not leave panel rebar exposed when cutting; use anti-corrosive paint to cover all exposed metal. Never install the cut edge of a panel (exposed reinforcement wire) facing metal, window frames, etc., or to an outside corner. Always face the cut edge pf a panel into a joint that will receive Mortar.

Never install fasteners through flashing. Ask the roofer to consult with you before installing over flashing. When in doubt, or when the roofer is not available, install fasteners at least 5" from the edge of the AAC panel. When installing over a roofline pull the panel up 2" from the surface of the roof decking. If the roofer is available ask him to provide you a chalk line for the bottom of the panels.

When applying AAC panels to a beam or viga we advise you first install panels on the vertical faces of the beam, stopping at the bottom face of the beam. Next install a piece on the bottom of the beam, reaching to the outside faces of the vertical panel. *(see Document ACCS Details)*

For arched openings we recommend you cover the bottom face with cement board (Druock, Hardie or equal). It is very expensive and slow work to cover these faces with AAC material. This applies to other features like niches as well.

Make sure porch ceilings are set into place before installing panels. Install the AAC panels up to ¼" of the ceiling, then caulk the joint where they meet. Make sure the painter does not paint the ceiling until AFTER the AAC panel is installed.

Chips, cracks and other imperfections can be repaired. Save cuttings and broken pieces of panel to be used for future repairs.

The AAC contractor should make all penetrations to the AACS System, not the plumber, not the electrician, not the HVAC man. Use a circular saw, oscillating multi-tool or reciprocating saw to make square and rectangular perforations to a panel. Cut from the back side of the panel. Overcuts can easily be filled with Adhesive Mortar. For circular perforations use a diamond edge hole saw, or drill a 1" hole, then a reciprocating saw to cut the required size hole in the panel.

Inform the builder that drywall should be attached to the inside face of all outside walls with screws, not nails. This requirement is similar to stucco. Hammering on the interior studs may crack nearby AAC panels. The application of Base Coat and Mesh will strengthen the wall assembly and mitigate cracking from drywall, cabinet or similar installations.

Radius Walls

Radius walls can be installed using AAC panels. Panels are scored, approximately ¾" deep, on one side with a skill saw and diamond blade. Cuts are made from top to bottom on the 2' dimension. The end of a panel that will intersect panels of an adjacent flat wall should be cut at an angle so as to present a flat surface to the adjoining panel for a good Adhesive Mortar joint.

The prepared panel is then placed on the wall face and pressed into place. This panel will break under the cut areas, following the contour of the framing below. Attach panels in the normal manner. Outer ends of the radius panels will interleave with intersecting panels.

Spot face the fasteners with Adhesive Mortar then coat the entire radius wall surface with a mixture (4:1) of Leveling Mortar and Adhesive Mortar. Trowel the mixture to a uniform surface to achieve the intended radius of the wall segment.
(see Appendix 5 for more details)

Special Considerations around Windows and Doors

Never end a panel at the top or bottom corner of a window, door or other major penetration of the wall. This is a weak part of the wall and a crack could from at that corner. Continue the panel beyond the corner to the next stud.

Never orient the cut end of a panel so the exposed steel reinforcement wire is exposed to the window or door opening. Cut ends of panels should ALWAYS face into a mortar joint, and never to the outside face of the wall.

Use a small piece of material (18"-24") long as a spacer for installing panels up to the edge of an installed window or door casing. The gap should be ~1/32" (the builder's choice) to allow for thermal expansion between window/door casing and AAC panel. This joint is to be caulked before final coating of the wall.
(see Appendix 6 for more details)

Repairing Cracks in the AAC Panel

Occasional stress cracks may form on panels during installation. Caused by uneven framing or impact from the inside by other trades, these cracks are not a problem. Using a diamond blade saw, score the front face of the panel, following the crack, to a depth of ¾" - 1". Clean dust and debris from the resulting cut and fill the cavity with Adhesive Mortar. Verify the wall surrounding the repair for planarity and resurface as necessary.

Preparation for and Application of Plaster and Textured Acrylic Color Coat

If the AACS system is being installed directly over framing do not proceed to this section until the fastener pattern has been inspected. Depending on your particular project this will be by the City, the Engineer of Record, or other regulatory agencies.

If the system is being installed over sheathing this inspection has already been made, and you may proceed. After approval, screw heads should be covered using Adhesive Mortar.

Rasp or grind the wall surface to remove crests, protruding corners and other high spots to make the wall as flat as possible. Fill valleys with a 9:1 mixture of AAC Leveling Mortar and Adhesive Mortar, using a darby or other straight edge to feather the mix into the depressed area. Repeat the process until a flat wall is achieved.

If architectural "control joints" are to be installed use a skill saw with a diamond blade, or router with a diamond bit to cut the channel as required.

Sheetrock may be installed on interior walls before starting to apply Base Coat. Fully inspect the walls and repair any cracks found with Adhesive Mortar.

Wash the walls to remove accumulated dust and debris. A lawn blower and large broom can be used if water is not readily available. Allow to dry for 2-3 hours before applying Base Coat and Mesh. A clean and moist wall strengthens the bond between the AAC panel and Base Coat.

Apply Base Coat with embedded Fiberglass Mesh to the entire surface of the walls. Return after 24 hours to inspect, and rasp any ridges or bumps.

Paint walls with an acrylic primer tinted to the color of the final finish.

Apply Textured Acrylic Finish (texture and color of choice), Hardie siding, veneer stone or other cladding to the entire surface of the walls as directed.

Inspect final coat for defects and repair as necessary. Remove window and door protection and clean any residue from walks, porches and patios.

Appendix

Appendix I - TOOLS REQUIRED

A minimum list of tools will include:

- A – Frame Scaffolds and Boards

- Hammer Tacker Staple Gun R-19
- Tape Measures (2)
- Chalk Line and Chalk (2)
- Saw Horses (2-3 sets)
- 7¼" Circular Saw, 15A, with diamond or metal cutting blades

- Reciprocating Saw (Saws-all) 12A with 6"diamond or bi-metal cutting blades

- Electric Drill ½" Chuck, 7A
- Portable Hammer Drills (20-24 volt)

- Router 1 HP with ½" Chuck - Diamond or Carbide Bits as needed
- 7" Grinder 13-15A Variable Speed w/ Diamond Cups and Blades

- Electric Drill, 550 RPM 9A, ½" Chuck, to mix adhesive, with Paddle Mixer to mix adhesive

- Construction Hammers and Rubber Mallets
- 5 gal Plastic Buckets (2-3)
- Safety Knife (2-3)
- Tungsten Rasp (10-12 grit) for rasping AAC material

- Hand Shears

- Hand Saw 15" 9 Point

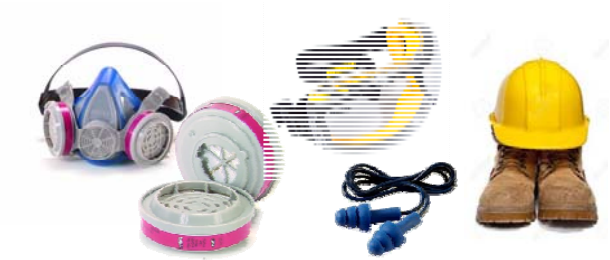
—

- 48” and 96” Masonry Level

- 6” Mud Knifes and Margin Trowels

- 1”x4” x 10’ (for aligning corners and parapets) (2)
- Scaffold w/ safety accessories (6’-6” x 5’ walk-thru) , as needed

- Extension Cords (2) 100’ minimum, 12 ga
- Water Hose 75’-100’ with Nozzle
- Anti-corrosive paint (RUST-OLEUM is good)
- Miscellaneous safety gear – Hard Hat, Steel Toe Boots, Gloves, Eye Protection, Ear Plugs, Dust Masks



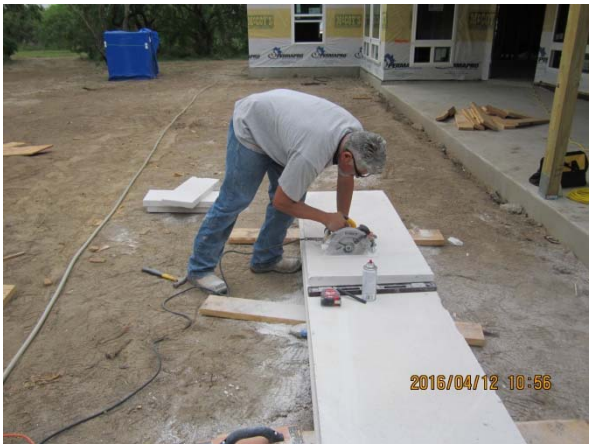
- Pressure Washer (optional)
- Generator (optional)

—

Appendix 2 - RELATED MATERIALS

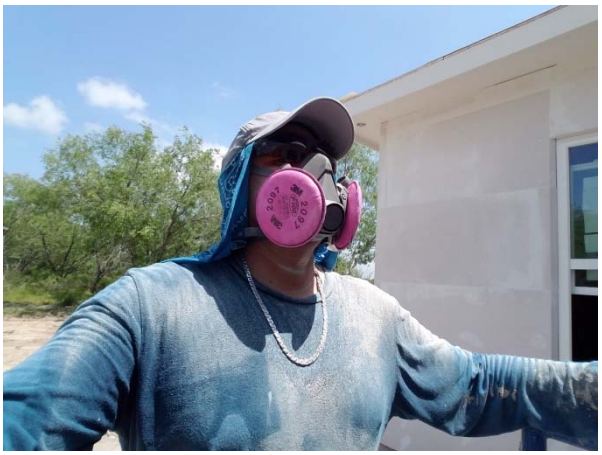
- Weather Barrier as required (TYVEK, other fabric, or liquid applied)
- Staples or cap nails for attaching the weather barrier
- Masking (brown), stucco (red) and painters (blue) tape
- Fasteners as designated be the Project Engineer, with Climate Coating, 3 ½" or more, as appropriate (see engineer's requirements)
- Flashing Tape as required
- AAC Adhesive Mortar (1 bag per pallet, plus 1)
- AAC Leveling Mortar (as required to fill low spots, etc.)
- Base Coat, a polymer-based cementitious coating
- 4.5 oz Fiberglass Mesh
- Acrylic Primer and Acrylic Finish
- Other claddings, as designated

Appendix 3 – SAFETY



One of the components in manufacturing AAC panels is silica, a known carcinogen. Silica is present in most types of cement products. All powdered cements warn against breathing cement dust during mixing. When cutting AAC panels, silica dust is created by the saw blade cutting into the panel. Because hand tools are used the worker is very close to the source of silica dust.

Eye and lung protection should always be used when cutting AAC panels. Glasses should be full wrap safety glasses, the type that seals against the face. Respirators should be worn, with filters designed to remove Toxic Dust (P100 class). The correct filters are magenta in color.



Common sense should be used when cutting panels. It is a good idea to orient the cutting area so prevailing wind blows away from the project and other workers. Likewise, the cutter should have the wind at his back or side to help push dust away from him.

With proper safety equipment and good workplace habits AAC products pose no more problems than other construction materials.

Appendix 4 – MATERIAL HANDLING

AAC panels are very strong when installed, but are easily damaged by improper handling while in transit, or at the job site. Care should be used when offloading the delivery truck. Instruct the forklift or tractor driver to avoid driving over rough ground. Pallets should be stacked around the perimeter of the job. Always place pallets on flat ground.

Pallets should be placed in pairs; one for full panel placement, the other for cutting partial panels as needed. It is a good habit to use a partial pallet as a work table as it will be a solid surface from which to cut partial panels.

Short panels are usually palletized flat on the pallet and can be easily removed as they are needed. Longer panels will be shipped standing on their edge. When staging these longer pallets around the job site it is a good idea to have the delivery driver tip them onto their sides. This allows you to lift them without the others tipping and becoming damaged.

Always carry panels in a vertical position. Carry them as if they are ready to be installed on a wall. When a panel is carried horizontal position (flat) the panel will flex as the workers walk, and is subject to cracking. This is especially true for the longer panels.

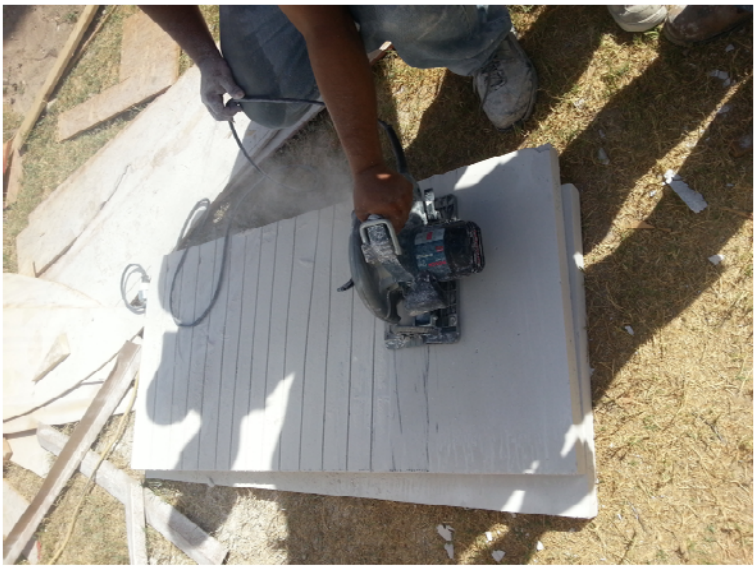
Save cut pieces. There will be very little scrap with ACCS panel installation. Even the smallest pieces can be broken and used for filler or repairs somewhere on the wall.

Adhesive Mortar and Leveling Mortar bags should never be stacked directly on the ground, or on any foundation or other concrete flatwork. ALWAYS stack bagged materials on a pallet to prevent moisture penetrating the bottom layer.

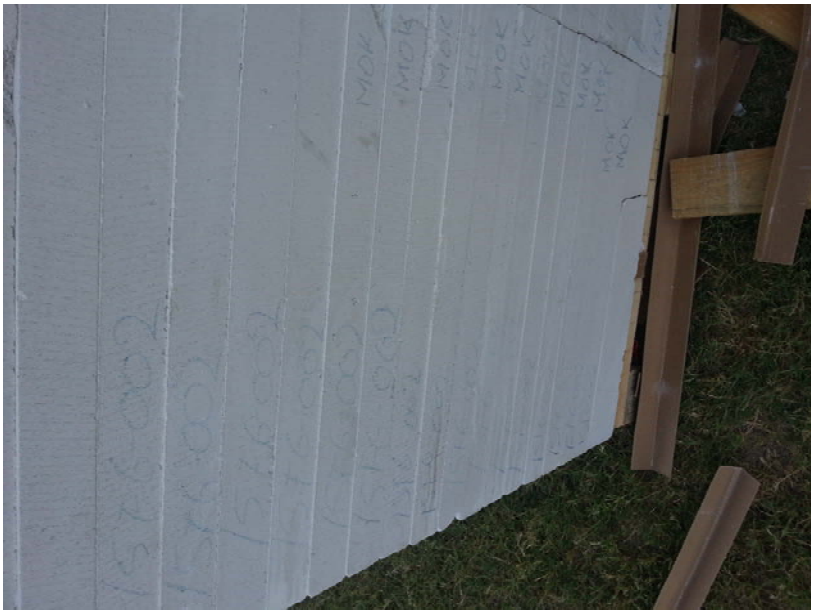
Appendix 5 – RADIUS WALLS

Cover curved wall framing with ½" plywood or OSB.

From top to bottom on the 24" face of an AAC panel mark parallel lines (2.5" min to 6") apart. Space the cuts evenly across the face.

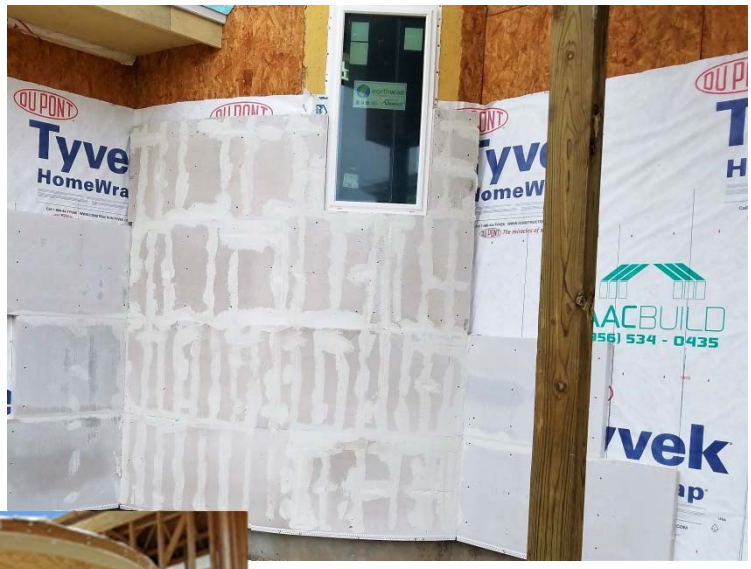


Adjust the Circular Saw blade to a depth of ¾" – 1", and make cuts on the lines. Make sure you do not cut the rebar.

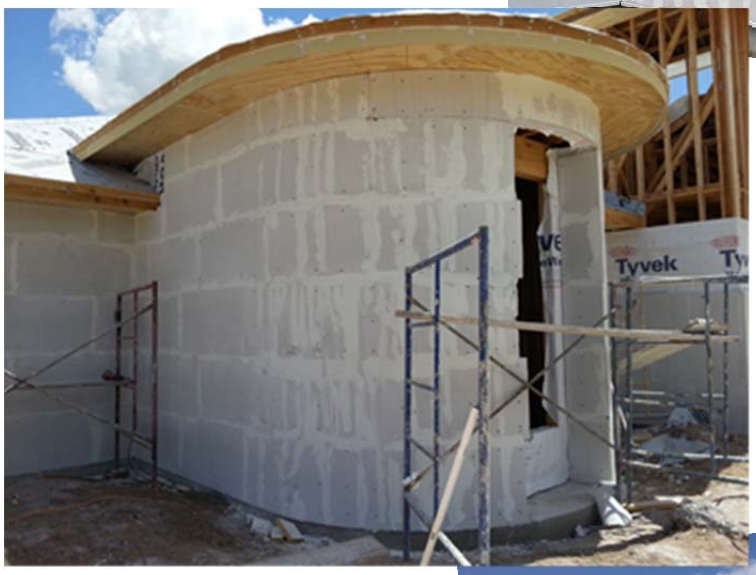


Apply pressure and bend the panel so the panel breaks on the uncut side following the cuts on the other side.

Attach the panel (cracked side out for in for concave surfaces) onto underlying framing and fill all cracks with Adhesive Mortar (only).

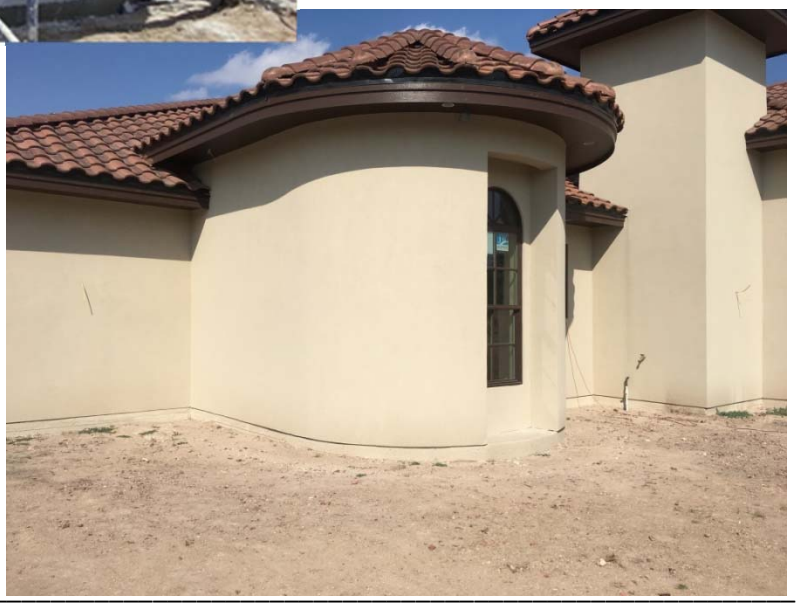


Apply AAC Leveling Mortar/Adhesive Mortar mix to the entire surface to make a smooth, curved surface. When finished the surface will be smooth and without joint lines.



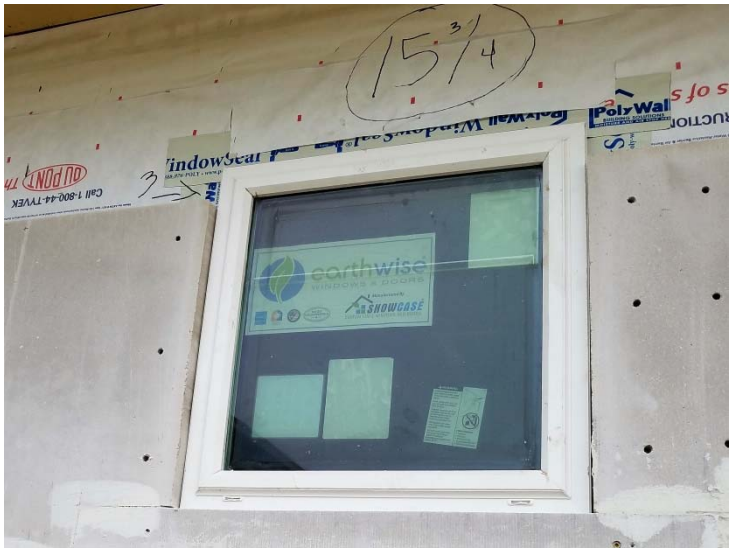
Apply Base Coat with embedded Fiberglass Mesh to the entire surface and finish with Textures Acrylic finish, veneer stone, or other cladding.

Once the underlayment coatings are completed a colored and textured finish coat can be applied. The resulting wall should be smooth, flat and clear of blemish or shadow.



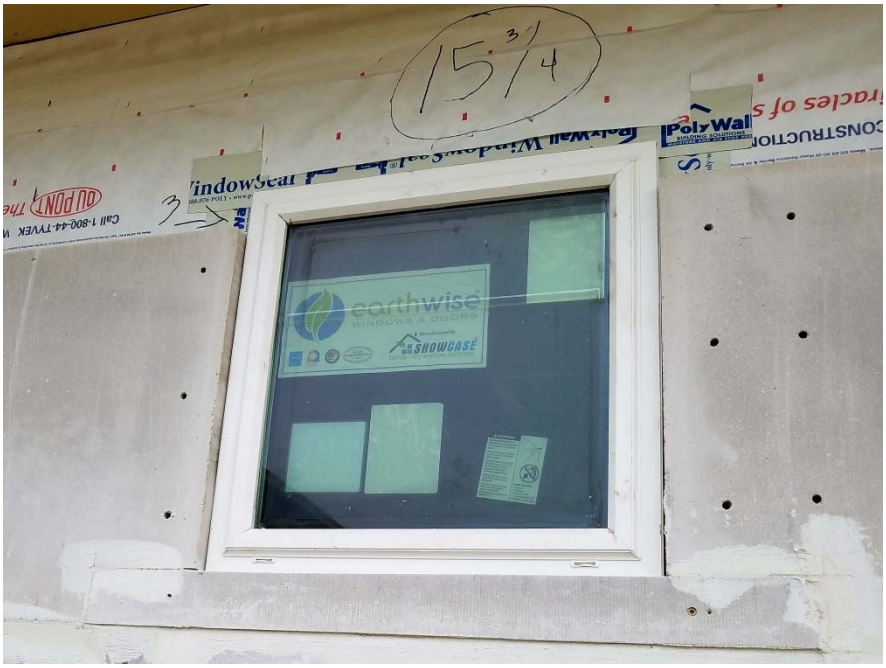
Appendix 6 – Special notes for Windows and Doors

Windows require special consideration during the ACCS installation. Proper flashing technique before installing panels is key to a waterproof wall assembly.



Once windows are installed the nail flange is flashed to the adjoining weather barrier. First cut the head piece diagonally away from the top corners and fold up. Jambs are taped first, then the head. Flashing tape should cover the fasteners and effectively seal the nail flange to the weather barrier. Fold the head piece down over the head flashing and tape the cut ends to the weather barrier.

As noted before, it is not recommended that a panel be terminated below or above the corner of a window. In this example the installer has cut a sill piece that extends about 8" beyond the bottom corner. Mating panels to either side of the window are notched to accommodate the sill piece. This assembly will not crack under strain. Panel segments over the window will be notched in a similar



manner.