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Energy Efficient • Acoustical Insulation • Fire Resistant • Pest Resistant • Environmentally Friendly



Your decision to open this Technical Design Manual says a lot. You are now in an elite group of professional Engineers, Architects, Designers, and Builders around the world who have chosen an innovative, cost effective, and environmentally safe building block called Autoclaved Aerated Concrete (AAC). E-Crete is a company dedicated to satisfying your high building standards in the western United States for energy efficient, sound insulation, and fire and insect resistant structures. E-Crete's AAC offers many more benefits to you and your clients as described in the following chapters.

This document was developed for only one purpose – to assist you. We invite you to review its contents and graciously accept questions and feedback at (888) 432-7383 ext 11.

Thank you for considering E-Crete's Autoclaved Aerated Concrete for your next project. We look forward to working with you!

Sincerely,

The Employees of E-Crete LLC





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PRODUCT DESCRIPTION

Autoclaved Aerated Concrete (AAC) is a lightweight, high strength building block used in a variety of applications for commercial, industrial, and residential construction. AAC is manufactured from lime, sand or mine tailings, cement, gypsum, aeration agent and water to produce pre-cast blocks and panels. AAC has excellent thermal and acoustic insulation properties, is fire and pest resistant, and environmentally superior to more traditional building materials. AAC is a viable and economical alternative to conventional building materials such as wood, concrete, and steel.

AAC was originally invented by architect Johan Axel Ericksson and was patented in 1924. AAC has been used extensively throughout Europe, Far and Middle East, Australia, and South America.

AAC was specifically designed for load-bearing applications such as wall and lintel construction. AAC is also a superior building block in non-load bearing applications such as sound and fire walls.

The following pages describe the manufacturing of AAC, the benefits of using it for masonry walls, the physical properties, construction details and guide specifications.



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AAC PRODUCTION

Environmentally friendly and energy conserving, AAC meets all the requirements of a "green" building material. No pollutants or hazardous wastes are generated in the production process and there is no waste of raw materials.

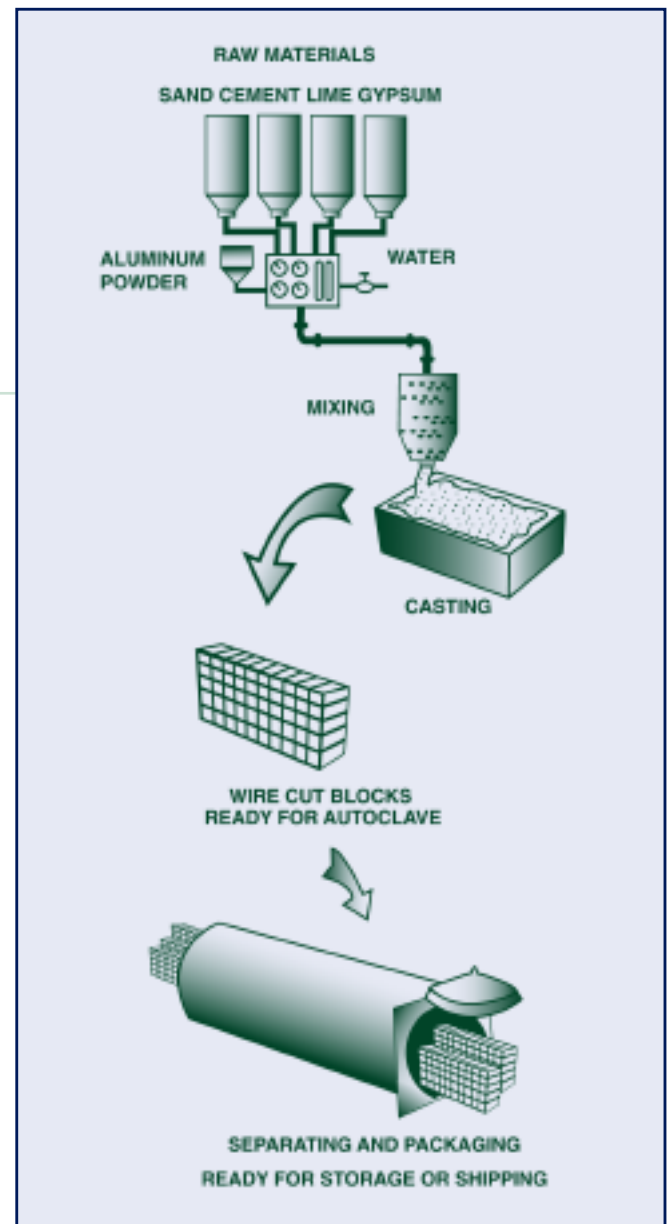


The production method

conserves energy since autoclaving is carried out at high pressures and thermal energy is recovered and reused for maximum efficiency. Production trimmings can also be fully recycled making E-Crete AAC a highly efficient and environmentally friendly building material.

Raw Ingredients of AAC

- Sand or Mine Tailings
- Water
- Cement
- Lime
- Gypsum
- Aerating Agent



IDEAL USES OF AAC

Eight Key Features

- Extremely Durable
- Thermal Insulation
- Fire Resistant (UL Classified)
- Acoustic Insulation
- Pest Resistant
- Environmentally Friendly
- Versatile and Easy to Use
- Lightweight

The many advantageous properties of AAC make it an ideal building material for:

- Commercial
- Residential
- Multi-Family
- Industrial
- Schools
- Hospitals
- Hotels
- Fire Walls
- Sound Walls



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PRODUCT LINE

MORTAR

E-Crete supplies thin-bed mortar and repair mortar, which are specifically manufactured for use with AAC blocks and lintels. It comes in ready-to-mix powder form. Just 1/16 inch mortar bed is needed to adhere the products. This extremely thin joint prevents heat loss and speeds installation. For best results, apply the thin-bed mortar with a notched trowel choosing a trowel the same width as the block.

Repair mortar is used to repair walls where cuts or channels were made to install wiring or plumbing. Cover channels with repair mortar or fiberglass tape. Use the repair mortar prior to application of exterior or interior plasters. When covering E-Crete with sheetrock or other sheathing materials, block patch may not be necessary.

Approximate mortar usage for blocks

40 - 8" blocks per bag

30 -10" blocks per bag

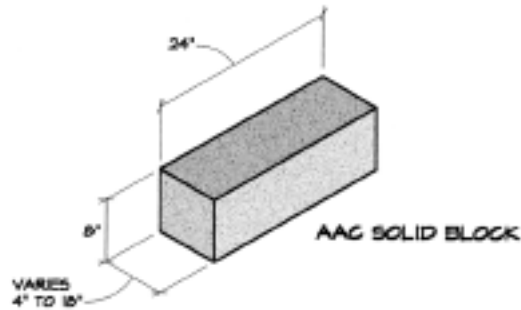
20 -12" blocks per bag

AAC BLOCK DIMENSIONS (INCHES)

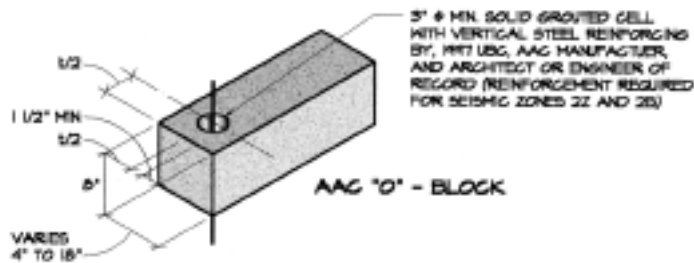
Width (Thickness)	Height	Length
4	8	24
6	8	24
8	8	24
10	8	24
12	8	24
14	8	24
16	8	24
Jumbo Block		
4	24	32
6	24	32
8	24	32
10	24	32
12	24	32
8	24	48
Cladding Block		
3	24	32
4	24	32



AAC STANDARD BLOCKS

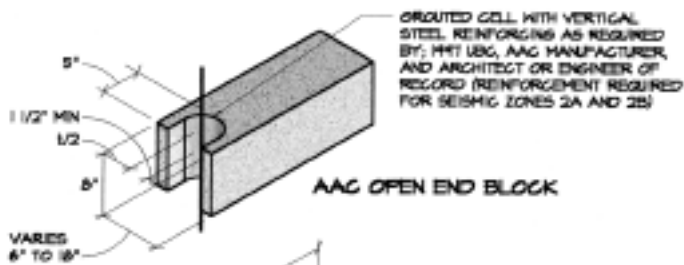


AAC SOLID BLOCK



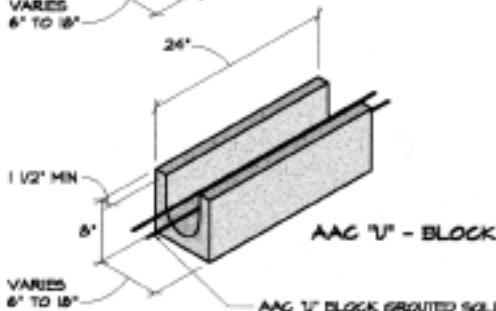
5" ϕ MIN. SOLID GROUTED CELL WITH VERTICAL STEEL REINFORCING BY: IBC, AAC MANUFACTURER, AND ARCHITECT OR ENGINEER OF RECORD (REINFORCEMENT REQUIRED FOR SEISMIC ZONES 22 AND 23)

AAC "O" - BLOCK



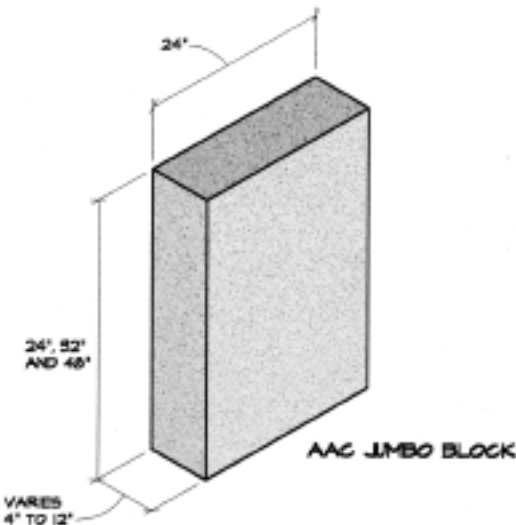
GROUTED CELL WITH VERTICAL STEEL REINFORCING AS REQUIRED BY: IBC, AAC MANUFACTURER, AND ARCHITECT OR ENGINEER OF RECORD (REINFORCEMENT REQUIRED FOR SEISMIC ZONES 2A AND 2B)

AAC OPEN END BLOCK



AAC "U" - BLOCK

AAC "U" BLOCK GROUTED SOLID WITH HORIZONTAL REINFORCING AS REQUIRED BY: IBC, AAC MANUFACTURER, AND ARCHITECT OR ENGINEER OF RECORD



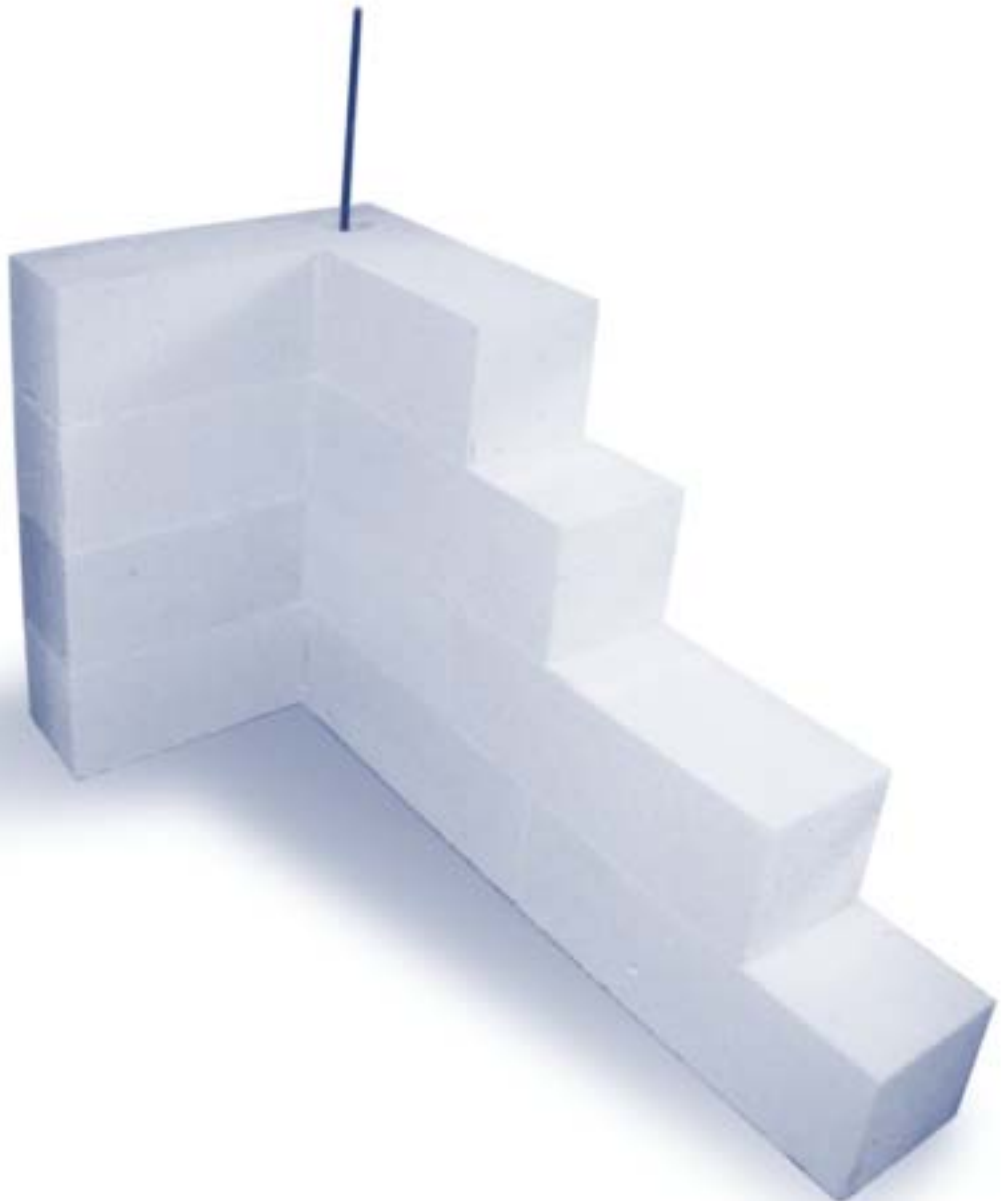
AAC JUMBO BLOCK

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STANDARDS AND APPROVALS

E-Crete is continuously updating design parameters and technical information and has obtained ICC ESR 1371.

The tests in the table on the following page were performed on various AAC products in accordance with the methods prescribed by the American Society for Testing and Materials (ASTM).



Standards	
Test or Report	Description
ASTM C 1386 Standard Specification for Autoclaved Aerated Concrete (AAC) Wall Construction Units	Standard Covers Physical Requirements of Load-Bearing Compression and Non-Load-Bearing AAC Units
ASTM C1452 Standard Specification for Reinforced Autoclaved Aerated Concrete Elements	Standard covers Load-Bearing and Non-Load-Bearing reinforced autoclaved aerated concrete (AAC) floor, roof, wall, and stair elements used as components for building construction.
ASTM C 1555-03 Standard Practices for AAC Masonry	Standard covers workmanship of AAC, thin bed mortars, and exterior and interior finishes.
ASTM E 119 Fire Test of Building Construction and Materials	Fire Test of Wall Assemblies (Load and Non-Load-Bearing) and Hose Stream Test. Fire Test of Floor and Roof Assembly
ASTM E 90-97, E 413-87 and C 423-99a Sound Transmission Loss Test (STC)	Airborne Sound Transmission Test on Walls
ASTM C-469 Modulus of Elasticity	Stress Strain Curve of AAC in Compression
ASTM E-78 Flexural Strength	Flexural Test of AAC Units To Determine Flexural Strength
ASTM E-518 Flexural Bond Strength of Masonry	Assembly of Masonry Units Constructed as Beams
ASTM E-519 Diagonal Tension Test of Masonry Assemblies	Full Scale AAC Walls To Determine Shear Strength
ASTM C-177-85 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus	A Portion of AAC Material of 12 x 12 inch and 1 inch Thick is Placed in the Guarded Hot Plate. It is subjected to a Heat Source and Temperature Measurements are made until a Steady State is Reached. This test is used to determine experimental value as thermal conductivity (K) on AAC units.
ASTM E-514 Test for Water Penetration and Leakage Through Masonry	Full Scale Wall Assemblies Subjected to Water Under Pressure Exposure

Approvals

Test or Report	Description
ICC ESR-1371	AAC Design Procedure For All Seismic Areas
Underwriters' Laboratories (UL) Design Numbers: U916, U917, U921, U919, X901	Fire Test Results for AAC Walls
Underwriters' Laboratories (UL) Design Number: U924	Sound Transmission Class (STC) For AAC Walls
ACI 523.5R-xx	Recommended Practices for AAC Panels (Draft)
ACI 530-05/ASCE 5-05/TMS 402-05	Building Code Requirements for Masonry Structures



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Thermal Performance for AAC Block

Introduction

Building design and material properties influence thermal performance and energy consumption for residential and commercial buildings. AAC wall, floor and roof systems provide an innovative combination of excellent thermal conductivity, thermal mass and low air-infiltration. This practical combination of properties in one system provides an excellent thermal insulation material and permits peak energy usage in the building to be shifted to off-peak hours, thus reducing operation costs for building users and owners, improving comfort of living and reducing the demand on power generation facilities.

Definitions

Thermal performance of any building material is the result of several factors and may not be assumed either effective or ineffective on the basis of any one factor. In this section, there are definitions and examples of the various thermal properties that are used to determine the overall thermal efficiency of any building material. Thermal properties generally influence the design of the building envelope and specifically how the AAC thermal properties result in outstanding performance and energy savings. The values for the various AAC thermal properties are included in a later section of this chapter.

Thermal Conductivity "K" (Btu.in/h.Ft².F) is a measure of the material conductivity as tested in a laboratory procedure that measures the heat flow through building material under steady and constant climatic conditions. It is important to remember that these laboratory conditions do not reflect the normal climatic cycles. This issue is discussed in further detail in the thermal mass section. Based on the above definition, it is obvious that the lower the "K" value the higher the insulating value. The following table gives the "K" value for different materials.

Designation	Thermal Conductivity, K (Btu.in/h.Ft ² .F)
AAC 32 pcf	0.96 (1)
Concrete (Density 150 pcf)	9.98 (2)
Insulation Board (Polystyrene)	0.2 (3)
Steel	329.0
Water	4.15

(1) Based on ASTM C518

(2) ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers)

(3) ASHRAE

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Thermal Resistance "R" (h.Ft².F/Btu) is the opposite of the thermal conductivity and it is *the resistance of material to conduct or allow heat flow*. **R-value**

$$R = (1 / K) \times \text{Wall Thickness (in.)}$$

Designation	Thermal Resistance "R" (h.Ft ² .F/Btu)
8" AAC 32 pcf Wall System	10.0
8" Concrete 150 pcf Wall System	1.0
3 ¹ / ₂ " Batt Insulation	13
1" Steel Plate	0.003

Note: Wall System and Concrete Wall System Consist of Plaster on both sides of the wall.

Heat Transmission Coefficient, U-value (Btu/h. Ft².°F) is defined as *the amount of heat, expressed in BTU's transmitted in one hour through one square foot of a building envelope in 1°F temperature difference*.

$$U = 1 / R$$

Designation	U-value (Btu/h.Ft ² .F)
8" AAC 32 pcf Wall System	0.10
8" Concrete 150 pcf Wall System	1.0
3 ¹ / ₂ " Batt Insulation	0.077
1" Steel Plate	329

Note: AAC Wall System and Concrete Wall System Consist of Plaster on both sides of the wall.

In addition to the above basic material thermal properties, other thermal properties such as **specific heat** and **heat capacity** affect the performance of the building envelope.

Specific heat, s (Btu/lb.°F) is the amount of heat required to raise one pound of material one degree °F.

Designation	U-value (Btu/h.Ft ² .F)
8" AAC 32 pcf Wall System	0.25
8" Concrete 150 pcf Wall System	0.21
3 ¹ / ₂ " Batt Insulation	0.085
1" Steel Plate	0.125

Heat capacity, HC (Btu/Ft².°F) or sometimes is referred to as “thermal mass”, is a measure of how much heat a building component can store or hold per unit of mass. It is essentially the specific heat taking into account the thickness of the material.

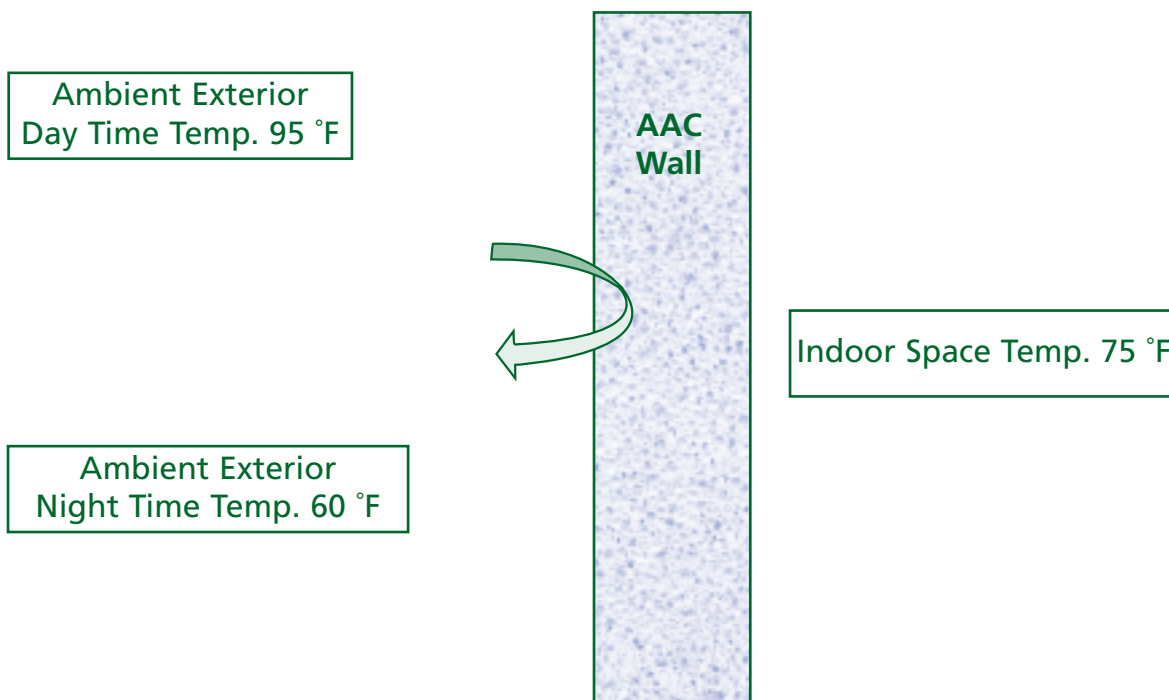
Designation	Heat capacity, HC (Btu/Ft ² .°F)
8" AAC 32 pcf Wall System	6.07
8" Concrete 150 pcf Wall System	23.0
3 ¹ / ₂ " Batt Insulation	0.007
1" Steel Plate	5.10

Note: AAC Wall System and Concrete Wall System Consist of Plaster on both sides of the wall.

Understanding the Thermal Mass Benefit Concept

In the “steady state” thermal values obtained from laboratory testing, it is assumed that temperatures at both sides of a wall are constant and remain constant for a period of time, unlike what actually occurs in normal conditions. In actual conditions, the temperature levels on both sides of walls may change during a 24-hour period. In many cases, the exterior temperature may experience large temperature swings. These changes may cause a reversal in direction of the heat flow or at the least, “delay” the heat flow to the point where it substantially reduces the heat transfer to the inside of the building envelope. The following diagrams illustrate each of these conditions.

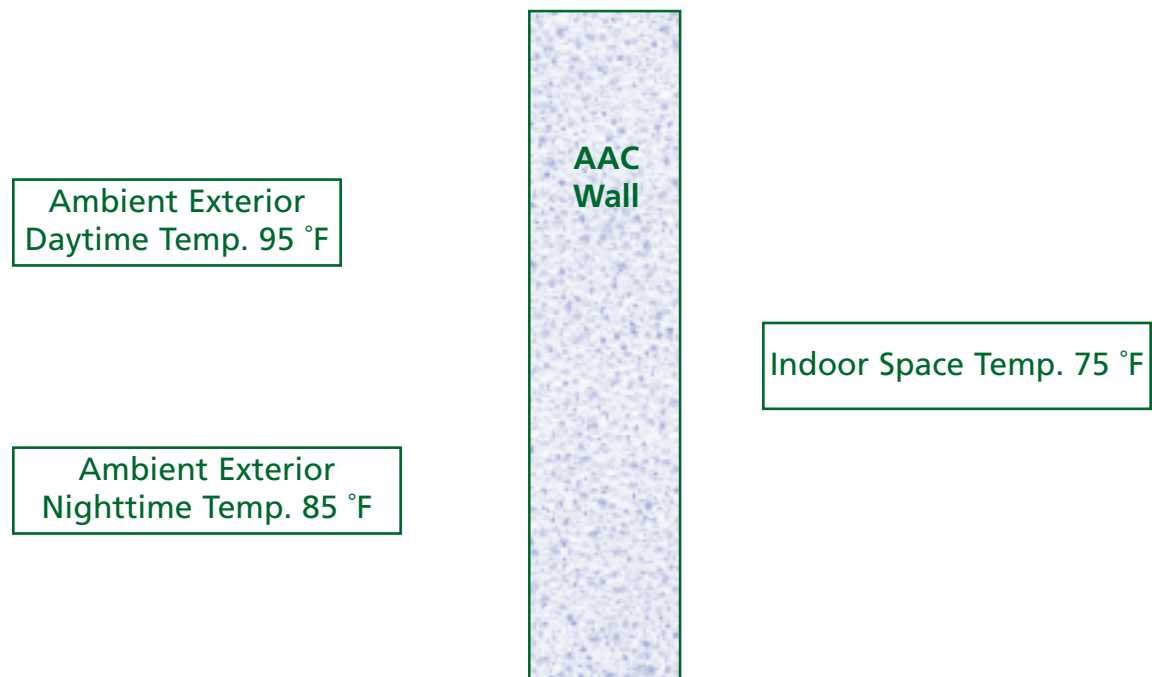
Reversed Heat Flow Example - Amarillo, Texas



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In Amarillo, Texas, it is not unusual that the outside day temperature may fluctuate from 95 °F down to 60 °F in the same 24-hour period while the indoor temperature is maintained at 75 °F. This drop in temperature and the excellent heat capacity of AAC materials cause a reversal in the direction of heat transfer back to the outside within the 24 hours. Subsequently, the total heat gain through the AAC wall system is significantly less than a low thermal mass wall system such as framed wall. In this case, the combination of the heat capacity and the excellent thermal resistance exceeds the performance of a high “steady state” R-value. This dynamic process is known as the “thermal mass benefit” or “mass-enhanced” R-value.

Delayed Heat Flow Example – Orlando, Florida



In Orlando, it is not unusual that when the outside day temperature is 95 °F, the outside night temperature will only drop down to 85 °F. During the same time frame, the inside temperature could be at 75 °F. In this case, the drop in the outside temperature may not be enough to cause a reversal in the direction of heat transfer. However due to the wall thickness, its thermal conductivity (1.1.1) and its heat capacity (1.1.5) a time delay or “Time lag” results and shifts the peak temperature load to between 7 to 9 hours later.

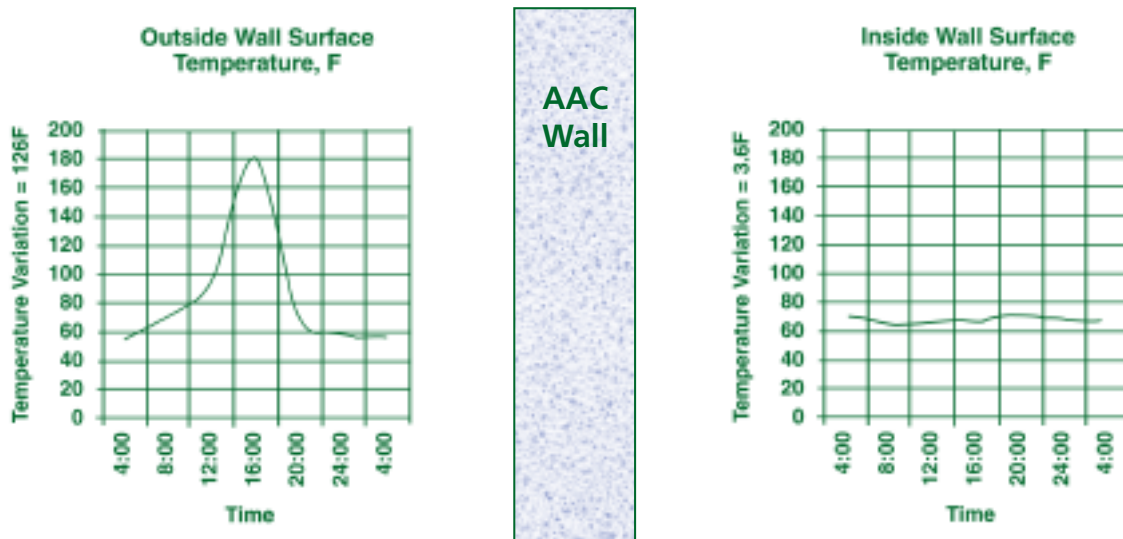
Since HVAC systems are required to be designed for peak loads, this shift in timing of the peak load can result in a significant reduction in the size of mechanical equipment with a subsequent reduction in energy consumption and cost. Table 1.0 shows “Time lag” values for different building materials.

Table 1.0

Material	Time Lag, hr
8" AAC Wall	8
8" CMU Wall	6 (1)
2x4 Frame Wall	2 (1)

(1) NCMA Tek 6-3: Shifting Peak Energy Loads with Concrete Masonry Construction (1991)

In a previous test, AAC wall surface temperatures were measured over a 24 hour period on a west wall, which was painted black to increase surface temperature. The outside wall temperature fluctuated by as much as 126°F. The inside temperature remained at a pleasant 68°F without air conditioning with a mere 3.6°F variation. Additionally, the peak temperature was shifted to a later time of the day when energy is no longer required to mechanically adjust the indoor temperature.



This “time lag” combined with the heat capacity of AAC results in substantial reduction of peak energy consumption. This reduction is considerable in residential buildings and represents financial savings for homeowners in addition to the comfort of living and pleasant steady interior climate.

Dynamic Benefit Analysis

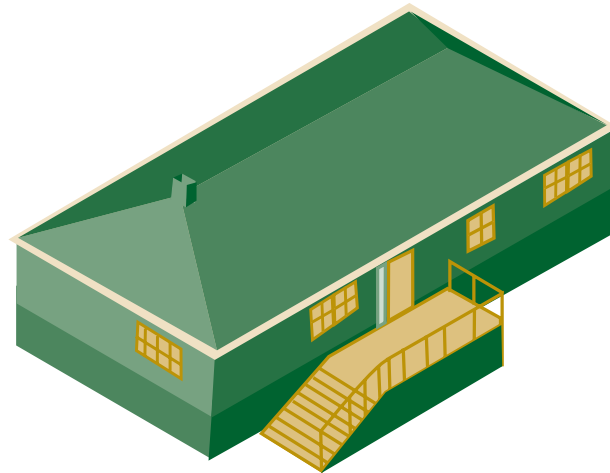
The effectiveness of AAC material in providing and controlling interior climatic conditions was illustrated by testing a wall in conditions that simulate actual climatic conditions in a comprehensive energy analysis performed by Oak Ridge National Laboratory (ORNL).

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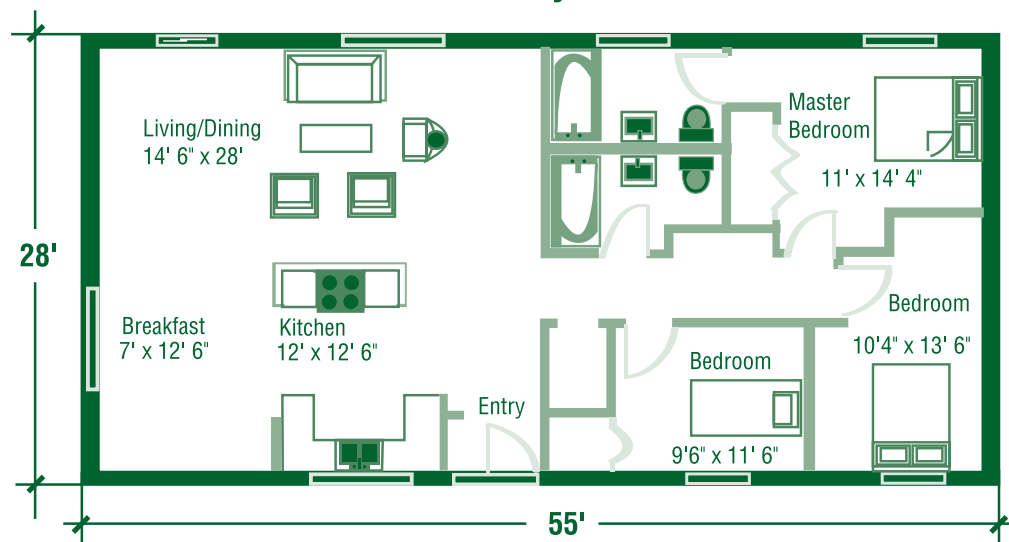
In the study performed by ORNL, the steady state and the dynamic thermal performance of an AAC wall system were analyzed using an ORNL Building Technology Center Guarded Hot box. In the dynamic test of an 8-foot x 8-foot wall, the climatic boundary conditions were changed to simulate similar conditions to a normal climatic cycle.

The results of ORNL steady state and dynamic analysis were used to develop a model for AAC wall systems using Department of Energy 2.1E software. The computer software was used to simulate the heating and cooling loads for a single-family residence with AAC walls compared to an identical building simulated with lightweight stud framed wall and a Concrete Masonry Unit (CMU) wall. Figure 1.0 shows the house model and the floor plan used in the study performed by Oak Ridge National Laboratory for six representative U.S. climates.

Figure 1.0 - Floor plan of one-story ranch-style house used in thermal modeling.



Ranch Style House



Location	Cooling Energy [MBtu]	Heating Energy [MBtu]	Total Energy [MBtu]
Atlanta	7.4	25.1	32.5
Denver	1.21	48.32	49.5
Miami	37.36	0.65	38.01
Minneapolis	2.05	82.72	84.77
Phoenix	31.73	5.27	37.0
Washington, D.C.	4.33	42.56	46.89

Table 2.0: Simulated heating and cooling energy required for a ranch house built with AAC walls as shown in ORNL report "Whole Wall Rating / Label for AAC Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis" dated February 8, 1999.

Additionally, the cooling and heating energy required for a wood framed house at different levels of thermal insulation was calculated to identify the savings in energy as shown in Table 3.0. It is apparent that only increasing the R-value of a wall does not necessarily decrease the required energy, contrary to common perception. This can also be attributed to thermal mass benefit, control of air infiltration and construction details.

R-value	Atlanta	Denver	Miami	Minneapolis	Phoenix	Washington
Annual Cooling Loads [MBtu]						
12.5	8.98	2.72	37.42	2.94	32.68	5.65
15	8.53	2.48	36.61	2.77	31.51	5.29
20	7.93	2.14	35.85	2.47	30.20	4.83
29	7.41	1.83	34.86	2.18	28.62	4.39
37	7.42	1.92	34.58	2.20	28.36	4.41
Annual Heating Loads [MBtu]						
12.5	25.05	48.33	0.94	80.27	7.46	41.68
15	23.73	45.99	0.84	77.14	6.85	39.90
20	22.292	43.43	0.713	73.92	6.051	37.83
29	20.54	40.32	0.61	69.73	5.27	35.24
37	20.11	39.58	0.61	68.39	5.34	34.51

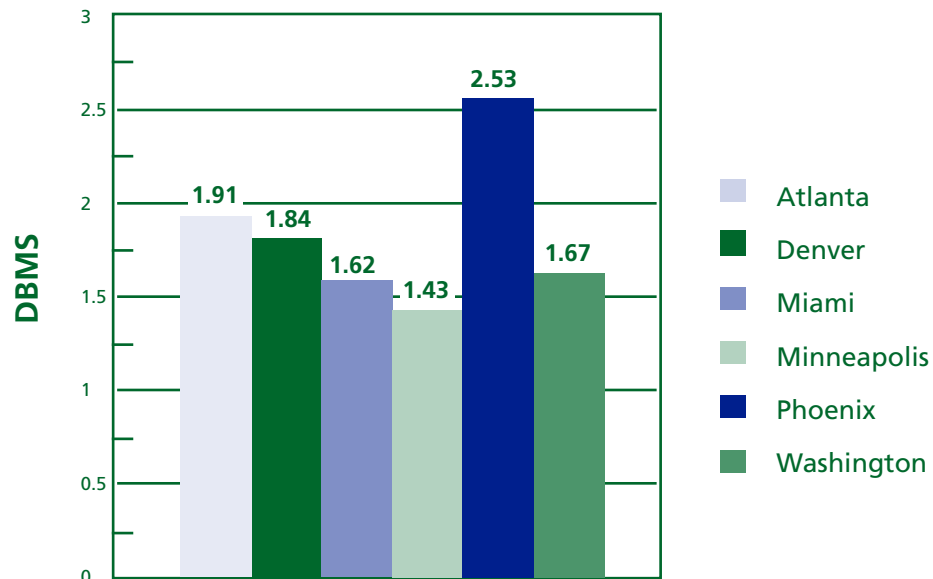
Table 3.0: Simulated heating and cooling energy required for a ranch house built with the wood framed walls as shown in ORNL report "Whole Wall Rating / Label for Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis dated February 8, 1999.

These loads were then used to estimate the effective R-value which would be needed in ordinary construction to result in the same total heating and sensible cooling loads as the AAC wall system in each of the six climates as shown in Table 2.0.

3

The resulting R-value is a steady R-value for AAC walls multiplied by DBMS (Dynamic Benefit for Massive Systems). DBMS is a function of climate, building type and base envelope system (i.e., conventional 2x4 wood frame wall system). DBMS values for the AAC wall were obtained by comparison between total loads necessary for heating and cooling the light-weight wood-frame building and the AAC unit house for six U.S. climates and four building orientations. This factor accounts for not only the steady state R-value but also the inherent thermal mass benefit without considering air infiltration. Figure 2.0 and Table 4.0 show DBMS values and effective R-value for AAC walls when compared to other wall systems.

Figure 2.0:
DBMS values for AAC Walls



City	AAC wall			Two-core CMU wall			2x4 Wood Stud Wall		
	Steady-state R-Value	DBMS	Effective R-Value	Steady-state R-Value	DBMS	Effective R-Value	Steady-state R-Value	DBMS	Effective R-Value
Atlanta	8.34	1.91	15.93	2.29	0.89	2.04	12.5	1.0	12.5
Denver		1.84	15.34		0.91	2.08			
Miami		1.62	13.51		0.62	1.42			
Minneapolis		1.43	11.93		0.57	1.31			
Phoenix		2.53	21.10		1.46	3.34			
Washington		1.67	13.93		0.78	1.78			

Table 4.0: Dynamic thermal performance characteristics for AAC units, two-core CMU and wood frame walls.

In a review of the above charts, AAC walls outperformed the other wall systems for the energy consumption by using the lowest energy demands and showed the highest effective R-value.

Beyond the thermal properties already discussed thus far, tests of actual buildings have shown the air infiltration of a structure to be 63% less than a wood stud framed structure and 48% less than an un-insulated 8" CMU wall. The impact of this on thermal performance and the resulting whole building annual energy demands of a building constructed using either AAC walls, CMU, or framed walls were compared using different air-tightness values. Similar to earlier calculations, six climates were used for energy modeling and determination of the whole building energy demand, of buildings with these different wall systems. Figure 3.0 shows that the increased air-tightness in houses constructed with an AAC wall system significantly reduce the energy demand requirements.

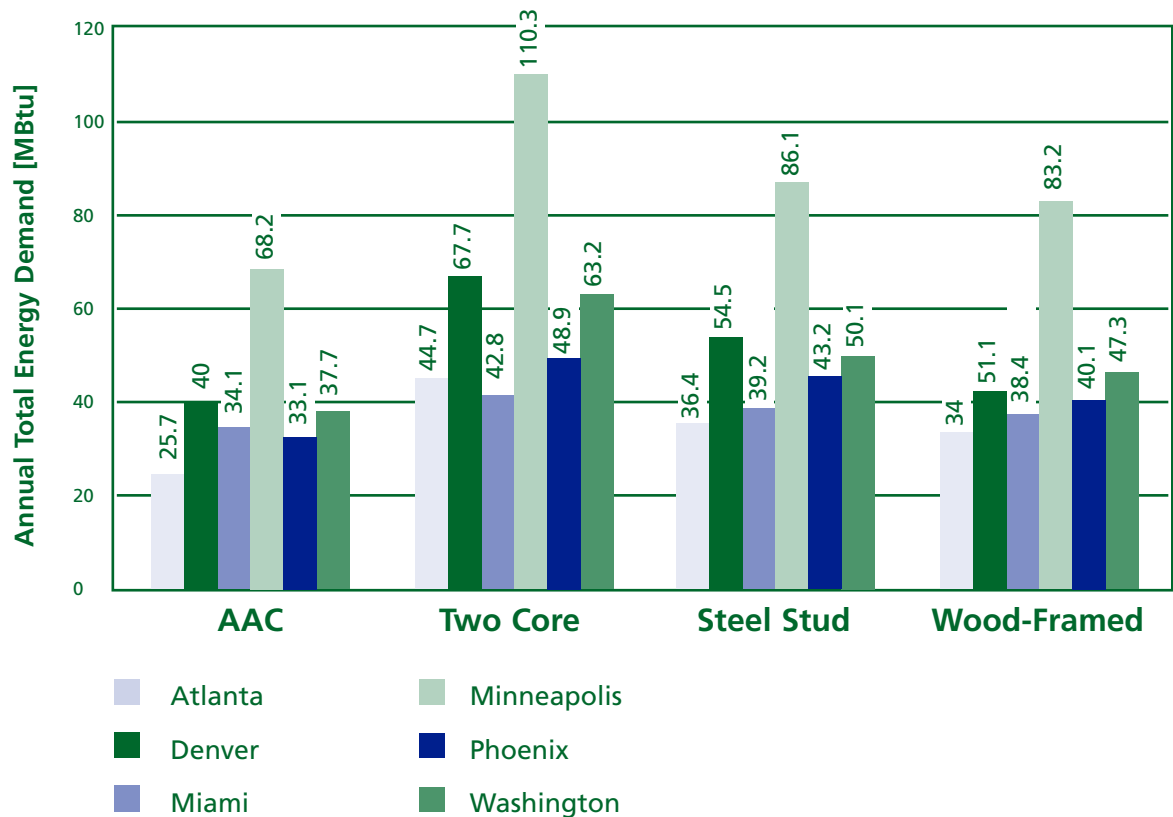


Figure 3.0: Comparison of annual demands for different wall systems considering different air-leakage rates as shown in ORNL report “Whole Wall Rating / Label for Wall Systems with Solid Autoclaved Cellular Concrete Blocks Part II - Dynamic Thermal Analysis” dated February 8, 1999.

According to the ORNL report, “the results of computer simulations for the six U.S. climates show that annual energy performance of the single family residence made of AAC walls is superior in comparison with a similar house built using either two-core CMU, steel studs, or conventional wood-framed walls. On average, energy demands of the AAC wall house are about **18%, 36%, and 23% lower** than similar houses constructed with **wood frame walls, two-core CMU, and steel studs walls**, respectively. Chart 1.0 shows that an AAC wall yielded the least operating energy cost when compared with other wall systems. In addition, as a result of lower demand on peak energy loads, the use of AAC walls reduces the size of mechanical equipment as shown in Chart 2.0.

Chart 1.0: Annual energy cost comparison for different wall systems.

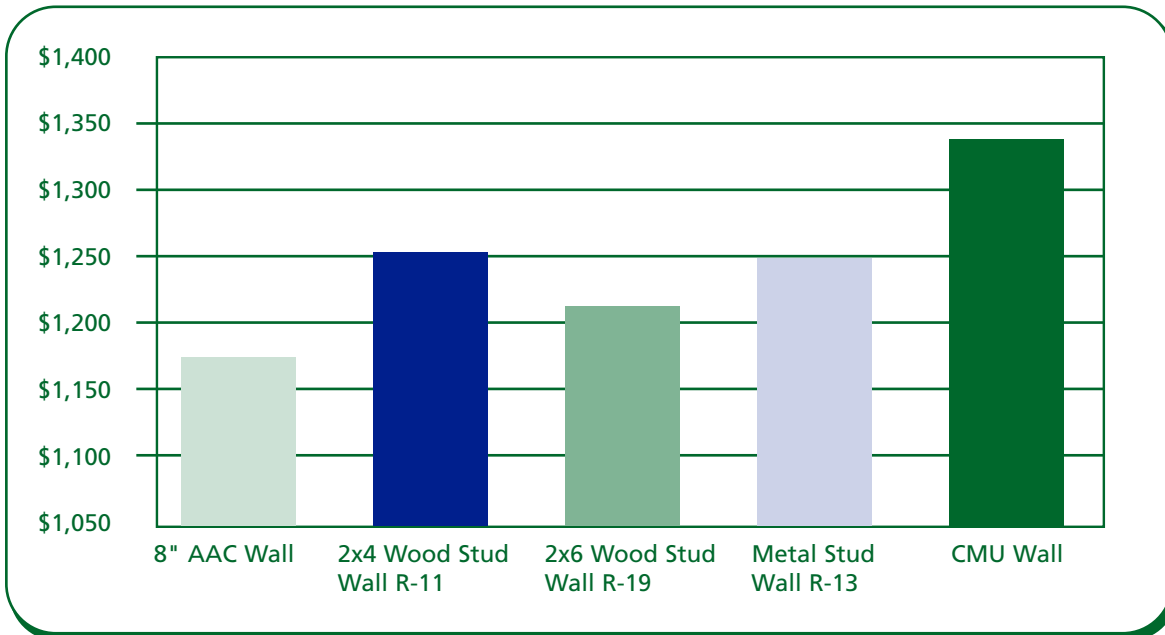
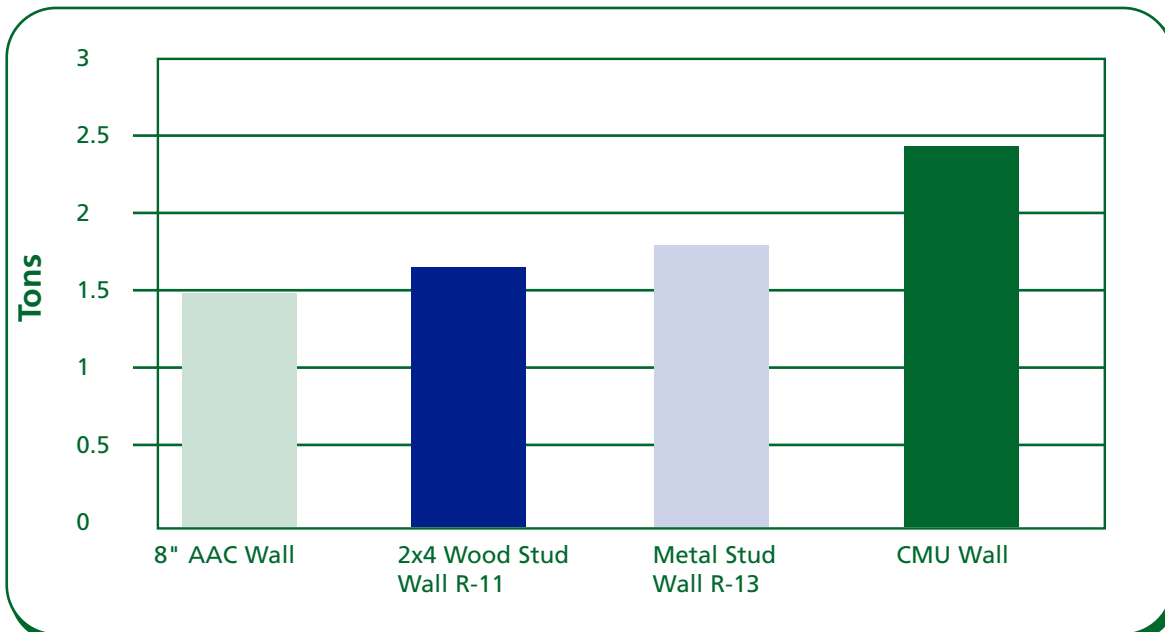


Chart 2.0: Size of mechanical equipment (A/C Unit Capacity) for different wall systems



The example cited makes the point that AAC products can offer the homeowner and the designer several important benefits if the material's thermal properties are used appropriately. This chapter of the Residential Application Manual provides the information needed by the design professional to understand and utilize the properties and design values that will result in the utmost thermal efficiency when using AAC.

3

For the mechanical engineer, included are simple design tools, tips and general directions to assist in the design of residential projects. All tables and design aids were developed by a mechanical engineering consulting firm and are based on current energy codes such as ASHRAE, Model Energy Code and State mandated code such as the Florida Energy Code. Step by step procedures are available for energy code compliance, load calculation and equipment sizing such as Manual J.

Design Aids: Thermal Properties For Different AAC Material

Table 5.0: Thermal Conductivity (K-value), R-value and U-value for AAC, Only

AAC Type	Density pcf	Thermal Conductivity	R-Value				U - Value			
			Thickness, in.				Thickness, in.			
			6	8	10	12	6	8	10	12
AAC 2.5 (AAC2)	26	0.79	7.59	10.13	12.66	15.19	0.13	0.10	0.08	0.07
AAC 2.5 (AAC3)	32	0.96	6.25	8.33	10.42	12.50	0.16	0.12	0.10	0.08
AAC 5.0 (AAC4)	38	1.15	5.22	6.96	8.70	10.43	0.19	0.14	0.12	0.10
AAC 7.5 (AAC6)	44	1.15	5.22	6.96	8.70	10.43	0.19	0.14	0.12	0.10

Values in parentheses correspond to C1386 and ICC ESR 1371

Table 6.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior and interior plaster

AAC Type	Density pcf	Thermal Conductivity	R-Value				U - Value			
			Thickness, in.				Thickness, in.			
			6	8	10	12	6	8	10	12
AAC 2.5 (AAC2)	26	0.79	8.91	11.45	13.98	16.51	0.11	0.09	0.07	0.06
AAC 2.5 (AAC3)	32	0.96	7.57	9.65	11.74	13.82	0.13	0.10	0.09	0.07
AAC 5.0 (AAC4)	38	1.15	6.54	8.28	10.02	11.75	0.15	0.12	0.10	0.09
AAC 7.5 (AAC6)	44	1.15	6.54	8.28	10.02	11.75	0.15	0.12	0.10	0.09

Values in parentheses correspond to C1386 and ICC ESR 1371

$$R\text{-value} = R \text{ outside air (0.17)} + R \text{ ext plaster (0.36)} \\ + R \text{ AAC} + R \text{ int plaster(0.11)} + R \text{ inside air (0.68)}$$

Table 7.0: Thermal Conductivity (K-value), R-value and U-value for AAC, brick veneer and interior plaster

AAC Type	Density pcf	Thermal Conductivity	R-Value				U - Value			
			Thickness, in.				Thickness, in.			
			6	8	10	12	6	8	10	12
AAC 2.5 (AAC2)	26	0.79	10.00	12.54	15.07	17.60	0.10	0.08	0.07	0.06
AAC 2.5 (AAC3)	32	0.96	8.66	10.74	12.83	14.91	0.12	0.09	0.08	0.07
AAC 5.0 (AAC4)	38	1.15	7.63	9.37	11.11	12.84	0.13	0.11	0.09	0.08
AAC 7.5 (AAC6)	44	1.15	7.63	9.37	11.11	12.84	0.13	0.11	0.09	0.08

Values in parentheses correspond to C1386 and ICC ESR 1371

$$\text{R-value} = \text{R outside air (0.17)} + \text{R 4" brick (0.44)} + \text{R Air space 1" (1.0)} + \text{R AAC} + \text{R int plaster(0.11)} + \text{R inside air (0.68)}$$

Table 8.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior plaster and glued 1/2" gypsum board

AAC Type	Density pcf	Thermal Conductivity	R-Value				U - Value			
			Thickness, in.				Thickness, in.			
			6	8	10	12	6	8	10	12
AAC 2.5 (AAC2)	26	0.79	9.25	11.79	14.32	16.85	0.11	0.08	0.07	0.06
AAC 2.5 (AAC3)	32	0.96	7.91	9.99	12.08	14.16	0.13	0.10	0.08	0.07
AAC 5.0 (AAC4)	38	1.15	6.88	8.62	10.36	12.09	0.15	0.12	0.10	0.08
AAC 7.5 (AAC6)	44	1.15	6.88	8.62	10.36	12.09	0.15	0.12	0.10	0.08

Values in parentheses correspond to C1386 and ICC ESR 1371

$$\text{R-value} = \text{R outside air (0.17)} + \text{R ext plaster (0.36)} + \text{R AAC} + \text{R drywall (0.45)} + \text{R inside air (0.68)}$$

Table 9.0: Thermal Conductivity (K-value), R-value and U-Value for AAC, exterior plaster, furring, and 1/2" gypsum board

AAC Type	Density pcf	Thermal Conductivity	R-Value				U - Value			
			Thickness, in.				Thickness, in.			
			6	8	10	12	6	8	10	12
AAC 2.5 (AAC2)	26	0.79	10.20	12.74	15.27	17.80	0.10	0.08	0.07	0.06
AAC 2.5 (AAC3)	32	0.96	8.86	10.94	13.03	15.11	0.11	0.09	0.08	0.07
AAC 5.0 (AAC4)	38	1.15	7.83	9.57	11.31	13.04	0.13	0.10	0.09	0.08
AAC 7.5 (AAC6)	44	1.15	7.83	9.57	11.31	13.04	0.13	0.10	0.09	0.08

Values in parentheses correspond to C1386 and ICC ESR 1371

$$\text{R-value} = \text{R outside air (0.17)} + \text{R ext plaster (0.36)} + \text{R AAC} + \text{R drywall} + \text{furring (1.4)} + \text{R inside air (0.68)}$$

3

Table 10.0: Specific Heat (s) and Heat Capacity (HC) for AAC, exterior and interior plaster

AAC Type	Density pcf	Specific Heat	Heat Capacity			
			Thickness, in.			
			6	8	10	12
AAC 2.5 (AAC2)	26	0.25	4.00	5.08	6.17	7.25
AAC 2.5 (AAC3)	32	0.25	4.75	6.08	7.42	8.75
AAC 5.0 (AAC5)	38	0.25	5.50	7.08	8.67	10.25
AAC 7.5 (AAC6)	44	0.25	6.25	8.08	9.92	11.75

Table 11.0: Specific Heat (s) and Heat Capacity (HC) for AAC, exterior plaster and ½" drywall

AAC Type	Density pcf	Specific Heat	Heat Capacity			
			Thickness, in.			
			6	8	10	12
AAC 2.5 (AAC2)	26	0.25	4.28	5.36	6.45	7.53
AAC 2.5 (AAC3)	32	0.25	5.03	6.36	7.70	9.03
AAC 5.0 (AAC5)	38	0.25	5.78	7.36	8.95	10.53
AAC 7.5 (AAC6)	44	0.25	6.63	8.36	10.20	12.03

Table 12.0: Specific Heat (s) and Heat Capacity (HC) for AAC, brick veneer and interior plaster

AAC Type	Density pcf	Specific Heat	Heat Capacity			
			Thickness, in.			
			6	8	10	12
AAC 2.5 (AAC2)	26	0.25	12.51	13.59	14.68	15.76
AAC 2.5 (AAC3)	32	0.25	13.26	14.59	15.93	17.26
AAC 5.0 (AAC5)	38	0.25	14.01	15.59	17.18	18.76
AAC 7.5 (AAC6)	44	0.25	14.76	16.59	18.43	20.26

Table 13.0: Specific Heat (s) and Heat Capacity (HC) for AAC, brick veneer and ½" glued drywall

AAC Type	Density pcf	Specific Heat	Heat Capacity			
			Thickness, in.			
			6	8	10	12
AAC 2.5 (AAC2)	26	0.25	12.79	13.88	14.96	16.04
AAC 2.5 (AAC3)	32	0.25	13.54	14.88	16.21	17.54
AAC 5.0 (AAC5)	38	0.25	14.29	15.88	17.46	19.04
AAC 7.5 (AAC6)	44	0.25	15.04	16.88	18.71	20.54

Brick 4" • Density = 135 pcf, • Specific heat = 0.20 Btu/lb.°F

(*) "Thermal Performance For AAC Block-Residential Application" was prepared by Hebel and is the property of Autoclaved Aerated Concrete Product Association (AACPA) and is only to be used by members of the AACPA.

Table 14.0: DBMS and Equivalent R Values

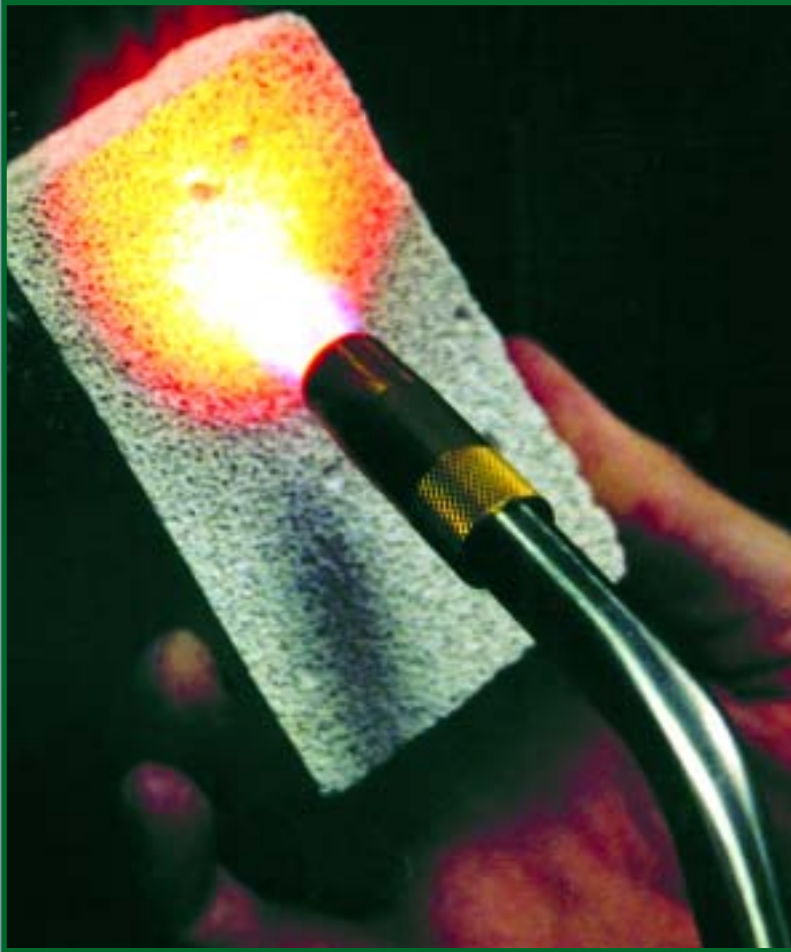
	8" AAC			10" AAC			*12" AAC		
	R	DBMS	Requiv	R	DBMS	Requiv	R	DBMS	Requiv
Phoenix	8.4	2.48	20.83	10.5	2.51	26.36	12.60	2.54	32.01
Flagstaff	8.4	1.99	16.72	10.5	1.99	20.90	12.60	1.99	25.07
Los Angeles	8.4	1.54	12.94	10.5	1.57	16.49	12.60	1.60	20.17
Sacramento	8.4	2.44	20.50	10.5	2.44	25.62	12.60	2.44	30.74
San Diego	8.4	1.42	11.93	10.5	1.44	15.12	12.60	1.46	18.40
San Francisco	8.4	1.78	14.95	10.5	1.79	18.80	12.60	1.80	22.68
Denver	8.4	1.9	15.96	10.5	1.92	20.16	12.60	1.94	24.45
Miami	8.4	1.73	14.53	10.5	1.76	18.48	12.60	1.79	22.56
Atlanta	8.4	1.93	16.21	10.5	1.94	20.37	12.60	1.95	24.57
Minneapolis	8.4	1.48	12.43	10.5	1.5	15.75	12.60	1.52	19.16
Albuquerque	8.4	2.06	17.30	10.5	2.09	21.95	12.60	2.12	26.72
Santa Fe	8.4	2.14	17.98	10.5	2.17	22.79	12.60	2.20	27.73
Las Vegas	8.4	2.46	20.66	10.5	2.49	26.15	12.60	2.52	31.76
Reno	8.4	2.05	17.22	10.5	2.06	21.63	12.60	2.07	26.08
Eugene	8.4	2.14	17.98	10.5	2.16	22.68	12.60	2.18	27.47
El Paso	8.4	2.31	19.40	10.5	2.34	24.57	12.60	2.37	29.87
Salt Lake City	8.4	2.11	17.72	10.5	2.11	22.16	12.60	2.11	26.59
Washington D.C.	8.4	1.7	14.28	10.5	1.72	18.06	12.60	1.74	21.93
Seattle	8.4	1.39	11.68	10.5	1.41	14.81	12.60	1.43	18.02
Spokane	8.4	1.85	15.54	10.5	1.86	19.53	12.60	1.87	23.56

(Source; "A Comparison of Innovative Exterior Wall Construction Techniques", Del E Webb School of Construction at Arizona State University)

R = steady state R-Value

DBMS=Dynamic Benefit of Massive Systems predicted by neural network Requiv=RxDBMS

*Interpolated



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E-Crete AAC is non-combustible. A 4-inch thick non-load-bearing or a 6-inch thick load-bearing E-Crete wall, provides a U.L. classified 4-hour fire rating. This far exceeds the requirements of the Standard Building Code, and provides a significant level of protection against loss of life and property.

Toxic fumes generated from traditional materials burning pose a danger. AAC is an inorganic material that does not burn. The melting point of AAC is over 2900 °F, more than twice the typical temperature in a building fire of 1200 °F. The use of E-Crete AAC eliminates the need for applying costly fireproofing materials.



Precast Autoclaved
Aerated Concrete As
To Fire Resistance Only
See UL Fire Resistance
Directory 87DN

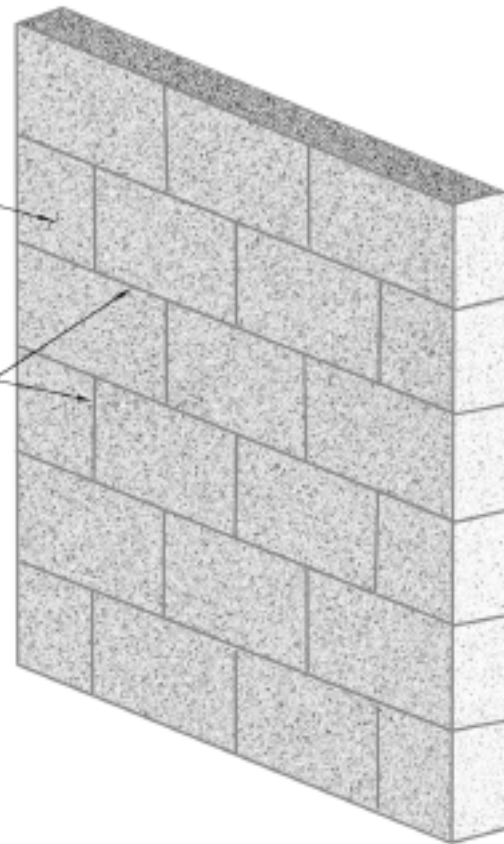
4" THICK AAC NON-BEARING WALL

UL DESIGN NO. U919

FIRE RATING - 4 HRS

4" X 8" X 24" OR 4" X 24" X 32"
AAC BLOCK WALL

THIN BED MORTAR BLOCKS
LAID IN A ANSI A118.4 LATEX/
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



6" THICK AAC BEARING AND NON-BEARING WALL

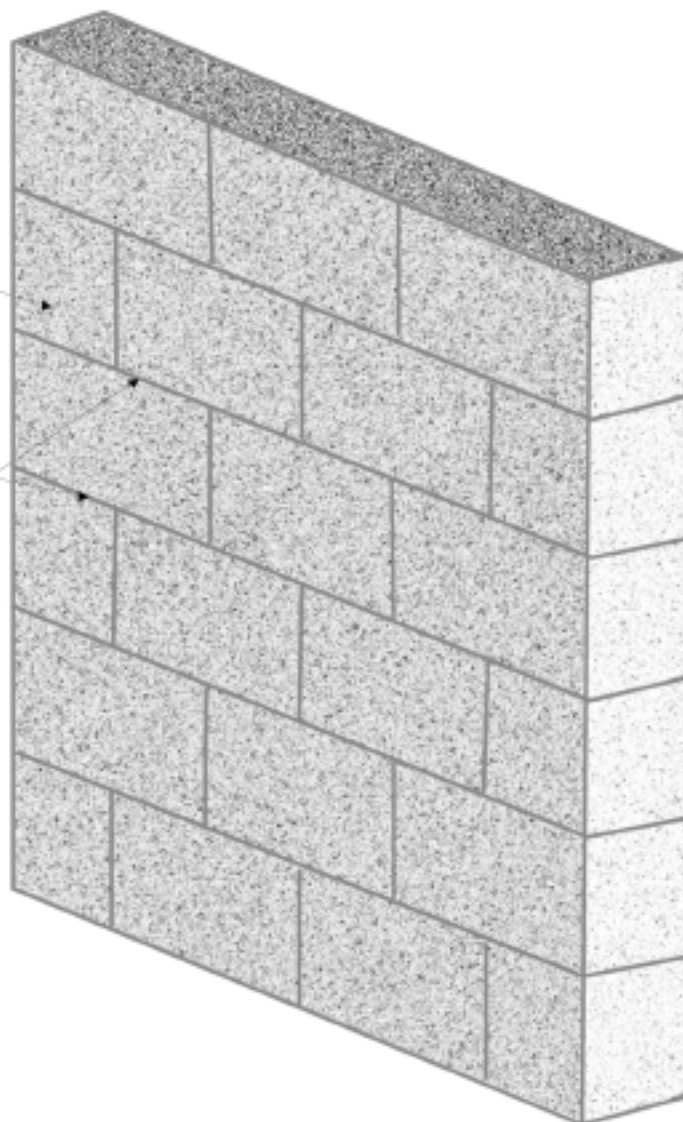
UL DESIGN NO. U917 AND U921

FIRE RATING (BEARING) - 4 HRS

FIRE RATING (NON-BEARING) - 4 HRS

6" X 8" X 24" OR 6" X 24" X 32"
AAC BLOCK WALL

THIN BED MORTAR BLOCKS
LAID IN A ANSI A118.4 LATEX/
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



8" THICK AAC BEARING AND NON-BEARING WALL

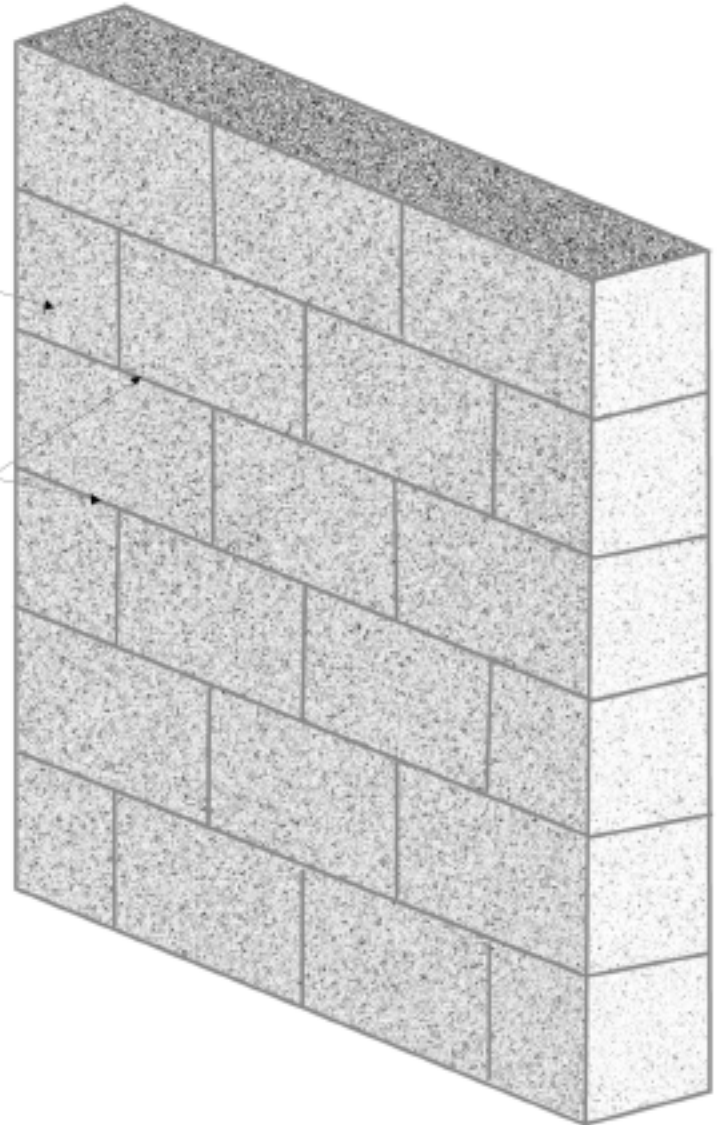
UL DESIGN NO. U916

FIRE RATING (BEARING) - 4 HRS

FIRE RATING (NON-BEARING) - 4 HRS

8" X 8" X 24" OR 8" X 24" X 48"
AAC BLOCK WALL

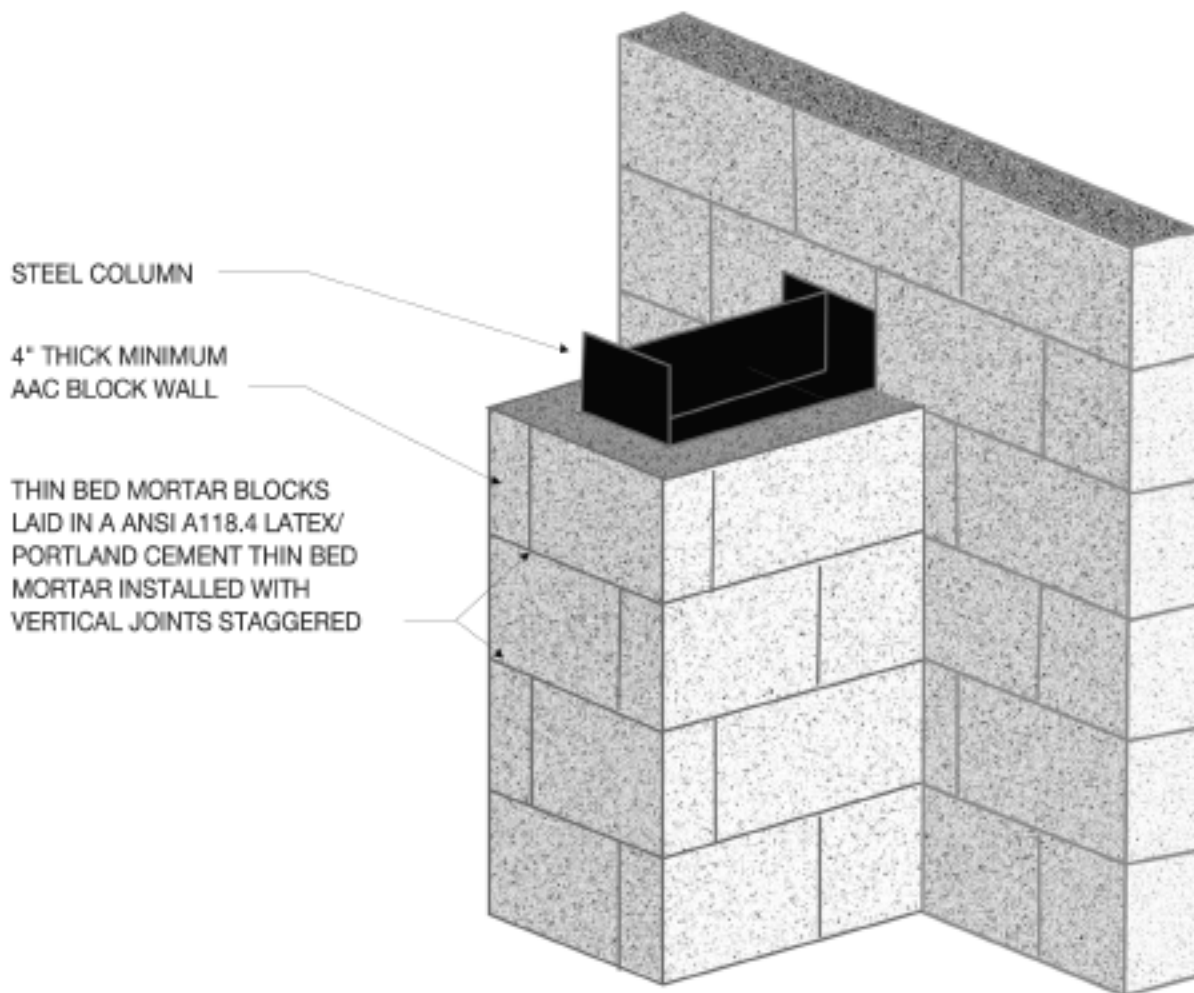
THIN BED MORTAR BLOCKS
LAID IN A ANSI A118.4 LATEX/
PORTLAND CEMENT THIN BED
MORTAR INSTALLED WITH
VERTICAL JOINTS STAGGERED



4" THICK STEEL COLUMN WRAP

UL DESIGN NO. X901

FIRE RATING - 4 HRS





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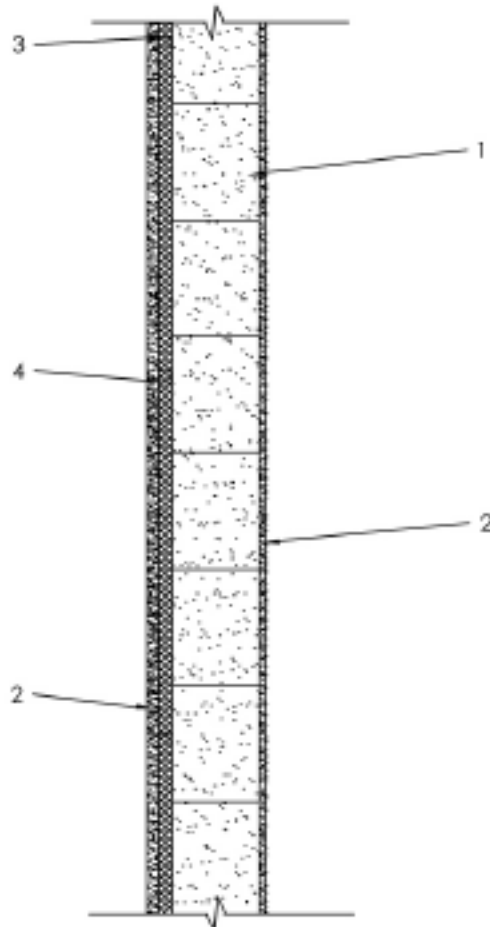
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A commonly overlooked environmental problem in construction is noise pollution. The solid wall construction of a building made of E-Crete provides exceptional acoustic insulation. Its porous structure and high surface mass, coupled with its ability to dampen mechanical vibration energy, greatly reduces outside environmental noise pollution and the indoor echo effect (i.e. reflecting sound) in empty rooms, providing a quieter, more comfortable interior for the occupants. E-Crete sound wall systems can achieve STC ratings up to 60.



As to STC properties only.
Design No. 924

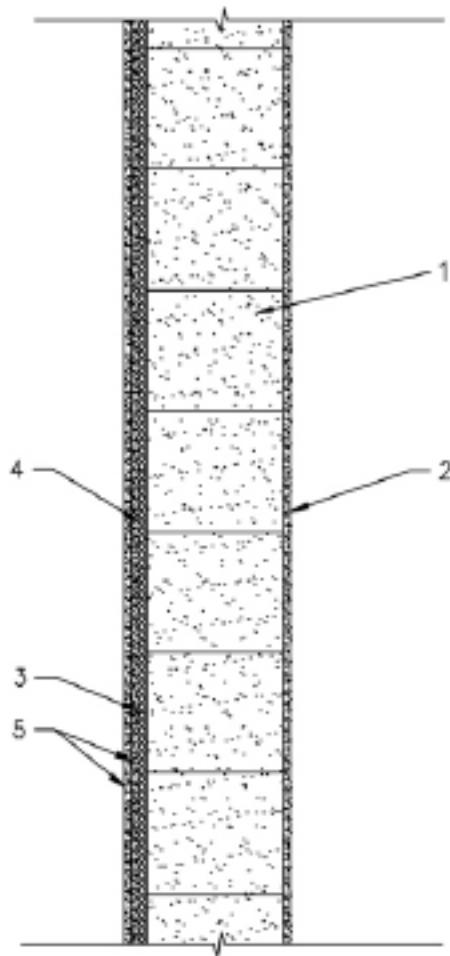


DETAIL KEY NOTES

- 1 6" E-CRETE[AAC-4] AAC Block wall
- 2 1/2" Gypsum board
- 3 5/8" Resilient Channels
- 4 R7 - Batt Insulation



6" E-CRETE AAC SOUND WALL - STC = 50



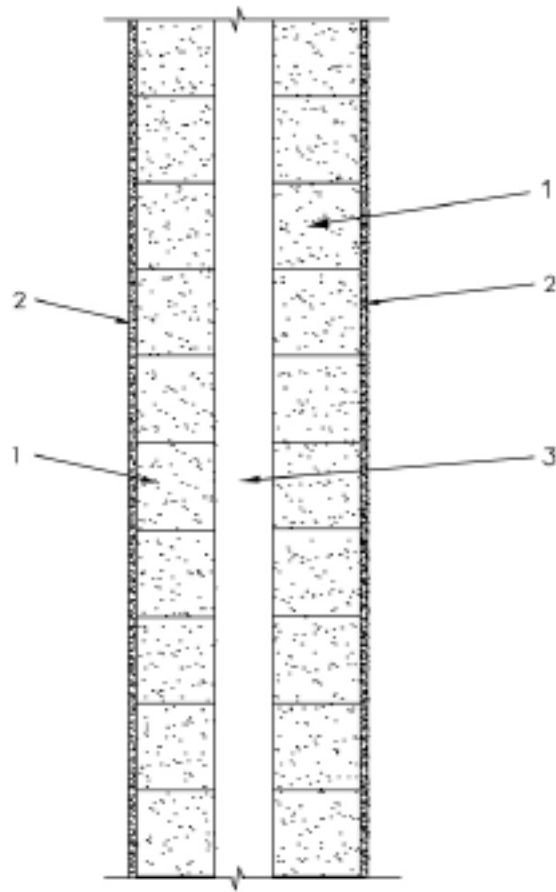
DETAIL KEY NOTES

- 1 10" E-CRETE (AAC-4) AAC Block wall
- 2 1/2" Gypsum board
- 3 5/8" Resilient Channels
- 4 Batt insulation
- 5 2 Layers of 1/2" gypsum board



10" E-CRETE AAC SOUND WALL - STC = 55

19004



DETAIL KEY NOTES

- 1 6" E-CRETE (AAC-4) AAC Block wall
- 2 1/2" Gypsum board
- 3 4" Air Space



DOUBLE 6" E-CRETE AAC SOUND WALL WITH 4" AIR SPACE - STC = 61

19006



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6

Moisture protection is a primary consideration since moisture from both external and internal sources can cause damage to buildings.

External moisture sources include rain and water from the soil. Internal moisture, usually in the form of humidity, can cause condensation on the surface of the walls as well as condensation inside the wall itself. The goal when considering moisture protection details is to avoid allowing moisture, either from external or internal sources, to damage the building or make the building environmentally unhealthy.

Mold can grow when the walls are moist and this can cause surface discoloration as well as damage to the plaster and wall finishes. Thermal resistance is decreased if the wall is permitted to retain condensation and thus reduces the thermal efficiency of the wall. Buildings with consistently moist walls and floors also allow for unhealthy environments since mold and bacteria can be present.

AAC has a very unique cellular structure, which is characterized by “macro” pores. Macro pores are small air bubbles evenly distributed throughout the material. The pores in a matrix characterized as “micro” pores are very small in relation to those in a “macro” matrix. Capillary action is very strong in structures characterized with micro pores as compared to E-Crete. Absorption of water into the E-Crete material through capillary action is minimal. Since this absorption of water is minimal, coating of the walls during the building construction can be scheduled at any convenient time or sequence. The interior elements and components of the building may be completed without concern of damage due to water migration through the E-Crete material.

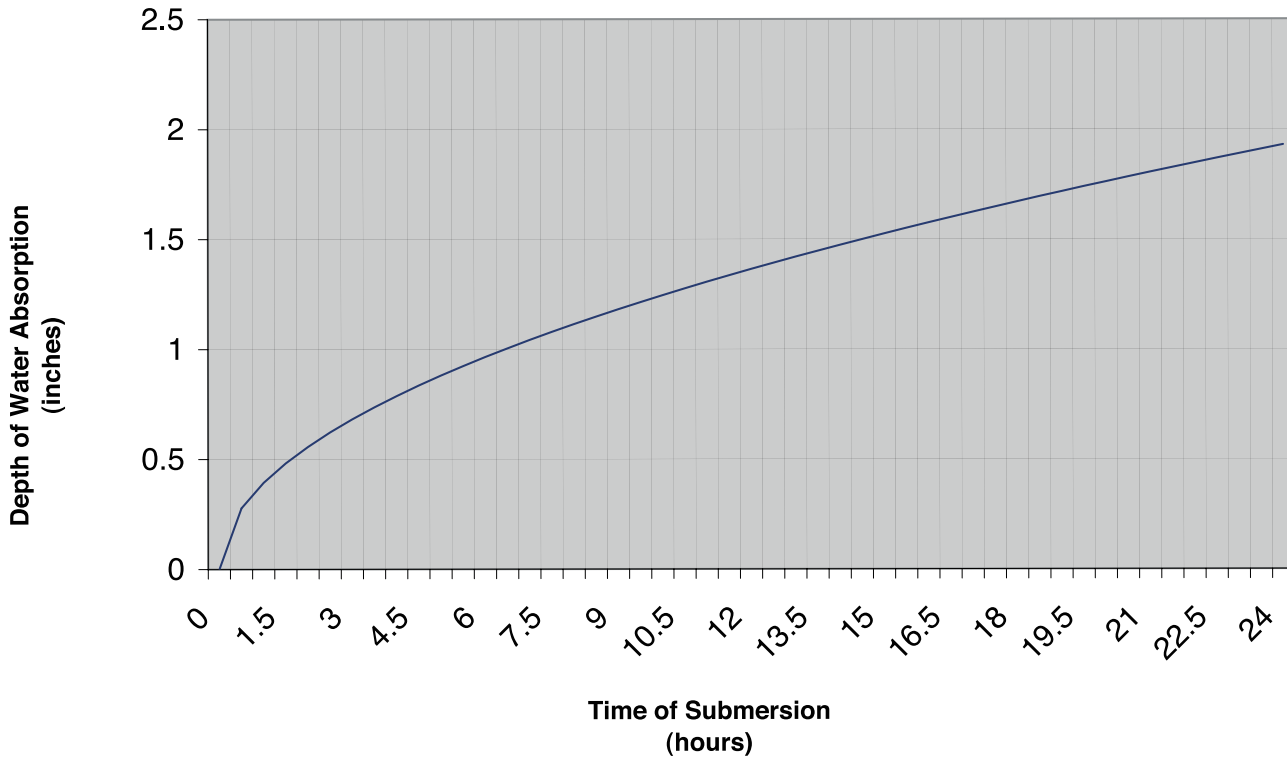
All buildings must be protected from the influence of external moisture sources. The most common and effective ways are to apply stucco, coatings or water-protected brick facades to the exterior surface of the walls.

By using a waterproof mortar on the floor slab under the first course of block, the building will be protected from water in the soil. Another effective method is to place a horizontal moisture barrier in the first mortar joint.



Correct sizing and cycling of the air conditioners should control internal moisture and wall condensation in climates with high temperatures and humidity. Dehumidifiers may also be integrated into the air conditioning system.

Water Absorption into Autoclaved Aerated Concrete



*Reference: Rilem Recommended Practice
Autoclaved Aerated Concrete
Properties, Testing and Design, 1993*



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Autoclaved aerated concrete (AAC) is well known as an environmentally friendly construction material. E-Crete is manufactured from common and abundant natural raw materials and the finished product is up to twice the volume of the raw materials used, making it extremely resource-efficient and environmentally friendly. The energy consumed in the production process is only a fraction compared to the production of other materials. The manufacturing process emits no pollutants and creates no by-products or toxic waste products.

AAC is a load-bearing block, which also provides thermal and sound insulation as well as fire protection, thereby eliminating the need for many different layers of materials. The workability of AAC helps to eliminate waste on the jobsite.

The use of AAC can reduce indoor air pollutants. AAC is completely inert and does not emit toxic gases, even when exposed to fire.





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Structural Design/Engineering Services

E-Crete offers engineering services that can provide the following:

- Engineering and design assistance to the Engineer and (or) Architect of record.
- Sealed set of wall calculations and shop drawings showing all AAC masonry block walls, details, connections, specifications, schedules and related information.
- Design coordination with architectural / structural drawings.
- An internet based engineering program is available on our website and is accessible to engineers free of charge.

Although the program was developed to aid the engineer in the design of E-Crete AAC masonry walls, it is the engineer's responsibility to verify the results. E-Crete LLC in no way assumes liability for the results, use or misuse of the program.



8

DESIGN INTRODUCTION

Autoclaved Aerated Concrete (AAC) masonry blocks have been used successfully around the world since 1923. AAC has performed well for many years in seismically active and hurricane-prone regions around the world. AAC buildings have shown good resistance to earthquake forces. The non-combustible and fire resistant characteristics provide further advantage against fires commonly associated with earthquakes.

The current approved design method for AAC masonry block walls in all seismic zones (design categories) is very similar to the design of conventional masonry using ultimate strength design procedures as outlined in the ICC ESR-1371.

AAC masonry walls can be designed as reinforced or un-reinforced wall systems. AAC masonry blocks can be pre-drilled with one 4-inch diameter hole at a distance of $t/2$ to allow for vertical wall reinforcing as required by the designer. If vertical reinforcing is required it should be spaced in two-foot increments. Solid blocks can be drilled on site for special reinforcing requirements but should be avoided if possible.

Minimum vertical wall reinforcing requirements are one #4 rebar at wall corners, within 24 inches of each side of wall openings, and at the end of walls and control joints. Horizontal reinforcing requirements are two #4 rebars in solid grouted AAC masonry "U" block at floor and roof bearing and one #4 rebar at the top of the parapet walls. Horizontal reinforcing at AAC masonry lintels should extend 24 inches past wall openings.

Some of the differences between AAC masonry walls and conventional masonry are:

1. AAC masonry weighs approximately 30 lbs. per cu. ft. compared to 150 lbs. per cu. ft. and 50 lbs. per cu. ft. for concrete and conventional masonry, respectively.
2. AAC masonry is constructed using a thin-bed mortar, which has a greater compressive and tensile strength than the block. The bond strength of the thin-bed mortar will not allow failure at the joints. AAC masonry walls act like a beam with a neutral stress axis at the wall's center, thus reducing or eliminating the minimum reinforcement requirement that is currently required for conventional masonry.
3. AAC masonry blocks are solid blocks with drilled holes only where vertical wall reinforcing is required.
4. AAC masonry block lengths are 24" long versus 16" in conventional masonry.
5. AAC masonry blocks provide an economical balance between strength, fire, thermal, and fire resistance properties.

The Masonry Standard Joint Committee (MSJC) has approved the design procedures for AAC masonry and has been published in ACI 530-05.

E-Crete is a member of the Autoclaved Aerated Concrete Association (AACPA) and a leader in the technical review committee. The purpose of the Association, and the technical committee, in particular, is to further the research and technological development of AAC and to standardize its design and construction procedures.



8

STRUCTURAL DESIGN PROCEDURES

Structural design of AAC masonry walls and lintels are designed in accordance with section 4.0 of the ICC ESR-1371.

Items to consider when designing AAC masonry walls:

- AAC masonry blocks are available in a variety of grades with corresponding density and compressive strength. The most common grade produced by E-Crete is the EC-3 (AAC3). Consult with your local distributor for availability of other grades.
- If vertical reinforcing is required it should be spaced in 2' increments (2', 4', 6', etc.). AAC masonry blocks can be drilled on site for additional reinforcement requirements. Caution should be taken to make sure that there is at least 2" of AAC remaining when notching or drilling the block to prevent possible splitting when grouting.
- Vertical reinforcing at each end of wall openings need to be within 2' of the opening which will allow the installer flexibility in maintaining a 2' module to minimize on site drilling.
- For long walls, crack control joints should be placed at 20' to 24' O.C. to prevent temperature and shrinkage cracking.
- AAC lintels can be designed in two different ways as illustrated in the AAC masonry lintel design examples. AAC "U" blocks tend to split when grouting if stirrups are spaced less than 8" O.C.
- Steel lintels can be used similar to conventional masonry.
- Power Steel Lintels are available to use with AAC masonry and the load tables are provided at the end of this chapter.
- If needed, concentrated loads can be spread out by using a bond beam in the same manner as conventional masonry.
- Allowable loads for anchor bolts are the same as conventional masonry provided that the AAC "U" block is notched 4" around the anchor bolt and grouted solid. See ledger detail in the construction detail section.
- Special inspection is required for all AAC masonry walls. Inspections are to be performed in the same manner as conventional masonry. See section 4.4 of the ICC ESR-1371.

PHYSICAL PROPERTIES OF AAC BLOCK

E-Crete LLC offers high quality Autoclaved Aerated Concrete (AAC) building products for structural and non-structural applications. Weighing about one-fifth the weight of conventional concrete, E-Crete AAC can improve thermal performance resulting in reduced cooling and heating equipment requirements and lower utility bills while providing the greatest fire resistance of any building material currently on the market. E-Crete AAC also serves as an excellent acoustic insulation material.

Physical Properties of AAC Block					
AAC Grade	Dry Bulk Density		Minimum Compressive Strength		Average Drying Shrinkage
	lbs/ft ³	kg/m ³	psi	Mpa	%
EC-2 (AAC2)	25-31	400	290	2	< 0.02
EC-3 (AAC3)	31	500	435	3	< 0.02
EC-4 (AAC4)	31-50	500-800	580	4	< 0.02
EC-6 (AAC6)	37-50	600-800	870	6	< 0.02

*See ICC ESR-1371 and ASTM C1386



8

Design Examples:

Un-reinforced AAC masonry wall design example

$h = 9 \cdot ft$	wall height
$t = 8 \cdot in$	wall thickness
$h_p = 4 \cdot ft$	parapet wall height
$t_p = 8 \cdot in$	parapet wall thickness
$\omega = 32 \cdot pcf$	wall density
$f_{AAC} = 435 \cdot psi$	AAC compressive strength
$\mu = 1$	sliding coefficient of friction at leveling bed joint
$\phi_s = 0.8$	shear strength reduction factor
$\phi_b = 0.6$	bending strength reduction factor
$\phi_a = 0.6$	axial strength reduction factor

$$E_{AAC} = 6500 \cdot \left(\frac{f_{AAC}}{psi} \right)^{0.6} \cdot psi$$

Note: All referenced sections correspond to ICC ESR-1371

$b = 1 \cdot ft$ design strip

Wall Loads

Axial Loads:

Roof

$$DL_r = 360 \cdot plf \quad \text{roof dead load} \quad e_r = 0 \cdot in$$

$$LL_r = 300 \cdot plf \quad \text{roof live load}$$

Floor

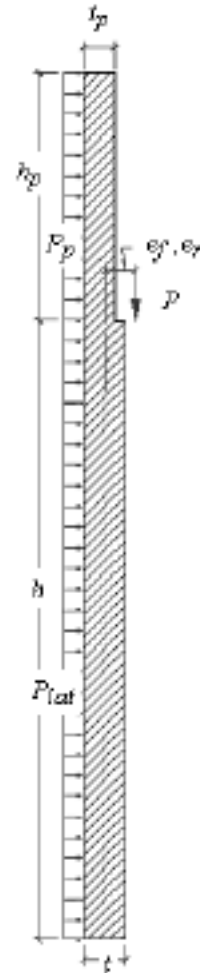
$$DL_f = 200 \cdot plf \quad \text{roof dead load} \quad e_f = 5.75 \cdot in \quad \text{distance for eccentric floor load}$$

$$LL_f = 280 \cdot plf \quad \text{roof live load}$$

Out of plane Load:

$$P_{lat} = 24 \cdot psf \quad \text{wall lateral load between supports}$$

$$P_p = 18.4 \cdot psf \quad \text{parapet wall lateral load}$$



Load Combination based on 1997 UBC (designer will need to check other applicable load combinations)

(1.2D+1.3W+0.5L+0.5(Lr or Snow))

$DL_{factor} = 1.2$	Dead Load Factor	$Lf_{factor} = .5$	Floor Live Load Factor
$Lr_{factor} = .5$	Roof Live Load Factor	$WE_{factor} = 1.3$	Wind or Seismic Load Factor

Factored Loads:

Axial

$$P_{serDL} = [(DL_r) + (DL_f)] \cdot b + \omega \cdot t \cdot b \cdot \frac{h}{2} + \omega \cdot t_p \cdot b \cdot h_p$$

Used for calculating service deflection

$$P_{serDL} = 741.3 \text{ lb}$$

$$P_{u_{roofDL}} = DL_{factor} \cdot DL_r \qquad P_{u_{floorDL}} = DL_{factor} \cdot DL_f$$

$$P_{u_{roofLL}} = Lr_{factor} \cdot LL_r \qquad P_{u_{floorLL}} = Lf_{factor} \cdot LL_f$$

$$P_{uw} = DL_{factor} \cdot \omega \cdot t \cdot b \cdot \frac{h}{2} + DL_{factor} \cdot \omega \cdot t_p \cdot b \cdot h_p \quad \text{factored wall weight at mid height} \quad P_{uw} = 218 \text{ lb}$$

$$P_{uf_roof} = P_{u_{roofLL}} \cdot b + P_{u_{roofDL}} \cdot b \qquad P_{uf_roof} = 582 \text{ lb}$$

$$P_{uf_floor} = P_{u_{floorLL}} \cdot b + P_{u_{floorDL}} \cdot b \qquad P_{uf_floor} = 380 \text{ lb}$$

$$P_{uf_TL} = P_{uf_roof} + P_{uf_floor} \qquad P_{uf_TL} = 962 \text{ lb}$$

$$A_g = b \cdot t$$

Lateral

$$w_u = WE_{factor} \cdot P_{lat} \cdot b \quad \text{factored wall lateral load between supports} \quad w_u = 31.2 \text{ plf}$$

$$w_{pu} = WE_{factor} \cdot P_p \cdot b \quad \text{factored lateral load at parapet} \quad w_{pu} = 23.9 \text{ plf}$$

$$w_{ser} = P_{lat} \cdot b \quad \text{unfactored wind load used for calculating wall deflection} \quad w_{ser} = 24 \text{ plf}$$

$$M_{ser} = w_{ser} \cdot \frac{h^2}{8} \quad \text{service moment between supports} \quad M_{ser} = 243 \text{ ft} \cdot \text{lb}$$

The nominal shear strength for out-of-plane loads shall be determined by section 4.1.2.4.1.2.5

4.1.2.4.1.2.5 Nominal shear strength by out of plane loading shall be computed as follows:

$$\boxed{V_{AAC} = 0.8 \cdot \sqrt{\frac{f_{AAC}}{psi}} \cdot psi \cdot b \cdot t} \quad \phi_s \cdot V_{AAC} = 1281 \text{ lb} \quad V_u = w_u \cdot \frac{h}{2} \quad V_u = 140 \text{ lb} \quad \text{(4-18)}$$

$$\frac{V_u}{(\phi_s \cdot V_{AAC})} = 0.11 \leq 1.0 \quad \text{Shear} = \text{"O.K."}$$

Check sliding

4.1.1.8.5 Coefficient of friction -- The coefficient of friction between AAC and leveling bed mortar shall be 1.0 MAX

$$V_{AACsliding} = \mu \cdot \left(P_{u_{roofDL}} \cdot b + P_{u_{roofLL}} \cdot b + P_{u_{floorDL}} \cdot b + P_{u_{floorLL}} \cdot b + P_{uw} + DL_{factor} \cdot \omega \cdot t \cdot b \cdot \frac{h}{2} \right)$$

$$\phi_s \cdot V_{AACsliding} = 1036 \text{ lb} \quad V_u = 140 \text{ lb}$$

$$\frac{V_u}{(\phi_s \cdot V_{AACsliding})} = 0.14 \leq 1.0 \quad \text{Sliding} = \text{"O.K."}$$

Factored moment and axial force shall be determined at the midheight of the wall and shall be used for design. The factored moment, M_u

$$M_u = \frac{w_u \cdot h^2}{8} + P_{uf} \cdot \frac{e_u}{2}$$

wall		parapet
$S = \frac{b \cdot t^2}{6}$	$S = 128 \text{ in}^3$	$S_p = \frac{b \cdot t_p^2}{6}$
	$I = \frac{b t^3}{12}$	$I = 512 \text{ in}^4$
	$r = \sqrt{\frac{I}{A_g}}$	$r = 2.3 \text{ in}$
$P_u = P_{uw} + P_{uf_TL}$	$P_u = 1180 \text{ lb}$	
$f_{tAAC} = 2.4 \cdot \sqrt{\frac{f_{AAC}}{\text{psi}}}$	$f_{tAAC} = 50.1 \text{ psi}$	$f_{rAAC} = 2 \cdot f_{tAAC}$
		$f_{rAAC} = 100.1 \text{ psi}$

$$M_u = \frac{w_u \cdot h^2}{8} + P_{uf_roof} \cdot \frac{e_r}{2} + P_{uf_floor} \cdot \frac{e_f}{2} \quad \text{factored moment between supports}$$

$$M_{pu} = w_{pu} \cdot \frac{h_p^2}{2} \quad \text{factored moment at parapet}$$

$$M_{twu} = P_{uf_roof} \cdot e_r + P_{uf_floor} \cdot e_f \quad \text{factored moment at top of wall (at ledger)}$$

$$M_u = 406.9 \text{ lb ft} \quad \text{factored moment between supports}$$

$$M_{pu} = 191.4 \text{ lb ft} \quad \text{factored moment at parapet}$$

$$M_{twu} = 182.1 \text{ lb ft} \quad \text{factored moment at top of wall (at ledger)}$$

$$P_u = 1179.6 \text{ lb} \quad \text{factored axial load}$$

The nominal moment strength for pure bending (used for parapet and top of wall), M_{pn} , is given by:

$$M_{pn} = f_{tAAC} \cdot S_p \quad \text{nominal moment at parapet}$$

where f_{tAAC} is given by:

$$f_{tAAC} = 2.4 \cdot \sqrt{f_{AAC}} \quad (4-01)$$

4.1.3.3 The nominal axial strength, P_n is given by equation (2-30) or Eq. (2-31)

For members having an h/r ratio < 99:

$$P_n = 0.8 \cdot \left[0.85 \cdot A_g \cdot f_{AAC} \cdot \left[1 - \left(\frac{h}{140 \cdot r} \right)^2 \right] \right] \quad P_n = 25228.2 \text{ lb} \quad (4-30)$$

For members having an h/r ratio > 99: $\frac{h}{r} = 46.8$

$$P_n = 0.8 \cdot \left[0.85 \cdot A_g \cdot f_{AAC} \cdot \left[\left(\frac{70 \cdot r}{h} \right)^2 \right] \right] \quad P_n = 63623.4 \text{ lb} \quad (4-31)$$

$$P_n = \text{if } \left[\frac{h}{r} \leq 99, 0.8 \cdot \left[0.85 \cdot A_g \cdot f_{AAC} \cdot \left[1 - \left(\frac{h}{140 \cdot r} \right)^2 \right] \right], 0.8 \cdot \left[0.85 \cdot A_g \cdot f_{AAC} \cdot \left[\left(\frac{70 \cdot r}{h} \right)^2 \right] \right] \right] \quad P_n = 25228.2 \text{ lb}$$

Combined Flexural and Axial Compression Between Wall Supports

For members subjected to combined flexural and axial compression, the following equations must be satisfied:

For Compression Face (between supports)

$$\frac{P_u}{\phi_u \cdot P_n} + \frac{M_u}{\phi_b \cdot 0.85 \cdot f_{AAC} \cdot S} < 1 \quad \frac{P_u}{\phi_u \cdot P_n} + \frac{M_u}{\phi_b \cdot 0.85 \cdot f_{AAC} \cdot S} = 0.25 \leq 1.0$$

Compression_{check} = " Combined flexural and axial compression check is O.K. "

For Tension Face (between supports)

$$\frac{M_u}{S} - \frac{P_u}{A_g} \leq \phi_b \cdot f_{tAAC} \quad \frac{M_u}{S} - \frac{P_u}{A_g} = 25.9 \text{ psi} \leq \phi_b \cdot f_{tAAC} = 30 \text{ psi}$$

Tension_{check} = " Flexural (tension) check is O.K. "

Combined Flexural and Axial Compression at Top of Wall (at ledger)

For members subjected to combined flexural and axial compression, the following equations must be satisfied:

For Compression Face (at top of wall)

$$P_u = P_{uf_roof} + P_{uf_floor}$$

$$P_u = 962 \text{ lb}$$

$$\frac{P_u}{\phi_a \cdot P_n} + \frac{M_{twu}}{\phi_b \cdot 0.85 \cdot f_{AAC} \cdot S} < 1$$

$$\frac{P_u}{\phi_a \cdot P_n} + \frac{M_{twu}}{\phi_b \cdot 0.85 \cdot f_{AAC} \cdot S} = 0.14 \leq 1.0$$

*Compressipn*_{check} = " Combined flexural and axial compression check is O.K. "

For Tension Face (at top of wall)

$$\frac{M_{twu}}{S} - \frac{P_u}{A_g} \leq \phi_b \cdot f_{tAAC}$$

$$\frac{M_{twu}}{S} - \frac{P_u}{A_g} = 7.05 \text{ psi} \leq \phi_b \cdot f_{tAAC} = 30 \text{ psi}$$

*Tension*_{check} = " Flexural (tension) check is O.K. "

Parapet Bending Stress Check

$$M_{pu} = 191.4 \text{ lb ft} \quad M_{pn} = 533.9 \text{ lb ft}$$

$$\frac{M_{pu}}{(\phi_b \cdot M_{pn})} = 0.6 \leq 1.0 \quad \text{Parapet}_{check} = \text{" Parapet Flexural (tension) check is O.K. "}$$

4.1.2.5.6 Deflection design --The horizontal midheight deflection, δ_s , under service lateral load and service axial loads (without load factor) shall be limited by the relation:

$$\boxed{\delta_s \leq 0.007 \cdot h} \quad (4-25)$$

P - delta effects shall be included in deflection calculation. The midheight deflection shall be computed using Eq. (2-26)

$$\boxed{\delta_s = \frac{5 \cdot M_{ser} \cdot h^2}{48 \cdot E_{AAC} \cdot I}} \quad (4-26)$$

$$\delta_s = 0.0278 \text{ in} \leq 0.007 \cdot h = 0.76 \text{ in} \quad \text{Deflection}_{check} = \text{" Deflection O.K. "}$$

Use 8" thick AAC masonry block wall (reinforce per minimum reinforcement requirement per section 4.1.1.3.3)

Design Examples: Reinforced AAC masonry wall design example

$h = 15 \cdot ft$	wall height
$t = 8 \cdot in$	wall thickness
$h_p = 4 \cdot ft$	parapet wall height
$t_p = 6 \cdot in$	parapet wall thickness
$d = \frac{t}{2}$	distance from the compression zone to the tension steel
$bar_{size} = 4$	reinforcing bar No. (4 or 5)
$s = 48 \cdot in$	reinforcing spacing
$\omega = 37 \cdot pcf$	wall density (actual density is 31 pcf, add 6 pcf to nominal density)
$f_{AAC} = 435 \cdot psi$	AAC compressive strength
$f_y = 40000 \cdot psi$	steel strength
$d_{core} = 4 \cdot in$	core diameter (grouted cell)
$\mu = 1$	sliding coefficient of friction at leveling bed joint
$\phi_s = 0.8$	shear strength reduction factor
$\phi_b = 0.9$	bending strength reduction factor

$$E_{AAC} = 6500 \cdot \left(\frac{f_{AAC}}{psi} \right)^{0.6} \cdot psi$$

$$E_S = 29000000 \cdot psi$$

Note: All referenced sections correspond to ICC ESR-1371

Wall Loads

Axial Loads

Roof

$$DL_r = 400 \cdot plf \quad \text{roof dead load} \quad e_r = 0 \cdot in \quad \text{distance for eccentric roof load}$$

$$LL_r = 300 \cdot plf \quad \text{roof live load}$$

Floor

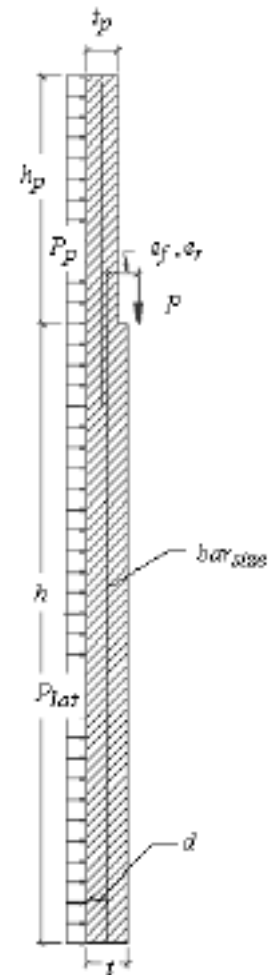
$$DL_f = 200 \cdot plf \quad \text{roof dead load} \quad e_f = 5.75 \cdot in \quad \text{distance for eccentric floor load}$$

$$LL_f = 300 \cdot plf \quad \text{roof live load}$$

Out of plane Load:

$$P_{lat} = 16 \cdot psf \quad \text{wall lateral load between supports}$$

$$P_p = 18 \cdot psf \quad \text{parapet wall lateral load}$$



Load Combination based on 1997 UBC (designer will need to check other applicable load combinations)

(1.2D+1.3W+0.5L+0.5(Lr or Snow))

$$DL_{factor} = 1.2 \quad \text{Dead Load Factor} \quad Lf_{factor} = 0.5 \quad \text{Floor Live Load Factor}$$

$$Lr_{factor} = 0.5 \quad \text{Roof Live Load Factor} \quad WE_{factor} = 1.3 \quad \text{Wind or Seismic Load Factor}$$

Factored Loads

Axial $b = 1 \cdot ft$ design strip

$$P_{LLf} = LL_f \cdot b \quad P_{LLf} = 300 \text{ lb}$$

$$P_{DL} = (DL_r) + (DL_f) \cdot b + \omega \cdot t \cdot \frac{h}{2} \cdot b + \omega \cdot t_p \cdot h_p \cdot b$$

Used for calculating service deflection and allowable maximum steel

$$P_{u_{roofDL}} = DL_{factor} \cdot DL_r$$

$$P_{u_{floorDL}} = DL_{factor} \cdot DL_f$$

$$P_{DL} = 859 \text{ lb}$$

$$P_{u_{roofLL}} = Lr_{factor} \cdot LL_r$$

$$P_{u_{floorLL}} = Lf_{factor} \cdot LL_f$$

$$P_{uw} = DL_{factor} \cdot \omega \cdot t \cdot \frac{h}{2} \cdot b + DL_{factor} \cdot \omega \cdot t_p \cdot h_p \cdot b$$

factored wall weight at mid height

$$P_{uw} = 311 \text{ lb}$$

$$P_{u_{f_roof}} = P_{u_{roofLL}} \cdot b + P_{u_{roofDL}} \cdot b$$

$$P_{u_{f_roof}} = 630 \text{ lb}$$

$$P_{u_{f_floor}} = P_{u_{floorLL}} \cdot b + P_{u_{floorDL}} \cdot b$$

$$P_{u_{f_floor}} = 390 \text{ lb}$$

$$P_{u_{TL}} = P_{u_{f_roof}} + P_{u_{f_floor}}$$

$$P_{u_{TL}} = 1020 \text{ lb}$$

Lateral:

$$w_u = WE_{factor} \cdot P_{lat} \cdot b \quad \text{factored wall lateral load between supports}$$

$$w_u = 20.8 \text{ plf}$$

$$w_{pu} = WE_{factor} \cdot P_p \cdot b$$

$$w_{pu} = 23.4 \text{ plf}$$

$$w_{ser} = P_{lat} \cdot b$$

unfactored wind load used for calculating wall deflection

$$w_{ser} = 16 \text{ plf}$$

$$M_{ser} = w_{ser} \cdot \frac{h^2}{8}$$

$$M_{ser} = 450 \text{ ft} \cdot \text{lb}$$

The nominal shear strength for out-of-plane loads shall be determined by section 2.3.2.4.1.2.5

4.1.2.4.1.2.5 Nominal shear strength by out of plane loading shall be computed as follows:

$$V_{AAC} = 0.8 \cdot \sqrt{\frac{f_{AAC}}{psi}} \cdot psi \cdot b \cdot d$$

$$V_u = w_u \cdot \frac{h}{2}$$

$$V_u = 156 \text{ lb}$$

$$\phi_s \cdot V_{AAC} = 641 \text{ lb}$$

(4-18)

$$\frac{V_u}{(\phi_s \cdot V_{AAC})} = 0.24 \leq 1.0 \quad \text{Shear} = \text{"O.K."}$$

Check sliding

4.1.2.4.1.2.3 Coefficient of friction -- The coefficient of friction between AAC and leveling bed mortar shall be 1.0 MAX

$$V_{AACsliding} = \mu \cdot (P_{u_{roofDL}} \cdot b + P_{u_{roofLL}} \cdot b + P_{u_{floorDL}} \cdot b + P_{u_{floorLL}} \cdot b + P_{uw} \cdot 2) + 0.6 \cdot f_y \cdot A_s$$

$$V_{AACsliding} = 2820 \text{ lb} \quad V_u = 156 \text{ lb}$$

$$\frac{V_u}{(V_{AACsliding})} = 0.06 \leq 1.0 \quad \text{Sliding} = \text{"O.K."}$$

4.1.2.5.4 Walls with factored Axial stresses of 0.05 f'_{AAC} or less- The procedure set forth in this section shall be used when the factored axial loads stress at the location of maximum moment satisfies the requirement computed by Eq. (4-19)

$$A_g = b \cdot t$$

$$\left(\frac{P_u}{A_g} \right) \leq 0.05 f'_{AAC}$$

(4-19)

$$\frac{P_{uTL} + P_{uw}}{A_g} = 13.9 \text{ psi} \leq 0.05 f'_{AAC} = 21.8 \text{ psi}$$

$AxialStress_{check}$ = "Procedures set forth in these sections are O.K."

2.3.2.5.5 Walls with factored axial stress greater than 0.05 f'_{AAC} or slenderness ratio greater than 30-- Such walls shall be designed in accordance with the provisions of section 4.1.2.5.4 and shall have a minimum thickness of 6 in.

$$\frac{P_{uTL} + P_{uw}}{A_g} = 13.9 \text{ psi} \leq 0.2 f'_{AAC} = 87 \text{ psi}$$

$AxialStress_{check}$ = "Design procedures set forth in section 2.3.2.5.4 may be used"

Factored moment and axial force shall be determined at the midheight of the wall and shall be used for design. The factored moment, M_u , at midheight of wall shall be computed using Eq. (4-20)

$$M_u = \frac{w_u \cdot h^2}{8} + P_{uf} \cdot \frac{e_u}{2} + P_u \cdot \delta_u$$

(4-20)

Where: $P_u = \frac{P_{uw}}{2} + P_{uf}$

(4-21)

$M_u = 703.2 \text{ lb ft}$	factored moment between supports
$M_{pu} = 187.2 \text{ lb ft}$	factored moment at parapet
$M_{twu} = 186.9 \text{ lb ft}$	factored moment at top of wall (at ledger)
$P_u = 1331 \text{ lb}$	factored axial load

Moment Design Strength Between Supports:

The design strength for out of plane wall loading shall be in accordance with Eq. (4-22)

$$M_u \leq \phi_b \cdot M_n \quad (4-22)$$

Where:

$$a = \frac{(P_u + A_s \cdot f_y)}{0.85 \cdot f_{AAC} \cdot b} \quad a = 0.74 \text{ in} \quad (4-24)$$

$$M_n = (A_s \cdot f_y + P_u) \cdot \left(d - \frac{a}{2}\right) \quad \phi_b \cdot M_n = 897 \text{ ft} \cdot \text{lb} \quad (4-23)$$

$$M_u = 703 \text{ ft} \cdot \text{lb} \quad \frac{M_u}{(\phi_b \cdot M_n)} = 0.784 \leq 1.0 \quad \text{Bending_Stresscheck} = \text{"Bending Stress O.K."}$$

Check maximum steel reinforcing

$$\alpha = 1.5 \quad \alpha=3 \text{ for Sear walls, and 1.5 for beams and out of plane walls} \quad E_s = 29000000 \cdot \text{psi}$$

$$\epsilon_y = \frac{f_y}{E_s} \quad \epsilon_{mu} = 0.003 \quad c = d \cdot \left[\frac{\epsilon_{mu}}{(\alpha \cdot \epsilon_y + \epsilon_{mu})} \right] \quad c = 2.4 \text{ in} \quad \beta_1 = 0.67$$

$$A_{smax} = \left(0.85 \cdot f_{AAC} \cdot b \cdot \beta_1 \cdot c - \frac{P_{DL} + 0.75 \cdot P_{LLf}}{\phi_b} \right) \cdot \frac{1}{f_y} \quad A_s = 0.05 \text{ in}^2 \leq A_{smax} = 0.146 \text{ in}^2 \quad \text{O.K.}$$

A_s is per lineal foot of wall

$$A_{smax} = \text{"As} < A_{smax} \text{ - O.K."}$$

Moment Design Strength at Top of Wall:

The design strength for out of plane wall loading shall be in accordance with Eq. (2-23)

$$M_{twu} \leq \phi_b \cdot M_n \quad (4-22)$$

Where:

$$P_u = P_{uTL} \quad P_u = 1020 \text{ lb}$$

$$a = \frac{(P_u + A_s \cdot f_y)}{0.85 \cdot f_{AAC} \cdot b} \quad a = 0.67 \text{ in} \quad (4-24)$$

$$M_n = (A_s \cdot f_y + P_u) \cdot \left(d - \frac{a}{2}\right) \quad \phi_b \cdot M_n = 820 \text{ ft} \cdot \text{lb} \quad (4-23)$$

$$M_{twu} = 187 \text{ ft} \cdot \text{lb} \quad \frac{M_{twu}}{(\phi_b \cdot M_n)} = 0.228 \leq 1.0 \quad \text{Bending_Stresscheck} = \text{"Bending Stress O.K."}$$

Moment Design Strength at Parapet Wall:

$$a = \frac{(A_s \cdot f_y)}{0.85 \cdot f_{AAC} \cdot b} \quad a = 0.44 \text{ in} \quad (4-24)$$

$$M_n = (A_s \cdot f_y) \cdot \left(\frac{t_p}{2} - \frac{a}{2} \right) \quad \phi_b \cdot M_n = 409 \text{ ft} \cdot \text{lb} \quad (4-23)$$

$$M_{pu} = 187 \text{ ft} \cdot \text{lb} \quad \frac{M_{pu}}{(\phi_b \cdot M_n)} = 0.457 \leq 1.0 \quad \text{Bending_Stress}_{check} = \text{"Bending Stress O.K."}$$

Check reinforcing bar size limitations per section 4.1.2.3.1

$$A_{grout} = \pi \cdot \left(\frac{d_{core}}{2} \right)^2 \quad \frac{A_s}{A_{grout}} = 1.56 \text{ ft} \% \leq 4.5\% \quad \text{O.K.}$$

4.1.2.5.6 Deflection design --The horizontal midheight deflection, δ_s , under service lateral load and service axial loads (unfactored loads) shall be limited by the relation:

$$\delta_s \leq 0.007 \cdot h \quad (4-25)$$

P - delta effects shall be included in deflection calculation. The midheight deflection shall be computed using either Eq. (4-23) or Eq. (4-24), as applicable.

(a) where $M_{ser} < M_{cr}$

$$\delta_s = \frac{5 \cdot M_{ser} \cdot h^2}{48 \cdot E_{AAC} \cdot I_g} \quad (4-26)$$

(b) where $M_{cr} < M_{ser} < M_n$

$$\delta_s = \frac{5 \cdot M_{cr} \cdot h^2}{48 \cdot E_{AAC} \cdot I_g} + \frac{5 \cdot (M_{ser} - M_{cr}) \cdot h^2}{48 \cdot E_{AAC} \cdot I_{eff}} \quad (4-27)$$

The cracking moment strength of the wall shall be computed using Eq. (4-28), where f_{rAAC} is given by section 4.1.1.8.3:

$$M_{cr} = S_n \cdot \left(f_{rAAC} + \frac{P_{DL}}{A_n} \right) \quad (4-28)$$

4.1.1.8.3 Masonry Modulus of rupture -- The modulus of rupture, f_{rAAC} , for AAC masonry elements shall be taken as two times the masonry splitting tensile strength, f_{tAAC} where:

$$f_{tAAC} = 2.4 \cdot \sqrt{\frac{f_{AAC}}{\text{psi}}} \cdot \text{psi} \quad f_{tAAC} = 50.1 \text{ psi}$$

$$f_{rAAC} = 2 \cdot f_{tAAC} \quad f_{rAAC} = 100.1 \text{ psi}$$

The effective moment of inertia (I_{eff}) is given in section 4.1.1.6.3 and may be taken as:

$$I_{eff} = I_g \cdot \left(\frac{M_{cr}}{M_{ser}} \right)^3 + I_{cr} \cdot \left(1 - \frac{M_{cr}}{M_{ser}} \right)^3 \leq 0.5 I_g$$

Note: If the section of AAC contains a horizontal leveling bed, the value of f_{rAAC} shall not exceed 60psi

$$M_{cr} = S_n \cdot \left(f_{rAAC} + \frac{PDL}{A_n} \right) \quad M_{cr} = 1163 \text{ ft}\cdot\text{lb} \quad M_{ser} = 450 \text{ ft}\cdot\text{lb}$$

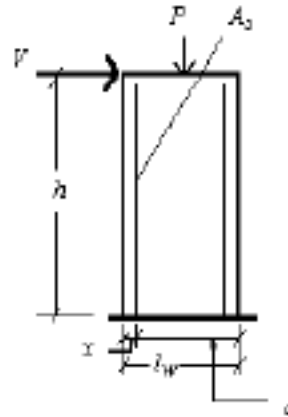
$$I_{eff} = \text{if} \left[I_{eff} \leq 0.5 I_g, I_n \cdot \left(\frac{M_{cr}}{M_{ser}} \right)^3 + I_{cr} \cdot \left(1 - \frac{M_{cr}}{M_{ser}} \right)^3, 0.5 I_g \right] \quad I_{eff} = 8649.3 \text{ in}^4$$

$$\delta_s = \text{if} \left[M_{ser} < M_{cr}, \frac{5 \cdot M_{ser} \cdot h^2}{48 \cdot E_{AAC} \cdot I_g}, \frac{5 \cdot M_{cr} \cdot h^2}{48 \cdot E_{AAC} \cdot I_g} + \frac{5 \cdot (M_{ser} - M_{cr}) \cdot h^2}{48 \cdot E_{AAC} \cdot I_{eff}} \right]$$

$$\delta_s = 0.143 \text{ in} \leq 0.007 \cdot h = 1.26 \text{ in} \quad \text{Deflection}_{check} = \text{"Deflection O.K."}$$

Design Examples: AAC masonry shear wall design example

$l_w = 6ft$	wall length
$\omega = 37 \cdot pcf$	wall density (actual density over time is 31 pcf - use 6pcf for design)
$f_y = 40000 \cdot psi$	tensile strength of steel
$A_v = 0 \cdot in^2$	shear reinforcing
$s = 0in$	shear reinforcing spacing
$A_s = 0.2 \cdot in^2$	tensile reinforcing
$f'_{AAC} = 435 \cdot psi$	AAC compressive strength
$\mu = 1$	sliding coefficient of friction at leveling bed joint
$\phi_s = 0.8$	shear strength reduction factor
$\phi_b = 0.9$	bending strength reduction factor
$w_{wall} = \omega \cdot t$	wall weight
$x = 4 \cdot in$	distance from edge of wall to tension reinforcing
$d = l_w - x$	distance from the compression zone to the tension steel



Note: All referenced sections correspond to ICC ESR-1371

Load combination - 1.2D + 1.6L+1.3W (designer will need to consider other applicable load combinations)

$V = 3500 \cdot lb$	un-factored lateral loads	$V_u = 1.3 \cdot V$	factored lateral load
$P_{dl} = 1000 \cdot lb + w_{wall} \cdot h \cdot l_w$	axial dead load	$P_{ll} = 1500 \cdot lb$	axial live load
$P_u = 1.2 \cdot P_{dl} + 1.6 \cdot P_{ll}$	$P_u = 5376 \cdot lb$	factored axial load	$P = P_{dl} + P_{ll}$
			$P = 3980 \cdot lb$
			unfactored axial load
$M_u = h \cdot V_u$	factored moment	$V_u = 4.5 \cdot kip$	$P_u = 5.4 \cdot kip$
			$M_u = 45.5 \cdot ft \cdot kip$

Check maximum steel reinforcing

$$\alpha = 3 \quad \alpha=3 \text{ for Sear walls, and 1.5 for beams and out of plane walls} \quad E_s = 29000000 \cdot psi$$

$$\epsilon_y = \frac{f_y}{E_s} \quad \epsilon_{mu} = 0.003 \quad c = d \cdot \frac{\epsilon_{mu}}{(\alpha \cdot \epsilon_y + \epsilon_{mu})} \quad c = 28.6 \cdot in \quad \beta_1 = 0.67$$

$$A_{smax} = 0.85 \cdot f'_{AAC} \cdot t \cdot \beta_1 \cdot c - \frac{P_{dl} + 0.75 \cdot P_{ll}}{\phi_b} \cdot \frac{1}{f_y} \quad A_s = 0.2 \cdot in^2 \leq A_{smax} = 1.316 \cdot in^2 \quad \underline{\text{O.K.}}$$

Moment strength

$$M_n = A_s \cdot f_y \cdot d - \frac{l_w}{2} + A_s \cdot f_y + \frac{P_u}{\phi_b} \cdot \frac{l_w}{2} - \frac{A_s \cdot f_y + \frac{P_u}{\phi_b}}{1.7 \cdot f'_{AAC} \cdot t}$$

$$M_u = 45.5 \cdot ft \cdot kip \leq \phi_b \cdot M_n = 54.5 \cdot ft \cdot kip \quad \underline{\text{O.K.}}$$

4.1.2.4.1.2.1 *Nominal masonry shear strength as governed by web-shear cracking* — Nominal masonry shear strength as governed by web-shear cracking, V_m , shall be computed using Eq. (4-15a) for AAC masonry with mortared head joints, and Eq. (4-15b) for masonry with unmortared head joints:

$$V_{AACwsc} = 0.95 \cdot l_w \cdot t \cdot \sqrt{\frac{f'_{AAC}}{psi}} \cdot \sqrt{1 + \frac{P_u}{2.4 \cdot \sqrt{\frac{f'_{AAC}}{psi}} \cdot (l_w \cdot t) \cdot psi} \cdot psi} \quad V_{AACwsc} = 12.4 \text{ kip} \quad (4-15a)$$

$$V_{AACwsc_uhj} = 0.66 \cdot l_w \cdot t \cdot \sqrt{\frac{f'_{AAC}}{psi}} \cdot \sqrt{1 + \frac{P_u}{2.4 \cdot \sqrt{\frac{f'_{AAC}}{psi}} \cdot (l_w \cdot t) \cdot psi} \cdot psi} \quad V_{AACwsc_uhj} = 8.6 \text{ kip} \quad (4-15b)$$

For AAC masonry in other than running bond, nominal masonry shear strength as governed by web-shear cracking, V_{AAC} , shall be computed using Eq. (4-15c):

$$V_{AAC} = 0.9 \cdot \sqrt{\frac{f'_{AAC}}{psi} \cdot psi \cdot A_n + 0.05 \cdot P_u} \quad (4-15c)$$

4.1.2.4.1.2.2 *Nominal shear strength as governed by crushing of diagonal compressive strut* — For walls with $M_u/V_u d_v < 1.5$, nominal shear strength, V_{AAC} , shall as governed by crushing of a diagonal strut, shall be computed as follows:

$$\frac{M_u}{V_u d} = 1.8$$

$$V_{AACc ds} = 0.17 \cdot f'_{AAC} \cdot t \cdot \frac{h \cdot l_w^2}{h^2 + (.75 \cdot l_w)^2} \quad V_{AACc ds} = 21.3 \text{ kip} \quad (4-16a)$$

$$V_{AAC} = \left(\frac{M_u}{V_u d} \leq 1.5, V_{AACc ds}, V_{AACwsc} \right) \quad V_{AAC} = 12.4 \text{ kip}$$

$$V_{AAC} = \min(V_{AACwsc}, V_{AAC})$$

$$V_{AAC} = 12.4 \text{ kip}$$

For walls with $M_u/V_u d_v$ equal to or exceeding 1.5, capacity as governed by crushing of the diagonal compressive strut need not be calculated.

4.1.2.4.1.2.3 *Nominal shear strength as governed by sliding shear* — At an unbonded interface, nominal shear strength as governed by sliding shear, V_{AAC} , shall be as follows:

$$V_{AACsliding} = \mu \cdot (A_s \cdot f_y + P_u) + 0.6 \cdot f_y \cdot A_s \quad A_s \text{ may be taken as the reinforcing at the toe side only} \quad V_{AACsliding} = 18.2 \text{ kip} \quad (4-16b)$$

At an interface where thin-bed mortar or leveling bed mortar are present, the nominal sliding shear capacity shall be calculated by Eq 2-16b using coefficient of friction from Section 2.3.1.8.5.

4.1.2.4.1.2.4 Nominal Shear Strength provided by shear reinforcement – Nominal shear strength provided by reinforcement, V_s , shall be computed as follows:

$$V_s = \left(\frac{A_v}{s} \right) \cdot f_y \cdot d \qquad V_s = 0 \text{ kip} \qquad (4-17)$$

4.1.2.4.1.2 *Nominal shear strength* — Nominal shear strength, V_n , shall be computed using Eq. (4-12) and either Eq. (4-13) or Eq. (4-14), as appropriate.

$$V_n = V_{AAC} + V_s \qquad V_n = 12.4 \text{ kip} \qquad (4-12)$$

where V_n shall not exceed the following:

(a) Where $M_u/V_u d_v < 0.25$: $A_n = l_w \cdot t$

$$V_n \leq 6 \cdot A_n \cdot \sqrt{f'_{AAC}} \qquad (4-13)$$

(b) Where $M_u/V_u d_v > 1.00$:

$$V_n \leq 4 \cdot A_n \cdot \sqrt{f'_{AAC}} \qquad (4-14)$$

(c) The maximum value of V_n for $M_u/V_u d_v$ between 0.25 and 1.0 may be interpolated.

$$V_n = \min \left(\text{if } \left(\frac{M_u}{V_u d} \leq 0.25, 6 \cdot A_n \cdot \sqrt{\frac{f'_{AAC}}{\text{psi}}} \cdot \text{psi}, 4 \cdot A_n \cdot \sqrt{\frac{f'_{AAC}}{\text{psi}}} \cdot \text{psi} \right), V_n \right) \qquad V_n = 12.4 \text{ kip}$$

The nominal masonry shear strength shall be taken as the least of the values computed using Section 4.1.2.4.1.2.1 through 4.1.2.4.1.2.3. Nominal shear strength provided by reinforcement, V_s , shall include only deformed reinforcement embedded in grout for AAC shear walls.

$$\phi V_n = \min(V_{AACsliding}, \phi_s \cdot V_n) \qquad V_u = 4.5 \text{ kip} \leq \phi V_n = 9.9 \text{ kip} \qquad \text{O.K.}$$

4.1.1.3 The design shear strength, ϕV_n , shall exceed the shear corresponding to the development of 1.25 times the nominal flexural strength (M_n) of the member, except that the nominal shear strength (V_n) need not exceed 2.5 times required shear strength (V_u).

$$V_{u1.25} = \frac{1.25 \cdot M_n}{\frac{M_u}{V_u}} \qquad V_{u1.25} = 7.6 \text{ kip} \leq \phi V_n = 9.9 \text{ kip} \qquad \text{O.K.}$$

$$2.5 \cdot V_u = 11375 \text{ lb} \qquad V_n = 12431.3 \text{ lb}$$

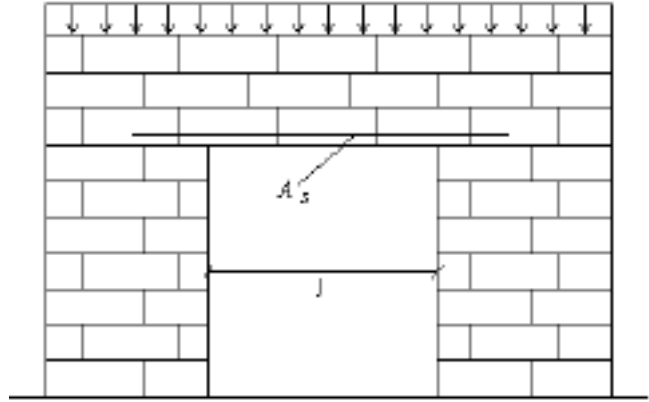
$$t = 8 \text{ in} \qquad A_s = 0.2 \text{ in}^2 \qquad A_v = 0 \text{ in}^2$$

USE 8 in thick AAC block shear wall with 1-#4 vertical reinforcing at each end of wall - no shear reinforcing required

8

Design Examples: AAC Lintel design example

- $t = 8\text{ in}$ wall thickness
- $l = 6\text{ ft}$ lintel length
- $h = 16\text{ in}$ lintel height
- $\omega_l = 60\text{ pcf}$ lintel density
- $\omega = 37\text{ pcf}$ wall density
- $f_y = 40000\text{ psi}$ steel strength
- $A_s = .31\text{ in}^2$ tensile reinforcement
- $f_{AAC} = 435\text{ psi}$ AAC compressive strength
- $H = 16\text{ in}$ wall height above header
- $w_l = \omega \cdot t$ lintel weight
- $\phi_s = 0.8$ shear strength reduction factor
- $\phi_b = 0.9$ bending strength reduction factor
- $y = 4\text{ in}$ distance from bottom steel to bottom of lintel
- $d = h - y$ distance from the compression zone to the tension steel



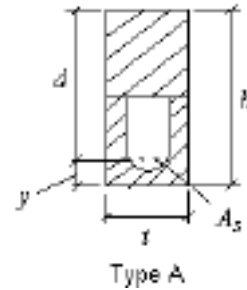
Elevation

$$E_{AAC} = 6500 \cdot \left(\frac{f_{AAC}}{\text{psi}} \right)^{0.6} \cdot \text{psi} \quad E_s = 29000000 \cdot \text{psi}$$

Note: All referenced sections correspond to ICC ESR-1371

Gravity Loads

- $DL = 18\text{ psf}$ roof dead load
- $LL = 20\text{ psf}$ roof live load
- $R_{trib} = 9\text{ ft}$ roof tributary length



Un-factored Uniform Roof Loads (Service Loads- used for calculating lintel deflection)

$$w_{DL} = (DL \cdot R_{trib} + \omega \cdot t \cdot H + \omega_l \cdot t \cdot h) \quad w_{LL} = LL \cdot R_{trib}$$

$$w = w_{DL} + w_{LL} \quad w = 428.2\text{ plf}$$

$$M_{ser} = \frac{w \cdot l^2}{8} \quad V_{ser} = \frac{w \cdot l}{2} - w \cdot d \quad M_{ser} = 1927\text{ ft}\cdot\text{lb} \quad V_{ser} = 856.4\text{ lb}$$

shear can be taken at a distance d from the support

Factored Uniform Roof Loads

$$w_{uDL} = 1.2(DL \cdot R_{trib} + \omega \cdot t \cdot H + \omega_l \cdot t \cdot h) \quad w_{uLL} = 1.6LL \cdot R_{trib}$$

$$w_u = w_{uDL} + w_{uLL} \quad w_u = 585.9\text{ plf}$$

$$M_u = \frac{w_u \cdot l^2}{8} \quad V_u = \frac{w_u \cdot l}{2} - w_u \cdot d \quad M_u = 2636.4\text{ ft}\cdot\text{lb} \quad V_u = 1171.7\text{ lb}$$

shear can be taken at a distance d from the support

Check maximum steel reinforcing

$$\alpha = 1.5 \quad \alpha=3 \text{ for Shear walls, and } 1.5 \text{ for beams and out of plane walls} \quad E_s = 29000000 \cdot \text{psi}$$

$$\epsilon_y = \frac{f_y}{E_s} \quad \epsilon_{mu} = 0.003 \quad c = d \cdot \left[\frac{\epsilon_{mu}}{(\alpha \cdot \epsilon_y + \epsilon_{mu})} \right] \quad c = 7.1 \text{ in} \quad \beta_1 = 0.67$$

$$A_{smax} = (0.85 \cdot f'_{AAC} \cdot t \cdot \beta_1 \cdot c) \cdot \frac{1}{f_y} \quad A_s = 0.31 \text{ in}^2 \leq A_{smax} = 0.352 \text{ in}^2 \quad \text{O.K.}$$

$$A_{smax} = "As < A_{smax} - \text{O.K.}"$$

Bending Strength Check:

$$a = \frac{A_s \cdot f_y}{.85 \cdot f'_{AAC} \cdot t} \quad a = 4.2 \text{ in}$$

$$M_n = A_s \cdot f_y \cdot \left(d - \frac{a}{2} \right) \quad \phi_b \cdot M_n = 9211 \text{ ft} \cdot \text{lb}$$

$$M_u = 2636.4 \text{ ft} \cdot \text{lb}$$

$$\frac{M_u}{(\phi_b \cdot M_n)} = 0.29 \leq 1.0$$

$$\text{Bending_Strength}_{check} = "Bending strength \Rightarrow \text{O.K.}"$$

Nominal Shear Strength -- The nominal shear strength provided by the AAC masonry, shall be the direct shear strength of the AAC (V_{AAC})

$$V_{AAC} = 0.8 \cdot h \cdot t \cdot \sqrt{\frac{f'_{AAC}}{\text{psi}}} \cdot \text{psi} \quad V_{AAC} = 2.1 \text{ kip}$$

4.1.2.4.1.2 Nominal shear strength — Nominal shear strength, V_n , shall be computed using Eq. (4-12) and either Eq. (4-13) or Eq. (4-14), as appropriate.

$$\boxed{V_n = V_{AAC}} \quad V_n = 2.14 \text{ kip} \quad (4-12)$$

where V_n shall not exceed the following:

(a) Where $M_u/V_u d_v < 0.25$: $A_n = h \cdot t$

$$\boxed{V_n \leq 6 \cdot A_n \cdot \sqrt{f'_{AAC}}} \quad 6 \cdot A_n \cdot \sqrt{\frac{f'_{AAC}}{\text{psi}}} \cdot \text{psi} = 16 \text{ kip} \quad (4-13)$$

(b) Where $M_u/V_u d_v > 1.00$:

$$\boxed{V_n \leq 4 \cdot A_n \cdot \sqrt{f'_{AAC}}} \quad 4 \cdot A_n \cdot \sqrt{\frac{f'_{AAC}}{\text{psi}}} \cdot \text{psi} = 10.7 \text{ kip} \quad (4-14)$$

(c) The maximum value of V_n for $M_u/V_u d_v$ between 0.25 and 1.0 may be interpolated.

$$V_u = 1.2 \text{ kip} \quad \phi_s \cdot V_n = 1.7 \text{ kip} \quad \frac{V_u}{(\phi_s \cdot V_n)} = 0.69 \leq 1.0$$

$$\text{Shear_Strength}_{check} = "Shear Strength \Rightarrow \text{O.K.}"$$

4.1.2.5.6 Deflection design --The horizontal midheight deflection, δ_s , under service lateral load and service axial loads (without load factor) shall be limited by the relation:

$$\delta_s \leq 0.007 \cdot l \quad (4-25)$$

The deflection shall be computed using either Eq. (2-26) or Eq. (2-27), as applicable.

(a) where $M_{ser} < M_{cr}$

$$\delta_s = \frac{5 \cdot M_{ser} \cdot l^2}{48 \cdot E_{AAC} \cdot I_g} \quad (4-26)$$

(b) where $M_{cr} < M_{ser} < M_n$

$$\delta_s = \frac{5 \cdot M_{cr} \cdot l^2}{48 \cdot E_{AAC} \cdot I_g} + \frac{5 \cdot (M_{ser} - M_{cr}) \cdot l^2}{48 \cdot E_{AAC} \cdot I_{cr}} \quad (4-27)$$

The cracking moment strength of the beam shall be computed using Eq. (4-28), where f_{rAAC} is given by section 4.1.1.8.3:

$$M_{cr} = S_n \cdot (f_{rAAC}) \quad (4-28)$$

4.1.1.8.3 Masonry Modulus of rapture -- The modulus of rapture, f_{rAAC} , for AAC masonry elements shall be taken as two times the masonry splitting tensile strength, f_{tAAC} where:

$$f_{tAAC} = 2.4 \cdot \sqrt{\frac{f_{AAC}}{psi}} \cdot psi \quad f_{tAAC} = 50.1 \text{ psi} \quad f_{rAAC} = 2 \cdot f_{tAAC} \quad f_{rAAC} = 100.1 \text{ psi}$$

$$\delta_s = 0.018 \text{ in} \leq 0.007 \cdot l = 0.5 \text{ in}$$

Deflection_{check} = "Deflection is less than 0.007L => O.K."

USE 16" deep AAC lintel with 1-No.5 bottom horizontal reinforcing in solid grouted AAC "U" block

AAC Lintel Design Example - Type B

$t = 8in$	wall thickness
$l = 16ft$	lintel length
$h = 24in$	lintel height
$\omega_l = 60pcf$	lintel density
$\omega = 37pcf$	wall density
$f_y = 40000psi$	steel strength
$A_s = 0.62in^2$	tensile reinforcement
$A_v = 0.11in^2$	shear reinforcement
$s = 12in$	shear reinforcing spacing
$f_{AAC} = 435psi$	AAC compressive strength

$f'_g = 2000psi$	grout compressive strength
$H = 16in$	wall height above header
$w_l = \omega t$	lintel weight
$\phi_s = 0.8$	shear strength reduction factor
$\phi_b = 0.9$	bending strength reduction factor
$y = 4in$	distance from bottom steel to bottom of lintel
$d = h - y$	distance from the compression zone to the tension steel
$b = 4.5in$	grout width

$$E_{AAC} = 6500 \cdot \left(\frac{f_{AAC}}{psi} \right)^{0.6} \cdot psi \quad E_s = 29000000 \cdot psi$$

Gravity Loads

$DL = 18psf$	roof dead load
$LL = 16psf$	roof live load
$R_{trib} = 15ft$	roof tributary length

Un-factored Uniform Roof Loads (Service Loads- used for calculating lintel deflection)

$$w_{DL} = (DL \cdot R_{trib} + \omega \cdot t \cdot H + \omega_l \cdot t \cdot h) \quad w_{LL} = LL \cdot R_{trib}$$

$$w = w_{DL} + w_{LL} \quad w = 622.9 plf$$

$$M_{ser} = \frac{w \cdot l^2}{8} \quad V_{ser} = \frac{w \cdot l}{2} - w \cdot d \quad M_{ser} = 19932.4 ft \cdot lb \quad V_{ser} = 3945 lb$$

shear can be taken at a distance d from the support

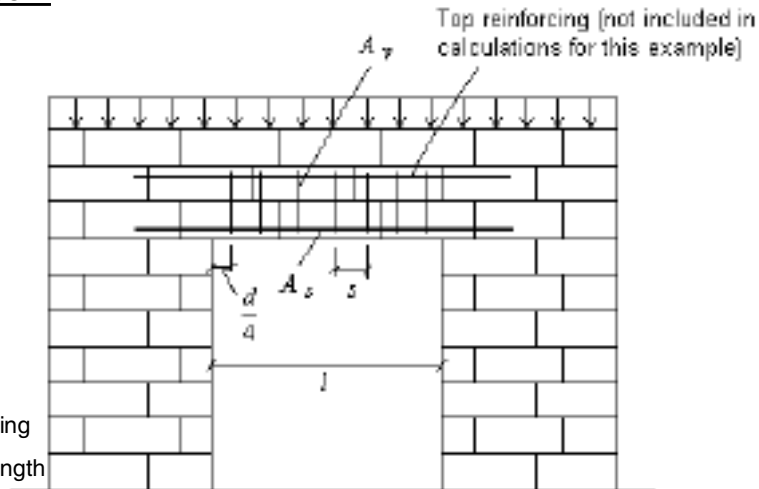
Factored Uniform Roof Loads

$$w_{uDL} = 1.2(DL \cdot R_{trib} + \omega \cdot t \cdot H + \omega_l \cdot t \cdot h) \quad w_{uLL} = 1.6LL \cdot R_{trib}$$

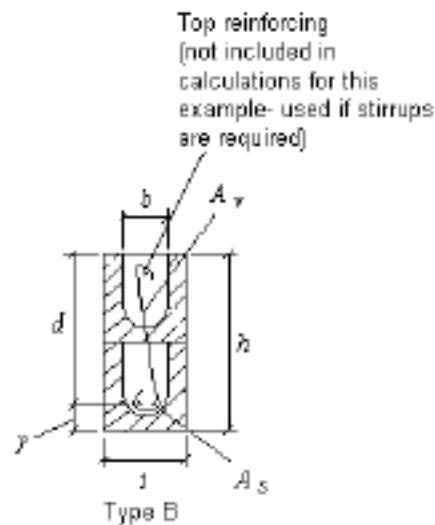
$$w_u = w_{uDL} + w_{uLL} \quad w_u = 843.5 plf$$

$$M_u = \frac{w_u \cdot l^2}{8} \quad V_u = \frac{w_u \cdot l}{2} - w_u \cdot d \quad M_u = 26990.9 ft \cdot lb \quad V_u = 5342 lb$$

shear can be taken at a distance d from the support



Elevation



Type B

Check maximum steel reinforcing

$$\alpha = 1.5 \quad \alpha=3 \text{ for Shear walls, and 1.5 for beams and out of plane walls} \quad E_s = 29000000 \cdot \text{psi}$$

$$\varepsilon_y = \frac{f_y}{E_s} \quad \varepsilon_{mu} = 0.003 \quad c = d \cdot \left[\frac{\varepsilon_{mu}}{(\alpha \cdot \varepsilon_y + \varepsilon_{mu})} \right] \quad c = 11.8 \text{ in} \quad \beta_1 = 0.67$$

$$A_{smax} = (0.85 \cdot f'_g \cdot b \cdot \beta_1 \cdot c) \cdot \frac{1}{f_y} \quad A_s = 0.62 \text{ in}^2 \leq A_{smax} = 1.517 \text{ in}^2 \quad \text{O.K.}$$

Bending Strength Check:

$$A_{smax} = "As < A_{smax} - \text{O.K.}."$$

$$a = \frac{A_s \cdot f_y}{0.85 \cdot f'_g \cdot b} \quad a = 3.2 \text{ in}$$

$$M_n = A_s \cdot f_y \cdot \left(d - \frac{a}{2} \right) \quad \phi_b \cdot M_n = 34185 \text{ ft} \cdot \text{lb}$$

$$M_u = 26990.9 \text{ ft} \cdot \text{lb}$$

$$\frac{M_u}{(\phi_b \cdot M_n)} = 0.79 \leq 1.0$$

$$Bending_Strength_{check} = "Bending strength \Rightarrow \text{O.K.}."$$

Nominal Shear Strength -- The nominal shear strength provided by the grout, shall be the direct shear strength of the grout (V_g)

$$V_g = 2 \cdot b \cdot d \cdot \sqrt{\frac{f'_g}{\text{psi}}} \cdot \text{psi} \quad V_g = 8 \text{ kip}$$

4.1.2.4.1.2.4 *Nominal Shear Strength provided by shear reinforcement (field installed)*– Nominal shear strength provided by reinforcement, V_s , shall be computed as follows:

$$V_s = \left(\frac{A_v}{s} \right) \cdot f_y \cdot d \quad V_s = 7.3 \text{ kip} \quad (4-17)$$

4.1.2.4.1.2 *Nominal shear strength* — Nominal shear strength, V_n , shall be computed using Eq. (4-12) and either Eq. (4-13) or Eq. (4-14), as appropriate.

$$V_n = V_g + V_s \quad V_n = 15.38 \text{ kip} \quad (4-12)$$

where V_n shall not exceed the following:

(a) Where $M_u/V_u d_v < 0.25$: $A_n = h \cdot b$

$$V_n \leq 6 \cdot A_n \cdot \sqrt{f'_g} \quad 6 \cdot A_n \cdot \sqrt{\frac{f'_g}{\text{psi}}} \cdot \text{psi} = 29 \text{ kip} \quad (4-13)$$

(b) Where $M_u/V_u d_v > 1.00$:

$$V_n \leq 4 \cdot A_n \cdot \sqrt{f'_g} \quad 4 \cdot A_n \cdot \sqrt{\frac{f'_g}{\text{psi}}} \cdot \text{psi} = 19.3 \text{ kip} \quad (4-14)$$

(c) The maximum value of V_n for $M_u/V_u d_v$ between 0.25 and 1.0 may be interpolated.

The nominal masonry shear strength shall be taken as the least of the values computed using Section 4.1.2.4.1.2 and 4.1.2.4.1.2.4. Nominal shear strength provided by reinforcement, V_s , shall include only deformed reinforcement embedded in grout for AAC shear walls.

$$V_u = 5.3 \text{ kip}$$

$$\phi_s \cdot V_n = 7.2 \text{ kip}$$

$$\frac{V_u}{(\phi_s \cdot V_n)} = 0.74 \leq 1.0$$

Shear_Strength_{check} = "Shear Strength => O.K."

4.1.2.5.6 Deflection design --The horizontal midheight deflection, δ_s , under service lateral load and service axial loads (unfactored loads) shall be limited by the relation:

$$\delta_s \leq 0.007 \cdot l \quad (4-25)$$

The deflection shall be computed using either Eq. (4-26) or Eq. (4-27), as applicable.

(a) where $M_{ser} < M_{cr}$

$$\delta_s = \frac{5 \cdot M_{ser} \cdot l^2}{48 \cdot E_{AAC} \cdot I_g} \quad (4-26)$$

(b) where $M_{cr} < M_{ser} < M_n$

$$\delta_s = \frac{5 \cdot M_{cr} \cdot l^2}{48 \cdot E_{AAC} \cdot I_g} + \frac{5 \cdot (M_{ser} - M_{cr}) \cdot l^2}{48 \cdot E_{AAC} \cdot I_{cr}} \quad (4-27)$$

The cracking moment strength of the wall shall be computed using Eq. (4-28), where f_{rAAC} is given by section 4.1.1.8.3:

$$M_{cr} = S_n \cdot (f_{rAAC}) \quad (4-28)$$

4.1.1.8.3 Masonry Modulus of rupture -- The modulus of rupture, f_{rAAC} , for AAC masonry elements shall be taken as two times the masonry splitting tensile strength, f_{AAC}

where:

$h = 24 \text{ in}$ Header height

$$\delta_s = 0.476 \text{ in} \leq 0.007 \cdot l = 1.34 \text{ in}$$

$A_s = 0.62 \text{ in}^2$ Bottom steel reinforcing

Deflection_{check} = "Deflection is less than 0.007L => O.K."

$A_v = 0.11 \text{ in}^2$ Shear reinforcing - Stirrups

USE 24" deep AAC lintel solid grouted AAC "U" blocks with 2-No.5 bottom horizontal reinforcing and one No. 4 top horizontal reinforcing with No. 3 stirrups at 12" o.c.

$s = 12 \text{ in o.c.}$ Stirrups spacing



Introduction

Product Line

Thermal Properties

Fire Resistance

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Moisture Absorption

Environmental

Structural Design

**Standard Construction
Details**

Installation Procedures

Tools/Fasteners

Wall Finishes

News

Energy Efficient • Acoustical Insulation • Fire Resistant • Pest Resistant • Environmentally Friendly



Standard Foundation Details

Exterior AAC-Block Wall at Monolithic Footing

Exterior AAC-Block Wall at CMU Stem Wall and Concrete Footing

Typical Interior AAC-Block Wall Footing

Typical AAC-Block Column

Elevation - AAC Wall Reinforcing at Openings

Elevation - AAC Lintel Detail

Elevation – AAC with wide Flange Steel Lintel Bearing

Standard Beams and Trusses Details

Prefabricated Wood Truss Bearing at AAC Block Wall

Wall Brace at AAC Block Wall

Prefabricated Wood Truss at AAC Block Wall 1

Prefabricated Wood Truss at AAC Block Wall 2

Prefabricated Wood Truss at AAC Block Wall 3

Wood "I" Joist at AAC Block Wall 1

Wood "I" Joist at AAC Block Wall 2

Wood "I" Joist at AAC Block Wall 3

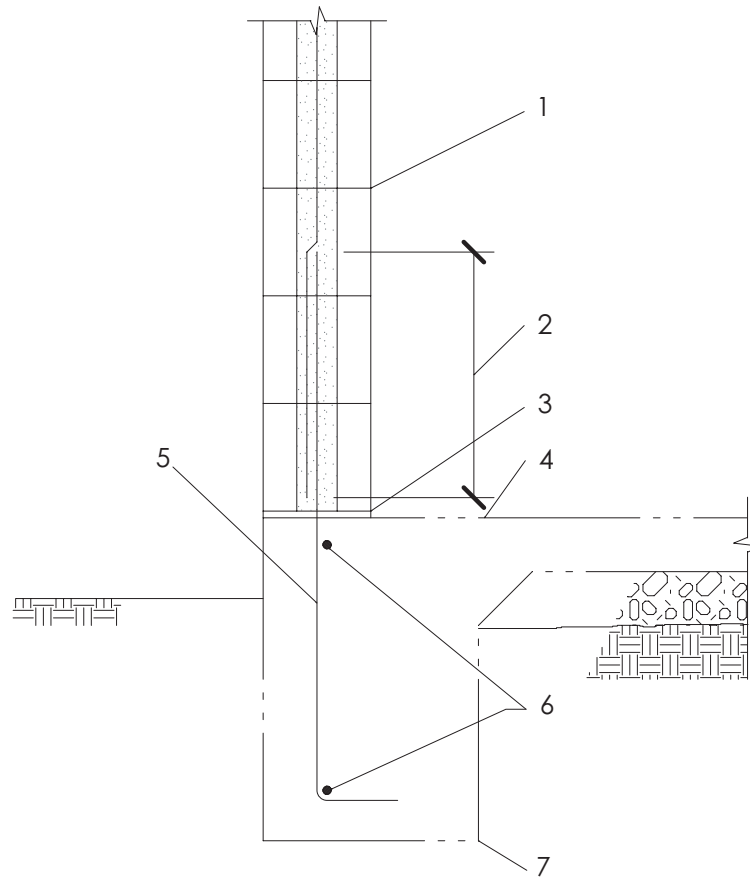
Interior AAC Block Wall at Wood "I" Joist

Typical Ledger Bolt Detail at AAC Wall

Wood Beam at AAC Block Wall 1

Wood Beam at AAC Block Wall 2

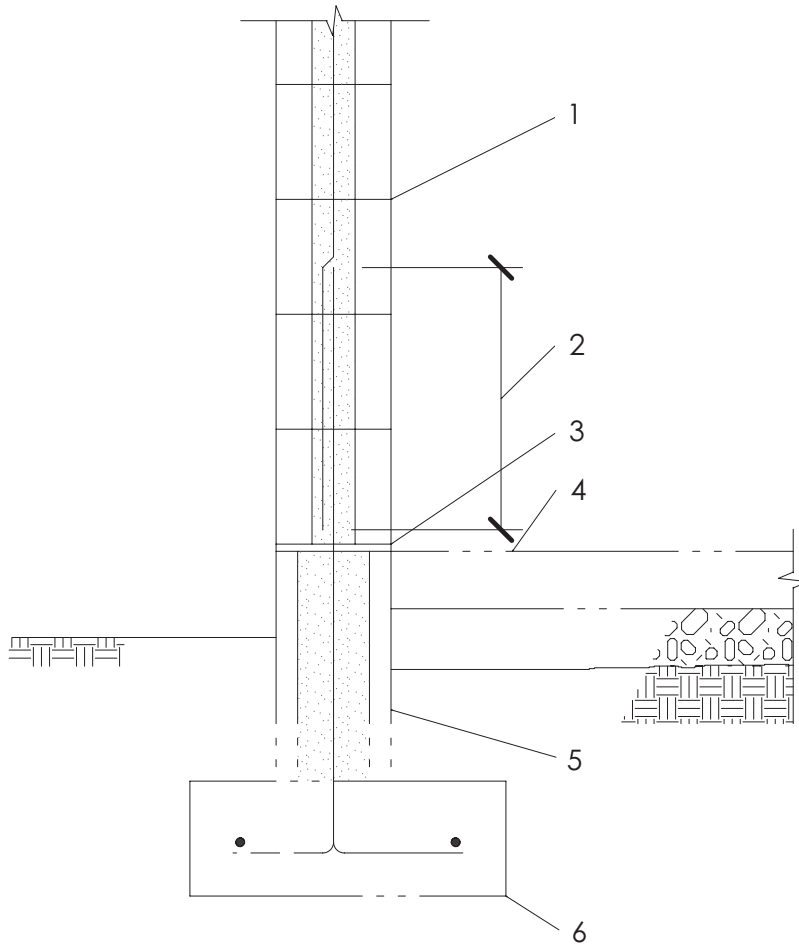
Top of AAC Wall Connection at Prefabricated Wood Truss



DETAIL KEY NOTES

- 1 AAC Block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Bar lap = $40 \times \text{bar } \varnothing$ - min
- 3 3/8" Type "M" or "S" leveling mortar bed
- 4 Concrete slab - by others
- 5 Reinforcing - by others
- 6 Dowels to match and lap vertical wall reinforcing
- 7 Concrete footing - by others

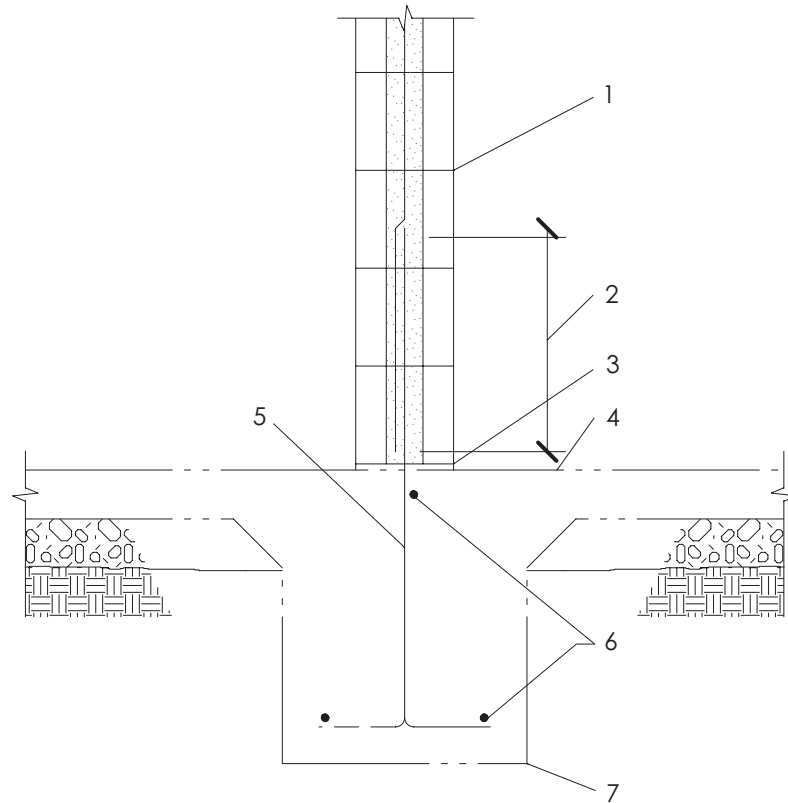
TYPICAL EXTERIOR AAC BLOCK WALL @ MONOLITHIC FOOTING



DETAIL KEY NOTES

- 1 AAC Block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Bar lap = $40 \times \text{bar } \varnothing$ - min
- 3 3/8" Type "M" or "S" leveling mortar bed
- 4 Concrete slab - by others
- 5 CMU Stem wall - by others
- 6 Concrete footing - by others

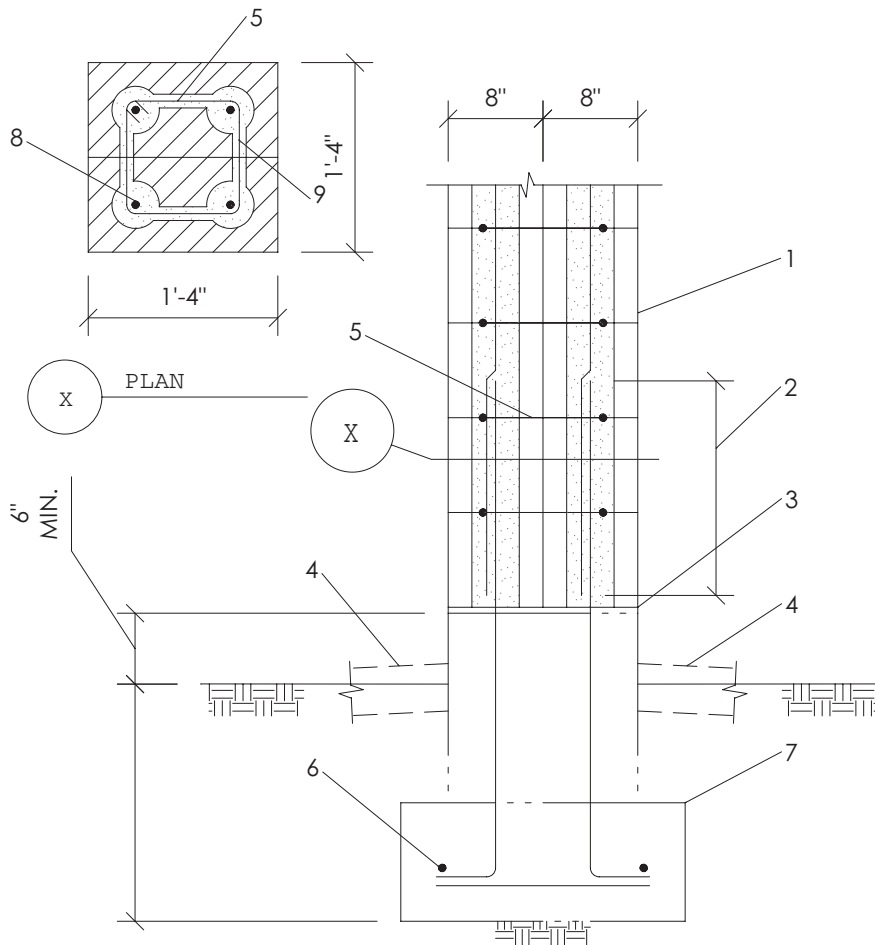
TYPICAL EXTERIOR AAC BLOCK WALL
@ CMU STEM WALL AND CONCRETE FOOTING



DETAIL KEY NOTES

- 1 AAC Block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Bar lap = $40 \times \text{bar } \varnothing$ - min
- 3 $3/8$ " Type "M" or "S" leveling mortar bed
- 4 Concrete slab - by others
- 5 Reinforcing - by others
- 6 Dowels to match and lap vertical wall reinforcing
- 7 Concrete footing - by others

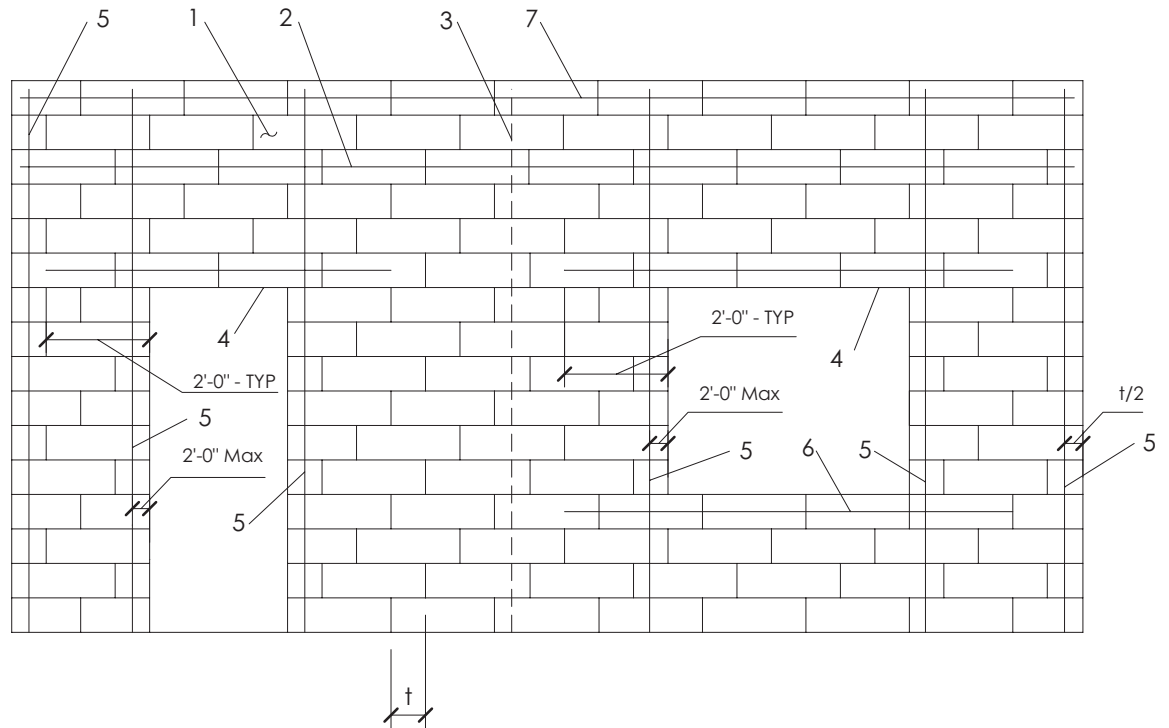
TYPICAL INTERIOR AAC BLOCK WALL @ MONOLITHIC FOOTING



DETAIL KEY NOTES

- 1 AAC block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Bar lap = 40 x bar diameter minimum
- 3 3/8" Type "M" or "S" leveling mortar bed
- 4 Concrete slab where shown on plans - by others
- 5 #2 ties at 8" o.c.
- 6 Footing reinforcing
- 7 Concrete footing - by others
- 8 4 #4 Vertical column reinforcing centered in 4" \varnothing solid grouted cell
- 9 Cut a 3/4" x 3/4" channel fill with thinbed mortar and place stirrups

16" SQUARE AAC COLUMN AT CONCRETE FOOTING



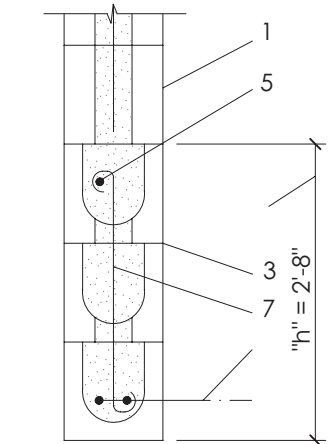
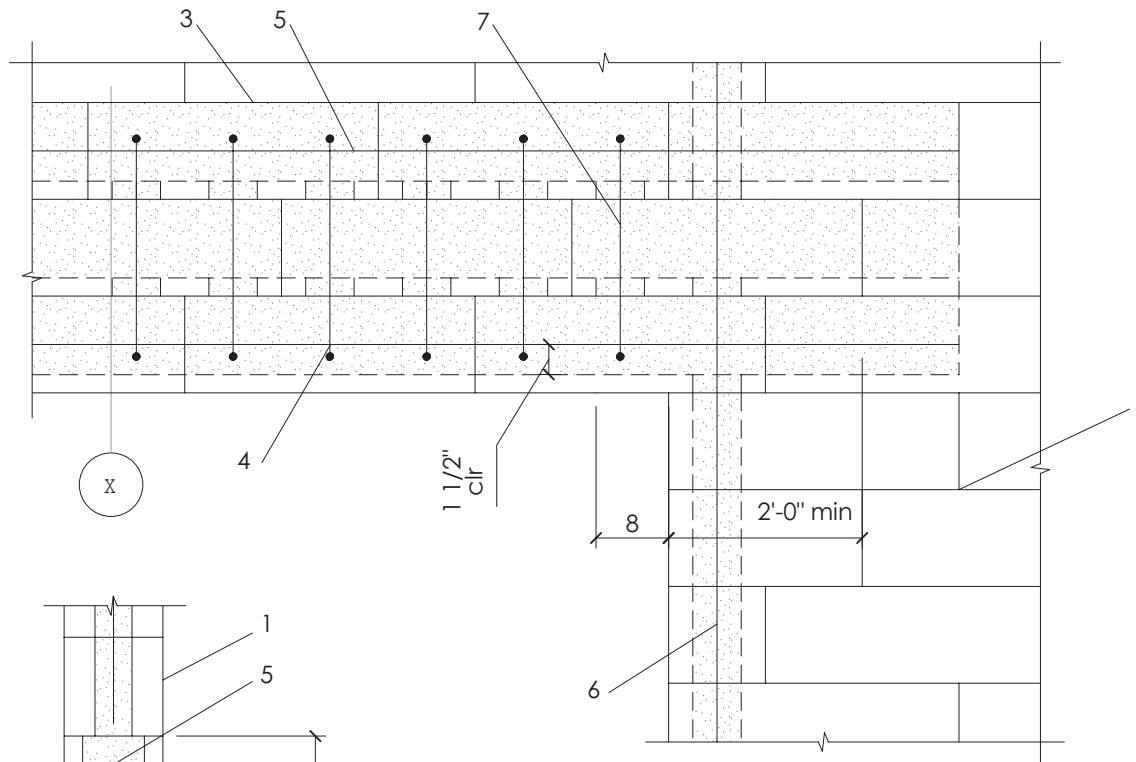
DETAIL KEY NOTES

- 1 AAC Block wall
- 2 2 #4 Horizontal reinforcing in AAC "U" block - typ at roof line u.n.o. on plans
- 3 Additional vertical wall reinforcing where shown on plans
- 4 AAC block lintel - see plans and AAC block lintel schedule
- 5 1 #4 Centered in 4" \varnothing cell vertical wall reinforcing within 24" of each end of wall opening - typ u.n.o. on plans
- 6 1 #4 Horizontal reinforcing in solid grouted AAC "U" block - extend 24" past each end of opening
- 7 1 #4 Horizontal reinforcing in solid grouted AAC "U" block at top of parapet

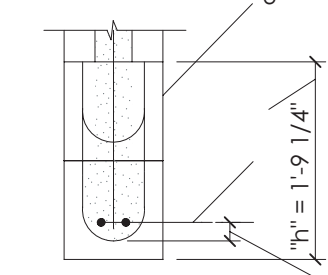
NOTE:

1. t = WALL THICKNESS.
2. ALL CELLS WITH VERTICAL REINFORCING TO BE SOLID GROUTED.
3. AAC BLOCK TO LAP A DISTANCE OF t .

ELEVATION - AAC BLOCK WALL REINFORCING AT OPENINGS



X SECTION - TYPE B



X SECTION - TYPE A

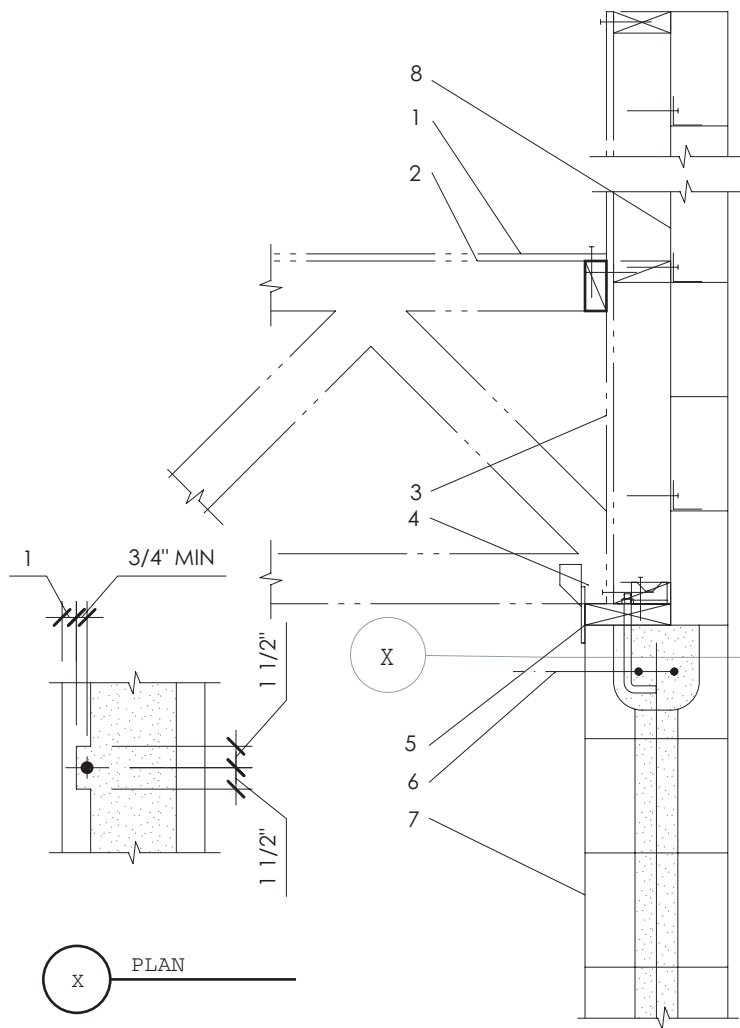
ELEVATION - AAC LINTEL DETAIL

DETAIL KEY NOTES

- 1 AAC block wall with vertical reinforcing in solid grouted cells where shown on plans
- 2 "h" - AAC Lintel depth - see AAC lintel schedule
- 3 AAC "U" block with 4" Ø holes at 12" o.c. for continuous grout flow - typ
- 4 Bottom lintel reinforcing - extend 24" past each end of opening
- 5 Top lintel reinforcing - extend 24" past each end of opening
- 6 Vertical jamb reinforcing in 4" Ø solid grouted cells - see plans
- 7 Stirrups as required - see AAC lintel schedule

Notes:

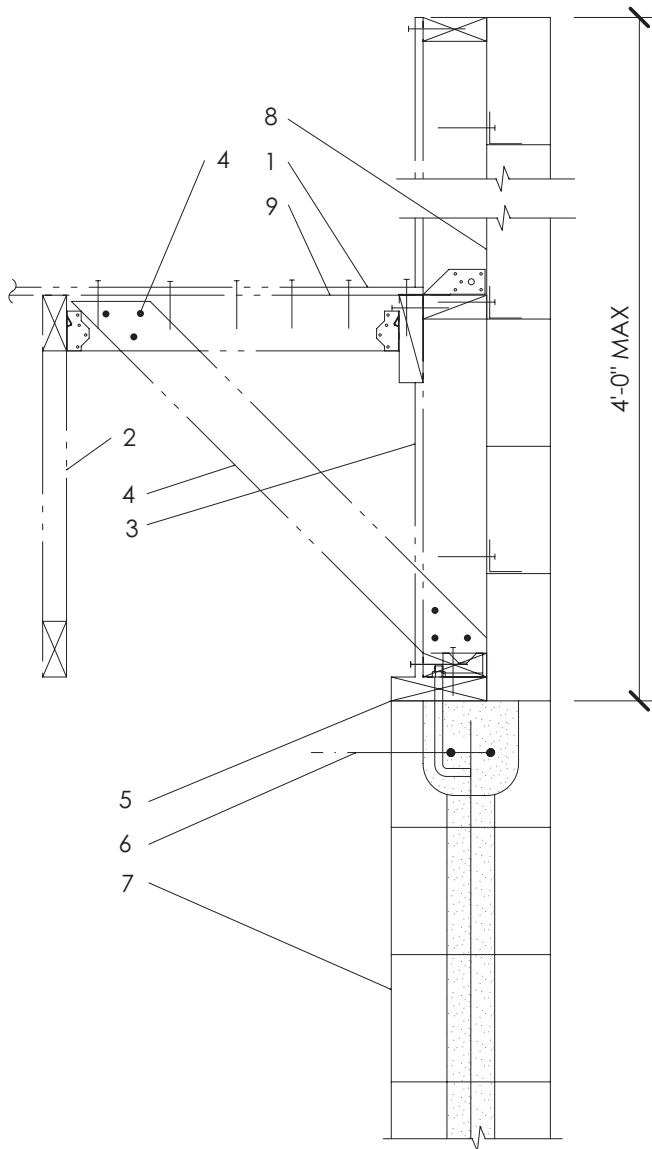
1. All grouted cells and bond beams to be mechanically vibrated- see general notes.
2. Contractor to provide clean-out at bottom of lintels greater than 16" deep - provide 2" Ø holes at 4'-0" o.c. to ensure continuous grout in lintel.



DETAIL KEY NOTES

- 1 Roof sheathing
- 2 Prefabricated wood roof truss with integrated wood parapet to support 4" AAC veneer
- 3 Wood shear panel blocking
- 4 Simpson framing anchor at each truss
- 5 Wood plate with anchor bolt
- 6 2 #4 Continuous reinforcing in solid grouted AAC "U" block
- 7 AAC block wall with vertical wall reinforcing in solid grouted cells where shown on plans u.n.o.
- 8 4" AAC parapet wall with 16 gauge corrugated veneer ties at 24" o.c. each way screwed to parapet wood truss

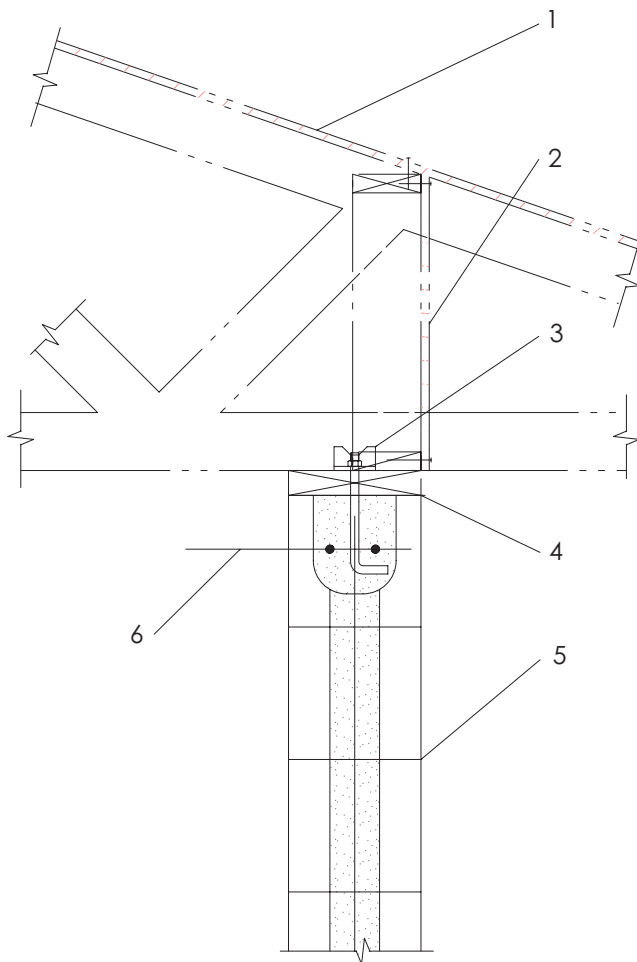
PREFABRICATED WOOD TRUSS BEARING @ AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Roof
- 2 Prefabricated wood roof truss
- 3 Wood stud wall with 3/8" plywood sheathing
- 4 Wall brace
- 5 Wood plate with anchor bolts - by others
- 6 2 #4 Continuous reinforcing in solid grouted AAC "U" block
- 7 AAC block wall with vertical wall reinforcing in solid grouted cells where shown on plans u.n.o.
- 8 4" AAC parapet wall with 16 gauge corrugated brick veneer ties at 24" o.c. each way screwed to wood stud wall with 2 #10 x 2" long wood screws
- 9 2 x blocking

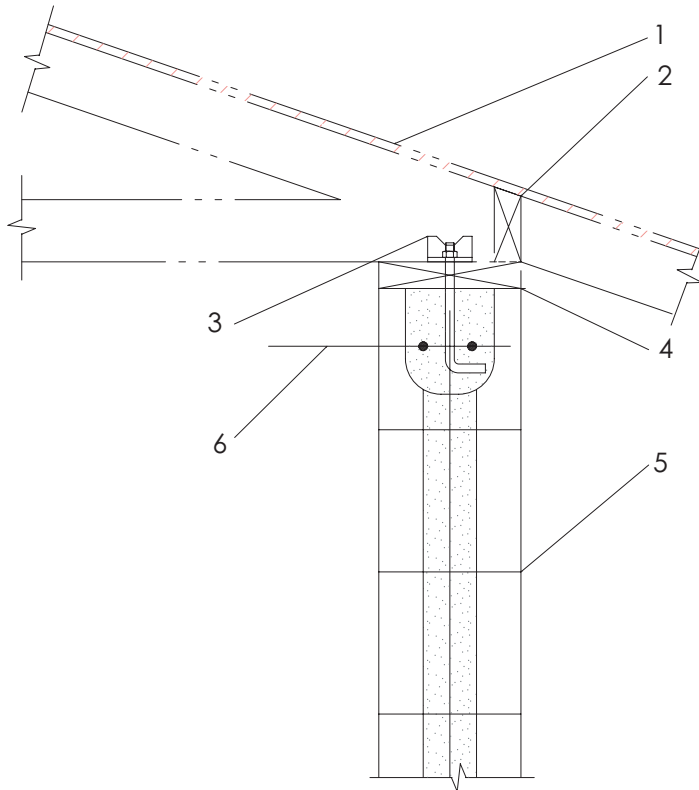
WALL BRACE AT AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Roof sheathing and prefabricated wood trusses - by others
- 2 Shear panel blocking - by others
- 3 Framing anchors at each truss
- 4 Wood plate with anchor bolts - by others
- 5 AAC Block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 6 2 #4 Continuous horizontal reinforcing in solid grouted AAC "U" block

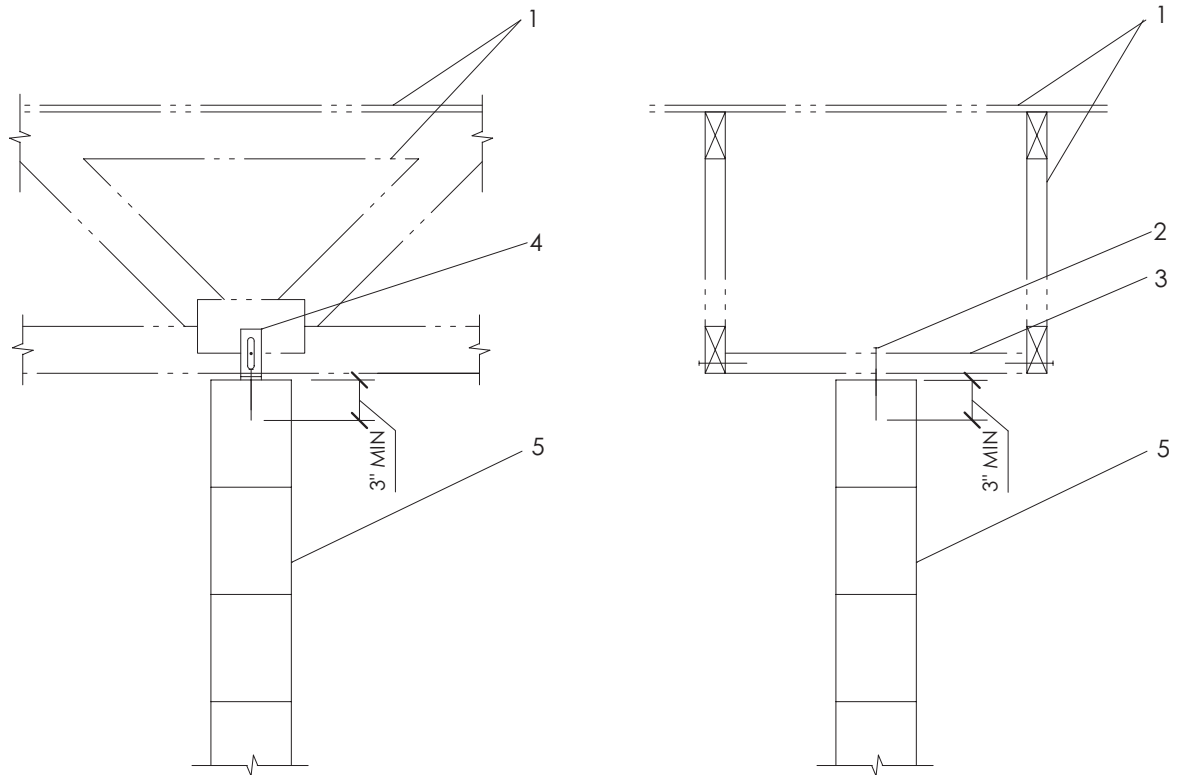
PREFABRICATED WOOD TRUSS BEARING @ AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Roof sheathing and prefabricated wood trusses - by others
- 2 2 X Blocking - by others
- 3 Framing anchors at each truss - by others
- 4 3 x Plate with 5/8" \varnothing anchor bolts at 32" o.c.
- 5 AAC Block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 6 2 #5 Continuous horizontal reinforcing in solid grouted AAC "U" block

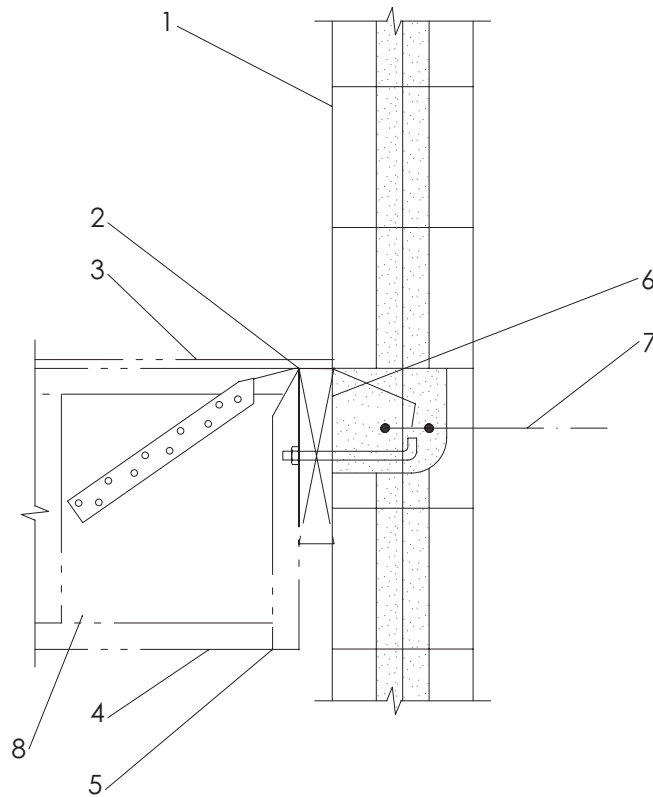
PREFABRICATED WOOD TRUSS BEARING @ AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Sheathing and roof framing - by others
- 2 3/16" Coarse threaded screws at each block/clip
- 3 2 X 4 Flat blocking at 24" o.c. with 2 - 16d nailed at each end
- 4 Simpson DTC clip at each truss
- 5 AAC Block wall

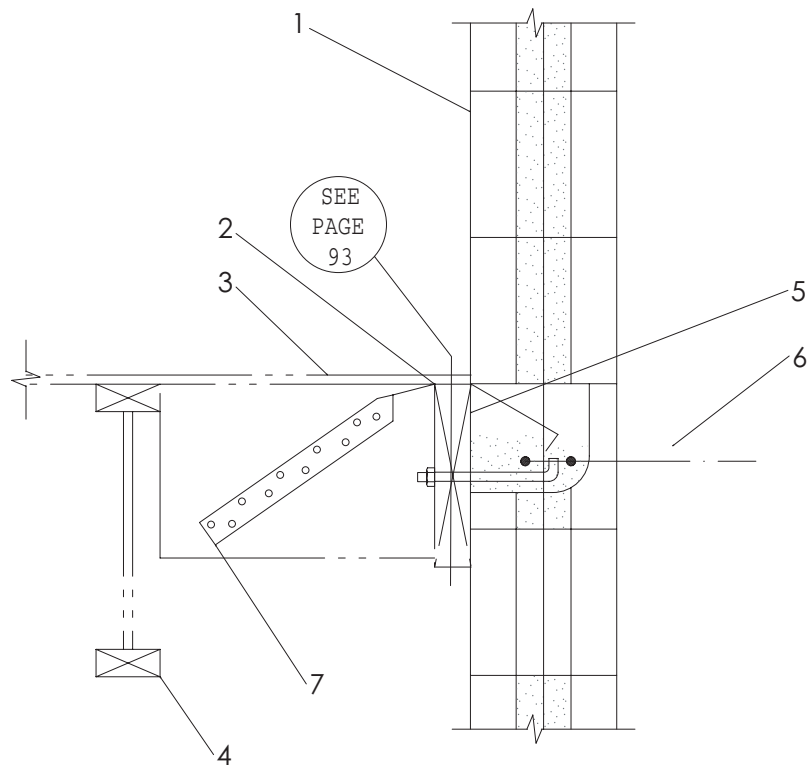
TYPICAL TOP OF AAC WALL CONNECTION
AT PREFABRICATED WOOD TRUSS



DETAIL KEY NOTES

- 1 AAC block wall with vertical reinforcing in solid grouted cells where shown on plan
- 2 Wood ledger with anchor bolts - by others
- 3 Plywood
- 4 Prefabricated wood "I" joists or wood joist - by others
- 5 Wood joist
- 6 Notch AAC "U" block 4" at each ledger bolt - see typical ledger bolt detail
- 7 2 #4 Continuous horizontal reinforcing in solid grouted AAC "U" block
- 8 Simpson wall strap - by others

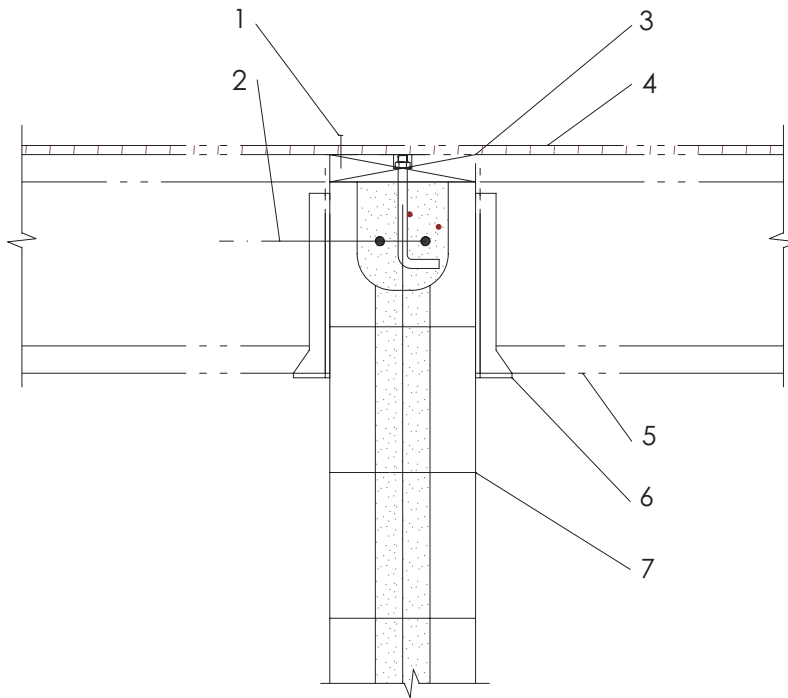
WOOD "I" JOIST AT AAC BLOCK WALL



DETAIL KEY NOTES

- 1 AAC block wall with vertical reinforcing in solid grouted cells where shown on plan
- 2 Wood ledger with anchor bolts - by others
- 3 Plywood
- 4 Prefabricated wood "I" joists or wood joist
- 5 Notch AAC "U" block 4" at each - see typical ledger bolt detail
- 6 2 #4 Continuous horizontal reinforcing in solid grouted AAC "U" block
- 7 Simpson wall strap - by others

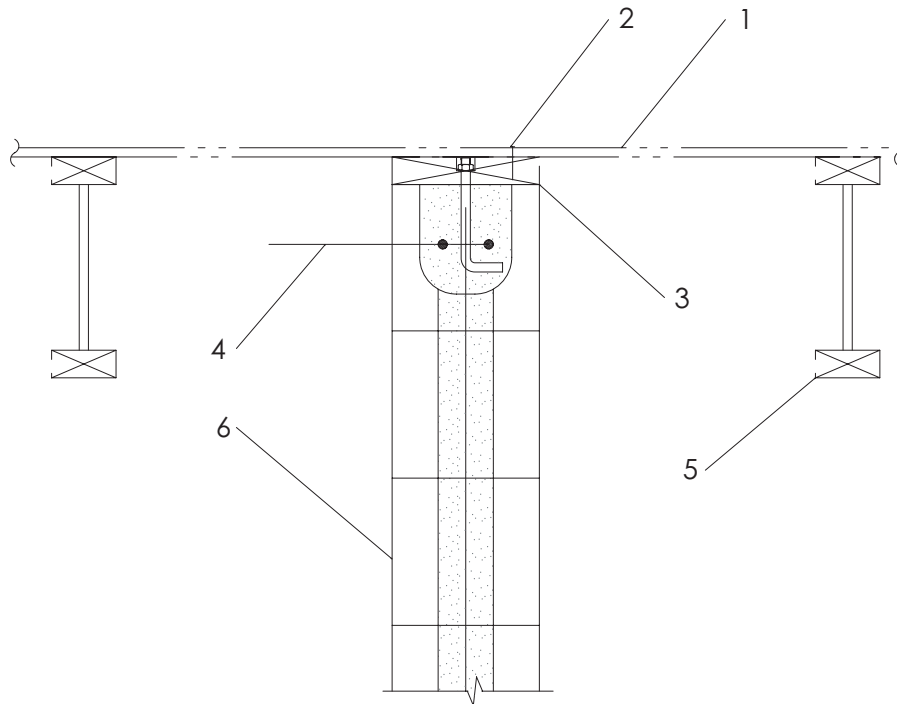
WOOD "I" JOIST AT AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Edge nailing - by others
- 2 2 #4 Continuous horizontal reinforcing in solid grouted AAC "U" block
- 3 Wood plate with anchor bolts - by others
- 4 Plywood sheathing - by others
- 5 Wood "I" joist - by others
- 6 Joist hanger - by others
- 7 AAC Block wall with vertical reinforcing in solid grouted cells where shown on plans

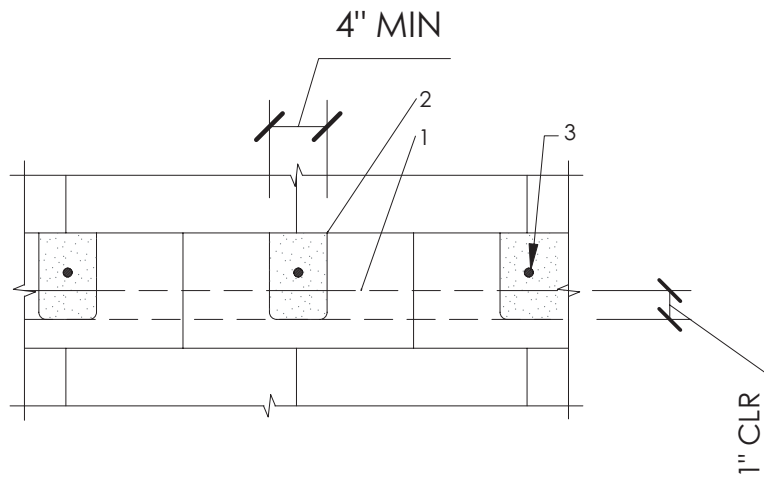
PREFABRICATED WOOD 'I' JOIST AT AAC BLOCK WALL



DETAIL KEY NOTES

- 1 Roof framing and sheathing - by others
- 2 Edge nailing - by others
- 3 Wood plate - by others
- 4 2 - #4 Continuous horizontal reinforcing in solid grouted AAC "U" block
- 5 Wood "I" joist - by others
- 6 AAC Block wall with vertical wall reinforcing in 4" \varnothing solid grouted cells where shown on plans

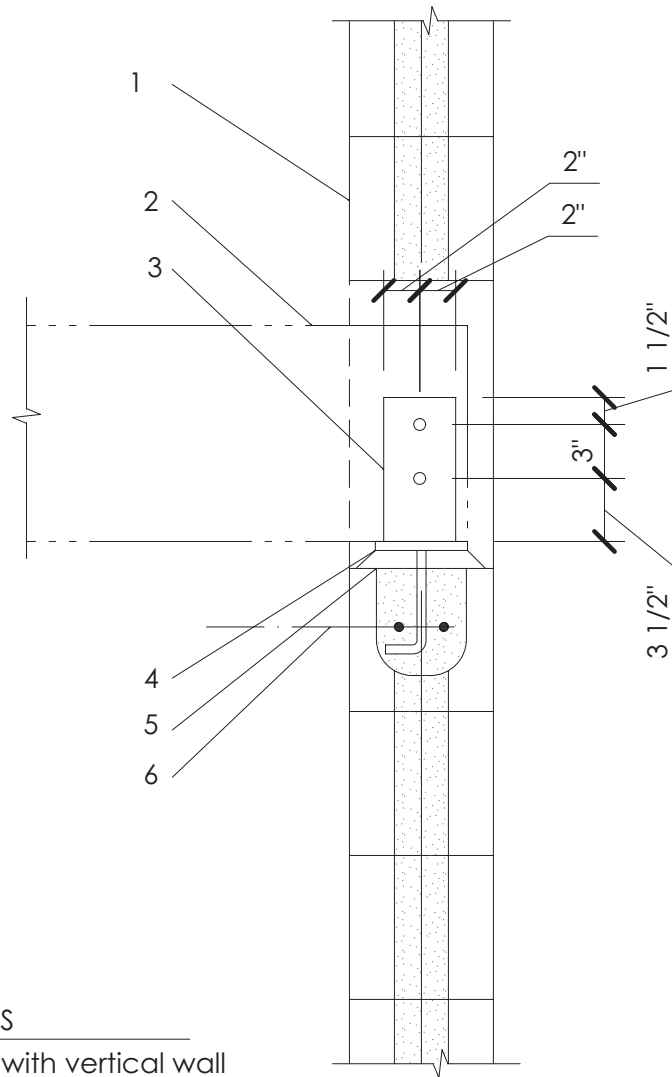
INTERIOR AAC BLOCK WALL @ WOOD "I" JOIST



DETAIL KEY NOTES

- 1 2 #4 Continuous horizontal reinforcing in solid grouted AAC "U" block
- 2 Notch AAC "U" block 4" around anchor bolt and grout solid around bolt
- 3 Anchor bolts - see plans

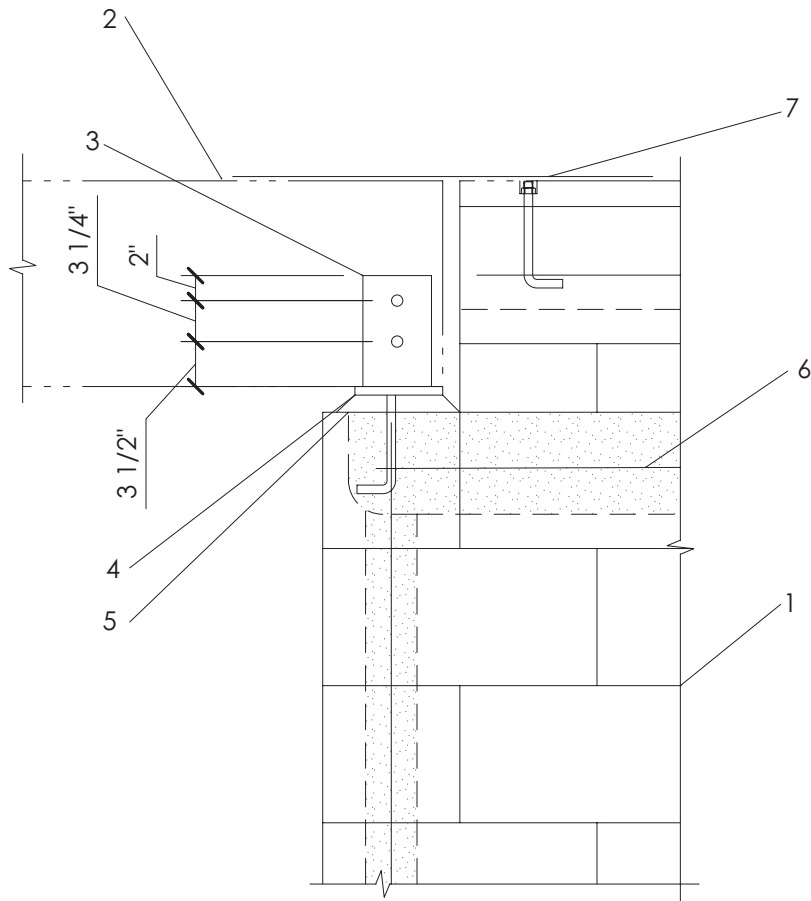
TYPICAL LEDGER BOLT DETAIL AT AAC WALL



DETAIL KEY NOTES

- 1 AAC block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Wood beam
- 3 3/16" Steel plate each side of beam with 2 - 3/4" \varnothing thru-bolts
- 4 Bearing plate with 2 - 3/4" \varnothing a.b. - by others
- 5 1" drypack
- 6 2 #4 x 48" long centered under beam in solid grouted

WOOD BEAM @ AAC BLOCK WALL



DETAIL KEY NOTES

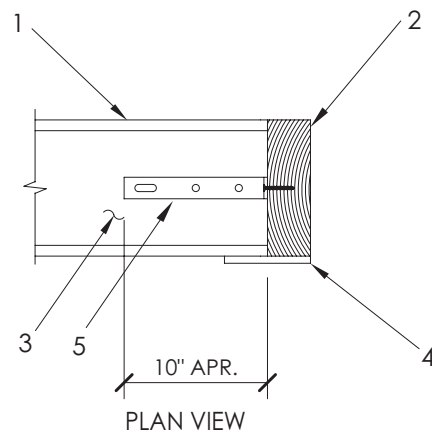
- 1 AAC block wall with vertical wall reinforcing in solid grouted cells where shown on plans
- 2 Wood beam
- 3 3/16" Steel plate each side of beam with 2 - 3/4" Ø thru-bolts
- 4 Bearing plate with 2 - 3/4" Ø a.b.
- 5 1" drypack
- 6 2 #4 x 4'-0" long centered under beam in solid grouted AAC "U" block
- 7 Simpson strap

WOOD BEAM @ AAC BLOCK WALL

9

Architectural Details at Openings

- Wide Door Opening Frame Anchorage
- Steel Door Anchorage to AAC-Block
- Wood Door Anchorage to AAC-Block

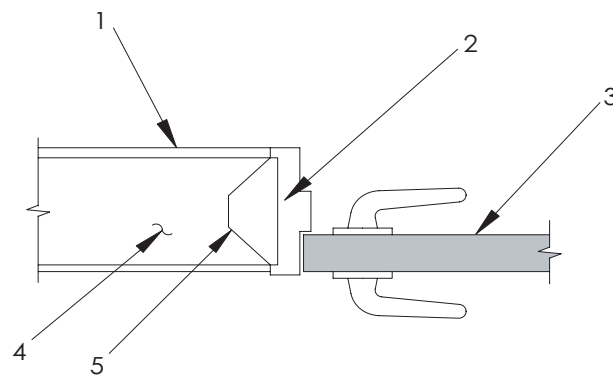


If a door frame opening spans more than 36" either a steel or aac lintel should be installed.

DETAIL KEY NOTES

- 1 Plaster
- 2 Wood jamb
- 3 AAC Block wall
- 4 Trim moulding
- 5 18 Gage galvanized strap at 24" o.c.

WIDE DOOR FRAME
OPENING ANCHORAGE TO AAC BLOCK



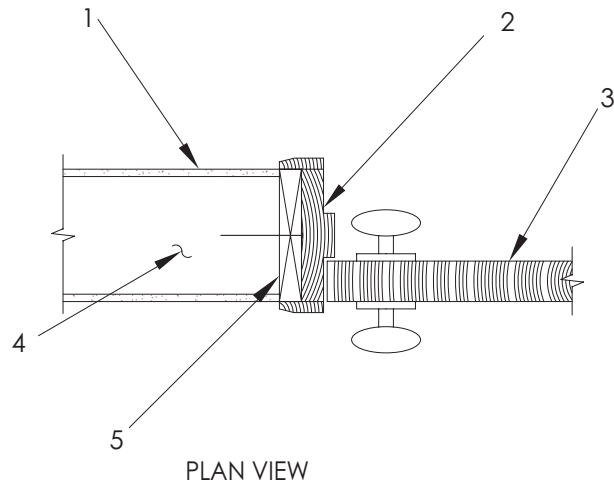
PLAN VIEW

DETAIL KEY NOTES

- 1 Plaster
- 2 Mortar fill
- 3 Steel door
- 4 AAC Block wall
- 5 Frame ties

Use frame wire ties laid in mortar bed to anchor steel door frame to aac block wall as shown in the illustration. Any gaps between frame and aac block should be filled with mortar to eliminate cavities.

STEEL DOOR FRAME ANCHORAGE TO AAC BLOCK



DETAIL KEY NOTES

- 1 Wall finishes
- 2 Wood door jamb
- 3 Wood door
- 4 AAC Block wall
- 5 Wood blocking screwed into AAC block wall

WOOD DOOR FRAME ANCHORAGE TO AAC BLOCK



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[Thermal Properties](#)

[Fire Resistance](#)

[Acoustic Insulation](#)

[Moisture Absorption](#)

[Environmental](#)

[Structural Design](#)

[Standard Construction
Details](#)

[Installation Procedures](#)

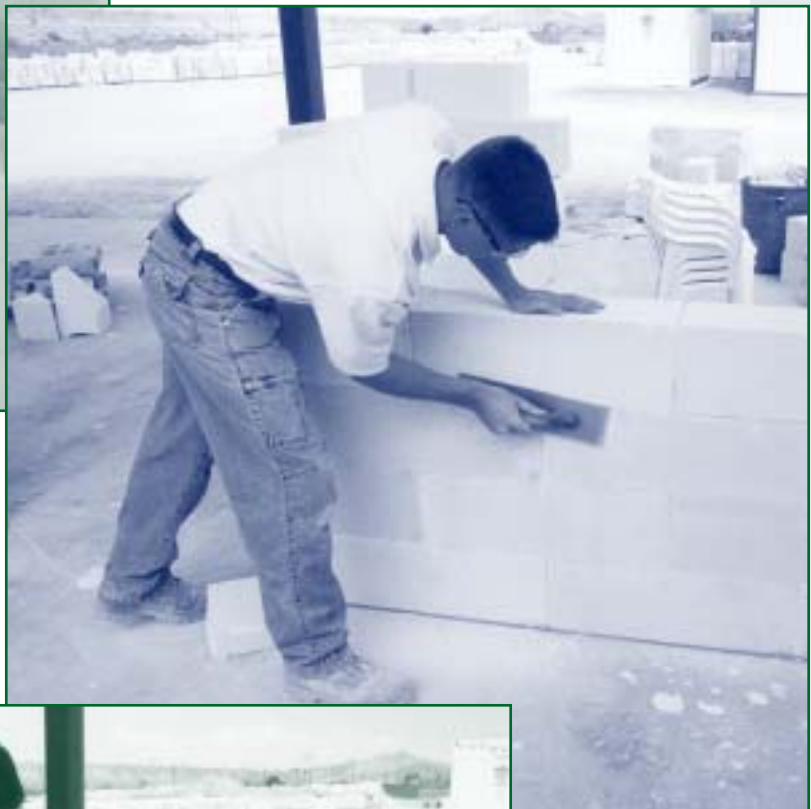
[Tools/Fasteners](#)

[Wall Finishes](#)

[News](#)

Energy Efficient • Acoustical Insulation • Fire Resistant • Pest Resistant • Environmentally Friendly





SUGGESTED AAC MASONRY STRUCTURAL NOTES

GENERAL

All construction shall conform to the 2000 International Building Code (IBC) and/or 1997 Uniform Building Code (UBC).

AAC block walls designed per ICC ESR 1371.

The contractor shall be responsible for and provide all measures necessary to protect the structure during construction. These measures shall include, but not be limited to bracing and/or shoring for loads due to wind. The contractor shall be responsible for the design implementation of all scaffolding, bracing and shoring.

Contractor shall verify all dimensions and coordinate the site conditions with the drawings prior to construction. Any discrepancies and omissions shall be resolved with the architect. Do not use scaled dimensions.

Where any discrepancies occur between plans, details, general notes and specifications, the greater requirement shall govern, where no specific detail is shown. All details shown shall be incorporated into the project at all appropriate locations, whether specifically indicated or not.

In general, like all other construction products, autoclaved aerated concrete (AAC) is susceptible to minor damage if mishandled. Less handling means lower potential for damage. In some instances, damage may occur from shipping. Damaged blocks should be trimmed and installed to reduce job waste.

FOR ALL AAC

CONSTRUCTION PRODUCTS:

Deliver only an amount of material that can readily be installed.

Unload pallets using pallet forks (either forklift or pallet fork on a crane cable). Consult your OSHA safety manual for "rigging" for other safety considerations. It is not advisable to use crane straps and slings. Storage areas should be accessible to delivery trucks and convenient to materials staging areas. If possible, drop-deliver the material right to the material staging areas.

Storage materials should always be stored away from other construction activities on a flat-graded area that is not susceptible to standing water, erosion or settling.

Keep material covered and banded until ready for installation.

LEVELING MORTAR BED (FIRST COURSE ONLY)

Mortar shall conform to ASTM C270, type S or M with 28-day compressive strength of 1800 PSI, tested per UBC standard 21-16 Masonry cement.

THIN BED MORTAR

Thin-bed mortar as provided by E-CRETE AAC manufacturer per ICC ESR 1371.

GROUT

Grout shall conform to ASTM C476, fine grout, 28-day compressive strength of 2000 PSI, tested per UBC standards. Grout shall be free of fly ash and /or chloride.

See details and notes on drawings for size and spacing of reinforcing bars. Lap splices of reinforcing in AAC walls, unless noted otherwise, shall be 40 bar diameters for grade 40 and 48 bar diameter for grade 60 bars.

Provide vertical dowels from footings continuous through stem walls into AAC walls above. All shall match size and spacing of vertical reinforcing above. Extend all horizontal bond beam reinforcing in AAC walls continuous around corners and intersections or provide bent corner bars to match and lap horizontal bond beam reinforcing at corners and intersections or provide bent corners and intersections. All reinforcing in AAC walls shall be accurately located prior to grouting and the position maintained during grouting.

All cells and courses with reinforcing shall be filled solid with grout. Maximum grout lift 8'-0" with each grout pour stopping 1-1/2 inches below the top course of lift. Provide cleanouts if grout lift exceeds 4'-0". Place grout continuously. Do not interrupt grouting for more than one hour. Mechanically vibrate grout in vertical spaces immediately after pouring and again about 5 minutes later.

Unless noted otherwise on the drawings, provide vertical AAC wall control joints such that no straight run of wall exceeds 24'0". Coordinate locations with architect.

REINFORCING

Reinforcing steel shall conform to ASTM A615, grade 40 (Fy=40 KSI) Deformed bars for all bars #5 and smaller.

Welding of reinforcing shall be in accordance to AWS D1.4. No tack welding of reinforcing bars allowed.

Extend all horizontal reinforcing continuous around corners and intersections or provide bent bars to match and lap with horizontal bars at corners and intersections of walls.

Provide vertical wall reinforcing at all corners, wall ends, and within 24" of all wall openings. See plans for size and additional requirements.

Provide two horizontal reinforcing bars in solid grouted AAC "U" blocks at roof and floor supports and one horizontal reinforcing at top of parapet. See plans for size and additional requirements.

SPECIAL INSPECTIONS: (REQUIRED FOR ALL AAC MASONRY BLOCK WALLS)

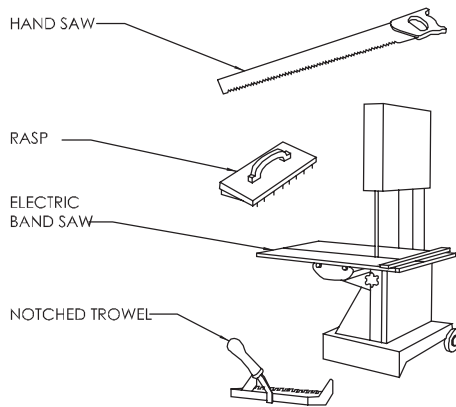
1. Special inspections shall be preformed by a qualified inspector approved by the architect and the building official.
2. Special inspections for structural Autoclaved Aerated Concrete (AAC) walls shall be preformed by a qualified inspector under the direct supervision of a state registered structural engineer who is familiar with the structural design of this project. The special inspection certificate shall be sealed by the supervising structural engineer. The contractor shall be responsible to providing a minimum of 24 hours notice to the special inspector to begin any work for which special inspection is required.
3. In accordance with UBC 1701.6.2 some inspections may be made on a periodic basis and satisfy the requirements of continuous inspection.
4. Special inspection is required during the following operations per UBC.
 - a. Structural AAC walls: During placement of reinforcing, inspection of grout space immediately prior to closing of cleanouts and during placement of all grout. Special inspection for placing of units may be performed on a periodic basis.
5. Duties and responsibilities of the special inspector:
 - a. The special inspector shall observe the work assigned for conformance with the approved design drawings and specifications.
 - b. The special inspector shall furnish inspection reports to the building official and the engineer or architect of record. All discrepancies shall be brought to the immediate attention of the contractor for correction, then, if uncorrected, to the engineer or architect of record and the building official.

Upon completion of the assigned work, the special inspector shall complete and sign a final report certifying that to the best of the inspector's knowledge, the work is in conformance with the approved plans and specifications, and the applicable workmanship provisions of the code.

E-Crete Autoclaved Aerated Concrete (AAC) Block Wall Installation Guide

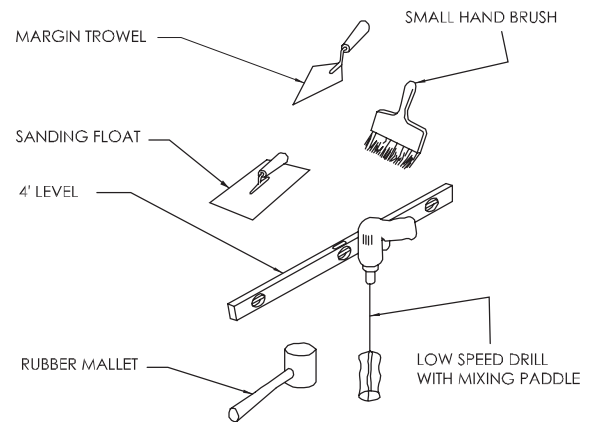
TOOLS REQUIRED FOR INSTALLATION OF AAC BLOCK

- THERE ARE A FULL RANGE OF TOOLS THAT ARE SPECIALLY DESIGNED TO ASSIST THE BLOCK LAYER IN INSTALLING AAC BLOCK PRODUCTS AND INCREASE PRODUCTIVITY AT THE JOB SITE.



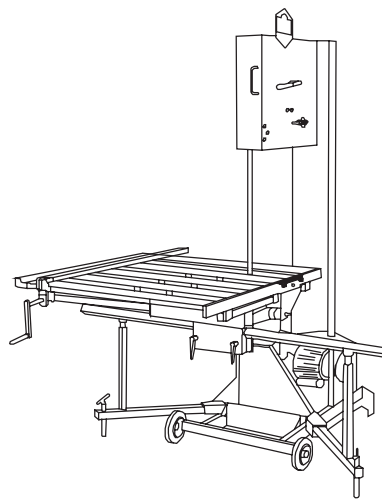
- ADDITIONAL TOOLS REQUIRED FOR INSTALLING AAC JUMBO BLOCKS

- AAC BLOCK INSTALLATION WILL ALSO REQUIRE THE FOLLOWING STANDARD MASONRY TOOLS.



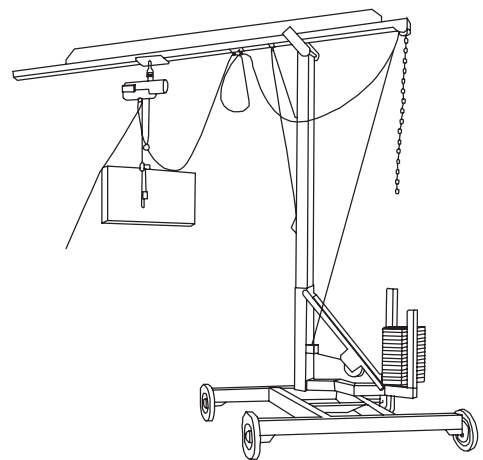
1

2



ELECTRIC JUMBO BAND SAW

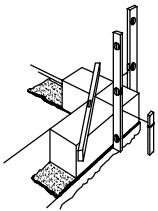
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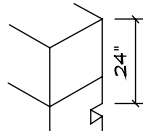
ELECTRIC MINICRANE

4

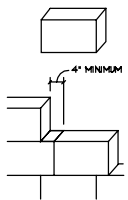
POINTS TO CHECK WHEN INSTALLING AAC BLOCK PRODUCTS



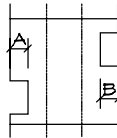
POINT 1
LEVELING COURSE MUST BE LEVEL AND PLUMB. DO NOT PROCEED TO SUBSEQUENT COURSES UNTIL LEVELING HAS SET SUFFICIENTLY.



POINT 4
DO NOT ROUT HORIZONTALLY GREATER THAN 24" FROM TOP AND BOTTOM OF LOAD BEARING WALLS.



POINT 2
BLOCKS MUST BE INSTALLED IN A RUNNING BOND WITH A MINIMUM 4" BEARING (OVERLAP) OR 40% OF THE BLOCKS HEIGHT (WHICHEVER IS GREATER). LINTELS MUST BE INSTALLED WITH A MINIMUM 8" BEARING (OVERLAP).



POINT 5
DO NOT ROUT HORIZONTALLY GREATER THAN 1/3 OF THE TOTAL WALL THICKNESS $A + B < 1/3$ OF TOTAL THICKNESS.



POINT 3
ALL HEAD AND BED JOINTS MUST BE SOLID WITH APPROVED E-CRETE THIN BED MORTAR FOR FULL ADHESION.



POINT 6
DO NOT ROUT BACK-TO-BACK WALL CHANNELS. OFFSET CHANNELS AT LEAST 12".

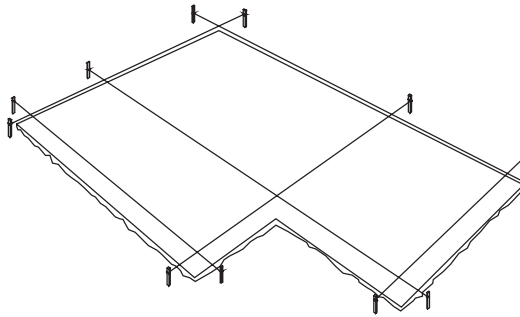


FAILURE TO ADHERE TO THESE PROPER INSTALLATION PROCEDURES WILL RENDER WARRANTY NULL AND VOID

10

LEVELING COURSE

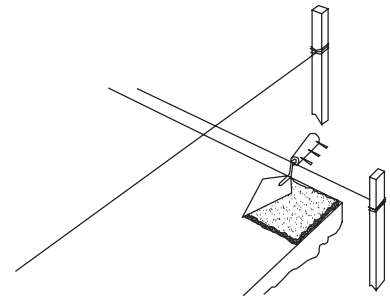
- LAY OUT WALL LINES ON BUILDING SLAB BY CONTROL LINES.



STEP 1 - LAYOUT WALL LINES

7

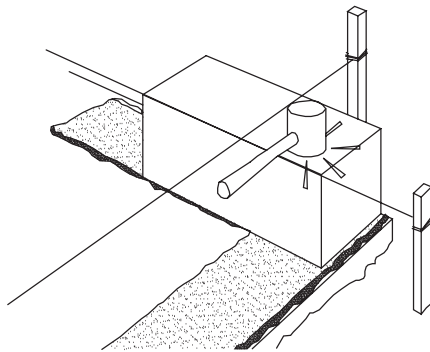
- AT THE HIGHEST CORNER OF THE SLAB PLACE A FULL WIDTH 1/2" DEEP SAND-CEMENT MORTAR JOINT USING A MASONRY TROWEL (MORTAR TO BE EITHER READY-MIX OR 3:1 SAND: PORTLAND CEMENT RATIO).
- SALVAGE ADDITIONAL MORTAR. DO NOT USE THIN-BED MORTAR FOR THE LEVELING BED JOINT.
- IF MOISTURE AND WICKING IS A PROBLEM, ADD WATERPROOFING ADMIXTURE TO SAND-CEMENT MORTAR.



STEP 2 - START THE LEVELING BED

8

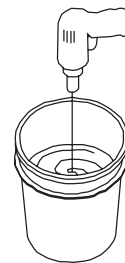
- SET THE FIRST CORNER BLOCK IN THE SAND-CEMENT MORTAR AND ADJUST THE JOINT AS NEEDED.
- TO ACHIEVE THE REQUIRED HEIGHT, LOWER OR RAISE THE BLOCK BY TAPPING DOWN WITH A RUBBER Mallet OR BY ADDING MORTAR BENEATH.



STEP 3 - SET THE FIRST CORNER BLOCK

9

- MIX APPROVED E-CRETE THIN-BED MORTAR IN A CLEAN MIXING CONTAINER (5 GALLON BUCKET OR PAIL) PER MANUFACTURER'S DIRECTIONS.
- THE CONSISTENCY OF THE MIXED THIN-BED MORTAR SHOULD BE SUCH THAT IT FLOWS EASILY THROUGH THE TEETH OF THE NOTCHED TROWEL LEAVING THE SHAPE OF THE TEETH IN THE MORTAR BEAD.
- THIN-BED MORTAR DROPPINGS SHOULD NOT BE USED.

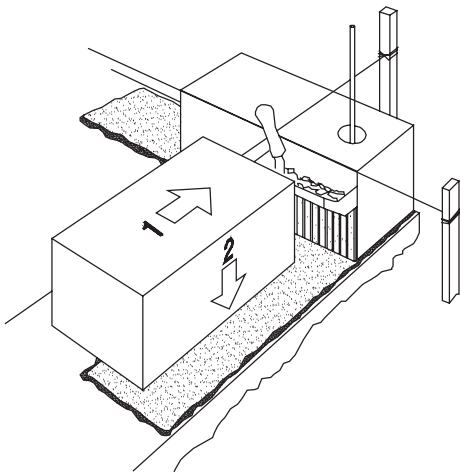


STEP 4 - MIX THIN-BED MORTAR

10

LEVELING COURSE

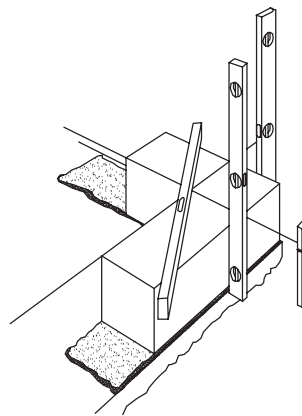
- SET THE SECOND CORNER BLOCK ADDING THIN-BED MORTAR TO THE HEAD JOINT WITH THE NOTCHED TROWEL.



STEP 5 -
SET SECOND CORNER BLOCK

11

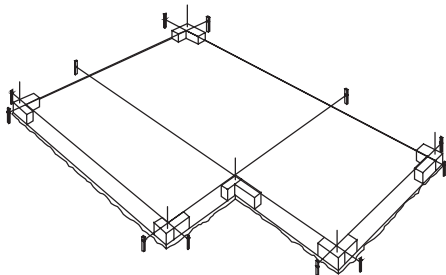
- REPEAT SUBSEQUENT STEPS FOR EACH CORNER USING BUILDERS LEVEL TO MAINTAIN AN EQUAL ELEVATION.
- TRIPLE CHECK EACH LEAD CORNER IN ALL PLANES.



STEP 6 - REPEAT FOR
ADDITIONAL CORNERS

12

- AFTER BUILDING THE LEAD CORNERS, PULL A STRING BETWEEN TWO CORNERS & COMPLETE THE LEVELING COURSE. SAND-CEMENT MORTAR SHOULD BE USED FOR THE BED JOINT AND THIN-BED MORTAR FOR EACH HEAD JOINT.
- LEVEL ACROSS EACH BLOCK TO INSURE A PLUMB WALL.



DO NOT PROCEED TO SUBSEQUENT COURSE UNTIL LEVELING COURSE HAS SET SUFFICIENTLY

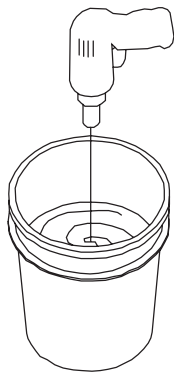
STEP 7 - FILL-IN COMPLETION OF
LEVELING COURSE

13

10

POINTS TO CHECK

- MIX THIN-BED MORTAR.
- BEFORE MIXING NEW BATCH, WASH OUT THE BUCKET OR PAIL TO PREVENT ANY OLD THIN-BED FROM ACCELERATING THE DRYING TIME OF THE NEW MIX.



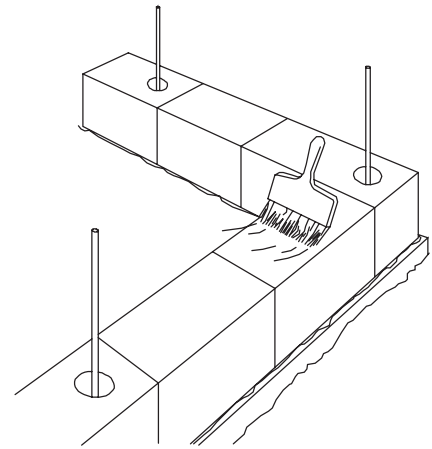
DO NOT USE SAND-CEMENT MORTAR FOR COURSES OTHER THAN THE LEVELING COURSE.



STEP 1 - MIX THIN-BED MORTAR

14

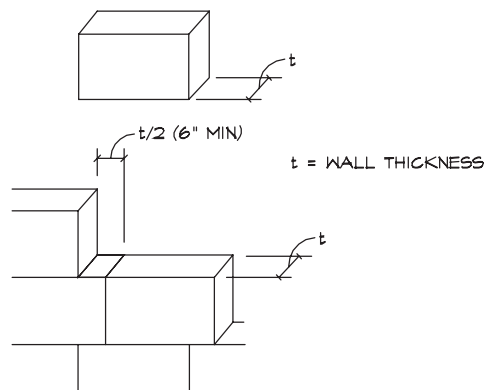
- WITH A BRUSH, SWEEP OFF ALL DUST AND LOOSE PARTICLES TO ENSURE ADHESION OF THIN-BED MORTAR.



STEP 2 - CLEAN BED JOINT SURFACE

15

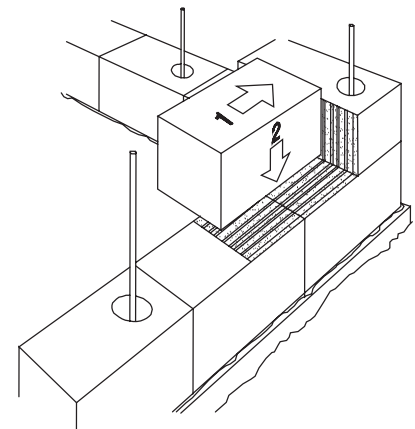
- USING A CLEAN, NOTCHED TROWEL THE SAME WIDTH AS THE BLOCK, SPREAD THIN-BED MORTAR UP THE HEAD JOINT OF THE ADJOINING BLOCK AND THEN ALONG THE BED JOINT.
- SPREAD ONLY ENOUGH THIN-BED MORTAR TO LAY ONE BLOCK AT A TIME. THE THIN-BED MORTAR MUST COVER THE FULL WIDTH OF THE JOINTS.
- INSTALL BLOCK IN A RUNNING BOND WITH A MINIMUM 6" BEARING (OVERLAP) OR 40% OF THE BLOCKS HEIGHT (WHICHEVER IS GREATER).



STEP 3 - APPLY THIN-BED MORTAR TO HEAD AND BED JOINTS

16

- PICK UP EACH BLOCK AND MOVE IT AS CLOSE TO THE HEAD JOINT AS POSSIBLE BEFORE LOWERING THE BLOCK ONTO THE BED JOINT.
- EXCESSIVE MOVEMENT ALONG THE BED JOINT WILL FORCE THE THIN-BED MORTAR INTO THE CORNER PREVENTING FULL ADHESION WITH THE HEAD JOINT.

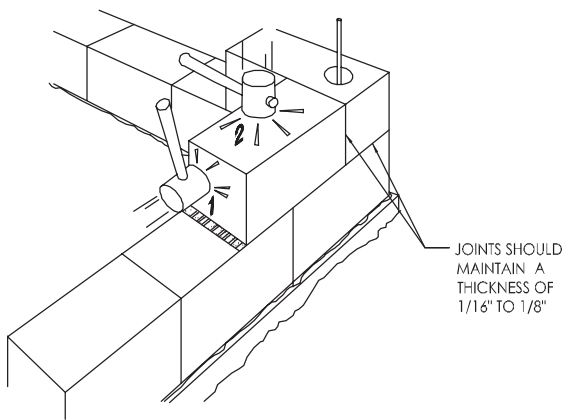


STEP 4 - SET BLOCK

17

TYPICAL COURSING

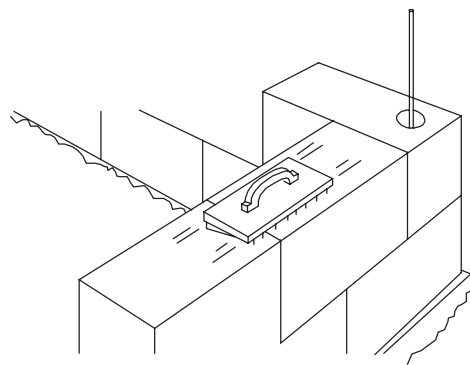
- TAP THE END OF THE BLOCK TO ENSURE A FULL SURFACE COVERAGE OF THIN-BED MORTAR AT THE HEAD JOINT AND ALIGN WITH STRING LINE.
- CLEAN OFF SPILLED OR DRIPPED THIN-BED MORTAR FROM FACE OF WALL AS WORK PROCEEDS.
- REPEAT INSTALLATION FOR SUBSEQUENT COURSES.



STEP 5 -
TAP THE END OF THE BLOCK

18

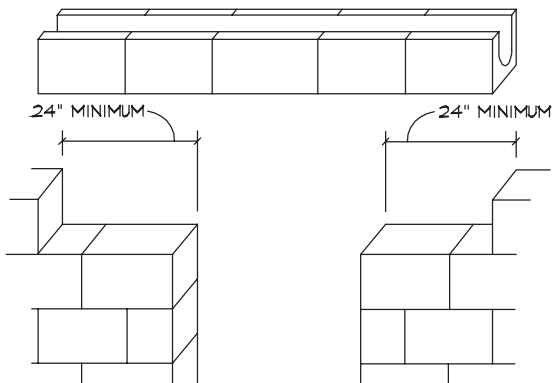
- AS NEEDED, RASP (SAND) THE TOPSIDE OF THE WALL TO ENSURE A LEVEL BED-JOINT FOR THE NEXT COURSE.
- THIS IS REQUIRED LESS OFTEN IF BLOCK IS INSTALLED WITHIN TOLERANCES.



STEP 6 -
RASP AS NEEDED

19

- INSTALL LINTELS WITH A MINIMUM 24" BEARING - SEE DRAWINGS FOR LINTEL DEPTH AND REINFORCING.

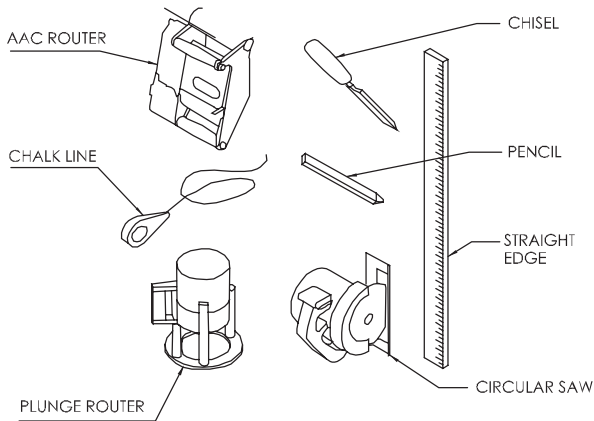


STEP 7 -
INSTALL LINTELS AS REQUIRED

20

ROUTING CHANNELS

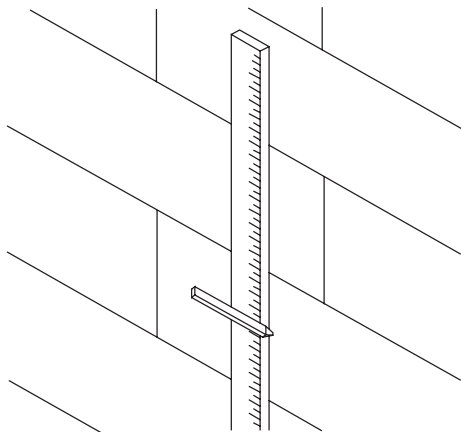
- CUT CHANNELS AS SMALL AS POSSIBLE. DO NOT USE IMPACT TOOLS SUCH AS HAMMERS OR ANY OTHER CUTTING TOOL THAT WILL DAMAGE THE ADJACENT WALL.
- REDUCE THE NUMBER OF CHANNELS BY TAKING SERVICES BEHIND WALL WHERE POSSIBLE.
- DO NOT ROUT CHANNELS IN FLOOR OR CEILING PANELS. A PERPENDICULAR HOLE MAY BE CORED THROUGH THE WALL IF LESS THAN 1/4 WALL THICKNESS.



ENSURING STRUCTURAL INTEGRITY

21

- USE A STRAIGHTEDGE TO MARK BOTH SIDES OF THE GROOVE WITH A PENCIL.



STEP 1 - MARK CHANNEL

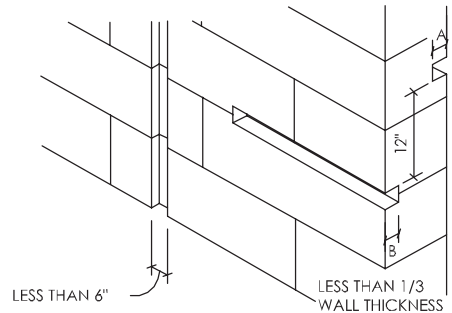
23

1. VERTICAL ROUTING

VERTICAL CHANNELS MAY BE CUT BY ROUTER OR SAW TO A WIDTH NOT TO EXCEED 6". DO NOT CUT CHANNELS DIRECTLY UNDER POINT LOADS.

2. HORIZONTAL ROUTING

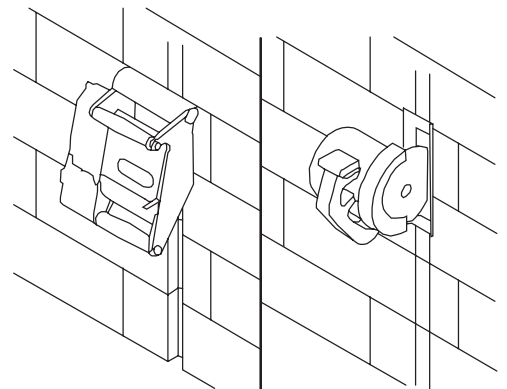
CUT HORIZONTAL CHANNEL(S) NO DEEPER THAT 1/3 OF THE WALL THICKNESS AND NO GREATER THAN THAT 24" FROM THE TOP AND BOTTOM OF A BEARING WALL. DO NOT CUT BACK-TO-BACK CHANNELS. OFFSET CHANNELS AT LEAST 12" WHEN ROUTING ON BOTH SIDES OF WALL. MAKE ACCESS HOLES IN THE WALL ON THE OPPOSITE SIDE OF THE CHANNEL WHERE NECESSARY.



A + B < 1/3 OF WALL THICKNESS

22

- METHOD 1: CUT CHANNEL WITH A CHANNEL ROUTER. (AAC ROUTER)
- METHOD 2: SET A BLADE ON A CIRCULAR SAW OR CONCRETE CUTTER TO THE NECESSARY CHANNEL DEPTH, IF USING A CIRCULAR SAW MAKE CUTS FOR EACH SIDE OF THE CHANNEL AND AN ADDITIONAL CUT IN THE MIDDLE.
- DO NOT CUT THE CHANNEL DEEPER THAN NECESSARY.

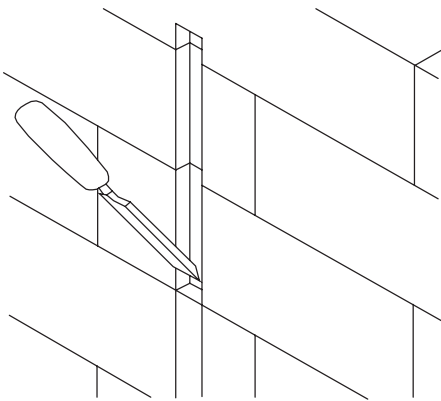


STEP 2 - CUT ALONG MARKINGS

24

ROUTING CHANNELS

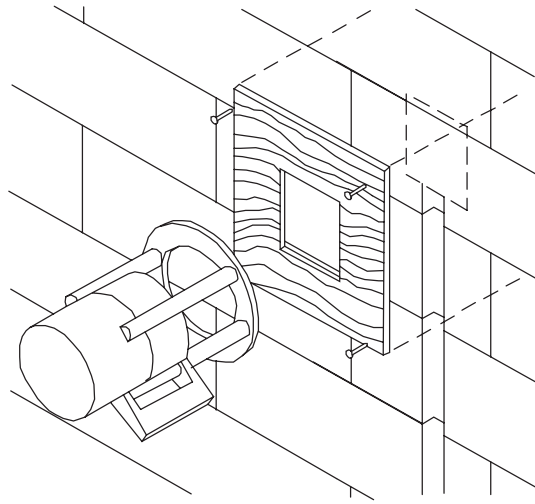
- IF A CIRCULAR SAW OR CONCRETE CUTTER WAS USED TO CUT THE CHANNEL THE UNWANTED MATERIAL CAN BE REMOVED BY SNAPPING IT AWAY WITH A CHISEL.



STEP 3 -
REMOVE WASTE
AND CLEAN CHANNEL

25

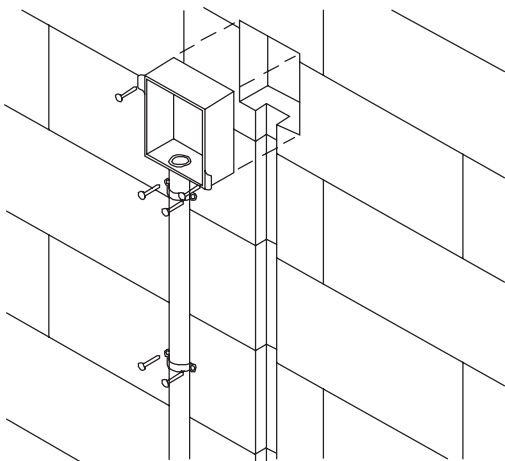
- CUT A TEMPLATE TO THE SIZE OF THE HOLE OR OUTLET AND TEMPORALLY SECURE TO THE WALL. REMOVE AAC MATERIAL WITH A PLUNGE ROUTER TO THE REQUIRED DEPTH.



STEP 4 -
CUT HOLES FOR OUTLETS

26

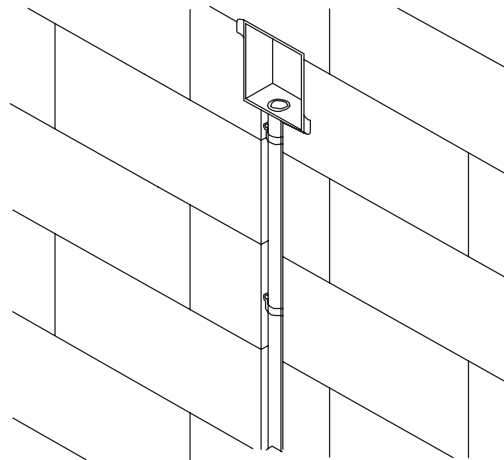
- INSTALL CABLE, FLEXIBLE, OR RIGGED CONDUIT IN CHANNEL AND SECURE WITH CHANNEL CLIPS. OBSERVE LOCAL CODES FOR TYPE OF CONDUIT, PROPER ATTACHMENT AND CHANNEL DEPTH.



STEP 5 -
INSTALL CONDUIT

27

- ELECTRIC BOXES MAY BE FIXED TO THE WALL WITH COURSE THREADED SCREWS. AS AN OPTION, GLUE, FOAM OR THIN-BED MORTAR MAY BE USED.



STEP 6 -
INSTALL ELECTRIC BOXES

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AAC TOOLS AND FASTENERS

The following companies specialize in tools and fasteners expressly designed for AAC.

Hilti

(fasteners)
P.O. Box 21148
Tulsa, OK 74121
(800) 879-8000
www.hilti.com/us

Demand Products

(tools and fasteners)
1055 Nine North Drive
Alpharetta, GA 30004
(800) 325-7540
www.demandproducts.com

Windlock Select

(tools and accessories)
1055 Leisz's Bridge Road
Leesport, PA 19533
(877) 468-5643
www.windlockselect.com





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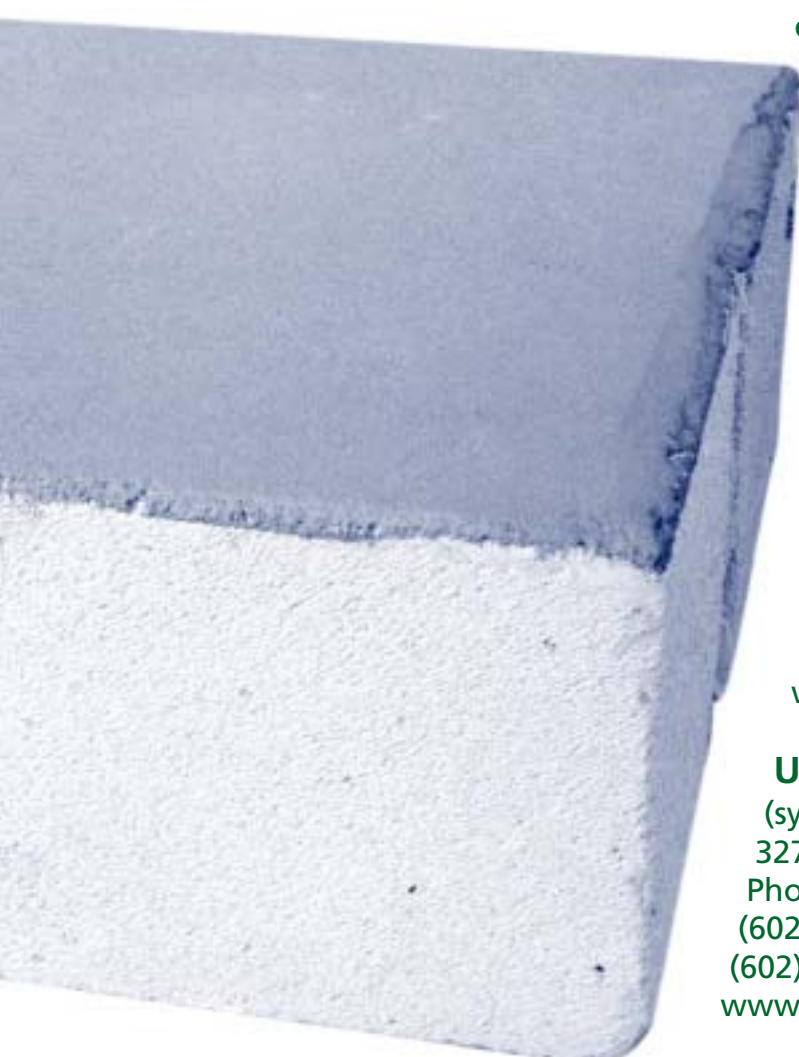


MANUFACTURERS OF COATINGS AND FINISHING PRODUCTS

Exterior surfaces of AAC must be protected by water permeable and breathable coatings. A stucco finish used on AAC provides a low maintenance wall system and can be integrally colored with mineral pigments to eliminate the need for frequent painting.

Numerous conventional coatings and finishing products are compatible with Autoclaved Aerated Concrete. All coatings must comply with ASTM C 1555 section 9 ("Exterior Surface Treatment").

Interior plaster coatings applied directly to AAC provide a beautiful and solid interior wall that is easy to repair. Plastered walls can be painted in an assortment of interior colors and a veneered plaster left unpainted provides an exceptionally pleasing appearance.



Recommended Suppliers:

Elite Cement Products, Inc.

(mineral/acrylic finishes)
4235 Buford Highway
Duluth, GA 30096
(678) 206-0242
www.elitecement.com

Sider-Oxydro, Inc.

(mineral finishes)
10110 Regur Road
Hawkinsville, GA 31036
(478) 892-9800
www.sider-oxydro.com

Ultra Kote

(synthetic/acrylic finishes)
327 S. 27th Avenue
Phoenix, AZ 85009
(602) 272-5830
(602) 272-6445
www.ultrakoteproducts.com



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Project: Las Palmas at Sandy Beach
Rocky Point, Mexico

Project Information:

E-Crete is proud to be a part of the new development surge in the Rocky Point area in Mexico. Las Palmas at Sandy Beach is a master-planned community that includes 4 seven-story condominium buildings and 20 luxury homes.

This new development offers several floor plans and amenities. The condominiums are being constructed using the “post and beam” method with E-Crete blocks as the infill material for all exterior and partitioning walls.

All structural elements including exterior and interior walls in the twenty beachfront homes are being constructed with E-Crete blocks.

The owner recognized the choice of building materials was critical to the success of the high-end oceanfront project. E-Crete blocks were chosen for their excellent thermal and fire resistance and superior sound barrier characteristics.

The homes have been completed and the fourth 7 story condominium building is almost completed.

Las Palmas



Project: Arcadia High School
4703 E. Indian School Road
Phoenix, AZ 85018

General Contractor: Target General, Inc.
3036 E. Greenway Road
Phoenix, AZ 85032

The Challenge: Target General, Inc. was contracted to build an interior wall (33' long x 16' high) through the middle of an existing building. The wall needed to be built around mechanical equipment over an existing slab and have a 1-hour fire rating.

Original plans called for a wall constructed from 8 x 8 x 16 CMU to the bottom of the roof deck. The foundation was to be saw cut and a 2'6" wide section was to be removed from the existing floor slab. An 8" footing was to be poured and doweled back to the slab.

Target General, Inc.

The Solution: E-Crete's Autoclaved Aerated Concrete (AAC)

Using E-Crete's AAC, Target General was able to exceed the customer's specific job requirements for less money. The cost and inconvenience of saw cutting, rerouting utilities, footing construction and additional reinforcement were all eliminated due to AAC's lightweight properties. E-Crete blocks were quickly and accurately cut, shaped and installed by Desert Masonry around mechanical and electrical piping.

E-Crete's U.L. classified 4-hour fire rating exceeded the job requirements by 4 times, providing added benefit for Target General's client.

Target General's superintendent Ken Garman said "Due to the fact that there were utilities in the slab, that made the situation all the more challenging. E-Crete and their staff were most helpful in solving my problem. AAC was the answer and E-Crete was with me every step of the way from demonstrations on site to having professional assistance through completion. Hats off to E-Crete and their amazing product AAC!"



Project: Bright International
1301 W. Industrial Drive
Coolidge, AZ 85228

General Contractor: Carlson Masonry
1008 A E. Vista Del Cerro Dr.
Tempe, AZ 85281
480-446-7750

The Challenge: Bright International was planning to build a bleach powder and hair reactive factory in Coolidge, Arizona. Due to the chemicals used to make these products, the factory needed to be constructed with materials that would offer a high fire resistance rating.

The Solution: E-Crete's Autoclaved Aerated Concrete (AAC)

Due to the high risk of fire from the chemicals, E-Crete's Autoclaved Aerated Concrete (AAC) block was chosen for its UL classified 4-hour fire resistance rating. The AAC was used on the interior walls of the building.

Bright International



Project: Custom Home

Contractor: Novak Construction

The Challenge: When Mark Novak of Novak Construction received the building plans for a custom home for one of his clients, he didn't know what to think. A product that he was only vaguely familiar with was specified in the plans. It was E-Crete building blocks and he wasn't sure what to make of it.

"I didn't know how this product was going to be to work with," said Novak. "I wasn't sure if it would be accepted by my trades."

Novak Construction

The Solution: As it turned out, Novak's tradesmen had heard of E-Crete and were eager to work with it, and some already had.

"Working with E-Crete blocks wasn't any more complicated than ordinary masonry blocks," Novak said. "In fact, working with E-Crete was easier because you use thinbed mortar resulting in a much more even wall with tighter seams."

One of the driving forces behind E-Crete being specified was the owner of the home. Mr. Gerd Zimmerman is originally from Germany where Autoclaved Aerated Concrete (AAC) has been used for decades in the construction of all types of structures. He was accustomed to the many benefits of building and living with AAC.

"I wanted my home to be as energy efficient and soundproof as possible," comments Mr. Zimmerman. "My house is located near a bus route and I didn't want to hear the engines of the buses while I was inside my home."

Novak said he looks forward to building more homes with E-Crete and will recommend E-Crete to his future customers.



Project: Edwards Residence

Designer/Builder: Kevin Edwards
Edwards Design Group
8015 E. Vista Bonita Dr.
Scottsdale, AZ 85255
480-563-7774
edg@contractor.net

The Challenge: Building a "green" home

The Solution: E-Crete's Autoclaved Aerated Concrete (AAC)

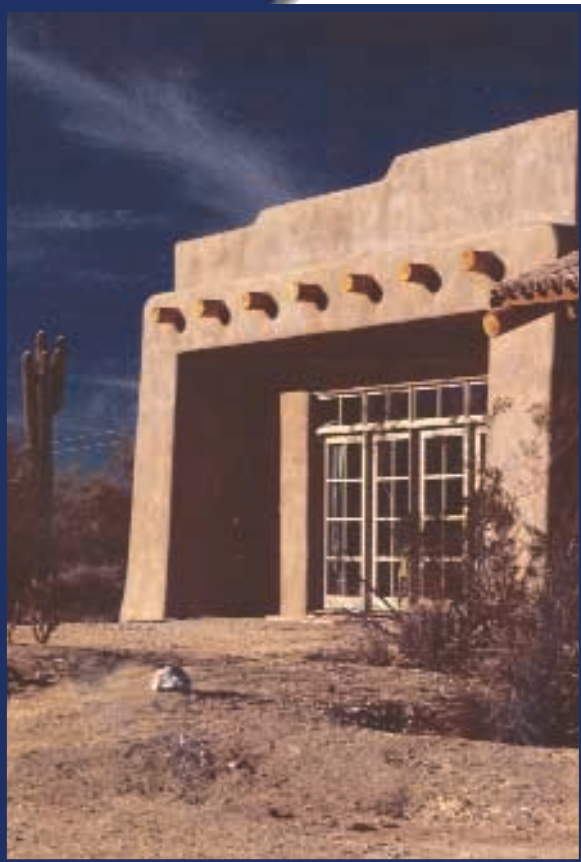
Kevin and Doug Edwards, brothers and partners in the Scottsdale based Edwards Design Group built a 2000 square foot home out of E-Crete that they hope will be the springboard to a project building a mainstream, eco-friendly subdivision.

The exterior walls of the home are constructed with E-Crete's AAC block. The home also features interior metal framing, solar heating, shade structures and desert landscaping.

"Thanks to versatile materials like E-Crete's AAC, it's easy to construct environmentally friendly homes that are affordably priced, aesthetically appealing and comfortable," said Kevin Edwards, co-owner of Edwards Design Group.

A decorative graphic consisting of a dark blue diagonal shape with four green squares arranged in a descending staircase pattern.

Edwards Residence



Project: Adobe style residence

Contractor: Siteworks, Inc. Santa Fe, NM

The Challenge: Siteworks, Inc.'s president Ray Gee had a client that wanted a home that really captured the look and feel of the Southwest. Details such as rounded walls, thick door and window openings, a beehive fireplace, and multiple niches had to be included. In addition to these architectural features, the home also had to be energy efficient and built with quality products. Mr. Gee turned to E-Crete for the solution to building a home for his discriminating client.

Siteworks, Inc.

The Solution: By building with E-Crete, Siteworks, Inc. was able to meet the clients' demand for a home with a masonry-like feel, but priced more competitively than a conventional, thick-walled wood frame system. Siteworks chose E-Crete blocks to achieve the look, feel and workability of adobe. The client also benefitted from other E-Crete block characteristics such as superior thermal and acoustic insulation. In the end, both client and builder were very satisfied with the results of this E-Crete home.

