

EPSCoR Research Fellowship Fall 2009



**EVALUATION OF BOND STRENGTH
AT THE AAC GROUT INTERFACE**

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Previous Research at UW

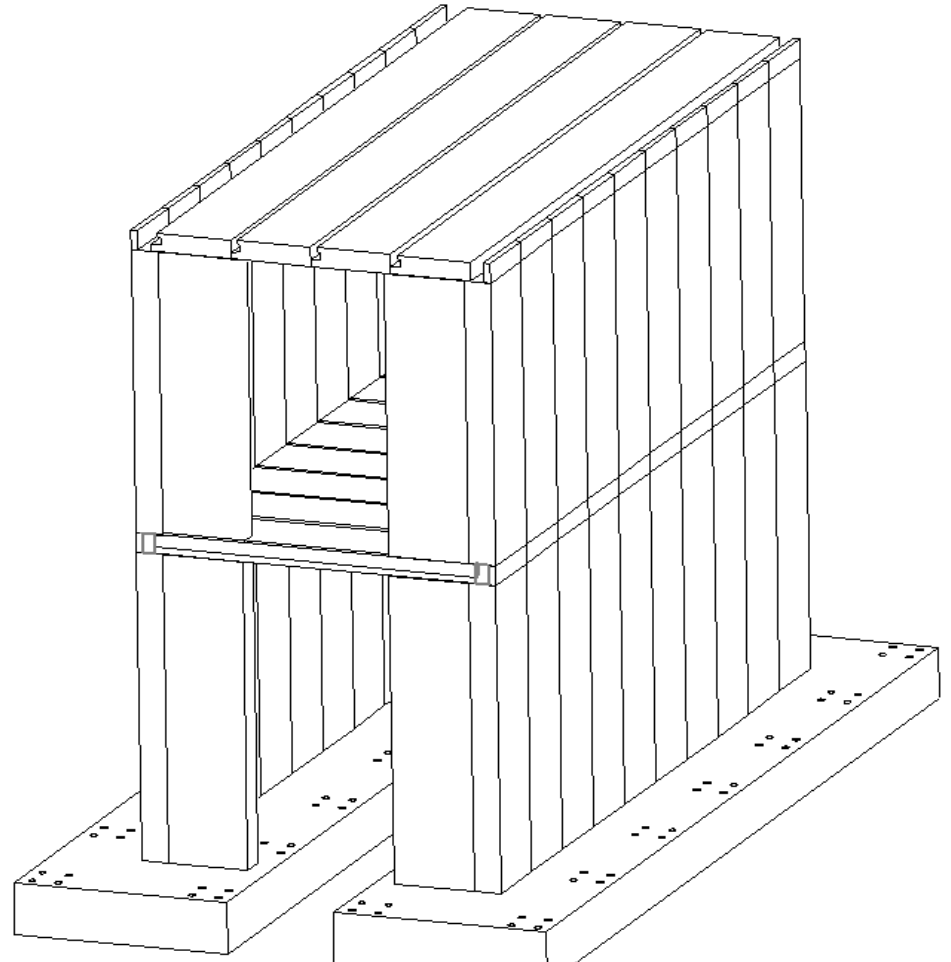


- Tyler Robison
 - Tensile strength of thin-bed mortar joints
 - Shear strength of AAC grout interface
 - Addition of methylcellulose to AAC grout
 - Effects of humidity on shear strength
 - **Effects of different sands**

Research Goals



- Effect of Different aggregate clasts
- Most critical joint occurs at the wall to floor interface



What is Autoclaved Aerated Concrete?



- Excellent building properties

- Durable

- Frost and Fire

Resistance

- Sulfate Resistance

- Excellent

Thermal and Acoustics



Expansive Ingredient



- Aluminum
- Causes a Significant increase in volume.
- Density can be controlled by the amount of aluminum added to the mix.



Production Process



- Autoclaved
- Normally a steel tube 3 meters in diameter and 45 meters in length.



Current AAC Construction



- 1800 Amarone Way
Henderson, NV
 - Small Scale



AAC Core



<http://silvasindustries.com/projects/1800amarone/>

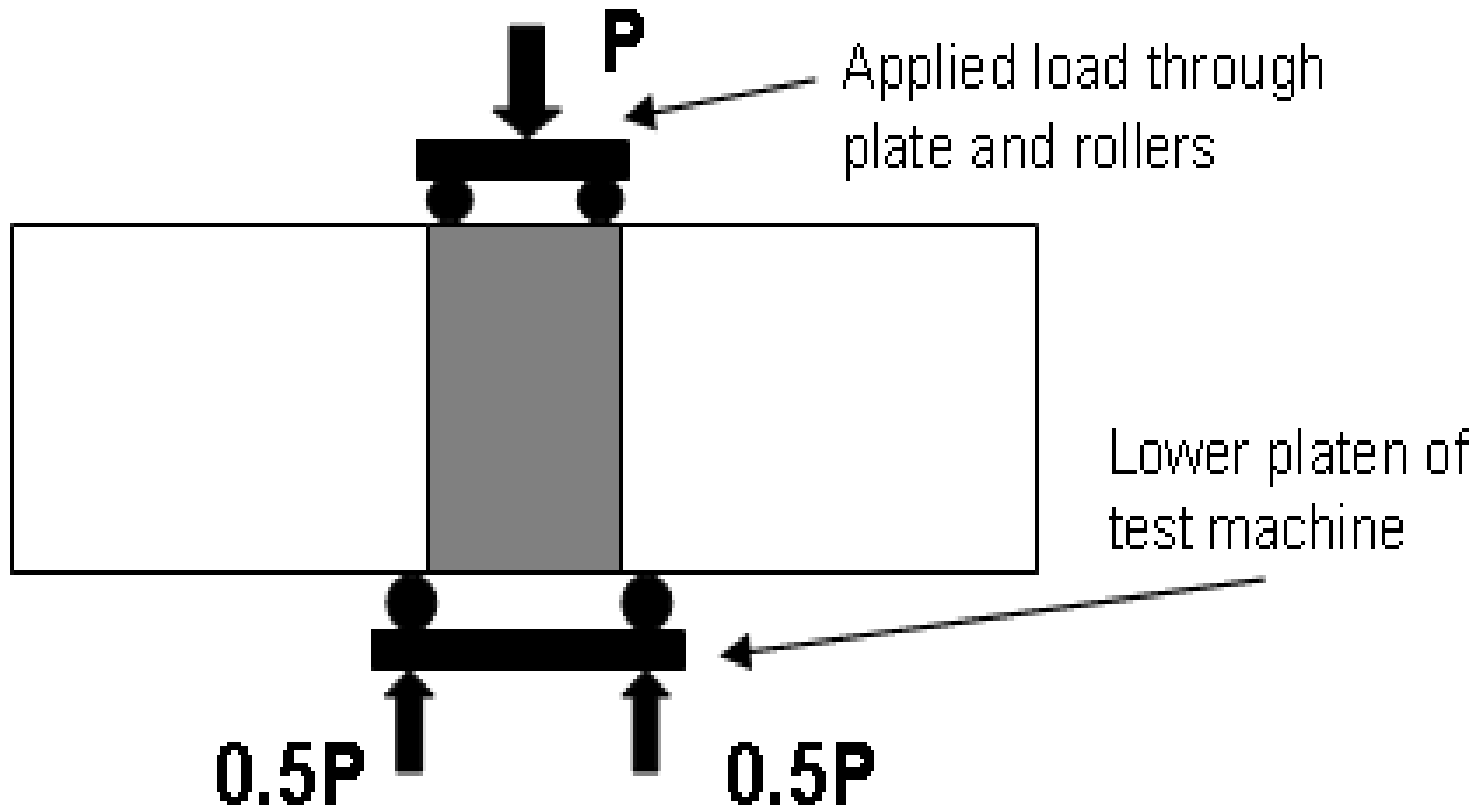
AAC Construction



- 51st Street
New York
 - Large Scale



Direct Shear Test



Fine Aggregate



Angular Sand



Rounded Sand
(U.S. Silica)

Specimen Construction



Specimen Testing



Results AAC Grade 2



Grade 2 Angular Sand Specimens

Grade 2 Rounded Sand Specimens

Specimen	Force, lb.	Area _{bond} , in ²	σ_{shear} psi
1-2A	3899	90	22
2-2A	4175	91	23
3-2A	3071	90	17
4-2A	4451	90	25
5-2A	2519	90	14
6-2A	2243	89	13
7-2A	2243	91	12
8-2A	2795	90	16
9-2A	5279	90	29
		Average 2A	19
		COV	32

Specimen	Force, lb.	Area _{bond} , in ²	σ_{shear} psi
19-2R	5003	93	27
20-2R	6659	92	36
21-2R	6659	94	35
22-2R	5831	93	31
23-2R	4451	93	24
24-2R	6107	93	33
		Average 2R	31
		COV	19

Results AAC Grade 6

Grade 6 Angular Sand Specimens

Grade 6 Rounded Sand Specimens

Specimen	Force, lb.	Area _{bond} , in ²	σ_{shear} , psi
10-6A	1139	91	6
11-6A	35	90	0
12-6A	35	90	0
		Average 6A	2
		COV	8

Specimen	Force, lb.	Area _{bond} , in ²	σ_{shear} , psi
13-6R	5831	92	32
14-6R	6107	93	33
15-6R	4175	94	22
16-6R	4451	94	24
17-6R	2243	94	12
18-6R	2795	94	15
		Average 6R	23
		COV	60

$$\sigma_{\text{shear}} := \frac{\left(\frac{\text{Force}}{2} \right)}{\text{Area}_{\text{bond}}}$$

Conclusions



- Angular vs. rounded sand
- Grade 2 vs. grade 6 AAC blocks
- Bond failure

Thanks



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