



Rutledge College – USC Horseshoe

# Traditional Wood Windows in a LEED Gold Building

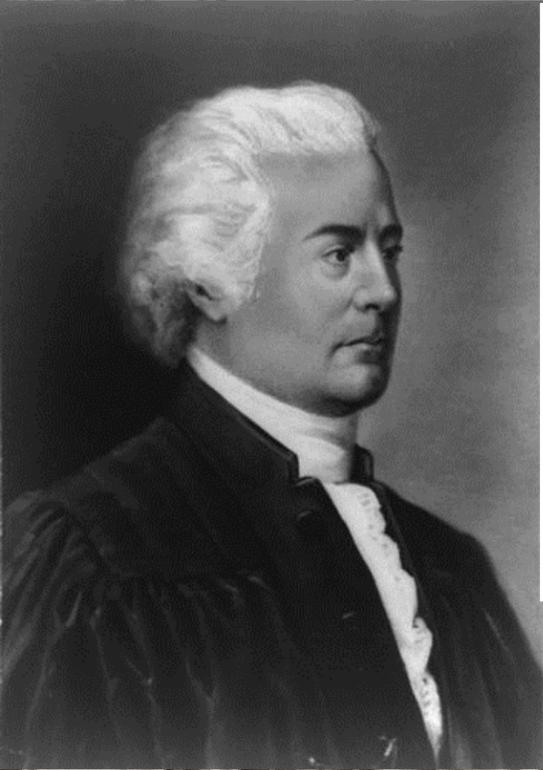
# Outline

- Building History
- Existing Conditions
- Design Process
- Testing
- Details
- Other Stories



Rutledge College

# Building History - 1805



**John Rutledge (1739-1800)**  
Member of the Provincial Assembly  
Attorney General of South Carolina  
Delegate to the Stamp Act Congress  
Continental Congress Representative  
Governor of South Carolina  
Signatory of the United States Constitution  
Chief Justice of South Carolina  
Chief Justice of the United States



**Edward Rutledge (1749-1800)**  
Signatory of the Declaration of Independence  
Continental Congress Representative  
Revolutionary War Military Commander  
Prisoner of War  
South Carolina General Assembly  
Governor of South Carolina



Rutledge College

# Building History - 1805



Rutledge College

# Building History – 1855 Fire



Rutledge College

# Building History – Rebuilt



Rutledge College

# Building History – Civil War



Chapel; South Carolina House of Representatives  
East wing; Federal military commander of the Columbia district  
West wing; Columbia post office and the state treasurer

## Building History – Reconstruction



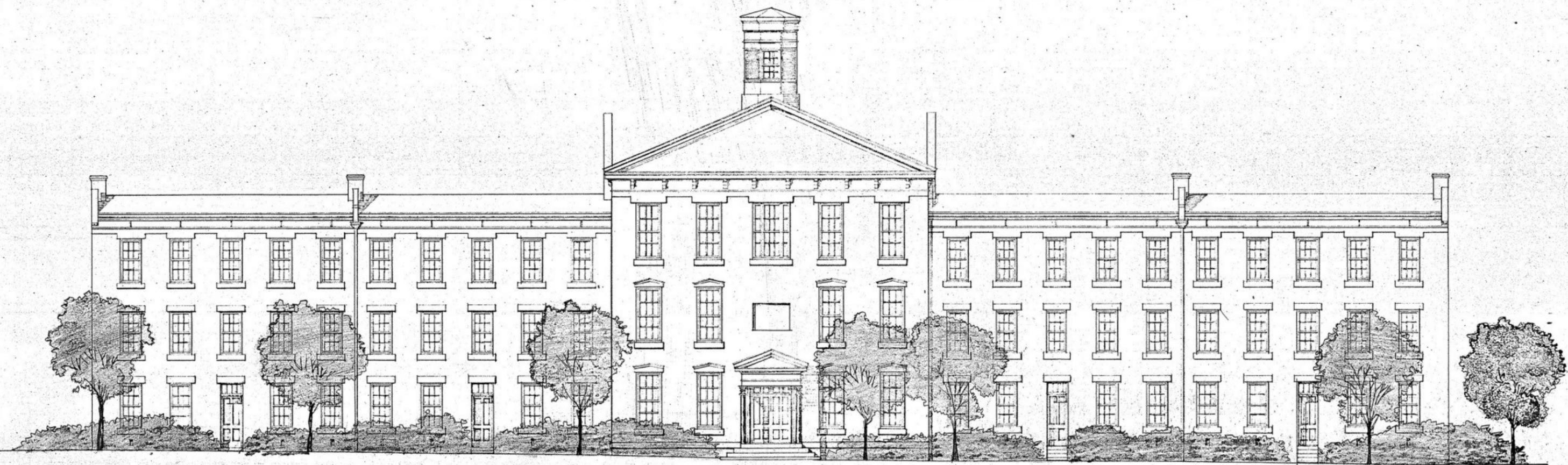
# Existing Conditions



# Existing Conditions



# Existing Conditions – 1970s Renovations



Rutledge College • 1805

067-01-04-001

Front Elevation  
Arch 5-10-02

# Existing Conditions – 1970s Renovations



## Existing Conditions – 1970s Renovations







①

②

③

WINDOW DETAILS @ A,B,C,D,E,F  
3/8" = 1'-0"

④

⑤

⑥

WINDOW DETAILS @ G,H,J,K,L,M  
3/8" = 1'-0"

⑦

⑧

⑨

⑩

WINDOW DETAILS @ N (JAMB)  
3/8" = 1'-0"

WINDOW DETAILS @ P (JAMB)  
3/8" = 1'-0"

WINDOW DETAILS @ Q,R,S (JAMB)  
3/8" = 1'-0"

WINDOW DETAILS @ R (MULLION JAMB)  
3/8" = 1'-0"

WINDOW ELEVATIONS  
3/8" = 1'-0"

**NOTES:**

PLEASE NOTE THAT WINDOW DETAILS ARE OUTLINES OF EXISTING WINDOWS. IF WINDOW NEEDS TO BE REPLACED JOB CHECK EXISTING AND MATCH. IF WINDOW NEEDS MINOR REPAIR JOB CHECK TO SEE CONDITION AND REPAIR TO MATCH EXISTING. SEE WINDOW WORK SCHEDULE ON ANOTHER SHEET FOR WORK TO BE DONE.

ALL WINDOW DIMENSIONS SHOWN IN SCHEDULE THIS SHEET ARE MASONRY OPENINGS AND ARE ± DIMENSIONS. PLEASE VERIFY DIMENSIONS ON ALL WINDOWS BEFORE PREFABRICATION.

LABEL	MASONRY OPENING ±	TYPE	FRAMES		TOTAL UNITS	REMARKS
			INTERIAL	ELEVATION		
A	3'-2 3/4" x 6'-10" M.O.	DB. HUNG	WOOD	D-D	1,2,3	
B	3'-2 1/2" x 6'-10" M.O.	"	"	"	1	
C	3'-2 3/4" x 6'-10" M.O.	"	"	"	1	
D	3'-2 3/4" x 6'-10" M.O.	"	"	"	1	
E	3'-2 3/4" x 6'-10" M.O.	"	"	"	10	
F	3'-2 1/2" x 6'-10 1/2" M.O.	"	"	D-D	1,2,3	
G	3'-4" x 6'-11" M.O.	"	"	G-C	4,5,6	
H	3'-4" x 6'-10" M.O.	"	"	"	6	
J	3'-4" x 6'-11" M.O.	"	"	"	6	
K	3'-4" x 6'-10 1/2" M.O.	"	"	"	7	
L	3'-4 1/2" x 6'-10 1/2" M.O.	"	"	"	6	
M	3'-4 1/2" x 6'-11" M.O.	"	"	C-C	4,5,6	
N	4'-1" x 6'-10" M.O.	"	"	A-A	7	
O	SEE REMARKS					REMOVE EXIST. WINDOW AND FILL OPENING
P	4'-1" x 6'-10" M.O.	DB. HUNG	WOOD	A-A	8	
Q	4'-1" x 6'-10" M.O.	"	"	A-A	9	
R	6'-0" x 6'-10" M.O.	"	"	B-B	3,10	
S	4'-1" x 6'-10" M.O.	"	"	A-A	9	

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DATE	REVISION

DRAWN BY: YOUNG  
CHECKED BY: [ ]  
APPROVED BY: [ ]

BUILDING RENOVATIONS  
RUTLEDGE COLLEGE  
UNIVERSITY OF S.C. CAROLINA  
WINDOW DETAILS & SCHEDULE

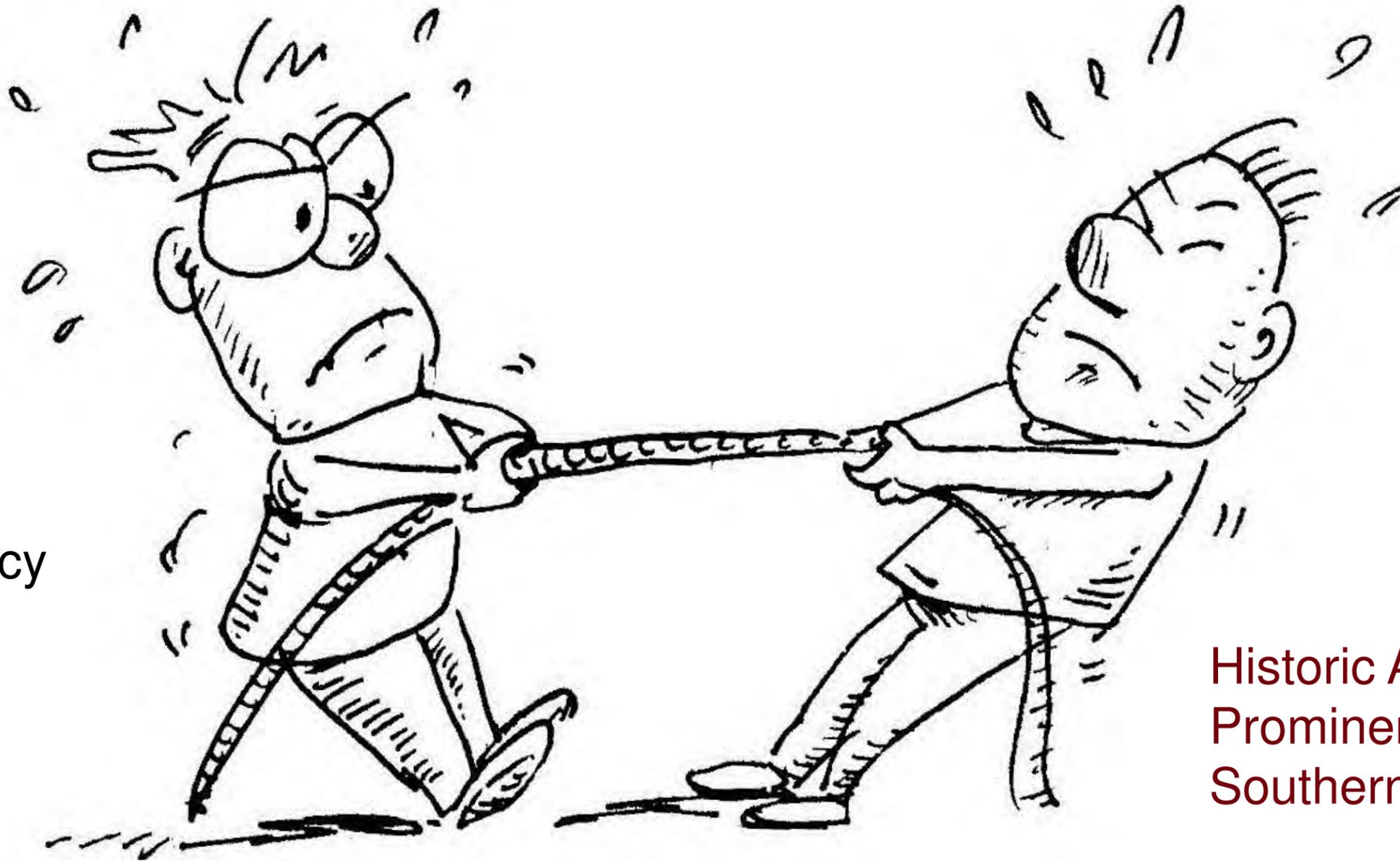
COMM. NO. [ ]  
DATE: AUG. 1975  
SHEET: 9  
OF TWELVE

067-01-03-028



# Design Process

Energy Efficiency  
Maintenance  
Durability



Historic Accuracy  
Prominence on Campus  
Southern Charm

# Design Process

# Design Process – LEED



# LEED 2009 for New Construction and Major Renovations

## Project Checklist

Rutledge College Renovation - University of South Carolina 4-22-16

### 15 1 10 Sustainable Sites Possible Points: 26

Y	?	N			
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
	1		Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
		1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		3	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
		1	Credit 6.1	Stormwater Design—Quantity Control	1
		1	Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
		1	Credit 7.2	Heat Island Effect—Roof	1
		1	Credit 8	Light Pollution Reduction	1

### 8 2 Water Efficiency Possible Points: 10

Y	?	N			
Y			Prereq 1	Water Use Reduction—20% Reduction	
	4		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
	4		Credit 3	Water Use Reduction	2 to 4

### 22 13 Energy and Atmosphere Possible Points: 35

Y	?	N			
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
	15	4	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
		2	Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

### 10 4 Materials and Resources Possible Points: 14

Y	?	N			
Y			Prereq 1	Storage and Collection of Recyclables	
	3		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
		2	Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

### Materials and Resources, Continued

Y	?	N			
	2		Credit 4	Recycled Content	1 to 2
	2		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

### 2 9 4 Indoor Environmental Quality Possible Points: 15

Y	?	N			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
	1		Credit 1	Outdoor Air Delivery Monitoring	1
	1		Credit 2	Increased Ventilation	1
	1		Credit 3.1	Construction IAQ Management Plan—During Construction	1
	1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
	1		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
	1		Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
	1		Credit 4.3	Low-Emitting Materials—Flooring Systems	1
	1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
	1		Credit 5	Indoor Chemical and Pollutant Source Control	1
	1		Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
	1		Credit 7.1	Thermal Comfort—Design	1
	1		Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
	1		Credit 8.2	Daylight and Views—Views	1

### 2 4 Innovation and Design Process Possible Points: 6

Y	?	N			
	1		Credit 1.1	Innovation in Design:	1
	1		Credit 1.2	Innovation in Design:	1
	1		Credit 1.3	Innovation in Design:	1
	1		Credit 1.4	Innovation in Design:	1
	1		Credit 1.5	Innovation in Design:	1
	1		Credit 2	LEED Accredited Professional	1

### 2 2 Regional Priority Credits Possible Points: 4

Y	?	N			
	1		Credit 1.1	Regional Priority: SSC4.1	1
	1		Credit 1.2	Regional Priority: IEQc7.1	1
		1	Credit 1.3	Regional Priority:	1
		1	Credit 1.4	Regional Priority:	1

### 21 54 35 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110



# LEED 2009 for New Construction and Major Renovations

## Project Checklist

Rutledge College Renovation - University of South Carolina 4-22-16

### 15 1 10 Sustainable Sites Possible Points: 26

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5			Credit 2	Development Density and Community Connectivity	5
	1		Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
		1	Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		3	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
		1	Credit 6.1	Stormwater Design—Quantity Control	1
		1	Credit 6.2	Stormwater Design—Quality Control	1
		1	Credit 7.1	Heat Island Effect—Non-roof	1
		1	Credit 7.2	Heat Island Effect—Roof	1
		1	Credit 8	Light Pollution Reduction	1

### 8 2 Water Efficiency Possible Points: 10

Y	?	N			
Y			Prereq 1	Water Use Reduction—20% Reduction	
	4		Credit 1	Water Efficient Landscaping	2 to 4
		2	Credit 2	Innovative Wastewater Technologies	2
	4		Credit 3	Water Use Reduction	2 to 4

### 22 13 Energy and Atmosphere Possible Points: 35

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Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
	15	4	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
		2	Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2

### 10 4 Materials and Resources Possible Points: 14

Y	?	N			
Y			Prereq 1	Storage and Collection of Recyclables	
	3		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
		2	Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

### Materials and Resources, Continued

Y	?	N			
	2		Credit 4	Recycled Content	1 to 2
	2		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1
		1	Credit 7	Certified Wood	1

### 2 9 4 Indoor Environmental Quality Possible Points: 15

Y	?	N			
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
	1		Credit 1	Outdoor Air Delivery Monitoring	1
	1		Credit 2	Increased Ventilation	1
	1		Credit 3.1	Construction IAQ Management Plan—During Construction	1
	1		Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
	1		Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
	1		Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
	1		Credit 4.3	Low-Emitting Materials—Flooring Systems	1
	1		Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
	1		Credit 5	Indoor Chemical and Pollutant Source Control	1
	1		Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
	1		Credit 7.1	Thermal Comfort—Design	1
	1		Credit 7.2	Thermal Comfort—Verification	1
	1		Credit 8.1	Daylight and Views—Daylight	1
	1		Credit 8.2	Daylight and Views—Views	1

### 2 4 Innovation and Design Process Possible Points: 6

Y	?	N			
	1		Credit 1.1	Innovation in Design:	1
	1		Credit 1.2	Innovation in Design:	1
		1	Credit 1.3	Innovation in Design:	1
		1	Credit 1.4	Innovation in Design:	1
		1	Credit 1.5	Innovation in Design:	1
		1	Credit 2	LEED Accredited Professional	1

### 2 2 Regional Priority Credits Possible Points: 4

Y	?	N			
	1		Credit 1.1	Regional Priority: SSC4.1	1
	1		Credit 1.2	Regional Priority: IEQc7.1	1
		1	Credit 1.3	Regional Priority:	1
		1	Credit 1.4	Regional Priority:	1

### 21 54 35 Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110



# LEED 2009 for New Construction and Major Renovations

Rutledge College Renovation - University of South Carolina 4-22-16

Project Checklist

## 15 1 10 Sustainable Sites Possible Points: 26

Y	?	N			
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1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5

## Materials and Resources, Continued

Y	?	N			
	2		Credit 4	Recycled Content	1 to 2
	2		Credit 5	Regional Materials	1 to 2
		1	Credit 6	Rapidly Renewable Materials	1

## 22 13 Energy and Atmosphere Possible Points: 35

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
	15	4	Credit 1	Optimize Energy Performance	1 to 19
		7	Credit 2	On-Site Renewable Energy	1 to 7
	2		Credit 3	Enhanced Commissioning	2
		2	Credit 4	Enhanced Refrigerant Management	2
	3		Credit 5	Measurement and Verification	3
	2		Credit 6	Green Power	2

## 10 4 Materials and Resources Possible Points: 14

Y	?	N			
	3		Prereq 1	Storage and Collection of Recyclables	
	1		Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
	2		Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
		2	Credit 2	Construction Waste Management	1 to 2
		2	Credit 3	Materials Reuse	1 to 2

## 2 2 Regional Priority Credits Possible Points: 4

Y	?	N			
1			Credit 1.1	Regional Priority: SSc4.1	1
1			Credit 1.2	Regional Priority: IEQc7.1	1
		1	Credit 1.3	Regional Priority:	1
		1	Credit 1.4	Regional Priority:	1

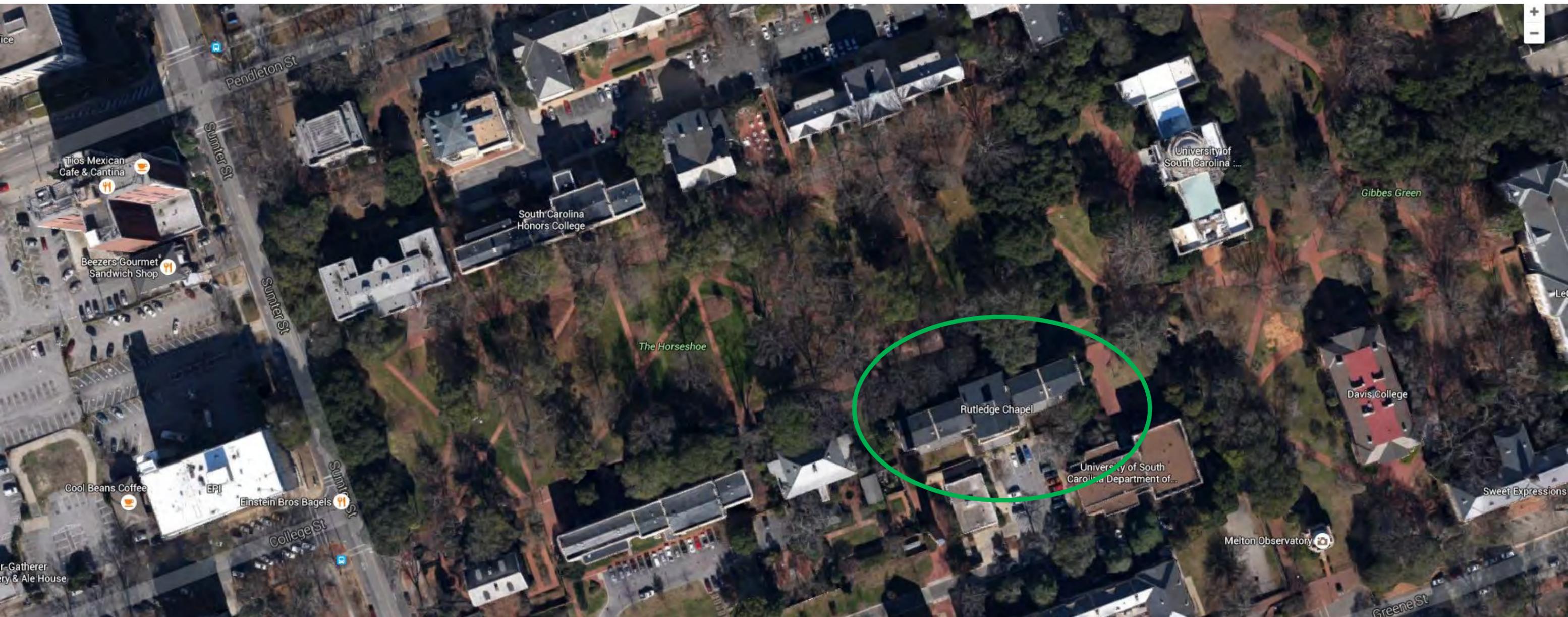
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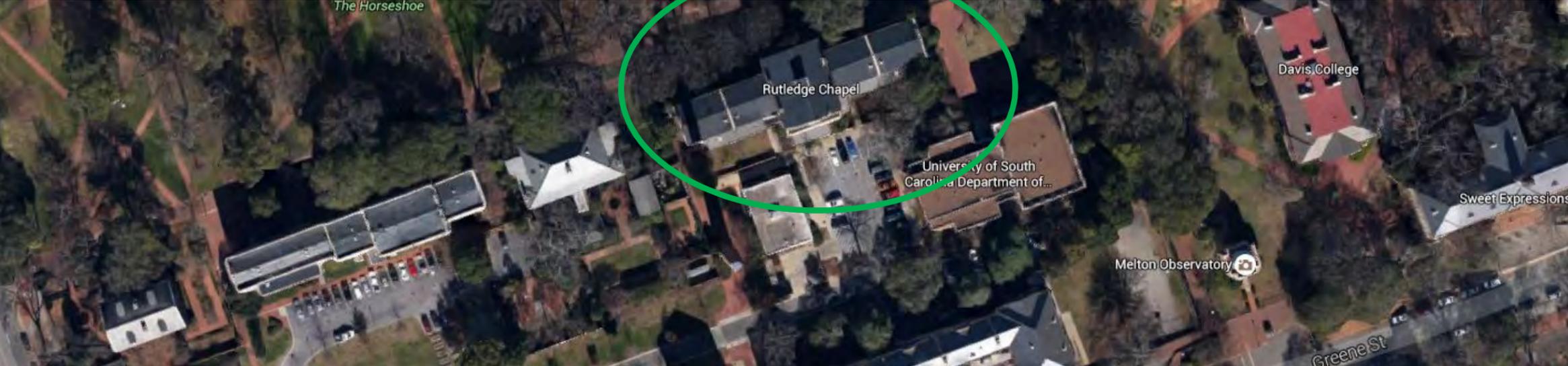
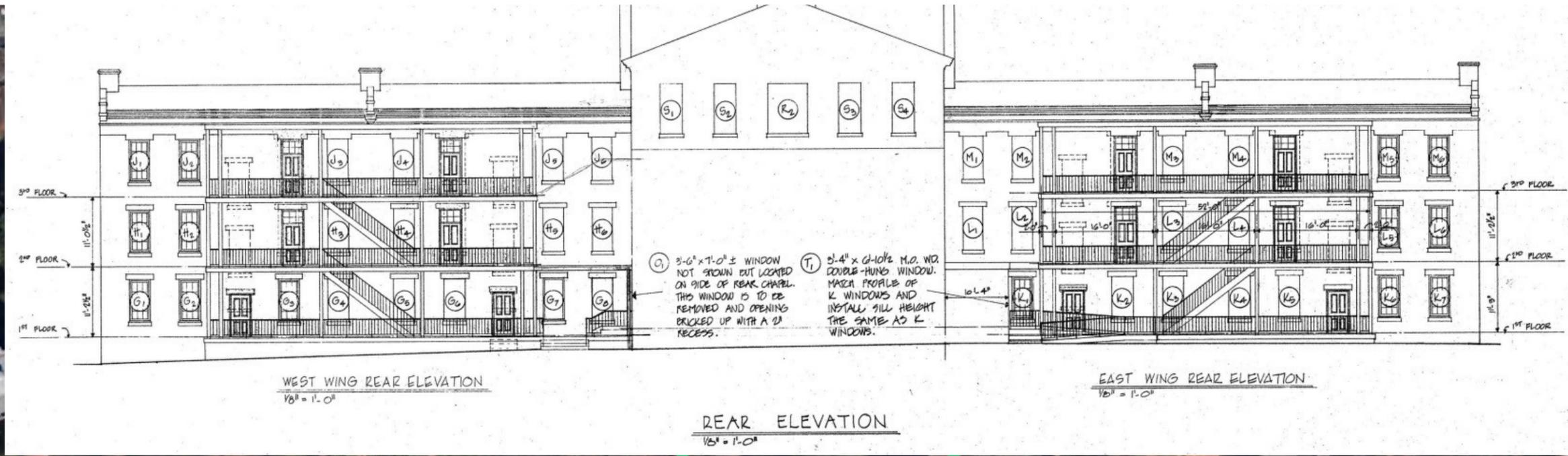
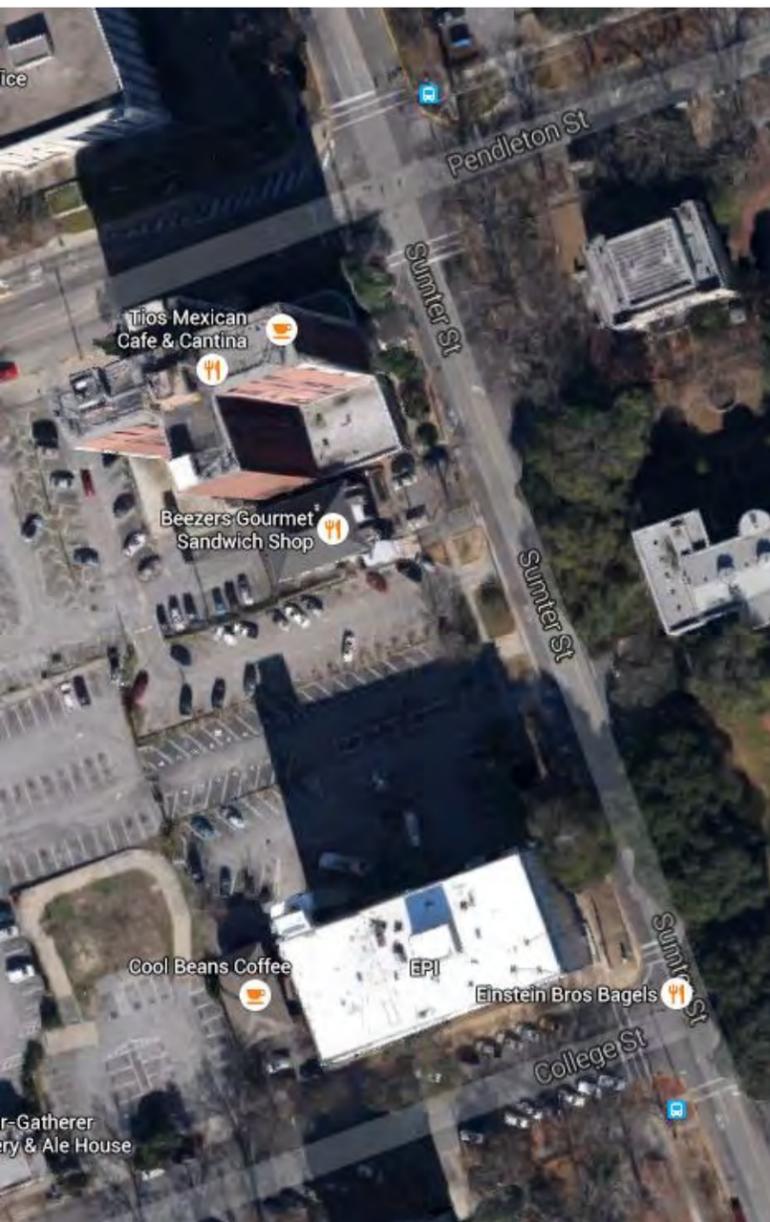
# Design Process – Energy Model



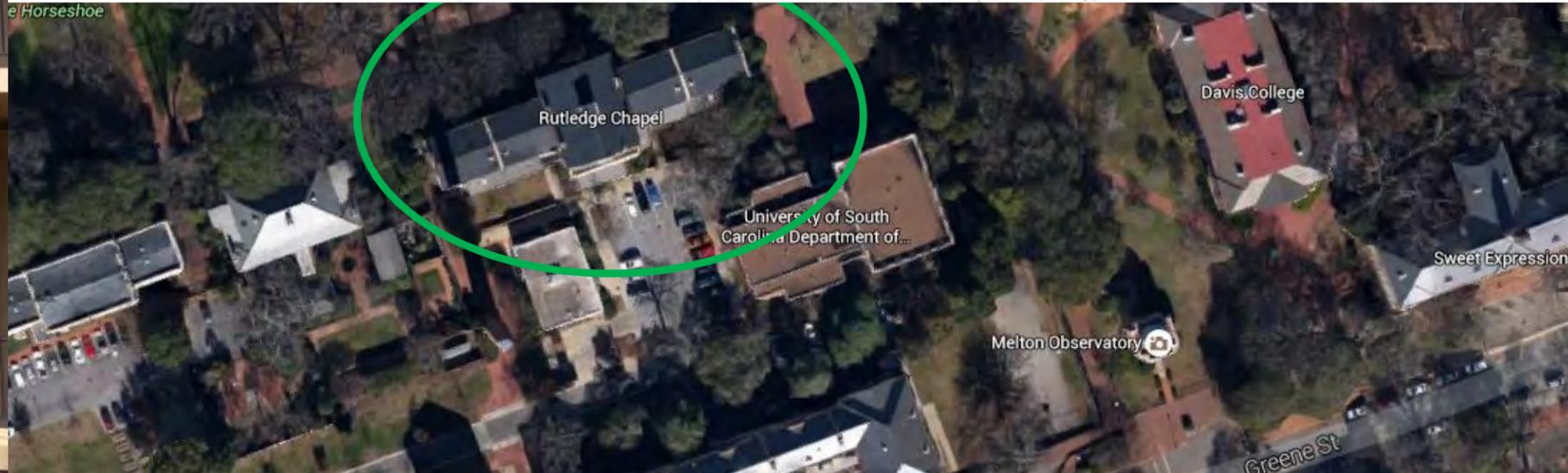
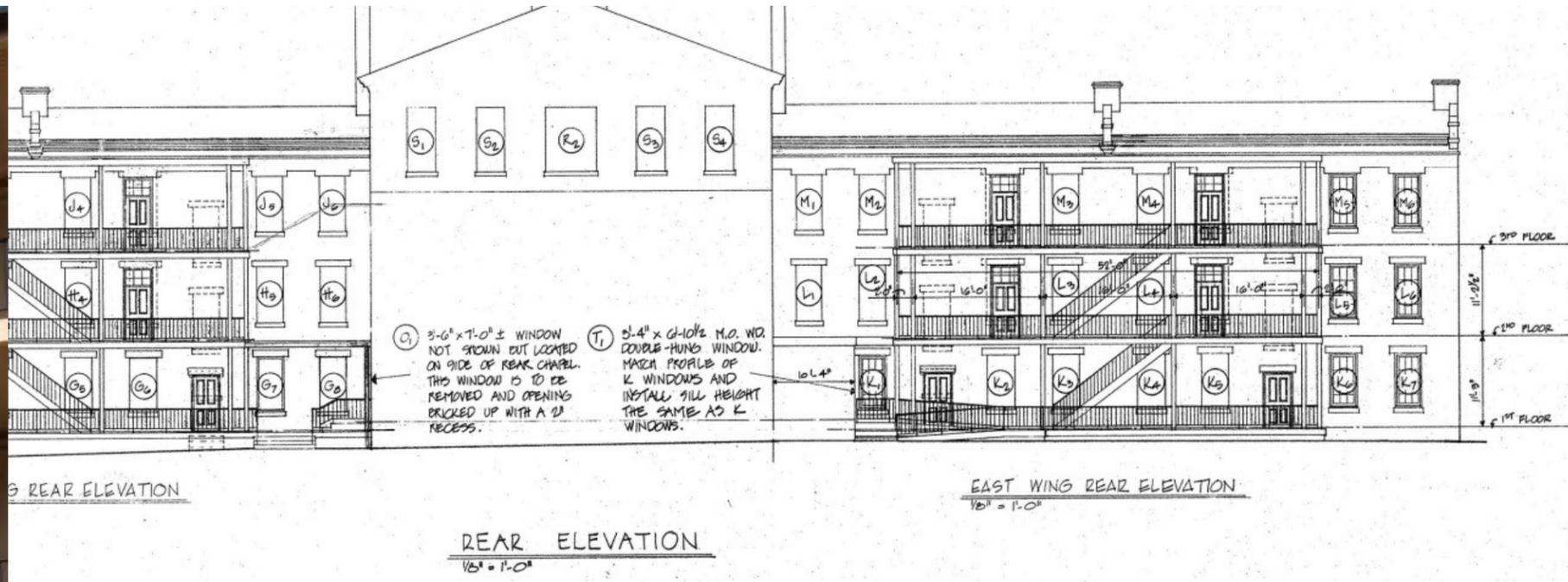
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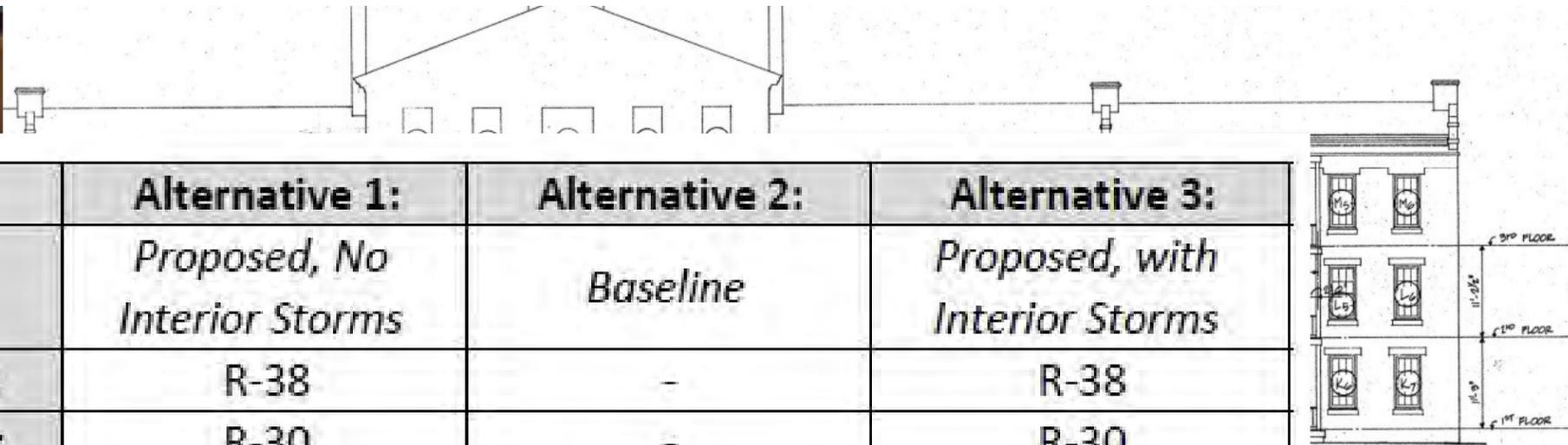
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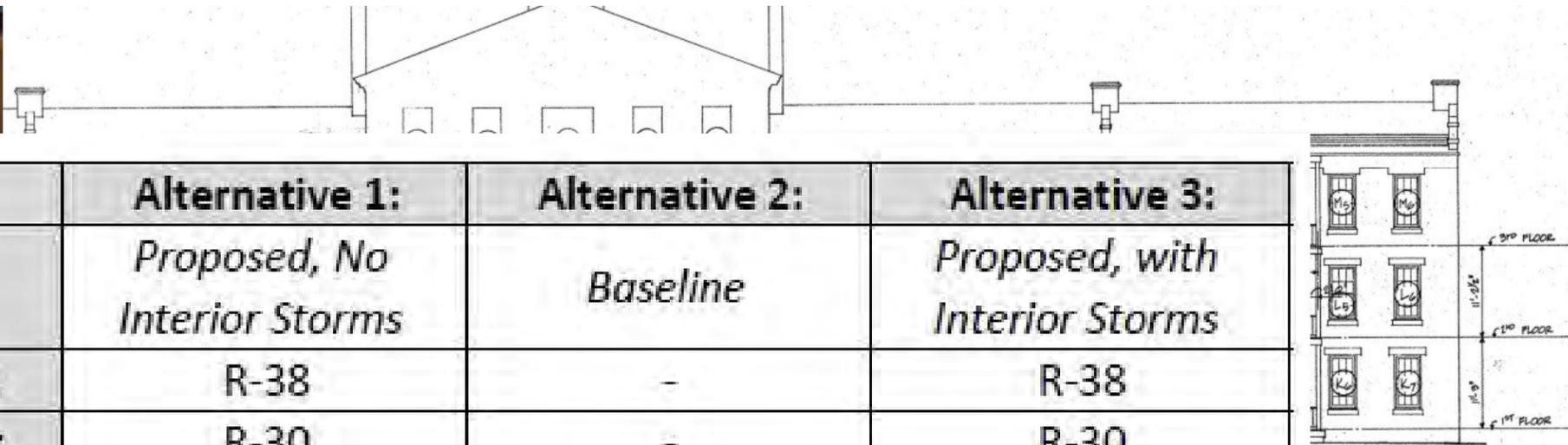
# Design Process – Energy Model



	<b>Alternative 1:</b>	<b>Alternative 2:</b>	<b>Alternative 3:</b>
<b>Description</b>	<i>Proposed, No Interior Storms</i>	<i>Baseline</i>	<i>Proposed, with Interior Storms</i>
<b>Insulation Added - Attic</b>	R-38	-	R-38
<b>Insulation Added - Floor</b>	R-30	-	R-30
<b>Infiltration</b>	0.3 ACH	0.5 ACH	0.3 ACH
<b>Glass</b>	Single Pane New	Single Pane Existing	Single Pane New
	U-value: 0.95	U-value: 1.25	U-value: 0.64
<b>Lighting - Apts.</b>	0.8 W/sf	1.0 W/sf	0.8 W/sf
<b>Systems</b>	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
<b>Plants</b>	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps



# Design Process – Energy Model



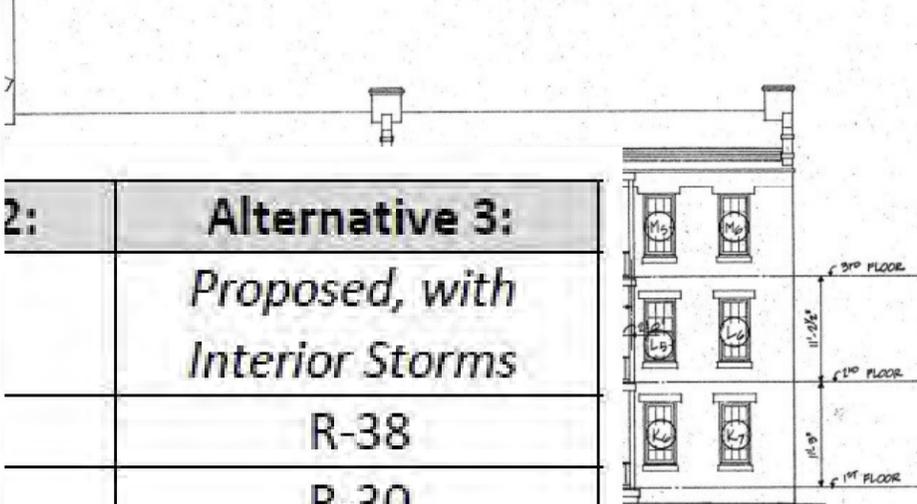
	Alternative 1:	Alternative 2:	Alternative 3:
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<b>Insulation Added - Attic</b>	R-38	-	R-38
<b>Insulation Added - Floor</b>	R-30	-	R-30
<b>Infiltration</b>	0.3 ACH	0.5 ACH	0.3 ACH
<b>Glass</b>	Single Pane New	Single Pane Existing	Single Pane New
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<b>Systems</b>	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
<b>Plants</b>	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps



# Design Process – Energy Model

Description	Proposed, No Interior Storms	Baseline	Proposed, with Interior Storms
Site EUI	44	72	43
% Better than Baseline	39%		40%
Source EUI	65	115	64
% Better than Baseline	43%		44%
Annual Energy Cost	\$ 12,798	\$ 21,744	\$ 12,581
% Better than Baseline	41%		42%

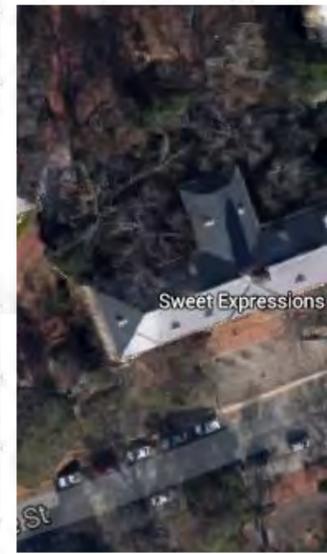
EUI units: Btu/ft2-yr



2:	Alternative 3:
	Proposed, with Interior Storms
	R-38
	R-30
	0.3 ACH
	Single Pane



	New	Existing	New
<b>Glass</b>	U-value: 0.95	U-value: 1.25	U-value: 0.64
<b>Lighting - Apts.</b>	0.8 W/sf	1.0 W/sf	0.8 W/sf
<b>Systems</b>	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
<b>Plants</b>	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps

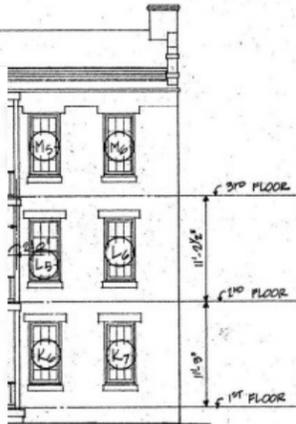


# Design Process – Energy Model

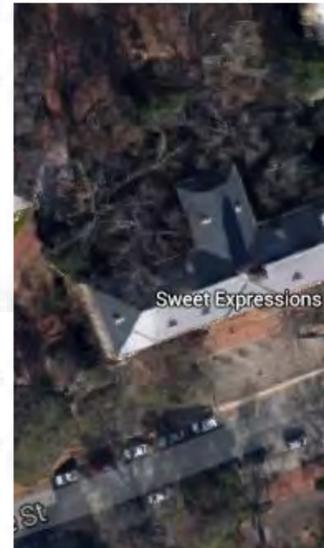
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% Better than Baseline	<b>41%</b>		<b>42%</b>

EUI units: Btu/ft<sup>2</sup>-yr

2:	Alternative 3:
	Proposed, with Interior Storms
	R-38
	R-30
	0.3 ACH
	Single Pane




	New	Existing	New
Glass	U-value <b>0.95</b>	U-value: 1.25	U-value: <b>0.64</b>
Lighting - Apts.	0.8 W/sf	1.0 W/sf	0.8 W/sf
Systems	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
Plants	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps

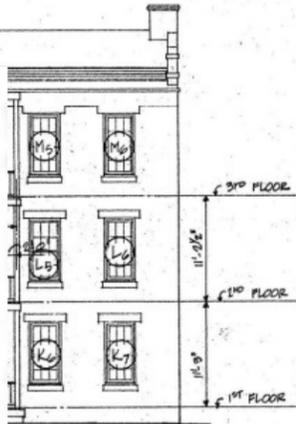


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Annual Energy Cost	\$ 12,798	\$ 21,744	\$ 12,581
% Better than Baseline	41%		42%

EUI units: Btu/ft2-yr

2:	Alternative 3: Proposed, with Interior Storms
	R-38
	R-30
	0.3 ACH
	Single Pane




	New	Existing	New
Glass	U-value 0.95	U-value: 1.25	U-value: 0.64
Lighting - Apts.	0.8 W/sf	1.0 W/sf	0.8 W/sf
Systems	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
Plants	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps



# Design Process – Energy Model

Description	Proposed, No Interior Storms	Baseline	Proposed, with Interior Storms
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Source EUI	65	115	64
% Better than Baseline	43%		44%
Annual Energy Cost	\$ 12,798	\$ 21,744	\$ 12,581
% Better than Baseline	41%		42%

EUI units: Btu/ft2-yr

**Alternative 3:**  
Proposed, with Interior Storms

**\$217 / year savings**

	New	Existing	New
<b>Glass</b>	U-value: 0.95	U-value: 1.25	U-value: 0.64
<b>Lighting - Apts.</b>	0.8 W/sf	1.0 W/sf	0.8 W/sf
<b>Systems</b>	Var. Sp. FCUs	1 Speed FCUs	Var. Sp. FCUs
<b>Plants</b>	Var. Vol. Pumps	Const. Vol. Pumps	Var. Vol. Pumps



# Design Process – Energy Model



Okay, but we don't want drafty windows



# Testing



## Testing – Blower Door 101



# Testing – Blower Door 101

# 1970s window

# Mock up window

# New window

- ASTM E 783 air leakage test
- ASTM E 1105 water penetration test

## Testing

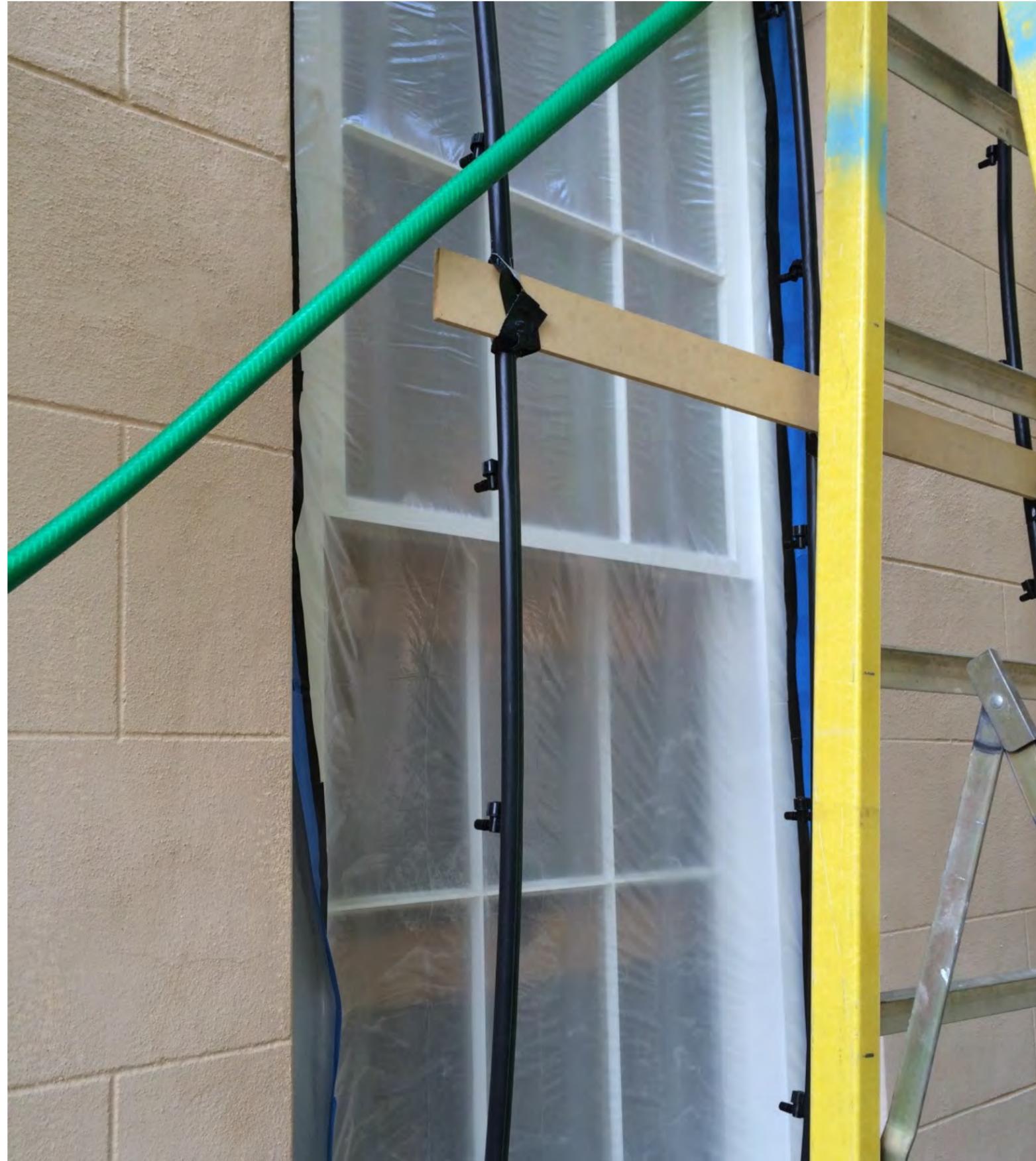
# Testing



# Testing



# Testing



# Testing



1970s window;

Failed both tests

Mock up window;

Passed both tests

New window;

Passed both tests

Testing

# Testing – What passes, what fails?

Air leakage PASS; less than 0.25 Cubic Feet per Minute per Square Foot at 30 Pascals

Air leakage PASS; < 0.25 CFM/SF @ 30 Pa

Air leakage FAIL; > 0.25 CFM/SF @ 30 Pa

Water leakage PASS; NEGATIVE @ 50 Pa

Water leakage FAIL; POSITIVE @ 50 Pa

- ASTM E 783 air leakage test
- ASTM E 1105 water penetration test

Testing – What passes, what fails?

Air leakage PASS; < 0.25 CFM/SF @ 30 Pa

Water leakage PASS; NEGATIVE @ 50 Pa

Testing – What passes, what fails?

Air leakage PASS; < 0.25 CFM/SF @ 30 Pa

New window; 0.13 CFM/SF @ 30 Pa

Water leakage PASS; NEGATIVE @ 50 Pa

New window; NEGATIVE up to 170 Pa

Testing – What passes, what fails?



# Details



## Details – What wood is best?

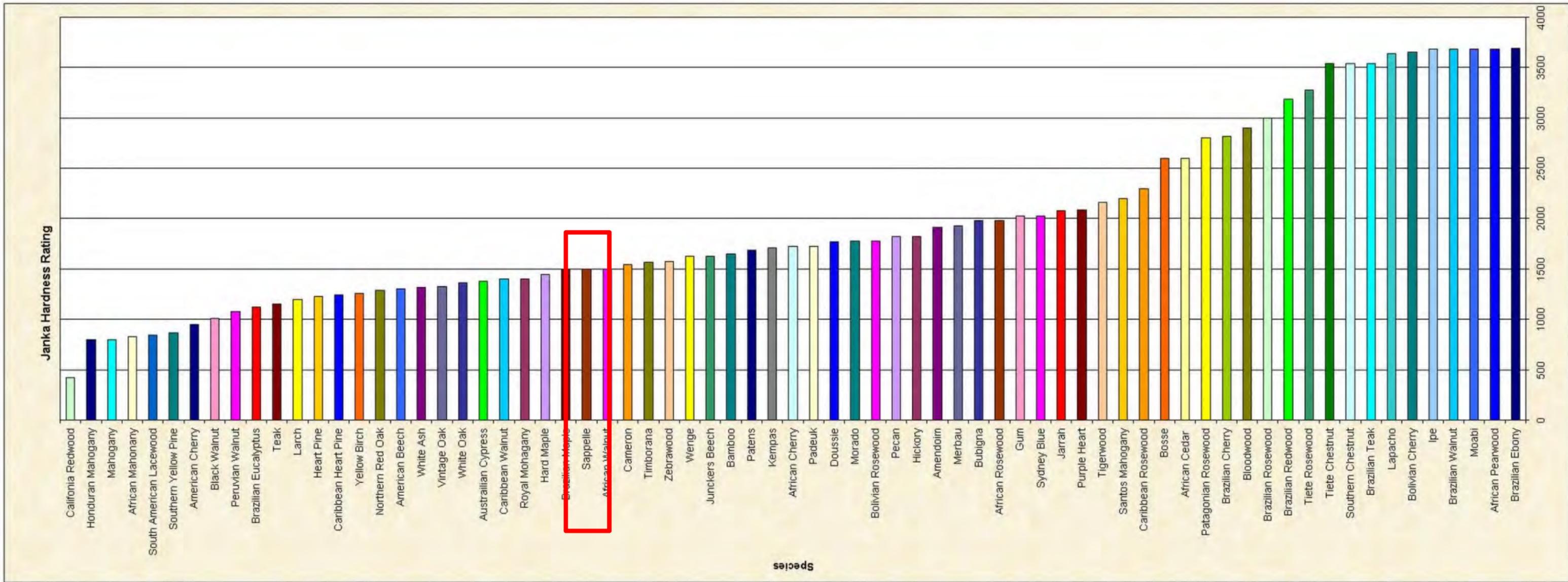
Cedrela odorata  
(Spanish Cedar)

Swietenia macrophylla  
(Honduran Mahogany)

Entandrophragma cylindricum  
(Sapele)

Details – What wood is best?

Entandrophragma cylindricum  
(Sapele)



Janka Hardness Rating – Sapele: 1510 lbs.



**AFRICA**

- ☆ National capital
- Major City
- International boundary

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Online Project

# Chain-of-Custody – FSC Wood

ahc  
craigimports

# Chain-of-Custody – FSC Wood



Importer of Record - Huntersville, NC

# Chain-of-Custody





Importer of Record - Huntersville, NC

Moisture Content

Off the ship 80%

Air dried 25%

# Chain-of-Custody



ahc  
craigimports

Importer of Record - Huntersville, NC

Moisture Content

Off the ship	80%
Air dried	25%
Kiln dried	8%



# Chain-of-Custody



Importer of Record - Huntersville, NC



Distributor – North Charleston, SC

## Chain-of-Custody – FSC Wood



Importer of Record - Huntersville, NC



Distributor – North Charleston, SC



Window Fabricator – Charleston, SC

## Chain-of-Custody – FSC Wood

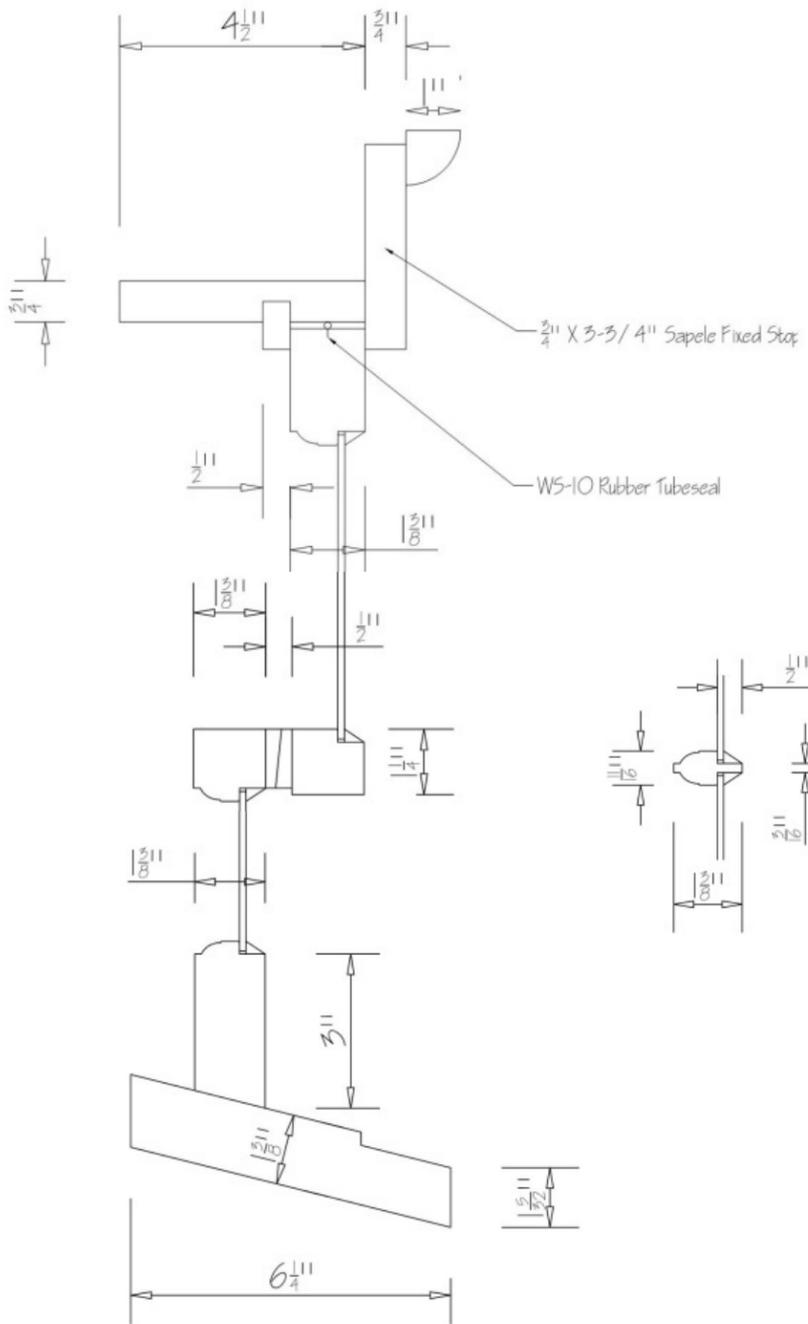
ahc  
craigimports



Distributor – North Charleston, SC



Window Fabricator – Charleston, SC  
• Shop Drawings

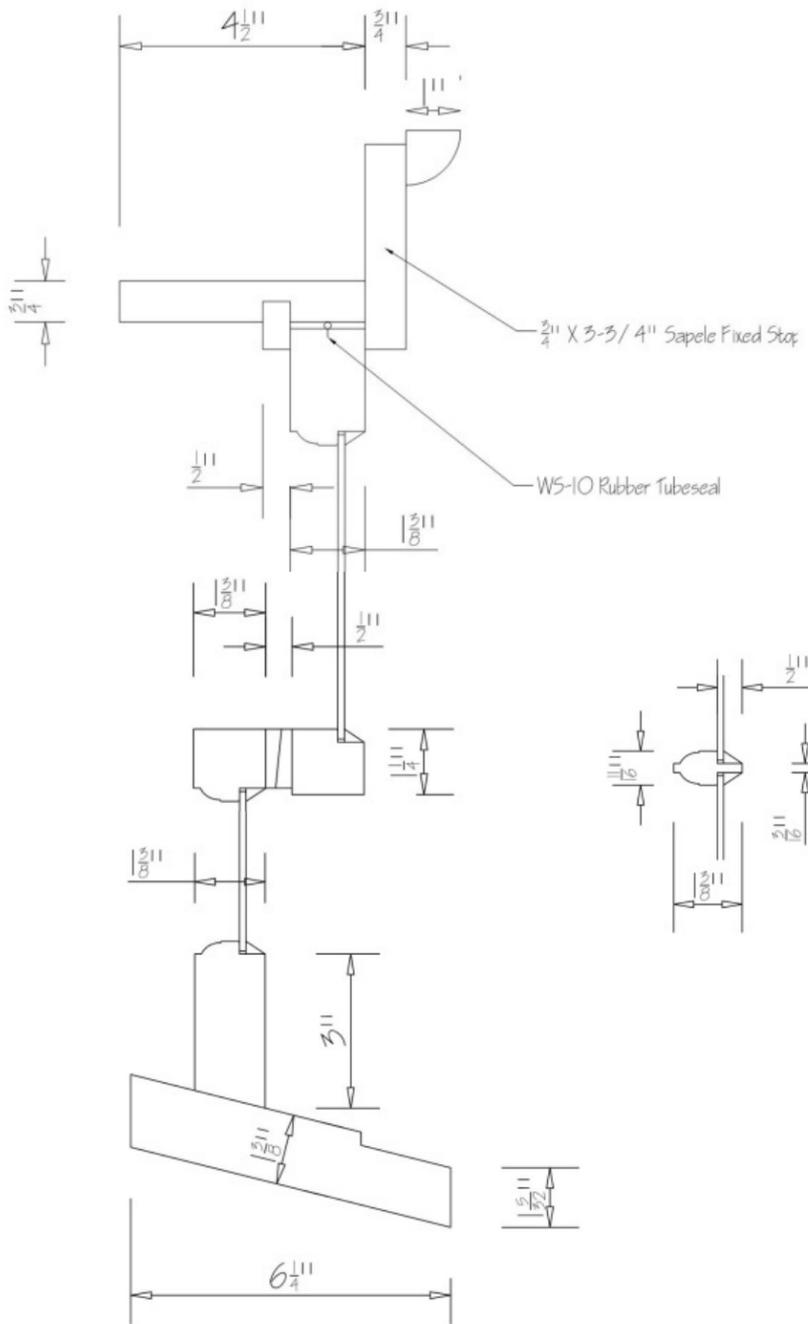


ahc  
craigimports

 WÜRTH



CUSTOM MILLWORK  
TURNINGS • SASH • DOORS



- Window Fabricator – Charleston, SC
- Shop Drawings
  - Glazing

ahc  
craigimports

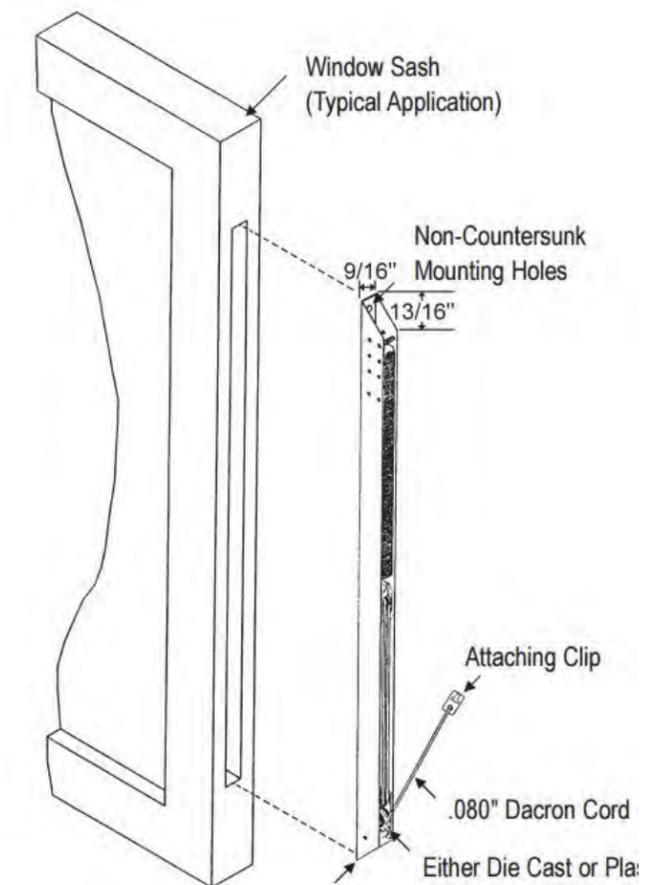
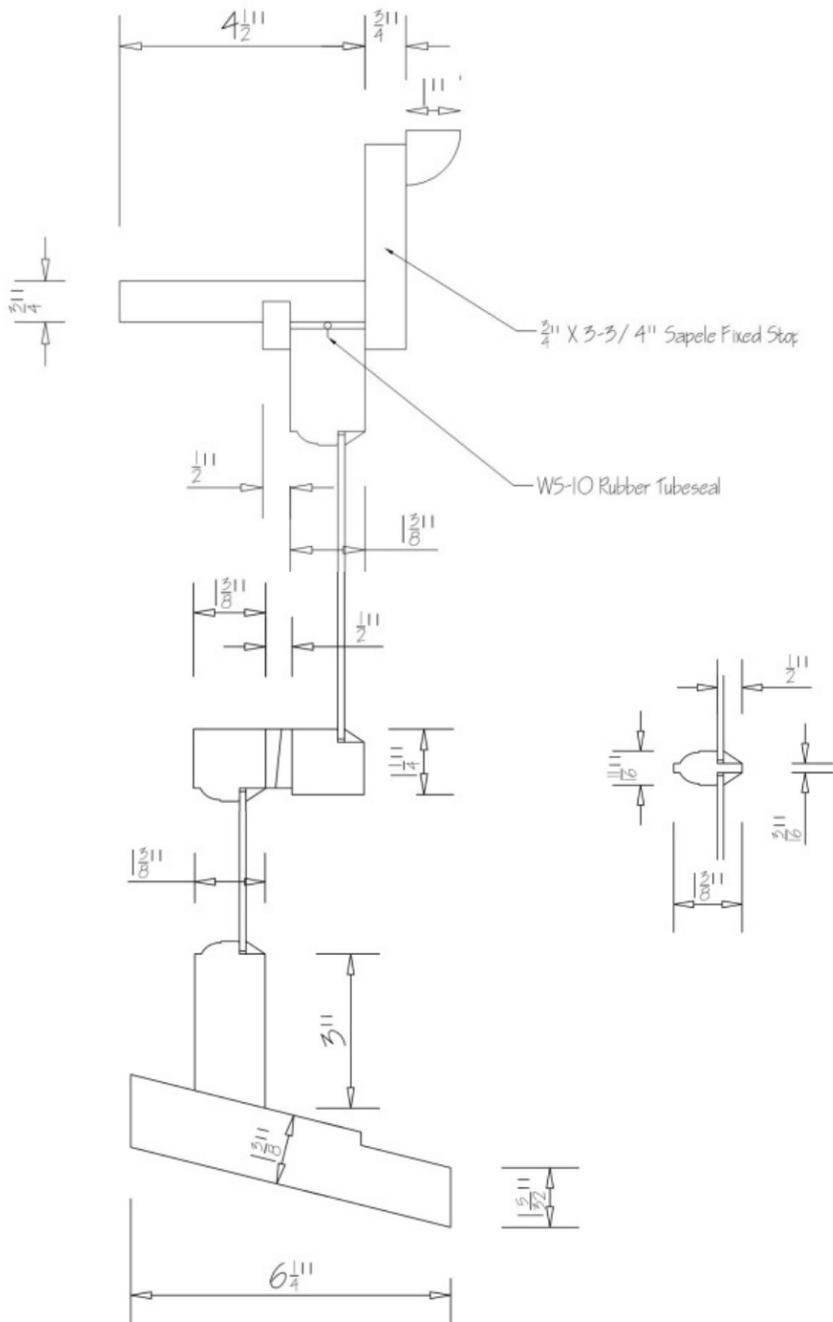
 WÜRTH



CUSTOM MILLWORK  
TURNINGS • SASH • DOORS

Window Fabricator – Charleston, SC

- Shop Drawings
- Glazing
- Unit Assembly





Importer of Record - Huntersville, NC



Distributor – North Charleston, SC



Window Fabricator – Charleston, SC



Window Subcontractor – Charleston, SC

## Chain-of-Custody – FSC Wood



Importer of Record - Huntersville, NC



Distributor – North Charleston, SC



Window Fabricator – Charleston, SC



Window Subcontractor – Charleston, SC



General Contractor – Columbia, SC

## Chain-of-Custody – FSC Wood



Importer of Record - Huntersville, NC



Distributor – North Charleston, SC



Window Fabricator – Charleston, SC



Window Subcontractor – Charleston, SC



General Contractor – Columbia, SC



Owner – Columbia, SC

# Chain-of-Custody – FSC Wood





# Installation







After



RUTLEDGE COLLEGE



RUTLEDGE  
COLLEGE

FDC







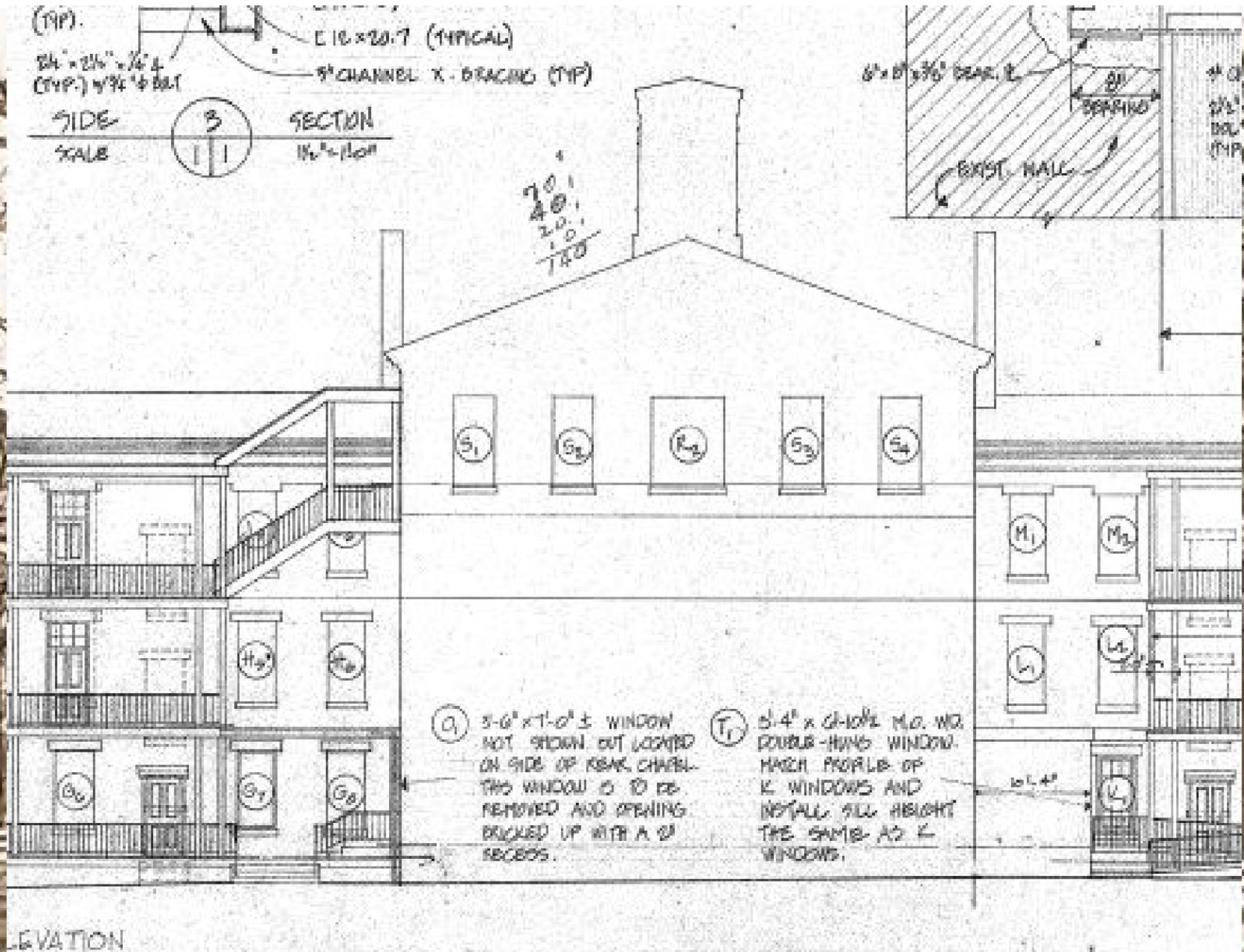
# Other Stories



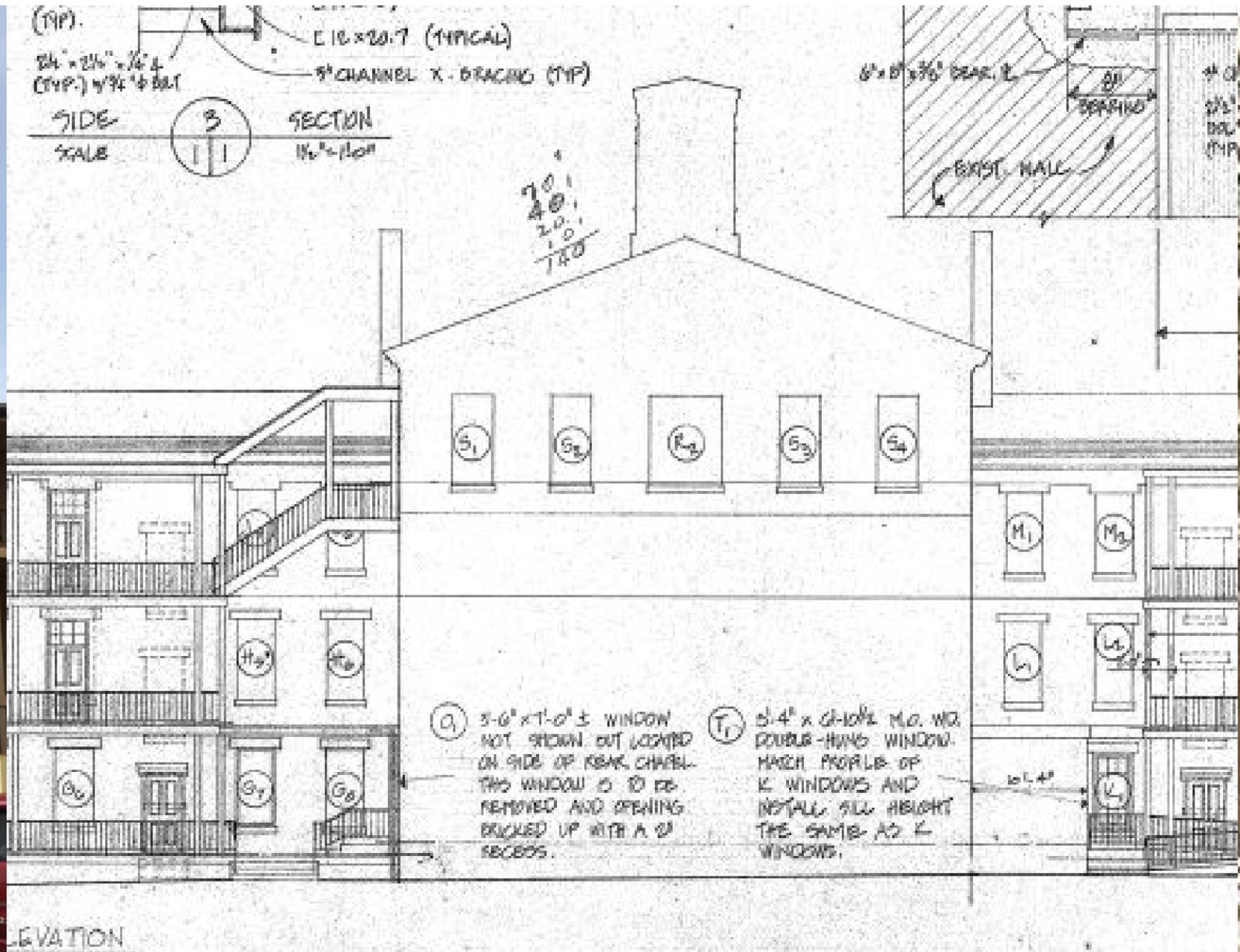
## Other Stories – Why is this floor sagging?



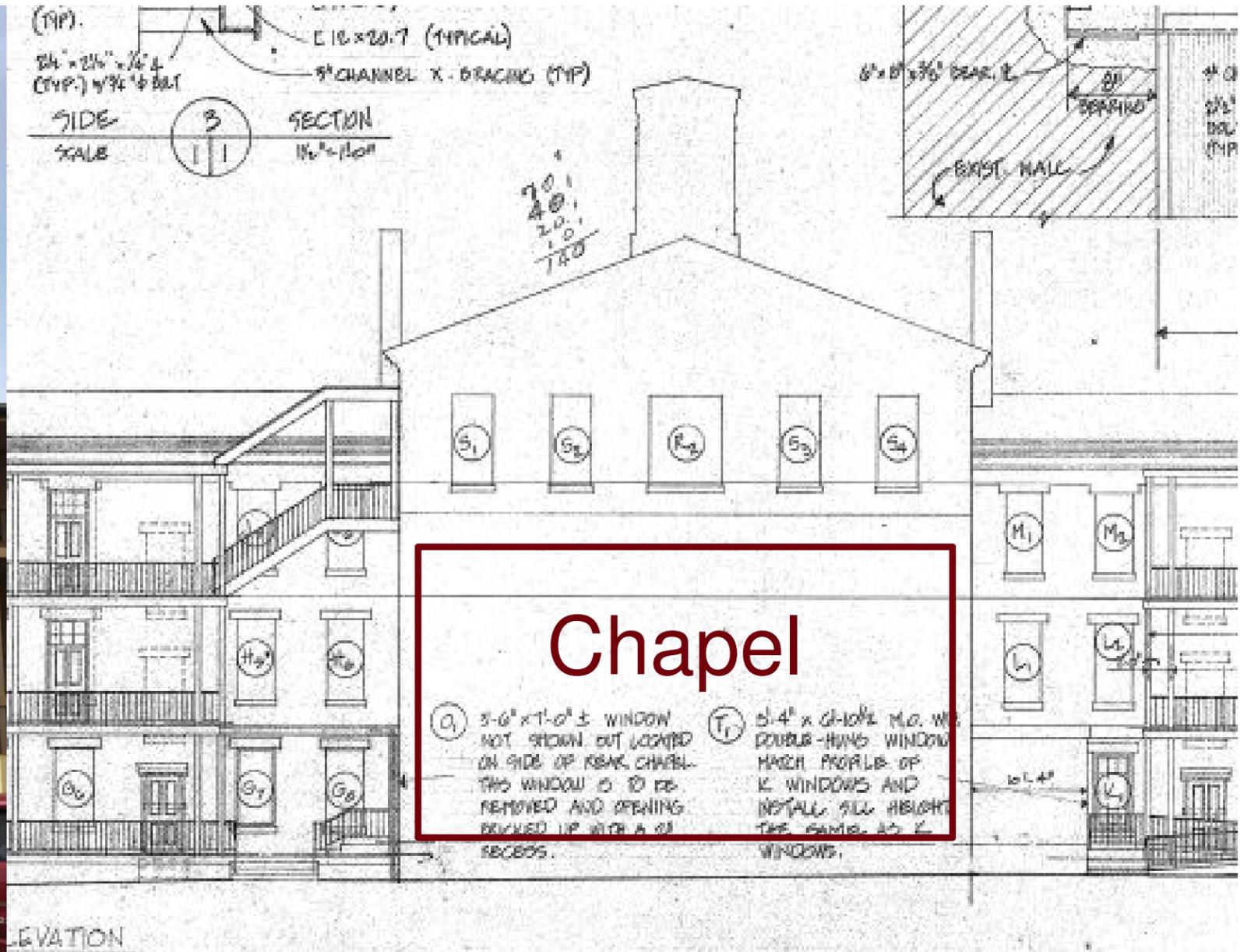
## Other Stories – What’s holding this floor up?



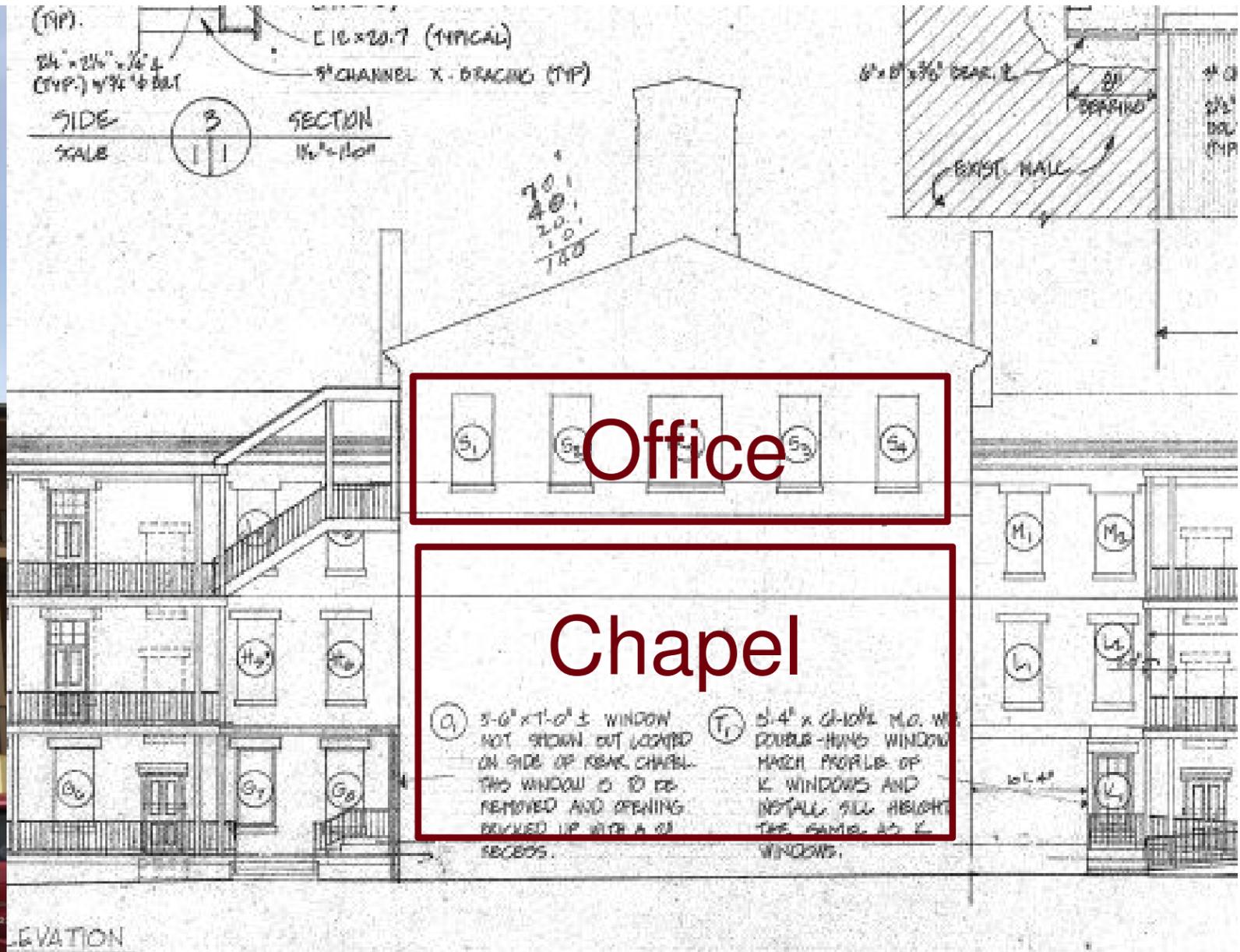
# Other Stories – What’s holding this floor up?



# Other Stories – What’s holding this floor up?



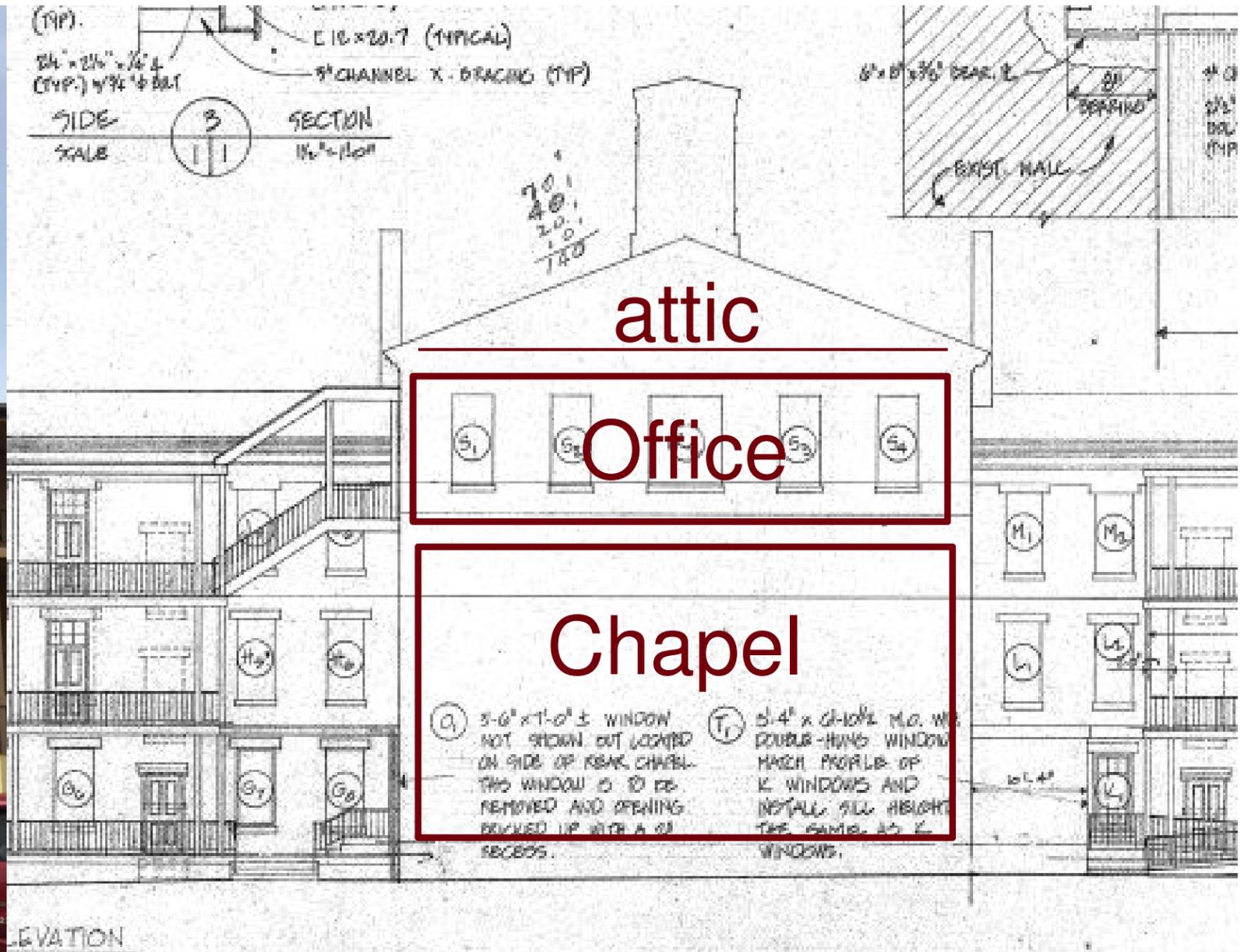
# Other Stories – What’s holding this floor up?



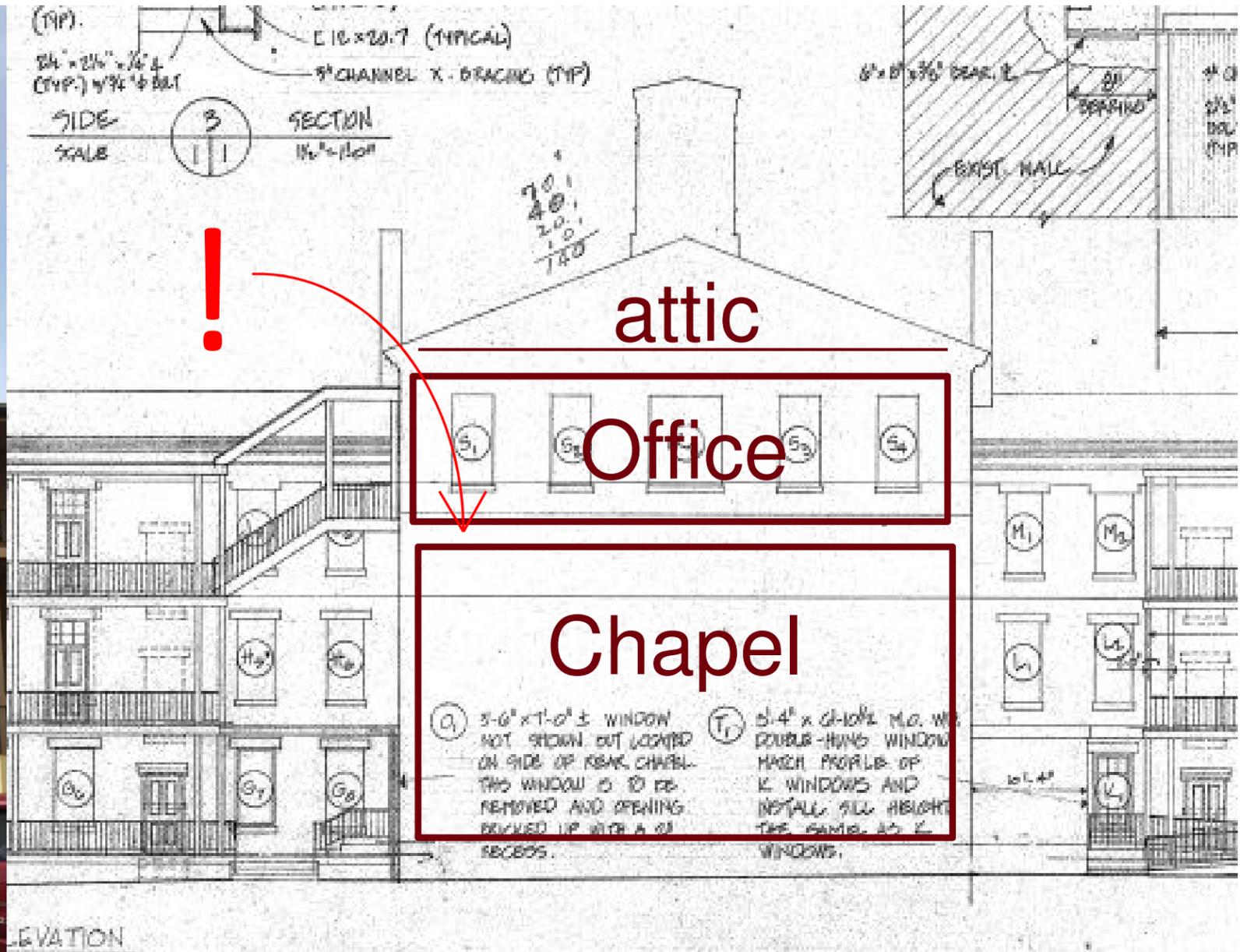
Office

Chapel

# Other Stories – What’s holding this floor up?



# Other Stories – What’s holding this floor up?

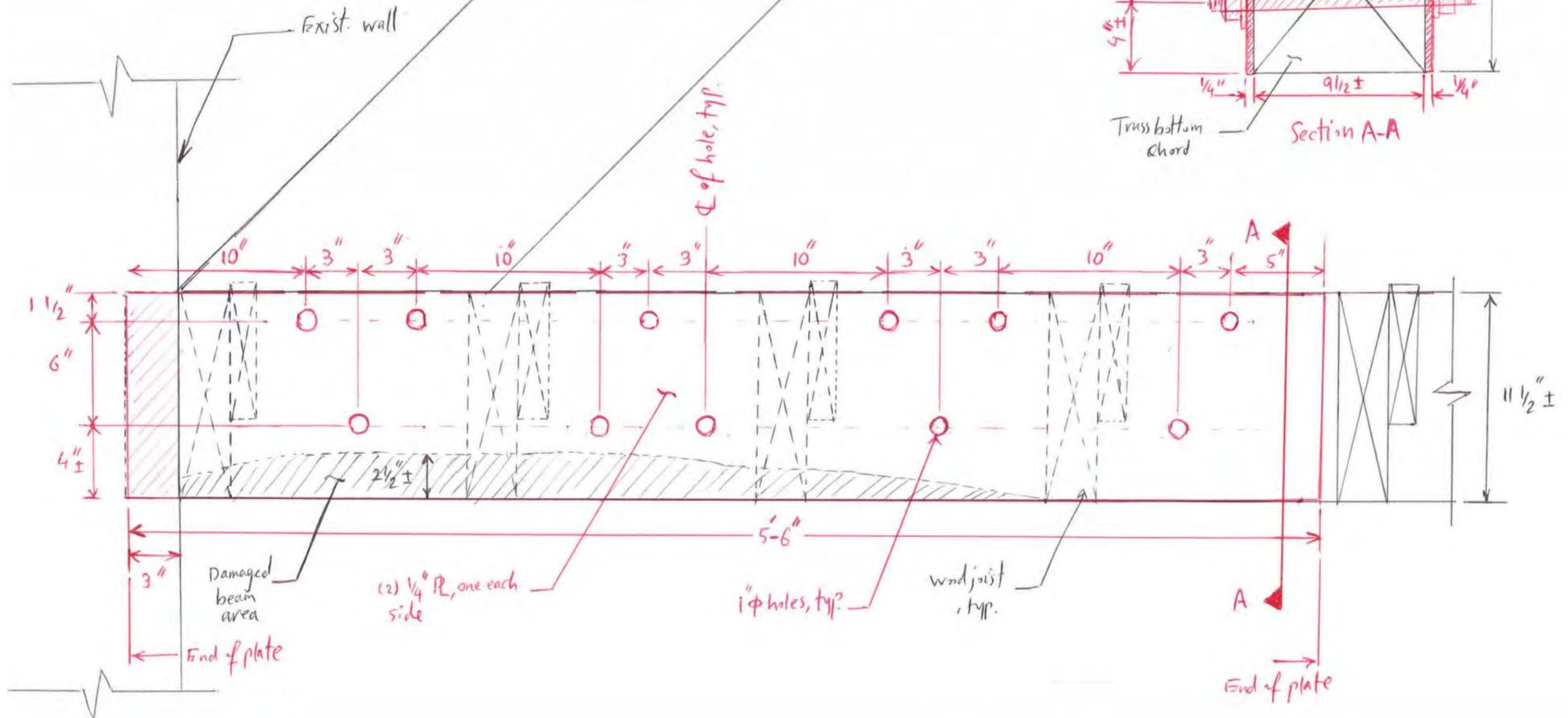
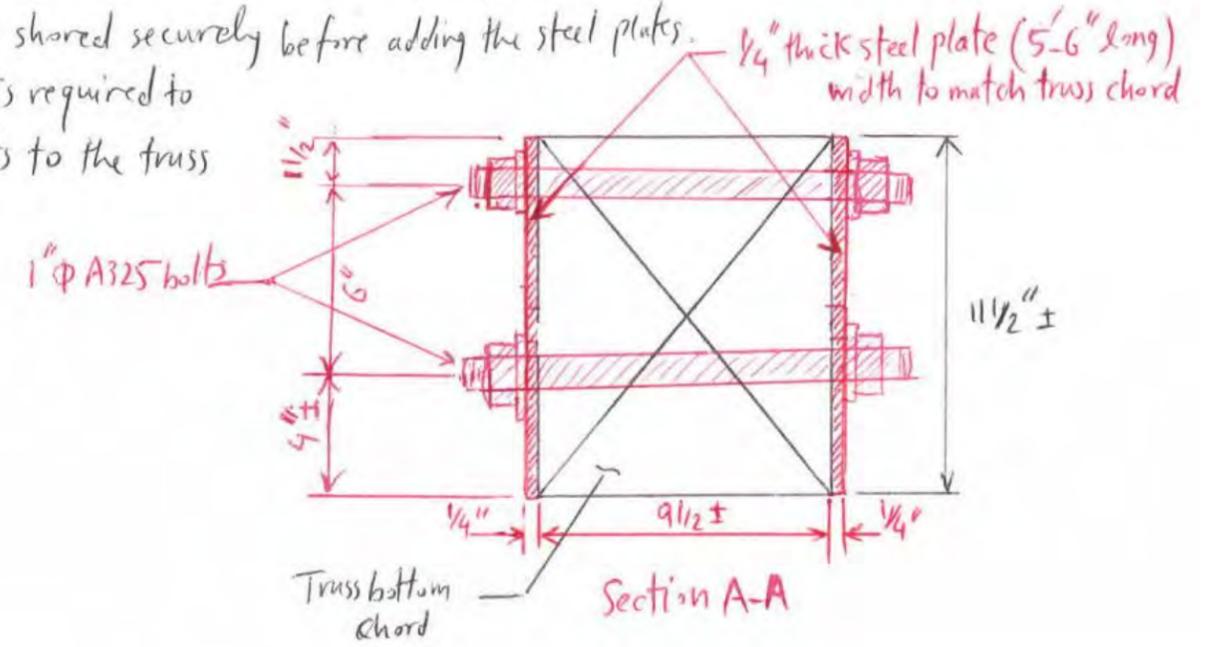
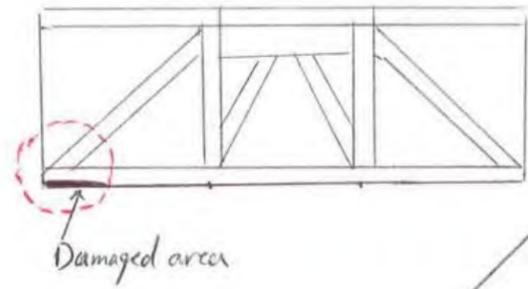


Other Stories – What’s holding this floor up?

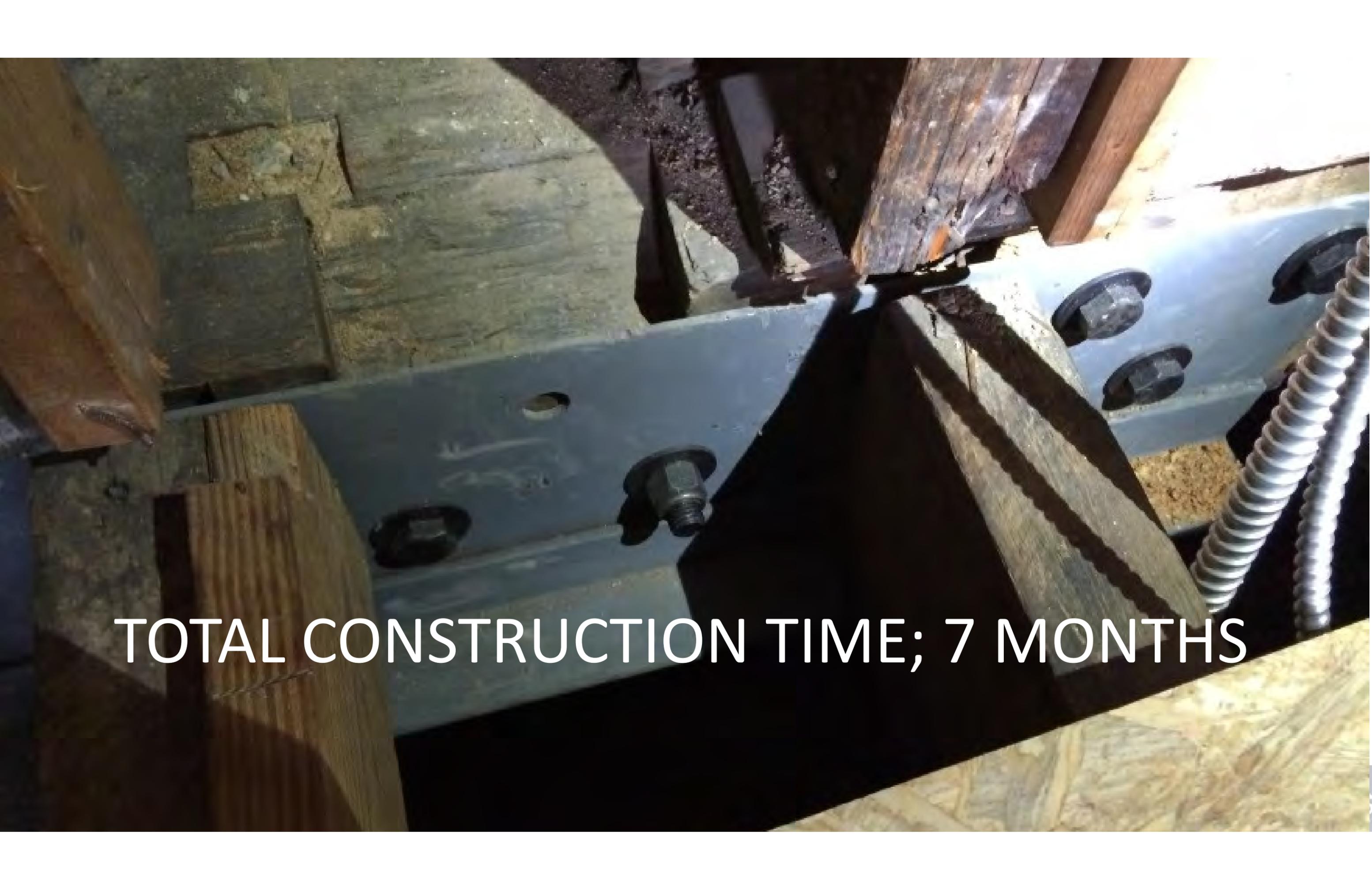




- Notes:
1. The dimensions shown with suffix "±" are approximate and shall be verified by the contractor.
  2. Steel plates shall be at least 3" embedded into the wall.
  3. Wood joists shall be shored securely before adding the steel plates.
  4. HU312, by Simpson is required to re-connect joists to the truss chord.







TOTAL CONSTRUCTION TIME; 7 MONTHS



TOTAL CONSTRUCTION TIME; 7 MONTHS  
TOTAL TRUSS REPAIR TIME; 7 MONTHS



## Other Stories – What's the foundation made of?





## Other Stories – There's no bearing wall?





## Other Stories – There's no crawlspace?







## Other Stories – Amazing Attic







# Acknowledgments



Thank you...Questions

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