

COMcheck-EZ Software Case Studies



What is COMcheck-EZ?

- **COMcheck-EZ is a computer program that can be used to demonstrate Commercial Energy Code Compliance**
- **The Software is self-contained**
 - **Energy Code book can be used as needed for reference only**
- **Relatively simple to use and very flexible**

What Do I Need to Know?

Information you need to use COMcheck-EZ:

- 1. General Understanding of Windows-based Computer Programs**
- 2. Basic Information about the Builder and Project to be Constructed**
- 3. Building Plans including Exterior Wall Areas, Glazing Areas, Roof/Ceiling Areas, Basement Wall Areas, etc.**
- 4. Insulation R-Values, NFRC Glazing and Door U-Values, etc.**
- 5. Lighting**
- 6. Heating and Cooling System Efficiencies**
- 7. Service Water Heating**

Components that Must Comply with the Energy Code

Building Envelope

- construction assembly (materials & insulation levels)
- windows, doors & skylights

Mechanical Systems

Service Water Heating

Lighting Systems

- Microsoft Outlook
- Software Analysis
- Adobe Reader 6.0
- ETR
- AOL for Broadband
- Internet
- Instant Messenger
- AdbeRdr60_...
- Netscape 7.1
- Microsoft Word
- Netscape Mail & Newsgroups
- RealOne Player
- Offline PopFon Setup Instr...
- VPN Setup



COMcheck-EZ™

DOE's Building Energy Codes Program
 Internet Address: www.energycodes.gov
 Technical Support: techsupport@becp.pnl.gov



OK

Office of Energy Efficiency and Renewable Energy * U.S. Department of Energy





File Edit View Options Code Help



- 90.1 (89) Code
- 90.1 (99) Standard
- 90.1 (2001) Standard
- 1998 IECC
- 2000 IECC
- ✓ 2001 IECC
- Colorado
- Georgia
- Louisiana
- Massachusetts
- Minnesota
- New York
- Vermont

Project Env

State Washington

City Richland

Building Use
 Whole Building

Area Category	
1	Click to select category.
2	
3	
4	
5	
6	
7	
8	
9	
10	

Total Area 0

Mechanical

Project Type
 New Construction Addition

Project Information
Project Name

Designer/Contractor

Document Author

Notes

Envelope TBD Lighting TBD

Expand the Screen like other programs.

Lets take a closer look at this area.



File Edit View Options Code Help

Project Env

State Washington

City Richland

Building Use

Whole Building

	Area Category		
1	Office	15849	1.5
2	Corridor, Restroom, Support	3838	0.8
3	Kitchen	505	2.2
4	Lobby - Other	340	1.0
5			
6			
7			
8			
9			
10			

Total Area 20532

- 90.1 (89) Code
- 90.1 (99) Standard
- 90.1 (2001) Standard
- 1998 IECC
- 2000 IECC
- 2001 IECC
- Colorado
- Georgia
- Louisiana
- Massachusetts
- Minnesota
- New York
- Vermont

Mechanical

Project Type

New Construction Addition

Project Information

Project Name

Sigma 4 Office Building
3170 George Washington Way

Designer/Contractor

Joe's Construction
George, Washington

Document Author

KRT

Notes

Existing construction major renovation with lighting design (existing fixtures and existing mechanical eq

- Title Bar
- Menu Bar
- Toolbar
- Make sure the correct code is chosen.



State:

City:

Building Use

Whole Building Area Category

	Area Category	Area	W/ft2
1	Office	15849	1.5
2	Corridor, Restroom, Support	3838	0.8
3	Kitchen	505	2.2
4	Lobby - Other	340	1.0
5			
6			
7			
8			
9			
10			

Total Area

Project Type

New Construction Addition

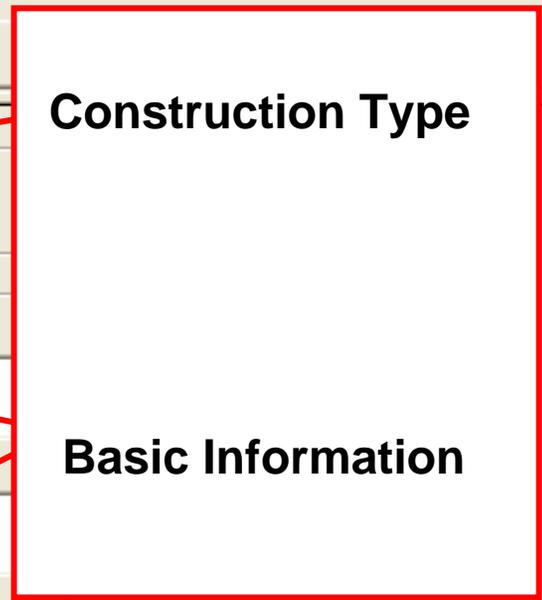
Project Information

Project Name

Designer/Contractor

Document Author

Notes





File Edit View Options Code Help



Project

Envelope

Lighting

Mechanical

State Washington

City Richland

Building

- Richland
- Richmond Highlands
- Ridgefield
- Ritzville
- Riverside (Okanogan)
- Rochester
- Rockford
- Rock Island
- Rosalia
- Roslyn
- Roy
- Royal City
- Ruston
- Saint John (Whitman)
- Salmon Creek
- Satus
- SeaTac
- Seattle
- Sedro-Woolley
- Selah
- Sequim
- Shelton
- Silverdale

Project Type

 New Construction Addition

Project Information

Project Name

Sigma 4 Office Building
3170 George Washington Way

Designer/Contractor

Joe's Construction
George, Washington

Document Author

KRT

Notes

Existing construction major renovation with lighting design (existing fixtures and existing mechanical eq



Project Envelope Lighting Mechanical

Four Main Screens

State Washington
City Richland

Project Type
 New Construction Addition

Building Use
Whole Bldg. or
Area Category

Building Use
 Whole Building Area Category

Project Information
Project Name
Sigma 4 Office Building
3170 George Washington Way

	Area Category	Area	W/ft2
1	Office	15849	1.5
2	Corridor, Restroom, Support	3838	0.8
3	Kitchen	505	2.2
4	Lobby - Other	340	1.0
5			
6			
7			
8			
9			
10			

Designer/Contractor
Joe's Construction
George, Washington

Document Author
KRT

Notes
Existing construction major renovation with lighting design (existing fixtures and existing mechanical eq

Compliance Results:

Total Area 20532

Envelope +22% Lighting -10%



Project

Envelope

Lighting

Mechanical

Roof

Skylight

Ext. Wall

Int. Wall

Window

Door

Basement

Floor

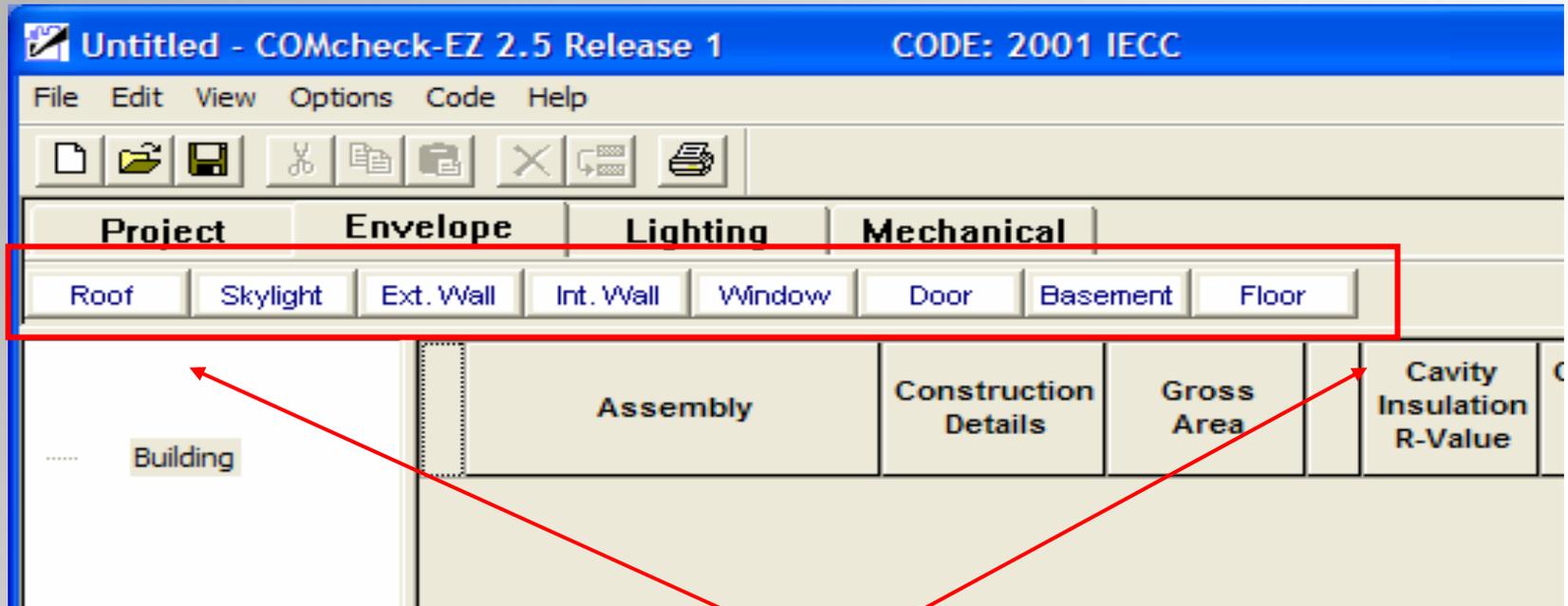
Building
Roof 1
Exterior Wall 1
Window 1
Door 1
Door 2
Floor 1

	Assembly	Construction Details	Gross Area or Slab Perimeter		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
1	Non-Wood Joist/Rafter/Truss		20532	ft2	19.0	8.0	0.040		
2	Metal Frame, 16" o.c.		8172	ft2	10.0	0.0	0.145		
3							0.690	0.57	0.50
4							0.920	0.47	0.00
5							0.700		
6									

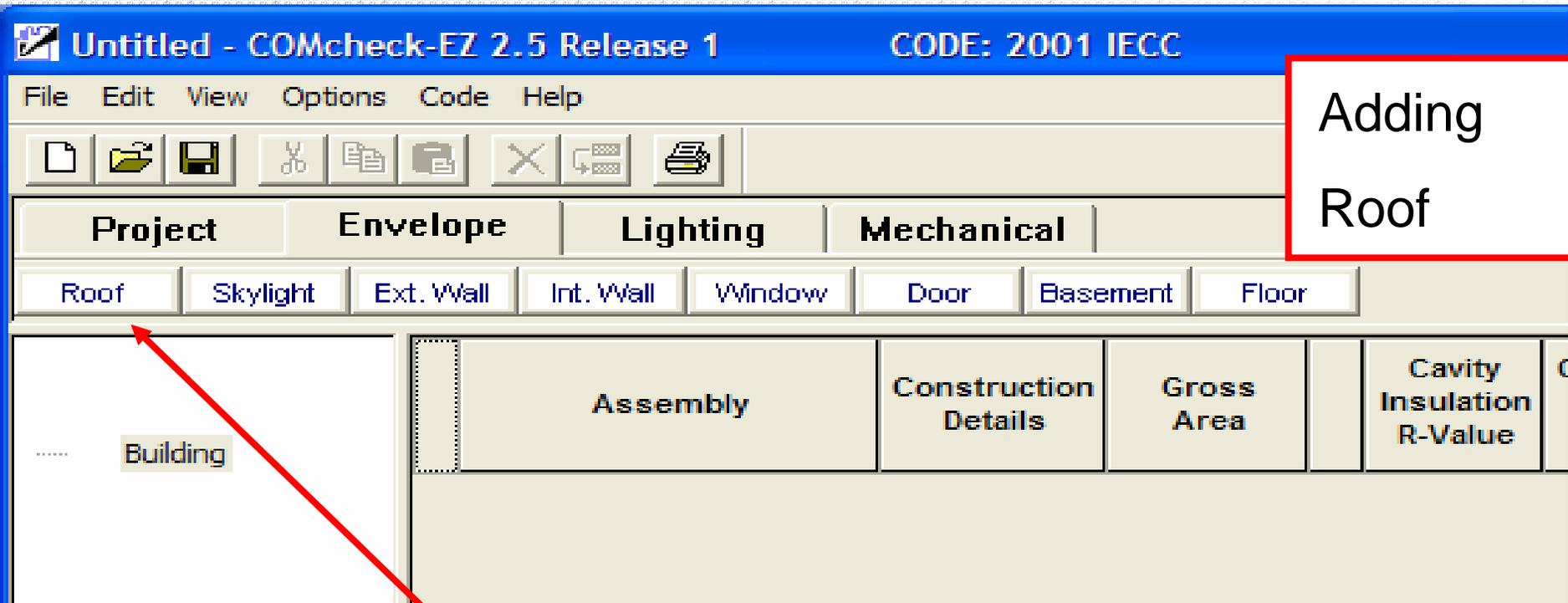
Main Building Envelope

1. This is where you add square footage values for roofs, exterior walls, windows, etc.
2. This is where you add U-factors and R-values for ceilings, exterior walls, windows etc.
3. Continuous insulation is entered separately from cavity insulation.

Envelope Section



Building Components are added by clicking on these.



Adding
Roof

Step 1:
Click on Roof



Adding
Roofs

Project Envelope Lighting Mechanical

Roof Skylight Ext. Wall Int. Wall Window Door Basement Floor

Assembly	Construction Details	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
		0	ft2				

- All-Wood Joist/Rafter/Truss
- Non-Wood Joist/Rafter/Truss
- Structural Slab
- Metal Roof without Thermal Blocks
- Metal Roof with Thermal Blocks
- Other

Step 2:
Select Roof Type (This can be repeated so that different roof types and any number of skylights can be added individually.)

Untitled - COMcheck-EZ 2.5 Release 1 CODE: 2001 IECC

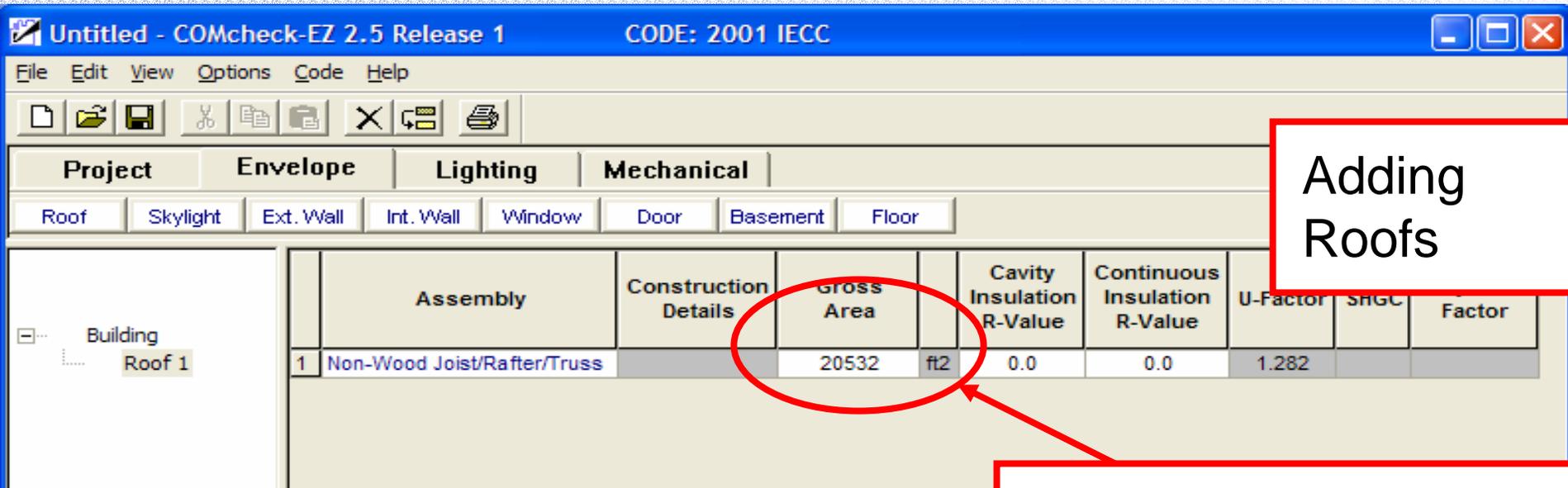
File Edit View Options Code Help

Project Envelope Lighting Mechanical

Roof Skylight Ext. Wall Int. Wall Window Door Basement Floor

Building
 Roof 1

	Assembly	Construction Details	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Factor
1	Non-Wood Joist/Rafter/Truss		20532	ft2	0.0	0.0	1.282		



Adding
Roofs

Step 3:

Add square footage (In this case 20532 square feet)

Untitled - COMcheck-EZ 2.5 Release 1 CODE: 2001 IECC

File Edit View Options Code Help

Project Envelope Lighting Mechanical

Roof Skylight Ext. Wall Int. Wall Window Door Basement Floor

	Assembly	Construction Details	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
1	Non-Wood Joist/Rafter/Truss		20532	ft2	19.0	8.0	0.040		

Adding
Roofs

Step 4:
Add insulation R-Value (R-19 cavity and R-8.0 continuous in this example)

Adding Roofs

Untitled - COMcheck-EZ 2.5 Release 1 CODE: 2001 IECC

File Edit View Options Code Help

Project Envelope Lighting Mechanical

Roof **1** light Ext. Wall Int. Wall Window Door Basement Floor

Assembly	Construction Details	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
1 Non-Wood Joist/Rafter/Truss		20532 ft2	19.0	8.0	0.040		

Building
Roof 1

3 4

- Step 1: Click on "Roof"
- Step 2: Select Roof type
- Step 3: Add square footage
- Step 4: Add insulation R-Value

Adding Exterior Walls

Assembly	Construction Details	Gross Area or Slab Perimeter	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
1 Non-Wood Joist/Rafter/Truss		20532 ft2	19.0	8.0	0.040		
2 Metal Frame, 16" o.c.		8172 ft2	10.0	0.0	0.145		
3 Metal Frame, Double Pane	Glazing: Tinted	998 ft2			0.690	0.57	0.50
4 Glass	Glazing: Clear	12 ft2			0.920	0.47	0.00
Wood Frame, 16" o.c.		21 ft2			0.700		
Wood Frame, 24" o.c.		0 ft2			0.000		
Steel Frame, 16" o.c.		681 ft					
Steel Frame, 24" o.c.							
Solid Concrete or Masonry							
Masonry Block with Empty Cells							
Central Insulation							
...							
...							

1

2

3

4

Exterior walls, windows and doors can be added as a total sum or each exposure can be added separately

- Step 1: Click on "Wall"
- Step 2: Choose Assembly
- Step 3: Add square footage
- Step 4: Add the R-Values



File Edit View Options Code Help



Project Envelope Lighting Mechanical
Roof Skylight Ext. Wall Int. Wall Window Door Basement Floor

Adding Windows

Building
Roof 1
Exterior Wall 1
Window 1
Door 1
Door 2
Floor 1

	Assembly	Construction Details	Gross Area or Slab Perimeter	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	SHGC	Projection Factor
1	Non-Wood Joist/Rafter/Truss		20532 ft2	19.0	8.0	0.040		
2	Metal Frame, 16" o.c.		8172 ft2	10.0	0.0	0.145		
3	Metal Frame, Double Pane	Glazing: Tinted	998 ft2			0.690	0.57	0.50
4	Metal Frame					0.920	0.47	0.00
5	Metal Frame with Thermal Break					0.700		
6	Wood Frame							
7	Vinyl Frame							
8	Other							

- Metal Frame
 - Single Pane
 - Double Pane
 - Double Pane with Low-E
- Metal Frame with Thermal Break
 - Triple Pane
 - Triple Pane with Low-E
- Wood Frame
- Vinyl Frame
- Other

Basement Walls

Assembly	Construction Details	Gross Area or Slab Perimeter	Cavity Insulation R-Value	Continuous Insulation R-Value	U-F
1 Non-Wood Joist/Rafter/Truss		20532 ft2	19.0	8.0	0.040
2 Metal Frame, 16" o.c.		8172 ft2	10.0	0.0	0.145
3 Metal Frame, Double Pane	Glazing: Tinted	998 ft2			0.690 0.57 0.50
4 Glass	Glazing: Clear	126 ft2			0.920 0.47 0.00
5 Opaque		21 ft2			0.700
6		0 ft2			
7	Solid Concrete or Masonry <= 8"	681 ft			

- Solid Concrete or Masonry <= 8"
- Solid Concrete or Masonry > 8"
- CMU <=8" with Empty Cells
- CMU >8" with Empty Cells
- CMU <=8" with Integral Insulation
- CMU >8" with Integral Insulation
- Other

Basement Walls



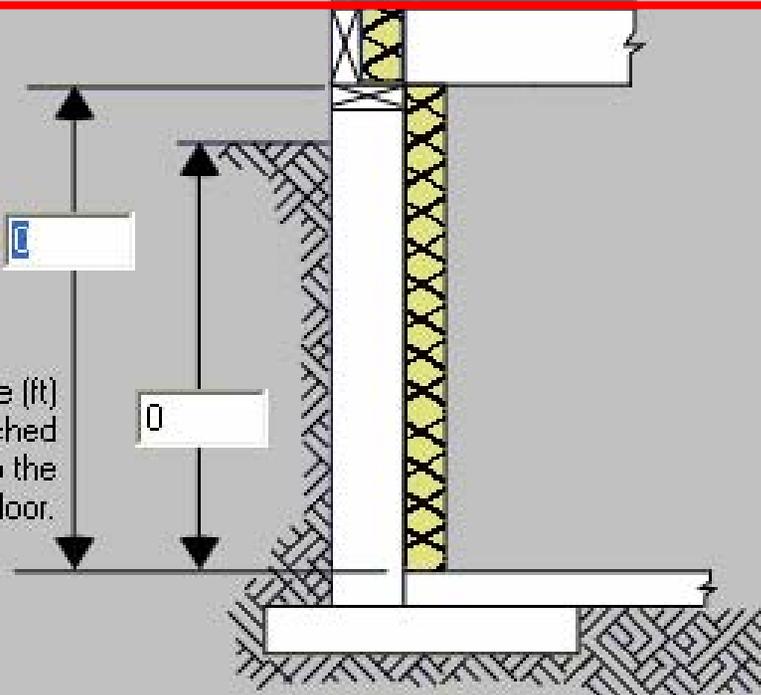
Enter the specified dimensions in feet (not inches) in the boxes provided. Basement walls are walls that are partially or fully below grade. Ignore portions of walls that are more than 10 ft below grade.

1

Wall Height (ft)
Measured from the
top of the wall to the
basement floor.

2

Depth Below Grade (ft)
Measured from the finished
outside grade to the
basement floor.



OK

Cancel

Adding Floors

Assembly	Construction Details	Gross Area or Slab Perimeter	Cavity Insulation R-Value	Continuous Insulation R-Value	U-F
1 Non-Wood Joist/Rafter/Truss		20532 ft2	19.0	8.0	0.040
2 Metal Frame, 16" o.c.		8172 ft2	10.0	0.0	0.145
3 Metal Frame, Double Pane	Glazing: Tinted	998 ft2			0.690 0.57 0.50
4 Glass	Glazing: Clear	126 ft2			0.920 0.47 0.00
5 Opaque		21 ft2			0.700
6 Unheated Slab-On-Grade	Insulation: None	681 ft			

- No Insulation
- Horizontal Insulation ▶
 - 1 ft
 - 2 ft
 - 3 ft
 - 4 ft
 - Continuous
- Vertical Insulation ▶

Slab-On-Grade should be entered in linear feet



File Edit View Options Code Help



Project Envelope Lighting Mechanical

T8 / T12 Fluor. Compact Fluor. HID Incandescent

- Building
 - T8 / T12 Fluorescent 1
 - T8 / T12 Fluorescent 6
 - T8 / T12 Fluorescent 3
 - T8 / T12 Fluorescent 4
 - T8 / T12 Fluorescent 2

Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
1 A	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	4	174	139
2 B	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	31	70
3 C	1 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	5	70
4 D	2 x 2 Prismatic Troffer	24" T12U 40W	Magnetic	2	53	70
5 E	2 x 4 Prismatic Troffer	48" T12 40W	Magnetic	2	11	70

Lighting components are added by clicking on these

Lighting Results

Allowed Wattage 28295

Proposed Wattage 31186



File Edit View Options Code Help

Comments/Description (Envelope)

Orientation (Envelope)

Daylight Control Factor (Envelope)

Spaces (Lighting)

Exemptions and Allowances (Lighting)

Project

T8 / T12 Fluor.

Mechanical

ent

Building	Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
T8 / T12 Fluorescent 1	1 A	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	4	174	139
T8 / T12 Fluorescent 5	2 B	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	31	70
T8 / T12 Fluorescent 3	3 C	1 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	5	70
T8 / T12 Fluorescent 4	4 D	2 x 2 Prismatic Troffer	24" T12U 40W	Magnetic	2	53	70
T8 / T12 Fluorescent 2	5 E	2 x 4 Prismatic Troffer	48" T12 40W	Magnetic	2	11	70

Lighting Options:
Spaces
Exemptions and Allowances

Allowed Wattage 28295

Proposed Wattage 31186

Envelope +22% Lighting -10%



Project Envelope Lighting Mechanical

T8 / T12 Fluor. Compact Fluor. HID Incandescent **Add Space**

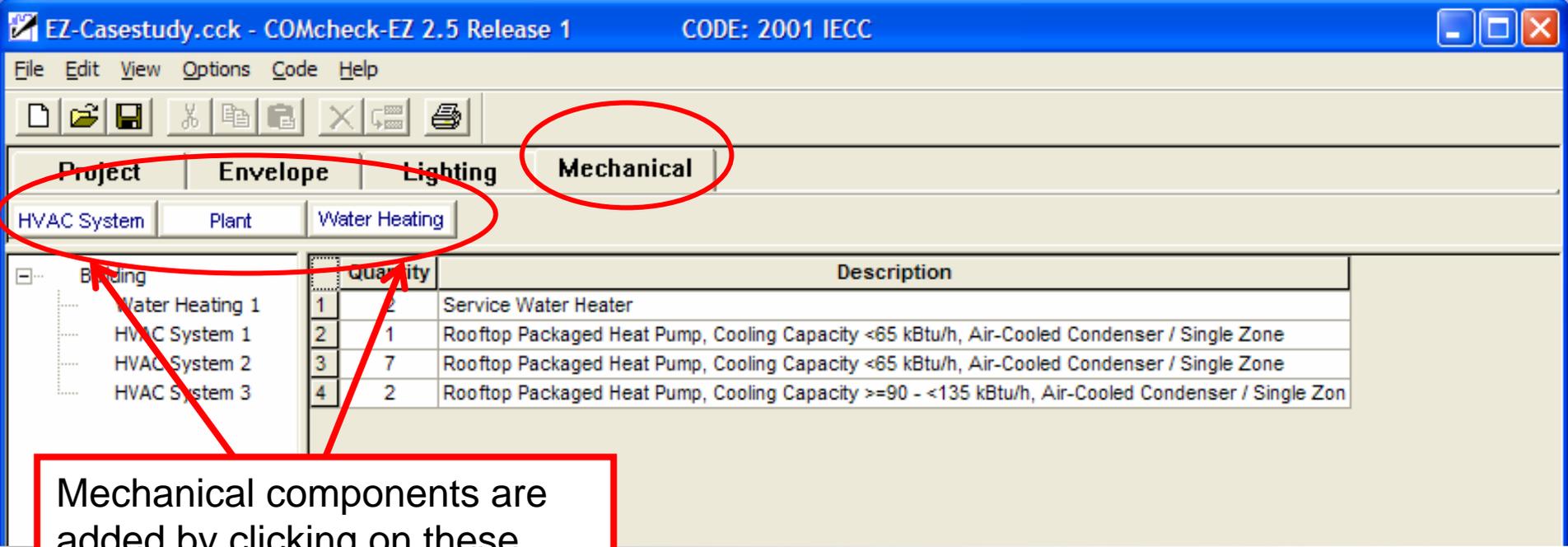
Building

- Space 1
 - T8 / T12 Fluorescent 1
 - T8 / T12 Fluorescent 6
 - T8 / T12 Fluorescent 3
 - T8 / T12 Fluorescent 4
 - T8 / T12 Fluorescent 2

Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage	Exemption Allowance	
1	Space 1							
2	A	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	4	174	139	None
3	B	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	31	70	None
4	C	1 x 4 Parabolic Troffer	48" T12 40W					
5	D	2 x 2 Prismatic Troffer	24" T12U 40W					
6	E	2 x 4 Prismatic Troffer	48" T12 40W					

- None
- Special Medical/Dental/Research
- Professional Sports Arena Playing Field
- Gallery/Museum/Monument Exhibits
- Lighting in Residential Dwelling Units
- Emergency Lighting (Automatic Control)

Allowed Wattage 28295 Proposed Wattage 31186



The Mechanical section generates a customized list of mandatory requirements applicable to the mechanical components you identify.

Mechanical System Description Wizard



Equipment Type Selection

Heating Equipment Type: _____

- None
- Central Furnace
- Duct Furnace
- Hydronic or Steam Coil
- Heat Pump
- Radiant Heater
- Unit Heater
- Other

Cooling Equipment Type: _____

- None
- Field-Assembled DX System
- Hydronic Coil
- Packaged Terminal DX Unit
- Rooftop Package DX Unit
- Split DX System
- Other

Zoning Category: _____

- Single Zone Perimeter System
- Multiple-Zone Perimeter System

Help

« Previous

Next »

Finish

File Edit View Options Code Help

- New Ctrl+N
- Open... Ctrl+O
- Save Ctrl+S
- Save As...
- Print Report... Ctrl+P
- Print Preview
- Print Setup...
- Save Report...
- 1 EZ-Casestudy.cck
- 2 F:\Tasks\...\MDPC.cck
- 3 F:\Tasks\...\Destin Store.cck
- 4 Riverhead store.cck
- Exit

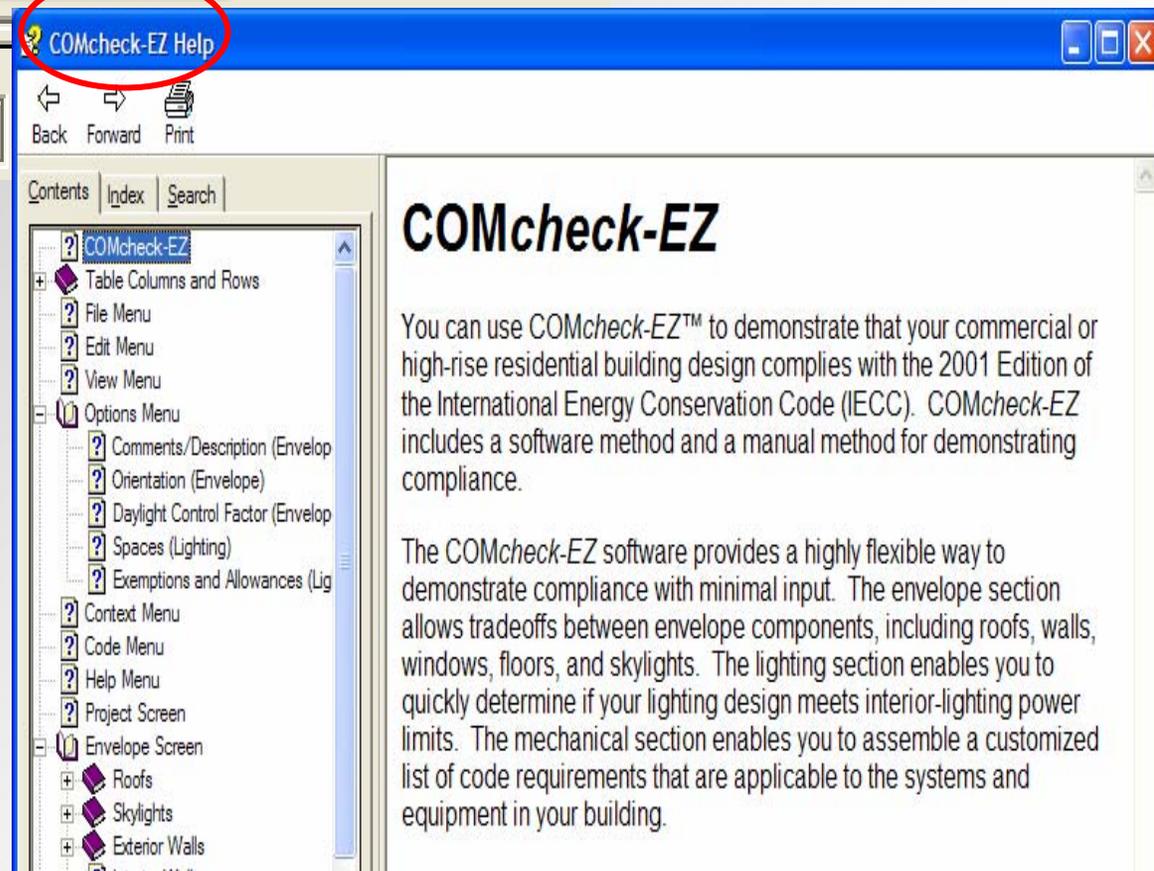
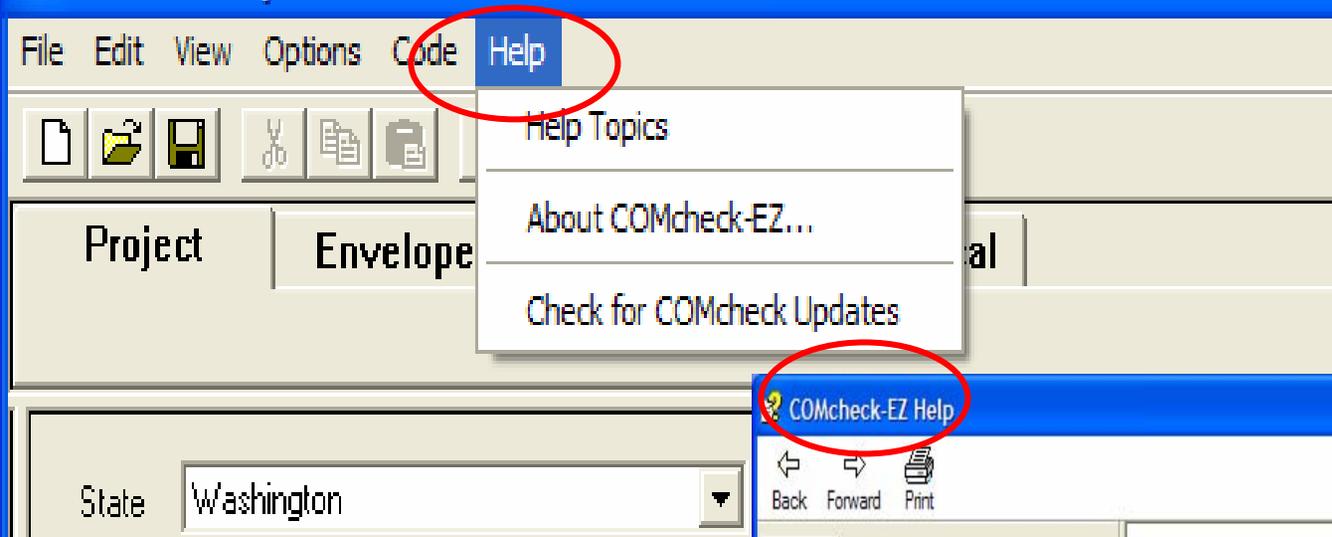
			W/ft2
			1.5
2	Corridor, Restroom, Support	3838	0.8
3	Kitchen	505	2.2
4	Lobby - Other	340	1.0
5			
6			
7			
8			

Save as many files as you like

Print and Preview reports

Last files worked on are here

Need Help?



•Sigma 2 Bldg. Floor Plan



Window/ Door Schedule

D1	6' x 7' Glass Entry Door - single pane tinted	3
D2	3' x 7' Opaque Entry Door	1
W1	3'0" x 4'6" aluminum, double paned, solar bronzed tint	48
W2	8'0" x 7'0" aluminum, double paned, solar bronzed tint	4
W3	6'0" x 7'0" aluminum, double paned, solar bronzed tint	3

•Sigma 2 Bldg. Building Envelope

Roof: 20,532 sq.ft. Wood truss R-19
Insulation

Exterior Walls: 8172 sq.ft. 2 X 4 Metal
Frame at 16" O.C., R-10 Insulation

Walls Perimeter = 681 In. ft.

Windows: 998 sq.ft. Metal Frame,
double pane, tinted, U-value .69,
SHGC-Value .57, P.F. .50

Window/Wall Ratio = 12%

Glass Doors: 126 sq. ft. Clear Glazing,
U-value .92, SHGC-Value .47

Metal Door: 21 s.f. U-value .70

Floor: 20,532 sq. ft./681 linear
feet, unheated slab on grade, no
insulation

2 Storage Water Heaters,
Electric, 80 gal. capacity

Activity Areas

Office: 15,849 sq.ft.

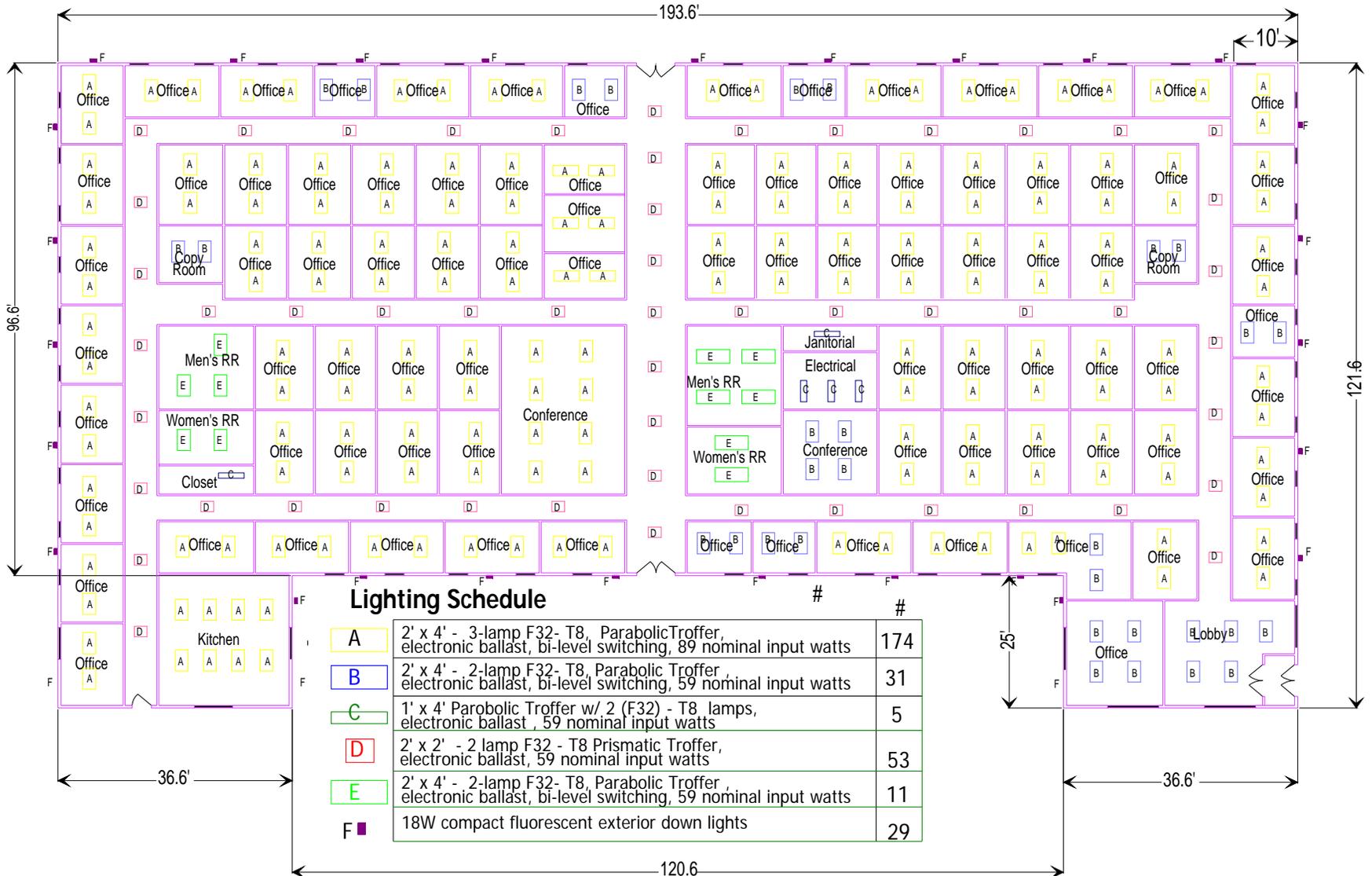
Halls/Corridors/Transitions:
3338 sq.ft.

Restrooms: 500 sq.ft.

Kitchen: 505 sq.ft.

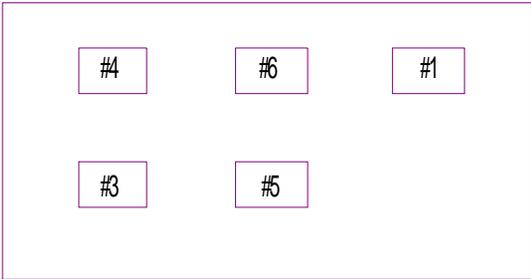
Lobby: 340 sq.ft.

•Sigma 2 Bldg. Lighting Plan – Existing Lighting

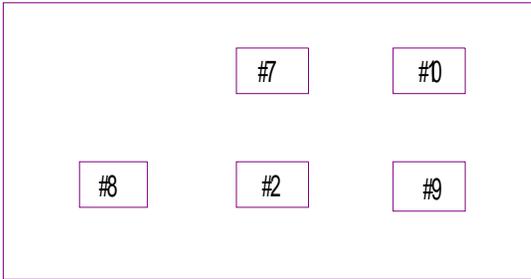


•Sigma 2 Bldg. Mechanical Plan

Unit 6
Carrier Heatpump
Rooftop Packaged Unit
Model #50RQ008600KB
Cooling Capacity = 7-1/2 tons
Heating Output = 88,000 Btu/hr
Electric Resistance Heat

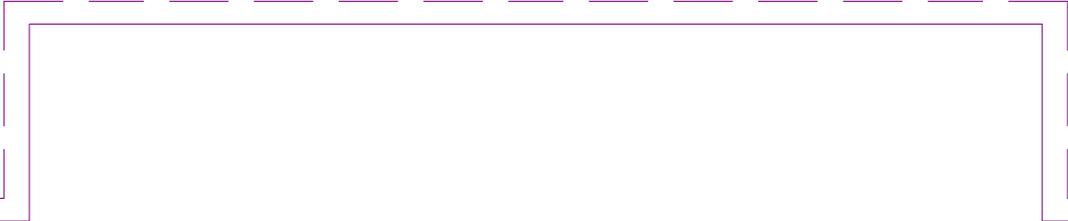


Unit 10
Carrier Heatpump
Rooftop Packaged Unit
Model #50VQ0030300
Cooling Capacity = 2-1/2 tons
Heating Output = 30,000 Btu/hr
Airflow = 938 CFM

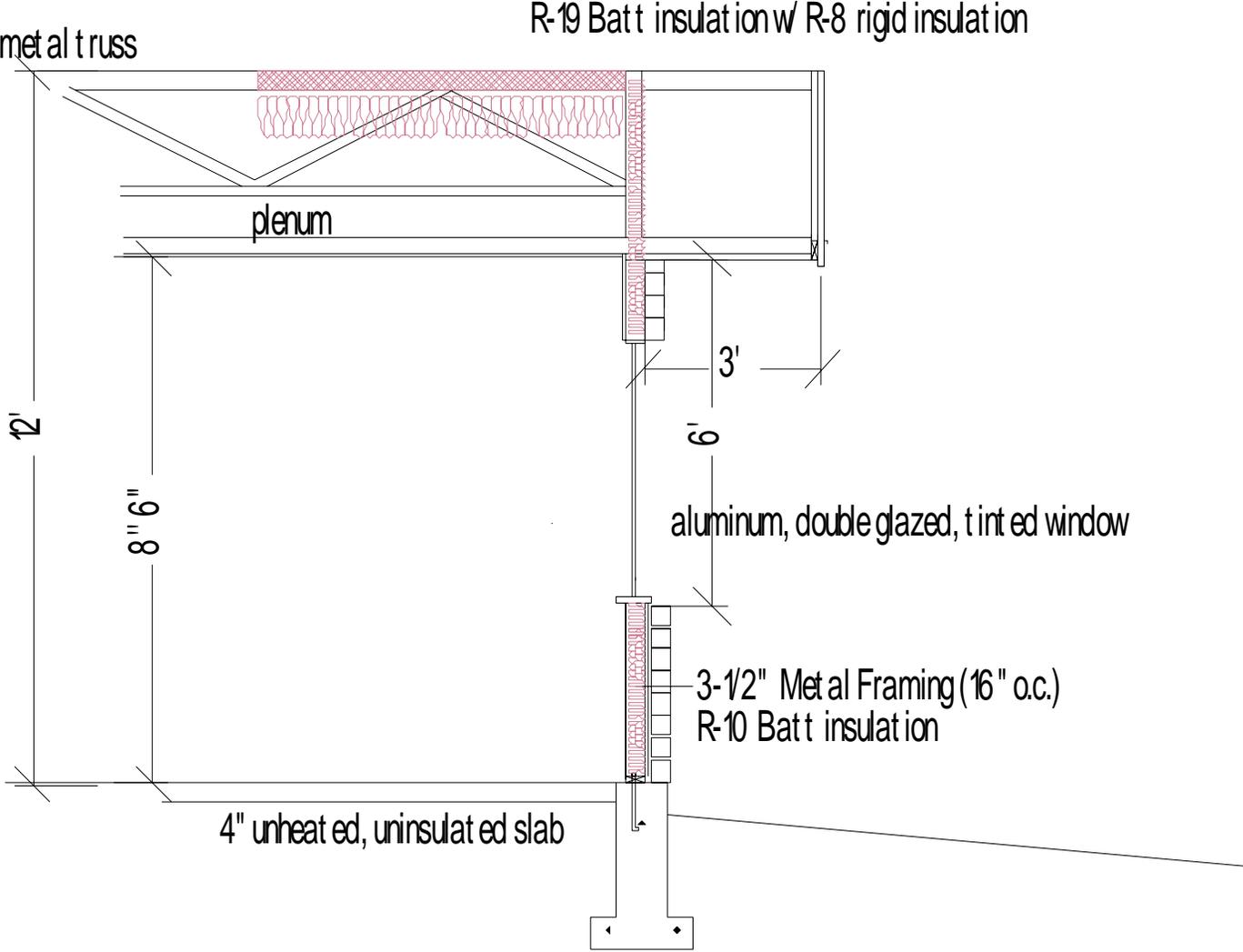


Unit 5
Carrier Heatpump
Rooftop packaged unit
Model #50RQ008600KB
Cooling Output = 7-1/2 tons
Heating Output = 88,000 Btu/hr
Airflow = 3000 CFM

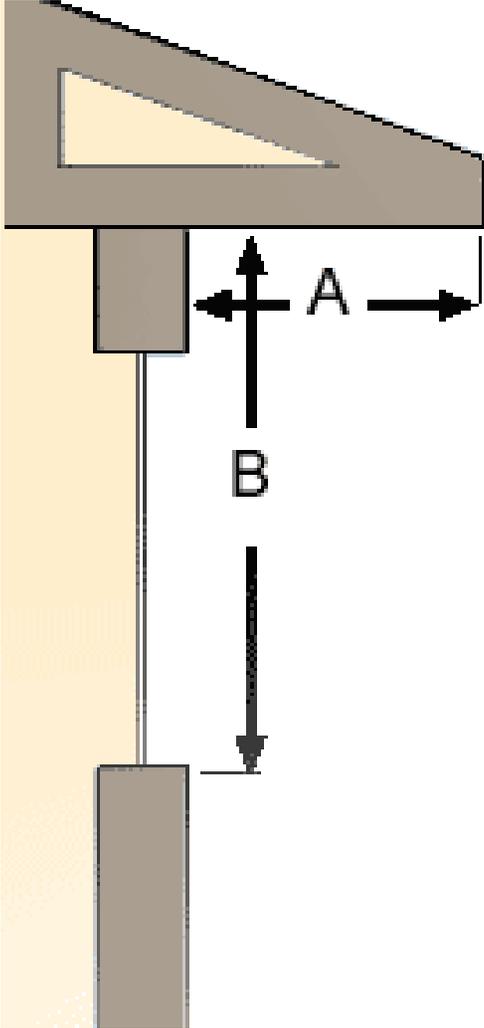
Units #1,2,3,4,7,8 & 9
Carrier Heatpump
Roof Top Packaged Unit
Model #50PQ006600QC
Cooling Output = 5 tons
Heating Output = 58,000 Btu/hr
Airflow = 2000 CFM



• **Building Section**



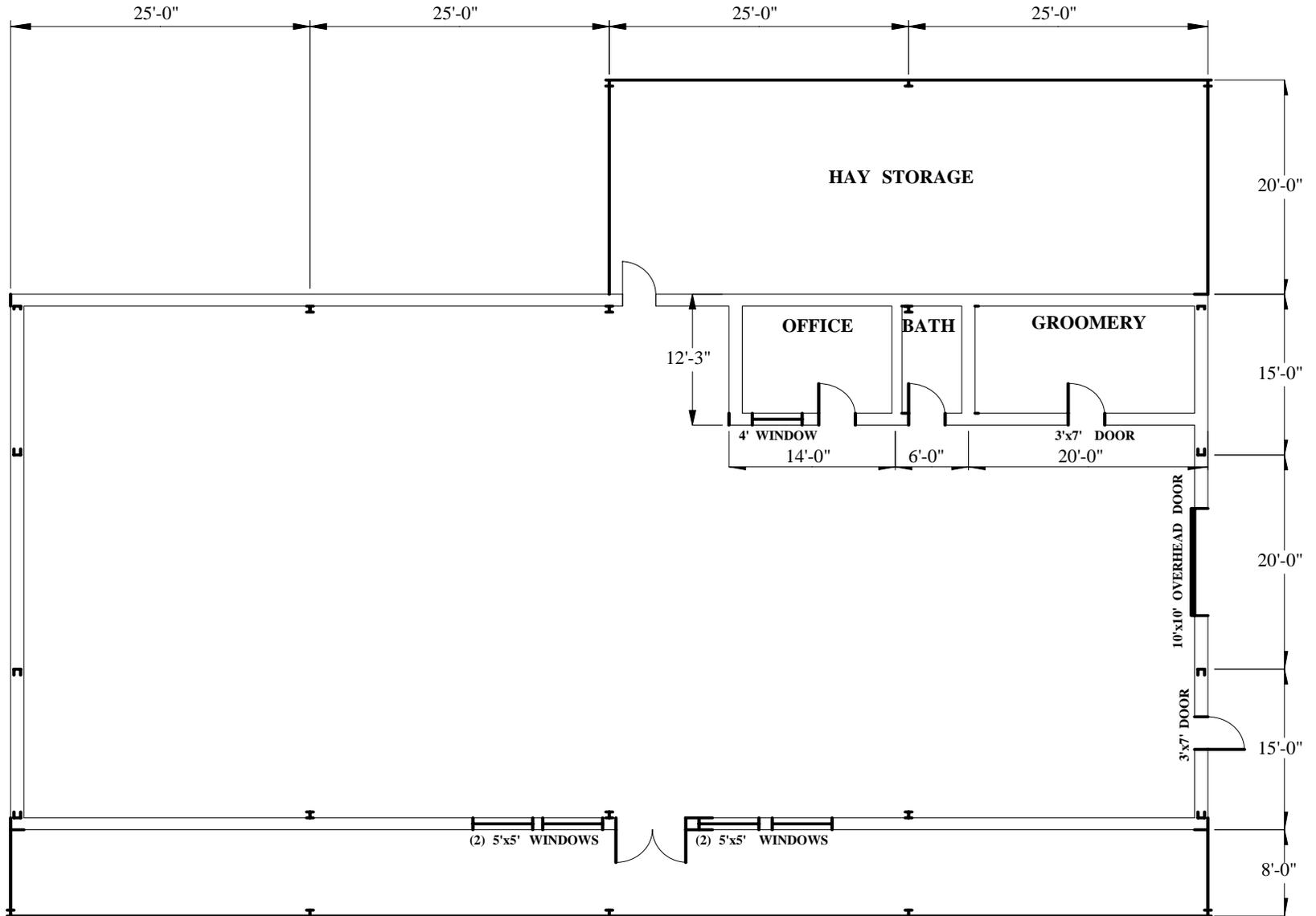
Overhang/Projection Factor (PF)



PF= A/B

PF=0.5

Red Mountain Feed & Irrigation Floor Plan

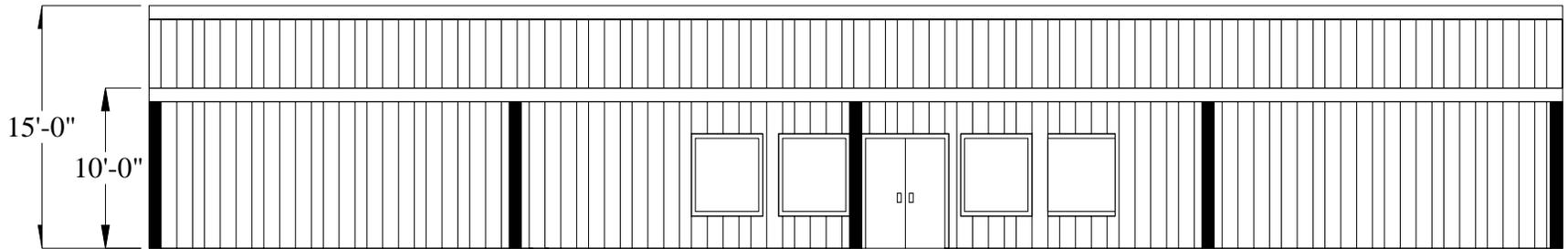




Inside Office/Bathroom

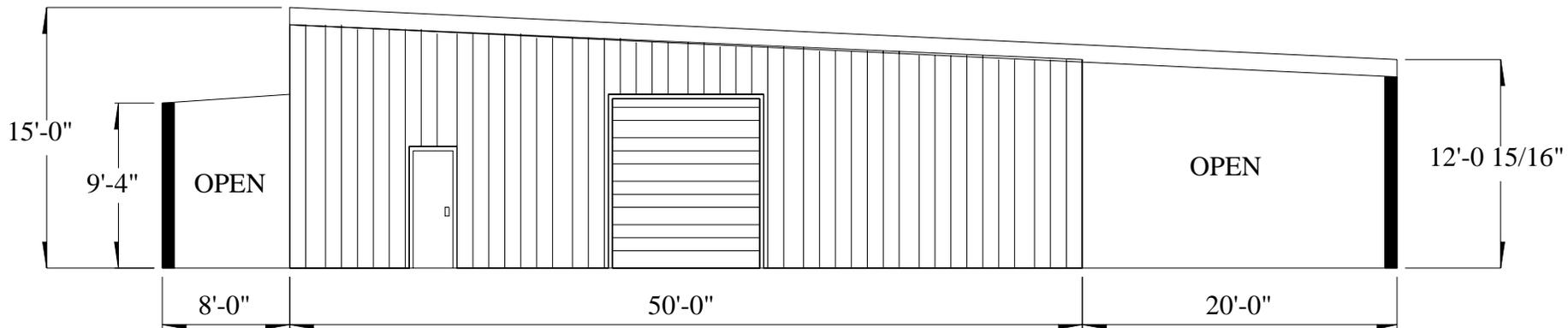


Storage



Exterior Walls: 3,954 sq.ft.

- 10' High: R10 between girt & metal wall + 2x4 R11 metal studs, 0.071 u-factor, heat capacity=1 (2,176 sq. ft.)
- 5' High: R10 between girt & metal wall (928 sq. ft.)



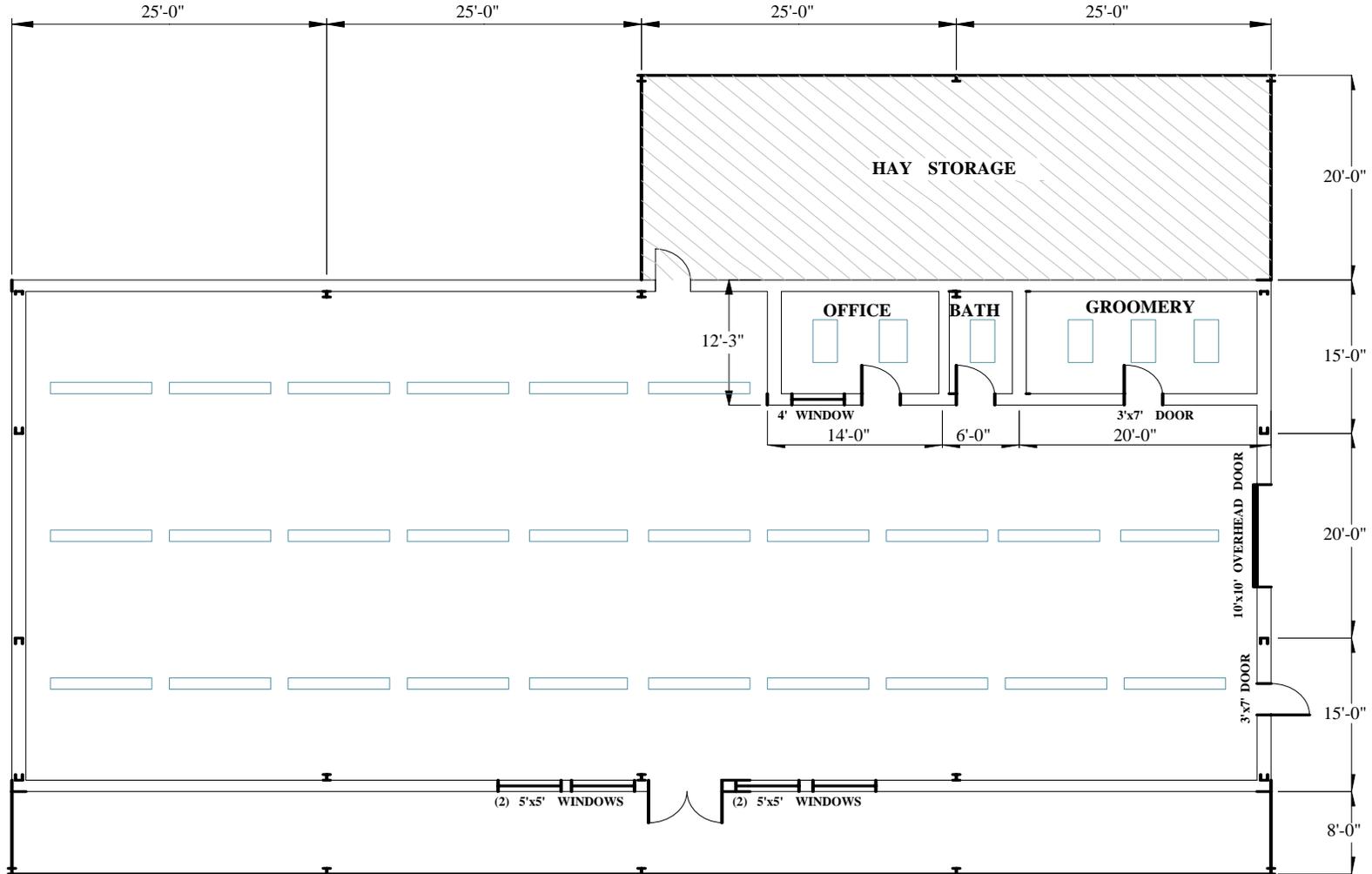
Walls



Lighting



•Red Mountain Feed Lighting Plan



Lighting Schedule

8' Industrial Fluorescent, 2 F96T12 Slimline Lamps & Energy Saving Magnetic Ballast

43 Fixtures, 173 watts/fixture

2'x4" Troffer 2 F32T8 lamps and GEB, 6 Fixtures, 59 watts/fixture

Heating System



Pellet Stove



Unit Heater

- **Red Mountain Feed Building Envelope**

Roof: 5,000 sq.ft. Metal w/1” Styrofoam thermal block, R-13 Insulation

Exterior Walls: 6,397 sq.ft.

Windows: 144 sq.ft. Metal Frame, double pane, tinted, U-factor .75, SHGC .88, PF .33

Glass Doors: 42 sq. ft., Metal Frame, U-factor .92, SHGC .87, PF, .33

Window/Wall Ratio = 2.9%

Doors: 100 sq. ft. Overhead Metal, U-value .60, other metal-42’, u-value 1.20

Floor: 5000sq.ft./300 linear feet, unheated slab on grade, R10 2’ vertical