



COMcheck Basics

2022 Department of Energy National Energy Codes Conference
Building Energy Codes Program

May 2, 2023

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Senior Research Engineer



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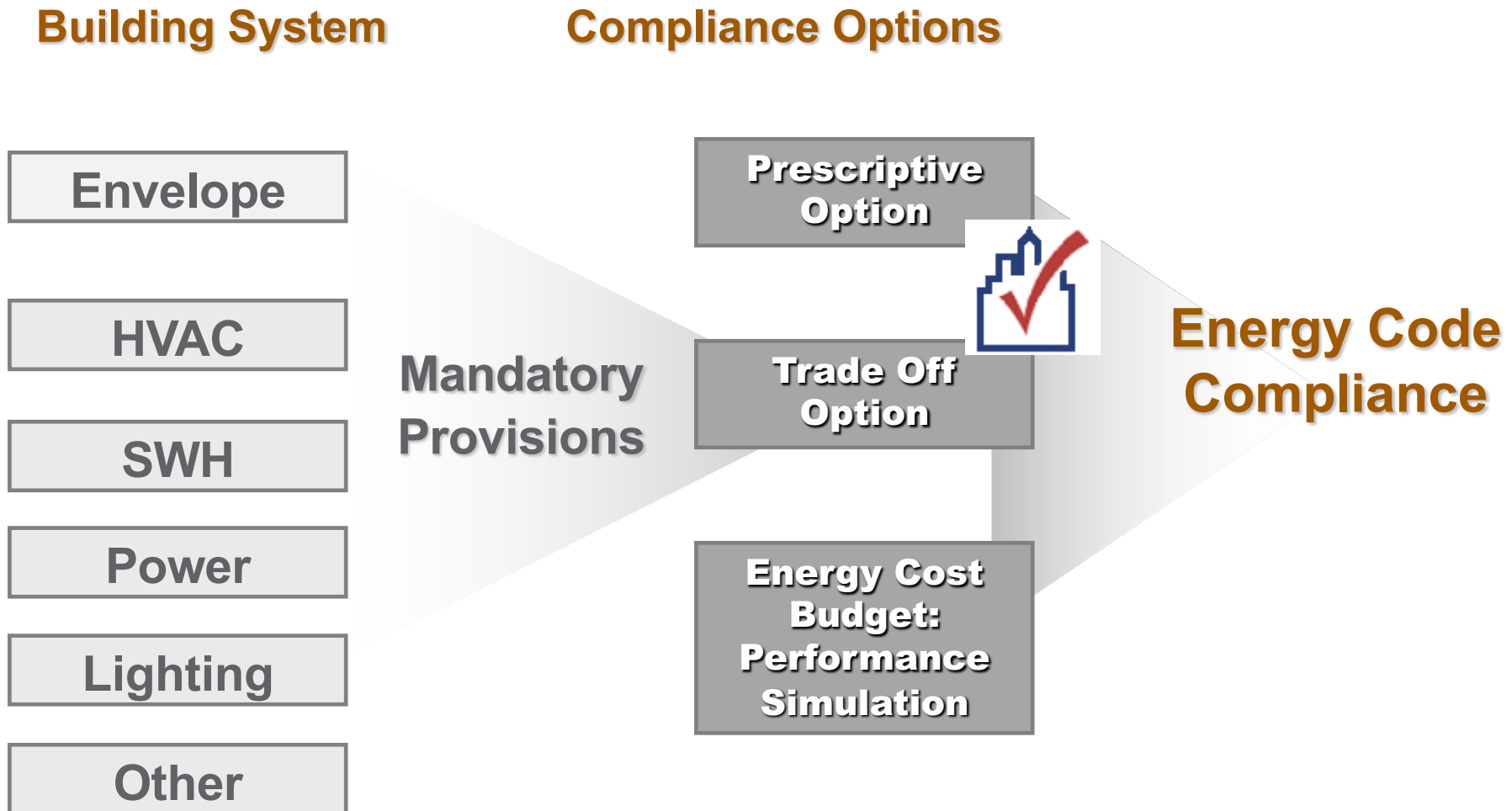
PNNL-SA-XXXXXX





BECP Tools used only during “Demonstrate Compliance” Stage

COMcheck Compliance Methods



COMcheck Commercial Energy Codes



- ASHRAE 90.1 (Pre-2013) Normative Appendix C Methodology for Building Envelope Trade-Off Option
 - 90.1-2007/2010
 - 2009/2012 IECC
- ASHRAE 90.1-2013/2016/2019 Appendix C limited performance method (EnergyPlus)

ASHRAE 90.1-2022 fourth quarter 2023
- 2015/2018/2021 IECC Component Performance Alternative (hybrid Total UA method)

Envelope Trade-Off Methods

90.1-2007/2010 and 2009/2012 IECC: Normative Appendix C Methodology for Building Envelope Trade-Off Option

- Building energy cost factor computed using regression equations
- 90.1-2007/2010: Window/wall and skylight/roof ratio limitations **enforced but tradable**
- 2009/2012 IECC: Window/wall and skylight/roof ratio limitations **enforced as hard limit**

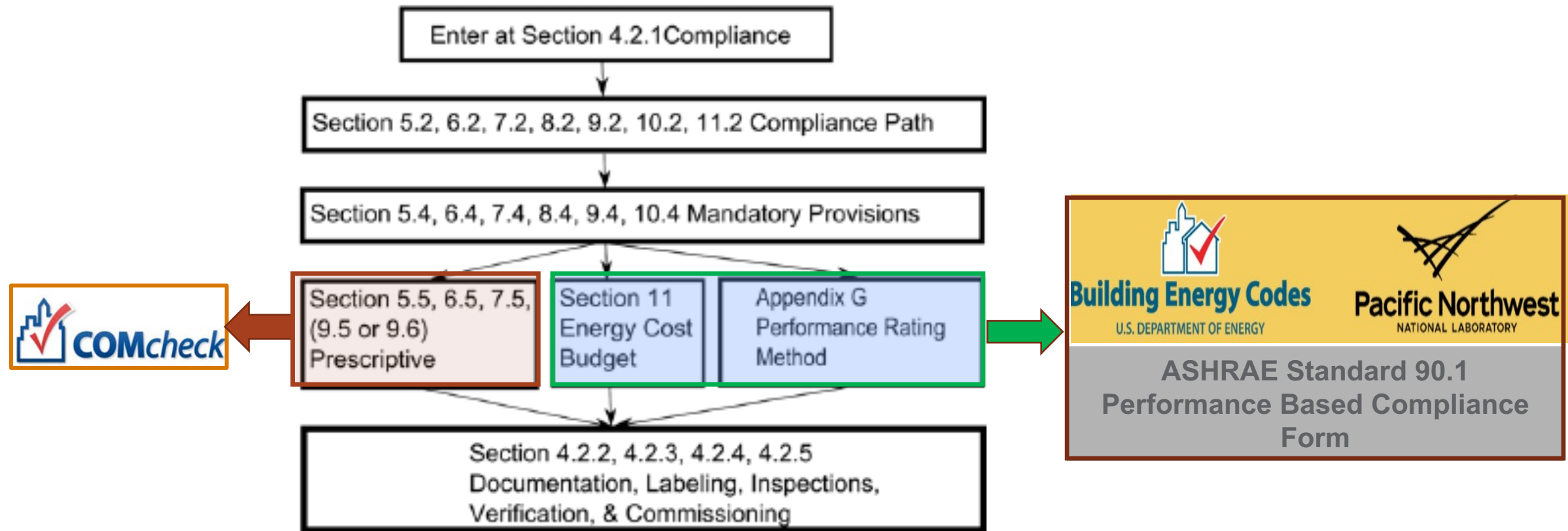
90.1-2013/2016/2019 Appendix C Envelope Trade-Off Methodology

- Envelope components are assigned to isolated thermal zones based on
 - Building Envelope Area Types (BEAT) play influential role
 - Space conditioning categories (SCC)
 - Window/wall and skylight/roof ratio limitations **enforced but tradable**

2015/2018/2021 IECC Component Performance Method Criteria

- Envelope assemblies must pass on 'hybrid' Total UA based criteria
- Window/wall and skylight/roof ratio limitations **enforced but tradable**
- SHGC prescriptive requirement enforced

ASHRAE Standard 90.1 Section 11 and Appendix G Compliance Documentation



<https://www.energycodes.gov/ashrae-standard-901-performance-based-compliance-form>

IECC Envelope Opaque Assembly Requirements

TABLE C402.1.4
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, U-FACTOR METHOD^{a, b}

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Roofs																
Insulation entirely above roof deck	U-0.048	U-0.039	U-0.039	U-0.039	U-0.039	U-0.039	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028
Metal buildings	U-0.044	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.035	U-0.031	U-0.031	U-0.029	U-0.029	U-0.029	U-0.029
Attic and other	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.027	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021	U-0.021
Walls, above grade																
Mass ^e	U-0.151	U-0.151	U-0.151	U-0.123	U-0.123	U-0.104	U-0.104	U-0.090	U-0.090	U-0.080	U-0.080	U-0.071	U-0.071	U-0.071	U-0.061	U-0.061
Metal building	U-0.079	U-0.079	U-0.079	U-0.079	U-0.079	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.052	U-0.039	U-0.052	U-0.039
Metal framed	U-0.077	U-0.077	U-0.077	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.052	U-0.064	U-0.045
Wood framed and other ^c	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.064	U-0.051	U-0.051	U-0.051	U-0.051	U-0.036	U-0.036
Walls, below grade																
Below-grade wall ^c	C-1.140 ^o	C-1.140 ^o	C-1.140 ^o	C-1.140 ^o	C-1.140 ^o	C-1.140 ^o	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass ^d	U-0.322 [*]	U-0.322 [*]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.064	U-0.055	U-0.051	U-0.055	U-0.051
Joist/framing	U-0.066 [*]	U-0.066 [*]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033
Slab-on-grade floors																
Unheated slabs	F-0.73 [*]	F-0.73 [*]	F-0.73 [*]	F-0.73 [*]	F-0.73 [*]	F-0.73 [*]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs ^f	F-1.02 0.74	F-1.02 0.74	F-1.02 0.74	F-1.02 0.74	F-0.90 0.74	F-0.90 0.74	F-0.86 0.64	F-0.86 0.64	F-0.79 0.64	F-0.79 0.64	F-0.79 0.55	F-0.69 0.55	F-0.69 0.55	F-0.69 0.55	F-0.69 0.55	F-0.69 0.55
Opaque doors																
Swinging door	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
Garage door <14% glazing	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31	U-0.31

IECC Envelope Fenestration Requirements

TABLE C402.4
BUILDING ENVELOPE FENESTRATION MAXIMUM *U*-FACTOR AND SHGC REQUIREMENTS

CLIMATE ZONE	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7	8
Vertical fenestration								
<i>U</i>-factor								
Fixed fenestration	0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29
Operable fenestration	0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37
Entrance doors	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77
SHGC								
Orientation ^a	SEW	N	SEW	N	SEW	N	SEW	N
PF < 0.2	0.25	0.33	0.25	0.33	0.25	0.33	0.36	0.48
0.2 ≤ PF < 0.5	0.30	0.37	0.30	0.37	0.30	0.37	0.43	0.53
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	0.58	0.58
Skylights								
<i>U</i> -factor	0.75	0.65	0.55	0.50	0.50	0.50	0.50	0.50
SHGC	0.35	0.35	0.35	0.40	0.40	0.40	NR	NR

(Source: 2018 IECC)

90.1 Envelope Requirements

Table 5.5-6 Building Envelope Requirements for Climate Zone 6 (A,B)*

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
Roofs						
Insulation entirely above deck	U-0.032	R-30 c.i.	U-0.032	R-30 c.i.	U-0.063	R-15 c.i.
Metal building ^a	U-0.031	R-25 + R-11 Ls	U-0.029	R-30 + R-11 Ls	U-0.060	R-19 + R-19
Attic and other	U-0.021	R-49	U-0.021	R-49	U-0.034	R-30
Walls, above Grade						
Mass	U-0.080	R-13.3 c.i.	U-0.071	R-15.2 c.i.	U-0.151 ^b	R-5.7 c.i. ^b
Metal building	U-0.050	R-0 + R-19 c.i.	U-0.050	R-0 + R-19 c.i.	U-0.094	R-0 + R-9.8 c.i.
Steel-framed	U-0.049	R-13 + R-12.5 c.i.	U-0.049	R-13 + R-12.5 c.i.	U-0.084	R-13 + R-3.8 c.i.
Wood-framed and other	U-0.051	R-13 + R-7.5 c.i. or R-19 + R-5 c.i.	U-0.051	R-13 + R-7.5 c.i. or R-19 + R-5 c.i.	U-0.089	R-13
Wall, below Grade						
Below-grade wall	C-0.092	R-10 c.i.	C-0.063	R-15 c.i.	C-0.119	R-7.5 c.i.
Floors						
Mass	U-0.051	R-16.7 c.i.	U-0.051	R-16.7 c.i.	U-0.087	R-8.3 c.i.
Steel joist	U-0.032	R-38	U-0.032	R-38	U-0.052	R-19
Wood-framed and other	U-0.027	R-38	U-0.027	R-38	U-0.051	R-19
Slab-on-Grade Floors						
Unheated	F-0.510	R-20 for 24 in.	F-0.434	R-20 for 48 in.	F-0.730	NR
Heated	F-0.688	R-20 for 48 in.	F-0.671	R-25 for 48 in.	F-0.860	R-15 for 24 in.
Opaque Doors						
Swinging	U-0.370		U-0.370		U-0.370	
Nonswinging	U-0.310		U-0.310		U-0.360	
Fenestration						
	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC	Assembly Max. U	Assembly Max. SHGC	Assembly Min. VT/SHGC
Vertical Fenestration, 0% to 40% of Wall						
Fixed	0.34	0.38	1.10 (for all types)	0.34	0.38	1.10 (for all types)
Operable	0.42	0.34		0.42	0.34	
Entrance door	0.63	0.34		0.63	0.34	
Skylight, 0% to 3% of Roof						
All types	0.47	0.40	NR	0.50	0.40	NR

Source: 90.1-2019

90.1 Envelope Opaque Assembly Requirements

Table 5.5-6 *Building Envelope Requirements for Climate Zone 6 (A,B)**

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
<i>Roofs</i>						
<i>Insulation entirely above deck</i>	U-0.032	R-30 c.i.	U-0.032	R-30 c.i.	U-0.063	R-15 c.i.
<i>Metal building^a</i>	U-0.031	R-25 + R-11 Ls	U-0.029	R-30 + R-11 Ls	U-0.060	R-19 + R-19
<i>Attic and other</i>	U-0.021	R-49	U-0.021	R-49	U-0.034	R-30
<i>Walls, above Grade</i>						
<i>Mass</i>	U-0.080	R-13.3 c.i.	U-0.071	R-15.2 c.i.	U-0.151 ^b	R-5.7 c.i. ^b
<i>Metal building</i>	U-0.050	R-0 + R-19 c.i.	U-0.050	R-0 + R-19 c.i.	U-0.094	R-0 + R-9.8 c.i.
<i>Steel-framed</i>	U-0.049	R-13 + R-12.5 c.i.	U-0.049	R-13 + R-12.5 c.i.	U-0.084	R-13 + R-3.8 c.i.
<i>Wood-framed and other</i>	U-0.051	R-13 + R-7.5 c.i. or R-19 + R-5 c.i.	U-0.051	R-13 + R-7.5 c.i. or R-19 + R-5 c.i.	U-0.089	R-13
<i>Wall, below Grade</i>						
<i>Below-grade wall</i>	C-0.092	R-10 c.i.	C-0.063	R-15 c.i.	C-0.119	R-7.5 c.i.
<i>Floors</i>						
<i>Mass</i>	U-0.051	R-16.7 c.i.	U-0.051	R-16.7 c.i.	U-0.087	R-8.3 c.i.
<i>Steel joist</i>	U-0.032	R-38	U-0.032	R-38	U-0.052	R-19
<i>Wood-framed and other</i>	U-0.027	R-38	U-0.027	R-38	U-0.051	R-19
<i>Slab-on-Grade Floors</i>						
<i>Unheated</i>	F-0.510	R-20 for 24 in.	F-0.434	R-20 for 48 in.	F-0.730	NR
<i>Heated</i>	F-0.688	R-20 for 48 in.	F-0.671	R-25 for 48 in.	F-0.860	R-15 for 24 in.
<i>Opaque Doors</i>						
<i>Swinging</i>	U-0.370		U-0.370		U-0.370	
<i>Nonswinging</i>	U-0.310		U-0.310		U-0.360	

Source: 90.1-2019

Project Types

- New Construction:
 - Trade-off compliance method
 - Modified UA or Appendix C
- Addition
 - Trade-off compliance method
- Alteration
 - Prescriptive compliance



Lighting Compliance Methods

- Mandatory requirements: Controls, Switching, Daylighting
- Interior/Exterior lighting power requirements
 - Complies if total connected power $\leq$ lighting power allowance
 - Ability to exempt lighting fixtures or allow lighting wattage allowances for retail lighting



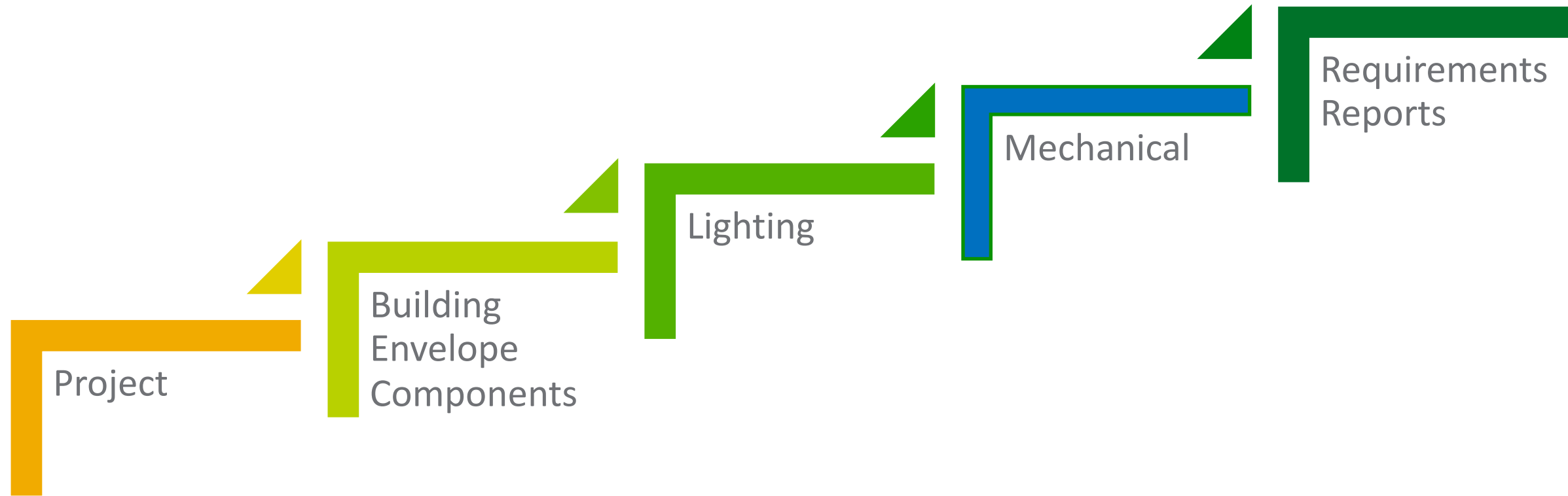
$\leq$



Mechanical/Service Hot Water Compliance

- ▶ Efficiency requirements
- ▶ Economizer requirements
- ▶ Fan Power Limitation
- ▶ Mandatory requirements
- ▶ No compliance metric available

COMcheck Project Specification Steps



Info You'll Need

- ▶ Energy Code
- ▶ Builder and project location
- ▶ Area take-offs for envelope assemblies
- ▶ Insulation R-values, fenestration performance data
- ▶ Interior/Exterior lighting fixture details
- ▶ Heating and cooling system details
- ▶ Service water heating details

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Registration and lodging reservations are now open!

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HOSTED BY THE U.S. DEPARTMENT OF ENERGY

May 2-4, 2023 | Chicago, IL

Tools

COMcheck

The COMcheck software and web tools simplify and clarify energy code compliance with the IECC, standard (ASHRAE Standard 90.1), and a number of state-specific energy codes.



Learn More

REScheck

The REScheck software and web tools simplify residential energy code compliance by automating trade-off calculations for the IECC and a number of state-specific codes.



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Help Desk

Submit technical questions about building energy codes, REScheck or COMcheck projects, or BECP website content.



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bobby@gmail.com

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MY PROJECTS

NEW PROJECT

IMPORT PROJECT

☐	Project		Last Updated	Energy Code	Status	Sharing	Shared	Export
☐	LIGHTING TEST		Fri Apr 07 2023	2018 IECC	Draft			
☐	FAN TESTING		Thu Apr 06 2023	2018 IECC	Draft			
☐	TESTING ALTERATIONS		Mon Apr 03 2023	2018 IECC	Draft			
☐	LIGHTING TEST 2		Mon Apr 03 2023	2018 IECC	Draft			
☐	ALTERATION TEST		Wed Mar 29 2023	2018 IECC	Draft			

No Projects Selected.

☒ Dense layout

Rows per page: 5 1-5 of 8 < >

>

SHARED PROJECT REQUESTS

0 Items

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MY PROJECTS

NEW PROJECT

IMPORT PROJECT

☐	Project		Last Updated	Energy Code	Status	Sharing	Shared	Export
☐	LIGHTING TEST		Fri Apr 07 2023	2018 IECC	Draft			
☐	FAN TESTING		Thu Apr 06 2023	2018 IECC	Draft			
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☐	ALTERATION TEST		Wed Mar 29 2023	2018 IECC	Draft			

No Projects Selected.

☒ Dense layout

Rows per page: 5 1-5 of 8


SHARED PROJECT REQUESTS

0 Items

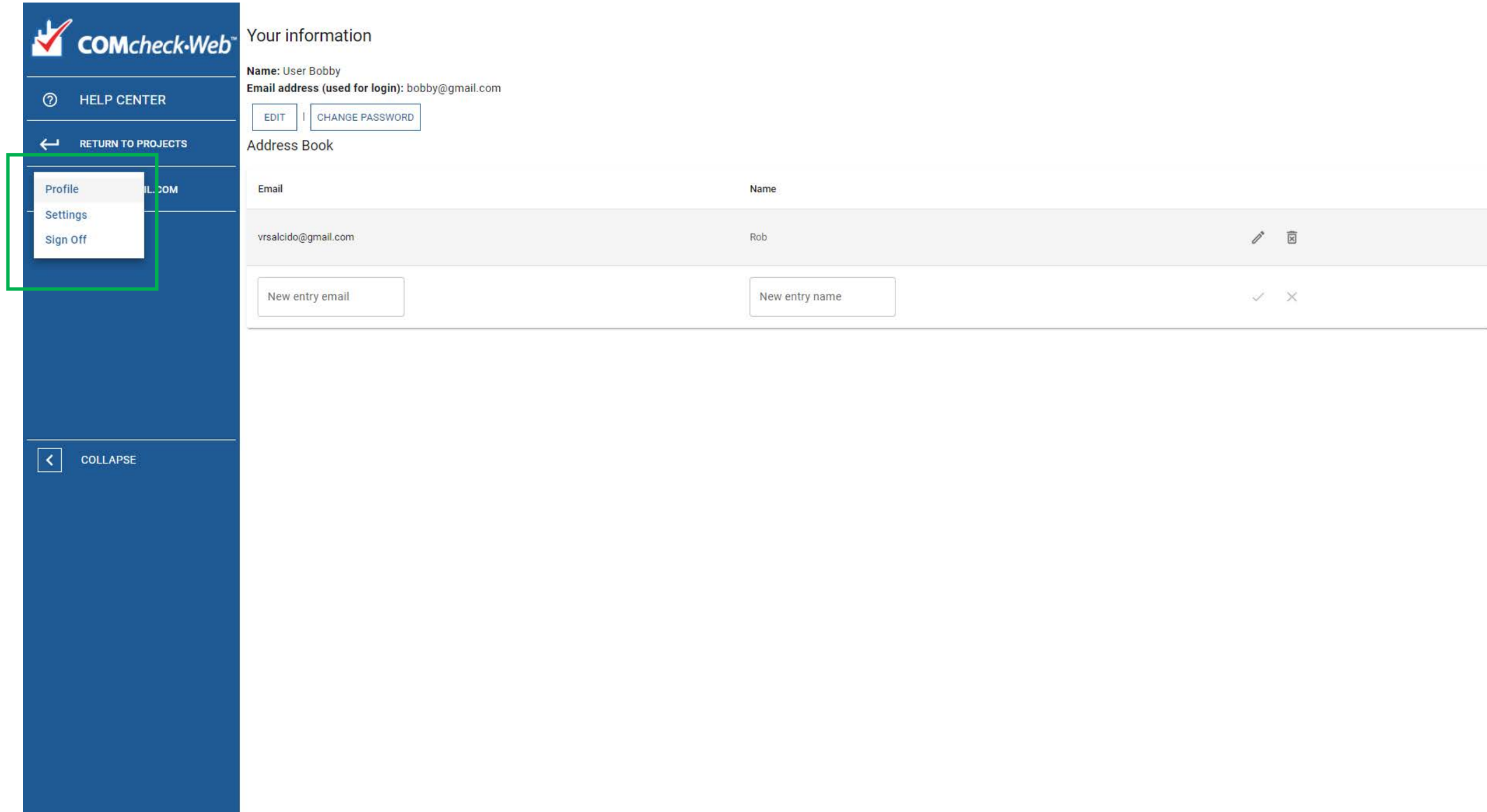
 Can exchange files between desktop and web

-  Log in to web
-  My Projects

Download from web account to desktop



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Settings

Sign Off

COLLAPSE

Your information

Name: User Bobby

Email address (used for login): bobby@gmail.com

EDIT | CHANGE PASSWORD

Address Book

Email	Name	
vrsalcido@gmail.com	Rob	 

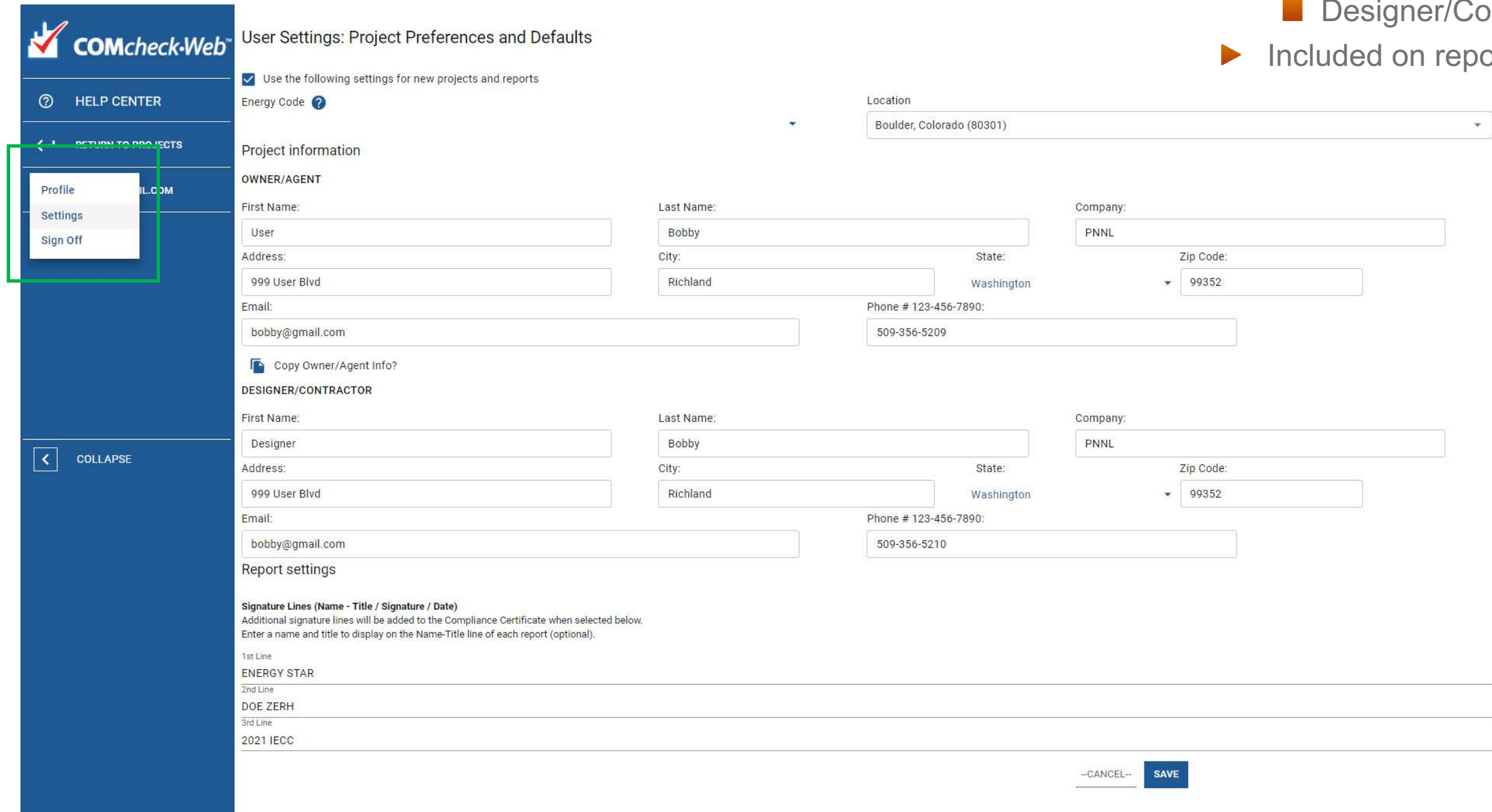
New entry email

New entry name

✓ ✕

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- ▶ Optional
- ▶ Sections
 - Site/Permit
 - Owner/Agent
 - Designer/Contractor
- ▶ Included on report



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Profile
Settings
Sign Off

COLLAPSE

User Settings: Project Preferences and Defaults

☒ Use the following settings for new projects and reports

Energy Code 

Location
Boulder, Colorado (80301)

Project information

OWNER/AGENT

First Name: User Last Name: Bobby Company: PNNL

Address: 999 User Blvd City: Richland State: Washington Zip Code: 99352

Email: bobby@gmail.com Phone # 123-456-7890: 509-356-5209

 Copy Owner/Agent Info?

DESIGNER/CONTRACTOR

First Name: Designer Last Name: Bobby Company: PNNL

Address: 999 User Blvd City: Richland State: Washington Zip Code: 99352

Email: bobby@gmail.com Phone # 123-456-7890: 509-356-5210

Report settings

Signature Lines (Name - Title / Signature / Date)
Additional signature lines will be added to the Compliance Certificate when selected below.
Enter a name and title to display on the Name-Title line of each report (optional).

1st Line	ENERGY STAR
2nd Line	DOE ZERH
3rd Line	2021 IECC

--CANCEL-- SAVE

Project Dashboard

Start a new project

Sorting

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MY PROJECTS							NEW PROJECT IMPORT PROJECT	
☐	Project		Last Updated	Energy Code	Status	Sharing	Shared	Export
☐	LIGHTING TEST		Fri Apr 07 2023	2018 IECC	Draft			
☐	FAN TESTING		Thu Apr 06 2023	2018 IECC	Draft			
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☐	LIGHTING TEST 2		Mon Apr 03 2023	2018 IECC	Draft			
☐	ALTERATION TEST		Wed Mar 29 2023	2018 IECC	Draft			
No Projects Selected.							☒ Dense layout	

Duplicate Projects

[>](#) SHARED PROJECT REQUESTS
0 Items

Project Sharing

Project Screen



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ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

CREDITS

COMPLIANCE

< COLLAPSE

New Project

Date: 2023-3-11
Created By:
Sharing:
Status:

Please select Energy Code to Continue

Project Title

New Project

Location (Climate Zone 0) ?

Abbeville, Alabama

Project Type ?

New Construction

Energy Code ?

Select the energy code applicable for your project. Make sure to select the correct code as data entries vary by code.

Owner/Agent
null null

Designer/Contractor
null null

SAVE

Advanced help in COMcheck

Project Screen (cont)

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New Project

Date: 2023-3-11
Created By:
Sharing:
Status:

SAVE

Please select Energy Code to Continue

Project Title

New Project

Location (Climate Zone 0) ?

Abbeville, Alabama

Energy Code ?

Project Type ?

New Construction

>

Building Areas ?

ADD BUILDING AREA

>

Project Details (optional) ?

Owner/Agent

null null

Designer/Contractor

null null

Set Project Name
Select Code and Location
Set Project Type

Project Screen (cont)

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📋

[REQUIREMENTS](#)

📄

[CREDITS](#)

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[COMPLIANCE](#)

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[COLLAPSE](#)

▼

New Project

Date: 2023-3-11
Created By:
Sharing:
Status:

ⓘ

 Please select Energy Code to Continue

Project Title

New Project

Location (Climate Zone 0) ?

Abbeville, Alabama

Energy Code ?

➤

Building Areas ?

ADD BUILDING AREA

➤

Project Details (optional) ?

Owner/Agent
null null

Select Building Area

Select from list or use search field

☒ Automotive Facility

☐ Convention Center

☒ Court House

☐ Dining: Bar Lounge/Leisure

☐ Dining: Cafeteria/Fast Food

☐ Dining: Family

☐ Dormitory

☐ Exercise Center

1 + Automotive Facility

1 + Court House

—CANCEL—

ADD BUILDING AREA(S)

Set Building Area(s)

Project: Project Type

- ▶ New Construction
- ▶ Addition
- ▶ Alteration



Project Type ?

New Construction

Addition

Alteration



Project: Alteration Project Type Explained

- ▶ Projects involve changes to or replacement of
 - Existing building components that are part of building envelope
 - Lighting, heating, ventilating, air conditioning, and water-heating equipment
- ▶ Specify only those envelope components, lighting fixtures, or mechanical systems/equipment that will exist upon completion of the project.
- ▶ Alteration detail dialogs
 - Specify exemptions if applicable
 - Additional qualifications may be required (e.g., Window/wall ratio)
- ▶ Compliance shown as Pass/Fail for Envelope and Lighting

Compliance Options (IECC)

► Efficiency Options

- High performance power (2012/2015/2018)
- Reduced lighting power (2012/2015/2018)
- On-site renewable energy (2012/2015/2018)
- High performance SWH (2015/2018)
- Enhanced interior lighting controls (2015/2018)
- Dedicated outdoor air system (2015/2018)
- Enhanced Envelope Performance (2018)
- Reduced Air Infiltration (2018)

► Air Barrier Options (IECC 2012+, climate zone dependent)

- Air barrier permeability
- Assembly permeability
- Air leakage test

Efficiency Compliance Option

Unspecified

Enhanced Envelope Performance
Reduced Lighting Power
Enhanced Interior Lighting Controls
High Performance HVAC
High Performance SWH
Dedicated Outdoor Air System
Reduced Air Infiltration
On-site Renewable Energy

Compliance Options (2021 IECC only) – under construction



HELP CENTER

RETURN TO PROJECTS

BOBBY@GMAIL.COM

ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

CREDITS

COMPLIANCE

COLLAPSE

New Project

Date: 2023-3-11
Created By:
Sharing:
Status:

Click here to continue go to Envelope Screen. [HERE](#)

Project Title

New Project

Location (Climate Zone 0) ?

Abbeville, Alabama

Energy Code ?

2021 IECC

Project Type ?

New Construction

Efficiency Compliance Option

Unspecified

Building Areas ?

ADD BUILDING AREA

Project Details (optional) ?

Owner/Agent
null null

Designer/Contractor
null null

Efficiency Compliance Option

Unspecified

5% heating efficiency improvement

5% cooling efficiency improvement

10% heating efficiency improvement

10% cooling efficiency improvement

Reduced lighting power

Enhanced digital lighting controls

On-site renewable energy

Dedicated outdoor air

Recovered or renewable water heating

Efficient fossil fuel water heater

Heat pump water heater

Enhanced envelope performance

Reduced air infiltration

Energy monitoring

Fault detection and diagnostics system

SAVE

► Additional Efficiency Requirements (2021 IECC)

- Added efficiency credit requirements based on occupancy type

Project: Building Envelope Area Types

- ▶ Primarily impacts envelope compliance
- ▶ Whole building types that describe the envelope (separating conditioned and unconditioned spaces)
- ▶ Space conditioning type
 - Nonresidential
 - Residential
 - Semiheated (no mechanical cooling) – 90.1 only

▼

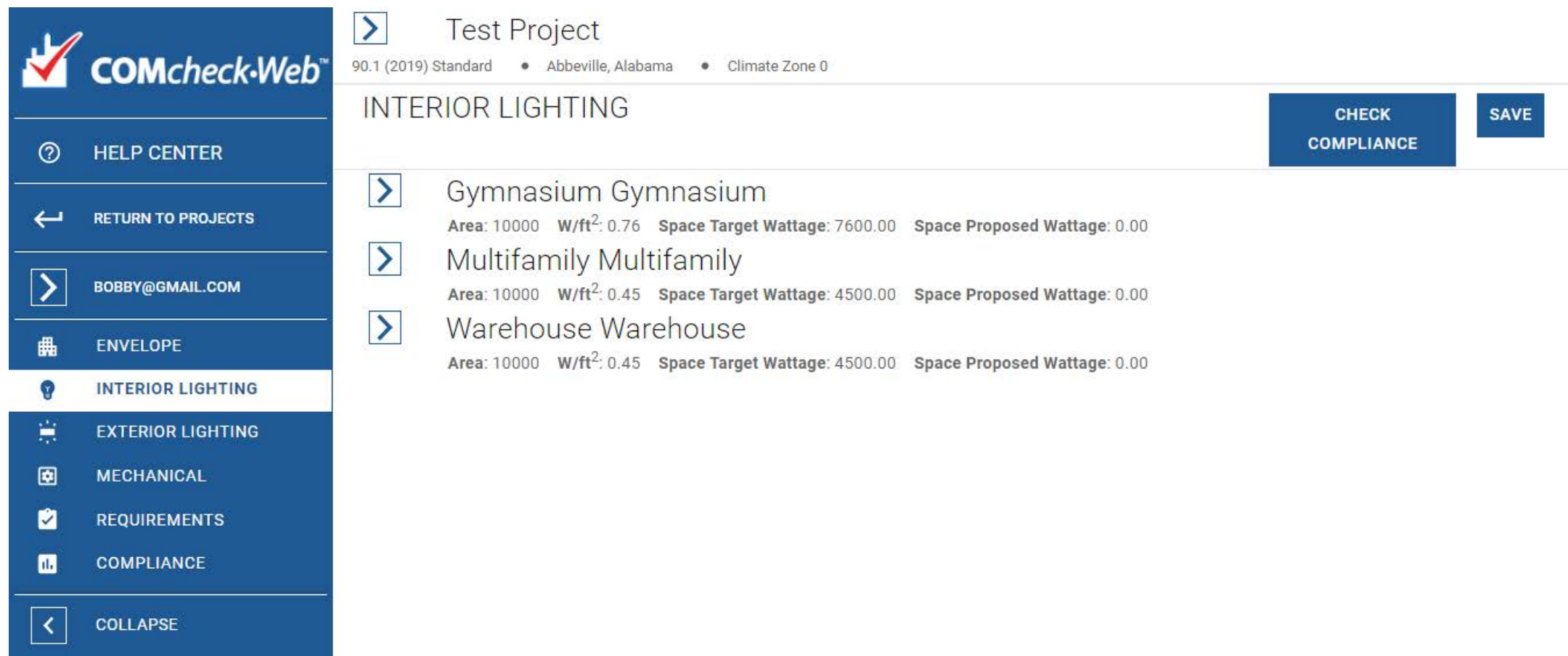
Building Areas ?

Gymnasium		AREA ACTIONS
Area Description	Space Conditioning	Area ft ²
Gymnasium	Non-residential ▼	10000
		AREA ACTIONS
Multifamily		AREA ACTIONS
Area Description	Space Conditioning	Area ft ²
Multifamily	Residential ▼	10000
		AREA ACTIONS
Warehouse		AREA ACTIONS
Area Description	Space Conditioning	Area ft ²
Warehouse	Semiheated ▼	10000
		AREA ACTIONS

ADD BUILDING AREA

Project: Interior Lighting Method and Area Types

- ▶ Method determines lighting power density and allowances
- ▶ Area category allows for more detailed space representation



The screenshot displays the COMcheck-Web interface. On the left is a blue sidebar with navigation links: HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE, INTERIOR LIGHTING (highlighted), EXTERIOR LIGHTING, MECHANICAL, REQUIREMENTS, COMPLIANCE, and a COLLAPSE button. The main content area is titled 'Test Project' and shows '90.1 (2019) Standard' for 'Abbeville, Alabama' in 'Climate Zone 0'. The 'INTERIOR LIGHTING' section is active, showing a list of space types with their respective metrics:

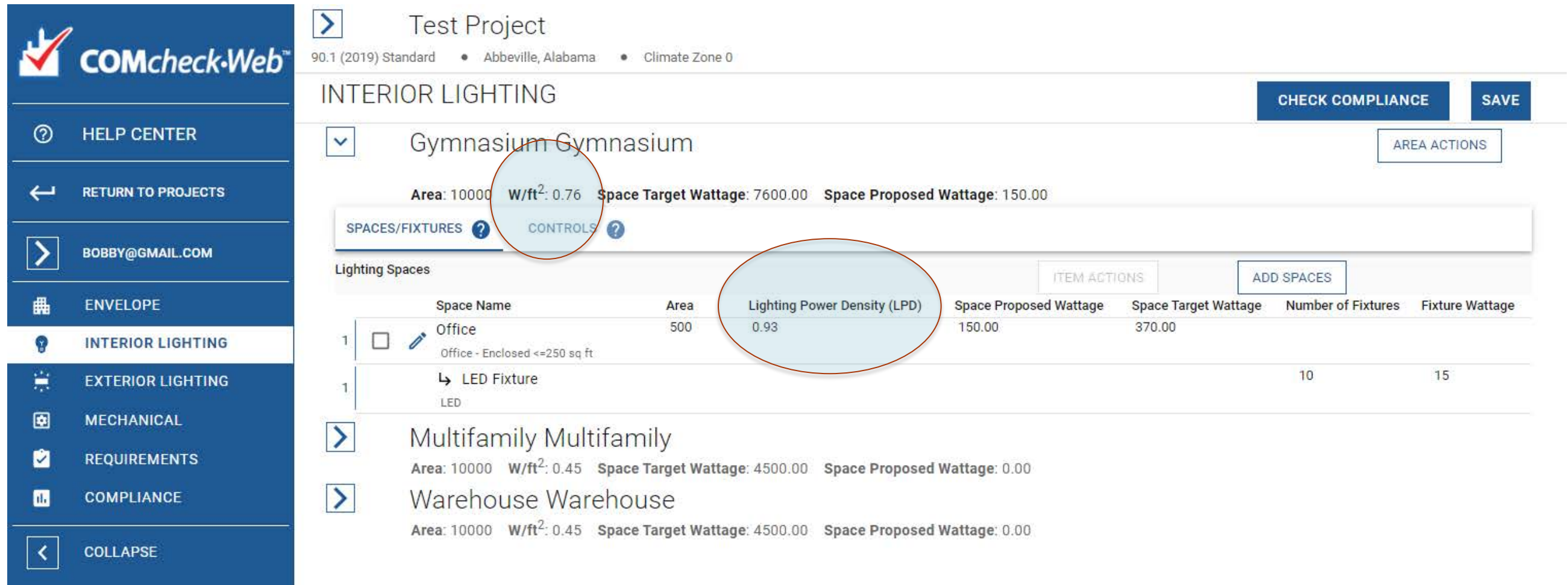
Space Type	Area	W/ft ²	Space Target Wattage	Space Proposed Wattage
Gymnasium Gymnasium	10000	0.76	7600.00	0.00
Multifamily Multifamily	10000	0.45	4500.00	0.00
Warehouse Warehouse	10000	0.45	4500.00	0.00

At the top right of the main content area are two buttons: 'CHECK COMPLIANCE' and 'SAVE'.

Interior Lighting: Methods

► COMcheck determines lighting power densities in interior lighting and exterior lighting screens

■ Automatically examines both building area and space-by-space lighting compliance



The screenshot displays the COMcheck-Web interface for a "Test Project" under the 90.1 (2019) Standard, Abbeville, Alabama, Climate Zone 0. The "INTERIOR LIGHTING" section is active, showing a summary for the "Gymnasium" space. The summary includes: Area: 10000, W/ft²: 0.76, Space Target Wattage: 7600.00, and Space Proposed Wattage: 150.00. Below this, a table lists "Lighting Spaces" with columns for Space Name, Area, Lighting Power Density (LPD), Space Proposed Wattage, Space Target Wattage, Number of Fixtures, and Fixture Wattage. The table shows one space, "Office", with an area of 500, an LPD of 0.93, and a proposed wattage of 150.00. The "Office" space is further detailed as "Office - Enclosed <=250 sq ft" and "LED Fixture". The interface also includes a sidebar with navigation options like HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE, INTERIOR LIGHTING, EXTERIOR LIGHTING, MECHANICAL, REQUIREMENTS, COMPLIANCE, and a COLLAPSE button. The "Gymnasium" space is highlighted with a red circle, and the "Lighting Power Density (LPD)" value of 0.93 is circled in red.

COMcheck-Web™

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

INTERIOR LIGHTING

CHECK COMPLIANCE SAVE

Gymnasium Gymnasium

AREA ACTIONS

Area: 10000 W/ft²: 0.76 Space Target Wattage: 7600.00 Space Proposed Wattage: 150.00

SPACES/FIXTURES ? CONTROLS ?

Lighting Spaces

	Space Name	Area	Lighting Power Density (LPD)	Space Proposed Wattage	Space Target Wattage	Number of Fixtures	Fixture Wattage
1	Office Office - Enclosed <=250 sq ft	500	0.93	150.00	370.00		
1	LED Fixture LED					10	15

ITEM ACTIONS ADD SPACES

Multifamily Multifamily

Area: 10000 W/ft²: 0.45 Space Target Wattage: 4500.00 Space Proposed Wattage: 0.00

Warehouse Warehouse

Area: 10000 W/ft²: 0.45 Space Target Wattage: 4500.00 Space Proposed Wattage: 0.00

HELP CENTER

RETURN TO PROJECTS

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ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

COMPLIANCE

COLLAPSE

Interior Lighting: Specifications

► Interior lighting is specified in the lighting wizard in four steps

- Adding spaces
- Daylighting areas
- Fixtures
- Controls

Add Interior Lighting Spaces

1 ————— 2 ————— 3 ————— 4

Add Space(s) Daylighting Fixtures Controls

Gymnasium

SPACE TYPE	REQUIRED NAME	AREA(sq.ft ²)	CEILING HEIGHT(ft)
Common Space Types (Office - Enc...	Office	500	

ADD SPACE

---CANCEL---

NEXT

Interior Lighting: Dashboard

- COMcheck lighting dashboard highlights building areas, spaces, fixtures, wattages and controls


COMcheck-Web™

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ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

COMPLIANCE

COLLAPSE

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

INTERIOR LIGHTING

Gymnasium Gymnasium

Area: 10000 W/ft²: 0.76 Space Target Wattage: 7600.00 Space Proposed Wattage: 150.00

SPACES/FIXTURES ? CONTROLS ?

Lighting Spaces

	Local Control	Restricted Manual On	Restricted Auto Partial On	Auto Full Off(50%)	Auto Partial Off(50%)	Bi-level	Auto Daylight (sidelight)	Auto Daylight (toplight)	Scheduled Shutoff
Office : LED Fixture	Yes	No	No	No	No	No	No	No	No

Multifamily Multifamily

Area: 10000 W/ft²: 0.45 Space Target Wattage: 4500.00 Space Proposed Wattage: 0.00

Warehouse Warehouse

Area: 10000 W/ft²: 0.45 Space Target Wattage: 4500.00 Space Proposed Wattage: 0.00

CHECK COMPLIANCE

SAVE

AREA ACTIONS

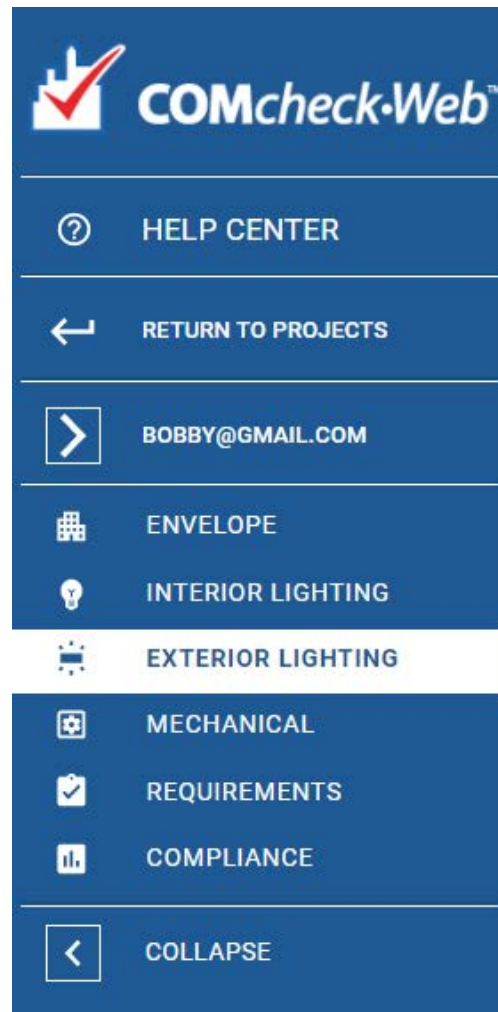
ITEM ACTIONS

ADD SPACES

Project: Exterior Lighting Area Types

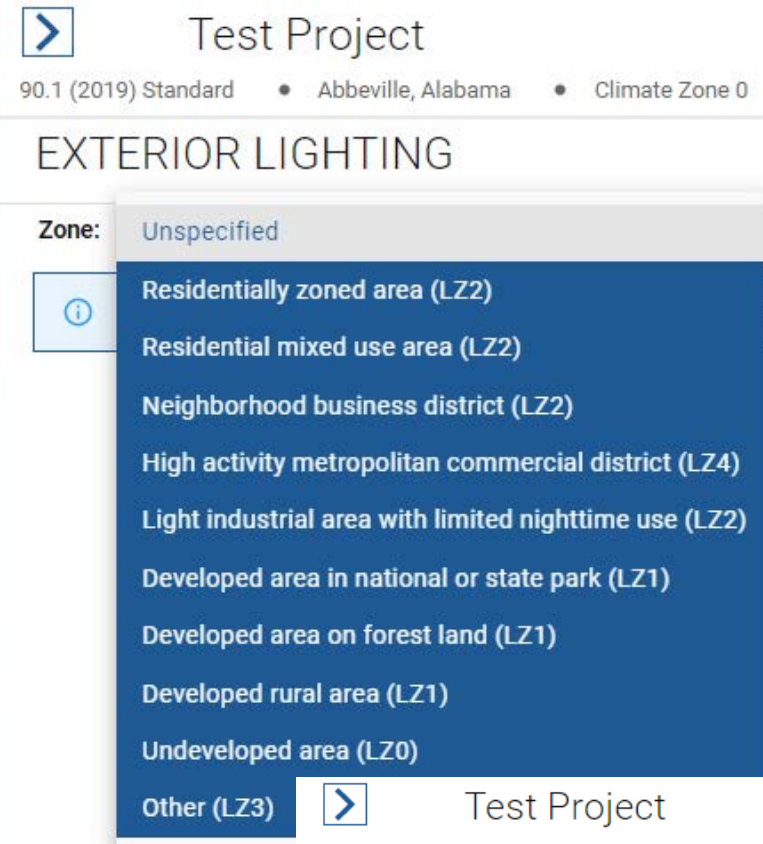
► Zone and area type determine:

- Lighting power density
- Units
- Tradability



COMcheck-Web™

- HELP CENTER
- RETURN TO PROJECTS
- BOBBY@GMAIL.COM
- ENVELOPE
- INTERIOR LIGHTING
- EXTERIOR LIGHTING**
- MECHANICAL
- REQUIREMENTS
- COMPLIANCE
- COLLAPSE



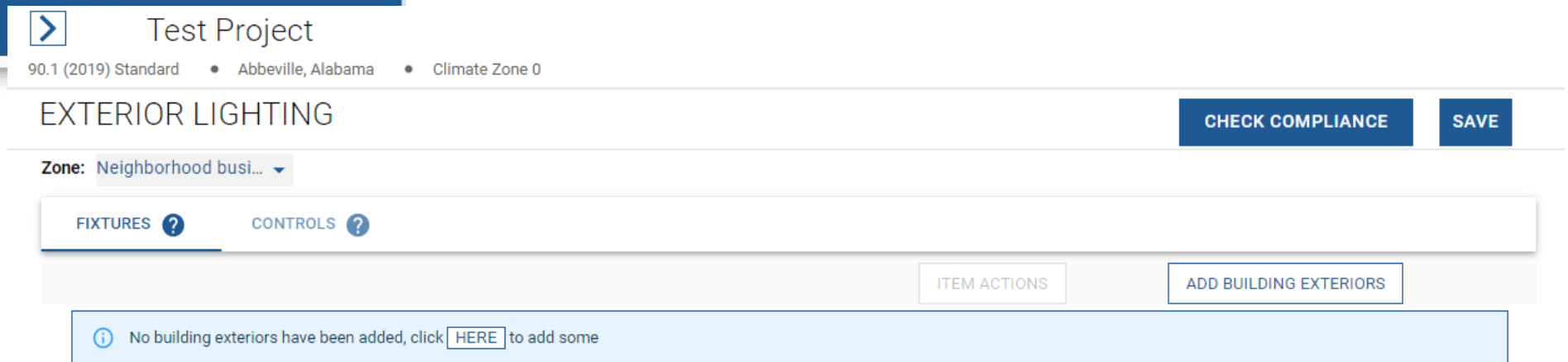
Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

EXTERIOR LIGHTING

Zone: Unspecified

- Residentially zoned area (LZ2)
- Residential mixed use area (LZ2)
- Neighborhood business district (LZ2)
- High activity metropolitan commercial district (LZ4)
- Light industrial area with limited nighttime use (LZ2)
- Developed area in national or state park (LZ1)
- Developed area on forest land (LZ1)
- Developed rural area (LZ1)
- Undeveloped area (LZ0)
- Other (LZ3)



Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

EXTERIOR LIGHTING

Zone: Neighborhood busi...

FIXTURES ? CONTROLS ?

ITEM ACTIONS ADD BUILDING EXTERIORS

No building exteriors have been added, click [HERE](#) to add some

Project: Exterior Lighting Specifications

Add Area

1 ————— 2 ————— 3
Area Fixture Controls

Building Area Information

ADD AREA

---CANCEL--- NEXT



HELP CENTER

RETURN TO PROJECTS

BOBBY@GMAIL.COM

ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

COMPLIANCE

COLLAPSE

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

EXTERIOR LIGHTING

CHECK COMPLIANCE SAVE

Zone: Neighborhood busi...

FIXTURES ? CONTROLS ?

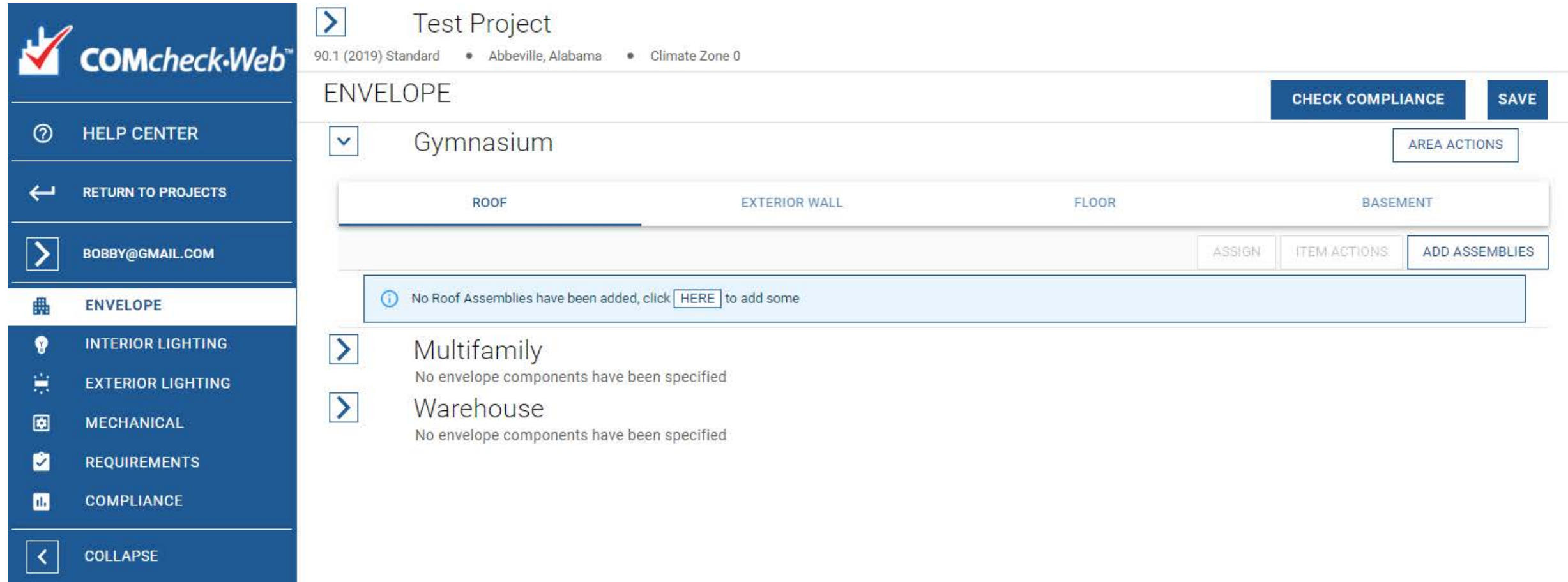
Building exteriors

	Type	Target Wattage	Proposed Wattage
1	☐ Landscaping		
	Landscaping		
1	☒ LED Fixture		
	LED		
TOTALS:		80	300

PLAN REVIEW CONTROLS WATTAGE

[9.7] Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.

Envelope: Introduction

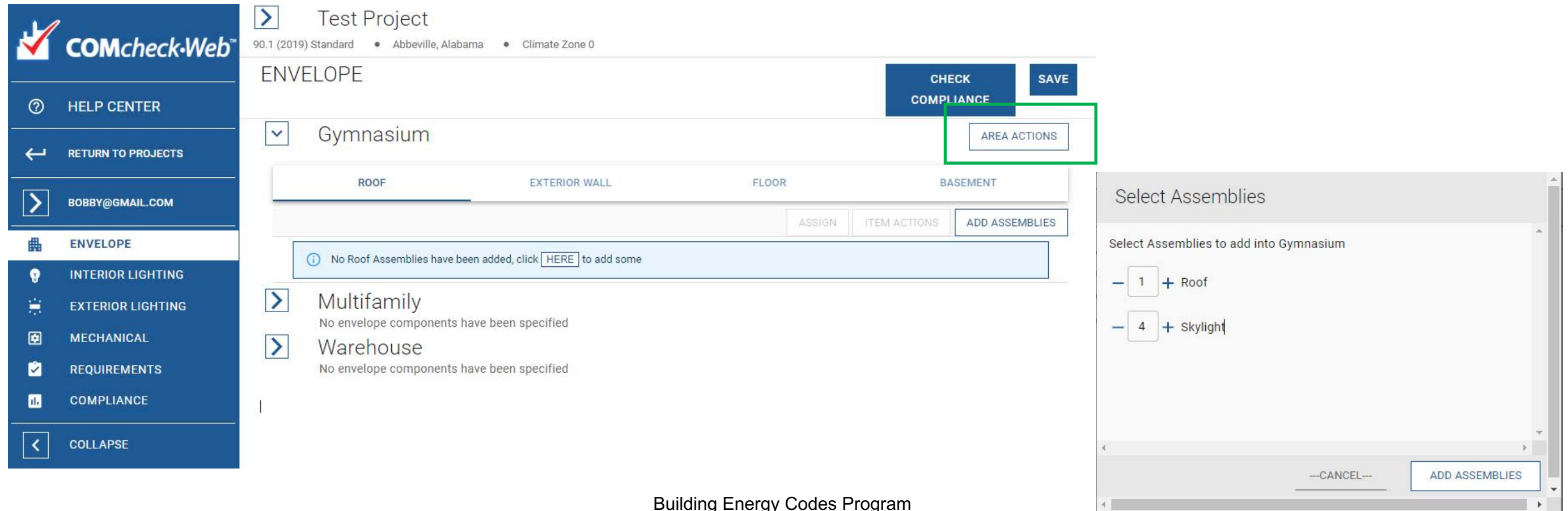


The screenshot displays the COMcheck-Web interface. On the left is a dark blue sidebar with the COMcheck-Web logo and navigation links: HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE (selected), INTERIOR LIGHTING, EXTERIOR LIGHTING, MECHANICAL, REQUIREMENTS, COMPLIANCE, and a COLLAPSE button. The main content area is titled 'Test Project' and shows project details: 90.1 (2019) Standard, Abbeville, Alabama, and Climate Zone 0. The 'ENVELOPE' section is active, showing a dropdown for 'Gymnasium' and an 'AREA ACTIONS' button. Below this are tabs for ROOF, EXTERIOR WALL, FLOOR, and BASEMENT. The ROOF tab is selected, displaying a message: 'No Roof Assemblies have been added, click [HERE](#) to add some'. At the bottom of the main area, there are links for 'Multifamily' and 'Warehouse', both with the note 'No envelope components have been specified'. Action buttons 'ASSIGN', 'ITEM ACTIONS', and 'ADD ASSEMBLIES' are visible near the bottom right of the main content area.

- ▶ Cavity Insulation R-value – insulation placed between structural members
- ▶ Continuous Insulation R-value – ‘continuous’ insulation across the structure (e.g., rigid insulation)

Envelope: Opaque Assemblies

- ▶ Entering envelope components follows a different pattern
 - Select envelope component (roof, exterior wall, floor or basement)
 - Select “Add Assemblies” button and determine number of components
 - Edit components



COMcheck-Web™

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

ENVELOPE

Gymnasium

ROOF EXTERIOR WALL FLOOR BASEMENT

ASSIGN ITEM ACTIONS ADD ASSEMBLIES

No Roof Assemblies have been added, click [HERE](#) to add some

Multifamily
No envelope components have been specified

Warehouse
No envelope components have been specified

Select Assemblies

Select Assemblies to add into Gymnasium

1 + Roof

4 + Skylight

---CANCEL--- ADD ASSEMBLIES

Envelope: Opaque Assemblies (cont)

?

HELP CENTER

←

RETURN TO PROJECTS

>

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ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

COMPLIANCE

<

COLLAPSE

>

Test Project

90.1 (2019) Standard

• Abbeville, Alabama

• Climate Zone 0

ENVELOPE

CHECK COMPLIANCE

SAVE

▼

Gymnasium

AREA ACTIONS

ROOF [1]

EXTERIOR WALL

FLOOR

BASEMENT

Assemblies

ASSIGN

ITEM ACTIONS

ADD ASSEMBLIES

	Assembly	Gross Area	Cavity R-Value	Continuous R-Value	U-Factor	SHGC	VT	Details
1	<div>□</div> <div>Roof</div> <div>SELECT TYPE</div>					--	--	...
Unassigned Assemblies								
1	<div>□</div> <div>Skylight</div> <div>SELECT TYPE</div>							...
2	<div>□</div> <div>Skylight 1</div> <div>SELECT TYPE</div>							...
3	<div>□</div> <div>Skylight 2</div> <div>SELECT TYPE</div>							...
4	<div>□</div> <div>Skylight 3</div> <div>SELECT TYPE</div>							...

>

Multifamily

No envelope components have been specified

>

Warehouse

No envelope components have been specified

PLAN REVIEW

INSULATION

AIR LEAKAGE

FENESTRATION

>

✖

[4.2.2, 5.4.3.1.1, 5.7] Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.

[5.5.4.2.3] In buildings > 2,500 ft2, any enclosed spaces directly under a roof with ceiling heights > 15 ft. and used as an office, lobby, atrium, concourse, corridor, storage (including nonrefrigerated warehouse), gymnasium, fitness/exercise area, playing area, gymnasium seating area, convention exhibit/event space, courtroom, automotive service, fire station engine room, manufacturing corridor/transition and bay areas, retail, library reading and stack areas, distribution/sorting area, transportation baggage and seating areas, or workshop, the following requirements apply: The daylight zone under skylights is >= half the floor area and (a) the skylight area to daylight zone is >= 3 percent with a skylight VT >= 0.40 or (b) the minimum skylight effective aperture >= 1 percent. The skylights have a measured haze value > 90 percent.

>

✖

Envelope: Opaque Assemblies (cont)

Edit Roof

Component description:

Roof

☒ Insulation Entirely Above Deck
☐ Metal Building, Standing Seam
☐ Metal Building, Screw Down
☐ Attic Roof, Wood Joists
☐ Attic Roof, Steel Joists
☐ Other (U-Factor option)

Properties

Gross Area (ft2) ?
10000

Continuous R-Value ?
60

Surface Conditioning Category

Adjacent Space Type
Exterior

Cool Roof Performance Details (Required)

The selected roof type and project location means your proposed building envelope must perform better than a building modelled with the same roof having a three-year-aged solar reflectance = 0.55 and thermal emittance = 0.75. Roofs qualifying for an exemption will be given credit for the required solar reflectance and thermal emittance. Select the appropriate option.

☐ Apply three-year-aged solar reflectance and thermal emittance performance data
☒ Cool Roof performance data not available
☐ Exemption applies

CANCEL

APPLY CHANGES

Envelope: Opaque Assemblies (cont)


COMcheck-Web™

 HELP CENTER

 RETURN TO PROJECTS

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 **ENVELOPE**

 INTERIOR LIGHTING

 EXTERIOR LIGHTING

 MECHANICAL

 REQUIREMENTS

 COMPLIANCE

 COLLAPSE

 Test Project

90.1 (2019) Standard
 • Abbeville, Alabama
 • Climate Zone 0

ENVELOPE

CHECK COMPLIANCE

SAVE

 Gymnasium

AREA ACTIONS

ROOF [1]
 EXTERIOR WALL
 FLOOR
 BASEMENT

Assemblies

ASSIGN

ITEM ACTIONS

ADD ASSEMBLIES

	Assembly	Gross Area	Cavity R-Value	Continuous R-Value	U-Factor	SHGC	VT Details
1	  Roof INSULATION ENTIRELY ABOVE DECK	10000		60	0.016	--	...
Unassigned Assemblies							
1	  Skylight SELECT TYPE						...
2	  Skylight 1 SELECT TYPE						...
3	  Skylight 2 SELECT TYPE						...
4	  Skylight 3 SELECT TYPE						...

 Multifamily
No envelope components have been specified

 Warehouse
No envelope components have been specified

Envelope: Opaque Assemblies (cont)



[HELP CENTER](#)
[RETURN TO PROJECTS](#)
[BOBBY@GMAIL.COM](#)

ENVELOPE
 INTERIOR LIGHTING
 EXTERIOR LIGHTING
 MECHANICAL
 REQUIREMENTS
 COMPLIANCE
[COLLAPSE](#)

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 0

ENVELOPE

[CHECK COMPLIANCE](#)
[SAVE](#)

[Gymnasium](#)
[AREA ACTIONS](#)

[ROOF \[1\]](#)
[EXTERIOR WALL](#)
[FLOOR](#)
[BASEMENT](#)

[ASSEMBLIES](#)
[ITEM ACTIONS](#)
[ADD ASSEMBLIES](#)

	Assembly	Gross Area	Cavity R-Value	Continuous R-Value	U-Factor	SHGC	VT	Details
1	Roof <small>INSULATION ENTIRELY ABOVE DECK</small>	10000		60	0.016	-	-	...
Unassigned Assemblies								
1	Skylight <small>SELECT TYPE</small>							
2	Skylight 1 <small>SELECT TYPE</small>							
3	Skylight 2 <small>SELECT TYPE</small>							
4	Skylight 3 <small>SELECT TYPE</small>							

[Multifamily](#)
 No envelope components have been specified

[Warehouse](#)
 No envelope components have been specified

Assign Assembly

Select an assignment for the following assemblies.

- Skylight
- Skylight 1
- Skylight 2
- Skylight 3

Assemblies available

☐ Roof

[---CANCEL---](#)
[ASSIGN ASSEMBLY](#)

[Duplicate](#)
[Delete](#)
[Edit](#)

Envelope: Fenestration

- ▶ NFRC site-built certified product
- ▶ Performance evaluated (per NFRC guidelines)
- ▶ Energy code defaults – will not comply

Properties

Surface Conditioning Category

Performance Data Options

- ☒ NFRC site-built certified product (commercial products only)

CPD ID [Search NFRC database for CPD ID...](#)

GET DATA

U-Factor

0

SHGC

0

Visible Transmittance (VT)

0

- ☐ Product performance evaluated in accordance with NFRC

- ☐ Energy code defaults

Properties

Surface Conditioning Category

Performance Data Options

- ☐ NFRC site-built certified product (commercial products only)

- ☒ Product performance evaluated in accordance with NFRC

Please enter the following values for product.

U-Factor

0

SHGC

0

Visible Transmittance (VT)

0

ID or Desc

Product ID or description

- ☐ Energy code defaults

Properties

Surface Conditioning Category

Performance Data Options

- ☐ NFRC site-built certified product (commercial products only)

- ☐ Product performance evaluated in accordance with NFRC

- ☒ Energy code defaults

Glazing Type

Single Pane

Solar Coating

Clear

U-Factor

0.65

SHGC

0.87

Envelope: Summary

- ▶ Don't have to use every assembly type
- ▶ Can group "like" components
- ▶ Gross area (except slab-on-grade)
- ▶ Use "Other" assembly as needed
- ▶ Use batch operations for quicker input

Diagnostic Data on Envelope Report



COMcheck Software Version COMcheckWeb Envelope Compliance Certificate

Project Information

Energy Code: 90.1 (2019) Standard
Project Title: example 901
Location: Aberdeen, Idaho
Climate Zone: 6b
Project Type: New Construction
Performance Sim. Specs: EnergyPlus 8.1.0.009 (EPW: USA_ID_Pocatello.Muni.AP.725780_TMY3.epw)

Construction Site:

Owner/Agent:

Designer/Contractor:

Building Area

Floor Area

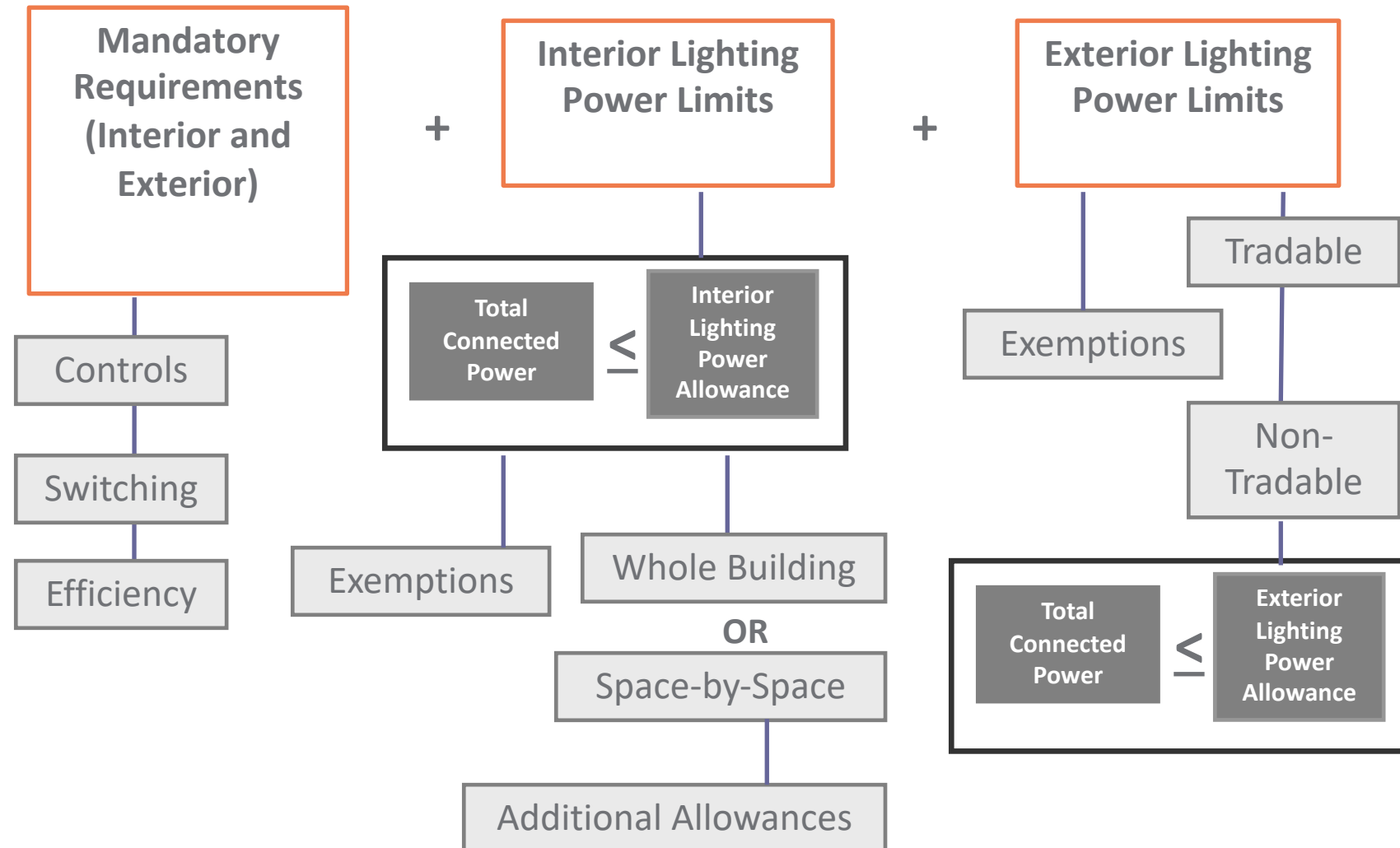
1-Exercise Center : Nonresidential

10000

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor _(a)
Roof: Metal Building, Standing Seam, Double Insulation Layer with Thermal Blocks (c), [Bldg. Use 1 - Exercise Center]	10000	30.0	0.0	0.072	0.031
Floor: Unheated Slab-On-Grade Fully insulated (uniform R-value across perimeter + under entire slab), [Bldg. Use 1 - Exercise Center] (b)	800	---	0.0	0.730	0.510
<u>NORTH</u> Ext. Wall: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Exercise Center]	1000	15.0	0.0	0.118	0.049

Lighting Compliance



Lighting Fixture Categories

- ▶ Linear fluorescent
- ▶ Compact fluorescent
- ▶ HID
- ▶ Incandescent
- ▶ Halogen
- ▶ Track lighting
- ▶ LED
- ▶ Induction

Lighting: Exemptions and Allowances

- ▶ Allowances and Exemptions as part of lighting wizard input
- ▶ Exemptions
 - Power for exempt fixtures is omitted from the **proposed wattage**
- ▶ Allowances
 - **Allowed wattage** for building increased by allowable amount

Add Interior Lighting Spaces

① Add Space(s) — ② Daylighting — ③ Fixtures — ④ Controls

Gymnasium ?

REQUIRED NAME	QUANTITY	FIXTURE WATTAGE	ALLOWANCES	ALLOWANCE AREA(ft ²)	EXEMPTIONS	ADD/DELETE FIXTURE	SELECT/ADD FIXTURE LIBRARY
Common Space Types (Office - Enclosed <=250 sq ft) Office <input type="text" value="LED Fixture"/> ↳ LED ▼	<input type="text" value="10"/>	<input type="text" value="15"/>	None ▼	<input type="text" value="0"/>	None ▼	<input type="button" value="+"/> <input type="button" value="−"/>	<input type="button" value="📖"/> <input type="button" value="🔖"/>

Lighting: Exemptions and Allowances (cont)

Update Exemptions/Allowances

☒ Exemption: **None**

☐ Allowance: **None**

- Advertising/Directional Signage
- Athletic TV Broadcasting
- Casino Gaming
- Display Lighting in Galleries/Museums
- Dressing Room Mirror Lighting
- Emergency Lighting Auto-off During Operating Hours
- Exit Signs
- Food Preparation Equipment
- Furniture-mounted Supplemental Task Lighting
- Health, Safety Required by Regulation
- Lighting in Refrigerator/Freezer Cases
- Lighting Integral to Equipment
- Lighting Sales or Educational Demonstration Systems
- Medical/Dental Procedure Lighting
- Non-Human Life Support Lighting
- Parking Garage Transition Lighting
- Registered Historical Landmark

Update Exemptions/Allowances or Cancel

Update Exemptions/Allowances

☐ Exemption: **None**

☒ Allowance: **None**

- None
- Additional Controls/Switching
- Decorative Appearance
- Vehicles, sporting goods, small electronics highlighting
- Furniture, clothing, cosmetics highlighting
- Jewelry, crystal, china highlighting
- Other retail highlighting

Update Exemptions/Allowances or Cancel

Exterior Lighting

- ▶ Inputs will be based on code selected
- ▶ Mandatory requirements
- ▶ Exemptions



Diagram illustrating the relationship between Total Connected Power and Ext. Ltg. Power Allowance, showing that Total Connected Power must be less than or equal to Ext. Ltg. Power Allowance.

Below the diagram is a software interface for "Exterior Lighting Design". The interface includes a progress bar with three steps: 1. Area, 2. Fixture, and 3. Controls. The "Area" step is currently active.

The "Area" section includes a dropdown menu for "AREA TYPE" with the following options:

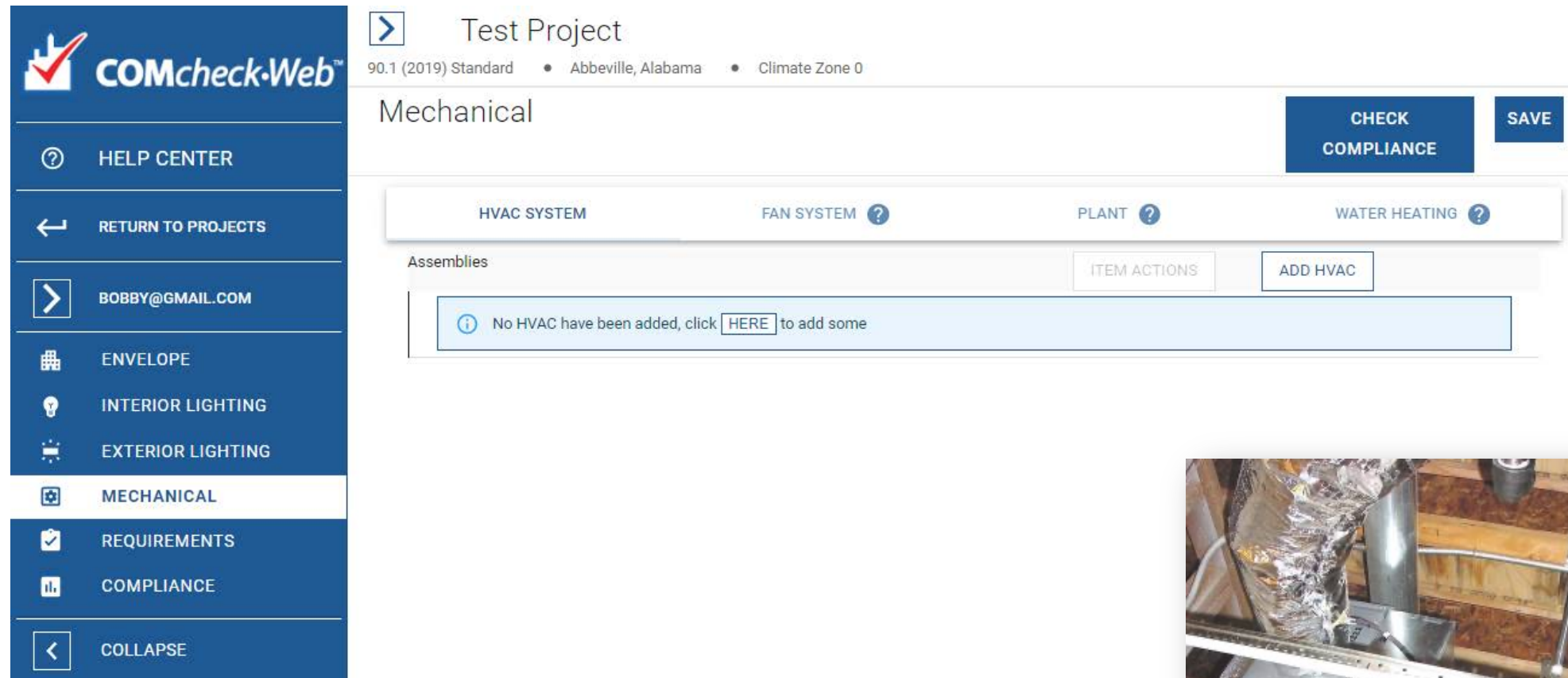
- Landscaping
- Landscaping
- LED Fixture
- LED

The "Fixture" section includes a dropdown menu for "QTY" with the value 20.

The "Controls" section includes a dropdown menu for "EXEMPTIONS" with the value None.

At the bottom of the interface are buttons for "--CANCEL--" and "NEXT".

Mechanical Systems



The screenshot shows the COMcheck-Web interface for a 'Test Project'. The left sidebar contains navigation links: HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE, INTERIOR LIGHTING, EXTERIOR LIGHTING, MECHANICAL (highlighted), REQUIREMENTS, COMPLIANCE, and COLLAPSE. The main content area is titled 'Mechanical' and shows the '90.1 (2019) Standard' for 'Abbeville, Alabama' in 'Climate Zone 0'. It features tabs for HVAC SYSTEM, FAN SYSTEM, PLANT, and WATER HEATING. Below these tabs, there's a section for 'Assemblies' with a message: 'No HVAC have been added, click HERE to add some'. Buttons for 'CHECK COMPLIANCE' and 'SAVE' are visible in the top right.

- Limited means to determine compliance
 - Enter characteristics of
 - HVAC or Heat Pump system
 - Fan system
 - Plant
 - Water heating
 - Characteristics you select determine which requirements apply
- Building Energy Codes Program



Mechanical Systems

Create HVAC System

Heating Equipment

☐ None

☐ Central Furnace

☐ Duct Furnace

☐ Hydronic or Steam Coil

☐ Radiant Heater

☐ Unit Heater

☐ Other Heating Equipment

Cooling Equipment

☐ None

☐ Field-Assembled DX System

☐ Packaged Terminal DX Unit

☐ Single Package DX Unit

☐ Room Air Conditioner

☐ Single Package Vertical AC Unit

☐ Single Package Vertical AC Unit Nonweatherized Space Constrained Unit

☐ Split DX Unit

☐ VRF Air Conditioner

☐ VRF Zone Fan Unit

☐ Computer Room Air Conditioner

☐ DX-DOAS Unit

☐ DX-DOAS With Heat Recovery

☐ Hydronic Coil

☐ Passive Chilled Water Unit

Create HVAC System or Cancel

Create Heat Pump

☐ Packaged Terminal Unit

☐ Single Packaged Unit

☐ Single Package Vertical Unit

☐ Single Package Vertical Heatpump Nonweatherized Space Constrained

☐ Split System

☐ Water Source

☐ Water-To-Water

☐ Groundwater Source

☐ Water-To-Water

☐ Ground Source, Brine-To-Water

☐ VRF Air Cooled Source

☐ Heat Recovery

☐ VRF Water Source

☐ Heat Recovery

☐ VRF Groundwater Source

☐ Heat Recovery

☐ VRF Ground Source

☐ Heat Recovery

Create Heat Pump or Cancel

Mechanical Systems

ADD HVAC

1 — 2 — 3 — 4 — 5

Heating Equipment Cooling Equipment System Details Zoning Configure Economizer

☐ Heat Pump/ VRF Condensing Unit

Configure Heating Equipment

☐ None ☒ Central Furnace
☐ Duct Furnace ☐ Hydronic or Steam Coil
☐ Radiant Heater ☐ Unit Heater
☐ Other Heating Equipment

---CANCEL--- BACK NEXT

ADD HVAC

1 — 2 — 3 — 4 — 5

Heating Equipment Cooling Equipment System Details Zoning Configure Economizer

Configure Zoning Equipment

☒ Single Zone ☐ Perimeter System
☐ Multiple Zone

Multiple Zone Details ?

Distribution Type: Single Duct

Terminal Unit Type: Reheat Type:

☐ VAX Box ☐ CV Mixing Box ☐ Electricity
☐ Fan Powered VAX Box ☐ Reheat/Recool Coil ☐ Hydronic
☐ VAV Mixing Box ☐ Steam

---CANCEL--- BACK NEXT

ADD HVAC

1 — 2 — 3 — 4 — 5

Heating Equipment Cooling Equipment System Details Zoning Configure Economizer

Configure Cooling Equipment

☐ None ☐ Field-Assembled DX System
☐ Packaged Terminal DX Unit ☒ Single Package DX Unit
☐ Room Air Conditioner ☐ Single Package Vertical AC Unit
☐ Nonweatherized Space Constrained Unit ☐ Split DX Unit
☐ VRF Air Conditioner ☐ VRF Zone Fan Unit
☐ Computer Room Air Conditioner ☐ DX-DOAS Unit
☐ DX-DOAS With Heat Recovery ☐ Hydronic Coil
☐ Passive Chilled Water Unit

---CANCEL--- BACK NEXT

ADD HVAC

1 — 2 — 3 — 4 — 5

Heating Equipment Cooling Equipment System Details Zoning Configure Economizer

Configure Economizer

Economizer Type:

Air

---CANCEL--- BACK ADD HVAC SYSTEM

ADD HVAC

1 — 2 — 3 — 4 — 5

Heating Equipment Cooling Equipment System Details Zoning Configure Economizer

Central Furnace

Name/Description: Furnace

Fuel Type / Heat Source: ?

Natural Gas

Quantity: 1

Capacity: (kBtu/h) ? 100

Proposed Efficiency (% Et) 90

Single Package DX Unit

Name/Description: AC

Condenser Type: ?

Air Cooled ?

Quantity: 1

Capacity: (kBtu/h) ? 100

Full Load Efficiency (EER) 15

Part Load Efficiency (EER) 13

Select Fan System

ADD FAN

---CANCEL--- BACK NEXT

Mechanical Systems


COMcheck-Web™

HELP CENTER

RETURN TO PROJECTS

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ENVELOPE

INTERIOR LIGHTING

EXTERIOR LIGHTING

MECHANICAL

REQUIREMENTS

COMPLIANCE

COLLAPSE

Test Project

90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 3 • New Construction

Mechanical

CHECK COMPLIANCE SAVE

HVAC SYSTEM FAN SYSTEM ? PLANT ? WATER HEATING ?

Assemblies

ITEM ACTIONS ADD HVAC

Component	System Type	Quantity	Capacity (kBtu/hr)	Fuel Type	Condenser Type	Fan System	Full Load Efficiency	Required Load Eff.	Part Load Efficiency	Required PartLoad Eff.
1 ☐ HVAC	HVAC	1				None	–		–	
1 ☐ Furnace	Central Furnace	1	100 kBtu/h	Gas			90 % Et	80 % Et	–	None
1 ☐ AC	Single Package DX Unit	1	100 kBtu/h		Air Cooled		15 EER	11 EER	–	12.7 IEER

SYSTEM_SPECIFIC PLAN REVIEW HVAC CONTROLS OTHER EQUIPMENT POST CONSTRUCTION

HVAC

☐ [6.4.1.4, 6.4.1.5] Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 80% AFUE)

☐ [6.4.1.4, 6.4.1.5] Equipment minimum efficiency: Single Package Unit: 11.00 EER + 12.7 IEER

Mechanical Fan Systems

- Determines Fan Power Limitations compliance for each fan system
- Motor nameplate HP and brake HP
 - Brake HP includes pressure drop credits as applicable

 Test Project 90.1 (2019) Standard • Abbeville, Alabama • Climate Zone 3 • New Construction

Mechanical CHECK COMPLIANCE SAVE

HVAC SYSTEM FAN SYSTEM ? PLANT ? WATER HEATING ?

Assemblies ITEM ACTIONS ADD FAN SYSTEM

? No FAN SYSTEM have been added, click [HERE](#) to add some

SYSTEM_SPECIFIC PLAN REVIEW HVAC CONTROLS OTHER EQUIPMENT POST CONSTRUCTION

HVAC

? ✗ [6.4.1.4, 6.4.1.5] Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 80% AFUE)

? ✗ [6.4.1.4, 6.4.1.5] Equipment minimum efficiency: Single Package Unit: 11.00 EER + 12.7 IEER

Add Fan System

1 System Details 2 Configure Pressure Drop Credits 3 Configure Fans

Fan System ID
Fan Sys 1

Flow control devices installed on exhaust/return to meet health, safety environmental air pressure requirements in hospital, vivarium or laboratory systems.
☐

Areas Served

Compliance Options
☐ Motor Nameplate HP ☒ Brake HP (BHP) ☒ Pressure Drop Credits

—CANCEL— BACK NEXT

Add Fan System

1 System Details 2 Configure Pressure Drop Credits 3 Configure Fans

Application	Credit Amount	CFM Through Device	Vertical Duct Length	Enter PD at design conditions	Enter clean filter PD	Recovery Effectiveness (Fraction)
Particulate filtratio...	2.42072	20000				
ADD CREDIT	DELETE SELECTED					

—CANCEL— BACK NEXT

Add Fan System

1 System Details 2 Configure Pressure Drop Credits 3 Configure Fans

Fan ID	Fan Type	Fan Control	Design Air Volume(CFM)	BHP at System Design Conditions	Maximum BHP	Motor Nameplate HP	Max Motor Nameplate HP	Fan Efficiency Grade (FEG)	Peak Efficiency (%)	Design Efficiency (%)	FEG Exception
F1	Supply	Constant	20000	15	15	15	20	90	90	90	Unspecified
ADD FAN			DELETE SELECTED								

Passes

System Type: Brake HP (BHP)

Proposed: 15

Max Allowed: 21.22

—CANCEL— BACK ADD FAN SYSTEM

Mechanical Fan Systems


COMcheck-Web™


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[ENVELOPE](#)


[INTERIOR LIGHTING](#)


[EXTERIOR LIGHTING](#)


[MECHANICAL](#)


[REQUIREMENTS](#)


[CREDITS](#)


[COMPLIANCE](#)


[COLLAPSE](#)


Test Project
2018 IECC • Abbeville, Alabama • Climate Zone 3 • New Construction

Mechanical

CHECK COMPLIANCE
SAVE

HVAC SYSTEM
FAN SYSTEM ?
PLANT ?
WATER HEATING ?

Assemblies

ITEM ACTIONS
ADD FAN SYSTEM

	Fan ID	Compliance Method	Areas Served	Pressure Credits	Complies	Design Air Volume (CFM)	Fan Type	Fan Control	Motor Nameplate HP	Fan Efficiency Grade (FEG)
1	 Fan Sys 1	Brake HP (BHP)		YES	Passes					
1	 F1					20000	Supply	Constant	15	90

SYSTEM_SPECIFIC
PLAN REVIEW
POST CONSTRUCTION
HVAC
TESTING

HVAC



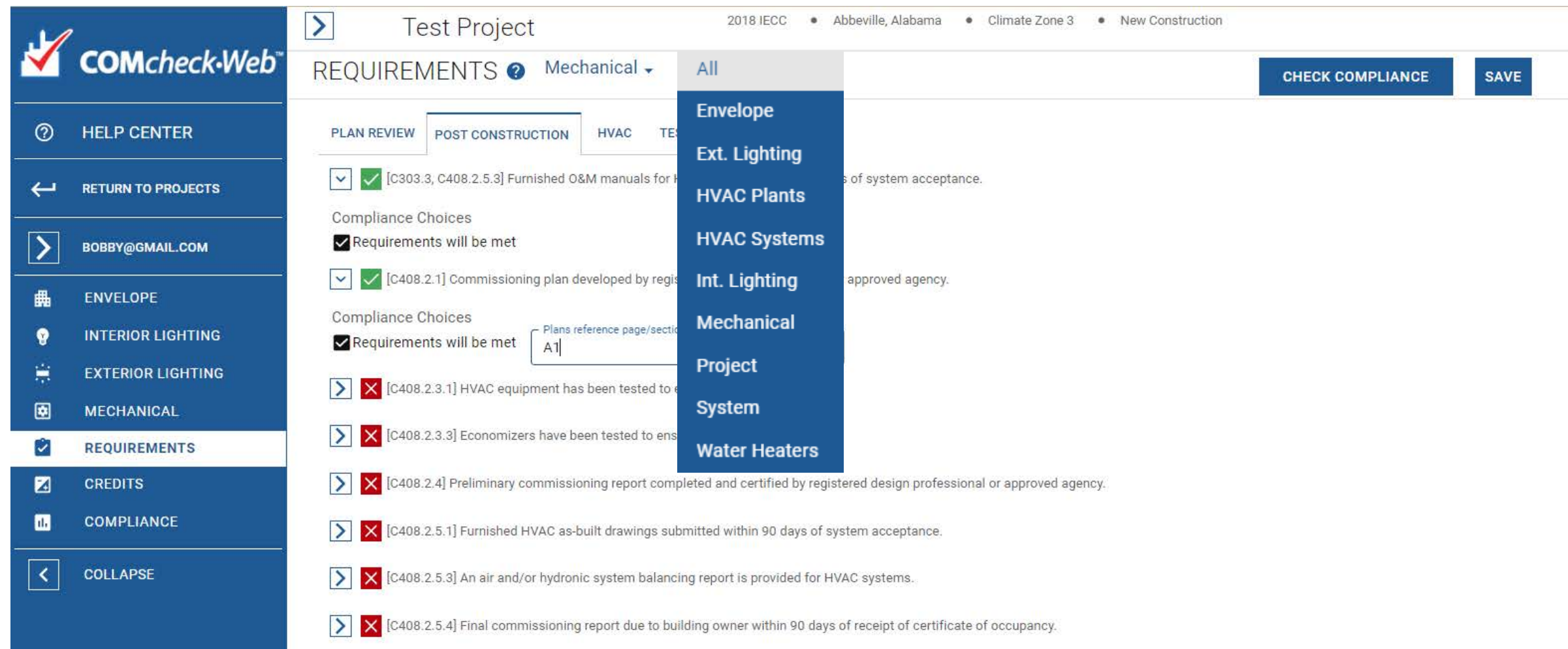
[C403.3.2] Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et or 80% AFUE



[C403.3.2] Equipment minimum efficiency: Single Package Unit: 11.00 EER + 12.6 IEER

Requirements Tab - Goals

- Ensure user is aware of applicable mandatory requirements and addresses each in the software
- Provide better documentation for code officials



Test Project

2018 IECC • Abbeville, Alabama • Climate Zone 3 • New Construction

REQUIREMENTS ? Mechanical ▾ All

CHECK COMPLIANCE SAVE

PLAN REVIEW POST CONSTRUCTION HVAC TEST

☐ ☒ [C303.3, C408.2.5.3] Furnished O&M manuals for building owner.

Compliance Choices

☒ Requirements will be met

☐ ☒ [C408.2.1] Commissioning plan developed by registered design professional or approved agency.

Compliance Choices

☒ Requirements will be met

Plans reference page/section: A1

☐ ☒ [C408.2.3.1] HVAC equipment has been tested to ensure proper operation.

☐ ☒ [C408.2.3.3] Economizers have been tested to ensure proper operation.

☐ ☒ [C408.2.4] Preliminary commissioning report completed and certified by registered design professional or approved agency.

☐ ☒ [C408.2.5.1] Furnished HVAC as-built drawings submitted within 90 days of system acceptance.

☐ ☒ [C408.2.5.3] An air and/or hydronic system balancing report is provided for HVAC systems.

☐ ☒ [C408.2.5.4] Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.

Envelope

Ext. Lighting

HVAC Plants

HVAC Systems

Int. Lighting

Mechanical

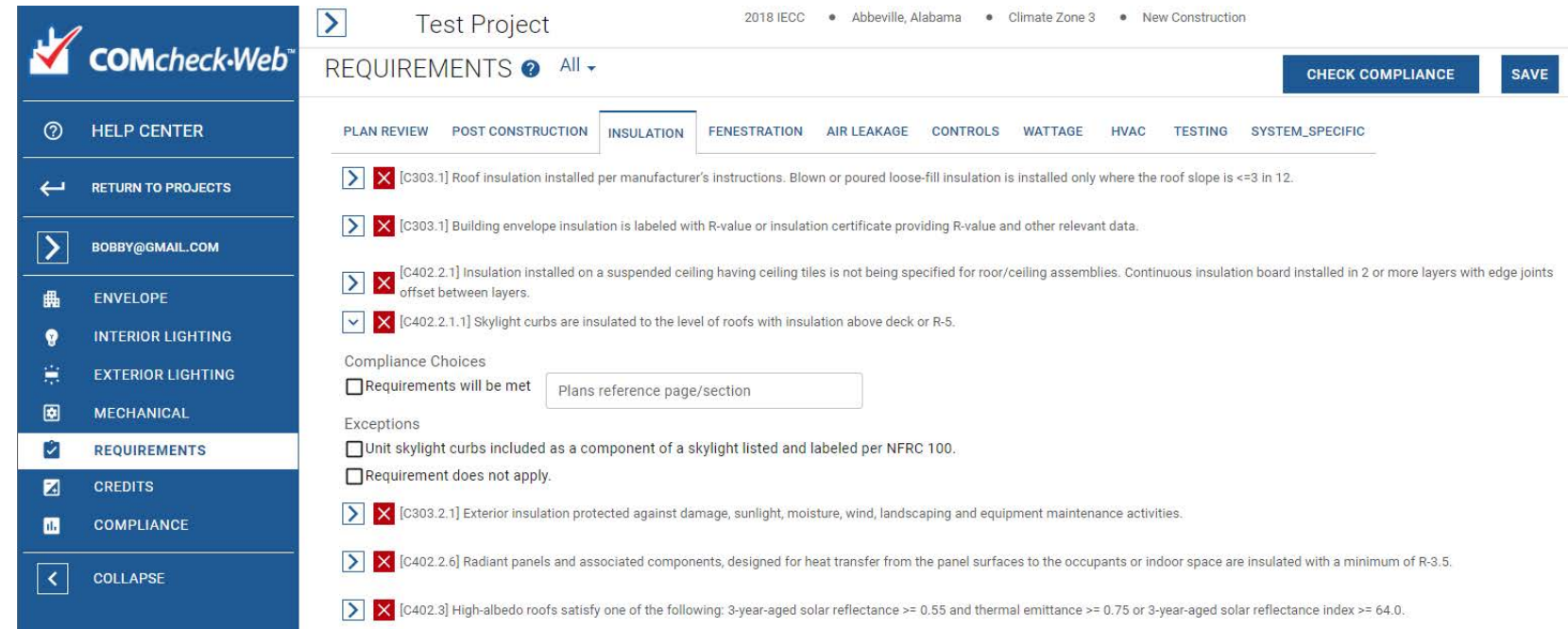
Project

System

Water Heaters

Requirements Tab – How it Works

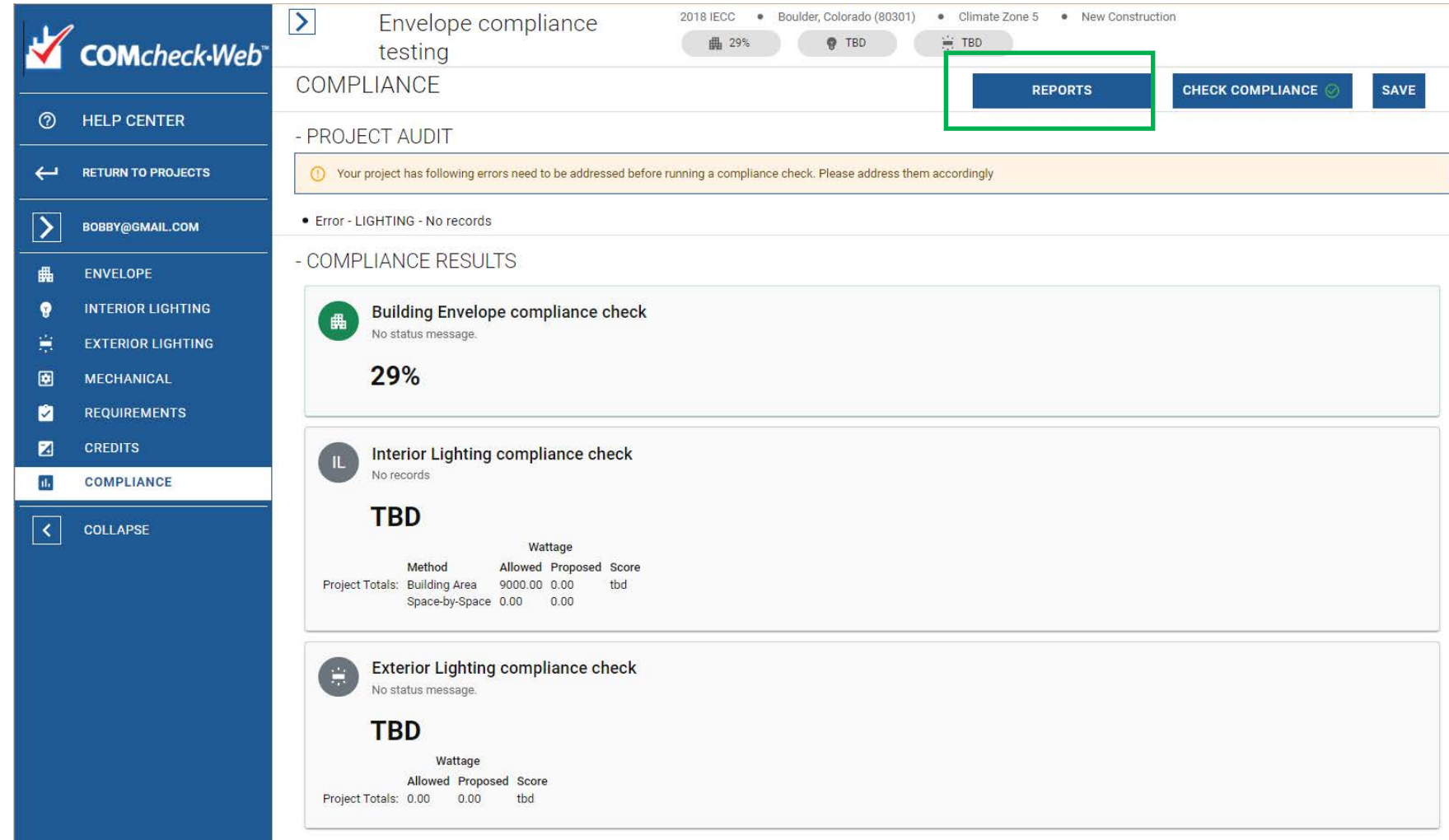
- For each requirement, the user
 - Chooses a “compliance option”
 - Requirement will be Met
 - Exempt or Exceptions
 - Requirement is Not Applicable or Requirement Does Not Apply
 - Notes how compliance for applicable requirements are documented
 - All Plans reference page/section are required to be filled out.
- This information is shown on the report in the “Comments/ Assumptions” column of the Inspection Checklist
- All requirements must be addressed or no compliance can be determined



The screenshot displays the COMcheck-Web interface for a project named "Test Project". The interface includes a sidebar with navigation options: HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE, INTERIOR LIGHTING, EXTERIOR LIGHTING, MECHANICAL, REQUIREMENTS (selected), CREDITS, COMPLIANCE, and COLLAPSE. The main content area shows the "REQUIREMENTS" tab for the "INSULATION" category. It lists several requirements with checkboxes for compliance status. For example, [C303.1] Roof insulation installed per manufacturer's instructions. Blown or poured loose-fill insulation is installed only where the roof slope is <=3 in 12. The interface also includes sections for "Compliance Choices" and "Exceptions" with checkboxes and text input fields for user notes.

Compliance and Reports

- Click on Reports – top right of screen
- Choices, choose any or all
 - Envelope Compliance Certificate
 - Interior Lighting Compliance Certificate
 - Exterior Lighting Compliance Certificate
 - Mechanical Compliance Certificate
- First pages are the Compliance Certificate
- Follow-on pages are the Inspection Checklists by phase of inspection
 - Plan Review
 - Footing/Foundation
 - Rough-in
 - Final



The screenshot shows the COMcheck-Web interface for Envelope compliance testing. The left sidebar contains navigation links: HELP CENTER, RETURN TO PROJECTS, BOBBY@GMAIL.COM, ENVELOPE, INTERIOR LIGHTING, EXTERIOR LIGHTING, MECHANICAL, REQUIREMENTS, CREDITS, and COMPLIANCE (highlighted). The main content area shows the 'Envelope compliance testing' page with a 'COMPLIANCE' tab. A 'REPORTS' button is highlighted with a green box. Below the 'COMPLIANCE' tab, there is a message: 'Your project has following errors need to be addressed before running a compliance check. Please address them accordingly'. The 'COMPLIANCE RESULTS' section shows three checks: Building Envelope compliance check (29%), Interior Lighting compliance check (TBD), and Exterior Lighting compliance check (TBD). The 'Building Envelope compliance check' section includes a table with columns: Method, Allowed, Proposed, and Score. The 'Interior Lighting compliance check' section includes a table with columns: Method, Allowed, Proposed, and Score. The 'Exterior Lighting compliance check' section includes a table with columns: Method, Allowed, Proposed, and Score.

Method		Allowed	Proposed	Score
Project Totals: Building Area		9000.00	0.00	tbd
Space-by-Space		0.00	0.00	

Method		Allowed	Proposed	Score
Project Totals: 0.00		0.00		tbd

Check Compliance button opens compliance page

Reports – Compliance Certificate



Project Information

Energy Code: 90.1 (2013) Standard
Project Title: Project Demo
Location: Bozeman, Montana
Climate Zone: 6b (weather data: TBD)
Project Type: New Construction
Vertical Glazing / Wall Area: 33%
Permit Date: 998877
Permit No. XYZ
Performance Sim. Specs: EnergyPlus Version 8.1.0.009

Construction Site: 123 Main St. Mainville, MT 59515	Owner/Agent: John Doe Acme Real Estate Agency 321 Example Ave. Example, MT 99522 444-333-2222 example@example.com	Designer/Contractor: Jane Contractor Excel Contractors, Inc. 444 Contractor Ave. Contractorville, MT 99999 999-999-9999 email@email.com
---	---	---

Building Area	Floor Area
1-Admin offices (Office) : Nonresidential	2000
2-Lumber storage (Warehouse) : Semiheated	100000

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor _{min}
Roof: Insulation Entirely Above Deck, [Bldg. Use 1 - Admin offices]	10000	---	30.0	0.032	0.032
Slab floor: Slab-On-Grade:Unheated, Vertical 2 ft., [Bldg. Use 1 - Admin offices] (c)	400	---	20.0	0.510	0.510
NORTH					
Exterior Wall 1: Wood-Framed, 24" o.c., [Bldg. Use 1 - Admin offices]	1500	19.0	5.0	0.047	0.051
Window 1: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Admin offices] (b)	500	---	---	0.420	0.420
EAST					
Exterior Wall 2: Wood-Framed, 24" o.c., [Bldg. Use 1 - Admin offices]	1500	19.0	5.0	0.047	0.051
Window 2 in Wall2: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Admin offices] (b)	500	---	---	0.420	0.420
SOUTH					
Exterior Wall 4: Wood-Framed, 24" o.c., [Bldg. Use 1 - Admin offices]	1500	19.0	5.0	0.047	0.051
Window 4 in wall 4: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Admin offices] (b)	500	---	---	0.420	0.420
WEST					
Exterior Wall 3: Wood-Framed, 24" o.c., [Bldg. Use 1 - Admin offices]	1500	19.0	5.0	0.047	0.051
Window 3 in wall 3: Metal Frame:Fixed, Perf. Specs.: Product ID	500	---	---	0.420	0.420

Reports – Compliance Certificate (cont)



COMcheck Software

Envelope Compliance Certificate

Project Information

Energy Code: 90.1 (2013) Standard
Project Title: Project Demo
Location: Bozeman, Montana
Climate Zone: 6b (weather data: TBD)
Project Type: New Construction
Vertical Glazing / Wall Area: 33%
Permit Date: 998877
Permit No. XYZ
Performance Sim. Specs: EnergyPlus Version 8.1.0.009

Construction Site:
123 Main St.
Mainville, MT 59515

Owner/Agent:
John Doe
Acme Real Estate Agency
321 Example Ave.
Example, MT 99522
444-333-2222
example@example.com

Designer/Contractor:
Jane Contractor
Excel Contractors, Inc.
444 Contractor Ave.
Contractorville, MT 99999
999-999-9999
email@email.com

Building Area	Floor Area
1-Admin offices (Office) : Nonresidential	2000
2-Lumber storage (Warehouse) : Semiheated	100000

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor ^(a)
Roof: Insulation Entirely Above Deck, [Bldg. Use 1 - Admin offices]	10000	---	30.0	0.032	0.032
Slab floor: Slab-On-Grade:Unheated, Vertical 2 ft., [Bldg. Use 1 - Admin offices] (c)	400	---	20.0	0.510	0.510
NORTH					
Exterior Wall 1: Wood-Framed, 24" o.c., [Bldg. Use 1 - Admin offices]	1500	19.0	5.0	0.047	0.051
Window 1: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Admin offices] (b)	500	---	---	0.420	0.420

Verify energy code,
location, and
construction type
specifications

Reports – Compliance Certificate (cont)

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Proposed U-Factor	Budget U- Factor ^(a)
Roof: Insulation Entirely Above Deck, [Bldg. Use 1 - Law library]	10000	—	30.0	0.032	
Slab floor: Slab-On-Grade:Unheated, Vertical 2 ft., [Bldg. Use 1 - Law library] (c)	400	—	10.0	0.550	
NORTH					
Exterior Wall 1: Wood-Framed, 24" o .c., [Bldg. Use 1 - Law library]	1000	13.0	7.5	0.050	
Window 1: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Law library] (b)	300	—	—	0.360	
EAST					
Exterior Wall 2: Wood-Framed, 24" o .c., [Bldg. Use 1 - Law library]	1000	13.0	7.5	0.050	
Window 2 in Wall2: Metal Frame:Fixed, Perf. Specs.: Product ID AX321, SHGC 0.40, VT 0.44, [Bldg. Use 1 - Law library] (b)	300	—	—	0.360	

Verify area,
insulation R-
values, and U-
factors consistent
with plans

Verify Compliance
Statement is Signed

Envelope PASSES: Design 1% better than code

Envelope Compliance Statement

Compliance Statement: The proposed envelope design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed envelope systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.0.2.3 and to comply with the mandatory requirements listed in the Inspection Checklist.

Name - Title

Signature

Date

Reports – Inspection Checklist



COMcheck Software

Inspection Checklist

Energy Code: 90.1 (2013) Standard

Requirements: 25.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

90.1 (2010) Standard	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
8.4.2 [EL10] ²	At least 50% of all 125 volt 15- and 20-Amp receptacles are controlled by an automatic control device.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	
9.4.1.1 [EL1] ²	Automatic controls to shut off all building lighting.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.2 [EL2] ²	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.3 [EL11] ²	Parking garage lighting is equipped with required lighting controls and daylight transition zone lighting.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	Requirement will be met. Location on plans/spec: Spec G, page 3, section 32
9.4.1.4 [EL12] ¹	Primary sidelighted areas ≥ 250 ft ² are equipped with required lighting.	☐ Complies ☐ Does Not ☐ Not Observable ☐ Not Applicable	

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Project Title: Florida 2020 Testing 2018

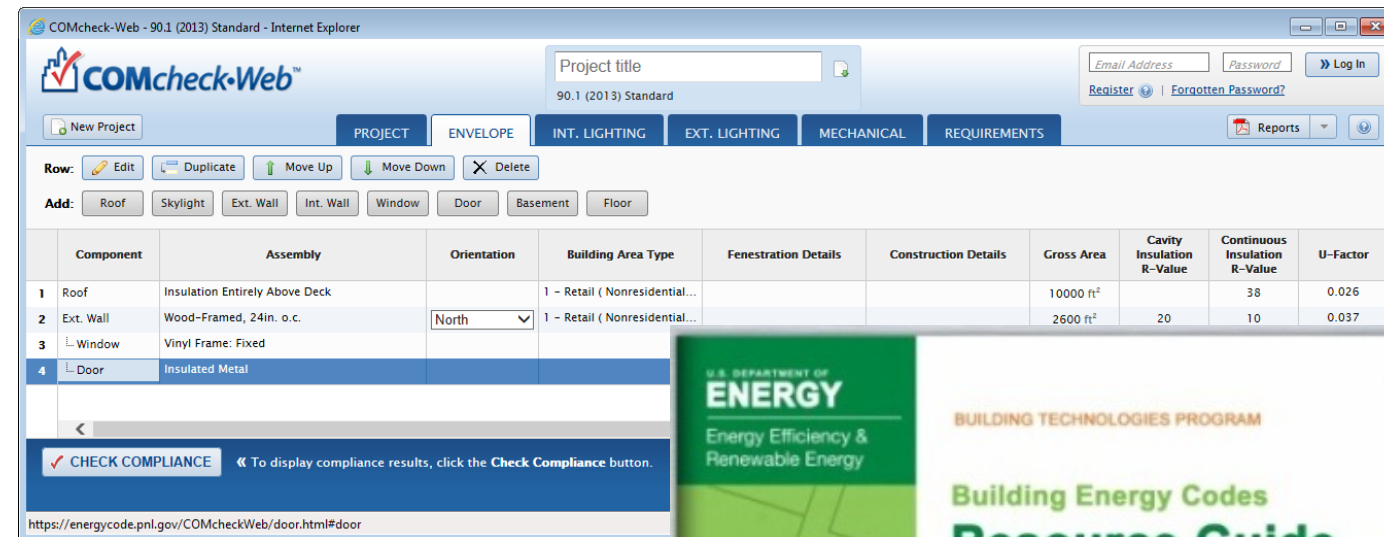
Report date: 07/20/21

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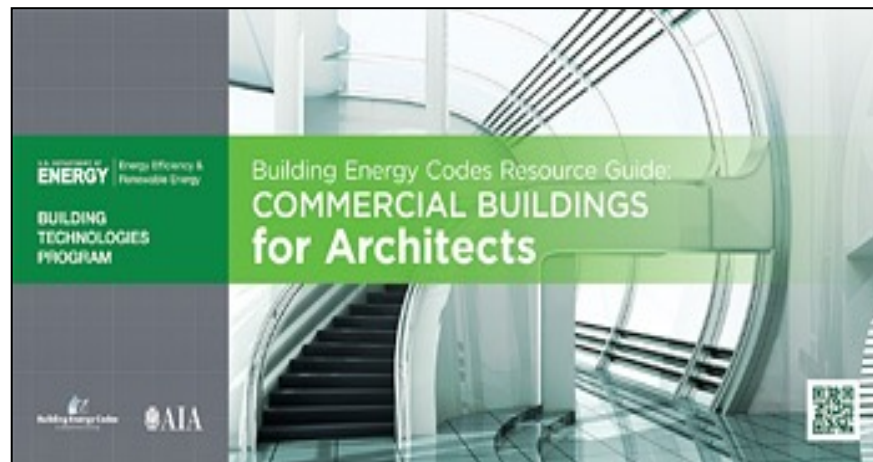
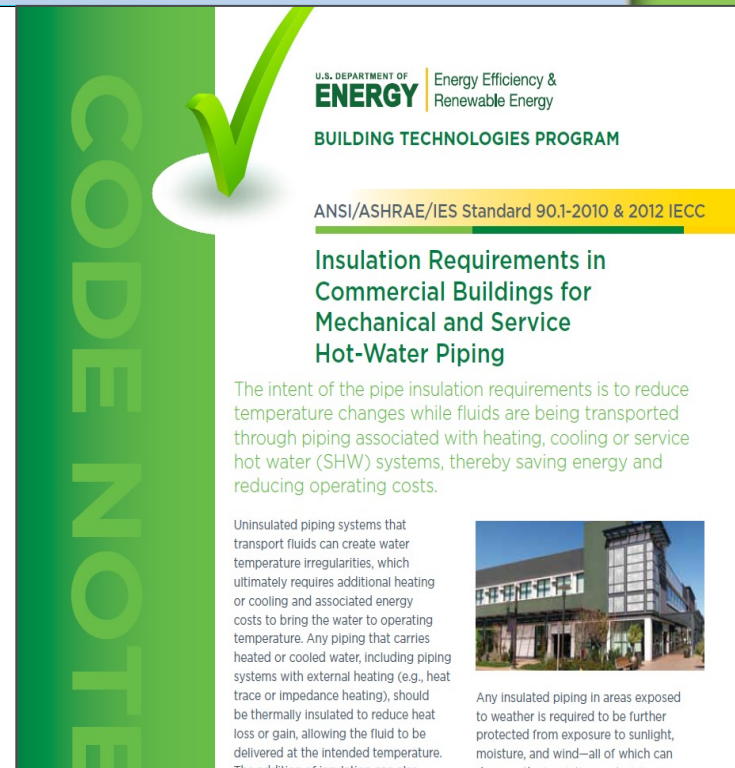
Page 3 of 8

U.S. DOE: BECP Resources

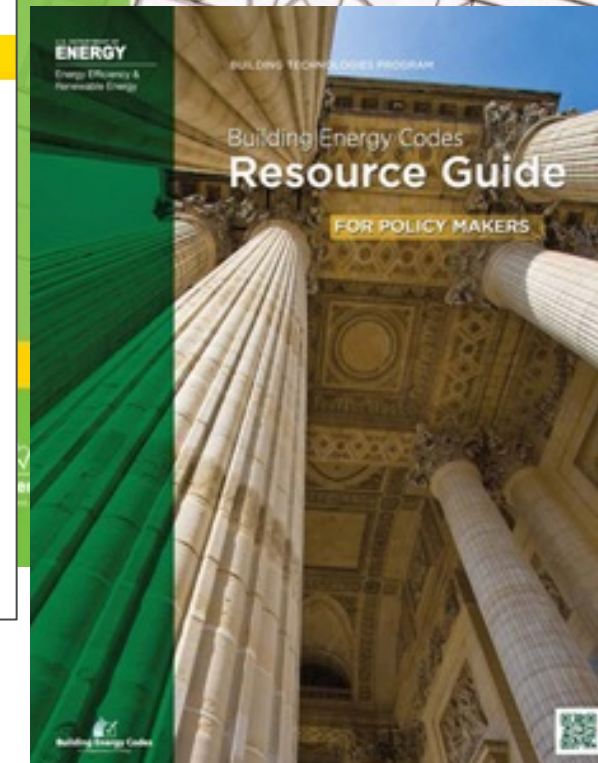
- Compliance software
 - Technical support
 - Code notes
 - Publications
 - Resource guides
 - Training materials
- www.energycodes.gov



Row	Component	Assembly	Orientation	Building Area Type	Fenestration Details	Construction Details	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor
1	Roof	Insulation Entirely Above Deck		1 - Retail (Nonresidential...			10000 ft ²		38	0.026
2	Ext. Wall	Wood-Framed, 24in. o.c.	North	1 - Retail (Nonresidential...			2600 ft ²	20	10	0.037
3	Window	Vinyl Frame: Fixed								
4	Door	Insulated Metal								



Building Energy Codes Program



THANK YOU!!!

Building Energy Codes Program

www.energycodes.gov

BECP help desk

<http://www.energycodes.gov/resource-center/help-desk>

Thank you

