Pacific Northwest
NATIONAL LABORATORY

COM*check* Basics

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

July 19, 2022

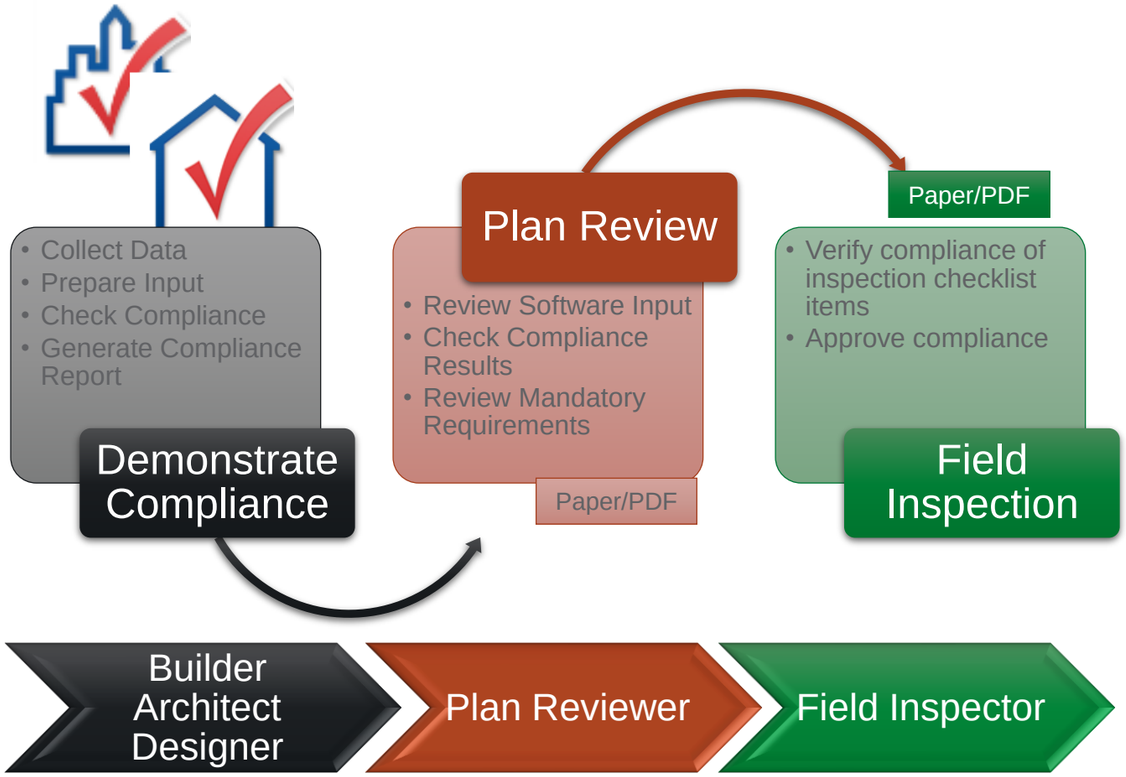
V. Robert Salcido
Senior Research Engineer

U.S. DEPARTMENT OF ENERGY BATTELLE

PNNL-SA-174899

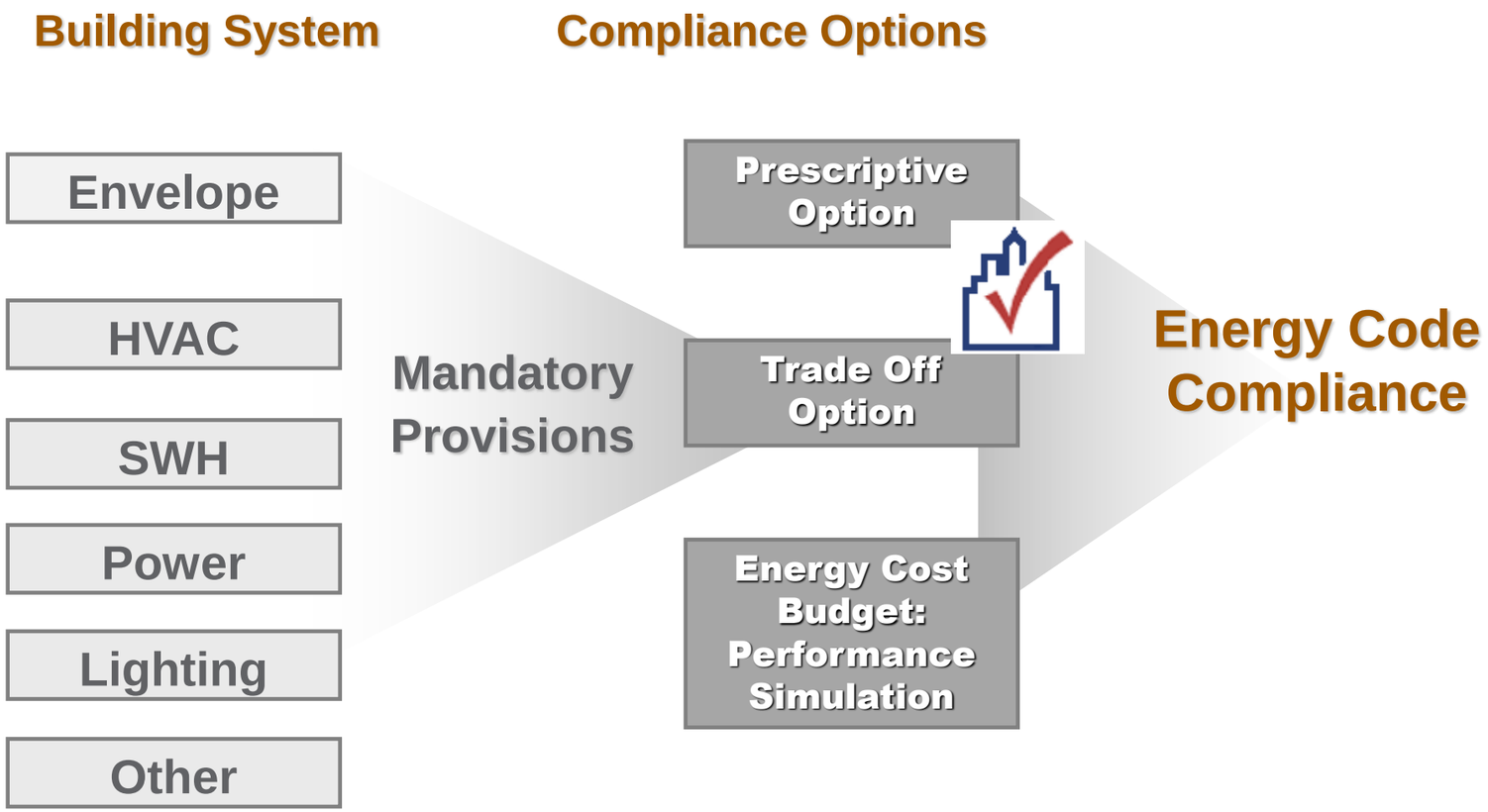
PNNL is operated by Battelle for the U.S. Department of Energy

COM*check* Current Use Scenario



BECP Tools used only during “Demonstrate Compliance” Stage

COM*check* Compliance Methods



COM*check* 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 has limited performance method (EnergyPlus)
- 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**

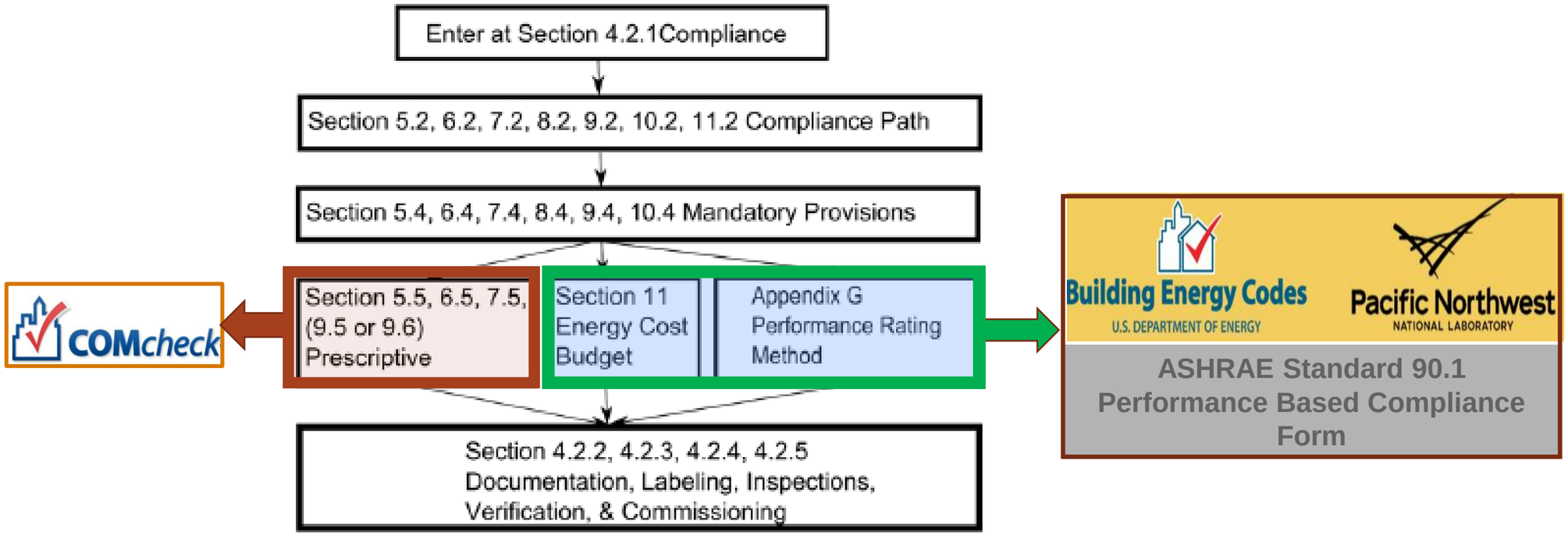
90.1-2013/2016/2019 Appendix C Envelope Trade-Off Methodology

- 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

Pacific Northwest NATIONAL LABORATORY

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[g]	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[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	C-1.140[e]	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[e]	U-0.322[e]	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[e]	U-0.066[e]	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[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	F-0.73[e]	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																
***U*-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	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	0.38	0.51	0.40	0.53	0.45	NR	0.45	N
0.2 ≤ PF < 0.5	0.30	0.37	0.30	0.37	0.30	0.37	0.43	0.53	0.46	0.56	0.48	0.58	NR	NR	NR	NR
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	0.58	0.58	0.61	0.61	0.64	0.64	NR	NR	NR	NR
Skylights																
U-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)

Pacific Northwest NATIONAL LABORATORY

90.1 Envelope Requirements

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

Opaque Elements	Nonresidential Assembly Maximum	Nonresidential Insulation Min. R-Value	Residential Assembly Maximum	Residential Insulation Min. R-Value	Semiheated Assembly Maximum	Semiheated Insulation Min. R-Value
Roofs						
Insulation Entirely above Deck	U-0.048	R-20.0 c.i.	U-0.048	R-20.0 c.i.	U-0.093	R-10.0 c.i.
Metal Building[a]	U-0.049	R-13.0 + R-19.0	U-0.049	R-13.0 + R-19.0	U-0.072	R-16.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.034	R-30.0
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-0.069	R-13.0 + R-5.6 c.i.	U-0.069	R-13.0 + R-5.6 c.i.	U-0.113	R-13.0
Steel-Framed	U-0.064	R-13.0 + R-7.5 c.i.	U-0.064	R-13.0 + R-7.5 c.i.	U-0.124	R-13.0
Wood-Framed and Other	U-0.051	R-13.0 + R-7.5 c.i.	U-0.051	R-13.0 + R-7.5 c.i.	U-0.089	R-13.0
Walls, Below-Grade						
Below-Grade Wall	C-0.119	R-7.5 c.i.	C-0.119	R-7.5 c.i.	C-1.140	NR
Floors						
Mass	U-0.064	R-12.5 c.i.	U-0.057	R-14.6 c.i.	U-0.137	R-4.2 c.i.
Steel-Joist	U-0.038	R-30.0	U-0.032	R-38.0	U-0.052	R-19.0
Wood-Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.051	R-19.0
Slab-On-Grade Floors						
Unheated	F-0.540	R-10 for 24 in.	F-0.520	R-15 for 24 in.	F-0.730	NR
Heated	F-0.860	R-15 for 24 in.	F-0.688	R-20 for 48 in.	F-1.020	R-7.5 for 12 in.
Opaque Doors						
Swinging	U-0.700		U-0.500		U-0.700	
Nonswinging	U-0.500		U-0.500		U-1.450	
Fenestration	**Assembly Max. U**	**Assembly Max. SHGC**	**Assembly Max. U**	**Assembly Max. SHGC**	**Assembly Max. U**	**Assembly Max. SHGC**
Vertical Glazing, 0%–40% of Wall						
Nonmetal framing (all)[c]	U-0.35		U-0.35		U-0.65	
Metal framing (curtainwall/storefront)[d]	U-0.45	SHGC-0.40 all	U-0.45	SHGC-0.40 all	U-0.60	SHGC-NR all
Metal framing (entrance door)[d]	U-0.80		U-0.80		U-0.90	
Metal framing (all other)[d]	U-0.55		U-0.55		U-0.65	
Skylight with Curb, Glass, % of Roof						
0%–2.0%	U_{all}–1.17	$SHGC_{all}$–0.49	U_{all}–0.98	$SHGC_{all}$–0.46	U_{all}–1.98	$SHGC_{all}$–NR
2.1%–5.0%	U_{all}–1.17	$SHGC_{all}$–0.49	U_{all}–0.98	$SHGC_{all}$–0.36	U_{all}–1.98	$SHGC_{all}$–NR
Skylight with Curb, Plastic, % of Roof						
0%–2.0%	U_{all}–0.87	$SHGC_{all}$–0.71	U_{all}–0.74	$SHGC_{all}$–0.65	U_{all}–1.90	$SHGC_{all}$–NR
2.1%–5.0%	U_{all}–0.87	$SHGC_{all}$–0.58	U_{all}–0.74	$SHGC_{all}$–0.55	U_{all}–1.90	$SHGC_{all}$–NR
Skylight without Curb, All, % of Roof						
0%–2.0%	U_{all}–0.69	$SHGC_{all}$–0.49	U_{all}–0.58	$SHGC_{all}$–0.49	U_{all}–1.36	$SHGC_{all}$–NR
2.1%–5.0%	U_{all}–0.69	$SHGC_{all}$–0.49	U_{all}–0.58	$SHGC_{all}$–0.39	U_{all}–1.36	$SHGC_{all}$–NR

Source: 90.1-2010

Pacific Northwest NATIONAL LABORATORY

90.1 Envelope Opaque Assembly Requirements

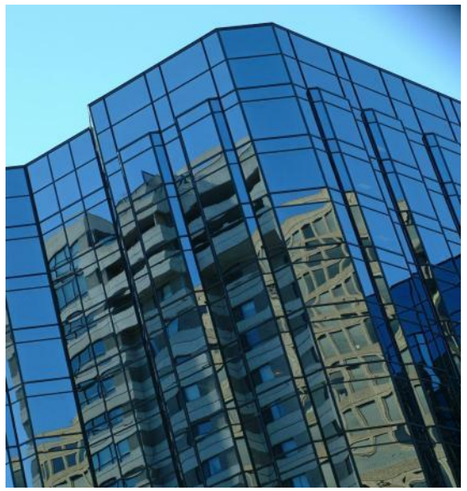
TABLE 5.5-6 Building Envelope Requirements for Climate Zone 6 (A, B)*

Opaque Elements	Nonresidential		Residential		Semiheated	
	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value	Assembly Maximum	Insulation Min. R-Value
Roofs						
Insulation Entirely above Deck	U-0.048	R-20.0 c.i.	U-0.048	R-20.0 c.i.	U-0.093	R-10.0 c.i.
Metal Building[a]	U-0.049	R-13.0 + R-19.0	U-0.049	R-13.0 + R-19.0	U-0.072	R-16.0
Attic and Other	U-0.027	R-38.0	U-0.027	R-38.0	U-0.034	R-30.0
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-0.069	R-13.0 + R-5.6 c.i.	U-0.069	R-13.0 + R-5.6 c.i.	U-0.113	R-13.0
Steel-Framed	U-0.064	R-13.0 + R-7.5 c.i.	U-0.064	R-13.0 + R-7.5 c.i.	U-0.124	R-13.0
Wood-Framed and Other	U-0.051	R-13.0 + R-7.5 c.i.	U-0.051	R-13.0 + R-7.5 c.i.	U-0.089	R-13.0
Walls, Below-Grade						
Below-Grade Wall	C-0.119	R-7.5 c.i.	C-0.119	R-7.5 c.i.	C-1.140	NR
Floors						
Mass	U-0.064	R-12.5 c.i.	U-0.057	R-14.6 c.i.	U-0.137	R-4.2 c.i.
Steel-Joist	U-0.038	R-30.0	U-0.032	R-38.0	U-0.052	R-19.0
Wood-Framed and Other	U-0.033	R-30.0	U-0.033	R-30.0	U-0.051	R-19.0
Slab-On-Grade Floors						
Unheated	F-0.540	R-10 for 24 in.	F-0.520	R-15 for 24 in.	F-0.730	NR
Heated	F-0.860	R-15 for 24 in.	F-0.688	R-20 for 48 in.	F-1.020	R-7.5 for 12 in.
Opaque Doors						
Swinging	U-0.700		U-0.500		U-0.700	
Nonswinging	U-0.500		U-0.500		U-1.450	

Source: 90.1-2010

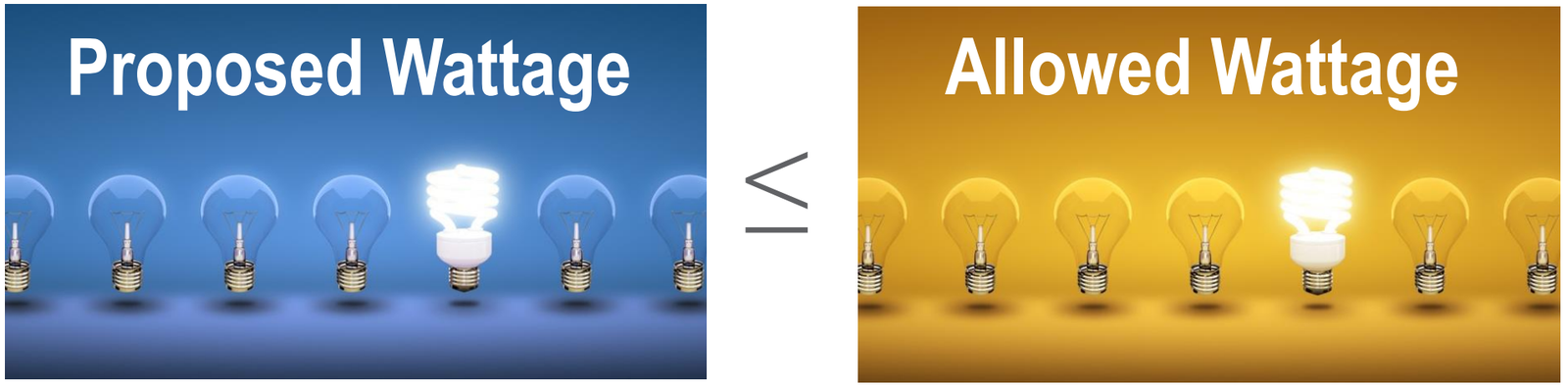
Project Types

- New Construction:
  - Trade-off compliance method
  - Prescriptive – Oregon only
- Addition
  - Trade-off compliance method
  - Prescriptive – Oregon only
- Alteration
  - Prescriptive compliance



Lighting Compliance Methods

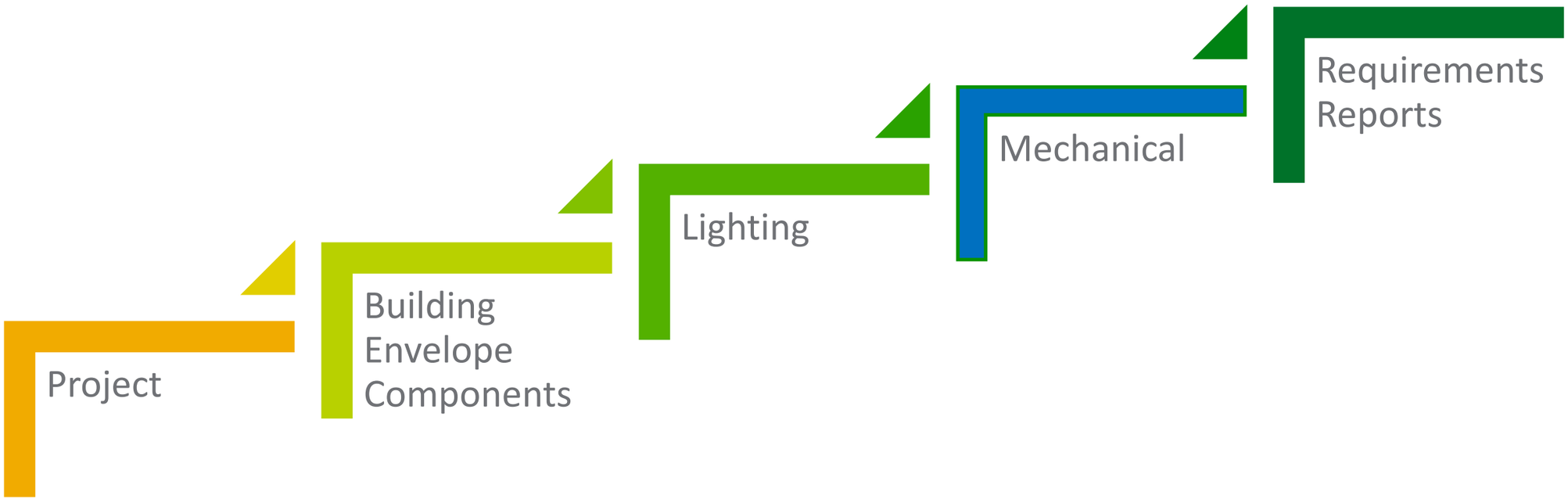
- Mandatory requirements: Controls, Switching, Daylighting
- Interior/Exterior lighting power requirements
  - Complies if total connected power <= lighting power allowance



Mechanical/Service Hot Water Compliance

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

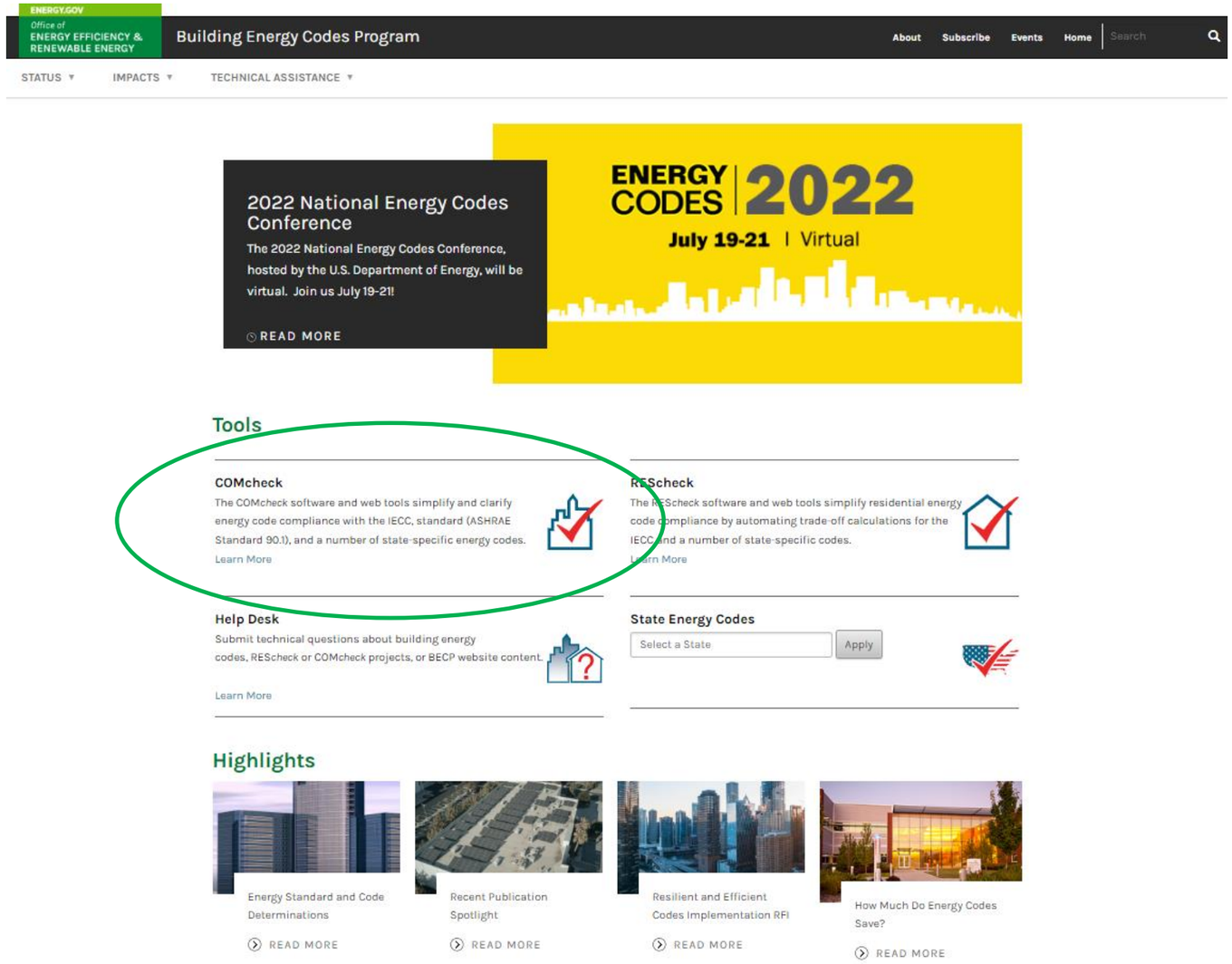
COM*check* Project Specification Steps



Info You'll Need

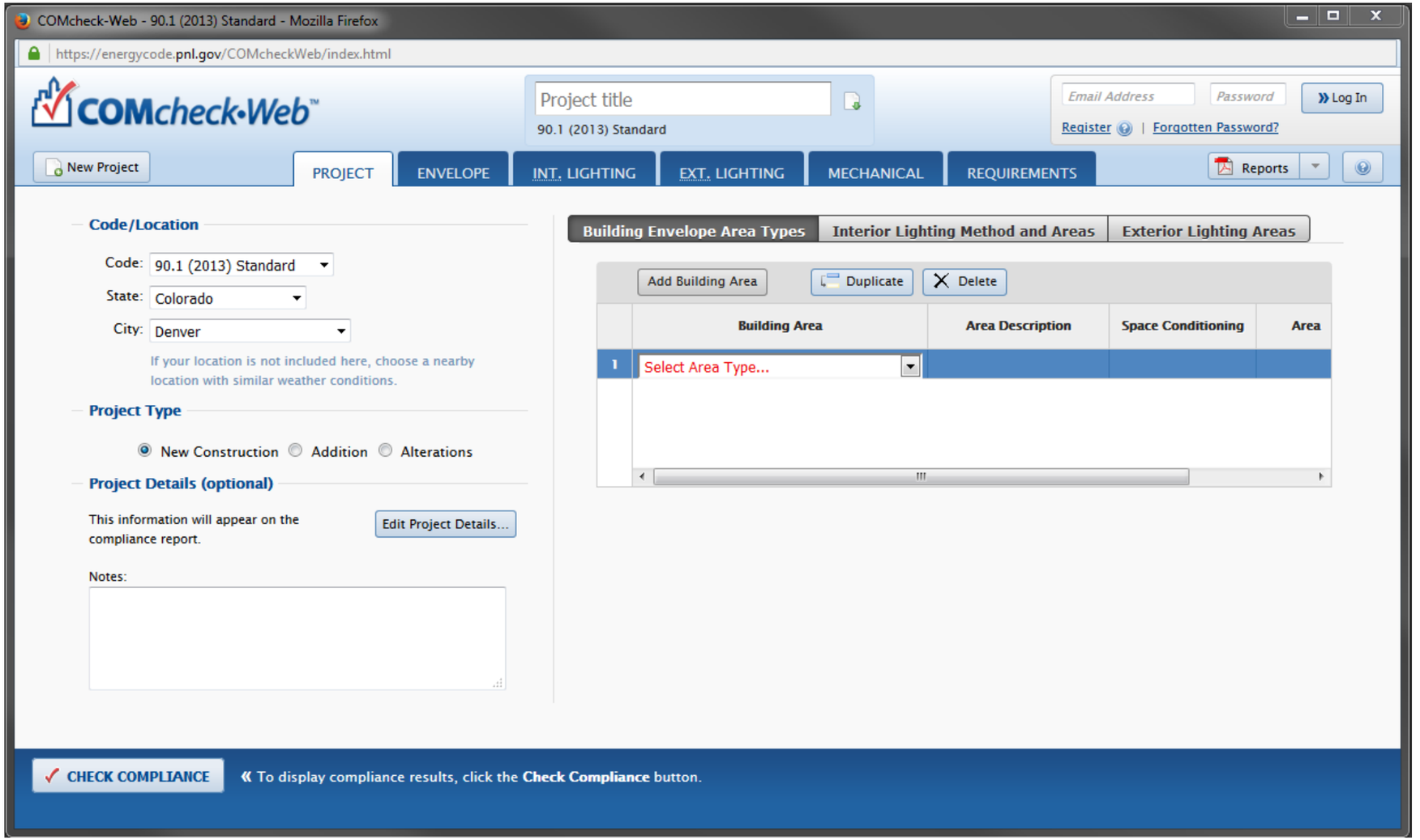
- Energy Code
- Builder and project location
- Area take-offs for envelope assemblies
- Insulation R-values, fenestration performance data
- Interior/Exterior lighting fixture details
- Heating and cooling system details
- Service water heating details

www.energycodes.gov



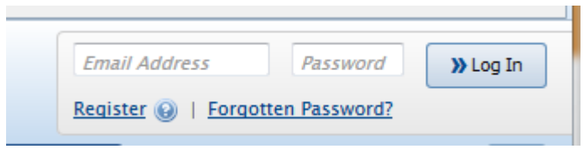
Building Energy Codes Program

COMcheck

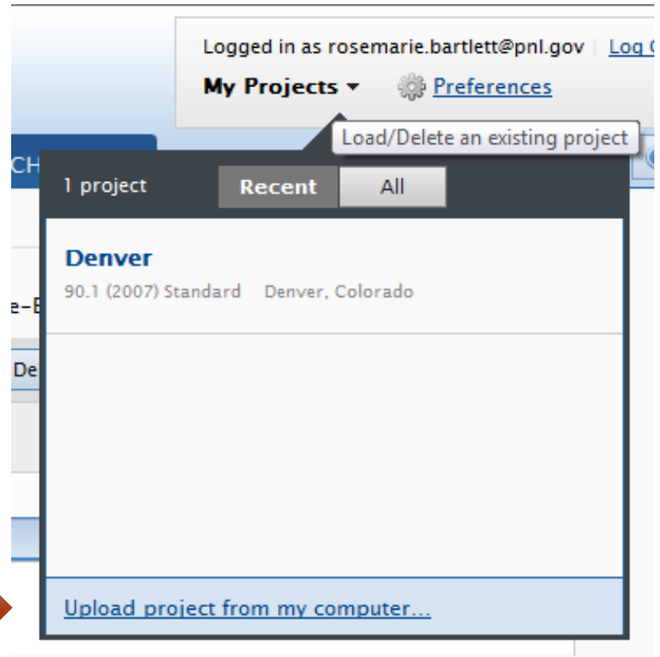

COMcheck-Web - 90.1 (2013) Standard - Mozilla Firefox
https://energycode.pnl.gov/COMcheckWeb/index.html
COMcheck·Web™
Project title
90.1 (2013) Standard
Email Address
Password
Log In
Register | Forgotten Password?
New Project
PROJECT
ENVELOPE
INT. LIGHTING
EXT. LIGHTING
MECHANICAL
REQUIREMENTS
Reports
Code/Location
Code: 90.1 (2013) Standard
State: Colorado
City: Denver
If your location is not included here, choose a nearby location with similar weather conditions.
Project Type
New Construction
Addition
Alterations
Project Details (optional)
This information will appear on the compliance report.
Edit Project Details...
Notes:
Building Envelope Area Types
Interior Lighting Method and Areas
Exterior Lighting Areas
Add Building Area
Duplicate
Delete
Building Area
Area Description
Space Conditioning
Area
1
Select Area Type...
CHECK COMPLIANCE
To display compliance results, click the Check Compliance button.

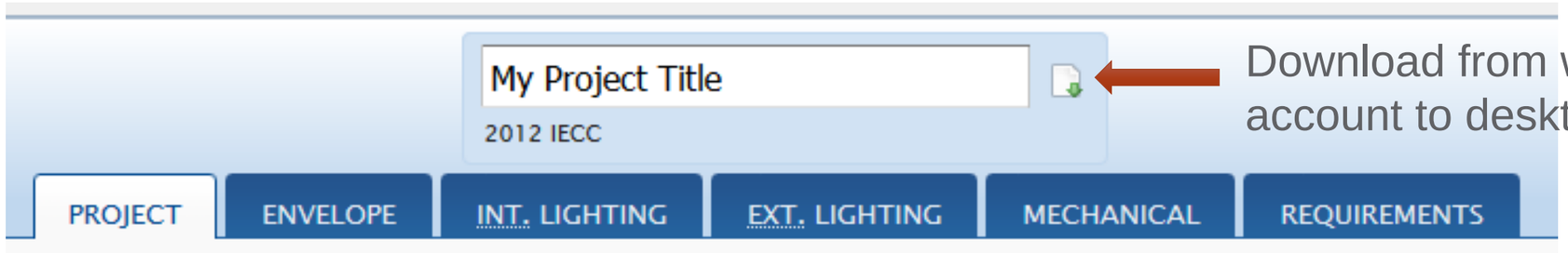
Desktop/Web Data Exchange

- Can exchange files between desktop and web
  - Log in to web
  - My Projects



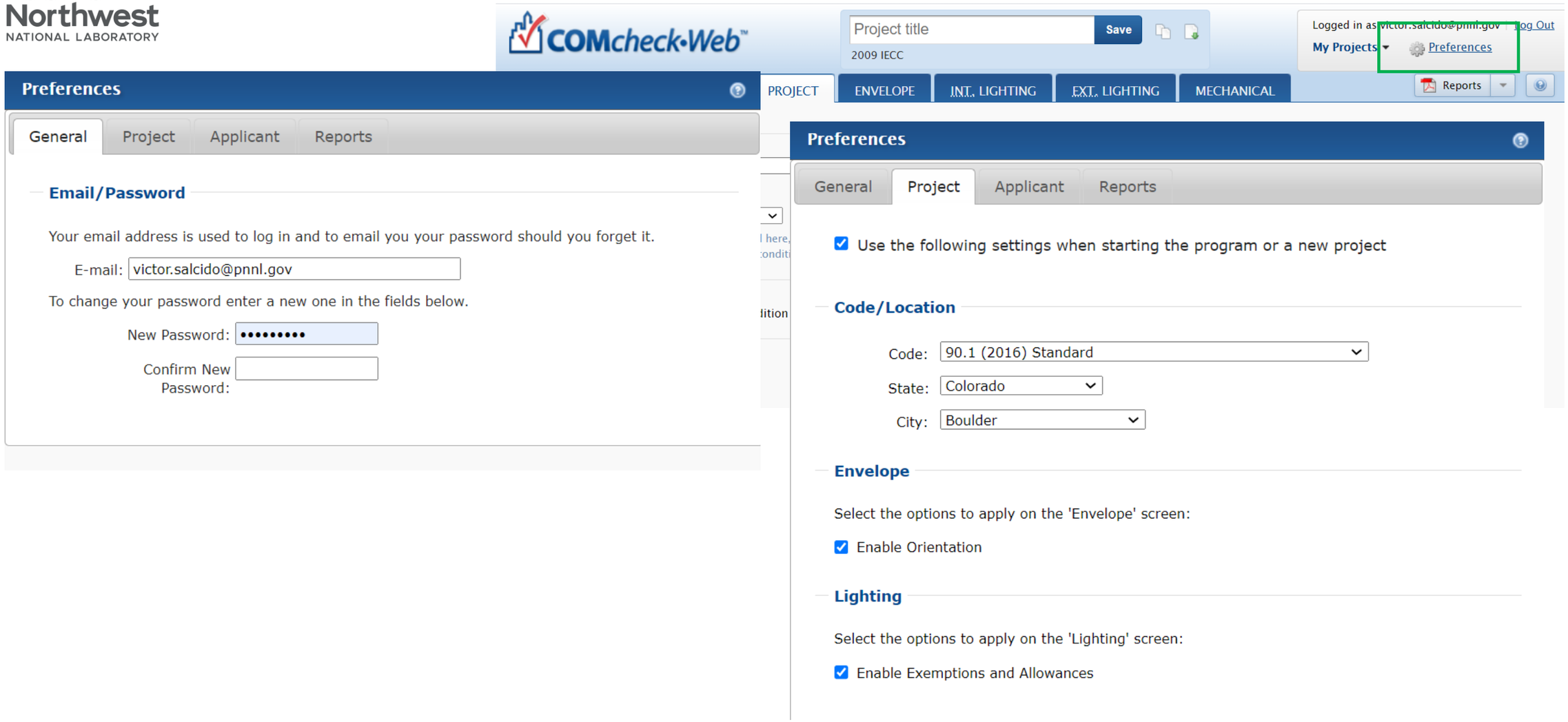
Upload from desktop to web account



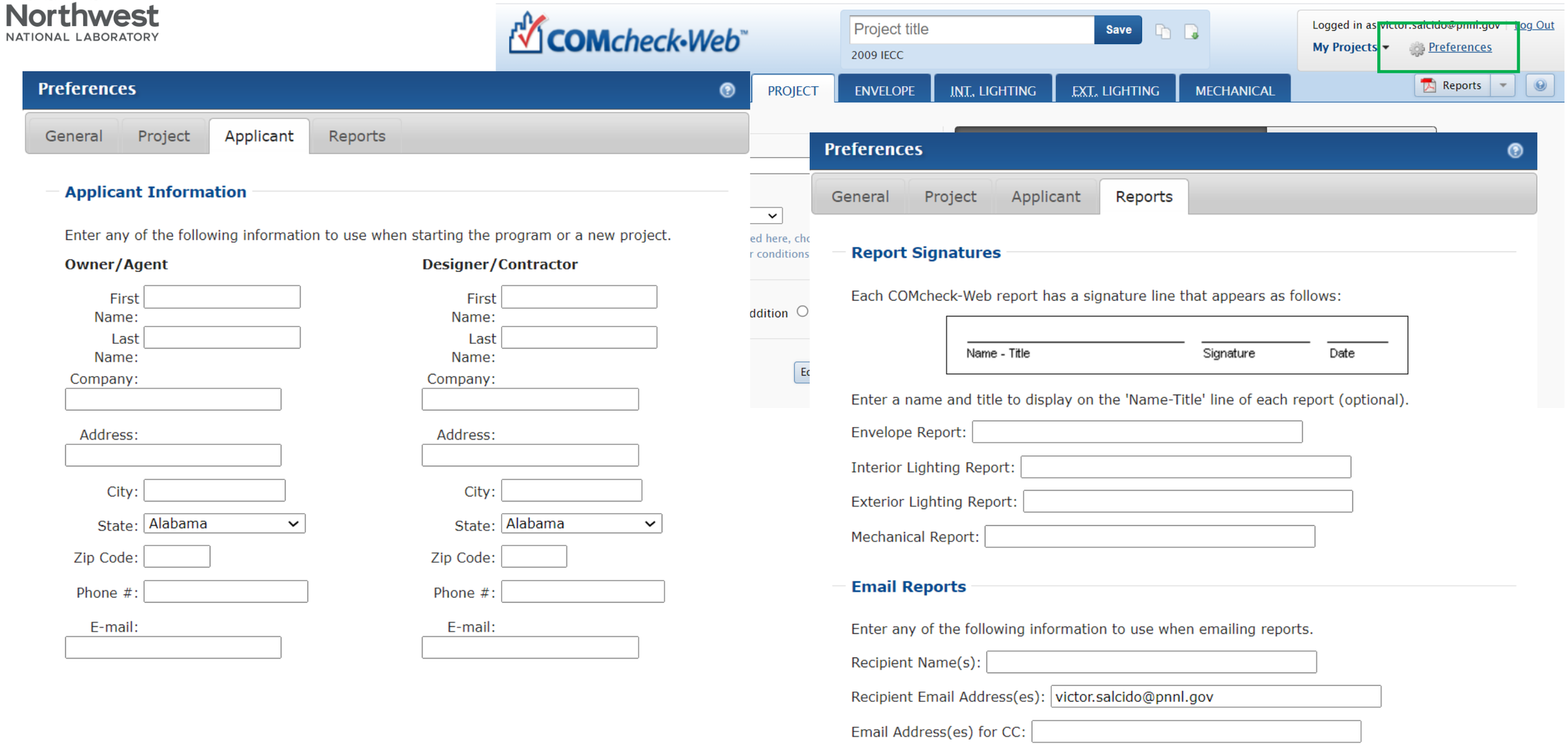


Download from web account to desktop

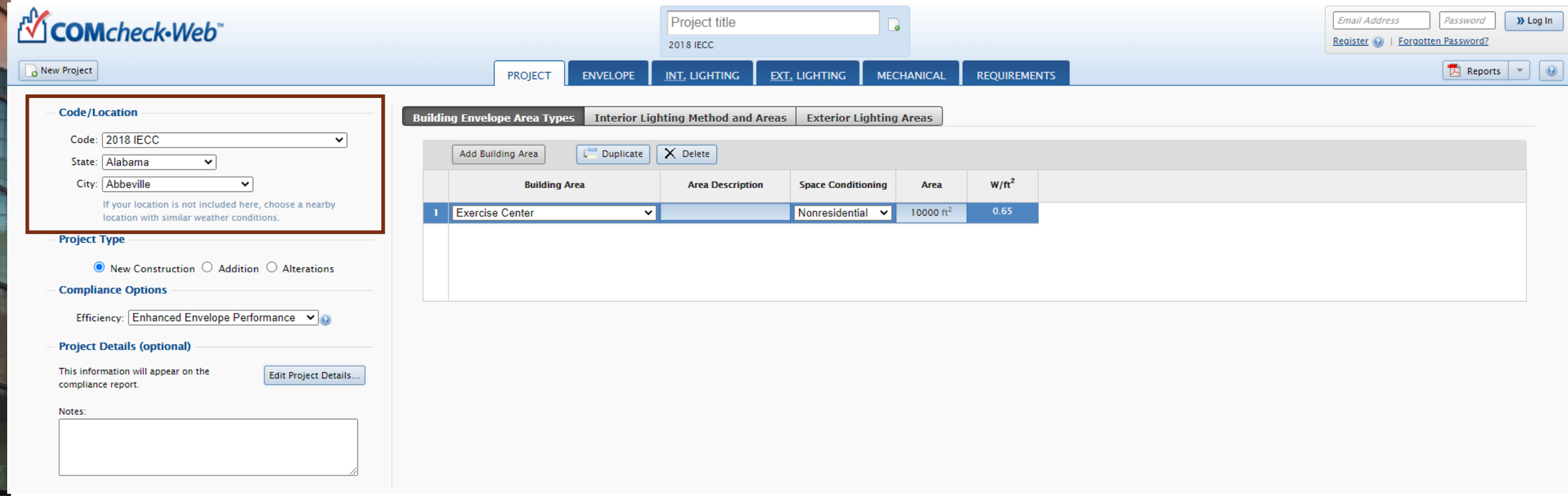
COMcheck Basics: Preferences



COMcheck Basics: Preferences (cont)



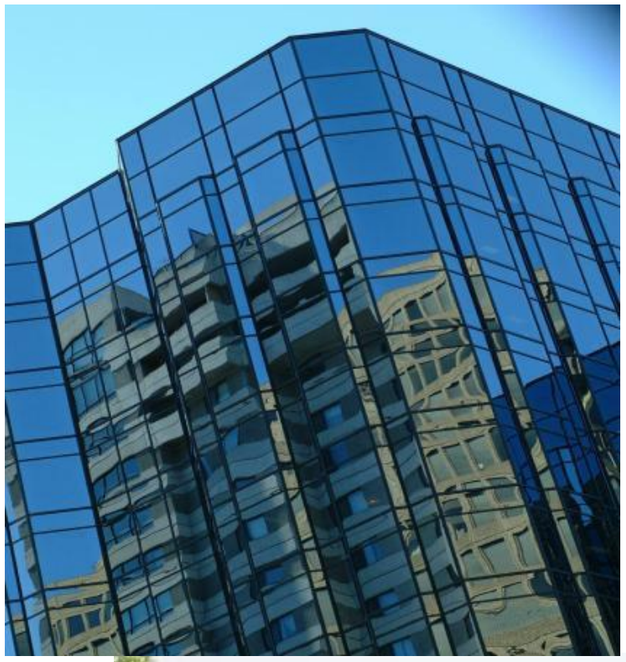
Project Screen

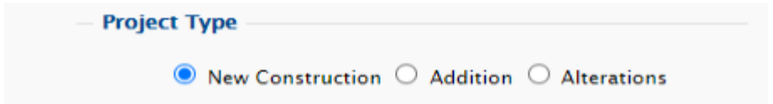


Select Code and Location

Project: Project Type

- New Construction
- Addition
- Alteration



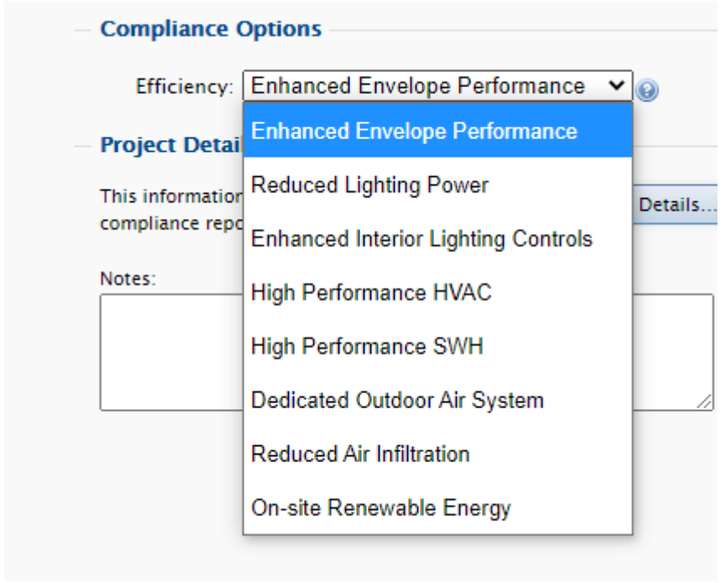


Project: Alteration Project Type Explained

- 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

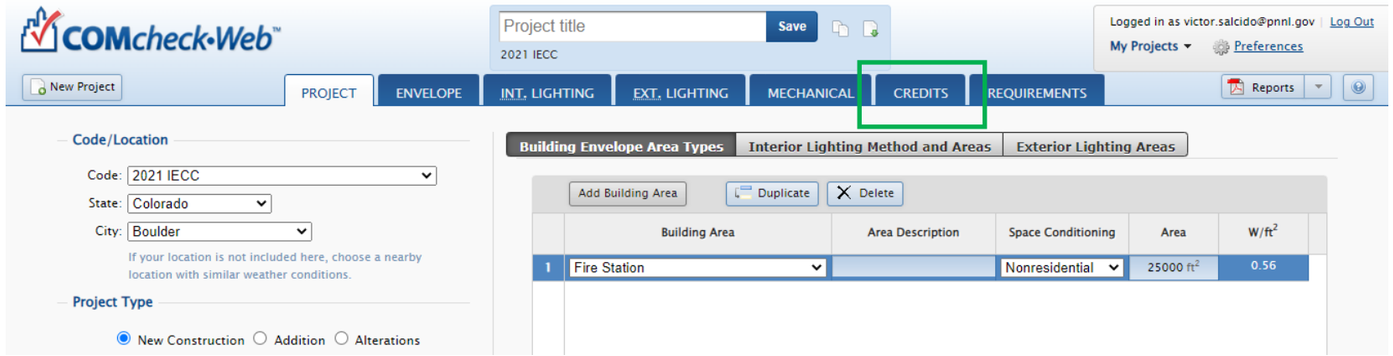
Compliance Options (IECC)

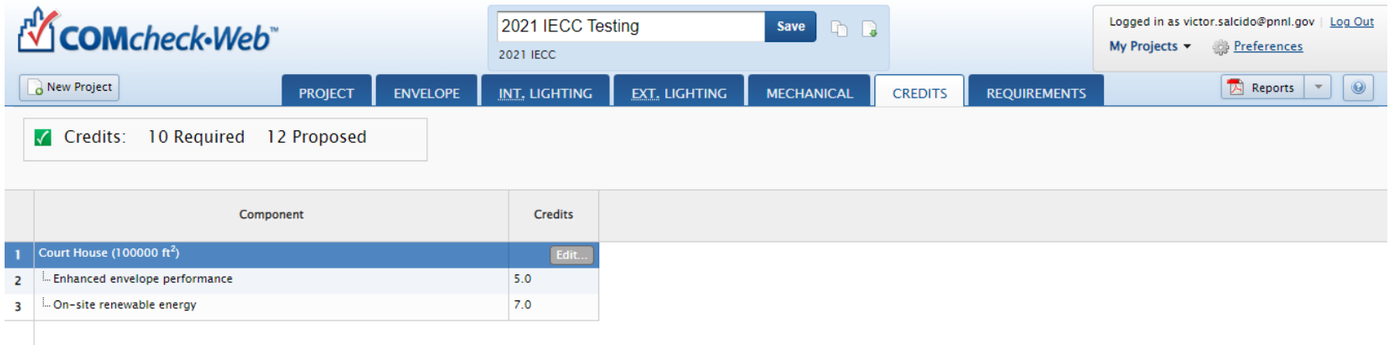
- Efficiency Options
  - High performance power (2012/2015/2018)
  - Reduced lighting power (2012/2015/2018)
  - On-site renewable energy (2012/2015/2018)
  - High performance SWH (2015/2018)
  - Enhanced interior lighting controls (2015/2018)
  - Dedicated outdoor air system (2015/2018)
  - Enhanced Envelope Performance (2018)
  - Reduced Air Infiltration (2018)
- Air Barrier Options (IECC 2012+, climate zone dependent)
  - Air barrier permeability
  - Assembly permeability
  - Air leakage test

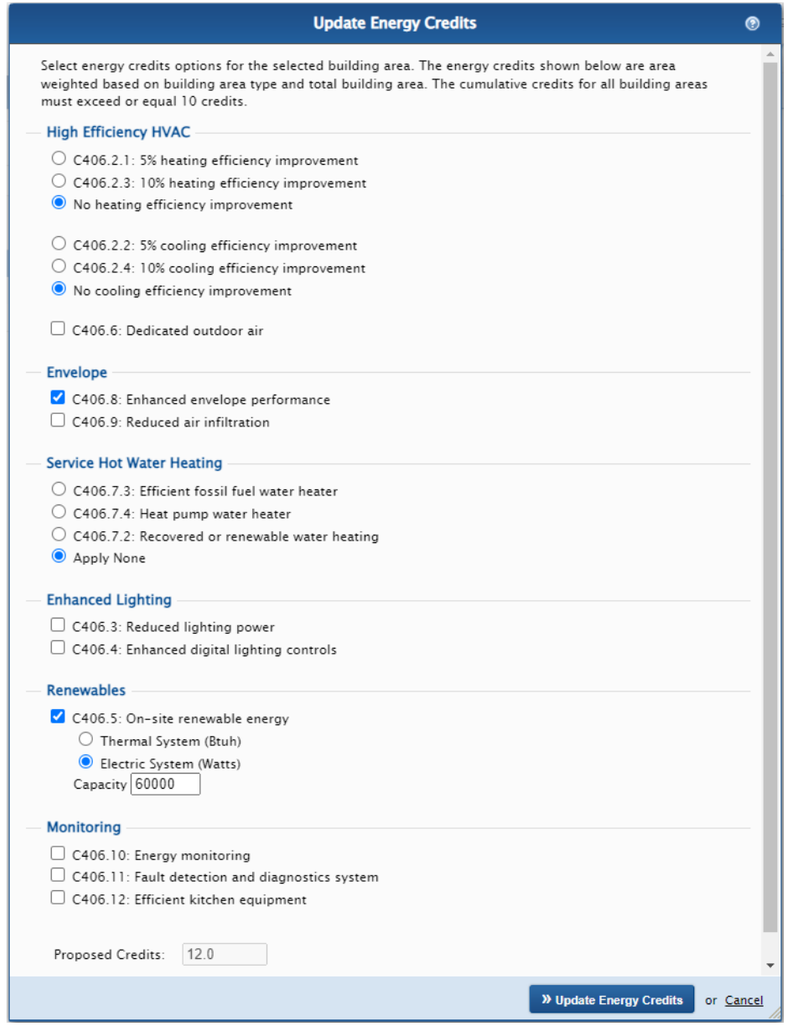


Compliance Options (2021 IECC only)

- Additional Efficiency Requirements (2021 IECC)
  - Added efficiency credit requirements based on occupancy type

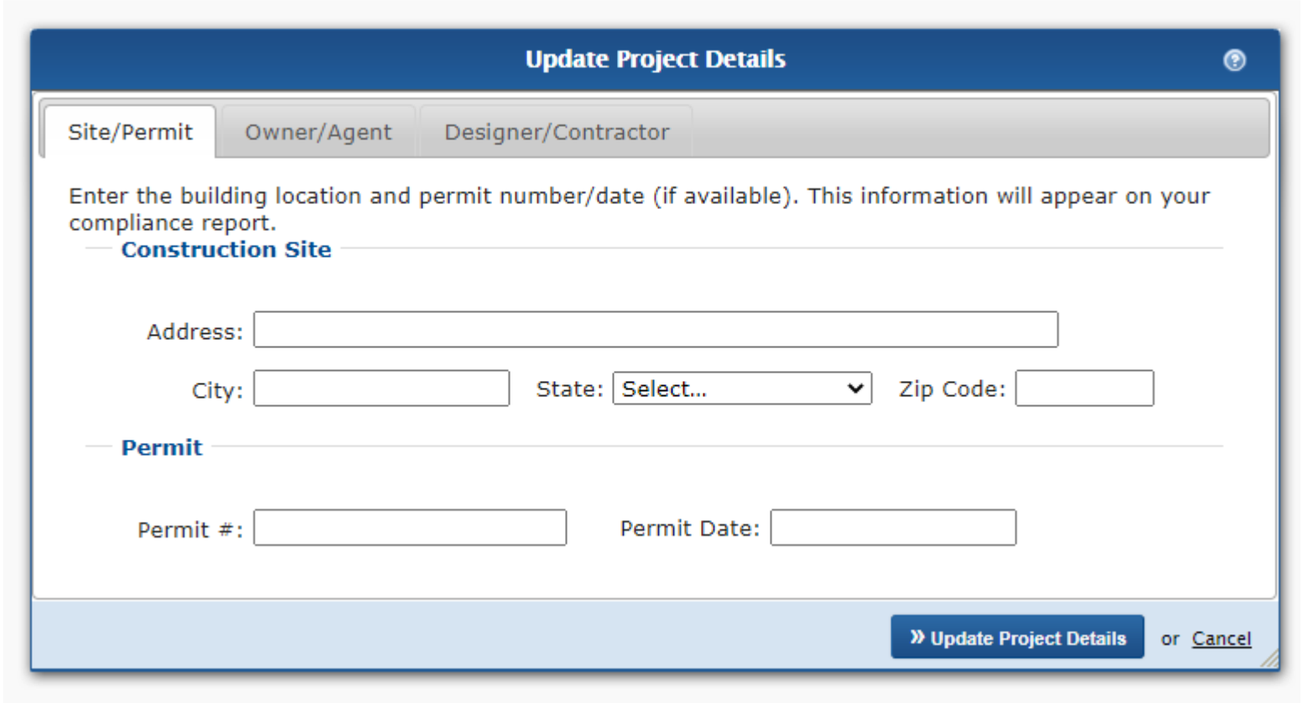






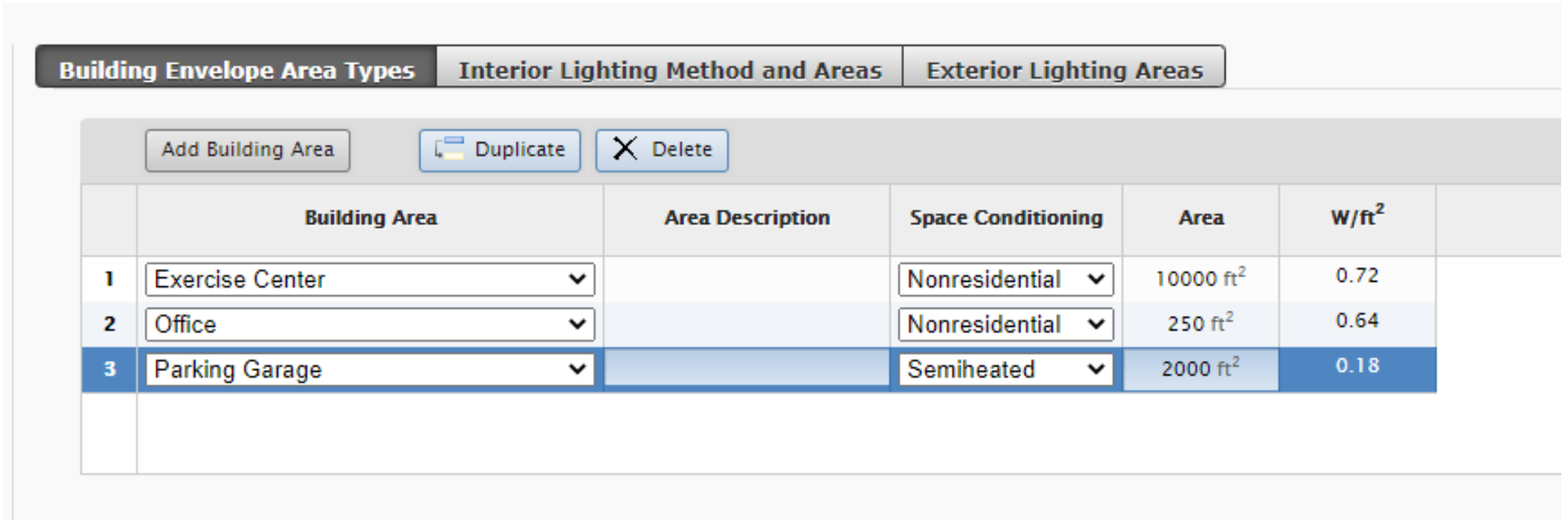
Project: Project Details

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



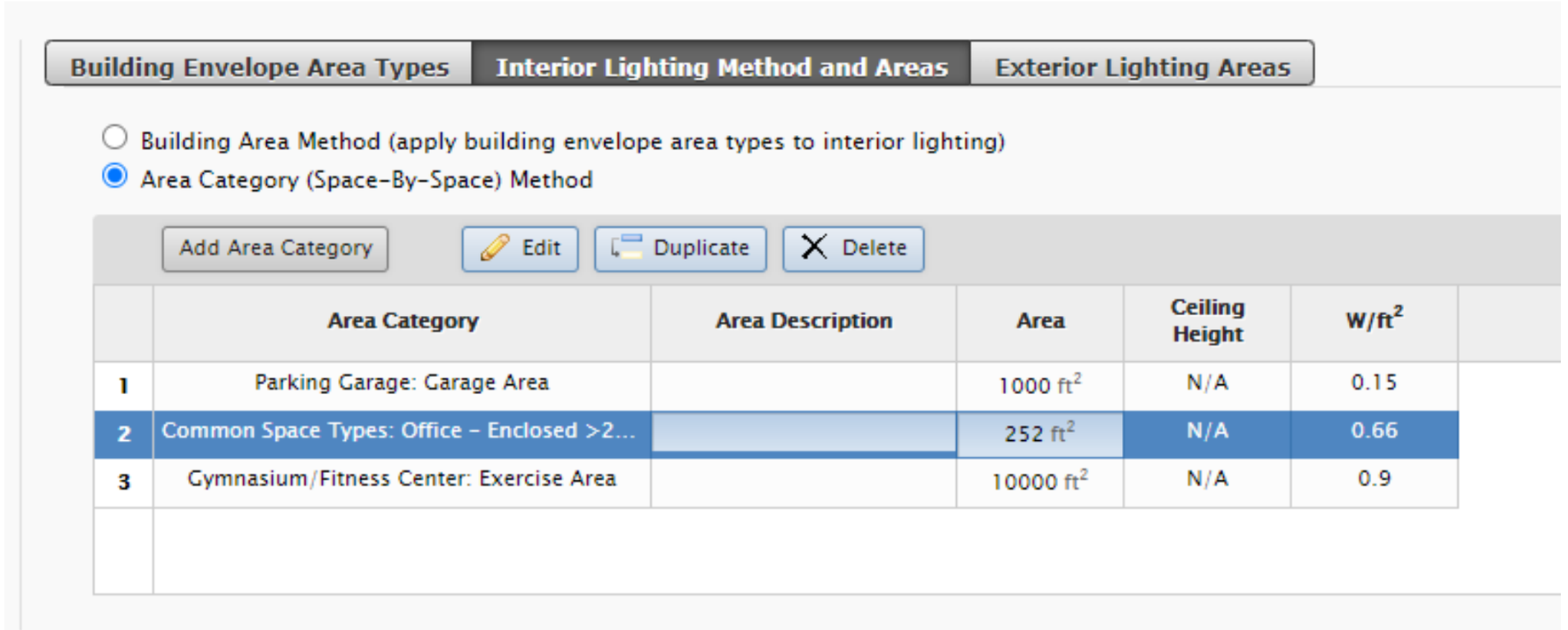
Project: Building Envelope Area Types

- 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



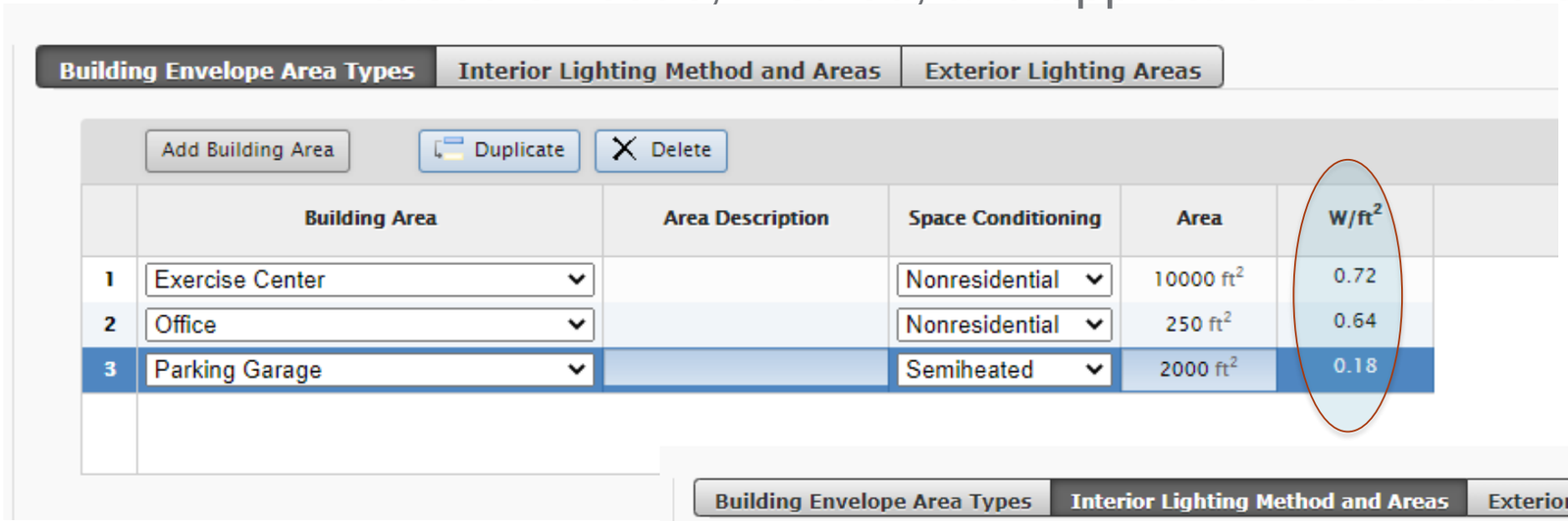
Project: Interior Lighting Method and Area Types

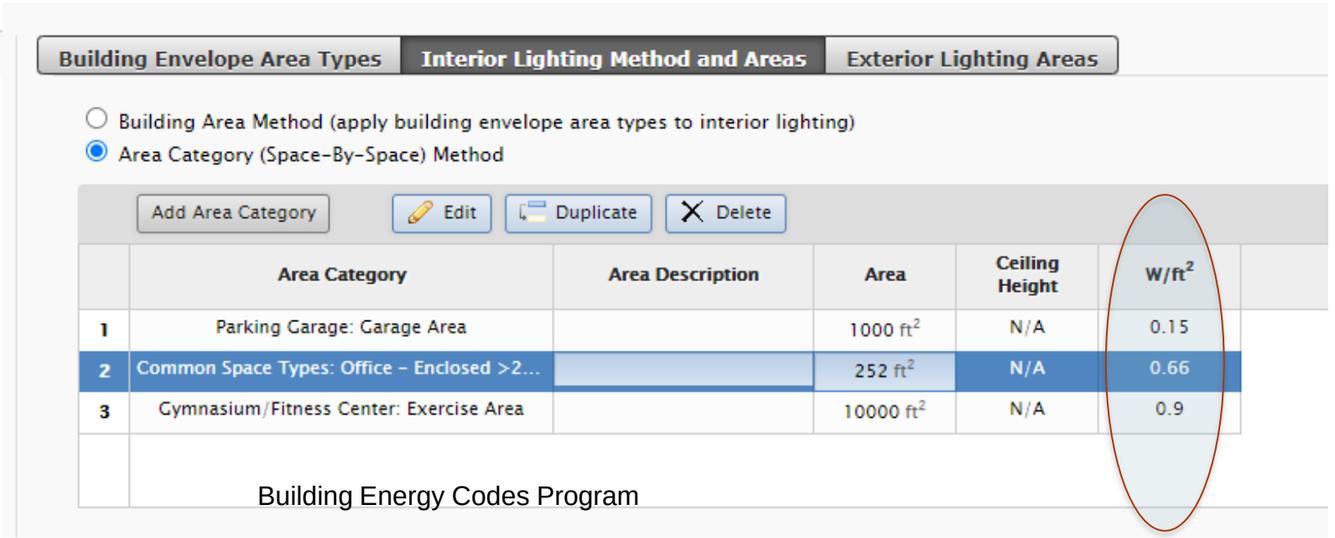
- Method determines lighting power density and allowances
- Area category allows for more detailed space representation



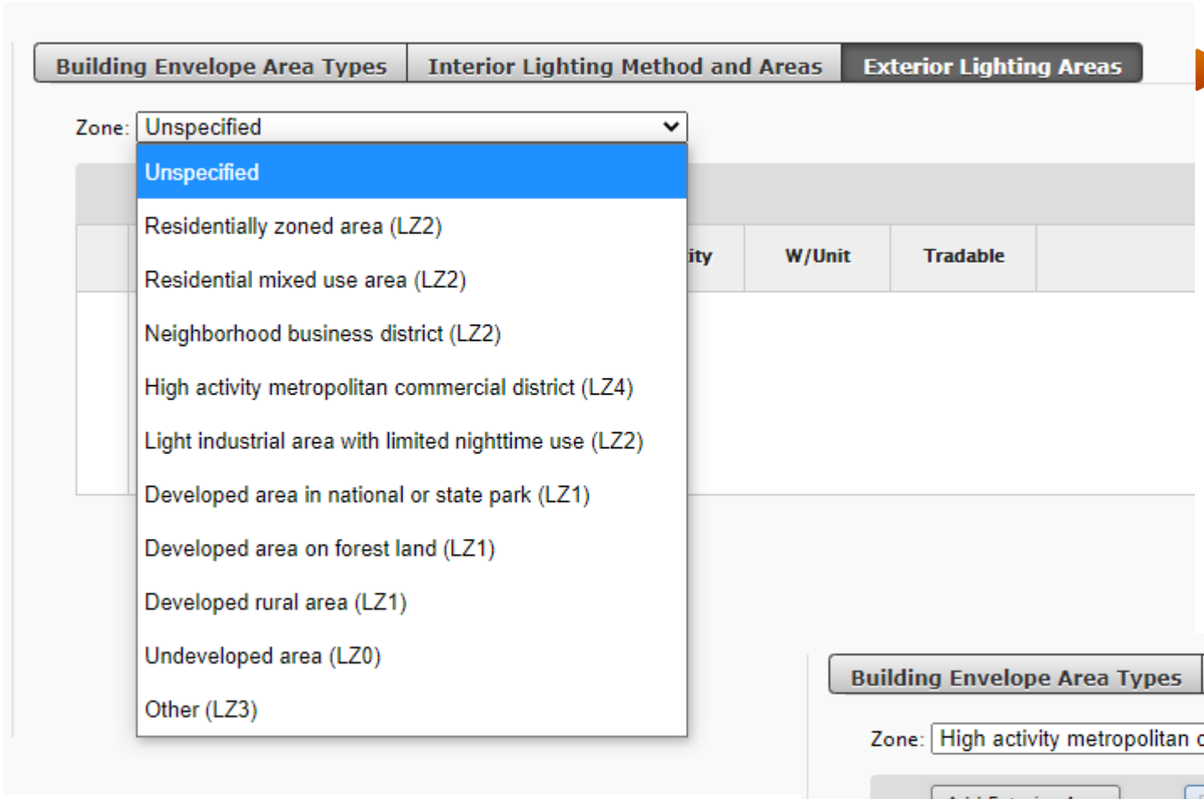
Interior Lighting: Methods

- Selected method determines lighting power densities in interior lighting and exterior lighting screens
  - based on code, method, and applications selected on the Project screen

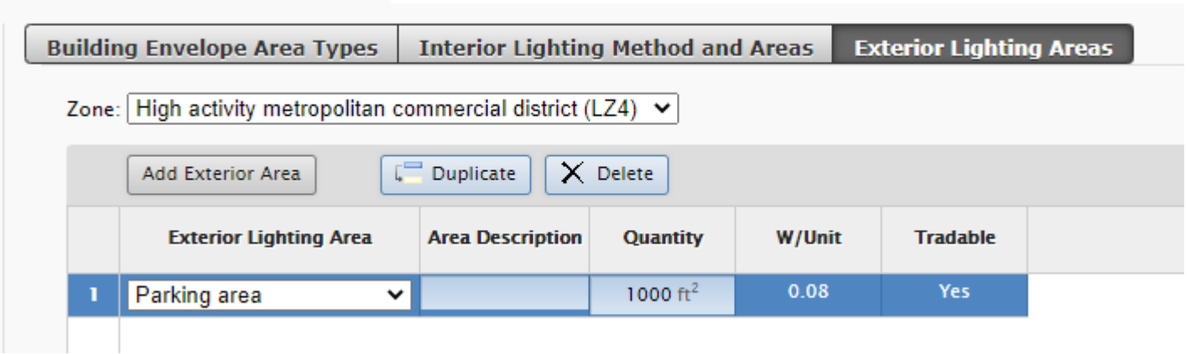




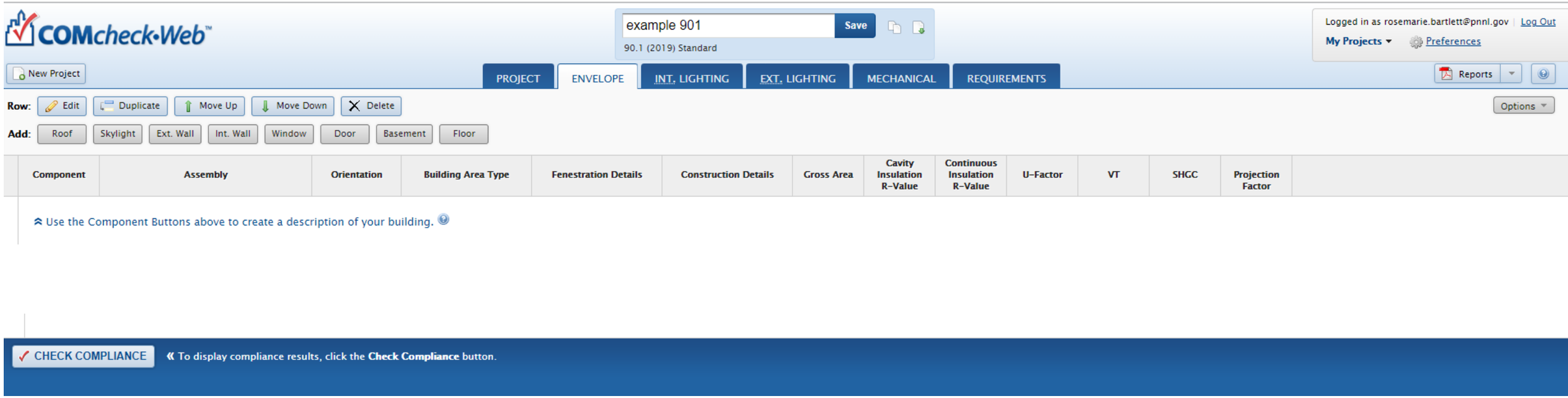
Project: Exterior Lighting Area Types



- Zone and area type determine:
  - Lighting power density
  - Units
  - Tradability



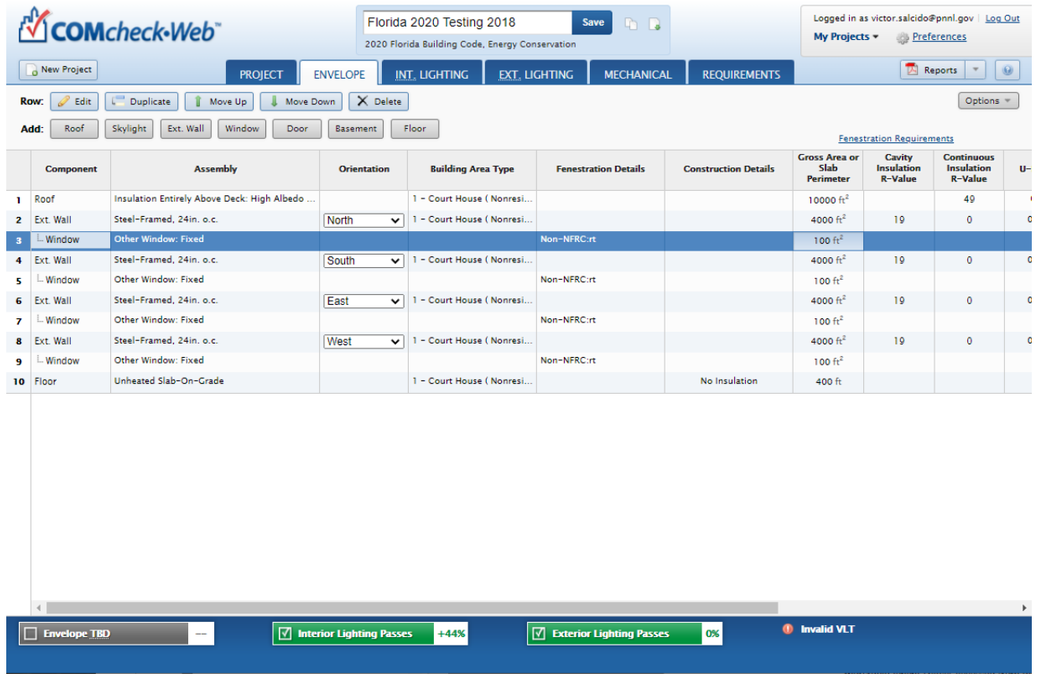
Envelope: Introduction



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

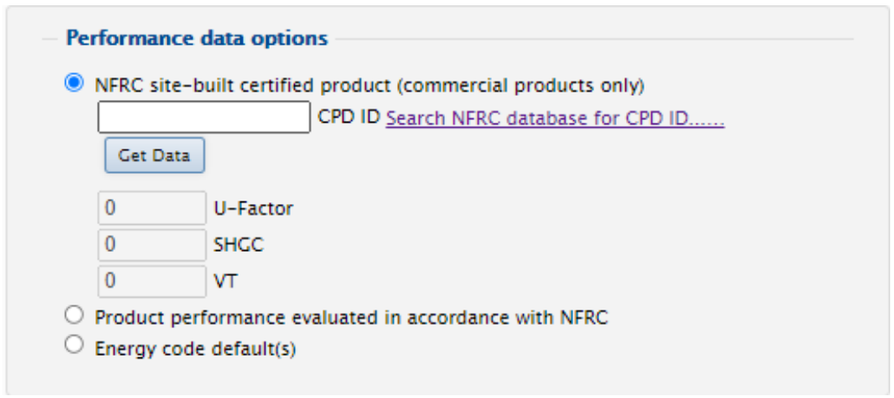
Envelope: Opaque Assemblies

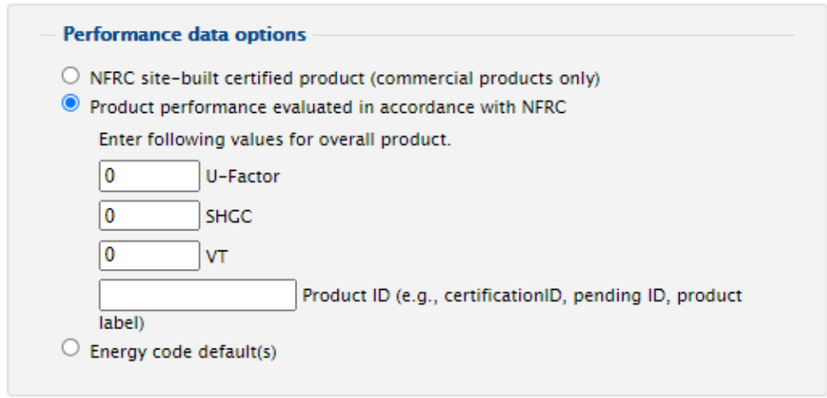
- After you've entered building components, look at compliance result
  - Look for fields with red text
  - If TBD, look for missing data

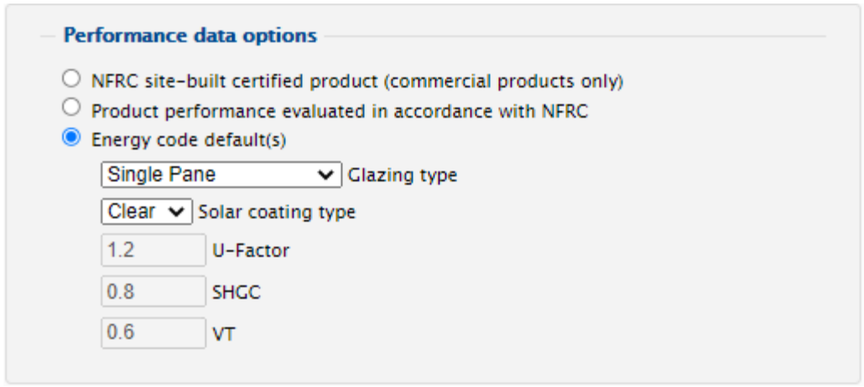


Envelope: Fenestration

- NFRC site-built certified product
- Performance evaluated (per NFRC guidelines)
- Energy code defaults







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

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)

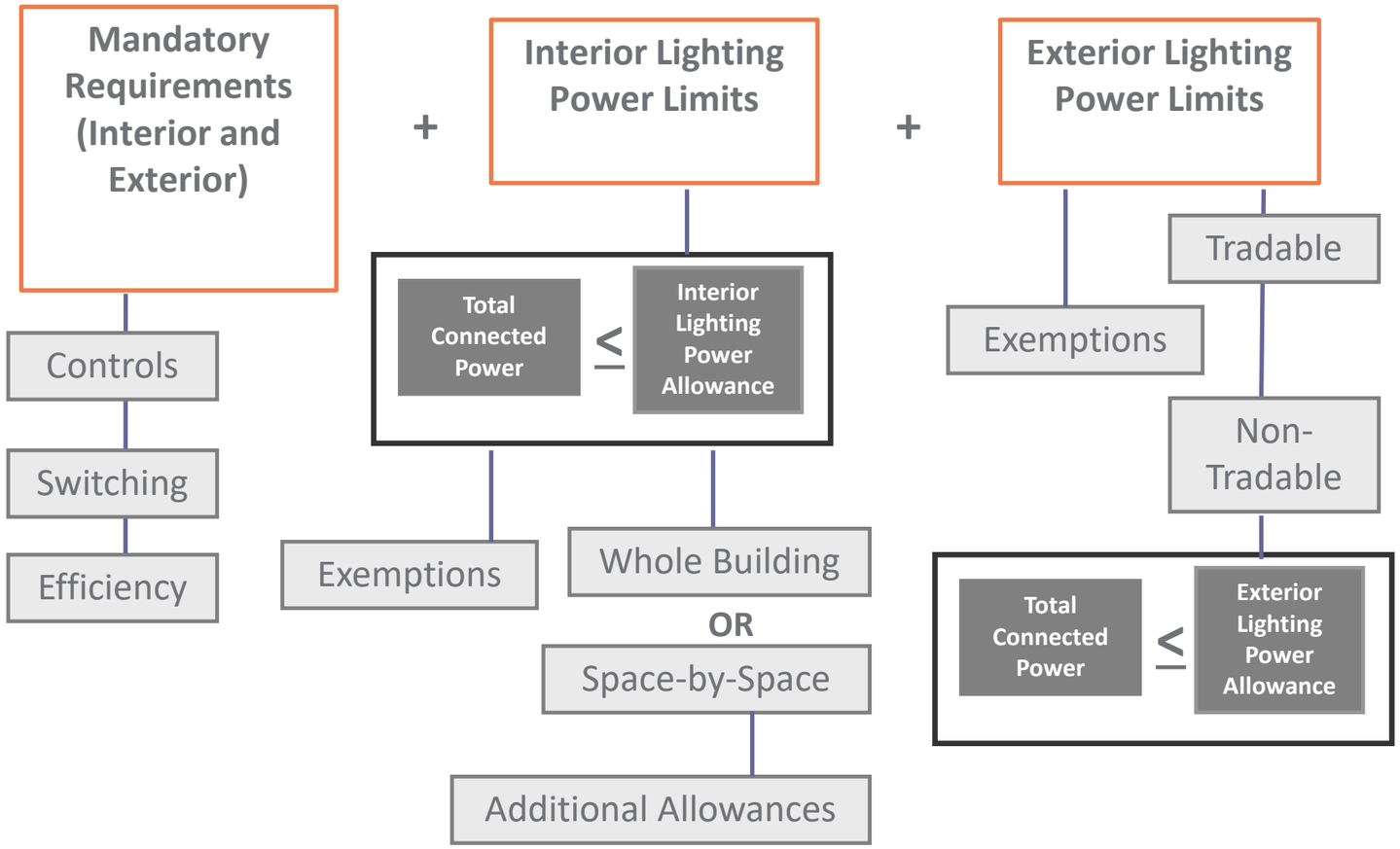
Construction Site: Owner/Agent: Designer/Contractor:

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
NORTH Ext. Wall: Steel-Framed, 16in. o.c., [Bldg. Use 1 - Exercise Center]	1000	15.0	0.0	0.118	0.049

Lighting Compliance

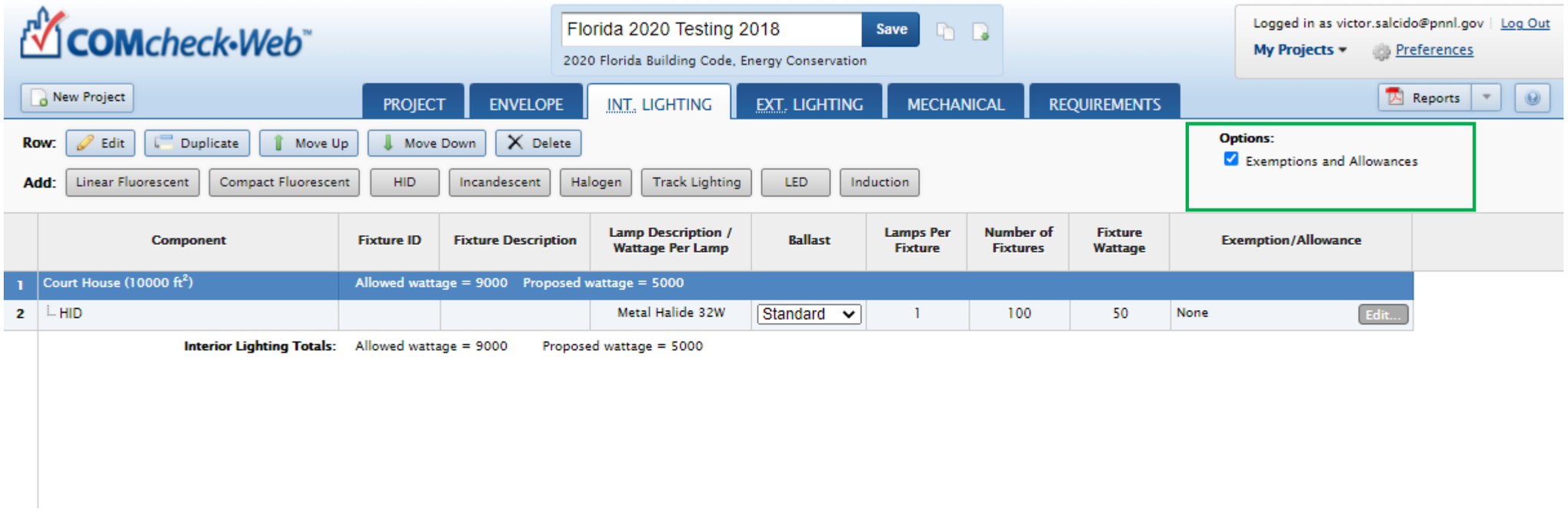


Lighting Fixture Categories

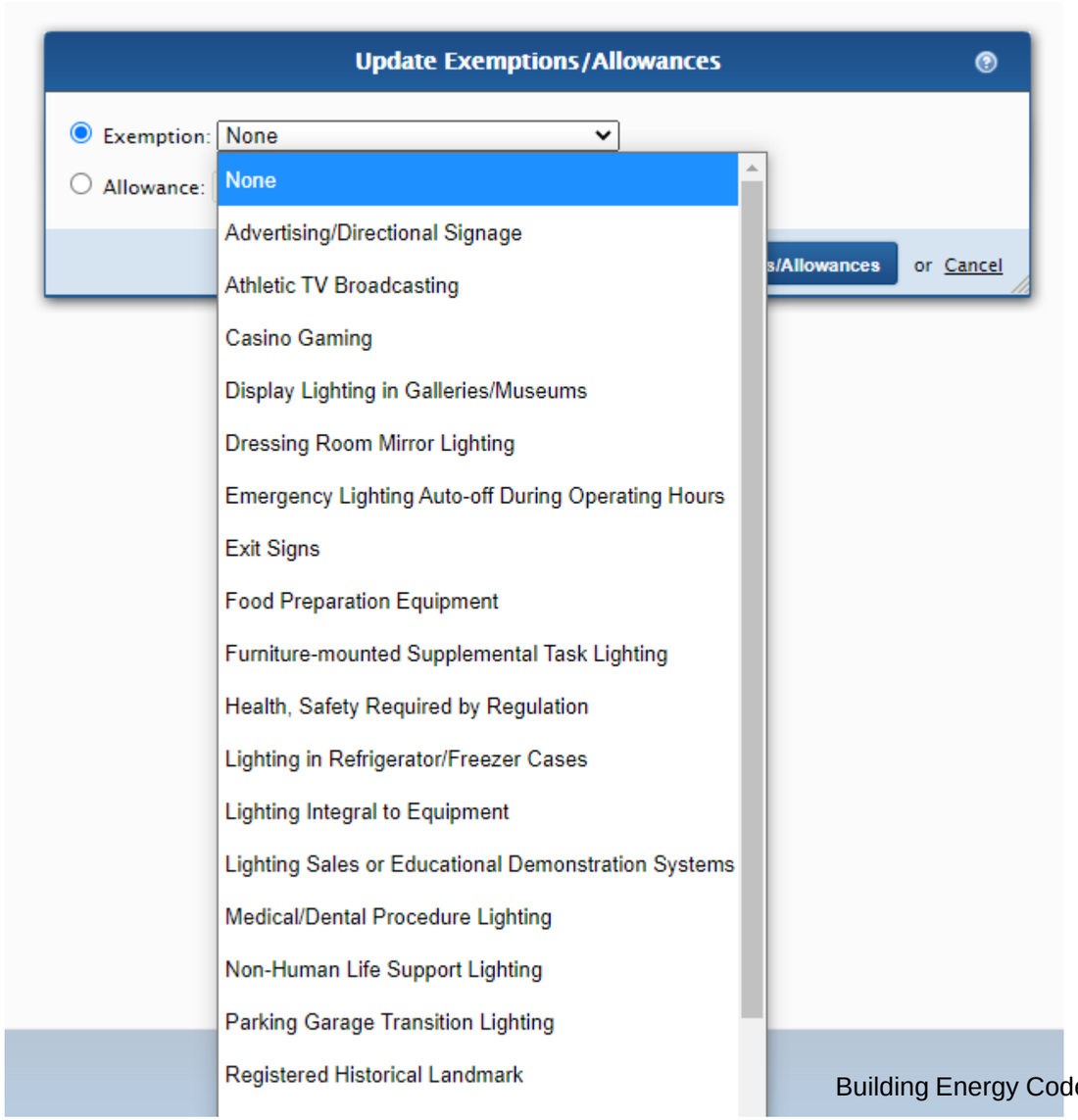
- Linear fluorescent
- Compact fluorescent
- HID
- Incandescent
- Halogen
- Track lighting
- LED
- Induction

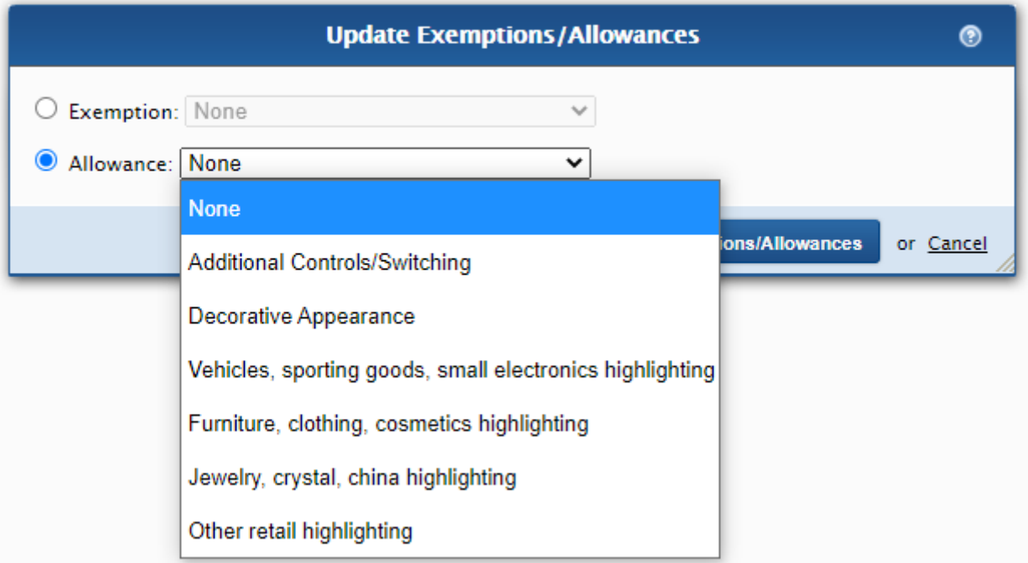
Lighting: Exemptions and Allowances

- Options checkbox – top right of screen
- Exemptions
  - Power for exempt fixtures is omitted from the **proposed wattage**
- Allowances
  - **Allowed wattage** for building increased by allowable amount



Lighting: Exemptions and Allowances (cont)

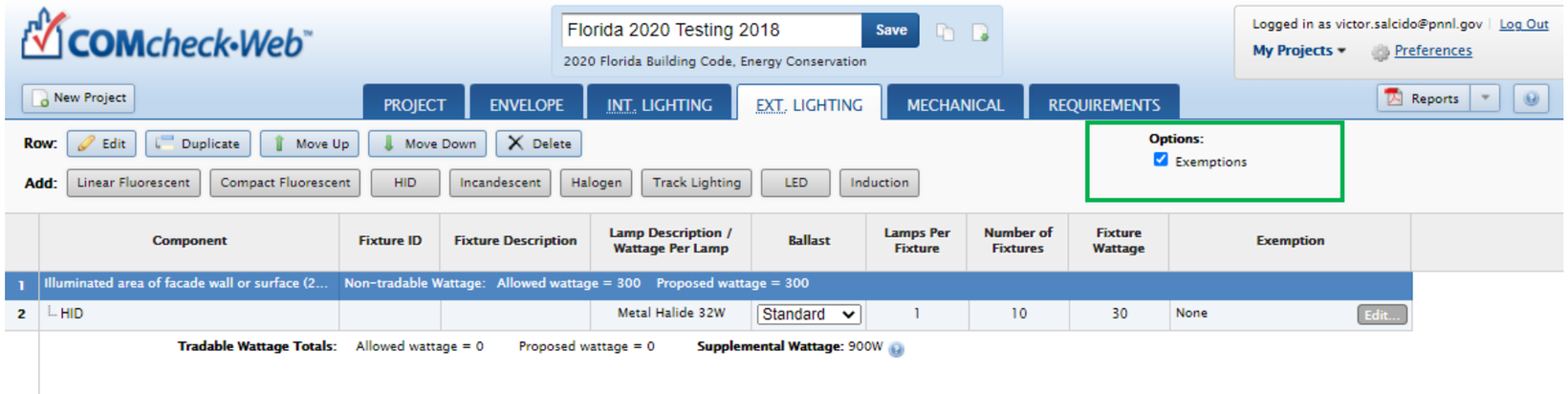




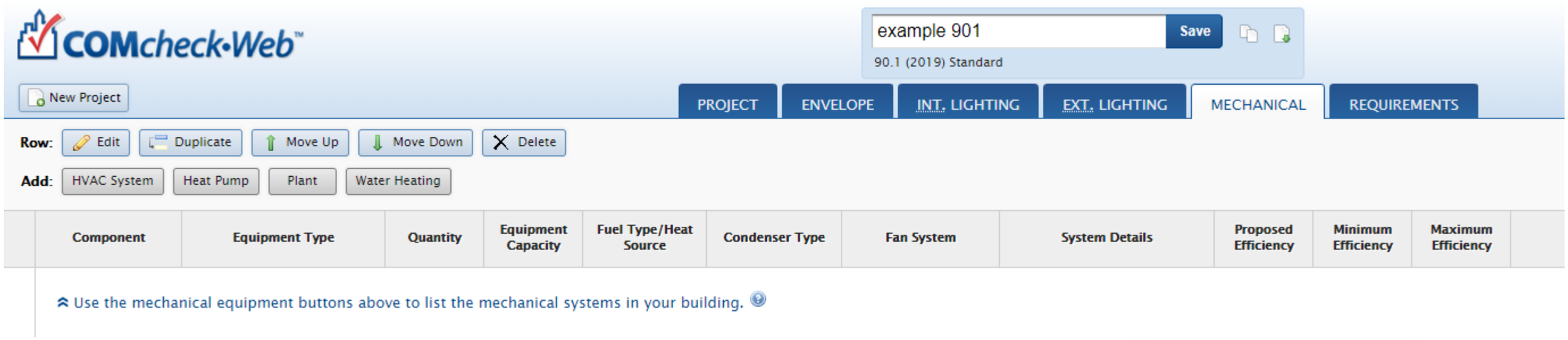
Exterior Lighting

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

≤

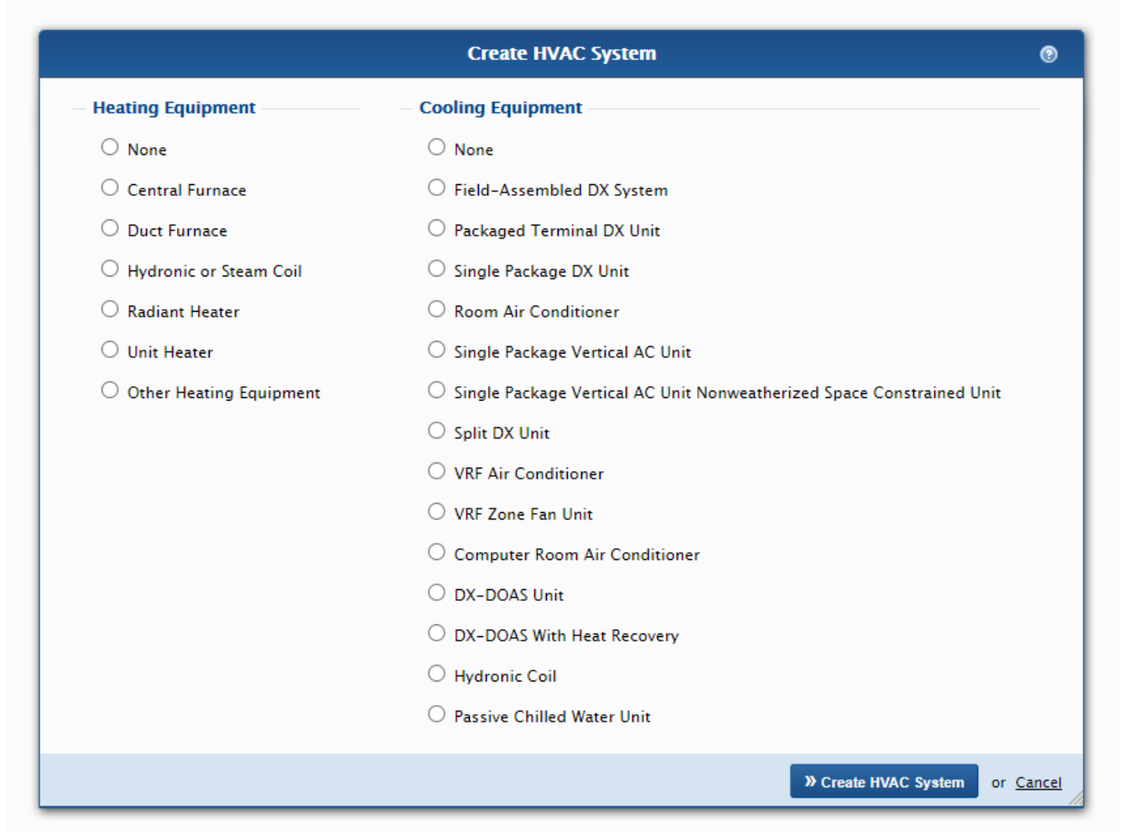


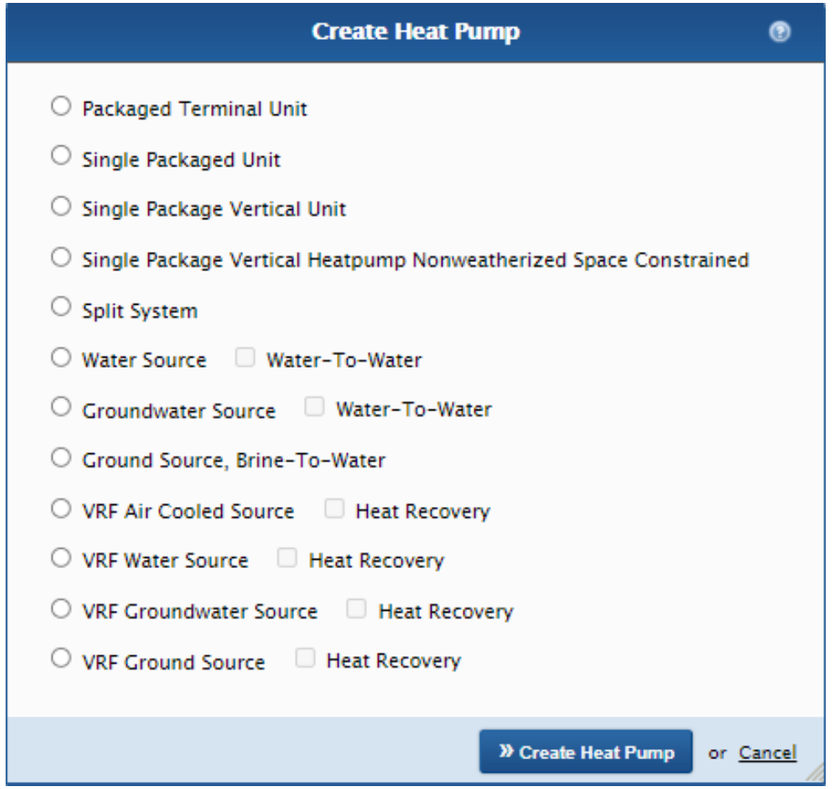
Mechanical Systems



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

Mechanical Systems





Mechanical Systems

COMcheck-Web™

2018 IECC Testing | Save

2018 IECC

Logged in as victor.salcido@pnnl.gov | Log Out

My Projects | Preferences

New Project | Reports

PROJECT | ENVELOPE | INT. LIGHTING | EXT. LIGHTING | MECHANICAL | REQUIREMENTS

Row: Edit | Duplicate | Move Up | Move Down | Delete

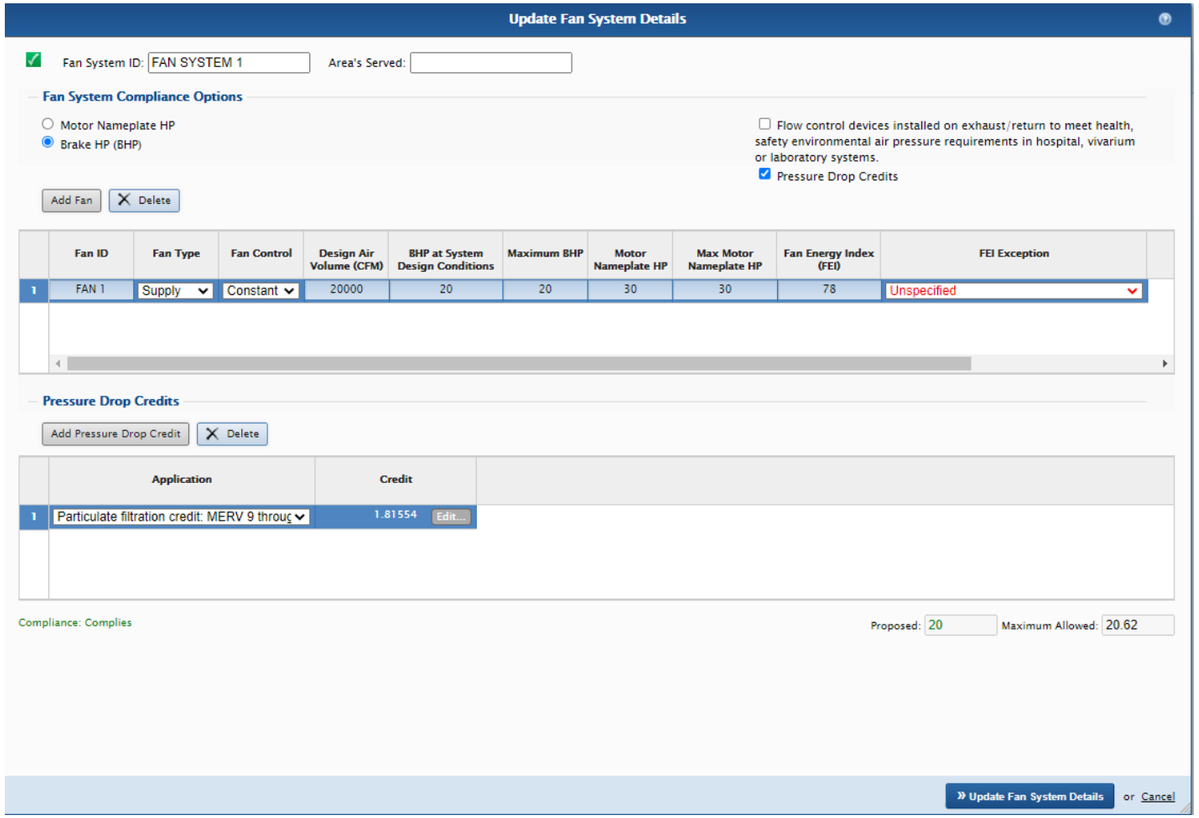
Add: HVAC System | Heat Pump | Plant | Water Heating

Proposed part load efficiency data may be required for HVAC or Plant cooling systems.

	Component	Equipment Type	Quantity	Equipment Capacity	Fuel Type/Heat Source	Condenser Type	Fan System	System Details	Proposed Part Load Eff.	Required Part Load Eff.	Proposed Full Load Eff.	Required Full Load Eff.
1	RTU-1	HVAC System	1				RTU-1	Single Zone Edit...				
2	Heating equipment	Central Furnace	1	89 kBtu/h	Electric				--	--	--	--
3	Cooling equipment	Single Package DX Unit	1	256 kBtu/h		Air Cooled		Air Economizer Edit...	0 IEER	11.6 IEER	12 EER	10 EER
4	RTU-2	HVAC System	1				RTU-2	Single Zone Edit...				
5	Heating equipment	Central Furnace	1	22 kBtu/h	Electric				--	--	--	--
6	Cooling equipment	Single Package DX Unit	1	54 kBtu/h		Air Cooled		Air Economizer Edit...	--	--	17.6 SEER	14 SEER
7	RTU-3	HVAC System	1				RTU-3	Single Zone Edit...				
8	Heating equipment	Central Furnace	1	89 kBtu/h	Electric				--	--	--	--
9	Cooling equipment	Single Package DX Unit	1	160 kBtu/h		Air Cooled		Air Economizer Edit...	0 IEER	12.4 IEER	12 EER	11 EER
10	Water Heater	Storage Water Heater	1	119 gallons	Electric			54 kW, Additional Equipm Edit...	--	--	0.15 SL, %/h...	0 SL, %/h (if ...

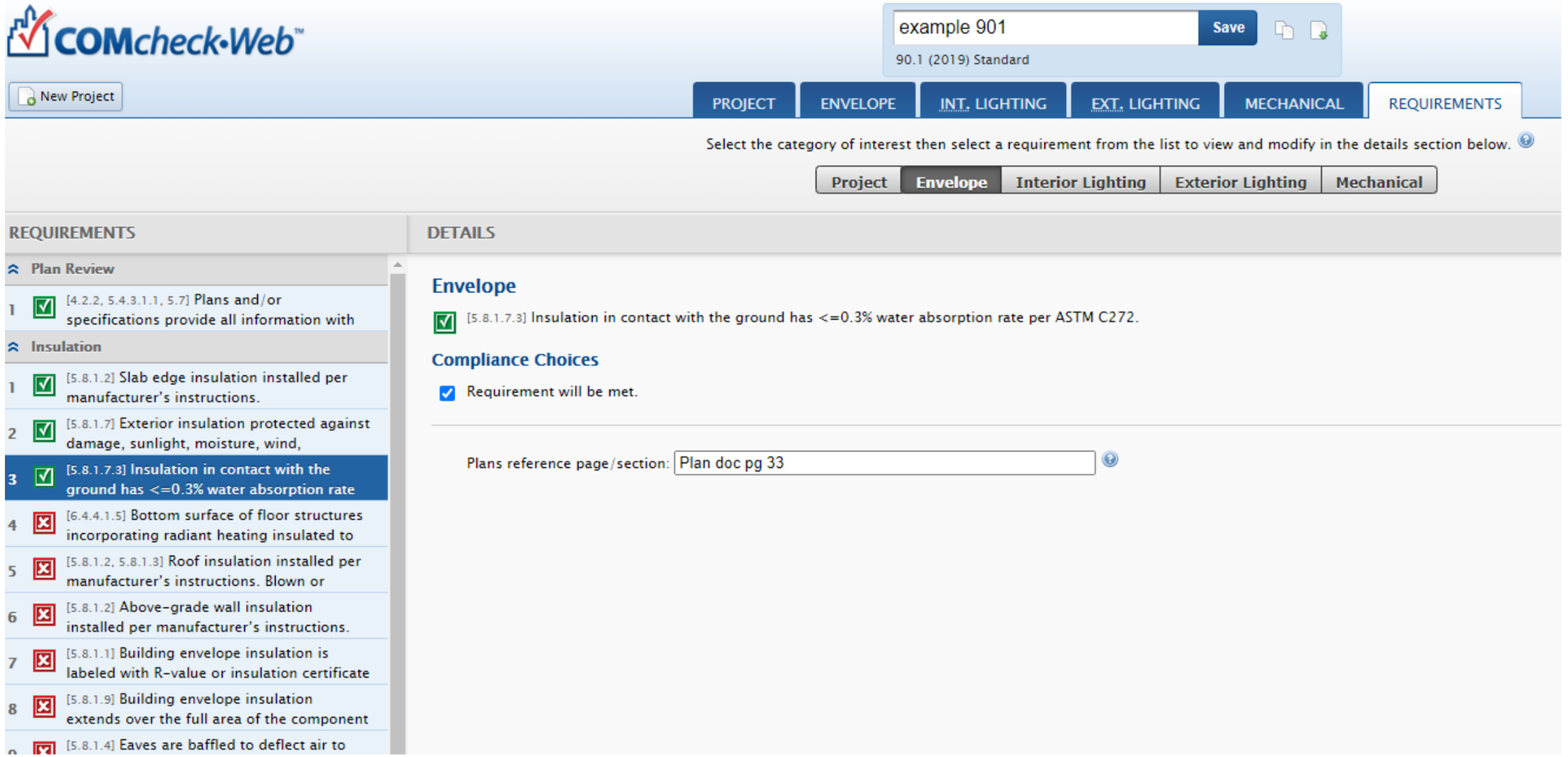
Mechanical Fan Systems

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



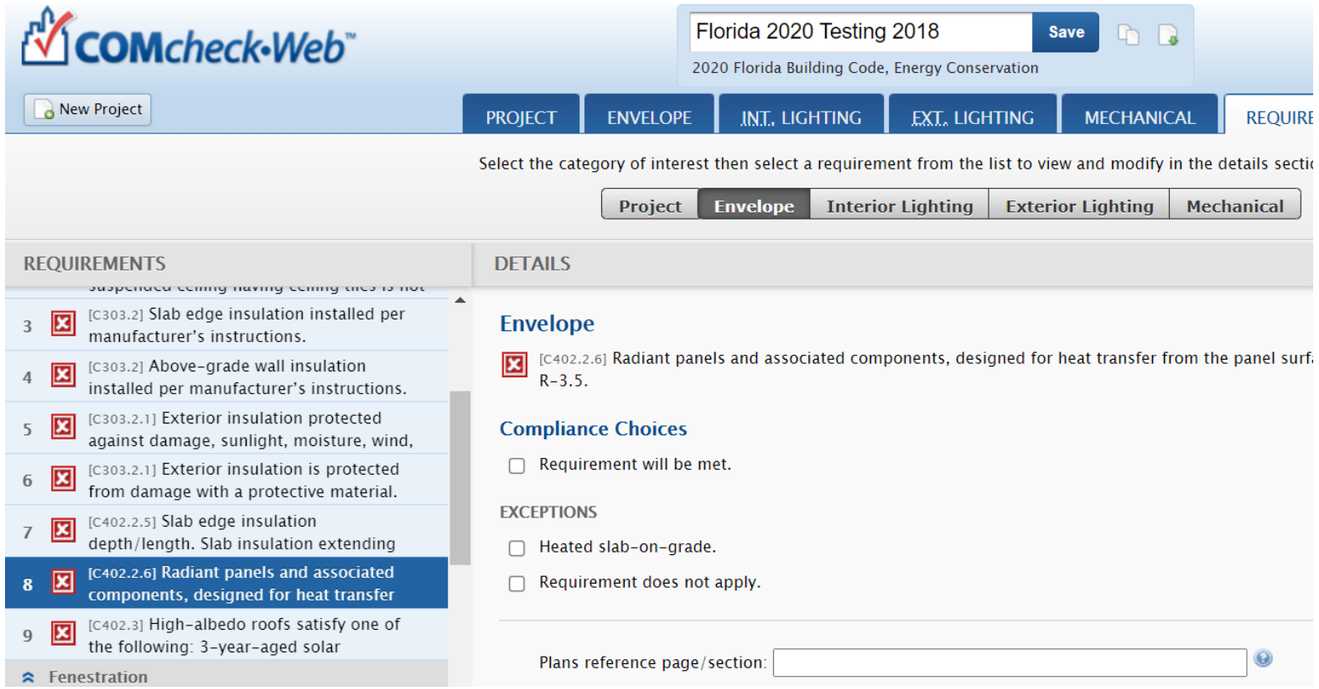
Requirements Tab - Goals

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



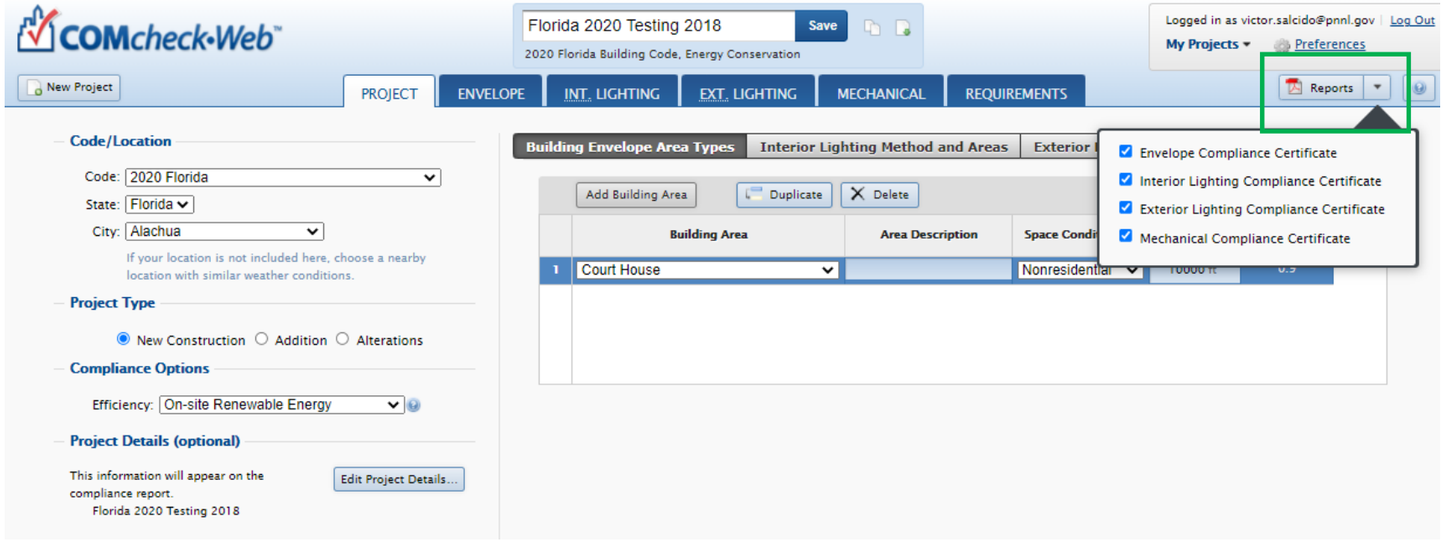
Requirements Tab – How it Works

- 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
- This information is shown on the report in the “Comments/ Assumptions” column of the Inspection Checklist



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



Pacific Northwest NATIONAL LABORATORY

Reports – Compliance Certificate

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 Estatel Agency
321 Example Ave.
Example, MT 99522
444-333-2222
example@example.com

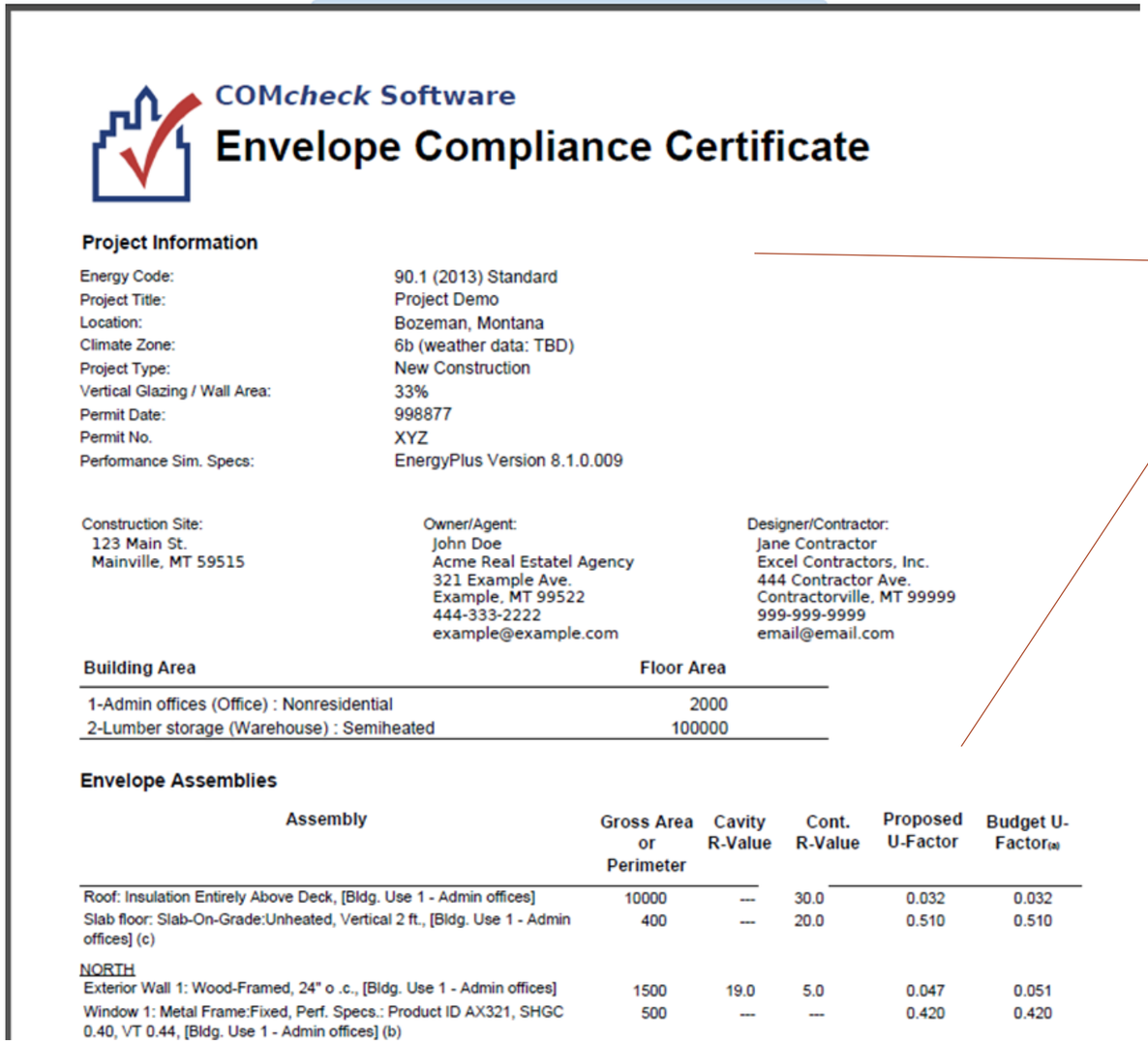
Designer/Contractor:
Jane Contractor
Excel Contractors, Inc.
444 Contractor Ave.
Contractorville, MT 99999
999-999-9999
email@email.com

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
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 Estatel 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	0.360

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

Verify Compliance Statement is Signed

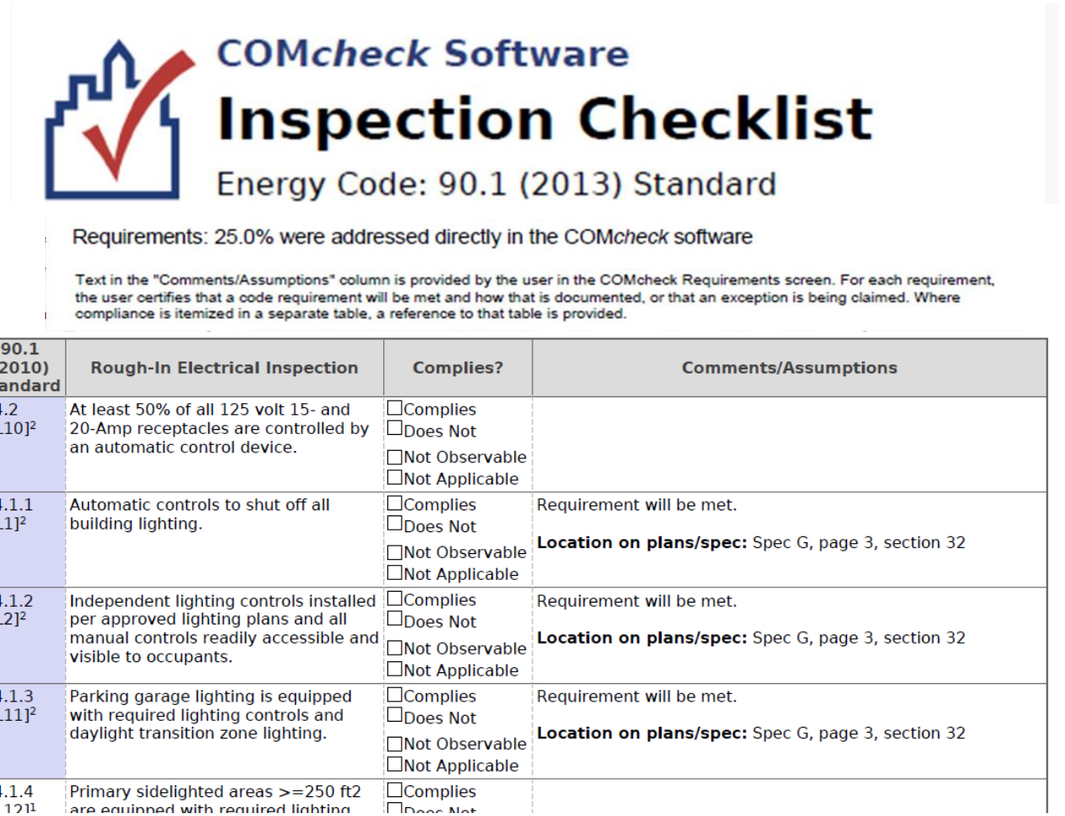
Envelope PASSES: Design 1% better than code

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 COM*check* 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 ft2 are equipped with required lighting	☐Complies ☐Does Not	

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

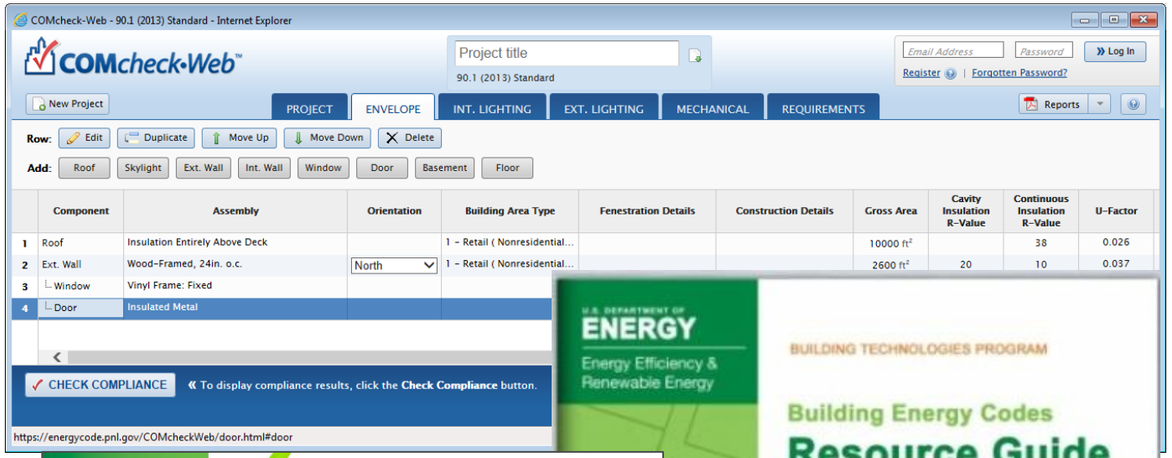
Project Title: Florida 2020 Testing 2018 Report date: 07/20/21

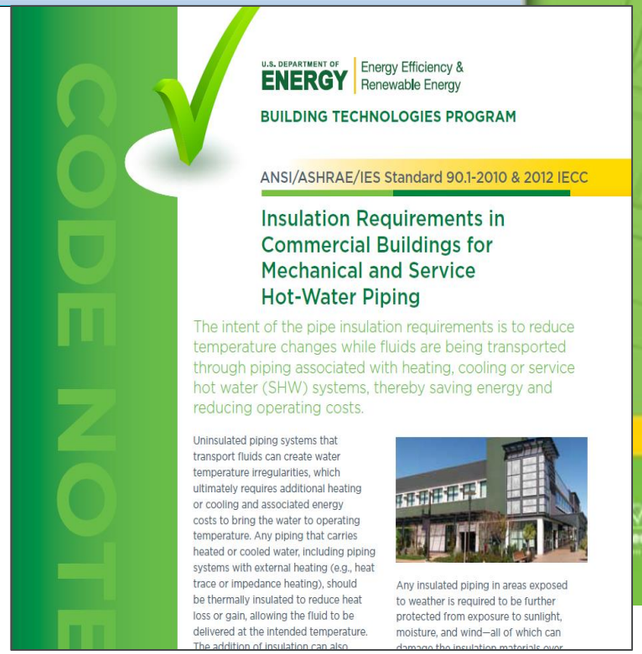
Data filename: Page 3 of 8

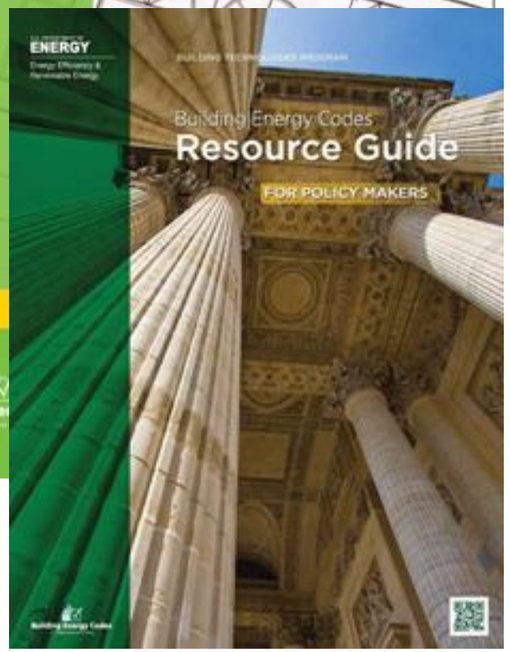
U.S. DOE: BECP Resources

- Compliance software
- Technical support
- Code notes
- Publications
- Resource guides
- Training materials

www.energycodes.gov



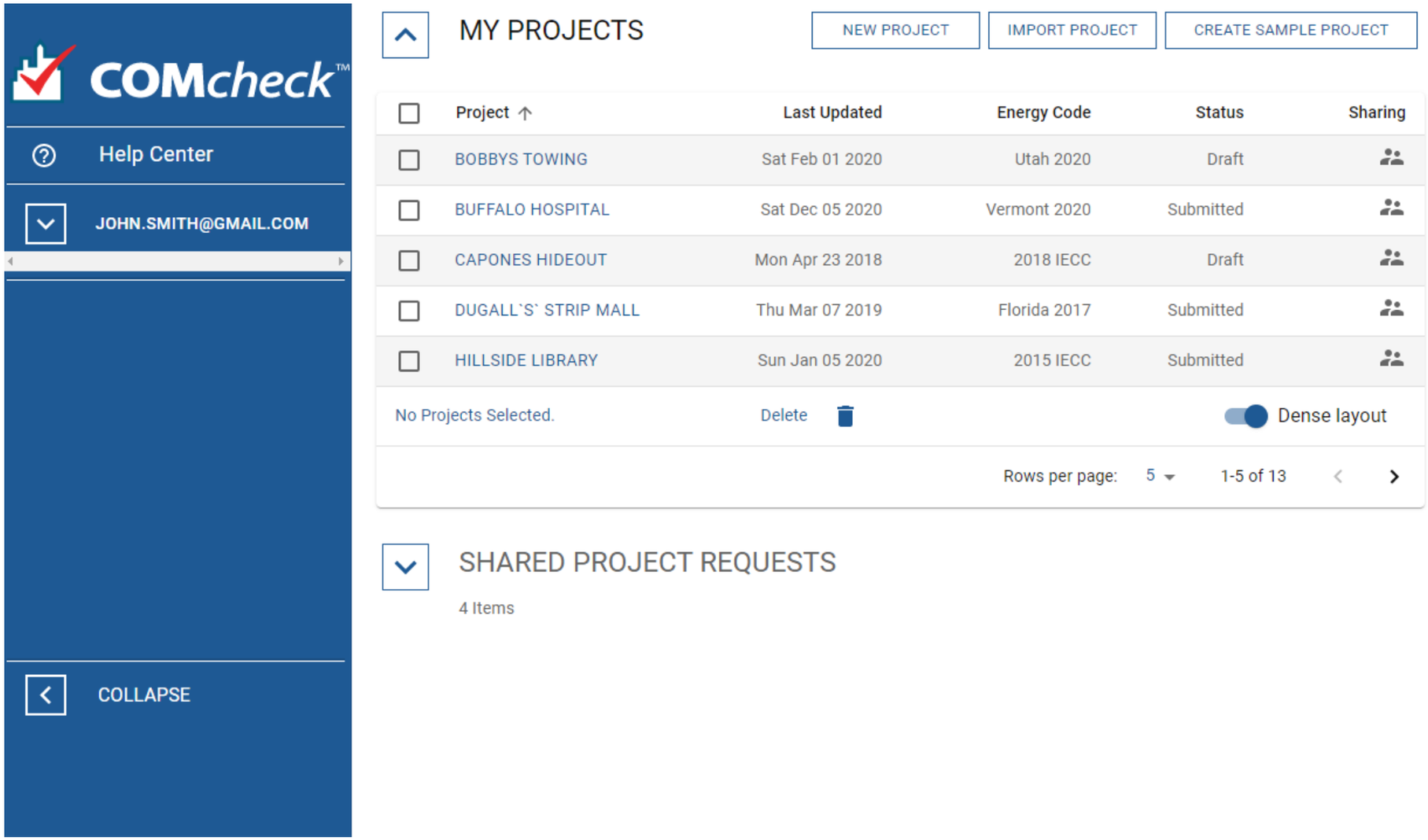




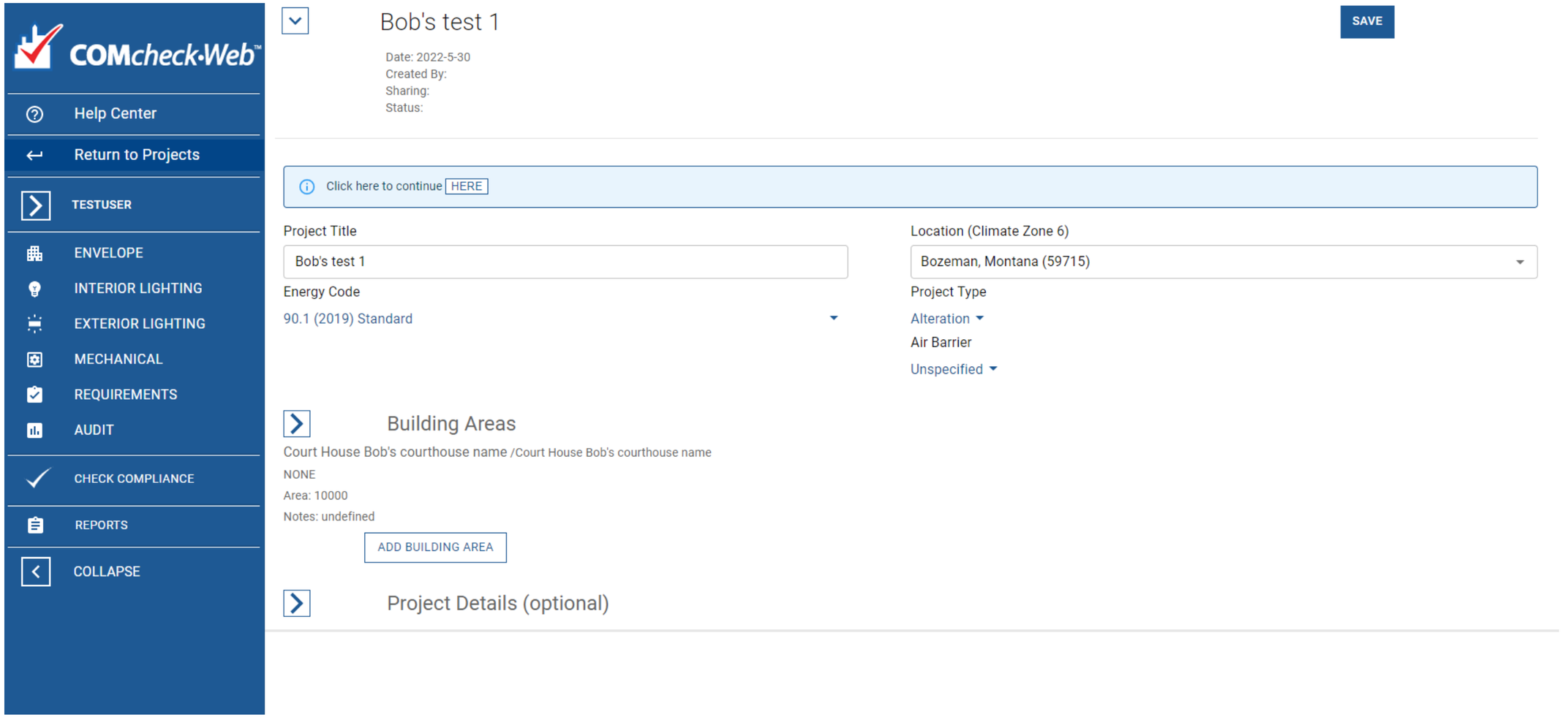
Building Energy Codes Program

COMcheck – Next Generation (Anticipated Fall 2021)

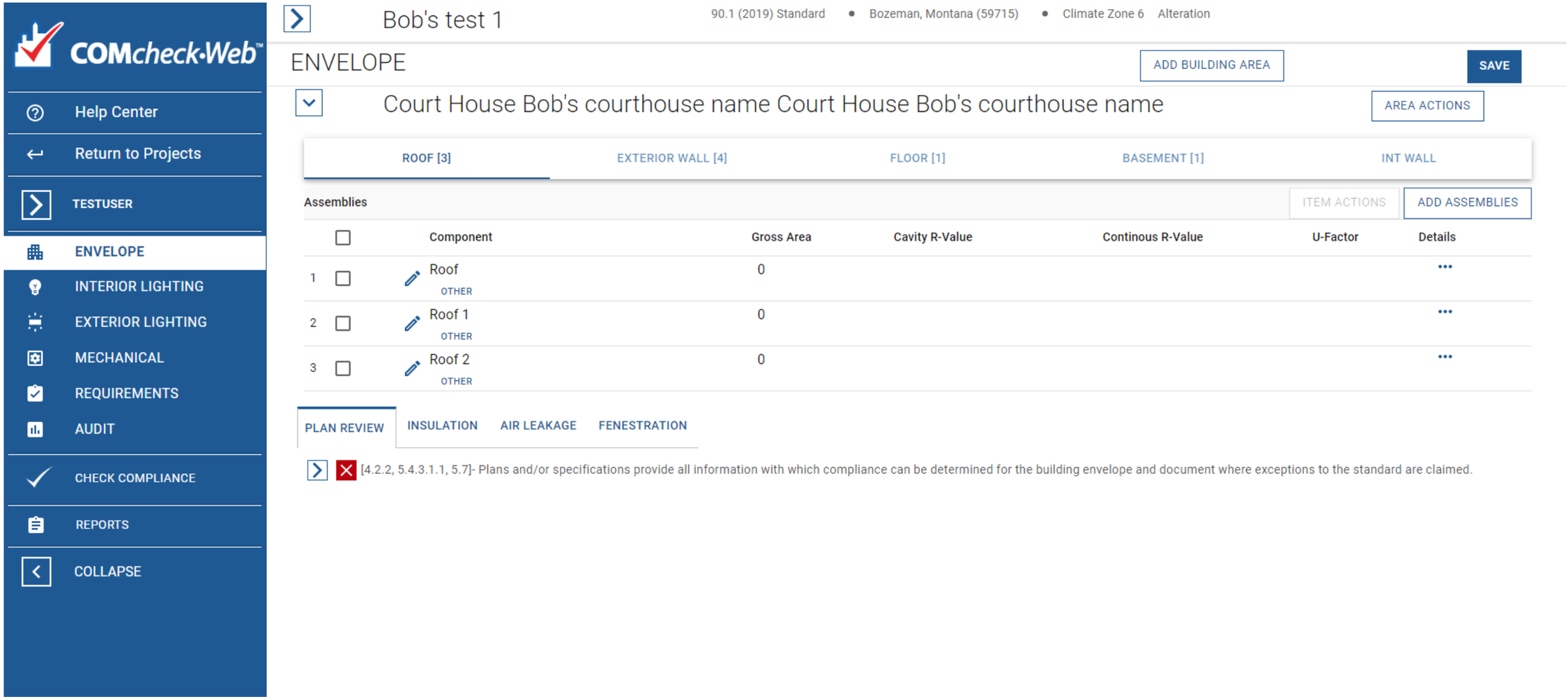
COMcheck – Project Page



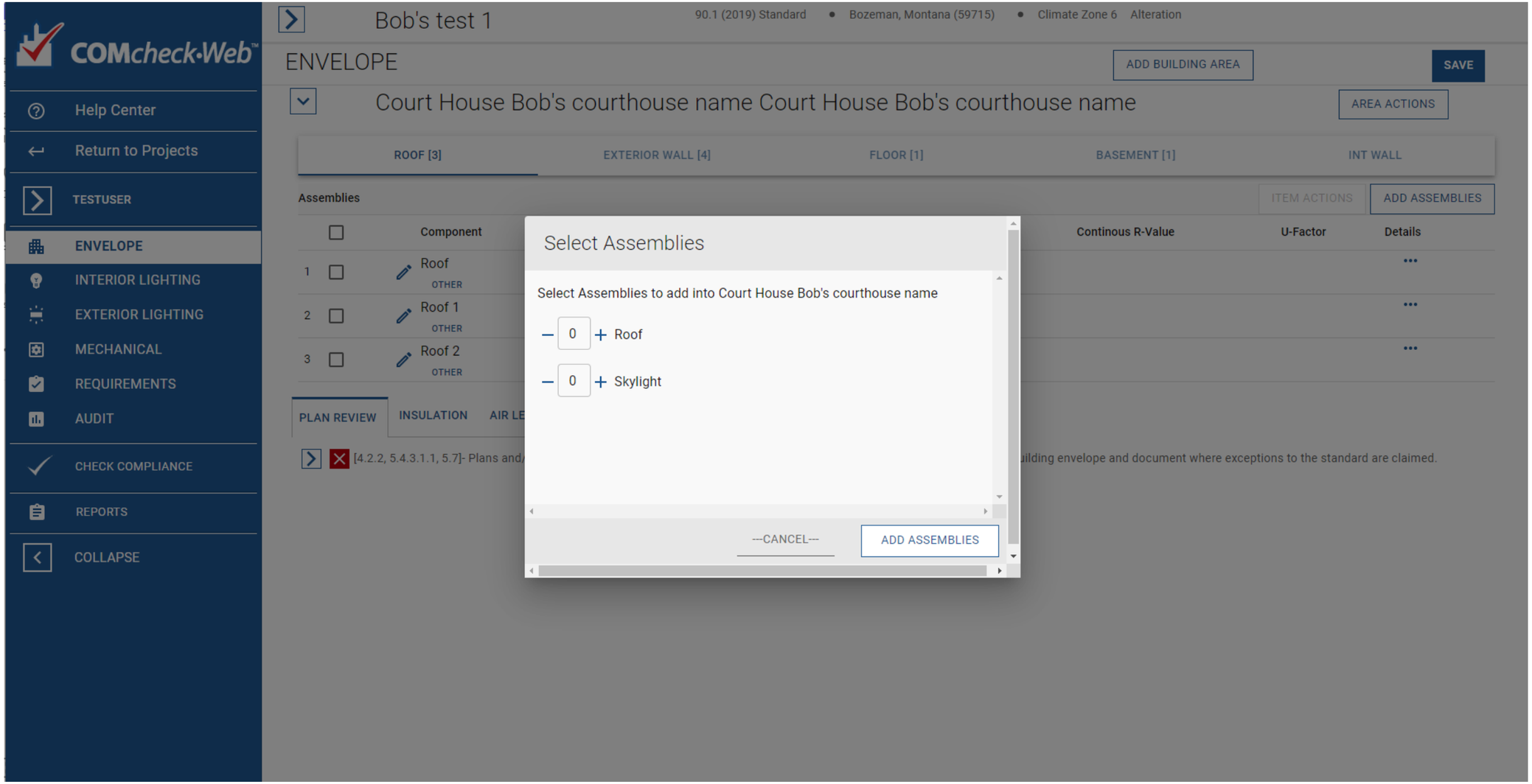
COMcheck – Project Page



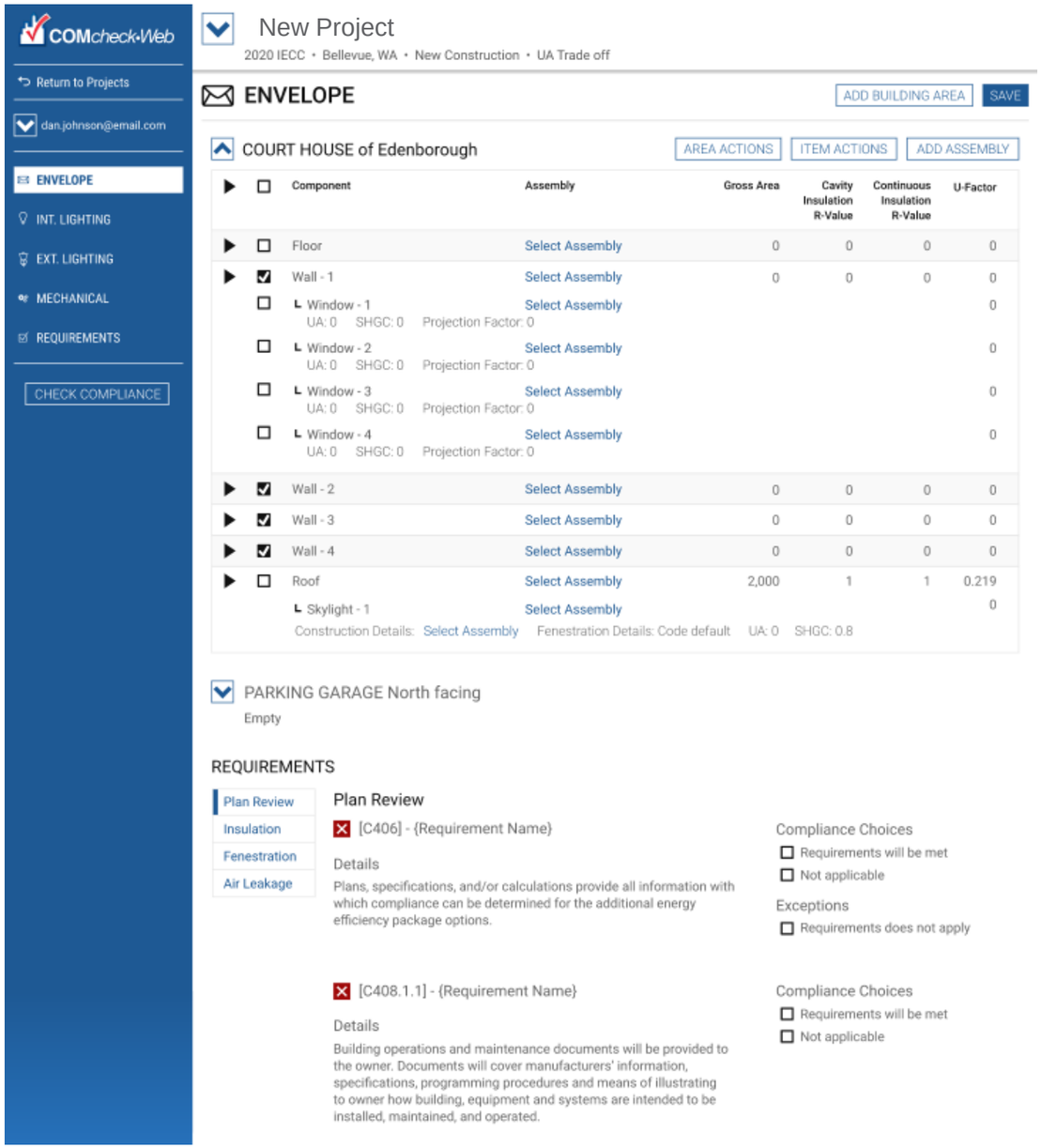
COMcheck Upgrade – Envelope



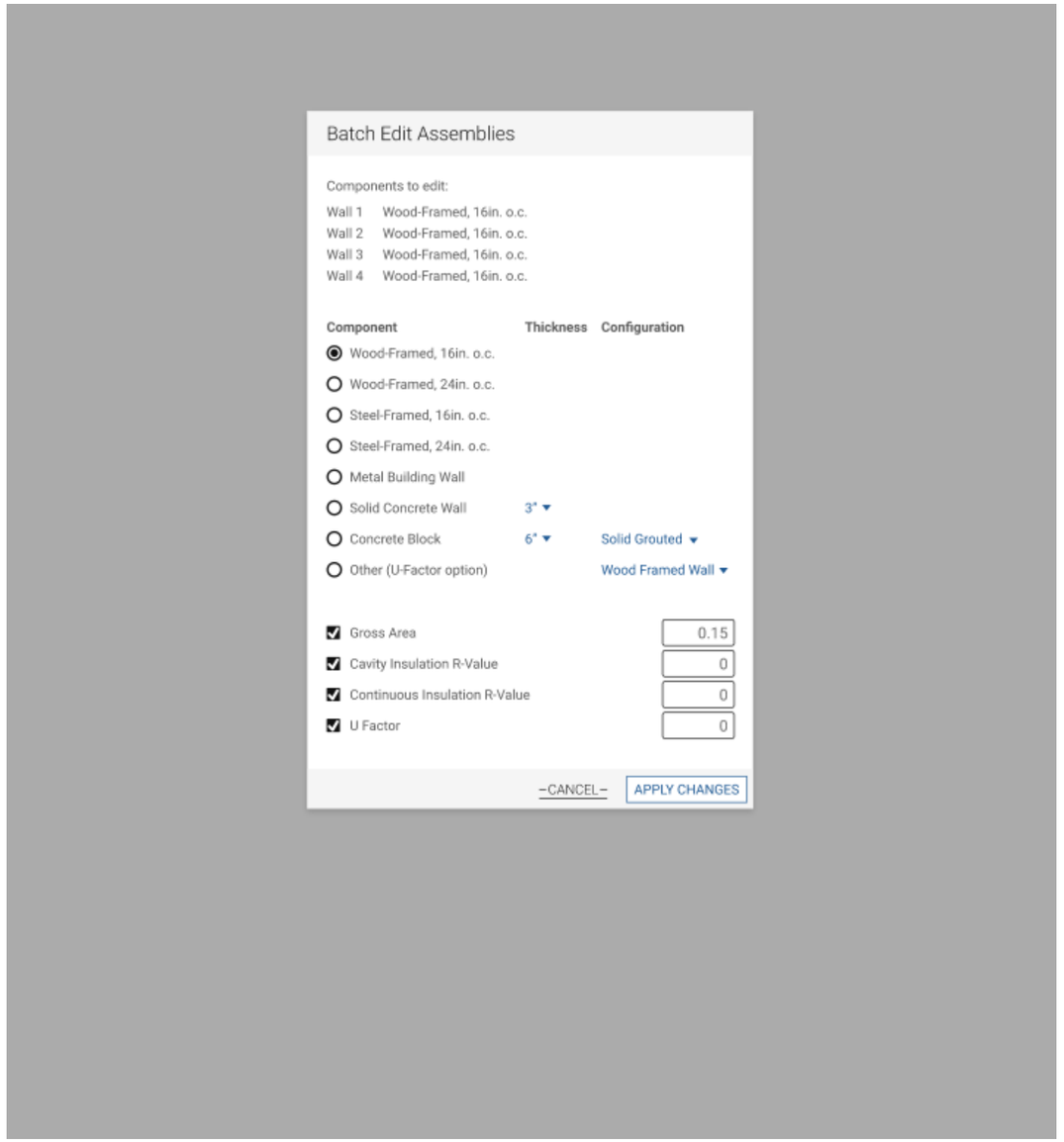
COMcheck Upgrade – Envelope



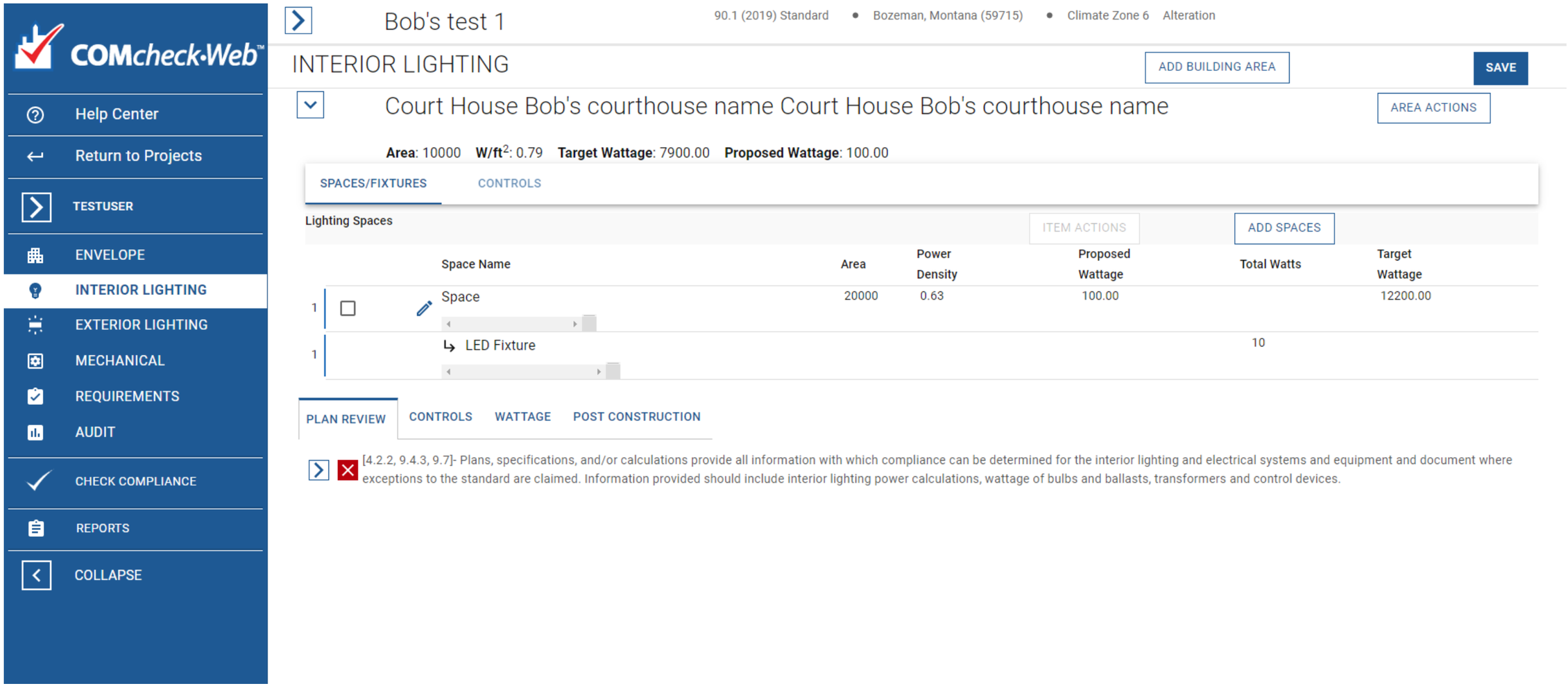
COMcheck Upgrade – Envelope



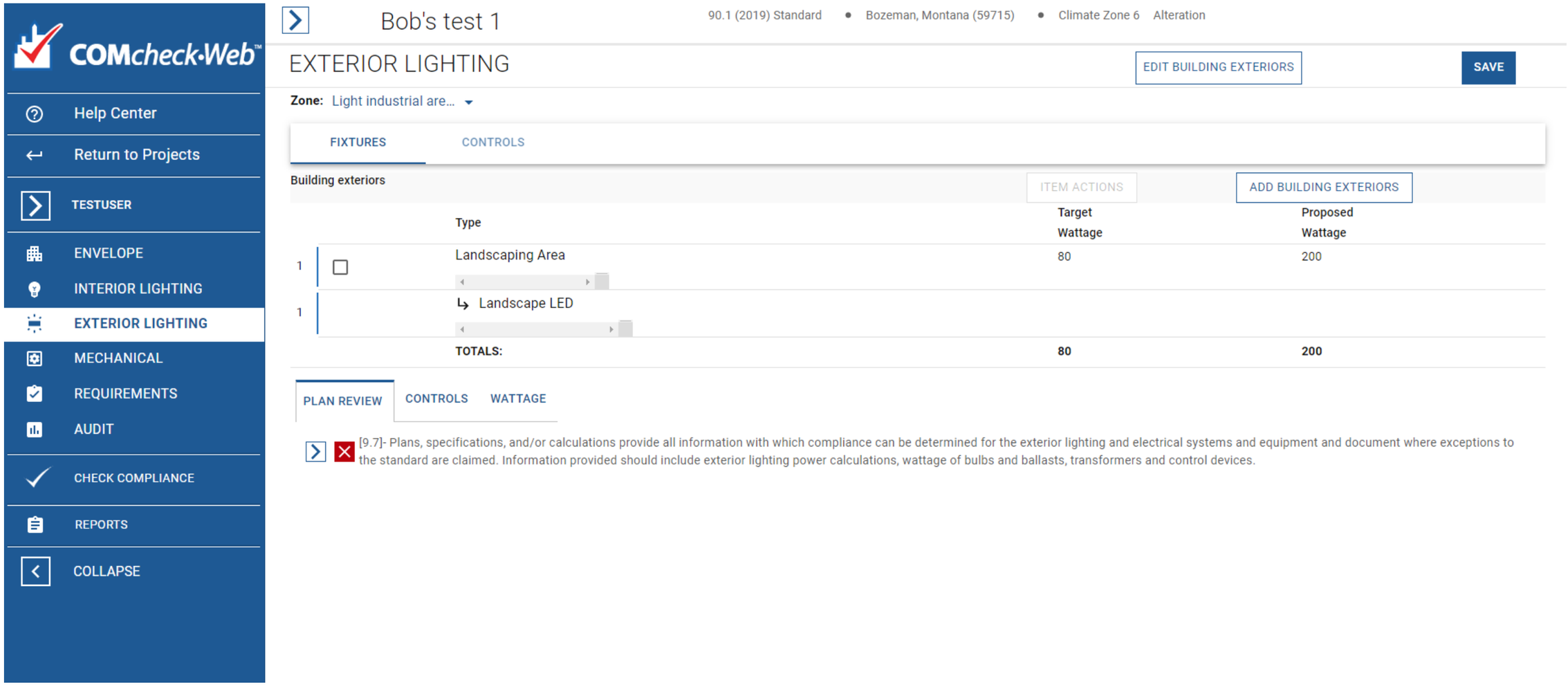
COMcheck Upgrade – Batch Operations



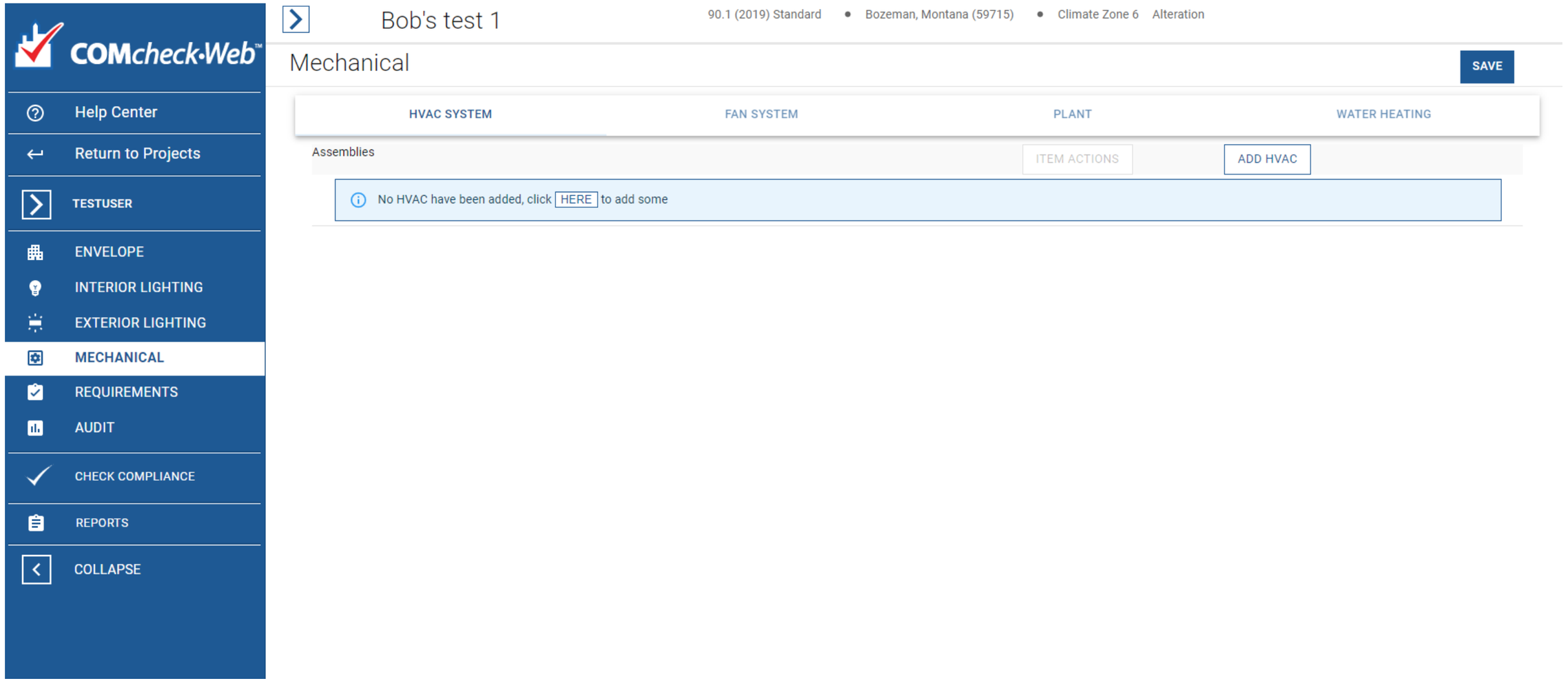
COMcheck Upgrade – Interior Lighting



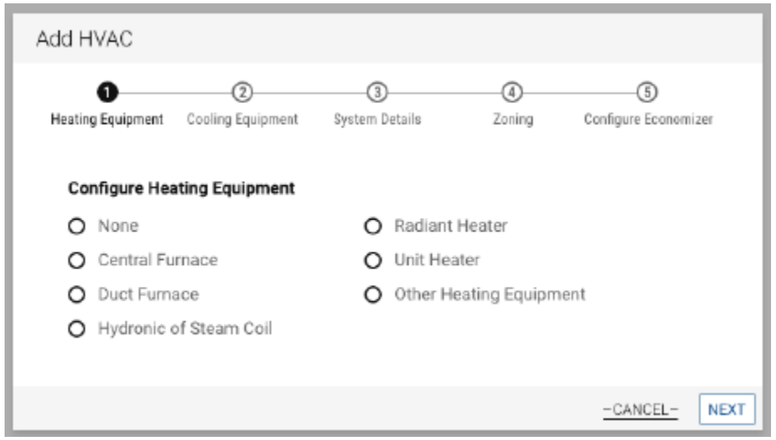
COMcheck Upgrade – Exterior Lighting

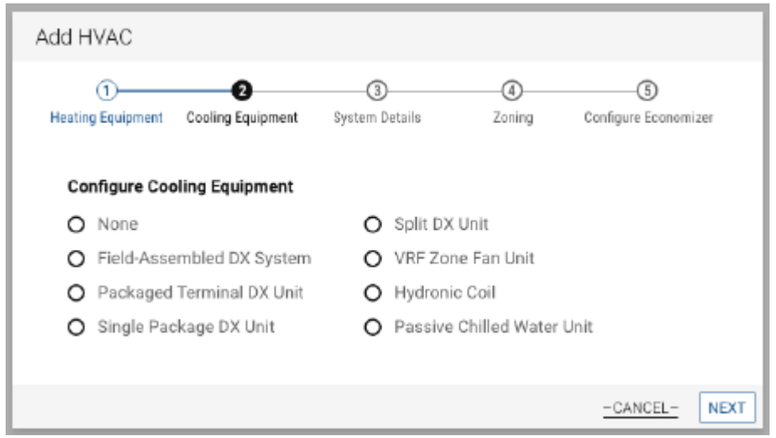


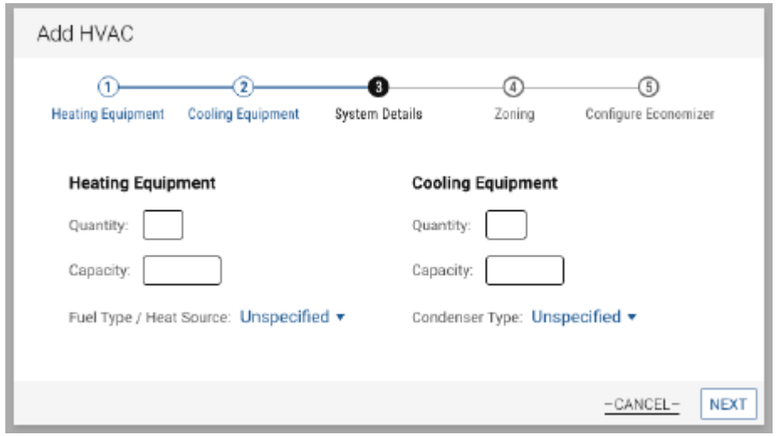
COMcheck Upgrade – Mechanical

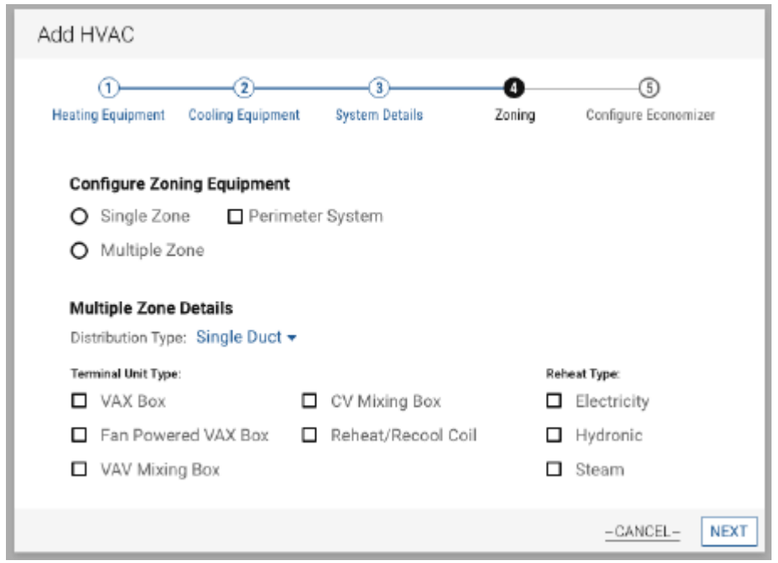


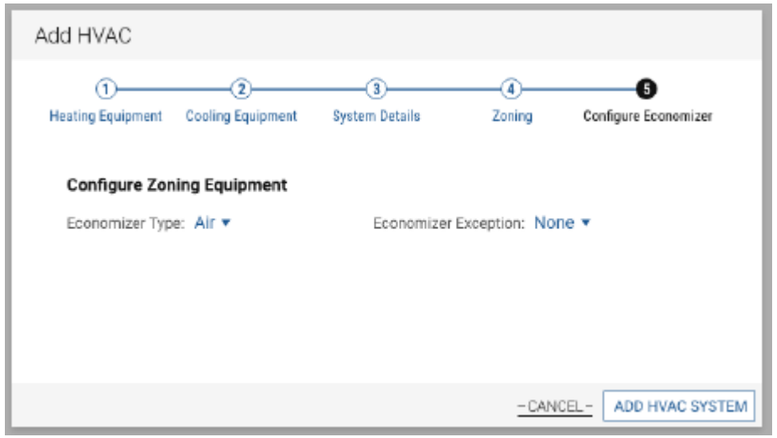
COMcheck Upgrade – Mechanical



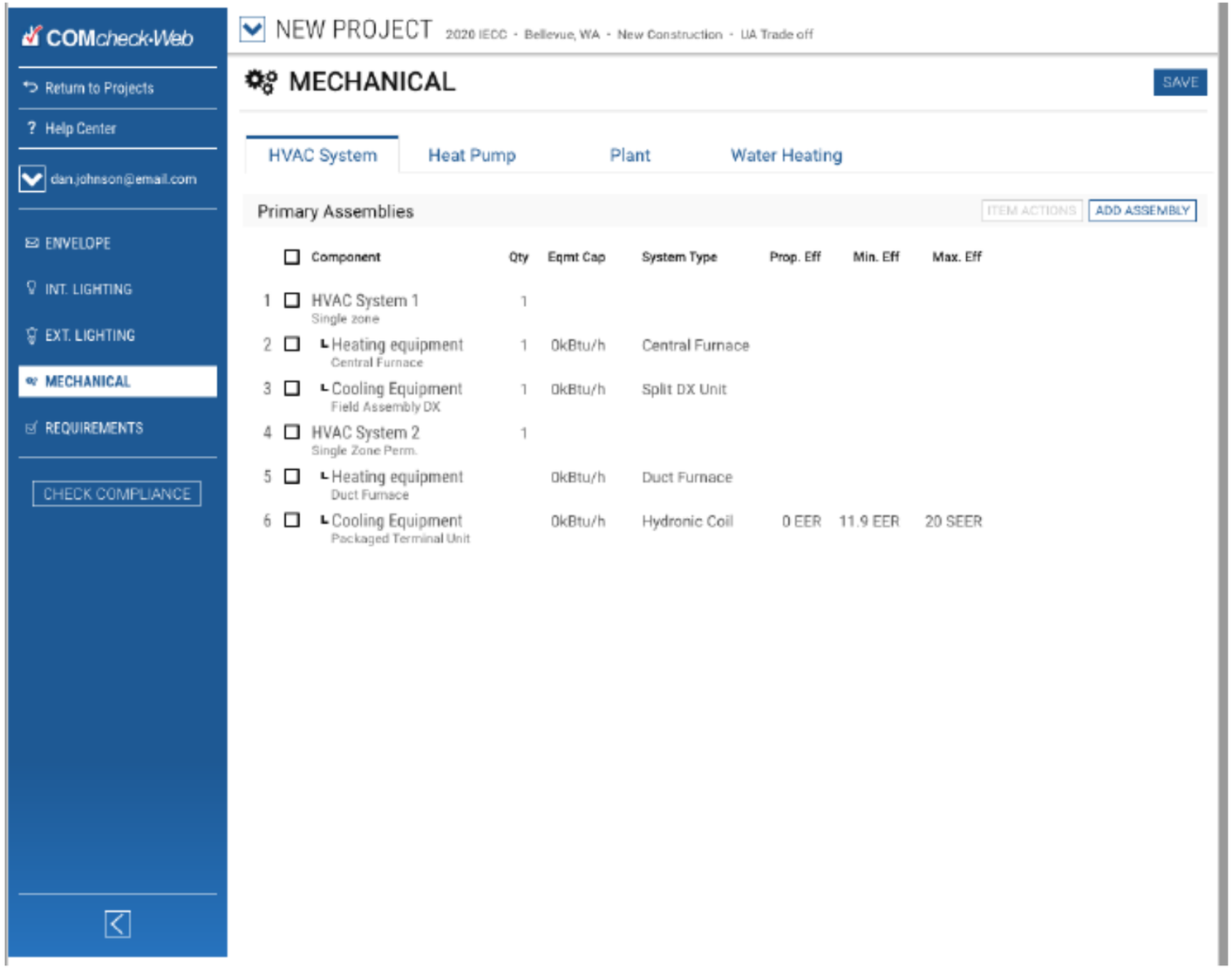




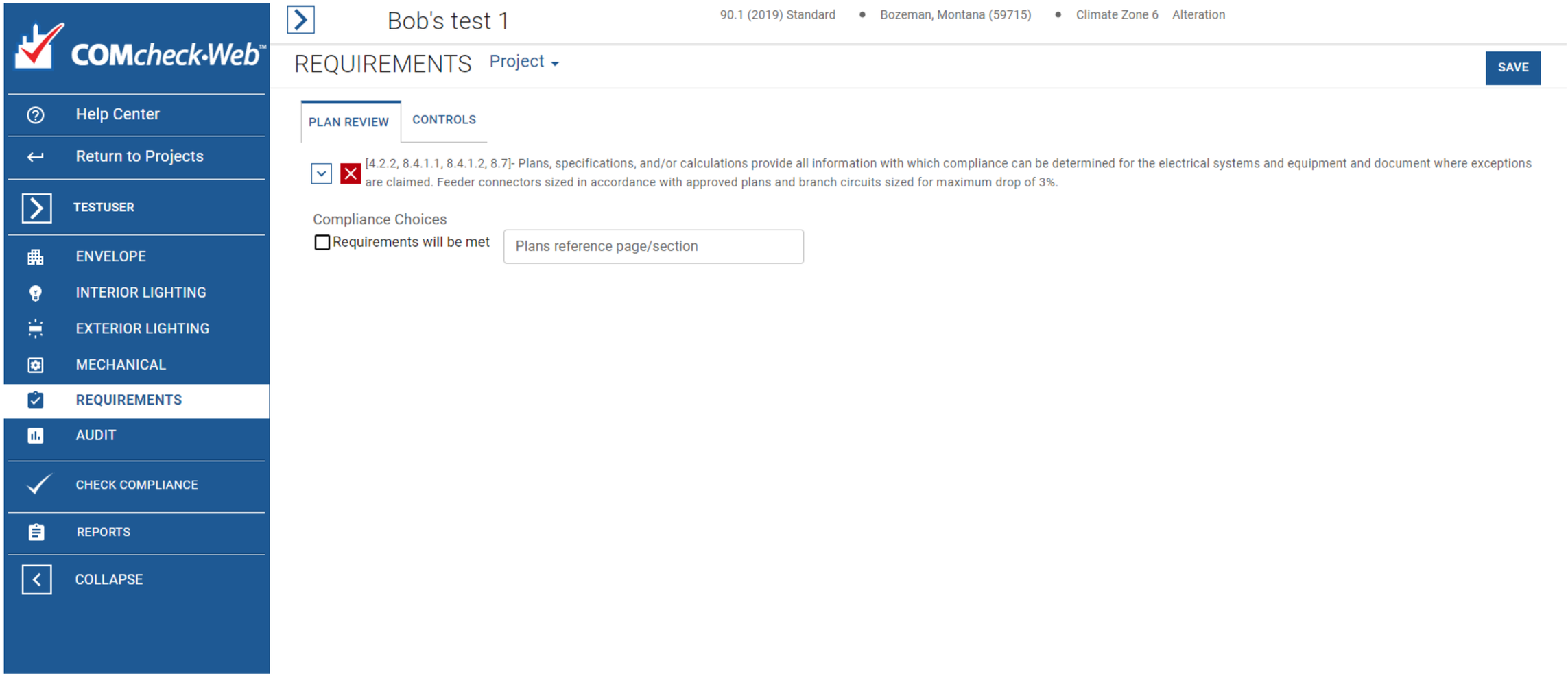




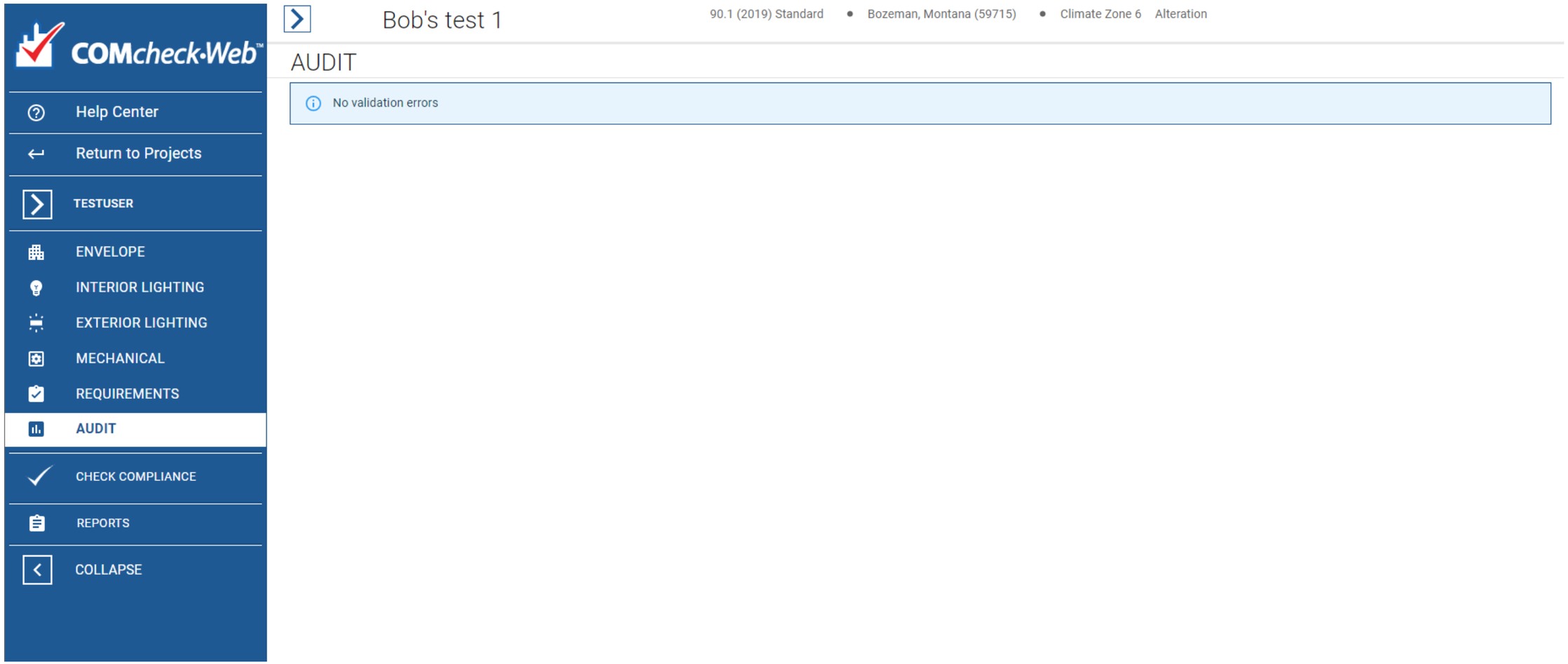
COMcheck Upgrade – Mechanical



COMcheck Upgrade – Requirements



COMcheck Upgrade – Audit Report



ENERGY CODES 2022

2022 NATIONAL ENERGY CODES CONFERENCE
HOSTED BY THE U.S. DEPARTMENT OF ENERGY

July 19-21 | Virtual

U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Building Energy Codes
U.S. DEPARTMENT OF ENERGY

- If you want AIA LUs or a Certificate of Attendance for self-reporting to ICC or RESNET, WRITE DOWN THIS LINK:

www.energycodes.gov/necc/2022_credit_request

Once you have attended your last conference session, go to the link, request credits or a certificate, mark the sessions you attended, and submit!

NOTE: This link will only be active until Monday, July 25

THANK YOU!!!

Building Energy Codes Program

www.energycodes.gov

BECP help desk

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

Pacific Northwest
NATIONAL LABORATORY

Thank you