



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

Bringing you a prosperous future where energy
is clean, abundant, reliable, and affordable



Building Energy Codes

How to Use *COMcheck* Energy Code Compliance Software

U.S. Department of Energy
Building Energy Codes Program

Commercial Compliance Tools

Desktop Software Tools



Web-Based Tools



Free

Printed Materials

Compliance Guides

Prescriptive Tables

Training Tools

- PowerPoint presentations with faculty notes
- Case studies
- Online training
- Online videos

The screenshot displays the 'Building Energy Codes ONLINE TRAINING' website. The user is logged in as Pam Cole. The page is titled 'energycodes >> COMcheck 101'. It features a search bar, an administration section with links for 'Activity report...', 'Change password...', and 'Unenrol me from COMcheck 101...', and a courses section listing 'REScheck Training', 'COMcheck Training', 'Residential Requirements of the 2006 IECC', and 'Article 124 - Single Top Plates'. The main content area is titled 'COMcheck 101 Training' and includes a welcome message, a description of the course, a 'Pilot Study' section, and a note about AIA credits. The right sidebar contains a 'Topics' section with a list of numbers and a list of topics: 'Scope of IECC', 'Envelope General Requirements', and 'HVAC Efficiency Requirements'. The bottom right corner shows 'Local intranet'.

Welcome to the Building Energy Codes Resource Center



This system has been developed to provide users with information about energy codes and beyond code technologies. You can SEARCH by keyword, or BROWSE the available topics. Start your research using the toolbar at the top of the page.

Resources are available in a variety of different media types, including Articles, Graphics, Online Tools, Presentations, and Videos. The BECP Resource Center gathers content not only from our own archives, but also provides links to energy code resources from around the web. [Learn more about the Resource Center.](#)

NEW MATERIALS

[Article #1529: Energy Policy Act 2005 and Tax Credits](#)

[Article #1533: Appropriate Use of Building Energy Simulation Software](#)

[Article #1484: Vestibule Case Study](#)

POPULAR RESOURCES

[Article #139: Insulating Suspended Ceilings](#)

[Building Energy Codes Glossary](#)

[Article #1420: Energy Code Climate Zones](#)

[Article #1469: How Do I Enter Non-Uniformly Insulated Basement Walls in REScheck?](#)

Graphics Search Results

Keywords: *duct system approach HVAC*

Viewing: 1-9 of 92

 [Printer-friendly Format](#)

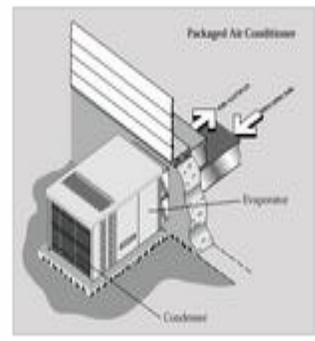
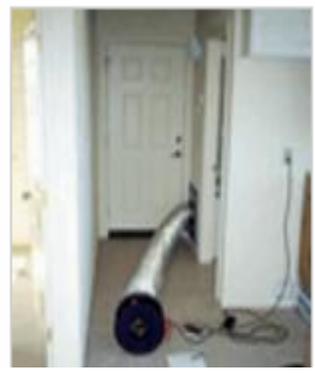
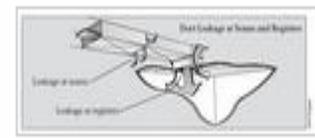
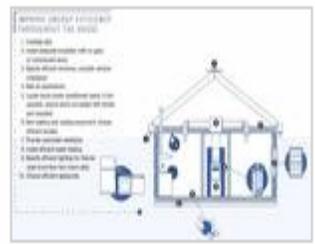
ADDITIONAL RESOURCES

[Articles](#)

[Online Tools](#)

[Presentations](#)

[Videos](#)

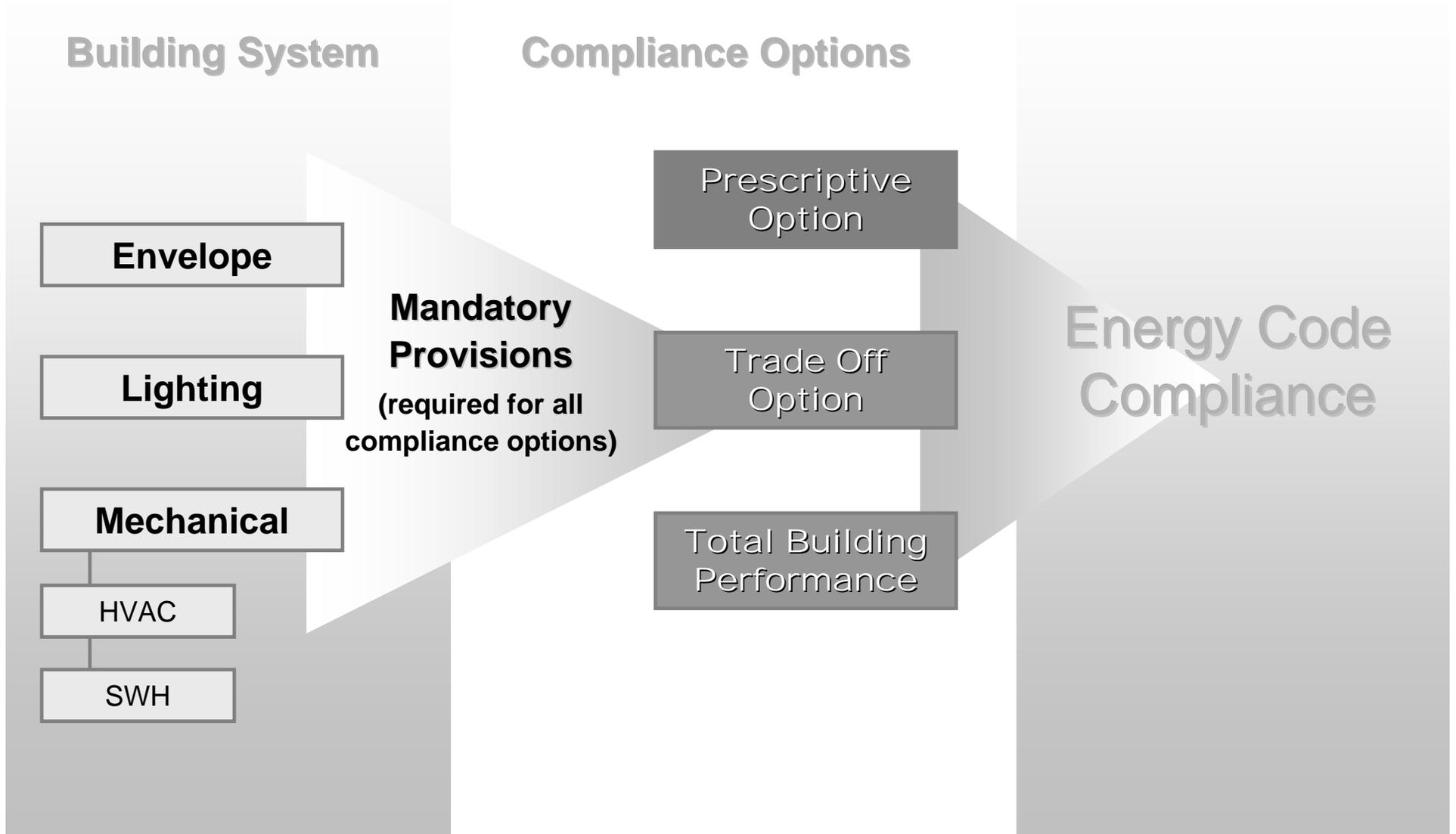


When does COMcheck apply?

Commercial New Construction, Alterations and Additions

- Commercial Buildings include all buildings **except**
 - Single family
 - Low rise multi-family - 3 stories or less
- State Dependent
 - Not all states have the same code, some states have state-specific energy codes
 - Check to see what code is applicable in your state and if COMcheck is accepted
 - Status of State Codes
 - http://www.energycodes.gov/implement/state_codes/index.stm

Commercial Buildings



Components that Must Comply with the Energy Code

Building Envelope

- Construction Assemblies (materials and insulation levels)
- Windows, doors, and skylights

Lighting

- Watts/sq. ft.
- Trade offs between spaces

Mechanical

- HVAC Systems
- Service Water Heating Systems
- Equipment efficiency



How do they correlate in COMcheck?
No trade-offs between systems!

What is COMcheck?

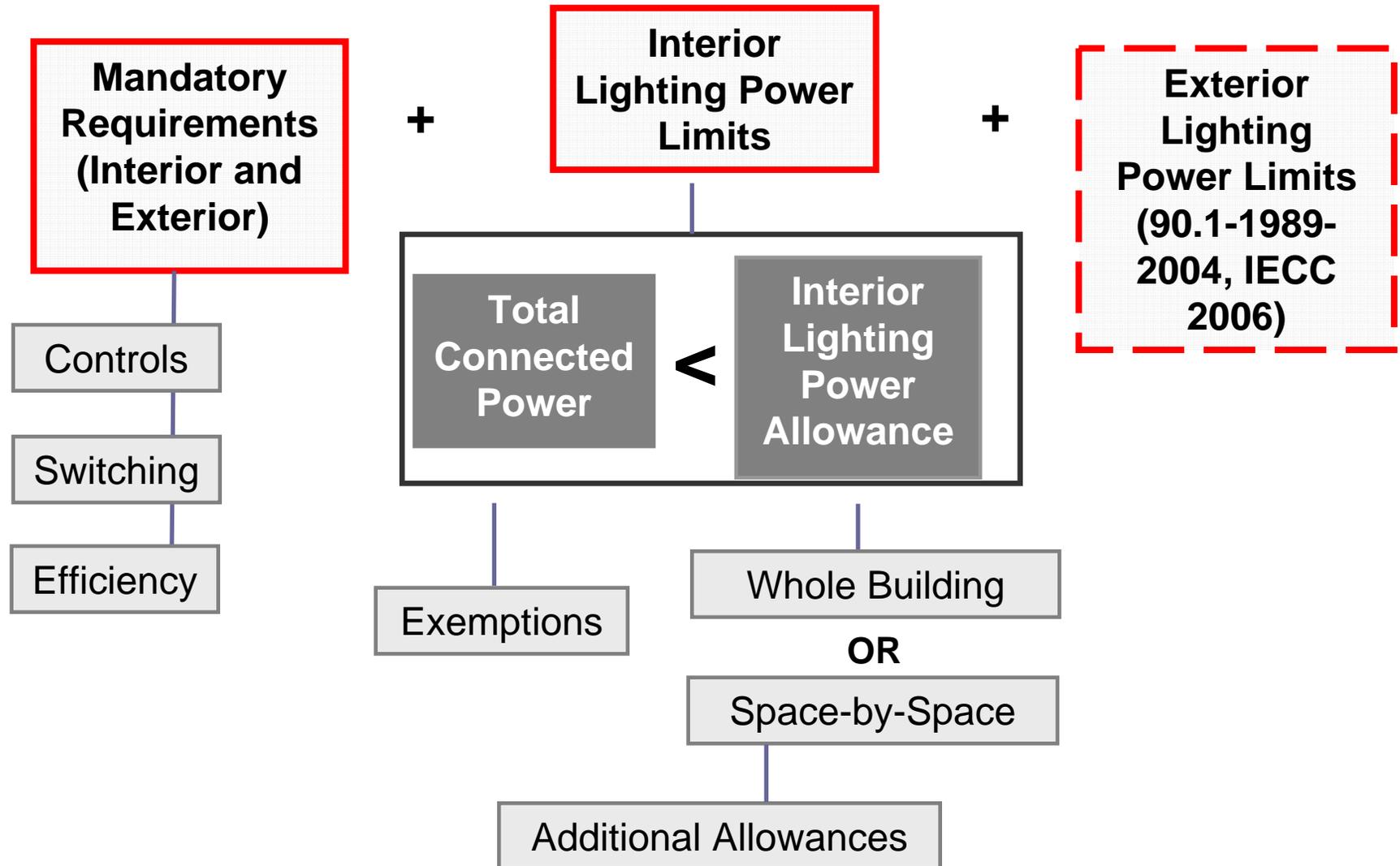
- Envelope
 - trade-off calculations are based on envelope loads only
 - defines a proposed design and a budget design
- Lighting
 - Watts/square foot (LPDs)
- Mechanical
 - short wizard to customize a list of requirements applicable to the system identified

Commercial Building Envelope Requirements

- Mandatory Requirements:
 - Moisture Control
 - Air Leakage
- Climate Specific Requirements:
 - Roof
 - Above Grade Walls
 - Below Grade Walls
 - Floor
 - Slab
 - Skylights, Windows, and Doors



Basic Lighting Requirements



Mechanical

- Mandatory
 - Equipment Efficiencies
 - Equipment Labeling
 - Controls
 - Load Calculations
 - Duct Sealing
- Climate Specific
 - Economizers
 - Duct Insulation
- Prescriptive
 - Simultaneous heating/cooling
 - Fan Power Limitation
 - Energy Recovery
 - Exhaust Hoods



COMcheck™

DOE's Building Energy Codes Program

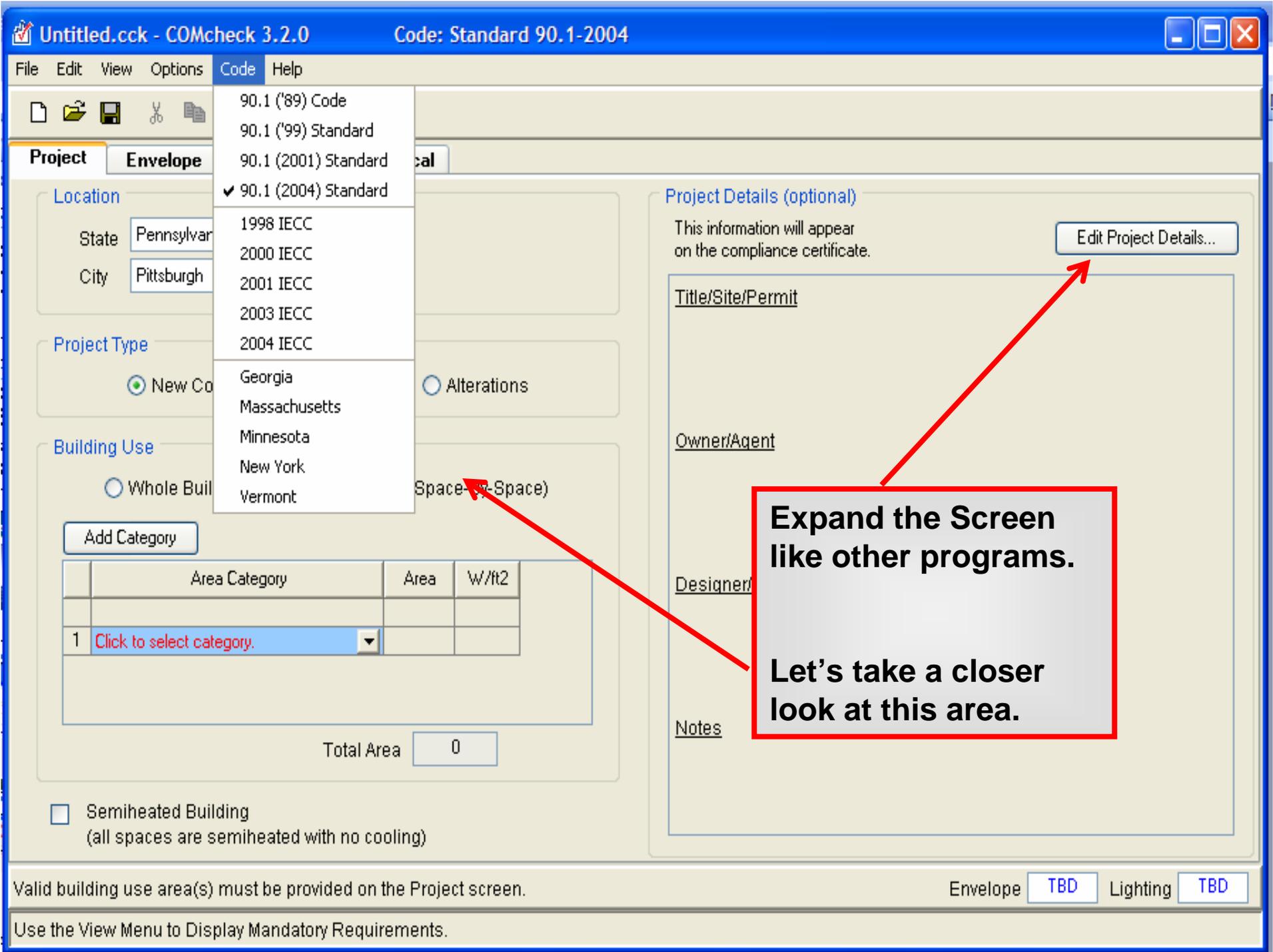
Internet Address: www.energycodes.gov

Technical Support: techsupport@becp.pnl.gov



Energy Efficiency and Renewable Energy · U.S. Department of Energy

Loading...



**Expand the Screen
like other programs.**

**Let's take a closer
look at this area.**

Untitled.cck - COMcheck 3.2.0 Code: Standard 90.1-2004

File Edit View Options Code Help

90.1 ('89) Code
90.1 ('99) Standard
90.1 (2001) Standard
✓ 90.1 (2004) Standard
1998 IECC
2000 IECC
2001 IECC
2003 IECC
2004 IECC
Georgia
Massachusetts
Minnesota
New York
Vermont

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

Project **Envelope**

Location
State: Pennsylvania
City: Pittsburgh

Project Type
 New Construction Alterations

Building Use
 Whole Building Space-By-Space

Add Category

	Area Category	Area	W/ft2
1	Click to select category.		

Total Area: 0

Semiheated Building (all spaces are semiheated with no cooling)

Valid building use area(s) must be provided on the Project screen.

Envelope: TBD Lighting: TBD

Use the View Menu to Display Mandatory Requirements.

example.cck - COMcheck Code: Standard 90.1-2001

File Edit View Options Code Help

Project Envelope Lighting Mechanical

Location

State Montana

City Bozeman

Project Type

New Construction Addition Alterations

Building Use

Whole Building Area Category (Space-By-Space)

Add Category

	Area Category	Area	W/ft
1	Common Space Types:Office - Encl...	4520	1.5
2	Common Space Types:Conference/...	420	1.5
3	Common Space Types:Corridor/...	1400	0.7

Total Area 12160

Semiheated Building
(all spaces are semiheated with no cooling)

Project Details (optional)

This information will appear on the compliance certificate. Edit Project Details...

Title/Site/Permit

Building Use

- Whole Building
- Area Category

Owner/Agent

Designer/Contractor

Notes

Previously saved project information:
COMcheck-EZ Example Building
Eric Makela
Eric Makela

Envelope TBD Lighting TBD

Valid building use area(s) must be provided on the Project screen.

Use the View Menu to Display Mandatory Requirements.

Four Main Screens

Compliance Results

Adding Lighting

example.cck - COMcheck Code: 2001 IECC

File Edit View Options Code Help

Project Envelope **Lighting** Mechanical

Linear Fluorescent Compact Fluorescent HID Incandescent Add Space

	Component	Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
Building								
1	T8 / T12 Fluorescent 1	A	2x4 Troffer, parabolic lo...	48" T8 32W	Electronic	3	51	95
2	T8 / T12 Fluorescent 2	B	2x4 Troffer, parabolic lo...	48" T8 32W	Electronic	3	1	95
3	T8 / T12 Fluorescent 3	C	4 ft. Wall mout, wrap-ar...	48" T8 32W	Electronic	2	4	65
4	surface mount			48" T8 32W	Electronic	1	4	32
5	erial, pendant ...			96" T8 75W	Electronic	2	30	130
6	twin tube			Twin Tube 18W	Magnetic	2	31	46
7	wall washer			Incandescent 150W		1	2	150
8	Incandescent 2	H	Accent track lighting	Incandescent 50W		1	5	50
9	HID 1	I	Recessed mtl halide do...	Metal Halide 50W	Magnetic	1	2	67
10	HID 2	J	Low bay, pendant mount	High-Pressure Sodi...	Magnetic	1	6	190

Lighting components are added by clicking on these

Lighting Results

Allowed Wattage 15808 Proposed Wattage 2478

Lighting PASSES: Design 21% better than Code Envelope +6% Lighting +21%

Use the Options Menu to Arrange Lighting Fixtures by Spaces.

Lighting Options

The screenshot shows the EZ-Casestudy.cck - COMcheck-EZ software interface. The title bar includes the code '2001 IECC'. The menu bar contains 'File', 'Edit', 'View', 'Options', 'Code', and 'Help'. The 'Options' menu is open, with 'Spaces (Lighting)' and 'Exemptions and Allowances (Lighting)' circled in red. A red arrow points from this menu to a table of lighting fixtures. A text box in the foreground lists 'Lighting Options: Spaces' and 'Exemptions and Allowances'.

	Comp		Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
1	Space 1						
2	T8 / T12 Fluorescent 1	A	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	4	174
3	T8 / T12 Fluorescent 6	B	2 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	31
4	T8 / T12 Fluorescent 3	C	1 x 4 Parabolic Troffer	48" T12 40W	Magnetic	2	5
5	T8 / T12 Fluorescent 4	D	2 x 2 Prismatic Troffer	24" T12U 40W	Magnetic	2	53
6	T8 /			48" T12 40W	Magnetic	2	11

Allowed Wattage: 28295 Proposed Wattage: 31186

Envelope: TBD Lighting: -10%

Ready

Lighting Options:

- Spaces
- Exemptions and Allowances

Mechanical

EZ-Casestudy.cck - COMcheck-EZ 3.0 Release 1a Code: 2001 IECC

File Edit View Options Code Help

Project Envelope Lighting **Mechanical**

HVAC System Plant Water Heating

	Component	Quantity	Equipment Capacity	Fuel Type/ Heat Source	Condenser Type	System Details
	Building					
1	Water Heating 1	2				Click here... ...
2	HVAC System 4	1				
3	Rooftop Packaged Heat Pu		Select... ▼		Select... ▼	
4	HVAC System 1	1				
5	Rooftop Packaged Heat Pu		<65 kBtu/h ▼		Air-Cooled ▼	
6	HVAC System 2	7				
7	Rooftop Packaged Heat Pu		<65 kBtu/h ▼		Air-Cooled ▼	
8	HVAC System 3	2				
9	Rooftop Packaged Heat Pu		>=90 - <135 k... ▼		Air-Cooled ▼	Air Economizer ...

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

Envelope TBD Lighting -10%

Use the View Menu to display Requirements.

Mandatory Requirements in COMcheck Software

- Requirements Checklist generated automatically based on input
 - applicable code
 - building location

Permit Number _____

Envelope Compliance Certificate
2001 IECC
COMcheck#E2 Software Version 3.0 Release 7
Data filename: C:\Program Files\Check\COMcheck-E2\000

Section 1: Project Information

Project Name: COMcheck-E2
Designer/Contractor: Eric Makela
Document Author: Eric Makela

Section 2: General Information

Building Location (for weather data):
Climate Zone:
Heating Degree Days (base 65 degrees F):
Cooling Degree Days (base 65 degrees F):
Project Type:
Window / Wall Ratio:

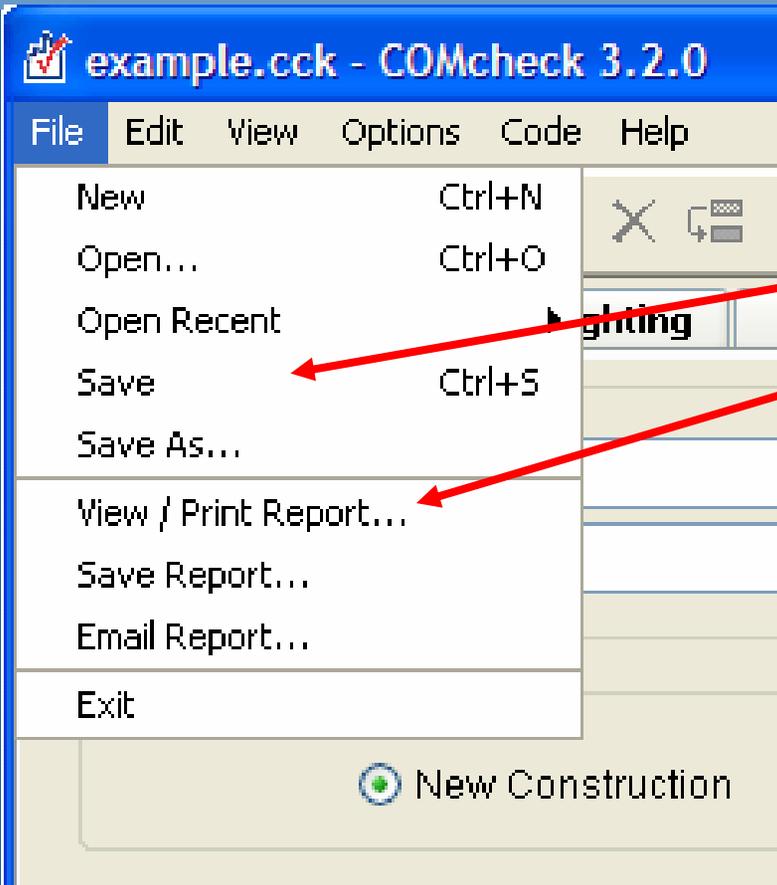
Building Type: _____
Office

Section 3: Requirements Checklist

Bldg.	Dept.	Use	
			Air Leakage, Component Certification, and Vapor Retarder Requirements
			1. All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed.
			2. Windows, doors, and skylights certified as airtight leakage requirements.
			3. Component R-values & U-factors labeled as certified.

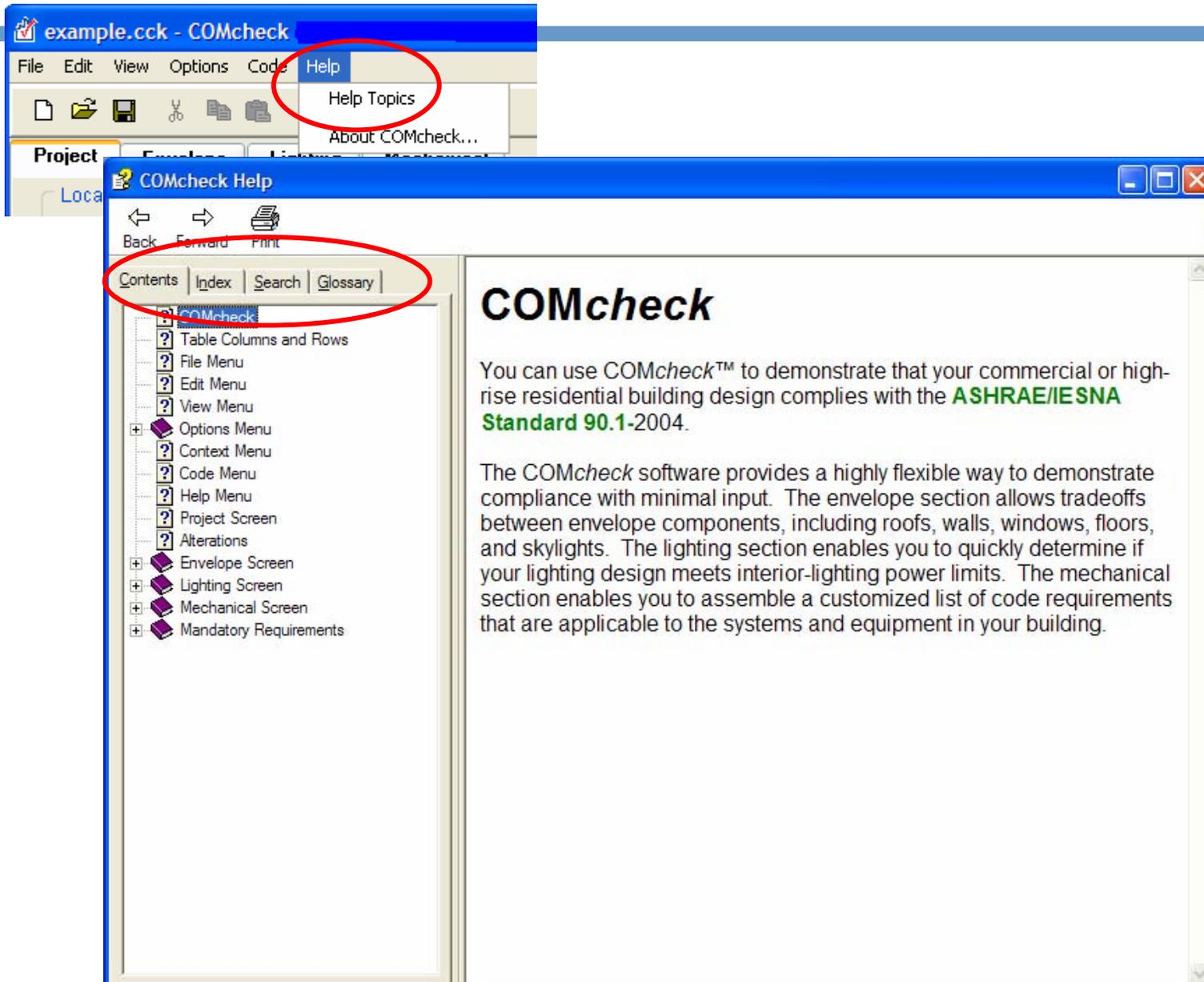
Air Leakage, Component Certification, and Vapor Retarder Requirements:
All joints and penetrations are caulked, gasketed, weather-stripped, or otherwise sealed

Save/Print



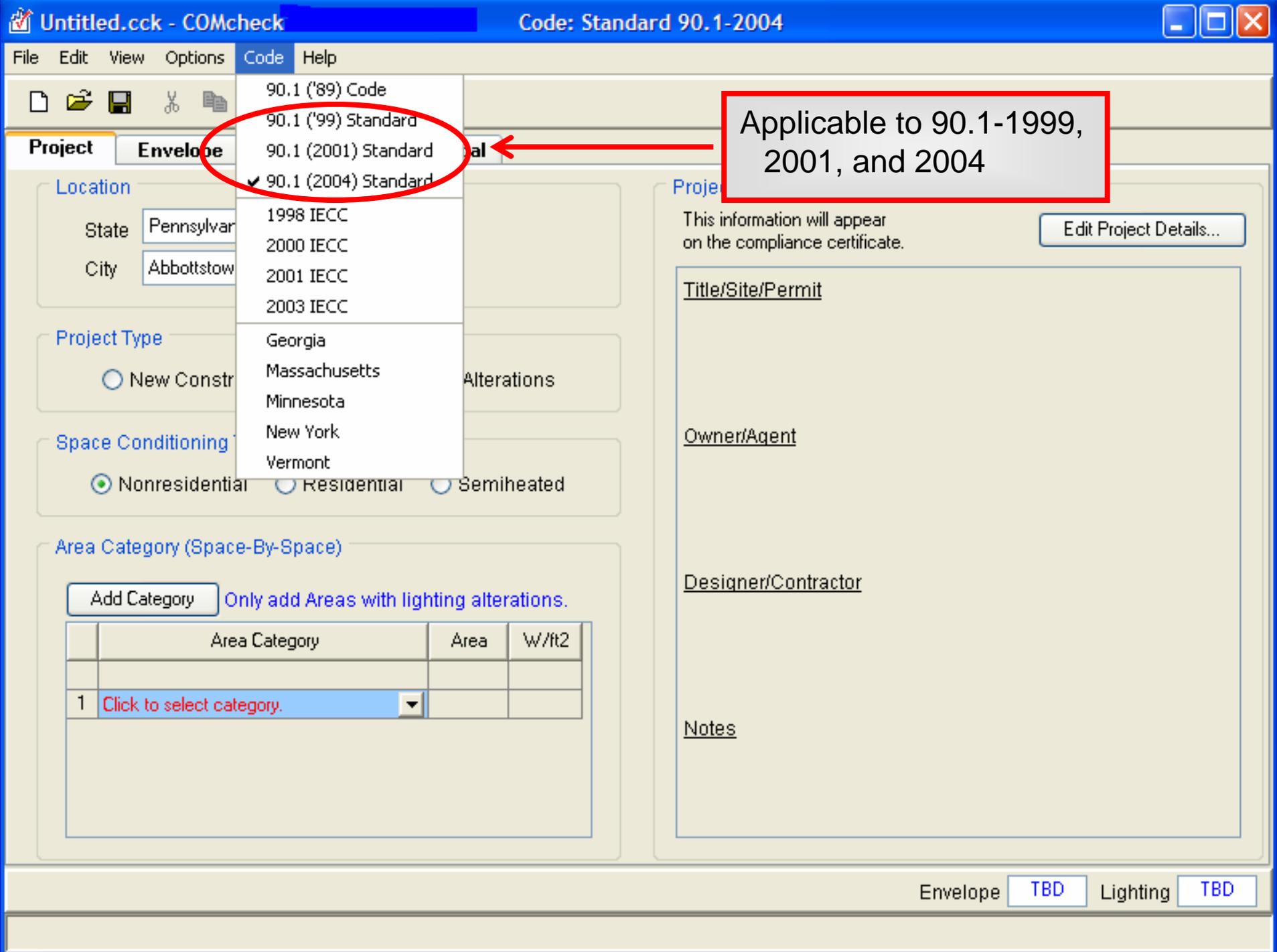
Be sure to save your project
Preview and Print reports

Need Help?



Alterations Feature in COMcheck

- 90.1-1999
- 90.1-2001
- 90.1-2004



Untitled.cck - COMcheck Code: Standard 90.1-2004

File Edit View Options Code Help

Project Envelope Lighting Mechanical

Location

State Pennsylvania

City Abbottstown

Project Type

New Construction Addition Alterations

Space Conditioning Type

Nonresidential Residential Semiheated

Area Category (Space-By-Space)

Add Category Only add Areas with lighting alterations.

	Area Category	Area	W/ft2
1	Click to select category.		

Project Details (optional)

This information will appear on the compliance certificate. Edit Project Details...

Title/Site/Permit

Owner/Agent

Designer/Contractor

Notes

Envelope TBD Lighting TBD

Choose the state in which the building will be located.





Project Envelope Lighting Mechanical

Location

State: Pennsylvania City: Abbottstown

Project Type

Radio buttons for New Construction, Addition, Alterations (selected)

Space Conditioning Type

Radio buttons for Nonresidential (selected), Residential, Semiheated

Area Category (Space-By-Space)

Add Category Only add Areas with lighting alterations.

Table with columns: Area Category, Area, sq/ft2. Row 1: 1, Click to select category.,

Project Details (optional)

This information will appear on the compliance certificate.

Edit Project Details...

Title/Site/Permit

Owner/Agent

Designer/Contractor

Notes

Area Categories: Use if LIGHTING is being altered ONLY

Need Help?

The image shows a screenshot of the COMcheck software interface. The main window title is "example.cck - COMcheck". The menu bar includes "File", "Edit", "View", "Options", "Code", and "Help". The "Help" menu is circled in red. Below the menu bar is a toolbar with icons for file operations. A "Project" window is partially visible in the background.

The "COMcheck Help" window is open, showing a table of contents on the left and the "Alterations" help topic on the right. The "Alterations" topic is also circled in red in the table of contents. The "Alterations" help text reads:

Alterations

An *Alterations* feature is included when 90.1-1999, 90.1-2001, or 90.1-2004 is selected from the *Code* menu. This feature is only included for these editions of the 90.1 Standard because these editions provide detailed requirements for alterations. To use the alterations feature, select *Alterations* as the *Project Type* on the *Project* screen.

Alteration projects involve changes to or replacement of: 1) existing building components that are part of the building envelope; 2) lighting, heating, ventilating, air conditioning, and water heating equipment; or 3) other equipment. Alterations also include converting an unconditioned or semi-heated space to a conditioned space. Additions (i.e., added square footage), even if in conjunction with existing building alterations or "New Construction" (i.e., new building), must be shown to comply in separate compliance runs. Software inputs for alterations include only those envelope components, lighting fixtures, or mechanical systems/equipment that will exist upon completion of the alteration project.

Compliance is shown as Pass/Fail for Envelope and Lighting.

Space Conditioning Type

YMCA – Case Study

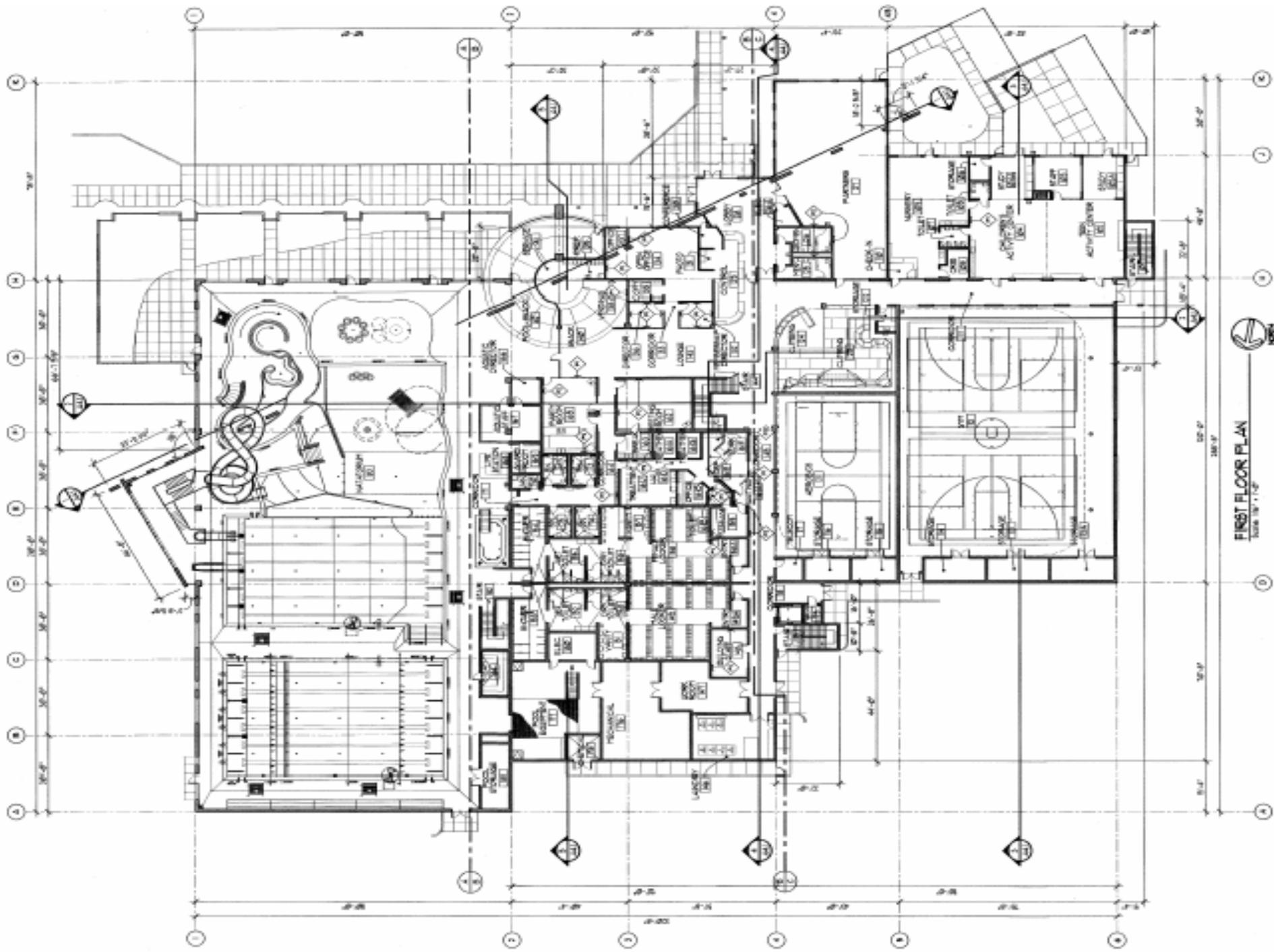




East Elevation Entrance

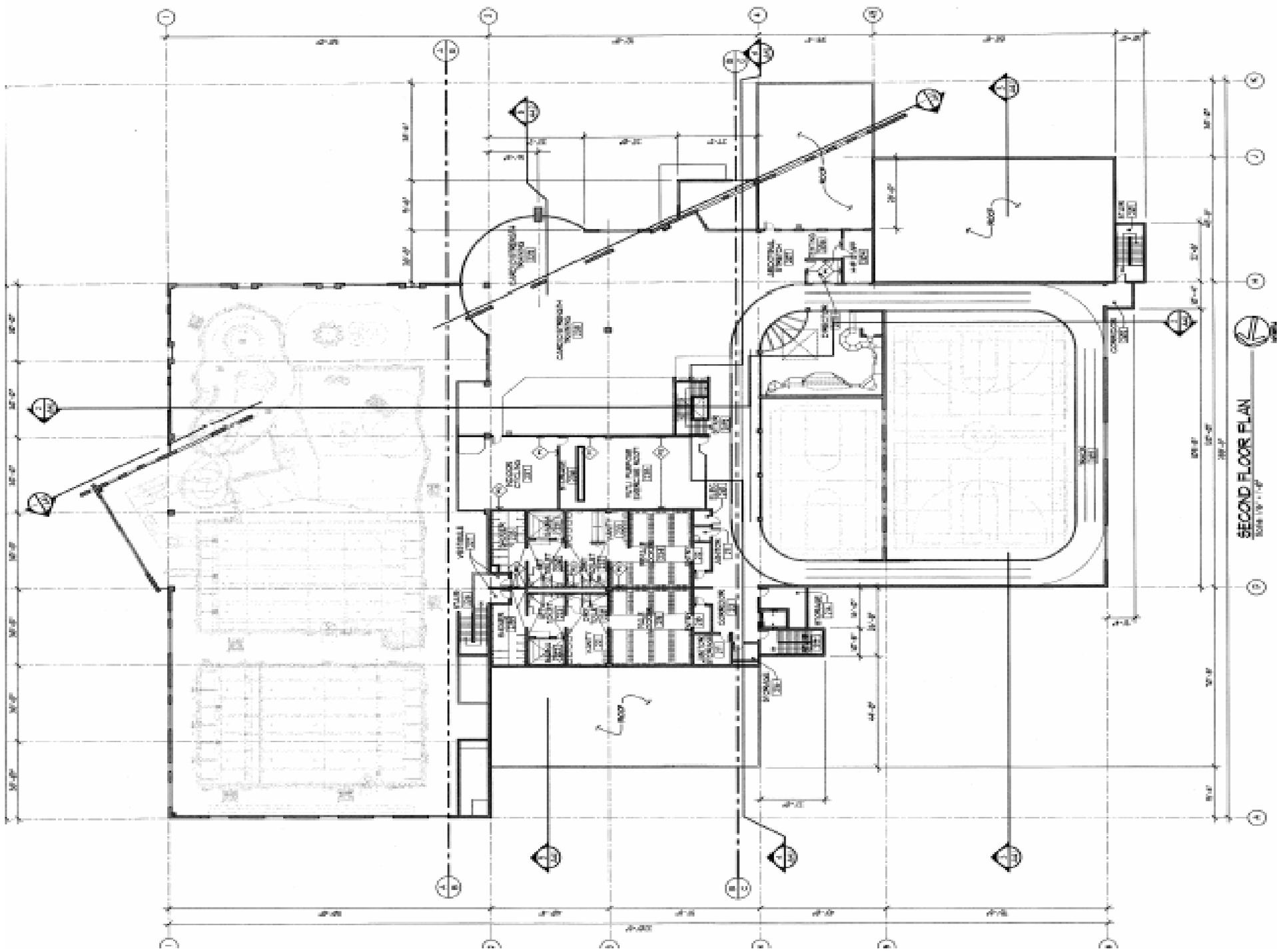


South Elevation

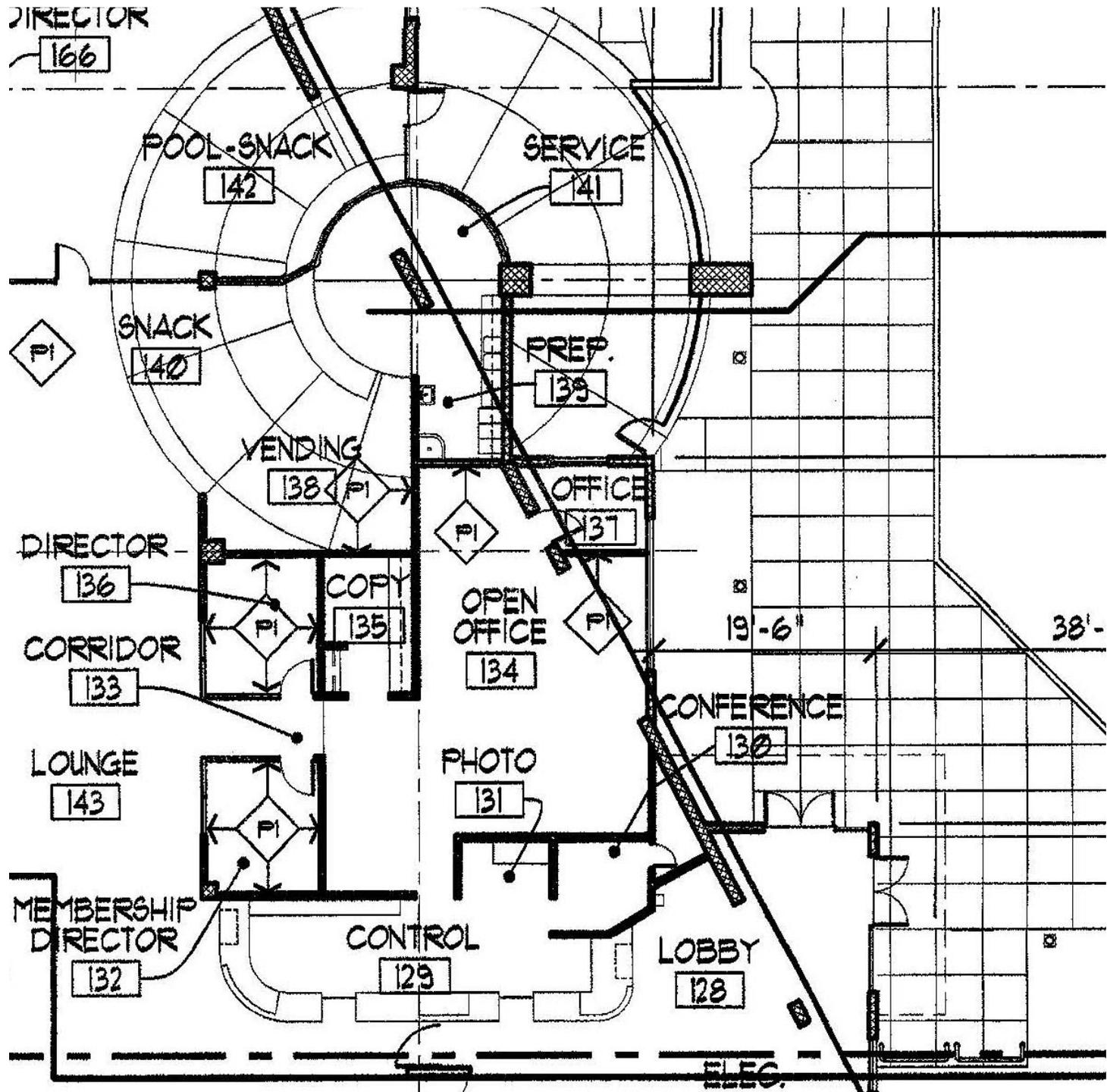


FIRST FLOOR PLAN
 SCALE: 1/8" = 1'-0"

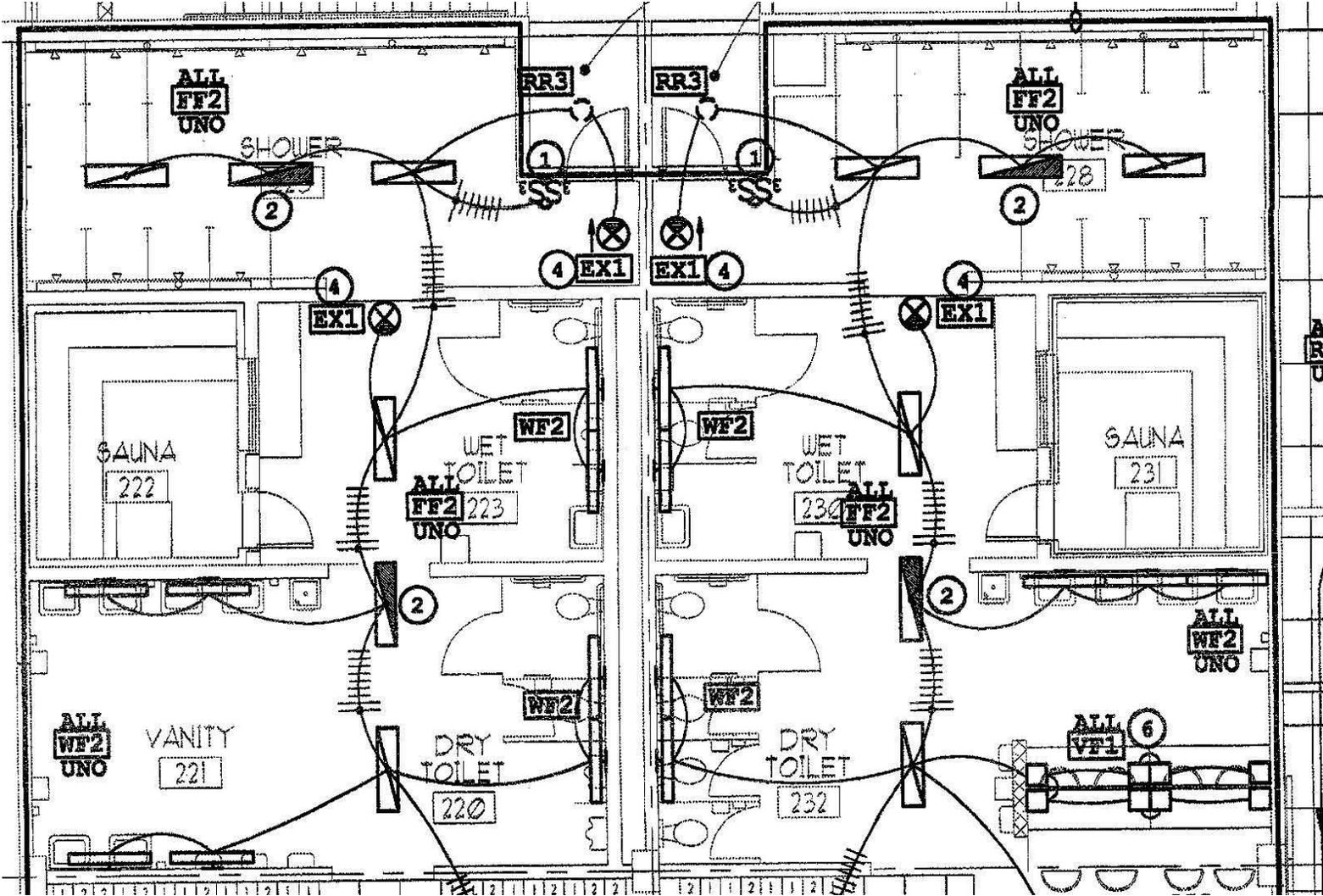




SECOND FLOOR PLAN
SCALE 1/8" = 1'-0"



Fixtures



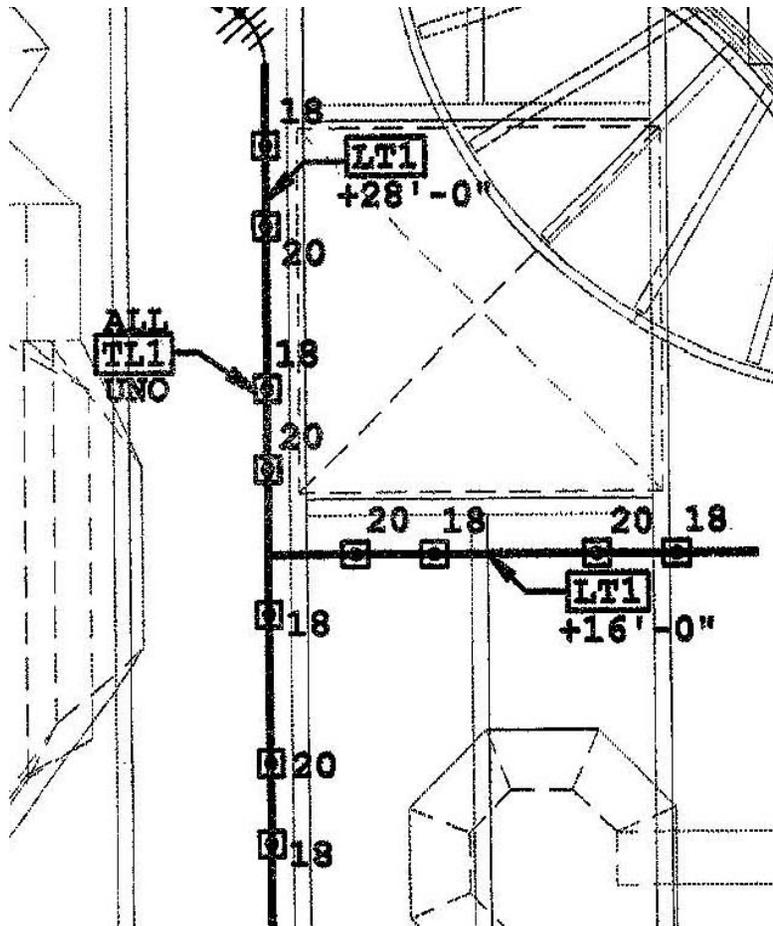
Fixture Schedule

LIGHTING FIXTURE SCHEDULE					
TYPE	DESCRIPTION	MTG.	LAMPS	MFG. & CATALOG NUMBER	NOTES
WB1	WALL-PAK DIE-CAST ALUMINUM HOUSING	WALL MOUNTED	WITH FIXTURE	LITHONIA NO, TWA-100M-TB-LPI-DNA	2
WB2	WALL-PAK DIE-CAST ALUMINUM HOUSING WITH EMERGENCY CIRCUIT	WALL MOUNTED	WITH FIXTURE	LITHONIA NO, TWA-70M-TB-LPI-EC-DNA	2,4
WB3	WALL MOUNTED , DOWN LIGHT BRONZE ALUMINUM HOUSING TEMPERED GLASS DIFFUSER	WALL MOUNTED	WITH FIXTURE	TERON LIGHTING NO. HN50MH-MT-ALUMINUM COLOR	2
WB4	WALL MOUNTED INCANDESCENT, VAPOR PROOF	WALL HEIGHT ON PLANS	(1) 150W A12 TS	CANLET NO. G-I-W-F-150-D-GHC-120V	2
WB5	WALL MOUNTED, WALL WASH CAST ALUMINUM HOUSING ALUMINUM COLOR	WALL +10" AFF	(1) 70W G12-T6-MH CLEAR	BEGA NO. 2028MH-277V-534-ALUMINUM COLOR	2
WB6	WALL MOUNTED, ARCHITECTURAL, HIGH ABUSE, COMPACT FLUORESCENT	WALL HEIGHT ON PLANS	(1) 42W PLT 3500K	KENALL NO. MR13CL-PP-CC (ALUMINUM) -42F-1-DV	2
WB7	WALL MOUNTED, ARCHITECTURAL, HIGH ABUSE,	WALL +7'-1" AFF	(1) 50W M.H. CLEAR	KENALL NO. MR17CL-PP-CC (ALUMINUM) -50M-1-DV	2
WB8	WALL MOUNTED, ARCHITECTURAL, HIGH ABUSE, EMERGENCY SOCKET	WALL +7'-1" AFF	(1) 50W M.H. CLEAR	KENALL NO. MR17CL-PP-CC (ALUMINUM) -50M-1-DV-QS	2,4
WF2	WALL BRACKET, 4' FLUORESCENT ACRYLIC LENS	WALL AT CEILING	(2) 32W T8 3500K	LITHONIA NO. WP-2-32-DO-277-GEB10	2
WF3	WALL BRACKET FLUORESCENT POLYCARBONATE LENS	WALL +10' AFF	(1) 42W T8T 3500K	LITHONIA NO. VR2C-42T8T-MVOLT-LPI	2

LIGHTING FIXTURE SCHEDULE NOTES:

- 1 PROVIDE WITH DUAL BALLASTS FOR DUAL LEVEL SWITCHING.
- 2 OR PRE-BID APPROVED EQUAL
- 3 WITH DIRECTIONAL CHEVERONS AS INDICATED ON PLANS
- 4 PROVIDE FIXTURE WITH 12V, 35W QUARTZ LAMP WITH BAYONET BASE FOR EMERGENCY CIRCUIT.
- 5 PROVIDE ALL NESSCARY COMPONENTS FOR A COMPLETE INSTALLATION.
- 6 PROVIDE LENGTH AS INDICATED ON DRAWINGS

Track Lighting



44 ft. of track
11 heads
70 watt metal halide



Project



Project Envelope Lighting Mechanical

Location

State: Idaho
City: Caldwell

Project Type

New Construction Addition

Building Use

Whole Building Area Category (Space-By-Space)

Add Category

	Area Category	Area	W/ft
1	Corridor, Restroom, Support Area	11356	0.9
2	Kitchen	260	1.2
3	Convention, Conference or Meeting ...	1277	1.3
4	Exercise Center	15694	0.9
5	Medical and Clinical Care	1275	1.2

Total Area 80930

Project Details (optional)

This information will appear on the compliance certificate.

Edit Project Details...

Title/Site/Permit

Owner/Agent

Designer/Contractor

Notes

Previously saved project information:
YMCA Case Study

Area Categories/Spaces

Area Categories	Square Footage	Watts/Sq. Ft.
Corridor, Restroom, Support Area	11,356	0.9
Kitchen	260	1.2
Convention, Conference area	1,277	1.3
Exercise Center	15,694	0.9
Medical/Clinic	1,275	1.2
Lecture Rooms	5,914	1.4
Restaurant	656	0.9
Gym	37,327	1.4
Industrial <20ft. Ceiling Height	516	1.2
Storage	559	0.8
Lobby	2,488	1.3
Office	3,608	1.1
Total Whole Building/Exercise Center	80,930	1.0



Envelope



Project **Envelope** Lighting Mechanical

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

	Component	Orientation	Assembly	Concrete Density	Construction Details	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor
Building									
1	Roof 1		Non-Wood Joist/Rafter/Truss			43047 ft2	0.0	38.0	0.026
2	Skylight 1		Metal Frame:Double Pane with L...		Glazing: Ti...	208 ft2			0.330
3	Exterior Wall 1	West	Concrete Block:8", Partially Gro...	Medium...	Furring: N...	2197 ft2		3.5	0.157
4	Exterior Wall 2	West	Concrete Block:12", Partially Gr...	Medium...	Furring: N...	5233 ft2		3.5	0.141
5	Window 2	West	Metal Frame:Double Pane		Glazing: Cl...	238 ft2			0.400
6	Door 1	West	Glass		Glazing: Ti...	42 ft2			0.920
7	Exterior Wall 3	North	Concrete Block:8", Partially Gro...	Medium...	Furring: N...	3161 ft2		3.5	0.157
8	Window 3	North	Metal Frame:Double Pane with L...		Glazing: Ti...	57 ft2			0.400
9	Door 3	North	Glass		Glazing: Ti...	42 ft2			0.920
10	Exterior Wall 4	North	Concrete Block:12", Partially Gr...	Medium...	Furring: N...	3493 ft2		3.5	0.141
11	Door 4	North	Wood		Swinging	63 ft2			0.330
12	Exterior Wall 5	South	Concrete Block:8", Partially Gro...	Medium...	Furring: N...	4890 ft2		3.5	0.157
13	Window 5	South	Metal Frame:Double Pane with L...		Glazing: Ti...	798 ft2			0.400
14	Door 5	South	Glass		Glazing: Ti...	128 ft2			0.920
15	Exterior Wall 6	South	Concrete Block:12", Partially Gr...	Medium...	Furring: N...	1362 ft2		3.5	0.141
16	Exterior Wall 7	South	Metal Frame, 16" o.c.			1203 ft2	19.0	3.5	0.079
17	Window 7	South	Metal Frame:Double Pane with L...		Glazing: Ti...	629 ft2			0.400
18	Exterior Wall 8	East	Concrete Block:8", Partially Gro...	Medium...	Furring: N...	420 ft2		3.5	0.157
19	Window 8	East	Metal Frame:Double Pane with L...		Glazing: Ti...	309 ft2			0.400
20	Door 8	East	Glass		Glazing: Ti...	42 ft2			0.920
21	Interior Wall 1		Concrete Block:8", Partially Gro...	Medium...	Furring: N...	1318 ft2		0.0	0.318
22	Interior Wall 1 Glass Door		Other			63 ft2			0.920
23	Interior Wall 1 Window		Other			434 ft2			1.130
24	Interior Wall 1 Opaque Door		Other			105 ft2			0.330

Envelope PASSES: Design 6% better than Code

Envelope **+6%** Lighting **+29%**

Building Envelope – Conditioned Space

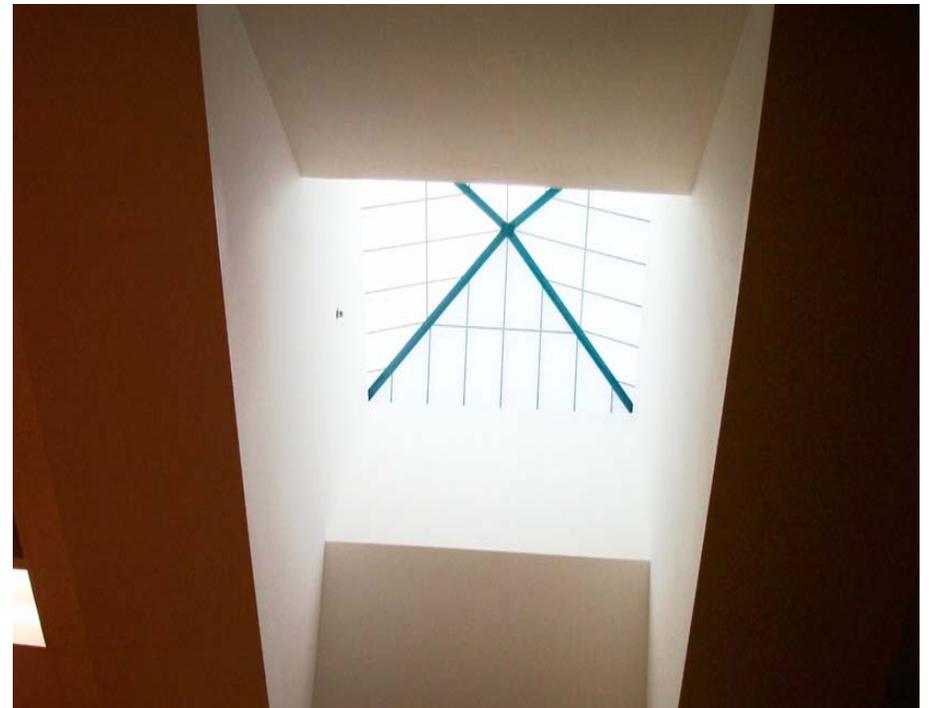


Skylights



Skylight: Climbing Wall Area

Skylight: Stair area



Building Take Off Summary

CONDITIONED SPACE			
ASSEMBLY TYPE	DESCRIPTION	R-VALUE/U-FACTOR	AREA (ft ²)
Roof 1	Steel truss with metal roof deck. Insulation placed on top of roof deck	R-38 Continuous	43047
Slab 1 (Between conditioned space and exterior)	Slab-on-grade w/ insulation up to bottom of slab	R-0 (Does not count since the insulation does not cover face of slab)	694 linear ft
Skylights	Metal Frame/Double pane reflective	U-0.33 / SHGC = 0.25	208
Slab 2 (Between conditioned space and unconditioned pool)	Slab-on-grade w/ insulation up to bottom of slab	R-0 (Does not count since the insulation does not cover face of slab)	194 linear ft
Floor 1 – over outside air and over unconditioned space	Steel decking with concrete	R-19	1216

Unconditioned Space - Interior Walls



Aquatic Area

Spinning Room



Building Take Off Summary Cont'd.

UNCONDITIONED SPACE			
Roof 1	Steel truss with metal roof deck. Insulation placed on top of roof deck	R-38 Continuous	23,724
Slab 3	Slab-on-grade w/ no insulation		462 linear ft
Interior Wall 1	Concrete Block 8", Partially Grouted, Cells Insulated	R-0	1920
Interior Window 1	Metal frame Single pane	Default value	434
Interior Door 1	Glass – Single pane	Default value	63
Interior Door 2	Opaque	0.33	105
Interior Wall 2	Metal Frame	R-19	3360
Interior Window 2	Metal frame Single pane	Default value	640
Interior Door 2	Glass – Single pane	Default value	63

Walls, Windows, and Doors



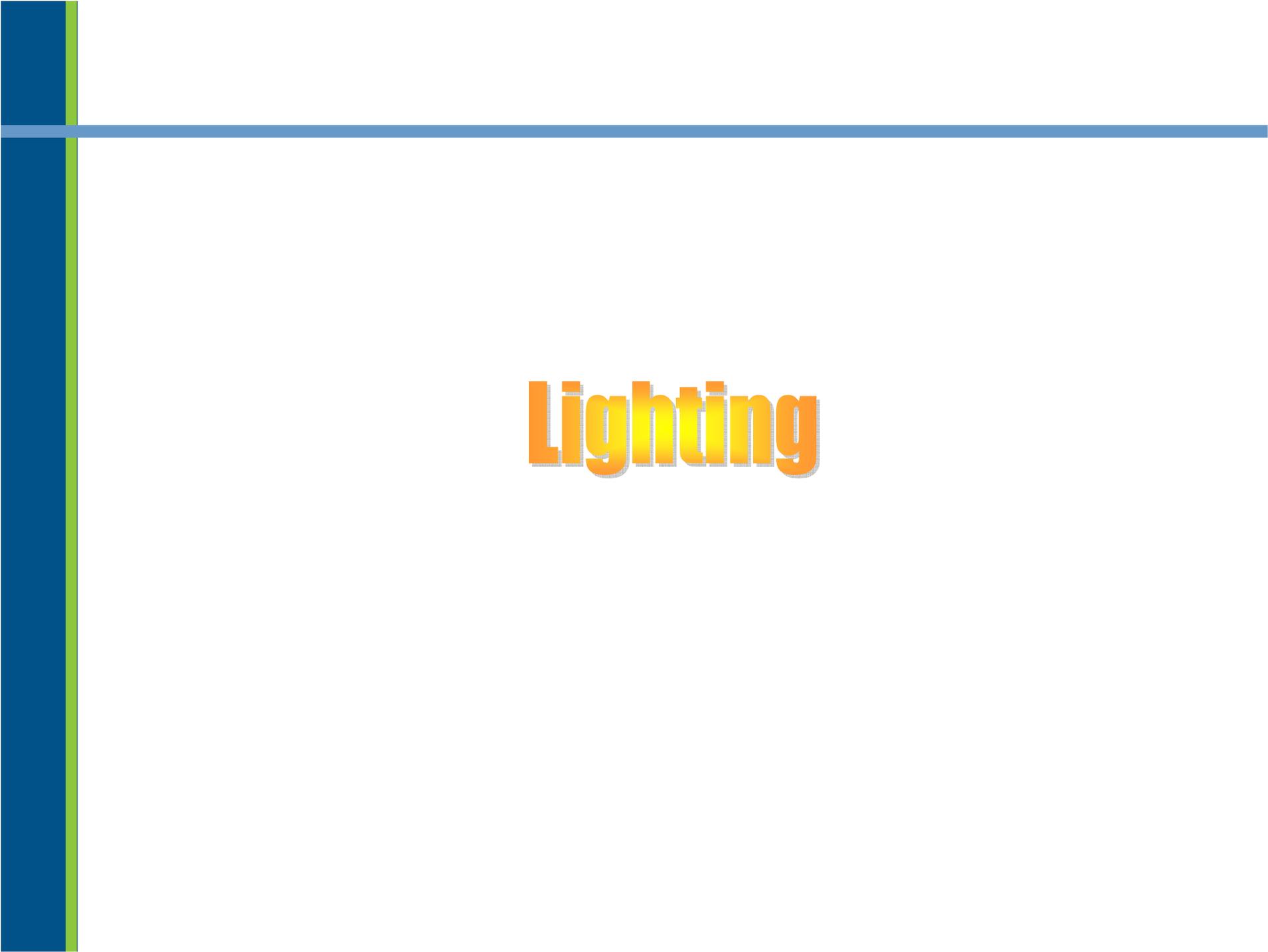
South Elevation

West Elevation
Translucent Fenestration



WALLS / WINDOWS / DOORS

Assembly	Orientation	Description	R-value/U-factor	Area
Wall 1	West	Concrete Block 8" – Partially Grouted, Cells Insulated,	R 3.5, 1" Insulated Sheathing	2197
Wall 2	West	Concrete Block 12" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	5233
Window 2	West	Translucent / Metal frame/double pane	Proposed = 0.40 / SHGC = 0.25	238
Door 2	West	Glass – Double Pane/Low E	Use Default	42
Wall 3	North	Concrete Block 8" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	3161
Window 3	North	Metal Frame/Double Pane/Low E	Proposed = 0.40 / SHGC = 0.25	57
Door 3	North	Glass – Assume double pane Low E	Use Default	42
Wall 4	North	Concrete Block 12" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	3493
Door 4	North	Opaque	U-0.33	63
Wall 5	South	Concrete Block 8" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	4890
Window 5	South	Metal Frame/Double Pane/Low E	Proposed = 0.40 / SHGC = 0.25	798
Door 5	South	Glass– Assume double pane Low E	Use Default	128
Wall 6	South	Concrete Block 12" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	1362
Wall 7	South	Metal Stud	R-19 cavity, R 3.5 1" Sheathing	1203
Window 7	South	Metal Frame/Double Pane/Low E	Proposed = 0.40 / SHGC = 0.25	629
Wall 8	East	Concrete Block 8" – Partially Grouted, Cells Insulated	R 3.5, 1" Insulated Sheathing	420
Window 8	East	Metal Frame/Double Pane/Low E	Proposed = 0.40 / SHGC = 0.25	309
Door 8	East	Glass – Assume double pane Low E	Use Default	42



Lighting



Project Envelope **Lighting** Mechanical

Linear Fluorescent **Compact Fluorescent** HID Incandescent Add Space

	Component	Fixture ID	Fixture Description	Lamp Description/ Wattage Per Lamp	Ballast	Lamps Per Fixture	Number of Fixtures	Fixture Wattage
Building								
1	T8 / T12 Fluorescent 1	BF1	Bare Fluorescent (2) 3...	48" T8 32W	Electronic	2	24	65
2	T8 / T12 Fluorescent 2	BF2	Bare Fluorescent (2) 3...	48" T8 32W	Electronic	2	5	65
3	T8 / T12 Fluorescent 3	CL1	Light Tube, Colored Le...	Other	Electronic	1	10	300
4	T8 / T12 Fluorescent 4	FF1	Fluorescent (2) 32W T8	48" T8 32W	Electronic	2	4	62
5	T8 / T12 Fluorescent 4 copy	FF2	Fluorescent (2) 32W T8	48" T8 32W	Electronic	2	27	62
6	HID 1	FL1	Flood Light 150 T6 Met...	Metal Halide 150W	Electronic	1	2	150
7	T8 / T12 Fluorescent 6	GF1	Dual Ballast (3) 32 W T-8	48" T8 32W	Electronic	3	167	95
8	T8 / T12 Fluorescent 6 copy	GF2	Dual Ballast (3) 32 W T-8	48" T8 32W	Electronic	3	77	95
9	T8 / T12 Fluorescent 6 copy	GF3	2 X 4 (2) 32 W T-8	48" T8 32W	Electronic	2	53	62
10	T8 / T12 Fluorescent 6 copy	GF4	Dual Ballast (2) 32 W T-8	48" T8 32W	Electronic	2	50	62
11	Compact Fluorescent 1	HB1	CFL (8) 42 W	Other	Electronic	8	18	480
12	Compact Fluorescent 1 copy	HB1E	CFL (8) 42 W	Other	Electronic	8	16	480
13	HID 2	IL1	Mercury Vapor Stem M...	Other	Electronic	1	9	1080
14	HID 2	IL2	Mercury Vapor - Wall M...	Other	Electronic	1	10	1080
15	HID 4	LT1	Metal Halide Track 44 F...	Other	Electronic	1	1	1320
16	Compact Fluorescent 3	PF1	Pendant Compact Fluo...	Other	Electronic	1	8	455
17	Compact Fluorescent 4	RR1	Recessed/ Triple 4-Pin ...	Triple 4-pin 32W	Electronic	1	38	35
18	Compact Fluorescent 4 copy	RR2	Recessed/ Triple 4-Pin ...	Triple 4-pin 32W	Electronic	1	11	35
19	Compact Fluorescent 4 copy	RR3	Recessed/ Triple 4-Pin ...	Triple 4-pin 32W	Electronic	1	29	35
20	Compact Fluorescent 4 copy	RR4	Recessed/ Triple 4-Pin ...	Triple 4-pin 32W	Electronic	1	28	35
21	T8 / T12 Fluorescent 10	SF1	(2) 32W T-8	48" T8 32W	Electronic	2	5	62
22	T8 / T12 Fluorescent 10 copy	SF2	(2) 32W T-8	48" T8 32W	Electronic	2	9	62
23	T8 / T12 Fluorescent 10 copy	SF4	(2) 32W T-8	48" T8 32W	Electronic	2	19	62
24	T8 / T12 Fluorescent 13	VF1	36" (2) 17 W T-8	Other	Electronic	2	16	33

Allowed Wattage 122434 Proposed Wattage 87523

Lighting PASSES: Design 29% better than Code

Envelope +6% Lighting +29%

Use the Options Menu to Arrange Lighting Fixtures by Spaces.

Track Lighting



Exercise Center



Running Track



Corridor/Hallway



High Bay Lighting



Exterior Lighting



Lighting Schedule

Fixture Designation	Fixture Description	Number of Bulbs	Ballast Type	Fixture Wattage	Number of Fixtures	Total Wattage
BF1	Bare fluorescent chain hung – (2) 32W T-8	2	Electronic	62	24	1,448
BF2	Bare fluorescent chain hung – (2) 32W T-8	2	Electronic	62	5	310
CL1	Light Tube, Colored Lens, Other	1	Electronic	300	10	3,000
FF1	Flanged Fluorescent w/ acrylic lens (2) 32W T-8	2	Electronic	62	4	248
FF2	Flanged Fluorescent w/ acrylic lens	2	Electronic	62	27	1,647
FL1	Flood Light 150 T6 Metal Halide	1	Electronic	150	2	300
GF1	Grid Fluorescent 2 X 4, Dual Ballast (3) 32 W T-8	3	Electronic	95	167	15,865
GF2	Grid Fluorescent 2 X 4, Dual Ballast (3) 32 W T-8	3	Electronic	95	77	7,315
GF3	Grid Fluorescent 2 X 4, (2) 32 W T-8	2	Electronic	62	53	3,286
GF4	Grid Fluorescent 2 X 4, Dual Ballast (2) 32 W T-8	2	Electronic	62	50	3,100
HB1	High Bay – Compact Fluorescent (8) 42 W CFL	8	Electronic	480	18	8,640
HB1E	High Bay – Compact Fluorescent (8) 42 W CFL	8	Electronic	480	16	7,680
IL1	Indirect light, Stem Mounted 1000 W Mercury Vapor	1	Electronic	1,080	9	9,720

Lighting Schedule Cont'd

IL2	Indirect light, Wall Mounted 1000 W Mercury Vapor	1	Electronic	1,080	10	10,800
LT1	Track Lighting 44 Feet – 11 Metal Halide 70 Watt fixtures	44 linear feet	Electronic	44 feet @ 30w/ft = 1,320	1	1,320
PF1	Pendant Compact Fluorescent, Other	1	Electronic	455	8	3,640
RR1	Round Recessed/ Triple 4-Pin 32 W	1	Electronic	35	38	1,330
RR2	Round Recessed/ Triple 4-Pin 32 W	1	Electronic	35	11	385
RR3	Round Recessed/ Triple 4-Pin 32 W	1	Electronic	35	29	1,015
RR4	Round Recessed/ Triple 4-Pin 32 W	1	Electronic	35	28	980
SF1	Low Profile Wrap Around (2) 32W T-8	2	Electronic	62	5	310
SF2	Surface Fluorescent, chain hung (2) 32W T-8	2	Electronic	62	9	558
SF4	Surface Fluorescent, chain hung, dual ballast (2) 32W T-8	2	Electronic	62	19	1,178
VF1	Vanity Fluorescent 36" (2) 17 W T-8	2	Electronic	33	16	528
WB6	Wall Mounted 42 W CFL	1	Electronic	45	6	270
WF2	Wall Mounted 4' Fluorescent (2) 32 W	2	Electronic	62	38	2,356
WF3	Wall mounted downlight/Triple 4-pin 42 W	1	Electronic	35	4	140



Mechanical



Project Envelope Lighting **Mechanical**

HVAC System Plant Water Heating

	Component	Quantity	Equipment Capacity	Fuel Type/ Heat Source	Condenser Type	System Details
Building						
1	RTU 1,2,7,8,10,16,17,19,20	9				
2	Central Furnace		<65 kBtu/h	Gas		
3	Rooftop Package Unit		<65 kBtu/h		Air-Cooled	
4	RTU 3,9	2				
5	Central Furnace		<65 kBtu/h	Gas		
6	Rooftop Package Unit		<65 kBtu/h		Air-Cooled	
7	RTU 4,5,6	3				
8	Central Furnace		>=65 - <225 ...	Gas		
9	Rooftop Package Unit		>=90 - <135 ...		Air-Cooled	Air Economizer
10	RTU 11,12,14	3				
11	Central Furnace		<65 kBtu/h	Gas		
12	Rooftop Package Unit		<65 kBtu/h		Air-Cooled	
13	RTU 13	1				
14	Central Furnace		<65 kBtu/h	Gas		
15	Rooftop Package Unit		<65 kBtu/h		Air-Cooled	
16	RTU 15	1				
17	Central Furnace		>=65 - <225 ...	Gas		
18	Rooftop Package Unit		>=90 - <135 ...		Air-Cooled	Air Economizer
19	RTU 18	1				
20	Central Furnace		>=225 kBtu/h	Gas		
21	Rooftop Package Unit		>=135 - <24...		Air-Cooled	Air Economizer
22	AHU 1,3	2				
23	Central Furnace		>=225 kBtu/h	Gas		
24	Rooftop Package Unit		>=240 - <76...		Air-Cooled	Air Economizer
25	AHU 2	1				
26	Central Furnace		>=225 kBtu/h	Gas		

Envelope PASSES: Design 6% better than Code

Use the View Menu to display Requirements.

Mechanical - Exhaust Fans



Mechanical



Balancing Damper and Diffuser

Roof Top Unit Control



Mechanical



Air Handler Aerobics

Balancing Dampers and Sealant



System Designation	Make/Model Number	Cooling Capacity (Output Tons)	Heating Capacity MBH	CFM	Number	Economizer
RTU 1,2,7,8,10,16,17,19,20	Carrier 48TME-006	5.0	115	2,000	9	YES
RTU 3,9,	Carrier 48TME-005	4.0	115	1,600	2	YES
RTU 4, 5, 6,	Carrier 48TME-008	7.5	180	3,000	3	YES
RTU 11,12, 14,	Carrier 48GS-024	2.0	60	800	3	NO
RTU 13	Carrier 48TM-036	3.0	60	1,200	1	NO
RTU 15	Carrier 48TME-009	8.5	180	3,400		YES
RTU 18	Carrier 48TME-014	12.5	250	5,000		YES
AIR HANDLER UNITS						
AHU 1, 3	McQuay 49S-040	40	800	Supply 16,000 Return 16,000	2	YES
AHU 2	McQuay 49S-030	30	500	Supply 12,000 Return 12,000	1	YES
GAS-FIRED UNIT HEATER						
UH-1	Reznor UDAS-250	n/a	250		1	
DUCTLESS SPLIT SYSTEM AIR CONDITIONING UNIT						
FC1 / CU1	Carrier 40QKB-024	1 1/2		415	1	NO
ELECTRIC WALL HEATER SCHEDULE						
EWH 1 - 8	Q-MARK AWH-4207	N/A	2 KW (6.8 MBH)		8	NO
ELECTRIC BASEBOARD SCHEDULE						
EBB 1,3	Q-MARK QMCK- 2576W	N/A	1.5 KW (5.1 MBH)		2	NO
EBB 2	Q-MARK QMCK- 2570W	N/A	2.5 KW (8.5 MBH)		1	NO
EBB 4,5	Q-MARK QMCK- 2575W	N/A	1.25 KW (4.3 MBH)		2	NO

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Basements: Advantages and Disadvantages of Finishing Basements During Initial Construction of the Home

The 2000 and 2003 Editions of the International Energy Conservation Code (IECC) require basement walls to be insulated if the basement is considered part of the heated and/or cooled living space (conditioned space). If the basement is initially designed to be unfinished, insulation is required in the basement ceiling. The 2003 IECC requires floors over unheated spaces or basement walls that define the conditioned space (Section 502.2.3.3 or 502.2.3.6) to meet the applicable overall thermal transmittance factor (U-factor) or the minimum R-value based on the prescriptive specifications on an individual component basis. In basic terms this means, if the basement is unconditioned, the floor above the basement (basement ceiling) must be insulated and meet all the requirements of the IECC for floors over an unconditioned space. If the basement is considered part of the conditioned building envelope, the basement walls must be insulated and meet all the requirements of the IECC for basement walls. The requirements in the code vary depending on location and climate conditions. Requirements in the IECC include some of the following: Insulation Installation (Section 102.4), Moisture Control (Section 502.1.1), and Caulking and Sealants (Section 502.1.4.2).

Many homes are being constructed with unfinished basements to reduce initial costs. In most cases, the homeowner eventually finishes the basement for additional living space by installing basement wall insulation. Because most basements are eventually occupied, the advantages and disadvantages of conditioning the basement should be thoroughly reviewed prior to permitting and construction.

Table 1 provides a list of advantages and disadvantages of basement wall insulation compared to basement ceiling insulation.

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