UNIVERSITY OF MARYLAND

FACILITIES MANAGEMENT
Department of Planning & Construction

Commercial Energy Code
Building Envelope, Mechanical, Service Water Heating and Lighting

PART I – GUIDELINES FOR PLAN SUBMITTAL: APPLICABILITY OF THE COMMERCIAL 2018 IECC:

The 2018 IECC Commercial Section is applicable to any *new commercial building with conditioned space and to any residential building four stories and above grade*.

Where a building has mixed use of residential and commercial, the appropriate section of the IECC shall apply with appropriate submittal documents; Residential and Commercial submittals are required as appropriate for the portion of the mixed-use building.

For additions to, remodel/alterations to, repairs of, and change of occupancy or change in use of an existing commercial building, Chapter 5 CE (*Existing Buildings*) of the 2018 IECC applies and lists specific requirements and exemptions. Generally a ComCheck/ResCheck (or similar) is not required unless a building is being "gutted" – brought down to the structural framing and being totally renovated. ***Note:*** *Energy models (if required) must include both input data and results (output).*

This document shall be submitted for each design submission beginning with 50% construction documents and shall be updated for each subsequent submission. A final signed copy shall be submitted with the 100% construction document submission.

PART II – INFORMATION ON CONSTRUCTION DOCUMENTS:

Construction documents shall be drawn to scale. ***The IECC Design Checklists shall be submitted indicating sheet or page numbers associated with the code provisions of your chosen path of compliance. Follow this guideline for completion of the Checklists.*** Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as governed by the IECC. Details shall include, but are not limited to, the following as applicable:

1. Insulation materials and their R-values.
2. Fenestration U-factors and solar heat gain coefficients (SHGCs).
3. Area-weighted U-factor and solar heat gain coefficient (SHGC) calculations.
4. Mechanical system design criteria. Include HVAC load calculations, both input and output.
5. Mechanical and service water heating system and equipment types, sizes and efficiencies. [Specify in the equipment schedules. Where possible, use actual equipment to be installed – not 'basis of design'.]
6. Economizer description.
7. Equipment and system controls.
8. Fan motor horsepower (hp) and controls. Provide a motor schedule for all motors not integral to a packaged system
9. Duct sealing, duct and pipe insulation and location.
10. Lighting fixture schedule with wattage and control narrative. Supply lighting load calculations.
11. Location of daylight zones on floor plans.

Building thermal envelope depiction. The building's thermal envelope shall be represented on the construction drawings.

PART III – ENERGY FORMS/REPORTS TO SUBMIT:

The Energy Code Compliance Package shall include:

REQUIRED – The energy compliance documentation provided to UMD at the time of plan submittal shall identify the Path of Energy Compliance being used. See page 5 of the Design Checklist.

1. 2018 IECC or ASHRAE 90.1-2016?
2. If 2018 IECC is chosen, which sub-compliance method will be used?
   - Prescriptive Path (C402 through C406), or Total Building Performance Path (C407)?
   - Will the Air Barrier Details be provided, or will there be a building pressure test?
3. If 2016 ASHRAE 90.1 is chosen, which sub-method will be used?
   - Prescriptive Path (See 4.2.1), Energy Cost Budget Method (Section 11), or ASHRAE Appendix G Performance Rating Method?
   - For the IECC Prescriptive Path, indicate which *Additional Efficiency Package* is chosen and provided in design documents.

REQUIRED - Provide an **energy performance analysis for the building design** as applicable, based on the chosen compliance strategy. HVAC load calculations shall be provided separately.

The design itself must utilize the specific energy values indicated by the energy analysis. Mandatory sections of the 2018 IECC or ASHRAE 90.1-2016 must be complied with even if the energy analysis software printout passes without the design in compliance with a mandatory section. The software used must be a DOE approved software from one of the following options:

1. **ComCheck** published by the US Department of Energy (DOE) based on the 2016 ASHRAE Standard 90.1 for the prescriptive path; *user completed inspection checklists shall be provided with the printout.*
2. **ComCheck** based on the 2018 IECC for the prescriptive path; *user completed inspection checklists shall be provided with the printout.*
3. **Other DOE approved/sponsored software based on the 2018 IECC, or ASHRAE Standard 90.1- 2016;** Based on Whole Building Energy Performance Simulation: DOE-2, EnergyPlus, SPARK, Building Design Advisor, Trace, etc. Provide full input values not just the results.

REQUIRED – *All energy compliance documentation must be signed, sealed, stamped and dated by the appropriate design professional.*

PART IV – RESPONSIBILITES FOR ENERGY REVIEW/INSPECTION AND SPECIFIC SUBMITTAL REQUIREMENTS:

The project's *Registered Design Professional in Responsible Charge* will perform a plan submittal QC for the building design relating to energy compliance utilizing the Design Checklists. Some individual energy related provisions ask for a number (percent/value) or a narrative be provided with the plans or specifications. Narratives must be submitted as a document in the submittal package referencing the appropriate drawing.

PART V – LIST OF MANDATORY REQUIREMENTS OF THE 2018 IECC OR ASHRAE 90.1-2016:

If ASHRAE 90.1-2016 is chosen, there is a **Prescriptive Path (Sections 5 through 10) and, Energy Cost Budget Method (Section 11**). Designers must choose one or the other;

Mandatory provisions of the **Energy Cost Budget Method (Section 11)** are:

A. **Section 5.4 Thermal Envelope Mandatory Provisions:** Insulation, Fenestration, and Air Leakage
B. **Section 6.4 HVAC Mandatory Provisions:** Minimum Efficiencies, Equipment Sizing, HVAC Controls, HVAC construction and Insulation, Walk-in Coolers and Freezers
C. **Section 7.4 Service Water Heating Equipment:** Load Calculations, Equipment Efficiencies, Insulation, and Controls
D. **Section 8.4 Electrical Mandatory Provisions:** Maximum voltage drop, Receptacle Control, Energy Monitoring; Low Voltage Dry Type Distribution Transformers
E. **Section 9.4 Lighting Mandatory Provisions:** Lighting Controls (Interior and Exterior), Functional Testing
F. **Section 10.4 Other Mandatory Provisions:** Electric Motors, Service Water Pressure Booster Systems, Elevators, Escalators and Moving Walkways, Whole Building Energy Monitoring
G. **Energy Cost Budget** less than or equal to the Design Energy Cost (Software for Energy Cost Budget – DOE-2, BLAST, other software that complies with Section 11.4.1.1)

Mandatory Provisions of the ASHRAE 90.1-2016 Prescriptive Path are:

A. **Section 5 Building Envelope;** Sections 5.1, 5.2, 5.4, 5.7, 5.8, 5.9 and either Section 5.5 OR Section 5.6
B. **Section 6 HVAC;** Sections 6.1, 6.2, 6.7, and either Section 6.3 OR Section 6.4 and 6.5
C. **Section 7 Service Water Heating;** All of Section 7
D. **Section 8 Electrical Power;** All of Section 8
E. **Section 9 Lighting;** Sections 9.1, 9.2, 9.4, 9.7, and either Section 9.5 OR Section 9.6.

If the 2018 IECC path is Chosen, there is a **Prescriptive Path (Sections C402 through C406) and a Total Building Performance Path (Section C407**). Designers must choose one or the other.

Mandatory provisions of the Total Building Performance Path (Section C407) are:

A. Section C402.5 Air Leakage
B. Section 403 (various sections) HVAC; Minimum Efficiencies, Equipment Sizing, HVAC Controls, Energy Recovery Ventilators, HVAC construction and Insulation, Fan Horsepower and Efficiencies, Walk-in Coolers and Freezers
C. Section C404 Service Water Heating
D. Section C405 Electrical Power and Lighting
E. Section C407 Total Building Performance; Building Energy Costs shall be equal to or less than 85% of the standard reference building design
F. Section C408 System Commissioning

Mandatory Provisions of the 2018 IECC Prescriptive Path are:

A. All of Sections C402 through C405; Building Envelope, HVAC, Service Water Heating, Power and Lighting
B. Commercial Buildings must comply with C406 Additional Efficiency Package (Chose one of 6 options)
C. Tenant Spaces must comply with C406.1.1 (either one of the following)
D. Where the shell building is not in compliance, tenant spaces must comply with one of the following additional energy efficiency packages:
    a. C406.2; or C406.3; or C406.4; or C406.6; or C406.7 or
    b. Where the shell building is in compliance, comply with C406.5 On-Site Renewable Energy

PART VI - COMMISSIONING REQUIREMENTS:

A commissioning plan (where required) shall be developed by a registered design professional and shall include the following: mechanical, service water heating systems (SWH), and electrical systems. This includes requirements for air balancing, list of mechanical electrical and plumbing systems to be included in commissioning and functional testing of controls (mechanical, electrical and plumbing) to be included.

1. A narrative of the activities that will be accomplished during each phase of *commissioning,* including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested including, but not limited to, calibrations and economizer controls.
4. Conditions under which the test will be performed. Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

If applicable, the authorized Commissioning Agent (CxA) shall submit the **Preliminary Report of Commissioning** to the building owner or authorized agent.

A. The preliminary report should include an itemization of deficiencies found that have not been corrected by the time of the report, list of deferred tests not accomplished because of climatic conditions, and conditions necessary for scheduling of deferred tests. The report should address the following in particular:

   a. Mechanical, and service hot water commissioning – Air system balancing, hydronic systems balancing per C408.2.2.

   b. Functional Performance Testing of Equipment and Controls per C408.2.3.

   c. Lighting System Controls Functional Testing per C408.3.

B. **ASHRAE** - **Duct Leakage Test Results -** If applicable to the project. For ducts designed to operate in excess of 3 in water gauge and all ductwork outside conditioned space per Section C403.11.2.3.

C. **Pressure Testing of the Envelope Test Results** (under Section C402.5; if applicable).

The Preliminary Report of Commissioning shall be submitted by the Architect, Engineer or the authorized commissioning agent (where required). The items listed must address all the items in the Commissioning Plan submitted (C408.2.1). The preliminary commissioning report must be provided to the building owner or owner's agent.

The Final Report of Commissioning is to be provided to the owner. **All documentation required by C408.2.5 shall be provided to the building owner or owner's agent within 90 days of occupancy (with the exception of deferred tests that cannot be performed at the time of the report due to climactic conditions).*

COMMERCIAL DESIGN CHECKLIST – IECC/2018

DESIGN PROFESSIONAL CERTIFICATION OF ENERGY REVIEW

Project Address:_____ Project Name: _____

The above referenced project is being designed under the commercial provisions of (*Path of Compliance*):

2018 - IECC

☐ *Prescriptive* ☐ *Performance*

ASHRAE 90.1 –2016

☐ *Prescriptive* ☐ *Performance (Energy Cost Budget)*

The following checklist is separated into *envelope, mechanical, lighting, additions and alterations*. Complete the appropriate checklists in their entirety, Indicate chosen compliance path and complete the Registered Design Professional in Responsible Charge section; sign and date.

We have reviewed the design of this project for the following related provisions. It is our opinion that the items checked below, as designed, meet the substantial intent of the 2018 IECC or ASHRAE 90.1 -2016. Code provisions not contained within the checklist will be provided to UMD for their review with the final construction document submission.

Individual/Company Name: _____

Address: _____

Email: _____ Phone: _____ Mobile: _____

Signature: _____ Print: _____ Date: _____

The *Commercial Design Checklist* must accompany all Commercial Building Plan Submittals which are subject to the requirements of the International Energy Conservation Code (IECC) inclusive of all other documentation, forms, calculations, specifications and certifications.

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

ENVELOPE REQUIREMENTS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/a
Certification	Responsible design professional certification on plans	C103.1				
Construction documents	Include: ▪ Insulation R-values ▪ Fenestration U-factors and solar heat gain coefficients (SHGCs)	C103.2 5.7				
Roof – insulation above deck	R-30ci	C402.2.1 5.5.3.1				
Roof – metal building	R-19 + R-11 (with thermal block and liner system)	C402.2.1 5.5.3.1				
Roof – attic or other	R-38 (IECC); R-49 (ASHRAE)	C402.2.1 5.5.3.1				
Wall – mass	R-9.5ci R-11.4ci (Group R)	C402.2.2 5.5.3.2				
Wall – metal building	R-13 + R-13ci (IECC); R-0 + R15.8ci (ASHRAE)	C402.2.2 5.5.3.2				
Wall – metal frame	R-13 + R-7.5ci	C402.1.3 5.5.3.2				
Wall – wood frame and other	R-13 + R3.8 or R-20	C402.2.2 5.5.3.2				

Wall - Below grade	R-7.5 ci	C402.2.5 5.5.3.3				
Floor insulation	Mass R-10ci Joist/Framing R-30	C402.2.3 5.5.3.4				
Slab-on grade floor insulation	Unheated slabs R-10 for 24" below; R-15 (ASHRAE) Heated slabs R-15 for 24" below + R-5 full slab; R-20 (ASHRAE)	C402.2.4 5.5.3.5				
Opaque Doors	Swinging U-0.370 Assembly Max (ASHRAE) Nonswinging R-4.75 (IECC); U-0.310 (ASHRAE)	5.5.3.6				
Windows – maximum area	**≤ 30%** of gross wall area (≤ 40% when meeting daylighting requirements)	402.4.1 5.5.4.2				
Windows – solar heat gain coefficient (SHGC) (S-E-W)	≤ **0.36** if projection factor < 0.2. ≤ **0.43** if projection factor 0.2-0.5. ≤ **0.58** if projection factor ≥ 0.5.	C402.4.3 5.5.4.4				
Windows – U-factor	≤ **0.48** if projection factor < 0.2. ≤ **0.53** if projection factor 0.2-0.5. ≤ **0.58** if projection factor ≥ 0.5.	C402.4.3 5.5.4.4				
Skylights – minimum area	≤ **0.38** fixed fenestration ≤ **0.45** operable fenestration (0.46 ASHRAE) ≤ **0.77** entrance doors (0.68 ASHRAE)	C402.4.3 5.5.4.3				
Skylights – solar heat gain coefficient (SHGC)	Skylights and daylight responsive controls required for certain spaces **≥**2,500 ft^2 with ceiling height ≥15 ft.	C402.4.2 5.5.4.2				
Skylights – U-factor	**≤ 3%** of gross roof area (≤ 5% when meeting daylighting requirements)	C402.4.1.2 5.5.4.2				
Air leakage	**≤** 0.40 (≤ 0.60 with daylighting control)	C402.4.3 5.5.4.4				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

MECHANICAL SYSTEM REQUIREMENTS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/a
Certification	Responsible design professional certification on plans	C103.1				
Information on construction documents	Include: ▪ System design criteria ▪ Equipment type, capacity and efficiency ▪ System controls ▪ Fan motor hp and controls ▪ Duct sealing ▪ Duct and pipe insulation and location	C103.2 6.7				
HVAC Load Calculations	▪ ASHRAE/ACCA Standard 183 or other approved computation procedure ▪ Loads reduced from energy recovery systems utilized in HVAC system accounted for	C403.1.1 6.4.2				
HVAC System Design	▪ Zone isolation ▪ Ventilation	C403.2				
HVAC equipment	Per efficiency tables	C403.3.2 6.4.2.1, 6.8				

efficiencies						
Mechanical system commissioning	For buildings with ≥480kBtu/hr cooling capacity and 600kBtu/h combined svc water-heating and space heating capacity. ▪ Include construction document notes indicating Cx requirements ▪ Provide evidence of Cx prior to final inspection.	C408.2 6.7.2.3 6.7.2.4				
HVAC system controls Thermostatic Controls	▪ Heat Pump Supplementary heat ▪ Deadband ▪ Setpoint overlap restriction ▪ Heated or cooled vestibules ▪ Hot water boiler outdoor temp setback control ▪ Shutoff dampers ▪ Zone isolation	C403.4 6.4.3 6.5.2				
HVAC system controls Off-hour controls	▪ Thermostatic setback ▪ Automatic setback and shutdown ▪ Automatic start	C403.4.2				
HVAC system controls Hydronic systems controls	▪ Limit reheat/recool of fluids ▪ Multiple boiler heating plants – auto controls to sequence boiler operation ▪ Single boilers > 500kBtu/h - include multi-staged or modulating burner ▪ 3-pipe system not allowed ▪ 2-pipe changeover system – dead band between changeover >= 15degrees F outside temp ▪ Hydronic heat pump systems – temperature dead band, heat rejection ▪	C403.4.3 6.5.2.2 6.5.4				
HVAC system controls Part-load controls	▪ Hydronic systems >=300,000 Btu/h (146.5kW)	C403.4.4				
Ventilation + Exhaust	▪ Outdoor air ventilation per IMC ▪ Demand controlled ventilation ▪ Parking garage ventilation control ▪ Energy recovery ▪ Kitchen exhaust systems	C403.7 C403.2.6 6.4.3.4 6.4.4.1.2 6.5.1.1				

Duct and plenum insulation and sealing	≥ R-6 in unconditioned space ≥ R-8 outdoors	C403.11.1 6.4.4.1.2				
Piping insulation	Minimum thickness per table C403.11.3	C403.11.3 6.4.4.1.3				
HVAC fans (IECC – Mandatory ASHRAE - Prescriptive)	When fan motors' total hp ≥ 5hp ▪ Allowable fan horsepower ▪ Motor nameplate horsepower ▪ Fan efficiency	C403.8 6.5.3.1				
Refrigeration systems	▪ Refrigeration equipment performance ▪ Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and freezers ▪ Refrigerated display cases ▪ Condenser requirements ▪ Compressor requirements	C403.10 6.4.5 6.4.6 6.5.11.1				
Heat rejection equipment	▪ Fan speed control ▪ Multiple-cell cooling tower fan control ▪ Limitation on centrifugal fan open-circuit cooling towers ▪ Tower flow turndown ▪ Heat recovery for service water heating	C403.9 6.5.5				
Multiple-zone systems	▪ Variable air flow ▪ ECM motors for 1/12 hp - 1 hp ▪ Supply air temperature reset control ▪ Ventilation optimization control	C403.6 6.5.3.3 6.5.3.5 6.5.3.6				
Heat recovery for service water heating	Condenser heat recovery for systems operating 24 hr/day with water- cooled cooling capacity ≥6,000 kBtu/hr and service water heating load ≥1,000 kBtu/hr	C403.9.5 6.5.6.2				
Hot gas bypass	Not allowed except under specific conditions	C403.3.3 6.5.9				
Humidification and Dehumidification	▪ Humidity control ▪ Prevention of simultaneous humidification and dehumidification	6.4.3.6				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

SERVICE WATER HEATING REQUIREMENTS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/A
Heat traps	For non-circulating systems provide equipment with integral heat traps or provide heat traps on supply and discharge piping.	C404.3 7.4.6				
Pipe insulation	Insulation thickness per Table C403.2.10: ▪ 1" for pipes <1½" diameter ▪ 1½" for pipes ≥1½" diameter Circulating systems: all supply pipe. Non-circulating storage systems: first 8 ft from tank (or from tank to heat trap) on inlet and outlet.	C404.4 7.4.3				
Maximum supply pipe length/volume	Table C404.5.1 lists maximum hot water supply pipe length or volume, which varies with pipe diameter.	C404.5				
Circulation system controls	Automatic controls to start pump based on demand and to automatically shut off pump based on temperature and on lack of demand	C404.6.1 7.4.4.4				
Pool and spas	Readily accessible on/off switch No continuous pilot light Time switch for heater and pumps Pool covers required, except with >70% site-recovered heat	C404.9 7.4.5				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

LIGHTING AND ELECTRICAL SYSTEM REQUIREMENTS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/A
Information on construction documents	Include ▪ Lighting fixture schedule with input power ▪ Lighting control narrative ▪ Location of daylight zones on floor plans	C103.2 9.7				
Lighting system functional testing	Prior to final inspection the registered design professional provides evidence of testing. ▪ Occupant sensor controls ▪ Time-switch controls ▪ Daylight responsive controls Construction documents specify that certification documents be provided to the owner within 90 days of occupancy.	C408.3 9.7.2 9.4.3				
Controls - occupant sensor	Required in many specific spaces. Manual-on type required in most cases.	C405.2.1 9.4.1				
Controls - time-switch	Required where occupant sensors are not used. Specific spaces allowed to use light-reduction controls as an alternative.	C405.2.2 9.4.1				
Controls - daylight-responsive	Required in spaces with ≥150W of lighting within daylight zones.	C405.2.3 9.4.1				

	Some exceptions, such as patient care areas and dwelling units. Definitions provided for sidelight and toplight daylight zones.					
Controls – display & accent lighting	Display lighting, accent lighting and display-case lighting controlled separately from general lighting.	C405.2.4 9.4.1.3				
Controls – guest rooms	Hotel, motel, and timeshare sleeping units and guest suites have master control to automatically switch off luminaires and switched receptacles within 20 minutes after all occupants leave the room	C405.2.4 9.4.1.3				
Total connected interior lighting power	Includes input power for all proposed luminaires. Some exceptions apply. Special cases: ▪ Screw-in luminaires. Rated luminaire power (not the lamp power) ▪ Low-voltage lighting. Power rating of the transformer (not the lamp power) ▪ Line-voltage track lighting. Input power for the proposed luminaire power (but not less than 30 W/linear foot) or the power of the circuit breaker or other current-limiting device.	C405.3 9.2.2 9.5 9.6				
Interior lighting power allowance	Total connected power shall be no greater than allowance. Two calculation methods for allowance: ▪ Building area method ▪ Space-by-space method (includes extra allowance for retail and decorative lighting)	C405.3.2 9.2.2.3				
Parking Garage Lighting Control	• Automatic lighting shut-off per 9.4.1.1 • Lighting power of each luminaire reduced by minimum of 30% when no activity detected • Lighting for entrances and exits controlled separately; reduce by at least	9.4.1.2				

	50% sunset to sunrise • Daylight control where required					
Exterior lighting controls	Photo cell and time-based control required. ▪ For façade and landscape lighting, automatic on/off off- hour required. ▪ Otherwise, automatic reduction ≥30% required during off-hours. ▪ Some exceptions apply.	C405.2.6 9.4.1.4				
Exterior building lighting power	Maximum allowed power listed in Table C405.5.2(2) includes: ▪ Base allowance ▪ Tradeable allowance ▪ Non-tradeable allowance Allowances vary by lighting zone per Table C405.5.2(1)	C405.4 9.4.2				
Electrical transformers	Electric transformers meet efficiency requirements of Table C405.7. Some exceptions apply.	C405.7 8.4.4				
Electrical motors	Electric motors meet the efficiency requirements of Tables C405.7(1)-(4)	C405.7 10.4.1				
Vertical and horizontal transportation systems	▪ Elevator cab lighting ≥35 lumens/watt. ▪ Elevator cab fan ≤0.33 W/cfm. ▪ Escalator and moving walkway automatic speed control. ▪ Escalator regenerative drive.	C405.8 10.4.3				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

ADDITIONAL EFFICIENCY PACKAGE OPTIONS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Compl.	N/A
Requirements	Project must meet at least one of the following requirements.	C406.1				
More efficient HVAC equipment	▪ 10% better than minimum efficiency	C406.2				
Reduced lighting power density	▪ 10% lower allowed lighting power	C406.3				
Enhanced digital lighting controls	▪ Continuous dimming and digitally-addressable luminaires	C406.4				
On-site renewable energy	▪ ≥0.5 W/ft^2, or ≥3% of mechanical, water heating and lighting energy.	C406.5				
Dedicated outdoor air system	▪ For multiple-zone systems, include independent system with total heat recovery to condition ventilation air.	C406.6				
Reduced energy in service water heating system	▪ For specific building types, ≥60% solar or waste heat recovery for water heating.	C406.7				
Enhanced envelope performance	▪ Total UA of building thermal envelope not less than 15% below total UA of building thermal envelope in accordance with Section C402.1.5	C406.8				
Reduced air infiltration	▪ Air infiltration verified by whole-building pressurization testing; air-leakage rate shall not exceed 0.25 cfm/sqft.	C406.9				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

ADDITIONS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/A
General	Requirements for new construction apply to additions. Unaltered portions of the existing building are not required to comply.	C502 4.1.1.2 4.2.1.2				
Windows – maximum area	▪ Total building window area including addition ≤ 30% of gross wall area ▪ Or, window area in addition alone ≤ 30% of gross added wall area (≤ 40% when meeting daylighting requirements)	C502.2.1 5.5.4				
Window – U-factor and SHGC	Same as new construction. See envelope checklist	C502.2.1 5.5.4				
Skylights – maximum area	▪ Total building skylight area including addition ≤ 3% of gross roof area ▪ Or, skylight area in addition alone ≤ 3% of gross roof area (≤ 5% when meeting daylighting requirements)	C502.2.2 5.5.4				
Skylight – U-factor and SHGC	Same as new construction. See envelope checklist	C502.2.2 5.5.4				
Mechanical systems	Requirements for new systems and	C502.2.3				

	equipment serving additions are the same as for new construction. See the mechanical checklist.	6.1.1.2				
Service water heating	Requirements for new equipment, controls and piping serving additions are the same as for new construction. See the service water heating checklist.	C502.2.4 7.1.1.2				
Pools and spas	Requirements for new pools and in- ground spas are the same as for new construction. See the service water heating checklist.	C502.2.5 7.4.5				
Interior lighting	Requirements for lighting systems in additions are the same as for new construction. See the lighting checklist. **Interior lighting power options**: ▪ Addition alone complies ▪ Addition + existing building complies	C502.2.6.1 9.2				
Exterior lighting	Requirements for exterior lighting systems for additions are the same as for new construction. See the lighting checklist. **Exterior lighting power options**: ▪ Addition alone complies ▪ Addition + existing building complies	C502.2.6 9.4.1.4 9.4.2				

COMMERCIAL DESIGN CHECKLIST
IECC 2018/ASHRAE 90.1-2016

ALTERATIONS

Project: _____ Date: _____

Instructions ***Code References: Cxxx.x refers to an IECC Section - While 5.xx, 6.xx, 7.xx...etc. refer to ASHRAE 90.1 Sections***

- **RECOMMENDED**: List performance values, note exceptions that were applied, or provide other notes to the reviewer.
- ***REQUIRED***: Indicate the sheet on the plans where the reviewer can find relevant information.
- ***REQUIRED***: For each requirement check either "Complies" or "N/A" to indicate whether the project complies or the requirement is not applicable in this case.

Component/System	Requirement	Code Section	Describe Proposed Design *(Indicate performance values, exceptions applied, notes to review, etc.*	Indicate Plan Sheet	Complies	N/A
General	New-construction requirements apply to altered portions of the building. Unaltered portions are not required to comply.	C503.1 4.1.1.3 4.2.1.3				
Change in space conditioning	Full compliance is required for previously unconditioned spaces that are altered to become conditioned	C503.2 4.1.1.5				
Roof	No requirement: ▪ Roof recover ▪ Ceiling/roof cavity not exposed New-construction requirements: ▪ New roof ▪ Roof replacement where insulation is above deck ▪ Alteration where ceiling/roof cavity is exposed (exception if cavity is filled with insulation)	C503.3.1 5.1.3				
Wall	No requirement: ▪ Wall cavity is not exposed New-construction requirements: ▪ Wall cavity is exposed (exception if cavity is filled with insulation)	C503.1 5.1.3				

Windows – maximum area	▪ Total building window area after added windows ≤ 30% of gross wall area ▪ Or, window area in space with added windows alone ≤ 30% of gross wall area (≤ 40% when meeting daylighting requirements)	C503.3.2 5.1.3				
Window – U-factor and SHGC	Same as new construction. See envelope checklist	C503.3.2 5.1.3				
Skylights – maximum area	▪ Total building skylight area after added skylights ≤ 3% of gross roof area ▪ Or, skylight area in space with added skylight(s) alone ≤ 3% of gross roof area (≤ 5% when meeting daylighting requirements)	C503.3.3				
Skylight – U-factor and SHGC	Same as new construction. See envelope checklist	C503.3.3 5.1.3, 5.5-4				
Mechanical systems	New heating, cooling and duct systems are required to meet new construction requirements.	C503.4 6.1.1.3				
Service water heating systems	New water heating systems are required to meet new construction requirements.	C503.5 7.1.1.3				
Lighting systems	New lighting systems that are part of an alteration are required to meet new construction requirements. ▪ Exception if less than 10% of luminaires in a space are replaced and installed lighting power does not increase	C503.6 9.1.2				