

The 2006 International Energy Conservation Code

Commercial

IECC Commercial Provisions

Buildings under Commercial IECC

Discussing _

- Highlighted changes per chapter 2000 : 2006
- City of Austin *PROPOSED* amendments within
- A few examples how affect Green Bld Rating

IECC Commercial Provisions

Buildings under Commercial IECC

All buildings **OTHER** than

- One- and two-family dwellings,
- Multiple single family dwellings [townhomes] not > 3 stories
 - These follow IRC
- Residential use buildings [R-2, R-3, R-4] three stories or less
 - These follow IBC

IECC Commercial 2006

Major general changes

- Commercial now in Chapter 5
- IECC 2006 – references ASHRAE 90.1 2004
- 8 climate zones overlaid by 3 moisture regimes
 - For warmer zones [1-4b] based on heating + cooling degree days and accounts for humidity
 - [Zone 2 revised to 2.2 , to IECC 2000/3 basic divisions, by Texas A&M ESL]
- Sections labeled as “mandatory”

IECC Commercial Provisions

What *part of* the building must comply

1. Building Envelope - *SECTION 502*
 - *> if don't comply with prescriptive move to TOTAL BUILDING PERFORMANCE – SECTION 506*
2. Mechanical Systems - *SECTION 503*
3. Service Water Heating – *SECTION 504*
4. Electrical Power & Lighting Systems – *SECTION 505*

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MAJOR CHANGES

Building Envelope – SECTION 502

New envelope tables

- includes opaque doors

Mass Walls + Mass Floors

New requirements for metal buildings

Limit to 40% WWR [glass : wall]

- = Previously 50%

- = Prescriptive approach limit [BEYOND = Total Bld Performance – Section 506]

Limit of 3% skylight [anything over 15% from vertical]

- = Prescriptive approach limit [BEYOND = Total Bld Performance – Section 506]

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Building Envelope – SECTION 502

New envelope tables – PRESCRIPTIVE APPROACH COMPLIANCE

TABLE 902.2(15)
BUILDING ENVELOPE REQUIREMENTS^a through ^e - CLIMATE ZONE 5b

WINDOW AND GLAZED DOOR AREA 10 PERCENT OR LESS OF ABOVE-GRADE WALL AREA				
ELEMENT	CONDITION/VALUE			
Skylights (U-factor)	1			
Slab or below-grade wall (R-value)	R-0			
Windows and glass doors:	SHGC		U-factor	
	FF < 0.25	Any	Any	
	0.25 ≤ FF < 0.50	Any	Any	
FF ≥ 0.50	Any	Any		
Roof assemblies (R-value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-19	R-14	
	Metal joist/truss	R-19	R-15	
	Concrete slab or deck	NA	R-14	
	Metal panels with thermal block	R-25	R-15	
Metal panels without thermal block	X	R-15		
Floors over outdoor air or unconditioned space (R-value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-11	R-5	
	Metal joist/truss	R-11	R-6	
Concrete slab or deck	NA	R-5		
Above-grade walls (R-value)	No framing		Metal framing	Wood framing
	Framed	NA	R-11	R-11
	R-value cavity	NA	R-0	R-0
	R-value continuous	NA	R-0	R-0
	CMU, 8 in, with integral insulation	NA	R-0	R-0
	R-value cavity	NA	R-0	R-0
	R-value continuous	E-0	E-0	E-0
	Other masonry walls	NA	R-0	R-0
R-value cavity	NA	R-0	R-0	
R-value continuous	E-0	E-0	E-0	

WINDOW AND GLAZED DOOR AREA OVER 10 PERCENT BUT NOT GREATER THAN 25 PERCENT OF ABOVE-GRADE WALL AREA				
ELEMENT	CONDITION/VALUE			
Skylights (U-factor)	1			
Slab or below-grade wall (R-value)	E-0			
Windows and glass doors:	SHGC		U-factor	
	FF < 0.25	0.6	Any	
	0.25 ≤ FF < 0.50	0.7	Any	
FF ≥ 0.50	Any	Any		
Roof assemblies (R-value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-25	R-19	
	Metal joist/truss	R-25	R-20	
	Concrete slab or deck	NA	R-19	
	Metal panels with thermal block	R-30	R-20	
Metal panels without thermal block	X	R-20		
Floors over outdoor air or unconditioned space (R-value)	Insulation between framing		Continuous insulation	
	All-wood joist/truss	R-11	R-5	
	Metal joist/truss	R-11	R-6	
Concrete slab or deck	NA	R-5		
Above-grade walls (R-value)	No framing		Metal framing	Wood framing
	Framed	NA	R-11	R-11
	R-value cavity	NA	R-0	R-0
	R-value continuous	NA	R-0	R-0
CMU, 8 in, with integral insulation	NA	R-0	R-0	

< 2000 IECC = BUILDING ENVELOPE

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Building Envelope – SECTION 502

New envelope tables – PRESCRIPTIVE APPROACH COMPLIANCE

2006 =

OPAQUE ASSEMBLIES >

+

Including NEW opaque DOOR requirements >

TABLE 502.2(1)
BUILDING ENVELOPE REQUIREMENTS – OPAQUE ASSEMBLIES

CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Roofs								
Insulation entirely above deck	R-15 ci	R-15 ci	R-15 ci	R-15 ci	R-20 ci	R-20 ci	R-25 ci	R-25 ci
Metal buildings (with R-5 thermal blocks) ^b	R-19 + R-10	R-19	R-19	R-19	R-19	R-19	R-19 + R-10	R-19 + R-10
Attic and other	R-30	R-30	R-30	R-30	R-30	R-30	R-38	R-38
Walls, Above Grade								
Mass	NR	NR	R-5.7 ci ^{c,4}	R-5.7 ci ^c	R-7.6 ci	R-9.5 ci	R-11.4 ci	R-13.3 ci
Metal building ^b	R-13	R-13	R-13	R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13	R-13 + R-13
Metal framed	R-13	R-13	R-13	R-13	R-13 + R-3.8 ci	R-13 + R-3.8 ci	R-13 + R-7.5 ci	R-13 + R-7.5 ci
Wood framed and other	R-13	R-13	R-13	R-13	R-13	R-13	R-13	R-13 + R-7.5 ci
Walls, Below Grade								
Below grade wall ^d	NR	NR	NR	NR	NR	NR	R-7.5 ci	R-7.5 ci
Floors								
Mass	NR	R-5 ci	R-5 ci	R-10 ci	R-10 ci	R-10 ci	R-15 ci	R-15 ci
Joist/Framing	NR	R-19	R-19	R-19	R-19	R-30	R-30	R-30
Slab-on-Grade Floors								
Unheated slabs	NR	NR	NR	NR	NR	NR	NR	R-10 for 24 in. below
Heated slabs	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 12 in. below	R-7.5 for 24 in. below	R-10 for 36 in. below	R-10 for 36 in. below	R-10 for 48 in. below
Opaque Doors								
Swinging	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.70	U – 0.50
Roll-up or sliding	U – 1.45	U – 1.45	U – 1.45	U – 1.45	U – 1.45	U – 0.50	U – 0.50	U – 0.50

For SI: 1 inch = 25.4 mm.

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Building Envelope – SECTION 502

New envelope tables – PRESCRIPTIVE APPROACH COMPLIANCE

2006 =

METAL BUILDING ASSEMBLY >

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TABLE 502.2(2)
METAL BUILDING ASSEMBLY DESCRIPTIONS

ROOFS	DESCRIPTION	REFERENCE
R-19 + R-10	<p>Filled cavity roof.</p> <p>Thermal blocks are a minimum R-5 of rigid insulation, which extends 1 in. beyond the width of the purlin on each side, perpendicular to the purlin.</p> <p>This construction is R-10 insulation batts draped perpendicularly over the purlins, with enough looseness to allow R-19 batt to be laid above it, parallel to the purlins. Thermal blocks are then placed above the purlin/batt, and the roof deck is secured to the purlins. In the metal building industry, this is known as the "sag and bag" insulation system.</p>	ASHRAE/IESNA 90.1 Table A2.3
R-19	<p>Standing seam with single insulation layer.</p> <p>Thermal blocks are a minimum R-5 of rigid insulation, which extends 1 in. beyond the width of the purlin on each side, perpendicular to the purlin.</p> <p>This construction R-19 insulation batts draped perpendicularly over the purlins. Thermal blocks are then placed above the purlin/batt, and the roof deck is secured to the purlins.</p>	ASHRAE/IESNA 90.1 Table A2.3
Walls		
R-13	<p>Single insulation layer</p> <p>The first layer of R-13 insulation batts is installed continuously perpendicular to the girts and is compressed as the metal skin is attached to the girts.</p>	ASHRAE/IESNA 90.1 Table A3.2
R-13 + R-13	<p>Double insulation layer</p> <p>The first layer of R-13 insulation batts is installed continuously perpendicular to the girts, and is compressed as the metal skin is attached to the girts. The second layer of R-13 insulation batts is installed within the framing cavity.</p>	ASHRAE/IESNA 90.1 Table A3.2

For SI: 1 inch = 25.4 mm.

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Building Envelope – SECTION 502

New envelope tables – PRESCRIPTIVE APPROACH COMPLIANCE

2006 =

FENESTRATION >

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**TABLE 502.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION**

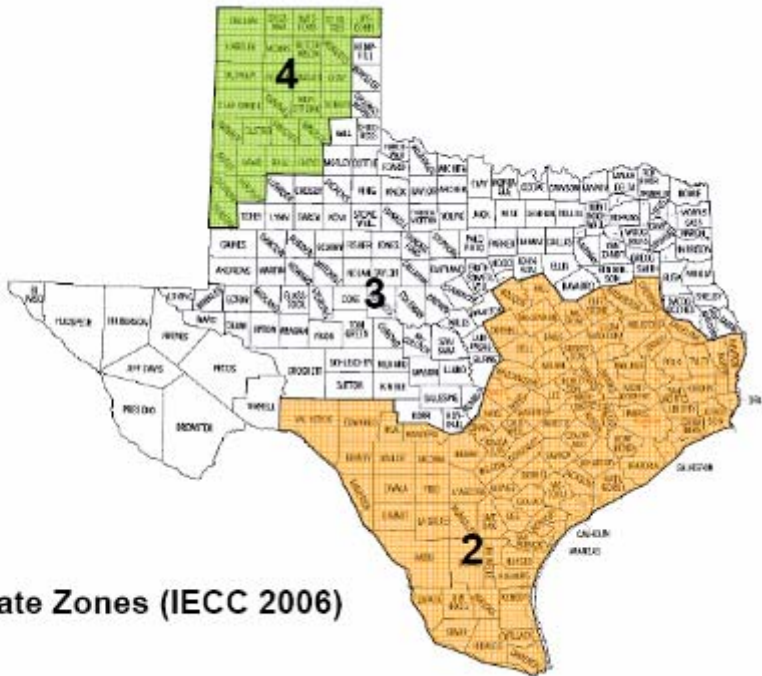
CLIMATE ZONE	1	2	3	4 except Marine	5 and Marine 4	6	7	8
Vertical Fenestration (40% maximum of above-grade wall)								
<i>U-Factor</i>								
Framing materials other than metal with or without metal reinforcement or cladding								
<i>U-Factor</i>	1.20	0.75	0.65	0.40	0.35	0.35	0.35	0.35
Metal framing with or without thermal break								
Curtain Wall/Storefront <i>U-Factor</i>	1.20	0.70	0.60	0.50	0.45	0.45	0.45	0.45
Entrance Door <i>U-Factor</i>	1.20	1.10	0.90	0.85	0.80	0.80	0.80	0.80
All Other <i>U-Factor</i> ^a	1.20	0.75	0.65	0.55	0.55	0.55	0.50	0.50
SHGC-All Frame Types								
SHGC: PF < 0.25	0.25	0.25	0.25	0.40	0.40	0.40	NR	NR
SHGC: 0.25 ≤ PF < 0.5	0.33	0.33	0.33	NR	NR	NR	NR	NR
SHGC: PF ≥ 0.5	0.40	0.40	0.40	NR	NR	NR	NR	NR
Skylights (3% maximum)								
Glass								
<i>U-Factor</i>	1.60	1.05	0.90	0.60	0.60	0.60	0.60	0.60
SHGC	0.40	0.40	0.40	0.40	0.40	0.40	NR	NR
Plastic								
<i>U-Factor</i>	1.90	1.90	1.30	1.30	1.30	0.90	0.90	0.60
SHGC	0.35	0.35	0.35	0.62	0.62	0.62	NR	NR

NR = No requirement.
 PF = Projection factor (See Section 502.3.2)
 a. All others includes operable windows, fixed windows and non-entrance doors.

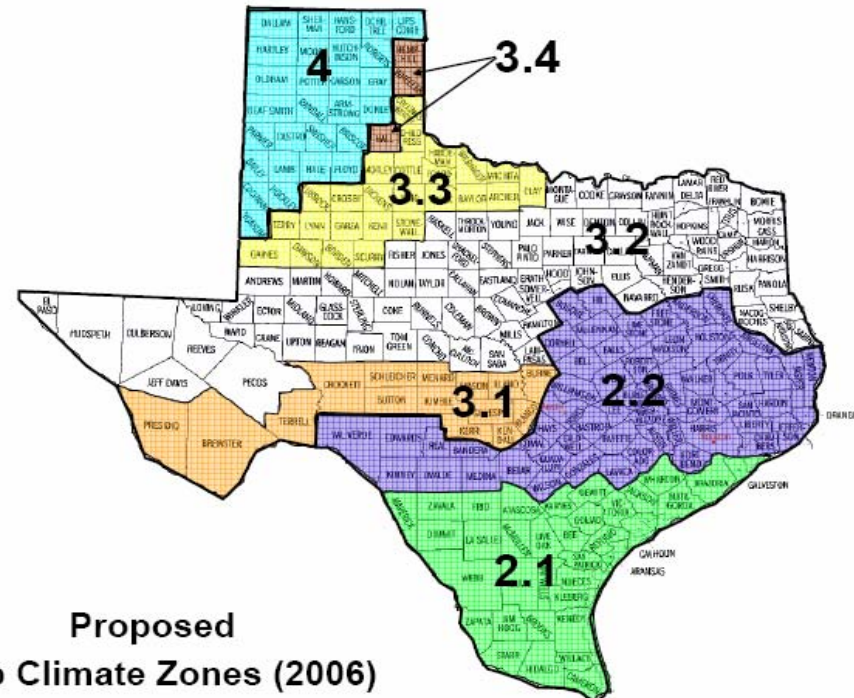
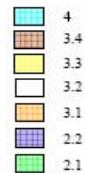
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Climate Zones – IECC 2006

envelope table commercial revisions to come from ESL



Climate Zones (IECC 2006)



Proposed
Sub Climate Zones (2006)

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Building Envelope – SECTION 502

New requirement Metal Building Walls [Table 502.2(1)-(2)]



Picture from NAIMA

- Climate Zones 1 – 4 except Marine
 - R-13 Insulation installed perpendicular to the girts and compressed by the metal skin
- Climate Zones Marine 4 and higher
 - R-13 insulation installed perpendicular and continuously to the girts, and
 - Additional R-13 insulation installed within the framing cavity

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Building Envelope – SECTION 502

Mass Walls and Floors – Section 502.2.3 & 5



Examples

- 4" Concrete walls
@115 lb/ft³
- 8" CMU Block

Mass walls

- Walls weighing at least 35 lbs/ft² of wall surface area, or
- 25 lbs/ft² of wall surface area if material weight is ≤ 120 lb/ft³

< new

Britt Makela Group, Inc

**+ Mass Floor added [35 lb/sf] floor
over outdoor or unconditioned space**

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Building Envelope PROPOSED amendment

Delete — EXISTING DEFINITION VAPOR “RETARDER” ..membrane etc rated 1 perm or **LESS**

ADD —DEFINITION VAPOR “RETARDER” ..membrane etc rated 1 perm or **MORE**

ADD —DEFINITION VAPOR “BARRIER” ..membrane etc rated 1 perm or **LESS**

502.5 – Moisture Control

PRIOR “*vapor retarder shall be installed on the warm-in-winter side of thermal insulation*” : **EXCEPTION** Climate Zone 2

ADD: “Vapor retarder shall be installed on exterior side of the framing”

ADD: “Vapor barrier shall NOT be installed “

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Building Envelope PROPOSED amendment

ADD - NEW

502.6 – Reflective Roofing

FLAT ROOF

– Surfaces less than 2:12,

reflectance = 0.70 or SRI 0.78

STEEP ROOF

– Surfaces greater than 2:12,

reflectance = 0.35 or SRI 0.29

***exception – vegetated roofs or roof top pools**



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MAJOR CHANGES

Mechanical Systems – SECTION 503

Chapter simplified to include Only Four Sections:

1. Provisions of code that apply
2. Mandatory provisions
3. Simple HVAC systems & equipment
4. Complex HVAC systems & equipment

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MAJOR CHANGES

Mechanical Systems – SECTION 503

- Table 503.2.3, lists SEER 10.
- Incorrect, as of Jan 2006 Fed Govt cannot manufacturer anything < 13 SEER
- **NEW** ERV's –[503.2.6]
- Reduced economizer threshold [503.3.1]
- Reduced hydronic aggregate system controls thresholds [600,000 Btu/h tp 300,000 Btu/h] [503.3.2]
- Reduced VAV [variable air volume] fan motor horsepower threshold variable speed drive [25hp to 10hp]

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Mechanical PROPOSED amendment

ADD - *NEW*

503.2.10 – Ventilation Filtration

All ventilation systems shall incorporate filtration having a minimum efficiency reporting value [MERV] rating of 6 or greater

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Service Water Heating – SECTION 504

NEW 504.7.3 : Pools

- Heaters, time switches, and pool covers must be equipped with energy conserving measures.



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Electrical Power & Lighting – SECTION 505

REVISED 505.2.2.2 : Automatic Lighting Shutoff

- To include automatic control function where occupant sensors turn lighting off within 30 minutes of occupant leaving

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Electrical Power & Lighting – SECTION 505

REVISED Table 505.5.2 : Interior Lighting Power

- Deleted tenant area portion of building method [space-by-space] in its entirety.

TABLE 505.5.2
INTERIOR LIGHTING POWER ALLOWANCES

LIGHTING POWER DENSITY	
Building Area Type ^a	(W/ft ²)
Automotive Facility	0.9
Convention Center	1.2
Court House	1.2
Dining: Bar Lounge/Leisure	1.3
Dining: Cafeteria/Fast Food	1.4
Dining: Family	1.6
Dormitory	1.0
Exercise Center	1.0
Gymnasium	1.1
Healthcare-Clinic	1.0
Hospital	1.2
Hotel	1.0
Library	1.3
Manufacturing Facility	1.3
Motel	1.0
Motion Picture Theater	1.2
Multi-Family	0.7
Museum	1.1
Office	1.0
Parking Garage	0.3
Penitentiary	1.0
Performing Arts Theater	1.6
Police/Fire Station	1.0
Post Office	1.1
Religious Building	1.3
Retail ^b	1.5
School/University	1.2
Sports Arena	1.1
Town Hall	1.1
Transportation	1.0

< 2006

NOW whole tenant
Assume corridor
etc within

TABLE 805.4.2
INTERIOR LIGHTING POWER

BUILDING OR AREA TYPE	ENTIRE BUILDING (W/ft ²)	TENANT AREA OR PORTION OF BUILDING (W/ft ²)
Auditorium	NA	1.6
Bank/financial institution ^a	NA	2.0
Classroom/lecture hall ^b	NA	1.6
Convention, conference or meeting center ^a	NA	1.5
Corridor, restroom, support area	NA	0.8
Dining ^a	NA	1.4
Exercise center ^a	1.4	1.1
Exhibition hall	NA	3.3
Grocery store ^a	1.9	2.1
Gymnasium playing surface	NA	1.9
Hotel function ^a	NA	2.4
Industrial work, < 20 ft ceiling height	NA	2.1
Industrial work, ≥ 20 ft ceiling height	NA	3.0
Kitchen	NA	2.2
Library ^a	1.5	1.8
Lobby—hotel ^a	NA	1.9
Lobby—other ^a	NA	1.0
Mall, arcade, or atrium	NA	1.4
Medical and clinical care ^{a, c}	1.6	1.6
Museum ^b	1.6	1.6
Office ^a	1.3	1.5
Religious worship ^a	2.2	3.2
Restaurant ^a	1.7	1.7
Retail sales, wholesale showroom ^a	1.9	2.1
School	1.5	NA
Storage, industrial and commercial	0.6	1.0
Theater—motion picture	1.1	1.0
Theater—performance ^a	1.4	1.5
Other	0.6	1.0

For SI: 1 foot = 304.8 mm, 1 W/ft² = W/0.0929 m².

< 2000

PREVIOUS could
break each tenant
Space out:
kitchen/corridor/rr
etc.

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Electrical Power & Lighting – SECTION 505

Revised 505.2.4 : Exterior Lighting Controls

- Controls capable of turning off exterior lighting with sufficient daylight – use astronomical time switch to control.

PROPOSED AMENDMENT

Lighting designated for dusk to dawn operation shall be controlled by an astronomical time switch *in series* with a photo sensor



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Electrical Power & Lighting – SECTION 505

NEW Table 505.6.1 : Exterior Building Grounds Lighting

- Exterior Lighting \geq 100 watts shall have a minimum efficacy of 60 lumens/watts or be controlled by a motion sensor



IECC Commercial 2006

Electrical Power & Lighting – SECTION 505

NEW Table 505.6.2 : Exterior Building Lighting Power

- A total exterior lighting power allowance for all exterior building applications is now required and shall not be exceeded.
 - - exceptions provided [specialized signal, directional, marked for transportation]

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Effects on Commercial GBP Rating

Basic Requirements

A building must fulfill all 8 items on this page to qualify for a Rating.
An X in the green box indicates implementation of the measure.

1. Building Systems Commissioning

A commissioning agent with documented commissioning experience on at least two other buildings will verify and ensure that mechanical and electrical systems are installed, and calibrated to operate according to the design intent and the owner's operational needs. The following commissioning will be completed:

- Develop design intent and basis of design documentation.
- Develop and utilize a commissioning plan.
- Include commissioning requirements in the construction documents.
- Verify installation, functional performance, training, and documentation.
- Complete a commissioning report.

2. Storm Water Run-off & Water Quality Control

Meet current city drainage and water quality standards applicable in the watershed where the project is located.

3. Roofing to Reduce Heat Island - Reduce heat island effects to minimize the impact on micro-wildlife habitat.

- Use ENERGY STAR compliant, high-reflectance roofing (according to the EPA Energy Star minimum of 75% of the total roof area.
- Vegetated roofing material for a minimum of 50% of the total roof area.
- Roofing materials are a combination of vegetated roofing and ENERGY STAR compliant tiles for a combined total of at least 75% of the total roof area.

4. Exceed Energy Code by 15%

Reduce building lighting and envelope energy use compared to the current City of Austin Energy Code by 15%.

5. Building Water Use Reduction by 15%

Reduce planned indoor water consumption below the current City of Austin Plumbing Code by 15%.

6. Low VOC Interior Paints and Coatings

All paint used in the interior of the building must meet Green Seal Standards; all coatings used in the building interior must meet South Coast Air Quality Management District (SCAQMD) standards.

7. Storage and Collection of Recyclables

Provide an easily accessible area that serves the entire facility and is dedicated to the separation, collection, and storage of materials for recycling including, at a minimum, the top two identified recyclable waste stream items. Building loading dock or pick-up location must be sized appropriately to handle the recycling material volumes generated by the building occupants.

8. Construction Waste Plan

Recycle or salvage at least 50% (by weight) of construction, demolition, and land clearing waste.

ENERGY:

0

1. Additional Energy Use Efficiency - Reduce environmental impacts associated with excessive energy use.

Energy model shows building performs:

- 20% better than City of Austin Energy Code.
- 25% better than City of Austin Energy Code.
- 30% better than City of Austin Energy Code.
- 35% better than City of Austin Energy Code.
- 40% better than City of Austin Energy Code.

0

2. Green Energy - Encourage the use of

- Have a 10 year Green Power contract in place for 50% of building's non-renewable energy needs.

0

3. Renewables -

- Install on-site renewable energy system for 2% of energy needs.
- Install on-site renewable energy system for 5% of energy needs.

0

4. Additional Commissioning -

In addition to the Building Systems Commissioning Pre-Requisite the following must be completed:

- Commissioning agent shall at a minimum conduct design document review prior to 50% CD's.
- Demonstrate that all building systems operate according to design intent narrative.
- Demonstrate building structure and envelope perform according to design intent narrative.
- Provide seasonal re-commissioning through warranty period.
- Complete a commissioning report.

0

5. District Cooling -

- Tie into Austin Energy's district cooling and heating loop for all HVAC building energy needs.