Green Buildings Ordinance: Project Requirements
Green Buildings Ordinance: Essentials

- Mandatory if 25,000 GSF+
- Applies to:
  - Existing buildings
  - New buildings
  - Additions
  - Campuses

All projects must address two areas of compliance:
- 1 Cool roof +
- 2 Additional green building options

- Denver specific
- Adopted November 2, 2018
- Modest improvements over base code through:
  - green space
  - energy efficiency
  - renewables
  - broad sustainability
Green Buildings Ordinance: Cool Roof

- **Mandatory**
- **Solar reflectance** (white, tan, gray)
- **Covering, pavers,** (Membrane, metal, rock, concrete, clay, ceramic, glass)
- **Condensation**
  - air barrier
  - vapor retarder
  - ventilation
- **Exceptions**
GBO Existing Buildings: Nine Options

Cool roof +

a. Green space: at grade or vegetated roof
b. On-site renewables
c. Building certification
d. Energy Program
   1. Energy Star 85
   2. Building certification
   3. On-site renewables
   4. Off-site renewables
   5. Energy efficiency
e. Off site green space
GBO New Buildings: Nine Options

- Cool roof +
  a. Green space: at grade or vegetated roof
  b. On-site renewables
  c. Off-site renewables
  d. Energy efficiency (12%)
  e. Building certification
  f. Green space + on-site renewables
  g. Green space + off-site renewables + energy efficiency (2.5%)
  h. Green space + energy efficiency (5%)
  i. Off site green space
GBO Exemptions

Full (Cool roof + Options)
• < 25,000 GSF
• One + two family IRC
• 3+ connected 3 story dwellings
• Temporary, air supported, or greenhouse structures

Partial: Cool roof
• Character defining
• Covered or shaded
• Ballast
• Visible (up to 10%)
• Some recovers with approval

Partial: Options
• Recover
• 5 story 62.5’ residential
• Wind/fire emergency
• Hail – no longer
• Ext’g vegetated roof
Details: GBO

At-Grade Green + Vegetated Roofs

New buildings
- 10% GFA or
- 60% total roof area or
- All available roof

Existing buildings
- 2% GFA or
- 18% total roof area or
- All available roof
Details: GBO Vegetated Roofs

Check Rules + Regs for specifics related to:
- Irrigation
- 80% coverage
- Plant selections
- PVs + vegetation
- Trees + groundcover
- Maintenance plan
- 4” growing media

- Landscape architect
- Licensed green roof contractor
Details: GBO Vegetated Roofs

Check Rules + Regs for specifics related to:

- IBC, IFC, IPC, Denver amendments
- Standpipes
- Fire zones
- Fire clearances
- Exit stairs
- Wind + Gravity loads
Green Buildings Ordinance Clearances:

Section 4.02(d)(ii)2(i)-(v)
Requirement:

3’ wide vegetation free border zones at non-combustible rooftop structures, roof joints, and penetrations.
Green Buildings Ordinance
Clearances:

Section 4.02(d)(ii)2(i)-(v)
Requirement:

A 6’ wide area covered with stone ballast or concrete pavers where vegetative roof systems abut combustible vertical surfaces and when terminating at a fire-resistance rated wall.
Green Buildings Ordinance Clearances:

Section 4.02(d)(ii)2(i)-(v) Requirement:

A 13’ wide area that meets Class A fire classification requirements shall divide vegetated roofs into areas not exceeding 15,625 SF or 125’ in length or width.
Green Buildings Ordinance
Clearances:

Section 4.02(d)(ii)2(i)-(v)
Requirement:

In buildings less than 4 stories in height, there shall be a minimum 8’ wide clear perimeter around the edges of the roof when existing stairway and fixed permanent ladders are not provided.
Green Buildings Ordinance Clearances:

Section 4.02(d)(ii)2(i)-(v)

Requirement:

In buildings 4 stories or more in height, all roofs containing vegetated areas shall be afforded access via exit stairways and fixed permanent ladders to upper roofs.

Access points shall be separated by a minimum of 10’ from vegetated areas.
Green Buildings Ordinance Clearances:

Section 4.02(d)(ii)(3)b
Requirement:
Required clearances for fire protection.

Where the building requires a standpipe system, it shall extend to the roof.

The hose outlet shall be located within 230’ of all vegetated areas.
Details: GBO At-grade green space

Check Rules + Regs for specifics related to:
• Trees + groundcover
• Zoning
• Water quality treatment
• Right of way
• Must be new
• Soil quality
• Drainage
• Tree standards
• Turfgrass
• Urban agriculture
## Details: GBO On-site renewables

### New buildings
- 70% total roof or
- 100% energy

### Existing buildings
- 5% GFA or
- 42% total roof or
- 100% energy

### Requirements
- 16% efficiency – will update this in the GBO as technology advances
- Energy model
- Other renewable equivalency to solar output *if applicable*
- Clearances
Details: GBO Off-site renewables

**New buildings**
- 70% total roof or
- 100% energy
AND
- 6% decreased energy

**Existing buildings**
- 100% energy or
25,000-50,000 GFA:
- 10% energy + 5% decreased energy
50,000+ GFA
- 15% energy + 7.5% decreased energy

**Requirements**
- Energy model
- Five year contracts
- Life of building (new)
- 20 years / roof replacement (ext’g)
- Available programs limited
- Zero net energy complies
Details: GBO Building Certification

New buildings
• LEED BD+C Gold
• Enterprise Green Communities
• National Green Building Standard Gold
• Other with approval

Existing buildings
• LEED BD+C or O+M Silver
• Enterprise Green Communities
• National Green Building Standard Silver
• Other with approval
Details: GBO Reduced energy consumption

**New buildings**
- 12% below code or
- 5% below code + green space

**Existing buildings**
- >25,000SF
  - <50,000SF 10% decrease
- >50,000SF
  - 15% decrease
Details: GBO Green + on-site renewables

- New buildings only
- Green space:
  - 3% GFA or
  - 18% total roof or
  - 30% available roof

AND
- On-site renewables:
  - 7% GFA or
  - 42% total roof or
  - 70% available roof
Details: GBO Green + off-site renewables

- New buildings only
- Green space:
  - 3% GFA or
  - 18% total roof or
  - 30% available roof

AND
- Off-site renewables
  - 7% GFA or
  - 42% total roof or
  - 70% available roof

AND
- 2.5% energy decrease
Details: GBO Green + reduced energy

• New buildings only
• Green space:
  - 3% GFA or
  - 18% total roof or
  - 30% available roof
AND
• 5% energy decrease
Green Buildings Ordinance: Approval!

How to succeed:

• Consider all options early
• Engage the Owner
• Download, read + understand the GBO, Rules + Regs
• Follow guidance in SDP comments
• Communicate responsibility within team
• Seek clarification from the City
• Gain familiarity
Green Buildings Ordinance: Submittals

Information provided is a high level summary and not fully complete and comprehensive. Submittals must include all information required to illustrate full compliance with all applicable provisions of the Green Buildings Ordinance and Rules and Regulations.
Existing Buildings!

Part 1a  General
Part 1b  Cool Roof
Part 2  Additional Green Buildings Options

Projects must include submittals addressing all three sections: 1a, 1b and 2.
For roof permit

- Green Building Declaration Form
- Roof plan with area indicated on it
- Roof assembly / detailed scope description
- Exemptions: substantiation
- Show compliance
GBO Submittals: **Existing Buildings:**

**Part 1b: Cool Roof**

For roof permit:

- Cool roof covering + paver product data with solar reflectance value identified
- Air barrier + vapor retarder product data when applicable
- Steep sloped roof ventilation detailing when applicable
- Condensation considerations:
  - prescriptive assembly / details, *or*
  - dewpoint analysis by registered professional, *or*
  - note stating replacing existing cool roof
- Partial exemption(s): substantiation
- Show compliance
GBO Submittals: Existing Buildings:
Part 2: Additional Green Buildings Options

a. Green space

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit

- Site Development Plan minor modification
  - If at-grade green space, maintenance note per GBO R+Rs Section 4.02(b)(v)
  - Statement signed by landscape architect stating design is per GBO
  - Required green space calculations + diagrammatic plan (identical to landscape CDs)

- Landscape Construction Documents by a licensed landscape architect
  - Detailed calculations of green space required including dimensioned roof plan(s) if applicable
  - If at-grade green space: dimensioned site plan illustrating green space + detailed calculations outlining what’s taken credit for
  - General note underscoring applicability of GBO landscape requirements
  - If vegetated roof: roof plan identifying + dimensioning all GBO R+Rs required clearances
  - If vegetated roof: details + system specification or manufacturer’s product data
  - Additional materials as required to illustrate compliance with GBO R+Rs Section 4.02(a) through (e)
  - Irrigation, plumbing + fire protection plans

- Separate CD submittals / permits when applicable
  - Fire protection systems
  - Plumbing / backflow preventer
  - Irrigation system
  - Zoning
  - Vegetated roof system – include a maintenance plan
b. On-site solar

All requirements from Part 1a General + Part 1b Cool Roof, plus:

**For roof permit**
- SDP minor modification
  - Required PV coverage calculations + diagrammatic site and/or roof plan (identical to CDs)
  - Last year’s energy use data if applicable
- Construction Documents
  - Detailed calculations of PV coverage required including dimensioned roof plan(s) and last year’s energy use data if applicable
  - Dimensioned roof plan illustrating PV coverage provided + detailed calculations
  - Roof plan identifying + dimensioning all GBO R+Rs required clearances
  - PV panel product data including efficiency rating + system capacity (kW)
  - Additional materials as required to illustrate compliance with GBO R+Rs Section 4.03(a)(ii) through (v) + (viii)
- Separate CD submittals / permits
  - Fire protection systems
  - Photovoltaic system
  - Zoning

System must be installed and inspected within 12 months of roof final inspection.
GBO Submittals: Existing Buildings:
Part 2: Additional Green Buildings Options

c. Building certification

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit

- **USGBC documentation** *(LEED BD+C Silver or O+M Silver or higher)* or
- **Enterprise documentation** *(Enterprise Green Communities certification)* or
- **Home Innovation Research Labs documentation** *(National Green Building Standard Silver or higher)* or
- **Third party certification documentation** *(Building official approved LEED equivalent)*
GBO Submittals: Existing Buildings:

Part 2: Additional Green Buildings Options

d-1. Energy Program: Energy Star Score 85+

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit:
• Enrollment using the Green Building Declaration Form

Within five years + annually for 20 years or until next roof replacement:
• Denver benchmarking data in Energy Star Portfolio Manager proving compliance
• If Energy Star score of 85+ cannot be maintained every year, annual submittal showing compliance with one of the other four Energy Program options
GBO Submittals: Existing Buildings: Part 2: Additional Green Buildings Options

d-2. Energy Program: Building Certification

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit:
• Enrollment using the Green Building Declaration Form

Within five years
• USGBC documentation (LEED BD+C Silver or O+M Silver or higher) or
• Enterprise documentation (Enterprise Green Communities certification) or
• Home Innovation Research Labs documentation (National Green Building Standard Silver or higher)
• Third party certification documentation (Building official approved LEED equivalent)
GBO Submittals: **Existing Buildings:**

**Part 2: Additional Green Buildings Options**

d-3. **Energy Program: On-site solar**

*All requirements from Part 1a General + Part 1b Cool Roof, plus:*

**For roof permit:**
- Enrollment using the Green Building Declaration Form

**Within five years**
- Documentation meeting DDPHE Energy Program requirements. Coordinate directly with Energy Program lead to define precise submittal requirements, which will be similar to those for option b. on-site solar.
- If on-site solar system is removed, annual submittal showing compliance with one of the other four Energy Program options thereafter
All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit:
- Enrollment using the Green Building Declaration Form

Within five years + maintained for 20 years or until next roof replacement:
- Copy of 5 year+ contract, renewed + resubmitted upon expiration and/or building sale
- If off-site solar contract is terminated, annual submittal showing compliance with one of the other four Energy Program options
GBO Submittals: **Existing Buildings:**

**Part 2: Additional Green Buildings Options**

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**Energy Program: Energy Use Reduction**

All requirements from Part 1a General + Part 1b Cool Roof, plus:

**For roof permit:**

- Enrollment using the Green Building Declaration Form

Within five years + maintained for 20 years or until next roof replacement:

- Denver benchmarking data in Energy Star Portfolio Manager proving required energy savings, or

- **Proof of completion of energy efficiency improvements** with estimated energy savings + proof of savings within two years. Coordinate directly with Energy Program lead to define precise submittal requirements, or

- If decreased energy consumption cannot be maintained, annual submittal showing compliance with any Energy Program option.
GBO Submittals: Existing Buildings:
Part 2: Additional Green Buildings Options

e. Payment into green building fund

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For roof permit
- Detailed calculations of green space required including dimensioned roof plan(s) if applicable
- Payment when roof permit is pulled
New Buildings!

Part 1a General
Part 1b Cool Roof
Part 2 Additional Green Buildings Options

Projects must include submittals addressing all three sections: 1a, 1b and 2.
For **superstructure construction permit**

- Green Building Declaration Form
- Roof plan with area indicated on it
- Roof assembly section detail
- Exemptions: substantiation
- Complete Site Development Plan – details of what needs to be included in the SDP vary with additional green buildings option selected. **All SDPs must include identification of GBO compliance path and any full or partial exemptions taken on the cover sheet.**
- Show compliance
GBO Submittals: New Buildings: Part 1b: Cool Roof

For superstructure construction permit:

- Cool roof covering + paver specification(s) with solar reflectance identified
- Steep sloped roof ventilation detailing when applicable
- Partial exemption(s): substantiation
- Show compliance
GBO Submittals: New Buildings:
Part 2: Additional Green Buildings Options

a. Green space

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For superstructure construction permit

- Site Development Plan
  - If at-grade green space, maintenance note per GBO R+Rs Section 4.02(b)(v)
  - Statement signed by landscape architect stating design is per GBO
  - Required green space calculations + diagrammatic plan (identical to landscape CDs)

- Construction Documents by a licensed architect + landscape architect
  - Detailed calculations of green space required including dimensioned roof plan(s) if applicable
  - At-grade green: dimensioned site plan illustrating green space + detailed calculations outlining what’s taken credit for
  - General note underscoring applicability of GBO landscape requirements
  - If vegetated roof: roof plan identifying + dimensioning all GBO R+Rs required clearances
  - If vegetated roof details + system specification
  - Additional materials as required to illustrate compliance with GBO R+Rs Section 4.02(a) through (e)
  - Irrigation, plumbing + fire protection plans

- Separate CD submittals / permits when applicable
  - Fire protection systems
  - Plumbing / backflow preventer
  - Irrigation system
  - Zoning
  - Vegetated roof system – include a maintenance plan
b. On-site solar

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For superstructure construction permit
- Site Development Plan
  - Required PV coverage calculations + diagrammatic site and/or roof plan (identical to CDs)
- Construction Documents
  - Detailed calculations of PV coverage required including dimensioned building and/or roof plan(s) as applicable
  - Dimensioned site and/or roof plan illustrating PV coverage provided with detailed calculations
  - Roof plan identifying + dimensioning all GBO R+Rs required clearances
  - PV panel product data including efficiency rating + system capacity (kW)
  - Energy model data showing estimated annual average electricity usage including pEUI
  - Statement identifying limiters to energy model accuracy + ROM estimate for swing in accuracy of pEUI
  - Additional materials as required to illustrate compliance with GBO R+Rs Section 4.03(a)(i), (iii) through (iv), (vi), (vii) + (viii)
- Separate CD submittals / permits
  - Fire protection systems
  - Photovoltaic system
  - Zoning

System must be installed and inspected within 12 months of roof final inspection.

Net zero energy projects must submit actual energy use data 12 months after certificate of occupancy, showing actual use to be within 10% of predicted.

c. Off-site solar

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For superstructure construction permit
- Energy model data showing estimated annual average electricity usage including pEUI
- Statement identifying limiters to energy model accuracy + ROM estimate for swing in accuracy of pEUI
- Letter of commitment signed by project Owner stating that an off-site solar contract will be procured

For certificate of occupancy
- Copy of 5 year+ contract or
- If tenant contracts will contribute, submittal of required aggregation of 5 year+ tenant contracts within 18 months of certificate of occupancy

For life of project
- renewal + resubmittal of copy of 5 year+ contract upon expiration and/or building sale
d. 12% decreased energy consumption

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For superstructure construction permit:
- Energy model data showing estimated annual average electricity usage including pEUI
- Statement identifying project features included above those to achieve code compliance to which additional savings for GBO compliance might be attributed
- Statement identifying limiters to energy model accuracy + ROM estimate for swing in accuracy of pEUI
- Additional materials as required to illustrate compliance with GBO R+Rs Section 4.04

For certificate of occupancy:
- Preliminary commissioning report for systems and features included for GBO compliance
GBO Submittals: New Buildings:
Part 2: Additional Green Buildings Options

e. Building certification

All requirements from Part 1a General + Part 1b Cool Roof, plus:

For superstructure construction permit

• Scorecard showing all targeted credits under one of the certification systems listed below, illustrating that the project as designed is tracking towards achievement of GBO required level of certification

Within 18 months after certificate of occupancy

• USGBC documentation (LEED BD+C Gold or higher) or
• Enterprise documentation (Enterprise Green Communities certification) or
• Home Innovation Research Labs documentation (National Green Building Standard Gold or higher)
• USGBC documentation (LEED Core & Shell Gold with 2+ points using Optimize Energy Performance Option 1 in Energy + Atmosphere). Include energy model.
GBO Submittals: New Buildings:

Part 2: Additional Green Buildings Options

f. Combination green space + renewable energy

All requirements from Part 1a General + Part 1b Cool Roof, plus,

- All requirements from Part II Additional Green Buildings Options a. Green space, plus
- All requirements from Part II Additional Green Buildings Options b. On-site solar
GBO Submittals: New Buildings:

Part 2: Additional Green Buildings Options

g. Combination green space + off-site renewable

All requirements from Part 1a General + Part 1b Cool Roof, plus,

- All requirements from Part II Additional Green Buildings Options a. Green space, plus
- All requirements from Part II Additional Green Buildings Options c. Off-site solar
Part 2: Additional Green Buildings Options

h. Combination green space + 5% decreased energy

All requirements from Part 1a General + Part 1b Cool Roof, plus,

- All requirements from Part II Additional Green Buildings Options a. Green space, plus
- All requirements from Part II Additional Green Buildings Options d. 12% decreased energy consumption (adjusted to 5%)
GBO Submittals: New Buildings:
Part 2: Additional Green Buildings Options

i. Payment into green building fund

- All requirements from Part 1a General + Part 1b Cool Roof, plus:
  - For superstructure construction permit
    - Detailed calculations of green space required including dimensioned building and/or roof plan(s) where applicable
    - Payment when construction permit is pulled
Green Buildings Ordinance

Review Timeline + Process
Yes, Denver is enforcing the Green Buildings Ordinance!

- Plans review (Community Planning + Development)
- Inspections (Community Planning + Development)
- Post occupancy (Climate Team)
GBO Review Timeline: Existing Buildings

**Project team defines**
- 2 days

Project prepare submittal for permit
- 10 days

First review+ comments
- 2 days

Project team defines
- 5 days

Re-review+ comments if needed
- 2 days

Project team defines
- 5 days

Re-review+ comments if needed
- 2 days

Roof clear on permit if needed
- 2 days

**Intake**

*“days”=business days

Permit conveys key facets to inspections team
GBO Review Timeline: New Buildings

Project team defines

Project team prepare submittal for permit
*confirm clear on GBO + submittal requirements

Project team prepare resubmittal if needed

First review + comments

20 days

Project team defines

Project team prepare resubmittal if needed

2 days

Re-review + comments if needed

2 days

Re-review + comments if needed

10 days

Project team defines

Re-review + comments if needed

2 days

Re-review + comments if needed

10 days

"days" = business days

Intake

Intake if needed

Intake if needed

Intake

Superstructure construction permit

Permit conveys key facets to inspections team

Project team achieve all CD approvals