

DENVER'S GREEN BUILDINGS ORDINANCE



Denver Botanic Gardens

FEB 5TH, 2019

HANDOUTS

DRAFT GREEN BUILDINGS RULES & REGS

ARTICLE III. Cool Roofs

3.01 In General

New and existing buildings and additions containing 25,000 SF or more GFA upon a roof replacement or recover of more than 5% of the total or individual roof area requires a cool roof.

3.02 Coverage Requirements

- (a) New Buildings or applicable additions. Must provide a cool roof, except as specifically exempted in Section 3.04
- (b) Existing Buildings. Only that portion of total roof area or roof section being replaced or recovered must provide a cool roof, except as specifically exempted in Section 3.04

3.03 Roof Covering Material Requirements

- (a) Applicability. Roof covering materials shall contain a minimum solar reflectance in accordance with Table 1 for a new roof, roof replacement, or roof recover of new or existing buildings containing 25,000 square feet or greater of gross floor area. Roof covering materials shall meet at least one of the values identified in Table 1; materials do not have to meet all four values.
- (b) Requirements

Table 1.

Low Sloped Roofs (Slope less than 2:12)				
	Initial Minimum Reflectance	3-Year Minimum Reflectance	Initial SRI Minimum	3-Year SRI Minimum
Low Slope roofs (except materials specified below).	0.70	0.55	78	64
Low Slope metal roofs	0.50	not available	not available	not available
Low Slope concrete pavers or a concrete surface or stone roofs	0.20	not available	not available	not available
Character defining roof	See Section 3.04(a)	See Section 3.04(a)	See Section 3.04(a)	See Section 3.04(a)
Steep Sloped Roofs (Slope 2:12 or greater)				
Steep Slope roofs (except materials specified below)	0.25	0.15	39	32
Clay or Concrete roof tile installed on elevated battens	None Required	not available	not available	not available
Character defining roof	See Section 3.04(a)	See Section 3.04(a)	See Section 3.04(a)	See Section 3.04(a)

NOTE: Owners may apply for an administrative modification when proposing specific roof materials not itemized or included in the above table.

- (i) Where a roof recover or roof replacement project introduces a cool roof where none previously existed, the roof shall be demonstrated, or modified, to meet one of the following designs:
 - (1) **Steep sloped roofs** shall be designed and installed to meet IBC 1203.2 Ventilation Requirements.
 - (2) **Low sloped roofs** shall be designed and installed to include at least a Class III vapor retarder at the roof deck in addition to an air barrier at the roof deck, a single layer may be used to provide both preventative measures. The roof shall also be installed with insulation on top of the roof deck that exceeds the R-value of any interior insulation by a minimum of R-18 thermal insulating value, and all other requirements of the International Energy Conservation Code, as amended.
 - (3) **The roofing system shall be designed by a professional roofing consultant, architect, or engineer** who must submit an analysis of the existing roofing system. The analysis shall calculate and identify the dew-point and include a section-detail of the roofing system documenting the vapor retarder, air barrier and other roof components used to minimize condensation within the roof system.

3.04 Exceptions

- (a) **Character defining roof:** Where approved by the Building Official, the solar reflectance of roof covering materials for use on a character-defining roof may be reduced as is technically and financially feasible to allow the use of materials and colors in keeping with the visual character of the building.
 - (i) A submission requesting a character defining roof determination shall include the following, though the Building Official may ask for additional information:
 - (1) Roof plan (new buildings only or existing buildings if a roof plan exists)
 - (2) Photographs of the building and roof from public vantage points (existing buildings only)
 - (3) Elevations (new buildings only – as photographs would not exist)
 - (4) Demonstration of at least one of the following criteria:
 - a. The roof is or will be highly visible and contributes to the architectural identity of the building or its context.
 - b. There are certain roof features important to the profile of the building against the sky or its background, such as cupolas, multiple chimneys, dormers, cresting, or weather vanes.
 - c. The roofing material, color or patterns (such as patterned slate tile) are distinctive.
 - d. The roof is identified as being an integral part of the building's character and an identified feature for any historically designated building in its designation materials. Such historical designation may be local, state or national.
 - (5) The application shall also include general information about the proposed roofing materials, color and finish, the materials' solar reflectance, and the importance of the roof in context of the building or its location.
 - (6) Any other information the Building Official requests in order to make a determination.

- (ii) The Building Official will use the following process to determine whether a roof is a character defining roof:
 - (1) CPD staff shall review all submitted materials to determine if the above criteria are applicable and if the definition of character defining roof is met.
 - (2) The review team shall, at minimum, consist of at least three staff: a member of the Landmark Preservation team, an architectural/structural plan reviewer, and a member of the urban design team. Other staff may be consulted as deemed necessary. The team shall prepare a recommendation to the Building Official who shall have the final determination if the roof may or may not be characterized as a character defining roof.
 - (3) Upon a determination that the roof is a character defining roof, then a roofing permit may be issued using the information provided by the customer.
 - (4) Upon a determination that the roof is not a character defining roof, then the owner shall be notified and must make a resubmittal to provide roofing materials that comply with the cool roof provisions identified above before a roofing permit may be issued.
 - (5) The determination of the Building Official shall be appealable to the Board of Appeals per the Denver Building and Fire Code.
- (b) **In the case of a roof recover of a non-cool roof, where the roof system analysis (item 3.03(b)(i)(3) above) determines that the existing roof would need to be replaced to control condensation, the roof section analyzed is exempt from meeting cool roof requirements.**
- (c) **The following roofs and portions of roofs are exempt from the requirements of Table 1:**
 - (i) Portions of the roof that include or are covered by the following:
 - (1) **Photovoltaic systems** or components.
 - (2) **Solar air or water-heating systems** or components.
 - (3) **Vegetated roofs.**
 - (4) **Above-roof decks or walkways.** The roof below the deck or walkway need not be a cool roof, but the deck and walkways themselves must be made of materials meeting the cool roof standard.
 - (5) **HVAC systems and components**, and other opaque objects mounted above the roof.
 - (ii) **Roof covering materials that are swimming pools, sport surfaces** (such as tennis courts) and glazing.
 - (iii) **Portions of the roof shaded** during the peak sun angle on the summer solstice by neighboring buildings or other portions of the same building.
 - (iv) **Portions of roofs that are ballasted** with a minimum stone ballast of 15 pounds per square foot or, in the case of an existing ballasted roof, the weight of ballast for which the roof was originally designed.
 - (v) The solar reflectance of roof covering materials for use on a visible roof, as defined in Section 1.03 may be reduced for no more than 10% of the total roof area unless a roof is determined to be a character defining roof.
 - (vi) A roof section, as defined in Section 1.03, where not less than 75 percent of the roof covering materials comply with this Section.

Example Projects as applied to Green Buildings Ordinance

Project 1 (3-Story Small Commercial Office - 7,000 SF gross area per floor)

- Step 1: Need Denver licensed roofing contractor (d Commercial)
- Step 2: Fill Out Green Buildings Declaration Form
- Step 3: EXEMPT FROM GBO Entirely – select system
- Step 4: Online or Counter Permit for roofing
- Step 5: Other permits as required
- Step 6: Pre-roof inspection
- Step 7: install a roof (with proper inspections)
- Step 8: Done!

Project 2 (4-story multi-family residential - 10,000 SF gross area per floor)

- Step 1: Need Denver licensed roofing contractor (d Commercial)
- Step 2: Fill Out Green Buildings Declaration Form
- Step 3: EXEMPT FROM GBO except cool roof requirement – select system, including proper cool roofing product. May need consultant for system design.
- Step 4: Online Permit for roofing
- Step 5: Other permits as required
- Step 6: Pre-roof inspection
- Step 7: install a roof (with proper inspections)
- Step 8: Done!

Project 3 (1-story Retail store - 50,000 SF gross floor area)

- Step 1: Need Denver licensed roofing contractor (d Commercial) AND applicable green roof, landscaping, Plumbing, and irrigation licenses
- Step 2: Fill Out Green Buildings Declaration Form
- Step 3: Not EXEMPT FROM GBO – select cool roof system, and green/energy/fee compliance option. May need consultant for system design.
- Step 4: Online Permit for roofing
- Step 5: Other permits as required
- Step 6: Pre-roof inspection
- Step 7: install a roof (with proper inspections)
- Step 8: Done!



Include this form with permit applications for a roof replacement/recover on buildings of 25,000 square feet or more in gross floor area (GFA) and for additions of 25,000 – 49,999 square feet to an existing building. For additions of 50,000 square feet or more, use the “New Buildings” form available at www.denvergov.org/greenroofs.

Log number: _____

I. Project Description

- Roof recover only Roof replacement Addition (25,000 - 49,999 ft² of GFA)

Address: _____

II. Cool Roof Requirement

Submittal requirements for cool roofs, character-defining roofs, and condensation analyses are listed in the Rules and Regulations at www.denvergov.org/greenroofs. Include that documentation with this application to ensure a timely start to your review. Attach additional pages if more space is needed.

- Exempt:** This is a roof recover only, and an analysis of the roof system shows a cool roof will cause condensation.
- Exempt:** This roof replacement/recover is for 5% or less of the total roof area or section in any calendar year.
- Other exemption** as listed in Article III of the Rules and Regulations. List and submit appropriate documentation:

All other projects:

- Low-sloped roof (slopes less than 2:12) Steep-sloped roof (slopes 2:12 or steeper)

New roof material(s) and manufacturer(s): _____

Initial solar reflectance: _____ Solar reflectance at three years (or N/A if unknown): _____

Initial solar reflectance index (SRI): _____ SRI at three years (or N/A if unknown): _____

III. Exemptions from Additional Green Building Requirements

If this project meets one of the exemptions listed below, skip to the end, Section V. Signatures and Contact Information.

- Roof recover only
- Roof replacement/recover for 5% or less of the total roof area or section in any calendar year
- Residential building with five or fewer stories or less than 62.5 feet in height
- Emergency roof replacement due to fire or wind damage. Hail damage is not considered an emergency.
- Existing green roof that will be reinstalled. Existing permit number for green roof: _____
- The building or campus has already complied with the ordinance and is still in compliance. Building permit or project record number (e.g., COMMCON, Project Master, SDP, Energy Master Plan): _____
- Before November 2, 2019, only:** This roof is being replaced due to hail damage and the property owner is demonstrating they had insurance to cover the cost of meeting new code requirements, but the coverage is insufficient to meet the costs of this ordinance and the policy is not yet due for renewal. Insurance policy documents must be included with this application.

IV. Compliance Options

Select which option (A-G below) will apply to this building. For the selected option, cross-reference the submittal requirements listed in the Rules and Regulations at www.denvergov.org/greenroofs and include that documentation with your application.

Gross floor area (GFA): _____

Total roof area: _____

Gross Floor Area (GFA):
Calculate GFA the same as under the building code, minus any area used exclusively to park or store vehicles. For additions, only include the GFA of the addition.

Total Roof Area:
The square footage of all roofs and roof sections on a building. Do not include roofs covering stories below grade.

A. Green space amounting to at least (choose one):

Total roof replacement / Additions

- 2% of the building or addition's GFA
- 18% of the total roof area, or
- All available roof area.

OR

Replacing roof section(s)

- $\frac{(2\% \text{ of the building GFA} \times \text{roof section area})}{\text{total roof area of the building}}$
- 18% of the roof section(s), or
- All available area on the roof section(s).

B. Payment to the green building fund of \$50 per square foot of green space required but not provided. Make sure to select a green space amount from option A. If selecting "all available roof area," please specify the available square footage: _____ ft.²

C. Solar panels located on the building or lot amounting to at least (choose one):

Total roof replacement / Additions

- 5% of the building or addition's GFA
- 42% of the total roof area, or
- An amount capable of generating 100% of the building's estimated average annual electricity use.

OR

Replacing roof section(s)

- $\frac{(5\% \text{ of the building GFA} \times \text{roof section area})}{\text{total roof area of the building}}$
- 42% of the roof section(s), or
- An amount capable of generating 100% of the building's estimated average annual electricity use.

D. Green building certification, e.g., LEED Silver, Enterprise Green Communities, the National Green Building Standard (NGBS) Silver, or an equivalent program: _____

E. **Option for additions only:** This addition is designed to use less energy, as measured by an estimated energy cost savings of at least 4% above building code requirements for the addition.

F. **Option for roof replacements only:** By checking this box, this building is enrolling in the Energy Program. The building owner will have five years, starting from June 1 following their enrollment date, to achieve one of the following options:

- An ENERGY STAR score of 85 or higher.
- Installation of solar panels located onsite, as detailed in option B above, or an off-site solar purchase equivalent to 100% of the electricity used in the building.
- A 10% improvement in energy use intensity (EUI) for buildings between 25,000 and 49,999 square feet.
- A 15% improvement in EUI for buildings of 50,000 square feet or more.



Review the Energy Program requirements located online at www.denvergov.org/EnergizeDenver > Energy Program. Enrolling in the Energy Program is valid for 20 years or through one roof replacement, whichever is longer.

G. **Option for roof replacements only:** This building is already enrolled in the Energy Program.

V. Signatures and Contact Information

I understand that the cool roof and compliance options selected above will apply to this building for the duration of its existence, according to the Green Buildings Ordinance as set out in Article XIII, Chapter 10 of the Denver Revised Municipal Code.

Applicant name: _____

Relationship to project: _____

Building Owner. Owner signature can be a photocopy, scan, or image saved as a PDF of the original signature.

Owner name: _____ Phone: _____ Date: _____

Owner signature: _____ Email: _____

If enrolling in the Energy Program, who will be the primary contact leading the building's participation?

Name and position: _____

Email: _____

Phone: _____

Submit this form with the building plans for any new building of 25,000 square feet or more in gross floor area (GFA) or any addition of 50,000 square feet or more in GFA. For smaller additions, use the "Existing Buildings" form available at www.denvergov.org/greenroofs.

Record number: _____

I. Project Description

- New building ≥ 25,000 ft² of GFA Addition ≥ 50,000 ft² of GFA

Address: _____

II. Cool Roof Requirement

Submittal requirements for cool roofs and character-defining roofs are listed in the Rules and Regulations at www.denvergov.org/greenroofs. Include this documentation with your permit application to ensure a timely start to your review.

- Low-sloped roof (slopes less than 2:12) Steep-sloped roof (slopes 2:12 or steeper)

Roof material(s) and manufacturer(s): _____

Initial solar reflectance: _____ Solar reflectance at three years (or N/A if unknown): _____

Initial solar reflectance index (SRI): _____ SRI at three years (or N/A if unknown): _____

III. Compliance Options

- Exempt.** This project is exempt from choosing a compliance option because it is a residential building with five or fewer stories and is under 62.5 feet in height. Skip the rest of Section III: Compliance Options.

Select which compliance option (A - I) will apply to this project. For the selected option, cross-reference the submittal requirements listed in the Rules and Regulations on the green roofs webpage and include that documentation with your plans.

Gross floor area (GFA): _____

Total roof area: _____

Gross Floor Area (GFA):
Calculate GFA the same as under the building code, minus any area used exclusively to park or store vehicles. For additions, only include the GFA of the addition.

Total Roof Area:
The square footage of all roofs and roof sections on a building. Do not include roofs covering stories below grade.

- A. **Green space** amounting to at least (choose one):
- 10% of the building or addition's GFA,
 - 60% of the total roof area, or
 - All *available* roof area.
- B. **Solar panels** located on the building or zone lot amounting to at least (choose one):
- 70% of the total roof area, or
 - An amount capable of generating 100% of the building or addition's estimated average annual electricity use, or



Other renewable energy devices providing similar generation capacity.

C. **Net-zero-energy** building

D. Purchase of **off-site renewable energy** from Xcel Energy's Solar*Rewards Community®. The minimum contract term is five years, which must be renewed for the life of the building. Choose one:

- This renewable energy will provide 100% of the building/addition's estimated average annual electricity use.
- Or, this renewable energy will provide the same amount of electricity that would have been provided with onsite solar panels AND this structure is designed to use less energy, as measured by an estimated energy cost savings of at least 6% above building code requirements.

E. This building/addition is designed to use less energy, as measured by an estimated **energy cost savings of at least 12%** above building code requirements.

F. **Green building certification**, e.g., LEED Gold, Enterprise Green Communities, National Green Building Standard (NGBS) Gold, or an equivalent program: _____

G. This building is **part of a campus** that has already submitted plans to comply with the Green Buildings Ordinance. Project record number (e.g., Project Master, SDP, Energy Master Plan): _____

H. A **combination** of green space and another compliance option. Green space amounting to at least (choose one):

- 3% of the building or addition's GFA,
- 18% of the total roof area, or
- All *available* roof area.

And one of the following four options:

- i. Solar panels in an amount listed below or other renewable energy devices generating energy equivalent to solar panels if provided in an amount listed below (choose one):
 - 7% of the building or addition's GFA,
 - 42% of the total roof area, or
 - All *available* roof area.
- ii. Use of off-site renewable energy from Xcel Energy's Solar*Rewards Community®. The minimum contract term is five years, which must be renewed for the life of the building. Purchased renewable energy must provide the same amount of electricity that would have been provided with onsite solar panels AND the structure must be designed to use less energy, as measured by an estimated energy cost savings of at least 2.5% above building code requirements.
- iii. This building/addition is designed to use less energy, as measured by an estimated energy cost savings of at least 5% above building code requirements.
- iv. An alternative combination of green space and on-site solar panels, with at least 30% of the area being green space, amounting to a total coverage of at least (choose one):
 - 10% of the building or addition's GFA,
 - 60% of the total roof area, or
 - All *available* roof area.



- I. **Payment to the green building fund** of \$50 per square foot of green space required but not provided. Make sure to also select a green space amount from either option A or H. If selecting "all available roof area," please specify available square footage: _____ ft.²

IV. Signatures and Contact Information

I understand that the cool roof and compliance options selected above will apply to this building for the duration of its existence, according to the Green Buildings Ordinance as set out in Article XIII, Chapter 10 of the Denver Revised Municipal Code.

Applicant name: _____

Relationship to project: _____

Building Owner. Owner signature can be a photocopy, scan, or image saved as a PDF of the original signature.

Owner name: _____ Phone: _____ Date: _____

Owner signature: _____ Email: _____

Designee. Several compliance options (e.g., net zero, purchasing off-site renewable energy, green building certifications, campuses) will require reporting and follow-up after the building is complete. If not the property owner, who will be the primary contact for confirming the building's continued participation?

Name and position: _____

Email: _____

Phone: _____

DENVER'S GREEN BUILDING ORDINANCE

NEXT STEPS?

1. Obtain any desired licenses to meet requirements.
2. Partner with licensed subcontractors to provide other services as needed to meet green building requirements in GBO.
3. Partner with one or more design professionals to meet cool roof design guidelines.
4. Inform customers of their responsibilities. Explain options and provide links to information and online forms on city website. Work with a consultant or the C&C of Denver as needed to answer questions.
5. Fill out your proper Green Building Declaration Form.
6. Get back to work!

REFERENCES

denvergov.org/greenroofs

Ordinance, declaration forms, submittal requirements, and rules and regulations.

denvergov.org/DS

Sign up for the "Code and Policy Alert" email list for updates on the rules and regulations, and other news that impacts building/zoning permits in Denver. (~1-2 emails/month)

COPY OF PRESENTATION

<http://coloradoroofing.org/member/education/>