Grey to Green Fund
Green Roof Technical Document

Summary/Description

This technical supplement supports Boulder County's Grey to Green (G2G) grant program by providing property owners, designers, and contractors with concise guidance for designing, installing, and maintaining successful green roofs. A green (or living) roof integrates vegetation atop a building to manage stormwater, reduce heat islands, elevate air quality, and support local biodiversity.
It outlines technical criteria and best practices aligned with G2G eligibility and grant requirements.

Definition, Types (Extensive vs. Intensive)

- **Extensive green roofs**: Lightweight, minimal soil depth (2–6 in.), drought-tolerant plantings.
- **Intensive green roofs**: Deeper planting media (>6 in.), supports richer plant diversity (shrubs/trees) and higher structural requirements.

Suitability in Boulder County

Green roofs are a highly effective nature-based solution in Boulder County's urban environment, and they can thrive even in our semi-arid climate when designed with the right strategies. They bring multiple benefits such as managing stormwater, reducing heat, and supporting biodiversity. At the same time, careful planning is essential to maximize these benefits and address regional considerations such as structural limitations, wildfire risk, and water-wise plant selection. This section outlines key local considerations to help ensure project success under the Grey to Green (G2G) grant program.

- Climate Considerations: Boulder County's semi-arid climate presents unique challenges for green roofs:
    - Low annual precipitation, high solar radiation, and intense summer heat require drought-tolerant and cold-hardy plant species.
    - Seasonal freeze-thaw cycles and strong winds at elevation can stress green roof systems.
    - Irrigation is necessary for establishment and long-term irrigation is highly recommended depending on plant selection and roof exposure.
    - Use high-albedo materials or integrate cool roof components to reduce solar heat gain and improve roof performance.
    - Snow loading considerations require additional structural reinforcement and proper drainage. More information available at Colorado Green Roofing Solutions.
- Structural Requirements: Before proceeding, applicants must confirm their building can support the added weight of a green roof system.
    - Extensive systems typically weigh 15–35 lbs/sq ft (saturated), while intensive systems may exceed 50+ lbs/sq ft.

    - A structural assessment by a licensed engineer is required for all new or retrofitted buildings
    - Reinforcement may be necessary for existing roofs.
- Waterproofing Requirements:
    - The green roof assembly must be built on a properly installed waterproof membrane.
    - A root barrier is required above the waterproof membrane to protect the membrane from damage from plant roots.
    - Drainage and filtration layers should be installed between the membrane and growing medium to ensure proper water flow without overloading the waterproofing system.
    - Designs must address wind uplift pressures (through engineer-stamped reports), overflow considerations, and load calculations to ensure the waterproofing component or soil volume is not compromised under stormwater load, wind or heavy weather. Ballast pavers or design elements may be required.
- Fire & Building Code Compliance: All green roof designs must comply with applicable building, fire, and energy codes
    - Ignition Resistant Construction requirements must be aligned with the minimum standards of the new Statewide Wildfire Resiliency Code. All jurisdictions are required to adopt these standards by April 2026, with an effective date no later than July 1, 2026.
    - Boulder County has adopted the **International Building Code (IBC)** with local amendments; applicants must ensure green roof components meet Class A roofing requirements. Applicants must meet the building requirements of the jurisdiction in which they are based.
    - Avoid flammable plant species and materials. Use fire-resistant vegetation (e.g., succulents, low-growing sedums, or native grasses with low biomass).
    - Include mineral aggregate borders (e.g., gravel) and firebreaks to reduce fire risk and meet code requirements.
- WUI/Wildfire Considerations: Projects located within or near the Wildland-Urban Interface (WUI) require additional scrutiny and are generally not recommended in Boulder County.
    - Green roof designs must follow Boulder County Wildfire Partners guidance and comply with WUI regulations for defensible space.
    - Any landscape design in the WUI must comply with defensible space requirements and Boulder County's Fire & Building Code.
- Other Design Considerations:
    - **Roof Slope:** Ideal pitch for snow-prone areas: 30° to 45° to prevent snow buildup and structural stress. Low-pitch or flat roofs (<15°) may lead to snow accumulation, requiring snow retention systems or reinforcements.
    - **Waterproofing & Drainage**: Green roofs require a durable, root-resistant waterproofing membrane with proper protection and detailing to prevent leaks and ensure longevity.
    - **Planting:** Use hardy, drought-tolerant, regionally adapted plants suited to shallow soils and rooftop conditions.

- **Solar Panels:** When paired with solar panels, green roofs perform best with low-growing, non-reflective plants that minimize glare, enhance cooling, and maintain access.
- **Irrigation:** Use efficient irrigation systems as needed, focusing on drought-tolerant plants to minimize water use.
- **Maintenance:** Green roofs require periodic inspection, weeding, and plant replacement to ensure long-term health.

Resources

- CSU Green Roof Research
- Green Roofs for Healthy Cities
- Denver Green Building Ordinance
- Green Roofing Solutions Colorado
- Green Roof Plants at Denver Botanic Gardens