



# GREEN BUILDING SYSTEMS

**CAUTION**

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CONSTRUCTION WASTE RECYCLING MANAGEMENT

**LIVING MACHINE** rammed earth **Vegetated Roof** SLAG

Solar Reflective Index **STORMWATER MANAGEMENT**

bio-swale **Living Wall** **Photovoltaic Panels** retention pond

**COMPOSTING** Embodied Energy **portland cement** Radiant barrier

**PERVIOUS PAVING** EVACUATED TUBE SOLAR COLLECTORS  
Fenestration

PRE-INDUSTRIAL RECYCLED CONTENT **GRAYWATER** REC's

**forest stewardship council** UREA FORMALDEHYDE **Electric Vehicle**  
Sedimentation

**THERMAL MASS** heat transfer **SMART GROWTH**  
aquifer

**POST-CONSUMER RECYCLED CONTENT**

HEPA filter high-efficiency toilet (HET) Salvaged Materials **Silt fencing**

**Solar Thermal** xeriscaping **Non-potable water** Light Pollution  
glazing

**CONSTRUCTED WETLAND** deconstruction **RAINWATER HARVESTING**

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# VEGETATED ROOFING





# What is it?

According to the Environmental Protection Agency (EPA), Vegetated Roofing systems use foliage and a lightweight soil mixture to absorb, filter, and detain rainfall. They typically include layers of drainage material and planting media on a high-quality waterproof membrane.



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# Types of systems

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## EXTENSIVE

- Shallow soil base
- Typically planted with sturdy, short root vegetation like sedums
- Often require less maintenance
- Lighter system means roof does not need to be designed much different in relation to load



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# Types of systems

## INTENSIVE

- Deeper soil base for a wider variety of vegetation including shrubs and small trees
- Typically 6" to 12"+ of soil
- Very similar to a garden bed
- Often requires more maintenance



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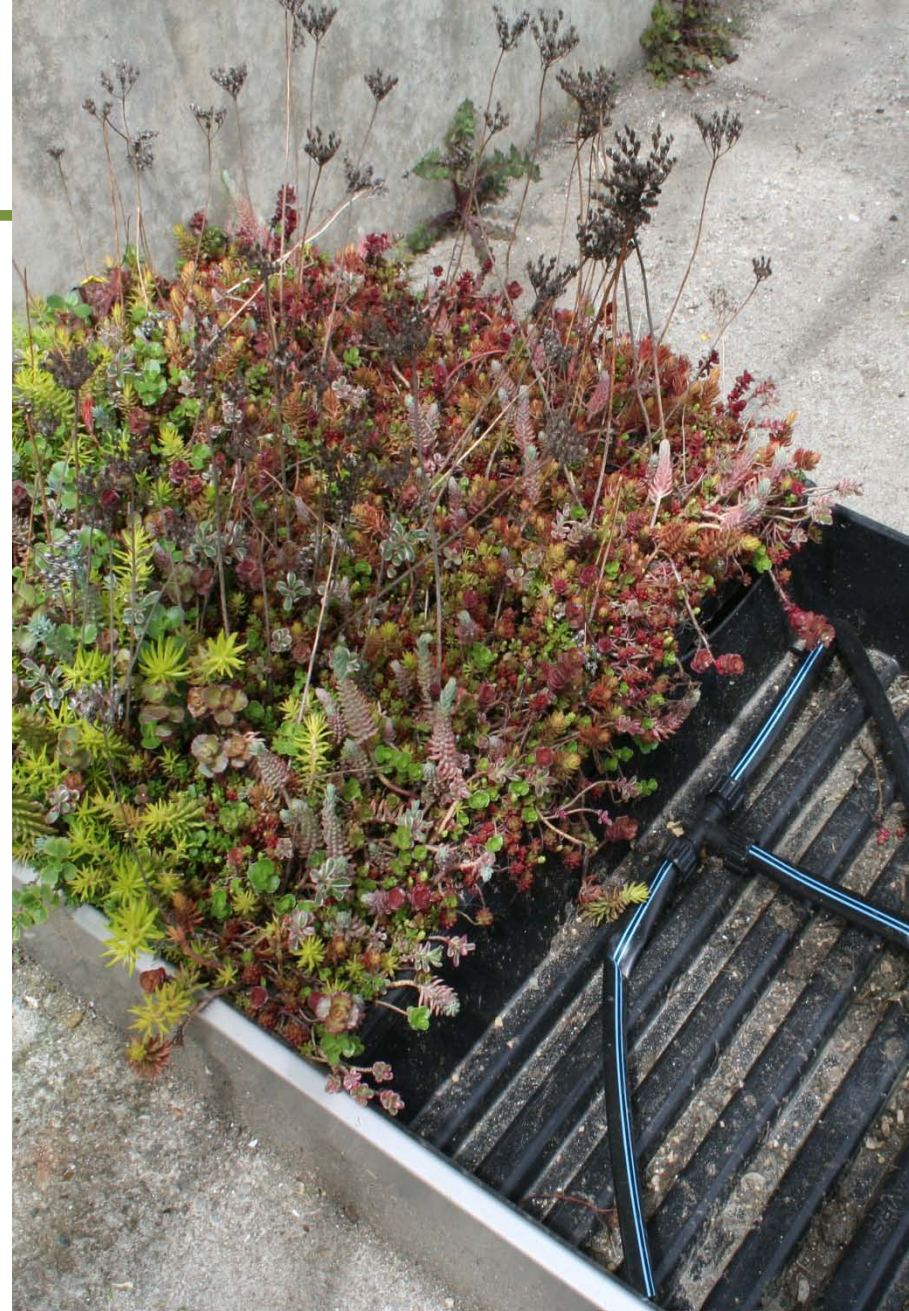


# Types of systems

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## TRAYS

- Often have extensive soil depths
- Prefabricated system
- Easy to install, replace and maintain
- Irrigation can be integrated into tray system



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# How is it Constructed?

- Where is it located?
- Which trades may experience a new situation?
- How is it sequenced?
- What equipment & materials are involved?
- How is it installed?
- How is it operated & maintained



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# Installation



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# Operation & Maintenance



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# Top 9 Most Frequently Cited OSHA Standards

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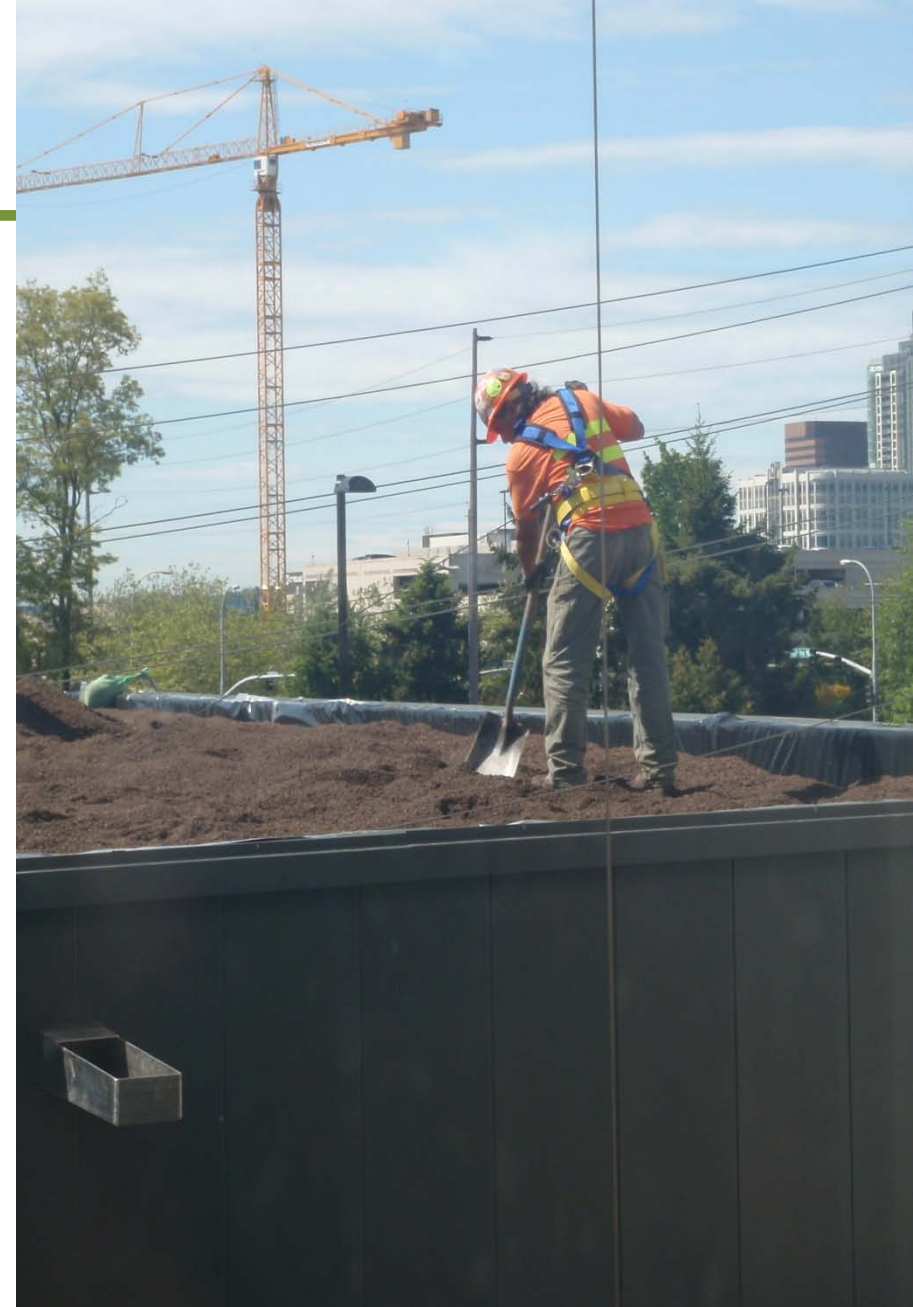
- ☒ Scaffolding, general requirements, construction
- ☒ Fall Protection, construction
- ☒ Hazard communication standard, general industry
- ☒ Control of hazardous energy (lockout/tagout), general industry
- ☐ Electrical, wiring methods, components and equipment, general industry
- ☐ Powered industrial trucks, general industry
- ☒ Ladders, construction
- ☐ Electrical systems design, general requirements, general industry
- ☐ Machine guarding (machines, general requirements, general industry)





# Ensuring Safety

- Access
- Fall Protection
- Material Delivery
  - Placement
  - Point Loading
  - Overhead Protection
  - Hoisting
  - Equipment Conveyance
- Environmental Factors



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# SKYLIGHTS



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# What is it?

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Skylights are openings in the roof that allow daylight to enter a given space. While skylights are not new, green building projects integrate skylights and daylighting more frequently than typical construction projects.



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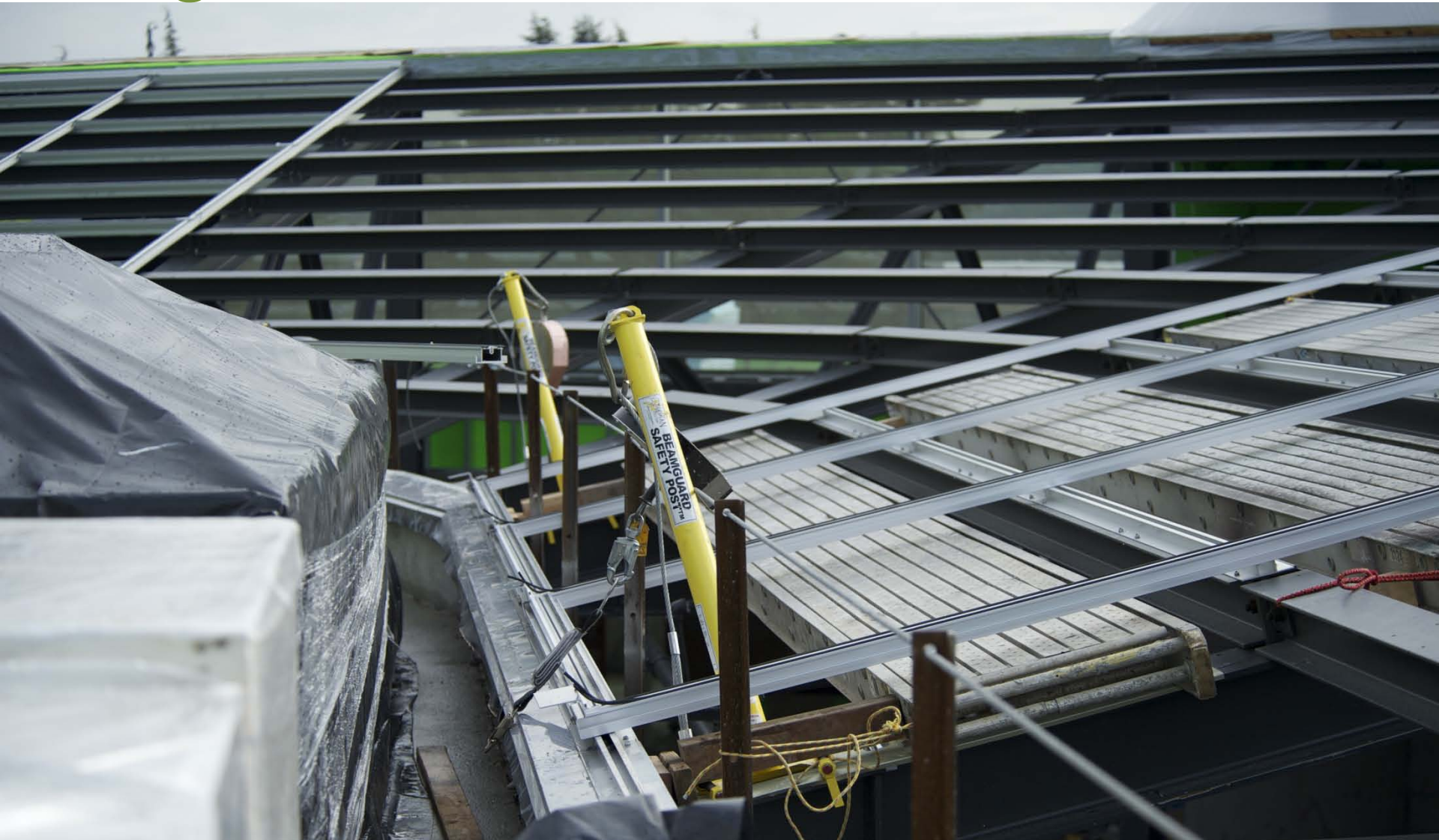
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# Large Installations



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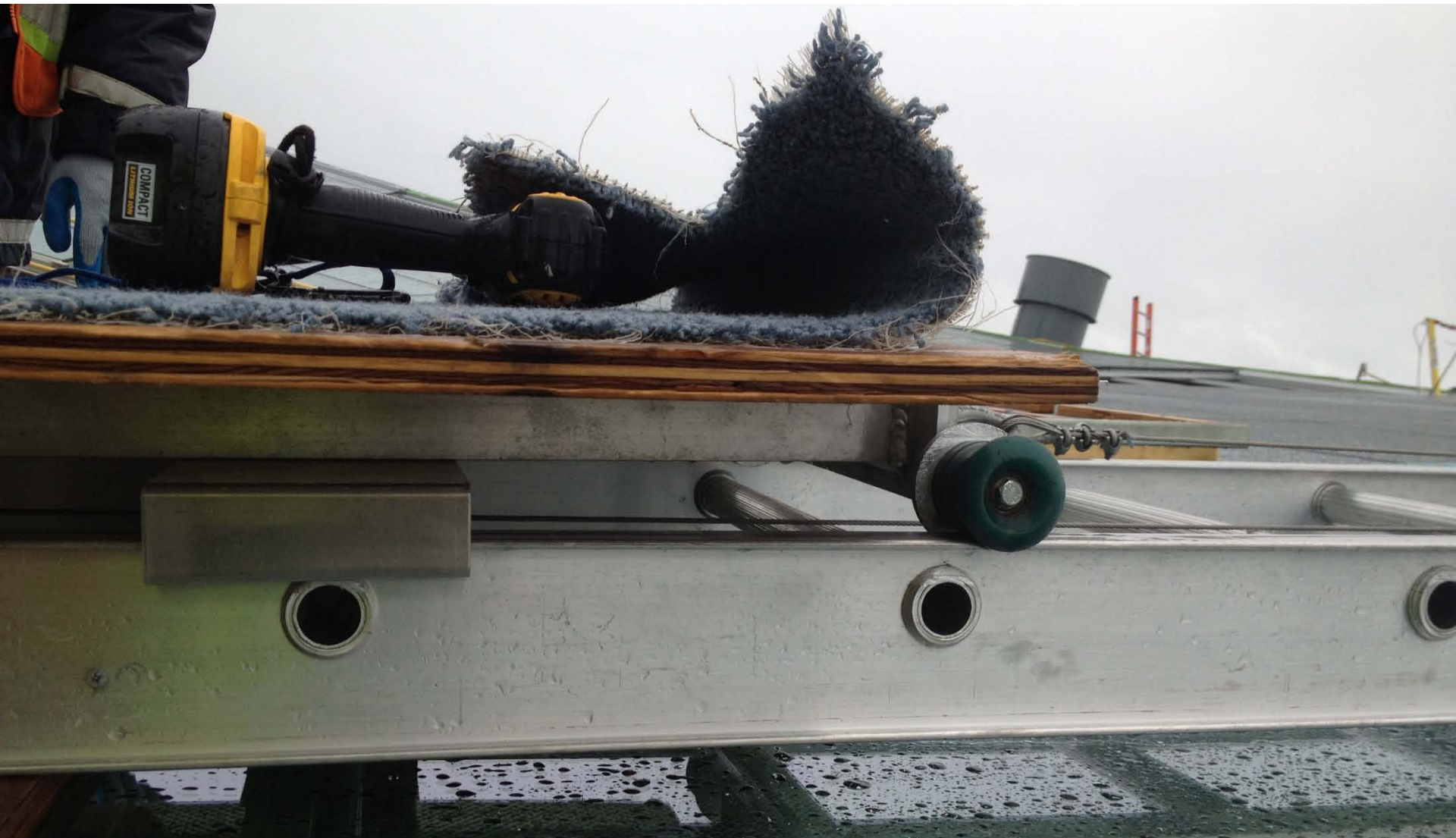
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# Large Installations



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# Unique Safety Concerns

- Large installations
- Glass of varying sizes
- Bends and curves in roof
- Steep sloped roof
- Additional green building systems integrated into roof design



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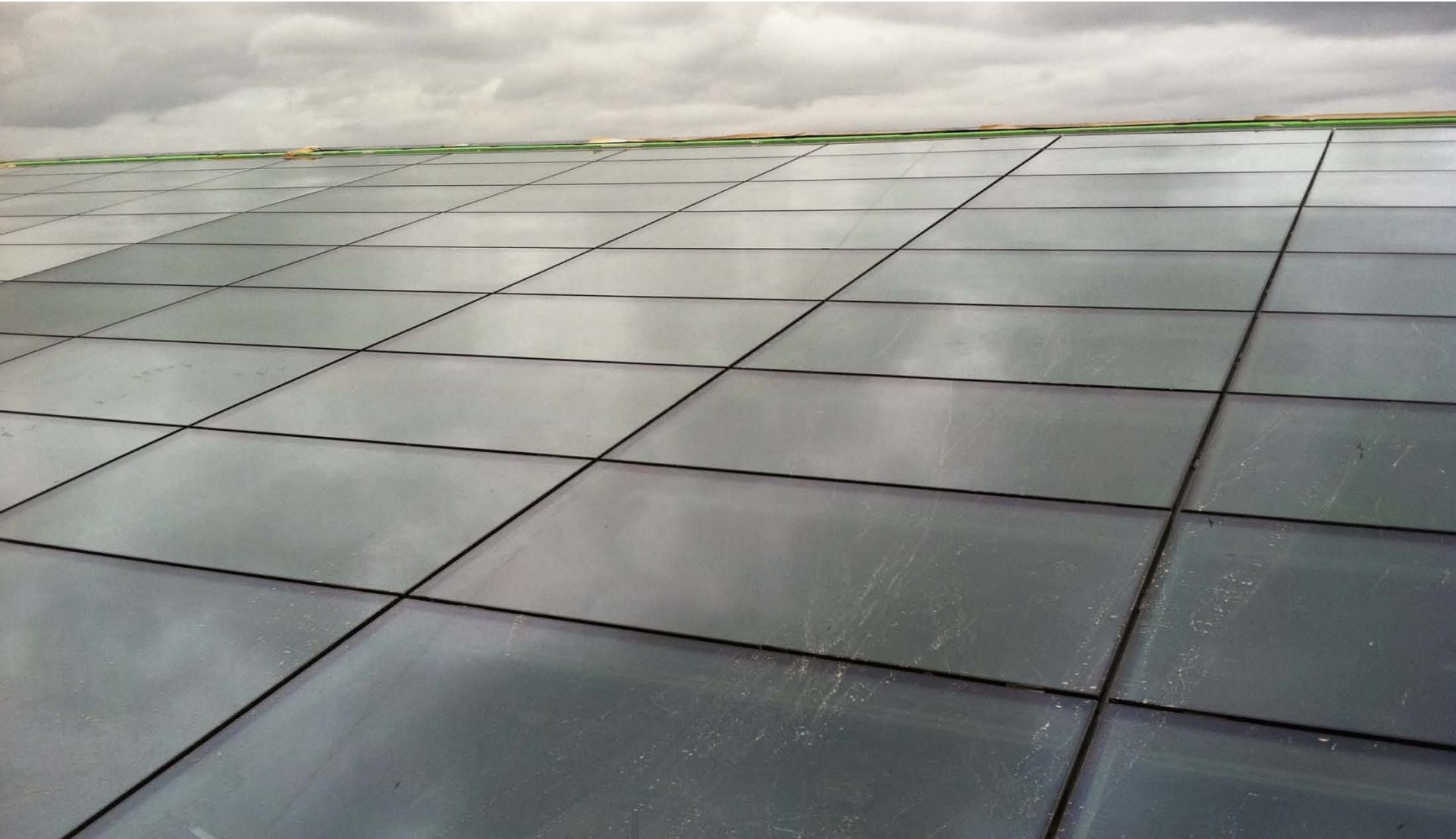
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# Operation & Maintenance



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# Ensuring Safety

- Fall Protection
- Overhead Protection
- Access
- Scheduling
- Material Delivery
  - Rigging
  - Point Loading
  - Pinch points / Caught between
- Rescue & Retrieval
- Environmental Factors



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# EXTERIOR SHADING DEVICES



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# What is it?

Exterior shading devices are being installed on green building projects to prevent heat, from the sun's rays, from entering the building. Exterior shading devices allow daylight to enter a space while keeping direct sunlight and heat out, using nature to reduce cooling and lighting demands.



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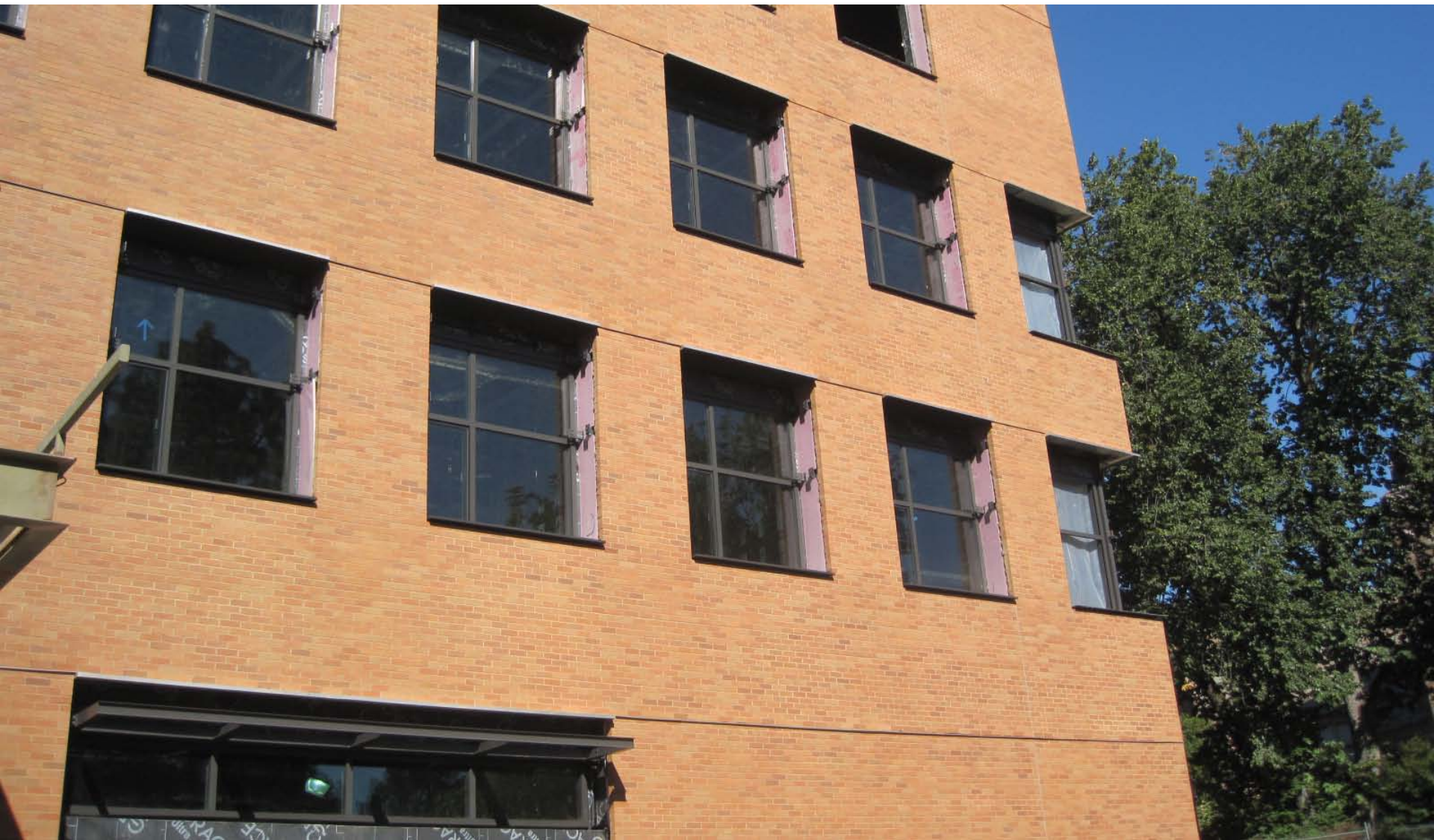
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# Ensuring Safety

- Access
- Sequencing
- Material Handling
  - Hoisting
  - Overhead Protection
  - Pinch point / Caught between
- Fall Protection
- Environmental Factors



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