

GREEN GUIDELINES FOR RENOVATIONS

UNIVERSITY OF PENNSYLVANIA



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Purpose of these guidelines:

The intent of these guidelines is to improve environmental practices for building renovation projects across campus, including the Morris Arboretum, the New Bolton Center, UPHS projects, and Penn Real Estate Projects. The Guidelines are to be followed throughout all phases of applicable renovation projects, and apply to project design, specification, and construction.

When to use the guidelines:

At the outset of the project, and no later than the project kick-off meeting, the Project Team is to review the following matrix to determine applicability of these Guidelines.

FIVE QUESTIONS	YES	NO
1. Is the total project construction budget greater than \$7 million?		
2. Is the total renovated project area greater than 10,000 sq.ft?		
3. Does the renovation project involve more than one building system (HVAC, plumbing, lighting, etc.)?		
4. Does the renovation involve more than 3 specification divisions? (for example, Section 06 Wood, 09 finishes, 12 furnishings, etc.)		
5. Will an outside design professional be hired?		

If the Project Team answers YES to *all five* of these questions, the policy is to design, construct, and certify the renovation project to at least the Silver level under LEED™ for Commercial Interiors. In addition, any project with a construction budget over \$4 million and 10,000 sf should be *considered* for LEED certification. Exception: If the project does not meet the USGBC's [Minimum Program Requirements](#), the project is not required to meet LEED certification. The project boundaries and schedule are among the factors to be considered in determining the USGBC's Minimum Program Requirements.

If the Project Team answers YES to *fewer than five* of these questions, and the project construction budget is at least \$100,000, University policy is to follow these Renovation Guidelines in lieu of LEED Certification.

Project Kick-off Meeting:

The Penn Project Manager will include a review of project goals, including sustainability goals, as part of the kick-off meeting agenda, and ensure that the project team is aware of all requirements of Penn's *Instructions to Design Professionals*. At the outset of the project, and no later than the project kick-off meeting, the Project Team shall identify a "Green Guidelines Coordinator" (GGC) for the project, as follows:

- For LEED projects, the A/E Team shall designate a member of the consultant team as a LEED coordinator who fulfills the duties as the GGC;
- For projects that require an outside design professional that are not seeking LEED certification, the design professional, or A/E, shall designate a member of their staff to fulfill the duties of the GGC;
- For projects that do not have an outside design professional, these responsibilities of the GCC will be performed by a designated member of the School / Center staff;
- For projects performed by the FRES O&M Small Projects Group, the GGC shall be designated by O&M management and the School / Center.

Green Guidelines for Renovations

These guidelines are intended to identify the most important environmental criteria for use in project design, the selection of materials and products; and management and construction renovation projects.

01 General Requirements

A. Policy Statement

- i. Guidelines are to be followed unless budget or schedule would be severely and adversely affected. When any deviations from any aspects of the Guidelines are identified, they must be justified by the School / Center project representative in a written document forwarded to the University Architect and the Penn Sustainability Director at the earliest possible time. This document is to be included in the project closeout documents.
- ii. Some Schools within the University have developed specific standards for design, engineering, and product selection that should be followed in addition to these University-wide Guidelines. The School-specific design standards are intended to be complementary to both the USGBC's LEED rating system and the University's Green Renovations Guidelines. In the event of any confusion or ambiguity, the GGC should review the issue with the Project Team at the earliest opportunity.
- iii. For projects that contain extensive matching of existing materials, finishes, or furnishings, the GGC should review the environmental performance of those existing materials for compliance with the Green Guidelines and present the information to the Project Team. When existing materials do not meet the Green Guidelines, the Project Team will determine if a wholesale replacement of the materials is justified, and/or if there is an alternate compliant material that could be used. Use of non-compliant materials is considered an exception to the Guidelines, and should be documented in the project file with an explanation by the GGC, and the explanation sent via e-mail to the University Architect and the Penn Sustainability Director.

B. Responsibility

- i. These Guidelines are referenced as part of the Penn *Instructions to Design Professionals*, and as such compliance with the Guidelines is the responsibility of all parties identified in Project contracts, including design consultants and subconsultants, contractors and construction managers, and project trades and service providers.
- ii. The primary consultants for design and construction are responsible for ensuring that all subconsultants comply with the Guidelines in terms of reporting, submittals, and providing the documentation required.
- iii. The Penn Project Manager is responsible for ensuring that the design consultants and construction/construction management team are apprised of and comply with these Guidelines, and is responsible for coordinating resolution of all questions arising from application of these Guidelines with the Project Team.
- iv. It is the responsibility of the Penn School and Center administrators to ensure that the project site is prepared for renovation, and to ensure that remediation of hazardous materials and site cleanup are either identified as part of the project scope or completed prior to the execution of the renovation work.

C. Maintenance Manuals and Instructions. The Penn Project Manager is to coordinate with Penn Area Managers and other key FRES staff to:

- i. Ensure that all building engineering and building systems information (such as engineering equipment operation manuals and maintenance recommendations) is provided to and received by appropriate Penn Operations and Maintenance personnel;
- ii. Coordinate training on all installed or purchased equipment with appropriate FRES and building administration staff;

- iii. The Penn PM will coordinate with the contractor to provide submittal materials / guidelines for cleaning and maintenance of newly installed interior finishes with FRES Housekeeping leadership and the building administration staff.
- D. Commissioning and Minimum Energy Performance. The GGC shall:
- i. Coordinate the goals for commissioning and energy performance with the project team at the start of the project, in consultation with the Penn Director of Engineering and Energy Planning in the O&M Department at FRES. If a consulting commissioning agent is part of the project team, this consultant is to be managed by the Penn Project Manager.
 - ii. The project team is responsible for developing an energy reduction plan for the renovation in consultation with the Penn Director of Engineering and Energy Planning
 - iii. Ensure that the design consultants follow the requirements for building systems set out in Penn's [Penn Engineering Standards](#);
 - iv. Ensure that the design consultants specify [Energy Star](#) rated equipment and appliances. (If [Energy Star](#) does not rate the type of equipment needed, products selected / specified must be in the top 25% of its type or classification.)
 - v. Ensure that the design team investigates opportunities for Pennsylvania Act 129 energy efficiency rebates as part of all building system upgrades and replacements.
- E. Indoor Air Quality during Construction
- i. The GGC shall ensure that the project specifications follow the recommended control measures of Chapter 3 of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, latest Edition.
 - ii. Protect new and existing materials from moisture damage during construction.
- F. Construction/Demolition Waste Management & Jobsite Recycling
- i. Recycle and/or salvage a minimum of 75% of nonhazardous construction and demolition debris.
 - ii. A construction and demolition waste plan is to be coordinated with School or Center leadership at the start of the project, and is to include a list of all materials that are to be salvaged or reused within the project. The Contractor shall coordinate reuse, salvage, recycling, donation, and/or disposal of all equipment, furniture, and movable items within the project scope in coordination with the GGC.
 - iii. Provide recycling and waste containers to accommodate the anticipated quantities of demolition and construction waste, and jobsite recycling, throughout the duration of the project. Recycling may include, and is not limited to, electronic and electrical waste (fluorescent tubes, lighting equipment, wiring, old equipment, and electronics), construction & demolition waste (drywall, carpet, lumber, ceiling tiles, metals, etc.), and jobsite waste such as bottles, cans, and cardboard, which can be recycled in Penn's single-stream recycling system. The GGC shall ensure there is an appropriate location for these containers in the project space during demolition, construction, and fit out, and follows the guidelines posted on the University's [recycling website](#).
 - iv. Construction and demolition waste quantities are to be reported monthly to the GGC and project Team. Reporting is to include, by weight, all waste delivered to landfills and all waste diverted from landfills through recycling, reuse, donation, composting, or other diversion strategies. All waste data, including recycling, donation, and other diversion strategies, are to be included in the Penn project close-out documents.
 - v. The GGC is to collect all construction and demolition waste data and report monthly to the FRES O&M Urban Parks Director.

Resources:

Ben's Attic (for recycling office equipment & furniture within Penn):

<http://www.upenn.edu/almanac/volumes/v57/n13/attic.html>

Revolution Recovery (construction & demolition waste management):

<http://www.revolutionrecovery.com>

E-Force Compliance (for certified electronics recycling, universal waste, and construction/demolition waste): <http://eforcecompliance.com/>

Elemental, Inc. (for electronics recycling) <http://www.leminc.com>

The Habitat ReStore (for furniture and unused building materials):

<http://www.habitatphiladelphia.org/habitat-philadelphia-restore/donate-restore>

- G. Third Party Certifications to ensure indoor air quality of finished spaces: All furniture, furniture systems, carpets, resilient flooring, other flooring and floor covering, acoustic ceilings, paints, stains, coatings, caulks, adhesives, sealants, primers, and wall coverings used in Penn renovation projects shall comply with one or more of the following certifications and standards. If certifications are not available for specified product types, the design consultant is to verify that the products meet or are equal to the following standards for indoor environmental quality.
- i. [BIFMA level Certification](#): level® is the multi-attribute, sustainability standard and third-party certification program for the furniture industry.
 - ii. [California Section 01350](#): offers guidance to ensure that pollutant concentrations in a finished space do not exceed certain maximum levels. The Collaborative for High Performance Schools (CHPS), a California-based consortium, maintains a list of products with pollutant emission rates that meet the standard.
 - iii. [CRI Green Label Plus](#): The Green Label Plus program from the Carpet and Rug Institute (CRI) identified carpets and pads tested to show very low emissions of VOCs. Adhesives must also comply.
 - iv. [Floor Score](#): FloorScore® was developed by the Resilient Floor Covering Institute (RFCI) together with Scientific Certification Systems (SCS) to test and certify flooring products for compliance with stringent indoor air quality emission requirements adopted in California.
 - v. [GREENGUARD Indoor Air Quality Certification Program](#): The GREENGUARD Indoor Air Quality Certification Program lists products that meet strict chemical emissions limits, which contribute to the creation of healthier interiors.
 - vi. [Green Seal GS-11](#): The Green Seal Standard for Paints and Coatings GS-11 establishes environmental requirements for paints and coatings.
 - vii. [Green Seal GS-47](#): The Green Seal Standard for Stains and Finishes GS-47 establishes requirements for stains and finishes.
 - viii. [NSF 140 Platinum](#): a rating system with varying levels of certification to define sustainable carpet.
 - ix. [South Coast Air Quality Management District Rule 1168](#) for coatings, adhesives, sealants, and primers.
- H. Definitions
- i. Recycled materials terminology
 - a. Postconsumer recycled material is defined as waste material generated by households or by commercial, industrial, and/or institutional facilities in their role as end-users of the project, and which can no longer be used for its intended purpose.

- b. Preconsumer recycled material is defined as material diverted from the waste stream during the manufacturing process. Reutilization of materials (i.e., rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it) is excluded.
- ii. FSC: Wood or wood products certified in accordance with the [Forest Stewardship Council's](#) principles and criteria
- iii. LEED-CI: USGBC's [Leadership in Energy and Environmental Design for Commercial Interiors](#). Reference to LEED-CI in this document means the most current, applicable version.
- iv. VOC: Volatile Organic Compounds

03 Concrete

For interior concrete work, the intent should be to replace Portland cement (which has an extremely high carbon footprint) with a natural or recycled pozzolan to the greatest degree possible for the specific application. The design specification for interior concrete is to provide the following data:

- A. The percentage of post-industrial pozzolan (fly ash, blast furnace slag, or other materials) cement substitution as a percentage of the full product composite by weight.
- B. The percentage of post-industrial and post-consumer recycled content aggregate.
- C. The percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.
- D. The location where all products were manufactured and where the raw materials were harvested, extracted, or recovered.
- E. For projects using reusable or FSC certified formwork, provide chain-of-custody documentation and other data as required.
- F. MSDS product information data showing that form release agents meet any environmental performance goals.

06 Wood and Plastics

- A. Composite wood and panel products (plywood, particleboard, etc.):
 - i. Products shall have no added urea formaldehyde.
 - ii. Panel adhesives shall be low-emitting with a maximum VOC content of 50 g/L.
- B. Wood Trim, Custom Casework, Paneling, Veneer, etc.: Wood should be from [FSC](#) sources or from salvaged sources.
- C. Location of harvest: Use wood harvested or salvaged within 250 miles of campus.
- D. Countertops: Provide products that are GREENGUARD Indoor Air Quality Certified or whose emissions are less than the Full Levels listed in GREENGUARD Indoor Air Quality (IAQ) Standard for Building Materials, Finishes and Furnishings.

07 Thermal and Moisture Protection

- A. Interior Sealants: Use interior sealants with a maximum VOC of 250 G/l¹¹ (as required to meet South Coast Air Quality Management District (SCAQMD) Rule 1168)

08 Doors

- A. All existing doors should be evaluated for potential reuse as the preferred strategy in renovation projects.
- B. For wood used in new doors: follow guidelines in Section 06.
- C. Composite wood & panel products in doors: follow guidelines in Section 06.

¹¹ SCAQMD Rule 1168

* Exceptions to this requirement are to be documented in the project file with an explanation by the GGC, and sent via e-mail to the University Architect and the Penn Sustainability Director.

09 Finishes

- A. Gypsum Board
 - i. Specify synthetic gypsum board as preferred to virgin gypsum sourcing
 - ii. Recycled Content: Preconsumer 10% minimum
- B. Acoustical Ceiling Tile
 - i. Recycled Content:
 - a. Preconsumer: 10% minimum
 - b. Postconsumer: 25% minimum
 - ii. Reflectivity, in areas with windows: 90% minimum
- C. Wood Flooring:
 - i. See Section 06
 - ii. Cork Flooring products must be [GREENGUARD Indoor Air Quality Certified](#)
- D. Ceramic Tile: Recycled content, postconsumer: 25%
- E. Resilient flooring, epoxy flooring, and other hard flooring
 - i. All hard flooring must meeting the requirements of the [FloorScore®](#) standard or be [GREENGUARD Indoor Air Quality Certified](#)
 - ii. Adhesives: see Section 09.H below for VOC content limits of adhesives
 - iii. Use resilient sheet products with 35% recycled content, minimum (20% postconsumer).*
 - iv. Recycled Content: Preconsumer ,10% minimum
 - v. Epoxy flooring is to meet SQAMD Rule 1113 for VOC mixed compounds.
- F. Carpet
 - i. Use Products that meet [CRI GreenLabel Plus](#) and are certified to [NSF 140 Platinum](#)
 - ii. Use products that have a minimum of 10% postconsumer recycled content
 - iii. All carpet adhesives must have less than 50g/L VOC.
- G. Carpet Backing
 - i. Use Products that meet the CRI GreenLabel Plus
 - ii. Recycled content: Postconsumer, 20% minimum
 - iii. Use backing from a manufacturer that provides closed loop recycling.*
- H. Adhesives: Use products that are [GREENGUARD Indoor Air Quality Certified](#) or use product with the following maximum emissions limits:

ARCHITECTURAL APPLICATIONS	VOC LIMIT (grams /liter)
Indoor Carpet Adhesives	50
Carpet Pad Adhesives	50
Outdoor Carpet Adhesives	150
Wood Flooring Adhesives	100
Rubber Floor Adhesives	60
Subfloor Adhesives	50
Ceramic Tile Adhesives	65
VCT and Asphalt Tile Adhesives	50
Drywall and Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesive	70

* Exceptions to this requirement are to be documented in the project file with an explanation by the GGC, and sent via e-mail to the University Architect and the Penn Sustainability Director.

I. Paint

- i. VOC: Paints and coatings must be [GREENGUARD Indoor Air Quality Certified](#) or have VOC content limits that meet those established in [Green Seal Standards GS-11, Paints](#)
- ii. Reflectivity: In spaces with windows, provide paint whose reflectivity is a minimum of:
 - a. Walls: 80% reflectivity on at least 75% of wall surfaces
 - b. Ceilings: 90% reflectivity
- iii. Clear wood finishes, floor coatings, stains, primers, sealers, and shellacs must be [GREENGUARD Indoor Air Quality Certified](#) or have VOC content limits that meet the [South Coast Air Quality Management District \(SCAQMD\) Rule 1113, Architectural Coatings](#), (summarized below):

INTERIOR COATING TYPE	VOC LIMIT (grams /liter)
Clear Wood Finishes	275
Varnish	50
Sanding Sealers	150
Wood Flooring Adhesives	100
Lacquer	60
Floor Coatings, including epoxy coatings	50
Primer Sealers & Undercoaters	100

10 Specialties

Toilet Compartments: Recycled content, postconsumer, 50% minimum

11 Equipment

- A. All new appliances, office and lab equipment, mechanical equipment, windows, ceiling and exhaust fans, and other items shall be Energy Star labeled when such ratings exist.
- B. Appliances and equipment that are more than 10 years old are to be replaced with Energy Star labeled units when such ratings exist
- C. If Energy Star is not appropriate or applicable, specify the most energy efficient option which meets other requirements

12 Furnishings

- A. Casework: See Section 06
- B. Textiles
 - i. Provide products that are [GREENGUARD Indoor Air Quality Certified](#) or whose emissions are less than the full levels listed in the REENGUARD IAQ Standard
 - ii. Provide products with at least 50% postconsumer recycled content or 50% natural material.*
- C. Window Treatments
 - i. Provide products that are [GREENGUARD Indoor Air Quality Certified](#) or whose emissions are less than the full levels listed in the REENGUARD IAQ Standard
 - ii. Products must be PVC-free
 - iii. Recycled content: Postconsumer, 25%
 - iv. Microbial and fungal resistant

* Exceptions to this requirement are to be documented in the project file with an explanation by the GGC, and sent via e-mail to the University Architect and the Penn Sustainability Director.

- D. Furniture
 - i. When appropriate, re-use existing or salvaged and refurbished pieces
 - ii. All new office furniture must meet the requirements BIFMA [level®](#) certification or be [GREENGUARD Indoor Air Quality Certified](#)
 - iii. All furniture must be PVC Free
 - iv. Wood in furniture: follow guidelines in Section 06
 - v. Where possible, provide products whose construction includes 50% easily recyclable parts.
- Emissions: Contaminant emissions from furniture should not exceed the following limits:

Contaminant	Emissions Units - Systems Furniture	Emissions Limits - Seating
TVOC	0.5 mg/m ³	0.25 mg/m ³
Formaldehyde	50 parts per billion	25 parts per billion
Total Aldehydes	100 parts per billion	50 parts per billion
4-Phenylcyclohexene (4-PCH)	0.0065 mg/m ³	0.00325 mg/m ³

Table 12D. Indoor Air Concentrations Chemical Contaminant (from LEED-CI)

32 Mechanical

Refer to [Penn Engineering Standards](#)

33 Electrical

- A. Refer to [Penn Engineering Standards](#)
- B. Other requirements:
 - i. Daylight Controls: Install daylight responsive controls in all regularly occupied spaces within 15 feet of windows and under skylights. Daylight controls must switch or dim electric lights in response to the presence or absence of adequate daylight illumination.
 - ii. Occupant controls: Consider individual lighting controls for regularly occupied spaced to enable adjustments to suit individual workstations and designing to a lower level of ambient lighting
 - iii. Task/Ambient Lighting: Consider providing task lighting at individual workstations and designing to a lower level of ambient lighting
- C. Lamp types: avoid use of incandescent bulbs. Consider use of high efficiency lamps / bulbs such as LEDs and compact fluorescents.

34 Plumbing

- A. Refer to [Penn Engineering Standards](#)
- B. Use [EPA WaterSense](#) listed fixtures where available and feasible

35 Cleaning Materials

- A. Coordinate cleaning requirements and practices with Penn Facilities Area Manager.
- B. Provide products that can be cleaned using the following guidelines for the maximum contaminant concentrations:

Contaminant	Emissions Limits - Seating
Formaldehyde	50 parts per billion
Particulates (PM10)	50 mg/m ³
TVOC	500 mg/m ³
4-Phenylcyclohexene (4-PCH)	6.5 mg/m ³
Carbon Monoxide (CO)	9 parts per million and do greater than 2 parts per million above outdoor levels

Table 18A: Maximum contaminant levels for cleaning materials (From LEED-CI)