

GREEN GUIDELINES FOR RENOVATIONS

UNIVERSITY OF PENNSYLVANIA



October 2015

GREEN GUIDELINES FOR RENOVATIONS

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 the project’s 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 to fulfill the duties described in this document:

- For LEED projects, the A/E team shall designate the LEED coordinator, and an additional GGC is not needed;
- For projects that require an outside design professional that are not seeking LEED certification, the A/E team shall designate the GGC;
- For projects that do not have an outside design professional, the 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 focus on the most important environmental aspects in project design and implementation: best practices in construction management and the selection of materials and products that provide for healthy, easily maintained interior spaces.

01 General Requirements

- A. Organization and Scope:
 - i. These guidelines are organized by specification section, and where noted, mandate compliance with all significant work in each section. Incidental work (for example, a partial ceiling removal to access HVAC equipment) does not come under the scope of these Guidelines.
 - ii. Scope: The Green Guidelines for Renovations (GGR) CHECKLIST is appended at the end of this document to assist the project team identify the scope of the GGR for each project. The CHECKLIST is to be used to identify applicable portions of this document and streamline the reporting process to the University Architect and Penn Sustainability Director. At the start of each project, the GGR CHECKLIST should be submitted to the Penn Project Manager and forwarded to the Penn Sustainability Director.
- B. Policy Statement
 - i. Guidelines are written to include best practices in design and construction, be consistent with other Penn standards, and to be cost neutral to the design professionals, other consultants, and contractors. When deviations from any aspects of the Guidelines are identified, they must be justified by the School / Center project representative using the GGR CHECKLIST forwarded to the University Architect and the Penn Sustainability Director at the earliest possible time. This document is also 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 Guidelines. Penn's Green Renovations Guidelines are intended to be complementary to both the USGBC's LEED rating system and any School-specific design standards. 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 and explained in the GGR CHECKLIST, and recorded in the project file.
- C. 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.
- D. 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. Coordinate with the contractors, FRES Housekeeping leadership, and the building administration staff to ensure that all submittal materials and/or guidelines for cleaning and maintenance of interior finishes are provided and received by appropriate Penn staff.
- E. Commissioning and Minimum Energy Performance
- There are a number of ongoing energy reduction initiatives being carried out on campus. Each School and Center, for example, is working to develop an energy reduction plan for all of their buildings by 2019. The FRES O&M team is identifying opportunities for applying for Pennsylvania Act 129 energy efficiency rebates during every renovation project.
- For each renovation project, the GGC shall:
- i. Coordinate the goals for energy performance and commissioning 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 and in accordance with the building energy reduction plan, if available. Because commissioning decisions are made on a case-by-case basis, depending on the complexity and scope of each project, Penn's Recommissioning Program Manager is to be invited to the kick-off meeting of any project over 10,000 sf or as deemed appropriate by the Penn PM.
 - ii. Ensure that the design consultants follow the requirements for building systems set out in Penn's [Penn Design Standards](#);
 - iii. Ensure that the design consultants specify [Energy Star](#) rated equipment and appliances. (If [Energy Star](#) does not rate the type of equipment, products are to be selected / specified with energy efficiency as a primary concern.)
 - iv. Ensure that the design team meets the requirements (if any) of previously identified PA Act 129 energy efficiency rebates.
- F. 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.
- G. Indoor Air Quality (post construction). The GGC shall ensure that the design professional specify all furniture, furniture systems, carpets, flooring, acoustic ceilings, paints, stains, coatings, caulks, adhesives, sealants, primers, and wall coverings to comply with one or more of the following third party 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 and/or bring the lack of compliance to the attention of the Penn PM. (Note: in small renovations, this requirement does not apply to *de minimus* amounts of materials that are incidental to the project completion.)
- 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. Waste & Jobsite Recycling

The General Contractor or Construction Manager (GC/CM) is primarily responsible for jobsite recycling.

- i. The GGC shall ensure that the GC/CM provides manifests to the Penn Project Manager documenting that a minimum of 75% of total non-hazardous construction and demolition debris is recycled and/or salvaged.
- ii. Jobsite Waste Management Plan: The GC/CM is to provide a construction and demolition waste plan to the Penn PM to be coordinated with School or Center leadership at the start of the project. The GC/CM 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, and make sure that jobsite personnel are familiar with Penn's recycling practices and the project waste plan.
- iii. Facilitating jobsite recycling: Provide recycling and waste containers to accommodate the anticipated quantities of demolition and construction waste and 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. For more information, see the guidelines posted on the University's [recycling website](#).
- iv. Reporting: construction and demolition waste quantities are to be reported monthly to the GGC and project Team and is also to be included in the Penn Close-out Documents. Reporting is to include, by weight, all waste delivered to landfills and all waste diverted from landfills through recycling, reuse, donation, composting, and all other diversion strategies.
- v. The GGC is to provide monthly reports of all construction and demolition waste data to the Penn PM, to be forwarded to the FRES O&M Urban Parks Director.

Waste & Recycling 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>**I. Definitions****i. Recycled materials terminology**

- a. Postconsumer recycled material is waste material generated by households or by commercial, industrial, and/or institutional facilities in their role as end-users, 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 or production 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: 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**[Specification Section 02, Existing Conditions, is not included in these guidelines]****03 Concrete**

The cement industry accounts for 5% of the greenhouse gasses emitted worldwide due to the enormous amount of energy required to produce Portland cement. Reducing the amount of cement in concrete used at Penn by replacing it with recycled or renewable materials is a goal of these guidelines. Note that projects with no concrete work or incidental patching work do not have to meet these Guidelines.

For projects with significant amounts of concrete work (projects that have concrete delivered by a mix truck), the design mix provided is to replace at least 20% of all cementitious material by weight with fly ash, ground granulated blast furnace slag, or other recycled materials. For some high-performance applications, fly ash may account for 70% to 100% of the pozzolan materials.

The design specification for interior concrete is to provide the following data:

- A. The amount of post-industrial pozzolan (fly ash, blast furnace slag, or other materials) cement substitution as a percentage of the full product composition by weight.
- B. The percentage of post-industrial and post-consumer recycled content aggregate.
- C. MSDS product information data for form release agents.

Projects using wood formwork for concrete shall ensure that the formwork is FSC Certified.

[Specification Sections 04, Metals, and 05, Masonry, are not included in these Guidelines]

06 Wood and Plastics

Locally reused or recycled wood products are the most preferred options in all cases.

- A. New 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. FSC Certification: New Wood Trim, Custom Casework, Paneling, Veneer, etc. is to be [FSC](#) certified.
- C. Location of harvest: Wood harvested or salvaged within 250 miles of campus is generally available for trim work and furniture, and is preferred.
- D. Plastic Laminate 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

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 in the project 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.

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.

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.

- 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

- 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

* 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.

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 evaluated for efficiency and are to be considered for replacement 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
- 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.
 - vi. Emissions: Contaminant emissions from furniture should not exceed the limits in the chart below. New furnishing must be tested in accordance with ANSI/BIFMA Standard Method M7.1-2011. Comply with ANSI/BIFMA e3-2011 Furniture Sustainability Standard, Sections 7.6.1 and 7.6.2, using either the concentration modeling approach or the emissions factor approach. (Note, all systems furniture and seating that was manufactured, refurbished, or refinished more than one year prior to occupancy is considered compliant with these emissions 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)

* 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.

33 Utilities (Including Operations and Maintenance of Utilities, HVAC, Electrical, and Plumbing)

- A. Refer to [Penn Engineering Standards](#)
- B. Other requirements:
 - i. Daylight Controls: Daylight responsive controls are the preferred option for reducing wasted lighting energy use and are to be considered 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 spaces 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
 - iv. Lamp types: avoid use of incandescent bulbs. Consider use of high efficiency lamps / bulbs such as LEDs and compact fluorescents.
 - v. Use EPA [WaterSense](#) listed fixtures where available and feasible.
 - vi. Where a new drinking fountain is required by code, install a combined water fountain / water bottle filler, with chiller and filter, in accordance with Penn Standards. In office settings where drinking fountains are not provided but a drinking water source is requested, filtered and chilled drinking water is to be provided by a filtered water unit at a break room sink or through the installation install a Quench or Aqua Pure filtered tap water dispenser. Coordinate installation with Penn's Operations & Maintenance staff and follow the plumbing section of the Penn Standards. Water coolers that require delivery of five-gallon bottles are not to be used in any case.

General Cleaning Materials and Requirements

- A. Coordinate cleaning requirements and practices with Penn Facilities Area Manager.
- B. Provide products and finishes that can be cleaned with cleaning products and methods that meet one or more of the following standards:
 - i. Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes;
 - ii. Environmental Choice CCD-110, for cleaning and degreasing compounds;
 - iii. Environmental Choice CCD-146, for hard-surface cleaners;
 - iv. Environmental Choice CCD-148, for carpet and upholstery care;
 - v. Green Seal GS-40, for industrial and institutional floor care products;
 - vi. Environmental Choice CCD-147, for hard-floor care;
 - vii. EPA Design for the Environment Program's Standard for Safer Cleaning Products; and/or Cleaning devices that use only ionized water or electrolyzed water and have third-party verified performance data equivalent to the other standards mentioned above (if the device is marketed for antimicrobial cleaning, performance data must demonstrate antimicrobial performance comparable to EPA Office of Pollution Prevention and Toxics and Design for the Environment requirements, as appropriate for use patterns and marketing claims).



Project Name: _____ Project Number: _____

I have read and am familiar with the Green Guidelines for Renovations (GGR).
<http://www.facilities.upenn.edu/sites/default/files/Green%20Guidelines%20for%20Renovations%20Jan%202015.pdf>

A: This section is to be filled out at the time of the Capital Needs Statement:

Based on the FIVE QUESTIONS on Page 1 of the GGR, will this project be designed to meet *LEED CI Certification* or the *Penn Green Guidelines for Renovations*?

- LEED CI Certification
- Penn Green Guidelines for Renovation

B: This section is to be filled out at the time of the Project Kick-Off Meeting:

If the project will meet the Penn Green Guidelines for Renovations, please note if the following sections of the GGR are applicable to the project. If they are not applicable, provide a brief note documenting why the project is exempted and forward to the Office of the University Architect and Sustainability Director for review.

Y / N

Section 01.E: Commissioning and Minimum Energy Performance

Section 01.F: Indoor Air Quality (during Construction)

Section 01.G: Indoor Air Quality and Third Party Certifications to ensure indoor air quality of finished spaces (post construction)

Section 01.H: Waste Management & Jobsite Recycling

