

SUSTAINABILITY - DRAFT

Washington University School of Medicine (WUSM) Design Standards addresses the following Sustainability Requirements:

**DESIGN SUSTAINABILITY GUIDELINES
SUSTAINABLE DESIGN REQUIREMENTS**

References:

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Standards References:

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DESIGN SUSTAINABILITY GUIDELINES

DESIGN GUIDELINES

1. As part of our commitment to sustainability, Washington University **has adopted a policy** that, at a minimum, all new buildings and renovations will be designed and constructed to incorporate green building guidelines based upon the following:
 - a. Projects under \$2 Million:
 - i. Green Building Guidelines shall be practiced. Design and Construction practices and all material selections and their installation shall comply in strict accordance with the US Green Building Council (USGBC).
 - b. Projects \$2 - \$5 Million:
 - ii. Green Building Guidelines shall be practiced and documented. Submission to the USGBC for LEED certification shall be optional, on a per project basis. Design and Construction practices and all material selections and their installation shall comply in strict accordance with the US Green Building Council (USGBC).
 - c. Projects \$5 Million and above:
 1. Green Building Guidelines shall be adhered to, documented, and submitted to the USGBC for certification and achieve a minimum level of LEED Silver under one of the following rating systems:
 - **LEED NC for New Construction, LEED CI for Commercial Interiors and LEED CS for Core & Shell.*** Projects will be reviewed in detail on an individual basis seeking Silver to Platinum status. The level of potential achievement will be determined for each project during the conceptual or preliminary design phase after completing a Washington University LEED Scorecard (**Appendix A**). All material selections and their installation shall comply in strict accordance with the US Green Building Council (USGBC).
***Out of date – now BD+C – Building Design and Construction, ID+C – Interior Design and Construction**
 2. In addition to performing basic scope of services, the architectural firm shall have on staff a LEED Accredited Professional (LEED AP) or employ a LEED AP to serve as a principle participant of the project team to serve as the principle facilitator for LEED compliance, directing the team members in achieving the highest possible rating, using the Owner's basis of design and to coordinate and monitor the documentation of the project. The scope of work includes the documentation and submission process to the USGBC from registration through certification. The principle LEED AP team member shall be familiar with the appropriate LEED **NC, CI and CS*** rating system and have **completed a minimum of two LEED projects**.
 3. The selected engineering firm(s) must also have a LEED AP on staff or employ a LEED AP to serve as a principle participant of the engineering project team and the engineering interface facilitator. The LEED AP team member shall also be familiar with the appropriate LEED **NC, CI and CS*** rating system and have **completed a minimum of two LEED projects**.
 4. At the beginning of each project, the Architect/Engineer/Owner shall review the project scope, confirming the type of building, project estimated cost and the appropriate rating system to apply,

followed by review and completion of the Washington University LEED Score Card ([Appendix A](#)). Implementation shall strictly adhere to the following SUSTAINABLE DESIGN REQUIREMENTS.

SUSTAINABLE DESIGN REQUIREMENTS

DESIGN GUIDELINES

1. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED certification based on [LEED-NC, Version 2.2. \(Now on v4.1\)](#)
 - a. Other LEED prerequisites and credits needed to obtain LEED certification depend on material selections and may not be specifically identified as LEED requirements used as one criterion to evaluate substitution requests and comparable product requests.
 - b. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
 - c. A copy of the LEED Project checklist is attached at the end of this Section for information only.
2. Terms used in this document shall be defined as follows:
 - a. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship: Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - b. LEED: Leadership in Energy & Environmental Design.
 - c. Rapidly Renewable Materials: Materials made from plants that are typically harvested within a 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
 - d. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only a percentage (by weight) shall contribute to the regional value.
 - e. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles from Project site. Manufacturing refers to the final assembly of components into the building product that is installed at Project site.
 - f. Regionally Extracted and Manufactured Materials: Regionally manufactured materials made from raw materials that are extracted, harvested, or recovered within a radius of 500 miles from Project site.
 - g. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

- i. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - ii. "Pre-consumer" material is defined as material diverted from the waste stream during manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.
 - h. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).
 - i. Spill and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
 - ii. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.
- 3. Submittals:
 - a. General: Submit additional LEED submittals required by other Specification Sections.
 - b. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
 - c. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project, excluding mechanical, electrical, and plumbing components, and specialty items such as elevators and equipment.
 - d. LEED Action Plans: Provide preliminary submittals within seven days of date established for commencement of the Work indicating how the following requirements will be met:
 - i. **Credit MR 2.1 and Credit MR 2.2:** Waste management plan complying with Division 01 Section "Construction Waste Management and Disposal".
 - ii. **Credit MR 4.1 and Credit MR 4.2:** List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 - iii. **Credit MR 5.1:** List of proposed regionally manufactured and extracted, harvested or recovered materials.
 - iv. **Credit MR 7:** List of proposed certified wood products. Indicated each product containing certified wood, including its source and cost or certified wood products.
 - v. **Credit EQ 3.1:** Construction indoor-air-quality management plan.
 - e. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:

- i. **Credit MR 2.1 and Credit MR 2.2:** Waste reduction progress reports complying with Division 01 Section "Construction Waste Management and Disposal".
 - ii. **Credit MR 4.1 and Credit MR 4.2:** Recycled content.
 - iii. **Credit MR 5.1 and Credit MR 5.2:** Regionally manufactured and regionally extracted materials.
 - iv. **Credit MR 7:** Certified wood products.
- f. LEED Documentation Submittals:
 - i. **Credit EA 5:** Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over time.
 - ii. **Credit MR 2.1 and Credit MR 2.2:** Comply with Division 01 Section "Construction Waste Management and Disposal".
 - iii. **Credit MR 4.1 and Credit MR 4.2:** Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
 - iv. **Credit MR 5.1 and Credit MR 5.2:** Product data indicating location of material manufacturer for regionally manufactured and extracted materials. Include statement indicating cost for each material.
 - v. **Credit MR 7:** Product data and chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.
 - vi. **Credit EQ 3.1:**
 - Construction indoor-air-quality management plan.
 - Product data for temporary filtration media.
 - Product data for filtration media used during occupancy.
 - Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 - vii. **Credit EQ 3.2:**
 - Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 - Product data for filtration media used during flush-out and during occupancy.
 - Report from testing and inspecting agency indicating results of indoor-air-quality testing procedures and requirement.
 - viii. **Credit EQ 4.1:** Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Indicate

VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- ix. **Credit EQ 4.2:** Product data for paints and coatings used inside the weatherproofing system indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Engage an experience LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PRODUCTS

1. Recycled Content of Materials:
 - a. **Credit MR 4.1 and Credit MR 4.2:** Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20 percent of cost of materials used for Project.
 - i. Cost of post-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 - ii. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 - iii. Do not include mechanical and electrical components in the calculation.
2. Regional Materials:
 - a. **Credit MR 5.1 and Credit MR 5.2:** Provide 20 percent of building materials (by cost) that are regional materials.
3. Certified Wood:
 - a. **Credit MR 7:** Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship".
4. Low Emitting Materials:
 - a. **Credit EQ 4.1:** For field applications that are inside the weatherproofing system, use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - i. Wood Glues: 30g/L.
 - ii. Metal to Metal Adhesives: 30g/L.
 - iii. Adhesives for Porous Materials (Except Wood): 50g/L.
 - iv. Subfloor Adhesives: 50g/L.
 - v. Plastic Foam Adhesives: 50g/L.
 - vi. Carpet Adhesives: 50g/L.

- vii. Carpet Pad Adhesives: 50g/L.
- viii. VCT and Asphalt Tile Adhesives: 50g/L.
- ix. Cove Base Adhesives: 50g/L.
- x. Gypsum Board and Panel Adhesives: 50g/L.
- xi. Rubber Floor Adhesives: 60g/L.
- xii. Ceramic Tile Adhesives: 65g/L.
- xiii. Multipurpose Construction Adhesives: 70g/L.
- xiv. Fiberglass Adhesives: 80g/L.
- xv. Contact Adhesives: 80g/L.
- xvi. Contact Adhesives: 80g/L.
- xvii. Structural Glazing Adhesives: 100g/L.
- xviii. Wood Flooring Adhesive: 100g/L.
- xix. Structural Wood Member Adhesive: 140g/L.
- xx. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250g/L.
- xxi. Top and Trim Adhesive: 250g/L.
- xxii. Plastic Cement Welding Compounds: 350g/L.
- xxiii. ABS Welding Compounds: 400g/L.
- xxiv. CPVC Welding Compounds: 490g/L.
- xxv. PVC Welding Compounds: 510g/L.
- xxvi. Adhesive Primer for Plastic: 650g/L.
- xxvii. Sheet Applied Rubber Lining Adhesive: 850g/L.
- xxviii. Aerosol Adhesive, General Purpose Mist Spray: 65 percent by weight.
- xxix. Aerosol Adhesive, General Purpose Web Spray: 55 percent by weight.
- xxx. Special Purpose Aerosol Adhesive (All Types): 70 percent by weight.
- xxxi. Other Adhesives: 250g/L.
- xxxii. Architectural Sealants: 250g/L.
- xxxiii. Non-membrane Roof Sealants: 300g/L.
- xxxiv. Single-Ply Roof Membrane Sealants: 450g/L.
- xxxv. Other Sealants: 420g/L.
- xxxvi. Sealant Primers for Nonporous Substrates: 250g/L.
- xxxvii. Sealant Primers for Porous Substrates: 775g/L.

- xxxviii. Modified Bituminous Sealant Primers: 500g/L.
- xxxix. Other Sealant Primers: 750g/L.
- b. **Credit EQ 4.2:** For field applications that are inside the weatherproofing system, use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
 - i. Flat Interior Topcoat Paints: VOC not more than 50g/L.
 - ii. Non-flat Interior Topcoat Paints: VOC not more than 150g/L.
 - iii. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250g/L.
 - iv. Clear Wood Finishes, Varnishes and Sanding Sealers: VOC not more than 350g/L.
 - v. Clear Wood Finishes, Lacquers: VOC not more than 550g/L.
 - vi. Floor Coatings: VOC not more than 100g/L.
 - vii. Shellacs, Clear: VOC not more than 730g/L.
 - viii. Shellacs, Pigmented: VOC not more than 550g/L.
 - ix. Stains: VOC not more than 250g/L.
 - x. Primers, sealers, and Undercoaters: VOC not more than 200g/L.
 - xi. Dry-Fog Coatings: VOC not more than 400g/L.
 - xii. Zinc-Rich Industrial Maintenance primers: VOC not more than 340g/L.
 - xiii. Pretreatment Wash Primers: VOC not more than 420 g/L.
 - xiv. Aromatic Compounds: Paints and coating shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - xv. Restricted Components: Paints and coatings shall not contain any of the following:
 - Acrolein
 - Acrylonitrile
 - Antimony
 - Benzene
 - Butyl Benzyl Phthalate
 - Cadmium
 - Di (2-ethylhexyl) Phthalate
 - Di-n-butyl Phthalate
 - Di-n-octyl Phthalate
 - 1, 2-Dichlorobenzene
 - Ethylbenzene
 - Formaldehyde
 - Hexavalent Chromium
 - Isophorone

- Lead
 - Mercury
 - Methyl Ethyl Ketone
 - Methyl Isobutyl Ketone
 - Methylene Chloride
 - Naphthalene
 - Toluene (Methylbenzene)
 - 1, 1, 1-Trichloroethane
 - Vinyl Chloride
- c. **Credit EQ 4.4:** Do not use composite wood or agrifiber products or adhesives that contain ureaformaldehyde resin.

EXECUTION

1. Refrigerant and Clean-Agent Fire-Extinguishing-Agent Removal:
 - a. **Prerequisite EA 3:** Remove CFC-based refrigerants from existing HVAC&R equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate new refrigerant as described in Division 23 Sections.
 - b. **Credit EA 4:** Remove clean-agent fire-extinguishing agents that contain HCFCs or halons and replace with agent that does not contain HCFSs or halons. See Division 21 Section "Clean-Agent Fire Extinguishing Systems: for additional requirements.
2. Measurement and Verification:
 - a. **Credit EA 5:** Implement measurement and verification plan consistent with Option B: Energy Conservation Measure Isolation or Option D: Calibrated Simulation, Savings Estimation Method 2 in the EVO's "International Performance Measurement and Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction".
 - b. If not already in place, install metering equipment to measure energy usage. Monitor, record, and trend log measurements.
 - c. Evaluate energy performance and efficiency by comparing actual to predicted performance.
 - d. Measurement and verification period shall cover at least one year of post construction occupancy.
3. Construction Waste Management:
 - a. **Credit MR 2.1 and Credit MR 2.2:** Comply with Division 01 Section "Construction Waste Management and Disposal".
4. Construction Indoor-Air-Quality Management:
 - a. **Credit EQ 3.1** Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction".
 - i. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section "Temporary Facilities and Controls", install filter media having a MERV 8 according to

ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.

ii. Replace all air filters immediately prior to occupancy.

5. Comply with one of the following requirements:

- a. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
- b. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined EQ Prerequisite 1, whichever is greater. During each day of the flush out prior, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. of outside air has been delivered to the space.
- c. Air-Quality Testing:
 - i. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air", and as additionally detailed in the USGBC's "LEED-CI: Reference Guide".
 - ii. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - Formaldehyde: 50 ppb
 - Particulates (PM 10): 50 micrograms/cu. m
 - Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m
 - 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m
 - Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
 - iii. For each sampling point where the maximum concentration limits are exceeded, conduct additional flush-out with outside air and retest the specific parameter(s) exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from same locations as in the first test.
 - iv. Air sample testing shall be conducted as follows:
 - All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
 - Building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
 - Number of sampling locations will vary depending on the size of building and number of ventilation systems. For each portion of building served by

a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft. or for each contiguous floor area, whichever is larger, and shall include areas with the least ventilation and greatest presumed source strength.

- Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.