

SUSTAINABILITY FOR SMALL PROJECTS – PRESCRIPTIVE APPROACH

PART 1 GENERAL

1.1 DEFINITIONS

- A. Sustainability: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable building projects integrate building materials and methods that promote environmental quality, economic vitality, and social benefit through the design, construction and operation of the built environment. Sustainable building merges sound, environmentally responsible practices into one discipline that looks at the environmental, economic and social effects of a building or built project as a whole. Sustainable design encompasses the following broad topics: efficient management of energy and water resources, management of material resources and waste, protection of environmental quality, protection of health and indoor environmental quality, reinforcement of natural systems, and integrating the design approach.

1. Agrifiber Products: Composite panel products derived from agricultural fiber
2. Biobased Product: As defined in the 2002 Farm Bill, a product determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials
3. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight
4. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that it was obtained from forests certified by the Forest Stewardship Council
5. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder
6. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19.

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7. LEED: The Leadership in Energy & Environmental Design green building rating systems developed and adopted by the U.S. Green Building Council (USGBC). The systems certify levels of environmental achievement based on a point and credit scoring system.
8. LEED NC: The Leadership in Energy & Environmental Design green building rating system developed and adopted by the USGBC for new construction and major renovations of buildings
9. LEED EB: The Leadership in Energy & Environmental Design green building rating system developed and adopted by the USGBC for operating and maintaining existing buildings
10. Light Pollution: Light that extends beyond its source such that the additional light is wasted in an unwanted area or in an area where it inhibits view of the night sky
11. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock
12. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use
13. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 "Guidelines for the Use of Environmental Marketing Claims": www.ftc.gov/bcp/gnrule/guides980427
14. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 500 miles (800 km) from the Project site
15. Salvaged or Reused Materials: Materials extracted from existing buildings in order to be reused in other buildings without being manufactured
16. Sealant: Any material that fills and seals gaps between other materials
17. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

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- B. Sustainable Practices: Those elements of planning, design and construction that promote the efficient use of energy and material resources.
- C. Guideline Applies to Small Projects: This Guideline applies to all Small Projects which are new construction measuring less than 10,000 sf, renovations that are less than 50% replacement values, building interiors that are less than 10,000 sf, JOC projects, and Operations & Maintenance projects throughout the OSU System and the A&M Colleges.
- D. State Policy for Small Projects: HB 3394, High Performance Green Building Act, signed into law on June 6, 2008 by Governor Brad Henry and as codified in the Oklahoma Statutes as Section 213 of Title 61, requires, effective July 1, 2009 for projects that began design after July 1, 2008, all minor construction (<10,000 sf) and small renovations to meet, to greatest extent possible, be consistent with the high-performance certification programs, commonly known as LEED, Green Globes, and Energy Star, which promotes effective energy and environmental standards.
- E. OSU Physical Plant Policy: Every project shall address to the fullest extent possible sustainable building practices. Sustainable practices include those elements of planning, design and construction that promote the efficient use of energy and material resources, the conservation of water, and the protection of land and water environments.

1.2 PROCEDURES AND RESPONSIBILITIES

- A. All Physical Plant employees whose responsibilities include planning, designing, constructing or renovating University-owned facilities shall be responsible for ensuring that facilities and buildings comply with this Guideline.
- B. Authority OSU System: The authority for the OSU System to determine the appropriate level of Sustainable Building (i.e. sustainable building best practice) is the Chief Facility Officer of Oklahoma State University who will rely on the recommendations made by the Campus Sustainability Committee.
- C. A&M College Authority: The authority for an individual A&M College to determine the appropriate level of Sustainable Building (i.e. sustainable building best practice) is the College's Fiscal Affairs Office acting on behalf of the College Presidents, as guided by OSU A&E Services.

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PART 2 PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

- A. Site Clearing: Topsoil shall be provided by the Contractor from on-site material which has been stockpiled for reuse. Off-site borrow should only be used when on-site sources are exhausted. Chip and/or compost on site all vegetated material identified for removal.
- B. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of legally.
- D. Site Paving: All site impervious paving must be light colored, with a Solar Reflectance Index (SRI) of at least 29.
- E. Roofing Materials: All roofing systems, other than vegetated roof systems, must comply with the following requirements:
 - 1. Low-Sloped roofing less than or equal to 2:12 slope must have an SRI of at least 78.
 - 2. Steep-Sloped roofing greater than 2:12 slope must have an SRI of at least 29.
 - 3. All roofing systems shall be Energy Star certified.
 - 4. All roofing systems shall be CRRB certified (Cold Roof Rating Council).
- F. Exterior Lighting Fixtures:
 - 1. All exterior luminaries must not emit more than 2% of the total initial designed fixture lumens at an angle above 90° from nadir and/or meet the requirements of the Dark Sky certification program.
 - 2. Exterior lighting cannot exceed 80% of the lighting power densities defined by ASHRAE/IESNA Standard 90.1-2004, Exterior Lighting Section, without amendments.
 - 3. No lighting of building facades or landscape features is preferred. If used, lighting pattern must not extend more than 15-feet beyond building site boundary.
- G. Herbicides and Pest Control: : Only EPA environmentally-approved herbicides shall be used, and pest control measures shall utilize EPA-registered biopesticides only.
- H. Irrigation Systems: Any permanent landscape irrigation systems must be supplied entirely by collected rainwater or, where approved, graywater, and must be comprised of below-grade drip emitters controlled by moisture sensors. Timer controls shall not be permitted. Recommend that xeroscape landscape be used.

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- I. Water-Conserving Fixtures: Plumbing fixtures and fittings shall use in aggregate at least 40% less water than the water use baseline calculated for the building after meeting the Energy Policy Act of 1992 fixture performance requirements. Flow and flush rates shall not exceed the following:
 - 1. Toilets: no more than 1.12 gallons per flush, otherwise be dual flush 1.6/0.8 gallons per flush, and have documented bowl evacuation capability per MaP testing of at least 400 grams
 - 2. Urinals: no more than 0.7 gallons per flush or use
 - 3. Lavatory Faucets: 0.5 gpm with automatic faucet controls
 - 4. Kitchen Sink Lavatories: 2.2 gpm
 - 5. Showerheads: no more than 1.75 gpm

- J. Process Water Use: Employ strategies that in aggregate result in 20%-30% less water use than the process water use baseline for the building after meeting the commercial equipment and HVAC performance requirements as listed in the Table below. For equipment not addressed by EPACT 2005 or the list below, additional equipment performance requirements may be proposed provided documentation supporting the proposed benchmark or industry standard is submitted.
 - 1. Clothes Washer: 7.5 gallons/cubic foot/cycle
 - 2. Dishwasher with Racks: 1.0 gallons/rack
 - 3. Ice Machine: 20 gallons/100 pounds ice for machines making over 175 pounds of ice per day; 30 gallons/100 pounds ice for machines making less than 175 pounds of ice per day. Avoid water-cooled machines.
 - 4. Food Steamer: 2 gallons/hour. Use only boilerless steamers.
 - 5. Pre-Rinse Spray Valves: 1.4 gallons/minute
 - 6. Kitchen Pot-Washing Sinks: 2.2 gallons/minute
 - 7. Cooling Towers: 2.3 gallons/ton-hr water loss
 - a. Use atrazine-based corrosion inhibitors and reducing bleed-off by increasing cycles of concentration (at least 5, or with water quality problems limit to 4).
 - b. Install meters on make-up water and discharge blow-down.
 - c. Install conductivity controller for blow-down.
 - d. Provide overflow alarm connected to central building controls.
 - e. Install drift eliminators.
 - f. Provide makeup water from sources other than potable water supply.

- K. Elimination of CFCs AND HCFCs:
 - 1. Fire suppression systems may not contain ozone-depleting substances.
 - 2. Extruded polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation shall not be manufactured with hydro-chlorofluorocarbon (HCFC) blowing agents.

- L. Appliances and Equipment: All Energy Star eligible equipment and appliances, including office equipment, computers and printers, electronics, and commercial food service equipment (excluding HVAC and lighting components), shall be qualified by EPA's Energy Star program.

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- M. HVAC Distribution Efficiency:
1. All duct systems shall be constructed of galvanized sheet metal, aluminum, or stainless steel as deemed appropriate based on the application requirements. No fiberglass duct board shall be permitted.
 2. All medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the current SMACNA standards.
 3. All ductwork shall be externally insulated. No interior duct liner shall be permitted.
 4. Where possible, all air terminal connections shall be hard-connected with sheet metal ductwork. If flexible ductwork is used, no flexible duct extension shall be more than six feet in length.
 5. All HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.
 6. All supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch dampers, not at terminal face.
- N. Measurement and Verification: Install controls and monitoring devices as required by division 15 and 16 in order to comply with International Performance Measurement & Verification Protocol (IPMVP), Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003, Option D.
- O. Salvaged or Reused materials: There shall be no substitutions for specified salvaged and reused materials and products.
- P. Recycled Content of Materials:
1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 10% (20% preferred) of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.
 - a. The post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 - b. The pre-consumer recycled content value of a material shall be determined by dividing the weight of pre-consumer recycled content by the total weight of the material and multiplying by the cost of the material.
 - c. Do not include mechanical and electrical components in the calculations.
 - d. Do not include labor and delivery costs in the calculations.
 - e. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).
 - f. Utilize all on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.

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g. At a minimum, the materials in the following list must contain the minimum recycled content indicated:

Category	Minimum Recycled Content
Compost/mulch	100% post-consumer
Asphaltic Concrete Paving	25% post-consumer
Cast-in-Place Concrete	6% pre-consumer
CMU: Gray Block	20% pre-consumer
Steel Reinforcing Bars	90% combined
Structural Steel Shapes	90% combined
Steel Joists	75% combined
Steel Deck	75% combined
Steel Fabrications	60% combined
Steel Studs	30% combined
Steel Roofing	30% post-consumer
Aluminum Fabrications	35% combined
Rigid Insulation	20% pre-consumer
Batt insulation	30% combined
Cellulose Insulation	90% combined
Rock Wool Insulation	75% pre-consumer
Fireproofing	20% combined
Steel Doors and Frames	35% combined
Gypsum Wallboard	75% combined
Carpet	20% combined
Ceramic Tile Flooring	50% combined
Sheet Vinyl Flooring and Base	20% pre-consumer
Vinyl Composite Tile (VCT)	10% pre-consumer
Rubber Flooring	50% combined
Rubber Base	19% pre-consumer
Acoustical Ceiling Tile (ACT)	29% combined
ACT Suspension System	30% post-consumer
Toilet Partitions – Metal	60% combined
Toilet Partitions - HDPE	30% combined

Q. Regional Materials: Provide a minimum of 10 percent (20% preferred) of building materials (by cost) that are manufactured and extracted/harvested within a 500 mile radius of the project site, exclusive of labor and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials within this specified 500 mile radius.

R. Biobased Products:

1. Use only biobased concrete form-release products.
2. Solid Wood Products: All new solid-wood-based materials will be certified as “FSC 100%” by an independent third party in accordance with FSC Forest Stewardship Council “Principles and Criteria” and will have received Chain-of-Custody

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Certification as certified by an accredited certification group such as Smartwood or Scientific Certification Systems (SCS).

3. Other Wood Products: All other new wood-based materials will be certified by an independent third party in accordance with any of the following standards:
 - a. FSC: Forest Stewardship Council "Principles and Criteria" and has received Chain-of-Custody Certification as certified by an accredited certification group such as Smartwood or Scientific Certification Systems (SCS)
 4. Preservative-treated lumber with chromated copper arsenate (CCA) treatments is not permitted, and lumber with copper-based treatments (such as ACQ) is permitted only for ground-contact applications.
 5. Wood-based materials include but are not limited to the following materials (when made from wood), engineered wood products, or wood-based panel products:
 - a. Rough carpentry
 - b. Miscellaneous carpentry
 - c. Heavy timber construction
 - d. Wood decking
 - e. Particleboard
 - f. Plywood
 - g. Metal-plate-connected wood trusses
 - h. Structural glued-laminated timber
 - i. Finish carpentry
 - j. Architectural woodwork
 - k. Wood paneling
 - l. Wood veneer wall covering
 - m. Wood flooring
 - n. Wood lockers
 - o. Wood cabinets
 - p. Wood doors
 - q. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection
- S. Brominated Flame Retardants: For new furniture, do not utilize cushioned office seating, and for lounge seating, do not utilize cushioned seating with brominated flame retardants.
- T. Outdoor Air Delivery Monitoring:
1. All spaces with an occupant density greater than 1 person per 40 square feet must include at least one CO₂ monitor located between 3 feet and 6 feet above the finished floor.
 2. All spaces with occupant density less than 1 person per 40 square feet must include a direct outdoor airflow monitor, capable of measuring the minimum outdoor airflow rate within 15% accuracy.
 3. Monitoring equipment must be configured to generate a building automation system alarm and a visual or audible alert when CO₂ concentrations vary by 10% or more from set point.

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U. Adhesives and Sealants:

1. All adhesives and sealants used inside the building's thermal envelope must be third-party certified under one of the following programs:
 - a. Indoor Advantage Plus from Scientific Certification Systems, Inc.
 - b. Greenguard Children and Schools from Greenguard Environmental Institute
 - c. Collaborative for High Performance Schools.

2. All adhesives and sealants, regardless of where they are used, must comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):
 - a. Concrete Curing Compound: 60 g/L
 - b. Concrete Sealer: 10 g/L
 - c. Concrete Form Release Agents: 0g/L
 - d. Garage Deck Sealer: 50g/L
 - e. Wood Glues: 20 g/L
 - f. Millwork and Casework Adhesives: 20g/L
 - g. Metal to Metal Adhesives: 30 g/L
 - h. Adhesives for Porous Materials (Except Wood): 50 g/L
 - i. Subfloor Adhesives: 50 g/L
 - j. Plastic Foam Adhesives: 50 g/L
 - k. Carpet Adhesives: 50 g/L
 - l. Carpet Pad Adhesives: 50 g/L
 - m. Carpet Seam Sealer: 50g/L
 - n. VCT and Sheet Vinyl Adhesives: 50 g/L
 - o. Cove Base Adhesives: 50 g/L
 - p. Rubber Floor Adhesives: 60 g/L
 - q. Wood Flooring Adhesives: 100 g/L
 - r. Ceramic Tile Adhesives: 65 g/L
 - s. Gypsum Board and Panel Adhesives: 50 g/L
 - t. Gypsum Drywall Joint Compound: 20 g/L
 - u. Portland Cement Plaster: 20 g/L
 - v. Multipurpose Construction Adhesives: 70 g/L
 - w. Cast Resin Countertop Silicone Sealant: 20g/L
 - x. Plastic Laminate Adhesives: 20 g/L
 - y. General Contact Adhesive: 80 g/L
 - z. Structural Glazing Adhesives and Compounds: 100 g/L
 - aa. Silicone Sealant: 50 g/L
 - bb. Pipe Thread Sealant: 50 g/L
 - cc. Duct Sealant: 10 g/L
 - dd. Plastic Cement Welding Compounds: 250 g/L
 - ee. ABS Welding Compounds: 325 g/L
 - ff. CPVC Welding Compounds: 490 g/L
 - gg. PVC Welding Compounds: 510 g/L
 - hh. Adhesive Primer for Plastic: 250 g/L
 - ii. Architectural Sealants: 250 g/L
 - jj. Single-Ply Roofing Membrane Adhesives: 250 g/L

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3. Interior sealants shall not contain: mercury, butyl rubber, neoprene, SBR (styrene butadiene rubber), or nitrile.
4. Sealants and glazing compounds formulated with aromatic solvents (organic solvent with a benzene ring in its molecular structure) fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, or their components shall not be used.
5. Adhesives used to apply laminates, whether shop-applied or field-applied, shall contain no urea-formaldehyde.

V. Paints and Coatings:

1. Interior Paints and Coatings: For interior field-applied applications, 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 chemical restrictions (Restricted Components listed below) of Green Seal Standard GS-11, Paints, First Edition, May 20, 1993; Green Seal Standard GC-03, Anti-Corrosive Paints, Second Edition, January 7, 1997; and South Coast Air Quality Management District Rule 1113, Architectural Coatings, rules in effect on January 1, 2004, as follows:
 - a. Flat Paints and Coatings: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments
 - b. Non-Flat Paints and Coatings Except High Gloss: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments.
 - c. High Gloss Paints and Coatings: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM Test Method D 523 as specified in paragraph (e)(6).
 - d. Multicolor Paints: Not more than 250 grams of VOC per liter
 - e. Water-Based Polychromatic Finish Coatings: Not more than 150 g/L (150 g/L for primer and flat polychromatic paint)
 - f. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
 - g. Sanding Sealers: Not more than 50 grams of VOC per liter of coating less water and exempt compounds
 - h. Waterproofing Sealers: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
 - i. Concrete Slab Sealers: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
 - j. Polyurethanes: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
 - k. Stains: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
2. Interior field applied varnishes and lacquers are not permitted.
3. Interior paints shall not contain antimicrobial additives (such as fungicides and biocides).
4. Exterior Paints and Coatings: For exterior applications, use paints and coatings that comply with the following limits for VOC content when calculated according to 40

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CFR 59, Subpart D (EPA method 24) and the chemical restrictions (Restricted Components listed below) of Green Seal's Standard GS-11:

- a. Flat Paints and Coatings: Not more than 50 grams of VOC per liter of coating less water and exempt compounds, including pigments
 - b. Non-Flat Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments
 - c. High Gloss Paints and Coatings: Not more than 150 grams of VOC per liter of coating less water and exempt compounds, including pigments. High Gloss Coatings are coatings that register a gloss of 70 or above on a 60-degree meter according to ASTM Test Method D 523 as specified in paragraph (e)(6)
 - d. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds
 - e. Varnishes and Sanding Sealers: Not more than 275 grams of VOC per liter of coating less water and exempt compounds
 - f. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds
5. Aromatic Compounds: Paints and coatings shall not contain more than 1% (by weight) total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
6. Restricted Components: Paints and coatings shall not contain any of the following:
- a. Acrolein
 - b. Acrylonitrile
 - c. Aniline dyes
 - d. Antimony
 - e. Benzene
 - f. Butyl benzyl phthalate
 - g. Cadmium
 - h. Di (2-ethylhexyl) phthalate
 - i. Di-n-butyl phthalate
 - j. Di-n-octyl phthalate
 - k. 1,2-dichlorobenzene
 - l. Diethyl phthalate
 - m. Dimethyl phthalate
 - n. Ethylbenzene
 - o. Formaldehyde
 - p. Hexavalent chromium
 - q. Isophorone
 - r. Lead
 - s. Mercury
 - t. Methyl ethyl ketone
 - u. Methyl isobutyl ketone
 - v. Methylene chloride
 - w. Naphthalene
 - x. Toluene (methylbenzene)
 - y. 1,1,1-trichloroethane
 - z. Vinyl chloride

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aa. 27. Xylene

7. Coordinate with paint manufacturers for implementing a “take-back program” for all unused paint. Set aside scrap and unused paint to be returned to the manufacturer for recycling into new product. Close and seal all partially used containers of paint to maintain quality as necessary for reuse.

W. Floor Coverings:

1. All carpet systems, including adhesives, must meet or exceed the Carpet and Rug Institute Green Label Plus Indoor Air Quality Test Program.
2. Carpet cushion shall not contain brominated flame retardants.
3. Carpet tile applications shall be self-adhering or adhered with low VOC adhesives per LEED IEQc4.1.
4. All resilient floorcovering must be certified under the Greenguard or FloorScore indoor emissions testing programs.
5. Engineered wood flooring and bamboo flooring must be certified under the Greenguard or FloorScore indoor emissions testing programs.

X. Systems Furniture and Seating:

1. All systems furniture and seating meet the requirements of one of the following:
 - a. Greenguard certification
 - b. SCS Indoor Advantage certification
 - c. SCS Indoor Advantage Gold certification
 - d. BIFMA Standard X7.1-2005, as tested to BIFMA method M7.1-2005 and as verified by an independent laboratory
 - e. Calculated indoor air concentration limits for furniture systems and seating determined by the U.S. EPA’s Environmental Technology Verification Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes (September 1999) testing protocol as conducted in an independent air quality testing laboratory
2. Systems furniture and seating made with coatings or sealants that contain any of the following solvents are not permitted: naphtha, benzene, toluene, xylene, hexavalent chromium.

Y. Entryway Systems: Walk-off systems to capture particulates shall be installed at least 10 feet long in the direction of entry travel at all entryways directly connected to the outdoors that are used as regular entry points by building users. Acceptable entryway systems include:

1. Permanently installed grates, grilles, or slotted systems that allow for cleaning beneath them
2. Permanently installed direct glue-down walk-off mats
3. Non-permanent roll-out mats, but only if a service organization is contracted for maintenance on a weekly basis

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Z. Air Filtration: Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system. Replace all filtration media after the completion of construction and prior to occupancy.

AA. Mercury in Lighting:

1. Provide only low-mercury fluorescent or HID lamps with mercury content limited to the following:
 - a. T-5 and T-8 fluorescent lamps: 80 picograms per lumen hour
2. Measurement Standards: Lumens to be measured according to IES LM9 for linear fluorescent lamps, IES LM66 for compact fluorescent lamps, and LM51 for HID lamps; mercury content to be measured according to U.S. EPA "Total Mercury by Cold Vapor Absorption Method" 7471A.

BB. Illumination:

1. Exit Signs. At the time of installation or replacement of broken or non-functional exit signs, all exit signs shall be replaced with light-emitting diode (L.E.D.)-type signs. Edge-lit compact fluorescent signs may be used as replacements for existing edge-lit incandescent exit signs.
2. Fluorescent Fixtures. At the time of installation or replacement of broken or non-functional fluorescent fixtures equipped with T10 or T12 lamps, all fixtures shall be equipped with electronic ballasts and T8 or more efficient lamps unless this replacement will create lighting levels at the work surface that are below the standards established by the Illuminating Engineering Society.
3. Incandescent Fixtures: Replace existing incandescent fixtures with compact fluorescent fixtures.
4. Specialty Fixtures, such as wall washers and spot lighting, shall be minimized and switched separately. Prefer that wall washers and spot lighting be limited to one wall of the space and then only where absolutely necessary.
5. Direct/Indirect Fluorescent Fixtures: Where all fixtures within a space are to be replaced, replace with direct/indirect type fixtures.
6. Exterior Light Fixtures: At the time of installation or replacement of broken or non-functional exterior light fixtures, a photocell or automatic timer shall be installed to prevent lights from operating during daylight hours. The existing switching capability shall be maintained..
7. Fluorescent Fixture Ballasts: At the time of installation or replacement of the ballasts in fluorescent fixtures equipped with T10 or T12 lamps, all replacement ballasts shall be electronic and compatible with only T8 or more efficient lamps unless such replacement will create light levels at the work surface that are below the standards established by the Illuminating Engineering Society.
8. Controls: Use controls to reduce energy use (e.g., dimmers, occupancy sensors, light system control and time clocks). Use sensors to control lighting levels in daylight spaces.
9. Task Lighting: Where functional requirements permit, lighting design should combine task and ambient lighting to reduce the high overall light levels.

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CC. Thermal Comfort:

1. Install and calibrate controls to comply with LEED requirements.

DD. Blended Cement Concrete:

1. Cementitious Materials: Provide composite mix of portland cement and ground granulated blast-furnace slag or fly ash or blended hydraulic cement and limit percentage (by weight) of portland cement (ASTM C150) in aggregate (total weighted average of cementitious material weight for all mixes and pours) to 40% less than standard regional concrete mix designs.
2. Limit percentage (by weight) of standard portland cement (C-150), to the following maximum percentages of the cementitious portion of the mix while maintaining the above-40% required reduction in portland cement across the Project's total quantity of concrete:
 - a. Footings: 50%
 - b. Slab on Grade: 60%, except for cold-weather pours
 - c. Insulated Concrete Form Concrete: 40%
 - d. Elevated Slabs: 60%, except for cold-weather pours
 - e. Exterior Concrete: 75%

EE. Gypsum Wallboard: Standard paper-faced gypsum wallboard can be used only in dry climates, where wetting during or after construction is not anticipated. In humid climates, where dampness and condensation are a concern, use only non-paper-faced gypsum wallboard. In wet locations a cementitious wallboard, made of portland or magnesium oxide cement, must be used.

FF. Building Insulation:

1. Fiberglass batt insulation shall contain no formaldehyde-based binders.
2. All building insulation products (e.g., spray foam, cellulous, fiberglass, cotton batt) shall be third-party certified for conformance with GreenGuard Children & Schools or Indoor Advantage Gold.

GG. Duct Acoustical Insulation: Mechanical sound insulation materials within the duct shall consist of an impervious, non-porous coating that prevents dust from accumulating in the insulating materials.

HH. Green Housekeeping:

1. Utilize cleaning products that meet the requirements of the Green Seal GS-37 standard or comply with the requirements and maximum VOC limits of Title 17, California Code of Regulations, Division 3, Chapter 1, Subchapter 8.5, Article 2, Regulation for Reducing VOC Emissions from Consumer Products (September 2001).
2. Utilize janitorial paper products and trash bags that meet the minimum percentages of post-consumer recycled content and recovered content requirements of EPA's Comprehensive Procurement Guidelines.

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II. Appliances & Equipment:

1. Appliances: Provide appliances that are Energy Star rated.
2. Equipment: Provide equipment with the highest energy efficiency rating available (e.g. SEER).

JJ. Laboratories:

1. Design, Construct and Test in accordance with “Laboratories for the 21st Century: Best Practice Guide” (Labs21) as published by the United States Environmental Protection Agency in cooperation with the U.S. Department of Energy.

2.2 PRODUCT LIST OF PRODUCTS MEETING ENVIRONMENTAL REQUIREMENTS

(Under Development)

- A. Low Emitting Materials
- B. Recycled Content
- C. Local/Regional Materials
- D. Rapidly Renewal
- E. Forest Stewardship Council (FSC)

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PART 3 EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. Within the limits of the construction schedule, contract sum, and available materials, equipment, products and services, generate the least amount of waste possible and employ processes that ensure the generation of as little waste as possible.
- B. Develop and implement a Construction Waste Management Plan (CWMP) consistent with the following goals:
 - 1. Minimize the amount of C/D (construction and demolition) waste initially generated by such methods as efficient use of materials, appropriate planning, proper storage, prevention of breakage and damage to materials, avoidance of excess packaging and source separation of waste.
 - 2. Of the inevitable waste that is generated, as many of the waste materials as economically feasible shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized. Consistent with LEED criteria, the project goal is to reuse, salvage, or recycle a minimum of 50% of the wastes generated by weight on demolition/renovation projects and 75% on new construction.
 - 3. Use recycled, salvaged, renewable and recyclable building materials.
- C. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Utilize any on-site existing paving materials that are scheduled for demolition as granulated fill or subbase material, and include the weight of this material in the calculations for material diverted from landfill disposal.
- E. Discuss CWMP procedures and measures as an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

- A. Develop and implement a Construction IAQ Management Plan (CIAQMP) to prevent indoor air quality problems resulting from construction activities, including, at minimum, the following:
 - 1. Construction activities must meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995.
 - 2. During construction, protect all absorptive materials stored on-site or installed from moisture damage as described in the Construction IAQ Management Plan (CIAQMP) defined above. Specifically:

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- a. Exercise special care at all times in the storage of materials to prevent exposure to moisture.
 - b. Avoid installation of gypsum wallboard and other porous materials until the building is weather-tight.
 - c. All standing water which accumulates on interior floors shall be removed on the day that it is observed.
 - d. Any drywall that has retained more than 20% moisture after 48 hours following exposure to moisture, or that has evidence of mold, must be disposed of in accordance with Specification Section 01 74 19 "Construction Waste Management."
 - e. The contractor shall identify and remove all porous building materials that become wet or damaged by moisture within 7 calendar days of such exposure.
3. Cleaning: Thoroughly clean finishes, furniture and fixtures in order to remove and reduce the growth of organisms hazardous to human health at the time of renovation and delivery, and regularly after installation.
 4. Inspect for mold and/or mildew contamination in porous building materials, fixtures and furnishing, including provisions for the complete removal and replacement of such materials where it is determined by inspection that the materials have become contaminated by mold and/or mildew.
 5. Use cleaners and polishes with minimal effects on indoor air quality.
 6. Prevention of Moisture Contamination: Building materials that are intended to be kept dry before, during and following installation (e.g., fabrics, carpeting, drywall, ceiling tiles, and insulation) shall be protected from moisture prior to, during, and after installation.
 7. Removal of Building Materials Contaminated by Moisture. If, in the judgment of the project architect or project manager, any building material that is intended to be kept dry before, during and after installation has become wet, such material shall be removed immediately from the job site, disposed of in accordance with waste management practices, and replaced. It shall be the responsibility of the relevant contractor or subcontractor to monitor the storage of such materials to ensure that they remain dry and to remove and dispose of such materials if they become wet.
 8. Elimination or Encapsulation of Fibrous Insulation Materials. The use of exposed fibrous duct insulation material in Construction Projects shall be prohibited. If the design of a Construction Project requires the use of fibrous insulation material, such material shall be encapsulated to minimize mold and/or mildew growth and emissions of volatile organic compounds into the habitable space.
- B. Air Filtration:
1. Thermal Scanning: Thermal scan exterior walls of existing spaces. Seal exterior walls and appurtenances (windows and other openings) based upon thermal scan results.
 2. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system; replace all filtration media after the completion of construction and prior to occupancy.
 3. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 8 or better for filtration media installed at return air grilles during

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construction if permanently installed AHUs are used during construction. Inspect weekly and replace as required.

- C. Develop CIAQMP (Construction IAQ Management Plan) procedures and measures, and make it an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.
- D. Engage an independent testing and inspecting agency to conduct a baseline indoor air quality testing program after the completion of construction and prior to occupancy in accordance with Section 01 81 09 "Testing for Indoor Air Quality."

3.3 INSULATE EXTERIOR WALLS

- A. The walls are to achieve a minimum R-Value of 19. May require insulation overlay of the existing walls (floor to underside of structure). For new construction and renovation, achieve minimum average insulation R-Values of not less than R-19 for walls and R-30 for roofs.

3.4 HVAC SYSTEMS

- A. Where possible, upgrade the HVAC control systems so that the equipment is controlled through the campus wide Energy Management System (EMS) and where possible, each HVAC system has an unoccupied mode sequence of controls.
- B. Insulate hot water, steam, chilled water piping, supply and return ductwork.
- C. Inspect Mechanical Systems Servicing the Small Project/Renovation Space: Inspect and maintain mechanical systems, including heating, ventilation and air conditioning systems (hereinafter "HVAC" systems).
- D. Replace Ductwork where ductwork interior is not cleanable. Clean existing ductwork serving the project space and replace broken components (e.g., turning vanes, dampers, extractors).
- E. Re-Commission HVAC mechanical system(s), including heating, ventilation and air conditioning systems serving the small project/renovation area. Applicable where the lesser of (1) the entire area being serviced by one HVAC unit is being renovated or (2) at least one floor is being renovated.
- F. Adjust Ventilation Rate considering user needs, health and safety protection, and energy consumption.
- G. Duct Sealing and verification by Inspection Services is required when portions of the heating and cooling system are altered. Alterations include the installation or replacement of:
 - 1. New or replacement ductwork,
 - 2. An air handler,
 - 3. An outdoor condensing unit of a split system air conditioner or heat pump,

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4. A cooling or heating coil,
5. A furnace heat exchanger.
6. Ductwork sealing is not required for duct systems with less than 40 linear feet of new or replacement ducts in unconditioned space.

3.5 LABORATORIES PER LABS21

A. Apply following Lab21 Tools:

1. Design Intent Tool
2. Environmental Performance Criteria
3. Design Process Manual Where

B. Right-size HVAC: Size and number of chillers, fans; duct sizes

C. Low-pressure drop design: Adequate space for larger coils, ducts

D. Energy recovery: space and adequacy requirements for desiccant wheels

E. Daylighting in labs: Lab orientation and spatial configuration

F. Cascading airflow: Spatial adjacencies. Consider cascading supply air from non-laboratory spaces to laboratory spaces for exhaust

G. Ensure efficient air flow: Undersized or convoluted duct runs increase resistance to airflow and, thus, fan energy consumption

H. Locate fume hoods at “dead-end” locations away from entryways and circulation routes

I. Supply Air Diffusers and Fume Hoods: place diffusers to avoid compromising hood containment and ventilation short circuiting

J. Eliminate cross-contamination between laboratories

K. Minimize areas requiring controlled environments

--- End of Section ---