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Guidance for Section 01 81 13*

# **GUIDANCE for SECTION 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS**

## **Part 1, General**

### *Introduction*

These guideline specifications are designed to be modified as needed for use in the development, modification, and maintenance of facilities at the U.S. Environmental Protection Agency's Research Triangle Park campus. In addition to the current section, three additional Division 01 specification sections are provided:

- 1 01 74 19 Construction Waste Management
- 2 01 81 09 Testing for Indoor Air Quality
- 3 01 91 00 General Commissioning Requirements

Together, these four sections provide an overview of sustainable design requirements that might be appropriate to EPA RTP projects. When these sections are used in an actual project specifications, specific requirements must be inserted throughout the construction documents to ensure compliance with the sustainable design intent.

Topics relating to sustainable design that are not directly reflected in the specifications (because they are determined by design or siting decisions, for example) are identified below as a support to project designers.

### ***1.1 Summary – Sources of Green Guidance***

#### **General information about LEED**

The U.S. Green Building Council's LEED<sup>®</sup> Rating Systems are used as the basis for many of these sustainable design requirements. LEED is the predominant framework for implementing sustainable design in commercial and institutional buildings in North America. Some EPA projects may be pursuing LEED certification, or wish to track their performance against LEED. For those projects, the specifications are annotated with details on how LEED's requirements relate to the language in the specifications.

There are currently four official LEED Rating Systems:

- 1 LEED for New Construction and Major Renovations (LEED-NC). LEED-NC is the original LEED Rating System, and forms the basis for the others. It was developed primarily for office buildings, but has been used successfully for a wide range of building types.
- 2 LEED for Commercial Interiors (LEED-CI). LEED-CI applies to tenant

improvements in preexisting (new or renovated) buildings. It accommodates the limited control that tenants typically have over the site and base building.

- 3 LEED for Existing Buildings (LEED-EB). LEED-EB addresses the operations and maintenance of existing facilities, along with minor retrofits or upgrades to those facilities. Unlike the other LEED Rating Systems, in which certification is provided based on the design and construction of a building, LEED-EB certification is based on documentation of actual building performance in terms of energy use, water use, maintenance practices, and procurement policies, over a defined period of performance (which can range from 1 to 5 years).
- 4 LEED for Core & Shell (LEED-CS). LEED-CS applies to spec buildings, in which a developer provides the base building and leaves the fit-out to the tenants.

Two additional rating systems, LEED for Homes (LEED-H) and LEED for Neighborhood Developments (LEED-ND) are currently being pilot-tested.

There are also several “Application Guides” that describe how to apply these rating systems (primarily LEED-NC, as it has the longest track record) to specific project types and conditions. The Application Guide that is most relevant to the RTP campus is LEED for Multiple Buildings, which describes how certain LEED credits apply in a campus setting. A “LEED for Labs” Application Guide, based in part on the EPA’s Labs 21 program, is in draft form.

Projects seeking LEED certification must be registered with the U.S. Green Building Council, and must be submitted for review by USGBC. An web-based tool, LEED Online, is available for submitting project documentation.

Many LEED credits are not addressed in the product requirements part of Section 01 81 13 because the achievement of those credits is determined by choices made in site-selection or design, and it is not affected by product choices. Some of these are addressed in other parts of the specification, others are not. The designer will need to ensure that any such credits have been addressed, however, so a list of these is provided here:

### ***Credit Topic***

#### **Sustainable Sites**

- 1 Erosion and Sedimentation Control
- 2 Site Selection
- 3 Development Density & Community Connectivity
- 4 Brownfield Redevelopment
- 5 Alternative Transportation- Public Transportation Access

- 6 Alternative Transportation- Bicycle Storage & Changing Rooms
- 7 Alternative Transportation- Low Emitting and Fuel Efficient Vehicles
- 8 Alternative Transportation- Parking Capacity and Carsharing
- 9 Site Development- Protect or Restore Habitat
- 10 Site Development- Maximize Open Space
- 11 Stormwater Quality
- 12 Integrated Pest Management

### **Energy & Atmosphere**

- 1 Commissioning (New Buildings, Existing Buildings, Enhanced Commissioning)
- 2 Minimum Energy Performance
- 3 Optimize Energy Performance; Minimum Energy Performance
- 4 Renewable Energy (Including Residential)
- 5 Building Operation & Maintenance
- 6 Measurement and Verification; Building Monitoring Systems
- 7 Emissions Reduction Documentation
- 8 Green Power

### **Materials & Resources**

- 1 Storage & Collection of Recyclables and Waste
- 2 Building Reuse
- 3 Construction Waste Management
- 4 Cleaning Products and Materials (Materials Efficiency)
- 5 Cleaning Products and Materials (IAQ, Emissions)

### **Indoor Environmental Quality**

- 1 Minimum IAQ Performance
- 2 Environmental Tobacco Smoke (ETS) Control

- 3 Asbestos Removal or Encapsulation
- 4 Polychlorinated Biphenyl (PCB) Removal
- 5 Increased Ventilation
- 6 Construction IAQ Management Plan, During Construction
- 7 Construction IAQ Management Plan, Before Occupancy
- 8 Occupant Productivity: includes Absenteeism Recording and Health Care Impact Recording
- 9 Indoor Chemical & Pollutant Source Control, including Air Filtration
- 10 Controllability of Systems: Lighting
- 11 Controllability of Systems: Temperature and Ventilation
- 12 Thermal Comfort, Compliance
- 13 Thermal Comfort, Monitoring
- 14 Daylight and Views
- 15 IAQ Management Programs (EPA reference standard)
- 16 Green Cleaning (includes cleaning equipment, cleaning products, IPM, chemical storage)

### **Innovation & Design Process**

- 1 Innovation in Design
- 2 LEED Accredited Professional

### **Federal Guidance on Green Buildings**

*Executive Order 13148, Greening the Government Through Leadership in Environmental Management* requires the head of each Federal agency to ensure that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision-making and long-term planning processes—across all missions, activities, and functions. The order establishes a requirement for agencies to have performance standards, which would include standards for sustainable facilities, to measure compliance.

EO 13148 revokes all or part of EOs 12843, 12856, 12969 and 12088 but does not eliminate existing obligations under the Emergency Planning and Community Right-to-

Know Act (EPCRA), the Pollution Prevention Act or the Clean Air Act. Significant new requirements include:

- 1 Implementing installation EMSs, which may require substantial revision of agency policies, and auditing performance by Dec. 31, 2005;
- 2 Reducing EPCRA TRI releases and transfers for treatment by 40 percent by 2006;
- 3 With the Environmental Protection Agency, revising EPCRA TRI reporting exemptions to cause reporting of a substantial amount of chemical release;
- 4 Identifying and reducing chemical use of 15 priority chemicals by 50 percent by 2006; and
- 5 Revising installation pollution prevention plans to include EO requirements by March 31, 2002.

*EO 13101 Greening the Government Through Waste Prevention, Recycling and Federal Acquisition* directs Federal agencies to use recycled content products and environmentally preferable products. The Executive Order directs agencies to consider a broad range of environmental factors in developing plans, drawings, work statements, specifications, or other product descriptions. These factors include waste prevention; recyclability, the use of recycled content, environmentally preferable, and biobased products; life cycle cost; and ultimate disposal.

The Comprehensive Procurement Guideline (CPG) program, administered by the EPA, leads government agencies in purchasing products with recycled content. The CPG identifies products that *must* contain recycled content when purchased by federal or other government agencies. Executive Order 13101 requires that the CPG be updated every two years.

The Environmentally Preferable Purchasing (EPP) program, administered by the EPA “encourages and assists Executive agencies in the purchasing of environmentally preferable products and services”. Under Executive Order 13101 and Federal Acquisition Regulation, agencies are required to identify and purchase environmentally preferable products and services. The EPA developed guidance, as required by Executive Order 13101 and its predecessor, to address environmentally preferable purchasing in Federal agencies. The Final EPP Guidance Document “is designed to help Executive agencies meet their obligations under EO 13101 to identify and purchase environmentally preferable products and services.” These products and services range from office paper to building materials. The Database of Environmental Information for Products and Services allows users to search by material or type of product to find resources related to environmental standards and guidelines, specification language, vendor lists, and other resources. [<http://yosemite1.epa.gov/oppt/epstand2.nsf>].

*EO 13123 Greening the Government Through Efficient Energy Management* directs the Federal Government to significantly improve its energy management in order to save taxpayer dollars and reduce emissions that contribute to air pollution and global climate change. The Federal Government operates more than 500,000 buildings and, according to the Executive Order, can lead the Nation in energy efficient building design, construction, and operation. The Federal government is directed to promote energy

efficiency, water conservation, and the use of renewable energy products, and help foster markets for emerging technologies.

The Executive Order sets specific goals for federal agencies. Each agency shall, through life cycle cost effective energy measures, reduce energy consumption per gross square foot of its facilities by 30 percent by 2005 and 35 percent by 2010 relative to 1985. Industrial and laboratory facilities shall, through life cycle cost effective energy measures, reduce energy consumption per square foot, per unit of production, or per other unit as applicable by 20 percent by 2005 and 25 percent by 2010 relative to 1990.

Executive Order 13123 does not specify which technologies or design strategies should be used, but instead requires the evaluation of life cycle cost effectiveness of products and building improvements.

The order establishes goals concerning greenhouse gases reduction, energy efficiency improvement, renewable energy use, petroleum use reduction, and water consumption reduction. Section 403(d), in particular, requires the Department of Defense and GSA to develop sustainable design principles, and states that: “Agencies shall apply such principles to the siting, design, and construction of new facilities. Agencies shall optimize lifecycle costs, pollution, and other environmental and energy costs associated with the construction, life-cycle operation, and decommissioning of the facility.”

To fulfill the requirements of Section 403(d), DOD and the GSA Public Building Service, in consultation with the Department of Energy and EPA, developed sustainable design principles for federal agencies. These principles are summarized as follows:

- 1 *Site*: Optimize Site Potential
- 2 *Energy*: Minimize Nonrenewable Energy Consumption
- 3 *Materials*: Use Environmentally Preferable Products
- 4 *Water*: Protect and Conserve Water
- 5 *Indoor Environmental Quality*: Enhance Indoor Environmental Quality
- 6 *Operations & Maintenance*: Optimize Operational and Maintenance Practices

Individual agencies are attempting to apply these principles in their facility development programs. Policy documents and guidelines have been, and continue to be, established to address agency-specific needs.

*Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding – signed January 24, 2006 at the White House Summit on Federal Sustainable Buildings*

EPA and 16 other Federal agencies signed this MOU, which represents interagency consensus on a set of performance-based guiding principles for the design, construction and operation of high-performance and sustainable buildings. The agencies “will strive to incorporate and adopt, as appropriate and practical” the guiding principles “into existing agency policy and guidance within 180 days of signature.”

The Guiding Principles include:

## Employ Integrated Design Principles

*Integrated Design.* Use a collaborative, integrated planning and design process that initiates and maintains an integrated project team in all stages of a project's planning and delivery; Establishes performance goals for siting, energy, water, materials, and indoor environmental quality along with other comprehensive design goals; and, ensures incorporation of these goals throughout the design and lifecycle of the building; and, Considers all stages of the building's lifecycle, including deconstruction.

*Commissioning.* Employ total building commissioning practices tailored to the size and complexity of the building and its system components in order to verify performance of building components and systems and help ensure that design requirements are met. This should include a designated commissioning authority, inclusion of commissioning requirements in construction documents, a commissioning plan, verification of the installation and performance of systems to be commissioned, and a commissioning report.

1. Optimize Energy Performance (30% reduction compared to ASHRAE 90.1-2004, utilize measurement and verification)

*Energy Efficiency.* Establish a whole building performance target that takes into account the intended use, occupancy, operations, plug loads, other energy demands, and design to earn the Energy Star™ targets for new construction and major renovation where applicable. For new construction, reduce the energy cost budget by 30 percent compared to the baseline building performance rating per the ASHRAE and IESNA Standard 90.1-2004, Energy Standard for Buildings Except Low-Rise Residential. For major renovations, reduce the energy cost budget by 20 percent below pre-renovations 2003 baseline.

*Measurement and Verification.* In accordance with DOE guidelines issued under section 103 of the Energy Policy Act of 2005 (EPAct), install building level utility meters in new major construction and renovation projects to track and continuously optimize performance. Compare actual performance data from the first year of operation with the energy design target. After one year of occupancy, measure all new major installations using the Energy Star™ Benchmarking Tool for building and space types covered by Energy Star™. Enter data and lessons learned from sustainable buildings into the High Performance Buildings Database. ([www.eere.energy.gov/femp/highperformance/index.cfm](http://www.eere.energy.gov/femp/highperformance/index.cfm))

2. Protect and Conserve Water

*Indoor Water.* Employ strategies that in aggregate use a minimum of 20 percent less potable water than the indoor water use baseline calculated for the building, after meeting the Energy Policy Act of 1992 fixture performance requirements.

*Outdoor Water.* Use water efficient landscape and irrigation strategies, including water reuse and recycling, to reduce outdoor potable water consumption by a minimum of 50 percent over that consumed by conventional means (plant species



and plant densities). Employ design and construction strategies that reduce storm water runoff and polluted site water runoff.

3. Enhance Indoor Environmental Quality

*Ventilation and Thermal Comfort.* Meet the current ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy, including continuous humidity control within established ranges per climate zone, and ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality.

*Moisture Control.* Establish and implement a moisture control strategy for controlling moisture flows and condensation to prevent building damage and mold contamination.

*Daylighting.* Achieve a minimum of daylight factor of 2 percent (excluding all direct sunlight penetration) in 75 percent of all space occupied for critical visual tasks. Provide automatic dimming controls or accessible manual lighting controls, and appropriate glare control.

*Low-Emitting Materials.* Specify materials and products with low pollutant emissions, including adhesives, sealants, paints, carpet systems, and furnishings.

*Protect Indoor Air Quality during Construction.* Follow the recommended approach of SMACNA's Indoor Air Quality Guidelines for Occupied Buildings under Construction, 1995. After construction and prior to occupancy, conduct a minimum 72-hour flush-out with maximum outdoor air consistent with achieving relative humidity no greater than 60 percent. After occupancy, continue flush-out as necessary to minimize exposure to contaminants from new building materials.

4. Reduce Environmental Impact of Materials (recycled content, biobased products – rapidly renewable and certified wood, construction waste, eliminate ozone depleting compounds)

*Recycled Content.* For EPA-designated products, use products meeting or exceeding EPA's recycled content recommendations. For other products, use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of the total value of the materials in the project.

*Biobased Content.* For USDA-designated product categories, use products meeting or exceeding USDA's biobased content recommendations. For other products, use biobased products made from rapidly renewable resources and certified sustainable wood products.

*Construction Waste.* During a project's planning stage, identify local recycling and salvage operations that could process site related waste. Program the design to recycle or salvage at least 50 percent construction, demolition and land clearing waste, excluding soil, where markets or onsite recycling opportunities exist.

*Ozone Depleting Compounds.* Eliminate the use of ozone depleting compounds

during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI of the Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account life cycle impacts.

*Mandatory Purchase Programs, referenced in several of the documents mentioned above, include Energy Star™, Comprehensive Procurement Guidelines (CPG), and Bio-based Purchasing.*

Each of these programs require federal agencies to give preference to products that meet the designated standards whenever possible.

### ***1.3 Related Documents***

The other three specification sections that were developed as part of this program are listed here. In an actual specification additional Division 1 specifications should also be listed. It is not useful to list all related technical sections, however, as nearly every section would be included in such a list. This Division 1 should be listed as a “related section” in those other sections, however.

### ***1.4 Definitions***

A selection of the most important and relevant definitions is included in the specification. For additional definitions, see a LEED Reference Guide, *HOK Guidebook on Sustainable Design*, or other source.

### ***1.5 Submittals***

Early versions of LEED have required the submittal of extensive documentation from contractors and subcontractors to verify compliance with credit requirements. Recently, in conjunction with the shift to online submissions, the documentation requirements have been reduced dramatically. However, the owner or designer is required to vouch for the fact that the requirements have been met, so it is good practice to require documentation as a way of ensuring that they have, indeed, been met.

Most of the submittals requested in this specification are documents that might be required as part of LEED submission for an early version of LEED, and are still worth requiring for verification purposes whether or not they are needed for a LEED application.

For projects pursuing LEED certification, a “LEED submittal form” should be provided to the contractor for each LEED credit for which the contractor will be providing documentation. The contractor would then be expected to complete that form and attach any additional documentation to it. The project manager may wish to consider linking receipt of the completed forms to payment requests from the contractor at appropriate points in the process.

Project Materials Cost Data: A number of credits in LEED allocate points based on

formulas that involve the cost of materials for the project. For these formulas, the LEED project manager has to know the total cost of materials for the project, exclusive of plumbing, electrical, and mechanical materials. He or she also has to estimate how much of that cost is for materials that will contribute to one or more points under the related credits. The affected credits are:

LEED-NC 2.2 and LEED-CI 2.0:

- 1 MRc3, Resource Reuse
- 2 MRc4, Recycled Content
- 3 MRc5, Local and Regional Materials
- 4 MRc6, Rapidly Renewable Materials
- 5 MRc7, Certified Wood

LEED-EB 2.0 (these are based on purchases by the facility during the period of performance):

- 1 MRc2: Optimize Use of Alternative Materials;
- 2 MRc3: Optimize Use of IAQ Compliant Products;
- 3 MRc4: Sustainable Cleaning Products and Materials

NOTE: Any products specified throughout the project specifications that have sustainable design submittals associated with them should reference the submittal requirements in Section 01 81 13 and list it as a related section.

There may be submittals required for LEED or for the Agency that are not typically within the scope of the specifications document. For instance, the EPA is the first federal agency to buy green power certificates to offset emissions from 100% of electrical purchases, but this purchase is typically made by the building owner, and thus the relevant submittals are not outlined in the specifications document. The responsible party should, however, retain and submit a copy of the electricity purchase contract, highlighting the purchase amount, the duration of the contract, and verification that the renewable sources comply with the Center for Resource Solutions (CRS) Green-e products certification requirements OR submit copies renewable energy certificates (RECs), tradable renewable certificates (TRCs), green tags, or other forms of green power purchasing that complies with Green-e requirements. The EPA requirement that 100% of building purchased electrical use is offset with purchased Green-e compliant renewable power credits significant exceeds the LEED-NC credit for 35% green power. Those seeking the LEED credit should be aware that the credit specifies at least a 2-year renewable energy contract.

## ***1.6 Quality Assurance***

Sustainable design requirements should be the subject of a special meeting dedicated to the topic, to ensure that contractors and appropriate subcontractors are fully informed, prior to construction, about the implications of these requirements on their work. In addition, in coordination with standard quality assurance program, sustainable design requirements should be addressed regularly throughout the project.

## **Part 2 - Products**

### ***2.1 Product Environmental Requirements***

Included throughout the specification document are notes describing the rationale for product- or material-specific guidelines in the specification. Additional notes describe how those guidelines relate to the requirements (if any) in current versions of LEED. Technically, this information may not belong in a “Part 2” of the specification, since no products should actually be purchased and installed based solely on these requirements. But for common usage it is more intuitive to retain this as “Part 2.”

The intent of this document would be to include plumbing, mechanical and electrical components such as wiring, piping, and ductwork. However, it should be noted that such materials are generally excluded from the materials and resources credits in LEED version 2.

Ideally, product and material selection decisions would be based on a comprehensive, reliable life-cycle assessment to determine the most environmentally preferable choice for each application. Such a selection process is not feasible for most construction and renovation projects at this time. However, the Building for Environmental and Economic Sustainability software tool from the National Institute for Standards and Technology contains information that makes such comparisons feasible for at least one product category—carpets. The comments in the specifications document include a suggestion for using BEES as part of a carpet selection process. In addition the Athena Environmental Impact Estimator software from the Athena Sustainable Materials Institute ([www.athenasmi.ca](http://www.athenasmi.ca)) provides useful guidance in comparing major building structural systems. That software is not referenced in this specification, however, as it is more appropriate for use by designers than by contractors working on the construction of a building.

## **Part 3 – Execution**

### ***3.1 Construction Waste Management***

Summary included in this specification. For details, see related section 01 74 19. “Construction Waste Management.”

### ***3.2 Construction Indoor Air Quality Management***

This section spells out the requirements for managing and protecting indoor air quality during construction. It is written to conform with the requirements in LEED-NC EQ credit 3.1 and LEED-EB EQ credit 3. In addition, the Construction Indoor Air Quality Management Plan specified includes requirements for the sequencing of finish materials installation to avoid cross-contamination, adapted from the Section 01450 Specification that was developed for construction of EPA's Research Triangle Park lab and office complex.

For details on a testing plan to meet the requirements of LEED-NC EQ credit 3.2, see related section 01 81 09, "Testing for Indoor Air Quality."

### ***3.3 Commissioning***

The language in this section is highly summarized. For details, see related section 01 91 00, "General Commissioning Requirements" and the Commissioning sections in Divisions 22, 23, 26, and elsewhere in the specification.

### ***3.4 Measurement and Verification***

The measurement and verification protocols in this specification are based on the parts of the International Performance Measurement and Verification Protocol documents that are most relevant to new (Volume III) and existing (Volume I) facilities as found on the Research Triangle Park campus.

The Multi-agency federal MOU signed during 2006 commits the agencies to following these protocols, both initially and with a 1-year follow-up.