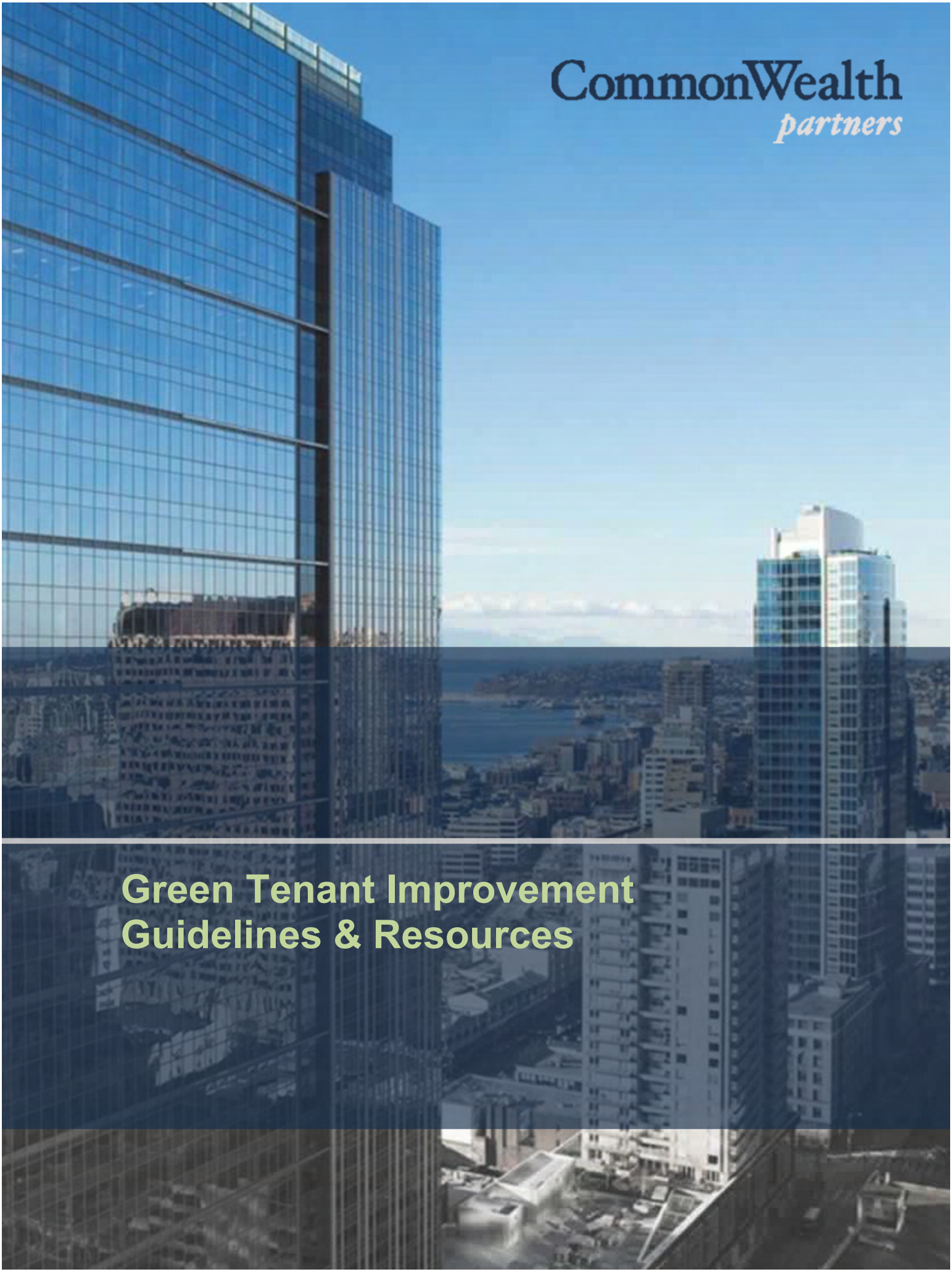
CommonWealth
partners
Green Tenant Improvement
Guidelines & Resources

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# INTRODUCTION

CommonWealth Partners is committed to environmentally responsible building design, construction and operation. The Asset Management team's vision is for CommonWealth "to become one of the global leader's in green" through certifying the entire CommonWealth portfolio of properties with LEED[1] and Energy Star[2], mapping our carbon baseline and reducing it, exceeding current standards and enhancing competitiveness of the company and buildings.

Benefits of green operation include:

- Maximize energy & water efficiency
- Reduce operational costs
- Provide a higher quality product
- Position property to attract and retain tenants
- Stay ahead of pending government regulations
- Fulfill the needs of tenants who are increasingly demanding healthy & sustainable work environments

The purpose of this handbook is to educate you, the tenant, about the variety of strategies you can use to green your interior space. We encourage you to pursue the green building strategies identified and explained in this manual. Our hope is that this handbook will be a starting-place for you to learn more about the benefits of green building and will inspire you to explore the many ways you can join us in providing a healthy work environment for your employees and a positive image as a leader in sustainability.

### What is a Green Building?

A green building is one that incorporates design, construction and operational practices that significantly reduce or eliminate the negative impact of development on the environment and occupants with strategies for addressing:

[1] Leadership in Energy and Environmental Design, the U.S. Green Building Council's third-party green building
[2] Energy Star is a U.S. government-backed program helping businesses and individuals protect the environment through superior energy efficiency. www.energystar.gov

- smart growth
- energy efficiency
- greenhouse gas emissions reduction
- water conservation
- waste avoidance, reuse and recycling
- pollution prevention – noise, water, air, soil & light
- enhanced biodiversity
- reduced natural resource consumption
- productive & healthier environments
- flexible and adaptable spaces
- triple-bottom-line profitability, **TBL = People** (social) + **Planet** (environmental) + **Profit** (Economic)

## Why Green Your TI?

There are many benefits to "greening" your TI, ranging from cost savings, employee health and productivity, a contribution to a positive company reputation, to helping the environment as a whole. As stated in the "Creating a High Performance Workspace G/Rated Tenant Improvement Guide" Research indicates that each year, Sick Building Syndrome costs $60 billion in lost white-collar productivity in the U.S. alone, and heating and lighting of commercial buildings uses about half of the word's fossil-fuel consumption and one-third of the US's electricity consumption. How you choose to construct your space and manage the everyday operation of your space makes a difference.

## LEED for Commercial Interiors (LEED-CI)

LEED™ stands for Leadership in Energy and Environmental Design. The USGBC established this third-party rating system to educate, and reward project teams for voluntarily incorporating sustainable design practices into new and existing building construction. In doing so, the USGBC has set the standard for what constitutes a "green" building.

Designing and building a LEED™ certified building requires collaboration from all members of the design and construction team. By focusing on the integrative design process and addressing environmental concerns in the initial stages of the building design, the project team can deliver a building that shows notable improvements in the areas of water efficiency, energy usage, materials and resources, indoor air quality and waste management.

Points are awarded based on various criteria that fall in five basic categories – sustainable sites, water efficiency, energy & atmosphere, materials and resources, and indoor environmental quality. Credits can also be earned for exceeding credit thresholds for certain points, or for innovative strategies. Projects achieve a Certified, Silver, Gold or Platinum level of certification based upon total points earned.

LEED for Commercial Interiors is the green benchmark for the tenant improvement market. It is the recognized system for certifying high-performance green interiors that are healthy, productive places to work; are less costly to operate and maintain; and have a reduced environmental footprint. LEED for Commercial Interiors gives the power to make sustainable choices to tenants and designers, who do not always have control over whole building operations.

Many of the green strategies identified in this manual follow the guidance supplied by LEED for Commercial Interiors (LEED-CI). Cross-references to LEED-CI requirements are provided in the footnotes. Should you choose to formally certify your build-out to LEED-CI, or simply to follow LEED-CI standards as good practices, these guidelines should prove helpful.
For more information about LEED-CI visit the USGBC website at: USGBC LEED-CI:
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=145

### Green Features

The main goals of the property's Green Features are to reduce demand for energy and water by maximizing efficiency to prevent future green house emissions, to reduce operating expenses and to create a productive workplace by focusing on achieving a healthy space (i.e.: improving indoor air quality, increasing daylight and views, and increasing occupant controllability of systems).

### Green Tenant Improvements

Green building techniques typically result in energy savings for your office space and a healthy working environment for your employees. Office tenants should strive to use resources efficiently during construction, and ensure operational water and energy savings by installing efficient equipment and fixtures. Selecting natural furnishings and finish materials that contain low levels of noxious chemicals will vastly improve the space's indoor air quality.

The following sections summarize strategies that contribute to a green interior space and that we recommend you consider in your build-out.

Please use the following resources as a toolbox to help guide your green tenant improvements:

- G/Rated Tenant Improvement Guide - Creating a High Performance Workspace (A comprehensive guideline for high performance tenant improvements)
  http://www.portlandonline.com/shared/cfm/image.cfm?id=112733

- LEED™ for Commercial Interiors – Detailed guidelines,
  www.usgbc.org/DisplayPage.aspx?CMSPageID=145

For more information and resources about greening your tenant improvements and your space, contact Daniele Horton, Director of Sustainability at CommonWealth. cel.: 213.949.6600
e-mail: dhorton@cwpla.com

# SUSTAINABLE SITES

**Strategies:**

Establish sustainable design objectives, and make building location and sustainable features a metric for decision-making. This encourages development and preservation or restoration practices that limit the environmental impact of buildings on local ecosystems.

Best practice green building strategies and technologies for sustainable sites include:

- Urban infill or reuse of a brownfield site
- Pedestrian access to a variety of services
- Good access to public transportation
- Effective commuter programs, minimized parking capacity, preferred parking for car/vanpools
- Stormwater management and treatment systems
- Water-efficient landscape including native plants, drought resistant planting, high-efficiency irrigation technology, use of harvested rainwater or recycled site water, or elimination of irrigation
- Efficient use of water for all purposes
- Measures to reduce heat island effect (shading, light-colored materials, open-grid paving, covered parking, or vegetated roofs)
- On-site renewable energy systems
- Measures to reduce light pollution
- Bicycle racks and shower/changing facilities

Many of these strategies are already in use at the property. If you decide to pursue LEED CI certification, contact our Property Management Office as they may help you with a few credits under the sustainable sites category. As an example you should get one point under this category by being in a LEED certified building.

**Resources:**

- For lighting pollution reduction strategies visit the IESNA website: www.ieasna.org
- Alternative Transportation Resource Sites:
  - *Transit Systems in California: http://www.publictransportation.org/systems/state.asp?state=CA*
  - Office of Transportation and Air Quality U.S. Environmental Protection Agency: www.epa.gov/otaq/
  - Best Workplaces for Commuters: www.bestworkplaces.org
  - Association for Commuter Transportation: www.actweb.org
  - Benefits of using Alternative Transportation Costs Calculator: http://www.pacommutes.com/alternative-transportation/commute-cost-calculator/
  - Smart Commute: www.smartcommute.org/
  - The Telework Coalition: www.telcoa.org
  - Teletrips: www.secure-teletrips.com

# WATER EFFICIENCY

### Strategies:

Installing high efficiency fixtures will mean significant water and energy savings, will reduce your operating expenses, and will help protect our region's fresh water resources. We encourage your building upgrades to follow the recommendations below for any water consuming fixtures that will be installed.

### Recommended fixture flow rates:

The following recommendations should be reviewed by a plumbing engineer:

- Install low-flow/ultra or low-flow fixtures, fittings, and equipment, such as toilets and urinals that exceed current code requirements. Examples of low flow fixtures include:
  - Water closets, max 1.1 to 1.6 gallons/flush
  - Urinals, max 0.125 to 0.5 gallons/flush
  - Showerheads, max 1.8 gallons/minute
  - Faucets, max 1.0 gallons/minute
  - Replacement aerators, max 0.5 gallons/minute
  - Metering faucets, max 0.25 gallons/cycle
- Many flow fixtures are available as low as 1.1 to 1.6 gallons/minute, and dual-flush toilets have two flush settings, 1.1 and 1.6 gallons/flush, contributing greatly to overall water savings.
- Look for the products that have the EPA "WaterSense" label.
- Include required performance levels (e.g. flow rates) fixtures, fittings, and equipment modification in plans and specifications.
- Install aerators and automatic controls on faucets.

### Resources:

- Look for the EPA WaterSense seal, a recognized emblem of approval for water efficiency similar to Energy Star. http://www.epa.gov/watersense/
- Visit the US Dept of Energy, for water efficiency BMP's http://www1.eere.energy.gov/femp/program/waterefficiency_bmp.html

✓ *Recommended Vendors*:*

- Sloan Valve Company
  Contact: John Aykroyd, VP Business Development, (847) 233-2026.
  www.sloanvalve.com

# ENERGY & ATMOSPHERE

The following are some suggestions for designing an energy-efficient tenant improvement space:

**Strategies:**

- HVAC Systems: We recommend that tenants have an engineer prepare an energy model to compare the energy use of your designed space built to code standard versus as-built conditions, taking into consideration regulated loads under the current version of ASHRE 90.1.[3] Additional recommendations or requirements include:
  - Tenant HVAC Design must comply with the tenant standards in order to maintain base building energy efficiency targets and LEED Certification.
  - Minimum Ventilation: at least 30% above the minimum rates required by the current version of ASHRAE Standard 62.1, or 15.0 CFM/100 square feet, whichever is higher. [4]
  - Building has central temperature and humidity control system to monitor for thermal comfort of building occupants.[5]
  - Investigate opportunities to use and support "green energy" by purchasing Green-e Certified REC's (Renewable Energy Certificates).[6]
  - Tenant supplemental HVAC&R systems shall use HFC refrigerants only. CFCs, HCFCs and Halons are prohibited.[7]

- Lighting: Poor lighting design and inefficient fixtures waste energy and increase the loads on cooling systems. In addition, glare and reflections from poor workspace lighting can lead to eye strain, fatigue, reduced productivity, and increased errors in visual tasks. Advances in ballast, lamp, luminaires, and control technology make it possible to obtain higher quality lighting with significant reductions in energy usage.
  - Your lighting design shall not exceed minimum Title 24 requirements. However, we recommend that you consider not exceeding 1.0 watt/sf of lighting power density. High quality lighting solutions are available as low as 0.7 watts/sf.
  - Design your workspace to maximize both daylight and view opportunities for all employees working in the space.[8]
  - Develop a lighting design based on your space layout that makes optimal use of natural and artificial lighting for ambient, task, and accent lighting needs.
  - Use task lighting to efficiently light work surfaces. In addition, design your space so that employees can control the amount of light within their work area.[9]
  - Non-standard fluorescent fixtures shall have high quality, energy efficient fixtures, such as high output T5 (T5HO) or Super T8 fixtures and electronic ballasts. Consider glare, aesthetics, and the visual comfort of occupants.
  - Use high-efficiency luminaires, lamps, electronic ballasts, and lighting controls.
  - Lamps with electronic ballasts shall have less than 104 harmonics.

[3] EA Prerequisite 2, Minimum Energy Performance, and EA Credit 1, Optimize Energy Performance
[4] IEQ Credit 2: increased Ventilation
[5] IEQ Credit 6.2, Controllability of Systems—Thermal Comfort
[6] EA Credit 4, Green Power
[7] EA Prerequisite 3, Fundamental Refrigerant Management
[8] IEQ Credit 8.1 and 8.2, Daylight and Views
[9] IEQ Credit 6.1, Controllability of Systems–Lighting

- Lighting in all areas shall be controlled by occupancy sensors to automatically turn off lights in unoccupied spaces and in the entire workspace at the end of the day. The building lighting control systems turn lights off at the end of the day. Override capabilities should be made available to tenants for off-hour use.
- Use variations in lighting to highlight surfaces and define or delineate spaces having different uses, such as circulation zones, work areas, and meeting spaces. Increase the effectiveness of lighting by using light-colored finishes on ceilings and walls.
- Building standard is 3500 degrees Kelvin. Select a pleasant color temperature of lamps with a Color Rendering Index (CRI) of 80 or higher.
- For all exterior building signage and lighting, conform to national IESNA standards and shield fixtures so that there is no up-lighting or light trespassing into the surrounding neighborhood.[10]

- Measurement and verification can confirm that your mechanical and electrical systems are performing as designed. We encourage you to install continuous submetering equipment and develop a Measurement and Verification Plan that is consistent with Option B, C or D of the International Performance Measurement & Verification Protocol (IPMVP) Volume I (2001), for concepts and options for determining water savings, and Volume III (2003), for determining energy savings (http://www.evo-world.org).[11]
- Power Metering: Tenant shall separately meter power for all over-standard equipment such as computers, telephone switches, supplementary air condition, food service equipment, etc. Meters shall be E-MON D-MON with meters located in the building electrical room.

**Resources:**

- Resources for overall energy conservation:
  - Energy Star, www.energystar.gov
  - IESNA recommendations, www.iesna.org
  - BEEP BOMA Energy Efficiency Program, http://www.boma.org/TrainingAndEducation/BEEP/

- To purchase Renewable Energy Certificates (green tags):
  - Retail products, http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=1

✓ *Recommended Vendors*:*

- Carrier (HVAC Products and Systems)
  Contact: John M. Mandyck, Vice President
  John.M.Mandyck@carrier.utc.com, (860) 674-3006
  Website: www.carrier.com
- Lucid Design Group (Building performance dashboard and web access)
  Contact: Kai Mak, VP Sales and Business Development
  kai@luciddg.com, (510) 907-0400
  Website: www.luciddg.com

[10] SS Credit 1, Site Selection PATH 6. Light Pollution Reduction
[11] EA Credit 3, Measurement & Verification

- Redwood Systems (LED Lighting Controls and Power Infrastructure)
  Contact: Randy Schmitz, Sr. Director of National Accounts
  rschmitz@redwoodsys.com, (510) 270-5360 x 325
  Website: http://www.redwoodsystems.com

# MATERIALS & RESOURCES

CommonWealth is committed to installing materials in the base building that minimize negative impacts to the local and global environment and provide a healthy indoor workspace. Several materials found in interior finishes have been proven to cause adverse health impacts by releasing harmful gasses and volatile organic compounds (VOC's) into the air**.** We encourage you to use the following strategies for selecting materials to use in your tenant improvements.

**Strategies:**

- Purchase Locally-Manufactured and Extracted Materials: Using materials from local sources reduces the embodied environmental costs of transporting the material long distances to the job-site.
- Recycled Content and Materials Reuse: By reusing materials and using materials with recycled content, less virgin resources are consumed for building purposes. The following building materials are commonly used in construction and interior finishes and often contain post-consumer and post-industrial recycled content.[12]
  - Steel, drywall & carpet, acoustic ceiling, furniture and furnishings such as case pieces, seating, filing systems, decorative lighting and accessories
  - Supplementary information can be found in Exhibits C & F.
- Rapidly Renewable Materials: Use materials considered to be rapidly renewable (i.e. made from materials typically harvested within a 10-year cycle) such as bamboo, linoleum, and wool [13]
- Wood from forests that practice sustainable forestry management – specify wood with the Forestry Stewardship Council (FSC) designation. [14]
- Adhesives and Sealants off-gas quickly and the volatile organic chemicals may redeposit in carpet, fabrics or unpainted drywall. We suggest using the following guidelines when selecting adhesives and sealants for your project.[15]
  - Low-toxicity adhesives are available for installation of all building materials including ceramic tile, linoleum, vinyl flooring, carpet base, wall coverings, and countertops.
  - Specify only adhesives that meet the VOC limits of the South Coast Air Quality Management District, Rule # 1168 for carpet, seam sealer, tile, flooring, cove base, countertop, framing, and panel adhesives (www.aqmd.gov).
  - Use low toxicity, water-based siliconized acrylic caulk (painter's caulk) for interior moisture and air sealing. Low-toxicity mastic is available for sealing HVAC ductwork.
  - Use low-VOC water-proofing sealants.

[12] MR Credit 3.1 & 3.2: Materials reuse, MR Credit 4, Recycled Content and MR Credit 5, Regional Materials
[11] MR Credit 6, Rapidly Renewable Materials
[13] MR Credit 6, Rapidly Renewable Materials
[14] MR Credit 7: Certified wood
[15] IEQ Credit 4.1, Low-Emitting Materials–Adhesives & Sealants

- Airborne mineral fibers are suspected to be a cause of sick building syndrome. Install duct boards that are designed to eliminate loose mineral fibers from the air.
- Specify carpet with the Carpet and Rug Institute's (CRI) Green Label, or choose natural fibers such as wool carpet.[16]
- Paints: All paints used in the building must be water based and low VOC. Any deviation from this requires written authorization from CWP's Construction Manager Rep. Paints and primers must meet the emission and chemical component requirements according to Green Seal Standard GS-11:[17]
    - Non-flat sheen: 150 g/L VOC maximum
    - Flat sheen: 50 g/L VOC maximum
- Consider low-VOC or rapidly renewable alternatives to vinyl composition flooring, including the following:
    - Linoleum is made from natural materials including ground cork, limestone, pigment and linseed oil and does not off-gas any petroleum based harmful or irritating chemicals.
    - Vinyl tile flooring does not contain plasticizers or softening chemicals found in sheet vinyl.
    - Consider FSC-certified hardwoods for flooring (be sure to look for no added urea-formaldehyde).
    - Use bamboo flooring. Bamboo is durable and a rapidly renewable (e.g. fast growing with short harvest cycles) material.
- Furniture fabrics may be a source of noxious chemicals, but low-toxicity options are available. Reuse existing furniture to the greatest extent possible.
- Use indoor composite wood products that contain no added urea-formaldehyde for built-in cabinets and shelving. Specify wheat board, formaldehyde-free MDF (Medium Density Fiberboard), or plywood for cabinets, storage systems and shelving.[18]

**Resources:**

- GreenSpec: The online GreenSpec® Product Guide lists over 2,200 environmentally preferable products selected by editors at BuildingGreen, LLC. The guide includes key insight on the green attributes of each product and the most critical green issues for each product category. Editors at BuildingGreen conduct their own independent research in assessing manufacturer claims, ensuring that the directory contains unbiased, quality information. GreenSpec does not charge for listings or sell ads. GreenSpec product listings are accessed on BuildingGreen.com with a subscription to BuildingGreen Suite. http://www.buildinggreen.com/menus/

- EPA's Environmentally Preferable Purchasing (EPP) Database, at Products (con'd) www.epa.gov/opptintr/epp/database.htm, is a searchable database providing environmental information on over 600 products and services.

- Green Building Pages: http://www.greenbuildingpages.com/manufacturers/ProductSearch.php
- Carpet and Rug Institute: www.carpet-rug.com

[16] IEQ Credit 4.3, Low-Emitting Materials–Flooring Systems
[17] IEQ Credit 4.2, Low-Emitting Materials–Paints & Coatings
[18] IEQ Credit 4.4, Low-Emitting Materials–Composite Wood and Agrifiber Products

- Green Guard, www.greenguard.org/DesktopDefault.aspx?tabindex=3&tabid=16
- Green Seal: http://www.greenseal.org

✓ *Recommended Manufacturers:*

- *Interface FLOR*
  *Contact: Lunny Lundstrom, Account Executive,*
  *lunny.lundstrom@interfaceflor.com, (415) 421-7700, www.interfaceflor.com*

- *Bentley Prince Street*
  *Contact: Brett Hart 801-633-6895*

*http://www.bentleyprincestreet.com/*

- Finishes:
  - Speed Grip is a 100% VOC-free, chemically reactive construction Adhesive – Geocel Corporation, Elkhart, IN, 800.348.7615, www.geocelusa.com.
  - Titebond is a solvent-free, nonflammable construction adhesive that contains 6.6 g/L VOCs – Franklin International, 800.877.4583, www.titebond.com
  - American Bamboo Society, www.americanbamboo.org.
  - Forest Stewardship Council; locate a supplier of FSC certified wood products, www.fscus.org.

✓ Recommended Manufacturer*:

- Paint (No VOC and Non-toxic)
  Mythic Paint, Contact: Jeff McCann, Senior Account Executive,
  (727) 418-8111 jeff@mythicpaint.com; www.mythicpaint.com

- Furnishings:
  - WheatBoard by Primeboard Inc., distributed by United Board Group, 701.642.9700.
  - FIBEROCK Brand Gypsum Fiber Underlayment, manufactured by US Gypsum Co., 800.874.4968, www.usg.com.
  - AllGreen® MDF, the first fiberboard made from 100% waste wood. CanFibre Group Ltd., Toronto, ON Canada, 416.681.9990.
  - Purebond™ formaldehyde-free hardwood plywood for veneer-core and Woodstalk® agrifibre core construction, Columbia Forest Products, 800.237.2428.
  - SkyBlend Particleboard Panel, particleboard using phenol-formaldehyde resins, Roseburg Forest Products, 541.679.3311.

✓ Recommended Manufacturer:

- Haworth
  Contact: Celeste Altimari, 310.481.2304
  http://www.haworth.com

- Partitions / Gypsum Board / Acoustic Ceiling Tile:
  - ✓ Recommended Manufacturers:
    - Armstrong Ceiling Systems
      Contact: Anita Snader, Environmental Sustainability Manager,
      alsnader@armstrong.com, (717) 396-6486
      http://www.armstrong.com/commceilingsna/.
- Doors:
  - ✓ Recommended Manufacturers:
    - ASSA ABLOY
      Contact: Aaron Smith, Director Sustainable Solutions, asmith@assaabloydss.com, (612) 325-5719, www.assaabloydss.com.
- Supplies
  - ✓ Recommended Vendors:
    - Green Office Supplies
      Office Depot:
      Contact: Chris Mellgren Regional Sales Manager II,
      chris.mellgren@officedepot.com, M: 714-749-0849, O: 562-490-9139
      www.officedepot.com.

    - Toilet paper, paper towels, dispensers and cleaning supplies:
      SCA Tissue North America
      Contact, Bob Silva, robert.silva@sca.com, (678) 427-4331, www.torkusa.com,

**Reduce Waste Generation during construction**:[19]

As part of ComoonWealth' green construction strategies, we encourage both you and your contractor to minimize construction impacts by implementing an aggressive Construction Waste Management Plan.

**Strategies:**

- Challenge yourself by establishing a 75% minimum overall recycling rate as a project goal.
  **Required project close-out document: At the end of your project provide documentation to the property management office with your construction diversion rates.*
- Work with CWP's Property Management Group to identify a good location to collect recyclable source-separated debris on-site.
- Alternatively, the contractor can use a facility that will accept, sort, and recycle commingled waste to avoid the space requirement of multiple containers.
- Ask your contractor to recycle any tear-out materials that can be salvaged or recycled.
- Have suppliers take back packaging, including wood pallets, cardboard packaging, shrink-wrap plastic and Styrofoam.
- Ask your contractor to arrange for recycling with the hauler, find out where the hauler takes materials for recycling, and arrange to get copies of the load tickets to confirm delivery.

[19] MR Credit 2, Construction Waste Management

**Resources:**

- *City of Newport, Department of Public Services: Construction and Demolition Waste http://www.cityofnewport.com/departments/public-services/cleancity/c_and_dem.cfm*
- *LA County Department of Public Works: http://dpw.lacounty.gov/epd/; http://dpw.co.la.ca.us/epd*
- *Los Angeles Bureau of Sanitation, http://www.cityofla.org/SAN/index.htm; http://www.lacity.org/SAN/solid_resources/recycling/index.htm http://www.lacity.org/SAN/solid_resources/pdfs/C&D_guide.pdf*
    - ✓ *Recommended local Demolition Contractor*:*
        - Interior Removal Specialists, Inc,
          Contact: Richard A. Ludt (323) 357-6900
          http://www.irsdemo.com/index.html
    - ✓ *Recommended Resource Reuse donation service:*
        - Contact: MaryEllen Etienne, Executive Director, Reuse Alliance
          maryellen@reusealliance.org, P: 917.238.6218
          http://www.reusealliance.org/

# INDOOR ENVIRONMENTAL QUALITY

Our properties are designed to provide a healthy indoor environment for occupants by providing fresh air and an adequate exhaust of contaminants to the outdoors. We encourage you to institute similar measures during your build-out in order to prevent indoor air quality problems resulting from construction projects and maintain the well-being of all building personal. A healthy indoor environment has been shown to contribute to greater employee retention and productivity, and a more pleasurable experience for customers. We encourage you to implement an Indoor Air Quality (IAQ) Management Plan during construction with the intent to protect the health and comfort of workers, as well as future occupants. These plans should directly reflect the requirements listed in the following guidelines (as appropriate):

- LEED-EB:O&M IEQ Credit 1.5 - IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions
- LEED-CI IEQ Credit 3.1 - Construction Indoor Air Quality Management Plan—During Construction
- LEED-CI IEQ 3.2: Construction Indoor Air Quality Management Plan—Before occupancy
- Sheet Metal and Air Conditioning National Contractor's Association (SMACNA) *IAQ Guidelines for Occupied Buildings Under Construction*, current edition

Contractors and sub-contractors shall familiarize themselves with the principles and methods of documentation described in these documents.

The documentation described below needs to be included in your Close-out package at the end of your TI project.

**Strategies:**

- Pathway Interruption: During construction erect temporary barriers to isolate the project area and / or rebalance the HVAC pressurization of such areas. Temporary barriers may consist of dust curtains for minor remodels to stronger plastic seals for major renovations. Rebalance HVAC to depressurize the project area while pressurizing the occupied contiguous area(s). When weather conditions permit, during the installation of VOC-emitting materials ventilate using 100% outside air, and exhaust contaminated air directly to the exterior of the building. **Required for project close-out: Provide pictures of pathway barriers. Provide a narrative of HVAC pressurization measures.*
- HVAC Equipment Protection: With the cooperation and direction of the building engineering team, shut down return air ducts during heavy construction and / or demolition. Seal return air ducts and equipment openings with plastic to protect from dust and debris.
- When the mechanical system must remain operational, install filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each return air header or return air grille on the affected floor(s). At the end of the project, and prior to occupancy, replace filtration media with filters that are MERV 13 or better. **Required for project close-out: Provide manufacturer's product sheet documenting model/product number and MERV rating. Provide narrative describing location and confirmation that the filter was replaced immediately prior to occupancy. Provide photos documenting the filtration media was in place during the project.*

- Install temporary balancing dampers in the temporary ventilation outlets to limit the supply air volume to 1/3cfm per sq ft or less during construction.
- After construction is complete remove the temporary airs filters and vacuum the return air stub duct(s).
- Scheduling: The contractor shall provide the building management team with a construction schedule including the order of the project tasks. When applicable, the construction schedule shall sequence the installation/application of wet and emissive materials (paints and coatings), before the installation/application of absorbent materials (carpet, cloth covering, ceiling tile and gypsum). At minimum, allow time in the work schedule to complete the first phase of the flush–out procedures prior to occupancy (see Flush-Out Procedure below). **Required for project close-out: Provide a copy of the construction schedule including the order of project tasks and flush-out procedure.*
- Provide temporary walk-off mats to catch dust, mud, and debris from worker's shoes as they enter or leave the space or main building.
- Tenants are encouraged to take air quality samples to check for levels of VOC and contaminants after construction.
- Install a $CO_2$ monitoring system for densely occupied areas that provides feedback to the HVAC system and/or Building Automation System (BAS) to trigger corrective action when fresh air is needed, if applicable. If automatic controls are not feasible, use the monitoring system to trigger an alarm that informs building operators or occupants when adjustments are needed in order to bring in the right amount of fresh air. [20]
- Separate any high-volume copy rooms or janitorial closets installed during the tenant build-out via deck-to-deck partitions and provide an exhaust vent connected into the building general exhaust systems.[21]
- Source Control: Whenever possible, specify project finish materials that have low- or no-voc's and/or no toxicity.
    - Adhesives and Sealants: VOC content below SCAQMD Rule #1168 or BAAQMD Reg 8, Rule 51
    - Paints and Coatings: VOC emissions below Green Seal GS-11 standards
    - Carpet: CRI Green Label Plus
    - Carpet Cushion: CRI Green Label Plus
    - Non-carpet flooring: FloorScore-certified
    - Composite Panels and Agrifiber: Contains no added urea-formaldehyde resins
- In addition to material specification, the contractor and sub contractors shall use a portable air cleaner during all construction and / or demolition. The portable air cleaner will have a removal effectiveness of MERV 13 or greater, as well as any additional filter needed to suit the material being controlled (e.g., HEPA, charcoal, or potassium permanganate). **Required for project close-out: Include material cut sheet highlighting above mentioned sustainable criteria. Supply documentation and pictures of the on-site portable air cleaner. Documentation to include filtration MERV rating, as well as any additional filter needed to suit the material being controlled (e.g., HEPA, charcoal, or potassium permanganate).*

[20] IEQ Credit 1, Outdoor Air Delivery Monitoring
[21] IEQ Credit 5, Indoor Chemical & Pollutant Source Control

- Flush-out Procedure: After all construction ends and prior to occupancy, install new filtration media and contact building management office to coordinate flushing-out the space with outdoor air to remove any remaining off-gassing contaminants. This procedure has to be done off-hours. The flush-out must be done by supplying a total outdoor air volume of 14,000 cubic feet per square foot of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and relative humidity no higher than 60% where cooling mechanisms are operated. After the flush-out procedure is complete, replace filtration media with filters that are MERV 13 or better and re-balance the affected project area. The affected space may be occupied only after the space has been ventilated at a minimum rate of 0.30 cfm per square foot of outdoor air or the design minimum outside air rate (whichever is greater) for at least three hours prior to occupancy until the total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space. The flush-out may continue during occupancy. **Required for project close-out: Provide a narrative of the pre-occupancy and post-occupancy flush-out process. Include data regarding airflow, duration of flush-out, and any special considerations.*
- Upon the completion of construction, HVAC and lighting systems must be returned to the normal building (designed or modified) sequence of operations.
- Housekeeping: The contractor shall be responsible for daily cleanup of their debris and proper storage of materials, with attention to methods sensitive toward maintaining healthy indoor air quality. Such methods include: use of sweeping compounds to suppress dust, removing spills or excess applications of solvent-containing products as soon as possible, keeping project area and materials as dry as possible, micro-fiber dusting cloths, and use of high-efficiency vacuum cleaners with HEPA rated filters. Porous building materials should be protected from moisture and off-gassing from other materials, and stored in clean staging areas prior to installation. **Required for project close-out: Provide pictures and a narrative of the housekeeping procedures employed during project.*

**Resources:**

- Whole Building Design Guide's "*Enhance Indoor Environmental Quality (IEQ)*", from the National Institute of Building Sciences. www.wbdg.org/design/ieq.php
- Sheet Metal and Air Conditioning National Contractor's Association (SMACNA) *IAQ Guidelines for Occupied Buildings Under Construction*, current edition. www.smacna.org/bookstore
- Construction IAQ Management: *Job-site Strategies for Ensuring a Healthy Building*, Environmental Building News, Vol. 11, No. 5, May 2002 – Provides a checklist based on the SMACNA guideline above.
- US Environmental Protection Agency (EPA), IAQ website: www.epa.gov/iaq/index.html
- EPA "*Building Air Quality: A Guide for Building Owners and Facility Managers*": www.epa.gov/iaq/largebldgs/baqtoc.html
- California Integrated Waste Management Board (CIWMB) Section 01350 Special Environmental Requirements for testing emissions of products: www.calrecycle.ca.gov/greenbuilding/Specs/Section01350/
- Building Owners and Managers Association (BOMA ) International, www.boma.org
- Center for Disease Control "*Indoor Environmental Quality Policy*." http://www.thecanaryreport.org/wp-content/uploads/2010/04/CDC-2009-Indoor-Environmental-Quality.-internal-policy542.pdf

- ✓ Recommended Manufacturer*:
  - Paint (No VOC and Non-toxic)
    Mythic Paint, Contact: Jeff McCann, Senior Account Executive,
    (727) 418-8111 jeff@mythicpaint.com; www.mythicpaint.com

# INNOVATION IN OPERATIONS & MAINTENANCE

In case you decide to pursue LEED CI certification for your Tenant Improvement project, this credit category provides the project teams with the opportunity to be awarded points for additional environmental benefits achieved beyond those already addressed by the LEED CI Rating System.

**Strategies:**

Credits in this category may be earned by documenting increased benefits to the environment in any of three ways:

- Innovation in Design: Achieve significant, measurable environmental performance using a strategy not addressed in LEED-CI.
- Exemplary Performance: Achieve double the requirements and/or the next incremental percentage threshold of an existing LEED-CI prerequisite or credit that allows exemplary performance points.
- Pilot Credit: Attempt a pilot credit available in the Pilot Credit Library at www.usgbc.org/pilotcreditlibrary.

Below you will find a complete list of sample innovation credits that have already been approved by the USGBC. For more information click on the links below or read the USGBC LEED CI Reference Guide.

**Resources:**

- List of approved USGBC Innovation & Design Credits:
  http://www.usgbc.org/ShowFile.aspx?DocumentID=3569
- For more information on ID credits, see the "Guidance on Innovation in Design (ID) Credits"
  http://www.usgbc.org/Docs/LEEDdocs/IDcredit_guidance_final.pdf

# GREEN BUILDING OPERATIONS

Listed below are several important green operations practices, policies and programs developed by CommonWealth. Sustainability has become a source of competitive advantage for corporations, individual buildings and real estate portfolios. It also plays an increasingly important role in business and regulatory relationships, such as real estate investments by companies with environmental screening criteria and office tenant space selection decisions.

The Asset Management team's vision is for CWP "to become one of the global leader's in green" through certifying the entire CWP portfolio of properties with LEED and Energy Star, mapping our carbon baseline and reducing it, exceeding current standards and enhancing competitiveness of the company and buildings.

Benefits of green operation include:

- Maximize energy & water efficiency
- Reduce operational costs
- Provide a higher quality product
- Reposition property to attract and retain tenants
- Stay ahead of pending government regulations
- Fulfill the needs of tenants who are increasingly demanding healthy & sustainable work environments
- Increase NOI & Value

## Green Policies

CWP has developed a series of company-wide Green Policies and Best Management Practices that have been implemented:

Green Operations Programs and Best Practices:

- Energy Efficiency Best Management Practices
- Water Efficient Best Management Practices
- IAQ Best Management Practices
- Emissions Reduction Reporting
- Alternative Transportation Programs
  - CWP encourages you to consider subsidizing bus and light rail passes for your employees[22]

CWP's Green Policies:

- Building Exterior & Hardscape Management Plan
- Integrated Pest Management, Erosion Control, and Landscape Management Plan
- Water Efficiency Program
- Cooling Tower Management Plan
- Refrigerant Management Policy
- Energy Policy
- Sustainable Purchasing Policy
- Lamp Purchasing Plan

[22] SS Credit 3.1, Alternative Transportation – Public Transportation Access

* Please note that CWP is not benefiting financially for making these vendor recommendations. The majority of vendors were recommended by the U.S. Regenerative Network (USRN). USRN is a consortium of vetted green building product manufacturers and service providers that have proven leadership in technology and green products. The USRN recommends companies that have shown excellence in sustainability and innovative solutions through its Regenerative Balance Sheet analysis - an holistic economic, environmental, social and data transparency review of a company. For more information on the U.S. Regenerative Network, please contact for more information. www.regen-net.com

- Solid Waste Management Policies
  - Recycling is an important component of our building operation program. Tenant participation is essential for the success of our waste management programs. Tenants need to provide recycle bins. The property management office will arrange pick up of materials including paper, cardboard, aluminum cans, plastic bottles, E-waste and batteries.
- Smoking Policy
- Green Cleaning Policy
  - Environmentally responsible cleaning practices use products and/or processes that reduce or eliminate the negative impacts of cleaning on human health and to the environment. Conventional cleaning products often contain ingredients that are harmful to humans and the environment. Traditional cleaning methods such as feather dusting tends to disburse dust into the air causing it to resettle elsewhere as opposed to eliminating the particles altogether. We feel it is important to be proactive in this regard in the same way we address building maintenance.
- Indoor Air Quality Management Plan
- Indoor Air Quality Management Plan for Facilities Alterations and Additions
- High Performance Cleaning Program
- Indoor Integrated Pest Management Plan

These policies and best management practices are an integral part of day-to-day operations at CWP properties. CWP is continually developing innovative strategies in the effort to maximize efficiencies, create healthier environments for tenants, minimize environmental impacts of building operations and reduce operating expenses.

## CONCLUSION

Thank you for taking the time to read about the various opportunities for making a “green” tenant improvement. We hope that you will reflect on the variety of the green building strategies supplied in this guide book, incorporate them in your Tenant improvements and operational practices, and consider pursuing LEED-CI certification. Below you will find several exhibits that may further assist you with the greening of your space.

# EXHIBITS

## EXHIBIT A: LEED CI Scorecard

### LEED 2009 for Commercial Interiors

Project Checklist

| Y | ? | N | | | |
|---|---|---|---|---|---|
| | | | **Sustainable Sites** | **Possible Points:** | **21** |
| | | | Credit 1 | Site Selection | 1 to 5 |
| | | | Credit 2 | Development Density and Community Connectivity | 6 |
| | | | Credit 3.1 | Alternative Transportation—Public Transportation Access | 6 |
| | | | Credit 3.2 | Alternative Transportation—Bicycle Storage and Changing Rooms | 2 |
| | | | Credit 3.3 | Alternative Transportation—Parking Availability | 2 |
| | | | **Water Efficiency** | **Possible Points:** | **11** |
| Y | | | Prereq 1 | Water Use Reduction—20% Reduction | |
| | | | Credit 1 | Water Use Reduction | 6 to 11 |
| | | | **Energy and Atmosphere** | **Possible Points:** | **37** |
| Y | | | Prereq 1 | Fundamental Commissioning of Building Energy Systems | |
| Y | | | Prereq 2 | Minimum Energy Performance | |
| Y | | | Prereq 3 | Fundamental Refrigerant Management | |
| | | | Credit 1.1 | Optimize Energy Performance—Lighting Power | 1 to 5 |
| | | | Credit 1.2 | Optimize Energy Performance—Lighting Controls | 1 to 3 |
| | | | Credit 1.3 | Optimize Energy Performance—HVAC | 5 to 10 |
| | | | Credit 1.4 | Optimize Energy Performance—Equipment and Appliances | 1 to 4 |
| | | | Credit 2 | Enhanced Commissioning | 5 |
| | | | Credit 3 | Measurement and Verification | 2 to 5 |
| | | | Credit 4 | Green Power | 5 |
| | | | **Materials and Resources** | **Possible Points:** | **14** |
| Y | | | Prereq 1 | Storage and Collection of Recyclables | |
| | | | Credit 1.1 | Tenant Space—Long-Term Commitment | 1 |
| | | | Credit 1.2 | Building Reuse | 1 to 2 |
| | | | Credit 2 | Construction Waste Management | 1 to 2 |
| | | | Credit 3.1 | Materials Reuse | 1 to 2 |
| | | | Credit 3.2 | Materials Reuse—Furniture and Furnishings | 1 |
| | | | Credit 4 | Recycled Content | 1 to 2 |
| | | | Credit 5 | Regional Materials | 1 to 2 |
| | | | Credit 6 | Rapidly Renewable Materials | 1 |
| | | | Credit 7 | Certified Wood | 1 |
| | | | **Indoor Environmental Quality** | **Possible Points:** | **17** |
| Y | ? | N | | | |
| Y | | | Prereq 1 | Minimum IAQ Performance | |
| Y | | | Prereq 2 | Environmental Tobacco Smoke (ETS) Control | |
| | | | Credit 1 | Outdoor Air Delivery Monitoring | 1 |
| | | | Credit 2 | Increased Ventilation | 1 |
| | | | Credit 3.1 | Construction IAQ Management Plan—During Construction | 1 |
| | | | Credit 3.2 | Construction IAQ Management Plan—Before Occupancy | 1 |
| | | | Credit 4.1 | Low-Emitting Materials—Adhesives and Sealants | 1 |
| | | | Credit 4.2 | Low-Emitting Materials—Paints and Coatings | 1 |
| | | | Credit 4.3 | Low-Emitting Materials—Flooring Systems | 1 |
| | | | Credit 4.4 | Low-Emitting Materials—Composite Wood and Agrifiber Products | 1 |
| | | | Credit 4.5 | Low-Emitting Materials—Systems Furniture and Seating | 1 |
| | | | Credit 5 | Indoor Chemical & Pollutant Source Control | 1 |
| | | | Credit 6.1 | Controllability of Systems—Lighting | 1 |
| | | | Credit 6.2 | Controllability of Systems—Thermal Comfort | 1 |
| | | | Credit 7.1 | Thermal Comfort—Design | 1 |
| | | | Credit 7.2 | Thermal Comfort—Verification | 1 |
| | | | Credit 8.1 | Daylight and Views—Daylight | 1 to 2 |
| | | | Credit 8.2 | Daylight and Views—Views for Seated Spaces | 1 |
| | | | **Innovation and Design Process** | **Possible Points:** | **6** |
| | | | Credit 1.1 | Innovation in Design: Specific Title | 1 |
| | | | Credit 1.2 | Innovation in Design: Specific Title | 1 |
| | | | Credit 1.3 | Innovation in Design: Specific Title | 1 |
| | | | Credit 1.4 | Innovation in Design: Specific Title | 1 |
| | | | Credit 1.5 | Innovation in Design: Specific Title | 1 |
| | | | Credit 2 | LEED Accredited Professional | 1 |
| | | | **Regional Priority Credits** | **Possible Points:** | **4** |
| | | | Credit 1.1 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.2 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.3 | Regional Priority: Specific Credit | 1 |
| | | | Credit 1.4 | Regional Priority: Specific Credit | 1 |
| | | | **Total** | **Possible Points:** | **110** |

Certified 40 to 49 points  Silver 50 to 59 points  Gold 60 to 79 points  Platinum 80 to 110

**EXHIBIT B:**

## Products that typically have High Recycled Content

Projects incorporating sustainable design principles often specify materials with recycled content whenever feasible. In addition, projects seeking Leadership in Energy and Environmental Design (LEED®) certification can often receive points if a sufficient percentage of their materials contain recycled content, such as through LEED-NC Materials and Resources credit 4.1 & 4.2.

This list contains items that frequently have options that include recycled content. This list is broad, but not comprehensive as new product options become available each month.

Acoustic Ceiling Tiles
Aluminum Windows
Asphalt
Bender Boards
Bicycle Racks
Buckling Restraint Braces
Carpet
Casework and Millwork
Ceramic Tile
CMUs (Concrete Masonry Units)
Composite Wood
Crushed Aggregate
Crushed Concrete Base
Fiber Cement Siding
Flyash Concrete (30% or 50%)
Gypsum
Insulation
Metal Decking
Metal Fencing and Gates
Metal Roof and Wall Panels
Mobile Shelving Units
Rebar
Resilient Flooring
Roofing
Rubber Coving
Site Furnishings
Soil Amendments – *if composted content*
Stainless Steel Countertops
Steel Doors and Frames
Straw Wattles
Structural Precast Panels
Structural Steel
Toilet Partitions
Windows (glazing, frame) – *also, are usually manufactured locally*

The Sustainable Communities Program also can provide sample language for the specifications to incorporate recycled content.

**EXHIBIT C:**

# A Standards for Low-Emitting Materials

## Summary of LEED standards and VOC limits and for interiors

### EQc4.1: Adhesives and Sealants

*Used on interior of the building(inside the weatherproofing system and applied on site)*

| Classification of Material | VOC Limit [g/L less water] | Applicable Standard |
|---|---|---|
| *Architectural Applications* | | |
| Indoor Carpet Adhesives | 50 | SCAQMDRule#1168 |
| Carpet Pad Adhesives | 50 | SCAQMDRule#1168 |
| Wood Flooring Adhesive | 100 | SCAQMDRule#1168 |
| Rubber Floor Adhesives | 60 | SCAQMDRule#1168 |
| Subfloor Adhesives | 50 | SCAQMDRule#1168 |
| Ceramic Tile Adhesives | 65 | SCAQMDRule#1168 |
| VCT & Asphalt Adhesives | 50 | SCAQMDRule#1168 |
| Drywall and Panel Adhesives | 50 | SCAQMDRule#1168 |
| Cove Base Adhesives | 50 | SCAQMDRule#1168 |
| Multipurpose Construction Adhesives | 70 | SCAQMDRule#1168 |
| Structural Glazing Adhesives | 100 | SCAQMDRule#1168 |
| *Specialty Applications* | | |
| PVC Welding | 510 | SCAQMDRule#1168 |
| CPVC Welding | 490 | SCAQMDRule#1168 |
| ABS Welding | 325 | SCAQMDRule#1168 |
| Plastic Cement Welding | 250 | SCAQMDRule#1168 |
| Adhesive Primer for Plastic | 550 | SCAQMDRule#1168 |
| Contact Adhesive | 80 | SCAQMDRule#1168 |
| Special Purpose Contact Adhesive | 250 | SCAQMDRule#1168 |
| Structural Wood Member Adhesive | 140 | SCAQMDRule#1168 |
| Sheet Applied Rubber Lining Operations | 850 | SCAQMDRule#1168 |
| Top & Trim Adhesive | 250 | SCAQMDRule#1168 |
| *Substrate Specific Applications* | | |
| Metal to Metal | 30 | SCAQMDRule#1168 |
| Plastic Foams | 50 | SCAQMDRule#1168 |
| Porous Material (except wood) | 50 | SCAQMDRule#1168 |
| Wood | 30 | SCAQMDRule#1168 |
| Fiberglass | 80 | SCAQMDRule#1168 |
| **Sealants** | | SCAQMDRule#1168 |
| Architectural | 250 | SCAQMDRule#1168 |
| Nonmembrane Roof | 300 | SCAQMDRule#1168 |
| Roadway | 250 | SCAQMDRule#1168 |
| Single-Ply Roof Membrane | 450 | SCAQMDRule#1168 |
| Other | 420 | SCAQMDRule#1168 |
| *Sealant Primers* | | |
| Architectural Non Porous | 250 | SCAQMDRule#1168 |
| Architectural Porous | 775 | SCAQMDRule#1168 |
| Other | 750 | SCAQMDRule#1168 |
| *Aerosol Adhesives* | | |
| General purpose mist spray | 65% VOCs by weight | Green Seal GS-36 |
| General purpose web spray | 55% VOCs by weight | Green Seal GS-36 |
| Special purpose aerosol adhesives (all types) | 70% VOCs by weight | Green Seal GS-36 |

### EQc4.2: Paints and Coatings

*Used on the interior of the building (inside the weatherproofing system and applied on site)*

| Classification of Material | VOC Limit | Applicable Standard |
|---|---|---|
| *Architectural paints, coatings and primers applied to interior walls and ceilings* | | |
| Flat | 50 g/L | Green Seal GS-11 |
| Non-Flat | 150 g/L | Green Seal GS-11 |
| *Ferrous Metal Paints* | | |
| Anti-corrosive paint | 250 g/L | Green Seal GS-03 |
| Anti-rust paint | 250 g/L | Green Seal GS-03 |
| *Clear wood finishes, floor coatings, stains, sealers, and shellacs* | | |
| Clear wood varnish | 350 g/L | SCAQMD Rule #1113 |
| Clear wood lacquer | 550 g/L | SCAQMD Rule #1113 |
| Floor coatings | 100 g/L | SCAQMD Rule #1113 |
| Waterproofing sealers | 250 g/L | SCAQMD Rule #1113 |
| Sanding sealers | 275 g/L | SCAQMD Rule #1113 |
| All other sealers | 200 g/L | SCAQMD Rule #1113 |
| Stains | 250 g/L | SCAQMD Rule #1113 |

### EQc4.3: Carpet Systems

*Installed in the building interior*

| Classification | Requirement | Applicable Standard |
|---|---|---|
| Carpet | Green Label Plus Or RFCI FloorScore certified | Carpet & Rug Institute Green Label Plus program RFCI FloorScore certified program |
| Carpet cushion | Green Label | Carpet & Rug Institute Green Label program |
| Carpet Adhesive | VOC limit of 50 g/L | SCAQMD Rule #1168 |

### EQc4.4: Composite Wood & Agrifiber Products

*Used on the interior of the building (inside the weatherproofing system) – applied on or off site (including in the factory)*

| Classification | Requirement |
|---|---|
| Particleboard | contain no added urea-formaldehyde resins |
| Medium density fiberboard (MDF) | contain no added urea-formaldehyde resins |
| Plywood | contain no added urea-formaldehyde resins |
| Wheatboard | contain no added urea-formaldehyde resins |
| Strawboard | contain no added urea-formaldehyde resins |
| Panel substrates | contain no added urea-formaldehyde resins |
| Door cores | contain no added urea-formaldehyde resins |
| Other composite wood products | contain no added urea-formaldehyde resins |
| Other agrifiber products | contain no added urea-formaldehyde resins |

**EXHIBIT D:**

# Environmentally Preferable Alternatives to Conventional Tenant Improvement Materials

This is a listing of common finish materials used in tenant improvement projects, followed by potential alternatives to these materials and a summary of the environmental benefits of choosing the alternatives. This listing is by no means exhaustive, but is intended to assist in the identification and evaluation of alternatives.

| Common Material | Alternate Material | Environmental Benefits |
|---|---|---|
| Sheet Vinyl Flooring | ▶ Linoleum Flooring<br>▶ Cork Flooring | ▶ Low VOC, rapidly renewable<br>▶ Low VOC, rapidly renewable |
| Vinyl Composition Flooring | ▶ Stratica by Amtico<br>▶ MetaFlor by Lees, Burlington Indiana<br>▶ Rubber Flooring<br>▶ Stained Concrete | ▶ Low VOC<br>▶ High recycled content, meets CRI green label, less material use<br>▶ High recycled content<br>▶ Minimal material use |
| Rubber Base | ▶ Carpet Base | ▶ Can be recycled at end of life<br>▶ Meets CRI Green Label |
| Vinyl Wallcovering | ▶ Paint<br>▶ Sisal Wallcoverings<br>▶ Cork Wallcoverings<br>▶ Natural Fiber Wallcoverings | ▶ Use paint that has no or low VOC's<br>▶ Rapidly renewable material<br>▶ Rapidly renewable material<br>▶ Rapidly renewable material |
| Nylon Broadloom carpet | ▶ Nylon Carpet with recycled content face fibers and/or recycled content backing.<br>▶ Wool Carpet<br>▶ Nylon Carpet Tile<br>▶ Stained Concrete<br>▶ Bamboo Flooring | ▶ Encourages recycling of materials, meets CRI Green Label<br>▶ Rapidly renewable/high performance<br>▶ Backing has high recycled content, meets CRI Green Label<br>▶ Minimal material use, high durability<br>▶ Rapidly renewable |
| Plastic Laminate | ▶ Linoleum<br>▶ Sealed Concrete<br>▶ Syndecrete Concrete | ▶ Rapidly renewable<br>▶ Include fly ash for recycled content<br>▶ High recycled content |
| Plywood<br>Medium Density Fiberboard<br>Oriented Strand Board | ▶ Cellulose fiberboard<br>▶ Straw Board | ▶ Uses recycled newsprint, no formaldehyde<br>▶ Agricultural waste, no formaldehyde |
| Finish Wood Materials | ▶ FSC Certified wood materials | ▶ Supports sustainable forest management |

Source: G/Rated Tenant Improvement Guide – City of Portland – Office of Sustainable Development

## EXHIBIT E:

# Materials Matrix

| | | | ENVIRONMENTAL ATTRIBUTES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSI | Material List | Who | Durable (F-2) | Recycled Content (F-3) | Salvage/Refurbished (F-4) | Low-Emitting Carpet (F-5) | Low-Emitting Interior Paints and Coatings (F-6) | Low-Emitting Interior Adhesives and Sealants (F-7) | Formaldehyde-Free Interior Composite Wood (F-8) | Local Materials (F-9) | Rapidly Renewable (F-10) | Certified Wood (F-11) | Comments |
| **05000: METALS** | | | | | | | | | | | | | |
| 05100 | Metal framing | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **06000: WOOD & PLASTICS** | | | | | | | | | | | | | |
| 06070 | Plywood and OSB | | | | | | | | | | | | |
| 06100 | Lumber - rough carpentry | | | | | | | | | | | | |
| 06160 | Fiberboard sheets, MDF | | | | | | | | | | | | |
| 06170 | Engineered lumber | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 06200 | Finish lumber and millwork | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 06400 | Architectural woodwork | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 06500 | Structural plastics | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 06600 | Plastic Fabrications | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **08000: DOORS & WINDOWS** | | | | | | | | | | | | | |
| 08100 | Metal doors and frames | | | | | | | | | | | | |
| 08200 | Wood and plastic doors | | | | | | | | | | | | |
| 08550 | Wood windows | | | | | | | | | | | | |
| 08560 | Vinyl windows | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| | | | ENVIRONMENTAL ATTRIBUTES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CSI | Material List | Who | Durable (F-2) | Recycled Content (F-3) | Salvage/Refurbished (F-4) | Low-Emitting Carpet (F-5) | Low-Emitting Interior Paints and Coatings (F-6) | Low-Emitting Interior Adhesives and Sealants (F-7) | Formaldehyde-Free Interior Composite Wood (F-8) | Local Materials (F-9) | Rapidly Renewable (F-10) | Certified Wood (F-11) | Comments |
| **09000: FINISHES** | | | | | | | | | | | | | |
| 09250 | Gypsum | | | | | | | | | | | | |
| 09300 | Ceramic tile | | | | | | | | | | | | |
| 09510 | Acoustical ceiling panels | | | | | | | | | | | | |
| 09640 | Wood flooring | | | | | | | | | | | | |
| 09650 | Resilient flooring | | | | | | | | | | | | |
| 09680 | Carpet | | | | | | | | | | | | |
| 09910 | Interior paints and stains | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **10000: SPECIALITIES** | | | | | | | | | | | | | |
| 10110 | Fixed tackboards | | | | | | | | | | | | |
| 10155 | Toilet compartments | | | | | | | | | | | | |
| 10150 | Portable partitions, screws and panels | | | | | | | | | | | | |
| 10670 | Storage shelving | | | | | | | | | | | | |
| 10705 | Exterior sun control devices | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| **12000: FURNISHINGS** | | | | | | | | | | | | | |
| 12484 | Floor mats | | | | | | | | | | | | |
| 12492 | Window shades | | | | | | | | | | | | |
| 12510 | Office furniture | | | | | | | | | | | | |
| 12000 | Manufactured casework | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Source: G/Rated Tenant Improvement Guide – City of Portland – Office of Sustainable Development

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