

CITY OF LAKE OSWEGO

HIGH PERFORMANCE BUILDINGS

GUIDELINES FOR CITY FACILITIES

SECTION ONE: OVERVIEW

The purpose of the High Performance Buildings Guidelines for City Facilities is to set standards for the design, construction, operation, maintenance, and demolition of City buildings to support the City's sustainability goals. These guidelines are intended to guide staff and City Council in their consideration of building design for future City facilities and major renovations. Including these guidelines in Requests for Proposals (RFPs) will ensure that the following outcomes are achieved in new and renovated City buildings:

- Financial savings for the City
- Improved employee health and productivity
- Improved work environment
- Healthy spaces for the public
- Support local jobs
- Realize environmental benefits

When considering which high performance features to include in a City project, these guidelines will form the backbone of a "menu", from which City staff and Council can select based on the site, building function, financial resource availability, and achievement of the triple bottom line. These guidelines can also be used to direct design charrettes and the public consultation process. It is anticipated that City staff will provide these guidelines to all contracted entities with whom they work throughout the design/build process to ensure that they are considered early in the design process when high performance feature integration can be maximized.

The City owns and operates more than 16 buildings, including: four fire stations, an adult community center, a library, the city hall, a tennis center, a water sports center, an office/mixed use building, a water treatment plant, operations buildings, maintenance storage, an historic farm with several buildings and a barn, a golf course with club house, and the historic Workers Cottage, in addition to several small parks maintenance outbuildings and public restrooms.

POLICY APPLICATION

These guidelines apply to all buildings **5,000 square feet and larger** owned or operated by the City of Lake Oswego or the Lake Oswego Redevelopment Agency (hereinafter referred to collectively as the City). Buildings are defined as: "any structure used or intended for supporting or sheltering any use or occupancy."¹

Exceptions to these guidelines shall be reviewed by the City Council with written comment from the Sustainability Advisory Board.

¹ LOC 50.10.003 Definitions

Note: These guidelines are to be used in conjunction with those standards set forth in the most recent (v4 or greater) LEED for Building Design and Construction: New Construction (NC) and Building Operations and Maintenance (BOM). These guidelines are not intended to replace the LEED v4 or greater standards but shall complement them. In some cases, these guidelines may require design elements over and above LEED v4. These guidelines will standardize processes that support the specific needs for the construction and renovation of publicly owned buildings in the City of Lake Oswego.

The policy shall support the seven goals of the *City Sustainability Action Plan for City Operations 2014 Update*:

- GOAL 1: FISCAL RESPONSIBILITY AND ORGANIZATIONAL STABILITY – CONTRIBUTE TO THE LONG-TERM FINANCIAL STABILITY OF THE CITY ORGANIZATION THROUGH OPERATIONAL SAVINGS, RISK AVOIDANCE, REVENUE GENERATION, AND BRAND CREATION THAT WILL CONTINUE TO ATTRACT RESIDENTS, BUSINESSES, AND EMPLOYEES.
- GOAL 2: QUALITY SERVICES – DELIVER HIGH-QUALITY SERVICES AT A REASONABLE COST TO CITIZENS BY PROVIDING A HEALTHY, SAFE, AND SUPPORTIVE WORKPLACE THAT IN TURN LOWERS EMPLOYEE TURNOVER AND ABSENTEEISM AND ASSOCIATED COSTS.
- GOAL 3: GREENHOUSE GAS (GHG) EMISSIONS – REDUCE DIRECT AND INDIRECT GREENHOUSE GAS EMISSIONS AND RELATED CONSUMPTION OF ENERGY, FUEL, AND OTHER CONTRIBUTING SOURCES. QUANTITATIVE TARGETS INCLUDE:
 - BY 2020, REDUCE GHG EMISSIONS 10 PERCENT BELOW 2000 LEVELS.
 - BY 2035, REDUCE GHG EMISSIONS 40 PERCENT BELOW 2000 LEVELS.
 - BY 2050, REDUCE GHG EMISSIONS 75 PERCENT BELOW 2000 LEVELS.
- GOAL 4: WATER CONSERVATION – CONSERVE AND OPTIMIZE INDOOR AND OUTDOOR WATER USE THROUGH THE IMPLEMENTATION OF BEST MANAGEMENT PRACTICES.
- GOAL 5: WASTE PREVENTION – REDUCE OVERALL GENERATION OF WASTE AND RECYCLE OR COMPOST ALL REMAINING WASTE BY 2035.
- GOAL 6: TOXICS REDUCTION – ELIMINATE THE USE OR EMISSIONS OF PERSISTENT BIO-ACCUMULATIVE TOXIC (PBT’S) CHEMICALS AND OTHER PRIORITY TOXIC AND HAZARDOUS SUBSTANCES BY 2035.
- GOAL 7: HABITAT ENHANCEMENT AND STORMWATER MANAGEMENT – ALL CITY PARKS, TRAILS, NATURAL AREAS, AND DEVELOPED PROPERTIES POSITIVELY CONTRIBUTE TO HEALTHY, FUNCTIONING URBAN ECOSYSTEMS AND WATERSHED HEALTH BY 2035.

HIGH PERFORMANCE BUILDING STANDARDS

The following high performance building standards apply to newly-constructed City buildings and all major renovations to buildings the City owns and operates.

Newly constructed buildings and major renovations² of buildings greater than 5,000 square feet shall be built to the LEED³ v4 or greater Rating System for Building Design and Construction (BD+C): New Construction and Major

² See Section 10. Definitions

³ LEED, or Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project. <http://www.usgbc.org/leed>

Renovations Gold or Platinum level. The most recent version of the LEED BD+C: New Construction and Major Renovations standard shall be followed.

The following LEED BD+C credits should be incorporated into each project, in addition to the prerequisites and other credits needed to reach the desired certification level to the extent possible on each site. Receiving certification is not required. These credits have been selected because of their alignment with sustainability goals for City operations and compliance with existing City policies:

- a. Location and Transportation (LT) Credits:
 - Sensitive Lands
 - Access to Quality Transit
 - Bike Facilities
 - Green Vehicles
- b. Sustainable Sites (SS) Credits:
 - Site Development - Protect or Restore Habitat
 - Construction Pollution Prevention
 - Site Assessment
 - Rainwater Management
 - Heat Island Reduction
 - Dark Skies
- c. Water Efficiency (WE) Credits:
 - Outdoor Water Use Reduction
 - Indoor Water Use Reduction
 - Cooling Tower Water Use (where applicable)
 - Water Metering
- d. Energy and Atmosphere (EA) Credits:
 - Enhanced Commissioning
 - Optimize Energy Performance
 - Advanced Energy Metering
 - Demand Response
 - Renewable Energy Production
 - Green Power and Carbon Offsets
- e. Materials and Resources (MR) Credits:
 - Construction and Demolition waste management
 - Life Cycle impact reduction
 - Environmental Product Declarations
 - Sourcing of Raw Materials Disclosure
 - Material ingredients
- f. Indoor Environmental Quality (EQ):
 - Enhanced Indoor Air Strategies
 - Low-emitting materials
 - Construction IAQ plan
 - IAQ assessment
 - Thermal Comfort
 - Interior Lighting
 - Daylight
 - Acoustic performance

Newly constructed buildings and major renovations under 5,000 square feet shall not require certification.

The City has also identified specific technical standards that shall be applied to both newly constructed buildings and major renovations over 5,000 square feet and existing buildings. These standards are described in **Section 3: Technical Standards**.

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SECTION TWO: DESIGN AND PLANNING PROCESSES



PROGRAM PLANNING: GOALS AND DELIVERABLES

PROJECT DESIGN

All new construction and major renovation projects shall provide for resources in the project budget needed to comply with the requirements of these guidelines, starting with the initial design phase. These resources may include staff or consultant time necessary to complete documentation requirements for the high performance building standard applicable to the building.

Early in the design process, integrated design practices will identify a project team to establish performance goals in line with LEEDv4 or most recent standard and ensure these goals are incorporated throughout the design and complete lifecycle of the building through deconstruction.

Integrated design⁴ is 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;
- Ensures incorporation of these goals throughout the design and lifecycle of the building;
- Considers all stages of the building's lifecycle, including deconstruction.

IMPLEMENTATION PLAN

The following actions are recommended to ensure that these guidelines are implemented into City practices:

- Develop and adopt operational policies and procedures that support the High Performance City Facility Policy, including but not limited to an integrated pest management (IPM) policy, solid waste management policy, stormwater manual, and water conservation policy, where not already in place.
- Revise and update capital project and renewal and replacement funding processes to be consistent with the High Performance City Facility Policy.
- Evaluate list of existing capital and renewal and replacement projects for the following ten years and identify opportunities to integrate sustainability into these projects.
- Develop and adopt appropriate sustainable site management standards for the City's developed properties, as identified in the *Sustainability Action Plan for City Operations*, where not already in place.

To implement these guidelines in existing buildings, the following steps are recommended:

⁴ More information about integrated design: http://www.wbdg.org/design/engage_process.php; <http://www1.eere.energy.gov/femp/pdfs/29267-4.1.pdf>; http://www.betterbricks.com/graphics/assets/documents/Hiring-the-team_Final.pdf.

- Implement the existing buildings strategies specified in these guidelines to improve environmental performance of City building stock. Where applicable, renovate to LEEDv4 or greater EBOM standard.

To ensure City wide acceptance of these guidelines, the following actions are recommended to create an inclusive design process leading to high performance outcomes:

- All City departments and offices responsible for financing, planning, designing, developing, constructing, and managing City-owned buildings. Each of the above departments shall be included in the design and planning phases of the project, as relevant to their responsibilities and key deliverables.
- The building project team and its consultants shall review these guidelines and make plans for implementation as a first step in the design phase.
- Training on design, maintenance and operations of high performance buildings shall be provided for all individuals required by these guidelines to participate in the implementation process.

Standards for new construction and major renovations are effective starting with Council approval of these guidelines.

PROGRAM PLANNING DELIVERABLES

To ensure all project phases are adequately managed and recorded, and to measure performance throughout the lifecycle of the building, the following deliverables are recommended:

NEW CONSTRUCTION AND MAJOR RENOVATIONS DELIVERABLES

- ✓ **Projects working toward LEED BD+C certification:** submit LEED checklist and review comments from the Green Building Certification Institute at project completion indicating that the project has achieved the credits. A LEED scorecard of “expected” LEED credits by 50% design development phase is preferable, to ensure design is on track, and to allow for follow-up with teams on a project-by-project basis as needed.
- ✓ If certification is not being pursued, the included checklist should be used to demonstrate compliance with these guidelines. A third party shall be engaged to review the LEED checklist where budget allows.
- ✓ At the end of each new construction or major renovation project, the project manager is responsible for submitting the following information to the City Manager or designee:
 - Amount of construction and demolition waste diverted from each project and reused on the job site (total tons, percent diverted, and list of primary materials diverted);
 - A summary of all LEED credits that were incorporated in the project, and
 - A copy of certification document for LEED, if applicable.

EXISTING BUILDINGS DELIVERABLES

- ✓ Conduct assessments of building performance and identify areas for improvement for energy usage, water consumption, waste generation and recycling, toxics usage, habitat-friendly development practices, and stormwater impact.

ANNUAL DELIVERABLES

The City’s sustainability coordinator is a staff resource who can assist with completion of the following recommended deliverables:

- ✓ Annual assessments of all buildings to identify areas for continuous improvement in sustainable operations. Describe accomplishments and plan for continuous improvement as part of *Sustainability Action Plan Progress Report*.
- ✓ Performance of City buildings as specified in the action areas identified in the *Sustainability Action Plan for City Operations 2014 Update* in quantitative terms, such as total gallons or cubic feet of water consumed from a building in a given year.
- ✓ Energy and water efficiency results over the 20 year payback period of new and renovated City buildings. As part of this process, building commissioning on all new City facilities shall be performed by a third-party every 5 years to verify that all aspects of the building are operating as expected.
- ✓ Annual reviews of the high performance building guidelines and amendments as needed to reflect new design standards, existing renovations or revised goals in the City's Sustainability Action Plan for City Operations.
- ✓ A summary of sustainable building operations and maintenance projects completed in the previous fiscal year, including capital improvement projects and renewal and replacement projects that implement these guidelines. These summaries shall include:
 - A one to two-paragraph summary of the project;
 - Which of the City's sustainability goals the project addresses; and
 - Any anticipated resource or financial savings expected from the project.



BUDGET PLANNING AND LIFECYCLE ANALYSIS: GOALS AND DELIVERABLES

Fiscal responsibility is a key aspect of the High Performance Buildings guidelines. It is imperative that funding needs for increasing long-term performance of building projects are identified in the City's Capital Improvement Plan Program and Renewal and Replacement Program scheduled for the next five years.

Budgetary, funding and accounting methods for achieving high performance outcomes consistent with these guidelines and with sustainability goals included in the Sustainability Action Plan for City Operations 2014 Update will need to be identified early in the design process. The following tools must be incorporated into budget planning, and into preparing a Life Cycle Analysis (LCA), which is the key deliverable for budget planning under these guidelines.

RETURN ON INVESTMENT (ROI)

- Projects must result in a measurable reduction in electricity, natural gas, or water consumption by increasing efficiency, resulting in lowered cost for ongoing operations, and have a positive ROI to the City.
- Energy efficiency projects which have a ROI of 20 years or less shall be prioritized for funding even if there is an up-front capital investment required.
- ROI calculation can take place as part of the LCA process.
- ROI for energy efficiency projects is typically estimated by the Energy Trust of Oregon or its partner service providers.
- Accounting for ROI from energy efficiency projects will be determined by budgetary, funding and accounting methods identified in this section.

INCENTIVES

- When incentive funds are available from the Energy Trust of Oregon for energy efficiency projects, including Early Design Assistance⁵ and Eco-Charrette planning, project managers shall apply these to their projects. Energy Trust of Oregon shall be contacted early in the design and planning process to ensure that possible incentives are identified and maximized.

APPLICATION OF CITY FUNDS

- Implementation of these guidelines shall be consistent with the administration process appropriate for each fund, including the General Fund, Water Fund, and Wastewater Fund.
- Department directors and facility managers shall have the authority to integrate high performance building methods that support these guidelines into their proposed annual budgets.

CALCULATING TOTAL COST OF OWNERSHIP

- Building maintenance projects shall use a total cost of ownership model to determine the best value for the City over the expected life of the equipment.
- Studies have found that there is no statistical difference between the up-front costs of high performance buildings compared to standard buildings⁶. To ensure that these guidelines do not become a financial burden for the City, all projects calculated to exceed five (5) percent of standard up-front costs shall be re-evaluated, by the building project team, to seek a more cost effective solution.
- The building project team may also decide that the up-front expenditure is the fiscally responsible choice in light of future savings. A complete life cycle analysis should be the primary fiscal responsibility indicator.

BUDGET PLANNING DELIVERABLE: LIFE CYCLE ANALYSIS

A Life Cycle Cost Analysis (LCA) will be applied to evaluate design considerations of new construction and renovations, as well as to efficiency upgrade projects in existing buildings. To ensure accuracy, and account for all variables, the following LCA process is recommended:

- The LCA shall be applied over a discounted payback period of 20 years.
- Inputs shall include:
 - Initial project costs;
 - Any incentives;
 - A discount rate that is set by the 10 year Treasury rate at time of design;
 - Escalation rates for utilities, materials and maintenance. Material and maintenance escalation rates shall be in accordance with Energy Information Agency estimates of inflation.
- The baseline will be determined as follows:
 - For New Construction: total costs of design, construction, labor and maintenance

⁵ ETO Early Design Assistance – <http://energytrust.org/commercial/incentives/multifamily/construction-renovation-improvements/custom/early-design-assistance>

⁶ Cost of Green Revised: Reexamining the Feasibility and Cost Impact of sustainable design in the Light of Increased Market Adoption. Davis Langdon. <http://www.davislangdon.com/USA/Research/ResearchFinder/2007-The-Cost-of-Green-Revisited/>

- For Building Upgrades: cost premium of upgrades versus existing system
- Energy Savings shall be calculated by:
 - Working with vendors, contractors, Energy Trust of Oregon, and the Facilities Manager
 - When inputting energy source data, location data shall first be gathered to ensure energy source and projected climatic conditions are accurate
- LCA outputs shall include the following metrics:
 - 20 year Net Present Value (NPV) calculation, which must be positive for project to continue;
 - 20 year Net Present Cost;
 - 20 year Net Present Savings;
 - Internal Rate of Return calculation;
 - Energy Savings both annually and over 20 years, presented in cost, kWh and cost/kWh;
 - Greenhouse Gas emission reduction both annually and over 20 years, in MTCOE.
- An LCA tool must be used to run the analysis. The Department of Energy Building Life Cycle Cost (BLCC)⁷ tool is a free program that can be used for LCA analysis. Choice of LCA tool must be based on cost, ease of access and accuracy in calculating metrics described above. LCA can be completed by project contractor or project manager.

⁷ <http://energy.gov/eere/femp/building-life-cycle-cost-programs>

SECTION THREE: TECHNICAL AND DESIGN STANDARDS

These standards have been developed to assist in designing, constructing and renovating to LEEDv4 or greater Gold or Platinum standards. They will also promote healthy, efficient and cost-effective buildings designed for long-term sustainability and improved operation and maintenance. To ensure these guidelines serve as an easy reference, the standards are grouped into the following categories: Site Design, Energy Use, Water Management, Indoor Environment, Construction/Deconstruction, Commissioning, and Operations and Maintenance.



GENERAL SITE DESIGN

FUTURE PROOFING

To ensure City facilities maintain their high performance features throughout the life cycle of the building, the following techniques are recommended:

- Build to Zero Energy-Capable (ZEC) standards, where practical, to protect the City budget against the volatility of future energy and water prices.⁸
- Implement all energy conservation and efficiency measures that are cost effective based on the 20 year life cycle analysis.
- Design and build new City buildings in a manner that will allow for future implementation of on-site or near-site renewable energy generation and domestic hot water heating. Design elements such as building orientation, roof pitch, and building height shall be primary considerations. Anticipated building electricity base load and ability to meet this load through on-site renewable energy sources shall also be analyzed.
- Include the Facilities Manager in the design process to ensure that buildings are designed to allow for regular maintenance, cleaning and monitoring of building systems for the lifespan of the building.

CLIMATE ADAPTATION AND RESILIENCY

Design for Passive Survivability shall be considered for new buildings and major renovations. Passive Survivability refers to a building's ability to maintain critical life-support conditions if services such as power, heating fuel, or water are lost.

- Where deemed to be cost effective, based on the 20-year life cycle analysis, design and build City facilities to maintain a base level of operations in the event of extended power outages, through passive heating and cooling, day lighting, natural ventilation, and other design techniques.
- Designing for Passive Survivability shall be based on 50 year climate predictions to ensure that investments are made in systems best suited to future conditions.

LANDSCAPE AND NATURAL FEATURES

Landscape design plays an integral role in the function of City buildings, and can be incorporated in all passive solar designs, water conservation plans, biophilic and aesthetic-enhancing plans, and mitigation of heat island impacts. Landscape planning shall also be consistent with City Sensitive Area Plans, Stormwater Manual, Integrated Pest

⁸ ZECs are commercial buildings that achieve energy performance similar to Zero Energy Buildings and could achieve net-zero energy consumption with the addition of on-site power generation.

Management policies, and minimize the loss of natural features. The following practices help to achieve these goals:

- Site Planning
 - An inventory of existing vegetation and ecologically sensitive areas as part of the site design process.
 - Mapping of natural hazards zones, soil profiles, and watersheds as part of the topographical site analysis.
- Species Identification
 - When replacing plant materials, use natives or drought-tolerant species, where practicable, for water efficiency purposes. Avoid the use of invasive species.
 - Plant species and maintenance techniques that minimize the use of pesticides and fertilizers shall be used.
 - Design landscaping to maximize views from the building, while also minimizing urban heat island effects. Passive solar design plans can incorporate landscaping and promote the use of plant species that are compatible with the sun and shade patterns on the site.
 - Use climate-specific landscaping that will be adaptable to 50 year future climate predictions.
- Landscape Maintenance
 - Maintain landscaping at all City buildings using Integrated Pest Management practices.
 - Use drip-irrigation or other water conservation irrigation techniques, where irrigation is required.
 - Investigate the use of rainwater harvesting systems where available.
 - Participate in yard debris collection programs to ensure proper disposal of landscape waste, where it cannot first be used in City landscaped areas, natural areas or parks.

ALTERNATIVE TRANSPORTATION

The City shall promote the use of alternative transportation including, but not limited to, cycling, walking, electric vehicles, public transportation, carpooling or other low-emission forms of transportation. New construction and major renovations shall include the following facilities for City employees and visitors:

CITY EMPLOYEES

- For employees, provide secure bicycle storage areas, along with access to shower and locker facilities. No less than 5 bicycle parking spaces shall be provided per 100 employees OR adequate bicycle parking spaces shall be provided based on results of Employee Commute Options survey.
- The City shall also continue to offer subsidized TriMet passes for City employees.
- Carpool incentives, such as a dedicated parking area, shall be provided as part of new construction, major renovations, or parking area re-designs.

EMPLOYEES AND VISITORS

ELECTRIC VEHICLES

- Include adequate power supply, meters, and electrical systems capable of powering electric vehicle (EV) charging station(s) at all new buildings or major renovations. Power supply lines shall be extended from the building to location(s) adjacent to planned public parking areas as part of the building construction.

- Charging stations shall be Level 2 or higher and installed at the time of building construction. If EV unit installation is not feasible at the time of construction, parking lot configuration and number of spaces shall be designed in such a way as not to preclude the installation of dedicated parking spaces for future EV charging stations.

BICYCLE STORAGE

To avoid bikes being locked inappropriately to City buildings, trees, light fixtures, artwork or blocking entrance to City buildings, the following design techniques can be used:

- Bicycle racks shall be located so as not to block entrance to City buildings, impede pedestrian movement on City sidewalks, block existing travel lanes, or emergency vehicle access. Parking areas and garages are designed to include bicycle parking in a safe, designated area free from vehicle traffic.
- Bicycle racks shall be located within close proximity to building entrances and have adequate lighting.
- Rack design should be consistent across City facilities to minimize maintenance costs and be easily identifiable.
- To minimize maintenance and reduce theft, bicycle racks shall:
 - Be installed on a permanent foundation, securely anchored with tamper-proof nuts
 - Allow for both wheels to remain parked on the ground while the frame and a minimum of one wheel can be secured to the rack
 - Support a variety of bicycle sizes and designs
 - Be constructed of galvanized or stainless steel and covered with a thermoplastic coating
 - When possible and financially feasible, an indoor bike storage room for employees shall be considered during the design phase of new construction or major renovations



ENERGY MANAGEMENT

New construction and major renovations can use many energy management features to minimize the building's total energy requirements. Siting, passive solar design, daylighting, roof design, lighting choice, and electrical system design can help to reduce total energy load. While these guidelines requires that buildings be designed to LEEDv4 or greater standards, the following shall also be complied with to ensure energy efficiency and management for the lifecycle of the building.

BUILDING LAYOUT

- Orient new construction on the site so as to maximize the use of passive solar design as a tool for regulating building temperature. Best practices in passive solar design shall be incorporated. Major renovations can use shading strategies, improved insulation, installation of windows with a higher "R" factor, and re-painting of roofs to light colors as tools to achieve passive solar design.

TEMPERATURE CONTROL

- Daylighting shall be used as a key design technique to regulate temperature and need for artificial lighting. Designs strategies that maximize daylighting include:
 - Variable window glazing on different sides of the buildings adequate to levels of sunlight exposure
 - Skylights, atriums, and courtyards that allow light to reach interior sections of the building
 - Responsive lighting sensors that adjust interior lighting levels in response to external light levels

- Where possible, natural ventilation shall be permitted. Where indoor air quality can be safely regulated, windows shall be designed so that they can be opened.

LIGHTING

- Energy Trust of Oregon shall be consulted early in the design process to ensure that all lighting choices made at all City facilities qualify for Energy Trust of Oregon incentives, where applicable.
- The most energy efficient lighting is preferred, with preference given to LEDs or comparable products. Choice of lumens shall be appropriate for the purpose of the space being illuminated and shall take into account the health and comfort of users in that space.
- Where possible, dimmable LEDs with sensors shall be used to be responsive to outdoor lighting conditions to both save energy and maximize productivity of employees.
- All new lighting should be paired with occupancy or vacancy sensors.
- Facilities management shall be consulted during the lighting design phase to ensure that fixtures can be easily maintained, replaced and cleaned throughout the lifecycle of the product.
- Exterior lighting shall be designed to minimize light pollution to the night sky and neighboring properties.

ELECTRONICS

All new electronic equipment purchased shall be Energy Star certified⁹, where certified products are available. Life-cycle costs should be considered when purchasing new electronic equipment.

ROOF DESIGN AND ENERGY PRODUCTION

- Design roofs to minimize urban heat island effects. On new construction and any roof projects, high solar reflectance design consistent with LEED requirements shall be used where an ecoroof is not installed.
- Where feasible from a financial and engineering standpoint, design roofs to incorporate an ecoroof for both building insulation and as a stormwater management tool. Plants that require little to no irrigation beyond rainwater are recommended.
- Incorporate rainwater harvesting into roof design. If an ecoroof is deemed unfeasible from an engineering and design perspective, project managers shall incorporate an alternative method of treating stormwater runoff from the roof surface on the development site.
- Roof area planned for future photovoltaic arrays or other renewable energy generation shall meet the solar reflectance/Energy Star-rated roof material requirement. The total roof area excludes skylights, equipment, solar energy panels, and appurtenances.

GREEN ENERGY TECHNOLOGY

- New public buildings and major renovations that meet the criteria outlined by the State of Oregon in the “1.5% for Green Energy Technology in Public Buildings” rule¹⁰ are required to include an appropriate

⁹ The U.S. EPA certification program for energy efficient equipment and appliances is Energy Star. Find certified product information at: http://www.energystar.gov/index.cfm?fuseaction=find_a_product.

¹⁰Oregon Administrative Rules (OAR) 330-135-0010 to 330-135-0055 (Implementing Oregon Laws 2012, chapter 83 – S.B.1533), “1.5 Percent for Green Energy Technology in Public Buildings”, Effective January 1, 2013, <http://www.oregon.gov/energy/CONS/docs/15GETRules12.27.12.pdf>

green energy technology by spending an amount equal to at least 1.5 percent of the total contract price associated with that building.

ENERGY MANAGEMENT DELIVERABLES

ENERGY TRACKING

Establish and maintain, an Energy Star Portfolio Manager¹¹ account for each building and update quarterly. A partnership between Finance, Sustainability, and Facilities shall be established to ensure timely entry of energy use and cost data. The data can be used for quarterly benchmarking and use in annual energy use reporting. It is the responsibility of the sustainability coordinator to maintain and update the City's portfolio.

ENERGY EFFICIENCY ACTION PLAN

All City buildings greater than 5,000 square feet shall complete a comprehensive energy audit (if they have not already), using the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Level II standard. Recommendations should be included in a building-specific Energy Efficiency Action Plan. The Energy Efficiency Action Plan should also include a target date for retro-commissioning, where appropriate, and identify funds required to implement recommended measures.



WATER MANAGEMENT

Water conservation requires an integration of landscape, building, energy, and facilities management systems. The goal of these guidelines is to meet the LEEDv4 or greater Gold or Platinum standards for Water Efficiency. This section specifies additional policies to assist in achieving the greatest water management standards possible to promote efficiency, savings, and protect the water resources within the City of Lake Oswego.

FIXTURES

- All water fixtures purchased shall be EPA Water Sense certified¹², where certified products are available.
- Electrical systems in new construction or major renovations shall be designed to support the use of automatic sensors on sinks, toilets and urinals. In existing buildings, sensors shall be installed where the electrical system has capacity to support their use.

WATER REUSE SYSTEMS

All water reuse and collection systems should be metered to determine quantities of water processed through the system.

- Rainwater Collection
 - On new construction or major renovations, roofs shall be designed to support a green roof to reduce the discharge of storm water. The green roof shall incorporate a rainwater harvesting system.

¹¹ Portfolio Manager is EPA's free, online tool for tracking energy and water use and efficiency across an entire portfolio of buildings. <https://www.energystar.gov/istar/pmpam/>.

¹² The U.S. EPA certification program of water efficient fixtures is Water Sense. Find certified products at <http://www.epa.gov/watersense/>

- Where a roof cannot bear the load of a green roof, an alternative rainwater harvesting system must be provided to divert and collect storm water.
- Collected rainwater can be used for: green roof irrigation, landscape irrigation, toilet/urinal flushing, and other uses permitted by Oregon Administrative Rules Chapter 340, Division 53.
- Collected rainwater must be retained in sealed containers to avoid introduction of vermin and breeding of insects.
- **Greywater Collection**
 - Incorporate greywater collection systems (shower, sink and laundry wastewater) into all new construction and major renovations, where possible.
 - Greywater shall be collected and reused as permitted by Oregon Administrative Rules Chapter 340, Division 53. Permits from the Oregon Department of Environmental Quality must be obtained for all greywater reuse and disposal.



INDOOR AIR QUALITY

LEEDv4 has stringent indoor air quality (IAQ) standards, which these guidelines are designed to support. Providing good IAQ for City employees and visitors promotes a healthy, productive, safe, and inviting environment. Along with lighting, quality visual features and noise control, IAQ is a crucial component of any high performance buildings policy. The following standards, along with those in the LEEDv4 Gold and Platinum level credits and many other design options, will protect the indoor air of City facilities.

DESIGN AND OPERATION

- All new construction and major renovations shall be designed to promote beneficial indoor air quality
- Involve the Facilities Manager in the design phase to ensure that all control systems are designed to maximize ventilation, temperature, humidity, and air flow, and can be easily maintained or replaced throughout the lifecycle of the building
- Evaluate the site for sources of contamination and off gassing from soils, bedrock, neighboring buildings and excess moisture. Where pollution sources are present, design the building to minimize transfer of exterior pollutants into the interior of the building.
- Where appropriate and where outdoor air has been tested to be low in pollutants, include operable windows in designs for ventilation. It will be at the Facilities Manager's discretion to request that windows not be opened during times of high pollen count or degraded air quality.
- Occupants shall be able to control temperature, lighting levels, and noise where possible, while maintaining safe levels of indoor air.
- Smoking shall be prohibited in and around City buildings in compliance with the Oregon Indoor Clean Air Act (ICAA) HB 2546.

PROCUREMENT

- All materials purchased for construction through furnishing of City facilities shall avoid the chemicals and volatile organic compounds included on the Living Building Challenge Red List.
- Finishing of walls, flooring, and all wood products shall be free of volatile organic compounds (VOCs) and formaldehyde.
- Cleaning products shall be purchased in accordance with a City Green Cleaning policy and be approved by the Facilities Manager.
- Office equipment and electronics shall be EPEAT-registered by the Green Electronics Council to limit the off gassing of toxins within the facility.

CONSTRUCTION

- Ensure that absorbent building materials are protected from the elements to prevent moisture damage and future mold growth
- “Wet” materials such as concrete, caulk, adhesives, sealants etc. must meet the applicable VOC limits, as specified by the South Coast Air Quality Management District¹³.
- Fibers and particles released during installation of insulation shall be properly controlled, contained and disposed of prior to building occupancy.
- A vacancy period shall be allowed between end of construction and occupancy to allow for full air circulation through the building and minimization of odors from new paints, carpets and furnishings. The building shall be flushed continuously with outside air for a period of no less than 10 days, while maintaining an indoor air temperature between 60-75 degrees.

INDOOR AIR QUALITY DELIVERABLES

- ✓ In compliance with LEEDv4, an Indoor Air Quality Management Plan for the construction and preoccupancy phases of the building.
- ✓ Production of a Green Procurement Policy to ensure future purchases do not compromise the health of employees and building occupants.



CONSTRUCTION/DECONSTRUCTION

It is expected that construction of any new City building, and deconstruction to allow for the construction of a new building, will follow site management and planning, resource recovery and recycling, and pollution control standards as required by LEEDv4 and existing legislation. The strategies provided in this section outline specific guidelines to ensure that construction and deconstruction occurs with minimal environmental and social impact while maintaining the project budget.

CONSTRUCTION

CONSTRUCTION MATERIALS

- The construction management team shall work with suppliers to obtain materials that meet the following standards;
 - no less than 10% of materials, based on total value of materials, shall come from within a 500 mile radius of the building site
 - at least 5% of building materials, based on total value of materials, shall be comprised of refurbished, salvaged, or reused materials
 - all wood-based materials shall be certified by the Forest Stewardship Council
 - every effort shall be made to choose manufacturers who supply materials in minimal packaging, or reclaim packaging for recycling

¹³ Rule 1113, Regulation XI- Source Specific Standards, South Coast AQMD; <http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf?sfvrsn=15>

WASTE AND POLLUTION CONTROL

- The construction team shall work with local haulers to recycle or salvage at least 75% of construction materials, where applicable.
- Hazardous materials shall be properly separated and disposed of in accordance with relevant legislation. Every effort shall be made to minimize the use of hazardous materials during the construction process of all City buildings.
- Storage of construction materials shall occur under the guidance of an Integrated Pest Management Plan to prevent infestation of vermin
- A site management plan for construction and deconstruction shall specify the following:
 - Waste water control measures
 - Preservation of top soils
 - Erosion control
 - Airborne pollutant control (dust, smoke, odors)
 - Noise control
 - Habitat protection, including the salvage and protection of existing site vegetation and trees
 - Site activity designation to minimize damage to the site from soil compaction, storage, vehicle access and waste
 - Cleaning stations to prevent the transfer of pollutants off the site
- Minimize idling of construction vehicles when not in use by working with the Oregon DEQ Clean Diesel Grant Program to use idle reduction technologies.

DECONSTRUCTION

Where buildings are demolished to allow for the construction of a new City building, the following strategies shall be applied:

- The demolition team shall work with local haulers to salvage at least 50% of the non-hazardous building materials and demolition debris.
- Where materials have been deemed to be non-hazardous and compliant with building standards, the new building shall make use of at least 10% of materials salvaged from the demolished building. This shall exclude windows and frames, roofing materials, and insulation.
- All hazardous materials shall be disposed of in accordance with local, state and federal laws.
- Where possible, if construction of a new City facility requires the demolition of an existing building, demolition shall occur in a manner that allows for reuse in the new building to the extent that these materials will comply with the LEED Gold or Platinum standards.

CONSTRUCTION AND DECONSTRUCTION DELIVERABLES

SITE MANAGEMENT PLAN

A site management plan specifying the items listed above shall be developed by the construction management team immediately following the design process. The plan shall be kept on file on site with additional copies submitted to City departments as relevant.

WASTE MANAGEMENT PLAN

A waste management plan shall be developed prior to any construction of demolition that outlines the following:

- A list of materials that can be economically salvaged for reuse, or removed by salvage haulers.
- A recycling plan for materials that can be collected by Lake Oswego's contracted recycler, and identification of other reclaimers who can remove construction and demolition scrap from the site.
- Manufacturers and suppliers who can supply products with minimal packaging, or reclaim packaging from their products.
- Procedures for properly disposing of hazardous waste.



COMMISSIONING

The commissioning process is key to ensuring that the building functions as it was designed. Each new building can be commissioned in compliance with ASHRAE Standard 202-2013. A commissioning agent will determine whether equipment, systems and controls that supply heating and cooling, light, ventilation and other key building components are working together in conformance with original plans. Commissioning should occur from the early design process and continue for a minimum of 5 years after construction and follow a monitoring based approach to keep track of and reduce costs. This will ensure that the building operates to the building owner's needs, that problems can be prevented or eliminated, that costs are lowered early in the process, and that the building can perform at a high level throughout its lifecycle. Energy efficiency, improved air quality, reduced operating costs, and an easy to maintain building should all be outcomes of the commissioning process.

COMMISSIONING AGENT

- Commissioning shall be performed by an independent third-party individual who shall not be an employee of any firm associated with the design or construction process.
- The agent shall be hired directly by the City as either an employee or contractor for the duration of the process.
- The agent shall report all recommendations directly to the City.
- The agent shall work closely with facilities management to ensure that all staff are trained on new building systems, controls and equipment, including any energy management systems and verification of all building systems.

COMMISSIONING PROCESS

- Include all costs for commissioning in the project budgets to ensure that resources are available to allow for a thorough commissioning process.
- The development of a Commissioning Plan shall occur during the design phase of the project.
- The commissioning agent or team shall be engaged throughout the design and construction process to review plans, drawings, and the installation of building systems.
- Following construction, all building systems, controls, and equipment shall be verified for conformance with performance goals. All inconsistencies or underperforming systems shall be reported immediately to allow for corrections to be made.
- All facilities management staff shall be trained on systems specific to the building.
- Systems will continue to be monitored and adjusted as part of a retro-commissioning process for a period of no less than 5 years, and then re-assessed every 5 years for the lifespan of the building.

SYSTEMS TO BE PART OF COMMISSIONING PROCESS

- HVAC systems and associated controls

- Lighting systems and associated controls
- Plumbing systems and associated controls
- Renewable energy systems and associated controls
- Electrical systems and associated controls
- Building envelope, including roofing and windows

COMMISSIONING DELIVERABLES

- ✓ A commissioning plan that outlines the project timeline, systems to be commissioned, testing methodology, training program, functional tests, and system verification.
- ✓ Training program set up or reviewed by the commissioning agent.
- ✓ Progress reports, test results and compliance reports submitted to the City on an annual basis for a period of no less than 5 years.
- ✓ Final commissioning report that includes all testing results, findings, systems documentation and proof of compliance.



OPERATIONS AND MAINTENANCE

The operations and maintenance standards included in these guidelines apply not only to new high performance City buildings, but to all existing buildings. Compliance with these standards will ensure that buildings operate as designed while maintaining a safe and healthy work environment. High environmental performance in compliance with LEED Platinum credits are an expected outcome of these guidelines.

WASTE MANAGEMENT

- In addition to continuing existing recycling and composting policies, staff shall be trained to reduce overall waste in day-to-day operations. Waste prevention methods shall apply to all procurement and purchasing decisions and include the following:
 - Reduction of packaging
 - Durable and reusable items shall be given preference over disposable items
 - All new construction and renovated facilities shall have EPA Water Sense and Energy Star certified dishwashers installed to reduce the use of disposable dishware and cutlery
 - The use of compostable dishware shall be minimized in favor of durable dishware, but shall be used in place of any other disposable dishware purchasing.
 - Water filling stations shall be provided throughout the building and jugs and glasses shall be made available. The purchase of bottled water is prohibited.
 - All electronics shall be recycled through a program or recycler certified by the Oregon Department of Environmental Quality Oregon E-Cycles program.

RECYCLING

- All City buildings shall include the following recycling infrastructure:
 - Recycling containers in each department that meet the requirements of the City's contracted recycler
 - Paper recycling containers at each workstation
 - Educational materials at each recycling station that clearly illustrate what can be accepted.

COMPOSTING

Food-only composting bins shall be available at all City buildings, located in all employee areas where food is prepared or consumed. The bins shall be vermin resistant and emptied each day by janitorial staff.

EDUCATION

Employees and building occupants shall be trained on waste management during their intake orientation and through continuing education their employment. All employees shall be made aware of changes in policy or procedures related to waste management. Training topics shall cover:

- Identification of City staff resources for questions about waste disposal and management
- Proper separation of recycling, compost, and waste
- Results of waste audits shall be shared with staff along with recommendations for improvement
- Conservation of water and energy in the building
- Reduction of waste through paperless processes, food and beverage purchases while at work, and other streamlined business processes

Custodial staff shall also be trained in:

- The City's recycling and compost program, to ensure those streams are not contaminated with waste and that all materials that have been separated are recycled correctly.

DEFINITIONS

Appurtenance: As defined by the U.S. Green Building Council, "an appurtenance is any built-in, nonstructural portion of a roof system, such as skylights, ventilators, mechanical equipment, partitions and solar energy panels."

ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers

Biophilia:

Building: An enclosed structure that is regularly occupied by people and contains conditioned space (heated or cooled)

Commissioning: Commissioning is an all-inclusive process for all the planning, delivery, verification, and managing risks to critical functions performed in, or by, facilities. Commissioning ensures building quality using peer review and in-field or on-site verification. Commissioning also accomplishes higher energy efficiency, environmental health, and occupant safety and improves indoor air quality by making sure the building components are working correctly and that the plans are implemented with the greatest efficiency. Commissioning is a quality assurance-based process that delivers preventive and predictive maintenance plans, tailored operating manuals and training procedures for all users to follow. Essentially, the commissioning process formalizes review and integration of all project expectations during planning, design, construction, and occupancy phases by inspection and functional performance testing, and oversight of operator training and record documentation.

Deconstruction: The practice of disassembling a building in such a way that the materials (joists, flooring, siding, fixtures, and more) can be reused for new construction.

Ecoroof: An Ecoroof consists of a layer of vegetation over a growing medium on top of a synthetic, waterproof membrane. According to the City of Portland Ecoroof program, an Ecoroof significantly decreases stormwater runoff, saves energy, reduces pollution and erosion and helps preserve fish habitat.

ENERGY STAR: ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

ENERGY STAR Portfolio Manager: Portfolio Manager is an interactive energy management tool that allows you to track and assess energy and water consumption across your entire portfolio of buildings in a secure online environment.

Green Building Certification Institute (GBCI): A third-party organization that provides independent oversight of professional credentialing and project certification programs related to green building. GBCI administers certifications and professional designations within the framework of the U.S. Green Building Council's LEED® Green Building Rating Systems™.

IAQ: Indoor air quality – the nature of air inside the space that affects the health and well-being of building occupants.

Integrated Design: Early, multidisciplinary collaboration, including key stakeholders and design professionals, from conception to completion of a building project, rather than the traditional series of hand-offs from owner to architect, from builder to occupant. Integrated design incorporates the interplay between location, siting, layout, structure, systems, and anticipated use patterns.

LEED: Leadership in Energy and Environmental Design, a green building certification standard and rating system developed and maintained by the U.S. Green Building Council.

- LEED BD+C: LEED for Building Design and Construction and Major Renovations, latest version available.
- LEED EBOM: LEED for Existing Buildings Operations and Maintenance, latest version available.

Life Cycle Cost Analysis: Life-cycle cost analysis (LCCA) is a method for assessing the total cost of facility ownership. It takes into account all costs of acquiring, owning, and disposing of a building or building system.

Major Renovation or Retrofit: The replacement of both lighting and HVAC that serve more than 50% of the total building floor area. Major renovation project scopes involve significant design and construction activities. For the purposes of these guidelines, the City uses the Energy Trust of Oregon's most current definition of major renovation¹⁴.

¹⁴ http://energytrust.org/library/forms/NBE_PG_CommissioningParticipantManual.pdf

Natural Ventilation: Use of the natural airflow patterns, operable windows, etc, to move air within a building without use of fans (as opposed to mechanical ventilation).

Passive Survivability: A building's ability to maintain critical life-support conditions if services such as power, heating fuel, or water are lost.

Solar Reflectance Index: A measure of a material's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Materials with the highest SRI values are the coolest choices for roofing.

Sustainability: A sustainable Lake Oswego is a community that meets the vital human needs of the present without compromising our ability to meet future needs. This requires consideration of both long-term and short-term economic, social, and environmental effects. Operating sustainably means that we are leaving a legacy for the community of Lake Oswego and the planet.

Total Cost of Ownership: The comprehensive accounting of the total cost of ownership, including the initial costs, energy and operational costs, longevity and efficacy of service, and disposal costs.

Zero Energy Building: Refers to a building that generates onsite at least as much energy as it uses over the course of a year using renewable resources.

Zero Energy Capable Building A building with total energy use per square foot low enough that there is the potential for achieving net zero through onsite or offsite renewables.