MUNICIPAL HIGH-PERFORMANCE AND HEALTHY BUILDINGS GUIDELINES

UNIVERSITY OF PENNSYLVANIA – FELS INSITUTE OF GOVERNMENT
CAPSTONE PROJECT

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Introduction

Capital projects are the most direct and physical expression of the City's plans for its future. They influence employee operations, maintenance and energy costs, public perceptions, and the neighborhoods they are located in. Decades from now they will still be visibly representing the City's ideals at the time they were built. As long-term, bond-funded investments it's essential that they produce as much return as possible, both financially and by furthering the City's goals.

This guide uses the structure of structure of the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) certification to consolidate information from master plans across city departments into a tool for project managers and design consultants. In 2009, City Council passed Bill No. 080025 requiring new construction for City-owned buildings over 10,000 square feet to obtain LEED-silver certification by the United States Green Building Council (USGBC).

This guide answers commonly asked questions about city policies that effect which credits are feasible, sets baseline expectations for some credits, and connects credits to City priorities.

HOW TO USE THE GUIDE

This guide is organized by LEED credits, but the information it contains can be used for any capital project. It's a set of recommendations which can be adapted to individual projects, not a new master plan or policy.

There are eight credit categories:
Integrated Design, Location and Transportation, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation Credits

Each category has an introduction discussing why the topic is important, what the City is doing now, and suggestions for future actions. It also highlights credit achievement expectations, City priorities, and challenges.

Each credit in the category follows:

Category abbreviation and credit name

Point summary (Yes, Maybe Yes, Maybe No, No)

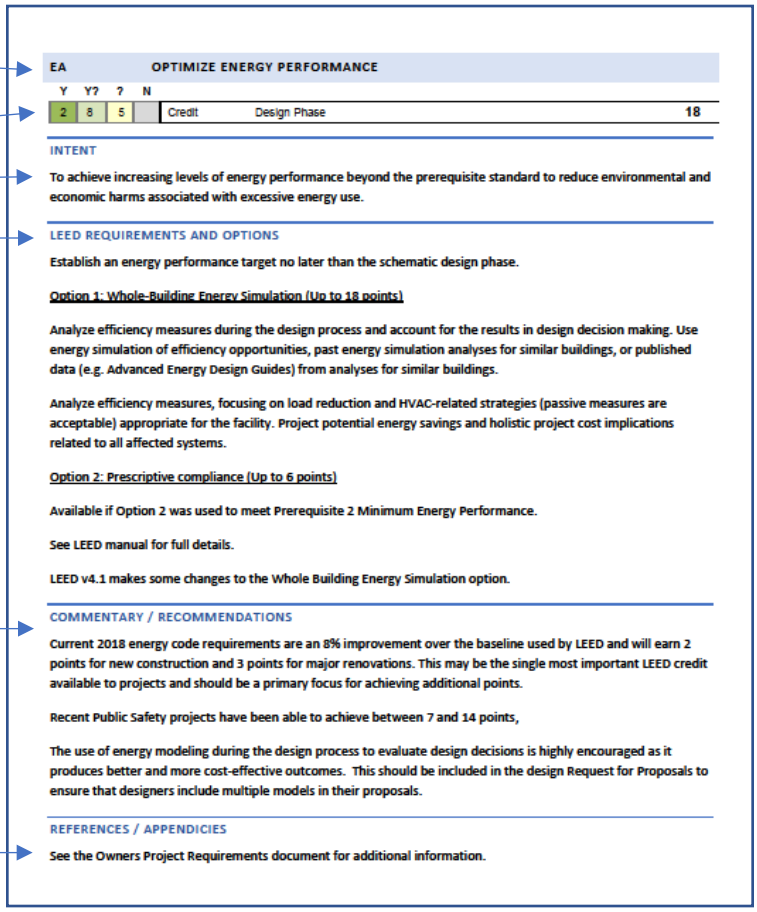
Intent of the credit (from LEED manual)

Key credit requirements and options (from LEED manual)

Points to related credits (if applicable)

Recommendations based on City priorities, policies, and earlier projects

References to other documents or attached appendices (if applicable).



EA OPTIMIZE ENERGY PERFORMANCE

Y	Y?	?	N			
2	8	5		Credit	Design Phase	18

INTENT

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.

LEED REQUIREMENTS AND OPTIONS

Establish an energy performance target no later than the schematic design phase.

Option 1: Whole-Building Energy Simulation (Up to 18 points)

Analyze efficiency measures during the design process and account for the results in design decision making. Use energy simulation of efficiency opportunities, past energy simulation analyses for similar buildings, or published data (e.g. Advanced Energy Design Guides) from analyses for similar buildings.

Analyze efficiency measures, focusing on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility. Project potential energy savings and holistic project cost implications related to all affected systems.

Option 2: Prescriptive compliance (Up to 6 points)

Available if Option 2 was used to meet Prerequisite 2 Minimum Energy Performance.

See LEED manual for full details.

LEED v4.1 makes some changes to the Whole Building Energy Simulation option.

COMMENTARY / RECOMMENDATIONS

Current 2018 energy code requirements are an 8% improvement over the baseline used by LEED and will earn 2 points for new construction and 3 points for major renovations. This may be the single most important LEED credit available to projects and should be a primary focus for achieving additional points.

Recent Public Safety projects have been able to achieve between 7 and 14 points,

The use of energy modeling during the design process to evaluate design decisions is highly encouraged as it produces better and more cost-effective outcomes. This should be included in the design Request for Proposals to ensure that designers include multiple models in their proposals.

REFERENCES / APPENDICIES

See the Owners Project Requirements document for additional information.

LEED is periodically updated and is currently on version 4.0. Version 4.1 is in a testing mode that allows project teams to use individual v4.1 credits in place of v4.0 credits. This guide primarily uses v4.0 credit with some v4.1 changes noted.

CAPITAL PROJECT OBJECTIVES

Capital projects are tasked with fulfilling not the just goals of the Department of Public Property, which builds and operates building, and the client departments which use them, but also multiple other plans and priorities from across city government.

CLIMATE AND ENERGY

Office of Sustainability

The Office of Sustainability (OOS) works with partners around the City to improve quality of life in all Philadelphia neighborhoods, reduce the City's carbon emissions, and prepare Philadelphia for a hotter, wetter future.

The City's *Greenworks* plan set out to make Philadelphia "the greenest city in America" in 2007. Since then, like many cities, Philadelphia has made number of commitments to meet climate goals and reduce energy use to create a better future for its citizens.

REDUCE GREENHOUSE GAS EMISSIONS FROM CITY OPERATIONS 50% BY 2030
REDUCE ENERGY USE BY 20% BY 2030
CARBON NEUTRALITY BY 20501

Greenworks Philadelphia, the City's comprehensive sustainability plan, is made up of eight visions:

Accessible food and drinking water

Healthy outdoor and indoor air

Clean and efficient energy

Climate-prepared and carbon-neutral communities

Quality natural resources

Accessible, affordable, and safe transportation

Zero Waste

Engaged students, stewards, and workers

Greenworks has been further developed into:

- *Useful Climate Trends for Philadelphia* 2014
- *Growing Stronger: Towards a Climate Ready Philadelphia* 2016
- *Municipal Energy Master Plan* 2017, *updates* 2020, 2021
- *Greenworks Initiatives Update* 2021
- *Beat the Heat Toolkit* 2019
- *Philadelphia Climate Action Playbook* 2021

Buildings account for 72% of Philadelphia's carbon footprint, and it's critical that the City reduce emissions from our own facilities. This work will stabilize our energy costs and increase the health of our buildings for employees and visitors.[2]

[1] Philadelphia Climate Action Playbook 2021
[2] Municipal Energy Master Plan 2021 update

BUILDING OPERATIONS

Department of Public Property (DPP)

The Department of Public Property (DPP) manages the buildings and structures where City employees work and where City equipment is kept. The department buys, sells, leases, designs, constructs, renovates, and maintains City properties. DPP makes sure that facilities operated by the City are in safe condition, are accessible, and that they function well.

CITY-WIDE PLANS

The following City plans were consulted in the creation of this guide:

- Philadelphia City Planning Commission (PCPC) – Philadelphia 2035, Pedestrian and Bicycle Plan
- Office of Emergency Management (OEM) – All Hazard Mitigation Plan , amendment (update in progress)
- Philadelphia Water Department (PWD) – Green City, Clean Waters
- Philadelphia Streets Department (Streets) – Green Streets Manual, Complete Street Design Handbook
- Office of Transportation and Infrastructure Systems (oTIS) – The Philadelphia Transportation Plan, A Vision for 2045
- Mayor's Office for People with Disabilities – City of Philadelphia ADA Transition Plan

BACKGROUND

NEED FOR A GUIDE

City projects are influenced by many conflicting demands, and third-party standards help assure that City goals that may not have an active advocate in the project team are met. However, the certification process can add complication and cost to projects that are already long and expensive. LEED certification is only required for larger projects, meaning smaller renovations have less to guide them towards meeting the city's energy efficiency goals.

Each capital project is unique, but certain elements remain consistent across projects. By providing a reference to aspects of City building projects that affect LEED certification, this guide answers consultants' frequently asked questions. Regardless of size, each project is an opportunity to move the city towards its goals. Applying the guide to all projects, and not just those that meet the LEED ordinance criteria, will result in better, more consistent projects.

Leverage institutional knowledge

The City owns and maintains its buildings for decades, giving it the benefit of accumulated institutional knowledge. Past problems can inform future solutions and allow for iterative learning and improvement. Much of this "library" has been held by long-term employees, but risks being lost or fragmented over time as people retire and change positions. Projects are also influenced by a huge range of other city agencies and individual department plans, which exist on paper but can be hard to keep track of. Consolidating information from these sources into this tailored reference guide makes that accumulated knowledge more available.

Clear direction attracts better consultants

The best design consultants want to work with organized clients that have clear objectives. Architects can design more efficiently and effectively the better they understand City expectations. The more project specifics are provided to them, the more they can focus their efforts on the unique aspects of the project. Less time spent gathering material and products lists and discussing settled operational questions is more time for improving building performance and design quality.

More effective project management

City project managers benefit from a clear guide in the same ways that consultants do. Clear expectations make it easier to manage consultants' work. A guide can help client departments and ensure new projects are installing materials and systems that the department can maintain. Consistent projects make budgeting easier.

Better buildings

Buildings impact employee productivity, satisfaction, and health. They also play an important role in public perception as one of the primary ways the public views and interacts with government. A 2010 study found that sustainably designed Federal buildings "use less energy and water, cost less to maintain, and have occupants that are satisfied when compared to typical buildings…Aggregate operations costs [were] 19% lower than industry average."[3]

[3] Fowler, K. M., Rauch, E. M., Henderson, J. W., & Kora, A. R. (2011, September). *Re-Assessing Green Building Performance: A Post Occupancy Evaluation of 22 GSA Buildings*. Pacific Northwest National Laboratory. https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-19369.pdf

WHY LEED?

Council ordinance

The United States Green Building Council's LEED (Leadership in Energy and Environmental Design) certification system was selected for this guide because City Council ordinance requires major renovation projects over 10,000 square feet to attain LEED Silver certification, meaning larger projects will be working with this system. Designers are familiar with LEED and the ratings are easy to understand.

Incorporates multiple priorities

But LEED offers other advantages. Unlike certification systems that focus only on energy use, LEED addresses a wide array of design aspects, including site design, water use, indoor environmental quality, and user experience. Integrating other city priorities into this structure has a double benefit – the number of points available towards LEED certification is increased, and projects are encouraged to incorporate those priorities.

> EXAMPLE: LEED offers several "pilot" credits for emergency preparedness and resiliency planning. This is of obvious importance for municipal facilities, and in addition to taking steps to ensure buildings are highly durable the City has both a Hazard Mitigation Plan and *Growing Stronger,* a climate adaptation plan. Including this credit in the guide highlights the importance of resiliency to project managers and designers, and earns points for measures the City is already taking. Addressing the hazards an individual facility might face earns additional points. That information can in turn be fed back into the standards and inform all projects.

Encourages integrated design

LEED is structured to encourage an integrated design process. Buildings are increasingly complicated and individual aspects of design influence each other in ways that traditional design doesn't fully account for. System conflicts are one of the most common causes of change orders during construction. Integrated design calls for active collaboration between all members of the design team, from users to engineers and maintenance staff. The project team works together from the start of design, looking at all aspects of the project from multiple perspectives to select design strategies that work together and leverage benefits. Different solutions may be modeled together to evaluate options. The result is more economical, higher performance buildings that balance priorities.

> EXAMPLE: In a traditional design process, windows are selected for views, walls are selected from a typical menu to meet code, lighting is set to a uniform level throughout, and the HVAC system is sized based on rules of thumb for the building square footage. Many of these decisions are made by separate people working independently, and the pieces are added together after checking for major conflicts.
>
> In an integrated design process, multiple rounds of modeling options might show that slight relocation of the windows and more wall insulation combined with task-specific lighting would allow for a smaller HVAC system, both saving costs and improving performance.

Other green building standards

Project teams should be aware of other standards and rating systems that may be appropriate for some projects:

- **International Green Building Code (IGBC)** – Developed by the International Code Council and USGBC, the IGBC is designed to be used as a building code instead of for individual projects. As an example,

Baltimore has adopted the IGBC as their city-wide building code. Philadelphia Licenses & Inspections can only review building plans against the 2018 suite of codes.
ICBC is a potential alternative to LEED, but local design teams may not be familiar with using it and third-party review may be difficult to arrange.

- **EnergyStar** – EnergyStar is a building operations certification program run by the U.S. Environmental Protection Agency (EPA) that promotes energy efficiency. Commercial buildings can earn EnergyStar certification annually when a third party verifies that the building performs in the top 25% of similar buildings nationwide as calculated by the EPA's EnergyStar Portfolio Manager tool.
  As a certification of operations, EnergyStar is not an alternative to LEED but a potential add-on.
- **WELL** – The WELL Building Institute administers this health-focused building and portfolio certification system. Buildings earn points in ten categories of indoor environmental quality. Energy is not a component of the rating system. WELL is intended to work with LEED. Certification costs are high compared to other systems.
  WELL certification could be an option in addition to LEED for particularly health-focused projects.
- **FitWel** – The Center for Active Design grew out of New York City's Active Design program and now operates the health-focused FitWel certification system. The system itself was developed by the U.S. Centers for Disease Control and Prevention (CDC) and the U.S. General Services Administration. Like WELL, energy is not a component of the system, and both buildings and portfolios can become certified. Certification is more affordable than WELL.
  FitWel could be a worthwhile addition to LEED.
- **SITES** – SITES is a sustainable certification system for landscape design developed by the United States Green Building Council, the same organization that created LEED.
  SITES is most appropriate for landscape projects with limited building components.
- **Passive House Institute US (PHIUS)** – Passive House is a performance-based certification system. Building mechanical systems and energy use are drastically reduced through superinsulation and a very airtight building exterior. Performance is verified through extensive testing. The Pennsylvania Housing Finance Agency has incorporated Passive House into their project evaluation bonuses and renovated their own office building to Passive House standards.
  Passive House's emphasis on performance testing at project completion contracting challenges within the public works bidding process that would need to be resolved.

HOW WAS THIS GUIDE DEVELOPED?

This project has been a joint effort of the Office of Sustainability and the Department of Public Property's Capital Projects Division. A series of LEED projects suggested the need for an organized guide to City LEED projects to go beyond the Owner's Project Requirements template that was previously developed by the Capital Projects Division in partnership with Facilities staff and the Office of Sustainability.

Information for this guide was consolidated from the many conversations between the Department of Public Property's Capital Programs and Maintenance divisions, the Office of Sustainability, and several design teams over the course of several Public Safety buildings projects. Those projects include the 2nd , 15th , and 22nd Police Districts, Engine 37 and Engine 11. Reference documents previously developed by Re:Vision Architecture for the Office of Sustainability were updated and integrated. Planning documents from numerous City departments that intersect with capital projects were reviewed for integration into the guide.

Design standards and guides from New York City's Department of Design and Construction and Chicago's Public Building Commission were also consulted to understand how cities are communicating their building goals to employees and consultants.

In addition to collecting current City of Philadelphia building practices, this guide is intended to incorporate more evidence-based information about effective building practices for both building performance and durability, and staff and public experience. The National Institute of Building Science's Whole Building Design Guide, the NJ Green Building Manual, the US Department of Energy's Better Buildings Solutions Center, and the Consortium for Building Energy Innovation (CBEI) were significant sources of information on current high-performance commercial building practices.

RECOMMENDATIONS

Recommendations for continued progress are included in credit category's overview and are summarized below. Coordination is the overarching theme of the recommendations. Many are specific suggestions to increase collaboration across Public Property teams or with other City departments to leverage limited resources. Likewise, from design Requests for Proposals to standard construction specifications, there is room to further align template documents to work together. This guide draws connections between design and construction decisions and the ways completed buildings support larger City goals, and measuring those outcomes is another reoccurring recommendation. Lastly, the guide is a snapshot in time that will need regular updating to remain useful.

Project Management and Design Process

- Incorporate integrated design process requirements into design Requests for Proposals.
- Continue to coordinate with Facilities to ensure products used in capital projects are available within procurement contracts.
- Keep Owner's Project Requirements and standard material documents up to date.
- Include commissioning from the beginning of projects.
- Coordinate standard specifications with LEED credit requirements.

Location and Transportation

- Continue to coordinate with Fleet, the Office of Transportation, and the Philadelphia City Planning Commission. Each city planning district has an assigned planner who can be a great resource for neighborhood priorities and concerns.

- Update with Clean Fleet Plan findings later this year.
- Survey employees and the public to better understand user transportation needs.
- Incorporate site-selection credits in real estate selection process for new projects, or site selection process for new buildings on large sites.

Sustainable Sites

- Increase attention to quality outdoor spaces' positive health impacts.
- Develop department-wide planting guidelines coordinated with landscape maintenance contract.
- Develop improved landscape maintenance plans to allow greater use of plantings.
- Explore partnerships with organizations like PowerCorpsPHL and PHS to expand plantings by improving maintenance capacity, while also providing job training.

Water Efficiency

- Transition fixture repairs to replacement with efficient fixtures, and consider systematic replacement.
- Increase use of water sub-meters to aid leak detection.
- Consider gray-water systems to increase resilience of systems.
- Restructure water billing to allow DPP to directly benefit from reduced water use.

Energy and Atmosphere

- Use integrated design to make cost-effective whole-building improvements.
- Continue to include exterior insulation, and research how the building retrofit process can be taken to the next level as high-performance building envelope technology becomes more mainstream.
- Improve the department's capacity to maintain new VRF mechanical systems.
- Improve preventative system maintenance to reduce energy use and increase occupant satisfaction.

Materials and Resources

- Systematically research regularly used materials and upgrade for sustainability and performance.
- Improve recycling by building users.

Indoor Environmental Quality

- Improve lighting design as more research becomes available on the best practices to mitigate the health impacts of shift work.
- Continue to explore and refine strategies to improve building acoustics.
- Improve access to daylight and views. Consider experimenting with tube skylights for daylight.
- Study effects of improved spaces on employee satisfaction, performance, and health.

Innovation Credits

- Project teams should select innovation credits based on their contributions to city priorities rather than ease of documentation.
- As teams explore these credits, they can be added to this guide for the benefit of future projects.

ACKNOWLEDGEMENTS

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Practical Energy Solutions

Kate Lyons provided building code and other technical assistance and helped with the layout of this guide.
Ben Pressman, P.E. provided guidance related to building energy modeling and mechanical systems.

Department of Public Property, Facilities Division

Robert Fischer, Joe Misko, Dan Luptak, and Rick Mariano provided valuable insights into building operations and maintenance over several years of capital projects and the development of this guide.

City of Philadelphia Healthy Buildings Working Group

INTEGRATIVE PROCESS

WHY IS THIS IMPORTANT TO QUALITY PROJECTS?

INTENT

To support high-performance, cost-effective project outcomes through an early analysis of the interrelationships among systems.

WHAT IS INTEGRATED DESIGN?

In the traditional design process, engineers independently design individual systems, which are then coordinated by the architect with the building design. This worked well when buildings were relatively simple. Over time, though, building systems have become increasingly complicated and individual aspects of design influence each other in ways that traditional design doesn't fully account for. System conflicts are one of the most common causes of change orders during construction.

The Integrative Process credit calls for active collaboration between all members of the design team, from users to engineers and maintenance staff, to find synergies. The project team works together throughout the design process, looking at all aspects of the project from multiple perspectives to select design strategies that work together and leverage benefits. Instead of optimizing each system within itself, the systems are optimized collectively. Different solutions may be modeled together to evaluate options. The result is more economical, higher performance buildings that balance priorities.

BETTER PROCESS, BETTER PROJECTS

As an example of how this can work in practice, imagine two projects. In traditional design, the architect might lay out the building plans, then have the various engineers design the lighting, heating and air conditioning (HVAC) systems while a landscape architect and civil engineer lay out the site. Large south facing windows might call for a larger HVAC system and cause glare and cold drafts for employees. By the time the systems are combined into a drawing set, it can be expensive and time consuming to make major changes.

If the same project used an integrated design process, the building might have been shaped and oriented to take optimize sunlight and views while also reducing the HVAC system size through a couple rounds of building models. This happens early in the design when changes are easier to make. Maybe the floor plan is changed to use of the optimized window arrangement and other systems updated accordingly. More frequent communication across the project team means everyone involved has a better understanding of stakeholder needs. When these system interrelationships and trade-offs are considered the buildings is more likely to perform as expected and to users' satisfaction.

HOW DOES IT AFFECT THE DESIGN PROCESS?

PRE-DESIGN / REQUEST FOR PROPOSALS

The expectation of integrated design process should be incorporated into the project's Request for Proposals, including specific tasks the consultant may be asked to perform. These could include multiple energy models at different project phases, design charettes, or additional team meetings. Ask applicants to detail their experiences with integrated design and identify if they used the same sub-consultants for those projects.

CONSULTANT SELECTION

Have applicants completed projects using integrated design? Were those projects with the same subconsultants? Consider talking to client references for those projects.

LEED REQUIREMENTS

Beginning in pre-design and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems described below. Use the analyses to inform the owner's project requirements (OPR), basis of design (BOD), design documents, and construction documents.

Discovery:

Perform a preliminary "simple box" energy modeling analysis before the completion of schematic design that explores how to reduce energy loads in the building and accomplish related sustainability goals by questioning default assumptions. Assess at least two potential strategies associated with each of the following:

- Site conditions. Assess shading, exterior lighting, hardscape, landscaping, and adjacent site conditions.
- Massing and orientation. Assess massing and orientation affect HVAC sizing, energy consumption, lighting, and renewable energy opportunities.
- Basic envelope attributes. Assess insulation values, window-to-wall ratios, glazing characteristics, shading, and window operability.
- Lighting levels. Assess interior surface reflectance values and lighting levels in occupied spaces.
- Thermal comfort ranges. Assess thermal comfort range options.
- Plug and process load needs. Assess reducing plug and process loads through programmatic solutions (e.g., equipment and purchasing policies, layout options).
- Programmatic and operational parameters. Assess multifunctioning spaces, operating schedules, space allotment per person, teleworking, reduction of building area, and anticipated operations and maintenance.

Perform a preliminary water budget analysis before the completion of schematic design that explores how to reduce potable water loads in the building and accomplish related sustainability goals. Assess and estimate the project's potential nonpotable water supply sources and water demand volumes, including the following:

- INDOOR WATER DEMAND. Assess flow and flush fixture design case demand volumes, calculated in accordance with WE Prerequisite Indoor Water-Use Reduction.
- OUTDOOR WATER DEMAND. Assess landscape irrigation design case demand volume calculated in accordance with WE Credit Outdoor Water-Use Reduction.
- PROCESS WATER DEMAND. Assess kitchen, laundry, cooling tower, and other equipment demand volumes, as applicable.
- SUPPLY SOURCES. Assess all potential nonpotable water supply source volumes, such as on-site rainwater and graywater, municipally supplied nonpotable water, and HVAC equipment condensate.

Implementation:

Document how the above analysis informed design and building form decisions in the project's OPR and BOD and the eventual design of the project, including the following, as applicable:

- Building and site program;
- Building form and geometry;
- Building envelope and façade treatments on different orientations;
- Elimination and/or significant downsizing of building systems (e.g., HVAC, lighting, controls, Exterior materials, interior finishes, and functional program elements); and
- Other systems.

Document how the above analysis informed building and site design decisions in the project's OPR and BOD. Demonstrate how at least one on-site nonpotable water supply source was analyzed to reduce the burden on municipal supply or wastewater treatment systems by contributing to at least two of the water demand components listed above. Demonstrate how the analysis informed the design of the project, including the following, as applicable:

- plumbing systems;
- sewage conveyance and/or on-site treatment systems;
- rainwater quantity and quality management systems;
- landscaping, irrigation, and site elements;
- roofing systems and/or building form and geometry; and
- other systems.

RELATIONSHIP TO COMMISSIONING AND OTHER CREDITS

The commissioning prerequisite and credits are closely connected to the Integrative Process credit. The commissioning agent should be part of the project team for the beginning, but no later than design development. They help create the Owner's Project Requirements and Basis of Design, which both inform and document the integrated design process. They review both the mechanical systems and the envelope.

The Site Assessment credit is not a prerequisite but serves as an important foundation for the integrative design process because it summarizes important features of the site that should have an impact on the design.

If the project is a candidate for the resiliency pilot credits, these should also be considered early as part of the integrated design process. Like the site assessment, they start with gathering important baseline information about risks and desired levels of resilience that can drive design.

LOCATION AND TRANSPORTATION (LT)

Y	Y?	?	N	
6	9	1	16	**32**

WHY IS LOCATION AND TRANSPORTATION IMPORTANT?

Where a building is located and how that building is accessed are closely interrelated and together determine how the building interacts with the world outside the property lines. Transportation determines not only a large percentage of energy use and emissions related to the building, but also who can easily access it and how it contributes to the health of the place it's located.

Well-located public buildings with good public transportation and pedestrian connections are easier for all members of the public to access and serve as important neighborhood anchors. Those same characteristics also make them better places to work.

WHAT IS THE CITY DOING ALREADY?

City-wide: A number of plans address building locations and transportation at different scales. *Philadelphia 2035,* the City Planning Commission's comprehensive plan, sets out neighborhood and regional strategies for development. Municipal facilities are often called out specifically in these plans because they are under the City's direct control.

The Streets Department, PWD, and oTIS have worked together to produce a collection of plans – the *Complete Streets Guide / Vision Zero*, the *Green Streets Guide*, and the *Pedestrian & Bicycle Plan* - detail many efforts to better connect neighborhood commercial corridors, strengthen public transit and bicycle networks, and improve pedestrian safety and experience across the city.

The Office of Fleet Management is working on a Clean Fleet plan due later in 2021. Hazard mitigation and climate adaptation plans also exist and should plan a role in facility planning.

Public Property: City properties are often built on left-over urban sites, so meet many of the credit criteria already. Recent capital projects have been adding electric vehicle charging to parking areas, including visitor and employee bike racks, and even providing electrical infrastructure and space for City-run bike share stations. All sidewalk improvements include rebuilt handicapped curb ramps to promote accessibility.

NEXT STEPS

- Update with Clean Fleet Plan findings later this year.
- Continue to coordinate with Fleet, the Office of Transportation, and the Philadelphia City Planning Commission. Each city planning district has an assigned planner who can be a great resource for neighborhood priorities and concerns.
- Survey employees and the public to better understand user transportation needs.
- Incorporate site-selection credits in real estate selection process for new projects, or site selection process for new buildings on large sites.

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
  - None for this category.
- Credits
  - DPP projects can be expected to earn between 6 and 15 points out of 16 possible.
- Priorities
  - Promote equitable access to city facilities.
  - Contribute to neighborhood quality.
  - Prepare for future shifts in transportation.
- Challenges
  - City projects are typically existing buildings, meaning many of these points are pre-determined.

CREDITS

LT LEED for Neighborhood Development Location 17

LT Sensitive Land Protection 18

LT High Priority Site 19

LT Surrounding Density and Diverse Uses 20

LT Access to Quality Transit 21

LT Bicycle Facililties 22

LT Reduced Parking Footprint 23

LT Green Vehicles 24

LT LEED FOR NEIGHBORHOOD DEVELOPMENT LOCATION

Y	Y?	?	N			
			16	Credit	Design Phase	**16**

INTENT

To avoid development on inappropriate sites. To reduce vehicle distance traveled. To enhance livability and improve human health by encouraging daily physical activity.

LEED REQUIREMENTS AND OPTIONS

Locate the project within the boundary of a development certified under LEED for Neighborhood Development.

COMMENTARY / RECOMMENDATIONS

There are no City-owned properties that fall within LEED for Neighborhood Development locations.

No changes for v4.1.

LT SENSITIVE LAND PROTECTION

Y	Y?	?	N			
	1			Credit	Design Phase	1

INTENT

To avoid the development of environmentally sensitive lands and reduce the environmental impact from the location of a building on a site.

LEED REQUIREMENTS AND OPTIONS

Option 1: Locate the development footprint on land that has been previously developed.

Option 2: Locate the development footprint on land that has been previously developed or that does not meet the following criteria for sensitive land: Prime farmland; Floodplains; Habitat for threatened or endangered species; within 100' of water bodies; within 50' of wetland.

COMMENTARY / RECOMMENDATIONS

Most projects will meet the requirements of this credit.

No significant changes to this credit in v4.1.

LT				HIGH PRIORITY SITE		
Y	Y?	?	N			
1	1			Credit	Design Phase	2

INTENT

V4.0: To encourage project location in areas with development constraints and promote the health of the surrounding area.
V4.1: To build the economic and social vitality of communities, encourage project location in areas with development constraints, and promote the ecological and community health of the surrounding area.

LEED REQUIREMENTS AND OPTIONS V4.0

Option 1: Historic District

Option 2: Priority Designation

- A site listed by the EPA National Priorities List;
- A Federal Empowerment Zone site;
- A Federal Enterprise Community site;
- A Federal Renewal Community site;
- A Department of the Treasury Community Development Financial Institutions Fund Qualified Low-Income Community (a subset of the New Markets Tax Credit Program);
- A site in a U.S. Department of Housing and Urban Development's Qualified Census Tract (QCT) or Difficult Development Area (DDA); or
- A local equivalent program administered at the national level for projects outside the U.S.

Option 3: Brownfield Remediation

LEED REQUIREMENTS AND OPTIONS V4.1

Option 1. High Priority Site (1 point)

Path 1. Economically Disadvantaged Community Location (1 point)
Locate within one of the following areas:

- Census tract* in which average household income is at or below 80% area median income (AMI)
- Census tract in which at least 20% of population is at or below poverty rate of state, provincial, or other regional jurisdiction
- Census tract in which unemployment is at least 150% of the state, provincial, or other regional jurisdiction.

Path 2. Brownfield Remediation (1 point)

Option 2. Equitable Development

Path 1. Equity & Community Benefits (1 point)
Develop and implement an equity plan.

COMMENTARY / RECOMMENDATIONS

Many projects will be located in a location that meets at least one of these criteria.

Open Data Philly - Historic Sites and Districts Map
EPA – Cleanups in My Community Interactive Map

LT SURROUNDING DENSITY AND DIVERSE USES

Y	Y?	?	N			
3	2			Credit	Design Phase	**5**

INTENT

To conserve land and protect farmland and wildlife habitat by encouraging development in areas with existing infrastructure. To promote walkability, and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging daily physical activity.

LEED REQUIREMENTS AND OPTIONS

Option 1: Surrounding Density (2-4 points) – Use the table provided in the LEED Manual to see if your project qualifies.

Option 2: Diverse Uses (1-2 points) - Construct or renovate a building or a space within a building such that the building's main entrance is within a ½-mile walking distance of the main entrance of four to seven (1 point) or eight or more (2 points) existing and publicly available diverse uses (listed in Appendix 1 of the LEED Manual). Restrictions apply and are listed in the LEED Manual.

COMMENTARY / RECOMMENDATIONS

Most projects should be eligible for points in this credit.

No change for v4.1.

LT ACCESS TO QUALITY TRANSIT

Y	Y?	?	N			
2	2	1		Credit	Design Phase	**5**

INTENT

To encourage development in locations shown to have multimodal transportation choices or otherwise reduced motor vehicle use, thereby reducing greenhouse gas emissions, air pollution, and other environmental and public health harms associated with motor vehicle use.

LEED REQUIREMENTS AND OPTIONS

Locate any functional entry of the project within a 1/4-mile walking distance of existing or planned bus, streetcar, or informal transit stops, or within a 1/2-mile walking distance of existing or planned bus rapid transit stops, light or heavy rail stations, commuter rail stations, or commuter ferry terminals. Restrictions apply and can be viewed in the LEED Manual.

COMMENTARY / RECOMMENDATIONS

Most projects should be eligible for this credit, depending on their access to public transportation routes.

In LEED v4.1, the minimum daily transit service table has been expanded.

REFERENCES

Use the SEPTA Transit Network Map to determine routes near your project's location, then check SEPTA Schedules to ensure that your location meets the minimum number of trips set by LEED.

LT				BICYCLE FACILILTIES	
Y	Y?	?	N		
	1			Credit	Design Phase	1

INTENT

To promote bicycling and transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging utilitarian and recreational physical activity.

LEED REQUIREMENTS AND OPTIONS

Design or locate the project such that a functional entry or bicycle storage is within a 200-yard walking distance or bicycling distance from a bicycle network. Planned bicycle trails or lanes may be counted if they are fully funded by the date of the certificate of occupancy and are scheduled for completion within one year of that date.

Commercial or Institutional Projects

- Provide short-term bicycle storage for at least 2.5% of all peak visitors, but no fewer than four storage spaces per building.
- Provide long-term bicycle storage for at least 5% of all regular building occupants, but no fewer than four storage spaces per building in addition to the short-term bicycle storage spaces.
- Provide at least one on-site shower with changing facility for the first 100 regular building occupants and one additional shower for every 150 regular building occupants thereafter.

COMMENTARY / RECOMMENDATIONS

The 2009 Complete Streets Executive Order directs all City departments to give full consideration to the safety and convenience of the transportation system. This Order mandates that City departments promote the bicycle network and address the needs of cyclists where practicable.

The Philadelphia City Planning Commission's Pedestrian and Bicycle Plan identifies goals that align with this credit, including encouraged use of biking. Bicycle parking should be provided for project visitors even if the full credit is not pursued.

Showers and long-term storage may not always be available. Showers are not included in the majority of City buildings maintenance and safety reasons. Police and Fire projects are an exception and do include showers for employee use.

In v4.1, showers are needed on a sliding scale for large occupancy projects. More description is provided for all projects in discerning qualifications for this credit.

REFERENCES

Visit the Philadelphia Bicycle Map to see if your building is located on a route that complies with the requirements of this credit.

Consult the Complete Streets Handbook Checklist for bicycle parking and storage guidelines.

LT REDUCED PARKING FOOTPRINT

Y	Y?	?	N			
	1			Credit	Design Phase	1

INTENT

To minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.

LEED REQUIREMENTS AND OPTIONS

Do not exceed the minimum local code requirements for parking capacity.

Provide parking capacity that is a percentage reduction below the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 3rd edition, Tables 18-2 through 1804.

Case 1: Baseline Location- Projects that have not earned points under LT Credit Surrounding Density and Diverse Uses or LT Credit Access to Quality Transit must achieve a 20% reduction from the base ratios.

Case 2: Dense and/or Transit-Service Location - Projects earning 1 or more points under either LT Credit Surrounding Density and Diverse Uses or LT Credit Access to Quality Transit must achieve a 40% reduction from the base ratios.

COMMENTARY / RECOMMENDATIONS

This credit is likely for most projects that do not have a significant parking component of the program.

In v4.1, there are three options. Option 1. No Parking or Reduce Parking requires a 30% reduction below base ratios for parking spaces by building type. Projects with no off-street parking meet the requirements for this credit. Option 2. Carshare requires that dedicated parking is provided for carshare vehicles. Option 3. Unbundling Parking requires that owner-occupied projects do not provide free or subsidized parking to employees, and that daily parking fees be implemented at a cost equal to or greater than the daily roundtrip cost of public transit. See more in the LEED v4.1 Manual.

REFERENCES

See the Philadelphia Zoning Code for minimum local code requirements for parking capacity.

LT				GREEN VEHICLES		
Y	Y?	?	N			
	1			Credit	Design Phase	1

INTENT

To reduce pollution by promoting alternatives to conventionally fueled automobiles.

LEED REQUIREMENTS AND OPTIONS

Designate 5% of all parking spaces used by the project as preferred parking for green vehicles. Clearly identify and enforce for sole use by green vehicles.

Option 1: Electric Vehicle Charging - Install electrical vehicle supply equipment (EVSE) in 2% of all parking spaces used by the project. Clearly identify and reserve these spaces for the sole use by plug-in electric vehicles. Parking spaces that include EVSE must be provided separate from and in addition to preferred parking spaces for green vehicles. The EVSE must:

- Provide a Level 2 charging capacity (208 – 240 volts) or greater.
- Comply with the relevant regional or local standard for electrical connectors, such as SAE Surface Vehicle Recommended Practice J1772, SAE Electric Vehicle Conductive Charge Coupler or IEC 62196 of the International Electrotechnical Commission for projects outside the U.S.
- Be networked or internet addressable and be capable of participating in a demand-response program or time-of-use pricing to encourage off-peak charging.

COMMENTARY / RECOMMENDATIONS

Some projects with parking space may be eligible for this credit.

In v4.1, this credit is now called “Electric Vehicles.” If infrastructure is not associated with electric vehicles, it does not meet the requirements. There is also a new option: Option 2. Electric Vehicle Ready Infrastructure. At this time no charging devices meet the v4.1 criteria and Fleet needs.

The Office of Fleet Management is working with the Office of Sustainability to complete a Clean Fleet Plan, which is due to be released later this year. Fleet Management has been a partner in the City’s clean energy plans and has worked to make the City’s vehicles more environmentally friendly and to encourage smart fuel and vehicle choices in the community.

Electric vehicle charging infrastructure is evolving rapidly, making it important to design for future flexibility. The chargers currently installed by Fleet and DPP do not require data connections, but this may change in the future. The number of electric vehicles in use by the City is also likely to increase. Extra conduits and junction boxes installed in trenches at a small cost today will greatly reduce future costs to run data or additional electrical lines.

SUSTAINABLE SITES (SS)

Y	Y?	?	N	
2	5	3	0	**10**

WHY ARE SUSTAINABLE SITES IMPORTANT?

The sustainable sites credits relate to the project's relationship with the natural environment. Credits include open space, stormwater management, heat island effects, light pollution, and wildlife habitat

Locally, the effect of ecology can be seen in combined stormwater overflows, hotter neighborhoods, and an aging, reduced tree canopy across the city. Even urban spaces can support surprising biodiversity, which in turn supports the health of building users.

At the building level, the health care industry has been studying the health benefits of green spaces for decades. Hospitals like Boston's Brigham and Women's[1] have intentionally integrated the natural environment into their downtown hospital due to its improvement in staff and patient stress, and the Veteran's Administration has included natural elements in their design guide to promote healing.[2] Quality landscaping improves the look and feel of buildings for everyone who passes by, not only their users. Studies – including those here in Philadelphia[3] - have shown that adding trees to neighborhoods reduces residents' stress and can encourage people to walk more.

WHAT IS THE CITY DOING ALREADY?

Locally, the importance of sustainable sites has been recognized by PWD's *Green City, Clean Waters* plan, which addresses stormwater runoff in a combined sewer system, the Office of Sustainability's efforts to combat dangerous heat island effects that disproportionately effect the least advantaged parts of the city, and Parks & Recreation's urban tree plan that's working to restore Philadelphia's tree canopy.

Public Property has partnered with PWD on many stormwater management projects, which have often had the added benefit of adding attractive landscaping the public facilities. Native trees and grasses at several police sites have transformed stretches of city streets. All roofing projects are reflective materials that reduce heat islands, and all site lighting is designed to prevent any spillage outside the property. Quality outdoor spaces have been a recent focus.

NEXT STEPS

- Increase attention to quality outdoor spaces' positive health impacts.
- Develop department-wide planting guidelines coordinated with landscape maintenance contract.
- Develop improved landscape maintenance plans to allow greater use of plantings.
- Explore partnerships with organizations like PowerCorpsPHL and PHS to expand plantings by improving maintenance capacity, while also providing job training.

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[1] Green, J. (2019, August 9). *In Boston's Leading Hospitals, Nature Is Part of the Therapy*. THE DIRT. https://dirt.asla.org/2017/12/14/in-boston-leading-hospitals-heal-with-nature/.

[2] Department of Veterans Affairs, Office of Construction and Facilities Management, & Fischer, G. M., Healing Environment Design Guidelines (n.d.).

[3] Center for High Impact Philanthropy, University of Pennyslvania. (n.d.). *Philadelphia LandCare Program Case Study*. Vibrant Cities Lab. Retrieved May 1, 2021, from https://www.vibrantcitieslab.com/case-studies/philadelphia-landcare/

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
  - Projects that comply with permit requirements are likely to comply with the category prerequisite.
- Credits
  - DPP projects can be expected to earn between 2 and 7 points out of 10 possible in this category.
- Priorities
  - The site assessment credit encourages an early look at key site characteristics during design, and should be included in the integrated design process.
  - Continue to improve relationship with PWD.
  - Continue to improve public and employee outdoor spaces.
- Challenges
  - The rainwater management credit is difficult for tight urban sites and is different from PWD requirements in fundamental ways.
  - Maintenance of landscape is very difficult with Public Property's current funding levels.

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SS Construction Activity Pollution Prevention 27

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SS Site Development – Protect or Restore Habitat 29

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SS Rainwater Management 31

SS Heat Island Reduction 32

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SS CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Y	Pre Req	Construction Phase	Required

INTENT

To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation, and airborne dust.

LEED REQUIREMENTS AND OPTIONS

Create and implement an erosion and sedimentation control plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency (EPA) Construction General Permit (CGP) or local equivalent, whichever is more stringent. Projects must apply the CGP regardless of size. The plan must describe the measures implemented.

COMMENTARY / RECOMMENDATIONS

Create specification template that incorporates prerequisite and City requirements.

No change for v4.1

SS SITE ASSESSMENT

Y	Y?	?	N			
1				Credit	Design Phase	1

INTENT

To assess site conditions before design to evaluate sustainable options and inform related decisions about site design.

LEED REQUIREMENTS AND OPTIONS

Complete and document a site survey or assessment that includes the following information: Topography, Hydrology, Climate, Vegetation, Soils, Human use, and Human health effects.

COMMENTARY / RECOMMENDATIONS

Understanding the site is a key starting point for integrated design to ensure design decisions are working with rather than against unchangeable site characteristics. This credit form is a good overview of important site aspects and design considerations applicable to all projects.

In v4.1, plant and animal species are added to the required list of elements that must be included in the assessment.

SS SITE DEVELOPMENT – PROTECT OR RESTORE HABITAT

Y	Y?	?	N			
	2			Credit	Design Phase	**2**

INTENT

To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.

LEED REQUIREMENTS AND OPTIONS

Preserve and protect from all development and construction activity 40% of the greenfield area on the site (if such areas exist).

Option 1: On-Site Restoration (2 points)

Using native or adapted vegetation, restore 30% (including the building footprint) of all portions of the site identified as previously disturbed. Projects that achieve a density of 1.5 floor-area ratio may include vegetated roof surfaces in this calculation if the plants are native or adaptive, provide habitat, and promote biodiversity. Restore all disturbed or compacted soils that will be revegetated within the project's development footprint to meet the following requirements:

- Soil (imported and in situ) must be reused for functions comparable to their original function.
- Imported topsoils or soil blends designed to serve as topsoil may not include the following:
  - Soils defined regionally by the Natural Resources Conservation Service web soil survey as prime farmland, unique farmland, or farmland of statewide or local importance, or
  - Soils from other greenfield sites, unless those soils are a byproduct of a construction process.
- Restored soil must meet the criteria of reference soils in categories 1-3 and meet the criteria of either category 4 or 5:
  1. Organic matter;
  2. Compaction;
  3. Infiltration rates;
  4. Soil biological function; and
  5. Soil chemical characteristics.

Project teams may exclude vegetated landscape areas that are constructed to accommodate rainwater infiltration from the vegetation and soils requirements, provided all such rainwater infiltration areas are treated consistently with SS Credit Rainwater Management.

COMMENTARY / RECOMMENDATIONS

The planting and soil requirements of this credit are recommended for all projects that include landscape. DPP has a staff landscape architect who should be included in all DPP projects that have a landscape component.

DPP does not typically install green roofs due to maintenance constraints.

Option 2, Off-site restoration is not possible with City funding.

In LEED v4.1, this credit is called “Protect or Restore Habitat” and both protection and restoration are required.

SS				OPEN SPACE		
Y	Y?	?	N			
	1			Credit	Design Phase	1

INTENT

To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.

LEED REQUIREMENTS AND OPTIONS

Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation) or have overhead vegetated canopy. The outdoor space must be physically accessible and be one or more of the following:

- A pedestrian-oriented paving or turf area with physical site elements that accommodate outdoor social activities;
- A recreation-oriented paving or turf area with physical site elements that encourage physical activity;
- A garden space with a diversity of vegetation types and species that provide opportunities for year-round visual interest;
- A garden space dedicated to community gardens or urban food production;
- Preserved or created habitat that meets the criteria of SS Credit Site Development - Protect or Restore Habitat and also includes elements or human interaction.

For projects that achieve a density of 1.5 floor-area ratio (FAR), and are physically accessible, extensive or intensive vegetated roofs can be used toward the minimum 25% vegetation requirement, and qualifying roof-based physically accessible paving areas can be used toward credit compliance.

Wetlands or naturally designed ponds may count as open space if the side slope gradient average 1:4 (vertical:horizontal) or less and are vegetated.

Option 2. Financial Support is not possible with City funding.

COMMENTARY / RECOMMENDATIONS

Earning this credit is likely for many projects. This credit should be considered in the LEED boundary selection process.

Even if this credit cannot be obtained, incorporate open space principals whenever possible. Access to outdoor spaces has documented benefits for employee and public health. According to See the US General Services Administration's Sustainable Facilities Tool, " Studies have demonstrated that including outdoor space amenities such as paths, tables, benches or gardens may improve health by increasing levels of physical activity, reducing general stress, and exposing occupants to daylight… Creating restorative gardens, adding vegetative/green roofs, or providing outdoor fitness equipment may reduce absenteeism resulting in increased productivity and instill feelings of well-being."

Some details of this credit are different in LEED v4.1. See the LEED v4.1 Manual for more details.

SS RAINWATER MANAGEMENT

Y	Y?	?	N			
		3		Credit	Design Phase	3

INTENT

To reduce runoff volume and improve water quality by replicating the natural hydrology and water balance of the site, based on historical conditions and undeveloped ecosystems in the region.

LEED REQUIREMENTS AND OPTIONS

Option 1. Percentile of rainfall events

Path 1. 95th Percentile (2 points)

In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 95th percentile of regional or local rainfall events using low-impact development (LID) and green infrastructure. OR

Path 2. 98th Percentile (3 points)

Achieve Path 1 but for the 98th percentile of regional or local rainfall events, using LID and green infrastructure. OR

Path 3. Zero lot line projects only – 85th Percentile (3 points)

The following requirement applies to zero lot line projects in urban areas with a minimum density of 1.5 FAR. In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 85th percentile of regional or local rainfall events, using LID and green infrastructure.

Option 2. Natural land cover conditions (3 points)

Manage on site the annual increase in runoff volume from the natural land cover condition to the post-developed condition.

COMMENTARY / RECOMMENDATIONS

Philadelphia Water Department (PWD) requirements focus on slowing rather than reducing water's entry into their system and do not meet this credit; this credit requires managing most stormwater on site and may meet PWD requirements. Review feasibility for larger projects and PWD partnership projects.

In LEED v4.1, the percentages of rainfall events have changed. See the LEED v4.1 Manual for more details.

SS	HEAT ISLAND REDUCTION				
Y	Y?	?	N		
	2			Credit	Design Phase	2

INTENT

To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

LEED REQUIREMENTS AND OPTIONS

Option 1: Nonroof and Roof (2 points)

Meet the following criterion: (Nonroof Measures / 0.5) + (High-Reflectance Roof / 0.75) + (Vegetated Roof / 0.75) > Total Site Paving + Total Roof

Use any combination of the following strategies:

Nonroof Measures

- Use existing plant material or install plants that provide shade over paving areas (including playgrounds) on the site within 10 years of planting. Install vegetated planters. Plants must be in place at the time of occupancy permit and cannot include artificial turf.
- Paving materials or shade from structures covered by energy generation systems.
- Shade from architectural devices or structures that have a three-year aged solar reflectance (SR) value of at least 0.28. If three year aged information is not available, use materials with an initial SR of at least 0.33 at installation.
- Shade from vegetated structures
- Open-grid pavement system (at least 50% unbound).

High-Reflectance Roof.

Use roofing materials with a solar reflectance index (SRI) equal to or greater than the values below, and meet the three-year aged SRI value. If three-year aged value information is not available, use materials that meet the initial SRI value.

- Low-sloped roof < 2:12, Initial SRI - 82 SRI; 3-year aged SRI - 64
- Steep-sloped roof > 2:12, Initial SRI - 39; 3-year aged SRI – 32

Option 2: Parking Under Cover (1 point)

COMMENTARY / RECOMMENDATIONS

This credit is likely for projects with limited parking. Reducing the urban heat island effect is a priority. High-reflectance roofs are standard for city projects and required by the "Cool Roof Law," an ordinance that requires all rooves (slope <2:12) to be white or Energy Star rated.

While the heat island effect is a factor across the city, some neighborhoods are as much as 22 degrees hotter than others. These neighborhoods are typically also the most disadvantaged, and that additional heat has quality of life and health impacts. See the Philadelphia Heat Vulnerability Index and the Beat the Heat Toolkit for more information.

There are some minor changes in SRI values in LEED v4.1.

SS LIGHT POLLUTION REDUCTION

Y	Y?	?	N			
1				Credit	Design Phase	1

INTENT

To increase night sky access, improve nighttime visibility, and reduce the consequences of development for wildlife and people.

LEED REQUIREMENTS AND OPTIONS

Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method (Option 1) or the calculation method (Option 2). Projects may use different options for uplight and light trespass.
Meet these requirements for all exterior luminaires located inside the project boundaries (except those listed under "Exemptions").

Additionally, internally illuminated exterior signage must not exceed a luminance of 200 cd/m^2 during nighttime hours and 2000cd/m^2 during daytime hours.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects to reduce the impact of site lighting on neighboring properties. Photometric plans are recommended to ensure sufficient project lighting with no trespass. Standard site lighting fixtures are full-cutoff.

This credit is unchanged in LEED v4.1.

WATER EFFICIENCY (WE)

Y	Y?	?	N	
5	1	3	2	**11**

WHY IS WATER EFFICIENCY IMPORTANT?

A changing climate is leading to both more extreme rain events and increased chances of drought, even in the Delaware Valley. Droughts have been uncommon here but that may not be the case in the future.

Although water shortages are rare in Philadelphia, water does have an environmental cost. The Philadelphia Water Department's (PWD) operations are the source of more than a third of all greenhouse gas emissions created by the City of Philadelphia's municipal buildings and operations. As one of the oldest municipal water systems in the country, maintenance costs for aging infrastructure are high and this is passed on in water bills. Increased water efficiency at other municipal buildings will reduce General Fund costs and make a small dent in PWD's emissions.

WHAT IS THE CITY DOING ALREADY?

Public Property does not use landscape irrigation and is transitioning to lower-flow, sensor-operated plumbing fixtures.

NEXT STEPS

- Coordinate new fixtures with Facilities procurement contracts.
- Transition fixture repairs to replacement with new fixtures. Consider systematic replacement efforts.
- Increase use of water sub-meters to aid leak detection.
- Consider gray-water systems to increase resilience of systems.
- Restructure water billing to allow DPP to directly benefit from reduced water use.

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
    - Outdoor and indoor water use reduction prerequisites are met when DPP standard plumbing fixtures are used. Building-level water metering requires some additional meters but is not difficult and provides leak-detection benefits.
- Credits
    - Projects using standard plumbing fixtures typically earn 5 to 6 points out of 11 possible.
- Priorities
    - Durability and ease of maintenance of plumbing fixtures is the highest priority.
- Challenges
    - Increased water use reduction measures will require increased maintenance.
    - The current billing arrangement with the Philadelphia Water Department does not incentivize water use reduction.

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WE OUTDOOR WATER USE REDUCTION

Y	Pre Req	Design Phase	Required

DESCRIPTION

City projects do not typically include landscape irrigation, which meets this prerequisite.

WE INDOOR WATER USE REQUIREMENT

Y	Pre Req	Design Phase	Required

DESCRIPTION

DPP standard fixtures exceed this requirement.

WE BUILDING-LEVEL WATER METERING

Y	Pre Req	Design Phase	Required

INTENT

To support water management and identify opportunities for additional water savings by tracking water consumption.

LEED REQUIREMENTS AND OPTIONS

Install permanent water meters that measure the total potable water use for the building and associated ground. Meter data must be compiled into monthly and annual summaries; meter readings can be manual or automated.

Commit to sharing with USGBC the resulting whole-project water usage data for a five-year period beginning on the date the project accepts LEED certification or typical occupancy, whichever comes first. The commitment must carry forward for five years or until the building changes ownership or lessee.

COMMENTARY / RECOMMENDATIONS

All projects will have a water meter on the service that reports to the Building Automation System (BAS), and the Energy Office then reports utility use to USGBC.

There are no changes to this prerequisite in LEED v4.1.

WE OUTDOOR WATER USE REDUCTION

Y	Y?	?	N			
2				Credit	Design Phase	**2**

INTENT

To reduce outdoor water consumption.

LEED REQUIREMENTS AND OPTIONS

Reduce outdoor water use through one of the following options. Non-vegetated surfaces, such as permeable or impermeable pavement, should be excluded from the landscape area calculations. Athletic fields and playgrounds (if vegetated) and food gardens may be included or excluded at the project team's discretion.

Option 1: No irrigation required (2 points) - Show that the landscape does not require a permanent irrigation system beyond a maximum two-year establishment period.

Option 2: Reduced irrigation (1 point for compliance, 2 points for 100% reduction) - Reduce the project's landscape water requirement (LWR) by at least 50% from the calculated baseline for the site's peak watering month. Reductions must be achieved through plant species selection and irrigation system efficiency, as calculated by the Environmental Protection Agency (EPA) WaterSense Water Budget Tool. Additional reductions beyond 30% may be achieved using any combination of efficiency, alternative water sources, and smart scheduling technologies.

COMMENTARY / RECOMMENDATIONS

City projects do not typically include landscape irrigation, which earns two points for this credit.

There are no changes to this prerequisite in LEED v4.1.

WE INDOOR WATER USE REDUCTION

Y	Y?	?	N			
2	1	1	2	Credit	Design Phase	**6**

INTENT

To reduce indoor water consumption.

LEED REQUIREMENTS AND OPTIONS

Further reduce fixture and fitting water use from the calculated baseline in WEp2 Indoor Water Use Reduction. Additional potable water savings can be earned above the prerequisite level using alternative water sources. Include fixtures and fittings necessary to meet the needs of the occupants. Some of these fittings and fixtures may be outside the project boundary. One (1) point for 25% reduction, (2) for 30%, (3) for 35%, etc.

COMMENTARY / RECOMMENDATIONS

DPP projects have been earning (2) points with manual fixtures. DPP has recently adopted hard-wired, sensor-operate fixtures, which may increase the number of achievable points. See Owner's Project Requirements for current fixtures.

In LEED v4.1, appliance and process water requirements are established for various pieces of equipment, including commercial washing machines, commercial kitchen equipment, lab and medical equipment, and municipal steam systems. Consult the LEED 4.1 Manual for more information.

WE COOLING TOWER WATER USE

Y	Y?	?	N			
		2		Credit	Design Phase	**2**

INTENT

To conserve water used for cooling tower makeup while controlling microbes, corrosion, and scale in the condenser water system.

LEED REQUIREMENTS AND OPTIONS

See LEED guide for full details.

COMMENTARY / RECOMMENDATIONS

Not applicable for majority of projects.

Ensure cooling towers are included in water treatment contract.

In LEED v4.1 this credit has been replaced with “Optimize Process Water Use,” and the credit was expanded to include other process water uses besides cooling towers. Consult the LEED 4.1 Manual for more information.

WE WATER METERING

Y	Y?	?	N			
1				Credit	Construction Phase	**1**

INTENT

To support water management and identify opportunities for additional water savings by tracking water consumption.

LEED REQUIREMENTS AND OPTIONS

Install permanent water meters for two or more of the following water subsystems, as applicable to the project: Irrigation, Indoor plumbing fixtures and fittings, Domestic hot water, Boiler, Reclaimed water, other processes. See LEED guide for additional details.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to most projects. Water sub-meters are a good method for detecting leaks and excessive or unexpected use. If included, water sub-meters should report the to the BAS system.

LEED v4.1 requires permanent water meters for two or more of the listed subsystems, as applicable to the project, including: irrigation, indoor plumbing fixtures, domestic hot water, boilers, reclaimed water, and other process water. Consult the LEED 4.1 Manual for more information.

ENERGY AND ATMOSPHERE (EA)

Y	Y?	?	N	
6	15	10	2	**33**

WHY IS ENERGY USE AND THE ATMOSPHERE IMPORTANT?

These days, the global importance of climate change needs no introduction. Drastic and rapid reduction of carbon emissions is necessary to reduce future climate changes, and those reductions can only be accomplished through reductions in energy usage and a transition to clean energy.

In the last twenty years alone, Philadelphia has experienced extreme snow, rain, wind, and fifty record high temperature days. Reducing global climate change will reduce local climate change. The City has committed to do its part through reductions in both energy use and carbon emissions – reduce greenhouse gas emissions from City operations 50% by 2030, reduce energy use by 20% by 2030, and full carbon neutrality by 2050.

Municipal buildings supported by the General Fund account for approximately $20 million in annual energy costs. The Office of Sustainability's *Growing Stronger: Towards a Climate Ready Philadelphia* report expects climate change to increase annual electricity costs by up to $1 million due to increased demand for air conditioning. The heating and lighting systems that drive building use energy are the systems that need the most maintenance and cause the most employee complaints when they fail to function properly. Energy efficiency measures then have the potential to also reduce maintenance costs while increasing employee satisfaction.

WHAT IS THE CITY DOING ALREADY?

The Office of Sustainability has led several projects that improve building energy efficiency for both public and private construction in Philadelphia. The office successfully lobbied at the state level to adopt the 2018 International Energy Conservation Code (2018 IECC). The 2018 IECC is a leap ahead of the previous Pennsylvania building code and will increase energy efficiency across new construction. The Office of Sustainability also oversees a city-wide Building Energy Performance Policy for non-residential buildings over 50,000 square feet.

The City of Philadelphia has also made significant progress and is on track to reach 2030 climate goals for municipal operations. The Office of Sustainability developed a Municipal Energy Master Plan and a Climate Action Playbook. The 2021 update to the Municipal Energy Master Plan, which uses 2019 data, shows a 39% reduction in greenhouse gas emissions from the 2006 baseline. A renewable energy purchasing contract to build a large solar farm in Adams County Pennsylvania will allow the City to purchase solar electricity more efficiently than by installing and maintaining solar panels locally.

DPP has supported the Office of Sustainability in multiple energy efficiency projects, from lighting replacements to a large-scale energy efficiency contract project at the Philadelphia Museum of Art that was completed recently and will be paid for with the savings it generates. The One Parkway office building became the City's first EnergyStar building, and the warehouse at 660 E Erie Avenue is close to certification.

The Office of Sustainability's Building Monitoring Program is helping buildings with early stages of continuous commissioning. The Office of Sustainability currently monitors building activity for the City's four largest downtown buildings and communicates with operations personnel to reduce energy waste, troubleshoot building controls, and highlight operations practices that need attention. (Municipal Energy Master Plan 2017). Larger new

capital projects with building automation systems (BAS) that control HVAC and related building systems will be able to participate in an expansion of the Building Monitoring Program.

Since the 2009 ordinance requiring major capital projects to attain LEED Silver certification, the Department of Public Property (DPP) has built or renovated five LEED buildings, with four more in various stages of design or construction. Although not eligible for LEED, HVAC and roof insulation projects are also reducing building energy use.

NEXT STEPS

- Continue comprehensive retrofit projects that use integrated design to make cost-effective whole-building improvements.
- Continue to include exterior insulation in building renovations.
- Research how the building retrofit process can be taken to the next level as high-performance building envelope technology becomes more mainstream.
- Non-capital system component replacements should meet the same standards as capital-funded projects. For example, require all replacement equipment to be EnergyStar.
- Improve the department's capacity to maintain new mechanical systems.
- Improve preventative system maintenance to reduce energy use and increase occupant satisfaction.

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
    - Current Philadelphia building code meets minimum energy performance. The fundamental refrigerant management prerequisite forbids the use of CFC refrigerants. These have been banned in new buildings in the US, but may be found in some existing older buildings, and should be replaced wherever possible.
    - Fundamental commissioning is a valuable component of an integrated design process, especially when started early in the design, and is recommended on all projects with mechanical or building envelope components.
- Credits
    - Recent projects have earned between 10 and 18 points out of 33 possible in this category.
- Priorities
    - This is the most important credit category and offers the most opportunity to increase the project certification level. Energy use reduction was the primary objective of the original LEED council ordinance and is essential to meeting the city's climate goals. It also has the benefit of reducing future operating costs and increasing occupant comfort.
- Challenges
    - Maintenance of mechanical systems.

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EA FUNDAMENTAL COMMISSIONING AND VERIFICATION

Y	Pre Req	Design Phase	Required

INTENT

To support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

LEED REQUIREMENTS AND OPTIONS

Complete the commissioning (Cx) process activities listed in the LEED manual for mechanical, electrical, plumbing, and renewable energy systems and assemblies, in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1-2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

A commissioning authority (CxA) must review the OPR and BOD no later than during the design development phase, then meet the requirements of the Cx process detailed in the LEED manual. LEED sets specific qualifications for the CxA, who must be a qualified employee of the owner, an independent consultant, or an employee of the design or construction firm who is not part of the project's design or construction team, or a disinterested subcontractor of the design or construction team.

The CxA prepares and maintains a current facilities requirements and operations and maintenance (O&M) plan that contains the information necessary to operate the building efficiently. Required elements of this plan are detailed in the LEED Manual.

COMMENTARY / RECOMMENDATIONS

The IECC 2018 code and the City of Philadelphia building code include many of the requirements for this credit, but do not include the same level of detail for Cx activities, CxA qualifications, and O&M plan requirements as stated in LEED. See code comparison for a detailed list of requirements.

A third-party CxA adds a valuable additional quality check during design and construction and is recommended for projects that included mechanical systems. The O&M plan for future operations required by this prerequisite should be standard on all City projects. An OPR template is available through DPP.

This prerequisite requires the commissioning agent to be involved in the project from early in the design phase, which must be factored into the design contracting process. They also must review the envelope design during the design process to meet the prerequisite, even when enhanced envelope commissioning is not being pursued. This has been valuable at catching design issues on previous projects, particularly thermal bridging.

This prerequisite is virtually unchanged in LEED v4.1.

See EA # Enhanced Commissioning for more information. The CxA requirements are different if the Enhanced Commissioning credit is pursued.

EA MINIMUM ENERGY PERFORMANCE

Y	Pre Req	Design Phase	Required

INTENT

To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

LEED REQUIREMENTS AND OPTIONS

LEED offers three compliance options:

Option 1. Whole-building energy simulation

> Demonstrate an improvement of 5% for new construction, 3% for major renovations, or 2% for core and shell projects in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to ANSI/ASHRAE/IESNA Standard 90.1–2010, Appendix G, with errata, using a simulation model.

Options 2 and 3 are prescriptive compliance pathways. See LEED manual for full details of all three paths.

COMMENTARY / RECOMMENDATIONS

2018 International Energy Conservation Code (IECC) exceeds the prerequisite requirements.

Basic energy models should be used early in the design process as a tool to evaluate multiple options that might include building orientation, insulation, mechanical systems, windows, shading devices, or others. They are not intended only as documentation of a completed design.

The Minimum Energy Performance Calculator spreadsheet that accompanies this credit includes the following list of approved software: EnergyPlus, EnergyPro, eQUEST, HAP, IES, Trace. These softwares are the most common, but others may be approved on a case-by-case basis. According to ASHRAE 90.1 Appendix G, the simulation software must be able to explicitly model the following:

1. 8,760 hours per year, hourly variations in occupancy and equipment schedules, thermal mass effects, ten or more thermal zones, part-load performance curves and capacity/efficiency curves for mechanical equipment, air-side economizer
2. It must also be able to produce hourly reports, perform design load calculations according to standard calculation procedures, be tested according to ASHRAE Standard 140, and include hourly climatic data.

LEED does not require the modeler to submit design documents, but it is good practice for all models to be reviewed against the design drawings and specifications, which should ideally be submitted with the model.

In LEED v4.1, the only way to meet the requirements of this prerequisite are to comply with ANSI/ASHRAE/IESNA Standard 90.1–2016, with errata or a USGBC-approved equivalent standard. See the LEED v4.1 manual for more details.

See EA # Optimize Energy Performance for more information.

EA BUILDING-LEVEL ENERGY METERING

Y	Pre Req	Design Phase	Required

INTENT

To support energy management and identify opportunities for additional energy savings by tracking building-level energy.

LEED REQUIREMENTS AND OPTIONS

Install new or use existing building-level energy meters, or submeters that can be aggregated to provide building-level data representing total building energy consumption (electricity, natural gas, chilled water, steam, fuel oil, propane, biomass, etc.). Utility owned meters capable of aggregating building-level resource use are acceptable.

Commit to sharing with USGBC the resulting energy consumption data and electrical demand data (if metered) for a five-year period beginning on the date the project accepts LEED certification. At a minimum, energy consumption must be tracked at one-month intervals. The commitment must carry forward for five years or until the building changes ownership or lessee.

COMMENTARY / RECOMMENDATIONS

Building-level utility meters are standard on all City buildings. The Energy Office reports building-level data to USGBC.

There are no changes to this prerequisite in LEED v4.1.

See EA # Advanced Energy Metering for more information.

EA FUNDAMENTAL REFRIGERANT MANAGEMENT

Y	Pre Req	Design Phase	Required

INTENT

To reduce stratospheric ozone depletion.

LEED REQUIREMENTS AND OPTIONS

Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems. When reusing existing HVAC&R equipment, complete a comprehensive CFC phase-out conversion before project completion. Phase-out plans extending beyond the project completion date will be considered on their merits. Existing small HVAC&R units (defined as containing less than 0.5 lb of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 lbs. of refrigerant, are exempt.

This prerequisite is virtually unchanged in LEED v4.1.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects.

See EA # Enhanced Refrigerant Management for more information.

EA ENHANCED COMMISSIONING

Y	Y?	?	N			
3	1	2		Credit	Design Phase	6

INTENT

To further support the design, construction, and eventual operation of a project that meets the owner's project requirements for energy, water, indoor environmental quality, and durability.

LEED REQUIREMENTS AND OPTIONS

Option 1: Enhanced Commissioning (3-4 points)

Path 1: Enhanced Commissioning (3 points)

Complete the commissioning process (CxP) activities detailed in the LEED manual for mechanical, electrical, plumbing, and renewable energy systems and assemblies in accordance with the guidelines detailed in the LEED Manual. Include all enhanced commissioning tasks in the OPR and BOD.

Path 2: Enhance and Monitoring-Based Commissioning (4 points)

Achieve Path 1 AND

Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems. Include the procedures and measurement points in the commissioning plan. Address the elements detailed in the LEED Manual.

Option 2: Envelope Commissioning (2 points)

Fulfill the requirements in EAp1 Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies. AND Complete the commissioning process (CxP) activities for the building's thermal envelope including the required items listed in the LEED Manual.

Refer to the LEED manual for full details, including qualifications and requirements for the commissioning agent.

This credit is virtually unchanged in LEED v4.1.

COMMENTARY / RECOMMENDATIONS

Option 1, Path 1 Enhanced Commissioning – This compliance path should be applied to all projects. Third party review or submittals adds a valuable additional quality check during design and construction. An ongoing commissioning plan for future operations will benefit the project and future maintenace.

Option 1, Path 2 Monitoring-based Commissioning - This compliance path is recommended for larger projects, and required for those over 50,000 square feet to meet the City's building monitoring ordinance. Review potential projects with the Energy Office.

Option 2 Envelope Commissioning – This option can be considered for projects with a substantial envelope component.

EA OPTIMIZE ENERGY PERFORMANCE

Y	Y?	?	N			
2	14	2		Credit	Design Phase	**18**

INTENT

To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use.

LEED REQUIREMENTS AND OPTIONS

Establish an energy performance target no later than the schematic design phase.

Option 1: Whole-Building Energy Simulation (Up to 18 points)

Analyze efficiency measures during the design process and account for the results in design decision making. Use energy simulation of efficiency opportunities, past energy simulation analyses for similar buildings, or published data (e.g. Advanced Energy Design Guides) from analyses for similar buildings.

Analyze efficiency measures, focusing on load reduction and HVAC-related strategies (passive measures are acceptable) appropriate for the facility. Project potential energy savings and holistic project cost implications related to all affected systems.

Option 2: Prescriptive compliance (Up to 6 points)

Available if Option 2 was used to meet Prerequisite 2 Minimum Energy Performance.

See LEED manual for full details.

LEED v4.1 makes some changes to the Whole Building Energy Simulation option.

COMMENTARY / RECOMMENDATIONS

The whole building energy simulation required for this credit is a requirement of IECC 2018. Current 2018 energy code requirements are an 8% energy savings over the baseline used by LEED and will earn 2 points for new construction and 3 points for major renovations. This may be the single most important LEED credit available to projects and should be a primary focus for achieving additional points.

Recent Public Safety projects have been able to achieve between 7 and 14 points with mainstream insulation and mechanical systems. It may be worth exploring strategies that use very high levels of insulation to reduce mechanical system sizes on future projects.

The use of energy modeling during the design process to evaluate design decisions is highly encouraged as it produces better and more cost-effective outcomes. This should be included in the design Request for Proposals to ensure that designers include multiple models in their proposals. ENERGY STAR's Target Finder tool is useful for comparing model results to real-world buildings.

REFERENCES / APPENDICIES

See the Owners Project Requirements document for additional information.

EA ADVANCED ENERGY METERING

Y	Y?	?	N			
1				Credit	Design Phase	1

INTENT

To support energy management and identify opportunities for additional energy savings by tracking building-level and system-level energy use.

LEED REQUIREMENTS AND OPTIONS

Install advanced energy meters for the following:

- All whole-building energy sources used by the building
- Any individual energy end uses that represent 10% or more of the total annual consumption of the building

The advanced energy metering must have the following characteristics:

- Meters must be permanently installed, record at intervals of one hour or less, and transmit data to a remote location
- Electricity meters must record both consumption and demand. Whole-building electricity meters should record the power factor, if applicable.
- The data collection system must use a local area network, building automation system, wireless network, or comparable communication infrastructure.
- The system must be capable of storing all meter data for at least 36 months.
- The data must be remotely accessible.
- All meters in the system must be capable of reporting hourly, daily, monthly, and annual energy use.

COMMENTARY / RECOMMENDATIONS

Advanced energy metering should be applied to all projects. According to current building and energy code, exterior lighting, interior lighting, plug loads, and HVAC must be sub-metered. The only meters required above code to meet this credit are typically submeters for hot water and heating systems. Electric vehicle chargers are to be sub-metered to allow their usage to be monitored separately from the building's.

All meters and sub-meters should report to the BAS system. See the Owner's Project Requirements Appendix E *Building HVAC Controls Guidelines for New and Existing Buildings* for BAS connection requirements. Consult with the Energy Office for more specific meter requirements. This may require coordination with the City's Office of Innovation and Technology (OIT) for connections to the network

There are no changes to this credit in LEED v4.1.

EA DEMAND RESPONSE

Y	Y?	?	N			
			2	Credit	Construction Phase	2

INTENT

To increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions.

LEED REQUIREMENTS AND OPTIONS

Design building and equipment for participation in demand response programs through load shedding or shifting. On-site electricity generation does not meet the intent of this credit.

Case 1: Demand response program available (2)

- Participate in an existing demand response (DR) program and complete the following activities. Design a system with the capability for real-time, fully automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice.
- Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multiyear renewal, for at least 10% of the estimated peak electricity demand. Peak demand is determined under EAp2 Minimum Energy Performance.
- Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event.
- Include the DR processes in the scope of work for the commissioning authority, including participation in at least one full test of the DR plan.

Case 2: Demand response program not available (1)

- Not applicable, PECO has a demand response program.

COMMENTARY / RECOMMENDATIONS

The Energy Office works closely with PECO. Participation in PECO's demand response program is not sought for buildings under 50,000 ft^2.

Consult with the Energy Office if your project is larger than 50,000 ft^2 and you would like to consider earning this credit.

This credit is eliminated in v4.1.

EA RENEWABLE ENERGY PRODUCTION

Y	Y?	?	N			
		3		Credit	Design Phase	**3**

INTENT

To reduce the environmental and economic harms associated with fossil fuel energy by increasing self-supply of renewable energy.

LEED REQUIREMENTS AND OPTIONS

Use renewable energy systems to offset building energy costs. Calculate the percentage of renewable energy with the following equation:

$$\% \text{ renewable energy} = \frac{\text{(Equivalent cost of usable energy produced by the renewable energy system)}}{\text{(Total building annual energy cost)}}$$

Use the building's annual energy cost, calculated in EAp2 Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use and cost.

The use of solar gardens or community renewable energy systems is allowed if both of the following requirements are met:

- The project owns the system or has signed a lease agreement for a period of at least 10 years.
- The system is located with the same utility service area as the facility claiming the use.

Credit is based on the percentage of ownership or percentage of use assigned in the lease agreement.

COMMENTARY / RECOMMENDATIONS

On-site renewable energy has been evaluated by the Energy Office and is not cost-effective except on very large projects.

Contact the Energy Office if the building is very large and you believe it would be a good candidate for an on-site renewable energy project.

In LEED v4.1, this credit is called “Renewable Energy,” and tiers are developed to award credits based on the characteristics of the project’s renewable energy. See the LEED v4.1 manual for more information.

See EA # Green Power and Carbon Offsets for more information about clean energy opportunities through LEED.

EA ENHANCED REFRIGERANT MANAGEMENT

Y	Y?	?	N			
		1		Credit	Design Phase	**1**

INTENT

To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.

LEED REQUIREMENTS AND OPTIONS

Opt 1: No refrigerants or low-impact refrigerants (1)

Do not use refrigerants, or use only refrigerants (naturally occurring or synthetic) that have an ozone depletion potential (ODP) of zero and a global warming potential (GWP) of less than 50.

Opt 2: Calculation of refrigerant impact (1)

Select refrigerants that are used in heating, ventilation, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The combination of all new and existing base building and tenant HVAC&R equipment that serve the project must comply with the formula provided in the guide.

COMMENTARY / RECOMMENDATIONS

This credit is virtually unchanged in LEED v4.1.

EA GREEN POWER AND CARBON OFFSETS

Y	Y?	?	N			
		2		Credit	Construction Phase	**2**

INTENT

To encourage the reduction of greenhouse gas emissions through the use of grid-source, renewable energy technologies and carbon mitigation projects.

LEED REQUIREMENTS AND OPTIONS

Engage in a contract for qualified resources that have come online since January 1, 2005, for a minimum of five years, to be delivered at least annually. The contract must specific the provision of at least 50% or 100% of the project's energy from green power, carbon offsets, or renewable energy certificates (RECs). Green power and RECs must be Green-e Energy certified or the equivalent. RECs can only be used to mitigate the effects of Scope 2, electricity use. Carbon offsets may be used to mitigate Scope 1 or Scope 2 emissions on a metric ton of carbon dioxide-equivalent basis and must be Green-e Climate certified, or the equivalent. The offsets must be from greenhouse gas emissions reduction projects within the U.S. Determine the percentage of green power or offsets based on the quantity of energy consumer, not the cost. Use the project's annual energy consumption, calculated in EAp2 Minimum Energy Performance, if Option 1 was pursued; otherwise use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database to estimate energy use.

COMMENTARY / RECOMMENDATIONS

Modifications to building designs concerning energy should be prioritized above purchasing green energy or carbon offsets. Green energy and carbon offsets can be purchased down the road, whereas building design will last the lifetime of the building systems. Renewable Energy Credits may be available for projects that will meet or exceed Gold certification if other energy efficiency and electrification options have also been pursued.

In LEED v4.1, this credit has been replaced with a credit called “Grid Harmonization” to increase participation in demand response technologies and programs that make energy generation and distribution systems more efficient, increase grid reliability, and reduce greenhouse gas emissions. See the LEED v4.1 manual for more information about this new credit.

MATERIALS AND RESOURCES (MR)

Y	Y?	?	N	
5	4	2	3	**13**

WHY MATERIALS AND RESOURCES IMPORTANT?

This credit category addresses construction waste, recycling within the building by occupants, and building life-cycle impacts. The materials that make up buildings can be very energy- and carbon-intensive through their extraction, manufacture, and transportation. At the other end of the building life cycle, demolition and construction waste are large contributors to waste streams.

The City's Zero Waste and Litter plan aims to reduce the waste produced by the city as a whole to near—zero by 2035. More immediately, reducing wastes at all project stages reduces costs to the city. With the high cost of public construction, design that takes a life-cycle approach optimizes the use of existing building assets and ensures our buildings will serve well into the future.

WHAT IS THE CITY DOING ALREADY?

The Zero Waste and Litter plan outlines city-wide strategies to reduce construction waste and increase recycling.

The Department of Public Property builds very few entirely new buildings. There's a saying that "the greenest building is the one that already exists" and most capital projects are renovations of existing buildings. A large proportion of City buildings are 1940s and 50s, and many are older. Materials are not seen as disposable - building renovations are designed to perform well after decades under heavy use, and buildings are expected to last through multiple renovation cycles.

NEXT STEPS

- Coordinate and standardize materials with Maintenance procurement contracts and the Real Estate team.
- Systematically research regularly used materials and upgrade for sustainability and performance.
- Improve recycling by building users.
- Coordinate standard specifications with LEED credit requirements.

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
  - Minimal effort beyond existing policies is required to comply with the prerequisites.
- Credits
  - DPP projects typically earn 9+ points in this category
- Priorities
  - Durability and east of maintenance.
- Challenges
  - City bidding laws prevent the use of products that are only available from a single supplier.
  - Recycling practices do not always live up to recycling policies.

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MR STORAGE AND COLLECTION OF RECYCLABLES

Y	Pre Req	Design Phase	Required

INTENT

To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.

LEED REQUIREMENTS AND OPTIONS

Provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Collection and storage areas may be separate locations. Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals. Take appropriate measures for the safe collection, storage, and disposal of two of the following: batteries, mercury-containing lamps, and electronic waste.

COMMENTARY / RECOMMENDATIONS

Existing City policies comply with this prerequisite. Executive Order 5-96, which established a recycling policy for municipal buildings and employees, requires all municipal buildings to offer recycling to employees and constituents.

There are no changes to this prerequisite in LEED v4.1.

APPENDICIES

City recycling and waste policy.

MR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT PLANNING

Y		Pre Req	Design Phase	Required

INTENT

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

LEED REQUIREMENTS AND OPTIONS

Develop and implement a construction and demolition waste management plan:

- Establish waste diversion goals for the project by identifying at least five materials (both structural and nonstructural) targeted for diversion. Approximate a percentage of the overall project waste that these materials represent.
- Specify whether materials will be separated or comingled and describe the diversion strategies planned for the project. Describe where the material will be taken and how the recycling facility will process the material.

Provide a final report detailing all major waste streams generated, including disposal and diversion rates.

COMMENTARY / RECOMMENDATIONS

This prerequisite should be applied to all projects as part of the City's overall waste-reduction goals.

DPP standard specification section 017419 Construction Waste Management and Disposal requires contractors to "Develop waste management plan that results in end-of-Project minimum rates for salvage/recycling of 75 percent by weight of total waste generated by the Work." Contractors must also identify materials targeted for salvage and recycling.

This prerequisite is eliminated in LEED v4.1.

See MR # Construction and Demolition Waste Management.

MR BUILDING LIFE-CYCLE IMPACT REDUCTION

Y	Y?	?	N			
2	2	1		Credit	Design Phase	**5**

INTENT

To encourage adaptive reuse and optimize the environmental performance of products and materials.

LEED REQUIREMENTS AND OPTIONS

Demonstrate reduced environmental effects during initial project decision-making by reusing existing building resources or demonstrating a reduction in materials use through life-cycle assessment.

Option 1: Historic Building Reuse (5 points)

Maintain the existing building structure, envelope, and interior nonstructural elements of a historic building or contributing building in a historic district. To qualify, the building or historic district must be listed or eligible for listing in the local, state, or national register of historic places. Do not demolish any part of a historic building or contributing building in a historic district unless it is deemed structurally unsound or hazardous. Any alteration (preservation, restoration, or rehabilitation) of a historic building or a contributing building in a historic district on the project site must be done in accordance with local or national standards for rehabilitation, whichever are applicable. See manual for additional information.

Option 2: Renovation of Abandoned or Blighted Building (5 points)

Maintain at least 50%, by surface area, of the existing building structure, enclosure, and interior structural elements for buildings that meet local criteria of abandoned or are considered blight. The building must be renovated to a state of productive occupancy. Up to 25% of the building surface area may be excluded from credit calculation because of deterioration or damage.

Option 3: Building and Material Reuse (2-4 points)

Reuse or salvage building materials from off site or on site as a percentage of the surface area. Include structural elements (e.g. floors, roof decking), enclosure materials (e.g. skin, framing), and permanently installed interior elements (e.g. walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project.

COMMENTARY / RECOMMENDATIONS

The majority of City projects are renovations of existing buildings and should earn points from this credit. Building reuse reduces costs, waste, new material use, and contributes to neighborhood quality. A report by the US National Trust for Historic Preservation in 2016[1] found, through a series of case studies, that "it takes between 10 and 80 years for a new building that is 30 per cent more efficient than an average-performing existing building to overcome, through efficient operations, the negative climate change impacts related to the construction process."

There are some changes to this credit in LEED v4.1, including the addition of an option to submit a building life cycle assessment. See the LEED v4.1 manual for more information.

[1] Frey, P. (Ed.). (2016). *The Greenest building: Quantifying the environmental Value of building reuse* (Rep.). Washington, DC: Preservation Green Lab, National Trust for Historic Preservation. Retrieved from https://forum.savingplaces.org/connect/community-home/librarydocuments

MR BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – ENVIRONMENTAL PRODUCT DECLARATIONS

Y	Y?	?	N			
1			1	Credit	Construction Phase	2

INTENT

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

LEED REQUIREMENTS AND OPTIONS

Option 1. Environmental Product Declaration (EPD) (1 point)

Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the listed disclosure criteria. Note that v4.0 and v4.1 have slightly different criteria and are both options.

Option 2. Multi-Attribute Optimization (1 point)

v4.0: Use products that comply with one of the criteria listed for 50%, by cost, of the total value of permanently installed products in the project.

For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at 200% of their base contributing cost.

In LEED v4.1, this credit is called “Environmental Product Declarations”

Use products that comply with one of the criteria below for 10%, by cost, of the total value of permanently installed products in the project, or use at least 10 permanently installed products sourced from at least three different manufacturers. Products will be valued as below.

- Life Cycle Impact Reduction Action Plan (value at 50% by cost or ½ product)
- Life Cycle Impact Reductions in Embodied Carbon.
- USGBC approved program -- Products that comply with other USGBC approved multi-attribute frameworks. For credit achievement calculation, products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site are valued at twice their base contributing cost (or number of products), up to a maximum of 200% of cost, or 2 products.

See LEED Guide for full details on each option.

COMMENTARY / RECOMMENDATIONS

Recent Public Safety projects are on track to earn one point towards this credit using Option 1 under v4.1. Project material spreadsheets are available.

In LEED v4.1, this credit is included in the new credit, “Environmental Product Declarations.” See the LEED v4.1 manual for more information.

MR BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – SOURCING OF RAW MATERIALS

Y	Y?	?	N			
	1		1	Credit	Construction Phase	**2**

INTENT

To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

LEED REQUIREMENTS AND OPTIONS

Option 1. Raw Material Source and Extraction Reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that have publicly released a report from their raw material suppliers which include raw material supplier extraction locations, a commitment to long-term ecologically responsible land use, a commitment to reducing environmental harms from extraction and/or manufacturing processes, and a commitment to meeting applicable standards or programs voluntarily that address responsible sourcing criteria.

AND/OR

Option 2. Leadership Extraction Practices (1 point)

Use products that meet at least one of the responsible extraction criteria for at least 25%, by cost, of the total value of permanently installed building products in the project.

In LEED v4.1, this credit is called “Sourcing of Raw Materials”

Use products sourced from at least three different manufacturers that meet at least one of the responsible sourcing and extraction criteria below for at least 20%, by cost, of the total value of permanently installed building products in the project (1 point).

Use products sourced from at least five different manufacturers that meet at least one of the responsible sourcing and extraction criteria below for at least 40%, by cost, of the total value of permanently installed building products in the project (2 points).

See LEED manual for additional details.

COMMENTARY / RECOMMENDATIONS

Recent Public Safety projects are on track to earn one point towards this credit using v4.1. Project material spreadsheets are available.

MR BUILDING PRODUCT DISCLOSURE AND OPTIMIZATION – MATERIAL INGREDIENTS

Y	Y?	?	N			
	1		1	Credit	Construction Phase	**2**

INTENT

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

LEED REQUIREMENTS AND OPTIONS

Option 1. Material ingredient reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product

AND/OR

Option 2. Multi-attribute optimization (1 point)

Use products that document their material ingredient optimization using the paths below for at least 25%, by cost, of the total value of permanently installed products in the project.

In LEED v4.1, this credit is called “Material Ingredients.”

Option 1. Material Ingredient Reporting (1 point)

Use at least 20 different permanently installed products from at least five different manufacturers that use any of the listed programs to demonstrate the chemical inventory of the product

AND/OR

Option 2: Material Ingredient Optimization (1 point)

Use permanently installed products from at least three different manufacturers that document their material ingredient optimization using the paths detailed in the manual. Choose either 10 compliant products, or select products that constitute at least 10%, by cost, of the total value of permanently installed products in the project.

See LEED Guide for full details.

COMMENTARY / RECOMMENDATIONS

Recent Public Safety projects are on track to earn one point towards this credit using Option 1 under v4.1. Project material spreadsheets are available.

MR CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Y	Y?	?	N			
2		1		Credit	Construction Phase	**2**

INTENT

To reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.

LEED REQUIREMENTS AND OPTIONS

Recycle and/or salvage nonhazardous construction and demolition materials. Calculations can be by weight or volume but must be consistent throughout. Exclude excavated soil, and land-clearing debris from calculation. Include materials destined for alternative daily cover (ADC) in the calculations as waste (not diversion). Include wood waste converted to fuel (biofuel) in the calculations; other types of waste-to-energy are not considered diversion for this credit. However, for projects that cannot meet credit requirements using reuse and recycling methods, waste-to-energy systems may be considered waste diversion if the European Commission Waste Framework Directive 2008/98/EC and Waste Incineration Direction 200/76/EC are followed and Waste to Energy facilities meet applicable European Committee for Standardization (CEN) EN 303 standards.

Option 1. Diversion (1-2 points)

Path 1: Divert 50% and Three Material Streams (1 point)

- Divert at least 50% of the total construction and demolition material; diverted materials must include at least three material streams.

Path 2: Divert 75% of Four Material Streams (2 points)

- Divert at least 75% of the total construction and demolition material; diverted materials must include at least four material streams.

Option 2: Reduction of Total Waste Material (2 points)

Do not generate more than 2.5 pounds of construction waste per square foot of the building's floor area.

Exemplary Performance: Achieve both Option 1 (either Path 1 or Path 2) and Option 2.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects as part of the City's overall waste-reduction goals. Several local waste, recycling, and recovery companies divert a large portion of the material they take and readily provide LEED documentation. The exact percentage of construction waste that can be diverted has varied over the last few years due to larger market conditions, but recent projects have been able to achieve at least one point.

Some minor changes have been made to the requirements for this credit in LEED v4.1. See the manual for more information.

INDOOR ENVIRONMENTAL QUALITY (EQ)

Y	Y?	?	N	
9	4	1	2	**16**

WHY IS INDOOR ENVIRONMENTAL QUALITY IMPORTANT?

The healthcare field has been researching how building design contributes to occupant health and well-being. Characteristics like light, views, sound, and air quality have measurable effects on employee performance and health. This research is regularly incorporated into the design of healthcare facilities, the US General Services Administration's building guidelines, and is now getting more widespread attention as companies realize the financial benefits.

The pandemic has further highlighted the importance of ventilation to reduce disease transmission, but there are many other potential benefits to indoor environmental quality. Better acoustics allow employees to focus more easily; comfortable temperatures increase employee comfort and reduce complaints; natural light and views reduce stress and can be particularly important for shift workers. These elements also have a large influence in public perceptions of a space, and in turn their experience in that space.

WHAT IS THE CITY DOING ALREADY?

The Office of Sustainability convened a Healthy Buildings Working Group with representatives from the Health Department, the Department of Public Property, PWD, Streets, and Parks & Recreation to coordinate and brainstorm opportunities to improve employee health through improvements to the City's own buildings. A pilot air testing program on the 13th floor of One Parkway Building, and efforts to increase tap water consumption and stair usage in City facilities grew out of this effort.

Lighting improvements through recent Office of Sustainability and Public Property partnerships have moved towards better light quality that reduces glare. Office cubicles available through the City's furniture contract include built-in task lighting and have low chemical emissions for better indoor air quality. Indoor air quality testing has also become standard for major construction projects prior to building occupancy.

NEXT STEPS

- Continue to standardize materials by coordinating with Maintenance division procurement contracts and the Real Estate team that handles interior renovations.
- Improve lighting design as more research becomes available on the best practices to mitigate the health impacts of shift work.
- Continue to explore and refine strategies to improve building acoustics.
- Improve access to daylight and views. Consider experimenting with tube skylights for daylight.
- See the US General Services Administration's Sustainable Facilities Tool website for more detailed recommendations for healthy buildings.
- See the Active Buildings Guide created by New York City through an interdisciplinary project with several departments, including the Department of Design & Construction. The guide is available to the public through the Center for Active Design and includes more detailed recommendations for creating buildings that encourage employee health.
- Survey effects of improved spaces on employee satisfaction, performance, and health.

SUMMARY OF SECTION CREDITS AND PRIORITIES

- Prerequisites
  - Existing policies and building codes comply with prerequisites.
- Credits
  - DPP projects can expect to earn between 9 and 13 points out of 16 possible in this category.
- Priorities
  - Low-maintenance actions with the largest impact on employee comfort.
- Challenges
  - Maintenance and durability.
  - Small existing buildings can limit layout options.

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EQ MINIMUM INDOOR AIR QUALITY PERFORMANCE

Y	Pre Req	Design Phase	Required

INTENT

To contribute to the comfort and well-being of building occupants by establishing minimum standards for indoor air quality (IAQ).

LEED REQUIREMENTS AND OPTIONS

Meet the requirements for both ventilation and monitoring.

Ventilation - ASHRAE Standard 62.1–2010

For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), determine the minimum outdoor air intake flow for mechanical ventilation systems using the ventilation rate procedure from ASHRAE 62.1–2010 or a local equivalent, whichever is more stringent. Meet the minimum requirements of ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a local equivalent, whichever is more stringent. The indoor air quality procedure defined in ASHRAE Standard 62.1–2010 may not be used to comply with this prerequisite. (see guide for naturally ventilated and mixed-mode systems)

Monitoring - Mechanically ventilated spaces

For mechanically ventilated spaces (and for mixed-mode systems when the mechanical ventilation is activated), monitor outdoor air intake flow as follows:

- For variable air volume systems, provide a direct outdoor airflow measurement device capable of measuring the minimum outdoor air intake flow. This device must measure the minimum outdoor air intake flow with an accuracy of +/–10% of the design minimum outdoor airflow rate, as defined by the ventilation requirements above. An alarm must indicate when the outdoor airflow value varies by 15% or more from the outdoor airflow setpoint.
- For constant-volume systems, balance outdoor airflow to the design minimum outdoor airflow rate defined by ASHRAE Standard 62.1–2010 (with errata), or higher. Install a current transducer on the supply fan, an airflow switch, or similar monitoring device.

COMMENTARY / RECOMMENDATIONS

The International Mechanical Code (IMC) 2018 specifies outdoor air intake flow rates in Table 4.3.1.1, which corresponds with the ventilation rate procedure in ASHRAE 62.1. Some required flow rates have changed since ASHRAE 62.1-2010, which is the version specified by this credit. Projects should double check ASHRAE 62.1-2010 to ensure that their rates are satisfactory for the prerequisite.

The prerequisite requires measurement devices and alarms for VAV systems. These measures are above code.

This prerequisite should be applied to all projects. Air quality is important for employee and public health.

In LEED v4.1, outdoor air monitors are required for mechanically vented systems. Some other changes have also been made. See the LEED v4.1 manual for more information.

See EQ # Enhanced Indoor Air Quality Strategies.

EQ ENVIRONMENTAL TOBACCO SMOKE CONTROL

Y	Pre Req	Design Phase	Required

INTENT

To prevent or minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke.

LEED REQUIREMENTS AND OPTIONS

Prohibit smoking inside the building. Prohibit smoking outside the building except in designated smoking areas located at least 25 feet (7.5 meters) from all entries, outdoor air intakes, and operable windows. Also prohibit smoking outside the property line in spaces used for business purposes. If the requirement to prohibit smoking within 25 feet (7.5 meters) cannot be implemented because of code, provide documentation of these regulations. Signage must be posted within 10 feet (3 meters) of all building entrances indicating the no-smoking policy.

COMMENTARY / RECOMMENDATIONS

City Policy requires smoking areas to be located at least 20 feet from all entries. LEED requires additional distance from and for air intakes and operable windows to be considered when designating smoking areas. USGBC requires a letter from the using agency documenting that each project will comply with the higher LEED requirements.

No significant applicable changes in v4.1.

APPENDICIES

Example template for smoking policy letter from using department commissioning.

EQ	ENHANCED INDOOR AIR QUALITY STRATEGIES				
Y	Y?	?	N		
2				Credit	Design Phase	2

INTENT

To promote occupants' comfort, well-being, and productivity by improving indoor air quality.

LEED REQUIREMENTS AND OPTIONS

Option 1: Enhanced IAQ Strategies (1 point)

Mechanically ventilated spaces (see guide for naturally ventilated and mixed-mode systems)

- Entryway systems. Install permanent entryway systems at least 10 feet long in the primary direction of travel to capture dirt and particulates entering the building at regularly used exterior entrances.
- Interior cross-contamination prevention. Sufficiently exhaust each space where hazardous gases or chemicals may be present of used (e.g. garages, housekeeping and laundry areas, copying and printing rooms). For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling.
- Filtration. Each ventilation system the supplies outdoor air to occupied spaces must have particle filters or air-cleaning devices that meet one of the following filtration media requirements:
    - MERV 13 or higher, in accordance with ASHRAE Standard 52.2-2007
    - Class F7 or higher as defined by CEN Standard EN 779-2002, Particulate Air Filters for General Ventilation, Determination of the Filtration Performance. Replace all air filtration media after completion of construction and before occupancy

Option 2: Additional Enhance IAQ Strategies (1 point)

Mechanically ventilated spaces should select at least one from the list below (see guide for naturally ventilated and mixed-mode systems)

- Exterior contamination prevention.
- Increased ventilation.
- Carbon dioxide monitoring.
- Additional source control and monitoring.

See LEED manual for full details.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects. Air quality has always been important for employee and public health, even more so now that it has become a key part of the pandemic response. According to the US General Services Administration's Sustainable Facilities Tool, "Ventilation above standard levels in particular has been associated with health and performance gains. Recent studies have found the health benefits of enhanced ventilation to exceed the per occupant costs of implementing them; they have also identified increases of worker cognitive performance of 61-101% under conditions of enhanced ventilation."

In LEED v4.1, the credit is rearranged and no longer broken down by types of spaces. There is only one option for compliance, where the project must comply with three strategies for one point or six strategies for two points. See the LEED v4.1 manual for more information.

EQ LOW-EMITTING MATERIALS

Y	Y?	?	N			
3				Credit	Construction Phase	3

INTENT

To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

LEED REQUIREMENTS AND OPTIONS

This credit includes requirements for product manufacturing as well as project teams. It covers volatile organic compound (VOC) emissions in the indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in seven categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials.

See LEED guide for calculation options.

COMMENTARY / RECOMMENDATIONS

This credit has been obtainable on previous projects and should be applied to all buildings to the extent possible. Air quality is important for employee and public health and satisfaction with spaces. Standard products have been selected with this credit in mind and material credit spreadsheets from previous projects are available.

See standard material and products in Owner's Project Requirements.

There are various changes to how points are awarded and how this credit is arranged in LEED v4.1. See the LEED v4.1 manual for more information.

EQ CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

Y	Y?	?	N			
1				Credit	Construction Phase	1

INTENT

To promote the well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation.

LEED REQUIREMENTS AND OPTIONS

Develop and implement an indoor air quality (IAQ) management plan for the construction and preoccupancy phases of the building.

The plan must address all of the following:

- During construction, meet or exceed all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 2nd edition, 2007, ANSI/SMACNA 008-2008, Chapter 3.
- Protect absorptive materials stored on-site and installed from moisture damage.
- Do not operate permanently installed air-handling equipment during construction unless filtration media with a MERV of 8, as determined by ASHRAE 52.2-2007, with errata, are installed at each return air grilled and return or transfer duct inlet opening such that there is no bypass around the filtration media. Immediately before occupancy, replace all filtration media with the final design filtration media, installed in accordance with the manufacturer's recommendations.
- Prohibit the use of tobacco products inside the building and within 25 feet of the building entrance during construction.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects. Air quality is important for employee and public health.

Create template construction specification.

There are no significant changes to this credit in v4.1.

EQ INDOOR AIR QUALITY ASSESSMENT

Y	Y?	?	N			
1	1			Credit	Construction Phase	**2**

INTENT

To establish better quality indoor air in the building after construction and during occupancy.

LEED REQUIREMENTS AND OPTIONS

Choose from two options:

- Option 1, Path 1: Flush-Out, Before Occupancy (1 point)
- Option 1, Path 2: Flush-Out, During Occupancy (1 point)
- Option 2: Air Testing (2 points)

See LEED Guide for full details.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects. Air quality is important for employee and public health.

Option 2 (Air Testing) is recommended. Option 1 (Flush Out) often requires supplemental ventilation and the building to be kept empty for a period of time that can be difficult to justify. Recent projects have passed air testing by a large margin, and test results can provide reassurance to employees.

In v4.1, two paths were developed to pursue Option 2, Air Testing. These paths are one point each and can be pursued together for a total of two points. Path 1 includes particulate matter testing and Path 2 includes VOC testing. See the LEED guide for more details.

EQ THERMAL COMFORT

Y	Y?	?	N			
	1			Credit	Design Phase	1

INTENT

To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

LEED REQUIREMENTS AND OPTIONS

Meet the requirements for both thermal comfort design and thermal comfort control.

Thermal Comfort Design

Design heating, ventilating, and air-conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2010, Thermal Comfort Conditions for Human Occupancy with errata or a local equivalent.

Thermal Comfort Control

Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multioccupant spaces. Thermal comfort controls allow occupants, whether in individual spaces or shared multioccupant spaces, to adjust at least one of the following in their local environment: air temperature, radiant temperature, air speed, and humidity.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects. Thermal comfort is a significant component of occupant satisfaction with the space and a leading cause of maintenance requests. Occupants who have some control over the temperature of their space are satisfied with a wider range of temperatures.

Other than updates to ASHRAE standards, there are no significant changes to this credit in v4.1.

APPENDICIES

Managing Director's Office temperature range memo

EQ INTERIOR LIGHTING

Y	Y?	?	N			
1	1			Credit	Design Phase	**2**

INTENT

To promote occupants' productivity, comfort, and well-being by providing high-quality lighting.

LEED REQUIREMENTS AND OPTIONS

Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Select one of the following three options. See Guide for full details and calculations.

Option 1. Simulation: Spatial Daylight Autonomy (2–3 points)

Demonstrate through annual computer simulations that spatial daylight autonomy of at least 55%, 75%, or 90% is achieved. Use regularly occupied floor area.

AND Demonstrate through annual computer simulations that annual sunlight exposure of no more than 10% is achieved.

Option 2. Simulation: Illuminance Calculations (1–2 points)

Demonstrate through computer modeling that illuminance levels will be between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox, for the floor area indicated in Table 2. Use regularly occupied floor area.

Option 3. Measurement (2-3 points)

Achieve illuminance levels between 300 lux and 3,000 lux for the floor area indicated:

- 75% of regularly occupied floor area - 2 points
- 90% of regularly occupied floor area - 3 points

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects to the extent possible to promote occupant comfort and productivity.

In LEED v4.1, four strategies are offered for compliance: glare control, color rendering, lighting control, and surface reflectivity. Meeting one strategy earns one point. Meeting three strategies earns two points. See the LEED guide for more details.

EQ				DAYLIGHT		
Y	Y?	?	N			
	1	1	1	Credit	Design Phase	3

INTENT

To connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space..

LEED REQUIREMENTS AND OPTIONS

Provide manual or automatic (with manual override) glare-control devices for all regularly occupied spaces. Select one of the following three options. See Guide for full details and calculations.

Option 1. Simulation: Spatial Daylight Autonomy (2–3 points)

Demonstrate through annual computer simulations that spatial daylight autonomy of at least 55%, 75%, or 90% is achieved. Use regularly occupied floor area.

AND Demonstrate through annual computer simulations that annual sunlight exposure of no more than 10% is achieved.

Option 2. Simulation: Illuminance Calculations (1–2 points)

Demonstrate through computer modeling that illuminance levels will be between 300 lux and 3,000 lux for 9 a.m. and 3 p.m., both on a clear-sky day at the equinox, for the floor area indicated in Table 2. Use regularly occupied floor area.

Option 3. Measurement (2-3 points)

Achieve illuminance levels between 300 lux and 3,000 lux for the floor area indicated:

75% of regularly occupied floor area - 2 points
90% of regularly occupied floor area - 3 points.

COMMENTARY / RECOMMENDATIONS

Apply to all projects to the extent possible. in addition to improving users' comfort and perceptions of a space, exposure to daylight has been shown to positively affect sleep, mood, and alertness due its relationship with circadian cycles.

Projects with detention spaces may have difficulty obtaining the point but the rest of the space should be designed to comply. Explore options to provide some daylight to detention spaces.

EQ	QUALITY VIEWS				
Y	Y?	?	N		
1				Credit	Design Phase	1

INTENT

To give building occupants a connection to the natural outdoor environment by providing quality views.

LEED REQUIREMENTS AND OPTIONS

Requirements for v4.0:

Achieve a direct line of sight to the outdoors via vision glazing for 75% of all regularly occupied floor area. View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort color balance. Additionally, 75% of all regularly occupied floor area must have at least two of the following four kinds of views:

1. Multiple lines of sight to vision glazing in different directions at least 90 degrees apart;
2. Views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing;
3. Unobstructed views located within the distance of three times the head height of the vision glazing; and
4. Views with a view factor of 3 or greater, as defined in "Windows and Offices; A Study of Office Worker Performance and the Indoor Environment."

Include in the calculations any permanent interior obstructions. Movable furniture and partitions may be excluded. Views into interior atria may be used to meet up to 30% of the required area.

Requirements for v4.1:

Provide occupants in the building with a view to the outdoor natural or urban environment for 75% of all regularly occupied floor area. Auditoriums, conference rooms dedicated to video conferencing, and gymnasiums may be excluded. Views into interior atria may be used to meet up to 30% of the required area.

Views must be through glass with a visible light transmittance (VLT) above 40%. If the glazing has frits, patterns, or tints the view must be preserved. Neutral gray, bronze, and blue-green tints are acceptable.

Views must include at least one of the following:

- nature, urban landmarks, or art; or
- objects at least 25 feet (7.5 meters) from the exterior of the glazing.

Occupants must have direct access to the view and be within three times the head height of the glazing.

COMMENTARY / RECOMMENDATIONS

This credit should be applied to all projects to the extent possible to promote occupant satisfaction and the health benefits of natural lighting.

Detention spaces make obtaining quality views difficult, but the rest of the space should be able to comply.

EQ ACOUSTIC PERFORMANCE

Y	Y?	?	N			
			1	Credit	Design Phase	**1**

INTENT

To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design.

LEED REQUIREMENTS AND OPTIONS

For all occupied spaces, meet the listed requirements, as applicable, for HVAC background noise, sound isolation, reverberation time, and sound reinforcement and masking. See Guide for full details.

COMMENTARY / RECOMMENDATIONS

This credit is difficult to obtain. An acoustician would be needed for credit documentation. However, it's important to employees' satisfaction and productivity. At minimum, consider the acoustics of the spaces and provide mitigation where possible. Consider acoustic panels on high sections of walls or other low-traffic areas where durability is less of a concern.

INNOVATION

Innovation credits are new credits USGBC is testing. Project teams are highly encouraged to select from the following innovation credits that have been identified as furthering city goals.

POTENTIAL CREDITS - RESILIENCE

Assessment and planning for resilience

Design for enhanced resilience

Passive survivability and back-up power during disruptions

POTENTIAL CREDITS - HEALTH

Community contaminant prevention

Ergonomics approach for computer users

Integrative process for health promotion

Lead risk reduction

Operations and maintenance starter kit

POTENTIAL CREDITS - OTHER

Bird collision deterrence

Energy performance metering path

Inclusive design

Prevention through design

Social equity within the community

Verified construction and demolition recycling rates

REGIONAL PRIORITY

USGBC has determined that in this geographic area, projects receive an additional point for each of the following credits they have earned: High Priority Site, Access to Quality Transit, Building Life-Cycle Impact Reduction, Rainwater Management, Cooling Tower Water Use, Indoor Water Use Reduction.