



# BSR/GBI 01-202X GREEN GLOBES® ASSESSMENT PROTOCOL FOR DESIGN, NEW CONSTRUCTION, AND MAJOR RENOVATIONS

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Revision of ANSI/GBI 01-2021

This Standard is under continuous maintenance by the Green Building Initiative (GBI) and has a published schedule for regular publication of revisions, including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the GBI website ([thegbi.org](http://thegbi.org)). The latest edition of the Green Globes® Standard is free to download from the GBI website.

## Disclaimer

This Standard provides a method of assessing commercial buildings in relation to commonly valued environmental and efficiency outcomes. This Standard is an assessment tool and does not purport to instruct users on the appropriate design, construction, operations and maintenance, standards, applicable laws, codes or regulations for their building. The use of this Standard does not expressly or implicitly establish the appropriate level of care of a licensed design or other professionals nor the appropriate duties and responsibilities of owners, design, construction, operations or maintenance personnel.

The Green Building Initiative (GBI) does not guarantee or warrant the actual performance of any building as a result of (1) the use of this Standard, or (2) a particular level of assessment indicated through the use of this Standard, whether through individual use or in conjunction with a provider of a third-party assessment. This Standard has been developed and structured to provide a general assessment tool for various attributes of buildings, as outlined in this Standard. This Standard is not a design, construction, operations or maintenance tool or a quality or performance assurance system. Building systems, technology, construction processes, design methodologies and best practices are constantly evolving and no building performance assessment system or tool, including this Standard, can account for these changes or the site-specific variances and limitations associated with individual buildings. The use of this Standard does not serve as a substitute for the work and advice of knowledgeable, licensed design, and other professionals; skilled construction personnel; building operators; and dedicated building owners.

GBI makes no representations about the results obtained from using this Standard. GBI, to the fullest extent permitted by law, disclaims all warranties of any kind, whether express or implied, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose and non-infringement.

Information on the ANSI approved procedures used to develop this Standard can be found at [www.thegbi.org](http://www.thegbi.org) or by emailing [info@thegbi.org](mailto:info@thegbi.org).

## Special Notes

The Foreword and Appendix are informative only and do not contain mandatory requirements necessary for conformance to this Standard. As such, they may contain material that has not been subjected to public review or a consensus process. Sections 5 Definitions, Abbreviations, and Acronyms and 12 References and Guidelines are informative only and are updated by the Secretariat upon the Consensus Body approval of all criteria.

Reference documents cited within the Standard are mandatory and are only to be applied within the context for which they are cited. Full acknowledgement and credit are given to the source organization for all references listed within this standard. Copies of the references and guidelines cited within this standard can be obtained from the full list of sources found in section 12. Incorporation of a reference is limited to the edition of the publication that is cited within this standard. Future amendments or revisions of the reference are not included.

This Standard is maintained under continuous maintenance procedures. GBI publishes notices for meetings and calls for public comment in ANSI Standards Action as required. GBI has a list of stakeholders that will receive email announcements when any maintenance activity occurs to the recommended practice. GBI's website contains a place for new stakeholders to register.

Comments or proposals for revisions to any part of the Standard may be submitted to GBI at any time. The following person(s) may be contacted by those interested in submitting changes:

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## FOREWORD

***Note that the information contained in this Foreword is not part of this Standard. It does not contain requirements necessary for conformance to the Standard. The Foreword is not subject to public review.***

The Green Building Initiative (GBI) is a nonprofit organization dedicated to delivering a results-driven process for achieving sustainability goals through a comprehensive, collaborative rating system with an emphasis on applicability over rigidity. Green Globes is reviewed through an American National Standards Institute (ANSI) consensus process. ANSI has helped develop private sector standardization systems for over 90 years, focusing on requirements for openness, balance, consensus and due process. We believe that green building certification should be flexible enough to encourage participation from every type of building. Our process encourages innovation while providing the most personalized green building certification experience in the market.

In 2005 GBI became the first building rating organization to become an ANSI Standards Developer. GBI used the ANSI process, recognized for being open, balanced, and consensus-based, to create *ANSI/GBI 01-2010: Green Building Assessment Protocol for Commercial Buildings* out of the Green Globes environmental design and assessment rating system for New Construction and Major Renovations.

GBI owns the global rights to Green Globes®—a green commercial building rating system that combines education with environmental assessments within interactive online tools for new and existing buildings as well as major renovations. Green Globes isn't here merely to set the bar for building performance, but rather to help its customers achieve success. Our third-party assessors personally visit properties to review progress toward compliance and certification, provide feedback on opportunities for improvement, and collaborate with project teams to ensure that buildings meet certification requirements and are on track to achieve sustainability goals. GBI has made the commitment to revise its Green Globes rating system using the ANSI consensus process and ANSI approved procedures.

The following document represents revisions to and supersedes *ANSI/GBI 01-2019: Green Globes Assessment Protocol for Commercial Buildings* following four public comment periods and more than 100 public stakeholder meetings. The revised Standard correlates with the the rating system currently designated Green Globes for New Construction (NC) 2021. The GBI maintains *ANSI/GBI 01-2021: Green Globes Assessment Protocol for Design, New Construction, and Major Renovations* through a continuous maintenance schedule allowing for more frequent updates typically completing revisions over a two-year period.

## Stakeholder Involvement

All meetings of the Subcommittees and Consensus Body are public. GBI accepts Consensus Body and Subcommittee applications year-round and maintains a queue of applicants to fill potential Consensus Body vacancies in three interest categories: General Interest, Producer, and User. The seven Subcommittees are: Project Management, Site, Energy, Water Efficiency, Materials, Indoor Environment and Point Allocation. Subcommittee members are not required to also be members of the Consensus Body and individuals may serve on more than one Subcommittee. GBI's Secretariat maintains an email list of interested Stakeholders used for updates on developments or opportunities to participate or comment. More information is available at <https://thegbi.org/green-building-standards/> [www.thegbi.org/ANSI](http://www.thegbi.org/ANSI).

## GBI Encourages Participation in Public Comment Periods

The public comment process is a critical element to developing an ANSI Standard. GBI encourages discussion and debate. ANSI consensus processes afford due process to every commenter. Commenters will receive communication from the Secretariat upon receipt of their comment and again following Consensus Body action on their comment. Public comment notices are published in ANSI Standards Action.

## Comprehensive Not Rigid

One of the many strengths of the Green Globes® collaborative process is that it allows for sustainability improvements that best fit each specific project, rather than a rigid checklist of requirements that don't consider unique sites, building function, or innovation opportunities.

“Not applicables” play a prominent role in Green Globes’ flexibility, allowing projects to indicate criteria that are not applicable to a building or project. For instance, if a local code supersedes a criterion in the Standard and/or if optional features (e.g., cooling towers, etc.) are not included in the project scope, then those criteria could be marked Not Applicable removing those points from the denominator in determining percentages of points achieved.

The 1000 possible points are strategically allocated to direct projects toward criteria considered most critical in the reduction of a building’s environmental impacts, as well as criteria that maximize a building’s opportunity to have a positive impact on a community and its occupants. The new point distribution weights the Assessment Areas as follows:

- Project Management (100 points)
- Site (150 points)
- Energy (260 points)
- Water Efficiency (190 points)
- Materials (150 points)
- Indoor Environment (150 points)

The revised Standard, as is consistent with GBI-01-2019, does not contain mandatory criteria. Instead, additional weighting occurs within each Assessment Area to encourage pursuit of criteria considered to be most important. Every building that achieves Green Globes certification must achieve a minimum of 35% of points overall.

Through point weightings, the Standard encourages users to strive to earn the highest number of applicable points for the building type, size, and budget, while using the flexibility built into the system to keep on track with the owners’ goals and objectives, the planned functionality for the building, and the potential for deconstruction or repurposing of the building. Project teams achieving One Green Globes (the minimum certification level) on their first project—may strive for higher levels of achievement and recognition in future projects through their lessons learned. The Standard is designed to encourage and recognize incremental achievements that take buildings beyond minimum compliance requirements while incentivizing teams to innovate and strive for One, Two, Three, or Four Green Globes thereby going beyond code to achieve real-world results.

## Technical Advances

Reviewers of this revised Standard will find many notable improvements that advance the art, form and definition of what constitutes a green building. Discussion and debate through the public comment process have been extensive and important to this process. Additional information concerning criteria can be found in the Technical Manual under Informational References, Recommended Documents, Assessment Guidance and ToolTips.

Topics covered in GBI-01-2021 include:

- Project Management
  - Site and Building Resilience

- Moisture Control Analysis
- Two paths for Building Commissioning or Systems Manual & Training

#### Site

- Transportation
- Stormwater Management
- Urban-Wildland Interface Design

#### Energy

- Three paths provided for Assessing Energy Performance
- Renewable Energy Clarified
- Sub-metering

#### Water Efficiency

- Four paths for Indoor Domestic Plumbing
- Alternate Sources of Water
- Metering

#### Materials

- Whole Building Life Cycle Assessment
- Construction Waste
- Post Occupancy Solid Waste Recycling

#### Indoor Environment

- Air Ventilation and Quality
- Thermal Comfort
- Acoustic Comfort

## Minimum Requirements

GBI sets minimum requirements for its Standard and rating systems based on commonly valued environmental and efficiency outcomes, benchmarking against other global rating systems, analysis of federal, state/provincial, and local policies, as well as from public input. This Standard recognizes that:

- a) Jurisdictions set their own minimum requirements, which may include requiring a specific Green Globes rating (e.g., One Green Globes, Two Green Globes, Three Green Globes, or Four Green Globes) and/or requiring that specific criteria be achieved.
- b) GBI is an international organization and must consider a variety of markets in setting minimum requirements.

Existing minimum requirements are represented by the following statement:

To achieve compliance and final certification under the ANSI/GBI 01-2021 Standard and when using Green Globes® rating systems, each project must meet all jurisdictional requirements, achieve at least 35% of applicable points out of 1000 possible points, and complete third-party assessment by the certifying body, the Green Building Initiative, sole owner of the global rights to Green Globes. Specific protocols under the Green Globes suite of tools, such as the Green Globes Multifamily or Multifamily Performance Plus protocols, have additional and more stringent minimum requirements (e.g., energy savings of greater than 15% better than a baseline must be demonstrated). Rating systems and protocol minimum requirements for certification are updated from time to time following a [public input process](#). To obtain information on Green Globes minimum compliance requirements, please visit [www.thegbi.org](http://www.thegbi.org) or inquire at [info@thegbi.org](mailto:info@thegbi.org).



If you are interested in submitting input to GBI on minimum requirements for compliance with this Standard or any Green Globes rating system or protocol, please contact Emily Marx, Senior Manager, GBI Standards & Program Support, at [emarx@thegbi.org](mailto:emarx@thegbi.org). All notification of public input processes related to GBI programs will be sent to GBI's stakeholders' community, which you can join by completing a stakeholder application at <https://thegbi.org/public-input-procedures/www.thegbi.org/public-input>.

## How to Submit Public Comments

Calls for public comment will be published in ANSI Standards Action. Anyone wishing to submit a comment will be asked to complete a public comment form located at <https://thegbi.org/green-building-standards/www.thegbi.org/ANSI>. To submit a proposal for a substantive change to the Standard commenters must be specific about the change they are requesting and provide a reason. Commenters are expected to copy and paste a section of the Standard into the comment form and use ~~strike through~~ and underline to identify suggested deletions and additions to the text.

Learn more about the public comment process or review GBI's ANSI-approved procedures at <https://thegbi.org/green-building-standards/www.thegbi.org/ANSI>. For more information on upcoming calls for public comment or to request a public comment form, please contact the Secretariat at [comment@thegbi.org](mailto:comment@thegbi.org).

## Who Should Use This Standard

Property owners/operators, architects, green building consultants, design teams, developers, contractors, lenders, institutions, various levels of government, tenants, and occupants, as well as facility managers and maintenance personnel can apply this Standard to a broad range of commercial building types — such as office, multifamily, health care, schools, universities, labs, industrial, and retail. The Standard does not apply to single-family homes, two-family homes and townhouses that are three stories or less in height.

*ANSI/GBI 01-2021: Green Globes Assessment Protocol for Design, New Construction, and Major Renovations* includes prescribed levels of achievement that government agencies or other entities wishing to establish specific criteria may consider when adopting this Standard. GBI also develops customized tools for governments to comply with government-specific requirements or other codes and standards. An example is GBI's unique Guiding Principles Compliance program, which is customized for use by federal agencies for compliance with Executive Orders and "High Performance and Sustainable Building" mandates.

To learn more about current Green Globes tools, visit [www.thegbi.org](http://www.thegbi.org). To learn about participation in GBI's Standard development and ANSI consensus processes, visit <https://thegbi.org/green-building-standards/www.thegbi.org/ANSI> or contact GBI's Secretariat at [comment@thegbi.org](mailto:comment@thegbi.org).

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## 1. PURPOSE

This Standard provides a method for assessing commercial buildings relative to the tenets of integrated design and contemporary best practices for high-performance green buildings. This assessment method addresses the design and construction of buildings with respect to reducing life cycle resource consumption, waste, and global/regional/local environmental impacts; contributing to human and ecological system health; and providing performance feedback to owners and communities on indicators such as energy and water performance.

## 2. SCOPE

This Standard applies to a broad range of commercial building types, including offices, multifamily, health care, schools, universities, labs, industrial, retail, etc., as well as to major renovations as defined in Section 5 Definitions, Abbreviations, and Acronyms of the Standard. The Standard does not apply to single-family homes, two-family homes, and townhouses that are three stories or less in height.

The Standard includes a points-based assessment rating system that allows users to identify solutions that earn points for actions likely to achieve levels of performance commonly valued as having desirable environmental and related efficiency outcomes. The assessment criteria and rating system within the Standard apply to new commercial buildings and major renovations, including criteria related to planning for subsequent operations and maintenance.

The six Assessment Areas within the Standard include Project Management, Site, Energy, Water Efficiency, Materials, and Indoor Environment.

This Standard shall not be used to circumvent any code, health, safety, security, or environmental requirements. It is the sole responsibility of the user of this Standard to establish appropriate safety and health practices, to comply with required building codes, and to assess the applicability of criteria based on other possible regulatory limitations prior to use.

## 3. NOT APPLICABLES

### 3.1 Not Applicable Criteria

Each environmental assessment area contains certain criteria that a design and delivery team may deem to be “Not Applicable” to the building. Selecting “Not Applicable” may be appropriate in the following circumstances as denoted in Table 3:

TABLE 3

Reasons for Use of Not applicable Criteria	
1	If a criterion does not apply to the building type (e.g., if there are no oil fired burners on site, questions related to oil fired burners would be designated Not Applicable).
2	If a code or regulation overrides, conflicts with, or otherwise prevents compliance with a criterion.
3	If a criterion conflicts with best practices based on regional climatic differences.

Questions without a Not Applicable option should be answered as appropriate for the building.



## 4. ASSESSMENT OF COMPLIANCE

Assessment of compliance can be established through a third-party review of appropriate written plans, working drawings, specifications, site plans, energy modeling, life cycle assessment results, commissioning reports, construction documents and/or other data or documents that demonstrate conformance.

## 5. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

### 5.1 Definitions

***Note:** Italicized words found throughout this Standard indicate that a definition for the term can be found in the Definitions Section. Definitions not found in this section may be found in referenced standards contained in this Standard, and the user shall adhere to the meanings as defined in those standards. Other terms not defined in this Section or in referenced standards contained in this Standard shall have their ordinarily accepted meanings within the context in which they are used. Ordinarily accepted meanings are based upon American Standard English language usage as documented in a comprehensive dictionary. Where definitions in this Standard differ from those in a reference standard or any other source, definitions found in this Standard shall be used.*

**AARP Livability Index (Neighborhood category):** a measure of community livability on a scale of 0-100. The American Association of Retired Persons (AARP) is a nonprofit, nonpartisan organization that empowers people to choose how they live as they age. The livability index for a site can be publicly accessed at <https://livabilityindex.aarp.org/>.

~~**acoustically separated area:** an enclosed space that, to function properly, requires separation from other adjacent spaces by wall, floor, and ceiling assemblies that have an STC rating adequate to allow clear, intelligible communication between sender and receiver within the space (e.g. meeting rooms, auditoria, theaters, concert venues, cinemas, lecture halls, libraries, classrooms, conference rooms, counseling offices, private offices, private rooms in health care facilities, sleeping rooms, etc.).~~

~~**assemblies:** building systems categorized as exterior walls, internal partitions, windows, interim floors, roofs, beams, and columns.~~

**alternate water source(s):** non-potable water resources or water supplies not developed for potable use.

**assemblies:** building systems categorized as exterior walls, internal partitions, windows, interim floors, roofs, beams, and columns.

~~**baseline equivalent emission rate (BER):** the baseline building emission rate (BER) represents the mass carbon dioxide equivalent (CO<sub>2</sub>e) emitted for the average U.S. commercial building in the proposed building's location when using data from the U.S. Department of Energy's Energy Information Administration's (EIA) "Commercial Building Energy Consumption Survey (CBECS)." The BER is expressed as the mass of CO<sub>2</sub>e emitted per year per unit area of the total useful floor area of a building — lb./ft<sup>2</sup>/yr. (kg/m<sup>2</sup>/yr.).~~

**biobased content:** that portion of a material or product derived from plants and other renewable agricultural, marine, and/or forestry resources. *Biobased content* does not include animal feed, food, or biofuels.

**boilerless/connectionless food steamers:** an appliance designed to cook food within an enclosure via steam-laden air that does not have a dedicated connection to a water supply.

**brownfield:** real property, the expansion, redevelopment, or *reuse* of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant (Some legal exclusions and additions may apply).

**building commissioning:** a process for enhancing the delivery of a project. The process assesses and documents that the facility, systems, and/or *assemblies* are planned, designed, installed, tested, and can be operated and maintained to meet the Owner's Project Requirements.

**building envelope:** the element of a building that separates the conditioned interior space from the exterior, such as walls, roofs, floors, slabs, foundations, doors, and *fenestration*.

**building product:** building elements and *assemblies*.

**building resilience:** the ability of a building and project site to withstand and recover rapidly from adverse events and to adapt to changing environmental conditions.

~~**C-factor (thermal conductance):** the amount, in British Thermal Units (Btu), that flows each hour through 1 ft<sup>2</sup> of the surface area of material when there is a 1° temperature difference between the inside and outside air Btu/hr ft<sup>2</sup> F.~~

~~**carbon dioxide equivalent (CO<sub>2</sub>e):** a measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). CO<sub>2</sub>e approximates the time-integrated warming effect of a unit of a given greenhouse gas, relative to that of carbon dioxide (CO<sub>2</sub>). GWP is an index for estimating the relative global warming contribution of atmospheric emissions of a unit mass of a particular greenhouse gas compared to the emission of a unit mass of CO<sub>2</sub>.~~

**carbon offset:** a certificate representing the reduction of one metric ton (2,205 lbs.) of *carbon dioxide equivalent* emissions.

**cartridge filtration:** a removable type of filtration unit containing media. Cartridge filters are removed and cleaned or replaced as a unit in entirety.

**charrette:** a collaborative session in which a project team creates a solution to a design or project problem. The structure may vary, depending on the complexity of the problem or desired outcome and the individuals working in the group. *Charrettes* can take place over multiple sessions in which the group divides into sub-groups. Each sub-group then presents its work to the full group as material for future dialogue. *Charrettes* can serve as a way of quickly generating solutions while integrating the aptitudes and interests of a diverse group of people.

**clear views:** direct, unobstructed visual sightlines from a seated or standing position inside the building to a point at least 20 ft. (6.1 m) outside the building allowing occupants exposure to sunlight and a visual connection to nature and the outdoors. Adjustable shading devices for glare control shall not be considered an obstruction.

**climate zone:** see Normative Appendix B of ANSI/ASHRAE/IESNA Standard 90.1-2013, or Section 301 of the 2015 International Energy Conservation Code (IECC).

**clothes washer, residential:** a *clothes washer* designed for use in applications in which the occupants of one or more households will be using the *clothes washer*, including multifamily housing common areas or self service laundry

**clothes washer, tunnel:** an industrial laundry machine designed specifically to accommodate heavy wash loads; also called a continuous batch washer. In operation, laundry progresses through the washer in one direction, while water and washing chemicals move through in the opposite direction on a continuous basis.

**combination oven:** an appliance designed to cook food within an enclosure via hot air convection and steam-laden air.

**conceptual design phase:** a document that records the concepts, calculations, decisions, and product selections used to meet the owner's project requirements and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

**construction documents:** all of the written and graphic documents (including BIM, CAD, and other electronic files) prepared or assembled by the architect/engineer for communicating the design and administering the project. The term "*Construction documents*" also includes the Project Manual that contains the bidding forms and instructions, contract forms and conditions, and specifications, as well as documentation of all modifications made after the construction agreements are signed.

**construction documents phase:** the last stage of the design process. The *design and delivery team* is focused on finalizing the drawings and specifications for all components and systems of the building producing the Contract Documents. A complete set of Contract Documents provides a comprehensive, fully coordinated set of *construction documents* and specifications that the contractor uses to obtain necessary permits and construct the project.

**conventional filtration:** sorptive media filtration (e.g., with perlite or diatomaceous earth) in which regular backflushing is done with each filter cleaning and the media is replaced after each flush. In *conventional filtration*, the media is mixed in a slurry process inside the filter and deposited on fabric coated tubes in the pressure vessel.

**counterflow systems:** an evaporative cooling system in which the flow of air is upward across the wetted cooling media.

**cradle-to-gate product life cycle:** a partial product life cycle from resource extraction (cradle) to the factory gate before the product is transported to the consumer. This includes the product stages or raw material supply, transport, and manufacturing. The construction process, use, and end-of-life stages of the product are omitted in this case.

**cradle-to-grave product life cycle:** the full product life cycle from resource extraction (cradle) through the disposal stage (grave). This includes the product, construction process, use, and end-of-life stages.

**crossflow system:** an evaporative cooling system in which the flow of air is horizontal across the wetted cooling media.

**Dark Sky Façade Lighting:** electrical lighting intended to illuminate the exterior of a building that does not deliver any direct light beyond the edge of the building rooftop.

**Dark Sky Luminaire:** a Dark Sky compliant *luminaire* directs all illumination down, with no light that projects at an angle greater than 90 degrees above nadir and does not facilitate *light trespass* beyond the property border.

**daylighting:** the integration of natural light for an enhanced connection to nature and to minimize the need for artificial lighting during the day using strategies such as effective *orientation* and placement of windows, use of light wells, light shafts or tubes, skylights, clerestory windows, light shelves, reflective surfaces, and shading, and the use of interior glazing to allow light into adjacent spaces.

**deconstruction:** the systematic dismantling and removal of a structure or its parts to salvage and harvest the components, for the purpose of reusing and recycling the *reclaimed materials* for their maximum value; the disassembly of a building with the explicit intent of recovering building materials for safe and economical *reuse*. Reclaimed material is material that would have otherwise been disposed of as waste or used for energy recovery (e.g., incinerated for power generation), but has instead been collected and recovered as a material input, in lieu of virgin primary material, for recycling or a manufacturing process.

**design development phase:** refines the scope of work previously approved in the *schematic design phase*. In this phase, the project is developed to a level of detail necessary to work out a clear, coordinated description of all aspects of the project. Major elements including equipment, fire protection, mechanical, electrical, structural, telecommunications and plumbing systems are designed and coordinated through enlarged scale drawings, detailed elevations, and plans, and design mockups as required.

**direct lighting:** lighting provided from a source without reflection from other surfaces, which allows light to travel on a straight path from the light source to the point of interest, such as ceiling-mounted or suspended *luminaires* with mostly downward light distribution characteristics.

**drift eliminator:** structure to control water lost from cooling towers as liquid droplets are entrained in the exhaust air. A *drift eliminator* does not prevent water lost by evaporation.

**drip irrigation:** any non-spray, low volume irrigation system ~~using~~ ~~utilizing~~ emission devices with a flow rate measured in gallons per hour (gal/hr.) or liters per hour (L/hr.). Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

**drought tolerant plant:** a plant that can withstand long periods with little or no water and/or that have relatively low water requirements.

**dry vacuum system:** a system that does not use water to form a seal for a vacuum pump or use flowing water to create a vacuum.

**existing building:** a building or portion thereof that was previously occupied or approved for occupancy by the authority having jurisdiction.

**fenestration:** all areas (including frames) in the *building envelope* that transmit light including windows, translucent panels, clerestory windows, skylights, and glass block walls. For doors where the glazed vision area is less than 50% of the door area, the *fenestration area* is the glazed vision area. For all other doors, the *fenestration area* is the door area (including frames).

**fenestration area:** total area of the *fenestration* measured using the rough opening and including glass, sash, and frame.

**F-factor:** the perimeter heat loss factor for slab-on-grade floor, expressed in Btu/hr-ft-°F (W/m-K).

**food waste disposer:** a device used to shred food and other kitchen wastes prior to disposal.

**formulated product:** any combination or blend of two or more constituent chemicals if the combination does not occur in nature and is not, in whole or in part, the result of a chemical reaction.

~~**furnishings, finishes, and fit-outs:** products and materials permanently installed on the interior of a building. This definition includes casework, shelving, and cabinets as well as finish materials used on floors, walls and ceilings. This definition does not include moveable furniture such as desks, tables, and chairs.~~

**global warming potential (GWP):** an index, describing the radiative characteristics of well-mixed greenhouse gases, that represents the combined effect of the differing times these gases remain in the atmosphere and their relative effectiveness in absorbing outgoing infrared radiation. This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of carbon dioxide. (See *carbon dioxide equivalent*).

**graywater:** Untreated wastewater that has not come into contact with toilet waste, kitchen sink waste, dishwasher waste or similarly contaminated sources. *Graywater* includes wastewater from bathtubs, showers, and bathroom wash basins, *clothes washers* and laundry tubs.

**greenfield:** undeveloped lands such as fields, forests, farmland or rangeland.



~~**grid-displaced electricity:** all electricity generated in or on the building site by, for example, PV panels, wind power, combined heat and power systems (CHP), or similar systems.~~

**indoor environmental quality:** refers to the quality of the air and environment inside buildings, based on pollutant concentrations and conditions that can affect the health, comfort, and performance of occupants including temperature, relative humidity, light, sound and other factors.

**integrated design process (IDP):** a holistic approach to project design and planning where project team members from multiple disciplines work together throughout the project design and delivery process; this emphasizes goal setting, clear and ongoing communication, attention to detail, and active collaboration among team members with the objective of achieving holistic solutions.

**integrated pest management:** the use of different techniques to control pests, used singly or in combination, such as selection of pest-resistant plant varieties, regular monitoring for pests, use of pest-resistant materials or use of natural predators of the pest, to control pests, with an emphasis on methods that are least injurious to the environment and most specific to the particular pest.

**Integrated Water Factor (IWF):** the quotient of the total weighted per-cycle water consumption for all wash cycles in gallons divided by the cubic foot capacity of the *clothes washer*.

**landscape irrigation sprinkler(s):** hydraulically operated mechanical device consisting of a *sprinkler body* and one or more orifices that discharges pressurized water into the air through a nozzle(s) as a spray or stream of water.

**lavatory:** a washbowl or basin plumbing fixture supplied with water from a *lavatory faucet* located within the confinements of a bathroom or toilet room and used for the sole purpose of personal hygiene.

**lavatory faucet(s):** a fitting that controls the flow of water into a *lavatory*.

**light pollution:** any adverse effect of artificial light including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste.

**Light Trespass (ref. ies.org):** the encroachment of light, typically across property boundaries, causing annoyance, loss of privacy, or other nuisance.

**luminaire:** a complete lighting unit, consisting of an artificial light source(s) together with the components required to mount the unit and distribute the light, position the light source, and connect the light source to a power supply (often referred to as a “fixture”).

**major renovation:** has occurred when 50% of the gross area (measured to the exterior footprint) of the building has been renovated.

**makeup water:** water added for losses, especially losses caused by evaporation.

**mature plant:** a full-grown plant or the size of the plant after a specified period once the plant becomes established.

**modular construction:** the remote assembly of major portions of a building constructed of multiple material types involving several trades working together to build a modular unit such as a bathroom pod, patient room pod, or a wall/floor/roof assembly including HVAC, electrical, and plumbing components.

**mulch:** a layer of permeable material applied to the surface of a landscape area to help conserve soil moisture, improve soil health, discourage weed growth and enhance visual appeal.

~~**neighborhood asset(s):** a single physical location where business transactions or services are available to the public. *Neighborhood assets* include, but are not limited to grocery stores, banks, retail outlets, and nonprofit and public services such as religious facilities, schools, parks, police and fire stations, and government offices.~~

**non-potable water:** water that is not *potable water* (see *potable water*).

**non-structural element(s):** elements attached to or housed in a building or building system, that are not part of the main load-resisting *structural system* of the building. These include:

1. architectural elements such as a parapet wall, partition wall, non-load carrying windows, suspended ceilings, *furnishings*, cladding systems, and veneer;
2. mechanical system components;
3. electrical system elements; and
4. miscellaneous components, such as sign boards and file cabinets.

**off-site renewable energy:** green power or *Renewable Energy Certificates (RECs)* purchased from a third-party source such as an electrical utility. There is no physical *renewable energy* system either on site or specifically connected to the building.

**once-through water-cooled equipment:** equipment that uses water within a heat exchange process for cooling only once before discharge to a drainage system.

**on-site renewable energy:** energy derived from sun, wind, water, the Earth's core, and various forms of biomass ~~from recovered waste sources used in a sustainable manner~~, that is captured, stored and used on the building site, using such technologies as wind turbines, photovoltaic solar panels, transpired solar collectors, solar thermal heaters, and small-scale hydroelectric power plants.

**orientation:** the relation of a building and its associated *fenestration* and interior surfaces to compass direction and, therefore, to the location of the sun, usually given in terms of angular degrees away from the south, (e.g., a wall facing due Southeast has an *orientation* of 45 degrees east of south).

**overhang:** a horizontal projection for a window or wall.

**ozone depletion potential (ODP):** a number that refers to the amount of ozone depletion caused by a substance.

The *ODP* is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the *ODP* of CFC-11 is defined to be 1.0. Other CFCs and HCFCs have *ODPs* that range from 0.01 to 1.0. The halons have *ODPs* ranging up to 10. Carbon tetrachloride has an *ODP* of 1.2, and methyl chloroform's *ODP* is 0.11. HFCs have zero *ODP* because they do not contain chlorine. Manufacturers publish tables of all ozone depleting substances showing their *ODPs*, *GWPs*, and *CAS numbers*.

**permeable surface(s):** infiltrate, treat, and/or store *rainwater* where it falls. They can be made of *pervious concrete*, *porous asphalt*, or permeable interlocking pavers.

**pervious concrete:** allows some or all water to penetrate the concrete assembly.

~~**porous asphalt pavement(s):** allows some or all water to penetrate the asphalt assembly.~~

**post-consumer recycled content:** the portion of *recycled material*, in a product, generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose. *Post-consumer recycled content* includes returns of materials from the distribution chain.

**potable water:** water that meets the requirement of the authority having jurisdiction and is satisfactory for drinking, culinary, and domestic purposes.

**pre-consumer recycled content:** the portion of *recycled material* in a product diverted from the waste stream during a manufacturing process. Materials that have been reutilized (i.e., reworked, reground, or scrap generated in a process and capable of being reclaimed within the same process that generated it) are excluded.

**pre-design:** the activities that happen during or prior to the conceptual/*schematic design phase* of the project.

**prefabrication:** off-site, custom fabrication of major building elements in specialized facilities, in which various materials are joined to form a component part of a final installation. Examples include trusses, joists, structural steel fabrications, architectural casework, curtain wall, and precast concrete. This does not include manufactured, multi-material components such as windows, doors, and gypsum sheathing unless they are incorporated into a prefabricated building element.

**pre-rinse spray valve(s):** a handheld device, used with commercial dishwashing and warewashing equipment and applications, that sprays water on dishes, flatware, and other food service items to remove food residue before cleaning and sanitizing the items.

**previously developed site:** land that is or was occupied by a permanent structure (excluding agricultural or forestry buildings), and associated fixed surface infrastructure.

~~**proposed equivalent emission rate (PER):** PER is expressed as the mass of CO<sub>2</sub>e emitted per year per unit area of the total useful floor area of the proposed building — lb./ft<sup>2</sup>/yr. (kg/m<sup>2</sup>/yr.).~~

**qualified professional:** an individual licensed or accredited by a jurisdictional body, third-party or other recognized organization on the subject matter being addressed.

**R-value:** indicates the resistance to heat flow (thermal resistance) of a material. The *R-value* of thermal insulation depends on the type of material, its thickness, and its density. **The higher the *R-value*, the greater the insulating effectiveness.** In calculating the *R-value* of a multi-layered installation, the *R-values* of the individual layers are added.

**rain shutoff device:** a device connected to an irrigation controller that overrides scheduled irrigation when significant precipitation is detected.

**rainwater:** untreated water from natural precipitation that has not been contaminated by use. Can be ~~utilized~~ used through *rainwater harvesting*.

**reclaimed [recycled] water:** highly treated wastewater that can be used for irrigation or other *non-potable* uses to extend water supplies.

**regenerative sorptive media:** filtration media capable of filtering down to 5 microns, that is usually composed of diatomaceous earth or perlite but that is unique in that it is not back-washed and replace after each use, but rather agitated off of filter tubes and then recoated on the filter. In addition to only needing occasional replacement, filtration processes using this type of media are much more water efficient.

**regularly occupied space:** a room or enclosed space designed for human occupancy in which individuals perform activities for which the space has been specifically designed.

~~**remediation:** cleanup or other methods used to remove or contain a toxic spill, contamination or hazardous material.~~

**renewable energy:** energy that is continuously replenished on the Earth, such as wind, solar thermal, solar electric, geothermal, and hydropower, ~~and various forms of biomass from recovered waste sources.~~

**Renewable Energy Certificates (RECs):** renewable energy certificates (RECs) also known as renewable energy credits, green certificates, green tags, or tradable renewable certificates, represent the environmental attributes of the power produced from *renewable energy* projects and are sold separately from commodity electricity. Customers can buy green certificates whether or not they have access to green power through their local utility or a competitive electricity marketer and they can purchase RECs without having to switch electricity suppliers.

**renovation:** changing in-kind, strengthening, refinishing, or replacing of structural elements or upgrading of existing materials, equipment and/or fixtures.

**reuse:** to use an object, material or resource again, either for its original purpose or a similar purpose, without significantly altering the physical form of the object or material.

**risk:** the probability that a *product formulation, article* or constituent chemical will cause an unacceptable hazardous or toxic human health or safety, or ecological effect under the intended exposure and use conditions.

**risk assessment, product:** a scientific product composition screening-level analysis that determines if a *product formulation, article*, or constituent chemical will produce a *risk*, based upon constituent hazards, dose and exposure assessments, and *risk* characterization.

**salvaged material:** discarded or unused construction materials or products removed from a structure or a site that have value and can be directly substituted for new materials or products with minimal reprocessing.

**sand-based filtration:** filtration that does not ~~utilize~~use a sorptive media (such as diatomaceous earth or perlite) and does not filter down to 5 microns.

**service life:** the expected lifetime of a product.

**shared use [multi-user] path:** a form of infrastructure that supports multiple non-motorized transportation opportunities, such as walking, bicycling and inline skating. A multi-use path is physically separated from motor vehicular traffic with an open space or barrier.

**soil moisture sensor:** a device connected to an irrigation system used to measure the moisture level in the soil.

**specialized activities:** activities that generate pollutants, that may include but are not limited to, printing rooms, and areas that contain industrial and quasi-industrial equipment.

**splash out trough:** the channel located around the edge of a pool that is designed to catch water that otherwise would spill or be tracked out of the pool onto the decking. The *splash out trough* drains back to the pool system.

**sprinkler body:** the exterior case or shell of a sprinkler incorporating a means of connection to the piping system, designed to convey water to a nozzle or orifice.

**State of Place Index:** a walkability and quality of place score from 0-100. It is based on 290 features of the built environment – like sidewalks, benches, street trees, and land uses – data that is collected block by block. It indicates how walkable – convenient, safe, pleasurable, and livable – a block, group of blocks, or neighborhood is. The index value for a site is determined by a proprietary algorithm maintained by State of Place, Inc. who can be contacted at <https://www.stateofplace.co/>.

**steam sterilizer:** a device that uses moist heat in the form of saturated steam under pressure for a predetermined period of time to sterilize materials.

**stormwater:** natural precipitation that has contacted a surface at, below (channels storm drain pipes), or above (elevated roadways) grade.



**structural system:** the load-resisting system of a structure that transfers loads to the soil or supporting structure through interconnected structural components or members.

**sub-meter:** a metering subdivision of the energy, water, gas, or sound that records the use of the metered subject by specific building systems and equipment.

**substantial completion:** the stage in the progress of a construction project when the project or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize-use the project for its intended use.

**Superfund site:** a site that is on the U.S. Environmental Protection Agency's (EPA) National Priority List (NPL) based on a scoring process that rates its current or potential health impact.

**task lighting:** light that is directed to a specific surface or area to provide illumination for visual tasks.

**U-factor (thermal transmittance):** the heat transmission in unit time through unit area for all the elements of construction and the boundary air films, induced by unit temperature difference between the environmental conditions on each side. Btu/hr-ft<sup>2</sup>-°F (W/m<sup>2</sup>-K).

**variable occupancy:** a variance of 30% from design occupancy for a minimum of 30% of normally occupied hours.

**vegetated roof:** a roof system that may include a water proofing and root repellant system, a drainage system, filter cloth, a lightweight growing medium, and plants. *Vegetated roof* systems can be modular, with drainage layers, filter cloth, growing media and plants already prepared in movable, interlocking grids or each component can be installed separately.

**Walk Score®:** measures the walkability on a scale of 0-100 of any address using a patented system. For each address, Walk Score® analyzes hundreds of walking routes to nearby amenities. Points are awarded based on the distance to amenities in each category. Walk Score® is maintained by Walk Score® Management, LLC part of Redfin Corporation. The score can be publicly accessed for a site at <https://www.walkscore.com/>.

**waste heat:** *waste heat* from industrial processes and power stations rated at more than 10MWe and with a power efficiency of greater than 35%.

**water features:** a designated, often artificial, area in which visible water is moving or open for some purpose. While often this is for aesthetic purposes, these areas may have multiple uses. Generally, the term applies to places not used exclusively for irrigation.

**water tempering device:** a device that cools a discharge of hot water or steam to the sanitary sewer by dilution (mixing) with cooler water.

**wetland:** natural or constructed areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. *Wetlands* generally include swamps, marshes, bogs and similar areas.

## 5.2 Abbreviations and Acronyms

**ASA:** Acoustical Society of America

**ASABE:** American Society of Agricultural and Biological Engineers

**ASTM:** ASTM International

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

**ATFS:** American Tree Farm System

**BUG:** Backlight, Uplight and Glare Ratings

**CAS:** Chemical Abstracts Service

**CBECS:** Commercial Building Energy Consumption Survey. Developed by the U.S. Department of Energy's Energy Information Administration (EIA)

**CDPH:** California Department of Public Health

**CO<sub>2</sub>e:** *Carbon Dioxide Equivalent* Emissions Rate

**CSA:** Canadian Standard Association

**EMS:** Environmental Management System

**EPA:** Environmental Protection Agency

**FGI:** Facility Guidelines Institute

**HVAC&R:** heating, ventilating, air-conditioning, and refrigerating

**IAPMO:** International Association of Plumbing and Mechanical Officials

**ICC:** International Code Council®

**IDP:** Integrated Design Process

**~~IWF:~~** ~~Integrated Water Factor~~

**IECC:** International Energy Conservation Code

**IES:** Illuminating Engineering Society of North America

**ISO:** International Organization for Standardization

**IWF:** Integrated Water Factor

**LCA:** life cycle assessment

**LWA:** Landscape water allowance

**MERV:** Minimum Efficiency Reporting Value

**MURB:** Multi-Unit Residential Building

**NC:** Noise Criterion

**NREL:** National Renewable Energy Laboratory

**PEFC:** Programme for Endorsement of Forest Certification

**RELs:** Reference Exposure Levels

**SCAQMD:** South Coast Air Quality Management District

**VOC:** Volatile Organic Compounds

## ENVIRONMENTAL ASSESSMENT AREAS

### 6. PROJECT MANAGEMENT (100 points)

#### 6.1 TEAM & OWNER PLANNING (45 POINTS)

##### 6.1.1 PERFORMANCE & GREEN DESIGN GOALS

6.1.1.1 Performance and green design goals (qualitative AND/OR quantitative) are established in collaboration with the owner in writing and are regularly assessed from *pre-design* through to completion of construction and occupancy for the following listed items:

- Site design;
- Environmentally responsible construction activities;
- Biophilia and occupant enrichment;
- Water conservation, efficiency, *alternate water sources*, and *reuse*;
- *Building envelope* and moisture control;
- Energy efficiency;
- Materials including:
  - Efficiency;
  - Environmentally preferable products; and
  - Storage of hazardous materials;
- Indoor environment including:
  - Acoustic comfort;
  - Thermal comfort;
  - Lighting;
  - Air quality; and
- *Building resilience*.

Assessment criteria:

*Pre-design* written goals

Design stage review and assessment of goals prior to:

- *Conceptual design phase*
- *Design development phase*
- *Construction documents*

Construction stage review and assessment of goals at:

- Pre-construction
- 25% completion of budget or schedule
- 50% completion of budget or schedule
- *Substantial completion*

Maximum = 20 points

- One point is earned for each written performance and green design goal for listed items at *pre-design* to a maximum of ~~eight~~ nine points.
- One point is earned for evidence of each design stage review and assessment of goals prior to:
  - *Conceptual design*
  - *Design development*
  - *Construction documents*.
- One point is earned for evidence of each construction stage review and assessment completed at:
  - Pre-construction
  - 25% completion
  - 50% completion
  - *Substantial completion*
- ~~Five~~ Four points are earned for a written plan and contract for post-occupancy review and assessment.

Occupancy assessment of goals:

- Owner obtains a contract for Facility Performance Evaluation or Post-Occupancy Study to evaluate how the building meets the original and emerging goals and requirements within 18 months of being occupied.

## 6.1.2 INTEGRATED DESIGN PROCESS

**6.1.2.1** Employ an *Integrated Design Process (IDP)* with evidence of comprehensive *pre-design*, design phase, and construction phase planning and coordination.

Job functions involved in the *IDP* include but are not limited to the following:

- Architect;
- *Building Envelope* Specialist;
- Civil Engineer;
- Commissioning Agent;
- Community Representative;
- Electrical Engineer;
- Energy Engineer;
- Facilities Manager;
- General Contractor/Construction Manager:
  - Specialty Contractors;
- Industrial Hygienist or Occupational Health and Safety Professional;
- Infection Control Preventionist;
- Interior Designer;
- Irrigation Designer;
- Landscape Architect or Designer;
- Lighting Designer/Illuminating Engineer;
- Mechanical Engineer – Plumbing, HVAC, AND/OR Refrigeration;
- Owner's Representative;
- Structural Engineer;
- Sustainability Consultant; AND/OR
- User Group Representative.

Maximum = 14 points

The following points are earned when a minimum of the listed job functions or groups were represented at the following milestones or during the following project phases:

Milestone or Project Phase	Points for 6 to 9 Job Functions	Points for 10 or more Job Functions
<i>Pre-Design</i> Event (meeting, <i>charrette</i> , or workshop)	3	5
Conceptual or Design Phase	1	3
<i>Construction Documents</i> Phase	1	3



	Final Budget or Guaranteed Maximum Price (GMP) Review with the expectation of an in-depth review of the consequences of the decisions made on the project sustainability goals	1	3
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### 6.1.3 SITE AND BUILDING RESILIENCE

<b>6.1.3.1 Building Risk Assessment:</b> An assessment identifying <i>risks</i> to the building including continued building occupancy resulting from extreme natural events, global climate change, and human activity for the expected <i>service life</i> of the building has been conducted and provided to building owners and designers. The assessment identifies hazards and evaluates the probability and severity of occurrence of those events. These hazards include, but are not limited to, weather, flooding, seismic and volcanic events, drought, wildfire, soil stability, and terrorism.	3 points
<b>6.1.3.2 Building Operational Continuity or Recovery Assessment:</b> An assessment of the necessity of continuous or rapid recovery of various building functions during and after an extreme event has been conducted.	3 points
<b>6.1.3.3 Project Specific Design Parameters:</b> Document that the findings of both the <i>risk</i> and building function assessments have been integrated into the building design parameters and are reflected in the final design and construction of the building.	3 points
<b>6.1.3.4 Publication of Emergency Preparedness Manual:</b> A building operation manual has been prepared outlining actions to be taken in the event of an extreme event, materials to be stockpiled in the building if continuing occupancy is anticipated, and timeline for regular review.	2 points

## 6.2 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION (8 POINTS)

### 6.2.1 ENVIRONMENTAL MANAGEMENT SYSTEM (EMS)

**6.2.1.1** The general contractor (GC) or construction manager (CM) documents the following elements as part of their Environmental Management System (EMS):

- **6.2.1.1.1:** GC/CM Environmental Policy:
  - Includes policies and practices that support the health of humans and site-environment during construction;
- **6.2.1.1.2:** Designated GC/CM Environmental Management Plan and Compliance Manager:
  - Lists their qualifications, role, responsibilities, and reporting compliance structure (e.g., checklists, inspections, and records of compliance).
  - Indicates how this information is passed along to project personnel and sub-contractors;
  - Describe continuous reporting mechanism;
- **6.2.1.1.3:** Project Ecological and Health *Risk Assessment*:
  - An assessment is conducted prior to the start of construction to identify major *risks* that could impact the general welfare and health of humans (i.e., residents, workers, visitors, and construction trades people) and the ecological environment surrounding the immediate area of construction for the specific project and local agency requirements;
- **6.2.1.1.4:** A construction management policy prohibits smoking within 25 ft. (7.62 m) of the building perimeter and construction zone during the construction phase.
  - Smoking is defined as the inhalation of smoke from burning tobacco, use of electronic-cigarettes, or other substance encased in items such as, but not limited to, cigarettes, pipes, and cigars for recreational or medical use.

Maximum = 8 points

- Two points are earned for documenting the items listed in 6.2.1.1.1.
- Two points are earned for documenting the items listed in 6.2.1.1.2.
- Two points are earned for documenting the items listed in 6.2.1.1.3.
- Two points are earned for documenting the items listed in 6.2.1.1.4.

## 6.3 LIFE CYCLE COST ANALYSIS OR BUILDING *SERVICE LIFE* PLANNING (12 POINTS)

### 6.3.1 LCCA or Building *Service Life* Planning:

Path A or B

Two paths are available for assessing Life Cycle Cost Analysis or Building *Service Life* Planning.

- **6.3.1A Path A: Life Cycle Cost Analysis:** 12 points

OR

- **6.3.1B Path B: Building Service Life Plan:** 12 points

Points cannot be combined between paths. Select one of the paths below.

#### 6.3.1A PATH A: LIFE CYCLE COST ANALYSIS

**6.3.1A.1** A cost of ownership financial analysis is performed on the project's collective bundle of green features (i.e., energy/water conservation measures, energy/water efficiency features, maintenance best practices, waste reduction) that are expected to impact:

- Project first costs;
- Operation costs (i.e., utility costs/savings, maintenance and repair costs, costs of replacement,); or
- Other financial features of ownership.

The analysis is a life cycle cost analysis (LCCA) that compares the lifetime benefits of ownership to the subsequent costs. The analysis accounts for and clearly states all calculation assumptions related to:

- The time value of money;
- Fuel escalation rates;
- Other relevant operational factors that affect the cost of ownership.

The LCCA study period is not less than the expected life of the building or system.

Use projected annual energy costs for the proposed design for this LCCA.

12 points

OR

#### 6.3.1B PATH B: BUILDING SERVICE LIFE PLAN

**6.3.1B.1** A Building Service Life Plan is implemented that includes the expected service life estimates, including inspection and replacement during the life of the building. The Building Service Life Plan covers the following systems:

- **6.3.1B.1a:** Structural systems;
- **6.3.1B.1b:** Building envelope including facades, doors, and windows;
- **6.3.1B.1c:** Building roof system;

Maximum =12 points

- Two points are earned for each of the listed elements included in the Building Service Life Plan up to a maximum of 12 points.

- **6.3.1B.1d:** Mechanical, electrical, plumbing, fire protection, and energy generation systems;
- **6.3.1B.1e:** Site hardscape; AND/OR
- **6.3.1B.1f:** *Furnishing* and interior *fit-out*.

Provide documentation of the project design *service life*, the listed systems service lives, the basis for the determination, and the following details for each assembly or component used in the building:

- Building assembly and material description;
- Design *service life* in years;
- Predicted *service life* in years;
- Adaptability and repurposing at end of *service life*; and
- Maintenance frequency and maintenance access.

## 6.4 MOISTURE CONTROL ANALYSIS (6 POINTS)

### 6.4.1 MOISTURE CONTROL DESIGN ANALYSIS

**6.4.1.1** A moisture control design analysis is performed on walls and ceilings adjacent to spaces of added moisture AND/OR on above-grade portions of the *building envelope* in accordance with ASHRAE 160-2009 or a steady-state water vapor transmission analysis for the purpose of predicting, mitigating, or reducing moisture damage to the *building envelope*, materials, components, systems, and *furnishings*.

Maximum = 6 points

- Three points are earned when a moisture control design analysis is performed on walls and ceilings adjacent to spaces of added moisture.
  - Not applicable where there are no spaces of added moisture.
- Three points are earned when a moisture control design analysis is performed on above-grade portions of the *building envelope*.

## 6.5 COMMISSIONING OR SYSTEMS MANUAL & TRAINING (29 POINTS)

### 6.5.1 Commissioning or Systems Manual & Training

Path A or B

Two paths are available for assessing Commissioning or Systems Manual & Training.

- **6.5.1A Path A: *Building Commissioning* and Training:** 29 points
- OR
- **6.5.1B Path B: *Systems Manual* and Training:** 20 points

Points cannot be combined between paths. Select one of the paths below.

#### 6.5.1A PATH A: **BUILDING COMMISSIONING AND TRAINING**

**6.5.1A.1** Commissioning and building operator training is conducted in accordance with ANSI/ASHRAE/IES Standard 202–2018, *Commissioning Process for Buildings and Systems*, ~~and~~ ASHRAE Guideline 0-2019, *The Commissioning Process*, or CSA Z320-11, *Building commissioning* for the following building systems as applicable. Alternatively, ASTM E2813-18 *Standard Practice for Building Enclosure Commissioning* and ASTM E2947-16a *Standard Guide for Building Enclosure Commissioning* meet this requirement for the building envelope.

- **6.5.1A.1a:** HVAC&R systems and controls;
- **6.5.1 A.1b:** *Building envelope*;
- **6.5.1 A.1c:** Lighting systems and controls;
- **6.5.1 A.1d:** Plumbing;
- **6.5.1 A.1e:** Irrigation systems;
- **6.5.1 A.1f:** Electrical system including all renewable electrical generation;
- **6.5.1 A.1g:** Elevating and conveying systems;
- **6.5.1 A.1h:** Communication AND/OR Sound Masking systems; AND/OR
- **6.5.1 A.1i:** Other significant functional AND/OR energy systems (describe) that account for 10% or more of the total building energy use (describe).

Maximum = 29 points or as adjusted by N/A Items

- Six points are earned if commissioning and training is conducted for HVAC&R systems and controls.
- Six points are earned if commissioning and training is conducted for the *building envelope*.
- Six points are earned if commissioning and training is conducted for Lighting systems and controls.
- Two points are earned if commissioning and training is conducted for plumbing systems.
- Two points are earned if commissioning and training is conducted for irrigation systems.
  - Not applicable if there are no irrigation systems.
- Two points are earned if commissioning and training is conducted for Electrical systems.
- One point is earned if commissioning and training is conducted for Elevating/conveying systems.
  - Not applicable if there are no elevating/conveying systems.
- Two points are earned if commissioning and training is conducted for Communications AND/OR sound masking systems.
  - Not applicable if there are no communications AND/OR sound masking systems.
- Two points are earned if commissioning and training is



	<p>conducted for other significant functional AND/OR energy systems.</p> <ul style="list-style-type: none"> <li>○ Not applicable if there are no other significant systems.</li> </ul>
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OR

6.5.1B PATH B: SYSTEMS MANUAL & TRAINING	
<b>6.5.1B.1</b> Produce a systems manual in accordance with ASHRAE Guideline 0-2019, <i>The Commissioning Process</i> , Informative Annex O – Systems Manual, Sections 4 to 10, inclusive <u>or CSA Z320-11, <i>Building commissioning</i>.</u>	10 points
<b>6.5.1B.2</b> Conduct systems training in accordance with ASHRAE Guideline 0-2019, <i>The Commissioning Process</i> , Informative Annex P – Training Manual and Training Needs <u>or CSA Z320-11, <i>Building commissioning</i>.</u>	10 points

## 7. SITE (150 points)

### 7.1 DEVELOPMENT AREA (35 POINTS)

7.1.1 URBAN INFILL AND URBAN SPRAWL	
7.1.1.1 The building is being constructed on a <i>previously developed site</i> that has been served by existing utility and transportation infrastructure for at least a full year prior to construction.	10 points
7.1.2 GREENFIELDS, BROWNFIELDS, AND FLOODPLAINS	
7.1.2.1 The building is being constructed on a <i>brownfield</i> or <i>remediated Superfund site</i> .	10 points
<p>7.1.2.2 The project is not located on or adjacent to sensitive natural sites (e.g. land that is forest or woodland area, savanna, prairie, <i>wetland</i>, undeveloped riparian zones, or wildlife corridor) or on land that was a sensitive natural site for at least three years prior to time of purchase or from the start of project.</p> <ul style="list-style-type: none"> <li>The project is not located on a site that was used for farmland, public recreation, or a public park for at least three years prior to the time of purchase or from the start of the project.</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>The project is not within or adjacent to a wildland-urban interface area where established by the legislative body with jurisdiction.</li> </ul>	<p>6 points or N/A</p> <ul style="list-style-type: none"> <li>Not applicable where the legislative body with jurisdiction has not declared a wildland-urban interface area.</li> </ul>
<p><b>7.1.2.3 Floodplains:</b></p> <ul style="list-style-type: none"> <li><b>7.1.2.3.1:</b> No construction or site disturbance takes place in the 100-year floodplain.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li><b>7.1.2.3.2:</b> Buildings that have completed a <u>Waterfront Edge Design Guidelines (WEDG) Certification</u>.</li> </ul> <p><u>OR</u></p>	<p>Maximum = 9 points</p> <ul style="list-style-type: none"> <li>Nine points are earned for 7.1.2.3.1. <ul style="list-style-type: none"> <li>○ Not applicable where no areas in the local jurisdiction fall within the 100-year floodplain.</li> </ul> </li> <li><u>Nine points are earned for 7.1.2.3.2.</u></li> <li>Six points are earned for 7.1.2.3.23.</li> </ul>

- **7.1.2.3.23:** Elevate Buildings and additions in the floodplain to a minimum of 3 ft. (.9 m) above the 100-year floodplain or are built to allow water to flow through or under the lowest floor.

AND

The facility also earns points for 7.2.1.1 or 7.2.1.7-6 or is within 0.25 mi (0.4 km) walking distance of developed residential land of at least 8 dwelling units per acre.

AND

Buildings and structures assigned a *risk* category of III or IV in Table 1604.5 of the 2012 International Building Code will not be located within a 500-year floodplain. (Not required if the entire jurisdiction is located within the 100-year floodplain. If the entire jurisdiction is located within the 500-year floodplain, then the facility is built outside the 100-year floodplain. Not applicable where no areas in the local jurisdiction fall within the 500-year floodplain.)

## 7.2 TRANSPORTATION (31 POINTS)

### 7.2.1 TRANSPORTATION

**7.2.1.1** A building entrance is within 0.25 mi (0.4 km) walking distance of a local transit stop or 0.5 mi (0.8 km) walking distance of a rapid transit stop.

~~10~~ 7 points

Note: Local transit includes public transit that uses the same right-of-way as automobiles AND for which the distance between stops averages less than 0.33 mi (0.5 km). Rapid transit refers to all other types of public transit.

AND

The stop is served by a transit route that offers service:

- with single direction intervals (headways) no longer than 15 minutes during peak hours and 30-minute single direction intervals (headways) during off-peak hours for a minimum of 14 hours each weekday;

AND

<ul style="list-style-type: none"> <li>with single direction intervals (headways) no longer than 1 hour and operating at a minimum of 14 hours at least one day each weekend.</li> </ul>	
<del>7.2.1.2 Designated preferred parking for car/van pooling, and shelter from weather exists for persons waiting for transportation serving carpools or transit listed in 7.2.1.1.</del>	<del>1 point</del>
<p><del>7.2.1.3-2</del> <u>Parking areas have Electric Vehicle charging infrastructure that are either AC Level 2 (240V in one-phase or 208V in three-phase projects) or Direct Current Fast Charging (DCFC).</u></p> <p><u>For example, EV ready includes conduits in place to support installation of charging stations.</u></p> <p><del>Alternative refueling facilities or electric charging stations are located on site or within 0.25 mi (0.4 km) of the site.</del></p>	<p><u>Maximum =2-6 points or N/A</u></p> <ul style="list-style-type: none"> <li><u>Six points are earned for buildings when ≥10% of onsite parking spaces are equipped with the specified EV charging stations.</u></li> <li><u>Three points are earned for buildings when ≥5% and &lt;10% of onsite parking spaces are equipped with the specified EV charging stations.</u></li> <li><u>Two points are earned for buildings when ≥30% of onsite parking spaces are EV ready.</u></li> <li><u>Not applicable where this strategy is not possible or where the project will have no parking associated with the building.</u></li> </ul>
<u>7.2.1.3 1% or more of onsite parking spaces are equipped with electric charging stations designated for vanpools and carpools.</u>	<p><u>1 point or N/A</u></p> <ul style="list-style-type: none"> <li><u>Not applicable where the project will have no parking associated with the building or when employee van/carpool is not offered.</u></li> </ul>
<p><b>7.2.1.4</b> A building entrance is located within 0.25 mi (0.4 km) of a public bicycle path, <i>shared use [multi-user] path</i>, or road with an existing dedicated bicycle lane.</p> <p>AND</p> <p>The path, lane, or associated bicycle network connects within 5 mi (8.05 km) to a transit stop as described in 7.2.1.1 or to the developed residential land of at least 8 dwelling units per acre.</p>	2 points

<p>AND</p> <p>There is reasonable, unobstructed access between the bicycle lane or <i>shared use [multi-user] path</i> and the bicycle parking facilities or the building entrance.</p> <p><u>OR</u></p> <p><u>The building's Bike Score® is 50 or greater.</u></p>	
<p><del>7.2.1.5 A bicycle parking rack is located within 50 ft. (15.24 m) of an entrance, and is either readily visible from a main entrance, or signage indicating the location is posted at main entrances.</del></p>	<p><del>1 point</del></p>
<p><b>7.2.1.6.5</b> Facilities for Bicycle Commuting and Long-Term Bicycle Parking:</p> <ul style="list-style-type: none"> <li><b>7.2.1.6.5.1:</b> Sheltered bicycle parking is: <ul style="list-style-type: none"> <li>provided for at least 10% of building occupants, where the building occupant load is established in accordance with the International Building Code AND shower and changing facilities are provided within the building project;</li> </ul> </li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li>provided for at least 50% of units in a multifamily residential building.</li> </ul> <ul style="list-style-type: none"> <li><b>7.2.1.6.5.2:</b> At least 50% of the sheltered bicycle parking is located inside the building or within storage lockers or another area that provides security of a locked room or cage secured by a keyed, cipher, or electronic lock and the ability to lock the bicycle to a rack within that space.</li> </ul> <ul style="list-style-type: none"> <li><b>7.2.1.6.5.3:</b> The building is located within 0.25 mi (0.4 km) walking distance of a bike share facility.</li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li><u>7.2.1.5.4: A bicycle parking rack is located within 50 ft. (15.24 m) of an entrance, and is either readily visible from a main entrance, or signage indicating the location is posted at main entrances.</u></li> </ul>	<p>Maximum = 5 points</p> <ul style="list-style-type: none"> <li>Two points are earned where sheltered bicycle parking facilities are provided (and showers and changing facilities as applicable).</li> <li>Two points where the sheltered bicycle parking is secure. (Only applicable where the above two points are achieved.)</li> <li><u>One point is earned where the building is located near a bike share facility.</u></li> <li><u>One point is earned where there is a parking rack near the main entrance.</u></li> </ul>
<p><del>7.2.1.7 The building's Walkscore® is</del></p> <ul style="list-style-type: none"> <li><del>90 or greater;</del></li> </ul> <p><u>OR</u></p> <ul style="list-style-type: none"> <li><del>75-89;</del></li> </ul>	<p><del>Maximum = 10 points</del></p> <ul style="list-style-type: none"> <li><del>Ten points are earned where the building has a Walkscore of ≥90.</del></li> <li><del>Seven points are earned where:</del> <ul style="list-style-type: none"> <li><del>the building has a Walkscore of ≥75 to ≤89; OR</del></li> </ul> </li> </ul>



<p><del>OR</del></p> <ul style="list-style-type: none"> <li><del>A building entrance is within 0.5 mi (0.8 km) walking distance of a grocery store and a minimum of three other neighborhood assets.</del></li> </ul> <p><del>OR</del></p> <ul style="list-style-type: none"> <li><del>A building entrance is within 0.5 mi (0.8 km) walking distance of a minimum of six neighborhood assets.</del></li> </ul> <p><del>Neighborhood assets are open to the public, in operation, and as a group have NAICS codes that start with a minimum of three different numbers.</del></p>	<ul style="list-style-type: none"> <li><del>is located within 0.5 mi (0.8 km) of a grocery store and three other assets;</del></li> </ul> <p><del>OR</del></p> <ul style="list-style-type: none"> <li><del>within 0.5 mi (0.8 km) of six assets.</del></li> </ul>
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### **7.2.1.6 WALKABILITY**

Path A, B, or C

Three paths are available for assessing a site's walkability.

- 7.2.1.6A Path A: Walk Score®: Up to 10 points

OR

- 7.2.1.6B Path B: State of Place Index: Up to 10 points

OR

- 7.2.1.6C Path C: AARP Livability Index: Up to 10 points

Points cannot be combined between paths. Select one of the paths below. If building is unoccupied, select a Path and select N/A.

#### **7.2.1.6A PATH A: WALK SCORE®**

##### **7.2.1.6A.1 The Walk Score® is at least 50.**

Maximum = 10 points

- Ten points are earned for a  $\geq 90$  to  $\leq 100$  Walk Score®.
- Eight points are earned for a  $\geq 80$  to  $\leq 89$  Walk Score®.
- Six points are earned for a  $\geq 70$  to  $\leq 79$  Walk Score®.
- Four points are earned for a  $\geq 60$  to  $\leq 69$  Walk Score®.
- Two points are earned for a  $\geq 50$  to  $\leq 59$  Walk Score®.
- No points are earned for a Walk Score®  $< 50$ .
- Not applicable if the building is unoccupied.

**OR**

**7.2.1.6B PATH B: STATE OF PLACE INDEX**

**7.2.1.6B.1** The *State of Place Index* score is at least 40.

Maximum = 10 points

- Ten points are earned for a  $\geq 90$  to  $\leq 100$  *State of Place Index* score.
- Eight points are earned for a  $\geq 80$  to  $\leq 89$  *State of Place Index* score.
- Six points are earned for a  $\geq 70$  to  $\leq 79$  *State of Place Index* score.
- Four points are earned for a  $\geq 60$  to  $\leq 69$  *State of Place Index* score.
- Two points are earned for a  $\geq 40$  to  $\leq 59$  *State of Place Index* score.
- No points are earned for a *State of Place Index* score  $< 40$ .
- Not applicable if the building is unoccupied.

**OR**

**7.2.1.6C PATH C: AARP LIVABILITY INDEX**

**7.2.1.6C.1** The Neighborhood category of the *AARP Livability* score is at least 50.

Of the seven categories that make up the index the Neighborhood category index is used for the scoring in the criterion.

Maximum = 10 points

- Ten points are earned for a  $\geq 90$  to  $\leq 100$  *Livability* score.
- Eight points are earned for a  $\geq 80$  to  $\leq 89$  *Livability* score.
- Six points are earned for a  $\geq 70$  to  $\leq 79$  *Livability* score.
- Four points are earned for a  $\geq 60$  to  $\leq 69$  *Livability* score.
- Two points earned for a  $\geq 50$  to  $\leq 59$  *Livability* score.
- No points are earned for a *Livability* score  $< 50$ .
- Not applicable if the building is unoccupied.

## 7.3 CONSTRUCTION IMPACTS (34 POINTS)

### 7.3.1 Site Erosion:

Two paths are provided for assessing erosion and sedimentation:

- **7.3.1A Path A: Erosion and Sedimentation Control Plan: 5 points**  
OR
- **7.3.1B Path B: Erosion and Sedimentation Control Specifications: 5 points**

Select the path applicable or most applicable to the project. Points cannot be combined between paths.

**7.3.1A PATH A: EROSION AND SEDIMENTATION CONTROL PLAN**

**7.3.1A.1** An Erosion and Sedimentation Control Plan, signed and stamped by a professional engineer or designer approved by the authority having jurisdiction, is included in the *construction documents*.

5 points or N/A

- Not applicable where projects are interior-only.

OR

**7.3.1B PATH B: EROSION AND SEDIMENTATION CONTROL SPECIFICATIONS**

**7.3.1B.1** The specifications require the implementation of the following best practices as appropriate to the site for erosion and sediment control during construction:

- Construction Site Planning and Management Measures: construction sequencing, construction site operator BMP inspection and maintenance, preserving natural vegetation;
- Erosion Control: articulated concrete block, chemical stabilization, compost blankets, dust control, flocculants, geotextiles, gradient terraces, *mulching*, riprap, seeding, sodding, soil retention, soil roughening, temporary slope drain, temporary stream crossings, wind fences and sand fences;
- Runoff Control: check dams, grass-lined channels, permanent slope diversions, temporary diversion dikes;
- Sediment Control: brush barriers, compost filter berms, compost filter socks, construction entrances, fiber rolls, filter berms, sediment basins and rock dams, sediment filters and sediment chambers, sediment traps, silt fences, storm drain inlet protection, straw or hay bales, vegetated buffers; and
- Good Housekeeping/Materials Management: concrete washout, general construction site waste management, spill prevention, and control plan, vehicle maintenance and washing areas at construction sites.

~~Maximum =~~ 5 points or N/A

- Not applicable where the lot is larger than one acre.
- Not applicable where projects are interior-only.

**(Answer regardless of the Path chosen above):**

**7.3.2 SITE DISTURBANCE**

**7.3.2.1** Construction activities do not go beyond 40 ft. (12.2 m) of the building footprint(s) and remain within 5 ft. (1.5 m) of parking lots, roadways, sidewalks and utility right-of-ways except where the intent of the construction activities was one or more of the following:

Exceptions apply where the construction activities are intended to specifically improve the natural integrity of the site, e.g., removing invasive plant species, replacing existing hardscapes with vegetation, restoring prairie or *wetlands*, or increasing on-site water retention by building rain gardens, swales, retention ponds, or berms.

5 points or N/A

- Not applicable where projects are interior-only.

### 7.3.3 TREE AND SHRUB PRESERVATION

**7.3.3.1** Non-invasive existing trees and woody shrubs are retained and protected during construction.

A certified arborist, a landscape architect, or a certified professional landscape designer provides plans and specifications that are used by the general contractor or construction manager to protect retained trees and shrubs from disturbance and soil compaction.

Assessment Guidance:

Base Calculations on the area of canopy coverage provided by trees and shrubs prior to clearing and construction activity.

Calculations exclude plants that will be removed because they are unhealthy, invasive or otherwise inappropriate for site conditions (e.g., have water, soil, light, or other requirements that are inconsistent with the site).

If an area is covered by overlapping layers of plants, it is not counted multiple times, (i.e., the maximum canopy coverage for any site is 100%).

Maximum = 6 points or N/A

- Six points are earned when >90% of the canopy of existing trees and shrubs is retained and protected.
- Five points are earned when ≥75% to ≤90% of the canopy of existing trees and shrubs is retained and protected.
- Four points are earned when ≥50% to <75% of the canopy of existing trees and shrubs is retained and protected.
- No points are earned when <50% of the canopy of existing trees and shrubs is retained and protected.
- Not applicable where the site has no existing trees or shrubs or where existing plants do not qualify for calculation of canopy coverage, such as those that are invasive or in poor health.

### 7.3.4 MITIGATING HEAT ISLAND EFFECT

**7.3.4.1 Roof:** The building has a *vegetated roof*, is shaded during summer months, AND/OR has a roof with a high Solar Reflectance Index (SRI) as prescribed based on the slope of the roof.

Maximum = 6 points or N/A

The following number of points may be earned when using one or more of the

<p>Where used to comply, shading trees are to be existing, non-invasive plants that are retained on site or newly, non-invasive planted trees that will provide shade within 10 years.</p> <ul style="list-style-type: none"> <li>For a <i>roof</i> slope less than or equal to 2:12, a minimum initial SRI of 78 or greater or a three-year aged SRI of 60 or greater;</li> <li>For a <i>roof</i> slope greater than 2:12, a minimum initial SRI of 29 or greater or a three-year-aged SRI of 25 or greater.</li> </ul>	<p>listed heat island mitigation strategies on the roof:</p> <ul style="list-style-type: none"> <li>Six points are earned where &gt;70% of the roof complies             <ul style="list-style-type: none"> <li>Three points are earned where &gt;70% of the roof has a high initial SRI, and three points are earned where &gt;70% of the roof has a high three-year-aged SRI.</li> </ul> </li> <li>Four points are earned where ≥56% to ≤70% percent of the roof complies.             <ul style="list-style-type: none"> <li>Two points are earned where ≥56% to ≤70% of the roof has a high initial SRI and two points are earned where ≥56% to ≤70% of the roof has a high three-year-aged SRI.</li> </ul> </li> <li>Two Points are earned if ≥40% to &lt;56% percent of the roof complies.             <ul style="list-style-type: none"> <li>One point is earned where ≥40% to &lt;56% of the roof has a high initial SRI, and one point is earned where ≥40% to &lt;56% of the roof has a high three-year-aged SRI.</li> </ul> </li> <li>No points are earned if &lt;40% of the roof complies AND/OR has a high initial or three-year-aged SRI.</li> <li>Not applicable for interior-only projects.</li> </ul>
<p><b>7.3.4.2 Hardscape:</b> The building design addresses hardscape using one or more of the following strategies:</p> <ul style="list-style-type: none"> <li><b>7.3.4.2.1 Solar Reflectance Index:</b> Hardscape surfaces with a solar reflectance index (SRI) of 29 or greater. New concrete and concrete masonry without additional colored pigment are deemed to comply without additional testing.             <ul style="list-style-type: none"> <li>Not applicable for interior-only projects.</li> </ul> </li> <li><b>7.3.4.2.2 Shading:</b> Where the hardscape surfaces are not shaded by the primary building structures (either the building project or other <i>existing buildings</i>), hardscape surfaces outside the building footprint are intended to be shaded by</li> </ul>	<p>Maximum = 5 points or N/A</p> <ul style="list-style-type: none"> <li>Five points are earned where ≥50% of hardscape surfaces comply with 7.3.4.2.</li> <li>Three points are earned where ≥25% to &lt;50% of hardscape surfaces comply with 7.3.4.2.</li> <li>No points are earned where &lt;25% of hardscape surfaces comply with 7.3.4.2.</li> </ul>



<p>trees or other vegetation within 10 years. Take the shading measurement at noon Standard Time on the Summer Solstice and document in the shading plan.</p> <ul style="list-style-type: none"> <li>• <b>7.3.4.2.3 Permeable Surfaces:</b> At least 50% of installed hardscape area (walkways, patios, driveways, etc.) uses permeable materials. Permeable materials include one or more of the following:           <ul style="list-style-type: none"> <li>○ Clay or concrete paver with pervious joints/openings;</li> <li>○ Bricks;</li> <li>○ Gravel;</li> <li>○ Vegetative paving systems;</li> <li>○ <i>Mulch</i>;</li> <li>○ <i>Pervious concrete</i>;</li> <li>○ <i>Porous asphalt</i>; AND/OR</li> <li>○ Open-grid pavement system (at least 50% unbound).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Not applicable where there are no hardscape surfaces.</li> </ul>
<p><b>7.3.4.3 Walls:</b> At least 75% of opaque wall surfaces (by area) on the east, west, and south have a solar reflectance index (SRI) of 29 or greater, are covered by or are designed to be covered by non-invasive vegetation AND/OR a vegetative wall during the summer months. New concrete or concrete masonry without additional colored pigment is deemed to comply without additional testing.</p>	<p>3 points or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable for <i>climate zone 6, 7, and 8.</i></li> </ul>

### 7.3.5 BIRD STRIKES

<p><b>7.3.5.1</b> Measures to address bird strikes include, but are not limited to the following:</p> <p>Glass and Façade Treatments:</p> <ul style="list-style-type: none"> <li>• Fritted and Frosted Glass</li> <li>• Angled Glass</li> <li>• Ultra-Violet Glass</li> <li>• Film and Art Treatment of Glass</li> <li>• External Screens</li> <li>• Architectural Features</li> <li>• Netting</li> </ul> <p>Other Considerations:</p> <ul style="list-style-type: none"> <li>• Wind generators</li> <li>• Lighting Treatments</li> <li>• Location-Related Hazard:</li> <li>• Buildings located inside of, or within a clear flight path of less than 300 feet from an Urban Bird Refuge (defined below) require treatment when:</li> </ul>	<p>Maximum = 4 points</p> <ul style="list-style-type: none"> <li>• 3 points are earned for implementing measures identified in 7.3.5.1.</li> <li>• 1 point is earned for assessing and reporting on the design analysis for bird safety.</li> </ul>
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- New buildings are constructed
- Additions are made to *existing buildings* (Note: only the new construction will require treatment)
- *Existing buildings* replace 50% or more of the glazing within the “bird collision zone” on the façade(s) facing the Urban Bird Refuge

#### Bird Collision Zone:

The portion of buildings most likely to sustain bird strikes. This area begins at grade and extends upwards for 60 feet. This zone also applies to glass façades directly adjacent to large landscaped roofs (two acres or larger) and extending upward 60 feet from the level of the subject roof.

## 7.4 STORMWATER MANAGEMENT (21 POINTS)

### 7.4.1 STORMWATER MANAGEMENT

**7.4.1.1** A *qualified professional* makes a *stormwater* management report that shows the following:

- **7.4.1.1.1:** The project meets a minimum of 80% Total Suspended Solids (TSS) removal or complies with municipal AND/OR local watershed water quality control targets, whichever is more stringent; and
- **7.4.1.1.2:** 50% annual average total phosphorus (TP) removal assuming typical pollutant concentrations in urban runoff.
- **7.4.1.1.3:** Additional target pollutant removals are as follows:
  - Nitrate + nitrite reduction of 40%
 AND/OR
  - pH below 6.5
 AND/OR
  - Alkalinity below 10 mg CaCO<sub>3</sub>/L.

Note: Infiltration is not to be used as a treatment method if the site is located within 0.25 mi (0.4 km) of a lake or *wetland*.

OR

- **7.4.1.1.4:** The site retains at least the 95<sup>th</sup> percentile storm volume as per a site water balance assessment, to be included in the *stormwater* management report.

Maximum = 17 points or N/A

- Three points are earned for compliance with 7.4.1.1.1.
- One point is earned for compliance with 7.4.1.1.2.
- One point is earned for compliance with each item in 7.4.1.1.3. for a maximum of three points.

OR

- Seventeen points are earned for compliance with 7.4.1.1.4.
- Not applicable for interior-only projects.

**7.4.1.2** Hardscapes and structures, excluding pervious walkways 48 in. (121.9 cm) or less in width, are located 100 ft. (30.5 m) or more from a natural body of water or natural waterway on or

4 points or N/A

adjacent to the site. Document such distance on the site plan.  
Water bodies and waterways include:

- Oceans;
- Lakes;
- Rivers;
- Streams;
- Estuaries;
- Bays;
- *Wetlands*;
- Springs, or seeps;
- Ravines;
- Arroyos; AND/OR
- Canyons.

Note: Waterways may be intermittently dry provided they define channeled flow of water when wet.

- Not applicable where the body of water is a retention pond or constructed *wetland*, or is a constructed feature that receives all *stormwater* runoff.

## 7.5 LANDSCAPING (~~21~~16 POINTS)

### 7.5.1 LANDSCAPING

**7.5.1.1** A landscape design is planned and installed as follows:

- **7.5.1.1.1:** The plan is developed by a landscape architect, certified professional landscape designer, certified horticulturalist, or other *qualified professional*; AND
  - The plan shows the natural light conditions of the site; AND
  - The plan shows structural limitations (e.g., shading, utilities, *overhangs*, lights) that would impact the location and growth of plants.
- **7.5.1.1.2:** The plan identifies existing soil types, and the installed landscape incorporates appropriate soil preparation and drainage to support root development for vegetation planned for the site.

Where an irrigation system is installed, refer to Water Efficiency, Section 9.~~89~~, Irrigation.

**7.5.1.2** The vegetation palette includes the following:

- The vegetated area uses non-invasive, *drought tolerant plants*.

Required documentation:

Maximum = ~~6~~5 points or N/A

- Three points are earned where the landscape plan is developed and shows natural light conditions and structural limitations.
- ~~Three~~Two points are earned where the plan identifies existing soil types, and the installed landscape incorporates soil preparation and drainage as stated.
- Not applicable where there is no room for landscaping.

Maximum = ~~3~~2 points or N/A

- ~~Three~~Two points are earned if >75% of the plants are *drought tolerant* and non-invasive.

<p>Website or literature that indicates that the given plant(s) are drought-tolerant or require little to no supplemental water for the specific region.</p> <p>Only applicable when the determination of plant invasiveness is guided by a list or lists that:</p> <ul style="list-style-type: none"> <li>cover the appropriate geographical region; AND</li> <li>are not limited to noxious weeds.</li> </ul>	<ul style="list-style-type: none"> <li><del>Two</del><u>One</u> points <del>is are</del> earned if between <math>\geq 50\%</math> to <math>\leq 75\%</math> of the plants are <i>drought tolerant</i> and non-invasive;</li> <li><del>One point is earned if between <math>\geq 25\%</math> to <math>&lt; 50\%</math> of the plants are <i>drought tolerant</i> and non-invasive.</del></li> <li>No points are earned if <del><math>&lt; 25</math></del><u>50</u>% of the plants are <i>drought tolerant</i> and non-invasive.</li> <li>Not applicable where there is no room for landscaping.</li> </ul>
<p><b>7.5.1.3</b> The vegetated area is covered with plants (new, retained, or salvaged plantings) that are native.</p>	<p>Maximum = <del>4</del><u>3</u> points or N/A</p> <ul style="list-style-type: none"> <li><del>Four</del><u>Three</u> points are earned if <math>&gt; 75\%</math> of plants are native.</li> <li><del>Three</del><u>Two</u> points are earned if between <math>&gt; 50</math> to <math>\leq 75\%</math> of plants are native.</li> <li><del>Two</del><u>One</u> points <del>are is</del> earned if between <math>&gt; 32</math> to <math>\leq 50\%</math> of the plants are native.</li> <li><del>One point is earned if between <math>\geq 20</math> to <math>\leq 32\%</math> of plants are native.</del></li> <li>No points are earned if <del><math>&lt; 20</math></del><u><math>\leq 32</math></u>% of the plants are native.</li> <li>Not applicable where there is no room for landscaping.</li> </ul>
<p><b>7.5.1.4</b> The landscape design shows that plants with similar water requirements are grouped together on the site.</p>	<p><del>2</del><u>1</u> points or N/A</p> <ul style="list-style-type: none"> <li><del>Two</del><u>One</u> points <del>is are</del> earned if plants are grouped according to water requirements.</li> <li>Not applicable where all of the landscaping is a preserved natural area or where there is no room for landscaping.</li> </ul>
<p><b>7.5.1.5</b> The building project supports on-site agriculture accessible to building users or employees in any of the following ways:</p> <ul style="list-style-type: none"> <li><b>7.5.1.5.1:</b> Rooftop garden(s), edible landscape(s), food forest, or community garden is installed on-site;</li> </ul>	<p>Maximum = <del>6</del><u>5</u> points or N/A</p> <ul style="list-style-type: none"> <li>Two points are earned where there is an on-site rooftop garden, edible landscape, food forest, or community garden.</li> </ul>

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• <b>7.5.1.5.2:</b> 25% of vegetated area is dedicated to pollinator-friendly plantings or an apiary;</li> <li>• <b>7.5.1.5.3:</b> Chicken coop, aquaponics farm, AND/OR greenhouse is installed on-site.</li> </ul> | <ul style="list-style-type: none"> <li>• Two points are earned where there is an apiary or pollinator garden on-site.</li> <li>• <del>Two</del> <u>One</u> points <del>is are</del> earned where there is an on-site chicken coop, aquaponics farm, AND/OR greenhouse.</li> <li>• Not applicable for interior-only projects.</li> </ul> |
|---|---|

## 7.6 LIGHT POLLUTION (5 POINTS)

### 7.6.1 Exterior Light Pollution

Two paths are provided for assessing exterior *light pollution*:

- **7.6.1A Path A: Lighting Design Performance Method:** 5 points
- OR
- **7.6.1B Path B: Prescriptive Method Lighting Requirements:** 5 points

Points cannot be combined between paths. Select one of the paths below.

#### 7.6.1A PATH A: LIGHTING DESIGN PERFORMANCE METHOD

**7.6.1A.1** An engineer or lighting professional creates a lighting design that meets all the performance requirements of the *IDA - IES Model Lighting Ordinance (MLO), Tables D (Initial Lumens), AND Table E (Additional Lumen Allowances) AND Table F (Maximum Vertical Illuminance on the Property Line)* ~~A and B~~, 2011.

5 points or N/A

- Not applicable where there is no site lighting.

OR

#### 7.6.1B PATH B: PRESCRIPTIVE METHOD LIGHTING REQUIREMENTS

**7.6.1B.1** Exterior lighting does not exceed prescribed values for the amount of light per unit of area per IDA – IES Model Lighting Ordinance (MLO), Tables ~~A~~ (Parking Space Method) or and B (Hardscape Area Method) AND Table F (Maximum Vertical Illuminance on the Property Line), 2011.

1 point or N/A

- Not applicable where there is no exterior lighting.

**7.6.1B.2** Exterior lighting trespass does not exceed prescribed Backlight, Uplight and Glare (BUG) ratings as per *IDA – IES Model Lighting Ordinance (MLO), Table ~~C-(C-1, C-2, and C-3)~~*, 2011 for the following:

3 points or N/A

- Backlight ~~trespass~~;
- Uplight ~~trespass~~; and
- Glare.

- Not applicable where there is no exterior lighting.



**7.6.1B.3** Parking lot lighting does not emit light above 90 degrees from the vertical axis.

1 point or N/A

- Not applicable where there is no parking lot lighting.

## 7.7 SAFETY (5 POINTS)

### 7.7.1 EXTERIOR LIGHTING SAFETY

**7.7.1.1** Orientation and Wayfinding, all exterior vertical and horizontal illuminances fall within the specified range per Table A-1 in Annex A of ANSI/IES RP-43-21, Recommended Practice: Lighting Exterior Applications, 2021.

2 points or N/A

- Not applicable where there is no site lighting.

**7.7.1.2** Glare Reduction, exterior luminaires provide 55° cutoff above the horizontal plane. Exception for luminaires installed for the purpose of illuminating art, buildings, or trees.

1 point or N/A

- Not applicable when luminaires are installed for the purpose of illuminating art, buildings, or trees or where there is no site lighting.

**7.7.1.3** Color Rendering, exterior luminaires provide 80 or greater Color Rendering Index OR IES TM-30 Rf (Fidelity) of 80 and Rg (Gamut) of 85. Exception for luminaires installed for the purpose of illuminating art, buildings, or trees.

1 point or N/A

- Not applicable when luminaires are installed for the purpose of illuminating art, buildings, or trees or where there is no site lighting.

**7.7.1.4** For the safety and reassurance of pedestrians, uniformity is critical to ensure appropriate lighting of all contents within the same field of view. Exterior uniformity shall be 4:1 (Max:Avg) or greater for LZ0 or 20:5:1 (Max:Avg:Min) or greater for LZ1, LZ2, LZ3, and LZ4.

1 point or N/A

- Not applicable where there is no site lighting.

## 7.7.8 WILDLAND-URBAN INTERFACE SITE DESIGN (3 POINTS)

### 7.7.8.1 WILDLAND-URBAN INTERFACE SITE DESIGN

**7.7.8.1.1** Where a Wildland Urban Interface Code has been adopted OR ~~if~~ there is a determination by a fire protection engineer or certified fire marshal that the site wildland-urban interface hazard is moderate, high or extreme;

3 points or N/A

AND

- Not applicable where the building site is not located in authority having jurisdiction or legislative body has formally declared a wildland-urban interface area.

The project achieves points for 7.2.1.1 or 7.2.1.~~7~~6 or is within 0.25 mi (0.4 km) walking distance of developed residential land of at least 8 dwelling units per acre;

AND

The site is designed to comply with the most recent International Wildland-Urban Interface Code (2015);

AND

Excluding athletic fields and agriculture, greater than 50% of the vegetation on site achieves points for Section 7.5.1.2 for *drought tolerant plants*, and greater than 50% of the vegetation on site achieves points for Section 7.5.1.3 for native plants.

AND

A fire protection engineer or certified fire marshal has inspected the completed site within 90 days prior to project certification or re-certification and found it compliant with the International Wildland-Urban Interface Code (2015).

## 8. ENERGY (260 points)

### 8.1 ENERGY PERFORMANCE (180 POINTS)

#### 8.1.1 Assessing Energy Performance

~~Three-Five~~ paths are provided for assessing energy performance. ~~Path A and Path B~~ All paths provide a maximum of 180 points out of 180, ~~and except for~~ Path ~~C-E, which~~ provides a maximum of 111 points out of 180. Select one of the paths below. Points cannot be combined between paths.

- **8.1.1A Path A: Performance - ANSI/ASHRAE/IES Standard 90.1-2010, Appendix G or ANSI/ASHRAE/IES Standard 90.1-2013, 90.1-2016, or 90.1-2019: Up to 180 points**

OR

- **8.1.1B Path B: Performance – ENERGY STAR® Benchmarking: MURBS and Offices: Up to 180 points**

OR

- **8.1.1C Path C: Performance – ASHRAE Building EQ: Up to 180 points**

OR

- **8.1.1D Path D: Performance- Net Zero Carbon or Energy Certification: 180 points**
- ~~8.1.1B Path B: Performance – Building Carbon Dioxide Equivalent (CO<sub>2</sub>e) Emissions: 180 points~~

OR

- **8.1.1E Path ~~C-E~~: Prescriptive: Up to 111 points**

#### **8.1.1A PATH A: ANSI/ASHRAE/IES STANDARD 90.1-2010, APPENDIX G OR ANSI/ASHRAE/IES STANDARD 90.1-2013, 90.1-2016, OR 90.1-2019 (180 POINTS)**

**8.1.1A.1** The building complies with minimum performance based requirements of ANSI/ASHRAE/IES Standard 90.1-2010 or the 2012 IECC;

AND

The building demonstrates an improvement over an ANSI/ASHRAE/IES Standard 90.1-2010 Appendix G baseline ~~using Appendix G~~ through the use of a whole-building energy modeling ~~simulation program showing energy cost savings.~~

OR

The proposed building complies with the minimum performance-based requirements of either ANSI/ASHRAE/IES Standard 90.1-2013, 90.1-2016, or 90.1-2019, or the 2015, 2018, or 2021 IECC.

AND

The proposed building demonstrates an improvement over an estimated ANSI/ASHRAE/IES Standard 90.1-2010 Appendix G

Maximum = 180 points

- One hundred eighty points are earned for a ≥45% improvement over the baseline.
- One hundred sixty points are earned for a ≥40% to <45% improvement over the baseline.
- One hundred forty points are earned for a ≥35% to <40% improvement over the baseline.
- One hundred twenty points are earned for a ≥30% to <35% improvement over the baseline.
- One hundred points are earned for a ≥25% to <30% improvement over the baseline.

baseline through the use of whole-building energy modeling in accordance with Appendix G for either ANSI/ASHRAE/IES Standards 90.1 2013, 2016, or 2019, using the *Green Globes® Energy Baseline Translator™* to estimate the ANSI/ASHRAE/IES Standard 90.1-2010 Appendix G baseline.

- ~~Energy cost calculations may include price components based on time of day and demand if these are available. Credit for demand-saving measures, cogeneration, and energy storage may be claimed by utilizing rate schedules that reflect the billing rates in effect for the local utility, rather than using EIA state average utility rates.~~

- Eighty points are earned for a  $\geq 20\%$  to  $< 25\%$  improvement over the baseline.
- Sixty points are earned for a  $\geq 15\%$  to  $< 20\%$  improvement over the baseline.
- Forty points are earned for a  $\geq 10\%$  to  $< 15\%$  improvement over the baseline.
- Twenty points are earned for a  $\geq 5\%$  to  $< 10\%$  improvement over the baseline.
- No points are earned for a  $< 5\%$  improvement over the baseline.
- ~~One hundred eighty points are earned where the project achieves a level of 45% improvement over the baseline.~~
  - ~~Four points are earned for every 1% improvement up to 45% improvement over the baseline for a maximum of 180 points.~~
  - ~~No points are earned where the building complies only with the minimum performance-based requirements of either ANSI/ASHRAE/IES Standard 90.1-2010 or the 2012 IECC.~~

OR

#### 8.1.1B ENERGY STAR® BENCHMARKING – MURBS AND OFFICES (180 points)

8.1.1B.1 The ENERGY STAR® score of the proposed building is 75 or greater as determined by whole building energy modeling in accordance with the modeling guidelines prescribed in ANSI/ASHRAE/IES Standard 90.1-2010 Appendix G.

For MURBs and Office buildings only.

Maximum = 180 points

- One hundred eighty points are earned for an ENERGY STAR® score of 97 to 100 for a MURB.
- One hundred seventy-five points are earned for an ENERGY STAR® score of 95 to 96 for a MURB.
- One hundred sixty-eight points are earned for an ENERGY STAR® score of 93 to 94 for a MURB.

	<ul style="list-style-type: none"> <li>• <u>One hundred sixty-one points are earned for an ENERGY STAR® score of 91 to 92 for a MURB.</u></li> <li>• <u>One hundred fifty-four points are earned for an ENERGY STAR® score of 89 to 90 for a MURB.</u></li> <li>• <u>One hundred forty-seven points are earned for an ENERGY STAR® score of 87 to 88 for a MURB.</u></li> <li>• <u>One hundred forty points are earned for an ENERGY STAR® score of 85 to 86 for a MURB.</u></li> <li>• <u>One hundred thirty-three points are earned for an ENERGY STAR® score of 83 to 84 for a MURB.</u></li> <li>• <u>One hundred twenty-six points are earned for an ENERGY STAR® score of 81 to 82 for a MURB.</u></li> <li>• <u>One hundred nineteen points are earned for an ENERGY STAR® score of 79 to 80 for a MURB.</u></li> <li>• <u>One hundred twelve points are earned for an ENERGY STAR® score of 77 to 78 for a MURB.</u></li> <li>• <u>One hundred five points are earned for an ENERGY STAR® score of 75 to 76 for a MURB.</u></li> <li>• <u>No points are earned for an ENERGY STAR® score &lt;75 for a MURB.</u></li> </ul> <ul style="list-style-type: none"> <li>• <u>One hundred eighty points are earned for an ENERGY STAR® score of 98 to 100 for an office building.</u></li> <li>• <u>One hundred seventy points are earned for an ENERGY STAR® score of 96 to 97 for an office building.</u></li> <li>• <u>One hundred fifty points are earned for an ENERGY STAR® score of 94 to 95 for an office building.</u></li> <li>• <u>One hundred thirty points are earned for an ENERGY STAR® score of 92 to 93 for an office building.</u></li> </ul>
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	<ul style="list-style-type: none"> <li>• <u>One hundred ten points are earned for an ENERGY STAR® score of 90 to 91 for an office building.</u></li> <li>• <u>Ninety points are earned for an ENERGY STAR® score of 88 to 89 for an office building.</u></li> <li>• <u>Seventy points are earned for an ENERGY STAR® score of 86 to 87 for an office building.</u></li> <li>• <u>Fifty points are earned for an ENERGY STAR® score of 84 to 85 for an office building.</u></li> <li>• <u>Thirty points are earned for an ENERGY STAR® score of 82 to 83 for an office building.</u></li> <li>• <u>Ten points are earned for an ENERGY STAR® score of 80 to 81 for an office building.</u></li> <li>• <u>No points are earned for an ENERGY STAR® score of &lt;80 for an office building.</u></li> </ul>
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OR

<b><u>8.1.1C ASHRAE BUILDING EQ (180 points)</u></b>	
<b><u>8.1.1C.1 The ASHRAE Building EQ as designed rating is 85 or less.</u></b>	<p><u>Maximum = 180 points</u></p> <ul style="list-style-type: none"> <li>• <u>One hundred eighty points are earned when the building's ASHRAE Building EQ as designed rating is ≤50.</u></li> <li>• <u>One hundred seventy-five points are earned when the building's ASHRAE Building EQ as designed rating is 51 to 55.</u></li> <li>• <u>One hundred seventy points are earned when the building's ASHRAE Building EQ as designed rating is 56 to 60.</u></li> <li>• <u>One hundred fifty points are earned when the building's ASHRAE Building EQ as designed rating is 61 to 65.</u></li> <li>• <u>One hundred thirty points are earned when the building's ASHRAE</u></li> </ul>

	<p><u>Building EQ as designed rating is 66 to 68.</u></p> <ul style="list-style-type: none"> <li>• <u>One hundred ten points are earned when the building's ASHRAE Building EQ as designed rating is 69 to 71.</u></li> <li>• <u>Ninety points are earned when the building's ASHRAE Building EQ as designed rating is 72 to 74.</u></li> <li>• <u>Seventy points are earned when the building's ASHRAE Building EQ as designed rating is 75 to 77.</u></li> <li>• <u>Fifty points are earned when the building's ASHRAE Building EQ as designed rating is 78 to 80.</u></li> <li>• <u>Thirty points are earned when the building's ASHRAE Building EQ as designed rating is 81 to 83.</u></li> <li>• <u>Ten points are earned when the building's ASHRAE Building EQ as designed rating is 84 to 85.</u></li> <li>• <u>No points are earned when the building's ASHRAE Building EQ as designed rating is ≥86.</u></li> </ul>
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OR

<b>8.1.1D NET ZERO CARBON OR ENERGY CERTIFICATION (180 points)</b>	
<b>8.1.1D.1</b> <u>The project has achieved a Net Zero Carbon or a Net Zero Energy certification from a nationally or regionally recognized certification program within the last three years.</u>	<u>180 points</u>

<b>8.1.1B PATH B: BUILDING CARBON DIOXIDE EQUIVALENT (CO<sub>2</sub>e) EMISSIONS (180 POINTS)</b>	
<p><b>8.1.1B.1</b> <del>The building achieves more than a 50% reduction in carbon dioxide equivalent (CO<sub>2</sub>e) emissions over the baseline building for its geographical location. This reduction is calculated using the following formula:</del></p> <p><del>Percent reduction in CO<sub>2</sub>e = 100 X (1 — PER/BER), where:</del></p> <ul style="list-style-type: none"> <li>• <del>The Baseline Equivalent Emission Rate (BER) is the baseline building's carbon dioxide equivalent (CO<sub>2</sub>e) emission rate.</del></li> </ul>	<p><del>Maximum = 180 points</del></p> <ul style="list-style-type: none"> <li>• <del>Four points are earned for each percent reduction in CO<sub>2</sub>e emissions above the BER, to a maximum total of 180 points.</del></li> </ul>

- ~~• PER is the proposed building's carbon dioxide equivalent (CO<sub>2</sub>e) emission rate.~~
- ~~• PER is less than BER.~~

#### ~~Assessment Guidance:~~

#### ~~Baseline Equivalent Emission Rate (BER) Calculations~~

~~BER is calculated using the following formula:~~

~~BER = (baseline Energy Use Intensity (EUI)) X product of [(percentage of each fuel in the annual energy fuel mix for the planned building type and location) X (CO<sub>2</sub>e Emission Factor for each fuel)], where:~~

- ~~• The baseline building's site Energy Use Intensity (EUI) is determined using ENERGY STAR Target Finder.~~
- ~~• The baseline building's site EUI is 35% better than the Energy Performance Rating (Target Finder) score of 50.~~
- ~~• The annual energy fuel mix for the baseline building is determined from DOE EIA and reported at the top of Target Finder's Results page.~~
- ~~• The CO<sub>2</sub>e emission factor for each fuel in the baseline building's annual energy fuel mix can be found in Table 8.1.1-A.~~

#### ~~Proposed Equivalent Emission Rate (PER) Calculations~~

~~PER is calculated using the following formula:~~

~~PER = (proposed EUI) X product of [(percentage of each fuel in the annual energy fuel mix for the proposed building) X (CO<sub>2</sub>e Emission Factor for each fuel)], where:~~

- ~~• The proposed building's Energy Use Intensity (EUI) is calculated using a computer-based simulation program that conforms to the requirements outlined in Section 506 of the 2009 International Energy Conservation Code or ANSI/ASHRAE/IES Standard 90.1-2010, Appendix G, Section G2.2.~~
- ~~• Determine the Proposed Building's Equivalent Emission Rate (PER) by performing an EUI calculation for the proposed building using the energy performance requirements specified by Table G3.1 Modeling Requirements for Calculating Proposed and Baseline Building Performance in ANSI/ASHRAE/IES Standard 90.1-2010. Only the Proposed Building Performance column is used for modeling the PER.~~

- ~~Use the annual energy fuel mix planned for the proposed building for this calculation.~~
- ~~The CO<sub>2</sub>e emission factor for each fuel in the proposed building's annual energy fuel mix can be found in Table 8.1.1.B of this document.~~

**Table 8.1.1B: CO<sub>2</sub>e Emission Factors<sup>6</sup>**

Fuel	CO <sub>2</sub> e Emission Factor kg/kWh (lb./kWh)
Biomass	0.026 (0.057) <sup>2</sup>
Coal	0.379 (0.836) <sup>2</sup>
Fuel oil (residual)	0.341 (0.751) <sup>2</sup>
Fuel oil (distillate)	0.320 (0.706) <sup>2</sup>
Gasoline	0.313 (0.689) <sup>2</sup>
Grid-delivered electricity	0.630 (1.387) <sup>2</sup>
<del>Grid-displaced electricity<sup>3</sup></del>	<del>-0.833 (-1.835)<sup>1</sup></del>
LPG	0.272 (0.600) <sup>2</sup>
Natural gas	0.219 (0.483) <sup>2</sup>
<del>Off-site renewable electricity<sup>4</sup></del>	<del>-0.758 (-1.670)<sup>1</sup></del>
<del>Waste heat<sup>5</sup></del>	<del>0.019 (0.042)<sup>2</sup></del>
<del>District chilled water</del>	<del>0.151 (0.332)<sup>2</sup></del>
<del>District steam</del>	<del>0.368 (0.812)<sup>2</sup></del>
<del>District hot water</del>	<del>0.348 (0.767)<sup>2</sup></del>

<sup>1</sup>Deru, M., P. Torcellini. 2007. Source Energy and Emissions Factors for Energy Use in Buildings. NREL/TP-550-38617, June 2007. Golden, CO: National Renewable Energy Laboratory.

<sup>2</sup>L2A Conservation of Fuel and Power in New Buildings other than Dwellings. April 2006. Office of the Deputy Prime Minister, United Kingdom.

<sup>3</sup>~~Grid-displaced electricity~~ comprises all electricity generated at the building site by, for example, PV panels, wind power, combined heat and power systems (CHP), etc. The associated CO<sub>2</sub>e emissions are subtracted from the total CO<sub>2</sub>e emissions for the building before determining the PER. CO<sub>2</sub>e emissions arising from fuels used by the building's power generation system (e.g., to power the CHP plant) is included in the building's CO<sub>2</sub>e emission calculations.

<sup>4</sup>The associated CO<sub>2</sub>e emissions from off-site renewable electricity (e.g., using renewable energy certificates or "green power") are subtracted from the total CO<sub>2</sub>e emissions for the building before determining the PER. Contracts have a duration of at least three years. Only 25% of off-site

~~renewable electricity can be credited to the proposed building's CO<sub>2</sub>e calculation.~~  
~~<sup>5</sup>This includes waste heat from industrial processes and power stations rated at more than 10MWe and with a power efficiency of greater than 35%.~~  
~~<sup>6</sup>Values include direct and indirect emissions.~~  
~~<sup>7</sup>ASHRAE/USGBC/IES Standard 189.1-2014 Standard for the Design of High Performance Green Buildings~~

OR

## 8.1.1E PATH 1E: PRESCRIPTIVE (111 POINTS)

Compliance with the prescriptive requirements of this section earns points based on the minimum prescriptive requirements of referenced codes and standards and building characteristics or best practices that are related to energy efficiency.

### 8.1.1E.1 BUILDING ENVELOPE AND FORM (20 POINTS)

#### 8.1.1E.1.1 THERMAL RESISTANCE AND TRANSMITTANCE

**8.1.1E.1.1.1** All of the opaque and *fenestration* elements of the *building envelope* have a window-to-wall ratio less than or equal to 40% and comply with at least one of the following:

- The *thermal transmittance (U-factor)*, *thermal conductance (C-factor)*, *F-factor*, and SHGC are less than those in the 2015 IECC, Section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, Section 5, by 10%, except for these items where the factors must meet the 2015 IECC or ANSI/ASHRAE/IES Standard 90.1-2013:
  - Opaque elements in *Climate Zones* 1 through 3
  - SHGC for north and south-oriented *fenestration*
  - In cases where the *R-value* or SHGC are NR (no requirement).
- Demonstrate that the *U-factor*, *C-factor*, *F-factor*, and SHGC are less than those in the 2015 IECC, Section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, Section 5, by 5%, except for these items where the factors must meet the 2015 IECC or ANSI/ASHRAE/IES Standard 90.1-2013:
  - Opaque elements in *Climate Zones* 1-3
  - SHGC for north and south-oriented *fenestration*
  - In cases where the *R-value* or SHGC are NR (no requirement).

Maximum = 10 points

- Ten points are earned where there is a 10% decrease in *U-factor*, *C-factor*, *F-factor* and SHGC from prescriptive requirements of the 2015 IECC, section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, section 5.
- Eight points are earned where there is a 5% decrease in *U-factor*, *C-factor*, *F-factor*, and SHGC from prescriptive requirements of the 2015 IECC, section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, section 5.
- Five points are earned where *R-value*/RSI-value or *U-factor*, *C-factor*, and *F-factor*; and *fenestration*, *U-factor*, and SHGC meet or exceed prescriptive requirements of the 2015 IECC, section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, section 5.5.



- The thermal resistance (*R-value*/RSI-value) **or** the *thermal transmittance (U-factor)*, *thermal conductance (C-factor)*, and *F-factor*; and for *fenestration*, the *U-factor* and SHGC meet or exceed the prescriptive requirements of the 2015 IECC, section C402, or ANSI/ASHRAE/IES Standard 90.1-2013, section 5.5.

Note: A project must choose either the IECC or ANSI/ASHRAE/IES Standard 90.1 for all factors.

## 8.1.1.2 ORIENTATION

**8.1.1.2.1** The building is oriented such that the ratio of the west *fenestration* to the total *fenestration* and the ratio of the east *fenestration* to the total *fenestration* is between  $\frac{1}{4}$  and  $\frac{1}{6}$ .

Maximum = 10 points

- Ten points are earned where the ratio is  $\leq \frac{1}{6}$ .
- Six points are earned where the ratio  $\leq \frac{1}{5}$  to  $> \frac{1}{6}$ .
- Two points are earned where the ratio is  $\leq \frac{1}{4}$  to  $> \frac{1}{5}$ .

## 8.1.2 LIGHTING (41 POINTS)

### 8.1.2.1 INTERIOR LIGHTING POWER

**8.1.2.1.1** The total interior lighting power density (LPD) of the building is less than the referenced standard. Base calculations for LPD on either the whole-building method or space-by-space method.

- ANSI/ASHRAE/IES Standard 90.1-2013 or 2015 IECC baseline

The control factors from Table 9.6.3 in 90.1-2013 are used to achieve or exceed LPD targets.

Account for high-end trim or Institutional tuning in all spaces where it is present by using a control factor of 0.15 for the purposes of scoring this item.

Maximum = 20 points

- Five points are earned where LPD complies with ANSI/ASHRAE/IES Standard 90.1-2013 or 2015 IECC.
- One additional point is earned for each 2% beyond the requirements of ANSI/ASHRAE/IES Standard 90.1-2013 or 2015 IECC up to an additional 15 points out of a maximum of 20 points for 8.1.2.1.1.

### 8.1.2.2 INTERIOR AUTOMATIC LIGHT SHUTOFF CONTROLS

**8.1.2.2.1** All spaces have automatic controls that turn off non-twenty-four-hour lighting based on occupancy or time schedule. One or more of the following provides automatic control:

2 points or N/A

- Not applicable where lighting control could endanger occupant

- Occupancy or vacancy sensors;
- Building control system based on timer or schedule, for example:
  - Time switch;
  - Automatic relays controlled by BAS;
  - Embedded controls; or
- Other control signal.

safety in a space, patient care space, AND/OR dwelling units and guest rooms, or where local code prohibits such systems.

Lighting control zones consist of up to 25,000 ft.<sup>2</sup> (2,322.6 m<sup>2</sup>) on a single floor.

### 8.1.1C1E.2.3 LIGHTING LEVEL CONTROL

**8.1.1C1E.2.3.1** In all *regularly occupied spaces* ~~that use at least 0.5 W/ft.<sup>2</sup> (5.4 W/m<sup>2</sup>) of lighting power, more than 90% or more~~ of light fixtures have lighting controls that can reduce the lighting load by at least 50% from full lighting power using any of the following technologies:

- Dimming: Continuous dimming of the lamps or *luminaires* from 100% to at least 10% of full light output;
- Multi-level Lighting: Lighting with at least 5 control steps including ON and OFF; or
- Bi-level lighting: Dual switching of alternate rows or *luminaires*; Switching of individual lamps independently of adjacent lamps within a *luminaire*.

Maximum = 3 points or N/A

- Three points are earned where ≥90% of light fixtures have continuously dimmable light reduction controls.
- Two points are earned where ≥90% of the of light fixtures have light reduction controls based multi-level lighting;
- One point is earned where there is bi-level control.
- ~~Not applicable where spaces use <0.5 W/ft.<sup>2</sup> (5.4W/m<sup>2</sup>).~~

**8.1.1C1E.2.3.2** Occupants in private offices less than 250 ft<sup>2</sup> (23.23 m<sup>2</sup>) and in open office work station areas can adjust their direct overhead lighting levels via continuous dimming or multi-level lighting. Providing bi-level overhead lighting in conjunction with separate *task lighting* is permitted for compliance.

Maximum = 3 points

- Three points are earned where ≥90% of light fixtures have continuously dimmable personal lighting control.
- Two points are earned where ≥90% of the of light fixtures have multi-level light lighting.
- One point is earned where there is bi-level control of overhead lighting and separate task lights.

### 8.1.1C1E.2.4 DAYLIGHTING

**8.1.1C1E.2.4.1** For buildings two stories or less above grade, a minimum of 50% of the total combined floor area is in a *daylight area*. For buildings three or more stories above grade, a

3 points or N/A

<p>minimum of 25% of the total combined floor area is in a <i>daylight area</i>. Control Lighting in the primary and secondary <i>daylight areas</i> with <i>daylight responsive dimming plus OFF</i>.</p>	<ul style="list-style-type: none"> <li>• Three points are earned for compliance, excluding spaces that are not <i>regularly occupied</i>, such as, but not limited to, mechanical spaces and storage areas.</li> <li>• Not applicable where spaces would be functionally compromised by <i>daylighting</i>.</li> </ul>
<p><b>8.1.1E.2.4.2</b> A minimum of 2% of the roof area consists of skylights that comply with the requirements of Sections 5 and 9 of ASHRAE Standard 90.1-2013. Base this percentage upon the horizontal projected area of the skylight and roof, without <i>overhangs</i> Earning this credit is contingent on compliance with the daylight control credit <b>8.1.1E.2.5.18-3.2.5</b>.</p>	<p>Maximum = 3 points or N/A</p> <ul style="list-style-type: none"> <li>• Three points are earned where <math>\geq 5\%</math> of the roof consists of skylights.</li> <li>• Two points are earned where <math>&gt; 3\%</math> to <math>&lt; 5\%</math> of the roof consists of skylights.</li> <li>• One point is earned where <math>\geq 2\%</math> to <math>\leq 3\%</math> of the roof consists of skylights.</li> <li>• No points are earned where <math>&lt; 2\%</math> of the roof consists of skylights.</li> <li>• Not applicable where the building is located in <i>Climate Zones 7 or 8</i>.</li> </ul>

#### **8.1.1E.2.5 CONTROL FOR DAYLIT ZONES**

<p><b>8.1.1E.2.5.1</b> Control lighting in <i>primary and secondary daylight zones</i> [use 90.1-2013 definitions for daylight zones] with automatic daylight responsive lighting controls that lower the power consumption of the lighting system when daylight is available.</p>	<p>Maximum = 3 points</p> <ul style="list-style-type: none"> <li>• Three points are earned where there is automatic continuous daylight dimming to OFF control of all the general lighting in both primary and secondary zones.</li> <li>• Two points are earned where there is automatic <i>daylighting</i> switching to OFF control of the general lighting in primary zone and secondary daylight zones.</li> <li>• Two points are earned where there is no <i>daylighting</i> if it would be detrimental to the intended use of more than 90% of the building area.</li> </ul>
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## 8.1.1E.2.6 EXTERIOR LUMINAIRES AND CONTROLS

**8.1.1E.2.6.1** Exterior LPDs comply with or improve upon ANSI/ASHRAE/IES Standard 90.1-2013 Section 9.4.2 ~~9.4.3~~ for exterior lighting power density.

Additional control requirements to earn LPD credit include:

- Deactivating lighting when sufficient daylight is available; and
- Shutting off façade and landscape lighting between midnight and business opening, or other similar hours approved by the AHJ.

Maximum = 2 points or N/A

- Two points are earned where LPDs are 20% below ANSI/ASHRAE/IES Standard 90.1-2013.
- One point is earned where ANSI/ASHRAE/IES Standard 90.1-2013 is met.
- Not applicable where there are no exterior luminaires.

**8.1.1E.2.6.2** Garage and Parking Lot Lighting Control: Pole lighting in parking lots and garage *luminaires* are controlled such that at least 50% of the lighting power is automatically reduced during periods of no activity detected in the lighting zone.

Maximum = 2 points or N/A

- Two points are earned where all garage and parking lot general lights are controlled to more than one lighting level.
- One point is earned where 50% of the garage and parking lot general lighting is controlled to more than one lighting level.
- Not applicable where there are no garage or parking lot general lighting fixtures.

## 8.1.1E.3 HVAC SYSTEMS AND CONTROLS (37 POINTS)

### 8.1.1E.3.1 BUILDING AUTOMATION SYSTEM (BAS)

**8.1.1E.3.1.1** A central Building Automation System (BAS) encompasses all systems that affect building energy performance, lighting, and thermal comfort including all of the functionality listed below:

- A series of direct digital controllers (DDC) interconnected by a local area network and accessible by a web browser;
- Open communication protocols (e.g., BACnet) to allow interoperability between building systems and control vendors;
- Energy management and monitoring software that provides:
  - Start/stop control for HVAC equipment;
  - control of economizer cycles and heat recovery equipment; and

1 point or N/A

- Not applicable where buildings are under 20,000 ft.<sup>2</sup> (1,858.06 m<sup>2</sup>).

<ul style="list-style-type: none"> <li>○ control of minimum outdoor ventilation air;</li> <li>• Log of trending, scheduling, set-point adjustments, event information, alarm information, confirmation of operators, and execution of global commands; and</li> <li>• Monitoring of fire safety systems, security systems, and elevator control systems to prompt emergency operating modes of HVAC and lighting systems.</li> </ul>	
<p><b>8.1.1C1E.3.1.2</b> The BAS has the capability to accept and collate data generated by any and all <i>metering</i> equipment as required by Section 8.5-3 <i>Metering</i>, Monitoring, and Measurement of the Energy assessment area of this Standard.</p>	<p>1 point or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where buildings are under 20,000 ft.<sup>2</sup> (1,858.06 m<sup>2</sup>).</li> </ul>

### 8.1.1C1E.3.2 COOLING EQUIPMENT

**8.1.1C1E.3.2.1** The cooling equipment base efficiency meets ANSI/ASHRAE/IES Standard 90.1-2013 efficiency requirements with respect to COP, EER, IEER, and SEER or the building does not use mechanical cooling.

90.1-2013 Table	Equipment
Table 6.8.1-1	Unitary A/C and condensing units
Table 6.8.1-2	Unitary and applied heat pumps
Table 6.8.1-3	Water-chilling packages
Table 6.8.1-4	PTAC, PTHP, single-package vertical A/C and heat pumps, room air-conditioners, and room A/C heat pumps
Table 6.8.1-9	Variable refrigerant flow A/C (multisplit) systems
Table 6.8.1-10	Variable refrigerant flow air-to-air and applied heat pumps
Table 6.8.1-11	Computer room A/C and condensing units

A weighted average improvement over efficiency is provided by the design engineer based on the capacity for projects with multiple applicable types of equipment. Air-conditioning units constituting less than 1% of the total capacity may be omitted from the calculation.

Cooling systems that utilize-use hydronic heat rejection also include measures to minimize fan power in order to earn efficiency credits under this section. Any of the following measures are used in cooling towers to reduce fan energy consumption:

Maximum = 5 points or N/A

- Five points are earned where performance is 10% higher than the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- Three points are earned where performance is 5% higher than the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- One point is earned where performance is equivalent to the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- Not Applicable where the building does not use mechanical cooling.



- Two-speed fans;
- Variable speed fans; AND/OR
- Measures that allow operation at reduced fan power during part-load operation.

Heat rejection equipment complies with minimum efficiency levels in ANSI/ASHRAE/IES Standard 90.1-2013, Table 6.8.1-7.

### 8.1.1E.3.3 HEATING EQUIPMENT

**8.1.1E.3.3.1** The heating equipment base efficiency meets ANSI/ASHRAE/IES Standard 90.1-2013 efficiency requirements with respect to AFUE,  $E_c$ ,  $E_t$ , HSPF, or  $COP_H$  as appropriate to the specific equipment, or the building does not have a heating system.

90.1-2013 Table	Equipment
Table 6.8.1-2	Unitary and applied heat pumps (heating mode)
Table 6.8.1-4	PTHP, single-package vertical heat pumps, and room A/C heat pumps (heating mode)
Table 6.8.1-5	Warm-air furnaces and unit heaters
Table 6.8.1-6	Gas and oil-fired boilers
Table 6.8.1-10	Variable refrigerant flow air-to-air and applied heat pumps

The design engineer provides a weighted average improvement over efficiency based on the capacity for projects with multiple applicable types of equipment. Heating units constituting less than 1% of the total capacity may be omitted from the calculation.

Steam systems return condensate to the boiler feedwater system or recover heat from the condensate before sending it to the drain in order to claim equipment efficiency points.

Maximum = 5 points or N/A

- Five points are earned where performance is 10% higher than the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- Three points are earned where performance is 5% higher than the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- One point is earned where performance is equivalent to the requirements of ANSI/ASHRAE/IES Standard 90.1-2013.
- No points are earned where there is electric resistance heat.
- Not Applicable where the building does not use heating systems.

### 8.1.1E.3.4 DOMESTIC HOT WATER HEATERS

**8.1.1E.3.4.1** All domestic hot water heaters meet the efficiency requirements of ANSI/ASHRAE/IES STANDARD 90.1-2013, Table 7.8, or domestic hot water heaters are not provided.

~~Maximum =~~ 1 point

- One point is earned where performance is 10% better than the requirements of

	<p>ANSI/ASHRAE/IES Standard 90.1-2013.</p> <ul style="list-style-type: none"> <li>No points are earned where there is electric resistance heat unless the source of electricity was documented as 100% onsite renewable electricity [1 point].</li> </ul>
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### 8.1.1C1E.3.5 ENERGY RECOVERY

8.1.1C1E.3.5.1 The HVAC design complies with Section 6.5.6 of the ANSI/ASHRAE/IES Standard 90.1-2013.

6 points or N/A

- Not applicable where projects meet the exemptions of Section 6.5.6.

### 8.1.1C1E.3.6 SIMULTANEOUS HEATING AND COOLING

8.1.1C1E.3.6.1 The HVAC design minimizes or eliminates simultaneous heating and cooling through one of the following strategies:

- ~~HVAC design complies with Section 6.5.2 of the ANSI/ASHRAE/IES Standard 90.1-2013.~~

OR

- HVAC design incorporates a configuration/strategy that eliminates reheat and re-cool by using thermal and ventilation compartmentalization, with heating, cooling, and ventilation provided independently for each zone, e.g., fan coil systems, distributed heat pumps, single-zone systems.

OR

- HVAC design complies with Section 6.5.2 of the ANSI/ASHRAE/IES Standard 90.1-2013.

Maximum = 6 points or N/A

- Six points are earned where HVAC design uses ventilation compartmentalization.
- Four points are earned where HVAC design complies with Section 6.5.2.
- Not applicable for projects that meet the exemptions of Section 6.5.2.

### 8.1.1C1E.3.7 ECONOMIZERS

8.1.1C1E.3.7.1 The project complies with Section 6.5.1 of the ANSI/ASHRAE/IES Standard 90.1-2013.

3 points or N/A

- Not applicable where projects meet the exemptions of Section 6.5.1.

### 8.1.1C1E.3.8 AIR-HANDLING EQUIPMENT AND VENTILATION CONTROL

**8.1.1C1E.3.8.1** The project uses equal or less fan power than the requirements of ANSI/ASHRAE/IES Standard 90.1-2013 Table 6.5.3.1-1 including all exceptions and modifiers.

Maximum = 6 points or N/A

- Three points are earned where project complies with ANSI/ASHRAE/IES 90.1-2013 Table 6.5.3.1-1.
- One additional point is earned for each 10% less than the allowance according to Table 6.5.3.1-1, up to a maximum of 6 points.
- Not applicable where there are no fan systems.

**8.1.1C1E.3.8.2** Occupancy AND/OR CO<sub>2</sub> sensors are installed to control ventilation rates in *regularly occupied spaces* that may experience frequent variation in the number of occupants. CO<sub>2</sub> sensors maintain calibration within 2% for one year after initial installation.

3 points or N/A

- Not applicable where spaces meeting this criterion represent <40% of the total design ventilation volume of the building.

## 8.1.1C1E.4 ENERGY SIMULATION AIDED DESIGN & INTEGRATIVE PROCESS (13 POINTS)

### 8.1.1C1E.4.1 ENERGY SIMULATION AIDED DESIGN

**8.1.1C1E.4.1.1** Before finalizing the building footprint, perform an energy simulation on a simplified geometric representation of the building to determine strategies to save lighting and HVAC energy. This simulation includes massing, *orientation*, window-to-wall ratio, and *building envelope* strategies.

8 points

### 8.1.1C1E.4.2 INTEGRATIVE PROCESS

**8.1.1C1E.4.2.1** Before issuing *construction documents*, a simulation is used to inform design decisions regarding incremental equipment efficiency of building systems for the envelope, lighting, and HVAC.

5 points

Complete 8.2, 8.3, and 8.4 regardless of Path chosen above.

## 8.2 NON-MODELED ENERGY EFFICIENCY IMPACTS (15 POINTS)

### 8.2.1 VERTICAL, HORIZONTAL, AND INCLINED TRANSPORT SYSTEMS – EFFICIENCY MEASURES

**8.2.1.1** The building elevators use regenerative braking AND/OR machine-roomless (MRL) elevators for all passenger elevators and any regularly ~~utilized~~used elevators.

2 points or N/A

	<ul style="list-style-type: none"> <li>Two points are earned where there are regenerative drive systems elevators AND/OR machine-roomless (MRL) elevators.</li> <li>Not applicable where there are no elevators.</li> </ul>
<b>8.2.1.2</b> Enhance the energy efficiency of elevator systems through the use of: <ul style="list-style-type: none"> <li>TWIN elevators (stacked cabins on one operating elevator in one shaft);</li> <li>Elevators with a destination dispatch system (grouping people traveling to the same floor); AND/OR</li> <li>Elevators with a zero-power sleep mode.</li> </ul>	1 point <ul style="list-style-type: none"> <li>One point is earned where any of the prescribed strategies are used.</li> <li>One point is earned where there are no escalators or elevators.</li> </ul>
<b>8.2.1.3</b> Equip escalators and moving walkways with the efficiency measures to reduce energy consumption.	1 point or N/A <ul style="list-style-type: none"> <li>One point is earned where escalators and moving walkways have the capability to slow down or stop when detectors indicate no traffic or for the use of motor efficiency controllers.</li> <li>Not applicable where there are no escalators or moving walkways.</li> </ul>
<b>8.2.1.4</b> One or more of the following energy efficient equipment systems related to the movement of people is in use: <ul style="list-style-type: none"> <li>Reclaim of Machine Room <i>Waste Heat</i>;</li> <li>Linear Induction Motor (LIM);</li> <li>AC Synchronous Guide Rail hoisting motors with integral braking and controls; AND/OR</li> <li>innovative energy efficient people-transport equipment or system (Requires statement of system description and benefits document for submittal).</li> </ul>	1 point or N/A <ul style="list-style-type: none"> <li>One point is earned where any of the listed items are used.</li> <li>One point is earned where innovative energy efficient people-transport equipment or system is used.</li> <li>Not applicable where the building does not contain any systems capable of using this equipment.</li> </ul>

## 8.2.2 LOAD SHEDDING

<b>8.2.2.1</b> Install lighting systems that are capable of load shedding. Load shedding may be initiated automatically or manually.	Maximum = 3 points <ul style="list-style-type: none"> <li>Three points are earned where lighting system can reduce power by ≥30% from peak levels.</li> </ul>
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	<ul style="list-style-type: none"> <li>Two points are earned where lighting system can reduce power by <math>\geq 15\%</math> to <math>&lt; 30\%</math> from peak levels.</li> </ul>
<b>8.2.2.2</b> HVAC equipment controls that are capable of load shedding are installed. Load shedding may be initiated automatically or manually. Load shedding program initiates setback of space temperatures, heating and cooling system hydronic temperatures, air system static pressure setpoints, or cycling of heating and cooling equipment.	2 points

### 8.2.3 PLUG LOAD AND PROCESS ENERGY MANAGEMENT

<b>8.2.3.1</b> The project documents include an inventory of appliances and equipment organized by location. The inventory includes: <ul style="list-style-type: none"> <li>nameplate power use;</li> <li>typical power use; and</li> <li>an expected schedule of use.</li> </ul>	Maximum = 2 points <ul style="list-style-type: none"> <li>Two points are earned where there is a complete inventory of expected plug load equipment appliances, and hard-wired process equipment.</li> <li>One point is earned where there is a complete inventory of hard-wired process equipment only.</li> <li>One point is earned where there is a complete inventory of plug load equipment and appliances only.</li> </ul>
<b>8.2.3.2</b> Establish a policy that requires all new equipment purchases be based on energy efficient criteria, such as ENERGY STAR or other equivalent energy efficiency standards.	1 point or N/A <ul style="list-style-type: none"> <li>Not applicable if no equipment is subject to ENERGY STAR label criteria.</li> </ul>
<b>8.2.3.3</b> The project is furnished with receptacles that automatically control the availability of power based on occupancy sensors AND/OR timed schedules in accordance with ANSI/ASHRAE/IES Standard 90.1-2010.	Maximum = 2 points <ul style="list-style-type: none"> <li>Two points are earned where energy-saving power strips are installed on <math>\geq 75\%</math> to <math>\leq 100\%</math> of private offices, open offices and computer classrooms, including receptacles installed in modular partitions.</li> <li>One point is earned where energy-saving power strips are installed on <math>\geq 50\%</math> to <math>&lt; 75\%</math> of private offices, open offices and computer</li> </ul>



classrooms, including receptacles installed in modular partitions.

### 8.3 METERING, MONITORING, AND MEASUREMENT (25 POINTS)

#### 8.3.1 METERING

**8.3.1.1** Install *Metering* or ensure a mandatory design requirement exists for *metering* (at the building level) for the following:

- Electricity;
- Heating fuels;
- Steam; and
- Other (e.g., chilled or hot water for campus/district systems).

Maximum = 5 points

- One point is earned for each 20% increment of the building's site energy that is *metered* through any combination of building-level energy *meters* up to a maximum of 5 points.

**8.3.1.2** Install *sub-metering* or energy monitoring equipment in the building, or require a mandatory tenant improvement that calls for *sub-metering* or energy monitoring equipment to be installed for the following systems:

- Lighting and lighting controls by floor or by zones with floor areas no greater than 20,000 ft<sup>2</sup> (1860 m<sup>2</sup>);
- Plug loads by floor or by zones no greater than 20,000ft<sup>2</sup> (1860 m<sup>2</sup>);
- Major electric HVAC equipment (e.g., chillers, cooling towers, AHU fans, pumps) 5 HP or greater;
- Chilled water generation;
- *On-site renewable energy* power generation;
- Heating water or steam generation; AND/OR
- Specialty or process electrical equipment.

Maximum = 5 points or N/A

- One point each for *sub-metering* five or more of the listed systems in a MURB at the building level to a maximum of 5 points.
- Two points each are earned when heating, cooling, and electricity are *sub-metered* at the individual unit level in a MURB to a maximum of 5 points.
- One point is earned for each listed system where *sub-metering* is installed to a maximum of 5 points.
- Not applicable for buildings <20,000 ft<sup>2</sup> (1860 m<sup>2</sup>).

#### 8.3.2 MONITORING AND REPORTING

**8.3.2.1** A Resource Management Plan addresses all energy consuming areas of a building or project and includes the following monitoring protocols (i.e., hourly, daily, monthly, seasonal, by floor, etc.):

- Electricity;
- Heating fuels;
- Steam; and

Maximum = 2 points

- One point is earned where there is documentation of the plan that provides guidance for monitoring installed systems based upon Section 4.5 of the International Performance Measurement & Verification Protocol (IPMVP) Concepts and Practices for

<ul style="list-style-type: none"> <li>Other (e.g., <del>chilled or hot water for</del> campus/district systems)            Note: This may reflect new technology that uses other energy sources as long as they are measurable.</li> </ul>	<p>Determining Energy savings in New Construction, Volume III, Part I, January 2006.</p> <ul style="list-style-type: none"> <li>One point is earned where there is a definition of a constant feedback loop process in the plan for defining improvements in the efficiency of energy usage, based upon review and analysis of the gathered building level <i>meter</i> monitoring documentation.</li> <li>One point is earned where the gathered data is provided for review by occupants and visitors with up-to-date or real-time information on space energy consumption.</li> </ul>
<p><b>8.3.2.2</b> Create an action plan for evaluating the results of documentation defined by the Resource Management Plan and gathered by <i>metering</i> equipment (based upon Section 4.5 D, of the International Performance Measurement &amp; Verification Protocol (IPMVP): Concepts and Practices for Determining Energy savings in New Construction, Volume III, Part I, January 2006).</p> <p>The action plan has a process for implementing changes identified as a result of the analysis of the monitoring of energy use. The action plan addresses a minimum of two of the following systems:</p> <ul style="list-style-type: none"> <li>Lighting and lighting controls by floor or by zones;</li> <li>Plug loads by floor or by zones;</li> <li>Major electric HVAC equipment (e.g., chillers, cooling towers, AHU fans, pumps) 5 HP or greater;</li> <li>Chilled water generation;</li> <li><i>On-site renewable energy</i> power generation;</li> <li>Heating water or steam generation; AND/OR</li> <li>Specialty or process electrical equipment.</li> </ul>	<p>Maximum = 3 points</p> <ul style="list-style-type: none"> <li>One point is earned where there are provisions in the plan that mandate the creation of improvement goals, identified based upon the automated data collection of monitored <i>meter</i> usage information for two or more of the listed systems.</li> <li>Two points are earned where there is definition of a process for implementing improvements in energy usage to reach the stated goals, based upon review and analysis of the gathered documentation for two or more of the listed systems.</li> </ul>

### 8.3.3 VERIFICATION

<p><b>8.3.3.1</b> Provide verification of the measurement of energy use and efficiency in accordance with Section 4.5 Option D – Whole Building Calibrated Simulation, of the International Performance Measurement &amp; Verification Protocol (IPMVP): Concepts and</p>	<p>9 points</p> <ul style="list-style-type: none"> <li>Nine points are earned where verification documentation that</li> </ul>
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<p>Practices for Determining Energy savings in New Construction, Volume III, Part I. January 2006.</p> <p>Savings are determined at the whole-building level by measuring energy use at main <i>meters</i> or <i>sub-meters</i> or using whole-building simulation calibrated to measured energy use data.</p>	<p>the energy data gathered, analysis performed, and computation of energy efficiency is consistent with the objectives of the design intent of the project is provided.</p>
<p><b>8.3.3.2</b> Install a fault detection and diagnostic system (FDD) on HVAC and lighting systems with the ability to detect the following:</p> <ul style="list-style-type: none"> <li>• Economizer operation;</li> <li>• Simultaneous heating and cooling;</li> <li>• Photocell malfunction; and</li> <li>• Additional HVAC and lighting setpoints.</li> </ul>	<p>1 point or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable for buildings without a Building Automation System (BAS).</li> </ul>

## 8.4 RENEWABLE SOURCES OF ENERGY (40 POINTS)

<b>8.4.1 ON-SITE RENEWABLE ENERGY</b>	
<p><b>8.4.1.1</b> Conduct a study to determine the technical feasibility and life cycle cost effectiveness of <i>on-site renewable energy</i>. The study considers an <i>on-site renewable energy</i> system that provides at least 2% of the total building annual energy cost.</p>	<p>5 points</p>
<p><b>8.4.1.2</b> Use the recommendations of a Feasibility Study, or other owner's project requirements to implement <i>on-site renewable energy</i> system(s).</p>	<p>Maximum = 25 points or N/A</p> <ul style="list-style-type: none"> <li>• One point is earned for each percent of project energy produced by <i>on-site renewable energy</i> systems to a maximum of 25 points.</li> <li>• Not applicable where Feasibility Study was completed, and implementation was found to be not life cycle cost effective.</li> </ul>
<b>8.4.2 OFF-SITE RENEWABLE ENERGY CREDITS</b>	
<p><b>8.4.2.1</b> The building owner commits to signing a contract to purchase <i>Renewable Energy Certificates (RECs)</i>, either certified <i>Green Power (US Dept. of Energy)</i> listed <i>renewable energy</i> credit products or other certified <i>RECs</i> or <i>carbon offsets</i>, with a minimum three-year commitment.</p>	<p>Maximum = 10 points</p> <p>Points are earned where <i>renewable energy</i> supplies a percentage of the building's energy:</p> <ul style="list-style-type: none"> <li>• Ten points are earned for 100%.</li> </ul>

*Renewable energy* supplied as part of a utility provider portfolio may be considered towards earning this credit for systems using ~~utilizing~~ 10% or greater of power from appropriate sources.

Buildings using the prescriptive path and that don't otherwise have an energy model may base the percentage of *renewable energy* on median EUI from CBECS for the building type.

- Nine points are earned for  $\geq 90\%$  to  $< 100\%$ .
- Eight points are earned for  $\geq 80\%$  to  $< 90\%$ .
- Seven points are earned for  $\geq 70\%$  to  $< 80\%$ .
- Six points are earned for  $\geq 60\%$  to  $< 70\%$ .
- Five points are earned for  $\geq 50\%$  to  $< 60\%$ .
- Four points are earned for  $\geq 40\%$  to  $< 50\%$ .
- Three points are earned for  $\geq 30\%$  to  $< 40\%$ .
- Two points are earned for  $\geq 20\%$  to  $< 30\%$ .
- One point is earned for  $\geq 10\%$  to  $< 20\%$ .
- No points are earned for  $< 10\%$ .

## 9. WATER EFFICIENCY (190 points)

### 9.1 INDOOR DOMESTIC PLUMBING (54 POINTS)

#### 9.1.1 Plumbing Fixture and Fitting Standards

Where installed in the project and as permitted by local codes, plumbing fixtures and fittings are certified and listed as being compliant with the requirements of the U.S. EPA's *WaterSense* Program where *WaterSense* specifications exist.

Four paths are provided for assessing Indoor Domestic Plumbing.

- **9.1.1A Path A: ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017, Section 6.3.2.1:** 52 points  
OR
- **9.1.1B Path B: 2018 International Green Construction Code (IgCC), Table 601.3.2.1:** 52 points  
OR
- **9.1.1C Path C: 2020 IAPMO WEstand Section 402:** 52 points  
OR
- **9.1.1D Path D: *Major Renovations*:** 45 points. Not an eligible path for New Construction.

Points cannot be combined between paths. Select one of the paths below.

<b>9.1.1A PATH A: ANSI/ASHRAE/ICC/USGBC/IES STANDARD 189.1-2017</b>	
<b>9.1.1A.1</b> Plumbing fixtures and fittings comply with ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2017, Section 6.3.2.1.	52 points or N/A <ul style="list-style-type: none"> <li>• For points to be earned fifty percent of fixtures must comply.                         <ul style="list-style-type: none"> <li>○ Points earned = percentage of compliant fixtures x 52 (fractional points are rounded upward)</li> </ul> </li> <li>• Not applicable where no fixtures or fittings exist.</li> <li>• Not applicable where Path B, C or D is followed.</li> </ul>
<b>OR</b>	
<b>9.1.1B PATH B: 2018 INTERNATIONAL GREEN CONSTRUCTION CODE (IGCC), TABLE 601.3.2.1</b>	
<b>9.1.1B.1</b> Plumbing fixtures and fittings comply with the 2018 International Green Construction Code (IgCC), Table 601.3.2.1.	52 points or N/A <ul style="list-style-type: none"> <li>• For points to be earned fifty percent of fixtures must comply.                         <ul style="list-style-type: none"> <li>○ Points earned = percentage of compliant fixtures x 52</li> </ul> </li> </ul>



	<p>(fractional points are rounded upward)</p> <ul style="list-style-type: none"> <li>• Not applicable where no fixtures or fittings exist.</li> <li>• Not applicable where Path A, C or D is followed.</li> </ul>
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OR

9.1.1C PATH C: 2020 IAPMO WESTAND	
<p><b>9.1.1C.1</b> Plumbing fixtures and fittings comply with 2020 IAPMO WEstand, Section 402.</p>	<p>52 points or N/A</p> <ul style="list-style-type: none"> <li>• For points to be earned fifty percent of fixtures must comply.             <ul style="list-style-type: none"> <li>○ Points earned = percentage of compliant fixtures x 52 (fractional points are rounded upward)</li> </ul> </li> <li>• Not applicable where no fixtures or fittings exist.</li> <li>• Not applicable where Path A, B or D is followed.</li> </ul>

OR

9.1.1D PATH D: MAJOR RENOVATIONS	
<p><b>9.1.1D.1</b> New construction is not eligible for Path D.</p> <p>Points are earned when plumbing fixtures and fittings installed in the project meet or exceed requirements for maximum water consumption as listed below and are certified as being compliant with the requirements of the U.S. EPA's WaterSense Program where WaterSense specifications exist.</p> <ul style="list-style-type: none"> <li>• Toilets (Maximum flush volume 1.28 gal. (4.8 L) per flush);</li> <li>• Urinals (Maximum flush volume 0.5 gal. (1.9 L) per flush);</li> <li>• Showerheads (Maximum flow rate 2.0 gal. (7.6 L) per minute);</li> <li>• Residential <i>lavatory faucets</i> (Maximum flow rate 1.5 gal. (5.7 L) per minute);</li> <li>• Residential kitchen faucets (Maximum flow rate 2.2 gal. (8.3 L) per minute); and</li> <li>• Non-residential <i>lavatory faucets</i> (Maximum flow rate 0.5 gal. (1.9 L) per minute).</li> <li>• <i>Pre-rinse spray valves</i> (Maximum flow rate 1.28 gal. (4.8 L) per minute)</li> </ul>	<p>Maximum = 45 points or N/A</p> <ul style="list-style-type: none"> <li>• For points to be earned fifty percent of fixtures must comply.             <ul style="list-style-type: none"> <li>○ Points earned = percentage of compliant fixtures x 45 (fractional points are rounded upward)</li> </ul> </li> <li>• Not applicable where no fixtures or fittings exist.</li> <li>• Not applicable where Path A, B or C is followed.</li> </ul>

Complete regardless of the path chosen above.

9.1.2 RESIDENTIAL INDOOR APPLIANCES	
9.1.2.1 Residential clothes washers are ENERGY STAR 8.0 labeled and possess a maximum <i>Integrated Water Factor (IWF)</i> of 4.3 or less.	1 point or N/A <ul style="list-style-type: none"> <li>Not applicable where there are no clothes washers.</li> </ul>
9.1.2.2 Residential dishwashers are ENERGY STAR 6.0 labeled and possess a maximum water use of 3.5 gal per cycle (13.2 L per cycle).	1 point or N/A <ul style="list-style-type: none"> <li>Not applicable where there are no dishwashers.</li> </ul>

## 9.2 COOLING TOWERS (22 POINTS)

9.2.1 COOLING TOWERS	
<p>9.2.1.1 Cooling towers are <del>equipped designed to be in conformance with Section 6.3.2.3 HVAC Systems and Equipment of ANSI/ASHRAE/ICC/USGBC/IES Standard 189.1-2020. with conductivity controllers and minimize the amount of makeup water required by achieving one of the following:</del></p> <ul style="list-style-type: none"> <li><del>A minimum of 5 cycles of concentration for makeup water having less than or equal to 200 ppm (200 mg/L) total hardness as calcium carbonate or 3.5 cycles for makeup water with more than 200 ppm (200 mg/L) total hardness as calcium carbonate;</del></li> <li><del>A minimum discharge conductivity of 1500 micromhos/cm or a maximum of 150 ppm (150 mg/L) of silica measured as silicon dioxide.</del></li> </ul> <p>OR</p>	<p><del>Maximum =</del> 7 points or N/A</p> <ul style="list-style-type: none"> <li><del>Four points are earned where a conductivity controller is installed, and cooling towers achieve the respective threshold cycles of concentration.</del></li> <li><del>Three points are earned when either;</del> <ul style="list-style-type: none"> <li><del>6 cycles are achieved where the tower target performance metric is defined in 9.2.1.1 as 5;</del></li> <li><del>OR</del></li> <li><del>where 4.5 cycles are achieved where the target performance metric is defined in 9.2.1.1 as 3.5 and these cycles of concentration are sustained while maintaining the defined threshold water quality parameters in 9.2.1.1.</del></li> </ul> </li> <li>Not applicable where there are no wet-cooling towers.</li> </ul>
9.2.1.2 Use advanced predictive or tracking tower control systems to mediate cooling tower makeup and discharge. Possible examples include integrated systems with occupancy sensors estimating demand, tracer based monitoring systems, etc.	2 point or N/A <ul style="list-style-type: none"> <li>Not applicable where there are no evaporative towers.</li> </ul>

<p><b>9.2.1.3</b> For the purposes of reducing evaporated water losses, at least 20% of annual cooling demands are made up by non-evaporative cooling.</p>	<p>Maximum = 7 points or N/A</p> <ul style="list-style-type: none"> <li>• Seven points are earned where <math>\geq 75\%</math> to <math>&lt; 100\%</math> of annual evaporative cooling demands are replaced by non-evaporative cooling.</li> <li>• Four points are earned where <math>\geq 50\%</math> to <math>&lt; 75\%</math> of annual evaporative cooling demands are replaced by non-evaporative cooling.</li> <li>• Two points are earned where <math>\geq 20\%</math> to <math>&lt; 50\%</math> of annual evaporative cooling demands are replaced by non-evaporative cooling.</li> <li>• No points are earned where <math>&lt; 20\%</math> of annual evaporative cooling demands are replaced by non-evaporative cooling.</li> <li>• Not applicable where evaporative cooling is not required.</li> </ul>
<p><b>9.2.1.4</b> Equip Cooling tower(s) with the following features:</p> <ul style="list-style-type: none"> <li>• <b>9.2.1.4.1:</b> an overflow alarm to detect overflow of water from the basin caused by <i>makeup water</i> valve failure. Overflow alarm shall send an audible signal or provide an alert to the tower operator via the building automation system (BAS); AND/OR</li> <li>• <b>9.2.1.4.2:</b> <i>drift eliminators</i> that achieve an efficiency of 0.001% or less for <i>counterflow systems</i>;</li> </ul> <p>OR</p> <p>0.002% or less for <i>crossflow systems</i>.</p>	<p>Maximum = 2 points or N/A</p> <ul style="list-style-type: none"> <li>• One point is earned where an overflow alarm with an audible signal or alert is installed.</li> <li>• One point is earned where a <i>drift eliminator</i> is installed.</li> <li>• Not applicable where there are no wet-cooling towers.</li> </ul>
<p><b>9.2.1.5</b> Use safe and approved alternative non-potable sources to meet a cooling tower's annual <i>makeup water</i> demand.</p>	<p>Maximum = 4 points</p> <p>Points are earned where alternative non-potable sources supply a percentage of the cooling tower's annual <i>makeup water</i> demand:</p> <ul style="list-style-type: none"> <li>• Four points are earned for <math>\geq 25\%</math>.</li> <li>• Three points are earned for <math>\geq 20\%</math> to <math>&lt; 25\%</math>.</li> </ul>

- Two points are earned for  $\geq 15\%$  to  $< 20\%$ .
- One point is earned for  $\geq 10\%$  to  $< 15\%$ .
- No points are earned for  $< 10\%$ .
- Not applicable where there are no wet-cooling towers.

## 9.3 BOILERS AND HOT WATER SYSTEMS (9 POINTS)

### 9.3.1 BOILERS AND WATER HEATERS

**9.3.1.1** Boilers AND/OR water heaters have the following features:

- **9.3.1.1.1:** Boiler systems with over 50 BHP or 1.67MBtu/hr have condensate return systems;
- **9.3.1.1.2:** Non steam boilers have conductivity controllers; AND/OR
- **9.3.1.1.3:** Steam boilers have conductivity *meters*.

Maximum = 3 points or N/A

- Two points are earned where boiler systems with over 50 BHP or 1.67MBtu/hr have condensate return systems.
  - Not applicable where there will be no steam boilers or where steam boilers are less than 200 BHP or 6.69MBtu/hr.
- One point is earned where boilers have conductivity controllers and meters.
  - Not applicable where there are no boilers

### 9.3.2 DOMESTIC HOT WATER SYSTEMS

**9.3.2.1** Hot Water Volume: Conserve energy and water by designing efficient hot water delivery piping systems to one of the following:

- A maximum of 48 oz. from a water heater AND/OR a maximum of 24oz from a recirculation or similar hot water line;  
OR
- A maximum of 64 oz. from a water heater AND/OR a maximum of 24oz from a recirculation or similar hot water line;  
OR
- A maximum of 96 oz. from a water heater AND/OR a maximum of 36oz from a recirculation or similar hot water line.

Maximum = 3 points

- Three points are earned where there is a maximum of 48 oz. from a water heater AND/OR a maximum of 24 oz. from a recirculation or similar hot water line.
- Two points are earned where there is a maximum of 64 oz. from a water heater AND/OR a maximum of 24 oz. from a recirculation or similar hot water line.
- One point is earned where there is a maximum of 96 oz. from a water

Reduce hot water piping volume to all *lavatory* sinks, kitchen sinks, and showers.

heater AND/OR a maximum of 36 oz. from a recirculation or similar hot water line.

Table E202.1

**INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION TUBING**

Ounces of water per foot of tube					
Size Nominal Inch	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVC SCH 40
3/8	1.06	0.97	0.84	N/A	1.17
½	1.69	1.55	1.45	1.25	1.89
¾	3.43	3.22	2.90	2.67	3.38
1	5.81	5.49	5.17	4.43	5.53
1 ¼	8.70	8.36	8.09	6.61	9.66
1 ½	12.18	11.83	11.45	9.22	13.20
2	21.08	20.58	20.04	15.79	21.88

Ounces of water per foot of tube				
Size Nominal Inch	CPVC SCH 80	PE-RT SDR 9	Composite ASTM F 1281	PEX CTS SDR 9
3/8	-	0.64	0.63	0.64
½	1.46	1.18	1.31	1.18
¾	2.74	2.35	3.39	2.35
1	4.57	3.91	5.56	3.91
1 ¼	8.24	5.81	8.49	5.81
1 ½	11.38	8.09	13.88	8.09
2	19.11	13.86	21.48	13.86

2018 International Plumbing Code (IPC)



**9.3.2.2** Reduce hot water waste to *lavatory* sinks, kitchen sinks, and showers by use of hot water recirculating systems that use occupant sensors, occupant controls, and thermocouples to reduce waiting times and water purged down the drain.

Note: Continuously operating recirculation systems and recirculation systems on timers are not eligible for this credit.

Maximum = 3 points

- Three points are earned where >90% of the hot water fixtures listed are served by a hot water demand system.
- Two points are earned where ≥75 to ≤90% of the hot water fixtures listed are served by a hot water demand system
- No points are earned where <75% of the hot water fixtures listed are served by a hot water demand system.

## 9.4 WATER INTENSIVE APPLICATIONS (~~19~~21 POINTS)

### 9.4.1 COMMERCIAL FOOD SERVICE EQUIPMENT

**9.4.1.1** Food services avoid water intensive equipment as follows:

- **9.4.1.1.1:** The project does not include *once-through water-cooled equipment*; AND
- **9.4.1.1.2:** The project does not include water-fed *food waste disposers*.

Maximum = 2 points or N/A

- One point is earned where food services avoid water intensive equipment per each listed item up to a maximum of 2 points.
- Not applicable where there are no commercial food service facilities.

**9.4.1.2** The following appliances and fittings meet the prescribed limits for water usage:

- **9.4.1.2.1:** *Combination ovens* consume 1.5 gal per pan/hr. (39 L/hr.) or less in the steamer mode. N/A where there are no *combination ovens*;
- **9.4.1.2.2:** *Pre-rinse spray valves* consume 1.28 gal/min (4.8 L/min) or less;
  - N/A where there are no pre-rinse spray valves.
- **9.4.1.2.3:** *Boilerless/connectionless food steamers* comply with ENERGY STAR 1.2 requirements and consume 2 gal/hr./compartment (7.5 L/hr.) or less.
  - N/A where there are no food steamers;
- **9.4.1.2.4:** Commercial dishwashers comply with ENERGY STAR2.0 requirements. Rackless flight-type dishwashers consume 160 gal/hr. (605.7 L/hr.) or less.
  - N/A where there are no dishwashers; and

Maximum = ~~3~~5 points or N/A

- One point is earned where each listed appliance or fitting meets the specified water usage limits ~~up to a maximum of 3 points.~~
- Not applicable where the listed appliance or fitting is not present.

- **9.4.1.2.5:** Ice Makers comply with ENERGY STAR 3.0 requirements where such requirements exist.
  - N/A where there are no ice makers.

#### 9.4.2 LABORATORY AND MEDICAL EQUIPMENT

- |  |   |
|--|---|
| <b>9.4.2.1</b> When installed <i>steam sterilizers</i> are equipped with <i>mechanical vacuum systems</i> and <i>water tempering devices</i> that only allow water to flow when the discharge of condensate or hot water from the sterilizer exceeds 140°F (60°C). | 1 point or N/A <ul style="list-style-type: none"> <li>• Not applicable where there are no <i>steam sterilizers</i>.</li> </ul>          |
| <b>9.4.2.2</b> Specify <i>Dry vacuum systems</i> for all laboratory/medical/dental purposes.   | 1 point or N/A <ul style="list-style-type: none"> <li>• Not applicable where there are no laboratory/medical/dental systems.</li> </ul> |

#### 9.4.3 LAUNDRY EQUIPMENT

- |   |  |
|---|--|
| <b>9.4.3.1</b> Self service <i>clothes washers</i> <del>meet the prescribed Integrated Water Factor (IWF) performance as follows:</del><br><br><del>Clothes washers</del> have an <u>Integrated Water Factor (IWF)</u> of 4.3 or less and comply with ENERGY STAR 8.0 requirements  | 2 points or N/A <ul style="list-style-type: none"> <li>• <del>Two points are earned where all machines comply with the specified water factor.</del></li> <li>• Not applicable where there are no <i>clothes washers</i>.</li> </ul> |
| <b>9.4.3.2</b> Laundry equipment in industrial laundry facilities include the following features and systems: <ul style="list-style-type: none"> <li>• <i>Clothes washers, tunnel clothes washers</i> can be programmed to use a specific amount of water depending on the soil level of the material to be washed;</li> <li>• Maximum water consumption of <i>washers</i> is 1.0 gal/lb. (8 L/kg); AND</li> <li>• <i>Washers</i> have a water recycling system.</li> </ul> | 2 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where there is no industrial laundry or where volumes do not exceed 350 lbs. (160 kg) per hour.</li> </ul>   |
| <b>9.4.3.3</b> In an on-premise/institutional laundry, non-residential <i>clothes washers</i> have a maximum <i>IWF</i> of 4.0.   | 2 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where there are no non-residential <i>clothes washers</i>.</li> </ul>  |

#### 9.4.4. WATER FEATURES AND POOLS

- |   |  |
|---|--|
| <b>9.4.4.1</b> <i>Water features</i> re-circulate water for <i>reuse</i> within the system and have a leak/water loss detection system. | 1 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where there are no <i>water features</i>.</li> </ul> |
|---|--|

<b>9.4.4.2</b> <i>Water features use alternate water sources of non-potable water for makeup water.</i>	1 point or N/A <ul style="list-style-type: none"> <li>Not applicable where there are no <i>water features</i>.</li> <li>Not applicable where prohibited by the authority having jurisdiction.</li> </ul>
<b>9.4.4.3</b> Pools and spas or <i>water features</i> have an evaporation reduction/mitigation feature (e.g., Pool covers, storage of feature water in underground tanks, controls to curtail use during high loss periods, etc.).	1 point <ul style="list-style-type: none"> <li>Not applicable where there are no pools, spas, or <i>water features</i>.</li> </ul>
<b>9.4.4.4</b> Equip Pools and spas with <i>splash out troughs</i> to recover water.	1 point <ul style="list-style-type: none"> <li>Not applicable where there are no pools or spas.</li> </ul>
<b>9.4.4.5</b> Pools and spa backwash water is treated and recovered for appropriate reclamation, recycling, AND/OR irrigation.	1 point <ul style="list-style-type: none"> <li>Not applicable where there are no pools or spas.</li> </ul>
<b>9.4.4.6</b> Use <i>regenerative sorptive media</i> (not <i>conventional filtration</i> or standard <i>sand-based filtration</i> ) or <i>cartridge filtration</i> for pools and spas.	1 point <ul style="list-style-type: none"> <li>Not applicable where there are no pools or spas.</li> </ul>

## 9.5 WATER TREATMENT (4 POINTS)

<b>9.5.1 WATER TREATMENT FOR END USES</b>	
<b>9.5.1.1</b> Equip filtration systems with pressure drop gauges that allow backwash to be based on pressure drop and not on timers.	1 point or N/A <ul style="list-style-type: none"> <li>Not applicable where there is no water treatment system.</li> </ul>
<b>9.5.1.2</b> Provide reverse osmosis that achieves one of the following: <ul style="list-style-type: none"> <li><u>Rejects less than 60% of feed-water volume for a system that produces more than 100 gal. (380 L) per day.</u></li> </ul> <b>OR</b> <ul style="list-style-type: none"> <li>Rejects less than 70% of feed-water volume for a system that produces less than 100 gal. (380 L) per day;</li> </ul> <b>OR</b> <ul style="list-style-type: none"> <li><del>Rejects less than 60% of feed-water volume for a system that produces more than 100 gal. (380 L) per day.</del></li> </ul>	Maximum = 2 points or N/A <ul style="list-style-type: none"> <li>Two points are earned where reverse osmosis rejects &lt;60% of feed-water volume.</li> <li>One point is earned where reverse osmosis rejects &lt;70% of feed-water volume.</li> <li>Not applicable where there is no water treatment system.</li> </ul>

**9.5.1.3** Water softeners are demand-initiated, equipped with recharge controls based on volume of water treated or hardness and not on clock timers.

1 point or N/A

- Not applicable where there is no water treatment system.

## 9.6 ALTERNATE WATER SOURCES (25 POINTS)

### 9.6.1 ALTERNATE WATER SOURCES FOR INDOOR USES

**9.6.1.1** Use *non-potable water* for indoor purposes.

Maximum = 10 points or N/A

Points are earned based on the percentage of indoor water demands met with *non-potable water*:

- Ten points are earned for >75%.
- Eight points are earned for >50 to ≤75%.
- Six points are earned for >25% to ≤50%.
- Three points are earned for ≥15% to ≤25%.
- No points are earned for <15%.
- Not applicable where the authority having jurisdiction prohibits the use of *alternate water sources* for indoor applications.

**9.6.1.2** One of the following systems is at least 80% pre-plumbed (pipes and valves) during construction:

2 points

- *Graywater*;
- *Reclaimed water*;
- *Recycled water*;
- *Stormwater*; AND/OR
- *Rainwater*.

Pre-plumbed systems are marked or otherwise identified as such.

### 9.6.2 ALTERNATE WATER SOURCES FOR NON-DOMESTIC FOR NON-POTABLE USE

**9.6.2.1** Where applicable, use *alternate water source(s)* to replace *potable water* for one or more of the following purposes but not limited to:

Maximum = 12 points or N/A

Points are earned where *alternate water source(s)* are used to supply a percentage of annual *makeup water*

- **9.6.2.1.1:** Cooling Towers;

<ul style="list-style-type: none"> <li>• <b>9.6.2.1.2:</b> Irrigation;</li> <li>• <b>9.6.2.1.3:</b> <i>Water features</i>;</li> <li>• <b>9.6.2.1.4:</b> Wash Down/Surface Washing;</li> <li>• <b>9.6.2.1.5:</b> Dust Control.</li> </ul>	<p>demand for the combined purposes described:</p> <ul style="list-style-type: none"> <li>• Twelve points are earned for <math>\geq 50\%</math>.</li> <li>• Nine points are earned for <math>\geq 40\%</math> to <math>&lt; 50\%</math>.</li> <li>• Six points are earned for <math>\geq 30\%</math> to <math>&lt; 40\%</math>.</li> <li>• Three points are earned for <math>\geq 20\%</math> to <math>&lt; 30\%</math>.</li> <li>• One point is earned for <math>\geq 10\%</math> to <math>&lt; 20\%</math>.</li> <li>• No points are earned for <math>&lt; 10\%</math>.</li> <li>• Not applicable <del>for</del> when end uses are not included or reclaimed water is not available.</li> </ul>
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### 9.6.3 GRAYWATER TREATMENT

<b>9.6.3.1</b> <i>Graywater</i> treatment systems are NSF/ANSI 350, NSF/ANSI 350-1 or IAPMO IGC 324 listed where present.	<p>1 point or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where there are no <i>Graywater</i> treatment systems.</li> </ul>
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## 9.7 METERING (20 POINTS)

### 9.7.1 METERING

<b>9.7.1.1</b> Install <i>Sub-metering</i> for all water-intensive applications such as commercial kitchens, commercial laundries, laboratories, pools, spas, etc.	<p>2 points or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where there are no water intensive applications.</li> </ul>
<b>9.7.1.2</b> Install <i>metering</i> or <i>sub-metering</i> for water that is used for pressurized irrigation.	<p>4 points or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where there is no irrigation.</li> </ul>
<b>9.7.1.3</b> Link all water <i>meters</i> and <i>sub-meters</i> to a <i>Meter Data Management System</i> to store and report water consumption data.	<p>2 points</p>
<b>9.7.1.4</b> Equip chilled or hot water loops or cooling tower <i>makeup water</i> supply pipes with <i>meters</i> .	<p>2 points or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where there are no chilled or hot water loops.</li> </ul>
<b>9.7.1.5.</b> Use tenant <i>Metering</i> or <i>Sub-metering</i> in multi-unit developments.	<p>Maximum = 10 points or N/A</p>



	<ul style="list-style-type: none"> <li>• Ten points are earned when <math>\geq 90\%</math> of the units in the development are <i>sub-metered</i> and allow for tenants to view their consumption and be billed based upon it.</li> <li>• Seven points are earned when <math>\geq 75\%</math> to <math>&lt; 90\%</math> of the units in the development are <i>sub-metered</i> and allow for tenants to view their consumption and be billed based upon it.</li> <li>• Five points are earned when <math>\geq 50\%</math> to <math>&lt; 75\%</math> of the units in the development are <i>sub-metered</i> and allow for tenants to view their consumption and be billed based upon it.</li> <li>• Two points are earned when <math>\geq 25\%</math> to <math>&lt; 50\%</math> of the units in the development are <i>sub-metered</i> and allow for tenants to view their consumption and be billed based upon it.</li> <li>• Not applicable where there is no multi-unit development.</li> </ul>
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## 9.8 LEAK DETECTION (10 POINTS)

Leak detection devices shall comply with IAPMO Z1349 and not interfere with fire protection systems.

**Water Leak Detection Device:** A plumbing appurtenance that monitors a water supply and distribution system in order to detect and report unusual conditions that may cause water waste.

**Adaptive Plumbing System Monitoring and Control Device:** A type of water leak detection device that utilizes sensor inputs to continuously monitor the hydraulic conditions and intelligently adapts to remotely report expected normal vs abnormal plumbing system states.

9.8.1 LEAK DETECTION	
<b>9.8.1.1</b> Install <i>water leak detection device</i> for all water-intensive applications such as commercial kitchens, commercial laundries, laboratories, pools, spas, etc.	<p><del>Maximum</del> — 1 point or N/A</p> <ul style="list-style-type: none"> <li>• One point is earned for adaptive plumbing system leak detection devices.</li> </ul>

	<ul style="list-style-type: none"> <li>Not applicable where there are no water intensive applications.</li> </ul>
<b>9.8.1.2</b> Install <i>water leak detection device</i> for water that is used for pressurized irrigation.	<p><del>Maximum =</del> 2 points or N/A</p> <ul style="list-style-type: none"> <li>Two points are earned for adaptive plumbing system leak detection devices.</li> <li>Not applicable where there is no irrigation.</li> </ul>
<b>9.8.1.3</b> Link all <i>water leak detection devices</i> to internet or a central Data Management System to store, monitor and report data.	1 point
<b>9.8.1.4</b> Equip chilled or hot water loops or cooling tower <i>makeup water</i> supply pipes with water leak detection devices.	<p><del>Maximum =</del> 1 point or N/A</p> <ul style="list-style-type: none"> <li>One point is earned for adaptive plumbing system leak detection devices.</li> <li>Not applicable where there are no chilled or hot water loops.</li> </ul>
<b>9.8.1.5</b> Use tenant water leak detection devices in multi-unit developments. Percentages are based on units with water supply.	<p>Maximum = 5 points or N/A</p> <ul style="list-style-type: none"> <li>Five points are earned when ≥90% of the units in the development include adaptive plumbing system water leak detection.</li> <li>Four points are earned when ≥80% to &lt;90% of the units in the development include adaptive plumbing system water leak detection.</li> <li>Two points are earned when ≥40% to &lt;80% of the units in the development include adaptive plumbing system water leak detection.</li> <li>One point is earned when ≥20% to &lt;40% of the units in the development include adaptive plumbing system water leak detection.</li> <li>Not applicable where there is no multi-unit development.</li> </ul>

## 9.9 IRRIGATION (~~27~~25 POINTS)

### 9.9.1 Irrigation

Two paths are provided for assessing a project's irrigation.

- 9.9.1A Path A: No irrigation system is installed: 25 points
- OR
- 9.9.1B Path B: An irrigation system is installed: up to 25 points

Points cannot be combined between paths. Select one of the paths below.

<b>9.9.1A NO IRRIGATION SYSTEM IS INSTALLED</b>	
<b>9.9.1A.1</b> No irrigation system, or a temporary system that is dismantled after one year, is installed.	<u>25 points</u>
<u>OR</u>	
<b>9.9.1B IRRIGATION SYSTEM IS INSTALLED</b>	
<b>9.9.1B.1</b> <del>No irrigation system is installed.</del>  <u>OR</u>  Use the EPA <i>WaterSense</i> Water Budget Tool to determine landscape water allowance (LWA) and the landscape irrigation design and installation aligns with the allowance.  Exclusion: The area of the landscape used to grow food for human consumption is not included in the calculations.	Maximum = <del>16</del> <u>14</u> points <del>or N/A</del>  <ul style="list-style-type: none"> <li>• <del>Sixteen points are earned only where there is no irrigation system.</del></li> <li>• Six points are earned when there is a 30% reduction in water demand compared to the baseline as determined by the EPA <i>WaterSense</i> Water Budget Tool.</li> <li>• One point is earned for each additional 5% reduction in water demand above 30% to a maximum of an additional <del>9</del><u>8</u> points.</li> <li>• <del>Not Applicable where there is no landscaping or the landscaping has no vegetation.</del></li> </ul>
<b>9.9.1B.2:</b> An irrigation plan is developed by a certified/licensed irrigation designer for the approved landscape plan that shows calculations for landscape water requirements compared to the LWA.	Maximum = <del>4</del> points <del>or N/A</del>  <ul style="list-style-type: none"> <li>• Four points are earned where there is an irrigation plan.</li> <li>• <del>Not applicable where there is no landscaping, the landscaping has no vegetation, or where no irrigation system is installed.</del></li> </ul>
<b>9.9.1B.3</b> The irrigation system includes the following:	Maximum = 5 points <del>or N/A</del>

<ul style="list-style-type: none"> <li>• <b>9.9.1B.3.1:</b> <i>WaterSense</i> labeled weather-based irrigation controller, <i>WaterSense</i> labeled bypass <i>soil moisture sensors</i>, on-demand <i>soil moisture sensor</i>, AND/OR automatic <i>rain shutoff devices</i>;</li> <li>• <b>9.9.1B.3.2:</b> Pressure regulation for each zone to maintain proper operating pressures for <i>landscape irrigation sprinklers</i> or drip components;</li> <li>• <b>9.9.1B.3.3:</b> <i>Drip irrigation</i> on all planting beds where <i>mature plant</i> height is 10 in. (25.4 cm) or greater AND/OR in any planted area with a dimension less than 5 ft. (1.5 m) in any direction;</li> <li>• <b>9.9.1B.3.4:</b> Flow sensing incorporated in the control system to suspend irrigation in any zone where flows exceed expectation; <del>AND/OR</del></li> <li>• <b>9.9.1B.3.5:</b> <i>Landscape irrigation sprinklers</i> and drip emitters that comply with ASABE/ICC 802-2020 <i>Landscape Irrigation Sprinkler</i> and <i>Emitter Standard</i>; <del>AND/OR</del></li> <li>• <b>9.9.1B.3.6:</b> Spray <i>sprinkler bodies</i> are <i>WaterSense</i> labeled.</li> </ul>	<ul style="list-style-type: none"> <li>• One point is earned for each of the listed features included in the irrigation system up to a maximum of 5 points.</li> <li>• <del>Not applicable where no irrigation system is installed.</del></li> </ul>
<p><b>9.9.1B.4:</b> Sprinkler system is inspected for proper installation of all components specified on the irrigation plan and to assure that there is no runoff or overspray onto impervious surfaces.</p>	<p><del>Maximum = 2 points or N/A</del></p> <ul style="list-style-type: none"> <li>• Two points are earned where there is a sprinkler system inspection.</li> <li>• <del>Not applicable where no irrigation system is installed.</del></li> </ul>

## 10. MATERIALS (150 points)

### 10.1 WHOLE BUILDING LIFE CYCLE ASSESSMENT (~~20~~26 POINTS)

#### 10.1.1 WHOLE BUILDING LIFE CYCLE ASSESSMENT

10.1.1.1 The project team conducts a whole building life cycle assessment.

3 points

The life cycle assessment shall conform to ASTM E2921-22 Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems.

The life cycle assessment minimally reports the following life cycle impact indicators:

- Global warming potential (GWP);
- Acidification potential;
- Eutrophication potential;
- Ozone depletion potential (ODP); and
- Smog potential.

Operating energy consumption and MEP systems can be included in the life cycle assessment.

~~10.1.1.1-2~~ The project team evaluates ~~a minimum of two different building designs using ASTM E2921-16a and the following assessment protocol to select the building with the lower environmental impact.~~ of similar size and function comparing global warming potential (GWP) to select the building with the lower GWP impact through either of the following methods:

Maximum = ~~20~~7 points

Points are earned where the following percentage reduction is demonstrated ~~by adding at least three impact indicators for global warming potential:~~

Method 1: Conduct a Whole Building Life Cycle Assessment (LCA) that conforms to ASTM E2921-22 Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems.

Method 2: Conduct a GWP comparison assessment using an embodied carbon calculator.

Assessment protocol:

- Seven points are earned for a total of ≥20% reduction.
- Six points are earned for a total of ≥17% to <20% reduction.
- Five points are earned for a total of ≥15% to <17% reduction.
- Four points are earned for a total of ≥13% to <15% reduction.
- Three points are earned for a total of ≥11% to <13% reduction.
- Two points are earned for a total of ≥10% to <11% reduction.



The life cycle assessment or GWP assessment reports includes the following life cycle impact indicators:

- ~~Global warming potential (GWP);/climate change;~~
- ~~Acidification potential;~~
- ~~Eutrophication potential;~~
- ~~Ozone depletion potential (ODP); and~~
- ~~Smog potential.~~

~~The proposed final design of the building with the lower anticipated environmental impact achieves the following performance targets compared to the reference design:~~

- ~~A minimum 5% reduction each, for at least three impact indicators, one of which is global warming potential; and~~
- ~~No other impact indicator exceeds the reference design by more than 5%.~~

~~Operating energy consumption and MEP systems can be included. A registered design professional verifies structural material quantities, with the exception of existing buildings.~~

- One point is earned for a total of  $\geq 9\%$  to  $<10\%$  reduction.
- No points are earned  $<9\%$  reduction.
- ~~Twenty points are earned for a total  $\geq 25\%$  reduction.~~
- ~~Nineteen points are earned for a total  $\geq 24\%$  to  $<25\%$  reduction.~~
- ~~Eighteen points are earned for a total  $\geq 23\%$  to  $<24\%$  reduction.~~
- ~~Seventeen points are earned for a total  $\geq 22\%$  to  $<23\%$  reduction.~~
- ~~Sixteen points are earned for a total  $\geq 21\%$  to  $<22\%$  reduction.~~
- ~~Fifteen points are earned for a total  $\geq 20\%$  to  $<21\%$  reduction.~~
- ~~Fourteen points are earned for a total  $\geq 19\%$  to  $<20\%$  reduction.~~
- ~~Thirteen points are earned for a total  $\geq 18\%$  to  $<19\%$  reduction.~~
- ~~Twelve points are earned for a total  $\geq 17\%$  to  $<18\%$  reduction.~~
- ~~Eleven points are earned for a total  $\geq 16\%$  to  $<17\%$  reduction.~~
- ~~Ten points are earned for a total  $\geq 15\%$  to  $<16\%$  reduction.~~
- No points are earned for  $<15\%$  reduction.

10.1.1.3 The project team evaluates a minimum of two different building designs of similar size and function to select the building with the lower environmental impacts across three impact indicators, one of which must be GWP.

The selected building design shall be consistent with the design chosen for 10.1.1.2, if applicable.

Conduct a Whole Building Life Cycle Assessment (LCA) that conforms to ASTM E2921-22 Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems.

The life cycle assessment minimally reports the following life cycle impact indicators:

- Global warming potential (GWP);

Maximum = 16 points

Points are earned where the following cumulative percentage reduction is demonstrated by adding at least two impact indicators:

- Sixteen points are earned for a total  $\geq 25\%$  reduction.
- Fifteen points are earned for a total  $\geq 23\%$  to  $<25\%$  reduction.
- Fourteen points are earned for a total  $\geq 21\%$  to  $<23\%$  reduction.
- Thirteen points are earned for a total  $\geq 19\%$  to  $<21\%$  reduction.
- Twelve points are earned for a total  $\geq 17\%$  to  $<19\%$  reduction.

- Acidification potential;
- Eutrophication potential;
- Ozone depletion potential (ODP); and
- Smog potential.

The proposed final design of the building with the lower anticipated environmental impact has no other impact indicator exceeding the reference design by more than 5%.

- Eleven points are earned for a total  $\geq 15\%$  to  $< 17\%$  reduction.
- Ten points are earned for a total  $\geq 13\%$  to  $< 15\%$  reduction.
- Five points are earned for a total  $\geq 1\%$  to  $< 13\%$  reduction.
- No points are earned for  $< 1\%$  reduction.

## 10.2 PRODUCT LIFE CYCLE (39 POINTS)

### 10.2.1 PRODUCT LIFE CYCLE

**10.2.1.1** Product Manufacturers provide one or more of the following for a minimum of fifteen products that evaluate the *cradle-to-gate product life cycle*:

- Third-party verified Type III Environmental Product Declarations (EPD) according to ISO 21930: 2017 or ISO 14025: 2006, either product specific or industry averagewide. Environmental Product Declaration developed according to ISO 21930: 2007 shall be acceptable through December 31, 2024;
- Third-party Multiple Attribute Product Certification; AND/OR
- Third-party verified product life cycle assessment based upon ISO 14040: 2006 and ISO 14044: 2006.

Maximum = 29 points

Points are earned where products include one of the listed third-party verifications/certifications:

- Twenty-nine points are earned for  $\geq 40$  products.
- Twenty-six points are earned for  $\geq 38$  to  $\leq 39$  products.
- Twenty-three points are earned for  $\geq 35$  to  $\leq 37$  products.
- Twenty points are earned for  $\geq 33$  to  $\leq 34$  products.
- Seventeen points are earned for  $\geq 30$  to  $\leq 32$  products.
- Fourteen points are earned for  $\geq 28$  to  $\leq 29$  products.
- Eleven points are earned for  $\geq 25$  to  $\leq 27$  products.
- Eight points are earned for  $\geq 23$  to  $\leq 24$  products.
- Seven points are earned for  $\geq 21$  to  $\leq 22$  products.
- Six points are earned for  $\geq 18$  to  $\leq 20$  products.
- Five points are earned for  $\geq 15$  to  $\leq 17$  products.
- No points are earned for fewer than 15 products.

**10.2.1.2** A minimum of five products include one or more of the following verifications that evaluate the products through end of life (*cradle-to-grave product life cycle*):

- Third-party verified Type III Environmental Product Declarations (EPD) according to ISO 21930: 2017 or ISO 14025: 2006. Environmental Product Declaration developed according to ISO 21930: 2007 shall be acceptable through December 31, 2024;

AND/OR

- Third-party verified product life cycle assessment based upon ISO 14040: 2006 and ISO 14044: 2006.

Compliance-Product count compliance with 10.2.1.2 can also be used for 10.2.1.1 product count compliance.

Maximum = 10 points

Points are earned where products are evaluated through end of life:

- Ten points are earned for 10 or more products.
- Nine points are earned for 9 products.
- Eight points are earned for 8 products.
- Seven points are earned for 7 products.
- Six points are earned for 6 products.
- Five points are earned for 5 products.
- No points are earned for fewer than 5 products.

## 10.3 PRODUCT RISK ASSESSMENT (~~10~~4 POINTS)

### 10.3.1 OCCUPANT EXPOSURE SCREENING REPORT (OESR)

**10.3.1.1** Select at least one *formulated product* that has a completed Occupant Exposure Screening Report (OESR) prepared in accordance with ASTM E3182-20 - *Standard Practice for Preparing an Occupant Exposure Screening Report (OESR) for Substances in Installed Building Products* or other third-party verified transparency documentation that includes any chemical constituents that are carcinogenic, mutagenic, or reprotoxic (CMR) to reproduction or human development and related exposure risk.

Points are earned for discrete products with different functional uses that have an OESR, SDS, HPD, or equivalent labeling/certification that includes transparency and ingredient listing for specified products and not variations of the same product, unless the manufacturers show substantial difference between the chemical constituents or components.

Maximum = ~~10~~4 points

Points are earned where products undergo a screening-level *product risk assessment*:

- ~~• Ten points are earned for 10 products.~~
- ~~• Nine points are earned for 9 products.~~
- ~~• Eight points are earned for 8 products.~~
- ~~• Seven points are earned for 7 products.~~
- ~~• Six points are earned for 6 products.~~
- ~~• Five points are earned for 5 products.~~
- Four points are earned for 4 products.
- Three points are earned for 3 products.

- Two points are earned for 2 products.
- One point is earned for 1 product.

## 10.4 SUSTAINABLE MATERIALS ATTRIBUTES (15 POINTS)

### 10.4.1 PRODUCT SUSTAINABLE MATERIALS ATTRIBUTES

**10.4.1.1** Points are earned based on the Sustainable Materials Index (SMI), the percentage of the total value of the building materials that have sustainable materials attributes. The sustainable materials attributes considered in calculating the SMI are *pre-consumer recycled content*, *post-consumer recycled content*, *biobased content*, *third-party sustainable forestry certification content* and materials or that meet the requirements of the Eco-Certified Composite sustainability standard. The SMI is the sum of the value of these attributes divided by the Total Project Materials Cost Value (TMV) expressed as a percentage.

Sustainable Materials Index (%) =

$$\frac{100 \times (\$ \text{ value of pre-consumer recycled content} + \$ \text{ value of post-consumer recycled content} + \$ \text{ value of biobased content} + \$ \text{ value of third-party sustainable forestry certification content} + \$ \text{ value of Eco-Certified Composite})}{\text{TMV}}$$

Total Project Materials Cost

See example Sustainable Materials Index (SMI) Worksheet in the Technical Reference Manual.

Only the portion of materials that has the identified attribute should be included. For example, if a product has 40% *pre-consumer recycled content*, only 40% of the value of that product is included.

Products that are claimed for credit under Third-Party Sustainable Forestry Certification are not ~~also~~ included as *biobased content*.

Maximum = 15 points

Points are earned where the Sustainable Materials Index is greater than 10%:

- Fifteen points are earned for ≥38%.
- Fourteen points are earned for ≥36% to <38%.
- Thirteen points are earned for ≥34% to <36%.
- Twelve points are earned for ≥32% to <34%.
- Eleven points are earned for ≥30% to <32%.
- Ten points are earned for ≥28% to <30%.
- Nine points are earned for ≥26% to <28%.
- Eight points are earned for ≥24% to <26%.
- Seven points are earned for ≥22% to <24%.
- Six points are earned for ≥20% to <22%.
- Five points are earned where for ≥18% to <20%.
- Four points are earned where for ≥16% to <18%.
- Three points are earned for ≥14% to <16%.
- Two points are earned for ≥12% to <14%.
- One point is earned for ≥10% to <12%.
- No points are earned for <10%.

*Biobased content* percentage may be calculated by weight or in accordance with ASTM D6866-16 *Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis*.

The following forest certification systems and standards are recognized:

- Forest Stewardship Council (FSC): <https://us.fsc.org/en-us> (last accessed 1/23/238/30/17)
- Sustainable Forestry Initiative, Inc. (SFI): <http://www.sfiprogram.org/> (last accessed 1/23/238/30/17)
- American Tree Farm System (ATFS): <https://www.treefarmssystem.org/> (last access 1/23/238/30/17)
- Canadian Standards Association Sustainable Forestry Management (CSA): <http://www.csasfmforests.ca/> (last accessed 1/23/238/30/17)
- Programme for the Endorsement of Forest Certification (PEFC): <https://www.pefc.org/> (last accessed 1/23/238/30/17)
- Products categorized as Responsible or Certified Sources in accordance with ASTM D7612-21 *Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources*.

## 10.5 REUSE OF EXISTING STRUCTURES AND MATERIALS (30 POINTS)

### 10.5.1 STRUCTURAL SYSTEMS AND NON-STRUCTURAL/INTERIOR ELEMENTS

**10.5.1.1 Structural systems** (e.g., exterior walls, interior bearing walls, roof systems, floor systems) from an *existing building* on the site are retained and incorporated in the new design.

Assessment Guidance:

Percentage =  $100 \times (A \div B)$ , where:

A = Total square footage of *reused* existing *structural systems*

B = Total square footage of *structural systems* in the project

Wall Area is measured in the vertical plane and other *structural systems* are measured in the horizontal plane.

Maximum = 12 points

Points are earned where a percentage of the existing *structural systems* is reused:

- Twelve points are earned for  $\geq 95\%$  *reuse*.
- Eleven points are earned for  $\geq 90\%$  to  $< 95\%$  *reuse*.
- Ten points are earned for  $\geq 85\%$  to  $< 90\%$  *reuse*.
- Nine points are earned for  $\geq 80\%$  to  $< 85\%$  *reuse*.



	<ul style="list-style-type: none"> <li>• Eight points are earned for <math>\geq 75\%</math> to <math>&lt; 80\%</math> <i>reuse</i>.</li> <li>• Seven points are earned for <math>\geq 70\%</math> to <math>&lt; 75\%</math> <i>reuse</i>.</li> <li>• Six points are earned for <math>\geq 65\%</math> to <math>&lt; 70\%</math> <i>reuse</i>.</li> <li>• Five points are earned for <math>\geq 60\%</math> to <math>&lt; 65\%</math> <i>reuse</i>.</li> <li>• Four points are earned for <math>\geq 50\%</math> to <math>&lt; 60\%</math> <i>reuse</i>.</li> <li>• Three points are earned for <math>\geq 40\%</math> to <math>&lt; 50\%</math> <i>reuse</i>.</li> <li>• <u>No points are earned for <math>&lt; 40\%</math> <i>reuse</i>.</u></li> <li>• <u>Not applicable where a building didn't previously exist.</u></li> </ul>
<p><b>10.5.1.2</b> <i>Non-structural</i> interior systems and <i>finishes</i> (e.g., ceiling, interior partitions, demountable walls, flooring, doors) from an <i>existing building</i> on the site are retained and incorporated in the new design.</p> <p>Assessment Guidance:</p> <p>Areas are calculated as the projected area of the element (e.g., if an interior partition is <i>reused</i>, the area is calculated as length x height of the wall).</p> <p>Percentage = <math>100 \times (A \div B)</math>, where:  A = Total area of <i>reused</i> existing interior systems and <i>finishes</i>  B = Total area of interior systems and <i>finishes</i> in the new design</p>	<p>Maximum = 10 points</p> <p>Points are earned where a percentage of existing <i>non-structural</i>/interior systems and finished is <i>reused</i>:</p> <ul style="list-style-type: none"> <li>• Ten points are earned for <math>\geq 95\%</math> <i>reuse</i>.</li> <li>• Nine points are earned for <math>\geq 85\%</math> to <math>&lt; 95\%</math> <i>reuse</i>.</li> <li>• Eight points are earned for <math>\geq 75\%</math> to <math>&lt; 85\%</math> <i>reuse</i>.</li> <li>• Seven points are earned for <math>\geq 65\%</math> to <math>&lt; 75\%</math> <i>reuse</i>.</li> <li>• Six points are earned for <math>\geq 55\%</math> to <math>&lt; 65\%</math> <i>reuse</i>.</li> <li>• Five points are earned for <math>\geq 45\%</math> to <math>&lt; 55\%</math> <i>reuse</i>.</li> <li>• Four points are earned for <math>\geq 35\%</math> to <math>&lt; 45\%</math> <i>reuse</i>.</li> <li>• Three points are earned for <math>\geq 25\%</math> to <math>&lt; 35\%</math> <i>reuse</i>.</li> <li>• Two points are earned for <math>\geq 15\%</math> to <math>&lt; 25\%</math> <i>reuse</i>.</li> <li>• One point is earned for <math>\geq 10\%</math> to <math>&lt; 15\%</math> <i>reuse</i>.</li> <li>• <u>No points are earned for <math>&lt; 10\%</math> <i>reuse</i>.</u></li> </ul>

- Not applicable where a building didn't previously exist.

## 10.5.2 MATERIAL REUSE FROM OFF-SITE

**10.5.2.1** The project incorporates *reused*, refurbished AND/OR off-site *salvaged materials* in place of new materials (except *furnishings*).

Assessment Guidance:

Percentages are calculated as the percentage of the total materials cost.

Percentage =  $100 \times (A \div B)$ , where:

A = Total value of *reused* materials

B = Total value of materials

The value of the *reused*, refurbished, or *salvaged material* is the greater of the cost of the reused, refurbished or *salvaged material* or the cost of new comparable material which is being avoided.

Maximum = 4 points

Points are earned where a percentage of materials is *reused*, refurbished, AND/OR salvaged from off-site:

- Four points are earned for  $\geq 20\%$  of materials.
- Three points are earned for  $\geq 10\%$  to  $< 20\%$  of materials.
- Two points are earned for  $\geq 5\%$  to  $< 10\%$  of materials.
- One point is earned for  $\geq 2\%$  to  $< 5\%$  of materials.
- No points are earned for  $< 2\%$  of materials.

**10.5.2.2** *Furnishings* (including systems furniture) are *reused*, salvaged AND/OR refurbished for *reuse* within the project.

Assessment Guidance:

Percentages are calculated as the percentage of the total *furnishings* cost.

Percentage =  $100 \times (A \div B)$ , where:

A = Total value of *reused furnishings*

B = Total value of *furnishings*

Maximum = 4 points or N/A

Points are earned where a percentage of existing *furnishings* is *reused*:

- Four points are earned for  $\geq 30\%$  of existing *furnishings*.
- Three points are earned for  $\geq 20\%$  to  $< 30\%$  of existing *furnishings*.
- Two points are earned for  $\geq 15\%$  to  $< 20\%$  of existing *furnishings*.
- One point is earned for  $\geq 10\%$  to  $< 15\%$  of existing *furnishings*.
- No points are earned for  $< 10\%$  of existing *furnishings*.
- Not applicable where there are no existing *furnishings* or if it is not feasible to *reuse* existing *furnishings*.

## 10.6 WASTE (26 POINTS)

### 10.6.1 CONSTRUCTION WASTE

<p><b>10.6.1.1</b> A preconstruction waste management plan is created prior to any construction or demolition activities. This plan describes the project team's strategy for reducing construction waste and diverting materials from landfilling via <i>reuse</i> or recycling.</p> <p>The preconstruction waste management plan will include:</p> <ul style="list-style-type: none"> <li>• The strategies planned for construction waste reduction, salvaging, recycling, returning to supplier/manufacturer, or other methods for diverting waste from landfill;</li> <li>• The facility, hauler, or service provider that will handle each material being diverted;</li> <li>• Whether construction and demolition materials will be separated on-site or commingled;</li> <li>• The name and contact information for the person(s) responsible for developing and implementing the waste management plan;</li> <li>• Reporting and record keeping provisions;</li> <li>• Target construction waste rate per 10.6.1.3 below; and</li> <li>• Target waste diversion rate.</li> </ul>	<p>2 points</p>
<p><b>10.6.1.2</b> A final waste management summary report is completed after construction documenting the results of the implementation of the preconstruction waste management plan, including:</p> <ul style="list-style-type: none"> <li>• The weight or volume of the total quantity of construction and demolition waste;</li> <li>• <u>The calculated construction waste per unit area for the project (see 10.6.1.3 below);</u></li> <li>• <u>The weight or volume of hazardous waste generated, if any;</u></li> <li>• The weight or volume of the major categories of materials that were <i>reused</i> or recycled;</li> <li>• The <i>reuse</i>/recycling rate for each major category of waste material;</li> <li>• The overall <i>reuse</i>/recycling rate for the project;</li> <li>• A description of whether materials are managed through source separation or comingling;</li> <li>• Copies of receipts and invoices used to track the progress of the waste management effort;</li> <li>• A statement that describes if a waste recycling facility was used whether it was certified by a government or non-government organization;</li> </ul>	<p>1 point</p>

<ul style="list-style-type: none"> <li>The organization and contact information of the author of the waste management summary report and the name and contact information of the person(s) at the off-site recycling facility (or facilities) responsible for data collection and reporting.</li> </ul>	
<p><b>10.6.1.3</b> Minimize construction waste, per unit area of new building floor area, generated in new portions of buildings.</p> <p>Construction waste includes that which is hauled from the site, whether diverted, landfilled, incinerated, or otherwise disposed of.</p> <p>Soil and land-clearing debris are not included in the calculations.</p>	<p>Maximum = 10 points</p> <ul style="list-style-type: none"> <li>Ten points are earned where waste is &lt;1.2 lbs./ft<sup>2</sup> (5.9 kgf/m<sup>2</sup>) of the new building floor area.</li> <li>Six points are earned where waste is 1.2 lbs./ft<sup>2</sup> (5.9 kgf/m<sup>2</sup>) to 2.0 lbs./ft<sup>2</sup> (9.8 kgf/m<sup>2</sup>) of the new building floor area.</li> <li>Three points are earned where waste is 2.0 lbs./ft<sup>2</sup> (9.8 kgf/m<sup>2</sup>) to 2.5 lbs./ft<sup>2</sup> (12.2 kgf/m<sup>2</sup>) of the new building floor area.</li> <li>No points are earned where waste is &gt;2.5 lbs./ft<sup>2</sup> (12.2 kgf/m<sup>2</sup>) of the new building floor area.</li> </ul>
<p><b>10.6.1.4</b> Construction waste, including building demolition waste and packaging, is diverted from the landfill through recycling, reuse, repurposing, or composting.</p> <p>The amount of construction waste that is used for waste-to-energy combustion is multiplied by 0.5 when counted as waste diverted from landfill. Waste-to-energy facilities have a combustion efficiency rate of 60% or more.</p> <p>Soil and land-clearing debris and materials used as alternative daily cover at landfills are not included in these calculations.</p> <p>Calculations may be performed based on weight or volume, but the same basis is used throughout this credit. Where calculations are performed to convert waste from weight to volume or volume to weight, the source of these conversions is stated.</p>	<p>Maximum = 7 points</p> <p>Points are earned where a percentage of the total amount of construction waste is diverted from landfill:</p> <ul style="list-style-type: none"> <li><del>Six</del> <u>Seven</u> points are earned for ≥75%.</li> <li><del>Four</del> <u>Five</u> points are earned for ≥50% to &lt;75%.</li> <li><del>Two</del> <u>Three</u> points are earned for ≥25% to &lt;50%</li> <li><b>PLUS</b></li> <li><del>One additional point is earned for facilities that have verified their annual average recycling rate from an independent third-party organization.</del></li> <li>No points are earned for &lt;25%.</li> </ul>

## 10.6.2 POST OCCUPANCY SOLID WASTE RECYCLING

<p><b>10.6.2.1</b> The building design addresses recycling for solid waste using one or more of the following:</p>	<p>Maximum = 2 points</p>
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- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• <b>10.6.2.1.1: Capacity:</b> Provide recycling collection capacity as follows:           <ul style="list-style-type: none"> <li>○ Multifamily: Minimum of 0.0625 CY per resident; or</li> <li>○ Office and Retail: Minimum of 0.035 CY per full time employee; or</li> <li>○ Schools: Minimum of 0.010 CY per student;</li> </ul> </li> <li>• <b>10.6.2.1.2: Interior Storage Requirements:</b> Building design addresses interior storage of recyclables in accordance with one or more of the following space layouts, as required to meet minimum capacity for scheduled collection and any security or safety needs:           <ul style="list-style-type: none"> <li>○ In-cabinet or under-counter/work station collection bins;</li> <li>○ A minimum of one collection bin centrally located on each floor;</li> <li>○ A separate and secure collection area for a single material stream; AND/OR</li> <li>○ Recycling chutes that empty into dedicated recycling collection bin;</li> </ul> </li> <li>• <b>10.6.2.1.3: Exterior Storage Requirements:</b> Building design addresses exterior recycling storage by providing adequate, accessible enclosures for recycling collection containers in size and number that meet minimum capacity requirements and the following:           <ul style="list-style-type: none"> <li>○ Permanent, durable enclosures are sized to accommodate collection bins required for minimum recycling capacity;</li> <li>○ Enclosures are screened on three sides; and</li> <li>○ Enclosures are designed to accommodate minimum clearances for collection equipment.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Two points are earned where two or more of the listed items are used to address recycling for solid waste.</li> <li>• One point is earned where one of the listed items is used to address recycling for solid waste.</li> </ul> |
|---|---|

### 10.6.3 SUPPLY CHAIN WASTE MINIMIZATION

- |   |   |
|---|---|
| <p><b>10.6.3.1</b> Products used in the construction of the building are selected from manufacturers who have minimized or diverted waste during the production/manufacturing of the products. This criterion applies gate-to-gate – to all material inputs and outputs to a facility (or facilities) that produce/manufacture finished products. The diversion rate is calculated for the entire facility (or facilities) in which the products were produced/assembled/manufactured, and not just for an individual product line.</p> <p>Assessment Guidance:</p> | <p>Maximum = 4 points</p> <ul style="list-style-type: none"> <li>• Four points are earned where <math>\geq 50\%</math>, by cost, of <i>building products</i> used come from facilities that divert over 80% of their waste.</li> <li>• Three points are earned where <math>\geq 40\%</math> to <math>&lt; 50\%</math>, by cost, of <i>building products</i> used come from facilities that divert over 80% of their waste.</li> </ul> |
|---|---|



The diversion rate is expressed as a percentage and calculated as follows:

$$\text{Diversion Rate} = \left( 1 - \frac{\text{Mass Landfilled} + \text{Mass Incinerated without Energy Recovery}}{\text{Mass Discarded Material}} \right) \times 100$$

Waste materials generated from the recycling of an external waste stream as an incoming material should not be considered a “discarded material” and should not appear in either the denominator or numerator.

The Diversion Rate is multiplied by 1.5 for products that have been produced or manufactured in a facility that meets the following standards and certification programs:

- Business or facilities that have achieved Zero Waste certification from the US Zero Waste Business Council; or
- Have followed and certified to UL2799 2017

The following methods are accepted as valid diversion from landfill:

- Recycling;
- Returning to supplier;
- *Reuse* in same process;
- *Reuse* in different process;
- Processing and selling to third-party;
- Commercial composting; AND/OR
- Waste-to-energy: the manufacturer removes, to the maximum practical extent, recyclable materials from the waste stream using common or front-end recycling methods before material is sent to the waste-to-energy operation. Final by-products of waste-to-energy processes are disposed of properly and, if sent to landfill, are included in the total mass discarded value. Facilities are compliant with applicable government emissions regulations and facility permits. The waste-to-energy process used is one of the following:
  - Bio-diesel or other biofuels;
  - Anaerobic digestion with energy recovery; or
  - Combustion with energy recovery where:

- Two points are earned where  $\geq 30\%$  to  $< 40\%$ , by cost, of *building products* used come from facilities that divert over 80% of their waste.
- One point is earned where  $\geq 20\%$  to  $< 30\%$ , by cost, of *building products* used come from facilities that divert over 80% of their waste.
- Zero points are earned where  $< 20\%$ , by cost, of *building products* used come from facilities that divert over 80% of their waste.

- Combustion makes up less than 10% of the total waste by mass diverted; and
- Combustion does not generate bottom ash or fly ash defined as hazardous by US CFR 261.24 (TCLP) 2011 or equivalent test for the jurisdiction of the incineration plant.

## 10.7 RESOURCE CONSERVATION (10 POINTS)

### 10.7.1 OFF-SITE FABRICATION FOR CONSTRUCTION OPTIMIZATION

**10.7.1.1** The project incorporates building elements that are produced by one or both of the following methods, alone or in combination:

- *Modular Construction*
- *Prefabrication.*

Maximum = 4 points

Points are earned where a percentage of the building construction by cost, not including site work, is *Modular Construction AND/OR Prefabrication*:

- Four points maximum are earned for a minimum of ≥20%.
- Three points are earned for a minimum of ≥15% to <20%.
- Two points are earned for a minimum of ≥10% to <15%.
- One point is earned for a minimum of ≥5% to <10%.
- No points are earned for <5%.

### 10.7.2 DESIGN FOR DECONSTRUCTION (DFD)

**10.7.2.1** The project teams document the application of design for *deconstruction* (DFD) principles in the design of the building and provides the Owner with a *Deconstruction Plan* that addresses both partial *deconstruction* (for *renovations*) and total *deconstruction* (for end of life removal) of the building to maximize the *reuse* and recycling of building components and materials.

6 points

## 11. INDOOR ENVIRONMENT (150 points)

### 11.1 AIR VENTILATION AND QUALITY (35 POINTS)

#### 11.1.1 VENTILATION AIR QUANTITY

**11.1.1.1** The quantity of ventilation for the building is compliant with one of the following:

9 points

- *ANSI/ASHRAE Standard 62.1-2019; Ventilation for Acceptable Indoor Air Quality;*
- *The ICC International Mechanical Code (ICC IMC 2018);*
- *IAPMO UMC (2018): Uniform Mechanical Code;*
- *ANSI/ASHRAE/ASHE Standard 170-2017, Ventilation of Health Care Facilities;* OR
- Local codes or standards (if more stringent).

#### 11.1.2. AIR CHANGE EFFECTIVENESS

**11.1.2.1.** The following strategies are implemented for ventilation systems when used:

9 points

1. For mechanical ventilation systems, the zone air distribution effectiveness  $E_z$  value is greater than or equal to 0.9 in all *regularly occupied spaces*, excluding circulation and transitional spaces.
2. Natural ventilation systems are designed in accordance with Section 6.4 of ANSI/ASHRAE Standard 62.1- 2019, or are designed using professionally accepted sophisticated analytical methods such as computational fluid dynamics.

The  $E_z$  value is determined using Table 11.1.2.1.

**Table 11.1.2.1: Air Distribution Effectiveness**

Air Distribution Configuration	$E_z$
Ceiling supply of cool air	1.0
Ceiling supply of warm air and floor return	1.0
Ceiling supply of warm air 15F or more above space temperature and ceiling return	0.8
Ceiling supply of warm air less than 15F above space temperature and ceiling return provided that the 150 fpm supply air jet reaches to within 4.5 ft. (1.37 m) of the floor level. <i>Note: For lower velocity supply air, <math>E_z = 0.8</math></i>	1.0
Floor supply of cool air and ceiling return provided that	1.0

the 150 fpm supply jet reaches 4.5 ft. (1.37 m) or more above the floor. <i>Note: Most underfloor air distribution systems comply with this provision.</i>		
Floor supply of cool air and ceiling return, provided low-velocity displacement ventilation achieves unidirectional flow and thermal stratification.	1.2	
Floor supply of warm air and floor return.	1.0	
Floor supply of warm air and ceiling return.	0.7	
Makeup supply drawn in on the opposite side of the room from the exhaust AND/OR return.	0.8	
Makeup supply drawn in near to the exhaust AND/OR return location.	0.5	
<ol style="list-style-type: none"> <li>1. "Cool air" is air cooler than space temperature.</li> <li>2. "Warm air" is air warmer than the space temperature.</li> <li>3. "Ceiling" includes any point above the breathing zone.</li> <li>4. "Floor" includes any point below the breathing zone.</li> <li>5. As an alternative to using the above values, <math>E_z</math> may be regarded as equal to air change effectiveness determined in accordance with ANSI/ASHRAE 129-1997 (RA 02), <i>Measuring Air Change Effectiveness</i> for all air distribution configurations except unidirectional flow.</li> </ol>		

### 11.1.3 AIR HANDLING EQUIPMENT

<b>11.1.3.1</b> Air handling equipment is equipped with filtration as follows: <ul style="list-style-type: none"> <li>• Air handling equipment that provides ventilation air (e.g., central mixed air equipment, make-up air equipment, ventilation equipment for "compartmental" systems such as fan coils or unitary heat pumps): minimum MERV 13; and</li> <li>• Terminal equipment that circulates room or zone air (e.g., fan coils, unitary heat pumps): minimum MERV 8.</li> </ul>	6 points or N/A
<b>11.1.3.2</b> Interior liners that could harbor microbial growth AND/OR erode in the air stream are not <del>utilized</del> <u>used</u> in any outdoor air, return air, and supply air ductwork, or any fan, coil, terminal, or other devices exposed to the airstream.	5 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where a building does not have ductwork with radiant systems and operable windows.</li> </ul>

### 11.1.4 CO<sub>2</sub> SENSING AND VENTILATION CONTROL EQUIPMENT

<b>11.1.4.1</b> Densely occupied rooms (25 or more people per 1,000 ft. <sup>2</sup> (92.9 m <sup>2</sup> )) with <i>variable occupancy</i> (e.g., meeting rooms, assembly areas) have CO <sub>2</sub> sensing and ventilation control equipment.	6 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where there are no</li> </ul>
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densely occupied spaces with  
*variable occupancy.*

## 11.2 SOURCE CONTROL AND MEASUREMENT OF INDOOR POLLUTANTS (34 POINTS)

### 11.2.1 VOLATILE ORGANIC COMPOUNDS

**11.2.1.1** Adhesives and sealants (not including carpet adhesives) that are applied on site within, or part of, the *building envelope's* continuous plane of air tightness comply with VOC content limits for 90% of products by volume AND/OR VOC emissions criteria for 70% of products by volume.

Maximum = 3 points

- Two points are earned where 70% of products by volume comply with VOC emissions criteria.
- One point is earned where 90% of products by volume comply with VOC content limits.

**Table 11.2.1.1: Adhesives and Sealants VOC Content Criteria**

Product Area	Product Sub-area	VOC Content Limit <sup>1</sup> 1 point
Adhesives – Architectural Applications	Indoor Carpet	50 g/L
	Carpet Pad	50 g/L
	Outdoor Carpet	150 g/L
	Wood Flooring	100 g/L
	Rubber Flooring	60 g/L
	Subfloor	50 g/L
	Ceramic Tile	65 g/L
	VCT / Asphalt Tile	50 g/L
	Dry Wall and Panel	50 g/L
	Cove Base	50 g/L
	Multipurpose Construction	70 g/L
	Structural Glazing	100 g/L
	Single Ply Roof Membrane	250 g/L
Adhesives – Substrates	Metal to Metal	30 g/L
	Plastic Foams	50 g/L
	Porous Material (except wood)	50 g/L
	Wood	30 g/L
	Fiberglass	80 g/L
Adhesives – Specialty	PVC Welding	510 g/L
	CPVC Welding	490 g/L
	ABS Welding	325 g/L
	Plastic Cement Welding	250 g/L
	Adhesive Primer for Plastic	550 g/L
	Contact Adhesive	80 g/L
	Special Purpose Contact	250 g/L



Sealants	Adhesive		
	Architectural	250 g/L	
	Non-membrane Roof	300 g/L	
	Single Ply Roof Membrane	450 g/L	
Sealant Primers	Architectural		
	Non porous	250 g/L	
	Porous	775 g/L	
<p>1. The VOC content must conform to the VOC limits in the <i>South Coast Air Quality Management District (SCAQMD) Rule 1168 (October 6, 2017</i> <a href="http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf">http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf</a>). VOC limits are expressed as grams of VOC per liter of adhesive or sealant less water and less exempt compounds, with no exception for chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene according to SCAQMD Rule 1168. For low-solid adhesives or sealants the VOC limit is expressed in grams per liter of material. SCAQMD Rule 1168.</p>			
<p><b>VOC Emissions Criteria</b> VOC emissions results are determined by either the California Department of Public Health's <i>Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers</i>, Version 1.2, February 2017; or UL 2821 GREENGUARD <i>Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings</i>, 2013.</p> <p>Provide documentation indicating the product does not have VOC emissions exceeding compliance with the requirements as stated in the Standard Private Office Scenario in CDPH Standard Method V1.2 or a certification by a certification body accredited to ISO/IEC 17065:2012 and with relevant certification program in the scope of its accreditation.</p>			
<p><b>11.2.1.2</b> Paints and coatings applied on site within, or are a part of, the building's continuous plane of air tightness comply with VOC content limits detailed in CARB 2007 SCM for 90% of products by volume AND/OR VOC emissions criteria) for 70% of products by volume.</p> <p><b>VOC Emissions Criteria</b> VOC emissions results are determined by the California Department of Public Health's Standard Method for the Testing</p>			<p>Maximum = 3 points</p> <ul style="list-style-type: none"> <li>Two Points are earned where 70% of products by volume comply with VOC emissions criteria.</li> <li>One point is earned where 90% of products by volume comply with VOC content limits.</li> </ul>

and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2, February 2017; or

UL 2821 GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings, 2013.

Provide documentation indicating the product does not have VOC emissions exceeding compliance with the requirements as stated in the Standard Private Office Scenario in CDPH Standard Method V1.2 or a certification by a certification body accredited to ISO/IEC 17065:2012 and with relevant certification program in the scope of its accreditation.

**11.2.1.3** Interior products will comply with prescribed limits of product emissions.

**Table 11.2.1.3: Interior Product VOC Emissions**

Product Area
<b>11.2.1.3.1:</b> Floors / Floor Coverings (including carpeting, resilient, other non-carpet flooring, and padding/cushion) <sup>1</sup>
<b>11.2.1.3.2:</b> Acoustical and Thermal Insulation
<b>11.2.1.3.3:</b> Ceiling Systems (including acoustical ceiling and gypsum board)
<b>11.2.1.3.4:</b> Wall Systems (including wall coverings, gypsum board, and window shading devices) <sup>1</sup>
<sup>1</sup> Concrete, concrete masonry, clay brick, ceramic tile, stone, glass and glass block masonry used in floors and wall systems without additional coating/sealers are deemed to comply without testing.
VOC emissions are determined by a third-party laboratory that is accredited to ISO/IEC 17025 with the specified test method listed in the scope of its accreditation. VOC emissions results are determined by California Department of Public Health (CDPH) “ <i>Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers</i> ,” V 1.2, 2017, Standard Private Office Scenario. Alternatively, VOC emission results are determined by UL 2821 “ <i>GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings</i> ,” March 2013, Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Certification Gold.

Maximum = 8 points or as adjusted by N/A items

Points are earned when 90% by area of products in the following categories comply with VOC emissions criteria, up to a maximum of 8 points:

- Three points are earned where floors/floor coverings comply with VOC emissions criteria.
  - Not applicable if there are no floor coatings/floor coverings.
- Three Points are earned where ceiling systems comply with VOC emissions criteria.
  - Not applicable if there are no ceiling systems.
- One point is earned where acoustical and thermal insulation comply with VOC emissions criteria.
  - Not applicable if there is no acoustical and thermal insulation.
- One point is earned where wall systems comply with VOC emissions criteria.
  - Not applicable if there are no wall systems.

**11.2.1.4** Furniture, casework, cabinets, work stations, and seating all comply with prescribed limits of VOC emissions AND/OR are certified.

Note: certified means compliance with any of the certifications listed per Table 11.2.1.4: Furniture and *Furnishings* VOC Emissions.

**Table 11.2.1.4: Furniture and *Furnishings* VOC Emissions**

Product Area
Furniture and <i>Furnishings</i> (including case work, cabinetry, work stations, and seating)
<p><b>VOC Emissions Criteria</b></p> <p>VOC emissions are determined by a third-party laboratory that is accredited to ISO/IEC 17025:2017 with the specified test method listed in the scope of its accreditation. VOC emissions results are determined by ANSI/BIFMA M7.1-2011(R2016) <i>Standard Test Method for Determining VOC Emissions From Office Furniture Systems, Components and Seating</i>. Alternatively, VOC emission results may be determined by UL 2821 “<i>GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings</i>,” 2013 Table 2 Office Model and Section 34.1 Allowable Limits for GREENGUARD Gold Certification. To determine acceptability of the emission results, VOC product emission concentrations are estimated per testing procedures from ANSI/BIFMA e3-2019, 7.6.1, 7.6.2, and 7.6.3.</p>

Maximum = 3 points

- One point is earned when 100% by cost of installed furniture products comply with ANSI/BIFMA e3 Section 7.6.1.
- One point is earned when 90% by cost of installed furniture products comply with ANSI/BIFMA e3 Section 7.6.2.
- One point is earned when 70% by cost of installed furniture products comply with ANSI/BIFMA e3 Section 7.6.3.

## 11.2.2 Pre-Occupancy Indoor Air Quality Testing

Two paths are available for assessing 11.2.2.

- **11.2.2A Path A: Indoor Air Quality (IAQ) Pre-Occupancy Testing:** 6 points
- OR
- **11.2.2B Path B: Total Volatile Organic Compounds (TVOC):** 3 points

Points cannot be combined between paths. Select one of the paths below.

### 11.2.2A PATH A: INDOOR AIR QUALITY (IAQ) PRE-OCCUPANCY TESTING

**11.2.2A.1** To determine that the indoor air quality is acceptable upon *Substantial Completion* but prior to occupancy, the buildings indoor environments are tested using the U.S. EPA’s Compendium of Methods for the Determination of Toxic Organic

6 points

Pollutants in Ambient Air, TO-1, TO-11, TO-15, TO-17, and ASTM D 5197-16 *Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)*. The testing takes place after construction ends and prior to occupancy.

The test protocols are in accordance with the following:

- The VOC and Particulate Matter sampling and averaging times and measurement methods achieve the detection limits at or below the maximum concentrations of the contaminant levels listed in Table 11.2.2.1-11.2.2A.1 below;
- HVAC systems are operated at the minimum design outdoor air ventilation rate during testing;
- Air sampling and monitoring are at a height of 3-6 ft. (91-183 cm) from the floor and at least 3 ft. (0.9 m) away from walls and ventilation supply;
- The test protocols are documented to show that appropriate sampling methods and times were used; and
- The number of sampling locations are as follows for each portion of the building served by a separate ventilation system:
  - At Least one per contiguous floor; and
  - At Least one per 10,000 ft.<sup>2</sup> (929 m<sup>2</sup>) of floor area.

The sampling points include areas presumed to have the greatest source strength with the least ventilation.

**Table 11.2.2A.1: Maximum level of contaminants:**

Contaminant	Maximum Concentration
	µg/m <sup>3</sup> (Unless Otherwise Noted)
Acetaldehyde	140 <sup>1</sup>
Acrylonitrile	5 <sup>1</sup>
Benzene	60 <sup>1</sup>
1,3-Butadiene	20 <sup>1</sup>
t-Butyl methyl ether (Methyl-t-butyl ether)	80000 <sup>1</sup>
Carbon disulfide	800 <sup>1</sup>
Caprolactam	100 <sup>1</sup>
Carbon tetrachloride	40 <sup>1</sup>
Chlorobenzene	1000 <sup>1</sup>
Chloroform	300 <sup>1</sup>
1,4-Dichlorobenzene	800 <sup>1</sup>

Dichloromethane (Methylene chloride)	400 <sup>1</sup>
1,4-Dioxane	3000 <sup>1</sup>
Ethylbenzene	2000 <sup>1</sup>
Ethylene glycol	400 <sup>1</sup>
Formaldehyde	33 <sup>2</sup>
2-Ethylhexanoic acid	25 <sup>2</sup>
n-Hexane	7000 <sup>1</sup>
1-Methyl-2-pyrrolidinone	160 <sup>2</sup>
Naphthalene	9 <sup>1</sup>
Nonanal	13 <sup>2</sup>
Octanal	7.2 <sup>2</sup>
Phenol	200 <sup>1</sup>
4-Phenylcyclohexene (4-PCH)	2.5 <sup>2</sup>
2-Propanol (Isopropanol)	7000 <sup>1</sup>
Styrene	900 <sup>1</sup>
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene)	35 <sup>1</sup>
Toluene	300 <sup>1</sup>
1,1,1-Trichloroethane (Methyl chloroform)	1000 <sup>1</sup>
Trichloroethene (Trichloroethylene)	600 <sup>1</sup>
Xylene isomers	700 <sup>1</sup>
Particulate (PM <sub>2.5</sub> )	35 (24-hr)
Particulates (PM <sub>10</sub> )	150 (24-hr)
<sup>1</sup> Chronic RELS developed by the California Office of Environmental Health Hazard Assessment	
<sup>2</sup> ANSI/ASHRAE/USGBC/IES Standard 189.1-2014 Table 10.3.1.4	

For any area that fails to meet the requirements, the individual chemical(s) in the highest concentrations that are leading to failure are to be reviewed and the problem remedied.

OR

#### 11.2.2B PATH B: TOTAL VOLATILE ORGANIC COMPOUNDS (TVOC)

**11.2.2B.1** Upon *Substantial Completion*, but prior to occupancy, conduct a TVOC indoor air sampling and laboratory analysis of collected samples as follows:

Sampling for TVOCs is conducted over a minimum four-hour

3 points

- Three points are earned where the test is conducted. There are no pass/fail criteria for conducting this



<p>period. All measurements are completed prior to occupancy, but during normal occupied hours, with the building ventilation starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the testing.</p> <p>Samples are taken using one of the following collection media:</p> <ul style="list-style-type: none"> <li>• Thermal desorption tubes.</li> <li>• Canisters.</li> </ul> <p>Laboratory analysis is conducted in accordance with the following:</p> <ul style="list-style-type: none"> <li>• VOC Range (Carbon): C6 – C16.</li> <li>• Reference Compound: Toluene.</li> </ul> <p>All interior <i>finishes</i> are in place at the time of testing. Non-fixed <i>furnishings</i>, such as work stations and partitions are encouraged, but not required to be installed at the time of testing;</p> <p>Samples are collected for each portion of the building served by a separate air handling system. In each area served by a single air handler, samples are collected for each 25,000 ft.<sup>2</sup> (2,323 m<sup>2</sup>) of floor space, or each contiguous floor space, whichever is larger. Samples include areas presumed to have the least ventilation, and the strongest presumed source strength. Samples are collected at 3-6 ft. (91-183 cm) above the finished floor.</p>	<p>test.</p>
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### 11.2.3 CARBON MONOXIDE MONITORING

<p><b>11.2.3.1</b> Carbon monoxide monitoring devices and alarms are installed in enclosed areas where there are sources of combustion (i.e., stoves, ovens, grills, clothes dryers, furnaces, boilers, water heaters, heaters and fireplaces).</p>	<p>1 point or N/A</p> <ul style="list-style-type: none"> <li>• Not applicable where there are no areas with combustion sources.</li> </ul>
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### 11.2.4 LEGIONELLOSIS MITIGATION IN THE BUILDING WATER SYSTEMS

<p><b>11.2.4.1</b> The building water systems conform with ASHRAE 188-2018, <i>Legionellosis: Risk Management for Building Water Systems</i>.</p>	<p>3 points</p>
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### 11.2.5 PEST AND CONTAMINATION CONTROL

<p><b>11.2.5.1</b> The following <i>integrated pest management</i> strategies are used:</p>	<p>1 point</p>
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<ul style="list-style-type: none"> <li>Outdoor air inlets have insect screens of 18x14 mesh for plenum systems feeding multiple air handlers;</li> <li>Structural and mechanical openings are fitted with permanent protection (e.g. screens, sealants, etc.);</li> <li>Advertising signs and other <i>assemblies</i> affixed to the building façade are designed and constructed in a way that reduces bird habitation, and penetrations in the façade are sealed to prevent entry; and</li> <li>Mullions and ledges are less than 1 in. (2.5 cm) deep to discourage bird roosting.</li> </ul>	
<b>11.2.5.2</b> The building has a sealed storage area for food/kitchen solid waste and recycling.	1 point

### 11.2.6 OTHER INDOOR POLLUTANTS (TOBACCO, RADON)

<p><b>11.2.6.1</b> An occupancy policy prohibits smoking. Signage is posted at every building entrance prohibiting smoking and the use of electronic cigarettes within 25 ft. (7.6 m) of the building.</p> <p>Smoking is defined as the inhalation of smoke of burning tobacco, use of electronic-cigarettes or other substances encased in items such as (but not limited to) cigarettes, pipes, and cigars for recreational or medical use.</p>	1 point
<p><b>11.2.6.2</b> <del>The following measures are taken to address radon:</del></p> <p><del><b>11.2.6.2.1:</b> A site-specified assessment of radon potential is conducted and radon prevention and mitigation measures are implemented if indicated by the assessment.</del></p>	<p><del>Maximum = 2 points or N/A</del></p> <ul style="list-style-type: none"> <li><del>Two points are earned where radon potential is assessed and prevention and mitigation measures are implemented if indicated by the radon potential assessment.</del> <ul style="list-style-type: none"> <li><del>Not applicable when there is a documented absence of risk.</del></li> </ul> </li> </ul>
<p><b>11.2.6.3</b> <u>Hazardous materials are safely stored, secured, and HCS labeled per ANSI/ASHRAE Standard 62.1-2019 Ventilation for Acceptable Indoor Air Quality 1 Standard based on the space type.</u> Spaces housing <i>specialized activities</i> that generate hazardous pollutants are:</p> <ul style="list-style-type: none"> <li>provided with separate ventilation AND/OR exhaust systems capable of maintaining the space at a negative pressure of at least 5.0 Pascals (0.02 in. water gauge) on average relative to adjacent spaces (with doors closed) to prevent the spread of air-borne contaminants to other spaces;</li> <li>physically isolated by doors and deck-to-deck partitions or</li> </ul>	<p>2 points or N/A</p> <ul style="list-style-type: none"> <li><u>One point is earned when hazardous materials are safely stored, secured, and labeled.</u></li> <li><u>One point is earned when spaces are properly ventilated and isolated.</u></li> <li>Not applicable where there are no spaces housing <i>specialized activities</i>.</li> </ul>

hard lid ceilings.

## 11.3 LIGHTING DESIGN AND SYSTEMS (32 POINTS)

### 11.3.1 DAYLIGHTING AND VIEWS

**11.3.1.1** Regularly occupied floor area achieves a minimum *daylight factor (DF)* of at least 2 (excluding all direct sunlight penetration).

Assessment Guidance:

Estimate the DF for a daylit space that has vertical windows using the following formula:

**DF = 0.1 x PG**, where:

DF = daylight factor

PG = percentage of glass to floor area (area of the windows/floor area)

Maximum = 5 points

- Five points are earned where  $\geq 75\%$  of the floor area achieves a DF of 3 or more.
- Four points are earned where  $\geq 50$  to  $< 75\%$  of the floor area achieves a DF of 3 or more.
- Three points are earned where  $\geq 25$  to  $< 50\%$  of the floor area achieves a DF of 3 or more.
- Two points are earned where  $\geq 75\%$  of the floor area achieves a DF of 2 to  $< 3$ .
- One point is earned where  $\geq 50$  to  $< 75\%$  of the floor area achieves a DF of 2 to  $< 3$ .

**11.3.1.2** Regularly occupied task areas are designed to have *clear views* to the exterior or atria within 25 ft. (7.6 m) from a window.

Maximum = 3 points

- Three points are earned where  $\geq 90\%$  of occupied space has *clear views*.
- Two points are earned where  $\geq 60\%$  to  $< 90\%$  of occupied space has *clear views*.
- One point is earned where  $\geq 40\%$  to  $< 60\%$  of occupied space has *clear views*.
- No points are earned where  $< 40\%$  of occupied space has *clear views*.

**11.3.1.3** Southern, western, and eastern exposures have the following shading devices:

- **11.3.1.3.1:** Active automated shading devices (e.g., automated widow shades or electrochromic glazing) that automatically adjust based on sky conditions for all listed exposures; OR
- **11.3.1.3.2:** Passive shading devices (e.g., manual window

Maximum = 2 points

- Two points are earned where there are active automated shading devices for the specified exposures.
- One point is earned where there are passive shading devices for the specified exposures.

shades or permanent projections such as <i>overhangs</i> ).	<ul style="list-style-type: none"> <li>No points are earned if there are no shading devices.</li> </ul>
<b>11.3.1.4</b> Daylit areas (with a <i>Daylight Factor</i> of at least 2) use photo-sensors to maintain consistent lighting levels throughout the day using both <i>daylighting</i> and electric lighting.	<p>Maximum = 2 points</p> <ul style="list-style-type: none"> <li>Two points are earned where &gt;75% of daylit areas use photo-sensors.</li> <li>One point is earned where ≥50% to ≤75% of daylit areas use photo-sensors.</li> <li>No points are earned if &lt;50% of daylit areas use photo sensors.</li> </ul>

### 11.3.2 LIGHTING DESIGN QUANTITY

**11.3.2.1** *Regularly occupied spaces* meet the Recommended Illuminance for the Locations/Tasks in Table 11.3.2.1-A and Table 11.3.2.1-B.

“Recommended vertical and horizontal illuminance targets” are found in the *IES Lighting Handbook, 10<sup>th</sup> Edition, Table 22.2 and Applications Sections 21-37 OR Table 11.3.2.1-A: IES Illuminance Categories and Table 11.3.2.1-B: IES Task/Location Categories*. Lighting levels may be increased or decreased by 10% (max.) based on Occupant Age, Visual Performance Requirements, or other weighting factors as detailed in the *IES Lighting Handbook, 10<sup>th</sup> Edition Table 4.1*, the following weighting factors:

**Table 11.3.2.1–A: IES Illuminance Categories**

Illuminance Category	Description	Recommended Illuminance (lux/footcandle s)
<b>A</b>	Public Spaces	30 / 3
<b>B</b>	Simple <i>orientation</i> for short visits	50 / 5
<b>C</b>	Working spaces where simple visual tasks are performed	100 / 10
<b>D</b>	Performance of visual tasks of high contrast and large size	300 / 30

Maximum = 5 points

- Five points are earned where ≥90% of occupied floor area meets the IES Illuminance recommendations.
- Four points are earned where ≥70% to <90% of occupied floor area meets the IES Illuminance recommendations
- Two points are earned where ≥50% to <70% of occupied floor area meets the IES Illuminance recommendations.
- No points are earned where <50% of occupied floor area meets the IES Illuminance recommendations.

<b>E</b>	Performance of visual tasks of high contrast and small size or visual tasks of low contrast and large size	500 / 50
<b>F</b>	Performance of visual tasks of low contrast and small size	1,000 / 100
<b>G</b>	Performance of visual tasks near threshold	3,000-10,000 / 300-1,000

**Table 11.3.2.1–B: IES Location/Task Categories**

Interior Location/Task	Horizontal Category	Vertical Category
Auditoriums – Assembly	C	-
CAD drafting stations	C	A
Conference Rooms – Meeting	D	B
Conference Rooms – Video Conference	E	D
Hospital patient rooms – general	B	A
Hospital nursing stations – general	D	B
Hospital lobby	B	A
Hospital anesthetizing locations	E	C
Hospital general critical care	B	A
Hotel guest rooms – general	C	-
Hotel lobby general lighting	C	-
Library reading stacks	D	-
Museum exhibit cases	D	B
Open Office – Intensive VDT	D	B
Open Office – Intermittent VDT	E	B
Office lobby	C	A
Office copy room	C	A
Stairways and corridors	B	-
Toilets and washrooms	B	A

**11.3.2.2** Luminance ratios do not exceed the following as per IESNA for tasks:

- 3:1 between the task and adjacent surroundings;
- 10:1 between the task and remote (non-adjacent) surfaces; and
- 20:1 between the brightest and darkest surface in the field of view; or 8:1 between rows of *luminaires* where there is indirect lighting and where ceiling luminance exceeds 124.1 fL

2 points or N/A

- Not applicable where spaces are designed such that source/task eye geometry do not require IESNA Standard VDT compliant *luminaires*.



(425 cd/m <sup>2</sup> ).	
<b>11.3.2.3</b> The average luminance does not exceed the following values for given <i>luminaire</i> angles where there is <i>direct lighting</i> : <ul style="list-style-type: none"> <li>• 248.1 fL (850 cd/m<sup>2</sup>) at 65° from the vertical;</li> <li>• 102.2 fL (350 cd/m<sup>2</sup>) at 75° from the vertical; or</li> <li>• 51.1 fL (175 cd/m<sup>2</sup>) at 85° from the vertical.</li> </ul>	2 points or N/A <ul style="list-style-type: none"> <li>• Not applicable where spaces are designed such that source/task eye geometry do not require IESNA Standard VDT compliant <i>luminaires</i>.</li> </ul>

<b>11.3.3 LIGHTING DESIGN QUALITY</b>	
<b>11.3.3.1</b> Regularly occupied spaces use electric light sources with a minimum Color Rendering Index (CRI) of 80.	1 point
<b>11.3.3.2</b> Regularly occupied spaces use electric light sources with a Correlated Color Temperature (CCT) between 2700°K and 4500°K.	1 point or N/A <ul style="list-style-type: none"> <li>• Not applicable to specialty retail, medical, or exterior environments.</li> </ul>
<b>11.3.3.3</b> Regularly occupied spaces use no more than 50% direct only general lighting. Direct only general lighting limits Direct Glare to no more than 50° above horizontal; Direct Glare includes direct view of the light source and luminances over 2,335 fL (8,000 cd/m <sup>2</sup> ).	2 points
<b>11.3.3.4</b> Individual control of primary workspace lighting is provided for at least 90% of occupants.  “Control” may either be dimming from 100% to at least 10% or stepped dimming with at least three (3) steps: 100%, 50% and 0%.	Maximum = 2 points <ul style="list-style-type: none"> <li>• Two points are earned for continuous dimming of at least 10% to 100%.</li> <li>• One point is earned for stepped dimming or switching with at least three steps (100%, 50%, 0%).</li> </ul>

<b>11.3.4 LIGHTING SUSTAINABILITY</b>	
<b>11.3.4.1</b> A minimum of 75% of electric light sources have a Lumen Maintenance factor of 35,000 hours to L70 or greater (the output of the lights has lost no more than 30% of their initial output at 35,000 hours). 35,000 hours is based on at least 1 hour of operation per start.	2 points
<b>11.3.4.2</b> All <i>luminaires</i> are RoHS compliant with EU Directive 2011/65/EU of the European Parliament. RoHS specifies maximum levels for the following six restricted materials: <ul style="list-style-type: none"> <li>• Lead (Pb): &lt; 1000 ppm;</li> <li>• Mercury (Hg): &lt; 100 ppm;</li> <li>• Cadmium (Cd): &lt; 100 ppm;</li> </ul>	2 points

<ul style="list-style-type: none"> <li>• Hexavalent Chromium: (Cr VI) &lt; 1000 ppm;</li> <li>• Polybrominated Biphenyls (PBB): &lt; 1000 ppm; and</li> <li>• Polybrominated Diphenyl Ethers (PBDE): &lt; 1000 ppm.</li> </ul> <p>Certification is provided by the <i>luminaire</i> manufacturer.</p>	
<p><b>11.3.4.3</b> A maintenance and operations plan is documented and supplied to the building owners, management, and maintenance. The maintenance plan includes the following:</p> <ul style="list-style-type: none"> <li>• Reflected ceiling plan;</li> <li>• Lighting fixture schedule (<i>luminaire</i> catalog numbers, manufacturer, lamp, wattage, beam spread, color temperature, and color rendering index);</li> <li>• Initial measured footcandle levels in each space;</li> <li>• Cleaning instructions and cleaning schedule; and</li> <li>• Lighting sequence of operations for each space (e.g. what the lights are supposed to do when someone enters the room, what are the light levels they can choose, what controls are in each space).</li> </ul>	<p>1 point</p>

## 11.4 THERMAL COMFORT (23 POINTS)

11.4.1 THERMAL CONTROL ZONES	
<p><b>11.4.1.1</b> One or more of the listed thermal zoning strategies is used for continuously occupied areas:</p> <ul style="list-style-type: none"> <li>• <b>11.4.1.1.1: Office Occupancies/Areas:</b> Includes offices and conference rooms, among others. For open areas, thermal control zones are designed to be <del>between 500 ft<sup>2</sup> (46.5 m<sup>2</sup>) and ≤1000 ft<sup>2</sup> (92.9 m<sup>2</sup>)</del> for open areas. For single rooms, thermal control zones are designed to be <del>between 750 ft<sup>2</sup> (69.7 m<sup>2</sup>) and ≤1200 ft<sup>2</sup> (111.5 m<sup>2</sup>)</del> Circulation and support areas are excluded.</li> <li>• <b>11.4.1.1.2: Educational Occupancies/Areas:</b> Includes classrooms, teaching labs, etc. Classrooms AND/OR teaching labs <del>are designed</del> thermal control zones <u>are designed to be under ≤1500 ft. <sup>2</sup> (139.4 m<sup>2</sup>).</u></li> </ul>	<p>Maximum = 14 points or N/A</p> <ul style="list-style-type: none"> <li>• <b>Office Occupancies/Areas</b> <ul style="list-style-type: none"> <li>○ Fourteen points are earned where thermal control zones are designed to be <u>≤500 ft<sup>2</sup> (46.5 m<sup>2</sup>)</u> for open areas or <u>≤750 ft<sup>2</sup> (69.7 m<sup>2</sup>)</u> for a single room.</li> <li>○ Ten points are earned where thermal control zones are designed to be <u>≤1000 ft<sup>2</sup> (92.9 m<sup>2</sup>)</u> for open areas or <u>≤1200 ft<sup>2</sup></u></li> </ul> </li> </ul>

- **11.4.1.1.3: Healthcare Occupancies/Areas:** Includes patient wards, diagnostic and treatment areas. Thermal control zones are designed to be ~~between 500 ft.<sup>2</sup> (46.5 m<sup>2</sup>) and~~  $\leq 1000$  ft.<sup>2</sup> (92.9 m<sup>2</sup>).
- **11.4.1.1.4: Open-Area Mercantile and Assembly Occupancies/Areas:** Includes retail, food service, convention halls, etc. For spaces exceeding 464.5 m<sup>2</sup> (5000 ft.<sup>2</sup>) thermal control zones are designed to be ~~less than~~  $\leq 2500$  ft.<sup>2</sup> (232.3 m<sup>2</sup>). For spaces ~~between 2500 ft.<sup>2</sup> (232.3 m<sup>2</sup>) and~~  $\leq 5000$  ft.<sup>2</sup> (464.5 m<sup>2</sup>) thermal control zones are designed to be ~~less than~~  $\leq 1500$  ft.<sup>2</sup> (139.4 m<sup>2</sup>).

For multiple occupancy types and/or spaces with varying thermal zone size within a building type, score each occupancy area and prorate score by floor area (rounding upward to nearest integer to the maximum available total points).

- (111.5 m<sup>2</sup>) for single rooms.
- Not applicable where there are no office occupancies/areas.
- **Educational Occupancies/Areas:**
  - Fourteen points are earned where classrooms AND/OR teaching labs ~~are designed~~ thermal control zones ~~under~~ are designed to be  $\leq 1500$  ft.<sup>2</sup> (139.4 m<sup>2</sup>).
  - Not applicable where there are no educational occupancies/areas.
- **Healthcare Occupancies/Areas:**
  - Fourteen points are earned where thermal control zones are designed to be  $\leq 500$  ft.<sup>2</sup> (46.5 m<sup>2</sup>).
  - Ten points are earned where thermal control zones are designed to be  $\leq 1000$  ft.<sup>2</sup> (92.9 m<sup>2</sup>).
  - Not applicable where there are no healthcare occupancies/areas.
- **Open-Area Mercantile and Assembly Occupancies/Areas:**
  - Fourteen points are earned where thermal control zones are designed to be in spaces between  $\leq 2500$  ft.<sup>2</sup> (232.3 m<sup>2</sup>) and for spaces exceeding 5000 ft.<sup>2</sup> (464.5 m<sup>2</sup>) and are designed to be  $\leq 1500$  ft.<sup>2</sup> (139.4 m<sup>2</sup>) for spaces  $\leq 5000$  ft.<sup>2</sup> (464.5 m<sup>2</sup>).
  - ~~Ten points are earned where thermal control zones in spaces exceeding 5000 ft.<sup>2</sup> (464.5 m<sup>2</sup>) are designed to be~~  $< 2500$  ft.<sup>2</sup> (232.3 m<sup>2</sup>).
  - Not applicable where there are no open-area mercantile and assembly occupancies/areas.
- Not applicable for other

occupancies/areas.

#### 11.4.2 THERMAL COMFORT DESIGN

**11.4.2.1** The HVAC systems and building are designed to provide a thermal environment in conformance with *ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy*. Exceedance hours for *regularly occupied spaces* do not exceed 300 hours per year.

9 points or N/A

- Not applicable where the occupancy is outside the purview of 55-2017.

### 11.5 ACOUSTICAL PRIVACY AND COMFORT (26 POINTS)

#### 11.5.1 NOISE LIMITS AND MASKING SOUND LEVEL

**11.5.1.1** Design complies with noise limit criteria, quantified by either Noise Criterion (NC) or A-weighted Overall Sound Level (dBA)/C-weighted Overall Sound Level (dBC), as follows:

- **Healthcare spaces noise limit criteria in accordance with one of the following as applicable:**
  - *2018 FGI Guidelines for Design and Construction of Hospitals*
  - *2018 FGI Guidelines for Design and Construction of Outpatient Facilities*
  - *2018 FGI Guidelines for Design and Construction of Residential Health, Care, and Support Facilities*
- **Educational spaces noise limit criteria in accordance with the following:**
  - ANSI S12.60 Series: *Acoustical Performance Criteria, Design Requirements, And Guidelines For Schools*
- **All other spaces noise limit criteria in accordance with the following:**
  - *Table 1 Design Guidelines for HVAC-Related Background Sound in Rooms* in Chapter 49. *Noise and Vibration Control* of the 2019 *ASHRAE Applications Handbook*
  - Informative *Annex C – Recommended noise level specifications for various occupied activity areas* of *ANSI/ASA S12.2-2019: Criteria For Evaluating Room Noise*.

Maximum = 6 points

- One point is earned for establishing noise limit criteria for all listed spaces.

AND

- Three points are earned for validating compliance with a Noise Assessment of noise limit criteria for  $\geq 75\%$  to  $\leq 100\%$  of listed spaces.
- Two points are earned for validating compliance with a Noise Assessment of noise limit criteria for  $\geq 50\%$  to  $< 75\%$  of listed spaces.
- One point is earned for validating compliance with a Noise Assessment of noise limit criteria for  $\geq 10\%$  to  $< 50\%$  of listed spaces.
- No points are earned for validating compliance with a Noise Assessment of noise limit criteria for  $< 10\%$  of listed spaces.

**11.5.1.1.1** Verification of building-related systems', services' and utilities' noise levels comply with noise limit criteria in 11.5.1.1, measured after construction but prior to occupancy, using a Type I or Type II sound level meter.

- One point is earned for 11.5.1.1.1.
- One point is earned 11.5.1.1.2.

**11.5.1.1.2** Assessment of transient noise shall be evaluated, after

construction but prior to occupancy, using appropriate metrics as defined in one of the following:

- *Chapter 49. Noise and Vibration Control of the 2019 ASHRAE Applications Handbook*
  - *Table 1 Guidelines for HVAC-Related Background Sound in Rooms (with footnote c)*
  - *Table 5 Plumbing Noise Levels*
- *2018 International Green Construction Code (IgCC)*
  - *Table 8.3.3.2 Maximum Interior Background Sound Pressure Levels from Building Systems and Exterior Sound Sources*
- *ANSI/ASA S12.2-2019: Criteria For Evaluating Room Noise*
  - *Section 5.3.3 Screening for Surging or Large Random Fluctuations*
- *ANSI/ASA S12.60-2010/Part 1 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools*
  - *Section 5.2.2 (citing ANSI/ASA S1.13 Measuring Sound Pressure Levels in Air)*

**11.5.1.2** Design incorporates a sound masking system to provide the specified minimum A-weighted Overall Sound Level (dBA) for each type of space, selected from within the following ranges:

- **Offices:**
  - Open: 45-48dBA
  - Enclosed: 35-45dBA
  - Meeting/Conference: 30-45dBA
  - Circulation: 45-48dBA
- **Healthcare:**
  - Patient room: 40-48dBA
  - Private offices and exam/treatment room: 35-45dBA
  - Waiting area: 45-48dBA
  - Corridor and public spaces: 45-48dBA
  - Circulation: 45-48dBA
- **Other:**
  - All other areas where speech privacy, concentration, or sleep/relaxation is required: 35-48-dBA

**11.5.1.2.1** The installed sound masking system is measured in accordance with ASTM E1573-18 *Standard Test Method for Measurement and Reporting of Masking Sound Levels Using A-Weighted and One-Third-Octave-Band Sound Pressure Levels* to determine compliance with specified performance requirements, as follows:

Maximum = 6 points

- Four points are earned for ≥80% to ≤100% of floor area of listed room types ~~utilizing~~ using sound masking.
- Three points are earned for ≥50% to <80% of floor area of listed room types ~~using~~ utilizing sound masking.
- Two points are earned for ≥25% to <50% of floor area of listed room types ~~using~~ utilizing sound masking.
- One point is earned for ≥10% to <25% of floor area of listed room types ~~using~~ utilizing sound masking
- No points are earned if <10% of floor area of listed room types ~~utilize~~ use sound masking.
- Two points are earned for 11.5.1.2.1



- The measured overall level is within +/-0.5dBA of that specified.
- The measured spectrum conforms to the National Research Council's SPMSOFT Optimum Masking frequency range and 1/3 octave band levels, or the project acoustician's specified 1/3 octave band levels, within +/-2.0dB.

## 11.5.2 ACOUSTIC INSULATION AND VIBRATION ISOLATION

**11.5.2.1** Design complies with minimum composite Sound Transmission Class ratings of rooms, as follows:

- **Healthcare spaces, one of the following as applicable:**
  - 2018 FGI Guidelines for Design and Construction of Hospitals
  - 2018 FGI Guidelines for Design and Construction of Outpatient Facilities
  - 2018 FGI Guidelines for Design and Construction of Residential Health, Care, and Support Facilities
- **Educational spaces:**
  - ANSI S12.60 Series: Acoustical Performance Criteria, Design Requirements, And Guidelines For Schools
- **Other spaces:**
  - Table 801.3.3.3 Minimum Sound & Impact Sound Ratings of the 2018 International Green Construction Code (IgCC).

**OR**

Design complies with minimum composite Sound Transmission Class ratings calculated to meet the noise limit criteria or 5 ~~dBA~~ **points** less than the masking sound levels for spaces. For spaces requiring speech privacy, the minimum composite Sound Transmission Class ratings is set to the required "Level Difference" (as in ASTM E2638) or "Level Reduction" (as in ASTM E1130) ~~calculated~~ to provide the required level of speech privacy in accordance with one of the following:

- Speech Privacy Class values of 70 or greater, as in TABLE X2.1 Interpreting SPC: Descriptions of the Likelihood of Speech Being Audible or Intelligible for Various Ranges of SPC, Based on Speech Levels in Meeting Rooms and Offices in ASTM E2638-10 Standard Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Room
- Articulation Index values of 0.30 or less, as in Appendix X.1 RELATIONSHIP OF ARTICULATION INDEX TO SPEECH PRIVACY in ASTM E1130-16 Standard Test Method for Objective

Maximum = 4 points

- Four points are earned for ≥80% to ≤100% of listed room types.
- Three points are earned for ≥50% to <80% of listed room types.
- Two points are earned for ≥25% to <50% of listed room types.
- No points are earned for <25% of listed room types.

<i>Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index</i>	
<b>11.5.2.2</b> Design of floor-ceiling <i>assemblies</i> complies with <i>Table 801.3.3.3 Minimum Sound &amp; Impact Sound Ratings</i> in the 2018 <i>International Green Construction Code (IgCC)</i> for Impact Insulation Class (IIC).	1 point
<b>11.5.2.3</b> Design identifies and addresses vibration isolation in accordance with <i>Table 47 Selection Guide for Vibration Isolation</i> in <i>Chapter 49. Noise and Vibration Control</i> of the 2019 <i>ASHRAE Applications Handbook</i> and complies with recommendations in the selection guide.	1 point

#### 11.5.2.4 Performance Ratings

Path A or B

Two paths are available for field testing.

- **11.5.2.4A Path A: Room Design Performance Ratings:** 4 points
- OR
- **11.5.2.4B Path B: Space Performance Ratings:** 4 points

Points cannot be combined between paths. Select one of the paths below.

<b>11.5.2.4A PATH A: ROOM DESIGN PERFORMANCE RATINGS</b>	
<b>11.5.2.4A.1</b> Field-testing of room design performance ratings in 11.5.2.1, quantified by either Noise Insulation Class (NIC) or Apparent Sound Transmission Class (ASTC), comply within 5 points in accordance with <i>ASTM E336-20 Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings</i> , measured after construction but prior to occupancy.	<p>Maximum = 4 points</p> <ul style="list-style-type: none"> <li>• One point is earned if ≥10% of different sound-rated <i>assemblies'</i> performance ratings comply with designed composite STC-45 rating or greater of the room or adjacency.</li> <li>• One point is earned if ≥10% of different sound-rated <i>assemblies'</i> performance ratings comply with designed composite STC-50 rating or greater of the room or adjacency. If not applicable, the additional point is earned if the criteria for STC-45 is met.</li> <li>• One point is earned if ≥10% of different sound-rated <i>assemblies'</i> performance ratings comply with designed composite STC-55 rating or greater of the room or adjacency. If not applicable, the</li> </ul>

	<p>additional point is earned if the criteria for STC-50 is met.</p> <ul style="list-style-type: none"> <li>One point is earned if <math>\geq 10\%</math> of different sound-rated <i>assemblies'</i> performance ratings comply with designed composite STC-60 rating or greater of the room or adjacency. If not applicable, the additional point is earned if the criteria for STC-55 is met.</li> </ul>
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OR

11.5.2.4B PATH B: SPACE PERFORMANCE RATINGS	
<p><b>11.5.2.4B.2-1</b> Field-testing of <u>adjacent</u> spaces comply with <del>noise</del> criteria limits in 11.5.2.1 <del>or 5dBA less than the masking sound levels in 11.5.2.2 for spaces</del>, measured after construction but prior to occupancy, in accordance with the following as applicable:</p> <ul style="list-style-type: none"> <li>For adjacencies of mechanical, electrical and plumbing (MEP) and heating, ventilation and air-conditioning (HVAC) rooms: <ul style="list-style-type: none"> <li>ASTM E336-20 Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings</li> </ul> </li> <li>For spaces where speech privacy is required: <ul style="list-style-type: none"> <li>ASTM E2638-10 Standard Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Room</li> <li>ASTM E1130-16 Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index</li> </ul> </li> </ul>	<p>Maximum = 4 points</p> <ul style="list-style-type: none"> <li>Four points are earned if <math>\geq 15\%</math> of each different types of space comply with speech privacy criteria.</li> <li>Three points are earned if <math>\geq 10\%</math> to <math>&lt; 15\%</math> of each different types of space comply with speech privacy criteria.</li> <li>Two points are earned if <math>\geq 5\%</math> to <math>&lt; 10\%</math> of each different types of space comply with speech privacy criteria.</li> <li>One point is earned if <math>\geq 5\%</math> of MEP and HVAC rooms' adjacencies performance ratings comply with designed composite Sound Transmission Class rating. If not applicable, the point is earned.</li> <li>No points are earned if <math>&lt; 5\%</math> of each different types of space do not comply with speech privacy criteria or if <math>&lt; 5\%</math> of MEP and HVAC adjacencies' performance ratings do not comply with design composite STC ratings.</li> </ul>

11.5.3 REVERBERATION TIME OR CEILING NOISE REDUCTION COEFFICIENT (NRC) <sup>1</sup>	
<p><b>11.5.3.1</b> Design of spaces complies with the maximum reverberation time (T60) criteria from <i>Sections 801.3.3 Acoustical</i></p>	Maximum = 4 points or N/A

*Control and 801.3.3.4 Interior Sound Reverberation in the 2018 International Green Construction Code (IgCC).*

For specialized spaces not included in the above references the design team shall submit evidence of compliance. Spaces may include but are not limited to the following: community centers, theatres, music halls, studios, sensory rooms, supportive accessibility spaces.

- Four points are earned for ≥80% to ≤100% of listed spaces.
- Three points are earned for ≥50% to <80% of listed spaces.
- Two points are earned for ≥25% to <50% of listed spaces.
- No points are earned for <25%.
- Not applicable for Multi-Unit Residential Buildings (MURBs).

*The Foreword and Appendix are informative only and do not contain mandatory requirements necessary for conformance to this Standard. As such, they may contain material that has not been subjected to public review or a consensus process. Sections 5 Definitions, Abbreviations, and Acronyms and 12 References and Guidelines are informative only and are updated by the Secretariat upon the Consensus Body approval of all criteria.*

*Reference documents cited within the Standard are mandatory and are only to be applied within the context for which they are cited. Full acknowledgement and credit are given to the source organization for all references listed within this standard. Copies of the references and guidelines cited within this standard can be obtained from the full list of sources found in section 12. Incorporation of a reference is limited to the edition of the publication that is cited within this standard. Future amendments or revisions of the reference are not included.*

## 12. REFERENCES AND GUIDELINES

~~American National Standards Institute (ANSI)  
ANSI S12-2-2008~~

### American Society of Acoustics (ASA)

ANSI/ASA S12.60-2010/Part 1 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools

ANSI/ASA S12.2-2019: Criteria For Evaluating Room Noise

ANSI S12.60 Series: Acoustical Performance Criteria, Design Requirements, And Guidelines For Schools

### American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

ANSI/ASHRAE/IES Standard 90.1-2010, 2013, 2016, 2019 Energy Standard for Buildings Except Low-Rise Residential Buildings

~~ANSI/ASHRAE/IES Standard 90.1-2013 Energy Standard for Buildings Except Low-Rise Residential Buildings~~

ANSI/ASHRAE/USGBC/IES Standard 189.1-2014, 2017, 2020 Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

ASHRAE 160-2009 Criteria for Moisture-Control Design Analysis in Buildings

ASHRAE Guideline 0-2019, The Commissioning Process

ASHRAE 188-2018, Legionellosis: Risk Management for Building Water Systems

ASHRAE Systems Application Handbook, 2019 (Chapter 49)

~~ANSI/ASHRAE/IES Standard 202-2018 Commissioning Process for Buildings and Systems~~

ANSI/ASHRAE Standard 55-2017 Thermal Environmental Conditions for Human Occupancy

ANSI/ASHRAE Standard 62.1-2019, Ventilation for Acceptable Indoor Air Quality

ANSI/ASHRAE 129-1997 (RA 02), Measuring Air Change Effectiveness

ANSI/ASHRAE/ASHE Standard 170-2017 Ventilation of Health Care Facilities

ASHRAE's Building Energy Quotient Program

**American Society of Agricultural and Biological Engineers (ASABE)**

ASABE/ICC 802-2020 ANSI Landscape Irrigation Sprinkler and Emitter Standard

**ASTM International (ASTM)**

ASTM D 5197-16 Standard Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)

ASTM D6866-16, Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis

ASTM D7612-21 Standard Practice for Categorizing Wood and Wood-Based Products According to Their Fiber Sources

ASTM E1130-16 Standard Test Method for Objective Measurement of Speech Privacy in Open Plan Spaces Using Articulation Index

ASTM E2638-10 Standard Test Method for Objective Measurement of the Speech Privacy Provided by a Closed Room

ASTM E2921-~~13-22~~ Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes, Standards, and Rating Systems



ASTM E3182-20 - Standard Practice for Preparing an Occupant Exposure Screening Report (OESR)

ASTM E336-20 Standard Test Method for Measurement of Airborne Sound Attenuation between Rooms in Buildings

ASTM E1573-18 Standard Test Method for Measurement and Reporting of Masking Sound Levels Using A-Weighted and One-Third-Octave-Band Sound Pressure Levels

[ASTM E2947-16a Standard Guide for Building Enclosure Commissioning](#)

### **Business and Institutional Furniture Manufacturer's Association (BIFMA)**

ANSI/BIFMA e3-2019 Business and Institutional Furniture Sustainability Standard and Tools

ANSI/BIFMA M7.1-2011(R2016) Standard Test Method for Determining VOC Emissions From Office Furniture Systems, Components and Seating

### **Canadian Standards Association (CSA)**

[CSA Z320-11, Building Commissioning](#)

~~[CSA S4789-95 \(R2007\): Guideline on Durability in Buildings](#)~~

~~[CSA 6.19-01 \(R2011\): Residential Carbon Monoxide Alarming Devices](#)~~

### **Facility Guidelines Institute (FGI)**

Guidelines for Design and Construction of Outpatient Facilities, 2018

Guidelines for Design and Construction of Residential Health, Care, and Support Facilities, 2018

Guidelines for Design and Construction of Hospitals, 2018

### **Green Building Initiative**

[Green Globes® Energy Baseline Translator™](#)

### **Illumination Engineering Society of North America (IES)**

IDA – IES Model Lighting Ordinance (MLO), 2011

The IES Lighting Handbook: Informational Reference & Application, 2011

[ANSI/IES RP-43-21, Recommended Practice: Lighting Exterior Applications, 2021](#)

### **International Association of Plumbing and Mechanical Officials (IAPMO)**

IAPMO 2020 IAPMO WEstand

IAPMO 2018 Uniform Mechanical Code

~~IAPMO IGC 234-2016 Demand Driven Storm Water Diversion Systems~~

IAPMO IGC 324-2019 Alternate Water Source Systems for Multi-Family, Residential, and Commercial Use

IAPMO Z1349-2021 Standard for Devices for Detection, Monitoring or Control of Plumbing Systems

### **International Code Council (ICC)**

ICC ~~IECC~~ 2012 International Energy Conservation Code

ICC ~~IECC~~ 2015 International Energy Conservation Code

ICC 2018 International Energy Conservation Code

ICC 2021 International Energy Conservation Code

ICC 2018 International Mechanical Code

2018 International Plumbing Code (IPC)

ICC 2015 International Wildland-Urban Interface Code

International Green Construction Code (IgCC), 2018

### **International Organization for Standardization (ISO)**

ISO 14025, Environmental labels and declarations – Type III environmental declarations – principles and procedures, 2006

ISO 14040, Environmental management – Life cycle assessment—Principles and framework, 2006

ISO 14044, Environmental management – Life cycle assessment – Requirements and guidelines, 2006

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories, ~~2005~~2017

ISO/IEC 17065, Conformity assessment – Requirement for bodies certifying products, processes and services, 2012

ISO 21930, Sustainability in building construction – Environmental declaration of building products, 2007, 2017

### **National Research Council**

SPMSoft Optimum Masking

National Renewal Energy Laboratory

International Performance Measurement & Verification Protocol (IPMVP): Concepts and Practices for Determining Energy savings in New Construction, Volume III, Part I, January 2006

**NSF International**

NSF/ANSI 350- Onsite Residential And Commercial Water Reuse Treatment Systems

NSF/ANSI 350-1 Onsite Residential And Commercial Greywater Treatment Systems For Subsurface Discharge

**State of California, California Department of Public Health (CDPH)**

Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2, 2017

**South Coast Air Quality Management District (SCAQMD)**

Rule 1168, 2017

**State of California, California Environmental Protection Agency**

California Air Resources Board Suggested Control Measure for Architectural Coatings (February 1, 2008)

**UL**

UL2799 2017 Environmental Claim Validation Procedure for Zero Waste to Landfill

UL 2821- GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings, 2013

~~**U.S. Census Bureau**~~

~~North American Industry Classification System (NAICS)~~

**U.S. Department of Energy**

Energy Information Administration's (EIA) "Commercial Building Energy Consumption Survey (CBECS)"

~~International Performance Measurement and Verification Protocol; DOE/EE-0157; December 1997~~

**U.S. Environmental Protection Agency (EPA)**

ENERGY STAR® Commercial Buildings

ENERGY STAR® 1.2 Program Requirements for Commercial Steam Cookers

ENERGY STAR® 2.0 Program Requirements for Commercial Dishwashers

ENERGY STAR® 3.0 Program Requirements For Automatic Commercial Ice Makers

ENERGY STAR® 6.0 Program Requirements for Residential Dishwashers

ENERGY STAR® 8.0 Program Requirements Product Specification for Clothes Washer

~~ENERGY STAR® Qualified Product Lists, 2014~~

WaterSense® Water Budget Tool

US Zero Waste Business Council  
Zero Waste Certification

Waterfront Alliance  
Waterfront Edge Design Guidelines (WEDG) Certification