

SESSION 4

GREEN GLOBES FOR NEW CONSTRUCTION 2013

LEARNING OBJECTIVES

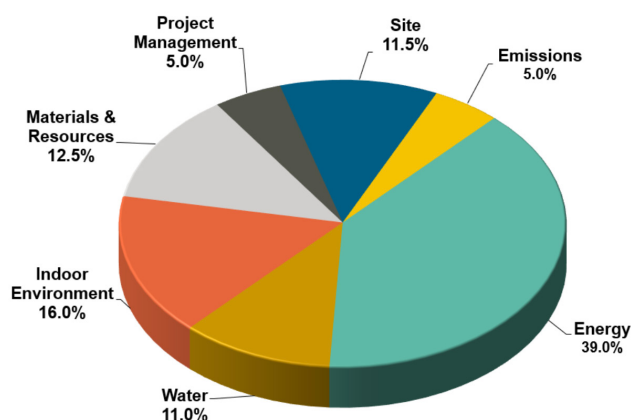
- Understand the Environmental Assessment areas and point allocations for Green Globes for New Construction 2013
- Review case studies from projects certified under Green Globes for New Construction 2013



ENVIRONMENTAL ASSESSMENT AREAS

SI	NC (CS)	EB
Project Management	Project Management	N/A
N/A	Site	N/A (Included with Resources)
Energy	Energy	Energy
Water	Water	Water
Materials & Resources	Materials & Resources	Resources
Emissions	Emissions	Emissions, Effluents, & Pollution Controls
Indoor Environment	Indoor Environment	Indoor Environment
N/A	N/A	Environmental Management

As previously mentioned, there are 1000 total points possible within Green Globes which are allocated differently under the New Construction, Sustainable Interiors and Existing Buildings programs. The diagram demonstrates the point distribution for the seven assessment areas within the NC 2013 program. Energy has the largest percentage of points followed by Indoor Environment and Materials and Resources.



PROJECT MANAGEMENT

Green Globes addresses management topics as critical aspects of assessment, incorporating them under a major topical section rather than as innovative or extra credit. Sound management practices inevitably lead to positive outcomes. The NC program enhances management concepts by measuring adherence to the incorporation of an integrated design process (IDP), including the use of pre-design and progress meetings as well as the establishment of IDP performance goals. It also incorporates measurement of the use of environmental management during construction which includes the requirement of the General Contractor to utilize and document specific policies, practices, and strategies as part of their Environmental Management Systems (EMS). It also covers clean diesel practices, building materials and envelope that prevent and control mold, and practices to maintain good indoor air quality (IAQ).

PROJECT MANAGEMENT		MAXIMUM POINTS: 50
1.1	Integrated Design Process (IDP)	9
1.1.1	Pre-Design Meetings	3
1.1.2	IDP Performance Goals	3
1.1.3	IDP Progress Meeting for Design	3
1.1.4	Capital Asset Plant & Business Case Summary (Federal Only)	0
1.2	Environmental Management During Construction	12
1.2.1	Environmental Management Systems (EMS)	4
1.2.2	Clean Diesel Practices	3
1.2.3	Building Materials and Building Envelope	3
1.2.4	IAQ During Construction	5
1.3	Commissioning	29
1.3.1	Pre-Commissioning	3
1.3.2	Whole Building Commissioning	19
1.3.3	Training	1
1.3.4	Operations and Maintenance Manual	6

Suggested Documentation:

- Owner's Project Requirements (OPR)
- Division 01 specifications
- List of written performance goals
- Progress meeting agendas and meeting minutes
- List of key personnel and a description of their major tasks
- EMS plan to be used by the general contractor
- Description & photos of clean diesel practices
- Construction documents*
- Manufacturer's specifications, cut sheets and performance documentation.
(needed for a significant number of criteria in the other Environmental Assessment Areas)
- Photographs of protected building materials
- IAQ Management Plan
- Basis of Design (BOD) documents
- Commissioning Plan
- Commissioning reports (including field testing results)
- Operations and maintenance manual (including all plans, protocols, strategies and contracts)

CASE STUDY

The Lofts at River East is a new construction project designed to renovate a facility with long historical significance in the City of Chicago. This building has seen numerous building type uses over its lifespan of 110 years. The space was most recently renovated to become a multi-unit residential high-rise building with commercial and tenant occupancy and community activity areas. The 7-bay configuration structure has a combined enclosed area of about 549,000 SF. This project certified with 2 Green Globes in October of 2016.

The project earned points in the Integrated Design Process subcategory.

- Members of the design and construction teams discussed the approach to integrated and sustainable design from the inception of the preliminary design.
- Meeting minutes and initial sustainable design parameters were reviewed to verify that an integrated process was used in all aspects of the facility design starting in the construction documents phase.
- Team members from 16 key design disciplines were involved in the design process. The prominence of the structure in the history of Chicago meant higher than normal interaction with the City of Chicago.



SITE

The Site area reviews the development area; urban infill and urban sprawl as well as greenfields, brownfields and floodplains. It covers the ecological impacts including site disturbance and erosion, tree integration and preservation, heat island effect and bird collision prevention. In addition, site criteria deal with stormwater management, landscaping, and exterior light pollution.

SITE		MAXIMUM POINTS: 115
2.1	Development Area	9
2.1.1	Urban Infill and Urban Sprawl	3
2.1.2	Greenfields, Brownfields, and Floodplains	3
2.2	Ecological Impacts	12
2.2.1	Site Disturbance and Erosion	4
2.2.2	Tree Integration	3
2.2.3	Tree Preservation	3
2.2.4	Heat Island Effect	5
2.2.5	Bird Collisions	5
2.3	Stormwater Management	29
2.4	Landscaping	29
2.5	Exterior Light Pollution	29

Suggested Documentation:

- Site civil plans and existing site civil plans
- Site plans that show the building, parking, street access, etc. and civil engineering plans that show topography, drainage and infrastructure
- Documentation by EPA, municipal, or other governmental authority of Superfund or brownfield site
- Construction Documents*
- Manufacturer's specifications, zoning maps, cut sheets and performance documentation
- Pre-construction site documentation
- Landscaping plans (including tree preservation plan)
- Floodplain map
- Photo documentation
- Manufacturer's specifications and/or interior design plans that show interrupted spaces
- Erosion and Sediment Control plan
- Shade site plan
- Roofing plans

- Percolation test results
- Area rainfall charts
- Storm water discharge plan
- Exterior lighting plans
- Electrical engineer's site lighting plan with illumination map
- Zoning ordinance requirements

CASE STUDY

Bob's Metals is a 4,700 SF two story office attached to a warehouse located in Portland, OR. This building was new construction, which completed in July 2017. The project certified with a Two Green Globes rating.

Bob's Metals is one of the only scrap metal recycling operations in the nation to have a fully contained zero discharge site thanks to its state-of-the-art stormwater treatment center.

The stormwater project had displaced 10,000 cubic yards of earth and the team reused much of that soil in the foundation's footprint for the new headquarters.



As previously stated, the Energy Assessment Area carries the most weight within the Green Globes programs due to the significant benefits of energy use reduction in regards to environmental impact as well as cost savings to the building owner. Of the various sections within the Energy area, Energy Performance is the most critical and carries the highest weight in both the NC and EB programs. (Energy Performance is not part of the SI program). Green Globes utilizes a flexible and comprehensive approach to evaluating energy performance by providing multiple paths for assessment and compliance scoring. These Energy Performance paths have a strong foundation in the most current building science and established standards. The Energy environmental assessment area also addresses - primarily on a prescriptive basis - energy demand, metering, building opaque envelope, HVAC systems and controls, energy efficient equipment, renewable energy including ground source and renewable energy credits, and lastly energy efficient transportation.

Green Globes NC offers the following four Energy Performance paths:

Path A - The ENERGY STAR Target Finder

For full credit, Path A requires the development of one energy design model for the proposed building (an energy model for a base building is not required). The whole building's energy usage information (EUI) from the model is input into the ENERGY STAR Target Finder program, which compares the building's energy usage versus peer buildings. To construct the proposed building's energy model for Path A, ANSI/ASHRAE/IES Standard 90.1-2010, Appendix G should be used as an overall guide.

The CBECS database, which ENERGY STAR utilizes, accommodates more than 80 different building types that are subdivided into dozens more subcategories of building types. Users can verify whether a particular commercial building type is currently included in the ENERGY STAR database at <http://www.eia.gov/consumption/commercial/building-type-definitions.cfm>. Green Globes Energy Performance Path A is applicable only to building types included in the ENERGY STAR program. Therefore, Path B or Path D should be utilized for buildings not accommodated by ENERGY STAR.

Suggested documentation for Path A includes a description of the computer software program used to provide the energy modeling results, a narrative describing the energy efficiency measures included in the project, a summary of energy end-uses, and monthly energy consumption and cost values. The narrative should also include the Target Finder results, including the EUIs and normalization factors.

Other approaches in the development of the energy usage information entered into Target Finder may be considered by the Green Globes Assessor for some level of credit based upon the assessor's overall professional judgment.

Path B - ASHRAE 90.1-2010, Appendix G; Requires two models, a base building model and energy design model.

Path C - Building Carbon Dioxide Equivalent CO₂e Emissions (ANSI/GBI 01-2010); Requires the use of both the ENERGY STAR Target Finder and the energy design model results for the proposed building.

Path D - ASHRAE Building Energy Quotient (bEQ); Requires bEQ certification based upon an energy design model for the proposed building based on as-built conditions.

Multi-unit residential buildings may use various energy performance paths depending upon the project.

Path A - ENERGY STAR Target Finder

The ENERGY STAR program is best used to assess energy performance for projects that meet the Target finder criteria. Projects should be mid-size and larger with 20 units or more. This path requires an energy model which provides a single-model demonstration of savings.

Path B - ASHRAE 90.1-2010, Appendix G

ASHRAE 90.1-2010, Appendix G fits all multi-unit residential projects. This path requires two energy models. (It can be used for energy performance points for projects for low rise 3 stories or less, even though it is not used for code compliance purposes). Proposed model and baseline model requirements may be substituted from ASHRAE 90.2 Section 8 to model buildings that are not included in the scope of ASHRAE 90.1.

Path C - Building Carbon Dioxide Equivalent CO₂e Emissions (ANSI/GBI 01-2010)

The CO₂e path uses the same criteria as ENERGY STAR Target Finder.

Path D - ASHRAE Building Energy Quotient (bEQ)

The ASHRAE bEQ method is best used to assess energy performance for buildings that have 5 units or more. Projects may benefit from this path where energy saving strategies exceed the rating scale for Target Finder or Appendix G.

As opposed to using a single, prescriptive approach, Green Globes NC offers stakeholders the opportunity to select their preferred path based on its applicability to their project and requirements. Each of the four paths firmly supports reduction in building energy use, and certain paths reward exemplary performance with bonus points to encourage project stakeholders to go above and beyond standard compliance.

ENERGY USE INTENSITY (EUI)

It can be challenging to balance real-life constraints of buildings, such as project budgets, with energy efficient strategies. Energy efficiency goals should be addressed very early on in the design phase of a project. There are two ways of developing an EUI number, the performance EUI which is based on the actual energy consumption of an existing building, and the design EUI, the goal that is set during the design phase. The advantages of setting an EUI is that it sets a clear metric that can be referred to throughout the design process. The design EUI number allows the design team to evaluate performance options, including changes in the mechanical systems design, higher-cost insulation options, and the potential for renewable systems. It is recommended that the design EUI be established by a professional with design experience with energy metrics for high-performance buildings. After a building is constructed and has a year of data, the design EUI should be compared against the performance EUI as energy modeled expectations for the most accurate results.

$$\text{EUI} = \frac{\text{KBTUs PER SQUARE FOOT PER YEAR}}{\text{KBTUs PER SQUARE FOOT PER YEAR}}$$

SPACE HEATING | PUMPS & FANS | SPACE COOLING
LIGHTING | HOT WATER | OTHER LOAD

▪ Design EUI ▪ Performance EUI

Maclay, William. The New Net Zero: Leading Edge Design and Construction of Homes and Buildings for a Renewable Future. White River Junction, Chelsea Green Publishing, 2014.

ENERGY		MAXIMUM POINTS: 390
3.1	Energy Performance	100
3.2	Energy Demand	35
3.2.1	Passive Demand Reduction	19
3.2.2	Power Demand Reduction	16
3.3	Metering, Measurement, and Verification	12
3.3.1	Metering	8
3.3.2	Measurement and Verification	4
3.4	Building Opaque Envelope	31
3.4.1	Thermal Resistance and Transmittance	10
3.4.2	Orientation	5
3.4.3	Fenestration Systems	16
3.5	Lighting	36
3.5.1	Lighting Power Density	10
3.5.2	Interior Automatic Light Shut-off Controls	3
3.5.3	Light Reduction Controls	4
3.5.4	Daylighting	8
3.5.5	Controls for Daylighted Zones	6
3.5.6	Exterior Luminaires and Controls	5
3.6	HVAC Systems and Controls	59
3.6.1	Building Automation System	10
3.6.2	Cooling Equipment	13
3.6.3	Cooling Towers	8
3.6.4	Heat Pumps	6
3.6.5	Heating Equipment	8
3.6.6	Condensate Recovery	3
3.6.7	Steam Traps	2

ENERGY		MAXIMUM POINTS: 390
3.6.8	Domestic Hot Water Heaters	3
3.6.9	Variable Speed Control of Pumps	6
3.7	Other HVAC Systems and Controls	32
3.7.1	Minimizing Re-Heat and Re-Cool	6
3.7.2	Air Economizers	3
3.7.3	Fans and Ductwork	7
3.7.4	Demand Controlled Ventilation	10
3.7.5	Variable Refrigerant Flow Systems	6
3.8	Other Energy Efficient Equipment and Measures	11
3.8.1	Elevators and Escalators	5
3.8.2	Other Energy Efficient Equipment	6
3.9	Renewable Energy	50
3.9.1	On-Site Renewable Energy	32
3.9.2	Off-Site Renewable Energy	18
3.10	Energy Efficient Transportation	24

Suggested Documentation:

- Energy design, modeling and simulation program's input and results
- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation
- Power demand factor calculations. (Applicable for ANSI only)
- Energy metering reporting plan
- Measurement and verification program details
- Energy certification or label
- References to specifications and drawings of sub-metering equipment
- Cut sheets for meters and meter reading equipment
- Description of the monthly monitoring and verification reports that will be sent to building management
- Landscaping plans
- Site plans
- Effective aperture for vertical fenestration calculations
- Equipment specifications, control schedules and diagrams
- Results of leak-testing
- Drawings and specifications of vertical transport equipment
- On-site renewable energy generation documentation
- Copy of the off-site renewable energy contract

CASE STUDY

The Vernonia School is a 135,000 SF K-12 school located in Vernonia, Oregon. This building was new construction, which completed in July 2014. The project certified with a Three Green Globes rating.

The Vernonia School project excelled in the Energy assessment area. They achieved points for their use of a Bio-Mass Boiler on site, which uses locally produced pellets to heat the building with renewable energy.

The project also utilizes photovoltaics to provide green power for the school.



WATER

Water is a critical natural resource that should be conserved. Its use should be measured to quantify the results of water efficiency measures. Green Globes NC addresses water consumption including whole building performance and prescriptively water conserving features, water treatment, alternative sources of water, metering and sub-metering, and irrigation design. The GBI Water Calculator the calculator measures and benchmarks the designed building's intended water performance. The calculator is Excel-based, user-friendly, and adaptable to all commercial buildings including multi-residential occupancies. Use of the calculator is required within NC to earn water performance points. It is free of charge and available for download from the GBI website.

GBI Water Calculator has three tabs:

1. Input Assumptions - to input data regarding building size and type, operating hours, and fixture use frequency.
2. Baseline Water Use – an output page based upon the inputs from the prior tab, as well as the

EPAAct requirements and Code. Use EPAAct 1992 and the projected values based on WaterSense for full credit.

3. Projected Water Use – provides a comparison between the baseline and the projected water usage based upon information entered into the first two tabs.

The lower section of each tab contains a parallel program for Multi-Unit Residential Buildings (MURBs).

In addition to water performance criteria, the Green Globes programs include prescriptive water efficiency criteria that allow the user to seek points for water-conserving fixtures, equipment, and systems.

WATER		MAXIMUM POINTS: 110
4.1	Water Consumption	9
4.2	Cooling Towers	9
4.3	Boilers and Water Heaters	9
4.4	Water Intensive Applications	12
4.4.1	Commercial Food Service Equipment	4
4.4.2	Laboratory and Medical Equipment	3
4.4.3	Laundry Equipment	3
4.4.4	Special Water Features	5
4.5	Water Treatment	9
4.6	Alternate Sources of Water	29
4.7	Metering	29
4.8	Irrigation	29

Suggested Documentation:

- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation for all plumbing fixtures, fittings and appliances
- Manufacturer's specifications, cut sheets and performance documentation for cooling equipment, makeup meter, blowdown meter, drift eliminators, conductivity controllers and wet/dry cooling towers
- Plumbing plans
- Manufacturer's specifications, cut sheets, and performance documentation for pre-rinse spray valves, ice machines, food steamers, dishwashers and combination ovens
- Manufacturer's specifications, cut sheets, and performance documentation for steam sterilizers, laboratory or medical equipment using non-potable water for once through cooling, water recycling units, and wet scrubbers
- Description of alternate sources of water to be used

- Manufacturer's specifications, cut sheets and performance documentation for clothes washers
- Manufacturer's specifications, cut sheets, and performance documentation for all special water features. Irrigation system equipment and fittings, and for all meters
- Manufacturer's specifications, cut sheets and performance documentation for filtration systems, pressure drop gauges, reverse osmosis systems, water softeners, and recharge controls
- Description of alternate source of water and implementation for non-potable water applications
- Manufacturer's specifications, cut sheets and performance documentation for the Meter Data
- Management System and meters

CASE STUDY

The Whole Foods Market Greenway, located in Tigard, Oregon is roughly 41,000 SF. This building was new construction, which completed at the end of 2013. The project certified with a Three Green Globes rating.

Points were achieved in the water assessment area for less than 10 gallons of water use/ SF/ year. This level of water consumption is excellent for this type of facility.

Water-conserving features include 1.28 gallon per flush toilets, 0.125 gallon per flush urinals, and low flow sink faucets with automatic shutoff.



MATERIALS & RESOURCES

Green Globes NC separates each building into two categories for materials assessment: Building Assembly (the core, shell, and envelope) and Interior Fit-Out (the interior partitions, finishes, and furnishings used within the Building Assembly). Each of the two categories has two paths for product selection compliance within the Green Globes online questionnaire: "Path A: Performance Path" which includes full life cycle assessment and "Path B: Prescriptive Path" including industry wide Environmental Product Declarations (EPDs) and third-party certifications based upon a multiple-attribute standard. This area looks at the whole building life cycle including the reuse of existing buildings, and a building life service plan. In addition, the NC program covers construction waste management, and aspects of the envelope; roofing/openings, foundation, waterproofing, cladding, and barriers.

MATERIALS & RESOURCES		MAXIMUM POINTS: 125
5.1	Building Assembly (Core & Shell Including Envelope)	33
5.2	Interior Fit-Out (Including Finishes and Furnishings)	16
5.3	Reuse of Existing Structures	26
5.3.1	Facades	6
5.3.2	Structural Systems	6
5.3.3	Non-Structural Elements	14
5.4	Waste	9
5.4.1	Construction Waste	7
5.4.2	Operational Waste	2
5.5	Building Service Life Plan	7
5.6	Resource Conservation	6
5.6.1	Minimized Use of Raw Materials	3
5.6.2	Multi-Functional Assemblies	1
5.6.3	Deconstruction and Disassembly	2
5.7	Building Envelope - Roofing/Openings	10
5.7.1	Roofing Membrane Assemblies and Systems	3
5.7.2	Flashings	3
5.7.3	Roof and Wall Openings	4
5.8	Envelope - Foundation, Waterproofing	6
5.8.1	Foundation Systems	4

MATERIALS & RESOURCES		MAXIMUM POINTS: 125
5.8.2	Below Grade Wall Slabs and Above Grade Horizontal Assemblies	2
5.9	Envelope - Cladding	5
5.9.1	Exterior Wall Cladding Systems	3
5.9.2	Rainscreen Wall Cladding	2
5.10	Envelope - Barriers	7
5.10.1	Air Barriers	4
5.10.2	Vapor Retarders	3

Suggested Documentation:

- Construction documents*
- Input and results from the Green Globes LCA Eco-Calculator for Building Assemblies
- Input and results from any BEES or Athena Impact Estimator or other LCA instrument
- Manufacturer's specifications, cut sheets and performance documentation
- List of recycled content materials and percentage calculations
- List of bio-based materials and percentage calculations
- List of harvested, reclaimed, salvaged or extracted materials and transportation distance calculations
- List of processed or manufactured materials and transportation distance calculations
- List of salvaged materials
- Wood-based products certification documentation
- Calculation for percentage of façade retained
- Calculation for the percentage of existing major structural systems re-used
- Calculations for area of existing non-structural elements re-used
- Waste minimization plan (Applicable for ANSI only)
- Landscaping and Site Development Plans showing incorporation of existing on-site materials
- Tipping records
- Letters and building models from architects or design professional
- Formal Building Service Life Plan (Applicable for ANSI only)
- Field testing reports
- Manufacturer's laboratory test results
- Plan for foundation systems, flashings, roof and wall openings, roofing, and cladding systems
- Construction plans

CASE STUDY

The New Seasons Market – Slabtown grocery store is 30,000 SF and is in Portland. This building was new construction, which completed in July 2015. The project certified with a One Green Globes rating.

This project earned points in the Materials & Resources assessment area for its reuse of existing façades.

Only 5,122 SF of 23,249 SF was altered for the design, thus 78% of the original façade was retained during construction.



EMISSIONS

Green Globes NC includes direct emissions, because the impacts of heating and cooling equipment are critical to air quality and the atmosphere. Specifically, the NOx emissions rating is utilized as an indicator of total emissions from fossil fuel burning equipment. There are two paths for assessing heating within the NC program; district heating or low emission boilers and furnaces. The cooling section includes review of refrigerants, specifically the ozone depleting potential (ODP), the global warming potential (GWP) and GreenChill best practices regarding leak detection. Emissions also address the storage for hazardous materials.

WATER		MAXIMUM POINTS:
		50
6.1	Heating	18
6.2	Cooling	29
6.2.1	Use of New or Existing Cooling Equipment (Informational Only)	0
6.2.2	Ozone-Depleting Potential	10
6.2.3	Global Warming Potential	10
6.2.4	Leak Detection	9
6.3	Janitorial Equipment	3

Suggested Documentation:

- Construction documents*
- Manufacturer's specifications, cut sheets, and performance documentation for boilers and furnaces
- Manufacturer's specifications, cut sheets, and performance documentation for cooling equipment, leak detection equipment and alarms
- Manufacturer's specifications, cut sheets, and performance documentation

CASE STUDY

Now we will review The Lofts at River East for their achievements in the Heating subsection of the Emissions & Other Impacts assessment area.

Green Globes provides two paths for assessing heating – Path A: District Heating and Path B: Low Emission Boilers and Furnaces. The Lofts at River East elected Path A and earned full credit for their use of Single Stage electric heat pumps throughout the building.

They are supplied by adjacent river water and enhanced by electric boiler operations when the weather is not conducive to natural water body temperature constants.



INDOOR ENVIRONMENT

Building green means considering not only the environmental impact of materials and construction, it also means looking at the physical and psychological health of the occupants. Green Globes covers critical aspects of environmental management: 1) environmental health, and 2) work and living environment. Environmental health is a comprehensive professional area in itself and references human health as it relates to, and is affected by, the surrounding environment. The work and living environment address productivity, well being, and overall satisfaction of occupancy in the built environment. Within the Green Globes programs, sub-topics such as ventilation and air quality, indoor pollutants, lighting quality, thermal comfort and acoustical quality are covered.

INDOOR ENVIRONMENT		MAXIMUM POINTS: 160
7.1	Ventilation	37
7.1.1	Ventilation Air Quantity	11
7.1.2	Air Exchange	8
7.1.3	Ventilation Intakes and Exhausts	8
7.1.4	CO2 Sensing and Ventilation Control Equipment	5
7.1.5	Air Handling Equipment	5
7.2	Source Control and Measurement of Indoor Pollutants	46
7.2.1	Volatile Organic Compounds	10
7.2.2	Leakage, Condensation, and Humidity	8
7.2.3	Access for HVAC Maintenance	4
7.2.4	Carbon Monoxide Monitoring	4
7.2.5	Wet Cooling Towers	2
7.2.6	Domestic Hot Water Systems	2
7.2.7	Humidification and Dehumidification Systems	3
7.2.8	Pest and Contamination Control	3
7.2.9	Other Indoor Pollutants (Tobacco, Radon)	8
7.2.10	Ventilation and Physical Isolation for Specialized Activities	2
7.3	Lighting Design and Systems	30
7.3.1	Daylighting	17
7.3.2	Lighting Design	13
7.4	Thermal Comfort	18
7.4.1	Thermal Comfort Strategies	12
7.4.2	Thermal Comfort Design	6
7.5	Envelope - Cladding	29
7.5.1	Acoustic Comfort Design	18
7.5.2	Mechanical, Plumbing, and Electrical	11

Suggested Documentation:

- Construction documents* and specifications
- Ventilation schedules
- Manufacturing specifications for ventilation systems, CO2 sensing and ventilation control equipment
- Ventilation air quantity design data
- Local ventilation codes or standards
- Manufacturer's specifications, cut sheets, and performance documentation for HVAC systems, humidification/dehumidification systems, CO2 monitoring devices, wet cooling towers and domestic hot water systems list of mold resistant materials

- Documentation demonstrating compliance with ASHRAE 62.1-07: section 5.14, "HVAC Duct Construction Standards: Metal and Flexible," and ICC's "International Building Code® (Applicable for ANSI only)
- Materials Safety Data Sheets or proof of certification for low-VOC products or materials
- Description of radon assessment
- Description of pest management strategies
- Manufacturer's specifications, cut sheets, and performance documentation
- Percentages and calculations for occupied areas with daylight illumination levels
- Percentages and calculations for views to building exterior or atria
- Percentages and calculations for primary occupied spaces with IESNA recommended task lighting levels
- Specifications for solar shading devices and luminaries
- Lighting plans
- Documentation demonstrating compliance with ANSI/ASHRAE Standard 55-04
- Sound level measurements taken at the property line
- Description of acoustic design strategies and all design targets
- FIIC value for flooring assemblies
- Acoustic mitigation measures for mechanical equipment and plumbing systems
- Specification that includes Annex E of ANSI S12.60 – 2006 (Applicable for ANSI only)
- Test report indicating compliance with ANSI S12.60 – 2006 (Applicable for ANSI only)

CASE STUDY

Luxe on Chicago is a 75,000 SF, four level, multifamily facility with 59 units and ground floor retail space. This project certified under Green Globes for New Construction in May 2017 with Two Green Globes.

Earning nearly 90% of the applicable points in the Indoor Environment, Luxe on Chicago was recognized for their achievements in acoustic comfort.

- The insulated glass assemblies had a good sound transmission coefficient (STC) which deadened noise from the outside.
- Traffic noise was not noticed indoors even though the building is in a dense urban area.
- Interior walls were thick and well insulated preventing noise transmission from one apartment to another.
- Apartment doors were heavy construction and prevented noise in corridors from entering apartments.
- Carpeting on most floors absorbed noise where it was generated.



**Construction documents are defined as all of the written and graphic documents 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.*