NEW YORK CITY

GREEN SCHOOLS GUIDE

2019

NYC Department of Education

SCA NYC School Construction Authority

Contributors

This guide and the associated design, construction and operations standards on which it is based were developed with the thoughtful efforts and contributions of the following parties:

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U.S. Green Building Council (USGBC), Washington, DC
These guidelines are adapted in part from and with the permission of the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System® for New Construction, LEED for Schools 2009 and v4. References to LEED are incorporated in this guide because LEED is the most widely-used nationally-accepted green building standard, and because the USGBC provides many resources, including its reference guides, to support the design and construction of green buildings. The New York City School Construction Authority would like to acknowledge its appreciation to the USGBC for their national and international efforts and leadership in the promotion of green building design, operation and practices.

The Collaborative for High Performance Schools, Inc. (CHPS), San Francisco, CA
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These guidelines are adapted, in part, from the CHPS Best Practices Manual by permission of the Collaborative for High Performance Schools, Inc. References to CHPS are incorporated in the guide because CHPS specifically addresses needs of schools and contains credits for district-wide school policies. The CHPS Best Practices Manual is copyrighted by CHPS, Inc. End users of the Best Practices Manual content are permitted to use and copy the content without further consent. However, prior permission from CHPS, Inc. must be granted in order to relicense, publish or develop derivative works from CHPS-copyrighted materials.

NY-CHPS – Version 1.1, High Performance Schools Guidelines
Appendix of the NY State Department of Education Manual of Planning Standards, September 2007.

Local Laws of New York City:

The following local laws are an integral part of the Green Schools Guide:
LL86 of 2005
LL130 of 2013
LL06 of 2016
LL31 of 2016
LL32 of 2016
LL97 of 2017
LL45 of 2018
LL94 of 2019
LL97 of 2019
and all other local laws to date.

HOW TO NAVIGATE GREEN SCHOOLS GUIDE 2019

Guide Structure

Overview:
Provides an overview of Local Law and GSG 2019, with guidance on the certification process.

Categories:
The GSG is organized according to the credit categories shown on the right. Colored tabs are provided to allow for easy navigation. At the beginning of each category, an introduction summarizing its scope and significance is provided on the colored pages preceding the credits.

Credits:
Contains content that is specific to the achievement of each credit.

Credit Structure

Intent & Requirements:
Outlines the rating system and local law requirements for achieving the prerequisite or credit.

Implementation:
This section describes how the credit requirements are applied to SCA projects, with specific guidelines and best practices for standard building systems, the design process, project roles and responsibilities, and credit documentation.

Credit Submittals:
Lists the submittal items and responsible parties required for certification review at each phase of the project.

References:
Identifies the LEED v4 reference credit as well as relevant SCA Design Requirements, SCA Standard Specifications and SCA Standard Details. Also lists the technical standards related to the credit and offers weblinks to find them.

Overview O
Integrative Design Process P
Location L
Site S
Water W
Energy E
Materials M
Indoor Environmental Quality Q
Innovation I
Regional Priority R
Appendices X

NYC GSG 2019 CONTENTS

How to Navigate Green Schools Guide 2019 . . . v
Rating System Summary . . . viii
OVERVIEW . . . XI
Overview of the Green Schools Guide . . . xii
Certification Process Diagram . . . xxiv
INTEGRATIVE DESIGN PROCESS . . . 2
P1.1R – Integrative Design Process . . . 3
LOCATION . . . 10
L1.1R – Sensitive Land Protection . . . 11
L1.2 – High Priority Site . . . 13
L1.3 – Surrounding Density . . . 15
L1.4R – Diverse Uses . . . 17
L2.1R – Access to Quality Transit . . . 19
L2.2 – Bicycle Facilities . . . 21
L2.3R – Reduced Parking Footprint . . . 23
L2.4P – Green Vehicles, Charging Station Infrastructure . . . 25
L2.5A – Green Vehicles, Charging Station Installation . . . 25
SITE . . . 28
S1.1P – Environmental Site Assessment . . . 29
S1.2R – Enhanced Site Assessment . . . 31
S2.1P – Construction Activity Pollution Prevention . . . 33
S2.2 – Open Space . . . 35
S2.3P – Green Infrastructure Assessment . . . 37
S2.4 – Rainwater Management . . . 37
S2.5 – Heat Island Reduction . . . 41
S2.6 – Light Pollution Reduction . . . 43
S3.1R – Joint Use of Facilities . . . 47
S3.2 – Active Design In A School Environment . . . 49
WATER . . . 52
W1.1P, W1.2R – Outdoor Water Use Reduction . . . 53
W2.1P, W2.2R – Indoor Water Use Reduction . . . 55
W3.1P, W3.2R – Water Metering . . . 57
W4.1A – Cooling Tower Water Use . . . 59
ENERGY . . . 62
E1.1P – Fundamental Commissioning & Verification . . . 63
E1.2A – Enhanced Cx & Monitoring Based Cx . . . 67
E1.3A – Envelope Commissioning . . . 71
E2.1P – Fundamental Refrigerant Management . . . 73
E2.2 – Enhanced Refrigerant Management . . . 75
E3.1P – Minimum Energy Performance . . . 77
E3.2R – Optimize Energy Performance . . . 79
E3.3R – HVAC System Sizing, Avoid Oversizing . . . 81
E4.1R – Energy Management System Controls . . . 83
E4.2A – Demand Response . . . 85
E5.1P – Building Level Energy Metering . . . 87
E5.2R – Advanced Energy Metering . . . 89
E6.1P– Renewable Energy Feasibility . . . 91
E6.2 – Renewable Energy Production . . . 91
E6.3R – Green Power & Carbon Offsets . . . 93

MATERIALS **96**
M1.1P – Storage & Collection Of Recyclables 97
M1.2P, M1.3R – Construction & Demolition Waste 99
Material Reporting & Optimization Overview (M2.1 – 2.6) 101
M2.1A – Material Extraction Reporting 103
M2.2A – Material Extraction Optimization 105
M2.3 – Material Environmental Reporting 107
M2.4A – Material Environmental Optimization 109
M2.5 – Material Ingredient Reporting 111
M2.6A – Material Ingredient Optimization 113
M3.1A – Life-Cycle Impact Reduction, Whole Building LCA 115
M3.2 – Life-Cycle Impact Reduction, Building & Material Reuse 119
M4.1R – Wallboard & Roof Deck Products, Mold Resistance 121
INDOOR ENVIRONMENTAL QUALITY **124**
Q1.1P – Minimum IAQ Performance 125
Q1.2R – Enhanced IAQ Source Control 127
Q1.3A – Enhanced IAQ Ventilation & Monitoring 129
Q2.1R – Construction IAQ Management Plan 133
Q2.2R – Building IAQ Flush-out 135
Q3.1R – Electric Ignition Stoves 137
Q3.2R – Post Construction Indoor Air Quality 139
Q4.1, Q4.2A – Low Emitting Materials 141
Q5.1R – Thermal Comfort 145
Q6.1R – Interior Lighting Control 147
Q6.2 – Interior Lighting Quality 149
Q6.3R – Visual Performance 151
Q7.1 – Daylight 153
Q7.2 – Quality Views 155
Q8.1P – Minimum Acoustic Performance 159
Q8.2 – Enhanced Acoustic Performance 161
INNOVATION **164**
I1.1R – LEED® Accredited Professional 165
I1.2A – Innovation or Pilot Credit 167
REGIONAL PRIORITY **170**
R1.1, R1.2, R1.3, & R1.4 – Regional Priority 171
APPENDICES **174**
Appendix A – Glossary 175
Appendix B – Abbreviations 182
Appendix C – Interior Fit-Out (IFO) Project Appendix 188
Appendix D – Forms 194

RATING SYSTEM SUMMARY

SCA Green Schools Guide Summary - GSG 2019 [1] 8/20/2020

	BD&C Reference LEED for Schools v4 [2]	CHPS Reference	NYC GSG 2019 [3]	Credit Name	Credits with No Points Required For all Projects [4]	Credit with Points Required For all Projects	Required if Feasible	Additional Credits	Regional Priority [5]
Integrative Design Process (P)									**1 Point**
	IP 1		P 1.1R	**Integrative Design Process**		1			
				Integrative Design Process Category Sub-Total:	0NP	1	0	0	0
Location (L)									**16 Points**
Site Selection	LT 2		L 1.1R	**Sensitive Land Protection**		1			
	LT 3		L 1.2	**High Priority Site**			2		1
	LT 4		L 1.3	**Surrounding Density**			3		
	LT 4		L 1.4R	**Diverse Uses**		2			
Transportation	LT 5		L 2.1R	**Access to Quality Transit**		2	2		
	LT 6		L 2.2	**Bicycle Facilities**			1		
	LT 7		L 2.3R	**Reduced Parking Footprint**		1			
			L 2.4P	**Green Vehicles , Charging Station Infrastructure**	NP				
	LT 8		L 2.5A	**Green Vehicles , Charging Station Installation**				1	
				Location Category Sub-Total:	1NP	6	8	1	1
Site (S)									**11 Points**
Site Assessment	SS Pr 2		S 1.1P	**Environmental Site Assessment**	NP				
	SS 1		S 1.2R	**Enhanced Site Assessment**		1			
Minimize Site Impact	SS Pr 1		S 2.1P	**Construction Activity Pollution Prevention**	NP				
	SS 3		S 2.2	**Open Space**			1		
	SS 4		S 2.3P	**Green Infrastructure Assessment**	NP				
	SS 4		S 2.4	**Rainwater Management**			3		1
	SS 5		S 2.5	**Heat Island Reduction**			2		
	SS 6		S 2.6	**Light Pollution Reduction**			1		
Facility Use	SS 8	1.1.2	S3.1R	**Joint Use of Facilities,** Community Access		1			
	IEQpc78		S3.2	**Active Design in a School Environment**			1		
				Site Category Sub-Total:	3NP	2	8	0	1
Water (W)									**10 Points**
Outdoor Systems	WE Pr 1		W 1.1P	**Outdoor Water Use Reduction**, Reduce Total 30%	NP				
	WE 1		W 1.2R	**Outdoor Water Use Reduction,** Reduce Potable 50%-100%		2			
Indoor Systems	WE Pr 1		W 2.1P	**Indoor Water Use Reduction**, 20% Reduction	NP				
	WE 3		W 2.2R	**Indoor Water Use Reduction**, 25%-45% Reduction		2	1	2	
Metering	WE Pr 3		W 3.1P	**Water Metering, Building Level**	NP				
	WE 4		W 3.2R	**Water Metering, Advanced**		1			
Cooling Tower	WEc3		W 4.1A	**Cooling Tower Water Use** (only for projects with cooling tower)				2	
				Water Category Sub-Total:	3NP	5	1	4	0
Energy (E)									**35 Points**
Commissioning	EA Pr 1		E 1.1P	**Fundamental Commissioning & Verification**	NP				
	EA c1		E 1.2A	**Enhanced Cx & Monitoring Based Cx**				4	
	EA c1		E 1.3A	**Envelope Commissioning**				2	
Refrigerant Management	EA Pr 4		E 2.1P	**Fundamental Refrigerant Management**	NP				
	EA 4		E 2.2	**Enhanced Refrigerant Management**			1		
Energy Efficiency	EA Pr 2		E 3.1P	**Minimum Energy Performance**	NP				
	EA 2		E 3.2R	**Optimize Energy Performance,** 6-42% for New, 4-40% for Renovations		3		15	
		3.1.2	E 3.3R	**HVAC System Sizing,** Avoid Oversizing	NP				
Energy Management		3.3.5	E 4.1R	**Energy Management System Controls**	NP				
	EA 4		E 4.2A	**Demand Response**				2	1
Metering	EA Pr 3	3.3.8	E 5.1P	**Energy Metering,** Building Level	NP				
	EA 3		E 5.2R	**Energy Metering,** Advanced		1			
			E 6.1P	**Renewable Energy Feasibility**	NP				
Power	EA 5		E 6.2	**Renewable Energy Production**			4		
	EA 7		E 6.3R	**Green Power & Carbon Offsets**		1		1	
				Energy Category Sub-Total:	7NP	5	5	24	1
Materials (M)									**16 Points**
Efficient Use of Materials	MR Pr 1		M 1.1P	**Storage & Collection of Recyclables**	NP				
	MR Pr 2		M 1.2P	**Construction & Demolition Waste,** Planning	NP				
	MR 5		M 1.3R	**Construction & Demolition Waste,** 50%-75% Diversion		1	1		
Materials Reporting & Optimization	MR 3		M 2.1A	**Material Extraction Reporting**				1	
	MR 3		M 2.2A	**Material Extraction Optimization**				1	
	MR 2		M 2.3	**Material Environmental Reporting**			1		
	MR 2		M 2.4A	**Material Environmental Optimization**				1	
	MR 4		M 2.5	**Material Ingredient Reporting**			1		
	MR 4	`	M 2.6A	**Material Ingredient Optimization**				1	
Materials Life-Cycle Impacts	MR 1.1		M 3.1A	**Life-Cycle Impact Reduction**, Whole Building LCA [6]				3	1
	MR 1.1		M 3.2	**Life-Cycle Impact Reduction**, Building & Material Reuse [7]			4		

SCA Green Schools Guide Summary - GSG 2019 [1] 8/20/2020

	BD&C Reference LEED for Schools v4 [2]	CHPS Reference	NYC GSG 2019 [3]	Credit Name	Credits with No Points Required For all Projects [4]	Credit with Points Required For all Projects	Required if Feasible	Additional Credits	Regional Priority [5]
Indoor Environmental Quality (Q)									**16 Points**
Design Indoor Air Quality	IEQ Pr 1		Q 1.1P	**Minimum IAQ Performance**	**NP**				
	IEQ 1		Q 1.2R	**Enhanced IAQ Source Control**[8]		**1**			**1**
	IEQ 1		Q 1.3A	**Enhanced IAQ Ventilation & Monitoring**[8]				**1**	
Construction Indoor Air Quality	IEQ 3		Q 2.1R	**Construction IAQ Management Plan**		**1**			
	IEQ 4		Q 2.2R	**Building IAQ Flush-Out**		**1**			
Post Construction Indoor Air Quality		5.3.5	Q 3.1R	**Electric Ignition Stoves**	**NP**				
		6.2.4	Q 3.2R	**Post Construction Indoor Air Quality**	**NP**				
Material Emissions	IEQ 2		Q 4.1	**Low-Emitting Materials,** 3 to 5 Categories			**2**		
	IEQ 2		Q 4.2A	**Low-Emitting Materials,** 6 Categories				**1**	
Thermal Comfort	IEQ 5		Q 5.1R	**Thermal Comfort**		**1**			
Lighting	IEQ 6		Q 6.1R	**Interior Lighting,** Control		**1**			
	IEQ 6		Q 6.2	**Interior Lighting,** Quality			**1**		
		5.2.1	Q 6.3R	**Visual Performance,** Artificial Direct-Indirect Lighting	**NP**				
Daylight & Views	IEQ 7		Q 7.1	**Daylight**, 55%-75%			**3**		
	IEQ 8		Q 7.2	**Quality Views**			**1**		
Acoustics	IEQ Pr 3	5.5.1	Q 8.1P	**Minimum Acoustic Performance**	**NP**				
	IEQ 9		Q 8.2	**Enhanced Acoustic Performance**			**1**		
				IEQ Category Sub-Total:	**5NP**	**5**	**8**	**2**	**1**
Innovation (I)									**2 Points**
Accreditation	ID 2		I 1.1R	**LEED® Accredited Professional**		**1**			
Above & Beyond	ID 1		I 1.2A	**Innovation or Pilot Credit**				**1**	
					0NP	**1**	**0**	**1**	**0**
									107 Points
				Total Points[9]:	**22NP**	**26**	**37**	**39**	**5**

1 The NYC GSG requires that all required for all and required if feasible credits be attempted and justified through calculation for those which are not feasible

2 LEED reference numbers are based on the order of credits in the LEED for Schools v4 Rating System.

3 Letter prefix indicates credit section (P, L, S, W, E, M, Q, I).
First number indicates the category within the section
Second number indicates the specific credit within the section category
Suffix "P" is added for credits that are LEED® prerequisites and therefore required of all projects
Suffix "R" is added for credits that are required of all projects
Suffix "A" indicates credits that are additional and may only be pursued with SCA direction/permission.

4 To be consistent with LEED®, the NYC GSG assigns no point "NP" value to prerequisites or non-LEED® credits.

5 If the referenced Regional Priority Credit is achieved, the project will receive the additional point for "RP". While 5 points are available, only 4 points maximum are permitted.

6 M3.1A is only applicable to new construction. Regional Priority is earned by achieving either M3.1A or 3.2

7 M3.2A is only applicable to renovations/remodels. Regional Priority is earned by achieving either M3.1A or 3.2

8 Projects need to achieve both Q1.2R and Q1.3A to earn the Regional Priority point.

9 LL32/16 requires Certified LEED® v4 for Schools or equivalent of a no-less stringent rating system for schools - Minimum 40 Points.

OVERVIEW

Summary of Local Laws & Code

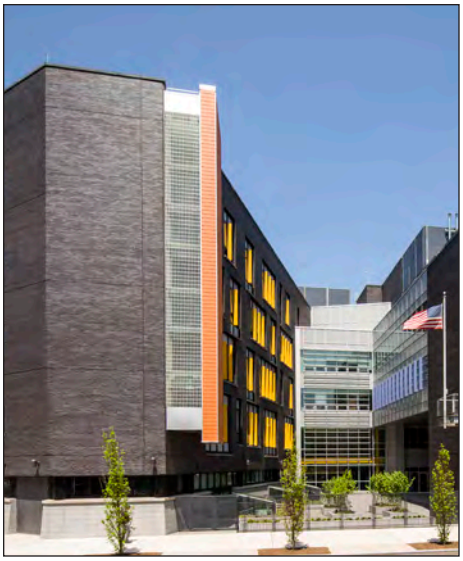
- History
- LL31/16 & LL32/16 Requirements for Schools
- LL Water Requirements
- LL Greenhouse Gas Emissions and LL Energy Requirements
- LL Annual Project Reporting Requirements
- Updating the NYC Green Schools Guide

Overview of the NYC Green Schools Guide

- GSG Summary
- Working with the SCA
- SCA Standards Reduce the Cost and Complexity of Sustainability in Schools
- LEED® Based System
- CHPS Credits
- Required Credits

Users Guide

- Submission Format
- Design Phase
    - Feasibility Study Phase
    - Pre-Schematic Design GSG Analysis
    - Schematic Design (SD) GSG Submittal, concurrent with the SD submission
    - Design Development (DD) GSG Submittal, concurrent with the DD submission
    - 60% Design GSG Submittal, concurrent with 60% CD submission
    - 100% Design GSG Submittal, concurrent with 100% CD submission
    - Design Phase GSG Certification Submittal
- Construction Phase
- Commissioning
- Final Certification
- Third-Party Audit of Projects



Summary of Local Laws & Code

History

In late 2005, Local Law 86/05 was enacted by the New York City Council, establishing a demanding set of sustainability standards for public construction projects in New York City. This local law made New York City one of the first and largest school districts in the nation to have sustainable school design, construction and operations guidelines required by law.

The New York City School Construction Authority (SCA), along with the New York City Department of Education (DOE), created the NYC Green Schools Guide (GSG) to support the sustainable design, construction and operation of new schools, modernization projects and school renovations and to achieve compliance with Local Law (LL) 86/05. The NYC GSG is based on the LEED® (Leadership in Energy and Environmental Design) Green Building Rating System™, which was developed by the U.S. Green Building Council (USGBC). The NYC GSG also includes enhancements beyond LEED, based on SCA best practices, best practices adopted from the Collaborative for High Performing Schools (CHPS) rating systems developed by the states of Washington, Massachusetts and New York, and New York City Local Laws related to sustainability and green buildings.

GSG version 2007 - The Director of the Office of Environmental Coordination (OEC), on behalf of the Mayor, accepted the SCA's NYC Green Schools Guide as no less stringent than LEED New Construction, version 2.2, for the achievement of a LEED certified rating. OEC approval was based on the careful consideration of an independent review of the NYC Green Schools Guide 2007 dated March 12, 2007.

GSG version 2009 - As per rules promulgated by the City, on June 26, 2009, LEED version 3 2009 became the standard required to comply with LL86/05. The SCA/DOE revised the NYC GSG to comply with this new standard, which is known as NYC GSG 2009.

GSG version 2016 – In 2016, the SCA issued an updated version of the 2009 GSG to address all addendums and interpretations issued for LEED version 3 2009, as well as incorporate some LEED version 4 language where appropriate.

GSG version 2019 - LL32/16 was enacted in March 2016, with an implementation date of July 1, 2017, updating the requirements of LL86/05. LL 32/16 now requires equivalence with the most current update to the LEED rating system, LEED version 4 (2015). At the same time, LL31/16 was enacted with requirements for all city-owned buildings to be low energy use. GSG 2019 was created on July 11th, 2018 (draft) to align with LEED v4 and incorporate the latest sustainability local laws and mandates. Updates are issued periodically to meet the most current sustainability requirements for NYC public schools.

While LL86/05 required that 50% of applicable projects apply for sustainable certification, the SCA and DOE exceeded the requirement by requiring certification under its system for all applicable projects. LL32/16 revises the LL 86/05 mandate by requiring that 100% of applicable projects apply for sustainable certification and thus the SCA will continue requiring certification for 100% of applicable projects under its system.

LL31/16 & LL32/16 Requirements for Schools

LL32/16 allows for the establishment of an SCA standard not less stringent than LEED version 4 as the basis for demonstrating compliance for the new construction and major renovation of schools and by name permits the use of the NYC Green Schools Guide. The law requires that schools meet a Certified level. LL31/16 requires energy use reduction beyond that required by LL32/16 for all public projects and thus schools will need to meet this requirement.

LL Water Requirements

In addition to demonstrating LEED equivalency, LL32/16 requires projects to install plumbing systems that reduce potable water consumption in aggregate by a minimum of 30%, as determined by a methodology not less stringent than LEED's Indoor Water Use Reduction credit.

LL97/17 requires a feasibility study on all projects to determine potential green infrastructure methods to reduce site runoff.

LL Greenhouse Gas Emissions and Energy Requirements

Compliance

LL32/16 does not include the specific requirement for projects to be designed and constructed to reduce energy cost by a minimum of 20% that was required by previous LL86/05. However, in addition to demonstrating LEED equivalency, schools must address the LL31/16 low energy use goals for buildings.

LL130/13 requires the infrastructure for electric car charging stations for 20% of the parking spaces to be installed when parking lots are provided.

LL06/16 requires city agencies to use a designated tool to determine if a site has the potential for use of a geothermal system and if so to then perform a feasibility study to determine if such system is cost effective on a given project. If determined to be cost effective, the geothermal system is then required to be implemented.

LL94/19 requires a new or replacement of existing roof deck/ assembly to comply with reflectance and sustainable roofing zone requirements. The addition of a photovoltaic system, green roof system, or combination thereof must cover the entire sustainable roofing zone, though an exception for roofs used for water detention is permitted.

LL 97/19 requires the city government operations portfolio to meet emissions reductions (expressed in metric tons of carbon dioxide) of 40% by 2025 and 50% by 2030, in accordance with rules of the NYC Department of Buildings.

Reporting

The SCA has developed standardized energy system prototypes as model systems for schools. The prototype 'standard systems' have been pre-determined to be compliant with the energy use reduction mandate per LL31/16 for most school designs through energy modeling studies. Prototype systems were developed through energy modeling for typical school buildings and scaled in the modeling exercise to equate with the size and energy requirements of other typical school buildings – high schools, primary schools, early childhood centers, additions and modernizations. As part of the exercise, parametric studies were performed altering parts of the system to determine how design strategies such as the amount of fenestration, ratio of energy saving to non-energy saving spaces, etc. influence the energy use and thus how flexible the design can be.

The prototypical model is the starting point of the energy use design for all SCA projects to understand how different system elements influence building design. A careful review of the prototypical model will take place early in the design process. A set of standard Energy Conservation Measures (ECM) are to be included. Then, to determine actual energy cost savings/energy usage for each specific building, the Design Team will need to perform project-specific energy modeling. The results of project-specific energy model will determine the number of energy points for each new project, taking into account the energy savings from renewable energy if such is to be provided, and if additional ECMs are required. The Design Teams will utilize the same project-specific modeling as the reporting basis for the Local Law requirements.

Continued on next page

References

SCA Local Law Flow Charts (under 'NYC Sustainability Laws')
http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

Summary of Local Laws & Code (cont.)

While it is intended that most buildings will fall into the parameters of SCA standards, there will be buildings that will deviate from those standards or require additional ECMs, in which case project specific modeling will be even more critical in determining the energy use decisions for the project.

LL Annual Project Reporting Requirements

Building, energy, water, and financial information for each capital project must be collected and submitted annually for each fiscal year in accordance with guidelines issued by the Mayor's Office of Sustainability (MOS). The project A/E of Record (A/EoR) will provide the project-specific building, energy and water data to the SCA and the SCA will submit all required data to MOS for schematic design, 100% construction documents (CD), and construction, or at phases determined otherwise by MOS. The SCA will complete the LL31/16 and LL32/16 Post Occupancy form after final certification as well as the LL06/16 end of year reporting form.

Updating the NYC Green Schools Guide

Regulatory Changes

When there are modifications or revisions to the New York City Building Code, New York City Energy Conservation Code (NYCECC), ASHRAE standards, enactment of Local Laws and/or the rules governing green building standards, the SCA will revise its energy models, the NYC Green Schools Guide, and other related SCA design standards and guidelines to reflect regulatory changes, as appropriate. The SCA will provide MOS with a copy of the updated GSG.

Utility Rate Changes/Site to Source Conversion Updates

As the utility rates paid by Department of Citywide Administrative Services (DCAS) for schools change or the city-accepted site to source conversion for electricity is updated, the SCA will assess the impact of such rate changes on the energy modeling and determine whether energy efficiency measures need to be revised to comply with LL31/16 and LL32/16. If energy efficiency measures are required to be revised, the SCA will provide MOS with a copy of the updated energy report and revisions to the applicable portions of the NYC Green Schools Guide.

Overview of the NYC Green Schools Guide

GSG Summary

Sustainable school design and operation provides many benefits to students, school staff and the city as a whole.

Sustainable schools:

- Conserve energy
- Reduce operating costs
- Promote a healthy environment
- Teach environmental responsibility
- Demonstrate commitment to sustainability
- Help the City meet its energy usage and carbon reduction goals

The NYC GSG:

- Establishes sustainable building guidelines that allow projects to achieve sustainable standards equivalent to those established for a LEED for Schools v4 Certified or higher rating,
- Addresses specific sustainable issues in the design, construction and operation of New York City public school buildings.
- Reduces the cost and complexity of sustainability for schools.
- Incorporates the energy and water conservation requirements mandated by LL31 and 32 and by the 2020 NYC Energy Conservation Code.
- Includes NYC Local Laws specific to sustainability and green buildings.
- Includes betterment practices specific to schools and to NYC school construction and operation.

All applicable projects are required to apply for and be certified under the NYC GSG 2019.

Working with the SCA

Members of the Design Team and sustainability consultants implementing GSG certification should become familiar with key SCA Architecture & Engineering (A&E) studios as well as the Design and Construction Services Department. The A&E Department is organized into four studios:

- The Technical Standards & Support (TSS) Studio maintains technical design standards for architectural, structural, electrical, HVAC (heating, ventilating, and air conditioning), and plumbing and drainage trades, which govern school design and construction quality. They are also responsible for implementing and maintaining the Green Schools Guide and Certification Process, and management of the Facilities Management Systems Integrator (FMSI) group, who commission Building Management Systems (BMS), and contract technical support. For the GSG, technical support may include commissioning and energy, daylighting, and acoustics analysis.
- The In-House Design Studio is responsible for the design of buildings and may provide design review assistance to the Architecture and Construction Services Department.
- The Design Consultant Management Studio manages the Design Team and consultants under contract to the SCA. Design Project Managers (DPM), also known as Senior Construction Assessment Specialists (SCAS), manage the consultants directly with supervision by the studio Design Managers (DM).
- The Operations Studio (“Ops”) provides support services to the A&E Department and includes the Consultant Contract Funding Unit (CCFU) which oversees and coordinates consultant payments.

The Design and Construction Services Department provides design review of all projects as well as reviews projects for constructability and value engineered cost savings, and acts as a facilitator and hub for improvement in construction-related activities that involve A&E. D&C Services will work closely with A&E Design Project Managers in the close-out of A/EoR services at the end of a project. The Commissioning group within D&C documents the criteria for system function, performance, and maintainability and then verifies and documents compliance with the established criteria through conformance with SCA design standards during design, construction, start up, initial period of operation, and post-occupancy.

SCA Standards Reduce the Cost and Complexity of Sustainability in Schools

Due to the high volume of construction in a narrow programmatic building type, New York City public school design has historically been based on design standards. The SCA continues that approach by using standards that have been carefully researched and refined to provide well-planned, durable, cost-effective schools. The SCA standards cover all aspects of school design from architectural planning to specific MEP systems. These standards include Design Requirements, Standard Specifications, Standard Details and Room Planning Standards, and many of these standards have been informed by the in-depth analysis of a prototypical project. It is important to the SCA's mission to standardize the approach to sustainability in order to contain costs, maintain aggressive project delivery schedules and to direct Design Teams in a systematic and efficient manner.

NYC GSG 2019 is a part of the SCA standards and all applicable details of each credit have been coordinated with the specifications, design requirements, and details.

LEED® based System

The SCA and DOE originally chose to create a sustainable guide for New York City Schools at a time when the LEED rating system was not school specific. The first versions of LEED created by the USGBC addressed building types including commercial, office, retail, institutional and residential. The USGBC has sub-sequentially developed a LEED for School rating system, with credit requirements and several additional prerequisites specific to schools.

The SCA continues to believe that the students, staff and general public will be better served by adopting sustainable standards specifically developed for NYC public school buildings. The NYC GSG developed by the SCA and DOE has been determined to be no less stringent than LEED for Schools v4 for the achievement of a LEED Certified rating.

The SCA has determined which LEED credits to incorporate or omit by performing a detailed feasibility study of the scope of work for each credit and estimation of the cost of compliance for different sizes and types of schools. Credits were selected for inclusion in the NYC Green Schools Rating System based on appropriateness of each credit to be required as a standard for NYC public schools, cost considerations, and environmental and health benefits. For the benefit of students and teachers, the GSG prioritizes indoor environmental quality, which includes approximately one–fifth of the credits.

An example of an omitted credit is the LEED prerequisite prohibiting smoking, which was omitted to reduce documentation and review of a requirement that is already mandated by local law.

Continued on next page

Overview of the NYC Green Schools Guide (cont.)

CHPS Credits

During the process of developing the NYC GSG, each LEED credit was evaluated for applicability to NYC schools. Other state guidelines for sustainable schools were reviewed for best practices to be incorporated in the NYC GSG. Based on this review of best practices, the SCA/DOE incorporated many prerequisites and credits from Collaborative for High Performing Schools (CHPS) rating systems. The SCA/DOE also referenced selected requirements from CHPS credits that were incorporated into LEED-based credits to make SCA credits more stringent or more appropriate for schools. One example is the inclusion of mold prevention measures into the LEED-based credit for indoor air quality during construction.
The SCA/DOE considered adopting NY-CHPS as a standard but chose not to do so for several reasons, including the fact that many credits as written did not apply to NYC context. The SCA/DOE determined that basing the system directly on LEED would facilitate demonstration of equivalency as required by LL86/05 and LL 32/16.

Enhancement credits based on the SCA's experience with New York City public schools are also included in the NYC GSG.

Required Credits

NYC GSG 2019 credits have been adapted from LEED for Schools v4, with several prerequisites/credits carried over from CHPS and several prerequisites based on NYC Local Laws. This includes:
6 CHPS prerequisites/points (2 also covered by LEED)
13 of the 14 LEED prerequisites
105 of the 110 LEED points

The NYC GSG has more requirements and fewer options than LEED. The NYC SCA has created a more directed system by instituting "required credits". In LEED and CHPS, the only required credits are prerequisites, whereas in the NYC GSG all credits that are not designated "additional" are required if they are feasible given the constraints of a specific project. Credits that cannot be earned by most SCA projects or may have a high cost to implement have been designated Additional Credits and are the only credits that are not required to be attempted, unless projects are directed to do so by The SCA.

The NYC GSG makes a distinction between several types of required credits:

- "No Points" credits are based on either LEED prerequisites, CHPS credits, or NYC Local Laws. The credits are required for all projects, but have no point value in the NYC GSG 2019 to make the total number of points earned by a project easily comparable to the LEED Rating System.
- "Required for all" credits must be achieved by all applicable projects. This category includes 26 LEED-based credits. There may be an occasional project unable to comply with a "Required for All" credit.
- "Required if feasible" credits must be achieved by all projects if possible, unless site constraints, programmatic requirements or extraordinary costs do not permit compliance. If credit compliance is not possible, the Design Team must provide an acceptable explanation of why that credit cannot be achieved for review and approval by the SCA. This category includes 37 LEED-based credits. An example of a "required if feasible" credit is High-Priority Site Selection. This credit would be pursued by any projects located on a site that meets the LEED definitions for High Priority.
- "Additional Credits" are credits that may not be achievable for typical SCA project types and scope and/or are not addressed by SCA standards. This category includes 38 LEED-based credits. SCA approval must be granted to pursue Additional Credits.
- All projects are required to achieve at least 40 points of the LEED-based credits included in the NYC Green Schools Rating System to achieve LEED Certified equivalency per LL32/16.

Users Guide

The SCA/DOE compliance process is similar to the LEED certification process but requires compliance verification earlier during the design phase. The SCA/DOE compliance process is less complex for Design Teams and Contractors than LEED certification review because complying materials and systems have been reviewed and incorporated into the SCA design standards.

SCA Compliance Review is administered by trained SCA Architecture and Engineering (A&E) Department reviewers and SCA Commissioning Authority (CxA) who monitor design and construction compliance and review submittals prepared by the A/E of Record's LEED AP during the design and construction phases and assisted by the General Contractor's LEED AP during the construction phase.

Design Teams should note that the GSG, unlike LEED, is not competitive. Projects must pursue all required and required if feasible credits. There is no incentive or differentiation in ratings for schools achieving more points because the number of points achieved will typically be based only on the circumstances of site and scope.

Submission Format

All submissions are required to follow the sample submissions format as provided on the SCA website and include:

- Table of Contents (include page numbers corresponding to documentation)
- Updated Credit Checklist
- Previous meeting minutes (as applicable) including responses to comments
- Narratives for each project credit and updated with each phase submission as necessary, referencing all supporting documentation provided in the submission
- Supporting documentation labeled with corresponding credit. If the supporting documentation includes a drawing, then the full sized referenced drawing will need to be included in the appendix of the electronic submission.

Design Phase

The A/E of Record will follow the requirements in this guide to develop sustainable school designs compliant with the NYC GSG.

At the conclusion of the 100% Design Phase, the A/E of Record will prepare a Sustainable Design Compliance Certification package, which will include the aggregate of all prior approved design phases with supporting documentation. This package is provided to the Green Schools' Review Committee as documentation of design compliance with the Green Schools Guide.

References

GSG Sample Submissions
http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

Continued on next page

Users Guide (cont.)

The steps in the SCA/DOE sustainable design compliance process include:

- Pre-Schematic – Meet the requirements for the Integrative Design Process credit to inform the design and the development of site selection credit documentation.
- Schematic Design (SD) – Submit the project checklist and, for all applicable credits, compliance narratives and completed documentation.
- Design Development (DD) – Submit a Sustainable Design Report including compliance narratives for all credits. The GSG Design Development submission should be concurrent with DD 40% Construction Documents (CD) submission.
- 60% Design – Submit a Sustainable Design Report including design phase credit calculations and forms. The 60% Design GSG submission should be concurrent with 60% design CD submission.
- 100% Design – Submit a Sustainable Design Report including design phase credit calculations and forms. The 100% Design GSG submission should be concurrent with 100% design CD submission. All design credit documentation should be complete and updated to respond to all outstanding issues raised during the 60% design review.
- Design Phase Certification – Submit a final Sustainable Design Report, updated to reflect the 100% CD design and compliance submission including a complete and signed Design Compliance Certification form.

The procedures for the sustainable certification process during the construction and post – occupancy phases are described in detail below. Note that the commissioning process takes place throughout project design and construction.

Feasibility Study Phase

Site feasibility studies are often prepared by designers who are independent of the school Design Team ultimately selected to execute the project. Designers assigned to prepare Feasibility Studies must investigate documentation of sustainable site information as described in the SCA Design Requirement for the scope of feasibility studies. Feasibility studies will include a determination of the applicability of local laws for each project. The SCA may choose on a case-by-case basis to require testing to determine viability of sustainable measures such as geothermal wells or on-site stormwater disposal.

Pre-Schematic Design GSG Analysis

1. The Design Team is required to familiarize themselves with the NYC Green Schools Guide, Project Checklist and all documentation on the NYC Green Schools Guide section of the website.
2. Pre-schematic conceptual design options should consider sustainable measures that are attainable for the site and building appropriate to this level of design, especially as they relate to selected site credits.
3. Prior to the Integrative Design Process Workshop, review discovery analysis and recommendations reports and complete the Discovery requirements detailed within Credit P1.1R to inform sustainable design priorities and an initial understanding of the feasibility of key design credits.
4. Facilitate the workshop and provide minutes of such meeting required to meet the Integrative Design Process credit and provide an IDP Workshop Report, as detailed in Credit P1.1R, in the GSG Schematic Phase Submission to document the potential design strategies discussed and identify which strategies will be incorporated into the project moving forward, if so decided at the time.

Schematic Design (SD) GSG Submittal, concurrent with the SD submission

Include the following:

1. Submit initial Project Checklist
2. Submit a Credit Compliance Narrative and supporting documentation (if required) for each of the Location and Site credits required to be submitted at this phase (per the submittal section of each credit). If the supporting documentation includes a drawing, then the full sized referenced drawing will need to be included in the appendix of the electronic submission. Each narrative should describe the approach to pursuing the credit, compliance methodology, SCA specification sections and standard details that will be included in the construction documents to achieve compliance. Include an explanation of each Location and Site credit that is determined to be not feasible for this project. Information may be drawn from the project feasibility study or test fit.
3. Include IDP Workshop Report in the submission

Design Development (DD) GSG Submittal, concurrent with the DD submission

Include the following:

1. Submit updated Project Checklist. If there have been any changes to the Checklist, include a narrative explanation.
2. Submit a Credit Compliance Narrative for each credit (including supporting documentation, if required and any modifications to previously documented Location and Site credits). Each narrative should describe the approach to pursuing the credit, compliance methodology, SCA specification sections and standard details that will be included in the construction documents to achieve compliance. Include an explanation of each credit that is determined to be not feasible for this project.
3. Commissioning Authority (CxA) is to submit the Project Commissioning Plan.
4. Submit a cost analysis for NYC GSG Additional Credit cost allocation when applicable.
5. Submit a DD level project specific energy model.

60% Design GSG Submittal, concurrent with 60% CD submission

Construction documents submitted must incorporate sustainability requirements. Include the following:

1. Submit updated Project Checklist – explain any changes.
2. Submit revised Credit Compliance Narratives, as required.
3. Submit calculations, design studies, forms and other required credit documentation for all design phase credits (except for site selection credits previously documented).
4. Submit a project specific Energy Model for the project.
5. Submit an updated cost analysis for NYC GSG Additional Credit cost allocation when applicable.
6. Provide documentation on any changes in the SCA/DOE's project requirements.

100% Design GSG Submittal, concurrent with 100% CD submission

CDs submitted with this submittal shall be updated from the 60% submission and must incorporate sustainable requirements to allow final documentation of design credits as included in the Sustainable Design Report. Include the following:

1. Submit updated Project Checklist – explain any changes.
2. Submit any revised Credit Compliance Narratives, as required.
3. Submit calculations, design studies, forms and other required credit documentation for all design phase credits (except for site selection credits previously documented).
4. Submit a final Project Specific Energy Model, updated as necessary to reflect the final design.
5. Submit an updated cost analysis for NYC GSG Additional Credit cost allocation when applicable.
6. Provide documentation on any changes in the SCA/DOE's project requirements.

Continued on next page

Users Guide (cont.)

Design Phase GSG Certification Submittal

Submit any outstanding CDs from the 100% submission required to document the design credits or to ensure construction credits will be met. Construction documents submitted must incorporate sustainability requirements. Include the following in the Final Sustainable Design Report:

1. Submit final Design Project Checklist.
2. Submit Design Team Certification Form- Design Phase initialed and signed by both the Architect and Engineer of Record.

Construction Phase

Compliance reviews during the construction period will be by the SCA GSG Review Committee. After the completion of the review process, the SCA Green Schools Review Committee will verify that the project complies with the NYC GSG and the requirements of LL32/16.

Preparing the Construction GSG submittal

1. Review construction submittals for compliance with specified sustainability requirements. For substitutions, indicate that the item meets or exceeds the sustainability standards specified.
2. Review Contractor's complete construction submission including Contractor Certification Form and supporting documentation for all construction credits.
3. Submit complete GSG Construction Phase submittal package including complete initialed and signed Design Team Certification Form-Construction Phase and Contractor Certification Form.

Commissioning

Commissioning will be conducted by a joint commissioning group made up of SCA and Department of Education (DOE) departments, SCA Consultants, and Contractor's personnel as presented in the Commissioning plan. This includes staff from the SCA's Environmental and Regulatory Compliance (ERC) and Architecture and Engineering (A&E) Departments, Facilities Management Systems Integrator (FMSI) and Commissioning Authority (CxA) consultants, and the Division of School Facilities (DSF).

The commissioning process will be monitored by the designated project CxA assigned to the project by the SCA Commissioning Director, who will develop and maintain the Project Commissioning Plan. A description of the commissioning process and a copy of the project specific Commissioning Plan are provided at the beginning of Construction. Commissioning requirements for construction are provided in the applicable specifications sections. See the commissioning credits (E1.1P, E1.2A) for more information on the commissioning roles and teams.

Final Certification

After successful completion and documentation of GSG Construction Phase and GSG Commissioning, the GSG Committee will hold a GSG Project Certification Meeting to review all previously issued notes by the Committee, if any, to verify that all electronic and hard copies of documentation was revised, if necessary, and submitted.

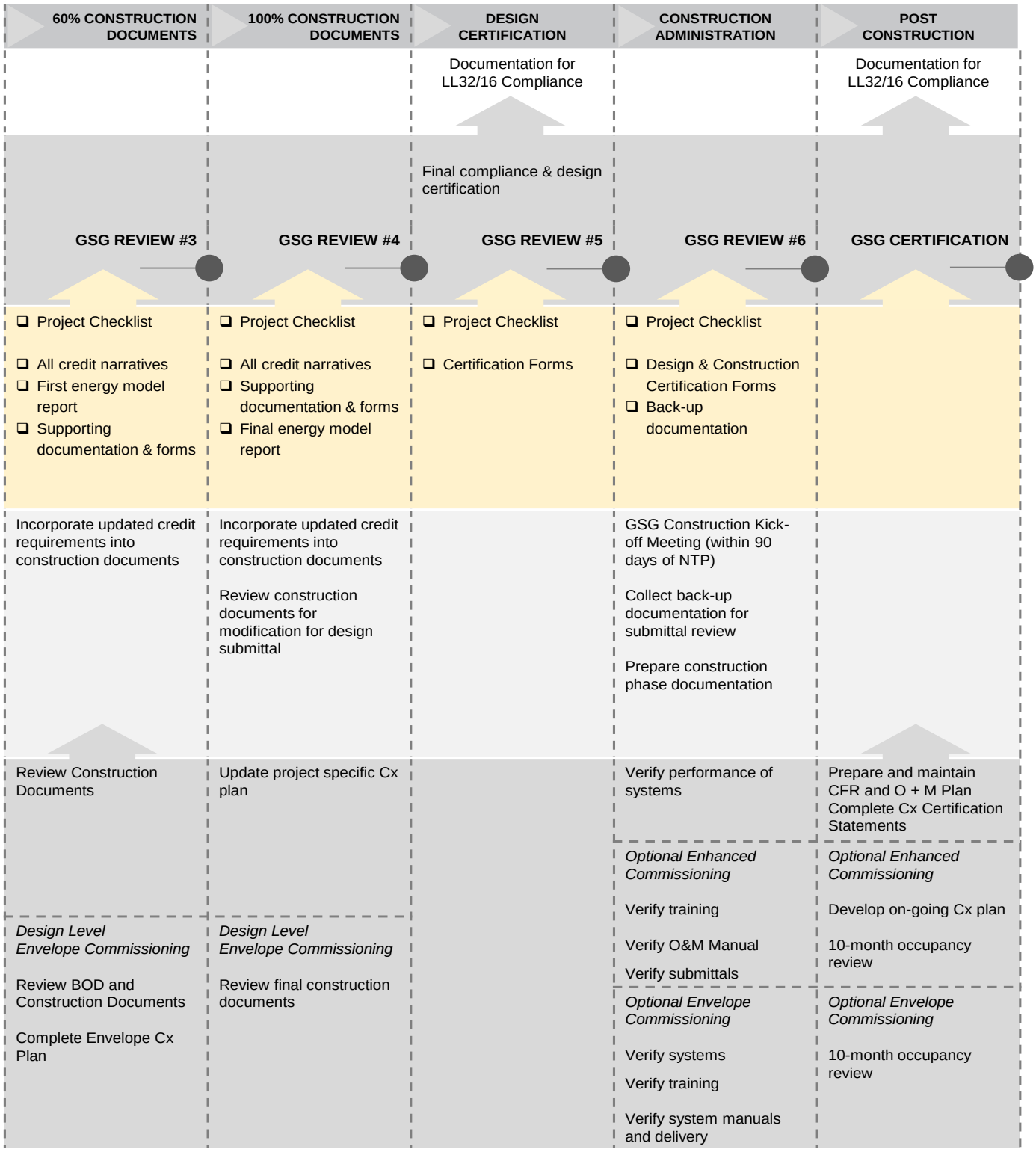
Upon Certification awarded to the project, a Certification Plaque will to be erected on the building, as outlined in SCA specifications.

Third-Party Audit of Projects

At the end of each fiscal year, the SCA will provide The Mayor's Office of Sustainability (MOS) with a list of new construction, addition and substantial reconstruction projects completed during that fiscal year. The MOS may select 10% of these projects to receive a third-party certification audit. The purpose of the verification is to review a sample of projects for compliance with the requirements of the NYC GSG. Where possible, the audit sample will be representative of SCA's distribution of project types (new construction of small schools and large schools, as well as rehabilitation projects). The third-party auditor will be under contract to the MOS.

CERTIFICATION PROCESS DIAGRAM

	PROJECT START	PRE-SCHEMATIC	SCHEMATIC DESIGN	DESIGN DEVELOPMENT
NYC MAYOR'S OFFICE OF SUSTAINABILITY			Documentation for LL32/16 Compliance	
SCA GSG COMMITTEE REVIEW PROCESS		**GSG INTEGRATED DESIGN WORKSHOP**	**GSG REVIEW #1**	**GSG REVIEW #2**
PROJECT TEAM SUBMITTAL DOCUMENTATION		❑ Draft Project Checklist ❑ Agenda for Integrative Design Process Workshop ❑ Discovery report with analyses as per SCA templates	❑ Project Checklist ❑ Location and Site Narratives ❑ Integrative Design Process Report ❑ Supporting documentation & forms	❑ Project Checklist ❑ All credit narratives ❑ Supporting Documentation & Forms
PROJECT TEAM ACTION ITEMS	Project kick-off meeting: Discuss Green Schools Guide and sustainability local law requirements Set tentative date for GSG IDP Workshop	Review Green School Guide Complete Integrative Design Process requirements for "Discovery" Facilitate Integrative Design Process Workshop Investigate site credits Incorporate site credits in concept design options	Prepare Integrative Design Process Workshop Report Investigate "Required If Feasible" credits	Incorporate updated credit requirements into design
COMMISSIONING AGENT ACTION ITEMS				Review OPR, BOD, and DD Documents Develop preliminary project specific [commission] plan *Design Level Envelope Commissioning* Review BOD and OPR Draft Envelope Cx Plan


60% CONSTRUCTION DOCUMENTS
100% CONSTRUCTION DOCUMENTS
DESIGN CERTIFICATION
CONSTRUCTION ADMINISTRATION
POST CONSTRUCTION
Documentation for LL32/16 Compliance
Documentation for LL32/16 Compliance
Final compliance & design certification
GSG REVIEW #3
GSG REVIEW #4
GSG REVIEW #5
GSG REVIEW #6
GSG CERTIFICATION
❑ Project Checklist
❑ All credit narratives
❑ First energy model report
❑ Supporting documentation & forms
❑ Project Checklist
❑ All credit narratives
❑ Supporting documentation & forms
❑ Final energy model report
❑ Project Checklist
❑ Certification Forms
❑ Project Checklist
❑ Design & Construction Certification Forms
❑ Back-up documentation
Incorporate updated credit requirements into construction documents
Incorporate updated credit requirements into construction documents
Review construction documents for modification for design submittal
GSG Construction Kick-off Meeting (within 90 days of NTP)
Collect back-up documentation for submittal review
Prepare construction phase documentation
Review Construction Documents
Update project specific Cx plan
Verify performance of systems
Prepare and maintain CFR and O + M Plan
Complete Cx Certification Statements
Optional Enhanced Commissioning
Verify training
Verify O&M Manual
Verify submittals
Optional Enhanced Commissioning
Develop on-going Cx plan
10-month occupancy review
Design Level Envelope Commissioning
Review BOD and Construction Documents
Complete Envelope Cx Plan
Design Level Envelope Commissioning
Review final construction documents
Optional Envelope Commissioning
Verify systems
Verify training
Verify system manuals and delivery
Optional Envelope Commissioning
10-month occupancy review

INTEGRATIVE DESIGN PROCESS

Realizing the benefits of the Green Schools Guide starts by transforming the design process itself. Successful SCA project teams will engage in an Integrative Design Process (IDP) that prioritizes cost-effective solutions over both the short and long terms. Teams should plan for early and active participation, input, and analysis from all disciplines to discover the beneficial interrelationships and synergies between systems and components. An effective integrative design process can improve decision making, achieve high levels of building performance, improved learning and teaching environments, and lead to significant environmental benefits.

The Integrative Design Process (P) category outlines a process for completing the early-phase analysis of energy and water systems, assessing acoustical strategies and unique building envelope assemblies, facilitating an IDP Workshop to present and synthesize the team's analysis and assessment, and developing an IDP Report that summarizes the integrative potential and goals for the project. This process will require team members from various disciplines to meet and discuss the project goals, opportunities, and risks both from the perspective of their respective disciplines AND the perspective of the whole project and its end users. Project teams are encouraged to take ownership of and improve the Integrative Design Process to effectively identify and evaluate synergistic opportunities and benefits.

P1.1R – INTEGRATIVE DESIGN PROCESS

P

Intent

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

This credit is required for all projects.

Requirements

Beginning in pre-design and continuing throughout the design phases, identify and use opportunities to achieve synergies across disciplines and building systems. Use the analyses for all potential schemes and workshop described below to inform the project design, provide integrative design strategies to SCA, and support ongoing performance and operations.

Discovery #1 - Energy and Daylight Related Systems

Perform a preliminary energy and daylight analysis before the completion of pre-schematic design that explores how to reduce energy loads and improve daylighting in the school and accomplish related sustainability goals by questioning default assumptions. Analyze and assess strategies associated with ALL of the following:

- Meet performance target as described in Credit E3.1P - Minimum Energy Performance.
- Site conditions: Assess site shading, prevailing winds, exterior lighting, landscaping, and adjacent site conditions.
- Massing and orientation: Assess how massing and orientation affect energy consumption, daylighting, HVAC sizing.
- Renewable Energy Analysis: Complete an assessment of renewable energy potential as required by LL31/16 and LL 94/19, as described in Credit E6.1P.
- MEP Layout Optimization: Develop a best and alternate solution to optimize the MEP design and determine the modifications to the Architectural system to meet the HVAC optimization goals.
- Daylight access and design strategies for gymnasium/gymatorium.
- Geothermal system applicability per New York City Geothermal Pre-feasibility Tool per LL06/16.
- Provide IDP Box Model as per template and instructions on the SCA website.

Discovery #2 - Water-Related Systems/Green Infrastructure

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

- Supply sources. Assess and quantify all potential nonpotable water supply sources, such as on-site rainwater, graywater, and HVAC equipment condensate.
- Annual Water Demand Analysis. Calculate annual water demands for building; match with potential supply sources.
- Potential cost impact associated with installing any water conserving systems other than SCA standard.
- Analyze potential locations for green infrastructure.

Discovery #3 - Preliminary Life-Cycle Impacts Assessment (LCA)

Perform a preliminary Life-Cycle Assessment by identifying potential building envelope assemblies that may be used for the project and quantifying the LCA impacts of each using the SCA LCA Impact Assessment Guidelines. Include results and LCA design considerations in the IDP Workshop Report.

Implementation

Orient the building to take advantage of maximum natural daylighting: plot shadow patterns from surrounding buildings to optimize access to daylight.

Consider prevailing winds when determining the site and building layout. For example, consider how the shape of the building itself can create wind-sheltered spaces and consider prevailing winds when designing operable windows and parking lots/driveways to help blow exhaust away from the school.

Take advantage of existing built environment conditions and vegetation to provide shelter from extreme weather or to deflect unwanted noise.

Plant or protect deciduous trees to block summer sun and allow winter solar gain.

Planting should be done an adequate distance from the building to prevent the accumulation of water along the building envelope.

Create physical connections to existing bike paths and natural features. Site design should seek to minimize impact and interaction of buses and drop-off with major arteries.

Discovery #4 - Active Design

Complete a Schematic Active Design Plan that identifies and locates all of the potential Active Design strategies that can be implemented on the project for each scheme. Refer to Active Design in a School Environment (Credit S3.2) for a list of potential strategies.

Discovery #5 - Acoustics

Review the requirements for the Minimum (Q8.1P) and Enhanced Acoustics (Q8.2) credits and identify risks to achieving each credit. Bring a list of potential risks to the IDP workshop to discuss and address, such as acoustical considerations for programmatic adjacencies, spaces that may need special acoustical treatment to mitigate sound transmission, exterior and interior noise levels, etc.

Discovery #6 – Climate Resiliency

Review the latest published version of the NYC Climate Resiliency Design Guidelines (CRDG) from the Mayor's Office of Recovery and Resiliency. (See link under 'other references')

Perform the following steps:

1. Identify all applicable climate hazards using the Exposure Screening Tool
2. Perform a Risk Assessment Methodology, based on Exposure Screening Tool results. If Exposure Screening Tool results indicate a Medium or High exposure rating, follow instructions in tool to address the triggered climate risk.
3. Identify possible resilient design interventions in response to increasing heat, increasing precipitation, and sea level rise, including but not limited to those recommended in the Design Strategies Checklist and consistent with related Green School Guide Credits

IDP Workshop

The project team will identify a moderator to serve as the Facilitator to lead an Integrative Design Process workshop during the pre-schematic phase, prior to final scheme selection. Preparation, workshop and follow up should include the following:

Before the IDP Workshop:

- Prepare a preliminary agenda with activity durations and list of participants distributed at least two days prior to the workshop
- Engage SCA in workshop planning and agenda development
- Assigned discipline lead shall prepare synopsis of each discovery analysis and send to the SCA at least 3 days before the workshop. Analyses will be covered in detail in the next section
- Prepare summary presentation of studies and analyses results including the questions they raised, to present at the workshop
- Review the SCA energy modeling templates and guidelines on the SCA website

Continued on next page

Though not typical on SCA projects, for large campuses where on-site parking and driveways are to be provided, design such areas to limit student proximity to bus emissions with separate drop-off areas for buses and private vehicles. Design bus loading and unloading areas such that buses need not be lined up head to tail. Do not design bus loading and unloading areas such that bus exhaust is in proximity to any of the school's air intake vents.

For Interior Fit-Out projects, provide analyses for applicable discoveries only. Refer to Appendix C – Interior Fit-Out (IFO) Project Appendix of the Green Schools Guide, and Interior Fit-Out documents in the IDP Toolkit as found on the SCA website, for further guidance on interior fit-out project compliance.

P1.1R – INTEGRATIVE DESIGN PROCESS (CONT.)

P

Requirements (cont.)

During the IDP Workshop:

- Facilitate workshop to identify, clarify, and evaluate integrative design opportunities
- Listen to and synthesize SCA and Design Team responses to identified challenges, opportunities, and next steps
- Prepare workshop meeting minutes to include all recommendations for each Discovery from the Workshop

After the IDP Workshop:

- Within 2 weeks of the IDP Workshop, summarize potential strategies and follow up actions required, along with responsible parties for each, into an Integrative Design Workshop Report including:
  - All analysis completed and included
  - Meeting minutes from workshop
  - Integrative design narrative with stated energy and water goals
  - Design impacts that may inform scheme selection
  - Narrative outlining strategy for meeting SCA standards and local law
  - Preliminary GSG checklist and credit impacts of strategies evaluated

IDP Workshop Report

Complete an IDP Workshop Report that includes the following.

Report - Energy and Daylight Related Systems

Document how the energy and daylight analysis has informed the building design, location of building on site, MEP systems, and energy use. Include the following, as applicable:

- Building and site program
- Building form and site layout
- Building envelope and façade elements on different orientations
- Modification to, or significant downsizing of building systems (e.g., HVAC, lighting, controls)
- Modifications to exterior materials, interior finishes, and other systems
- New York City Geothermal Pre-feasibility Tool results
- Roof plan with sustainable roofing zone per LL 94 of 2019, including all calculations and analysis indicating whether solar PV electricity generating system and/or green roof system is selected

Report - Water Systems

Document how the water budget analysis informed building and site design decisions and the systems outlined below. Demonstrate how at least one on-site nonpotable water supply source was analyzed to reduce the burden on the NYC municipal supply or wastewater treatment systems. Include the following, as applicable:

- Monthly and annual rainfall volume landing on site and building roof
- Monthly and annual site and building water use
- Rainwater quantity and quality management systems
- Landscaping, irrigation, and site elements
- Roofing systems and/or building form and geometry
- Potential locations for green infrastructure
- Other systems

Report - Preliminary Life-Cycle Assessment

Document the LCA considerations impacts of all building envelope assemblies selected for the project including the following:

- LCA environmental impacts for each assembly selected following the SCA LCA Impact Assessment Guidelines
- LCA environmental impacts for any assemblies that were considered and not selected with brief summary of why each assembly was not selected
- LCA considerations in selection of building envelope assemblies

Report - Active Design

Submit a schematic active design plan to include the following.

- First floor plan for each scheme with all potential Active Design strategies identified and located
- Narrative summarizing intentional design strategies that help the project meet the intent of Credit S3.2.

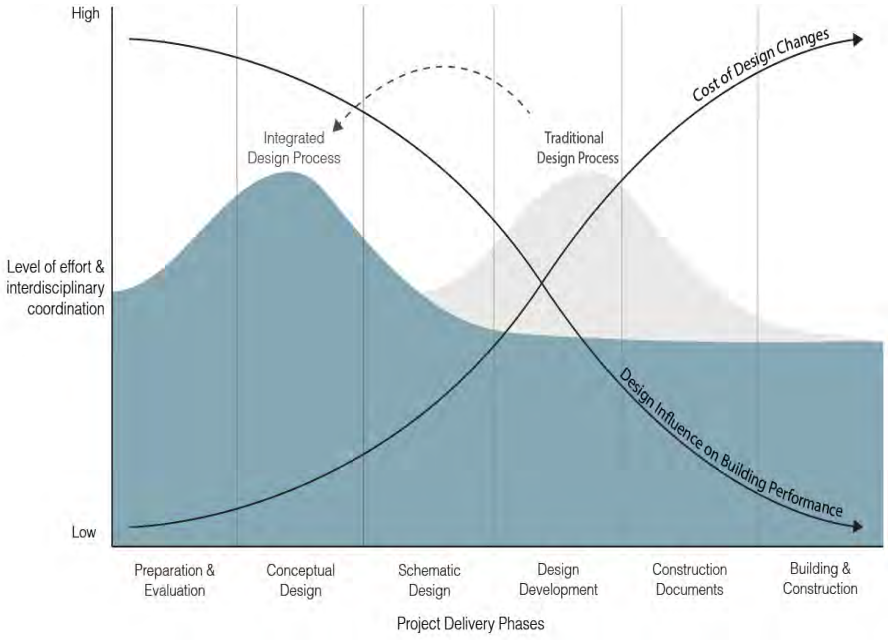
Report - Acoustics

Complete a preliminary acoustics narrative summarizing potential risks to achieving the Minimum (Q8.1P) and Enhanced Acoustics (Q8.2) credits, decisions made in the IDP Workshop, and proposed strategies for addressing the risks.

Report- Climate Resiliency

Provide a Climate Resiliency narrative assessing considerations for the project. Include the following:

- Results of CRDG Exposure Screening Tool
- Completed CRDG Design Strategies Checklist
- Maps of flood zones and sea level rise (present and predicted) for the school building location



P1.1R – INTEGRATIVE DESIGN PROCESS (CONT.)

P

Credit Submittals

PRE-SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Complete analysis outlined under 'Requirements'.
- Facilitate Integrative Design Workshop.

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

Submit IDP Workshop Report including:

- All analysis completed.
- Meeting minutes from workshop.
- Integrative design narrative with stated energy and water goals.
- Report with results and design impacts after workshop.
- Submit separate narrative describing how IDP discovery analysis informed the building design.
- Preliminary GSG checklist and credit impacts of strategies evaluated.
- Submit completed Integrative Design Process Credit Form

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

No credit submittal.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IP Credit
Integrative Design Process

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

SCA Integrative Design Process Facilitator Guide and Agenda

ANSI Consensus National Standard Guide© 2.0 for Design and Construction of Sustainable Buildings and Communities
https://webstore.ansi.org/RecordDetail.aspx?sku=MTS+2012%3a1

New York City Geothermal Pre-feasibility Tool
https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/RIVERWATER-ASSESSMENT-FINAL-RPT.pdf

IDP Toolkit
http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

SCA Geothermal System Feasibility Tool User Guide

NYC Climate Resiliency Design Guidelines
https://www1.nyc.gov/assets/orr/pdf/NYC_Climate_Resiliency_Design_Guidelines_v3-0.pdf

P

LOCATION

The Location (L) category rewards building locations that encourage compact development, alternative transportation, and connection with a diverse set of amenities such as food, parks, and neighborhood cultural institutions and services. Credits that cover location-related topics were previously part of the Site (S) category in earlier versions of the GSG. The new L category focuses on the existing features of the surrounding community and how this infrastructure affects occupants' behavior and environmental performance, whereas the S category now specifically addresses site design within the project boundary.

Well-located schools take advantage of existing infrastructure including public transit, street networks, pedestrian paths, bicycle networks, services and amenities, and existing utilities such as electricity, water, gas, and sewage.

When integrated into the surrounding community, school buildings can offer distinct advantages to NYC Public Schools and the students, teachers, and families they serve. For the school district, proximity to existing utility lines and street networks avoids the cost of bringing this infrastructure to the project site. For staff and students, walkable and bikeable locations can enhance health by encouraging daily physical activity, and proximity to services and amenities can increase the happiness and productivity of staff. Locating in a vibrant, livable community makes the building a destination for students, staff, parents and community members, and the building's occupants will contribute to the area's economic and community building activity, creating a good model for future development.

L1.1R – SENSITIVE LAND PROTECTION

Intent

Avoid the selection and development of inappropriate sites, and/or portions of sites, and reduce the environmental impact of locating the building on a site.

This credit is required for all projects.

Requirements

Option 1.

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

OR

Option 2.

Locate the development footprint on land that does not meet the following criteria for sensitive land:

- **Floodplains.** A flood hazard area shown on the legally adopted flood hazard map for New York City.
- **Habitat.** Land identified as habitat for the following:
  - Species listed as threatened or endangered under the U.S. Endangered Species Act or the state's endangered species act, or
  - Species or ecological communities classified by NatureServe as GH (possibly extinct), G1 (critically imperiled), or G2 (imperiled), or
  - Species listed as threatened or endangered specifies under local equivalent standards that are not covered by NatureServe data.
- **Water bodies.** Areas on or within 100 feet of a water body, except for minor improvements.
- **Wetlands.** Areas on or within 50 feet of a wetland, except for minor improvements.

The following improvements are considered minor:

- Bicycle and pedestrian pathways no more than 12 feet wide, of which no more than 8 feet may be impervious.
- Activities to maintain or restore native natural communities and/or natural hydrology.
- One single-story structure 300 linear feet on average, not exceeding 500 square feet.
- Grade changes necessary to ensure public access.
- Brownfield remediation activities.
- Clearings, limited to one per 300 linear feet on average, not exceeding 500 square feet each.
- Removal of the following tree types:
  - Hazardous trees, up to 75% of dead trees.
  - Trees less than 6 inches diameter at breast height.
  - Up to 20% of trees more than 6 inches diameter at breast height with a condition rating of 40% or higher.
  - Trees under 40% condition rating.
  - The condition rating must be based on an assessment by an arborist certified by the International Society of Arboriculture (ISA) using ISA standard measures.

Implementation

Potential school project sites are identified with the input of the NYC Department of Education, the SCA and other parties. The SCA Design Requirements 1.1.3.1 Feasibility Study and 1.1.3.2 Test Fit includes a scope of services that cover the investigation of the items listed in this credit to ensure that sustainable site issues are considered.

Feasibility studies are often conducted by an entity separate from school Design Teams. In cases where a feasibility study or test fit has been completed, the Design Team may find useful information for documenting this credit in the feasibility study or test fit report.

The designer needs to review both the official Flood Insurance Rate Maps (FIRM) and preliminary FIRM maps until the preliminary FIRM maps are adopted as official by FEMA and utilize the more stringent data.

Improvements within wetland and water body buffers may be undertaken to enhance appreciation of them, provided such improvements are open to all building users.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

If Option 1 is satisfied, provide a narrative explanation of the previous development on the property. Provide supporting documentation to verify previous development (example: aerial map, historical survey, etc.)

If Option 2 is satisfied, submit a narrative and the following supporting documentation to demonstrate compliance with each of the site selection criteria utilizing the numbering under requirements:

1. Confirm the development's elevations in relation to official Flood Insurance Rate Maps (FIRM) and preliminary FIRM maps. Include an annotated site plan if site includes or is adjacent to land within the designated floodplain boundary.
2. Submit US Fish and Wildlife Service listing of endangered species for the county. Provide site specific documentation if site is adjacent to a river or coastline, or if list includes species besides shortnose sturgeon, piping plover, roseate tern and sea beach amaranth. Submit site specific documentation from the New York Natural Heritage Program on whether site is the habitat for threatened or endangered species.
3. Confirm the development's proximity to wetlands. Include an annotated site plan if site is within 50 feet of a wetland, with distances and any minor improvements within required buffers clearly identified.
4. Confirm the development's proximity to bodies of water. Include an annotated site plan if site is within 100 feet of a water body, with distances and any minor improvements within required buffers clearly identified.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- If Option 1 is selected, no further action is necessary. If Option 2 is selected, submit updated documentation as necessary through to Design Development.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 LT Credit
Sensitive Land Protection

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

FEMA Flood Insurance Rate Maps:
https://msc.fema.gov/portal/home

NYC Preliminary Flood Insurance Rate Maps (FIRM)
www.region2coastal.com/view-flood-maps-data/view-preliminary-flood-map-data/

Environmental Resource Mapper
www.dec.ny.gov/gis/erm

New York Department of Environmental Conservation List of Endangered, Threatened, and Special Concern Species
www.dec.ny.gov/animals/29338.html

U.S. Fish and Wildlife Service
Environmental Conservation Online System, Information for Planning and Conservation
https://ecos.fws.gov/ecp/report/table/critical-habitat.html

NatureServe
www.natureserve.org

International Society of Arborculture
www.treesaregood.org/findanarborist/findanarborist

L

L1.2 – HIGH PRIORITY SITE

Intent

To encourage project location in areas with development constraints and promote the health of the surrounding area.

This credit is required, if feasible, for all projects.

Requirements

Option 1. Historic District (1 point)

Locate the project on an infill location in a historic district.

OR

Option 2. Priority Designation (1 point)

Locate the project on one of the following:

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

OR

Option 3. Brownfield Remediation (2 points)

Confirm the project site is defined as a Brownfield by a New York City, New York State, or federal government agency.

Implementation

Review the three options and determine if any apply to the project. If more than one of the options applies, indicate which and pursue documentation for only one.

Option 1. Historic District

Work with the NYC Landmarks Commission or State Historic Preservation Office (SHPO) to determine whether the proposed project site is in a historic district. Projects in a historic preservation district must often meet additional design or construction criteria. These restrictions may include use of specific exterior building materials, limitations on total building height, and restrictions on demolition. The NYC Landmarks Commission or SHPO will determine these restrictions and grant approval through the local review board where required.

Option 2. Priority Designation

Priority designations listed most often overlap with economically disadvantaged areas. Work with the local economic development, planning, community development, housing, or redevelopment agency or department to determine whether the specified priority designation applies to the project site.

- A *Qualified Census Tract* has a certain percentage of low-income households, as defined under Section 42 of the U.S. Internal Revenue Code. Difficult development areas are determined annually by Housing and Urban Development. Owners of rental properties in qualified census tracts and difficult development areas qualify for the low-income housing tax credit, as defined under Section 42 of the Internal Revenue Code.
- *EPA National Priority Sites* are designated by the U.S. Environmental Protection Agency. They release or threaten to release hazardous substances, pollutants, or contaminants. Projects on the National Priority List are targets for the federal Superfund program, which cleans up uncontrolled hazardous waste sites around the country.
- *Empowerment Zone, Enterprise Community*, and *Renewal Community* sites, identified by the U.S. Department of Housing and Urban Development, offer various tax incentives to encourage businesses to open or expand and hire local residents.
- The *Community Development Financial Institutions Fund* is a federal grant program that seeks to expand affordable credit, capital, and financial services for underserved populations through grants and tax credits. It is a subset of the Treasury's New Markets Tax Credit Program, which provides a tax credit for investing in designated "community development entities."

Option 3. Brownfield Remediation

The U.S EPA Brownfields Program defines a brownfield as a real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or possible presence of a hazardous substance, pollutant, or contaminant. Environmental site assessments are conducted through the SCA Industrial & Environmental Hygiene (IEH) Division and are typically completed prior to the start of schematic design. If project site is entered into the program or already part of the program, Brownfield status documentation is to be obtained through the SCA Industrial & Environmental Hygiene (IEH) Division.

The IEH Division will work with the authority having jurisdiction to determine the remediation requirements for the contaminated site. Once the remedy has been executed, the IEH Division will obtain documentation from the authority having jurisdiction confirming that remediation has been completed to its satisfaction.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying the relevant High Priority Site designation(s).
- For Option 1 and 2, submit vicinity maps or other documentation confirming historic district and/or priority site designation.
- For Option 3, submit a narrative summarizing the site's Brownfield status. Indicate which entity has declared the site contaminated and attach executive summary level findings on site contamination. Indicate if Brownfield remediation will be part of the project's contracted scope or completed prior to building project. Indicate entity responsible for site remediation.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- For Option 3, if Brownfield remediation is being done as part of the project's contracted scope of work, incorporate specifications and details by SCA IEH Division into construction documents.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- For Option 3, incorporate credit requirements in construction documents and provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

For Option 1 or 2:

- Submit the complete and initialed Design Team Certification Form-Design Phase confirming compliance with the option pursued.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

For Option 3, if Brownfield remediation was part of the project's contracted scope of work:

- Provide a narrative briefly summarizing the actions taken to remediate the site and the results of these actions.
- Provide documentation from authority having jurisdiction confirming that remediation has been completed to its satisfaction.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 LT Credit
High Priority Site

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

Project specific specifications prepared by SCA IEH Division.

SCA STANDARD DETAILS

Project specific details prepared by SCA IEH Division.

OTHER REFERENCES

U.S. Environmental Protection Agency, National Priority List
www.epa.gov/superfund/sites/npl

U.S. Housing and Urban Development, Federal Empowerment Zone, Federal Enterprise Community, and Federal Renewal Community
http://hudgis-hud.opendata.arcgis.com/datasets/1101a6c1e2364302b70485ca99fc7e69_0

U.S. Department of Treasury, Community Development Financial Institutions Fund
www.cdfifund.gov

U.S. Department of Housing and Urban Development, Qualified Census Tracts and Difficult Development Areas
https://www.huduser.gov/portal/datasets/qct.html

ASTM E1903-11 Standard Guide for Phase II Environmental Site Assessment Process
www.astm.org/Standards/E1903.htm

New York State Brownfield Cleanup Program, Development of Soil Cleanup Objectives, Technical Support Document, September 2006
www.dec.ny.gov/docs/remediation_hudson_pdf/techsuppdoc.pdf

For site cleanup strategies
www.brownfieldstsc.org

U.S. EPA Brownfield programs
https://www.epa.gov/brownfields

CRIS
https://cris.parks.ny.gov

L1.3 – SURROUNDING DENSITY

Intent

To conserve land and protect wildlife habitat by encouraging development in areas with existing infrastructure.

This credit is required, if feasible, for all projects.

Requirements

Locate on a site whose surrounding existing density within a ¼-mile radius of the project boundary meets the values in **Table 1**. Use either

Option 1. Combined Residential and Nonresidential Densities

OR

Option 2. Separate Residential and Nonresidential Densities

Figure 1 shows the breakdown of a ¼-mile radius into separate blocks to make documentation more manageable.

Physical education spaces that are part of the project site, such as playing fields and associated buildings used during sporting events only (e.g. concessions stands) and playgrounds with play equipment, are excluded from the development density calculations.

Table 1. Points for average density within 1/4 mile of project

Combined Density	Residential & Nonresidential Densities		Points
Square feet per acre of buildable land	Residential Density (DU/acre)	Nonresidential Denisty (FAR)	
22,000	7	0.5	2
35,000	12	0.8	3

Implementation

All projects should attempt to comply with the requirements.

The www.oasisnyc.net website can be used to determine lot area and built area for all lots within the ¼-mile radius. After a map is provided, the "Select" and "Lot Info" tools can be used to query information on surrounding lots near the school.

Consistent with USGBC Credit Interpretation Rulings, parkland, bodies of water and single-family homes may be excluded from density calculations, as well as physical education spaces like athletic fields and playgrounds.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing which documentation method(s) were used and what the results were.
- Submit Surrounding Density Credit Form.

Along with the form, provide:

- A site vicinity plan showing the project site and the surrounding sites and buildings. Draw the density boundary on the plan, note the drawing scale and assign sequential numbers to each lot within the boundary. Drawings, maps and aerial photos can all be used as a basis for plans as long as a scale is provided.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit updated documentation as necessary through to Design Development.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

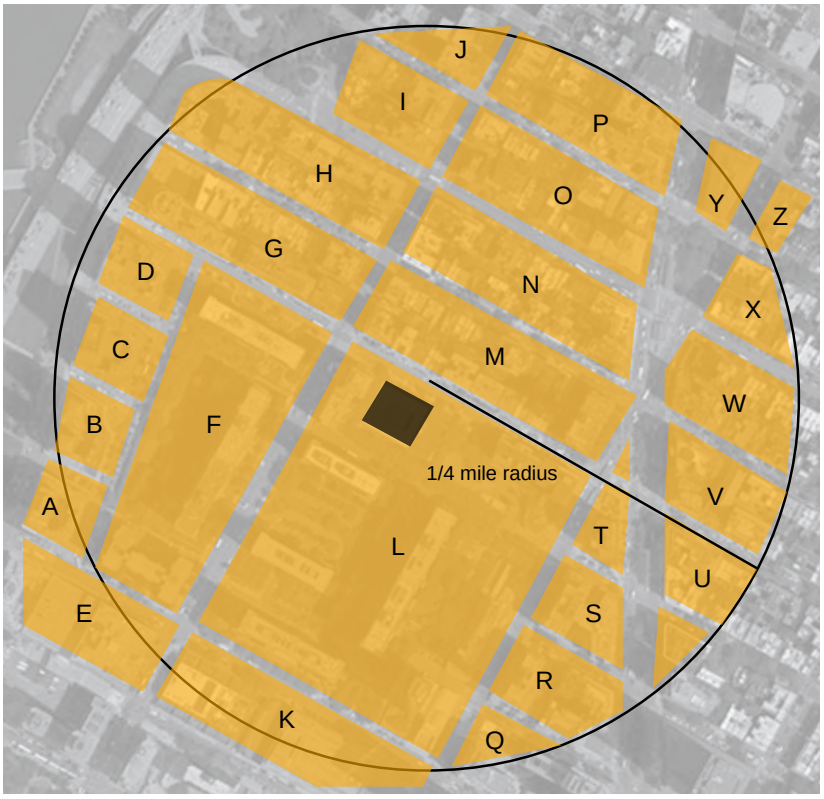


Figure 1. Block breakdown to calculate surrounding density.

References

LEED for Schools v4 LT Credit
Surrounding Density & Diverse Uses, Option 1

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

NYC OASIS Building Density Information
http://www.oasisnyc.net/map.aspx

NYC Zoning Information
https://www1.nyc.gov/site/planning/zoning/zoning-map-table.page

NYC census information
https://popfactfinder.planning.nyc.gov/#12.25/40.724/-73.9868

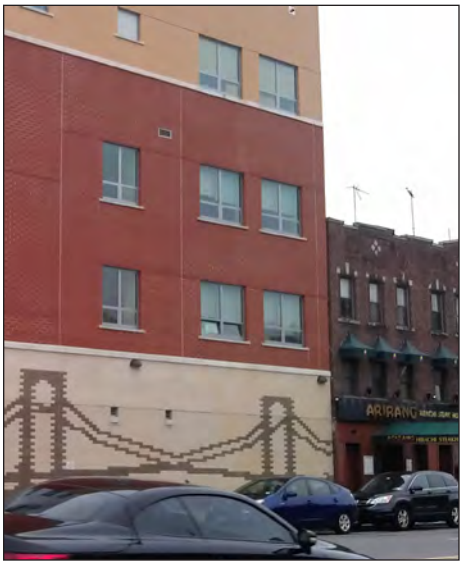
L

L1.4R – DIVERSE USES

Intent

To promote walkability, transportation efficiency and reduce vehicle distance traveled. To improve public health by encouraging daily physical activity.

This credit is required for all projects.



Requirements

Construct or renovate a building or a space within a building such that the building's main entrance is within a ½-mile walking distance of the main entrance of four to seven (1 point) or eight or more (2 points) existing and publicly available diverse uses. A sample map is shown in **Figure 1.**

Basic Services include, but are not limited to, those listed in **Table 1**.

Note that no services can be duplicated except restaurants, which can only be listed twice. Services must be from at least three of the five category use types.

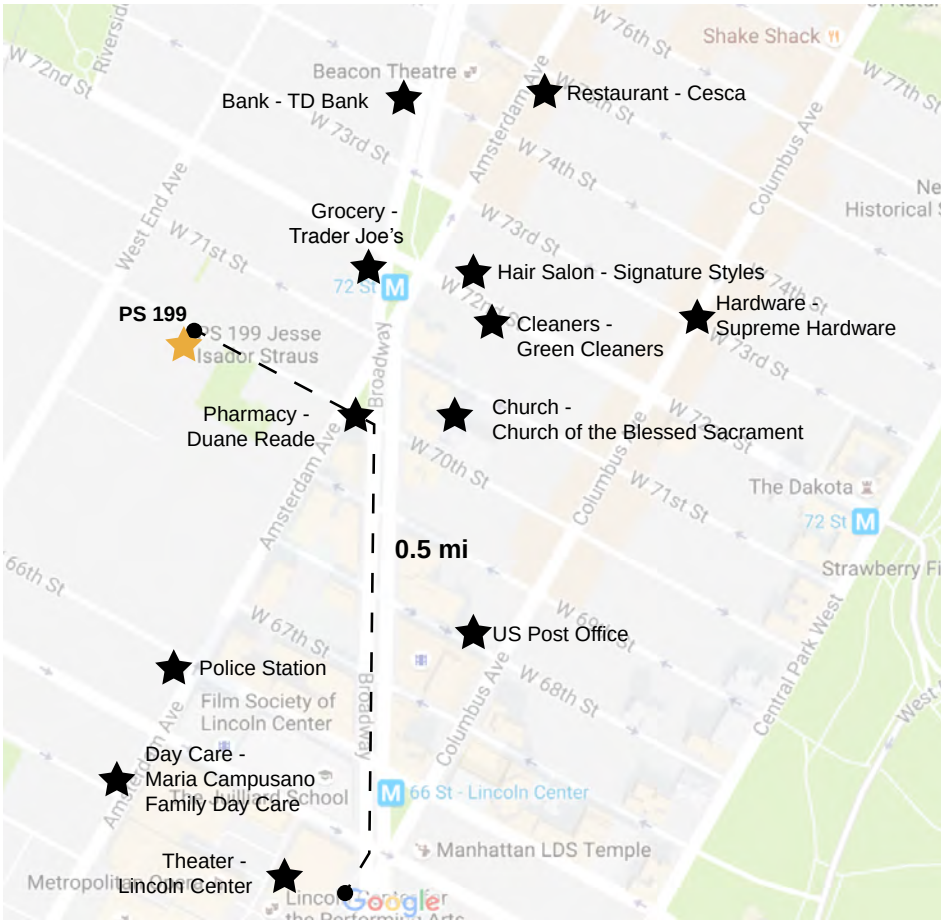


Figure 1. Sample map of diverse uses within a ½-mile walking distance of the project's main entrance.

Implementation

All projects should attempt to comply with the requirements.

The SCA Design Requirement for feasibility studies describes investigation of the requirements for this credit.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the documentation method(s) and results.
- Submit Diverse Uses Credit Form.

Along with the form, provide:

- A site vicinity plan showing the diverse uses within walking distance of the project. Draw the walking path to each diverse use. Drawings, maps and aerial photos can all be used as a basis for plans as long as a scale is provided.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit updated documentation as necessary through to Design Development.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 LT Credit
Surrounding Density & Diverse Uses, Option 2

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

For locating NYC community services
http://maps.nyc.gov/doitt/nycitymap/

Table 1. Use Types and Categories

Category	Food retail	Community-service retail	Services	Civic and community facilities	Community anchor
Use Type	・Supermarket ・Grocery with Produce	・Convenience Store ・Hardware store ・Pharmacy	・Bank ・Theater ・Fitness center ・Hair care ・Laundry ・Restaurant ・Entertainment venue (theater, sports)	・Senior care facility ・Day care ・Community center ・Place of worship ・Another school or university ・Medical/Dental ・Cultural arts facility (museum, performing arts) ・Fire station ・Library ・Post office ・Police Station ・Park	・Commercial office

L2.1R – ACCESS TO QUALITY TRANSIT

Intent

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

This credit is required for all projects.

Requirements

Option 1. Transit-served location (1–4 points)

Locate any functional entry of the project within a ¼-mile walking distance of existing or planned bus, streetcar, or rideshare stops, or within a ½-mile walking distance of existing or planned bus rapid transit stops, light or heavy rail stations, subways, commuter rail stations or ferry terminals. Sample documentation is shown in **Figure 1.**

See **Table 1** and **Table 2** for point thresholds based on transit types.

Projects served by two or more transit routes such that no one route provides more than 60% of the documented levels may earn one additional point, up to the maximum number of points.

If existing transit service is temporarily rerouted outside the required distance for less than two years, the project may meet the requirements, provided the local transit agency has committed to restoring the routes with service at or above prior level.

Qualifying transit routes must have paired route service (service in opposite directions). For each qualifying transit route, only trips in one direction are counted toward the threshold. If a qualifying transit route has multiple stops within the required walking distance, only trips from one stop are counted towards the threshold.

OR

Option 2. Pedestrian access (1–4 points)

Show that the project has an attendance boundary such that the specified percentages of students live within no more than a ¾-mile walking distance (for grades 8 and below, or ages 14 and below), and 1½-mile walking distance (for grades 9 and above or ages 15 and above) of a functional entry of a school building.

See **Table 3** for point thresholds based on percentage of students within walking distance.

In addition, locate the project on a site that allows pedestrian access to the site from all residential neighborhoods that house the planned student population.

Table 1. Minimum daily transit service for projects with multiple transit types (bus, streetcar, rail, subway, or ferry)

Weekday Trips	Points
72	1
144	2
360	4

Table 2. Minimum daily transit service for projects with commuter rail or ferry service only

Weekday Trips	Points
24	1
40	2
60	3

Implementation

Design Teams should review the project Feasibility Study for information relating to documenting this credit.

Option 1 will be the most likely path to be successful and should be pursued first, as it will be difficult to determine the percentages of student population and won't be applicable to High School aged students, as HS attendance is not area but program dependent. If Option 1 cannot be achieved, a discussion with the SCA's Capital Plan Management group will occur to discuss if the school being sited may meet the target attendance for PS and IS schools.

For Option 2, first delineate an applicable walkshed boundary using mapping software (GIS or CAD) to indicate the areas within a ¾-mile walk (for young students, as defined in the credit requirements). Then compare the walkshed boundary with the attendance boundary map for the school. The attendance boundary map or accompanying analysis generally indicates where concentrations of students live (or are anticipated to live), without indicating precise addresses. Using this information, estimate the required percentage of students who live within the particular walkshed boundary.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative indicating which option will be pursued.
- For Option 1, submit a scaled area plan and show all existing and proposed commuter rail, light rail or subway stations within a half mile walk of the site OR all existing bus stops within ¼ mile walk of the site. To indicate compliance, draw a line showing pedestrian path of travel from the site to each station/stop and indicate length of pedestrian path of travel in feet. Provide transit schedules showing the frequency of trips and service in each direction.
- For Option 2, submit maps of the walkshed boundary and the attendance boundary.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

Table 3. Points for student population within walking distance

Percentage of Students	Points
50%	1
60%	2
70% or more	4

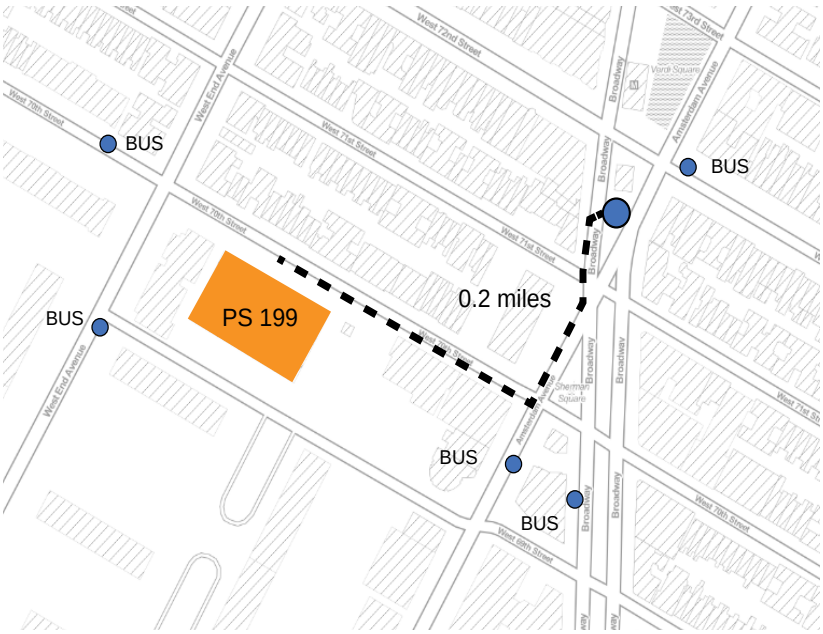


Figure 1. Sample map showing walking distance of public transportation.

References

LEED for Schools v4 LT Credit
Access to Quality Transit

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

Metropolitan Transportation Authority
www.mta.info

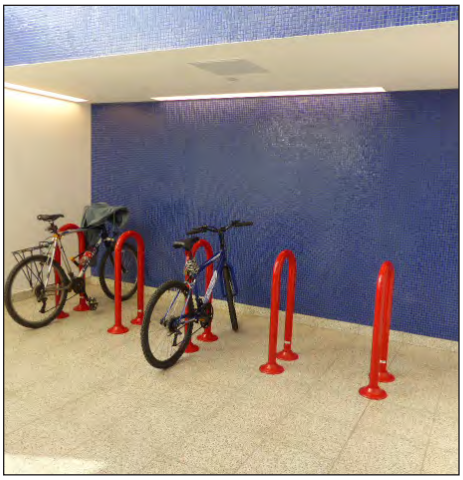
L

L2.2 – BICYCLE FACILITIES

Intent

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

This credit is required, if feasible, for all projects.



Requirements

Bicycle Network

Design or locate the project such that a functional entry and/or bicycle storage is within a 200-yard walking distance or bicycling distance of a bicycle network that connects to at least one of the following:

- At least 10 diverse uses which include, but are not limited to, those listed in **Table 1.**

OR

- A bus rapid transit stop, light or heavy rail station, commuter rail station, subway or ferry terminal.

All destinations must be within a 3-mile bicycling distance of the project boundary.

Provide dedicated bicycle lanes that extend at least to the end of the school property with no barriers (e.g., fences) on school property.

Planned bicycle trails or lanes may be counted if they are fully funded by the date of the certificate of occupancy and are scheduled for completion within one year of that date.

AND

Bicycle Storage and Showers

Provide covered and easily accessible bicycle storage for at least 5% of staff plus students above third grade within 100 feet walking distance of any main entrance. For buildings larger than 30,000 SF, zoning mandated interior bicycle parking spaces may be counted towards covered parking spaces.

Provide at least one on-site shower with changing facility for the first 100 regular building occupants (excluding all students) and one additional shower for every 150 regular building occupants (excluding all students) thereafter. **Equation 1** shows the shower facility calculation.

Equation 1. Shower Facilities Calculation
If regular occupants ≤ 100, Shower facilities = 1
If regular occupants > 100, Shower facilities = $1 + \frac{(\text{Regular building occupants} - 100)}{150}$

Implementation

To assess bicycle connection and accessibility, obtain or create a map of bicycle networks in the area surrounding potential project locations. A "bicycle network" is defined to include, in any combination, demarcated bike lanes, bike trails, and streets with a maximum speed limit of 25 mph. Both bike lanes and bike trails must meet the credit's width requirements. As all local streets within the City meet the 25 mph limit, they can be considered part of the network.

Design the building with transportation amenities such as bicycle racks and showering/changing facilities. NYC Zoning laws require a certain amount of interior bike storage, which can be utilized towards this credit. A minimum of 5 bicycle parking spaces outside the building are to be provided for general use and visitor parking and may or may not count towards the total depending on whether the parking is protected. Even if the credit is not feasible, the design team is to provide as many bike storage racks as is possible.

When bike lanes extend into school property, provide painting and symbols designating bike lane(s).

For new addition projects: If the area of addition is greater than 50% of the area of the existing building, the area of the existing building shall be included in the calculation for floor area.

Provide covered bicycle storage for new addition only, and exterior racks for existing building population.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

Submit a narrative describing how the requirement for diverse uses are met (refer to Credit L1.4R Diverse Uses), or how the bicycle network connects to transit.

Documents to be provided:

- Plan showing location of bicycle storage/racks.
- Site plan showing location of dedicated bicycle lanes that extend at least to the end of the school property with no barriers (e.g., fences) on school property.
- Map showing bicycle network and each diverse use within riding distance.
- Plan showing location of the shower, changing facility.
- For addition and annex projects, provide the gross area of the existing building and addition separately in the narrative.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

Submit Bicycle Facilities Credit Form and scaled plans to demonstrate compliance.

Floor Plan(s) and site plan to include:

- Distance of bicycle storage/racks from building entrance.
- Bike lane from building entrance and/or bicycle racks to the sidewalk.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate layout, details and specifications in construction documents.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 LT Credit
Bicycle Facilities

SCA DESIGN REQUIREMENTS

1.3.1.12 Bicycle Storage
2.3.3 Bicycle Racks

SCA STANDARD SPECIFICATIONS

02870 Site and Street Furnishings
05700 Ornamental Metal

SCA STANDARD DETAILS

1040009b Bicycle Parking Disclaimer Sign

OTHER REFERENCES

For locating NYC community services
http://maps.nyc.gov/doitt/nycitymap/

Table 1. Use Types and Categories

Category	Food retail	Community-service retail	Services	Civic and community facilities	Community anchor
Use Type	• Supermarket • Grocery with Produce	• Convenience Store • Hardware store • Pharmacy	• Bank • Theater • Fitness center • Hair care • Laundry • Restaurant • Entertainment venue (theater, sports)	• Senior care facility • Day care • Community center • Place of worship • Another school or university • Medical/Dental • Cultural arts facility (museum, performing arts) • Fire station • Library • Post office • Police Station • Park	• Commercial office

L2.3R – REDUCED PARKING FOOTPRINT

Intent

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

This credit is required for all projects.

Requirements

Option 1: Provide no new parking on site.

OR

Option 2: Do not exceed the minimum local code requirements for parking capacity.
Provide parking capacity that is a percentage reduction below the base ratios recommended by the Parking Consultants Council, as shown in the Institute of Transportation Engineers' Transportation Planning Handbook, 3rd edition, Tables 18-2 through 18-4 (see excerpt in **Table 1** below).

Table 1. Base ratios for parking spaces, by building type

Use	Parking Spaces
Elementary school	Higher of 0.2/auditorium or gym seat, or 0.25/student
High school	Higher of 0.3/auditorium or gym seat, or 0.3/student

Case 1. Baseline location
Projects that have not earned points under L1.3 Surrounding Density, L1.4R Diverse Uses, or L2.1 Access to Quality Transit must achieve a 20% reduction from the base ratios.

Case 2. Dense and/or transit-served location
Projects earning 1 or more points under either L1.3 Surrounding Density and L1.4R Diverse Uses or L2.1R Access to Quality Transit must achieve a 40% reduction from the base ratios.

Implementation

NYC schools typically provide no parking on site except when mandated by the SEQRA Report or when required by zoning. Students and teachers typically travel to school by public transportation or walk.

If parking spaces must be provided, perform the calculations with required reductions based on the points received under the other credits and compare to the zoning required number. A point can be earned if the calculated number of spaces is above the zoning required space and zoning required minimum is followed.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

Submit narrative indicating the applicable credit requirement option

- For Option 1, summarize why no parking is to be provided on site.
- If required to utilize Option 2, indicate how preferred parking is to be accommodated and how many points have been achieved under Credits L1.3 Surrounding Density, L1.4R Diverse Uses, or L2.1R Access to Quality Transit to determine percent reduction required.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

For Option 2, projects that will provide parking:

- Provide calculations to compare designed parking versus base ratios per Table 1.
- Show the location(s) of the preferred parking spaces for alternative transportation vehicles.
- Provide examples of preferred parking signage.
- Indicate the number of parking spaces required for the project per zoning.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

For Option 2, projects that will provide parking:

- Incorporate special requirements on the contract drawings.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 LT Credit
Reduced Parking Footprint

LEED for Schools v4 LT Credit
Access to Quality Transit

LEED for Schools v4 LT Credit
Green Vehicles

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

L2.4P – GREEN VEHICLES, CHARGING STATION INFRASTRUCTURE
L2.5A – GREEN VEHICLES, CHARGING STATION INSTALLATION

L

Intent

To reduce pollution by promoting alternatives to conventionally fueled automobiles.

The prerequisite raceway installation and electric panelboard sizing is required for all projects with parking spaces provided. The implementation of the charging station installation is optional and may only be pursued with SCA direction/permission.

Requirements

L2.4P- Charging Station Infrastructure (Required)

Where onsite parking is provided, provide raceway installation capable to supply a minimum of 11.5kVA to an Electric Vehicle Supply Equipment (EVSE) from an electrical panel to a minimum of 20% of all parking spaces for future installation of charging stations in accordance with LL130/13. In addition, provide panelboard sized to accommodate a minimum of 3.1kW of available capacity for each parking space connected to it with the raceway.

L2.5A- Charging Station Installation (1 point)

Where onsite parking is provided, designate a minimum of 5% of all parking spaces used by the project as preferred parking for green vehicles. Clearly identify and enforce for sole use by green vehicles.

Green vehicles must achieve a minimum green score of 45 on the American Council for an Energy Efficient Economy (ACEEE) annual vehicle rating guide.

In addition to preferred parking for green vehicles, install EVSE in a minimum of 2% of all parking spaces used by the project. Clearly identify and reserve these spaces for the sole use by plug-in electric vehicles. Parking spaces that include EVSE must be provided separate from and in addition to preferred parking spaces for green vehicles.

The EVSE must:

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

Implementation

NYC schools typically provide no parking except when mandated by the SEQRA Report or zoning. Students and teachers typically travel to school by public transportation or walk.

The intent of the prerequisite credit is to meet compliance with LL130/13, which requires that when parking is provided on a project, the infrastructure to provide charging units for the requisite number of electric vehicles must be provided. This includes installing a panelboard sized to provide a minimum of 3.1 KW of available capacity for each parking space connected to a raceway. LL130/13 also requires that if there is an increase in the size of electric service to an existing parking lot during an alteration, the same infrastructure as new must be installed.

If the approach to provide the entire charging station system is pursued with SCA direction/permission, the Design Team should assess the number of spots required to meet the five percent goal for which the one point can be achieved. The SCA will determine if the minimum 2% of spaces or the 20% of spaces is to be provided with charging stations.

Credit Submittals

Separate submissions are to be made for L2.4P and L2.5A respectively.

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit narrative indicating how preferred parking and electrical vehicle supply equipment will be accommodated.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

For projects that will provide parking, provide a site plan that includes the following:

- Number of parking spaces required for the project per local code or ordinance.
- Location(s) of parking spaces required to meet LL130/13 and proposed raceway route.
- Location(s) of the preferred parking spaces for alternative transportation vehicles to meet credit point.
- Location(s) of the electrical vehicle supply equipment.
- Examples of EV and Green Vehicle parking signage.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- If parking is provided, indicate special requirements on the contract drawings.
- If only raceway installation and panelboard requirements to meet LL130/13 are provided, these must be indicated on the contract drawings.
- If charging stations are authorized to be provided, provide a cut sheet indicating the type of electrical vehicle supply equipment.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 LT Credit
Green Vehicles

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

1040009c Green Vehicle Parking Detail

OTHER REFERENCES

Local Law 130/13

SITE

The Site (S) category includes credits that focus on studying the natural elements of the site, integrating the site with local and regional ecosystems, and preserving the biodiversity that natural systems rely on. The SCA site selection process includes the consideration of available properties that are within the geographical and jurisdictional area of need, and which meet the minimum size requirement for the targeted project. All Design Teams need to evaluate the advantages and disadvantages of the selected site and design schools to respond to the selected sites in a sustainable way.

Project teams that meet the prerequisites and credits in the S category protect sensitive ecosystems by completing an early site assessment and planning the locations of buildings and hardscape areas to avoid degrading urban habitats, existing open space, and the ecology of rivers and harbors. They use low-impact development methods that minimize construction pollution, reduce heat island effects and light pollution, and mimic natural water flow patterns to manage rainwater runoff. They also remediate areas on the project site that are already in decline.

Rainwater runoff generated by hardscape areas frequently overload the capacity of natural and man-made drainage systems, increasing both the quantity and pollution of site runoff. Rainwater runoff carries such pollutants as oil, sediment, chemicals, and lawn fertilizers directly to streams and rivers, where they contribute to eutrophication and harm aquatic ecosystems. The majority of New York City's sewer system is combined, conveying both sanitary and storm flows. During heavy rain and snow storms, combined sewers receive higher than normal flows that treatment plants are often unable to handle, sending a mix of excess stormwater and untreated wastewater directly into the city's waterways at certain outfalls to prevent upstream flooding. This combined sewer overflow (CSO) impacts water quality and recreational uses in local waterways.

S1.1P – ENVIRONMENTAL SITE ASSESSMENT

Intent

To protect the health of school populations by ensuring that the site is assessed for environmental contamination and that environmental contamination has been remediated and the site rendered suitable for use as a school.

This credit is required for all projects.

Requirements

Conduct a Phase I Environmental Site Assessment (ESA) to determine whether environmental contamination exists at the site (as described in ASTM E1527-05). If contamination exists or is suspected, conduct a Phase II ESA (as described in ASTM E1903-11).

If a school site is contaminated and requires regulatory oversight, remediate the site to meet local, state, or federal EPA region standards, whichever is most stringent. Documentation must be provided to prove that safe levels of contamination have been achieved. If site does not require regulatory oversight, the site must be rendered suitable for use as a school.

Implementation

Environmental site assessments are conducted through the SCA's Industrial & Environmental Hygiene (IEH) Division and are typically completed prior to the start of schematic design. Brownfield and site contamination status documentation may be obtained through the feasibility report or IEH.

Any contaminants not typically included in the scope of Phase I and Phase II ESAs should be considered if the site is at risk for such contamination. Non-scope "recognized environmental conditions" (RECs) (asbestos-containing materials, mold, lead-based paint etc.) must be identified in the Phase I and Phase II ESAs, as applicable. The SCA's IEH environmental consultant will provide a design to render the site suitable for use as a school and that design is to be included in the Contract Documents.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a brief narrative summary of the site assessment work done to date and the site's contamination/brownfield status. If the site is in an environmental regulatory program, indicate which entity has declared the site contaminated.
- Provide the executive summary of the Phase I ESA and, when required, the executive summary of the Phase II ESA.
- For projects where the IEH consultant has recommended remedial measures to render the site safe for use as a school, describe the measures that the report recommends will need to be included in the construction documents.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

If remediation is required:

- Update narrative of proposed remediation measures.
- Incorporate specifications and details by IEH's environmental consultant into the construction documents.

If the ESA determined that remediation is not required, no further documentation is necessary.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

If remediation is required:

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

If remediation is not required:

- Submit the complete and initialed Design Team Certification-Design Phase.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

If remediation requiring regulatory oversight is required:

- Provide documentation from authority having jurisdiction confirming that remediation has been completed to its satisfaction.

For all projects:

- Provide narrative briefly summarizing the actions taken to make the site suitable for school use and the results of these actions.
- Obtain documentation from the SCA's Construction Management unit that all remedial measures have been implemented and environmental engineering controls are functioning in accordance with the Contract Document, including the required PE certifications for the gas vapor barrier and SSDS (if required) installation. Obtain confirmation that environmentally clean soil has been installed over all exposed surfaces of the site as required in the Contract and any required IEH Remediation Group clearance letters or reports pertaining to non-scope items, including ACM, lead-based paint and mold.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

CONTRACTOR'S RESPONSIBILITY

If remedial measures or environmental engineering controls are required:

- Provide required PE certifications for environmental barrier and SSDS (if required) to Construction Management that the systems were installed and functioning properly in accordance with the Contract Documents.
- Provide photographs that exposed soils have been removed to the depths required by the Contract Documents and backfilled with environmentally clean fill.

References

LEED for Schools v4 SS Prerequisite Environmental Site Assessment

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASTM E1527-05
https://www.astm.org/DATABASE.CART/HISTORICAL/E1527-05.htm

ASTM E1903-11
https://www.astm.org/Standards/E1903.htm

40 CFR Part 312: Standard and Practice for All Appropriate Inquiries: Final Rule
https://www.epa.gov/brownfields/brownfields-all-appropriate-inquiries

NYS Brownfield Cleanup Program
https://www.dec.ny.gov/chemical/8450.html

S

S1.2R – ENHANCED SITE ASSESSMENT

Intent

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

This credit is required for all projects.

Requirements

Complete and document a site assessment that includes the following information:

- **Topography:** Contour mapping, unique topographic features, slope stability risks.
- **Hydrology:** Flood hazard areas, delineated wetlands, lakes, streams, shorelines, rainwater collection and reuse opportunities, TR-55 initial water storage capacity of the site.
- **Climate:** Solar exposure, heat island effect potential, seasonal sun angles, prevailing winds, monthly precipitation and temperature ranges.
- **Vegetation:** Primary vegetation types, greenfield area, significant tree mapping, threatened or endangered species, unique habitat, invasive plant species.
- **Soils:** Natural Resources Conservation Service soils delineation, healthy soils, previous development, disturbed soils.
- **Human use:** Views, adjacent transportation infrastructure, adjacent properties, construction materials with existing recycle or reuse potential.
- **Human health effects:** Proximity of vulnerable populations, adjacent physical activity opportunities, proximity to major sources of air pollution.

The site assessment should demonstrate the relationships between the site features and topics listed above and how these features influenced the project design. Give reasons for not addressing any of those topics. See **Table 1** for site assessment resources.

S

Implementation

Using a variety of data sources, site visits, and local experts, survey and inventory the existing site conditions and surroundings, according to the credit requirements, and compile the information for the site assessment.

The SCA Design Requirements 1.1.3.1 Feasibility Study and 1.1.3.2 Test Fit includes a scope of services that cover the investigation of some of the items listed in this credit to ensure that sustainable site issues are considered. Feasibility studies are often conducted by an entity separate from school Design Teams. In cases where a feasibility study or test fit has been completed, the Design Team may find useful information for documenting this credit in the feasibility study or test fit report.

Prepare a site plan that includes the required information gathered during the site inventory. Analyze the effect of the site features on the project design.

- Overlay the site information on a map to allow the features to be seen in relation to each other.
- Various types of information can be differentiated by color, line type, line weight, contrast, icons, and imagery to make the analysis clear and understandable.
- Highlight important relationships between site features and elements that may influence the project design.
- If regional context outside the items listed in the credit requirements is important for understanding the site and evaluating sustainable design options, it may be helpful to develop an assessment at multiple scales.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a brief narrative summary indicating which site features were evaluated, what was found, and how the findings influenced the project design. If certain features were not assessed, describe why they were excluded.
- Submit a completed Enhanced Site Assessment Credit Form.
- Submit supporting maps and information as necessary to demonstrate findings.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 SS Credit
Site Assessment

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

See Table 1

S

Table 1. Additional Resources for Enhanced Site Assessment

Human Use	Vegetation	Hydrology	
Existing site, local, and regional maps	Site survey and basic vegetation survey to gather plant information	Site Survey to determine hydrology	U.S. Geological Survey Maps, usgs.gov
Local land-use and zoning code maps Land uses, open space, habitat areas, density requirements, gis.nyc.gov/zola	U.S. EPA ecoregions identifying associated ecosystems and vegetation types, epa.gov	Local government geographic information system (GIS) containing site condition information, gis.nyc.gov	U.S. EPA Surf Your Watershed, epa.org
Local comprehensive planning documents for planned uses and future development, gis.nyc.gov/planning	Local land-use and zoning maps showing stream buffers, riparian zones, wetlands, and other vegetated habitat areas, gis.nyc.gov/zola	Federal Emergency Management Agency Database of U.S. flood maps, fema.gov	Natural Resources Conservation Service TR55 program; Urban Hydrology for Small Watersheds, nrcs.usda.gov
Aerial photographs for determining adjacent uses and infrastructure, maps.google.com	International Union for Conservation of Nature (IUCN) Redlist iucnredlist.org	Food and Agricultural Organization of the United Nations, Aquastat, global source of rainfall data, fao.org	
Sanborn Maps, historical and current maps of town and building information	U.S. Fish and Wildlife Service Endangered species list, fws.gov	UN Environmental Program (UNEP) Water quality information, unep.org	
	Local government geographic information system (GIS) containing site condition information, gis.nyc.gov	National Wetlands Inventory Inventory of wetland maps and data fws.gov	
	Aerial photographs for determining site vegetation, maps.google.com	Ramsar Convention on Wetlands; Inventory of protected wetlands, ramsar.org	
Climate	**Topography**	**Human Health Effects**	**Soil**
National Oceanic and Atmospheric Administration; climate data and future trends, noaa.gov	Site Survey to determine slopes	Aerial photographs for determining land uses and distances to pollution sources, maps.google.com	Soil Survey Soil map that classifies soil types and properties of project site
National Solar Radiation Database, Database of historical solar radiation rredc.nrel.gov	Local government geographic information system (GIS) containing site condition information, gis.nyc.gov	Local government geographic information system (GIS) containing site condition information, gis.nyc.gov	Natural Resources Conservation Service survey of U.S. soil types and classifications, usda.gov
DOE-2 software, energy modeling weather files, doe2.com	U.S. Geological Survey Maps, usgs.gov	U.S. EPA national-scale air toxics assessment (NATA), DOE-2 energy modeling weather files, epa.gov/nata	
U.S. Department of Energy, Energy Efficiency and Renewable Energy (EERE), energy.gov		Local land-use and zoning code maps, open space, habitat areas, density requirements, gis.nyc.gov/zola	

S2.1P – CONSTRUCTION ACTIVITY POLLUTION PREVENTION

Intent

Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.

This credit is required for all projects.

Requirements

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

- Prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
- Prevent sedimentation of stormwater or receiving streams.
- Prevent polluting the air with dust and particulate matter.

The EPA CGP outlines the provisions necessary to comply with Phase I and Phase II of the National Pollutant Discharge Elimination System (NPDES) program. While the EPA CGP only applies to construction sites greater than one acre, these requirements apply to all projects for the purposes of this credit.

For all projects, the Design Team must develop the Erosion and Sedimentation Control Plan. For projects that cause no site disturbance, develop a narrative to describe the specific situation and how the plan applies. All projects that discharge into a separate storm system or receiving stream require a full Stormwater Pollution Prevention Plan (SWPP). For projects less then one acre and that discharge into a combined sewer, the Erosion and Sedimentation Control Plan shall be shown schematically on the drawings and will be completed by the Contractor per the Project Specifications.

Implementation

The SCA specifications Section 02200 details these requirements and related submittals. The specification references the New York State Discharge Pollution Elimination System (NYS-DPES), which has been approved by the United States Environmental Protection Agency for the control of wastewater and stormwater discharges in accordance with the Clean Water Act, but is broader in scope than that act because it controls point source discharges to groundwater as well as surface waters.

An Erosion and Sedimentation Control Plan following CGP should address all of the following requirements applicable to the project.

Filtration for Dewatering Activities

The CGP requires filtration for projects with dewatering activities. For teams to achieve this prerequisite, if the team determines that filtration is not required, the team shall include in their plan how dewatering activities will be managed.

Erosion and Sedimentation Control

- Providing natural buffers
- Installing perimeter controls
- Minimizing sediment track-out
- Controlling discharges from stockpiled sediment or soil
- Minimizing dust
- Minimizing the disturbance of steep slopes
- Preserving topsoil
- Minimizing soil compaction
- Protecting storm drain inlets
- Maintaining control measures

Stabilization

- Deadlines for initiating and completing stabilization
- Criteria for stabilization

Pollution Prevention

- Prohibited discharges
- General maintenance requirements
- Pollution prevention standards
- Emergency spill notification
- Fertilizer discharge restrictions

Appropriate strategies may include temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, sediment basins, temporary gravel at construction site entrance, temporary block inlet protection, surface roughening, and surface stabilization, tree preservation and protection, land grading and dust control. Some of these strategies are shown in **Figure 1.**

For interior projects without excavation, the plan should include a requirement for the Contractor to implement and document a dust control plan.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative describing site size, conditions and limitations, and summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents. Indicate who on the Design Team will develop the Erosion and Sedimentation Control Plan.
- Include the Notification of Intent for SWPP application, if required.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit appropriate specification sections modified for the project.
- Submit the Erosion and Sedimentation Control Plan design document, along with SWPP if required.
- Submit Construction Activity Pollution Prevention Credit Form

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

Per the Project Specifications:

- Implement and/or develop the Erosion and Sedimentation Control Plan or Dust Control Plan if interior project only.
- Submit at least six digital, dated photos and inspection logs of measures taken during the course of construction.
- Submit the complete and initialed Construction Activity Pollution Prevention Inspection Log.
- Submit the complete and initialed Contractor Certification Form.

A/EoR's RESPONSIBILITY

- Review Contractor's submittal for compliance.

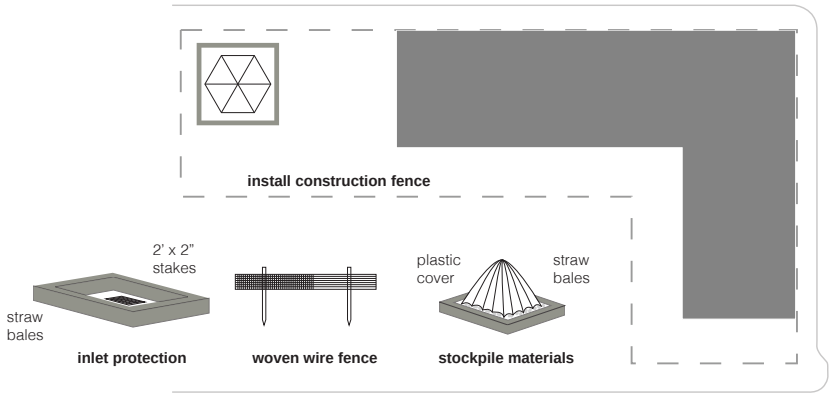


Figure 1. Erosion and Sedimentation Control Strategies.

References

LEED for Schools v4 SS Prerequisite
Construction Activity Pollution Prevention

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01900 Existing Premises Work
02200 Earthwork

SCA STANDARD DETAILS

None

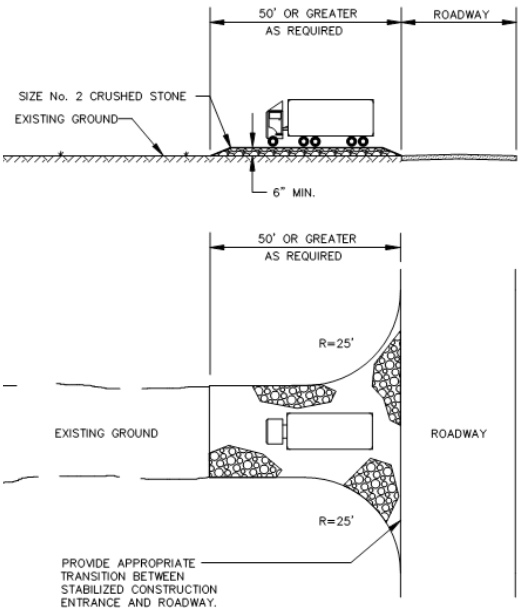
OTHER REFERENCES

NYS DEC Standards and Specifications for Erosion and Sediment Control
Construction Stormwater Toolbox
https://www.dec.ny.gov/chemical/8694.html

NYS DEC SPDES General Permit For Construction Activity
www.dec.ny.gov/docs/water_pdf/gp015002.pdf
www.dec.ny.gov/chemical/43133.html

NYS DEC Sample Erosion and Sediment Control Plan
www.dec.ny.gov/docs/water_pdf/appendixf1.pdf

NPDES EPA Construction General Permit
www.epa.gov/npdes/epas-2017-construction-general-permit-cgp-and-related-documents



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S2.2 – OPEN SPACE

Intent

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

This credit is required, if feasible, for all projects.

Requirements

Provide outdoor space greater than or equal to 30% of the total site area (including building footprint). A minimum of 25% of that outdoor space must be vegetated (turf grass does not count as vegetation). An example is shown in **Figure 1.**

The outdoor space must be physically accessible and be one or more of the following:

- A pedestrian-oriented paving or vegetated turf area with physical site elements that accommodate outdoor social activities;
- A recreation-oriented paving or vegetated turf area with physical site elements that encourage physical activity;
- A garden space with a diversity of vegetation types and species that provide opportunities for year-round visual interest;
- A garden space dedicated to community gardens or urban food production.

For projects that achieve a density of 1.5 floor-area ratio (FAR), and are physically accessible, extensive or intensive vegetated roofs can be used toward the minimum 25% vegetation requirement, and qualifying roof-based physically accessible paving areas can be used toward credit compliance. An example is shown in **Figure 2.** Approval by SCA is required.

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

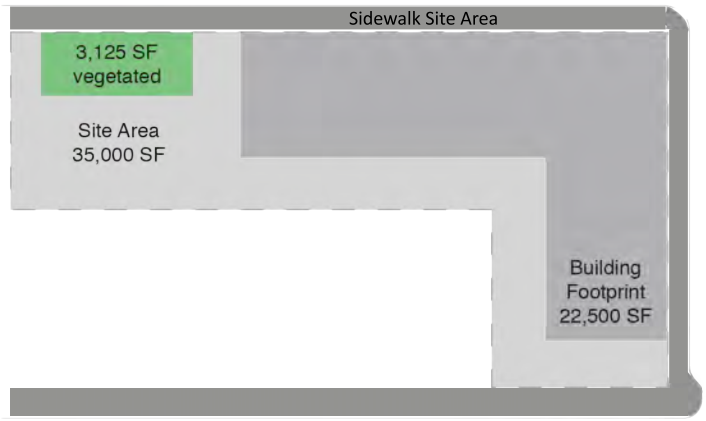


Figure 1. Outdoor space greater than or equal to 30% of the site area, with a minimum area of 25% vegetated.

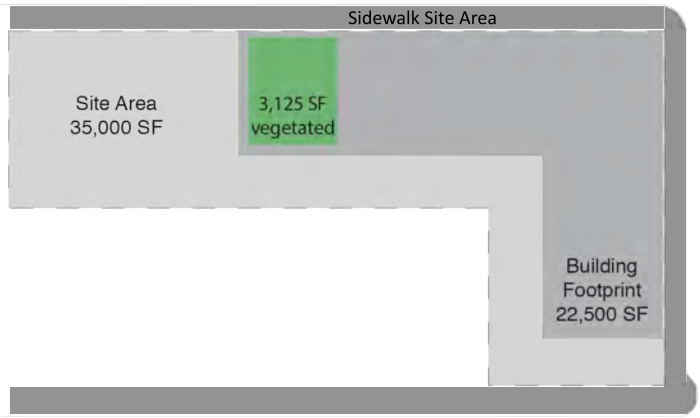


Figure 2. Projects with a minimum density of 1.5 FAR can utilize accessible roof space to reach the minimum of 25% vegetated space.

Implementation

Design Requirements relating to building siting incorporate the requirements of this credit. Given the high priority of providing opportunities for student recreation and the generally limited size of available urban sites, the number of projects able to achieve this credit will be limited. It is important to note that in the relatively low but dense urban areas where NYC schools are often built, consolidating building mass can have a negative impact on light, air and the scale of an adjacent residential neighborhood. These factors should be considered in determining whether this credit should be pursued.

Open spaces must be usable; a small strip of turf in a parking lot does not meet the intent of the credit. Artificial turf does not count as vegetation or hardscape. If project includes work outside the lot lines, the GSG site boundary shall include those areas (e.g. sidewalks limited to the curb line).

Credit Submittals

SCHEMATIC DESIGN

A/EoR's RESPONSIBILITY

- Submit a narrative describing the amount and type of open space provided, and how the open space is physically accessible.
- For projects where the credit is feasible, provide area calculations demonstrating the design approach for credit compliance and identify the applicable SCA standards to be incorporated into design documents.
- Submit a plan that indicates project boundary, highlighting the preliminary location of open space.
- For projects where credit is not feasible, include area calculations demonstrating that the credit cannot be met.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit the project site area and building footprint area (in square feet), including FAR calculations.
- Submit a plan that indicates project boundary, highlighting the location, size (square foot area), and type of any open spaces. Include a sum total for all open space, vegetated open space, and accessible vegetated roof area.
- Submit a list of plant species.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 SS Credit
Open Space

SCA DESIGN REQUIREMENTS

1.1.3.1 Feasibility Study
1.1.3.2 Test Fit/Sketch Studies
1.3.1.1 Building Location and Orientation

SCA STANDARD SPECIFICATIONS

02900 Landscaping

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

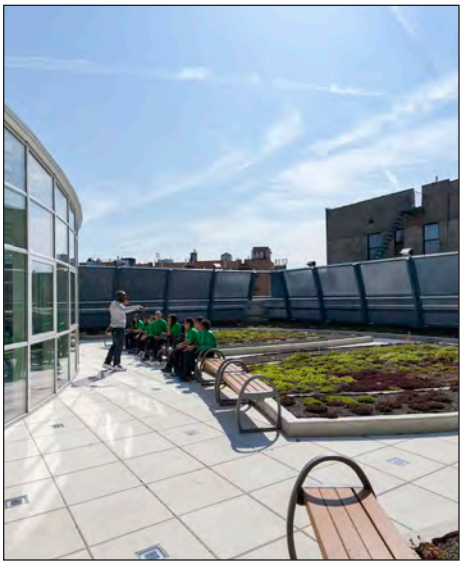
S

S2.3P – GREEN INFRASTRUCTURE ASSESSMENT
S2.4 – RAINWATER MANAGEMENT

Intent

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

The prerequisite feasibility study is required for all projects. The implementation part of the credit is required, if feasible, for all projects.



S

Requirements

S2.3P- Green Infrastructure Assessment (Required)

Perform a study determining the feasibility of incorporating green infrastructure into the project's design meeting the requirements of LL97/17.

S2.4- Rainwater Management (2-3 points)

Perform calculations following the methodology required by DEP to determine on-site detention requirements and propose a design, in conjunction with the results of the feasibility study, for incorporating green infrastructure. Based on results and DEP approval of the design, perform calculations per options below to determine available points.

Option 1. 95th percentile (2 points)

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

OR

Option 2. 98th percentile (3 points)

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

OR

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

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

OR

Project located within a campus or master plan that have previously demonstrated compliance with these credit requirements can earn this credit.

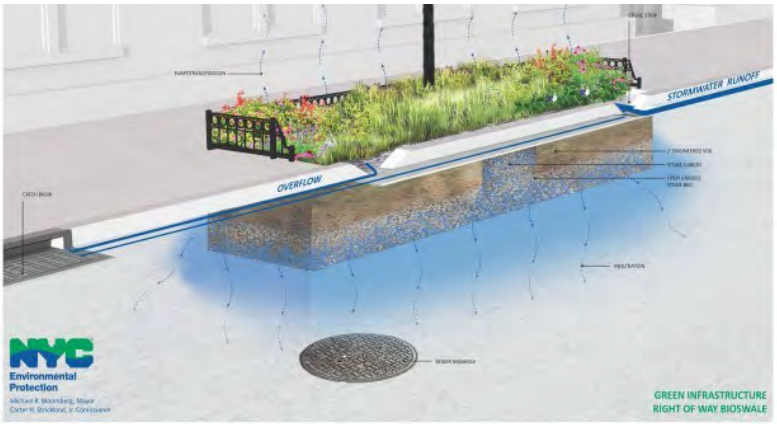
Implementation

These credits address both the quantity and quality of rainwater runoff. The approaches and techniques can include minimizing disturbed areas on the project site, limiting the amount of impervious cover on a site, and then infiltrating, filtering, storing and reusing, evaporating, or retaining rainwater runoff at or close to its source.

Perform a Feasibility Study as required by LL97/17 outlining justifications for including green infrastructure into the overall storm water design with the aim of reducing runoff volume. During the preschematic or schematic stages of the project, perform a soil investigation to determine the soil characteristics and its suitability for green infrastructure to inform the report. This geotechnical data is to indicate the groundwater levels and the permeability of the soil. Determine approximate cost of utilizing green infrastructure over the detention system required by DEP. Due to maintenance concerns regarding water reuse, options will typically entail site retention and percolation only.

As the primary design objective in developing the rain water management system is to demonstrate compliance with New York City Department of Environmental Protection (DEP) rules and regulations for connecting to NYC sewers, the design team shall file a sewer application and submit plans to DEP that conform with, among other things, DEP's prescribed methodology for sizing and determining required on-site storage volume and the allowable storm water flow from the site. If as part of the overall rainwater management system green infrastructure can economically be implemented utilizing the results of the feasibility report, the design team must obtain approval from DEP for the methodology used to calculate run-off volume retained onsite. The design team shall receive approval from the DEP for reducing the required on-site volume to be discharged to the sewers by an amount equivalent to the volume of rainwater retained onsite through the use of green infrastructure design.

For Credit S2.4, the project team must select a runoff volume calculation methodology based on acceptable engineering practices



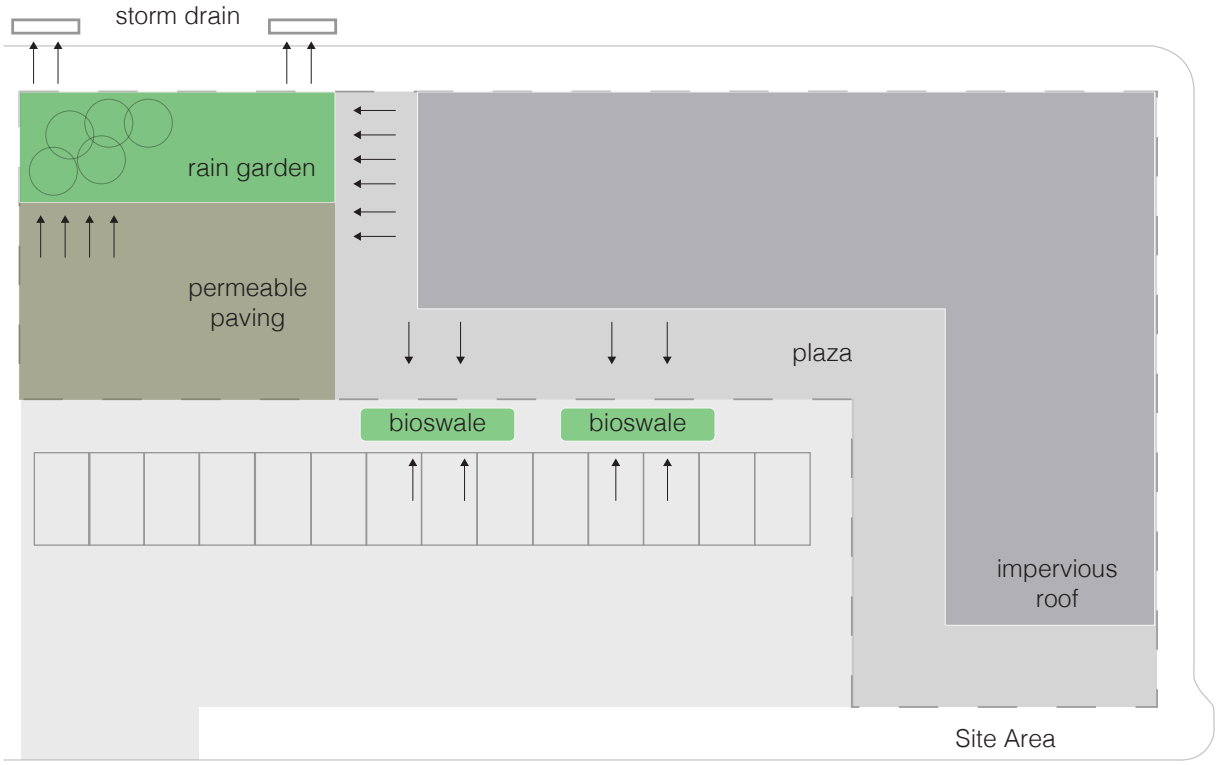


Figure 1. Use green infrastructure and low impact development to manage rainwater.

that the DEP will approve. The designer is to perform calculations utilizing Options 1 and 2 of Green Infrastructure Installation, and for zero lot line projects Option 3, to determine if points can be obtained for reducing the rainwater to be discharged from the site. Many rainwater software programs include calculation methodologies. Examples include the modified rational method; the Natural Resources Conservation Service method (sometimes called SCS method), as described in Technical Release 55 (TR-55); and the U.S. EPA Rainwater Management Model (SWMM).

A percentile rainfall event represents a precipitation amount that the chosen percent of all rainfall events for the period of record do not exceed. For example, the 95th percentile of rainfall events is the measured precipitation depth accumulated over 24 hours that ranks as the 95th-percent rainfall depth based on the range of all daily event occurrences during the period of record. Initial studies indicate that the amount of water to be infiltrated on site to meet the required 95 percentile will be more than the quantity that the DEP Green Infrastructure methodology will permit. The designer is to study what additional measures will be needed to meet the credit intent based on soli characteristics and approximate cost to implement above that required for DEP regulated Green Infrastructure. Please refer to the NYC Green Infrastructure On-Site Design Manual under the references section.

In addition to mimicking natural hydrologic cycle processes, green infrastructure and low-impact development help integrate the site with the surrounding watershed, are appropriate to the local ecosystem and climate, and deliver such other benefits as water reuse, habitat creation, and species diversity. Some examples are shown in Figure 1.

Use the closest TMY3 weather file to ensure that you are using at least 10 years of rainfall data. The National Renewable Energy Laboratory maintains an online database of TMY weather files.

S2.3P, S2.4 – GREEN INFRASTRUCTURE ASSESSMENT AND RAINWATER MANAGEMENT (CONT.)

Credit Submittals

Separate submissions are to be made for S2.3P and S2.4 respectively.

SCHEMATIC DESIGN

A/EoR's RESPONSIBILITY

- Submit a narrative describing the potential to manage rainwater on site. Refer to Green Infrastructure Assessment Flowchart.
- For projects where the credit is feasible, provide rainfall calculations and preliminary runoff volume calculations, and indicate the design approach for credit compliance.
- Submit Rainwater Management Credit Form.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit Green Infrastructure Assessment Report
- Submit plans depicting site conditions and GI or LID strategies, highlighting topography, soil qualities, direction of water flow, and area of site that each facility addresses.
- Submit a narrative confirming measures qualify as GI or LID.
- Submit calculations for volume of rainwater managed by GI or LID strategies.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit updated plans, details, or cross sections depicting site conditions and GI or LID strategies, highlighting topography, direction of water flow, and area of site that each facility addresses.
- Submit updated calculations for volume of rainwater managed by GI or LID strategies.
- Submit updated Green Infrastructure Assessment Report (if applicable).

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- Submit updated Green Infrastructure Assessment Report (if applicable)

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 SS Credit
Rainwater Management

SCA DESIGN REQUIREMENTS

2.5.1 Trees, Shrubs, Ground Cover and Lawns
6.1.11 Stormwater Management

SCA STANDARD SPECIFICATIONS

02723 Storm Drainage Systems
02900 Landscaping

SCA STANDARD DETAILS

None

OTHER REFERENCES

NOAA Datasets for Precipitation Data
www.ncdc.noaa.gov/cdo-web/datasets

NREL Data Base of TMY3 weather files for a Typical Meterological Year by State and City
https://.rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/by_state_and_city.html

U.S. EPA Technical Guidance on Implementing the Rainwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act
www.epa.gov/sites/production/files/2015-09/documents/eisa-438.pdf

U.S. EPA Green Infrastructure
https://www.epa.gov/green-infrastructure

Local Law 97/2017

Green Infrastructure Assessment Report
http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

Green Infrastructure Assessment Flowchart

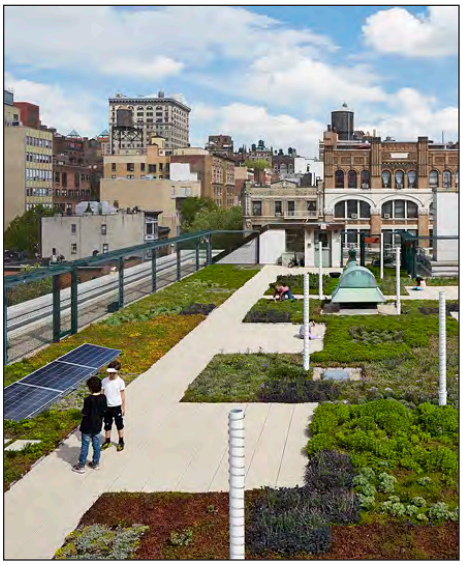
NYC Green Infrastructure On-Site Design Manual
https://www1.nyc.gov/assets/dep/downloads/pdf/water/stormwater/green-infrastructure/nyc-green-infrastructure-onsite-design-manual-v1.pdf

S2.5 – HEAT ISLAND REDUCTION

Intent

To minimize effects on micro-climates and human and wildlife habitats by reducing heat islands.

This credit is required, if feasible, for all projects.



Requirements

Meet the criterion in the equation below for nonroof and roof surfaces.

Weighted nonroof or roof calculation

$$\frac{\left(\text{Area of high reflectance nonroof A} \times \frac{\text{SR of high reflectance nonroof A}}{\text{Required SR}}\right)^{1}}{0.5} + \frac{\text{Area of other nonroof measures}}{0.5} + \frac{\left(\text{Area of high reflectance roof A} \times \frac{\text{SRI of high reflectance roof A}}{\text{Required SR}}\right)^{2}}{0.75} + \frac{\text{Area of vegetated roof}}{0.75} \geq \text{Total Site Paving Area} + \text{Total Roof Area}$$

1. Summed for all high-reflectance nonroof areas.
2. Summed for all high-reflectance roof areas.

Use any combination of the following strategies.

Nonroof Measures

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

High-Reflectance Roof

Use roofing materials that have an SRI equal to or greater than values in **Table 1.** Meet the three-year aged SRI value. If three-year aged value information is not available, use materials that meet the initial SRI value.

Table 1. Minimum solar reflectance index value, by roof slope

	Slope	Initial SRI	3-year aged SRI
Low-sloped roof	≤ 2:12	82	64
Steep-sloped roof	> 2:12	39	32

Vegetated Roof

Install a vegetated roof.

Implementation

Specify light-colored concrete paving in place of asphalt where feasible, or for playgrounds install SRI compliant athletic wearing surface over asphalt.

Retain existing shade trees and plant new trees to shade paved site areas.

Use roof paver system with an SRI > 82 and/or compliant coated metal roofing products.

With SCA approval, use vegetated-green roof over 50% of the roof area or an area of roof such that the green roof system and SRI compliant area covers 75% of roof area. An extensive green roof system should consist of 'adapted' plants, which grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. Provide hose bibb(s) for temporary watering of planted roofs. SCA specifications and details describe green roof for both stormwater detention and non-detention roof applications. Several of these strategies can be seen in **Figure 1.**

For sites in areas that do not have a combined sewer, a modified green roof assembly with interstitial egg crate drainage system can comply with NYC DEP stormwater detention regulations (design stormwater detention systems for 10-year/24-hour storm events with a maximum allowable water level on the roof of three inches). This approach represents a significant added cost and is not an SCA standard. Exclusive use of roof vegetation to meet 100% DEP stormwater detention requirements has not been approved at this time by DEP.

If this credit is achieved with a green roof, projects may also look to pursue credits:
S2.2 Open Space
S2.4 Rainwater Management

For concrete pavement, refer to Portland Cement Association Study in the References section.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identify applicable SCA standards to be incorporated into the design.
- Submit Heat Island Reduction Credit Form.
- Submit site plan with elements and measurements, including project boundary, building footprint, roof and hardscape area, and area of each roof and nonroof heat island mitigation measure.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Submit updated Heat Island Reduction Credit Form.
- Submit updated site plan with elements and measurements, including project boundary, building footprint, roof and hardscape area, and area of each roof and nonroof heat island mitigation measure.
- Submit manufacturer's documentation for specified materials, indicating SRI, SR, and paving permeability.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- Review Contractor's submittals for compliance with credit requirements.

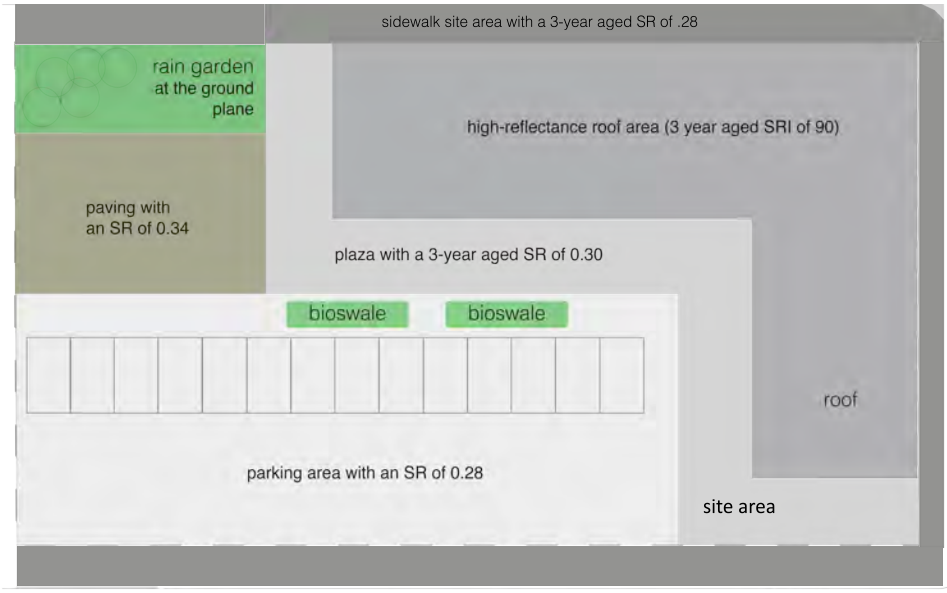


Figure 1. Strategies for heat island reduction.

References

LEED for Schools v4 Credit
Heat Island Reduction

SCA DESIGN REQUIREMENTS

6.1.11 Stormwater Management

SCA STANDARD SPECIFICATIONS

02511 Asphaltic Concrete Paving
02513 Sidewalk and Street Paving
02515 Unit Pavers
02533 Colored Athletic Wearing Surface
03300 Cast-in-Place Concrete
07560 Fluid Applied Protected Membrane Roofing
07561 Fluid-applied Protected Membrane Roofing (Planted Type I)
07565 Cold Fluid-Applied Resin Roofing
07610 Sheet Metal Roofing

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASTM E903 and G173
https://www.astm.org/Standards/E903
https://www.astm.org/Standards/G173

Cool Roof Rating Council Standard (CRRC-1)
www.coolroofs.org

Portland Cement Association Research and Development Information - PCA R&D SN2982a
https://www.cement.org/docs/default-source/fc_concrete_technology/sn2982a-solar-reflectance-values-of-concrete.pdf

S

S2.6 – LIGHT POLLUTION REDUCTION

Intent

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

This credit is required, if feasible, for all projects.

S

Requirements

Meet uplight and light trespass requirements, using either the backlight-uplight-glare (BUG) method (Option 1) or the calculation method (Option 2). Projects may use different options for uplight and light trespass.

Meet these requirements for all exterior luminaires located inside the project boundary (except those listed under "Exemptions"), based on the following:

- The photometric characteristics of each luminaire when mounted in the same orientation and tilt as specified in the project design; and
- The lighting zone of the project property (at the time design begins). Classify the project under one lighting zone using the lighting zones definitions provided in the Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model Lighting Ordinance (MLO) User Guide. RCNY 5000-01 specifies the lighting zone to corresponding zoning districts.

Additionally, meet the internally illuminated signage requirement.

UPLIGHT

Option 1. BUG Rating Method

Do not exceed the following luminaire uplight ratings, based in the specific light source installed in the luminaire, as defined in IES TM-5-11, Addendum A. See **Table 1** for maximum uplight ratings. See **Figure 1** to observe backlight, uplight, and glare from a sample light fixture.

Table 1. Maximum uplight ratings for luminaires

MLO lighting zone	Luminaire uplight rating
LZ0	u0
LZ1	u1
LZ2	u2
LZ3	u3
LZ4	u4

OR

Option 2. Calculation Method

Do not exceed the percentages of total lumens emitted above horizontal, shown in **Table 2**.

Table 2. Maximum percentage of total lumens emitted above horizontal

MLO lighting zone	Maximum allowed percentage of total luminaire lumens emitted above horizontal
LZ0	0%
LZ1	0%
LZ2	1.50%
LZ3	3%
LZ4	6%

AND

Continued on next page

Implementation

Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible and model the site lighting using a computer model. New York City Energy Conservation Code RCNY5000-01 determines applicable exterior lighting zones and requires lighting power density in accordance with ASHRAE 90.1-2010.

Technologies to reduce light pollution include full cutoff luminaries, low-reflectance surfaces and low-angle spotlights. Most SCA specified fixtures are wall mounted, so the backlight requirement does not apply to these fixtures.

Sports field lighting shall be included in this credit and meet all requirements. SCA Standards require that all non-emergency interior lighting be automatically turned off when the school is not in operation with

Requirements (cont.)

LIGHT TRESPASS

Option 1. BUG Rating Method

Do not exceed the following luminaire backlight and glare ratings (based on specific light source installed in the luminaire), as defined in IES TM-15-11, Addendum A, based on the mounting location and distance from the lighting boundary. Maximum ratings are shown in **Table 3**.

Table 3. Maximum backlight and glare ratings

	MLO lighting zone				
Luminaire mounting	LZ0	LZ1	LZ2	LZ3	LZ4
	Allowed backlight ratings				
> 2 mounting heights from lighting boundary	B1	B3	B4	B5	B5
1 to 2 mounting heights from lighting boundary and properly oriented	B1	B2	B3	B4	B4
0.5 to 1 mounting height to lighting boundary and properly oriented	B0	B1	B2	B3	B3
< 0.5 mounting height to lighting boundary and properly oriented	B0	B0	B0	B1	B2
	Allowed glare ratings				
Building-mounted > 2 mounting heights from any lighting boundary	G0	G1	G2	G3	G4
Building-mounted 1–2 mounting heights from any lighting boundary	G0	G0	G1	G1	G2
Building-mounted 0.5 to 1 mounting heights from any lighting boundary	G0	G0	G0	G1	G1
Building-mounted < 0.5 mounting heights from any lighting boundary	G0	G0	G0	G0	G1
All other luminaires	G0	G1	G2	G3	G4

The lighting boundary is located at the property lines of the property that the project occupies. The lighting boundary can be modified under the following conditions:

- When the property line abuts a public area that includes but is not limited to a walkway, bikeway, plaza, or parking lot, the lighting boundary may be moved to 5 feet beyond the property line.
- When the property line abuts a public street, alley, or transit corridor, the lighting boundary may be moved to the centerline of the street, alley or corridor.
- When there are additional properties owned by the New York City Department of Education that are contiguous to the project property that have the same or higher MLO lighting zone designation as the project property, the lighting boundary may be expanded to include those properties.

Orient all luminaires less than two mounting heights from the lighting boundary such that the backlight points toward the nearest lighting boundary line. Building-mounted luminaries with backlight oriented toward the building are exempt from the backlight rating requirement.

OR

Continued on next page

manual override capability for after-hours use.

Currently, the BUG rating method is not commonly available and Option 2 should be used until compliant fixtures are more readily available on the market.

For Option 2, the submittal for light trespass shall set a vertical calculation grid at each segment of the project's lighting boundary and the extent of the lighting zone allowances. Illuminance calculation points must be no more than five (5) feet apart and extend from grade level up to at least 33 feet above the tallest luminaire in the project. Highlight the greatest illuminance value for each vertical calculation plan at the lighting boundary. Submit the calculation grid for the highest vertical illuminance value (worst case scenario) with the point of greatest illuminance highlighted.

S2.6 – LIGHT POLLUTION REDUCTION (CONT.)

Requirements (cont.)

Option 2. Calculation Method

Do not exceed the vertical illuminance at the lighting boundary (use definition of lighting boundary in Option 1), as shown in **Table 4**. Calculation points may be no more than 5 feet apart. Vertical illuminances must be calculated on vertical planes running parallel to the lighting boundary, with the normal to each plane oriented toward the property and perpendicular to the lighting boundary, extending from grade level to 33 feet above the height of the highest luminaire.

Table 4. Maximum vertical illuminance at lighting boundary, by lighting zone

MLO lighting zone	Vertical illuminance
LZ0	0.05 fc (0.5 lux)
LZ1	0.05 fc (0.5 lux)
LZ2	0.10 fc (1 lux)
LZ3	0.20 fc (2 lux)
LZ4	0.60 fc (6 lux)

Exemptions from Uplight and Light Trespass Requirements

- Lighting that is used solely for faced and landscape lighting In MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 am
- Government-mandated roadway lighting
- Lighting for the national flag in MLO lighting zones 2, 3 or 4
- Internally illuminated signage

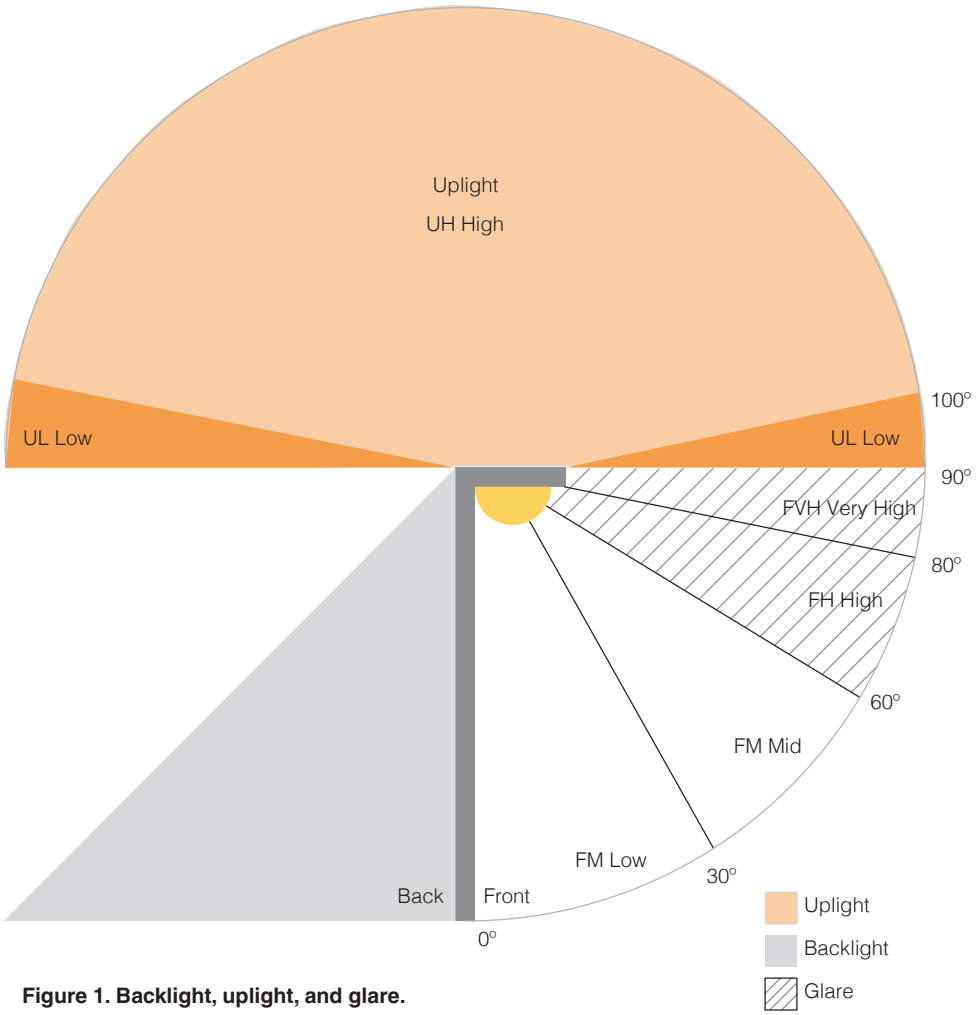


Figure 1. Backlight, uplight, and glare.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach to achieve credit compliance, list related applicable SCA standards, and confirm the project's lighting zone classification.
- Complete light trespass analysis.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit a narrative description of the results of light trespass analysis stating:
  - Which compliance option was applied to meet the uplight and light trespass requirements.
  - A summary of strategies used to achieve requirements including any specific challenges or areas that are not compliant.
- Provide plans of the exterior lighting photometrics corresponding to the narrative. Site lighting plans must clearly illustrate:
  - Property and GSG project boundaries
  - Five-foot boundaries beyond public walkways, bikeways, plazas, or parking lots
  - Centerline of streets, alleys, or corridors,
  - Location of fixtures and fixture types
  - Label site elements that require lighting including primary entryways, and emergency exits.

  For Uplight:
  - Option 1: Submit Light Pollution Reduction Credit Form and provide the luminaire schedule and documentation for all fixtures that meet the BUG Rating method requirements.
  - Option 2: Submit Light Pollution Reduction Credit Form.

  For Light Trespass:
  - Option 1: Submit Light Pollution Reduction Credit Form and provide the luminaire schedule and documentation for all fixtures that meet the BUG Rating method requirements.
  - Option 2: Submit Light Pollution Reduction Credit Form and photometric site plan showing all installed exterior lighting luminaires.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 SS Credit
Light Pollution Reduction

SCA DESIGN REQUIREMENTS

7.2.3 Emergency Lighting
7.2.5 Exterior/Site/Security Lighting
7.2.6 Athletic Fields/Sports Lighting

SCA STANDARD SPECIFICATIONS

16145 Lighting Control Devices
16520 Illuminated Exit Sign and Emergency Lighting Fixtures
16530 LED Site/Security Lighting

SCA STANDARD DETAILS

None

OTHER REFERENCES

Illuminating Engineering Society and International Dark Sky Association (IES/IDA) Model lighting Ordinance User Guide and IES TM-15-11, Addendum A
https://www.ies.org/product/model-lighting-ordinance-mlo-with-users-guide/

RCNY 5000-01 New York City Energy Conservation Code
http://www.nyc.gov/html/dob/downloads/rules/1_RCNY_5000-01.pdf

Visual Photometric Tool – software that will calculate the BUG rating using the IES file for the luminaire
https://www.usgbc.org/resources/visual-photometric-tool

S

S3.1R – JOINT USE OF FACILITIES

Intent

The most successful schools have a high level of parent and community involvement. This involvement can be enhanced if a school is designed so that neighborhood meetings, recreation activities, and other community functions can take place at the school in a safe and secure fashion.

This credit is required for all projects.

Requirements

Design appropriate entrances for community use of school facilities such as auditorium, gym, cafeteria, library, and select classrooms for meeting rooms.

New York City Schools are used actively by the community. Public activities in New York City public schools include: after-school programs, voting, community meetings and provision of emergency services through a long-standing agreement with the Red Cross.

Recreational areas and playgrounds are sometimes run as Jointly Operated Playgrounds with the NYC Department of Parks and Recreation.

Implementation

The SCA Design Requirements are written to accommodate community use of school spaces such as auditoriums, gyms, cafeterias and libraries.

Strategies that contribute to shared use of the school building include configuring entryways, lobbies and spaces for public use to allow for controlled or separate access of spaces likely to be used during and after school hours for community functions.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Submit a copy of relevant plan areas annotated to indicate design features incorporated to accommodate community/public use of select places of assembly and other possible community use spaces. Show on annotated plan path of travel from building entrance to community use spaces.
- Submit updated documentation as necessary through to 100%.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 SS Credit
Joint Use of Facilities

NY CHPS Version 1.1 2007 Credit 1.1.2
Joint Use of Facilities

SCA DESIGN REQUIREMENTS

1.3.1.1 Building Location and Orientation
1.3.5.1 Cafeteria PK-8 and HS

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

S

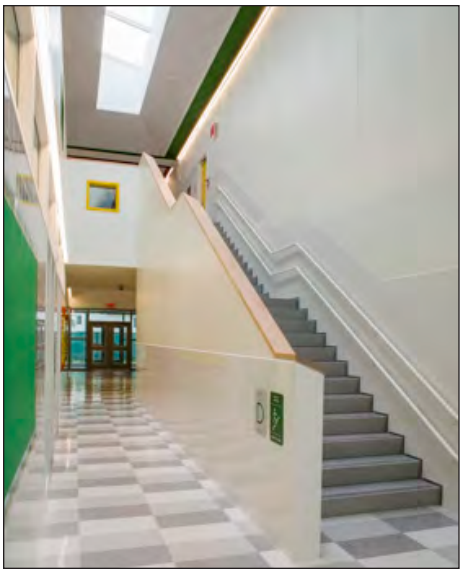
S3.2 – ACTIVE DESIGN IN A SCHOOL ENVIRONMENT

Intent

To incorporate regular physical activity into daily life and school routines through design features that provides activities both outdoors and inside school buildings.

These design features promote the health of students, teachers and staff through physical activity while synergistically achieving environmental benefits.

This credit is required, if feasible, for all projects.



S

Requirements

Buildings must have at least one main stair that enables occupants to travel between the building entrance floor(s), the occupants destination floor, and common use floors.

AND

Provide an on-site recreation space with exercise opportunities for both adults and children that is open and accessible to all users. The space must be at least 400 square feet for schools that have more than 10 classrooms. Include adult exercise and children's play equipment for a minimum of 5% of the building occupants. Gardening activity space and equipment may also count as adult active recreation space and equipment.

AND

Include seven or more of the following features within the project:
For the main staircase(s):

- Classify all regularly occupied floors for re-entry, allowing all building users to have access to and from these floors. Service floors do not need access for all users.
- Make accessible staircases visible from the corridor by either:
  - Providing transparent glazing of at least 10 square feet at all stair doors or at a side light.
  - Providing magnetic door holds on all doors leading to the stairs.
  - Providing unenclosed stairs.
- Provide accessibility to at least one open or interconnecting staircase to at least 50% of the tenant/occupant floors for convenient pedestrian vertical circulation.
- Locate a main staircase to be visible from main building lobby and within 25 foot walking distance from any edge of the lobby. Ensure that no turns or obstacles prevent visibility of or accessibility to the qualifying staircase from the lobby.
- Locate a main staircase to be visible before an occupant visually encounters any motorized vertical circulation (elevator/escalator). The staircase must be visible from the principal point of entry at each building floor.
- Install architectural light fixtures that provide a level of lighting in the staircase(s) consistent with or better than what is provided in the building corridor.
- Provide daylighting at each floor/roof level of the stair(s) using either windows and/or skylights of at least eight square feet in size.
- Place signage encouraging stair use for health and other benefits at all elevator call areas, next to escalators and outside stairwells on each floor.
- Use inviting sensory stimulation such as artwork and/or music in stairwells.

Elsewhere within the project:

- Provide exercise equipment or exercise opportunities for at least 5% of staff that can be used at employee workstations to allow workers opportunities for physical activity while working at their desks. Examples of appropriate exercise equipment include but are not limited to tread-desks, desk stationary bicycles, exercise ball chairs, desk stepper and others. A checkout system can be put in place to allow employees to check out equipment.
- Provide a dedicated or multi-use space to act as an on-site exercise room, which includes a variety of exercise equipment, for use by at least 5% of staff.

Implementation

In schools built by the SCA, stairs are designed to be the primary mode of transportation for students, who typically do not have access to elevators. The building design should therefore facilitate easy access to the stairs for students and also encourage use by staff and visitors. While an active design approach should be studied for all projects, the proposed design cannot compromise the functionality of the school or add redundancy, such as an extra stair that is not needed by code.

As the team explores different spacial layouts during early schematic design, all potential active design features listed in the credit requirements should be reviewed to clearly identify which are best suited to the specific needs of the project and which should not be attempted due to redundancy or excessive cost. It is recommended that the Design Team meet and walk through the detailed list of strategies listed in the Active Design in a School Environment Credit Form, and record decisions in terms of what does and does not make sense for the project.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative stating which features are being incorporated to meet this credit.

DESIGN DEVELOPMENT

No credit submittal.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

Provide a completed Active Design in a School Environment Credit Form attempting at least seven features required for this credit.

Provide a floor plan indicating:

- Location of the main stair(s)
- Minimum number of floors with accessibility to the staircase
- Staircase visibility and walking distance
- Staircase location along the principal path of travel

Based on the measured selected, provide the following:

- Signage indicating that the floors are classified for re-entry.
- Diagrams depicting the glazing or magnetic door holds
- Lighting diagrams indicating the light level equivalent between the stair-case and main building corridor.
- Stairwell diagrams indicating the size and location of windows and/or skylights.
- Lists of exercise equipment or exercise opportunities provided to staff and calculations indicating they can simultaneously serve 5% of staff.
- Floorplan showing recreation space provided to occupants.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 Pilot Credit
Design for Active Occupants

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

S

Prompts to encourage physical activity should be placed in locations where the occupants will see the sign before making their decision for which mode of vertical circulation to take; i.e. a prompt should be placed just outside the stair door on the corridor side.

WATER

The Water (W) section addresses water holistically, looking at indoor use, outdoor use, specialized uses, and metering. The section is based on an “efficiency first” approach to water conservation.

In NYC, potable water often comes from a public water supply system far from the building site, and wastewater leaving the site must be piped to a processing plant, after which it is discharged into a distant water body. This pass-through system reduces stream flow in rivers and depletes freshwater aquifers upstream. In addition, the energy required to treat water for drinking, transport it to and from a building, and treat it before discharging it represents a significant amount of energy use not captured by a building’s utility meter.

In the U.S., buildings account for 13.6% of potable water use, the third-largest category, behind thermoelectric power and irrigation. Buildings can use significantly less water by incorporating native landscapes that eliminate the need for irrigation and installing water-efficient fixtures. Since the release of the first GSG in 2007, school projects began exceeding 30% water savings as compared to the baseline established by LEED.

This updated version of the GSG no longer allows project teams to take credit for the reduced cycling time associated with metered lavatory faucets. SCA projects will continue to achieve potable water use reduction through the use of water-conserving fixtures and reduction or elimination of irrigation for landscaping. By reducing potable water use, the demands on sanitary sewage treatment infrastructure and facilities will be minimized.

W1.1P – OUTDOOR WATER USE REDUCTION, REDUCE TOTAL 30%
W1.2R – OUTDOOR WATER USE REDUCTION, REDUCE POTABLE 50%-100%

Intent

To reduce outdoor water consumption.

The prerequisite 30% reduction of the total landscape water requirement (W1.1P) and a 100% reduction in potable water (W1.2R) is required for all projects.

Requirements

Option 1: No Irrigation Required (2 points)

Install landscape that does not require irrigation beyond a maximum two-year establishment period. This credit can be achieved by projects that have no landscape area.

OR

Option 2: Reduced Irrigation (1-2 points)

If the installed landscape will require permanent irrigation and is approved by SCA, the project must comply with the prerequisite W1.1P by reducing the total landscape water requirement (LWR) within the GSG project boundary by a minimum of 30% from the calculated baseline for July, NYC's peak watering month. This minimum 30% reduction must be achieved through plant species selection and irrigation system efficiency as calculated by the U.S. Environmental Protection Agency (EPA) WaterSense Water Budget Tool.

Points for 100% potable water reduction can be achieved both through use of plant species selection and irrigation system efficiency and through the use of alternative water sources (captured rainwater, reclaimed wastewater, graywater, swimming pool filter backwash, etc.) and smart scheduling technologies.

Table 1. Points for reducing water use	
30% total	Required
50% potable	1 point
100% potable	2 points

W

Implementation

This credit is not intended to discourage landscaping, which should be provided where appropriate.

The SCA Design Requirements stipulate the use of native or adapted plants with no permanent irrigation system in landscaped areas. SCA defers to the NYC Parks Department for the selection of trees that are native to the northeastern US or adapted to the climate in New York City. SCA standards require maintenance hose bibs around the building, which are not considered permanent irrigation systems and may be used for temporary irrigation during establishment or periods of drought. In addition, the SCA's standard for athletic fields is artificial turf, which requires no irrigation. No calculations are required when plant species are selected that do not require irrigation.

The use of native plantings can attract wildlife and provide educational opportunities for students, allowing them to learn about biodiversity, the local ecosystem and the natural history of the site. Students can observe the characteristics and seasonal changes of the plants to better understand the relationship between living organisms and the environment.

The Design Team must receive approval from the SCA to pursue Option 2 of this credit using irrigation because of the potential costs involved. For projects with approved irrigated landscaping, calculations are required to demonstrate how total landscape water requirement (LWR) is reduced by at least 30% within the GSG project boundary to meet prerequisite Credit W1.1P. If project includes work outside the lot lines, those areas should be included in the GSG project boundary (e.g. sidewalks) and all applicable GSG site-related calculations.

Playgrounds and synthetic turf athletic fields can be excluded from calculations for this credit. It is optional to include ground cover within playgrounds and athletic fields as part of credit calculations . However, if these areas are included in this credit's calculation, they must be included consistently within all applicable credit calculations.

On an atypical project where it is determined to utilize an irrigation system, the project must prioritize native plantings and irrigation system efficiencies to meet the prerequisite 30% reduction of total LWR. In addition to meeting the minimum LWR reduction, the project may also consider further reduction of potable water through the use of captured rainwater or stormwater. For sites that use storm water tanks and filtration systems to meet State Pollution Discharge Elimination System (SPDES) requirements, the storm water system may be modified with SCA permission to allow use of captured rainwater for irrigation.

Credit Submittals

Separate credit submittals are to be made for W1.1P and W1.2R respectively.

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

For all projects:

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents. State whether permanent irrigation is being provided.

For Option 2, if irrigation is to be provided (atypical):

- Submit a Site Plan indicating vegetation. Provide calculations showing total areas of each surface type and vegetation list.
- Include in the narrative a description of the potable water use reduction techniques and any non-potable water source available for irrigation.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

For Option 1, no irrigation (typical):

- Include technical data verifying plants meet native or adaptive species requirements, and identifying water needs for proposed plants. Plant species should be selected from the Native Species Planting Guide for New York City.
- Incorporate native or adapted plants on landscaping drawings and in specifications.
- Submit the list of plant species used that will achieve the prerequisite 30% reduction.

For Option 2, if irrigation is to be provided (atypical):

- Submit the list of plant species used and summary of irrigation technology that will achieve the prerequisite 30% total reduction in the landscape water requirement (LWR).
- Provide calculations from the U.S. Environmental Protection Agency (EPA) WaterSense Water Budget Tool that demonstrates a minimum of 30% total reduction in the landscape water requirement (LWR) and the amount of potable water reduction (Outdoor Water Use Reduction Calculator).
- Submit documentation as required for contract specifications and commissioning of irrigation systems. Incorporate requirements in specifications.
- Submit Outdoor Water Use Reduction Credit Form

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 WE Prerequisite
Outdoor Water Use Reduction

LEED for Schools v4 WE Credit
Outdoor Water Use Reduction

SCA DESIGN REQUIREMENTS

2.5.1 Trees, Shrubs, Ground Cover and Lawns
6.1.7 Wall Hydrant Requirements for Window Washing and General Maintenance

SCA STANDARD SPECIFICATIONS

02900 Landscaping

SCA STANDARD DETAILS

None

OTHER REFERENCES

Native Species Planting Guide for New York City
https://www.nycgovparks.org/pagefiles/144/Native-Plant-Guide-2019-Final-CC__5dbb1a8b1bc6a.pdf

U.S. Environmental Protection Agency's
WaterSense Water Budget Tool
www.epa.gov/watersense/water_budget

W

W2.1P - INDOOR WATER USE REDUCTION, 20% REDUCTION
W2.2R – INDOOR WATER USE REDUCTION, 25%-45% REDUCTION

Intent

To reduce indoor water consumption.

The prerequisite 20% reduction (Credit W2.1P) and at least a 30% reduction (Credit W2.2R), is required for all projects. A 35% reduction is required, if feasible.

Requirements

Reduce aggregate indoor water use beyond the baseline using high efficiency fixtures and alternative water sources, where feasible.

Table 1. Minimum requirements and points	
20%	Required
25%	1 point
30%	2 points
35%	3 points
40%	4 points
45%	5 points

AND

For projects that include commercial food service equipment, ensure installed water-consuming food service equipment meets the minimum requirements in **Table 3**. Domestic type equipment must be ENERGY STAR rated.

Table 2. Baseline Flow Rates	
Fixture Type	**Baseline Flow Rate**
Toilet (water closet)	1.6 gpf
Urinal	1.0 gpf
Public Lavatory faucet	0.5 gpm at 60 psi
Private Lavatory faucet	2.2 gpm at 60 psi
Kitchen faucets	2.2 gpm
Showerhead	2.5 gpm at 80 psi

Implementation

The SCA standards require the use of the following water-saving fixtures for all projects: low-flow faucets, low-flow toilets, low-flow showers and low-flow urinals. IS and HS schools will typically achieve 35% water use reduction in combination with the other water-saving fixtures in the Standard Specifications.

For atypical projects that cannot achieve the 35% water use reduction – but must achieve 20% or 30% required by LL32/16, the most cost-effective way to achieve water use reduction is to use more efficient water conserving faucets and urinals. Projects where this might apply include major school modernizations and renovations of leased buildings where not all fixtures will be replaced.

In modernization projects, existing fixtures that are to remain must be included in the design case calculations with their actual flow rate and an indicated assumption about the percentage of occupant users for those fixtures.

This would also apply to addition/modernizations where the addition is over 50% of the size of the building being enlarged.

In rare cases for modernization projects where other building systems are upgraded, plumbing fixtures may need to be replaced to meet the prerequisite requirements.

Calculations estimating the percentage reduction of potable water use as compared with the baseline are built into the calculator within the Indoor Water Use Reduction Credit Form. In traditional plumbing design, calculations are often based on fixture counts; note that the GSG methodology calculates water use according to fixture consumption rates and estimated use. Occupants' estimated use is determined by counting staff, student, and transient occupants and applying appropriate fixture use rates to each. The usage-based calculation is based on default fixture usage values as shown in **Table 4**.

When calculating annual occupancy for schools with multiple sessions, consider each session a discrete period of school building operation. A session can be defined as season or by other variations in building occupancy and usage, such as weekend programming by a community organization. If the school building is used for more than one session annually, calculate the percentage for each session, based on the number of days in the session divided by the total number of days during which the school building operates annually. Then calculate the annual occupants of each gender by multiplying the number of occupants in each session by the session percentage and adding the results of all sessions together. The Indoor Water Use Reduction Credit Form incorporates this procedure.

Credit Submittals

Separate credit submittals are to be made for W2.1P and W2.2R respectively.

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit Indoor Water Use Reduction Credit Form showing achievement over baseline and LL32/16.
- Incorporate fixtures per Standard Specifications.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

Table 3. Standards for appliances and processes

Kitchen/Culinary Art Lab Equipment		Requirement
Dishwasher	Undercounter	≤ 1.6 gal/rack
Food steamer	Batch	≤ 6 gal/hour/pan
Pre-rinse spray valves		≤ 1.3 gpm
Combination Oven		≤ 3.5 gal/hour
Process Equipment		Requirement
Cooling towers		Equip with • makeup water meters • conductivity controllers and overflow alarms • efficient drift eliminators that reduce drift to maximum of 0.002% of recirculated water volume for counterflow towers and 0.005% of recirculated water for cross-flow towers

Table 4. Default fixture uses in schools, by occupancy type

Fixture Type	Staff	Student	Visitor
Water Closet			
Female	3	3	0.5
Male	1	1	0.1
Urinal	2	2	0.4
Lavatory Faucet	3	3	0.5
Shower	0.1	0	0
Kitchen Sink	1	0	0

References

LEED for Schools v4 WE Prerequisite
Indoor Water Use Reduction

LEED for Schools v4 WE Credit
Indoor Water Use Reduction

SCA DESIGN REQUIREMENTS

6.1.16 Potable Water Reduction – Compliance with LL32/16

SCA STANDARD SPECIFICATIONS

15440 Plumbing Fixtures
11400 Food Service Equipment
11450 Domestic Type Equipment
11452 Culinary Arts Lab Equipment

SCA STANDARD DETAILS

None

OTHER REFERENCES

The Energy Policy Act (EPAct) of 1992 (and as amended)

The Energy Policy Act (EPAct) of 2005

ENERGY STAR
www.energystar.gov

WaterSense
www.epa.gov/watersense

W3.1P – BUILDING LEVEL WATER METERING
W3.2R – ENHANCED WATER METERING

Intent

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

These credits are required for all projects.

Requirements

W3.1P - Building Level Water Metering (Required)

Install permanent water meters that measure the total potable water use for the building and associated grounds. Metering equipment must be capable of providing data that can be compiled into monthly and annual summaries. Data collection shall be possible via online access of DEP website, water meter number(s) corresponding account number(s), and the AMR MTU application on the DEP website. Data must also be made available for display by the Building Management System.

AND

W3.2R - Enhanced Water Metering (1 point)

Install permanent water meter(s) for two or more of the following water subsystems, as applicable to the project:

- **Domestic hot water.**
- **Boiler** with aggregate projected annual water use greater than 100,000 gallons or greater than 500,000 BtuH. A single makeup meter may record flows for multiple boilers.
- **Indoor plumbing fixtures and fittings**. Meter water systems serving at least 80% of the indoor fixtures and fittings, either directly or by deducting all other measured water use from the measured total water consumption of the building and grounds.
- **Irrigation.** Meter water systems serving at least 80% of the irrigated landscaped area. Calculate the percentage of irrigated landscape area served as the total metered irrigated landscape area divided by the total irrigated landscape area. Landscape areas fully covered with xeriscaping or native vegetation that requires no routine irrigation may be excluded from the calculation.
- **Reclaimed water.** Meter reclaimed water, regardless of rate. A reclaimed water system with a makeup water connection must also be metered so that the true reclaimed water component can be determined.
- **Other process water.** Meter at least 80% of expected daily water consumption for process end uses, such as humidification systems, pools, and other subsystems using process water.

Implementation

Building Level Metering

All water comes from a public water supply and the utility's water meter provides monthly consumption data, which meets the requirements for the building level water meter.

Enhanced Metering

Determine all end uses of potable water in the project building and on the grounds. For SCA projects, the requirements can be met cost effectively by monitoring boilers and domestic water heaters.

Install a sub-meter to monitor the makeup water supplied to boilers. The aggregate capacity for typical modular condensing boilers the SCA specifies for space heating in new schools typically exceeds the 500,000 BTUH threshold this credit mandates.

Install a sub-meter to domestic water heating to account for 100% of the hot water generated for indoor plumbing fixtures and fittings. Place the sub-meter on the make-up water line to the heater.

If 100% of domestic hot water cannot be monitored as described above, the credit requires a domestic hot water meter capable of metering at least 80% of the installed domestic hot water heating capacity (including both tanks and on-demand heaters), as required by New York City Building Code.

No calculation is required if 100% of the domestic hot water system is metered; however calculations are required for the monitoring of 80% of supplied hot water.

Plumbing system layout affects where submeters can be installed. New construction projects may facilitate submetering during plumbing system design.

Credit Submittals

Separate submissions are to be made for W3.1P and W3.2R respectively.

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Prepare a narrative describing the location of the building level water meter(s) serving the project and site, as applicable.
- Prepare a narrative describing the subsystems metered, including the location and model of each installed submeter, and the percentage of the subsystem that is metered.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Determine all potable water used within the project.
- Facilitate submetering during plumbing system design.
- Provide drawing showing location of water meter room with utility meters.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- If less than 100% of a system will be submetered, submit calculations showing that the required amount of the system will be metered.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 WE Prerequisite
Building-Level Water Metering

LEED for Schools v4 WE Credit
Water Metering

SCA DESIGN REQUIREMENTS

6.1.4 Water Services for Domestic, Sprinkler and Standpipe Systems

SCA STANDARD SPECIFICATIONS

15417 Cold Water Supply
15418 Hot Water Supply

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

W

W4.1A – COOLING TOWER WATER USE

Intent

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

Requirements

For cooling towers and evaporative condensers, conduct a one-time potable water analysis, measuring at least the five control parameters listed in **Table 1.**

Table 1. Maximum concentrations for parameters in condenser water

Parameter	Maximum Level
Ca (as $CaCO_3$)	1,000 ppm
Total Alkalinity	1,000 ppm
SiO_2	100 ppm
Cl^-	250 ppm
Conductivity	2,000 µS/cm

Calculate the number of cooling tower cycles by dividing the maximum allowed concentration level of each parameter by the actual concentration level of each parameter found in the potable makeup water. Limit cooling tower cycles to avoid exceeding maximum values for any of these parameters.

Points for cooling tower cycles are shown in **Table 2.**

Table 2. Point for cooling tower cycles	
Cooling Tower Cycles	**Points**
Maximum number of cycles achieved without exceeding any filtration levels or affecting operation of condenser water system (up to maximum of 10 cycles)	1
Achieve a minimum of 10 cycles by increasing the level of treatment in condenser or make-up water OR Meet the minimum number of cycles to earn 1 point and use a minimum 20% recycled nonpotable water	2

Table 3. Analysis of makeup water

Parameter	Maximum allowable concentrations	Makeup water concentrations
Calcuim (as $CaCO_3$)	1,000 ppm	100 ppm
Alkalinity	1,000 ppm	200 ppm
SiO_2	100 ppm	20 ppm
Chloride	250 ppm	50 ppm
Conducivity	2,000 µS/cm	300 µS/cm

Table 4. Cycles of concentration

Calcuim (as $CaCO_3$)	1,000 / 100 = 10 cycles
Alkalinity	1,000 / 200 = 5 cycles
SiO_2	100 / 20 = 5 cycles
Chloride	250 / 50 = 5 cycles
Conducivity	2,000 / 300 = 6.7 cycles

Implementation

This credit focuses on achieving an appropriate number of condenser water cycles in a cooling tower based on the concentrations of various water quality criteria, such as dissolved solids. While SCA projects use air cooled modular chillers, any special project using water-cooled chillers should meet this credit.

The key parameter used to evaluate cooling tower operation is cycles (sometimes referred to as cycles of concentration or concentration ratio). A cycle represents the extent to which water is used efficiently before being discharged via blowdown (where water is drained from cooling equipment in order to remove mineral build-up).

A cycle of concentration is defined as the ratio of total dissolved solids (TDS) levels in makeup water to TDS levels in water removed through blowdown, evaporative loss, and drift (windage). A higher number of cycles indicates better water efficiency because less makeup water is required. Building maintenance staff can monitor cycles of concentration by comparing the amount of soluble chloride ions (measured in parts per million, ppm) in makeup water with that in the recirculating water. A test kit is typically available through the cooling tower or evaporative condenser manufacturer or the service Contractor responsible for maintaining makeup water chemistry. Analysis of makeup water concentrations is listed in **Table 3**. The minimum number of cycles would be a once-through system that runs the makeup water through the heat exchange media once, without recirculating it. For obvious reasons, this wasteful use of water is discouraged. Yet as cycles increase, the amount of TDS also increases, resulting in potential fouling of the system. Optimizing the number of cycles avoids both of these scenarios.

The maximum cycles of concentration will vary depending on the system and the concentration of solids in the makeup water serving the cooling tower. Cooling towers commonly operate in the range of 5–7 cycles. Cycles of concentration are listed in **Table 4.** The calculation for cycles of concentration is shown in **Equation 1**.

The cooling tower or water treatment vendor can help assess the control parameters and implement a plan to meet the maximum cycles of concentration. These vendors can also help determine if additional chemical treatments can be employed in order to reach the 10

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Conduct a potable water analysis and narrative describing the results of the analysis.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

A/EoR's RESPONSIBILITY

- Calculate the cycles of concentration. If nonpotable water is used, provide the nonpotable water calculations, water treatment calculations, and nonpotable water analysis.

Equation 1. Indoor Water Use Reduction

$$\text{Cycles of Concentration} = \frac{\text{Acceptable maximum concentrations in condenser water}}{\text{Parameter concentrations in makeup water}}$$

References

LEED for Schools v4 WE Credit
Cooling Tower Water Use

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

CDC Cooling Towers
www.cdc.gov/healthywater/other/industrial/cooling_towers.html

Local Law 77/15

Department of Education Cooling Tower Water Sample Plan
www.opt-osfns.org/nycdsf/referenceDoc/programs/safety/Cooling_Tower_Water_Management_Plan_Final_KC.pdf

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cycles required to qualify for an additional point for this credit. The cooling tower or evaporative condenser manufacturer may also offer a water test kit.

In order to prevent contamination of the cooling tower, the Occupational Safety and Health Administration (OSHA) recommends the actions below. Designers should look to implement those design suggestions where possible. Those items listed as maintenance suggestions would be addressed by the Department of Education during operation of the building, who must also meet the registration, inspection, disinfection, cleaning and annual certification requirements for cooling towers as required by LL77/15.

Design Suggestions

- Locate cooling towers away from air intakes and operable windows to minimize unnecessary exposure risks.
- Design features that minimize the spray generated by these systems are desirable.
- New systems are required to be cleaned and disinfected as construction material residue can contribute to Legionnaires bacteria growth.

Maintenance Suggestions

- Add chemical biocides to control Legionnaires growth. Obtain information on appropriate biocide selection and use from equipment manufacturers or from companies experienced with the particular system used.
- Treat circulating water for control of microorganisms, scale, and corrosion. This should include systematic use of biocides and rust inhibitors, preferably supplied by continuous feed.
- Clean and disinfect cooling towers quarterly or at least twice a year if the unit is not used year round. Do this before initial start-up at the beginning of the cooling season and after shutdown in the fall.
- Any system that has been out of service for an extended period should be cleaned and disinfected. Basin shall be drained, inspected and repaired as needed to maintain operational readiness.

ENERGY

The Energy (E) category approaches energy from a holistic perspective, addressing energy use reduction, energy-efficient design strategies, and renewable energy sources. The current mix of energy sources in NYC is weighted heavily toward oil, nuclear and natural gas. In addition to emitting greenhouse gases, the current reliance on nonrenewable energy sources is not sustainable and involves increasingly destructive extraction processes, uncertain supplies, escalating market prices, and national security vulnerability. Accounting for approximately 40% of the total energy used today, buildings present a significant opportunity to affect these challenges.

Energy efficiency in a green school starts with a focus on design that reduces overall energy needs, such as building orientation and glazing selection, and the choice of climate-appropriate building materials. Strategies such as efficient lighting, high-efficiency HVAC systems and proper system sizing, partnered with smart controls further reduce a building's energy use. The generation of renewable energy on the project site or the purchase of green power allows portions of the remaining energy consumption to be met with non–fossil fuel energy, lowering the demand for traditional sources.

The commissioning process is critical to ensuring high-performing buildings. Early involvement of a Commissioning Authority (CxA) helps prevent long-term maintenance issues and wasted energy by verifying that the design meets the Owner's Project Requirements and functions as intended. In an operationally effective and efficient school, the staff understands what systems are installed and how they function. Staff must have training and be receptive to learning new methods for optimizing system performance so that efficient design is carried through to efficient performance. Energy efficient schools that are properly commissioned will reduce their environmental impact and operational costs while improving indoor air quality. The Quality Assurance function of commissioning has always played an important role at the SCA. Commissioning, maintenance and training are vitally important to the performance of the school and to the proper operation of its systems, and are critical to maintaining energy efficiency.

The E category recognizes that the reduction of fossil fuel use extends far beyond the walls of the building. Projects can contribute to increasing the electricity grid's efficiency by enrolling in a demand response program. Demand response allows utilities to call on buildings to decrease their electricity use during peak times, reducing the strain on the grid and the need to operate more power plants, thus potentially avoiding the costs of constructing new plants. Similarly, on-site renewable energy not only moves the market away from dependence on fossil fuels but may also be a dependable local electricity source that avoids transmission losses and strain on the grid. The E section supports the goal of reduced energy demand through credits related to reducing usage, designing for efficiency, and supplementing the energy supply with renewables. This category includes an expanded scope for commissioning in Credit E1.1P, options for monitoring-based commissioning in Credit E1.2A, and optional requirements for demand response in Credit E4.2A.

The SCA has investigated various HVAC systems using computerized energy modeling to conform to the requirements of New York City LL 31/16. Mandated requirements exceed minimum code and LEED v4 energy requirements. The selected HVAC system design and other conservation measures achieve an optimal balance between energy savings, required performance and cost. These systems are a critical part of an integrated building design approach. It is the intent of the SCA to design and construct energy efficient buildings that conform to its building design standards to consistently provide a high-quality educational environment for students, teachers, administrators and operating staff.

E1.1P – FUNDAMENTAL COMMISSIONING & VERIFICATION

Intent

To support the design, construction, and eventual operation of a project that meets the Owner's Project Requirements for energy, water, indoor environmental quality, and durability. Verify that the project's energy related systems are installed and perform according to the Owner's Project Requirements, Basis of Design, and construction documents.

Benefits of commissioning include

- Reduced energy use
- Lower operating costs
- Reduced Contractor callbacks
- Better building documentation
- Improved occupant productivity, and verification that the systems perform in accordance with the Owner's Project Requirements.

This credit is required for all projects.

Requirements

Complete the following commissioning (Cx) process activities for the systems and assemblies indicated under "Commissioned Systems" in accordance with ASHRAE Guideline 0-2005 and ASHRAE Guideline 1.1–2007 for HVAC&R Systems, as they relate to energy, water, indoor environmental quality, and durability.

- The SCA shall designate an individual/firm as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities.
- The CxA shall have documented CxA experience in at least two building projects. The experience must extend from early design phase through at least 10 months of occupancy.
- The CxA may be a qualified employee of SCA, an independent consultant, an employee of the design or construction firm who is not part of the project's design or construction team, or a disinterested subcontractor of the design or construction team.
- The CxA shall report results, findings and recommendations directly to the SCA.
- For projects smaller than 20,000 gross square feet, the CxA may include qualified persons on the design or construction teams who have the required experience.
- The SCA shall document the Owner's Project Requirements (OPR). The Design Team shall develop the Basis of Design (BOD). The CxA shall review these documents for clarity and completeness and review the design. The Owner and Design Team shall be responsible for updates to their respective documents throughout the design phase.
- Develop and incorporate commissioning requirements into the construction documents.
- Develop and implement a commissioning plan.
- Verify the installation and performance of the systems to be commissioned.
- Develop construction checklists and update to reflect project specific requirements.
- Develop a system test procedure.
- Verify system test execution.
- Maintain an issues/deficiency log throughout the Cx process.
- Prepare a final Cx process report.

Implementation

Commissioning (Cx) Team
The SCA/Department of Education (DOE) commissioning team consists of staff from the SCA's Environmental and Regulatory Compliance (ERC) and Architecture and Engineering (A&E) Departments, Facilities Management Systems Integrator (FMSI) and Commissioning Authority (CxA) consultants and the Division of School Facilities (DSF). The CxA consultant is typically engaged at the end of the SD phase. For compliance with the New York City Energy Code, certain portions of the commissioning required by the code will need to be performed by a NYC Approved Agency.

Commissioning Design Review
The Cx team must review OPR, BOD and Design Development documents during the DD phase.

The SCA OPR is considered to include:

- Program of Requirements (POR)
- SCA Standards and any additional written project requirements.

The BOD includes:

- Schematic Design set
- Integrated Design Workshop report
- SD Phase design narratives
- Any approved Deviation Reports

Elements of the OPR and BOD shall be updated as necessary at the end of the DD and CD phases, and the beginning of the construction phase.

A full review of the project design is done at each phase by a team of SCA or consultant reviewers not associated with the project. Issues are provided to the team through written review comments.

Development of the Commissioning Plan
This CxA develops and maintains the Building Commissioning Plan. During the DD phase, the SCA template will be edited to create a project specific preliminary Commissioning Plan. The specific systems and equipment to be commissioned will vary based on the project scope, size, and system. Typical electrical power distribution systems to be commissioned include switched outlets, circuit labeling, accuracy of panel directories, and meters. NIBS Guideline 3-2012 for Building Enclosures provides additional guidance for building envelope requirements for the OPR and BOD.

The Commissioning Plan will be maintained and updated by the Cx team throughout the design and construction phases.

Requirements (cont.)

Fundamental commissioning of exterior enclosures is limited to:

- Inclusion in the Owner's Project Requirements (OPR) and Basis of Design (BOD)
- Review of the OPR, BOD and project design, which can be performed by a qualified member of the design or construction team (or an employee of that firm) who is not directly responsible for design of the building envelope.

Current Facilities Requirements, Operations, and Maintenance Plan

Prepare and maintain a current Facilities Requirements, Operations, Maintenance plan that contains the information necessary to operate the building efficiently:

- A sequence of operations for the building.
- The building occupancy schedule.
- Equipment run-time schedules.
- Setpoints for all HVAC equipment.
- Set lighting levels throughout the building.
- Minimum outside air requirements.
- Any changes in schedules or setpoints for different seasons, days of the week, and times of day.
- A systems narrative describing the mechanical and electrical systems and equipment.
- A preventive maintenance plan for building equipment described in the systems narrative.
- A commissioning program that includes periodic commissioning requirements, ongoing commissioning tasks, and continuous tasks for critical facilities.

Commissioned Systems

Commissioning process activities shall be completed for the following energy, water, and IEQ related systems, at a minimum:

- Heating, ventilating, air conditioning, and refrigeration (HVAC&R) systems (mechanical and passive) and associated controls.
- Electrical, including service, distribution, lighting, and lighting and daylighting controls.
- Plumbing, including domestic hot water systems, pumps, and controls.
- Renewable energy systems (wind, solar etc.).

During Construction

The Design Team reviews commissioning-related submittals including as-built documents and operating & maintenance manuals. The Design Team also provides technical support to the CxA as required to address deficient or varying field conditions.

For systems requiring commissioning, the CxA will:

- Verify installation and performance.
- Develop construction checklists for project specific requirements.
- Develop a system test procedure.
- Verify system test execution.
- Compile Current Facilities Requirements and Operations & Maintenance Plan.
- Verify seasonal testing.
- Maintain an issues and benefits log throughout the Cx process.

Per E1.2A Enhanced Cx Credit, the CxA will also:

- Verify that O&M manuals have been provided to operating personnel.
- Verify that operating personnel training has occurred.
- Provide testing report and summaries from embedded continuous commissioning and fault detection software.
- Review building operations 10 months after substantial completion.
- Develop an on-going commissioning plan.

Commissioning requirements for construction are included throughout SCA Standard Specifications. The Contractor's responsibilities as outlined in Section S01660, 15970, 15971, 15992, and 15993 of the SCA Standard Specifications and required by the Contract Documents include:

- Attending commissioning meetings.
- Perform pre-functional tests and complete construction checklists for all equipment and systems.
- Perform Functional Performance and Acceptance Tests for all equipment and systems as detailed in the Contract Documents.
- Provide relevant submittals and system manuals.
- Provide training and training data.

GSG Submissions

The A/EoR team will submit the CxA design review comments and preliminary Commissioning Plan as part of the 60% GSG submission. The CxA team will submit the final Commissioning Plan and Commissioning Report directly to the SCA GSG committee; therefore these documents do not need to be included in the design team's GSG submission.

E1.1P – FUNDAMENTAL COMMISSIONING & VERIFICATION (CONT.)

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative confirming that all elements of the Basis of Design have been submitted to the SCA in compliance with ASHRAE Guidelines 0 and 1. Include a list of the standards to be incorporated and description(s) of any building systems that are not part of the SCA Standards.
- Submit specification Table of Contents modified for particular project.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Review the OPR, BOD, and Design Development Documents.
- Develop the preliminary Commissioning Plan.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate CxA design review comments and commissioning requirements into construction documents.
- Submit updated specification Table of Contents if the Table of Contents has changed since design development.
- Include Functional Performance and Acceptance Tests in project specific specification sections.
- Verify in the narrative that the preliminary Commissioning Plan has been submitted to SCA (do not include the Commissioning Plan in GSG submission).
- Submit draft Construction Checklist to reflect project requirements

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Review the 60% Construction Documents

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit updated specification Table of Contents if the Table of Contents has changed since 60% design.
- Incorporate CxA design review comments and commissioning requirements into construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- Indicate in the narrative that the CxA 60% review comments have been incorporated in the construction documents.
- Update Construction Checklist to reflect project requirements.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

A/EoR's RESPONSIBILITY

- Review commissioning-related submittals including as-built documents and operating & maintenance manual.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Submit the final Commissioning Plan.
- Submit the final Commissioning Report.
  - Verify the installation and performance of systems requiring commissioning
  - Compile the Current Facilities Requirements and the Operations & Maintenance Plan.
- Submit the complete and initialed Commissioning Authority Certification Form.

CONTRACTOR'S RESPONSIBILITY

- Submit final Construction Checklist and all checklists completed during the course of construction (submitted every 3 months).

References

LEED for Schools v4 EA Prerequisite
Fundamental Commissioning and Verification

NYCHPS Version 1.1 2007 Credit 3.3.1
Third Party Commissioning

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01650 Facility Start-up, Demonstration, and Training
S01660 Supplemental Commissioning Requirements References to Commissioning throughout specifications
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15992 Cleaning and Testing
15993 Balancing of Systems

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASHRAE Guideline 0-2005, The Commissioning Process
www.ashrae.org

ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process
www.ashrae.org

NIBS Guideline 3-2012, Building Enclosure Commissioning Process BECx
www.wbdg.org/FFC/NIBS/nibs_gl3.pdf

2020 New York City Energy Conservation Code (NYCECC), Section 408
https://www1.nyc.gov/site/buildings/codes/2020-energy-conservation-code.page

E

E1.2A – ENHANCED Cx & MONITORING BASED Cx

Intent

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

This credit is optional and may only be pursued with SCA direction/permission. Direction/ Permission for Option 1 and 2 must be provided separately.

Requirements

Implement, or have in place a contract to implement, the following commissioning process activities in addition to those required under E1.1P Fundamental Commissioning and Verification.

Commissioning Authority (CxA)

- The CxA may be a qualified employee of the owner, an independent consultant, or a disinterested subcontractor of the Design Team.

Option 1: Enhanced Commissioning (3 points)

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

The CxA must do the following:

- Review Contractor submittals.
- Verify inclusion of systems manual requirements in construction documents.
- Verify inclusion of operator and occupant training requirements in construction documents.
- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after occupancy.
- Develop an on-going commissioning plan.
- Provide testing report and summaries from embedded continuous commissioning and fault detection software.

Include all enhanced commissioning tasks in the OPR and BOD. For SCA projects, the OPR is considered to include SCA Standards and additional written project requirements, if any. The BOD includes the Schematic Design set, the Integrated Design Workshop report, and any additional SD Phase design narratives.

Implementation

Enhanced Commissioning (Cx)

Enhanced Cx is a natural extension of the fundamental Cx process. It provides the SCA, via the Commissioning Authority (CxA), further oversight and verification that the building will meet their expectations and requirements beyond the first day of occupancy. Enhanced Cx gives the CxA the power to act as the SCA's advocate by conducting in-depth reviews of the basis of design, design documents, and construction submittals. Training and a post construction verification visit are some of the enhancements that contribute to ongoing quality building control and operations.

Monitoring-based Commissioning (MBCx)

MBCx is the integration of three components: permanent energy monitoring systems, real-time energy analysis, and ongoing commissioning. MBCx is an ongoing performance analysis of an operational building that provides real-time equipment performance information to the building operators. MBCx allows the DOE to track energy consumption, detect faulty equipment operations, and identify unusual energy or power consumption patterns as they occur. MBCx can be accomplished via systems submetering, operational points trending, and real-time analyses, such as fault detection and sequence verification. MBCx is most cost-effective when the metering and energy analysis software are integrated into the initial design of a building.

During the Design Development phase, incorporate the MBCx requirements and activities into the project's Cx plan:

- Define analysis procedures, including frequency during year one.
- Outline the evaluation process and determine the procedure for handling system conflicts, usage profiles, and out-of-sequence operations.
- Include preventive planning and maintenance procedures necessary to meet performance goals.
- Determine measurement requirements and decide whether predictive algorithms can be used in conjunction with metered points.

Commissioning documents should address the following requirements for MBCx:

- Owner's requirements, such as specific trends to track, reflected accurately in the engineer's BOD.
- Metering and monitoring required for MBCx, included in the BOD.
- Single-line or riser diagrams for location of building and system meters.
- Controls sequences for specification of appropriate monitoring points.

Requirements (cont.)

OR

Option 2: Enhanced and Monitoring-Based Commissioning (4 points)
Achieve Option 1.

AND

Develop monitoring-based procedures and identify points to be measured and evaluated to assess performance of energy- and water-consuming systems.

Include the procedures and measurement points in the commissioning plan. Address the following:

- Roles and responsibilities.
- Measurement requirements (meters, points, metering systems, data access).
- The points to be tracked, with frequency and duration for trend monitoring.
- The limits of acceptable values for tracked points and metered values (where appropriate, predictive algorithms may be used to compare ideal values with actual values).
- The elements used to evaluate performance, including conflict between systems, out-of-sequence operation of systems components, and energy and water usage profiles.
- An action plan for identifying and correcting operational errors and deficiencies.
- Training to prevent errors.
- Planning for repairs needed to maintain performance.
- The frequency of analyses in the first year of occupancy after the BMS systems are fully operational (at least quarterly).

Update the systems manual with any modifications or new settings, and give the reason for any modifications from the original design.

- Cx specifications for Contractors and building operators.
- Submittal reviews of meters, energy analysis software, and drawings of controls for compliance with the owner's MBCx metering and monitoring requirements.
- Creation and completion of pre-functional tests for MBCx-related equipment, such as meters and energy analysis software programs, by the CxA and Contractors.
- MBCx operator education regarding measurement techniques, energy analysis software tools, fault detection and fault resolution, all incorporated into training requirements.

The SCA standards require a system for MBCx. The SCA systems incorporate sensors, sub-meters and instrumentation, as well as a Building Management System that provides the energy information in a useful manner to the operator. Some specific elements included in the SCA standards are gas flow meters for heating equipment and domestic hot water heaters, and watt-meters at lighting panels to monitor significant lighting loads such as in the Auditorium and Gymnasium.

The DOE/Division of School Facilities will use the system to monitor energy performance and alert staff that equipment maintenance is required. Energy system performance will be evaluated when LL32/16 and LL31/16 annual reports are submitted to the Mayor's Office of Sustainability.

Design Teams and Contractors participate with the SCA CxA and the Facilities Management System Integrator to verify that the BMS system meets the SCA's MBCx requirements, the requirements of this credit and the design intent.

GSG Submissions
The Cx team will submit the Commissioning Plan and the Commissioning Report directly to the SCA GSG committee; therefore these documents do not need to be included in the design team's GSG submissions.

The A/EoR team will submit the CxA design review comments and preliminary Enhanced Commissioning Plan as part of the 60% GSG submission. The CxA team will submit the final Enhanced Commissioning Plan and Enhanced Commissioning Report directly to the SCA GSG committee; therefore these documents do not need to be included in the design team's GSG submission.

E1.2A – ENHANCED Cx & MONITORING BASED Cx (CONT.)

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit narrative summarizing the Cx Team's direction provided to designer including confirmation of whether Option 1 or Option 2 will be pursued.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Develop the preliminary Enhanced Commissioning Plan including Ongoing Commissioning Plan.
- If project will pursue Monitoring Based Commissioning, prepare a list of measurement points to be tracked, including frequency and duration for trend monitoring.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate CxA design review comments and commissioning requirements into construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- Submit the preliminary Enhanced Commissioning Plan including Ongoing Commissioning Plan.
- If project will pursue Monitoring Based Commissioning, submit a list of measurement points to be tracked, including frequency and duration for trend monitoring.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate CxA design review comments and commissioning requirements into construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit the complete Systems Manual to A/EoR.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Submit the final Enhanced Commissioning Plan including Ongoing Commissioning Plan.
- Submit the final Commissioning Report verifying compliance with the Enhanced or Monitoring Based Commissioning requirements.
- Verify that O&M manuals have been provided to operating personnel.
- Verify that operating personnel training has occured.
- If project will pursue Monitoring Based Commissioning, submit a final list of measurement points to be tracked, including frequency and duration for trend monitoring.
- Submit the complete and initialed Commissioning Authority Certification Form.

References

LEED for Schools v4 EA
Enhanced Commissioning, Option1
Enhanced and Monitoring-Based Commissioning

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01650 Facility Start-up, Demonstration, and Training
S01660 Supplemental Commissioning Requirements
S01730 Systems Operation and Maintenance Manual
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15992 Cleaning and Testing
15993 Balancing of Systems

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASHRAE Guideline 0-2005, The Commissioning Process
www.ashrae.org

ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process
www.ashrae.org

2020 New York City Energy Conservation Code (NYCECC), Section 408
https://www1.nyc.gov/site/buildings/codes/2020-energy-conservation-code.page

NEBB National Environmental Balancing Bureau
www.nebb.org

E1.3A – ENVELOPE COMMISSIONING

Intent

To test and verify the school's thermal envelope, achieving better building performance, reduced maintenance, and less energy expenditure over its lifetime.

This credit is optional and may only be pursued with SCA direction/permission.

Requirements

Implement the following building envelope commissioning activities in addition to those required under Credit E1.1P Fundamental Commissioning and Verification.

Building Envelope Commissioning Authority (BECxA)

- The BECxA must have documented envelope commissioning process experience on at least two building projects with a similar scope of work. The experience must extend from the design phase through at least 10 months of occupancy;
- The BECxA may be a qualified employee of the owner, an independent consultant, or a disinterested subcontractor of the Design Team.

Fulfill the requirements in Credit E1.1P Fundamental Commissioning and Verification as they apply to the building's thermal envelope in addition to mechanical and electrical systems and assemblies.

Complete the following commissioning process (CxP) activities for the building's thermal envelope in accordance with ASHRAE Guideline 0–2005 and the National Institute of Building Sciences (NIBS) Guideline 3–2012 Building Enclosure Commissioning Process BECx as they relate to energy, water, indoor environmental quality, and durability.

Commissioning Authority (CxA) must complete the following:

- Review Contractor submittals.
- Verify inclusion of systems manual requirements in construction documents.
- Verify inclusion of operator and occupant training requirements in construction documents.
- Verify systems manual updates and delivery.
- Verify operator and occupant training delivery and effectiveness.
- Verify seasonal testing.
- Review building operations 10 months after occupancy.
- Develop an ongoing commissioning plan.

Review the full SCA Building Envelope Commissioning Task List to confirm all responsibilities associated with the credit.

Implementation

Building Envelope Commissioning (BECx)
Building envelope commissioning (BECx) validates that the design and performance of materials, components, assemblies and systems achieve performance objectives and prevents problems with envelope design and construction that would be costly or impossible to address after construction. Validation is achieved through performance-oriented practices and procedures including modeling, observing, testing, and documenting.

BECx Design Review
Per E1.1P Fundamental Cx Credit, a commissioning review of the building envelope during the design process includes a review of the Owner's Project Requirements (OPR), the Basis of Design (BOD), and design documents.

For this credit, a complete review of building envelope design must be completed prior to the 100% design submittal including a constructability review. Issues should be provided to the team through written review comments.

Development of the Envelope Commissioning Plan
The Building Envelope Commissioning Authority (BECxA) will develop and maintain an Envelope Commissioning Plan that is separate from the building systems commissioning plan. Completing the enhanced commissioning scope for building systems is not required for this credit.

Ensure that the building envelope is fully accounted for in all commissioning documents and testing procedures.

During Construction
The BECxA will use the following examples of testing and equipment to complete the envelope Cx as determined with the SCA:

- Testing examples: air infiltration, water infiltration, exhaust re-entrainment, thermal performance, building envelope pressure, building envelope air leakage, daylight glare control.
- Equipment examples: infrared camera, tracer smoke, bubble gun, calibrated water hose, moisture meter, field mock-up, blower door assembly.

Credit Submittals

SCHEMATIC DESIGN

A/EoR's RESPONSIBILITY

- Develop BOD with respect to building enclosure.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit narrative including a list of the standards to be incorporated and description(s) of any aspect of the building envelope that is not part of the SCA Standards.
- Submit specification Table of Contents modified for particular project.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Review OPR and BOD related to building enclosure.
- Complete review of building enclosure prior to 100% DD.
- Develop the preliminary Envelope Commissioning Plan including enclosure system maintenance manual outline and training requirements.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate BECxA review comments and building envelope commissioning requirements into construction documents, including IECC required air sealing details, prescriptive air barrier information, and thermal envelope requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- Submit the BECxA DD design review comments.
- Submit the preliminary Envelope Commissioning Plan, including:
  - Plans for ongoing commissioning.
  - Maintenance manual outline.
  - Training requirements.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate BECxA review comments and any remaining building envelope commissioning requirements into construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

A/EoR's RESPONSIBILITY

- Submit building envelope submittals verifying that IECC and ASTM testing requirements were confirmed and approved.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Submit the final Envelope Commissioning Plan, including:
  - Plans for ongoing commissioning.
  - Maintenance manual outline.
  - Training requirements.
- Submit the final Envelope Commissioning Report.
- Submit the complete and initialed Commissioning Authority Certification Form.

References

LEED for Schools v4 EA
Enhanced Commissioning, Option 2 Envelope Commissioning

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

07272 Fluid-Applied Membrane Air Barrier, Vapor Retarding

SCA STANDARD DETAILS

07272 Series Details

OTHER REFERENCES

NIBS Guideline 3-2012, Building Enclosure Commissioning Process BECx
www.wbdg.org/FFC/NIBS/nibs_gl3.pdf

SCA Sample BECxA Plan

2020 New York City Energy Conservation Code (NYCECC), Section 402.5
https://www1.nyc.gov/site/buildings/codes/2020-energy-conservation-code.page

E2.1P – FUNDAMENTAL REFRIGERANT MANAGEMENT

Intent

Reduce stratospheric ozone depletion.

This credit is required for all projects.

Requirements

Do not use chlorofluorocarbon (CFC)-based refrigerants in new heating, ventilation, air conditioning and refrigeration (HVAC&R) systems.

Existing small HVAC&R units (defined as containing less than 0.5 pound of refrigerant) and other equipment, such as standard refrigerators, small water coolers, and any other equipment that contains less than 0.5 pound of refrigerant, are exempt.

For modernization projects, existing base building HVAC equipment containing CFC-based refrigerants must be removed.

E

Implementation

HVAC&R-based equipment and refrigerants referenced in the SCA standards do not use CFC based refrigerants.

Incorporate SCA standard “non-CFC” equipment specifications in design and construction documents.

Section 02070 specifies the disposal of CFC’s. Non-CFC systems shall be used in replacement equipment.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing how compliance will be achieved.
- Identify applicable SCA standards to be incorporated into the Design Documents. For modernizations/renovations, describe scope relating to existing base building HVAC equipment that contains CFC refrigerants.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- For projects that include demolition, submit inventory of HVAC&R equipment to be removed and a list of associated CFC-based refrigerants to be recovered.
- When re-using existing base building HVAC equipment, provide a complete and comprehensive CFC phase-out conversion prior to project completion.
- For projects that include demolition, include a statement confirming the recovery of CFC-based refrigerants.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 EA Prerequisite
Fundamental Refrigerant Management

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

02060 Building Demolition
02070 Selective Removal and Demolition
11400 Food Service Equipment
11450 Domestic Type Equipment
11452 Culinary Art Lab & Equipment
15650 Split Air Cooled Chillers
15660 Packaged Modular Outdoor Chillers
15781 Packaged Heating and Cooling Units
15783 Split Heat Pump System
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

E2.2 – ENHANCED REFRIGERANT MANAGEMENT

Intent

Reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

This credit is required, if feasible, for all projects.

Requirements

Select refrigerants that are used in heating, ventilating, air-conditioning, and refrigeration (HVAC&R) equipment to minimize or eliminate the emission of compounds that contribute to ozone depletion and climate change. The combination of all new and existing base building HVAC&R equipment that serve the project must comply with the formula in **Table 1.**

Table 1. HVAC Compliance: LCGWP + LCODP × 10^5 ≤ 100
Calculation definitions for LCG WP + LCOD P × 10^5 ≤ 100 (IP units)
LCODP = [ODPr × (Lr × Life + Mr) × Rc] / Life
LCGWP = [GWPr × (Lr × Life + Mr) × Rc] / Life
LCODP: Lifecycle Ozone Depletion Potential (lb CFC 11/Ton-Year)
LCGWP: Lifecycle Direct Global Warming Potential (lb CO_2 /Ton-Year)
GWPr: Global Warming Potential of Refrigerant (0 to 12,000 lb CO_2/ lbr)
ODPr: Ozone Depletion Potential of Refrigerant (0 to 0.2 lb CFC 11/lbr)
Lr: Refrigerant Leakage Rate (2.0%)
Mr: End-of-life Refrigerant Loss (10%)
Rc: Refrigerant Charge (0.5 to 5.0 lbs of refrigerant per ton of gross AHRI rated cooling capacity)
Life: Equipment Life (10 years; default based on equipment type, unless otherwise demonstrated)

For multiple types of equipment, calculate a weighted average of all base building HVAC&R equipment, using **Equation 1.**

Equation 1. Weighted Average

$$\frac{\Sigma\ [\ (\ LCGWP + LCODP \times 10^5\ )\ X\ Qunit\ ]}{Qtotal} \leq 100$$

Implementation

To complete a project-specific Enhanced Refrigerant Management Credit Form, enter the number and size of units along with the selected refrigerant. The Design Team must use the actual refrigerant charge of each of the pieces of HVAC&R equipment.

The Enhanced Refrigerant Management Credit Form is based on a formula that sets a maximum threshold for the combined contributions to ozone depletion and global warming potential such that the calculated index number is less than or equal to 100. This credit is likely to only be met on some projects, as it is dependent on the size of building and equipment installed.

For split systems, locate refrigerant containing system components to minimize the length of refrigerant lines and reduce the refrigerant impact.

Utilize fire suppression systems that do not contain HCFCs or Halons when possible.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing how compliance will be achieved.
- Identify applicable SCA standards to be incorporated into the Design Documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit a completed Enhanced Refrigerant Management Credit Form based on units selected as Basis of Design.
- For VRF systems, provide supporting documentation for how the refrigerant charge value was calculated.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

A/EoR's RESPONSIBILITY

- Update Enhanced Refrigerant Management Credit Form based on installed equipment.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

Reference Equipment Life (confirm via specs for equipment)	
Equipment	**Reference equipment life**
Split Heat Pump	15 years
Walk-in refrigerator and freezer	10 years
For other equipment not listed	10 years
Unitary, split, packaged air-conditioner, package heat pump	15 years
Reciprocating and scroll compressor, reciprocating chiller	20 years
Water-cooled packaged air-conditioner	24 years

References

LEED for Schools v4 EA Credit
Enhanced Refrigerant Management

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
11400 Food Service Equipment
11450 Domestic Type Equipment
11452 Culinary Art Lab & Equipment
15650 Split Air Cooled Chillers
15660 Packaged Modular Outdoor Chillers
15781 Packaged Heating and Cooling Units
15783 Split Heat Pump System
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

E3.1P – MINIMUM ENERGY PERFORMANCE

Intent

Meet the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.

This credit is required for all projects.

Requirements

For LL32/16 Compliance:

Whole Building Energy Simulation

Demonstrate a 5% improvement for new buildings or a 3% improvement for major renovations to existing buildings in the proposed building performance rating compared to the baseline building performance rating per ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda) by a whole building project simulation using the Building Performance Rating Method in Appendix G of the Standard.

To meet the credit, the proposed design must comply with:

- The mandatory provisions (Sections 5.4, 6.4, 7.4, 8.4, 9.4 and 10.4) of ANSI/ASHRAE/IESNA Standard 90.1-2010 (with errata but without addenda).
- Must include all the energy consumption and costs within and associated with the building project.
- Must be compared against a baseline building that complies with Appendix G to Standard 90.1-2010 (with errata but without addenda).
- Document the energy modeling input assumptions for unregulated loads. Unregulated loads should be modeled accurately to reflect the actual expected energy consumption of the building.

For the purpose of this analysis, unregulated loads are considered to include, but are not limited to, office and general miscellaneous equipment, computers, elevators and escalators, kitchen cooking and refrigeration, laundry washing and drying. Regulated (non-process) energy includes lighting (such as for the interior, façade, or building grounds, except as noted above), HVAC (such as for space heating, space cooling, fans, pumps, toilet exhaust, parking garage ventilation, kitchen hood exhaust, etc.), and service water heating for domestic or space heating purposes.

Unregulated loads shall be identical for both the baseline building performance rating and for the proposed building performance rating. However, project teams may follow the Exceptional Calculation Method (ASHRAE 90.1-2010 G2.5) to document measures that reduce process loads. Documentation of process load energy savings shall include a list of the assumptions made for both the base and proposed design, and theoretical or empirical information supporting these assumptions. Alternatively, use the COMNET Modeling Guidelines and Procedures to document measures that reduce unregulated loads.

For LL 31/16 Compliance for New York City School Buildings:

Achieve one of the following low energy intensity targets, whichever is less stringent:

Case A: 70 kBTU/SF/yr per MOS rulemaking

Case B: 50% below a baseline building if designed and constructed according to the prescriptive and mandatory requirements of ASHRAE 90.1-2013.

Case C: For new buildings, a source energy use intensity of 38 kBTU/yr per square foot of floor area. For additions or substantial reconstructions, a source energy use intensity of 42 kBTU/yr per square foot of floor area.

For LL06/16 Compliance:

Perform an evaluation on implementation of a geothermal system for all projects where applicable. Use the New York City Geothermal Pre-feasibility Tool to determine if the school site is eligible for geothermal systems development. If the Site is technically suitable, the Geothermal Feasibility Study is to be performed.

Implementation

By way of prototypical energy analyses, it has been demonstrated which parametric configurations meet the minimum energy saving requirement described above as well as LL31/16 requirements.

Energy modeling is to be performed even if the building falls within SCA Standards to determine both cost and energy savings.

Other potential energy saving may be investigated and proposed. Designers are to select modeling programs to be used from those listed on the SCA website.

While not required by LL32/16, design the project to reduce regulated energy costs by 20% below the minimum requirements of the governing New York City Energy Conservation Code at the beginning of design, unless this prevents the project from also meeting the LL31/16 requirements.

If directed by the SCA to investigate alternative systems, perform calculations demonstrating compliance with ASHRAE 90.1.2010 and compliance with LL31/16. For LL06/16 documentation, the design team should use the SCA's Geothermal Feasibility Report Guide which can be downloaded from the SCA's website.

Credit Submittals

SCHEMATIC DESIGN

A/EoR's RESPONSIBILITY

- Complete Integrative Design analysis, workshop, and report establishing energy impacts and strategies for the project. See Credit P1.1R Integrative Design Process.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative to summarize how the project will comply with this credit. Organize the narrative by building system (architectural, mechanical, electrical, and plumbing) and for each section include:
  - Description of the design approach including energy conservation measures.
  - A list of applicable SCA standards to be incorporated in the design and any potential departures relating to this credit.
- Submit a Design Development level project specific Energy Modeling Report using modeling templates provided by the SCA.
  - Provide proposed input summary tables and efficiency measures for each system.
  - If NYC Geothermal Pre-feasibility Tool results indicate feasibility, complete the SCA Geothermal Feasibility Tool.
  - Submit SCA Geothermal System Feasibility Report.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit design drawings and specifications in compliance with SCA Design Requirements.
- Submit a project specific Energy Modeling Report using modeling following templates created by the SCA.
- Submit initial ComCheck forms or energy modeling drawings required as part of the EN series drawings, as well as the DOB EN1 Form.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit final Project Specific Energy Modeling Report.
- Submit final ComCheck forms or energy modeling drawings required as part of the EN series drawings and final DOB EN1 form.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 EA Prerequisite
Minimum Energy Performance

LEED for Schools v4 IP Credit
Integrative Design Process

SCA DESIGN REQUIREMENTS

1.3.1.10 Compliance with NYC Energy Conservation Code (NYCECC), LL 86/05, LL 31/16, LL 32/16, LEED for Schools and NYC Green Schools Guide, Energy Modeling Studies, and CIP Project Energy Saving Calculations
4.2.1 Exterior Masonry Wall
6.2.0 General Overview of HVAC
6.2.3 Non-Assembly Spaces
6.2.4 Public Assembly Spaces
6.2.9 Convectors and Enclosures
6.2.11 Existing School Buildings
6.2.20 BMS/DDC Controls
7.2.1 Interior Lighting
7.2.5 Exterior/Site/Security Lighting

SCA STANDARD SPECIFICATIONS

08524 Aluminum Projected Windows
08921 Aluminum Storefront
15454 Central Air-Source Heat Pump Water Heater
15455 Integrated Heat Pump Water Heater with Self-Contained Tank and Electric Resistance Elements
15540 HVAC Pumps
15565 Hot Water Condensing Boilers
15781 Packaged Htg & Cooling Units
15783 Split Heat Pump System
15853 Custom Packaged RTUs (VAV)
15854 Custom Packaged RTUs (CV)
15855 Commercial Packaged RTUs
15857 Unit Ventilator
15930 Variable Air Terminals
15932 Active Chilled Beams
15933 DOAS Air Handling Units
15937 Displacement Induction Units
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management System Integration
15985 Sequence of Operations
15992 Cleaning and Testing
15993 Balancing of Systems
16145 Lighting Control Devices
16502 LED Interior Building Lighting
16530 LED Site/Security Lighting

SCA STANDARD DETAILS

15985 BMS Standard Details

OTHER REFERENCES

NYC DDC Geothermal Heat Pump Manual

New York City Geothermal Pre-feasibility Tool

SCA Geothermal System Feasibility Report
http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

Department of Buildings EN1 Form
https://www1.nyc.gov/assets/buildings/pdf/en1.pdf

ASHRAE/IESNA Standard 90.1-2010
www.ashrae.org

2020 NYC Energy Conservation Code

Local Law 06/16

Local Law 31/16 and Local Law 32/16

E3.2R – OPTIMIZE ENERGY PERFORMANCE

Intent

Achieve energy cost reduction levels above the required minimum standard in Credit E3.1P Minimum Energy Performance, to reduce environmental and economic impacts associated with excessive energy use.

Achieving the points that will meet the LL31/16 source energy target is required for all projects. Additional achievement under this credit is optional and may only be pursued with SCA direction/permission.

Requirements

Follow the criteria in Credit E3.1P Minimum Energy Performance to demonstrate a percentage improvement in the proposed building performance rating compared with the baseline. Points for these credits, shown in **Table 1,** are based on project specific energy cost reduction modeling per ASHRAE 90.1-2010, Appendix G.

To demonstrate energy cost reduction as required by this credit, conduct a whole building energy simulation per ANSI/ASHRAE/IESNA standard 90.1-2010 (with errata but without amendments) using the building performance rating method in Appendix G.

When applicable, the LL31/16 energy performance target will be 70 kBTU/SF/yr source energy or below.

Table 1. Points for % improvement in energy performance

New Construction	Major Renovation	Points
6%	4%	1
8%	6%	2
10%	8%	3
12%	10%	4
14%	12%	5
16%	14%	6
18%	16%	7
20%	18%	8
22%	20%	9
24%	22%	10
26%	24%	11
29%	27%	12
32%	30%	13
35%	33%	14
38%	36%	15
42%	40%	16
46%	44%	17
50%	48%	18

Implementation

The prototypical SCA Energy Model based on SCA standards will typically result in a building with at least a 5% savings and to meet LL31/16 may be substantially more. Analyze efficiency measures during the design process and account for the results in design decision-making. Use energy simulation of efficiency opportunities, past energy simulation analyses for similar buildings, or published data (e.g., Advanced Energy Design Guides) from analyses for similar buildings. Analyze efficiency measures focusing on passive measures, load reduction and HVAC related strategies appropriate for the facility. Potential project energy savings and holistic project cost implications related to all affected systems shall be explored.

All project teams are required to pursue the Integrative Design Process credit to establish strategies for energy and water savings for this credit before conducting the energy simulation.

Projects pursuing this credit must also meet one of the following low energy intensity targets, whichever is less stringent, to demonstrate compliance with Local Law 31/16 requirements for New York City School Buildings:

Case A: 70 kBTU/SF/yr per MOS rulemaking

Case B: 50 percent below a baseline building if designed and constructed according to the prescriptive and mandatory requirements of ASHRAE 90.1-2013.

Case C: For new buildings, a source energy use intensity of 38 kBTU/yr per square foot of floor area. For additions or substantial reconstructions, a source energy use intensity of 42 kBTU/yr per square foot of floor area.

Credit Submittals

SCHEMATIC DESIGN

A/EoR's RESPONSIBILITY

- Complete Integrated Design analysis, workshop, and report establishing energy impacts and strategies for the project. See Credit P1.1R Integrative Design Process.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative to summarize how the project will comply with this credit. Organize the narrative by building system (architectural, mechanical, electrical, and plumbing) and for each section include:
  - Description of the design approach including energy conservation measures.
  - A list of applicable SCA standards to be incorporated in the design and any potential departures relating to this credit.
- Submit a Design Development level project specific Energy Modeling Report using modeling templates provided on the SCA website.
  - Provide proposed input summary tables and efficiency measures for each system.
- Submit Geothermal Feasibility Form.
- When applicable, submit a geothermal feasibility report.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit design drawings and specifications in compliance with SCA Design Requirements.
- Submit a project specific Energy Modeling Report using modeling templates provided on the SCA website.
- Submit initial ComCheck forms or energy modeling drawings required as part of the EN series drawings, as well as the DOB EN1 Form.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit final Project Specific Energy Modeling Report.
- Submit final ComCheck forms or energy modeling drawings required as part of the EN series drawings and final DOB EN1 form.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 EA Credit
Optimize Energy Performance

SCA Geothermal Feasibility Guide

SCA DESIGN REQUIREMENTS

1.3.1.10 Compliance with NYC Energy Conservation Code (NYCECC), LL 86/05, LL 31/16, LL 32/16, LEED for Schools and NYC Green Schools Guide, Energy Modeling Studies, and CIP Project Energy Saving Calculations
4.2.1 Exterior Masonry Wall
6.2.0 General Overview of HVAC
6.2.3 Non-Assembly Spaces
6.2.4 Public Assembly Spaces
6.2.9 Convectors and Enclosures
6.2.11 Existing School Buildings
6.2.20 BMS/DDC Controls
7.2.1 Interior Lighting
7.2.5 Exterior/Site/Security Lighting

SCA STANDARD SPECIFICATIONS

08524 Aluminum Projected Windows
08920 Curtain Wall
08921 Aluminum Storefront
15454 Central Air-Source Heat Pump Water Heater
15455 Integrated Heat Pump Water Heater with Self-Contained Tank and Electric Resistance Elements
15540 HVAC Pumps
15565 Hot Water Condensing Boilers
15781 Packaged Htg & Cooling Units
15783 Split Heat Pump System
15853 Custom Packaged RTUs (VAV)
15854 Custom Packaged RTUs (CV)
15855 Commercial Packaged RTUs
15857 Unit Ventilator
15930 Variable Air Terminals
15932 Active Chilled Beams
15933 DOAS Air Handling Units
15937 Displacement Induction Units
15970 Temperature Control System (BMS/DDC With School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations
15992 Cleaning and Testing
15993 Balancing of Systems
16145 Lighting Control Devices
16502 LED Interior Building Lighting
16530 LED Site/Security Lighting

SCA STANDARD DETAILS

15985 BMS Standard Details

OTHER REFERENCES

2020 NYC Energy Conservation Code
https://www1.nyc.gov/site/buildings/codes/2020-energy-conservation-code.page

ASHRAE/IESNA Standard 90.1-2016
www.ashrae.org

ASHRAE Advanced Energy Design Guide for Schools K-12
www.ashrae.org

Local Law 31/16 and Local Law 32/16

E

E3.3R – HVAC SYSTEM SIZING, AVOID OVERSIZING

Intent

Design all major HVAC components such that they are correctly matched to loads to preclude unnecessary over-sizing and to ensure energy efficient operation.

This credit is required for all projects.

Requirements

Systems shall be sized and configured to efficiently handle peak design load conditions, but more importantly to operate in an energy-efficient manner during a wide range of partial load conditions, which are the operating ranges that HVAC systems handle most of the time.

Submit the load calculations and a written narrative rationale for selecting the specified equipment and establishing the most efficient system size and configuration.

E

Implementation

Best practices for compliance are incorporated in the referenced Design Requirement.

Systems should not be sized so tightly that there is no allowance for degradation of equipment.

Building envelope parameter shall be provided by AoR and should match parameters in other forms, including Project Specific Energy Model.

Submit energy modeling calculations and performance analysis using TraneTrace or Elite for load calculations.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing how compliance will be achieved.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit load calculations including the output from the computerized load calculation program, system sizing calculations, design drawings and a written narrative explaining the rationale for selecting the specified equipment and establishing the most efficient system size and configuration. System sizing calculations shall indicate the safety factors employed, allowance for boiler pickup and piping losses, allowance for ductwork leakage, effects of adding propylene glycol antifreeze solution, and the assumed diversity.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

NY CHPS Version 1.1 2007 Credit 3.1.2
HVAC System Sizing

SCA DESIGN REQUIREMENTS

6.2.9 Heating and Cooling Design Parameters (Load Calculations)
6.2.13 Arrangement and Sizing of Equipment
6.2.34 Verification of Air System Design

SCA STANDARD SPECIFICATIONS

15540 HVAC Pumps
15565 Hot Water Condensing Boilers
15650 Split Air Cooled Chillers
15660 Packaged Modular Outdoor Chillers
15781 Packaged Heating and Cooling Units
15783 Split Heat Pump System
15852 Air Handling Units
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units
15932 Active Chilled Beam
15933 Dedicated Outside Air System (DOAS) Air Handling Units (Constant Volume System)
15934 Rooftop Air Handling Units For Public Assembly Spaces (Constant Volume Systems)
15935 Single-Zone Variable Air Volume (SZVAV) Air Handling Units for Public Assembly Spaces
15937 Displacement Induction Units

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

E4.1R – ENERGY MANAGEMENT SYSTEM CONTROLS

Intent

Specify and install an appropriate Energy Management System (EMS) for the school and its maintenance staff.

This credit is required for all projects.

Requirements

Provide for design and installation of an open protocol Building Management System (BMS). The BMS system shall control at a minimum the HVAC (heating, cooling, fans), exterior lighting, and hot water systems. Open protocol systems use published/non-proprietary protocols, open to all manufacturers. Incorporate the BMS in the design and construction documents.

E

Implementation

The SCA standard specification sections for school Building Management System controls for HVAC systems are consistent with the requirements of this credit. The BMS system should be fully commissioned. (See Credit E1.1P in this section regarding commissioning.)

Confirm SCA standard BMS systems before implementing the requirements for this credit.

Most SCA projects do not have exterior lighting except as required for site security. If the project has exterior lighting other than security lights, the BMS system must be designed to include associated controls.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated in the design documents.
- Identify any potential departures from SCA standards relating to this credit.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate the BMS specifications and control diagrams into construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.
- Provide statement that all FMSI comments have been addressed or responded to.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

NY CHPS Version 1.1 2007 Credit 3.3.5
Energy Management System Controls

SCA DESIGN REQUIREMENTS

6.2.20 Building Management Control System/ Direct Digital Control BMS/DDC

SCA STANDARD SPECIFICATIONS

15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

None

E4.2A – DEMAND RESPONSE

Intent

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

This credit is optional and may only be pursued with SCA direction/permission.

Requirements

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

Demand Response Program Available

- Participate in an existing demand response program and complete the following activities:
  - Design a system with the capability for real-time, fully-automated DR based on external initiation by a DR Program Provider. Semi-automated DR may be utilized in practice.
  - Enroll in a minimum one-year DR participation amount contractual commitment with a qualified DR program provider, with the intention of multi-year renewal, for at least 10% of the estimated peak electricity demand.
- Peak demand is determined under Credit E3.1P Minimum Energy Performance.
- Develop a comprehensive plan for meeting the contractual commitment during a Demand Response event.
- Include the DR processes in the scope of work for the Commissioning Authoirty (CxA), including participation in at least one full test of the DR plan.

E

Implementation

Demand response strategies encourage electricity customers to reduce their usage during peak demand times, helping utilities optimize their supply-side energy generation and delivery systems. One strategy is tiered demand electricity pricing.

The Department of Education participates in Demand Response Programs through firms contracted with the Department of Citywide Administrative Services. The program requires an interval meter being connected to ConEd by a telephone line and to the Demand Response partner by data cabling. The Contract Drawings must include the wiring required. When the utility moves to an IP based standard, this solution will be implemented. The system is manual and currently such program will not meet the credit's intent.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated in the design documents, including list of meters to be installed.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR's RESPONSIBILITY

- Provide documentation confirming that proper meters, demarcation boxes and all required phone and data outlets are installed.

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Construction Phase.

COMMISSIONING AUTHORITY'S RESPONSIBILITY

- Participate in at least one full test of DR plan and include statement of results in final commissioning report.

References

LEED for Schools v4 EA Credit
Demand Response

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

15985 Sequence of Operations

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

E5.1P – BUILDING LEVEL ENERGY METERING

Intent

Provide for the ongoing measurement and accountability of building energy consumption over time.

This credit is required for all projects.

Requirements

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

E

Implementation

Building level energy metering is standard for all SCA projects and the DOE shares energy use data with other agencies if requested.

All projects are intended for the utility meters to be connected to the Building Management System (BMS).

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated in the design documents.
- Identify any potential departures from SCA standards relating to this credit.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Include Specification Sections 15416, 15970, 15973 and 15985 in the construction document submittal modified as appropriate for the specific school project and provide appropriate control diagrams on contract drawings.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

COMMISSIONING AUTHORITY'S RESPONSIBILITY:

- Submit statement from the SCA's FMSI that systems are properly installed, connected, and functioning.

References

LEED for Schools v4 EA Prerequisite 9/17
Building-Level Energy Metering

SCA DESIGN REQUIREMENTS

6.2.20 Building Management Control System/ Direct Digital Control BMS/DDC

SCA STANDARD SPECIFICATIONS

15416 Gas Piping System
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations
16425 Switchboards

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April 2003. Section 3.2 describes Monitoring and Verification.
https://www.mwcog.org/file.aspx?A=UISSsL9D2j9td4z4JrqQFemIF%2FryHq3WxAIMROIm2%2Bgg%3D

E

E5.2R – ADVANCED ENERGY METERING

Intent

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

This credit is required for all projects.

Requirements

Install advanced energy metering for the following:

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

The energy metering systems require the following characteristics.

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

E

Implementation

The SCA standards require a system for measurement and verification. The SCA systems incorporate sensors, sub-meters and instrumentation, as well as a Building Management System that provides the energy information in a useful manner to the operator. System to include continuous Cx software. Some specific elements included in the SCA standards are gas flow meters for heating equipment and, if applicable, domestic water heaters, watt-meters at lighting panels to monitor significant lighting loads such as in the auditorium and gymnasium, and wattnodes to monitor the electric usage of any heat pump of electric resistance domestic hot water heater. Connect sub-meters to the Building Management System for display and response.

For SCA projects, the following systems have been shown to represent 10% of the load and thus are to be metered:

- Receptacle equipment
- Interior lighting
- Space heating
- Space cooling
- Fans
- Domestic hot water heat pumps
- Domestic hot water system with heat pumps

The Design Team is to verify in project-specific models any other systems for that

school that will meet the 10% threshold and include in the monitoring program.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated in the design documents. Identify any potential departures from SCA standards relating to this credit.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Include applicable specification sections in the construction document submittal, modified as appropriate for the specific school project, and provide appropriate control diagrams on contract drawings.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

A/EoR's RESPONSIBILITY

- Submit statement from the SCA's FMSI that systems are properly installed, connected, and functioning.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 EA Credit
Advanced Energy Metering

NY CHPS Version 1.1 2007 Credit 3.3.8
Submetering

SCA DESIGN REQUIREMENTS

6.2.20 Building Management Control System/ Direct Digital Control BMS/DDC

SCA STANDARD SPECIFICATIONS

15416 Gas Piping System
15451 Water Heaters
15454 Central Air Source Heat Pump Water Heater
15455 Integrated Domestic Water Heater Pump
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15973 Facility Management Systems Integration
15985 Sequence of Operations
16425 Switchboards
16470 Panelboards

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

Local Law 45/18

E6.1P – RENEWABLE ENERGY FEASIBILITY
E6.2 – RENEWABLE ENERGY PRODUCTION

Intent

Encourage and recognize use of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use.

The prerequisite feasibility study for a minimum of 10% renewable energy generation is required for all projects.

E6.2 is required, if feasible, for all projects.

Requirements

E6.1P- Renewable Energy Feasibility (Required)

For Prerequisite E6.1P, perform a study determining the feasibility of designing and constructing the project as an "onsite energy generating building" as per Local Law 31/16 and when applicable, as a "net zero energy building" as per Local Law 31/16.

The term "onsite energy generating building" means a building that has been designed and constructed to produce energy onsite from renewable energy sources in an amount equal to or greater than ten (10) percent of such building's total energy needs. The term "net zero energy building" means a building with an estimated height of no more than three stories above grade, which has been designed and constructed to produce energy onsite from renewable energy sources in an amount equal to or greater than such building's total energy needs.

Equation 1. Percentage of Renewable Energy

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

E6.2- Renewable Energy Production (1-4 points)

As per Local Law 94/19, a solar photovoltaic system may be selected to comply with sustainable roofing zone requirements. If this option is selected, then the project team must evaluate renewable energy production based on the requirements of this credit. Use renewable energy systems to offset building energy costs. Calculate the percentage of renewable energy with **Equation 1.**

Use the building annual energy cost calculated in Credit E3.1P or use the Department of Energy (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use. Table of use for different building types is provided in the LEED v4 BD+C Reference Guide.

To qualify as an eligible on-site system, the fuel source must meet one of the following conditions:

- Wholly contained/produced on-site;
- If the fuel source is not fully owned, and in cases where use of a substitute non-renewable fuel is possible, projects must enter into a two-year contract for purchase of the renewable fuel source, with an ongoing commitment to renew for a period of 10 years total.

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

See **Table 1** for point thresholds based on percentage of renewable energy.

Table 1. Points for renewable energy

Percentage renewable energy	Points
1%	1
5%	2
10%	3
15%	4

Implementation

Local Law 31/16 requires that all buildings investigate the possibility of providing 10% of the buildings usage for alternate energy sources. Based on the study, the SCA will determine if the building is to incorporate solar and to what extent.

As per section 45 of title 26 of the US code, qualified renewable energy sources are the following: wind, biomass, geothermal (in some cases), solar energy, low impact hydropower, and wave and tidal energy. Having studied the availability and practicality of the allowed renewable energy sources, solar photovoltaics is the only source that the SCA is currently evaluating further in the feasibility studies for Public Schools.

The design team will be required to provide the completed calculations and cost estimations on the Renewable Energy Feasibility Credit Form and Renewable Energy Production Credit Form, as well as delineate the location and size of the future

Credit Submittals

Separate submissions are to be made for E6.1P and E6.2 respectively.

SCHEMATIC DESIGN

- Submit Onsite Energy Generating Building Feasibility/Net Zero Energy Building Feasibility.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit narrative describing proposed renewable energy system and any deviations from the SCA standard identifying possible systems and locations for achieving this credit and design impacts to the project.
- Submit initial Renewable Energy Feasibility Credit Form based on the preliminary energy model.
- Develop a detailed roof plan indicating sustainable roofing zone with all applicable areas and exceptions as per Local Law 94/19.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit updated Renewable Energy Feasibility Credit Form.
- Submit Renewable Energy Production Credit Form based on initial full-scale energy analysis.
- If directed to proceed with the renewable energy design, incorporate credit requirements in construction documents.
- Update sustainable roofing zone plan and provide a PV plan indicating design layout of the solar photovoltaic system, if applicable.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit updated Renewable Energy Production Credit Form based on final energy analysis, when applicable.
- Provide updated documentation addressing any incomplete or outstanding issues, when applicable.
- Update sustainable roofing zone plan and PV plan as applicable.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase for Credit E6.1P.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit data on renewable energy system being installed, clearly indicating the generating capacity of the system, when applicable.

A/EoR's RESPONSIBILITY

- Submit updated Renewable Energy Production Credit Form based on actual installed energy production system data, when applicable.
- Submit the complete and initialed Design Team Certification Form-Construction Phase for Credit E6.2, when applicable

References

LEED for Schools v4 EA Credit
Renewable Energy Production
www.usgbc.org/node/2612988?return=/credits/schools---new-construction/v4

LEED for Schools IP Credit
Integrative Design Design Process
www.usgbc.org/node/2613097?return=/credits/schools---new-construction/v4

http://www.nycsca.org/Design/NYC-Green-Schools-Guide#GSG-Reference-Materials-154

Local Law 31/16 Renewable Energy Production Report

Net Zero Energy Building Feasibility/ Onsite Energy Generating Building Feasibility

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

13602 Photovoltaic System

SCA STANDARD DETAILS

None

OTHER REFERENCES

Local Law 31/16

Local Law 94/19

DCAS Solar Ready Design Guide

Solar PV Area.
Currently, the Department of Citywide Administrative Services (DCAS) is working directly with the Department of Education (DOE) to implement Solar PV projects on existing school roofs that are solar ready. Where practical on new schools, the SCA will try to deliver roof areas clear of obstructions with a minimum area that would allow for 10% total energy savings from a future Solar PV system.
Design Teams should list Credit E6.2 as being pursued only if the SCA has provided direction to that effect. If so directed, the design team is to provide updated Production of Renewable Energy Credit Form based on the final energy model, with the amount of kW and points selected by the SCA. The construction documents should note in the areas for the intended Solar PV Area that all penetrations and shading objects should be avoided and note any special instructions to the contractor for proper clearance of the identified Solar PV Area.

E6.3R – GREEN POWER & CARBON OFFSETS

Intent

Encourage the reduction of greenhouse gas emissions through the development and use of grid-source, renewable energy technologies on a net-zero pollution basis.

Achieving 50% under this credit is required for all projects. Additional achievement under this credit is optional and may only be pursued with SCA direction/permission.

Requirements

Engage in a five-year contract for qualified resources that provides at least 50% or 100% of the school's energy from green power, carbon offsets, or renewable energy certificates (RECs), to be delivered at least annually.

Qualified resources must meet all of the following requirements:

- Come online since January 1, 2005.
- Green power and RECs are Green-e Energy certified or the equivalent.
- Green power and RECs can only be used to mitigate the effects of purchased electricity use.
- Carbon offsets may be used for all energy use on a metric ton of carbon dioxide–equivalent basis and must be Green-e Climate certified, or the equivalent.

All renewable energy contracts shall be based on the quantity of energy consumed, not the cost. Use one of the following options to quantify the amount of renewable power that needs to be purchased.

Point thresholds based on percentage of total energy addressed are listed in **Table 1.**

Table 1. Points for energy from green power or carbon offsets

Percentage of total energy addressed by green power, RECs and/or offsets	Points
50%	1
100%	2

Use the annual electricity consumption from the results of Credit E3.2R Optimize Energy Performance to quantify energy consumed.

E

Implementation

The City of New York purchases wind credits that support the production of approximately 29,000 MWH a year. The City has arranged with the U.S. Green Buildings Council (USGBC) to utilize this purchase in order to qualify for green power credits that contribute to the achievement of a LEED® rating on city projects.

An application will be submitted by the SCA once construction has begun, i.e. after the Notice to Proceed has been given to the Contractor.

The Mayor's Office of Sustainability (MOS), in consultation with Office of Management and Budget (OMB) and the Department of Citywide Administrative Services (DCAS), will review each application and DCAS will track those which are approved. If approved, the requested green power allocation will be processed by DCAS, who will transmit confirmation to the appropriate parties.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative confirming which Option (1 or 2) the Design Team will pursue to quantify the project energy use.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Include a calculation of annual green power allocation based on the completed energy model and the selected option. Use the Green Power and Carbon Calculator to complete calculations.
- Submit Green Power and Carbon Offsets Credit Form

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 EA Credit
Green Power and Carbon Offset

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

Green-e Program
www.green-e.org

U.S. EPA
www.epa.gov/greenpower

NYC Mayor's Office of Sustainability Green Power Credit Request
www1.nyc.gov/site/oec/green-building/green-power-credit-request.page

E

MATERIALS

The Materials (M) credit category focuses on minimizing environmental and health impacts associated with the extraction, processing, transport, maintenance, and disposal of building materials. The requirements have been updated to further support a life-cycle approach that improves performance and promotes resource efficiency. Each requirement identifies specific actions that fit into the larger context of a life-cycle approach to embodied impact reduction.

The NYC Department of Sanitation (DSNY) website reports that 12,000 tons of garbage per day are exported from New York City to outlying incinerators and landfills, which is 50% of the city's total waste. The remainder is handled by private carters. A study in 2015-2016 found that approximately 8,500 tons of mineral construction and demolition waste (CDW) is handled daily by transfer stations within the city.

The selection of materials used in a construction project, and the manner in which materials are disposed of from construction sites and operating school facilities, have a significant impact on the natural and man-made environment, as well as human health. The purpose of this section is to encourage school design and construction that reduces the use of virgin natural resources and decreases the volume of waste materials disposed. This is achieved by:

- Requiring waste material recycling throughout the construction process.
- Limiting waste by encouraging re-use of existing structures and materials.
- Promoting selection of materials from manufacturers that disclose environmental and health impacts.
- Promoting selection of materials with low environmental and health impacts.
- Using design strategies to support increased recycling rates during occupancy.

Actions like recycling create the basis of students' first experience in environmental stewardship. Therefore, it is important that the materials and building components of their schools are chosen, used, and disposed of responsibly.

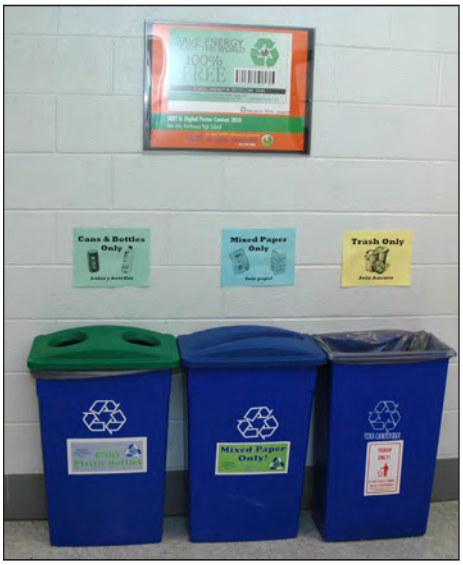
In Credits M2.1 through M2.6, the GSG has adopted the new approach to evaluating and quantifying environmentally preferable materials from LEED v4. In Credit M3.2, the GSG now offers more flexibility and rewards all material reuse achieved by a project - both as part of a building reuse strategy, and from off site as part of a salvaging strategy.

M1.1P – STORAGE & COLLECTION OF RECYCLABLES

Intent

To reduce the waste generated by students, teachers, and staff that is hauled to and disposed of in landfills.

This credit is required for all projects.



Requirements

Provide dedicated areas, accessible to building occupants, for the collection and storage of recyclable materials for the entire building. Recycling, sorting and cart storage are not required at every floor. Ensure each of the following requirements are met:

- Recyclable materials must include mixed paper, corrugated cardboard, glass, plastics, and metals.
- Size the central recycling collection/storage area to allow space for bailers and compactor in the trash room.
- Provide space in, or adjacent to recycling area, for the storage of utility carts used for the collection of trash and recyclables.
- In the cafeteria, provide designated area(s) for bin(s) for recyclables, organic waste, trash and liquid waste. Provide wall-mounted sign holder(s) at cafeteria trash and recycling areas for the display of recycling instructional posters.
- Within the kitchen area, provide space for three recycling containers to accommodate glass/plastic/metal, organics, and trash. Provide area for temporary storage of material to be recycled such as cardboard.
- Take appropriate measures for the safe collection, storage, and disposal of batteries and electronic waste.

M

Implementation

SCA Standard Specifications and Design Requirements include recycling areas and waste storage (trash) room. Collection and storage areas may be separate locations. The amount of space for recycling containers is established by the Design Team based on criteria in DR 1.3.1.8.

For additions, locating storage areas within existing buildings is acceptable, as long as the storage is easily accessible and sized to accommodate an increase in occupants associated with the new addition. Develop layout for central recycling area and food service area to ensure there is sufficient space for required recycling bins, and any equipment such as compactors and balers that may be required. Location of central recycling containers shall promote easy handling and removal of those materials.

Equipment for storing and processing recyclables is provided by the SCA/F&E Unit based on a standard list of items per project type. The SCA F&E Unit standard furniture equipment lists include: two-bin utility cart and recycling containers for classrooms, offices and cafeteria. The Design Team should confirm that these items are included in appropriate quantities on the purchase list developed by the SCA/F&E Unit for the specific project.

The DOE custodial staff is required to bring the recyclables outside for pick-up by the waste haulers, as they will not have access into the school. Project specific DOE agreements cover the location of container hauler access.

The Department of Education DIIT division ensures that electronic waste is recycled and does not go into the waste stream. As the city does not recycle batteries, the custodian's office will have a location for a bucket in the future to collect batteries that may be in the equipment once the city develops such a program.

For interior fit-out projects, provide supporting documentation from the building owner guidelines for the storage and collection of recyclables. If the refuse storage room or area is provided within project boundaries, the project must demonstrate that such allocated areas are appropriately sized, dedicated for such purpose, and accessible to the school.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- On Construction Document plans, indicate areas for recycling. Note recycling area square footage(s), location of utility carts, and number and type of containers assumed at cafeteria and food service areas.
- Include schematic plans in submission.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 MR Prerequisite
Storage and Collection of Recyclables

SCA DESIGN REQUIREMENTS

1.3.1.2 Planning Guidelines for New Schools and Additions
1.3.1.8 Refuse and Recycling Storage
1.3.5.1 Cafeterias PK-8 and HS

SCA STANDARD SPECIFICATIONS

11172 Waste Handling Equipment

SCA STANDARD DETAILS

None

OTHER REFERENCES

NYC Department of Sanitation Zero Waste Schools
www1.nyc.gov/assets/dsny/site/our-work/zero-waste-schools

NYC Department of Education website provide tips on recycling in schools
www.schools.nyc.gov/school-life/buildings/sustainability

M

M1.2P – CONSTRUCTION WASTE MANAGEMENT PLAN
M1.3R – CONSTRUCTION WASTE MANAGEMENT IMPLEMENTATION

Intent

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

The Construction Waste Management plan is a prerequisite for all projects, a 50% diversion rate is required for all projects, and a 75% diversion rate is required, if feasible, for all projects.

Requirements

M1.2P- Construction Waste Management Plan (Required)

Develop and implement a construction and demolition waste management plan that contains the following:

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

M1.3R- Construction Waste Management Implementation

Recycle and/or salvage nonhazardous construction and demolition materials. Provide a final report detailing all major waste streams generated, including disposal and diversion rates. Calculations can be by weight or volume but must be consistent throughout.

Exclude excavated soil, land-clearing debris from calculations. Include materials destined for alternative daily cover (ADC) in the calculations as waste. ADC does not qualify as material diverted from disposal. Include wood waste converted to fuel (biofuel) in the calculations as diverted material; other types of waste-to-energy are not considered diversion for this credit.

Divert percentage of the total construction and demolition material:

- 50% diverted including at least three material streams (1 point)
- 75% diverted including at least four material streams (2 points)

Implementation

The SCA Standard Specifications include requirements for the Contractor to develop a construction waste management plan and to record the amount and type of construction waste diverted/recycled.

Waste management services vary between different waste haulers and recycling facilities; therefore, teams should begin by verifying that waste haulers within the project's area can comply with the credit requirements. Planning for construction waste management (CWM) before construction allows time to identify the most effective waste diversion strategies available. Such strategies typically include recycling and may include reuse, donation, and salvage; however, source reduction and source separation are also viable and effective. Source reduction eliminates project waste through prefabrication, modular construction, or incorporating standard material lengths or sizes into construction documents. Source separation sorts waste on site into recycling streams, ensuring delivery to the correct facility.

The feasibility of the credit will be determined during construction based on construction waste documentation submitted by the Contractor.

In NYC, construction waste for recycling is typically sorted off-site. For sites with potential space to allow sorting of waste streams on site, documents should indicate such. This will assist in meeting credit requirements. Typical construction waste material streams for recycling in NYC are wood, cardboard/paper packaging, masonry, and steel. Calculations for this credit are based on the amount of waste diverted from landfill or wood incineration compared with the total amount of waste generated on-site. Convert all materials to either weight or volume to calculate the percentage, with weight being the SCA preferred method.

Projects that crush and reuse existing concrete, masonry, or asphalt on-site should include the weight or volume of these materials in the calculations.

Waste haulers providing commingled recycling rather than on-site separation must provide the project team with summaries of diversion rates from the recycling facility. Typically, the recycler should provide monthly reports. There are two acceptable options for documentation of commingled waste diversion, both of which are challenging for NYC waste haulers.

1. The waste-sorting facility provides a project-specific waste diversion percentage based on measurement of each component waste material. Visual inspection is not an acceptable method of evaluation for documenting this percentage.
2. The waste-sorting facility provides their facility's average diversion rate, which must be regulated by the local or state authority and must exclude alternative daily cover (ADC). This system must be a closed system; shipping waste to another municipality to manage, thus burdening another system, does not count as diverting the waste.

Credit Submittals

Separate submissions are to be made for M1.2P and M1.3R respectively.

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative identifying applicable SCA standards to be incorporated.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in specifications.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

Per the Project Specifications:

- Submit construction waste management plan.
- Submit waste reduction progress reports with each application for payment.
- Submit status report at 50% construction or at time of enclosure.
- If there are issues, schedule a working session with GSG committee.
- Submit Construction and Demolition Waste Credit Form.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

No credit submittal.

References

LEED for Schools v4 MR Credit
Construction Waste Management

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01524 Construction Waste Management
02060 Building Demolition
02070 Selective Removals & Demolition

SCA STANDARD DETAILS

None

OTHER REFERENCES

"Construction and Demolition Waste Manual"
Prepared for NYC Department of Design &
Construction DDC, 2003
www.nyc.gov/html/ddc/downloads/pdf/waste.pdf

M

MATERIAL REPORTING & OPTIMIZATION OVERVIEW (M2.1 – 2.6)

Overview

The following credits related to material selection have changed significantly since the last version of the GSG (per LEED). There are now two types of material selection credits: those that reward the use of products that disclose and report information on life-cycle impacts, and those that reward the selection of products to optimize for lower impact.

Responsible Extraction
- M2.1A Material Extraction Reporting
- M2.2A Material Extraction Optimization

Environmental Impact
- M2.3 Material Environmental Reporting
- M2.4A Material Environmental Optimization

Minimizing Harmful Ingredients
- M2.5 Material Ingredient Reporting
- M2.6A Material Ingredient Optimization

Figure 1. 100-mile radius from New York City

Scope, Calculation, and Documentation Details

Scope of Products and Materials

The required scope of these credits is permanently installed building products. Products purchased for temporary use on the project, like formwork for concrete, should always be excluded from the credit calculations.

In past versions of the GSG and LEED, all mechanical, plumbing, and electrical equipment (MEP) and other specialty divisions were excluded from MR credits. In this version, project teams have the option to include specific products that are "passive" parts of MEP systems (meaning not part of the active portions of the system) in credit calculations. This allows flexibility for the optional inclusion of materials such as piping and sheet metal. If a "passive" MEP product is included in credit calculations, that particular product must be included consistently across relevant material credits. However, not all products of that type must be included. SCA specifications will delineate which MEP sections will be included for these credits.

Defining a Product

'Reporting' credits calculate achievement on the basis of number of products. A 'product' is defined by its function in the project. Products from the same manufacturer can be counted as separate products if they have distinct functions and formulations but not if they are solely aesthetic variations or reconfigurations. The following examples further illustrate the definition of what qualifies as a distinct product.

Products that arrive at the project site ready for installation:
- Metal studs, wallboard, and concrete masonry units are all separate products.
- For wallboard, the gypsum, binder, and backing are all required for the product to function, so each component does not count as a separate product.

Products that arrive as an ingredient or component used in a site-assembled product:
- Concrete admixtures are considered separate products because each component (admixture, aggregate, and cement) serves a different function; each component is therefore a separate product.

Similar products from the same manufacturer with distinct formulations versus similar products from the same manufacturer with aesthetic variations or reconfigurations:
- Paints of different gloss levels are separate products because each paint type is specified to serve a different function, such as water resistance. Different colors of the same paint are not separate products because they serve the same function.
- Carpets of different pile heights are separate products because they are used for different kinds of foot traffic. The same carpet in a different color is not a separate product.

Cost Calculations

'Optimization' credits calculate achievement on the basis of cost. Product and materials cost includes all taxes and expenses to deliver the material to the project site incurred by the Contractor, but excludes any cost for labor and equipment required for installation after the material is delivered to the site.

To calculate the total materials cost of a project, use either the actual materials cost or the default materials cost.
- Actual materials cost is the cost of all materials being used on the project site, excluding labor but including delivery and taxes.
- Default materials cost is an alternative way to determine the total materials cost by calculating 40% of total construction costs. This default materials cost can replace the actual cost for most materials and products. If the project includes optional products and materials, such as MEP items as described in the Scope section above, add the actual value of those items to the default value for all other cost related material credits.

When calculating compliant materials:

- Structure and enclosure materials may not constitute more than 30% of the value of compliant building products. This requirement is intended to encourage a focus on interior finish products, which have more effect on building occupants due to everyday exposure.
- The base contributing cost of individual products compliant with multiple criteria is not permitted to exceed 100% its total actual cost (before regional multipliers).
- Single product components compliant with multiple criteria can not be double counted.

Optimize credits that incentivize the purchase of products that support the local economy. Products and materials that are extracted, manufactured, and purchased within 100 miles of the project are valued at 200% of their cost. The distance should be measured as the crow flies, not by actual travel distance. For a product to qualify for the location valuation factor, it must meet two conditions:

- All extraction, manufacturer, and purchase (including distribution) of the product and its materials must occur within a 100-mile radius as shown in **Figure 1**,
- And the product must meet at least one of the sustainable criteria specified in the credit.
- In no case is a product permitted to contribute more than 200% of its total actual cost.

Assemblies

Many sustainability criteria in the material selection credits apply to the entire product, as is the case for product certifications and programs. However, some criteria apply only to a portion of the product. The portion of the product that contributes to the credit could be either a percentage of homogeneous material or the percentage of qualifying components that are mechanically or permanently fastened together. In either case, the contributing value is based on weight. Examples of homogeneous material include composite flooring, ceiling tiles, and rubber wall base. Examples of assemblies include demountable partition walls, premade window assemblies, and doors.

Calculate the value that contributes toward credit compliance as the percentage, by weight, of the material or component that meets the criteria, multiplied by the total product cost. **Equation 1** and **Table 1** show the assembly contribution calculation of a sample product, shown in **Figure 2.**

Selecting, Tracking, and Documenting Materials

Due to NY State procurement laws, SCA cannot mandate the sourcing of materials. The SCA will maintain a matrix to track known compliance of products included in SCA Standard Specifications with the sustainability criteria within these credits.

The specifications require the Contractor to submit product information, including sustainability criteria, and enter it into a tracking form to determine if each credit can be met. Ensure the required documentation for each credit category and type of product is noted and collected throughout the process as products are purchased. The best source of documentation is the manufacturer or organization that manages the reporting program. Reports are typically available online, but in some cases it might be necessary to contact a company representative. See the SCA Construction Toolkit for more guidance.

References

LEED for Schools v4 MR Overview

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

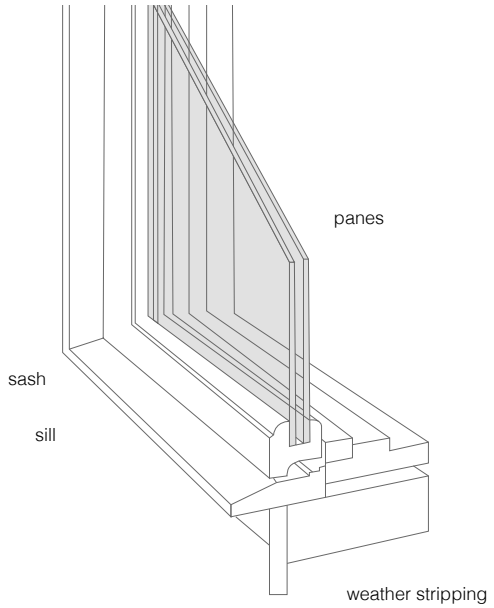


Figure 2. Typical Window Assembly

Equation 1. Material contributions of an assembly
Product Value ($) = total product cost ($) x (%) product component by weight x (%) meeting sustainable critiera

Table 1. Sample calculation for product assembly meeting sustainable criteria

Component	Percentage of product by weight	Value of component	Sustainable criteria		Location valuation factor?	Sustainable criteria value
			Percentage of component	Recycled Content		
Pane	60%	$300	0%	None	No	$0
Sash	20%	$100	100%	Preconsumer	Yes	$200
Sill	15%	$75	75%	Preconsumer	No	$56
Weather Stripping	5%	$25	100%	Preconsumer	No	$25
Total sustainable criteria value						$281

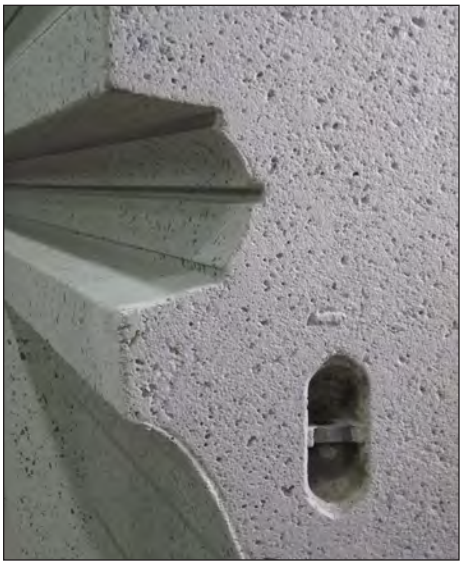
M2.1A – MATERIAL EXTRACTION REPORTING

Intent

To encourage the use of products and materials for which life-cycle information is available from manufacturers.

This credit is optional and may only be pursued with SCA direction/permission. This credit may be phased in as "required if feasible" when a sufficient number of products used on SCA projects are readily attainable.

Credit calculations must be tracked and reported by all projects to provide feedback on feasibility given products currently on the market.



Requirements

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

- To meet the credit requirements, reports must include information on the following:
  - Raw material supplier extraction locations
  - Commitment to long-term ecologically responsible land use
  - Commitment to reducing environmental harms from extraction and manufacturing processes
  - Commitment to meeting voluntary standards or programs that address responsible sourcing
- Products sourced from manufacturers with self-declared reports are valued as one half (1/2) of a product for credit achievement.
- Third-party verified corporate sustainability reports (CSR) which include environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain, are valued as one (1) whole product for credit achievement calculation. Acceptable CSR frameworks include the following:
  - Global Reporting Initiative (GRI) Sustainability Report
  - Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
  - U.N. Global Compact: Communication of Progress
  - ISO 26000: 2010 Guidance on Social Responsibility
  - Other programs approved by the USGBC after the date the GSG was last published, which meet the Corporate Source Reporting criteria.

M

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

This credit encourages the use of responsibly sourced and extracted materials through reporting and demonstration of responsible extraction practices. Corporate Sustainability Reports (CSRs), based on widely-recognized frameworks and standards, can shed light on product supply chains and identify sources of raw material extraction. CSRs have become increasingly popular among all types of businesses, from retail organizations to product manufacturers. For SCA, CSRs provide frameworks that highlight the environmental impacts that manufacturers are addressing, improving, and comparing with other manufacturers.

In addition to seeking the responsible sourcing of virgin materials, teams are also encouraged to reduce raw material usage by selecting reused and recycled materials. Thus if an alternate product is being proposed, this requirement shall be taken into consideration. Teams may also follow leadership performance standards and certifications that encourage local sourcing. Note that due to NY State procurement laws, the sourcing of materials cannot be mandated. The SCA is researching products meeting these sustainable goals while meeting the needed durability for schools.

To document product compliance, provide a publicly available document confirming the manufacturer's third-party verified corporate sustainability report. Reports are often available on websites, but because web pages can change without notice, project teams are advised to print and retain paper copies.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance, explaining any barriers to achievement and identifying applicable SCA standards to be incorporated into design documents.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Update credit narrative to list the primary material types within SCA standard specifications that are likely to contribute to this credit.
- Incorporate credit requirements in construction documents. Indicate any products beyond those in the Standard Specifications where corporate sustainability reports are to be provided.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying which products have compliant corporate sustainability reports.
- Provide manufacturer documentation of corporate sustainability reports for 100% of installed products contributing toward credit.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

- Review Contractor's submittals for verification of products that have compliant corporate sustainability reports.
- Complete Option 1 section in "Sourcing of Raw Materials" tab of the USGBC BPDO Calculator
- Download the SCA BPDO Overlay from the NYC Green Schools Rating System Forms page.
- Print the "Summary" tab of the USGBC BPDO Calculator to PDF.
- Use the SCA BPDO Overlay to fill in section M2.1A Material Ingredient Reporting in the GSG Material Reporting and Optimization Credit Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 1 Raw Material Source & Extraction Reporting

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

Global Reporting Initiative (GRI) Sustainability Report
www.globalreporting.org/information/sustainability-reporting/Pages/default.aspx

GRI Sustainability Disclosure Database Data Legend
www.globalreporting.org/SiteCollectionDocuments/GRI-Data-Legend-Sustainability-Disclosure-Database-Profiling.pdf

U.N. Global Compact, Communication on Progress
www.unglobalcompact.org/participation/report/cop

ISO 26000—2010 Guidance on Social Responsibility
www.iso.org/iso-26000-social-responsibility.html

Sustainable Agriculture Network
www.sanstandards.org/sitio

USGBC BPDO Calculator
https://www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

M

M2.2A – MATERIAL EXTRACTION OPTIMIZATION

Intent

To encourage the use of products and materials that have environmentally, economically, and socially preferable life-cycle impacts as a result of responsible extraction and sourcing.

This credit is optional and may only be pursued with SCA direction/permission. This credit may be phased in as "required if feasible" when a sufficient number of products used on SCA projects are readily attainable.

Credit calculations must be tracked and reported by all projects to provide feedback on feasibility given products currently on the market.

Requirements

Use products that meet at least one of the responsible extraction criteria below for at least 25%, by cost, of the total value of permanently installed building products in the project. To determine if the materials meet this minimum, use **Equation 1.**

Responsible Extraction Criteria

- Extended producer responsibility. Products purchased from a manufacturer (producer) that participates in an extended producer responsibility program or is directly responsible for extended producer responsibility. Products meeting extended producer responsibility criteria are valued at 50% of their cost for the purposes of credit achievement calculation.
- Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country. Exclude hide products, such as leather and other animal skin material. Products meeting bio-based materials criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- Wood products. Wood products must be certified by the Forest Stewardship Council (FSC) or USGBC-approved equivalent. Products meeting wood products criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- Recycled content. Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost. Products meeting recycled content criteria are valued at 100% of their cost for the purposes of credit achievement calculation.
- Other programs approved by the USGBC after the date the GSG was last published, which meet the material leadership extraction criteria.

When calculating credit compliance, products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

Equation 1. Percentage of multi-attribute optimization materials cost

$$\%\ \text{of materials cost} = \frac{\left[\text{product cost}^{1}\left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \left[\text{product cost}^{2}\left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \ldots}{\text{Cost of all permanantly installed products}} \times 100$$

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

In addition to seeking the responsible sourcing of virgin materials, teams are also encouraged to reduce raw material usage by selecting recycled materials when proposing alternate materials. Teams may also follow leadership performance standards and certifications that encourage local sourcing. Note that due to NY State procurement laws, the sourcing of materials cannot be mandated. The SCA is researching products meeting these sustainable goals while meeting the needed durability for schools.

Credit Specific Calculation Values
Multiplier assigned to each sourcing criterion:

- Bio-based products meeting Sustainable Agriculture Standard, value 1.0, by cost.
- Wood products certified to Forest Stewardship Council (FSC) standards, value 1.0, by cost. Refer to the Glossary for FSC certification procedure.
- Reused materials, value 1.0, by cost.
- Postconsumer recycled materials, value 1.0, by cost.
- Preconsumer recycled materials, value 0.5, by cost.
- Extraction, manufacture, and purchase location within 100 miles, value 2.0, by cost.
- Extended producer responsibility, value 0.5, by cost. Products that are part of an extended producer responsibility program may be counted in their entirety even if only part of the product is recycled.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement listing the primary material types within SCA standard specifications that are likely to contribute to this credit and explaining any barriers to achievement.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents. Indicate any products beyond those in the Standard Specifications where extraction criteria is to be reported.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying compliant products and their associated cost.
- Provide manufacturer documentation of product claims for credit requirements or other USGBC-approved programs.
- Submit construction cost figure for CSI divisions 2-10 and include MEP items specified in specification sections to be reported.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

- Review Contractor's submittals for verification of product claims for credit requirements or other USGBC programs.
- Complete Option 2 section in "Sourcing of Raw Materials" tab of the USGBC BPDO Calculator
- Download the SCA BPDO Overlay from the NYC Green Schools Rating System Forms page.
- Print the "Summary" tab of the USGBC BPDO Calculator to PDF.
- Use the SCA BPDO Overlay to fill in section M2.2A Material Extraction Optimization in the GSG Material Reporting and Optimization Credit Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

Table 1. Sample calculation for product assembly meeting sustainable criteria

Component	Percentage of product by weight	Value of component	Sustainable criteria		Location valuation factor?	Sustainable criteria value
			Percentage of component	Requirement		
MDF core	90%	$9,000	80%	Preconsumer recycled content	Yes	$7,200
Veneer	10%	$1,000	100%	FSC certified	No	$1,000
Total sustainable criteria value						$8,200

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Sourcing of Raw Materials, Option 2 Leadership Practices

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

Organization for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
www.oecd.org/daf/inv/mne

Forest Stewardship Council
ic.fsc.org/en

Sustainable Agriculture Network
www.sanstandards.org/sitio

The Rainforest Alliance
www.rainforest-alliance.org

ASTM Test Method D6866
www.astm.org/Standards/D6866.htm

International Standards ISO 14021–1999, Environmental Labels and Declarations—Self Declared Environmental Claims (Type II Environmental Labeling)
www.iso.org/iso/catalogue_detail.htm?csnumber=23146

USGBC BPDO Calculator
https://www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

M

M2.3 – MATERIAL ENVIRONMENTAL REPORTING

Intent

To encourage the use of products and materials for which critically reviewed life-cycle information is available.

This credit is required, if feasible, for all projects.

Credit calculations must be tracked and reported by all projects to provide feedback on feasibility given products currently on the market.

Requirements

Use at least 20 different permanently installed products sourced from at least five different manufacturers that meet one of the disclosure criteria below. Note that different levels of declaration are worth different values. See **Equation 1.**

- Product-specific declaration.
  - Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that have at least a cradle to gate scope are valued as one quarter (1/4) of a product for the purposes of credit achievement calculation.
- Environmental Product Declarations that conform to ISO 14025 and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
  - Industry-wide (generic) EPD - Products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator are valued as one half (1/2) of a product for purposes of credit achievement calculation.
  - Product-specific Type III EPD -- Products with third-party certification (Type III), including external verification in which the manufacturer is explicitly recognized as the participant by the program operator are valued as one whole product for purposes of credit achievement calculation.
- Other environmental product declaration frameworks approved by the USGBC after the date the GSG was last published.

Equation 1. Total number of products with environmental product declarations

$$\text{Total \# of products} = \left[\text{\# of products with product specific declarations} \times 0.25\right] + \left[\text{\# of products with industry specific declarations} \times 0.5\right] + \left[\text{\# of products with Type III EPD} \times 1\right]$$

M

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

Environmental Product Declarations (EPDs) are a standardized way of communicating the environmental effects associated with a product or system's raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water. Although a variety of EPD programs exist, the credit requires that EPDs come from program operators who follow the International Organization for Standardization (ISO) standards, the internationally recognized norm for EPDs. Project teams using EPDs can more accurately compare and evaluate similar products, improving their decisions when selecting materials. Note that, due to NY State procurement laws, the sourcing of materials cannot be mandated. The SCA is researching products meeting these sustainable goals while meeting the needed durability for schools.

Documentation of Product-Specific Declarations

For this credit, product-specific declarations are defined as declarations based on a life-cycle assessment of a product but do not necessarily constitute a full EPD. For this credit, EPDs must be at least cradle-to-gate—that is, EPDs must cover the product's extraction ("cradle") and material processing to create the final product ready for sale by the manufacturer ("gate"); transportation from the factory to distributors or end customers is excluded. EPDs that cover only manufacture ("gate to gate") do not contribute toward the credit. All EPDs must also be consistent with ISO standards 14025, 14040, 14044, and EN 15804 or ISO 21930. These standards address how to set up and perform LCA, how LCA feeds into an EPD, and the appropriate level of detail and content to be included in an EPD. EPDs can be found on manufacturers' websites or the program operator's website or can be requested from the manufacturer.

All documentation must include the following:

- Name (declaration holder or producer)
- Contact information
- Product type
- Product description
- Summary of impact categories measured and overall values
- Functional unit
- Standards met
- Independent review of entity's name and statement

Documentation of Industry-wide Declarations

Industry-wide (generic) declarations and product-specific Type III declarations must include the following:

- Declaration holder
- EPD program operator
- LCA verifier
- PCR reviewer

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement listing the primary material types within SCA standard specifications that are likely to contribute to this credit and explaining any barriers to achievement.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents. Indicate any products beyond those in the Standard Specifications where corporate sustainability reports are to be provided.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying which products have compliant EPD and LCA reports.
- Provide manufacturer documentation of compliant EPD and LCA reports for 100% of installed products contributing toward credit.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

Note*: If project is pursuing Credit M2.1A, M2.2A, M2.4A, or M2.6A in addition to this credit, use the USGBC BPDO Calculator to document compliance and fill in the respective section in the GSG Material Reporting and Optimization Credit Form. Reference the Architect's Responsibility section under Credit M2.4A. If the project is not pursuing the above mentioned credits, follow the bulleted list below.*

- Review Contractor's submittals for verification that products have compliant EPD and LCA reports.
- Track and submit the total number of products that comply using the Material Environmental Reporting Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Environmental Product Declarations, Option 1
Product Disclosure EPDs

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

International Standard ISO 14021–1999, Environmental Labels and Declarations—Self Declared Claims (Type II Environmental Labeling)
www.iso.org/standard/23146.html

International Standard ISO 14025–2006, Environmental Labels and Declarations (Type III Environmental Declarations - Principles and Procedures)
www.iso.org/standard/38131.html

International Standard ISO 14040–2006, Environmental Management, Life Cycle Assessment Principles, and Frameworks
www.iso.org/standard/37456.html

International Standard ISO 14044–2006, Environmental Management, Life Cycle Assessment Requirements, and Guidelines
www.iso.org/standard/38498.html

International Standard ISO 21930–2007 Sustainability in Building Construction—Environmental Declaration of Building Products
www.iso.org/standard/40435.html

Federal Trade Commission, Environmental Claims: Summary of the Green Guides
www.ftc.gov/tips-advice/business-center/guidance/environmental-claims-summary-green-guides

GSG Glossary of Terms
Definitions and programs for material reporting and optimization criteria

USGBC BPDO Calculator
www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

M

M2.4A – MATERIAL ENVIRONMENTAL OPTIMIZATION

Intent

To encourage the use of products and materials that have environmentally, economically, and socially preferable life-cycle impacts.

This credit is optional and may only be pursued with SCA direction/permission. This credit may be phased in as "required if feasible" when a sufficient number of products used on SCA projects are readily attainable.

Credit calculations must be tracked and reported by all projects to provide feedback on feasibility given products currently on the market.

Requirements

Use products that comply with one of the criteria below for 50%, by cost, of the total value of permanently installed products in the project. Products will be valued as below.

- Third party certified products that demonstrate impact reduction below industry average in at least three of the following categories:
  - Global warming potential (greenhouse gases), in CO_2e;
  - Depletion of the stratospheric ozone layer, in kg CFC-11;
  - Acidification of land and water sources, in moles H+ or kg SO_2;
  - Eutrophication, in kg nitrogen or kg phosphate;
  - Formation of tropospheric ozone, in kg NO_x, kg O3 eq, or kg ethene;
  - Depletion of nonrenewable energy resources, in MJ.
- Other environmental product declaration frameworks approved by the USGBC after the date the GSG was last published.

When calculating credit compliance, products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost.

Use **Equation 1** to determine percentage of compliant materials cost.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

Equation 1. Percentage of compliant materials' cost

$$\%\ \text{of materials cost} = \frac{\left[\text{product cost}^{1}\left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \left[\text{product cost}^{2}\left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \ldots}{\text{Cost of all permanantly installed products}} \times 100$$

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

When manufacturers can provide verification of positive environmental effects associated with a product or system's raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water, SCA Standards and project teams are able to evaluate and compare the multi-attribute benefits of similar products to improve decisions when selecting materials. Note that, due to NY State procurement laws, the sourcing of materials cannot be mandated. The SCA is researching products meeting these sustainable goals while meeting the needed durability for schools.

To qualify for this credit, environmental product declarations (EPDs) or material life-cycle assessments (LCAs) must be product-specific AND need to demonstrate impact reduction below industry average in at least 3 impact categories. Note that only Type III EPDs are third-party verified.

Documentation of Type III Product-Specific Declarations

A Type III EPD uses data from a life-cycle assessment (LCA) and is defined by a product category rule (PCR) so that all EPDs for a product are comparable. LCA data can also be aggregated to produce a representative EPD of several products in the same family (type). ISO has developed several standards regarding independent verification of quantitative data (the LCA), PCR development, and EPD review and publication. See M2.3 Material Environmental Reporting for more general information on EPD documentation.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement listing the primary material types within SCA standard specifications that are likely to contribute to this credit and explaining any barriers to achievement.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents. Indicate any products beyond those in the Standard Specifications where corporate sustainability reports are to be provided.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying compliant products and their associated cost.
- Provide manufacturer documentation of product claims for credit requirements or other USGBC-approved programs.
- Submit construction cost figure for CSI divisions 2-10 and include MEP items specified in specification sections to be reported.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

- Review Contractor's submittals for verification of product claims for credit requirements or other USGBC-approved programs.
- Complete "Environmental Product Declarations" tab of the USGBC BPDO Calculator.
- Download the SCA BPDO Overlay from the NYC Green Schools Rating System Forms page.
- Print the "Summary" tab of the USGBC BPDO Calculator to PDF.
- Use the SCA BPDO Overlay to fill in section M2.4A Material Environmental Optimization in the GSG Material Reporting and Optimization Credit Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Environmental Product Declarations, Option 2
Multi-Attribute Optimization

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

International Standard ISO 14021–2016, Environmental Labels and Declarations—Self Declared Claims (Type II Environmental Labeling)
www.iso.org/standard/66652.html

International Standard ISO 14025–2006, EnvironmentalLbels and Declarations (Type III Environmental Declarations—Principles and Procedures)
www.iso.org/standard/38131.html

International Standard ISO 14040–2006, Environmental Management, Life Cycle Assessment Principles, and Frameworks
www.iso.org/standard/37456.html

International Standard ISO 14044–2006, Environmental Management, Life Cycle Assessment Requirements, and Guidelines
www.iso.org/standard/38498.html

International Standard ISO 21930–2007 Sustainability in Building Construction—Environmental Declaration of Building Products:
s://www.iso.org/standard/40435.html

Federal Trade Commission, Environmental Claims: Summary of the Green Guides
s://www.ftc.gov/tips-advice/business-center/guidance/environmental-claims-summary-green-guides

USGBC BPDO Calculator
www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

M2.5 – MATERIAL INGREDIENT REPORTING

Intent

To encourage the use of products and materials for which material ingredient information is available.

This credit is required, if feasible, for all projects.

Credit calculations must be tracked and reported by all projects to provide feedback on feasibility given products currently on the market.

Requirements

Use at least 20 different permanently installed products from at least five different manufacturers that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm).

- Manufacturer Inventory. The manufacturer has published complete content inventory for the product following these guidelines:
  - A publicly available inventory of all ingredients identified by name and Chemical Abstract Service Registration Number (CASRN). No third-party verification is required for this option, but the information must be publicly available; direct disclosure to the designer or Contractor is not acceptable.
  - Materials defined as trade secret or intellectual property may withhold the name and/or CASRN but must disclose the material's function, amount and hazard using either:
    - GreenScreen benchmark, as defined in GreenScreen v1.2.
    - The Globally Harmonized System of Classification and Labeling of Chemicals rev.6 (2015) (GHS)
      - The hazard screen must be applied to each trade secret ingredient and the inventory lists the hazard category for each of the health hazards included in Part 3 of GHS (e.g. "GHS Category 2 Carcinogen").
      - Identify in the inventory all hazard classes for which a classification cannot be made because there are insufficient data for a particular endpoint(s).
- Health Product Declaration. The end use product has a published, complete Health Product Declaration with full disclosure of known hazards in compliance with the Health Product Declaration open Standard.
- Cradle to Cradle. The end use product has been certified at the Cradle to Cradle v2 Basic level OR Cradle to Cradle v3 Bronze level.
- Cradle to Cradle Material Health Certificate. The product has been certified a the Bronze level or higher and at least 90% of materials are assessed by weight.
- Declare. The Declare product label must indicate that all ingredients have been evaluated and disclosed down to 1000 ppm.
- Other programs approved by USGBC after the date the GSG was last published, which meet the material ingredient reporting criteria.

M

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

This credit aims to support manufacturers that disclose information about the ingredients in their products, allowing project teams to make better-informed decisions. The programs included as criteria for this credit use hazard assessment approaches that evaluate multiple human and environmental health endpoints at a level of detail that goes beyond the scope of most life-cycle assessments. Project teams may demonstrate responsible product selection by providing manufacturers reports or by ensuring the absence of materials of concern. Note that due to NY State procurement laws, the sourcing of materials cannot be mandated.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement listing the primary material types within SCA standard specifications that are likely to contribute to this credit and explaining any barriers to achievement.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents. Indicate any products beyond those in the Standard Specifications where corporate sustainability reports are to be provided.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying which products have compliant documentation of chemical inventory.
- Provide documentation of chemical inventory through manufacturers' lists of ingredients with GreenScreen assessment reports for confidential ingredients, HPD, C2C certification labels, or Declare labels for each product chosen that contributes towards credit achievement.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

Note*: If project is pursuing Credit M2.1A, M2.2A, M2.4A, or M2.6A in addition to this credit, use the USGBC BPDO Calculator to document compliance and fill in the respective section in the GSG Material Reporting and Optimization Credit Form. Reference the Architect's Responsibility section under Credit M2.6A. If the project is not pursuing the above mentioned credits, follow the bulleted list below.*

- Review Contractor's submittals for verification of products have compliant documentation of chemical inventory.
- Track and calculate the total number of products that comply using the Material Ingredient Reporting Credit Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Material Ingredients, Option 1 Material Ingredient Reporting

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

Chemical Abstracts Service
www.cas.org

GreenScreen
https://www.greenscreenchemicals.org/

A Guide to The Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
www.osha.gov/dsg/hazcom/ghsguideoct05.pdf

Health Product Declaration
www.hpd-collaborative.org

Cradle-to-Cradle Certified™ Product Standard
www.c2ccertified.org/get-certified/product-certification

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
www.echa.europa.eu/web/guest/support/guidance

USGBC BPDO Calculator
www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

M

M2.6A – MATERIAL INGREDIENT OPTIMIZATION

Intent

To reward projects for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances.

This credit is optional and may only be pursued with SCA direction/permission. This credit may be phased in as "required if feasible" when a sufficient number of products used on SCA projects are readily attainable.

Credit calculations must be reported on all projects to provide feedback on feasibility given products currently on the market.

Requirements

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

- GreenScreen v1.2 Benchmark. Products that have fully inventoried chemical ingredients to 100 ppm that have no Benchmark 1 hazards:
  - If any ingredients are assessed with the GreenScreen List Translator, value these products at 100% of cost.
  - If all ingredients have undergone a full GreenScreen Assessment, value these products at 150% of cost.
- Cradle to Cradle Certified. End use products are certified Cradle to Cradle. Products will be valued as follows:
  - Cradle to Cradle v2 Gold: 100% of cost
  - Cradle to Cradle v2 Platinum: 150% of cost
  - Cradle to Cradle v3 Silver: 100% of cost
  - Cradle to Cradle v3 Gold or Platinum: 150% of cost
- USGBC approved program. Products that comply with USGBC approved building product optimization criteria. Valuation may vary.

Products sourced (extracted, manufactured, purchased) within 100 miles of the project site are valued at 200% of their base contributing cost. Use **Equation 1** to determine percentage of compliant materials cost.

Structure and enclosure materials may not constitute more than 30% of the value of compliant building products.

Equation 1. Percentage of compliant materials' cost

$$\%\ \text{of materials cost} = \frac{\left[\text{product cost}_1 \left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \left[\text{product cost}_2 \left(\text{criterion valuation factor}\right)\left(\text{location valuation factor}\right)\right] + \ldots}{\text{Cost of all permanantly installed products}} \times 100$$

Implementation

See the Material Reporting & Optimization Overview for more guidance on credit scope and calculations. See the Glossary for detailed definitions.

By adhering to the precautionary principle and supporting green chemistry, this credit encourages project teams to avoid products containing potentially harmful chemicals, which will ultimately spur innovation in materials from manufacturers. The precautionary principle states, "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." When manufacturers can provide verification that they have reduced or eliminated hazardous ingredients, SCA Standards and project teams are able to evaluate and compare products to inform improved decisions when selecting materials. Note that, due to NY State procurement laws, the sourcing of materials cannot be mandated. The SCA is researching products meeting these sustainable goals while meeting the needed durability for schools.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement listing the primary material types within SCA standard specifications that are likely to contribute to this credit and explaining any barriers to achievement.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Specify and select compliant products.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit Contractor's Sustainable Materials Form identifying compliant products and their associated cost.
- Provide manufacturer documentation of product claims for credit requirements or other USGBC-approved programs.
- Submit construction cost figure for CSI divisions 2-10 and include MEP items specified in specification sections to be reported.
- Submit the complete and initialed Contractor Certification Form.

ARCHITECT'S RESPONSIBILITY

- Review Contractor's submittals for verification of products that have compliant corporate sustainability reports.
- Complete "Material Ingredients" tab of the USGBC BPDO Calculator.
- Download the SCA BPDO Overlay from the NYC Green Schools Rating System Forms page.
- Print the "Summary" tab of the USGBC BPDO Calculator to PDF.
- Use the SCA BPDO Overlay to fill in section M2.6A Material Ingredient Reporting in the GSG Material Reporting and Optimization Credit Form.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Product Disclosure and Optimization – Material Ingredients, Option 2 Material Ingredient Optimization

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

Chemical Abstracts Service
www.cas.org

Health Product Declaration
www.hpdcollaborative.org

Cradle-to-Cradle Certified™ Product Standard
www.c2ccertified.org/product_certification

Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
www.echa.europa.eu/support/guidance-on-reach-and-clp-implementation

GreenScreen
https://www.greenscreenchemicals.org/

USGBC BPDO Calculator
www.usgbc.org/resources/bpdo-calculator

SCA GSG Architect-PO Construction Toolkit

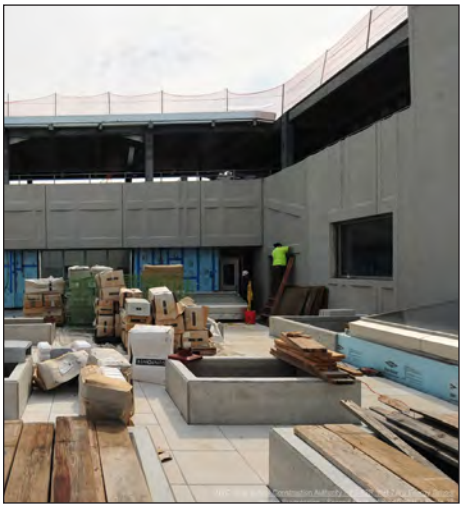
SCA GSG Contractor Construction Toolkit

M3.1A – LIFE-CYCLE IMPACT REDUCTION, WHOLE BUILDING LCA

Intent

To optimize the environmental performance of building products and materials for schools.

This additional credit is optional and may only be pursued with SCA direction/permission. Modernization and renovation projects that pursue MR Credit 3.2 Life-Cycle Impact Reduction Building and Material Reuse are not eligible to pursue this credit.



Requirements

For new construction projects, conduct a Life-Cycle Assessment (LCA) of the school's structure and building enclosure that demonstrates a minimum of 10% reduction, compared with a baseline school, in at least three of the six impact categories listed below, one of which must be global warming potential. No impact category assessed as part of the LCA may increase by more than 5% compared with the baseline building.

The baseline and proposed buildings must be of comparable size, function, orientation, and operating energy performance as defied in Energy Credit E3.1P Minimum Energy Performance. The service life of the baseline and proposed buildings must be the same and at least 60 years to fully account for maintenance and replacement. Use the same LCA software tools and data sets to evaluate both the baseline building and the proposed building, and report all listed impact categories. Data sets must be compliant with ISO 14044.

Select at least three of the following impact categories for reduction. LCA results need to be presented in the units below:

- Global warming potential (greenhouse gases), in CO_2e
- Depletion of the stratospheric ozone layer, in kg-CFC-11-eq
- Acidification of land and water sources, in SO_2e
- Eutrophication, in kg N-eq nitrogen
- Formation of tropospheric ozone, in kg NO_x eq
- Depletion of nonrenewable energy resources, in MJ

Implementation

The SCA has completed a Life-Cycle Assessment of an SCA prototype school with standard SCA building envelope and structural assemblies to determine if a building designed to the SCA Standards could meet this credit. The study can be found on the NYC Green School Guide website. While the SCA standard of brick and block back-up or precast concrete are believed to have a longer life span than most other façade systems, they do not meet the requirements of all six of the targeted life-cycle impact categories and thus will not meet the credit requirements. Unless the designer proposes a design alternative for the façade that is approved by the SCA, the designer should declare the credit as not pursued.

The credit may be achievable for some projects if the design deviates from SCA standards. If project teams are considering any of the following strategies they will be guided through next steps by the SCA review team:

- Team is proposing assemblies that are different from the SCA standard (for example, projects with metal stud or rainscreen system).
- Team is proposing substitutions of less-harmful materials for assemblies that do not have strict functional requirements.

Unique assemblies used in the project must meet all performance and durability requirements for those assemblies outlined in the SCA Standards and be approved by the SCA. The design should not be compromised to achieve this credit. This credit should only be pursued when there is no negative impact on design, including cost and program function.

LCA Considerations

The following considerations may help inform the selection of standard and unique assemblies:

- Durable building materials and assemblies that do not need to be replaced during the 60-year LCA period tend to perform better than ones that need to be replaced frequently within that period.
- Building materials that are energy-intensive and labor-intensive to manufacture tend to have higher life-cycle impacts.
- Building materials that make up the majority of the building structure and envelope have the largest life-cycle impacts. For SCA schools, these include concrete, steel, brick, aluminum, glass, and insulation.
- Although structural systems contribute heavily to the overall LCA impacts, the envelope may be even more important—in some cases representing over twice the LCA impacts of the structure.

Building the Baseline School LCA Model

If the SCA approves the deviation request for alternate materials and the designer believes this credit may be feasible, the team will obtain approval from SCA that they will move forward with the Life Cycle Assessment. The teams will chose a software tool to describe the baseline school and compare the impacts of the project design.

The following parameters must be consistent in the baseline and design case LCA models:

Requirements (cont.)

Figure 1. Construction materials stacked on project site. Materials that are energy intensive, labor intensive, or make up a large portion of the building envelope have the highest life-cycle impacts.

Both cases must have the same:

- Total floor area and building program.
- Orientation and massing.
- Total surface area of each assembly type
- Operating energy performance as defined in E3.1 Minimum Energy Performance.

Evaluating Unique Building Assemblies

The SCA prototype LCA model evaluated SCA Standard building envelope and structural assemblies using the Athena Impact Estimator for Buildings. Athena Impact Estimator provides LCA profiles for many common building assemblies and systems based on regionally specific, ISO 14044-compliant engineering and manufacturing data. The prototype school analysis was developed using Athena. The SCA LCA Impact Assessment Guidelines was also developed with Athena.

The assessment must follow TRACI Method developed by U.S. EPA. The scope of the analysis must be a cradle-to-grave assessment, which includes environmental impacts associated with all the life-cycle stages for the building structure and enclosure: resource extraction or harvest, building product manufacture, on-site construction, product maintenance and replacement (where warranted), and deconstruction or demolition and disposal over an assumed service life of at least 60 years. Operational energy use is excluded from the LCA to avoid double-counting reductions with E3.1.

The LCA must address the following:

Products

- The LCA must cover the complete building envelope and structural elements, including the material components of footings and foundations, structural wall assembly (from cladding to interior finishes), structural floors and ceilings (not including finishes), and roof assemblies.
- Exclude electrical and mechanical equipment and controls, plumbing fixtures, fire detection and alarm system fixtures, elevators, and conveying systems.
- Exclude excavation and other site development. Include parking structures; exclude parking lots.

Functional equivalence

- The proposed and baseline buildings must serve the same function, must have the same gross floor area and orientation, and must meet all mandatory regulatory and performance requirements such as operational energy performance.

Service life

- The project team must take into account the entire building structure and enclosure, from design to demolition for an assumed 60-year service life. The assumed service life must be the same for the baseline and proposed buildings and must be at least 60 years to properly account for material maintenance and replacement.
- Any parameters not defined above may change across the baseline and proposed buildings to achieve desired design and performance objectives.

Continued on next page

M

M3.1A – LIFE-CYCLE IMPACT REDUCTION, WHOLE BUILDING LCA (CONT.)

M

Implementation (cont.)

Once the baseline is created, the model can be used to conduct "what if" scenarios to analyze environmentally preferable assemblies and materials in support of early design decisions. Examples of alternative analyses could include the following:

- Comparing the environmental consequences of building footprint and shape.
- Evaluating different structural system types, such as load-bearing walls versus columns.
- Defining the selection of building products and assemblies.
- Optimizing structural system design (e.g., column spacing, slab depth).

If the Design Team wants to use a material, product, or assembly that is not in the selected LCA tool's data set, the results of a critically reviewed LCA or a verified environmental product declaration (EPD) can be used, provided the results cover the required full set of impact indicators for that component and follow the TRACI Method and ISO 14044. The EPD must be current and regionally applicable. Industry-wide (generic) EPDs are not substitutable for any material, product, or assembly in the selected LCA tool's data set. The material, product, or assembly in the model must then be removed and the impact measures for the replacement added as a side calculation, taking account of all related ancillary product use. Any such additions must be documented and the documentation included in the submittal. Include the rationale for the change and the source of the replacement impact measures.

At 60% CD, update the model to reflect and incorporate all design decisions as shown in the design documents, and prepare a narrative that describes the LCA assumptions for the baseline and proposed buildings.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Complete all submittals required for the Preliminary LCA as described in P1.1R – Integrative Design Process.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

If non-standard building envelope and structural assemblies are being used for the project and team has approval to proceed from SCA, provide an LCA Assessment Report using Athena, that includes the following:

- Individual and total areas for each building envelope, roof, and structural assembly.
- Compliant and complete LCA results for the baseline and proposed case.
- Description of LCA assumptions, scope, characterization model (e.g., TRACI), and analysis process for baseline and proposed building.
- The service life assumed for the baseline and proposed building assemblies.
- Table showing the percent of impact change for all impact indicators between the baseline and proposed buildings.
- Narrative describing the differences between the baseline and proposed that results in reduced impact.
- Submit Life Cycle Impact Reduction, Whole Building LCA Credit Form

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Update the LCA Assessment Report (outlined above) to include any new assemblies, products, and assumptions for the baseline and proposed buildings.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Update the LCA Assessment Report (outlined above) to include any new assemblies, products, and assumptions for the baseline and proposed buildings.
- Finalize the LCA Assessment Report (outlined above) to include any new assemblies, products, and assumptions for the baseline and proposed buildings that were confirmed during the construction phase.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- Update and finalize the LCA Assessment Report (outlined above) to include any new assemblies, products, and assumptions for the baseline and proposed buildings.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Life-Cycle Impact Reduction, Option 4

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

07461 Fiber Cement Panel Rainscreen
07543 Cladding System Support for Rainscreen

SCA STANDARD DETAILS

None

OTHER REFERENCES

SCA LCA Impact Assessment Guidelines

ISO 14044
https://www.iso.org/standard/38498.html

EPA Tool for Reduction and Assessment of Chemicals and Other Environmental Impacts (TRACI)
www.epa.gov/chemical-research/tool-reduction-and-assessment-chemicals-and-other-environmental-impacts-traci

Athena Impact Estimator for Buildings
www.athenasmi.org/our-software-data/impact-estimator

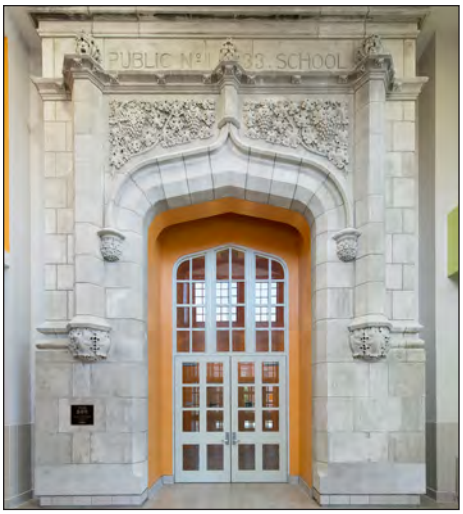
M

M3.2 – LIFE-CYCLE IMPACT REDUCTION, BUILDING & MATERIAL REUSE

Intent

To encourage building reuse and extend the useful life of existing building structures, conserve material resources, retain cultural resources, reduce waste and the environmental impacts of school projects as they relate to materials manufacturing and transport.

This credit is required, if feasible, for modernization and renovation projects, and is not applicable to new construction.



Requirements

This credit is for modernization and renovation projects. Reuse or salvage building materials from off site or on site as a percentage of the surface area, as listed in **Table 1**. Include structural elements (e.g. floors, roof decking), enclosure materials (e.g., skin, framing), and permanently installed interior elements (e.g., walls, doors, floor coverings, ceiling systems). Exclude from the calculation window assemblies and any hazardous materials that are remediated as a part of the project. **Table 2** shows an example of how to calculate reuse for existing buildings and materials.

Materials contributing toward this credit may not contribute toward Credit M2.5 Material Ingredient Reporting and Credit M2.6A Material Ingredient Optimization.

Table 1. Points for reuse of building materials

Percentage of completed project surface area reused	Points
25%	2
50%	3
75%	4

M

Implementation

Identify and quantify the surface areas of the structure, building enclosure, and interior elements (e.g., walls, doors, floor coverings, and ceiling systems) that can and cannot be retained. Exclude from the calculation any hazardous materials that are remediated as part of the project. Once the scope of reuse is determined, ensure that the areas intended for reuse are well defined and incorporated into the design and construction.

Reuse of off-site products is not typically not considered for SCA projects. Any reused product or material may be included in either this credit or Credit M2.4A Material Environmental Optimization. If off-site products and materials used in the project are included in the calculations for this credit, they may not be double-counted for M2.4A Material Environmental Optimization.

Note that for this credit, building and material reuse is measured in surface area; in Credit M2.4A Material Environmental Optimization, reuse is measured by cost or replacement value.

Each assembly (vertical or horizontal) may be calculated as up to three layers of surface area. For vertical building elements, the layers are enclosure, interior finish, and structure. For horizontal building elements, the layers are ceiling finish, structure, and floor finish. Structural support elements, such as columns, beams, and studs, are considered part of the larger surfaces they support. Calculate the surface area of these elements as equal to surface area of the wall.

Not all projects will have all layers present at the beginning of construction, depending on the state of the building. If a layer that existed before construction or demolition is removed and replaced with new material, it must be included in the calculation. If an existing layer was removed and not replaced, it is excluded from the credit calculations. If before construction and demolition the building has more than three layers that can be counted toward reuse, the project team may choose the three layers to include in the calculation. The three layers chosen should represent the structure of a typical basic wall or floor assembly (enclosure and interior finish, structure, and ceiling; or floor slab, ceiling finish, and floor finish).

The design should not be compromised to achieve this credit. This credit should only be pursued when there is no negative impact on design, including cost and program function.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative statement indicating that this credit appears to be feasible. Explain the portion and type of building elements to be reused.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Submit draft table listing and calculating reused elements.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to reflect the final design and address incomplete or outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- Submit final Life-Cycle Impact Reduction, Building and Material Reuse Credit Form (for all modernization and renovation projects).
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

LEED for Schools v4 MR Credit
Building Life-Cycle Impact Reduction, Option 3

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

ISO 14044
https://www.iso.org/standard/38498.html

Table 2. Example of calculating reuse for existing buildings and materials

Structure, enclosure, or interior element	Existing area (ft^2)	Reused area (ft^2)	Percentage reused
On-grade floor assembly			
Foundation, slab on grade	18,230	18,230	100.00%
Subfloor	17,500	15,000	85.70%
Carpet	10,000	0	0.00%
2nd-floor assembly			
Structural deck	18,230	18,230	100.00%
Hardwood flooring	10,000	2,500	25.00%
Salvaged wood flooring from barn	7,500	7,500	100.00%
Ceiling tiles	14,500	7,000	48.30%
Roof assembly			
Roof deck	18,000	7,630	42.40%
Asbestos ceiling tiles (hazardous material removed)	13,250	-	-
1st-floor wall assembly (excluding windows)			
Brick enclosure	16,460	16,460	100.00%
Sheathing	15,000	8,400	56.00%
Insulation	7,700	0	0.00%
Salvaged doors from off site	105	105	100.00%
2nd-floor wall assembly (excluding windows)			
Brick enclosure	16,460	16,000	97.20%
Steel structure	16,460	16,460	100.00%
Drywall	15,300	9,400	61.40%
TOTAL	**214,695**	**142,915**	**66.60%**

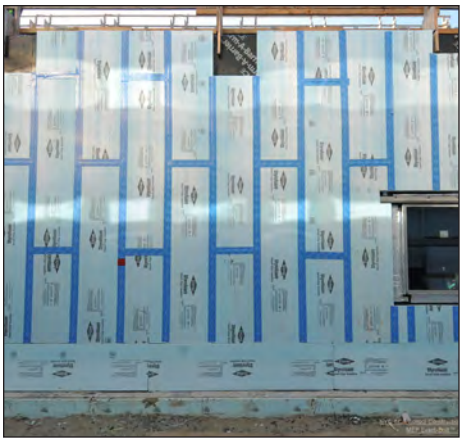
M

M4.1R – WALLBOARD & ROOF DECK PRODUCTS, MOLD RESISTANCE

Intent

To incorporate mold resistant materials at the building envelope and interior, including wallboard and roof deck products.

This credit is required for all projects.



Requirements

Select materials for exterior envelope construction that are resistant to mold. Incorporate mold resistance standards in specifications for applicable materials at the building envelope. Identify any materials to be used on the project that are potentially prone to mold and provide the means to prevent mold and damage.

M

Implementation

The SCA standards and specifications call for materials at the building envelope that contains little or no organic material. The standard for exterior wall construction is brick and block cavity wall. The standard for roof deck is concrete on metal deck.

The Standard Specifications include requirements for compliance with mold resistant standards for wallboard, spray fireproofing and building insulation. The standards referenced in the specification are included for reference in the “Other References” section on the facing page.

SCA standard details have been developed to address the critical element in mold resistance: water penetration.

Section S01550 and S01560 describe the methods of protection of mold susceptible material during the construction process.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in specifications.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

NY-CHPS Version 1.1 2007 Credit 4.1.1
Wallboard & Roof Deck Products

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01550 Indoor Air Quality (IAQ) Requirements
S01560 Installation Sequence of Finish Materials
06100 Rough Carpentry
07212 Miscellaneous Building Insulation
07250 Sprayed Fire-Resistive Materials
09260 Gypsum Board Assemblies

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASTM C1338-14 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings

ASTM D2020-92(2003) Standard Test Methods for Mildew (Fungus) Resistance of Paper and Paperboard

ASTM D4300-01(2013) Standard Test Methods for Ability of Adhesive Films to Support or Resist the Growth of Fungi

ASTM G21-15 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

INDOOR ENVIRONMENTAL QUALITY

The Indoor Environmental Quality (Q) category rewards decisions made by project teams about indoor air quality and thermal, visual, and acoustic comfort. Green schools with good indoor environmental quality protect the health and comfort of students, teachers and staff. High-quality indoor environments also enhance the learning environment and decrease absenteeism. This category addresses the myriad design strategies and environmental factors—air quality, lighting quality, acoustic design, control over one's surroundings—that influence the way people learn, work, and live.

Because of the high rates of asthma among NYC school children and concerns about the health of students and staff, the SCA has placed great emphasis on this section of the NYC Green Schools Guide

The credits in this section improve indoor environmental quality during construction and after occupancy by requiring a higher standard of performance relating to:

- Construction practices.
- Operational and maintenance practices.
- Selection of low-emitting materials.
- Improved ventilation.
- Air-flow monitoring and verification.
- Managing air contaminants.

IEQ improvements are provided throughout the school and include:

- Natural daylighting and views, with glare control measures.
- Direct-Indirect artificial lighting and controls.
- Improved acoustic performance.
- Thermal comfort control.
- Improved air filtration.
- Reduced levels of indoor air contaminants.

The Q category combines traditional approaches, such as ventilation and thermal control, with emerging design strategies, including a holistic, emissions-based approach (Credit Q4.1 Low-Emitting Materials), source control and monitoring for user-determined contaminants (Credit Q1.2R and Q1.3A Enhanced Indoor Air Quality Strategies credits), requirements for lighting quality (Credit Q6.1 and Q6.2 Interior Lighting credits), and advanced lighting metrics (Credit Q7.1 Daylight). Together, these measures will provide a healthy, comfortable indoor environment for NYC public schools.

Q1.1P – MINIMUM IAQ PERFORMANCE

Intent

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

This credit is required for all projects.

Requirements

Ventilation

Determine the minimum outdoor air intake flow for mechanical ventilation systems using the ventilation rate procedure from ASHRAE 62.1–2010 with errata. Meet the minimum requirements of ASHRAE 62.1–2010, Section 4 – 7, Ventilation for Acceptable Indoor Air Quality (with errata) or New York City Mechanical Code, if more stringent.

Monitoring

Monitor outdoor intake flows as follows:

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

Implementation

Mechanical ventilation, as opposed to natural ventilation, is the SCA standard because it facilitates control of indoor temperature and humidity conditions. The Indoor Air Quality Procedure defined in ASHRAE 62.1- 2010 may not be used to comply with these requirements. The Ventilation Rate Procedure must be employed. The SCA Design Requirements, Specifications, and Details provide the methodology to achieve this credit.

Section 4 of ASHRAE 62.1-2010 addresses analysis of outdoor air quality. The current EPA Green Book for contaminants indicates that the New York City region is in a "Nonattainment" zone for 8-hour ozone (2008) concentration, while Manhattan is a "Nonattainment" zone or Particulate Matter - PM-10 (1987). The New York City Area is also in a "Maintenance" category for Carbon Monoxide (1971) and the 24-hour PM-2.5 (2006).

- On 5/14/16, New York City was defined as a "Moderate ozone non-attainment" area with a 2012-2014 design value of 0.085 ppm and a 2014 4th highest daily maximum 8-hour average of 0.081 ppm. This is less than the 0.107 ppm level where LEED currently recommends employment of air filtration/cleaning to address ozone. Thus, special carbon/sorbent filters are not required for NYC Moderate ozone non-attainment areas.
- Manhattan is deemed an area of Moderate nonattainment for PM-10. For the 24-hour PM-2.5 (2006) standard, the New York City Region is in a maintenance category. MERV 13 filters are required by Enhanced IAQ Source Control Credit Q1.2 and are included in the SCA standards for fresh air intake. The usage of MERV 13 filters is an SCA elected requirement implemented to improve indoor air quality and addresses the nonattainment for PM-10.

The designer is to request the IEH unit to perform a walk-around observational survey (ASHRAE Outdoor Air Assessment-OAA) of the building site and its immediate surroundings, which is to be conducted during normal occupancy hours, to identify any possible local contaminants that might exceed their maximum acceptable concentrations. If the site is found during the OAA investigations to have possible local air quality issues using SEQRA parameters that require further investigation, the designer or the SCA is to engage a consultant specializing in air quality modeling to perform the following process:

1. Gather additional information - Research would be performed related to the sources identified in the IEH OAA, including permit research, to support air quality modeling
2. Perform screening-level analysis - Based on the information gathered during step 1, a screening-level model would be developed to identify the potential impacts of proximate sources
3. Detailed design evaluation - If sources could not be eliminated by the screening-level model, a CFD model is to be performed to determine if air intakes should be moved or active air quality controls (e.g carbon filtration) need to be implemented.

Compliance with the other three referenced sections of ASHRAE 62.1-2010 is summarized below.

- Section 5. Systems and Equipment –- Requirements for outdoor air intake and exhaust, filtration, dehumidification, and recirculation of air and relative humidity.
- Section 6 Procedures – For Mechanically Ventilated Spaces, calculations pertaining to the Ventilation Rate Procedure (VRP) methodology found in Section 6.2 of ASHRAE 62.1-2010 shall be used.
- Section 7 Construction and Systems Start-up – Protection, construction, start-up, field testing and balancing.

Incorporate airflow monitoring equipment into the HVAC system design. SCA Design Requirements, Standard Details and Standard Specifications include airflow stations and monitoring requirements. Airflow stations shall be provided at all outside air intake air systems of central air distribution systems.

- Airflow stations shall be calibrated on a yearly basis by DOE/DSF staff or as indicated by manufacturer recommendations.
- Information shall be kept three years from the date of collection and shall be made available to the public upon request.

Credit Submittals

SCHEMATIC DESIGN

Submit a report describing the outdoor air assessment of the site as per ASHRAE 62.1 2010 (Standard) Section 4.0 Outdoor Air Quality. The assessment shall include a qualitative evaluation of regional and local air quality and does not include air sampling, modeling, or other detailed analysis. The report shall include at minimum:

- Date and time of observations
- Site description
- Description of facilities on site and on adjoining properties
- Observation of odors, irritants, visible plumes, or visible air contaminants
- Description of sources of vehicle exhaust on site and on adjoining properties
- Identification of potential contaminant sources on the site and from adjoining properties.
- Conclusions regarding the acceptability of outdoor air quality based on consideration of information from investigation.
- If particular contaminants or sources are provide reason for concern, reference ASHRAE 62.1 2010 Appendix B Summary of Selected Air Quality Guidelines.
- Results of the ASHRAE Outdoor Air Assessment report and note any suspected source pollutants and if the report recommends a more detailed analysis. If a more detailed analysis is required, discuss with SCA so a Computational Fluid Dynamics (CFD) model can be authorized.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identify applicable SCA standards to be incorporated into the design documents. Include in the narrative:
  - If results of CFD modeling indicate problematic air contaminants, identify remedial measures planned to be taken (filtration/air cleaning, etc.) to address problematic air contaminants.
  - Describe the proposed ventilation system design and note any special considerations relating to compliance.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit the results of the detailed screening level model and design recommendations to implement the results, if any. Identify remedial measures planned to be taken (filtration/air cleaning, etc.) to address problematic air contaminants and include the design in the documents where applicable.
- Submit ventilation calculations verifying compliance with Table 6-1 of ASHRAE 62.1 entitled "Minimum Ventilation Rates in Breathing Zone".
- Incorporate credit requirements in construction documents.
- Submit Minimum Indoor Air Quality Performance Credit Form.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

Per the Project Specifications:

- Provide air balancing report cover page including the approval stamp.

References

LEED for Schools v4 IEQ Prerequisite
Minimum Indoor Air Quality Performance, Mechanically Ventilated Spaces

NY-CHPS Version 1.1 2007 Credit 5.3.13
Air Flow Stations

SCA DESIGN REQUIREMENTS

6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
6.2.1 HVAC Unit Centralization and Coordination
6.2.3 Non-Assembly Spaces (Classrooms,Offices,etc.)
6.2.4 Public Assembly Spaces
6.2.9 Heating and Cooling Design Parameters (Load Calculations)

SCA STANDARD SPECIFICATIONS

S01550 Indoor Air Quality Requirements
15781 Packaged Heating and Cooling Units
15852 Air Handling Units
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units
15933 Dedicated Outside Air System (DOAS) Air Handling Units
15934 Rooftop Air Handling Units for Public Assembly Spaces (Constant Volume System)
15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15985 Sequence of Operations
15992 Cleaning and Testing
15993 Balancing of Systems

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

ASHRAE 62.1–2010-Ventilation for Acceptable Indoor Air Quality

ASHRAE Indoor Air Quality Guide – 2009

New York City Region Community Air Survey
www1.nyc.gov/site/doh/data/data-publications/air-quality-nyc-community-air-survey.page

EPA Creating Healthy Indoor Air Quality in Schools
www.epa.gov/iaq-schools

EPA Nonattainment Areas for Criteria Pollutants (Green Book) www.epa.gov/green-book

Building Assessment Survey and Evaluation (BASE) Study
www.epa.gov/indoor-air-quality-iaq/building-assessment-survey-and-evaluation-study

Q1.2R – ENHANCED IAQ SOURCE CONTROL

Intent

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

This credit is required for all projects.

Requirements

Design to reduce and control pollutant entry into buildings and later cross-contamination of all occupied areas.

Entryway Systems

Employ permanent entryway systems at least ten feet long in the primary direction of travel to capture dirt and particulates from entering the building at regular entry points that are directly connected to the outdoors. Acceptable entryway systems include permanently installed grates, grilles or slotted systems that allow for cleaning underneath. Qualifying entryways are those that serve as regular entry points for students or staff.

Interior Cross-Contamination Prevention

Sufficiently exhaust each space where hazardous gases or chemicals may be present or used (including Science Labs, Janitor's Sink Closets, Grounds Equipment Storeroom, Receiving and General Storage, copying/printing rooms and garage areas), using the exhaust rates determined in Credit Q1.1P Minimum Indoor Air Quality Performance or a minimum of 0.50 cfm per square foot, to create negative air balance with respect to adjacent spaces with the doors to the room closed. For each of these spaces, provide self-closing doors and deck-to-deck partitions or a hard-lid ceiling.

Filtration

Provide occupied areas with air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better. Unit ventilator filters shall have a MERV of a minimum of 7 (consistent with NY-CHPS requirements). Filtration should be applied to both return and outside air that is to be delivered as supply air. Replace all air filtration media after completion of construction and before occupancy.

Q

Implementation

Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building. For renovation or additions where the scope of the project does not include an exterior entrance, entryway systems do not need to be installed. However, if the project scope includes an entrance that would qualify as a high volume exterior entrance, then the team must ensure that appropriate entryway systems are also installed.

Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants, even if green cleaning policies are adopted. Maintain physical isolation from the rest of the regularly occupied areas of the building. Additional ductwork and exhaust fans may be needed to achieve the required ventilation and negative pressure. If possible, stack these areas and/or locate rooms adjacent to outside walls and each other.

In general, exhaust rates are prescribed by Credit Q1.1P Minimum IAQ Performance. However, if there is not a requirement for a particular space type, a minimum exhaust rate of 0.5 cfm/sf must be used. ASHRAE 62.1-2010, Table 6-4 lists numerous spaces whose exhaust requirements exceed the 0.5 cfm/sf rate (such as art classrooms, janitor's closets, kitchens, locker rooms, and toilets). Exhaust rates for these spaces must be maintained at all times, even when the building is not occupied. If supply air is being provided to the room, the exhaust rate must be sufficient to create a negative pressure with respect to adjacent spaces when the doors to the room are closed. No recirculation of air from these rooms is permitted.

The use of hazardous materials in schools is limited and other than cleaning and maintenance areas, separate containment area will typically not need to be provided. Copying and printing rooms with convenience printers and copiers do not have to be addressed by this credit.

Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents. List designated entryways and any special circumstances or non-standard compliance paths taken by the project.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents, including showing filter rating on drawings.
- Entryways: provide scaled floor plans or plan details showing locations and measurements.
- Interior cross-contamination prevention: list of rooms, areas, exhaust rate, and separation method.
- Filtration: mechanical schedules highlighting MERV or class ratings for all units that supply outdoor air.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Enhanced Indoor Quality Strategies, Option 1 for Mechanically Ventilated Spaces

NY-CHPS Version 1.1 2007 Credit 5.3.2
Filter Efficiency

SCA DESIGN REQUIREMENTS

1.3.4.1 Entrances and Exits
6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
6.2.28 HVAC Design Requirements for Special Spaces

SCA STANDARD SPECIFICATIONS

12485 Foot Grilles
15781 Packaged Heating and Cooling Units
15852 Air Handling Units
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units
15857 Unit Ventilator
15934 Rooftop Air Handling Units for Public Assembly Spaces (Constant Volume System)
15993 Balancing of Systems

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

Janitorial products pollution prevention
http://wsppn.org/studies/janitorial/

U.S. EPA green cleaning product information
www.epa.gov/opptintr/epp

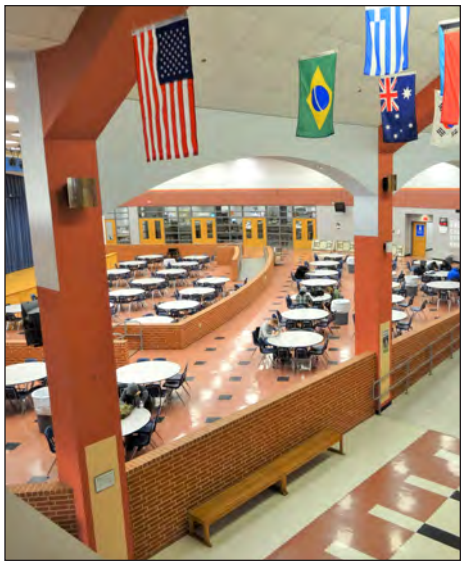
National Ambient Air Quality Standards (NAAQS)
https://www.epa.gov/naaqs

Q1.3A – ENHANCED IAQ VENTILATION & MONITORING

Intent

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

This credit is optional and may only be pursued with SCA direction/permission.



Requirements

Design for at least one of the following options (select one):

Option 1. Exterior Contamination Prevention

Design the project to minimize and control the entry of pollutants into the building. Ensure through the results of computational fluid dynamics modeling, Gaussian dispersion analyses, wind tunnel modeling, or tracer gas modeling that outdoor air contaminant concentrations at outdoor air intakes are below the thresholds listed in **Table 1**: Maximum concentrations of pollutants at outdoor air intakes. ASHRAE Minimum separation distances for air intake is listed in **Table 2.**

Pollutants regulated by the National Ambient Air Quality Standards (NAAQS) include carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution, and sulfur dioxide. The analysis must confirm that all NAAQS regulated pollutant concentrations are below or within 2.5% of the annual average, eight-hour or 24-hour average where an average standard does not exist, or the rolling three-month average. NAAQS is shown in **Table 3.**

Option 2. Carbon Dioxide Monitoring

Monitor CO_2 concentrations within all densely occupied spaces (25 people per 1,000 square feet). CO_2 monitors must be between 3 and 6 feet above the floor. CO_2 monitors must have an audible or visual indicator or alert the building automation system if the sensed CO_2 concentration exceeds the setpoint by more than 10%. Calculate appropriate CO_2 setpoints using method in ASHRAE 62.1-2010, Appendix C.

Option 3. Additional Source Control and Monitoring

For spaces where air contaminants are likely, evaluate potential sources of additional air contaminants besides CO_2 such as hazardous cleaning supplies and laboratory chemicals. Develop and implement a materials-handling plan to reduce the likelihood of contaminant release. Install monitoring systems with sensors designed to detect the specific contaminants. An alarm must indicate any unusual or unsafe conditions.

Q

Implementation

Exterior Contamination Prevention

Design outdoor air intakes to minimize and control the entry of pollutants. Locate outdoor air intakes away from nearby sources of pollutants. Avoid below-grade locations in areaways and locations near roof-mounted exhausts. Air intakes located one-third of the way up the side of the building tend to work best. ASHRAE 62.1-2010 Table 5-1 lists minimum separation distances for air intakes.

Perform a Level 1 screening to determine whether the concentrations for the pollutants regulated by NAAQS at outdoor air intakes are below the allowable average at worst-case meteorological conditions. If all pollutant concentrations are well below the required thresholds, no further modeling is required. If the Level 1 screening indicates noncompliance, or a small margin of compliance, consider modifying the air filtration or locations of the outdoor air intake and / or perform a Level 2 screening with more detailed inputs pertaining to atmospheric processes, building geometry, and emissions concentrations. Level 2 may require a different modeling technique or software.

CO_2 Monitoring

Compliant CO_2 sensors must be located in the breathing zone of each densely occupied space. Sensors installed in return air ducts do not meet the requirements. Determine CO_2 concentration setpoint(s) using the methods in ASHRAE 62.1-2010, Appendix C. See ASHRAE 62.1-2010 User's Manual, Appendix A for calculations and examples. CO_2 sensors can but are nor required to be incorporated into the HVAC control system.

Alarms may be audible or visual indicators to space occupants or building automation system alerts.

Additional Source Control and Monitoring

Identify a reference standard and exposure limit for each potential hazard. The monitoring system must be permanent, continuous, and configured to generate an alarm. Include the contaminant monitoring in the commissioning process for Credit E1.1P Fundamental Commissioning and incorporate a description of how the alarm setpoints were established in the operations and maintenance manual.

Table 1. Maximum concentrations of pollutants at outdoor air intakes		
Pollutants	Maximum concentration	Standard
Those regulated by National Ambient Air Quality Standards (NAAQS)	Allowable annual average **OR** 8-hour or 24-hour average where an annual standard does not exist **OR** Rolling 3-month average	National Ambient Air Quality Standards (NAAQS)

Table 2. Air Intake Minimum Separation Distance - from ASHRAE 62.1-2010 Table 5-1	
Object	Minimum Distance, ft
Class 2 air exhaust/relief outlet (Note 1)	10
Class 3 air exhaust/relief outlet (Note 1)	15
Class 4 air exhaust/relief outlet (Note 2)	30
Plumbing vents terminating less than 3 ft (1 m) above the level of the outdoor air intake	10
Plumbing vents terminating at least 3 ft (1 m) above the level of the outdoor air intake	3
Vents, chimneys, and flues from combustion appliances and equipment (Note 3)	15
Garage entry, automobile loading area, or drive-in queue (Note 4)	15
Truck loading area or dock, bus parking/idling area (Note 4)	25
Driveway, street, or parking place (Note 4)	5
Thoroughfare with high traffic volume	25
Roof, landscaped grade, or other surface directly below intake (Notes 5 and 6)	1
Garbage storage/pick-up area, dumpsters	15
Cooling tower intake or basin	15
Cooling tower exhaust	25

Note 1: This requirements applies to the distance from the outdoor air intakes for one ventilation system to the exhaust/relief outlets for any other ventilation system.

Note 2: Minimum distance listed does not apply to laboratory fume hood exhaust air outlets. Separation criteria for fume hood exhaust shall be in compliance with NFPA 45 and ANSI/AIHA Z9.5. Information on separation criteria for industrial environments can be found in the ACGIH Industrial Ventilation Manual and in the ASHRAE Handbook—HVAC Applications.

Note 3: Shorter separation distances shall be permitted when determined in accordance with (a) ANSI Z223.1/NFPA 54 for fuel gas burning appliances and equipment, (b) NFPA 31 for oil burning appliances and equipment, or (c) NFPA 211 for other combustion appliances and equipment.

Note 4: Distance measured to closest place that vehicle exhaust is likely to be located.

Note 5: Shorter separation distance shall be permitted where outdoor surfaces are sloped more than 45 degrees from horizontal or that are less than 1 in. (3 cm) wide.

Note 6: Where snow accumulation is expected, the surface of the snow at the expected average snow depth constitutes the "other surface directly below intake."

Table 3. National Ambient Air Quality Standards					
Pollutant		**Primary/Secondary**	**Averaging Time**	**Level**	**Form**
Carbon Monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary & Secondary	Rolling 3 month average	0.15 μ/m^3	Not to be exceeded
Nitrogetn Dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary & Secondary	1 year	53 ppb	Annual Mean
Ozone (O_3)		Primary & Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	Primary	1 year	12 μ/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15 μ/m^3	Annual mean, averaged over 3 years
		Primary & Secondary	24 hours	35 μ/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary & Secondary	24 hours	150 μ/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1 hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Q1.3A – ENHANCED IAQ VENTILATION & MONITORING (CONT.)

Q

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance. Identify applicable SCA standards to be incorporated into the design documents and note any special circumstances or non-standard compliance paths taken by the project. Describe sensors, airflow stations, and monitoring systems and note any special considerations relating to compliance. If pursuing Carbon Dioxide Monitoring, list potential indoor air contaminants based on space use. Identify priorities and a reference standard and exposure limit for each.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents, including showing filter rating on drawings.
- Perform all required calculations to confirm compliance.
- For Option 2, include CO_2 sensors for all densely occupied spaces.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

- Submit a copy of the air balancing report cover page and include the approval stamp.
- Verify operation of flow measuring stations and CO_2 sensors.

References

LEED for Schools v4 IEQ Credit
Enhanced Indoor Air Quality Strategies

NY-CHPS Version 1.1 2007 Credit 5.3.2
Filter Efficiency

SCA DESIGN REQUIREMENTS

1.3.4.1 Entrances and Exits
6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
6.2.1 HVAC Unit Centralization and Coordination
6.2.3 Non-Assembly Spaces (Classrooms, Offices, etc.)
6.2.4 Public Assembly Spaces
6.2.9 Heating and Cooling Design Parameters (Load Calculations)
6.2.28 HVAC Design Requirements for Special Spaces

SCA STANDARD SPECIFICATIONS

15781 Packaged Heating and Cooling Units
15852 Air Handling Units
15853 Custom Packaged Rooftop Heating and Cooling Units (Variable Air Volume System)
15854 Custom Packaged Rooftop Heating and Cooling Units (Constant Volume System)
15855 Commercial Packaged Rooftop Heating and Cooling Units
15857 Unit Ventilator
15970 Temperature Control System (BACnet BMS/DDC With School Operating Console)
15985 Sequence of Operations

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

ASHRAE 62.1-2010

National Ambient Air Quality Standards (NAAQS)
https://www.epa.gov/naaqs

Q2.1R – CONSTRUCTION IAQ MANAGEMENT PLAN

Intent

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

This credit is required for all projects.

Requirements

Develop and implement an Indoor Air Quality (IAQ) Management Plan for the construction and pre-occupancy phases of the building as follows:

- During construction, meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) IAQ Guidelines For Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- Protect absorptive materials that are either stored on-site or installed from moisture damage.
- Develop and implement a dust control plan.
- If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) 8 shall be used at each return air inlet (i.e., grilles, registers, openings in ductwork where ceilings are used as return air plenums) as determined by ASHRAE 52.2-2007.
- Replace all permanently required filtration media immediately prior to occupancy.
- Prohibit smoking inside the building and within 25' of construction site.

Mechanically exhaust materials that emit Volatile Organic Compounds (VOCs) or urea formaldehyde during installation. Continue ventilation of those materials after installation for at least 72 hours or until emissions dissipate. Materials that comply with low emissions criteria in Credits Q4.1-Q4.2A may be exempt from these requirements.

Use high-efficiency particulate arrestor (HEPA) vacuum on carpeted and soft surfaces prior to substantial completion. For phased, occupied renovations, HEPA vacuum any carpet daily in occupied areas.

Implementation

The SCA specification Section S01550, Indoor Air Quality Requirements, requires development and implementation of an IAQ plan by the Contractor consistent with this credit's requirements.

Section S01560 Installation Sequence of Finish Materials, requires the Contractor to sequence the installation of materials to avoid contamination of absorptive materials, such as insulation, carpeting, ceiling tile and gypsum wallboard.

Ensure careful implementation of the following IAQ management requirements:

Building materials, such as wood, porous insulation, paper and fabric, shall be kept dry to prevent the growth of mold and bacteria.

Schedule deliveries so that materials that are susceptible to mold growth are installed after the construction area is watertight.

During construction, cover these materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials. Provide site drainage as needed.

Drying of water-damaged materials shall begin within 24 hours of water damage. Due to the possibility of mold and bacterial growth, materials that are damp or wet for more than 48 hours may need to be discarded as determined by the SCA.

Immediately remove materials showing signs of mold and mildew, including any with moisture stains, from the site and properly dispose of them. Replace moldy materials with new, undamaged materials.

If it is not possible to install high VOC-emitting products before porous and fibrous materials (such as carpet) are installed, protect porous materials with polyethylene vapor retarders.

A copy of the IAQ Management plan should be kept on site in an accessible area throughout construction. Consider holding a subcontractors' orientation meeting to review the IAQ plan requirements. During regular job walks, the general Contractor and the A/E of Record should verify successful implementation of the actual IAQ management procedures. Dated photographs illustrating indoor air and environmental quality measures (HVAC protection, source control, pathway interruption, housekeeping, scheduling) should be taken and annotated on a monthly basis, at minimum.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements for IAQ Management Plan in the construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

Provide in accordance with the Project Specifications:

- IAQ Management plan or detailed checklist, highlighting nonsmoking policy
- Narrative describing protection measures for absorbent materials
- Annotated and dated photographs of six different indoor air and environmental quality measures (HVAC protection, source control, pathway interruption, housekeeping, scheduling)
- Record of filtration media
- Where non-compliant material for VOC or urea-formaldehyde has been inadvertently installed, provide narrative stating area was flushed for 72 hours.
- Statement signed by the Contractor attesting to the completion of the final cleaning of all surfaces according to contract requirements.
- Submit the complete and initialed Contractor Certification Form.

References

LEED for Schools v4 IEQ Credit
Construction Indoor Air Quality Management Plan

NY-CHPS Version 1.1 2007 Credit 5.4.3
Filters During Construction
Credits 5.4.4-5.4.6
Construction IAQ Ventilation of VOCs, HEPA Vacuuming, and Dust Protection

NY-CHPS Version 1.0 Credit 5.4.2
Mold Prevention

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01550 Indoor Air Quality Requirements
S01560 Installation Sequence of Finish Materials

SCA STANDARD DETAILS

None

OTHER REFERENCES

Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3)
www.smacna.org

NYSERDA Executive Order No. 111, "Green and Clean" State Buildings and Vehicles Guidelines, ogs.ny.gov/BU/DC/docs/pdf/exorder111guidelines.pdf

U.S. EPA Construction Indoor Air Quality Tools for Schools
www.epa.gov/iaq/schooldesign/controlling.html

ASHRAE 52.2-2007; Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.

Air Quality Scientific Findings Resource Bank
https://iaqscience.lbl.gov/

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

Q2.2R – BUILDING IAQ FLUSH-OUT

Intent

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

This credit is required for all projects.

Requirements

Select one of the following two flush-out options to be implemented after construction ends and the building has been completely cleaned. All interior finishes, such as millwork, doors, paint, carpet, acoustic tiles, and movable furnishings (e.g., workstations, partitions), must be installed, and major VOC punch list items must be finished. The options cannot be combined.

Option 1. Before Occupancy (Preferred)

The SCA preferred option is to perform a full building flush-out prior to occupancy. Install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%.

OR

Option 2. Before and During Occupancy

Only if it is determined that there is not enough time for full flush-out in the construction schedule, the space may be occupied after delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of gross floor area while maintaining an internal temperature of at least 60°F and no higher than 80°F and relative humidity no higher than 60%.

Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic foot per minute (cfm) per square foot of outdoor air or the design minimum outdoor air rate determined in Credit Q1.1P Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin at least three hours before occupancy and continue during occupancy.

These conditions must be maintained until a total of 14,000 cubic feet per square foot of outdoor air has been delivered to the space.

Equation 1. Flush-out outdoor air volume				
Cubic feet of outdoor air needed prior to occupancy	=	Area (sq. ft)	×	14,000 cfm

Equation 2. Flush-out outdoor air volume before occupancy				
Cubic feet of outdoor air needed prior to occupancy	=	Area (sq. ft)	×	3,500 cfm

Equation 3. Flush-out outdoor air volume during occupancy				
Cubic feet of outdoor air needed during occupancy to complete flush-out	=	Area (sq. ft)	×	10,500 cfm

Equation 4. Flush-out duration

$$\text{Duration (days)} = \left[\frac{(\text{Area (sq.ft)} \times 14{,}000 \text{ cfm})}{(\text{Air handler capacity} \div 1440 \text{ minutes/day})} \right]$$

Implementation

Ensure the Construction IAQ Management Plan per Credit Q1.1R has been followed throughout construction. This plan will protect the indoor air quality of the building to the highest extent possible during construction.

The SCA specifications include Section S01550, Indoor Air Quality Requirements. Complete the Building IAQ Flush-Out Credit Form to calculate the volume of outdoor air needed per **Equation 1**. If pursuing Option 2, calculations to determine the amount of flush-out needed prior to and during occupancy are based on **Equation 2** and **Equation 3. Equation 4** then translates the total volume of air needed into the duration in number of days which will inform the project schedule. For a typical 100,000 SF building, the full 14,000 cubic feet of outdoor air during full flush-out prior to occupancy is calculated to take over three weeks and the 3,500 cubic feet of outdoor air for flush-out was estimated to take approximately one week.

The quantity of outside air delivered shall include, in the aggregate, the total of all outside air flows as measured by the outside air flow stations.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in the construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR'S RESPONSIBILITY

Provide in accordance with the Project Specifications:

- A construction schedule highlighting the flush-out period at the beginning of the project.
- Construction schedule showing actual dates of flush-out.
- Submit Building IAQ Flush-Out Credit Form, including the following details of the project specific flush-out that was performed:
  - actual flush-out start and end date
  - the date of occupancy
  - air rates, air volumes, and temperature and humidity levels maintained during the flush-out
  - calculations to determine the total volume of outside air required to comply with the flush-out requirement, and the required amount of time to deliver this amount of air (at a minimum position of the designed air flow rate per HVAC unit).
- Document signed by the contractor attesting that all interior finishes, movable furnishings, and major VOC punch list items were installed and complete before beginning the flush-out.
- Submit the complete and initialed Contractor Certification Form.

A/EoR's RESPONSIBILITY

- Initial Contractor's Building IAQ Flush-Out Credit Form to confirm compliant implementation of the credit requirements in accordance with the Contractor's IAQ plan.

References

LEED for Schools v4 IEQ Credit
Indoor Air Quality Assessment, Option 1

NY-CHPS Version 1.1 2007
Credit 5.4.7 Construction IAQ, Building Flush-Out

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01352 Sustainability Requirements
S01550 Indoor Air Quality Requirements

SCA STANDARD DETAILS

None

OTHER REFERENCES

U.S. EPA Construction Indoor Air Quality Tools for Schools
https://www.epa.gov/iaq-schools

Air Quality Scientific Findings Resource Bank
https://iaqscience.lbl.gov/

Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3)
www.smacna.org

SCA GSG Architect-PO Construction Toolkit

SCA GSG Contractor Construction Toolkit

Q3.1R – ELECTRIC IGNITION STOVES

Intent

Avoid accumulation of carbon monoxide from pilot lights that can cause dangerous air quality conditions for staff and students by using electric ignition stoves.

This credit is required for all projects.

Requirements

Install only electric ignitions for all applicable gas-fired cooking appliances. In cases where compliant equipment is not available, provide a key operated safety shut off valve.

Q

Implementation

The SCA Standard Specifications require electric ignition on gas-fired cooking equipment for which this feature is available. Some equipment such as sectional ovens, gas deck type and the double deck ovens are not available with electric ignition.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative identifying applicable SCA standards to be incorporated into the design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR's RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

NY-CHPS Version 1.1 2007 Credit 5.3.5
Electric Ignition Stoves

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

11400 Food Service Equipment
11450 Domestic Type Equipment
11452 Culinary Arts Lab Equipment
15416 Gas Piping System

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

Q3.2R – POST CONSTRUCTION INDOOR AIR QUALITY

Intent

Reduce indoor airborne dust levels during cleaning activities.

This credit is required for all projects.

Requirements

High Efficiency Particulate Arrestor (HEPA) vacuums shall be provided through the SCA/F&E Unit as part of the initial equipment for the school.

Q

Implementation

HEPA vacuums are on the Custodial Initial Equipment list so they are part of the entitlement package for each new school addition or major modernization and renovation.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative stating that the initial equipment selection list provided by DOE/DSF will include two (2) HEPA vacuums.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

No credit submittal.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

SCA DESIGN PROJECT MANAGER'S RESPONSIBILITY

- Confirm custodial equipment list includes the HEPA vacuum.

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References

NY-CHPS Version 1.1 Credit 6.2.4
Purchase HEPA Vacuums

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

None

Q4.1 – LOW EMITTING MATERIALS, 3-5 CATEGORIES
Q4.2A – LOW EMITTING MATERIALS, 6 CATEGORIES

Intent

Reduce the concentration of chemical contaminants that can damage air quality, human health, productivity and the environment.

Credits Q4.1 is required, if feasible, for all projects. Q4.2A is optional and may only be pursued with SCA direction/permission.

Requirements

This credit covers volatile organic compound (VOC) emissions into indoor air and the VOC content of materials, as well as the testing methods by which indoor VOC emissions are determined. Different materials must meet different requirements to be considered compliant for this credit. The building interior and exterior are organized in six categories, each with different thresholds of compliance. The building interior is defined as everything within the waterproofing membrane. The building exterior is defined as everything outside and inclusive of the primary and secondary weatherproofing system, such as waterproofing membranes and air- and water-resistive barrier materials. Thresholds are listed in **Table 1**.

Table 1. Thresholds of compliance with emissions and content standards for 6 categories of materials

Category	Threshold	Emissions and content requirements
Interior paints and coatings applied on site	At least 90%, by volume, for emissions; 100% for VOC content	•General Emissions Evaluation for paints and coatings applied to walls, floors, and ceilings • VOC content requirements for wet applied products
Interior adhesives and sealants applied on site (including flooring adhesive)	At least 90%, by volume, for emissions; 100% for VOC content	• General Emissions Evaluation • VOC content requirements for wet applied products
Flooring	100%	General Emissions Evaluation
Composite wood	100% not covered by other categories	Composite Wood Evaluation
Ceilings, walls, thermal, and acoustic insulation	100%	General Emissions Evaluation
Exterior applied products	At least 90%, by volume	Exterior Applied Products

Table 2. Points for complaince based on chosen option

Credit	Option 1. Compliant Categories	Option 2. Budget Calculation, percent complaince	Points
Q4.1	3	≥ 50% and < 70%	1
	5	≥ 70% and < 90%	2
Q4.2A	6	≥ 90%	3

Option 1. Product Category Calculations

Points available for this option are based on number of compliant categories of products, and are listed in **Table 2.**

Option 2. Budget Calculation Method

If some products in a category do not meet the criteria, project teams may use the budget calculation method. Point allocation for budget calculation method is also listed in **Table 2**. The budget method organizes the building interior into five assemblies.

- Flooring
- Ceilings
- Walls
- Thermal and acoustic insulation

Implementation

The SCA Standard Specifications specify low-emitting adhesives and sealants and require Contractors to submit documentation of VOC content. The limits are included in specification section G01600, Material and Equipment. These limits are equal to or more stringent than current New York State VOC limits. Any products that are within the Low Emitting compliance categories added to a specific project's specifications must meet the specific requirements for this credit. Therefore, Option 1 is preferred and to be used unless there is an error during construction, in which case, the team may use Option 2 to verify compliance.

Collect product information and submit the Contractor's Healthy Materials Form table regularly throughout construction per specification section S01352 Sustainability. Design Teams must review the low-emitting criteria provided in the Contractor's construction submittals and complete Low-Emitting Material Credit Form for compliance.

Exterior applied products within SCA Specifications may not currently meet requirements. Thus only the five other categories are to be pursued unless directed by the SCA.

Requirements (cont.)

Exterior applied products

Walls, ceilings, and flooring are defined as building interior products; each layer of the assembly, including paints, coatings, adhesives, and sealants, must be evaluated for compliance. Insulation is tracked separately.

Determine the total percentage of compliant materials according to **Equation 1** or **Equation 2.**

Calculate surface area of assembly layers based on the manufacturer's documentation for application. Use **Equation 3** to calculate compliance percentages.

If 90% of an assembly meets the criteria, the system counts as 100% compliant. If less than 50% of an assembly meets the criteria, the assembly counts as 0% compliant.

Equation 1. Total percentage compliance

$$\text{Total \% compliant for projects without furniture} = \left[\frac{(\text{\% compliant walls} + \text{\% compliant ceilings} + \text{\% compliant flooring} + \text{\% compliant insulation})}{4} \right]$$

Equation 2. Total percentage compliance

$$\text{Total \% compliant for projects without furniture} = \left[\frac{(\text{\% compliant walls} + \text{\% compliant ceilings} + \text{\% compliant flooring} + \text{\% compliant insulation}) + (\text{\% compliant exterior finishes})}{5} \right]$$

Equation 3. System percentage compliant

$$\text{Flooring, walls, ceilings, insulation, \% compliant} = \left[\frac{(\text{compliant surface area of layer 1} + \text{compliant surface area of layer 2} + \text{compliant surface area of layer 3} + \ldots)}{(\text{total surface area of layer 1} + \text{total surface area of layer 2} + \text{total surface area of layer 3} + \ldots)} \right] \times 100$$

Emissions and Content Requirements

Manufacturers' Claims

Both first-party and third-party statements of product compliance must follow the guidelines in CDPH SM v1.1-2010 Section 8. Organizations that certify manufacturers' claims must be accredited under ISO Guide 65.

Laboratory Requirements

Testing methods must be accredited under ISO/IEC 17025.

Inherently Non-emitting Sources

Products that are inherently non-emitting sources of VOCs (stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring) are considered fully compliant without any VOC emissions testing if they do not include integral organic-based surface coatings, binders, or sealants.

General Emissions Evaluation

Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.1–2010, using the applicable exposure scenario. The default scenario is the private office scenario. The manufacturer's or third-party certification must state the exposure scenario used to determine compliance. Claims of compliance for wet-applied products must state the amount applied in mass per surface area.

Continued on next page

References

LEED for Schools v4 IEQ Credit
Low- Emitting Materials

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

References throughout specifications
G01600 Material and Equipment
S01352 Sustainability Requirements
06100 Rough Carpentry
06200 Finish Carpentry
06410 Custom Casework
07900 Joint Sealers
08210 Wood Doors
08211 Wood Doors
08510 Steel Windows - Projected, Casement, Pivoted, Double-Hung
08524 Aluminum Projected Windows
08800 Miscellaneous Glazing
08920 Aluminum Curtain Walls
08921 Aluminum Storefront
09310 Ceramic Tile
09510 Acoustical Ceilings
09650 Resilent Flooring
09680 Carpet
09685 Tile Carpeting
10100 Visual Display Boards
10400 Identifying Devices
10415 Bulletin Boards, Glazed Display Boards, Display Cabinets and Cases
10652 Electronically Operated Folding Panel Partitions
10653 Manually Operated Folding Panel Partitions
10830 Mirrors
11600 Laboratory Equipment
12345 Soapstone
Div 15 All HVAC and P&D adhesive and sealers

SCA STANDARD DETAILS

None

OTHER REFERENCES

California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.2
https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/VOC.aspx

Green Seal Standards and Certification for Commercial Adhesives
www.greenseal.org/GreenBusiness/Standards.aspx?vid=ViewStandardDetail&cid=0&sid=22

Q4.1, Q4.2A – LOW EMITTING MATERIALS (CONT.)

Requirements (cont.)

Manufacturers' claims of compliance with the above requirements must also state the range of total VOCs after 14 days (336 hours), measured as specified in the CDPH Standard Method v1.1:

- 0.5 mg/m^3 or less;
- between 0.5 and 5.0 mg/m^3; or
- 5.0 mg/m^3 or more.

Wet-Applied Products

In addition to meeting the general requirements for VOC emissions (above), on-site wet-applied products must not contain excessive levels of VOCs for the health of the installers and other trades workers who are exposed to these products. To demonstrate compliance, a product or layer must meet the following requirements, as applicable. Disclosure of VOC content must be made by the manufacturer. Any testing must follow the test method specified in the applicable regulation.

- All paints and coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (CARB) 2007, Suggested Control Measure (SCM) for Architectural Coatings.
- All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by the methods specified in Rule 1168. The provisions of SCAQMD Rule 1168 do not apply to adhesives and sealants subject to state or federal consumer product VOC regulations.
- If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
- If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.
- Methylene chloride and perchloroethylene may not be intentionally added in paints, coatings, adhesives, or sealants.

Composite Wood Evaluation

Composite wood, as defined by the California Air Resources Board, Airborne Toxic Measure to Reduce Formaldehyde Emissions from Composite Wood Products Regulation, must be documented to have low formaldehyde emissions that meet the California Air Resources Board ATCM for formaldehyde requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde resins.

Exterior Applied Products

Adhesives, sealants, coatings, roofing, and waterproofing materials applied on site must meet the VOC limits of California Air Resources Board (CARB) 2007 Suggested Control Measure (SCM) for Architectural Coatings, and South Coast Air Quality Management District (SCAQMD), Rule 1168, effective July 1, 2005. Small containers of adhesives and sealants subject to state or federal consumer product VOC regulations are exempt. Two materials are prohibited and do not count toward total percentage compliance: hot-mopped asphalt for roofing, and coal tar sealants for parking lots and other paved surfaces.

Credit Submittals

Separate submissions are to be made for Q4.1 and Q4.2A respectively.

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into the design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.
- Submit a list of all exterior applied materials and products used on site.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

CONTRACTOR RESPONSIBILITY

- Submit the Contractor's Healthy Material Credit Form, entering all low-emitting materials.
- If Option 2 must be pursued, use USGBC Low Emitting Credit Calculator here: https://www.usgbc.org/resources/low-emitting-materials-calculator
- Provide supporting documentation to verify low-emitting compliance.

ARCHITECT'S RESPONSIBILITY

- Submit Low-Emitting Materials Credit Form based on approved construction submittals for specified products.
- Submit the complete and initialed Design Team Certification Form-Construction Phase.

References (cont.)

EPA Architectural and Industrial Maintenance (AIM) Coatings
https://www.epa.gov/sites/production/files/2017-09/documents/part205_11.pdf

The Carpet and Rug Institute
www.carpet-rug.org

An update on formaldehyde
https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/formaldehyde.pdf

CARB 93120 ATCM
https://www.arb.ca.gov/toxics/compwood/compwood.htm

South Coast Air Quality Management District Rule 1168
http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf

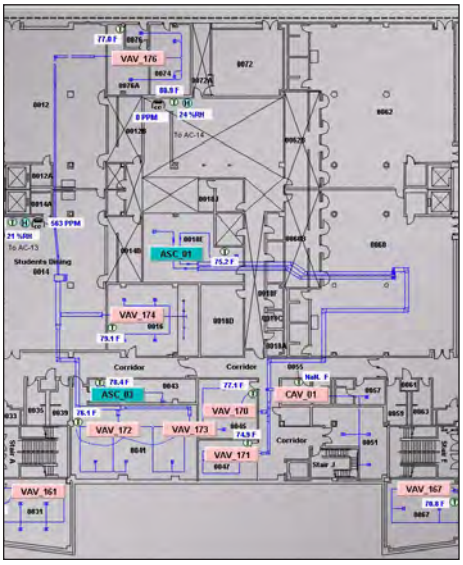
South Coast Air Quality Management District Rule 1113
http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf

Q5.1R – THERMAL COMFORT

Intent

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

This credit is required for all projects.



Requirements

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

Thermal Comfort Design

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

Gymnasiums, Fitness Areas, and Other Spaces with High Metabolic Rates

ASHRAE 55–2010, Normative Appendix A, permits use of a time-weighted average metabolic rate over a period of an hour or less. Any space with a rate of 2.0 MET or less must be addressed using standard compliance methods. Although the ASHRAE standard does not apply where the time-averaged metabolic rate is above 2.0 MET, thermal comfort in these spaces must still be addressed. For spaces with a rate above 2.0 MET, address how the project meets the intent of the credit. ISO 7730–2005 addresses metabolic rates up to 4.0 MET.

Kitchens

Many kitchens are not conditioned, not cooled, or are only indirectly cooled and may have difficulties achieving the requirements of ASHRAE 55–2010 or ISO 7730–2005. For kitchens that cannot meet the requirements of these standards, address how the project meets the intent of the credit.

Thermal Comfort Control

Provide individual thermal comfort controls for at least 50% of individual occupant spaces. Provide group thermal comfort controls for all shared multi-occupant spaces (instructional rooms, cafeterias, gyms, libraries, auditoriums).

Thermal comfort controls allow occupants, whether in individual spaces or shared multi-occupant spaces, to adjust at least one of the following in their local environment: air temperature, radiant temperature, air speed, and humidity.

Q

Implementation

The SCA standards incorporate requirements for prototypical HVAC systems that allow MEP designs to achieve the credit requirements.

Select Analysis Method(s)

Select the methodology for mechanically conditioned spaces from ASHRAE Standard 55–2010 Section 5.2, Methods for Determining Acceptable Conditions in Occupied Spaces, which will be used for the thermal comfort analysis:

- Section 5.2.1, Graphic Comfort Zone Method for Typical Indoor Environments.
- Section 5.2.1.2, Computer Model Method for General Indoor Application.
- Section 5.2.3.1, Graphic Elevated Air Speed Method.
- Section 5.2.3.2, SET Method.
- Section 5.2.4 must also be followed for potential sources of local discomfort.

Perform Analysis

Perform the analysis as described in the standard.

- Estimate occupants' personal factors, such as clothing and activity levels.
- Using the owner's comfort expectations, energy goals, and occupancy factors, set seasonal comfort criteria for operative temperature, humidity, and air speed for each programmed area. Refer to ASHRAE 55–2010, Appendices A and B, for recommended values.
- Calculate the effects of any likely local discomfort sources, such as radiant temperature asymmetry, vertical air temperature difference, floor surface temperature, and drafts, as described in Section 5.2.4.
- Confirm that dissatisfaction is within the allowable ranges listed in Table 5.2.4.

This analysis may be an iterative process in which thermal conditions are revised or

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for compliance with both thermal comfort and controllability. Identify applicable SCA standards to be incorporated into design documents.
- Submit a narrative to describe any special circumstances or non-standard compliance paths taken by the project.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Provide HVAC calculations to demonstrate design compliance in accordance with Section 6.1.1 of ASHRAE Standard 55-2010.
- Provide description of weather data used to determine operative temperatures, relative humidity, outdoor temperatures.
- Complete the Thermal Comfort Credit Form table by listing regularly occupied spaces by type, quantity, and controls.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Thermal Comfort

SCA DESIGN REQUIREMENTS

6.2.0 General Overview of Heating Ventilation and Air Conditioning Systems
6.2.1 HVAC Unit Centralization and Coordination
6.2.3 Non-Assembly Spaces (Classrooms, Offices, etc.)
6.2.4 Public Assembly Spaces
6.2.9 Heating and Cooling Design Parameters (Load Calculations)
6.2.22 Kitchen Ventilation
6.2.28 HVAC Design Requirement for Special Spaces

SCA STANDARD SPECIFICATIONS

15970 Temperature Control System (BACnet BMS/DDC with School Operating Console)
15985 Sequence of Operations

SCA STANDARD DETAILS

15985 HVAC Standard Detail Series

OTHER REFERENCES

ANSI/ASHRAE Standard 55-2010

ASHRAE HVAC Applications Handbook, 2011 edition, Chapter 5, Places of Assembly, Typical Natatorium Design Conditions
www.ashrae.org

ISO 7730–2005 Ergonomics of the thermal environment, Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria
www.iso.org

refined to meet the ASHRAE requirements. By using the standard in this way, project teams can ensure that the thermal conditions meet the credit requirements before they begin detailed design work.

Design Project's Conditioning Systems

Design the project's conditioning systems to provide the acceptable comfort conditions identified in the previous step. Additionally, verify that all spaces at risk for discomfort, such as locations close to entrances prone to drafts or west-facing walls that may retain heat, have been addressed. ASHRAE 55–2010, Section 6.1, requires the design to be within the acceptable comfort range at all combinations of conditions that are expected to occur, including variations in internal loads and the exterior environment, and at both full- and partial-load conditions. Systems that cannot maintain comfort under all conditions (e.g., a constant-volume rooftop unit with a single compressor may have problems controlling humidity levels) do not meet the credit requirements.

SCA HVAC Design Standards require that supply outlets be spaced so as to avoid air stagnation and stratification and to provide a maximum 40 feet per minute air impingement velocity when the air moves past occupants in order to comply with ASHRAE 55-10.

Controls

Examples of eligible thermal comfort controls include thermostats, ceiling fans, adjustable diffusers (if accessible by occupants), task-mounted controls, and operable windows. SCA Standards utilize thermostates as a method of control. Spaces that can be subdivided must be designed such that each group of occupants can control their area.

Q6.1R – INTERIOR LIGHTING CONTROL

Intent

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

This credit is required for all projects.

Requirements

For at least 90% of individual occupant spaces, provide individual lighting controls that enable occupants to adjust the lighting to suit their individual tasks and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel is 30% to 70% of the maximum illumination level (not including daylight contributions).

For all (100%) learning spaces, including classrooms, auditoriums, chemistry laboratories, art rooms, shops, music rooms, gymnasiums, and dance and exercise studios, meet all of the following requirements.

- Have in place multi-zone (multi-level or multi-scene) control systems that enable occupants to adjust the lighting to meet group needs and preferences, with at least three lighting levels or scenes (on, off, midlevel). Midlevel lighting should be 30% to 70% of the maximum illumination level.
- SCA standards do not provide separate lighting for presentation or projection walls. In rare circumstances where presentation or projection lighting is provided, it must be separately controlled.
- Switches or manual controls must be located in the same space as the controlled luminaires. A person operating the controls must have a direct line of sight to the controlled luminaires.

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Implementation

SCA Design Requirements and Standard Specifications incorporate standards for lighting controls for learning spaces that comply with this credit's requirements by providing controllability at learning spaces, including classrooms, auditoriums, chemistry laboratories, art rooms, shops, music rooms, gymnasiums, and dance and exercise studios. If the space is dividable by movable walls or partitions, each subdivision must be zoned and controlled separately, and the controls for each subdivision must meet the three-level requirement.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents. Include a description of how multi-occupant spaces were determined, any excluded spaces, and the reason for their exclusion. If any lighting is provided specifically for presentation or projection walls, describe how it can be separately controlled.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit floor plans indicating quantity of lighting fixtures, control switches for lights, and furniture layouts for every room.
- Complete the Interior Lighting Control Credit Form tables listing the number and location of lighting controls for individual and multi-occupant spaces.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Interior Lighting

SCA DESIGN REQUIREMENTS

7.2.1 Interior Lighting

SCA STANDARD SPECIFICATIONS

16140 Wiring Devices
16145 Lighting Control Devices

SCA STANDARD DETAILS

SCA Room Planning Standards

OTHER REFERENCES

The Lighting Handbook, 10th Edition, Illuminating Engineering Society of North America
https://www.ies.org/product/lighting-handbook-10th-edition/

Q6.2 – INTERIOR LIGHTING QUALITY

Intent

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

This credit is required, if feasible, for all projects.

Requirements

Choose four of the following strategies:

- Light Fixture Illuminance: For all regularly occupied spaces, use light fixtures with a luminance of less than 2,500 cd/m^2 (232.25 cd/ft^2) between 45 and 90 degrees from nadir. Exceptions include wallwash and display fixtures properly aimed at walls, as specified by manufacturer's data, indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above, and any other specific applications (i.e. adjustable fixtures)
- Color Rendering Index (CRI): For the entire project, use light sources with a CRI of 80 or higher. Exceptions include lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, or other special use.
- Luminaire Life: For at least 75% of the total connected lighting load, use light sources that have an L70 of at least 24,000 hours.
- Direct Overhead Lighting: Do not use direct-only overhead lighting for more than 25% of the total connected lighting load for all regularly occupied spaces.
- Surface Reflectance: For at least 90% of the regularly occupied floor area, meet or exceed the following thresholds for area weighted average surface reflectance: 85% for ceilings, 60% for walls, and 25% for floors.

Implementation

SCA Design Requirements and Standard Specifications incorporate standards for lighting quality that comply with this credit's requirements. The following strategies are summarized in **Table 1.**

Light Fixture Illuminance

Identify all regularly occupied spaces in the project and all light luminaires in these spaces. The following fixtures may be excluded:

- Wallwash fixtures properly aimed at walls, as specified by manufacturer's data
- Indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above
- Any other specific applications (e.g., adjustable fixtures)
- For the light fixtures, review luminaires cutsheets, Illuminating Engineering Society photometric files, or other documentation to identify luminance between 45 degrees and 90 degrees from nadir and select products that meet the credit requirements. The luminance must be below 2,500 candela per square meter (232.25 cd/ft^2).

SCA standard specifications require luminaires that exceed the credit requirements. LED fixtures are used for all lighting.

CRI

The following light sources may be excluded: lamps or fixtures specifically designed to provide colored lighting for effect, site lighting, and lamps or fixtures designed for some other special use. For the light sources, determine the CRI, not to be confused with correlated color temperature (CCT), which refers to the spectrum of warm to cool. A light source can have a high or low CRI regardless of its CCT.

SCA standard specifications require lamps with above 80 CRI, exceeding the credit requirements.

Lamp Life

Demonstrate all light sources meet the credit requirements for lamp life.

- Calculate the total connected lighting load for all lighting in the project, in watts or kilowatts. Refer to the lighting power calculations prepared for E Prerequisite 3.1 Minimum Energy Performance and tabulate luminaire quantities and wattages to determine the total connected load. For guidance on determining connected lighting load, see ASHRAE 90.1–2010, Sections 9.1.3 and 9.1.4.
- For lamp life, review luminaire cutsheets or other documentation. Lamp life depends on the type of source. For traditional light sources, the lamp life is based on the time at which 50% of the test samples have burned out. For LED light sources, the lamp life criterion L70 is based on the time at which the light source has a 30% reduction in light output. Review the IES Lighting Handbook for more information on lamp life.
- Calculate the amount of connected lighting load with compliant light source; it must be 75% or greater.

SCA standard specifications require LED luminaires with an L80 of 50,000 hours, exceeding the credit requirements, and are being continually updated as LED technology improves.

Minimize Direct Overhead Lighting

Based on the calculated total connected lighting load associated with all regularly occupied spaces, determine the connected lighting load that is associated with direct-only overhead lighting; it must be no greater than 25%.

SCA standard for lighting classrooms is use of direct-indirect luminaire. Designer will need to compare the lighting load of classroom direct-indirect luminaires with the overall lighting load. Designers should look for opportunities to use direct-indirect lighting in other space if needed to meet the credit requirement.

Surface Reflectance

Use **Equation 1** to calculate the average surface reflectance for walls, ceilings, and floors. 10% of the regularly occupied floor area may be excluded.

SCA standard specifications require surface reflectance that exceed the credit requirements.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit floor plans indicating quantity and type of lighting fixtures and furniture layouts for every room.
- Complete table of regularly occupied spaces and associated lighting details.
- Provide lighting details, including manufacturer and model.
- Calculations of total connected lighting load.
- Provide average surface reflectance calculations for ceiling, walls, and floors.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Interior Lighting, Option 2 Lighting Quality

SCA DESIGN REQUIREMENTS

7.2.1 Interior Lighting

SCA STANDARD SPECIFICATIONS

09510 Acoustic Ceiling
09590 Wood Flooring
09626 Resilient Athletic Flooring
09650 Resilient Flooring
09680 Carpet
09685 Tile Carpeting
09900 Painting
16502 LED Interior Building Lighting

SCA STANDARD DETAILS

SCA Room Planning Standards

OTHER REFERENCES

The Lighting Handbook, 10th edition, Illuminating Engineering Society of North America
https://www.ies.org/product/lighting-handbook-10th-edition/

Table 1. Strategies for Lighting Quality

Strategy	Scope	Exceptions, exclusions
A. Light fixture luminance	All light fixtures located in regularly occupied spaces	• Wallwash fixtures properly aimed at walls, as specified by manufacturer • Indirect uplighting fixtures, provided there is no view down into these uplights from a regularly occupied space above • Any other specific applications (e.g., adjustable fixtures)
B. Color rendering index (CRI)	All light fixtures	• Lamps or fixtures specifically designed to provide colored lighting for effect • Site lighting • Any other special use
C. Lamp life	75% connected lighting load	-
D. Direct overhead lighting	25% connected lighting load	-
E. Surface reflectance: ceilings, walls, floors	90% of regularly occupied floor area	-
F. Surface reflectance: furnishings	All furniture used for work surfaces	-
G. Surface illuminance ratio: wall to work surface	75% regularly occupied floor area	-
H. Surface illuminance ratio: ceiling to work surface	75% regularly occupied floor area	-

Equation 1. Average surface area reflectance

$$\text{Weighted average of surface reflectances} = \left[\frac{\left(\text{reflectance of surface 1} \times \text{surface area of surface 1}\right) + \left(\text{reflectance of surface 2} \times \text{surface area of surface 2}\right) + \left(\text{reflectance of surface n} \times \text{surface area of surface n}\right)}{\text{total surface area}} \right]$$

Q6.3R – VISUAL PERFORMANCE

Intent

Provide pendant-mounted, glare-free ambient lighting in classrooms, improving the visual environment for students and teachers to read, write and interact.

This credit is required, if feasible, for all projects.

Requirements

Install an artificial lighting system to enhance occupants' visual performance with pendant-mounted direct-indirect, semi-indirect or totally indirect luminaires mounted parallel to the window wall.

Energy efficient lighting reduces lighting power density (LPD) by using less energy to deliver a better quality of light to the space.

Q

Implementation

SCA Standards for interior lighting layouts incorporates luminaires and layout requirements that will assist in achieving this credit.

Design Requirement 7.2.1 includes specific dimensions for the acceptable distance between the ceiling and the bottom of light fixtures.

Luminaires shall use LED modules with a minimum color-rendering index of 82. The luminance of these pendant-mounted direct-indirect luminaires is enhanced by white or light colored ceilings, which reflect the light down into the learning space.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identify applicable SCA standards to be incorporated into design documents.
- Submit a narrative to describe any special circumstances or non-standard compliance paths taken by the project.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Incorporate SCA's requirements in construction documents including the lighting layouts and lighting fixture schedules.
- Submit legible point by point lighting level (photometric) calculations for typical and non-typical areas.
- Indicate calculation method and parameters, include LPD (Lighting Power Density) for each space and overall LPD for the building.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

NY-CHPS Version 1.1 2007 Credit 5.2.1
Visual Performance

SCA DESIGN REQUIREMENTS

7.2.1 Interior Lighting

SCA STANDARD SPECIFICATIONS

16502 LED Interior Building Lighting

SCA STANDARD DETAILS

None

OTHER REFERENCES

The Lighting Handbook, 10th edition, Illuminating Engineering Society of North America
www.ies.org/handbook

Q7.1 – DAYLIGHT

Intent

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

This credit is required, if feasible, for all projects.

Requirements

Meet the following requirements:

- **Glare Conrol:** Provide glare-control devices for all regularly occupied spaces.
- **Similuation of Spatial Daylight Autonomy (sDA):** Demonstrate through annual computer simulations that $sDA_{300/50\%}$ is achieved according to the thresholds in **Table 1**. Use regularly occupied floor area.

Table 1. Points for daylit floor area: Spatial daylight autonomy	
sDA (for regularly occupied floor area)	Points
55%	2
75%	3

- **Simulation of Annual Sunlight Exposure (ASE):** Use annual computer simulations to assess $ASE_{1000,250}$ for regularly occupied floor area that is daylit per the $sDA_{300/50\%}$ simulations.
  - Spaces below 10% comply.
  - Spaces that score between 10%-20% are acceptable with a narrative describing how the space is designed to address glare.
  - Spaces with an automated glare control are exempt from the ASE requirement. The ASE value must still be calculated and reported.

The sDA and ASE calculation grids should be no more than 2 feet square and laid out across the regularly occupied area at a work plane height of 30 inches above finished floor (unless otherwise defined). Use an hourly time-step analysis based on typical meteorological year data, or an equivalent, for the nearest available weather station. Include any permanent interior obstructions. Movable furniture and partitions may be excluded.

Implementation

The SCA specifications include enhanced glazing products and manual shades for glare control to aid compliance with credit requirements. Standard classroom layouts are consistent with achieving this credit in classrooms, though site limitations may alter room proportions making this credit more difficult to achieve. To achieve this credit, consider building orientation and higher visible light transmittance values for glazing. Pay special attention to the reflectance of ceiling materials and reflections off adjacent buildings. Analyze exterior shading and interior light shelves. If the school is on a traditional school calendar, consider seasonal variation. Investigate the use of interior glazing to provide daylight to enclosed spaces, though this will require approval from the SCA to move forward. If accepted by the SCA, the use of sloped ceilings may be considered. Measures for glare control that go beyond SCA standard measures will be evaluated on a project-by-project basis. Coordinate controls with the lighting control designer.

Data and Analysis Area

- Building geometry, plans, and furniture plan, and surrounding context.
- Determine how the regularly occupied spaces will be divided into analysis areas. Highlight regularly occupied spaces on the floor plan or furniture plan and create a tracking table that lists all regularly occupied spaces and their respective floor area. For the annual sunlight exposure (ASE) calculations, at a minimum, each floor must be an analysis area.
- Interior finishes and surface reflectance
- Glazing performance specifications
- Glare-control device specifications
- Project occupancy schedule
- Local climate weather files, such as typical meteorological year (TMY2) data, available at www.nrel.gov

sDA Simulation

Follow the modeling methodology outlined in Illuminating Engineering Society Lighting Manual 83 (section numbers below refer to this standard).

- See Section 2.2, sDA—Building 3D Modeling Methodology, for guidance on the period of analysis, illuminance threshold information, temporal threshold, analysis area, analysis points, operation of blinds and shades, optical properties of blinds and shades, exterior obstructions, window and skylight details, interior surface reflectances, and furniture and partitions. For building geometries, develop a complete building model.
- Ensure that the software program selected is capable of simulating the sDA model per Section 2.3.3, Modeling Parameters.
- Include glare-control devices in the model as described in Sections 2.2.7, Blinds/Shades Operation, and 2.2.8, Blinds/Shades Optical Properties.
- Set thresholds for the simulation to 300 lux for 50% of the hours between 8 A.M. and 6 P.M. local clock time, for a full calendar year, from January 1 to December 31. See Sections 2.2.1, Period of Analysis; 2.2.2, Illuminance Threshold Information; and 2.2.3, Temporal Threshold.
- Ensure that the model includes all permanent interior obstructions. Moveable furniture and Moveable furniture and partitions may be excluded.

ASE Simulation

Prepare the ASE model based on the sDA model which can be used with a few modifications. Follow the modeling methodology outlined in IES LM 83 (section numbers below refer to this standard).

- See Section 3.2, ASE—Building 3D Modeling Details, for guidance on the period of analysis, illuminance threshold information, temporal threshold, analysis

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents. Include a summary of occupancy areas that will be excluded from compliance, indicating why daylight would hinder their normal use.
- Submit floor plans highlighting regularly occupied spaces.
- Submit Daylight Autonomy Simulation modeling report, including geometric plots of simulations.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Incorporate credit requirements in construction documents.
- Submit updated modeling report and floor plans highlighting regularly occupied spaces, if applicable.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

area, analysis points, operation of blinds and shades, optical properties of blinds and shades, and exterior obstructions.
- The analysis areas should be the same as those used for the sDA simulations.
- To align with the supporting research for ASE, small analysis areas (ideally space by space, or orientation per floor) are recommended. At a minimum, the analysis area must be for all regularly occupied floor area on a single floor.
- Glare-control devices are not included in the analysis per Section 3.2.6, Blinds/Shade Operation.
- Set thresholds for the simulation to 1,000 lux of direct sunlight for more than 250 hours of the hours between 8 A.M. and 6 P.M. local clock time, for a full calendar year, from January 1 to December 31. See Sections 3.2.1, Period of Analysis; 3.2.2, Illuminance Threshold Information; and 3.2.3, Temporal Threshold.
- Refer to Section 3.3, ASE—Climatic Modeling Methodology, for guidance on climate conditions for the project's location. The ASE analysis does not require modeling of sky luminance or ground reflectance.
- If the software being used does not accommodate direct sunlight as described in Section 3.3, ASE may be identified based on illuminance compared with adjacent nodes.

Gymnasiums and gymnatoriums must be included in the daylight requirements. Auditoriums must be included in the daylight requirements, but a lower illuminance level is acceptable; see recommended illuminance values in SCA's Design Requirements for Electrical and Communication Services, section 7.2.1 – Interior Lighting.

References

LEED for Schools v4 IEQ Credit
Daylight

SCA DESIGN REQUIREMENTS

1.3.1.1 Building Location and Orientation
1.3.1.2 Planning Guidelines for New Schools and Additions

SCA STANDARD SPECIFICATIONS

08524 Aluminum Projected Windows
08621 Fiberglass Sandwich Panel Skylights
08800 Miscellaneous Glazing
08920 Aluminum Curtain Walls
08921 Aluminum Storefront
12500 Window Shades
12501 Chain and Clutch Operated Window Shades

SCA STANDARD DETAILS

None

OTHER REFERENCES

Illuminating Engineering Society, Approved Method: IES Spatial Daylight Autonomy (sDA) and Annual Sunlight Exposure (ASE), IES document LM-83
https://www.techstreet.com/standards/ies-lm-83-12?product_id=1853773

Heschong Mahone Group, Daylighting Metrics (California Energy Commission, PIER Daylighting Plus Research Program, February 2012)
www.energy.ca.gov/2012publications/CEC-500-2012-053/CEC-500-2012-053.pdf

The Lighting Handbook, 10th edition, Illuminating Engineering Society of North America
https://www.ies.org/product/lighting-handbook-10th-edition/

Radiance Synthetic Imaging System
http://radsite.lbl.gov/radiance/rad.1.html

Whole Budilign Design Guide, Electric Lighting Controls
www.wbdg.org/resources/electriclighting.php

NREL - Local climate weather files
https://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/

Q7.2 – QUALITY VIEWS

Intent

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

This credit is required, if feasible, for all projects.

Requirements

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

Additionally, 75% of all regularly occupied floor area must have at least two of the following four types of views:

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

Exceptions

- Gymnasiums and auditoriums may be excluded from the view requirements.
- Include any permanent interior obstructions in credit calculations; movable furniture and partitions may be excluded.
- Views into interior atria may be used to meet up to 30% of the required area.

Implementation

Designing for quality views involves consideration of building orientation, site design, facade, and interior layout.

- Standard classroom layouts are most likely to qualify for view types 2, 3, or 4.
- In office areas, consider lower partition height and interior glazing.
- Spaces whose functional requirements prohibit the incorporation of glazing for direct access to views may be excluded. Spaces may not be excluded for security or noise concerns.

During programming, consider how best to allocate interior space to maximize access to views. The designer must consider this credit early in the design if typical spaces need to be modified to meet this credit. During design development, design enclosures and select furniture to minimize visual obstructions to perimeter glazing.

Complete the tracking table (Table 1) to confirm that at least 75% of the regularly occupied floor area has two qualifying view types. Identify which kinds of view will be used to demonstrate view quality. For each regularly occupied space or area of the floor plan, select two view types and add the selection to the tracking table. Assess eligible view types as follows:

1) Multiple lines of sight to vision glazing in different directions at least 90 degrees apart (see **Figure 1**). On the floor plan or furniture plans, draw two lines of sight to the vision glazing for each location within the space.

- The space or location qualifies if the lines of sight are at least 90 degrees apart and if they are not intercepted by any permanent interior obstructions. If necessary, draw sight lines on section or elevation plans to confirm that permanent interior obstructions do not block the lines of sight.
- It may be easiest to determine the boundary of qualifying areas to nonqualifying areas.

2) Views that include at least two of the following: (1) flora, fauna, or sky; (2) movement; and (3) objects at least 25 feet from the exterior of the glazing.

- In plan, label the qualifying features located at the vision glazing.
- Two features must be indicated.
- Movement (feature 2) includes such activities as people walking, cars driving on the street, and boats moving through the water. Movement of plants and trees from wind does not qualify.
- Account for any changes in exterior views as floor elevation changes.
- In plan, draw one line of sight to the vision glazing for each location in the space. The space or location qualifies if the line of sight is not intercepted by any permanent interior obstructions.

Table 1. Quality views tracking table					
Regularly occupied space ID	Space type	Floor area (ft^2 or m^2)	Quality Views		
			Floor area with direct line of sight to outdoors via vision glazing	View types	
				1	2

Table 2. View Factor		
Preliminary view factor	View angle	
	Min-max (degrees)	Gray-zone range (degrees)
1	1-4	
1 or 2		4-5
2	5-9	
2 or 3		9-11
3	11-15	
3 or 4		15-20
4	20-40	
4 or 5		40-30
5	50-90	

If necessary, draw sight lines on section or elevation plans to confirm permanent interior obstructions do not block the lines of sight.

3) Unobstructed views located within the distance of three times the head height of the vision glazing (see **Figure 2**).

- In section, determine the head height of the vision glazing for each regularly occupied space. In plan, identify all regularly occupied floor area that is within three times the head height of the perimeter.
- The space or location qualifies if there are no permanent interior obstructions present in the area.
- No permanent interior obstructions are allowed, regardless of their height.
- Any regularly occupied floor area not in the identified area does not qualify.

4) View factor is a measure of the amount and quality of views within a 90-degree cone of vision from an individual workstation, rated from 0 (poor quality) to 5 (high quality). Views with a view factor of 3 or greater, as defined in Windows and Offices: A Study of Office Worker Performance and the Indoor Environment.

- On the floor plan or furniture plan, identify occupants' typical locations in each regularly occupied space (e.g., open-office workstation, enclosed office, conference room seat, counter). Indicate whether the location is the primary view location.
- Use one of the following methods to assess the view factor for each of these locations, based on the primary views.
  - Measure the view angle (**Figure 3** and **Table 2**). View angles in the gray-zone range are rated up one level when the view has high vegetation content and down one level if the view has no vegetation content.
  - Visually assess the view factor in section or elevation, or through drawings or images, demonstrate how the view factor was determined.

Each space may need to be reviewed to determine which two types of views will apply.

Q7.2 – QUALITY VIEWS (CONT.)

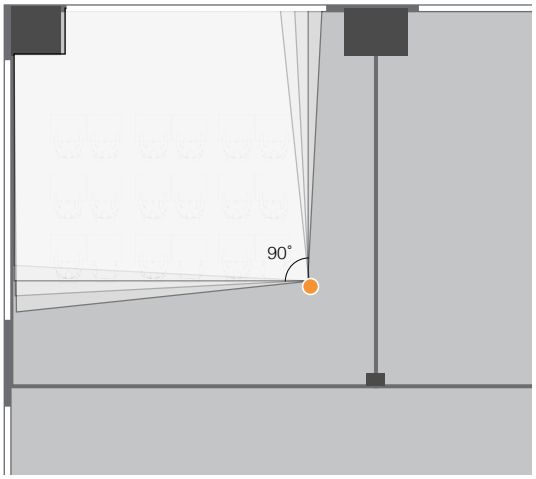

Figure 1. Multiple lines of sight to glazing at least 90 degrees apart

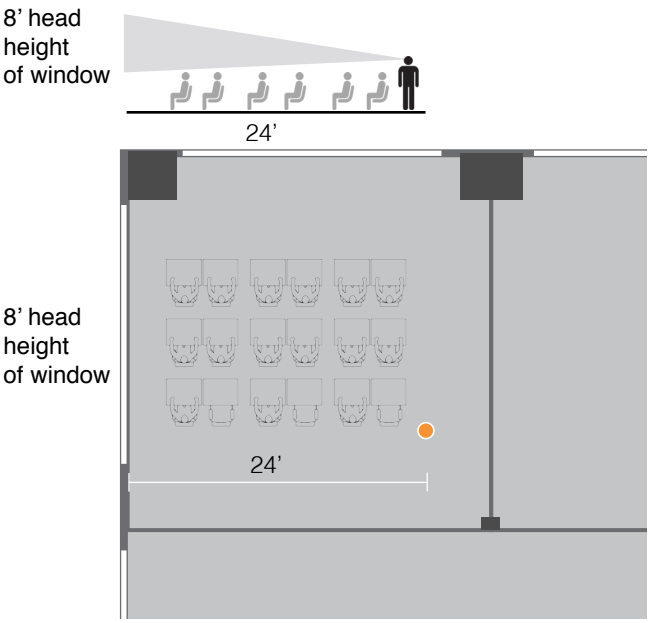

Figure 2. Unobstructed views within three times the head height of the glazing.

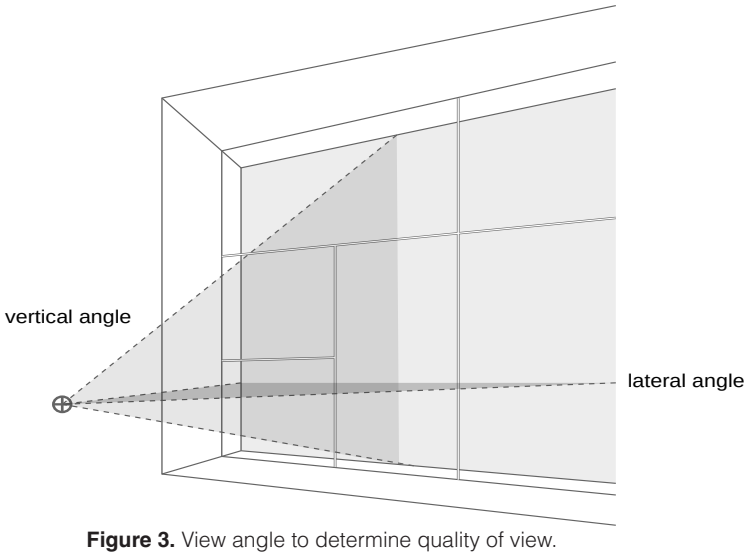

Figure 3. View angle to determine quality of view.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents. Include a summary of occupancy areas that will be excluded from compliance.
- Submit annotated drawings showing the line of sight from interior spaces through exterior windows in both plan and sectional views.
- Assess view quality using the Quality Views Credit Form. Determine if design as developed complies in Quality Views Credit Form and indicate percentage of spaces that comply. If the entire regularly occupied space or area does not meet the requirements of the selected view type, include only the regularly occupied floor area that complies.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit Quality Views Credit Form
- Incorporate credit requirements in construction documents.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Quality Views

SCA DESIGN REQUIREMENTS

1.3.1.1 Building Location and Orientation

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

California Energy Commission, Windows and Offices: A Study of Office Worker Performance and Indoor Environment: Technical Report (2003), http://www.energy.ca.gov/2003publications/CEC-500-2003-082/CEC-500-2003-082-A-09.PDF

Q8.1P – MINIMUM ACOUSTIC PERFORMANCE

Intent

To provide classrooms that support clear teacher-to-student and student-to-student communication through effective acoustic design.

This credit is required for all projects.

Requirements

Meet all three of the following requirements:

- **HVAC Background Noise:** Achieve a maximum background noise level of 40 dBA from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces. Follow the recommended methodologies and best practices for mechanical system noise control in ANSI Standard S12.60-2010, Part 1, Annex A.1; the 2011 HVAC Applications ASHRAE Handbook, Chapter 48, Noise and Vibration Control (with errata); AHRI Standard 885-2008.
- **Exterior Noise:** For high-noise sites (peak-hour Leq above 60 dBA during school hours), implement acoustic treatment and other measures to minimize noise intrusion from exterior sources and control sound transmission between classrooms and other core learning spaces. Projects at least one-half mile from any significant noise sources are exempt.
- **Reverberation Time:** Adhere to the following reverberation time requirements. These requirements do not apply to natatoriums, auditoriums, music performance spaces, teleconferencing rooms, or special education rooms, such as those for severely acoustically challenged students.
    - For Classrooms & Core Learning Spaces < 20,000 Cubic Feet:
      Design classrooms and other core learning spaces to include sufficient sound-absorptive finishes for compliance with the reverberation time requirement specified in ANSI Standard S12.60-2010, Part 1, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools.

      Option 1.

      For each room, confirm that the total area of acoustical wall panels, ceiling finishes, and other sound-absorbent finishes equals or exceeds the total ceiling area of the room, excluding recessed lights, diffusers, grilles, and chilled beams. Acoustic materials must have an NRC of 0.70 or higher to be included in the calculation.

      OR

      Option 2.

      Confirm through calculations described in ANSI Standard S12.60-2010 that rooms are designed to meet reverberation time requirements as specified in that standard.
    - For Classrooms and Core Learning Spaces > 20,000 Cubic Feet:
      Meet the recommended reverberation times for classrooms and core learning spaces described in the NRC-CNRC Construction Technology Update No. 51, Acoustical Design of Rooms for Speech (2002).

Q

Implementation

The project team shall employ the services of an Acoustical Consultant to make recommendations and document compliance.

HVAC Background Sound Levels

Standard strategies for HVAC systems can contribute to meeting the low background noise level requirements; eg non-fan powered VAV boxes with a silencer used in the downstream supply duct system, chilled beam, displacement induction units. Refer to 2011 HVAC Applications ASHRAE Handbook, Chapter 48, Noise and Vibration Control, Sound Control for Outdoor Equipment, for additional design guidance.

Measure Exterior Noise Levels

Identify significant noise sources within half a mile of the face of the building by studying adjacent uses through site visits and neighborhood maps. Examples may include major transit corridors, industrial or manufacturing facilities, outdoor concert or sports venues, rail lines, and air traffic lanes. If the site is in the flyover area of an airport, noise exposure maps are typically available online. Conduct acoustic readings on the project site during normal school hours using a sound meter that can measure equivalent continuous noise levels measured in A-weighted decibels (dBA). Note that fire-rated windows will not likely comply.

Minimize Exterior Noise

The appropriate combination of strategies depends on the type, location, and regularity of noise sources. Define the path(s) of noise on the site, and identify measures that create a barrier or dampening effect between the source and the receiving core learning space. Example strategies include:

- Reduce the source or occurrence of noise, if collaboration with the noise-generating property owner is possible.
- Site barriers, such as earth berms and site walls.
- Architectural barriers, such as other building spaces and courtyards.
- Architectural material barriers, such as dense wall construction and offset studs.
- Best practices for construction details, such as sound sealants and window and door gaskets.
- Architectural acoustic treatments as appropriate.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative summarizing the design approach for credit compliance and identifying applicable SCA standards to be incorporated into design documents.
- Provide a site plan indicating the distance of each façade of the school from exterior noise source(s) for high-noise sties.
- Submit DD documents to a qualified acoustical consultant.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit initial report from Acoustical Consultant based on DD Documents. Report to indicate:
  - Acoustical recommendations based on this phase of design. This should include a list of measures incorporated or to be incorporated such as acoustical materials schedule, note double floor slabs and sound barriers required.
  - Recommendations for the façade elements to meet or exceed requirements and evaluating the need for improved fenestration performance.
- Integrate the design criteria into the design documents.
- Provide a write-up describing each special separation for each location and detailed construction.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit 100% documents to a qualified acoustical consultant to obtain confirmation that project design meets the relevant requirements.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit report from the acoustical consultant confirming that project deisgn meets the relevant design requirements.
- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

Reverberation Times

Sound absorptive materials can be applied to any planar surface in the space. While applying treatment to the walls is typically the most effective way forward, a sound absorptive ceiling is generally the most cost effective for a classroom. Use of compliant lay-in sound-absorptive ceiling is an effective method for meeting the reverberation time goals in classrooms. In circumstances where the net area of sound absorptive ceiling is limited by gypsum board soffits, it may be necessary to provide supplemental sound absorption on upper wall areas. Refer to ANSI 12.60–2010, Annex C, for additional design guidance.

For classrooms and core learning spaces, determine the acoustic design approach option that is appropriate for each space:

- Option 1 is for simple spaces with regular shapes and parallel surfaces.
- Option 2 is for more complex spaces or for project teams that want a tailored solution to handle unique conditions. This option is strongly encouraged for spaces with a volume between 13,500 and 20,000 cubic feet.

Consideration of noise reduction coefficients (NRCs) alone may be insufficient if the space features irregular shapes and nonparallel surfaces; these configurations may need acoustic panels on both ceilings and walls to reduce reverberation.

References

LEED for Schools v4 IEQ Prerequisite
Minimum Acoustical Performance

SCA DESIGN REQUIREMENTS

1.3.1.9 Architectural Acoustic Standards
4.1.1 Building Facade - New Buildings and Additions
4.2.1 Exterior Masonry Wall
4.3.1 Window Types
5.4.1 Suspended Ceilings
6.2.25 HVAC Acoustical Standards

SCA STANDARD SPECIFICATIONS

08110 Steel Doors and Frames
08210 Wood Doors
08211 Wood Doors
08524 Aluminum Projected Windows
08800 Miscellaneous Glazing
08920 Aluminum Curtain Walls
08921 Aluminum Storefront
09510 Acoustical Ceilings
15853 Custom Rooftop Units (VAV)
15854 Custom Rooftop Units (CV)
15855 Commercial Rooftop Units
15857 Unit Ventilator
15891 Metal Ductwork
15910 Duct Accessories
15932 Active Chilled Beam
15933 DOAS
15993 Balancing of Systems

SCA STANDARD DETAILS

None

OTHER REFERENCES

ASHRAE Handbook Chapter 47 Sound and Vibration Control 2003 HVAC Applications

A Guide to New York City's Noise Code
http://www.nyc.gov/html/dep/pdf/noise_code_guide.pdf

AHRI Standard 885–2008, Procedure for Estimating Occupied Space Sound Levels in the Application of Air Terminals and Air Outlets
https://standards.globalspec.com/std/1404815/ahri-885

ANSI/ASHRAE Standard S12.60–2010, Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools
https://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fASA+S12.60-2010%2fPart+1+(R2015)

2011 HVAC Applications, ASHRAE Handbook, Chapter 48, Noise and Vibration Control
www.ashrae.org

NRC-CNRC Construction Technology Update No. 51, Acoustic Design of Rooms for Speech, 2002
https://nrc-publications.canada.ca/eng/view/accepted/?id=92392d67-912e-4fec-aaba-241452ab8648

Q8.2 – ENHANCED ACOUSTIC PERFORMANCE

Intent

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

This credit is required, if feasible, for all projects.

Requirements

HVAC Background Noise

Achieve a background noise level of 35 dBA or less from heating, ventilating, and air-conditioning (HVAC) systems in classrooms and other core learning spaces. Follow the recommended methodologies and best practices for mechanical system noise control in ANSI Standard S12.60–2010, Part 1, Annex A.1; the 2011 HVAC Applications ASHRAE Handbook, Chapter 48, Sound and Vibration Control, with errata; AHRI Standard 885–2008; or a local equivalent.

Sound Transmission

Design classrooms and other core learning spaces to meet the sound transmission class (STC) requirements of ANSI S12.60–2010 Part 1, or a local equivalent. Exterior windows must have an STC rating of at least 35, unless outdoor and indoor noise levels can be verified to justify a lower rating.

Implementation

The project team shall employ the services of an Acoustical Consultant to make recommendations and document compliance.

There are two types of methods used by the International Building Code (IBC) for assessing how sound vibration travels between spaces: Impact Insulation Class (IIC) and Sound Transmission Class (STC). STC typically applies to walls as an evaluation of an assembly's ability to reduce airborne sounds; eg voices. IIC typically applies to floors as an evaluation of a construction assembly's ability to block impact or structure-borne noise; eg footfalls.

The SCA Design Requirements are intended to meet required STC and IIC levels; however, the designers must work with an Acoustical Consultant to determine an STC rating for every wall, floor, and ceiling assembly that may affect noise levels in a core learning space. The designer must determine the cost of meeting enhanced noise levels within classrooms to inform SCA's decision of what is economically feasible to include it in the project. To ensure good learning conditions, all other items required by this credit should be incorporated, even if some credit requirements will not be met.

Interior Sound Isolation

- Acoustical consultant should carefully evaluate required measures for classrooms adjacent to the cafeteria.
- Specific conditions and proximities should be reviewed by the project acoustical consultant.
- Offset outlets and other partition penetrations.
- IIC-45 for instructional/office spaces above classrooms (not gymnasiums, music, dance or auditoriums) may be met with a concrete slab and a well-sealed suspended lay-in acoustical panel ceiling in the classroom below.
- IIC-60 for spaces with high noise levels or impact noise, such as music suites or gymnasiums, that are located over instructional rooms and offices, as well as if instructional and office spaces are located over the gym, may be met through special floated concrete floor construction. Adequate floated floor construction is comprised of a 4-inch thick normal weight concrete slab on isolators with a 2-inch air space to the base slab.

Exterior Sound Isolation

- STC-50 exterior walls can be met with CMU and face brick. Lightweight (curtain wall) façade constructions need careful review for sound isolation performance by the acoustical consultant.
- Building planning should avoid vertical adjacency of noisy spaces above instructional spaces or offices.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

A/EoR's RESPONSIBILITY

- Submit a narrative statement describing whether this credit is applicable. For project where this credit applies, summarize the specific design approach at each condition for credit compliance and identify applicable SCA standards to be incorporated into design documents.
- Submit DD documents to a qualified acoustical consultant.

60% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Sumit initial report from acoustical consultant based on DD with acoustical reccommendations.
- Incorporate requirements in construction documents.
- Submit acoustical laboratory test reports from window manufacturers on candidate window assemblies to verify STC ratings on operable assemblies.
- Provide write-up describing each special separation for each location and detailed construction.
- Submit 60% documents to a qualified acoustical consultant to confirm that the project has been designed to meet the relevant requirements.
- Submit published data, calculations or measurements for assemblies in each occupied space to verify sound isolation requirements.

100% CONSTRUCTION DOCUMENTS

A/EoR's RESPONSIBILITY

- Submit 100% documents to a qualified acoustical consultant to obtain confirmation that project design meets the relevant requirements.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

A/EoR RESPONSIBILITY

- Submit report from the acoustical consultant confirming that project deisgn meets the relevant design requirements.
- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

No credit submittal.

References

LEED for Schools v4 IEQ Credit
Enhanced Acoustical Performance

NY-CHPS Version 1.1 2007 Credit 5.5.2
Sound Isolation

SCA DESIGN REQUIREMENTS

1.3.1.9 Architectural Acoustic Standards
4.2.1 Exterior Masonry Walls
4.3.1 Window Types
5.1.1 Typical Room Finishes
5.2.2 Interior Partitions
5.3.1 Floor Types
5.5.1 Interior Doors and Frames
6.2.25 HVAC Acoustical Standards

SCA STANDARD SPECIFICATIONS

08524 Aluminum Projected Windows
08800 Miscellaneous Glazing
08920 Aluminum Curtain Walls
08921 Aluminum Storefront
09260 Gypsum Board Assemblies

SCA STANDARD DETAILS

0926010a Partition Details
0926010b Partition Details

OTHER REFERENCES

American National Standard "Acoustical Performance Criteria, Design Requirements, and Guidelines"

ASHRAE 2011, HVAC Applications Handbook, Chapter 48, Noise and Vibration Control
www.ashrae.org
ASHRAE Handbook, Chapter 47, Sound and

Vibration Control, 2003 HVAC Applications
AHRI Standard 885–2008

www.ahrinet.org

ANSI S1.4, Performance Measurement Protocols for Commercial Buildings
www.ashrae.org

ANSI/ASA S12.60–2010 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1, Permanent Schools
https://webstore.ansi.org/RecordDetail.aspx?sku=ANSI%2fASA+S12.60-2010%2fPart+1+(R2015)

ASTM E966, Standard Guide for Field Measurements of Airborne Sound Insulation of Building Facades and Façade Elements
https://www.astm.org/Standards/E966.htm

INNOVATION

This section requires that a LEED Accredited Professional participate on the Design Team and includes optional credits that may be applied to unique projects when pre-authorized by the SCA.

The SCA supports the added sustainable benefits afforded by the optional innovation credits and will encourage application of these credits for projects that receive special funding and/or have unique conditions that warrant exploration of the alternatives offered by these credits.

I1.1R – LEED® ACCREDITED PROFESSIONAL

Intent

To support and encourage the design integration required by an established level of familiarity with LEED®, upon which the NYC Green Schools Guide is based, and to facilitate the sustainable design application and certification process for schools.

This credit is required for all projects.

Requirements

At least one principal participant of the project team shall be a LEED® Accredited Professional (AP) with the BD+C specialty. This LEED AP must be actively involved in both the design process and GSG review process.

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Implementation

To become a LEED Accredited Professional, the LEED BD+C Accreditation Exam offered by the Green Building Certification Institute (GBCI) must be successfully passed.

Project teams are to engage a LEED BD+C Professional to help guide the team in sustainable design of the project, collect sustainability documentation, and prepare Green Schools Submissions.

The SCA specifications require the Contractor to engage a LEED AP to facilitate its requirements and prepare the sustainability submissions to be provided to the SCA.

Credit Submittals

SCHEMATIC DESIGN

ARCHITECT'S RESPONSIBILITY

- Submit a narrative listing the names and firm of the LEED Accredited Professional participating on the Design Team. Include a brief description of the LEED AP's project role(s).
- Submit a copy of proof of the LEED AP's accreditation.

DESIGN DEVELOPMENT

- Provide updated documentation for Design Team's LEED AP, if applicable.

60% CONSTRUCTION DOCUMENTS

- Provide updated documentation for Design Team's LEED AP, if applicable.

100% CONSTRUCTION DOCUMENTS

- Provide updated documentation for Design Team's LEED AP, if applicable.

DESIGN PHASE CERTIFICATION

- No credit submittal.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- Provide updated documentation for Design Team's LEED AP, if applicable.
- Submit the complete and initialed Design Team Certification Form - Construction Phase

CONTRACTOR'S RESPONSIBILITY

- Submit proof of the Contractor's LEED AP's accreditation.
- Submit the complete and initialed Contractor Certification Form.

References

LEED for Schools v4 IN Credit
LEED Accredited Professional

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

S01400 Quality Control

SCA STANDARD DETAILS

None

OTHER REFERENCES

LEED Website
www.usgbc.org

GBCI Website
www.gbci.org

I1.2A – INNOVATION OR PILOT CREDIT

Intent

To provide Design Teams and projects the opportunity to achieve exceptional performance above the requirements set by the SCA Green Schools Guide and/or innovative performance in Green Building categories not specifically addressed by the Green Schools Rating system.

Projects may only pursue innovation strategies with permission from SCA.

Requirements

Option 1. Innovation

There are 3 basic criteria for achieving an innovation credit for a category not specifically addressed by the GSG:

1. The project must demonstrate quantitative performance improvements for environmental benefit (establishing a baseline of standard performance for comparison with the final design).
2. The process or specification must be comprehensive. Measures that address a limited portion of a project, or are not comprehensive in other ways, will not qualify.
3. The innovation concept must be applicable to other projects and must be significantly better than standard sustainable design practices.

Option 2. USGBC LEED Pilot Credit

Determining which, if any, Pilot Credits within the USGBC's LEED Pilot Credit Program are appropriate to an SCA school project is up to the discretion of the SCA GSG Committee and can only be pursued with their explicit consent and direction.

Implementation

Consider innovation credits based on standards and requirements established by current versions of other Rating Systems including LEED, Collaborative for High Performance Schools (CHPS), and the WELL Building Standard.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Provide a narrative stating the intent of the proposed innovation credit, the proposed requirement for compliance, proposed submittals to demonstrate compliance, and the design approach (strategies) used to meet the requirements.

60% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Provide supporting documentation, including drawings and calculations, as necessary.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITIES

- Incorporate requirements in construction documents.
- Provide updated documentation to address incomplete and outstanding issues.

DESIGN PHASE CERTIFICATION

ARCHITECT'S RESPONSIBILITY

- Submit the complete and initialed Design Team Certification Form-Design Phase.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- For any construction-related innovation strategies, provide a narrative and supporting calculations as necessary to demonstrate compliance.

References

LEED for Schools v4 IN Credit Innovation

SCA DESIGN REQUIREMENTS

None

SCA STANDARD SPECIFICATIONS

None

SCA STANDARD DETAILS

None

OTHER REFERENCES

USGBC LEED Credit Library
www.usgbc.org/credits

USGBC LEED Pilot Credit Library
www.usgbc.org/pilotcredits

CHPS Criteria
https://chps.net/chps-criteria

International WELL Building Institutes's WELL Building Standard
https://www.wellcertified.com/

REGIONAL PRIORITY

Because some environmental issues are unique to a locale, USGBC has identified distinct environmental zones and allocated six existing credits to encourage Design Teams to focus on regional priorities. A project that earns a Regional Priority credit automatically earns one point in addition to any points awarded for that credit. Up to four extra points can be earned in this way.

All Regional Priority credits are based on the project's address.

R1.1, R1.2, R1.3, & R1.4 – REGIONAL PRIORITY

Intent

To provide an incentive for the achievement of credits that address geographically specific environmental priorities.

This credit is required, if feasible, for all projects.

Requirements

Each Regional Priority Credit is worth an additional single point and a total of four additional points may be earned by achieving Regional Priority credits, with one point earned per credit.

Earn 1-4 of the Regional Priority credits identified by USGBC as having environmental importance for a project's region. A table of Regional Priority credits for the five boroughs of New York City are provided below.

Refer to the Implementation and Requirements sections under each particular Regional Priority credit's listing.

Table 1. Regional Priority Credits for Schools in New York City

GSG Credit Number	L1.2**	S2.4**	E4.2A†	M3.1A† OR M3.2**	Q1.2R* AND Q1.3A†
Achieve to Earn RP	High Priority Site, Brownfield Remediation	Rainwater Management, Option 2 OR 3	Demand Response	Either Life-Cycle Impact Reduction Credit	Both Enhanced IAQ Credits

*this credit is required

**these credits are required if feasible, depending on project site and type

† these credits are not required and can only be pursued with direction/permission from SCA

Implementation

The Design Team, in conjunction with the project's LEED AP, determines which Regional Priority (RP) credits listed in **Table 1** apply to the project.

If the project achieves more than four Regional Priority credits, the team can choose the credits for which these points will apply. No more than four credits identified as Regional Priority credits may be earned.

Since these are not new credits, GSG project teams do not need to attempt them in addition to the other GSG credits they are attempting. If the project earns an RP credit, it will also earn the associated bonus point.

The concept of Regional Priority credits was introduced as an incentive to encourage achievement of credits that address geographically important environmental priorities. The incentive to achieve the credits is in the form of a bonus point. If an RP credit is earned, then a bonus point is awarded to the project's total points.

Credit Submittals

SCHEMATIC DESIGN

No credit submittal.

DESIGN DEVELOPMENT

ARCHITECT'S RESPONSIBILITY

- Provide a list indicating which credits are eligible to obtain the additional point as a Regional Priority and whether each related credit is feasible.

60% CONSTRUCTION DOCUMENTS

No credit submittal.

100% CONSTRUCTION DOCUMENTS

ARCHITECT'S RESPONSIBILITY

- Verify applicable GSG base credit has been obtained.

DESIGN PHASE CERTIFICATION

No credit submittal.

CONSTRUCTION

ARCHITECT'S RESPONSIBILITY

- Verify applicable GSG base credit has been obtained.

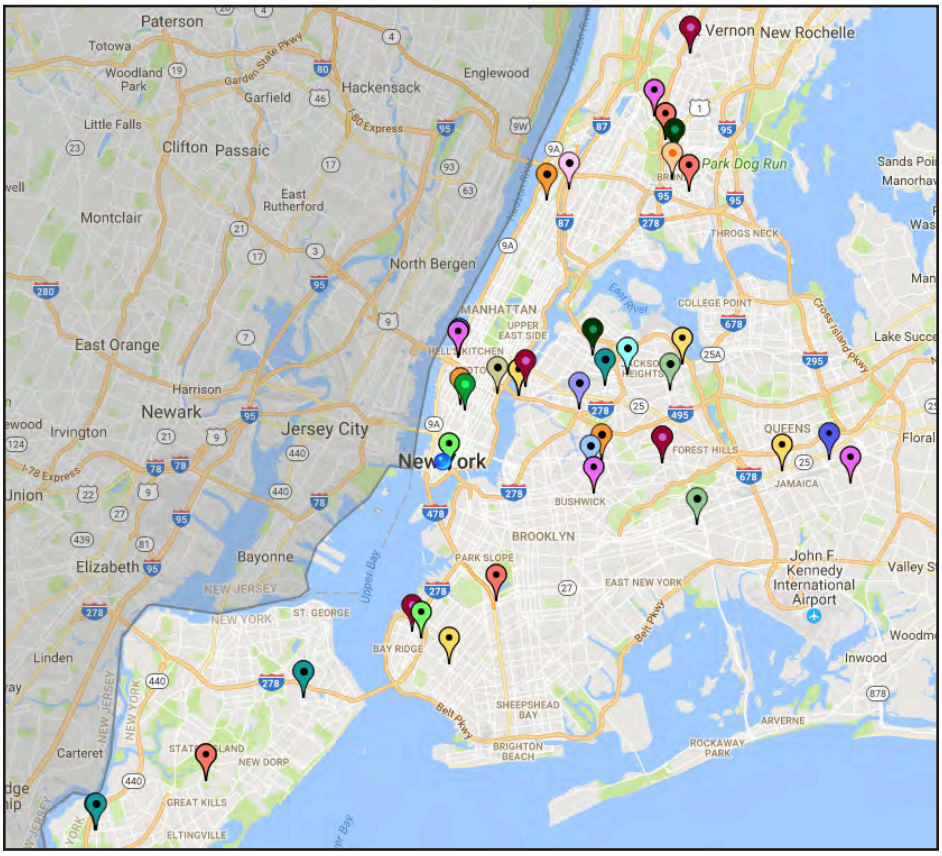

Figure 1. NYC School Construction Authority Projects

References

Refer to the standards for a particular Regional Priority credit as listed within the Green Schools Guide.

R

APPENDICES

APPENDIX A – GLOSSARY

adapted plant
vegetation that is not native to a particular region but that has characteristics that allow it to live in the area. Adapted plants do not pose the same problems as invasive species.

alternative daily cover (ADC)
material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging. Generally these materials must be processed so they do not allow gaps in the exposed landfill face.

annual sunlight exposure (ASE)
a metric that describes the potential for visual discomfort in interior work environments. It is defined as the percentage of an analysis area that exceeds a specified direct sunlight illuminance level more than a specified number of hours per year. (Illuminating Engineering Society)

ASE $_{1,000,250}$
reports the percentage of sensors in the analysis area, using a maximum 2-foot spacing between points, that are found to be exposed to more than 1000 lux of direct sunlight for more than 250 hours per year, before any operable blinds or shades are deployed to block sunlight, considering the same 10 hour/day analysis period as sDA and using comparable simulation methods.

baseline building performance
the annual energy cost for a building design, used as a baseline for comparison with above-standard design.

Basis of Design (BOD)
the information necessary to accomplish the owner's project requirements, including system descriptions, indoor environmental quality criteria, design assumptions, and references to applicable codes, standards, regulations, and guidelines.

bicycle network
a continuous network consisting of any combination of the following:
- off-street bicycle paths or trails at least 8 feet wide for a two-way path and at least 5 feet wide for a one-way path
- physically designated on-street bicycle lanes at least 5 feet wide
- streets designed for a target speed of 25 mph

biobased
products are defined by ASTM D6866, but testing (by the manufacturer or a contracted party) is not required in all cases. Manufacturers use this test to determine the amount of biobased material in a product. If the percentage of biobased materials, by weight, in the product are known, testing to this standard may not be necessary.

Nonwood products must be grown on farms that meet the Sustainable Agriculture Standard of the Sustainable Agricultural Network (SAN). Products originating on farms that meet the Sustainable Agriculture Standard must adhere to the guidelines and policies of the Rainforest Alliance—including traceability, chain of custody and use of seal—and receive pre-approval from the Rainforest Alliance in order to bear the Rainforest Alliance Certified™ seal. The Rainforest Alliance is a member of SAN and hosts its international secretariat, providing traceability, market linkages, and technical assistance. Several certification bodies in different countries are accredited to conduct Rainforest Alliance certification. A full listing of certified farms and operations can be found on the SAN website, sanstandards.org. A list of Rainforest Certified products can be found at rainforest-alliance.org. To date, nearly all Rainforest Alliance Certified agricultural products are foods, coffee, tea, and cut flowers.

Because the number of Rainforest Alliance–certified crops in building materials is limited, project teams may include products with manufacturer-declared conformance to the Sustainable Agriculture Standard (except bamboo and nonwood forest products that could be FSC certified) under the following three conditions:
- The product's manufacturer provides a signed letter on company letterhead from the raw material supplier attesting that its practices meet the standard.
- The letter includes a link to a publicly available document that specifies how the raw material supplier's practices conform to each paragraph in all 10 sections of the standard and attesting that each "critical criterion" is met.
- Both the letter and the detailed documentation are dated within one year before the date of project registration.

biobased material
commercial or industrial products (other than food or feed) that are composed in whole, or in significant part, of biological products, renewable agricultural materials (including plant, animal, and marine materials), or forestry materials. For the purposes of LEED, this excludes leather and other animal hides.

brownfield
real property or the expansion, redevelopment, or reuse of which may be complicated by the presence or possible presence of a hazardous substance, pollutant, or contaminant. Brownfields must be designated by government entity.

BUG rating
a luminaire classification system that classifies luminaires in terms of backlight (B), uplight (U), and glare (G) (taken from IES/IDA Model Lighting Ordinance). BUG ratings supersede the former cutoff ratings.

building exterior (envelope)
a structure's primary and secondary weatherproofing system, including waterproofing membranes and air- and water-resistant barrier materials, and all building elements outside that system.

building interior
everything inside a structure's weatherproofing membrane.

carbon offset
a unit of carbon dioxide equivalent that is reduced, avoided, or sequestered to compensate for emissions occurring elsewhere. (World Resources Institute)

chain of custody (CoC)
a procedure that tracks a product from the point of harvest or extraction to its end use, including all successive stages of processing, transformation, manufacturing, and distribution.

chlorofluorocarbon (CFC)-based refrigerant
a fluid, containing hydrocarbons, that absorbs heat from a reservoir at low temperatures and rejects heat at higher temperatures. When emitted into the atmosphere, CFCs cause depletion of the stratospheric ozone layer.

classroom or core learning space
a space that is regularly occupied and used for educational activities. In such space, the primary functions are teaching and learning, and good speech communication is critical to students' academic achievement. (Adapted from ANSI S12.60)

color rendering index (CRI)
a measurement from 0 to 100 that indicates how accurately an artificial light source, as compared with an incandescent light, displays hues. The higher the index number, the more accurately the light is rendering colors. Incandescent lighting has a color rendering index above 95; standard high-pressure sodium lighting (such as orange-hued roadway lights) measures approximately 25; many fluorescent sources using rare earth phosphors have a color rendering index of 80 and above.

commingled waste
building waste streams that are combined on the project site and hauled away for sorting into recyclable streams. Also known as single-stream recycling.

commissioning (Cx)
the process of verifying and documenting that a building and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the owner's project requirements.

commissioning authority (CxA)
the individual or agency/company designated to organize, lead, and review the completion of commissioning process activities. The CxA facilitates communication among the owner, designer, and contractor to ensure that complex systems are installed and function in accordance with the owner's project requirements.

corporate social responsibility (CSR)
reports the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain. Acceptable CSR reporting frameworks include Global Reporting Initiative, OECD Guidelines for Multinational Enterprises, U.N. Global Compact, and ISO 26000.

cradle-to-cradle (C2C) certified, version 2.1.1 and version 3.0
C2C require that ingredients be disclosed to an independent, accredited C2C assessor. The percent of the product defined and assessed impacts the level of certification. Products certified under v2.1.1, have had at least 95% by weight of their materials assessed at any level and 100% of their materials assessed at the Gold and Platinum levels. Products certified under v3.0, have had at least 75% or 95% by weight of their materials assessed at the Bronze and Silver levels respectively, and 100% of their materials at the Gold and Platinum levels. Eligible products will have their scorecard available in the C2C product registry. Product certification claims from manufacturers' websites should always be verified against this registry because they may be out-of-date.

During the material health assessment, assessors evaluate whether exposure to any of the identified or suspected hazardous chemicals are plausible in the context of the materials containing these chemicals and the product use and end of life scenarios. If avenues for exposure to these chemicals in a material exist, the material will receive an overall risk assessment rating of 'x'. Gold and Platinum certified products do not contain any x-assessed materials. Products certified at the Silver level under v3.0 do not contain materials that have been x-assessed due to the presence of a carcinogen, mutagen, or reproductive toxicant (CMR). Products certified at any level under v3.0 do not contain banned list chemicals. Chemicals on the v3.0 banned lists include PVC and related compounds, certain flame retardants, PFOS and PFOA, certain phthalates, halogenated hydrocarbons and toxic heavy metals. C2C certification.

cradle-to-gate assessment
analysis of a product's partial life cycle, from resource extraction (cradle) to the factory gate (before it is transported for distribution and sale). It omits the use and the disposal phases of the product.

declare
is a product labeling program that used the LBC Red List as it's basis for material evaluation. When creating a Declare label for a product, a manufacturer must disclose all of the products intentionally added constituent chemicals to the 100 ppm reporting threshold.

dedicated storage
a designated area in a building space or a central facility that is sized and allocated for a specific task, such as the collection of recyclable waste. Signage often indicates the type of recyclable waste stored there. Some waste streams, such as mercury-based light bulbs, sensitive paper documents, biomedical waste, or batteries, may require particular handling or disposal methods.

demand response (DR)
a change in electricity use by demand-side resources from their normal consumption patterns in response to changes in the price of electricity or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized.

demand response (DR) event
a specific period of time when the utility or independent service operator calls for a change in the pattern or level of use in grid-based electricity from its program participants. Also known as a curtailment event.

densely occupied space
an area with a design occupant density of 25 people or more per 1,000 square feet

development footprint
the total land area of a project site covered by buildings, streets, parking areas, and other typically impermeable surfaces constructed as part of the project.

APPENDIX A – GLOSSARY

electric vehicle supply equipment
the conductors, including the ungrounded, grounded, and equipment grounding conductors, the electric vehicle connectors, attachment plugs, and all other fittings, devices, power outlets or apparatuses installed specifically for the purpose of delivering energy from the premises wiring to the electric vehicle.

electronic waste
discarded office equipment (computers, monitors, copiers, printers, scanners, fax machines), appliances (refrigerators, dishwashers, water coolers), external power adapters, and televisions and other audiovisual equipment.

enclosure
the exterior plus semi-exterior portions of the building. Exterior consists of the elements of a building that separate conditioned spaces from the outside (i.e., the wall assembly). Semi-exterior consists of the elements of a building that separate conditioned space from unconditioned space or that encloses semi-heated space through which thermal energy may be transferred to or from the exterior or conditioned or unconditioned spaces (e.g., attic, crawl space, basement).

environmental product declarations (EPD)
are a standardized way of communicating the environmental effects associated with a product or system's raw material extraction, energy use, chemical make-up, waste generation, and emissions to air, soil, and water. EPDs must be at least cradle-to-gate—that is, it must cover the part of a product's life cycle from extraction ("cradle") and material processing to creation of the final product ready for sale by the manufacturer ("gate"); it excludes transportation from the factory to distributors or end customers. EPDs that cover only manufacture ("gate to gate") do not contribute toward the credit. All EPDs must also be consistent with ISO standards 14025, 14040, 14044, and EN 15804 or ISO 21930.

evapotranspiration
the combination of evaporation and plant transpiration into the atmosphere. Evaporation occurs when liquid water from soil, plant surfaces, or water bodies becomes vapor. Transpiration is the movement of water through a plant and the subsequent loss of water vapor.

extended producer responsibility
measures undertaken by the maker of a product to accept its own and sometimes other manufacturers' products as postconsumer waste at the end of the products' useful life. Producers recover and recycle the materials for use in new products of the same type. To count toward credit compliance, a program must be widely available. For carpet, extended producer responsibility must be consistent with NSF/ANSI 140–2007. Also known as closed-loop program or product take-back.

extensive vegetated roof
a roof that is covered with plants and typically not designed for general access. Usually an extensive system is a rugged green roof that requires little maintenance once established. The planting medium in extensive vegetated roofs ranges from 1 to 6 inches in depth.

floor-area ratio (FAR)
the density of nonresidential land use, exclusive of parking, measured as the total nonresidential building floor area divided by the total buildable land area available for nonresidential structures. For example, on a site with 10,000 square feet of buildable land area, an FAR of 1.0 would be 10,000 square feet of building floor area. On the same site, an FAR of 1.5 would be 15,000 square feet, an FAR of 2.0 would be 20,000 square feet, and an FAR of 0.5 would be 5,000 square feet.

forest stewardship council (FSC) wood
Wood products that are not reused, salvaged, or recycled must be certified to the standards of the FSC to contribute toward Credit M2.2A achievement. Bamboo and nonwood products that are not actually wood but are certified by FSC can count toward Credit M2.2A.

Chain-of-Custody (CoC) certification requirements are established by FSC CoC Standard 40-004 v2-1. Every entity that processes or trades FSC-certified material before it is shipped to the project site must have FSC CoC certification. If on-site installers of FSC-certified products modify the products off the project site, they must have CoC certification.

FSC-certified products must be itemized on the vendor's invoice. Their value toward credit contribution is calculated as one of the following:
Products identified as FSC 100% (FSC Pure) contribute 100% FSC content.
Products identified as FSC Mix Credit (FSC Mixed Credit) contribute 100% FSC content.
Products identified as FSC Mix [NN]% (FSC Mixed [NN]%) contribute the FSC content percentage indicated. For example, a product identified as "FSC Mix 75%" is valued at 75% of the product's cost.
Products identified as FSC Recycled Credit contribute 100% postconsumer recycled content.
Products identified as FSC Recycled [NN] % contribute the percentage postconsumer recycled content percentage indicated [NN].

Some products identified as FSC Mix Credit or FSC Mix [NN] % also have pre- or postconsumer recycled content. In these instances, choose whether to classify the product (or some fraction of the assembly) as FSC certified or as recycled content; the material cannot contribute to both claims simultaneously. Products certified by both FSC and to the Sustainable Agriculture Standard may receive credit for each criteria.

Each product shipped to the project site and contributing toward Credit M2.2A must be documented by an invoice from the CoC certificate holder as follows:
1) The invoice must have the vendor's CoC certificate code (e.g., RA-COC-001025, SCS-COC-000345, or SGSCOC-002563). The invoice must itemize FSC-certified products and specific FSC claims.
2) The invoice may aggregate the value of products, provided the cost of FSC products is isolated from other wood products and the vendor's CoC certificate code is on the invoice.

3) The invoice must show the entity being invoiced and indicate the delivery is intended for the SCA project.

functional entry
a building opening designed to be used by pedestrians and open during regular school hours. It does not include any door exclusively designated as an emergency exit, or a door not designed as a pedestrian entrance.

furniture and furnishings
the stand-alone furniture items purchased for the project, including individual and group seating; open-plan and private-office workstations; desks and tables; storage units, credenzas, bookshelves, filing cabinets, and other case goods; wall-mounted visual-display products (e.g., marker boards and tack boards, excluding electronic displays); and miscellaneous items, such as easels, mobile carts, freestanding screens, installed fabrics, and movable partitions.

global reporting initiative (GRI)
framework is widely recognized as the most comprehensive. Its corporate sustainability reporting program offers reporting services, a publicly available database of reports, and tracking of required progress. Reports are assigned a score of A, B, or C, reflecting how closely the framework was followed in the report; this letter grade is not an indicator of quality but pertains only to the application.

The reporting framework also supports third-party verification ("external assurance") through a network of approved assurance providers. A plus sign (+) after the score indicates that the report has been externally assured. For a product to count toward credit achievement, the "assurance scope" must cover either the entire report or all sections of the report that directly address raw materials extraction practices. The "level of assurance" for the relevant sections must be "reasonable/high" for the report to be considered third-party verified. If the level is "limited/moderate," the report is not considered third-party verified for the purposes of this credit. The report can still count as a manufacturer-declared report, however, provided it includes all the information specified in the credit requirements.

A report status of "GRI-checked" or "third-party checked" applies only to the application level. These checks are not the same as external assurance and do not qualify the report as third-party verified for the purposes of this credit.

graywater
untreated household waste water which has not come into contact with toilet waste. As defined in New York City Plumbing Code, graywater is discharge from lavatories and condensate water. This discharge can be repurposed to lower freshwater consumption in schools.

green infrastructure
a soil- and vegetation-based approach to wet weather management that is cost-effective, sustainable, and environmentally friendly. Green infrastructure management approaches and technologies infiltrate, evapotranspire, capture, and reuse stormwater to maintain or restore natural hydrologies.

green power
a subset of renewable energy composed of grid-based electricity produced from renewable energy sources.

greenscreen benchmark
hazard assessment method evaluates individual chemicals. GreenScreen version 1.2 is based on a toxicological assessment that starts with a collection of authoritative lists of "chemicals of concern" published by governmental and nongovernmental organizations (GreenScreen List Translator). These substances are known to be associated with certain health problems. This credit requires only the GreenScreen List Translator review of ingredients to ensure that none of the ingredients are on the authoritative lists and thus flagged as Benchmark 1 substances. Manufacturers documentation should either identify all ingredients in the product or identify and characterizes any benchmark hazards.

health product declarations (HPD)
is an open standard for reporting product ingredients and their associated health hazards. Manufacturers that use HPDs must provide the nonproprietary information on role or function, amount, and health hazards for every ingredient, not just those whose names have been withheld. The manufacturer affirms "Full disclosure of known hazards" on the front summary page and further affirms the level of disclosure with the check box under "Residuals disclosure." For the material to comply with the credit requirements, the HPD standards for the 1,000-ppm level must be attained and the appropriate box on the summary page checked.

An HPD is several pages long, with a one-page summary listing company information, metadata about the report, and ingredients, and continuing on subsequent pages with more detail about individual ingredients and their associated health hazards, plus details on any certifications and associated materials. GreenScreen Benchmarks, if any, are listed for each ingredient in HPDs, in the contents section. A report from a certified GreenScreen profiler may also be used to document the GreenScreen benchmarks for a product's ingredients.

historic building
a building or structure with historic, architectural, engineering, archeological, or cultural significance that is listed or determined to be eligible as a historic structure or building, or as a contributing building or structure in a designated historic district. The historic designation must be made by a local historic preservation review board or similar body, and the structure must be listed in a state register of historic places, be listed in the National Register of Historic Places (or a local equivalent outside the U.S.), or have been determined eligible for listing.

historic district
a group of buildings, structures, objects, and sites that have been designated or determined to be eligible as historically and architecturally significant, and categorized as either contributing or noncontributing to the historic nature of the district.

APPENDIX A – GLOSSARY

illuminance
the incident luminous flux density on a differential element of surface located at a point and oriented in a particular direction, expressed in lumens per unit area. Since the area involved is differential, it is customary to refer to this as illuminance at a point. The unit name depends on the unit of measurement for area: footcandles if square feet are used for area. (Adapted from Illuminating Engineering Society) In lay terms, illuminance is a measurement of light striking a surface. It is expressed in footcandles in the U.S. (based on square feet).

individual occupant space
an area where an occupant performs distinct tasks. Individual occupant spaces may be within multioccupant spaces and should be treated separately where possible.

intensive vegetated roof
a roof that, compared with an extensive vegetated roof, has greater soil volume, supports a wider variety of plants (including shrubs and trees), and allows a wider variety of uses (including human access). The depth of the growing medium is an important factor in determining habitat value. The native or adapted plants selected for the roof should support the site's endemic wildlife populations.

interior floor finish
all the layers applied over a finished subfloor or stairs, including stair treads and risers, ramps, and other walking surfaces. Interior finish excludes building structural members, such as beams, trusses, studs, or subfloors, or similar items. Interior finish also excludes nonfull spread wet coatings or adhesives.

interior wall and ceiling finish
all the layers comprising the exposed interior surfaces of buildings, including fixed walls, fixed partitions, columns, exposed ceilings, and interior wainscoting, paneling, interior trim or other finish applied mechanically or for decoration, acoustical correction, surface fire resistance, or similar purposes.

ISO 26000
provides guidance on how businesses and organizations can operate in an ethical and transparent way that contributes to the health and welfare of society. Not a standard to which a company's report can be certified, it helps clarify what social responsibility is, helps businesses and organizations translate principles into effective actions, and shares best practices relating to social responsibility.

land-clearing debris and soil
materials that are natural (e.g., rock, soil, stone, vegetation). Materials that are manmade (e.g., concrete, brick, cement) are considered construction waste even if they were on site.

landscape water requirement (LWR)
the amount of water that the site landscape area(s) requires for the site's peak watering month.

life-cycle assessments
examine the local, regional, and global environmental effects of buildings from construction through demolition. The effects relate to the products used to construct the building and can occur during many stages of the products life, including harvest, extraction, manufacture, and transportation of materials; construction and operations; and demolition and disposal. Whole-building LCAs take into account several effects such as global warming potential, stratospheric ozone depletion, acidification of land and water resources, eutrophication, formation of tropospheric ozone depletion, and depletion of nonrenewable resources.

life-cycle inventory
a database that defines the environmental effects (inputs and outputs) for each step in a material's or assembly's life cycle. The database is specific to countries and regions within countries.

light trespass
obtrusive illumination that is unwanted because of quantitative, directional, or spectral attributes. Light trespass can cause annoyance, discomfort, distraction, or loss of visibility.

load shedding
an intentional action by a utility to reduce the load on the system. Load shedding is usually conducted during emergency periods, such as capacity shortages, system instability, or voltage control.

low-impact development (LID)
an approach to managing rainwater runoff that emphasizes on-site natural features to protect water quality, by replicating the natural land cover hydrologic regime of watersheds, and addressing runoff close to its source. Examples include better site design principles (e.g., minimizing land disturbance, preserving vegetation, minimizing impervious cover), and design practices (e.g., rain gardens, vegetated swales and buffers, permeable pavement, rainwater harvesting, soil amendments). These are engineered practices that may require specialized design assistance.

manage (rainwater) on site
to capture and retain a specified volume of rainfall to mimic natural hydrologic function. Examples of rainwater management include strategies that involve evapotranspiration, infiltration, and capture and reuse.

mounting height
the distance between ground level (or the workplane) and the bottom of the luminaire (light fixture); the height at which a luminaire is installed.

movable furniture and partitions
items that can be moved by the users without the need of tools or assistance from special trades and facilities management.

native vegetation
an indigenous species that occurs in a particular region, ecosystem, and habitat without direct or indirect human actions. Native species have evolved to the geography, hydrology, and climate of that region. They also occur in communities; that is, they have evolved together with other species. As a result, these communities provide habitat for a variety of other native wildlife species. Species native to North America are generally recognized as those occurring on the continent prior to European settlement. Also known as native plants.

natural refrigerant
a compound that is not manmade and is used for cooling. Such substances generally have much lower potential for atmospheric damage than manufactured chemical refrigerants. Examples include water, carbon dioxide, and ammonia.

Natural Resources Conservation Service (NRCS) soils delineation
a U.S.-based soil survey that shows the boundaries of different soil types and special soil features on the site.

natural site hydrology
the natural land cover function of water occurrence, distribution, movement, and balance.

nonregularly occupied space
an area that people pass through or an area used for focused activities an average of less than one hour per person per day. The one-hour timeframe is continuous and should be based on the time a typical occupant uses the space. For spaces that are not used daily, the one-hour timeframe should be based on the time a typical occupant spends in the space when it is in use.

occupiable space
an enclosed space intended for human activities, excluding those spaces that are intended primarily for other purposes, such as storage rooms and equipment rooms, and that are occupied only occasionally and for short periods of time. (ASHRAE 62.1–2010)

occupied space
an enclosed space intended for human activities, excluding those spaces that are intended primarily for other purposes, such as storage rooms and equipment rooms, and that are only occupied occasionally and for short periods of time. Occupied spaces are further classified as regularly occupied or nonregularly occupied spaces based on the duration of the occupancy, individual or multioccupant based on the quantity of occupants, and densely or nondensely occupied spaces based on the concentration of occupants in the space.

open-grid pavement system
pavements that consist of loose substrates supported by a grid of a more structurally sound grid or webbing. Pervious concrete and porous asphalt are not considered open grid as they are considered bounded materials. Unbounded, loose substrates do not transfer and store heat like bound and compacted materials do.

operations and maintenance (O&M) plan
a plan that specifies major system operating parameters and limits, maintenance procedures and schedules, and documentation methods necessary to demonstrate proper operation and maintenance of an approved emissions control device or system.

organization for economic co-operation and development (OECD)
guidelines are a comprehensive corporate social responsibility instrument developed by governments. The recommendations, addressed to multinational enterprises operating in or from adhering countries, set forth voluntary principles and standards for responsible business conduct in such areas as employment and industrial relations, human rights, environment, information disclosure, antibribery practices, consumer interests, science and technology, competition, and taxation.

Owner's Project Requirements (OPR)
a written document that details the ideas, concepts, and criteria determined by the owner to be important to the success of the project. These include the Program of Requirements for the project and the SCA Standards.

peak demand
the maximum electricity load at a specific point in time or over a period of time.

permanent interior obstruction
a structure that cannot be moved by the user without tools or assistance from special trades and facilities management. Examples include lab hoods, fixed partitions, demountable opaque full- or partial-height partitions, some displays, and equipment.

plug load or receptacle load
the electrical current drawn by all equipment that is connected to the electrical system via a wall outlet (e.g. computers, printers, vacuums, etc.)

postconsumer recycled content
waste generated by households or commercial, industrial and institutional facilities in their role as end users of a product that can no longer be used for its intended purpose.

potable water
water that meets or exceeds U.S. Environmental Protection Agency drinking water quality standards (or a local equivalent outside the U.S.) and is approved for human consumption by the state or local authorities having jurisdiction; it may be supplied from wells or municipal water systems.

preconsumer recycled content
matter diverted from the waste stream during the manufacturing process, determined as the percentage of material, by weight. Examples include planer shavings, sawdust, bagasse, walnut shells, culls, trimmed materials, overissue publications, and obsolete inventories. The designation excludes rework, regrind, or scrap materials capable of being reclaimed within the same process that generated them (ISO 14021). Formerly known as postindustrial content.

process energy
power resources consumed in support of a manufacturing, industrial, or commercial process other than conditioning spaces and maintaining comfort and amenities for building occupants of a building. It may include refrigeration equipment, cooking and food preparation, clothes washing, and other major support appliances. (ASHRAE)

process load or unregulated load
the load on a building resulting from the consumption or release of process energy. (ASHRAE)

process water
water that is used for industrial processes and building systems, such as cooling towers, boilers, and chillers. It can also refer to water used in operational processes, such as dishwashing, and ice making.

APPENDIX A – GLOSSARY

product (permanently installed building product)
an item that arrives on the project site either as a finished element ready for installation or as a component to another item assembled on-site. The product unit is defined by the functional requirement for use in the project; this includes the physical components and services needed to serve the intended function of the permanently installed building product. In addition, similar product within a specification, each contributes as a separate product.

rainwater harvesting
the capture, diversion, and storage of rain for future beneficial use. Typically, a rain barrel or cistern stores the water; other components include the catchment surface and conveyance system. The harvested rainwater can be used for irrigation.

reclaimed water
wastewater that has been treated and purified for reuse.

recycled content
Recycled content claims must be specific to the installed product and must conform to the definition in ISO 14021–1999, Environmental Labels and Declarations, Self-Declared Environmental Claims (Type II Environmental Labeling). The average recycled content value can be used if provided by a single manufacturer for a single product. Industry-wide or national averages are not acceptable.

Distinguish between postconsumer and preconsumer recycled content when tracking materials for the purpose of credit calculations. Reuse of materials includes rework, regrind, or scrap product (ISO 14021); these count as preconsumer recycled only if they are used in a different product than the one whose production generated the waste.

red list
chemicals are those that have been designated as harmful to living creatures, including humans, or the environment.

reference evapotranspiration rate
the amount of water lost from a specific vegetated surface with no moisture limitation. Turf grass with height of 120 mm is the reference vegetation.

regularly occupied space
an area where one or more individuals normally spend time (more than one hour per person per day on average) seated or standing as they work, study, or perform other focused activities inside a building. The one-hour timeframe is continuous and should be based on the time a typical occupant uses the space. For spaces that are not used daily, the one-hour timeframe should be based on the time a typical occupant spends in the space when it is in use.

regulated load
any building end use that has either a mandatory or a prescriptive requirement in ANSI/ASHRAE/IES Standard 90.1–2010.

reuse/salvage
the reemployment of materials in the same or a related capacity as their original application, thus extending the lifetime of materials that would otherwise be discarded. Reuse includes the recovery and reemployment of materials recovered from existing building or construction sites. Also known as salvage.

Scope 1 emissions
direct greenhouse gas emissions from sources owned or controlled by the entity, such as emissions from fossil fuels burned on site.

Scope 2 emissions
indirect greenhouse gas emissions associated with the generation of purchased electricity, heating/cooling, or steam off site, through a utility provider for the entity's consumption.

service life
the assumed length of time that a building, product, or assembly will be operational for the purposes of a life-cycle assessment.

shared multioccupant space
a place of congregation, or where occupants pursue overlapping or collaborative tasks.

site assessment
an evaluation of an area's above ground and subsurface characteristics, including its structures, geology, and hydrology. Site assessments typically help determine whether contamination has occurred and the extent and concentration of any release of pollutants. Remediation decisions rely on information generated during site assessments.

solar garden
a shared solar array or other renewable energy system with grid-connected subscribers who receive credit for the use of renewables using virtual net metering. Also known as a community renewable energy system.

solar reflectance (SR)
the fraction of solar energy that is reflected by a surface on a scale of 0 to 1. Black paint has a solar reflectance of 0; white paint (titanium dioxide) has a solar reflectance of 1. The standard technique for its determination uses spectrophotometric measurements, with an integrating sphere to determine the reflectance at each wavelength. The average reflectance is then determined by an averaging process, using a standard solar spectrum, as documented by ASTM Standards E903 and E892.

solar reflectance index (SRI)
a measure of the constructed surface's ability to stay cool in the sun by reflecting solar radiation and emitting thermal radiation. It is defined such that a standard black surface (initial solar reflectance 0.05, initial thermal emittance 0.90) has an initial SRI of 0, and a standard white surface (initial solar reflectance 0.80, initial thermal emittance 0.90) has an initial SRI of 100. To calculate the SRI for a given material, obtain its solar reflectance and thermal emittance via the Cool Roof Rating Council Standard (CRRC-1). SRI is calculated according to ASTM E 1980. Calculation of the aged SRI is based on the aged tested values of solar reflectance and thermal emittance.

spatial daylight autonomy (sDA)
a metric describing annual sufficiency of ambient daylight levels in interior environments. It is defined as the percentage of an analysis area (the area where calculations are performed, typically across an entire space) that meets a minimum daylight illuminance level for a

specified fraction of the operating hours per year (i.e., the Daylight Autonomy value following Reinhart & Walkenhorst, 2001). The illluminance level and time fraction are included as subscripts, as in $sDA_{300,50\%}$. The sDA value is expressed as a percentage of area. (Illuminating Engineering Society)

$sDA_{300/50\%}$
the percentage of analysis points across the analysis area that meet or exceed this 300 lux value for at least 50% of the analysis period.

structure elements
carrying either vertical or horizontal loads (e.g., walls, roofs, and floors) that are considered structurally sound and nonhazardous.

systems manual
provides the information needed to understand, operate, and maintain the systems and assemblies within a building. It expands the scope of the traditional operating and maintenance documentation and is compiled of multiple documents developed during the commissioning process, such as the owner's project requirements, operation and maintenance manuals, and sequences of operation.

Technical Release (TR) 55
an approach to hydrology in which watersheds are modeled to calculate storm runoff volume, peak rate of discharge, hydrographs, and storage volumes, developed by the former USDA Soil Conservation Service.

three-year aged SR or SRI value
a solar reflectance or solar reflectance index rating that is measured after three years of weather exposure.

U.N. Global Compact
is a policy framework for the development, implementation, and disclosure of 10 sustainability principles in four core areas: human rights, labor, environment, and anticorruption. The GRI Sustainability Reporting Guidelines can be used to produce the Global Compact's annual Communication on Progress, the mechanism that UNGC uses to demonstrate progress toward its principles. The GRI guidelines provide a structure for reporting and independent verification. See the GRI Sustainability Reports section, above, for details on how to use that format to meet the credit requirements. Project teams should seek a signed letter from the manufacturer on company letterhead attesting to conformance with the credit requirements.

unoccupied space
an area designed for equipment, machinery, or storage rather than for human activities. An equipment area is considered unoccupied only if retrieval of equipment is occasional.

vertical illuminance
illuminance levels calculated at a point on a vertical surface, or that occur on a vertical plane. This lighting that affects spatial limits and proportions.

vision glazing
the glass portion of an exterior window that permits views to the exterior or interior. Vision glazing must allow a clear image of the exterior and must not be obstructed by frits, fibers, patterned glazing, or added tints that distort color balance.

walking distance
the distance that a pedestrian must travel between origins and destinations without obstruction, in a safe and comfortable environment on a continuous network of sidewalks, all weather-surface footpaths, crosswalks, or equivalent pedestrian facilities. The walking distance must be drawn from an entrance that is accessible to all building users.

water budget
a project-specific method of calculating the amount of water required by the building and associated grounds. The budget takes into account indoor, outdoor, process, and makeup water demands and any on site supply including estimated rainfall. Water budgets must be associated with a specified amount of time, such as a week, month, or year and a quantity of water.

zero lot line
project a plot whose building footprint typically aligns or nearly aligns with the site limits.

APPENDIX B – ABBREVIATIONS

ACEEE	American Council for an Energy Efficient Economy
ADC	Alternative Daily Cover
A/E	Architect/Engineer (typically A/E of Record)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASTM	ASTM International
ASE	Annual Sunlight Exposure
ANSI	American National Standards Institue
BECxA	Building Envelope Commissioning Authority
BOD	Basis of Design (Typically SCA Standards)
BMP	Best Management Practice
BMS	Building Management System
BRT	Bus Rapid Transit
BUG	Backlight – Uplight – Glare Method
C2C	Cradle-to-Cradle
CAC	Ceiling Attenuation Class
CARB	California Air Resources Board
CASRN	Chemical Abstract Service Registration Number
CBECS	Commercial Buildings Energy Consumption Survey
CDPH	California Department of Public Health
CFC	Chlorofluorocarbons
CFD	Computational Fluid Dynamics
CGP	Construction General Permit
CHPS	Collaborative for High Performing Schools
CI	Commercial Interiors (typically LEED-CI)
CIR	Credit Interpretation Ruling (from USGBC)
CoC	Chain of Custody
CO	Carbon Monoxide
CMR	Carcinogen, Mutagen, or Reproductive Toxicant
CMU	Concrete Masonry Unit
CRI	Carpet and Rug Institute
CRI	Color Rendering Index
CxA	Commissioning Authority
CxP	Commissioning Process
CSR	Corporate Social Reports
dBA	A-Weighted Decibles
DCAS	Department of Citywide Administrative Services
DEC	NYC Department of Environmental Conservation
DEP	NY State Department of Environmental Protection
DOB	NYC Department of Buildings
DOE	NYC Department of Education
DOAS	Dedicated Outside Air System
DOT	NYC Department of Transportation
DR	Demand Response
DRU	Decoupled Recirculating Air Handling Units
DSF	Division of School Facilities
DSNY	NYC Department of Sanitation
DU	Dwelling Unit

APPENDIX B – ABBREVIATIONS

EA	Effective Aperture
ECC	Early Childhood Center
ECM	Energy Conservation Measure (ECM)
EEM	Energy Efficiency Measure
EP	Exemplary Performance
EPA	Environmental Protection Agency
EPD	Environmental Product Declaration
EPR	Extended Producer Responsibility
ERC	Environmental and Regulatory Compliance
ESA	Environmental Site Assessment
ETS	Environmental Tobacco Smoke
ETV	Environmental Technology Verification
ET0	Evapotranspiration Rate
EVSE	Electric Vehicle Supply Equipment
FAR	Floor Area Ratio
FEMA	Federal Emergency Management Agency
F&E	Furniture and Equipment (typically SCA/F&E Unit)
FIRM	Flood Insurance Rate Maps
FMSI	Facilities Management System Integrator
FSC	Forestry Stewardship Council
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GI	Green Infrastructure
GRI	Global Reporting Initiative
(LC)GWP	(Life Cycle) Global Warming Potential
HCFC	Hydrochlorofluorocarbons
HEPA	High-Efficiency Particulate Arresting
HID	High-Intensity Discharge
HPD	Health Product Declaration
HS	High School
HVAC	Heating, Ventilating and Air Conditioning
IEH	Industrial and Environmental Hygiene
IES	Illuminating Engineering Society
IESNA	Illuminating Engineering Society of North America
IEQ	Indoor Environmental Quality
IFO	Interior Fit-Out
IIC	Impact Insulation Class
IPMVP	International Performance Measurement & Verification Protocol
IP	Integrative Process
IS	Intermediate School
LCA	Life Cycle Assessment
LEED	Leadership in Energy and Environmental Design
LID	Low-Impact Development
LPD	Lighting Power Density
LWR	Landscape Water Requirement
MEP	Mechanical, Electrical, Plumbing
MERV	Minimum Efficiency Reporting Value
MET	Metabolic Equivalent of Task
MLO	Model Lighting Ordinance
MOS	Mayor's Office of Sustainability

NAAQS	National Ambient Air Quality Standards
NIBS	National Institure of Building Sciences
NP-DES	National Pollutant Discharge Elimination System
NRC	Noise Reduction Coefficient
NYCECC	New York City Energy Conservation Code
NYSECCC	New York State Energy Conservation and Construction Code
OECD	Organization for Economic Co-operation and Development
OITC	Outdoor Indoor Transmission Class
(LC)ODP	(Life Cycle) Ozone Depletion Potential
OMB	Office of Management and Budget
OPR	Owners Project Requirements
PCR	Product Category Rule
PS	Primary School
POR	Program of Requirements
REC	Renewable Energy Credit
RH	Relative Humidity
RPC	Regional Priority Credit
RTU	Roof Top Units
SAA	Sound Absorption Average
SCA	NYC School Construction Authority
SCAQMD	South Coast Air Quality Management District
sDA	Spatial Daylight Autonomy
SEDI	Statement of Energy Design Intent
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPOT	Sensor Placement + Optimization Tool
SPDES	State Pollutant Discharge Elimination System
SRI	Solar Reflectance Index
SR	Solar Reflectance
STC	Sound Transmission Class
SWPP	Stormwater Pollution Prevention
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TVOC	Total Volatile Organic Compounds
USG	United States Gypsum
USGBC	United States Green Building Council
VAV	Variable Air Volume
VCT	Vinyl Compositional Tile
VOC	Volatile Organic Compounds
VRF	Variable Refrigerant Flow
VT	Visible Transmittance
WWR	Window to Wall Ratio

APPENDIX C – INTERIOR FIT-OUT (IFO) PROJECT APPENDIX

HOW-TO GUIDE FOR INTERIOR FIT-OUT PROJECTS

Certain SCA school project types do not fall within the definition of "New Construction." These project types include, but are not limited to:

- Projects where the school is part of a larger building;
- The complete renovation of several floors within an existing building;
- Existing building renovation projects including envelope improvements;
- Unique projects that require special energy modeling considerations and alternative compliance paths.

Projects that meet any of the descriptions above are recommended to demonstrate GSG 2019 compliance as an Interior Fit-Out. The following steps outline the guidance for projects following the Interior Fit-Out path.

1. Define the project scope.
2. Identify which path to pursue, either the New Construction Path or Interior Fit-Out Path.
3. If the Interior Fit-Out Path is selected, develop an Interior Fit-Out project checklist found on the SCA website. Note that Credits L1.3 R, L2.1R, W2.2R. E3.2R, E6.1P, and E6.2 have adjusted credit thresholds. Tables within this appendix show the threshold adjustments. Points have changed accordingly in the Interior Fit-Out Path checklist.
4. Identify the minimum required number of 'required if feasible' and additional credits to meet the minimum certification threshold.
5. Review the Interior Fit-Out specific requirements in the Interior Fit-Out Appendix.
6. Use the Interior Fit-Out Appendix to help determine which credits are similar or the same as New Construction (blue and red), new to Interior Fit-Out (green), or require different documentation.
7. If the documentation is the same, follow the GSG 2019 documentation process for the required milestones (Pre-schematic, SD, DD, 60%CD, 100%CD, and CA) for New Construction.
8. Changes in point thresholds have been accounted for in the Interior Fit-Out Project Checklist.
9. If the documentation is different, use the required Interior Fit-Out forms provided for each credit.
10. Interior fit-out projects intending to pursue the Long Term Commitment credit must include the lease duration in the project credit narrative.

SCA School Construction Authority

GSG 2019 Interior Fit-Out (IFO) Projects Appendix

Project:
Address | Zip Code:
LLW #:
Design #:
Architect:

LEGEND
INDICATES CREDIT IS SIMILAR TO NEW CONSTRUCTION (NC)
INDICATES CREDIT IS SIMILAR TO NEW CONSTRUCTION WITH MODIFIED POINTS
INDICATES CREDIT IS UNIQUE TO INTERIOR FIT-OUT (IFO)

	CI Reference LEED for Schools v4	NYC GSG 2019	Credit Name (Points Available)	GSG Phase Documentation							Major Changes in Credit Language	Documentation for IFO is the Same or Different than Base Credit
				Pre-SD	SD	DD	60% CD	100% CD	Des. Cert.	CA		
Integrative Process												
	IPc1	P 1.1R	Integrative Design Process (2)	x	x	x			x		There are (2) points available instead of (1). The points are distributed as follows: -Perform the integrative process for the Site Selection and Energy Related Systems [1 Point] -Perform the integrative process for the Water Related Systems [1 Point]	The same documentation is required however the team should determine which pieces of information are relevant based on how many points the project is pursuing.
Location & Transportation												
Site Selection	LTc2	L 1.1R	Sensitive Land Protection									
	LTc3	L 1.2	High Priority Site									
	LTc4	L 1.3	Surrounding Density (6)		x	x			x		Option 1: Adjust point thresholds see IFO tables attached under credit L1.3 [3-6 points]	Same
	LTc4	L 1.4R	Diverse Uses (2)		x	x			x		Option 2: Meet L1.4 R Diverse Uses requirements [1 or 2 points]	Same
Transportation	LTc5	L 2.1R	Access to Quality Transit (7)		x				x		Option 1: Adjust point thresholds to meet IFO values under credit L2.1R Option 2: Point Thresholds remain the same	Option 1: Same Option 2: Same
	LTc6	L 2.2	Bicycle Facilities (1)		x	x	x	x	x		Provide at least four (4) covered bicycle spaces are required. Storage that is fully allocated to the occupants of non project facilities cannot also serve project occupants.	Same
	LTc7	L 2.3R	Reduced Parking Footprint (2)		x	x	x	x	x		None	Same
	LTc8	L 2.3R	Green Vehicles, Charging Station Infrastructure & Installation									
	LTc8	L 2.4P, L 2.5A	Green Vehicles, Charging Station Insallation									
Site												
Site Assessment	SSp2	S 1.1P	Environmental Site Assessment									
	SSc1	S 1.2R	Enhanced Site Assessment									
Minimize Site Impact	SSp1	S 2.1P	Construction Activity Pollution Prevention			x	x	x		x	None	Same
	SSc3	S 2.2	Open Space									
	SSc4	S 2.3P, S 2.4	Green Infrastructure Assessment and Rainwater Management									
	SSc5	S 2.5	Heat Island Reduction									
	SSc6	S 2.6	Light Pollution Reduction									
Facility Use	SS 8	S 3.1R	Joint Use of Facilities, Community Access		x		x	x	x		None	Same
	IEQpc78	S 3.2	Active Design in a School Environment		x		x		x		None	Same
Water												
Outdoor Systems	WEp 1/c1	W 1.1P	Minimum Outdoor Water Use Reduction, Reduce by 30%									
	WEp 1/c1	W 1.2R	Enhanced Outdoor Water Use Reduction, Reduce Potable 50%-100%									
Indoor Systems	WEp2/c2	W 2.1P	Minimum Indoor Water Use Reduction, 20% Reduction			x	x	x	x			Same
	WEp2/c2	W 2.2R	Enhanced Indoor Water Use Reduction, 25%-50% Reduction (12)			x	x	x	x		Adjust point thresholds see IFO tables attached under W2.2-2.4 [2-12] Include fixtures and fittings necessary to meet the needs of the occupants.	Same
Metering	WEp3	W 3.1P	Water Metering, Building Level									
	WEc4	W 3.2R	Water Metering, Advanced									
Cooling Tower	WEc3	W 4.1A	Cooling Tower Water Use (only projects with cooling tower)(2)			x	x	x	x	x	None	Same; Teams to review with SCA if cooling tower is providing cooling for base building and school space.
Energy												
Commissioning	EAp1	E 1.1P	Fundamental Commissioning & Verification			x	x	x		x	Interior Fit-Out projects are responsible for completing tasks for all systems and equipment included in their scope including items furnished by the base building, but modified or relocated as part of school fit-out and must be coordinated with the base building requirements.	Same
	EAc1	E 1.2A	Enhanced Cx & Monitoring Based Cx (5)			x	x	x		x	Option 1: Enhanced Commissioning (4) points instead of (3) Option 2: Enhanced Monitoring Based Commissioning (5) points instead of (4)	Same
	EAc1	E 1.3A	Envelope Commissioning									
Refrigerant Management	EAp3	E 2.1P	Fundamental Refrigerant Management			x	x	x	x		None	Same
	EAc6	E 2.2	Enhanced Refrigerant Management (1)			x	x	x		x	Option 1: No Refrigerants or low impact refrigerants [1 point] - Do not use refrigerants or use refrigerants that have an ozone depletion potential of zero and a global warming potential of <50 Option 2: Calculation of refrigerant Impact [1 point]	Option 1: Confirmation that only no or low-impact refrigerants are used Option 2: Same as NC Enhanced Refrigerant Credit
Energy Efficiency	EAp2	E 3.1P	Minimum Energy Performance		x	x	x	x	x		Option 1: School energy simulation - Demonstrate 3% improvement above ASHRAE Standard 90.1-2010 Appendix G Option 2: Prescriptive Compliance - Comply with prescriptive provisions of ASHRAE Standard 90.1-2010 ; Reduce Connected LPD by 5% below ASHRAE 90.1-2010 by using the space-by-space method or by applying the whole building lighting power allowance to the entire school space; Install ENERGY STAR appliances, office equipment, electronics, and commercial food service equipment for 50% (by rate power) of the total ENERGY STAR eligible products in the project.	Option 1: Same Option 2: Target Finder Results, lighting power density calculations, ENERGY STAR appliance percentage
	EAc2	E 3.2R	Optimize Energy Performance, 6%-50% New, 4%-48% Renovations (25)		x	x	x	x	x		Option 1: School energy simulation - adjust point thresholds to meet IFO values under credit E3.2R Option 2: Prescriptive compliance - adjust point thresholds to meet IFO values under E3.2R	Option 1: Same Option 2: Lighting power density calculations, ENERGY STAR appliance percentage, Building envelope characteristics, base building HVAC equipment efficiencies, HVAC control devices and locations, lighting control devices and locations.

	CI Reference LEED for Schools v4	NYC GSG 2019	Credit Name (Points Available)	GSG Phase Documentation							Major Changes in Credit Language	Documentation for IFO is the Same or Different than Base Credit
				Pre-SD	SD	DD	60% CD	100% CD	Des. Cert.	CA		
Energy Efficiency (cont.)		E 3.3R	HVAC System Sizing, Avoid Oversizing			x	x	x	x		None	Same
Energy Management		E 4.1R	Energy Management System Controls			x	x	x	x		None	Same
	EAc4	E 4.2A	Demand Response			x	x	x		x	None	Same
Metering	EAp3	E 5.1P	Energy Metering, Building Level									
	EAc3	E 5.2R	Energy Metering, Advanced (2)			x	x	x		x	Option 1: Metering [1 point] Install new or use existing school space energy meters to provide school consumption data. Utility-owned meters are acceptable. Option 2: Advanced Metering [2 Points] Install advance energy metering for all energy sources in the school space and meter any energy end uses that represent 10% or more of the total annual consumption of the school space.	Option 1: Confirmation of permanently installed meters, letter of commitment and date sharing source. Option 2: Confirmation and list of advanced meters, including type and energy source metered, manufacturer's cut sheets.
Power	EAc5	E 6.1P, E 6.2	Renewable Energy Feasibility and Renewable Energy Production (3)		x	x	x	x	x	x	Adjust point thresholds see IFO tables under E6.1A	Same
	EAc7	E 6.3R	Green Power & Carbon Offsets (2)			x	x	x	x		None	Same
Materials												
Efficient Material Use	MRp1	M 1.1P	Storage & Collection of Recyclables			x	x	x	x		None	Same
	MRp2/c5	M 1.2P	Construction & Demolition Waste, Planning			x	x	x		x	None	Same
	MRp2/c5	M 1.3R	Construction & Demolition Waste, 50%- 75% Diversion (2)			x	x	x		x	None	Same
			Long-Term Commitment (1)		x				x		School must have at least a 10 year lease.	Verification of intent to remain in project space for 10 years.
Materials Reporting & Optimization	MRc4	M 2.1A	Material Extraction Reporting (1)			x	x	x		x	None	Same
	MRc4	M 2.2A	Material Extraction Optimization (1)			x	x	x		x	None	Same
	MRc3	M 2.3	Material Environmental Reporting (1)			x	x	x		x	None	Same
	MRc3	M 2.4A	Material Environmental Optimization (1)			x	x	x		x	None	Same
	MRc5	M 2.5	Material Ingredient Reporting (1)			x	x	x		x	None	Same
	MRc5	M 2.6A	Material Ingredient Optimization (1)			x	x	x		x	None	Same
Material Life-Cycle Impacts	MRc1	M 3.1A	Life-Cycle Impact Reduction, Whole Building LCA									
	MRc1	M 3.2A	Life-Cycle Impact Reduction, Building & Material Reuse									
		M 4.1R	Wallboard & Roof Deck Products, Mold Resistance			x	x	x	x		None	Same
Indoor Environmental Quality												
Design Indoor Air Quality	IEQp1	Q 1.1P	Minimum IAQ Performance (1)		x	x	x	x	x	x	None	Same
	IEQc1	Q 1.2R	Enhanced IAQ Source Control (1)			x	x	x	x		None	Same
	IEQc1	Q 1.3A	Enhanced IAQ Ventilation & Monitoring (1)			x	x	x	x	x	None	Same
Construction Indoor Air Quality	IEQc3	Q 2.1R	Construction IAQ Management Plan (1)			x	x	x		x	None	Same
	IEQc3	Q 2.2R	Building IAQ Flush Out			x	x	x		x	None	Same
Post Construction Indoor Air Quality		Q 3.1R	Electric Ignition Stoves			x	x	x	x		None	Same
		Q 3.2R	Post Construction Indoor Air Quality			x				x	None	Same
Material Emissions	IEQc2	Q 4.1, Q 4.2A	Low-Emitting Materials, 3-5 categories and 6 categories (3)			x	x	x		x	None	Same
Thermal Comfort	IEQc5	Q 5.1R	Thermal Comfort (1)			x	x	x	x		None	Same
Lighting Quality	IEQc6	Q 6.1R	Interior Lighting Control (1)			x	x	x	x		None	Same
	IEQc6	Q 6.2	Interior Lighting Quality (1)			x	x	x	x		None	Same
		Q 6.3R	Visual Performance, Artificial Direct-Indirect Lighting			x	x	x	x		None	Same
Daylight and Views	IEQc7	Q 7.1	Daylight, 55%-75% (3)			x	x	x	x		None	Same
	IEQc8	Q 7.2	Quality Views (1)			x	x	x	x		None	Same
Acoustics	IEQp3	Q 8.1P	Minimum Acoustical Performance			x	x	x	x		None	Same
	IEQ 9	Q 8.2	Enhanced Acoustical Performance (2)			x	x	x	x		None	Same
Innovation												
Accreditation	ID 2	A 1.1R	LEED® Accredited Professional			x			x	x	None	Same
Above & Beyond	ID 1	A 1.2A	Innovation or Pilot Credit			x	x	x	x	x	None	Same
Regional Priority												
Regional Priority	RP 1-4	R1.1A - R1.4A	Regional Priority			x		x		x	Regional Priority Credits for IFO projects are available for: E1.2A, E3.2R, M2.4A, W2.2R, projects that achieve both Q1.2R and Q1.3A	

APPENDIX C – INTERIOR FIT-OUT (IFO) PROJECT APPENDIX

INTERIOR FIT-OUT TABLES

L 1.3 SURROUNDING DENSITY

Table 1A Points for average density with 1/4-mile of project (imperial units)			
Combined density	Residential & Nonresidential Densities		Points
Square Feet per acre of	Residential Density	Nonresidential Density	
22,000	7	0.5	3
35,000	12	0.8	6

L 2.1R ACCESS TO QUALITY TRANSIT

Table 1A Minimum daily transit service for projects with multiple transit types (bus, streetcar, rail, or ferry)		
Weekday trips	Weekend trips	Points
72	40	2
144	108	5
360	216	7

W 2.2R INDOOR WATER USE REDUCTION

Table 1A Points for reducing water use	
Percentage reduction	Points
25%	2
30%	4
35%	6
40%	8
45%	10
50%	12

E 3.2R OPTIMIZE ENERGY PERFORMANCE

Table 1A Points for percentage improvement in energy performance	
Interior Construction	Points
4%	4
5%	6
6%	8
7%	10
8%	11
9%	12
10%	13
11%	14
12%	15
13%	16
14%	17
15%	18
16%	19
17%	20
18%	21
20%	22
22%	23
24%	24
28%	25

Table 2A Point for percentage reduction in lighting power density	
Percentage below standard LPD	Points
10%	1
15%	2
20%	3
25%	4

Table 3A Points for installing ENERGY STAR equipment and appliances	
Percentage of ENERGY STAR products	Points
70%	1
90%	2

E 6.1P, E 6.2 RENEWABLE ENERGY PRODUCTION

Table 1A Points for renewable energy	
Percentage renewable energy	Points
1%	1
3%	2
5%	3

APPENDIX D – FORMS (Refer to SCA website for all forms in Appendix D)

General	Project Credit Checklist
General	Project Credit Checklist Interior Fit-Out
General	Documentation Checklist
General	Project Information Form
General	Credit Compliance Narratives
P1.1R	Integrative Design Process Credit Form
L1.3	Surrounding Density Credit Form
L1.4R	Diverse Uses Credit Form
L2.2	Bicycle Facilities Credit Form
S1.2R	Enhanced Site Assessment Credit Form
S2.1P	Construction Activity Pollution Prevention Credit Form
S2.4	Rainwater Management Credit Form
S2.5	Heat Island Reduction Credit Form
S2.6	Light Pollution Reduction Credit Form
S3.2	Active Design in a School Environment Credit Form
W1.1P, W1.2R	Outdoor Water Use Reduction Credit Form
W2.1P. W2.2R	Indoor Water Use Reduction Credit Form
Commissioning	Commissioning Authority Certification Form (E1.1P, E1.2A, and E1.3A)
E2.2	Enhanced Refrigerant Management Credit Form
E3.1	Geothermal Feasibility Credit Form
E6.1P	Feasibility of Renewable Energy Credit Form
E6.2	Production of Renewable Energy Credit Form
E6.3R	Green Power and Carbon Offsets Credit Form
M1.2P, M1.3R	Construction and Demolition Waste Credit Form
Materials	Material Reporting and Optimization Credit Form (M2.1A, M2.2A, M2.4A, M2.6A)
Materials	Contractor's Sustainable Materials Credit Form (Credit M2.1A, M2.2A, M2.3, M2.4A, M2.5, M2.6A)
M2.3	Material Environmental Reporting Credit Form
M2.5	Material Ingredient Reporting Credit Form
M3.1A	Life-cycle Impact Reduction Whole Building Credit Form
M3.2	Life-cycle Impact Reduction, Building and Material Reuse Credit Form
Q1.1P	Minimum Indoor Air Quality Performance Credit Form
Q2.2R	Building IAQ Flush-Out Credit Form
Q4.1, Q4.2	Low Emitting Materials Summary Credit Form
Q5.1R	Thermal Comfort Credit Form
Q6.1R	Interior Lighting Control Credit Form
Q7.2	Quality Views Credit Form
ALL	Design Team Certification Form-Design Phase
ALL	Design Team Certification Form-Construction Phase
ALL	Contractor Certification Form

Project Credit Checklist[1]

SCA School Construction Authority

NYC Green Schools Rating System 2019

		SD	DD	60%	100%	Design	Const
Project:	PS 123A						
Address | Zip Code:	345 Example St	Date last updated:					
LLW #:	123456	Select if interior fit-out[13]					
Design #:	123456						
Architect:	#REF!						

Impact Area	BD&C Reference LEED for Schools v4[2]	CHPS Reference	NYC GSG 2019[3]	Credit Name	Credits with 0 Points Required for all projects[5]	Credit with Points Required for all Projects	Required if Feasible	Additional Credits	Regional Priority[6]	Credit submissions required for Design and Construction[7]: Design Phase	Const. Phase
Integrative Process										1 Point	
	IPc1		P1.1R	**Integrative Design Process**		1				0	
Category Sub-Total:					0NP	1	0	0	0	0	0
Location & Transportation										16 Points	
Site Selection	LTc2		L1.1R	**Sensitive Land Protection**		1				0	
	LTc3		L1.2	**High Priority Site**			2		1	0	
	LTc4		L1.3	**Surrounding Density**			3			0	
	LTc4		L1.4R	**Diverse Uses**		2				0	
Transportation	LTc5		L2.1R	**Access to Quality Transit**		2	2			0	
	LTc6		L2.2	**Bicycle Facilities**			1			0	
	LTc7		L2.3R	**Reduced Parking Footprint**		1				0	
			L2.4P	**Green Vehicles, Charging Station Infrastructure**	NP					N	
	LTc8		L2.5A	**Green Vehicles, Charging Station Installation**				1		0	
Category Sub-Total:					1NP	6	8	1	1	0	0
Site										11 Points	
Site Assessment	SSpr2		S1.1P	**Environmental Site Assessment**	NP					N	
	SSc1		S1.2R	**Enhanced Site Assessment**		1				0	
Minimize Site Impact	SSpr1		S2.1P	**Construction Activity Pollution Prevention**	NP						N
	SSc3		S2.2	**Open Space**			1			0	
			S2.3P	**Green Infrastructure Assessment**	NP					N	
	SSc4		S2.4	**Rainwater Management**				3	1	0	
	SSc5		S2.5	**Heat Island Reduction**			2			0	
	SSc6		S2.6	**Light Pollution Reduction**			1			0	
Facility Use	SS 8	1.1.2	S3.1R	**Joint Use of Facilities,** Community Access		1				0	
	IEQpc78		S3.2	**Active Design in a School Environment**			1			0	
Category Sub-Total:					3NP	2	5	3	1	0	0
Water										10 Points	
Outdoor Systems	WEpr1		W1.1P	**Outdoor Water Use Reduction**, Reduce 30%	NP					N	
	WEc1		W1.2R	**Outdoor Water Use Reduction,** Reduce Potable 50%-100%		2				0	
Indoor Systems	WEpr2		W2.1P	**Indoor Water Use Reduction**, 20% Reduction	NP					N	
	WEc2		W2.2R	**Indoor Water Use Reduction,** 25%-50% Reduction		2	1	2		0	
Metering	WEp3		W3.1P	**Water Metering,** Building Level	NP					N	
	WEc4		W3.2R	**Water Metering,** Advanced		1				0	
Cooling Tower	WEc3		W4.1A	**Cooling Tower Water Use** (only projects with cooling tower)				2		0	
Water Category Sub-Total:					3NP	5	1	4	0	0	0
Energy										35 Points	
Commissioning	EApr1		E1.1P	**Fundamental Commissioning & Verification**	NP						N
	EAc1		E1.2A	**Enhanced Cx & Monitoring Based Cx**				4			0
	EAc1		E1.3A	**Envelope Commissioning**				2			0
Refrigerant Management	EAp3		E2.1P	**Fundamental Refrigerant Management**	NP					N	
	EAc6		E2.2	**Enhanced Refrigerant Management**			1			0	
Energy Efficiency	EAp2		E3.1P	**Minimum Energy Performance**	NP					N	
	EAc2		E3.2R	**Optimize Energy Performance,** 6%-50% New, 4%-48% Renovations[8]		3		15		0	
		3.1.2	E3.3R	**HVAC System Sizing,** Avoid Oversizing	NP					N	
Energy Management		3.3.5	E4.1R	**Energy Management System Controls**	NP					N	
	EAc4		E4.2A	**Demand Response**				2	1		0
Metering	EApr3	3.3.8	E5.1P	**Energy Metering,** Building Level	NP						N
	EAc3		E5.2R	**Energy Metering,** Advanced		1					0
Power	EAc5		E6.1P	**Feasibility of Renewable Energy**	NP					N	
			E6.2A	**Production of Renewable Energy**				4			0
	EAc7		E6.3R	**Green Power & Carbon Offsets**		1		1		0	
Energy Category Sub-Total:					7NP	5	1	28	1	0	0

Project Credit Checklist[1]

SCA School Construction Authority

NYC Green Schools Rating System 2019

		SD	DD	60%	100%	Design	Const
Project:	PS 123A						
Address | Zip Code:	345 Example St	Date last updated:					
LLW #:	123456	Select if interior fit-out[13]					
Design #:	123456						
Architect:	#REF!						

Impact Area	BD&C Reference LEED for Schools v4[2]	CHPS Reference	NYC GSG 2019[3]	Credit Name	Credits with 0 Points Required for all projects[5]	Credit with Points Required for all Projects	Required if Feasible	Additional Credits	Regional Priority[6]	Credit submissions required for Design and Construction[7] Design Phase	Const. Phase
Materials										16 Points	
Efficient Material Use	MRpr1		M1.1P	**Storage & Collection of Recyclables**	NP					N	
	MRpr2		M1.2P	**Construction & Demolition Waste,** Planning	NP						N
	MRc5		M1.3R	**Construction & Demolition Waste,** 50%- 75% Diversion		1	1				0
				Long-Term Commitment[14]			0			0	
Materials Reporting & Optimization	MRc3		M2.1A	**Material Extraction Reporting**				1			0
	MRc3		M2.2A	**Material Extraction Optimization**				1			0
	MRc2		M2.3	**Material Environmental Reporting**			1				0
	MRc2		M2.4A	**Material Environmental Optimization**				1			0
	MRc4		M2.5	**Material Ingredient Reporting**			1				0
	MRc4		M2.6A	**Material Ingredient Optimization**				1			0
Material Life-Cycle Impacts	MRc1		M3.1A	**Life-Cycle Impact Reduction,** Whole Building LCA[9]				3	1		0
	MRc1		M3.2	**Life-Cycle Impact Reduction,** Building and Material Reuse[10]			4				0
		4.1.1	M4.1R	**Wallboard & Roof Deck Products,** Mold Resistance	NP					N	
Materials Category Sub-Total:					3NP	1	7	7	1	0	0
Indoor Environmental Quality										16 Points	
Design Indoor Air Quality	IEQpr1		Q1.1P	**Minimum IAQ Performance**	NP					N	
	IEQc1		Q1.2R	**Enhanced IAQ Source Control**[11]		1			1	0	
	IEQc1		Q1.3A	**Enhanced IAQ Ventilation & Monitoring**[11]				1		0	
Construction Indoor Air Quality	IEQc3		Q2.1R	**Construction IAQ Management Plan**		1					0
	IEQc4		Q2.2R	**Building IAQ Flush-Out**		1					0
Post Construction Indoor Air Quality		5.3.5	Q3.1R	**Electric Ignition Stoves**	NP					N	
		6.2.4	Q3.2R	**Post Construction Indoor Air Quality**	NP						N
Material Emissions	IEQc2		Q4.1	**Low-Emitting Materials,** 3-5 Categories			2				0
	IEQc2		Q4.2A	**Low-Emitting Materials,** 6 Categories				1			0
Thermal Comfort	IEQc5		Q5.1R	**Thermal Comfort**		1				0	
Lighting Quality	IEQc6		Q6.1R	**Interior Lighting,** Control		1				0	
	IEQc6		Q6.2	**Interior Lighting,** Quality			1			0	
		5.2.1	Q6.3R	**Visual Performance,** Artificial Direct-Indirect Lighting	NP					N	
Daylight and Views	IEQc7		Q7.1	**Daylight,** 55%-75%			3			0	
	IEQc8		Q7.2	**Quality Views**			1			0	
Acoustics	IEQpr3	5.5.1	Q8.1P	**Minimum Acoustical Performance**	NP					N	
	IEQ 9		Q8.2	**Enhanced Acoustical Performance**			1			0	
IEQ Category Sub-Total:					5NP	5	8	2	1	0	0
Innovation										2 Points	
Accreditation	IDc2		I1.1R	**LEED® Accredited Professional**		1					0
Above & Beyond	IDc1		I1.2A	**Innovation or Pilot Credit**				1		0	
Additional Credits Sub-Total:					0NP	1	0	1	0	0	0
					22NP	26	30	46	5	0	0
LEED® Equivalent Point Total[12]:										107	

1	The NYC GSG requires that all credits be attempted and proof through calculation for those which are not-feasible.
2	LEED reference numbers are based on the order of credits in the LEED for Schools v4 Rating System.
3	Letter prefix indicates credit section (P, L, S, W, E, M, Q, I) First number indicates the category within the section Second number indicates the specific credit within the section category Suffix "P" is added for credits that are LEED® prerequisites and therefore required of all projects Suffix "R" is added for credits that are required of all projects Suffix "A" indicates credits that are additional and may only be pursued with SCA direction/permission.
4	Select if feasible or not, first, in column F. If feasible complete column G using the drop down options.
5	To be consistent with LEED®, the NYC GSG assigns no point "NP" value to prerequisites or non-LEED® credits.
6	If the referenced Regional Priority Credit is achieved, the project will receive the additional point for "RP".
7	Indicates the submission phase for each credit. Columns will automatically fill with point values for credits being pursued (exception E 3.2 R).
8	credit
9	M3.1A is only applicable to new construction. Regional Priority is earned by achieving either M3.1A or 3.2A.
10	M3.2A is only applicable to renovations/remodels. Regional Priority is earned by achieving either M3.1A or 3.2A.
11	Projects need to achieve both Q1.2R and Q1.3A to earn the Regional Priority point.
12	LL32/16 requires Certified LEED® v4 for Schools or equivalent of a no-less stringent rating system - Minimum 40 Points.
13	Upon selection of interior fit-out, the checklist updates with accordance to Appendix C. Points, drop-down menus, credit applicability updates automatically.
14	Long Term Commitment is new credit in the checklist only and applicable to Interior Fit-out projects only.

Documentation Checklist

Project: Date last updated:

NYC School Construction Authority

NYC GSG 2019	Credit Name	SUBMITTAL/DOCUMENTATION	Notes	Responsible Party	Status
Overview Documents					
	Project Credit Checklist				
	Documentation Checklist				
	Credit Compliance Narratives				
	Design Team Certification Form-Design Phase				
	Design Team Certification Form-Construction Phase				
	Construction Toolkit - Architect				
	Construciton Toolkit - Contractor				
	Commissioning Authority Certification Form				
	Contractor Certification Form				
Integrative Design Process (P)					
P 1.1R	**Integrative Design Process**				
	PRE-SCHEMATIC DESIGN	Complete analysis under Requirements			
	PRE-SCHEMATIC DESIGN	Facilitate Integrative Design Workshop			
	SCHEMATIC DESIGN	Integrative Design Workshop Report			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Integrative Design Process Credit Form			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Location (L)					
L 1.1R	**Sensitive Land Protection**				
	SCHEMATIC DESIGN	Option 1 - Narrative			
	SCHEMATIC DESIGN	Option 2 - Narrative			
	DESIGN DEVELOPMENT	Updated Documentation			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 1.2	**High Priority Site**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Option 1 & 2 - Vicinity Map			
	SCHEMATIC DESIGN	Option 3 - Narrative			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	Option 3 - Narrative			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	Option 3 - Brownfield Remediation Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
L 1.3	**Surrounding Density**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Surrounding Density Credit Form			
	SCHEMATIC DESIGN	Site Vicinity Plan			
	DESIGN DEVELOPMENT	Updated Documentation			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 1.4R	**Diverse Uses**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Diverse Uses Credit Form			
	SCHEMATIC DESIGN	Site Vicinity Plan			
	DESIGN DEVELOPMENT	Updated Documentation			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 2.1R	**Access to Quality Transit**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Option 1 - Scaled Area Plan			
	SCHEMATIC DESIGN	Option 2 - Map of Boundaries			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			

	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 2.2	**Bicycle Facilities**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Plan w Location of Bike Racks			
	SCHEMATIC DESIGN	Site Plan w Dedicated Bike Lanes			
	SCHEMATIC DESIGN	Map of Bicycle Network & Diverse Uses			
	SCHEMATIC DESIGN	Plan w Location of Showers			
	DESIGN DEVELOPMENT	Submit Required Calculations			
	DESIGN DEVELOPMENT	Plan w Distance of Storage from Building Entrance			
	DESIGN DEVELOPMENT	Site Plan w Bike Lane from Building and/or Bike Racks			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 2.3R	**Reduced Parking Footprint**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Option 1 - Narrative			
	SCHEMATIC DESIGN	Option 2 - Narrative			
	DESIGN DEVELOPMENT	Option 2 - Calculations			
	DESIGN DEVELOPMENT	Option 2 - Location of Preferred Parking			
	DESIGN DEVELOPMENT	Option 2 - Examples of Signage			
	DESIGN DEVELOPMENT	Option 2 - Number of Spaces Required per Zoning			
	60% CONSTRUCTION DOCUMENTS	Option 2 - Incorporate Requirements on Contract Drawings			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
L 2.4A	**Green Vehicles**				
	SCHEMATIC DESIGN	Narrative			
	DESIGN DEVELOPMENT	Number of Spaces Required per Code			
	DESIGN DEVELOPMENT	Location of Preferred Parking			
	DESIGN DEVELOPMENT	Location of Electrical Vehicle Supply Equipment (EVSE)			
	DESIGN DEVELOPMENT	Examples of Signage			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements on Contract Drawings			
	60% CONSTRUCTION DOCUMENTS	Provide Cut Sheet w Type of EVSE			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Site (S)					
S 1.1P	**Environmental Site Assessment**				
	SCHEMATIC DESIGN	Narrative Site Assessment Work To Date			
	SCHEMATIC DESIGN	Executive Summary of Phase I and/or Phase II ESA			
	SCHEMATIC DESIGN	If Phase II, Documentation of Remediation			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	If Phase II, Narrative of Remediation Measures			
	60% CONSTRUCTION DOCUMENTS	Incorporate SCA IEH Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	If Phase II, Narrative of Remediation Measures			
	CONSTRUCTION	If Phase II, Letter Confirming Remediation Meets Residential Standards			
	CONSTRUCTION	If Phase II, Design Team Certification Form-Construction Phase			
S 1.2R	**Enhanced Site Assessment**				
	SCHEMATIC DESIGN	Narrative on Site Features Evaluated			
	SCHEMATIC DESIGN	Enhanced Site Assessment Credit Form			
	SCHEMATIC DESIGN	Supporting Maps or Other Information			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	No credit submittal			
S 2.1P	**Construction Activity Pollution Prevention**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative on ESC Plan			
	DESIGN DEVELOPMENT	Notification of Intent for SWPP Application, if required			
	60% CONSTRUCTION DOCUMENTS	Appropriate Spec Sections Updated for Project			
	60% CONSTRUCTION DOCUMENTS	ESC Plan w SWPP, if required			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Implement ESC Plan			
	CONSTRUCTION	At Minimum, Six Photos and Inspection Logs			
	CONSTRUCTION	Contractor Certification Form			
S 2.2	**Open Space**				

	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	If Feasible, Demonstrate w Calculations			
	SCHEMATIC DESIGN	Site Plan w Open Space			
	SCHEMATIC DESIGN	If Not Feasible, Demonstrate w Calculations			
	DESIGN DEVELOPMENT	Site Plan w Building and Site Area Details			
	DESIGN DEVELOPMENT	List of Plant Species			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
S 2.3A	**Rainwater Management**				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Rainwater Management Credit Calculator			
	SCHEMATIC DESIGN	Rainfall and Runoff Preliminary Calculations			
	DESIGN DEVELOPMENT	Site Plan w GI or LID Strategies and Topography			
	DESIGN DEVELOPMENT	Narrative Confirming GI or LID Measures			
	DESIGN DEVELOPMENT	Calculations for Volume Managed by GI or LID			
	60% CONSTRUCTION DOCUMENTS	Updated Site Plan w GI or LID and Topography			
	60% CONSTRUCTION DOCUMENTS	Updated Calculations for Volume Managed by GI or LID			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
S 2.4	**Heat Island Reduction**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Heat Island Reduction Credit Form			
	DESIGN DEVELOPMENT	Site Plan w Roof and Nonroof Measures			
	60% CONSTRUCTION DOCUMENTS	Updated Heat Island Reduction Credit Form			
	60% CONSTRUCTION DOCUMENTS	Updated Site Plan w Roof and Nonroof Measures			
	60% CONSTRUCTION DOCUMENTS	Manufacturers Doc w SR, SRI, and/or permeability			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Contractor's Submittals Confirming Compliance			
S 2.5	**Light Pollution Reduction**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Narrative w Results from Light Trespass Analysis			
	60% CONSTRUCTION DOCUMENTS	Plans of Exterior Lighting Corresponding to Narrative			
	60% CONSTRUCTION DOCUMENTS	Light Pollution Reduction Credit Form			
	60% CONSTRUCTION DOCUMENTS	Non-Emergency Lighting Not Auto-Controlled, Classroom Plan			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
S 3.1R	**Joint Use of Facilties,** Community Access				
	SCHEMATIC DESIGN	Narrative			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	Submit Plan Indicating Design Features and Path of Travel From Entrance			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
S 3.2	**Active Design in a School Environment**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Active Design in a School Environment Credit Form			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	No credit submittal			
Water (W)					
W 1.1P - 1.2R	**Outdoor Water Use Reduction**	Outdoor Water Use Reduction Calculator			
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Option 2 - Landscape Plan w Vegetated Area			
	DESIGN DEVELOPMENT	If Recommended Irrigation, Narrative w Water Use Reduction Techniques			
	60% CONSTRUCTION DOCUMENTS	Option 1 - Verify Plants are Native/Adaptive and Identify Water Needs			
	60% CONSTRUCTION DOCUMENTS	Option 1 - Add Native/Adaptive Plants in Drawings and Specs			
	60% CONSTRUCTION DOCUMENTS	Option 2 - List of Plant Species to Achieve 30% Reduction			
	60% CONSTRUCTION DOCUMENTS	Option 2 - Calculations from Water Sense for 50% Reduction			
	60% CONSTRUCTION DOCUMENTS	Option 2 - Submit Docs for Contract Specification and Cx of Irrigation			
	60% CONSTRUCTION DOCUMENTS	Option 2 - Outdoor Water Use Reduction Calculator			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			

	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
W 2.1P - 2.2R	**Indoor Water Use Reduction**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Indoor Water Use Reduction Credit Form			
	60% CONSTRUCTION DOCUMENTS	Pre-K & K Schools - Calculations for % of Students w Toilets in Room			
	60% CONSTRUCTION DOCUMENTS	Incorporate Fixtures per Standard Specs			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
W 3.1P	**Water Metering,** Building Level				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Drawings w Location of Water Meter Room w Utility Meters			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
W 3.2R	**Water Metering,** Advanced				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Determine All Potable Water Used w/in Project			
	60% CONSTRUCTION DOCUMENTS	Facilitate Submetering During Plumbing System Design			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	<100% Submetered - Calculations for Amnt of System Submetered			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
W 4.1A	**Cooling Tower Water Use** (only projects with cooling tower)				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Conduct Potable Water Analysis			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Calculate Cycles of Concentration			
Energy (E)					
E 1.1P	**Fundamental Commissioning & Verification**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Basis of Design w Narrative			
	DESIGN DEVELOPMENT	Modified Specification Table of Contents			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Updated Specification Table of Contents			
	60% CONSTRUCTION DOCUMENTS	Functional Performance and Acceptance Tests			
	60% CONSTRUCTION DOCUMENTS	CxA - Review BOD, OPR, and Construction Documents			
	60% CONSTRUCTION DOCUMENTS	CxA - Develop Preliminary Cx Plan			
	100% CONSTRUCTION DOCUMENTS	Updated Specification Table of Contents			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	CxA - Updated Cx Plan, if Required			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Review Cx Submittals			
	CONSTRUCTION	CxA - Updated Cx Plan, if Required			
	CONSTRUCTION	CxA - Commissioning Authority Certification Form			
	CONSTRUCTION	CxA - Completed Cx Report			
	CONSTRUCTION	CxA - Cx All Systems Requiring Cx-ing			
E 1.2A	**Enhanced Cx & Montoring Based Cx**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	CxA - Enhanced Cx Plan w Ongoing Cx Plan			
	60% CONSTRUCTION DOCUMENTS	CxA - Path 2, Measurement Points to be Tracked			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Complete Systems Manual			
	CONSTRUCTION	CxA - Cx Report Verifying Compliance w Enhanced Cx			
	CONSTRUCTION	CxA - Commissioning Authority Certification Form			
	CONSTRUCTION	CxA - If Monitoring Cx, Develop Ongoing Cx Plan			
E 1.3A	**Envelope Commissioning**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Modified Specification Table of Contents			
	DESIGN DEVELOPMENT	CxA - Review BOD & OPR			
	DESIGN DEVELOPMENT	CxA - Draft Envelope Cx Plan			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	CxA - Review BOD & Construction Docs			

	60% CONSTRUCTION DOCUMENTS	CxA - Complete Envelope Cx Plan			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	CxA - Review Final Construction Docs			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	CxA - Commissioning Authority Certification Form			
	CONSTRUCTION	CxA - Completed Envelope Cx Report			
	CONSTRUCTION	CxA - Perform Envelope Cx			
E 2.1P	**Fundamental Refrigerant Management**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Identify SCA Standards to be in DDs			
	60% CONSTRUCTION DOCUMENTS	Demolition, Inventory of HVAC&R & CFC-Based Refrigerants to be Removed			
	60% CONSTRUCTION DOCUMENTS	Re-Use, CFC Phase-Out Coversion			
	60% CONSTRUCTION DOCUMENTS	Demolition, Statement Confirming Recovery of CFC Refrigerants			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 2.2	**Enhanced Refrigerant Management**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Identify SCA Standards to be in DDs			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Enhanced Refrigerant Management Credit Form			
	60% CONSTRUCTION DOCUMENTS	VRF Systems, Documentation for Refrigerant Charge Value Calculated			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 3.1P	**Minimum Energy Performance**				
	SCHEMATIC DESIGN	Complete Integrated Design Analysis, Workshop & Report			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	EB - Drawings & Specifications in Compliance w SCA Design Requirements			
	60% CONSTRUCTION DOCUMENTS	EB - EPA Energy Star Target Finder Results			
	60% CONSTRUCTION DOCUMENTS	EB - Project Specific Energy Modeling			
	60% CONSTRUCTION DOCUMENTS	EB - Minimum Energy Performance Calculator			
	60% CONSTRUCTION DOCUMENTS	NC - Whole Building Energy Compliance Form			
	60% CONSTRUCTION DOCUMENTS	NC - Complete ComCheck Form			
	100% CONSTRUCTION DOCUMENTS	Energy Star Statement of Energy Design Intent (SEDI)			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	Final Energy Modeling Report			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 3.2R	**Optimize Energy Performance**[5]				
	SCHEMATIC DESIGN	Complete Integrated Design Analysis, Workshop & Report			
	DESIGN DEVELOPMENT	Summarize Systems Proposed to Achieve Compliance			
	60% CONSTRUCTION DOCUMENTS	Whole Building Energy Compliance Form - New Building Case Finder			
	60% CONSTRUCTION DOCUMENTS	Complete ComCheck Forms			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	Final Energy Modeling Report			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 3.3R	**HVAC System Sizing**, Avoid Oversizing				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Calculations and Narrative for System Sizing			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 4.1R	**Energy Management System Controls**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Identify Potential Departures from SCA Standards			
	60% CONSTRUCTION DOCUMENTS	Incorporate BMS Specifications and Diagrams into CDs			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	Statement that all FMSI Comments have been Addressed			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
E 4.2A	**Demand Response**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			

	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Documentation Confirming Meters, Demarcation Boxes, & Outliets are Installed			
E 5.1P	**Energy Metering,** Building Level				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Identify Potential Departures from SCA Standards			
	60% CONSTRUCTION DOCUMENTS	Include Spec Sections 15970, 15973, & 15985 in CDs.			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
E 5.2R	**Energy Metering,** Advanced				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Include Spec Sections 15970, 15973, & 15985 in CDs.			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Statement from SCA's FMSI that Systems are Installed, Connected, and Functioning			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
E 6.1A	**Renewable Energy Production**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Identify Possible Systems for Achieving this Credit			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Narrative of Proposed System w Calculations for Annual Energy Production			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Data on RE System, Indicating the Generating Capacity of System			
E 6.2R	**Green Power & Carbon Offsets**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative Confirming Option Pursued			
	60% CONSTRUCTION DOCUMENTS	Green Power and Carbon Offset Calculator			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Materials (M)					
M 1.1P	**Storage & Collection of Recyclables**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Indicate Areas for Recycling on CDs w Details on Storage Capacity			
	60% CONSTRUCTION DOCUMENTS	Include Schematic Plans in Submission			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
M 1.2P - 1.3R	**Const. & Demolition Waste Management**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Credit Requirements in Specifications			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Construction Waste Management Plan			
	CONSTRUCTION	GC - Waste Reduction Progress Reports			
	CONSTRUCTION	GC - Status Report at 50% Construction or Enclosure			
	CONSTRUCTION	GC - If Issues, Schedule Working Session w GSG Committee			
	CONSTRUCTION	GC - Construction Waste Management Credit Form			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	If Renovated w Reuse, Submit Building Reuse Calculation Form			
M 2.1A	**Material Extraction Reporting**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Contractor's Sustainable Materials Credit Form			
	CONSTRUCTION	GC - Manufacturer Doc or Corporate Sustainability Reports for 100% of Contributing Installed Products			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of CSR 's			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 2.2A	**Material Extraction Optimization**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			

	CONSTRUCTION	GC - Contractor's Sustainable Materials Form			
	CONSTRUCTION	GC - Manufacturer Docs or Product Claims for Credit Requirements			
	CONSTRUCTION	GC - Construction Cost For CSI Div 2-10 w MEP			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of Product Claims for Credit Requirements			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 2.3	**Material Environmental Reporting**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Contractor's Sustainable Materials Form			
	CONSTRUCTION	GC - Manufacturer Docs of EPD and LCA Reports for 100% of Contributing Installed Products			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of Products w EPD and LCA Reports			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	EPD and LCA reports for 100% of Contributing Products			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 2.4A	**Material Environmental Optimization**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Contractor's Sustainable Materials Form			
	CONSTRUCTION	GC - Manufacturer Docs or Product Claims for Credit Requirements			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of Product Claims for Credit Requirements			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 2.5	**Material Ingredient Reporting**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Contractor's Sustainable Materials Form			
	CONSTRUCTION	GC - Documentation of Chemical Inventory for Contributing Products			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of Chemical Inventory			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 2.6A	**Material Ingredient Optimization**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Specify and Select Compliant Products			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Contractor's Sustainable Materials Form			
	CONSTRUCTION	GC - Manufacturer Docs or Product Claims for Credit Requirements			
	CONSTRUCTION	GC - Construction Cost For CSI Div 2-10 w MEP			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Review Contractor Submittals for Verification of Product Claims for Credit Requirements			
	CONSTRUCTION	Track & Calculate Materials that Comply w Material Reporting & Optimization Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 3.1A	**Life-Cycle Impact Reduction ,** Whole Building LCA[7]				
	SCHEMATIC DESIGN	Preliminary LCA Submittals Required for P1.1R			
	DESIGN DEVELOPMENT	SCA LCA Assessment Tool			
	DESIGN DEVELOPMENT	Building Envelope, LCA Assessment Report			
	DESIGN DEVELOPMENT	Non-Standard Envelope, LCA Assessment Report			
	60% CONSTRUCTION DOCUMENTS	Update LCA Report			
	100% CONSTRUCTION DOCUMENTS	Update LCA Report			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Finalize LCA Report			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
M 3.2A	**Life-Cycle Impact Reduction,** Building and Material Reuse[8]				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Draft Table Listing and Calculating Reused Elements			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
	CONSTRUCTION	Life-cycle Impact Reduction Building and Material Reuse Credit Form			
M 4.1R	**Wallboard & Roof Deck Products,** Mold Resisitance				
	SCHEMATIC DESIGN	No credit submittal			

	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Indoor Environmental Quality (Q)					
Q 1.1P	**Minimum IAQ Performance**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	IEH Outdoor Air Analysis Report			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Describe Proposed Ventilation System			
	60% CONSTRUCTION DOCUMENTS	Comply w SCA Design Requirements			
	60% CONSTRUCTION DOCUMENTS	Ventilation Calcs Verifying Compliance w Table 6-2 of ASHRAE 62.1-2010			
	60% CONSTRUCTION DOCUMENTS	Submit Controls Drawing w Type and Location of Monitoring Devices			
	60% CONSTRUCTION DOCUMENTS	Minimum IAQ Performance Credit Form			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	GC - Air Balancing Report Cover Page w Approval Stamp			
Q 1.2R	**Enhanced IAQ Source Control**[9]				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs w Filter Ratings			
	60% CONSTRUCTION DOCUMENTS	Entryways, Scaled Floor Plan w Locations			
	60% CONSTRUCTION DOCUMENTS	Interior Cross-Contamination Prevention, List of Rooms, Areas, Exhaust Rate, & Separation Method			
	60% CONSTRUCTION DOCUMENTS	Filtration, Mechanical Schedules w MERV Ratings			
	100% CONSTRUCTION DOCUMENTS	Update LCA Report			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 1.3A	**Enhanced IAQ Ventilation & Monitoring**[10]				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs w Filter Ratings			
	60% CONSTRUCTION DOCUMENTS	Perform Required Calcs to Confirm Compliance			
	60% CONSTRUCTION DOCUMENTS	Option 2, Include CO_2 Sensors for Densely Occupied Spaces			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	GC - Air Balancing Report Cover Page w Approval Stamp			
	CONSTRUCTION	GC - Verify Operation of Flow Measuring Stations & CO_2 Sensors			
Q 2.1R	**Construction IAQ Management Plan**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - IAQ Management Plan, Highlighting Nonsmoking Policy			
	CONSTRUCTION	GC - Narrative Describing Protection of Absorbent Materials			
	CONSTRUCTION	GC - Annotated and Dated Photos			
	CONSTRUCTION	GC - Record of Filtration Media			
	CONSTRUCTION	GC - Signed Statement by Contractor Attesting to Completion of Final Cleaning			
	CONSTRUCTION	Construction Phase Contractor Certification Form			
Q 2.2R	**Building IAQ Flush-Out**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Construction Schedule w Flush-out Period at Beginning of Project			
	CONSTRUCTION	GC - Calculations for Total Volume of Air Required			
	CONSTRUCTION	GC - Construction Schedule w Dates of Flush-out			
	CONSTRUCTION	GC - Building IAQ Flush-Out Credit Form			
	CONSTRUCTION	GC - Signed Form Attesting all Finishes, Furnishings, and VOC Punch List were Installed & Completed Pre Flush-out			
	CONSTRUCTION	GC - Construction Phase Contractor Certification Form			
	CONSTRUCTION	Initial Contractor Flush-out Form			
Q 3.1R	**Electric Ignition Stoves**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 3.2R	**Post Construction Indoor Air Quality**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			

	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	PM - Confirm Custodial Equipment List w HEPA Vacuum			
Q 4.1 - 4.2A	**Low-Emitting Materials**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	List of Exterior Applied Materials and Products On Site			
	DESIGN PHASE CERTIFICATION	No credit submittal			
	CONSTRUCTION	GC - Credit Form Table w Low-Emitting Materials			
	CONSTRUCTION	GC - Supporting Documentation to Verify Low-Emitting Compliance			
	CONSTRUCTION	Low-Emitting Materials Credit Form			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
Q 5.1R	**Thermal Comfort**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative w Design Approach for Comfort and Controllability			
	DESIGN DEVELOPMENT	Narrative w Special Circumstances			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Provide Description of Weather Data Used			
	60% CONSTRUCTION DOCUMENTS	HVAC Calcs to Demonstrate Compliance w ASHRAE Standard 55-2010			
	60% CONSTRUCTION DOCUMENTS	Thermal Comfort Credit Form w Regularly Occupied Spaces			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 6.1R	**Interior Lighting Control**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Floor Plans w Light Fixtures, Control Switches, and Furniture Layouts			
	60% CONSTRUCTION DOCUMENTS	Interior Lighting Control Credit Form w Number and Location of Lighting Controls			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 6.2	**Interior Lighting Quality**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Floor Plans w Quantity & Type of Lighting Fixtures & Furniture Layouts			
	60% CONSTRUCTION DOCUMENTS	Complete Table of Reg Occupied Spaces			
	60% CONSTRUCTION DOCUMENTS	Lighting Details, w Manufacturer & Model			
	60% CONSTRUCTION DOCUMENTS	Calculations of Total Connected Lighting Load			
	60% CONSTRUCTION DOCUMENTS	Avg Surface Reflectance Calcs for Ceiling, Walls, & Floors			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 6.3R	**Visual Performance,** Artificial Direct-Indirect Lighting				
	SCHEMATIC DESIGN	Narrative w Design Approach			
	DESIGN DEVELOPMENT	Narrative w Special Circumstances			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Point by Point Lighting Level Calcs			
	60% CONSTRUCTION DOCUMENTS	Calculation Method & Parameters w LPD by Space and for Building			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 7.1	**Daylight**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Floor Plans w Reg Occupied Space			
	DESIGN DEVELOPMENT	Daylight Autonomy Simulation Modeling Report			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Updated Modeling Report & Floor Plans			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 7.2	**Quality Views**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Determine if Design as Developed Complies			
	DESIGN DEVELOPMENT	Annotated Drawings w Line of Sight			
	DESIGN DEVELOPMENT	Quality Views Credit Form			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 8.1P	**Minimum Acoustic Performance**				

	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Integrate Design Criteria into DDs			
	60% CONSTRUCTION DOCUMENTS	Write-up Describing Special Separation for each Location			
	60% CONSTRUCTION DOCUMENTS	60% Docs to Qualified Acoustical Consultant			
	60% CONSTRUCTION DOCUMENTS	Acoustic Performance Credit Form			
	100% CONSTRUCTION DOCUMENTS	100% Docs to Qualified Acoustical Consultant			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Q 8.2	**Enhanced Acoustical Performance**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	60% CONSTRUCTION DOCUMENTS	Write-up Describing Special Separation for each Location			
	60% CONSTRUCTION DOCUMENTS	60% Docs to Qualified Acoustical Consultant			
	60% CONSTRUCTION DOCUMENTS	Submit Published Data, Calcs, or Measurments for Assemblies to Verify Sound Isolation Requirements			
	100% CONSTRUCTION DOCUMENTS	100% Docs to Qualified Acoustical Consultant			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
Regional ®					
R 1.1	**Regionally Defined Credit Achieved,** High Priority Site				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Option 1 & 2 - Vicinity Map			
	SCHEMATIC DESIGN	Option 3 - Narrative			
	DESIGN DEVELOPMENT	No credit submittal			
	60% CONSTRUCTION DOCUMENTS	Option 3 - Narrative			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	100% CONSTRUCTION DOCUMENTS	Option 3 - Brownfield Remediation Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
R 1.2	**Regionally Defined Credit Achieved,** Building Life Cy	Depends on NC or Existing Buidling			
R 1.3	**Regionally Defined Credit Achieved,** Rainwater Management				
	SCHEMATIC DESIGN	Narrative			
	SCHEMATIC DESIGN	Rainfall Events Calculator			
	SCHEMATIC DESIGN	Rainfall and Runoff Preliminary Calculations			
	DESIGN DEVELOPMENT	Site Plan w GI or LID Strategies and Topography			
	DESIGN DEVELOPMENT	Narrative Confirming GI or LID Measures			
	DESIGN DEVELOPMENT	Calculations for Volume Managed by GI or LID			
	60% CONSTRUCTION DOCUMENTS	Updated Site Plan w GI or LID and Topography			
	60% CONSTRUCTION DOCUMENTS	Updated Calculations for Volume Managed by GI or LID			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	No credit submittal			
R 1.4	**Regionally Defined Credit Achieved,** Enhanced IAQ				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	GC - Air Balancing Report Cover Page w Approval Stamp			
	CONSTRUCTION	GC - Verify Operation of Flow Measuring Stations & CO_2 Sensors			
Innovation (I)					
I 1.1R	**LEED® Accredited Professional**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	DESIGN DEVELOPMENT	Proof of LEED AP's Accreditation			
	60% CONSTRUCTION DOCUMENTS	No credit submittal			
	100% CONSTRUCTION DOCUMENTS	No credit submittal			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Design Team Certification Form-Construction Phase			
I 1.2	**Innovation or Pilot Credit**				
	SCHEMATIC DESIGN	No credit submittal			
	DESIGN DEVELOPMENT	Narrative			
	60% CONSTRUCTION DOCUMENTS	Supporting Documentation			
	100% CONSTRUCTION DOCUMENTS	Incorporate Requirements in CDs			
	100% CONSTRUCTION DOCUMENTS	Updated Documentation			
	DESIGN PHASE CERTIFICATION	Design Team Certification Form-Design Phase			
	CONSTRUCTION	Narrative			

End