Earth

Parsons The New School for Design

School of Constructed Environments

Interior Design (AAS)

Environmental Design

PAID 1028-X1

SP-17

Hikida

Learning Objectives

- At the end of this presentation you should know:
  - How the orientation of a building on a site affects the interior.
  - How to measure your carbon footprint.
  - How to document development density and community connectivity.
  - How to document public transportation access.
  - How to document bicycle parking, showers and changing rooms.
  - How to estimate the amount of program area (square footage) to allocate for recycling in a commercial project.
  - How to document regional materials.

LEED 2009 for Commercial Interiors

Project Checklist

Project Name

Date

Sustainable Sites — Possible Points: 21

Y	N	?			
			Credit 1	Site Selection	1 to 5
			Credit 2	Development Density and Community Connectivity	6
			Credit 3.1	Alternative Transportation—Public Transportation Access	6
			Credit 3.2	Alternative Transportation—Bicycle Storage and Changing Rooms	2
			Credit 3.3	Alternative Transportation—Parking Availability	2

Water Efficiency — Possible Points: 11

Y			Prereq 1	Water Use Reduction—20% Reduction	
			Credit 1	Water Use Reduction	6 to 11

Energy and Atmosphere — Possible Points: 37

Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
			Credit 1.1	Optimize Energy Performance—Lighting Power	1 to 5
			Credit 1.2	Optimize Energy Performance—Lighting Controls	1 to 3
			Credit 1.3	Optimize Energy Performance—HVAC	5 to 10
			Credit 1.4	Optimize Energy Performance—Equipment and Appliances	1 to 4
			Credit 2	Enhanced Commissioning	5
			Credit 3	Measurement and Verification	2 to 5
			Credit 4	Green Power	5

Materials and Resources — Possible Points: 14

Y			Prereq 1	Storage and Collection of Recyclables	
			Credit 1.1	Tenant Space—Long-Term Commitment	1
			Credit 1.2	Building Reuse	1 to 2
			Credit 2	Construction Waste Management	1 to 2
			Credit 3.1	Materials Reuse	1 to 2
			Credit 3.2	Materials Reuse—Furniture and Furnishings	1
			Credit 4	Recycled Content	1 to 2
			Credit 5	Regional Materials	1 to 2
			Credit 6	Rapidly Renewable Materials	1
			Credit 7	Certified Wood	1

Indoor Environmental Quality — Possible Points: 17

Y	N	?			
Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
			Credit 1	Outdoor Air Delivery Monitoring	1
			Credit 2	Increased Ventilation	1
			Credit 3.1	Construction IAQ Management Plan—During Construction	1
			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
			Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
			Credit 4.5	Low-Emitting Materials—Systems Furniture and Seating	1
			Credit 5	Indoor Chemical & Pollutant Source Control	1
			Credit 6.1	Controllability of Systems—Lighting	1
			Credit 6.2	Controllability of Systems—Thermal Comfort	1
			Credit 7.1	Thermal Comfort—Design	1
			Credit 7.2	Thermal Comfort—Verification	1
			Credit 8.1	Daylight and Views—Daylight	1 to 2
			Credit 8.2	Daylight and Views—Views for Seated Spaces	1

Innovation and Design Process — Possible Points: 6

			Credit 1.1	Innovation in Design: Specific Title	1
			Credit 1.2	Innovation in Design: Specific Title	1
			Credit 1.3	Innovation in Design: Specific Title	1
			Credit 1.4	Innovation in Design: Specific Title	1
			Credit 1.5	Innovation in Design: Specific Title	1
			Credit 2	LEED Accredited Professional	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

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Percentages

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Section	Possible Points	Percentage
Sustainable Sites	21	19.09%
Water Efficiency	11	10.00%
Energy and Atmosphere	37	33.64%
Materials and Resources	14	12.73%
Indoor Environmental Quality	17	15.45%
Innovation and Design Process	6	5.45%
Regional Priorities	4	3.64%
TOTAL POINTS POSSIBLE	**110**	

Earth Facts (1 of 3)

1. *The Earth was formed 4.6 billion years ago.*
2. *The Earth is the third planet from the Sun.*
3. *The Earth orbits the Sun once every 365.27 days and the orbital speed the Earth travels is averaged at 107,000 km/h.*
4. *The Earth has one satellite, the Moon.*
5. *The surface of the Earth is 70% water and 30% land.*
6. *The circumference of Earth around the equator is 24,901 miles.*

Earth Facts (2 of 3)

1. *The earth is made from the following materials – 32.1% iron, 30.1% oxygen, 15.1% silicon, and 13.9% magnesium.*
2. *The Earth's core is made up of 88% iron, and the temperature can reach 3,000 degrees C.*
3. *The atmosphere on Earth is composed largely of nitrogen (78%) and oxygen (21%) with trace elements of other gases.*
4. *The troposphere is the region in the atmosphere 12km above the surface of the Earth. It is in the troposphere that all of our weather takes place.*

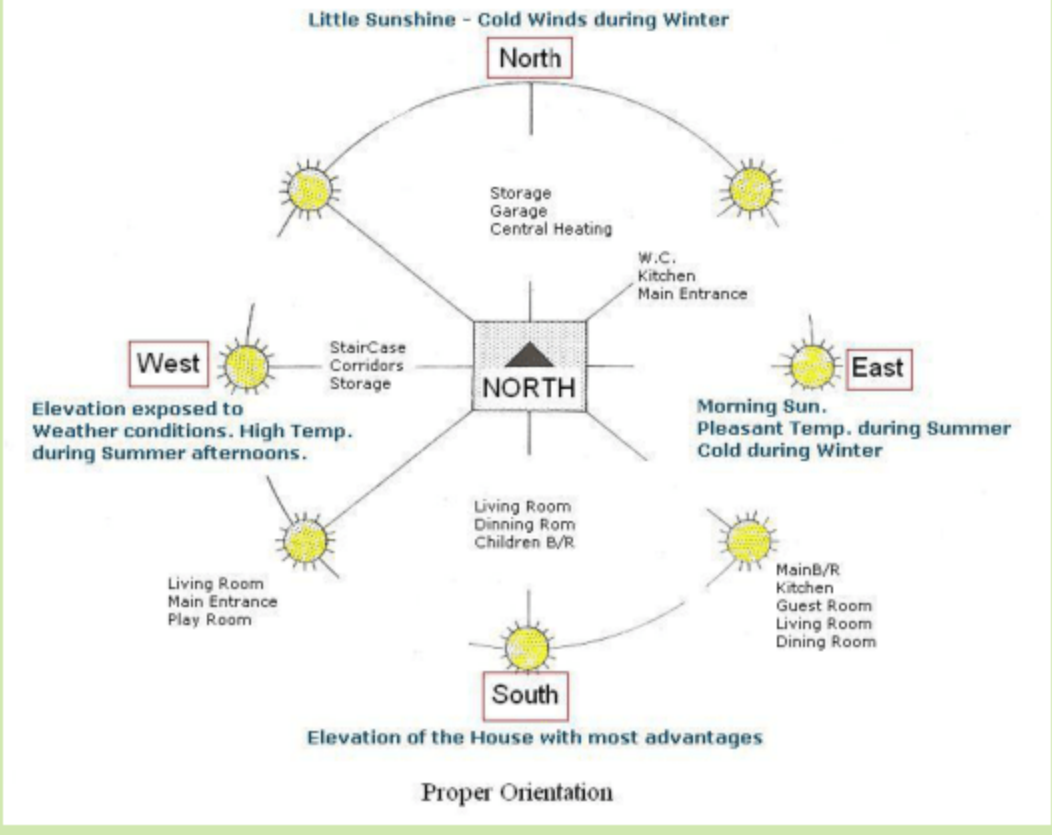
Earth Facts (3 of 3)

1. *Approximately 25km above the surface of the Earth is the ozone layer. This is a layer of ozone that protects the Earth from the Sun's harmful ultraviolet radiation.*
2. *The atmosphere extends as far as 500 km and the Earth's magnetic field stretches as far as 100,000 km.*
3. *The magnetic field is essential because it protects us from the Sun's solar winds.*

71% of the earth's surface is covered with water

Site Orientation – in the Northern Hemisphere

1. Eastern exposure: morning sun
2. Southern exposure: sun throughout the day
3. Western exposure: late afternoon sun
4. Northern exposure: little direct sun except at sunrise and sunset in the spring and fall
5. North and South are reversed in the Southern Hemisphere
6. Direction of prevailing winds
7. Direction of views



Proper Orientation

Carbon Footprint

Where would your carbon footprint be smaller:

1. on the farm in the photo to the near right, or
2. in the city on the photo to the far right?

Why?

Measure your Carbon Footprint

Use the following site to measure your carbon footprint:

http://www.nature.org/greenliving/carboncalculator/

What is your carbon footprint?

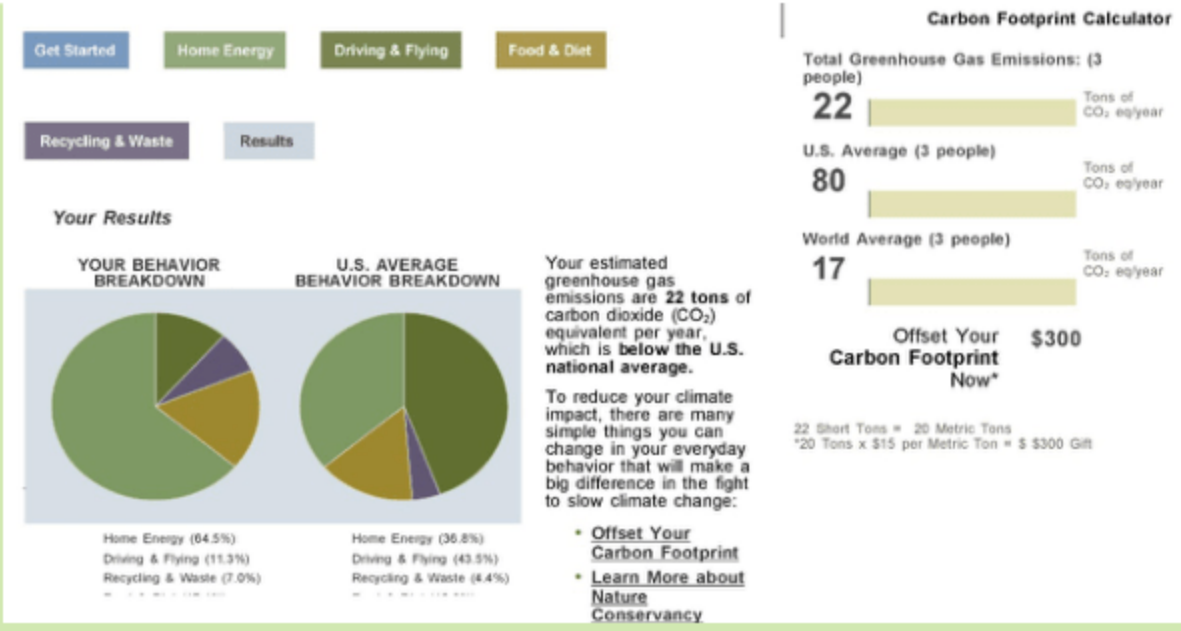
Are you above or below the U.S. average?

Are you above or below the world average?

Were you surprised by the results?

What are the leading contributors to your carbon footprint?

What can you do to reduce your carbon footprint?



Sustainable Sites Credit 2

Development Density and Community Connectivity

Option 1: minimum density of 60,000 sf per acre net

Option 2: located within ½ mile of a residential neighborhood; within ½ mile of at least 10 basic services; and has pedestrian access between the building and the services.

OPTION 1. Development Density

Select space in a building that is located in an established, walkable community with a minimum density of 60,000 square feet per acre net. The density calculation is based on a typical two-story downtown development and must include the area of the project being built.

OR

OPTION 2. Community Connectivity

Select space in a building on a site that meets the following criteria:

- Is located within 1/2-mile of a residential area or neighborhood with an average density of 10 units per acre net
- Is within 1/2-mile of at least 10 basic services
- Has pedestrian access between the building and the services.

For mixed-use projects, no more than 1 service within the project boundary may be counted as 1 of the 10 basic services, provided it is open to the public. No more than 2 of the 10 services required may be anticipated (i.e. at least 8 must be existing and operational). In addition, the anticipated services must be documented appropriately to demonstrate that they will be operational in the locations indicated within 1 year of occupation of the applicant project.

Examples of basic services include the following:

- Bank
- Place of Worship
- Convenience Grocery
- Day Care Center
- Cleaners
- Fire Station
- Beauty Salon
- Hardware
- Laundry
- Library
- Medical or Dental Office
- Senior Care Facility
- Park
- Pharmacy
- Post Office
- Restaurant
- School
- Supermarket
- Theater
- Community Center
- Fitness Center
- Museum

Proximity is determined by drawing a 1/2-mile radius around a main building entrance on a site map and counting the services within that radius.

Greenfield developments and projects that do not use existing infrastructure are not eligible.

Sustainable Sites Credit 2

Development Density and Community Connectivity

Option 1: minimum density of 60,000 sf per acre net

Example of a density calculation

Table 3. Sample Area Properties

Properties within Density Radius	Building Space (sf)	Site Area (acres)		Properties within Density Radius	Building Space (sf)	Site Area (acres)
Project Site	30,000	0.44		M	24,080	0.64
A	33,425	0.39		N	28,740	0.3
B	87,500	1.58		O	6,690	0.15
C	6,350	0.26		P	39,000	0.39
D	27,560	0.32		Q	348,820	2.54
E	66,440	1.17		R	91,250	1.85
F	14,420	1.36		S	22,425	0.27
G	12,560	0.2		T	33,650	0.51
H	6,240	0.14		U	42,400	0.52
I	14,330	0.22		V	—	0.76
J	29,570	0.41		W	19,200	0.64
K	17,890	0.31		X	6,125	0.26
L	9,700	0.31				
Total Building Space (sf)					1,018,36	
Total Site Area (acres)					5	15.94
Average Density (sf/acre)						63,887

For this example, the average building density of the surrounding area is greater than 60,000 square feet per acre, so the example qualifies for 6 points under this credit.

Sustainable Sites Credit 2

Development Density and Community Connectivity

Option 2: located within ½ mile of a residential neighborhood; within ½ mile of at least 10 basic services; and has pedestrian access between the building and the services.

Example of a community connectivity map

Figure 1. An illustration of a Sample Area Plan

Sustainable Sites Credit 3.1

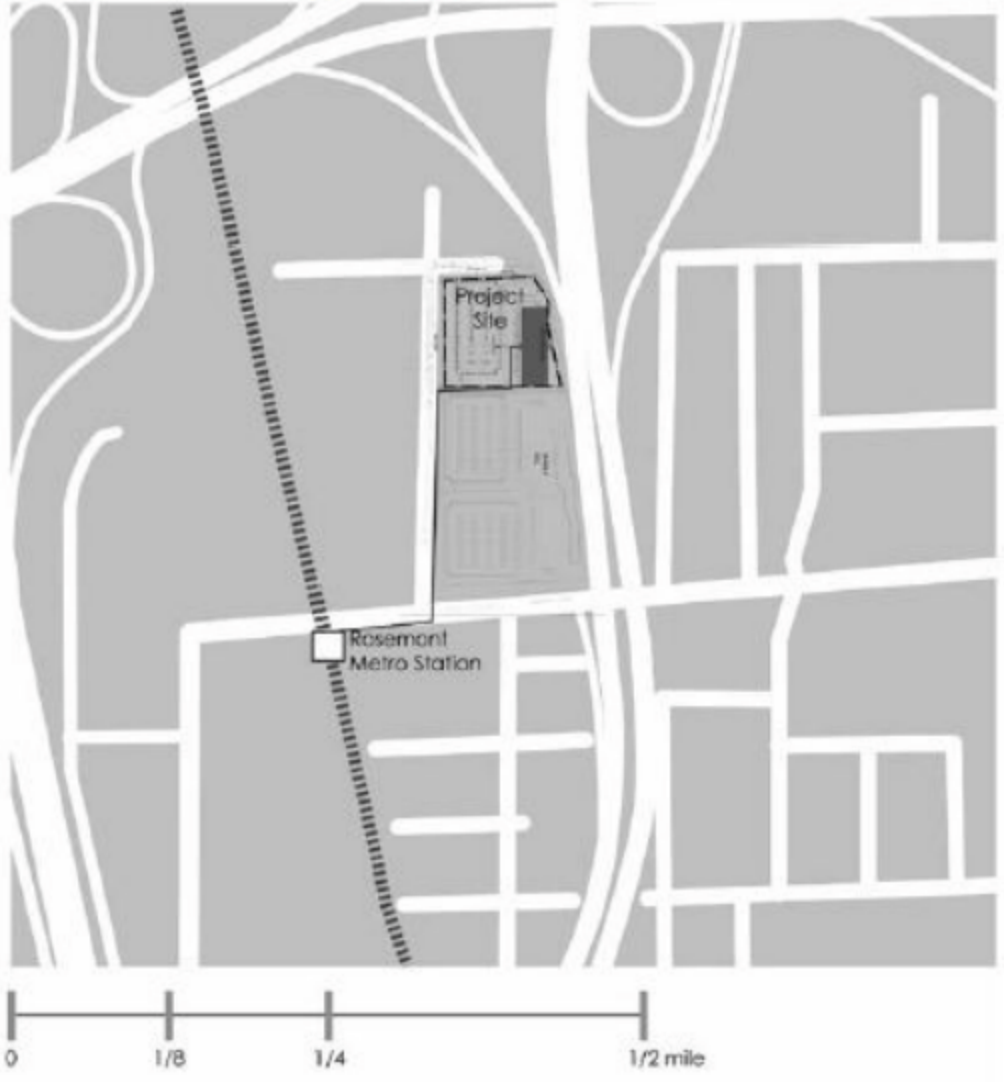
Alternative Transportation – Public Transportation Access

Option 1: within ½ mile walking distance to a commuter rail, light rail, or subway station.

Option 2: within ¼ mile walking distance to a bus stop

Example map

Figure 1: Sample Area Drawing: Distance to Rail



Sustainable Sites
Credit 3.2

Alternative Transportation – Bicycle Transportation

Requirements

Provide secure bicycle racks and/or storage (within 200 yards of a main building entrance) for 5% or more of tenant occupants (measured at peak periods).

Provide shower and changing facilities in the building, or within 200 yards of a building entrance, for 0.5% of full-time equivalent (FTE) occupants.

Sustainable Sites Credit 3.2

Alternative Transportation – Bicycle Transportation

Example:

- 100 full-time equivalents (FTEs)
- 100 x .05 = 5 bicycle parking spaces within 200-yards of the building entrance.
- 100 x .005 = 0.5 = 1 changing and shower facility in the building or within 200-yards of the building entrance.

Sustainable Sites Credit 3.2

Alternative Transportation – Bicycle Transportation

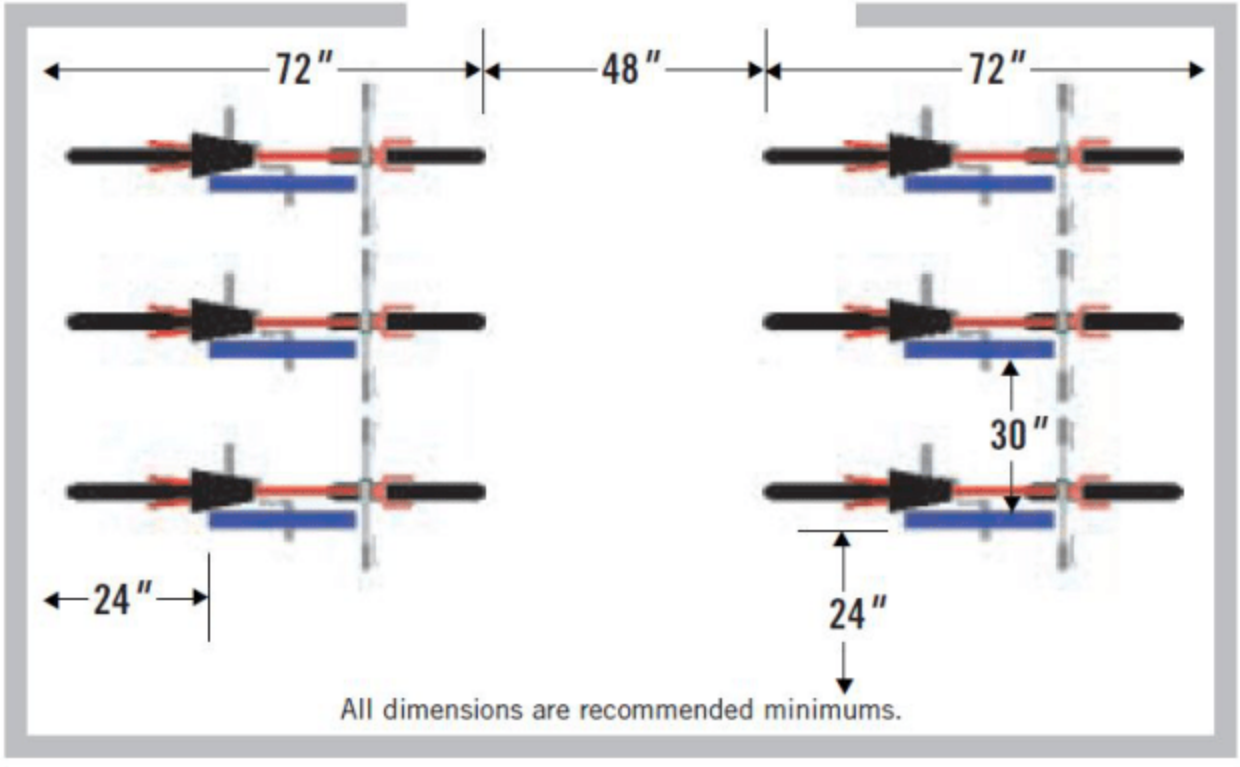
Bicycle parking space planning requirements

Considerations:

- Space utilization
- Safety and liability

Reference:

ource/resmgr/publications/bicycle_parking_guidelines.pdf



The rack area is a bicycle parking lot where racks are separated by aisles.

Sustainable Sites Credit 3.2

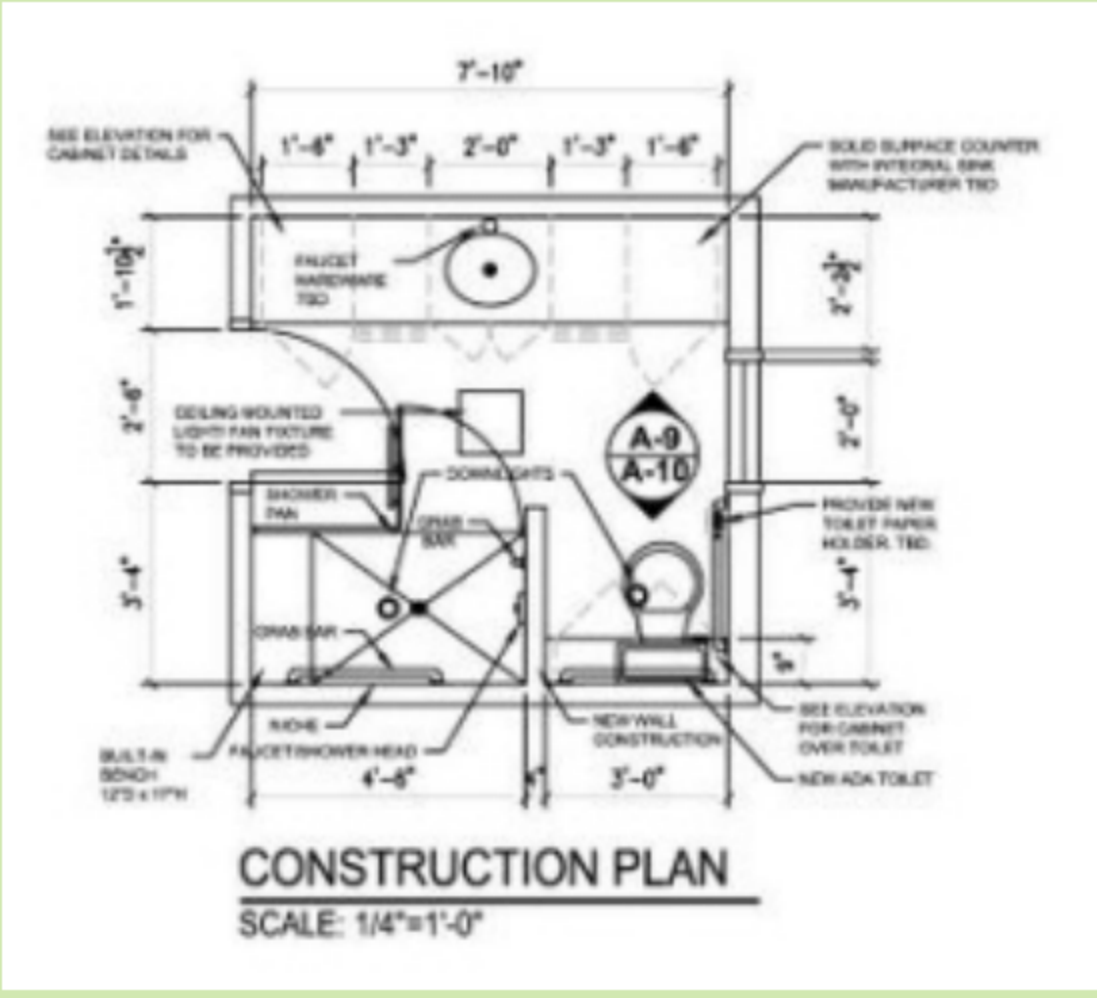
Alternative Transportation – Bicycle Transportation

Shower and changing facility space planning requirements

Other considerations:

- Additional use of space
- Additional utility use: water, HVAC, electricity
- Lockers and storage
- Towel service and/or laundry requirements
- Can use a local fitness center if located within 200 yards of the building entrance

Reference: [redacted]
Residential-Pricing-Set



LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

Figure 1 shows a typical breakdown of waste stream materials.

The 5 materials required for collection:

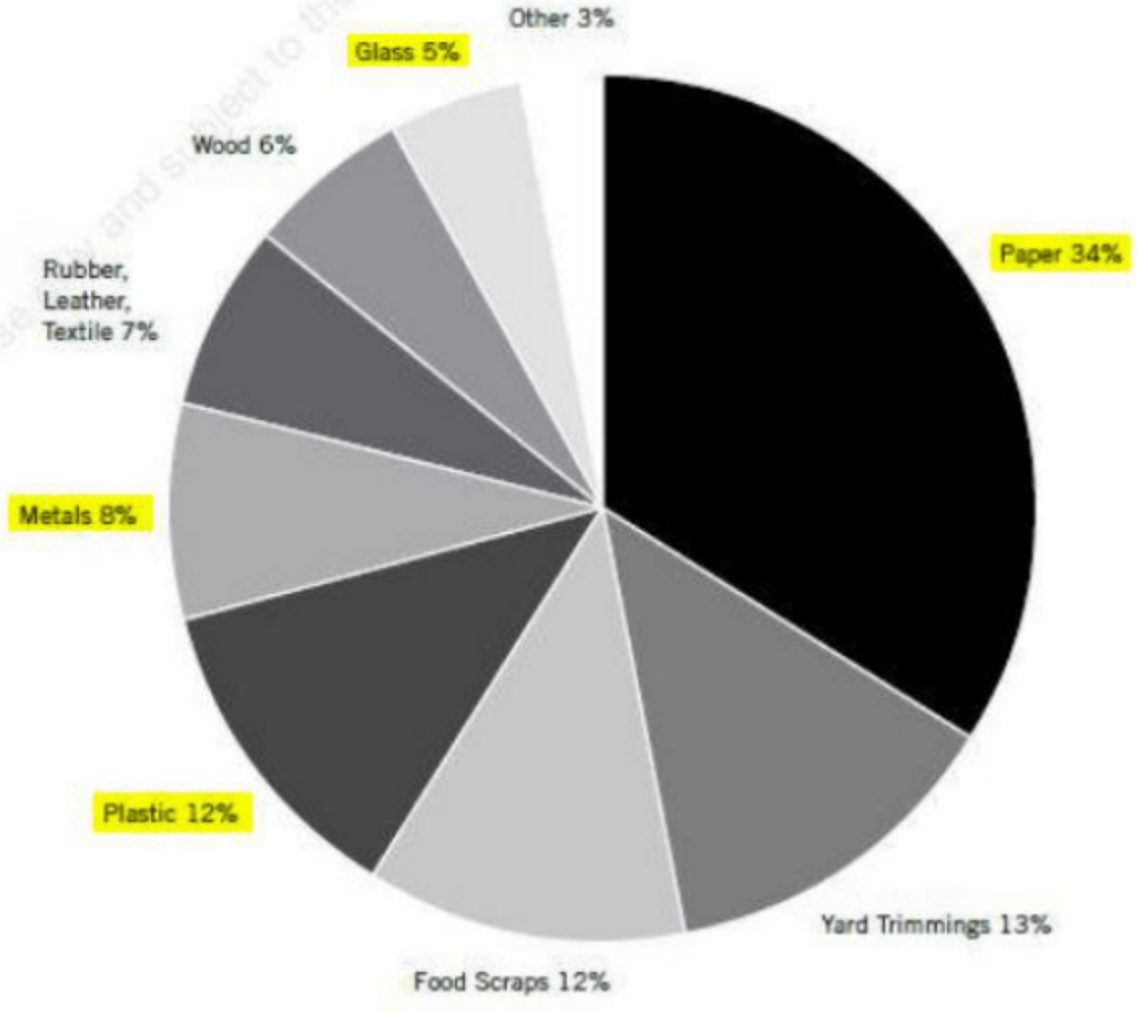
Cardboard and Paper	34%
Plastics	12%
Metals	8%
Glass	5%

Comprise 59% of the waste stream

Recycling reduces the amount of waste disposed in sanitary landfills.

Figure 1. Municipal Solid Waste Generation

Data from U.S. Environmental Protection Agency, 2006.



LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

Paper

Corrugated cardboard

Glass

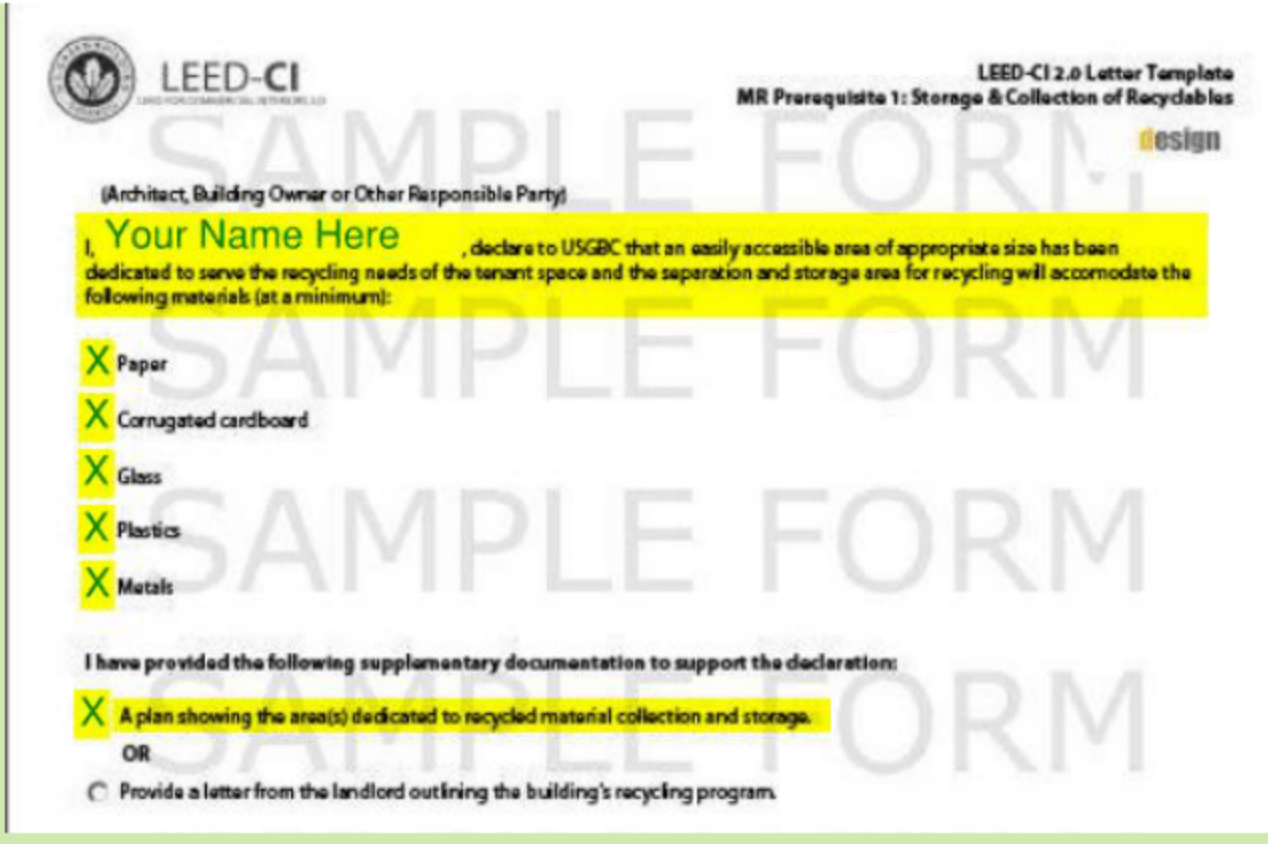
Plastics

Metals

Show collection areas in plan

Or

Provide a letter from the landlord outlining the building's recycling program.



LEED-CI

LEED-CI 2.0 Letter Template
MR Prerequisite 1: Storage & Collection of Recyclables

design

(Architect, Building Owner or Other Responsible Party)

I, Your Name Here, declare to USGBC that an easily accessible area of appropriate size has been dedicated to serve the recycling needs of the tenant space and the separation and storage area for recycling will accomodate the following materials (at a minimum):

X Paper

X Corrugated cardboard

X Glass

X Plastics

X Metals

I have provided the following supplementary documentation to support the declaration:

X A plan showing the area(s) dedicated to recycled material collection and storage.

OR

○ Provide a letter from the landlord outlining the building's recycling program.

LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

Use this table to estimate the amount of program area (square footage) to allow for a recycling area.

Example:

How much space should you allocate for a recycling area for a 20,000 square foot commercial office space?

How much space should you allocate for a recycling area for a 66,000 square foot commercial office space?

Table 1. Recycling Area Guidelines

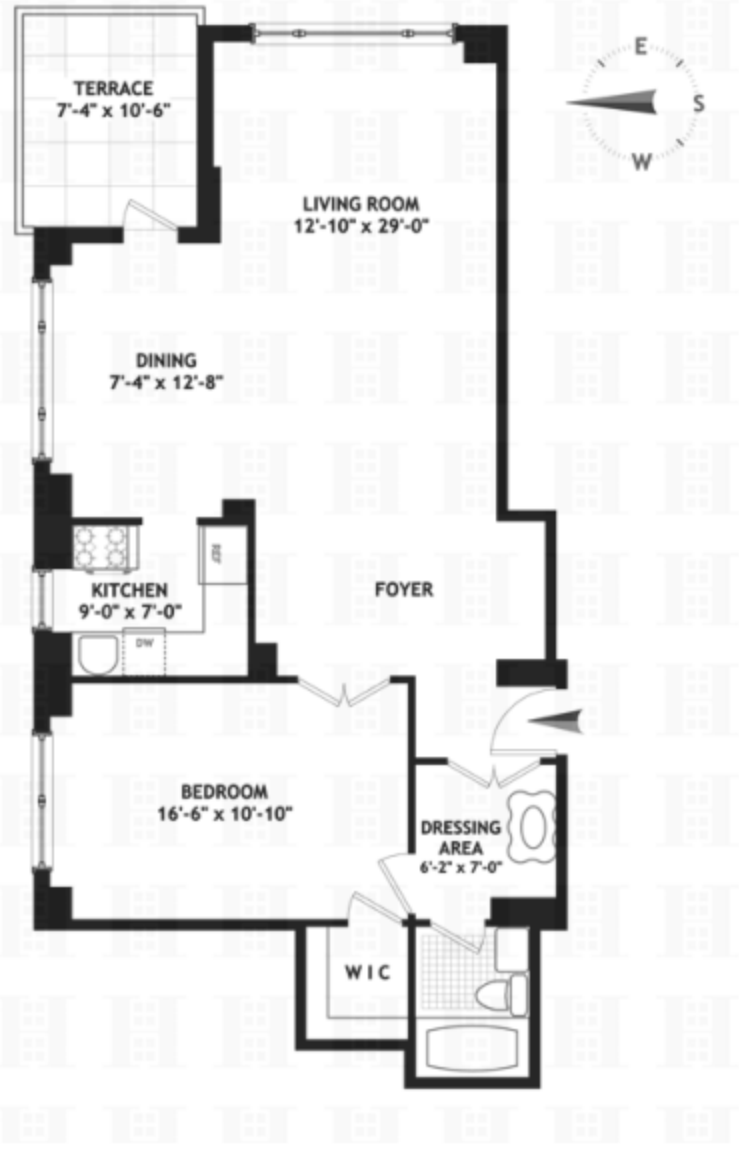
Building Size (sf)	Minimum Recycling Area (sf)
0 to 5,000	82
5,001 to 15,000	125
15,001 to 50,000	175
50,001 to 100,000	225
100,001 to 200,000	275
200,001 or greater	500

LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

For this approximately 900 sf apartment.

1. Use MR Prereq 1, Table 1 to determine how much space should be allocated for recycling.
2. Indicate on plan where you would recommend locating the recycling area.

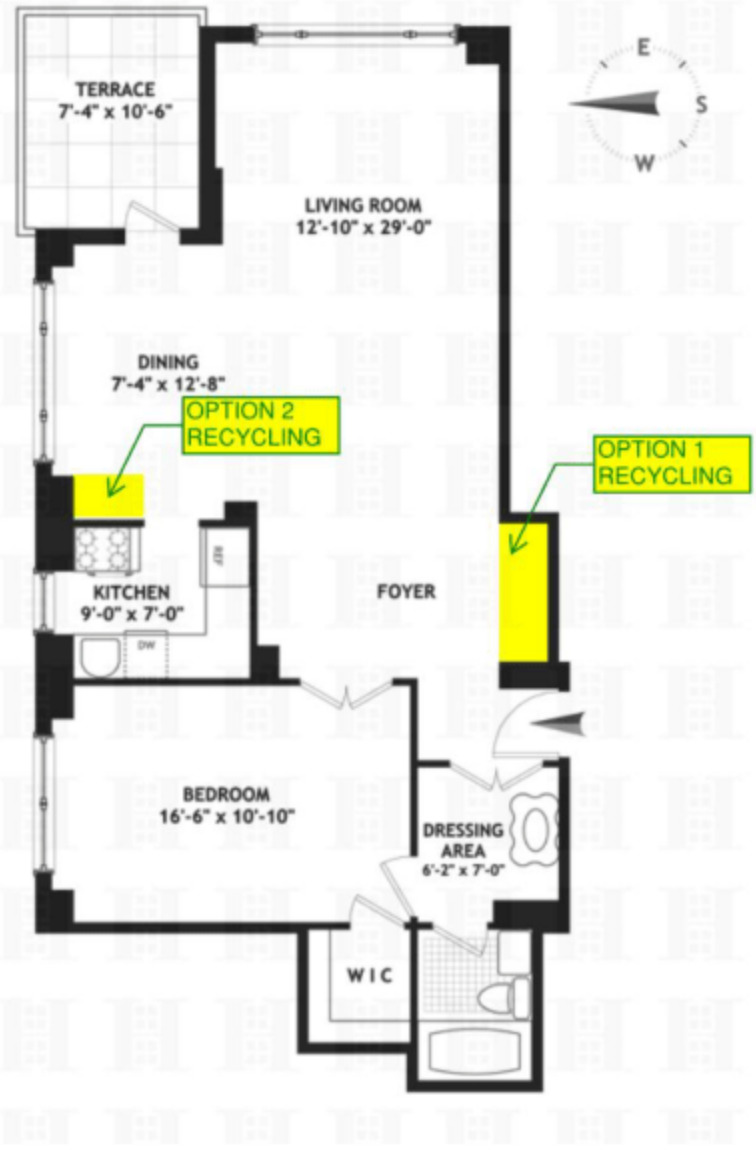


LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

For this approximately 900 sf apartment.

1. MR Prereq 1, Table 1 recommends for 0 – 5,000 sf that 82 sf is allocated for recycling; however this is for a commercial application.
2. Recycling Location Option 1: centrally located, and close to the entry.
3. Recycling Location Option 2: located near the kitchen – assumes most recycling is generated nearby.

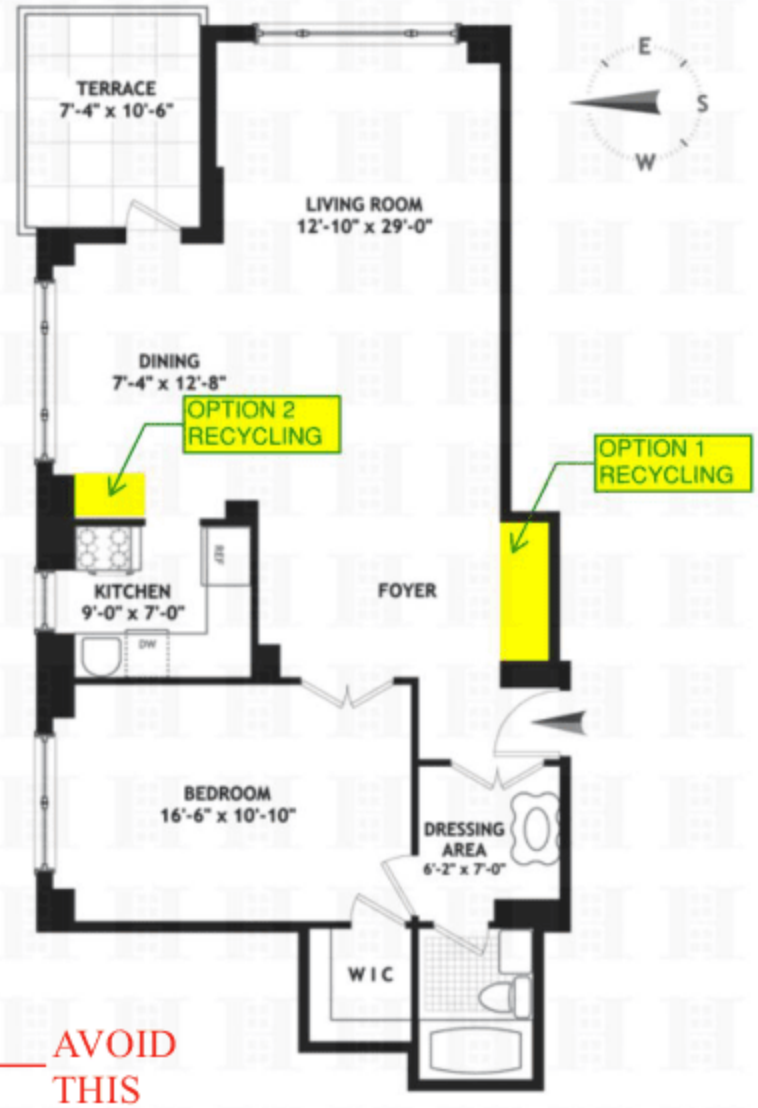


LEED-CI 2009
MR Prereq 1

Storage and collection of recyclables.

Possible solutions:

AVOID THIS



LEED-CI 2009
MR Credit 5

Regional Materials

Goals:

To reduce transportation costs and carbon footprint.

To support the local economy.

Requirements

OPTION 1 (1 point)

Use a minimum of 20% of the combined value of construction and Division 12 (Furniture) materials and products that are manufactured[1] regionally within a radius of 500 miles.

OR

OPTION 2 (2 points)

Meet the requirements for Option 1.

Use a minimum of 10% of the combined value of construction and Division 12 (furniture) materials and products extracted, harvested or recovered, as well as manufactured, within 500 miles of the project.

LEED-CI 2009
MR Credit 5

Regional Materials

500-mile radius from New York City

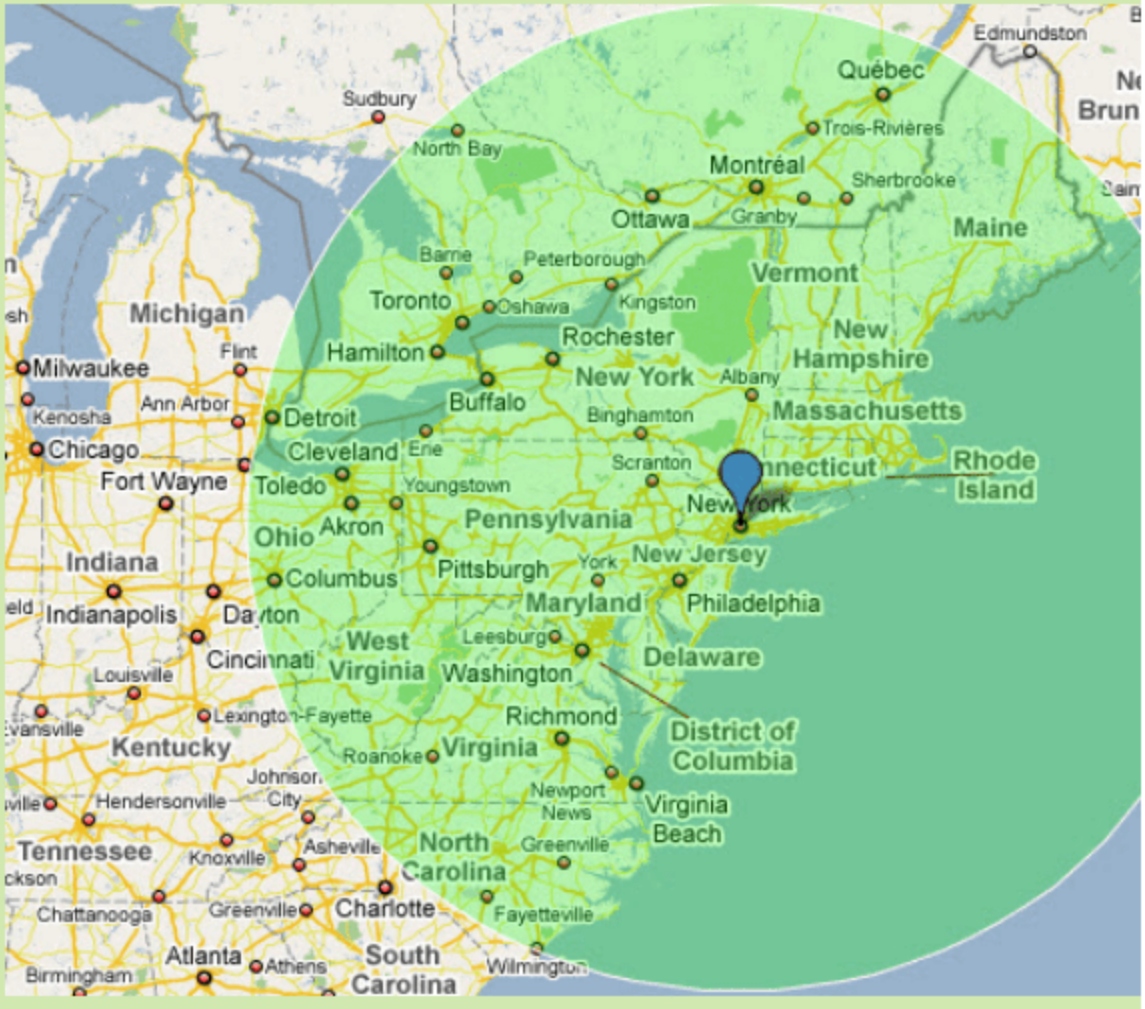
Is the product manufactured within 500-miles of the project site?

Is the product extracted, harvested, or recovered within 500-miles of the project site?

Does a product manufactured in Asheville, NC qualify?

Does a product manufactured in Montreal qualify?

Reference: [redacted]
mile-radius-york/



LEED-CI 2009
MR Credit 5

Regional Materials

Sample calculation for regional materials

- Distance between project site and manufacturer: >20% target.
- Distance between project site and point of extraction: >10% target.

Table 2. Sample Spreadsheet for Regional Materials

Product	Manufacturer	Distance Between Project & Manufacturer (miles)	Product Cost ($)	Distance Between Project & Extraction site (miles)	Product Cost ($)	Regional Content Information Source
Concrete (manufactured and extracted)	Omega Mix	5	926	370	926	Letter from supplier
Concrete (just manufactured)	Omega Mix	5	74			
Wood Paneling	Zeta Panels	25	6,000			Contractor submittal
Casework	Chi Casework	20	30,000			Letter from fabricator
Gypsum wall	Nu Gyps	320	9,900	312	9,900	Letter from fabricator
Wood flooring, salvaged	Xi Floors	20	2,640			Cut sheet
Ceiling light fixtures	Omicron Luminaire	275	21,000			Product brohure
Furniture, reused	Pi Works	45	203,700			Letter from prior owner
Component Totals			$274,240		$10,826	
Total Construction Material Value						$341,214
Division 12 Material Value						$598,722
Total Project Material Value						$939,986
Percent Manufactured Regionally (274,240/939,986)						29.2%
						29.2% > 20% MR 5, 1 point earned
Percent Both Manufactured Regionally & Extracted Regionally (10,826/939,986)						1.2%
						1.1% < 10.0% MR 5, 2nd point not earned

Sources

- [redacted]
  orientation-of-a-house.html
- [redacted]
  bicycle_parking_guidelines.pdf
- [redacted]