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white paper
February 29, 2012

Beauty in Building: Measuring the Impact of Spaces That Make Us Feel Fully Alive and That Inspire

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Introduction

If you want to get a heated discussion going, throw the word beauty into the mix.

Beauty: those attributes in the built environment that make us feel fully alive[1].

Beauty is not caused. It is.[2] *Everything has beauty, but not everyone sees it.*[3] *The perception of beauty is a moral test.*[4] *Nothing can be beautiful which is not true.*[5] *It is not sufficient to see and to know the beauty of a work. We must feel and be affected by it.*[6]

When we decided to undertake the task of measuring the impact of beauty on building performance, we had no intention of arguing for or against any particular definition or perception of beauty. We were interested in measuring the performance of spaces that make us feel fully alive and that inspire us, creating wellbeing. Did those spaces have particular attributes that inform their building performance?

You might ask – why bother? Beauty is in the eye of the beholder and as such its impact or affect is, at best - unpredictable. This is precisely why we defined beauty as being experiential; it involves all of the senses. It is neither solely aesthetics nor solely perception. This way of considering beauty might be more predictable. We feel something desirable when we are in a beautiful place - would you rather spend your holiday on a Caribbean island or at a strip mall? Feeling fully alive is a state we can relate to and furthermore, it can be the driver for building occupant behavior: think increased productivity, healing, learning, and even increased attention to caring for the building we occupy.

Of the 13 USGBC sponsored Green Building Research grants, 5 are measuring the effect of buildings on human health and performance. In health care, this is called evidence-based design and according to the Center for Health Design's Evidence-Based Design Accreditation and Certification program: "A large and growing body of evidence attests to the fact that physical environment impacts patient stress, patient and staff safety, staff effectiveness and quality of care provided in hospitals and other healthcare settings. Basing healthcare facility planning and design decisions on this evidence to achieve the best possible patient, staff and operational outcomes is what evidence-based design is all about."[7]

Although there is a growing case for building design creating wellbeing in their occupants, they aren't necessarily evaluating the energy and environmental performance of those buildings. And while high-performing buildings reduce energy and environmental impacts, they do not necessarily create wellbeing in their occupants. This study is looking to close these gaps by measuring the energy and environmental performance of buildings that create wellbeing for their occupants.

We are pretty sure that beauty plays a role in building performance and that perhaps when we experience wellbeing and feeling fully alive, we might be acknowledging something in our built environment that can be measured. Christopher Alexander, in his seminal book, *The Timeless Way of Building*[8], calls this The Quality Without a Name[9]. We call it Beauty.

The work was initiated and led by ml Robles and was jointly completed with Michael Goodrum and Dr. John Zhai.

[1] Beauty as defined in the Beauty in Building project
[2] Emily Dickinson (1830-1886) American poet
[3] Confucius (BC 551-BC 479) Chinese philosopher
[4] Henry David Thoreau (1817-1862) American naturalist
[5] John Ruskin (1819-1900) English art critic
[6] Voltaire (1694-1778) French philosopher

[7] http://www.healthdesign.org/edac
[8] Alexander, Christopher. 1979. *The Timeless Way of Building,* New York: Oxford University Press
[9] Alexander, 1979, p25

Overview

Over the course of two years, the Beauty in Building study developed a way to begin measuring the role beauty plays in making buildings.

The theory that Christopher Alexander lays out in *The Timeless Way of Building* provided the foundation for our definition of beauty and gave us the insight to focus on building strategies. This kept the project on track and out of any diversions about beauty as an aesthetic factor.

Definition - Beauty: those attributes in the built environment that make us feel fully alive.

From this definition we built the framework beginning with articulation of the attributes and their determinants.

Definition - Attributes: These are built environment qualities found to be common in spaces that make us feel fully alive. We identified several, initially used 3, and ended up with 2 built environment qualities attributed to beauty.

Definition - Determinants: These are building strategies that establish the desired qualities attributed to beauty. We identified 10 determinants.

In order to validate the attributes, we undertook the First Case Study to answer these questions:
Do the attributes, as determined by the building strategies, occur? If so, do they occur with any different frequency or quantity across a selection of buildings?

Using publicly available information for buildings that were AIA COTE winners and LEED Platinum certified, we validated that the attributes occur and found that they occur with different frequency and density across a selection of buildings.

The next phase of the project began with the results of the First Case Study informing refinement to the matrix we had developed by adding two filters which the building strategies must meet. One filter assured the building strategies were experiential, the second filter, originally an attribute, was included to assure dense, rather than stand alone strategies, a feature found to be significant in the First Case Study.

The final piece of the matrix was the development of the building performance metrics. These were culled from existing building certification programs, CASBEE[10] and CHPS[11], and refined to meet our qualitative measuring system with criteria for being green or regenerative.

Once the Beauty in Building (BiB) matrix was complete, we undertook the Second Case Study, using publicly available information for buildings that were AIA COTE winners, LEED Platinum certified, and Living building certified.

The analysis of both of the case study's data shows that the impact of spaces that make us feel fully alive and that inspire can be seen in building design and in building performance. This study uses the developed BiB matrix to measure in a qualitative manner using building performance metrics with broad green building or regenerative qualifiers. A quantitative analysis was undertaken by Michael Goodrum, to fulfill his Master of Science degree requirements.

[10] http://www.ibec.or.jp/CASBEE/english/ a tool for assessing and rating the environmental performance of buildings/built environment.
[11] http://www.chps.net/dev/Drupal/node/31: design guidelines for high performance schools

Beauty Attributes

After many months of researching qualities in the built environment that make people feel fully alive and that inspire, we settled on two built environment attributes that met this requirement.

Beauty Attributes: These are built environment qualities found to be common in spaces that make us feel fully alive[12]

1. LOCAL: Never twice the same: takes its shape from the particular place in which it occurs[13]; the transitory forces of nature in that particular place are reconciled within it.

This attribute is easily seen in built environments that have withstood the test of time and that have a local and regional specificity.

[12] Alexander, Christopher. 1979. *The Timeless Way of Building,* New York: Oxford University Press
[13] Alexander, 1979, p26

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2. CONNECTIVITY: A true relationship, free from inner contradictions between ourselves and our surroundings[14].

This attribute can be seen as an active exchange between the building, its occupants, and its environment.

[14] Alexander, 1979, p51-53

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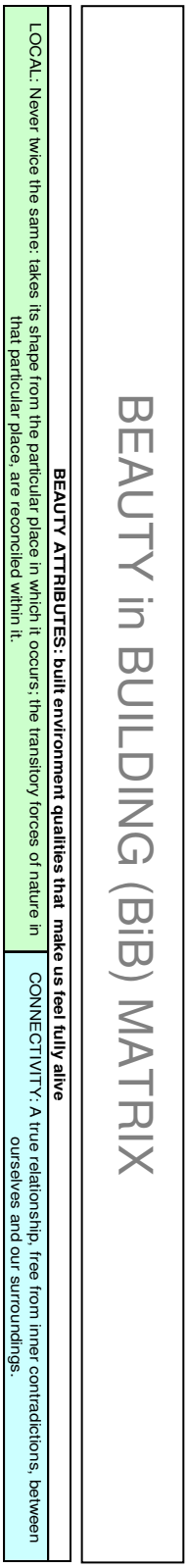
These two Attributes provide the first articulation for development of the process for measuring the environmental impact of building strategies that will become the Beauty in Building (BiB) matrix



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Determinants

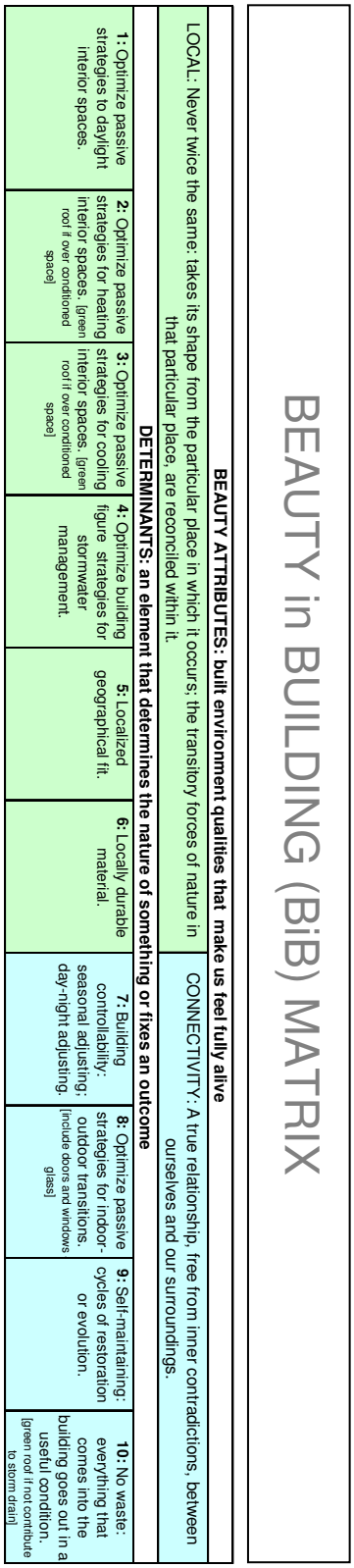
Referring to the two attributes, Local and Connectivity, we focused on identifying the building strategy categories that help determine and establish those attributes.

Determinants: A determinant is an element that establishes the nature of something. In the BiB project, the determinant elements are building strategy categories that establish the desired attribute. The following ten determinants provide the categories for identifying building strategies that can then be measured by building performance metrics.

The ten identified determinants include:

1. Optimize passive strategies to daylight interior spaces.
2. Optimize passive strategies for heating interior spaces.
3. Optimize passive strategies for cooling interior spaces.
4. Optimize building figure strategies for stormwater management.
5. Localized geographical fit.
6. Locally durable material.
7. Building controllability: seasonal adjusting; day-night adjusting.
8. Optimize passive strategies for indoor-outdoor transitions.
9. Self-maintaining: cycles of restoration or evolution.
10. No waste: everything that comes into the building goes out in a useful condition.

These Determinants provide the first view of what will be considered in taking a building through the process. A building making its way through the BiB matrix would specifically identify any building strategies that fall under the determinants.



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Filters

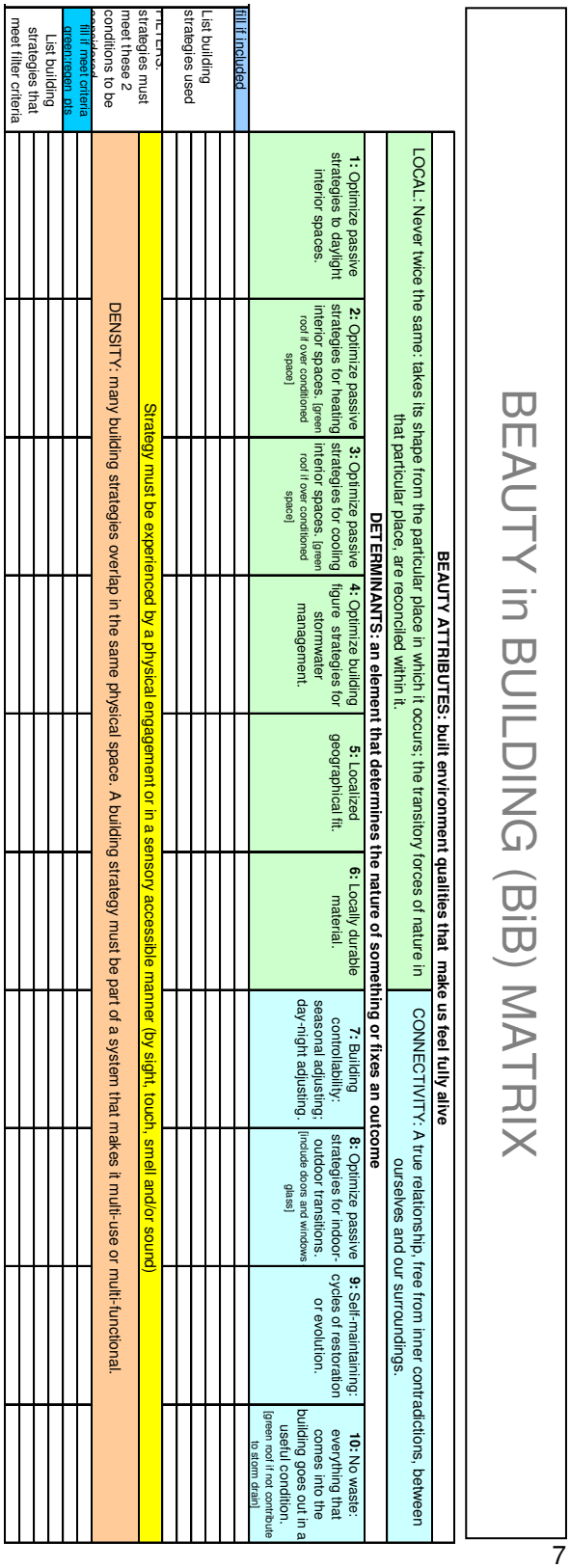
After the First Case Study we realized we needed to provide a means to assure that the building strategies moving through the BiB matrix were able to be experienced by the occupants, given our definition for beauty as promoting the occupant to feel fully alive. The First Case Study also found that dense strategies were a recurring feature that we realized held significant performance and design implications. We decided to include both of these as filters to inform the building strategies that would ultimately be measured.

Filters: conditions that must be met in order for the building strategy to move forward through the BiB matrix.

1. Building strategy must be able to be experienced by a physical engagement or in a sensory accessible manner (by sight, touch, smell and/or sound).

2. Building strategy must have Density, this is where many building strategies overlap in the same physical space. A building strategy must be part of a system that makes it multi-use or multi-functional.

The filters refine the building strategies as they make their way through the BiB matrix.



Metrics

In order for the building strategies to be measured with regard to impacts on building performance, we researched performance metrics that could be applicable to building strategies that were experiential and dense. The Japanese Comprehensive Assessment System for Built Environment Efficiency (CASBEE)[15] tool for assessing and rating the environmental performance of buildings/built environment was a valuable resource for its inclusion of impacts to occupants. The Collaboration for High Performance Schools (CHPS)[16] Best Practices Manual also included user impacts in its reference guide.

Metrics: Twenty building performance metrics have been refined from an original pool of CASBEE and CHPS metrics.

Building Thermal Load/ Building Envelope Performance/ Openings by Orientation/ Direct Use of Natural Forces/ Sunlight Control/ Daylighting/ Natural Ventilation/ Stormwater Managed by Building Figure/ Stormwater Discharge/ Greywater Use System/ Minimal Use of Material/ Design for Adaptability/ Durability of Structural Frame Materials/ Durability of Main Interior and Exterior Finishes/ Use of Recycled Materials/ Building Waste/ Preservation and Creation of Biotope/ Attention to Local Character/ Light Pollution/ Improvement of the Thermal Environment on Site.

METRICS		
Building Thermal Load		
The efforts to improve the reduction of thermal gains and losses; thermal load control as a means of reducing energy consumed by cooling and heating.		
CONVENTIONAL	G	R
Requires a mechanical system	Requires a reduced mechanical system	Mechanical system is optional but not required

[15] See p.2 footnote #10
[16] See p.2 footnote #11

Measuring

Building strategies that meet the requirements of the filters are then measured against building performance metrics.

The metrics illustrate three categories of performance: conventional (used as the base- the impact is acceptable in standard practice), green building - G (reducing negative impact), and regenerative – R (no negative impact). Our matrix registers G or R points. As this is a qualitative measuring, there is no weight giving greater value to R over G or vice versa. G and R are calculated separately, however, to give an understanding of a building's performance points toward being green or regenerative.

Measuring: each metric provides performance levels relative to being green with a reduced negative energy/environmental impact or being regenerative with a positive impact. The BiB matrix identifies which determinants are relevant to any given metric, facilitating the process of applying the measures. Each building strategy moves through the BiB matrix, checking the column and row where it achieves the metric. Each check is given a point and a total number of points are accumulated for the project's score.

METRICS			Related Determinants	building strategy	
				GREEN- G; REGENERATIVE - R	
Building Thermal Load				G	R
The efforts to improve the reduction of thermal gains and losses; thermal load control as a means of reducing energy consumed by cooling and heating.					
CONVENTIONAL	G	R	1		
Requires a mechanical system	Requires a reduced mechanical system	Mechanical system is optional but not required	2		
			3		
			5		
			7		
			8		

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First Case Study, 20 Projects: Analysis

The First Case Study was undertaken at the completion of the first year of the BiB project to validate the attributes and determinants that make up the BiB matrix. We were looking for answers to the following questions:

Do the attributes, as determined by the building strategies, occur? If so, do they occur with any different frequency or quantity across a selection of buildings?

All projects considered were LEED Platinum certified, half were also AIA COTE Top Ten winners. We used the AIA COTE Top Ten winners to represent the added beauty feature as they had competed to win the COTE Top Ten award in addition to having the LEED Platinum certificate. We used the published data on the USGBC LEED[17] database for Platinum certified projects and the AIA COTE[18] Top Ten award winner database to populate our then abbreviated matrix. We wanted to see if the buildings from the two different sources registered differently.

We looked at the information for each building from the two groups of projects and identified their building strategies that met the Determinants. Many strategies fit more than one Determinant. This is the matrix used for the First Case Study. See Appendix A for the matrix with the complete data from the First Case Study.

BEAUTY in BUILDING (BiB) MATRIX First Case Study

BEAUTY ATTRIBUTES: built environment qualities that make us feel fully alive

LOCAL: Never twice the same: takes its shape from the particular place in which it occurs; the transitory forces of nature in that particular place, are reconciled within it.

CONNECTIVITY: A true relationship, free from inner contradictions, between ourselves and our surroundings.

DETERMINANTS: an element that determines the nature of something or fixes an outcome

List building strategies used	fill if included	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]

[17] http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx

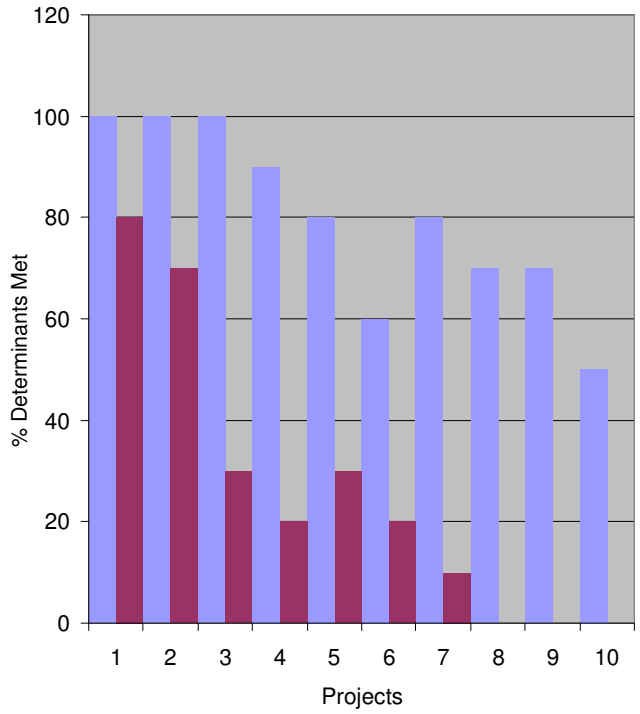
[18] http://www.aiatopten.org/

The following graphs provided the first view of the perceivable differences between high-performing award-winning buildings and simply high-performing buildings. The attributes, as determined by the building strategies, definitely occur, and they seem to occur differently across our selection of buildings. Buildings from the AIA COTE group on average used building strategies that met the Determinants almost 2.7 times more often than the LEED group.

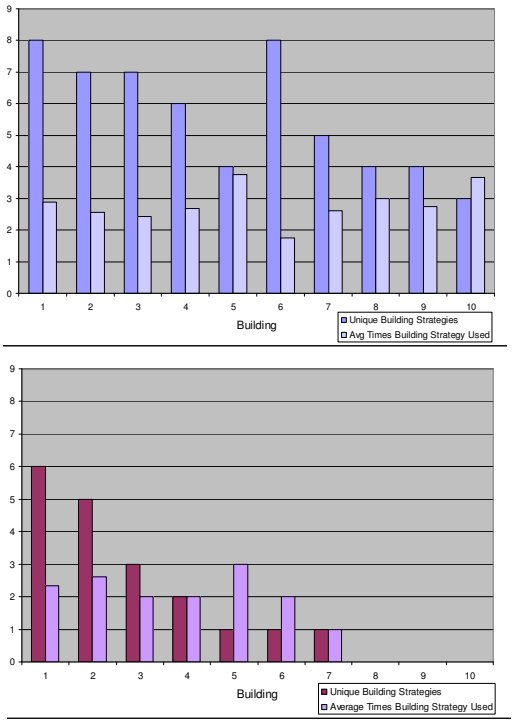
There are 10 Determinants. We looked at how many Determinants each project met with their building strategies. The following graph shows that the AIA COTE + LEED projects met on average 80% of the Determinants, while the LEED projects on average met 29.71% of the Determinants.

Many of the identified building strategies were used to meet more than one Determinant. We considered building strategies that served more than one Determinant to be integrated. The following graphs illustrate that the AIA COTE + LEED projects used an average of 5.6 unique building strategies that were on average used 2.81 times, while the LEED projects' used an average of 1.90 unique building strategies that were on average used 1.49 times.

% of Determinants Met By a Project's Building Strategies



# of Unique Building Strategies versus Average # Times Building Strategies Used



AIA COTE winner + LEED Platinum certified

LEED Platinum certified

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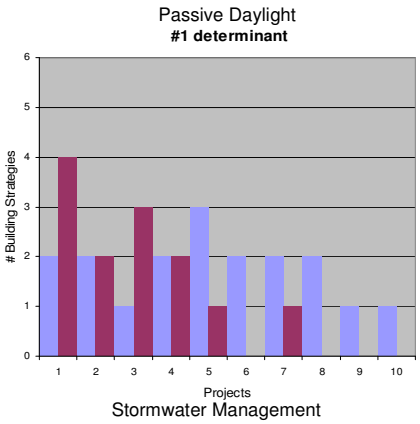
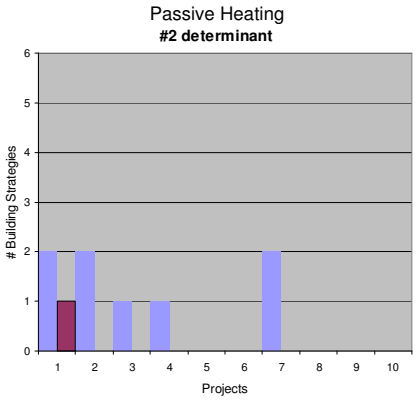
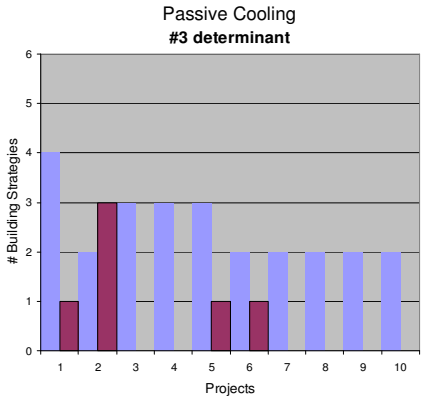
We looked in further detail at the number of building strategies each of the projects used to meet the 10 Determinants. This is illustrated on the following graphs listed 1-10 for each determinant. The AIA COTE + LEED group on average used 3.5 times more building strategies than the LEED group.

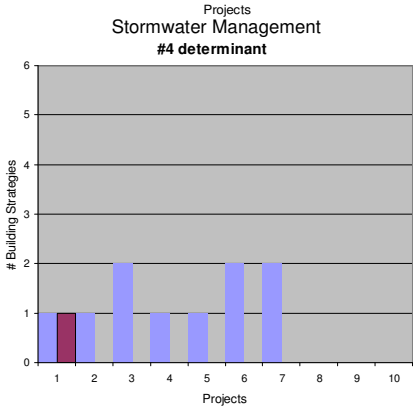
AIA COTE winner + LEED Platinum certified

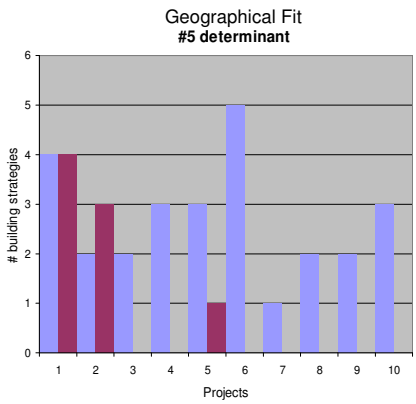
LEED Platinum certified

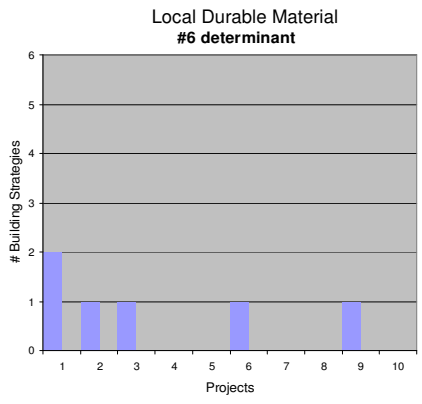


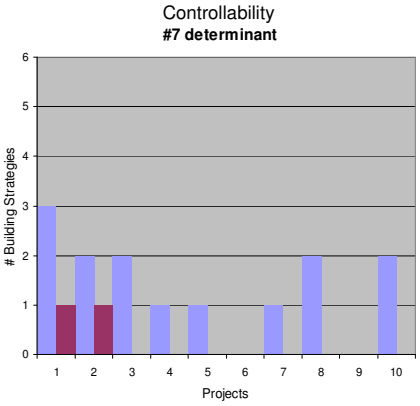


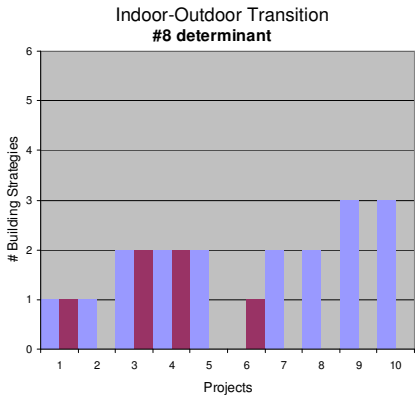


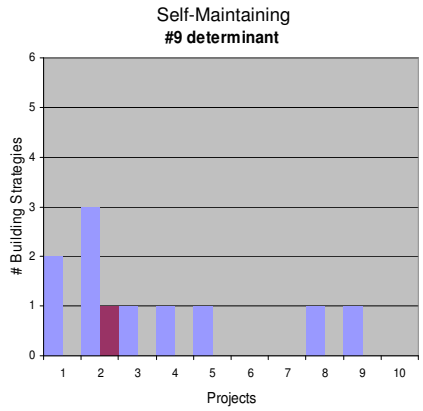


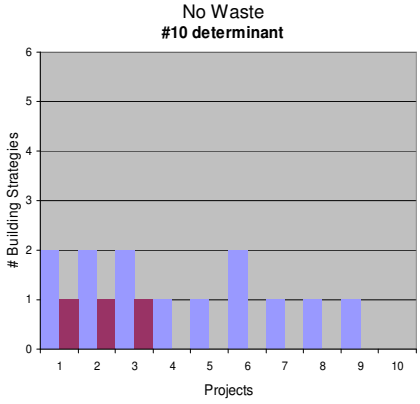












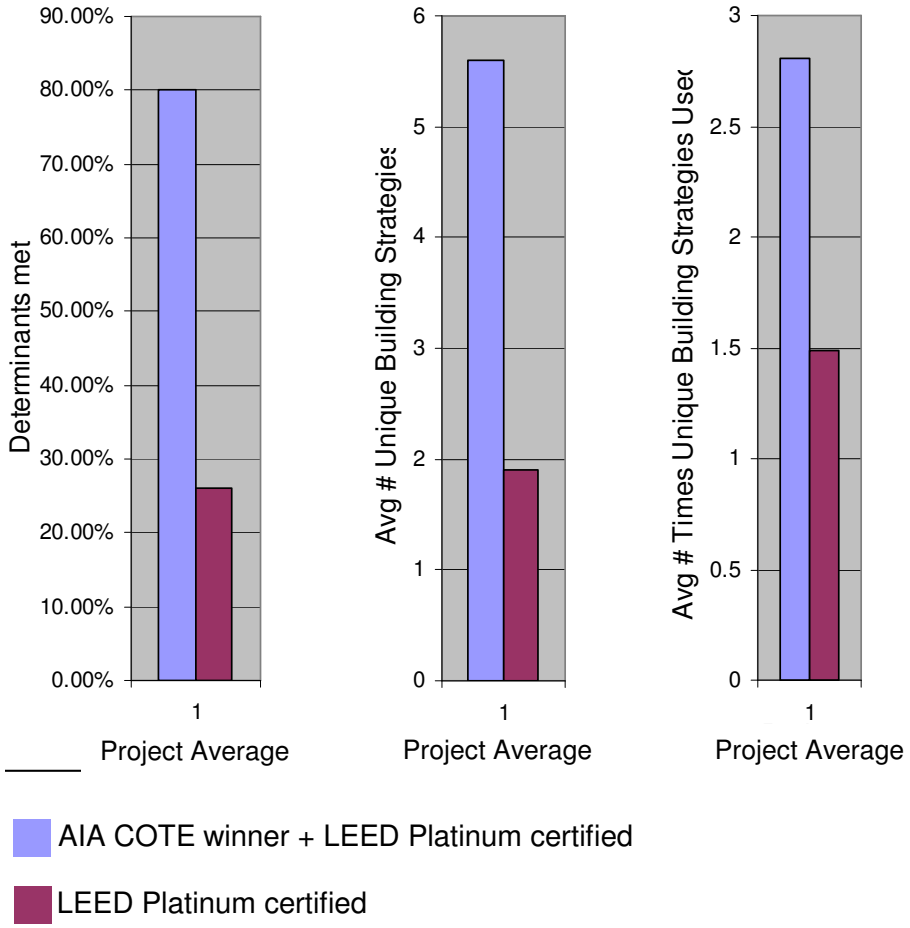
First Case Study, 20 Projects: Conclusions

Key findings:
The AIA COTE + LEED projects met on average 80% of the Determinants, while the LEED projects on average met 29.71% of the Determinants.

The AIA COTE + LEED projects used an average of 5.6 unique building strategies that were on average used 2.81 times, while the LEED projects' used an average of 1.90 unique building strategies that were on average used 1.49 times

There are key differences between the groups of buildings; these findings gave us confidence to proceed with the study.

Moving forward with the development of the matrix, we realized the process was lacking means to assure we were processing strategies that met our definition of beauty as being experiential. Additionally we recognized that the fundamental nature of the attributes was promoting integration with its context. Both of these concerns were addressed by adding filters to the developing matrix.



Second Case Study, 27 Projects: Analysis

Once the full matrix was developed with all its components: Attributes, Determinants, Filters, Metrics, and means to Measure, we conducted a more in depth analysis.

As in the First Case Study, each building was processed through the BiB matrix by first identifying the building strategies it was using in each Determinant category. These building strategies were then filtered and the remaining strategies were taken to the metrics to be measured. In the following example you can see the grey water strategy did not proceed beyond the filters.

Leed Platinum / AIA COTE CERTIFICATION		BEAUTY ATTRIBUTES: built environment qualities that make us feel fully alive									
		LOCAL: Never twice the same: takes its shape from the particular place in which it occurs; the transitory forces of nature in that particular place, are reconciled within it.						CONNECTIVITY: A true relationship, free from inner contradictions, between ourselves and our surroundings.			
		DETERMINANTS: an element that determines the nature of something or fixes an outcome									
PROJECT		1: Optimize passive strategies to daylight interior spaces.	2: Optimize passive strategies for heating interior spaces.	3: Optimize passive strategies for cooling interior spaces.	4: Optimize building figure strategies for stormwater management.	5: Localized geographical fit.	6: Locally durable material.	7: Building controllability: seasonal adjusting; day-night adjusting.	8: Optimize passive strategies for indoor-outdoor transitions.	9: Self-maintaining: cycles of restoration or evolution.	10: No waste: everything that comes into the building goes out in a useful condition.
	fill if included										
	List building strategies used	long narrow shape oriented	bioswale green roof	operable seasonal doors	bioswale green roof	long narrow shape oriented		flex space outdoors	wooden brise-soleil	bioswale green roof	grey water reuse
		wooden brise-soleil		flex space outdoors		wooden brise-soleil			operable seasonal doors		bioswale green roof
				bioswale green roof		bioswale green roof					
	FILTERS: strategies must meet these 2 conditions to be considered	Strategy must be experienced by a physical engagement or in a sensory accessible manner (by sight, touch, smell and/or sound)									
		DENSITY: Many building patterns overlap in the same physical space, without inner contradictions, the building is very dense, it has many meanings captured in a small space, through this density it becomes profound. strategy must be part of a system: mult use, multi function									
	fill if meet criteria netzero:regen pts	4:3	2:0	8:1	0:3	7:10		0:1	5:1	0:3	0:3
	List building strategies that meet filter criteria	long narrow shape oriented	bioswale green roof	flex space outdoors	bioswale green roof	long narrow shape oriented		flex space outdoors	wooden brise-soleil	bioswale green roof	bioswale green roof
		wooden brise-soleil		operable seasonal doors		wooden brise-soleil			operable seasonal doors		
				bioswale green roof		bioswale green roof					

			USE METRICS TO DETERMINE PERFORMANCE IMPACT OF BUILDING STRATEGIES: netzero points : regenerative points																	
		Related Determinants	bioswale green roof 2,3,4, 5, 9, 10		wooden brise-soleil 1, 5, 8		flex space outdoors 3, 7		long narrow shape oriented 1, 5		operable seasonal doors 3,8						building strategy		building strategy	
METRICS			GREEN: G REGENERATIVE :R		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)		NET ZERO (O); REGENERATIVE (+)	
Building Thermal Load			G	R	0	+	0	+	0	+	0	+	0	+	0	+	0	+	0	+
The efforts to improve the reduction of thermal gains and losses; thermal load control as a means of reducing energy consumed by cooling and heating.																				
CONVENTIONAL	(0)	1							0											
		2	0																	
		3	0								0									
Requires a mechanical system	Requires a reduced mechanical system	5	0						0											
	Mechanical system is optional but not required	7																		
		8									0									

For example, this project used a bioswale green roof that managed stormwater and eliminated any water leaving the site and was accessible to occupants, it would proceed to the metrics with the ability to generate points in Determinants #2, 3, 4, 5, 9, and 10. Each 'G' or 'R' registers as 1 point.

METRICS			Related Determinants	bioswale green roof 2,3,4, 5, 9, 10	
				GREEN: G REGENERATIVE :R	
Building Thermal Load				G	R
The efforts to improve the reduction of thermal gains and losses; thermal load control as a means of reducing energy consumed by cooling and heating.					
CONVENTIONAL	(0)	(+)	1		
Requires a mechanical system	Requires a reduced mechanical system	Mechanical system is optional but not required	2	0	
			3	0	
			5	0	
			7		
			8		

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For this study, we again used buildings certified to the USGBC LEED Platinum level (12 case studies) and winners of the AIA COTE award + USGBC LEED Platinum certified (12 case studies). We also added 3 buildings recently awarded Living certification by the International Living Future Institute[19] for a total of 27 buildings. We used information publically available from USGBC, AIA COTE and ILFI. In applying the metric points, we gave benefit of the doubt liberally and equally, note that points could change with deeper information on the buildings. The following chart provides data on the points each building generated and the Determinant it was received in.

AIA COTE + LEED Platinum buildings' accumulated points were on average 66.61% within LOCAL Determinants; Living buildings' accumulated points were about 50-50 between LOCAL and CONNECTIVITY Determinants; LEED Platinum buildings' accumulated points were on average 67.97% within LOCAL Determinants.

AIA COTE + LEED Platinum buildings averaged 28 Green points and 26 Regenerative points, 53 total.
Living buildings averaged 19 Green points and 15 Regenerative points, 34 total.
LEED Platinum buildings averaged 8 Green points and 5 Regenerative points, 13 total.

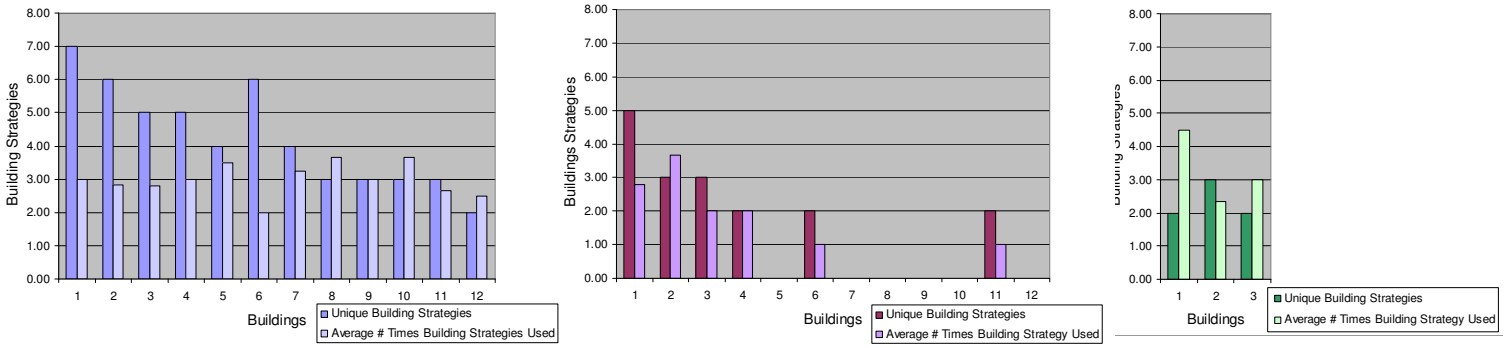
Beauty in Building Case Study Data

Cert	Building	Points		Points per Determinant green G regenerative R																				total
				1daylight		2 p heat		3 p coo		4 st water		5 loc geo		6 loc matl		7 control		8 in-out		9 maintain		10 no waste		
		G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	G	R	
AIA COTE + LEED Platinum	1	44	54	4	1	6	4	13	10	0	3	8	16	0	3	10	6	3	5	0	4	0	2	98
	2	34	34	7	4	5	1	4	3			8	6	1	0	3	2	3	3	2	9	1	6	68
	3	24	23	3	1	2	0	6	4	0	5	2	7			4	2	6	2			1	2	47
	4	26	25	4	3	2	0	8	1	0	3	7	10			0	1	5	1	0	3	0	3	51
	5	48	20	12	4			12	4	0	2	12	6			5	1	5	1	1	1	1	1	68
	6	26	24	12	6					0	4	13	10									1	4	50
	7	28	25	7	4	4	1	5	3	0	5	2	4			3	2	7	4			0	2	53
	8	37	5	8	1			9	1			0	1			9	1	9	1	1	0	1	0	42
	9	18	14	3	1			6	3			3	3					6	4	0	3			32
	10	41	20	5	1			9	4			9	7			9	3	9	5					61
	11	0	48	0	6			0	5			0	21			0	10	0	6					48
	12	8	15	3	6							2	3					3	6					23
	total	334	307	68	38	19	6	72	38	0	22	66	94	1	3	43	28	56	38	4	20	5	20	641
	avg	**28**	**26**	**6**	**3**	**2**	**1**	**6**	**3**	**0**	**2**	**6**	**8**	**0**	**0**	**4**	**2**	**5**	**3**	**0**	**2**	**0**	**2**	**53**
LIVING	1	24	18	5	1	3	2	5	2	0	3					5	2	5	2	1	3	0	3	42
	2	11	26	1	3			1	3			3	8			2	6	4	6					37
	3	21	1	4	1			5	0							6	0	6	0					22
	total	56	45	10	5	3	2	11	5	0	3	3	8	0	0	13	8	15	8	1	3	0	3	101
	avg	**19**	**15**	**3**	**2**	**1**	**1**	**4**	**2**	**0**	**1**	**1**	**3**	**0**	**0**	**4**	**3**	**5**	**3**	**0**	**1**	**0**	**1**	**34**
LEED Platinum	1	36	15	11	5	2	1	2	1	1	0	12	5			3	2	5	1					51
	2	28	13	6	2			8	3	1	1	9	4			3	2					1	1	41
	3	19	10	10	4													9	3			0	3	29
	4	8	4	4	2													4	2					12
	5	0	0																					0
	6	0	10					0	5									0	5					10
	7	0	0																					0
	8	0	0																					0
	9	0	0																					0
	10	0	0																					0
	11	8	2	4	1													4	1					10
	12	0	0																					0
	total	99	54	35	14	2	1	10	9	2	1	21	9	0	0	6	4	22	12	0	0	1	4	153
	avg	**8**	**5**	**3**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**2**	**1**	**0**	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**0**	**0**	**13**

highest
2nd high
3rd high

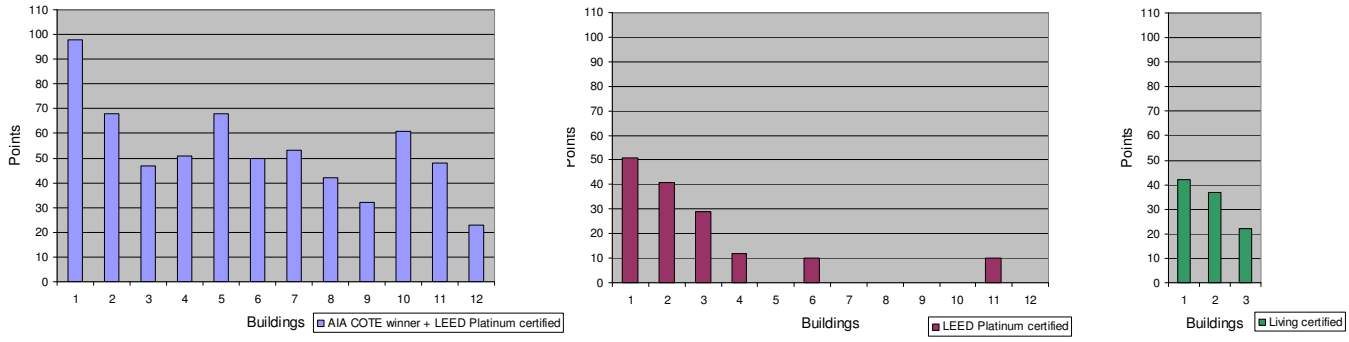
[19] https://ilbi.org/lbc/casestudies

Unique Building Strategies Used versus Average # of Times Building Strategies Used



Average # of times each building strategy is used per building:
AIA COTE + LEED: 2.99 times
LEED: 1.04 times
Living: 3.28 times

Points Accumulated



Average BiB points per building:
AIA COTE + LEED: 53 points
LEED: 13 points
Living: 34 points

AIA COTE winner + LEED Platinum certified

LEED Platinum certified

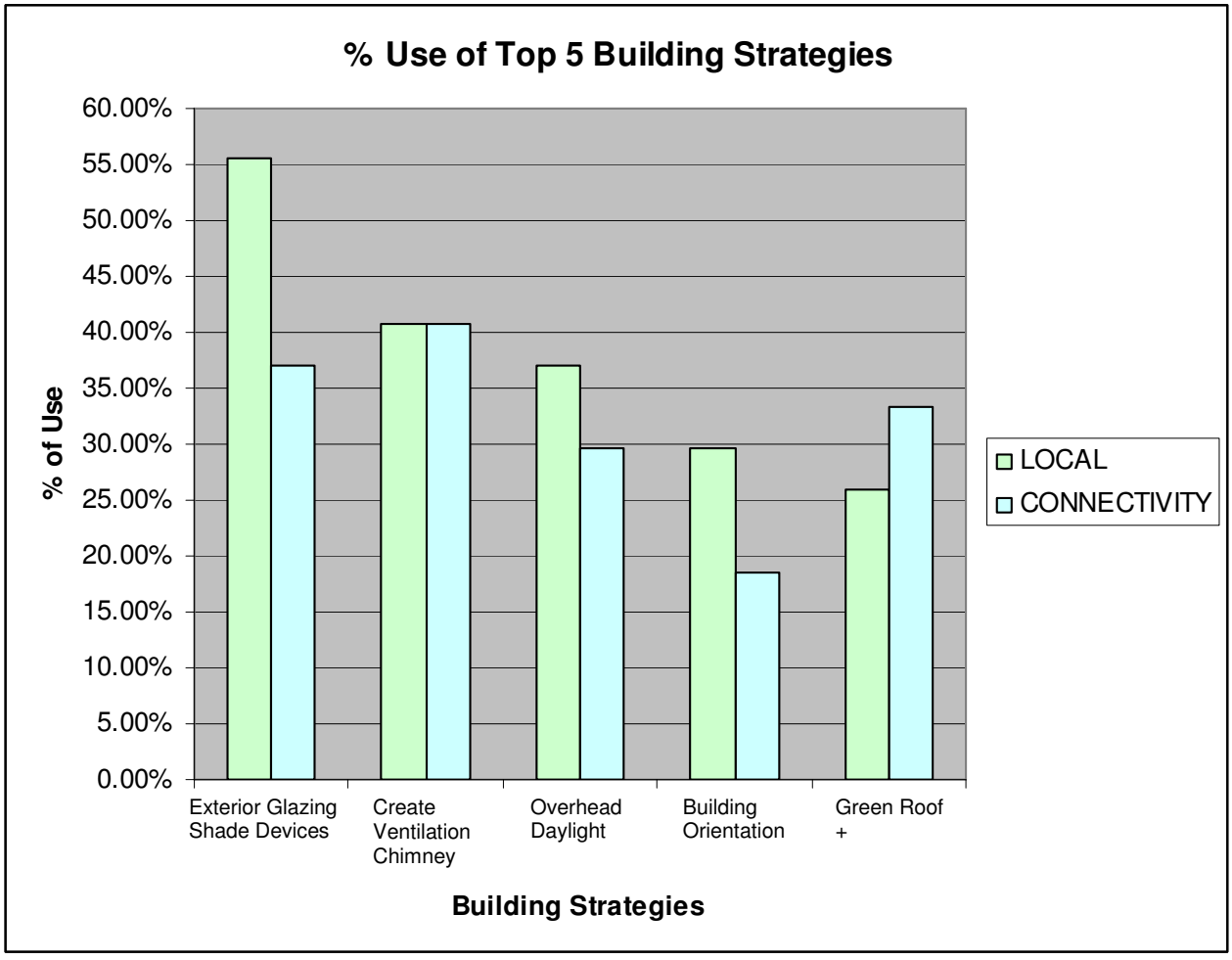
Living certified

timely information and the means to use it with intelligence

Taking the study data back to the origins, we identified the Top Five most used building strategies under each attribute. It turned out to be the same 5 strategies but in different order. The chart and graph below show that the top strategy to achieve the LOCAL attribute was use of exterior glazing shading devices, over 55% of the buildings in the study used this strategy.

The top strategy used to achieve the CONNECTIVITY attribute was to create a natural ventilation chimney; over 40% of the buildings in the study used this strategy.

LOCAL			CONNECTIVITY		
Building Strategy	# buildings that used the strategy	% of the 27 buildings	Building Strategy	# buildings that used the strategy	% of the 27 buildings
exterior glazing shade device	15	55.56%	create ventilation chimney	11	40.74%
create ventilation chimney	11	40.74%	exterior glazing shade device	10	37.04%
overhead daylight	10	37.04%	green roof+	9	33.33%
building orientation	8	29.63%	overhead daylight	8	29.63%
green roof+	7	25.93%	building orientation	5	18.52%



Second Case Study, 27 Projects: Analysis

BiB Points:
AIA COTE + LEED Platinum buildings on average accumulated BiB points 4 to 1 over the LEED Platinum buildings. The number of BiB points accumulated on average by LEED Platinum buildings is greatly skewed by the number of buildings that have no integrated strategies, which is a filter, and thus accumulate zero points. As there are only 3 Living buildings in this study, it is not meaningful to compare their number of points on average.

Building Strategy Integration:
AIA COTE + LEED Platinum buildings' building strategies are 2.87 times more likely to be integrated than those of the LEED Platinum buildings.

Living buildings present an interesting circumstance in that they seem to integrate their building strategies on average 10% more frequently than AIA COTE + LEED Platinum buildings and on average 69% more frequently than LEED Platinum's. Yet they on average only accumulate 64% of the BiB points AIA COTE + LEED Platinum buildings accumulate.

BiB Point Distribution:
AIA COTE + LEED Platinum and LEED Platinum buildings' points were accumulated mostly (66.61% and 67.97%, respectively) within LOCAL Determinants while Living buildings' points were accumulated fairly equally between LOCAL and CONNECTIVITY Determinants.

Top Building Strategies:
LOCAL: Never twice the same: takes its shape from the particular place in which it occurs; the transitory forces of nature in that particular place are reconciled within it. The most commonly used building strategies to determine the qualities of the LOCAL attribute includes use of exterior glazing shade devices, creating ventilation chimneys of some sort, use of overhead daylight, intentional building orientation, and use of green roofs and other strategies to manage water on site.

The top building strategy used by all 27 buildings to achieve the LOCAL attribute was use of exterior glazing shading devices; over 55% of the buildings in the study used this strategy. The general popularity of this strategy is easy to see in high performing buildings in most communities.

CONNECTIVITY: A true relationship, free from inner contradictions between ourselves and our surroundings. The most commonly used building strategies to determine the qualities of the CONNECTIVITY attribute include creating ventilation chimneys of some sort, use of exterior glazing shade devices, use of green roofs and other strategies to manage water on site, use of overhead daylight, and intentional building orientation.

The top building strategy used by all 27 buildings to achieve the CONNECTIVITY attribute was to create a natural ventilation chimney of some sort; over 40% of the buildings in the study used this strategy. Given the attention indoor air quality has received, it makes sense that this strategy has become popular.

There appears to be a direct correlation between use of integrated building strategies and the number of BiB points: the more integrated building strategies used, the more BiB points accumulated. Building strategy integration cannot be ignored as a factor for measuring a building's capacity to meet the attributes we have identified as common in beautiful built environments.

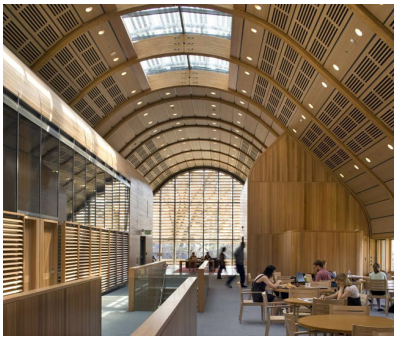
The five top building strategies used to meet the attributes are multi functional in that they perform many functions such as the use of exterior glazing shade devices allow daylight without glare, reduce heat gain on south and west exposure, enable views without compromising heat gain or daylight, all the while making buildings that take their shape from the particular place in which they occur and are free from contradictions between their occupants and their surroundings.

Beauty Poll

Lest we forget the beauty origins of this study, we conducted a beauty poll. Not without its challenges, (or challengers) we posted 6 photographs of buildings[20], taken from the project files online, and asked the following question. The number in bold is it's rank based on 'yes' votes, the second number is the BiB points it accumulated.

"Do you think this building is beautiful? A beautiful building makes you feel alive, inspired, happy!"

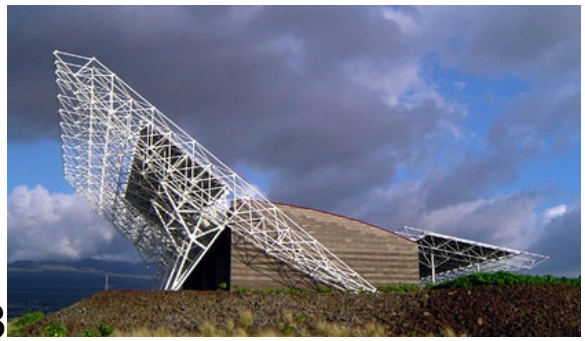
1/98



2/32

3/41

4/68



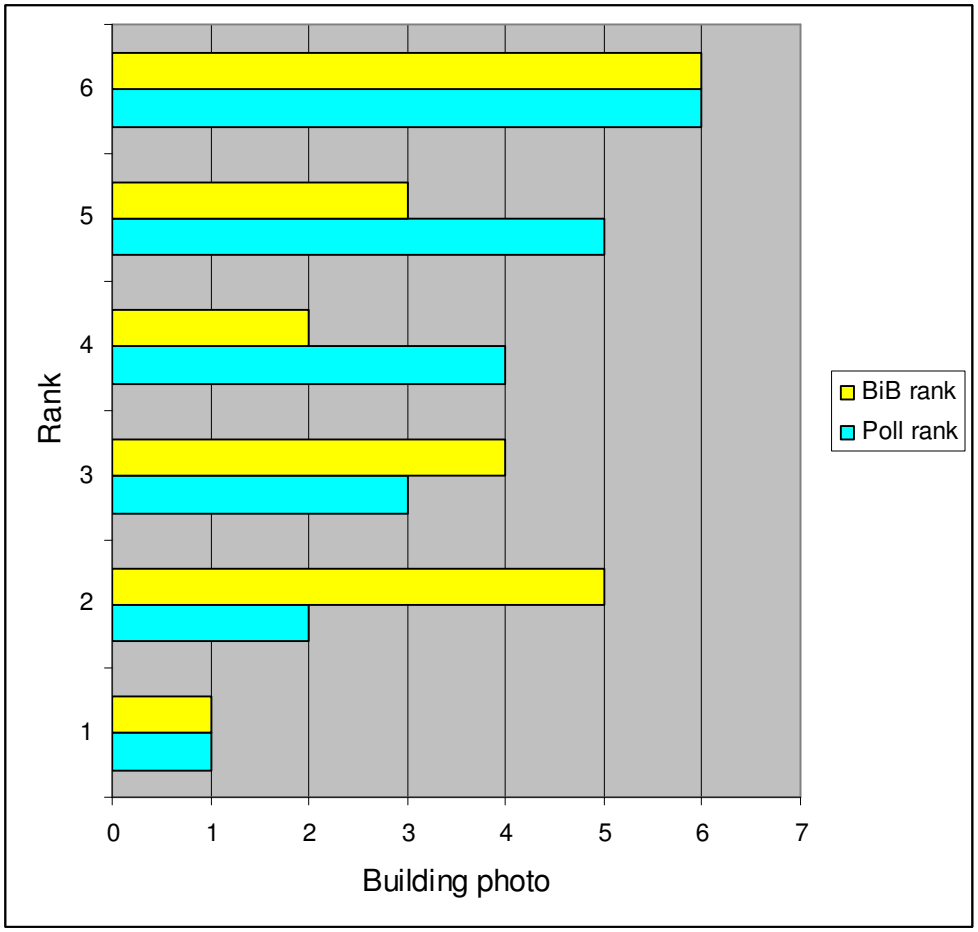
5/48

6/0

[20] http://www.pollsb.com, poll active November 2011

From the online poll, which was open to anyone browsing the Internet as well as from PatternMapping's web site, we gathered data on how the public might choose beauty. The results are shown in the matrix and graph below. The building photo garnering the most poll votes and ranked # 1 was photo #1. The building that accumulated the most BiB points was also photo #1. At the other end of the spectrum, the building photo garnering the least poll votes and ranked # 6 was photo #6. The building that accumulated the least BiB points was also photo #6. Building photos between the highest and lowest ranking ones did not have an apparent correlation between votes and BiB points. Based on these photos, it appears the public's capacity to choose the most and least beautiful building correlates with the BiB points but there is less consistency in the middle.

Photo	yes	no	votes	BiB pts	rank vote	rank BiB
1	33	24	57	98	1	1
2	28	18	46	32	2	5
3	25	23	48	41	3	4
4	21	21	42	68	4	2
5	19	46	65	48	5	3
6	4	39	43	0	6	6



Summary

While high-performing buildings reduce energy and environmental impacts, they do not necessarily create wellbeing in their occupants. And although there is a growing case for building design creating wellbeing in their occupants, they aren't necessarily evaluating the energy and environmental performance of those buildings. This study is looking to close these gaps by measuring the energy and environmental performance of buildings that create wellbeing for their occupants.

As a first step, this study articulated vocabulary for the qualities of buildings that create wellbeing and then developed the means to process and measure these qualities; the resultant tool is the BiB matrix.

Using the BiB matrix to analyze two sets of buildings (award wining certified high-performing buildings and certified high-performing buildings), this study found that the award winning buildings accumulated more green and regenerative points (4-1) and have a higher instance (2.87 times) of multi-functional building strategies than non award winning buildings.

These findings, made accessible via the BiB matrix, open the door for the value of wellbeing to be considered in evaluating building performance. Bringing beauty to the building science table and paving the way for qualitative measuring to inform high-performance building design and development.

As the BiB matrix rewards building strategy integration, there is the opportunity to use the tool in the initial design stages to encourage integrative thinking. This can be useful in a professional setting as well as to illustrate the interconnectivity qualities of integration to academic studios.

The capacity for the BiB matrix to qualitatively measure performance within the realms of green and regenerative building criteria also offers projects the opportunity to track the performance of building strategies into design development phases.

For information regarding development and use of the BiB matrix:
Contact: ml Robles
303 443 1945
ml@patternmapping.com

For information on publication and articles on the Beauty in Building study:
Contact: PatternMapping institute
studio@patternmapping.com

Appendix A: First Case Study

AIA COTE winners + LEED Platinum certified

Results

	BEAUTY ATTRIBUTES: built environment qualities that make us feel fully alive										
	LOCAL: Never twice the same: takes its shape from the particular place in which it occurs; the transitory forces of nature in that particular place, are reconciled within it.						CONNECTIVITY: A true relationship, free from inner contradictions, between ourselves and our surroundings.				
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #1	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	points
fill if included	open stair and top floor	shell and thermal mass	shell and thermal mass	courtyard roof	courtyard roof	local fsc wood	shell and thermal mass	louvers-overhangs	modular reuse	modular reuse	10
	louvers-overhangs	orientation and embed	orientation and embed		shell and thermal mass	age in place	orientation and embed		age in place	courtyard roof	8
List building strategies used			open stair and top floor		orientation and embed		open stair and top floor				3
			louvers-overhangs		local fsc wood						2
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #2	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	building orientation-windows	building orientation-	building shades itself	reuse rain for grey	building shades itself	reclaimed cedar screen	reclaimed cedar screen	reclaimed cedar screen	unfinished surfaces	fully flexible interior	10
	reclaimed cedar screen	exposed concrete	exposed concrete		building orientation-		building shades itself		exposed concrete	unfinished surfaces	7
List building strategies used									fully flexible interior		1
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #3	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	high glazing and white panels	green roof	solar vent chimney	wastewater wetland reuse	wastewater wetland reuse	reclaimed siding-flooring	solar vent chimney	shade screens	design for disassembly	wastewater wetland reuse	10
			shade screens	green roof	green roof		shade screens	high glazing and white		design for disassembly	6
List building strategies used			green roof								1
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #4	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	long narrow shape oriented	bioswale green roof	operable seasonal doors	bioswale green roof	long narrow shape oriented		flex space outdoors	wooden brise-soleil	bioswale green roof	grey water reuse	9
	wooden brise-soleil		flex space outdoors		wooden brise-soleil			operable seasonal doors		bioswale green roof	5
List building strategies used			bioswale green roof		bioswale green roof						2
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #5	**1:** Optimize passive	**2:** Optimize passive	**3:** Optimize passive	**4:** Optimize building	**5:** Localized	**6:** Locally durable	**7:** Building	**8:** Optimize passive	**9:** Self-maintaining:	**10:** No waste:	
fill if included	shaded windows		green roof	green roof	shaded windows		auditorium ahylight-shade	shaded windows	green roof	green roof	8
	bld orientation		bld orientation		green roof			auditorium ahylight-shade			4
List building strategies used	auditorium ahylight-shade		auditorium ahylight-shade		bld orientation						3
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #6	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	points
fill if included	roof monitor-clerestory		orient for wind	water cisterns	orient for wind	exposed structure is finish				exposed structure is finish	6
	high ceiling-large windows		south windows shading	building on piers	south windows shading					water cisterns	5
List building strategies used					roof monitor-clerestory						1
					high ceiling-large windows						1
					building on piers						1
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #7	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	west louvers	west louvers	west louvers	green roof	green roof		west louvers	west louvers		pond	8
	south louvers+fabric	green roof	green roof	pond				south louvers+fabric			5
List building strategies used											0
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #8	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	clerestory -windows		clerestory -windows		reuse old building material		clerestory -windows	overhangs and louvers	reuse old building material	reuse old building material	7
	overhangs and louvers		overhangs and louvers		low buildings		overhangs and louvers	clerestory -windows			5
List building strategies used											0
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #9	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	shaded glazing		oriented to breeze		piers above grade	material		piers above grade	piers above grade	material	7
			shaded glazing		oriented to breeze			oriented to breeze			3
List building strategies used								shaded glazing			1
											0
											0
											0
Leed Platinum + AIA COTE	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #10	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	window venting, high ctg		south trellis		piers		window venting, high ctg	piers			5
			window venting, high ctg		south trellis		south trellis	trellis			4
List building strategies used					window venting, high ctg			window venting, high ctg			2
											0
											0
											0

LEED Platinum certified
Results

Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #1	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	narrow footprint and orientation	narrow footprint/orient	overhang and brise-soleil	roof scupper	orientation		south lightshelves	skylights clerestories		roof scuppar	8
List building strategies used	overhang and brise-soleil				overhang and brise-soleil						2
	south lightshelves				south lightshelves						2
	skylights clerestories				skylights clerestories						2
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #2	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	shades and shelves		louvers	green roof	green roof		shades and shelves		flexible space	green roof	7
	louvers		shades and shelves	cistern	shades and shelves						4
List building strategies used			green roof		louvers						2
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #3	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	light shelf							light shlef		expose frame	3
	clerestory							clerestory			2
List building strategies used	expose frame										1
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #4	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	lightwell							lightwell			2
	translucent-transparent mat1							mat1			2
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #5	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	form follow rise		form follow rise		form follow rise						3
											0
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #6	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included			operable windows-transoms					operable windows-transoms			2
											0
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #7	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included	overhangs										1
											0
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #8	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included											0
											0
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #9	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included											0
											0
List building strategies used											0
											0
											0
											0
Leed Platinum	DETERMINANTS: an element that determines the nature of something or fixes an outcome										
building #10	**1:** Optimize passive strategies to daylight interior spaces.	**2:** Optimize passive strategies for heating interior spaces. [green roof if over conditioned space]	**3:** Optimize passive strategies for cooling interior spaces. [green roof if over conditioned space]	**4:** Optimize building figure strategies for stormwater management.	**5:** Localized geographical fit.	**6:** Locally durable material.	**7:** Building controllability: seasonal adjusting; day-night adjusting.	**8:** Optimize passive strategies for indoor-outdoor transitions. [include doors and windows glass]	**9:** Self-maintaining: cycles of restoration or evolution.	**10:** No waste: everything that comes into the building goes out in a useful condition. [green roof if not contribute to storm drain]	
fill if included											0
											0
List building strategies used											0
											0
											0
											0