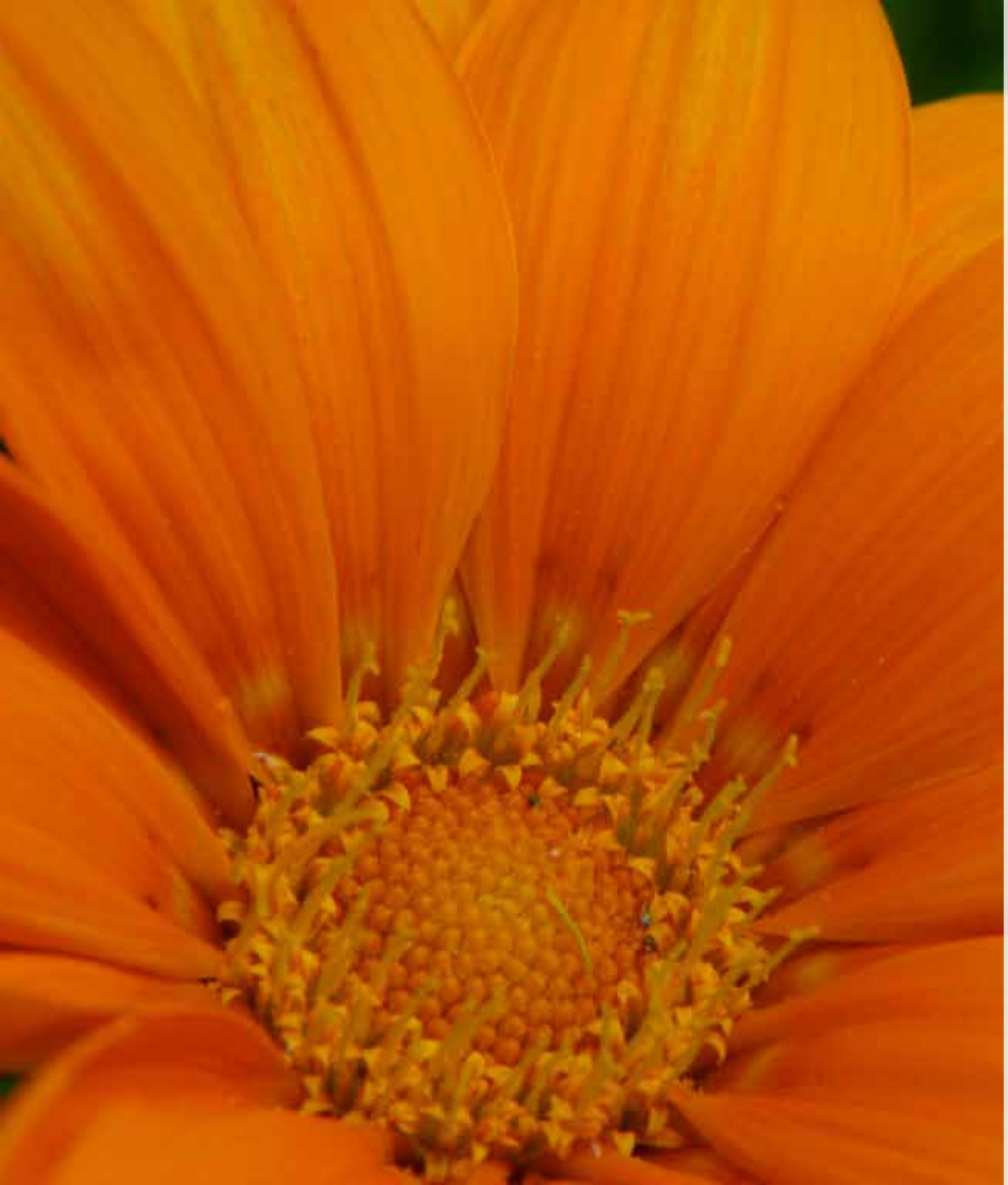

LIVING BUILDING CHALLENGE℠ 2.1

A Visionary Path to a Restorative Future

INTERNATIONAL LIVING FUTURE INSTITUTE℠

May 2012

NOTIFICATION

NOW IS THE RIGHT TIME FOR A WORLD OF LIVING BUILDINGS, SITES AND COMMUNITIES

Imagine a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion's characteristics, and that generates all of its own energy with renewable resources, captures and treats all of its water, and operates efficiently and for maximum beauty.

Imagine a city block or a college campus sharing resources from building to building, growing food, and functioning without a dependency on fossil fuel-based transportation.

Imagine true sustainability in our homes, workplaces, neighborhoods, villages, towns and cities – Socially Just, Culturally Rich and Ecologically Restorative℠.

EMBRACE THE PSYCHOLOGY OF THE END GAME

The International Living Future Institute issues a challenge:

to all design professionals, contractors and building owners to create the foundation for a sustainable future in the fabric of our communities.

to politicians and government officials to remove barriers to systemic change, and to realign incentives and market signals that truly protect the health, safety and welfare of people and all beings.

to all of humanity to reconcile the built environment with the natural environment, into a civilization that creates greater biodiversity, resilience and opportunities for life with each adaptation and development.

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EXECUTIVE SUMMARY

TRANSFORMATIVE IMPACT ACROSS ALL SCALES OF DEVELOPMENT: FROM BUILDINGS TO SITES, NEIGHBORHOODS AND COMMUNITIES

The Living Building Challenge is an attempt to raise the bar. It defines the most advanced measure of sustainability in the built environment possible today and acts to diminish the gap between current limits and ideal solutions. This philosophy, advocacy tool and certification program covers all building at all scales and is a unified tool for transformative design, allowing us to envision a future that is Socially Just, Culturally Rich and Ecologically Restorative. Whether the project is a single building, a park, a college campus or even a complete neighborhood community, Living Building Challenge provides a framework for design, construction and the symbiotic relationship between people and all aspects of the built environment. Indeed, "Living Building Challenge" is not a merely a noun that defines the character of a particular solution for development, but more relevant if classified as a series of verbs – calls for action that describe not only the 'building' of all of humanity's longest lasting artifacts, but also of the relationships and broader sense of community and connectivity they engender. It is a challenge to immerse ourselves in such a pursuit - and many refer to the ability to do so as a "paradigm shift".

Projects that achieve this level of performance can claim to be the 'greenest' anywhere, and will serve as role models for others that follow. Whether the project is restorative, regenerative or operates with a net zero impact, it has a home in the construct of the Living Building Challenge.

Although it may seem to be ambitious to simultaneously achieve all of the requirements of the Living Building Challenge, understanding the Standard and documenting compliance is inherently easy: there are never more than twenty simple and profound Imperatives that must be met for any type of project, at any scale, in any location around the world. This Standard is decidedly not a checklist of best practices – the facets of Living Building Challenge are performance-based and position the ideal outcome as an indicator of success. The specific methodology used to meet the expectations of the Living Building Challenge is relegated to the genius of the design teams, who are expected to make informed decisions appropriate to the project and bioregion.

The Living Building Challenge is a cohesive standard, pulling together the most progressive thinking from the worlds of architecture, engineering, planning, landscape design and policy. It challenges us to ask the question: What if every single act of design and construction made the world a better place? What if every intervention resulted in greater biodiversity; increased soil health; additional outlets for beauty and personal expression; a deeper understanding of climate, culture and place; a realignment of our food and transportation systems; and a more profound sense of what it means to be a citizen of a planet where resources and opportunities are provided fairly and equitably?

A tall order to be sure.

The scale of change we seek is immense. But without recording these utmost visions and clarity of purpose, we as a society will never experience the type of future that is possible and necessary for our long-term survival. It is our belief that less than a few decades remain to completely reshape humanity's relationship with nature and realign our ecological footprint to be within the planet's carrying capacity. Incremental change is no longer a viable option.

Over the last twenty years, "green building" has grown to become the most important and progressive trend in the building industry. There have been huge steps forward in the design, construction and operation of buildings, and yet when compared with the rate of change that is required to avoid the worst effects of climate change and other global environmental challenges, our progress has been minute and barely recordable.

We are entering a peak oil, peak water, world that is globally interconnected yet ecologically impoverished.

A world with seven billion people and counting.

A world where every single major ecological system is in decline and the rate of that decline is increasing.

A world where global temperature increases means shifting rainfall distributions, acidified oceans and potentially catastrophic sea-level rise.

Nothing less than a sea change in building, infrastructure and community design is required. Indeed, this focus needs to be the great work of our generation. We must remake our cities, towns, neighborhoods, homes and offices, and all the spaces and infrastructure in-between. This is part of the necessary process of reinventing our relationship with the natural world – reestablishing ourselves not separate from, but "part and parcel with creation".[1]

Since it was launched in 2006, the Living Building Challenge has inspired and motivated rapid and significant change: projects have sprouted up all over North America and beyond – currently, there are efforts underway in a dozen countries; the regulatory environment has embraced a series of reforms; and most importantly, a new sense of what is possible has permeated design communities as a result of the successful certification of the first Living Buildings[SM].

This Standard is an act of optimism and belief that with the right tools in the hands of passionate, literate and sensitive individuals, a revolutionary transformation is possible. We invite you to join us, so that together we can continue to forge ahead on our path towards restoration and a Living Future.

1 To paraphrase Edward O. Wilson, one of the world's most distinguished scientists, and a professor and honorary curator in entomology at Harvard.

HOW THE LIVING BUILDING CHALLENGE WORKS

PROVEN PERFORMANCE RATHER THAN ANTICIPATED OUTCOMES

The Living Building Challenge is comprised of seven performance areas, or 'Petals': Site, Water, Energy, Health, Materials, Equity and Beauty. Petals are subdivided into a total of twenty Imperatives, each of which focuses on a specific sphere of influence. This compilation of Imperatives can be applied to almost every conceivable Typology, or project type[2], be it a building (both renovation of an existing structure[3] or new construction), infrastructure, landscape or community development. Naturally, strategies to create Living Landscapes, Infrastructure, Renovations, Buildings or Neighborhoods will vary widely by occupancy, use, construction type and location – this is necessary – but the fundamental considerations remain the same.

There are two rules:

1. All Imperatives assigned to a Typology are mandatory.
   Some Typologies require fewer than twenty Imperatives because the conditions are either not applicable or may compromise other critical needs. However, teams are encouraged to integrate the optional Imperatives into their projects wherever possible. Refer to the summary matrix on page 12 to view the list of Imperatives that are mandatory for each project type.

   Many of the Imperatives have temporary exceptions to acknowledge current market limitations. These are listed in the footnotes of each section. Temporary exceptions will be modified or removed as the market changes. With this Standard, the Institute requires advocacy for the essential improvements to the building industry.

2. Living Building Challenge certification is based on actual, rather than modeled or anticipated, performance.
   Therefore, projects must be operational for at least twelve consecutive months prior to evaluation.

2 Refer to the Process Book of the Petal Series for a list of structures that may not seek certification due to occupancy types that are inherently in conflict with the overarching goals of the Living Building Challenge.

3 Specific modifications to the program requirements are noted in the Process Book of the Petal Series to provide for the inherent conditions of existing buildings.

The Living Building Challenge is versatile. There are four Typologies, and teams must identify the one that aligns with the project to determine which Imperatives apply[4]:

Renovation: This typology is for any project that does not form the substantial portion of a complete building reconstruction. Sample projects include single-floor tenant improvements, residential kitchen remodels or historic rehabilitations of a portion of a building.

Landscape or Infrastructure (non-conditioned development): This typology is for any project that does not include a physical structure as part of its primary program, although open-air 'park-like' structures, restrooms, amphitheatres and the like do fall into this category. Projects may be as diverse as roads, bridges, plazas, sports facilities or trails.

Building: This typology is for any project that encompasses the construction of a roofed and walled structure created for permanent use – either new or existing.

Neighborhood: This typology is for any project that contains multiple buildings[5] in a continuous campus, neighborhood, district or village. Sample projects include university, college or corporate campuses; residential streets; business or industrial districts; or small villages and towns.

To encourage proper development in specific settings, the standard draws on the work of Duany Plater-Zyberk & Company[6], who created the New Urbanism Transect model for rural to urban categorization. The Transect is a powerful basis for Planning, and demonstrates that different types of standards befit different development realities. The Living Transect, which applies to several Imperatives throughout the Living Building Challenge, is an adaptation of the original Transect concept; the significant modification herein is a reclassification of Transect zones T3 and T4 to emphasize appropriate mixed-use densification. The Challenge promotes the transition of suburban zones either to grow into new urban areas with greater density, or be dismantled and repurposed as new rural zones for food production, habitat and ecosystem services.

4 These are general descriptions. Refer to the Process Book of the Petal Series for a detailed portrayal of each Typology, including a complete distinction between renovations as compared to whole building projects.

5 To qualify as a Neighborhood project, there must be a concurrent development of at least four separate buildings by a minimum of three separate owners or six separate buildings by a single owner.

6 www.dpz.com

Every project must select a Living Transect category from the following options:

L1. Natural Habitat Preserve (Greenfield sites): This is comprised of land that is set aside as a nature preserve or is defined as sensitive ecological habitat.

It may not be developed except in limited circumstances related to the preservation or interpretation of the landscape as described in Imperative One: Limits to Growth. There is a temporary exception that allows a Neighborhood project to be constructed on a greenfield site in least developed, newly industrialized or other countries with a low Human Development Index rating where it can be clearly demonstrated that predominant societal land-use pressures require the allowance of partial development as a condition to preserve the majority of the property as a conservation area.

L2. Rural Agriculture Zone: This is comprised of land with a primary function for agriculture and development that relates specifically to the production of food as described in Imperative Two: Urban Agriculture. Small towns and villages do not apply. (Floor Area Ratio ≤ 0.09)

L3. Village or Campus Zone: This is comprised of relatively low-density mixed-use development found in rural villages and towns, and may also include college or university campuses. (FAR of 0.1 – 0.49)

L4. General Urban Zone: This is comprised of light- to medium-density mixed-use development found in larger villages, small towns or at the edge of larger cities. (FAR of 0.5 – 1.49)

L5. Urban Center Zone: This is comprised of a medium- to high-density mixed-use development found in small to mid-sized cities or in the first 'ring' of a larger city. (FAR of 1.5 – 2.99)

L6. Urban Core Zone: This is comprised of high-to very high-density mixed use development found in large cities and metropolises. (FAR. ≥ 3.0)

Living Building Challenge projects have their own 'utility,' generating their own energy and processing their own waste. They more appropriately match scale to technology and end use, and result in greater self-sufficiency and security. Yet, the ideal scale for solutions is not always within a project's property boundary. Depending on the technology, the optimal scale can vary when considering environmental impact, first cost and operating costs. To address these realities, the Living Building Challenge has a Scale Jumping overlay to allow multiple buildings or projects to operate in a cooperative state – sharing green infrastructure as appropriate and allowing for Living Landscape, Infrastructure, Renovation, Building or Neighborhood status to be achieved as elegantly and efficiently as possible. Refer to the summary matrix on page 12 to view all Imperatives that may employ the Scale Jumping overlay.[7]

7 Refer to the Process Book of the Petal Series for more information on Scale Jumping.

SOME USEFUL GUIDING INFORMATION

- The internal logic of the Living Building Challenge is based on pragmatic experience with what has already been built in the marketplace.
- This Standard is an evolving document. Periodically, new releases that update or provide clarification of the Imperatives will be published. Specific guidelines on how to document compliance and to seek certification is contained in the Dialogue, available to Living Building Challenge Community subscribers via the Institute website. (Refer to page 43 for more information about the Community.)
- The Living Building Challenge does not dwell on basic best practice issues so it can instead focus on fewer, high level needs. It is assumed that to achieve this progressive standard, typical best practices are being met. The implementation of this standard requires leading-edge technical knowledge, an integrated design approach, and design and construction teams well versed in advanced practices related to 'green building'.
- Regional solutions are manifested in all Living Building Challenge projects due to a number of variables, including climate factors and building characteristics. For example, becoming water-independent in the desert demands evolving a project's design to emulate a cactus instead of a tree. The built environment will be richer because of this response to place.

WHAT IS DIFFERENT ABOUT VERSION 2.1?

Those already familiar with Living Building Challenge 2.0 will notice that this round of modifications made to the Standard are not substantive. For the most part, this update was necessary to reconcile the Institute's name change[8] and to explain the new and updated resources available to all enthusiasts of the Living Building Challenge. (Refer to Additional Resources for Deeper Engagement on page 43 to learn about tools and opportunities.)

Otherwise, some word choices have been reconsidered and replaced to better convey the intent of an Imperative. In addition, excerpts from the Living Building Challenge Dialogue posts have been inserted into various footnotes to offer further insight to the Standard's requirements.

The Institute has developed a new approach for certification: Project teams pursuing 'Living' status may opt to receive a conditional preliminary audit of select Imperatives after construction is complete. The final audit still takes place after twelve consecutive months of operation. Refer to How to get started: register a project on page 43 for details.

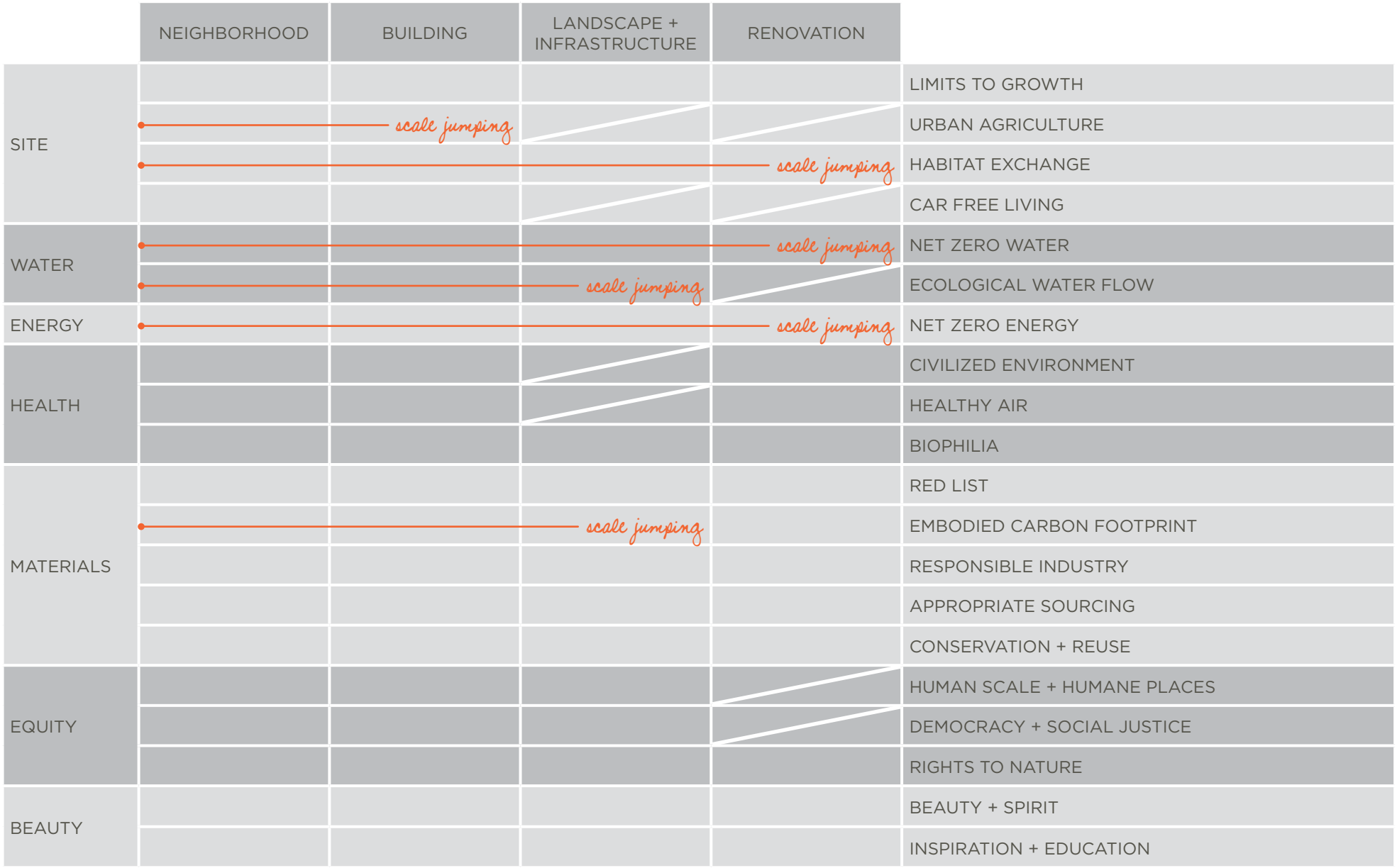
Changes are a reflection of compelling feedback and discussions with Living Building Challenge Community subscribers, project teams pursuing certification and volunteers in the Institute's Ambassador Network. The Standard will continue to adapt and evolve over the ensuing years with the participation of our growing community of practitioners.

8 The official name of the organization was changed to "International Living Future Institute" in May 2011 to reinforce a focus that extends well beyond the built environment.

SUMMARY MATRIX

Imperative is optional for corresponding Typology

scale Solutions beyond project area are permissible



SITE

RESTORING A HEALTHY COEXISTENCE WITH NATURE

	Limits to Growth	Urban Agriculture	Habitat Exchange	Car Free Living
Renovation			scale jumping	
Landscape + Infrastructure				
Building		scale jumping		
Neighborhood				

PETAL INTENT

The intent of the Site Petal is to clearly articulate where it is acceptable for people to build, how to protect and restore a place once it has been developed, and to encourage the creation of communities that are once again based on the pedestrian rather than the automobile. In turn, these communities should be supported by local and regional agriculture, since no truly 'sustainable' community can rely on globally sourced food production.

The continued spread of sprawl development threatens the few wild places that remain. The decentralized nature of our communities impedes our capacity to feed ourselves in a responsible way and also increases transportation impacts and pollution. As flat, prime land for construction diminishes, more and more development tends to occur in sensitive areas that are easily harmed or destroyed. Invasive species threaten ecosystems, which are already weakened by the constant pressure of existing human developments. Automobiles, often used as single occupancy vehicles, have become integral to our communities when we should depend on "people power" – walking and bicycling – as the primary mode of travel, and supplement it with shared transit.

IDEAL CONDITIONS + CURRENT LIMITATIONS

The Living Building Challenge envisions a moratorium on the seemingly never-ending growth outward, and a focus instead on compact, connected communities – inherently conserving the natural resources that support human health and the farmland that feed us. As previously disturbed areas are restored, the trend is reversed and nature's functions are invited back into a healthy interface with the built environment.

Human behavior and attitudes are the most significant barriers to transforming our surroundings. There is a frontier mentality that seems to encourage people to keep pursuing the next open territory and to value the untouched site more than the second-hand site. Humanity is territorial by nature and we tend to view our impacts through a narrow lens. It is not unusual for us to encourage unhealthy solutions, so long as they are "not in my backyard" and allow us the social stature to "keep up with the Joneses". We must erase the taboo associated with certain forms of transit and abandoned industrial and commercial facilities, and we must once again give regard to the many others that cohabit the earth with us.

01

LIMITS TO GROWTH

The project may only be constructed on previously developed[9] sites, greyfields and/or brownfields that are not classified as any of the following:

- sensitive ecological habitats[10] such as:
  - wetlands[11]: maintain at least 15 meters, and up to 70 meters[12] of separation
  - primary dunes[13]: maintain at least 40 meters of separation
  - old-growth forest[14]: maintain at least 60 meters of separation
  - native prairie[15]: maintain at least 30 meters of separation
- prime farmland[16]
- within the 100-year flood plain[17]

The project team must document conditions prior to the start of work.

On-site landscape[18] may only include native and/or naturalized species planted in such a way that emulates density and biodiversity of indigenous ecosystems and supports succession[19].

9 Sites that qualify must have been altered from a greenfield prior to December 31, 2007. There is an exception for a project whose primary purpose is related to the protection or interpretation of the land, as well as for some greenfield sites surrounded by existing development that abuts at least 75% of the project boundary.

There is also a temporary exception that allows a Neighborhood project to be constructed on a greenfield site in least developed, newly industrialized or other countries with a low Human Development Index rating where it can be clearly demonstrated that predominant societal land-use pressures require the allowance of partial development as a condition to preserve the majority of the property as a conservation area. Additional considerations for Imperative 03: Habitat Exchange and Imperative 04: Car Free Living apply. Refer to the Dialogue for more information.

10 Increased setbacks may be appropriate on specific sites. The following are minimum distances to property line boundaries. Refer to the Dialogue for the definition of Sensitive Ecological Habitats and other terms used herein.

11 There is an exception for a project whose primary purpose is related to wetland protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

12 Minimum buffer widths vary, depending on the wetland classification. Refer to the Dialogue for more information.

13 There is an exception for a project whose primary purpose is related to primary dune protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

14 There is an exception for a project whose primary purpose is related to old-growth forest protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

15 There is an exception for a project whose primary purpose is related to native prairie protection or interpretation and demonstrates that the site's ecological systems are not disturbed.

16 There is an exception a project whose primary purpose is related to farming or is a working farm/farmhouse.

17 There is an exception for an operational port, dock and any Landscape or Infrastructure project, as well as a project whose primary purpose is related to farming. There is also an exception for a project that is part of an existing historic community developed prior to 1945, or in a neighborhood that meets the density threshold of Living Transect L5 or L6.

18 In this context, "landscape" is considered to be planted area outside of the square meters of agricultural cover required per Imperative 03: Urban Agriculture, though implemented solutions are not required to be mutually exclusive or physically separated.

19 Refer to the Dialogue to learn more about plant succession.

02

URBAN AGRICULTURE

The project must integrate opportunities for agriculture[20] appropriate to its scale and density using the Floor Area Ratio (FAR) as a basis for calculation.[21]

For a Building or Neighborhood project, this basic chart outlines mandatory agricultural allowances:

Transect	FAR	Percent of Project Area[22]
1	-	does not apply
2	< 0.05[23]	80%
	0.05 ≤ 0.09	50%
3	0.10 ≤ 0.24	35%
	0.25 ≤ 0.49	30%
4	0.5 ≤ 0.74	25%
	0.75 ≤ 0.99	20%
	1.0 ≤ 1.49	15%
5	1.5 ≤ 1.99	10 %
	2.0 ≤ 2.99	5 %
6	> 3.0	no mandatory requirement

20 The Dialogue defines acceptable urban agriculture practices and the formula for determining how many square meters must be given over to agriculture. Specific agricultural strategies (e.g., crops, orchards and/or animal husbandry) should be determined by the project team based on the surrounding location, climate, and culture. This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the individual project scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to page 9.

21 The density of a project is inversely related to the agriculture requirement. Refer to the Dialogue for more detailed information, including a strict interpretation of how to calculate the FAR for the project and for acceptable agricultural uses on the site.

22 Project area is equal to the total site square meters. This figure should be uniformly applied to all Imperatives.

23 A project with this FAR is considered to be farm or ranchland. A project whose primary purpose is related to protection or interpretation of sensitive ecological habitats, as defined in Imperative 01: Limits to Growth, is exempt from Imperative 02: Urban Agriculture to avoid introducing elements that could compromise or threaten the viability of the existing bio-network.

03

HABITAT EXCHANGE

For each hectare of development, an equal amount of land away from the project site must be set aside in perpetuity as part of a habitat exchange[24].

24 0.4 hectare is the minimum offset amount, and the permanent easement or transfer of ownership must be to an official Land Trust organization to ensure proper safeguarding and long-term care. Compliance path and attributes of acceptable habitat exchange programs are provided in the Dialogue.

04

CAR FREE LIVING

The project should contribute towards the creation of walkable, pedestrian-oriented communities.

Evaluate the potential for the project to enhance the ability of a community to support a car free lifestyle[25] based on the density and the ratio of the following occupancy types within a defined catchment area[26] surrounding the project site:

a. Residential
b. Commercial (Business or Mercantile), Assembly, Educational, Institutional
c. Light Industrial (Factory, Storage)

Pedestrian-oriented communities are optimized when all three are represented and not one is demonstrably dominant.

For a Building or Neighborhood project, the proposed development may not lower the density of the existing site or the catchment area of the Transect.

For a Neighborhood project, the proposed development also may not cause the predominant occupancy type within the catchment area to exceed the maximum percentage allotted in the table below:

Transect	L1	L2	L3	L4	L5	L6
Maximum percentage of any single occupancy type[27] within catchment area	-	-	70%	60%	50%	40%

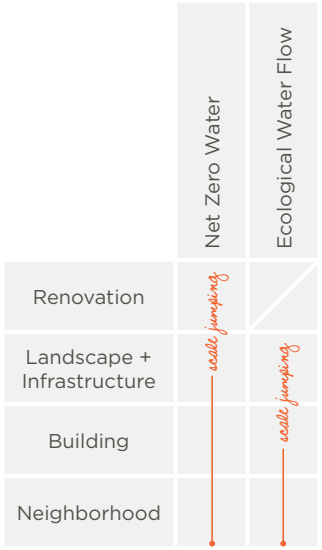
25 This is not the same as mandating the elimination of cars from the development. "Car free" is defined by the potential for a majority of people living in the neighborhood to have a productive and rich lifestyle without need of a car. A Project located in Living Transect L1 or L2 is exempt from Imperative 04: Car Free Living because transformation towards increased density and mixed-use development is not desired in these areas.

26 The catchment area is defined as the surroundings within a one-kilometer radius from the project site, taking into account natural and human-made barriers. Refer to the Dialogue for step-by-step instructions for the calculation.

27 The three distinct occupancy types to consider for this calculation include Residential, Commercial/Assembly/Educational/Institutional, and Light Industrial development. Select only the predominant occupancy within the catchment area and estimate its overall FAR to determine the contributing percentage.

WATER

CREATING WATER INDEPENDENT SITES, BUILDINGS AND COMMUNITIES



PETAL INTENT

The intent of the Water Petal is to realign how people use water and redefine 'waste' in the built environment, so that water is respected as a precious resource. Scarcity of potable water is quickly becoming a serious issue as many countries around the world face severe shortages and compromised water quality. Even regions that have avoided the majority of these problems to date due to a historical presence of abundant fresh water are at risk: the impacts of climate change, highly unsustainable water use patterns, and the continued drawdown of major aquifers portent significant problems ahead.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a future whereby all buildings, infrastructure, and communities are configured based on the carrying capacity of the site: harvesting sufficient water to meet the needs of a given population while respecting the natural hydrology of the land, the water needs of the ecosystem it inhabits, and those of its neighbors. Indeed, water can be used and purified and then used again - and the cycle repeats.

Currently, such practices are often illegal due to health, land use and building code regulations, or by the undemocratic ownership of water rights, which arose precisely because people were not properly safeguarding the quality of their water. Therefore, reaching the ideal for water use means challenging outdated attitudes and technology with decentralized site- or district-level solutions that are appropriately scaled and efficient.

05

NET ZERO WATER[28]

One hundred percent of the project's water needs[29] must be supplied by captured precipitation or other natural closed loop water systems[30] that account for downstream ecosystem impacts, or by re-cycling used project water. Water must be appropriately purified without the use of chemicals.

28 This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the individual project scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to page 9.

29 There is a temporary exception for water that must be from potable sources due to local health regulations, including sinks, faucets and showers but excluding irrigation, toilet flushing, janitorial uses and equipment uses. However, due diligence to comply with this Imperative must be demonstrated by filing an appeal(s) with the appropriate agency (or agencies).

30 There is an allowance for an initial water purchase to get cisterns topped off. A Living Building Challenge project only buys water once.

06

ECOLOGICAL WATER FLOW

One hundred percent of storm water and used, project water discharge must be managed onsite to feed the project's internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, agricultural use or adjacent property needs.[31]

31 Acceptable onsite storm water management practices are discussed in the Dialogue. Municipal storm sewer solutions do not qualify.

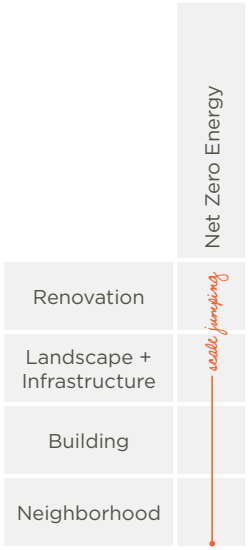
For a Building project that has a FAR equal to or greater than 1.5 in Transects L5 or L6, a conditional exception may apply, which allows some water to leave the site at a reduced rate and depends on site and soil conditions and the surrounding development context. Greater flexibility is given to a project with higher densities. Refer to the Dialogue for more detailed information.

For a Building project in specific identified Bioregions where weather patterns historically demonstrate a much greater than 'normal' proportion of rainfall equivalent duration and/or frequency, there is a Climate Overlay that offers an alternative compliance path to address extreme conditions. Refer to the Dialogue for more detailed information.

This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the individual project scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to page 9.

ENERGY

RELYING ONLY ON CURRENT SOLAR INCOME



PETAL INTENT

The intent of the Energy Petal is to signal a new age of design, wherein the built environment relies solely on renewable forms of energy and operates year round in a pollution-free manner. In addition, it aims to prioritize reductions and optimization before technological solutions are applied to eliminate wasteful spending – of energy, resources, and dollars. The majority of energy generated today is from highly unsustainable sources including coal, gas, oil and nuclear power. Large-scale hydro, while inherently cleaner, results in widespread damage to ecosystems. Burning wood, trash or pellets releases particulates and carbon dioxide (CO_2) into the atmosphere and often strains local supplies of sustainably harvested biomass. The effects of these energy sources on regional and planetary health are becoming increasingly evident through climate change, the most worrisome major global trend attributed to human activity.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a safe, reliable and decentralized power grid, founded on renewable energy that supplies to incredibly efficient buildings and infrastructure without the crutch of combustion.

Although there has been considerable progress made to advance renewable energy technologies, there is still a need for a greater yield from these systems and new ways to store the energy they generate. These, together with the current cost of the systems available, are the major limitations to reaching our goals.

07

NET ZERO ENERGY[32]

One hundred percent of the project's energy needs[33] must be supplied by on-site renewable energy[34] on a net annual basis.

32 This Imperative may be attempted using the Scale Jumping design overlay, which endorses the implementation of solutions beyond the individual project scale that maximize ecological benefit while maintaining self-sufficiency at the city block, neighborhood, or community scale. For more information on Scale Jumping, refer to page 9.

33 This must include all electricity, heating and cooling requirements. Back-up generators are excluded. System may be grid-tied or off the grid.

34 Renewable energy is defined as passive solar, photovoltaics, solar thermal, wind turbines, water-powered microturbines, direct geothermal or fuel cells powered by hydrogen generated from renewably powered electrolysis. Nuclear energy is not an acceptable option. By and large, no combustion is allowed. There is a temporary exception that allows combustion-based solutions for isolated applications, such as for natural gas cooktops in a commercial kitchen or for bunsen burners in a laboratory. Each exception request must be submitted in writing to the Dialogue with explanation. In the limited instances where development is allowed in Living Transects L1 and L2 as defined in Imperative 01: Limits to Growth, it is acceptable to install a single wood stove or fireplace because ecological impacts are minimal, intensely local fuel supply is guaranteed and there is a strong cultural legacy of the 'hearth in the wilderness' that contributes to the feeling of *hygge* in locations where humanity is not otherwise present. (*Hygge* is a Danish term that is difficult to translate but implies a sense of warmth, coziness, well-being and belonging in a certain place.)

HEALTH

MAXIMIZING PHYSICAL AND PSYCHOLOGICAL HEALTH AND WELL BEING

	Civilized Environment	Healthy Air	Biophilia
Renovation			
Landscape + Infrastructure			
Building			
Neighborhood			

PETAL INTENT

The intent of the Health Petal is to focus on the major conditions that must be present to create robust, healthy spaces, rather than to address all of the potential ways that an interior environment could be compromised. Many indoor areas provide substandard conditions for health and productivity. There is a direct correlation between decreased comfort and increased environmental impacts, since solutions in the physical environment to improve wellbeing are often energy-intensive and wasteful..

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a nourishing, highly productive and healthful indoor environment.

However, even best laid plans require acceptance and engagement by the project occupants and project owner. It is difficult to ensure that places will remain vibrant over time, since sensory aspects such as air quality, thermal control, and visual comfort can easily be compromised in numerous ways. It can also be complicated to ensure optimal conditions due to the unpredictable nature of how people operate and maintain their indoor spaces.

08

CIVILIZED ENVIRONMENT

Every occupiable interior space of the project must have operable windows[35] that provide access to fresh air and daylight[36].

35 There is an exception for spaces where the absence of daylight is critical to the performance of the space (such as a theatre) or where operable windows could pose a health risk (such as laboratory spaces with fume hoods where air flow could be compromised). A list of exempt spaces is in the Dialogue.

36 Minimum requirements for window sizes and placement relative to interior spaces and program are defined in the Dialogue. Maximum distances between an operable window and occupant are also described.

09

HEALTHY AIR

To promote good indoor air quality, a Renovation, Building, and building(s) completed as part of a Neighborhood project must meet the following criteria:

- Entryways must have an external dirt track-in system and an internal dirt track-in system contained within a separate entry space.[37]
- All kitchens, bathrooms, copy rooms, janitorial closets and chemical storage spaces must be separately ventilated and exhaust directly to outside air.
- Ventilation rates must be designed to comply with ASHRAE 62 and equipment must be installed to monitor levels of carbon dioxide (CO_2), temperature and humidity.
- Smoking must be prohibited within the project boundary.

Conduct air quality testing[38] at pre-occupancy and after nine months of occupancy to measure levels of Respirable Suspended Particulates (RSP) and Total Volatile Organic Compounds (TVOC).

37 Acceptable Dirt track-in systems are defined in the Dialogue.

38 Monitoring is required to provide occupants opportunities for improving indoor air quality over time. Maximum thresholds will not be used to test compliance with the Living Building Challenge, but are listed in the Dialogue for reference. A minimum of one test is required for each separate HVAC system installed. If the project includes any form of combustion (as granted through a temporary exception), levels of carbon monoxide must also be measured as part of air quality testing. See Footnote 34 for more information about combustion.

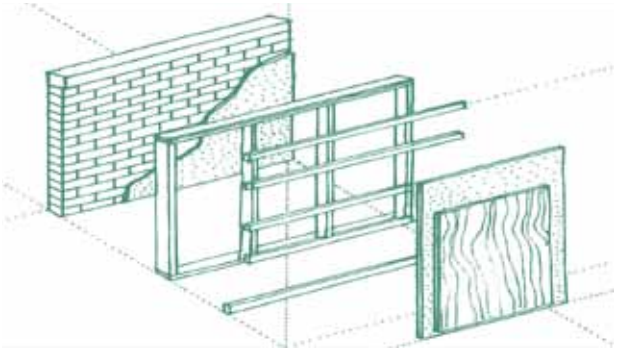
10

BIOPHILIA

The project must be designed to include elements that nurture the innate human attraction to natural systems and processes. Each of the six established Biophilic Design Elements[39] must be represented for every 2,000 m^2 of the project:

- Environmental features
- Natural shapes and forms
- Natural patterns and processes
- Light and space
- Place-based relationships
- Evolved human-nature relationships

39 These attributes of Biophilic design are defined and described in Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life by Stephen R. Kellert, Judith Heerwagen, and Martin Mador. Other than for Imperative 19: Beauty + Spirit, design attributes that are expressly required elsewhere in the Living Building Challenge may not be used to satisfy this Imperative.



MATERIALS

ENDORSING PRODUCTS AND PROCESSES THAT ARE SAFE FOR ALL SPECIES THROUGH TIME

	Red List	Embodied Carbon Footprint	Responsible Industry	Appropriate Sourcing	Conservation + Reuse
Renovation					
Landscape + Infrastructure		scale jumping			
Building					
Neighborhood					

PETAL INTENT

The intent of the Materials Petal is to induce a successful materials economy that is non-toxic, transparent and socially equitable. Throughout their lifecycle, materials are responsible for many adverse environmental issues including illness, squandered embodied energy, pollution, and resource depletion. The Imperatives in this section aim to remove the worst known offending materials and practices. When impacts can be reduced but not eliminated, there is an obligation not only to offset the damaging consequences associated with the construction process, but also to strive for corrections in the industry. At the present time it is impossible to gauge the true environmental impact and toxicity of the built environment due to a lack of product-level information.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions a future where all materials in the built environment are replenishable and have no negative impact on human and ecosystem health. The precautionary principle guides all materials decisions.

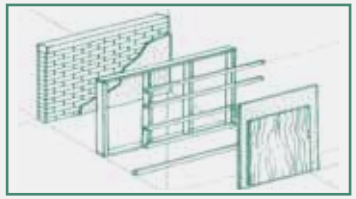
There are significant limitations to achieving the ideal for the materials realm. Product specification and purchase has far-reaching impacts, and although consumers are starting to weigh these in parallel with other more conventional attributes, such as aesthetics, function and cost the biggest shortcoming is due to the market itself. While there is a huge number of “green” products for sale, there is also a shortage of good, publicly available data that backs up manufacturer claims and provides consumers with the ability to make conscious, informed choices. Transparency is vital; as a global community the only way we can transform into a truly sustainable society is through open communication and honest information sharing, yet many manufacturers are wary of sharing trade secrets that afford them a competitive advantage, and make proprietary claims about specific product contents.

Declare, the Institute’s ‘ingredients label for building products’, is a publicly accessible label and online database with an official connection to the Materials Petal. Not only does Declare contribute to the overt methodology for removing a temporary exception, it also provides a forum for sharing the information compiled by a project team as part of their documentation requirements for certification. In addition, the Institute recognizes the Pharos Project developed by the Healthy Building Network as the best product comparison framework for evaluating materials and currently the most progressive tool for consumer benefit.[40]

40 www.declare.com and www.PharosProject.net

11

RED LIST[41]



The project cannot contain any of the following Red List materials or chemicals[42].

- Asbestos
- Cadmium
- Chlorinated Polyethylene and Chlorosulfonated Polyethlene[43]
- Chlorofluorocarbons (CFCs)
- Chloroprene (Neoprene)
- Formaldehyde (added)
- Halogenated Flame Retardants[44]
- Hydrochlorofluorocarbons (HCFCs)
- Lead (added)
- Mercury
- Petrochemical Fertilizers and Pesticides[45]
- Phthalates
- Polyvinyl Chloride (PVC)
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol

There are temporary exceptions for numerous Red List items due to current limitations in the materials economy. Refer to the Living Building Challenge Community Dialogue for complete and up-to-date listings.

41 This list is composed of items that have been identified to be phased out of production due to health/toxicity concerns and will be updated as new science emerges. A key intention for this Imperative transcends targeting specific ingredients, and aims to broadly influence the industry's procurement process through proactive and constructive communication between manufacturers and consumers. Ultimately, the shifted mindset that results from an increased awareness can affect all product decisions.

A list of CAS Registry Numbers that correspond with each Red List item is available in the Dialogue; CAS is a division of the American Chemical Society: www.cas.org.

42 Because of manifold manufacturing processes, there is a Small Component exception for complex products made from more than ten ingredients. A 'small component' is discrete and contained in its form as introduced into the product's assembly, and must also be less than ten percent of a product by both weight and volume. (e.g., Despite the quantity, a drop of food coloring added to a bucket of water impacts all of the liquid in such a way that would be difficult, if not impossible, to separate later. It is therefore not considered to be a 'small component'.)

It is acceptable to jump one Zone, as defined in Imperative 14: Appropriate Sourcing, if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed.

Each exception request must be submitted in writing to the Dialogue with explanation. Final documentation for granted exceptions must be accompanied by a copy of a letter sent to the manufacturer stipulating that the product purchase does not constitute an endorsement, together with a statement that requests that the company stops using the Red List material/chemical. Letters to the manufacturer are required for all exceptions, including those already acknowledged in the Standard and Dialogue. Sample letter templates are posted online in the Living Building Challenge Community.

43 HDPE and LDPE are excluded.

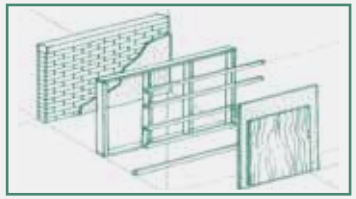
44 Halogenated flame retardants include PBDE, TBBPA, HBCD, Deca-BDE, TCPP, TCEP, Dechlorane Plus and other retardants with bromine or chlorine.

45 To attain "Living" status, petrochemical fertilizers and pesticides may not be used for the duration of the certification period or be needed for subsequent operations and maintenance.

12

EMBODIED CARBON FOOTPRINT

The project must account for the total footprint of embodied carbon (tCO_2e) from its construction through a one-time carbon offset tied to the project boundary.[46]

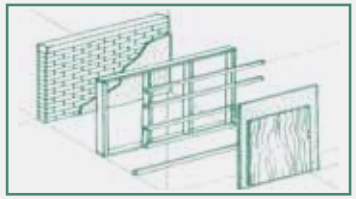


46 For documentation purposes, a simplified carbon calculator is located in the Project Portal. Certified Emission Reduction (CER) and Verified Emission Reduction (VER) carbon credits are suitable for purchase; Renewable Energy Certificates (REC) are not acceptable. The purchase of carbon offsets must directly support a new Renewable Energy project, and the selling agency must be able to demonstrate that it conforms to the minimum performance criteria listed in the Dialogue.

The amount of carbon offsets required may be reduced by fifty percent for renovations of existing buildings.

13

RESPONSIBLE INDUSTRY



The project must advocate for the creation and adoption of third-party certified standards for sustainable resource extraction and fair labor practices. Applicable raw materials include stone and rock, metal, minerals, and timber.[47]

For timber, all wood must be certified to Forest Stewardship Council (FSC)[48] 100% labeling standards, from salvaged sources, or from the intentional harvest of timber onsite for the purpose of clearing the area for construction or restoring/maintaining the continued ecological function of the onsite bionetwork[49].

47 Subsequent iterations of this standard will include listed regulations for other industries as they become available. All regulations referenced must be from independent third party organizations and not funded by the industries themselves. For industries that do not yet have standards in place, documentation must be accompanied by a copy of a letter sent from a project team representative to the corresponding national trade association and ASTM International encouraging the development and enforcement of such criteria. Only one letter per industry sector is required. Sample letter templates are posted online in the Living Building Challenge Community.

It is acceptable to jump one Zone, as defined in Imperative 14: Appropriate Sourcing, if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed. Refer to the Dialogue for more information.

48 There is an exception for wood in situ in existing buildings undergoing renovation.

49 For timber harvested onsite, final documentation must include an explanation about why tree removal was required for construction or necessitated as part of a reforestation/restoration program, as well as details of the harvest and milling process to create the finished goods.

14

APPROPRIATE SOURCING

The project must incorporate place-based solutions and contribute to the expansion of a regional economy rooted in sustainable practices, products and services.[50]

Source locations for materials and services must adhere to the following restrictions[51]:

Zone	Max. Distance	Materials or Services	MasterFormat 2012 Classification[52]
7	20,004 km	Ideas	-
6	15,000 km	Renewable Technologies[53]	Divisions: 42[54], 48
5	5,000 km	Assemblies that actively contribute to project performance[55] and adaptable reuse once installed	Divisions: 08 (all exterior products), 14*, 22[56], 23*, 26*, 33*, 44*, 46* Sections: 07 33 00[57], 07 50 00*, 10 22 00*, 10 70 00*, 44 40 00*
4	2,500 km	Consultant Travel[58]	-
3[59]	2,000 km	Light or low-density materials	Sections: 07 31 00, 07 40 00, 09 50 00, 09 60 00
2	1,000 km	Medium weight and density materials	Divisions: 06[60], 08 (all interior products) Sections: 07 32 00, 09 20 00, 09 30 00, 12 30 00
1	500 km	Heavy or high-density materials	Divisions: 03, 04, 05*[61], 31[62], 32[63]

* Zone designation refers to the location of the manufacturing facility only; raw material sourcing is not tracked.

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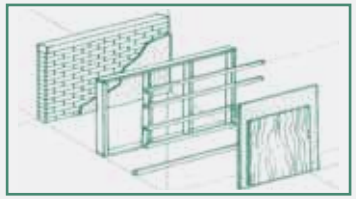

50 Responsible materials specification and project team member selection also further reduces the impacts associated with Imperative 12: Embodied Carbon Footprint, building resilience toward a viable economy in a post-peak oil age.

51 There is a variance for remote locations, such as Alaska, Hawaii and Yukon that expands the Zone radius as follows: Zone 1 = 2,000 km; Zones 2 and 4 = 5,000 km; Zones 3 and 5 = 8,000 km. There is a temporary exception for specialty consultants, who may travel up to 8,000 km.

For all other project locations, it is also acceptable to jump one Zone to comply with either Imperative 11 or 13 if compliant materials or products are not procurable within apportioned Zones. Once a compliant product is available within the Zone as originally designated in this standard, the exception will be removed. Refer to the Dialogue for more information.

The use of salvaged materials is encouraged to acknowledge the considerable value of a material's embodied energy. When procuring salvaged materials, the team is allowed to expand the Zone radius as follows: Zone 1 = 1,500 km; Zone 2 = 2,000 km; Zone 3 = 2,500 km.

52 The list of MasterFormat Divisions/Sections is provided to clarify the types of materials that are associated with each Zone designation. Because the hierarchy of MasterFormat classification prioritizes product function over product contents, there will be instances when a product that is specified in a Division/Section that is not explicitly listed should be tracked. For example, a precast concrete utility vault would be associated with Zone 1 (Division 03) instead of 'not tracked' (Division 33) - even if it is formally specified in the latter - because the product's material is concrete and its application is "Utilities". Otherwise, MasterFormat Divisions that are not listed do not need to be tracked, and if only select sections are listed then only these aspects of the Division need to be tracked. Assemblies classified under Division 13 are not tracked directly – products used as a result of specification in this Division that correlate primarily with other MasterFormat Divisions should be sourced accordingly.

The source location of small component(s) of a complex product does not need to be tracked. See Footnote 42 for more information.

53 Renewable energy technologies are defined in Footnote 34.

54 Appropriate sourcing only applies to solar equipment specified under Division 42. Other products that are classified in this Division do not need to be tracked.

55 Assemblies include products that contribute to the successful attainment of the Energy and Water Petals over time, such as high performance windows, mechanical equipment and decentralized water systems. Refer to the Dialogue for a complete listing and rationale of this Zone distinction.

56 For plumbing equipment specified in Division 22, Zone designation refers to the location of the manufacturing location only; raw material sourcing is not tracked.

57 The plant component of Natural Roof Covering specified in Section 07 33 00 must be sourced within the Zone 1 distance.

58 This Zone designation applies only to major project team members including the general contractor, architect of record, mechanical, electrical, plumbing and structural engineers of record. There is a temporary exception for specialty consultants and subcontractors, who may travel up to 5,000 km.

59 The radius distinction for Zones 2 and 3 are two-fold: first, the manufacturer must be within the set Zone from the site; and second, the raw materials must be sourced from within the same set Zone from the manufacturer location.

60 For plastic products specified in Division 06, Zone designation refers to the location of the manufacturing location only; raw material sourcing is not tracked.

61 Products that are classified under the following sections of Division 05 may be sourced within the Zone 2 distance: Metal Fabrications (05 50 00) and Decorative Metals (05 70 00).

62 Products that are classified under the following sections of Division 31 may be sourced within the Zone 5 distance: Erosion and Sedimentation Controls (31 25 00) and Slope Protection (31 35 00).

63 Products that are classified under the following sections of Division 32 may be sourced within the Zone 5 distance: Irrigation (32 80 00)

15

CONSERVATION + REUSE

The project team must strive to reduce or eliminate the production of waste during design, construction, operation, and end of life in order to conserve natural resources.

The project team must create a Material Conservation Management Plan[64] that explains how the project optimizes materials in each of the following phases:

- Design Phase[65], including the consideration of appropriate durability in product specification
- Construction Phase, including product optimization and collection of wasted materials
- Operation Phase, including a collection plan for consumables and durables
- End of Life Phase, including a plan for adaptable reuse and deconstruction.

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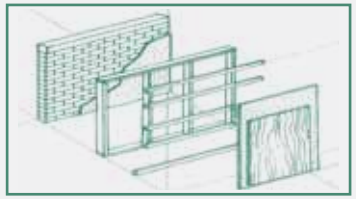


64 It is expected that the project team will evaluate the potential for each of the four stages in a substantive way and decide as professionals how far to probe. The amount of information to provide will likely vary by project and Typology. The degree of success in implementing the Plan will be assessed by the Auditor during the document review and site visit portions of the certification process.

65 A project that is located on a site with existing infrastructure must complete a "pre-building audit" that inventories available materials and assemblies for reuse or donation.

During construction, the project team must divert wasted material from[66] to the following levels:

Material	Minimum Diverted/Weight[67]
Metals	95%
Paper and Cardboard	95%
Soil, and biomass	100%
Rigid Foam, carpet & insulation	90%
All others - combined weighted average[68]	80%

Hazardous materials in demolition waste, such as lead-based paint, asbestos, and polychlorinated biphenyls (PCBs), are exempt from percentage calculations.

For all Typologies, there must be dedicated infrastructure for the collection of recyclables[69] and compostable food scraps. For a Neighborhood project, there must be onsite compost facilities to accommodate all food scraps.

66 Diverted waste includes those that are recycled, reused, salvaged or composted. Incineration or allocation as "alternative daily cover" is not permitted.

67 Although the project team is expected to make every effort to avoid landfill deposits, there is a temporary exception for meeting this level of diversion in jurisdictions where municipalities do not have systems in place to collect all listed construction materials. Final documentation must be accompanied by a copy of a letter from a project team representative sent to the Authority Having Jurisdiction stipulating that these basic public systems should be created. Sample letter templates are posted in the Living Building Challenge Community.

68 The allowed combined weighted average for the following list of materials accounts for the lack of diversion markets in certain jurisdictions: asphalt; concrete and concrete masonry units (CMUs); brick, tile and masonry materials; untreated lumber; plywood, oriented strand board (OSB) and particle board; gypsum wallboard scrap; glass; plumbing fixtures; windows; doors; cabinets; architectural fixtures; millwork, paneling and similar; electric fixtures, motors, switch gear and similar HVAC equipment; duct work; control systems; and switches.

69 There is a temporary exception in jurisdictions where municipalities do not have systems in place to collect all listed recyclables. Final documentation must be accompanied by a copy of a letter from a project team representative sent to the Authority Having Jurisdiction stipulating that these basic public systems should be created. Sample letter templates are posted in the Living Building Challenge Community.

EQUITY

SUPPORTING A JUST, EQUITABLE WORLD

	Human Scale + Humane Places	Embodied Carbon Footprint	Rights to Nature
Renovation			
Landscape + Infrastructure			
Building			
Neighborhood			

PETAL INTENT

The intent of the Equity Petal is to correlate the impacts of design and development to its ability to foster a true sense of community. A society that embraces all sectors of humanity and allows the dignity of equal access is a civilization in the best position to make decisions that protect and restore the natural environment.

There is a disturbing trend towards privatizing infrastructure and creating polarized attitudes of 'us' vs. 'them' – allowing only those of a certain economic or cultural background to participate fully in community life. Although opposite on the spectrum, enclaves for the wealthy are only one step removed from the racial and ethnic ghettos that continue to plague our neighborhoods. A subset of this trend is the notion that individuals can own access to nature itself, by privatizing admittance to waterways, beaches and other wilderness areas, cutting off most people from the few pristine environmental places that remain. Only by realizing that we are indeed 'all in this together' can the greatest environmental and social problems be addressed.

We need to aggressively challenge the notion that property ownership somehow implies that we can do whatever we like, even externalize the negative environmental impacts of our actions onto others. For example, consider these situations: when a polluting factory is placed next to a residential community, the environmental burdens of its operation are placed on the individuals who live in those houses. The factory is diminishing its neighbors' rights to clean air, water and soil. When a building towers over another structure, its shadow diminishes that structure's ability to generate clean and renewable energy, thereby impeding the rights to energy independence. We all deserve access to sunlight and clean air, water and soil.

We need to prioritize the concept of 'citizen' above that of 'consumer'. Equity implies the creation of communities that provide universal access to people with disabilities, and allow people who can't afford expensive forms of transportation to fully participate in the major elements of society. Indeed, most projects in the built environment greatly outlive the original owner or developer – society inherits the legacies of bad decisions and good decisions alike. Since the act of building is a considerable environmental impact shared by all, there is an inherent responsibility to ensure that any project provides some public good and does not degrade quality of life.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

The Living Building Challenge envisions communities that allow equitable access to all people regardless of physical abilities, age, or socioeconomic status.

Current limitations of reaching this ideal stem primarily from ingrained cultural attitudes about the rights associated with private ownership. It is necessary to change zoning standards in order to protect the rights of individuals who are 'downstream' of water, air and noise pollution, and are adversely impacted due to lack of sunlight or exposure to toxins. Past attempts by zoning standards to protect people from particularly egregious pollutants resulted in sterile single-use areas. A healthy, diverse community is one that encourages multiple functions, and is organized in a way that protects the health of people and the environment.

16

HUMAN SCALE + HUMANE PLACES

The project must be designed to create human-scaled rather than automobile-scaled places, so that the experience brings out the best in humanity and promotes culture and interaction. In context of the character of each Transect, there are specific maximum (and sometimes minimum) requirements[70] for paved areas, street and block design, building scale and signage that contribute to livable places.

(continued)

70 The Renovation and Building Typology includes a maximum single-family residence size of 425 square meters (4,575 square feet).

The project must implement the following design guidelines:

Transect		L1	L2	L3	L4	L5	L6
Surface Cover	Maximum dimension of surface parking lot before a separation is required on all four sides (e.g., building, wall, or 3 m wide minimum planted median or bioswale)	7 m x 10 m					
	Total area of surface parking lot allowed. All other parking requirements must be handled in structured or underground parking.	65 m^2	270 m^2	195 m^2	130 m^2	65 m^2	0 m^2
Streets + Intersections	Maximum street width, measured either shoulder-to-shoulder or curb-to-curb	5 m		7.5 m	10 m	15 m	22.5 m
	Maximum street width before driving lanes must be separated by a pedestrian strip and planting median (Additional lanes may be included on the other side of median to a maximum of 22.5 m total width of driving area)	Not applicable Development of this kind is not permitted in a Natural Habitat Preserve or Rural Agricultural Zone		15 m			
	Maximum street width before tree plantings and sidewalks are required on both sides			7.5 m			
	Minimum overall width of sidewalks and planted median			1/3 street width			
	Maximum distance between trees in furnishing zone and planted median			9 m			
	Maximum distance between circulation routes (Access way must be 3 m wide minimum to qualify)			45 m		60 m	
	Maximum street block size (Note: Providing multiple pedestrian/bicycle circulation routes within a block increases the approachability of urban areas.)			60 m x 120 m		120 m x 120 m	
Signage	Number of free-standing signs per development	1					
	Maximum dimensions of free-standing sign(s)	2 m x 2.5 m		2 m x 3 m		3.5 m x 6 m	
	Maximum elevation of sign's bottom edge above ground	2 m	3 m	6 m	9 m	12 m	12 m or roof-mounted
Proportion	Maximum distance between façade openings (e.g., doors and windows)	N/A	30 m				
	Maximum footprint for any building with a single use, single owner or single tenant (Acceptable to provide additional floor area for tenant on upper/lower floor(s))	3750 m^2 excludes floor area of atriums, courtyards and daylight shafts					

17

DEMOCRACY + SOCIAL JUSTICE

All primary transportation, roads and non-building infrastructure[71] that are considered externally focused[72] must be equally accessible[73] to all members of the public regardless of background, age and socioeconomic class - including the homeless - with reasonable steps taken to ensure that all people can benefit from the project's creation.

For any project located in Transect L3-L6, street furniture (such as benches) must be provided for and accessible to all members of society. For the Neighborhood Typology, a minimum of fifteen percent of housing units must meet an affordable housing standard. Provisions must be in place for these units to remain affordable through time.[74]

Access for those with physical disabilities must be safeguarded through designs meeting the Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines.[75]

71 A complete list of applicable infrastructure is in the Dialogue. Outdoor play areas on school grounds, and internal infrastructure, such as courtyards, are excluded.

72 Roads, street, alleys and major pathways between buildings must be accessible to the public. No gated communities or restricted-access campuses are permitted.

73 There is an exception for instances wherein such access would seriously threaten the safety of the public directly or indirectly.

74 Refer to the Dialogue for more detailed information about Transect requirements.

75 The ADA and ABA Guidelines shall be considered the minimum design compliance path for infrastructure and public buildings both in the United States and in other countries. The Renovation Typology does not have to meet this requirement if the project is private in nature or if it can be shown that compliance would damage the historical character of the building. Complete ADA and ABA Accessibility Guidelines are available online: www.access-board.gov/adaag/about

18

RIGHTS TO NATURE

The project may not block access to, nor diminish the quality of, fresh air[76], sunlight and natural waterways for any member of society or adjacent[77] developments.

Fresh Air: The project must protect adjacent properties from any noxious emissions that would compromise its ability to use natural ventilation. All operational emissions must be free of Red List items[79], persistent bioaccumulative toxicants, and known or suspect carcinogenic, mutagenic and reprotoxic chemicals[80].

Sunlight: The project may not block sunlight to adjacent building façades[81] and rooftops such that they are shaded above the maximum height allotted in the table below:

Transect	L1	L2-L3	L4	L5	L6
Maximum shade height on adjacent façade, measured on Winter Solstice between 10 am - 2 pm (meters)	-	6 m	10 m	15 m	20 m

The project may not shade the roof of a development with which it shares a party wall, unless the adjoining development was built to a lesser density than acceptable for the Transect. This corresponds to a neighboring building that is at least two stories in L2-L3; four stories in L4; eight stories in L5; and sixteen stories in L6.

Natural Waterways (such as ocean shoreline, rivers, lakes, wetlands, ponds, and creeks): The project may not restrict access[82] to the edge of any natural waterway, except where such access can be proven to be a hazard to public safety or would severely compromise the function of the development.[83] No project may assume ownership of water contained in these bodies or compromise the quality or quantity that flows downstream.

If the project's boundary is more than sixty meters long parallel to the edge of the waterway, it must incorporate and maintain an access path to the waterway from the most convenient public right-of-way. The pathway must be at least three meters wide and allow entry to both pedestrians and bicyclists.

76 External acoustics or sources of noise are considered to be part of this requirement.

77 'Adjacent' properties or developments are defined as any and all sites that share a property line with the project.

78 [not used]

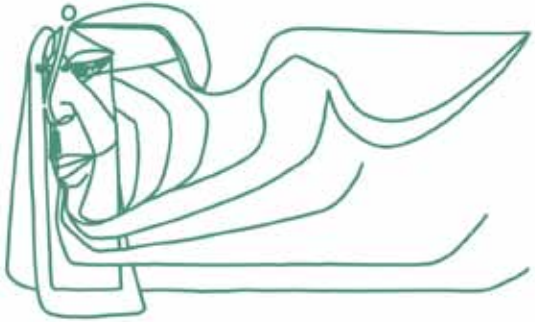
79 Refer to Imperative 11: Red List in the Materials Petal for a list of applicable materials and chemicals.

80 Refer to the Pharos Project Chemical And Material Library for more information about these hazardous chemicals.

81 For a project located in Transects L5 or L6, there is no set maximum shade height on building(s) located opposite from the project in an alleyway. (An alley is defined to be less than or equal to 4 meters wide.)
For a project located in Transects L4-L6, refer to the Dialogue for instruction when there is no other building immediately adjacent to the proposed development.
For Renovation and Building projects in specific identified Bioregions where latitude, existing adjacent natural landforms and/or weather patterns significantly limit insolation and daylighting potential for neighboring properties, there is a Climate Overlay that offers an alternative compliance path to address extreme conditions. Refer to the Dialogue for more detailed information.

82 Public access throughway must allow approach to waterway from land for pedestrians and bicyclists, and from the water via boat. No infrastructure to support any water-based transport is required.

83 For example, a working dock or marina might need to restrict shoreline access for safety reasons. A private residence may not.



BEAUTY

CELEBRATING DESIGN THAT CREATES TRANSFORMATIVE CHANGE

	Beauty + Spirit	Inspiration + Education
Renovation		
Landscape + Infrastructure		
Building		
Neighborhood		

PETAL INTENT

The intent of the Beauty Petal is to recognize the need for beauty as a precursor to caring enough to preserve, conserve and serve the greater good. As a society we are often surrounded by ugly and inhumane physical environments. If we do not care for our homes, streets, offices and neighborhoods then why should we extend care outward to our farms, forests and fields? When we accept billboards, parking lots, freeways and strip malls as being aesthetically acceptable, in the same breath we accept clear-cuts, factory farms and strip mines.

IDEAL CONDITIONS AND CURRENT LIMITATIONS

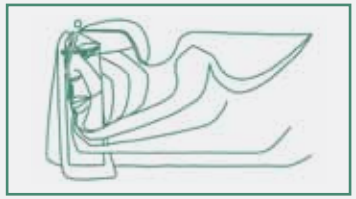
The Living Building Challenge envisions designs that elevate our spirits. Mandating beauty is, by definition, an impossible task. And yet, the level of discussion and, ultimately, the results are elevated through attempting difficult but critical tasks. In this Petal, the Imperatives are based merely on genuine efforts. We do not begin to assume we can judge beauty and project our own aesthetic values on others. But we do want to understand people's objectives and know that an effort was made to enrich people's lives with each square meter of construction on each project. This intentionality must carry forth into a program for educating the public about the environmental qualities of their Living Building Challenge project.

There are no current limitations to this petal other than our imaginations and what we as a society choose to value.

19

BEAUTY + SPIRIT

The project must contain design features intended solely for human delight and the celebration of culture, spirit and place appropriate to its function.



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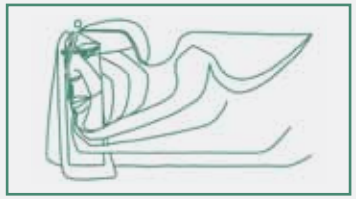
INSPIRATION + EDUCATION

Educational materials about the operation and performance of the project must be provided to the public[84] to share successful solutions and to motivate others to make change. Non-sensitive areas of the project must be open to the public at least one day per year to facilitate direct contact with the Living Building Challenge.



84 A list of required educational materials, tailored to project occupancy and type, is provided in the Dialogue.

ADDITIONAL RESOURCES FOR DEEPER ENGAGEMENT

The Institute continually works to create resources that advance the understanding and implementation of the principles of the Living Building Challenge, and we want to ensure that all enthusiasts are aware of the various ways to learn more about and to participate in the evolution of the program. This section lists several auxiliary offerings created by the Institute that expand the role of the Living Building Challenge beyond a framework for development, to an overlay for education, outreach and advocacy, and an informal influence through continued conversations and networking.

THE LIVING BUILDING CHALLENGE COMMUNITY www.livingbuildingchallenge.org/community

The online resource for project teams and others who wish to find detailed technical information, the Community is the 'go-to' area of the Institute's website for all key tools that support the certification process – from the initial concept stages to the award ceremony. Access to the Living Building Challenge Community is available to individuals and organizations for a prepaid annual subscription. A current fee schedule is published on the Institute's website. Once logged-in, subscribers are directed to a unique homepage with links to update account details and access all aspects of the Community. There are four key features: project registration, Dialogue, 'Brain Trust' and Project Portal.

How to get started: register a project

Registration is the first step toward Living Building Challenge certification and is accessible to Community subscribers. Registration fees are linked to the project's Typology, and can be found on the Institute's website. The registration form contains prompts for basic information about the project, primary contact, owner and team. Most of the information provided at the time of registration can be updated, if necessary, in the Project Portal by the team's project administrator. Once registration is complete, project teams are eligible for direct feedback from the Institute, such as program clarifications and technical assistance. In addition, the Institute may contact project teams to showcase their work-in-progress through media outlets or in-house publications.

Project teams may pursue Petal Recognition by satisfying the requirements of three or more Petals (at least one of the following must be included: Water, Energy or Materials), or for 'Living' status by attaining all requirements assigned to a Typology. A third option, Net Zero Energy Building Certification, is appropriate when project teams prioritize a subset of solutions that account for related design and performance criteria[85].

The certification process includes a review of written elements and a site visit by an independent auditor. Because the Living Building Challenge is performance-based, the implementation of some of the Imperatives' requirements can be evaluated only after a project is fully completed and operational for at least twelve consecutive months. However, project teams pursuing 'Living' status may opt to undergo a separate preliminary audit to receive a conditional assessment of Imperatives whose requirements are less likely to be impacted by the operational phase. The preliminary audit may take place any time after construction is complete, and also relies on the review of written elements and a site visit by an independent auditor. The following Imperatives are included in the preliminary audit:

85 www.living-future.org/netzero

01: Limits to Growth
03: Habitat Exchange
04: Car-Free Living
08: Civilized Environment
10: Biophilia
11: Red List
12: Embodied Carbon Footprint
13: Responsible Industry
14: Appropriate Sourcing
16: Human Scale + Humane Places
17: Democracy + Social Justice
20: Inspiration + Education

Any modifications made during the project's operational phase should be tracked for all Imperatives, and the new information will be reviewed for compliance in conjunction with the final audit. Certification fees and additional administrative details can be found on the Institute's website.

How to seek clarifications: the Dialogue

Throughout this Standard, there are references to the Dialogue as the source for additional information. Fundamentally, the Dialogue is an online host for the transparent exchange of ideas between project teams and the Institute – it is the official venue to request feedback on proposed strategies for meeting the requirements of the Living Building Challenge. The Dialogue allows for current unknowns to be discovered and shared in real time as teams proceed with their projects and research. It provides teams with the flexibility to get information most relevant to their work, such as in-depth commentaries, compliance paths, clarifications and temporary exceptions.

Organized by the twenty Imperatives and filterable based on specific content, the activity in Dialogue not only serves as a platform for distributing strategies for success, it also yields modifications to future releases of the Standard itself. In this way, the Dialogue captures the ongoing evolution of the Living Building Challenge and gives credit to the hundreds, if not thousands, of individuals who contribute to the process. All content within the Dialogue is visible to all Community subscribers, regardless of whether they are associated with an active registered project.

How to document written requirements: the Project Portal

The Project Portal exists to coordinate the iterative activities from the early stages of design and construction into operation. It also allows for project teams to document compliance with Imperatives throughout the process. All related communication between a project team, Institute staff and Auditor occurs within this online platform. A project team member does not have to be a Community subscriber to be assigned tasks and upload documents, but a subscription is recommended in order to receive communication from the Institute about program news and updates and access other parts of the Community.

How to share information: the 'Brain Trust'

The Brain Trust is intended to be a key starting point for increased cooperation and communication across disciplines to generate Inter-organizational Collaboration. For the principles of the Living Building Challenge to take root, the building industry and all its sectors must transcend beyond the typical constraints imposed by traditional competition and 'trade secrets', and find ways to educate each other, train each other and push each other. Indeed, more important than any single project is the spirit of helping a network of projects achieve the high threshold for performance set by the Living Building Challenge.

How to gain a deeper understanding of the Living Building Challenge: the Petal Series

A printed companion guide to complement the standard and online Dialogue, the Petal Series will provide necessary generalized support information as well as strategies, rationale, case studies and context for every Imperative in the Living Building Challenge. All Dialogue posts will be woven into the Petal Series in some way, with deeper explanations and examples included. There will be a dedicated volume for each Petal: Site, Water, Energy, Health, Materials, Equity, Beauty, and Process. The collection will be published by Ecotone Publishing (www.ecotonedesign.com) and will also be available as an e-book to Community subscribers.

TECHNICAL ASSISTANCE

Because the Living Building Challenge defines priorities on both a technical level and as a set of core values, it requires an approach to design, construction and operation that is fundamentally different than the current conventional structure. The Institute wants every undertaking to be successful on multiple levels. It supports a project team's transformative process of adopting the principles of the Challenge by offering optional services that shift the mindset and provide practical knowledge.

In addition to the specific services noted below, the Institute can also fashion customized options to match a project's needs during the design phases. The project team administrator may inquire about or schedule technical assistance via the Project Portal or by emailing certification@livingbuildingchallenge.org.

In-house Workshops

The Institute offers optional, customized training as a service for organizations and project teams to ensure that everyone has a shared fundamental understanding of the Living Building Challenge or particular Petal area. Whether there is a specific area of interest or a desire for a private presentation of an established curriculum, the Institute can deliver customized educational sessions. The most common workshop requested is a full-day introduction to Living Building Challenge that also includes discussion of contextual information such as development patterns and density, and regulatory, financial, behavioral and technological barriers and incentives.

Charrette Facilitation

To steer teams toward innovative yet feasible solutions for their Living Building Challenge projects, the Institute offers an optional service to lead the kick-off meeting or "charrette" and help define fundamental, strategic goals. A charrette should take place at the beginning of a project when the potential to explore is at its fullest. The one-day meeting format focuses on fostering an interactive dialogue that allows participants to consider each area of impact. The two- or three-day format allows time for a deeper examination of promising ideas. The Institute designs the agenda, facilitates the session and provides a follow-up summary document.

Design Guidance

This optional service is intended to improve a project's potential to comply with the Living Building Challenge requirements at multiple points in the design process where adjustments are still possible. The Institute spends a day with the team to learn how the project accounts for each Imperative of the Living Building Challenge (an option for an online meeting is also available). Following a review of the project documents, the Institute will issue a report outlining our guidance for the team to improve their ability to succeed. It is possible to receive feedback on the Imperatives within a single Petal, select Petals, or all seven Petals of the Living Building Challenge.

EDUCATION

The Institute is dedicated to transforming theory and practice in all sectors of the building industry, and offers several ways to broaden one's knowledge of deep-green building principles and practices, including the following:

Public Workshops + Seminars

The Institute offers in-person and online workshops taught by expert faculty about the Living Building Challenge and related topics. Workshops are continually developed throughout the year and are announced online and in the Living Building Challenge Community Bulletin that is emailed to Community subscribers. The Institute welcomes suggestions for future workshop content. Contact Institute staff to discuss options for hosting a workshop locally by emailing education@livingbuildingchallenge.org.

Living Future unConference

The Institute's three-day unConference is a major annual event for leading minds in the green building movement seeking solutions to the most daunting global issues of our time. Out-of-the-ordinary learning and networking formats deliver innovative design strategies, cutting-edge technical information, and much-needed inspiration to achieve progress toward a truly living future. Education sessions encourage a hopeful approach to the planet's economic, ecological and social challenges, and offer solutions for sites, infrastructure, buildings and neighborhoods.

Trim Tab

Trim Tab is the Institute's quarterly digital magazine. Each issue features provocative articles, interviews and news on the issues, designs and people that are truly transforming the built environment. Subscriptions are free, and a complete archive of past issues is available on the Institute's website: www.living-future.org/trimtab.

RESEARCH

Despite the rigor of the Living Building Challenge, project teams are confident that the theoretical requirements are solvable. However, both perceived and real limitations to success still exist that are technical, regulatory, behavioral or financial – or a combination of these influencing factors. In collaboration with partners in the design and construction field, local and state governments, and other forward-thinking nonprofits, the Institute is spearheading efforts to carry out cutting-edge research and create practical tools. The latest outcomes are posted on the Institute's website.

AMBASSADOR NETWORK – SPREADING THE WORD ABOUT LIVING BUILDING CHALLENGE

The Ambassador Network is a global initiative to encourage the rapid and widespread adoption of restorative principles guided by the Living Building Challenge. The quality of the built environment reflects our progress toward these goals, and each of us contributes to shaping it. In this way, we are all Ambassadors.

The Ambassador Network is an effort to support the development of the real and lasting relationships necessary for meaningful change to take place. It has been designed to support the continued flow of ideas and solutions among participants and the Institute. It presents numerous options for engagement, and the Institute has created a wealth of related training materials and resources. More information about the Ambassador Network and the online applications are available on the Institute's website: www.livingbuildingchallenge.org/action

Volunteer presenters of "An Introduction to the Living Building Challenge": Professionals who wish to shift the focus of green building conversations are trained through the Ambassador Network to deliver informal introductory presentations to peers, local organizations, institutions, companies and community groups.

Living Building Challenge Collaboratives: These community-based groups meet in-person regularly to share knowledge and create the local conditions that support development of Living Buildings, Sites and Communities. Each Collaborative is overseen by at least one trained volunteer facilitator, who is responsible for cultivating a welcoming environment for grassroots involvement and outreach. Each Living Building Challenge Collaborative has an online presence on Facebook. If there is no Collaborative in your area yet, we hope you will be inspired to form one.

OTHER WAYS TO GET INVOLVED

Continued advancement of the Living Building Challenge will require many minds and great ideas. The Institute has established a presence on an array of online communication forums that make it possible to aggregate impressions, suggestions and insights – and apply some small group dynamics to our worldwide virtual community.

- /livingbuildingchallenge and /livingfutureinstitute
- /livingbuildingchallenge
- @livingbuilding and @Living_Future
- /LivingFutureInst

A BRIEF HISTORY OF THE LIVING BUILDING CHALLENGE

The idea for Living Building Challenge emerged in the mid-1990's during an effort to produce the most advanced sustainable design project in the world: EpiCenter in Bozeman, Montana. This project was led by Bob Berkebile and Kath Williams and was funded by the National Institute of Standards and Technology. Working with Berkebile at BNIM, Jason F. McLennan guided the research and technology solutions for EpiCenter – in the process, he also began to conceptualize the requirements for what is now known as a Living Building℠. Following EpiCenter, Berkebile and McLennan continued to develop the idea and published several related articles.[86]

In 2000, BNIM was hired by the David and Lucile Packard Foundation to examine the economic and environmental implications of a Living Building alongside the various levels of LEED® certification. The findings were presented in a document called the Packard Matrix, which demonstrated that a Living Building was the smartest long-term choice economically, although it carried a hefty first-cost premium. (In 2009, the Institute's Living Building Financial Study proved that first-cost premiums have diminished, and certain building types make immediate financial sense.)

In 2005, McLennan began to turn the theoretical idea into a codified standard. He presented Living Building Challenge version 1.0 to the Cascadia Green Building Council in August 2006, and three months later the Challenge was formally launched to the public. In 2007, McLennan hired Eden Brukman to direct the ongoing development and international deployment of the Living Building Challenge. Together, they authored Living Building Challenge 2.0, rounding-out the requirements of the program and demonstrating how to apply the Imperatives to various scales of development and settings – from partial building renovations to whole structures, and from individual landscape and infrastructure projects to entire neighborhoods.

In response to an increase in global attention and interest, Cascadia founded the International Living Building Institute in 2009 as an umbrella organization for the Living Building Challenge and its auxiliary programs. The Institute certified the first projects in 2010, which changed the green building movement on a fundamental level. Groups from Mexico, Ireland, Australia, Germany, Israel and other countries around the world reached out to learn more about the Living Building Challenge and to forge formal ties with the Institute, underscoring the truth that people from all parts of the world are looking for hopeful, practical responses to environmental, social and economic difficulties.

At the beginning of 2011, the Institute was renamed as the International Living Future Institute, with a mission to lead the transformation to a world that is socially just, culturally rich and ecologically restorative. Living Building Challenge is the Institute's flagship program for deep systemic change. The Institute offers global solutions for lasting sustainability, partners with local communities to create grounded and relevant solutions, and reaches out to individuals to unleash their imagination and innovation.

86 Refer to the In The News section of the Institute website to download early publications.

INTERNATIONAL LIVING FUTURE INSTITUTE SM

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www.livingbuildingchallenge.org