Ballona Vista: A Living Building Challenge Neighborhood
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This proposal re-envision a 5.8 acre site in Playa Del Rey, California as Ballona Vista. Ballona Vista represents one of the first conceptual attempts to meet the design mandates and sustainability imperatives of the Living Building Challenge (LBC) on a neighborhood-wide scale. Guided by a contextual approach, this proposal facilitates the existing advantages of the site-area to move beyond mere functionality and into flourishing. Deeply inspired by the LBC’s philosophy, values, and standards, Ballona Vista presents a neighborhood vision that establishes a healthier, more dynamic relationship between nature, human activity, and the built environment.

In so doing, the proposal presents a guide for how the LBC can work on a neighborhood scale, and shows what obstacles – both internal and external – stand in the way of its real-world application.
1.1 Site

The location of the Ballona Vista design proposal is Playa Del Rey, a beach community lying just south of Marina Del Rey in Los Angeles, California. The site comprises 5.8 acres of residential neighborhood with some auxiliary commercial uses. Being primarily residential in its make up, the site and its immediate surroundings contain an imbalance of uses that mimics land patterns of Southern California at large. These traditional land use legacies of Southern California have also created a site that is dissected by unnatural divisions. Imposing roadways, abandoned parking, and unnecessary fences have created barriers between the site's natural advantages. These advantages – a vibrant marshland, a neglected lagoon, an inspiring hillside, and forgotten dunes, all combined with measurable human activity – can on any given day be seen trying to break through the unnatural limits imposed upon them. The result is a place that while casual, breezy, and spacious, is still not all it could be. Like a plant without adequate sunlight or water, strangled or overshadowed by an invasive species, Ballona Vista cannot thrive and flourish unless the unnatural barriers of unsustainable land use are weeded away.

1.2 Challenge

The Living Building Challenge (LBC) comprises a strict set of environmental and sustainable standards applied to the design and construction of buildings and neighborhoods. In their uncompromising rigor these standards carry with them the explicit goal of pushing the conventions, and what is considered possible, with regards to the built environment. It is no surprise, given these strict standards, that only a small handful of buildings, and no neighborhoods at all, have fulfilled LBC prerogatives. Still, examining the applications of the LBC at the neighborhood level are important, as through such a paradigm important questions of how local economies, community health, and shared resources contribute to sustainability are raised. Further, neighborhood design introduces more complicated issues of zoning, transportation, and land use to the mix. In this way the LBC for neighborhoods introduces a new character to the design table: the urban planner.

1.3 Concepts

Despite Ballona Vista's challenges, clear foci of potential exist throughout the site. These foci are best characterized as nodes. A node is a point at which lines or pathways intersect or branch, a central or connecting point. Further, a node is a place where the surroundings are charged with energy by users, just as the users are charged by the surroundings. As described by urban visionary Kevin Lynch, a node is a "conceptual anchor point...a distinct, unforgetable place, not to be confused with any other" (1). In Ballona Vista, four clear nodes command attention: three natural features and one a hub of social and commercial activity. While these nodes are spheres of activity that naturally gravitate, complement, and play off each other's advantages, the site they are impeded by barriers. Barriers can be energetic, physical, or situational, and can block both healthy social, economic activity, and ecological activities. To reinvigorate this site, the overarching proposal of Ballona Vista removes the barriers impeding the natural integration of these nodes. While many designs can superficially speak to this goal, a proposal adhering to LBC standards will accomplish this to a degree that is resilient, multi layered, and intertwined at profound levels, creating an ecological resilience, community vibrancy, and a seamlessness that will blur where one node ends and the other begins.

CHAPTER 1: INTRODUCTION
1.4 Proposal

Integration of Ballona Vista's nodes will be achieved through a specific reconceptualization of the site's main built components. Land use will be directed in a way that ensures a balanced mix of commercial, residential, and office uses.

The building typology will reflect this mixed emphasis through an eclectic yet functional portfolio of architectural designs. The circulation pattern will reinforce the advantages of the building typology by promoting a permeability between uses, and further, through an orientation that ensures pedestrian travel is the most flexible mode of travel.

A deeper level of connectedness will be promoted through the water management system, which by utilizing both central and decentralized components, will reestablish the natural hydrological connectivity of the site. Resource sharing will be another integral component of the water systems as it will be with the energy plan for Ballona Vista.

The energy system will rely on the advantages of the building orientation, combined with the abundant sunshine of Southern California, to produce solar power for the site's needs. These specific changes in the built environment of Ballona Vista will facilitate a reconnection of the site's nodes, allowing for an environment of interchange, sustainability, and resilience that will showcase the potential for LBC to promote an ecologically seamless built environment.

CHAPTER 2: THE SITE

2.1 Overview & Analysis

Playa Del Rey, part beach town and part quintessential Southern California sprawl, hugs the Los Angeles, California coast between Venice and Manhattan Beach, immediately south of Marina Del Rey. Beaches, dunes, protected wetlands, residential neighborhoods, and large sections of vacant land owned by Los Angeles International Airport (LAX) make up the area.

Playa Del Rey sits at the historic mouth of the Los Angeles River and is part of a floodplain originating in the Santa Monica Mountains. The northern part of the site is watershed land, which flooded naturally until the Los Angeles River and Ballona Creek were channelized in 1938. Now storm water from the City of Los Angeles, which is relatively unfiltered through the concrete channels and out into the Pacific Ocean. Ideal waves along Playa Del Rey's beach drew surfers during the 1950s and 60s, but jetties now break the surf and stormwater discharge from the mouth of Ballona Creek and the LA River compromises the quality of the water in the immediate area.

The southern half of Playa Del Rey was once a residential community called Palisades Del Rey, but the Los Angeles International Airport bought all of the residential land by eminent domain. What remains is mostly vacant land.
waiting for runway expansion. The southernmost tip of Playa Del Rey also once included the site of the Hyperion Sewage Treatment facility. Today what we understand as Playa Del Rey can be associated with four census tracts, measuring 2.03 square miles.

Playa Del Rey is one of the least dense communities in the City of Los Angeles, housing approximately 16,231 people (2). It is only a moderately racially diverse community compared to County demographics as a whole, and is relatively economically homogeneous. The annual median household income is high for the County, at $104,000. Land use is almost entirely residential. More than 80 percent of residents drive alone from their home in Playa Del Rey to work somewhere else, while eight percent work at home and one percent walks to work. Compared with the rest of Los Angeles City and County, there are relatively few children in Playa Del Rey. The vast majority of residents (almost 70 percent) are 25 to 64 years old. There are more non-family households than family households, and the average household size is just about two people. Playa Del Rey is a relatively well-educated community as well, with a majority of its residents having a Bachelors degree or higher (3). Workers are most likely to work in management, business, science, and the arts.

The three main streets – Culver Boulevard, Pershing Drive, and Manchester Avenue - boast some commercial activity. The other major road, Vista Del Mar, runs more or less parallel to the Ocean, as its name implies. Visitors arriving by car may come from Interstates 1 or 405, but those by bike may arrive from the east by way of the Ballona Creek bike path or the beach path that runs north to Santa Monica and south to Redondo Beach along the sand. Santa Monica's Big Blue Bus and the Culver City Bus system both serve Playa Del Rey. Using these bus lines, two percent of Playa Del Rey's population takes public transit to work.

The site is nestled in the northern corner of Playa Del Rey in one of the community's only commercial areas. The 5.8 acre site faces the beach and protected dunes to the west, Playa Del Rey Lagoon and Ballona Creek to the north, Dockweiler Beach to the south, and the wetlands and residences east. Farther east is Loyola Marymount University, and to the southeast lies the Los Angeles International Airport land. The site is situated at the terminus of Culver Boulevard and the beginning of Vista Del Mar. Vista Del Mar hugs the ose of Ballona Hill and then continues south. Culver Boulevard is bust to some commercial activity, mainly bars and restaurants and the local favorite cafe, Tanner's Coffee Co. Tanner's thrums with beach vibes and smells of roasting coffee beans from its corner post in the 1922 stucco building that became an official historic monument in Los Angeles in 2009. Four other historic buildings, including the 1956 triangle-shaped building that houses Cantalini's Italian restaurant and another built in 1911, also face Culver Boulevard and tell the story of the beach town's evolution through time.
Looking even more closely at the site, an energy and flow comes into view as well. Beyond intersections and blocks, there is a flow of people and an interaction between people and place that gives the site its distinctive feel. In fact there are several nodes of activity in the natural, built, and social environments. A node, as described in this document, is a “conceptual anchor point… a distinct, unforgettable place, not to be confused with any other” (1). In a network, a node is a point at which pathways intersect or branch; a central or connecting point. A node is a place where environment is energized by its inhabitants and vice versa – a place of energy interchange.

Nodes can be constrained by barriers, barriers that are energetic, physical, or situational. High traffic speeds, for example, can act as an energetic barrier to pedestrian crossing. By generating anxiety and blocking the safe passage of pedestrians, speeding automobiles hinder street life. Chain link fences, too, block the passage of people and so isolate or dampen the relevance of nodes. As we think about nodes of activity and energy interchange, and the networks they punctuate, we see how existing barriers hinder them.

3.1 The Living Building Challenge

In a climate of Leadership in Energy and Environmental Design (LEED) and other green building and neighborhood standards, the Living Building Challenge pushes planners and builders to think ahead – several generations ahead. Far enough ahead to reckon with the “end game”: the time when our natural resources change dramatically or run out as we know them. The Living Building Challenge (LBC), a performance-based design standard, challenges us to retrofit and create places such that they meet extremely strict ecological criteria; places that live and breathe, integrate with their users and their surroundings, and even incorporate plans for their own decomposition. Some have described buildings that meet LBC as structures that almost “disappear” because they are so integrated with the ecology and heartbeat of the place they inhabit. Living Buildings and Living Neighborhoods should vibrate, or harmonize with the energy, limits, and opportunities of the place.

First conceived in 2006 by the International Living Building Institute and Cascadia Green Building Council, The latest Living Building Challenge (version 2.1) presents 20 imperatives, organized into seven “petals”: Site, Energy, Water, Health, Materials, Equity, and Beauty. All imperatives are just that: imperative. With very few exceptions based on project typology, all must be met for a project to receive “living” status. (This is distinct from other rating systems that use points.) However, not all imperatives must be met on-site. “Scale-jumping” is allowed, depending on the category of project, for some of the imperatives. For example, the imperative of “Net Zero Energy” may be difficult to achieve on an individual building’s site, but designers must still meet the imperative by building energy capture technology on an adjacent or otherwise sensible nearby site (4).

The Challenge, as it is written, can be applied to individual buildings, landscape or infrastructural elements, renovations of existing buildings, and even communities. The solutions are organized into seven “petals”: Site, Energy, Water, Health, Materials, Equity, and Beauty. Each petal is divided into “imperatives” that must be met for a project to receive “living” status. The imperatives are organized into seven categories: Site, Energy, Water, Health, Materials, Equity, and Beauty. Each category includes specific imperatives that must be met for a project to receive “living” status. The categories and their imperatives are as follows:

- **SITE**
  - Limits to Growth
  - Habitat Exchange
  - Car-Free Living

- **ENERGY**
  - Net Zero Energy
  - Net Zero Water
  - Ecological Water Flow

- **WATER**
  - Net Zero Water
  - Ecological Water Flow

- **HEALTH**
  - Civilized Environment
  - Healthy Air
  - Biophilia

- **MATERIALS**
  - Red List
  - Embodied Carbon Footprint
  - Responsible Industry
  - Appropriately Sourced
  - Conservation + Reuse

- **EQUITY**
  - Human Scale + Humane Places
  - Democracy + Social Justice
  - Rights to Nature

- **BEAUTY**
  - Beauty + Spirit
  - Inspiration + Education

Figure 7: An illustration showcasing the existing barriers identified throughout the site.

Figure 6: The Living Building Challenge imperatives.
structures or places, and whole neighborhoods. Thus far three projects have met the challenge in its entirety. But no projects in the last category, LBC for neighborhoods, have yet been certified. The opportunity within LBC for neighborhoods is one of capturing more of the historical, ecological, and human flow of a place than is possible by designing a single building. Applying the challenge on a neighborhood level begins to move us beyond an individualistic, building-by-building approach to look at whole community systems. Building living neighborhoods means achieving economies of scale with sustainable water systems and environments that promote physical activity. The LBC for neighborhoods also introduces new voices to the design conversation: urban planners, community organizers, and local governments, all of whom have a stake in the systems on which neighborhoods thrive. Designing the retrofit of a neighborhood or building opens up questions of local economy, of culture and community, and of transportation. While one building may have a small effect on its surroundings, a living neighborhood can have much wider radiating effects on the community, and of transportation. While one building may have a small effect on its surroundings, a living neighborhood can have much wider radiating effects on the community, and of transportation.

The Living Building Challenge requires that designers choose a transect to contextualize their project. Our site falls into transect 4, a General Urban Zone, as it is an urban area with relatively low density, detached buildings, and primarily residential development (6). We were given the opportunity to move the site in either direction on the continuum – to revert it to a more rural zone or to increase density to make it more urbanized. Given the prior existence of a vibrant, long-standing community in Playa del Rey, the design team chose to further urbanize the site by adding density. The entire design concept attempts to maximize the unique environmental and social qualities of Playa del Rey.

The program also called for the provision of some motor vehicle parking, though 60 percent less parking than the Los Angeles zoning code currently requires. These requirements are summarized in the Appendix.

2.3 Beyond The Living Building Challenge

A increasingly common way of describing development, introduced by Andrés Duany, the father of New Urbanism, is in transects. In Duany's own words, a transect is "a geographical cross section through a sequence of environments – for example, from wetland to upland, or tundra to foothill. The transect extends the natural environments to the human habitat by increasing density and immersive urban character." (5) "Transsects range from "natural" (undeveloped) and rural to downtown urban core and each one calls for and describes a certain type of development intensity. It is a more holistic way of looking at an area than the parcel-by-parcel zoning maps planners are accustomed to seeing. Ultimately, the transect conveys the physicality of a place, as well as how people use it.
Within the Ballona Vista site, three natural features are focal points of activity: the dunes, the Ballona Wetlands, and the undeveloped hillside on the east side of Vista del Mar. These three features, and the energy around them, were classified as three green nodes. In addition to these green nodes, an undeniable social node is present at the intersection of Culver Boulevard and Vista del Mar – it is a hub of social activity. But the site is also riddled with chain link fences, hard edges, vacant lots, and asphalt parking lots. The speed limit on Vista Del Mar Avenue, which runs clear through the social node, is posted at 45 mph, and there are no sidewalks along it. These barriers physically inhibit movement throughout the site, but also contribute to a overall psychological feeling of off-limits, danger, separation, and interruption.

The nodes exist, but are not able to flourish to their greatest capacity. Physical and situational barriers at each of the four nodes reduce the utility of the nodes themselves. And because these nodes are key points in the network and a flow of energy through the site, what blocks the nodes also limits and deadens the livability of the site. To liberate, activate, and enhance these nodes is to activate the whole site so it can flourish as it already wants to. The proposal also increases the density of the site and promotes a balance of natural, social, and economic activity on a human scale. In keeping with the Living Building Challenge, the proposal strives to maximize connectivity between the nodes to promote a healthy ecosystem and to connect people to the site’s unique natural features (7). The following section describes the four nodes as they are today and as they will be in a fully realized Ballona Vista. The subsequent sections will outline the specific water, energy, circulation, and land use organization within the site.

The title Ballona Vista is a name that speaks both to the site’s past and to aspirations of the future. Ballona was the ancestral home of the site’s Spanish land grantees who took control of the land in 1839. Vista, Spanish for view, is also a word that connotes connectivity among features and a visual synthesis of landscape. Vista also speaks toward a location on the horizon, or a point not yet reached.
4.1 Nodes

A node is a “conceptual anchor point... a distinct, unforgettable place, not to be confused with any other.” -- Kevin Lynch

Social Node

Current State: The central point of social activity in the site is the commercial area near the intersection of Culver Boulevard and Vista del Mar. The node includes restaurants, bars, shops, and Tanner’s Coffee, a popular neighborhood hangout. Several of the buildings are historic structures dating back 60 to 100 years. Although the restaurants are brimming with crowds, few people linger on the streets. Sidewalks are narrow in width and speeding traffic makes the outdoor space feel like a place for cars instead of people. Culver Boulevard is a heavily trafficked five-lane road, and the constant rushing of cars renders the node inhospitable to vibrant street life.

Goals: The Social Node is the beating heart of the community. By removing the barriers of poor pedestrian street design and high traffic speeds, Ballona Vista will create an environment where people can come outdoors to linger and interact. The goals are to create an outdoor common space that is safe, comfortable, and compelling for people on foot, and to expand the social node so that it comprises more of the site.

Proposal: A Community Plaza, a Pedestrian Paseo, and the Living Tower Node: Preserving the existing activity and historic buildings, the social node will be expanded west towards the Ocean. A new central plaza at the center of Ballona Vista, on the western corner of the intersection of Culver Boulevard and Vista del Mar, will replace the current parking lot. The plaza will be surrounded by a retail corridor, and will be the home of the Living Tower.

The Tower, both community monument and ecological infrastructural element, is the new centerpiece of the node. It will serve as a gathering point, a filter for Del Rey Lagoon water, and a public educational feature that underscores the importance of responsible resource management. In addition to playing a critical role in the net-zero water system of Ballona Vista, the Living Tower also fulfills the Living Building Challenge’s “Inspiration and Education” imperative. Water from Del Rey Lagoon will be pumped to the top of the tower and will flow down through a vertical structure of gravel, plants, and microorganisms before landing on a pond-like bed of additional filtering vegetation. After going through the tower, the water will be distributed underground to individual buildings’ ultraviolet/reverse osmosis cleaning systems. The tower will be surrounded by signage explaining its role in Ballona Vista’s closed-loop water system.

The social node will remain the focal point where the community spontaneously gathers as they run errands, go out to eat, or take a stroll with their families. In keeping with the “Beauty and Spirit” imperative, the node will have a strong Playa del Rey character, with preserved historic buildings and cultural and community programming on the plaza throughout the year.

Figure 12: Culver Boulevard is completely auto-oriented.

Figure 13: More poor street design.

Figure 14: Section view of the Social Node from the west with office building in the foreground and living tower behind.

Figure 15: Sketch of Living Tower and Social Node.
Wetlands Node

Current State: The Ballona Wetlands are located at the northeast edge of the site. This rich and unique natural feature, to access the wetlands, residents must cross a large gravel and asphalt parking lot, and then can only view the wetlands area through a six-foot rod iron fence. The fence has one locked gate, opened only for special tours.

Goals: The Ballona Wetlands are an ancient feature of this coastal landscape and are filled with wildlife. The goals are to facilitate residents and visitors interfacing more directly with the wetlands and learning about their history and ecology.

Proposal: A Wetlands and Community Park Node: This newly activated node will be home to a park instead of a parking lot, and a new community center where school children and other visitors can learn about the natural water system of the wetlands, as well as the other systems that make Ballona Vista work. The community center can feature programming about urban agriculture, local habitat, and our on-site energy systems. This new community park is a place to learn, to view, to contemplate, but is also a kind of green entryway: an opening, an access point, an interface.

Figure 16: View looking northeast at the boundary of an existing parking lot and the Ballona wetlands.

Figure 17: Wetland Node rendering.

Figure 18: View looking northeast at the Ballona wetlands.

Figure 19: Wetlands Node section.

Figure 20: Office Building / Community Center

Figure 21: Wetland Node section.
Dunes Node

**Current State:** Located by the beach-front along Pacific Avenue, the Ballona Vista dunes are a striking natural feature drawing attention to the many amenities of Southern California: water, sand, wind, and sunshine. The beach beyond is a focal point for area residents as well as visitors from all over the region. The dunes provide a key marker indicating the transition from beach-town to natural splendor.

Unfortunately, access to the beach and dunes is extremely limited. The dunes are enclosed by a large, imposing, rusty chain-link fence. There are limited paths leading to the beach. The environment itself has also been degraded – invasive ice-plants have proliferated and directly across the street is a large, concrete parking lot.

**Goals:** To enhance access to the dunes, to preserve and restore the environment, and to integrate community-oriented spaces.

**Proposal:** A Boardwalk, Grandstand, and Elementary School Node: Two key elements enliven this new version of the dunes node. The elementary school's west-facing facade is terraced, creating a kind of grandstand facing the unblocked, unbrushed dunes. This new space attracts community members of all stripes to sit and enjoy the vista, as well as connect with each other. The dunes, no longer fenced off, will instead be protected by the new boardwalk that runs along them, connecting the park area to the dunes and provide educational signage about dune ecology. The space between the school steps and the dune boardwalk is reserved for agricultural production that provides food and physical activity for residents, as well as education for the elementary school students.

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**Figure 20:** View looking northwest along Pacific Ave., adjacent to the Ballona Dunes.

**Figure 21:** View of the Ballona Dunes.

**Figure 22:** Boardwalk leading part dunes to beach.

**Figure 23 (right):** Dunes Node: Grandstand on north side of school

**Figure 24 (left):** Running track concept leading to boardwalk.

**Figure 25:** View of the Ballona Dunes.
Hillside Node

Current State: There is an undeveloped parcel of land that greets visitors entering the site from the south along Vista del Mar Avenue. The tip of the triangular parcel on the corner of Vista del Mar and Trolley Place serves as a gateway or welcoming to the site as the street curves up under a prominent undeveloped steep hillside towards the retail Social Node. But the welcoming feature is now abandoned shack, and the rest of the parcel is covered in worn down grass and dirt, serving as an occasional parking lot. The curving section of Vista del Mar Avenue that hugs the hillside has no sidewalk on either side. This is especially dangerous for pedestrians and cyclists considering the speeding traffic on this stretch of the road. Furthermore, the community at the top of the hill can look down on the site below, but there is no direct path connecting the two communities.

Goals: To create a safe, passive recreation space for the entire community, to activate the entrance to the site, to connect the hilltop community with the residents and visitors of the Ballona Vista community, and to make use of the dramatic visual features at the Ballona Hill and the views from the hillside.

Proposal: A Hillside Staircase will connect the hilltop and beachside communities. In addition to the road diet (discussed in the next sections) slowing traffic and expanding pedestrian space along Vista Del Mar, the hillside too is transformed to promote connectivity and active transportation to and through Ballona Vista. Inspired by the incredible community attraction and passive recreation site at Baldwin Hills in Los Angeles, CA, this new feature will provide a direct walking line for residents of the houses up on the hills down to the commercial main street of Ballona Vista, as well as the dunes, the beach, and the wetlands. For residents, students, and workers in Ballona Vista, the staircase offers an ascent for physical activity, and for a magnificent view of the coastal landscape.
Figure 29: Plan view of the proposed hillside node, illustrating the new connectivity created between Ballona Vista nodes and the adjacent residential neighborhoods to the east (up the hill).

Figure 30 (right): North Elevation of the proposed hillside node.

Figure 31 (left): South Elevation of the proposed hillside node.
4.2 Land Use

The Finer Grain: Typologies, Networks, and Systems.

By activating the nodes of our site, we liberate and activate an entire network of ecological energy flows and human activity in Ballona Vista. These new or enhanced systems are conceived to meet the Living Building Challenge imperatives, as well as to strengthen the existing assets of the place. A detailed plan for the land use, building typology, circulation, and net-zero resource systems follows.

As specified by the program, our proposal includes retail, an elementary school, housing, a community center, and office/light industrial units, as well as automobile parking to accommodate the new development, and urban agriculture.

Retail: Our proposal seeks to expand the activity beyond the social node to create a pedestrian paseo along Culver Boulevard from Pershing Drive west to the dunes. Retail development will be concentrated along the Culver Boulevard artery, and the street will be closed to automobile traffic west of the intersection of Vista del Mar to bring people out onto the streets and plazas.

Elementary school: The elementary school is sited on the west of the site near Del Rey Lagoon to maximize the children’s access to existing recreation facilities. This puts the school nearby the existing residential area, which will facilitate children and their parents walking or bicycling to school. Situating the school along the Culver Boulevard will also help to expand the social node to include the plaza area.

Housing: The 28 units are located on the second, third, and fourth floors of buildings along the southwest of the site. Rather than adding single family homes, we added apartment units to increase the density of the site. The proximity to the plaza, retail corridor, elementary school, new office space, and green nodes create a walkable village atmosphere for residents of the new housing units. The LBC dictates that for the neighborhood typology, 15 percent of housing must be allocated as affordable housing, and Ballona Vista adheres to this directive.

Community center: The community center is located on the northeast end of the site, adjacent to the wetlands, where it can serve as an environmental education and event center. The center is also a walkable distance from the

Figure 32: Section of Gateway Park

Figure 33: View looking toward Living Machine Tower.

Figure 34: Another view looking toward Living Machine Tower.

Figure 35: Land Use by building floor.
elementary school, and the two are connected by pedestrian alleys.

Office/light industrial: The office space is located throughout the site in order to encourage a mix of user groups in the neighborhood throughout the day. The position of the office space will facilitate views of and contact with nature.

Parking: The Living Building Challenge encourages car-free living. We expect businesses to be local, neighborhood-serving, and within walking distance for most residents and workers. As such, we are providing a 60 percent reduction in parking from what the Los Angeles zoning code requires (8). A compact parking stall size (220 square feet) is assumed, and the size per space for both retail and restaurants is interpreted to be 250 square feet, as recommended by the Department of Building & Safety for non-furniture retail and for take-out restaurants. The resulting allocation is less than what would be applied for most cafés and restaurants, but since we do not know exactly what the tenant mix will be, we chose the middle guideline between restaurants and furniture/appliance retailers. Therefore, our total parking calculation is 241 spaces, for a total parking square footage of 53,079. (See Appendix for detailed parking calculations.) However, there is more than enough existing parking supply—more than 400 spaces—in and around Ballona Vista to accommodate the building program.

Historic preservation: Five historic structures along Culver Boulevard, which range from 60 to 100 years old, will be preserved. In keeping with the theme of facilitating what works in the site, we decided to preserve these buildings to maintain the cultural character and historic context that the structures bring to the neighborhood.

Urban agriculture: The “Limits to Growth” imperative of the LBC dictates that we cannot build adjacent to sensitive ecological habitats—in this case, the wetlands and the dunes. Therefore, we are unable to build on two parcels on the west and east sides of the site. Further, Playa del Rey is built on a floodplain and abuts the Pacific Ocean, and the risk of rising sea levels over time constrains our developable area. If we were to build on the two parcels that we set aside for urban agriculture, estimates project that a relatively moderate sea level rise would put these structures under water. The “Urban Agriculture” imperative dictates that we must devote fifteen percent of our project area to agriculture; fortunately, the two “no-build parcels” comprise approximately fifteen percent of our site area, so they meet this requirement. We plan to plant small crops of drought-tolerant, native, edible plants to promote the native habitat and reduce water consumption while producing food locally. Through the agricultural plots and other natural features of the site, Ballona Vista meets the "Biophilia" imperative, which nurtures the innate human attraction to natural systems and processes.
4.3 Building Typology

While building typologies traditionally diverge according to programmatic usage – for example, a “school” has a definable and recognizable form – the Ballona Vista proposal aspires to more sustainably redefine building typologies according to a set of environmental principles that align with the imperatives of the LBC. Orientation to the physical environment (sun and wind), scale and proportion all contribute to a building form which is simultaneously subject to the constraints of the technology systems implemented within the framework of the LBC imperatives. The additional layering of programmatic requirements influences both the proposed urban armature as well as built form. An analysis of the floodplain areas constrained the locations of the built structures to the four parcels with sufficient elevation to avoid both floods and sea level increases.

Although the site exhibits some characteristics of mat urbanism as reinterpreted by Stan Allen (shallow sections, pedestrian permeability and temporal variability), it lacks definition and a sense of place (9). A more complete site strategy will let the city flow through the project and incorporate a delicate interplay of repetition and variation. To those ends, the Ballona Vista proposal creates a condition with a permeable, continuous street wall. Human scale articulations enhance both the walkability and the pedestrian experience.

A design strategy that references New Urbanist ideas seeks to create a walkable “block” structure with natural courtyards that duplicate public space on the interior of each “block” and green pedestrian alleys that serve a pedestrian circulation to connect the various buildings on the site. The same green alley network also connects all four nodes to one another within the circulation diagram. While circulation connects each of the building and nodes, sunlight and airflow serve to unify a building typology design. Each of the proposed operates according to several principles, some of which are outlined in the LBC. Local site conditions dictate that the buildings faces southwest to maximize sunlight exposure for solar energy generation. Properly angled rooftops position solar panels in an optimal orientation. In keeping with the LBC imperative “Rights to Nature,” none of the buildings block the direct sunlight of any existing structure on site. Prevailing wind direction and strength also limits building typology to long, skinny and relatively tall buildings to take advantage of the natural ventilation of convection and differential air pressure.

Ballona Vista’s buildings range in height from one to four stories. All of the buildings are mixed-use except for the elementary school. Skylights, windows, and open-air courtyards will ensure that building users have access to fresh air and daylight, meeting the “Civilized Environment” imperative of the LBC. All buildings will comply with rigorous indoor air quality standards to meet the “Healthy Air” imperative.

The buildings make up 289,485 square feet which is programmatically divided by block as follows:

**The northeast block** has two three-story multi-use buildings. The building closer to the Wetlands totals 36,242 square feet and houses the community center and office space on the first floor, and office space above on the second and third floors. The building facing Culver Boulevard totals 36,695 square feet has retail space on its first floor and office space on its second and third floors.

**The northwest block** has one four-story and one three-story multi-use building. The four-story building facing a Playa del Rey residential area totals 45,060 square feet and has office space on its first floor and housing on the rest of its floors. The three-story building facing Culver Boulevard has retail on the first floor and office space on floors two and three.

**The triangle-shaped block** contains two built forms. One is the water tower totaling 26,715 square feet with community center space on the second, third and fourth floor. The other built structure has four floors, totally 67,315 square feet, with retail on the first floor and office space on the other floors. The southeast block has one three-floor building on it, totaling 42,330 square feet, which is the school.

![Figure 40: A sample building typology street frontage.](image)

![Figure 41: Land Use Overview Diagram.](image)
Circulation and Block Pattern: The circulation and block patterns of Ballona Vista will work directly towards creating a community that is both permeable and devoid of artificial barriers. Ballona Vista will achieve this by retaining the existing street layout but reorienting it in a way that reverses the current hierarchy of transportation modes. Above all, the goal of the Ballona Vista layout is to facilitate the reconnection of its divided nodes. An essential component of this goal is a circulation pattern that is pedestrian safe, bike-friendly, and devoid of intense automobile traffic. A building layout that integrates intimately with the circulation pattern, ensuring an environment geared towards the pedestrian perspective, will complete this picture.

To meet the “Car-Free Living” imperative of the LBC, the design of Ballona Vista will close off the principal thoroughfare to vehicular traffic, limit access on others, and mitigate traffic speeds on the fastest roads. The linchpin of these changes will be Culver Boulevard. In the new Ballona Vista design, Culver Boulevard will become a car-free paseo, allowing pedestrians to dominate the central artery of the community. This pedestrian and bike only thoroughfare will begin where Culver Boulevard and Vista del Mar intersect and continuing west to the dunes. This will allow an uninhibited pedestrian flow between the Social Node and the beach, reestablishing a connection that has long been severed by auto-oriented roads.

Seeking to further reinforce the pedestrian connectivity of the site, a number of pathways and alleys will be created within Playa Del Rey’s layout. These alleyways will serve not only as a means of foot transportation, but a destination in and of themselves. All alleyways and plaza area will comply with standards of the Americans with Disabilities Act in order to accommodate all users and meet the “Democracy and Social Justice” imperative of the LBC. Continuing the work of the circulation pattern, the building layout will reinforce the concepts of connectivity between nodes by prioritizing pedestrians. The building layout in general will establish a framework that creates opportunities for activities that at the present are uncommon within the site. Cultural, social, and recreational, these activities will be both formal and spontaneous in nature. Formal activities will be facilitated by urban agriculture, the school, the community center, and the central Living Machine Tower plaza. Spontaneous activities will find even greater expression as allowed by the building layout. Increased encounters in alleyways, car-free roads to throw around a ball, and shaded benches for people-watching are only a small example of the myriad of activities that will be given an opportunity to flourish through building layouts that are dense in scale, permeable, and humane.

All of these factors will combine to create a pedestrian-scale environment, meeting the “Human Scale and Humane Places” imperative of the LBC. In addition to fostering connections among people and all resources that make the community function. In this way, the circulation and building pattern is not just about facilitating movement, it will also foster connectivity between people and among all resources, creating a pedestrian environment, meeting the Human Scale and Humane Places imperative of the LBC.
The Living Machine Tower will be a highly visible component of the water system, which underscores a further important point. Each of Ballona Vista’s efforts to reconnect nodes involve designs that incorporate high degrees of interaction and tangibility among users. Ballona Vista’s water system will be no different, as in seeking to reconnect unnaturally severed components of the community, it will do so in a way that is visible, educational, and engaging. For example, cisterns placed next to buildings throughout the community will communicate to residents the direct source of their fresh water and make community members aware of the finite nature of water resources. Having a water system that is visible lies in stark contrast to the traditional, buried means of water management in a community.

Beyond overarching concepts, however, a specific methodology is involved in Ballona Vista’s water systems. According to calculations made based on assumptions of building type and use, the total annual demand from building users and agriculture comes to 3,549,120 gallons. Water will be supplied to the users of our site through a one-time water purchase to fill up the cisterns (as allowed by the Living Building Challenge), rainfall capture, greywater and blackwater reuse, and from the Del Rey Lagoon.

Rainfall is expected to provide an average of 730,375 gallons a year. This amount is based on...
the average annual rainfall measurement for the Los Angeles basin of 15.5 inches. A rainfall of 15.5 inches, over a roof area of 107,705 net square feet, will amount to over 1.6 million gallons of water. Conservative estimates assume that our catchment system will be able to capture and store around 70% of this rainfall. Multiplying 1.6 million by 0.7, and then by 0.625 to convert from inches to gallons, gives us the maximum average amount of rainfall we can depend on. (See Appendix for detailed calculations of estimated water demand and cistern sizes.)

Through rainfall and reuse of blackwater, it can be assumed that 1,774,783 gallons of water will be produced on-site per year. Still, this number leaves a deficit of 94,205 gallons for the site's annual water needs. To fill this gap, the remaining water will be drawn from Del Rey Lagoon. This water will be filtered through the living machine tower located in the central plaza. This water will be distributed to the same UV/RO units as the rainwater at individual buildings. After the potable water is used for sinks, showers, dishwashers and laundry, it will be sent to agriculture and toilets, then to the UV/RO unit for cleaning up to potable level. Rainwater captured in cisterns will be brought to potable level at all buildings through compact, commercially available ultraviolet/reverse osmosis (UV/RO) treatment systems (such as the Delta Environmental Ecopod-N unit, which can treat between 500 and 1,500 gallons per day and ranges in size from 2'x2'x4' to 6'x2'x4'.) This will provide a final stage of filtration before the water is used for sinks, showers, dishwashers and laundry. Greywater from these sources will then flow to agriculture and toilets. Blackwater from the toilets will be sent to an on-site living machine and then back to the UV/RO unit for reuse.

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## 4.6 Energy

### Net Zero Energy

Through our program of high-performance energy efficient buildings, occupant engagement, and large photo-voltaic array, we achieve not only net zero energy on the site, but actually generate abundant energy that we contribute to the general supply, performing as an environmentally beneficial organism.

#### High Performance Buildings

We expect our buildings to achieve an energy use intensity (EUI) of between 18-20 kBtu/sf/yr, based on measured performance of other high-efficiency buildings that utilize a similar design and construction strategy. The 2003 national average EUI of U.S. commercial buildings was 93 kBtu/sf/yr, and a 2008 study found that the national median EUI of LEED-certified commercial buildings was 69 kBtu/sf/yr. A recent New Buildings Institute study of the 69 zero-energy or zero-energy-capable commercial buildings in the United States demonstrated that there are now many buildings with total EUI under 10 kBtu/sf/yr and large commercial buildings are capable of achieving EUI below 20 kBtu/sf/yr.

Our buildings are the product of an integrated design approach with careful attention paid to building sitting and layout, envelope, mechanical systems, and electrical systems. Our structures utilize daylighting extensively, enabled by their orientation, narrow floor-plan, and the strong Southern California sun. They also feature high-efficiency lighting, including photo-sensor occupancy-based controls and efficient lamps. The climate is very favorable, so we are able to significantly minimize the HVAC systems, mostly through passive strategies to maintain thermal comfort, including natural ventilation, thermal mass to moderate temperature fluctuations, and nighttime flushing with cold air. The buildings have a high-performance envelope and well-insulated glazing. Following the example of Richardville Elementary, a 77,000 sf. school in Bowling Green, KY that achieves an EUI of 18, our school uses combination ovens and microwaves, saving appliance energy and the need for a high flow fume hood. Instead of a traditional computer lab, the school will use a portable set of laptops and tablets. A custom control system will be installed throughout all the commercial and educational structures, which shuts off specified circuits when the security system is armed, ensuring that equipment and lights are not left on at night.
The example of Richardville Elementary demonstrates that a very low EUI can be achieved in a large, high-use commercial building. The climate of seaside Los Angeles is much more favorable than that of Kentucky, and so with limited HVAC need and stronger sun, we expect that our buildings could achieve an even lower EUI, perhaps 14-16. We also acknowledge that the majority of our buildings are high-density office complexes with high plug loads, and that we have onsite water treatment, so estimate Ballona Vista EUI at 22 kBtu/sf. for the majority of the structures and 18 kBtu/sf. for the school/office building.

Energy - Occupant Engagement Program
Our buildings will be designed and constructed to be as energy-efficient as possible, but we understand that a building cannot perform at optimal levels if its occupants use electricity wastefully. Commercial building management company Jones Lang LaSalle estimate that 50-60 percent of energy usage in the structures they oversee is directly related to the particular behavior of their tenants. In the average home or office, plug loads – the things people plug in, including lamps, computers, and copiers – account for at least 20 percent of energy consumption. In educational spaces, the plug loads are nearly 50 percent. The mechanical systems and building envelope of our buildings will be far more efficient than that of the average building, and so the plug loads could account for an even greater percentage of the overall consumption. Whether the buildings will be as efficient as possible will largely depend on whether the occupants power down computers and other equipment overnight, as well as making sure to turn off lights and to not open windows when the heating, ventilation, and air conditioning system is in operation.

We will engage our occupants and make them active and aware users and conservers of electricity, from the level of landlord, to tenant companies, to individual users, through smart-metering and direct feedback on use habits, as well as through an education and marketing program.

Each building will be equipped with a software-linked metering system that will allow for real-time monitoring and comparison of energy usage. Each employee will receive feedback about their level of energy consumption in their own workspace and how it compares to their co-workers. The software will enable companies to make specific departments responsible for their own share of energy costs, creating an incentivized system for managers to make sure employees are energy-conscious. If they observe that an employee leaves lights on at night, they will be able to tell them exactly the negative impact of that behavior.

Residential occupants will be able to gauge their consumption against their neighbors. The real-time monitoring will allow them to observe that by turning off computers on any single night results in lower energy consumption than other nights. Building managers will be able to observe the demand of all the buildings at a given time, and by comparing performance between structures and with past results, they will more easily identify problems with the mechanical systems. Overall energy usage trends can be displayed in large, animated charts in the lobbies of the structures. We will provide tenant managers with toolkits that instruct them in how to hold energy conservation competitions and charrette-like meetings where neighborhood stakeholders can work out energy-related problems and concerns.

Behavior modification is difficult, and requires more than small signs placed over the light switches – although Ballona Vista will have those, too. The real-time monitoring software is a powerful feature that enables real engagement with energy conservation among the occupants, by measuring and displaying the result of every behavioral change. This system of metering and incentives coupled with educational and marketing programs could result in a significant reduction in building energy use intensity (11).

Photovoltaic Array
We plan to cover all 110,000 sf of roof surfaces with solar panels that generate about 12 watts per square foot, achieving 1 kw for every 83 sf. of panel space. This expectation is well in line with the industry standard for solar panel capacity (12).

Based on the EUI rating discussed above, we expect site consumption requirements of 12 watts per square foot, achieving 1 kw for every 83 sf. of panel space. This expectation is well in line with the industry standard for solar panel capacity (12).

Figure 51: Photovoltaic surface area.

Figure 52: Shadow Diagram.
Other Renewable Energy Options

In order to balance the neighborhood’s energy consumption and production in a localized, environmentally responsible manner, we explored a variety of renewable energy technologies: wind, hydropower, geothermal, ocean power, hydrogen fuel cells, and compost. While each of these energy sources has their advantages, our site is ultimately ill suited to these technologies.

Wind power: Our site simply does not have enough wind to meet its own energy needs. Installing one 100-foot diameter turbine would produce just one percent of our energy needs. In order to meet the net zero energy requirement, we would need to install 47 turbines on the site, which is infeasible given the small area and urban setting of the site.

Hydropower: Rivers with strong currents or dams are required to generate hydropower, and our site has neither. Although Ballona Creek is adjacent to the site, its current is too weak to supply energy.

Geothermal: The energy potential is low at shallow depths and increases as you tap deeper into the earth. Given that the water table of our site is just five feet below the ground, however, it is not possible to generate an adequate supply of geothermal energy on site.

Ocean power: The ocean can generate significant power if the difference between high and low tides is greater than five meters. Unfortunately, the tidal range in Playa del Rey is too small to serve as a viable energy source. Although Ballona Creek is adjacent to the site, its current is too weak to supply energy.

Hydrogen fuel cells: Although fuel cells are an efficient source of energy, they only operate in temperatures above 1200 degrees Fahrenheit and are extremely corrosive. Further, energy generation requires many cells to work simultaneously, and given the high cost of fuel cells, this is not a feasible option.

Compost: Though it fits nicely with our concept of a neighborhood ecosystem, it is unrealistic to use decomposed organic waste to meet our energy needs. We estimate that one ton of compost could generate approximately 700 kWh per year. The site is too small to manage this massive amount of decomposing waste.

Potential Users

Ballona Vista is radically ecologically sustainable, and also enhances the physical, emotional, and social wellness of its residents and visitors of all ages. The updated and integrated built environment influences their movement patterns as well as the places and ways that they linger and connect with each other and learn. Here, a “day” in each of these five character’s lives represents the condensed form of a week in their new community...

Figure 53: Paths of users in Ballona Vista.

Mark rides his bike in from Westchester, three miles to the east, to his office at a new media company. He takes his lunch in the Gateway Park with some of his co-workers and they discuss how long they think the company should wait before going public. After work, he asks his co-worker Sophie if she wants to grab a drink. They catch happy hour in the retail corridor, munch some fish and chips, and afterwards they take in the Cumbia performance in the plaza. There are whole families with picnics packed, and Mark and Sophie are moved to dance. They walk to the dunes and just as the sun is setting, he manages to steal a kiss. He gathers his bike and rides back home to Westchester.

Jeremy lives in one of the houses on Esplanade Street and walks past the Del Rey Lagoon on his way in to school. He goes over to the plaza and watches the people with their dogs for a while before going in. His teacher leads the class out to the wetlands for the science portion of the lesson and they collect water samples. They take them back to the classroom, put droplets on a slide, and examine the water born organisms. The teacher tells him that tomorrow they will learn about the living machine and how it purifies the water. After school, he and his friends play some soccer in the outfield of the softball field. He sees on his watch that it is nearly 6:00 PM. He tells his friends he must go, and walks back past the lagoon to his house for dinner. Later, he takes a walk with his parents through the beach and the plaza, where he sees some his classmates with their parents, before returning home again and going to bed.

Worker

Mark rides his bike in from Westchester, three miles to the east, to his office at a new media company. He takes his lunch in the Gateway Park with some of his co-workers and they discuss how long they think the company should wait before going public. After work, he asks his co-worker Sophie if she wants to grab a drink. They catch happy hour in the retail corridor, munch some fish and chips, and afterwards they take in the Cumbia performance in the plaza. There are whole families with picnics packed, and Mark and Sophie are moved to dance. They walk to the dunes and just as the sun is setting, he manages to steal a kiss. He gathers his bike and rides back home to Westchester.

Child Resident

Jeremy lives in one of the houses on Esplanade Street and walks past the Del Rey Lagoon on his way in to school. He goes over to the plaza and watches the people with their dogs for a while before going in. His teacher leads the class out to the wetlands for the science portion of the lesson and they collect water samples. They take them back to the classroom, put droplets on a slide, and examine the water born organisms. The teacher tells him that tomorrow they will learn about the living machine and how it purifies the water. After school, he and his friends play some soccer in the outfield of the softball field. He sees on his watch that it is nearly 6:00 PM. He tells his friends he must go, and walks back past the lagoon to his house for dinner. Later, he takes a walk with his parents through the beach and the plaza, where he sees some his classmates with their parents, before returning home again and going to bed.

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Joe walks his children to school, drops them off, and then takes the bus to his job at Electronic Industrial. He decides to leave work early, take the bus back home, and test out his new camera on the wetlands trail. He walks his kids home from school and then walks to the grocery store to pick up some items for dinner. After dinner, his wife puts the kids to bed while he goes to the ballfields and climbs up to take in the view. Exhausted, they lock up their bikes, get ice cream and eat it on the steps up a prescription. She goes to Tanner's for coffee and talks to the baristas and the other customers about the latest goings-on at the neighborhood council and the school that her grandson attends. Later, she takes the bus to her doctor's appointment in Marina del Rey. Upon returning, Geraldine walks to the school to pick up her granddaughter and accompany him on an after school visit to the wetlands education center. She walks home with him and waits there for his parents to come home after work. After dinner, she walks to the community center for that evening's neighborhood council meeting. Her neighbors walk her home afterwards.

Roberto and his kids bike from the Ballona Creek bike path south into the community. They lock up their bikes, get ice cream and eat it on the steps surrounding the living machine. Roberto and his kids check out the signage around the living machine and he helps explain to the kids how it works. They walk over to the Gateway Park area and climb up to take in the view. Exhausted, they put their bikes on the bus and head home.

Geraldine wakes up in the morning and walks to the agriculture field to check on her plants. On her way back, she stops at the pharmacy to pick up a prescription. She goes to Tanner's for coffee and talks to the baristas and the other customers about the latest goings-on at the neighborhood council and the school that her grandson attends. Later, she takes the bus to her doctor's appointment in Marina del Rey. Upon returning, Geraldine walks to the school to pick up her grandson and accompany him on an after school visit to the wetlands education center. She walks home with him and waits there for his parents to come home after work. After dinner, she walks to the community center for that evening's neighborhood council meeting. Her neighbors walk her home afterwards.

6.1 Where Does the Living Building Challenge Inspire and Where Does It Fall Short?

A. Limitations

The Living Building Challenge is Insensitive to Regional Variation

W hen deconstructing the imperatives of the LBC it is not difficult to surmise that the program is a product of the Pacific Northwest. While such a fact is not critical to the LBC's global applicability, it does expose the program to regional biases. These regional biases, calibrated towards the resources available in moister latitudes of the globe, in turn constrain the flexibility of the LBC. In the case of Southern California for example, the issues of rainwater collection are not fully compatible with Seattle-designed imperatives. Here, it would be fair to question the wisdom of building a megapolis Southern California's arid environment in the first place, but in reality the time to debate the viability of such decisions has long passed. In trying to create sustainable future, rather than bemoan the choices past generation has made, there must be adaptations made to the the built legacy already created. As such, the LBC might be wise to add more regional flexibility to its programs and make appropriate imperative adjustments as appropriate to specific subregions. What works for Seattle does not necessarily work for Los Angeles. Taking true ecological variability into account, what is suitable for Playa Del Rey may not necessarily even be sustainable for nearby Culver City.

The Living Building Challenge Relies on the Built Environment to Change Human Behavior

The LBC assumes that people living, working, and visiting a “living neighborhood” will behave in an environmentally-responsible manner. It may be naive to expect that people will participate in social marketing and culture of sustainability working with the various stakeholders. In its own words, it targets neighborhoods “at the intersection of buildings, infrastructure and people” (13). By doing so, it solidifies a shared sense of purpose and partnership that would more likely lead to changes in human behavior.
3. Implement region-wide incentives to encourage more sustainable development projects
4. Host some to provide technical learning experiences as well as opportunities to share resources and network with peers.
5. Develop performance indicators and tracking methods for evaluating the success of the regional stakeholder committee.

6.2 Potential of the Living Building Challenge

Not all aspects of the Living Building Challenge have proven themselves appropriate for Playa Del Rey at the neighborhood level. There are some components, however, that clearly do make sense when looked at through a neighborhood lens. These components, to no surprise, are aspects that generally undertaken at a macro level regardless of planning and development goals. Water systems, for example, involve sewers, storm drains, and potable water delivery for entire interdependent blocks, and would do well to be adapted in living building standards. Standards that several neighborhood level projects in Los Angeles already incorporate such aspects speaks to the LBC’s potential with water at such a scale.

Likewise, circulation patterns are another component dealt most commonly on a macro scale, and as such, adapt well to LBC’s neighborhood level standards. That established uses often stand in the way of a more humane circulation pattern, however, this makes this component less of a low-hanging fruit that water systems. Still, the potential to close off streets, calm traffic, create parks where parking lots once stood, and add bike and bus only lanes, shows much promise within Los Angeles. As urban form often follows the way that people move around, the circulation patterns of LBC’s standards are an important starting point for creating more just, equitable, and sustainable neighborhoods.

Yet just because a component of the LBC does not work on the neighborhood level does not mean it’s importance should be discounted. As parts of a greater whole, the individual components of the LBC that don’t work on a grander scale can still come together to accomplish much. The LBC’s standards are daunting, but this only stems from the even greater problems that the LBC seeks to address.

Also, much promise within Los Angeles. As urban form often follows the way that people move around, the circulation patterns of LBC’s standards are an important starting point for creating more just, equitable, and sustainable neighborhoods.

6.3 Conclusion

The Health Petal of the Living Building Challenge includes an imperative for place-based relationships. This imperative is perhaps the one that Ballona Vista is most faithful to of all. The concept of place and context-specific design is present throughout the Challenge, as it is the only true way sustainable design can happen. In the words of the Living Building Challenge 2.1, "The built environment will be richer because of this response to place. Much of this refers to the ecological context – the historical and present realities of land, water, and energy on a site. Ballona Vista takes this concept a step further than perhaps envisioned in the original Challenge to incorporate the human element – the existing cultural history and social energy of a place – more fully.

It was not our explicit goal to improve the lives of Ballona Vista residents, workers, and visitors, nor is this the primary purpose of the Living Building Challenge. Yet, it is a natural result of a creating context-sensitive place that re-establishes long-impeded ecological and human connections. The existing site is an area that is segregated, difficult to navigate, disconnected, and more hospitable to cars than people.
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APPENDIX

Endnotes:
2. Unless otherwise specified, all statistics in this paragraph are drawn from the U.S. Census Bureau, 2010.

Additional References:

APPENDIX

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TOTAL 289,485 110,380 6,199,350 1,816,926 1,330 1,994,819 177,894

Appendix 1: Energy calculations.
Appendix 2: Water demand calculations.

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<th>Building</th>
<th>Building roof area</th>
<th>Largest single rain event (inches)</th>
<th>Collectable gallons</th>
<th>Cistern size (cubic feet)</th>
<th>Cubed root (length, width and height in feet)</th>
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Appendix 3: Cistern calculations.

Appendix 4: Parking calculations.