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The Living Community Challenge for Environmental and Urban Sustainability

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Abstract

The Living Community Challenge (LCC) is a green certification program that, unlike most certification programs, is geared toward whole neighborhoods as opposed to singular buildings. Unfortunately, no existing communities have achieved Living Community Challenge certification. Still, there are many neighborhoods utilizing the ideals – known as petals – of the LCC in attempts to become more sustainable. The Living Building Challenge (LBC), the parent certification for the LCC, has seen more success than the LCC and will provide further research on the implications of its criterion. This paper will look at the hypothetical variables of the LCC, the communities trying to achieve these variables, and how elements of it could be used in relation to impoverished communities. Through case studies on groups and individuals attempting LCC and LBC certification, specifically Bend, Oregon and the BLOCK Project, the potential of the research becomes evident. This paper seeks to demonstrate how the LCC could be applied specifically in low-income areas in Gainesville, FL without achieving all the requirements of each petal.

Keywords: Sustainability, Living Community Challenge, Living Building Challenge

Background

No Living Communities currently exist, the rules are too strict for the ideals to be collectively applicable. There are two core rules which define the rest of the process: all imperatives are mandatory, and the certification is based on actual performance. This prevents newer communities, or communities built with the imperatives in mind, from gaining a quick certification. There are many projects which have not yet gained certification, but which are registered and thus available for study. The LCC also uses the same rubric as the LBC.

There are seven petals to be judged by the International Living Future Institute (ILFI), the organization responsible for both the LCC and the LBC. There are twenty subsequent imperatives spread across the seven petals, and as previously stated, none of these petals are optional.

Figure one displays all these imperatives, it also introduces the notion of scale jumping, which is one of the few instances where the ILFI will provide a small amount of leniency. It

allows the community to, in specific cases and limited to the imperatives with the orange highlights, seek resources outside of the community for better solutions.

Figure 1: Living Community Challenge guidelines, In *International Living Future Institute*, from https://living-future.org/lcc/resources/#key-resources. Copyright 2020 by International Living Future Institute.

In August of 2019, the ILFI released a fully updated version of the LBC Framework for Affordable Housing. This report was completed on the basis that all people, regardless of income or social standing, should have access to housing that healthy, affordable, and sustainable. A major goal of all ILFI building rating systems is resiliency, achieving any of the listed petals should provide long-term durability that outlasts environmental crises. Extending the availability of these systems to lower-income citizens would be costly, with the possibility of eventual return on investment but no guarantee (Kudryashova et al., 2015).

When discussing low-income families or individuals, this paper is referring to those that fall below the poverty line when factoring in location and dependents. These families and individuals have historically suffered the brunt of natural disasters, environmental hazards created by climate change being no exception. Climate change can not only motivate natural

disasters which destroy these communities, like hurricanes, tsunamis, and wildfires, but can create health risk like heart and lung disease (Chappell, 2018). The ILFI has introduced many pilot projects to combat this issue in an affordable way.

Petal by Petal

Place

The place petal was designed to prevent sprawl by dictating where a community should build. There are buffers which prevent the projects from extending into a designated list of habitats. If a project cannot avoid these habitats, then there are specific requirements that must be followed. Greenfield development is avoided as often as possible. For every hectare of land which is developed, another hectare must be set aside for conservation.

The LCC is special for the idea of an entirely self-sufficient community, including food. The place petal includes the Urban Agricultural Imperative. This gives the minimum percent of food production required provided the Floor Area Ratio (FAR). FAR is how much property is being dedicated to farmlands ("Place Petal | Living-Future.Org," 2016). Scale jumping, when alternatives that exceed the LCC requirements are allowed, is permitted for the agriculture section of place.

An LCC is built around a more sustainable lifestyle, as automobile free as possible. The Community is required to have a certain amount of bicycle racks, electric vehicle charging stations, and public transit routes when necessary. It is required to have a walkable network, a system that should allow pedestrians to safely walk to wherever they need to go.

Water

Though water can be filtered, purified, and used again, many people find that unsanitary. This petal on the LCC is dedicated towards seeing water as a non-renewable resource, trying to force people to see and use water as the finite resource which it is ("Water Petal | Living-Future.Org," 2016). This is partially done through encouraging Net Positive Water (NPW), when the built environment can be used to generate more water than what is consumed (Ma, 2014, p. 94). Scale jumping is allowed here in case NPW is unobtainable.

Energy

Like with the water petal, the energy petal focuses on keeping energy usage within a loop that encourages conservation. The LCC has a Net Positive Energy (NPE) imperative, 105% of

the energy which the community uses must be generated by the community ("Energy Petal | Living-Future.Org," 2016). Like NPW, scale jumping is allowed here.

Health and Happiness

The LCC is more than a community that can sustain itself via food or energy, it has this petal to assure that the people are connecting socially. The LCC requires community hubs, food sharing programs, and libraries among other things.

It also includes biophilia, the connection between human and nature that can be created through the strategic design of green infrastructure. Biophilic design includes the historical, cultural, ecological and climatic pieces of the design ("Health & Happiness Petal | Living-Future.Org," 2016).

Materials

The materials petal emphasizes using materials that are replenished and regenerative. Declare is the ILFI's ingredient label, it is readily available for public access and supports the overarching notion of transparency in all products.

Net positive waste is an important factor. Every Community is required to create a plan that sets guidelines to reduce waste in the four phases of building life cycle: Design, Construction, Operation, and End of Life. Including durability, optimizing the products, creating a collection plan, and then accounting for reuse or deconstruction at the end ("Materials Petal | Living-Future.Org," 2016).

Equity

A commonly identified issue with suburbia is the lack of community centers- features which draw a community together. The LCC seeks to prioritize the people over the profit, creating places where people can come together and enjoy a better quality of life.

All LCCs are designed at human-scale rather than at automobile-scale, there are separated Transects and each Transect cannot exceed a certain factor. Factors include surface cover, streets and intersections, signage, and proportion. Though there is no inalienable right to decent lighting, which other communities can exploit for financial gain, the Transects limit construction so that every citizen is guaranteed fair access to sunlight.

Within the commonly established planning principles for accessibility without automobiles, all residents are guaranteed access to the LCCs established places with a public transportation

line within ½ to ¼ mile. The transport lines must run from 7am-7pm, with different requirements in each Transect ("Equity Petal | Living-Future.Org," 2016).

Beauty

Beauty includes the arts and aesthetic principles of the Community. A mandate requires the installation of public art on every block, street or plaza. There are further requirements on the distribution of information regarding the arts, including an open day for the public, brochures, and signage ("Beauty Petal | Living-Future.Org," 2016).

Case Study: Bend, Oregon

Bend, Oregon is a redevelopment project that aims to one day earn LCC status. The planning area began as light commercial and industrial zone, with the typical problems that plague city development. Bend, Oregon is a mid-sized city with an arid climate with limited public transportation options. 9.3% of the county which Bend resides in, Deschutes, is below the poverty level (*Poverty Status in the Past 12 Months*, 2018). The city and projected planning area are surrounded by desert making access to freshwater difficult.

The Place Petal

Figure 2 marks the section of the city proposed for development. The entirety of the area was rampant with underutilized parking lots and limited vegetation. This is poor for drainage and maximizes the urban heat island effect, the significantly elevated temperatures that exist in cities as opposed to more natural land. Temperature rises arise from highly reflective materials used in construction- like asphalt or concrete.

Figure 2: Proposed planning area. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 36. Copyright 2014 by The International Living Future Institute.

This area is near the Deschutes River Park, the freeway and railway design prevent this from being a walkable distance. The entire city is surrounded by forests, however, there are no greenways within the city that connect the industrial landscape with the nature. Greenways would connect the green areas which are currently separated, allowing for pedestrian and animal traffic. Prior to the construction of the freeway and the railway, the roadways lead directly to downtown and seamlessly integrated the suburbs with the commercial sector. Currently the sprawl has taken over, limited public transit and major traffic issues (Graves & Fisher, 2014). The LCC requires potential communities to take a holistic approach to redeveloping the entire city. Especially through green infrastructure and providing more green spaces for the citizens.

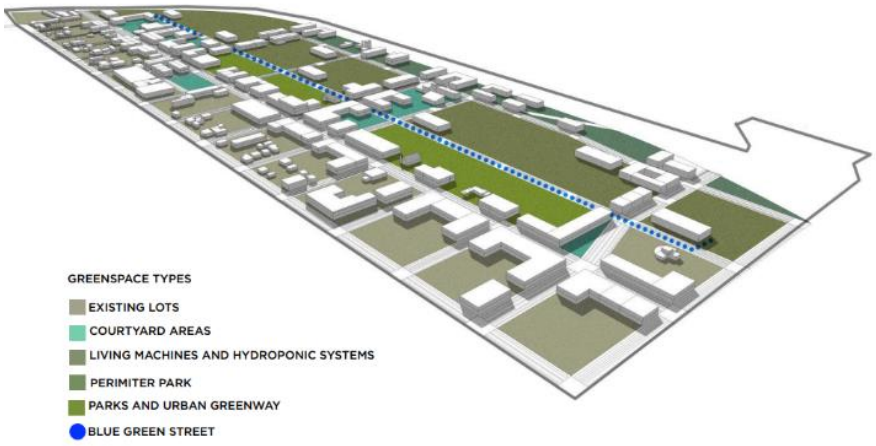

Figure 3: Proposed interconnected greenways. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 85. Copyright 2014

Figure 4: Proposed urban greenway. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 86. Copyright 2014 by The International Living Future Institute.

The proposed interventions from ILFI in figures 3 and 4 address the sprawl, interconnectedness, and green space issues. The redevelopment proposal includes the addition of an urban greenway that spans the entirety of the proposed area. Greenways increase natural drainage, reduce urban heat island effect, and beautify the city. Figure 6 focuses on interconnectedness of all existing and proposed greenspaces within Bend. This crosses over to the health and happiness petal with the consideration for biophilia.

The Water Petal

Figure 5: Proposed redevelopment water infrastructure design in Bend, Oregon. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 93. Copyright 2014 by The International Living Future Institute.

The redevelopment was designed to be Net-Zero Water in a desert ecosystem. As is seen in figure 5, there would be widespread roof top rain collection, permeable surfaces, and water treatment. Water would be recycled via greywater production and blackwater reuse. Though this is only proposed redevelopment, Net-Zero Water is being proven in Bend by a residential project called Desert Rain House (Graves & Fisher, 2014). This could have major implications for impoverished communities as the costs of running water can be unbearable.

The Energy Petal

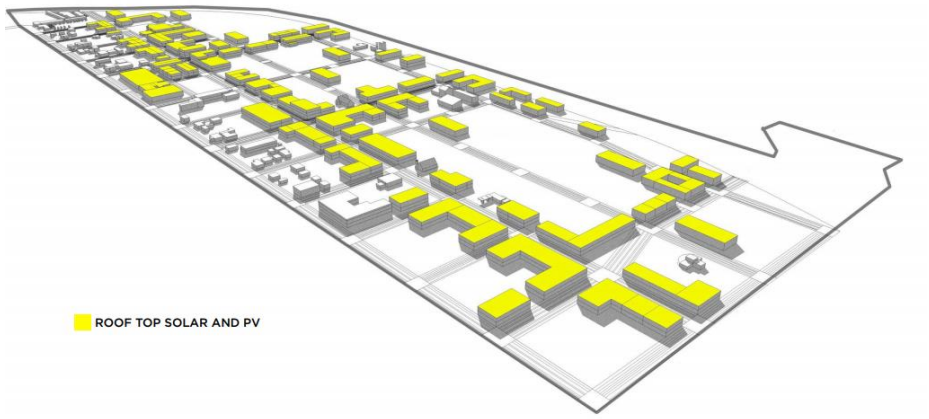

Figure 6: Proposed solar and PV placement. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 91. Copyright 2014 by The International Living Future Institute.

The Bend plan gives projected solar panel utilization, they view roofs as resources. As shown in Figure 6 ILFI has calculated more than 1,000,000 square feet of eligible roof space. Bend is not special in this aspect, almost any city that receives a considerable amount of sunlight has the roof space eligible for the generation of solar power. If the plan for Bend could be implemented, the redeveloped area could generate 200% of their energy needs every year just from solar (Graves & Fisher, 2014).

The Health and Happiness Petal

To transform Bend into an LCC, the entire urban geography would have to shift to improve both social connectivity and biophilic design. To achieve this, ILFI created diagrams mapping almost every element. Though the city had some pedestrian-centered infrastructure, the LCC proposal requires intense reconstruction that reconnects the roads for the people. Figure 3 displays pedestrian accessibility currently in Bend, while figure 4 displays the new proposal for

connectivity. Becoming an LCC requires the city to reinvent itself in many ways, all done through the scope of creating a more interactive environment.

Figure 7: Existing pedestrian conditions. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 52. Copyright 2014 by The International Living Future Institute.

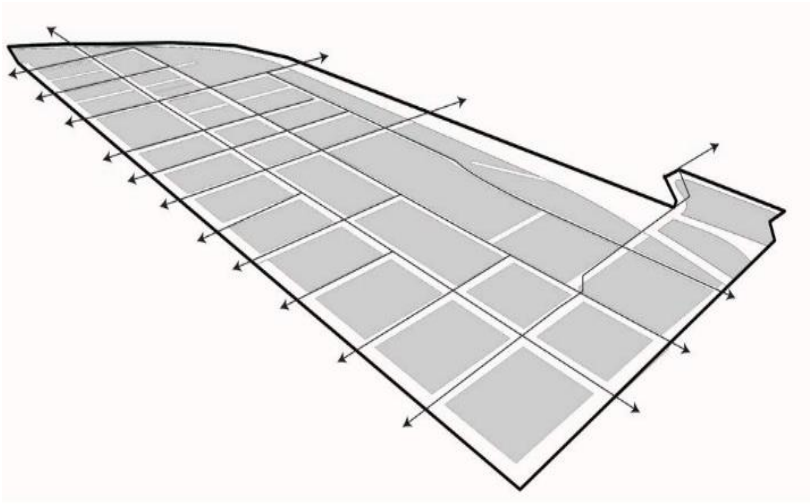

Figure 8: Proposed pedestrian connections. Reprinted from *A Living City/Bend, Oregon,* by R. Graves and J. Fisher, 2014, p. 73. Copyright 2014 by The International Living Future Institute.

How Does Bend, Oregon Influence Impoverished Communities?

The potential plan for Bend goes through numerous solutions to problems, only a few of them discussed in this paper are relevant to a low-income community. The Living Community Challenge prompted architects and planners to think outside of convention. They created a plan

that may have higher upfront costs but has the potential to be costless in the long-term. Bend is currently considering the proposals and have made efforts towards limited implementation.

Case Study: The BLOCK Project

There are organizations attempting to utilize the guidelines of the ILFI in order to better the lives of those in need, the BLOCK Project being an example. Centered in Seattle, the BLOCK Project was created by a group called Facing Homelessness to address poverty issues. Facing Homelessness is community driven, most of the funding and support which it receives comes from the citizens of Seattle. The city has been facing major gentrification and increasing rent costs, both of which have magnified the general issue of homelessness (*The Roots of the Crisis - Homelessness*, n.d.).

The BLOCK Project has developed and implemented nine BLOCK homes, 125 square foot units perfect for backyards, and nearly self-sustaining regarding water and electricity. While meeting the goals of some LBC petals, they have not actually earned certification (*The BLOCK Project FAQs 1*, n.d.). They are not attempting to earn LCC certification because of the geography of their project, these homes are not placed in a community form.

In close proximity to the urban centers, these pods give homeless people the opportunity for food and shelter away from the elements. They will have everything necessary to a home: a kitchen, a bedroom, a bathroom, and storage. There are no limits currently set on the duration of stay. These units are classified as Detached Accessory Dwelling Units (DADUs) and completely legal in Seattle as well as in many other major cities (*The BLOCK Project FAQs 1*, n.d.).

Figure 3: Digital rendering of the coexistence between a BLOCK unit and the community, In *International Living Future Institute*, from https://living-future.org/affordable-housing-the-block-project/. Copyright 2020 by International Living Future Institute.

The BLOCK Project designs units that become integrated with the community, the homeless population is no longer forgotten. Figure 9 displays a digital rendering of the ideal placement of a BLOCK unit, where the resident can safely interact and feel a sense of belonging.

The BLOCK Project screens the residents for any flags in their history, like previous violent crimes or abuses of welfare, working closely with case management agencies in Seattle to do so. They screen the "host families" by lot size and zoning.

To attempt LBC certification, the design of the units has undergone intense scrutiny to fit all guidelines. Being such a small unit, energy and water consumption is minimal, providing shelter and necessities without over-taxing the grid. These BLOCK units are designed, more than anything, to give back more than they take.

How Does the BLOCK Project Relate to the Living Community Challenge?

As stated, the BLOCK Project is seeking LBC certification, not LCC, so any achievements which this initiative makes are difficult to view from the scope of upgrading an entire community.

The most relevant element of this project are the implications and the funding of these units. The construction, the placement, and the maintenance are all funded by community initiative. The host families see an opportunity to be a part of a solution, and more than one hundred families have stepped forward to do so. If this could be replicated, in any part, by existing low-income communities, there is massive potential for alleviating economic stresses.

How the Living Community Challenge Impacts Gainesville

Alachua County

Alachua County was selected due to the proximity to the University of Florida and the accessibility which the site provided. The neighborhood discussed was chosen specifically due to the criteria established through the map featured in figure 10 along with separate specifics to calculate vulnerability.

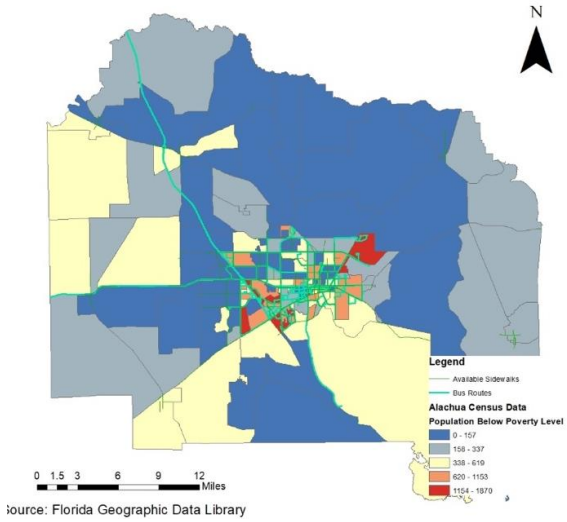

Figure 4: A map of Alachua County featuring census data on poverty. Data from Florida Geographic Data Library, created by U.S. Census Bureau, 2018.

The map featured in figure 10 displays the entirety of Alachua County with data from 2018, the colors marking the population that reported income within the last twelve months at below the poverty level. The aqua line is bus routes which are accessible by the public (Florida Transit Information System, 2019). The gray lines are existing sidewalk barriers, though those lines are what is available through the U.S Census Bureau Survey of 2019 and are self-reported (U.S. Census Bureau, 2019b). Red areas are where more than a thousand members of the population are below poverty. The age level of the populations also must be considered. As many of these areas are close to campus and support college students, many do not report income and thus fall below the poverty level.

Oak Park Village

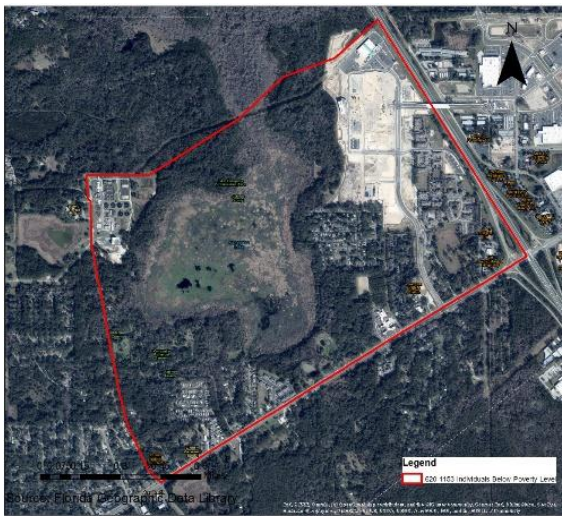

Figure 5: Map of selected area below poverty level. Google, 2020.

The area selected in figure 11 was selected with consideration for the age of the population, being sure to factor in the skew in income levels which university students introduce to census data. It is southwest of Archer Road, there are 2723 people in the total population and 686 of them have incomes that place them below poverty level- approximately 25 percent (U.S. Census Bureau, 2019a). The specific neighborhood selected within the area for analysis is Oak Park Village

Under the LCC challenge, only aspects of energy and place will be presented. This is due to the limitation on the accessibility of the data along with the depth of this research paper, coupled with the economic relevance of the topics.

Place Petal Oak Park Village

Viewing the area using a similar methodology to Bend, Oregon, the first concern would be access to public transportation. As seen in figure 12, even the corner of the neighborhood closest to the available bus route is over half-a-mile away. Urban planners widely view amenities a quarter-of-a-mile away as outside of walking distance (*Pedestrians and Park Planning*, n.d.). For Oak Park Village to obtain certification in the place petal, there must be significant access to public modes of transportation. As Gainesville public transportation is provided by the Regional Transit Services, to increase public accessibility, it would be a matter of petitioning RTS.

Figure 6: Distance from Oak Park Village to a bus route. Data from Florida Geographic Data Library created by the U.S. Census Bureau. Imagery from Google, 2020.

The Florida Geographic Data Library has no recorded sidewalk barriers in this neighborhood, and the street view on Google Maps supports this- as shown in figure 13. Even if public transportation were within walking distance, the LCC would not identify it as accessible given that the streets have an automobile focus.

Figure 7: Google Maps Oak Park Village street view. Google, 2020.

Oak Parks Village is more than five miles from the center of the city. The place petal requires the establishment of meaningful connections to the community. If this was seen through the scope of Gainesville being the community, it would be impossible to make this distance walkable even if the proper network of sidewalks could be established.

There are not established opportunities for employment within this neighborhood. Bettering public transportation or increasing walkability or the bicycle-access to existing public

transportation would not only boost the economic vitality of the area, but the general human welfare as well.

Energy

Analyzing the solar potential of the neighborhood will be based on the hourly performance simulation from a multi-year historical period for a fixed photovoltaic system. The LBC and LCC require Net Zero Energy, but a community like Oak Park Village that has no current energy production would first have to work towards creating infrastructure.

While solar panels can pay off, in correlation with the LCC, they are not financially feasible for low-income communities to obtain without outside funding. As the 2020 U.S. Federal Poverty Guidelines mark a single person's income at $12,760 at the poverty level, this investment could quantify multiple years of income (*Poverty Guidelines*, 2020). To achieve any type of solar, Oak Park Village would have to seek private or public financial assistance in funding.

Conclusion

The seven petals of the LCC have been discussed in depth and presented in multiple scenarios. Though no city or neighborhood has fully accomplished the criteria of the LCC, many cities like Bend have begun the process of planning based on those guidelines. Bend has designed plan that can make them self-sufficient through water conservation and solar panel placement. They have provided blueprints for designing streets to be more pedestrian-accessible and more biophilia-centered. All motivated by the petals which the LCC pushes. The BLOCK Project has utilized the petals in application through the resource-efficient designs of their temporary housing units for the homeless. Without the guidelines provided by the ILFI, there units would not have nearly the degree of autonomy. Gainesville has the potential to do something similar, take the advice of these communities and initiatives with the information provided by the LCC to design more sustainable and livable neighborhoods. As seen through this paper, low-income areas are easily identified and analyzed in the city. The proposals provided and the analysis of community facets through the LCC petals could motivate positive change. The final certification may be unobtainable, but the projects themselves create invaluable research and applications which can be translated across different income levels and types of neighborhoods.

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