

<b>Topic:</b>	Healthy Communities; Design Control; Land Use Planning
<b>Resource Type:</b>	Guidance Materials and Scholarly Articles
<b>State:</b>	N/A
<b>Jurisdiction Type:</b>	N/A
<b>Municipality:</b>	N/A
<b>Year (adopted, written, etc.):</b>	2015
<b>Community Type – applicable to:</b>	Urban; Suburban
<b>Title:</b>	Building Healthy Places Tool Kit: Strategies for Enhancing Health in the Business Environment
<b>Document Last Updated in Database:</b>	July 10, 2018

### ***Abstract***

The Building Healthy Places Tool Kit focuses on community opportunities to promote health and prevent its members from chronic diseases. This toolkit is meant to serve as a resource for shapers of buildings and projects interested in making “specific evidence supported design” to create a healthier environment. The report lists twenty-one recommendations for promoting “gold star” health organized into three separate categories; “physical activity, healthy food and drinking water, and healthy environment and social well-being”. These strategies can apply to multiple forms of development, including, multi-family buildings, mixed use buildings, office buildings, industrial development, and single-family housing. The ultimate goal is to provide evidence-based recommendations to this variety of real estate.

### ***Resource***



# BUILDING HEALTHY PLACES

## T O O L K I T



STRATEGIES FOR **ENHANCING HEALTH**  
IN THE **BUILT ENVIRONMENT**



# **BUILDING HEALTHY PLACES** **T O O L K I T**

## **STRATEGIES FOR ENHANCING HEALTH IN THE BUILT ENVIRONMENT**

This project was made possible through the generous financial support of the Colorado Health Foundation. Additional support for the ULI Building Healthy Places Initiative has been provided by the estate of Melvin Simon.

© 2015 by the Urban Land Institute

Printed in the United States of America. All rights reserved.

Recommended bibliographical listing:

Urban Land Institute. *Building Healthy Places Toolkit: Strategies for Enhancing Health in the Built Environment*. Washington, DC: Urban Land Institute, 2015.

ISBN: 978-0-87420-357-8

**COVER IMAGES, CLOCKWISE**

**FROM TOP:** The residents of Via6 in Seattle, Washington, enjoy gathering spaces, including a mezzanine with game tables and a rooftop pavilion. *(Ben Benschneider)* | Tai Yuen Market in Hong Kong offers fresh vegetables, meats, and prepared food. *(The Link Management Limited)* | At Station Center in Union City, California, children can play on unusual equipment, including a 35-foot-tall play pyramid. *(Bruce Damonte)* | Street markings alert drivers to the presence of pedestrians in Linz, Austria. *(Rachel MacCleery)*

## About the Urban Land Institute

The Urban Land Institute is a nonprofit research and education organization whose mission is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide.

The Institute maintains a membership representing a broad spectrum of interests and sponsors a wide variety of educational programs and forums to encourage an open exchange of ideas and sharing of experience. ULI initiates research that anticipates emerging land use trends and issues, provides advisory services, and publishes a wide variety of materials to disseminate information on land use development.

Established in 1936, the Institute today has more than 34,000 members and associates from some 92 countries, representing the entire spectrum of the land use and development disciplines. Professionals represented include developers, builders, property owners, investors, architects, public officials, planners, real estate brokers, appraisers, attorneys, engineers, financiers, academics, students, and librarians.

ULI relies heavily on the experience of its members. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice. The Institute is recognized internationally as one of America's most respected and widely quoted sources of objective information on urban planning, growth, and development.

## About the Building Healthy Places Initiative

Around the world, communities face pressing health challenges related to the built environment. For many years, ULI and its members have been active players in discussions and projects that make the link between human health and development; we know that health is a core component of thriving communities.

In January 2013, ULI's board of directors approved a focus on healthy communities as a cross-disciplinary theme for the organization. Through the Building Healthy Places Initiative, launched in July 2013, ULI is working to promote health in projects and places around the globe.

Through the Building Healthy Places Initiative, ULI is leveraging the power of ULI's global networks to shape **PROJECTS AND PLACES** in ways that improve the health of **PEOPLE AND COMMUNITIES**. The organization is focusing on four main areas of impact:

- **RAISING AWARENESS.** Raise awareness of the connections between health and the built environment in the real estate community, and work to make sure health is a mainstream consideration.
- **DEFINING THE APPROACH.** Help define and share information about the design elements, programming strategies, materials, and other approaches that improve health for people.
- **EXPLORING THE VALUE PROPOSITION.** Build understanding of the market and nonmarket factors at play in building healthy places, and the value proposition of building and operating in health-promoting ways.
- **ADVANCING THE STATE OF PRACTICE AND POLICY.** Using the ULI membership as a lever, and in partnership with others, advance the state of policy and practice.

Learn more and connect with Building Healthy Places: [www.uli.org/health](http://www.uli.org/health).

Share your story via Twitter: #ulihealth.

## About the Center for Active Design

The Center for Active Design is a nonprofit organization that promotes architecture and urban planning solutions to improve public health. The mission of the Center for Active Design is to reduce the risk of obesity and chronic diseases by promoting physical activity and healthy food access through the design of buildings, streets, and neighborhoods.

As a resource for design professionals, policy makers, community organizations, and the real estate community, the Center for Active Design promotes and expands upon the *Active Design Guidelines* created by New York City. The Center maintains a multidisciplinary perspective in the translation of health research into design solutions that amplify the role of architecture and urban planning in improving public health and well-being.

For more information, visit <http://centerforactivedesign.org/>.

## About This Report

*Building Healthy Places Toolkit: Strategies for Enhancing Health in the Built Environment* outlines evidence-supported opportunities to enhance health through changes in approaches to buildings and projects. Developers, owners, property managers, designers, investors, and others involved in real estate decision making can use the strategies described in this report to create places that contribute to healthier people and communities and that enhance and preserve value by meeting the growing desire for health-promoting places.

### ULI Senior Executives

**Patrick L. Phillips**

Global Chief Executive Officer and President of ULI Foundation

**Cheryl Cummins**

Executive Officer

**Michael Terseck**

Chief Financial Officer/Chief Administrative Officer

**Lela Agnew**

Executive Vice President, Strategic Communications

**Kathleen Carey**

Chief Content Officer

**John Fitzgerald**

Chief Executive, ULI Asia

**Lisette van Doorn**

Chief Executive, ULI Europe

**David Howard**

Executive Vice President, Development and ULI Foundation

**Jason Ray**

Chief Technology Officer

**Marilee Utter**

Executive Vice President, District Councils

### ULI Project Staff

**Rachel MacCleery**

Senior Vice President, Content

**Sara Hammerschmidt**

Senior Research Associate, Content

**James Mulligan**

Senior Editor

**Laura Glassman, Publications Professionals LLC**

Manuscript Editor

**Betsy Van Buskirk**

Creative Director

**John Hall Design Group**

Designer

**Craig Chapman**

Senior Director, Publishing Operations

### Contributing Authors

**Joanna Frank**

Executive Director, Center for Active Design

**Rachel MacCleery**

Senior Vice President, Content

**Suzanne Nienaber**

Partnerships Director, Center for Active Design

**Sara Hammerschmidt**

Senior Research Associate, Content

**Abigail Clafin**

Research Fellow, Center for Active Design

# CONTENTS



## CHAPTER 1

### INTRODUCTION

1



## CHAPTER 2

### PHYSICAL ACTIVITY

10



## CHAPTER 3

### HEALTHY FOOD AND DRINKING WATER

32



## CHAPTER 4

### HEALTHY ENVIRONMENT AND SOCIAL WELL-BEING

46



## CHAPTER 5

### CERTIFICATION PROGRAMS

66



### REFERENCES

78





Abundant glass and skylights let in natural light at the Livestrong Foundation office in Austin, Texas.  
*(Paul Hester)*

# INTRODUCTION

**AROUND THE WORLD,** many communities and countries are facing troubling health trends. By 2030, chronic diseases will cause 52 million global deaths per year, nearly five times the number of deaths from communicable diseases. In 1970, just one in eight American adults was obese (with a body mass index of 30 or higher). Today, it is one in three adults. Health problems have become a drag on economies and the futures of individuals, families, communities, and nations.

In the face of these health challenges, the design of our built environment has become a key element in combating the risk factors for chronic disease. Health does not stop or start at the doctor's office—it begins in homes, workplaces, schools, and communities. Evidence shows that where we live and work has strong links to health.

This report identifies opportunities to enhance health and to enhance and preserve value by meeting growing desires for health-promoting places. This report is targeted at the shapers of buildings and projects from design to operation, including developers, property owners, building managers, investors, and others involved in decision making about real estate. These actors can play a role in crafting places that contribute to a healthier community fabric, places that promote better health for all and that will ultimately result in higher, more sustained market returns.



Pedestrian-friendly sidewalks along Euclid Avenue in Cleveland, Ohio, make walking easy. (Craig Kuhner)

Building on much good work at the city scale, many people are now focusing on the basic building blocks of a community: buildings and development projects. The fabric of a city is woven from these units. Many untapped opportunities exist to do more to *prevent* poor health and to *promote* good health, in developments themselves and in the way that they interact—physically and socially—with their communities and neighborhoods.

The development industry—real estate developers, property owners, operators, and managers, and others involved in the direct delivery of real estate, both public and private—has a profound influence on the world. Everyday project decisions the industry makes directly affect the future of communities. What if more of these decisions had health at their core?

## ABOUT THE TOOLKIT

This report is intended to serve as a resource and reference for those seeking to shape buildings and projects in ways that enhance and promote health by making specific evidence-supported design and programming

recommendations that relate to health. The toolkit builds on previous publications from the Building Healthy Places Initiative, which seeks to leverage the power of ULI's global networks to shape projects and places in ways that improve the health of people and communities.

Previous ULI publications include the foundational report *Ten Principles for Building Healthy Places* (see box on page 5), as well as *Intersections: Health and the Built Environment*, which reviews interconnections between health and the built environment. *Building for Wellness: The Business Case*, discussed on page 4, highlights 13 projects that have used health-promoting design strategies and analyzes the market response. Taken together, these publications provide the development community with critical insights for creating projects that promote health.

This toolkit takes the conversation further by unpacking how to pursue healthy development practices. It serves as a resource and reference, outlining specific, practical,

### INSIGHT

#### Richard J. Jackson, M.D.

Professor, Environmental Health Sciences

UNIVERSITY OF CALIFORNIA, LOS ANGELES (UCLA) FIELDING SCHOOL OF PUBLIC HEALTH

Health happens not in your doctor's office but where you live. Our high-cost medical system is mostly ineffective in creating healthfulness. We can't change our genes, but we can create good places, homes, and communities that make it easier for us to be more active, happier, and healthier.

## INSIGHT

### Peter Rummell

Principal, RummellMunz Partners  
JACKSONVILLE, FLORIDA

Health is the new value add in real estate. Fifty years ago, developers figured out that sports added value to real estate. Thus were born fairways with housing lined up along them and tennis centers at the heart of resorts. Today, health and its various activities and amenities are going to do the same.

People will be attracted to places that help them be healthier, just as 40 years ago they were attracted to a view down a fairway. The difference is, in today's vernacular, healthy living is driven by both hardware and software. Not only do you need to produce the fairway, you need to teach them how to use it.

and evidence-based strategies that can improve health outcomes. The toolkit is targeted at shapers of buildings and projects from design to operation.

The report outlines 21 evidence-based recommendations for promoting health at the building or project scale. These 21 “gold star” recommendations are organized according to three categories: **physical activity**, **healthy food and drinking water**, and **healthy environment and social well-being**.

At the heart of the report lies a rigorous review of existing health literature. The 21 recommendations all have strong supporting evidence. A list of practical implementation strategies and best practices, grouped according to their available evidence base, supports each of the 21 overarching recommendations.

The recommendations and strategies in the report meet the following criteria:

➔ **EVIDENCE-BASED RECOMMENDATIONS.** The toolkit identifies 21 evidence-based recommendations, which are in boldface type and numbered throughout. These recommendations have strong supporting evidence, defined as peer-reviewed publication of at least five cross-sectional or two longitudinal studies or an equivalent systematic review with significant findings.

➔ **EVIDENCE-BASED STRATEGIES.** These strategies support the 21 recommendations. The listed strategies have strong supporting health evidence in at least one supporting peer-reviewed publication.

At a market in Paris, France, residents and visitors can purchase local goods, including produce. (Rachel MacCleery)

➔ **BEST PRACTICE STRATEGIES.** The best practice strategies lack a published health-evidence base at this time but are anticipated to promote health, given theory, professional practice, and industry standards. More research is encouraged.

## SYNERGIES

Ample research from ULI and other sources points to strong market and consumer demand for places that support healthy behaviors. The survey-based research effort *America in 2013* identified strong market preferences for walkability, proximity to parks, and other wellness-related community features, with 76 percent of U.S. millennials saying walkability was an important community characteristic.<sup>1</sup> Pedestrian-oriented communities with access to transit have been shown to garner higher rents and retail sales.<sup>2</sup> Bicycle infrastructure can have an economic payoff, with homes located near bike paths commanding a 10 percent price premium.<sup>3</sup>



## INSIGHT

### Sandra Kulli

President, Kulli Marketing  
MALIBU, CALIFORNIA

After college, I taught school in Los Angeles. One year, my third-grade class was housed in a bungalow in Griffith Park. Living in Echo Park made it an easy bike ride to school. Three decades ago, that kind of behavior (bike riding to work) elicited this question almost daily: “Is your car broken?”

Fast forward to now. Designing healthy communities is what we all do. Teams everywhere understand a healthy focus wins big with our markets; from Daybreak/Utah where 83 percent of the kids walk or bike to school to Todos Santos/Mexico where wellness is front and center to our planning and marketing.

As the playwright Tom Stoppard has said, “A healthy attitude is contagious but don’t wait to catch it from others. Be a carrier.” Healthy ways have come full circle—from outlier to majority—and today no one ever asks, “Is your car broken?”

Similar impacts are seen at the building scale. In the office sector, innovations are being driven by the “war for talent”: the unrelenting need for employers—especially technology companies—to be able to attract the very best, through a compelling package that includes an optimized work environment.

*Building for Wellness: The Business Case*, a 2014 report by ULI, profiled 13 projects that had health at their heart and that generated a market response that exceeded developer expectations. *Building for Wellness* estimated

that health-enhancing features accounted for a minimal percentage of overall development costs, especially when planned for at the onset.<sup>4</sup>

What’s more, the rise of health-conscious building users—tenants and owners—could pose risks for buildings or projects that do not meet health objectives. In the same way that sustainability made some buildings obsolete from a market-acceptance perspective, a growing focus on health could shift perceptions about places that are not perceived as health promoting. Forward-looking approaches can help mitigate these risks.

Importantly, many of strategies in this report overlap with sustainability objectives. A healthy and safe environment is a prerequisite for healthy people, and practices that promote and protect the natural environment can enhance human health. The recommendations in this toolkit build upon and advance practices that promote a healthy planet—and healthy communities.

## Taking It to the Next Level

The 21 recommendations in this report represent a tremendous opportunity to benefit health. The following implementation considerations could greatly enhance the impact of the recommendations:

➔ **NEW PARTNERSHIPS THAT SUPPORT HEALTH PRIORITIES.** Formal and informal partnerships can help developers, property owners, and managers build bridges,

Children play with movable foam blocks at Columbus Commons in Columbus, Ohio.  
(Randall Schieber)



increase impact, and ensure the ongoing success of a project. Nontraditional partners include foundations, schools, health care providers, and health-focused nonprofits.

➔ **DEEPER UNDERSTANDING OF COMMUNITY HEALTH NEEDS.** Each community has particular and specific health challenges, needs, and goals. A health profile can help build an understanding of health challenges that the project can address. Health impact assessments can be used to analyze the potential health effects of a proposed project and to identify strategies for reducing harm and increasing benefits.

➔ **MEASUREMENT OF HEALTH OUTCOMES.** We measure what we value. In partnership with other professionals, the real estate industry can help facilitate efforts to measure health outcomes and grow the body of evidence about what works for health, so that practices can be improved in the future.

➔ **USE OF LANGUAGE THAT REINFORCES HEALTH MESSAGES.** Words matter. Language that reinforces health, wellness, and well-being can help spur behavior change. Make the healthy choice the visible choice by emphasizing healthy options, such as walking and taking transit. This report is grounded in a rigorous review of the health literature, with the understanding that the included recommendations and strategies can be referenced in marketing language.

➔ **CONSIDERING HEALTH AT EVERY STAGE OF REAL ESTATE DEVELOPMENT.** Because many of the design recommendations and strategies in the toolkit look at the base building or project design, considering them at the outset of a project and revisiting them at each key decision-making stage of a project are essential.

## Health for All

Market drivers for health-promoting development features are strong, but regardless of income, education, or ethnic background, all people should have the opportunity to live, work, learn, and play in places that allow them to live long, healthy lives.

Today, too many people do not have the opportunity to be healthy because they live in places that make choosing healthy behaviors extremely challenging: they lack access to healthy foods and places that make physical activity easy and are exposed to environmental toxins. Improvements to the physical realm and built environment should enable everyone to enjoy the best health possible.

## EXPLORATION

### Ten Principles for Building Healthy Places

In August 2013, a group of interdisciplinary experts convened by ULI developed a set of principles for building healthy communities. These principles draw on insights gleaned during three Advisory Services panels conducted in Colorado in spring 2013 and are elaborated on in the ULI report *Ten Principles for Building Healthy Places*, released in fall 2013. The ten principles are the following:

- ➔ **PUT PEOPLE FIRST.**
- ➔ **RECOGNIZE THE ECONOMIC VALUE.**
- ➔ **EMPOWER CHAMPIONS FOR HEALTH.**
- ➔ **ENERGIZE SHARED SPACES.**
- ➔ **MAKE HEALTHY CHOICES EASY.**
- ➔ **ENSURE EQUITABLE ACCESS.**
- ➔ **MIX IT UP.**
- ➔ **EMBRACE UNIQUE CHARACTER.**
- ➔ **PROMOTE ACCESS TO HEALTHY FOOD.**
- ➔ **MAKE IT ACTIVE.**

A building or project's impact extends beyond its physical walls. Projects that enable or encourage social ties and connections, that use strategies to facilitate stronger physical links, and that work to address community needs enhance both real estate and community values. Playgrounds and recreation assets should be widely accessible, for example, and consideration should be given to improving community assets outside the reach of projects. Throughout this report, we have identified opportunities for broad impact.

Every day, developers, designers, and others involved in the practice of real estate make decisions about their projects—they make tradeoffs and set priorities. They anticipate market trends. They balance community needs and wishes with financial constraints. Most of the health strategies described in this report are low-cost or no-cost adjustments to business as usual, yet they have the potential to both improve health outcomes and increase the appeal of buildings and projects. Let's make them the norm.

# APPLYING THE RECOMMENDATIONS

These schematics illustrate how the 21 recommendations might be applied in a variety of real estate typologies and sectors. *(Renderings by Mark Patrizio)*

## KEY

### Evidence-Based Recommendations

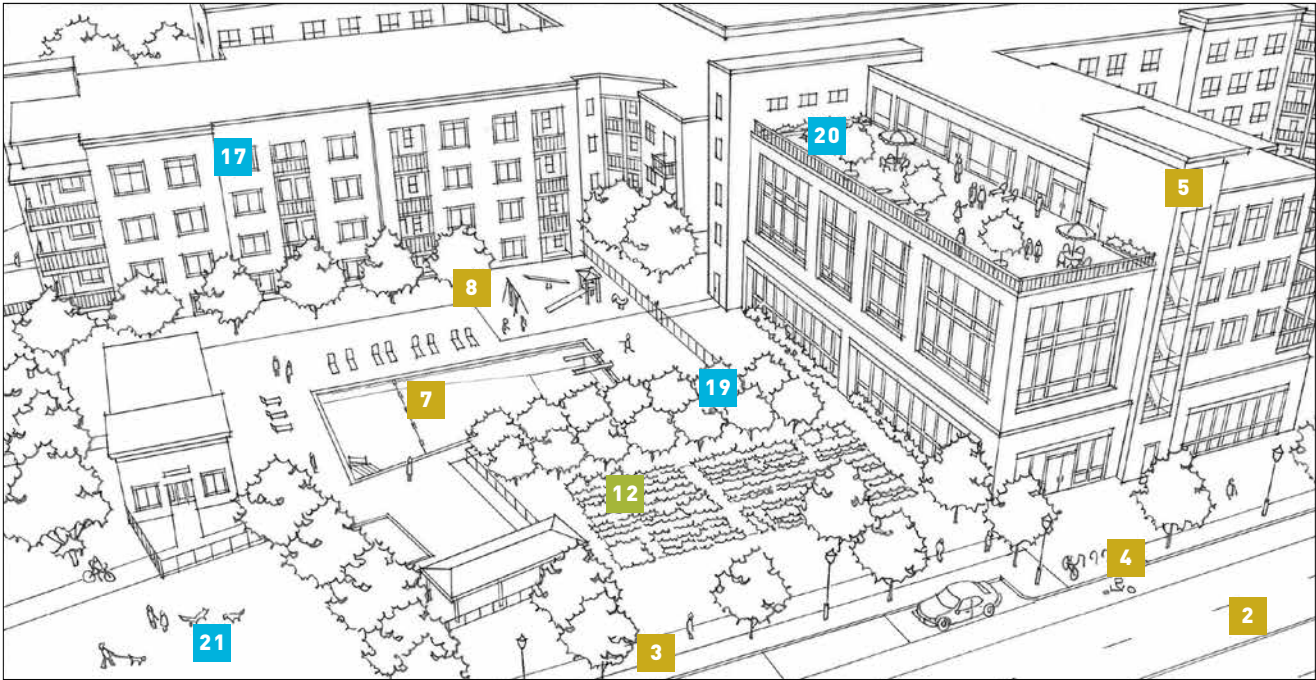
- 1** Incorporate a mix of land uses
- 2** Design well-connected street networks at the human scale
- 3** Provide sidewalks and enticing, pedestrian-oriented streetscapes
- 4** Provide infrastructure to support biking
- 5** Design visible, enticing stairs to encourage everyday use
- 6** Install stair prompts and signage
- 7** Provide high-quality spaces for multigenerational play and recreation
- 8** Build play spaces for children
- 9** Accommodate a grocery store
- 10** Host a farmers market
- 11** Promote healthy food retail
- 12** Support on-site gardening and farming
- 13** Enhance access to drinking water
- 14** Ban smoking
- 15** Use materials and products that support healthy indoor air quality
- 16** Facilitate proper ventilation and airflow
- 17** Maximize indoor lighting quality
- 18** Minimize noise pollution
- 19** Increase access to nature
- 20** Facilitate social engagement
- 21** Adopt pet-friendly policies

### MASTER PLANNED Recommendations that apply but are not shown: **9 11 13 14 15 16 17 18 21**



# MULTIFAMILY

Recommendations that apply but are not shown: 1 6 10 11 13 14 15 16 18



# MIXED USE

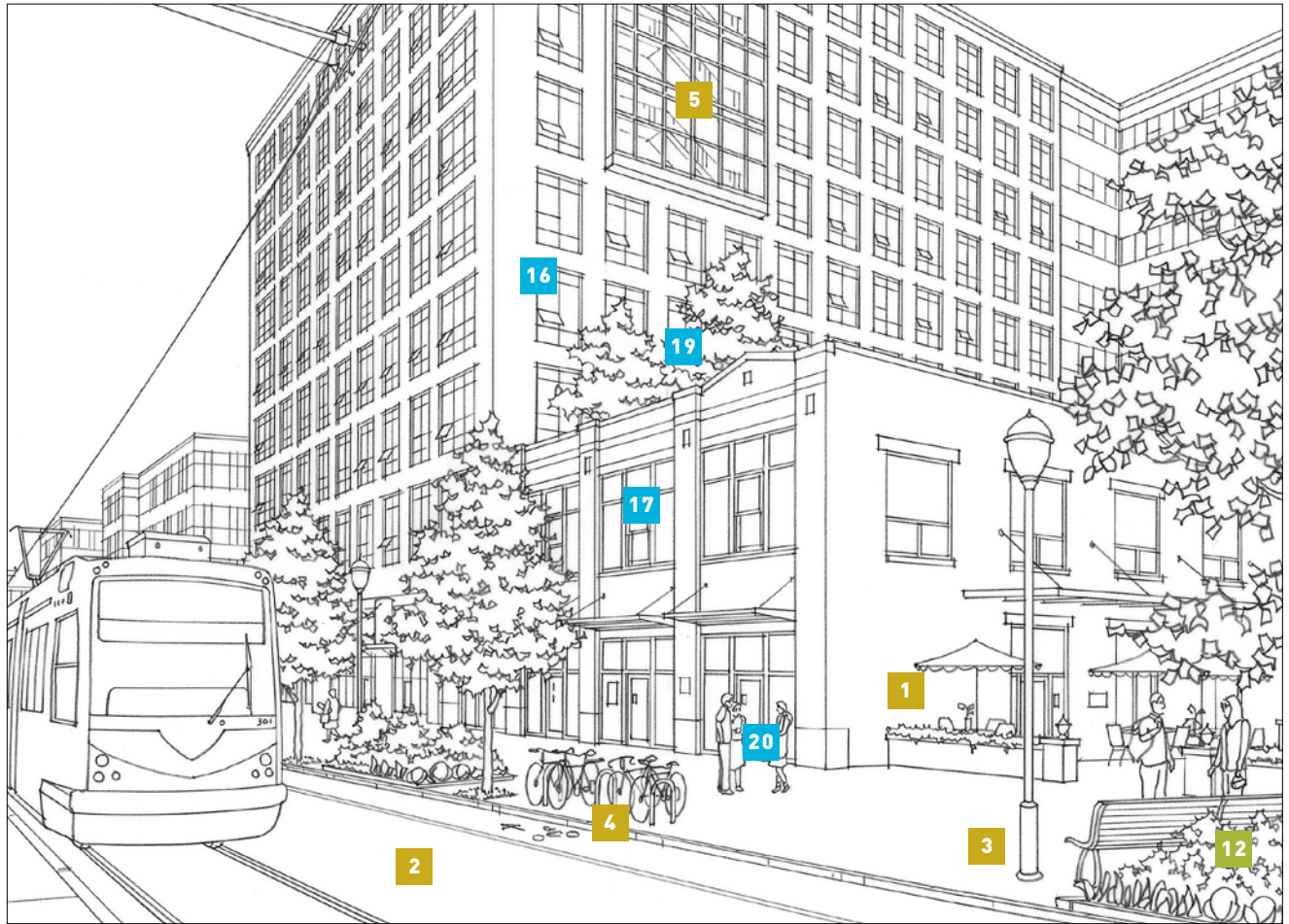
Recommendations that apply but are not shown: 6 7 8 10 11 13 14 15 16 18





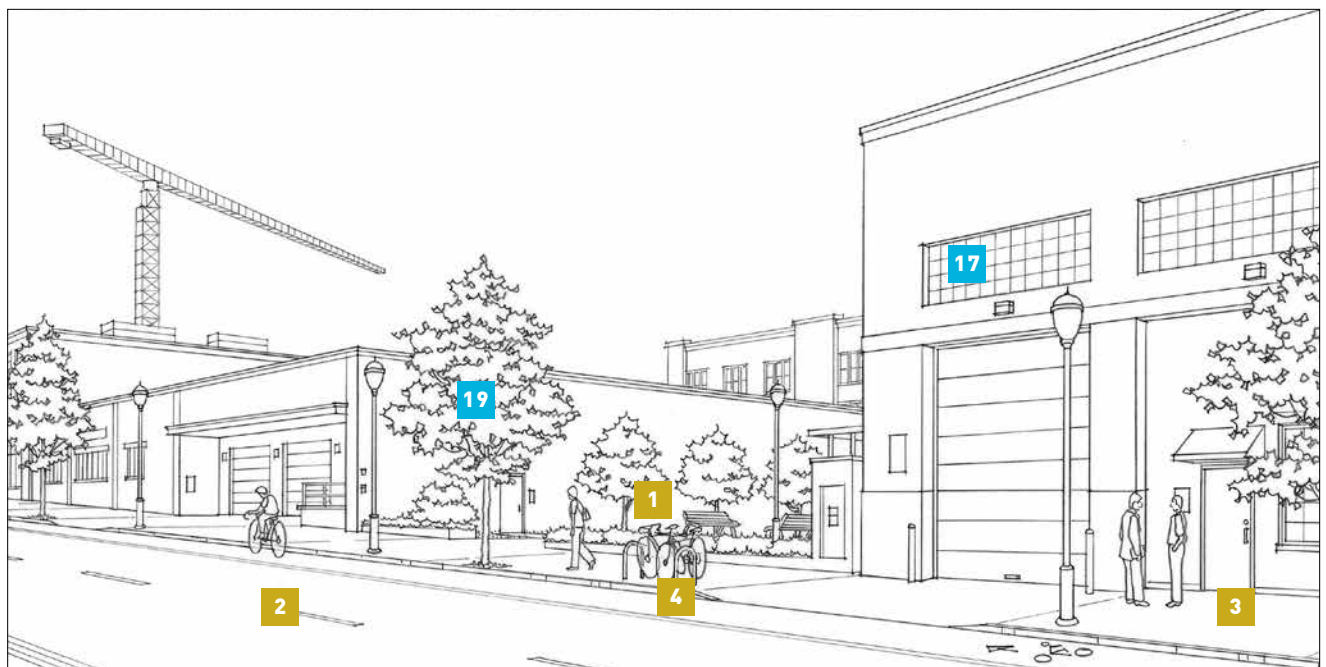
# OFFICE

Recommendations that apply but are not shown: 6 7 8 10 11 13 14 15 18 21



# INDUSTRIAL

Recommendations that apply but are not shown: 14 15 16 18 20



# SINGLE FAMILY

Recommendations that apply but are not shown: **7** **8** **12** **15** **16** **18**



# RETAIL

Recommendations that apply but are not shown: **1** **5** **6** **9** **10** **11** **14** **15** **16** **18** **20**





Runners, walkers, and cyclists take advantage of designated walking and biking lanes in Central Park in New York City. (Sara Hamerschmidt)

# PHYSICAL ACTIVITY

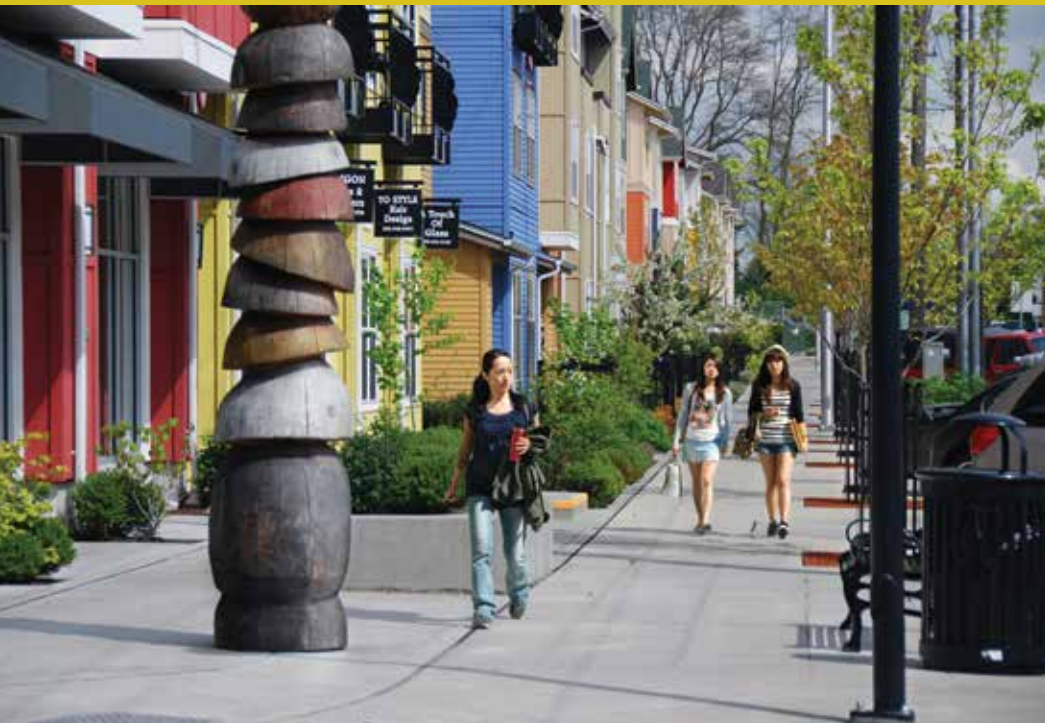
**DESPITE THE WELL-KNOWN BENEFITS** of exercise, only one in five U.S. adults gets enough physical activity.<sup>1</sup> In an era of sedentary jobs, extended screen time, and long commutes sitting in cars, it's no surprise that health researchers are telling us "sitting is the new smoking."<sup>2</sup>

Design and development practices can make a significant impact by increasing opportunities for physical activity in daily life. Several studies show that people who live in places with good pedestrian amenities, bicycle infrastructure, and access to trails have higher rates of physical activity and lower body weights.<sup>3,4</sup> Park and playground access is also critical, since people who live within half a mile of a park tend to exercise more than people who lack park access.<sup>5,6</sup> The design of buildings can also affect physical activity habits by encouraging active circulation within the site. Regular stair use provides numerous health benefits, including reduced stroke risk,<sup>7,8</sup> improved cardiovascular health,<sup>9</sup> and weight management.

- 1 INCORPORATE A MIX OF LAND USES**
- 2 DESIGN WELL-CONNECTED STREET NETWORKS AT THE HUMAN SCALE**
- 3 PROVIDE SIDEWALKS AND ENTICING, PEDESTRIAN-ORIENTED STREETSCAPES**
- 4 PROVIDE INFRASTRUCTURE TO SUPPORT BIKING**
- 5 DESIGN VISIBLE, ENTICING STAIRS TO ENCOURAGE EVERYDAY USE**
- 6 INSTALL STAIR PROMPTS AND SIGNAGE**
- 7 PROVIDE HIGH-QUALITY SPACES FOR MULTI-GENERATIONAL PLAY AND RECREATION**
- 8 BUILD PLAY SPACES FOR CHILDREN**

# LAND USE MIX

**SEVERAL STUDIES SHOW THAT MIXED LAND USE,** with shops and services nearby, is significantly associated with increased physical activity.<sup>10</sup> This is because people walk more in their daily lives when they can walk to different types of destinations.<sup>11</sup> Mixed-use neighborhood design can help people access shops, transit, parks, schools, and other neighborhood amenities on foot. Even single-family developments can take steps to leverage nearby town centers, retail, and other destinations.



The mixed-income Greenbridge community in Seattle, Washington, features retail, residential, and other uses clustered closely. (©Derek Reeves)

## INSIGHT

### Susan Powers

President, Urban Ventures  
DENVER, COLORADO

**CREATING MIXED-INCOME** and multigenerational communities that offer access to healthy food and a healthy lifestyle is what I'm most interested in, and I believe the result will be improved health. My sensitivity to this issue grew out of my long-term concerns about the affordable-housing needs in Denver and other cities.

The relationship between health and poverty is nowhere more apparent than in public housing, so being part of the Mariposa master-planning team for the Denver Housing Authority was an opportunity to move the dial on many factors that could improve the health of residents.

As a private developer at Aria, I have carried the same set of values with me, and addressing the health of residents in the context of the development is just part of how we think about all of our work now. We are fortunate to be working with Regis University and the Colorado Health Foundation and with them are taking these concepts to the neighborhood scale, beyond the boundaries of our private development.

The development community needs to be looking outside of our property lines because what we build impacts others, and the neighborhoods around our properties impact what we build. We are all experimenting a little to see how some less traditional partners can work together to improve a neighborhood's overall health.

## 1

# INCORPORATE A MIX OF LAND USES

## EVIDENCE-BASED STRATEGIES ▼

- Provide for a mix of uses in new projects, for example, residential, retail, office, recreation, and community facilities.<sup>12</sup>
- Provide retail and service uses on the ground floor to entice pedestrians.<sup>13</sup>



### INSIGHT

#### Guy Perry

Executive Director, Buildings + Places, Asia Pacific, AECOM  
HONG KONG, CHINA

**FOR THE FORESEEABLE FUTURE,** I cannot imagine a more important factor than health in shaping our environment—seemingly obvious, yet overlooked for decades. Though people are living longer, they are leading less healthy lives. Yet, just as our built environment bears much of the responsibility for our increasingly sedentary lifestyles, reshaping it also holds the keys to reinvigorating our living patterns. Our sedentary trend has been compounded by an increasingly convenient and seductive virtual world.

In spite of this and in light of this, people innately want to be human, so well-being has perhaps become the strongest marketing message in advanced economies. Communities should help sustain people's fitness without them even realizing it, keeping the personal trainer and the doctor as last resorts. I am determined to make human well-being-oriented planning and design the preeminent theme for how we shape our environment going forward. The remarkable bonus of this real-time health focus is that it is also one of the most effective ways of sustaining our planet.



**TOP:** Harper Court in Chicago, Illinois, features retail and other land uses. (Leslie Schwartz Photography)

**ABOVE:** The mixed-income Aria community in Denver, Colorado, incorporates a health clinic and other uses. (Rachel MacCleery)

# WALKING AND BIKING



People stroll on a pedestrian-friendly street in Tianjin, China. (Rachel MacCleery)

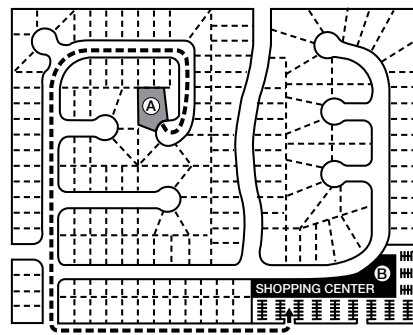
**HOW TRANSPORTATION INFRASTRUCTURE IS DESIGNED** determines how extensively active transportation options such as walking and biking are used. In communities that are designed to prioritize pedestrians, walking is a reliable mode of transportation with demonstrated health benefits. Biking is a great form of exercise, emission free, and one of the most efficient forms of transportation available—particularly for shorter trips under two miles. Bike lanes support real and perceived safety for all street users.<sup>14</sup> Several studies have shown a positive association between bicycle lanes and levels of bicycling.<sup>15</sup>

ULI has endorsed the *Urban Street Design Guide*<sup>16</sup> produced by the National Association of City Transportation Officials. The guide has detailed recommendations on street configurations in a variety of settings.

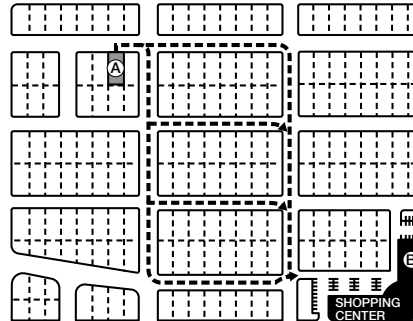
# DESIGN WELL-CONNECTED STREET NETWORKS AT THE HUMAN SCALE

## EVIDENCE-BASED STRATEGIES ▼

- **Design the street network with the pedestrian in mind: ensure good connectivity as well as a choice of routes for walking.**<sup>17,18</sup>
- **To maximize walkability, developments should favor shorter blocks (200–400 linear feet) with multiple intersections within developments.**<sup>19,20</sup>



(A) Conventional suburban hierarchical network.



(B) Traditional urban connected network.

Street networks with short and connected blocks create numerous options to travel from point A to point B. (Kimley-Horn)

## PROJECT

### Miasteczko Wilanow

WARSAW, POLAND

**MIASTECZKO WILANOW DISTRICT** is a planned mixed-use community in Warsaw, Poland, that was designed and developed at the pedestrian scale. Developed by Prokom Investments with IN-VI Investment Environments, the plan for the community began by establishing walking distances to daily needs for each resident and for all generations, including playgrounds, schools, shops, restaurants, and offices.

Rather than prioritizing the automobile, the street design and parking placement were dictated by the layout of sidewalks, cycling paths, and landscapes. Buildings are four to five

stories high, where visible and naturally lit stairs are a more attractive option than an elevator. It is also possible to cycle throughout Miasteczko Wilanow and directly to the center of Warsaw on an uninterrupted cycling path. Residents walk, take stairs, jog, and cycle as part of their daily lives.

Community health statistics have supported the focus on human-scaled design: Miasteczko Wilanow has the highest birthrate in Poland and the longest life expectancy in Warsaw, while having some of the lowest rates of heart disease and childhood obesity in the city.



# DESIGN WELL-CONNECTED STREET NETWORKS AT THE HUMAN SCALE

## BEST PRACTICE STRATEGIES ▼

- Establish pedestrian paths to allow for a cut-through in the middle of longer blocks.<sup>21</sup>
- Reduce the amount of land devoted to parking to increase space for other pedestrian-oriented uses and activities. Leverage shared parking opportunities where possible.
- Design blocks to minimize pedestrian exposure to surface parking lots and active driveways. For example, situate parking behind buildings and provide direct sidewalk access to building entrances and lobbies.<sup>22</sup>



**TOP:** The redesigned 1315 Peachtree Street in Midtown Atlanta, Georgia, replaced the circular drive with a pedestrian plaza, making the building and surrounding land uses more pedestrian friendly. (Before: Perkins+Will Inc.; after: Raftermen Photography) **ABOVE:** Consolidated parking creates a buffer against a neighboring highway and allows residences to be oriented around central courtyards at the West Village apartments in Davis, California. (Frederic Larson on behalf of West Village Community Partnership LLC)

## Bike Programming

**WHEN IT COMES TO** encouraging biking, providing racks and access to trails may not be enough to get occupants of a given development or building moving. Building and place managers can take an active role in programming activities to encourage use of these bike amenities.

**BIKE CLUBS.** Bike clubs are an excellent way to both encourage exercise and foster a sense of community. Group rides might include regular early morning rides before work, lunchtime rides at workplaces, and weekend rides.

**BIKE RACES.** Bike races can encourage healthy physical competition as well as community engagement, with recognition or prizes to the top bikers to make exercise more attractive. Holding a community event centered on biking gives people a reason to head outdoors as participants or spectators.

**BIKE-TO-WORK EVENTS.** Bike-to-work events are a great way to encourage bicycle use in the workplace. Advertise the event ahead of time and provide biking necessities such as helmets, lights, and maps of safe bike routes to interested employees. Employers can incentivize the event by providing food and beverages for participants. This type of event can give those who have never biked to work the tools and information they need to start.

**BIKING CLASSES.** Bike classes are a great way to get nonriders familiar with equipment, safety techniques, and rules of the road. Classes can serve as a regular exercise routine or as a way to support other bike programming such as bike races or clubs. Classes may be the first way that residents or employees are exposed to biking and provide individuals with the training necessary to become more comfortable with it.

### FOR MORE INFORMATION:

➔ “Attributes of a Bicycle Friendly Community,” League of American Bicyclists [http://bikeleague.org/sites/default/files/Attributes\\_of\\_BFC.pdf](http://bikeleague.org/sites/default/files/Attributes_of_BFC.pdf)

➔ “National Bike Challenge,” League of American Bicyclists <http://bikeleague.org/content/national-bike-challenge>

### INSIGHT

#### David Henry

Chief Operating Officer, Springfield Land Corporation  
BRISBANE, AUSTRALIA

**IN 1992**, as we were crafting a vision for Greater Springfield—which will eventually be home to 85,000 residents—we selected three industry sectors that we thought would support our residential housing and employment aspirations. Health was one of those three sectors.

Now 23 years on, with a population reaching 30,000, physical activity is everywhere: we have many kilometers of bike and jogging tracks, more than a third of the land preserved as open space, fully utilized sport fields, and significant public transport usage. Health anchors our development, with 15 schools focusing on health care, primary health care facilities immersed into the six suburban neighborhoods, a new hospital under construction, health-related training courses at the university and technical college, and retirement partners about to deliver new housing to meet our aging consumer base.

We 100 percent feel that health was the right focus for us.

### PROJECT

#### UC Davis West Village

DAVIS, CALIFORNIA

**THE UNIVERSITY** of California at Davis’s West Village neighborhood is the largest planned zero-net-energy community in the United States. The West Village also offers opportunities for physical activity to residents. The project was developed by the West Village Community Partnership LLC and designed by Studio E Architects, MVE Institutional, Lim Chang Rohling & Associates, Moore Rubell Yudell, and SWA Group.

University of California faculty, staff, and students living in the West Village have access to a number of parks, paths, and gardens that are designed to increase walking and other

physical exercise, while decreasing residents’ reliance on cars. Parking is consolidated along the eastern edge of the development, thereby allowing the apartments to be accessed by pedestrian and bike paths. A neighborhood bike trail, bike parking, and bike repair facilities on the premises further encourage residents to bike for recreation or transport.

The neighborhood hosts a 24-hour fitness center, sports courts, a yoga studio, and pools that provide residents the opportunity to engage in their preferred type of exercise on a daily basis.

## 3

# PROVIDE SIDEWALKS AND ENTICING, PEDESTRIAN-ORIENTED STREETSAPES

## EVIDENCE-BASED STRATEGIES ▼

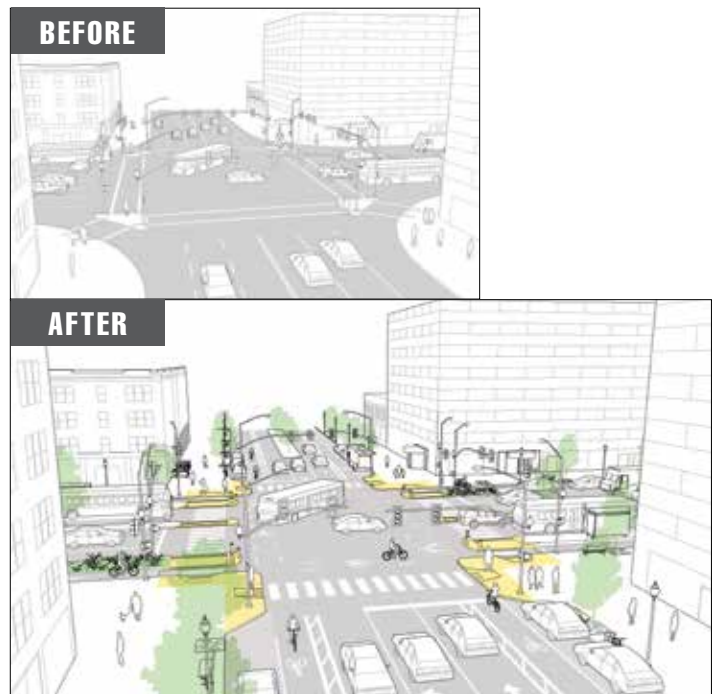
- **Build sidewalks in all new communities to encourage walking and to help keep pedestrians safe.**<sup>23</sup>
- **Include well-marked crosswalks, special pavers, and curb extensions to visually highlight pedestrians and slow traffic.**<sup>24</sup>
- **Light streets, trails, and public spaces to minimize dark and unsafe areas.**<sup>25,26</sup>



**TOP:** Sidewalks connect homes in the Mueller neighborhood in Austin, Texas. (Thomas McConnell Photography) **ABOVE:** In New York City, a variety of strategies—including signs, curb extensions, medians, and special markings—are used to keep pedestrians safe when crossing the street. (New York City Department of Transportation)

## BEST PRACTICE STRATEGIES ▼

- **Maximize transparency of facades at ground level—for instance, with windows—to increase visual interest and promote walkability.**
- **Provide amenities such as bike racks, street lamps, public art, benches, and bus shelters to turn sidewalks into more appealing spaces.<sup>27</sup>**
- **Include street trees and benches along sidewalks to provide shade and respite for pedestrians and joggers.<sup>21</sup>**
- **Within large projects, provide maps and signage oriented to pedestrians—with mileage and key destination points in the area—to help people feel at ease about walking and biking.<sup>27</sup>**



**TOP:** NACTO's Urban Street Design Guide recommends interventions including crosswalks, trees, and bulb-outs to improve the safety of streets. (*National Association of City Transportation Officials*) **MIDDLE:** The effective use of outdoor lighting improves the safety of public spaces at Cebu Park District in Cebu City, Philippines. (*Erik Liangoren*) **BOTTOM:** Signage and maps in public spaces orient pedestrians and bikers. (*New York City Department of Transportation*)

## 4

# PROVIDE INFRASTRUCTURE TO SUPPORT BIKING

## EVIDENCE-BASED STRATEGIES ▼

- **Where possible, provide bikeways within the street network.**<sup>28</sup>



- **Maximize connections to existing bicycle networks, including multiuse trails and greenways.**<sup>15</sup>



**FAR LEFT:** A barrier and parked cars buffer bike lanes in the Mueller neighborhood in Austin, Texas. (Thomas McConnell Photography)

**LEFT:** New trails link to the regional trail system at Rancho Mission Viejo in San Juan Capistrano, California. (SWA)

## PROJECT

### GlaxoSmithKline Headquarters

PHILADELPHIA, PENNSYLVANIA

**GLAXOSMITHKLINE'S** new office headquarters in Philadelphia's historic Navy Yard is designed to improve the health and productivity of its workforce. The project was developed by Liberty Property Trust and Synterra Partners and designed by Robert A.M. Stern Architects in association with Kendall/Heaton Associates.

In the open-concept workspace, employees are not limited to any one workspace for an extended period of time. Special features such as adjustable desks that move between sitting and standing promote healthy working habits, and workers can even exercise as they work by using one of the walk-station desks attached to

a treadmill. Adjustable chairs and monitor arms offer employees a comfortable, ergonomic office environment.

A prominent lobby staircase encourages employees to skip the elevator. Amenities such as an in-office gym, walking trails, and parks with a putting green offer employees a variety of ways to stay active throughout the workday. A bike-sharing program, maintained by local bike shop Keswick Cycle, offers employees a fleet of bikes to borrow for midday exercise or running errands. A health clinic with a nurse further supports the company's mission to make wellness a priority.

## BEST PRACTICE STRATEGIES ▼

- **Provide secure indoor bicycle parking in the form of indoor racks or storage rooms to ensure security and weather protection, and provide outdoor bike racks.** <sup>15,29,30</sup> **Offer bike valet services.**
- **Provide locker rooms and showers, which facilitate cycling and other types of exercise** <sup>29,31</sup> **and offer places to store helmets and gear.**
- **Set up a bike-share program to provide access to bikes for residents or tenants on an as-needed basis, particularly if the project does not have access to a larger bike-share network.**

(See link for Social Bicycles in Resources section.)



**TOP:** At Via6, an apartment building in Seattle, Washington, ample bike storage is a selling point. *(Ben Benschneider)* **MIDDLE:** The GlaxoSmith-Kline headquarters in Philadelphia, Pennsylvania, features an employee bike-share program. *(Brian Hackford/Keswick Cycle)* **BOTTOM:** Bicycle storage and racks are open to residents, office tenants, and other city commuters at the Century Building in Pittsburgh, Pennsylvania. *(Eric Staudenmaier Photography)*

# STAIRS

## EXPLORATION

### LEED Pilot Credit: Design for Active Occupants

**BUILDINGS THAT ENCOURAGE** stair use enhance physical activity opportunities and reinforce environmental sustainability goals through reduced energy expenditure from elevators and escalators. Recognizing this symbiosis between health and sustainability, in 2013 the U.S. Green Building Council released a new pilot credit called Design for Active Occupants, which aims to increase physical activity in building occupants. The credit was developed in collaboration with New York City agencies and private sector firms involved with developing the Active Design Guidelines.

To qualify for the Design for Active Occupants pilot credit, a project must have at least one main stairway that enables building occupants to travel freely between the entrance floor, occupant destination floors, and common use floors. (As necessary, access may be restricted to floor occupants through the use of security devices such as access keys and codes.) Additionally, the credit outlines a menu of suggested features related to stairway location, visibility, and design elements; signage prompting stair use; and the provision of exercise space and equipment.

#### FOR MORE INFORMATION:

➔ "Pilot Credit Library," U.S. Green Building Council  
[www.usgbc.org/pilotcredits](http://www.usgbc.org/pilotcredits)



**HISTORICALLY, MANY BUILDINGS** included a beautiful, grand staircase that people used on a daily basis. Over time, stairs have been relegated to the back corners of buildings. Incorporating well-lit, attractive, and easily accessible staircases into a project is a great way to encourage people to skip the elevator or escalator and incorporate small bursts of daily activity, particularly for trips of four floors or less.

The Teaching Center in Vienna, Austria, features enticing indoor and outdoor stairways. (BUSarchitektur)

# DESIGN VISIBLE, ENTICING STAIRS TO ENCOURAGE EVERYDAY USE

## EVIDENCE-BASED STRATEGIES ▼

- Provide open stairs that are unobstructed by turns or other obstacles.<sup>32</sup>
- Place stairs within 25 feet of an entrance and before any elevators.<sup>32,33</sup>
- Use aesthetic treatments such as vivid colors, artwork, and music.<sup>34,35</sup>
- Treat stairs with the same finishing standards as other public corridors in the building.<sup>36</sup>



**TOP:** The Gates Foundation headquarters in Seattle, Washington, features bright, open stairs. (Rachel MacCleery)

**RIGHT:** At the Arbor House development in the Bronx, New York, the main entrance was relocated to make stairs more prominent and visible. (Blue Sea Development Company)





# DESIGN VISIBLE, ENTICING STAIRS TO ENCOURAGE EVERYDAY USE

## BEST PRACTICE STRATEGIES ▼

- Use windows and skylights to make enclosed stairs more appealing.<sup>21</sup>
- Make egress stairs accessible and visible. Use fire-rated glass panels in stair doors or special magnetic devices that hold open stair doors and release automatically in case of emergency.
- In buildings where stairwells are locked for safety or security reasons, provide keys or access cards so building users have secure access.<sup>37</sup>



**ABOVE:** At the Bullitt Center in Seattle, Washington, natural materials and light make taking the stairs more appealing. (©Nic Lehoux) **RIGHT:** Electromagnets hold open doors to fire stairways at the Center for Architecture in New York City. (Emily Young)

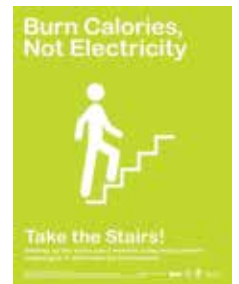


## 6

# INSTALL STAIR PROMPTS AND SIGNAGE

## EVIDENCE-BASED STRATEGIES ▼

- Provide stair prompt signage at elevator banks and at the base of or entrance to staircases.<sup>38</sup>
- Install wayfinding signage to direct visitors to the nearest stairway.<sup>38,39</sup>



Signage has been shown to be effective at encouraging people to use the stairs. (Clockwise from left: Brandie Mies/1100 Architect; Sara Hammerschmidt; NYC Department of Health and Mental Hygiene.)

## PROJECT

### Mariposa

DENVER, COLORADO

**AT MARIPOSA**, an affordable housing redevelopment project located southwest of downtown Denver and redeveloped by the Denver Housing Authority, physical activity is encouraged through thoughtful design and programming choices. Located adjacent to a new light-rail station, Mariposa encourages the use of active transportation options with a bike-sharing program and supportive classes, and the community center features an attractive, interactive internal staircase and lots of programming to get people moving.

# PARKS AND PLAYGROUNDS



At the Superkilen park in Copenhagen, Denmark, unconventional play equipment encourages children to run and climb. *(Iwan Baan)*

**WELL-DESIGNED** and well-maintained parks and playgrounds of all sizes serve as venues for physical activity and recreation, increase access to nature, and boost the value of surrounding properties.<sup>40</sup> Parks and playgrounds shape community identity and serve as the backdrop to social interactions among different ages and groups.<sup>41</sup> In one study, researchers found that those living within half a mile and a mile of a park used it for around 50 percent and 16 percent of vigorous physical activity time, respectively.<sup>5</sup> Playgrounds are essential resources in helping to combat the childhood obesity epidemic.<sup>42,43</sup>

## PROJECT

### Rancho Sahuarita

SAHUARITA, ARIZONA

**THE MASTER-PLANNED COMMUNITY** Rancho Sahuarita, located near Tucson, Arizona, and developed and owned by Sharpe & Associates, was designed with healthy living at the forefront.

The lake's clubhouse provides residents with numerous opportunities for physical activity, including a 6,000-square-foot fitness center, dance and aerobic studios, splash park, and lap pool. The clubhouse also features an outdoor "adventure park" with tennis and basketball courts, a mini golf green, and a children's playground. Homeowners association dues cover more than 50 different fitness classes offered in the clubhouse, including tennis, basketball, ballet, karate, and yoga.

An extensive network of recreational amenities, such as a ten-acre lake with an adjacent park and walkable promenade, encourage physical activity. The development maintains two large parks complete with pools, as well as smaller parks throughout the grounds with volleyball courts and play equipment for children. Forty miles of paved walking paths and bicycle trails, including a kid-friendly safari trail with life-size bronze animals, connect residents throughout the community.

Rancho Sahuarita has partnered with Carondelet Health Network to maintain an on-site primary and urgent care facility, as well as to offer programming that encourages physical activity and a healthy lifestyle, like a children's summer camp and a health and wellness lecture series.

# PROVIDE HIGH-QUALITY SPACES FOR MULTIGENERATIONAL PLAY AND RECREATION

## EVIDENCE-BASED STRATEGIES ▼

- Site and design projects to maximize access to on- and off-site high-quality parks and recreation spaces.<sup>5,44</sup>
- Create adaptable, multiuse spaces for community gathering, play, and social activity for all ages.<sup>45</sup>
- Accommodate diverse uses (for example, dog parks, skate parks, and picnic facilities).<sup>45</sup>
- Incorporate exercise equipment for all ages, such as outdoor elliptical machines and circuit training equipment.<sup>46,47</sup>



**TOP:** A free fitness class at City Center in Washington, D.C., encourages people to get active. (Sara Hammerschmidt) **RIGHT:** Outdoor fitness equipment offers adults free places to exercise. (Allana Wesley White)

# PROVIDE HIGH-QUALITY SPACES FOR MULTIGENERATIONAL PLAY AND RECREATION

## BEST PRACTICE STRATEGIES ▼

- **Develop on-site recreation spaces that suit the project scale, from a large neighborhood park to a parklet (which is a small, often temporary park).**
- **Ensure that routes leading to new and existing parks are safe, well marked, and well lit.**
- **Locate new parks and play spaces in view of busy sidewalks or streets, and incorporate appropriate lighting.**
- **Provide swimming pools, where appropriate.**



The minipark Pracinha Oscar Freire was created on the site of an empty parking lot in São Paulo, Brazil. (REUD Brazil)

### INSIGHT

#### Jeremy Sharpe

Vice President, Community Development, Sharpe & Associates  
TUCSON, ARIZONA

**AT RANCHO SAHUARITA**, we aspire to enhance our residents' lives by creating engagement, participation, and education around health. We believe that by bringing these opportunities to the community, we can impact resident choices and ultimately create a healthier place for people to live. The key to our success lies in intentionality. Our soft programming and hard asset mix work together to bring residents out of their homes and into the community.

As developers, we have the unique opportunity and the immense responsibility to create places that impact peoples' lives and the overall community in a positive way. I love seeing dozens of schoolchildren walking to our Safari Trail to learn about different animals or the grandparent who takes his granddaughter to our farmers market. Interactions like these encourage our team to continue striving for more innovative ways to bring healthy opportunities to community.

## 8

# BUILD PLAY SPACES FOR CHILDREN

## EVIDENCE-BASED STRATEGIES ▼

- **Preserve or create natural terrain to support play.**<sup>48</sup> For example, plant trees, grasses, and other greenery; make a hill to climb or cycle around; and add boulders, tree stumps, or sand.
- **Incorporate simple interventions such as colorful ground markings to inspire more active play among children.**<sup>49</sup>
- **Think beyond classic swings and slides; install playground equipment that includes movable parts, imaginative playscapes, and opportunities for children of all abilities.**<sup>48,50</sup>

**TOP:** An empty parking lot was transformed into an appealing playground in New York City. (*Joan Keener/The Trust for Public Land*) **RIGHT:** Colorful ground markings inspire play for children in Houston, Texas. (*Community Design Resource Center, University of Houston*)



## BEST PRACTICE STRATEGIES ▼

- Respond to the local climate by providing shelters that offer shade and wind protection.
- Install drinking fountains to encourage water consumption and support longer play.
- Provide water features, such as splash pads with fountains, nozzles, and spray pipes on no-slip surfaces, to help children and families stay cool while being active even on the hottest days of summer.



**TOP:** The Rancho Sahuarita development in Sahuarita, Arizona, features a splash park. (*Rancho Sahuarita*) **MIDDLE:** Drinking fountains in play spaces allow children to play longer. (*Leslie Science and Nature Center*) **BOTTOM:** Covered structures provide shade and offer protection from wind and rain. (*Joan Keener/The Trust for Public Land*)

## EXPLORATION

### Programming and Maintenance

**ALTHOUGH PROVIDING** the appropriate infrastructure for play and physical activity is critical, it is often not enough to keep people active. Parks and playgrounds also need maintenance and programming to keep them clean, safe, and well used.

Developers can partner with neighborhood organizations, local businesses, and other community groups to create and support park maintenance plans. These groups can help organize volunteers or provide financial support to help with regular upkeep of park and playgrounds, including cleanup, landscaping, and other maintenance. A maintenance plan will help ensure that all users can continuously enjoy the spaces.

Partnerships can be formed for programming and events to draw people into parks and playgrounds. Developers should identify local partners who can host free fitness and gardening classes, kid-focused activities, movie nights, and other community events.

#### FOR MORE INFORMATION:

- ➔ "What Role Can Programming Play in Creating Safer Parks?," Project for Public Spaces  
[www.pps.org/reference/torontosafety5](http://www.pps.org/reference/torontosafety5)

## RESOURCES

### LAND USE MIX

- ➔ "Smart Growth Principles: Mix Land Uses," Smart Growth Online  
[www.smartgrowth.org/principles/mix\\_land.php](http://www.smartgrowth.org/principles/mix_land.php)
- ➔ "Design Principles: Mixed Land Use (Australia)," Healthy Spaces & Places  
[www.healthyplaces.org.au/site/mixed\\_land\\_use.php](http://www.healthyplaces.org.au/site/mixed_land_use.php)

### WALKING AND BIKING

- ➔ *Active Design Guidelines: Promoting Physical Activity and Health in Design*, City of New York  
<http://centerforactivedesign.org/guidelines>
- ➔ *Urban Street Design Guide*, National Association of City Transportation Officials  
<http://nacto.org/usdg>
- ➔ *Measuring the Street: New Metrics for 21st Century Streets*, NYC Department of Transportation  
[www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf](http://www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf)
- ➔ "Green Garage Certification," Green Parking Council  
[www.greenparkingcouncil.org/certified-green-garages/certification](http://www.greenparkingcouncil.org/certified-green-garages/certification)
- ➔ Social Bicycles website (bike share)  
<http://socialbicycles.com>

### STAIRS

- ➔ *Active Design Guidelines: Promoting Physical Activity and Health in Design*, City of New York  
<http://centerforactivedesign.org/guidelines>
- ➔ "Design for Active Occupants," U.S. Green Building Council, LEED  
[www.usgbc.org/node/4810558?return=/credits/new-construction/v4](http://www.usgbc.org/node/4810558?return=/credits/new-construction/v4)
- ➔ *Unlocking Office Stairwells: A Resource for Property Owners, Building Managers, and Tenants*, ChangeLab Solutions  
[http://changelabsolutions.org/sites/phlpnet.org/files/Unlocking\\_Office\\_Stairwells\\_FactSheet\\_FINAL\\_20120423\\_1.pdf](http://changelabsolutions.org/sites/phlpnet.org/files/Unlocking_Office_Stairwells_FactSheet_FINAL_20120423_1.pdf)
- ➔ "Stairwell Motivational Signs," Centers for Disease Control and Prevention, Healthier Worksite Initiative  
[www.cdc.gov/nccdphp/dnpao/hwi/toolkits/stairwell/motivational\\_signs.htm](http://www.cdc.gov/nccdphp/dnpao/hwi/toolkits/stairwell/motivational_signs.htm)

### PARKS AND PLAYGROUNDS

- ➔ *From Fitness Zones to the Medical Mile: How Urban Park Systems Can Best Promote Health and Wellness*, Peter Harnik and Ben Welle, The Trust for Public Land  
<http://cloud.tpl.org/pubs/ccpe-health-promoting-parks-rpt.pdf>
- ➔ International Play Equipment Manufacturers Association website (certifies play equipment and surfacing materials)  
[www.ipema.org](http://www.ipema.org)
- ➔ Playscapes design blog, Paige Johnson  
[www.play-scapes.com](http://www.play-scapes.com)



Children learn to plant fruits and vegetables in the James Berry Elementary School garden in Houston, Texas. (Aker Imaging)



# HEALTHY FOOD AND DRINKING WATER

**WHAT WE EAT AND DRINK DIRECTLY AFFECTS WELL-BEING.** Unfortunately, unhealthy foods are cheap and readily available, and sugary drinks like soda are a major contributor to today's obesity epidemic.<sup>1</sup> Vending machines are ubiquitous, but they usually sell snacks and drinks that are high in sugar, salt, and fat and have little nutritional value. Unhealthy dietary patterns are contributing to current obesity and cardiovascular disease trends in the United States and globally.<sup>2</sup> More than 10 percent of the world's population is obese.<sup>3</sup> Thoughtful integration of strategies that promote access to healthy food and drinking water can bolster health, sustainability, and the appeal of projects and communities.

- 9 ACCOMMODATE A GROCERY STORE**
- 10 HOST A FARMERS MARKET**
- 11 PROMOTE HEALTHY FOOD RETAIL**
- 12 SUPPORT ON-SITE GARDENING AND FARMING**
- 13 ENHANCE ACCESS TO DRINKING WATER**

# HEALTHY FOOD FOR SALE



The Pike Place Market in Seattle, Washington, hosts vendors selling fresh, healthy food.  
*(Rachel MacCleery)*

**THE RETAIL LANDSCAPE** is an important component of the overall health picture. In many communities, demand for supermarkets is unmet.<sup>4,5</sup> Benefits include supporting local agriculture, contributing to overall neighborhood revitalization, and generally promoting social well-being.<sup>6,7</sup> By facilitating access to healthy food, developers and property owners can promote health and appeal to health-focused consumers.

## INSIGHT

### Elizabeth Shreeve

Principal, SWA Group  
SAUSALITO, CALIFORNIA

**THE TOPIC OF HEALTH** has deep roots for me. I come from a medical family—my dad worked with patients struggling with obesity and type 2 diabetes. It was called “adult onset” then, but now it’s a disease of childhood. To me, that’s a motivation to design places that support healthy choices—that get people moving. Nature has tremendous restorative power, and we need to get people closer to it.

Landscape architects design places that are intrinsically supportive of health—trails, parks, plazas, the spaces between buildings. At Guthrie Green in Tulsa, we designed a park for the George Kaiser Family Foundation that now hosts an amazing lineup of exercise classes, such as yoga, tai chi, and belly dancing. The lawn suffers, but the people love it! At UC Davis West Village, we prepared the master plan for a new zero-net-energy community where bicycling is the primary mode of transportation.

These are the sorts of places where we love to walk and bicycle, where we play with our children and friends. The landscape is where we get healthy.

## 9

# ACCOMMODATE A GROCERY STORE

## EVIDENCE-BASED STRATEGIES ▼

- Provide space to accommodate a full-service grocery store, particularly in neighborhoods where there is unmet demand for healthy foods.<sup>8,9</sup>



**LEFT AND ABOVE:** Fresh and local food is for sale at the Market at the Pinehills, Plymouth, Massachusetts. (Left: The Pinehills; Above: Mark A. Steele Photography Inc.)

## PROJECT

### Ecopark

HANOI, VIETNAM

**ECOPARK**, a master-planned community in Hanoi, Vietnam, developed and designed by Viet Hung Urban Development & Investment J.S.C., is helping address some of the issues of living in Vietnamese cities. Given the quality-of-life challenges that are emerging as the country's infrastructure development races to keep up with its rapid economic growth, Ecopark's sustainable planning is providing residents with much-needed access to abundant green open spaces, pedestrian links, and a higher degree of safety and security while adding more than 30,000 jobs to the economy. The project also has a focus on enhancing access to fresh and safe local food, a growing concern of Hanoians.

Ecopark has designed numerous features to connect residents to local food sources. To ensure that residents have consistent

access to healthy food, retail space is planned and leased with special promotional conditions for certified tenants offering organic and locally sourced food options that are grown without the use of pesticides. The community holds weekly farmers markets that provide residents with another source of fresh fruits and vegetables, as well as artisanal food products, and help support small local businesses.

Residents and students of the local school system have the opportunity to grow their own herbs and vegetables in open land plots that are provided by the development. Restaurants in the development's town center are able to take advantage of the availability of safe, locally grown produce.

## EXPLORATION

### Policies, Incentives, and Financing for Grocery Stores

**MANY LOW-INCOME** neighborhoods are also “food deserts” that suffer from a lack of full-service grocery stores and access to fresh, healthy food. To combat this issue, an increasing number of federal and local policies are being designed to attract healthy food stores to areas with few options.

Policies that lessen stores’ tax burdens and licensing fees as well as ease zoning requirements have had success in encouraging grocery stores to open in these areas. Some local policy tools include requiring fewer parking spaces per square foot, providing stores with property tax credits, and offering grants or loans to enable grocery stores to open. Some federally designated community development entities have also used the federal New Market Tax Credits program to support the establishment of grocery stores in underserved areas.

#### FOR MORE INFORMATION:

- ➔ “Food Retail Expansion to Support Health,” New York City  
[www.nyc.gov/html/misc/pdf/fresh\\_fact\\_sheet\\_eng.pdf](http://www.nyc.gov/html/misc/pdf/fresh_fact_sheet_eng.pdf)
- ➔ “Healthy Food Financing Funds,” Healthy Food Access Portal  
[www.healthyfoodaccess.org/funding/healthy-food-financing-funds](http://www.healthyfoodaccess.org/funding/healthy-food-financing-funds)
- ➔ “New Markets Tax Credit Program,” Community Development Financial Institutions Fund  
[www.cdfifund.gov/what\\_we\\_do/programs\\_id.asp?programID=5](http://www.cdfifund.gov/what_we_do/programs_id.asp?programID=5)

9

## ACCOMMODATE A GROCERY STORE

### BEST PRACTICE STRATEGIES ▼

- ➔ **Check local zoning code requirements and industry standards to ensure that retail space meets minimum square footage, ground-floor ceiling height, glazing, and other specifications related to grocery stores. Prezone space for a grocery store where possible.**

At the mixed-use project 77H in Washington, D.C., the Walmart offers full-service grocery options. (Ed McMahon)



### PROJECT

#### Harvest

ARGYLE/NORTHLAKE, TEXAS

**HARVEST**, a master-planned community developed by Hillwood Communities in suburban Argyle and Northlake, Texas, is located on the site of a historic farm and connects its residents to an agricultural lifestyle. Among the many amenities that contribute to healthy living is a five-acre farm that produces fresh, organic produce for residents and an area food bank. A local farmer runs the farm, which also operates as an outdoor agricultural classroom. Residents can take classes to learn how to grow their own seasonal crops in the community garden.

## EVIDENCE-BASED STRATEGIES ▼

- **Host a farmers market on site, particularly in neighborhoods where demand for healthy foods is not met.**<sup>10,11</sup>
- **Help make farmers markets more affordable by supporting pay-as-you-can policies, and encourage or require vendors to accept Electronic Benefit Transfer (EBT) and similar payment programs.**<sup>12,13</sup>

**TOP:** Farmers markets provide ready access to fresh, local, and healthy food. (Ed Ragland/USDA)  
**RIGHT:** Farmers markets that accept SNAP/EBT and other benefits increase the accessibility of healthy food. (Lance Cheung/USDA)



## PROJECT

### Champion Station

SAN JOSE, CALIFORNIA

**CHAMPION STATION** is a redeveloped office park that incorporated numerous amenities and features that have set it apart from more traditional suburban office parks. Developed by TMG Partners, Champion Station encompasses connectivity and healthy amenities—both within the complex and nearby. Opportunities for physical activity and collaboration are abundant, including running and biking trails, sports courts, and open meeting spaces.

The development also provides opportunities for healthy food access beyond what office parks more typically provide. Champion Station is located in walking and biking distance of a number of healthy food options that can be accessed by foot or by bike, including farmers markets. The building concierge offers classes on gardening, and common grill areas and kitchens encourage social interaction and healthy food consumption among employees.

## EXPLORATION

### Increasing Access to Healthy Food

**COMMUNITY FARMERS** markets are convenient ways to connect people to local and fresh produce but often at a higher price than large-scale grocery stores. In an effort to increase access to the healthy food sold at farmers markets, many states have made efforts to establish an EBT system so people enrolled in programs such as the Supplemental Nutrition Assistance Program (SNAP) or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) can use these benefits toward fresh produce.

Another way to increase access to produce available at farmers markets among low-income individuals and families is to match every dollar spent in cash or SNAP/WIC benefits with a voucher that is redeemable for additional food. Farmers markets that operate a Community Supported Agriculture program can seek members from a variety of economic backgrounds by basing the membership fees on income.

#### FOR MORE INFORMATION:

- ➔ "WIC Farmers' Market Nutrition Program," U.S. Department of Agriculture [www.fns.usda.gov/sites/default/files/wic/WICFMNPFactSheet.pdf](http://www.fns.usda.gov/sites/default/files/wic/WICFMNPFactSheet.pdf)
- ➔ *Supplemental Nutrition Assistance Program (SNAP) at Farmers Markets: A How-To Handbook*, USDA Agricultural Marketing Service, USDA Food and Nutrition Service, and Project for Public Spaces Inc. [www.ams.usda.gov/AMsv1.0/getfile?dDocName=STEPRC5085298&acct=wdmgeninfo](http://www.ams.usda.gov/AMsv1.0/getfile?dDocName=STEPRC5085298&acct=wdmgeninfo)
- ➔ "Farmers Markets and Local Food Marketing, Publications and Presentations," USDA Agricultural Marketing Service [www.ams.usda.gov/AMsv1.0/MarketingServicesPublications](http://www.ams.usda.gov/AMsv1.0/MarketingServicesPublications)

## 10 HOST A FARMERS MARKET

### BEST PRACTICE STRATEGIES ▼

- ➔ **Develop flexible spaces such as public plazas that can be used for farmers markets. The most desirable sites are highly visible and accessible, have significant existing foot traffic, and can accommodate parking for farmers' trucks.**<sup>14</sup>
- ➔ **Facilitate the delivery of fresh produce baskets directly from farmers or farmers markets to tenants in office buildings and multifamily settings; for example, host a community-supported agriculture program.**

A farmers market in the Mount Vernon Triangle area of Washington, D.C., hosts vendors selling fresh and prepared foods. (Sara Hammerschmidt)



# PROMOTE HEALTHY FOOD RETAIL

## EVIDENCE-BASED STRATEGIES ▼

- **Provide healthier foods in cafeterias, vending machines, and other retail sites.**<sup>15,16</sup>
- **Require healthy food options in vendor contracts and encourage strategic pricing, product placement, and promotional standards that favor healthy options.**<sup>17</sup>

(See “Model Beverage and Food Vending Machine Standards” in Resources section.)

- **Do not accommodate unhealthy fast-food restaurants in your project.**<sup>18,19</sup>



Cafeterias that offer fresh salads enhance access to healthy food. (USDA)

## BEST PRACTICE STRATEGIES ▼

- **Prioritize healthy restaurant options. For example, seek out companies that offer nutritious alternatives to traditional fast-food fare.**

### PROJECT

#### Stapleton

DENVER, COLORADO

**AT STAPLETON**, a master-planned community in Denver, Colorado, developed by Forest City, healthy food is everywhere you look. Urban agriculture is encouraged, with some of the parks offering space for residents to grow vegetables and herbs. The landscaping incorporates a number of edible options, including cherry, plum, and apple trees, berry bushes, and grape vines. After noticing how the residents embraced the edible landscaping, the developer added “harvest tables” in open spaces near some of the landscaping to encourage community gathering and interaction. Stapleton residents also enjoy regular farmers markets on the weekends, which sell locally grown produce, meats, and artisanal food items.



# GROWING HEALTHY FOOD



At the Grow Community on Bainbridge Island in Washington, vegetable gardens are a major focus. (Serena Peck)

**COMMUNITY GARDENS**, edible landscaping, and small farms grow produce that can make a healthy diet more accessible. Participation in community gardening activities can increase consumption of fruits and vegetables,<sup>20</sup> and when community members come together around the growing of food, the interaction promotes social bonds and connections.<sup>21</sup> Local produce helps reduce pollution associated with shipping food long distances.<sup>22</sup> In recent years, gardening has enjoyed a growing popularity, a trend that is likely to continue. Small farms can take the place of golf courses as community centerpieces, can cost less on an upfront and ongoing basis, and can provide community members with fresh, locally grown food.

## EXPLORATION

### Edible Landscaping

**EDIBLE LANDSCAPING** is the practice of integrating food-producing plants, such as trees, shrubs, and herbs, into a landscape design. A variety of edibles—such as berry bushes, fruit and nut trees, lettuce, cherry tomatoes, and herbs—can be integrated with more traditional plants to create an ornamental and productive landscape. With the burgeoning interest in gardening and local food, edible landscaping can contribute to a project's market appeal.

Edible landscaping can be integrated into any type of project. Label the plants and trees, and include signage that encourages or provides guidelines for harvesting the edibles. Programming activities, including group planting or harvesting events, can build resident and tenant engagement.

#### FOR MORE INFORMATION:

- ➔ "Extension Fact Sheet: Edible Landscaping," Ohio State University <http://ohioline.osu.edu/hyg-fact/1000/pdf/1255.pdf>
- ➔ "Edible Landscaping Basics," in Rosalind Creasy, *Edible Landscaping* [www.rosalindcreasy.com/edible-landscaping-basics](http://www.rosalindcreasy.com/edible-landscaping-basics)

# SUPPORT ON-SITE GARDENING AND FARMING

## EVIDENCE-BASED STRATEGIES ▼

- Provide space for growing food on site through community gardens, edible landscaping, or a small-scale farm.<sup>23,24</sup>
- Facilitate opportunities to get locally grown produce to residents,<sup>25</sup> for example through farm stands, farmers markets, or community-supported agriculture arrangements.

### INSIGHT

#### Erin Christensen Ishizaki

Associate Principal, Mithun  
SEATTLE, WASHINGTON  
*Winner, 2014 Urban Land 40 Under 40*

**WHAT INSPIRES ME MOST** is getting to know a community's unique DNA: climate, identity, culture, and place. Design with health and quality of life in mind is the ultimate in responsive, user-focused design. To me, innovations through evidence-based design are an exciting way to provide new choices and living environments that have a multitude of benefits—resilience, equity, human connections, and well-being.



**ABOVE:** The Via Verde project in South Bronx, New York, is home to fruit orchards. (Jonathan Rose Companies) **RIGHT:** A farm producing healthy food is at the heart of the Willowsford project in Ashburn, Virginia. (Willowsford)



## BEST PRACTICE STRATEGIES ▼

- **Partner with local community organizations that offer gardening or farming expertise. Collaborate with them on site assessment, planning, and preparation.**
- **Select sites that are suitable for growing food and readily accessible to potential gardeners.<sup>26</sup>**
- **Assess past uses and potential pollution sources. Test soils and take steps to manage risks as appropriate, for example, by using raised beds or container gardens.<sup>27</sup>**

(See *Brownfields and Urban Agriculture* in Resources section.)



In the community garden in the Mariposa community in Denver, Colorado, residents grow fresh food. (Rachel MacCleery)

**INSIGHT****Marja Preston**

Former president, Asani Development  
BAINBRIDGE ISLAND, WASHINGTON

**I HAVE ALWAYS BELIEVED** that our social well-being has an immense effect on our overall health. The way we design buildings and neighborhoods can profoundly influence our social health, having wide-reaching impacts for individuals and communities as a whole.

In general, what is healthy for people is also healthy for the planet. For instance, neighborhoods designed to include community gardens increase opportunities for eating healthy foods, reduce the carbon footprint of food transport, and more important, create opportunities for social connections amongst neighbors.

The places we design and build now will be here for the next 100 years. As developers, we must create places that are healthy for people and for the planet so that we shape our future responsibly.

## Soil

**SOIL MAY CONTAIN** a number of contaminants that can affect human health. Depending on the history of the parcel under development, it may contain chemicals or heavy metals present from sewage, pesticides, toxic cleaners, paint, or other toxic materials. Direct contact with contaminated soil is dangerous, and testing should be performed to ensure that building occupants, especially children, are not exposed to harmful chemicals.

Soil should be tested before planting any plants intended for human consumption or when new soil is used to fill planting boxes. Organic farms can reduce water and soil pollution and are a best practice for farms operating close to people. Raised beds can provide a barrier from contaminated soil on site.

**FOR MORE INFORMATION:**

- ➔ *Reusing Potentially Contaminated Landscapes: Growing Gardens in Urban Soils*, U.S. Environmental Protection Agency  
[www.epa.gov/region4/foiapggs/readingroom/rcra\\_community/urban\\_gardening\\_fina\\_fact\\_sheet.pdf](http://www.epa.gov/region4/foiapggs/readingroom/rcra_community/urban_gardening_fina_fact_sheet.pdf)
- ➔ "Soil Testing Is an Excellent Investment for Garden, Lawn, and Landscape Plants, and Commercial Crops," Ohio State University  
<http://ohioline.osu.edu/hyg-fact/1000/pdf/1132.pdf>
- ➔ "Interpreting Your Soil Test Results," UMass Extension Center for Agriculture  
<https://soiltest.umass.edu/fact-sheets/interpreting-your-soil-test-results>

➔ **Consult available local guidelines for community garden design.**<sup>28</sup>

(See *Growing Community Gardens* handbook in the Resources section.)

➔ **Craft a management and maintenance plan with clearly laid-out responsibilities for day-to-day gardening activities, as well as rules, security, and strategies for preventing vandalism.**<sup>29</sup>  
**If needed, hire a specialty landscaper or gardener.**

## PROJECT

## Via Verde

SOUTH BRONX, NEW YORK

**AT VIA VERDE**, a 222-unit, mixed-income housing project in New York City's South Bronx neighborhood developed by Jonathan Rose Companies and Phipps House and designed by Dattner Architects, Grimshaw Architects, and Lee Weintraub Landscape Architecture, urban agriculture dominates.

Garden amenities and facilities are located throughout the development, including a ground-level courtyard garden, a fruit tree orchard, a fitness garden, and a community garden on the fifth floor. A local nonprofit organization, GrowNYC, is managing and operating the gardens in the first two years of operation, with hopes that the Via Verde community will eventually entirely manage and maintain the gardens.

An assortment of organic heirloom herbs, vegetables, and edible flowers is grown in the garden and distributed to residents and the surrounding community. Residents also participate in monthly workshops where they prepare food and participate in tasting demonstrations and recipe giveaways.

# DRINKING WATER



**ON ANY GIVEN DAY**, half of all Americans consume sugary drinks; they represent the top calorie source in the average teenager's diet, setting the stage for weight gain and lifelong health problems like diabetes.<sup>1</sup> Attractive alternatives are essential, and water is by far the best bet, because it is calorie free, inexpensive, and readily available.<sup>30</sup>

Providing drinking water at playgrounds and community gathering places can enhance health. (Left: Christina Spicuzza/Flickr; below: Jim Larrison/Flickr)

13

## ENHANCE ACCESS TO DRINKING WATER

### EVIDENCE-BASED STRATEGIES ▼

- ➔ **Install drinking fountains in parks, playgrounds, gyms, and public spaces.**<sup>31,32</sup>



## BEST PRACTICE STRATEGIES ▼

- ➔ **Install drinking fountains or water coolers along commonly used corridors to make water more visible and accessible.**
- ➔ **Provide taps on drinking fountains or stand-alone filling stations to make filling reusable water bottles easier.**
- ➔ **Connect drinking-water filters to sink faucets so people feel comfortable drinking straight from the tap.**



Faucet design can make refilling water bottles and filtering tap water easier. (Above: Sara Hammerschmidt; right: Rachel MacCleery)



## RESOURCES

### HEALTHY FOOD FOR SALE

- ➔ "Retail and Grocery Business Guide," City of Baltimore  
<http://business.baltimorecity.gov/BusinessGuides/RetailandGrocery.aspx>
- ➔ *Grocery Store Attraction Strategies: A Resource Guide for Community Activists and Local Governments*, PolicyLink and LISC Bay Area  
<http://research.policyarchive.org/13664.pdf>
- ➔ *Food within Reach: A Guide to Opening Small Farmers' Markets in San Jose, California*, Fresh Approach  
<http://foodwithinreach.org>
- ➔ "Model Beverage and Food Vending Machine Standards," National Alliance for Nutrition and Activity  
<http://cspinet.org/new/pdf/final-model-vending-standards.pdf>
- ➔ "Healthy Food Access Portal," PolicyLink, the Reinvestment Fund, and the Food Trust  
[www.healthyfoodaccess.org](http://www.healthyfoodaccess.org)

### GROWING HEALTHY FOOD

- ➔ *Growing Community Gardens*, Denver Urban Gardens  
[http://dug.org/storage/public-documents/DUG\\_Best\\_Practices\\_digital\\_copy.pdf](http://dug.org/storage/public-documents/DUG_Best_Practices_digital_copy.pdf)
- ➔ *Brownfields and Urban Agriculture: Interim Guidelines for Safe Gardening Practices*, U.S. Environmental Protection Agency  
[www.epa.gov/brownfields/urbanag/pdf/bf\\_urban\\_ag.pdf](http://www.epa.gov/brownfields/urbanag/pdf/bf_urban_ag.pdf)
- ➔ *Ground Rules: A Legal Toolkit for Community Gardens*, NPLAN and ChangeLab Solutions  
[http://changelabsolutions.org/sites/default/files/CommunityGardenToolkit\\_Final\\_\(CLS\\_20120530\)\\_20110207.pdf](http://changelabsolutions.org/sites/default/files/CommunityGardenToolkit_Final_(CLS_20120530)_20110207.pdf)

### DRINKING WATER

- ➔ *Increasing Access to Drinking Water in Schools*, Centers for Disease Control and Prevention  
[www.cdc.gov/healthyyouth/npao/pdf/Water\\_Access\\_in\\_Schools.pdf](http://www.cdc.gov/healthyyouth/npao/pdf/Water_Access_in_Schools.pdf)

A roof deck with indoor and outdoor communal spaces encourages social interaction at Via6 in Seattle, Washington.  
*(Rachel MacCleery)*



# HEALTHY ENVIRONMENT AND SOCIAL WELL-BEING

**WHETHER OR NOT WE'RE AWARE OF IT**, our surroundings significantly affect our health and well-being. Because people spend approximately 90 percent of their time indoors, projects and buildings play a critical role in minimizing exposure to toxins and protecting the health of occupants.

Noise pollution and poor lighting can take their toll on stress levels, whereas the restorative effects of natural environments, daylighting, and quiet spaces can positively affect physical and mental health. Flexible environments and programming and policies that enhance opportunities for social engagement can offer a variety of health benefits.

- 14 BAN SMOKING**
- 15 USE MATERIALS AND PRODUCTS THAT SUPPORT HEALTHY INDOOR AIR QUALITY**
- 16 FACILITATE PROPER VENTILATION AND AIRFLOW**
- 17 MAXIMIZE INDOOR LIGHTING QUALITY**
- 18 MINIMIZE NOISE POLLUTION**
- 19 INCREASE ACCESS TO NATURE**
- 20 FACILITATE SOCIAL ENGAGEMENT**
- 21 ADOPT PET-FRIENDLY POLICIES**



# INDOOR AIR



A living wall filters the air in the lobby of the Arbor House in South Bronx, New York. (Blue Sea Development Company)

**RESEARCH IS MIXED** on how much of a toxin, or what length of exposure, can cause health problems, so taking specific measures to improve the quality of all indoor environments to prevent toxin exposures is important. For example, volatile organic compounds (VOCs) have been associated with a range of mild to severe illnesses<sup>1</sup> and should therefore be avoided.

Through careful selection of materials and policies to mitigate the presence of toxins, developers, property owners, and managers can help minimize toxin exposure. Each year, smoking causes about one in five deaths in the United States.<sup>2</sup> Smoke-free policies can improve health outcomes.<sup>3</sup>

## INSIGHT

### Jeremy Hudson

Cofounder and CEO,  
Specialized Real Estate Group  
FAYETTEVILLE, ARKANSAS  
*Winner, 2014 Urban Land 40  
Under 40*

**I GREW UP** with severe allergies and asthma. While there are likely many factors that led to the severity of my experience with both asthma and allergies, I am confident that the buildings I lived and spent time in contributed to the problem. Looking back, I see that the indoor air quality of those buildings was a major contributor to my issues. Since this realization, I have become committed to practices that deliver better air quality in both our new construction and existing projects.

So many people in our country struggle with health and live a very poor quality of life because of obesity. I believe that a lack of community, caused by poor planning and development, is the root of the issue. Again, other factors contribute, but I am certain that the built environment plays a big role.

In a nutshell, I believe that developers (and others whose work influences our built environment) have an obligation to the people that will live, work in, and experience their projects. We expect a toy manufacturer to make toys that are safe and not toxic for our children, so why would we not expect the same from those who influence the places where we live.

## EVIDENCE-BASED STRATEGIES ▼

- **Establish and enforce indoor and outdoor no-smoking policies.**<sup>4,5</sup>

## BEST PRACTICE STRATEGIES ▼

- **Post signage in public areas informing residents, tenants, and visitors of the no-smoking policy. Clearly communicate the repercussions of violating the policy (for example, fines or eviction).**



The Aria development in Denver, Colorado, mandates no smoking near buildings. (Rachel MacCleery)

## PROJECT

## Arbor House

SOUTH BRONX, NEW YORK

**ARBOR HOUSE** is a low-income multifamily housing development in the South Bronx, New York, that sets the bar high for green and healthy multifamily buildings. The project, developed by Blue Sea Development and the New York City Housing Authority and designed by ABS Architecture, aims to maintain healthy indoor air quality and to reduce the high asthma rates of the residents.

Several features of the Leadership in Energy and Environmental Design (LEED)-platinum building were designed to achieve

these goals. A living green wall in the lobby produces fresh oxygen, an air filtration system helps clean the air, and low- and no-VOC materials were used during construction. The development also maintains a 100 percent no-smoking policy, designed to improve the air quality in and around the development, and an integrated pest management program eliminates the need to use chemicals to keep pests away.

# USE MATERIALS AND PRODUCTS THAT SUPPORT HEALTHY INDOOR AIR QUALITY

## EVIDENCE-BASED STRATEGIES ▼

- **Select building materials that are not known to emit harmful toxins.**

(See the International Living Future Institute's *Living Building Challenge 3.0* Red List in the Resources section.)

- **Minimize occupant exposure to VOCs.<sup>6-8</sup> Use cabinetry, doors, molding, shelving, and trim materials with low VOCs. Employ caulks, adhesives, paints, varnishes, and other finishes that are free of solvents and VOCs.**

- **Minimize occupant exposure to molds<sup>9,10</sup> by using mold-resistant materials in bathrooms and other water-sensitive locations.<sup>11</sup>**



Concrete floors and non-VOC finishes were used at ECO Modern Flats in Fayetteville, Arkansas. (Adaptive Creative)

### PROJECT

## ECO Modern Flats

FAYETTEVILLE, ARKANSAS

**ECO MODERN FLATS** in Fayetteville, Arkansas, is a one-of-a-kind rehabilitation of a 1960s apartment building. Developed by Specialized Real Estate Group and designed by Modus Studio, it is the first multifamily building in the state to be certified LEED Platinum.

ECO Modern flats is not only designed according to sustainable principles, it also promotes a healthy lifestyle for its residents. Bio-based spray foam insulation and non-VOC paints and finishes reduce the amount of chemicals that residents are exposed to. A ductless heating and cooling system reduces mold, mildew, and dust accumulation, as do concrete floors that do not harbor dust or other allergens and are easy to clean. A strictly enforced nonsmoking policy—the first of its kind in the region—protects residents from secondhand smoke.

- **Use nontoxic cleaning products within buildings.<sup>12,13</sup> Provide building occupants information on green and healthy cleaning products and practices.<sup>14</sup>**

## **BEST PRACTICE STRATEGIES ▼**

- **Remove or avoid use of carpet, which can hold allergens, and instead use smooth wood flooring or polished concrete.<sup>15</sup>**
- **Use air filters and purifiers that exceed industry standards to keep the air clean and minimize allergies.<sup>16</sup>**
- **Select furniture to support indoor air quality. Use solid wood rather than pressed-wood products.<sup>17</sup> Choose upholstered furniture that is free of flame retardants and off-gassing chemicals.**
- **Incorporate walk-off mats at building entrances to reduce the amount of dust, dirt, and moisture tracked indoors.<sup>11</sup>**



The George Washington School of Public Health in Washington, D.C., provides walk-off mats to control dirt and dust. (Sara Hamerschmidt)

# FACILITATE PROPER VENTILATION AND AIRFLOW

## EVIDENCE-BASED STRATEGIES ▼

- **Improve ventilation<sup>18-20</sup> by installing and maintaining systems that increase ventilation rates above industry standards and code requirements.<sup>21</sup>**

## BEST PRACTICE STRATEGIES ▼

- **Monitor airflow and quality to appropriately adapt ventilation systems.<sup>22</sup>**
- **Design operable windows to improve thermal comfort and place them for optimal cross-ventilation.**
- **Install mechanical ventilation systems in buildings with low-leakage building envelopes.<sup>23,24</sup>**
- **Install outdoor air economizers in commercial buildings to increase ventilation rates and save energy.<sup>25</sup>**



The Hercules Campus, Playa Vista, California, offers operable windows. (Randall Michelson/rmpix.com)

- **Direct outdoor air-intake systems away from sources of pollutants.<sup>21</sup>**

# LIGHTING



Glass-enclosed corridors provide abundant natural light at Innovation Park in Charlotte, North Carolina. (*University City Partners*)

**NATURAL LIGHT**—and light that mimics the look and feel of natural light—has been shown to improve feelings of well-being.<sup>26</sup> Studies link exposure to daylight to increased productivity and increased mood in occupants of office space.<sup>27</sup>

Outdoor lighting of streets, trails, and public spaces can improve personal safety and encourage people to walk more at night because they feel safer.<sup>28</sup> However, measures should be taken to avoid light pollution, which can lead to disruption of the circadian clock and is linked to a number of medical disorders.<sup>29</sup>

# MAXIMIZE INDOOR LIGHTING QUALITY

## EVIDENCE-BASED STRATEGIES ▼

- Optimize daylighting through site design, building orientation, larger windows, and programming of interior spaces.<sup>30,31</sup> Use glass partitions in interior offices.
- Minimize glare<sup>32</sup> using task lighting and adjustable window treatments.<sup>31</sup>
- Minimize light pollution with automated lighting shutoffs at night and after periods of inactivity.<sup>29</sup>



**ABOVE:** Large windows at the Amazon headquarters in Seattle, Washington, provide access to abundant daylight. *(Benjamin Benschneider)* **BELOW:** LED lighting can be controlled by the occupants at Park 20|20 in Haarlemmermeer, Netherlands. *(Foppe + Schut)*

## BEST PRACTICE STRATEGIES ▼

- Provide lighting system control by occupants to promote comfort and well-being.<sup>33</sup>



# NOISE CONTROL

**SOUNDS ARE ALL AROUND US**—but when they are unwanted or disturbing, they become noise. Noise pollution detracts from overall quality of life in a variety of ways, interrupting sleep, disrupting conversations, and diminishing concentration and productivity.<sup>34</sup>

Noise pollution is recognized as a public health concern with direct links to stress-related illnesses, high blood pressure, hearing loss, and sleep problems.<sup>34,35</sup>

City noises, such as from traffic and buses, can affect health. (*Aude Vivere*)

## PROJECT

### The Hercules Campus

PLAYA VISTA,  
CALIFORNIA

**THE HERCULES CAMPUS** in Playa Vista, California, is a 28-acre redevelopment of historic buildings into an innovative office and studio complex. Developed by the Ratkovich Company and designed by Brenda Levin & Associates and EPT Design, the project uses a variety of features to connect employees and visitors to the picturesque surroundings.

Native Californian plants preserve water, limit landscaping needs of the campus and creating a natural outdoor setting. Outdoor spaces complete with picnic tables provide options for social interaction and outdoor meetings throughout the workday. Indoors, bowed truss ceilings, open spaces, and abundant operable windows provide ample access to light and fresh air.





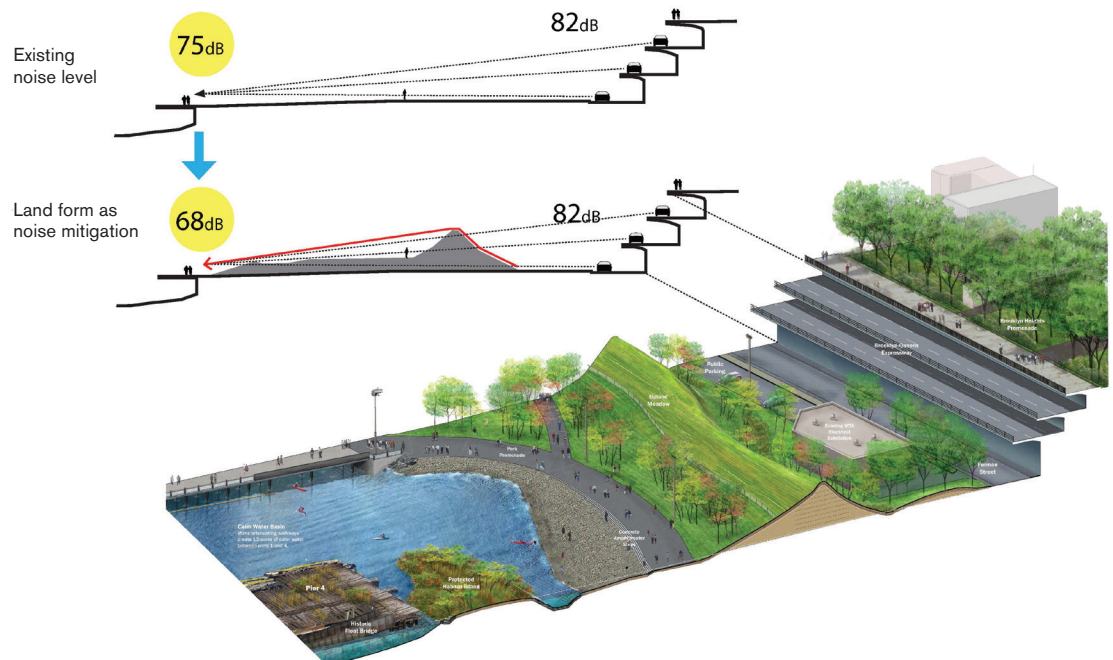
# MINIMIZE NOISE POLLUTION

## EVIDENCE-BASED STRATEGIES ▼

- Reduce exposure to noise pollution for building occupants.<sup>36</sup> For example, incorporate acoustically designed walls, double-glazed windows, and well-sealed doors.
- Minimize exposure to noise pollution in outdoor spaces.<sup>36</sup> For example, plant earthen berms with grasses and shrubs<sup>37,38</sup> or incorporate evergreens and plants with thick, waxy leaves to absorb sound.



**ABOVE:** Extra sheet rock and acoustic mats under the hardwood floors were used to reduce noise transfer at the SmartSpace® Harriet apartments in San Francisco, California. (*Panoramic Interests*)  
**BELOW:** The use of earthen berms reduces street noise in Brooklyn Bridge Park in Brooklyn, New York. (*Michael Van Valkenburgh Associates*)



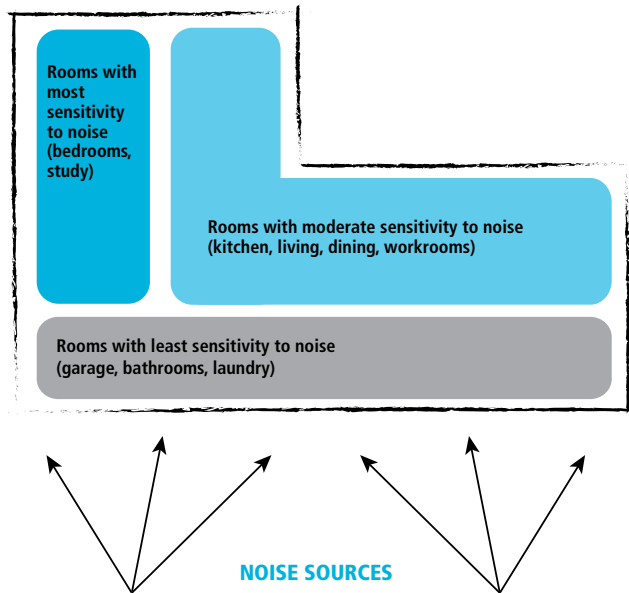
→ **Minimize sources of noise pollution where possible, for example, by using quiet asphalt overlays on roads.**<sup>38,39</sup>

**BELOW:** Building design and room placement can help mitigate impacts of noise. (Adapted from Level.org.nz) **BOTTOM:** Green roofs at the Silver City Townhomes in Milwaukee, Wisconsin, buffer noises. (Silver City Townhomes LLC)

## BEST PRACTICE STRATEGIES ▼

→ **Place more active rooms (such as kitchens) in locations that buffer sounds from rooms where noise is more problematic (such as bedrooms).**<sup>40,41</sup>

→ **Use green roofs, which can absorb noise and reduce outside sound levels by up to 40 to 50 decibels.**<sup>42</sup>



# NATURE

## EXPLORATION

### Biophilia

**BIOPHILIA** is the concept that people share an innate affinity with other forms of life and nature. Research suggests that children do better in school when classrooms have natural light, that natural views shorten hospital stays, and that offices devoid of nature can contribute to employee absenteeism.<sup>51</sup>

Design that follows the concepts of biophilia incorporates nature and emulates natural forms. Developers can incorporate innate preferences for natural environments by creating a variety of outdoor spaces, such as gardens, paths, and parks, which act as extensions of a building. Developers and designers can bring nature indoors by installing green walls, planting trees in large atriums, and strategically placing windows to provide landscape views. Incorporating fountains and other water installations can also convey a sense of nature within a project.

#### FOR MORE INFORMATION:

➔ "Biophilia: The Need to Connect with Nature," Ambius [www.ambiusindoorplants.com.au/news/latest-news/AMB468\\_-\\_Fact\\_Sheet\\_Biophilia\\_final.pdf](http://www.ambiusindoorplants.com.au/news/latest-news/AMB468_-_Fact_Sheet_Biophilia_final.pdf)



Exercise equipment and a walking trail are placed next to a restored creek at the Jackson Walk project in Jackson, Tennessee. (Looney Ricks Kiss)

**ACCESS TO NATURE** has links to positive health outcomes. Many studies cite the calming effects of spending time in nature,<sup>43</sup> and health can be harmed by a lack of exposure to nature.<sup>44,45</sup> Views of nature have been shown to speed healing in hospitals.<sup>46</sup>

Green roofs contribute to enhanced air quality, reduce energy consumption and stormwater runoff, and moderate the urban heat island effect. Green walls offer many of the same benefits as green roofs, including aesthetic enhancement, improved air quality, and noise reduction.<sup>47</sup> A solid body of evidence shows that human health benefits from exposure to nature.<sup>48</sup>

# INCREASE ACCESS TO NATURE

## EVIDENCE-BASED STRATEGIES ▼

- **Maximize access to natural areas.<sup>48</sup> Preserve and restore natural areas within and around your project.**
- **Plant trees,<sup>49</sup> which support air quality, provide shade, and increase outdoor comfort. Include trees in parks and plazas and along sidewalks.**
- **Provide views of nature<sup>48</sup> through strategic placement of windows, indoor plants, or pictures of nature.<sup>50</sup>**



Singapore's Interlace project includes water features, courtyards, green spaces, and shade as a response to the limited amount of open space in the city. (CapitaLand Singapore/ Woh Hup [Private] Limited)

## PROJECT

### Park 20|20

HAARLEMMERMEER, NETHERLANDS

**PARK 20|20**, a 28-acre office park in Haarlemmermeer, Netherlands, is designed with the health of the building occupants in mind. The project, developed by Delta Development Group and designed by William McDonough + Partners, features specially selected plants that are used to filter internal air through green walls that store carbon dioxide and produce fresh oxygen. Dust is minimized through a ductless floor system and through moss that acts as a natural filter.

Natural light is abundant throughout the office space, minimizing the need for much artificial light. LED lighting—the

closest lighting to sunlight—was used to the extent possible, and an automated sun-shading system regulates the interior lighting based on sun and cloud cover. Each office space contains a window that can be opened for fresh air, and buildings are horseshoe shaped with large atriums that allow natural light from two sides. Natural views are provided through 22 acres of open space, which includes a central park that is visible from surrounding streets.

## BEST PRACTICE STRATEGIES ▼

- **Install green roofs and green walls, where possible, to improve air quality and aesthetics.**<sup>42</sup>
- **Use trees and plantings to cultivate an appropriate balance between sunlight and shade, given local climate conditions.**
- **Provide seating and opportunities for rest within parks and green spaces.**



A green roof garden provides views of green space and access to nature at Chengdu International Finance Square in Chengdu, China. (Benoy Ltd.)

## INSIGHT

**Colleen Carey**

President, The Cornerstone Group  
RICHFIELD, MINNESOTA

**I BELIEVE THAT THE REAL ESTATE COMMUNITY** has an essential role to play in creating healthier communities. The places that surround us can either contribute to the health and well-being of people and the planet or detract from it.

At my development firm, the Cornerstone Group, we are excited about the opportunity to create places of community change—places where art and artists, nature and open space, and opportunities for healthy living, lifelong learning and social connections are intentionally designed into our development projects. We are committed to engaging the communities in which we work as we consider new options for building strong communities.

We believe that *now* is the time to forge a new path and to raise the bar for future projects. We have incorporated the *Ten Principles for Building Healthy Places* into the planning and design of all of our new projects.

# SOCIAL CONNECTION



Spaces for residents to socialize is an important healthy design feature of ECO Modern Flats in Fayetteville, Arkansas. (Timothy Hursley)

**COMMUNITY ENGAGEMENT** is an important factor in creating safe, happy, and healthy places.<sup>52</sup> Bringing people together in social settings can improve mental and physical health.<sup>53</sup> Health benefits from social interaction include reduced risks for health issues such as depression, high blood pressure, and cardiovascular problems.<sup>54</sup>

Positive social interactions can be facilitated by the physical environment—for example, through well-designed public parks and plazas, community rooms, and rooftop spaces.<sup>55</sup> Programs and events are good strategies for strengthening community identity, increasing social interaction, and supporting a variety of goals related to health and well-being.<sup>56</sup> Focusing on intergenerational interactions can also support well-being.<sup>57</sup>

## PROJECT

### SoundCloud

BERLIN, GERMANY

**THE NEW SOUNDCLLOUD HEADQUARTERS** in Berlin provides a number of healthy features, including concrete floors that reduce allergens, an on-site yoga room, and an indoor garden that provides access to nature. The design of the building also provides employees with an environment that fosters collaboration, creativity, and flexibility. Office designer Kelly Robinson, who led the project with Berlin-based architecture firm Kinzo, based the design on principles of health, wellness, and meaningful interaction.

Themed meeting rooms echo the company's creative culture. Open workspaces and various common areas allow employees and visitors to collaborate in a variety of settings. Abundant windows and interior glass walls maximize natural light within the space. The office also provides quieter spaces for employees to relax, including a cozy "tech free" zone with beanbag chairs and a soundproofed nap room.

# FACILITATE SOCIAL ENGAGEMENT

## EVIDENCE-BASED STRATEGIES ▼

- **Create community gathering spaces—plazas, parks, dog runs, roof decks, and barbecue areas—to encourage social interaction and enhance opportunities for physical activity.<sup>58–60</sup> Open these gathering spaces to the public to strengthen community ties.**
- **Design on-site spaces to accommodate classes and programs that promote healthy activities, such as fitness, cooking, nutrition, and gardening.<sup>61</sup>**



**TOP:** Break rooms with kitchens and outdoor meeting areas with power outlets and wi-fi are provided for the tenants at Champion Station in San Jose, California. (David Wakely) **ABOVE:** At Rancho Sahuarita in Sahuarita, Arizona, residents can select from more than 50 classes per week, including karate, yoga, ballet, and tennis. (Rancho Sahuarita)

→ **Design spaces for maximum accessibility to allow people of all ages and abilities to participate.<sup>62</sup> For example, apply universal design standards to access points for outdoor parks and plazas.**



## BEST PRACTICE STRATEGIES ▼

- **Develop a calendar of regular programming to keep community spaces activated and vibrant.**
- **Hold larger events, such as movie nights, music festivals, art fairs, and holiday events, to bring out large numbers of people to projects and places.**



**TOP:** Public spaces can be used in a variety of ways—from exercise to relaxation to cultural activities—at Calligraphy Greenway in Taichung, Taiwan. (AECOM Asia Company Limited) **RIGHT:** Selendra Community Place arranges 20 to 30 free health, wellness, and social programs per month for people of all ages at Selendra Rise in Casey, Australia. (Stockland)



# PETS

**PETS OFFER COMPANIONSHIP**, inspire healthier lifestyles, and positively affect physical and mental health.<sup>63</sup> Dogs need to be walked regularly, which leads to more outdoor exercise as well as opportunities to socialize with neighbors.<sup>64</sup> And caring pet owners tend to be responsible tenants.<sup>65</sup>

This dog is drinking from a water fountain provided specifically for pets. (U.S. Marine Corps)



## 21

# ADOPT PET-FRIENDLY POLICIES

## EVIDENCE-BASED STRATEGIES ▼

→ **Adopt policies to support pet ownership,<sup>64,66</sup> for example, permitting pets in residential buildings or allowing pets in offices.**

→ **Provide infrastructure to support dog owners,<sup>67,68</sup> for example, by providing dog parks and water stations.**

## PROJECT

### Rouse Hill Town Centre

SYDNEY, AUSTRALIA

**ROUSE HILL** Town Centre in Sydney, Australia, is an innovative mixed-use and retail center that engages the surrounding community. Developed by the GPT Group and designed by CIVITAS, Rice Daubney, AJC, and Group GSA, the project's shops and restaurants are organized in a pedestrian loop that connects to walking and cycle paths, as well as public transport. Rouse Hill provides numerous opportunities for social engagement as well.

Interactive public spaces offer various venues for community activities, including twilight movie nights, local performances,

and civic events. A rooftop "secret garden" offers a quiet space for yoga classes and children's storytelling. Outdoor play areas, including an oversized jungle gym with modern interactive games, encourage visitors to be active. Visitors to Rouse Hill are also welcome to bring their dogs and can utilize the "dog parking" areas that provide water bowls for furry friends while their owners shop or eat.

## BEST PRACTICE STRATEGIES ▼

- **Allow for all types of pets—but screen the candidates. Rather than restricting dogs by breed or weight limit, establish a system to evaluate pets.**
- **Make the rules clear by including a pet policy in the lease that outlines the requirements and expectations for pet owners. Charge a refundable pet deposit (depending upon laws in your area).**

- **Undertake efforts to minimize exposure to pet allergens. Use air filters and purifiers, and avoid carpeting and fabric-upholstered furniture.<sup>69</sup>**



The 1221 Broadway project in San Antonio, Texas, offers a high-quality, fenced-in dog park as an amenity for residents. (Chris Cooper)

## RESOURCES

### INDOOR AIR

- *Living Building Challenge 3.0*, International Living Building Institute  
[http://living-future.org/sites/default/files/reports/FINAL%20LBC%203\\_0\\_WebOptimized\\_low.pdf](http://living-future.org/sites/default/files/reports/FINAL%20LBC%203_0_WebOptimized_low.pdf)  
(see Red List materials on page 44)
- Declare Product Database  
<http://declareproducts.com/product-database>
- *Care for Your Air: A Guide to Indoor Air Quality*, U.S. Environmental Protection Agency  
[www.epa.gov/iaq/pdfs/careforyourair.pdf](http://www.epa.gov/iaq/pdfs/careforyourair.pdf)

### LIGHTING

- “Advanced Lighting Guidelines,” New Buildings Institute  
<http://algonline.org/index.php>

### NOISE CONTROL

- “Chapter 4: Physical Techniques to Reduce Noise Impacts,” in *The Audible Landscape*, U.S. Department of Transportation and Federal Highway Administration  
[www.fhwa.dot.gov/environment/noise/noise\\_compatible\\_planning/federal\\_approach/audible\\_landscape/al04.cfm](http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/al04.cfm)

### NATURE

- *Green Roof Guide*, Groundwork Sheffield  
[www.greenroofguide.co.uk/](http://www.greenroofguide.co.uk/)
- Arbor Day Foundation Tree Nursery  
<http://shop.arborday.org/content.aspx?page=tree-nursery>

### SOCIAL CONNECTION

- “Eleven Principles for Creating Great Community Spaces,” Project for Public Spaces  
[www.pps.org/reference/11steps](http://www.pps.org/reference/11steps)
- “Principles of Universal Design,” RL Mace Universal Design Institute  
[www.udinstitute.org/principles.php](http://www.udinstitute.org/principles.php)

### PETS

- *Model Pet Ownership Policy*, American Society for the Prevention of Cruelty to Animals  
[www.petsincondos.org/ASPCAModelPetOwnershippolicy.pdf](http://www.petsincondos.org/ASPCAModelPetOwnershippolicy.pdf)
- *Establishing a Dog Park in Your Community*, American Kennel Club  
<https://images.akc.org/pdf/GLEG01.pdf>

The LEED Platinum–certified Hydro Place in Manitoba, Canada, features open stairs and a green roof.  
*(Gerry Kopelow)*



# CERTIFICATION PROGRAMS

**A NUMBER OF CERTIFICATION PROGRAMS** exist for various facets of the built environment, from buildings to landscapes to entire communities. Many of these programs include elements that directly relate to human health.

- **BREEAM**
- **BLUE ZONES CERTIFICATION**
- **ENTERPRISE GREEN COMMUNITIES CERTIFICATION**
- **INDOOR AIRPLUS**
- **LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)**
- **LIVING BUILDING CHALLENGE AND LIVING COMMUNITY CHALLENGE**
- **ONE PLANET COMMUNITY**
- **STAR COMMUNITY RATING SYSTEM**
- **SUSTAINABLE SITES INITIATIVE RATING SYSTEM (SITES)**
- **WELL BUILDING STANDARD**

# → BREEAM

## APPLIES TO: BUILDINGS, NEIGHBORHOODS

**BREEAM (BRE ENVIRONMENTAL ASSESSMENT METHOD)** is an environmental assessment method and rating system for buildings that has been applied to projects all over the world. Launched in 1990 in the United Kingdom by the BRE building research organization, BREEAM uses a broad set of performance measures to evaluate the design, construction, and use of buildings. Though primarily applied to projects in the United Kingdom, the BREEAM process is flexible and can be adapted and applied internationally.

BREEAM can be used for a variety of project types and phases, referred to as “schemes”: new construction, existing buildings currently in use, refurbishment and renovation, and community planning. With the exception of in use, projects can be certified at both the design stage and the final (postconstruction) stage. Certification at the design stage is optional, but recommended.

The performance measures used within BREEAM are grouped into ten categories—including one devoted to health—which each have a certain number of points that can be earned:

- Energy (operational energy and carbon dioxide);
- Management (management policy, commissioning, site management, and procurement);
- Health and well-being (indoor and external issues—e.g., noise, light, air quality);
- Transport (transport-related carbon dioxide and location-related factors);
- Water consumption and efficiency;
- Materials (embodied impacts of building materials);

- Waste (construction resource efficiency and operational waste management and minimization);
- Pollution (outdoor air and water pollution);
- Land use (type of site and building footprint); and
- Ecology (ecological value, conservation, and enhancement of the site).

The relative importance of each category varies within BREEAM, so points for each category are multiplied by an environmental weighting factor. Once the total number of points is determined, the project is given a rating from one to five stars (pass, good, very good, excellent, or outstanding).

### FOR MORE INFORMATION:

→ [www.breeam.org](http://www.breeam.org)

# → BLUE ZONES CERTIFICATION

## APPLIES TO: CITIES AND TOWNS

**THE BLUE ZONES PROJECT® COMMUNITY CERTIFICATION PROCESS** is based on the research of Dan Buettner and a National Geographic team that identified areas of the world—referred to as Blue Zones—where people tend to live long lives. The Blue Zones Communities certification process is a true community effort: it requires various community stakeholder groups to pledge to meet specific goals.

Certification applies to entire cities or towns, and Blue Zones Communities are nationally recognized as great places to live, work, and play. Individual organizations—worksites, restaurants, grocery stores, and schools—can also achieve Blue Zones designations upon completing specific actions.

To become a Blue Zones Community, a city or town must achieve the following:

- At least 20 percent of citizens sign the Blue Zones Personal Pledge and complete one action.
- Completion of the Blue Zones Community Policy® Pledge.
- At least 50 percent of the top 20 community-identified employers become a Blue Zones Worksite™.
- At least 25 percent of independently or locally owned restaurants become a Blue Zones Restaurant™.
- At least 25 percent of public schools become a Blue Zones School™.
- At least 25 percent of grocery stores become a Blue Zones Grocery Store™.

The certification process for a community requires a coordinated effort between local policy makers, residents, employers, restaurants, schools, and grocery stores to meet the goals. The Blue Zones framework is helping cities and towns actively advance and promote health and well-being. Currently, several communities in California, Hawaii, Iowa, Minnesota, and Texas have achieved or are working toward becoming Blue Zones certified.

### FOR MORE INFORMATION:

→ [www.bluezones.com/services/cities](http://www.bluezones.com/services/cities)

→ [www.bluezonesproject.com/communities](http://www.bluezonesproject.com/communities)

# → ENTERPRISE GREEN COMMUNITIES CERTIFICATION

## APPLIES TO: AFFORDABLE HOUSING DEVELOPMENTS

**THE ENTERPRISE GREEN COMMUNITIES CERTIFICATION** aims to apply the health, economic, and environmental benefits of green construction techniques to affordable housing developments. Enterprise defines affordable housing as projects targeted to prospective renters at or below 60 percent of area median income or prospective buyers at or below 80 percent of area median income. Projects eligible for certification have at least 80 percent of units designated affordable and at least 80 percent of the space designated for residential use.

Enterprise Green Communities Certification is a two-step process. First, an online application is completed for eligible projects during the design phase. Once a project is selected and upon completion of its construction, the project team submits additional documents. Enterprise Green Communities does a final review to determine whether the development has met the criteria before awarding certification.

Based on construction type (new, moderate rehabilitation, or substantial rehabilitation), a set of mandatory and optional measures from the Enterprise Green Communities Criteria Checklist are required for certification. Measures fall within the following eight categories:

- Integrative Design;
- Location and Neighborhood Fabric;
- Site Improvements;
- Water Conservation;
- Energy Efficiency;
- Materials Beneficial to the Environment;
- Healthy Living Environment; and
- Operations and Maintenance.

### FOR MORE INFORMATION:

→ [www.enterprisecommunity.com/greenportal](http://www.enterprisecommunity.com/greenportal)

## → INDOOR AIRPLUS

### APPLIES TO: NEW-CONSTRUCTION HOMES

**INDOOR AIRPLUS**, a program of the U.S. Environmental Protection Agency, provides specifications to protect indoor air quality in new homes. This program, which is free to participate in, builds on the existing Energy Star certification, given to homes that meet specific criteria for energy efficiency. Indoor airPLUS homes must also earn the Energy Star label, resulting in new-construction homes that not only are more energy efficient than homes built to minimum code, but also provide better indoor air quality and comfort for occupants.

For a new home to become Indoor airPLUS qualified, design and construction features are utilized that help protect homes from indoor contaminants. Specifications fall into seven categories: moisture control; radon; pest barriers; HVAC systems; combustion pollutant control; low-emission materials; and home commissioning. Requirements within each category must be met to earn the Indoor airPLUS label. Homeowners of Indoor airPLUS homes are also given educational materials on the best ways to maintain the home and which personal behaviors may degrade indoor air quality.

Upon completion of the requirements, homes are inspected and verified by an independent third party to ensure compliance with the program's guidelines

and specifications. Once verified, Indoor airPLUS homes can be labeled and nationally recognized for their role in protecting both human health and the environment. The EPA also has an annual recognition program—the Indoor airPLUS Leader Awards—for market leaders who participate in the Indoor airPLUS program and provide their homebuyers with healthier indoor environments.

#### FOR MORE INFORMATION:

→ [www.epa.gov/indoorairplus](http://www.epa.gov/indoorairplus)





# → LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

## APPLIES TO: BUILDINGS, NEIGHBORHOODS

**LEED**, a program of the U.S. Green Building Council, is a well-known certification system for green building. LEED certification is recognized as the leading achievement in green building. Projects that become LEED certified are designed to save money, conserve energy, reduce water use, and improve the health of occupants. LEED provides a checklist for developers and architects who want to create buildings and communities that are sustainable in a variety of ways.

A project can achieve four levels of certification: certified, silver, gold, and platinum. Five ratings systems are designed to meet the needs of different project types: Building Design and Construction (BD+C); Interior Design and Construction (ID+C); Building Operations and Maintenance (O+M); Neighborhood Development (ND); and Homes. Each rating system has specific combinations of credit categories, and the number of points achieved determines the project's level of certification.

Although the primary focus of LEED is energy efficiency, many credits directly relate to strategies that can improve human health. Certain credits are designed to improve indoor air quality and ventilation,

promote access to transit and services, and promote walkability, among other strategies that have direct links to health.

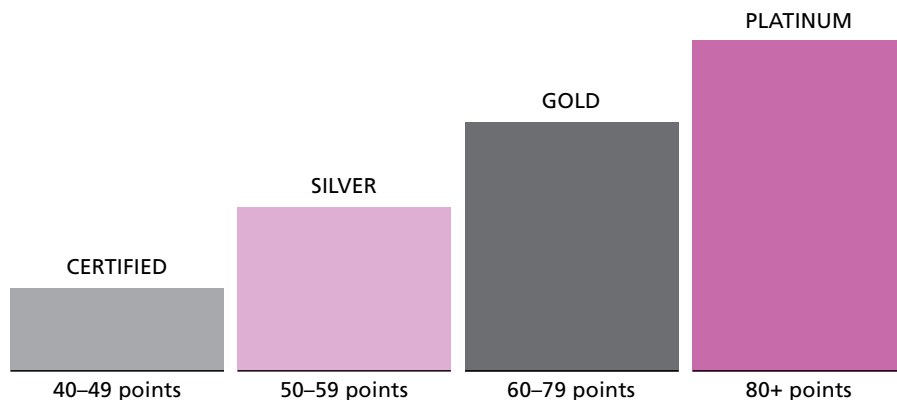
Registering a project for LEED currently costs \$600. Certification fees vary based on the size of the project.

### FOR MORE INFORMATION:

→ [www.usgbc.org/leed](http://www.usgbc.org/leed)

---

There are four levels of certification. The number of points a project earns determines the level of LEED certification the project will receive. Typical certification thresholds are:



# → LIVING BUILDING CHALLENGE AND LIVING COMMUNITY CHALLENGE

## APPLIES TO: BUILDINGS, COMMUNITIES

**TWO PROGRAMS OF THE INTERNATIONAL LIVING FUTURE INSTITUTE** help planners and developers design, build, and certify community-scale projects and buildings that advance measures of sustainability requirements in the built environment: the Living Building Challenge and the Living Community Challenge.

The Living Building Challenge and the Living Community Challenge both comprise seven performance categories, referred to as *petals*: place, water, energy, health and wellness, materials, equity, and beauty. These petals are further divided into 20 subcategories—referred to as *imperatives*—that are cultivated from best practices from the fields of architecture, engineering, planning, landscape design, and policy. Cost of certification varies widely, depending on the size of the project and the type of certification selected.

The Living Building Challenge has seven typologies: renovation, infrastructure and landscape (such as roads, bridges, plazas, sports facilities, or trails), buildings (new or existing), and community (consisting of multiple buildings in a continuous campus, neighborhood, or district).

The Living Community Challenge has three certification types. Living Community–certified projects meet all of the 20 required imperatives. Petal Community–certified projects meet the requirements for at least three petals (at least one must be the water, energy, or materials petal; certain imperatives are mandatory). Net-zero-energy-certified buildings must meet the requirements for the energy petal.

### FOR MORE INFORMATION:

→ <https://living-future.org/lbc/> (Living Building Challenge)

→ <http://living-future.org/lcc> (Living Community Challenge)



The Bullitt Center in Seattle, Washington, is working to achieve the goals of the Living Building Challenge.  
(Joe Mabel)

## → ONE PLANET COMMUNITY

### APPLIES TO: NEIGHBORHOODS AND MASTER-PLANNED COMMUNITIES

**THE ONE PLANET COMMUNITIES PROJECT** is a program of the One Planet Living Initiative, which aims to reduce humans' impact on the planet and encourages sustainable living. A One Planet Community is a development that is designed to be energy efficient and promote attractive, affordable, healthy, and environmentally-friendly living. The program focuses not only on buildings but also on services and infrastructure. The communities follow the ten One Planet Principles that guide the One Planet Living Initiative.

Developers can apply the One Planet Principles to their projects and receive endorsement as a One Planet Community by participating in a three-step process:

- Development of a One Planet Action Plan based on the One Planet Principles;
- A commitment to deliver on the Action Plan; and
- A commitment to undergo an annual review of progress.

A BioRegional adviser, called a Sustainability Integrator, is assigned to each community to assist with implementation of the action plan. Participants in the program also have access to a panel of experts to provide guidance and advice on plan development and implementation.

This program is designed to complement existing national and international design standards, such as LEED and BREEAM. Private developers and public entities with development responsibilities are the target applicants for this program. Although the program is suitable for any new or redevelopment project, the ideal project applicant will be mixed use with a large residential component, be at a scale viable for shared infrastructure (such as water, energy, and transport), have existing or planned connections to public transit, and demonstrate a sensitive use of land.



Ten Principles: Zero carbon, Zero waste, Sustainable transport, Sustainable materials, Local and sustainable food, Sustainable water, Land use and wildlife, Culture and heritage, Equity and local economy, and Health and happiness.

Grow Community, on Bainbridge Island, Washington, has incorporated the ten principles of One Planet Living. *(Rachel MacCleery)*

#### FOR MORE INFORMATION:

→ [www.oneplanetcommunities.org](http://www.oneplanetcommunities.org)

# → STAR COMMUNITY RATING SYSTEM

## APPLIES TO: CITIES AND TOWNS

**THE SUSTAINABILITY TOOLS FOR ASSESSING AND RATING (STAR)** Community Rating System is a framework and a certification and recognition program for sustainable communities. The STAR framework can be used as a planning tool to aid in decision making and community engagement around sustainability efforts, and communities can also apply to be a STAR-certified community.

STAR aims at helping cities and counties achieve healthier environments, stronger economies, and improved quality of life for residents. Because certification is at the city level, government agencies are the primary applicants though partnerships are encouraged. Partners can become STAR Affiliates to support the mission of STAR Communities.

The rating system helps local governments assess their sustainability efforts in seven goal areas: built environment; climate and energy; economy and jobs; education, arts, and community; equity and empowerment; health and safety; and natural systems. Each goal area has a set of objectives that are tied to a point system.

Upon application submission, local governments have the flexibility to select the objectives that are most relevant to their communities. The STAR Communities technical team reviews the submissions and assigns a STAR certification based on the points achieved. Certification lasts for three years: after that period, the community is expected to measure its progress and then apply to be recertified.

### FOR MORE INFORMATION:

→ [www.starcommunities.org](http://www.starcommunities.org)

CERTIFICATION LEVELS	POINT RANGE
<b>Reporting STAR Community</b>	50–199
<b>Three-STAR Community</b>	
Recognized for sustainability leadership	200–399
<b>Four-STAR Community</b>	
Recognized for national excellence	400–599
<b>Five-STAR Community</b>	
Recognized as top tier achiever in national sustainability	600+

# → SUSTAINABLE SITES INITIATIVE RATING SYSTEM (SITES)

## APPLIES TO: LANDSCAPE DESIGN

**THE SUSTAINABLE SITES INITIATIVE (SITES)** is a partnership between the American Society of Landscape Architects, the U.S. Botanical Garden, and the Lady Bird Johnson Wildflower Center at the University of Texas at Austin. The SITES Rating System evaluates how well a landscape supports environmental sustainability, based on advice from experts in soil, water, vegetation, and materials science.

The system is modeled after and aligned with the LEED Green Building Rating System, and representatives of the U.S. Green Building Council participated in the development of the second version of the SITES Rating System. The SITES v2 Rating System was developed after a two-year pilot program tested the first version of the rating system on more than 160 projects.

The SITES v2 Rating System can be applied to projects with or without buildings, including open spaces, streetscapes and plazas, residential neighborhoods, infrastructure, and commercial space. The central goals of the certification system are to

- Create regenerative systems and foster resiliency;
- Ensure future resource supply and mitigate climate change;
- Transform the market through design, development and maintenance practices; and
- Enhance human well-being and strengthen community.

Depending on the health of a site's existing ecosystem, the overall aim of a project should be to conserve, manage, restore, or generate ecosystem services.

The SITES v2 Rating System evaluates landscape projects in ten major categories that follow typical design and construction phases. These categories are divided into 48 different credits, which offer 200 total potential points to a given project. Eighteen characteristics are required for a site to be considered for certification, with 30 characteristics offering points to a given project. For instance, a site is required to “conserve habitats for threatened and endangered species,” but a project earns three to six points for “redeveloping degraded sites.” To be certified, a project must earn at least 70 points, with the highest level of certification—Platinum—requiring 135 points. To date, SITES has certified 34 projects as sustainable, all through the pilot program that used the SITES 2009 Rating System.

### FOR MORE INFORMATION:

→ [www.sustainablesites.org/rating-system](http://www.sustainablesites.org/rating-system)

# → WELL BUILDING STANDARD

## APPLIES TO: BUILDINGS

**THE WELL BUILDING STANDARD** is a certification program that focuses on the elements of building design and performance that address the health and well-being of building occupants. Pioneered by Delos and administered by the International WELL Building Institute, WELL includes 102 features that are grouped into seven categories: air, water, nourishment, light, fitness, comfort, and mind. Grounded in evidence-based medical and scientific studies on the impacts of the built environment on human health and wellness, the WELL Building Standard completed an extensive peer review prior to its public release in October 2014.

Examples of WELL building features include circadian lighting technologies that support the body's sleep and wake cycles, advanced performance requirements for indoor air and water quality, and active design strategies that encourage physical activity.

As of November 2014, nearly 8 million square feet of building projects in the United States and globally had registered to pursue WELL certification. The WELL Building Standard version 1.0 is optimized for commercial and institutional projects and is available for core and shell, tenant improvement, and new construction and renovation. Projects can earn Silver, Gold, or Platinum WELL Certification, and recertification is required every three years to ensure that WELL-certified buildings continue to maintain required levels of performance.

Third-party certification is delivered through the International WELL Building Institute's collaboration with the Green Building Certification Institute, the LEED certification body. WELL has been de-

signed to align with other green building certification systems, including LEED and the Living Building Challenge, and applicants are encouraged to apply for certification in both WELL and other standards that promote environmental sustainability.

Future plans for WELL include updated versions to address the specific performance requirements of multifamily residences, retail and restaurants, sports facilities and convention centers, schools, and health care facilities—each of which is in active pilot stage.

### FOR MORE INFORMATION:

→ <http://delos.com/about/well-building-standard>



# REFERENCES

## CHAPTER 1: INTRODUCTION

1. Urban Land Institute. 2013. *America in 2013: A ULI Survey of Views on Housing, Transportation, and Community*. Washington, DC: Urban Land Institute Infrastructure Initiative and Terwilliger Center for Housing.
2. ChangeLab Solutions. 2013. *Move This Way: Making Neighborhoods More Walkable and Bikeable*. Oakland, CA: ChangeLab Solutions.
3. Lindsey, G., S. Payton, J. Man, and J. Ottensmann. 2003. *Public Choices and Property Values: Evidence from Greenways in Indianapolis*. Indianapolis, IN: Center for Urban Policy and the Environment, Indiana University School of Public and Environmental Affairs, Indiana University-Purdue University Indianapolis.
4. Kramer, A., T. Lassar, M. Federman, and S. Hammerschmidt. 2014. *Building for Wellness: The Business Case*. Washington, DC: Urban Land Institute.

## CHAPTER 2: PHYSICAL ACTIVITY

1. Centers for Disease Control and Prevention. 2013. "One in Five Adults Meet Overall Physical Activity Guidelines." Press release, May 2. <http://www.cdc.gov/media/releases/2013/p0502-physical-activity.html>.
2. Gerstacker, D. 2014. "Sitting Is the New Smoking: Ways a Sedentary Lifestyle Is Killing You," Huffington Post. (Accessed November 5, 2014.) [http://www.huffingtonpost.com/the-active-times/sitting-is-the-new-smokin\\_b\\_5890006.html](http://www.huffingtonpost.com/the-active-times/sitting-is-the-new-smokin_b_5890006.html).
3. Goodman, A., S. Sahlqvist, and D. Ogilvie. 2014. "New Walking and Cycling Routes and Increased Physical Activity: One- and 2-Year Findings from the UK iConnect Study." *American Journal of Public Health* 104 (9): e38–e46. doi: 10.2105/AJPH.2014.302059.
4. Rodriguez, D. A. 2009. "Active Transportation: Making the Link from Transportation to Physical Activity and Obesity." Active Living Research, Research Briefs, San Diego State University, San Diego, CA, Summer.
5. Han, B., D. Cohen, and T. L. McKenzie. 2013. "Quantifying the Contribution of Neighborhood Parks to Physical Activity." *Preventive Medicine* 57 (5):483–87. doi: 10.1016/j.ypmed.2013.06.021.
6. Harnik, P., and B. Welle. 2009. *Measuring the Economic Value of a City Park System*. Washington, DC: The Trust for Public Land.
7. Lee, I. M., and R. S. Paffenbarger Jr. 1998. "Physical Activity and Stroke Incidence: The Harvard Alumni Health Study." (*Chronic Disease in Former College Students: LXI*.) *Stroke* 29: 2049–54.
8. Loy, S. F., L. M. Conley, E. R. Sacco, W. J. Vincent, G. J. Holland, E. G. Sletten, and P. R. Trueblood. 1994. "Effects of Stairclimbing on VO2max and Quadriceps Strength in Middle-Aged Females." *Medicine and Science in Sports and Exercise* 26 (2): 241–47.
9. Boreham, C. A., R. A. Kennedy, M. H. Murphy, M. Tully, W. F. Wallace, and I. Young. 2005. "Training Effects of Short Bouts of Stair Climbing on Cardiorespiratory Fitness, Blood Lipids, and Homocysteine in Sedentary Young Women." *British Journal of Sports Medicine* 39 (9): 590–93. doi: 10.1136/bjism.2002.001131.
10. Bauman, A., and F. Bull. 2007. *Environmental Correlates of Physical Activity and Walking in Adults and Children: A Review of Reviews*. London: National Institute of Health and Clinical Excellence.
11. Giles-Corti, B., F. Bull, M. Knuiaman, G. McCormack, K. Van Niel, A. Timperio, H. Christian, S. Foster, M. Divitini, N. Middleton, and B. Boruff. 2013. "The Influence of Urban Design on Neighbourhood Walking Following Residential Relocation: Longitudinal Results from the RESIDE Study." *Social Science and Medicine* 77: 20–30. doi: 10.1016/j.socscimed.2012.10.016.
12. McCormack, G. R., B. Giles-Corti, and M. Bulsara. 2008. "The Relationship between Destination Proximity, Destination Mix and Physical Activity Behaviors." *Preventive Medicine* 46 (1): 33–40. doi: 10.1016/j.ypmed.2007.01.013.
13. Ewing, R., and S. Handy. 2009. "Measuring the Unmeasurable: Urban Design Qualities Related to Walkability." *Journal of Urban Design* 14 (1): 65–84.
14. NYCDOT (New York City Department of Transportation). 2012. *Measuring the Street: New Metrics for 21st Century Streets*. New York: NYCDOT.
15. Pucher, J., J. Dill, and S. Handy. 2010. "Infrastructure, Programs, and Policies to Increase Bicycling: An International Review." *Preventive Medicine* 50 (Suppl. 1): S106–25. doi: 10.1016/j.ypmed.2009.07.028.
16. National Association of City Transportation Officials. 2013. *Urban Street Design Guide*. <http://nacto.org/usdg/>.
17. Sun, G., N. M. Oreskovic, and H. Lin. 2014. "How Do Changes to the Built Environment Influence Walking Behaviors? A Longitudinal Study within a University Campus in Hong Kong." *International Journal of Health Geographics* 13: 28. doi: 10.1186/1476-072X-13-28.
18. Berrigan, D., L. W. Pickle, and J. Dill. 2010. "Associations between Street Connectivity and Active Transportation." *International Journal of Health Geographics* 9: 20. doi: 10.1186/1476-072X-9-20.
19. Ewing, R., and R. Cervero. 2010. "Travel and the Built Environment." *Journal of the American Planning Association* 76 (3): 265–94.
20. ChangeLab Solutions. 2014. "Pedestrian Friendly Code Directory: Short Street Blocks." <http://changelabsolutions.org/childhood-obesity/short-street-blocks>.
21. New York City Departments of Design and Construction (DDC), Health and Mental Hygiene, Transportation (DOT), and City Planning. 2010. *Active Design Guidelines: Promoting Physical Activity and Health in Design*. New York: City of New York.

22. Green Parking Council. n.d. "Green Garage Certification." (Accessed July 20, 2014.) <http://www.greenparkingcouncil.org/certification/>.
23. Kelly, C., J. S. Wilson, M. Schootman, M. Clennin, E. A. Baker, and D. K. Miller. 2014. "The Built Environment Predicts Observed Physical Activity." *Frontiers in Public Health* 2: 52. doi: 10.3389/fpubh.2014.00052.
24. Yannis, G., A. Kondyli, and X. Georgopoulou. 2014. "Investigation of the Impact of Low Cost Traffic Engineering Measures on Road Safety in Urban Areas." *International Journal of Injury Control and Safety Promotion* 21 (2): 181–89. doi: 10.1080/17457300.2013.796387.
25. Sullivan, J. M., and M. J. Flannagan. 2007. "Determining the Potential Safety Benefit of Improved Lighting in Three Pedestrian Crash Scenarios." *Accident; Analysis and Prevention* 39 (3): 638–47. doi: 10.1016/j.aap.2006.10.010.
26. Addy, C. L., D. K. Wilson, K. A. Kirtland, B. E. Ainsworth, P. Sharpe, and D. Kimsey. 2004. "Associations of Perceived Social and Physical Environmental Supports with Physical Activity and Walking Behavior." *American Journal of Public Health* 94 (3): 440–43.
27. Podowski, M. 2012. *Seattle Design Guidelines*. Edited by DPD Design Guidelines Ordinance ATT 1.
28. Fraser, S. D., and K. Lock. 2011. "Cycling for Transport and Public Health: A Systematic Review of the Effect of the Environment on Cycling." *European Journal of Public Health* 21 (6): 738–43. doi: 10.1093/eurpub/ckq145.
29. Wardman, M., M. Tight, and M. Page. 2007. "Factors Influencing the Propensity to Cycle to Work." *Transportation Research Part A: Policy and Practice* 41 (4): 339–50.
30. Transportation Alternatives. n.d. *Bicycle Parking Solutions: A Resource for Improving Secure Bicycle Parking in New York City*. New York: Transportation Alternatives and Rack & Go. <http://www.transalt.org/files/issues/bike/bikeparking.pdf>.
31. City of New York Department of City Planning. 1999. *New York City Bicycle Parking Needs*. New York: City of New York Department of City Planning, Transportation Division.
32. Nicoll, G. 2007. "Spatial Measures Associated with Stair Use." *Science of Health Promotion* 21 (4): 345–52.
33. U.S. Green Building Council. 2009. "Design for Active Occupants," LEED. (Accessed August 5, 2014.) <http://www.usgbc.org/credits/new-construction-schools-new-construction-retail-new-construction-commercial-interiors-ret-1>.
34. Kerr, N. A., M. M. Yore, S. A. Ham, and W. H. Dietz. 2004. "Increasing Stair Use in a Worksite through Environmental Changes." *American Journal of Health Promotion* 18 (4): 312–15.
35. Boutelle, K. N., R. W. Jeffery, D. M. Murray, and M. K. Schmitz. 2001. "Using Signs, Artwork, and Music to Promote Stair Use in a Public Building." *American Journal of Public Health* 91 (12): 2004–6.
36. Nicoll, G. 2006. "Taking the Stairs: Environmental Features That Predict Voluntary Stair Use in 3 to 4 Story Academic Workplace Buildings." PhD thesis, Georgia Institute of Technology.
37. ChangeLab Solutions. 2012. *Unlocking Office Stairwells: A Resource for Property Owners, Building Managers, and Tenants*. Oakland, CA: ChangeLab Solutions.
38. Soler, R. E., K. D. Leeks, L. R. Buchanan, R. C. Brownson, G. W. Heath, D. H. Hopkins, and Services Task Force on Community Preventive Services. 2010. "Point-of-Decision Prompts to Increase Stair Use. A Systematic Review Update." *American Journal of Preventive Medicine* 38 (2 Suppl.): S292–300. doi: 10.1016/j.amepre.2009.10.028.
39. Olander, E. K., F. F. Eves, and A. Puig-Ribera. 2008. "Promoting Stair Climbing: Stair-Riser Banners Are Better Than Posters ... Sometimes." *Preventive Medicine* 46 (4): 308–10. doi: 10.1016/j.ypmed.2007.11.009.
40. Crompton, J. L. 2001. "The Impact of Parks on Property Values: A Review of the Empirical Evidence." *Journal of Leisure Research* 33 (1): 1–31.
41. Tinsley, H. E. A., and D. J. Tinsley. 2002. "Park Usage, Social Milieu, and Psychosocial Benefits of Park Use Reported by Older Urban Park Users from Four Ethnic Groups." *Leisure Sciences* 24: 199–218.
42. Center on the Developing Child at Harvard University. 2010. *The Foundations of Lifelong Health Are Built in Early Childhood*. Cambridge, MA: Center on the Developing Child at Harvard University.
43. Farley, T. A., R. A. Meriwether, E. T. Baker, L. T. Watkins, C. C. Johnson, and L. S. Webber. 2007. "Safe Play Spaces to Promote Physical Activity in Inner-City Children: Results from a Pilot Study of an Environmental Intervention." *American Journal of Public Health* 97 (9): 1625–31. doi: 10.2105/AJPH.2006.092692.
44. Sturm, R., and D. Cohen. 2014. "Proximity to Urban Parks and Mental Health." *Journal of Mental Health Policy and Economics* 17 (1): 19–24.
45. Kaczynski, A. T., L. R. Potwarka, and B. E. Saelens. 2008. "Association of Park Size, Distance, and Features with Physical Activity in Neighborhood Parks." *American Journal of Public Health* 98 (8): 1451–56. doi: 10.2105/AJPH.2007.129064.
46. Cohen, D. A., T. Marsh, S. Williamson, D. Golinelli, and T. L. McKenzie. 2012. "Impact and Cost-Effectiveness of Family Fitness Zones: A Natural Experiment in Urban Public Parks." *Health and Place* 18 (1): 39–45. doi: 10.1016/j.healthplace.2011.09.008.
47. Lopez, R. 2011. "The Potential of Safe, Secure and Accessible Playgrounds to Increase Children's Physical Activity." Active Living Research, Research Briefs, San Diego State University, San Diego, CA, February.
48. Fjørtoft, I. 2004. "Landscape as Playscape: The Effects of Natural Environments on Children's Play and Motor Development." *Children, Youth and Environments* 14 (2).



49. Ridgers, N. D., G. Stratton, S. J. Fairclough, and J. W. Twisk. 2007. "Long-Term Effects of a Playground Markings and Physical Structures on Children's Recess Physical Activity Levels." *Preventive Medicine* 44 (5): 393–97. doi: 10.1016/j.ypmed.2007.01.009.
50. Refshauge, A. D., U. K. Stigsdotter, B. Lamm, and K. Thorleifsdottir. 2013. "Evidence-Based Playground Design: Lessons Learned from Theory to Practice." *Landscape Research* (ahead-of-print):1–21.
12. Cole, K., M. McNeese, K. Kinney, K. Fisher, and J. W. Krieger. 2013. "Increasing Access to Farmers Markets for Beneficiaries of Nutrition Assistance: Evaluation of the Farmers Market Access Project." *Preventing Chronic Disease* 10: 130121. doi: 10.5888/pcd10.130121.
13. Young, C. R., J. L. Aquilante, S. Solomon, L. Colby, M. A. Kawinzi, N. Uy, and G. Mallya. 2013. "Improving Fruit and Vegetable Consumption among Low-Income Customers at Farmers Markets: Philly Food Bucks, Philadelphia, Pennsylvania, 2011." *Preventing Chronic Disease* 10: 120356. doi: 10.5888/pcd10.120356.

### CHAPTER 3: HEALTHY FOOD AND DRINKING WATER

1. Department of Nutrition at Harvard School of Public Health. 2012. "Fact Sheet: Sugary Drink Supersizing and the Obesity Epidemic."
2. Evidence Analysis Library Division, Center for Nutrition Policy and Promotion, U.S. Department of Agriculture. 2014. *A Series of Systematic Reviews on the Relationship between Dietary Patterns and Health Outcomes*. Alexandria, VA: U.S. Department of Agriculture.
3. World Health Organization. 2014. "Obesity and Overweight." Fact sheet no. 311, Media centre. (Accessed July 13, 2014.) <http://www.who.int/mediacentre/factsheets/fs311/en/>.
4. AECOM (AECOM Technical Services Inc.). 2010. *NYC Full Service Grocery Store Analysis: Final Project Report*. Prepared for NYC Department of Health and Mental Hygiene, New York, NY.
5. Drewnowski, A., A. Aggarwal, P. M. Hurvitz, P. Monsivais, and A. V. Moudon. 2012. "Obesity and Supermarket Access: Proximity or Price?" *American Journal of Public Health* 102 (8): e74–e80. doi: 10.2105/AJPH.2012.300660.
6. Hunt, A. R. 2007. "Consumer Interactions and Influences on Farmers' Market Vendors." *Renewable Agriculture and Food Systems* 22 (1): 54–66.
7. Brown, C., and S. Miller. 2008. "The Impacts of Local Markets: A Review of Research on Farmers Markets and Community Supported Agriculture (CSA)." *American Journal of Agricultural Economics* 90 (5): 1298–1302.
8. Morland, K., A. V. Diez Roux, and S. Wing. 2006. "Supermarkets, Other Food Stores, and Obesity: The Atherosclerosis Risk in Communities Study." *American Journal of Preventive Medicine* 30 (4): 333–39. doi: 10.1016/j.amepre.2005.11.003.
9. Larson, N. I., M. T. Story, and M. C. Nelson. 2009. "Neighborhood Environments: Disparities in Access to Healthy Foods in the U.S." *American Journal of Preventive Medicine* 36 (1): 74–81. doi: 10.1016/j.amepre.2008.09.025.
10. Larsen, K., and J. Gilliland. 2009. "A Farmers' Market in a Food Desert: Evaluating Impacts on the Price and Availability of Healthy Food." *Health and Place* 15 (4): 1158–62. doi: 10.1016/j.healthplace.2009.06.007.
11. Jilcott Pitts, S. B., A. Gustafson, Q. Wu, M. Leah Mayo, R. K. Ward, J. T. McGuirt, A. P. Rafferty, M. F. Lancaster, K. R. Evenson, T. C. Keyserling, and A. S. Ammerman. 2014. "Farmers' Market Use Is Associated with Fruit and Vegetable Consumption in Diverse Southern Rural Communities." *Nutrition Journal* 13: 1. doi: 10.1186/1475-2891-13-1.
14. GrowNYC. 2014. "Location Suggestion." (Accessed October 22, 2014.) <http://www.grownyc.org/location-suggestion>.
15. Kocken, P. L., J. Eeuwijk, N. M. Van Kesteren, E. Dusseldorp, G. Buijs, Z. Bassa-Dafesh, and J. Snel. 2012. "Promoting the Purchase of Low-Calorie Foods from School Vending Machines: A Cluster-Randomized Controlled Study." *Journal of School Health* 82 (3): 115–22.
16. French, S. A. 2003. "Pricing Effects on Food Choices." *Journal of Nutrition* 133 (3): 841S–43S.
17. Liberato, S. C., R. Bailie, and J. Brimblecombe. 2014. "Nutrition Interventions at Point-of-Sale to Encourage Healthier Food Purchasing: A Systematic Review." *BMC Public Health* 14 (1): 919. doi: 10.1186/1471-2458-14-919.
18. Mehta, N. K., and V. W. Chang. 2008. "Weight Status and Restaurant Availability a Multilevel Analysis." *American Journal of Preventive Medicine* 34 (2): 127–33. doi: 10.1016/j.amepre.2007.09.031.
19. Maddock, J. 2004. "The Relationship between Obesity and the Prevalence of Fast Food Restaurants: State-Level Analysis." *American Journal of Health Promotion* 19 (2): 137–43.
20. Litt, J. S., M. J. Soobader, M. S. Turbin, J. W. Hale, M. Buchenau, and J. A. Marshall. 2011. "The Influence of Social Involvement, Neighborhood Aesthetics, and Community Garden Participation on Fruit and Vegetable Consumption." *American Journal of Public Health* 101 (8): 1466–73. doi: 10.2105/AJPH.2010.300111.
21. George, D. R. 2013. "Harvesting the Biopsychosocial Benefits of Community Gardens." *American Journal of Public Health* 103 (8): e6. doi: 10.2105/AJPH.2013.301435.
22. Weber, C. L., and H. S. Matthews. 2008. "Food-Miles and the Relative Climate Impacts of Food Choices in the United States." *Environmental Science & Technology* 42 (10): 3508–13. doi: 10.1021/es702969f.
23. Lovell, S. T. 2010. "Multifunctional Urban Agriculture for Sustainable Land Use Planning in the United States." *Sustainability* 2 (8): 2499–2522. doi: 10.3390/su2082499.
24. Castro, D. C., M. Samuels, and A. E. Harman. 2013. "Growing Healthy Kids: A Community Garden-Based Obesity Prevention Program." *American Journal of Preventive Medicine* 44 (3 Suppl. 3): S193–99. doi: 10.1016/j.amepre.2012.11.024.
25. Blanck, H. M., O. M. Thompson, L. Nebeling, and A. L. Yaroch. 2011. "Improving Fruit and Vegetable Consumption: Use of Farm-to-Consumer Venues among US Adults." *Preventing Chronic Disease* 8 (2): A49.

26. U.S. Department of Agriculture, Natural Resources Conservation Service. 2009. "Community Garden Guide: Vegetable Garden Planting and Development." East Lansing, MI: Rose Lake Plant Materials Center.
27. U.S. Environmental Protection Agency. 2011. *Brownfields and Urban Agriculture: Interim Guidelines for Safe Gardening Practices*. Chicago: U.S. Environmental Protection Agency, Region 5 Superfund Division.
28. Denver Urban Gardens. 2012. *Growing Community Gardens: A Denver Urban Gardens' Best Practices Handbook for Creating and Sustaining Community Gardens*. Denver, CO: Denver Urban Gardens; LiveWell Colorado.
29. NPLAN (National Policy and Legal Analysis Network to Prevent Childhood Obesity) and ChangeLab Solutions. 2012. *Ground Rules: A Legal Toolkit for Community Gardens*. Oakland, CA: ChangeLab Solutions.
30. Zeratsky, K. 2014. "Nutrition and Healthy Eating: I've Been Seeing Ads That Say Caffeinated Drinks Hydrate You as Well as Water Does. Is This True?" Mayo Clinic, Healthy Lifestyle, Nutrition and Healthy Eating, Expert Answers. (Accessed August 4, 2014.) <http://www.mayoclinic.org/healthy-living/nutrition-and-healthy-eating/expert-answers/caffeinated-drinks/faq-20057965>.
31. Park, S., B. Sherry, H. Wethington, and L. Pan. 2012. "Use of Parks or Playgrounds: Reported Access to Drinking Water Fountains among US Adults, 2009." *Journal of Public Health (Oxford, England)* 34 (1): 65–72. doi: 10.1093/pubmed/fdr047.
32. Jasper, C., T. T. Le, and J. Bartram. 2012. "Water and Sanitation in Schools: A Systematic Review of the Health and Educational Outcomes." *International Journal of Environmental Research and Public Health* 9 (8): 2772–87. doi: 10.3390/ijerph9082772.
6. Rumchev, K., J. Spickett, M. Bulsara, M. Phillips, and S. Stick. 2004. "Association of Domestic Exposure to Volatile Organic Compounds with Asthma in Young Children." *Thorax* 59 (9): 746–51. doi: 10.1136/thx.2003.013680.
7. Mølhave, L., B. Bach, and O. F. Pedersen. 1986. "Human Reactions to Low Concentrations of Volatile Organic Compounds." *Environment International* 12 (1–4): 167–75. doi: [http://dx.doi.org/10.1016/0160-4120\(86\)90027-9](http://dx.doi.org/10.1016/0160-4120(86)90027-9).
8. Ware, J. H., J. D. Spengler, L. M. Neas, J. M. Samet, G. R. Wagner, D. Coultas, H. Ozkaynak, and M. Schwab. 1993. "Respiratory and Irritant Health Effects of Ambient Volatile Organic Compounds: The Kanawha County Health Study." *American Journal of Epidemiology* 137 (12): 1287–1301.
9. Mendell, M. J., A. G. Mirer, K. Cheung, M. Tong, and J. Douwes. 2011. "Respiratory and Allergic Health Effects of Dampness, Mold, and Dampness-Related Agents: A Review of the Epidemiologic Evidence." *Environmental Health Perspectives* 119 (6): 748–56. doi: 10.1289/ehp.1002410.
10. Fisk, W. J., Q. Lei-Gomez, and M. J. Mendell. 2007. "Meta-analyses of the Associations of Respiratory Health Effects with Dampness and Mold in Homes." *Indoor Air* 17 (4): 284–96.
11. Urban Green Council. 2010. *NYC Green Codes Task Force*. New York: Urban Green Council, New York Chapter of the U.S. Green Building Council.
12. Nazaroff, W. W., and C. J. Weschler. 2004. "Cleaning Products and Air Fresheners: Exposure to Primary and Secondary Air Pollutants." *Atmospheric Environment* 38 (18): 2841–65. doi: <http://dx.doi.org/10.1016/j.atmosenv.2004.02.040>.
13. Landrigan, P. J., and L. R. Goldman. 2011. "Children's Vulnerability to Toxic Chemicals: A Challenge and Opportunity to Strengthen Health and Environmental Policy." *Health Affairs* 30 (5): 842–50. doi: 10.1377/hlthaff.2011.0151.

## CHAPTER 4: HEALTHY ENVIRONMENT AND SOCIAL WELL-BEING

1. Rumchev, K., H. Brown, and J. Spickett. 2007. "Volatile Organic Compounds: Do They Present a Risk to Our Health?" *Reviews on Environmental Health* 22 (1): 39–55.
2. Centers for Disease Control and Prevention. 2014. "Health Effects of Cigarette Smoking." Smoking and Tobacco Use, Data and Statistics, Fact Sheets. Last updated February 6, 2014. (Accessed September 25, 2014.) [http://www.cdc.gov/tobacco/data\\_statistics/fact\\_sheets/health\\_effects/effects\\_cig\\_smoking/](http://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/).
3. International Agency for Research on Cancer (IARC). 2009. *IARC Handbooks on Tobacco Control, Vol. 13: Evaluating the Effectiveness of Smoke-Free Policies*. Lyon, France: IARC.
4. Sargent, R. P., R. M. Shepard, and S. A. Glantz. 2004. "Reduced Incidence of Admissions for Myocardial Infarction Associated with Public Smoking Ban: Before and After Study." *BMJ* 328 (7446): 977–80. doi: 10.1136/bmj.38055.715683.55.
5. Mulcahy, M., D. S. Evans, S. K. Hammond, J. L. Repace, and M. Byrne. 2005. "Secondhand Smoke Exposure and Risk Following the Irish Smoking Ban: An Assessment of Salivary Cotinine Concentrations in Hotel Workers and Air Nicotine Levels in Bars." *Tobacco Control* 14 (6): 384–88. doi: 10.1136/tc.2005.011635.
14. U.S. Environmental Protection Agency. "Greening Your Purchase of Cleaning Products: A Guide for Federal Purchasers," Environmentally Preferable Purchasing (EPP). Last updated May 12, 2010. (Accessed August 4, 2014.) <http://www.epa.gov/epp/pubs/cleaning.htm>.
15. Zock, J-P., J. Heinrich, D. Jarvis, G. Verlato, D. Norbäck, E. Plana, J. Sunyer, S. Chinn, M. Olivieri, and A. Soon. 2006. "Distribution and Determinants of House Dust Mite Allergens in Europe: The European Community Respiratory Health Survey II." *Journal of Allergy and Clinical Immunology* 118 (3): 682–90.
16. Sublett, J. L., J. Seltzer, R. Burkhead, P. B. Williams, H. J. Wedner, and W. Phipatanakul. 2010. "Air Filters and Air Cleaners: Rostrum by the American Academy of Allergy, Asthma and Immunology Indoor Allergen Committee." *Journal of Allergy and Clinical Immunology* 125 (1): 32–38.
17. Eartheasy.com. 2011. "7 Easy Ways to Reduce Your Exposure to Formaldehyde." Eartheasy blog, June 20, 2011. (Accessed October 22, 2014.) <http://eartheasy.com/blog/2011/06/7-easy-ways-to-reduce-your-exposure-to-formaldehyde/>.

18. Sundell, J., H. Levin, W. W. Nazaroff, W. S. Cain, W. J. Fisk, D. T. Grimsrud, F. Gyntelberg, Y. Li, A. K. Persily, A. C. Pickering, J. M. Samet, J. D. Spengler, S. T. Taylor, and C. J. Weschler. 2011. "Ventilation Rates and Health: Multidisciplinary Review of the Scientific Literature." *Indoor Air* 21 (3): 191–204. doi: 10.1111/j.1600-0668.2010.00703.x.
19. Fisk, W. J., A. G. Mirer, and M. J. Mendell. 2009. "Quantitative Relationship of Sick Building Syndrome Symptoms with Ventilation Rates." *Indoor Air Journal* 19 (2): 159–65.
20. Seppanen, O., W. J. Fisk, and Q.H. Lei. 2006. "Ventilation and Performance in Office Work." *Indoor Air Journal* 16 (1): 28–36.
21. Lawrence Berkeley National Laboratory. 2014. "Health and Economic Impacts of Building Ventilation: Implications for Good Ventilation Practices." Indoor Air Quality Scientific Findings Resource Bank. (Accessed November 4, 2014.) <http://www.iaqscience.lbl.gov/vent-practices.html>.
22. Fisk, W. J., D. Faulkner, and D. P. Sullivan. 2006. "Measuring Outdoor Airflow into HVAC Systems." *ASHRAE Journal* 48 (8): 50–57.
23. Price, P. N., and M. H. Sherman. 2006. *Ventilation Behavior and Household Characteristics in New California Houses*. Berkeley, CA: Lawrence Berkeley National Laboratory.
24. ASHRAE and ANSI/ASHRAE. 2010. "Standard 62.1-2010. Ventilation for Acceptable Indoor Air Quality." American Society of Heating, Refrigerating, and Air Conditioning Engineers Inc. [https://ashrae.iwrapper.com/ViewOnline/Standard\\_62.2-2013](https://ashrae.iwrapper.com/ViewOnline/Standard_62.2-2013).
25. ASHRAE (American Society of Heating, Refrigerating, and Air Conditioning Engineers). 2004. "Chapter 5: HVAC Systems and Equipment." In *ASHRAE Handbook*. Atlanta, GA: ASHRAE.
26. Van Den Wymelenberg, K. 2014. "The Benefits of Natural Light." *Architectural Lighting*, January–February.
27. Muszynski, L. 2009. "Studies Link Green Design, Occupant Productivity." *Facilities Net*. (Accessed July 20, 2014.) <http://www.facilitiesnet.com/green/article/Studies-Link-Green-Design-Occupant-Productivity--11283>.
28. Clarke, R. V. 2008. *Improving Street Lighting to Reduce Crime in Residential Areas*. Problem-Oriented Guides for Police: Response Guide Series No. 8. Washington, DC: Center for Problem-Oriented Policing, U.S. Department of Justice.
29. Chepesiuk, R. 2009. "Missing the Dark: Health Effects of Light Pollution." *Environmental Health Perspectives* 117 (1): A20–27.
30. Boubekri, M., I. N. Cheung, K. J. Reid, C. H. Wang, and P. C. Zee. 2014. "Impact of Windows and Daylight Exposure on Overall Health and Sleep Quality of Office Workers: A Case-Control Pilot Study." *Journal of Clinical Sleep Medicine* 10 (6): 603–11.
31. Galasiu, A. D., and J. A. Veitch. 2006. "Occupant Preferences and Satisfaction with the Luminous Environment and Control Systems in Daylit Offices: A Literature Review." *Energy and Buildings* 38 (7): 728–42. doi: <http://dx.doi.org/10.1016/j.enbuild.2006.03.001>.
32. Lukcsó, D., T. L. Guidotti, D. E. Franklin, and A. Burt. 2014. "Indoor Environmental and Air Quality Characteristics, Building-Related Health Symptoms, and Worker Productivity in a Federal Government Building Complex." *Archives of Environmental and Occupational Health* Sep 25:0. [Epub ahead of print] doi: 10.1080/19338244.2014.965246.
33. U.S. Green Building Council. 2012–2014. "Thermal Comfort - Controlability." LEED. (Accessed October 7, 2014.) <http://www.usgbc.org/credits/eq62>.
34. U.S. Environmental Protection Agency. 2012. "Noise Pollution." Air and Radiation. Last updated July 16, 2012. (Accessed August 2, 2014.) <http://www.epa.gov/air/noise.html>.
35. Foraster, M., N. Kunzli, I. Aguilera, M. Rivera, D. Agis, J. Vila, L. Bouso, A. Deltell, J. Marrugat, R. Ramos, J. Sunyer, R. Elosua, and X. Basagana. 2014. "High Blood Pressure and Long-Term Exposure to Indoor Noise and Air Pollution from Road Traffic." *Environmental Health Perspectives* 112 (11). doi: 10.1289/ehp.1307156.
36. Ising, H., and B. Kruppa. 2004. "Health Effects Caused by Noise: Evidence in the Literature from the Past 25 Years." *Noise Health* 6 (22): 5–13.
37. U.S. Department of Transportation Federal Highway Administration. 2011. "Keeping the Noise Down: Highway Traffic Noise Barriers." Last updated July 6, 2011. [http://www.fhwa.dot.gov/environment/noise/noise\\_barriers/design\\_construction/keepdown.cfm](http://www.fhwa.dot.gov/environment/noise/noise_barriers/design_construction/keepdown.cfm).
38. Gidlöf-Gunnarsson, A., and E. Öhrström. 2008. "The Effectiveness of Quiet Asphalt and Earth Berm in Reducing Annoyances due to Road Traffic Noise in a Residential Area." In *Proceedings of the 9th Congress of the International Commission on the Biological Effects of Noise (ICBEN)*, July 21–25, Foxwoods, CT.
39. Arizona Department of Transportation. 2013. "Quiet Pavement Program." Environmental Planning, Programs. (Accessed October 7, 2014.) <http://azdot.gov/business/environmental-planning/programs/quiet-pavement-program>.
40. U.S. Department of Transportation, Federal Highway Administration. 2011. "The Audible Landscape: Four Physical Techniques to Reduce Noise Impacts." Office of Planning, Environment, & Realty (HEP), Environment. Last updated July 14, 2011. (Accessed July 20, 2014.) [http://www.fhwa.dot.gov/environment/noise/noise\\_compatible\\_planning/federal\\_approach/audible\\_landscape/al04.cfm](http://www.fhwa.dot.gov/environment/noise/noise_compatible_planning/federal_approach/audible_landscape/al04.cfm).
41. Vigenier, N., and M. A. Brown. 2009. "Building Envelope Design Guide: Glazing." Whole Building Design Guide, a program of the National Institute of Building Sciences. Last updated June 1, 2009. (Accessed August 3, 2014.) [http://www.wbdg.org/design/env\\_fenestration\\_glz.php](http://www.wbdg.org/design/env_fenestration_glz.php).
42. Green Roofs for Healthy Cities. 2014. "Green Roof Benefits." (Accessed July 20, 2014.) <http://www.greenroofs.org/index.php/about/greenroofbenefits>.
43. Green Cities: Good Health. 2010–2014. "Mental Health & Function." University of Washington, College of the Environment, Urban Forestry/Urban Greening Research. Last modified September 11, 2014. (Accessed July 20, 2014.) [http://depts.washington.edu/hhwb/Thm\\_Mental.html](http://depts.washington.edu/hhwb/Thm_Mental.html).

44. Maas, J., R. A. Verheij, S. de Vries, P. Spreeuwenberg, F. G. Schellevis, and P. P. Groenewegen. 2009. "Morbidity Is Related to a Green Living Environment." *Journal of Epidemiology and Community Health* 63 (12): 967–73. doi: 10.1136/jech.2008.079038.
45. American Society of Landscape Architects. 2014. "Health Benefits of Nature." Professional Practice. (Accessed August 3, 2014.) <http://www.asla.org/healthbenefitsofnature.aspx>.
46. Ulrich, R. S. 1984. "View through a Window May Influence Recovery from Surgery." *Science* 224: 420–22.
47. Green Roofs for Healthy Cities. 2014. "Green Walls Benefits." (Accessed July 20, 2014.) <http://www.greenroofs.org/index.php/about/green-wall-benefits>.
48. Haluza, D., R. Schonbauer, and R. Cervinka. 2014. "Green Perspectives for Public Health: A Narrative Review on the Physiological Effects of Experiencing Outdoor Nature." *International Journal of Environmental Research and Public Health* 11 (5): 5445–61. doi: 10.3390/ijerph110505445.
49. Donovan, G. H., D. T. Butry, Y. L. Michael, J. P. Prestemon, A. M. Liebhold, D. Gatzliolis, and M. Y. Mao. 2013. "The Relationship between Trees and Human Health: Evidence from the Spread of the Emerald Ash Borer." *American Journal of Preventive Medicine* 44 (2): 139–45. doi: 10.1016/j.amepre.2012.09.066.
50. Grinde, B., and G. G. Patil. 2009. "Biophilia: Does Visual Contact with Nature Impact on Health and Well-Being?" *International Journal of Environmental Research and Public Health* 6 (9): 2332–43. doi: 10.3390/ijerph6092332.
51. Browning, B., C. Garvin, C. Ryan, N. Kallianpurkar, L. Labruto, S. Watson, and T. Knop. 2014. *The Economics of Biophilia: Why Designing with Nature in Mind Makes Financial Sense*. New York: Terrapin Bright Green.
52. Murayama, H., Y. Fujiwara, and I. Kawachi. 2012. "Social Capital and Health: A Review of Prospective Multilevel Studies." *Journal of Epidemiology* 22 (3): 179–87.
53. University of Rochester Medical Center. 2014. "Older Adults and the Importance of Social Interaction." In *Health Encyclopedia*. Last updated November 22, 2014. <http://www.urmc.rochester.edu/encyclopedia/content.aspx?ContentTypeID=1&ContentID=4513>.
54. Holt-Lunstad, J., T. B. Smith, and J. B. Layton. 2010. "Social Relationships and Mortality Risk: A Meta-analytic Review." *PLoS Med* 7 (7): e1000316. doi: 10.1371/journal.pmed.1000316.
55. Kawachi, I., B. P. Kennedy, and R. Glass. 1999. "Social Capital and Self-Rated Health: A Contextual Analysis." *American Journal of Public Health* 89 (8): 1187–93.
56. Centers for Disease Control and Prevention. 2011. *Strategies to Prevent Obesity and Other Chronic Diseases: The CDC Guide to Strategies to Increase Physical Activity in the Community*. Atlanta, GA: U.S. Department of Health and Human Services.
57. Glass, T. A., M. Freedman, M. C. Carlson, J. Hill, K. D. Frick, N. Ialongo, S. McGill, G. W. Rebok, T. Seeman, and J. M. Tielsch. 2004. "Experience Corps: Design of an Intergenerational Program to Boost Social Capital and Promote the Health of an Aging Society." *Journal of Urban Health* 81 (1): 94–105.
58. Ejlskov, L., R. N. Mortensen, C. Overgaard, L. R. Christensen, H. Vardinghus-Nielsen, S. R. Kraemer, M. Wissenberg, S. M. Hansen, C. Torp-Pedersen, and C. D. Hansen. 2014. "Individual Social Capital and Survival: A Population Study with 5-Year Follow-Up." *BMC Public Health* 14 (1): 1025. doi: 10.1186/1471-2458-14-1025.
59. Fullilove, M. T. 1998. "Promoting Social Cohesion to Improve Health." *Journal of the American Medical Women's Association* 53 (2): 72–76.
60. Mohnen, S. M., P. P. Groenewegen, B. Volker, and H. Flap. 2011. "Neighborhood Social Capital and Individual Health." *Social Science and Medicine* 72 (5): 660–67. doi: 10.1016/j.socscimed.2010.12.004.
61. Powell, L. M., S. Slater, F. J. Chaloupka, and D. Harper. 2006. "Availability of Physical Activity-Related Facilities and Neighborhood Demographic and Socioeconomic Characteristics: A National Study." *American Journal of Public Health* 96 (9): 1676–80. doi: 10.2105/AJPH.2005.065573.
62. New York City Departments of Design and Construction (DDC), Health and Mental Hygiene, Transportation (DOT), and City Planning. 2010. *Active Design Guidelines: Promoting Physical Activity and Health in Design*. New York: City of New York.
63. Arhant-Sudhir, K., R. Arhant-Sudhir, and K. Sudhir. 2011. "Pet Ownership and Cardiovascular Risk Reduction: Supporting Evidence, Conflicting Data and Underlying Mechanisms." *Clinical and Experimental Pharmacology and Physiology* 38 (11): 734–38.
64. Horowitz, S. 2008. "The Human–Animal Bond: Health Implications across the Lifespan." *Alternative and Complementary Therapies* 14 (5): 251–56. doi: 10.1089/act.2008.14505.
65. Leshnowar, R. 2014. "Smart Landlord Policies for Pet-Friendly Rentals." NOLO: Law for All. <http://www.nolo.com/legal-encyclopedia/smart-landlord-policies-pet-friendly-29763.html>.
66. Allen, K., B. E. Shykoff, and J. L. Izzo Jr. 2001. "Pet Ownership, but Not ACE Inhibitor Therapy, Blunts Home Blood Pressure Responses to Mental Stress." *Hypertension* 38 (4): 815–20.
67. Christian, H., G. Trapp, C. Lauritsen, K. Wright, and B. Giles-Corti. 2013. "Understanding the Relationship between Dog Ownership and Children's Physical Activity and Sedentary Behaviour." *Pediatric Obesity* 8 (5): 392–403.
68. Cutt, H., B. Giles-Corti, M. Knuiiman, A. Timperio, and F. Bull. 2008. "Understanding Dog Owners' Increased Levels of Physical Activity: Results from RESIDE." *American Journal of Public Health* 98 (1): 66–69.
69. Partnership for Animal Welfare. 2014. "Allergies to Pets." Last updated July 26, 2014. (Accessed August 4, 2014.) [http://www.paw-rescue.org/PAW/PETTIPS/DogTip\\_Allergies.php](http://www.paw-rescue.org/PAW/PETTIPS/DogTip_Allergies.php).

# ACKNOWLEDGMENTS

The Building Healthy Places Initiative gratefully acknowledges the contributions of the following people to this report:

## REVIEWERS

### **Erin Christensen Ishizaki**

Associate Principal, Mithun  
Seattle, Washington

### **Richard J. Jackson, M.D.**

Professor, Environmental Health Sciences  
UCLA Fielding School of Public Health  
Los Angeles, California

### **Marice Ashe**

Founder and CEO, ChangeLab Solutions  
Oakland, California

### **Clare de Briere**

Chief Operating Officer and Executive Vice President  
The Ratkovich Company

## PARTICIPANTS IN MAY 28–29, 2014, WORKSHOP IN WASHINGTON, D.C.

### **Mariela Alfonso**

Founder  
State of Place  
New York, New York

### **Mary Borgia**

President  
The Borgia Company  
Newport Beach, California

### **Suzanne Cameron**

Owner/Principal  
Suzanne Cameron LLC  
Washington, D.C.

### **Kathleen Carey**

Chief Content Officer  
Urban Land Institute  
Washington, D.C.

### **John Clymer**

Executive Director  
National Forum for Heart Disease & Stroke Prevention  
Washington, D.C.

### **Laura Cole**

Vice President of Marketing  
Corbelis  
Ashburn, Virginia

### **Chris Dunn**

Managing Principal  
Dunn + Kiley  
Denver, Colorado

### **Ted Eytan**

Director, Permanente Federation  
Kaiser Permanente  
Washington, D.C.

### **Whitney Austin Gray**

Health Research and Innovation Director  
Cannon Design  
Washington, D.C.

### **Tony Green**

Managing Partner  
Pinehills  
Plymouth, Massachusetts

### **Sara Hammerschmidt**

Senior Research Associate  
Urban Land Institute  
Washington, D.C.

### **Jeremy Hudson**

Partner and CEO  
Specialized Real Estate Group  
Fayetteville, Arkansas

### **Chris Kochtitzky**

Urban and Regional Planner  
National Center for Environmental Health at  
Centers for Disease Control and Prevention  
Atlanta, Georgia

### **Jeffrey Kottmeier**

Director, Research & Analytics  
CBRE  
Washington, D.C.

### **Sandra Kulli**

President  
Kulli Marketing  
Malibu, California

### **Rachel MacCleery**

Senior Vice President for Content  
Urban Land Institute  
Washington, D.C.

### **Maureen McAvey**

Senior Resident Fellow  
Urban Land Institute  
Washington, D.C.

### **Ed McMahon**

Senior Resident Fellow  
Urban Land Institute  
Washington, D.C.

**James Moore**

Senior Vice President  
HDR Inc.  
Tampa, Florida

**Clifford Moser**

Director, Facilities Planning and Design  
National Facility Services for Kaiser Permanente  
Oakland, California

**Rafael Muñiz**

Senior Vice President  
The JBG Companies  
Washington, D.C.

**Jim Murley**

Executive Director  
South Florida Regional Planning Council  
Hollywood, Florida

**Susan Powers**

Founding Partner  
Urban Ventures LLC  
Denver, Colorado

**Christopher Pyke**

Vice President, Research  
U.S. Green Building Council  
Washington, D.C.

**Anna Ricklin**

Manager, Community Health and Planning Research  
Center  
The American Planning Association  
Washington, D.C.

**Lisa Rother**

Executive Director  
ULI Washington  
Bethesda, Maryland

**Peter Rummell**

Principal  
RummellMunz Partners  
Jacksonville, Florida

**David Scheuer**

President  
The Retrovest Companies  
Burlington, Vermont

**Brad Segal**

President  
PUMA  
Denver, Colorado

**Jeremy Sharpe**

Vice President, Community Development  
Sharpe & Associates  
Tucson, Arizona

**Elizabeth Shreeve**

Principal  
SWA  
Sausalito, California

**Chris Smith**

Senior Program Officer - Healthy Living  
Colorado Health Foundation  
Denver, Colorado

**Anne Warhover**

Former President and CEO  
Colorado Health Foundation  
Denver, Colorado

**Matthew Welker**

Manager, Strategic Alliances + Initiatives  
The American Institute of Architects  
Washington, D.C.

**Amanda Wilson**

Research Coordinator  
Active Living Research  
San Diego, California

**Margaret Wylde**

President and CEO  
ProMatura Group LLC  
Oxford, Mississippi

**BACK COVER IMAGES,**

**TOP:** HafenCity in Hamburg, Germany, features recreation spaces for children and adults. *(Thomas Hampel/Elbe & Flut)*

**MIDDLE:** One Bryant Park in New York City, offers abundant greenery in an interior public space. *(Sara Hamerschmidt)*

**BOTTOM:** Fresh produce is plentiful at the historic Saint John City Market in New Brunswick, Canada. *(Rachel MacCleery)*

# BUILDING HEALTHY PLACES

## T O O L K I T



*Building Healthy Places Toolkit: Strategies for Enhancing Health in the Built Environment* outlines opportunities to enhance health through changes in approaches to buildings and projects.

Developers, owners, property managers, designers, investors, and others involved in real estate decision making can use the strategies and tactics described in this report in their projects to create places that contribute to healthier people and communities and to enhance and preserve value by meeting growing desires for health-promoting places.

### STRATEGIES FOR **ENHANCING HEALTH** IN THE **BUILT ENVIRONMENT**

1025 Thomas Jefferson Street, NW  
Suite 500 West  
Washington, DC 20007  
[www.uli.org](http://www.uli.org)  
ISBN: 978-0-87420-357-8

ISBN 978-0-87420-357-8



5 3 9 9 5



9 780874 203578



**Urban Land  
Institute**

Building Healthy  
Places Initiative