CREATING HEALTHY PLACES
GUIDEBOOK

HEALTH + DESIGN INITIATIVE

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The Colorado Health Foundation made a generous grant to the University of Colorado Denver College of Architecture and Planning through a project titled Creating Healthy Places through Transformational Education and Design. This *Guidebook* is a product of this health and design project, which aims to advance the integration of health and wellness through design, planning, and decision-making.

Acknowledgements

Creating Healthy Places through Transformational Education and Design

UNIVERSITY OF COLORADO DENVER STUDENT CONTRIBUTORS

Greg Adelberg
Cherryl Agosto
Khawla Alazabi
Aziz Alhassan
Emily Allen
Abdulrahman Almajadiah
Maz Almazrou
Maryam Alnoaimi
Maria Alvarez
Asim Alzahrani
Elyse Appelgate
Beth Erin Benn
Matthew Bossler
Cassidy Bowman
Maggie Brown
Sofia Bruni
Amanda Jeanne Bucher
Adam Buehler
Alyson E. Burkhalter
Nicole Bush
Robert Chesnova
Becca Chmiel
Lukas Coker
Kyle Renee Conrad
Christina Contreras
Helen Davidovski
Marika Davis
Ann Desanctis
Thomas Dimperio
Rio Dulaney
Madison Dyer
Marty Egan
Carl Faler
Natalie Floyd
Max Gesten
Emily Gluckin
Sucha Godinez
Paige Goneau
Christina Lee Gray
Naomi Grunditz
Kelsey Grundmor
Sylvia Leon Guerrero
Rose Haag
Stephanie Hamby
Korney Harris
Kurt Hartmann
Annemarie Heinrich
Landon Hilliard
Caleb Jackson
Greg Jacobs
Daniel Jennings
Congcong Jia
Camran J. Kazemian
Amy Marie Kotches
Ramya Krishna
Kathryn Landers
Karrin Larson
Stepanie Leonard
Brayan Marin
Erin Michelle Marrero
Joseph Martz
Pallavi Mathur
Erica Mathwich
Catharine McCord
Charlotte McGuire
Zach McManus
Gaelen Means
Kimberly Mejia
Rocio Mercedes
Laurie Meyer-Lancisi
Kristin Milardo
Sarah Miley
Becca Minasian
Jonathan Moore
Patrick John Noonan
Calin Oliverio
Frank Pendrell
Joshua Phillips
Sydney Provan
Yan Qi
Jana Raines Elle Rich
Terri Register
Rudolfo Rodriguez
Kyle Roddy
Dajana Rogulja
Lizzeth Romero
Isabelle Rooney
Abdsalam Saad
Bashir Sagheir
Sarine Sahakian
Hillary Seybold
Sarah Shaffer
Kevin Small
Brandon Smith
Noah Sosin
Michael D. Sousa
Ivy Steele
Evyn Taylor
Moorer Tatum
Logan Telles
Samuel Evan Thomas
Sarah Turnbach
Carolina Van Horn
Ngoc Vu
Yueyang Wang
Hunter Wells
Matt Whitman
Ryan Wrensch
Bella Xu
Yashmine Yacubu
Yuanjie Yu

PROJECT LEADS

Michael Jenson
Rocky Piro
Austin Troy

EDITORIAL + DESIGN TEAM

Jenna McKnight, Managing Editor
The NORDEN41 Creative Team
Alyson E. Burkhalter
Camran J. Kazemian
Stephanie Leonard
Nicole Bush
Jennifer Davis-Flynn

STUDIO INSTRUCTORS

Anna Bierbauer
Christopher Koziol
Korkut Onaran
Andrew Rutz
Esther Sullivan
Krista Trofka
Gretchen Wilson

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Preface

The *Creating Healthy Places Guidebook* culminates three years of work on researching and developing best practices for making communities healthier. The intent has been to provide new models for integrating health into the design and planning of the built environment, both educationally and professionally. Developed by students and faculty at the University of Colorado Denver's College of Architecture and Planning, the *Guidebook* incorporates findings and outcomes from studios and research that began in 2016 under a generous grant from the Colorado Health Foundation.

The grant sought to specifically capitalize on current and potential institutional synergies between the University of Colorado Denver and the surrounding healthcare community. There was an emphasis on developing exemplary collaborative educational practices that included community organizations, academic institutions, practitioners, and private enterprise. In addition, this effort took steps to better connect and positively transform (often isolated) disciplinary practices in health and design. Broadly speaking, the activities supported by this grant sought to achieve three things simultaneously. First, engaging in the transformation of a specific place, namely the Sun Valley neighborhood, provided applied lessons and outcomes. Secondly, educational paradigms were created to realign how design and health professionals (and students) consider the role that a healthy environment must play as a foundational agenda for design and planning. Finally, the grant supported the development of products to disseminate strategically the lessons learned to a wider audience, both across the state of Colorado and nationally.

In the fulfillment of these three goals, the Colorado Health Foundation grant directly funded scholarly research, interdisciplinary studios, lectures, symposia, and professional networking opportunities, all related to the belief that the connection between the built environment and human health is paramount. More than 100 students and many faculty members across several academic and professional disciplines have participated in the development of the *Guidebook*. Student involvement included researching current best practices, as well as studio design projects. Many of the strategies presented here clearly illustrate the transformational power that design can bring to issues of human well-being when the focus is on the creation of healthy environments.

The redeveloping Sun Valley neighborhood in west Denver served as the central case study for the studios, which included students from urban and regional planning, landscape architecture, urban design, sociology, and architecture. Located near the Auraria campus and in close proximity to downtown Denver, Sun Valley has a high concentration of poverty and a legacy of environmental pollution, and it remains isolated due to poor connections to the rest of the city. However, its location along the Platte River Greenway and its potential to serve as connective urban tissue linking to Denver's core have made it a candidate for model redevelopment. As an *ecodistrict,* both health and sustainability are utilized as guiding principles. In this spirit, the design studios applied ecodistrict design philosophies to test their potential for transforming planning and design practices. In many ways, the resultant work became the basis for practices included in this *Guidebook*.

Parallel work on health and planning with other projects at the College of Architecture and Planning allowed some of the findings and outcomes to be tested in other communities in Colorado. A framework designed to evaluate and assess health issues in Sun Valley was also used in other Colorado cities such as Brush, Durango, and Westminster. This subsequent work confirmed that the various tools and practices presented in the *Guidebook* seeking to better address the relationship between health and design have applicability in communities throughout Colorado and beyond.

In addition, the *Guidebook* has been designed to complement and expand on the Urban Land Institute's 2013 *Building Healthy Places Toolkit* (also funded through a Colorado Health Foundation Grant). The project team consulted with the Institute's Colorado chapter throughout the process, while also working to build a statewide network of professional organizations and associations. This network brings together professionals from a broad variety of disciplines to collaborate further on advancing a health-focused agenda for planning and design initiatives throughout Colorado communities. As of 2019, there are 24 partner organizations in this network, named the Colorado Healthy Places Collaborative. These partners also provided consultation in the development of the *Guidebook's* text.

The *Guidebook* is designed to be used by practitioners, educators, decision-makers, citizens, and community organizations. It is organized into seven chapters that focus on health issues related to community engagement, the natural environment, water, food, buildings, open space and streetscapes,

and mobility. The expectation is for the *Guidebook* to contribute in a meaningful way to continued efforts to make communities healthy, vibrant, and complete places in which all types of residents can live, work, and play.

We are grateful to the Colorado Health Foundation for making this work possible, the Denver Housing Authority, Sun Valley EcoDistrict, residents of Sun Valley, the planning teams working in Sun Valley, our partners in the Colorado Healthy Places Collaborative, and colleagues and students at the University of Colorado Denver.

Michael Jenson

Assistant Vice Chancellor for Research and Creative Activities, University of Colorado Denver

Austin Troy

Chair, Department of Urban and Regional Planning, University of Colorado Denver

Rocky Piro

Executive Director, Colorado Center for Sustainable Urbanism, University of Colorado Denver

Foreword

The process for developing the *Creating Healthy Places Guidebook* has been intentionally participatory and collaborative. An initial charge by the Colorado Health Foundation was to develop resources to complement and build off of the Urban Land Institute's 2013 *Building Healthy Places Toolkit*. This *Guidebook* has accomplished that and now represents input and support from a broader statewide network of practitioners and associations. The new network, the Colorado Healthy Places Collaborative, brings together two dozen professional organizations from a broad variety of disciplines to advance health and wellness in planning and designing Colorado communities. This foreword includes the impressions from nine of the partner organizations regarding the contribution of this *Guidebook* as a practical resource for creating healthier places throughout the state and beyond.

CALPHO
Colorado Association of Local Public Health Officials

PETER MANETTA
Manager for Partnerships and Research
Colorado Association of Local Public Health Officials

Health in All Policies

Like walkable streets and accessible parks, local governmental public health is a key part of the infrastructure that supports healthy communities. The mission of local health officials is to protect and promote the health of all people in their jurisdiction. This includes a wide variety of preventive and responsive activities, such as containing a viral outbreak or partnering with a local school to increase social-connective opportunities for the surrounding neighborhood.

Over the last couple decades, public health professionals have articulated a cross-sectoral approach to policymaking called *Health in All Policies* (HiAP). Using this approach means encouraging any entity that enacts policies affecting people's lives (including governments, employers, and institutions) to consider the health impacts of those policies. For example, a local public health agency in Colorado helped employers design workplace breastfeeding policies.

The HiAP approach means different things in each community. How policies affect community health, directly or indirectly, is heavily dependent on local circumstances around demographics, economics, history, and interactions with outside forces. This level of awareness is a collective one—no one person or organization has such systemic operational understanding of a community. Because of this, sustaining *Health in All Policies* is highly collaborative and requires stable, inclusive partnerships that

value community members' lived experience as much as the quantitative data about their health.

Many local public health agencies in Colorado are moving to adopt this approach, starting with laying the groundwork for strong partnerships that can accelerate *Health in All Policies*. Funding remains a challenge. The Colorado Association of Local Public Health Professionals and the Colorado Department of Public Health and Environment continue to lead efforts to secure adequate funding for foundational public health capabilities and services to support further adoption of *Health in All Policies*.

The *Creating Healthy Places Guidebook* is a welcome addition to advancing a more comprehensive, integrated, and sustainable approach to addressing health and wellness. Public health agencies work hard to make progress in the eight sections of the *Guidebook's Health Assessment Lens* (see Appendix A), but our health challenges are so complex and interconnected that no one agency can address them on its own. All the sectors that influence health, and the people they impact, must play a part. Also, addressing the social and environmental determinants of health requires changing systems through policy—and local policies, including ordinances, are powerful tools for achieving healthy communities in Colorado.

MICHELE SCANZE
Chair
Healthy Communities Committee, Colorado Chapter of the American Planning Association

Health and Planning: Equity and Engagement

Public health and planning are intrinsically and historically linked. Initially, this connection focused more heavily on infectious disease as a result of overcrowding, poor sanitation, and harmful exposures from environmental pollutants. The story of London physician John Snow discovering the Broad Street pump as the source of the 1880s cholera epidemic is taught to public health students as an example of identifying a disease outbreak, as well as to planning students to understand how the design of cities impacts the well-being of residents. In the United States, "health, safety, and general welfare" were the rationale lifted up to advance formal planning and zoning in cities.

Over time, the focus on public health turned its attention to preventing chronic disease, while planning focused more on urban form, infrastructure, facilities, and services. More recently, as research on the nation's obesity and chronic disease epidemics has increased,

there has been growing evidence that lifestyles and wellness are influenced by social and physical environments. It is now common to refer to *public health and planning* as a single phrase, as research has continuously shown that health is impacted by the design of our communities and the distribution of resources. Applying a health lens to planning has created a new foundation for addressing social and environmental impacts on well-being, such as access to healthy food, opportunities for physical activity, a variety of mobility options, and availability of affordable and safe housing.

Understanding the multiple factors that affect the health and wellness of all residents, along with mobilizing existing community assets, ensures that planning and design interventions to improve well-being are successful and sustainable long-term. Planners acknowledge and respond to the reality that the highest health inequities exist among traditionally underrepresented populations, including people of color, low-income groups, youth, older adults, people of various sexual orientation and gender, and people with physical and mental disabilities. Additionally, it is important to understand the economic and employment landscape within a community to begin dismantling health disparities and to foster resilient communities.

Authentic community engagement is an essential component for creating vibrant places and spaces that respond to and resonate with community members' culture, values, and priorities. Planning strategies that place residents at the heart of engagement efforts result in mutual trust and strong ties between community members and planning professionals. Genuine engagement also allows community members to voice their unique perspectives and experiences while simultaneously generating social equity.

The Colorado Chapter of the American Planning Association understands that the way we design and build our communities—including the places where we live, learn, work, and play—impacts our physical, social, and mental health. Development, transportation, zoning, and land use patterns that promote a healthy lifestyle, provide access to community resources, and are considered through an equity lens are critical for establishing a high quality of life for all Coloradans. Our chapter's Healthy Communities Committee firmly believes in using community-driven approaches to transform the built environment for all Coloradans to thrive, regardless of who they are or where they come from.

The Colorado Chapter and its Healthy Communities Committee

welcome the partnership with CU Denver's Health + Design Initiative and the Colorado Healthy Places Collaborative to create a healthier future for Colorado communities. The *Creating Healthy Places Guidebook* is a valuable contribution in advancing health and wellness in communities large and small.

CRAIG CORONATO, FASLA
American Society of Landscape Architects, Colorado Chapter

Healthy Landscapes Support Healthy Communities

In the design of New York's Central Park in the mid 1800s, Frederick Law Olmsted, the "father" of American landscape architecture, sought to bring nature into a growing city. He recognized that providing all people, rich and poor, with a place for respite and recreation supported a societal goal of physical, mental, and spiritual well-being. Over 160 years later, the field of landscape architecture continues to recognize that access to outdoors and nature is fundamental to human health.

Ecological systems—including designed landscapes in urban settings—provide access to open space and nature, along with beauty and resilience, which in turn improves human health and quality of life. Medical journals and professionals now routinely prescribe outdoor visits and activities for improved health and recovery, and there is ample evidence substantiating the value, economic and otherwise, of access to open space and nature.

Landscape architects understand the health importance of outdoor places that people see, touch, and hear. In the urban environment, quality of life is improved by creating safe spaces for social interaction and leisure activities. Within both natural and built environments, in rural and urban areas, there is health and design value in developing policies that protect environmentally sensitive areas and scenic landscapes, and protect people from the catastrophic effects of environmental degradation, flooding, wildfire, and other hazards.

An understanding of natural properties and processes—hydrology, soils, vegetation, climate impacts, and construction materials and techniques—allows adaptation of human uses into designed and natural landscapes, for the benefit of both. The tools used include creative use of structures, pavements, furnishings, soils, and vegetation. These elements can provide human scale, community character, visual and physical access, and sense of place. How these elements are sourced and applied

have a direct impact on human health. We know, for example, that trees can help moderate temperature in urban environments and that effective land-use policies can protect sensitive landscapes and views in larger open spaces.

Recent initiatives in the United States have resulted in the identification of ecosystem services, which provide a common understanding of the definition and measurement of the inherent value of landscapes. The Sustainable Sites Initiative (SITES) describes the application of best practices for the protection of sensitive landscapes and the design of sustainable and resilient places for people. Key elements of this initiative touch on many of the practices addressed in the *Creating Healthy Places Guidebook*. Landscape architects and related professionals welcome this resource and the information it provides on community engagement, equity in access, restoring and protecting the natural environment, planning for water, responsible sourcing of materials, and attention to siting development to improve health and wellness.

KELLY WORDEN
Director, Health Research
U.S. Green Building Council

Healthy Water, Healthy Buildings, Healthy Places

The built environment is a critical determinant of health behaviors and outcomes. Prioritizing an intentional health focus within sustainability efforts allows decision-makers to create places that benefit individuals, communities, and future generations. Take the example of water. Having sustainability and health as foundations helps us to manage water for people today and to preserve water resources for tomorrow. Within the built environment, management of watersheds, how water is used, and how stormwater is treated protects communities from environmental hazards, promotes community health and interaction with nature, and benefits social well-being and economic opportunity. In buildings and public spaces, thoughtful design and operation can provide access to healthy, clean water and ensure that there is adequate water for consumption. Addressing water in planning and design encourages an understanding of and an appreciation for water, as well as for the conservation of water resources. Multi-disciplinary benefits of sustainable and health-focused interventions can be found across the spectrum of building and

construction, community vitality, and thoughtful city design.

At the U.S. Green Building Council, we build these types of considerations into the Leadership in Energy and Environmental Design (LEED) rating system for sustainable building and construction. LEED version 4.1 raises the bar for the sustainable design and operation of built environments and makes it easier for practitioners and building owners to readily understand how individual LEED strategies relate to positive outcomes centered around climate change, human health, water resources, biodiversity, material resources, and a green economy and community. Our organization is proud to support efforts to advance tools and resources focused on promoting a culture of health through green building practice. We welcome our partnership with the Colorado Healthy Places Collaborative and look forward to applying the *Creative Healthy Places Guidebook*.

CATE TOWNLEY AND KRISTIN MILARDO
Colorado Department of Public Health and Environment

Partnerships for Healthier Built Environments

Investing in making our communities healthier can yield many benefits, including reducing healthcare costs and improving people's physical and mental well-being. In a healthy place, the built environment—including roads, sidewalks, buildings, and parks—is designed to enable healthy choices. People can choose to walk, bike, or take transit to work and school as part of their everyday routine. They also have access to affordable, nutritious food and feel connected to their community.

Where people live, work, learn, and play determines nearly 80 percent of their health, according to the Robert Wood Johnson Foundation. Individual responsibility is important, but environmental, social, and economic factors have a huge influence on the availability of options and the choices people make. Income and education levels, along with neighborhood environments, play a significant role in determining a person's opportunities. All of these factors ultimately determine how healthy people are—and how healthy they can be.

Over the past several decades, certain laws, policies, and practices such as redlining and predatory lending have reduced opportunities for healthy choices in some communities. The longer someone lives or works in an unhealthy place, the longer that person will be exposed

to heightened levels of pollution and noise, industrial smells, and broken sidewalks, among other adverse conditions. Moreover, people might struggle to find good doctors, nutritious food, and places to exercise. These factors can increase a person's chance of becoming ill or can intensify an existing illness, which in turn can shorten the individual's lifespan.

Increasingly, people have chronic diseases attributable to the design of the built environment. These diseases include obesity, diabetes, heart disease, and asthma. One solution is to design communities that reduce our dependence on cars, which in turn can increase physical activity and lower air-pollution levels. When the built environment makes it easier for people to walk, bike, or take transit, there is a good chance that people in these communities will have better cardiovascular and respiratory health. In addition, walking and bicycling can boost the economy. A 2016 Colorado study estimated that walking and bicycling account for combined health and economic benefits of approximately $4.8 billion annually ($3.2 billion for walking and $1.6 billion for bicycling).

Addressing these growing health challenges and inequities requires strengthening partnerships and collaboration between practitioners in the built environment and public health fields. Public health agencies are responsible for protecting, assessing, and assuring the health of individuals, communities, and environments. Involving public health staff in the planning and design of the built environment is an approach that can help communities improve their health status. Most importantly, community members who face built environment and health challenges should also have the knowledge and power to develop creative solutions.

The *Creating Healthy Places Guidebook* is a useful resource for public health agencies, local jurisdiction staff, and community members. The best practices it offers can help foster partnerships and collaboration to create robust communities that allow people to achieve their highest level of health possible.

AIA Colorado

NIKOLAS REMUS
Government Affairs Manager
American Institute of Architects Colorado

Design for Health: Healthy Homes and Healthy Buildings

In designing for health, architects help our clients make a conscious decision to prioritize the well-being of people who use and inhabit a building. While this may seem like an obvious approach to take, every project has constraints and priorities that architects must work through. Design that *enhances* health must be a philosophy that both the architect and client believe in and want to work toward.

It was not that long ago that harmful substances such as asbestos and lead paint were used in buildings. We have come a long way. Still, there are many considerations that can help amplify a healthy place. For example, does manufacturing of a particular product cause harm to the environment? What materials and products are most appropriate for the building's intended use? Is the building energy efficient?

We know these are important considerations, and architects can help guide clients to find the best choice for their project. There are numerous strategies for health-focused design. These strategies vary across the buildings we call home and the places where we work, visit, or simply see as part of our community.

A healthy building is more than one that doesn't actively cause harm. Architects help our clients create buildings that foster a more active lifestyle. There are numerous guides, programs, and rating systems that promote health and activity. We help our clients find the best way to implement those recommendations into their own project.

When it comes to integrating health into home design, the strategies must bring together the specific desires of a person or family and the flexibility to accommodate changing tastes, needs, and/or ownership. An individual might prefer bright, open spaces, while a larger family may want more discrete rooms so everyone has space to themselves. Architects also bring our expertise to home design using well-established practices that we incorporate into our work. Designing homes with flexibility and durability in mind strengthens a community as well, since homes are often the biggest investment people will make in their lives.

No matter the project type, architects have experience working with their clients to bring the community into the design process. Buildings do not exist in a vacuum, and we recognize that health considerations matter within and outside of every building.

The American Institute of Architects Colorado views the

Creating Healthy Places Guidebook as a useful resource for designing a better world for all. We welcome collaboration with other professional associations to advance the relationship of health and design in advocacy, leadership development, education, and resources.

ASHLEY PERILLO
Professional Development Program Manager
The Colorado Parks and Recreation Association

Healthy Parks and Open Space

Public places and civic spaces, including park and recreation facilities, are important to livability and health. Open spaces, parks, and protected lands are truly the *lungs* of the community, as they improve the quality of the air we breathe. They also mitigate climate impacts from pavement and structures, provide buffers and habitat for wildlife, and play an important role in planning for and managing water—including maintaining water quality, protecting ground water, and controlling flooding.

Beyond the environmental benefits, parks and other open spaces are an important part of our civic infrastructure. They provide opportunities for residents to gather and connect with each other, and they can foster a sense of place within a community. They also offer opportunities for children and families to recreate outdoors and connect with nature. Moreover, parks have economic benefits. For all of these reasons, parks and other open spaces play a vital role in the built environment in 21st century cities.

The Colorado Parks and Recreation Association strives to work with communities in our state to maintain excellence in parks and recreation, which in turn fosters healthy residents and communities. The Association appreciates the contribution that the *Creating Healthy Places Guidebook* brings to making our cities, towns, and communities in Colorado healthier places. We appreciate the attention to open spaces and streetscapes—including greenways, parks, and trails—that provide both direct and indirect health benefits.

STEPHEN FISHER
Chair
Sustainability Committee, Colorado Section, American Society of Civil Engineers

Healthy Infrastructure

Infrastructure has been inextricably linked to public health since its urban genesis, arguably since before the famous waterworks, roads, and sewers of Rome. In modern times, infrastructure is often taken for granted, and a much more nuanced connection between infrastructure and public health has emerged. While some characterize infrastructure in terms of commerce and gross domestic product, we cannot let ourselves forget that public health has always been in the balance, acting as sort of a canary in the coal mine.

Today's built environment and urbanization have resulted in their own set of consequences. While water and sanitation have generally enjoyed high marks in regards to protecting public health and the environment, there are notable exceptions. Those exceptions remind us to be vigilant. Contemporary infrastructure and the civil engineers who design it must take into account a number of factors, including epigenetic and psychological health effects of the built environment, new design parameters due to a changing climate, and the environmental and social impacts of development. Moreover, they must be well-versed in fields related to public health and their many intersections with civil engineering.

The *Creating Healthy Places Guidebook* contributes to understanding the intersection of health, engineering, and infrastructure. It is a resource for practitioners across a variety of disciplines who are working to make our communities more sustainable, more efficient, and healthier.

MICHAEL LECCESE
Executive Director
Urban Land Institute Colorado

Healthy Places, Healthy People

The intersection between health and the built environment is integral to creating thriving places where we can all live, work, and recreate. Good health is more than regular doctor visits and exercise; it's a product of our physical built environment.

A generation or two ago, it was possible to live a healthy lifestyle in a lower-income neighborhood. Often kids could play safely in the streets; fresh, nutritious food was generally available or even locally grown; and people walked daily to do errands or go to school or work. The postwar rise of the auto-dominated culture changed much of that structure. Streets full of fast-moving traffic are no longer safe for play, and they cut residents off from access to parks and recreation. We sit stuck

in traffic instead of walking to work or to the bus stop. Corner shops and markets have been replaced by regional shops that require a drive. Neighborhoods built around the car make everyday exercise less safe and accessible.

The Urban Land Institute strives to elevate the conversation on creating healthy communities by educating our members in the fields of real estate development, architecture, and city planning and sharing best practices through research and advisory services. In 2013, the Institute and the Colorado Health Foundation started the *Building Healthy Places* initiative. This work has focused on research connecting the quality of the built environment to indicators and trends in public health. Specifically, this research links urban areas that lack access to active living, healthy food choices, parks and open spaces, healthy housing, and economic opportunity to growing rates of obesity and chronic disease.

One cannot underestimate the challenges to creating health communities. Places that lack access to healthy living also tend to be lower income, and they may also suffer from rates of crime and pollution. Many unhealthy communities became that way after decades of disinvestment. Residents may be jaded after decades of false starts, failed programs, and broken promises from public officials. The Urban Land Institute advocates for approaches that are holistic and practical. It starts with engaging the community (residents, local business and property owners, public officials, faith-based organizations); creating a relevant menu of best practices for placemaking and healthy spaces; and developing a practical strategy for implementation. It is important to note that it is up to the community to carry out plans.

The *Creating Healthy Places Guidebook* is a timely companion to the Urban Land Institute's 2013 *Building Healthy Places Toolkit*. The *Guidebook*'s content builds on the *Toolkit* and offers additional useful resources and examples for better addressing health across a spectrum of critical issues involving the way we build communities. Colorado is well positioned to become a leader in planning and designing healthy places that improve the well-being of residents today and for generations to come.

Introduction

The *Creating Healthy Places Guidebook* is an essential resource for professionals, decision-makers, agencies, and citizens interested in advancing public health and wellness within the built environment. Many of the disciplines shaping this realm share concerns about health that are largely based on a recognition of the unsanitary and unsafe conditions in cities over a century ago. By the end of the 20th century, the health implications of urbanization and development had become detached from planning, architecture, and landscape design. The result has been the creation of built environments with disjointed land uses, unintended exposures, disconnected communities, and environmentally damaging highways, among many other impacts.

This *Guidebook* is intended to complement the 2013 Urban Land Institute's *Building Healthy Places Toolkit.* The *Guidebook* identifies and catalogues a select number of best practices, design interventions, and useful tools to ensure that development projects, programs, and plans contribute to healthier neighborhoods and communities. The *Guidebook* is also intended to serve as a resource for those interested in planning and designing for health by providing real-world examples of places that have intentionally taken steps to improve health within the context of towns and cities. The examples should not be seen as exhaustive, but as providing "jumping-off" points for exploring useful and pioneering methods to create healthy places.

WHO SHOULD USE THE GUIDEBOOK?

The *Creating Healthy Places Guidebook* serves as a resource and reference for a diverse set of professionals and organizations, including public health professionals, planners, elected officials, educators, and others who seek to shape the built environment in ways that support and promote health and healthy living.

Professionals and Decision-Makers: Through use of this *Guidebook*, practitioners and professional associations can recommend, adopt, and implement evidence-based infrastructure investments, programmatic recommendations, and regulations and design guidelines that seek to enhance health.

Communities and Citizen Groups: Neighborhood groups and communities interested in evaluating health impacts locally can use a number of the tools and practices in this *Guidebook*—especially the *Health Assessment Lens*. The public, private, and nonprofit sectors can all utilize the *Guidebook* by implementing any variety of the presented practices in an effort to create and cultivate environments that are conducive to and support health and healthy behaviors.

Educators: Whether for college, high school, or professional development, the *Guidebook* presents a trove of information and practices to help educators teach about the relationship between health and the built environment.

HOW THE GUIDEBOOK WAS DEVELOPED

The *Creating Healthy Places Guidebook* draws from work undertaken by the University of Colorado Denver College of Architecture and Planning through a three-year project titled Creating Healthy Places through Transformational Education and Design, funded by the Colorado Health Foundation. The project brought together interdisciplinary research teams composed of students from the graduate programs in Urban and Regional Planning, Architecture, Landscape Architecture, Sociology, and Urban Design. Students and faculty worked together through design studios and research teams to compile information on the relationship between health and the built environment and to create designs and plans based on these principles.

The Sun Valley Case Study: The geographic focus of the studios was Sun Valley, a low-income neighborhood in west Denver that is currently undergoing major redevelopment led by the Denver Housing Authority, the Sun Valley EcoDistrict, and other partners. Many of the best practices in this *Guidebook* have direct application to the Sun Valley neighborhood, although the intent very much is for the tools and practices described here to have applicability to neighborhoods and communities throughout Colorado, the Intermountain West, and beyond.

The studios and student project teams developed a number of work products that influenced the content of this *Guidebook*. Key products are described in the following paragraphs.

Final Report
Interdisciplinary Research Team Health Project
Fall 2016

This report includes information on the expectations for the studio courses to be conducted under the Creating Healthy Places project. It provides a definition of health and sets the stage for addressing the health aspects of housing. This is a survey of various planning initiatives in the Sun Valley neighborhood of west Denver, along with an evaluation of various assessment approaches to addressing health and the built environment from the Urban Land Institute and additional allied professional organizations.

The Healthy Design Pattern Book
Urban Planning Project Studio and
Urban Design Studio II
Spring 2017

This final studio report identifies many of the most prevalent development patterns that exist today. It then examines their core components and proposes design interventions to ensure that future development contributes to healthier communities. The book includes information on corridors, green streets, public places, diverse blocks, courtyards, and walkability.

Healthy Communities: Villa Park Neighborhood Survey
Department of Sociology
Fall 2017

Led by a team of students in the Sociology program at University of Colorado Denver in conjunction with architecture and planning students, this survey focused on five topic areas that are important to understanding health and the built environment: (1) healthy homes, (2) healthy connections, (3) human well-being, (4) economic resiliency, and (5) healthy communities.

Healthy Communities Playbook
Urban Planning Studio Product
Fall 2017

While focusing on methods for improving the health of the Sun Valley and Villa Park neighborhoods in west Denver, the practices and tools in this report have application to places throughout Colorado and elsewhere. The book addresses meaningful community engagement, economic inclusion, housing security, food planning, and mobility.

Sun Valley, Creating Healthy Places through Transformational Education and Design
Planning Project Studio
Fall 2018

This report presents student work on three main topics: (1) health and industrial development, (2) streetscape and infill development, and (3) greenway-oriented development. Also included are recommended catalytic projects for the Sun Valley neighborhood in west Denver.

Designing Well-Being in/of the City, Rivers in/of the City
Landscape Architecture Studio
Fall 2018

The studio report includes site analysis, site planning, and site design, along with an evaluation using the *Health Assessment Lens* (described in the next column). Student work addressed ecosystem approaches to planning and design, stormwater infrastructure, food access, pedestrian connections, and green streets.

HEALTHY PLACES FRAMEWORK

As part of the Creating Healthy Places project, an evaluation matrix was created early on that incorporated health considerations into a broad array of factors in the areas of architecture, urban design, and urban planning. The initial working draft of the matrix was the result of various health assessment tools developed by academic institutions and professional associations, including the Urban Land Institute. The evaluation matrix was used in the College's health studios in 2017 and 2018, and then went through a series of revisions to refine the scope and layout of the evaluation material and to make it more user-friendly.

A streamlined version of the evaluation matrix was used in a project by the College's Colorado Center for Sustainable Urbanism in partnership with the Colorado Chapter of the American Planning Association (APA). The project was made possible through a grant from the national offices of the APA titled PLAN4Health. The evaluation was applied to three Colorado jurisdictions: Brush, Durango, and Westminster. The results were presented at a national APA conference in Washington, D.C.; at the state chapter's annual conference; and during a webinar in the fall of 2017.

The current version of the evaluation tool is called the *Health Assessment Lens.* The *Lens* is organized into eight categories, which are associated with each of the best practices in the *Guidebook.* In many instances, a best practice relates to two or more of the categories in the *Lens.* This correlation is indicated in the *Guidebook* by the placement of icons identifying each of the categories as presented on the next page.

Equity and Justice

Achieving social equity and environmental justice are critical to creating healthy places for all people. It is important to understand an area's past and current conditions to accurately address equity and justice. Designers, planners, and others should know about past environmental, social, and economic damage in areas in which they are working. Any new project, plan, or program should provide opportunities to repair damage and introduce new benefits into these communities.

Education and Wellness

Education impacts the health and wellness of all people. This includes physical accessibility to educational facilities, as well as opportunities for residents to have the means and opportunities for education. Designers, planners, and others should be familiar with schooling and education opportunities in the area in which they are working. They should be mindful of cultural conditions, as cultural knowledge can trump formal education in certain places and situations.

Human Well-Being

Environmental psychology tells us that healthy living is not simply a result of the presence of resources and absence of threats. Human well-being must be approached holistically. Designers, planners, and others should be informed about existing health conditions in the areas in which they are working, as well as existing health policies or provisions that could be applied to their work. Physical, mental, and social wellness should be factored into any project from the outset.

Economic Resiliency

Economics play a role in human health. The built environment can support the creation of businesses and encourage economic opportunities, which can provide health benefits. Designers, planners, and others should know the economic and employment conditions in the areas in which they are working. Projects, plans, and programs can bridge economic disparities and enhance opportunities for residents.

Harmony with Nature

Architects, designers, and planners should know about the condition of the natural environment in which they are working, including contaminated soils, water pollution, and air toxins. Projects, plans, and programs should contribute to restoring damaged ecosystems to a more functional state.

Healthy Homes and Buildings

Sound housing is essential to a person's ability to deal with every other aspect of his or her life. Designers, planners, and others should assess existing conditions for siting and orienting structures to maximize health benefits. Building materials should be appropriate for the climate and context and meet health standards to prevent exposure to toxins. Home design should factor in universal design principles to ensure maximum accessibility and freedom from hazards.

Healthy Communities

Architects, designers, and planners should develop projects, plans, and programs that contribute to creating more complete communities that contribute to and reinforce the existing character of place. (Complete communities meet the needs of all residents in terms of housing types, employment, public facilities, and services.) In addition, projects, plans, and programs should intentionally minimize exposure to hazards and potential disasters, such as flooding, steep slopes, environmentally sensitive areas, and more.

Healthy Connections

Mobility and accessibility can impact the physical and mental well-being of people in the area. Designers, planners, and others should advance state-of-the-art solutions for healthy infrastructure and services. Attention should be given to maximize easy connections to sidewalks and bicycling facilities, as well as to transit stops and stations.

ORGANIZATION OF THE GUIDEBOOK

While categories in the *Health Assessment Lens* are used to tag practices, the *Creating Healthy Places Guidebook* is organized sequentially into the following seven chapters. Each chapter has up to five practices listed. The practices include case studies, which offer more detailed information on tools being applied in different communities around the United States and beyond. For some of the practices, there are sidebars that include additional information on health factors or related tools.

Chapter 1: Community Engagement

This section addresses authentic public participation and the health of communities. It includes practices addressing resident involvement, economic inclusion, community-wide campaigns, and health education.

Chapter 2: Environment

A healthy natural environment is critical to the well-being of all. This section includes practices that address air quality, climate, and noise pollution.

Chapter 3: Water

This section begins by addressing comprehensive approaches to planning for water, from source to discharge. There are also practices that address drinking water, green infrastructure, and water reuse.

Chapter 4: Food

Availability of fresh and nutritious food is an important health consideration. This section includes information on access to healthy food and local food production.

Chapter 5: Buildings

How we live and where we live are important to our well-being. This section addresses mixed-use development, building design, and sustainable design strategies.

Chapter 6: Public Space and Streetscapes

Having access to open space, public places, and green areas has multiple health benefits. This section includes practices for open space and public places, pedestrian-oriented street design, and safe sidewalks.

Chapter 7: Connectivity and Accessibility

How we get around in the built environment impacts health and personal well-being. Included in this section are practices that address street connectivity, reducing driving alone, access to transit, and bicycle infrastructure.

INFORMATIONAL SIDEBARS

Within each chapter, supportive information is provided in a series of sidebars. These icons were created to help identify the different types of sidebar content.

Action

Definition

Explanation

Idea

Measurement

Resource or Tip

Community Engagement and Health

CHAPTER 1

Community Engagement and Health

Overview

Community engagement is a central component in any health-related plan or program. It entails working with individuals, neighborhood coalitions, community leaders, and other entities at all stages, from research gathering to design and implementation. It includes not only education and information-sharing, but also active public participation. Authentic engagement requires honest and ongoing interactions, and the involvement of as many community members as possible. Public engagement can result in positive health outcomes, from reduced rates of illness to increased physical activity. In a larger sense, it can address issues of social equity and economic growth. This chapter addresses four topics: (1) Public Participation, (2) Economic Inclusion, (3) Community-Wide Campaigns, and (4) Health Education.

1.1 PUBLIC PARTICIPATION

Snapshot

Public engagement involves working genuinely and collaboratively with individuals and groups on all aspects of planning, design, and decision-making. Regarding health and wellness, it involves open and transparent processes for addressing issues that affect public health and personal well-being.

Detailed Description

Health and well-being are influenced by the physical, social, and economic context in which people live, work, and play. When it comes to health problems, low-income and minority populations are affected disproportionately.[1] Engaging residents provides the opportunity to learn about and understand health issues in an authentic and comprehensive matter. It also can facilitate collective action to foster healthier environments. Public health agencies, planning offices, design teams, and decision-makers should make every effort to engage community members in scoping out key issues and challenges, developing solutions, participating in action steps, and monitoring progress.

They also should be ever-mindful that communities differ, issues differ, and solutions differ.

Health + Design Considerations

Achieving community engagement requires a thoughtful and well-planned strategy. The Clinical and Translational Science Awards Consortium is an affiliate of the Centers for Disease Control and Prevention (CDC). The Consortium has identified a number of principles to consider when designing a program or initiative that involves public participation[2]:

- Pinpoint the population groups and communities to engage
- Identify health-related issues and concerns in the community, including economics, social and environmental factors, and past experiences with engagement efforts
- Establish a relationship of trust, respect, and open dialogue
- Establish a process to guide interactions among participants
- Emphasize the responsibility of community members to develop solutions and take action
- Recognize the capacities and resources for health-based decision-making, and mobilize community assets
- Empower the community to meet its needs and act on solutions
- Take steps to ensure a sustainable, long-term commitment

Authentic public participation requires transparency and broad engagement. Any health-based process needs to begin with community engagement at the outset, and continue with community participation at all steps. A successful process is one in which members of the community take ownership and responsibility for developing, implementing, and monitoring.

Implementation Considerations

The CDC has developed a series of questions for evaluating community engagement efforts. They include the following: Were any voices missing; Did the process allow for all voices to be heard; Were community members involved in identifying health-related issues; Did community members play a role in developing interventions; How did community members help implement and monitor actions? Successful community engagement can engender a number of outcomes, including changes in policy and practice, reductions in health disparities, and the establishment of health indicators to measure progress. The process can also enable communities to achieve empowerment and self-determination.[3]

AUTHENTIC ENGAGEMENT

Public participation ensures that all segments of the community are involved in each phase of the planning process, including identifying issues, visioning, developing plans, and evaluating outcomes. Authentic programs often employ innovative outreach strategies that go beyond the minimum legal requirements for public engagement. These strategies may include promoting leadership development in marginalized communities; publishing multilingual websites to inform residents about projects and to collect feedback; involving community members in scenario-planning processes; and continuing communication with the community after project completion.[4]

CASE STUDY
TURNING POINT; STATE OF OKLAHOMA

Determined to improve public health, an independent statewide consortium called the Oklahoma Turning Point Council was launched in 1997 and continues to operate today. Rather than a top-down approach, the Council is focused on collaborating with local partners across Oklahoma to identify problems, set priorities, and conceive solutions. The consortium's efforts have resulted in the creation of public health centers, walking trails, and community gardens, along with a rise in health-related activities in schools. The consortium also works on policy issues, serving as a conduit between different agencies. It hosts community meetings to educate people about policy objectives, and each year it sponsors a Policy Day to further engage residents. For over 20 years, the consortium has given communities a voice in public health initiatives and outcomes.[5]

1.2 ECONOMIC INCLUSION PLAN

Snapshot

An economic inclusion plan is an intentional process for ensuring full participation of individuals and communities in a greater regional economy. There is an emphasis on engaging population groups that may be on the fringe or otherwise disenfranchised.

Detailed Description

An inclusive economy is an economy that creates opportunities for all people. This allows for an entire population to be self-sufficient and to prosper, resulting in reduced economic stress, a better quality of life, and access to resources for healthy choices. An economic inclusion plan has several components. First, the existing conditions of a community and its population need to be considered. For example, what is the economic situation in terms of wage levels and employment rates? Next, existing resources and barriers need to be evaluated. For instance, what opportunities and challenges exist in regard to jobs? The third step involves a needs assessment. What is specifically needed to fill the gaps and expand economic opportunities? With that information, a concrete and comprehensive action plan can be assembled. This plan includes information on interventions, financing strategies, responsibilities, along with targets and measures for monitoring implementation and performance.[6]

Health + Design Considerations

Economic health is a vital part of a healthy community. Within the built environment, a resilient economy can encourage economic opportunities and support the creation of businesses. For designers, planners, economists, public health officials, and decision-makers, it is important to begin the development of a health framework with knowledge of a community's economic conditions, including employment opportunities.

ENGAGEMENT IN COLORADO

The Colorado Health Assessment and Planning System, or CHAPS, is an initiative of the Colorado Department of Public Health and Environment and local public health agencies that is focused on measuring community health and developing improvement plans. CHAPS provides guidance, resources, and technical assistance on how to carry out multi-phased assessments and to devise plans on a five-year cycle. Engaging the community lies at the heart of the process.[7]

The health department's Office of Planning, Partnerships, and Improvement works with the Disease Control and Environmental Epidemiology Division to offer local assistance. This support includes developing data and indicators related to the built environment, including demographic trends and environmental conditions.[8]

Health-based programs and plans can bridge economic disparities and enhance opportunities for residents.

For an economic inclusion plan to be successful, it must fully engage the community from its inception. This includes expansive participation in setting goals and objectives, compiling and evaluating information, and assessing alternative courses of action. Residents should also be involved in drafting the strategic plan and carrying it through the adoption process. Community engagement does not end once the plan is complete; it should continue through the plan's implementation and the monitoring of progress.[9]

Implementation Considerations

A plan for economic inclusion needs to be sustainable, equitable, and participatory. "Sustainability" ensures that social, environmental, and resiliency factors are foundational in the plan framework. "Equitable" means that those who have more need are lifted up so they can more fully participate. "Participatory" ensures that the process is transparent, genuine, and accessible to all.[10]

CASE STUDY
ONENYC; NEW YORK, NEW YORK

America's most populous city adopted a strategic plan with the intent of addressing social, economic, and environmental challenges—including the creation of a more just and equitable city. Originally released in 2007 as PlaNYC and updated in 2015, the OneNYC plan has a number of focus areas. Among them are poverty reduction, healthcare access, healthy neighborhoods, and an inclusive education system. Guided by this comprehensive plan, the city has worked to create jobs and boost incomes, especially for low-income residents. It also has focused on offering pre-kindergarten at no charge and increasing the amount of affordable housing throughout the city's five boroughs. Progress reports are made available to the public and feature easy-to-understand performance measures.[11]

FLEXIBLE INDUSTRIAL AREAS

A pattern over the past 100 years has been to separate industrial areas from residential areas. This is starting to change. As economic activities evolve in urban regions, some industrial zones have become underutilized, with less manufacturing taking place there. These areas are being re-envisioned as mixed-use districts that can reconnect employment with residences, in turn bringing about health benefits. One such example is the False Creek area in Vancouver, Canada. The City is pursuing redevelopment of this neighborhood, while retaining industrial uses and the jobs they provide.[12] The Central Eastside district in Portland, Oregon, is another place that merges industrial and residential. The result has been a regenerated neighborhood with a vibrant mix of uses, both old and new.[13]

1.3 COMMUNITY-WIDE CAMPAIGNS

Snapshot

Community-wide campaigns use multiple strategies to promote healthy, active lifestyles. Planners, developers, and community partners should leverage relationships with public health departments and other local organizations to maximize efforts and success.

Detailed Description

Community-wide campaigns consist of multi-dimensional, large-scale interventions that promote active living. The campaigns can involve a range of participants, such as schools, community centers, neighborhood coalitions, governmental agencies, businesses, and other organizations. The participants are aligned in their desire to educate people about healthy living and to create more opportunities for physical activity.[14] Interventions can include on-the-ground efforts and policy changes, and they generally require partnerships across sectors and disciplines. Campaigns aimed at providing physical education at the community level are most successful when they leverage relationships with public health departments and other local organizations.

Health + Design Considerations

Community-wide campaigns involve a range of tactics. Organizers should begin with collecting reliable data and information, and they should work to get buy-in from the community. Authentic public engagement helps to establish trust and foster a sense of ownership. A comprehensive program can include schools, community centers, hospitals, senior centers, fitness facilities, parks and recreation agencies, and schools. When it comes to education and messaging, topics of focus can include

CASE STUDY
FRIENDS FOR FITNESS; KONA, HAWAII

The Friends for Fitness West Hawaii Community Coalition provides an example of how improving access to existing places can result in community-wide increases in physical activity. The coalition, which formed in 1992, consists of community volunteers and leaders from health-related organizations. In order to establish a safe and reliable location for residents to walk regularly, the coalition set its sights on the closed Old Kona Airport. Plans were then set in motion to transform the site into a park. The Rotary Club provided a grant to fund the equipment and materials needed to develop an existing pathway that wove through the site. Edible gardens were planted, and "purple pipes" (see page 33) were installed to irrigate grassy areas, with reused water coming from an adjacent wastewater treatment facility. The park has been a success, and the coalition has continued to develop other healthy-living opportunities for residents.[15]

HEALTH ASSESSMENT LENS

The Health Assessment Lens (see overview in Introduction) has been developed as an adaptable tool for evaluating health factors in planning, design, and decision-making. It is designed for use in applying health and wellness to plans, projects, programs within the built environment. The Health Assessment Lens can be used by professionals, elected-officials, citizens, and interest groups to assess health matters as they apply to the natural environment, personal well-being, homes and buildings, education, the economy, communities and social cohesion, mobility and accessibility, and more.

The Lens is presented in its entirety in Appendix A.

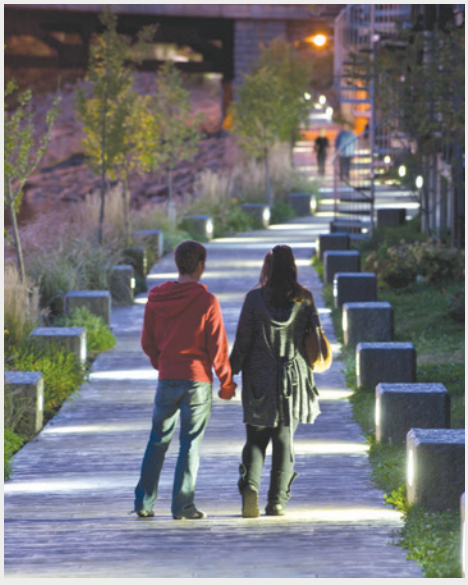
healthy lifestyles, fitness programs and support groups. Environmental components might include building and extending trails for walking and biking, and increasing access to health and recreational facilities.

Key individuals who can help with promotion include community leaders, media personalities, and elected officials. Campaign organizers should work with public health agencies and other local organizations to heighten visibility and to ensure efforts are sustainable. A more multidisciplinary approach can translate into a more successful intervention, and ultimately, a healthier community.[16]

MODEL HEALTH ELEMENT

As the practice of planning continues to integrate health factors into various processes for community development, new resources have become available for incorporating health and wellness into jurisdictions' comprehensive plans. A Model Health Element has been developed as part of CU Denver's Creating Healthy Places project. This adaptable model can be included as a stand-alone element in comprehensive plans or as a subsection.

The Model Health Element is included in Appendix B.



CASE STUDY
B.C. WALKS; UPSTATE NEW YORK

B.C. Walks is an example of a community-wide campaign that has leveraged relationships with various organizations and departments to facilitate physical activity in the community. The campaign is aimed at residents within multiple counties in New York's Upstate region (Broome, Chenango, Delaware, Otsego, Sullivan, Tioga, and Tompkins). The campaign promotes 30 minutes of daily walking as a way to increase physical activity among adults. Media, public relations, and community-based health activities are used to increase awareness about the campaign. Additionally, prescription pads with the B.C. Walks logo have been distributed to local doctors and nurses. The campaign works closely with land-use and transportation planners to expand trails and sidewalks and to improve overall safety for pedestrians. Program monitoring has shown a 34 percent increase in walking by adults participating in the campaign.[17]

Implementation Considerations

There is a multitude of factors than can lead to successful outcomes. To best leverage relationships, it is important to engage individuals and/or groups who can provide resources, including facilities and equipment. Once partners are engaged, provide rich and varied opportunities to sustain their involvement. Formative research is also important, as it can help establish a framework for health programs and provide relevant information to community members.

Community engagement is crucial; involving residents in the design and planning process elevates the likelihood of successful implementation. Moreover, ongoing efforts to communicate and share information can also lead to successful outcomes. Last off, consider including group-oriented activities and programs, which can foster social network support. These have been shown to further enhance the use of facilities and infrastructure for physical activity.[18] H

To best leverage relationships, it is important to engage individuals and/or groups who can provide resources, including facilities and equipment.

1.4 HEALTH EDUCATION

Snapshot

Health education programs can increase safety, prevent disease, improve wellness, and enhance overall quality of life. The success of these programs depends upon a range of considerations and variables.

Detailed Description

The health status of individuals and families, along with associated health behaviors, are the result of multiple factors that include environment, availability of services, personal knowledge and actions,

and social conditions. Educational efforts and information sharing that address these various health determinants are important for bettering health and personal well-being. Such programs have the ability to contribute to improved human health and to achieve other important objectives.[19]

Health + Design Considerations

Educational programs can help inform community members about chronic disease, injury prevention, mental health, pregnancy, substance abuse, obesity, and many other health-related topics. Schools, workplaces, and other non-healthcare settings can be ideal venues because individuals can be reached within their own communities. Moreover, people typically have a high degree of contact with these types of settings. This heightened level of accessibility and engagement can maximize a program's impact, and it can reduce the time and resources that might be needed for programs in other contexts. Combining multiple settings can have an even greater impact.[20]

Implementation Considerations

Typically, a health department or partner organization initiates an educational program. When this is the case, the group also has the responsibility of engaging the community. To achieve a goal of healthy people and healthy communities, an organization must work as an authentic partner. Authenticity can help boost a community's receptiveness to educational programs.[21] Moreover, it is important for health professionals, designers, and decision-makers to understand that health depends on a range of factors. When designing education programs, consider all aspects of the physical and social environment. In many communities, there is a need for instituting new programs and practices, along with changing attitudes and behaviors.[22]

CASE STUDY

SEPI'S WORK@HEALTH; RALEIGH, NORTH CAROLINA

In 2014 the Centers for Disease Control and Prevention (CDC) conducted a hands-on training for companies interested in the Work@Health program.[23] The program leverages evidence-based prevention and wellness strategies to teach employers how to improve the health of their workers, increase employee productivity, and decrease healthcare costs. In addition to the comprehensive training, the CDC provided employers with six to ten months of technical assistance that included coaching, webinars, and peer interaction.[24]

SEPI Engineering and Construction[25] is one of the companies that participated in the training. SEPI is a civil engineering, surveying, planning, remediation, and construction management firm headquartered in Raleigh, North Carolina. After participating in the Work@Health training, SEPI employees established a wellness committee to assess workplace needs and interests through a formal survey. The company incentivizes employees to complete the survey by providing $250 in a health savings account. SEPI received seed funding from Work@Health to improve stairwells with carpeting, inspiring quotes, and

information about the health benefits of stair use. Other successes include implementing physical activity and stress reduction programs, promoting counseling services, and providing affordable programs for cholesterol/lipid control.[26]

WHOLE SCHOOL, WHOLE COMMUNITY, WHOLE CHILD

The Whole School, Whole Community, Whole Child (WSCC) model serves as a framework for incorporating health practices into school settings. The model was developed by the Centers for Disease Control and Prevention, the Association for Supervision and Curriculum, and leaders from the health and education sectors.

As outlined by the CDC[27], the model includes 10 components: physical education and physical activity; nutrition environment and services; health education; social and emotional school climate; physical environment; health services; counseling, psychological, and social services; community involvement; family engagement.

The model places an emphasis on psychosocial and physical environments, the role of families and community agencies, and the need for students to be active participants. As the CDC explains, the student-centered model "emphasizes the role of the community in supporting the school, the connections between health and academic achievements, and the importance of evidence-based school policies and practices."[28]

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Environment

CHAPTER 2

Environment

Overview

From the air we breathe to the sounds that permeate our daily lives, environmental factors play a critical role in human health. Designers, planners, health professionals, and decision-makers need to take environmental conditions into account when working to improve the health and well-being of individuals and the community. Initiatives should seek to protect and restore ecosystems, and they should strive to incorporate natural elements into urban contexts. Features in the built environment that can produce positive outcomes include plants and trees, permeable surfaces, and reflective materials. Improvements to the environment can help mitigate ailments such as asthma, cancer, high blood pressures, strokes, hearing loss, and other health conditions. This chapter addresses three topics: (1) Improving Air Quality, (2) Heat Mitigation, and (3) Noise Reduction. The topic of water is addressed in Chapter Three.

2.1 IMPROVING AIR QUALITY

Snapshot

Federal standards exist for maximum levels of air pollutants allowed, but contaminants in the air we breathe continue to contribute to respiratory ailments and chronic diseases. Although not always visible, air pollution—especially from transportation-related activities—can result in ailments such as bronchitis, asthma, lung cancer, and strokes.

Detailed Description

Improving air quality, particularly in urban areas, needs to remain a top priority when it comes to human health and wellness. Recent research demonstrates that ongoing exposure to nitrogen dioxide and black carbon, two transportation-related air pollutants, affect cognitive development in children.[1] People living along major urban highways can have reduced lifespans compared to residents in neighborhoods that are more removed from such highways.[2] Air pollution can be an indoor problem as well. Ventilation systems in buildings, materials used in construction, and furnishings can all produce toxins that impact health and well-being.[3]

Health + Design Considerations

When designing and constructing projects in the built environment, it is critical to address the individual and cumulative impacts on air quality—both existing and into the future. Designers and decision-makers need to consider how exposure to air pollution can be reduced at all scales, from individual buildings to entire neighborhoods.

A comprehensive approach should be used to address sources of air contaminants. This includes an evaluation of transportation systems, energy supplies, waste management, agricultural and industrial activities, and building design. As suggested by the World Health Organization and UN Environment via its BreatheLife campaign[4], here are several questions to consider:

- Are there transportation options that do not require fossil fuels?
- What practices can be employed in industrial settings to reduce fugitive emissions?
- Is there a waste management system that lessens the release of methane?
- Can food be produced, processed, and distributed in a way that reduces pollution and waste?
- What passive design principles can be used to reduce indoor pollution?

There are numerous solutions available, and many can be incorporated relatively quickly. BreatheLife offers a range of options on its website.[5]

WHAT ARE FUGITIVE EMISSIONS?

The term "fugitive emissions" generally applies to industrial plants. These emissions are described as micro leaks of volatile organic compounds from valves, pumps, and other equipment. Harmful to human health, fugitive emissions can occur due to operating conditions, aging equipment, and improper maintenance. There are devices that can help detect fugitive emissions.[8]

CASE STUDY
PLANYC; NEW YORK CITY, NEW YORK

With over eight million residents, New York City's air quality is an ongoing concern. After ozone and particulate matter exceeded federal standards, the city launched a long-range sustainability strategy in 2007 as part of its PlaNYC (now called OneNYC).

The plan established an air pollution monitoring program, which yielded helpful insights. For instance, it revealed that contaminants were notably elevated in areas with a high concentration of burning oil. In response, the city initiated both regulatory reforms and incentive programs. These included reducing the sulfur content in heating oil; phasing out high-polluting types of heating oil; and requiring all boilers to convert to cleaner fuels like natural gas. To help with the transition, technical and financial assistance was provided to building owners.[6]

These measures, in combination with others, resulted in significant outcomes. Between 2005 and 2013, greenhouse gas emissions from

buildings were reduced by 19 percent. Moreover, the city estimates there are 780 fewer deaths and at least 2,000 fewer emergency room visits each year due to the city's improved air quality.[7]

Implementation Considerations

When it comes to the major sources of outdoor air pollution, change often occurs through policies and investments made by local, regional, and national governments. Transportation, housing, power generation, industrial practices, and waste management are among the issues that should be addressed. At the individual level, people can help mitigate air pollution through actions such as using public transit, planting gardens, recycling and composting waste, and conserving water. Many of these practices not only help reduce air pollution, but also encourage a healthy, active lifestyle.[9]

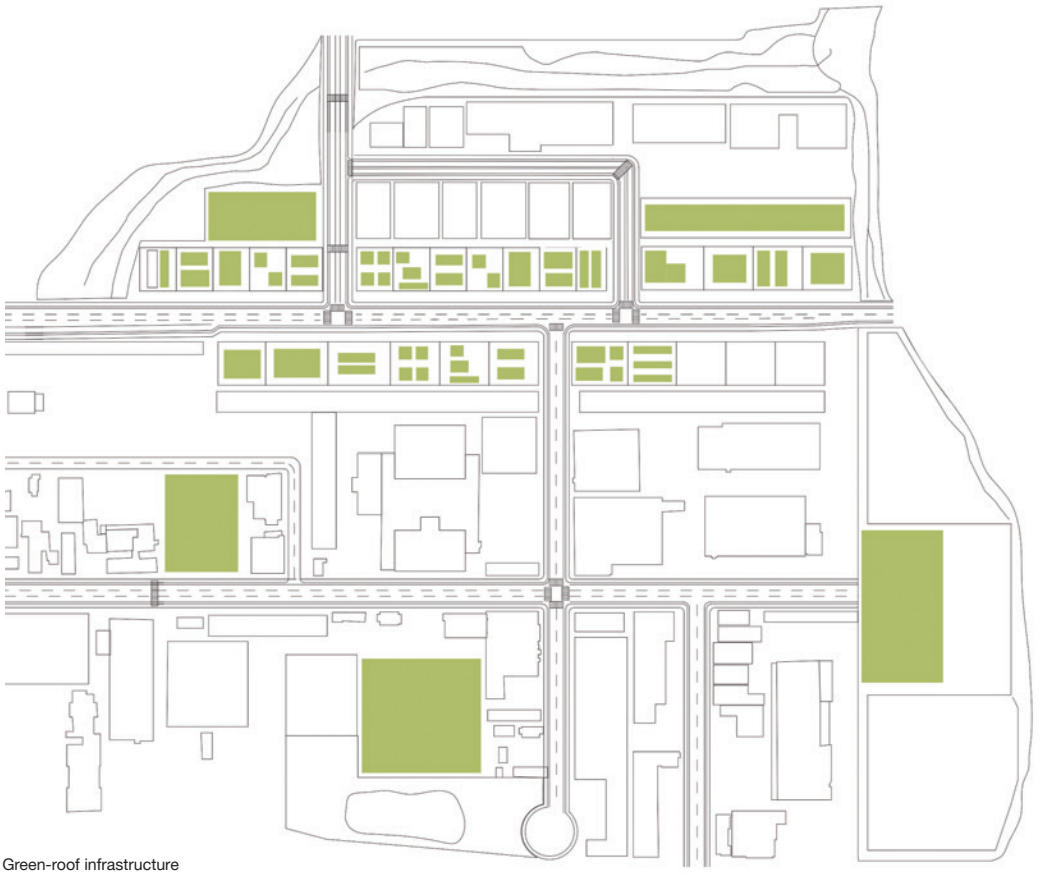
2.2 HEAT MITIGATION

Snapshot

Urban heat islands are the result of various factors specific to the built environment, including impervious surfaces, lack of vegetation, and heat-absorbing roofs. Heat islands not only contribute to climate change, but also result in adverse impacts on human health.

Detailed Description

Temperatures tend to be higher in urban centers than in less developed areas. In fact, city temperatures can be up to 22 degrees Fahrenheit warmer than temperatures in neighboring, less urban areas. Extensive pavement, large building masses, and a lack of green space all



Green-roof infrastructure plan by a CU Denver student.

PASSIVE DESIGN

Passive design involves using non-mechanical strategies to increase a building's energy efficiency. There are several strategies, including the following: carefully orienting the building in relationship to the sun and landscape; providing shade through elements such as roof eaves and trees; using context-appropriate building materials, particularly in regards to how they absorb, store, and release heat; installing proper insulation; and selecting the right windows and placing them in optimal locations.[10]

SMART MATERIALS

As part of the SMART Materials for Urban Climate and Energy program, researchers at Arizona State University are evaluating designs—both existing and emerging—that optimize thermal conductivity and heat storage capacity. Models are being developed to inform planners, designers, and decision-makers about how materials, energy use, and shading affect temperatures in cities.[11]

CASE STUDY
COOL HOUSTON PLAN; HOUSTON, TEXAS

The City of Houston has launched an initiative to reduce urban heat effects. The *Cool Houston! Plan* has multiple components, including an initiative focused on alternative paving. The "Cool Paving" goal calls for educating residents and decision-makers about the benefits of alternative pavements, and identifying highways, streets, and parking lots that could be repaved using alternative technologies. It also suggests establishing incentives for property owners to encourage the use of cool paving. The plan calls for forming a steering committee of agencies and stakeholders to guide the implementation of cool paving strategies.[12]

contribute to this warming effect. The heat can cause a range of negative impacts, including the following[13]:

Increased air pollution: Electricity consumption increases as temperatures soar, resulting in the release of more pollutants from power plants.

Warmer stormwater runoff: Urban surfaces tend to be warmer, which in turn causes stormwater runoff to be hotter. This runoff can eventually raise temperatures in natural bodies of water and harm aquatic life.

Decreased human health: High daytime temperatures can decrease human health and comfort. The elevated temperatures, combined with heightened air pollution, can contribute to respiratory problems and exhaustion, among other serious issues. Sensitive groups, such as children and the elderly, are particularly vulnerable.

Health + Design Considerations

Urban planning, design, and transportation engineering can advance measures to reduce the urban heat island effect. According to the Environmental Protection Agency (EPA)[14], there are several strategies. These include increasing the amount of trees, vines, shrubs, and grasses in a city, as vegetation can provide shade and reduce radiant temperatures. Vegetation can be added to barren patches at ground level and can also be used on rooftops. The EPA also suggests using "cool" materials that absorb less solar radiation. For rooftops and paved surfaces, use reflective materials to decrease surface

CASE STUDY
GREEN ALLEY PROGRAM; CHICAGO, ILLINOIS

Launched by the City of Chicago, this program aims to repave more than 1,900 miles of alleys using green strategies. The program calls for using permeable pavement, reflective and recycled materials, and energy-efficient lighting. It also emphasizes the need for proper grading and pitching of alleys to effectively manage stormwater runoff. As part of the program, a comprehensive handbook has been created that provides detailed guidance and offers specific design strategies.[15]

HEAT ISLAND COMPENDIUM

The Environmental Protection Agency's Heat Island Compendium presents a vast trove of information about urban heat islands. The report describes the formation of health islands and their impacts, including the consequences for human health. A number of strategies for heat island mitigation are thoroughly detailed in the report, ranging from increasing vegetation to using reflective materials. The Compendium also presents a number of voluntary and policy efforts undertaken in the United States. The Compendium is available for download on the EPA's website.[16]

temperatures and reduce heat absorption. According to IS Global[17], additional strategies include improving building insulation to lessen cooling demands and reducing activities that rely on fossil fuels.

Implementation Considerations

Strategies for heat island mitigation will differ depending on context, scope, and reach. According to the EPA[18], strategies can be broken down into voluntary or policy efforts. Voluntary initiatives include "demonstration projects, incentive programs, urban forestry efforts, weatherization programs, outreach and education, and awards to recognize and encourage heat island reduction activities." Initiatives that are policy-oriented include tree ordinances, design guidelines, zoning codes, and sustainability standards for buildings, among other initiatives. Efforts in the United States to reduce heat island effects are featured in the EPA's Heat Island Community Actions Database. Available to the public, the database allows users to search by state, mechanism, and/or strategy.[19]

2.3 NOISE REDUCTION

Snapshot

Elevated noise levels can have serious consequences for human health and well-being. Exposure to high noise levels is linked to high blood pressure, sleep issues, decreased productivity, noise-induced hearing loss, and other stress-related health conditions.[20]

Detailed Description

Sound is a byproduct of the world around us. The EPA defines noise as "unwanted or disturbing sounds" that interfere with everyday activities.[21] Common sources of noise include cars, trains, and airplanes; construction work; industrial activities; and residential activities like

mowing the lawn.[22] When noise-producing activities take place in areas where people live, work, and play, negative health outcomes can ensue.

The design of the built environment can play a role in noise pollution. For example, in urban corridors lined with tall buildings, noise can get trapped and amplified.[23] Noise within buildings is an issue as well. Heating and cooling systems, plumbing, voices, and physical movement can all contribute to internal building noise.[24]

Health + Design Considerations

Communities can address noise issues through planning and design practices that separate loud areas from quieter ones. Moreover, natural and built features can be used to help dampen noise levels. Consideration should be given to the following:

- Separation of incompatible land uses
- Street design to reduce noise impacts
- Asphalt overlays and sound barriers, including earthen berms
- Trees and plants that can absorb noise
- Siting and orientation of building
- Acoustically designed wall
- Well-sealed doors and windows
- Noise-absorbing materials

A building's interior layout is also important. In residential buildings, for instance, the Urban Land Institute[25] recommends placing kitchens between garages and bedrooms. The kitchen acts as a buffer, helping protect sleeping areas from noisy garages.

Implementation Considerations

Considering that noise often transcends property boundaries, addressing noise pollution requires authentic community engagement. A critical aspect of effective public involvement is the accessibility of accurate information, including information on local, state, and federal guidelines regarding noise. Making information available about the health impacts of noise pollution is also key. Public health agencies and advocacy groups can assist with public engagement to help advance health and wellness for individuals and the community. H

NATURE'S ROLE IN REDUCING NOISE

When working to mitigate noise pollution, consider natural elements. Green roofs, for instance, can be used to soften outdoor noise. According to the Urban Land Institute, green roofs can reduce outdoor noise by up to 50 decibels. Other natural interventions include earthen berms and certain types of landscaping.[30]

CASE STUDY
ENVIRONMENTAL NOISE DIRECTIVE; EUROPEAN UNION

Within the European Union, areas with a population greater than 100,000 are required to develop local noise maps.[26] These maps are available to the public, enabling residents to assess and monitor noise levels.[27] Barcelona sets a good example with its interactive online map that allows residents to enter their street address and see decibel levels in their area.[28] Cities in the European Union are also required to develop action plans for reducing noise levels in certain areas. Common strategies include limiting traffic, reducing speed limits, and establishing silent zones, including parks and other green spaces.[29]

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Water

CHAPTER 3

Water

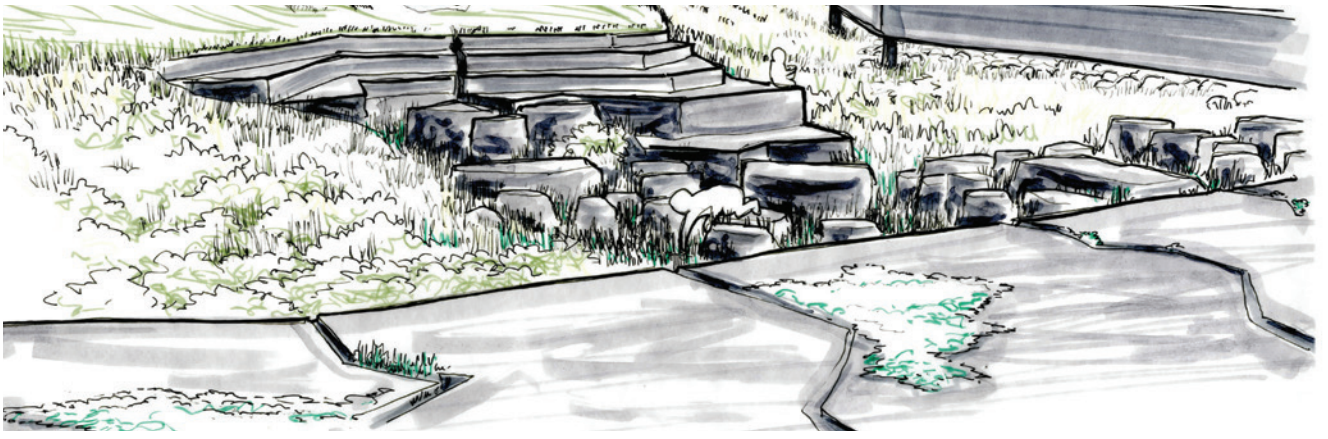
Overview

Water is essential for life on earth, yet we struggle to properly manage this vital and precious resource. While much has been done in recent decades to reduce water pollution and to conserve water, communities around the globe and within Colorado still face serious challenges. Among the challenges are a lack of collaboration among stakeholders, stormwater problems brought on by urbanization, and depleted water supplies—all of which impact the health of communities. While planners and designers seek to address these issues, they are considering other aspects concerning water and health. Specifically, they are devising strategies to boost people's water consumption, as inadequate hydration can cause major health problems. This chapter explores pressing issues and promising solutions related to water, health, and communities. It contains the following sections: (1) One Water Roadmap, (2) Drinking Water, (3) Green Infrastructure for Stormwater, and (4) Greywater.

3.1 ONE WATER ROADMAP

Snapshot

The "One Water Roadmap" approaches water management in an integrated, inclusive, and sustainable way. It offers a transformative approach to viewing, valuing, and managing both water and water-related issues, including land use, habitat protection, climate change, and human health.[1]



Consideration for the entire water cycle can be implemented into urban infrastructure, as depicted in this image by a CU Denver student.

Detailed Description

Released in 2016, the Roadmap was developed by the US Water Alliance, a national organization whose members include public agencies, private companies, nonprofit groups, and research institutions. The Roadmap has been developed from a perspective that *all* water has value, from water resources in natural ecosystems to water used for farming, drinking, and domestic purposes. Management of water needs to be multifaceted and should consider achieving benefits for the environment, for economic resiliency, and for individuals and society.[2]

A systems approach that considers the entire water cycle and all forms of infrastructure is critical for managing and using water. Strategies that respect and take into account the natural ecosystem, the hydrology of an area, and water's use and reuse are essential. The Roadmap identifies six "arenas of action": (1) water utilities, (2) cities, (3) businesses and industry, (4) agricultural systems, (5) society and the economy, and (6) waterways.[3]

Health + Design Considerations

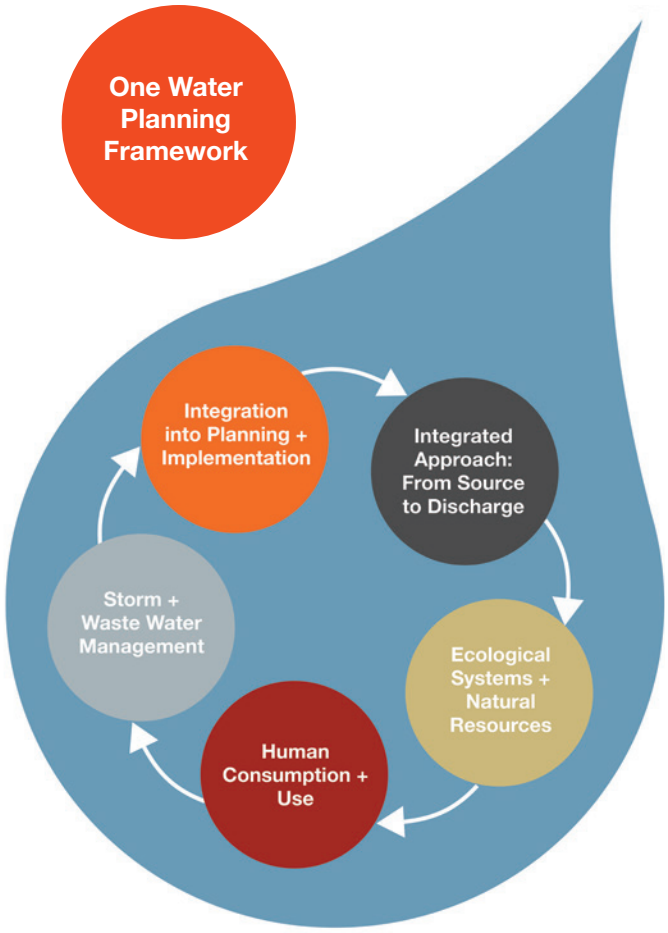
To foster sustainable water management, the US Water Alliance has developed "seven big ideas" for courses of action. These ideas are based on input from water providers, water users, and the public. As outlined in an Alliance report[4], the ideas are as follows:

- Advance regional collaboration on water management
- Accelerate agriculture-utility partnerships to improve water quality
- Sustain adequate funding for water infrastructure
- Blend public and private expertise and investment to address water infrastructure needs
- Redefine affordability for the 21st century
- Reduce lead risks, and embrace the mission of protecting public health
- Accelerate technology adoption to build efficiency and improve water service

These ideas are outlined in the Alliance's *One Water for America Policy Framework,* a guidebook that describes how to apply the One Water Roadmap at the local, state, regional, and federal levels. The publication is available for download on the Alliance's website.[5]

Implementation Considerations

Community engagement is a critical element in water management. Efforts to involve the community should include a wide range of stakeholders, including watershed planners, utility providers, local and state agencies, non-governmental organizations, and farmers and ranchers. Moreover, community organizations and neighborhood councils should be engaged in the process.[6] H



A systems approach that considers the entire water cycle and all forms of infrastructure is critical for managing and using water.

CASE STUDY
ONE WATER LA; LOS ANGELES, CALIFORNIA

One Water LA is an ambitious initiative that aims to get governmental departments and other stakeholders working together to address water management in Los Angeles. As described in a 2017 report[7], the overarching goal is to develop an "integrated framework for managing the city's water resources, watersheds, and water facilities" in a way that benefits society, the economy, and the environment.

Among the many specific objectives are reducing impervious cover and waterway pollutants, and increasing water conservation and reuse. In a broader sense, One Water LA aspires to protect public health and bolster resiliency against climate change.[8] One Water LA has been spearheaded by the city's Bureau of Sanitation (LASAN) and Department of Water and Power (LADWP). A broad spectrum of stakeholders is involved, including city and regional agencies, nonprofit groups, and neighborhood councils.

The initiative has unfolded in several phases. The first involved strengthening collaboration; developing initial planning baselines; and establishing principles and objectives for coordinated water management. The second stage entailed the development of the *One Water LA 2040 Plan*, which outlines a vision, framework, and implementation strategy. The next stage in the initiative involves conducting a Programmatic Environmental Impact Report.[9] More information is available on the Board of Public Works's website.[10]

3.2 DRINKING WATER

Snapshot

Adequate water consumption is vital to one's health and the overall health of a community. There are several strategies for increasing people's water consumption, including the proper maintenance of water fountains, the installation of filling stations, and access to free drinking water in schools.

Detailed Description

Water consumption is crucial to maintaining a healthy lifestyle. Proper hydration helps with regulating body temperature; protecting joints, spinal cords, and body tissues; and cleansing the body of waste. Readily available drinking water enables people to maintain their bodily systems and helps protect them from injury and illness.[11] Access to drinking water is especially important when encouraging physical activity and promoting water as an alternative to sugar-sweetened beverages. Physical movement and a reduction in sugary drink consumption can help mitigate obesity, diabetes, tooth decay, and other health issues.[12] Relying on bottled water for hydration can be expensive; therefore, providing free and unlimited drinking water for everyone in a community can increase water-intake levels and overall health.[13] Ensuring access to clean drinking water requires a holistic approach that considers a multitude of factors.

Health + Design Considerations

Water should be visible and accessible in public spaces. Public drinking fountains provide free, clean water to all members of a community. Populations that may regularly rely on public drinking fountains for hydration include children, commuters, runners and bikers, tourists, and people experiencing homelessness. Below are several ways to bolster water consumption in a community.

Monitoring and Maintenance: Ensuring that water fountains are well-used requires trust from the public.

People must be assured that drinking fountains are functional, clean, and safe. Communities can achieve this by improving the monitoring and maintenance of drinking fountains, including upgrading fountains as needed. Communities should establish comprehensive monitoring and testing plans for drinking fountains in public spaces, and they should encourage private owners to do the same. These plans should not only focus on the functioning of a fountain, but also on water quality and the effectiveness of installed filters.[14]

Filling Stations: New drinking fountains often come equipped with bottle-filling spouts, which enable users to fill up their personal containers with clean tap water. In many instances, these spouts can be added to older drinking fountains. Filling stations help encourage hydration while also reducing the use of single-serve plastic bottles. In a report published as part of its "Take Back the Tap" campaign, the Food & Water Watch outlines strategies to encourage the use of filling stations on campuses and in offices.[15]

Water in Schools: Providing access to water in schools is proven to increase overall water consumption, promote healthy choices, and improve students' cognitive function. Abundant and well-placed drinking fountains throughout a school can make water a more visible alternative to sugar-sweetened beverages. Water should be a clear option in school cafeterias to encourage hydration and to discourage the purchase of unhealthy beverages. Moreover, hydration should be promoted as an essential part of physical education in schools.[16]

Implementation Considerations

Beyond the specific strategies outlined above, there are a multitude of factors to consider when considering drinking water and the built environment. One must consider where water comes from, how it is treated, and its quality as it enters a community and is utilized. One should also consider measures for water conservation and reuse, management strategies that minimize damage caused by water (such as flooding), and ways to return water to the natural system.[17]

CASE STUDY

EARLIMART SCHOOL DISTRICT WELLNESS POLICY; EARLIMART, CALIFORNIA

In 2011, the Earlimart School District in central California approved a revised wellness policy that includes guidelines to promote water consumption. The policy requires that water be free and accessible to students and employees at every District facility. It also allows students to bring water from home into the classroom in capped containers. Moreover, the policy states that the District will monitor drinking water fountains and perform maintenance as needed. To further encourage water consumption, the District prohibits the sale of sugary drinks in vending machines, at fundraising events, and in school stores. The only beverages allowed are water with no additives, cow's milk, non-dairy milk, and juice.[18]

3.3 GREEN INFRASTRUCTURE FOR STORMWATER

Snapshot

Green infrastructure can be a cost-effective and resilient approach to managing stormwater. Green infrastructure, which captures and treats stormwater on-site, comes with a host of environmental, social, and economic benefits. Community health is significantly impacted by stormwater and its related infrastructure. Rain gardens, planter boxes, and permeable pavement are among the different types of green infrastructure.

Detailed Description

In urban areas, stormwater runoff is a significant source of pollution. When rain falls on impermeable surfaces—such as roofs, streets, and parking lots—it

is unable to soak into the ground. The water is usually forced to drain through a maze of gutters, storm sewers, and other engineered systems and is then discharged into nearby bodies of water. Stormwater can carry garbage, heavy metals, bacteria, and other pollutants. Water quality can be adversely impacted, in turn affecting the health of communities. Heavy rain can be particularly damaging: Increased water flows can trigger erosion and flooding, in turn damaging habitat, property, and infrastructure—and posing a threat to human safety, according to the U.S. Environmental Protection Agency (EPA).[19]

Green infrastructure uses vegetation, soils, and other natural elements to manage water and create a healthier urban environment. There are several green infrastructure elements, both small and large in scale, that can be incorporated into urban contexts to improve the health of the built environment. A variety of designs and strategies can be woven into a site, a neighborhood, or a large community spanning entire watersheds.[20]

As landscapes become increasingly covered with impervious surfaces, stormwater becomes more of a problem; however, this problem offers opportunities to creatively incorporate infrastructure into our urban environments.

Health + Design Considerations

When it comes to stormwater management, major impacts can be achieved with relatively small interventions. Below are several examples outlined by the EPA.[21]

Downspout disconnection: This simple practice involves rerouting rainwater that passes through rooftop drainage pipes. Rather than directing the water to storm sewers, the water is channeled to barrels, cisterns, or permeable areas. The water can infiltrate the soil or be stored for later use. Downspout disconnections can be very beneficial in areas with combined sewer systems.

Rainwater harvesting: This practice entails collecting and storing rainwater for later use. It is particularly valuable in arid locales with limited water resources.

LOW-IMPACT WATERCOURSE

Green infrastructure should incorporate a low-impact watercourse, which is a system designed to mimic an area's pre-development hydrology. This system can include rain gardens, bioswales, and restored natural drainageways. The intent of a low-impact watercourse is to provide ecosystem services, a connection to nature, greater aesthetic appeal, and an improved sense of place. There are health benefits as well. Lush vegetation often encourages physical activity, and the presence of nature improves cognitive function while reducing stress and depression. Moreover, beautiful places created by the implementation of low-impact watercourses can foster a sense of community pride—a significant factor in creating healthy communities.[22]

Rain gardens: These typically are shallow basins with vegetation that absorb runoff from streets, sidewalks, and rooftops. Also known as bioretention cells, rain gardens mimic a natural hydrological process by evapotranspiring stormwater. In urban environments, planter boxes can serve as rain gardens.

Bioswales: A form of rain gardens, bioswales move water around the landscape and increase water filtration and ground infiltration. They generally are placed in linear spaces, such as a stretch of land between a street curb and sidewalk. Bioswales can feature vegetation, mulch, or xeriscaping.

Permeable pavement: Rainwater is able to infiltrate this type of pavement, which can be made of porous asphalt, pervious concrete, or permeable pavers. In areas with high land values and/or threats of flooding and icing, installing permeable pavement can be a cost-effective approach.

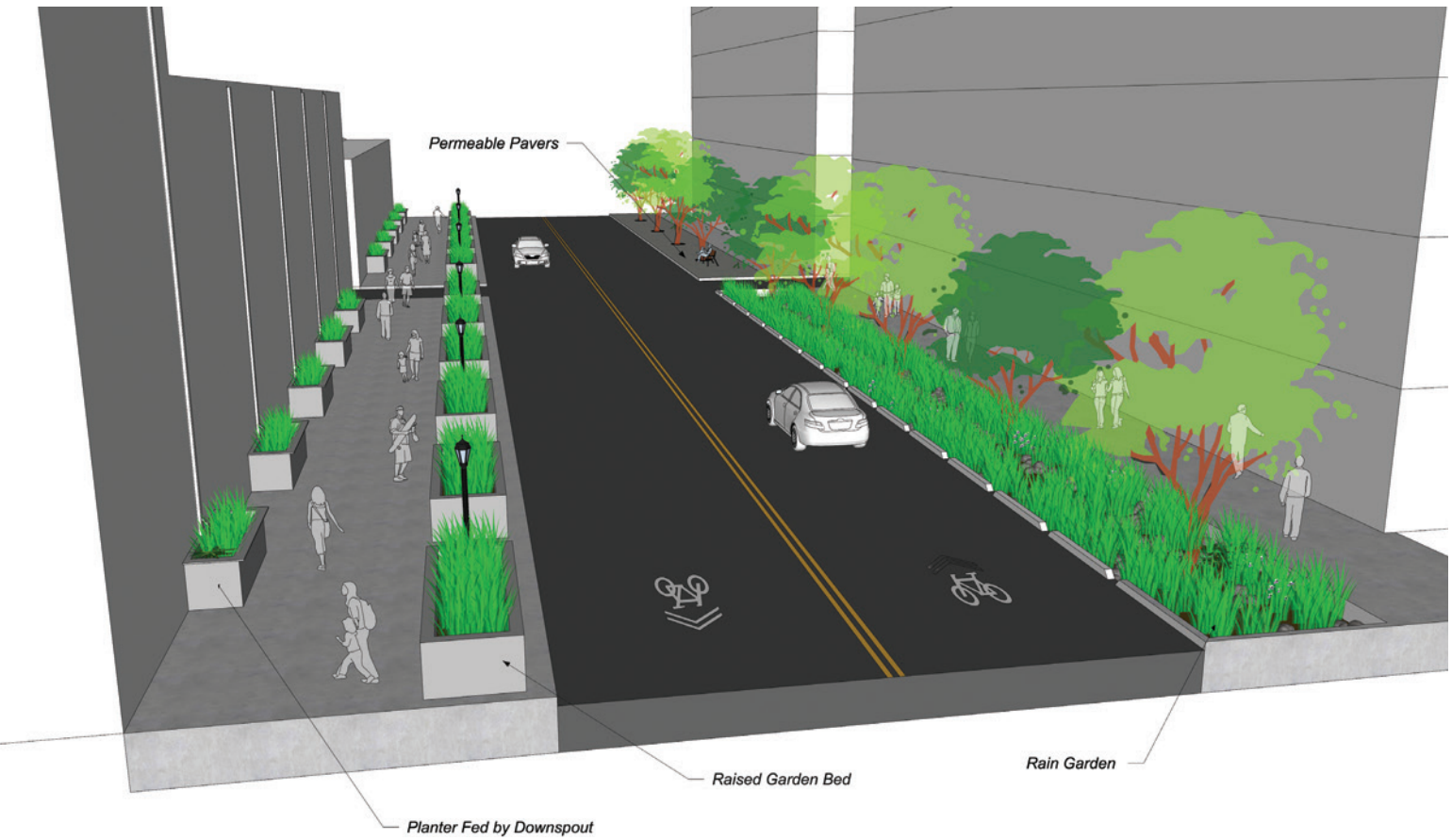
Green streets, alleys, and parking lots: These are created by incorporating elements that collect and evapotranspire stormwater. These elements include trees, rain gardens, and permeable pavement. In addition to managing stormwater, these elements can reduce the heat island effect and engender more walkable urban environments.

Green roofs: Covered with vegetation, green roofs enable absorption and evapotranspiration of rainwater. They can be a cost-effective solution in dense areas with high land values and for large industrial or office buildings, which often face high stormwater management costs.

Urban tree canopy: Beyond providing shade, tree leaves and branches intercept

WHAT IS EVAPOTRANSPIRATION?

Evapotranspiration is the combination of two processes: evaporation and transpiration. Evaporation is the transformation of water to vapor, and transpiration is the process in which moisture from plant surfaces is converted into water vapor. As defined by Erickson et al., evapotranspiration is a process that entails "water surface evaporation, soil moisture evaporation, and plant transpiration."[23]



This rendering by a CU Denver student illustrates how green infrastructure can be easily integrated into the urban fabric to help manage stormwater.

rainfall, in turn helping reduce stormwater runoff. Many cities have established tree canopy goals. Community members can help plant and maintain trees throughout their built environment.

Land conservation: Preserving open space and fragile natural areas can play a role in maintaining water quality and minimizing the flooding impacts of stormwater. These areas can be within a city or adjacent to it. Riparian zones, wetlands, and steep hillsides should be areas of focus.

Implementation Considerations

The benefits of green infrastructure are most impactful when solutions are integrated throughout a watershed. The EPA has developed three separate guides to assist municipalities in bolstering green infrastructure throughout the built environment: *Municipal Handbook, More Policy Guides,* and *More Policy Tools.* The *Municipal Handbook* is a comprehensive guide that discusses funding options, retrofitting policies, and incentive mechanisms, among other topics. *More Policy Guides* is a compendium of EPA publications that examines the relationship between smart growth and water resource protection. *More Policy Tools* contains communication and program evaluation tools. These valuable guides are available on the EPA website.[24]

Community engagement should also be taken into account. Collaboration and negotiation among multiple stakeholders are critical when it comes to adopting and implementing green infrastructure programs and policies. One helpful resource is the Green Infrastructure Collaborative, which was formed in 2014 by federal agencies, nongovernmental organizations, and private-sector organizations. This "network-based learning alliance" uses a range of tactics to help communities implement green infrastructure.[25] H

CASE STUDY

GREEN INFRASTRUCTURE INITIATIVES; CHICAGO, ILLINOIS

Chicago's green infrastructure program is just one element of a comprehensive environmental agenda that includes buildings, transportation, energy, and resource management. Below is a description of several green infrastructure elements.

Stormwater Management Ordinance: Adopted in 2008, this ordinance outlines several guidelines. For one, it requires that at least the first half-inch of rain be detained onsite for any building with a footprint larger than 15,000 square feet or any parking lot larger than 7,500 square feet. Alternatively, the development may reduce the site's "prior imperviousness" by 15 percent. The Ordinance promotes green infrastructure as a key element in managing stormwater.[26] [27]

Green Streets Program: This initiative has increased public and private tree plantings, improved tree maintenance, and boosted public education about tree benefits. By 2006, more than 580,000 trees had been planted since the program's launch in 1989. The trees not only improve air quality and residents' quality of life, but also reduce urban heat island effects and stormwater runoff.[28] [29]

Green Roof Program: Building owners are incentivized to create green roofs through the city's Green Roofs Grant Program and Green Roof Improvement Fund. During a three-year period, the city awarded grants to 72 different roof projects involving residential and small commercial buildings. Moreover, the city council has authorized the awarding of grants of up to $100,000 to projects within the Chicago Loop.[30]

3.4 GREYWATER

Snapshot

Greywater is non-potable water from sinks, bathtubs, showers, and washing machines. This water can be captured and reused, which in turn reduces pressure on water resources. Greywater systems are available for homes and other types of buildings.

Detailed Description

Greywater from homes and other buildings can be utilized to water grass, ornamental plants, and trees. It also can be used for vegetable plants as long as it does not come into contact with edible parts. Moreover, greywater has been used in industrial systems and other contexts that do not require potable water. Greywater systems are available for a variety of scales, from single-family homes to large commercial and industrial buildings. These systems can play an important role in water conservation in all types of environments.[31]

Health + Design Considerations

There are several simple systems for capturing and using greywater. According to Greywater Action, rinse water from washing machines is generally the easiest greywater to reuse because it can be diverted without cutting into existing plumbing systems. A low-cost option is a laundry drum system, in which rinse water is pumped into a barrel and then drained out through a hose. The hose can be moved around to irrigate different areas of a yard. Another option is diverter valve that is connected to a washing

CASE STUDY
FRANK A. CASSELL HALL; PITTSBURGH, PENNSYLVANIA

Frank A. Cassell Hall is a 16,500-square-foot building on the University of Pittsburgh's Greenburg campus. The two-story building, which opened in 2012, has received LEED Gold certification from the U.S. Green Building Council. Among its sustainable features are two green roofs that direct rainfall to a 5,000-gallon harvesting cistern. The cistern provides greywater for the building's toilets and a drip irrigation system. The landscaping around the building features native flowers and trees, as well as bioswales for stormwater management. The building was designed to reduce water usage by more than 50 percent.[32]

PURPLE PIPES

Some communities have installed purple piping, which are lines designated for repurposed water. The "purple pipe" water is used for irrigation and industrial purposes. In San Diego, for instance, over 90 miles worth of purple pipes deliver recycled water to golf courses and parks.[33] In Denver, there is a 70-mile underground network of purple pipes, with the water being used for landscape irrigation, car washing, industrial systems, and firefighting.[34] The use of recycled water at a large scale can ease the strain on potable resources and treatment plants.

BLACKWATER VS. GREYWATER

Both blackwater and greywater are forms of wastewater, but they are very different. Blackwater is toilet water that contains human excrement. Greywater comes from sinks, dishwashers, and washing machines.[35] Both can be recycled; however, greywater is easier to treat and reuse.

machine's drainage hose. The user can switch between sending the greywater to a sewer or septic system, or sending it to an onsite irrigation system. The irrigation system can direct water to specific plants or areas.[36]

Showers are also a great source of greywater, as the rinse water is typically very clean. Water from kitchen sinks is often high in organic matter, which can clog drainage systems. One solution is a branched drain system with mulch basins, where organic matter can collect and decompose. (Note: Some states prohibit the reuse of kitchen sink drainage.)[37]

Beyond individual homes, greywater is being captured and used on a much larger scale. Office buildings, apartment complexes, and schools are among the places where water can be captured and reused. The greywater systems for these types of buildings are more complex than single-family homes. The water is generally collected in a tank and then filtered and disinfected. Some places use a membrane bioreactor (MBR) system, which treats and stores the water for use in toilets, cooling systems, and irrigation. With large buildings, it is often easier and cheaper to treat greywater and blackwater together, rather than separating out the greywater.[38]

Implementation Considerations

There are several key tips to remember. Before establishing a greywater system, local laws and guidelines need to be consulted.[39] Irrigation needs should be carefully calculated, and greywater systems should be kept as simple as possible to avoid maintenance. Once the system is in place, greywater needs to be separated from fresh water, and physical contact with greywater should be avoided. Building owners and occupants that intend to reuse their greywater should avoid products with salts, boron, or chlorine bleach. Ideally, greywater directly penetrates the ground; do not allow it to pool. Moreover, greywater should not be stored because nutrients start to break down after 24 hours and release bad odors.[40]

There are many factors that influence what type of greywater system should be installed. Greywater Action provides examples of small-scale systems on its website.[41] In areas where water is scarce, rebate programs are emerging that incentivize homeowners to install greywater systems.[42] There also are resources such as the Clean Water State Revolving Fund, a federal-state program that offers loans to communities for water infrastructure projects.[43] H

CONSTRUCTED WETLANDS

Artificially created wetlands can play an important role in dealing with greywater. If greywater will be used for irrigation, it does not need to be treated; however, in some cases, greywater is destined for waterways, ponds, and estuaries. Constructed wetlands can prepare the water for discharge by extracting harmful nutrients, removing pollutants, and filtering sediments. For more information, visit the Greywater Action website.[44]

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Food

CHAPTER 4

Food

Overview

In recent years, planning professionals have increasingly focused on the intersection of food systems and the built environment. There are many reasons for this shift, including a recognition that food systems represent a significant portion of land and a community's economy. Moreover, access to healthy food plays a critical role in improving public health, as it can help prevent obesity, high-blood pressure, and diabetes, among other illnesses. Removing barriers to healthy food can go a long way toward benefiting both individuals and entire communities. In order to understand the complexities between a community and its food sources, this section discusses two practices: (1) Access to Healthy Food and (2) Local Production, Processing + Distribution.

4.1 ACCESS TO HEALTHY FOOD

Snapshot

Stores that sell healthy food are important contributors to a neighborhood's quality of life. Communities can boost public health and help decrease food insecurity by ensuring there are plenty of grocery stores, supermarkets, and smaller retailers that provide nutritious options.

Detailed Description

Many people face barriers to accessing nutritious food despite exponential growth in the globalized industrial food system. Food insecurity occurs when people do not have physical and economic access to nutritious and safe food. It is estimated that nearly 12 percent of American households experienced food insecurity

Conceived by a CU Denver student, this plaza showcases the activation of public space by means of local food production and distribution.

in 2017.[1] Food insecurity is correlated to socioeconomic status and race.[2] Food insecurity tends to be more prevalent in households with single mothers, men and women living alone, Hispanic residents, and black/non-Hispanic residents.[3]

One key aspect of food insecurity is the presence of food deserts — a term that refers to places with limited proximity to supermarkets, low rates of vehicle ownership, a lack of transit, and the presence of physical barriers such as interstates and rivers. As one might expect, basic grocery shopping is made more difficult in food deserts.

Health + Design Considerations

Improving access to healthy food is no small task. There are a number of things to consider. First and foremost, conduct a systematic assessment of the demand for food, which will help paint a big picture and pinpoint strengths and weaknesses. It is also important to assemble a jurisdiction-wide supermarket program that identifies available sites and development assistance.[4]

Another approach is encouraging deliveries of fresh produce from farmers' markets to office buildings and multi-family dwellings. In many cases, access to food is limited

CASE STUDY
FOOD POLICY COALITION; CLEVELAND-CUYAHOGA COUNTY, OHIO

Formed in 2007, the Cleveland-Cuyahoga County Food Policy Coalition works to foster a healthier food system through policy changes. The group builds coalitions, convenes working groups and quarterly forums, conducts research, disseminates information, and partners on events. One of its many successes involved working with city leaders to establish a food purchasing and contracting policy that supports regional food growers and producers.[5] Additional action was taken by the city to establish a preference

for local food production.[6] Other areas the Coalition has worked on include urban gardens, farm animals and bees, food trucks, composting, and water access.[7]

FINANCING HEALTHY FOOD

Produced by the Food Trust[8], *The Healthy Food Financing Handbook* is focused on how to create supermarkets in underserved areas. It presents step-by-step approaches for developing local and state policies to stimulate the creation of supermarkets and other types of retailers that offer healthy food options. As the book notes, healthy food financing initiatives typically involves three partnerships: (1) partnerships for policy development; (2) partnerships for program management; and (3) partnerships for project implementation. The book presents a range of success stories, from a supermarket in Philadelphia to a seafood and produce store in New Orleans.[9]

by a person's means of transportation; removing this barrier helps community members get the nutrition they need. Providing healthier food choices in public buildings, schools, and hospitals can also be an effective strategy. These choices can be offered in places such as vending machines and cafeterias. This strategy can be implemented without major education initiatives or major institutional changes.[10]

Other strategies include prioritizing healthy food establishments in new developments and encouraging public agencies to modify procurement guidelines so that they require more nutritious and locally produced food. All of these strategies can form a community-wide blanket that ensures healthy food is available to all.[11]

Implementation Considerations

When designing programs to address healthy food access, it is vitally important to understand issues related to food availability at the local level. Bolstering access to nutrition and increasing food security starts with knowledge about the community's needs and challenges. Additionally, generating awareness among decision-makers about vulnerable populations is important and helps streamline the path to food security.[12]

FOOD ACTION PLAN

A food action plan is designed to assist areas that lack access to healthy food. The overarching aim of the plan is to help community members gain access to vital nutrition. The following steps can be employed: take food to people; gather food and people together (i.e., a community garden); evolve efforts into a small store; and establish a major food destination, such as a supermarket. These steps can be long and arduous, and full implementation may take multiple years. The end goal is a destination where healthy and affordable food can be accessed by all members of the community.[17]

CASE STUDY
FARM TO TABLE PARTNERSHIP; SEATTLE/KING COUNTY, WASHINGTON

The Farm to Table Partnership works to provide fresh, local produce to children and older adults in the Puget Sound region.[13] To help make local food more accessible, the group offers technical support and assistance in linking meal sites with area farms. The Partnership drove the creation of the Puget Sound Food Hub, facilitating the purchase of local food by hundreds of childcare and senior meal sites. The program helped menu items become healthier and better aligned with the harvest seasons.[14,15] Similarly, the Good Food Bag program provides childcare and senior meal sites with bulk purchasing power, allowing them to establish groups that distribute local produce to families in need.[16]

4.2 LOCAL PRODUCTION, PROCESSING + DISTRIBUTION

Snapshot

Strengthening a local food system can result in a multitude of environmental and public health benefits. Promoting local food production, processing, and distribution requires a comprehensive approach to planning.

Detailed Description

Food systems planning is becoming more prevalent as planning and design professionals recognize that a substantial portion of urban and regional land is connected to food system activities. Moreover, food systems represent a large portion of a community's economy. The two overarching goals in food systems planning are: (1) To foster resilient and self-reliant food systems; and (2) To propose ways in which the industrial food system can benefit public health, ecology, social equity, and other aspects of a community.[18]

From a sustainability point of view, the globalization of the food industry requires vast amounts of fossil fuels to produce, harvest, process, transport, and dispose of food. Implementing stronger local food systems is a viable way to address the environmental issues related to industrial food production.[19] From a public health perspective, food systems planning can be leveraged as a strategy to mitigate obesity, high blood pressure, heart disease, and diabetes.[20] A robust food system must be socially equitable in order to be sustainable.[21]

Health + Design Considerations

In the past, planners and designers paid minor attention to food issues due to a belief that food systems are not broken or that they do not directly affect the built environment.[22] They are now moving beyond this silo-type of thinking. In fact, there are various ways in which planners, urban designers, and architects can integrate comprehensive food planning into action plans, development plans, and/or site programming. Below are several examples:

Local resources: It is important to support the creation of a food system that relies on available local resources. This includes production, processing, distribution, and waste management.[23]

Community spaces: Land use, transportation, and urban design practices should help increase access to healthy and culturally sensitive food sources. One approach is establishing community spaces where people can eat and socialize. These spaces can also provide opportunities for nutrition education, which opens up a dialogue that supports positive, long-term outcomes.[24]

Access and engagement: Ensure that community residents have access to programs and facilities (such as gardens) that focus on food and nutrition. In the case of facilities, prepare a management and maintenance plan with clearly defined responsibilities that involve community members. This will help ensure the longevity of facilities.[25]

Alternative farming: It is important to promote alternative farming techniques that work for different scales and

CASE STUDY
BOSTON PUBLIC MARKET; BOSTON, MASSACHUSETTS

When it opened in 2015, the Boston Public Market was one of the first indoor marketplaces in the United States to require that all food come from local suppliers. Owned and operated by a nonprofit company[26], the market is adjacent to a park (the Rose Fitzgerald Kennedy Greenway) and is easily accessible to residents in the area. The market has 35 year-round vendors, along with a farmers' market during the spring and summer. Additionally, the Boston Public Market accepts SNAP and EBT benefits, which enables the purchase of local, nutritious food by low-income residents. The market has won various awards and has achieved Silver LEED Certification from the U.S. Green Building Council.[27]

CASE STUDY

DENVER SUSTAINABLE FOOD POLICY COUNCIL; DENVER, COLORADO

The mission of the Denver Sustainable Food Policy Council is to "influence policy that fosters food security for all community members and promotes a healthy, equitable and sustainable local food system with consideration for economic vitality and environmental impact."[28] The Council analyzes existing food systems in communities, and it advocates for policy changes that will improve those systems. The Council is committed to cultivating partnerships between the community and the food industry's main sectors (production, processing, distribution, consumption, and waste recovery). The Council takes a comprehensive approach to seek government buy-in and to achieve long-term strategies that offer real solutions.[29]

different types of communities. For instance, planners can work with ethnic minority groups to protect and/or restore their food systems.[30]

Ripple effect: Food action plans can include regulatory and policy changes that impact city codes, regulations, processes and/or design guidelines. These can help ingrain the importance of food in governmental actions.[31]

Implementation Considerations

Engaging with community members is critical to understanding challenges related to food systems planning. To improve food network conditions, it is necessary to undergo an extensive public engagement process that includes businesses, non-profits, and community members. These stakeholders can help identify both the strengths and weaknesses of the current system. Moreover, it is important to take periodic assessments of community food issues and integrate community recommendations into plans.[32]

One approach for linking voices of the community to governmental actions is through food policy councils. Such councils often are composed of local community members and representatives from each of the five food sectors (production, processing, distribution, consumption, and waste recovery). Council members work together to develop mutually beneficial solutions.[33] H

FOOD PROCUREMENT POLICIES

Food procurement policies are adopted by local governments and dictate which foods are provided, purchased, or made publicly available by municipal entities. Policies can increase demand for local, healthy foods and develop greater availability of these foods. They also can improve eating behaviors by introducing consumers—regardless of their age and setting—to more viable nutrition options. Procurement policies focused on local food offer a wide range of benefits. These policies can be leveraged to not only foster good health within a community, but also to satisfy other social and economic goals, such as job creation, income generation, and farmland preservation.[34]

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Buildings

CHAPTER 5

Buildings

Overview

The ways in which buildings are designed and constructed can influence our physical and mental health. There are numerous strategies that architects, designers, and planners can use to encourage and support healthy living. One must first look at the community as a whole and ensure there is a mix of land uses, which can help foster walkability and accessibility. When it comes to buildings, focus should be placed on elements such as stairs and gathering areas. Sustainability should also be a guiding principle. Conserving water, reducing energy usage, and enhancing indoor air quality are among the measures that can be incorporated to facilitate positive health outcomes for both people and the environment. This section covers three practices: (1) Mix of Uses, (2) Building Design, and (3) Sustainability.

5.1 MIX OF USES

Snapshot

The term “mixed use” refers to having residences, workplaces, retail, community services, public spaces, and recreation all in close proximity to one another—if not actually in the same building or complex. A mixed-use approach can promote walking and other healthy behavior.

This rendering by CU Denver students illustrates how living walls can be incorporated into a range of building types.

Detailed Description

Studies show that mixed land use—that is, co-located residential, office, commercial, civic, and open space—is significantly associated with increased levels of physical activity. For instance, placing schools near residential zones enables students to walk to school, in turn promoting daily physical activity among children. Mixed use is also important for encouraging physical activity among the elderly. Researchers have found that people aged 65 and older who live close to shops and services are more likely to walk, use public transit, and take trips outside of the home.[1]

The ability to walk to destinations can help curb obesity. A study conducted in Atlanta, Georgia, discovered that mixed land use was associated with a 12 percent reduction in the likelihood of obesity.[2] Mixed use also helps improve air quality by reducing car usage, and it increases social equity by providing a variety of necessities within reach.[3]

Health + Design Considerations

Mixed-use developments should strive to create a more complete community—that is, a community in which homes, offices, parks, and services exist for all sectors of society.[4] Land-use designations should be responsive to the surrounding context, which includes social patterns, cultural expressions, and market forces, along with the physical expression of the natural and built environment.

There should be a variety of building types and uses in central zones and along main corridors. Land use configurations should

CASE STUDY

MARIPOSA REDEVELOPMENT MASTER PLAN AND HEALTHY LIVING INITIATIVE; DENVER, COLORADO

Improving residents' health and quality of life was a guiding principle for the Mariposa mixed-use development, which lies just south of Denver's central business district. The Denver Housing Authority and its partners created 600 mixed-income units in an area formerly occupied by aging, subsidized housing. Prior to redevelopment, more than 55 percent of residents were overweight or obese, and over 38 percent reported having a health condition that kept them from working.[5] The development is designed to connect residents with key essential services and transportation options, and to bolster access to green space—all of which contribute to increased walkability and other opportunities for daily physical activity.[6]

Several lessons have been learned from the project. One is the importance of involving residents and partners early on to identify gaps in services and to determine what the community needs. Another lesson is using health to set the tone for redevelopment, which can help ensure that health factors are considered at every step. The project has also underscored the importance of having guiding principles based on the idea that everyone deserves a high-quality and healthy environment.[7]

COMPLETE COMMUNITY

The term "complete community" refers to a place with a full range of housing, services, and employment opportunities. This range meets the needs of all residents, regardless of class, ethnicity, income, education, gender, or age. Complete communities are places where people live, work, shop, and play in a manner that allows easy access and mobility. This includes walking and using public transit. These communities feature a mix of land uses, enabling residents to be located near jobs and services.[8]

be complementary to accommodate varying uses within buildings, including live-work spaces and residential uses.[9] Additionally, amenities and services should be situated within close proximity. Destinations located within one-quarter to one-half mile of each other are more likely to promote walking.

Mixed-use developments, especially those oriented around transit, should incorporate first-floor retail and services to establish a more human-scale environment. This in turn creates an enticing pedestrian experience that invites people to walk. Mixed-use developments must ensure a safe walking environment for pedestrians. Design elements that can increase safety include crosswalks, signalized crossings, and adequately sized sidewalks, preferably with a buffer from the street and passing automobiles.

A mixed-use approach applies to both public and private sector projects.[10] The Sonoran Institute[11] offers suggestions for both public and private entities on how to select sites for mixed-use developments. Projects should be located where they will provide a missing use, offer an element of convenience for area residents, be compatible with surrounding land use and density conditions, and be readily serviceable in terms of infrastructure. Local policies and officially adopted plans also need to be considered. Zoning rules or ordinances might hinder the development of mixed-use projects.

This student image depicts a corridor with a mix of building types, including housing and a cafe.

Implementation Considerations

Working with a jurisdiction's planning staff, neighborhood associations, advocacy groups, residents, and developers can engender a cohesive and coordinated vision for mixed-use corridors and neighborhoods. Community involvement is particularly important in low-income and disadvantaged communities, as they might be vulnerable to gentrification. Redevelopment can result in a broader mix of uses, which in turn can attract new residents with higher incomes and increase property values. This can make the area unaffordable for longtime residents with fixed or lower incomes. Additionally, new uses may change a neighborhood's character and weaken its sense of community, making longtime residents feel unwelcome. Community engagement is critical to ensure that mixed-use initiatives provide value and benefits to all residents. H

GENTRIFICATION AND HEALTH

Gentrification entails modifying a neighborhood in a way that often results in an influx of new residents, an increase in property values, and the displacement of low-income residents. The term is rooted in the British word "gentry," which refers to a class of people in good financial and social standing. Gentrification has become a pressing issue in American cities and beyond. For people who are displaced, the impacts can be very harmful. A loss of social connections and belongingness are among the consequences, in addition to the stress of finding new, affordable housing. Studies show that displacement's health impacts—whether physical, emotional, or social—can carry over from one generation to the next.[12]

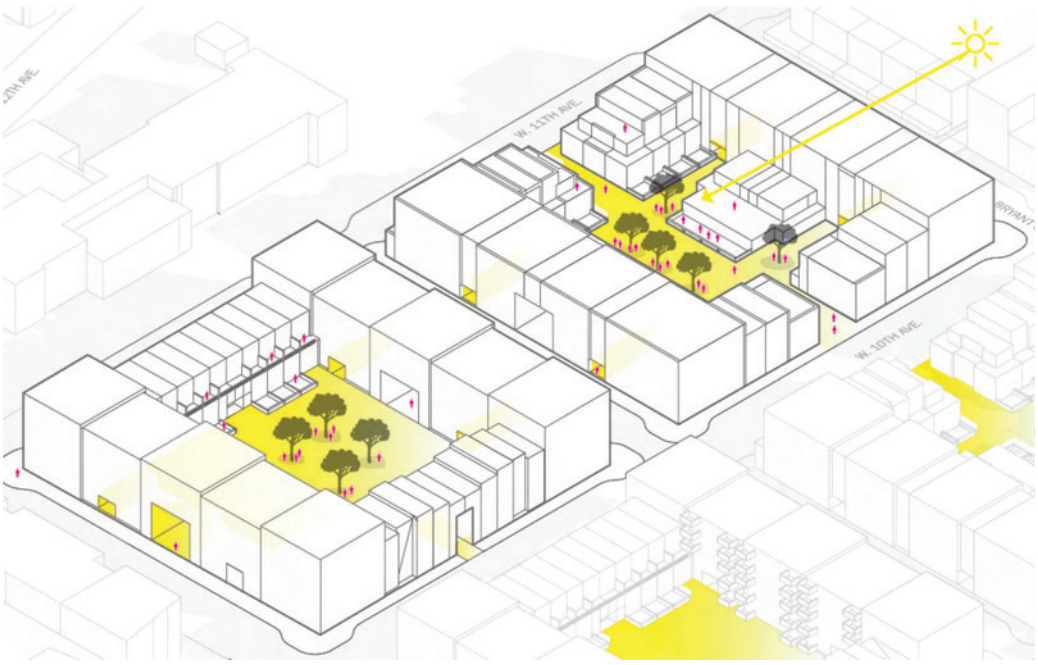
5.2 BUILDING DESIGN

Snapshot

The ways in which buildings are designed contribute to health and personal well-being. Stairs, gathering areas, and diverse building forms are among the devices used to promote physical activity.

Detailed Description

With people spending upward of 90 percent of their days indoors[13], it is important that designers consider how architecture can impact health and well-being. The design of buildings can promote healthier living, such as sparking an increase in physical movement. As public health leader Dr. Richard Jackson has stated: "Just as we design resilience into our buildings, we must design health into our buildings".[14] There are numerous design strategies that can be deployed to foster good health, particularly in regards to increasing physical activity.



This design by CU Denver students shows diverse building forms wrapping central courtyards.

Health + Design Considerations

From the very start of a project, architects and designers should consider health implications. There are many ways to encourage movement both inside and around a building. The placement of stairs can play a critical role. Stairs should be clearly visible and preferably located toward the entrance of the building.[15] Sizing is also important: Wider stairs have a larger presence, which can encourage people to use them rather than taking the elevator.

Beyond stairs, there are other basic strategies. Plazas, courtyards, and other gathering areas can encourage users to get up and take breaks. Signage with caloric information can encourage physical activity. Stand-up desks and onsite fitness centers can also be beneficial. Additionally, adequate lighting should be provided throughout the building, as natural lights can boost moods while uneven light can cause fatigue and discomfort.[16]

In a larger sense, architects can create "diverse building forms," which refer to

CASE STUDY
MARIPOSA REDEVELOPMENT; DENVER, COLORADO

Just south of Denver's Central Business District, and immediately west of the culturally rich Santa Fe Arts District, the Mariposa District provides an example of using community-driven design to promote health. The project involved reconstruction of an aging public housing complex, with new buildings and amenities that promote physical activity. Spaces were designed so that stairways are easier to reach than elevators, enticing residents to use the stairs. One building features an "active staircase," which has railings with built-in buttons that activate sounds and lights. The sensory and auditory elements help tell a Mayan folktale called "Chocolate Tree."[17]

ACTIVE BUILDING FRONTS

The term "active building front" refers to building facades that engage the streetscape and contribute to an area's liveliness. Various devices can be used to create active frontages, including modulations in scale, transparency, and spaces for gathering.[18] Active building fronts contribute to "active streetscapes," which are safe, comfortable, and vibrant areas that encourage walking and other forms of physical activity. Features that can help activate a street include outdoor furniture, ground-level retail, large windows, and occupied buildings.[19]

Greenery can add visual interest and improve indoor air quality, as demonstrated in this rendering by CU Denver students.

buildings that vary in height, footprint, and type. A mixture of buildings can make an area feel interesting and intriguing; this in turn can attract pedestrians, stimulate social interactions, and boost economy activity. The buildings should complement each other, transition from the surrounding network, and speak to the area's unique identity.[20]

Implementation Considerations

Not every client will immediately understand the benefits of healthy design features. Architects and designers need to fully understand the positive effects in order to educate clients, building users, and other stakeholders. It is important to garner support and commitments to ensure that healthy design features are implemented and promoted.[21] H

5.3 SUSTAINABLE DESIGN

Snapshot

Design and construction methods can have a significant impact on the environment and human health. Reducing energy usage, conserving water, and recycling materials are among the many strategies that can be used to foster sustainability.

Detailed Description

Where we build, how we build, and the materials used can all have impacts on health and well-being. To ensure the sustainability of buildings and the health of people and the environment, there are various strategies that should be considered and implemented. Does a building have access to generous amount of sunlight and fresh air? Have non-hazardous materials been utilized? Are energy and water conservation measures in place? These are just a few of the myriad questions that architects and designers should ask themselves while designing a sustainable building.

Health + Design Considerations

Sustainable design entails a wide spectrum of factors. Below is a breakdown of specific strategies as outlined by the National Institute of Building Sciences.[22]

Optimizing site potential: The site selection for a building will affect not only environmental and health concerns, but also security, accessibility, energy consumption, impacts on the local ecosystem, and building lifecycle. By addressing features of a site early on, sustainability issues can be addressed throughout the process—including solar access, water and erosion control, heat island effects, and walkability. In addition, when dealing with a degraded site, the project needs to address contamination removal, low-impact development approaches, and safety and security issues.

Minimizing energy use: A third of America's overall energy consumption each year is related to buildings. While buildings primarily rely on non-renewable, fossil fuels, they have the most potential for energy efficiency. Climate-sensitive and energy-conservative design and practices can help reduce heating, cooling, and lighting loads. Measures can include using renewable and/or high-efficiency energy sources; optimizing building performance and system-control strategies; and minimizing exposure to electromagnetic fields.

Conserving water: Buildings can decrease their need and consumption; moreover, water can be collected

CASE STUDY
TYSON LIVING LEARNING CENTER; EUREKA, MISSOURI

The Tyson Living Learning Center is part of a field station operated by Washington University in St. Louis. Completed in 2009, the building was one of the first structures in the world to meet the Living Building Challenge requirements.[23] The Living Building Challenge is an international building certification program that was developed by the Cascadia Region Green Building Council. Certification is based on a building's actual performance and encompasses the following areas: site, water, energy, materials, equity, health and happiness, and aesthetics.

Constructed on the site of a degraded parking lot, the Tyson Center is sustainable from top to bottom. Among its features are high-efficiency glass, shading devices, high performing insulation, demand-control ventilation, and porous pavement. A 23-kilowatt photovoltaic system generates power for the facility, and water is provided by a rainwater harvesting system that is chemical-free.[24] An exemplar of sustainable design, the building serves as a valuable teaching tool.

This student image highlights the benefits of incorporating natural light and social areas into a building's design.

and reused on-site. Recycling water has added benefits beyond water conservation; reusing water on-site reduces the energy used to procure, treat, transport, and store potable water.

Using environmentally preferable products: A major factor in a building's environmental impact is the lifecycle of the materials used in construction. Designers can utilize materials and processes that are sensitive to the waste stream, to our finite natural resources, and to health concerns. To reduce the need for virgin materials, use existing facilities, equipment, and products. Additionally, optimizing building size and space can help reduce material use. The environmental impact of materials can be evaluated using a life-cycle perspective and by referring to the Environment Protection Agency's Environmentally Preferable Purchasing Program.

Enhancing indoor environmental quality: Occupant health can be most affected by indoor environmental quality. Facilitate healthy indoor air quality through good design and responsible construction and operation practices. Indoor air quality can also be made safer through the use of materials that do not emit allergens and pollutants. In addition, take into account adequate daylighting, ventilation, moisture control, acoustical performance, and high volatile organic compounds (VOC) emissions.

Optimizing operations and maintenance practices: As a part of holistic design, the sustainability of the building must continue throughout its operation and maintenance. Focus should be given to the occupants' use of the building, which includes health, safety, comfort, and productivity. The future reuse and recycling of the building and its components should also be considered. Monitor and uphold energy efficiency through systems maintenance, and upgrade to higher efficiency equipment when possible.

Design for changes over time: Flexible design allows for future adaptations to extend the life of a building. Designers should also plan for the disassembly and reuse of building components.

Implementation Considerations

Education is key to promoting and creating sustainable buildings. There are numerous resources available, including reports and guidelines provided by the U.S. Green Building Council[25] and the American Institute of Architects.[26] Post-occupancy evaluation is important to measure the effectiveness of sustainability strategies. These evaluations examine factors such as water and energy usage, air quality, thermal comfort, and occupant behavior, among many other elements. They might include interviews and ethnographic observations.[27]

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6

Public Space and Streetscapes

CHAPTER 6

Public Space and Streetscapes

Overview

The design of the public realm influences a person's health and well-being. Humans are social creatures who require places in which they can gather, exchange, and feel a sense of belonging. Additionally, moving from place to place should feel comfortable and safe. When possible, walking should be enabled and encouraged. Stepping out of the car and becoming a pedestrian can foster many benefits, including a sense of environmental stewardship, a stronger connection to the community, and improved physical health. In this chapter, a broad range of spaces are considered, including parks, plazas, and sidewalks. The overarching message is that open areas and streetscapes are critical elements in a built environment, particularly when it comes to human health. The following practices are addressed: (1) Open Space, (2) Pedestrian-Oriented Streets, and (3) Safe Sidewalks.

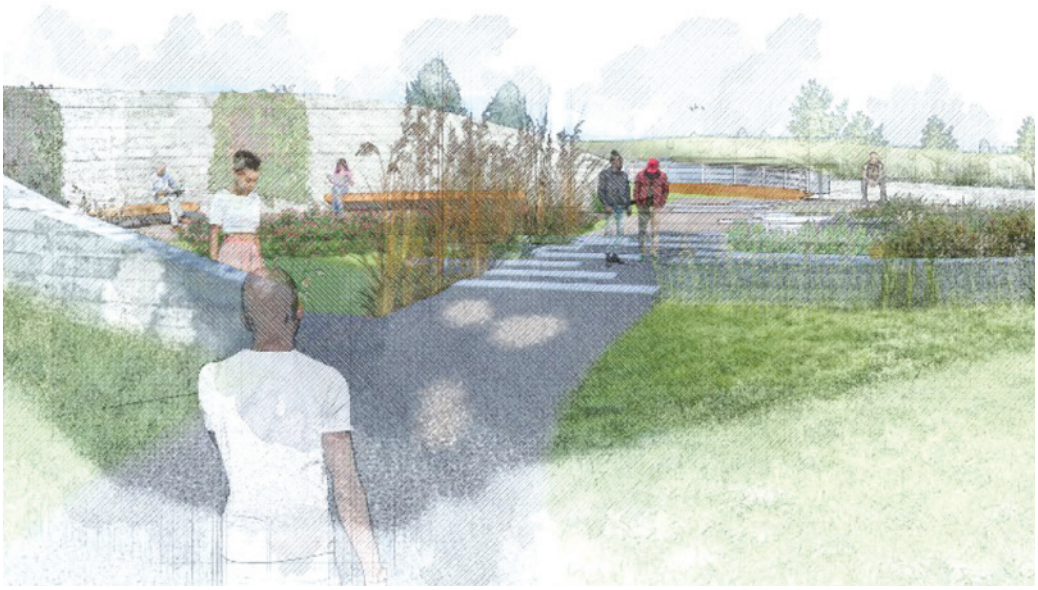
6.1 OPEN SPACE

Snapshot

Parks, greenways, plazas, and other open areas can result in major health benefits. These spaces offer residents the opportunity to socialize, play, and relax, while also helping maintain the health of natural systems and serving as a community's "green lungs."

Detailed Description

Open spaces are known to promote healthier lifestyles within a community. They provide opportunities for social interaction, physical activity, interactions with nature, and respite from everyday stress.[1] They also help reduce pollution and the urban heat island effect,



Open space rendering by CU Denver student.

and they provide habitat for wildlife. Moreover, integrating open space into the fabric of towns and cities elevates the economic attractiveness of a place. Access to open space should be a leading concern for planners, architects, and designers.

Health + Design Considerations

From large natural areas to small urban oases, the presence of open space has profound effects on both physical and mental health. Natural spaces can also heighten an area's aesthetic appeal and help mitigate environmental issues.[2] For instance, open spaces can serve as a buffer zone in the event of flash flooding, providing safety benefits.[3] Whether designing a whole community or a single site, access to open space should be factored into planning and development. The following are several strategies and

THIRD PLACES

Expanding upon the notion of home and work being the "first" and "second" types of social environments, third places are public spaces—such as parks and plazas—that act as "neutral ground where people can gather and interact."[7] Proximity to third places is associated with increased levels of physical activity and a healthier weight status among young people and adults, according to recent research.[8] Well-designed parks and plazas can increase social activity and provide a mix of uses to the community, all of which contribute to healthier living. When designing or enhancing third places, it is important to keep versatility in mind. Provide a variety of spaces, including shaded zones and seating areas to increase user comfort.

CASE STUDY

CITY OF GARDENS ORDINANCE; PASADENA, CALIFORNIA

Courtyards are small interior spaces within a building or development. These intimate spaces can offer cross-seasonal comfort and perceived physical safety, which in turn contributes to physical and mental wellness. Due to their small scale, they can aid in the equitable distribution of outdoor environments within a community.[4] Pasadena, a city in Southern California, has taken notable measures to ensure that courtyards are distributed throughout the city. Its City of Gardens Ordinance, adopted in 1989[5], requires the inclusion of courtyards in developments with more than four units—ensuring that multifamily developers provide open space for residents.[6]

considerations provided by the Municipal Research and Services Center[9]:

Accessibility: Provide regular and dependable access. Be mindful of user access at different times of the day and the varying mobility needs among visitors. Ensure that open spaces are safe and user-friendly.

Green space: New developments should include generous green spaces, such as parks and greenways. Incorporate trees and landscaping elements that provide shade.

Siting: Locate new buildings near existing open spaces to allow for active living and a connection to nature. Ideally, residences should be within a 10-minute walk to a park.[10]

Variety of uses: Flexible and adaptable designs can enable a range of activities for people of all ages.

Consider offering spaces that vary in size, type, and use. Features can include running paths, playgrounds, sports courts, and seating areas for eating and relaxing.

Implementation Considerations

Community engagement is key to ensuring that parks, public plazas, and other third places benefit local residents. Consider forming a steering committee that represents residents, community advocates and leaders, neighborhood and business associations, and relevant local government agencies. Provide the community with an opportunity to help with visioning, design, and implementation; this can reduce costs in the long run and help residents feel as though the park is truly theirs. Once fully developed, the space can be used to bring people together and to educate them on topics such as urban agriculture and health-related programs.[11] H

Parks and greenways can play a vital role in cities, as shown in this student image.

6.2 PEDESTRIAN-ORIENTED STREETS

Snapshot

The design of streetscapes plays a direct role in an area's walkability. There are numerous features that can be incorporated to provide a pleasant and safe pedestrian experience, which in turn can increase physical activity within a community.

Detailed Description

When considering the street grid, it is important to remember that every trip, no matter how big or small, starts and ends on foot for most residents. Ideally, people are provided the opportunity to walk to work, to school, to stores, and to other destinations. The walkability of an area depends on factors such as safety, attractiveness, and approachability. Streetscape design should take into account a range of users: motorists, pedestrians, bicyclists, and individuals using mobility aids such as wheelchairs. There is a wide range of design elements used to entice and support pedestrians, including buffer zones, landscaping, signage, lighting, bathrooms, and drinking fountains. Bolstering an area's walkability can produce many benefits, including improved public health.

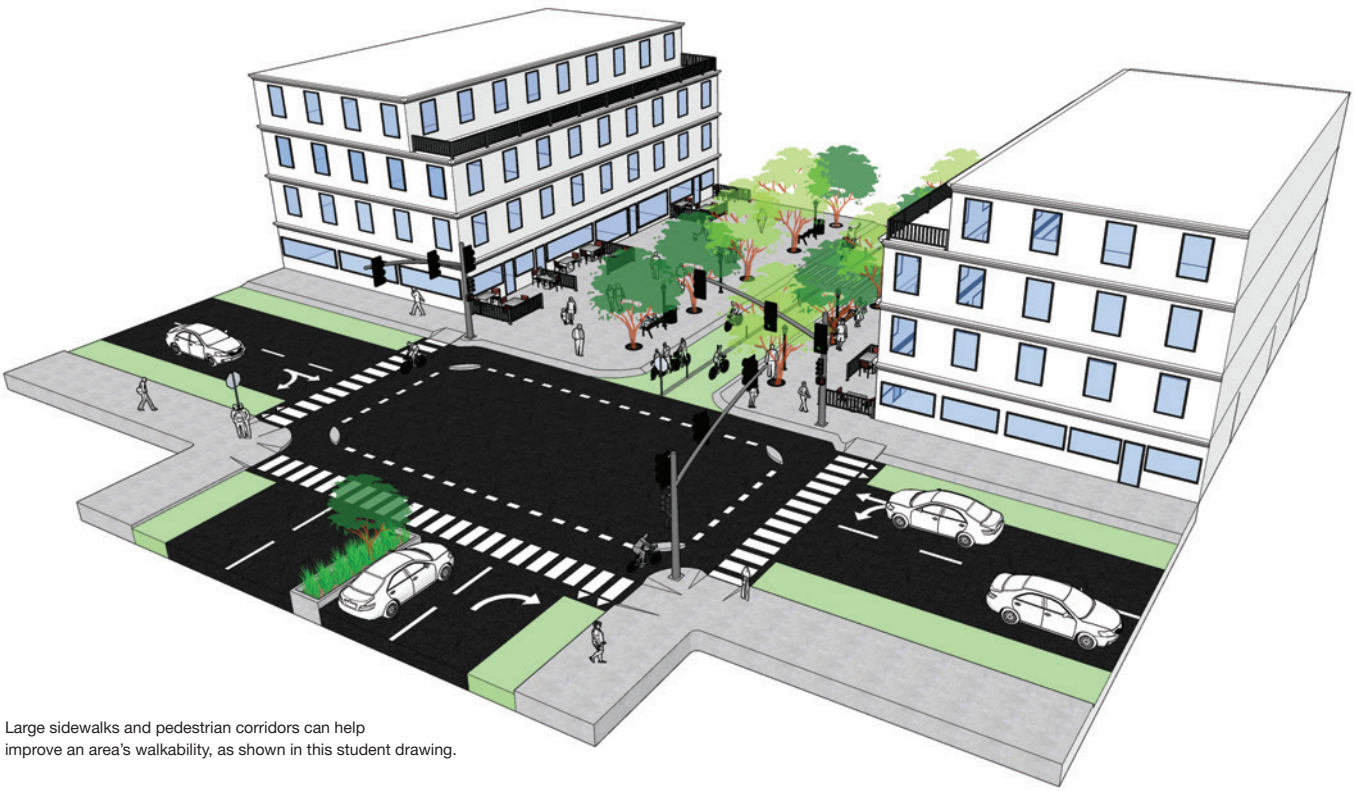
Health + Design Considerations

It is important to provide a walking environment that is comfortable and safe, and one that enables quick and efficient trips. To create a pedestrian-oriented streetscape, consider the following:

Amenities: Seating, drinking fountains, and restrooms can enhance an area's walkability, which in turn can promote physical activity among residents. In New York City, focus group participants said benches and restrooms would support longer and more frequent walks.[12]

CENTERS AND CONNECTIVITY

Safe and convenient connections between buildings, transit centers, parks, and other components are critical to the success of an urban center. Pedestrian pathways play an important role in this network of connections, as do bicycle routes and areas for bike parking and storage. The ability for pedestrian and cyclists to easily connect to adjacent districts and neighborhoods is also important, particularly when encouraging alternatives to driving.



Large sidewalks and pedestrian corridors can help improve an area's walkability, as shown in this student drawing.

Accessible to all: Walkways should be welcoming for all people, regardless of their physical ability. Paths should be smooth and adequately wide, and they should have curb cuts and turning radii that are sufficient for wheelchairs and walking aids. Moreover, paths should have clear signage, auditory crossing signals, adequate crossing times, and visible access ramps.[13]

Street level: While once popular, pedestrian overpasses and underpasses are now seen as inadequate due to safety and accessibility challenges. When possible, pedestrian pathways should be placed at street level.[14]

Safety buffer: A buffer between moving vehicles and pedestrians has been associated with increased rates of walking. To develop a buffer, consider using street furniture, trees, planters, and other elements. Separating pedestrians from vehicles improves safety conditions for everyone.[15] Moreover, sidewalks and pedestrian facilities should be separated from non-motorized forms of travel, such as bicycles.

Pedestrian crossings: A full median, refuge islands, and clear markings in the center of wide streets are among the techniques used to create safe pedestrian crossings. Moreover, intersections should have curb cuts and signals with pedestrian countdowns. Signals should always provide adequate time for pedestrians to safely cross the street, including those with mobility needs.[16]

Lighting: Research has linked street lighting to increased walking. Street lights should be consistent in height and evenly spaced, and they should provide sufficient light coverage for pedestrians.[17]

ACCESS FOR ALL

When creating a pedestrian-oriented streetscape, accessibility principles should be incorporated to ensure that spaces are welcoming to people of all ages and physical abilities. There are several factors that have been shown to increase activity among people with disabilities. These include targeted signage, the quality of the path, and the accessibility of destinations and transportation options along the route.[18]

This student image illustrates how lighting and landscaping can act as a buffer between car lanes and a park.

Trees and landscaping: Trees provide a number of benefits, including shade and visual appeal. The presence of trees has been associated with higher rates of walking to school among children. Well-landscaped streets and walkways can also demonstrate and promote environmental stewardship.[19]

Views: In many instances, pathways and sidewalks can be oriented toward interesting views. Studies suggest that attractive, open views encourage walking.[20]

Wayfinding: Without adequate signage, pedestrian and bicycle pathways can go unnoticed and underutilized. Marking pathways with signs can be an effective tool for increasing usage. Signage can also provide distances and times to points of interest.[21]

Buildings: Ground-level windows, active lobbies, and other building elements can promote walkability. Design guidelines for both new and existing buildings can play an important role in creating pedestrian-oriented streetscapes.

Community-oriented activity: Cultivating and encouraging community activities along streets can promote physical activity and enliven the public realm.[22]

Porous blocks: These provide a variety of ways to access and move through an urban block. Different types of buildings and different uses, along with multiple pathways, can facilitate porous blocks.[23]

Implementation Considerations

Planners, designers, and engineers should ensure that walking is a safe and convenient option for residents as they travel through their community. At the start of the planning and design process, there should be a full analysis of walking at different times during the day and in different weather conditions. The analysis should also consider different levels of physical ability. Community engagement is important as well. Residents can share their needs and illuminate issues that might otherwise be concealed. Community involvement helps ensure the long-term success of streetscape improvement projects. H

COMPLETE STREETS, LIVING STREETS, GREEN STREETS

"Complete streets" accommodate all forms of mobility, from vehicle movement to walking and bicycling. "Living streets" are geared toward attracting pedestrians, enhancing accessibility, and encouraging sidewalk uses; the ultimate aim is to promote social interactions, enjoyment, and comfort. "Green streets" use state-of-the-art practices for managing stormwater and mitigating the heat island effect. This suite of street types can engender many benefits, including economic gains and increased walkability.[26]

CASE STUDY

STREETSCAPE IMPROVEMENTS; WALLA WALLA, WASHINGTON, AND PORTLAND, OREGON

The Downtown Walla Walla Foundation, established in 1984, has helped revitalize the city's urban district in numerous ways. It has played a key role in renovating buildings, adding public art, improving the streetscape, and hosting events such as festivals and concerts. The Foundation works with many local agencies and groups to help strengthen the downtown area, particularly in regards to walkability.[24]

Similarly, the City of Portland has worked to bolster the streetscape design in urban zones. One significant project was the revitalization of a six-block area in the Old Town/Chinatown district. Improvements included new plazas, paving, trees, street furniture, and lighting. Sidewalks were widened and crosswalks were improved; plus, streets can now be blocked off from cars during special events.[25]

Both initiatives demonstrate how pedestrian-oriented improvements can translate into safer and more vibrant environments that promote socializing and physical activity.

6.3 SAFE SIDEWALKS

Snapshot

Sidewalks play a key role in fostering an active, healthy community. There are many issues to consider, with safety, maneuverability, and connectivity being top concerns.

Detailed Description

Sidewalks are essential to a pedestrian-friendly streetscape; however, not all sidewalks are meant to be identical. Context matters. Designs will vary based on the neighborhood, street type, and local guidelines. That said, public sidewalks must comply with the Americans with Disabilities Act (ADA), which outlines specific guidelines related to surfaces, slope, width, and other characteristics.[27] Designers should carefully study the ADA guidelines to ensure sidewalks are in compliance.

Health + Design Considerations

Numerous factors come into play when designing sidewalks. Ped Safe, a division of the U.S. Department of Transportation Federal Highway Administration, has developed a set of resources, recommendations, and guidelines for sidewalks and walkways. This information, which is available online, can assist in the planning, design, and implementation of sidewalks.[28] Below are just a few topics that should be considered when designing sidewalks:

Width: Sidewalks should be wide enough to accommodate multiple people moving in opposite directions. Sidewalks, along with curbs, should be wide enough for strollers, wheelchairs, and other mobility aids. A sidewalk width that accommodates at least 12 people per minute per yard is desirable. Sidewalks should be even wider if they are intended to support stationary activities, such as waiting for a bus.[29]

Public transit routes: Ensuring that walking routes to public transit are safe, easy, and clearly identified is key to maintaining ridership and encouraging healthier lifestyles. Elements of "safe routes" include adequate lighting and wide sidewalks. Within transit planning, there are programs commonly referred to as "first-and-last-mile connections," which aim to complete gaps that may exist along routes to rail and bus stops.[30]

School routes: Ensuring that children have safe passage to school is an important consideration when creating sidewalks. To help designers, the Pedestrian and Bicycle Information Center has developed the

RAMBLAS

Spanish *ramblas* are centralized, pedestrian-only promenades that are often filled with street activity and public interaction. Ramblas are lined with sidewalks and building entrances, and they intersect with parallel paths. They provide a safe environment for pedestrians and contribute to a more walkable and accessible community.[32]

CASE STUDY
LA RAMBLA; BARCELONA, SPAIN

While American communities often prioritize the automobile when designing streets, the city of Barcelona has become the gold standard for putting pedestrians first. The city offers diverse street types to serve automobiles, bicycles, and pedestrians—with pedestrians always being a priority. One prime example is La Rambla, a tree-lined, 0.8-mile-long street that connects two major centers. Nearly 100 feet wide, the bustling street hosts many kiosks and vendors. The promenade is lined on both sides with a single lane for cars, but due to the promenade's throng of people, traffic moves slowly, and visitors feel comfortable crossing over to the storefronts.[31]

Student rendering of a safe sidewalk, with ample space for a range of people.

Safe Routes to School Online Guide.[33] It includes advice on placement, width, surface types, buffers, landscaping, street lighting, curb ramps, warning strips, driveway design, and corridor access management.[34]

Implementation Considerations

In the case of new developments, planners, designers, and governmental staff should collaborate to ensure a walkable and safe pedestrian environment. In many jurisdictions, property owners are responsible for maintaining sidewalks in front of their properties. A lack of enforcement and the potentially high costs of maintenance can result in poorly maintained sidewalks throughout a community. Implementing a program to assist property owners with maintenance could help improve the quality of sidewalks. H

CASE STUDY
FIRST STREET; GRAND JUNCTION, COLORADO

In Grand Junction, residents became concerned about the safety of pedestrians and cyclists after urban growth turned First Street—a quiet, two-lane road—into a busy thoroughfare. As a solution, the city proposed a two-way, left-turn lane, but residents were strongly against road-widening proposals. The city devised a new plan based on community engagement that included public meetings and newsletters.

Several traffic-calming features were incorporated into the revised plan. These included raised medians to provide safer pedestrian crossings; five-foot curbs and sidewalks with level cross-grade at driveways; three speed tables functioning as crosswalks; and five-foot gutters that double as bike lanes. In the end, the project accommodated increased traffic volume while also reducing vehicle speeds and bolstering the use of First Street by pedestrians and cyclists.[35]

NOTES

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7

Connectivity and Accessibility

CHAPTER 7

Connectivity and Accessibility

Overview

Connectivity and accessibility impact the economic, physical, and mental well-being of all people. The ability to easily and safely access jobs, schools, services, shops, and recreational areas is important to maintaining good health. In the United States, historical land-use patterns have produced auto-oriented communities that create connectivity and accessibility barriers, particularly for people who are unable to drive. Planners, designers, and others involved in shaping the built environment need to consider the many dimensions of our transportation network. A comprehensive approach offers "mobility for all," which in turn can have positive outcomes for public health. This section includes five practices: (1) Street Connectivity, (2) Transportation Demand Management, (3) Access to Transit, (4) Access to Parks, and (5) Bicycle Infrastructure.

7.1 STREET CONNECTIVITY

Snapshot

Street connectivity refers to a grid-based street network that provides multiple routes and connections to destinations.[1] Well-designed street networks include a mixture of street types and a dense pattern of streets with short blocks and frequent intersections.[2] The development of a connected street network is essential for encouraging multiple modes of transportation and promoting mobility for all.[3]

This student drawing shows how green alleys can help with connectivity.

Detailed Description

Well-connected streets form an effective framework for building a community or enhancing an existing one. A network that is well-connected reduces land consumption and increases accessibility and travel efficiency. Street network connectivity is associated with higher pedestrian and bicyclist counts. Additionally, street connectivity distributes traffic across the entire street network. When all streets are well-connected, local streets can be used for local trips, which reduces congestion on collector and arterial streets.[4]

The connectivity of a street network can be evaluated by examining the number of connections and the directness of routes provided. A general rule is that well-connected street networks offer short block lengths, frequent intersections, and minimal dead-end streets.[5] Additionally, researchers may use variables such as intersection density or link-to-node ratio to quantify street network connectivity. Intersection density evaluates the compactness of a network, and the link-to-node ratio relates to connectivity. According to the Congress for the New Urbanism, the two measurements can be calculated using the equations outlined below. Generally, a street network is considered well-connected if it scores at least 1.4, and a perfect grid has a ratio of 2.5.[6]

Intersection Density = Total number of intersections including dead ends / Area in square miles

Link-to-Node Ratio = Total number of road segments between intersections / Total number of intersections including dead ends

Health + Design Considerations

A well-connected street network promotes healthy mobility options in several ways. Street connectivity supports walking, bicycling, and the use of transit, and it may reduce drive-alone trips.[7] Research suggests that people who live in communities with compact street networks are four times more likely to use active transportation, and three times less likely to be in a fatal car crash.[8] A reduction in overall vehicle miles travelled may improve

CASE STUDY
KING COUNTY HEALTHSCAPE; KING COUNTY, WASHINGTON

HealthScape is an initiative in King County, Washington, to promote health and wellness by addressing the way communities are built. The initiative began in 2001 when the County began studying the relationship between land use, transportation, air quality, and health. The study's findings indicate that changes in land use development patterns and transportation investments can achieve multiple benefits, including smart growth, more efficient land use, transit efficiency, and improved air quality and public health.[9] As a result, the County launched the HealthScape program, which includes two planning tools that address health and wellness.

The Transportation Programming Tool[10] allows the County's staff to predict health benefits of proposed non-motorized transportation projects. The key element is a benefits calculator that quantifies anticipated health benefits, including increased transit access, improved air quality, and decreased traffic incidents. The Development Impact Assessment Tool is used to evaluate proposed land-use changes. The key function is to provide a comparison between baseline conditions and those of proposed scenarios. For example, the tool can examine how a project may impact greenhouse gas emissions over time.

CONTEXT SENSITIVE DESIGN

Context Sensitive Design, or CSD, is a process used to tailor roadways to fit the surrounding natural setting or built environment. This process promotes mobility for all by stipulating that projects look beyond engineering guidelines and vehicle throughput. Rather, roadways should reflect the community setting and address social and economic factors, aesthetics, historic and scenic resources, and environmental constraints. The U.S. Federal Highway Administration, which has played a key role in advancing CSD, notes that community engagement is an important aspect of the process. As the Administration describes, CSD entails "a collaborative, interdisciplinary approach in which citizens are part of the design team."[11]

air quality and limit environmental pollution. Additionally, street connectivity in a town or city provides more equitable access to essential services and amenities by promoting mobility for all.[12]

Local policies, statutes, and design standards play a key role in improving street network connectivity. The following is a list of considerations from Transportation Efficient Communities[13] that can help decision-makers implement and promote network connectivity.

Street design: A well-connected street network includes variation in street types and designs. Local, collector, and arterial streets work in tandem to shape the character of a community and increase accessibility for all road users. For example, some streets can be designed to accommodate all modes of travel while others prioritize pedestrians or bicyclists over motorized vehicles.

Complete Streets policy: Complete Streets policies establish a framework for developing a well-connected street network and facilitating multimodal transportation systems. Complete Streets policies vary based on context, but the general purpose is to design and operate streets in a manner that ensures people of all ages, abilities, and modes may travel safely.[14] The establishment of a Complete Streets policy demonstrates a community's commitment to promoting mobility for all.

Mapping connections: Mapping a plan for future local streets may ensure that new developments create connected street networks. This process identifies the most important local streets and non-motorized path connections.

Revisions to codes or statutes: Local development codes for residential and mixed-use areas can advance grid-based standards. An example of a revision that supports street connectivity may be allowing the use of public easements to develop active transportation networks. Design standards that promote street connectivity should also limit or prevent the use of dead-end and cul-de-sac streets.

Connectivity measurement tools: Establish metrics for evaluation, implementation, and performance.

This student rendering shows a repurposed alley that separates cyclists and pedestrians, creating a comfortable space for all.

The primary connectivity index is the measurement of intersection density because it measures variation in mode-share and traffic safety.

Implementation Considerations

When it comes to establishing street connectivity, there are a number of potential obstacles. These include design standards that are geared toward automobiles, land-use restrictions, outdated codes and ordinances, and existing development patterns that are non-complementary. Natural features such as rivers and streams can also impede connectivity. Moreover, limited funding and negative perceptions among stakeholders can hinder efforts to improve connectivity. It is important to identify potential barriers early on and develop solutions. More information about potential barriers is available on the Transportation Efficient Communities website.[15]

Alleys can play a vital role in improving connectivity, as shown in the student drawings above.

REPURPOSING ALLEYWAYS

Repurposing alleyways to accommodate bicycle and pedestrian traffic can be a low-cost way to improve street connectivity and promote health. This tactic is especially useful in areas where public right of way is limited or surrounding streets are heavily trafficked arterials. Alleys can help connect broken pedestrian and bicycle networks, which increases safety and encourages more physical mobility. Alleys can be redesigned as a public gathering space through the inclusion of design features like benches, trash cans, lighting, planters, and shade trees. An alley redesign project also offers an opportunity to incorporate green infrastructure into urban areas, which increases permeable surfaces and encourages natural groundwater recharge.[16]

7.2 TRANSPORTATION DEMAND MANAGEMENT

Snapshot

Transportation demand management, or TDM, is a planning approach that aims to increase the efficiency of transportation systems. Tactics include promoting sustainable modes of travel and discouraging drive-alone car trips. These strategies can help mitigate transportation-related health problems.

Detailed Description

There are many planning and health challenges related to automobile use in urban environments. Automobile-oriented development leads to suburban sprawl, which is linked to increased infrastructure costs, fuel use, and traffic congestion. Vehicle emissions are a major source of air pollutants that are linked to human health concerns such as respiratory illnesses, cancer, and heart disease.[17] Vehicular crashes result in thousands of deaths and injuries annually[18] and cost individuals and states billions of dollars.[19] Even small decreases in automobile use can pay big dividends in terms of reduced pollution and crashes, increased health benefits, and improved quality of life.[20]

The aim of TDM strategies is to increase transportation system efficiency, with a focus on mitigating issues related to automobile travel. There are numerous methods for achieving this goal, such as eliminating or shortening driving trips, shifting travel modes, and decreasing traffic congestion. Comprehensive programs help educate people about alternative modes of travel, including carpooling and vanpooling, bicycling, walking, and taking public transit. Many programs employ participation incentives like discounted transit passes, while some enact driving disincentives, such as congestion pricing and highway tolls. TDM can also include employer-based programs that help reduce travel during peak commute times. Employers can offer alternative work schedules, which shift trips to non-peak commuting hours, and telework options that eliminate some work-related trips entirely.[21]

PARKING BUY-OUT PROGRAMS

Parking buy-out programs are common strategies in mixed-use developments to encourage sustainable travel modes. One approach is giving tenants a monthly stipend in exchange for foregoing a parking permit. The stipend can be used for transportation-specific needs or general expenses. Another approach is providing tenants with a monthly public-transit pass. This option is most effective in communities where a high number of people are transit-dependent.

To fund these two options, building owners can use revenue collected from visitor parking fees and commercial leases. Additionally, many transit agencies offer reduced rates when transit passes are purchased in bulk. Parking buy-out programs have financial benefits, as they enable developers to save money on building parking lots and garages.[22]

Health + Design Considerations

TDM strategies and policies seek to create a more efficient transportation network. While programs must be tailored to the conditions in each community, below are several strategies that planners and decision-makers can take into account.[23]

Establish a regional approach: While jurisdictions may develop individual strategies, TDM is most successful when there is a regional approach that addresses the entire mobility system. Programs typically are multi-pronged and include education, incentives, regulation, and enforcement.

Implement driving disincentives: An increasingly common strategy is to enact driving disincentives. A few examples include road-user fees or congestion tolling. In a similar vein, the installation of high-occupancy vehicle lanes may encourage people to carpool instead of driving alone.

Consider public-private partnerships: Several strategies, such as congestion tolling, require the installation of expensive information technology systems. Establishing public-private partnerships can support large-scale demand management approaches.

Establish mode-split goals: Establishing mode-split goals is an effective tool for decreasing drive-alone trips; it also can provide direction for investments in sustainable modes of travel. While mode-split goals can be established regionwide or citywide, a practical approach is setting goals for designated centers or districts.

Create a parking management system: A parking management program is a systematic and integrated approach to addressing the parking of vehicles in a neighborhood, district, or entire city. Parking management programs typically result in more efficient and cost-effective parking. These programs can reduce the need for oversized surface parking lots, which frequently provide barriers for walking and access.

Implementation Considerations

There are various questions planners should ask when developing TDM-related projects. Those questions might include: What are the specific goals? Is there an adequate policy foundation to support the efforts? Which geographic locations are best-suited for certain programs? What types of regulations are needed to ensure successful implementation?[24] A clear measurement strategy is also important. There are various ways to evaluate the effectiveness of interventions, including distributing surveys and requiring participating agencies and organizations to record the impacts. Moreover, annual reports are helpful in documenting the implementation and success of TDM programs and determining next steps.[25]

CASE STUDY
ARLINGTON COUNTY COMMUTER SERVICES; ARLINGTON COUNTY, VIRGINIA

Arlington County Commuter Services is a multifaceted initiative that aims to enhance Arlington's economic vitality by reducing congestion and drive-alone car trips. Aims of the initiative including reducing commuting hours, decreasing parking demand, and promoting transit and ridesharing by maximizing the use of high-occupancy vehicle infrastructure. The initiative also works to improve mobility for those who cannot drive or do not own automobiles. Alternative transportation is promoted through a number of programs including WalkArlington, Bike Arlington, Arlington Transportation Partners, The Commuter Store, and Mobility Lab.[26]

7.3 ACCESS TO TRANSIT

Snapshot

Public transportation is essential for increasing accessibility and mobility for all people, regardless of age or ability. Creating transit networks that are affordable, reliable, and easy to use is central to increasing ridership, which in turn benefits the environment and public health.

Detailed Description

While public transportation provides a healthier and safer alternative to driving alone, transit remains underutilized in many American cities and regions. Shifting public perception, while difficult, is critical. In order for individuals to use transit, they should have a positive opinion of transit and should feel it is more reliable, sustainable, and efficient than driving alone. One method for improving perceptions is making it easier to access and use public transportation.

Equitable transit access offers equal mobility opportunity to all users, regardless of age, income, race, or ability.[27] A key element of equitable transit access is ensuring that people can get to and from public transportation stops and centers using multiple modes of travel, including walking, bicycling, shared mobility services, and driving.[28] Generally, transit riders will walk between a quarter and a half mile—or five to ten minutes—to and from stops and stations. Riders may rely on local sidewalks, street crossings, and bicycle facilities to access these departure points. This means that providing transit access is the responsibility of both transit agencies and local municipalities.[29]

Health + Design Considerations

Research indicates that increased public transportation is beneficial to health, society, and the environment. On average, public transportation vehicles produce less air pollution than private cars, including a 95 percent reduction in carbon monoxide and a 45 percent reduction in carbon dioxide emissions. The fatality rate associated with public transportation is about 1/25th of that associated with automobiles.[30] Men who commute via public transit are nearly 45 percent less likely to be overweight or obese as a result of increased active commuting.[31] The act of switching commute patterns

Providing bus stops that are safe and comfortable is an important consideration, as shown in this student rendering.

from driving to public transportation may increase energy expenditures equivalent to losing one pound of fat per six weeks.[32]

There are several ways that transportation agencies and local municipalities can work together to ensure equitable transit access. Below are considerations for the design of transit facilities and surrounding communities. These recommendations are primarily sourced from New York City's Active Design Guidelines[33] and from the Pedestrian and Bicycle Information Center.[34]

Location of transit stops: Locate transit stops along well-connected streets. Stops should be placed with regularity, so that users can easily identify and walk to them. When possible, coordinate bus stops with building entrances.

Transit stop amenities: Furnish transit stops with seating and shelter to improve safety and comfort for users.

Consider pedestrian features: Ensure that sidewalk widths allow all people, including those in wheelchairs and those pushing strollers, to comfortably pass through. Features of safe crossings include crosswalks, pedestrian signals, and sufficient crossing times.

Accommodate bicycle users: There are many ways to support bicycling as means to access transit. Bike parking and storage should be available at public transportation centers and major stops. Equip buses with bicycle racks or undercarriage capacity. Coordinate with shared bike services to locate stations near transit stops and centers.

Consider specific needs of vulnerable users: There are transit users who may have specific needs, such as older adults and people with disabilities. Specific techniques to address their needs include installing comfortable seating at bus stops, increasing street crossing times, and widening sidewalks to comply with the requirements of the Americans with Disabilities Act.

Implementation Considerations

Acquiring meaningful input from the community is a vital component in any public transit initiative. Community engagement should be ongoing and authentic, and should be done in a way that "ensures accountability, continuous communication, consistency, ethics, and integrity."[35] Best practices include knowing the audience, having a clearly defined message, devising a well-planned outreach strategy, collaborating with local organizations, and ensuring that presentation material is comprehensible. Beyond public meetings, planners and decision-makers can set kiosks around the community to inform residents about plans. Polling apps can also be used to solicit public input.[36] H

CASE STUDY
PROMOTING TRANSIT; SOUTH AFRICA

At times it may seem like an impossible task to shift travel behaviors, but South Africa is an exemplary case to study. Traditionally, many South Africans relied on driving alone. However, in recent decades the country has enacted new policies and made investments to promote public transportation over private vehicle use. Infrastructural elements of this shift include implementing Bus Rapid Transit, installing commuter rail, and improving facilities for active transportation.

Regarding policy and procedures, South Africa has taken action to increase safety regulations, reorganize the national paratransit (minibus and taxi) system, and collaborate with international agencies. The impact of these measures has been positive, but, as with any change, there has been a stretching period. Moving forward, South Africa is working to resolve resistance from private paratransit operators and communities through which the new transit routes will run.[37]

7.4 ACCESS TO PARKS

Snapshot

Parks play an important role in facilitating physical activity. To encourage the use of parks, they should be located near residences and jobs. Tying parks into bike and pedestrian routes can improve their accessibility.

Detailed Description

Pedestrian access to a mixture of land uses is linked with increased physical activity levels.[38] Studies have shown that the closer people live to a park, the more likely they are to bike or walk to the park and use it for exercise. Increased access to parks can result in a 25 percent increase in adults who exercise three or more days per week.[39] Mixed-use developments and districts should incorporate parks and other types of green space to provide opportunities for healthy living and to improve residents' quality of life.[40]

Health + Design Considerations

Green space comes in different types and sizes. The term can refer to regional parks, large urban parks, and pocket parks, along with spaces in watersheds and along natural corridors. When it comes to park planning, an important first step is conducting a gap analysis. This type of study identifies a neighborhood or community's characteristics and determines the availability of parks and other types of green space. The analysis can also evaluate the presence of

Pathways, grassy areas, trees, and water are incorporated into this park design by a CU Denver student.

recreational facilities, playgrounds, and community centers. Using geospatial mapping, the analysis can visually display which areas of a community are underserved when it comes to opportunities for physical activities. The results can help determine how and where investments should be made.

Connectivity and amenities are key when it comes to the use of parks and other types of green space. Parks should be placed near residences and should offer a mix of amenities, including lawns, fountains, playgrounds, running and walking paths, game tables, and space for dogs. Parks should be embedded within pedestrian and bicycle networks to heighten accessibility and to promote active modes of getting to the park.[41] Events, such as concerts and farmers' markets, can also attract park visitors.

Implementation Considerations

Parks can play an important role in a community's identity. As with other planning efforts, engagement of multiple stakeholders is vitally important when addressing issues related to parks and other types of greenspace. A jurisdiction's parks and recreation staff should work with property owners, neighborhood groups, elected officials, and others to develop specific guidelines and goals. Collaborative efforts can help ensure that a park successfully accommodates all members of a community.

CASE STUDY

HEALTH IMPACT ASSESSMENT FOR WESTWOOD NEIGHBORHOOD PLAN; DENVER, COLORADO

Childhood obesity is alarmingly high in Denver's Westwood neighborhood. Incidentally, the area has fewer parks and open areas for physical activity than other neighborhoods in the city. The closest recreation center is several miles away and is separated from Westwood by physical and network barriers. To help alleviate the obesity problem, the neighborhood worked with the Denver Department of Public Health and Environment to conduct a Health Impact Assessment. That study recommends an increase in the number of parks and open spaces, as well as improved connectivity between these areas. To accomplish these goals, the Assessment discusses several options, including acquiring properties, adapting public or private easements, and using established rights-of-way in a flexible way.[42]

7.5 BICYCLE INFRASTRUCTURE

Snapshot

Cycling is a mode of transportation that offers a multitude of benefits. Strategies for increasing cycling among residents include creating protected bike lanes, providing secure storage areas, and implementing bike-sharing programs.

Detailed Description

Like many forms of physical activity, cycling comes with health benefits. One study found that people who bike to work have a lower risk of heart disease, cancer, and premature death compared to those who drive or take public transit.[43] Cycling, however, can be difficult in areas that lack proper infrastructure. From marked lanes to secure lock-up areas, bicycle infrastructure is a key component in encouraging people to choose cycling. Research indicates that areas with better bicycle infrastructure are linked with higher cycling activity and lower obesity rates.[44]

Bicycle infrastructure should be integrated with other modes of transportation to create a community that is conducive for full mobility and accessibility. Bicycle networks should easily connect to transit stops, and bike parking should be situated near these stops.

Moreover, street-level bike lanes and off-street bike paths should be seamlessly integrated. Where there are breaks in the bicycle network, signage should be provided to direct cyclists to routes and connections. Providing adequate off-street space to accommodate bicycle parking is also essential.[45]

Health + Design Considerations

Bicycle infrastructure is now present in many U.S. communities, but there is much room for improvement. Below are several ways to increase ridership and safety. These recommendations are primarily sourced from New York City's Active Design Guidelines.[46] For specific information pertaining to design and cost, a great first resource is the Pedestrian and Bicycle Information Center.[47]

Protected bike lanes: When possible, bikeways should be separated from vehicular traffic lanes. Protected bike lanes increase bicycle ridership by improving safety and comfort. Special treatment of bikeways at intersections may increase cyclist visibility and mitigate vehicle conflicts.

Shared-use paths: Shared-use paths are designed for use by cyclists, pedestrians, inline skaters, and others who are not operating motorized vehicles. These paths can become recreational destinations that ultimately promote physical activity.

Bicycle greenways: These are scenic bikeways with dedicated bike lanes and limited intersection crossings. Greenway trails can enhance commuter corridors.

Wayfinding: Signposts that include directions, distances, and times to various destinations can help bicyclists navigate the built environment. Wayfinding can also include on-street markings that distinguish cyclists' right of way. These markings can be made with paint, markers, or buffers.

Bike sharing: Bike-sharing programs are becoming increasingly popular in the United States. To encourage

Bike lanes, bike locks, and a bikeshare program are incorporated into this scheme by a CU Denver student.

ridership, a system should encompass at least four square miles. Bikes should be durable, attractive, and utilitarian. Stations should feature user-friendly signage to ease the electronic check-out system.[48]

Implementation Considerations

There are numerous factors that lead to the success or failure of bike-related planning initiatives. Certainly, effective community engagement can make or break a project. In its *Strategies for Engaging the Community* publication, the Better Bike Share Partnership offers guidance on how to involve residents in the planning and implementation process for bike-share programs. Topics include financial issues, education and outreach, marketing, and partnerships.[49] There are many organizations across the globe that conduct research related to urban cycling. These include People for Bikes[50], the Urban Cycling Institute[51], and the League of American Bicyclists.[52]

CASE STUDY
SMARTBIKE SYSTEM; WASHINGTON, D.C.

When the SmartBike system was launched in August 2008, it was the first fully automated bike-share program in the United States. The project was financed through a public-private partnership between the District of Columbia's Department of Transportation and the advertising company Clear Channel Outdoor. The District received user fees to operate the system while Clear Channel was granted advertising rights. SmartBike began as a pilot program with ten stations and 120 bikes. It was later replaced by a regional program called Capital Bikeshare, which features a network of 4,300 bicycles and 500 stations that are available at all hours of the day.[53]

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Appendix A
Health Assessment Lens

An integrated tool for evaluating all aspects of health in the built environment

APPENDIX A

Health Assessment Lens

Overview

The *Health Assessment Lens* is designed to inform designers, planners, and decision-makers of health conditions prior to beginning a project, plan process, or program. The purpose is to identify issues related to health and the built environment in order to inform a health-based approach to design, planning, and decision-making. It continues to be a resource for comprehensive evaluation through the development of a plan or project, and into implementation. This tool is organized around eight health categories.

Equity and Justice

Economic Resiliency

Human Well-Being

Healthy Homes and Buildings

Harmony with Nature

Healthy Community

Education and Wellness

Healthy Connections

Each section begins with a brief introduction of the health conditions and then contains a series of more detailed questions. The *Lens* is designed to provide the user with a way to easily identify gaps and positive aspects of health. It has application for scoping out a plan, project, or program. It can also be used to assess existing plans or programs and inform work to better integrate health into decisions and actions.

The *Lens* is designed as a comprehensive checklist for addressing various health aspects within communities and their built environments. In addition, space is provided for users who may want to track and list their sources of information for each question. The simple design of the *Lens* enables it to be used by category or in its entirety. Also, the questions may be considered points-of-departure for addressing a health issue. It is appropriate to tailor the *Lens* to add more detail or specificity around particular topics or issues addressed.

Optional scoring system: For those who may want to use the *Lens* for communicating cumulative health implications, a simple scoring system can be applied. A space is provided for applying a score of “0” or “1” for each question. Each category area then includes a reference for total possible score for that section. There are 62 primary questions in the Tool.

Weighting responses: As designed, the *Lens* does not weigh the importance of one category or issue over another; however, users may want to adapt the scoring system to place emphasis on certain points or factors.

CATEGORY I. EQUITY AND JUSTICE (Total Possible Score: 6)

Achieving social equity and environmental justice are critical to creating healthy places for all people. Social equity refers to fairness and justice for all people, including disadvantaged populations. It entails the assurance of a safe and healthy environment, along with access to goods and services. Environmental justice refers to responding to damage that has been done in disadvantaged communities, and ensuring that new developments result in tangible benefits for these communities.

It is important to understand an area's past and current conditions to accurately address equity and justice. Architects, designers, and planners should know about environmental, social, and economic damage in areas in which they are working. Any new project, plan, or program should provide opportunities to repair damage and introduce new benefits into these communities.

a. Is there minimal or no damage (social, environmental, or other) in the area as a result of past activities or projects (such as nuisances, incompatible land uses, or sources of pollution)? _____

Source: _____

b. Are members of the community who are most vulnerable to negative health impacts engaged in project planning and decision-making? _____

Source: _____

c. Are there opportunities to repair past damage? _____

Source: _____

d. Are there opportunities to introduce new benefits to the area? _____

Source: _____

e. Are there initiatives that aim to mitigate any negative impacts of past and future decisions? _____

Source: _____

f. Are there local social justice advocate groups in the area? _____

Source: _____

CATEGORY II. HUMAN WELL-BEING (Total Possible Score: 6)

Environmental psychology tells us that healthy living is not simply a result of the presence of resources and absence of threats. Human well-being must be approached holistically.

Architects, designers, and planners should be informed about existing health conditions in the area in which they are working, as well as existing health policies or provisions that could be applied to their work. Physical, mental, and social wellness should be factored into any project from the outset.

a. Is there a health policy framework in place to guide design, planning, and decision-making? _____

Source: _____

If yes, is it comprehensive in addressing all topic and issue areas related to health and built environment? _____

Source: _____

b. Is there information on the existing health conditions of populations in the area, both physical and mental, including stress? _____

Source: _____

c. Is there access to services for the community, including facilities and programs for health and wellness? _____

Source: _____

d. Is there consistent access to local healthy and affordable food? _____

Source: _____

e. Are there opportunities, or are they missing, for physical activity, such as walking and biking, or access to recreation? _____

Source: _____

Are these opportunities being utilized by residents? _____

Source: _____

f. Is there information on safety, crime, and/or violence in the area (including injuries and accidents? _____

Source: _____

CATEGORY III. HARMONY WITH NATURE (Total Possible Score: 16)

Architects, designers, and planners should know about the condition of the natural environment in which they are working, including contaminated soils, water pollution, and air toxins. Projects, plans, and programs should contribute to restoring damaged ecosystems to a more functional state.

a. Is there information on the existing environmental conditions of the overall ecosystem of the area, including land, water, air, climate, flora, and fauna? _____

Source: _____

b. Is an ecosystem approach in place for designing, planning, and decision-making? _____

Source: _____

c. Is there, or has there been, an effort to connect the built environment with the surrounding natural environment, including addressing vulnerable ecosystems? _____

Source: _____

d. Is there information on soil quality and the conditions of land in the area? _____

Source: _____

e. Are superfund sites absent from the area? _____

Source: _____

If no, are there plans to remediate sites and/or mitigate soil toxins? _____

Source: _____

f. Are there resource lands or critical areas, including environmentally sensitive zones, in the area? _____

Source: _____

If yes, are there existing standards or regulations in place for resource lands or critical areas? _____

Source: _____

g. Are there unique landscapes in the area? _____

Source: _____

h. Are watersheds in a healthy, functional state for aquatic life and human health? _____

Source: _____

i. Are there adequate facilities for clean water delivery? _____

Source: _____

j. Are there adequate facilities for water treatment and discharge? _____

Source: _____

k. Is there information on air quality in the area? _____

Source: _____

If substandard, are there efforts in place to bring air quality to levels that meet or are better than local, state, and federal standards? _____

Source: _____

l. Is there information on climate conditions in the area, including heat island conditions, tree canopy, and more? _____

Source: _____

m. Are there efforts in place to mitigate and reduce human impacts on the climate? _____

Source: _____

n. Are there efforts in place to adapt to changing climate conditions? _____

Source: _____

o. Is noise at or better than standards for human health? _____

Source: _____

p. Are invasive species absent from the area? _____

Source: _____

If no, are there efforts to protect and restore vegetation and habitat areas for native species? _____

Source: _____

CATEGORY IV. EDUCATION AND WELLNESS (Total Possible Score: 4)

Education impacts the health and wellness of all people. This includes physical accessibility to educational facilities, as well as opportunities for residents to have the means and opportunities for education.

Architects, designers, and planners should be familiar with schooling and education opportunities in the area in which they are working. They should be mindful of cultural conditions, as cultural knowledge can trump formal education in certain places and situations.

a. Is there information on the educational conditions and accessibility in the area? _____

Source: _____

b. Are there a variety of educational opportunities available, including K-12 schools, higher education, and training programs? _____

Source: _____

c. Are there educational opportunities to learn about health? _____

Source: _____

d. Are there mechanisms for news and information-sharing in the area? _____

Source: _____

CATEGORY V. ECONOMIC RESILIENCY (Total Possible Score: 5)

Economics play a role in human health. The built environment can support the creation of businesses and encourage economic opportunities, which can provide health benefits.

Architects, designers, and planners should know the economic and employment conditions in the area in which they are working. Projects, plans, and programs can bridge economic disparities and enhance opportunities for residents.

a. Is there information on the economic and employment conditions in the area, including information on existing businesses and job opportunities? _____

Source: _____

b. Is there a full range of businesses and job opportunities in the area? _____

Source: _____

c. Are there locally owned businesses in the area? _____

Source: _____

d. Is there an absence of vacant or underutilized lots? _____

Source: _____

e. Is there information on current property values and home values in the area? _____

Source: _____

CATEGORY VI. HEALTHY HOMES AND BUILDINGS (Total Possible Score: 7)

Sound housing is essential to a person's ability to deal with every aspect of his or her life. Architects, designers and planners should assess existing conditions for siting and orienting structures to maximize health benefits. Building materials should be appropriate for the climate and context and meet health standards to prevent exposure to toxins. Home design should factor in universal design principles to ensure maximum accessibility and freedom from hazards.

a. Is there information on the current condition of the housing stock in the area, including information on whether homes are in a state of good repair? _____

Source: _____

b. Are individuals and families able to retain their existing homes and not experience displacement? _____

Source: _____

If no, are there programs and opportunities to help keep residents in place? _____

c. Is housing available for all sectors of the population (i.e., people of all ages, income levels, mobility levels, etc.)? _____

Source: _____

d. Are there mechanisms in place for affordable housing? _____

Source: _____

e. Do building materials address and promote health and sustainability? _____

Source: _____

f. Are there efforts for siting and orienting buildings to benefit the health of occupants? (For example: maximum access to light and fresh air, minimum exposure to noise and pollution, safe from health hazards such as high-intensity power lines) _____

Source: _____

g. Are health and safety addressed in the design and planning of housing? _____

Source: _____

CATEGORY VII. HEALTHY COMMUNITY (Total Possible Score: 8)

A person's health can be influenced by the community in which he or she lives. Complete communities are those that meet the needs of all types of residents, regardless of factors such as age, income level, and cultural beliefs. A health community also offers protection from environmental hazards.

Architects, designers, and planners should develop projects, plans, and programs that contribute to the creation of complete communities. In addition, projects, plans, and programs should intentionally minimize exposure to hazards and potential disasters, such as steep slopes, flooding, and more.

a. Is there information on the existing community character of the area? _____

Source: _____

b. Is there information on cultural aspects and conditions in the area? _____

Source: _____

c. Is there a mix of uses in the area? _____

Source: _____

d. Are there civic spaces and public places in the area? _____

Source: _____

e. Are there "champions for health" in the area? _____

Source: _____

f. Is the area free from exposure to natural or environmental hazards, such as flooding, unstable soils, or landslides? _____

Source: _____

If no, is there a resiliency and mitigation plan? _____

Source: _____

g. Are there strategies in place for natural or human-caused disasters? _____

Source: _____

h. Are there adequate resources to respond to disasters? _____

Source: _____

CATEGORY VIII. HEALTHY CONNECTIONS (Total Possible Score: 10)

Mobility and accessibility can impact the physical and mental well-being of people in the area. Architects, designers, and planners should advance state-of-the-art solutions for healthy infrastructure and services. Attention should be given to maximize easy connections to sidewalks and bicycling facilities, as well as to transit stops and stations.

a. Is there information on the existing conditions of infrastructure in the area (i.e., utilities, stormwater systems, streets, alleys, sidewalks, and bikeways)? _____

Source: _____

b. Do utilities and infrastructure follow green principles? _____

Source: _____

c. Are low-impact development practices employed? _____

Source: _____

d. Is there information on the transportation use patterns of populations in the area? _____

Source: _____

e. Is the mobility and accessibility system complete? (For instance, there are no "incomplete streets," transit service deficiencies, or gaps in "first and last mile" connections to transit) _____

Source: _____

f. Are there opportunities to complete sidewalk and bikeway connections? _____

Source: _____

g. Are there opportunities to introduce complete streets and living streets? _____

Source: _____

h. Is there a parking management plan in the area? _____

Source: _____

i. Are there adequate connections to adjacent communities? _____

Source: _____

j. Is there information on the current conditions of social networks (e.g., family networks) for the populations in the area? _____

Source: _____

Using the scoring system

For users who opt to apply a scoring system, there are 62 primary questions in the Tool.

NOTES:

The *Health Assessment Lens* has been developed through the *Creating Healthy Places through Transformational Education and Design* project at the University of Colorado Denver College of Architecture and Planning. This project was made possible through a grant from the Colorado Health Foundation. Additional support for testing and refining the Lens was provided by the American Planning Association through a project titled *PLAN4Health Colorado*.

Appendix B
Model Health Element

An outline of an example health element for a local jurisdiction's comprehensive plan, or other planning processes

APPENDIX B

Model Health Element

SECTION I: INTRODUCTION

A. Purpose Statement

The statement should provide a foundation for how the community addresses the relationship of health and the built environment. How does the community view its future health and wellness? What actions are needed to implement the community's vision for its future?

B. Assessment and Conclusions

What current conditions exist regarding health and the built environment? Summarize any evaluation or assessment that addresses health as it relates to various aspects of community. In addition to traditional health indicators, also address the health aspects of the community's ecosystem, equity and access, building construction and siting, economic opportunity and education, housing, and safety.

TERMS

Goal: A broad statement of a community's vision for a desired future condition.

Objective: A specific outcome to guide actions to achieve a goal.

Policy: A formal statement adopted by a community's officials to direct or guide decisions, actions, and approvals.

SECTION II: GOALS, OBJECTIVES, POLICIES

Topic: Health and the Natural Environment

1.1: Clean Land and Soils
- Goal
  - Objective
    - Policies

1.2: Clean Water
- Goal
  - Objective
    - Policies

1.3: Clean Air and Climate
- Goal
  - Objective
    - Policies

EXAMPLE

Topic: Health and the Natural Environment

Goal: The community will have a clean and healthy natural environment that is supports human well-being and wildlife.

Objective: All land and soils are clean for ecological functions to occur and for safe use by residents of the community.

Policies: Remediate any superfund sites to conditions at or better than establish standards prior to approving development.

Topic: Health and the Built Environment

2.1: Healthy Communities, Development Patterns, Community Design
- Goal
  - Objective
    - Policies

2.2: Housing for All, Healthy Homes and Neighborhoods, Preventing Displacement
- Goal
  - Objective
    - Policies

2.3: Resilient Economy, Reducing Poverty
- Goal
  - Objective
    - Policies

2.4: Healthy Connections, Mobility and Accessibility for All
- Goal
  - Objective
    - Policies

2.5: Services and Infrastructure, Reduce/Recycle/Reuse
- Goal
  - Objective
    - Policies

Topic: Health and Public Safety

3.1: Safe Places, Safe Environments
- Goal
  - Objective
    - Policies

3.2: Prevention
- Goal
  - Objective
    - Policies

3.3: Hazards Reductions, Mitigation
- Goal
  - Objective
    - Policies

3.4: Emergency Response
- Goal
  - Objective
    - Policies

Topic: Systems of Health Care

4.1: Service Delivery
- Goal
  - Objective
    - Policies

4.2: Care Systems
- Goal
  - Objective
    - Policies

4:3: Care for the Whole Person, Body/Mind/Spirit
- Goal
  - Objective
    - Policies

Topic: Health and Human Services, Equity and Justice

5.1: Protection of Vulnerable Populations
- Goal
  - Objective
    - Policies

5.2: Access to Care
- Goal
  - Objective
    - Policies

5.3: Advocacy
- Goal
  - Objective
    - Policies

5.4: Housing the Homeless
- Goal
  - Objective
    - Policies

Topic: Behavioral Health

6.1: Core Services
- Goal
  - Objective
    - Policies

6.2: Early Intervention, Youth Diversion Programs
- Goal
  - Objective
    - Policies

SECTION III. IMPLEMENTATION

A. Action Strategies: Responsible Party, Date and Schedule, Budget

Individual Strategies

B. Monitoring: Implementation and Performance

Targets (relate to Objectives | Indices or Measures | Findings)

Source

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Colorado Healthy Places Collaborative

The Colorado Healthy Places Collaborative is a partnership of 23 statewide and regional associations and groups that have united to work on advancing health and wellness in communities across the state of Colorado. The Collaborative includes professionals with expertise in public health, planning and design, engineering, land use and development, building and construction, advocacy, policy, the environment, sustainability, and more. This group represents a unique partnership of practitioners, academics, and engaged citizens.

CHPC Colorado Healthy Places Collaborative

HEALTH+DESIGN INITIATIVE

AIA Colorado

THE ALLIANCE CENTER

APA CO American Planning Association Colorado Chapter

ASCE American Society of Civil Engineers Colorado Section

ASLA COLORADO

CALPHO Colorado Association of Local Public Health Officials

CENTER FOR HEALTH PROGRESS

Center for Health, Work & Environment colorado school of public health

CDPHE COLORADO Department of Public Health & Environment

The Colorado Health Foundation

COLORADO HEALTH INSTITUTE

CPRA Colorado Parks & Recreation Association

CNU COLORADO

LiveWell COLORADO

MetroDNA METRO DENVER NATURE ALLIANCE

MileHighConnects

REGIS UNIVERSITY

Regional Institute for Health & Environmental Leadership

RMLUI ROCKY MOUNTAIN LAND USE INSTITUTE

THE TRUST FOR PUBLIC LAND

ULI Urban Land Institute Colorado

COLORADO